REPORT

S-K 1300 TRS Technical Report Summary

Southern Copper Corporation: La Caridad

Submitted to:

Southern Copper Corporation

Submitted by:

Golder Associates USA Inc.

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Project No.

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Author	Section(s)	Signature
Ronald Turner (Golder)	1.2-1.3, 1.5, 1.10, 2.4, 5.2, 6, 7.1-7.2, 8, 9.1, 11, 20, 22.1, 23.1	
Danny Tolmer (Golder)	1.4, 1.6-1.8, 1.10, 2.1-2.3, 2.4, 2.5, 5.1, 5.3, 9.2, 12, 13, 15.1-15.5, 18, 19, 21, 22.4, 23.5, 24, 25	
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Eugenio Iasillo (Process Engineering LLC)	2.4, 10, 14, 22.3, 23.4	
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The qualifications and relevant experience of each QP are shown below.

- Ronald Turner:
  - Education:
    - Geologist, Universidad de Concepción, Chile, 1993
    - Postgraduate Studies in Geostatistical Estimation, Universidad de Chile, Santiago, Chile, 2007
  - Years of Experience:
    - Has 29 years of experience in the mining industry with 13 years in geological and mineral resource and reserves reporting, 8 years in project development and mining and 8 years in exploration of base and precious metals.
  - Relevant Experience:
    - Has been a Mineral Resource Group Leader with Golder Associates S.A. working on validation and construction of databases and QA/QC programs, interpretation and construction of 3D geological models, and resource estimation.

    - Has led and participated in Mineral Resources and Reserves audits and Due Diligence in mines and projects for a variety of commodities under different international codes.
      - Was a Mineral Resource Superintendent at Minera Escondida Ltda. responsible for the Resources, Geological and Geometallurgic models for Minera Escondida, including Escondida and Escondida Norte Deposits
  - Professional Registration:
    - Is in good standing as a Member of the Australian Institute of Mining and Metallurgy (MAusIMM, CP, Geo)
- Danny Tolmer:
  - Education:
    - Is a Mining Engineer with a B.A.Sc. in Mining Engineering from the University of British Columbia, Vancouver, 2004.
  - Years of Experience:
    - Has 18 years of experience in the mining industry having worked in large coal and copper open pit mining operations.
    - Is a Principal Mining Engineer at Golder (a member of WSP). Provides consulting services for mining projects from preliminary economic assessments to feasibility and permitting. Has assisted mines around the globe with short-range, long-range, drill and blast, and other operational issues.
  - Relevant Experience:
    - Is a Principal Mining Engineer responsible for the mine planning and economic evaluations group in Vancouver, British Columbia.
    - Has completed numerous reserve estimates and audits, operational assistance, short-term mine plans, long-term mine plans, permit applications, and cashflow models.
    - As a mining engineer with Snowden has worked on economic pit shell analyses, training, and site assistance for numerous open pits as well as commissioned an open pit gold mine in Newfoundland, Canada.
  - Professional Registration:
    - Registered Professional Engineer – British Columbia, EGBC Certificate
    - Registered Professional Engineer – Alberta, APEGA Certificate
    - Registered Professional Engineer – Ontario, PEO Certificate
    - Registered Professional Engineer – Yukon, APEY Certificate
    - Registered Professional Engineer

- Dawn Garcia
  - Education:
    - Is graduate of Bradley University with a bachelor's degree in Geological Sciences in 1982 and a graduate of California State University, Long Beach, with a master's degree in Geology in 1995
  - Years of Experience:
    - Practiced as an environmental geologist and hydrogeologist for over 35 years.
    - Over 20 years of experience in the mining industry.
  - Relevant Experience:
    - Acted as the Qualified Person for the Environmental, Permitting and Social section for 10 NI 43-101 technical reports and more than 20 detailed environmental and permitting reviews.
    - Conducted environmental, socio-economic, or water-related tasks for over 50 mineral development, mineral processing, and mining operations.
  - Professional Registration:
    - Licensed Professional Geologist (Arizona, License No. 26034)
    - Professional Geologist (CPG) with the American Institute of Professional Geologists (Membership Number 08313)
    - Registered member of the Society for Mining, Metallurgy & Exploration (Membership No. 4135993)

- Jorge Castillo:
  - Education:
    - Is a Senior Consultant with a Master of Science (M.Sc.) in Geotechnical Engineering from the Catholic University of Río de Janeiro (Brazil)) and a Bachelor of Science (B.S.) in Civil Engineering from the National University of Engineering Peru.
    - Completed a Graduate Course in Erosion Control from the Japan International Cooperation Agency (JICA) and has a Graduate Certificate in Project Management from the Queensland University of Technology in Brisbane, Australia.
  - Years of Experience:
    - He has 25 years of experience in geotechnical services and project management in the mining industry.
  - Relevant Experience:
    - His experience in tailings and mine waste projects in North America, South America and Central America include, site geotechnical investigation, tailings dams design and construction, waste dumps

design, foundations design, geotechnical analyses and seismic hazards studies and preparation of construction drawings and specifications.

- Professional Registration:
  - Registered Professional Engineer - Colorado, U.S. (Colorado Registration No. 0054466)
  - Registered Civil Engineer in Peru (Peruvian Registration No. CIP 46756)

- Eugenio Iasillo:
  - Education:
    - Has a Bachelor of Science (B.S.) in Chemical Engineering from the University of Michoacán (Mexico). Completed Continuing Education certificate in Computer Science and Extractive Metallurgy from the University of Arizona.
  - Years of Experience:
    - Has 45 years of experience in the mining industry with 21 years in engineering and metallurgical research geared toward project development.
    - Has a strong background in operation and control of large mineral beneficiation plants and has been involved in engineering and start-up of pilot and industrial scale plants.
  - Relevant Experience:
    - As Principal of Process Engineering LLC. provides consulting services for mining project development and mineral processing plants design. Development of metallurgical data, data analysis and development of plant design criteria.
    - Has been Technical Director/ Sr. Process Engineer with Metcon Research / K D Engineering, (Tucson, Arizona) responsible for technical, commercial and operational aspects of a metallurgical research facility with analytical capability.
    - Was a mill manager at Franklin Consolidated Mines, Inc. (Idaho Springs, Colorado); a mill superintendent at Au Magnetics Management Inc. (La Jolla, California); a Concentrator Metallurgist at Sonora Mining Corp. (Sonora, California) and at Phelps Dodge Corp. (Morenci, Arizona); and a Process Engineer at Mexicana de Cobre, S.A. (Sonora, Mexico).
  - Professional Registration:
    - Registered Professional Engineer - Arizona, U.S. (Arizona Certificate/Registration No. 28209)
    - Chemical Engineering, Mexico (Professional Registration, CEDULA No. 486768)

- Michael Pegnam:
  - Education:
    - Graduate of University of Arizona with a bachelor's degree in Geological Engineering

      Graduate of University of California Berkeley with a master's degree in Geotechnical Engineering
  - Years of Experience:
    - He has 28 years of experience in geotechnical engineering in the mining and civil engineering fields
  - Relevant Experience:
    - His relevant experience in slope engineering includes completing slope designs for open pit mines in North America, Mexico, and South America and highway cuts in rock in North America. He also has specialty expertise in rock and soil slope stability evaluation, installation of rock bolts, dowels, and pinned/draped mesh for rockfall mitigation
  - Professional Registration:
    - Registered Professional Engineer - Arizona, U.S. (Registration No. 33800)
    - Registered Professional Engineer – New Mexico, U.S. (Registration No. 16267)
    - Registered Professional Engineer – California, U.S. (Registration No. C56831)
    - Registered member of the American Society of Civil Engineers since 1995 (Membership I.D. #321277)

1.0 EXECUTIVE SUMMARY

1.1 Property Description and Ownership

The La Caridad operation is located in northeastern Sonora, Mexico, about 266 kilometers (km) northeast of the city of Hermosillo and 125 km south of the city of Agua Prieta Sonora, Mexico, which is on the international US - Mexico border. La Caridad mining unit is accessed from kilometer 19 of the Nacozari-Agua Prieta highway. The mining unit is within the municipality of Nacozari de García, Sonora, next to the municipality of Villa Hidalgo. It is bordered to the north by the municipalities of Bacoachi, Fronteras and Agua Prieta, to the east by Bavispe, Bacerac and Huachinera; to the south by Bacadéhuachi, Huásabas and Cumpas; and to the west by Arizpe. The closest town is Nacozari, which is about 23 km northwest of the mining unit.

All the estimated Mineral Resources and Reserves lie within privately owned or possessed land under the name of Buenavista del Cobre SA de CV, or Proyecciones Urbanisticas S de RL de CV. Ownership is not required to explore or mine a concession; however, Southern Copper Corporation generally owns the land related to the LC operations. Additionally, Southern Copper Corporation stated that all the processing facilities of the LC operations and land on which they are built are owned by Southern Copper Corporation. The La Caridad unit includes an open-pit copper mine, one copper concentrator, one Solvent Extraction and Electrowinning (SX-EW) plants, and a smelter.

1.2 Geology and Mineralization

La Caridad is a porphyry copper deposit, that is currently the largest copper producer in Mexico and the youngest dated porphyry system in the American Southwest region. The La Caridad district lies within the eastern section of the Sonora Basin and Range Province of northern Mexico. Sustained magmatic activity along the North American Cordillera during the late Mesozoic through Paleogene resulted in the development of numerous porphyry copper deposits. The basement rocks of area consist of strongly deformed greenschist- grade volcanic and sedimentary rocks that are intruded by granites emplaced at 1.4 and 1.1 billion years ago. Above the sequence Late Proterozoic and Paleozoic rocks are overlain by volcanic and plutonic rocks of Mesozoic and Cenozoic age. Middle Jurassic rocks characterized by volcanic and volcano-sedimentary sequences, with occasional granite intrusions, outcrop in the northern and northeastern portion of Sonora. In the La Caridad district, these rocks outcrop in the Sierra Cobriza area, west of the town of Nacozari.

The main mineralization at La Caridad occurs in the Quartz-monzonite porphyry and hydrothermal breccias. The host rocks at La Caridad are andesites, with the oldest rocks corresponding to the Laramide volcanic rocks, which are regionally correlated with the Tarahumara Formation. Locally, this andesitic volcanic sequence was intruded by a granodiorite which is well exposed to the east-southeabvc

st of the La Caridad mine, which are in turn intruded by diorite dikes that range from fine to coarse grain. Discordantly overlying this igneous complex is a sequence of rhyolitic flows.

1.3 Status of Exploration

The La Caridad mining district has been subject to several historical and recent exploration campaigns targeting copper mineralization at the Project site. These exploration campaigns primarily included exploration drilling, and geotechnical drilling. Exploration drilling has been undertaken almost yearly at La Caridad since 1968. To date, a total of 3,529 exploration drill holes, totaling 694,455 m, have been drilled on the La Caridad property.

The main objective of the exploration programs implemented at La Caridad have been to explore for new ore bodies as well as the increase of Proven and Probable Mineral Reserves. The achievement of these objectives has served as a basis to support planning and growth strategies as well as investment programs for the modernization of the mining unit.

1.4 Development and Operations

Mining operations at La Caridad can be traced to the early 1900s with the concurrent development of similar copper mining operations in the Nacozari region.

La Caridad is an established operation that currently mines at a rate of about 98 million tonnes per year (Mtpy) of total material. The operation currently runs 6 electric shovels, 1 hydraulic shovel, 6 loaders, and 36 trucks of varying size and models. Since this is an established operation, the deposit, mining, metallurgy and processing, and environmental aspects of the project are very well understood. The geological knowledge for La Caridad is based on the collective experience of personnel from La Caridad's site operations geology, mining, metallurgy, and other technical disciplines gained during the history of the operations. This knowledge is supported by years of production data at La Caridad.

The ore at La Caridad is recovered using open-pit conventional truck and shovel mining methods due to the proximity of the ore to the surface and the physical characteristics of the deposit. The current operation is expanding into an area called Bella Union which is south of the existing pit. The ore from the main pit and the expansion area is hauled to the primary crusher located near the maintenance facility or to the Guadalupe leach pads. Waste is hauled to valley overburden storage facilities (OSFs) located to the west of the pit.

The mine plan targets a mill feed rate of about 34.6 Million tonnes per annum (Mtpa) with the LOM schedule averaging an annual production of 43.7 Mt total material. This production rate for the mill feed results in approximately 94,000 t per day through the concentrator. The mine plan targets have been significantly reduced compared to current levels due to a significant reduction in the tailings storage facility's estimated capacity.

1.5 Mineral Resource Estimate

This sub-section contains forward-looking information related to Mineral Resource estimates for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including geological and grade interpretations and controls and assumptions and forecasts associated with establishing the prospects for economic extraction.

The Mineral Resource were estimated based on the long-standing exploration drilling and sampling completed at La Caridad since 1968. The drilling database used for the modeling was reviewed with the QP's internal software (DataCheck®), which allows the detection of inconsistencies such as: overlapping intervals, excessive path deviation between measurement intervals, duplication of collars, sample depth greater than the depth of the collar, among others. The La Caridad Mineral Resource estimate contains both the main La Caridad zone and the Bella-Union zone. This is the first public disclosure that includes the Bella-Union zone.

This Mineral Resource estimate was determined using a block model methodology based on original kriging and Inverse Distance cubed interpolation methods. Drill hole sample data was capped to control outlier values and composited for equal sample weighting. EDA and geostatistical analysis were completed on the raw and composite data sets to help define interpolation parameters and Mineral Resource classifications. The Mineral

Resources were restricted based on an optimized pit limit that took into account cut-off grade (COG), price, mining costs, infrastructure limitations, and mineral licenses.

Mineral Resource estimates exclusive of Mineral Reserves are summarized in Table 1.1 and Table 1.2 on a 100% ownership basis. Mineral Resources presented in the table are in accordance with the definitions presented in S-K 1300. The effective date of the Mineral Resource estimate is December 31, 2021.

Table 1.1: Mineral Resource Estimates Exclusive of Mineral Reserves for the Leach Process – 100% Ownership Basis

Process	Classification	Tonnes (Mt)[4]	Grade		Contained Metal
			Total Cu (%)[2]	Mo (%)[2]	Cu (Mt)[5]
Leach[1][3]	Measured	-	-	-	-
	Indicated	817	0.06	-	0.5
	Total Measured + Indicated	**817**	**0.06**	**-**	**0.5**
	Inferred	927	0.06	-	0.6

Notes:
1. Mineral Resources are reported on a 100% basis and are exclusive of Mineral Reserves.
2. Mineral Resources are reported on a break-even plant and leach profit basis.
3. The estimate was constrained to within the Resource pit based on a Cu price of $US3.795/lb, Mo price of US$11.50/lb.
4. Tonnes are reported on a dry basis.
5. Contained Metal (CM) is calculated as follows:
   CM = Tonnage (Mt) * Grade (%).
6. Tonnage and contained metal have been rounded to reflect the accuracy of the estimate and numbers may not add exactly
7. The estimate was completed using a SG of 2.6.
8. The estimate was constrained to within the Resource pit.
9. The Mineral Resource estimates were prepared by Ronald Turner, CP. (who is the independent Qualified Person for these Mineral Resource estimates), reported using the S-K 1300 Definition Standards adopted December 26, 2018.

Table 1.2: Mineral Resource Estimates Exclusive of Mineral Reserves for the Mill Process – 100% Ownership Basis

Process	Classification	Tonnes (Mt)[4]	Grade		Contained Metal
			Total Cu (%)[2]	Mo (%)[2]	Cu (Mt)[5]
Mill[1][3]	Measured	-	-	-	-
	Indicated	6,455	0.17	0.026	10.8
	Total Measured + Indicated	**6,455**	**0.17**	**0.026**	**10.8**
	Inferred	4,039	0.13	0.025	5.1

Notes:
1. Mineral Resources are reported on a 100% basis and are exclusive of Mineral Reserves.
2. Mineral Resources are reported on a break-even plant and leach profit basis.
3. The estimate was constrained to within the Resource pit based on a Cu price of $US3.795lb, Mo price of US$11.50/lb.
4. Tonnes are reported on a dry basis.
5. Contained Metal (CM) is calculated as follows:
   CM = Tonnage (Mt) * Grade (%).
6. Tonnage and contained metal have been rounded to reflect the accuracy of the estimate and numbers may not add exactly.
7. The estimate was completed using a SG of 2.6.
8. The estimate was constrained to within the Resource pit.
9. The Mineral Resource estimates were prepared by Ronald Turner, CP. (who is the independent Qualified Person for these Mineral Resource estimates), reported using the S-K 1300 Definition Standards adopted December 26, 2018.

SCC has a 98.14% ownership in LC through their main subsidiaries with the remainder being held through intermediate holding companies.

1.6 Mineral Reserve Estimate

This sub-section contains forward-looking information related to Mineral Reserve estimates for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including Mineral Resource model tonnes and grade, modifying factors including mining and recovery factors, production rate and schedule, mining equipment productivity, commodity market and prices and projected operating and capital costs.

Based on the TSF capacity and modifying factors discussed in Section 12.2 the recovery factors discussed in Section 12.2.4 and the Economic Assessment discussed in 12.2.5, the LC mine contains the economically mineable Mineral Reserves listed in Table 1.3 on a 100% ownership basis. The effective date of the Mineral Resource estimate is December 31, 2021.

The Mineral Reserves include approximately 372 Mt of mill feed with a Cu grade of 0.24% total Cu for 1,955 Million pounds (Mlbs) of contained Cu with the point of reference being the mill. An additional 43 Mt of Mineral Reserves is estimated as Leachable ROM Ore with a Cu grade of 0.09% total Cu for 81 Mlbs of contained Cu with the point of reference being delivery to the leach pads. Total material in the restricted pit is 452 Mt, resulting in a waste to ore (mill ore + leach material) ratio of 0.09.

For this Mineral Reserve estimate, Indicated Mineral Resources inside the ultimate pit were converted to Probable Mineral Reserve. The Mineral Reserves are estimated at a copper price of US$3.30/lb.

Table 1.3: Estimated Mineral Reserves – 100% Ownership Basis

Classification	Destination	Tonnes (Mt)	Grade		Contained Metal	
			Total Cu (%)	Mo (%)	Cu (Mlbs)	Mo (Mlbs)
Probable	Leach	43	0.09	-	81	-
	Mill	372	0.24	0.02	1,955	185
	Waste	38				
	Total Material	452				
	Strip Ratio (Waste/Ore)	0.09				

Notes:

1. Mineral Reserves are reported effective December 31, 2021. The Qualified Person for the estimate is Mr. Danny Tolmer, P.Eng.
2. Mineral Reserves are mined tonnes and grade; the reference point is the leach pad or concentrator and includes considerations for operational modifying factors such as loss (2%) and dilution (1%).
3. Mineral reserves are reported for ore with an economic value greater than or equal to 0 US$/t. Full discussion of cut off is discussed in Section 12.2.4.
4. Numbers have been rounded to reflect appropriate accuracy.
5. Grades are not reported if the economic value is less than 0 US$/t.
6. The Mineral Resource model only contained Indicated Mineral Resources and, therefore, there are no Proven Mineral Reserves reported in the estimate.
7. The October 9, 2021 topographic surface was used for the calculation of the Mineral Reserves and the actual production data provided by LC for October to December 31, 2021 was used to adjust this estimate.

It should be noted that SCC has a 98.14% ownership in LC through their main subsidiaries with the remainder being held through intermediate holding companies.

1.7 Capital and Operating Costs

This section contains forward-looking information related to capital and operating cost estimates for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this section including prevailing economic conditions continue such that projected capital costs, labor and equipment productivity levels and that contingency is sufficient to account for changes in material factors or assumptions.

The annual production estimates were used to determine annual estimates of capital and operating costs. All cost estimates were in Q4 2021 US$. Total capital costs are estimated to be about US$737 million including new mine equipment, major maintenance and components and special projects. Annual operating costs were based on historical operating costs, material movements and estimated unit costs. They included costs for mining, crushing and conveying, milling, leaching, SX-EW, molybdenum plant, freight and marketing costs and estimates of accretion. Annual total operating costs varied from US5.55 per tonne to US$9.45 per tonne of total material moved, with an average total cost of US$7.94 per tonne of total material moved.

1.8 Economic Analysis

This section contains forward-looking information related to economic analysis for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including estimated capital and operating costs, project schedule and approvals timing, availability of funding, projected commodities markets and prices.

All costs were assumed to be at Q4 2021 US$.

For the economic analysis, a Discounted Cashflow (DCF) model was developed. SCC requested that the following commodity prices be considered for the economic analysis: Copper at US$3.30/lb, Molybdenum at US$10.00/lb and Zinc at US$1.15/lb. The QP is of the opinion that these prices reasonable reflect current market prices and are reasonable to use as forecast future prices for the purpose of the economic analysis for this Study.

The discounted cashflow establishes that the Mineral Reserves estimate provided in this report are economically viable. The base case NPV_{10} is estimated to be US$927 M. The Net Present Value for this study is most sensitive to copper price.

The QP considers the accuracy and contingency of cost estimates to be well within a Prefeasibility Study (PFS) standard and sufficient for the economic analysis supporting the Mineral Reserve estimate for LC.

1.9 Permitting Requirements

This sub-section contains forward-looking information related to permitting requirements for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including regulatory framework is unchanged for Study period and no unforeseen environmental, social or community events disrupt timely approvals.

Mexico has established environmental laws and regulations that apply to the development, construction, operation and closure of mining projects. The majority of the current La Caridad mining operations were initiated prior to the issuance of environmental laws in Mexico. In 2018 the mining operation obtained environmental impact authorizations to incorporate projects under a regional permit.

The operations generate mining wastes in the form of tailings, waste rock and spent ore, which have all been characterized as potentially acid generating (PAG). None of the metals results exceeded the Mexican mining wastes permissible limits for classification as hazardous waste.

Due to the age of the historic operations, no environmental studies were completed prior to the start of operations; however subsequent environmental baseline studies have been prepared to characterize the environmental conditions of the area, including climate, fauna, flora, and hydrology and presented to the Mexican environmental agency (Secretaria de Media Ambiente y Recursos Naturales or SEMARNAT) as part of the environmental permitting process for more recent changes in operations. The area is not considered to have a high grade of biodiversity.

Historical surface water sampling has indicated concentrations of metals that exceeded permissible limits for surface water in samples collected from Arroyo La Francisca, Arroyo Bavispe and Arroyo Guadalupe, and surface water at the Santo Domingo waste rock facility. No exceedances of surface water permissible limits were detected recently at the two monitoring locations (upstream of the Francisca Heap Leach Facility and downstream of tailings storage facility (TSF) No. 7 that were sampled and reported to the environmental agency.

La Caridad operations are located within three municipalities: Nacozari de Garcia, Cumpas and Villa Hidalgo. The community perceives that there are environmental, social, economic, health and safety issues in the community. The most recent risk assessment identified the highest risks as demonstrations against the company or mining industry; actions against the company or mining industry related to environmental issues; complaints regarding impacts due to infrastructure projects; and social dependence on the company. Grupo Mexico has established a “Casa Grande” in Nacozari for administration of social programs that supported financially by Grupo Mexico. Taxes paid by Grupo Mexico support the “Fondo Minero,”, which also provides funds to the local communities for improvement projects.

Although Mexico has no specific closure regulation, closure activities are considered as part of the regional permit. Per the requirement of the regional permit, La Caridad submitted a closure plan to the Mexican environmental agency, which subsequently authorized the closure plan. The closure cost was estimated at about US$103 million which does not include post-closure care and maintenance. This closure cost is based on the asset retirement obligation and does not consider the LOM closure cost obligations associated with the current mine plan.

1.10 Qualified Person’s Conclusions and Recommendations

As the La Caridad Mine is an active mine with more than 50 years of operational experience and data, it is the QP’s opinion that the relevant technical and economic factors necessary to support economic extraction of the Mineral Resource have been appropriately accounted for at the Mine. The QP recommends, however, that a detailed validation of the database should be carried out, especially on data from historical campaigns that are still in unmined areas of the mine, so that confidence in the data can be clearly established.

The 2021 Mineral Resource Estimate may be materially impacted by any future changes in the breakeven COG, potentially resulting from changes in mining costs, processing recoveries, or metal prices or from changes in geological knowledge as a result of new exploration data.

In the QP's opinion, the operational and mine planning data, process recovery testing and modeling, LOM Plan, and estimation are carried out in a manner that both represents the data and operational experience and methodology well and mitigates the likelihood of material impacts to the estimates of Mineral Reserves.

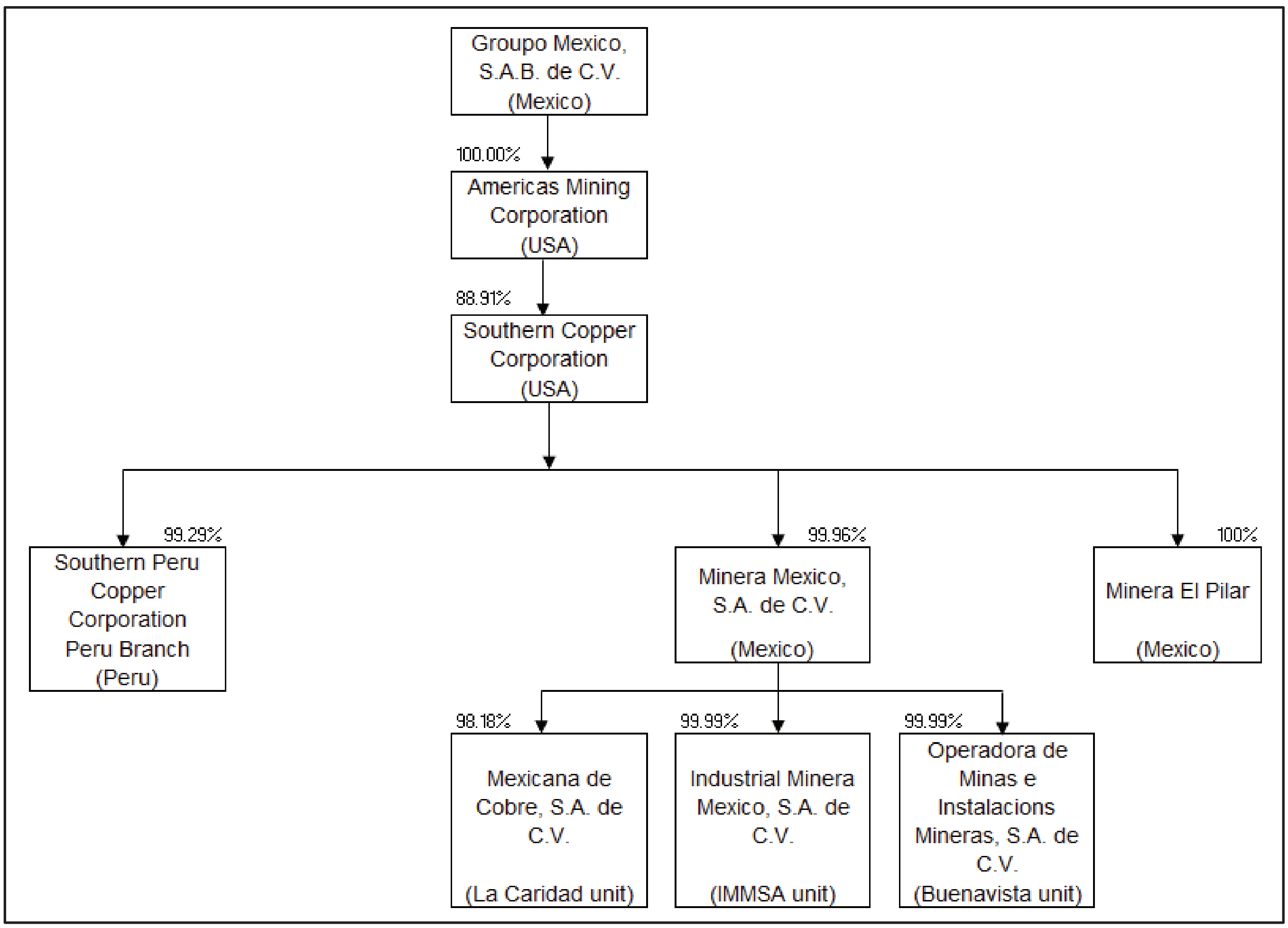
2.0 INTRODUCTION

Southern Copper Corporation (SCC) is an indirect subsidiary of Grupo Mexico S.A.B. de C.V. (Grupo Mexico) which, as of December 31, 2021, owns 88.9% of SCC through its wholly-owned subsidiary Americas Mining Corporation (AMC). SCC's operations in Mexico are conducted through its subsidiary, Minera Mexico, S.A. de C.V. (Minera Mexico), which SCC acquired in 2005 from Americas Mining Corporation. SCC owns 99.6% of Minera Mexico.

Minera Mexico is a holding company and operates through three main subsidiary units namely, Operadora de Minas e Instalaciones Mineras, S.A. de C.V. (the Buenavista unit), Mexicana de Cobre, S.A de C.V. (the La Caridad unit) and Industrial Minera Mexico, S.A. de C.V. (the IMMSA unit). The corporate organization structure is shown in Figure 2.1. The chart describes the organizational structure and identifies SCC's main subsidiaries and does not include their intermediate holding companies.

The La Caridad unit includes an open-pit copper mine, one copper concentrator, one Solvent Extraction and Electrowinning (SX-EW) plants and a smelter.

Figure 2.1: Southern Copper Corporation Organization Structure



Source: SCC

2.1 Registrant Information

This Technical Report Summary (TRS) for the La Caridad (LC) property located in the north-central part of the State of Sonora, Mexico, was prepared by Golder Associates USA Inc. (Golder), a member of WSP, for SCC. As noted on the Date and Signature Page, several Qualified Persons (QPs) were involved in the technical work summarized in this TRS.

2.2 Terms of Reference and Purpose

The effective date of this TRS report was February 24, 2022, while the effective date of the Mineral Resource and Mineral Reserves estimates was December 31, 2021. It is the Qualified Person's opinion that there are no known material changes impacting the Mineral Resource and Mineral Reserve estimates between December 31, 2021 and February 24, 2022.

This TRS uses US English spelling and a combination of Metric and Imperial units of measure. Ore grades are presented in weight percent (wt.%), while metals quantities are stated in pounds. All other values are presented in Metric units of measure. Costs are presented in Q4 2021 US Dollars.

Except where noted, coordinates in this TRS are presented in metric units using the World Geodetic System (WGS) 1984 Universal Transverse Mercator (UTM) ZONE 12 North (12N).

The purpose of this TRS is to report Mineral Resources and Mineral Reserves for SCC's La Caridad operation.

Key Acronyms and definitions for this Report include those items listed in Table 2.1.

2.3 Sources of Information

All information and data used in the development of this TRS was provided by LC and SCC as well as sourced from publicly available information.

Most of the technical documents related to the tailings storage facilities were received when Golder personnel visited Grupo Mexico's office in Mexico City on October 14, 2021, and October 15, 2021.

A detailed list of cited reports is noted in Section 24.0 of this TRS.

Table 2.1: Key Acronyms and Definitions

Abbreviation/Acronym	Definition
%	percent
°	degrees
12N	Zone 12 North
3D	three-dimensional
A	ampere
A/m2	amperes per square meter
AA	Atomic Absorption
Actlabs	Activation Laboratory
Ag	silver
AMC	Americas Mining Corporation
amsl	above mean sea level
As	arsenic
Au	gold
Bi	Bismuth
Bm^3	Billion cubic meters
Bt	Billion tonnes
Buena vista unit	Operadora de Minas e Instalaciones Mineras, S.A. de C.V.
BVC	Buenavista Copper
Ca	calcium
CAN	Comision Nacional del Agua or National Water Commission
Cd	cadmium
CD	Contingency Dam or Presa de Contingencia
CDA	Canadian Dam Association
CFE	Comision Federal de Electricidad (federal electricity commission)
cm	centimeter
CNI	Call & Nicholas, Inc.
Co	cobalt
COG	cut-off grade
CONAGUA	Mexican Water Commission
Cr	chromium
CRM	certified reference material
Cu	copper
Cu-Mo	copper-molybdenum
CuO	copper oxide
CuSol	soluble copper
DBA	dam break analysis
DC	Design Criteria
DD	diamond core
DDH	diamond drill hole
DGM	Direccion General de Mina
DSR	Dam Safety Review
EDA	Exploratory Data Analysis
EOR	engineer of record
ETJ	Estudio Técnico Justificativo, or environmental permit application
EW	Electrowinning
Fe	iron
FEL	front-end loader
FOS	Factor of Safety
FS	Feasibilty Study
ft	feet

Abbreviation/Acronym	Definition
ft^3	cubic feet
g	gram
Ga	billion years ago
gCu/l	grams of copper per liter
GERD	Servicios y Soluciones de Ingenieria y Logistica
GIL	geological information limit
Golder	Golder Associates USA Inc.
GPM	gallons per minute
GPS	global posistioning system
Groupo Mexico	Grupo Mexico S.A.B. de C.V
ha	hectare
HDPE	High-density polyethylene
Hg	mercury
HP	horsepower
ICP-OES	Inductively Coupled Inductively Coupled Plasma-Optical Emission Spectrometry
ID^3	Inverse Distance cubed
IMMSA Unit	Industrial Minera Mexico, S.A. de C.V.
INAH	National Institute of Anthropology and History
INE	National Institute of Ecology
ITRB	Independent Tailings Review Board
K	potassium
kg	kilogram
km	kilometer
km^2	square kilometers
ktpd	thousand tonnes per day
kV	kilovolt
kWh/t	kilowatt hour per metric tonne
L/m	liters per minute
L/m/ha	liters per minute per hectare
$L/m/m^2$	liters per minute per square meter
La Caridad unit	Mexicana de Cobre, S.A de C.V.
LAU	Licencia Ambiental Única , or environmental license
LC	La Caridad
LME	London Metal Exchange
LOM	life-of-mine
L-SX-EW	Leaching, Solvent Extraction, and Electrowinning
m	meter
m^3	cubic meter
m^3/day	cubic meters per day
m^3/h	cubic meters per hour
m^3/s	cubic meters per second
Ma	million years ago
MCE	maximum credible earthquake
MCSA	Mexicana de Cobre S. A
MD	diamond hammer
Mg	magnesium
MGE	Mexico Generadora de Energia S. de R. L. - a subsidiary of Grupo Mexico
mm	millimeter
Mm^3	Million cubic meters
Mn	manganese
Mo	molybdenum

Abbreviation/Acronym	Definition
Mo or moly	molybdenum
MS	Microsoft
MT	hammer
mtpd	metric tonnes per day
MVA	megavolt-ampere
MW	megawatt
Na	sodium
Na-Cn	sodium cyanide
NE	northeast
Ni	nickel
NN	nearest neighbor
NW	northwest
NW	northwest
OK	Ordinary Kriging
OREAS	ORE Research & Exploration Pty Ltd
OSF	overburden storage facilities
Pb	lead
PEMEX	Petroleos Mexicanos
PFM	potential failure mode
PGA	Peak Ground Acceleration
PLS	pregnant leach solution
ppb	parts per billion
PROFEPA	Prosecutor for the Protection of the Environment
Pt	platinum
QA/QC	quality assurance and quality control
QCg	Polymictic Conglomerate
QP	Qualified Person
RC	reverse circulation
ROM	run-of-mine
RQD	rock quality designation
RTFE	responsible tailings facility engineer
Sb	antimony
SCC	Southern Copper Corporation
SD	standard deviations
Se	selenium
SE	southeast
SG	Specific Gravity
S-K 1300	United States Security and Exchange Commission's regulation Subpart S K 1300
S-N	South-North
SS	stainless steel
SX-EW	Solvent Extraction and Electrowinning
t/m^3	tonnes per cubic meter
TARPS	triggering action response plan(s)
Tcu	Total Cu
TF	Tank farm
tpd	tonnes per day
tpy	tonnes per year
TRS	Technical Report Summary
TSF	tailings storage facility
UCS	Uniaxial Compressive Strength
UTM	Universal Transverse Mercator

Abbreviation/Acronym	Definition
WGS	World Geodetic System
Wi	Bond Work Index
yd3	cubic yard
Zn	zinc

2.4 Personal Inspection Summary

A site visit and inspection of the La Caridad mining operation was completed on August 26 and August 27, 2021, by Golder's QPs responsible for the preparation of this TRS. The Golder QPs present at the site visit included Mr. Ronald Turner, Mr. Danny Tolmer, P.Eng., Ms. Dawn Garcia, CPG, Mr. Jorge Castillo, P.E. and Mr. Eugenio Iasillo, P.E.

The Golder team that conducted the site visit was provided with a site safety orientation, introduced to key mine personnel who conducted the guided tours of specific site areas. Golder QPs visited key areas of the open pit, including active mining areas, crusher locations, waste storage facilities, run-of-mine (ROM) and crushed leach pads, process facilities, core shack, dispatch, security gate, administration, historic smelter and other infrastructure. The site visit also included a tour of the No. 7 TSF.

2.4.1 Ronald Turner

The independent QP, as defined in S-K 1300, responsible for the preparation of the Mineral Resources provided in this TRS is Mr. Ronald Turner (MAusIMM), (Senior Resource Geologist). Mr. Turner visited LC on August 27, 2021. During the site visit, Mr. Turner visited and inspected the Pilares site, data capture facilities and the current conditions for sample storage. He inspected representative core of the deposit, sample cutting and logging areas. Mr. Turner also conducted discussions with site personnel regarding the geology and mineralization and reviewed geological interpretations with staff.

2.4.2 Danny Tolmer

The independent QP, as defined in S-K 1300, responsible for the preparation of the Mineral Reserves provided in this TRS is Mr. Danny Tolmer (P.Eng.), (Principal Mining Engineer). Mr. Tolmer visited LC on August 27, 2021. During the site visit, Mr. Tolmer visited and observed the open pit operation, Guadalupe leach pad, and overburden storage facilities. Mr. Tolmer visited various areas of the open pit including Bella Union mining area which was starting to be mined at the time of the visit. Mr. Tolmer also conducted discussions with site personnel responsible for the dispatch, geology, security, and management of the site. Mr. Tolmer also visited the Pilares Project area located approximately 12 Km away from the LC site.

2.4.3 Jorge Castillo

The independent QP, as defined in S-K 1300, responsible for the preparation of the Tailings Section provided in this TRS is Mr. Jorge Castillo P.E., MSc. in geotechnical engineering. Mr. Castillo visited the TSF No. 7 at La Caridad mine on August 27, 2021. During the site visit, Mr. Castillo visited and observed the embankment along the crest and toe, and the north side of the impoundment. Mr. Castillo also conducted discussions with site personnel during the site visit and discussion with the Grupo Mexico tailings manager during the visit of Grupo Mexico's office in Mexico City on October 14, 2021, and October 15, 2021.

2.4.4 Dawn Garcia

The independent QP, as defined in S-K 1300, responsible for the preparation of the summary of the hydrogeologic, environmental, permitting and social aspects provided in this TRS is Ms. Dawn Garcia, CPG, Senior Consultant at Golder. Ms. Garcia visited LC on August 26 and August 27, 2021.

During the site visit, Ms. Garcia met with site personnel and toured the operating mine, including various water management facilities, the TSF No. 7, leaching operations and the leaching operations. Ms. Garcia also held discussions with the environmental staff to understand the management of mining wastes and environmental monitoring program.

2.4.5 Eugenio Iasillo

The independent QP, as defined in S-K 1300, responsible for the preparation of the mineral processing sections provided in this TRS is Mr. Eugenio Iasillo PE, Principal, Process Engineering LLC. Mr. Iasillo visited La Caridad on August 26 and August 27, 2021.

During the site visit, Mr. Iasillo visited and observed the following processing areas: Crushing, Grinding, Flotation, Thickening, and Hydrometallurgy (Leaching and SX-EW).

2.5 Previously Filed Technical Report Summary Reports

This is the first TRS filed for the La Caridad mine site.

3.0 PROPERTY DESCRIPTION

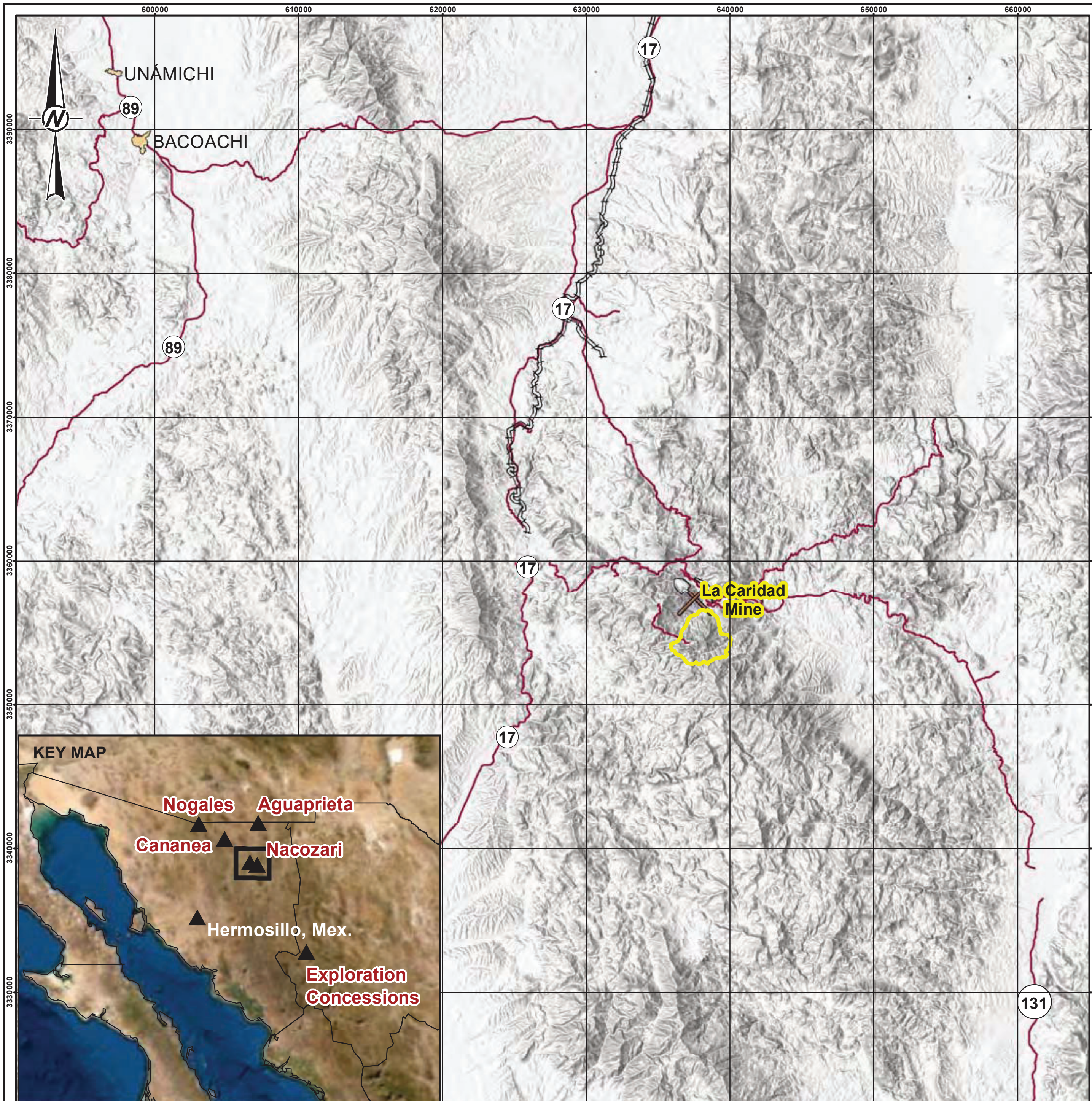
3.1 Property Location

The La Caridad unit is located in northeastern Sonora, Mexico, about 266 km northeast of the city of Hermosillo and 125 km south of the city of Agua Prieta Sonora, Mexico, which is on the international US - Mexico border. La Caridad mining unit is accessed from kilometer (km) 19 of the Nacozari-Agua Prieta highway. The mining unit is within the municipality of Nacozari de García, Sonora, next to the municipality of Villa Hidalgo. It is bordered to the north by the municipalities of Bacoachi, Fronteras and Agua Prieta, to the east by Bavispe, Bacerac and Huachinera; to the south by Bacadéhuachi, Huásabas and Cumpas; and to the west by Arizpe (source: SOJGA and SEGA, 2017). The closest town is Nacozari, which is about 23 km northwest of the mining unit.

The municipality of Nacozari de García is located between 30°17' and 30°20' of north latitude and 109°32’ and 109 35' of west longitude with respect to the Greenwich meridian. The average elevation is 1500 m above mean sea level (amsl). The limits of the mining unit using UTM coordinates are listed in Table 3.1.

Table 3.1: Project Coordinates

Vertex	UTM Zone 12 WGS 84	
	Easting	Northing
1	629,600.00	3,361,303.35
2	655,325.58	3,361,303.35
3	655,325.58	3,350,065.74
4	629,600.00	3,350,065.74



LEGEND

- La Caridad Mine
- Railway
- Towns and Cities
- Site Location
- Highway

0 10 20

1:400,000 Kilometers

NOTE(S)

REFERENCE(S)

1. COORDINATE SYSTEM: WGS 1984 UTM ZONE 12N
2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY AIRBUS,USGS,NGA,NASA,CGIAR,NCEAS,NLS,OS,NMA,GEODATASTYRELSEN,GSA,GSI AND THE GIS USER COMMUNITY

CLIENT

GrupoMéxico

PROJECT

LA CARIDAD MINE

TITLE

PROPERTY LOCATION MAP

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-02-22
DESIGNED	JW
PREPARED	JAM
REVIEWED	SP
APPROVED	MO

PROJECT NO.	CONTROL	REV.	FIGURE
20442424	-	-	3.1

The La Caridad mining unit includes an open-pit copper mine, a copper ore concentrator, a SX-EW plant, a smelter, refinery, lime plant, two sulfuric acid plants and a rod plant, as shown in Figure 3.2. The La Caridad refinery has a precious metals plant that produces refined silver, gold, and other materials. The smelting, refining plants and support facilities service both the La Caridad and Buenavista mining units, which are both located in northern Sonora, Mexico.

Bella Union is a prospect area that is part of the La Caridad mining unit and Pilares is a mineral development area within the La Caridad mining unit.

3.2 Mineral Rights

Mining and exploration rights in Mexico are controlled by the federal government. Prior to 2006, exploration and mining rights were assigned to third parties by the granting of “exploration” and “exploitation” concessions, each with differing validity periods and tax and assessment obligations. Mining law reform in December 2005 simplified the concession regime, and all new concessions are “mining concessions,” which are valid for a 50-year period and are renewable. Upon enactment of the mining law reform, all previously issued “exploration” and “exploitation” concessions automatically converted to “mining concessions” with the effect date of title the same as that of the previously titled “exploration” or “exploitation” concession. The mining concessions are administered by the Direccion General de Mina (DGM), a sub-secretariat of the cabinet-level Secretary of Economy.

The concession holder is required, among other things, to explore or exploit the relevant concession, to pay any relevant fees, to comply with all environmental and safety standards, to provide information to the Ministry of Economy and to allow inspections by the Ministry of Economy.

To maintain concessions in good legal standing, concession holders are obligated to pay semi-annual tax payments and to annually file documentation of exploration or development work at the concession.

The mining claims held by the La Caridad unit cover an area of about 103,821 ha for exploration and exploitation activities. The claim names, identification numbers are listed in Table 3.2 and the claim locations are shown on Figure 3.2.

All of the concessions are in full force and in effect under applicable Mexican laws and the company is in compliance with all material terms and requirements applicable to these concessions. The concessions are valid for a term of 50 years from the date the concessions were granted. The concession can be renewed for an additional 50 years.

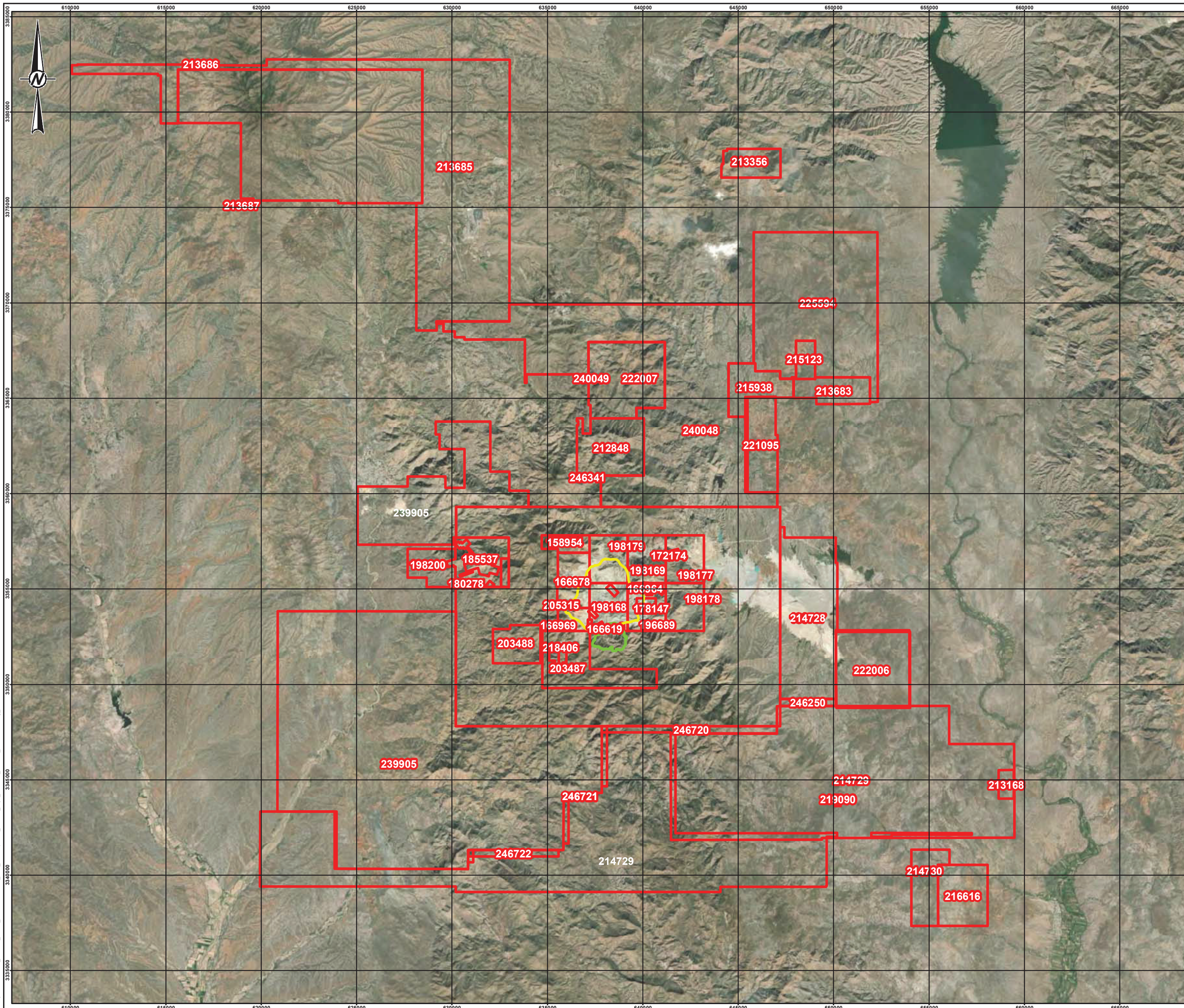
Table 3.2: Mineral Concessions

Concession Number	Concession Name	Municipality	Province	Date Granted	Expiry Date	Area (ha)
158954	El Hueco	Nacozari De Garcia	Sonora	14-08-1973	13-08-2023	208
165538	El Sarape	Nacozari De Garcia	Sonora	30-10-1979	30-10-2029	9
166619	San Carlos	Nacozari De Garcia Y Villa Hidalgo	Sonora	27-06-1980	26-06-2030	12
166678	Santa Monica	Nacozari De Garcia	Sonora	11-07-1980	10-07-2030	445
166963	Molibdeno No. 2	Villa Hidalgo	Sonora	02-08-1980	01-08-2030	2
166964	El Canutillo	Nacozari De Garcia	Sonora	02-08-1980	01-08-2030	9
166965	San Idelfonso	Villa Hidalgo	Sonora	02-08-1980	01-08-2030	10
166966	Guadalupe	Nacozari De Garcia	Sonora	02-08-1980	01-08-2030	10
166967	Virginia	Nacozari De Garcia	Sonora	02-08-1980	01-08-2030	10
166969	Continuacion Sur De Santa Monica	Nacozari De Garcia	Sonora	02-08-1980	01-08-2030	195
169378	La Caridad	Villa Hidalgo	Sonora	12-11-1981	11-11-2031	20
170533	Libertad	Nacozari De Garcia	Sonora	13-05-1982	12-05-2032	10
172174	El Alacran	Villa Hidalgo	Sonora	26-09-1983	25-09-2033	10
178147	Molibdeno	Villa Hidalgo	Sonora	11-07-1986	10-07-2036	80
180278	El Patriarca No. 1	Nacozari De Garcia	Sonora	24-03-1987	23-03-2037	60
180279	El Patriarca No. 2	Nacozari De Garcia	Sonora	24-03-1987	23-03-2037	60
185537	Unificacion El Patriarca	Nacozari De Garcia	Sonora	14-12-1989	13-12-2039	460
186727	Juan	Villa Hidalgo	Sonora	15-05-1990	14-05-2040	9
196689	La Caridad No. 6	Nacozari De Garcia	Sonora	02-08-1993	07-01-2029	391
198168	La Caridad No. 1	Nacozari De Garcia Y Villa Hidalgo	Sonora	05-11-1993	07-01-2029	455
198169	La Caridad No. 3	Nacozari De Garcia Y Villa Hidalgo	Sonora	05-11-1993	07-01-2029	499
198175	Laura	Nacozari De Garcia	Sonora	05-11-1993	18-12-2041	62
198177	La Caridad No. 4	Villa Hidalgo	Sonora	05-11-1993	07-01-2029	470
198178	La Caridad No. 5	Villa Hidalgo	Sonora	05-11-1993	07-01-2029	500
198179	La Caridad No. 2	Nacozari De Garcia	Sonora	05-11-1993	07-01-2029	500
198200	Pilares Oeste	Nacozari De Garcia	Sonora	05-11-1993	18-12-2041	436
201542	Santa Rosa	Nacozari De Garcia Y Villa Hidalgo	Sonora	10-10-1995	01-08-2030	18
203486	Santo Domingo	Nacozari De Garcia	Sonora	08-08-1996	08-08-2046	34
203487	Nuevo Santo Domingo	Nacozari De Garcia	Sonora	08-08-1996	08-08-2046	1,004
203488	Nuevo Saucito	Nacozari De Garcia	Sonora	08-08-1996	08-08-2046	482
205315	Ampliacion La Caridad	Nacozari De Garcia,villa Hidalgo Y Cumpas	Sonora	07-08-1997	07-08-2047	13,353
211525	Bella Esperanza	Nacozari De Garcia Y Cumpas	Sonora	30-05-2000	30-05-2050	16,145
212848	Los Jucaros 2	Nacozari De Garcia	Sonora	30-01-2001	30-01-2051	1,017
213168	La Villa 2	Saric	Sonora	29-03-2001	29-03-2051	120
213356	El Bellotal	Nacozari De Garcia	Sonora	26-04-2001	26-04-2051	455
213683	Diana	Villa Hidalgo	Sonora	07-06-2001	07-06-2051	513
213685	Purica Fracc. 1	Nacozari De Garcia	Sonora	07-06-2001	07-06-2051	7,504
213686	Purica Fracc. 2	Nacozari De Garcia	Sonora	07-06-2001	07-06-2051	30
213687	Purica Fracc. 3	Nacozari De Garcia	Sonora	07-06-2001	07-09-2051	1
214728	Poche	Villa Hidalgo	Sonora	21-11-2001	21-11-2051	2,503
214729	La Villa 3 Fracc. I	Villa Hidalgo	Sonora	21-11-2001	21-11-2051	9,856
214730	La Villa 3 Fracc. Ii	Villa Hidalgo	Sonora	21-11-2001	21-11-2051	63
215123	Diana 2	Nacozari De Garcia	Sonora	07-02-2002	07-02-2052	200
215938	Delia	Villa Hidalgo	Sonora	01-04-2002	01-04-2052	604
216616	La Villa 4	Villa Hidalgo	Sonora	16-05-2002	16-05-2052	832
218406	Petra	Nacozari De Garcia	Sonora	04-11-2002	04-11-2052	7
219090	San Francisco	Villa Hidalgo	Sonora	03-02-2003	03-02-2053	18
221095	Los Amoles	Villa Hidalgo	Sonora	18-11-2003	18-11-2053	830

Table 3.2: Mineral Concessions (cont.)

Concession Number	Concession Name	Municipality	Province	Date Granted	Expiry Date	Area (ha)
222006	La Presa 7	Villa Hidalgo	Sonora	26-04-2004	26-04-2054	1,537
222007	Los Jucaros	Nacozari De Garcia	Sonora	02-04-2004	26-04-2054	1,368
225592	La Villa Fraccion I	Villa Hidalgo	Sonora	22-09-2005	22-09-2055	10,890
225593	La Villa Fracc. Ii	Villa Hidalgo	Sonora	22-09-2005	22-09-2055	608
225594	El Nogal	Nacozari De Garcia Y Villa Hidalgo	Sonora	22-09-2005	22-09-2055	4,674
225808	Purica Fracc. 1	Nacozari De Garcia	Sonora	25-10-2005	25-10-2055	7,601
239905	El Represo	Nacozari De Garcia	Sonora	15-03-2012	14-03-2062	2,786
240048	La Caridad-8 Fraccion 1	Nacozari De Garcia Y Villa Hidalgo	Sonora	12-04-2012	12-04-2062	7,970
240049	La Caridad-8 Fraccion 2	Nacozari De Garcia Y Villa Hidalgo	Sonora	12-04-2012	12-04-2062	12
246250	Villa Esperanza F1	Villa Hidalgo	Sonora	05-04-2018	05-04-2068	108
246341	Calerita 4 Fraccion 3	Nacozari De Garcia	Sonora	17-05-2018	17-05-2068	9
246486	La Presa 3	Villa Hidalgo	Sonora	02-08-2018	02-08-2068	457
246720	Villa Esperanza F2	Villa Hidalgo Y Nacozari De Garcia	Sonora	30-10-2018	30-10-2068	325
246721	Villa Esperanza F3	Villa Hidalgo Y Cumpas	Sonora	30-10-2018	30-10-2068	60
246722	Villa Esperanza F4	Villa Hidalgo Y Cumpas	Sonora	30-10-2018	30-10-2068	163
63					***Subtotal Mine Concessions***	***99,089***
170558	Promontorio	Divisaderos	Sonora	13-05-1982	12-05-2032	12
216048	La Mina	Sahuaripa	Sonora	01-04-2002	01-04-2052	2,499
216557	Palma	Sahuaripa	Sonora	16-05-2002	16-05-2052	120
234696	La Manteca Reduccion Ii	Caborca	Sonora	28-07-2009	28-09-2050	2,100
4					***Subtotal Exploration Concessions***	***4,731***
67					**Grand Total**	**103,821**

Note: Exploration concessions are not shown on Figure 3.2.



LEGEND

- La Caridad Mine Bella
- Union Boundary
- Concession Boundary

0 5 10

1:200,000 Kilometers

NOTE(S)

REFERENCE(S)

1. COORDINATE SYSTEM: WGS 1984 UTM ZONE 12N
2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

GrupoMéxico

PROJECT

LA CARIDAD MINE

TITLE

MINERAL CONCESSION MAP

CONSULTANT

GOLDER MEMBER OF WSP

YYYY-MM-DD	2022-02-22
DESIGNED	JS
PREPARED	JAM
REVIEWED	JS
APPROVED	MO

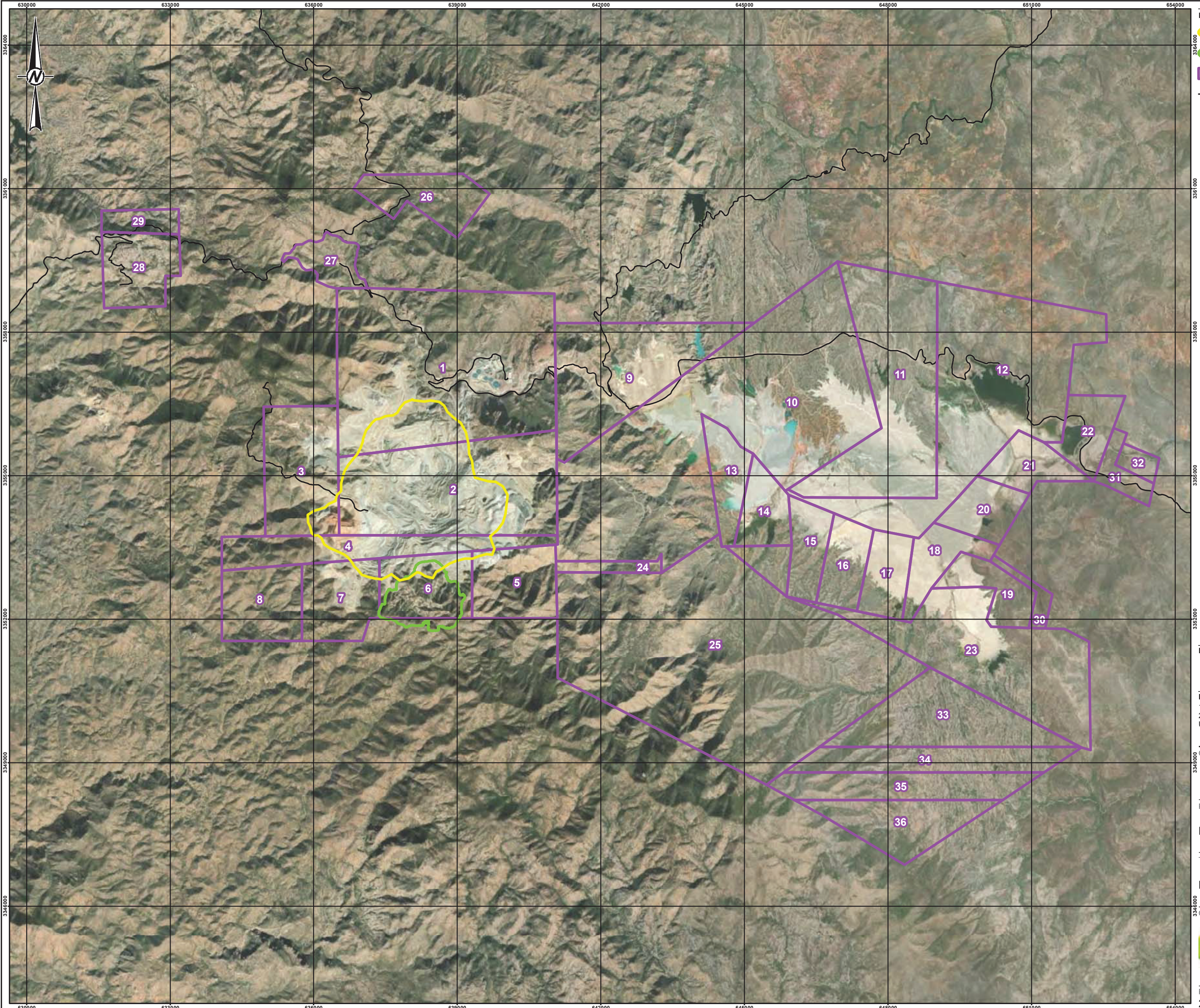
PROJECT NO.	CONTROL	REV.	FIGURE
20442424	-	-	3.2

3.3 Description of Property Rights

Surface rights are held by a combination of private ownership and agreements with local ejidos. Ejidos are agrarian land grants held by a group of people. The agreements allow for exploration and mining activities. The property lots are identified by name and document in Table 3.3. The majority of the property is under ownership of the mining unit. The locations of the lots are shown in Figure 3.3. There are three lots that have private ownership. The mining unit has had an agreement for access and use of the three lots. The agreements can be extended for 30 years beyond the original agreement. The original agreements were dated January 5, 2017, and should have been renewed by January 5, 2020; however due to the COVID pandemic, the extensions have been delayed. The formal renewals are pending, and in the meanwhile the mining unit still has access to the properties.

Table 3.3: Property Ownership

Polygon Number	Lot Name	Owner	Document Number	Surface Area (Ha)
1	Fraccion "B" Mina Concentradora	Mexicana de Cobre S.A. de C.V.	**27,602**	1,372
2	Fraccion "A" Mina Y Planta Esde	Mexicana de Cobre S.A. de C.V.	**428**	789
3	Pilares Mina	Mexicana de Cobre S.A. de C.V.	**27,602**	417
4	Fraccion J	Mexicana de Cobre S.A. de C.V.	**19,283**	120
5	Parcela N° 1, Santo Domingo	Mexicana de Cobre S.A. de C.V.	**147**	259
6	Parcela N° 2, Santo Domingo	Mexicana de Cobre S.A. de C.V.	**145**	257
7	Parcela N° 3, Santo Domingo	Mexicana de Cobre S.A. de C.V.	**148**	257
8	Parcela N° 4, Santo Domingo	Mexicana de Cobre S.A. de C.V.	**146**	257
9	Fraccion "A" Los Alisos	Mexicana de Cobre S.A. de C.V.	**19,280**	626
10	Fraccion "F" San Rafael Juriquipa	Mexicana de Cobre S.A. de C.V.	**1134, 1589**	1,967
11	Fraccion "L" San Rafael Juriquipa	Mexicana de Cobre S.A. de C.V.	**19,290**	830
12	Fraccion "M" San Rafael Juriquipa	Mexicana de Cobre S.A. de C.V.	**2318**	1,390
13	Presa De Jales Cruz De Cañada Parcela 2 Z 1 P 1	Mexicana de Cobre S.A. de C.V.	**2,337**	159
14	Presa De Jales Cruz De Cañada Parcela 4 Z 1 P 1	Mexicana de Cobre S.A. de C.V.	**2,415**	153
15	Presa De Jales Cruz De Cañada Parcela 6 Z 1 P 1	Mexicana de Cobre S.A. de C.V.	**2,334**	153
16	Presa De Jales Cruz De Cañada Parcela 7 Z 1 P 1	Mexicana de Cobre S.A. de C.V.	**2,335**	160
17	Presa De Jales Cruz De Cañada Parcela 9 Z 1 P 1	Mexicana de Cobre S.A. de C.V.	**2,332**	159
18	Presa De Jales Cruz De Cañada Parcela 8 Z 1 P 1	Mexicana de Cobre S.A. de C.V.	**2,333**	159
19	Presa De Jales Cruz De Cañada Parcela 10 Z 1 P 1	Mexicana de Cobre S.A. de C.V.	**2414**	157
20	Presa De Jales Cruz De Cañada Parcela 5 Z 1 P 1	Mexicana de Cobre S.A. de C.V.	**2,336**	158
21	Presa De Jales Cruz De Cañada Parcela 3 Z 1 P 1	Mexicana de Cobre S.A. de C.V.	**2,413**	154
22	Presa De Jales Cruz De Cañada Parcela 1 Z 1 P 1	Mexicana de Cobre S.A. de C.V.	**2,609**	158
23	Fraccion "N" San Rafael Juriquipa	Mexicana de Cobre S.A. de C.V.	**2318**	921
24	Fraccion "K"	Mexicana de Cobre S.A. de C.V.	**941**	52
25	El Cachuly (El Nogalito)	Mexicana de Cobre S.A. de C.V.	**4112, 8161**	2,296
26	Colonia El Globo	Mexicana de Cobre S.A. de C.V.	**27,602**	216
27	Colonia El Abanico	Mexicana de Cobre S.A. de C.V.	**27,602**	109
28	Colonia Satelite	Mexicana de Cobre S.A. de C.V.	**27,602**	208
29	Fraccion "G" Colonia La Caridad	Mexicana de Cobre S.A. de C.V.	**19,281**	67
30	Parcela 13, Cruz De Cañada (1)	Mexicana de Cobre S.A. de C.V.	**Temporary Occupation Agreement**	45
31	Parcela 11, Cruz De Cañada (2)	Mexicana de Cobre S.A. de C.V.	**Temporary Occupation Agreement**	80
32	Parcela 12, Cruz De Cañada (3)	Mexicana de Cobre S.A. de C.V.	**Temporary Occupation Agreement**	43
33	Poligono 1 Subd. Cruz De Cañada	Mexicana de Cobre S.A. de C.V.	**1,990**	451
34	Poligono 2 Subd. Cruz De Cañada	Mexicana de Cobre S.A. de C.V.	**2,348**	293
35	Poligono 3 Subd. Cruz De Cañada	Mexicana de Cobre S.A. de C.V.	**2494**	293
36	Poligono 4 Subd. Cruz De Cañada	Mexicana de Cobre S.A. de C.V.	**2735**	293
			Total	**15,482**



LEGEND

- La Caridad Mine
- Bella Union Boundary
- Parcels
- Highways

0 2 4

1:80,000 Kilometers

NOTE(S)

REFERENCE(S)

1. COORDINATE SYSTEM: WGS 1984 UTM ZONE 12N
2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

GrupoMéxico

PROJECT

LA CARIDAD MINE

TITLE

PROPERTY OWNERSHIP MAP

CONSULTANT

GOLDER MEMBER OF WSP

YYYY-MM-DD	2022-02-22
DESIGNED	JS
PREPARED	JAM
REVIEWED	JS
APPROVED	MO

PROJECT NO.	CONTROL	REV.	FIGURE
20442424	-	-	3.3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

3.3.1 Royalty Payments to Property Owners

There are no royalties associated with the three parcels that are leased. All other parcels are owned by Southern Copper Corporation

3.4 Royalty Payments

In December 2013, the Mexican government enacted a law that, among other things, established a mining royalty charge of 7.5% on earnings before taxes as defined by Mexican tax regulations and an additional royalty charge of 0.5% over gross income from sales of gold, silver, and platinum. These charges were effective January 2014 and are deductible for income tax purposes.

3.5 Significant Encumbrances to the Property

No significant encumbrances to the property have been noted as per information from SCC.

3.6 Other Significant Factors and Risks Affecting Access

No additional significant factors or risks affecting site access have been identified.

4.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

4.1 Topography and Land Description

The Regional Environmental System is located within the Sierra Madre Occidental Physiographic Province in its northern portion and within this, it is within the Sierras y Valles del Norte subprovince, which is mainly formed by high mountain ranges between which wide valleys are located. parallel with preferential north-south orientation.

The geologic subprovince was originally a large plateau, but millions of years of erosion created a landscape of peaks, plateaus, large canyons, and ravines. It extends to near the western coast of Mexico in a northwest-southwest direction, beginning 50 km south of the international border with the United States of America and ending at the Santiago River in Nayarit and the Neovolcanic Axis. In its northern portion it is more separated from the coast (30 km). In its southern extent it reduces its width and is closer to the sea. The average elevation is 2,250 m. To the east it forms a barrier to the Mesa del Centro.

The La Caridad mining unit has steep topography and significant elevation changes.

4.2 Access to the Property

Nacozari is connected by paved highway with Hermosillo and Agua Prieta and by rail with the international port of Guaymas, and the Mexican and United States rail systems. An airstrip with a reported runway length of 2,500 m is located 36 km north of Nacozari, less than 1 km from the La Caridad copper smelter and refinery. The smelter and the sulfuric acid plants, as well as the refineries and rod plant, are located approximately 24 km from the mine. Access is by paved highway and by railroad. The property layout and access are shown in Figure 4.1.

LEGEND

- La Caridad Boundary
- La Caridad Mine
- Towns and Cities
- Cultural Areas
- Highway
- Railway

0 30 60

Kilometers

1:1,250,000

NOTE(S)

REFERENCE(S)

1. COORDINATE SYSTEM: WGS 1984 UTM ZONE 12N
2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

GrupoMéxico

PROJECT

LA CARIDAD MINE

TITLE

SITE ACCESS MAP

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-02-22
DESIGNED	JW
PREPARED	JAM
REVIEWED	JS
APPROVED	MO

PROJECT NO.	CONTROL	REV.	FIGURE
20442424	-	-	4.1

4.3 Climate Description

Climate data was obtained from the National Meteorological Service, which is administered by the National Water Commission (CNA) (SEGA, 2017). The climate in the region varies between three types of climates, namely, BS1k (x '), BS1h (x') and BSoh (x '), as described in Table 4.1.

Table 4.1: Project Area Climate Types

Climate Type	Code	Surface Area (ha)	Total Area (%)
Semi-arid, Semi-warm	BS1h(x')	18,519.48	48.38
Semi-arid, Temperate	BS1k(x')	14,362.27	37.52
Arid, Semi-warm	BSoh(x')	5,397.89	14.1
Total		**38,279.64**	**100**

The mining complex activities are carried out 365 days a year, including holidays or non-working days.

4.4 Availability of Required Infrastructure

The principal raw materials used in the operations are fuel, gas, electricity, and water. Natural gas is used to power boilers as well as generators and for metallurgical processes. Diesel fuel is used to power mining equipment.

The La Caridad complex imports natural gas from the United States through its pipeline (between Douglas, Arizona and Nacozari, Sonora). Several contracts are in place with Petroleos Mexicanos (“PEMEX”), the state producer, and the United States and provides options for natural gas purchases.

The electrical power is supplied to site from the utility grid via 230 kV overhead transmission lines. The bulk of the demand is supplied by Mexico Generadora de Energia S. de R. L. (MGE), a subsidiary of Grupo Mexico. MGE owns and operates three gas-fired combined-cycle generation plants with a total combined capacity of about 500 megawatts (MW), primarily supplying power to Southern Copper’s La Caridad and Buenavista operations.

The primary fresh water source is the La Angostura Dam located approximately 29 km to the northeast of the La Caridad Mine.

The primary smelter and the sulfuric acid plants, as well as the refineries and rod plant, are located approximately 24 km from the mine. Access is by paved highway and by railroad.

5.0 HISTORY

5.1 Mining History of the Area

Mining operations at La Caridad can be traced to the early 1900s with the concurrent development of similar copper mining operations in the region. In 1895 the Moctezuma Copper Co. built a beneficiation plant and smelter to process ore from Pilares. The area around Nacozari reportedly became a major center of Sonoran mining operations for Phelps Dodge with operations reportedly reaching full capacity in 1905. Two smelters were built at starting in 1901 at Douglas to serve several mines owned by Phelps Dodge including its operations at Nacozari. After intermittent disruptions in the 1920s and 1930s, Phelps Dodge reportedly shut down operations in 1949.

In 1962, a preliminary exploration program sponsored in part by the United Nations discovered the La Caridad copper-molybdenum porphyry deposit. An extensive study was conducted in 1968 by the Board of Non-renewable Natural Resources, an agency of the Mexican government and Mexicana de Cobres, S.A., a company formed by ASARCO Mexicana to develop the project.

The current concentrator at La Caridad began operations in 1979; the molybdenum plant was added in 1982 and the smelter in 1986; the first sulfuric acid plant was added in 1988 and the SX-EW plant in 1995; the second sulfuric acid plant was added in 1997 and the copper refinery in 1997; the rod plant was added in 1998 and the precious metals refinery in 1999.

5.2 Drilling Exploration History

Exploration drilling has been undertaken almost yearly at La Caridad since 1968. A total of 3,529 exploration drill holes, totaling 694,455 m, have been drilled on the La Caridad property. Several different drilling techniques have been implemented at La Caridad, including diamond core (DD), reverse circulation (RC), hammer (MT) and diamond hammer (MD) drilling. Table 5.1 summarizes the various types of drilling conducted at La Caridad.

Table 5.1: Summary of Exploration Drilling

Drill Type	No. of Drill Holes	Total Meterage
DD	1,167	353,924
RC	2,034	317,817
MD	201	15,796
MT	127	6,919
Total	**3,529**	**694,455**

5.3 Historical Production

The last three years of production and the 2020 ore reserves as published by SCC in its 2020 Annual Report is shown in Table 5.2.

Table 5.2: Production Statistics for La Caridad (2018 through 2020)

Item	Unit	Year		
		2020	2019	2018
Mine annual operating days		366	365	365
Mine				
Total ore mined	(kt)	34,949	34,401	34,675
Copper grade	(%)	0.361	0.356	0.353
Leach material mined	(kt)	29,561	28,457	30,764
Leach material grade	(%)	0.220	0.224	0.221
Stripping ratio	(kt/kt)	0.45	0.50	0.48
Total material mined	(kt)	93,373	94,578	96,541
Concentrator				
Total material milled	(kt)	34,858	34,648	34,548
Copper recovery	(%)	87.14	86.80	87.09
Copper concentrate	(kt)	473	446	446
Copper in concentrate	(kt)	110	107	106
Copper concentrate average grade	(%)	23.18	24.01	23.78
SX-EW Plant				
Estimated leach recovery	(%)	38.04	38.06	37.99
SX EW cathode production	(kt)	25.85	25.93	26.41
Molybdenum				
Molybdenum grade	(%)	0.036	0.036	0.034
Molybdenum recovery	(%)	82.82	82.17	83.28
Molybdenum concentrate	(kt)	19.30	18.80	18.00
Molybdenum concentrate average grade	(%)	54.48	54.26	54.61
Molybdenum in concentrate	(kt)	10.50	10.20	9.80

Notes:
Key: kt = thousand tonnes.
kt/kt = Stripping ratio obtained dividing waste by leachable material plus ore mined.
The copper and molybdenum grade are total grade.

6.0 GEOLOGICAL SETTING, MINERALIZATION, AND DEPOSIT

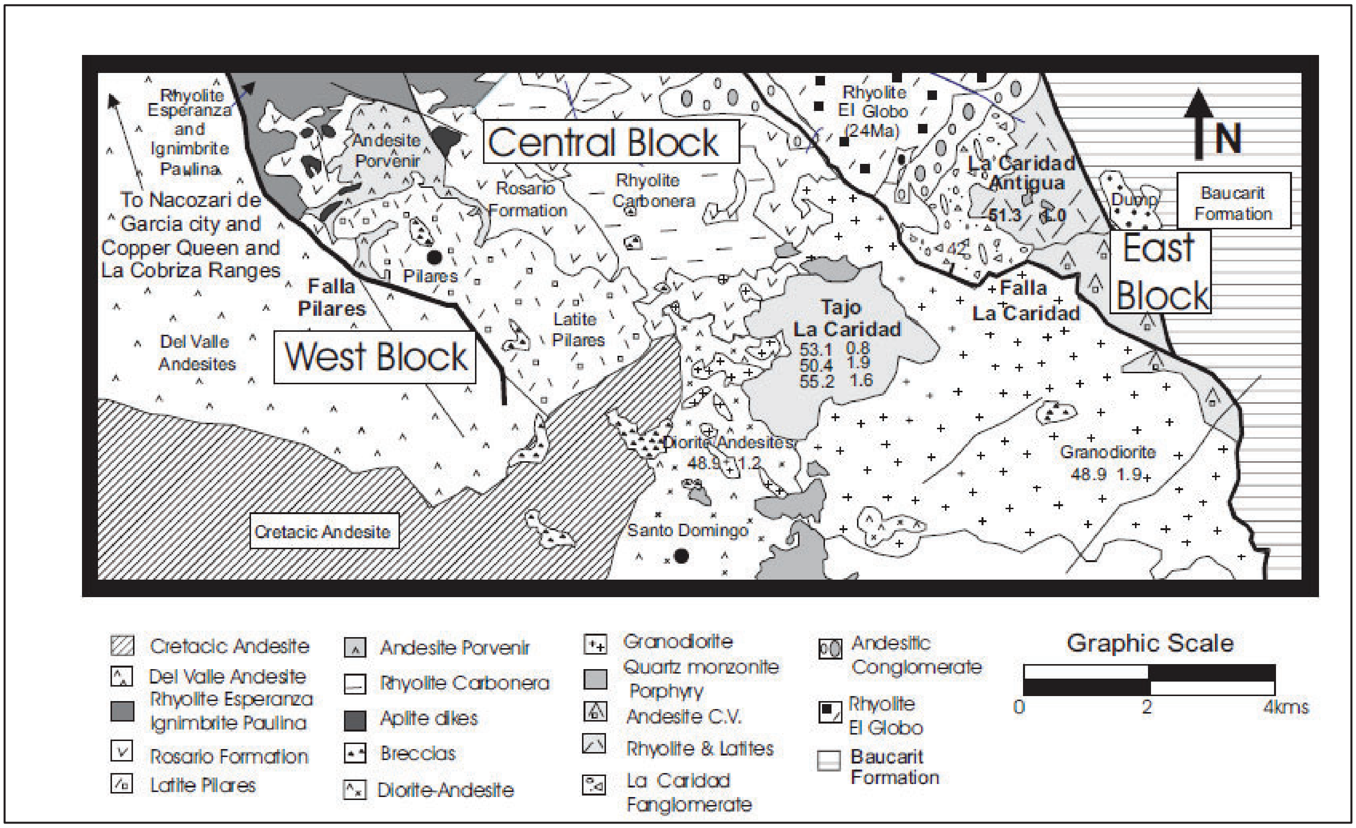
6.1 Regional Geology

La Caridad is a porphyry Cu deposit, that is currently the largest Cu producer in Mexico and the youngest dated porphyry system in the American Southwest region. Located within the North America Terrane (Campa and Coney, 1983) which is dominated by north trending mountain ranges consisting of strongly deformed greenschist-grade volcanic and sedimentary rocks that are intruded by granites emplaced at 1.4 and 1.1 billion years ago (Ga) (Anderson and Schmidt, 1983). Above the sequence Late Proterozoic and Paleozoic rocks are overlain by volcanic and plutonic rocks of Mesozoic and Cenozoic age. Middle Jurassic rocks characterized by volcanic and volcano-sedimentary sequences, with occasional granite intrusions, outcrop in the northern and northeastern portion of Sonora (Anderson and Silver, 1978; Pérez-Segura and Echávarri, 1981; Stewart, 1988; Nourse, 2001). In the La Caridad district, these rocks outcrop in the Sierra Cobriza area, west of the town of Nacozari.

After a period of magmatic quiescence during the Middle and Late Eocene (González-León et al., 2000), igneous activity reemerged at the beginning of the Oligocene with the great ignimbritic explosion of the Sierra Madre Occidental (McDowell and Clabaugh, 1979), the outcrops of which form one of the largest silicic volcanic provinces on Earth (Ferrari et al., 2005). Subsequently, in the Miocene, the progressive approach of the Pacific ridge to the trench, shifted the convergence margin of the trench, changing it to a transforming boundary (Atwater, 1970; Ferrari et al., 2005) and giving rise to an extensional regime (Rehrig, 1986; Nourse et al., 1994; Parsons, 1995). In the north-central region of Sonora, the extension reached extreme conditions, causing rocks of the middle crust to be rapidly exhumed, forming metamorphic core complexes. These complexes are well exposed in a belt located to the west of the mineralized zone of La Caridad, and whose orientation is generally similar to the porphyry Cu belt (e.g., Davies, 1979; Nourse et al., 1994). Extensive deformation continued through much of the Cenozoic, with development of the block faulting system along the southern portion of the Basin and Range province.

The Nacozari mining district lies in the northwestern portion of the Sierra Madre Occidental physiographic province and is cut by two regional structures that divided the district in three blocks. La Caridad and Pilares mines are located in the central block (Figure 6.1).

Figure 6.1: Simplified Regional Geologic Map of the Nacozari Mining District



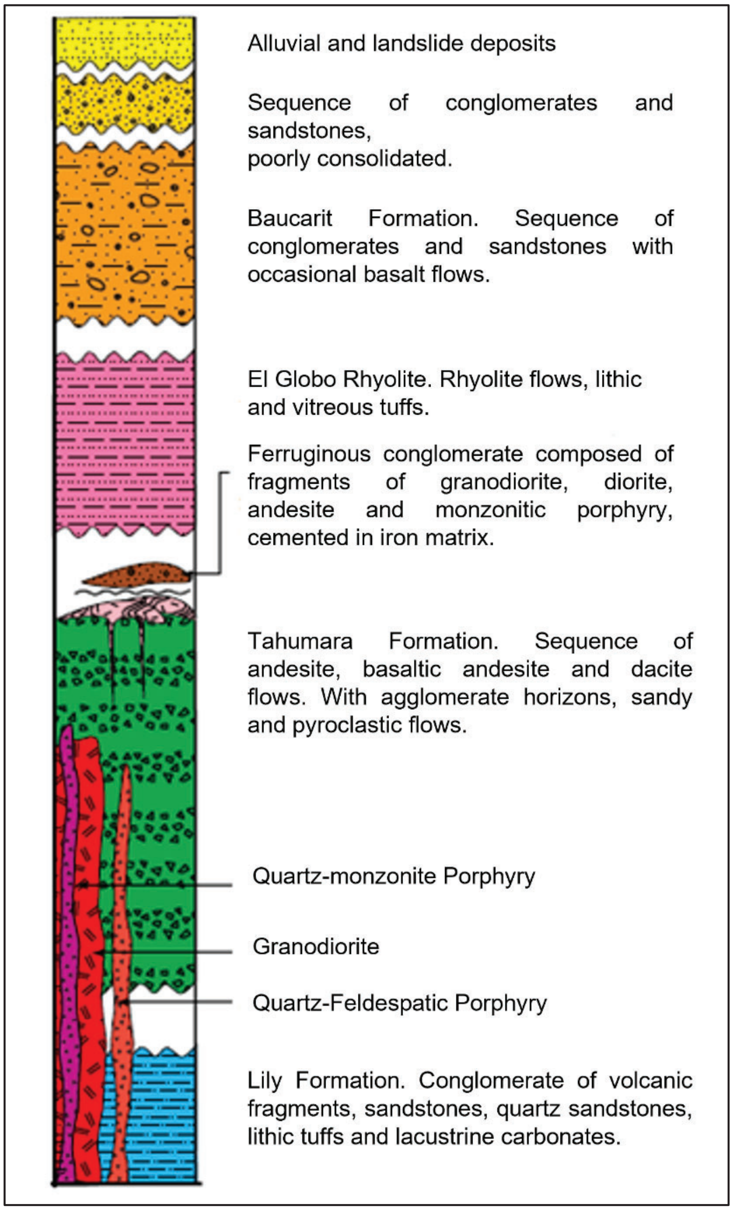
Source: Valencia, et al, 2003

The West block in dominated by a sequence of dacitic to andesitic flows, volcanic breccias and basaltic dykes. The Central Block is dominated by pseudo-stratigraphic ignimbrites, andesitic, rhyolitic and latitic flows. Reyna and Mayboca (1986) proposed a stratigraphic column of the following informal units, from older to younger include; 1), Esperanza rhyolitic ignimbrite; 2), Lithic ignimbrite Paulina; 3), Rosario andesite; and 4), Pilares latite. These rocks are intruded by diorite, granodiorite and quartz monzonite porphyry in the La Caridad mine area. The East Block is characterized by pre-mineral and post-mineral rocks separated by an erosional unconformity. The pre-mineral rocks are andesites and rhyolitic ignimbrites which are intruded by a quartz monzonite porphyry (mineral phase). These rocks are overlain by a ferruginous fanglomerate that represents the first phase of post-mineral rocks. In the northern area the fanglomerate is covered by El Globo rhyolite (24 million years ago [Ma], Livingston, 1973).

6.2 Local and Property Geology

The main mineralization at La Caridad occurs in the Quartz-monzonite porphyry and hydrothermal breccias. The host rocks at La Caridad are andesites, with the oldest rocks corresponding to the Laramide volcanic rocks, which are regionally correlated with the Tarahumara Formation (Figure 6.2). These consist of lavas and tuffs of intermediate composition with aphanitic to porphyritic texture, including agglomeratic horizons and brecciated pyroclastic flows and fine-grained tuff. Locally, this andesitic volcanic sequence was intruded by a granodiorite which is well exposed to the east-southeast of the La Caridad mine, which are in turn intruded by diorite dikes that range from fine to coarse grain. Discordantly overlying this igneous complex is a sequence of rhyolitic flows, dated by K-Ar at 51.3 ± 1.0 Ma (Livingston, 1973). This unit is well exposed to the east of the La Caridad mine, in the La Caridad Vieja area, where these rocks show structures in the form of domes and volcanic necks (Figure 6.3).

Figure 6.2: Stratigraphic Column Showing the Lithologic Units that Outcrop in the La Caridad District



Source: Rascón et al, 2012

Other rocks present at La Caridad include ae diorite porphyry, which has a hypidiomorphic-granular texture and is composed of 40% to 60% of euhedral plagioclase phenocrysts (anortite 40% -45), clots of biotite (20% to 30%), quartz (15% to 20%) and K-feldspar (2% to 3%). Locally, close to the contact between andesites and biotite bearing diorite, irregular bodies of magmatic breccias composed of diorite matrix and subangular fragments of andesite (up to tens of centimeters [cm]) are observed. These are located in the southwest and west zone of the La Caridad deposit. A granodiorite body is emplaced in the east part of the deposit and is bounded to the east by the La Caridad

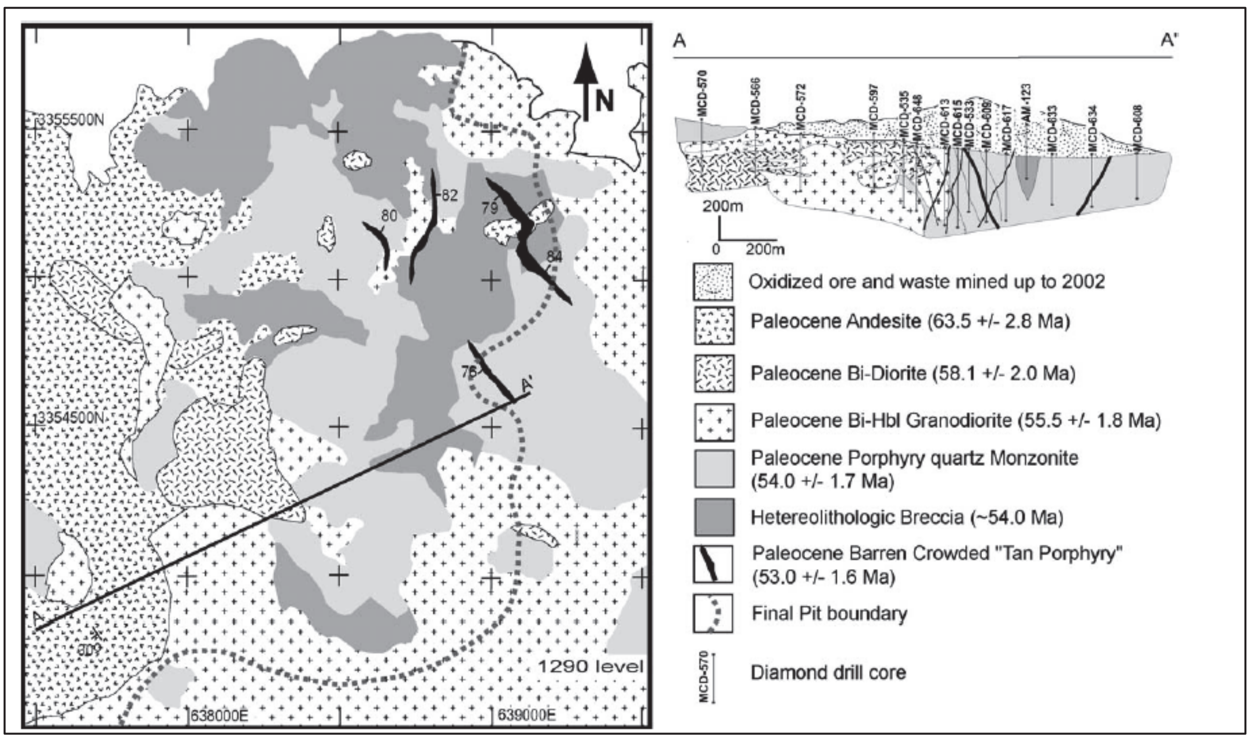
Fault. Irregular bodies of Quartz-monzonite porphyry appear at the contact between the granodiorite stock and the andesite flows

Large bodies of quartz-cemented hydrothermal breccia are located around and within the Quartz-monzonite porphyry, which usually consist of large blocks, tightly fitted against one another, so that the main evidence for brecciation is the occurrence of small 2-cm to 10-cm angular cavities. Its distribution indicates two dominant structural directions, a north-west trend associated with the central mass of the quartz-monzonite porphyry, and a subordinate north-east trend through the center of the ore deposit.

Irregular bodies of interlocking biotite with massive quartz, minor K-feldspar and molybdenite occur at the center and edges of the deposit. These bodies have been termed “pegmatites” in the past; however, their location mainly within the breccia unit suggest that they are most likely hydrothermal open-space fillings. Barren porphyry dykes, known as “Tan porphyry” (~53.0 Ma; Valencia et al. in review), crop out within the pit and intrude all the previously mentioned rock units (Figure 6.3).

An erosional episode around 24 Ma to the north of the deposit is recorded as the deposition of the La Caridad Fanglomerate (Valencia, 2005).

Figure 6.3: Geological Map of La Caridad Mine Area (Plan View at 1290 Level) and SW-NE Cross-Section A-A’ looking NW



Source: Valencia, 2005

6.3 Alteration and Mineralization

6.3.1 Alteration

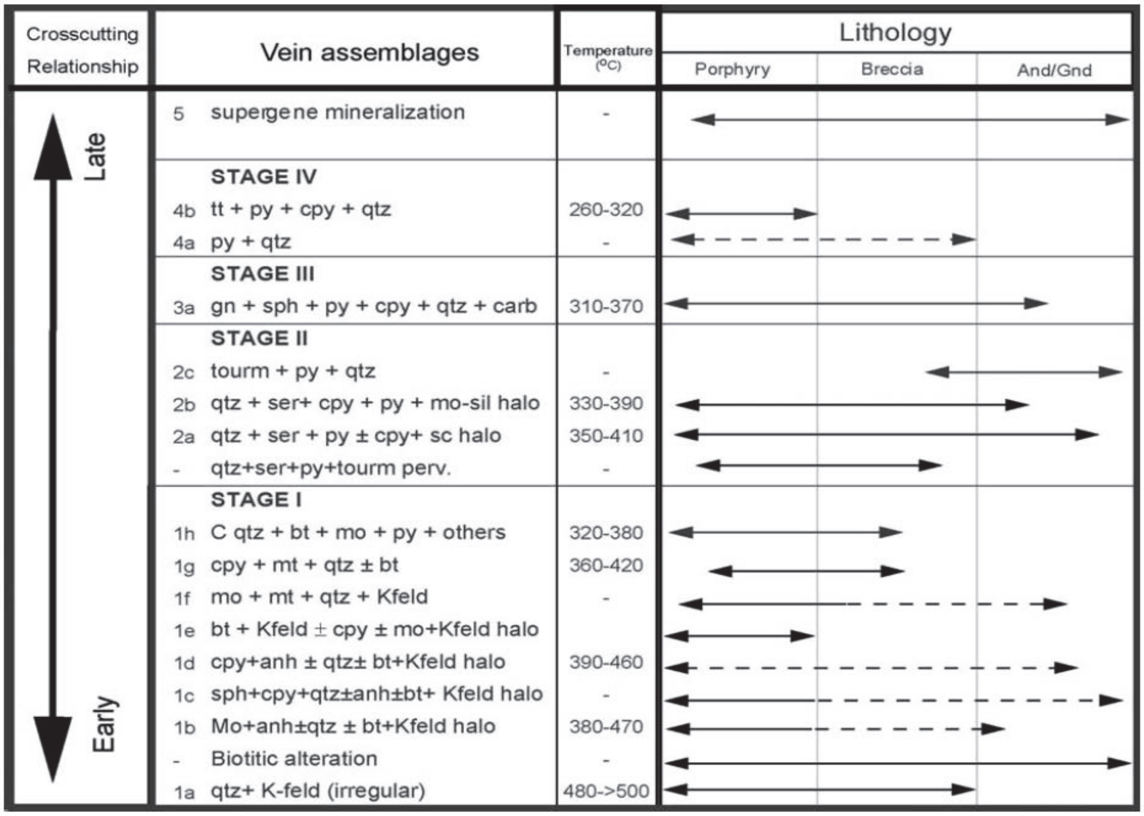
Extensive hydrothermal alteration with superimposed events has been recognized at La Caridad. Documented cross-cutting relationships between different vein types and mineral assemblages, permitted a detailed sequence of hydrothermal events to be established. An early stage characterized by potassium (K)-silicate veins in the intrusive complex and pervasive biotitization of andesites and diorites is associated with weak mineralization of magnetite, chalcopyrite, molybdenite, sphalerite and pyrite (Figure 6.4). Propylitic alteration appears to be contemporaneous with potassic alteration.

A later second event is recognized as the main mineralization stage. Intermediate stage phyllic alteration replaces and is superimposed on the potassic and propylitic assemblages, with mineralization of chalcopyrite, pyrite and lesser molybdenite. The ore grade is evenly distributed within the porphyry quartz-monzonite, but higher grades are developed in the breccia

The third event correspond to a high sulfidation stage, that affects the central part of the deposit, with presence of polymetallic base-metal veins (lead[Pb]-zinc[Zn]-silver[Ag])-Cu and sphalerite-galena-chalcopyrite-pyrite-quartz-carbonate veins emplaced mainly at the periphery of La Caridad pit, and locally in the northwestern part of the pit. After these event, quartz-tennantite-chalcopyrite-pyrite-sericite veinlets cut pyrite-quartz vein, both represent the latest alteration stages and the collapse of the hydrothermal system. This stage is mainly observed in the central part of the pit.

Tourmalinisation is a minor but significant alteration process at La Caridad. It occurs as aggregates of very fine acicular, black, light green, or colorless, tourmaline crystals in breccias, in veinlets and as tiny rosettes distributed throughout the rock.

Figure 6.4: Paragenetic Sequence of the La Caridad Vein Assemblage, According to Cross-Cutting Relationships



Note: Temperatures were determined from fluid inclusions. Horizontal arrows are related to the relative distribution of veins in different lithologies, qtz = quartz, Kfeld = potassium feldspar, mo = molybdenite, anh = anhydrite, bt = biotite, sph = sphalerite, mt = magnetite, ser = sericite, py = pyrite, tourm = tourmaline, cpy = chalcopyrite, gn = galena, tt = tetrahedrite / tennantite.

6.3.2 Mineralization

Intense fracturing, with multiple fracture directions are observed at La Caridad. More than 560 local faults and fractures were measured in the La Caridad open pit at benches 1380 and 1305. This data exhibits two dominant trends to include the northeast (NE) and northwest (NW). Fracture density increases northward from the upper to the lower benches, consistent with the location of the mineralized center at the northern end of the open pit. Fractures appear to have provided important controls to the hypogene mineralization, particularly toward the margins of the deposit. Both pre-mineral and post-mineral fractures influenced the supergene mineralization

The hypogene mineralization comprises pyrite, chalcopyrite and molybdenite in order of decreasing abundance, together with minor amounts of sphalerite, galena and bornite. Pyrite is by far the most abundant hypogene mineral.

Primary mineralization occurs in the deposit in disseminated form, in fractures and in-filling breccia cavities. In the central part of the deposit, the presence of pyrite and chalcopyrite occurs mainly in disseminated form. There is a direct relationship between the amounts of pyrite and chalcopyrite mineralization and the quartz-sericite hydrothermal alteration. The primary disseminated mineralization occupies approximately 70% of abundance in the central part of the deposit, which as it moves away from the center toward the outside, decreases as dissemination and increases in the fractures and cavities of the breccias.

Chalcopyrite is most abundant in the central part of the deposit, where it has Cu grades in the order of 0.75% to 1.0%. Chalcopyrite contents gradually decrease towards the exterior of the deposit. The chalcopyrite-pyrite ratio in the primary zone is 2:1 and gradually increases towards the exterior with a ratio of 1:10.

Molybdenite occurs gradually in fine aggregate crystals accompanied by variable amounts of quartz, filling thin fractures in the quartz monzonite porphyry. Generally, pyrite, chalcopyrite and molybdenite occur as a mixture filling fractures.

Significant amounts of molybdenite occur in the mid-central part of the deposit and grades of around 0.04% molybdenum (Mo) are found towards the east; towards the mid-western part of the deposit Mo grades are around 0.01%. Currently, the highest concentration of molybdenite in the deposit occurs within the pegmatitic zone with Mo grades in the order of 0.07 to 0.10%, associated with biotite, quartz, apatite, pseudomorphized to turquoise and sporadically, sphalerite, galena, and tetrahedrite.

The supergene sulfide zone (Figure 6.5) or chalcocite zone is located at the base of the iron cap and represents the reducing environment below the paleo-water table. In this environment, Cu loses its solubility and is deposited on the hypogene sulfides, enriching them by processes of replacement of the Fe contained in them. Contrary to Cu, Fe is soluble under these conditions of low oxidation/reduction potential (Eh) and low to neutral potential of hydrogen (pH). The main constituents in this zone are chalcocite, covellite, native Cu, as well as Cu carbonates.

In porphyry Cu deposits, there is typically an increase in the quality and quantity of sulfide and oxide precipitation in zones of acidic groundwater infiltration. Typical supergene processes are solution, hydration, oxidation, precipitation, and reactions of ions in solution with ions from minerals.

The Cu has been completely leached from the oxide zone of the deposit, commonly also referred to as leached exhaust. The oxide zone is thickest in the central part of the deposit and gradually decreases in thickness as it approaches the marginal areas of the deposit. The thickness of the leached zone varies from 10 m to 230 m with an overall mean of 50 m. This zone is mainly represented by Cu oxides and carbonates such as cuprite, tenorite, azurite, plus native Cu. The limits are approximately between elevations 1755 and 1665.

The process of leaching and oxidation of the sulfides has produced a series of siltstones (Loke, 1926) comprising oxide minerals including hematite, goethite and jarosite. The interpretation of the siltstones has led to the identification of the type and distribution of the pre-existing sulfides. It has been assumed that hematite is a derivative of leaching of sulfides with low pyrite/chalcocite ratios; while goethite and jarosite are derivatives of leaching of sulfides with a moderate pyrite/chalcocite ratio (Tunell, 1930). In addition, alunite is also present in this area.

Figure 6.5: Oxidation Zone (Red) and Supergene Zone (White) in the Western Part of the La Caridad Pit

Source: SCC

6.4 Deposit Types

La Caridad is emplaced in a metallogenic province that is notable for Cu, Mo, gold (Au), silver (Ag), and platinum (Pt) Resources (Titley, 1995). It contains more than 50 deposits, some of which are considered giant ore deposits. Porphyries are Upper Paleocene to Lower Eocene in age and often exhibit supergene enrichment, which forms during exhumation of the hydrothermalized rocks towards the surface.

The largest mineralized districts in northwest Mexico occur in two main intervals, one at 59–63 Ma (Cananea), and the other at 53–55 Ma (La Caridad District), where associated magmatism overlaps in space and time. La Caridad porphyry intruded the thick-skinned Laramide orogen and is the southernmost giant porphyry Cu deposit belonging to the cluster of Arizona-Sonora Cu porphyries (Figure 6.6).

LEGEND

- Approximate Site Location
- Approximate Location of Porphyry Copper Deposits
- City
- International Border
- "Great Cluster" of Porphyry Deposits
- Mexico
- United States of America

0 100 200
1:8,000,000 KILOMETERS

NOTE(S)

1. THE SHADED ZONE REPRESENTS THE SO-CALLED "GREAT CLUSTER" OF THE PORPHYRY COPPER DEPOSITS OF THE WESTERN CORDILLERA OF NORTH AMERICA, INDICATING THE MOST SIGNIFICANT DEPOSITS SOURCE: MORENO ET AL, 2007.

REFERENCE(S)

1. COORDINATE SYSTEM: WGS 1984 WEB MERCATOR AUXILIARY SPHERE

CLIENT
GrupoMéxico

PROJECT
LA CARIDAD MINE

TITLE
LARAMIDE CU PORPHYRY BELT

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-02-22
DESIGNED	JS
PREPARED	TBH
REVIEWED	JS
APPROVED	MO

PROJECT NO.	CONTROL	REV.	FIGURE
20442424	-	-	6.6

The deposit occurs exclusively in felsic to intermediate intrusive igneous rocks and associated breccias. The host rocks include diorite and granodiorite intruded by a quartz-monzonite porphyry stock and by numerous breccia masses that contain fragments of all the older rock types.

7.0 EXPLORATION

7.1 Exploration Work

7.1.1 Surface Exploration

There is no evidence of surface exploration work, including channel, or bulk sampling, that may have been completed on the La Caridad Project to date. Mineral Resource estimation was conducted utilizing only the drill hole database that was provided for this Study.

7.1.2 Topographic Survey

The La Caridad advance control, mine design and other operational tasks are carried out in a local coordinate system. A series of topographical control points are used for any topographical triangulation. For all recent work, a Leica TS06, TS11 (2 mm and 1 mm accuracy with prism), Maptek XR3 Scanner (5mm accuracy) and Trimble R10 and R12 GPS (8-mm H/15-mm V accuracy) are used for all surveying activities. All topographic surveys are undertaken by LC personnel from the Topography department of the Engineering and Mine Planning department at La Caridad. The historical surveying was completed by prism surveying. The QP was unable to verify whether the historical drill hole points were resurveyed with modern equipment, and whether these locations were reviewed prior to input into the database.

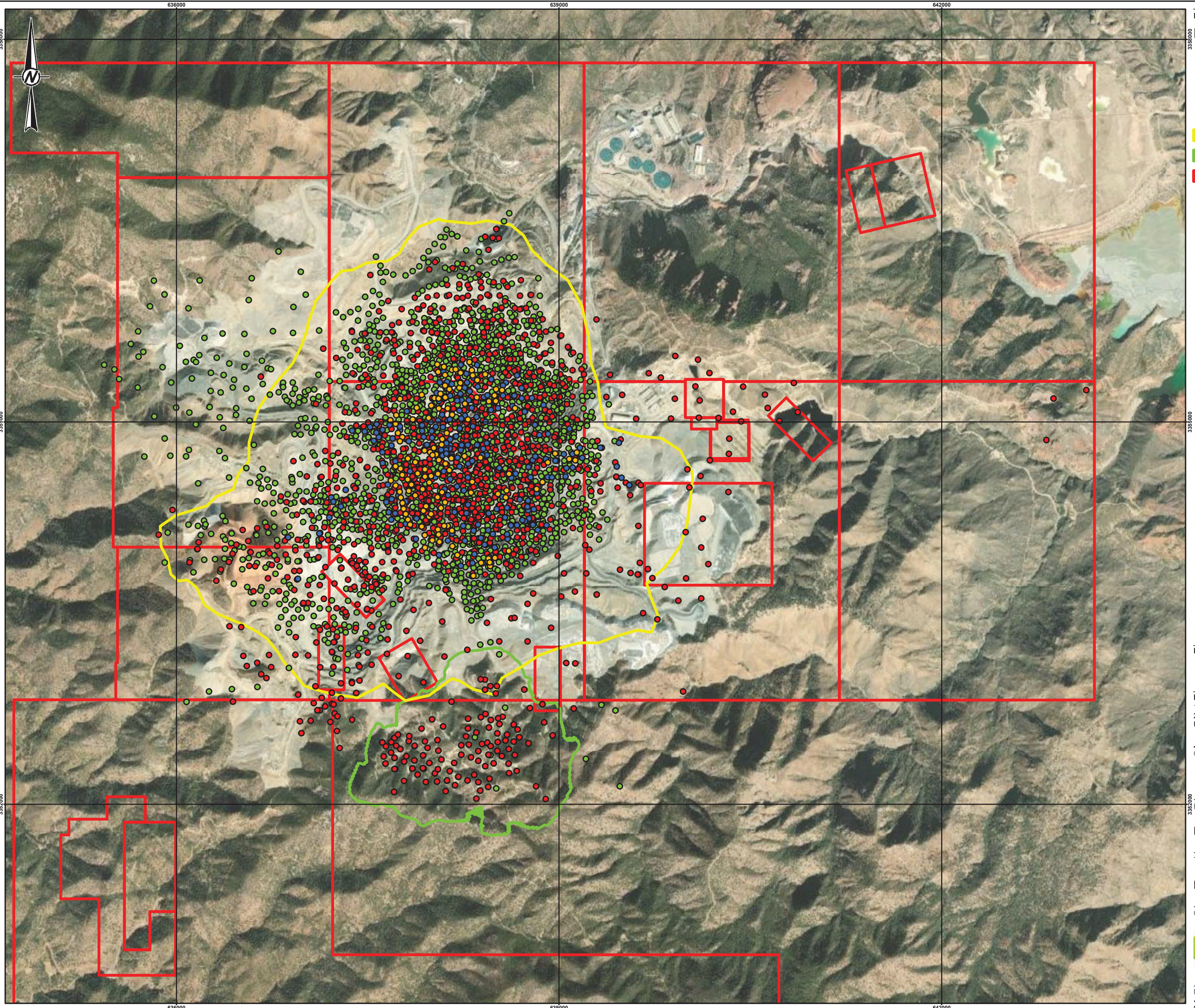
7.2 Geological Exploration Drilling

7.2.1 Exploration Drilling Methods and Results

Exploration drilling has been undertaken almost yearly at La Caridad since 1968. A total of 3,529 exploration drill holes, totaling 694,455 m, have been drilled on the La Caridad property. Several different drilling techniques have been implemented at La Caridad, including diamond core (DD), reverse circulation (RC), hammer (MT) and diamond hammer (MD) drilling. Table 7.1 summarizes the various types of drilling at La Caridad and Figure 7.1 illustrates the drill hole locations. Figure 7.2 is an example South-North (S-N) cross-section through the block model and drill holes.

Table 7.1: Summary of Exploration Drilling

Drill Type	No. of Drill Holes	Total Meterage
DD	1,167	353,924
RC	2,034	317,817
MD	201	15,796
MT	127	6,919
Total	**3,529**	**694,455**



LEGEND

Drill Hole Type

- DD
- RC
- MT
- MD
- La Caridad Boundary
- Bella Union Boundary
- Concession Boundary

0 1 2

1:30,000 Kilometers

NOTE(S)

REFERENCE(S)

1. COORDINATE SYSTEM: WGS 1984 UTM ZONE 12N
2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

GrupoMéxico

PROJECT

LA CARIDAD

TITLE

DRILL HOLE LOCATION MAP

CONSULTANT

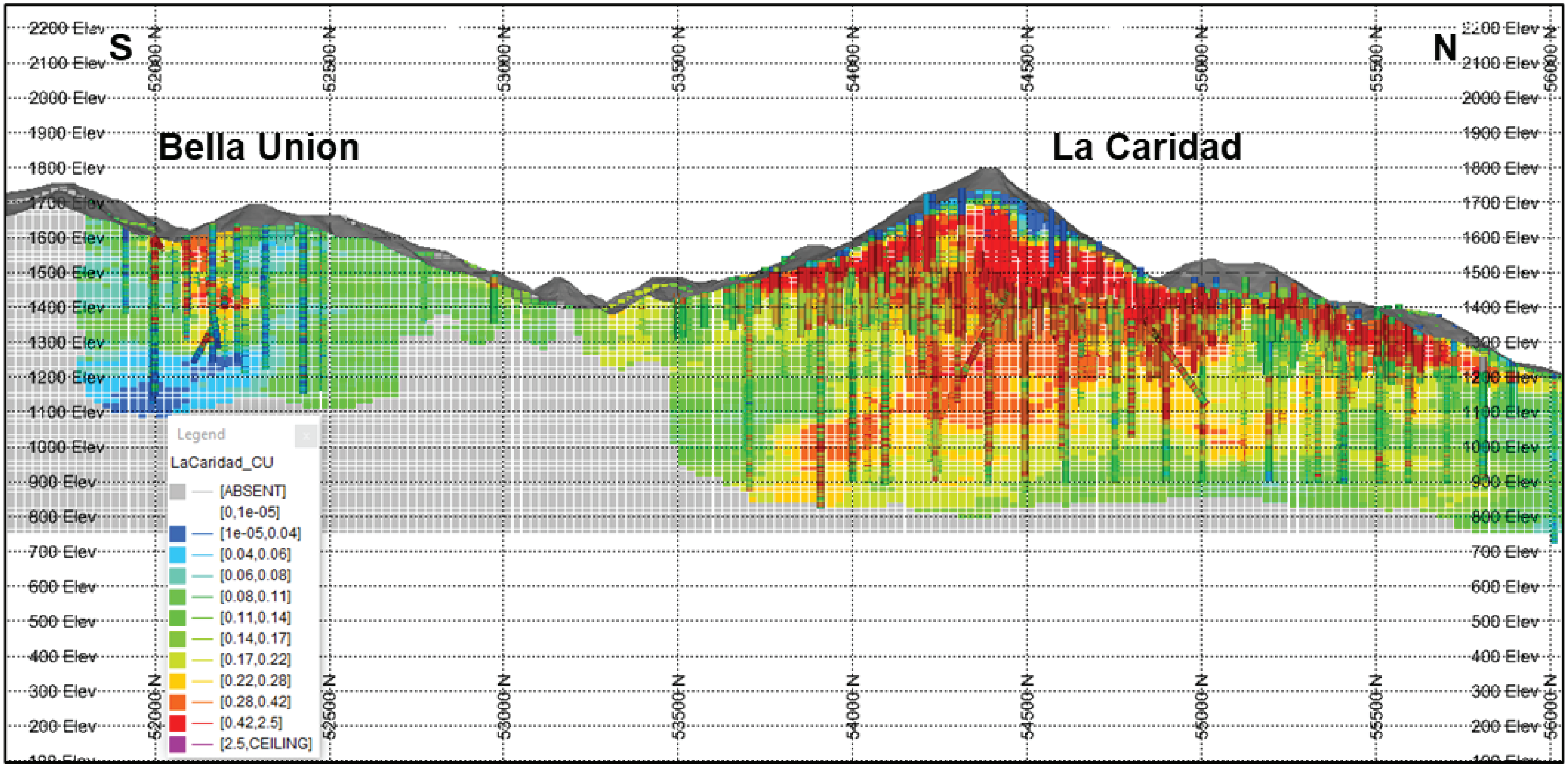
GOLDER MEMBER OF WSP

YYYY-MM-DD	2022-02-22
DESIGNED	JS
PREPARED	TBH
REVIEWED	JS
APPROVED	MO

PROJECT NO.	CONTROL	REV.	FIGURE
20442424	-	-	7.1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

Figure 7.2: Example S-N Cross-Section(38,000 E) through the Block Model and Drill Holes



7.2.2 Exploration Drill Hole Logging

Drill hole logging was conducted by core logging geologists at the La Caridad core logging and storage facility (Figure 7.3 and Figure 7.4) and supervised by senior LC geologists. The logging process included the detailed description of the lithology of the different rock units found in the deposit, as well as, the identification of alteration, mineral zones and a visual grade estimation. Based on the geological description, codes were assigned to each geological unit.

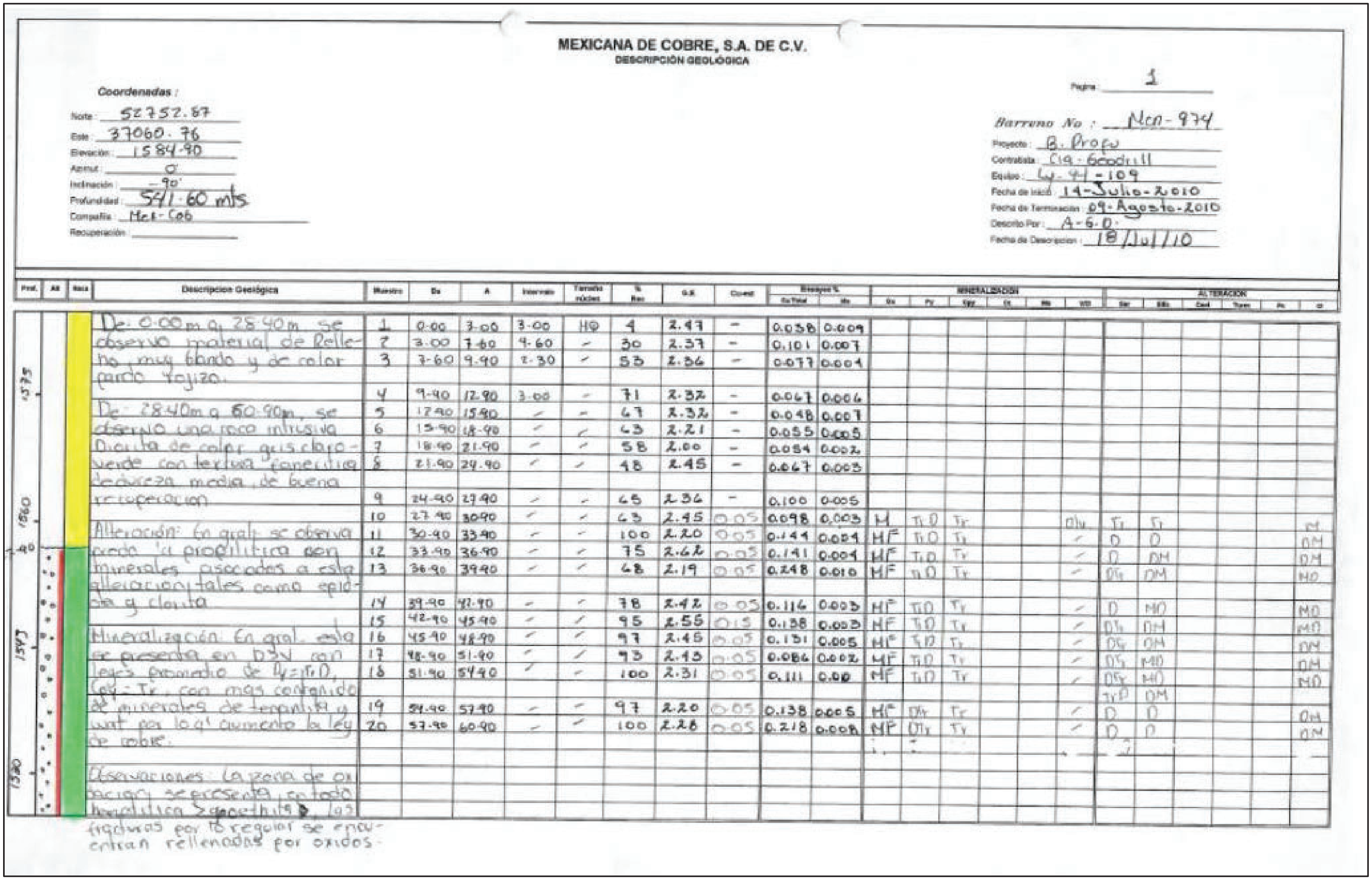
The logging process was carried out manually on paper log sheets, which were then entered into a Microsoft (MS) Excel spreadsheet. Once the transcription was completed, the geologists responsible for the Project reviewed the Excel files for consistency before it was uploaded into an acQuire™ Database. An example of a paper logging sheet is shown in Figure 7.5.

The senior supervisory geologist was responsible for defining and selecting the sampling intervals that were to be cut. The sampling intervals to be cut for analysis were recorded in the core recovery database as well as in the core box and were identified by unique sample numbers.

Figure 7.3: La Caridad Core Storage Facility

Figure 7.4: La Caridad Core Logging Facility

Figure 7.5: Example Core Logging Sheet for La Caridad



MEXICANA DE COBRE, S.A. DE C.V.
DESCRIPCIÓN GEOLÓGICA

Coordenadas :
Norte : 52752.87
Este : 37060.76
Elevación : 1584.90
Azimut : 0
Inclinación : -90°
Profundidad : 541.60 mts
Compañía : Mex-Cob
Recuperación :

Página : 1
Barreno No : Mcn-974
Proyecto : B. Profu
Contratista : Cia. Geodrill
Equipo : LJ-44-109
Fecha de Inicio : 14-Julio-2010
Fecha de Terminación : 09-Agosto-2010
Descrito Por : A-G-D.
Fecha de Descripción : 18/Jul/10

Descripción Geológica:

De 0.00m a 28.40m se observo material de Relleno, muy blando y de color pardo rojizo.

De 28.40m a 60.90m, se observo una roca intrusiva Diorita de color gris claro-verde con textura fanerítica de dureza media, de buena recuperación.

Alteración: En gral. se observa cierta propilítica con minerales asociados a esta alteración, tales como epidota y clorita.

Mineralización: En gral. esta se presenta en D3V con leyes promedio de Py = TrD, Cpy = Tr, con mas contenido de minerales de tenantita y wat por lo q' aumenta la ley de cobre.

Observaciones: La zona de oxidación se presenta en todo hematítica > goethita, las fracturas por lo regular se encuentran rellenadas por oxidos.

Muestra	De	A	Intervalo	Tamaño núcleo	% Rec	G.E	Cu-ox	Ensayes % CuTotal	Ensayes % Mo	Mineralización						Alteración					
1	0.00	3.00	3.00	HQ	4	2.47	–	0.038	0.009												
2	3.00	7.60	4.60	/	30	2.37	–	0.101	0.007												
3	7.60	9.90	2.30	/	53	2.36	–	0.077	0.004												
4	9.90	12.90	3.00	/	71	2.32	–	0.067	0.006												
5	12.90	15.90	/	/	67	2.32	–	0.048	0.007												
6	15.90	18.90	/	/	63	2.21	–	0.055	0.005												
7	18.90	21.90	/	/	58	2.00	–	0.054	0.002												
8	21.90	24.90	/	/	48	2.45	–	0.067	0.003												
9	24.90	27.90	/	/	65	2.36	–	0.100	0.005												
10	27.90	30.90	/	/	63	2.45	0.05	0.098	0.003	M	TrD	Tr			Dlu	Tr	Tr				M
11	30.90	33.90	/	/	100	2.20	0.05	0.144	0.004	MF	TrD	Tr			/	D	D				DM
12	33.90	36.90	/	/	75	2.62	0.05	0.141	0.004	MF	TrD	Tr			/	D	DM				DM
13	36.90	39.90	/	/	68	2.19	0.05	0.248	0.010	MF	TrD	Tr			/	DTr	DM				MD
14	39.90	42.90	/	/	78	2.42	0.05	0.116	0.003	MF	TrD	Tr			/	D	MD				MD
15	42.90	45.90	/	/	95	2.55	0.15	0.138	0.003	MF	TrD	Tr			/	DTr	DM				MD
16	45.90	48.90	/	/	97	2.45	0.05	0.131	0.005	MF	TrD	Tr			/	DTr	DM				DM
17	48.90	51.90	/	/	93	2.43	0.05	0.086	0.002	MF	TrD	Tr			/	DTr	MD				DM
18	51.90	54.90	/	/	100	2.31	0.05	0.111	0.00[illegible]	MF	TrD	Tr			/	DTr	MD				MD
																TrD	DM				
19	54.90	57.90	/	/	97	2.20	0.05	0.138	0.005	MF	DTr	Tr			/	D	D				DM
20	57.90	60.90	/	/	100	2.28	0.05	0.218	0.008	MF	DTr	Tr			/	D	D				DM

Source: LC logging protocol document "Logueo Geológico de Barrenación a Diamante.pdf"

7.2.3 Exploration Drill Sample Recovery

The core recovery was measured by the core logging geologist or their assistant. The geologist first verified that the lengths of the run matched those reported by the driller. Then, the core was carefully reorientated in the box and the corresponding run was measured

In the ore zones, a core recovery of 85% was considered the minimum acceptable, with the exception of fractured zones or zones with tectonic features. The instances of lower recovery within fractures zones were detailed in the geological log to explain the lower recovery.

Core recovery was calculated using the following formula:

$$\text{Recovery} = \frac{\text{Sample Mass (kg)}}{(\text{Interval Length (m)}) * (\text{SG}) * (\text{Core Diameter Constant})}$$

Diameter constant = HQ= 31.1669

La Caridad have recorded core recovery data since August 2020. There are no records of core recovery from any previous drilling campaigns. Table 7.2 summarizes the core recovery for the drilling conducted since August 2020 by month.

Table 7.2: Summary of Core Recovery

Year	Month	Drill Hole Count	Mean Core Recovery (%)
2020	Aug	3	94.7
	Sep	8	94.9
	Oct	12	93.1
	Nov	18	89.5
	Dec	7	90.7
2021	Jan	12	91.8
	Feb	10	92.2
	Mar	14	88.6
Total		**84**	**91.8**

7.2.4 Exploration Drill Hole Location of Data Points

Prior to setting up the drill rig on a new drill hole, the La Caridad Project senior geologist is responsible for locating the planned drill hole location with a handheld global positioning system (GPS) according to the planned X, Y, Z coordinates. The location measurements are taken before drilling starts and at the completion of drilling. In order to check the accuracy of the handheld GPS, known reference points were used to tie in the measurements.

In cases where the drill hole was inclined and not vertical, the drill rig was orientated in the specified direction and inclination. Once the drill rig was positioned, the geologist responsible for the drilling campaign confirmed the drill rig orientation with a compass and the dip with an inclinometer.

The decision to terminate the drilling of the hole was made by the responsible La Caridad's geologist, before or after the scheduled depth. The core boxes were transported daily to the assigned warehouse by the drilling company. Once the drill hole was completed, the drilling company made a concrete cairn around the casing and a piece of pipe of PQ (85.0- mm core diameter), or HQ (63.5-mm core diameter) size was embedded with the name of the drill hole engraved in the concrete. The pipe was sealed and padlocked for security. An example of a completed drill site is shown in Figure 7.6.

Figure 7.6: Example of a Completed Drill Hole Site

Once the drilling was completed, a precision topographic location survey was carried out using a Trimble R10 y R12 GPS. The surveyed coordinates were incorporated into the drill hole database

The La Caridad geologist responsible for the Project maintained a daily control of the drill holes, which included monitoring of drilling, changes in drill size diameters or casing, control of areas with water inflows, mud or string seizure losses, pipe breaks or any other incident. In general, water levels were measured at shift changes as well as during any period where the rig was shut down. All drilling information was captured in the driller's daily report, which was signed by the geologist on a daily basis and a copy was stored for record.

7.2.5 Exploration Drill Hole Data Spacing and Distribution

The approximate drill hole spacing in the core (where the existing pit is) of La Caridad main is 50 m. Outside the core and in Bella Union, the approximate drill hole spacing varies from 100 m to 200 m.

The QP considers the drill hole spacing sufficient to establish geological and grade continuity appropriate for Mineral Resource Estimates.

7.2.6 Qualified Person's Statement on Exploration Drilling

The QP is not aware of any drilling, sampling, or recovery factors that could materially affect the accuracy and reliability of the results of the recent exploration drilling. However, as core recovery measurements only began in

2020, there is a degree of uncertainty with the historical drilling data. The data are well documented via original digital and hard copy records and were collected using industry standard practices in place at the time. All data has been organized into a current and secure spatial relational database. The data has undergone thorough internal data verification reviews, as described in Section 9.0 of this TRS.

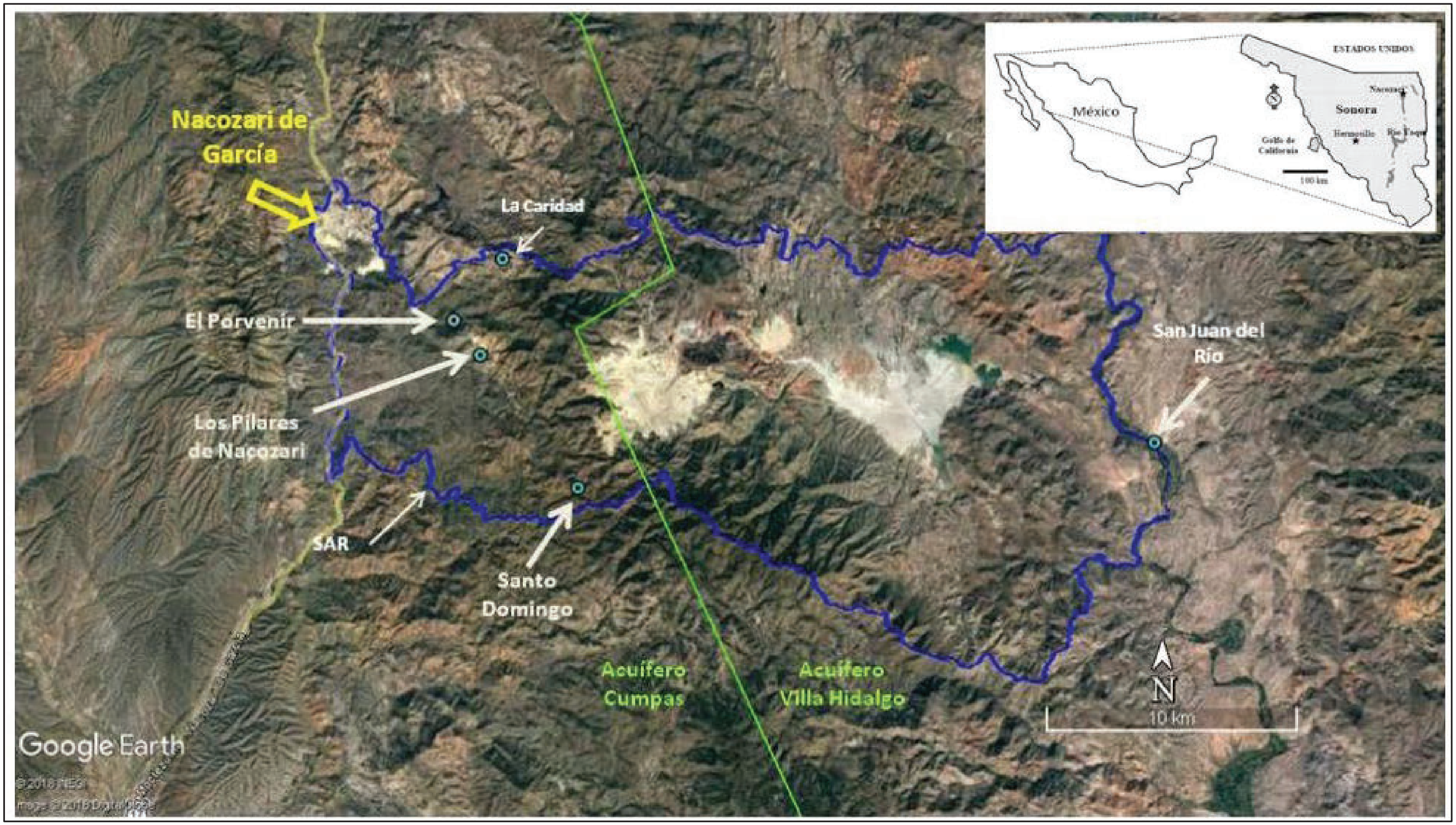
7.3 Hydrological Characterization

No hydrological or hydrogeological specific drilling has been completed at La Caridad or Bella Union to date. The following sections present a review of the hydrological characterization studies completed.

An aquifer vulnerability study per the requirements of NOM-141-SEMARNAT-2003 was carried out in 2018 by TAAF for the area of the mining complex (TAAF 2018). This study relied on government publications, reports, and peer reviewed articles regarding water availability to prepare a description of the hydrogeologic setting. Information from available sources was verified through a field visit to verify the lithological units and corroborate information regarding the rock formation properties and geologic structures (that is, faults and fractures).

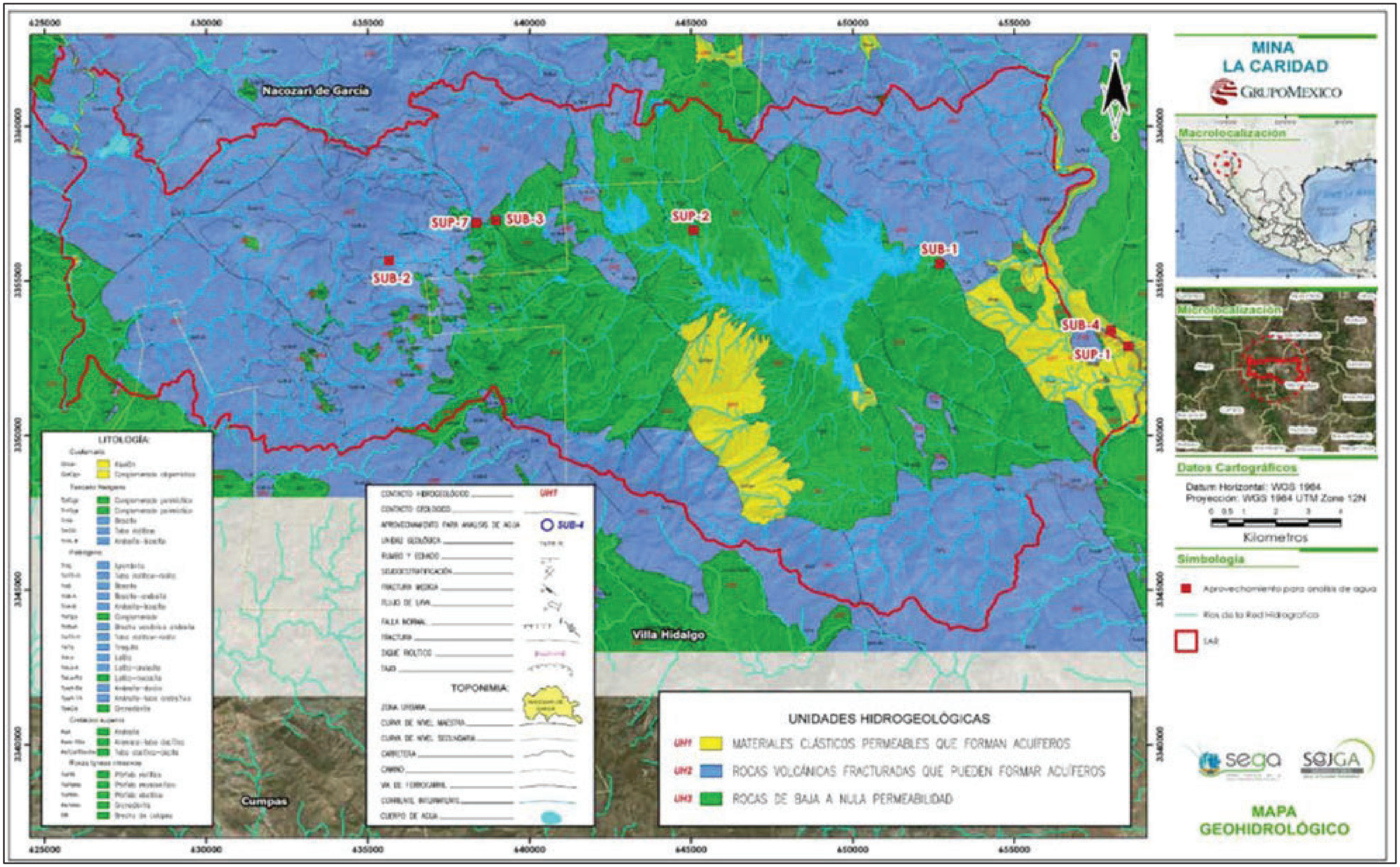
The Mexican government has designated two aquifers within the La Caridad mining complex that include the Cumpas and Villa Hidalgo aquifers, as shown on Figure 7.7. These designations are administrative areas with a calculated water availability volume and have been identified by CONAGUA based on administrative boundaries, surface hydrologic basins, geologic setting and limited aquifer testing data. Both aquifers are described as unconfined with an upper zone of unconsolidated materials (clastic deposits) and poorly consolidated conglomerates and a lower zone of volcanic and sedimentary rocks that exhibits secondary porosity related to fracturing. In some areas there is a third, deeper bedrock formation of low to very low permeability. These hydrogeologic units outcrop in different areas of the mining operations, as shown in Figure 7.8. The upper zone is considered to have high hydraulic conductivity and the lower zone has relatively low hydraulic conductivity.

Figure 7.7: Hydrogeologic Study Area and Environmental Area of Influence (within blue line)



Source: TAAF, 2018

Figure 7.8: Hydrogeological Units



Source: SOJGA and SEGA, 2017

Hydrogeologic characterization within the mine complex has been very limited. The TAAF report (2018) relied on the water availability reports published by CONAGUA for any hydraulic parameter data. CONAGUA water balance models commonly used indirect methods to determine vertical recharge of aquifers and empirical equations to determine evapotranspiration rather than measured data. Groundwater pumping data was based on authorized concession volumes and do not take into account all extractions from the aquifer. Some hydraulic parameters from the CONAGUA reports were obtained from previous studies and by correlating information available from adjacent aquifers, however the method used to determine the hydraulic parameters is unknown.

A geotechnical report (Golder, 2014) for the construction of the Guadalupe heap leach facility (HLF) indicated that groundwater appeared to be at or close to the ground surface in the bottom of Guadalupe Arroyo. Permeability testing indicated that the upper zone exhibited high permeability (1x10-3 to $1x10^{-4}$ centimeters per second [cm/s] in the upper 9 m to 12 m) and fresh bedrock had generally low permeability ($1x10^{-5}$ to $5x10^{-5}$ cm/s in the underlying bedrock) based on packer testing in vertical drill holes. The geotechnical report concluded that the amount of infiltration from the pregnant leach solution (PLS) pond to groundwater would not impact geotechnical stability of the dam, but could be an environmental concern. Upper, fractured bedrock and fault zones had representative porosity of 1% to 20%, whereas the fresh, unfractured bedrock had representative porosity of 0.05% to 1%.

A hydrogeologic study (Ingenieros Civiles y Geologos Asociados, 2005) that reviewed the Cruz de Canada arroyo, which contains the TSF 7, indicated that the surficial materials are alluvium with a thickness of about 50 m, underlain by fractured rock of about 30 m thick. The hydraulic gradient was between 0.1% and 1%. It was assumed that the hydrogeologic conditions were similar downstream from the TSF 7. The study indicated that the hydrogeologic conditions at the La Francisca PLS pond would be permeable units of alluvium (mean of 10^{-3} meters per second [m/s]) and the fractured rock (granodiorite) had a permeability of about $2x10^{-6}$ m/s.

Seepage in the open pit has been observed, but it was reported to be minimal, and the benches do not become saturated. The seepage could be primarily from infiltration of rainwater (perched zone) and not from the regional aquifer; however, there was no demonstration that verifies the hydrogeologic setting.

The occurrence of groundwater and the characteristics of the aquifer at La Caridad are described based on few site-specific studies and primarily on regional information. Little hydraulic testing has been carried out at the site, and no hydrogeologic model has been prepared. Little is known about the influence of faults on the groundwater regime. Groundwater elevation monitoring and the development of groundwater contour maps are not carried out. The site has not determined groundwater flow directions and gradient.

The groundwater conditions at Pilares and Bella Union have not been characterized.

7.3.1 Groundwater Balance Results

Results from CONAGUA´s groundwater balance reports for the Villa Hidalgo and the Cumpas aquifers from 2014 state that there is groundwater extraction availability for both aquifers. There is no site-specific groundwater model.

La Caridad does not use groundwater for its freshwater supply.

7.3.2 Qualified Person's Statement on Hydrogeological Characterization

In the QP's opinion, the hydrogeologic setting at the current and planned operations has not been adequately characterized. The lack of groundwater characterization will not impact water availability because the water concession is based entirely on a surface water reservoir. For the current pit operations, the groundwater inflows to the pit are not problematic. It is unknown whether the Pilares or Bella Union future developments will need a more rigorous dewatering system.

The larger risk to the operations is associated with the potential environmental impacts from the mining operations from contaminant migration to the aquifer and the lack of understanding regarding infiltration impacts and the direction of groundwater flow (see Section 17.0 for more discussion on the environmental impacts to groundwater).

7.4 Geotechnical Drilling

Geotechnical drilling and sampling was completed by Call & Nicholas, Inc. (CNI) from February through April 2019. Additional geomechanical and structural data were obtained from a 2003 drilling campaign that consisted of ten cored drill holes. Logs of the 2003 drill holes were not included in CNI (2019) report. Structural data was collected by CNI from orientated core data from the two drilling programs and by cell mapping conducted by La Caridad and CNI personnel. Discrete orientation data for major faults was obtained by CNI from structure geology maps available for the La Caridad and Bella Union areas. Additional description of these data sources is provided in Sections 7.4.1 through 7.4.3.

7.4.1 Geotechnical Surface Mapping

Rock fabric are geological structures, mainly fractures and joints, which break the intact rock into more or less discrete blocks. They are too numerous or too short to be mapped individually, and therefore are treated statistically in a slope-design analysis. The fabric data utilized to conduct the assessment of jointing characteristics throughout the area of the La Caridad pit plans were collected by bench cell-mapping and oriented core drilling. The rock fabric databases included the following:

- Cell-mapping data from mapping programs conducted in 2001, 2003, 2018, and 2019.
- Fracture orientation data from the nineteen geotechnical oriented core holes: ten drilled in 2003, and nine for this study in 2019.

From these data, CNI developed the following structural domains:

- Structural Domain 1 – La Caridad West Wall (Quartz-Feldspar Porphyry + Diorite + Intermediate Breccia + Volcanics)
- Structural Domain 2 – La Caridad Southeast Wall and Bella Union pit (Granodiorite)
- Structural Domain 3 – La Caridad East Wall (Late Porphyry)
- Structural Domain 4 – La Caridad Northeast (Late Breccia)

From the structure geology maps, CNI identified three major structural trends that are present in the La Caridad Pit:

- A northwest-southeast set that is dipping west with dips ranging between 55 and 85 degrees and regionally has the longest lengths.
- A northeast-southwest set that was interpreted as extensional fractures formed during the Laramide Orogeny as a response to regional sinistral movement. In the pit area, this set is represented by two families of conjugate dip-directions. The first is dipping northwest, with dips ranging between 60 and 80 degrees, and the second is dipping southeast, with dips ranging between 40 and 90 degrees.
- An east-west set that exhibits relatively short persistence and limited occurrence. The set was interpreted as extensional fractures formed by the interaction between the NW and SE structures.

The La Caridad and Pilares faults form an additional family, interpreted as post-mineral structures, and formed during Basin and Range extension. A lower hemisphere stereonet project of the major structure data collected by CNI is shown in Figure 7.10.

Figure 7.9 : CNI Structural Domain Map

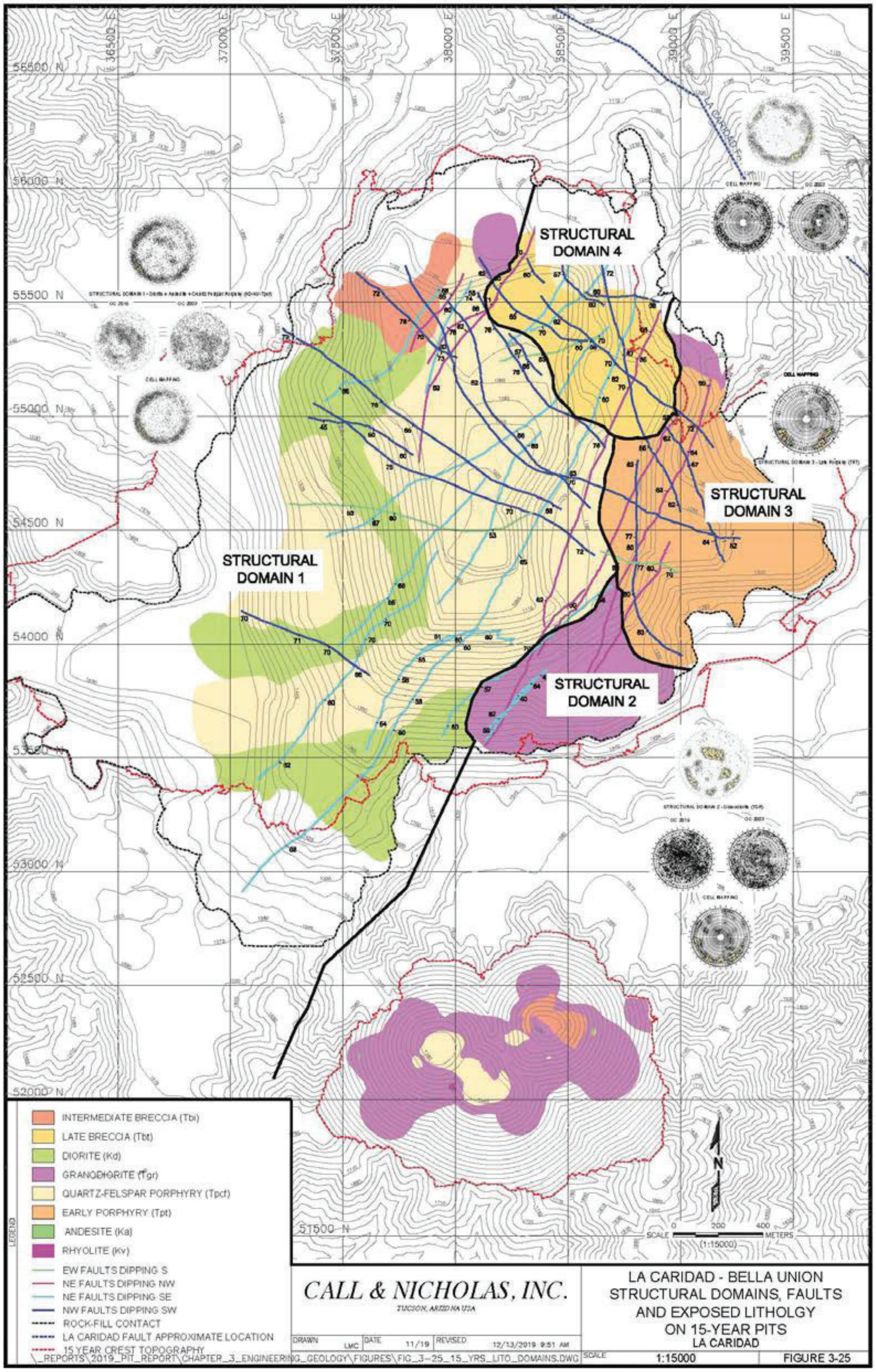
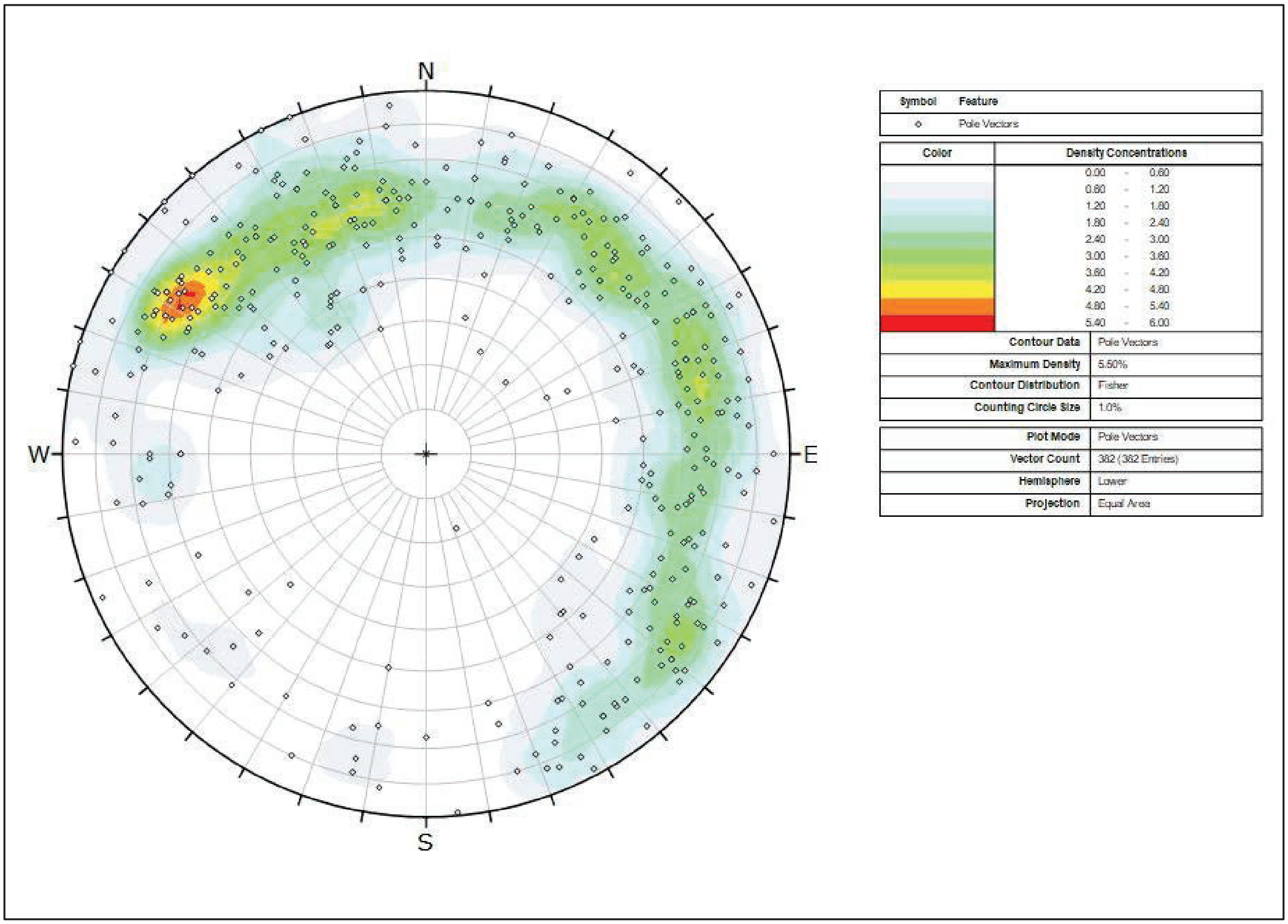


Figure 7.10: Stereographic Project of Major Faults



7.4.2 Geotechnical Core Drilling Program

Geomechanical properties, including rock quality designation (RQD) index, fracture frequency and number of joint sets were collected during drilling of the nine (9) oriented geotechnical drill holes, supervised by CNI personnel, that were drilled from February 2019 through April 2019. The drilling method was not specified; however, the core samples tested in the laboratory have a diameter that indicated HQ3 (61.1 mm core diameter) triple tube coring was used to obtain the core. In addition to the 2019 drill holes, designated BD-O11 through BD- O19, CNI obtained drill hole data from the following sources:

- 10 oriented core holes drilled for the 2003 study (BDO1 – BDO10)
- 61 vertical drill holes with geotechnical information (B605 – B677, and V010)

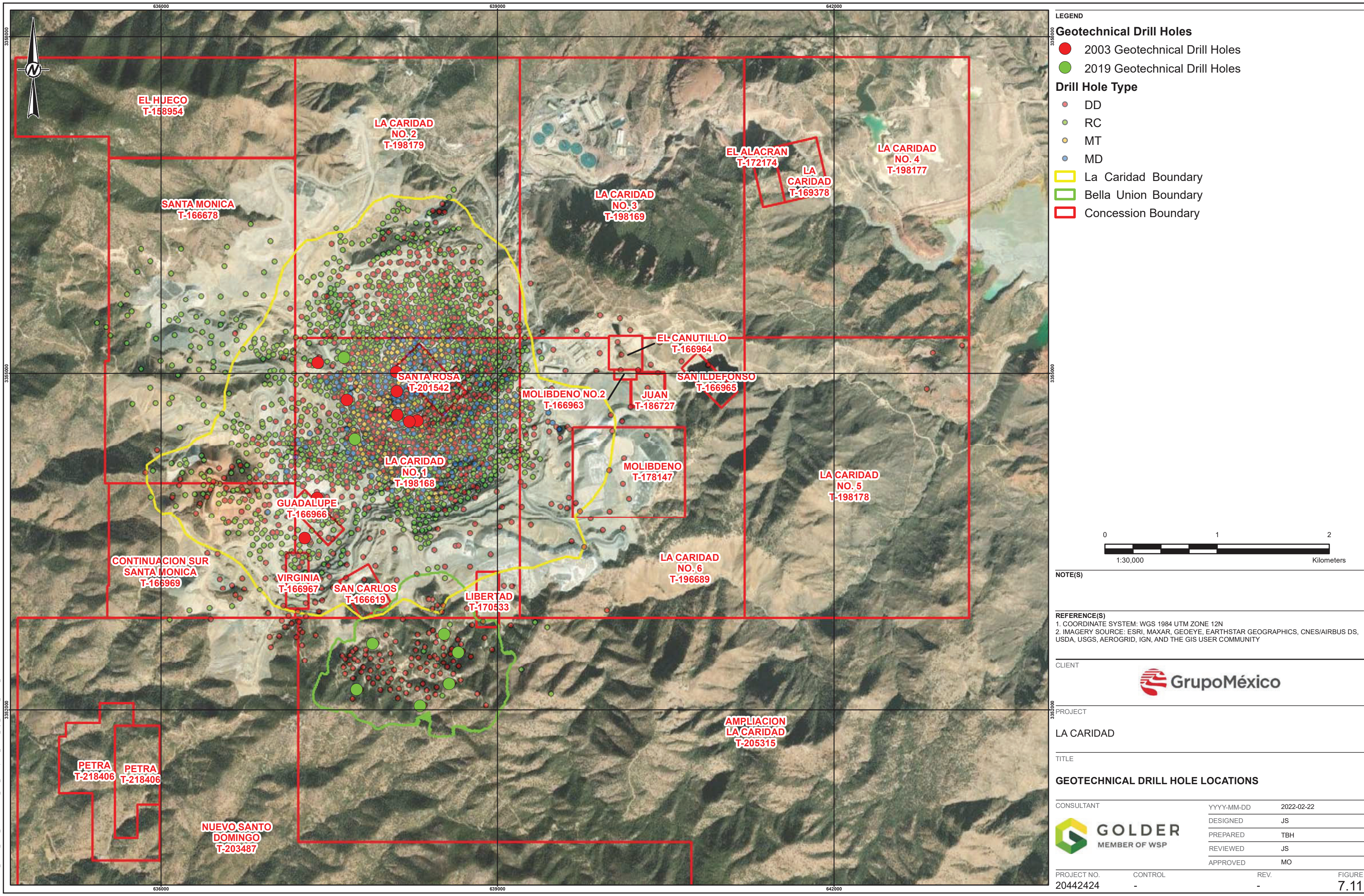
Table 7.3 provides a summary of the locations and orientations of the 2003 and 2019 oriented drill holes. Figure 7.11 illustrates the drill hole locations relative to the exploration drilling and the La Caridad and Bella Union boundaries.

Table 7.3: Summary of Geotechnical Drilling

Drill Hole ID	Easting (m)	Northing (m)	Azimuth (°)	Inclination (°)	Elevation (m)	Total Depth (m)	Year
BDO1	638,100	3,354,831	355.0	-55.0	1,367.5	310.0	2003
BDO2	638,251	3,354,698	88.0	-55.0	1,395.2	369.9	2003
BDO3	638,109	3,354,449	220.0	-55.0	1,455.5	490.0	2003
BDO4	638,287	3,354,397	499.0	-55.0	1,429.3	130.0	2003
BDO5	637,400	3,354,915	210.0	-55.0	1,453.1	349.6	2003
BDO6	638,217	3,354,390	180.0	-55.0	1,443.0	472.7	2003
BDO7	638,104	3,354,659	285.0	-55.0	1,410.3	450.2	2003
BDO8	637,659	3,354,583	230.0	-60.0	1,422.5	320.0	2003
BDO9	637,396	3,353,709	315.0	-60.0	1,581.2	200.3	2003
BDO10	637,284	3,353,352	225.0	-55.0	1,552.7	360.3	2003
BDO-11	637,634	3,354,960	257.3	-75.5	1,265.5	300.0	2019
BDO-12	637,731	3,354,232	256.3	-74.8	1,336.7	214.1	2019
BDO-13	638,181	3,353,884	188.7	-75.4	1,381.9	300.0	2019
BDO-14	637,888	3,352,410	351.3	-74.8	1,596.6	300.0	2019
BDO-15	637,745	3,352,002	229.5	-75.0	1,643.3	300.0	2019
BDO-16	638,526	3,352,494	18.0	-74.2	1,660.4	300.0	2019
BDO-17	638,652	3,352,333	85.4	-74.9	1,652.1	290.0	2019
BDO-18	638,570	3,352,053	154.0	-75.7	1,769.3	300.0	2019
BDO-19	638,312	3,351,856	160.2	-76.1	1,693.8	285.9	2019

Note: Coordinates in NAD 1927 UTM Zone 12 N

The RQD data from these sources was used by CNI to generate an RQD block model to define areas of different rock quality. RQD can be used as a method of assessing rock quality as it relates to the degree of fracturing within the in-situ rock mass. The block model was estimated using Ordinary Kriging (OK), with a five-pass estimation technique and is used by CNI in the geotechnical analysis.



EL HUECO
T-158954
LA CARIDAD
NO. 2
T-198179
SANTA MONICA
T-166678
LA CARIDAD
NO. 3
T-198169
EL ALACRAN
T-172174
LA
CARIDAD
T-169378
LA CARIDAD
NO. 4
T-198177
EL CANUTILLO
T-166964
SAN ILDEFONSO
T-166965
SANTA ROSA
T-201542
MOLIBDENO NO.2
T-166963
JUAN
T-186727
LA CARIDAD
NO. 1
T-198168
MOLIBDENO
T-178147
LA CARIDAD
NO. 5
T-198178
GUADALUPE
T-166966
CONTINUACION SUR
SANTA MONICA
T-166969
VIRGINIA
T-166967
SAN CARLOS
T-166619
LIBERTAD
T-170533
LA CARIDAD
NO. 6
T-196689
AMPLIACION
LA CARIDAD
T-205315
PETRA
T-218406
PETRA
T-218406
NUEVO SANTO
DOMINGO
T-203487
636000
639000
642000
LEGEND
Geotechnical Drill Holes
2003 Geotechnical Drill Holes
2019 Geotechnical Drill Holes
Drill Hole Type
DD
RC
MT
MD
La Caridad Boundary
Bella Union Boundary
Concession Boundary
0
1
2
1:30,000
Kilometers
NOTE(S)
REFERENCE(S)
1. COORDINATE SYSTEM: WGS 1984 UTM ZONE 12N
2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY
CLIENT
GrupoMéxico
PROJECT
LA CARIDAD
TITLE
GEOTECHNICAL DRILL HOLE LOCATIONS
CONSULTANT
GOLDER
MEMBER OF WSP
YYYY-MM-DD 2022-02-22
DESIGNED JS
PREPARED TBH
REVIEWED JS
APPROVED MO
PROJECT NO. 20442424
CONTROL -
REV. -
FIGURE 7.11

7.4.3 Laboratory Testing

The laboratory testing program included tests of intact rock strength and shear strength of discontinuities and fault gouge. A summary of these testing programs is listed in the following sections.

7.4.3.1 Intact Rock Strength

Laboratory testing of core samples for intact rock strength provided the following geotechnical data:

- 73 Uniaxial Compressive Strength (UCS) tests plus rock density
- 50 Brazilian Indirect Tensile Strength tests
- 37 Triaxial Compressive Strength tests

The laboratory testing methods used to determine the rock strength are the standard methods recommended in Read and Stacey, 2009. CNI performed all laboratory testing in their Geotechnical laboratory located in Tucson, Arizona. Golder's review of the laboratory testing data sheets found that the data reported, and derivation of the test results generally followed the ASTM standards for Uniaxial Compressive Strength Tests (ASTM D7012 Method C) and Brazilian Indirect Tensile Strength Tests (ASTM D3967).

CNI used a method of estimating rock mass strength that was bracketed by the intact rock strength and the fracture shear strength, which they developed (Call et al, 2000), (Read and Stacey 2009). The technique was developed from a rational basis and commonly produced comparable results to more conventional techniques for developing rock mass strength estimates when Golder has the data available to compare results. A summary of the derived intact rock strengths is provided in Table 7.4. Based on the data presented, the results of the method of rock mass strength analyses produce results that are reasonable for the geotechnical material characterizations presented.

Table 7.4: Summary of Intact Rock Strength Laboratory Testing

Rock Type	Mean Uniaxial Compression (psi)	Disk Tension (psi)	Estimated Intact Shear Strength	
			phi (°)	Cohesion (psi)
Cretaceous Diorite /Andesite (oxide)	7,171.0	1,248.0	38	1,465.86
Cretaceous Diorite /Andesite	20,275.8	1,857.5	47.87	3,007.11
Tertiary Quartz-Feldspar Porphyry (oxide)	8,807.7	1,235.0	41.6	1,616.07
Tertiary Quartz-Feldspar Porphyry	24,590.8	2,023.6	49.29	3,456.55
Tertiary Granodiorite (oxide)	7,104.0	1,184.0	38.75	1,421.10
Tertiary Granodiorite	27,135.4	1,865.6	51.52	3,486.42
Tertiary Early Porphyry	24,590.8	2,023.6	49.29	3,456.55
Tertiary Intermediate Breccia (oxide)	5,369.2	894.9	38.75	1,074.06
Tertiary Intermediate Breccia	15,033.6	1,724.7	44.69	2,495.05

CNI's description of the primary lithologic units included in Table 7.4 is provided below:

- Andesite (Ka) – Diorite (Kd): Both of similar composition, these are differentiated by their crystalline texture, with the andesite having an aphanitic texture. Both rocks are of Cretaceous age, andesite being the oldest rock in the area and forming the host rock for the deposit. Andesite is intruded by diorite dikes that range from fine to coarse grain texture. Locally, there are breccias consisting of diorite and andesite (Bda). In the current geology model, they are grouped as diorite and are in the southwest and west walls of the La Caridad pit.
- Granodiorite (Tgr): This Tertiary age intrusion has the greatest extent and occupies the east part of the deposit. It is present in the south wall of the La Caridad pit, and as two small outcrops in the north and northeast walls of the same pit. It will be the main rock type in the Bella Union area.
- Early Porphyry (Tpt): This Tertiary age unit has the same chemical composition as the Quartz – Feldspar Porphyry. It is located in the east part of the deposit and comprises a large portion of the east wall of the La Caridad pit.
- Quartz – Feldspar Porphyry (Tpcf): This unit of Tertiary age (Laramide) is the productive rock in the deposit and intrudes the contact between diorite/andesite rocks and the granodiorite. It is in the central part of the La Caridad pit and is also present in the south wall intruding the diorite. In Bella Union area, it is present as a small body intruding the granodiorite at the center of the pit.
- Large bodies of siliceous hydrothermal breccia are located around and, in the quartz-feldspar porphyry. The breccia is monolithic to polymictic, depending to the adjacent rocks, and is related to the intrusion of the porphyry complex. Three breccias are distinguished:
  - Intermediate Breccia (Tbi): This consists mainly of fragments of diorite and dacite. One body of this breccia is located on the north part of the pit and another smaller one in the pit bottom.
  - Late Breccia (Tbt): This is present in the northeast walls of the pit. It is composed of porphyry and granodiorite fragments.
  - Bella Union Breccia: Located in the center of the Bella Union area. No information was available about the characteristics of this unit, and for the purposes of this study, it was assumed to be geotechnically like the intermediate breccia.

7.4.4 Strength of Structural Defects

Shear strength of structural defects was measured from 47 direct-shear tests, which were distributed among the rock types as shown in Table 7.5. An additional two tests were performed on samples of fault gouge obtained as block samples from the 1365 bench and the 1410 bench. A summary of the estimated mean shear strength of the fractures and fault gouge is listed in Table 7.5.

Table 7.5: Summary of Fracture and Fault Gouge Shear Strengths

Rock Type	No. of Tests	Estimated Mean Shear Strength	
		phi (°)	Cohesion (psi)
Tertiary Late Breccia	3	29.63	4.81
Tertiary Intermediate Breccia	2	28.57	3.96
Tertiary Quartz Feldspathic Porphyry	15	28.36	4.42
Tertiary Early Porphyry	1	27.82	7.44
Tertiary Granodiorite	15	28.64	5.64
Tertiary Diorite-Andesite Breccia	4	26.33	0.82
Cretaceous Diorite	7	30.85	5.57
Fault Gouge	2	10.55	22.45

7.4.5 Qualified Person's Opinion

The QP is not aware of any drilling, sampling, or recovery factors that could materially affect the accuracy and reliability of the results of the historical geotechnical drilling and sampling. The data are well documented via original digital and hard copy records and were collected using industry standard practices in place at the time. All data has been organized into a current and secure spatial relational database. The data has undergone thorough internal data verification reviews, as described in Section 9.0 of this TRS.

8.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

8.1 Site Sample Preparation Methods and Security

All sampling was completed by geologists employed by LC, or the previous operators, depending on the program. The QP was not directly involved during the exploration drilling programs or sample selection. Based on review of the procedures during the site visit and subsequent review of the data, it is the opinion of the QP that the measures taken to ensure sample representativeness were reasonable for the purpose of estimating Mineral Resources.

Several different sampling techniques have been used on the Project since 1968. The nature and quality of the sampling from the various sampling programs is summarized in the following sections.

8.1.1 Sampling Techniques and Preparation

During the geological logging process, the intervals and type of sampling were selected for the different analyses (geochemical, petrographic, polished sections, etc.). La Caridad sampling protocols stated that samples should be no more than 3.05 m and no less than 60 cm. A new sample was taken when changes in mineralization, lithology, or rock quality changes were observed even if located within the mineralized zone. When sampling for geochemical analyses, the core recovery was taken into consideration to ensure the representativeness of the sample. If there was a zone of, for example, 60-70% recovery between zones of 100%, the lower recovery zone must be taken independently in the sampling. Likewise, if there were fine levels of mineralization between zones of massive or stockwork, it was also taken as an independent sample.

8.1.1.1 RC Drilling

Samples from RC drill holes were recovered and quartered successively, from 40 kg of total sample. A 5-kg sub-sample was then obtained, which was passed through a Jones Splitter to continue quartering and homogenizing until between 1.5 kg and 2.0 kg of sample was obtained to send to the laboratory (Figure 8.1). If the sample was wet, the Jones Splitter was replaced by a mechanical splitter.

The recovered pulps at a #150 mesh (100 micron) size, were routinely prepared and preserved from each sample for future reference and assay verification. RC samples were composited according to pit bench elevations and heights.

Figure 8.1: Jones Splitter – RC Sample Splitter, Left, Mechanical Splitter, Right

8.1.1.2 Core Drilling

Drill cores were carefully handled from the time they were obtained at the drill collar and placed sequentially in boxes in the orientation indicated by the drill site logging geologist. Core was placed in the core box from top to bottom and left to right in the order in which it comes out of the core barrel. The drilling depth was marked on a wooden block and placed at the appropriate depth in the core boxes. The boxes were properly labeled with the drill hole name, box number and interval.

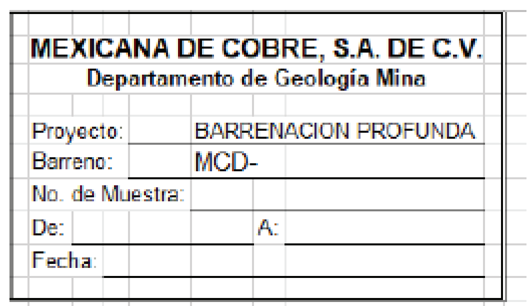
Boxes and bags of samples obtained from the drilling were transferred to storage in a vehicle by the drilling company personnel, where the geological and geotechnical logging was completed. Core size was either PQ or HQ.

Core photography with a digital camera was part of the standard procedure for core logging. Each full core box was photographed from the top to show the core box in its entirety. Each core box had a placard indicating the drill hole number, corresponding box number and the beginning and end of the core interval in the box. The core was photographed wet in order to highlight lithological and mineralization details. Before taking the photograph, the geologist verified that the intervals noted by the drillers are correct and legible, and made sure that the core was correctly positioned and clean. The orientation of the casing was indicated with a block showing the start and end of the casing, and an arrow showing the direction of drilling and progress.

The drill hole was cut by dividing the core into two equal halves; guiding lines were drawn on the core in green and red, which indicated the right and left halves respectively. If it was possible to know the orientation of the drill hole, the core was oriented in such a way that there was always continuity in the half core to be analyzed. One half of the core was retained in a core box and the other half was divided into two; one quarter was retained for reference sample purposes while the remaining quarter was used in the preparation of samples for geochemical analysis.

For the geological sampling of exploration drill holes, the elevation was very important because the height of the bench is 15 m. To identify bench samples, a red label was placed at the bottom of the sample, with the elevation of the bench and sample number identified (Figure 8.2).

Figure 8.2: Example of a Logged and Sampled Drill Hole

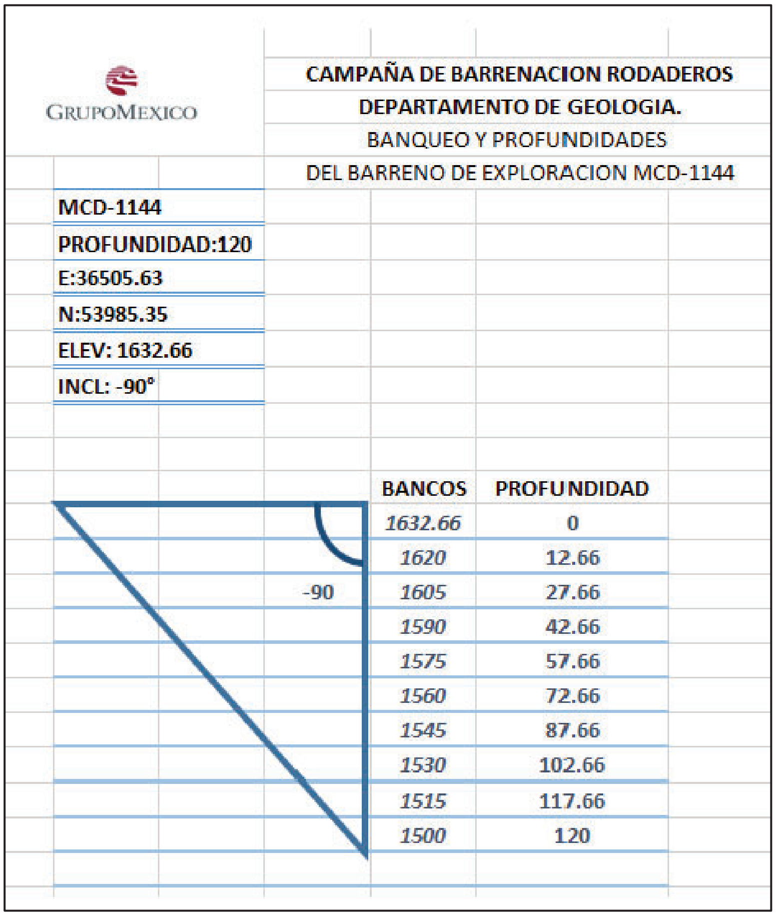


MEXICANA DE COBRE, S.A. DE C.V.
Departamento de Geología Mina

Proyecto:	BARRENACION PROFUNDA
Barreno:	MCD-
No. de Muestra:	
De:	A:
Fecha:	

Figure 8.3 illustrates a bench identification for drill hole MCD-1144, which starts at elevation 1632.66 m. As the closest bench was 1635 m, after 12.66 m a new bench was marked at an elevation 1620 m.

Figure 8.3: Example of Bench Identification in Drill Hole MCD-1144



BANCOS	PROFUNDIDAD
1632.66	0
1620	12.66
1605	27.66
1590	42.66
1575	57.66
1560	72.66
1545	87.66
1530	102.66
1515	117.66
1500	120

8.1.1.3 Sample Preparation

The following sample preparation techniques were used for all samples processed at the internal SCC laboratory, Laboratorio de Unidad La Caridad in Nacozari, Sonora. The Laboratorio de Unidad la Caridad is ISO 9001:2015 certified. The mechanical sample preparation generated one set of three pulps per sample weighing approximately 100 g. Each pulp was identified with the drill hole number, bench and sample number. Once pulp samples were prepared the samples were processed as follows:

- 1 pulp sent to the Geochemical Laboratory.
- 2 pulps were stored for reference.

The procedure at the laboratory for both DDH and RC samples was as follows:

- Samples were received at the laboratory and catalogued
- Samples were weighed
- Samples were crushed to ½ inch, and placed in a labelled bucket (drill hole, bench, sample number)
- The sample was reduced by a Cone Crusher Nº6 and homogenized 10 times with the Jones Medium cutter, reducing the sample to 100 g

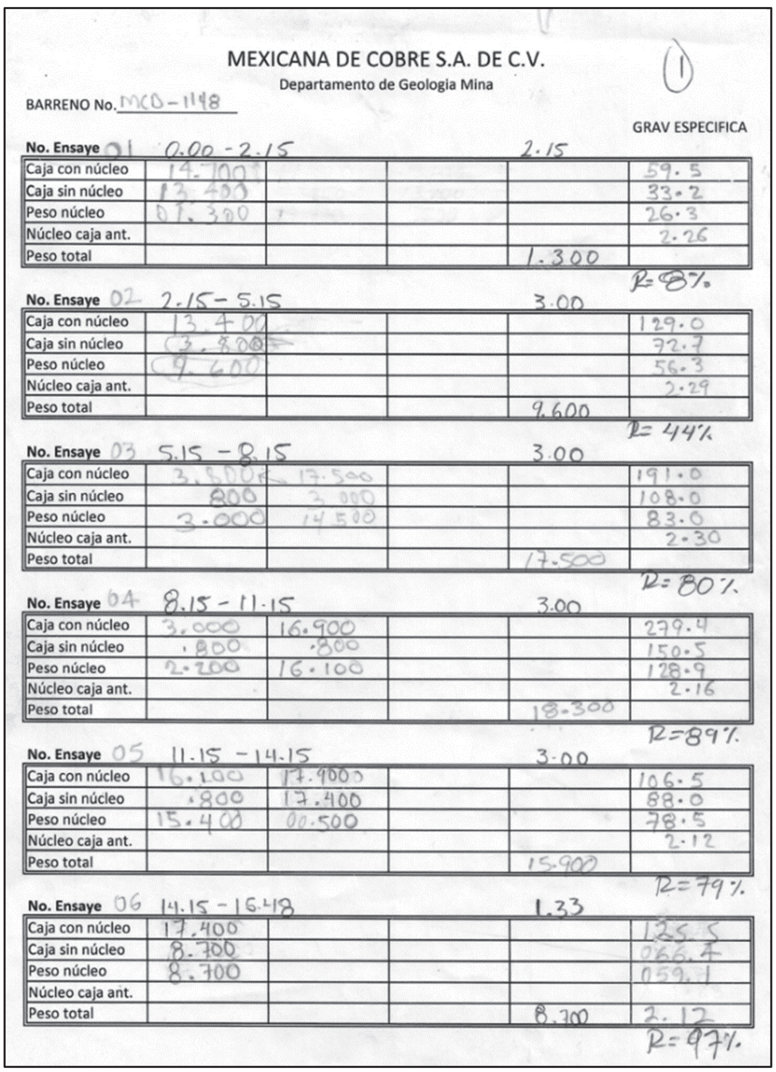
- Samples were dried for 2 hours
- Sieved and pulverized to -100 mesh (0.147 mm)
- Samples were then homogenized, split and distributed into three labeled envelopes

The leftover samples were organized and stored for future reference or assay verification.

For the recent drilling, SG determinations were routinely completed on samples submitted to the laboratory. The measurement was based on obtaining the dry mass and wet mass of each interval sampled in a core drill hole.

An electronic scale was used for SG determinations on small core samples (samples from 0 m to 3 m). Core samples were dried and weighed in air as well as submerged in water. The mass measurements were entered into an MS Excel spreadsheet and the SG was then calculated. An example for drill hole MXD-1148 is illustrated in Figure 8.4.

Figure 8.4: Example of SG Report for Drill Hole MXD-1148



MEXICANA DE COBRE S.A. DE C.V.
Departamento de Geologia Mina

BARRENO No. MXD-1148 (1)

GRAV ESPECIFICA

No. Ensaye 01 0.00 - 2.15 2.15

Caja con núcleo	14.700				59.5
Caja sin núcleo	13.400				33.2
Peso núcleo	01.300				26.3
Núcleo caja ant.					2.26
Peso total				1.300	

R=8%

No. Ensaye 02 2.15 - 5.15 3.00

Caja con núcleo	13.400				129.0
Caja sin núcleo	3.800				72.7
Peso núcleo	9.600				56.3
Núcleo caja ant.					2.29
Peso total				9.600	

R= 44%

No. Ensaye 03 5.15 - 8.15 3.00

Caja con núcleo	3.800	17.500			191.0
Caja sin núcleo	.800	3.000			108.0
Peso núcleo	3.000	14.500			83.0
Núcleo caja ant.					2.30
Peso total				17.500	

R= 80%

No. Ensaye 04 8.15 - 11.15 3.00

Caja con núcleo	3.000	16.900			279.4
Caja sin núcleo	.800	.800			150.5
Peso núcleo	2.200	16.100			128.9
Núcleo caja ant.					2.16
Peso total				18.300	

R=89%

No. Ensaye 05 11.15 - 14.15 3.00

Caja con núcleo	16.100	17.900			106.5
Caja sin núcleo	.800	17.400			88.0
Peso núcleo	15.400	00.500			78.5
Núcleo caja ant.					2.12
Peso total				15.900	

R=79%

No. Ensaye 06 14.15 - 16.48 1.33

Caja con núcleo	17.400				125.5
Caja sin núcleo	8.700				066.4
Peso núcleo	8.700				059.1
Núcleo caja ant.					
Peso total				8.700	2.12

R=97%

8.1.2 Sample Results

To date there has been a total of 107,239 samples collected on the La Caridad Project. The sampling comprises 81,567 core samples and 25,672 samples that are either RC, MD, or MT. A summary of the sampling by drilling type is presented in Table 8.1. These tables include all available assay data, including drill holes and samples that were excluded in the modeling process, as discussed in Section 11.1

Table 8.1: Summary of Assay Samples by Drill Hole Type

Drill Hole Type	No. of Samples	Mean Thickness (m)	Mean Cu (wt. %)	Mean Mo (wt. %)
DD	81,567	4.32	0.194	0.025
RC	23,394	13.59	0.263	0.022
MD	1,644	10.37	0.383	0.020
MT	634	10.91	0.464	0.025
Total	**107,239**	**6.47**	**0.214**	**0.025**

8.1.3 Verification of Sampling and Assaying

To verify the assay results from the internal SCC laboratory, approximately 10% of the total campaign samples were sent to an external third-party laboratory, Activation Laboratory (Actlabs), in Zacatecas, Mexico. Actlabs are internationally certified to ISO 9001:2015. No details on the sample verification process and results were provided.

8.1.4 Sample Security

Drill core was collected at the drill rig by drilling company personnel and transported to the core shed, a locked and fenced facility. The sampled interval was indicated on the core box with a wooden tag painted red. The respective sample number and the interval from and two were also included on the board, as well as on the box (Figure 8.5).

Figure 8.5: Drill Hole BDO0019 with Sample Tags and Depth

Once the cores were logged, the information was imported to acQuire. The drill hole location and logging data was verified by Senior LC geologists prior to importing into acQuire, and again after the importation was complete. The information appeared in the list of the drill holes uploaded to the database and the information entered was verified again. When entering the lithology data, the drill hole name was confirmed, as well as the interval from and to, lithology, alteration and mineralization. The codes for each variable were automatically generated by acQuire in the database.

The8-7oged and sampled core boxes were then sent to be cut. Each selected sample interval was cut in half with a manual core cutter. The assistant geologist supervised the core cutting, as in order to ensure as representative a sample as possible was cut for analysis. This was necessary as the mineralization in the core was often not homogeneous, with variable veining or thin banding.

The cut samples were placed in a clear plastic bag, and the bag was marked on both sides with the drill hole name and the sample number. A sample tag was attached to the bag with the corresponding drill hole and sample information. The bag was then sealed to prevent contamination. Figure 8.6 illustrates examples of core samples, ready to be sealed (left) and sealed on transport vehicle (right).

Figure 8.6: Example Core Samples

The samples were then loaded onto the transport vehicle in order of drill hole and sample number and delivered to the laboratory by LC geology personnel. Once received at the laboratory, each of the samples was reviewed by the laboratory supervisor. The geology personnel delivered a sample shipment report of the total of the samples (Figure 8.7) per drill hole and the laboratory signed as received. All remaining core were stored in the Colonia El Ranchito, Sonora, core storage warehouses for future metallurgical, or leach column testing.

Figure 8.7: Example Sample Requisition Report – MCD-1144

GrupoMexico EXPLORACIONES		RELACION DE MUESTRAS BARRENO : MCD-1144						FECHA Octubre-25-2019			
BANCO	MUESTRAS	E N S A Y E S									
		% Pb	%Cu	%Cuo	%CuSol	%Fe	%Mo	%Sb	%Bi	%As	%Zn
1620	1-2-3-4-5	X	X	X	X	X	X	X	X	X	X
1605	6-7-8-9-10	X	X	X	X	X	X	X	X	X	X
1590	11-12-13-14-15-16	X	X	X	X	X	X	X	X	X	X
1575	17-18-19-20-21	X	X	X	X	X	X	X	X	X	X
1560	22-23-24-25-26	X	X	X	X	X	X	X	X	X	X
1545	27-28-29-30-31-32-33	X	X	X	X	X	X	X	X	X	X
1530	34-35-36-37-38	X	X	X	X	X	X	X	X	X	X
1515	39-40-41-42-43	X	X	X	X	X	X	X	X	X	X
1500	44	X	X	X	X	X	X	X	X	X	X
	TOTAL= 44 MUESTRAS										
	GEOLOGIA	PREP. DE MUESTRA			RECIBIO			LAB. DE ENSAYES			
	Orlando Padilla R.										

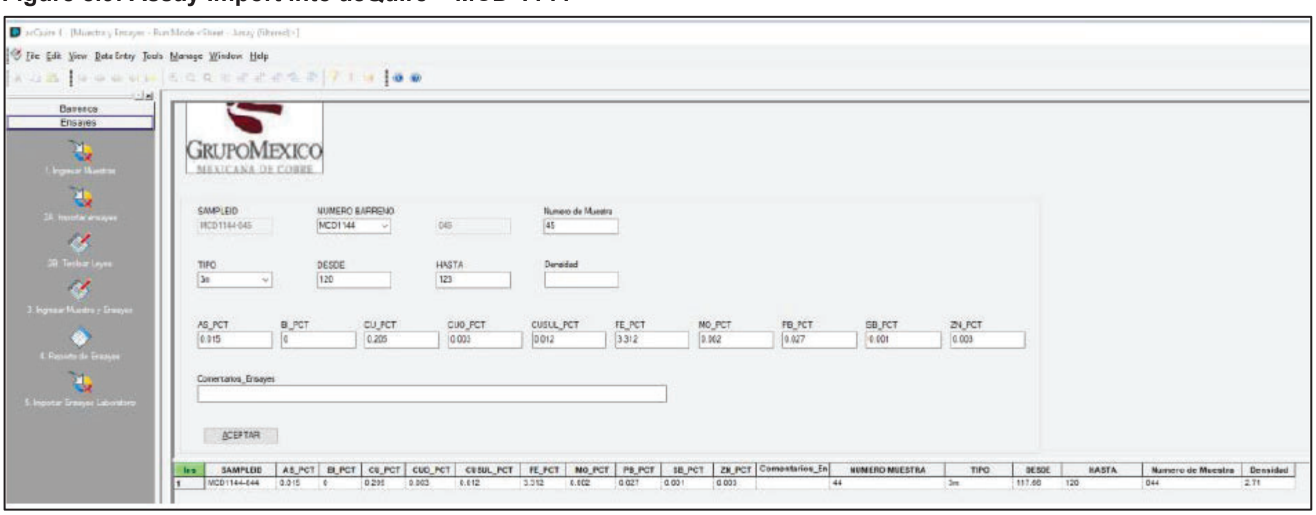
At the laboratory, the chain of custody of the sample preparation was well established. Both, the reception of the sample coming from the drill rig and the transfer of the prepared sample to the chemical laboratory are also appropriately documented.

Once the laboratory finished the preparation, two (2) pulps of each sample were returned to the Geology Department as control samples (one remained as a control sample and the other was used for certification purposes). The pulp samples were stored in the geology warehouse located in Colonia El Ranchito (Figure 8.8).

Figure 8.8: Example of Stored Sample Pulps

Once the samples were analyzed, the results were sent electronically to the LC Project geologist, which were then uploaded into acQrurie. The laboratory analyzed for Specific Gravity (SG), arsenic (As), bismuth (Bi), Cu, copper oxide (CuO), soluble copper (CuSol), iron (Fe), Mo, lead (Pb), and antimony (Sb). During the import, the assay information, including sampling intervals and assay values, were verified in acQuire. Figure 8.9 illustrates an example assay interval as it appears in the acQuire database.

Figure 8.9: Assay Import into acQuire – MCD-1144



8.2 Laboratory Sample Preparation Methods and Analytical Procedures

Due to internal company policies, the laboratories owned by SCC were used for the mechanical preparation and chemical analysis of the samples, including the following:

- Laboratorio de Unidad La Caridad, in Nacozari de García, Sonora, which was ISO 9001:2015 certified during the period when the samples were analyzed
- Estación Santiago Laboratorio Geoquimico, in, San Luis Potosi. The laboratory did not have any type of certification during the period that the work was carried out at La Caridad.

Analysis for all the La Caridad drilling was performed at an internal SCC laboratory (Laboratorio de Unidad La Caridad) located in Nacozari, Sonora.

The analysis for As, Bi, calcium (Ca), cadmium (Cd), cobalt (Co), chromium (Cr), Cu, Fe, mercury (Hg), magnesium (Mg), manganese (Mn), Mo, nickel (Ni), sodium (Na), Pb, Sb, selenium (Se), and Zn were done by a three-acid digestion with clorhidric (50%), nitric and perchloric acids, followed by analysis by ICP and Atomic Absorption (AA) Spectroscopy.

The analysis for Au was done by a two-acid digestion of a 75 g geochemical solution sample with methyl isobutyl cetone and clorhidric acid. Final analysis was by AA fire assay for values below 500 parts per billion (ppb). The same process was used for samples over 500 ppb although with more sample weights.

The analysis for sequential copper, was done by digestion of a 0.2-g pulverized sample with sulfuric acid which obtained the Cu content as an acid-soluble oxide. The remainder of the same sample was then subject to digestion with a sodium cyanide (Na-CN) solution, where the Cu contained in the secondary sulfides and bornite – primary sulfide – was then obtained. Finally, the previous analytical residue was assayed for Cu using AA, (known as residual Cu), which was mostly the Cu present in the primary sulfide chalcopyrite.

8.3 Quality Control and Quality Assurance Programs

QA/QC programs help to ensure the reliability of assay results from both internal and commercial laboratories and are considered to be essential industry standard practice. Prior to the 2020 drilling campaign, no QA/QC programs had been implemented at La Caridad. As of 2020, LC have begun a systematic QA/QC program, which includes the insertion of the certified reference materials (CRMs), pulp duplicate, field duplicates, field blanks, and coarse or preparation duplicates into the sampling stream at regular intervals, as shown below:

- Pulp Duplicates: Correspond to samples obtained after the milling process. Pulp duplicates were inserted at a rate of 1 every 25 samples, including half in the same shipment and the other half in another shipment or to the control laboratory.
- Coarse or Preparation Duplicates: Correspond to the samples obtained after crushing. Coarse duplicates were inserted at a rate of 1 every 25 samples), including half in the same shipment and the other half in another shipment or to the control laboratory.
- Field Duplicates: Consist of the second core quarter separated for analysis. Field duplicates were inserted at a rate of 1 every 25 samples.
- Field Blanks: Samples of barren rocks or prepared with local barren rocks. Field blanks were inserted at a rate of 1 every 25 samples.

- CRM: samples were purchased from the commercial laboratory, ORE Research & Exploration Pty Ltd (OREAS), and include a corresponding certificate. CRMs were inserted at a rate of 1 every 20 or 25 samples, with the CRM chosen randomly.

The samples were sent to two laboratories owned by SCC: Labratorio Geoquimico San Luis Potosi and Laboratorio de Unidad La Caridad. For the 2020-2021 drilling campaign a total of 6,554 samples corresponding to 78 drill holes were distributed between the two laboratories.

The review of the QA/QC results was carried out by the LC geologist in charge of the Project. Once the results were received, the statistics of the control samples were analyzed in Excel, via a series of control charts. The QA/QC process was constantly monitored for CRM results so that there was no prolonged upward or downward drift or deviation, and the laboratory was alerted in case of deviations.

The laboratory was also alerted if there were outliers in the analysis of blanks and duplicates, and the situation was evaluated in order to modify the procedure, or reanalyze the shipments.

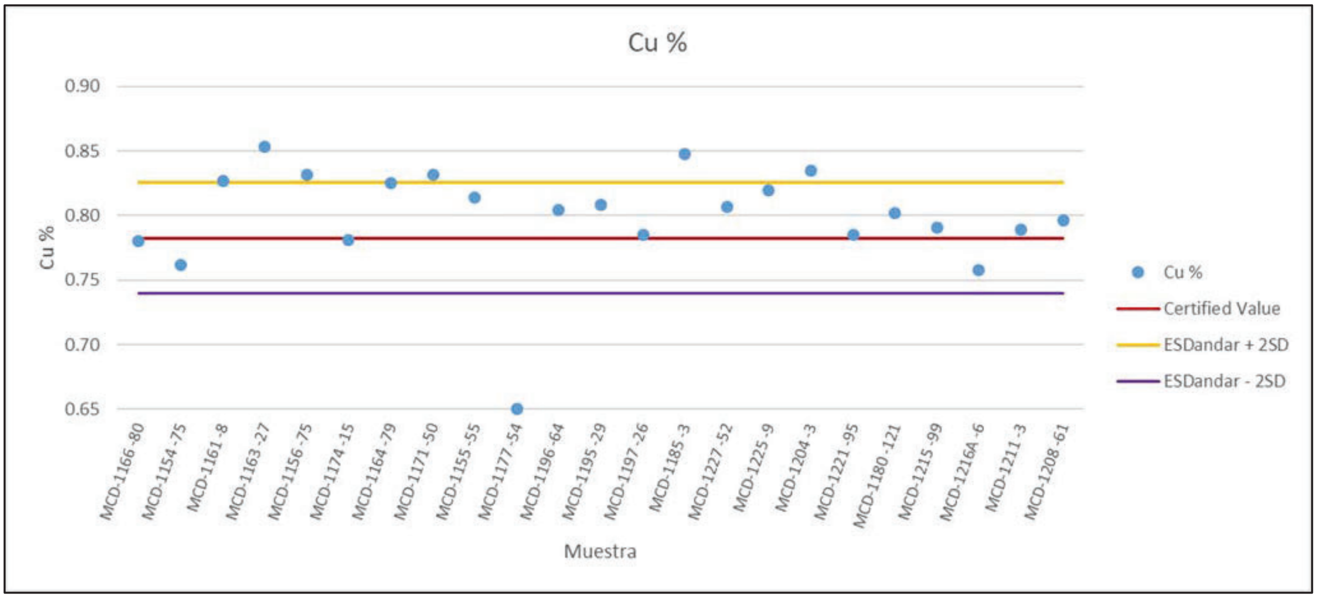
8.3.1 SCC CRM

Four types of OREAS Cu-porphyry CRM standards were inserted in alternating order, including:

- OREAS 151b: low-grade Cu-Au porphyry
- OREAS 505: mid-grade Cu-Au porphyry
- OREAS 502c: high-grade Cu-Au-Mo porphyry
- OREAS 501c: low-grade Cu-Au porphyry with minor Cu-Mo concentrate

The results for the CRMs analyzed at Laboratorio de Unidad La Caridad displayed good results for Cu. Mo results were within control limits for the high grade Cu-Au-Mo porphyry CRM, OREAS 502C, but outside control limits for the other CRM's where Mo is not a certified element. At the Laboratorio Geoquimico San Luis Potosi, the CRM's displayed good results for Cu. For the OREAS 502c, Mo showed results lower than the expected control limits. This may indicate that there is a systematic underrepresentation of the Mo results for all samples analyzed at San Luis Potosi. Further reivew and monitoring is recommended. Figure 8.10 illustrates the results for Cu and Mo for OREAS 502c as analyzed by Laboratorio de Unidad La Caridad. Figure 8.11 illustrates the results for Cu and Mo for OREAS 502c at Laboratorio Geoquimico San Luis Potosi.

Figure 8.10: Example CRM Control Chart for Cu and Mo (Oreas 502c) as Analyzed by Laboratorio de Unidad La Caridad



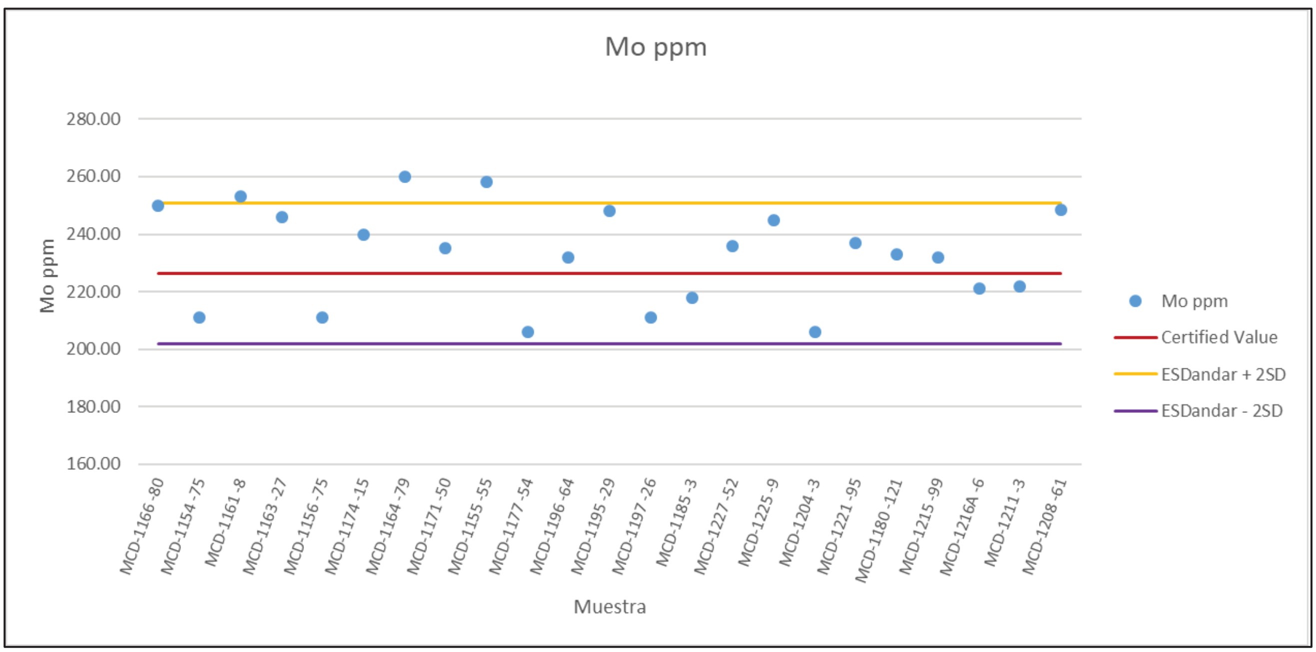
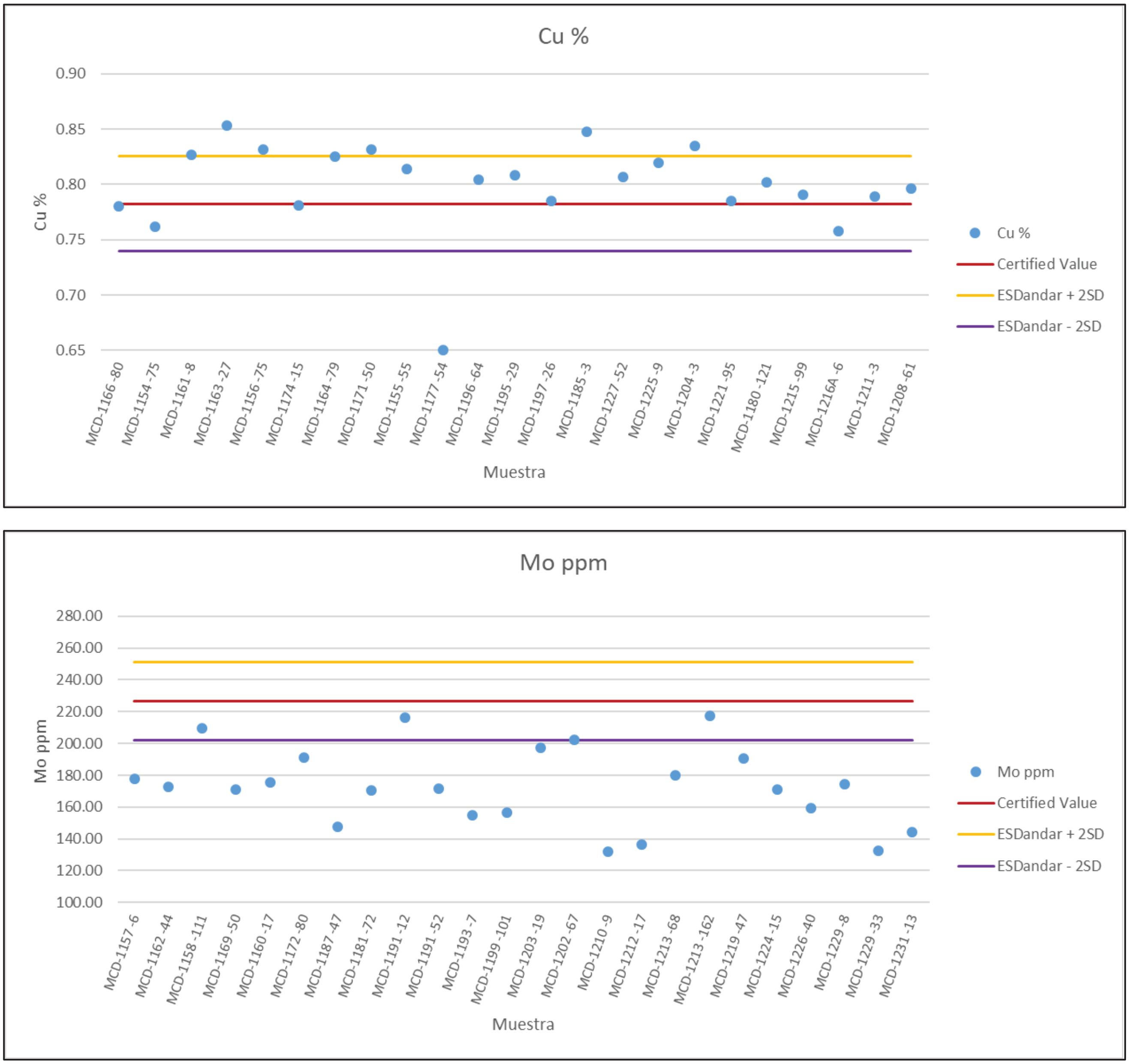


Figure 8.11: Example CRM Control Chart for Cu and Mo (Oreas 502c) as Analyzed by Laboratorio Geoquimico San Luis de Potosi

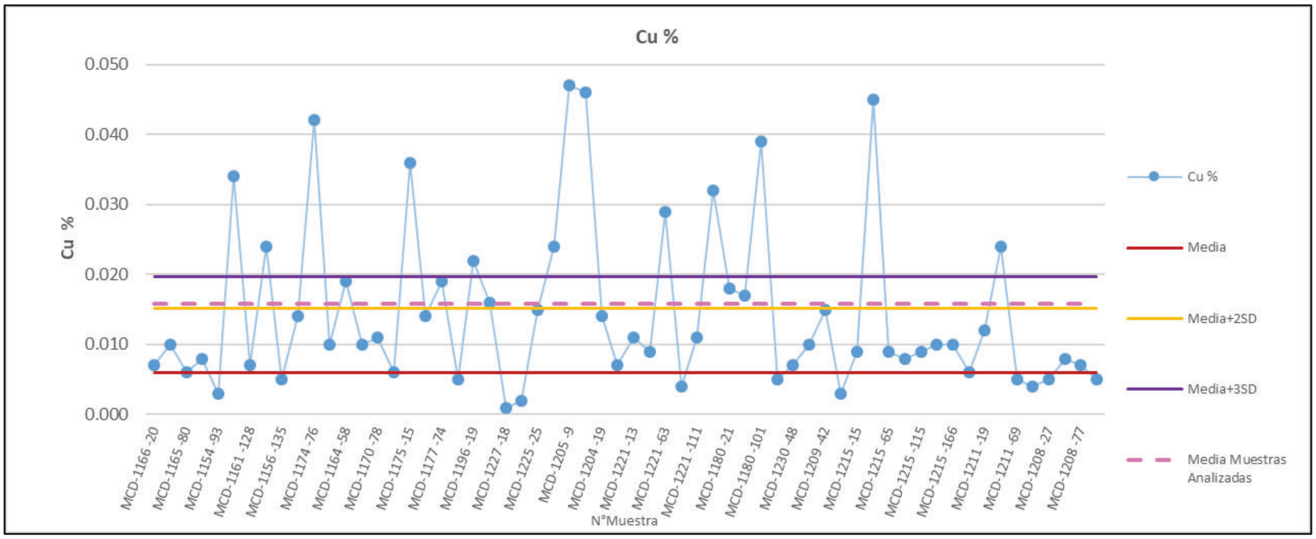


Source: LC 2021

8.3.2 Blanks

A total of 60 samples of coarse blanks were analyzed at Laboratorio de Unidad La Caridad. The results for Cu show that 13 samples (22%) exceeded the limit of +-3 standard deviations (SD), with 78% of the samples within the control parameters. Figure 8.12 illustrates the performance of the coarse blanks at Laboratorio de Unidad La Caridad for Cu. For Mo, of the 60 coarse blanks samples analyzed, for all samples were within the control limits.

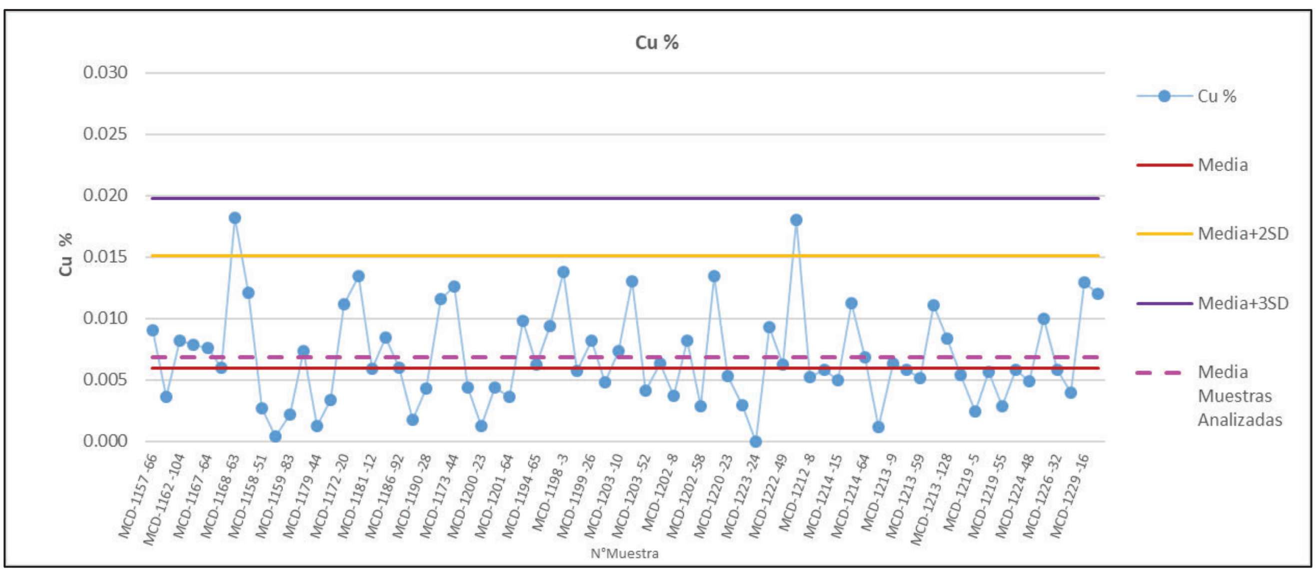
Figure 8.12: Coarse Blanks for Cu, Laboratorio de Unidad La Caridad



Source: LC 2021

At the San Luis Potosi geochemical laboratory, a total of 70 samples of coarse blanks were analyzed. All of the of the samples for Cu and Mo were within the control parameters (Figure 8.13).

Figure 8.13: Coarse Blanks for Cu, Laboratorio Geoquimico San Luis de Potosi

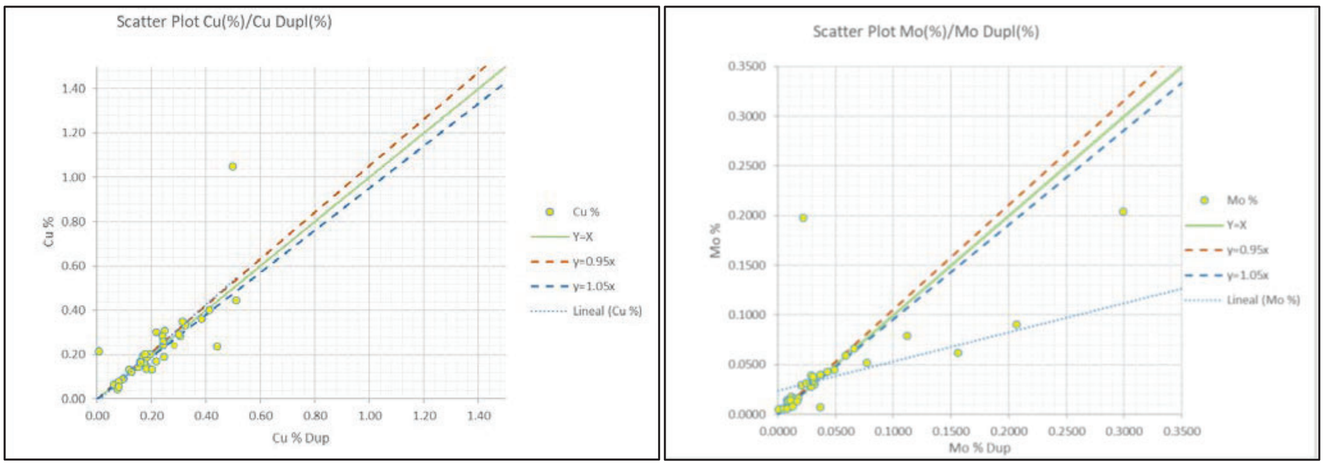


Source: LC 2021

8.3.3 Coarse Duplicates

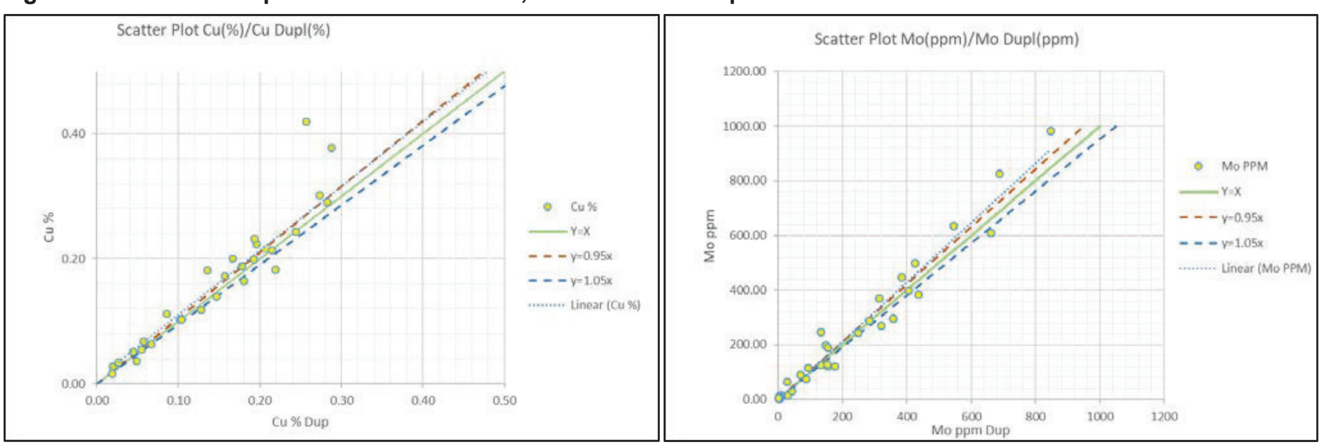
For the coarse duplicates analyzed in both laboratories, a good precision was observed for the Cu samples. Mo values show poor precision above the low-grade samples, with some values well outside the tolerance limits, for samples analyzed at Laboratorio de Unidad La Caridad. Figure 8.14 illustrates the coarse duplicates for both Cu and Mo which were analyzed at Laboratorio de Unidad La Caridad, and Figure 8.15 at Laboratorio Geoquimico San Luis de Potosi.

Figure 8.14: Coarse Duplicates for Cu and Mo, Laboratorio de Unidad La Caridad



Source: LC 2021

Figure 8.15: Coarse Duplicates for Cu and Mo, Laboratorio Geoquimico San Luis de Potosi

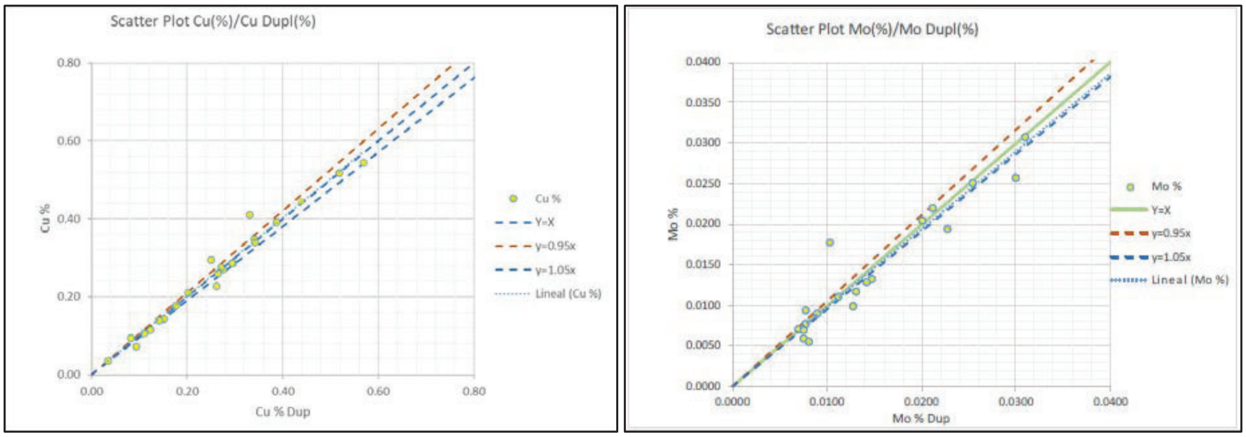


Source: LC 2021

8.3.4 Pulp Duplicates

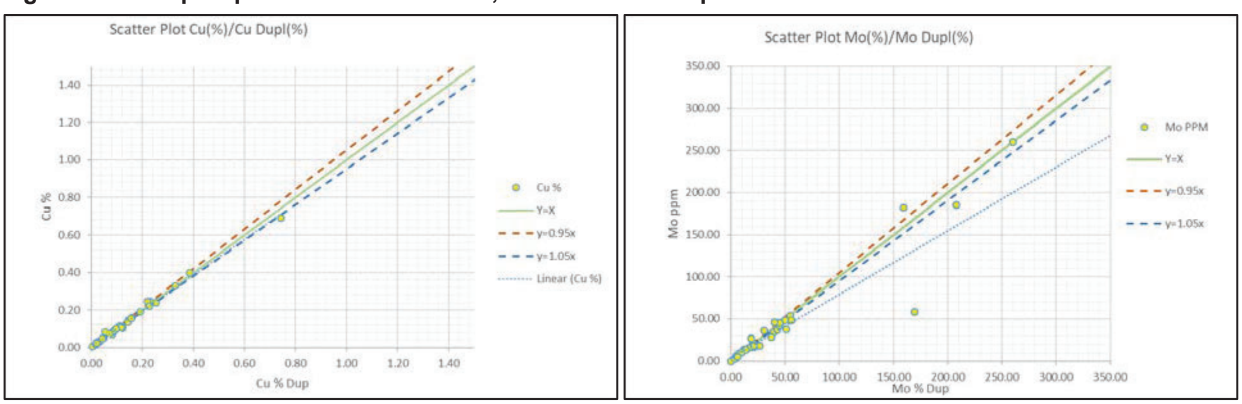
For the pulp duplicates analyzed in both laboratories, a good precision was observed for the samples analyzed for Cu. The samples analyzed for Mo display a poor precision for sample above the low-grades for both labratories, with some values outside the tolerance limits. Figure 8.16 illustrates the pulp duplicates for both Cu and Mo which were analyzed at Laboratorio de Unidad La Caridad and Figure 8.17 at Laboratorio Geoquimico San Luis de Potosi.

Figure 8.16: Pulp Duplicates for Cu and Mo, Laboratorio de Unidad La Caridad



Source: LC 2021

Figure 8.17: Pulp Duplicates for Cu and Mo, Laboratorio Geoquimico San Luis de Potosi



Source: LC 2021

No information exists about the analytical QA/QC procedures at La Caridad between 1968 and 2020.

8.4 Qualified Person’s Opinion Regarding Sample Preparation, Security and Analytical Procedures

It is the QP’s opinion that the sample preparation, security, and analytical procedures applied by LC were generally appropriate and fit for the purpose of establishing an analytical database for use in grade modeling and preparation of Mineral Resource estimates, as summarized in this TRS. The QP notes that no QA/QC programs were implemented at the site until 2020, which does add a degree of uncertainty with the pre-2020 samples. Any future drilling and sampling programs should include a robust QA/QC program.

The QP reviewed the core and sampling techniques during a site visit in August 2021. The QP found that the sampling techniques were appropriate for collecting data for the purpose of preparing geological models and Mineral Resource estimates.

9.0 DATA VERIFICATION

9.1 Exploration and Mineral Resource Data Verification

9.1.1 Exploration Data Compilation

The QP was provided with the compiled La Caridad database, in Excel file format, which included survey information, downhole geological units, sample intervals, and analytical results.

Drill hole data for La Caridad comprised 3,529 exploration drill holes, totaling 694,455 m and containing 107,239 analytical samples amounting to 694,353 m. Compiled supporting documentation for the La Caridad drilling data included descriptive logs, with collar survey, core photos, and assay information.

9.1.2 Exploration Data Validation

All recent drill hole logs were recorded by logging geologists on formatted paper sheets, then transcribed into Excel for eventual upload into the acQuire project database. Data and observations recorded into the digital logging files were reviewed for transcription, or keying errors, or omissions, by senior La Caridad geologists. The data provided by La Caridad was evaluated for errors or omissions as part of the data validation procedures. Of note, much of the pre-2020 drilling did not have the detailed lithological, alteration or mineralization data found on the paper logging sheets fully recorded in the digital database. It is strongly recommended that all available information on the original paper logs with included in the digital acQuire database.

The review of the database used for the modeling was performed with Golder's internal software (DataCheck®), which allows the detection of inconsistencies such as: overlapping intervals, excessive path deviation between measurement intervals, duplication of collars, sample depth greater than the depth of the collar, among others.

No major inconsistencies were detected in the digital databases submitted; however, the following data errors were noted:

- 11 drill holes had intervals with no information at the beginning or ends of drill holes in assay table
- 21 drill holes had intervals with no information at the beginning or ends of drill holes in lithology table
- 5 drill holes without lithology information
- 1 drill holes with overlaps in the assay table
- 4 drill holes with gaps without information in the assay table
- 23 drill holes with gaps without information in the lithology table
- The downhole survey table contained 46 intervals which exceeded 50 m between survey points
- 1 drill hole displayed a dip variation in excess of 10°
- 3 drill holes showed an excessive azimuth variation of greater than 10°
- 3 drill holes displayed an excessive dip variation (greater than 10° in the case of an inclined drill hole or greater than 5° in a vertical drill hole)

The QP reviewed the available drill hole data during the August 26, to 27, 2021, site visit. The purpose of the site visit was to review the project site, geology, current, and previous exploration methods, and results and identify any concerns and provide recommendations for consideration by LC. The site visit was completed in fulfilment of the requirement that the Mineral Resource or Mineral Reserves QP(s) perform a current site visit to the project in support of preparation of any S-K 1300 Mineral Resource and/or Mineral Reserve statements, or TRS.

9.1.3 Validated Drill Hole Information

In support of the geological modeling, the QP performed the following validation steps on the 3,529 available drill holes:

- Examination of the drillhole collars against the original and end-of-2020 topography surfaces.
- Evaluation of the different drilling methods.
- Check for sample overlaps, sample duplication, survey anomalies and assay anomalies.
- A detailed review of 70 scanned paper logs and comparison to the electronic data.

The results of the validation are detailed below.

An original topography surface and an end-of-2020 topography surface, covering the entire La Caridad area (including Bella-Union), were provided by LC. Both surfaces were based on contours at 15 m vertical intervals. The collar locations were assessed based on these two surfaces. Given the contour resolution level, any drillhole within 10 m of the surfaces was considered acceptable, which accounted for 43% to the total number of drill holes. Potential reasons for a difference greater than 10 m are as follows:

- The hole was drilled prior to the pit deepening.
- The hole was drilled on a waste dump that has subsequently been removed.
- The hole was drilled on an excavated surface that has subsequently been filled.
- A mis-recording of the collar coordinates from the paper copies.
- Bad topography data in the vicinity of the hole collar.

A total of 19 drill holes (Table 9.1) with collar versus topographic elevation discrepancies were discarded from the final estimation database following these criteria.

Table 9.1: List of Excluded holes

Drill Hole	Drill Hole	Drill Hole	Drill Hole	Drill Hole
AM00152	CFCA031	MCD0479	MCI0612	MCI1258
AM00165	CRO0032	MCD0480	MCI0624	MCM0271
AM00251	CRO0041	MCD0573	MCI0757	MCM0391
CFCA024	MCD0477	MCD0694	MCI1231	

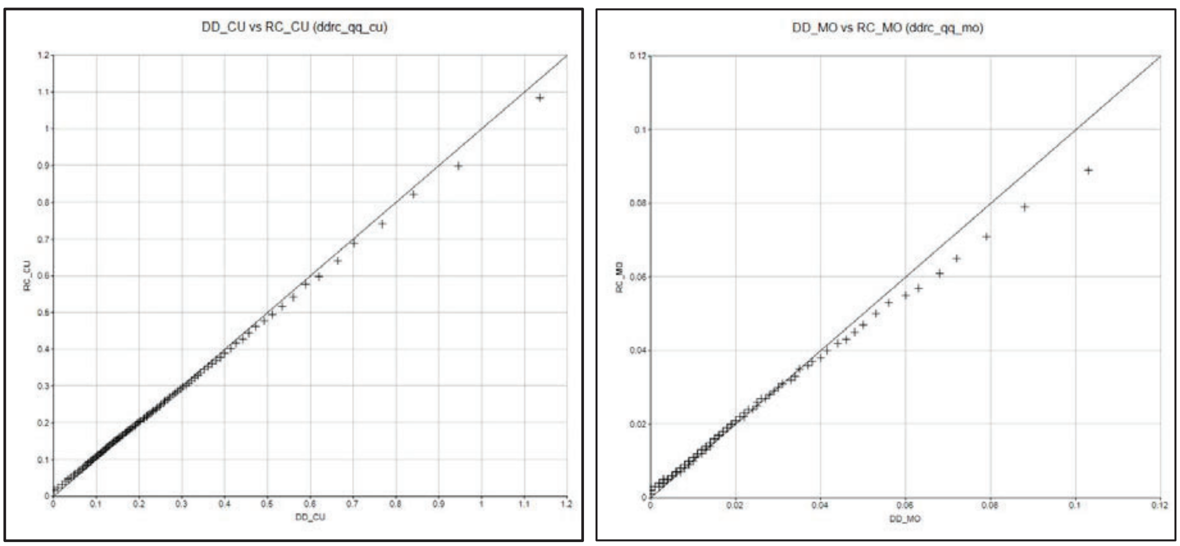
Four different drilling methods were identified (see Table 9.2). Their spatial distribution is shown in Figure 9.2. The cluster of holes to the south is Bella-Union.

Table 9.2: List of Drilling Methods

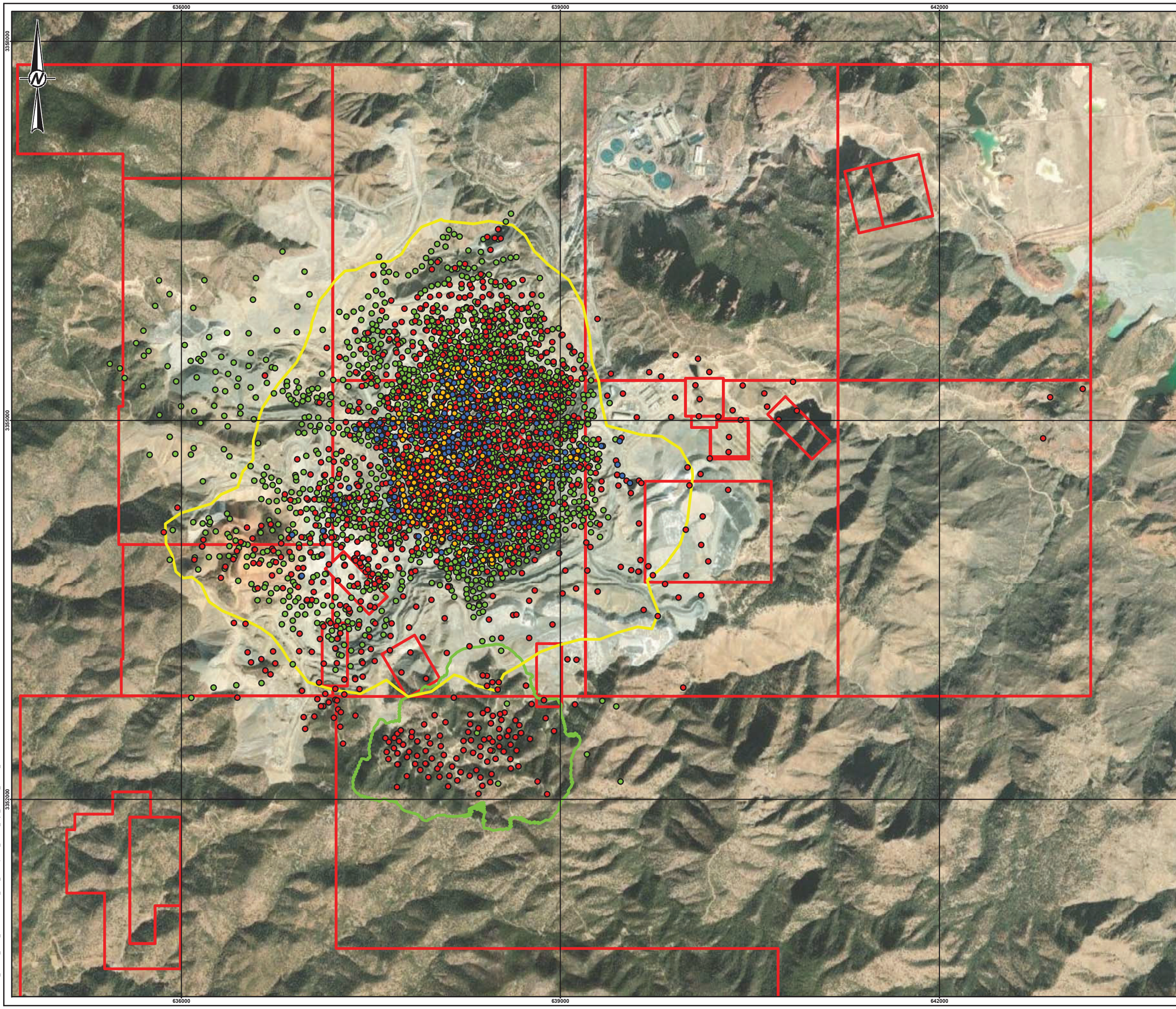
Drill Method	Code	Count	Percent
Diamond Drilling	DD	1,167	33%
Diamond Hammer	MD	201	6%
Hammer	MT	127	4%
Reverse Circulation	RC	2,034	58%
Total		**3,529**	**100%**

An evaluation was conducted to determine if there was any potential bias with the two principal drilling methods, DD and RC. Drill hole samples from the two different types that were within 50 m of each other were isolated and quantile-quantile (QQ) plots generated (Figure 9.1). In the plots, the x-axis is the DD, and the y-axis is RC. The left plot is Cu. It follows the diagonal up to 0.5%, deviating slightly thereafter indicating a negative bias towards RC (i.e., RC values are lower than DD). The right plot is Mo. It follows the diagonal up to 0.04%, deviating significantly thereafter indicating a negative bias towards RC. It is acknowledged that other factors such as historical drilling campaigns could influence these results. It is also recognized that a large proportion of the RC drilling occurs in areas that have already been mined out. For these reasons, it was decided to retain all drill hole types for the Mineral Resource estimate.

Figure 9.1: Drilling Type QQ Plots



Note: Cu on the left, Mo on the right.



NOTE(S)

REFERENCE(S)
1. COORDINATE SYSTEM: WGS 1984 UTM ZONE 12N
2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT
GrupoMéxico

PROJECT
LA CARIDAD

TITLE
DRILL HOLES BY TYPE

CONSULTANT
GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-02-22
DESIGNED	JS
PREPARED	TBH
REVIEWED	JS
APPROVED	MO

PROJECT NO.	CONTROL	REV.	FIGURE
20442424	-	-	9.2

The QP reviewed the data for sample overlaps, sample duplication, survey anomalies and assay anomalies revealed several issues which were corrected after consultation with LC and evaluation of paper logs. Several instances of zero (0) values in the assay database were treated as absent or missing values for the following reasons.

- Only 73 out of 107,110 Cu assays had a value of zero (0), whereas 16,909 out of 107,064 CuO assays had a value of zero, and 1,507 out of 106,976 Mo assays had a value of zero. Due to the uncertainly in whether zero was a true recorded assay value, all instances of an assay value of zero were treated as absent/missing data.
- Only 87 out of 66,498 SG measurements had a value of zero. These were treated as absent/missing data.
- There were 119 samples where the CuO values exceeded the Cu values. In most of these samples the CuO assay was much higher than the Cu value. For this reason, in all these cases CuO values were treated as absent/missing data.

Of the 3,529 drill holes, 3,490 (99%) have a single survey measurement at the collar and 3,448 (98%) are vertical. LC provided a separate small dataset of holes that had downhole survey recorded, typically at 50-m intervals. Dip variation from vertical, down to depths of 350 m, is never more than 2° and is typically much less than 1°. If it is assumed these results can be applied to the entire dataset, then the potential maximum horizontal discrepancy would be around 3.5 m per 100 m vertical depth and is more typically in the order of 1 m per 100-m vertical depth. The average depth of all holes is around 200 m (DD 300 m, RC 150 m). Almost half of DD holes are greater than 300 m in depth, meaning there is the potential for a horizontal discrepancy of more than 10 m. This potential discrepancy is a risk to the Mineral Resource Estimate and has impacted the Resource Classification (see Section 11.4).

A detailed review of 70 scanned paper logs in comparison to the electronic data revealed several issues which were corrected. The main finding from this review is that most of the historical data had been manually composited into 15 m intervals and it is this information that was recorded electronically. It is recommended that the original sample assay intervals from the paper logs be recorded electronically. While much of the data that is recorded at 15 m manually composited intervals is in areas that have already been mined, there are still areas where the Mineral Resource is largely supported by these drill holes. It is also noteworthy that the paper logs contain considerable geological information which does not appear to be recorded in any electronic form or, if it was, that information is no longer available. As previously stated, all pertinent lithological, alteration and mineralization information available in the paper copies should be recorded electronically.

9.1.4 Limitations on Data Verification

The QP was not directly involved in the exploration drilling and sampling programs that formed the basis for collecting the data used in the geological modeling and Mineral Resource estimates for the Project; however, the QP was able to observe the drilling, sampling, and sample preparation methods in progress during the 2021 drilling campaign site visit. The QP has had to rely upon a detailed review of the pre-2020 exploration program data, documentation and standard database validation checks to ensure the resultant geological database is representative and reliable for use in geological modeling and Mineral Resource and Reserve estimation.

The Golder QP is not aware of any other limitations on nor failure to conduct appropriate data verification.

9.1.5 Qualified Person's Statement on Adequacy of Data Verification

The QP has verified the data disclosed, including collar survey, downhole geological data and observations, sampling, analytical, and other test data underlying the information or opinions contained in the written disclosure presented in this TRS. The QP recommends that the lithological, alteration and mineralization information available in the paper copies of the drill hole logs be revisited and all pertinent geological data be recorded electronically. In addition, the original assay intervals should be captured in the digital database.

The QP, by way of the data verification process described in this Section of the TRS, has used only that data, which were deemed by the QP to have been generated with proper industry standard procedures, were accurately transcribed from the original source and were suitable to be used for the purpose of preparing geological models and Mineral Resource estimates.

9.2 Mine Plan, Cost Model, and Mineral Reserves Review

The QP reviewed the historical data provided by La Caridad mine personnel. Examples of the data provided and reviewed include costs associated to the extraction and processing of the ore, equipment availability and unit costs, and the current production schedule being followed by operations.

The QP verified the assumptions being used for the mine plan, cost model, and the Mineral Reserves were reasonable for use on the Project; however, reconciliation data was not provided by site. With an updated geological block model being prepared for the Project the QP assumed a nominal dilution and mining loss based on experience on similar projects. The dilution and mining loss assumptions should be verified in future studies once reconciliation data is available.

The assumptions and inputs used in the preparation of the mine plan, cost model, and subsequently to form the Mineral Reserve estimate are suitable for a Pre-feasibility level of accuracy.

The following sections provide details into the data verification of the key modifying factors used to prepare the Mineral Reserves.

9.2.1 Geotechnical

CNI evaluated the structural stability of benches by analyzing structural data on orientation, length, spacing, and shear strength of fractures using a proprietary software package. CNI then applying an empirical correction factor based on experience to account for operating practices to develop estimated bench face angles. While these proprietary methods can not be independently verified in detail, the results are reasonable based on the data presented and the QP's experience.

CNI developed design bench face angles and inter-ramp slope angles in 1° intervals based on application of their proprietary methods. While such small increments may not seem to be justified based on the samples of structural data available, the expected variability of geological conditions, and the assumptions inherent in their analytical and methods and correction factors, ultimately the recommendations are based on the complete data set available and are therefore supported by the available data.

CNI evaluated stability at the inter-ramp scale using an internal probabilistic procedure similar to that used for the structural stability analysis of benches, except that the major structure database is used rather than the structural fabric. Estimated failure tonnage was computed by this procedure for the inter-ramp slope angles estimated from the bench-scale analysis and for both dry and saturated conditions. The estimated percentage of sector walls exhibiting inter-ramp failures ranged from 0% to 0.5% and 0% to 4.0% for dry and saturated conditions in the La

Caridad pit and ranged from 0% to 1.0% and 0.1% to 2.3% in the Bella Union area. Failure volume in these ranges is generally considerable to be routine for pit operations, where material is removed as pit development progresses.

The Factors of Safety (FOS) estimated at seven critical cross sections (five located in La Caridad and two located in the Bella Union area) exceeded 1.3 in all cases. CNI concluded that overall slope rotational shear instability is unlikely to occur due to low rock mass strength conditions.

Use of CNI slope designs is recommended for the purposes used in the TRS. Their recommendations in terms of the additional geotechnical work that would be required during final design or during mine operations to further optimize slope designs. A summary of these recommendations for the additional work required follows:

- Targeted geotechnical drilling and sampling of pit walls to improve confidence in RQD measurements and rock mass rating assessments.
- Updates to the pit geology and RQD models.
- Hydrogeological investigation that includes targeted airlift and recovery testing and packer testing in primary lithological units in the geological model, and installation of piezometers in select areas the pit
- Maintain records of water seep locations along with any noted seasonal fluctuations in the existing pit slopes and the location of any blasthole water intercepts.
- Use of the Hoek-Brown shear strength criterion as a check on the CNI method for assessing the shear strength of materials for global stability analysis is recommended.
- Preparation of regular reports from radar monitoring of existing slopes.

9.2.2 Mining Methods

During the site visit the QP verified the Project utilizes a conventional bulk mining method. A truck and shovel with both electric and diesel hydraulic units is employed at La Caridad. Due to the age of some of the units being used on site there does appear to be some mismatch of trucks to shovels, however, the historical and forecasted material movements does take this into account. The Project site natural topography allows for end dumping waste into valleys.

9.2.3 Cut-off Grade and Modifying Factors

LC currently utilizes a fixed mill and leach COG constraint. Dilution and mining loss are not considered currently at site.

9.2.4 Pit Optimization

LC retains a third-party consultant to prepare unrestricted pit optimization analysis. Golder reviewed the pit optimization analysis and noted that there was a limited understanding the site’s physical and operational constraints.

9.2.5 Mine Design

LC utilizes a third-party to assist with mine phase design. Golder’s preliminary review of these designs indicated there was a lack of consideration for phase interaction. During the site visit, discussions with LC indicated there were ongoing mine planning revisions.

9.2.6 Production Schedule

Monthly and yearly production statistics were provided for 2016 through end of 2021. The data that was provided showed that there is sufficient loading capacity for the production targets set in the schedule. LC retains monthly actuals and compares that to the forecasted schedule.

9.2.7 Manpower and Equipment

LC reviews the manpower and equipment requirements annually and has considered maintenance and replacement for mine planning.

9.2.8 Limitations on Data Verification

There was limited data by LC to verify industry standard verification is being completed at LC.

9.2.9 Statement on Adequacy of Data

The Golder QP responsible for mine planning and Mineral Reserve estimates has verified the data used in the preparation of the mine design and resultant Mineral Reserve estimate, including geotechnical design criteria, cut-off value calculations, mine modifying factors, production schedule, labor and equipment estimates, and other test data underlying the information, or opinions, contained in the written disclosure presented in this TRS.

The QP has used only that data which was deemed by the QP to have been generated with proper industry standard procedures, was accurately transcribed from the original source and was suitable to be used for the purpose of preparing the mine design and Mineral Reserve estimates. Data that could not be verified to this standard was reviewed for information purposes only but was not used in the development of the mine design, or Mineral Reserve estimates, presented in this TRS.

10.0 MINERAL PROCESSING AND METALLURGICAL TESTING

This sub-section contains forward-looking information related to mass recovery for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including actual plant feed characteristics that are different from the historical operations or from samples tested to date, and, equipment and operational performance that yield different results from the historical operations and historical and current test work results.

The original metallurgical testing was conducted in conjunction with the Mexican government entity, Comision de Fomento Minero, to develop an economic study for the Project during late-1960 to early-1970. Representative samples of the original deposit were tested at the government metallurgical laboratory to develop the parameters needed for the economic study. It should be noted that the Mexican government owned a majority (51%) of the Project at the time of the evaluation.

The metallurgical test results from the original evaluation could not be obtained from Mexicana de Cobre. Based on the results from the metallurgical and geological studies the project was designed by Ralph M. Parsons in California. All the data needed for development of the Design Criteria (DC) for the Project was developed as a joint effort between Mexicana de Cobre and the Mexican government. The technology used was known conventional technology commonly used in the mining industry. The final plant design did not include any parameters to address any potential factors impacting the viability of the Project.

The project was approved and constructed as a joint venture between Mexicana de Cobre and the Mexican government. The Mexican government owned metallurgical laboratory was considered the most capable and reliable laboratory in Mexico in 1970.

10.1 Concentrator

The Mexicana de Cobre (La Caridad) process plant has been in operation since 1979. The Project was based on an extensive exploration program developed in 1968 that included preliminary metallurgical testing.

The original plant design capacity for crushing, grinding and flotation circuits was 72,000 tpd. The operation of the plant started in June 1979. At this design throughput, the life-of-mine (LOM) for the Project was originally estimated at 30 years, starting in 1972. Continuing exploration has periodically increased the Mineral Reserves and LOM.

The development of the La Caridad Project required comprehensive metallurgical studies that were conducted internally by Mexicana de Cobre S. A. (MCSA) and by international laboratories. In addition, a pilot plant with 100 tonnes per day capacity was designed and built in 1972 at La Caridad for evaluation of the process parameters developed for the Project. The pilot plant facility served as a training site for future supervisory staff in training at La Caridad. The flotation testing focused on evaluation of grind size versus copper recovery and the viability of the DC developed for the processing plant.

The reports of those original studies were not available for this TRS; however, in the 42 years that the plant has been in operation, the mine has almost reached the ore tonnage estimated in 1979 for the LOM.

The process design developed for La Caridad Project is consistent with the metallurgical data developed from samples tested by MCSA. The estimated levels of copper recovery developed for La Caridad have been achieved throughout the life of the Project.

10.1.1 Process Selection

A beneficiation process utilizing a conventional milling and flotation circuit was selected for recovery of copper from the mineralization present at La Caridad, mainly chalcocite, which was the best available technology at the time. Copper is recovered into a flotation concentrate that is shipped by truck to a subsidiary smelter, approximately 20 km north of the concentrator. Product copper anodes from the smelter are refined on site to London Metal Exchange (LME) grade copper.

10.1.2 Process Parameters

Metallurgical data from pilot plant operations were used in the development of process DC and processing plant unit operations design. The metallurgical data developed met mining industry accepted best practices at the time based on a review of documents provided. The process DC include the following:

- **Comminution**: A relatively coarse grind provided acceptable levels of copper recovery. The metallurgical data developed during the test program indicated that a flotation process provided the expected copper recovery of 85.0% at a 66% passing 200 mesh Tyler (75 micron) grind size.
- **Flotation**: A three-step flotation circuit was tested: Rougher, Cleaner, and re-cleaner flotation, with a re-grind step after rougher flotation.
- **Tailings**: The parameters for thickening and dewatering were investigated in the pilot plant, as a basis for the DC of the Project.

10.1.3 Representativeness of Samples

Although the laboratory tests and pilot plant operation were conducted with samples and ore that were available at the time, the actual results of operation have proven the original estimates and results were correct. The historical copper recovery has been very close to the 85.0% originally estimated. In the last ten years, the deposit transitioned from chalcocite to chalcopyrite mineralization, but the recoveries have remained consistent.

10.1.4 Current Practice and Operating Performance

The current copper circuit is the same as the original. Over the years, the flotation circuit was improved to maintain an economic copper recovery with changes in ore mineralization and to increase production, as dictated by the increases in crushing and milling capacities.

The production results for the last 10 years of operation provided by MCSA are discussed in Section 14.0. Historically, since mining commenced in 1974, the mine has processed about 1,227.3 Mt of concentrator ore at an average 0.514% Cu, 0.0348% Mo, with a copper recovery of 85.4% Cu and 969.7 Mt of below COG ore for leaching.

10.1.5 Laboratory Certification

The plant laboratory is certified by ISO-4000. Besides the samples and assays used for control of the operation, the laboratory takes and assays samples for overall metallurgical balance purposes and to report production results to the fiscal authorities. The laboratory is certified by external third-party consultants and regulatory authorities for such purposes. Normally, a witness sample of the products is sent to the regulatory authorities.

10.2 Leaching, Solvent Extraction, and Electrowinning

The development of the open pit mine started in 1974. In 1979, the concentration plant started. Before the start-up of the plant and over the years, run-of-mine (ROM) ore below the concentrator COG and above a final COG of 0.15% Total Cu (TCu) was stockpiled in dumps located south and southeast of the pit, expecting an opportunity to economically process that low-grade material. Those original dumps were built by trucks in an end-dump fashion like waste dumps without height control nor care for compaction, or other factors that could affect leaching.

10.2.1 Test Program

A test program to determine the suitability of leaching the old dumps started in 1989. Column leach tests were conducted internally and by METCON Research, Inc. (Tucson, Arizona) during 1991. A pilot plant, including a 4,000-tonne-test leach pad was operated for over a year from 1992 through 1993 to confirm the proposed process of L-SX-EW. The company started placing the low-grade ROM ore in 30-meter-high lifts in Guadalupe Canyon, downstream of where the original low-grade ore dumps were placed.

10.2.2 Process Selection

SX-EW technology was chosen because it was the best available process to recover copper from low concentration solutions resulting from leaching low-grade ore. An alternative process of producing cement copper by precipitation with scrap iron was given cursory attention, but this alternative process was discarded. La Caridad considered the experience of a sister company, Buenavista de Cobre (BVC), acquired by Grupo Mexico three years earlier, where in 1980, discarded the precipitation process in favor of SX-EW.

In 1993, Bateman Engineering (Tucson, Arizona) developed a Feasibility Study (FS) for La Caridad and the company decided to build the SX-EW facility. The Engineering, Procurement, and Construction Management (EPCM) contract was conducted by Davy (San Ramon, California). International financing institutions and later both engineering companies reviewed all the Project information and process selection and accepted it as suitable for Project development.

10.2.3 Process Parameters

The main process parameters, such as unit solution flow, solution mixing time, settling rate, and solution separation time were investigated in the pilot plant, to confirm that the leach solutions to be produced at La Caridad would behave as those produced at BVC and that standard factors were applicable. Those parameters became the preliminary basis for the DC within the FS and later for plant engineering designs, leading to equipment dimensions calculations.

10.2.4 Representativeness of Samples

After completion of the FS, the project was subject to an extensive review over a period of four months by representatives of a consortium of banks that had to approve the financing of the project. The review team included independent qualified geology and process experts that ultimately accepted the estimated mine reserves for leaching to support the project, and the quality and representativeness of the samples used for the test programs and the pilot leach pad.

10.2.5 Current Practice and Operating Performance

The SX-EW plant began operating in 1995. The leaching system started six months before plant start-up, to load the system with leach solutions and start building up the concentration of copper in the PLS to the 2.1 grams of copper per liter (gCu/L) stipulated in the DC.

The nominal capacity of the SX-EW plant is 64.26 tpd copper cathode, or 23,455 tpy (365 days per year). The "catch-up" capacity at 95% availability is 67.64 tpd (347 days per year). As discussed in Section 14.0, over the last ten years, the production of cathode copper has averaged 25,779 tpy.

The main drawback of the operation is that the copper in PLS cannot be consistently maintained at the 2.1 grams of copper per liter (gCu/L) stipulated in the DC. This is due to issues in the grade of soluble copper in the ore. To offset the negative effect of the lower PLS copper concentration, in 1997 the SX portion of the plant was modified from the original Series-Configuration with two stages of extraction and two stages of stripping to a Series-Parallel-Configuration with two stage of extraction in series, one stage of extraction in parallel and one stage of stripping, which practically allows the plant to double the solution flow and achieve the electrowinning (EW) design capacity at a lower PLS copper concentration.

10.2.6 Plant Laboratory Certification

The plant laboratory is certified to be ISO-4000. Besides the samples and assays used for control of the operation, the laboratory takes three samples of the product copper cathode. One sample is assayed for overall metallurgical balance purposes and to report production results to the fiscal authorities. A second sample is sent to the fiscal authorities and the third sample is kept as a reference. The laboratory is certified by external third-party consultants and regulatory authorities for such purposes.

10.3 Recovery Estimates

This sub-section contains forward-looking information related to metallurgical recovery for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including actual plant feed characteristics that are different from the historical operations or from samples tested to date, , equipment and operational performance that yield different results from the historical operations and historical and current test work results.

From 2011 to 2020, the Concentrator Plant achieved 85.45 % copper recovery based on a review of records provided by Mexicana de Cobre. This level of copper recovery was practically the same predicted in the plant design criteria.

10.4 Qualified Person's Opinion

La Caridad uses actual production results as basic parameters for the estimation of Mineral Reserves. Each year, the actual results of operation are reconciled with the estimates in the mine model to adjust the estimates accordingly. This approach completes the circle of sample analysis estimation results and ensures that the actual data do not deviate significantly from the estimations. The metallurgical and analytical testing annual reconciliations are considered adequate for the estimation of mass and metallurgical recovery modifying factors to be used in the estimation of Mineral Reserves.

11.0 MINERAL RESOURCE ESTIMATES

11.1 Key Assumptions, Parameters, and Methods

This sub-section contains forward-looking information related to density and grade for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including actual in-situ characteristics that are different from the samples collected and tested to date, equipment and operational performance that yield different results from current test work results.

11.1.1 Introduction

The La Caridad Mineral Resource estimate contains both the main La Caridad zone and the Bella-Union zone. This is the first public disclosure that includes the Bella-Union zone.

This Mineral Resource estimate was determined using a block model methodology based on OK and Inverse Distance cubed (ID^3) interpolation methods. Drill hole sample data was capped to control outlier values and composited for equal sample weighting. Mineral Resource categories were assigned to the model based on drill hole spacing relative to the spatial continuity of the deposit and the search pass that block grades were estimated in. Mineral Resource estimates were constrained by an open pit shell based on economic criteria outlined in Section 11.6.

11.1.2 Geological Model

Lithological, alteration and mineralization domain solid models were provided by LC for the La Caridad deposit. The models were imported into Datamine Studio RM software and compared against the drill hole data. On review, it was found that the drill hole data did not support the solid models provided. The reasons for this are summarized below.

- Much of the drill hole data did not have lithological, alteration and mineralization recorded. More recent drill holes had a fuller record of information, but this represents a small proportion of the overall data.
- Investigation of the available lithological, alteration and mineralization drill hole data relative to the lithological, alteration and mineralization solids showed only weak to moderate correlation.
- There were no lithological, alteration and mineralization domain solid models for the Bella Union zone.

The provenance of the solid models is not clear. It is unlikely the models were developed based on the electronic drill hole data provided. It is possible that additional electronic data was available at some point, and this has been lost.

It was concluded that the available electronic drill hole data was insufficient for new domain solid models to be constructed.

The deposit is known to have oxide, primary sulfide, and secondary sulfide mineralization components. Typically, for this type of deposit, domains of these components would be used as an estimation control, provided the statistical estimation variables (Cu, Mo, etc.) could be shown to have different statistical populations. The lack of data to implement domain control is a risk to the Mineral Resource Estimate, and this has impacted the Resource Classification (see Section 11.5).

11.1.3 Available Data

The drill hole database provided by LC consisted of 3,529 drill holes, including 107,239 sample intervals of which 107,110 had a total Cu assay, 107,064 had a CuO assay, 106,976 had a Mo assay, and 66,498 had a SG measurement. The total length of sample intervals is 694,353 m. Drill hole data has been collected over 16 separate drill campaigns, ranging from 1968 to 2019. The drilling is explained in more detail in Section 7.2 of this TRS.

Data validation included a review of the collars versus the topography, drilling methods, sampling and review of the original scanned logs against the database. A total of 19 drill holes were removed from the final modeling database, as shown in Table 11.1. Further details of the validation process are discussed in Section 9.1.

Table 11.1: List of Excluded holes

Drill Hole	Drill Hole	Drill Hole	Drill Hole	Drill Hole
AM00152	CFCA031	MCD0479	MCI0612	MCI1258
AM00165	CRO0032	MCD0480	MCI0624	MCM0271
AM00251	CRO0041	MCD0573	MCI0757	MCM0391
CFCA024	MCD0477	MCD0694	MCI1231	

As discussed in Section 9.1.3, the QP checked for sample overlaps, duplications, survey anomalies and assay anomalies, which were discussed with LC and addressed.

Based on the validation conducted in Section 9.1.3, the final drill hole database submitted for Exploratory Data Analysis (EDA) consisted of 3,510 drill holes, including 106,282 sample intervals of which 106,132 had a Cu assay, 89,234 had a CuO assay, 104,577 had a Mo assay, and 66,235 had a SG measurement. The total length of sample intervals is 683,807 m.

11.1.4 Exploratory Data Analysis

The sample data were reviewed for Cu, CuO, and Mo using descriptive statistics as well as a series of graphs including histograms, probability plots and X-Y scatterplots for the purpose of describing the sample population and identifying outlier values.

Table 11.2 summarizes the descriptive statistics of the total sample population.

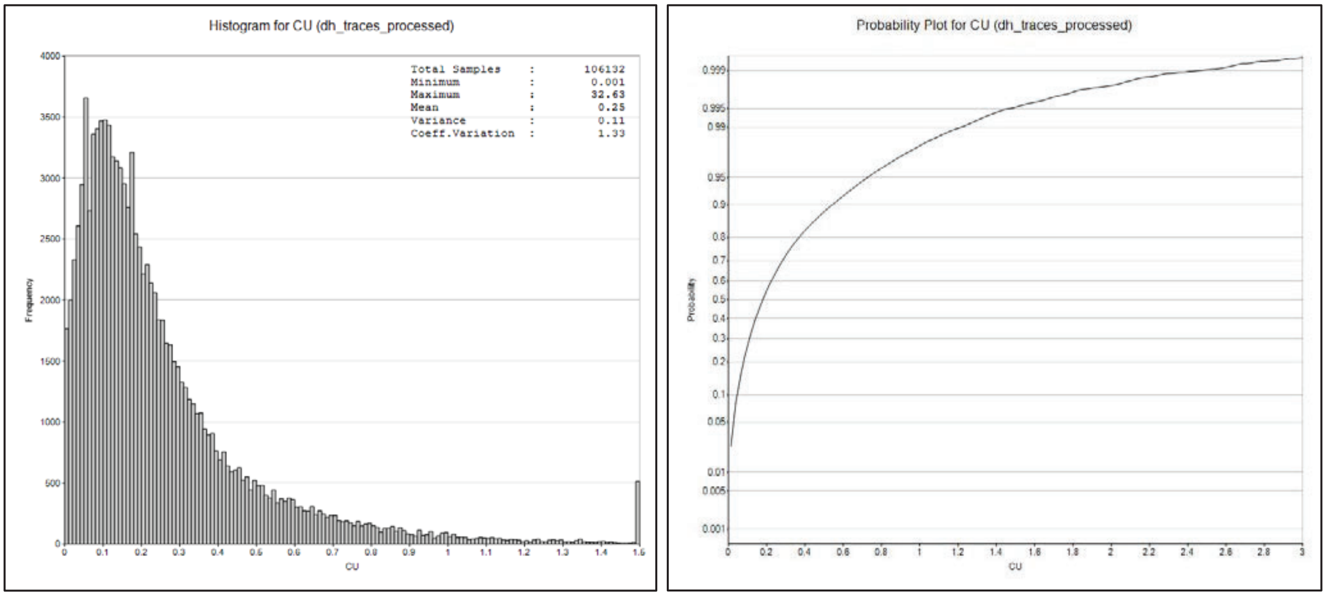
Table 11.2: Summary of Sample Statistics

Variable	Count	Minimum	Maximum	Mean	Variance	Std. Dev.	Co. Var.
Cu	106,132	0.001	32.63	0.254	0.114	0.338	1.329
CuO	89,234	0.001	2.89	0.023	0.002	0.043	1.879
Mo	104,577	0.001	8.023	0.024	0.003	0.055	2.27

Note: Samples are length weighted. Std. Dev.=Standard Deviation. Co. Var.=Coefficient of Variation

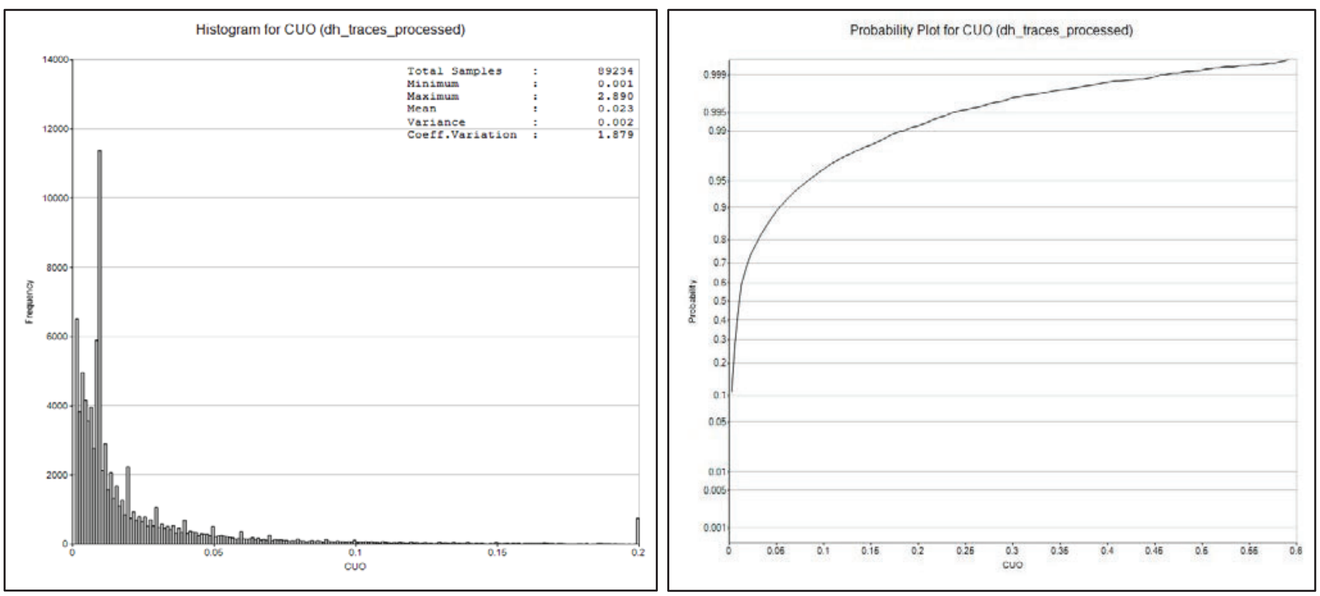
Figure 11.1, Figure 11.2, and Figure 11.3 show the histogram and cumulative probability plots for Cu, CuO, and Mo, respectively. The populations are all positively skewed and there is no clear evidence of multiple populations. All the histograms show spikes which are indicative of assay detection limits. Data has been collected since 1968 and assay methodologies have changed and improved over time, which may explain the reason some populations, CuO in particular, show multiple spikes.

Figure 11.1: Histogram and Probability Plot for Cu



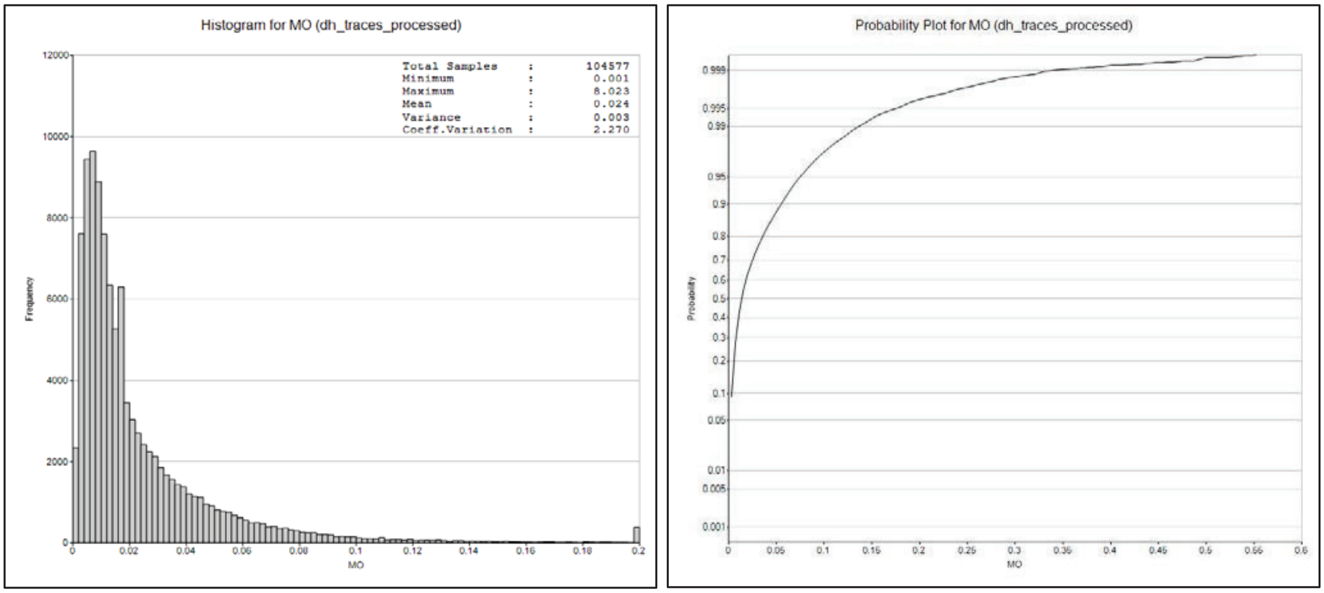
Note: Samples are length weighted.

Figure 11.2: Histogram and Probability Plot for CuO



Note: Samples are length weighted.

Figure 11.3: Histogram and Probability Plot for Mo



Note: Samples are length weighted.

Assay data was evaluated for outlier values using probability plots, scatter plots and quantile analysis. Outlier values were identified and capped (top-cut) for the purposes of grade estimation. The capping values used, and the impact of using the caps is presented in Table 11.3. The percentile value represents the position of the cap value within the overall population distribution.

Table 11.3: Summary Comparison of Capped vs Uncapped Statistics

Variable	Cap Value	No. of Samples Capped	Percentile	Uncapped Mean	Uncapped Co. Var.	Capped Mean	Capped Co. Var.
Cu	2.5	139	above 99.9	0.254	1.329	0.252	0.999
CuO	1.0	22	above 99.9	0.023	1.879	0.023	1.762
Mo	1.0	43	above 99.9	0.024	2.270	0.024	1.441

Note: Samples are length weighted. Co. Var.=Coefficient of Variation

A correlation analysis indicated no significant correlation between any of the variables to be estimated.

Visual examination of the drillhole data showed several features:

- Higher Cu values exhibit pre-mining topographic following features in many areas as well as horizontal to sub-horizontal features (see example section in Figure 11.4).
- Higher CuO values exhibit the pre-mining topographic following features very strongly down to 150 to 200 m below the surface (see example section in Figure 11.5).
- There is a distinct volume of higher Mo values to the North-East (see Figure 11.6).

As previously noted in Section 11.1.2, there is insufficient electronic geological information available against which to correlate these features (and create estimation domains if appropriate). Therefore, specific estimation controls were employed to preserve these features, as closely as possible, in the block model (see Section 11.1).

Figure 11.4: South-North Section (38,000 E) of Drill Holes Showing Cu

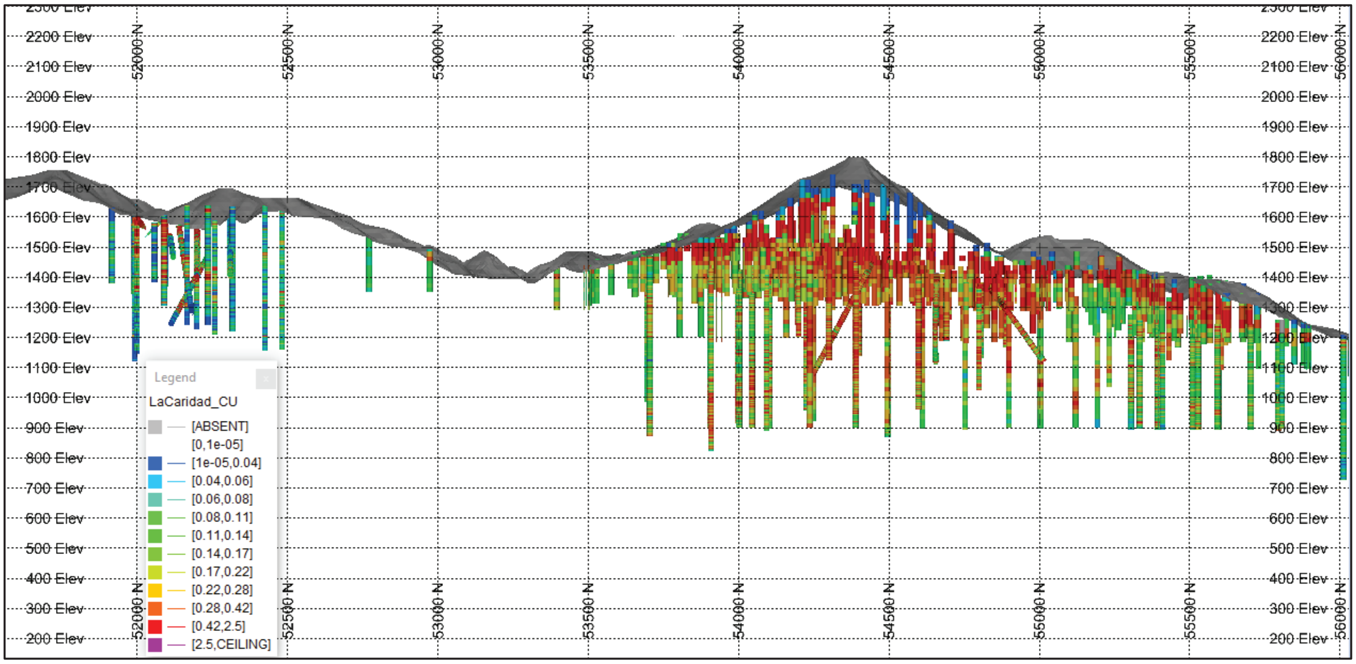


Figure 11.5: South-North Section (38,000 E) of Drill Holes Showing CuO

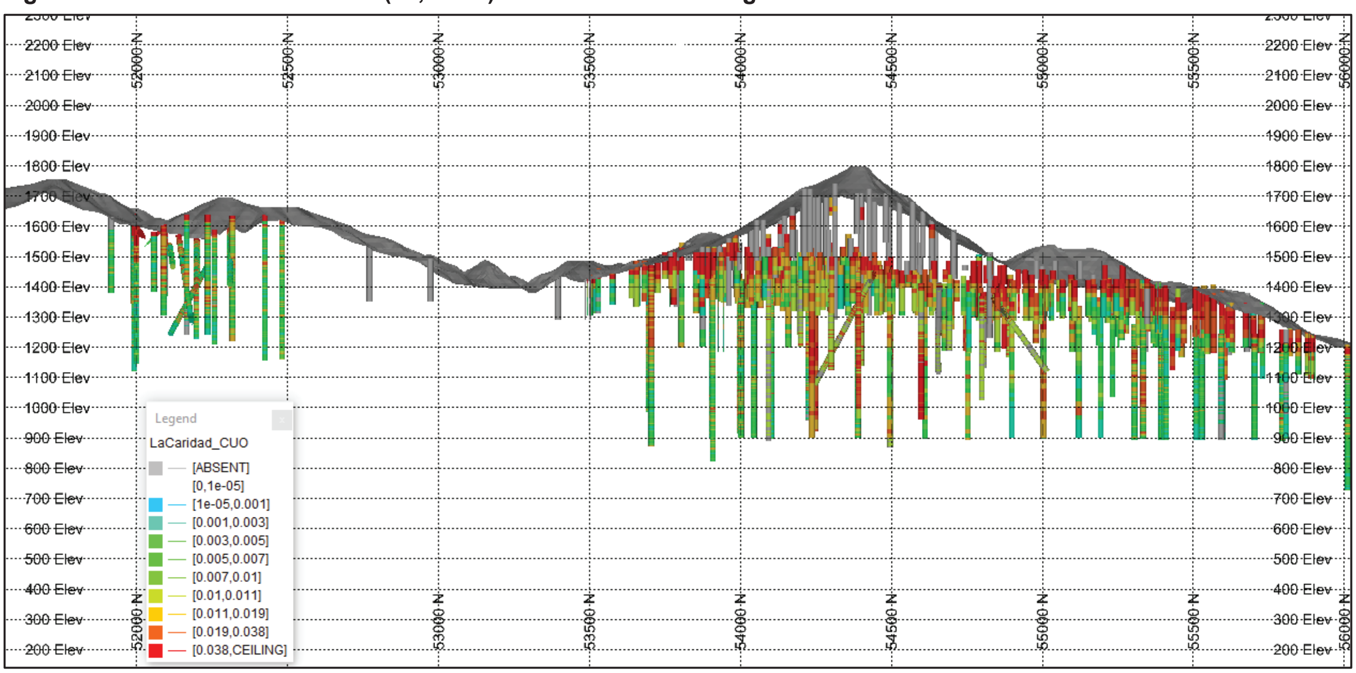
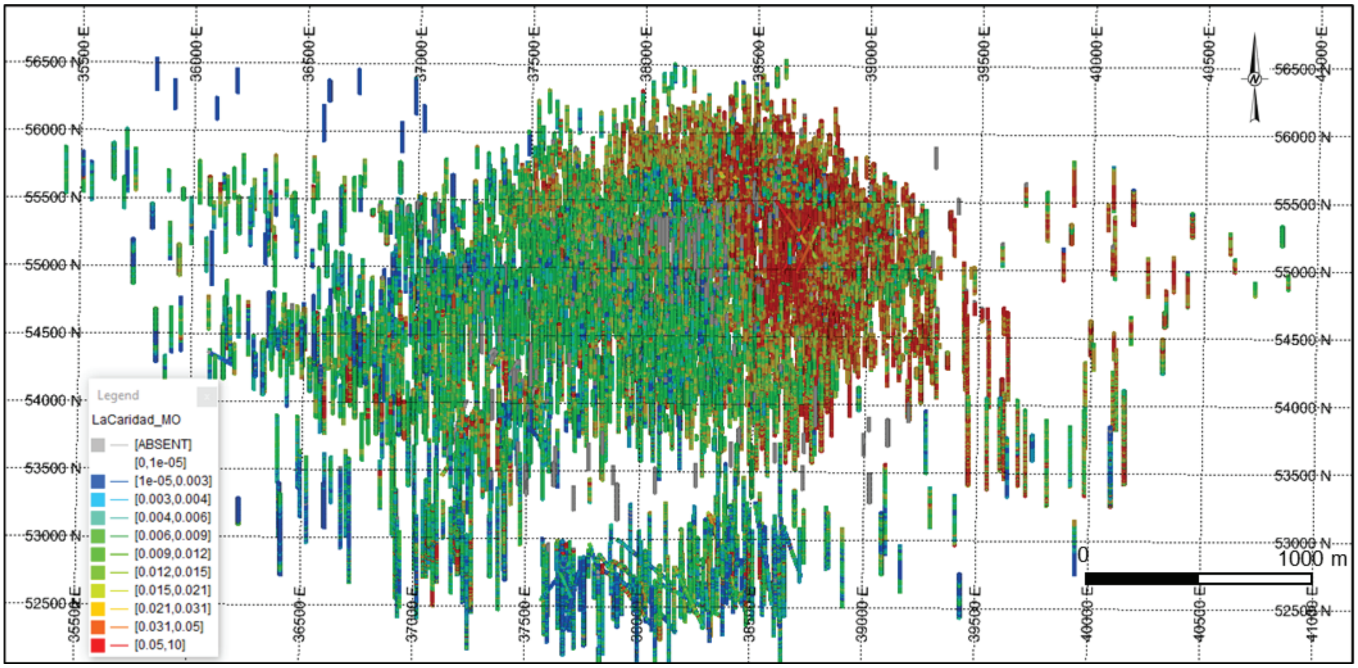


Figure 11.6: Perspective View (looking North from above) of Drill Holes Showing Mo



Sample interval lengths were analyzed for the purpose of selecting a composite length for block model grade estimation (see Figure 11.7). The two most common sample lengths were 15 m (63% of total sample length) and 3 m (23%). As previously noted, historical data had been manually composited into 15-m intervals and it is this information that was recorded electronically; original samples were typically recorded at 3-m lengths. To maintain compatibility with older data, and compatibility with previous Mineral Resource Estimates methodology, a 15-m composite length was used. Table 11.4 summarizes the descriptive statistics of the composite population.

Figure 11.7: Histogram of Sample Lengths

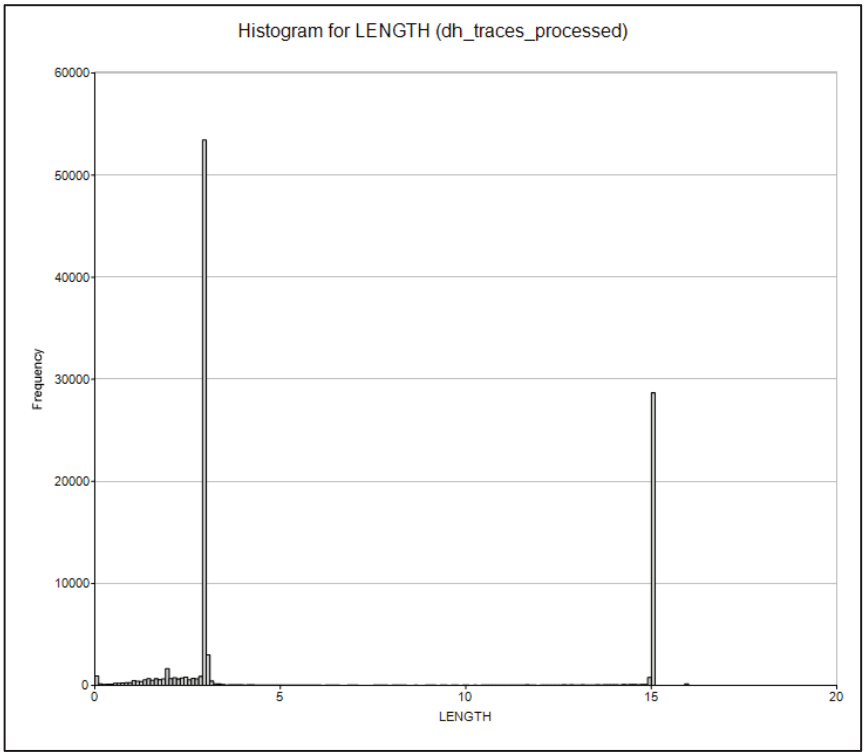


Table 11.4: Summary of Composite Statistics

Variable	Count	Minimum	Maximum	Mean	Variance	Std. Dev.	Co. Var.
Cu	45,428	0.001	2.500	0.252	0.058	0.240	0.953
CuO	37,420	0.001	0.954	0.023	0.001	0.037	1.637
Mo	44,415	0.001	0.954	0.024	0.001	0.030	1.269

Note: Samples are length weighted. Std. Dev.=Standard Deviation. Co. Var.=Coefficient of Variation

11.1.5 Spatial Continuity

The spatial continuity of Cu, CuO and Mo was assessed using variogram analysis.

Three-structure spherical variograms were modeled based on the pairwise-relative experimental variogram data. Figure 11.8 and Figure 11.9 show the along-strike and down-dip variograms and models for total Cu. The isotropic (non-directional) experimental variogram is shown for reference.

The models were used as a guide for the sample search ellipse dimensions and for the assignment of OK weights to the samples for the purpose of grade estimation using OK ,as further discussed in Section 11.2.

Figure 11.8: Along-Strike Variogram Model for Cu

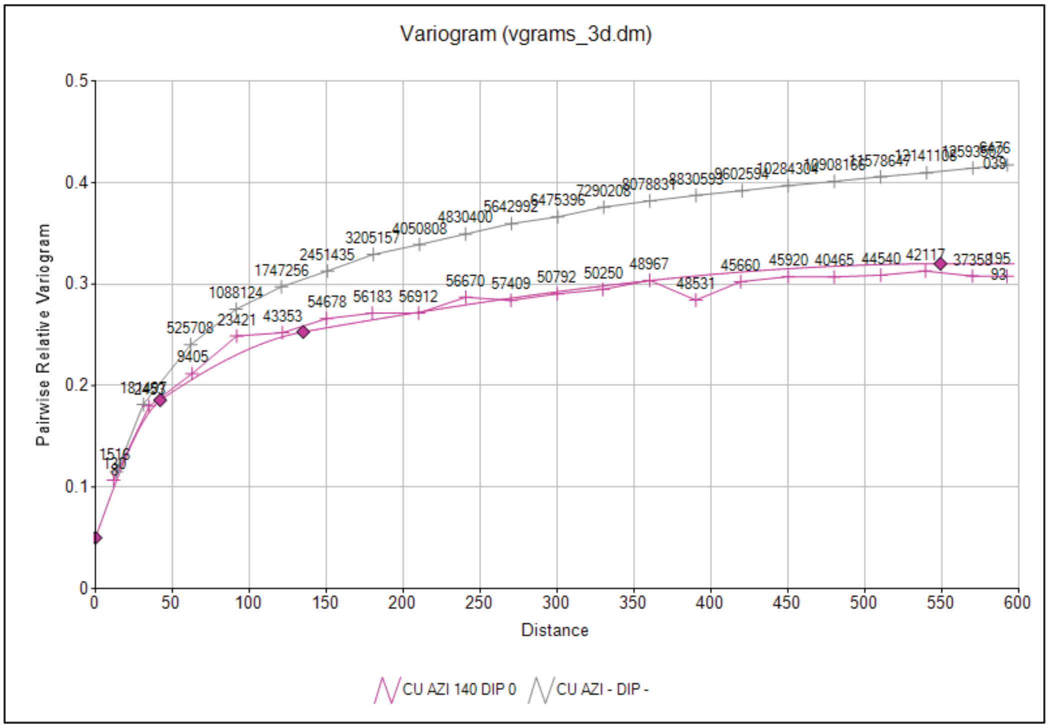
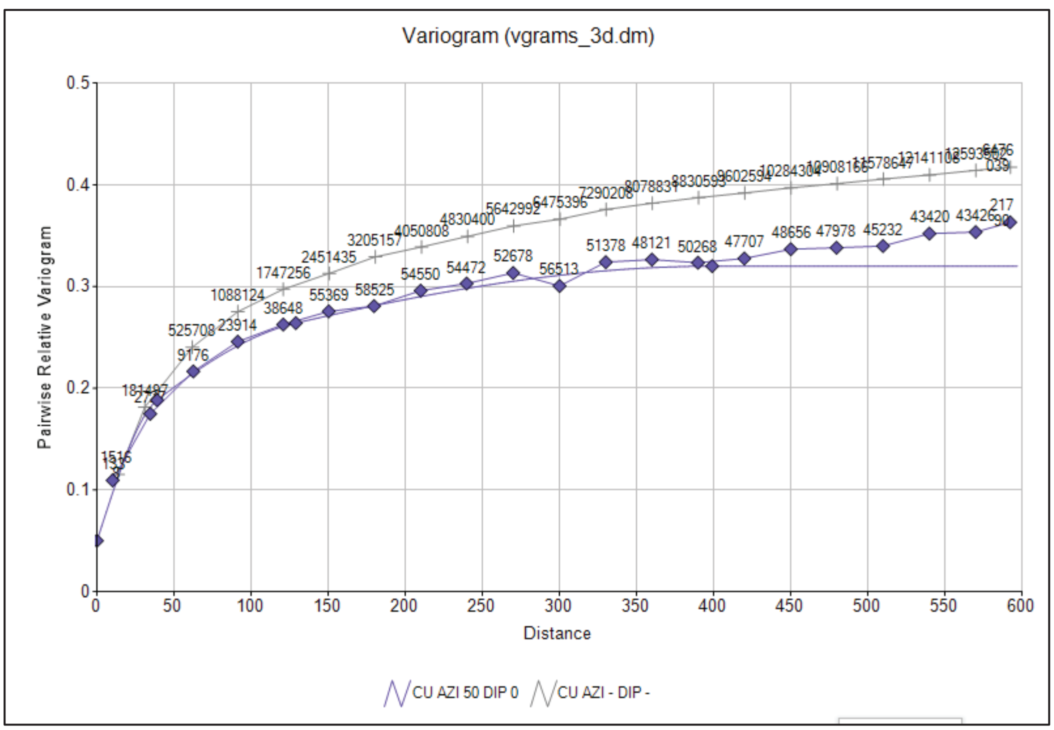


Figure 11.9: Down-Dip Variogram Model for Cu



A summary of variogram model parameters is presented in Table 11.5. CuO variography did not show significant structure, so the Cu variogram model was used as a proxy.

Table 11.5: Summary of Variogram Model Parameters

					Structure 1				Structure 2				Structure 3			
Variable	Angle 1	Angle 2	Angle 3	Nugget	Range 1	Range 2	Range 3	Sill	Range 1	Range 2	Range 3	Sill	Range 1	Range 2	Range 3	Sill
Cu	0	0	50	0.05	43	39	61	0.09	136	129	115	0.075	550	400	170	0.105
CuO	0	0	50	0.05	43	39	61	0.09	136	129	115	0.075	550	400	170	0.105
Mo	-110	15	175	0.065	41	30	20	0.135	188	234	166	0.085	900	644	600	0.085

11.1.6 Specific Gravity

This sub-section contains forward-looking information related to density for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including actual in situ characteristics that are different from the samples collected and tested to date, equipment and operational performance that yield different results from current test work results.

SG data was analyzed using descriptive statistics (see Table 11.6) and histograms (Figure 11.10).

The population is normally distributed around the mean of 2.61. There are several spikes in the distribution indicating potential measurement resolution issues/constraints. Data has been collected since 1968 and SG measurement methodologies have changed and improved over time, which may explain the spikes. There are 33 values of SG less than 2.0 and 31 values greater than 3.2 (+/- 0.6 of the mean). Although, these values could be a true part of the overall distribution, a conservative approach was taken, and they were treated as absent/missing data.

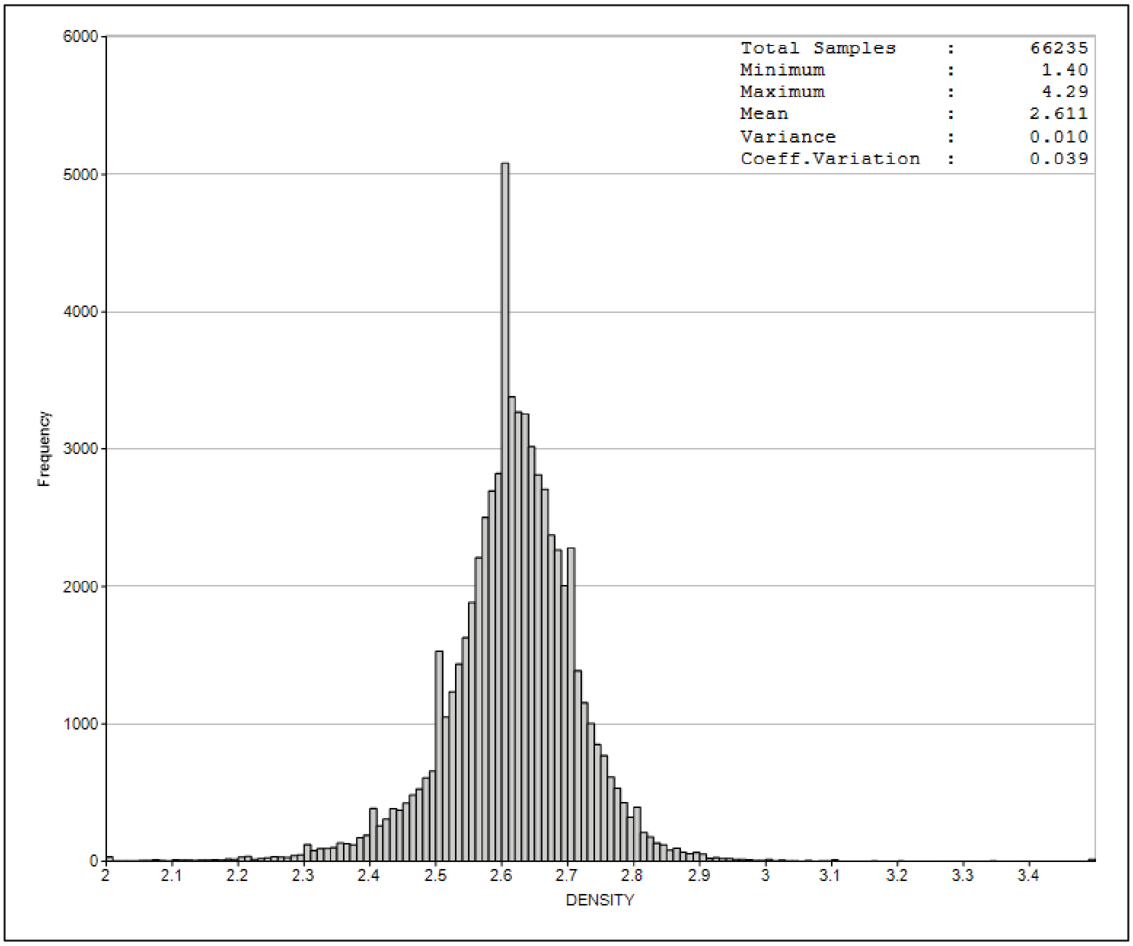
SG was estimated using nearest neighbor (NN) and ID^3 methods.

Table 11.6: Summary of SG Statistics

Variable	Count	Minimum	Maximum	Mean	Variance	Std. Dev.	Co. Var.
SG	66,235	1.400	4.290	2.611	0.010	0.101	0.039

Note: Samples are length weighted. Std. Dev.=Standard Deviation. Co. Var.=Coefficient of Variation

Figure 11.10: Histogram of Sample SG



A correlation analysis indicated no significant correlation between density and any of the other variables to be estimated.

11.1.7 Block Model Methodology

This sub-section contains forward-looking information related to grade for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including geological and grade interpretations and controls and assumptions and forecasts associated with establishing the prospects for economic extraction.

A three-dimensional (3D) block model was generated using Datamine Studio RM software. Block model parameters, including origin and block size, are summarized in Table 11.7. Block splitting was used at the topographic surface.

Table 11.7: Summary of Block Model Details

	Origin	Size	Number	Range	Extent
Easting	35,150	25	248	6,200	41,350
Northing	51,400	25	216	5,400	56,800
Elevation	750	15	80	1,200	1,950

Cu, CuO and Mo were estimated using NN, ID^3OK methods.

As noted in Section 11.1.4, Cu and CuO values showed distinctive pre-mining topographic surface related trends. To account for this, dynamic control of the orientation of the search ellipse, based on the pre-mining topographic surface, was used for blocks within 200 m of the pre-mining topographic surface. All other blocks used the search orientations identified by the variography.

The search strategy consisted of a 3-pass elliptical search, as follows:

- The first pass search radius was equal to approximately half the second structure variogram range of the total copper, for the along-strike and down-dip directions. For the across-strike direction a tighter control was employed than indicated by the variography, in recognition of the topographic surface following and lateral features seen in the drill holes.
- The second pass search was two times the size of the first pass search.
- The third pass search was three times the size of the first pass search.
- In all passes, estimates required a minimum of 8 composites and a maximum of 12 composites.
- In all passes, estimates limited the maximum number of composites per drill hole to four. This, combined with the minimum number of composites, ensured the composites from at least two holes were used for all estimates.

The same sample search strategy was used for all variables, based on the following logic:

- The clearest variogram structures were seen in the Cu variogram.
- The lack of geological information to create domains (see 11.1.2) warranted a conservative approach to estimation, to mitigate smearing of grade between potential different statistical populations.
- To honor the topographic surface following and lateral features seen in the drill holes.

The search parameters were derived using an iterative approach, using visual comparison of block model and composite grades in plan and section, along with a global comparison of mean grades, evaluation of smoothing ratios and swath plots.

The search parameters are summarized in Table 11.8.

Table 11.8: Summary of Search Parameters

Pass	Range 1	Range 2	Range 3	Minimum No. of Composites	Maximum No. of Composites	Max. No. of Composites per hole
1	75	75	30	8	12	4
2	150	150	60	8	12	4
3	225	225	90	8	12	4

11.1.8 Model Validation

The model validation process included a visual comparison of block model and drill hole composite grades in plan and section, along with a global comparison of mean grades, evaluation of smoothing ratios and swath plots. Emphasis was placed on the visual comparison, given no estimation domains were used (see Section 11.1.2), to ensure no smearing, or over-smoothing of grade.

Good agreement between block grades and drill hole composite data was observed for Cu, CuO, and Mo, as demonstrated in Figure 11.11, Figure 11.12, and Figure 11.13.

Figure 11.11: South-North Section (38,000 E) Comparison of Composites and Block Grades for Cu

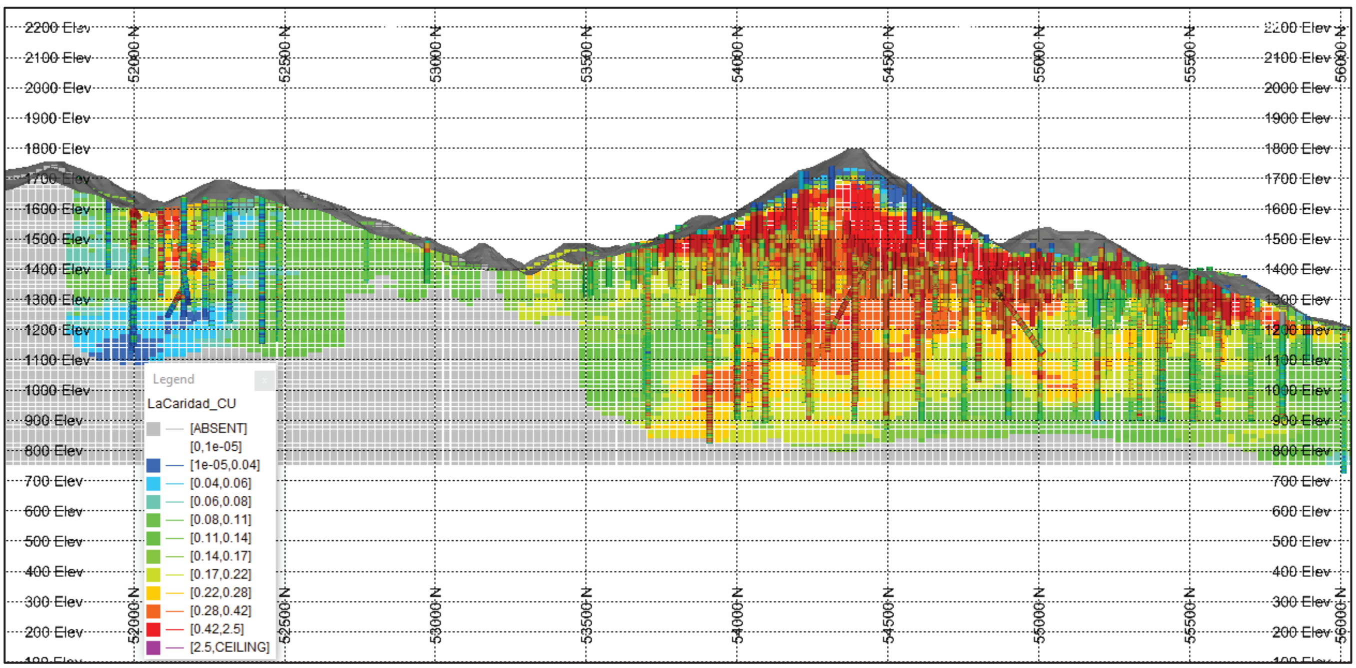


Figure 11.12: South-North Section (38,000 E) Comparison of Composites and Block Grades for CuO

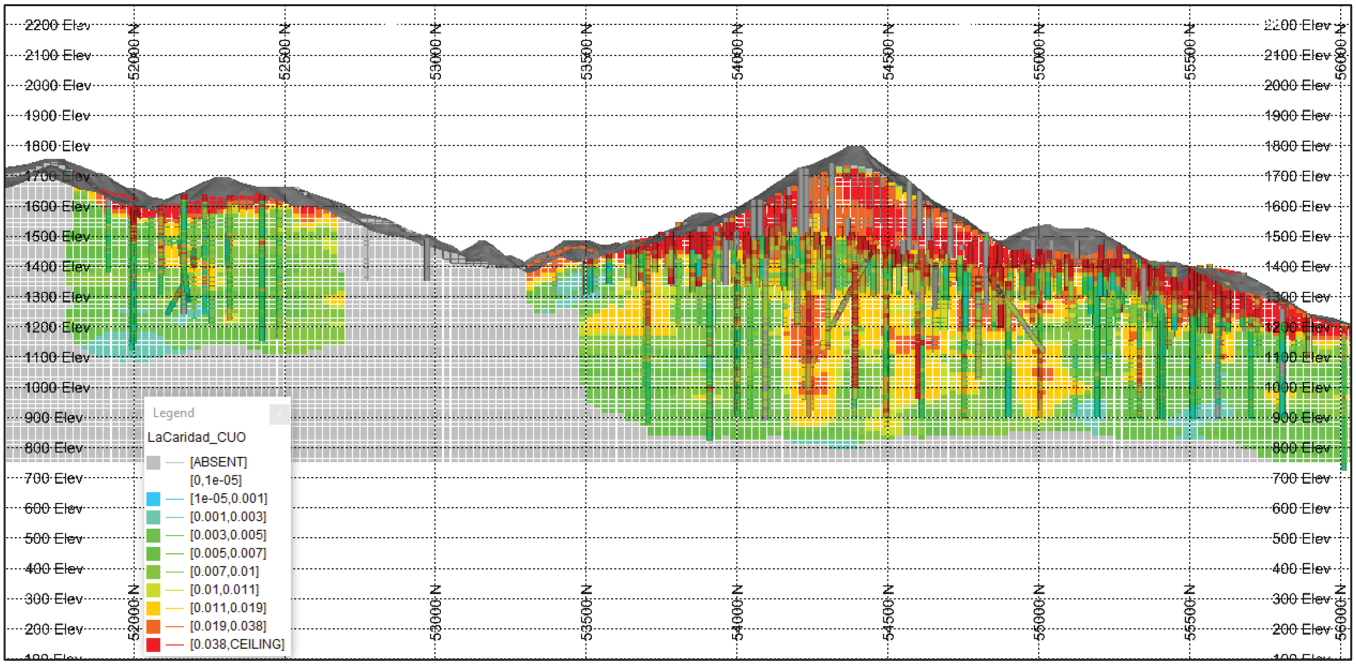
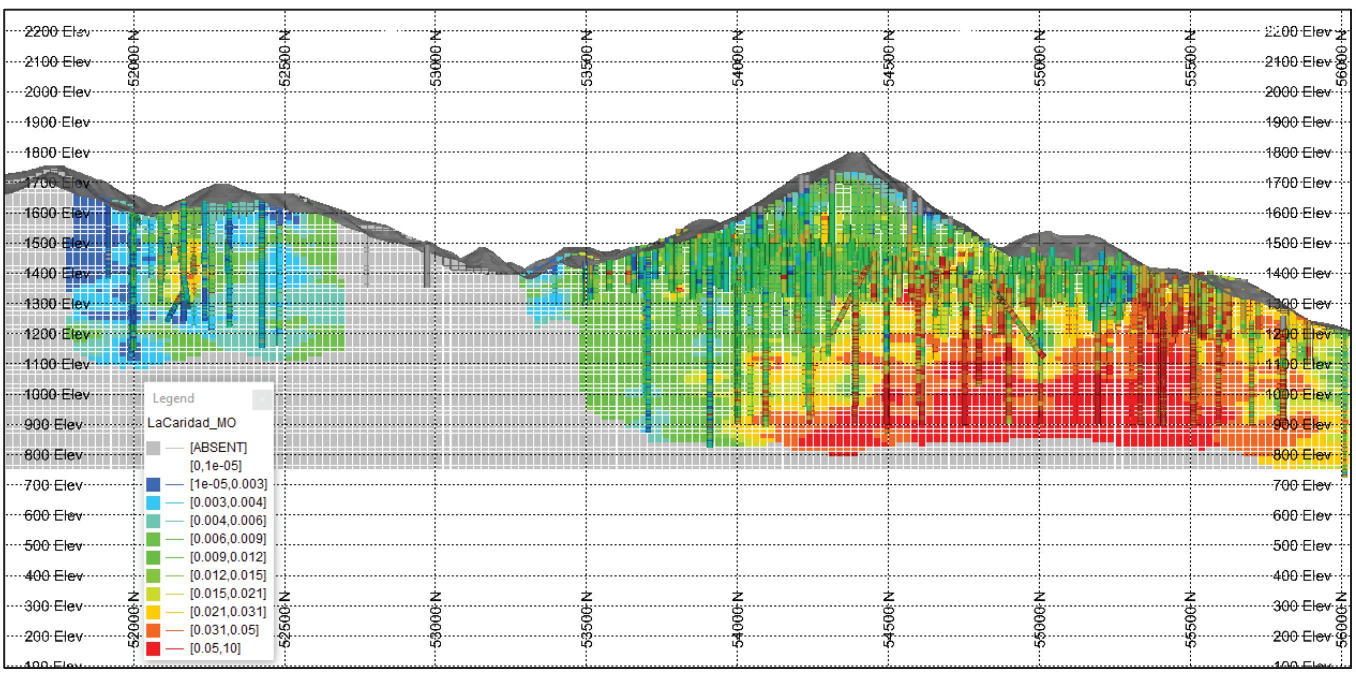


Figure 11.13: South-North Section (38,000 E) Comparison of Composites and Block Grades for Mo



Global mean grades for Cu, CuO and Mo were compared between NN estimates (proxy for de-clustered composite grades), ID^3 estimates, and OK estimates to determine if there was any significant global bias (see Table 11.9). The global means differences are all less than 5% (see last two columns in the Table 11.9) indicating no significant global bias in the grade estimates.

Table 11.9: Comparison of Global Mean Estimates

Variable	NN Mean	ID^3 Mean	OK Mean	ID^3 % Diff	OK % Diff
Cu	0.157	0.159	0.159	0.96	0.98
CuO	0.014	0.014	0.014	2.77	3.27
Mo	0.022	0.022	0.022	0.13	0.11
SG	2.615	2.614		-0.02	

Grade estimates were evaluated for smoothing by calculating smoothing ratios which are based on the ratio between the theoretical model variance and actual model variance, where the theoretical variance is calculated based on the sum of the variance inside the block and variance between blocks using parameters, including the variogram model sill, block size, and F Function. A certain degree of smoothing is expected due to the change of support size from core sized samples to large mining blocks. It is common when using OK to see higher smoothing than expected, which can be an issue when reporting resources above a mining cut-off, as the overly smoothed distribution results in resource tonnages being overestimated and grades being underestimated. The smoothing ratios were reviewed and considered to be within generally accepted ranges (see Table 11.10).

Table 11.10: Estimate Smoothing Ratios

Variable	ID^3 Smoothing Ratio	OK Smoothing Ratio
Cu	0.980	1.070
CuO	1.070	1.220
Mo	0.900	1.000

Swath plots were generated for Cu, CuO and Mo to evaluate local grade comparisons between NN, ID^3, and OK estimates. Example swath plots are presented in Figure 11.14, Figure 11.15, and Figure 11.16. In general, there was good correlation between all estimates. Some divergence was observed at the margins of the model, but this is not unexpected given the low data density in these areas.

Figure 11.14: North-South Cu Swath Plot

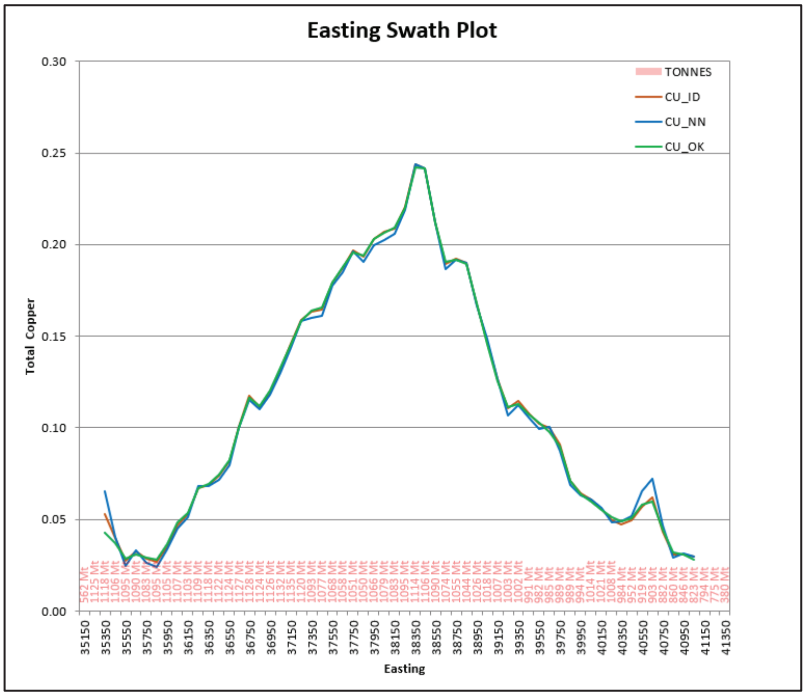


Figure 11.15: East-West Cu Swath Plot

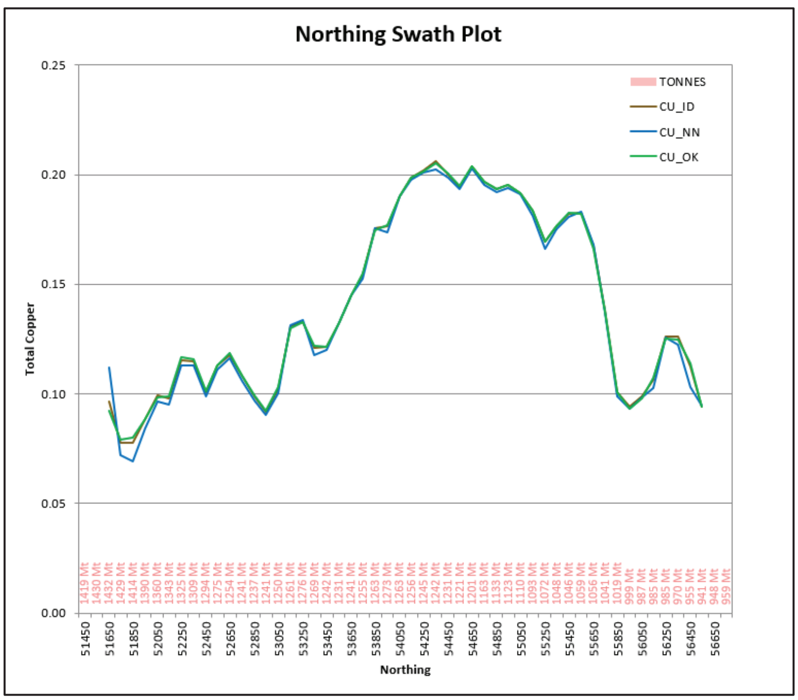
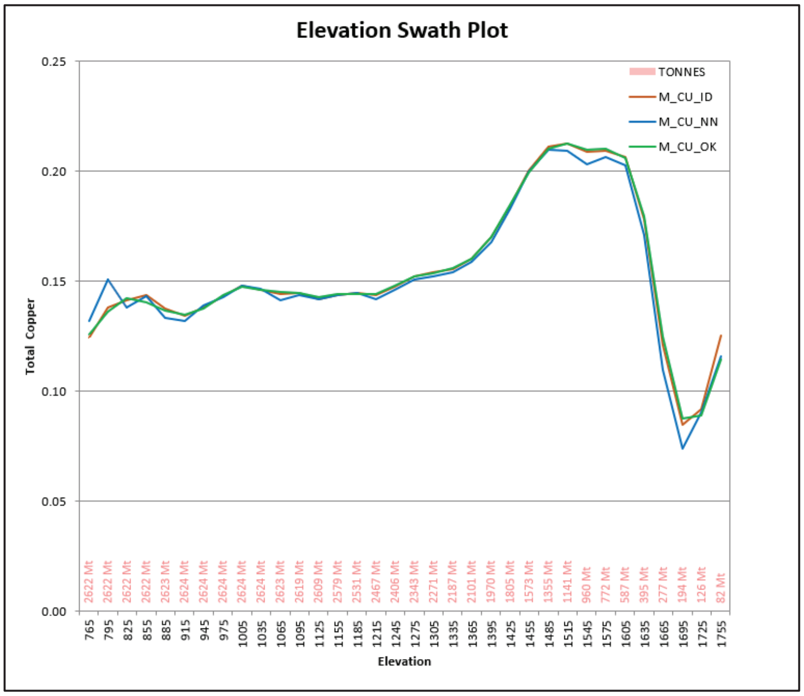


Figure 11.16: Plan Cu Swath Plot



Based on the validations conducted, OK was chosen as the final estimated grades for Cu and ID^3 was used for CuO and Mo.

11.2 Mineral Resource Estimate

This sub-section contains forward-looking information related to Mineral Resource estimates for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including geological and grade interpretations and controls and assumptions and forecasts associated with establishing the prospects for economic extraction.

The Mineral Resource estimate for the project is reported here in accordance with the SEC S-K 1300 regulations. For estimating the Mineral Resources of El Pilar, the following definition as set forth in the S-K 1300 Definition Standards adopted December 26, 2018 was applied.

Under S-K 1300, a Mineral Resource is defined as:

> "…is a concentration or occurrence of 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 economic extraction. A mineral resource is a reasonable estimate of mineralization, taking into account relevant factors such as cut-off grade, likely mining dimensions, location or continuity, that, with the assumed and justifiable technical and economic conditions, is likely to, in whole or in part, become economically extractable. It is not merely an inventory of all mineralization drilled or sampled."

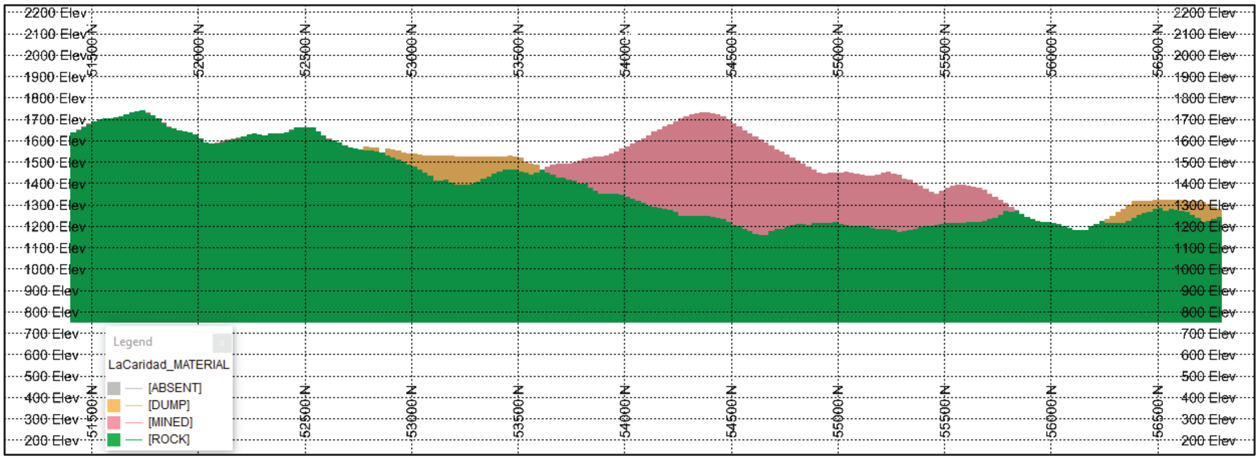
Note to readers: The Mineral Resources presented in this section are not Mineral Reserves and do not reflect demonstrated economic viability. The reported Inferred Mineral Resources are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves. There is no certainty that all or any part of this Mineral Resource will be converted into Mineral Reserve. All figures are rounded to reflect the relative accuracy of the estimates and totals may not add correctly.

Mineral Resource estimates exclusive of Mineral Reserves are summarized in Table 11.11 for the Leach Process and Table 11.12 for the Mill Process on a 100% ownership basis. Mineral Resources presented in the table are in accordance with the definitions presented in S-K 1300. The effective date of the Mineral Resource estimate is December 31, 2021.

The Mineral Resource estimate was reported from within a constrained pit shell developed using the criteria presented in Section 11.3 of this TRS to establish reasonable prospects for economic extraction. To prepare the block model for Whittle the following actions were taken.

- The original surface topography and the October 2021 topography were used to define a material type, identifying previously mined material (pink in Figure 11.17), surface dumps (orange) and un-mined material (green).
- Previously mined material was removed from the model.
- All un-estimated blocks were assigned a zero grade for Cu and Mo.
- Un-mined blocks without an estimated SG were assigned the average SG of 2.61.
- Dump blocks were assigned an SG of 1.77.
- Blocks were regularized to 25-m Easting x 25 m Northing x 15-m Elevation: this being the anticipated minimum mining unit.

Figure 11.17: S-N Section (38,000 E) of Material Type Assigned to the Block Model



Current operating practice at La Caridad states that material with a Cu grade greater than 0.30% is sent to the mill and remaining material above 0.15% Cu grade is sent to the leach pad. For the purposes of estimating the Mineral Resources, and Mineral Reserve estimates, an economic breakeven COG was applied (rather than a defined Cu grade).

The Mineral Resources and the Mineral Reserves assumed material with a solubility index (CuO/Cu) greater than 0.8 would be sent to the leach pad rather than the mill (irrespective of the total copper grade).

Table 11.11: Mineral Resource Estimates Exclusive of Mineral Reserves for the Leach Process – 100% Ownership Basis

Process	Classification	Tonnes (Mt)(4)	Grade		Contained Metal
			Total Cu (%)(2)	Mo (%)(2)	Cu (Mt)(5)
Leach(1)(3)	Measured	-	-	-	-
	Indicated	817	0.06	-	0.5
	Total Measured + Indicated	**817**	**0.06**	**-**	**0.5**
	Inferred	927	0.06	-	0.6

Notes:
1. Mineral Resources are reported on a 100% basis and are exclusive of Mineral Reserves.
2. Mineral Resources are reported on a break-even plant and leach profit basis.
3. The estimate was constrained to within the Resource pit based on a Cu price of $US3.795/lb, Mo price of US$11.50/lb.
4. Tonnes are reported on a dry basis.
5. Contained Metal (CM) is calculated as follows:
   CM = Tonnage (Mt) * Grade (%).
6. Tonnage and contained metal have been rounded to reflect the accuracy of the estimate and numbers may not add exactly.
7. The estimate was completed using a SG of 2.6.
8. The estimate was constrained to within the Resource pit.
9. The Mineral Resource estimates were prepared by Ronald Turner, CP. (who is the independent Qualified Person for these Mineral Resource estimates), reported using the S-K 1300 Definition Standards adopted December 26, 2018.

Table 11.12: Mineral Resource Estimates Exclusive of Mineral Reserves for the Mill Process – 100% Ownership Basis

Process	Classification	Tonnes (Mt)(4)	Grade		Contained Metal
			Total Cu (%)(2)	Mo (%)(2)	Cu (Mt)(5)
Mill(1)(3)	Measured	-	-	-	-
	Indicated	6,455	0.17	0.026	10.8
	Total Measured + Indicated	**6,455**	**0.17**	**0.026**	**10.8**
	Inferred	4,039	0.13	0.025	5.1

Notes:
1. Mineral Resources are reported on a 100% basis and are exclusive of Mineral Reserves.
2. Mineral Resources are reported on a break-even plant and leach profit basis.
3. The estimate was constrained to within the Resource pit based on a Cu price of $US3.795lb, Mo price of US$11.50/lb.
4. Tonnes are reported on a dry basis.
5. Contained Metal (CM) is calculated as follows:
   CM = Tonnage (Mt) * Grade (%).
6. Tonnage and contained metal have been rounded to reflect the accuracy of the estimate and numbers may not add exactly
7. The estimate was completed using a SG of 2.6.
8. The estimate was constrained to within the Resource pit.
9. The Mineral Resource estimates were prepared by Ronald Turner, CP. (who is the independent Qualified Person for these Mineral Resource estimates), reported using the S-K 1300 Definition Standards adopted December 26, 2018.

It should be noted that SCC has a 98.14% ownership in LC through their main subsidiaries with the remainder being held through intermediate holding companies.

11.3 Basis for Establishing the Prospects of Economic Extraction for Mineral Resources

This sub-section contains forward-looking information related to establishing the prospects of economic extraction for Mineral Resources for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including COG assumptions, costing forecasts and product pricing forecasts.

Mill recoveries for La Caridad are based on the historical 3-year average of 84% for Cu and 83% for Mo. Heap leach recoveries for La Caridad are based on the historical 3-year average of 40% for Cu. Mo is not recovered in the leach.

Additional description of the lab testing, and analyses can be found in Section 8.0, 10.0, 12.0, and 14.0.

As described in Section 12, both the Mineral Resources and the Mineral Reserves assumed material with a solubility index greater than 0.8 would not be sent to the concentrators and instead would be sent to the leach pad. While La Caridad currently assigns mill feed with material at a Cu grade greater than 0.30% and a leach COG greater than 0.15%, for estimating the Mineral Resources, and Mineral Reserve estimates, an economic breakeven COG was applied.

A copper price of US$3.30/lb was used for estimating Mineral Reserves while a 15% higher price of US$3.795/lb used when estimating Mineral Resources. Similarly, a molybdenum price of United States Dollars US$10.00/lb was used for estimating Mineral Reserves while a 15% higher price of US$11.50/lb used when estimating Mineral Resources. These price assumptions were provided by SCC.

The Mineral Resource estimate was reported from within a constrained pit shell developed using the following criteria to establish reasonable prospects for economic extraction.

- Cu price assumption = US$3.795/lb
- Mo price assumption = US$11.50/lb
- Mining cost (Mill, Leach, Waste) = US$1.189/t (base cost, excluding haulage)
- Mining cost (Fill) = US$1.041/t (base cost, excluding haulage)
- Processing cost (Mill, Mo>0.05) = US$4.539/t
- Processing cost (Mill, Mo<0.05) = US$4.589/t
- Processing cost (Leach) = US$0.244/t
- Cu Selling Cost (Mill) = US$0.269/lb
- Cu Selling Cost (Leach) = US$0.544/lb
- Mo Selling Cost (Mill) = US$1.750/lb
- Cu recovery (Mill) = 84% (based on 3-year historical average)
- Cu recovery (Leach) = 40% (based on 3-year historical average)
- Mo recovery (Mill) = 83% (based on 3-year historical average)

Commodity price assumptions were provided by SCC and it is the QP's opinion that the prices are reasonable and consistent with the market studies provided by SCC as discussed in Section **Error! Reference source not found.**. Mining and selling costs were based on historical operational data from La Caridad and were deemed to be reasonable based on general experience with other operations. The selling cost includes estimates for the solvent extraction and electro-winning (SX-EW), cathode transport, general administration, and royalty costs.

Additional details on the pit limits and Whittle pit optimization are in Section 12.0.

11.4 Mineral Resource Classification

This sub-section contains forward-looking information related to Mineral Resource classification for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including geological and grade continuity analysis and assumptions.

According to the S-K 1300 regulations, to reflect geological confidence, Mineral Resources are subdivided into the following categories based on increased geological confidence: Inferred, Indicated, and Measured, which are defined under S-K 1300 as:

"Inferred Mineral Resource is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. The level of geological uncertainty associated with an inferred mineral resource is too high to apply relevant technical and economic factors likely to influence the prospects of economic extraction in a manner useful for evaluation of economic viability. Because an inferred mineral resource has the lowest level of geological confidence of all mineral resources, which prevents the application of the modifying factors in a manner useful for evaluation of economic viability, an inferred mineral resource may not be considered when assessing the economic viability of a mining project, and may not be converted to a mineral reserve.

Indicated Mineral Resource is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of adequate geological evidence and sampling. The level of geological certainty associated with an indicated mineral resource is sufficient to allow a qualified person to apply modifying factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Because an indicated mineral resource has a lower level of confidence than the level of confidence of a measured mineral resource, an indicated mineral resource may only be converted to a probable mineral reserve.

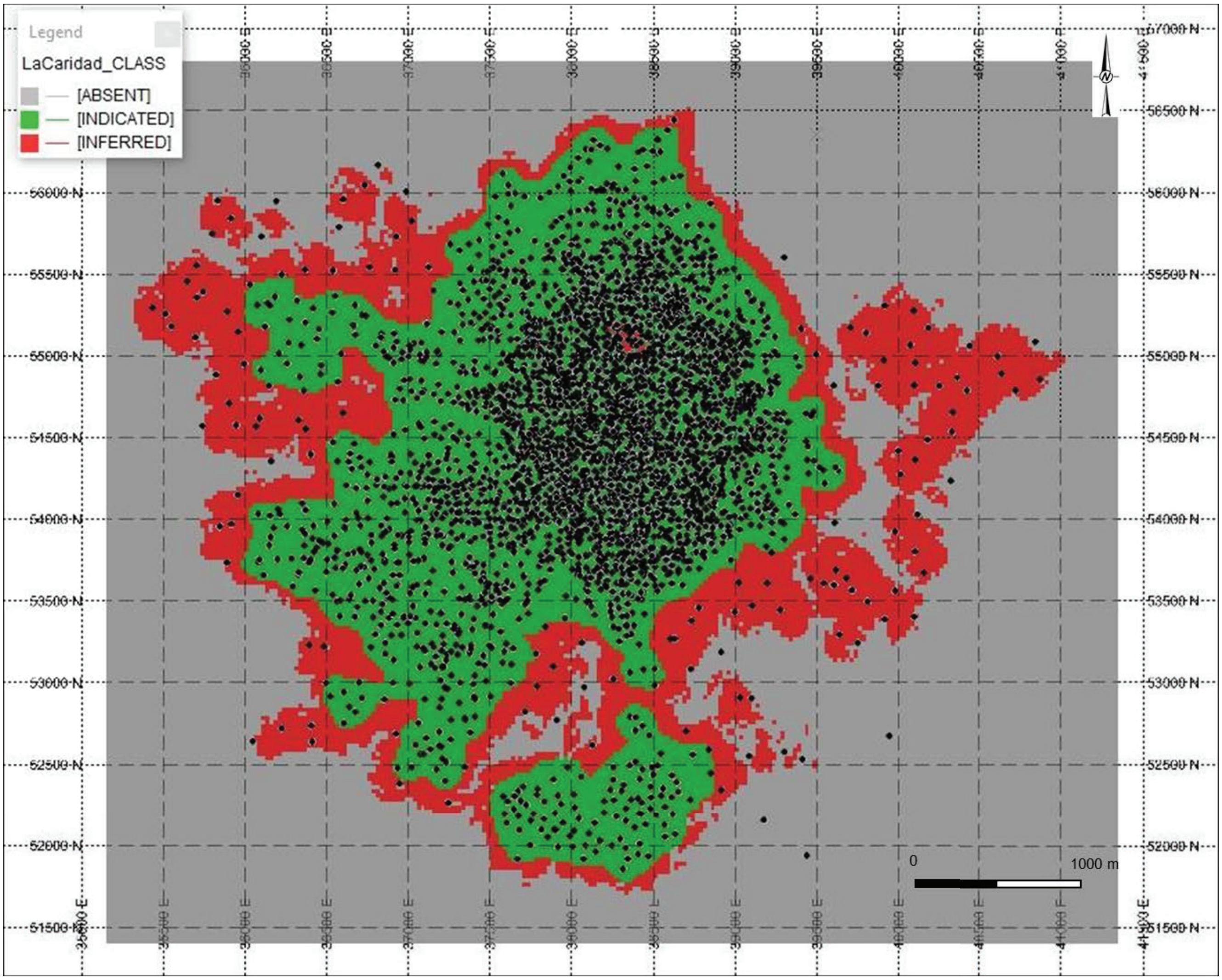
Measured Mineral Resource is that part of a mineral resource for which quantity and grade or quality are estimated on the basis of conclusive geological evidence and sampling. The level of geological certainty associated with a measured mineral resource is sufficient to allow a qualified person to apply modifying factors, as defined in this section, in sufficient detail to support detailed mine planning and final evaluation of the economic viability of the deposit. Because a measured mineral resource has a higher level of confidence than the level of confidence of either an indicated mineral resource or an inferred mineral resource, a measured mineral resource may be converted to a proven mineral reserve or to a probable mineral reserve."

Resource categories were assigned to broad regions of the block model based on the confidence related to drill hole density, geological understanding, continuity of mineralization relative to the style of mineralization, and data quality. A combination of drill hole density and the estimation pass used to estimate the grade of the block was used as a guide for outlining classification regions. Areas where the drill hole spacing is on average less than 100 m, and most blocks were estimated in the first or second pass, were classified as "Indicated Mineral Resource" and areas where the drill hole spacing is greater than 100 m and less than 150 m, and the blocks were estimated in the second or third pass, were classified as "Inferred Mineral Resource". Figure 11.18 and Figure 11.19 show a plan view and an example section view of the resource categories assigned to the block model.

Normally in this type of deposit, the drill hole density in some areas would be sufficient to declare "Measured Mineral Resource." However, these areas were classified as "Indicated Mineral Resource" for the following reasons:

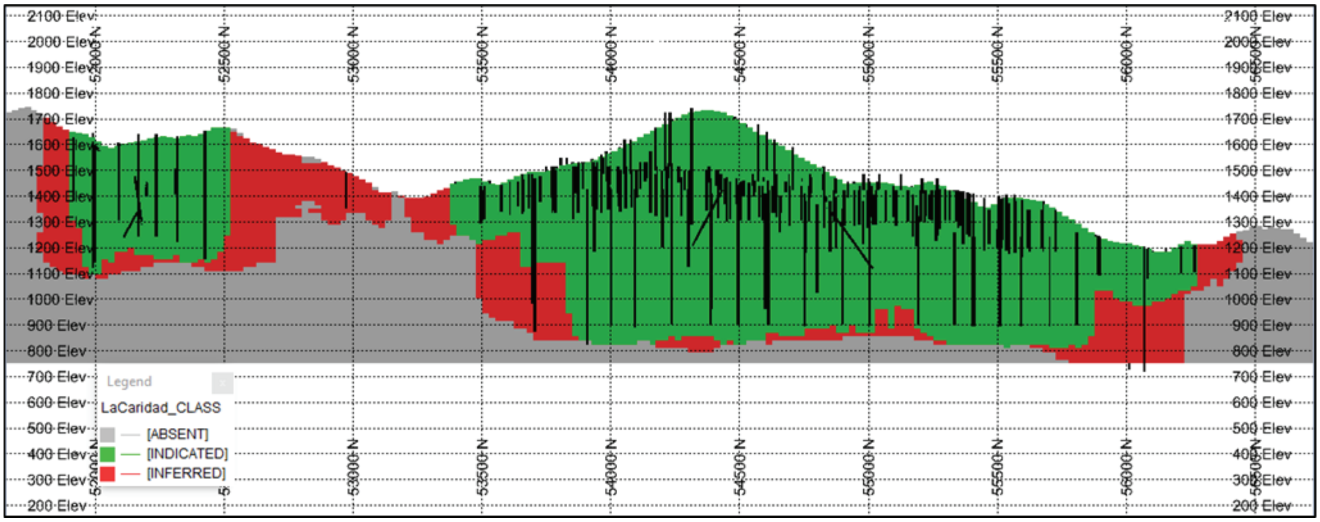
- Lack of industry standard drill hole QA/QC.
- Lack of downhole survey measurements (holes treated as vertical).
- Lack of geological information to identify potential domains of different statistical properties.

Figure 11.18: Plan View of Resource Classification Assigned to the Block Model



Note: Drill hole collars are shown in black

Figure 11.19: S-N Section (38,000 E) of Resource Classification Assigned to the Block Model



Note: Drill hole traces are shown as black lines

11.5 Mineral Resource Uncertainty Discussion

Mineral Resources are not Mineral Reserves and do not necessarily demonstrate economic viability. There is no certainty that all or any part of this Mineral Resource will be converted into Mineral Reserve.

Inferred Mineral Resources are too speculative geologically to have economic considerations applied to them to enable them to be categorized as Mineral Reserves.

Mineral Resource estimates may be materially affected by the quality of data, natural geological variability of mineralization and / or metallurgical recovery and the accuracy of the economic assumptions supporting reasonable prospects for economic extraction including metal prices, and mining and processing costs.

La Caridad is a mine with legacy information, which is suitable to be used in Mineral Resource estimation. However, as discussed in the previous section, there are some issues related to the lack of QA/QC, deviation measurements, and lack of electronically recorded geological information that, in the QP's opinion, prevent the classification of Measured Mineral Resources. Areas where the drill hole spacing is on average less than 100 m were classified as Indicated Mineral Resource and areas where the drill hole spacing is greater than 100 m and less than 150 m were classified as Inferred Mineral Resource.

Subsequent infill drilling, with appropriate QA/QC, could potentially confirm the continuity of the mineralization and upgrade the Mineral Resource categories and associated quantities. Action plans have been defined and are being implemented to address the existing concerns regarding the shortcoming described above. These plans will be reviewed in the future as Mineral Resources are re-ascertained.

Mineral Resources may also be affected by the estimation methodology and parameters and assumptions used in the grade estimation process including top-cutting (capping) of data or search and estimation strategies although it is the QP’s opinion that there is a low likelihood of this having a material impact on the Mineral Resource estimate.

11.6 Assumptions for Multiple Commodity Mineral Resource Estimate

Not applicable to this TRS as no metal/mineral equivalents are being used or reported.

11.7 Qualified Person’s Opinion on Factors that are Likely to Influence the Prospect of Economic Extraction

It is the QP’s opinion that the Mineral Resource block model is representative of the informing data and that the data is of sufficient quality to support the 2021 Mineral Resource Estimate. The December 31, 2021 Mineral Resource Estimate for the LC Project has been estimated in accordance with the December 26, 2018, SEC S-K 1300 regulations. However, it is the opinion of the QP that a detailed validation of the database should be carried out, especially on data from historical campaigns that are still in unmined areas of the mine, so that confidence in the data can be clearly established.

The 2021 Mineral Resource Estimate may be materially impacted by the any future changes in the breakeven COG, potentially resulting from changes in mining costs, processing recoveries, or metal prices or from changes in geological knowledge as a result of new exploration data.

12.0 MINERAL RESERVE ESTIMATES

12.1 Key Assumptions, Parameters, and Methods

This sub-section contains forward-looking information related to the key assumptions, parameters and methods for the Mineral Reserve estimates for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including Mineral Resource model tonnes and grade and mine design parameters.

12.1.1 Geologic Resource Model

The dimensions of the block model are shown in Table 12.1 and the principal variables of the block model are shown in Table 12.2.

Table 12.1: Block Model Dimensions

Dimensiton	Min	Max	Block Size (m^3)	No. of Blocks
X	0	6200	25	248
Y	0	5400	25	216
Z	0	1200	15	80

Table 12.2: Principal Variables of the Block Model

Variable	Description
Cu	Total copper grade (%)
CuO	Oxide copper grade (%)
CuSol	Soluble copper grade in (%)
Mo	Total molybdnenum grade in (%)
Density	Density in tonnes per cubic meter
CusIndex	Solubility index (CuO + CuSol) / Cu
Class	Resource classification code
Material	Rock or Fill Material
Deposit	La Caridad or Bella Union
ISX	Solubility index (CuO) / Cu

The model was also depleted to the October 09, 2021, topographic surface provided by LC. Actual production data for 2021 was provided by LC.

12.1.2 Mine Design Criteria

LC has a long history of mining and has been engaged in large scale open pit mining of the deposit. The mine design criteria were provided by LC and used as a guide to the development of the pit design for this Study. There will be differences between the production plan being followed at site and the mining plan described in this Study. Notable differences between the two are as follows:

- La Caridad assumes no dilution and no mining loss in their long-range mine planning:
  - The dilution and mining loss used in this Study is described in Section 12.2.1.
- This study incudes an economic COG assumption, Section 12.2.4.1, for mill and leach selection:
  - La Caridad currently assumes a hard cut-off 0.3 Cu% COG for concentrator feed
  - La Caridad currently assumes a hard cut-off 0.12 Cu% COG for ROM and crushed leached feed

12.2 Modifying Factors

This sub-section contains forward-looking information related to the modifying factors for the Mineral Reserve estimates for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including modifying factors including dilution and mining and recovery factors, beneficiation assumptions, property limits, commodity price, cut off grades, pit optimization assumptions and the ultimate pit design.

12.2.1 Property Limits

No constraints by property limits were identified for the operational and proposed pit.

12.2.2 Project Constraints

LC provided a boundary so that the pit optimization and design did not mine into the site infrastructure. The red dashed polygon used to restrict the pit optimization is shown in Figure 12.1.

12.2.3 Processing

This study assumed a current capacity of approximately 361 Mt remaining in the TSF (as of December 31, 2021). which provides an estimated capacity of 11 years remaining with an annual production of 32.4 Mtpy.

12.2.4 Commodity Price Used

The commodity prices used for the pit optimization and economic cut-off analysis were:

- US$3.30/lb copper
- US$10.00/lb molybdenum

Commodity prices used were provided by SCC and described in the Section 16.0.

12.2.5 Cut-off Grade Estimate

For this study, an economic cut-off was used rather than the current practice site is using of a COG of 0.12% copper for leach and 0.3% copper for mill.

The prices listed in Table 12.5 were used to compute two distinct profit values for each non-fill block having a resource classification of Measured or Indicated. The distinct profit values include:

- The block profit if sent to the mill (both copper and molybdenum)
- The block profit if sent to leach pad (copper only)

12.2.5.1 Leach

All material was considered leachable. The parameters in Table 12.3 are used to calculate the value of sending the material to a leach pad. Note the leach recovery 40% was provided from historical site data. The current practice at LC is to leach ROM ore. If the value is greater than zero the material can be considered leachable.

Table 12.3:Leach COG Parameters

Variable	Units	Value
Payable Metals		Cu
Selling Price	US$/lb	3.30
Processing Cost	US$/t	0.24
Processing Recovery	%	40
Payablity	%	100
Selling Cost	US$/lb	0.55

Note: Processing cost includes heap leach, SX-EW, and additional leach mining cost.

To determine the leach value, the following equation was used:

The value formula for leach is shown below.

$$Value_{leach} = Cu\% * Recovery_{Cu} * Payability_{Cu} * \frac{2204.6\ lb}{1\ t} * (SellingPrice_{Cu} - SellingCost_{Cu}) - ProcessingCost$$

The estimated Cu leach COG would be approximately 0.01% based on the leach value calculation above. This differs from the current practice were any material above a Cu grade of 0.12% and less than mill cut-off of 0.30% reports to the leach pad.

12.2.5.2 Mill

Material was considered for processing if it had a solubility index less than 0.8. The parameters in Table 12.4 are used to calculate the value of sending the material to the mill. If the value is greater than zero, the material can be considered for processing.

Table 12.4: Copper Concentrator COG Parameters

Variable	Units	Value	
Payable Metals		Cu	Mo
Selling Price	US$/lb	3.30	10.00
Processing Cost if Mo ≥ 0.05	US$/t	4.29	0.25
Processing Cost if Mo < 0.05	US$/t	4.34	0.25
Processing Recovery	%	84	83
Payablity	%	100	100
Selling Cost	US$/lb	0.27	1.75

Note: Processing Cost Includes G&A Mexico, molybdenum circuit operating costs, and additional ore mining costs. Selling cost includes concentrate transportation, smelter charges and penalties and refining.

The value formula for the Cu Concentrator is shown below:

$$Value_{CuPlant} = Cu\% * Recovery_{Cu} * Payability_{Cu} * \frac{2204.6\ lb}{1\ t} * (SellingPrice_{Cu} - SellingCost_{Cu}) + Mo\%$$
$$* Recovery_{Mo} * Payability_{Mo} * \frac{2204.6\ lb}{1\ t} * (SellingPrice_{Mo} - SellingCost_{Mo}) - ProcessingCost$$

Based on the above value equation, the Cu equivalent cut-off used to calculate the Mineral Reserves, is approximately 0.08% Cu. This differs from the current practice were any material above a Cu grade of 0.30% reports to one of the concentrators, assuming there is capacity in the mill. The QP recommends LC assess the COGs being used on site.

For ore to be routed to the mill in this study, it had to meet the following criteria:

- A Classification of either Measured or Indicated
- A solubility index ($\frac{Copper\ Oxide}{Copper}$) less than 0.8
- A mill value greater than or equal to zero
- A mill value greater than the leach value

For ore to be routed to the leach pad in this study, it had to meet the following criteria:

- A Classification of either measured or indicated
- A leach value greater than or equal to zero
- A leach value greater than the mill value

Blocks with a resource classification of Inferred were considered as waste in the pit optimization along with blocks that have both a mill and/or leach value less than zero.

The two values are compared and the greatest positive value is used for pit optimization purposes.

12.2.6 Pit Optimization Methodology and Ultimate Pit

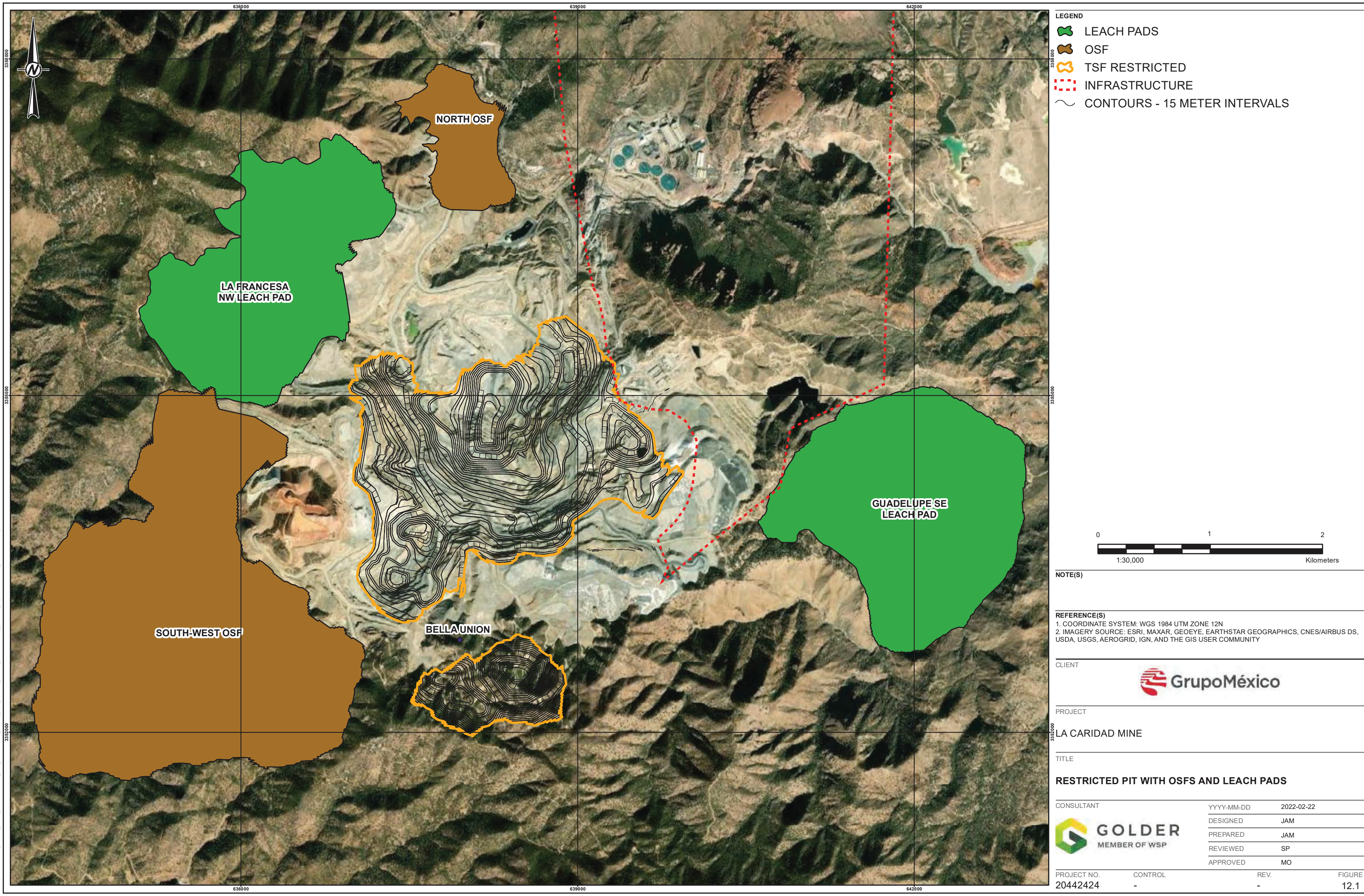
A pit optimization analysis was carried out using Whittle 4X software. The purpose of pit optimization work is to determine the economic shell that can be mined using open pit methods. The optimum result is to mine as much of the resource as economically possible. A nested pit analysis was performed on the geologic model using the three processing routes and the economic cut-offs described in Section 12.2.4. Additional optimization parameters are shown in Table 12.5.

The Lerch-Grossman pit optimization method was used to determine the economic pit limits.

Table 12.5: La Caridad Pit Optimization Economic Inputs

Description	Units	Value
Mining Cost - Fill (inclusive of incremental haulage)	US$/t	1.47
Mining Cost - Waste/Leach/Mill (inclusive of incremental haulage)	US$/t	1.62
Mining Loss	%	2.00
Mining Dilution	%	1.00
Dilution Grade	%	0.00
Discount Rate	%	8.00

A constraint was applied to limit the pit optimization so that the pit would not impede on the current processing facilities and other infrastructure. Figure 12.1 shows the restricted pit design, OSFs, leach pads, and the constraint polygon used for the pit optimization and design.


NORTH OSF
LA FRANCESA
NW LEACH PAD
GUADELUPE SE
LEACH PAD
SOUTH-WEST OSF
BELLA UNION
636000
639000
642000
LEGEND
LEACH PADS
OSF
TSF RESTRICTED
INFRASTRUCTURE
CONTOURS - 15 METER INTERVALS
0
1
2
1:30,000
Kilometers
NOTE(S)
REFERENCE(S)
1. COORDINATE SYSTEM: WGS 1984 UTM ZONE 12N
2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY
CLIENT
GrupoMéxico
PROJECT
LA CARIDAD MINE
TITLE
RESTRICTED PIT WITH OSFS AND LEACH PADS
CONSULTANT
GOLDER
MEMBER OF WSP
YYYY-MM-DD 2022-02-22
DESIGNED JAM
PREPARED JAM
REVIEWED SP
APPROVED MO
PROJECT NO. 20442424
CONTROL -
REV. -
FIGURE 12.1

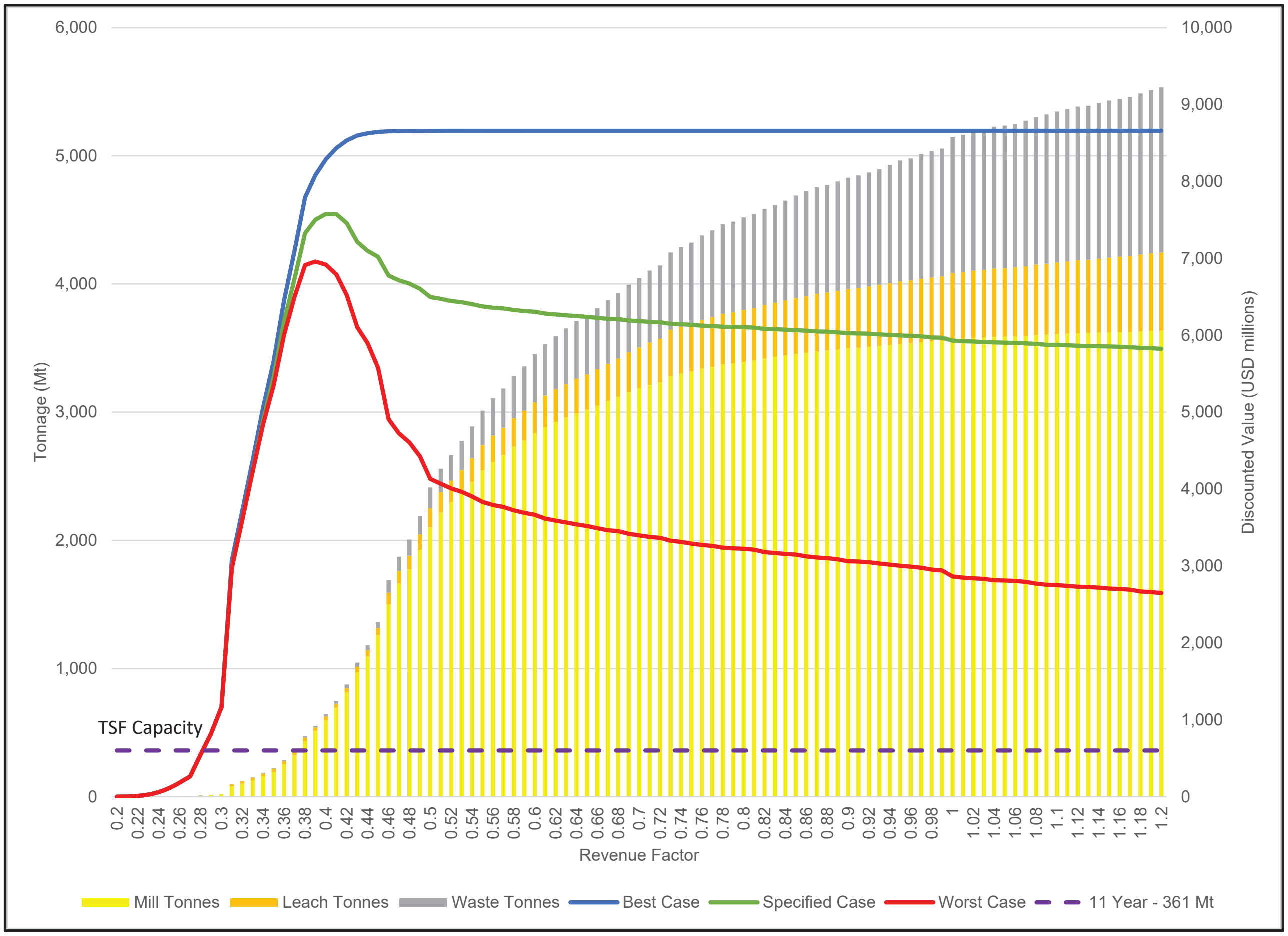
Revenue factor (RF) shells were generated in Whittle varying the selling price by increments of 0.02 from 0.2 to 1.1. Each RF shell selects blocks for leach and concentrators that has sufficient value to mine waste blocks above. The results of the nested pit analysis is shown in Figure 12.2 with the resulting NPV at the best case, worst case, and specified cases:

- Best case – Assumes pit shells can be mined entirely without consideration of vertical advance or other operational constraints.
- Worst case – Assumes each pit shell is mined bench by bench, with a yearly mill constraint of 35 Mt and leach constraint of 41 Mt. These mining rates were assumed based on an analysis of the existing LOM plan.
- Specified case – Assumes selected pushbacks and an eight bench maximum vertical advance prior to advancing to the next selected phase. This case is a first pass production schedule using pit shells as phases.

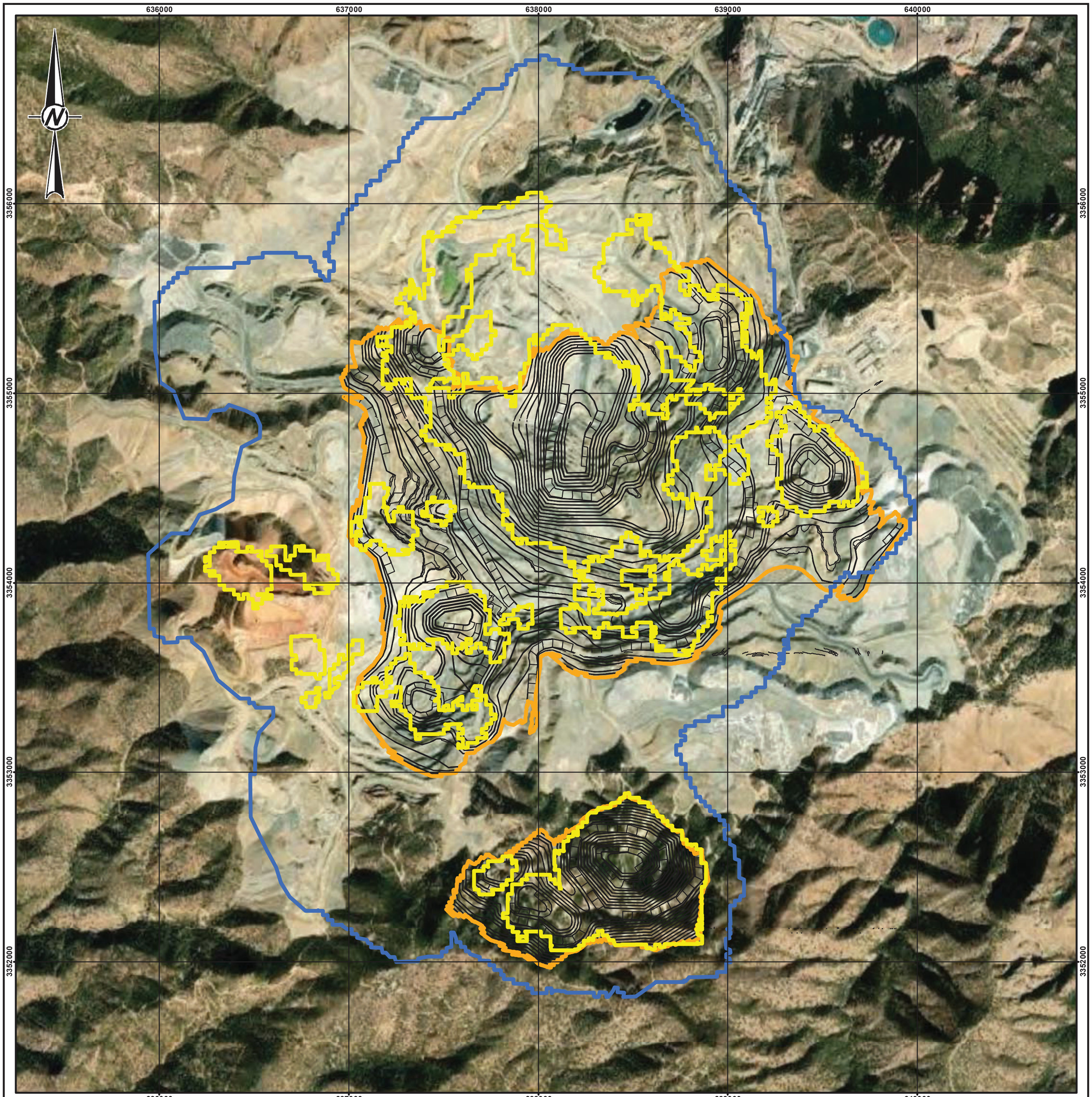
RF of 0.36 was selected as the basis of the ultimate pit design described in Section 12.2.6.

The remaining capacity of the existing tailings storage facility, TSF No. 7, imposed a limitation on the potential size of the ultimate pit. Based on documentation supplied by SCC and an independent check of TSF contours provided, Golder has estimated that the TSF No. 7 has a remaining life of about 11 years. The dashed line represents the cumulative milled tonnage that can be sent to the TSF.

Figure 12.2: Summary of LC Nested Pit Analysis



For the Mineral Reserve design, the RF 0.36 was selected due to the TSF limitation. Portions of the ultimate pit design go beyond the extents of the RF 0.36 whittle shell to ensure a minimum mining width of 60 m is achieved on every bench.



LEGEND

- RF1
- RF0.36
- TSF RESTRICTED
- CONTOURS - 15 METER INTERVALS

0 1 2

1:30,000 Kilometers

NOTE(S)

REFERENCE(S)

1. COORDINATE SYSTEM: WGS 1984 UTM ZONE 12N

CLIENT

GrupoMéxico

PROJECT

LA CARIDAD MINE

TITLE

RESTRICTED PIT, RF 0.36 WHITTLE SHELL, AND RF 1 WHITTLE SHELL

CONSULTANT

GOLDER MEMBER OF WSP

YYYY-MM-DD	2022-02-22
DESIGNED	JAM
PREPARED	JAM
REVIEWED	SP
APPROVED	MO

PROJECT NO. 20442424

FIGURE 12.3

12.2.7 TSF Restricted Pit Design

For the restricted pit design, a ramp width of 40 meters was used to accommodate the largest truck in the fleet, a Caterpillar 797F, 360-tonne haul truck. This width allows for 3.5 times the width of the truck, as well as a berm and ditch. The current widths of the ramps in production at site are also 40 m wide. A maximum grade of 10% was designed for the ultimate pit. This design aimed to have multiple exits to allow for access to all mining phases, as well as to create the shortest haul distances from the pit to either the OSFs, leach pads, and the mill.

12.3 Mineral Reserve Classification

This sub-section contains forward-looking information related to the Mineral Reserve classification for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including Mineral Resource model tonnes, grade, and classification.

For estimating the Mineral Reserves for La Caridad, the following definition as set forth in the S-K 1300 Definition Standards adopted December 26, 2018, was applied.

Under S-K 1300, a Mineral Reserve is defined as:

> "… an estimate of tonnage and grade or quality of indicated and measured mineral resources that, in the opinion of the qualified person, can be the basis of an economically viable project. More specifically, it is the economically mineable part of a measured or indicated mineral resource, which includes diluting materials and allowances for losses that may occur when the material is mined or extracted."

Mineral Reserves are subdivided into classes of Proven Mineral Reserves and Probable Mineral Reserves, which correspond to Measured and Indicated Mineral Resources, respectively, with the level of confidence reducing with each class. Mineral Reserves are always reported as the economically mineable portion of a Measured and/or Indicated Mineral Resource, and take into consideration the mining, processing, metallurgical, economic, marketing, legal, environmental, infrastructure, social, and governmental factors (the "Modifying Factors") that may be applicable to the deposit.

12.4 Mineral Reserve Estimate

This sub-section contains forward-looking information related to Mineral Reserve estimates for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including Mineral Resource model tonnes and grade, modifying factors including mining and recovery factors, production rate and schedule, mining equipment productivity, commodity market and prices and projected operating and capital costs.

Based on the infrastructure constraint and modifying factors discussed above, the recovery factors discussed in Section 12.2.4 and the Economic Assessment discussed in 12.2.5, the LC mine contains the economically mineable Mineral Reserves listed in Table 12.6 on a 100% ownership basis. The effective date of the Mineral Reserve estimate is December 31, 2021.

The Mineral Reserves include approximately 372 Mt of mill feed with a Cu grade of 0.24% total Cu for 1,955 Million pounds (Mlbs) of contained Cu with the point of reference being the mill. An additional 43 Mt of Mineral

Reserves is estimated as Leachable ROM Ore with a Cu grade of 0.09% total Cu for 81 Mlbs of contained Cu with the point of reference being delivery to the leach pads. Total material in the restricted pit is 452 Mt, resulting in a waste to ore (mill ore + leach material) ratio of 0.09.

For this Mineral Reserve estimate, Indicated Mineral Resources inside the ultimate pit were converted to Probable Mineral Reserve. The Mineral Reserves are estimated at a copper price of US$3.30 per pound.

Table 12.6: Estimated Mineral Reserves – 100% Ownership Basis

Classification	Destination	Tonnes (Mt)	Grade		Contained Metal	
			Total Cu (%)	Mo (%)	Cu (Mlbs)	Mo (Mlbs)
Probable	Leach	43	0.09	-	81	-
	Mill	372	0.24	0.02	1,955	185
	Waste	38				
	Total Material	452				
	Strip Ratio (Waste/Ore)	0.09				

Notes:
1. Mineral Reserves are reported effective December 31, 2021. The Qualified Person for the estimate is Mr. Danny Tolmer, P.Eng.
2. Mineral Reserves are mined tonnes and grade; the reference point is the leach pad or concentrator and includes considerations for operational modifying factors such as loss (2%) and dilution (1%).
3. Mineral reserves are reported for ore with an economic value greater than or equal to 0 US$/t. Full discussion of cut off is discussed in Section 12.2.4.
4. Numbers have been rounded to reflect appropriate accuracy.
5. Grades are not reported if the economic value is less than 0 US$/t.
6. The Mineral Resource model only contained Indicated Mineral Resources and, therefore, there are no Proven Mineral Reserves reported in the estimate.
7. The October 9, 2021 topographic surface was used for the calculation of the Mineral Reserves and the actual production data provided by LC for October to December 31, 2021 was used to adjust this estimate.

It should be noted that SCC has a 98.14% ownership in LC through their main subsidiaries with the remainder being held through intermediate holding companies.

12.5 Qualified Person's Opinion on Risk Factors that could Materially Affect the Mineral Reserve Estimates

The QP is unaware of any mining, metallurgical, infrastructure, or other factors that might materially affect the Mineral Reserve, aside from those mentioned in this Section.

13.0 MINING METHODS

13.1 Production Tasks

La Caridad is an established operation that currently mines at a rate of about 98 million tonnes per year of total material. The operation currently runs 6 electric shovels, 1 hydraulic shovel, 6 loaders, and 36 trucks of varying size and models. Since this is an established operation, the deposit, mining, metallurgy and processing, and environmental aspects of the project are very well understood. The geological knowledge for La Caridad is based on the collective experience of personnel from La Caridad’s site operations geology, mining, metallurgy, and other technical disciplines gained during the history of the operations. This knowledge is supported by years of production data at La Caridad.

The ore at La Caridad is recovered using open-pit conventional truck and shovel mining methods due to the proximity of the ore to the surface and the physical characteristics of the deposit. The current operation is expanding into an area called Bella Union which is south of the existing pit. The ore from the main pit and the expansion area is hauled to the primary crusher located near the maintenance facility or to the Guadalupe leach pads. Waste is hauled to valley OSFs located to the west of the pit.

13.1.1 Drill and Blast

The mining operation begins with the drilling process; drill samples are sent to an assay laboratory for analysis. The assay results are used to mark out zones of ore, leach, and waste rock, which are mined separately. Currently the site uses 5 electric drills and 1 diesel blasthole drill to meet production requirements. Based on the LOM plan, this study assumes that the current standard for drill patterns and blasting regulations would continue.

13.1.2 Waste Removal and Storage

After the blasting is completed, ore, leach, and waste are mined by excavators loading onto trucks. The fleet consists of 6 electric shovels, 1 hydraulic shovel, 6 front end loaders, and 36 mining trucks. Overburden and waste loads can be used for fixing roads, building ramps, or simply placed on the OSFs.

13.1.3 Ore Removal and Transport

Trucks take mill loads to the primary crushers for breaking the larger rocks down to a size suitable for transport on the conveyor belt. The mill ore from the mine is broken by two rotary crushers near the plant on the East side of the pit. The product of the primary crushing is transported via a 1.98 km long conveyor to the coarse mill stockpile.

The conveyor belt has a capacity of 6,000 ton/hour and the stockpile has a capacity of 240,000 tonne with size of ore minus 8." There are two fine crushing sections are fed from the stockpile by eight apron feeders. The fine crushing plant has a capacity of 95,000 tons per day. After the mill ore goes through the crusher and screens, it is sent to a fine storage bin by conveyor. The fine storage bin has a capacity of 309,000 tonnes with no size greater than 4% of +1/2 inch. The ore then goes a 16.5"x24" wet griding facility with a capacity of 94,500 tonnes per day. Then the mill ore goes to the 48" hydrocylons and then to flotation. The rougher concentrate is passed to regrinding and cleaner banks to obtain a concentrate of 21% copper and 2.22% molybdenum. The bulk copper and moly concentrate is sent by gravity to one of the two thickeners before moving it to the molybdenum separation

Leach ore is taken to one of two run-of-mine (ROM) pads named Francisca to the northwest of the pit or to the Guadalupe leach pad to the southeast of the pit. The Guadalupe leach pad has a 1,121 Mt of capacity and the La Francisca leach pad has 660 Mt of capacity. The designs of the leach pads in relation to the ultimate pit are shown in Figure 12.1.

13.2 Parameters Relative to the Mine Design and Plans

This sub-section contains forward-looking information related to mine design for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section.

13.2.1 Geotechnical Characterization

Pit slope design for La Caridad is presented in a report prepared by Call and Nicholas, Inc. (CNI) in 2019. The slope design recommendations provided by CNI for the La Caridad and Bella Union pits (Figure 13.1) are a generally reasonable basis for pre-feasibility-level for the geotechnical units represented by the corresponding design sectors.

The level of geotechnical investigation and testing are appropriate to support feasibility-level slope designs. Detailed discussion of the investigation and testing is included in Section 7.4.

The risks associated with the slope design recommendations, particularly geological risks that result from the geological complexity and uncertainty of certain elements of the site conditions, are appropriately identified, and suitable methods for mitigating these risks are recommended.

13.2.1.1 Pit Slope Stability Analysis

CNI pit slope designs are reported to be based on:

- 80% reliability of maintaining minimum catch bench widths
- A calculated minimum Factor of Safety (FOS) of 1.2 against large-scale overall rock mass slope failure.

Current practices in mine slope design have recently been documented in Guidelines for Open Pit Slope Design, 2009, edited by John Read and Peter Stacey, published by CSIRO Publishing. These values are generally within the range of acceptance criteria typically used in the mining industry as presented in these Guidelines. The Minimum factors of safety for overall stability is at the low end of the usually acceptable range, consistent with relatively low consequences of failure.

CNI evaluate structural stability of benches by analyzing structural data on orientation, length, spacing, and shear strength of fractures using a proprietary software package, and then applying an empirical correction factor based on experience to account for operating practices to develop estimated bench face angles. While these proprietary methods can not be independently checked in detail, the results are reasonable based on the data presented and our experience.

CNI develop design bench face angles and inter-ramp slope angles in 1° intervals based on application of their proprietary methods. While such small increments may not seem to be justified based on the samples of structural data available, the expected variability of geological conditions, and the assumptions inherent in their analytical and methods and correction factors, ultimately the recommendations are based on the complete data set available and are therefore supported by the available data.

CNI evaluated stability at the inter-ramp scale using an internal probabilistic procedure similar to that used for the structural stability analysis of benches, except that the major structure database is used rather than the structural fabric. Estimated failure tonnage was computed by this procedure for the inter-ramp slope angles estimated from the bench-scale analysis and for both dry and saturated conditions. The estimated percentage of sector walls exhibiting inter-ramp failures ranged from 0 to 0.5% and 0 to 4.0% for dry and saturated conditions in the La Caridad pit and ranged from 0 to 1.0% and 0.1% to 2.3% in the Bella Union pit. Failure volume in these ranges is generally considerable to be routine for pit operations, where material is removed as pit development progresses.

Factors of safety estimated at seven critical cross sections (5 located in La Caridad and 2 located in Bella Union) exceeded 1.3 in all cases. CNI concludes that overall slope rotational shear instability is unlikely to occur due to low rock mass strength conditions.

13.2.1.2 Pit Slope Design Recommendations

The slope design for La Caridad is provided for 29 design sectors. The geotechnical units and slope design recommendations for each sector are summarized in Table 13.1. The slope design recommendations for Bella Union are provided in Table 13.2 for 13 design sectors.

Figure 13.1: CNI Design Sectors for La Caridad and Bella Union Pits

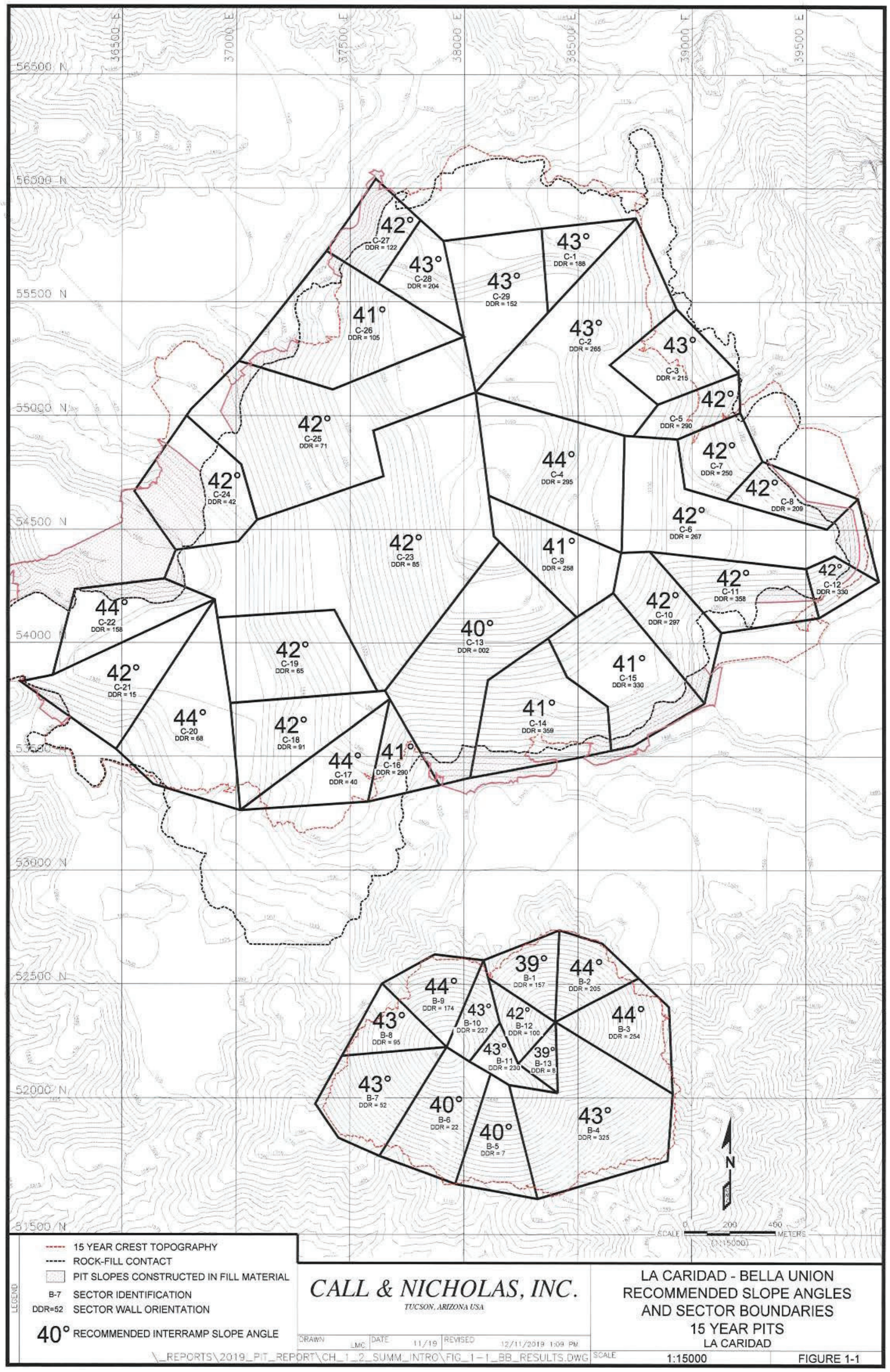


Table 13.1: CNI Slope Design Recommendations for La Caridad

Design Sector	Structural Domain	Wall DDR (degrees)	Recommended Slope Configuration (15 m Single Bench)		
			Inter-ramp Slope Angle (degrees)	Bench Face Angle (degrees)	Design Catch Bench Width (degrees)
C01	4	175	43	80	13.4
C02	4	236	43	80	13.4
C03	4	273	43	80	14
C04	1	209	44	77	12.1
C05	3	262	42	80	14
C06	3	320	42	83	14.8
C07	3	2	42	82	14.6
C08	3	22	42	84	15.1
C09	1	188	41	77	13.8
C10	3	265	42	81	14.3
C11	3	215	42	81	14.3
C12	3	295	42	81	14.3
C13	1	290	40	75	13.9
C14	2	267	41	82	15.1
C15	2	250	41	82	15.1
C16	1	209	41	76	13.5
C17	1	258	44	74	11.2
C18	1	297	42	75	12.6
C19	1	358	42	75	12.6
C20	1	330	44	75	11.5
C21	1	2	42	75	12.6
C22	1	359	44	75	11.5
C23	1	330	42	77	13.2
C24	1	290	42	74	12.4
C25	1	40	42	75	12.6
C26	1	91	41	75	13.2
C27	1	65	42	75	12.6
C28	1	68	43	80	13.4
C29	1	15	43	75	12.1

Table 13.2: CNI Slope Design Recommendations for Bella Union

Design Sector	Structural Domain	Wall DDR (degrees)	Recommended Slope Configuration (15 m Single Bench)		
			Inter-ramp Slope Angle (degrees)	Bench Face Angle (degrees)	Design Catch Bench Width (degrees)
B01	2	157	39	84	16.9
B02	2	205	44	79	12.6
B03	2	254	44	78	12.3
B04	2	325	43	83	14.2
B05	2	7	40	82	15.8
B06	2	22	40	81	15.5
B07	2	52	43	83	14.2
B08	2	95	43	86	15
B09	2	174	44	78	12.3
B10	2	227	43	79	13.2
B11	2	230	43	79	13.2
B12	2	100	42	84	15.1
B13	2	8	39	82	16.4

13.2.1.3 Recommendations for Additional Geotechnical Work

Use of CNI slope designs is recommended at the pre-feasibility level and following their recommendations in terms of the additional geotechnical work that should be performed during final design and mine operations to optimize slope designs. A summary of recommendations for additional work that would develop pit slope design to the feasibility level is provided below:

- Targeted geotechnical drilling and sampling of pit walls to improve confidence in RQD measurements and rock mass rating assessments.
- Updates to the pit geology and RQD models.
- Hydrogeological investigation that includes targeted airlift and recovery testing and packer testing in primary lithological units in the geological model, and installation of piezometers in select areas of the proposed pit
- Maintain records of water seep locations along with any noted seasonal fluctuations in the existing pit slopes and the location of any blasthole water intercepts.
- Use of the Hoek-Brown shear strength criterion as a check on the CNI method for assessing the shear strength of materials for global stability analysis is recommended.
- Preparation of regular reports from radar monitoring of existing slopes

13.3 Mining Design Factors

This sub-section contains forward-looking information related to mine design and production plans for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including mining strategy and production rates, expected mine life and mining unit dimensions.

Mine planning at La Caridad follows the typical standards for open pit mining. The processes include:

1. Application of dilution and recovery factors
2. Development of a value for each of the blocks in the model
3. Perform pit optimization and select optimal pit shell to be used for the basis of the ultimate pit design
4. Ultimate pit design
5. Develop phase designs
6. Develop mine planning targets and constraints

The restricted pit shell selected from the pit optimization process was used as a guide to develop a more detailed design. The resulting pit design was referred to as the operational pit. The operational pit was also limited by the following constraints:

1. Eastern constraint to not mine into current infrastructure
2. Mining restrictions, including legal and environmental impacts
3. Overall slope angle
4. Operational design characteristics, including ramp locations and grades, OSF locations, mining width and height, and other practical mining considerations given the mine geometry.

The mine design criteria are listed below:

1. Surface mining approach
2. Minimum operating width of 60 m
3. Haul road design width of 40 m
4. Bench height of 15 m
5. Maximum road grade of 10%
6. Bench face angle and catch berms vary based on geotechnical sector
7. Typical blasting grid ranging from 7x7 m, 8x8 m, 8x10 m, 9x11 m
8. Final wall Control Drill Pattern of 5x5m
9. Blasthole diameter of 12 ¼”
10. Rock density average of 2.5

13.3.1 Dilution, Loss, and Mine Recovery

Dilution in mining can be defined as the addition of waste material to the ore during the mining process and are due to a lack of selectivity, or in some cases, due to inadequate operational configuration. The process considers the neighborhood relationship between an ore block with the adjacent blocks, weighting the grades by a predetermined distance, and by the density of the blocks. The dilution effects result in a reduction of the ore grade for the mining model as well as a reduction in mass recovery. The factors that cause dilution are diverse and include:

- Nature of ore contacts and boundaries
- Pit boundary zones
- Block size and position
- Sample density
- Geological complexity
- Selectivity of mining, equipment size
- Mining method and type of crushing, etc.

Dilution can be internal (caused by intrinsic deposit factors) or external (caused by operational errors). Dilution cannot be fully eliminated as it is impossible to have the exact accuracy of the mining limits; however, it can be estimated and considered, thus minimizing the differences between the mine plan and the actual operations.

A dilution of 1% and a mining loss of 2% was applied to the schedule and Mineral Reserve estimate. It is the opinion of the QP of Mineral Reserves that with the current practices at LC there will be minimal ore loss and mining dilution attributed to bulk mining.

13.3.2 Mining Strategy and Production Rates

The mine plan targets a mill feed rate of about 34.6 Mtpa with the LOM schedule averaging an annual production of 43.7 Mt total material. This production rate for the mill feed results in approximately 94,000 t per day through the concentrator. The mine plan targets have been significantly reduced compared to current levels due to a significant reduction in TSF capacity.

13.3.3 Expected Mine Life

Due to current tailings storage capacity limitations (see Section 12.2.5) the scheduled La Caridad Mine life is approximately 11 years. During this period, the mine has an average ROM mill ore production rate of 33.8 Mtpa (dry) resulting in an average annual copper production of 152 million pounds per year and an annual average molybdenum production of about 14 million pounds per year.

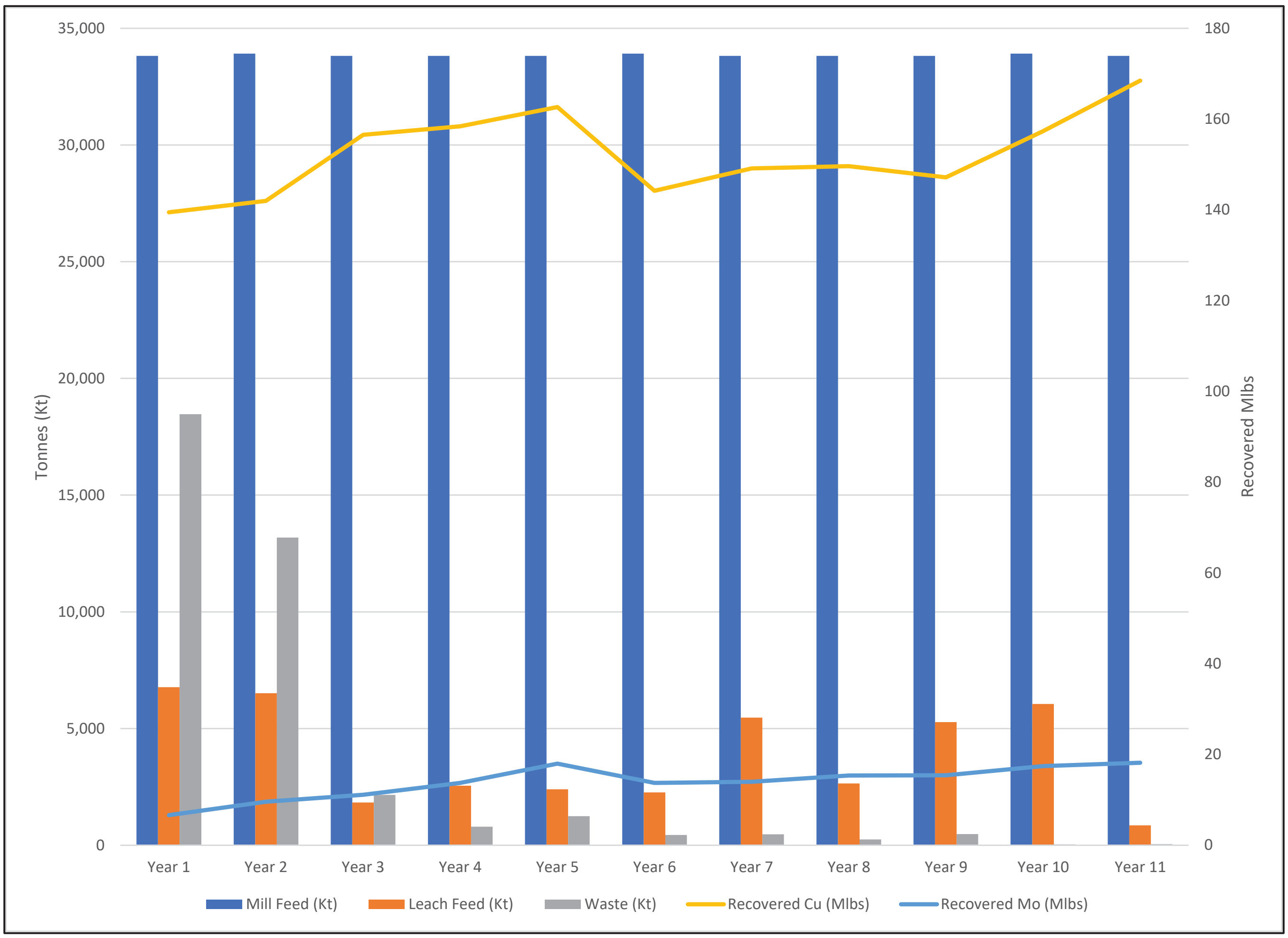
13.4 Production Schedule

A summary of the LOM Plan production statistics, including ore tonnes, waste tonnes, copper production, and ore quality is shown in Table 13.3 with waste and ore tonnage shown graphically in Figure 13.2. The LOM schedule has been adjusted using the LC production figures from October to December 2021. The Effective date of the schedule is December 31, 2021.

Table 13.3: LOM Plan Ore and Waste Quantities

Mining Period	Mill			Leach		Waste	Total				
	Tonnes (Mt)	Cu (%)	Mo (%)	Tonnes (Mt)	Cu (%)	Tonnes (Mt)	Tonnes (Mt)	Contained Cu (Kt)	Contained Mo (Kt)	Recvrd. Cu (Mlbs)	Recvrd. Mo (Mlbs)
Year 1	33.8	0.21	0.01	6.8	0.09	18.5	59.1	79	4	139	7
Year 2	33.9	0.22	0.02	6.5	0.09	13.2	53.6	80	5	142	10
Year 3	33.8	0.25	0.02	1.8	0.13	2.2	37.8	86	6	157	11
Year 4	33.8	0.25	0.02	2.6	0.08	0.8	37.2	87	8	158	14
Year 5	33.8	0.26	0.03	2.4	0.08	1.2	37.5	89	10	163	18
Year 6	33.9	0.23	0.02	2.3	0.07	0.4	36.6	79	7	144	14
Year 7	33.8	0.23	0.02	5.5	0.08	0.5	39.8	83	8	149	14
Year 8	33.8	0.24	0.02	2.6	0.08	0.2	36.7	82	8	150	15
Year 9	33.8	0.23	0.02	5.3	0.08	0.5	39.6	82	8	147	15
Year 10	33.9	0.24	0.03	6.1	0.08	0.0	40.0	88	10	157	17
Year 11	33.8	0.27	0.03	0.9	0.08	0.0	34.7	91	10	168	18
Total/Avg.	**372.3**	**0.24**	**0.02**	**42.6**	**0.09**	**37.6**	**452.5**	**924**	**84**	**1,675**	**153**

Figure 13.2: LOM Plan Production Statistics



13.5 OSFs, Haulage, and Road Networks

Ore from the mine is hauled either to a primary ore crusher located at the 1410 elevation or to one of the two leach pads located outside the final pit. Waste is hauled to one of three OSFs listed below:

- North OSF
- West OSF
- Southwest OSF

The OSFs are design based on a 37° angle of repose and a 1.77 t/m^3 loose density. The North OSF has a capacity of 89 Mt, the West OSF has a capacity of 195 Mt, and the Southwest OSF is the largest with a capacity of 1,625 Mt. The total OSFs capacity is 1,909 Mt. The designs of the OSFs in relation to the ultimate pit are shown in Figure 12.1.

13.5.1 Mining Fleet, Machinery, and Personnel Requirements

This sub-section contains forward-looking information related to equipment selection for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including labor and equipment availability and productivity.

The mine uses a combination of CAT, Komatsu, P&H and Bucyrus equipment for material extraction and transportation. Currently, the largest haul truck on site is the CAT 797F with a capacity of 360 tonnes; additional trucks include the Komatsu 830E (215 tonnes), the Komatsu 960E (327 tonnes), the CAT 793B (216 tonnes) and the CAT 793D (220 tonnes). The shovels used at the site are mainly 40-cubic yard (yd^3) electric rope shovels from P&H and Bucyrus, along with 1 CAT 6060 FS Hydraulic Shovel with a 44.5-yd^3 capacity.

Mining schedule is assumed to be 24-hours-per-day, 365-days-peryear. The current fleet consists of:

- Loading Equipment:
  - 2 P&H 2800 XPA
  - 2 P&H 2800 XPB
  - 2 Bucyrus 395BIII
  - 1 Caterpillar 6060 FS
- Trucks:
  - 2 Komatsu 960E 327 tonne
  - 14 Komatsu 830E 218 tonne
  - 9 CAT 793B 218 tonne
  - 6 CAT 797F 360 tonne
  - 5 CAT 793 D 220 tonne

- Front-end Loaders (FEL):
  - 4 Komatsu WA-1200
  - 2 Komatsu WA-900

Based on the TSF limitation and the reduced LOM, the QP does not see a need to expand the fleet. A detailed assessment of the vintage of the equipment would be required if the LC mine were to expand. Details of the assumptions used for the LOM costs and equipment are presented in Section 18.0.

14.0 PROCESSING AND RECOVERY METHODS

This sub-section contains forward-looking information related to the process plant throughput and design, equipment characteristics, and specifications for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including actual plant feed characteristics that are different from the historical operations or from samples tested to date, equipment and operational performance that yield different results from the historical operations, historical and current test work results, and beneficiation recovery factors.

The current mineral processing facility is comprised of crushing and milling circuits to achieve liberation of copper mineralization. Copper contained in primary and secondary copper minerals is recovered via flotation into a copper concentrate. The concentrate is shipped to their own smelter located approximately 20 km from the beneficiation plant. The processing methodology selected is considered conventional and is widely used in the mining industry worldwide.

14.1 Copper Concentrator

14.1.1 Summary and Facilities Site Layout

The current plant started operations in 1979. The original plant design capacity for crushing, grinding and flotation circuits was 72,000 tpd and the expected copper recovery was 85.0%. Over the last 10 years of operation, the plant has processed more than 34 Mtpy, or 93.6 thousand tonnes per day (ktpd), with an average of 85.45% copper recovery. Over the last five years, the averages are 94.6 ktpd and 86.4% copper recovery.

At the original design throughput, the LOM for the project was originally (1972) estimated at 30 years. Continuing exploration has periodically increased the Mineral Reserves and LOM with the current plant capacity to 2085. Plant capacity improvements are shown in Table 14.1.

Table 14.1: Capacity Improvements and Additions

Year	Description	Installation/Capacity Increase
1982	Molybdenum Plant	Complete flotation and S/L separation
1988	Capacity upgrade	72,000 to 90,000 MTPD
1999	Wemco flotation cells	Installation 40 (1,000 ft^3) cells
2009	Secondary crushers replaced	Metso MP800 six units installed
2013	Cyclones and pumps	90,000 to 94,000 MTPD
2018	Expert system	94,862 MTPD capacity

A brief description of the process circuits included in the design is provided in the following paragraphs. The overall process facilities are divided in two main process circuits, namely the Dry Circuit that includes the Crushing and Screening Plants and the Wet Circuit that includes Grinding and Flotation (Concentrator).

The layout of the concentrator process facilities is presented in Figure 14.1.

LEGEND

0 0.25 0.5

1:9,500 Kilometers

NOTE(S)

REFERENCE(S)
1. COORDINATE SYSTEM: WGS 1984 UTM ZONE 12N
2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

GrupoMéxico

PROJECT

LA CARIDAD

TITLE

LA CARIDAD SITE LAYOUT

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-02-22
DESIGNED	SP
PREPARED	TBH
REVIEWED	SP
APPROVED	MO

PROJECT NO.	CONTROL	REV.	FIGURE
20442424	-	-	14.1

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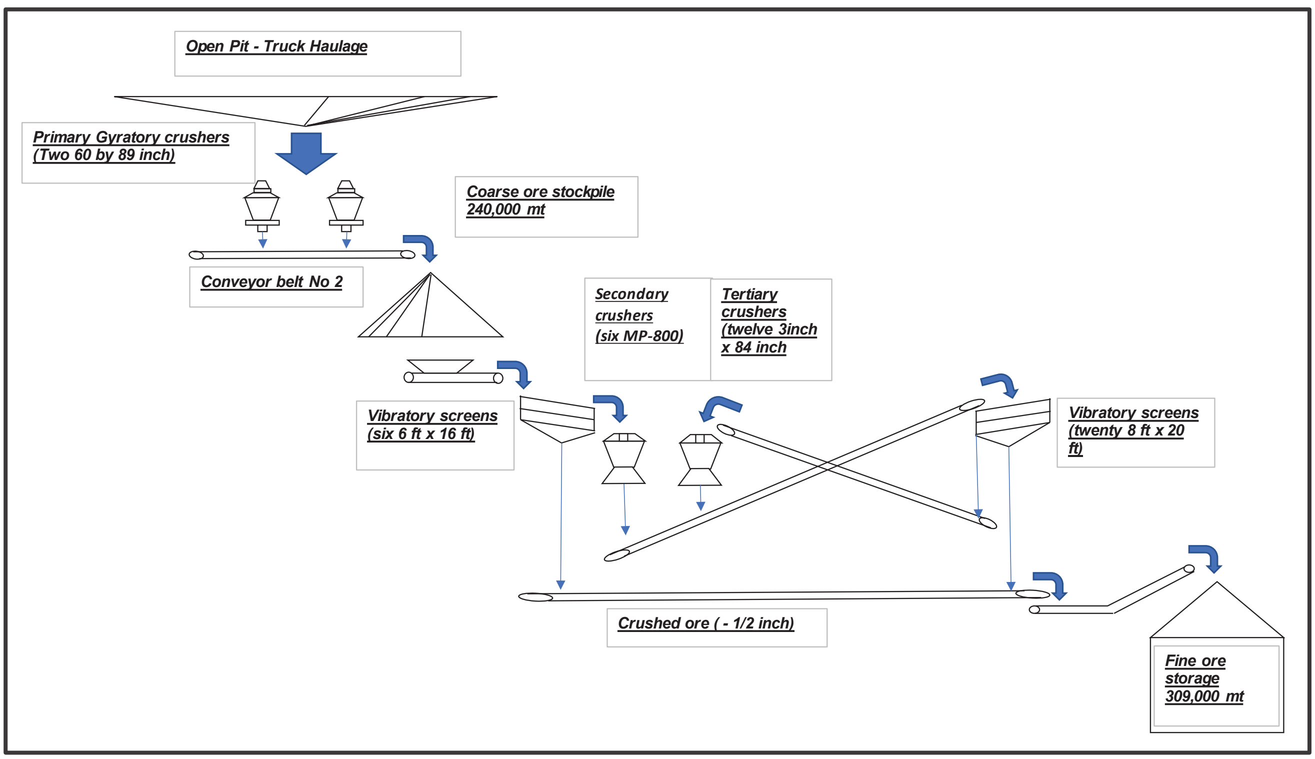
14.1.2 Crushing and Screening Plant Equipment

The Crushing and Screening Plant includes the following equipment and processes:

- Equipment (three stage - closed circuit):
  - Primary Crushing (Two 60-inch x 89-inch gyratory crushers)
  - Ore conveyor to Coarse ore stockpile (72 inch by 970 m)
  - Coarse ore storage yard (240,000 metric tonnes capacity; 165,000 dry tonnes live capacity).
  - Secondary Screens (Six double deck 6 ft by 16 ft)
  - Secondary Crushing (Six MP-800)
  - Tertiary Screens (Twenty double deck 8 ft by 20 ft)
  - Tertiary Crushing (Twelve Allis Chalmers 3 inch by 84 inch)

The flow diagram of the Crushing and Screening Plant is shown in Figure 14.2.

Figure 14.2: La Caridad – Crushing and Screening Plant



The primary crushing circuit includes two 60-inch by 89-inch gyratory crushers The primary crushers are located near the final pit limit. The run-of mine material is transported to the primary crusher with haul trucks. The haul trucks discharge directly into the crushers. The crushing circuit was designed to process 72,000 dry tpd (75% availability) with 8-inch closed size setting (P_{80} minus 8 inch) in 18 hours of operation.

The ROM oversize material is broken with a hydraulic breaker.

The primary crushed material is conveyed to a coarse ore stockpile area. When full, the coarse ore stockpile provides almost two days of surge capacity to protect the downstream circuits from any eventualities in the primary crushers or the mine.

The primary crushed ore is reclaimed with feeders and transported to two subsequent stages of screening and crushing in closed circuit to further reduce the material to minus ½ inch. Conveyor belts are used to transport the intermediate and fine crushed materials throughout the entire crushing and screening circuit.

The crushing circuit design includes weigh scales, crushed ore sampling system and magnetic separators to protect the cone crushers from iron debris coming from mining operations. The crushed product is transported to a fine ore storage building with 309,000 tonnes live capacity. When full, the fine ore storage provides almost three days of surge capacity to protect the beneficiation circuits from any eventualities in the crushing and screening plant.

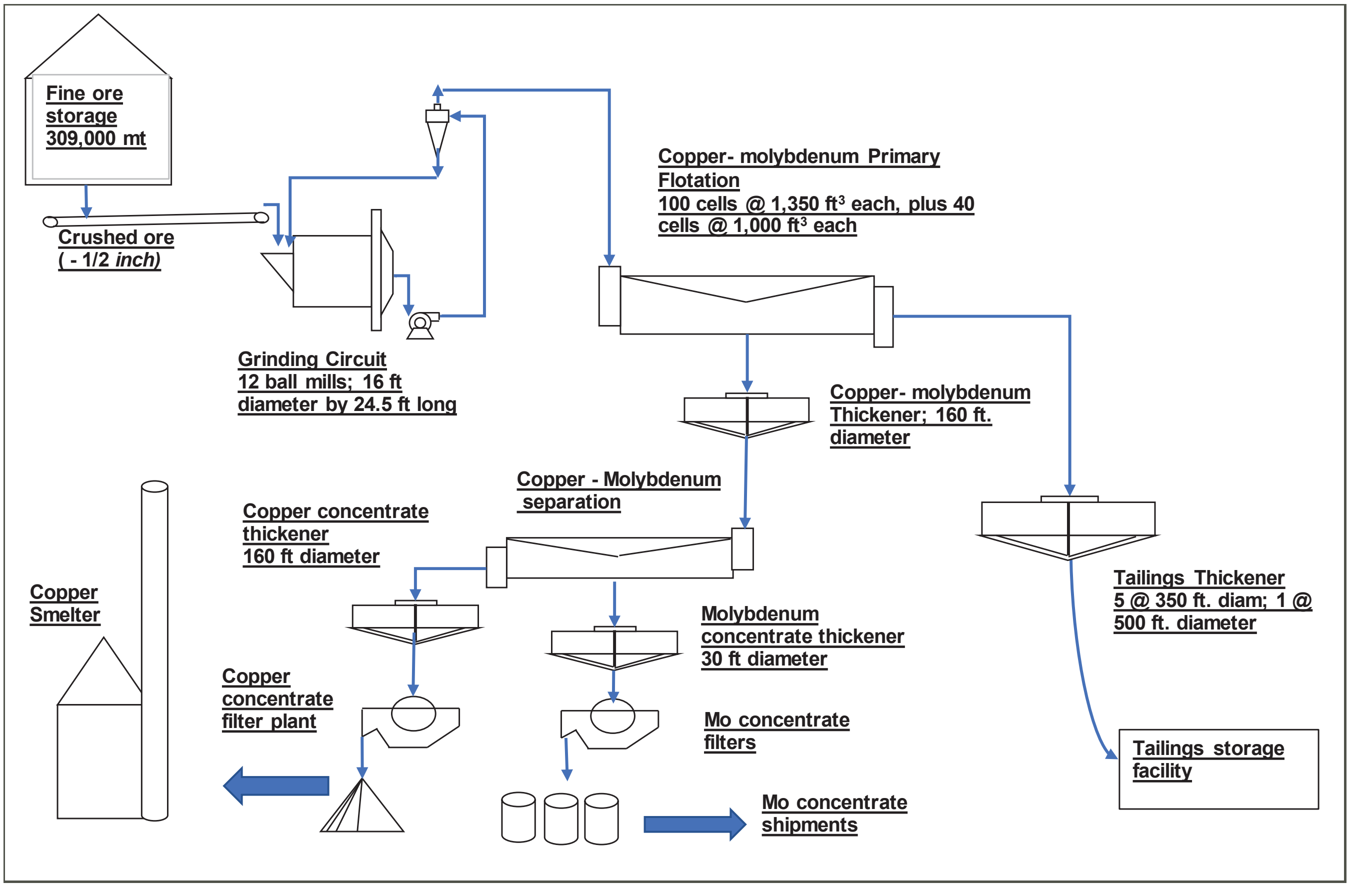
14.1.3 Concentrator Grinding and Flotation

The Concentrator includes the following equipment and processes:

- Fine ore storage (309,000 wet tonnes capacity).
- Primary grinding mills (Twelve 16.5-ft diameter by 24 ft long).
- Rougher Flotation (100 cells – 1350 cubic feet [ft^3] per cell; 40 cells – 1,000 ft^3 per cell).
- Regrind mills (Four 10.5-ft diameter by 23 ft long)
- Scavenger flotation (48 cells – 500 ft^3 per cell)
- First cleaner flotation (32 cells – 500 ft^3 per cell)
- Second cleaner flotation (16 cells – 500 ft^3 per cell)
- Molybdenum plant
- Rougher flotation (12 cells – 300 ft^3 per cell)
- Eight cleaner cells
- Scavenger cleaner flotation
- Molybdenum concentrate sedimentation and filtration
- Molybdenum concentrate storage and shipping
- Final copper concentrate sedimentation and filtration.
- Final copper concentrate storage and shipping.
- Tailing sedimentation and water recovery.
- Reclaimed and freshwater systems.
- TSF and water recovery.

The flow diagram of the Beneficiation (Grinding and Floatation) Plant is shown in Figure 14.3.

Figure 14.3: La Caridad – Grinding and Flotation Plant



The Beneficiation Plant operates continuously 365 days per annum. The beneficiation plant availability was designed to be 92 percent, or approximately 336 days per year. Table 14.4 shows that from 2011 to 2020 the plant has achieved availability of over 363 days per year. The bulk density of the ROM material is 2.67 t/m^3 with average moisture content of 3.5%. The beneficiation plant final products are copper and molybdenum concentrates.

Variable speed belt feeders transport the crushed material from the fine ore stockpile to the milling section.

The grinding circuit design consists of a single stage of grinding in primary ball mills. The main materials at La Caridad have been classified as (medium – hard) with an average Bond Work Index (Wi) of 11.81 kilowatt hour per metric tonne (kWh/t).

The milling section consists of twelve primary grinding mills. The material is ground to 66% minus 200 mesh (75 microns) in closed circuit with a battery of size classification cyclones. Flotation reagents are added into the grinding mill to allow for conditioning.

The mill discharge slurry is pumped to banks of cyclones for size classification. Finely ground slurry (cyclone overflow) at approximately 32% solids is sent to a conditioning tank where flotation reagents are added for conditioning prior to the flotation process. Cyclone underflow is returned to the mills for further grinding.

The flotation circuit consists of banks of rougher cells followed by scavenger cells to achieve maximum copper recovery. The rougher and scavenger concentrates are sent to a regrind circuit to achieve optimum liberation of copper mineralization. The cyclone overflow from the regrind circuit feeds a two-stage cleaning circuit to achieve the highest possible copper grade in the final concentrate. The first cleaner tailing product is returned to the head of copper rougher flotation.

The second cleaner concentrate reports to the copper-molybdenum (Cu-Mo) concentrate thickener.

Flotation tails slurry at about 32% solids is sent to a tailings thickener area. The original plant had four, 350-ft diameter thickeners. A fifth similar 350-ft thickener and then a sixth, 500-ft diameter thickener were added for the plant expansions from 72,000 metric tonnes per day (mtpd) to 90,000 mtpd, as noted in Table 14.1 in Section 14.1.1.

A conventional tailings system is used at La Caridad. The higher density tailings thickener underflow slurry produced at approximately 50% solids is sent by gravity via a natural creek to the tailings storage facility. Thickener overflow water is pumped to the reclaimed water reservoir. After the solids sediment in the tailings dam water is recovered and is pumped to a reservoir next to the thickener water reservoir.

The molybdenum plant circuit consists of the following flotation and solid-liquid separation processing stages:

- Rougher flotation
- Eight cleaners
- Scavenger cleaner flotation
- Molybdenum concentrate sedimentation and filtration

After molybdenite recovery the copper concentrate is pumped to the copper concentrate thickener. The final copper concentrate is filtered and the filter cake, with moistures ranging from 15% to 20%, is stored and air dried in a warehouse prior to shipment by truck to the smelter.

Each copper concentrate shipment is sampled and analyzed for copper and moisture contents. Impurities present in the concentrate are quantified and evaluated prior to shipment.

The molybdenum concentrate is loaded in 2,000-kg bulk bags for shipment to market.

14.1.4 Beneficiation Plant Process Reagents

The reagents utilized in copper and molybdenum sulfide mineralization flotation at La Caridad are outlined in Table 14.2.

Table 14.2: Main Reagents and Dosage

Reagent	Dosage (g/tonne)
Solvay 5160 Collector Copper	7 – 9
Solvay MX 2418	30 – 35
FROTHER Teuton M-91	20
Surfactant Teuton 609	11
Lime (CaO) – Pyrite depression	2,700 – 3,200

14.1.5 Energy and Water Requirements

This sub-section contains forward-looking information related to the projected requirements for energy, water, process materials and personnel for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including actual plant requirements that yield different results from the historical operations.

Power for the operation comes from two combined-cycle, natural gas fired power plants with a total capacity of 500 MW. The power plants belong to a subsidiary of Grupo Mexico and are located north of the smelter/refinery complex. The power plants are connected to the national power grid to reach La Caridad facilities and can supply up to 90 MW. Most of the power (340 MW) goes to BVC and the rest to the Smelter/Refinery complex.

The incoming power at 230 kV is transformed to 34.5 kV and distributed over medium tension lines with substations to service the following processing areas in separate circuits:

- Crushing plant
- Grinding – flotation – sedimentation
- Ancillaries
- Mine
- L-SX-EW

The unit power consumption over the last ten years is approximately 23 KWH per dry metric tonne.

The water system for La Caridad is comprised of two separate systems:

- Freshwater
- Reclaimed Water

Freshwater is pumped from La Angostura dam, located 24.3 km from the plant. The freshwater make-up requirement for grinding/flotation is estimated at 41,379 m^3 per day equivalent to 0.43 tonnes of freshwater per tonne of ore processed. Historical water consumption is shown on Table 14.3.

Table 14.3: Water Consumption

Water Type	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fresh (Mm^3/y)	19.2	20.0	18.3	19.7	21.7	22.1	21.1	21.6	20.6	18.6
Reclaimed (m^3/t)	2.0	2.2	1.9	1.8	1.8	1.8	1.8	1.8	2.0	2.1

Source: Information provided by Mexicana de Cobre.

Water from the La Angostura dam is pumped to a freshwater reservoir from where it is distributed without further treatment to the following process areas:

- Make-up to reclaimed water
- Process make-up water
- Fire water system
- Potable water
- Pump's gland water seals
- Reagent mixing
- Mine and Plant Water trucks (dust abatement)

Reclaimed water is returned from the Tailings Thickeners and Tailings Dam. Water reclaimed from the plant thickeners and from the tailings dam is pumped to a reclaimed water reservoir. The reclaimed water reservoir distributes water by means of pumps to maintain proper pressure throughout the following processing circuits:

- Grinding
- Classification (dilution water)
- Flotation (launder water)

Reagent selection and dosage optimization studies have allowed for improvement of metal recoveries and subsequent reduction of costs associated with flotation and sedimentation of tailing and concentrate products.

14.1.6 Production, Metallurgical Recovery, and Product Quality

Table 14.4 shows the key production parameters. The plant is operating at full capacity and the recovery of copper is slightly higher than the original estimate.

Considering that all the concentrate is sent to a smelter that belongs to SCC, the quality of the copper concentrate is less relevant than if the concentrate were sold in the open market. With the type of minerals present at La Caridad, production of a concentrate with good grade must be balanced with the need to achieve the best possible recovery. Normally, the higher the grade the lower the recovery and vice versa. In this case, a concentrate grade between 20% and 25% seems acceptable to avoid causing excessive operating cost at the smelter.

Table 14.4: Production Statistics

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ore Milled (Mt)	33.2	33.4	33.6	34.4	34.5	34.5	34.5	34.5	34.6	34.6
Cu Concentrate Grade (%)	19.6	21.2	21.1	22.0	22.8	23.5	24.0	23.8	24.0	23.2
Cu Concentrate (kt)	459.0	461.0	460.0	459.0	455.0	447.0	443.0	446.0	446.0	473.0
Concentrate Cu Content (kt)	89.8	97.8	96.9	101.1	103.9	104.9	106.3	106.1	107.2	109.7
Copper Recovery (%)	82.2	85.1	83.8	85.5	85.8	85.7	85.5	87.1	86.8	87.1
Mo Concentrate Grade (%)	53.5	54.1	54.0	53.6	53.8	53.7	54.3	54.6	54.3	54.5
Mo Concentrate (kt)	19.2	20.3	21.8	20.2	18.7	18.7	18.3	18.0	18.8	19.3
Mo Recovery (%)	68.8	76.4	79.8	81.5	81.6	82.4	82.5	83.3	82.2	82.8
Operating Days	365	365	364	364	364	365	364	364	364	364

14.1.7 Production and Cost of Copper Concentrator

Table 14.5 shows the summary of production The information for the Concentrator was summarized from the MdC general report of production and costs that includes the Mine Department and L-SX-EW. The tonnes of ore milled have been consistently on budget, which is the design capacity of the plant. The unit costs per tonne milled and for pound of Cu produced have been under budget.

Table 14.5: Historical Copper Concentrator Production and Costs

Item	2018			2019			2020		
	Real	Budget	% Diff. *	Real	Budget	% Diff. *	Real	Budget	% Diff. *
Ore Milled, (1,000 dmt)	34,548	34,398	0.4	34,648	34,530	0.3	34,858	34,523	1.0
Cu Production (000 lbs.)	233,882	227,219	2.9	236,249	232,396	1.7	241,783	234,371	3.2

Note: *Difference = Real/Budget/Budget*100.

14.1.8 Metallurgical Reporting and Mass Balances

For operation control purposes the plant has in-line samplers. The laboratory maintains international standards and is certified to ISO-9001. For reporting purposes, at the end of the month the plant issues a report called a “manifestation” that basically is a mass balance that starts with the inventory in the coarse ore pile and ends in the molybdenum and copper concentrates storages. The manifestations from each operating department are reviewed every month and at the end of the year by the company’s comptroller office to ensure that the reports of each department coincide with one another and finally become the official report for taxation purposes and to report to financial institutions.

As an example, Table 14.6 is a translation of the official document issued by the Concentrator Department at the end of 2020, with a comparison of plan versus real production for 2020 presented in Table 14.7.

Table 14.6: Material Balance 2020 - Concentrator Department

Description	Coarse Ore Storage			Description	Fine Ore Storage		
	Wet Tonnes	%Hum.	Dry Tonnes		Wet Tonnes	%Hum.	Dry Tonnes
Initial Iinventory	286,966	2.18	280,703	Initial Iinventory	175,233	1.66	172,326
M I N E	35,837,158	2.48	34,949,323	**CRUSHED**	35,900,269	2.48	35,010,856
Sub-Total	36,124,124	2.48	35,230,026	Sub-Total	36,075,502	2.47	35,183,182
CRUSHED	35,900,269	2.48	35,010,856	**MILLED**	35,743,939	2.48	34,858,261
Final Inventory	223,856	2.09	219,170	Final Inventory	331,562	2.00	324,921
Truck/Factor Total	224.0		218.5	Number of 400 t trucks		**23,811**	
Tonnes 400 Truck	8,087,929	2.48	7,887,557				
Truck/Factor 400	339.7		331.3	Number of 240 t trucks		**136,157**	
Tonnes 240 Truck	27,749,229	2.48	27,061,765	TOTAL TRUCKS		**159,968**	
Truck/Factor 240	203.8		198.8				

Description	DMT	Dry Tonnes		Dry Tonnes		Dry Tonnes	
		Au, g/t	Ag, g/t	Cu, %	CuO, %	Mo, %	Fe, %
MILLED	**34,858,261**	1,802	153,168	125,863	14,732	12,720	1,000,667
		0.052	4.394	0.361	0.042	0.037	2.870
Shippable Inventory Cu Concentrate Storage	1,815.4	1.744	252.708	400.010	2.084	4.277	517.236
		0.961	139.203	22.030	0.110	0.240	28.490
Copper Concentrate In Transit	2,448.3	2.563	353.730	556.005	8.329	4.855	689.872
		1.047	144.479	22.710	0.340	0.200	28.180
Final Inventory Cu Concentrate	4,263.7	4.307	606.400	956.015	10.413	9.132	1,207.108
		1.010	142.232	22.420	0.240	0.214	28.310
Final Inventory Mo Concentrate	46.4	0.001	1.16	0.28	0.02	26.21	0.42
		0.011	25.00	0.61	0.03	56.53	0.91
Total Cu Shiptments	**479,640**	230.8	71,299	111,199	2,446	558	141,623
		0.481	148.65	**23.18**	0.51	**0.12**	29.53
Mo Concentrate Shipments	**19,401**	0.258	540.184	167.090	5.185	10,567	291.121
		0.013	27.843	0.860	0.03	**54.46**	1.50
Initial COPPER Inventory	10,840	6.478	1,438	2,484	15.376	23	3,104
		0.598	132.688	22.92	0.14	0.21	28.63
Initial MOLYBDENUM Inventory	111.274	0.001	3.672	1.896	0.030	57.517	2.292
		0.011	33.00	1.70	0.03	51.69	2.06
Cu Concentrate Production	**473,064**	228.64	70,468	**109,671**	2,441	544.62	139,726
		0.483	148.96	**23.18**	0.52	0.115	29.54
Mo Concentrate Production	**19,336**	0.26	537.67	165.48	5.17	**10,535**	289.25
		0.013	27.806	0.860	0.027	**54.480**	1.500
Total Production Cu-Mo	492,400	228.90	71,005	109,836	2,446	11,080	140,016
		0.465	144.202	22.306	0.497	2.250	28.435
FINAL TAILINGS	34,365,860	1,573	82,163	16,026	12,286	1,640	860,651
		0.046	2.391	0.047	0.036	0.005	2.504

% Grade in ORE		0.052	4.394	0.361	0.042	0.036	2.871
% Grade Copper Production		0.483	149.00	23.18	0.52	0.12	29.54
% Grade Molybdenum Production		0.013	28.00	0.86	0.03	54.48	1.50
% Grade Cu-Mo Production		0.465	144.00	22.31	0.50	2.25	28.44
% Grade Final Tailings		0.046	2.39	0.05	0.04	0.01	2.50
% Recovery Cu		12.690	46.01	87.14	16.57	4.28	13.96
% Recovery Mo TOTAL		0.014	0.35	0.13	0.04	82.82	0.03
% Recovery Cu-Mo		12.710	46.36	87.27	16.60	87.11	13.99
% Recovery Mo Circuit		0.112	0.757	0.151	0.211	95.080	0.207
Concentration Ratio Cu	73.69						
Concentration Ratio Mo	1802.73						
Concentration Ratio Cu-Mo	70.79						

Table 14.7: Comparison of Plan versus Actual 2020 Production

Item	Plan	Actual	Diff.	% Diff.
Ore Milled (t)	**34,523,467**	**34,858,261**	**334,794**	**101.0**
Cu Grade %	0.355	0.361	0.006	101.8
Mo Grade %	0.033	0.037	0.004	110.6
Prod. Copper Concentrate (t)	**454,837**	**473,064**	**18,227**	**104.0**
Cu Concentrate Grade %	23.50	23.18	(0.32)	98.7
Contained Copper (t)	**106,309**	**109,671**	**3,362**	**103.2**
% Cu Recovery	86.80	87.14	0.33	100.4
Prod. Molybdenum Concentrate (t)	**17,649**	**19,336**	**1,687**	**109.6**
Molybdenum Concentrate Grade %	53.25	54.48	1.23	102.3
Contained Molybdenum (t)	**9,398**	**10,535**	**1,137**	**112.1**
% Mo Recovery	82.53	82.82	0.30	100.4

Note: % Diff. = Actual to Plan ratio

14.2 Solvent Extraction Electrowinning Plant

The L-SX-EW operation of Mexicana de Cobre. S.A. de C.V. (MdC) is located within the complex La Caridad, that includes the open pit and concentrator. La Caridad is approximately 120 km south by road from the USA-Mexico border. The detailed location is described in the general site location description in this report. The L-SX-EW plant location is shown in Figure 14.4.

La Caridad began mining in 1975. The ore was mainly secondary sulfide. The orebody has gradually transitioned into the primary sulfides zone of chalcopyrite. The process is a conventional milling/flotation of ore above a COG normally around 0.30% TCu. The concentration plant started in 1979. Before the Concentrator Plant start-up and over the years, ROM low-grade ore below the concentrator COG and above a COG of 0.15% TCu was stockpiled in dumps located SE of the pit, to wait for an opportunity to economically process that low-grade material. Those original dumps were built by trucks, in an end-dump fashion like waste dumps, without height control, nor care for compaction or other factors that could affect leaching.

The commercial SX-EW plant started operation in 1995. The nominal capacity is 64.26 tpd copper cathode, or 23,455 tpy (365 days per year), with a “catch-up” capacity at 95% availability of 67.64 t/d (347 days per year).

SX-EW technology was chosen because it was the best available process to recover copper from low concentration solutions resulting from leaching low-grade ore.

LEGEND

0 0.5 1

1:20,000 Kilometers

NOTE(S)

REFERENCE(S)

1. COORDINATE SYSTEM: WGS 1984 UTM ZONE 12N
2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRID, IGN, AND THE GIS USER COMMUNITY

CLIENT

GrupoMéxico

PROJECT

LA CARIDAD

TITLE

L-SX-EW SITE VIEW

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-02-22
DESIGNED	SP
PREPARED	TBH
REVIEWED	SP
APPROVED	MO

PROJECT NO.	CONTROL	REV.	FIGURE
20442424	-	-	14.4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

14.2.1.1 Leaching Process Description

This sub-section is based on production data and other information provided by Mexicana de Cobre , the FS developed for the SX-EW project, and from descriptions included in the operations manual for the plant. The L-SX-EW Project was based on leaching new ore to be mined in a 10-year mine plan, that included 153.2 Mt of ore at 0.23% TCu, or 353,892 t contained Cu and the existing low-grade ROM ore stockpiles of 152.7 Mt of ore at 0.23% TCu. The plan also considered 348,156 tonnes of contained copper that were placed in the Guadalupe Canyon area since mining started in 1975 to reach the 21,900 tpy plant capacity used in the FS. The expected extraction in leaching was 57% of TCu. As a precaution, the SX-EW plant layout contemplated a possible expansion of the SX section, depending on the actual results from Leaching. Eventually, the SX-EW plant was designed to produce 23,455 t of copper cathode per year.

The plant was built at an elevation of 1,400 meters above sea level (masl). The old pads were built by end-dump trucks, at elevations from 1,545 masl to 1,380 masl, as convenient to haulage when the open pit was being developed. When the project started, the Guadalupe PLS dam was built at an elevation approximately 200 m lower than the plant elevation. The new ROM ore lifts started at the tail end of the PLS dam, to be built by trucks in 30 m lifts. Due to the restricted area at the bottom of the canyon, the toe-end of the first lift was about 60 meter high.

A second leach area called La Francisca, to the north of the pit and northwest of the plant, started in 1997.

The MdC ore is mainly chalcocite. Leaching is conventional ferric-bacterial pad leaching, represented by the following general equation:

$$\underset{\text{Chalcocite}}{Cu_2S} + \underset{\text{Ferric Sulfate}}{5Fe_2(SO_4)_3} + \underset{\text{Water}}{4H_2O} \xrightarrow{\text{Bacteria Catalysts}} \underset{\text{Copper Sulfate}}{2CuSO4} + \underset{\text{Ferrous Sulfate}}{10FeSO4} + \underset{\text{Sulfuric Acid}}{4H_2SO4} \quad (1)$$

The ferrous ions produced by Equation (Eq.) 1 above are re-oxidized to ferric by Equation 2, and the process becomes cyclic. Oxygen is from air dissolved in the leach solutions.

$$0.5O_2 + 2FeSO_4 + H_2SO_4 \xrightarrow{\text{Bacteria Catalysts}} Fe_2(SO_4)_3 + H_2O \quad (2)$$

The less common oxide ores, like tenorite, are leached by sulfuric acid.

$$CuO + H_2SO_4 \rightarrow CuSO_4 + H_20$$

In 2014 La Caridad installed a 300-m^3 reactor to produce biomass that is added to the leach system to improve copper extraction by inoculation of thio-bacillus ferrooxidans into the leach solution.

The leach ore is placed in approximately 30 m high lifts by mine trucks. After a lift is completed, the surface is ripped by tractor at about 1.5 m depth. The leach solution is irrigated by sprinklers or wobblers, in a triangular 10-m by 10-m pattern, installed in 4-inch pipes separated 10 m. The main headers are 18-inch, high-density polyethylene (HDPE) pipes that are reduced to 10 inches and finish in 4 inches.

The leach solution application rate is 1,800 to 2,200 liters per minute per hectare (L/min/ha) (10.8 – 13.2 liters per minute per square meter [L/h/m^2]), depending on the stage of the leach cycle and PLS concentration, normally with 60 days of leaching followed by a variable rest period.

The Francisca PLS dam has a floating pump station. Three vertical (500 HP) pumps direct the PLS to a stationary pump station on the dam shore. Three (500-horsepower [HP]) pumps in parallel pump to a booster station that sends the PLS to the plant feed pond.

The Guadalupe PLS dam has a similar pumping system to transfer the PLS to the plant feed pond.

From the plant feed pond the PLS flows by gravity to the SX plant. In 2019, by-passes were installed from the PLS pipes feeding the pond, to allow feeding the SX plant directly, in case of failure or maintenance of the feed pond.

Once copper is recovered in SX, the raffinate is sent by gravity to a pond. Five (500 HP) pumps send the leach solution to the leach fields or to a booster station with three (900 HP) pumps in parallel to irrigate the areas at higher elevations. The leach solution ponds and dams were built according to the regulations in place at the time of construction.

There is no emergency pond. The PLS and raffinate ponds are located within the Guadalupe catchment area. The ultimate emergency catchment is the concentrator tailings dam, downstream of both the Francisca and Guadalupe PLS dams.

The discharge pipes in the floating pump stations are high density polyethylene (HDPE). In the stationary pump stations, the suction and discharge headers are stainless steel (SS), the pipes are HDPE of different calibers, except in zones of high pressure like the first sections from La Francisca and Guadalupe, where SS pipes are necessary.

The leach systems have rainwater diversion ditches, to reduce the intake of meteoric water to the leach circuit. The addition of water to the leach circuit is only by rain over the leach pads. The rainwater is diverted downstream of the Francisca and Guadalupe PLS dams, to report to the concentrator tailings dam.

There are four zones considered to place future leach ore, to increase the leaching area or replace areas that are no longer under production. A new area called Sinaloa to the north-east of La Francisca area will add 0.9 km^2 of leach area is in progress. Eventually, over 1,455 masl elevation, Sinaloa will join La Francisca. Another new leach area called Cachuli that will add 3.7 km^2 is in development to the east of the Guadalupe leach pad.

The other parts of the development program are to place fresh ore over 1.7 square kilometers (km^2) of the existing Guadalupe leach pad, and in an area of 1.8 km^2 over the southwest part of La Francisca pads.

The new areas are described in a comprehensive stability analysis by CNI developed in 2019.

Table 14.8 is a summary of the year-by-year information provided by LC and shows that, except for years 2011, 2012, and 2013 the mine has supplied more than enough soluble copper to surpass the nominal capacity of 23,455 tpy of the SX-EW plant.

Table 14.8: Annual Leach Ore and Cathode Production

Year	Tonnes (1,000)	% Cu.	% S.I.	Soluble Cu (tonnes)	Cathode (tonnes)
2011	32,333	0.24	23.95	17,287	23,853
2012	34,848	0.22	24.71	18,303	22,808
2013	30,426	0.23	22.64	14,726	23,875
2014	31,164	0.24	36.77	25,976	25,212
2015	32,758	0.24	44.71	33,903	27,163
2016	41,342	0.23	36.11	32,292	28,307
2017	36,540	0.23	41.43	33,130	28,388
2018	30,765	0.22	36.25	23,385	26,414
2019	28,457	0.22	46.52	28,228	25,927
2020	29,561	0.22	41.42	25,556	25,846
Total	**328,193**	**0.23**	**35.40**	**252,786**	**257,794**
Average	32,819			25,279	25,779

Table 14.9: shows the production results for First Quarter 2021.

Table 14.9: Leach Ore and Cathode Production (First Quarter 2021)

Year 2021	Tonnes (millions)	% Cu.	% I.S.	Soluble Copper (tonnes)	Cathode Production (tonnes)
January	3.04	0.21	32.52	1,943	**2,210**
February	2.59	0.21	33.63	1,741	**2,058**
March	3.05	0.21	25.40	1,525	**2,218**
Total	**8.68**	**0.21**	**30.36**	**5,209**	**6,486**
Average	2.89	0.21	30.36	1,736	2,162

14.2.2 Energy Requirements and Water Balance

Electrical power is supplied to the plant substation by a 34.5 kV dedicated powerline connected to the company's main substation, which receives power from plants owned by a subsidiary of Grupo Mexico through the national grid. The plant substation reduces the power tension to 13.8 kV for the EW transformer/rectifiers and other lower voltages for pumps and general services.

The electrical power required by EW represents approximately 80% of the total plant energy consumption, excluding power for the pumps in the leaching circuits.

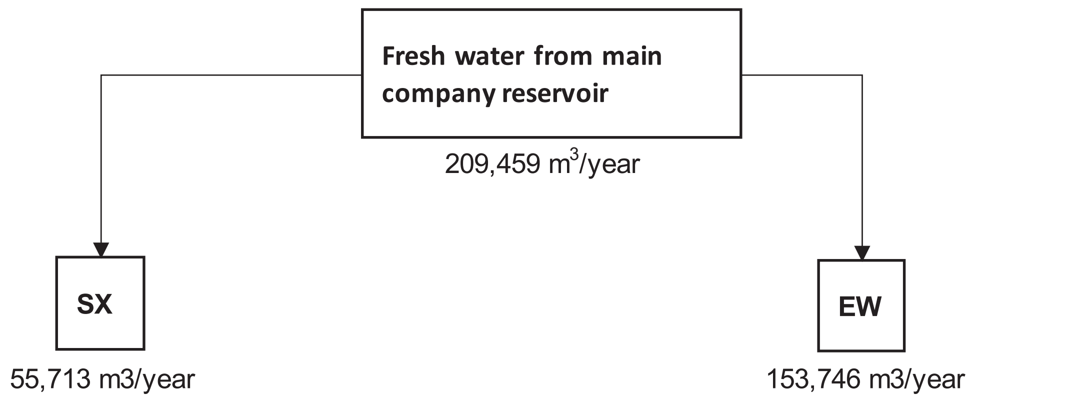
Theoretically, the energy requirement to produce one kilogram of copper is 843.3 A-hr if the current efficiency is 100 percent. Under actual operating conditions, however, the current efficiency is always somewhat less. The overall tank house design efficiency is 90 percent, but an actual operating efficiency of 95 percent is achieved.

The amperage supplied to the cells is used to control the copper production rate. The EW plant has been designed to operate at about 236 amperes per square meter (A/m^2) nominal. At maximum rectifier output of 35,000 amperes (A), the electrical power required by the EW operation is approximately 4,800 kWh.

To reduce the rainwater intake to the leaching system, there are rainwater diversion trenches around the leaching areas. Only the rain falling directly over the leach pads is captured in the system. The leaching system does not require a regular water make-up and no freshwater is added to leaching. The water necessary to compensate evaporation losses and to make-up the inventory of leach solutions is from the direct rain mentioned before and from the process water discharges from the SX-EW process plant, such as weak acid, electrolyte bleed, wash water, etc.

Figure 14.5 shows a simplified overall water balance.

Figure 14.5: Diagram No. 1 - L-SX-EW Plant Water Balance 2020



Leaching System Balance

No fresh process water. Inventory make-up by direct rainwater over leach pads, weak acid from smelter and discharges from SX-EW plant, above.

Date	Level, masl		Volume, m^3	
	Guadalupe Dam	Francisca Dam	Guadalupe Dam	Francisca Dam
1/1/2020	1,192.6	1,167.1	1,571,000	165,601
1/1/2021	1,186.8	1,163.4	1,121,000	78,539

Balance by Dam (m^3)	-450,000	-87,062
Total Dam Balance (m^3)	-537,062	
Weak Acid Trucks (m^3)	560,294	
Process Water (m^3)	209,459	
Balance Total (m^3)	**-1,306,815**	

(Rain catchment , evaporation and saturation with raffinate of new ore into the system)

14.2.3 Solvent Extraction (SX) Process Description

The SX-EW process descriptions and the corresponding facilities descriptions in the following sub-sections are based on the project feasibility study and the manual of operation of the plant, plus communications from MdC personnel regarding changes made over the years.

The original flow capacity of the SX plant was 1,500 cubic meters per hour (m^3/h), 500 m^3/h per train, with a PLS concentration of 2.1 gCu/L and 85% extraction in the plant. Because the PLS fell below the planned concentration, the plant was modified in 1997 to a Series-Parallel configuration to be able to process higher PLS flows and maintain the EW capacity.

The SX plant concentrates Cu from a dilute impure PLS at about 2.0 gCu/L and produces a clean electrolyte solution at 45 to 55 g Cu/L suitable for the EW process. The main impurities deleterious to EW to be rejected in SX are iron and manganese. This is accomplished by selectively extracting Cu from the aqueous PLS into an organic solution, which consists of a Cu extractant reagent diluted in purified kerosene.

The reagent is extremely selective to extract Cu from low-acid solutions instead of other metal ions. The transfer of Cu into and out of the organic solution or phase is a reversible reaction, which is controlled by the sulfuric acid concentration of the aqueous solutions.

In the Extraction stages the aqueous phase PLS is mixed with the organic solution to transfer the copper from the aqueous phase to the organic phase and then allowed to separate by density difference in the SX settlers. The aqueous solution depleted of copper (raffinate) returns to leaching, to extract more copper and the organic solution advances to the Stripping section.

In the Stripping stages the organic phase loaded with copper is mixed with an aqueous phase (electrolyte) containing high acid After separation of the phases in the settlers, the organic solution depleted of copper returns to extraction to load more copper and the electrolyte advances to EW to deposit copper as cathode in the EW cells.

The SX plant division into Extraction and Stripping sections is represented by the following reaction:

$$\mathbf{(2RH)\ org + [Cu^{+2} SO^{=}_4]\ aq \leftrightarrow (Cu)\ org + [2H^{+} + SO^{=}_4]\ aq} \qquad \text{[Eq. 1]}$$

where:

R = organic extractant

H = hydrogen ion

Cu = copper or any bivalent metallic cation

$SO_4^{=}$ = sulfate ion

In the extraction section, the relatively low acid content of the PLS allows the copper ions to be extracted from the aqueous phase PLS into the organic phase, to the right in the equation. The solutions depleted of copper (raffinate) are returned to leaching. In the Stripping section, the reaction is reversed when the organic phase is contacted with high-acid electrolyte and the copper ions are stripped from the organic phase into the electrolyte (aqueous), to the left in the equation.

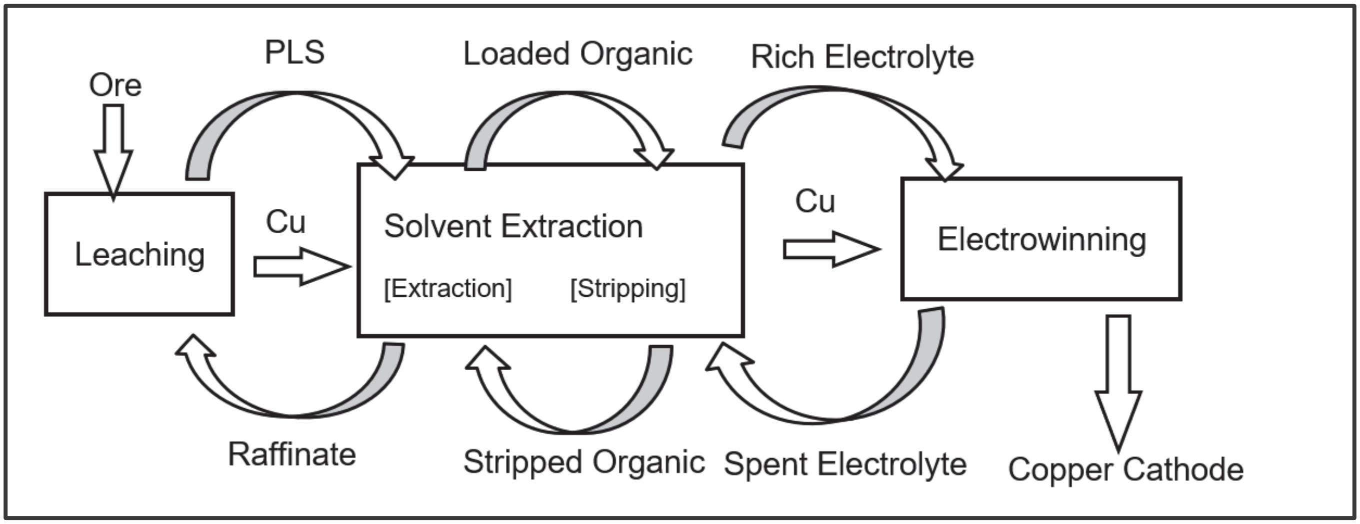
14.2.4 Electrowinning (EW) Process Description

In the EW section, a direct electrical current is applied to the Cu electrolyte aqueous solution to deposit metallic Cu onto stainless steel cathode blanks. The electrolyte depleted of copper and with the acid generated by electrowinning returns to the Stripping section to recover more copper.

$$\mathbf{[Cu^{+2}\ SO^{=}_4]}\ aq + H_2O + 2e^{-} \rightarrow Cu^{o} + [2H^{+} + SO^{=}_4]\ aq + \tfrac{1}{2}\ O_{2\ gas}\uparrow \qquad \text{[Eq. 2]}$$

Figure 14.6 represents the overall SX-EW process.

Figure 14.6: Overall SX-EW Process



For optimum mixing efficiency a ratio of 1:1 Organic to Aqueous (O/A) ratio in the mixers has to be maintained.

The overall control of the SX plant is maintained by controlling the three feed flows: PLS, loaded organic, and spent electrolyte, as well as the aqueous recycle in the stripping stages. As the copper concentration in the various streams changes, the flow rates are also changed to try to maintain a "chemical steady-state" condition.

14.2.5 Facilities Description

The SX/EW plant facilities, shown in Figure 14.7, includes the following major areas:

- PLS pond
- SX plant
- Tank farm (TF) area
- Raffinate pond
- EW tank house
- Utilities and services
- Electrical distribution

LEGEND

0 40 80
1:1,500 Meters

NOTE(S)

REFERENCE(S)
1. COORDINATE SYSTEM: WGS 1984 UTM ZONE 12N
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CLIENT
GrupoMéxico

PROJECT
LA CARIDAD

TITLE
GENERAL ARRANGEMENT - SX-EW PLANT

CONSULTANT
GOLDER MEMBER OF WSP

YYYY-MM-DD	2022-02-22
DESIGNED	SP
PREPARED	TBH
REVIEWED	SP
APPROVED	MO

PROJECT NO.	CONTROL	REV.	FIGURE
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14.2.5.1 PLS Pond

The PLS pond receives the solutions rich in copper from the PLS dams located down-stream of the leaching areas. The PLS pond was built at a higher elevation than the process plant, to allow solution flow by gravity to the SX plant. The working volume of the PLS pond is approximately 24,000 m^3, enough to provide 16 hours of retention time for a nominal plant flow of 25,000 L/min (1,500 m^3/h), (6,605 gallons per minute [gpm]). The PLS pond was excavated mostly in rock and is double lined with HDPE membranes to comply with the national environmental regulations.

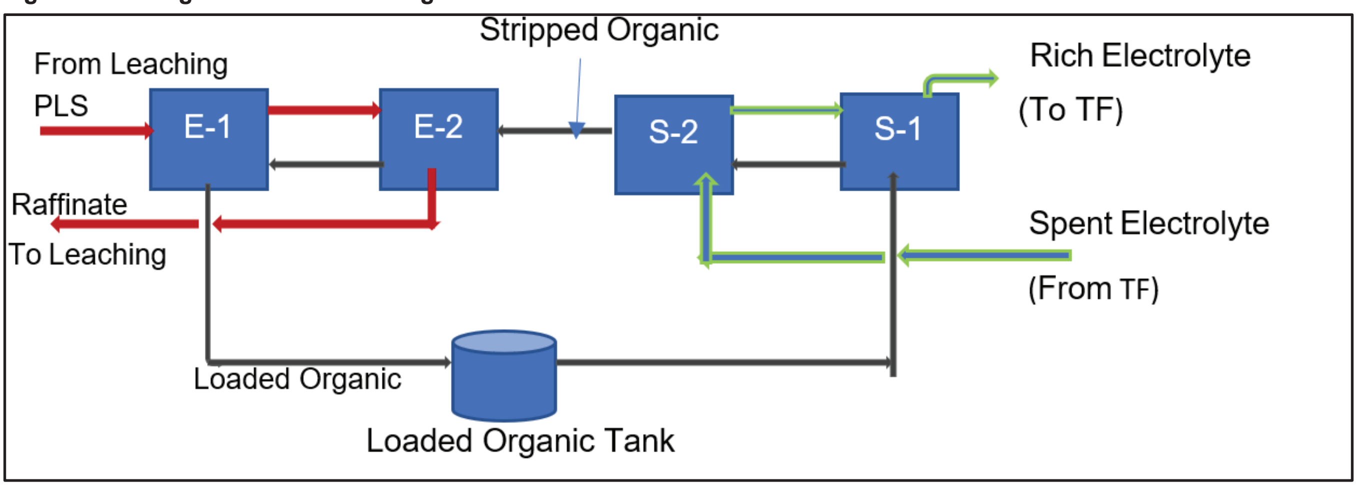
In 2019, the PLS piping system was modified to allow pumping directly from the PLS ponds in the leaching areas to the primary mixers in the SX plant during PLS pond maintenance.

14.2.5.2 SX Plant

One extraction stage consists of a primary mixer chamber and a secondary mixer chamber, to mix the aqueous solutions with the organic solution, and a settler chamber where the organic and aqueous phases are separated. The stripping stages have only one primary mixer.

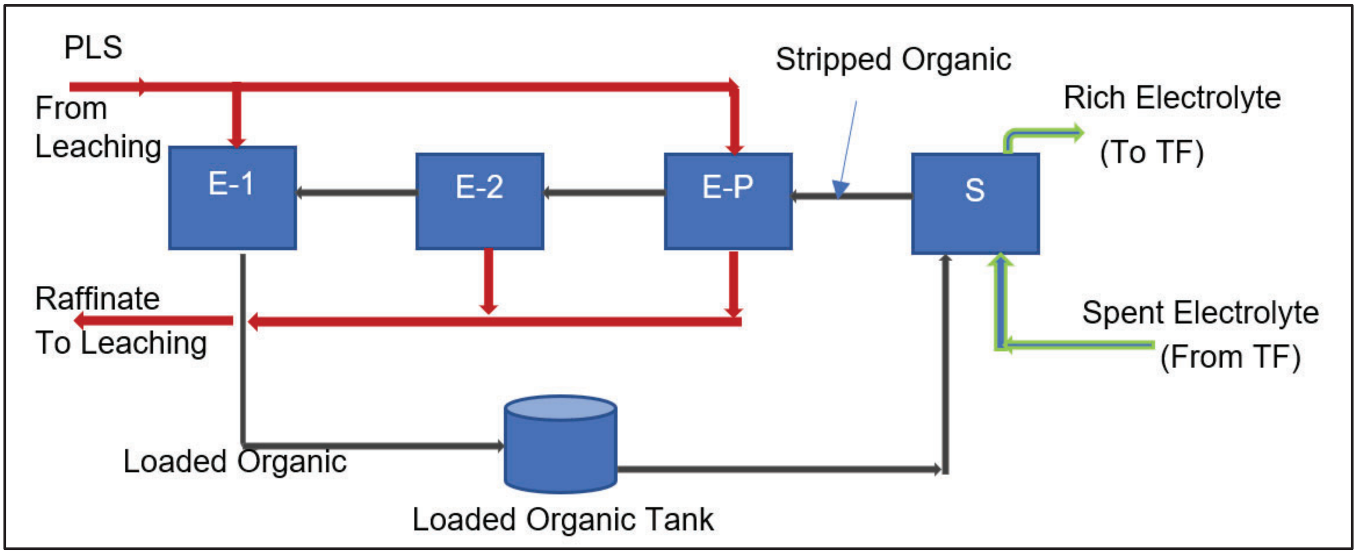
The mixers and mixing tanks are fabricated with stainless steel. The settlers are concrete, lined with stainless steel plates. Originally the SX plant consisted of three process trains with two stages of extraction (E1, E2) in series and two stages of stripping also in series per train (S1, S2), a 2E – 2S Series configuration, shown in Figure 14.8.

Figure 14.8: Original Series SX Configuration



In 1997, one stage of stripping in each train was converted to extraction to increase the flow of PLS to the plant, into a Series-Parallel configuration, 2E-1EP-1S, where the PLS feed to each train is split into two primary mixers, or extraction stages. The modified configuration is shown in Figure 14.9.

Figure 14.9: Current Series-Parallel SX Configuration



In the original configuration the total PLS flow of 1,500 m^3/h was split evenly to the three trains, 500 m^3/h per train. With the modified configuration the flow of PLS can be increased to practically double the original flow capacity and can be split as necessary, depending on the conditions of the plant, PLS copper content, etc.

The following description is for the existing Series-Parallel SX configuration.

Starting from the west, the mixer/setter units are: First stage of extraction (E-1), the second stage of extraction (E-2), the stage of extraction in parallel (EP), and the stage of stripping (S).

These units have the following functions:

- The first stage of extraction (E-1) receives the PLS and partially loaded organic from the second stage of extraction (E-2) and produces a loaded organic and a partially depleted leach solution.
- The second stage of extraction (E-2) receives the partially depleted leach solution and partially loaded organic and produces a partially loaded organic and raffinate (or barren aqueous solution).
- The stage of extraction in parallel (EP) receives PLS and stripped organic and produces partially loaded organic and raffinate.
- The stage of stripping (S) receives loaded organic and spent (or poor) electrolyte and produces rich electrolyte and stripped organic.

Each stage of extraction or stripping is a combination mixer/settler unit with a nominal throughput of 528 m3/hr of aqueous feed. Two mixing tanks are used in extraction but only one in striping. In the first mixing tank the agitator is a double-shrouded, turbine-type impeller that creates a pumping action to help draw the solution from the preceding mixer/settler into the mixing tank. The solution from the first mixing tank overflows through a downcomer to the second mixing tank to increase the mixing time.

The mixed phase discharge from the mixer(s) overflows a weir and flows down a launder which runs the entire length down a side of the associated settler. The feed flow direction is then diverted 90 degrees through a set of turning vanes in the launder and runs perpendicularly across the back of the settler to redirect the solutions in the direction back toward the head of the settler, where it is discharged to the next stage of process.

In the settler compartment the organic phase rises and the aqueous phase sinks due to the differences in specific gravity. When the separated suspension reaches the discharge launders at the head of the settler, the organic flows over a weir and into the organic discharge launder. The aqueous phase flows under the organic launder into the aqueous discharge pipe. The organic weir height is fixed. However, the height of the interface {or depth of the organic layer) can be controlled by adjusting the aqueous weir position in the associated aqueous level control column. When the adjustable weir in this column is lowered, the corresponding aqueous level in the settler is lowered; and because the top of the organic level is fixed by its overflow weir, the depth of the organic will increase.

The mixer/settlers for stripping are identical to the extraction mixer/settlers except only one mixing chamber (identical to the first extraction mixing chamber) is utilized for stripping.

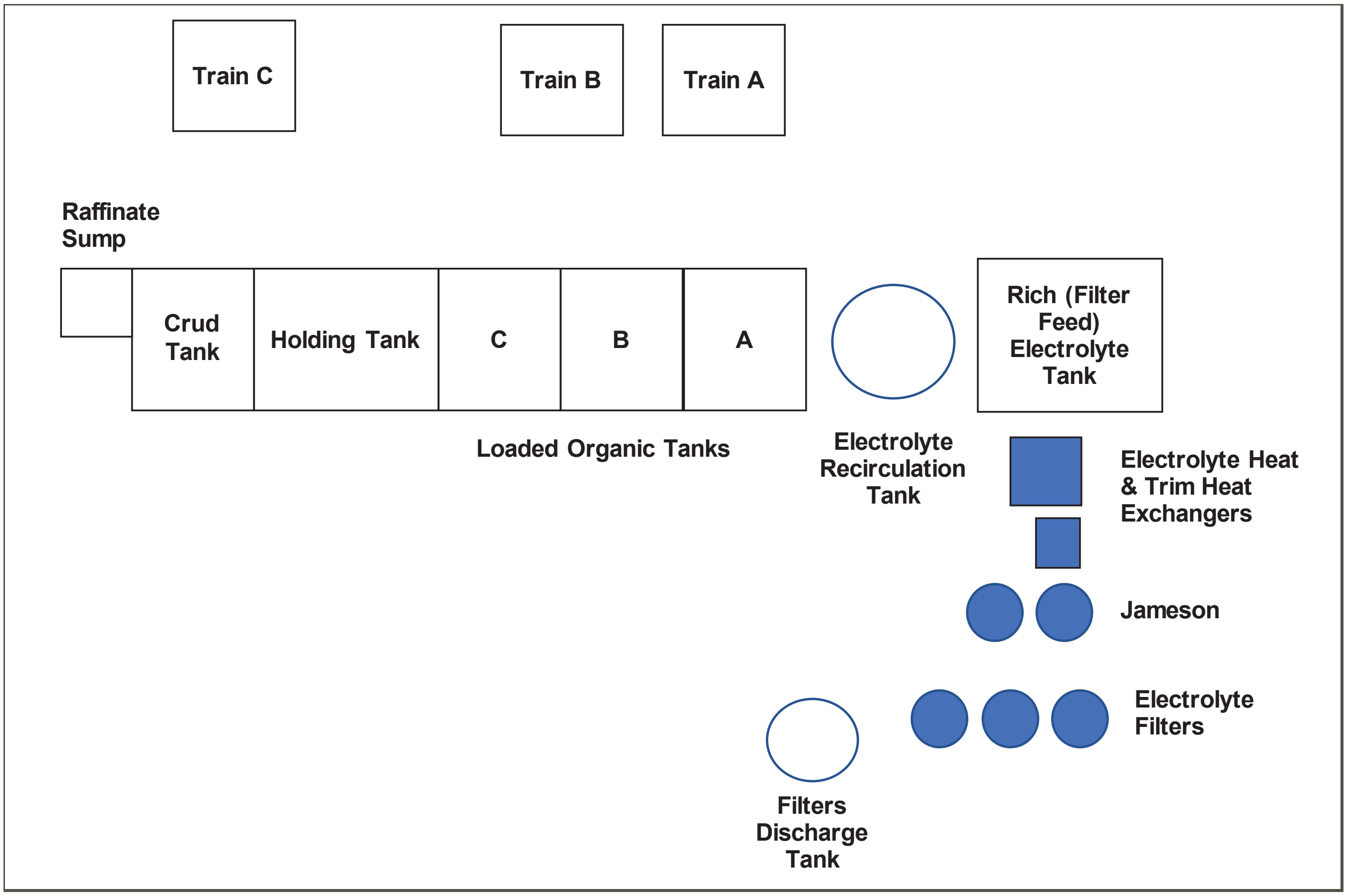
The piping between the various extraction and stripping mixer/settlers is arranged so that the aqueous and organic phases flow countercurrent to one another. The PLS is pumped to the first stage of extraction, is moved to the second stage by the pump/mixer, and then flows by gravity to a sump and then to the raffinate pond. The loaded organic is pumped to the stripping stage and moved by the pump/mixers through all the mixer/settlers and returns to the loaded organic tank by gravity. The spent electrolyte is pumped from the recirculation tank in the EW plant through plate heat exchangers to the stripping stage and flows by gravity to the rich electrolyte tank in the TF.

Each mixer/settler has the capability to recycle aqueous solution from the aqueous discharge back to the mixing chamber for the purpose of adjusting the ratio of organic to aqueous in the mixing chamber. In extraction, the volume of aqueous solution recycled, if any, will be small in comparison to the total aqueous volume. However, in the stripping stages the aqueous recycle is the major aqueous flow. The aqueous advance is kept small in order to increase the copper concentration in the electrolyte. For optimum mixing it is required to maintain a 1:1 Organic to Aqueous (O/A) ratio in the mixer and the recycle flow in Stripping must be large.

14.2.5.3 Tank Farm Area

The TF area is located between the SX area and the EW building and it was built at a lower elevation than the other two areas to allow flow by gravity of the main process flows: raffinate, loaded organic, rich electrolyte, poor electrolyte. Most of the tanks and pumps are contained within the TF. The main equipment in the TF area is arranged as shown in Figure 14.10 and described below. The tanks are HDPE-lined concrete, with a common wall, to save space and cost. For simplicity, secondary equipment, such as the crud treatment system, is not shown and is not described.

Figure 14.10: Tank Farm Layout



The FS area includes the following facilities:

- Loaded Organic Tanks (3): There are three loaded organic tanks, one for each of the three SX trains. Each tank is fed by gravity from the corresponding E-1 extraction settler. Loaded organic is directed to the bottom of a vertical aqueous coalescer packed column, which is located inside the tank. These columns aid in removing aqueous entrainment from the loaded organic. Each tank was designed with a retention time of 30 minutes of organic flow.
- Holding Tank: The holding tank is an HDPE-lined, concrete tank located between the crud tank and the loaded organic decant tank. This tank is normally empty and provides storage capacity to hold any one train's total contained organic (four mixer/settlers),. The holding tank overflows to the three loaded organic tanks.
- Jameson Cells: The Jameson cells are flotation cells, which are located above the two electrolyte heat exchangers. The two cells operate in series. The feed to the first cell is combined strong electrolyte from all three S stripping sections. The operating concept is to remove entrained organic as a foam from the electrolyte by aspirating air into the solution. The rich electrolyte flows to the Strong Electrolyte Filter Feed Tank.

- Strong (Rich) Electrolyte Tank (or filter feed tank): The strong electrolyte tank is located just to the north (on the right side facing the tanks from the pump bay) of the recirculation tank. It is a vertical, rectangular, concrete tank lined with HDPE. The feed to the tank is clean strong electrolyte from the second Jameson cell. From this tank the electrolyte is pumped to the electrolyte filters.
- Electrolyte Filters (3): The electrolyte filters were installed in 2020 to improve the removal of organic entrainment from the electrolyte feeding the EW tank house. They are installed in front of the Filter Feed Tank (formerly the Strong Electrolyte Tank. The filters are made of stainless steel, packed with media of sand, garnet and activated carbon, designed to retain fine solids and organic that are carried over from SX. The filter operation cycle is automatic. When one filter is in the backwash step the other two filters sustain the electrolyte flow. The filters discharge to the electrolyte filters discharge tank.
- Electrolyte Filters Discharge Tank: The electrolyte filter discharge tank is located next to the filters and is fabricated in stainless steel. The feed to the tank is clean strong electrolyte from the filters. From this tank the electrolyte is pumped through the electrolyte heat exchanger and trim heater to the scavenger cells in EW, which discharge to the electrolyte recirculation tank.
- Electrolyte Interchanger and Trim Heater: The electrolyte interchanger is a plate-type heat exchanger, which transfers heat from the spent electrolyte to the strong electrolyte. The trim heater is also a plate- type heat exchanger, but it uses steam to boost the strong electrolyte temperature to the temperature required at the electrowinning plant (approximately 43°C). These exchangers are located just to the east of the filter feed tank.
- Electrolyte Recirculation Tank: The electrolyte recirculation tank is made of stainless steel, thermally insulated, and fitted with a single underflow internal baffle that creates two asymmetric chambers. The primary feed to the tank is strong preheated electrolyte from SX, via the discharge from the scavenger cells to the smaller chamber, and on the opposite side of the baffle, the spent commercial cell electrolyte. The purpose of the baffle is to limit back-mixing of the spent electrolyte discharged from the commercial cells with the strong incoming feed electrolyte, pump the highest possible copper concentration to the commercial cells and still provide for system surges and small flow variations in a single tank. Rich electrolyte mixed with spent electrolyte is recirculated to the EW cells. Spent electrolyte is pumped to Stripping in SX. This tank has a residence time of 30 minutes of strong electrolyte flow.
- Raffinate Collection Sump: The raffinate collection sump receives raffinate from all three E-2 and three EP extraction settlers by gravity. It can also receive iron bleed from the electrowinning sump in the tank house. Normally, however, this bleed will be directed to the SX feed pond (PLS pond).
- Crud Tank and Crud/Organic Treatment: Crud is an emulsion of aqueous, organic and air caused by impurities in the leach solutions that tends to collect in the interphase of the organic and aqueous solutions in the SX settlers. Since crud carries impurities deleterious to the process, it is removed periodically to avoid the impurities from traveling from one settler to the next and eventually to the EW plant. The crud tank receives dirty solutions (crud) extracted from the mixer/settlers by the portable crud pump. It also receives plant spillage collected in the various sumps located throughout the plant, organic recovered from the raffinate pond, organic foam recovered from the Jameson cells, electrolyte filters, and electrolyte clean-up scavenger cells. From this tank the crud is fed to the crud treatment system.

The crud treatment system is a series of tanks, centrifuge, and filters where organic trapped in the crud is recovered, to be returned to the plant. This system can also treat organic by mixing it with clay, to restore the properties of the organic. All crud operations are batch and intermittent on an as-required basis.

- Service Tanks: In addition to the process tanks in the SX/TF area, several services tanks are located to the north and west of the SX-EW area, as described below:
  - Plant Water Tank: The plant water tank is a dedicated tank for the plant water system. The feed to the tank is from the company's freshwater supply system. Feed to the SX-EW plant is by gravity.
  - Fire Water Tanks: Two vertical steel tanks are available for fire water. They are dedicated exclusively to the fire water protection system and are always kept full.
  - Potable Water Tank: The potable water tank is a vertical, cylindrical steel tank dedicated to several uses:
    - Safety shower and eyewash station
    - Drinking fountains
    - Cathode washing and handling.
    - Boiler feed water purification system (make-up)
  - Diesel Tank: A storage tank for diesel fuel is to be used by the boiler and the diesel-driven emergency generator.
  - Boiler Fuel Tank (Diesel Oil Day Tank). This tank provides sufficient fuel for daily operations.
  - Extractant (Reagent) Tank: The extractant tank receives the extractant from trucks by gravity. The extractant is fed to the circuit using a metering pump to the three loaded organic tanks.
  - Diluent Tank: This tank is for storage of diluent to be used in the SX plant. Diluent is fed by gravity to the three loaded organic tanks on a batch make-up basis.
  - Sulfuric Acid Tank: Storage of concentrated sulfuric acid. Supplied from the company's smelter by trucks. It is added to the aqueous discharges of interstage electrolyte from the three S settlers. Flow into and out of the acid tank is by gravity.

14.2.5.4 Raffinate Pond

The raffinate pond receives the solutions depleted of copper from the raffinate sump located in the TF area. The Raffinate Pond was built at a lower elevation than the process plant, to allow raffinate flow by gravity from the SX plant. The working volume of the PLS pond is approximately 28,000 m^3, enough to provide 19 hours of retention time for a nominal plant flow of 25,000 L/min (1,500 m^3/h), (6,605 gpm). The raffinate pond was excavated mostly on rock and is double lined with HDPE membranes to comply with the national environmental regulations. From this pond the raffinate solutions are pumped to all the different leach areas.

14.2.5.5 Emergency Pond

There is no emergency pond in the SX-EW area. Any emergency overflow of the PLS pond or the raffinate pond would be collected in the PLS Dam in the Guadalupe Canyon, downstream from the plant.

14.2.6 Electrowinning Plant

14.2.6.1 Process Description

The purpose of the EW plant is to produce London Metal Exchange (LME) electrolytic grade A copper cathodes for sale. The EW plant produces metallic copper from an electrolyte containing copper sulfate and sulfuric acid. In the EW tank house cells, the electrolysis process deposits copper on stainless-steel cathodes and breaks down a portion of the water to hydrogen and oxygen. When a direct electric current from an insoluble lead anode passes through the electrolyte to a stainless-steel cathode mother blank, copper is deposited on the surface of the cathode and oxygen is liberated on the surface of the lead anode. The hydrogen remains in the aqueous solution in an ionic state and increases the acidity of the electrolyte. The oxygen gas bubbles out of the cell. The sulfate ion is not involved in the reaction. The overall reaction as noted in Equation 2 is:

$$[Cu^{+2} + S0_4^{-2}] + H_20 + 2e^- \rightarrow \underset{\text{(Cathode)}}{Cu^o} + 2H^+ + SO_4^{-2} + \tfrac{1}{2}\,\underset{\text{(Anode)}}{0_2}\uparrow gas \qquad [Eq.2]$$

The cathodes are harvested or pulled from the cells by an overhead bridge crane on a 7-day cycle and taken to the stripping machine and automatically washed, flexed and stripped of copper. The cathode copper plates are collected in stacks or bundles and are then weighed, sampled, and banded for shipment to market. The cathode blanks are returned to the cells.

14.2.6.1.1 Copper in Spent Electrolyte

To produce a good quality cathode deposit, it is recommended to maintain a copper concentration of 35 gCu/L in the spent electrolyte exiting the EW cells. If the current is held constant, the spent electrolyte assay varies in copper concentration in direct proportion to the strong electrolyte assay, which for La Caridad was recommended as 50 gCu/L, to reduce the risk of copper sulfate crystallization, especially in winter conditions. If the amount of copper arriving at the plant increases, more copper will leave the plant in the spent solution and vice-versa. The tank house will maintain a constant rate of removal (design is for a decrease of 15 grams of copper per liter) unless the current is changed.

In the event the spent electrolyte copper concentration drops below the 35-g/L copper, the rectifiers are turned down gradually. If the copper concentration rises above the specified limit, the rectifiers are turned up, to maintain the overall balance expressed in Equation 2.

14.2.6.1.2 Acid Level in Spent Electrolyte

Although acid (hydrogen ions) is generated by the electrowinning reaction, it is depleted in the SX plant by the stripping reaction. Because of inefficiencies and the iron bleed, a small amount of acid must be added into the overall circuit to maintain sufficient acid strength at the level required for stripping (180 to 190 g/l).

14.2.6.1.3 Voltage Drop

The voltage drop across a cell is due to the sum of several resistances. The copper busbar and the electrolyte have relatively low electrical resistances (normally less than 0.2 volts per cell). The theoretical voltage required to deposit copper and evolve oxygen is 0.91 volts. The total of all the voltage drops involved is generally in the range of 1.8 to 2.0 volts. The design cell voltage is 2.13 volts/cell.

14.2.6.1.4 Electrolyte Temperature

The electrical power in excess of the theoretical power required will produce heat in the cells which will be absorbed by the electrolyte. To utilize some of this energy, the spent electrolyte which leaves the tank house passes through a heat exchanger, where heat is transferred from the spent electrolyte to the strong electrolyte which is entering the tank house. Normally, the heat produced in the tank house and transferred to the electrolyte feed is sufficient to maintain a steady temperature around 43°C in the cells. If insufficient heat is available from the spent electrolyte, additional heat will be provided by steam in the trim heater, which will generally be required in winter conditions.

14.2.6.1.5 Reagents Addition

Cobalt sulfate is added to produce a hard adherent oxide layer on the surfaces of the anodes that extends anode life, minimizes flaking, and prevents cathode lead contamination. The cobalt concentration in the electrolyte is usually be maintained at 160 ppm.

Guartec is added to the cell electrolyte to improve the quality of the cathode deposit. The Guartec helps to produce smooth, dense copper deposits with a minimum of entrapped impurities.

14.2.6.1.6 Iron Bleed

Ferric iron, commonly the most significant impurity in cell electrolyte, reduces current efficiency by the ferrous/ferric conversion. It can also redissolve copper at the electrolyte surface of the cathode. Ferric ion (iron) is transferred by the organic from the PLS into the strip circuit by minute droplets (entrainment) of leach solution. Although the extractant is highly selective to extract copper, under abnormal conditions it could also extract minute amounts of iron.

Under normal conditions, a small amount of spent electrolyte must be bled from the tank house to control the build-up of ferric iron. The spent electrolyte bleed is high in copper (approximately 35 g/L) and acid (approximately 180 g/L) and is recycled to the SX feed pond. The rate will be controlled to maintain a maximum iron concentration of 1.5 g/L of total iron in the electrolyte.

14.2.6.1.7 Make-up Watter to Electrolyte

If the electrolyte volume drops below normal, a low level in the recirculation tank will result. Plant water must continuously be added to the recirculation tank since water is constantly removed from the electrolyte by the reaction in Eq. 2, by the electrolyte bleed and by evaporation.

14.2.6.2 Plant Description

The nominal capacity is 64.26 t/d copper cathode, or 23,455 tpy (365 days per year) with a current density of 236 A/m^2 applied to the cells, with a “catch-up” capacity of 67.64 t/d (347 days per year) with 244 A/m^2 applied to the cells. The design plating capacity is 84 t/d (29,148 tpy @ 347 days per year)

The EW facility is contained within the tank house building. The tank house cells are made of acid-resistant polymer concrete. Cell fittings, platforms, stair treads, piping handrails, and electrode insulators are made of plastic-based, non-conducting materials, such as Fibre Re-inforced Plastic (FRP).

The tank house design is a “total production stripping” operation using permanent cathodes. The use of stainless-steel blanks is part of the ISA Process technology package purchased from MIM of Australia. It includes a semi- automated cathode stripping machine.

The main components of the electrowinning facility are:

- EW rectifiers
- Electrowinning cells
- Tank house crane
- Cathode stripping machine
- Lead anodes
- Stainless-steel cathodes
- Ventilation system,
- Electrolyte recirculation tank

The operating platform around the cells is fiberglass. The building structural steel is protected with one coat of vinyl-ester primer and two coats of vinyl-ester top-coat epoxy.

14.2.6.2.1 Rectifier

There are two rectifiers connected in parallel, each with half of the current load. The rectifiers convert an alternating current input to a direct current output to the cells for the electrowinning process. The rectifiers are designed for operation outdoors and are located to the south of the tank house building. Each rectifier is rated for 13.8 kV input and output of 17,500 A, 200 V DC. An emergency rectifier is also provided to supply power to the tank house in the event of a power failure.This rectifier is energized by a diesel generator.

The nominal capacity of the plant requires a current density of 236 A/m^2 to be applied to the EW cells. The design capacity of the rectifiers is 304 A/m^2 and for the busbar system and EW cells it is 344 A/m^2.

14.2.6.2.2 Electrowinning Cells

There is a total of 94 cells, 16 of which are called “scavenger cells.” The cells are arranged in two lines or rows. The scavenger cells process the warm strong electrolyte before it enters the main tank house circuit and serve as a final back-up protection against organic contamination in the electrolyte. Here, the fine anodic oxygen bubbles produced by electrowinning scour any remaining organic entrainment from the strong electrolyte. Following a major organic slippage from mal-function or SX plant upset, the scavenger cells can save the bulk of the tank house “commercial cells” from organic contamination. Contamination leads to "organic burn" on the cathodes and subsequent rejection of product.

The cells are precast monolithic boxes constructed of FRP reinforced polymer concrete. Each cell contains 54 stainless-steel cathode mother blanks and 55 rolled lead-calcium-tin anodes. The anode suspension bar is of solid copper with 4 to 6 mm of 6% antimonial lead cast over the bar for welded attachment to the blade. The cathodes are of symmetrical design with 316 L stainless-steel blades that are welded into bottom-slotted copper bars.

The center-to-center spacing between anodes (or between cathodes) is 4 in. (102 mm). The anodes and cathodes are connected electrically in parallel within a cell and in series between cells so that ideally each anode/cathode pair receives the same current flow.

The electrolyte is fed from a distributor manifold which passes down the length of the cell on both sides. The electrolyte overflows the cell at the top of the opposite end through a V-shaped weir and enters a common discharge header, which returns it to the electrolyte recirculation tank. The cell flow electrolyte control is achieved by manually adjusting the individual cell valves. The flow is gauged by visually observing discharge over the V-notched outlet weir.

14.2.6.2.3 Tank House Crane

The tank house crane is used to transport cathodes from the cells to the stripping machine and cathode blanks back to the cells. It also serves for maintenance and other duties within the EW building. The crane may be operated by radio control or by using the pendant control. The double girder, top running, electric overhead travelling bridge crane is equipped with a cross travel trolley carrying twin hoists to provide two hook falls, with eight-tonne total capacity, to a crane bale cathode lifting frame that can pull one third of the cathodes in a cell at a time. The crane also has an auxiliary one-tonne hoist.

14.2.6.2.4 Cathode Washing and Stripping Machine

The permanent cathode washing and stripping machine performs several related functions. The cathodes are loaded by the tank house crane into the receiving conveyor and moved through a spray washing chamber installed over the conveyor for a three-stage wash, where the first two stages use counter-current recirculating hot water, and the final wash stage is a rinse with clean hot water.

After washing, the cathodes are transferred by a cross-conveyor to a flexing station and then to the automated knife-stripping station. The cathode copper plates fall onto a pair of scissor tables and are then passed onto a roller conveyor. This conveyor passes them through a weighing station to a lifting pillar stand for manual banding into stacks or bundles. The stacks are removed by forklift. Stripped permanent cathode blanks are accumulated on a discharge conveyor for automatic removal and set at the correct spacing for replacement in the cells. The speed of the conveyors and the stripping station are sufficient to harvest or collect in one shift of operation all the cathodes necessary to maintain a 7-day-cycle.

14.2.6.2.5 Ventilation System

The tank house ventilation system consists of variable-speed, induced-draft, exhaust fans on the east side of the building and louvers on the windward side of the building. Both are positioned at the cell operating (top) level. The intention of the ventilation system is to maintain a strong flow of air across the top of the cells below the head height of the operators. In so doing, mist-laden air is swept out of the building before it can rise.

14.2.6.2.6 Electrolyte Recirculation Tank

The strong electrolyte is pumped to a group of scavenger cells, where oxygen generated by the electrolytic reaction at the anodes provides a final scour of the organic entrainment. The strong electrolyte, almost completely free of organic after passing through the scavenger cells, flows into one side of a divided recirculation tank fabricated from 316L stainless steel. There, it enriches some of the electrolyte returning from the commercial cells, which passes under the weir to the other side of the recirculation tank. The mixture is then pumped to the commercial cells. After some of the copper is deposited on the stainless-steel cathodes, the partially depleted solution, enriched in acid, leaves the cells to return to the recirculation tank by gravity flow. Details of the electrolyte recirculation tank are covered in the TF description.

14.2.6.2.7 Stray Current Corrosion Reduction

The tank house circulation equipment is arranged such that all metallic components are connected electrically and are not separated by sections of non-conducting materials. All metallic components are insulated electrically from the ground. Pumps are insulated from their motors.

14.2.6.2.8 Source Mist Suppression

Two layers of polyolefin balls provide acid mist suppression in the EW cells. The polyolefin balls are used on all the commercial cells. No polyolefin balls are used in the scavenger cells.

14.2.7 Production and Cost of SX-EW Operation

Over the last ten years, the SX-EW plant has been able to surpass the nominal capacity of 23,455 tpy, as shown in Table 14.10 and Figure 14.11. Apparently the 2.8% of capacity below nominal in 2012 was caused because the supply of soluble copper from the mine was below the plant capacity that year and the year before. Overall, the 10-year average cathode production is 25,779 tpy, almost 10% above the nominal capacity.

Table 14.10: L-SX-EW Yearly Production

Year	Cu Cathode Production (tonnes)
2011	23,853
2012	22,808
2013	23,875
2014	25,212
2015	27,163
2016	28,307
2017	28,388
2018	26,414
2019	25,927
2020	25,846
Total	**257,794**
Average	25,779

Figure 14.11: Cathode Production (tonnes)

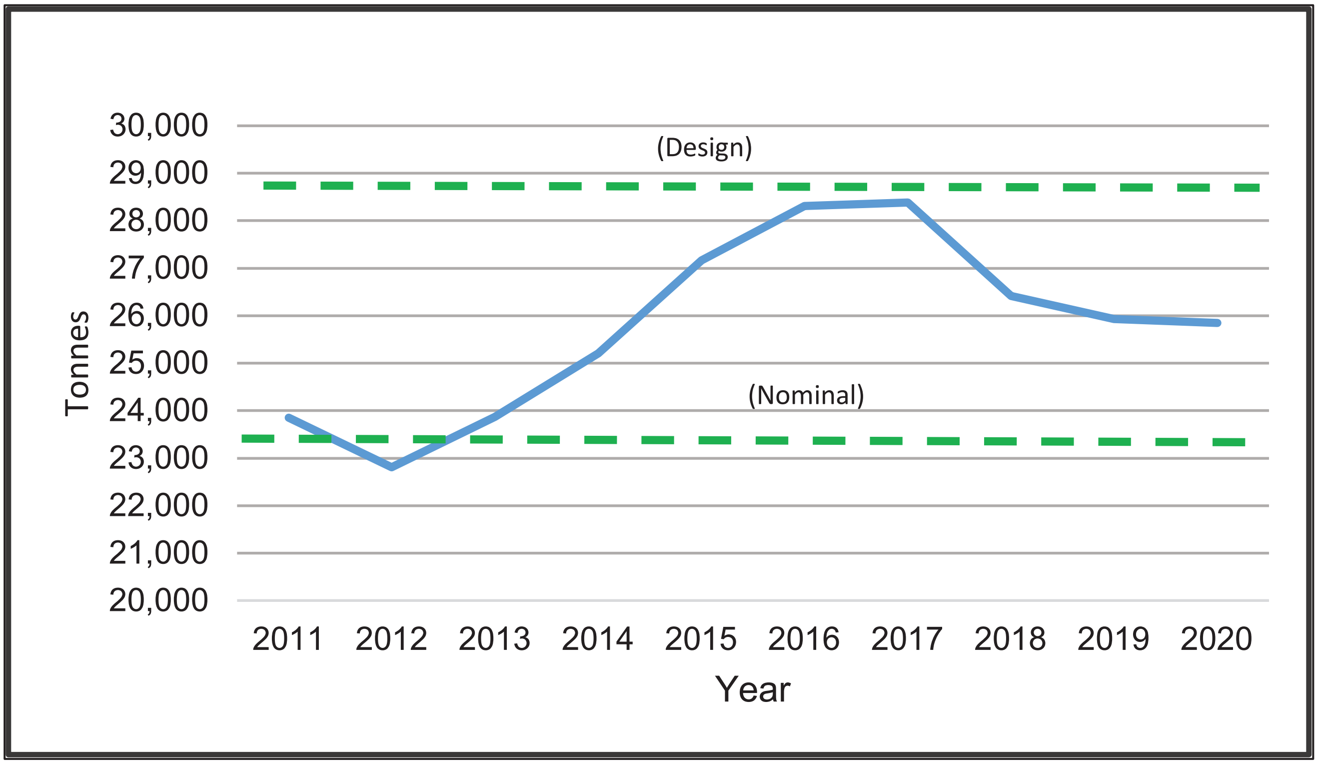


Table 14.9, as included in Section 14.2.1.1, shows that the production of cathode in the first quarter of 2021 was in line with the historical production.

14.3 Personnel Requirements

La Caridad employs 1,104 people, including 787 union labor. The nearby town of Nacozari has an approximate population of 12,000 and is 22 km from the company mine site. The town of Nacozari has a long tradition of mining and provides a large part of the personnel. The requirement of technical and labor personnel is the normal turnover for this size of operation. La Caridad operates with an outsourcing company that provides most of the labor requirements. La Caridad has a Human Resources department, that recruits throughout Mexico and includes a training department to compensate the turnover of people and the need for constant improvement of labor skills.

15.0 INFRASTRUCTURE

15.1 General

This section contains forward-looking information related to locations and designs of facilities comprising infrastructure for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including Project development plan and schedule, available routes and facilities sites with the characteristics described, facilities design criteria, access and approvals timing.

The La Caridad complex includes the open-pit mine, concentrator, smelter, copper refinery, precious metals refinery, rod plant, SX-EW plant, lime plant and two sulfuric acid plants.

La Caridad mine and mill are located about 23 km southeast of the town of Nacozari in northeastern Sonora at an altitude of 2,000 meters above sea level. Nacozari is about 264 kilometers northeast of the Sonora state capital of Hermosillo and 121 kilometers south of the U.S.-Mexico border. Nacozari is connected by paved highway with Hermosillo and Agua Prieta and by rail with the international port of Guaymas, and the Mexican and United States rail systems. An airstrip with a reported runway length of 2,500 m is located 36 kilometers north of Nacozari, less than one kilometer away from the La Caridad copper smelter and refinery. The smelter and the sulfuric acid plants, as well as the refineries and rod plant, are located approximately 24 kilometers from the mine. Access is by paved highway and by railroad.

Figure 15.1 shows a general footprint of the mine and shows key facilities such as the concentrator, SX-EW plant, waste storage facilities, leach pads and ponds, central workshops and warehouse as well as the administrative office area. Additional details regarding the waste dumps, leach pads, concentrator and SX-EW plant can be found in Section 13 and Section 14. The primary Tailings Storage Facility No. 7 is described in detail later in this Section.

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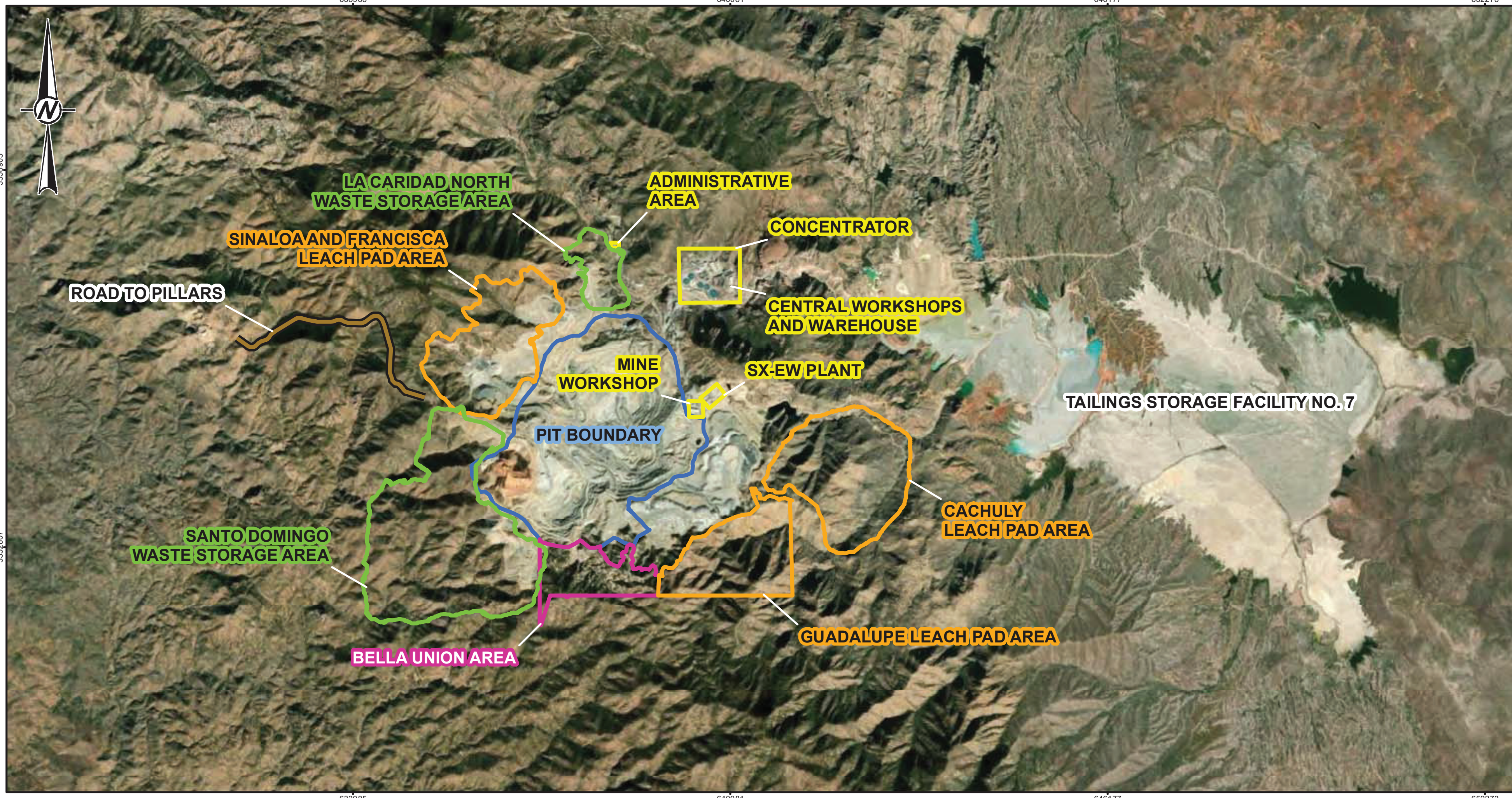


633985 640081 646177 652273

LEGEND

- PIT BOUNDARY
- MINE FACILITIES
- LEACH PADS
- WASTE STORAGE AREAS
- BELLA UNION AREA
- ROAD TO PILLARS

0 2.5 5
Kilometers
1:95,000

NOTE(S)

1. COORDINATE SYSTEM: COORDINATE SYSTEM: WGS 1984 UTM ZONE 12N
PROJECTION: TRANSVERSE MERCATOR
DATUM: WGS 1984

REFERENCE(S)

1. AERIAL IMAGERY. ESRI PROVIDED BASEMAP SERVICE. VIVID. MAXAR. IMAGERY COLLECTED 12/04/2017.

CLIENT
GRUPO MEXICO

PROJECT
LA CARIDAD MINE

CONSULTANT

GOLDER
MEMBER OF WSP

YYYY-MM-DD	2022-02-22
DESIGNED	JAM
PREPARED	JAM
REVIEWED	SP
APPROVED	MO

TITLE
LA CARIDAD GENERAL FACILITIES LAYOUT

PROJECT NO.
GL20442424

FIGURE
15.1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET HAS BEEN MODIFIED FROM: ANSI A
0 1 in

15.2 Fuel

The La Caridad complex imports natural gas from the United States through its pipeline (between Douglas, Arizona and Nacozari, Sonora). Use of natural gas helps reduce operating costs. Several contracts are in place with Petroleos Mexicanos ("PEMEX"), the state producer, and the United States and provides options for natural gas purchases.

Natural gas is the primary fuel source for all the metallurgical processes and electric generators while diesel fuel is a backup method. Diesel fuel is the primarily used to power mining equipment.

15.3 Electrical Power

The electrical power is supplied to site from the utility grid via 230 kV overhead transmission lines. A minor portion of the site demand is supplied by CFE, the state's electrical power producer. The bulk of the demand is supplied by Mexico Generadora de Energia S. de R. L. (MGE), a subsidiary of Grupo Mexico. MGE owns and operates three gas-fired combined-cycle generation plants with a total combined capacity of about 500 megawatts (MW), primarily supplying power to Southern Copper's La Caridad and Buenavista operations.

Power is fed at the 230 kV tension to primary substations and stepped down to 34.5 kV for distribution secondary substations. The main La Caridad Substation has three bays of transformers (50/66/83 megavolt-ampere [MVA]) two of them operating and one stand-by. The installed and contracted capacity is to supply 100 MW. Power is distributed through 14 branch circuits in 34.5 KV corresponding to the Mine, Concentrators, SX-EW Plant, Molybdenum Plant and the various grinding and pumping circuits.

15.4 Water

The primary fresh water source is the La Angostura Dam located approximately 29 km to the northeast of the La Caridad Mine. Fresh water is pumped using a 24.3-km long pipeline utilizing three pumping stations with some storage in the Los Alisos Dam. Average annual freshwater consumption has been about 20 Mm^3 for the past five years.

15.5 Ancillary Facilities

The site is equipped with all necessary facilities required to sustain its operation. This includes buildings for office space, laboratories, training rooms, canteens, security, and first aid shops for truck wash, lube and repair and workshops for general maintenance, and warehouses for storage of products, consumables, and spare parts.

15.6 Tailings Storage Facility

Mexico is divided into four seismic zones to include A, B, C, and D, where Zone A indicates low seismic activity. Zones B and C indicates intermediate seismic activity, and Zone D indicates high seismic activity. The La Caridad site is in an intermediate seismic region of Mexico (Zone C). The Peak Ground Acceleration (PGA) at bedrock associated with 2,475-year return period was reported to be 0.40 gravity acceleration (g), and PGA for 10,000-year return period was reported to be 0.83 g (Prodisis, 2015).

According to the Mexican Guideline "Manual de Diseno de Obras Civiles" (CFE, 2015), the TSF No. 7 in use for the La Caridad operation is classified as Type A1 based on risk consequence classification. For an equivalent risk consequence classification, the Canadian Dam Association guideline (CDA, 2014), recommends a design earthquake between 2,475-year and 10,000-year, or maximum credible earthquake (MCE).

TSF No. 7 was designed in 1980 by a local Mexican entity (no name was provided) and construction started in 1981. The detailed engineering design for the dam raise from crest elevation 885 m to 905 m was developed by CIEPS (a Mexican entity) in 2017 (CIEPS, 2018). A general description of TSF No. 7 is provided below, and it is based on the documents reviewed and site visit performed by Golder personnel.

15.6.1 Description of TSF No. 7

The TSF No. 7 embankment was constructed using the downstream construction method, using a zoned embankment type. The embankment was built in three (3) construction stages using pervious and impervious fill materials. For Stage 1 construction, the core (impervious material) was placed approximately at the center and is flanked by zoned shells (pervious materials). The core is supported and protected by the shells.

An inclination of the core located in the upstream portion of the embankment was constructed during Stages 2 and 3. Fill materials upstream to downstream include rockfill, core, filter, transition, and rockfill. The embankment is considered impervious since the core provides low permeability that reduces the seepage. A plan view and a typical cross-section are shown in Figure 15.2 and Figure 15.3, and crest details are shown in Figure 15.4.

The current configuration of the embankment Stage 3 was built to crest elevation 905 masl. The embankment was constructed to crest elevations 871 m and 885 m in previous Stages 1 and 2, respectively. The total current embankment height is 189 m measured from the crest elevation Stage 3 (El. 905 m) to the approved foundation elevation at the toe (El. 716 m). The total crest width is 30 m, and upstream and downstream slopes are 1.6H:1V and 2H:1V, respectively. The embankment alignment length is approximately 630 m.

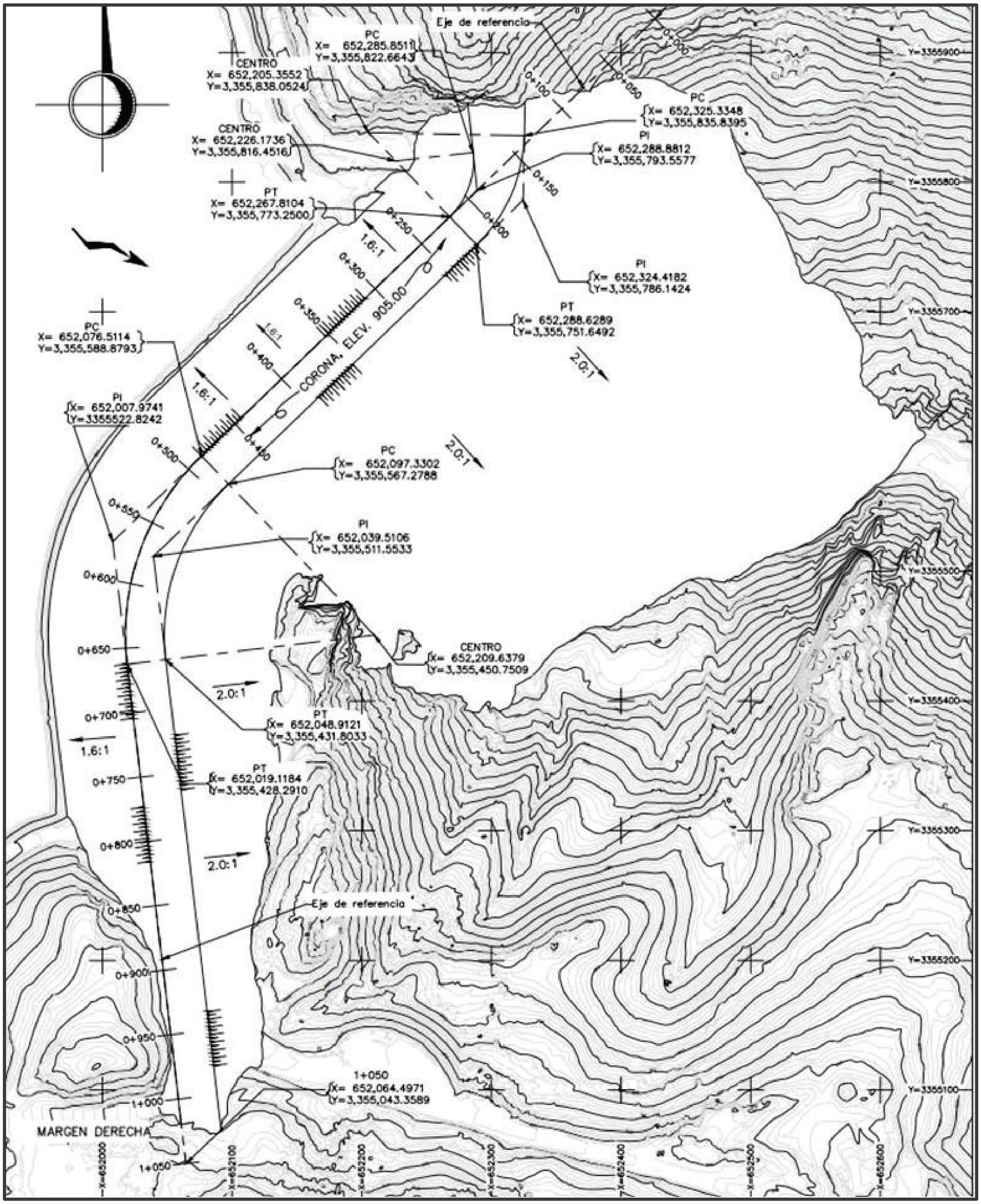
The TSF was designed and constructed without an impoundment liner system (i.e., geomembrane placed on a low permeability fill material or other impermeabilization systems).

Currently, thickened slurry tailings (tailings with 50% solid content by weight (Grupo Mexico, 2021)) are being discharged from the Process Plant by gravity directly into the existing natural valley without a pipeline or a tailings channel for tailings transport. The discharge takes the slurry tailings approximately 4 km to 5 km until the valley meets the impoundment from the east side. The impoundment is filled upstream, resulting in water impounded directly against the dam and within the periphery of drainages.

A runoff water dam (non-contact water) was constructed at the north side of the TSF. There are no water dams or diversion channels to the south side of the TSF, thus allowing the runoff to enter into the impoundment.

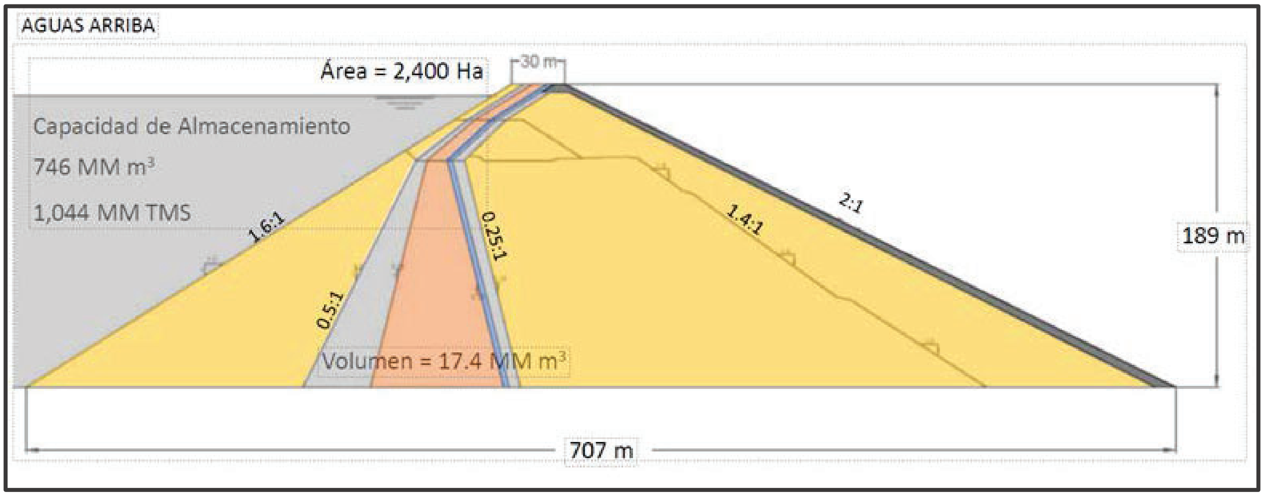
Currently, a spillway was constructed at the left (north) abutment of the TSF and designed to pass a 10,000-year design storm (Buro Hidrológico, 2015). However, there was no available TSF water balance or survey information provided to verify the freeboard during the life of the TSF.

Figure 15.2: TSF No. 7 Plan View



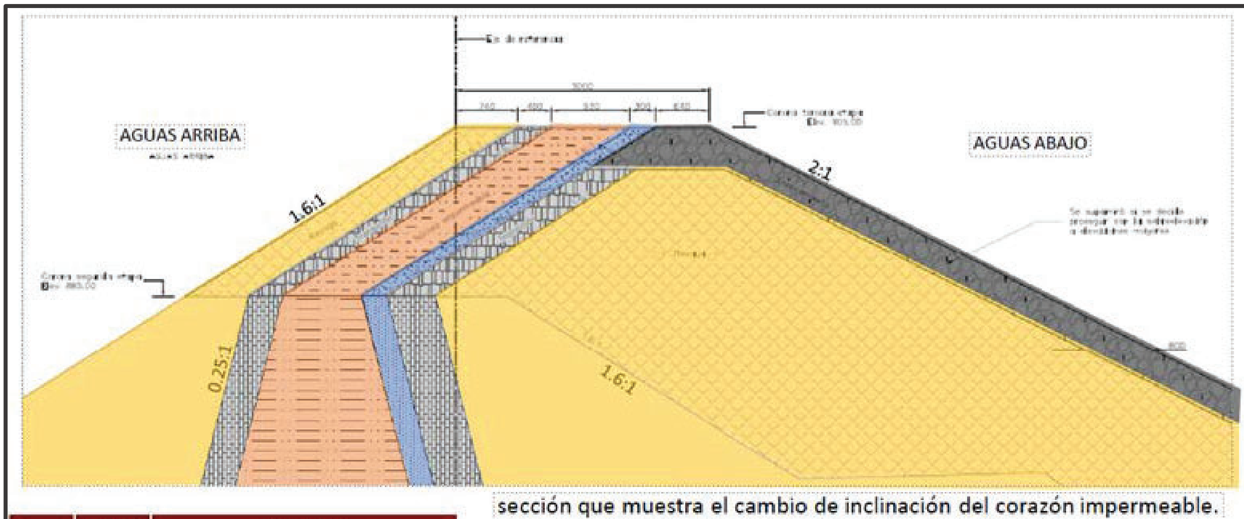
Source: Arriaga A., 2019.

Figure 15.3: Typical La Caridad TSF No. 7 Embankment Cross Section



Source: Arriaga A., 2019.

Figure 15.4: La Caridad TSF No. 7 Embankment Crest Details



	Tipo	Material
	1	Núcelo impermeable
	2	Filtro
	3	Transición
	4	Rezaga
	5	Enrocamiento

Source: Arriaga A., 2019

15.6.2 Operational Data and TSF Capacity

Selected key mine operational data include:

- Process Plant:
  - Annual mill throughput: 34.5 Mt (Minera Caridad, 2021)
  - Tailings generation:
    - Percent tailings to surface disposal: 100% (Minera Caridad, 2021)
    - Tailings daily production (tonnes/day): 90,000 (Grupo Mexico, 2021a)
    - Tailings annual production: 32.4 Mt (assuming 360 days of the Process Plant operation)
    - Tailings average dry density (tonnes per cubic meter [t/m^3]): 1.4 t/m^3 (assumed, similar to BVC mine)
    - Tailings annual production (million cubic meters [Mm^3]): 23.142
- The TSF No. 7 remaining capacity at embankment crest elevation 905 m:
  - TSF capacity: 1,106 Mm^3 (Grupo Mexico, 2021a)
  - Total tailings disposed to date (September 2021): 885.3 Mm^3 (Grupo Mexico, 2022)
  - Remaining TSF capacity: 224.7 Mm^3
  - Remaining TSF No. 7 life 224.7/23.1= 9.72 years (Golder estimate), approximately till 2035
  - Remaining TSF No. 7 life: 2036 (Grupo Mexico, 2021a)
- Grupo Mexico plans to raise the embankment from crest elevation 905 m to 921 m with a total tailings storage capacity of 1,650 Mm^3 (GERD, 2021). This embankment raise could increase the capacity for approximately an additional 24 years ((1,650-1,106)/23.1).

The operational data collected from different sources is currently insufficient to verify the remaining capacity of TSF No. 7. Applying an independent estimate to contours provided by SCC in December 2021, Golder has estimated a life of about 11.1 years based on the capacity and a tailings density of 1.42 $t./m^3$

The TSF No 7 capacity was provided by SCC considering a flat tailings disposal. Any future update for the TSF No. 7 capacity, key items to consider include:

- TSF tailings consolidation model and tailings deposition plan considering in-place tailings slope.
- Update the tailings production over the mine life.
- Updated TSF water balance results.

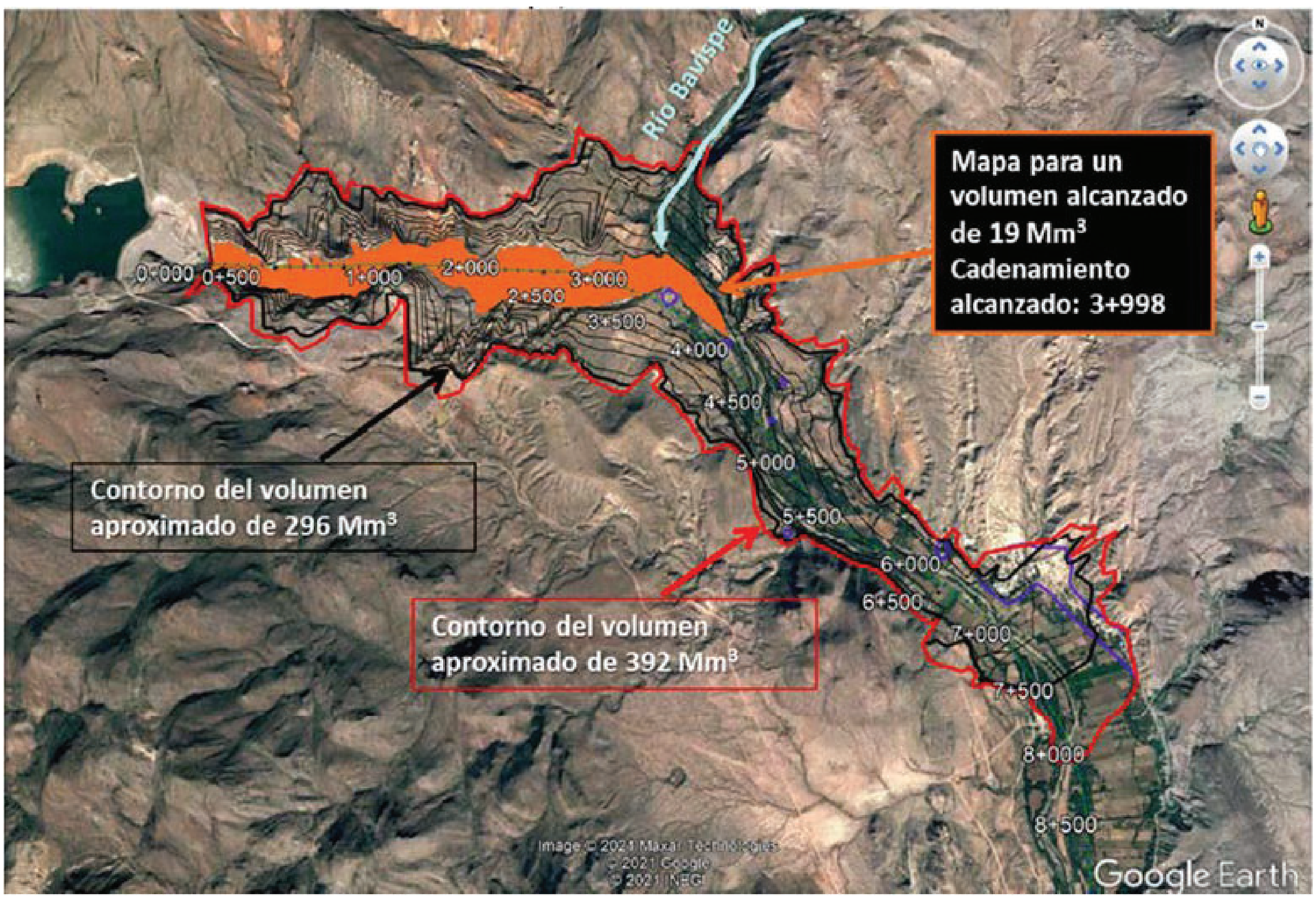
15.6.3 TSF No. 7 Consequence Classification

Grupo Mexico requested that GERD (Servicios y Soluciones de Ingenieria y Logistica) carry out a preliminary (screening level) dam break analysis (DBA) for the TSF No. 7 (GERD, 2021). The DBA was performed considering a fourth embankment raise with a crest elevation at 921 m and total tailings storage of 1,650 Mm^3. GERD considered a simplified methodology for the dam breach analysis (Lucia et al. 1981), defining the inundation maps using a constant runout tailings gradient (1.5 %) and 20% of the total tailings to be discharged. For the ultimate embankment configuration, the total volume of the tailings runout is 330 Mm^3, extending approximately 7.7 km downstream from the TSF No. 7. Figure 15.5 shows the tailings runout inundation extents.

The Bavispe River is located 3.4 km downstream from TSF No. 7, the San Juan del Rio town is approximately 6 km downstream from TSF No. 7 and agriculture areas are extended along the Bavispe River. The tailings discharge could impact the Bavispe River, small ranches along the river, and the San Juan del Rio town with an estimated loss of human lives greater than ten but lower than 100 people. Based on the CDA (2014) dam consequence criteria, GERD classified TSF No. 7 as Very High risk.

The dam break analysis carried out by GERD appears to be non-conservative. If the dam fails, it will release the impounded water, which is impounded against the upstream face. The tailings impounded upstream of the dam have been segregated and are composed of fine tailing due to the current tailings disposal strategy; the coarse tailing is impounded well upstream. Rapid drawdown and seepage forces will result in large strain deformation, and the fine tailings will likely go to a residual undrained strength. As a result, the actual tailings runout distance may be more extensive than predicted by the GERD, and the runout tailings slope could be flatter than the 1.5% assumed by GERD.

Figure 15.5: TSF No. 7 Inundation Tailing Runout Map



Source: Dam breach analyses (GERD, 2021)

15.6.4 TSF No. 7 Key Components

TSF No. 7 should comply with the Mexican tailings management standard (Norma Oficial Mexicana NOM-141-SEMARNAT- 2003). Grupo Mexico mentioned its intention to meet the international guidelines on tailings management (CDA, 2014; MAC, 2021; GISTM, 2020); however, specifically for the GISTM, there is currently no commitment to implement it. Grupo Mexico's corporate standards on tailings management were not provided.

15.6.4.1 TSF Embankment

The embankment design concept (i.e., impervious embankment) in general appears to be aligned to TSF standards (Norma Mexicana NOM-141-SEMARNAT-2003; CDA, 2014; GISTM, 2020). Guidelines require minimizing seepage from the tailings facilities, such as the use of liners, water-retaining dams, or underdrains during the operations and closure phases to minimize the tailings water seepage downstream of the facility and potential impacts to groundwater.

The embankment design included an impermeable core (see Figure 15.3 and Figure 15.4) keyed into the bedrock foundation.

The embankment foundation is bedrock comprising a sequence of andesites and andesites tuff. Outcrops were observed during the Golder site visit, along the abutments, and downstream of the facility. Andesite tuff material (a welded pyroclastic flow material) should be verified as a boundary condition and will not become progressively weaker with exposure to saturation.

Bedrock permeabilities range from 2x10-3 cm/s to 1x10-6 cm/s in the upper 30 m at right and left abutments. Most of the permeability data are between 10-3 to 10-4 cm/s, indicating a relatively permeable rock at the abutments (Geovisa, 2016; GeoMecanica, 2016). There were no bedrock permeability data for the Stage 1 embankment foundation (at the bottom of the valley). Relatively high permeability in the upper 30 m of the bedrock could be a concern for seepage and water quality downstream of the facility.

A filter was placed to protect the core zone and comprises sand and gravel with a maximum fines content of 5% and maximum particle size of 3 inches (CIEPS, 2017). No filter compatibility calculations were provided for the core zone and filter zone interface or the filter and shell interface.

In the current TSF operations, the tailings pond is deposited on the east side of the impoundment. The reclaim pond is located permanently against the upstream slope of the embankment. This condition increases the potential risk and creates three failure modes for consideration namely, slope stability, internal erosion, and overtopping.

Borrow materials were obtained by nearby areas (core and drained fills) away from the mine mineralized zone. There is no visual evidence of oxidation or potential acid generation. However, no laboratory testing for environmental impacts has been conducted.

No piezometers were installed within the embankment (Grupo Mexico, 2021b); only monument surveys were installed for displacement monitoring. One monitoring well was observed approximately 100 m downstream from the embankment toe. A shallow phreatic surface (~ 2 m) was indicated by La Caridad personnel..

No evidence of seepage at the embankment toe was observed during the site visit. The bottom of the valley immediately at the toe embankment was covered with granular material that might be covering any potential seepage. However, near the existing well (100 m downstream), water accumulation was observed that could be related to embankment/foundation seepage or rainfall accumulation (see Photo 4, Appendix B).

Static and dynamic Flac 3D stability analyses were performed for the TSF No. 7 embankment at crest El 905 m (UNAM, 2018). The conclusions of this study include; 1), The level of stress and deformation under the MCE design earthquake is acceptable and; 2), Core fill could present cracks. However, the physical stability is not compromised, but the impermeability of the core could be compromised. It is important to note that developing a slope stability model fundamentally depends on establishing the internal stress conditions within the embankment. The lack of instrumentation prevents establishing pore pressure and stress conditions within the embankment, preventing calibration, and potentially invalidating the model results.

15.6.4.2 Tailings Transport, Tailings Disposal, and Water Reclaim System

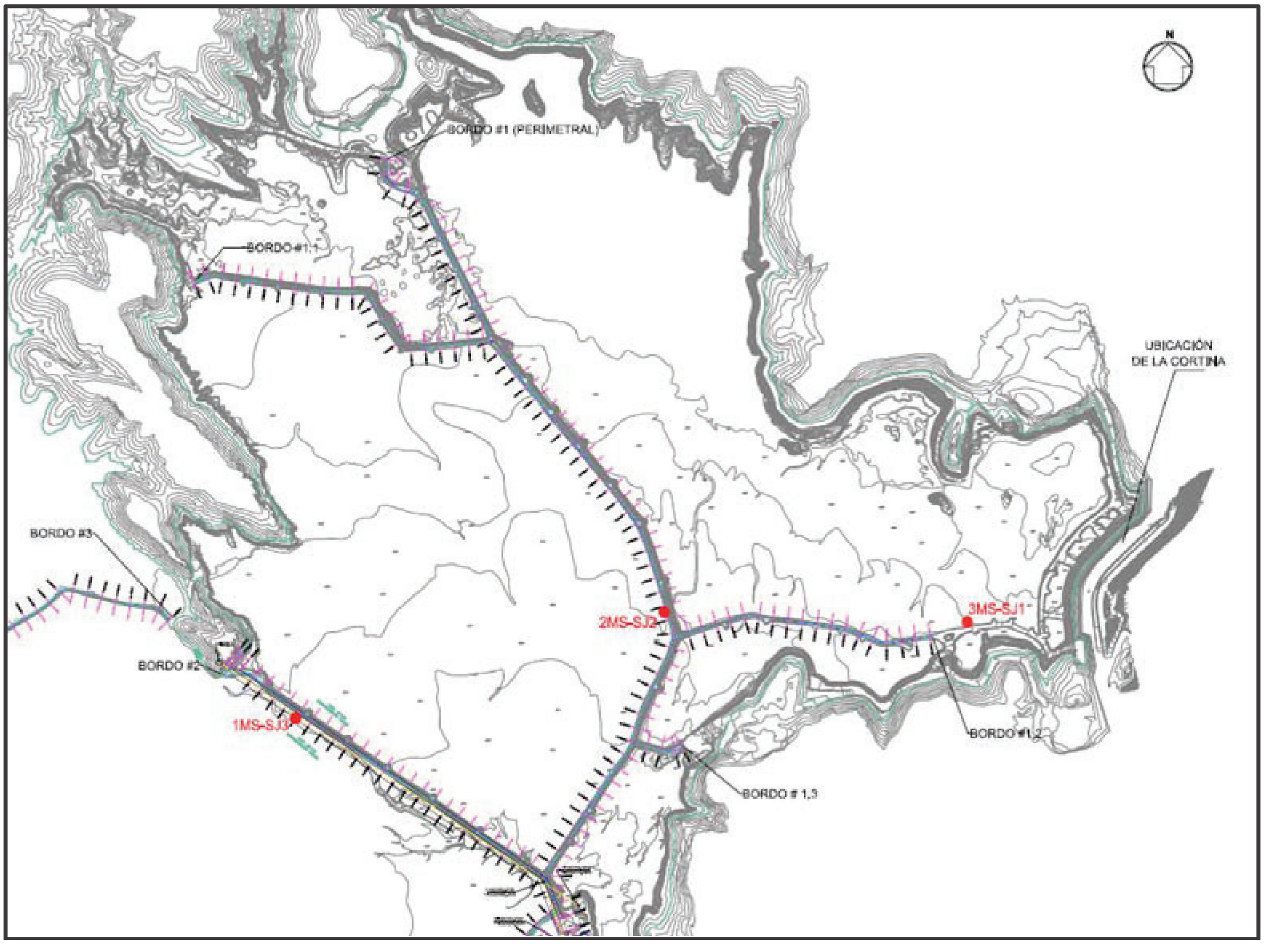
Slurry tailings are being discharged from the process plant by gravity directly into the existing natural stream. Slurry tailings are diluted with existing streamflow and go along the narrow valley for approximately 4 to 5 km until discharged into the impoundment from the west side.. This deposition method results in the preferential classification of the tailing, with the coarse tailing being deposited upstream and the finer tailing being pounded near the containing embankment..

The tailings impoundment is relatively large, approximately 10 km long from west to east direction. As indicated above, the tailings slurry enters the impoundment from the west side as a single point of tailings. The slurry travels the entire 10 km length, pushing the main pond to the east side against the upstream slope of the embankment to the northeast. Other areas of water accumulation were observed due to the single point tailings discharge and topography configuration (see Figure 15.5).

The overall tailing beach slope is 0.3 % (Minera Caridad, 2021), indicating relatively fine-grained tailings. No tailings index test results were available.

La Caridad implemented the construction of internal dikes (8 m to 12 m high), constructed with borrow material on top of existing tailings, to form cells (approximately 4 to 5 cells in the entire impoundment) (see Figure 15.6). The purpose of the cells is to direct the tailings water into the specific points on the northern and eastern sides of the impoundment, where a battery of pumps is installed as part of the current water reclaim system. The pumping system is implemented on the northern side of the TSF. It includes three stations (stations 5, 6, and 7) with an average total pumping rate of 70,000 m^3/day conveying reclaimed water to the process plant, via an HDPE 36-inch pipeline.

Figure 15.6: Internal Dikes Constructed with Borrow Material



Source: (Geovisa, 2016)

A significant portion of the tailings water is lost mainly to evaporation and infiltration within the existing tailings (recharge), during the long travel route (approximately 15 km) through the cells, and exposure in several ponds along the impoundment.

The main tailings pond located against the embankment could risk embankment instability. State-of practice on tailings management includes the tailings discharge from the crest to develop a tailings beach again the upstream slope and keep the pond away from the embankment.

15.6.4.3 Water Management

The water management process is described below:

- Runoff water diversion (non-contact water) around the TSF is not maximized. Small dams capture only a portion of the runoff, and most of the runoff goes into the tailings impoundment.
  - Small water retention dams constructed along the north side of the TSF partially collect the runoff, which is pumped to the process plant
  - There are no diversion channels at the north and south sides of the TSF

- Runoff contact water from the mining area (from the catchment area located upstream of the TSF) appears to go directly into the impoundment
- Storm flow volume management
  - The spillway was constructed at the right abutment
  - The TSF has a relatively large catchment area that could generate a large storm flow volume
  - No updated hydrology and hydraulic calculations were available to verify the spillway hydraulic capacity to maintain the minimum freeboard under the design storm. Buro Hidrologico (2015) performed the hydraulic calculation to discharge the design storm (10,000-year return period) and the spillway design. Buro Hidrologico (2017) verified that the freeboard was sufficient in 2017 to manage the volume of the maximum annual precipitation (17Mm^3) when the embankment crest was at 885 m and tailings surface was at El. 875 m. There were no spillway design drawings nor as-built spillway documentation available to verify the design storm volume management and spillway hydraulic capacity
- TSF water balance
  - No TSF water balance calculation was available to verify the minimum freeboard required (Grupo Mexico, 2021b)
  - There is a potential for embankment failure by overtopping. No TSF water balance calculation was available to verify the minimum freeboard

15.6.4.4 Geochemical Stability

Comments on the tailings geochemical characterization and long-term geochemical stability are discussed in Section 17.0 of this TRS. Based on Golder's preliminary findings of the very limited geochemical testing, the tailings exhibit the potential to generate acid. The tailings mobility test results did not have any results that exceeded Mexican NOM-157 permissible limits. Only static testing has been conducted on a sample that may not be representative of the current and/or future tailings, and the long-term water quality has not been assessed via kinetic testing.

Tailings oxidation was observed during the Golder personnel site visit. Based on Golder's review and observations, seepage from the TSF (potentially containing leached metals related to tailings) through the relatively permeable bedrock foundation could be a concern for downstream surface water and groundwater quality.

15.6.5 Identification of the Embankment Potential Failure Modes and Other Concerns

Golder performed a preliminary identification of Potential Failure Mode (PFM) candidates for the TSF No. 7 at the La Caridad mine. This work only identifies the possible causes. The consequences identification, risk estimation (probability of occurrence or likelihood), and severity of consequences are not included. The identified PFMs are discussed below. This list of PFMs is preliminary, based on Golder's current knowledge and information reviewed.

- Embankment overtopping: No TSF water balance and updated hydrology and hydraulic calculation were available to verify freeboard and spillway hydraulic capacity.
- Internal erosion: Pond permanently located against the embankment and no filter compatibility analysis between the core fill and filter fill were available.

- Potential slip surfaces within the foundation and the embankment: Grupo Mexico should demonstrate that they have a suitable foundation (verify that tuff materials will not became progressively weaker with exposure to saturation), pore pressure conditions within the embankment are low (install geotechnical instrumentation to monitor pore pressure and stresses), and embankment materials to have high shear strength properties (by field and laboratory testing program and interpretation).

Seepage from the TSF (potentially containing metals leached from the tailings) through the relatively permeable bedrock foundation could be a concern to downstream surface water and groundwater quality.

15.6.6 Recommendations

General recommendations include:

- Implement the governance of tailings management for all Grupo Mexico TSFs. Governance of tailings management comprises organizational structures, processes, procedures, and communication channels established to maximize effective management, oversight, and accountability for tailings.
- Prepare and regularly update an emergency action plan (EAP) that meets the current standard of care and practice.
- Prepare an update the triggering action response plan(s) (TARPs), which apply Key Performance Indicators (KPIs) that are quantifiable, measurable, and actionable.
- Plan to commit to implementing the GISTM requirements to achieve the goal of "zero harm to people and the environment."
- Establish an engineer of record (EOR), including clearly defining responsibility and succession planning.
- Establish a responsible tailings facility engineer (RTFE), including clearly defining responsibility and succession planning.
- Perform a Dam Safety Review (DSR). Golder has identified potential credible failure modes and does not have sufficient information to confirm or refute these potential failure modes. A detailed and robust investigation is warranted and should be completed by a qualified and experienced professional engineer and organization that is suitably experienced in tailings storage facilities' design, operation, and closure.
- Identify and implement an Independent Tailings Review Board (ITRB) or an individual reviewer to assess the different aspects of the TSF safety: governance, design, construction, operation, closure, and post-closure.

Site specific recommendations are as follows:

- Develop a comprehensive tailing management plan for the life of mine
- Update the dam break analyses, considering the ponded water and associated fine tailing release
- Prepare an updated seismic hazard study with a site-specific PSHA and DSHA. Current MCE seismic parameters appear to be low compared with regional probabilistic seismic hazard analyses.
- Update the TSF No. 7 embankment slope stability analyses using the updated seismic hazard study parameters and updated materials properties. Stability numerical models should include the model calibration based on field geotechnical instrumentation data, laboratory tests results and available technical literature parameters for specific materials.

- Install proper geotechnical instrumentation within the embankment and abutments
- Verify filter compatibility between the different fill zones
- Maximize the reuse of water that has been used in the process and reduce the loss of water during the transport and disposal of tailings into the impoundment (i.e., via evaporation and infiltration).
- Freshwater has limited availability for mining use. Its availability could be related to the climate conditions in the area (high evaporation and low precipitation concentrated in a few rainfall events) and the hydrogeological site conditions. Freshwater is also relatively expensive (~1 US$/$m^3$, as indicated by Grupo Mexico personnel). Some recommendations to optimize the tailings water recovery are indicated below:
  - Golder recommends performing a trade-off study to compare tailings dewatering technology options, including thickened, paste, and filtered tailings. Filtered tailings appear to be an attractive option due to the site conditions.
  - Minimize the construction of internal dikes to manage the tailings beaches development. Instead, replace the current tailings transport system (where tailings have been discharged by gravity directly into the existing natural valley and travel approximately 4 km to 5 km until discharged into the impoundment) using pipelines for tailings transport with several points of tailings discharge (i.e., spigots). Tailings transport by pipelines and tailings disposal by spigots will better control the tailings beaches development and pond location (away from the embankment) and reduce the loss of tailings water by evaporation and infiltration. Should the fresh tailings be an environmental concern due to acid generation or metals leaching, then controlled transport in pipelines will also reduce contact between the process plant and the final disposition area.
- Implement the concept of separation of contact water (water impacted by the mining operation) and non-contact water (runoff/freshwater) and minimize the entering of non-contact water into the tailings impoundment.
  - Build additional small water retention dikes at the north side of the impoundment to capture non-contact runoff. Upgrade current pumping water reclaim system located on the north side.
  - Build diversion channels at the south side of the TSF where there appears to be a significant runoff contribution of non-contact water.
- Develop a detailed TSF water balance (no TSF water balance was available for review). Flow inputs and outputs should be carefully identified, quantified, and supported by specific studies (i.e., hydrogeology, seepage). The detailed TSF water balance should be part of a site-wide detailed water balance.
- Conduct a detailed geochemistry study that assesses long-term environmental impacts based on static and kinetic testing of the embankment and current/future tailings materials, and possibly geochemical modeling, depending on the testing results.

15.6.7 QP Opinion

The embankment design concept (i.e., impervious embankment) and materials used for the embankment construction (core zone keyed into the bedrock, filter zone, transition fill, and rockfill) in general appears to be aligned to TSF standards (Norma Mexicana NOM-141-SEMARNAT-2003; CDA, 2014; GISTM, 2020). However, based on Golder's current knowledge and information reviewed, Golder has identified potential embankment credible failure modes (overtopping, internal erosion, potential slip surfaces within the foundation and embankment) and does not have sufficient information to confirm or refute these potential failure modes. Therefore, a detailed DSR is warranted and should be completed by a qualified and experienced professional engineer and organization that is suitably experienced in tailings storage facilities' design, operation, and closure.

Many other recommendations were made and described in Sections 15.6.6 and 15.6.7 key being:

- Grupo Mexico to commit to implementing the GISTM requirements to achieve the goal of "zero harm to people and the environment." One of the critical principles from GISTM and other international guidelines is the tailings management and governance that Grupo Mexico would plan to implement for all Grupo Mexico TSFs. Governance of tailings management comprises organizational structures, processes, procedures, and communication channels established to maximize effective management, oversight, and accountability for tailings.

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16.0 MARKET STUDIES

This section contains forward-looking information related to commodity demand and prices for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this section including prevailing economic conditions, commodity demand and prices are as forecasted over the LOM period.

16.1 Copper Market Outlook

Copper Outlook Reports published by Wood Mackenzie are the source of the copper market information provided in this section.

Copper concentrate stocks-balances will rise steadily as the rate of smelter capacity additions begins to slow. Future Copper Concentrate TC/RCs are also expected to steadily rise.

In the meantime, there will be a steady increase in smelter utilization to a level of 88%. Given that smelting capacity is enough to satisfy market requirements long term, the level required to incentivize new smelter construction is not necessarily a reliable guide to long-term TC/RCs.

16.1.1 Copper Market Studies

In a long-term analysis, it was assumed that low-acid prices mean that smelters will continue to receive less significant sulfur byproduct credits in the future, than they have in the past. So, TC/RCs will continue to have to make up a larger share of their revenue stream. Furthermore, the Copper Outlook Reports maintain that it is in the interests of mining companies involved in the annual benchmark negotiations to keep TC/RCs at a level at which smelters outside China can stay in business, so that they do not become too dependent on that single market as a customer for their concentrate production. Not only do smelters have to “survive,” they also need to invest in maintenance, new technology, or even relocation to areas of new demand that requires a sufficient TC/RC to achieve an acceptable return on capital.

The Copper Outlook Reports consider concentrate availability relative to that required for smelter production in the “custom traded” sector only.

Over the last 10 to 15 years, the deficit of copper in concentrate relative to 88% of primary smelting capacity has been greater in the custom traded market than the global average. This reflects the slow pace of construction of new mining production capability at a time when several new smelters intended to treat imported custom concentrate were being built in China. This differential narrowed to some extent in 2015 and 2016, as new mine capacity became available.

In 2019, there was a small shift to slightly greater availability in the custom market due to smelter disruption. Overall, concentrate availability is still forecast to remain at all-time lows both on a global basis and in the custom traded market, as shown on Figure 16.1.

Figure 16.1: Copper Concentrate Market Balance versus TC/RCs

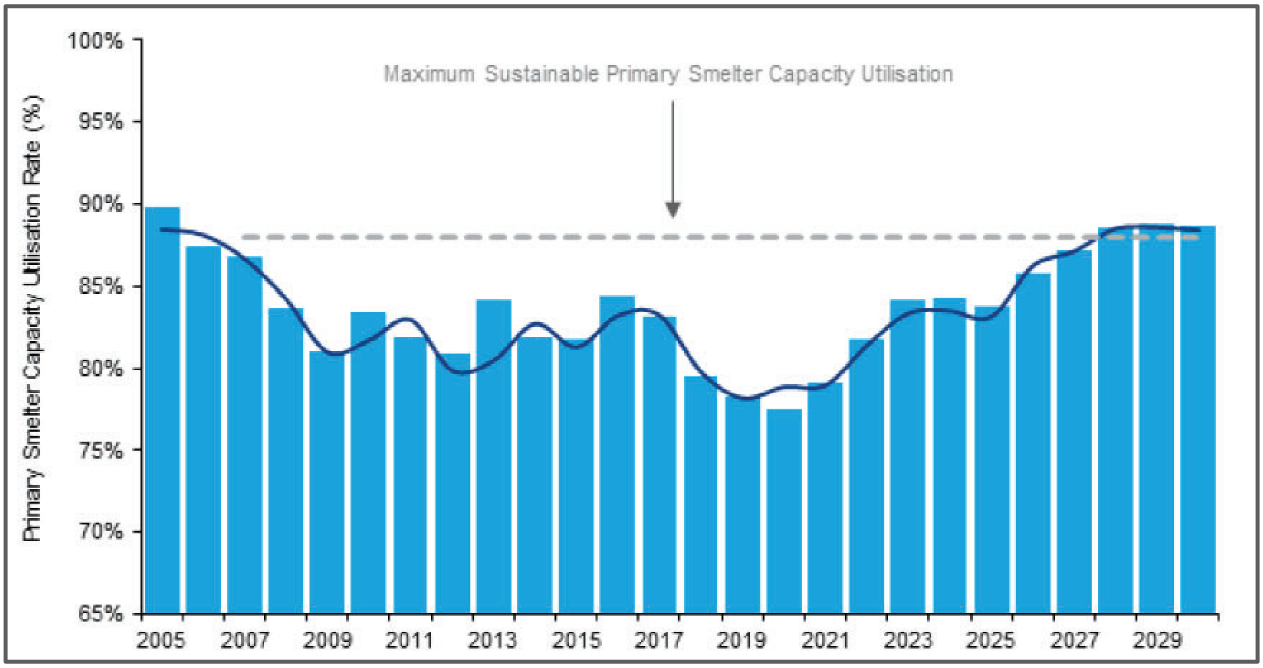
Source: Wood and Mackenzie.

16.1.2 Supply and Demand Forecasts

Based on the forecast of future concentrate availability, there is sufficient global smelter capacity, both in our current base case and probable projects, to meet market requirements until 2027/2028 (see Figure 16.2). However, for various political, strategic, or environmental reasons, several projects are being proposed that could provide further concentrate availability over the long term.

In total, 22 possible projects were identified that combined would have an annual production capability of 4.83 Mtpa of copper (primary and secondary). This includes potential capacity in China (1.0 Mtpa), India (1.05 Mtpa, including the Tuticorin restart), with the remainder in DR Congo, Iran, Indonesia, Mongolia, Mexico, Peru, Russia, Saudi Arabia, and Zambia.

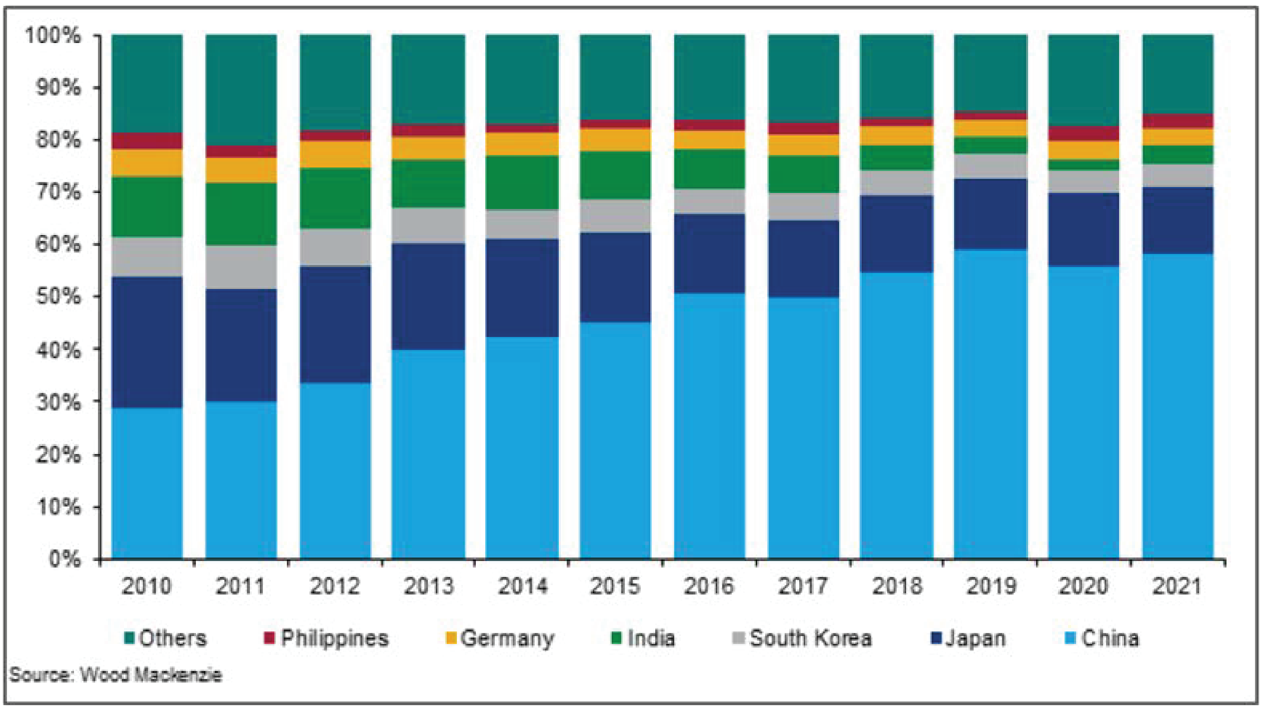
Figure 16.2: Maximum Sustainable Primary Smelter Capacity Utilization



Source: SCC

The main regions of global copper consumption are shown in Figure 16.3.

Figure 16.3: Main Regions of Copper Consumption



16.1.3 Copper Commodity Price Projections

The principal commodities that will be produced will be Cu, Ag, and Au.

Historical copper prices for 2010 through 2020 are provided in Table 16.1.

Table 16.1: Historical Copper Prices

Data Set	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
LME Cash	USD/t	$7,539	$8,811	$7,950	$7,322	$6,862	$5,498	$4,862	$6,166	$6,523	$6,000	$6,181
LME Cash	USD/lb	$3.42	$4.00	$3.61	$3.32	$3.11	$2.49	$2.21	$2.80	$2.96	$2.72	$2.80

Source: Wood and Mackenzie.

Forecast copper prices are summarized in Table 16.2.

Table 16.2: Copper Price Projections

Description	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Base Case - Global												
Copper Stock Days	69	63	66	72	79	81	75	73	71	69	67	65
Nominal $/t	$6,181	$9,338	$8,575	$7,450	$6,557	$8,449	$6,944	$7,331	$7,731	$8,145	$8,571	$8,877
Real $/t	$6,335	$9,338	$8,399	$7,154	$6,173	$5,952	$6,283	$6,504	$6,724	$6,945	$7,165	$7,275
Low Price Scenario - Global												
Copper Stock Days	69	66	69	78	85	87	81	77	74	70	68	65
Nominal $/t	$6,181	$8,818	$8,103	$7,117	$6,323	$5,972	$6,335	$6,834	$7,351	$7,886	$8,439	$8,877
Real $/t	$6,335	$8,818	$7,937	$6,834	$5,952	$5,512	$5,712	$6,063	$6,393	$6,724	$7,055	$7,275
High Price Scenario - Global												
Copper Stock Days	69	63	60	62	65	71	70	69	68	67	66	65
Nominal $/t	$6,181	$9,338	$9,904	$9,643	$9,367	$9,077	$9,015	$8,947	$8,872	$8,791	$8,835	$8,877
Real $/t	$6,335	$9,338	$9,700	$9,259	$8,818	$8,378	$8,157	79'37	$7,716	$7,496	$7,385	$7,275

Source: Wood and Mackenzie.

16.1.4 Market Contracts

AMC, a sister company of SCC under Grupo Mexico, has a corporate strategy that allows for a presence in the markets for several years due to long-term contracts with strategic business partners in the Asian and European markets, as well as annual contracts with other active market participants.

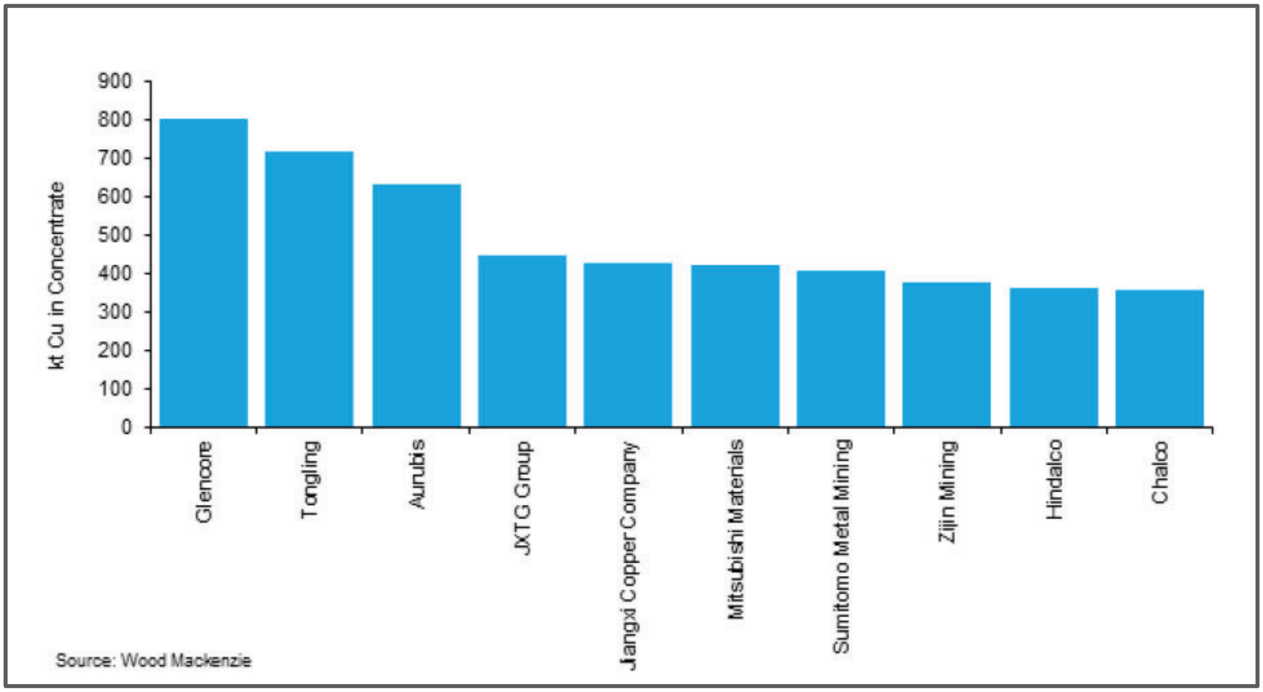
16.1.5 Product Specifications Requirements

The principal product specifications required consist in Cu concentrate free from radioactivity and deleterious impurities harmful to smelting and/or refining processes, considering the China Inspection and Quarantine Services (CIQ) limit specifications for the import of the Cu Concentrates as per follows:

Lead (Pb) ≤6.0%, Arsenic (As) ≤0.5%, Fluorine (F) ≤0.1%, Cadmium (Cd) ≤0.05%, and Mercury (Hg) ≤0.01% in contents

The principal corporate buyers for copper concentrate materials in 2021 are shown on Figure 16.4.

Figure 16.4: 2021 Principal Copper Concentrate Buyers



Depending on the main products:

- If the production were of concentrates with high or low grade of Cu, the main placement would be in the Asian or European market or right with smelters or other market participants depending on their quality.

If the main production were of copper cathodes, the placement of this material would be in the Asian, European, Brazilian and / or North American markets.

16.2 Molybdenum Market Outlook

Several factors have contributed to an apparently unstoppable rally in molybdenum prices. Demand from key stainless end uses continues to recover, especially in mature markets, due to generous economic stimulus and increased confidence as economies reopen following the relaxation of Covid-19 measures. Nevertheless, the molybdenum market has slowed after a turbulent 2021 Q2, with significant uncertainty remaining over what lies ahead. It is unsurprising that some profit taking has taken place, given the speed and extent of the recent price rise. With the seasonal summer slowdown approaching, prices may continue to edge lower while buying activity wanes further.

The upward trend of molybdenum prices has slowed, as increased buying activity boosted European and US prices in October 2021, but prices have since stabilized, while Chinese prices are dropping due to weakening demand. Western prices are expected to follow the Chinese market lower in the near term. However, the risk of significant downside is limited because of persisting supply concerns, both on a spot basis and into 2022.

It is important to note that spot supply remains very tight, particularly in Europe, leaving the market vulnerable to new supply disruptions. Chilean mine output in 2021 Q3 was at its lowest quarterly level since early 2015 (see Figure 16.5), although this was partially offset by rebounding mine supply in Peru. If South American production is similarly sluggish for the rest of the year, this could add upside pressure to prices. On the other hand, demand is continuing to strengthen in Western markets, thanks to the recovery of key stainless steel end-use sectors. It is understood that most Western mills are receiving sufficient material from their long-term agreements to meet their operational requirements. If stronger demand begins to exceed contract deliveries, this could offer further support to prices as consumers seek supplemental spot purchases.

The molybdenum market will probably remain in deficit in 2022. Further clarity is expected over the next few weeks on production guidance from key operations, but our initial analysis suggests that mine supply growth will be insufficient to track demand higher in 2022. Long-term contract agreements are currently being negotiated for next year. This portrays expectations of tightness and supply concerns continuing into next year.

It is expected that in 2022 the production of the key producers will decrease due to lower ore grades, severe weather conditions, and lack of labor. Also, there are indications that the Chinese government will keep the energy cut impositions and environmental restrictions to the producers, which will support the deficit in the market. Table 16.3 summarizes molybdenum global market production and pricing for 2020 Q3 through 2021 Q4.

Table 16.3: Molybdenum Global Market Summary

Description	Units	2020 Q3	2020 Q4	2021 Q1	2021 Q2	2021 Q3	2021 Q4	Y/Y %
Supply Demand								
Production[1]	M lb	148.3	160.1	152.1	147.1	137.1	140.7	-12
Consumption	M lb	138.2	148.5	148.1	149.5	145.2	149.3	0.5
Balance	M lb	10.0	11.6	4.0	-2.4	-8.1	-8.5	
Stocks								
Total Stocks	M lb	184.1	195.7	199.7	197.3	189.2	180.7	-7.7
Total Stocks Consumption Ratio	Months	4.0	4.0	4.0	4.0	3.9	3.6	
Prices								
Europe Oxide Delivered Consumers' Works Merchant Price	USD/lb	$7.71	$8.78	$11.02	$13.54	$20.03	$20.75	

Note:

1. Useable molybdenum units net of yield loss and disruption allowances. Includes molybdenum units recovered from reprocessing of catalysts.

Source: CRU Molybdenum Monitor, 12-3-2021.

16.2.1 Molybdenum Demand

The major areas that lead the behavior of the molybdenum demand are the fabrication of stainless steel and steel alloys for construction. As shown in Figure 16.5, the sum of these two industries represents 67% (29% stainless steel and 38% construction steel) of the total molybdenum demand globally.

It is important to spread into industry sectors that are relevant drivers for the demand, for example, Oil and Gas, Automotive, and Construction, which comprise 34% of the total demand.

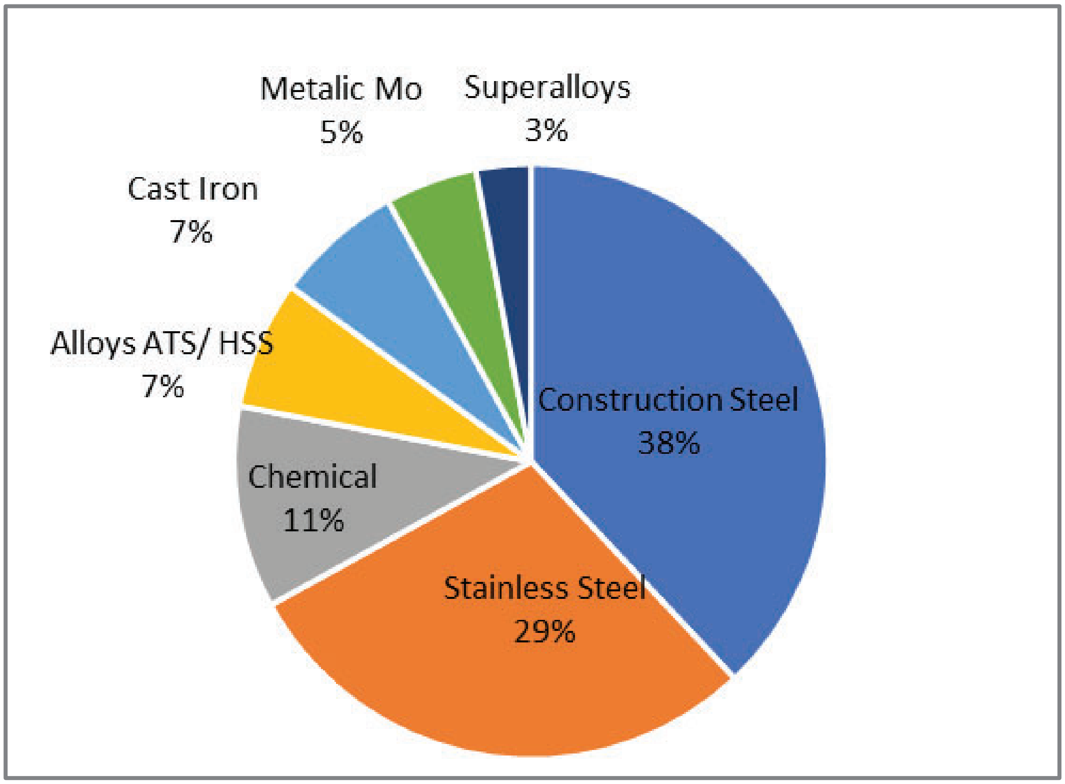
The industries shown above had been affected during 2020 due to the COVID-19 pandemic, losing in total approximately 6% of the demand year over year (y/y).

As shown on Figure 16.6, the Oil and Gas industry represents around 16% of the total global consumption, and due to the deceleration of this sector, some investments were put on hold and the demand for this class of molybdenum decreased.

There are other emergent industries that will support indirectly the molybdenum market, such as the hydrogen industry. The 316L stainless steel is one of the main steels used in the production, storage, and exploitation of hydrogen. This industry is expected to grow significantly in the near term due to the feasibility of being a decarbonization solution. The use of hydrogen is being explored as a substitute of fossil fuels.

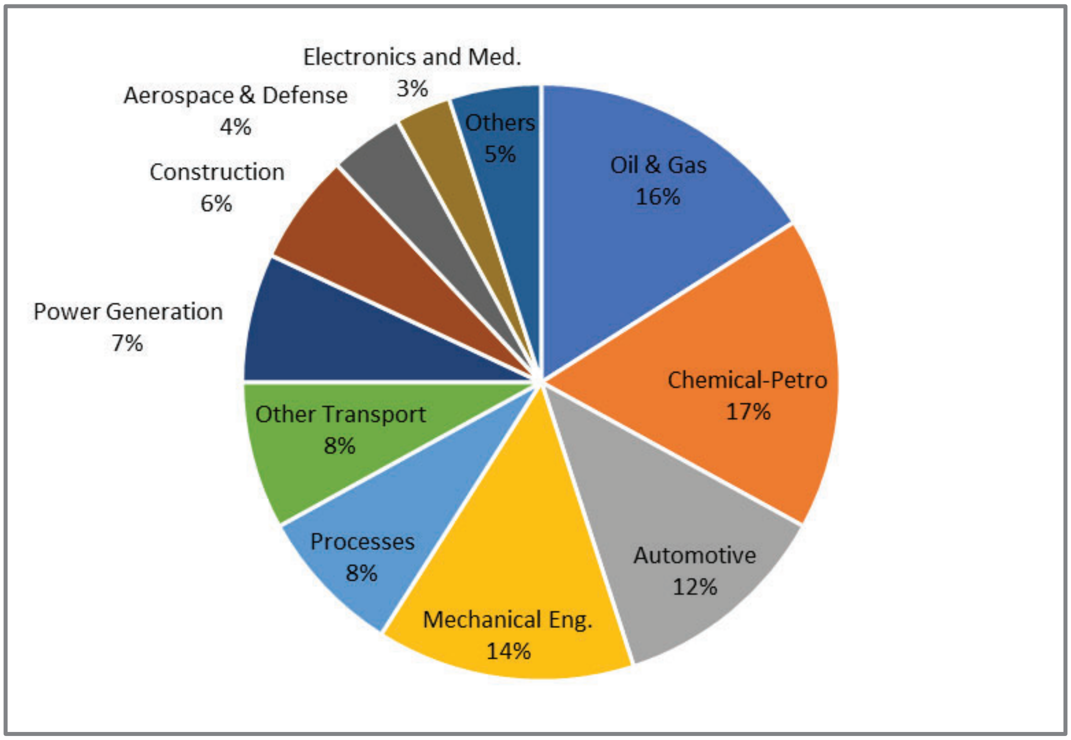
Considering the increase in demand for some sectors, it is forecasted that the global demand will increase in 7.8%, leading to a shortfall in the market balance for 2021.

Figure 16.5: Molybdenum Demand – First Use



Source: SCC

Figure 16.6: Molybdenum Demand by Industry



Source: SCC

16.2.2 Molybdenum Supply

Total global mine supply in 2021 (net yield loss and disruption allowance) is expected to fall by 3.5% year over year due to lower by-product mine production (-11%) caused by shutdown periods by Covid-19, maintenance, or high production cost in China. Nevertheless, primary mine production will be 20% higher than 2020, mainly for Yichun Lumings (restarted operations in September 2020), Zhongxi, and others.

It is estimated that global molybdenum mine supply (net yield losses and disruption allowance) will rise at a 2020-2025 CAGR (compound annual growth weight) of 1.5%. Some molybdenum producers will reach the maximum level or drop their production over the next five year due to high capacity utilization and falling ore grades. The growth forecast is dominated by eight projects, which are yet to come online. Some of these projects will start in the H2 of 2021, although initial volumes will be small during ramp up phases. Molybdenum prices must remain high to ensure project's viability.

One important point to consider on molybdenum supply is the impact of a proposed copper tax increase in Chile that would prevent investment in domestic copper mines.

16.2.3 Molybdenum Price

Chinese molybdenum prices edged higher in early October 2021 as domestic buyers returned to the market after the Golden Week Holiday. This pickup in activity was short-lived; however, as FeMo purchasing by domestic steel mills was particularly weak in October after a sluggish September. Power rationing and the dual control of energy consumption continued to weigh on steel demand, and subsequently steelmakers' procurement, through October.

Molybdenum prices in Europe and the US edged higher in October 2021. Buying activity increased after prices had fallen to their lowest level for several months earlier in September, as traders and other buyers looked to take advantage of the lower prices but ultimately caused prices to pick up again. Spot activity has since slowed, leaving prices steady in November. US oxide prices increased to US$19.00 - 20.00/lb from US$18.00 - 19.00/lb in late October 2021.

Oxide prices in Europe did decline to US$19.90 - 20.50/lb from US$20.20 - 21.30/lb in mid-October after lagging other market movements due to low spot liquidity but have since remained unchanged.

Western molybdenum prices are expected to edge lower over the next few weeks, in line with the recent declines in China. The arbitrage window between China and Europe is open, which could see increased exports to Europe as occurred in 2021 Q3. Market participants believe that the speed and extent of the recent drop in Chinese prices has made the current geographical price spread unsustainable. Without a significant rebound in Chinese prices, Western prices will have to decline to narrow the arbitrage.

Although prices may dip in the near term, analysts expect any declines to be minor for several reasons. Firstly, if prices dip too quickly, opportunistic restocking will quickly stem further losses as it did in October. There is further room for prices to continue easing from their peaks in 2021 Q4. However, bullish sentiment for the year ahead means that any decline in prices will be gradual, and only to a level far higher than where they were at the start of 2021.

It is expected that prices will decrease slightly in 2022 as the market returns to balance, after being in deficit this year, because of additional mine supply from new projects.

16.3 Commodity Price Used

The following commodity prices were used in this study for estimating Mineral Reserves and for the economic analysis:

- US$3.30/lb copper
- US$10.00/lb molybdenum

Mineral Resource estimates were conducted at commodity prices 15% higher than those listed above as per instructions from SCC. It is the QP’s opinion that the prices are reasonable and consistent with the market studies and price forecasts provided by SCC in this Section 16.0.

17.0 ENVIRONMENTAL STUDIES, PERMITTING, AND PLANS, NEGOTIATIONS, OR AGREEMENTS WITH LOCAL INDIVIDUALS OR GROUPS

17.1 Environmental Studies

Mining operations began prior to the establishment of environmental study requirements in Mexico so no baseline environmental information was gathered. However, environmental studies have been carried out for more recent permitting efforts for the Regional Environmental Impact Assessment authorization (SOJGA and SEGA, 2017). Although there are no government-designated conservation or protected areas within the operations, Los Pilares de Nacozari is a small community with relevant cultural aspects, such as historical buildings and graveyards. The area is not considered to have a high grade of biodiversity.

The mining operations are located within a rural area except for the community of Nacozari de Garcia. The principal land uses are agriculture and livestock pasture. The Bavispe River, which is located east of the Tailings Storage Facility (TSF), is an important water source for the area, and for commercial fishing.

The environmental setting summarized below is based primarily on the environmental permitting baseline studies (SOJGA and SEGA, 2017), a draft closure plan (JDS Minera Mexico, 2014) and more recent data provided by La Caridad.

17.1.1 Topography, Climate, and Soils

The mine and La Caridad plant are in a rural area within the northern portion of the Sierra Madre Occidental physiographic province in the Basin and Range sub-province, which is characterized by northwest trending mountain ranges with wide parallel valleys. The nearest town is Nacozari de Garcia.

The climate is a semi-dry steppe, characterized with semi-warm summers and cool winters. Rain is scarce all year round. The La Caridad property exhibits variations due to the differences in elevation between the mine camp and the operational areas. Air quality impacts from the mining operations were reported to be widespread, primarily due to equipment emissions and suspended particles from blasting.

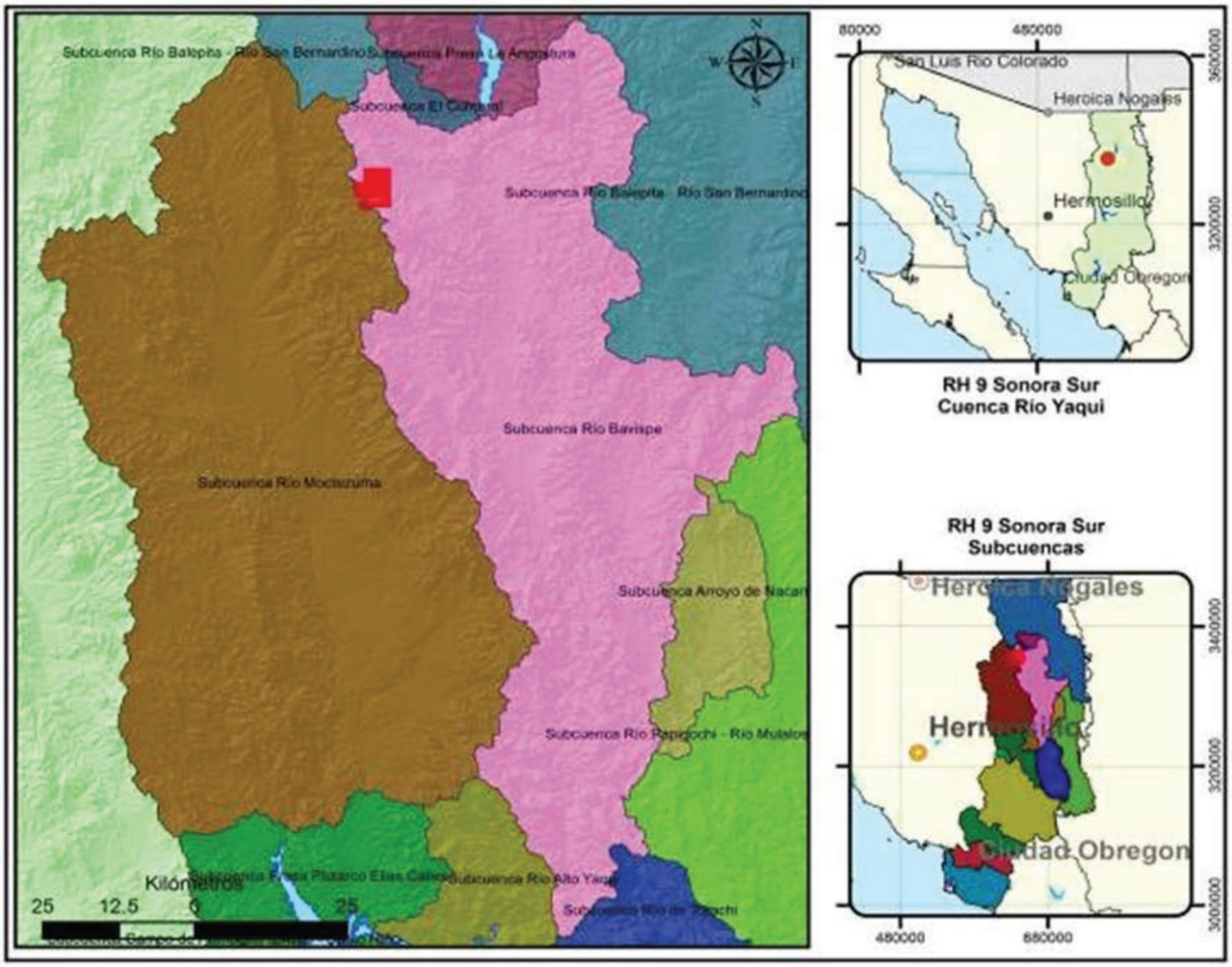
The types of soils in the region include Regosol, Lithosol, Phaeozem, Vertisol and Xerosol, which are classifications used by the Food and Agriculture Organization of the United Nations. Most of these regional soils occur as rocks, stones, and gravels. The Phaeozem soils, which form in grasslands and forests, contain organic materials.

Soil salvage depth is variable throughout the Project area as much of the mine site occurs in steep topography with bedrock at the surface, leaving little opportunity for soil salvage for reclamation purposes.

17.1.2 Surface Water Hydrology

La Caridad 's mining operations are in Hydrological Region 9 “Sonora Sur.” The mine and its operations are located in the Río Yaqui hydrological subbasin in Region 9B (Figure 17.1), which is one of the most important river basins in northwestern Mexico. There are no naturally occurring surface water bodies within the mining operations. Surface water managed within the mining operations is a mixture of stormwater, process water and mine water (that is, water recovered from the open pit). The Tailings Storage Facility (TSF No. 7) is about 4 km upstream of the Bavispe River, which is a tributary of the Yaqui River. There is an unnamed stream located in the Ejido Santo Domingo that is used for domestic purposes by the community and was reported to be flowing at 0.2 liters per second (lps).

Figure 17.1: Rio Yaqui Hydrologic Subbasins



Source: JDS Minera Mexico, 2014.

17.1.3 Surface Water Quality

Historical surface water sampling conducted 2003 through 2015 has indicated concentrations of metals that exceeded permissible limits for surface water in samples collected from Arroyo La Francisca and Arroyo Guadalupe (JDS Minera Mexico, 2014). It is not clear whether these samples were collected in a diversion channel or within the channel that conveys impacted water to the TSF No. 7.

Surface water samples from the Santo Domingo and Cachuly waste rock facilities are routinely sampled but not reported to the environmental agency. The Santo Domingo surface water exhibits quality well above permissible limits.

Three water quality samples were included in the geochemical characterization developed by TAAF (2018). These samples were analyzed for major cations and anions and were in the Arroyo Bavispe. The samples exhibited high concentrations of salts and total suspended solids, with some results exceeding surface water quality standards.

No exceedances of surface water permissible limits were detected in 2020 at the two monitoring locations (upstream of the Francisca Heap Leach Facility and downstream of TSF No. 7) that were sampled and reported to the environmental agency.

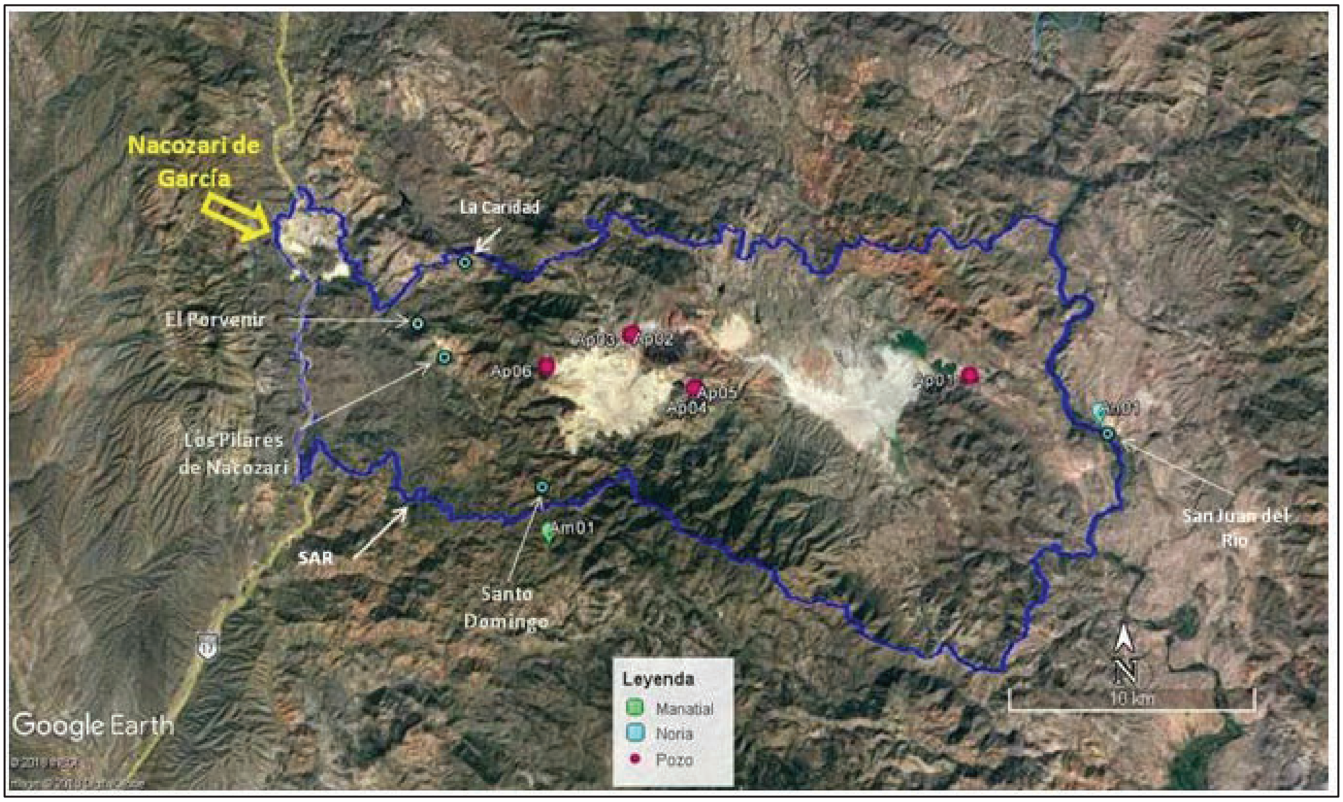
17.1.4 Groundwater Quality

Several groundwater studies have been performed in addition to routine groundwater monitoring conducted at two monitoring wells for compliance reporting to the Mexican Environmental Agency. The hydrogeologic setting is described in Section 7.0.

Monitor wells within the operations include two monitor wells, located downstream of the La Francisca PLS pond, two monitor wells located downstream of the La Guadalupe PLS pond, and one monitor well located downstream of the TSF No. 7. The monitoring wells were indicated to be about 30 m deep.

It is not documented whether the monitoring wells were screened in the deeper volcanic aquifer. The San Juan Well is believed to be about 20-m deep and constructed within the upper alluvial aquifer. The static water levels were reported to be between 3 m to 7 m (Note: no measuring point was provided; this may mean 3 to 7 m bgs. Well locations are shown on Figure 17.2. The groundwater characterization for major cations and anions within the La Caridad complex was carried out by TAAF 2018, via the sampling of five wells, which included four monitor wells within the complex and a well located at the town of San Juan (downstream of the arroyo where the TSF No. 7 is located. The study concluded that, the well downstream of the TSF No. 7 and the well at the Concentrator exhibited contamination; the well at La Francisca PLS Pond was slightly contaminated; the well downstream of the La Guadalupe PLS Pond was highly contaminated and the San Juan Well was not contaminated.

Figure 17.2: Locations of Monitoring Wells



Source: TAAF 2018

Groundwater samples are collected twice a year at two wells for compliance reporting. These wells are the "upstream" well for the La Francisca HLF and the "downstream" well of the TSF No. 7. There were no exceedances of Mexican surface water permissible limits. Site personnel indicated that groundwater samples are collected using a bailer without procedures to ensure a representative groundwater sample. Samples were sent to a certified laboratory. No information was provided regarding a QA/QC program.

17.1.5 Vegetation

The area has multiple vegetation zones due to the diversity of elevations: desert scrub; induced grassland; natural pastureland; live oak (evergreen oak) forest and live oak-pine forest. Desert scrub is present in about 50% of the environmental study area described for the regional permit. None of the species of vegetation identified are protected or endemic.

17.1.6 Fauna

The area is in a transition zone with influences from the Chihuahuan and Sonoran deserts as well as the Sierra Madre Occidental. It is near mountains known as "Sky Islands," such as Sierras de San Luis, Sierra de Ajo-Buenos Aires-La Purica, Sierra El Tigre, and Sierra La Madera with elevations ranging from 800 masl to 2,200 masl, that are recognized as biological corridors that connect flora and wildlife species between regions. Species that are in some category of risk that are present are boa constrictor, common black hawk, and rufous-breasted sparrowhawk.

17.1.7 Socio-economic Conditions

La Caridad is located within three municipalities: Nacozari de Garcia, Cumpas and Villa Hidalgo. Based on data available from 2010, these municipalities include 80 rural towns or ranches, including inactive ranches with no inhabitants. Nacozari de Garcia is the municipality capital and has the largest concentration of mine workers and subcontractors. The main economic activities in the area are mining and agriculture/livestock. The average age in Nacozari is about 27 years old. Educational institutions range from preschool to colleges (but not university), so students are often sent to other cities for academic reasons. There is a government medical clinic (IMSS) for the region in Nacozari. Based on human development, education, economics, and health, Nacozari is ranked higher than the state and national average.

The ejidos (agrarian communities that have a legal status) near the mine include Pillars of Nacozari, Nacozari de Garcia, Old Nacozari, Beautiful Hope, Sant Domingo, Cruz de Canada, Juriquipa, San Juan del Rio and Villa Hidalgo.

The communities identified in the area of influence of La Caridad are Nacozari de Garcia (population about 16,000), Colonia Globo, San Juan, Villa Hidalgo, Colonia La Caridad, Ejido Pilares, Colonia Satélite, Colonia Abanico and Rancho El Porvenir. The communities of Nacozari de Garcia, Colonia Globo, and San Juan are the most impacted by the mining operations. Caridad, Satélite, Abanico and Globo are within the property of La Caridad, and are intendedfor mine housing. None of the communities were identified in opposition to the mine, and two communities (Villa Hidalgo and San Juan) are in favor. The other communities are either neutral or supportive with conditions.

Stakeholders from the neighborhoods of Colonia Centro, Presidentes, Puesta del Sol, Henros, Colosio, La Pilareña, Solidaridad, Lomas Nuevas and El Asilo (higher level of influence), and La Cantera, Gomez Morin and Lomas de Nacozari (lower levels of influence), are located within the environmental area of influence of Mexicana del Cobre. Colonia Centro and Presidentes are the neighborhoods that are most impacted by the mining operations. No opposition to the mine was identified by any of the neighborhoods.

Institutions identified as stakeholders include Ayuntamiento de Nacozari, Protección Civil, OOMAPAS, CEC, Cruz Roja, Comité Comunitario, Primaria Jesus Garcia #2, Club de Leones, Sindicato 298, Instituciones educativas, George Papanicolaou, Centro de Salud, DIF, Bombero, IMSS, and Asociación de Ejidatarios. The Ayuntamiento de Nacozari (town council) was identified as being the most impacted; having the highest level of influence; and being in favor of the mine. The Sindicato 298 (a workers' union) and a local opposition group (not specified) were identified as being in opposition to the mine. Two individuals who actively opposed the mine have been using only social media.

In 2017, La Caridad had direct 1,104 employees. This number of direct employees was planned to remain the same with the expansion of Bella Union and Los Pilares.

The corporate office of Grupo Mexico has a well-structured procedure for conducting a social diagnosis, but the information provided does not match the social diagnosis procedure.

There is a procedure established for grievances. There is an audit process associated with the social programs; however, there is no social management plan that integrates all programs into an orderly and comprehensive system.

The community perceives that there are environmental, social, economic, health and safety issues in the community. A risk assessment prepared in 2016 identified the highest risks as demonstrations against the company or mining industry; actions against the company or mining industry related to environmental issues; complaints regarding impacts due to infrastructure Projects; and social dependence on the company. Of highest importance are issues related to violence, use of the Fondo Minero for infrastructure improvements and social segregation. La Caridad has identified health, environment, unrealistic expectations of the community and anti-mining groups as the largest challenges in their social program.

17.2 Requirements and Plans for Waste and Tailings Disposal

This sub-section contains forward-looking information related to waste and tailings disposal, site monitoring and water management for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including waste disposal volumes increase from historical values and predicted values, that regulatory framework is unchanged during the Study period, and no unforeseen environmental, social or community events disrupt timely approvals.

17.2.1 Hazardous, Regulated, and Special Wastes

The operations generate a wide range of wastes, such as waste oil, capacitors, grease, solids containing hydrocarbons, empty containers, spent batteries, and waste solvent. The management of the wastes is highly regulated by law (Ley General para la Prevencion y Gestion Integral de los Residuos) and environmental regulations (normas), such as the requirements for landfills (NOM-083-SEMARNAT-2003) and wastes (NOM-052-SEMARNAT-2005, NOM-053-SEMARNAT-1995, and NOM-054-SEMARNAT-1995). The mining unit has a detailed waste management plan for reuse, recycling, treatment, and disposal inside the mining unit, or disposal by special subcontractors.

Some wastes are authorized to be placed in the waste rock facilities.

17.2.2 Mining Wastes

The operations generate mining wastes in the form of tailings, waste rock and spent ore. The Mexican environmental agency (SEMARNAT) has published official guidelines for mining project design criteria that apply to the entire mining life cycle and mining wastes generated during the mine life cycle. There are three Mexican environmental regulations that include requirements related to tailings, spent ore and waste rock, as summarized below:

- NOM-141-SEMARNAT-2004. Establishes procedures to characterize tailings, as well as specifications and criteria for tailings dam siting, design, construction, operation, and closure.
- NOM-157-SEMARNAT-2009. Requires characterization of mining wastes and development of a waste management plan.
- NOM-159-SEMARNAT-2011. Establishes criteria for management of barren mineral solutions for copper, defined as wastes from a mineral treated under a leachate process, including a toxicity elimination phase.

Mining wastes include waste rock generated from the La Caridad Pit, Bella Union Pit, Pilares (waste rock existing from historical operations, although the legal responsibility to manage the historical wastes is not clear), and Santo Domingo WRF; spent ore in the heap leach facilities (La Francisca HLF and Guadalupe HLF); and tailings (the historical TSF and TSF No. 7). La Caridad also produces electrolytic anode sludge and degraded organic material as part of the beneficiation process:

- Waste Rock Characterization: The waste rock has been classified as acid-generating. None of the metals results exceeded the NOM-157 permissible limits.
- Spent Ore Characterization: The mineral had been characterized in 2014 as acid-generating and none of the metal concentrations exceeded NOM-157 permissible limits. The heap leach has 1 “upstream” monitor well and 1 “downstream” monitor well. SEMARNAT requested that La Caridad characterize the heap leach facilities in the waste management plan per the criteria of NOM-157-SEMARNAT-2009 (SEMARNAT, 2017). However, La Caridad replied that the mining unit does not consider the leached mineral to be a waste because it is in an active heap leach with 25 years of planned life (La Caridad, 2017).
- Tailings Characterization: The tailings have been classified as acid-generating and none of the metal concentrations exceeded the NOM-157 permissible limits. Tailings characterization and management is discussed further in Section 15.6.
- Other Beneficiation Process Wastes: The electrolytic anode sludge and degraded organic material has been characterized as corrosive and toxic and is classified as a hazardous waste.

17.3 Environmental Monitoring

Mexican laws require mandatory monitoring programs that are implemented under SEMARNAT. La Caridad has developed a detailed monitoring program in response to a requirement in the regional permit granted in 2018. An annual compliance report is required to be submitted to SERMARNAT, and the first report was submitted in July 2020. The environmental monitoring program includes environmental monitoring; environmental education and regulation; flora rescue and relocation; wildlife rescue and relocation; soil conservation and restoration; water quality monitoring; reforestation, restoration and compensation of soils; seismic monitoring of explosions; integrated management of wastes; raptor monitoring; air quality monitoring and a mine closure plan.

17.4 Water Management Plan

Although there are no published surface water or groundwater management plans, reviewed information indicates water for La Caridad is sourced only from surface water and there are no permitted groundwater sources for the mine.

17.4.1 Water Concessions

Most mining regulations in Mexico are issued at the federal level, however several permits are subject to state and local jurisdiction. Environmental permitting in the mining industry in Mexico is mainly administered by the federal government body the SEMARNAT. SEMARNAT is the federal regulatory agency that establishes the minimum standards for environmental compliance. One of SEMARNAT’s sub-departments is National Water Commission (CONAGUA), which is responsible for water supply and assessing fees related to wastewater discharges.

Per CONAGUA’s concession title 02SON101417/09IBGR06, Mexicana del Cobre S.A. de C.V. can utilize 28,382,400.00 cubic meters of surface water each year for La Caridad activities (at a 900.00 liters per second rate). Surface water uses were divided as following: 26,805,600.00 cubic meters per year for industrial uses and 1,576,800.00 cubic meters per year for public urban uses. The surface water source associated to this concession is La Angostura Dam, which belongs to the Rio Yaqui Basin and the Region Hidrológica (Hydrologic Region) Sonora Sur. Under the same concession title, it is also expressed that Mexicana del Cobra S.A. de C.V. has a wastewater discharge permit for a volume 499,685.00 cubic meters per year. The surface water concession and the wastewater discharge permit were granted for 30 years, starting April 29, 1996 (CONAGUA 2006).

17.4.2 Water Supply

The mining operation is supplied with raw water from the La Angostura dam, via 3 pumping stations, fitted with 3 sets of equipment each. In the Mine, water is used for cleaning and sanitation services, cleaning of light and heavy units, against fires and as a means of controlling emissions and dust suppression, as it is used for the irrigation of roads, where heavy trucks and light units' travel.

According to concession title 02SON101417/09IBGR06, Mexicana del Cobre S.A. de C.V., does not have groundwater extraction permits (groundwater concessions). Industrial water demands, and public urban water demands for La Caridad are fulfilled through surface water volumes from La Angostura water reservoir.

17.4.3 Water Treatment

In the hydrometallurgy plant there are three wastewater drainage systems (service, rainwater and industrial), however, these are not discharged to national assets, municipal drainage, or other natural water bodies, since, due to the nature of the process, these are fully reintegrated into the processes.

The discharge of wastewater from the toilets and dressing rooms in the workshop area is currently incorporated into the leaching dumps. Regarding wastewater generated from the concentrator plant and the Molybdenum plant, the process wastewater is diverted to the tailings dam where it is later recovered. Additionally, service wastewaters and other wastewaters of the La Caridad operation are managed through waterproofed septic tanks (biodigestors) whose cleaning product is also diverted to the tailings dam. Therefore, there is no discharge to national receiving bodies, so no discharge permits are required (SOJGA 2017).

17.5 Mine Closure

This sub-section contains forward-looking information related to mine closure for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including prevailing economic conditions continue such that unit costs are as estimated in US$ terms, projected labor and equipment productivity levels are appropriate at time of closure and estimated infrastructure and mining facilities are appropriate at the time of closure.

Although Mexico has no specific closure regulation, closure activities are considered as part of the regional permit. Per the requirement of the regional permit, La Caridad submitted a closure plan to SEMARNAT in 2019 (Grupo Mexico Minera Mexico, 2019). The authorization from SEMARNAT included the following closure activities:

- A fence will be installed around the open pit to prevent access and a berm will be constructed to prevent surface water from entering the pit. The need for pit lake management will be evaluated in a future water quality prediction.
- The HLFs will be closed by removing the irrigation lines as much as practical, and then rinsing. The slopes will be reconfigured to a 3H:1V slope and waste rock used as fill. A cover of soil will be placed at about 1 m thickness and revegetated. A rock armor of 0.3 m will be placed on the slopes.

- The PLS from the HLFs will continue to be collected until no longer economically viable. The remaining solution in the HLF will be recirculated for 3 years to increase evaporation, then the PLS ponds will be drained and filled. The feasibility of passive evaporation of the remaining PLS will need additional evaluation.
- The waste rock slopes will be reconfigured to 5H:1V, covered with 0.2 m of growth media and then revegetated. The configuration will include surface water controls.
- The TSF has a design slope of 3H:1V, which will be adequate for closure. The TSF will be reconfigured with surface water controls. If the tailings geochemistry allows, then no cover except growth media will be placed. The tailings solution will be allowed to drain and/or evaporate passively. The feasibility of this closure method requires more evaluation.
- The plants will be dismantled. The activities will include decontamination of equipment, removal of hazardous materials, dismantling and disposition of infrastructure, removal of up to 2 m of soil, reconfiguration of the area for drainage, placement of 0.3 m of soil with growth media and installation of surface water controls. The waste ponds will be closed in place by placing a low permeability cover, soil cover and growth media, and then revegetation. Foundations will be left in place and soil with growth media placed over the foundations.
- Services will be dismantled. Piping will be drained, closed and buried or removed. Electrical lines will be removed. The electrical substation will be removed with the exception of the central station operated by Siemens that will be left for future usage.
- Transportation corridors used for concentration will be evaluated for soil contamination. Asphalt will be removed from roads and the road base will be scarified and revegetated. It is assumed that only roads between the plant and other key facilities will be removed.

The closure cost was estimated at about US$103 million with a contingency of +/- 35%, which does not include post-closure care and maintenance. This closure cost is based on the asset retirement obligation (that is, closure of existing operations and disturbances) and does not consider the LOM closure cost obligations associated with the current mine plan.

A separate reclamation project is ongoing for TSF No. 1, which is a Moctezuma Company historical tailings impoundment in Nacozari and is not part of the current La Caridad operations. Stabilization of the slopes and revegetation was to be carried out in 2020 and 2021. The authorized budget TSF No. 1 closure was about US$1.7 M.

17.6 Permitting

This sub-section contains forward-looking information related to permitting requirements for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including regulatory framework is unchanged for Study period and no unforeseen environmental, social or community events disrupt timely approvals.

17.6.1 Permitting Requirements in Mexico

Most mining regulations in Mexico are promulgated at the federal level, however several permits are subject to state and local jurisdiction. Guidance for the federal environmental requirements, including conservation of soils, water quality, flora and fauna, noise emissions, air quality, and hazardous waste management, derives primarily from the Ley General del Equilibrio Ecológico y la Protección al Ambiente (General Law of Ecological Balance and Environmental Protection) ("LGEEPA"), the Ley General para la Prevención y Gestión Integral de los Residuos and the Ley de Aguas Nacionales (General Law for the Prevention and Comprehensive Management of Waste and the National Water Law) ("LAN"). Article 28 of the LGEEPA specifies that SEMARNAT must issue prior approval to parties intending to develop a mine and mineral processing plant.

On June 7, 2013, the Federal Law of Environmental Liability (Ley Federal de Responsabilidad Ambiental) was enacted. According to this law, any person or entity that by its action or omission, directly or indirectly, causes damage to the environment will be liable and obliged to repair the damage, or to pay compensation if the repair is not possible. This liability is in addition to penalties imposed under any other judicial, administrative, or criminal proceeding.

Environmental permitting in the mining industry in Mexico is mainly administered by the federal government body SEMARNAT, the federal regulatory agency that establishes the minimum standards for environmental compliance. SEMARNAT has four sub-departments:

- National Institute of Ecology (INE), which is responsible for planning, research, and development; conservation of national protection areas; and promulgation of environmental standards and regulations.
- Federal Prosecutor for the Protection of the Environment (PROFEPA), which is responsible for enforcement, public participation, and environmental education.
- National Water Commission (CONAGUA), which is responsible for water supply and assessing fees related to wastewater discharges.
- Federal delegation and state agencies of SEMARNAT.

SEMARANT has set regulatory standards for air emissions, discharges, biodiversity, noise, mining wastes, tailings, hazardous wastes, and soils. The regulatory standards apply to construction and operation activities. There is no separate regulation for mine closure, but there are aspects of closure and post-closure requirements in some of the regulations.

There are three main SEMARNAT permits required prior to construction and development of a mining project. An Environmental Impact Statement (the Manifestación de Impacto Ambiental, or "MIA," for its initials in Spanish) is the document that must be filed with SEMARNAT for its evaluation and, if applicable, further approval by SEMARNAT through the issuance of an Environmental Impact Authorization. In addition, the Ley General de Desarrollo Forestal Sustentable indicates that authorizations must be granted by SEMARNAT to use land for industrial purposes. An application for change in land use (or Cambio de Uso de Suelo Forestal) must be accompanied by a technical study that supports the environmental permit application (Estudio Técnico Justificativo, or ETJ). In cases requiring a change in forestry land use, a Land Use Environmental Impact Assessment is also required. Mining projects also need to include a risk analysis for the use of regulated substances (Análisis de Riesgo) and an accident prevention program, which are reviewed and authorized by an inter-ministerial governmental body.

Once the MIA is submitted for review, the government publishes an announcement to allow for public review of the proposed project. If the government receives requests, a formal public hearing will be conducted. The government also requires that the mining company publish announcements in the local papers to provide an opportunity for public comment. Government review, comment and approval of the environmental permit documents are estimated to be completed in three to six months; however, it should be noted that permitting can be delayed with requests for additional information or for political reasons, such as strong local opposition to the project.

After the main project approval and receipt of the Change of Land Use authorization, there are several permits that need to be acquired from various federal agencies. The LAN provides authority to the Comisión Nacional del Agua (CONAGUA), an agency within SEMARNAT, to issue water extraction and discharge concessions, and specifies certain requirements to be met by applicants. Key required permits include an archaeological release letter from the National Institute of Anthropology and History (INAH); an explosives permit from the Ministry of Defense (SEDENA) before construction begins; and a water discharge and usage permit must be granted by the CONAGUA.

A project-specific environmental license (LAU), which states the operational conditions and requirements to be met, is issued by SEMARNAT when the agency has approved the project operations. A construction permit is required from the local municipality. Other local permits regarding non-hazardous waste handling and municipal safety and operating authorizations may also be required. The permitting process requires that the mining company has acquired the necessary surface titles, rights, and agreements for the land to be used for the project.

17.6.2 Status of Environmental Permits

The majority of the current La Caridad mining operations were initiated prior to the issuance of environmental laws in Mexico. In 2018 the mining operation obtained environmental impact authorizations to incorporate projects under a regional permit. This authorization is valid for 60 years from the date of issuance, September 10th, 2018.

The regional permit requires that La Caridad exhibit a financial guarantee to comply with the conditions of the permit for the current phase of the project. La Caridad prepared an estimate for the costs of the measures and programs to be carried out during the first year of project implementation, which was the continued operation and expansion, and eventual closure of the current operations. The project considers the open pits of La Caridad, Bella Union and Pilares, the waste rock facilities Santo Domingo, Cachuly and Poniente, the HLFs La Francisca and Guadalupe, and the TSF No. 7. The total estimated cost was about MXN$66,000,000 (about US$3 M), which was paid in 2019 via a finance policy with Chubb Fianzas Monterrey.

17.7 Plans, Negotiations, or Agreements with Local Individuals, or Groups

This sub-section contains forward-looking information related to plans, negotiations or agreements with local individuals or groups for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including that regulatory framework is unchanged for Study period; no unforeseen environmental, social or community events disrupt timely approvals.

Grupo Mexico has established a “Casa Grande” in Nacozari, which refers to their social programs. About 70 different ideas have been developed for social programs (for example, cultural events, sports activities, support of materials, health programs, safety, and education). In 2019, for example, there were 97 activities carried out related to health, safety, education, culture, sports and environment; and 16 concerts performed. The budget for the cultural projects in 2020 was about US$175,000.

Planned projects from 2019 and 2020 were for the treatment and reuse of Nacozari wastewater. The treated water would be used for La Caridad and for irrigation of parks. There is a plan to support water issues in the municipality of Nacozari with a budget of about US$1.9 M. This a project to develop a sanitary landfill to be used by the town of Nacozari as well as La Caridad.

There is a signed agreement that established the community committee, which has eleven members (2 from Grupo Mexico and nine from the community). The responsibility of the committee is to review and approve projects proposed for the benefit of the community.

Taxes paid by Grupo Mexico support the “Fondo Minero,” which provides funds to the local communities for improvement projects.

17.8 Descriptions of Any Commitments to Ensure Local Procurement and Hiring

Grupo Mexico presents data regarded distributed economic value in its annual sustainability report, however the data is not broken into geographical or operations areas. The 2019 sustainability report indicated that 85% of the providers are local, and that Grupo Mexico has the commitment to generate employment and spur economic development in the region of mining operations.

Locally, Grupo Mexico and La Caridad have held workshops focusing on providing financial education to small, local businesses. Workshops have been held at Casa Grande Nacozari to develop practical skills for crafts, cooking, weaving, and trade techniques.

17.9 Qualified Person’s Opinion

17.9.1 Baseline Studies

The historical surface water sample results and the results from the Santo Domingo Pond and infiltration indicate that within the mining operations there is impacted surface water and it is not clear what volume of infiltration reaches groundwater. The QP notes that there is a lack of a site-wide water balance.

The groundwater sampling technique does not meet generally accepted industry standards and there is a lack of a QA/QC program. Groundwater samples are being analyzed for total metals and not dissolved metals, and that results are compared to surface water discharge standards, and not the drinking water standard, which is more comparable to groundwater standards established by other countries. Total metals analysis determines the sum of the dissolved and suspended concentrations. Industry standard is to determine dissolved metals in groundwater, ideally as part of a dual analysis for total and dissolved constituents. Mexico has not established groundwater standards and it is not unusual for groundwater results to be compared to surface water discharge standards; however, the generally accepted industry standard would be to analyze for dissolved metals and to compare the results to the more stringent drinking water standards.

The groundwater results from the TAAF study indicate that infiltration of poor-quality water from mining facilities, such as the unlined heap leach facilities and TSF No. 7, may have occurred, even though the 2020 analytical results for the two monitor wells used for compliance reporting had no exceedances of surface water permissible limits. There may also be problems with the construction of some wells, such as the TSF No. 7 well, because fecal coliform has been detected, which indicates a lack of wellhead protection (that is, migration of contaminants from the surface via the well).

The socio-economic data regarding the area is incomplete, missing data such as health statistics, social conditions, access to basic services, transport, working age population and poverty levels and the existing study should be updated.

17.9.2 Mining Wastes

The waste rock analytical results did not identify the lithology or lithologies associated with the waste rock samples. The study is not representative of the waste rock generated currently, nor of waste rock that will be generated as part of the mine plan and must be updated to meet generally accepted industry standards.

The QP notes that the intent of the NOM-157-SEMARNAT-2009 (and industry standards) was to classify the leached ore, whether the heap is still operating or not. From a processing perspective, the leach process continues indefinitely, and that was not the intention of the NOM-157-SEMARNAT-2009, which was to understand potential environmental conditions/impacts.

The QP notes that kinetic testing of either the mineral or leached ore is needed to support the closure planning and closure costs. In addition, “upstream” and “downstream” groundwater flows cannot be determined with only two monitor wells, because a minimum of three points are needed to determine three-dimensional groundwater flow (direction and gradient).

The QP notes that only one sample was analyzed, and this would not be considered to be a representative sampling based on industry standard, nor is the analysis considered to be sufficient, because of the lack of kinetic testing.

The QP considers that the environmental monitoring plan is generally complete but lacking in some respects. It is lacking the demonstration that the surface water sampling and groundwater sampling is based on representative samples and sufficient sampling. The discussion of hazardous wastes considers the spent ore but does not include the waste rock and tailings, which were also classified as hazardous. There is no demonstration of how these hazardous wastes are managed to prevent environmental impacts.

17.9.3 Mine Closure

A detailed LOM closure plan and associated costs should be prepared.

17.9.4 Environmental Permitting

There is a potential risk related to the permit approval because the current political administration in Mexico has made anti-mining statements and is not following the permitting timeframes.

18.0 CAPITAL AND OPERATING COSTS

This section contains forward-looking information related to capital and operating cost estimates for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this section including prevailing economic conditions continue such that unit costs are as estimated in US$ dollar terms, projected labor and equipment productivity levels and that contingency is sufficient to account for changes in material factors or assumptions.

18.1 Capital Costs

Capital cost estimates were assembled based primarily on information provided by LC. All capital costs are expressed in Q4 2021 U.S. dollars.

The capital cost estimate consists of costs for LC's open pit processing facilities, mining equipment, capitalized maintenance and components, and infrastructure. The reporting of capital expenses for the Project is grouped in the following manner:

- New mine equipment
- Components
- Maintenance
- Special projects

Major repairs, maintenance, and re-builds were factored into the annual maintenance and component cost estimates provided by SCC. SCC advised Golder that the maintenance and component costs are estimated for board approval every year and the same estimate is used as a forecast for future years. This process is repeated annually. Golder utilized the annual estimated maintenance and component costs provided by SCC for 2022 and projected it for the life-of-mine being considered in this Study.

It is of the opinion of the QP the capital expenditures have been estimated to a PFS level and its attendant accuracy and contingency levels. A summary of the capital costs can be seen in Table 18.1. The Effective date of the estimate is December 31, 2021.

Table 18.1: Total LOM Capital Costs (2022-2033)

Parameters	Units	Total LOM
New Mine Equipment	US$ M	$303
Components	US$ M	$155
Maintenance	US$ M	$228
Special Projects	US$ M	$52
Total	**US$ M**	**$737**

Note: Totals may not add due to rounding.

SCC provided Golder with the average rates of depreciation for the different Project capital items at LC. A standard linear depreciation rate was used in all cases. A depreciation life of twelve years was used for the new mining equipment, components, and maintenance capital. For the special projects' capital, the depreciation life used was twenty-one years.

18.1.1 New Mine Equipment Capital Cost Estimate

Costs for primary mining equipment were provided by LC while costs for support equipment were provided by LC and sourced from Golder's database of comparably sized equipment from recent projects. Costs for equipment included recent (2021) estimates from the mine planning department at LC for mining equipment such Komatsu P&H 2800-XPB, Komatsu 930E, Komatsu WA1200, BE 495HR, CAT 24M, Komatsu 475A, and Komatsu WD600-3. Prices for support equipment such as service trucks and mobile cranes were sourced from Golder's internal equipment pricing database.

In this Study, primary mining equipment is considered to be electric rope-shovels, front end loaders, trucks, and drills. Support equipment is considered to be all the remaining mine equipment, including, but not limited to track dozers, wheel dozers, motor graders, water trucks, field service truck, tire service truck, fuel and lube truck, light pickup trucks, rough terrain crane, and light plants. All mining equipment is assumed to be purchased and no leasing is considered. A summary of the new mine equipment capital costs is provided below as Table 18.2.

Table 18.2: Total New Equipment Capital Costs

Parameters	Units	Total LOM
New Mine Equipment	**US$ M**	**$303**
Primary Mine Equipment	US$ M	$257
Support Mine Equipment	US$ M	$46

Note: Totals may not add due to rounding.

Capital expenses for replacement of primary mine equipment were calculated using the replacement schedule provided by the mine planning department at LC. The site replaces support equipment as needed. Golder used the historical utilization rate of support equipment to determine the long-term replacement schedule of support equipment. A ratio of the required support equipment to primary equipment was assumed based a standard open pit operation of similar size.

18.1.2 Component Capital Cost Estimate

Golder utilized the estimated component capital estimates based on 2022 detailed budget information provided by SCC. The component capital expenditure is categorized as follows:

- Mine components include all major components used in the rebuild of mine equipment, such as motor wheels, diesel motors, shovel tracks, engines, among others.
- Concentrator.

A summary of the components capital expenditures is provided in Table 18.3.

Table 18.3: Total Component Capital Costs

Parameters	Units	Total LOM
Components	**US$ M**	**$155**
Mine	US$ M	$149
Concentrator	US$ M	$6

Note: Totals may not add due to rounding.

18.1.3 Maintenance Capital Cost Estimate

The maintenance capital costs provided by SCC is categorized as follows:

- Mine maintenance
- SX-EW plant
- Concentrator
- Molybdenum processing plant
- Lime processing plant
- Administrative offices

A summary of the components capital costs is provided below as Table 18.4.

Table 18.4: Total Maintenance Capital Costs

Parameters	Units	Total LOM
Maintenance	**US$ M**	**$228**
Mine	US$ M	$57
SX-EW Plant	US$ M	$22
Concentrator	US$ M	$102
Moly Plant	US$ M	$1.4
Lime Plant	US$ M	$34
Admin Offices	US$ M	$13

Note: Totals may not add due to rounding.

18.1.4 Special Projects Capital Cost Estimate

The special projects capital costs section consists of major infrastructure projects at LC mine site which included expansion of the lime plant at Agua Prieta; sulfuric acid tanks and instrumentation at Guaymas; dam instrumentation; investment in ecology, dams and explorations; and land acquisition. A proposed capital disbursement schedule for these projects was provided by SCC which was utilized in the discounted cashflow model. About US$52 million was assigned for special projects.

18.2 Operating Costs

SCC provided Golder with detailed historical unit operating costs for 2018, 2019, and 2020. These costs included details on various aggregated cost centers such as mining, concentrators, molybdenum plant, leaching and SX-EW, and smelting and refining. Each aggregated cost center had numerous subitems. For example, the aggregated mining cost center included average three year historical estimates for:

- Individual costs for ore, leach and waste mining excluding haul
- Individual haulage costs for ore, leach, and waste

Each component item in turn was tied to detailed three year cost items listed in component tabs of a detailed spreadsheet that was provided by SCC. Each aggregate costs center and its component items were reviewed by

Golder as part of the data verification and as a basis for establishing unit costs to be used in the discounted cashflow model.

Subsequent to the review, the historical unit costs were escalated to 2021 values using the Consumer Price Index (FRED Economic Data for Mexico) as shown in Table 18.5.

Table 18.5: Consumer Price Index FRED

Item	2018	2019	2020	2021
Consumer Price Index	117.5	120.9	124.7	133.8

Source: https://fred.stlouisfed.org/series/MEXCPIALLMINMEI. Indices

All costs reported are on a dry metric tonne basis unless otherwise stated.

18.2.1 Mining

Examples of select operating costs escalated to 2022 dollars can be seen in Table 18.6. Values in blue designate historical unit operating costs received from SCC while the estimated average escalated costs are shown in green. The average escalated costs were estimated by averaging the estimated escalated costs for each year. An example of the estimate of the escalated drilling and blasting cost is shown below:

*D&B = ($0.15/t x (133.8 / 117.5) + $0.15/t x (133.8 / 120.9) + $0.15/t x (133.8 / 124.7)) / 3 = **$0.16/t***

Table 18.6: Escalated Unit Mining Costs

Unit Cost Parameters	Units	Real 2018	Real 2019	Real 2020	Average Escalated Costs
Drilling and Blasting	$/t-mined	$0.15	$0.15	$0.15	$0.16
Loading	$/t-mined	$0.11	$0.12	$0.13	$0.13
Support	$/t-mined	$0.07	$0.07	$0.08	$0.08

Mining includes a fixed component of US$0.64/t-mined for the items shown above with additional costs related to other fixed and operating costs. Haulage was calculated based on an adjusted tonne-kilometer, by multiplying the estimated annual equivalent flat haul by a unit cost of a US$0.14/tonne-km. For planning purposes, SCC assumes a 3:1 rate for uphill loaded at 10%, and 1.5:1 rate for downhill loaded at 10%. For instance, assuming a lift of 10 m, at 10%, for a 100-m distance, SCC estimates and equivalent 300-m flat haul.

The resulting mining costs inclusive of haulage for the first three years are shown in Table 18.7.

Table 18.7: Mining Unit Cost Inclusive of Haulage

Unit Cost Component	Units	2022	2023	2024
Ore	$/t-ore	$1.71	$1.57	$1.39
Waste	$/t-waste	$1.82	$2.21	$2.26
Leach Ore	$/t-leach	$1.52	$1.91	$1.96

18.2.2 Processing

The methodology for escalating the mining costs described above was applied to escalate the processing costs. Table 18.8 shows the unit costs for year 2018, 2019, and 2020 with the associated average escalated costs (in green). Table 18.8 also shows costs associated with the concentrator, leach, SX-EW, and Mo.

Table 18.8: Escalated Unit Processing Cost

Cost Parameters	Units	Real 2018	Real 2019	Real 2020	Average Escalated Costs
Concentrator	$/t-milled	$3.82	$3.77	$3.63	$4.14
Leach	$/t-leach	$0.22	$0.26	$0.25	$0.27
SX-EW	$/lb	$0.22	$0.22	$0.22	$0.24
Marketing and Sales (Cathode)	$/lb Cu	$0.02	$0.02	$0.01	$0.02
Molybdenum Plant	$/t-milled	$0.21	$0.25	$0.29	$0.27
Molybdenum Refining, Freight and Sales	$/lb Mo	$1.62	$1.40	$1.08	$1.52

18.3 Other Costs

18.3.1 General and Administrative

A corporate General and Administrative overhead assessment of US$0.61/t-milled was utilized based on information provided by SCC and an allocation of 25% of corporate overhead costs to La Caridad.

18.3.2 Concentrate Transport Costs

The concentrate is shipped to LC's smelter located approximately 20 km from the beneficiation plant at a cost of about US$4.42 per tonne of concentrate.

18.3.3 Closure Cost

A closure cost of US$103 million was determined for LC based on an ARO estimate prepared by SCC. This estimate did not consider mine closure and, therefore, is deemed incomplete. It should, however, be noted there is no specific mine closure regulation established in Mexico, and there are no requirements to create a closure accrual fund.

The mine plan is currently restricted to 11 years due to current capacity limitations at TSF No. 7. Golder expects the LOM to be extended with an expansion of the TSF. Therefore, the ARO closure estimates were not included in the current discounted cashflow analysis.

18.4 Risks Associated with Estimation Methods

All operating and capital costs were provided by SCC based on actual past performance and customary internal SCC budget review and approvals process. Therefore, it is the QP's opinion that as an operating mine with well-established internal budgeting approvals processes, the capital expenses and operating costs utilized are at a PFS level and its attendant accuracy and contingency levels.

Maintenance and component costs are adjusted annually and based on very good operational experience and not deemed to be a significant risk. Global supply chain dynamics could have some impact to the costs of the various components but is deemed to be low risk at this time.

19.0 ECONOMIC ANALYSIS

This section contains forward-looking information related to economic analysis for the Project. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were set forth in this sub-section including estimated capital and operating costs, project schedule and approvals timing, availability of funding, projected commodities markets and prices.

All costs, prices, and monetary values are in Q4 2021 US$.

19.1 Principal Assumptions

- Sales price: The commodities prices considered are as shown below:
  - Copper: US$3.30/lb
  - Moly: US$10.00/lb
- Production: The schedule for LC with 11 years of mine life entails about:
  - 372 Mt of copper ore
  - 43 Mt of leached ore
  - 38 Mt of waste
  - 452 Mt of total material mined
- FX Rate: all historical costs were provided by SCC on a US$ basis. The discounted cashflow basis is on a US$ basis.
- Inflation: consumer price index estimates were applied to historical costs provided for 2018 through 2020 to estimate operating costs on a Q4 2021 basis
- Discount Rate: A discount rate of 10% was used to account for cost of capital and project risk.

19.2 Cashflow Forecast

The cashflow for production from the La Caridad Mine is shown in Table 19.1.

Table 19.1: Cashflow

DESCRIPTION	Units	Total / Avg	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
MATERIAL MOVEMENT													
Copper Pit Ore	Tonnes M	**372**	34	34	34	34	34	34	34	34	34	34	34
Leach	Tonnes M	**43**	7	7	2	3	2	2	5	3	5	6	1
Waste	Tonnes M	**38**	18	13	2	1	1	0	0	0	0	0	0
Total Mined	Tonnes M	**452**	59	54	38	37	37	37	40	37	40	40	35
REVENUE													
Copper	US$ M	**$ 5,496**	$ 458	$ 466	$ 514	$ 520	$ 534	$ 473	$ 489	$ 491	$ 483	$ 516	$ 553
Molybdenum	US$ M	**$ 1,532**	$ 66	$ 96	$ 111	$ 137	$ 180	$ 137	$ 140	$ 154	$ 154	$ 174	$ 182
TOTAL REVENUE	**US$ M**	**$ 7,028**	**$ 524**	**$ 562**	**$ 625**	**$ 657**	**$ 713**	**$ 610**	**$ 629**	**$ 645**	**$ 637**	**$ 691**	**$ 735**
COSTS													
Mining	US$ M	**$ 868**	$ 102	$ 95	$ 56	$ 61	$ 66	$ 69	$ 81	$ 79	$ 89	$ 91	$ 80
Concentrator and Plants	US$ M	**$ 1,642**	$ 149	$ 150	$ 149	$ 149	$ 149	$ 150	$ 149	$ 149	$ 149	$ 150	$ 149
Smelting/TCRC, Freight and Sales	US$ M	**$ 744**	$ 53	$ 59	$ 64	$ 69	$ 77	$ 65	$ 67	$ 69	$ 69	$ 75	$ 78
On-going and final accretion	US$ M	**$ 24**	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ -
G&A Cost	US$ M	**$ 228**	$ 21	$ 21	$ 21	$ 21	$ 21	$ 21	$ 21	$ 21	$ 21	$ 21	$ 21
Total Operating Cost	**US$ M**	**$ 3,506**	**$ 328**	**$ 326**	**$ 292**	**$ 302**	**$ 315**	**$ 306**	**$ 321**	**$ 320**	**$ 330**	**$ 339**	**$ 328**
EBITDA	**US$ M**	**$ 3,522**	**$ 197**	**$ 236**	**$ 333**	**$ 355**	**$ 398**	**$ 304**	**$ 308**	**$ 325**	**$ 307**	**$ 351**	**$ 406**
Depreciation	US$ M	**$ 387**	$ 7	$ 16	$ 21	$ 25	$ 31	$ 34	$ 39	$ 44	$ 53	$ 57	$ 60
Royalty (Derechos de Mineria)	US$ M	**$ 264**	$ 15	$ 18	$ 25	$ 27	$ 30	$ 23	$ 23	$ 24	$ 23	$ 26	$ 30
PTU Employee Sharing	US$ M	**$ 287**	$ 17	$ 20	$ 29	$ 30	$ 34	$ 25	$ 25	$ 26	$ 23	$ 27	$ 32
Pre Tax Gross Income	US$ M	**$ 2,583**	$ 157	$ 182	$ 258	$ 274	$ 304	$ 222	$ 222	$ 231	$ 208	$ 241	$ 285
Minimum tax	US$ M	**$ 79**	$ 4	$ 5	$ 7	$ 8	$ 9	$ 7	$ 7	$ 7	$ 7	$ 8	$ 9
Income tax	US$ M	**$ 775**	$ 47	$ 55	$ 77	$ 82	$ 91	$ 67	$ 67	$ 69	$ 62	$ 72	$ 85
Total Taxes	US$ M	**$ 696**	$ 43	$ 49	$ 70	$ 74	$ 82	$ 60	$ 60	$ 62	$ 55	$ 65	$ 76
Operating Income	US$ M	**$ 1,888**	$ 115	$ 133	$ 188	$ 199	$ 222	$ 162	$ 162	$ 169	$ 153	$ 177	$ 208
Add back Depreciation	US$ M	**$ 387**	$ 7	$ 16	$ 21	$ 25	$ 31	$ 34	$ 39	$ 44	$ 53	$ 57	$ 60
Add back Accretion	US$ M	**$ 24**	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ 2	$ -
NET INCOME AFTER TAXES	US$ M	**$ 2,299**	$ 124	$ 151	$ 212	$ 227	$ 255	$ 199	$ 203	$ 215	$ 208	$ 236	$ 268
Total Capex	US$ M	**$ 737**	$ 99	$ 115	$ 64	$ 42	$ 74	$ 42	$ 53	$ 65	$ 107	$ 42	$ 35
Working Capital	US$ M	**$ (0)**	$ (17)	$ 3	$ 8	$ 2	$ 3	$ (8)	$ 0	$ 1	$ (2)	$ 3	$ 5
Pre Tax Cash Flow	US$ M	**$ 2,784**	$ 114	$ 118	$ 260	$ 312	$ 321	$ 270	$ 255	$ 258	$ 202	$ 306	$ 367
After Tax Cash Flow	US$ M	**$ 1,561**	$ 42	$ 33	$ 139	$ 183	$ 178	$ 165	$ 150	$ 149	$ 103	$ 191	$ 229

As shown in Table 19.1 the following parameters were estimated:

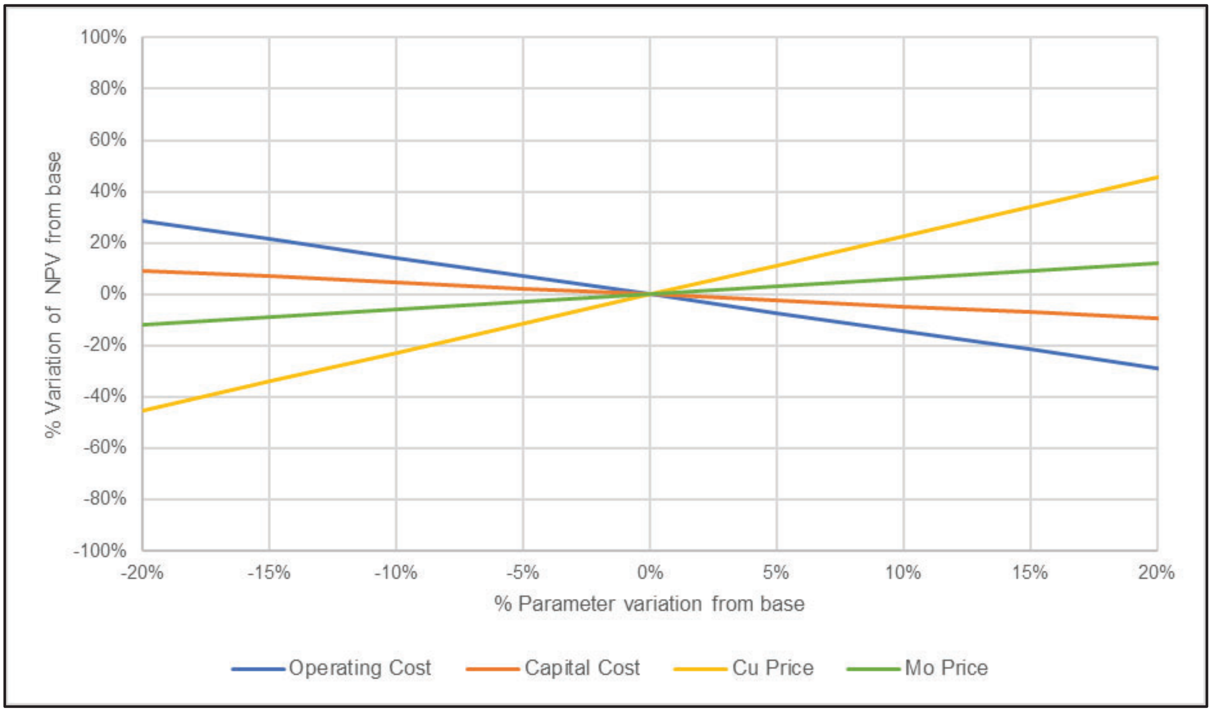
- Total Revenue: The total sales revenue of US$7.0 B includes Copper and Molybdenum sales.
- Total Operating Cost: Total operating cost is estimated to be US$3.5 B.
- Accretion: An annual ARO accretion expense of about US$2 M was provided by SCC.
- EBITDA: The EBITDA is estimated to be US$3.5 B
- A royalty of 7.5% was applied (Derechos de Mineria)
- An employee profit sharing tax (PTU) was estimated at 10% of EBITDA less depreciation and royalty
- Taxes: Tax rate of 30% on pre-tax gross income less 30% of the royalty
- No reclamation or closure was applied since the mine is expected to continue past 11 years as currently envisioned. The current life is limited by the estimated capacity at TSF No. 7 which is expected to be increased once a PFS design for the TSF has been completed..
- Capital Expenditures: The total LOM capital expenditures is US$737 M.
- Net Present Value: The after tax NPV is US$927 M at a discount rate of 10%.

The QP considers the accuracy and contingency of cost estimates to be well within a Prefeasibility Study (PFS) standard and sufficient for the economic analysis supporting the Mineral Reserve estimate for LC.

19.3 Sensitivity Analysis

The sensitivity analysis was carried out by independently varying the commodities price, operating cost, and capital cost. The results of the sensitivity analysis are shown in Figure 19.1Figure 19.1.

Figure 19.1: Sensitivity Analysis



As seen in the above figure, the project NPV is most sensitive to price and least sensitive to capital. This is to be expected for a mature, well-established project with much of its infrastructure already in place and no significantly large projects currently planned during the LOM discussed in this Study. The sensitivity clearly shows the Project is most sensitive to the copper selling price.

20.0 ADJACENT PROPERTIES

There is no information used in this TRS that has been sourced from adjacent properties. The mineralization model for this deposit is limited to the complex, which is fully enclosed within the La Caridad mining permits.

21.0 OTHER RELEVANT DATA AND INFORMATION

It is the opinion of the QPs that all material information has been stated in the above sections of this TRS.

22.0 INTERPRETATION AND CONCLUSIONS

This section contains forward-looking information related to Mineral Resources and Mineral Reserves. The material factors that could cause actual results to differ materially from the conclusions, estimates, designs, forecasts or projections in the forward-looking information include any significant differences from one or more of the material factors or assumptions that were forth in this sub-section including: geological and grade interpretations and controls and assumptions and forecasts associated with establishing the prospects for economic extraction; grade continuity analysis and assumptions; Mineral Resource model tonnes and grade and mine design parameters; actual plant feed characteristics that are different from the historical operations or from samples tested to date; equipment and operational performance that yield different results from the historical operations and historical and current test work results; mining strategy and production rates; expected mine life and mining unit dimensions; prevailing economic conditions, commodity markets and prices over the LOM period; regulatory framework is unchanged during the Study period and no unforeseen environmental, social or community events disrupt timely approvals; estimated capital and operating costs; and project schedule and approvals timing with availability of funding.

22.1 Mineral Resources

The La Caridad geology team has a clear understanding of the interaction of lithology and mineral zone as it related to controlling the total Cu mineralization of interest, and the geological and deposit related knowledge has been appropriately used to develop and guide the exploration, modeling and estimation processes.

The resultant validated geological database is considered reliable, representative and it is the QPs view that it is fit for purpose in developing a geological model and for the preparation of Mineral Resource estimates as well as for use in other modifying factors studies, including mine design and scheduling and Mineral Reserve estimation.

The geological interpretation and modeling methodology is appropriate for the style of mineralization and data available for La Caridad. The modeling methodology followed current industry standard practices, and the lithology and mineral zone and interpolation of the grade parameters was guided by sound geological interpretation and detailed geological, statistical, and geostatistical analysis and interpretation of the validated geological data.

The classification of Mineral Resources into confidence classes Indicated and Inferred based on the confidence related to drill hole density, geological understanding, continuity of mineralization relative to the style of mineralization, and data quality. A combination of drill hole density and the estimation pass used to estimate the grade of the block was used as a guide for outlining classification regions.

The impact of geological uncertainty and risk has been evaluated across various key stages of the data collection, modeling and estimation process. A high-level summary of the assessment of geological uncertainty is as follows:

Indicated Mineral Resources are considered to have a low degree of geological uncertainty across most items, except for the lack of QA/QC program, uncertainty of collar positions, little information on survey and deviation data in these elements. This is not seen as a risk to the global estimate of Mineral Resources for La Caridad but could have local short-range impact on future mining operations if not addressed via infill/production drilling and so forth.

Inferred Mineral Resources are considered to have a mix of low to moderate degree of geological uncertainty across all elements evaluated. As with the low-moderate risks identified in the Indicated Mineral Resource category above. Geological uncertainty in the Inferred Mineral Resource category can likely be reduced via future infill and production drilling.

As La Caridad is an operation with almost 100 years of operational experience and data, the QP does not see any issues that require further work relating to relevant technical and economic factors that are likely to influence the prospect of economic extraction.

22.2 Environmental, Permitting and Social

Mexico has established environmental laws and regulations that apply to the development, construction, operation and closure of mining projects. The majority of the current La Caridad mining operations were initiated prior to the issuance of environmental laws in Mexico. In 2018 the mining operation obtained environmental impact authorizations to incorporate projects under a regional permit.

The operations generate mining wastes in the form of tailings, waste rock and spent ore, which have all been characterized as potentially acid generating (PAG). None of the metals results exceeded the Mexican mining wastes permissible limits for classification as hazardous waste.

Due to the age of the historic operations, no environmental studies were completed prior to the start of operations; however, subsequent environmental baseline studies have been prepared to characterize the environmental conditions of the area, including climate, fauna, flora, and hydrology. These baseline studies were presented to the Mexican environmental agency (Secretaria de Media Ambiente y Recursos Naturales or SEMARNAT) as part of the environmental permitting process for more recent changes in operations. The area is not considered to have a high grade of biodiversity.

Historical surface water sampling has indicated concentrations of metals that exceeded permissible limits for surface water in samples collected from Arroyo La Francisca, Arroyo Bavispe and Arroyo Guadalupe, and surface water at the Santo Domingo waste rock facility. No exceedances of surface water permissible limits were detected recently at the two monitoring locations (upstream of the Francisca Heap Leach Facility and downstream of TSF No. 7) that were sampled and reported to the environmental agency.

Several groundwater studies have been carried out, plus routine groundwater monitoring conducted at two monitoring wells for compliance reporting to the Mexican environmental agency. A groundwater study indicated that the well downstream of the TSF No. 7 and the well at the Concentrator exhibited contamination; the well at La Francisca PLS pond was slightly contaminated; the well downstream of the La Guadalupe PLS pond was highly contaminated and the San Juan well (village along the Bavispe River) was not contaminated. Recent groundwater samples are collected at two wells for compliance reporting (the “upstream” well for the La Francisca HLF and the “downstream” well of the TSF No. 7) reported no exceedances of Mexican surface water permissible limits.

Nacozari de Garcia is the municipality capital and has the largest concentration of mine workers and subcontractors. Stakeholders are local ejidos, neighborhoods, institutions, groups, communication media, formal and informal leaders, and government. The Ayuntamiento de Nacozari (town council) was identified as being the most impacted by the mining operations; having the highest level of influence; and being in favor of the mine. The Sindicato 298 (a workers’ union) and a local opposition group (not specified) were identified as being in opposition to the mine. The community perceives that there are environmental, social, economic, health and safety issues in the community. The most recent risk assessment identified the highest risks as demonstrations against the company or mining industry; actions against the company or mining industry related to environmental issues; complaints regarding impacts due to infrastructure projects; and social dependence on the company. Grupo

Mexico has established a “Casa Grande” in Nacozari for administration of social programs that supported financially by Grupo Mexico. Taxes paid by Grupo Mexico support the “Fondo Minero”, which also provides funds to the local communities for improvement projects.

Although Mexico has no specific closure regulation, closure activities are considered as part of the regional permit. Per the requirement of the regional permit, La Caridad submitted a closure plan to the Mexican environmental agency, which subsequently authorized the closure plan. The closure cost was estimated at about US$103 million which does not include post-closure care and maintenance. This closure cost is based on the asset retirement obligation (that is, closure of existing operations and disturbances) and does not consider the LOM closure cost obligations associated with the current mine plan.

22.3 Mineral Processing

22.3.1 Concentrator

The main challenge to sustain the production of copper is the diminishing grade of the ore from the open pit As planned by Mexicana de Cobre the grade may be improved by including higher grade ore from the satellite Pilares mine.

22.3.2 Leaching-Solvent Extraction and Electrowinning

The main challenge to maintain the current level of production is the low solubility index (S.I.) of the leach ore that reportedly will be approximately 22.8 %. The addition of Pilares ore in the future with a high S.I. may help.

As indicated by the low S.I., La Caridad pit is well into the primary sulfides zone. Reportedly, LC has improved the ferric-bacterial leaching process by growing their own bacteria strains to improve copper extraction. It is recommended that LC review the experiences of large copper mining operations in Arizona that have developed and commercially applied techniques to enhance copper recovery in ROM dump leaching.

22.4 Mineral Reserves

The Mineral Reserve estimate was constrained by the TSF storage capacity. The Study assumed a total storage capacity of 361 Mt remaining in the TSF. This allows for approximately 11 years of tailings storage capacity, assuming an annual production of 32.4 Mtpa.

The October 09, 2021, topographic surface, along with production data for 2021, was provided by LC for this Study. Golder used the topographic surface for the design and adjusted the production schedule to take into account the remaining October to December 31, 2021, production figures.

Mineral Reserves are reported effective December 31, 2021. The Qualified Person for the estimate is Mr. Danny Tolmer, P.Eng. Mineral Reserves are reported as the mined tonnes and grade; the reference point is the leach pad or concentrator and includes considerations for operational modifying factors such as loss (2%) and dilution (1%). Mineral reserves are reported using an economic breakeven value. Inferred Mineral Resources within the pit design were considered waste for the Mineral Reserve estimate. For this Mineral Reserve estimate, Indicated Mineral Resources inside the ultimate pit were converted to Probable Mineral Reserve. The Mineral Reserves are estimated at a copper price of US$3.30 per pound.

The Mineral Reserves include approximately 372 Mt of mill feed with a Cu grade of 0.24% total Cu for 886 Million pounds (Mlbs) of contained Cu with the point of reference being the mill. An additional 43 Mt of Mineral Reserves is estimated as Leachable ROM Ore with the point of reference being delivery to the leach pads. Total material in the restricted pit is 452 Mt, resulting in a waste to ore (mill ore + leach material) ratio of 0.09.

The LC mine economic analysis showed the Project has a $NPV_{10\%}$ of US$927 M. The sensitivity analysis shows the Project is most sensitive to copper selling price; however, even with a 20% drop in price the Project has positive economics.

23.0 RECOMMENDATIONS

23.1 Mineral Resources

Golder provides the following recommendations:

- It is recommended that the lithological, alteration and mineralization information available in the paper copies of the drill hole logs be revisited and all pertinent geological data be recorded electronically.
- Construct updated procedures that describe in sufficient detail the activities of capture, administration, and backup of the data.
- Improve the geological knowledge of the deposit to better understand the geological controls on mineralization and include them in future updates of the geological models. This information should be included in future updates of the geological model as well in grade estimation.
- Design and implement a samples (pulps) reanalysis campaign with an appropriate QA/QC program, and based on the results obtained, see the possibility of improving the Mineral Resource categorization.
- Maintain a drill core photo library for all drilling campaigns going forward.
- Maintain original and/or digitized records of collar surveys, geological, and geochemical data in a secure database.
- Complete a review of the collar topography in order to verify the soundness of the existing data and establish a reliable database.
- Analysis and testing of samples should be completed by a reputable, and preferably ISO-accredited laboratory, qualified for the particular element or material to be analyzed or tested. All analytical or other test results should be supported by duly signed certificates or reports issued by the laboratory or testing facility and should be accompanied by a statement of the methods used.
- Continue with the infill drilling campaigns to improve the Mineral Resource categorization.
- Complete a survey of drill hole collars to verify inconsistencies with respect to topography.

23.2 Environmental, Permitting and Social

- The geochemistry study of the mining wastes is incomplete and does not meet industry standards. A comprehensive geochemistry study should be carried out and results used as part of an assessment of whether environmental impacts have been managed. The operations must demonstrate that the TSF, waste rock facilities and heap leach facilities designs manage possible environmental impacts to surface/groundwater over time. The demonstration should include the kinetic characterization results, infiltration models, hydrogeologic flow modeling and geochemical transport modeling.
- The historical surface water sample results and the results from the Santo Domingo Pond and infiltration indicate that within the mining operations there is impacted surface water and it is not clear what volume of infiltration reaches groundwater. The source of impacted water should be assessed and a corrective action plan developed.
- A detailed side-wide water balance should be developed.

- The hydrogeologic setting has not been adequately characterized and monitored to assess potential environmental impacts. The groundwater monitoring program needs to be expanded to assess groundwater occurrence and quality throughout the mining operations. Additional wells are needed and aquifer characterization is needed. Groundwater level contour maps should be generated for each sampling round. The groundwater sampling technique does not meet generally accepted industry standards and there is a lack of a QA/QC program. The groundwater quality program needs to improve with a comprehensive written plan and procedures to document that the plan is followed.
- The socio-economic data should be updated.
- A detailed LOM closure plan and cost obligation should be prepared.

23.3 Geotechnical

Geotechnical characterization for pit slope design should progress such that the geotechnical model is developed to a sufficiently high degree of confidence that it remains predictive of slope performance experience at the site. The geotechnical model is composed of four component models: geological, geomechanical (intact rock strength and discontinuity shear strength), structural (major structure and rock fabric), and hydrogeological. Target levels of data confidence for each component model should range from 50% to 75% by the feasibility level and should approach 75% to 80% during operations. Based on review of available data, the geomechanical model (particularly with respect to the RQD/RMR model), the structural model, and the hydrogeological model requires additional work to improve data confidence levels. A summary of recommendations for additional geotechnical characterization is provided below:

- Targeted geotechnical drilling to investigate the low-RQD zones indicated by CNI (2019). These data can also be collected from exploration core holes that are logged for geotechnical data.
- The geology and alteration models should be updated as new data become available from exploration/development drilling campaigns and mapping of new exposures.
- A continuous effort should be made to collect, interpret, and analyze geotechnical data as benches are developed in the La Caridad and Bella Union pits. Cell mapping and geologic mapping should be performed along new pit benches. Pit mapping will improve confidence in the structural model by:
    - Updating projections of faults, contacts, and areas of low rock-mass strength for analysis of slope stability.
    - Confirm fracture characteristics.
    - Detect any potential stability problems in a timely manner.
- Periodic bench face angle surveys should be conducted along benches to evaluate the success in achieving the bench geometries and inter-ramp angle recommendations.
- Targeted airlift and recovery testing and packer testing in primary lithological units in the geological model, installation of piezometers along the final pit wall to define the groundwater table and its fluctuations.
- Maintain records of water seep locations along with any noted seasonal fluctuations in the existing pit slopes and the location of any blasthole water intercepts.

23.4 Mineral Processing

- Investigate production levels at Pilares to optimize overall recovery
- Investigate metallurgical response of Pilares ore:
  - Copper recovery via flotation
  - Leach feed solubility
  - Copper extraction via dump leaching
- Investigate improvements to the ferric-bacterial leaching process.
- Research improvements for ROM dump leaching techniques

23.5 Mineral Reserves

- Targeted geotechnical drilling and sampling of pit walls to improve confidence in RQD measurements and rock mass rating assessments.
- Updates to the pit geology and RQD models.
- Hydrogeological investigation that includes targeted airlift and recovery testing and packer testing in primary lithological units in the geological model, and installation of piezometers in select areas of the proposed pit
- Maintain records of water seep locations along with any noted seasonal fluctuations in the existing pit slopes and the location of any blasthole water intercepts.
- Use of the Hoek-Brown shear strength criterion as a check on the CNI method for assessing the shear strength of materials for global stability analysis is recommended.
- Preparation of regular reports from radar monitoring of existing slopes.
- Completion of a PFS level TSF design to increase the storage capacity.
- Develop a comprehensive tailing management plan for the LOM.
- Update the dam break analyses, considering the ponded water and associated fine tailing release.
- Prepare an updated seismic hazard study with a site-specific PSHA and DSHA. Current MCE seismic parameters appear to be low compared with regional probabilistic seismic hazard analyses.
- Update the TSF No. 7 embankment slope stability analyses using the updated seismic hazard study parameters and updated materials properties. Stability numerical models should include the model calibration based on field geotechnical instrumentation data, laboratory tests results and available technical literature parameters for specific materials.
- Install proper geotechnical instrumentation within the embankment and abutments.
- Verify filter compatibility between the different fill zones.
- Maximize the reuse of water that has been used in the process and reduce the loss of water during the transport and disposal of tailings into the impoundment (i.e., via evaporation and infiltration).

- Freshwater has limited availability for mining use. Its availability could be related to the climate conditions in the area (high evaporation and low precipitation concentrated in a few rainfall events) and the hydrogeological site conditions. Freshwater is also relatively expensive (~1 US$/$m^3$, as indicated by Grupo Mexico personnel). Some recommendations to optimize the tailings water recovery are indicated below:
  - Golder recommends performing a trade-off study to compare tailings dewatering technology options, including thickened, paste, and filtered tailings. Filtered tailings appear to be an attractive option due to the site conditions.
  - Minimize the construction of internal dikes to manage the tailings beaches development. Instead, replace the current tailings transport system (where tailings have been discharged by gravity directly into the existing natural valley and travel approximately 4 km to 5 km until discharged into the impoundment) using pipelines for tailings transport with several points of tailings discharge (i.e., spigots). Tailings transport by pipelines and tailings disposal by spigots will better control the tailings beaches development and pond location (away from the embankment) and reduce the loss of tailings water by evaporation and infiltration. Should the fresh tailings be an environmental concern due to acid generation or metals leaching, then controlled transport in pipelines will also reduce contact between the process plant and the final disposition area.
- Implement the concept of separation of contact water (water impacted by the mining operation) and non-contact water (runoff/freshwater) and minimize the entering of non-contact water into the tailings impoundment:
  - Build additional small water retention dikes at the north side of the impoundment to capture non-contact runoff. Upgrade current pumping water reclaim system located on the north side.
  - Build diversion channels at the south side of the TSF where there appears to be a significant runoff contribution of non-contact water.
- Develop a detailed TSF water balance (no TSF water balance was available for review). Flow inputs and outputs should be carefully identified, quantified, and supported by specific studies (i.e., hydrogeology, seepage). The detailed TSF water balance should be part of a site-wide detailed water balance.
- Conduct a detailed geochemistry study that assesses long-term environmental impacts based on static and kinetic testing of the embankment and current/future tailings materials, and possibly geochemical modeling, depending on the testing results.
- Postpone placement of ROM leach in the area of La Francisca
- Assess phase designs for LOM plan.
- Assess haulage and equipment availability.

24.0 REFERENCES

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25.0 RELIANCE ON INFORMATION PROVIDED BY THE REGISTRANT

The Qualified Persons for Mineral Resources and Mineral Reserves have relied upon the registrant to supply information that was used in the following Sections:

- Section 3.0 – Description of mineral and property rights
- Section 11.3 – Resource pit shell costs and pricing for Mineral Resources
- Section 12.2.4 – COG costs and pricing for Mineral Reserves
- Section 12.2.5 – Pit Optimization costs and pricing for Mineral Reserves
- Section 16.0 – Market Studies
- Section 18.0 – Capital and Operating Costs
- Section 19.0 – Assumptions for Economic Analysis

For the information relating to mineral and property rights in Section 3.0, Golder relied on LC's permitting and environmental team. Golder has not researched property or mineral rights for LC as we consider it to be reasonable to rely on LC's permitting and environmental team who is responsible for maintaining this information.

Golder has also relied on LC's finance team for details regarding applicable taxes, royalties, exchange rates, product pricing, and market studies as noted in the COG and pit optimization for Mineral Resources and Mineral Reserves, Market Studies, and the Economic Analysis. It is Golder's opinion that it is reasonable to rely on LC for this information as LC has been operating the mine for a very long time and is keenly aware of its operations and associated costs.

GOLDER

MEMBER OF WSP