Southern Copper

and

Grupo México MINERÍA

Cuajone Operations
Peru
Technical Report Summary

Report prepared for:

Southern Copper Corporation

Report prepared by:

Wood Group USA, Inc.

wood.

Report current as at:
December 31, 2021.

Date and Signature Page

This technical report summary (the Report), entitled “Cuajone Operations, Peru, Technical Report Summary” is current as at December 31, 2021. The Report was prepared by Wood Group USA, Inc. (Wood), acting as a Qualified Person Firm.

Dated: February 24, 2022.

“signed”

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1 EXECUTIVE SUMMARY

1.1 Introduction

This technical report summary (the Report) was prepared for Southern Copper Corporation (Southern Copper) by Wood Group USA, Inc. (Wood, acting as the QP Firm) on the Cuajone Operations (the Project), located in the District of Torata, Province of Mariscal Nieto within the Moquegua Region, Peru.

1.2 Terms of Reference

The Report was prepared to be attached as an exhibit to support mineral property disclosure, including mineral resource estimates, for the Cuajone Operations in Southern Copper's Form 10-K for the year ending December 31, 2021.

Mineral resources and mineral reserves are reported for the Cuajone deposit.

Unless otherwise indicated, all financial values are reported in United States (US) currency (US$) including all operating costs, capital costs, cash flows, taxes, revenues, expenses, and overhead distributions. Unless otherwise indicated, the metric system is used in this report for mineral resources and mineral reserves and associated financials. Mineral resources and mineral reserves are reported using the definitions in Regulation S–K 1300 (SK1300), under Item 1300. The Report uses US English.

1.3 Property Setting

The Cuajone Operations are located in the Torata District, Mariscal Nieto Region, of Moquegua, approximately 878 km from the city of Lima and 27 km from the city of Moquegua.

The Cuajone mine is accessible by paved road from Lima or Tacna by the Pan-American Highway. The Quebrada Honda tailings storage facility (TSF) is about 120 km via local roads, south of the Cuajone Operations. Access within the Project area is via developed roads that are routinely maintained.

Tacna, Moquegua, and Ilo have regularly scheduled air services from Lima.

Climate conditions vary with altitude, from moderately temperate at lower elevations to intensely cold at high elevations. Mining operations are conducted year-round. Exploration activities are conducted year-round.

1.4 Mineral Tenure, Surface Rights, Water Rights, Royalties and Agreements

The Cuajone Operations and the Ilo smelter/refinery are owned and operated by Southern Peru Copper Corporation, Sucursal del Perú.

The Project consists of a single mining concession, "Acumulación Cuajone", registration code 010000512L, which was granted on 16 July 2021, and covers an area of 15,024.5 ha. There are two approved beneficiation concessions: Concentradora de Botiflaca, which allows for 90,000 t/d processing capacity; and Cuajone solvent extraction (SX) leach plant, permitted for 3,100 t/d. The beneficiation concessions have been amended on a number of occasions.

Southern Copper holds a "right of free use" on the uncultivated lands in the Cuajone mining concession and Quebrada Honda tailings TSF areas. There are granted easements covering the TSF and related facilities, the TSF pipelines, and water pipelines from the Suches lagoon to the Cuajone Operations. These easements will be maintained as current as long as the mine operates and Southern Copper pays the government annual fees.

Southern Copper has both groundwater and surface water usage licenses, for a total extraction rate of 1,950 L/sec.

A mining royalty is payable to the Government of Peru, based on operating income margins with graduated rates ranging from 1–12% of operating profits. There is also a mining tax payable, based on operating income, with rates that range from 2–8.4%.

1.5 Geology and Mineralization

The Cuajone deposit is considered to be an example of a porphyry copper–molybdenum deposit.

The basal regional geology consists of Precambrian metamorphic rocks that are cut by Paleozoic granite, and are unconformably overlain by Upper Triassic to Jurassic marine volcanic and sedimentary lithologies. Overlying these units are late Cretaceous to early Tertiary rhyolites, andesites and agglomerates of the Toquepala Group. These lithologies are intruded by the composite, polyphase Cretaceous to Paleogene Coastal (Andean) Batholith.

Mineralization and alteration at the Cuajone deposit is directly related to a multi-stage latite porphyry that intrudes basaltic andesites and the overlying 370 m of rhyolite porphyries of the Toquepala Group. The Cuajone porphyry deposit exhibits a zoned alteration pattern that includes potassic, propylitic, sericitic and intermediate argillic hydrothermal alteration styles.

Hypogene mineralization represents >98% of the remaining mineralization within the Cuajone open pit. The mineralogy is typically simple and consists of pyrite, chalcopyrite, and bornite, with sparse sphalerite, galena, and enargite.

1.6 History

Southern Copper has had an interest in the Project area since 1954. Predecessor companies included Cerro de Pasco Corporation, Newmont and Asarco. Work conducted by Southern Copper and its predecessor companies included geology and photogeology studies, tunneling, churn drill, core and reverse circulation (RC) drill campaigns, metallurgical testwork, and engineering studies. The Cuajone mine commenced operations in 1976.

1.7 Exploration, Drilling, and Sampling

Drilling totals 1,599 core, churn, and reverse circulation (RC) drill holes (446,394 m). Drilling that supports mineral resource estimation consists of 870 core, churn and RC drill holes, (301,037 m).

Historically, geological data were recorded on paper log forms; however, since 2017, logging data have been entered directly into GVMapper. Logging currently uses pre-set geological codes. Logging consists of collection of structural and geological data, and recovery statistics. Core recoveries were reported by Southern Copper to be generally good.

The collar survey method for the earlier campaigns is not known and there is no original hard copy data to verify the collar locations in the database. Southern Copper has, whenever possible, picked up historical collar locations with modern equipment. Such surveys have largely confirmed the drill hole collar locations. Collar surveys for the 2015–2020 drilling were performed by mine surveyors using Trimble R12 GPS instruments.

The majority of the drill holes were vertical. The database does not record why certain drill holes and not others, were down-hole surveyed. Downhole surveys were not systematically performed during the pre-2011 drill campaigns, with exception of some drill holes completed during the 2000 drill campaign. Where surveys were performed, instrumentation included Sperry Sun single- and multi-shot, Eastman, CBC Welany, Christensen, and WhipStock GmbH single-shot, Flexit, Peewee, and Devishot instruments, and Precision Tools gyroscopes. Where recorded, surveys could be on 3, 5 or 50 m intervals.

Core and RC drill holes were sampled on 3 m intervals. Blasthole samples are sampled by cutting four channels on opposite sides of the cuttings pile. Samples are scraped from the walls of the channels and placed in a bag.

The database contains 24,174 density determinations performed by Southern Copper personnel using the water immersion method.

Laboratories used for analysis have primarily been internal company laboratories, either at the Toquepala mine site or at the Ilo smelter (neither were accredited). Independent laboratories included Certimin, ALS Global, Bureau Veritas, SGS Perú, and Inspectorate. Where known, accreditations held included ISO 14001, ISO9001, and ISO 17025.

Sample preparation methods varied over time. Depending on the program this included: drying; initial crushing to 90% passing 6 mm, secondary crushing to 90% passing 2 mm (10 mesh), and pulverizing to 95% passing 105 µm.

Analytical methods, where known, included atomic absorption (copper and molybdenum) and inductively coupled plasma (multi-element suite). Sequential copper analyses were also conducted, as were carbonate and chlorine assays.

Quality control programs for pre-2017 drill campaigns are not recorded. Southern Copper selected 160 samples (80 one-half core samples; 80 pulp samples) from 69 holes drilled in 1980, 1994, 2000, 2006, and 2011–2015 and sent them to Certimin for check assaying. Accuracy was judged by Wood to be generally acceptable.

Quality control programs for exploration core holes and bast holes were implemented in 2017 with insertion of certified reference materials (standards), coarse blanks, fine blanks, twin samples, coarse duplicates, and pulp duplicates. The use of check samples was also adopted. Precision for copper and molybdenum is considered to be acceptable. The standards showed acceptable bias.

Bureau Veritas was sent a total of 268 pulp samples, from drill campaigns in 1982, 2009, 2011, 2012, 2017, and 2018, to evaluate the quality of the internal Ilo laboratory facility. Biases of the Ilo data relative to Bureau Veritas were acceptable for copper (-1.6%) and questionable for molybdenum (-6.3%).

Southern Copper personnel collected 40 samples per month during the months of December 2020 to March 2021 to send to Certimin to evaluate the quality of the primary Ilo laboratory. Results indicate acceptable correspondence between the two laboratories.

Selected blasthole pulps from late 2020 and early 2021 that were analyzed at the internal Ilo laboratory were submitted to the Inspectorate laboratory in Lima (Inspectorate) for check assay. The results of the blasthole check assays are good.

Selected drill hole sample pulps and archived core intervals from resource drill programs from the late 1990s to 2021, which were analyzed at the Cuajone mine laboratory until 2016 and at the Ilo laboratory from 2016 to 2020, were submitted to Inspectorate for check assay. Reproducibility of the samples from before 2016 is poorer than expected, suggesting potential issues with sampling, sample preparation, assaying or database integrity for the samples analyzed at the Cuajone mine laboratory before the implementation of QA/QC programs and use of the Ilo laboratory.

1.8 Data Verification

Wood's data verification included site visits, comparisons of the dataset and its available original sources including collar, survey, density, assay certificates and reports; and a limited check assay program. Wood is of the opinion that the data verification programs for Project data adequately support the geological interpretations, the analytical and database quality, and therefore support the use of the data in mineral resource estimation.

1.9 Metallurgical Testwork

Mining operations commenced in 1976, and the original samples supporting metallurgical testwork and process designs are long since mined out. Two different laboratories were used to perform metallurgical testwork. The Southern Copper-operated Cuajone concentrator was used from 2007–2012, and is not independent. Inmet Chapi in Arequipa (Inmet) was used in 2008 and is an independent laboratory. Leach Inc., a metallurgical consultancy, was retained to provide advice to the Southern Copper metallurgical team.

Testwork consisted of Bond ball mill work index, and flotation tests.

The LOM head grade and copper recovery for the oxide facilities are expected at 0.497% (including material feed from existing stockpile) and 57.74% respectively.

Within the sulfide plant, recoveries forecast are:

- The LOM expected copper recovery is estimated at 84.73%
- The LOM expected molybdenum recovery is estimated at 62.84%.

The forecast LOM copper concentrate grade is 25.42%, and the LOM molybdenum concentrate grade forecast is 54.13%.

A significant number of samples were selected by rock type/alteration for comminution and flotation testing. Tests were performed on samples that are considered to be representative of the different orebodies/zones and the mineralogy and alteration styles.

The copper and molybdenum concentrates produced at the Cuajone Operations are considered clean concentrates as they do not contain significant amounts of deleterious elements.

1.10 Mineral Resource Estimates

1.10.1 Estimation Methodology

Mineral resource estimates were performed by third-party consultants, Hexagon.

A partial model indicator kriging approach was used to estimate copper and molybdenum grades. Exploratory data analysis consisted of review of histogram and probability plots.

The lithological model consists of four groups, there are eight alteration domains, and eight geometallurgical domains. Geometallurgical zones were assigned based on the percentages of lithology, alteration, and mineralization types in each block.

Lithology, alteration and mineralization domains were combined to produce geometallurgical domains for estimation of work index and the geometallurgical domains were also used for bulk density assignment. The mean value of bulk density determinations was assigned to each geometallurgical domain for tonnage estimation.

No capping or outlier restrictions were used during mineral resource estimation.

More than 90% of the intervals of the exploratory holes have a length of 3 m. Data were composited to 3 m.

Variography was completed in MineSight software on total copper (CuT), solubility index for soluble copper (ROX), solubility index for cyanide-soluble copper (RSUL), soluble copper (CuS) (CUSAC), cyanide soluble copper (CuCN) (CUSCN), molybdenum, silver, iron, and soluble Fe (FESAC).

Copper, CUSAC, CUSCN, molybdenum, iron, arsenic, antimony, bismuth, lead, zinc, potassium, magnesium, sodium, calcium, AL_2O_3, chlorite, CO_3, manganese, FESAC, sulfur, selenium, SIO_2, and silver were estimated with ordinary kriging (OK). Blocks that were not estimated were assigned a mean grade according to their corresponding estimation domain. Indicators of total copper grade anomalies were estimated using OK. To complement the global statistical reviews, estimates were constructed using polygonal and inverse distance to the second power (ID2) methods.

Wood completed visual inspection of copper and molybdenum models and geostatistical validation of global bias (comparison of OK and nearest neighbor (NN) models), local trends in grade profiles (swath plots using ID2 and NN estimates and declustered composites) and change of support for each estimation domain. Reconciliation was also used as a validation tool.

Mineral resource classification was based on the distance from the block center to the closest estimation composite. The final classification was:

- Indicated: 60 m average distance (two-hole); 30 m extrapolation around singe drill holes
- Inferred: maximum 300 m average distance (two-hole) and were restricted to 120 m average distance to the three closest composites to avoid classifying blocks with assigned grades as inferred mineral resources.

No measured mineral resources were classified.

Wood constrained the mineral resource estimates within conceptual pit shells using a Lerchs–Grossmann algorithm. Commodity prices used in resource estimation were based on long-term analyst and bank forecasts, supplemented with research by Wood's internal specialists. The estimated timeframe used for the price forecasts is the 48-year LOM assumption that supports the mineral reserve estimates. The internal cut-off grade used for mineral resource estimation for sulfide material was 0.130% Cu. Material to be sent to the leach pad was reported at an internal cut-off of 0.118% Cu. Wood considers those blocks within the constraining resource pit shell and above the cut-off applied to have reasonable prospects for economic extraction.

1.10.2 Mineral Resource Statement

Mineral resources are reported using the mineral resource definitions set out in SK1300, and are reported exclusive of those mineral resources converted to mineral reserves. The reference point for the estimate is in situ. The mineral resource estimate is current as at 31 December, 2021.

The indicated mineral resource estimates for the Cuajone Operations are provided in Table 1-1. The inferred mineral resource estimates are included in Table 1-2. Wood is the QP Firm responsible for the estimate.

Table 1-1: Indicated Mineral Resource Statement

Process Type	Tonnage (kt)	Copper Grade (%)	Molybdenum Grade (%)	Contained Copper (klb)	Contained Molybdenum (klb)
Sulfide	282,338	0.47	0.02	2,943,603	105,843

Table 1-2: Inferred Mineral Resource Statement

Process Type	Tonnage (kt)	Copper Grade (%)	Molybdenum Grade (%)	Contained Copper (klb)	Contained Molybdenum (klb)
Sulfide	601,363	0.32	0.01	4,286,113	144,217
Oxide	89	0.12	—	240	—
Total	***601,452***	***0.32***	—	***4,286,353***	***144,217***

Notes to Accompany Mineral Resource Tables

1. Mineral resources are reported in situ and are current as at December 31, 2021. Mineral resources are reported exclusive of mineral reserves. Mineral resources that are not mineral reserves do not have demonstrated economic viability. Wood is the QP Firm responsible for the estimate.
2. Mineral resources are constrained within an optimized pit shell based on copper and molybdenum only. Mineral resources are reported within a conceptual pit shell that uses the following input parameters: metal prices of US$3.80/lb Cu and US$10.35/lb Mo; average metallurgical recovery assumptions of 84% for copper and 54% for molybdenum from a process plant and 47% copper recovery from a heap leach; based mining cost of US$ 1.39/t, mill process operating costs of US$8.33/t, leach costs of US$4.70/t; concentrate payable price of US$3.46, molybdenum concentrate payable price of US$8.58/t, and leach copper payable price of US$ 3.35/t.
3. Numbers in the table have been rounded. Totals may not sum due to rounding.

Areas of uncertainty that may materially impact the mineral resource estimates include: changes to long-term metal price and exchange rate assumptions; changes in local interpretations of mineralization geometry such as presence of unrecognized mineralization off-shoots; faults, dikes and other structures; and continuity of mineralized zones; changes to geological and grade shape, and geological and grade continuity assumptions; changes to metallurgical recovery assumptions; changes to the input assumptions used to derive the conceptual open pit shell that is used to constrain the estimates; changes to the cut-off values applied to the estimates; variations in geotechnical (including seismicity), hydrogeological and mining assumptions; and changes to environmental, permitting and social license assumptions.

1.11 Mineral Reserve Estimates

1.11.1 Estimation Methodology

Indicated mineral resources were converted to mineral reserves. Inferred mineral resources were set to waste.

Mineral reserves were confined within an optimized pit shell that included consideration of appropriate pit revenue factors, reconciliation data, current topography, geotechnical pit slope recommendations, metallurgical recoveries, operating costs (mining, processing, general and administrative (G&A), smelting, refining and processing costs, SX/EW and selling costs), royalties, metal prices, and net smelter return (NSR) cut-offs.

The determination of what was ore versus waste was based on a process that considered sulfide grade and amenability to either concentration or leach processes. For the concentration process, an internal cut-off value of 0.164% Cu. This internal cut-off value included mining, processing, sustaining, G&A, and other costs charged to the process. For the leaching process, an internal cut-off value of 0.159% Cu was used, which only considers leaching process costs.

1.11.2 Mineral Reserve Statement

Mineral reserves are reported using the mineral reserve definitions set out in SK1300. The reference point for the estimate is delivery to the process plant. Mineral reserves are summarized in Table 1-3.

Areas of uncertainty that may materially impact the mineral reserve estimates include: changes to long-term metal price and exchange rate assumptions; changes to metallurgical recovery assumptions; changes to the input assumptions used to derive the mineable shapes applicable to the open pit mining methods used to constrain the estimates; changes to the forecast dilution and mining recovery assumptions; changes to the NSR cut-off values applied to the estimates; variations in geotechnical (including seismicity), hydrogeological and mining method assumptions; and changes to environmental, permitting and social license assumptions.

Table 1-3: Probable Mineral Reserve Statement

Process Type	Tonnes (kt)	Copper Grade (%)	Molybdenum Grade (%)	Contained Copper (klb)	Contained Molybdenum (klb)
Mill	1,333,559	0.492	0.017	14,452,169	507,620
Leach (from mine)	2,754	0.493	—	29,915	—
Leach (from stockpile)	19,252	0.497	—	211,084	—
Total	***1,355,565***	***0.492***	**—**	***14,693,167***	***507,620***

Notes to Accompany Mineral Reserves Table

1. Mineral reserves are current as at December 31, 2021. Wood is the QP Firm responsible for the estimate.
2. Mineral reserves are constrained within a smoothed designed pit based on copper and molybdenum only. The following parameters were used in estimation: assumption of open pit mining methods; assumption of heap leach and concentrate processing; copper price of US$3.30/lb, molybdenum price of US$9.00/lb; internal net smelter return cut-offs of US$9.147/t for concentrator, and an internal NSR cut-off of US$4.698/t for leaching process; mining recovery of 100%; variable metallurgical recoveries (average LOM recoveries of 85 % for copper by concentration, 63 % for molybdenum by concentration, and 47% for copper by leaching); average copper recoveries of 97.426% for smelting and 99.855% for refining; reference mining cost of US$1.95/t mined, with an additional US$0.012/t for up haulage costs and US$0.02/t for down haulage; average process costs of US$9.147/t for concentration and US$4.698/t for leaching; metal price deductions of US$0.208/lb for smelted and refined copper, US$1.446/lb for concentrated molybdenum, and US$0.419/lb for copper obtained by SX/EW; 1% royalty applied to the NSR
3. Numbers in the table have been rounded. Totals may not sum due to rounding.

Areas of uncertainty that may materially impact the mineral reserve estimates include: changes to long-term metal price and exchange rate assumptions; changes to metallurgical recovery assumptions; changes to the input assumptions used to derive the mineable shapes applicable to the open pit mining methods used to constrain the estimates; changes to the forecast dilution and mining recovery assumptions; changes to the NSR cut-off values applied to the estimates; variations in geotechnical (including seismicity), hydrogeological and mining assumptions; and changes to environmental, permitting and social license assumptions.

1.12 Mining Methods

The Cuajone Operations use conventional truck-and-shovel open pit mining methods.

Geotechnical zones used for pit designs were based on guidance provided by a third-party consultant. Overall slope angles were estimated based on the final pit design developed by Southern Copper.

Water that accumulates in the base of the pit is pumped out of the pit and used for dust suppression.

Nine pit phases remain in the life-of-mine (LOM) plan, starting with phase 6 and ending with phase 10C. The mine plan assumed a maximum mining capacity of 115 Mt of annual movement and a nominal processing rate of 90 kt/d of sulfide ore at the concentration facility.

The mill crusher is located at elevation 3295 masl in the northern zone of the pit. Material is supplied either directly by haul trucks or is fed from a short-term sulfide stockpile near the crusher. From the crusher, the crushed material is transported using a 7 km long conveyor belt to the concentrator plant. The mill crusher throughput is a nominal 90 kt/d.

Material destined for the heap leach can be sent either directly to a short-term stockpile, or to the leach crusher that is located at elevation 3480 masl, 5.9 km southwest of the pit. Crushed leachable material is rehandled by loaders and trucks and deposited on a heap leach pad approximately 1.0 km northeast of the leach crusher.

Equipment is conventional, and consists of drill, load, haul and support equipment.

1.13 Recovery Methods

The process designs were based on existing technologies and proven equipment, and the plants constructed using those designs have a 45-year operating history.

The Cuajone heap leach facility was designed to treat oxide ores and produce a copper-rich pregnant leach solution (PLS) that is sent to the Toquepala Operations for solvent extraction/electrowinning (SX/EW) recovery. Oxide ore is treated in a conventional leaching facility consisting of two stages of crushing, agglomeration and permanent leaching pads.

The Cuajone concentrator treats sulfide material to produce copper and molybdenum concentrates. The majority of the copper concentrate is sent to the Ilo smelter and refinery to produce copper cathodes as the final product. The molybdenum concentrate is sold to third parties. The Cuajone concentrator commenced operations on November 25, 1976 and was initially designed to process 40,823 t/d. Following upgrades and plant modifications, the current plant capacity is 90,000 t/d.

The Ilo smelter processes the copper concentrates from the Cuajone and Toquepala concentrators and produces copper anodes for the Ilo refinery. In 2007 a new smelter was commissioned at Ilo, with a nominal capacity of 1,200,000 t/a of copper concentrate. The smelter consists of one single Isasmelt smelting unit associated with two rotary holding furnaces, four Peirce Smith converters, two anode furnaces associated with twin anode casting wheels, two acid plants, two oxygen plants, and auxiliary services plants.

The Ilo refinery is located in the Pampa de Caliche at 9 km north of the city of Ilo. The plant was acquired by Southern Copper in 1994 and modernized to produce 246,000 t/a of copper cathodes. It was subsequently expanded to the current annual capacity of 294,763 t/a of copper cathodes. The Ilo refinery has the capacity to produce 125,000 kg Ag, 840 kg Au, and 50,000 kg Se annually.

Power is sourced from the National Intercontected Electric System (SEIN).

Fresh water for the mine and process facilities is obtained from both ground and surface sources. All sources discharge into the Vina Blanca lagoon from where the fresh water is supplied to the process facilities.

The primary consumables in the various process plants include:

- Heap leach plant: sulfuric acid
- Concentrator: flotation reagents such as: collector, frother, flocculant, sodium hydrosulfide (NaSH), diesel and lime; steel grinding media.

Power is sourced for process needs from the Peruvian grid.

1.14 Infrastructure

All required infrastructure to support the Cuajone Operations is in place. Additional tailings storage will be required to support the LOM plan after approximately the end of 2035.

On-site infrastructure that supports the Cuajone Operations include: an open pit; four WRSFs; two oxide stockpiles; four leach pads; process facilities; warehouses, workshops, and offices; 138 kV and 220 kV power transmission lines; electrical substation and power distribution system; water handling facilities; permanent camp for operations; and a railway and rail yard.

Off-site infrastructure includes: access road; 138 kV and 220 kV power transmission lines; electrical substations and power distribution systems; railway; Quebrada Honda TSF; water supply system; smelter, refinery and sulfuric acid plants at Ilo; port facilities in Ilo including dock and storage areas, rail yard, and wagon repair shop; port facilities in Tablones, where hydrocarbons and sulfuric acid are unloaded and sent to the mine site; and the Simón railway yard, which has assembly and dispatch areas, as well as workshops and offices.

Railways extend from Ilo to Toquepala, and a spur railway runs from the Toquepala Operations to the Cuajone Operations. Supplies such as sulfuric acid, equipment, fuel, and mining supplies are transported to the operations using the rail network. Concentrates are railed from the mine site to the Ilo smelter/refinery, and cathodes produced at the refinery are railed to the Port of Ilo. The Port of Ilo is a private port, operated by Southern Copper. It has two berths, and can take vessels to 40,000 deadweight. The port is the export point for copper cathodes, copper concentrate, sulfuric acid and molybdenum; and the import location for general containerized and loose cargo to support operations.

The TSF operates as a cross-valley impoundment and is confined by two dams constructed of cyclone tailings sand. The remaining capacity of the existing TSF will support operations until approximately the end of 2035.

No waters are discharged from the operations as no mining effluents are generated at the mine site. At Quebrada Honda, Southern Copper is authorized to dispose of decanted water from the tailings. Water from the TSF is used in the process plant, following treatment in a neutralization facility.

Collectively, the Toquepala and Cuajone Operations, together with the Ilo smelter/refinery complex, have five accommodations areas, which provide a permanent accommodation capacity of 4,756 persons.

The energy supply for the Toquepala Operations comes from SEIN, primarily from natural gas-fired thermal power plants located in the Chilca–Lima district of Peru, and from the Antunez de Mayolo and Cerro del Aguila hydroelectric power plants. Power is transmitted to the Southern Copper facilities in transmission networks of 500, 220 and 138 kV, using two Southern Copper-owned transmission lines of 138 kV (225 km long) and 220 kV (240 km long). The Ilo facilities are supported by 564 MW of power supplied by SEIN, and 564 MW of gas reserve power from the southern Peru gas pipeline.

1.15 Market Studies

Copper futures are exchange-traded contracts on all of the world's major commodity exchanges. Copper is the world's third most widely used metal after iron and aluminum and is primarily consumed in industries such as construction and industrial machinery manufacturing. The Cuajone Operations produce copper concentrates and copper cathodes.

Molybdenum is mainly used as an alloying agent in stainless steel, and also in the manufacture of aircraft parts and industrial motors. Molybdenum futures are available for trading in The London Metal Exchange (LME). Prices are generally determined by principal-to-principal negotiations between producers, trading houses, and end users. The Cuajone Operations produce molybdenum concentrates.

Gold and silver is sold as contained in the copper concentrate and not as a separate product from the mine.

Southern Copper employs a corporate strategy that is in line with the company's marketing experience, and experience with obtaining long-term contracts with strategic business partners in the Asian and European markets, as well as annual contracts with other active market participants.

Normally over 60% of the molybdenum concentrate is sold to Chile, with the remainder sold into the Northern Europe, Asia and the US markets. Cathode copper is sold onto the Asian, European, Brazilian and/or North American markets.

To establish the copper price forecasts Wood used a combination of information derived from 22 financial institutions, from pricing used in technical reports filed with Canadian regulatory authorities over the previous 12-month period, from pricing reported by major mining companies in public filings such as annual reports in the previous 12-month period, spot pricing, and three-year trailing average pricing. Wood considers that a long-term price forecast of US$3.30/lb Cu is reasonable.

It is in accordance with industry-accepted practice to use higher metal prices for the mineral resource estimates than the pricing used for mineral reserves. The copper price forecast of US$3.30/lb was increased by 15% to provide the mineral resource estimate copper price estimate of US$3.80/lb.

Wood reviewed the Southern Copper long term forecast price for molybdenum of US$9.00/lb, and concluded that the molybdenum price selected by Southern Copper is reasonable and conservative compared to what others have recently been using in the industry. Wood considers there is a reasonable probability that the realized price of molybdenum will be at or higher than forecast US$9.00/lb over the projected LOM. The Southern Copper molybdenum price forecast of US$9.00/lb was increased by 15% to US$10.35/lb to provide the input to the mineral resource constraining pit shell and NSR cut-off.

The forecasts used are:

- Mineral resources
  - Copper: US$3.80/lb;
  - Molybdenum: US$10.35/lb

- Mineral reserves:
  - Copper: US$3.30/lb;
  - Molybdenum: US$9.00/lb

Cashflows use the mineral reserves price forecasts.

The exchange rate for cashflow analysis purposes was US$1.00 = PENS/3.60. This exchange rate was provided by Southern Copper.

Cuajone Operations concentrates are sent to the Ilo Smelter and Refinery for processing to produce refined cathodes. When the production from the Cuajone Operations exceeds the smelter's capacity, a portion is sold to third parties. In recent years, these sales to third parties Cuajone Operations concentrates have represented about 20–25% of the annual production. Approximately 95% of the production of refined cathodes is sold under annual contracts with industrial customers (mainly copper rod producers), with whom Southern Copper has had a commercial relationship for many years, and about 5% is sold on the spot market.

The largest in-place contracts other than for product sales cover items such as bulk commodities, operational and technical services, mining and process equipment, and administrative support services. Contracts are negotiated and renewed as needed.

1.16 Environmental, Permitting and Social Considerations

1.16.1 Environmental Studies and Monitoring

Baseline studies were completed prior to mine start-up, and included assessments of air quality, noise, vibrations, water and sediment quality, flora and fauna surveys, and the human environment. Baseline and supporting studies were completed in support of Project permitting, together with development of management plans to address major impacts. These included environmental impact assessments, environmental management plans, evaluation of flood controls on the Torata River, archaeological surveys, and closure planning.

As per permit requirements, Southern Copper has a number of monitoring programs in place, and monitors surface water, ground water and air quality in accordance with commitments made in the Environmental Management and Adjustment Plan, Environmental Impact Study, Closure Plans and updates to those plans and studies.

1.16.2 Closure and Reclamation Considerations

The Mine Closure Plan for the Cuajone Operations was approved in 2009, and modifications were approved in 2012 and 2019. Closure costs are included in the mine site financial model as cash costs on an annual basis. The current closure plan and cost estimates were prepared in 2019. A portion of the closure costs for the Quebrada Honda TSF were allocated, based on tailings production, to the Cuajone Operations.

The closure cost used in the economic analysis is US$251.8 M, and is inclusive of the Peruvian general sales tax.

1.16.3 Permitting

The Cuajone Operations and the Ilo smelter/refinery have all of the required permits to operate. The operations maintain a permit register, which includes a record of the legal permits obtained, the approval authority, permit validity period and expiration dates, permit status (current, canceled or replaced) and whether or not the permit requires renewal. The operations also have a control and monitoring system to ensure that the requirements of each permit are monitored to comply with the relevant regulatory conditions imposed.

1.16.4 Social Considerations, Plans, Negotiations and Agreements

Southern Copper has community programs in place as part of its Social Management Plan. However, the Social Management Plan is not currently formally incorporated into the base EIA or subsequent amendments.

Southern Copper has communication channels and tools in place, based on the company's community development model, which allow the company to recognize potential conflicts early, to work with the community to find appropriate solutions to address their concerns, and generate positive social license conditions for the continued operation of Southern Copper's mining projects.

1.17 Capital Cost Estimates

Capital cost estimates are at a minimum at a pre-feasibility level of confidence, having an accuracy level of ±25% and a contingency range not exceeding 15%. All capital costs were expressed in Q4 2021 US$.

In general, the Cuajone Operations have the necessary facilities to carry out the current operations. Sustaining capital costs were estimated by area and allocated over time to support the proposed mine production schedule at current production throughputs.

Mine equipment requirements were estimated by operating area (drilling, loading, hauling, support, etc.) based on the proposed LOM plan and equipment replacement ratios provided by Southern Copper.

Leach pad expansion costs were estimated based on a unit cost of US$2.9/t of oxide ore.

The costs associated with the raise of the existing Quebrada Honda TSF account for the works to expand the TSF to its maximum design storage capacity until approximately the end of 2035. Costs were distributed between the Cuajone and Toquepala Operations proportionally to the tailings tonnages to be produced by each.

Additional tailings storage capacity is required once the Quebrada Honda TSF reaches capacity. Wood assumed that a co-stack (dry-stack) facility which would store waste and tailings would be constructed. Land acquisition costs as provision for waste and tailings management space were also included in the estimate. Sustaining costs at US$0.56 M each year and US$11.3 M every three years were included for relocating conveyors for continued operation, equipment replacement, associated with the conveyor systems, and additional cost related to changing/updating filtering equipment.

Cost allocations were made for sulfide crusher relocation, which assumed that a new crusher would be installed.

Mine equipment and facilities maintenance, process facilities sustaining and maintenance, and other general sustaining and maintenance costs were accounted for based on the following unit costs derived from a five-year (2022-2026) sustaining and maintenance cost schedule developed by Southern Copper.

The sustaining capital cost estimate totals US$4,617.4 M (Table 1-4).

Table 1-4: Sustaining Capital Cost Estimate

Area	Sustaining Capital Cost (US$ M)
Mining equipment	1,817.0
Leach pad expansion	64.2
Existing tailings storage facility (Quebrada Honda) raise	122.3
Filtering tailings plant, inc. land acquisition	594.5
Primary crusher relocation	60.6
Mine equipment and facilities maintenance	710.0
Process facilities sustaining and maintenance	1,061.7
Other general sustaining and maintenance	187.1
Total	***4,617.4***

Note: Numbers have been rounded. Totals may not sum due to rounding.

1.18 Operating Cost Estimates

Operating cost estimates are at a minimum at a pre-feasibility level of confidence, having an accuracy level of ±25% and a contingency range not exceeding 15%.

Operating costs were based on actual costs and data from Southern Copper's operating mines in Peru, Wood's experience and the proposed mine and process plans.

Mine operating costs are forecast to average US$2.03/t mined over the LOM. The mine cost increases gradually starting at US$1.91/t mined in year 1 (2022) to a cost of US$2.20/t mined in year 25 (2046), due to the increase in ex-pit hauling distance (waste dump facilities) and the deepening of the pit. In the last years of the LOM, the average cost is US$2.02/t mined until the end of the LOM, due to the reduction of waste material. A cost of US$1.0/t reclaimed was applied to account for reclamation costs from the oxide stockpile, which include ore loading, hauling and feeding to the leach pad.

Process operating costs were based on actual costs averages over the period 2017–2021, adjusted to account for the LOM based on expected variations of key commodities costs such as energy, consumables and services. Processing costs include concentration costs, leaching and SX/EW cathode recovery, and smelting and refining at Ilo. Cathode recovery costs were allocated to the Cuajone and Toquepala Operations in proportion to cathodes recovered from their copper content feeds.

Operating costs were allocated to the assumed dry-stack facility that will be required once the Quebrada Honda TSF reaches capacity in approximately the end of 2035. A cost of US$1.67/t was estimated, which includes filtering and thickening, tailing conveying and spreading and compaction of the tailing material.

General and administrative costs are included in the corresponding mining and processing costs.

Table 1-5 is a summary of the operating cost estimates, exclusive of value-added taxes.

As Southern Copper assumes, in its cashflow planning, that the Tia Maria Project will source the required sulfuric acid for that operation from the Ilo smelter and refinery at the cost of production, which represents approximately 720,000 t/a, or about 60% of the total acid production from the Ilo smelter, over approximately 20 years. This cost was removed from the Ilo smelter operating costs.

1.19 Economic Analysis

1.19.1 Forward-Looking Information Caution

Certain information and statements contained in this section are forward-looking in nature and are subject to known and unknown risks, uncertainties, and other factors, many of which cannot be controlled or predicted and may cause actual results to differ materially from those presented here. Forward-looking statements include, but are not limited to, statements with respect to the economic and study parameters of the Cuajone Operations; mineral reserves; the proposed mine plan and mining strategy; ability of mine designs to withstand seismic events; dilution and extraction recoveries; processing method and rates and production rates; projected metallurgical recovery rates; infrastructure requirements; capital, operating and sustaining cost estimates; concentrates and cathodes marketability and commercial terms; the projected LOM and other expected attributes of the Project; the net present value (NPV); future metal prices and currency exchange rates; government regulations and permitting timelines; estimates of reclamation obligations; requirements for additional capital; environmental and social risks; and general business and economic conditions.

Table 1-5: LOM Operating Cost Estimate

Description	Total (US$ M)	Unit Cost	
Mining	8,930.7	US$/t mined	2.03
Process	12,893.5	US$/t processed *	9.51
Total	***21,824.2***		

Note: * Including sulfides and oxides. Numbers have been rounded and may not sum due to rounding.

1.19.2 Methodology

The financial analysis was performed using a discounted cash flow (DCF) method. Net annual cash flows were estimated projecting yearly cash inflows (or revenues) and subtracting projected yearly cash outflows (such as capital and operating costs, royalties, and taxes).

The financial model that supports the mineral reserve declaration was a standalone model that calculated annual cash flows based on: scheduled ore production; assumed processing recoveries; metal sale prices and PEN/US$ exchange rate; projected operating and capital costs; and estimated taxes.

The financial analysis was based on an after-tax discount rate of 10%. Cash flows were assumed to occur at the end of each year and were be discounted to the beginning of 2022 (year 1 of the economic analysis).

Costs projected within the cash flows are based on constant Q4 2021 US dollars.

Revenue was calculated from the recoverable metal and the long-term forecasts of metal prices and exchange rates. Recoverable metal and products include those recovered at the Ilo smelter and refinery from the copper concentrate feed from the mine operation.

1.19.3 Key Parameters and Assumptions

The cashflow assumes, based on Southern Copper's forecast, that on average, in those years when the total annual copper concentrate production from Cuajone and Toquepala Operations is equal or less than the Ilo Smelter nominal capacity (1.2 Mt/a of Cu concentrate), all the copper concentrate from the Cuajone and Toquepala Operations will be treated at the Ilo smelter; and in those years when the total annual copper concentrate production from Cuajone and Toquepala Operations is higher than the Ilo smelter nominal capacity, 90% of the copper concentrate from the Cuajone and Toquepala Operations will be treated at the Ilo smelter, with the remaining 10% sent to third parties.

Typically, about only about 4.50% of the copper anodes produced are sold to third parties; the remainder is sent to the Ilo refinery for cathode production.

Copper and molybdenum concentrate moisture contents and transport costs were based on average costs in 2019–2021. Transport losses applied were based on benchmarks. Commercial terms were applied to the portion of the copper concentrate that is assumed to be sold to third parties and to molybdenum concentrate and copper anode and cathode sales.

Neither the revenue from silver shot and gold-bearing doré bars nor the costs associated with these products is included in the cashflow analysis.

Approximately 88% of the sulfuric acid produced is sold within South America, with 60% of that acid production figure going to Chile, and 40% to Peru. The remaining 12% is used in the Cuajone and Toquepala Operations. Southern Copper assumes, in its cashflow planning, that the Tia Maria Project will source the required sulfuric acid for that operation from the Ilo smelter and refinery at the cost of production, which represents approximately 720,000 t/year, or about 60% of the total acid production from the Ilo smelter. All other revenue from acid sales apart from that from the Tia Maria project have been excluded from the financial model.

Special mining taxes and the modified mining royalty are included in the economic analysis.

Closure costs were allocated in the relevant cashflow years based on the progressive, final and post closure schedule. It was assumed that closure cost accruals are not required and closure obligations will be satisfied by either escrow with other Southern Copper assets as collateral, a bond or a bank letter of credit. The salvage value was assumed to be zero.

The taxation modeled within the financial analysis is based on the taxation scheme that was provided and validated by Southern Copper.

1.19.4 Economic Analysis

The Cuajone Operations are anticipated to generate a pre-tax NPV of US$2,528.5 M at a 10.0% discount rate and an after-tax NPV of US$1,553.8 M at a 10.0% discount rate.

As the mine is operating, and initial capital is already sunk, considerations of IRR and payback are not relevant.

A cashflow summary is provided in Table 1-6.

Table 1-6: Summary of Economic Results

Description	Units	Value
Remaining mine life	Years	48
Copper payable	Mt	5.45
Molybdenum payable	Mt	0.14
After-Tax Valuation Indicators		
Undiscounted cash flow	US$M	9,285.1
NPV @ 10.0%	US$M	1,553.8
Sustaining capital	US$M	4,617.4
Closure cost (inc. IGV)	US$M	251.8
Mining operating cost	US$M	8,930.7
Process operating cost	US$M	12,893.5

Note: Numbers have been rounded. IGV = value-added tax (Impuesto General a las Ventas.

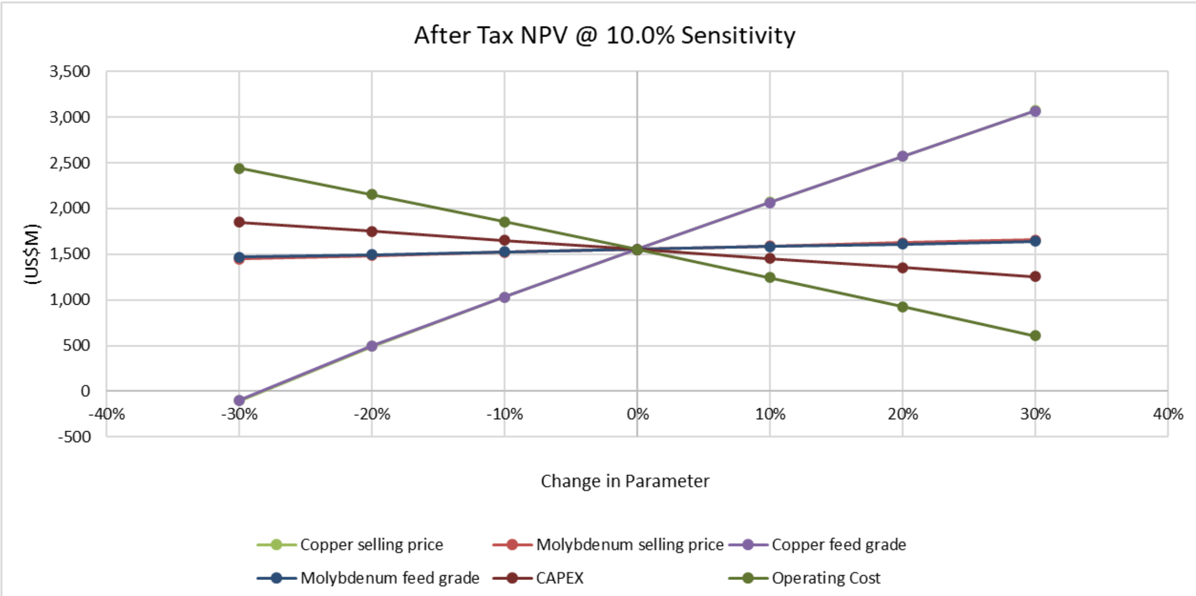
1.19.5 Sensitivity Analysis

A sensitivity analysis was performed to identify potential impacts on the after-tax NPV of variations in metal prices, grades, sustaining capital costs and operating costs. The results of this analysis are presented in Figure 1-1 (NPV). For the purpose of the sensitivity to metal grades, it was assumed that the capacity of the processing facilities are not a constraint.

The Cuajone Operations are most sensitive to fluctuations in copper price and grade. It is less sensitive to changes in operating costs and capital costs. The operations are least sensitive to variations in molybdenum price and grade.

Table 1-7 presents the after-tax NPV at a range of discount rates from 8–12% with the base case highlighted.

Figure 1-1: After-Tax NPV Sensitivity (10% discount rate)



Note: Figure prepared by Wood, 2021.

Table 1-7: After-Tax NPV Sensitivity to Discount Rates (base case is highlighted)

Discount Rate	After-Tax NPV (US$ M)
NPV @ 8%	1,959.1
NPV @ 9%	1,735.4
NPV @ 10%	**1,553.8**
NPV @ 11%	1,404.2
NPV @ 12%	1,279.4

1.20 Risks and Opportunities

1.20.1 Risks

Risks to the Cuajone Operations include:

- The mineral reserve estimates are sensitive to metal prices. Lower metal prices than forecast in the LOM plan may require revisions to the mine plan, with impacts to the mineral reserve estimates and the economic analysis that supports the mineral reserve estimates

- Geotechnical and hydrological assumptions used in mine planning are based on historical performance, and to date historical performance has been a reasonable predictor of current conditions. Any changes to the geotechnical, including seismicity, and hydrological assumptions could affect mine planning, affect capital cost estimates if any major rehabilitation is required due to a geotechnical (seismic) or hydrological event, affect operating costs due to mitigation measures that may need to be imposed, and impact the economic analysis that supports the mineral reserve estimates
- An increase in the clay content of the deposit could have an effect on the process flow, resulting in treatment capacity reduction and increases in operating costs when pumping tailings material to the TSF
- The Quebrada Honda TSF does not have sufficient storage capacity for the LOM. The mine plan assumes that a new facility location can be obtained, designs completed and approved by the relevant regulatory authorities prior to approximately the end of 2035. If the new TSF is not available by the time envisaged, this could affect the mineral reserves, capital and operating cost estimates, and the economic analysis
- Wood has assumed that the new TSF will be a co-stack (dry-stack) facility and has estimated capital and operating costs for such a facility. If the final TSF option uses a different disposal method, this could affect the mineral reserves, capital and operating cost estimates, and the economic analysis
- The new Global Industry Standard on Tailings Management (GISTM) provides a set of industry Standard to guide design and management of TSF's. Members and non-members of International Council on Mining and Metals (ICMM) are required to be in compliance with the GISTM over the next several years. The TSF design needs to be revisited and be revised as needed to be in full compliance with the recently-published global tailings standard (GISTM, 2020). This may result in changes to the design criteria. Such changes may result in increases to the capital cost estimates, and changes to the operating cost estimates, which could affect the mineral reserve estimates

- Labor cost increases or productivity decreases, particularly due to the impact of Covid-19, could also impact the estimated mineral reserves, operating cost estimates and the economic analysis
- Commodity price increases for key consumables such diesel, electricity, tires and chemicals would negatively impact the stated mineral reserves because of the effect on the forecast operating costs
- Assumed permitting and project development timelines may be longer than anticipated for the new TSF
- Political risk from challenges to mining licenses and/or Southern Copper's right to operate.

1.20.2 Opportunities

Opportunities include:

- Conversion of some or all of the measured and indicated mineral resources currently reported exclusive of mineral reserves to mineral reserves, with appropriate supporting studies;
- Upgrade of some or all of the inferred mineral resources to higher-confidence categories, such that such better-confidence material could be used in mineral reserve estimation;
- Higher metal prices than forecast could present upside sales opportunities and potentially an increase in predicted Project economics;

1.21 Conclusions

Under the assumptions in this Report, the operations evaluated show a positive cash flow over the remaining LOM. The mine plan is achievable under the set of assumptions and parameters used.

1.22 Recommendations

The recommendations cover the discipline areas of data storage, mineral resource estimates, tailings storage and permitting. The total recommended budget estimate to complete the programs is US$1.2–US$1.9 M.

Recommendations include:

- Internal controls:
  - Establish a controlled documents database to store copies of internal protocols, management plans, and registers
- Database:
  - Implement a document storage system for all supporting documentation
  - Complete a verification program on recovery, logging, and density data and ensure that only verified data are included in the Project database
- Mineral resources:
  - Complete a capping study and implement a grade capping/outlier restriction process in the next mineral resource update
- Mine plan:
  - Review the mine plan to assess opportunities for smoothing the mine sequencing
- Quebrada Honda TSF:
  - Revisit and revise TSF designs to be in full compliance with the recently-published global tailings standard
- Future tailings and waste management:
  - Review the most appropriate storage mechanisms for these materials for the LOM after approximately the end of 2035 and devise the most appropriate designs given storage requirements and site conditions

Permitting

- Determine what surface rights will need to be obtained in support of the preferred tailings and waste rock storage plan and the path needed to secure these rights and conclude the necessary agreements with current surface rights holders
- Determine the permitting path, and numbers and types of permits and authorizations required to construct and operate the selected tailings and waste rock storage facility

- Confirm if any additional baseline studies will be required in support of permit applications for the preferred tailings and waste rock storage facility

2 INTRODUCTION

2.1 Registrant

This technical report summary (the Report) was prepared for Southern Copper Corporation (Southern Copper) by Wood Group USA, Inc. (Wood, acting as the QP Firm) on the Cuajone Operations (the Project), located in the District of Torata, Province of Mariscal Nieto within the Moquegua Region, Peru (Figure 2-1).

The Cuajone Operations contain the Cuajone deposit.

2.2 Terms of Reference

2.2.1 Report Purpose

The Report was prepared to be attached as an exhibit to support mineral property disclosure, including mineral resource estimates, for the Cuajone Operations in Southern Copper's Form 10-K for the year ending December 31, 2021.

Mineral resources and mineral reserves are reported for the Cuajone deposit.

2.2.2 Terms of Reference

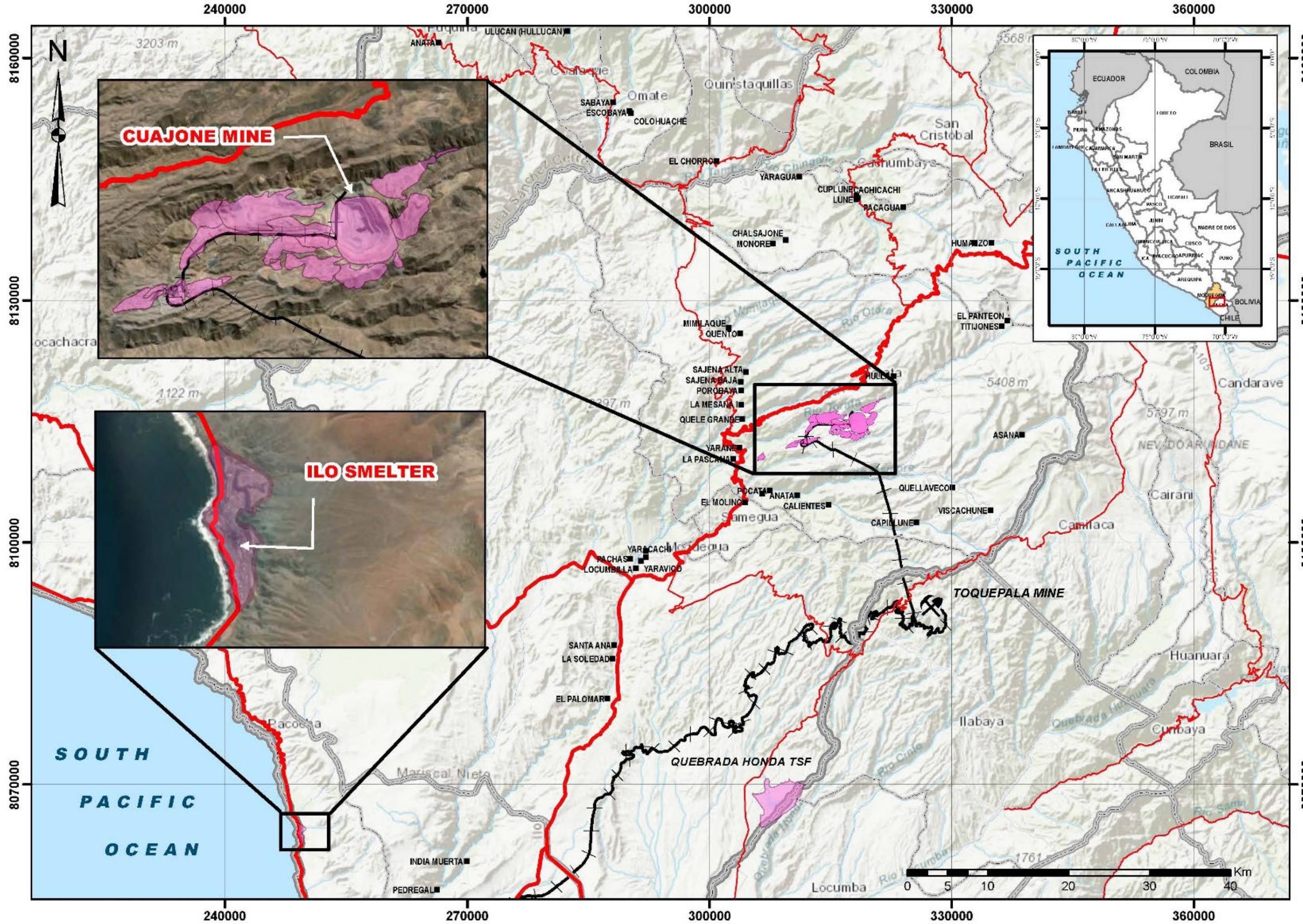
Unless otherwise indicated, all financial values are reported in United States (US) currency (US$) including all operating costs, capital costs, cash flows, taxes, revenues, expenses, and overhead distributions.

Unless otherwise indicated, the metric system is used in this Report.

Mineral resources and mineral reserves are reported using the definitions in Regulation S–K 1300 (SK1300), under Item 1300.

The Report uses US English.

Figure 2-1: Project Location Plan



Note: Figure prepared by Wood, 2021. Red lines are roads, crossed lines are railways, and project infrastructure locations are shown in pink.

2.3 Qualified Persons

Wood is using the allowance for a third-party firm consisting of mining experts to date and sign the Report.

Wood had appropriate individual Qualified Persons (QPs) prepare the content that is summarized in this Report.

A portion of the information was provided by Southern Copper as the registrant as set forth in Chapter 25. Wood has relied on the registrant for the information specified in Chapter 25.

2.4 Site Visits and Scope of Personal Inspection

Wood QPs and support staff visited the Project site. The scope of inspection by each discipline area is summarized in Table 2-1.

2.5 Report Date

Information in the Report is current as at December 31, 2021.

2.6 Information Sources

The reports and documents listed in Chapter 24 and Chapter 25 of this Report were used to support Report preparation.

2.7 Previous Technical Report Summaries

Southern Copper has not previously filed a technical report summary on the Project.

Table 2-1: Scope of Personal Inspection

Discipline Area	Site Visit Date	Scope of Personal Inspection
Geology/mineral resources	23–25 September, 2021	Presentation on the geology of the area by Southern Copper geologists. Review of QA/QC procedures with Southern Copper personnel Visit to the core shed; inspection of reject and pulp storage area. Pit inspection, observed blast hole sampling. Inspected the on-site mine laboratory and observed sample preparation and analysis of blast hole samples.
Infrastructure	25–26 September, 2021	Inspected selected surface infrastructure, including workshops, pit, accesses, railway, belt surface conveyor (overland), water tanks, fuel storage. Inspected infrastructure used for supply of fresh water, including canals, pipelines, dams, and storage ponds. Visited the accommodations complex at Villa Cuajone and Villa Botiflaca; sighted hospital, schools, administrative offices, water tanks, sewage treatment plants. Visited Cuajone concentrator, inspected warehouses, workshops, fuel tanks, water, rail, tailings management and reclaim water storage.
	1 October, 2021	Visited Quebrada Honda TSF. Also visited the refinery facilities, Tablones port terminal, Simón railway yard, foundry, offices and camps, dock, warehouses and workshops in the Puerto area.
Mining engineering	6–7 December, 2021	Inspected the open pit; visited the primary sulfide crusher; viewed waste rock storage facilities and potential sites for additional waste rock storage; visited the mine site offices and discussed mine operations with Southern Copper staff and reviewed proposed LOM plans.
Processing	6–8 December, 2021	Inspected the Cuajone concentrator and the heap leach facilities.

3 PROPERTY DESCRIPTION

3.1 Property Location

The Cuajone Operations are located in the Torata District, Mariscal Nieto Region, of Moquegua, approximately 878 km from the city of Lima and 27 km from the city of Moquegua.

The Project centroid is at about 17° 3.130'S; 70° 44.499' W.

The open pit is centered at approximately 17° 2.601' S; 70° 42.481' W.

The smelter and refinery are located at about 17° 29.924'S; 71° 21.608'W and 17°34.728'S; 71°21.188'W respectively.

The tailings storage facility (TSF) at Quebrada Honda is located at approximately 17° 27.724'S; 70° 47.810'W.

3.2 Property and Title in Peru

Wood has not independently verified the following information which is in the public domain and have sourced the data from Elias (2019), Ernst and Young (2017), and KPMG (2016) as well as from official Peruvian Government websites.

3.2.1 Regulatory Oversight

The right to explore, extract, process and/or produce minerals in Peru is primarily regulated by mining laws and regulations enacted by Peruvian Congress and the executive branch of government, under the 1992 Mining Law. The law regulates nine different mining activities: reconnaissance; prospecting; exploration; exploitation (mining); general labor; beneficiation; commercialization; mineral transport; and mineral storage outside a mining facility.

The Ministry of Energy and Mines (MINEM) is the authority that regulates mining activities. MINEM also grants mining concessions to local or foreign individuals or legal entities, through a specialized body called The Institute of Geology, Mining and Metallurgy (INGEMMET).

Other relevant regulatory authorities include the Ministry of Environment (MINAM), the National Environmental Certification Authority (SENACE), the Supervisory Agency for Investment in Energy and Mining (OSINERGMIN), the Ministry for Agriculture, and the Ministry for Culture. The Environmental Evaluation and Oversight Agency (OEFA) monitors environmental compliance.

3.2.2 Mineral Tenure

Mining concessions can be granted separately for metallic and non-metallic minerals. Concessions can range in size from a minimum of 100 ha to a maximum of 1,000 ha.

A granted mining concession will remain valid providing the concession owner:

- Pays annual concession taxes or validity fees (derecho de vigencia), currently US$3/ha, by June each year. Failure to pay the applicable license fees for two consecutive years will result in the cancellation of the mining concession
- Meets minimum expenditure commitments or production levels. The minima are divided into two classes:
  - Achieve "Minimum Annual Production" by the first semester of Year 11 counted from the year after the concession was granted, or pay a penalty for non-production on a sliding scale, as defined by Legislative Decree N° 1320 which became effective on 1 January, 2019. "Minimum Annual Production" is defined as one tax unit (UIT) per hectare per year, which is which is S/4,400 in 2021 (about US$1,220)
  - Alternatively, no penalty is payable if a "Minimum Annual Investment" is made of at least 10 times the amount of the penalty.

The penalty structure sets out that if a concession holder cannot reach the minimum annual production on the first semester of the 11th year from the year in which the concessions were granted, the concession holder will be required to pay a penalty equivalent to 2% of the applicable minimum production per year per hectare until the 15th year. If the concession holder cannot reach the minimum annual production on the first semester of the 16th year from the year in which the concessions were granted, the concession holder will be required to pay a penalty equivalent to 5% of the applicable minimum production per year per hectare until the 20th year. If the holder cannot reach the minimum annual production on the first semester of the 20th year from the year in which the concessions were granted, the holder will be required to pay a penalty equivalent to 10% of the applicable minimum production per year per hectare until the 30th year. Finally, if the holder cannot reach the minimum annual production during this period, the mining concessions will be automatically expired.

Title-holders of mining concessions that were granted before December 2008 were obliged to pay the penalty from 2019 if the title-holder did not reach either the Minimum Annual Production or make the Minimum Annual Investment in 2018.

Mining concessions will lapse automatically if any of the following events take place:

- The annual fee (derecho de vigencia) is not paid for two consecutive years
- The applicable penalty is not paid for two consecutive years
- The Minimum Annual Production Target or Minimum Annual Investment is not met within 30 years following the year after the concession was granted.

Beneficiation concessions follow the same rules as for mining concessions. A fee must be paid that reflects the nominal capacity of the processing plant or level of production. Failure to pay such processing fees or fines for two consecutive years would result in the loss of the beneficiation concession.

3.2.3 Surface Rights

Mining companies must negotiate agreements with surface landholders or establish easements. Where surface rights are held by communities, such easements must be approved by a qualified majority of at least two thirds of registered community members. In the case of surface lands owned by communities included in the indigenous community database maintained by the Ministry of Culture, it is necessary to go through a prior consultation process before administrative acts, such as the granting of environmental permits, are finalized. For the purchase of surface lands owned by the government, an acquisition process with the Peruvian state must be followed through the Superintendence of National Properties.

Expropriation procedures have been considered for cases in which landowners are reluctant to allow mining companies to have access to a mineral deposit and the government has determined that the project is in the national interest. Once a decision has been made by the Government, the administrative decision can only be judicially appealed by the original landowner as to the amount of compensation to be paid.

3.2.4 Water Rights

Water rights are governed by Law 29338, the Law on Water Resources, and are administered by the National Water Authority (ANA) which is part of the Ministry of Agriculture. There are three types of water rights:

- License: this right is granted in order to use the water for a specific purpose in a specific place. The license is valid until the activity for which it was granted terminates, for example, a beneficiary concession

- Permission: this temporary right is granted during periods of surplus water availability
- Authorization: this right is granted for a specified quantity of water and for a specific purpose. The grant period is two years, which may be extended for an additional year, for example for drilling.

In order to maintain valid water rights valid, the grantee must:

- Make all required payments including water tariffs
- Abide by the conditions of the water right in that water is only used for the purpose granted.

Water rights cannot be transferred or mortgaged. However, in the case of the change of the title holder of a mining concession or the owner of the surface land who is also the beneficiary of a water right, the new title holder or owner can obtain the corresponding water right.

3.2.5 Environmental Considerations

MINAM is the environmental authority, although the administrative authority is the Directorate of Environmental Affairs (DGAAM) of MINEM. The environmental regulations for mineral exploration activities were defined by Supreme Decree No. 020-2008-EM of 2008. New regulations for exploration were defined in 2017 by Supreme Decree No. 042-2017-EM.

An Environmental Technical Report (Ficha Técnica Ambiental or FTA) is a study prepared for approval of exploration activities with non-significative environmental impacts and less than 20 drilling platforms. The environmental authority has 10 working days to make observations.

An Environmental Impact Declaration (Declaración de Impacto Ambiental or DIA) has to be presented for Category I exploration activities which have a maximum of 40 drilling platforms or disturbance of surface areas of up to 10 ha. The environmental authority has 45 working days to make observations.

A semi-detailed Environmental Impact Study (Estudio de Impacto Ambiental Semi-Detallado or EIAsd) is required for Category II exploration programs which have between 40–700 drilling platforms or a surface disturbance of more than 10 ha. The environmental authority has 96 working days to make observations. The total process including preparation of the study by a registered environmental consulting company can take 6–8 months.

A full detailed Environmental Impact Study (Estudio de Impacto Ambiental Detallado or EIAd) must be presented for mine construction. The preparation and authorization of such a study can take as long as two years.

3.2.6 Permits

In order to start mineral exploration activities, a company is required to comply with the following requirements and obtain a resolution of approval from MINEM, as defined by Supreme Decree No. 020-2012-EM of 6 June 2012:

- Resolution of approval of the Environmental Impact Declaration
- Work program
- A statement from the concession holder indicating that it is owner of the surface land, or if not, that it has authorization from the owners of the surface land to perform exploration activities
- Water License, Permission or Authorization to use water
- Mining concession titles
- A certificate of non-existence of archeological remains (CIRA) whereby the Ministry of Culture certifies that there are no monuments or remains within a project area. However, even with a CIRA, exploration companies can only undertake earth movement under the direct supervision of an onsite archeologist.

3.2.7 Royalties

In 2011, the Peruvian Congress approved an amendment to the mining royalty charge. The mining royalty charge is based on operating income margins with graduated rates ranging from 1–12% of operating profits; the minimum royalty charge is equivalent to 1% of net sales. If the operating income margin is 10% or less, the royalty charge is 1% and for each 5% increment in the operating income margin, the royalty charge rate increases by 0.75%, to a maximum of 12%.

At the same time the Peruvian Congress enacted a Special Mining Tax that is also based on operating income. Rates range from 2–8.4%. If the operating income margin is 10% or less, the Special Mining Tax is 2%, and for each 5% increment in the operating income margin, the special mining rate increases by 0.4%, to a maximum of 8.4%.

3.2.8 Other Considerations

Producing mining companies must submit, and receive approval for, an environmental impact study that includes a social relations plan, certification that there are no archaeological remains in the area, and a draft mine closure plan. Closure plans must be accompanied by payment of a monetary guarantee.

In April 2012, Peru's Government approved the Consulta Previa Law (prior consultation) and its regulations approved by Supreme Decree Nº 001-2012-MC. This requires prior consultation with any indigenous communities as determined by the Ministry of Culture, before any infrastructure or projects, in particular mining and energy projects, are developed in their areas.

Mining companies also have to separately obtain water rights from the National Water Authority and surface lands rights from individual landowners.

3.2.9 Fraser Institute Survey

Wood used the Investment Attractiveness Index from the 2020 Fraser Institute Annual Survey of Mining Companies report (the Fraser Institute survey) as a credible source for the assessment of the overall political risk facing an exploration or mining project in Peru. The Fraser Institute annual survey is an attempt to assess how mineral endowments and public policy factors such as taxation and regulatory uncertainty affect exploration investment.

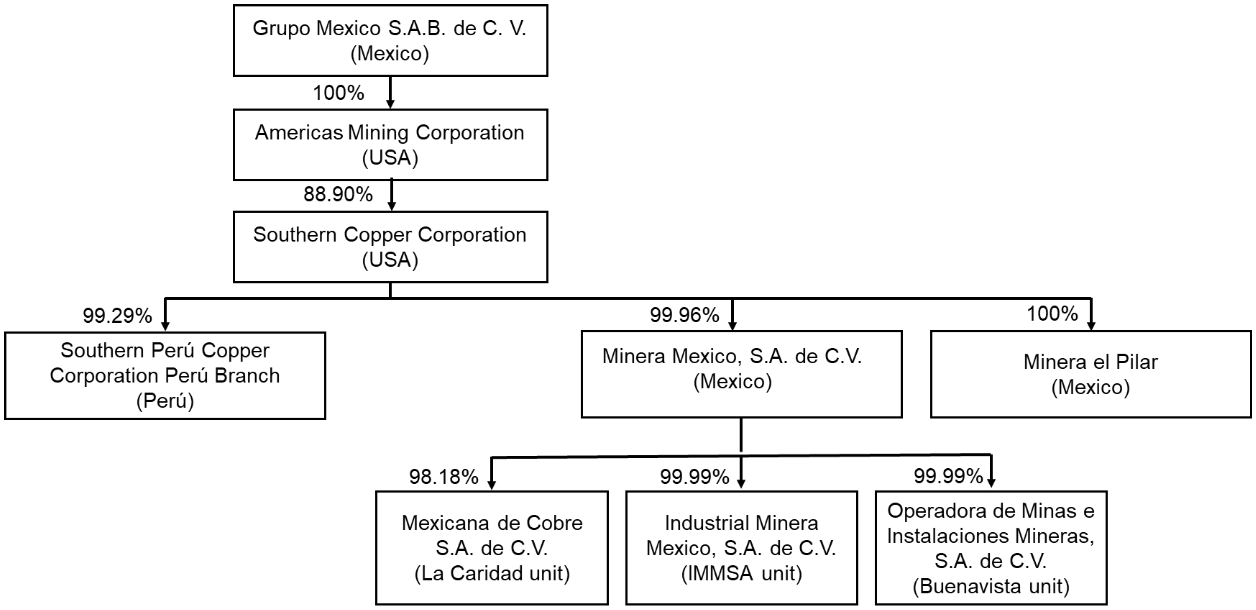
Wood used the Fraser Institute survey because it is globally regarded as an independent report-card style assessment to governments on how attractive their policies are from the point of view of an exploration manager or mining company senior management, and forms a proxy for the assessment by the mining industry of the political risk in Peru.

In 2020, the rankings were from the most attractive (1) to the least attractive (77) jurisdiction, of the 77 jurisdictions included in the survey. Peru ranked 34 out of 77 jurisdictions in the attractiveness index survey in 2020; 42 out of 77 in the policy perception index; and 30 out of 77 in the best practices mineral potential index.

3.3 Ownership

The Project is wholly owned by Southern Copper Corporation, Sucursal del Perú, which is a majority-owned, indirect subsidiary of Grupo Mexico S.A.B de CV. (Grupo Mexico). An ownership organogram is provided in Figure 3-1.

Figure 3-1: Ownership Organogram



Note: Figure courtesy Southern Copper, 2020.

3.4 Mineral Title

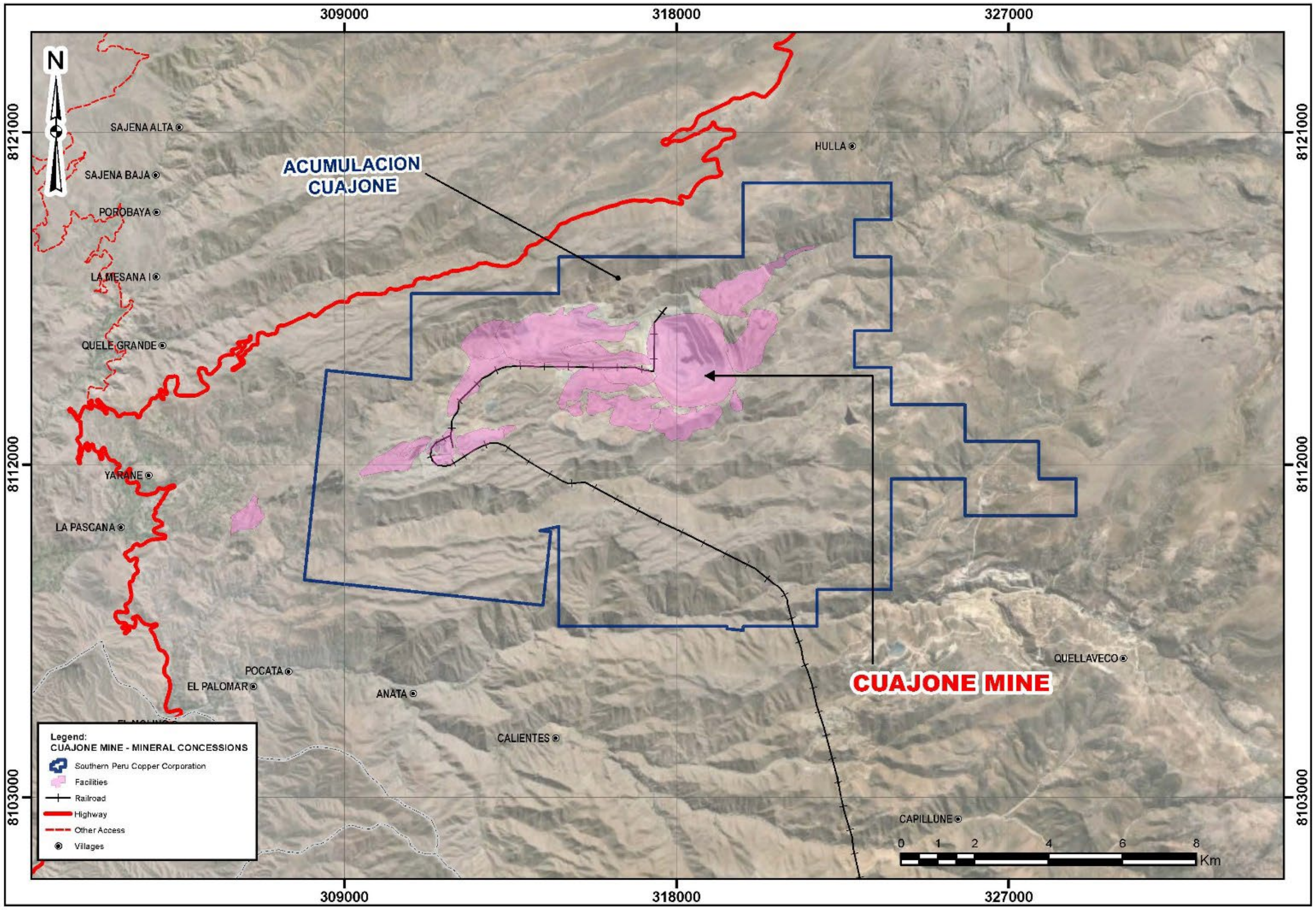
The Cuajone mine is located within the mining concession Acumulación Cuajone, which is registered as the mining concession Acumulación Cuajone, No. 010000512L, and registered in the Mining Rights Book of the Real Estate Property Registry of the Zona No. 11294175 of the Mining Rights Book of the Real Estate Property Registry of Zone XXI, Arequipa. Registry Zone Nº XXI, Arequipa Branch of the National Superintendence of Public Registries (SUNARP). That registration was completed on 16 July 2021.

Acumulación Cuajone incorporates approximately 15,024.5 ha. Figure 3-2 shows the location of Acumulación Cuajone. Table 3-1 provides the locations of the vertices of points on the perimeter of Acumulación Cuajone.

Mining concessions in Peru are laid out using a grid system delimited by Igemmet.

The annual holding fee is US$3.00/ha.

Figure 3-2: Mineral Tenure Location Plan



Note: Figure prepared by Wood, 2021.

Table 3-1: Acumulación Cuajone Vertex Locations

Vertex	Coordinates UTM WGS84 18S		Vertex	Coordinates UTM WGS84 18S	
	East (m)	North (m)		East (m)	North (m)
1	323,813.74	8,119,623.45	22	323,813.79	8,108,623.51
2	323,813.75	8,118,623.45	23	321,813.81	8,108,623.51
3	323,022.60	8,118,623.45	24	321,813.82	8,107,623.52
4	322,813.76	8,118,623.45	25	319,813.84	8,107,623.52
5	322,813.76	8,118,359.48	26	319,813.84	8,107,520.28
6	322,813.76	8,117,623.46	27	319,366.79	8,107,561.96
7	323,813.75	8,117,623.46	28	319,372.52	8,107,623.52
8	323,813.76	8,115,623.47	29	314,813.89	8,107,623.52
9	322,813.77	8,115,623.47	30	314,813.87	8,110,333.86
10	322,813.78	8,114,623.48	31	314,292.77	8,110,218.81
11	323,813.77	8,114,623.48	32	314,590.77	8,110,187.06
12	323,813.77	8,113,623.48	33	314,378.83	8,108,198.35
13	325,813.75	8,113,623.48	34	307,915.49	8,108,887.17
14	325,813.76	8,112,623.49	35	308,519.52	8,114,555.04
15	327,813.74	8,112,623.49	36	310,813.90	8,114,310.51
16	327,813.74	8,111,623.50	37	310,813.88	8,116,623.47
17	328,813.73	8,111,623.50	38	314,813.85	8,116,623.47
18	328,813.73	8,110,623.50	39	314,813.84	8,117,623.46
19	325813.76	8110623.50	40	319813.79	8117,623.46
20	325813.76	8111623.49	41	319813.78	8119,623.45
21	323813.78	8111623.49	42	323813.74	8119,623.45

There are two approved beneficiation concessions:

- Concentradora de Botiflaca
- Cuajone solvent extraction (SX) leach plant.

The Concentradora Botiflaca beneficiation concession was approved on August 14, 1981, by Resolución Directoral No.150-81- EM/DCM, and covered an area of 56 ha. On July 20, 1999, General Director of Mining authorized the operation of the process plant, at a capacity of 87,000 t/d, under report No.266-99-EM-DGM/DPDM. An expansion approval to 90,000 t/d was granted on October 7, 2010, under Resolution N° 379-2010-MEM-DGM/V. Later that year, Southern Copper requested that three additional installations be approved, in support of optimization of the crushing process; approval was provided in Directorial Resolution N° 153-2012-MEMDGM-V.

The Cuajone SX leach plant concession (Planta de Lixiviación SX Cuajone) has a 400 ha area, and was granted on May 6, 1996, under Directorial Resolution No.155-96- EM-DGM. The plant capacity approved was 2,100 t/d. An approved plant capacity expansion to 3,100 t/d was approved under Resolution N°988-2009-MEMDGM/V on December 16, 2009.

3.5 Surface Rights

Southern Copper acquired land from private owners in support of the operations. In other areas, surface rights were granted by the Peruvian State in accordance with the law, either by the granting of old mining concessions or by the granting of surface rights (DUTES) for exclusive use.

Most of the surface rights are those granted by the Peruvian State because the operations are situated on uncultivated land owned by the State. Water easements, power lines, tunnels, industrial railroad line and tailings canal are authorized by the Peruvian State, as they are cross uncultivated land that is owned by the State. These surface rights will remain as long as the mining concession remains in force.

Southern Copper holds a "right of free use" on the uncultivated lands in the mining concessions and Quebrada Honda TSF areas. These surface rights will remain current as long as the mining concession remains in force.

There are granted easements covering the TSF and related facilities, the TSF pipelines, and water pipelines from the Suches lagoon to the Cuajone Operations (see also discussion in Chapter 15.10).

Additional surface rights will be required to allow construction and operation of a co-stack (dry-stack) facility that is assumed to be used once the Quebrada Honda TSF capacity is reached in approximately the end of 2035 (refer to Chapter 18.2). There is sufficient time for Southern Copper to obtain the required surface rights and negotiate agreements prior to that date. A provision for these costs has been included in the cashflow analysis in Chapter 19.

3.6 Water Rights

Southern Copper has both groundwater and surface water usage licenses, for a total extraction rate of 1,950 L/sec. The rights are summarized in Table 3-2.

3.7 Royalties

Apart from the mining royalties (see Chapter 3.2.7) there are no other royalty agreements pertinent to the Project.

3.8 Encumbrances

There are currently no encumbrances such as liens, streaming agreements etc. that could affect the LOM plan.

3.9 Permitting

Permitting and permitting conditions are discussed in Chapter 17.5 of this Report.

3.10 Violations and Fines

There are no current material violations or fines, as imposed in the mining regulatory context of the Mine Safety and Health Administration (MSHA) in the United States, that apply to the Cuajone Operations.

3.11 Significant Factors and Risks That May Affect Access, Title or Work Programs

To the extent known to Wood, there are no other significant factors and risks that may affect access, title, or the right or ability to perform work on the Project that are not discussed in this Report.

Table 3-2: Water Rights

	Document number	Water Right	Date
Surface water	R.S. N° 534-72-AG	License in process of adaptation of 150 L/s of the waters of the Ticalaya and Quebrada Honda.	June 15, 1972
	R.M. N° 00405-77-AG/DGA	License in the process of adapting the use of 60 L/s of the waters of the Cinto-Quebrada Honda river	April 12, 1977
	R.D. N° 053-88-AG-DGA	Modification of the R.S. N° 535-72-AG reducing the flow to 300 L/s	April 10, 1988
	R.D. N° 271-2010-ANA/AAA I C-O	Regularization of the License for the use of surface water, reallocating volumes of the R.M. N ° 405-77-AG/DGA	December 31, 2010
Groundwater	R.M. 00899-79-AA-AGAS	License to use a mass of 15'736,464 m3 of groundwater through tubular wells drilled in the "Vizcachas" and "Titijones" hydrographic basins.	July 09, 1979
	R.D. N° 0062-83-AG-DGASI	License to use an annual mass of up to 13,268,966 m3 of groundwater extracted through four tube wells from the "Huaitire" basin	June 15, 1983
	R.A. N°169-95-DISRAGT-ATDRLIS	License to use groundwater in the Vizcachas basin of up to 360 L/s	July 12, 1995
	R.A. N° 002-94-DISRAG/ATDRL-S	License for the use of an annual mass of 5'991,840 m3 of groundwater captured from tubular wells TP-11 and TP-12 drilled in the "Huaitire-Gentilar" hydrographic basin	1994
	R.A. N° 020-2003-ATDR.M/DRA.MDO	Adequacy of the water use license granted to in the R.M. N ° 00899-79-AA/DGAS and R.A. N ° 002-94-DISRAG/ATDRL-S up to 9'744,624 m3	April 1, 2003
	R.A. N° 034-2005-DRA.T/GR.TAC-ATDRL/S	Groundwater use license with a flow of 162.2 L/s equivalent to an annual mass of 5'115,139 m3 captured by two tubular wells TP-14 and TP-15 located in the Huaitire-Gentilar basin.	January 28, 2005

4 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

4.1 Physiography

The Project area ranges in elevation from 2,700–3,800 masl, with the mine situated in an area of very steep terrain. Mine facilities and the pit rim are at about 3,500 masl.

The general direction of water runoff from the area is from the northeast to the southwest. Streams have a dendritic drainage pattern and are typically ephemeral.

Vegetation types vary, depending on terrain elevation and proximity to watercourses. Vegetation commonly consists of scrub and grasslands. Dryer areas are characterized by cacti species. In desert areas, if there is vegetation, it consists of thorny plants and shrubs.

Crops are cultivated along the banks of the watercourses and on flatter land. Hill slopes are used extensively for grazing of goats.

Using classifications developed by the Peruvian-Japanese Centre for Seismic Research and Disaster Mitigation (Cismid), the Project area straddles two seismic zones (JCI, 2020):

- Destructive (VIII intensity): slight damage to specialized structures; considerable damage to well-built ordinary structures, with possible collapse; heavy damage to poorly-built structures; seriously damaged or destroyed masonry, and furniture completely moved out of place
- Very destructive (IX intensity): considerable damage to specialized structures, walls out of plumb; extensive damage to major buildings, with partial building collapse; and buildings displaced off foundations.

4.2 Accessibility

The Cuajone mine is accessible by paved road from Lima or Tacna by the Pan-American Highway as follows:

- Lima to Moquegua: 1,140 km
- Moquegua to Cuajone: 42 km
- Tacna to Moquegua: 152 km.

Access within the Project area is via developed roads that are routinely maintained.

Puerto de Ilo, the port site and location of the smelter and refinery, is 135 km from the Cuajone mine via paved road.

The Quebrada Honda tailings storage facility (TSF) is about 120 km via local roads, south of the Cuajone Operations. It is accessed via the departmental road MO-107 from the town of Camiara, or via departmental roads MO-105 and MO-107.

Tacna, Moquegua, and Ilo have regularly scheduled air services from Lima.

4.3 Climate

Climate conditions vary with altitude, from moderately temperate at lower elevations to intensely cold at high elevations. Monthly temperature averages range from 9–11ºC. Wind speeds range, on average, from 1.54–2.06 m/sec.

Average monthly precipitation varies from 0.05–85 mm; however, significantly more rain can fall when the El Niño phenomenon is in force. The dry season typically occurs from June–November, and the wet season generally is confined to the months of December–May.

Mining operations are conducted year-round. Exploration activities are conducted year-round, but may be temporarily curtailed by rare heavy rainfall events.

4.4 Infrastructure

Infrastructure that supports the current operations is in place (see also discussions in Chapter 13, Chapter 14, and Chapter 15 of this Report). These Report chapters also discuss water sources, electricity, personnel, and supplies for the LOM plan.

Southern Copper has water rights or licenses for as much as 1,950 liters per second from well fields at the Huaitire, Vizcachas and Titijones aquifers and surface water rights from Lake Suches and two small water sources, Quebrada Honda and Quebrada Tacalaya. Two desalination plants in Ilo produce water for industrial use and domestic consumption.

There is a power purchase agreement in place with the state company Electroperu S.A., for 120 MW, which has a 20-year term, starting in 2017. A second agreement is in place with a private power generator Kallpa Generacion S.A. (Kallpa), which has a 10-year duration, beginning in 2017. Southern Copper has 9 MW of power generation capacity from two small hydro-generating installations at the Cuajone Operations.

Personnel live in mine accommodation villages adjacent the operations.

Tacna is the main source of supplies and fuel.

5 HISTORY

The exploration and development history is outlined in Table 5-1.

Table 5-1: Exploration and Development History

Date	Operator	Comment
19th century		Brief references in the geographic literature about the existence of copper deposits located in the southwest of Peru and sporadic exploitation of copper on the southern slope of the Torata ravine, where thin layers of copper oxides and sulfides were exploited
1929		After the border conflict between Peru and Chile was resolved, interest in the area renewed and the Cuajone area claimed by Julio E Gianella.
1937	Cerro de Pasco Corporation	The Cuajone prospect was considered by A.C. Schmedeman to be a potential porphyry copper deposit. He was exploring for the Cerro de Pasco Corporation.
1942–1945	Cerro de Pasco	Optioned claims. Drilled 40 holes (12,366 m)
1951–1954	Newmont/Asarco	SP and resistivity surveys completed; geochemical surveys completed Drilled 88 holes (30,115.6 m), 70 were churn drill holes and 18 were core holes
1954	Southern Copper	Feasibility study completed; Southern Peru Copper Corporation formed by Asarco, Marmon Group Inc., Phelps Dodge Overseas Capital Corporation, and Newmont Mining Corporation. Southern Copper owned 88.5% of Cuajone and Billiton BV owned 11.5%.
1956		Preliminary geochemical surveys were completed over the volcanic rocks that covered the deposit
1965–1970		122 holes drilled (27,515.43 m)
1969–1970		After 18 months of negotiations, a bilateral agreement was signed with the revolutionary government of the Peruvian armed forces to construct the Cuajone Project.
1970–1976		Construction of mine and ancillary facilities
1976		Copper production began
1980		Core drilling to verify 1950s churn drill data, and to establish the contact between mineralized and post-mineralized cover to the south and southeast of the operations. Completed 26 holes (3,191.89 m) Molybdenum plant operational, generating molybdenum concentrates.
1981	Billiton B.V.	Sells its interest to Southern Copper
1982–1988	Southern Copper	128 core holes (36,130.65 m) for exploration and geotechnical investigations (3 holes)
1991–1994		24 core holes (4,636.33 m) for geotechnical and hydrogeological investigations. Casagrande piezometers were installed.

Date	Operator	Comment
1993		Regional lithogeochemistry survey (267 points, 255 were in situ rock). Assayed for Cu, Mo, ag, and Au. Two small anomalies were identified.
1993		Induced polarization (IP) study over 1,600 ha
1994		Two geophysical anomalies on the north slope of the Torata River were core drilled to test the anomalies
1994–1997		274 holes (125,482.57 m) drilled for exploration, geotechnical, and hydrogeological purposes.
1995	Newmont	Sells its shares to Southern Copper
1997–1999	Southern Copper	116 holes (12,536 m) drilled for various purposes of which, 49 were RC (6,014.30 m.) for metallurgical tests, inclinometers and evaluation of the tuff crystal.
1998		Cuajone concentrator was expanded to 87,100 t/d
1999	Grupo Mexico	Acquired the Asarco interest to become the major shareholder
2000–2001	Southern Copper	114 core holes (40,902.35 m) to support the mine plan with some geotechnical and condemnation holes
2002–2011		275 core holes (36,205.33 m) drilled for infill, metallurgist test, geotechnical and piezometers
2007		Incorporated a new mill at the concentrator
2012–2013		297 core holes drilled (79,986.72 m) to support 15-year plan; principally infill and geotechnical drilling
2013		Installation of high pressure grind rolls (HPGR) in the concentrator
2014		Integrated the mining division into Americas Mining Corporation for management purposes.
2014–2016		50 core holes (13,283.55 m) for infill and geotechnical purposes
2017–2018		70 core holes (23,781 m) for infill and geotechnical purposes. Drilled 72 RC holes (3,850 m) to evaluate oxides.
2018		Crusher upgrade at the mine and overland conveyor installed
2019		28 core holes (10,134.05 m) for infill and geotechnical instrumentation installation
2020		22 core holes (5,763.70 m) for infill and geotechnical instrumentation installation
2021		37 core holes (12,685.05 m) for infill, metallurgist test and geotechnical

6 GEOLOGICAL SETTING, MINERALIZATION, AND DEPOSIT

6.1 Deposit Type

The Cuajone deposit is considered to be an example of a porphyry copper–molybdenum deposit.

Porphyry deposits range in age from Archean to Recent, although most are Jurassic or younger, and form in a variety of tectonic settings. Most copper–molybdenum deposits are associated with low-silica, relatively primitive dioritic to granodioritic plutons that fall on the more oxidized, magnetite-series spectrum.

Deposits commonly form irregular, oval, solid or "hollow" cylindrical and inverted cup shapes. Orebodies can occur separately, overlap each other, or be stacked on top of each other. They are characteristically zoned, with barren cores and crudely concentric metal zones that are surrounded by barren pyritic halos with/without peripheral veins, skarns, replacement manto zones and epithermal precious-metal deposits. At the scale of ore deposits, associated structures can result in a variety of mineralization styles, including veins, vein sets, stockworks, fractures, 'crackled zones' and breccia pipes.

Pyrite is typically the dominant sulfide mineral, in association with chalcopyrite, bornite, chalcocite, tennantite, enargite, other copper sulfides and sulfosalts, molybdenite and electrum.

6.2 Regional Geology

The Cuajone deposit is part of the Eocene porphyry copper belt of the main arc of the Peruvian Andes. The regional geology consists of the Upper Cretaceous/Lower Tertiary Toquepala Group, a sequence of basal volcanic flows and volcano–sedimentary rocks overlain by Miocene to Recent volcanic and volcano sedimentary rocks (Figure 6-1). Toquepala Group rocks are intruded by the late Cretaceous Yarabamba Super Unit of the Costal batholith, characterized by northwest–southeast elongated granodiorite to monzogranite bodies. The final stage of this magmatic event is defined by hypabyssal intrusions that host the lower Tertiary porphyry copper–molybdenum systems in southeastern Peru.

The top of the Toquepala Group is marked by an erosional unconformity. Above that unconformity are numerous post-mineral volcanic and sedimentary formations. Those formations form a cover above the deposit and are not altered or mineralized.

6.3 Local Geology

6.3.1 Lithologies and Stratigraphy

The major sedimentary and intrusive rock types in the general Cuajone Operations area are summarized in Table 6-1 and Table 6-2, respectively. A summary of the breccia types in the deposit area is provided in Table 6-3. A stratigraphic column is provided in Figure 6-2.

6.3.2 Structure

The regional-scale Incapuquio fault system influenced the location of the Late Cretaceous-Early Paleogene magmatism of the Toquepala Group. The "Cuajone Alignment" (Manrique and Plazolles, 1975) follows the structural pattern defined by the Incapuquio fault system. The geometry of the porphyritic stocks, the magmatic-hydrothermal breccias, as well as the dykes are oriented and controlled by pre- and inter-mineral faults that were later sealed by magmatic and hydrothermal activity with a preferential orientation of N40–50° W. Post-mineral reactivations follow the same structural model with components orthogonal to the northeast and east–west, with generally steep dips.

6.3.3 Alteration

Alteration is primarily recognized in association with the Cuajone deposit, and is described in Chapter 6.4.4.

6.4 Property Geology

6.4.1 Deposit Dimensions

The deposit is approximately 2,300 m long, 900 m wide, and averages 1000 m in thickness. Mineralization has been drill tested to a depth of 2,255 m. The deposit remains open at depth.

6.4.2 Lithologies

A geology map is provided as Figure 6-3. Example lithological cross-sections through the deposit is included as Figure 6-4 and Figure 6-5.

The geology summary that follows is sourced from Portergeo (2021).

Mineralization and alteration at the Cuajone deposit is directly related to a multi-stage latite porphyry that intrudes basaltic andesites and the overlying 370 m of rhyolite porphyries of the Toquepala Group.

Figure 6-1: Regional Geology Map

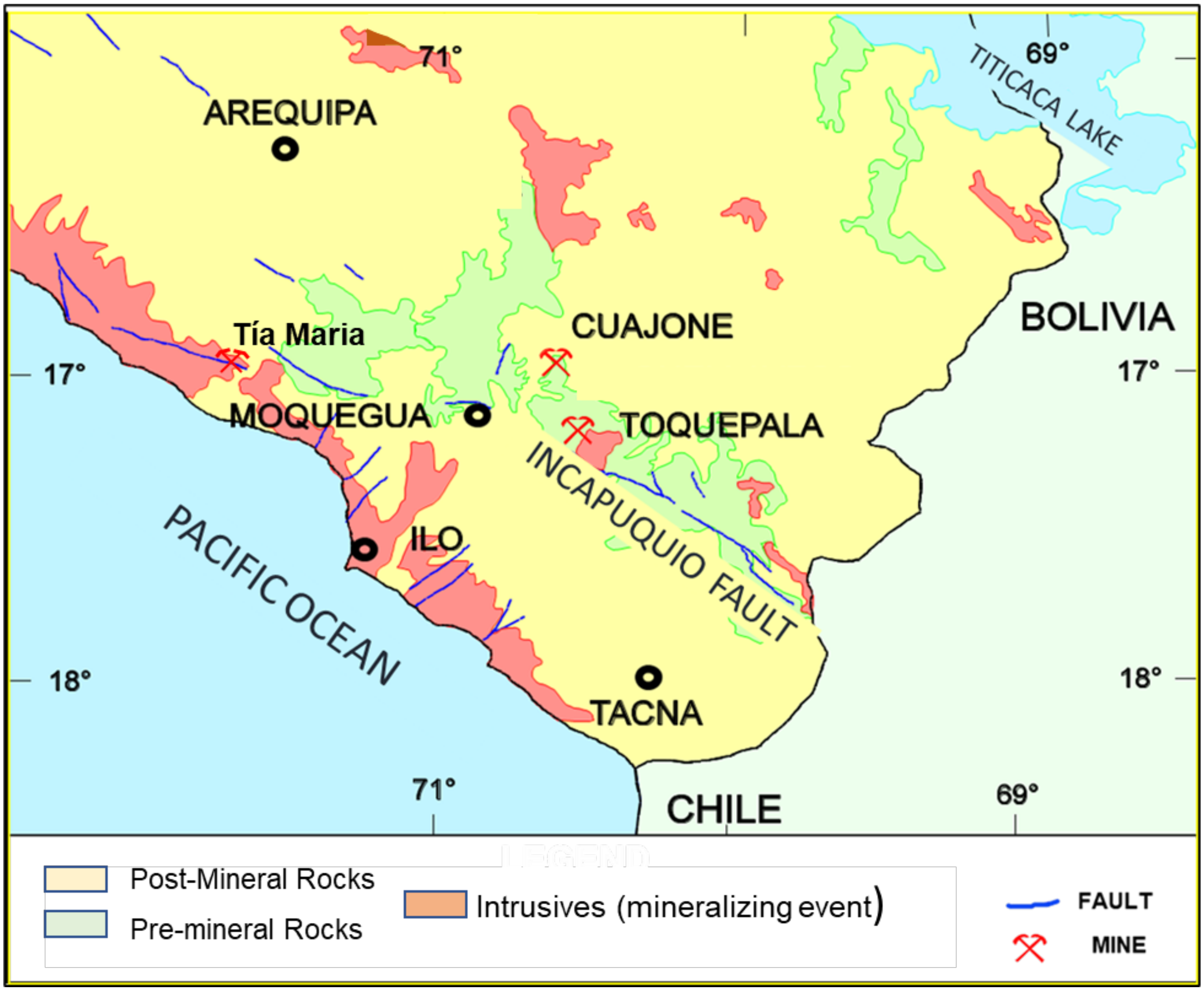


Table 6-1: Sedimentary and Volcanic Lithology Table

Unit	Age	Comment
	Quaternary	Alluvial deposits in river beds and colluvial deposits on hill slopes. Moraines.
Chuntacala Formation	mid-Late Miocene	Pyroclastic flows and welded tuffs with volcanoclastic flow deposits and lahars. Pink to brown tuffs and agglomerates
Huaylillas Formation	Early Miocene	Post-mineral volcaniclastic succession with interspersed pyroclastic intervals. White, grey and pink dacitic and rhyolitic tuffs.
Moquegua Formation	Late Oligocene to early Miocene	Unconformably overlies the Toquepala Group. In mine area, consists of sandy to conglomeratic, continental sedimentary rocks; also rhyolitic conglomerate-doleritic conglomerate
Toquepala Group	Cretaceous to lower Tertiary	Toquepala, Inogoya, Paralaque and Quellaveco Formations. Volcanic sequence of andesite, rhyolite and dacite flows

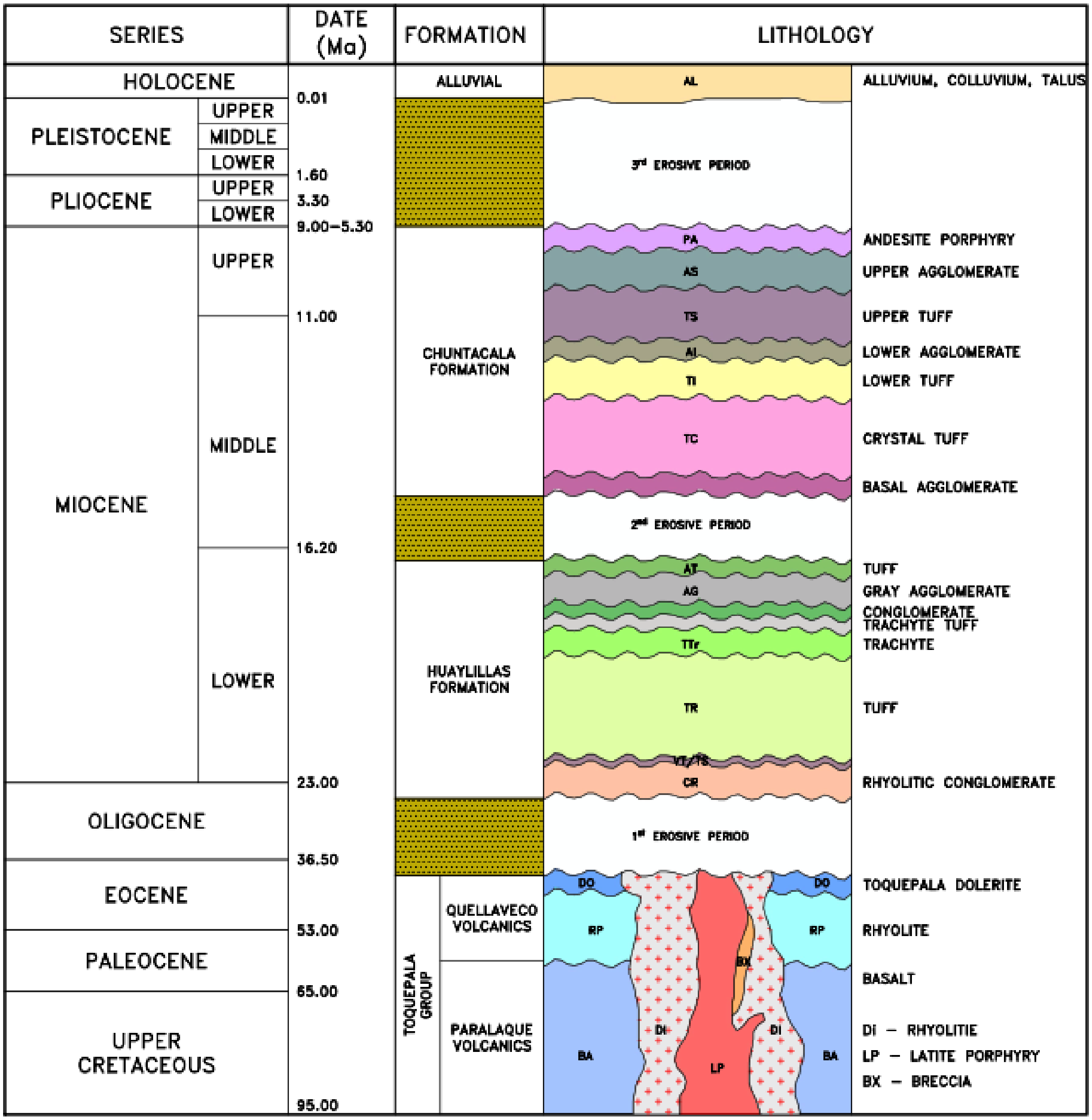
Table 6-2: Intrusive Lithology Table

Unit	Age (Ma)	Comment
Dikes		Two compositions predominate: quartz-feldspathic granitoids and to a lesser extent hypabyssal andesite. Orientation of these dikes is controlled by a N46ºW and east–west trend, with steep dips to the northeast and north respectively. Exhibit a spaced parallelism with lengths to 830 m and variable thicknesses to 6 m
Latite Porphyry 3	53	monzogranite to granodiorite stock and dikes with bipyramidal quartz phenocrystals without Cu-Mo mineralization. It is weakly altered with a predominance of sericite and to a lesser extent, clays; weakly disseminated pyrite and sporadic veinlets
Latite Porphyry 2	56	Coarse-grained with hornblende phenocrysts and/or plagioclase to 1 cm and very low density of granular quartz veins. It is considered to be an intra-mineral intrusion. Weak to moderate argillic alteration and sericitization superimposed on earlier potassic alteration characterized by granular silica veins with K-feldspar halos
Latite Porphyry 1	55–51	The stock is elongate northwest to southeast. Cu and Mo mineralization are related spatially and temporally to this stock. It is characterized by a medium to coarse grain porphyritic texture, phenocrysts of plagioclase, hornblende, biotite and quartz, with moderate to high density of granular quartz veins. Sulfides are mainly disseminated and in quartz veins. The ratio pyrite to chalcopyrite varies depending on the location within the system
Granodiorite	65–58	This pluton extends to the west and northwest of the porphyritic stocks, cutting lava sequences of andesite and rhyolite (Toquepala Group) and is partially covered by pyroclastic deposits of the Huaylillas Formation. Hydrothermal granodiorite breccias developed in the Cuellar sector are weakly mineralized in intra-clastic cavities, showing weak to no rotation of clasts
Diorite	66	Crops out in an elongate north–south trend east of the current pit. Cuts most of the units of the Toquepala Group

Table 6-3: Breccia Type Table

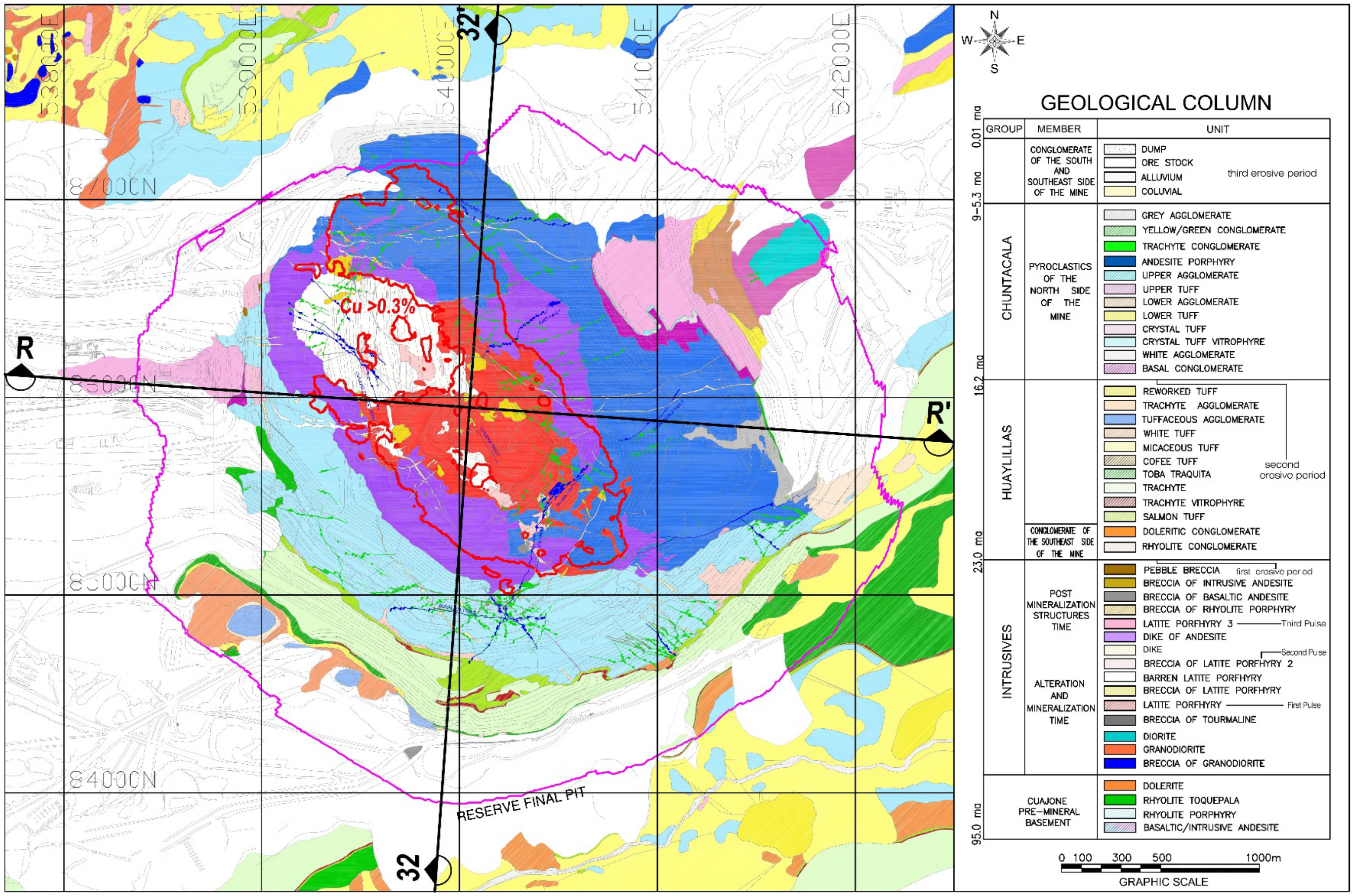
Breccia Type	**Comment**
Rupture breccia	Synonymous with "stockwork", "shatter breccia", "fracture breccia" and "crackle breccia" and is characterized by a multitude of randomly crisscrossing cracks, the same ones that, when crossing and joining each other, divide the original rock into angular fragments, caused by hydraulic fracturing. The most distinctive characteristic of the rupture breccia is that its individual fragments do not detach, displace, slide or rotate among themselves
Hydrothermal breccia	Predominantly angular clasts, arranged chaotically in a matrix of strongly altered porphyritic latite and mineral sulfides
Magmatic–hydrothermal breccias	Ore Brecha, Ore Brecha Silícea, Brecha Silícea, Blind Brecha in LP2 and Brecha de Cubes. Form elongated sub-vertical chimneys with diameters that vary from 58 to 244 m. They are characterized by the rotation and / or transport of their angular to sub-rounded clasts in a matrix of granular quartz and sulfides. The breccia is typically inter-mineral and Cu-Mo mineralization is most common within the breccia itself. A molybdenite-bearing breccia is characterized by the fact that the upper part of the chimney has tabular fragments of latite porphyry 2, aligned parallel to the cupola, defining a "shingle breccia" with quartz-molybdenite cement. Its formation is attributed to exfoliation of the wall rock and its fall towards the interior of the magmatic chamber. Intra-clastic cavities contain calcite and ankerite druse due to the circulation of fluids with high Calcium content and contain high-grade copper mineralization due to its intrinsic permeability
Intrusive breccias	Associated with emplacement of quartz-feldspathic intrusive rocks (not hydrothermal). These are characterized by incorporated clasts of wall rocks as xenoliths. Clasts are angular to subrounded in a crystalline igneous matrix. These are not genetically related to a mineralizing process; however, they may be mineralized
Phreatic breccias	Non-mineralized breccias, commonly <3 m wide.

Figure 6-2: Stratigraphic Column



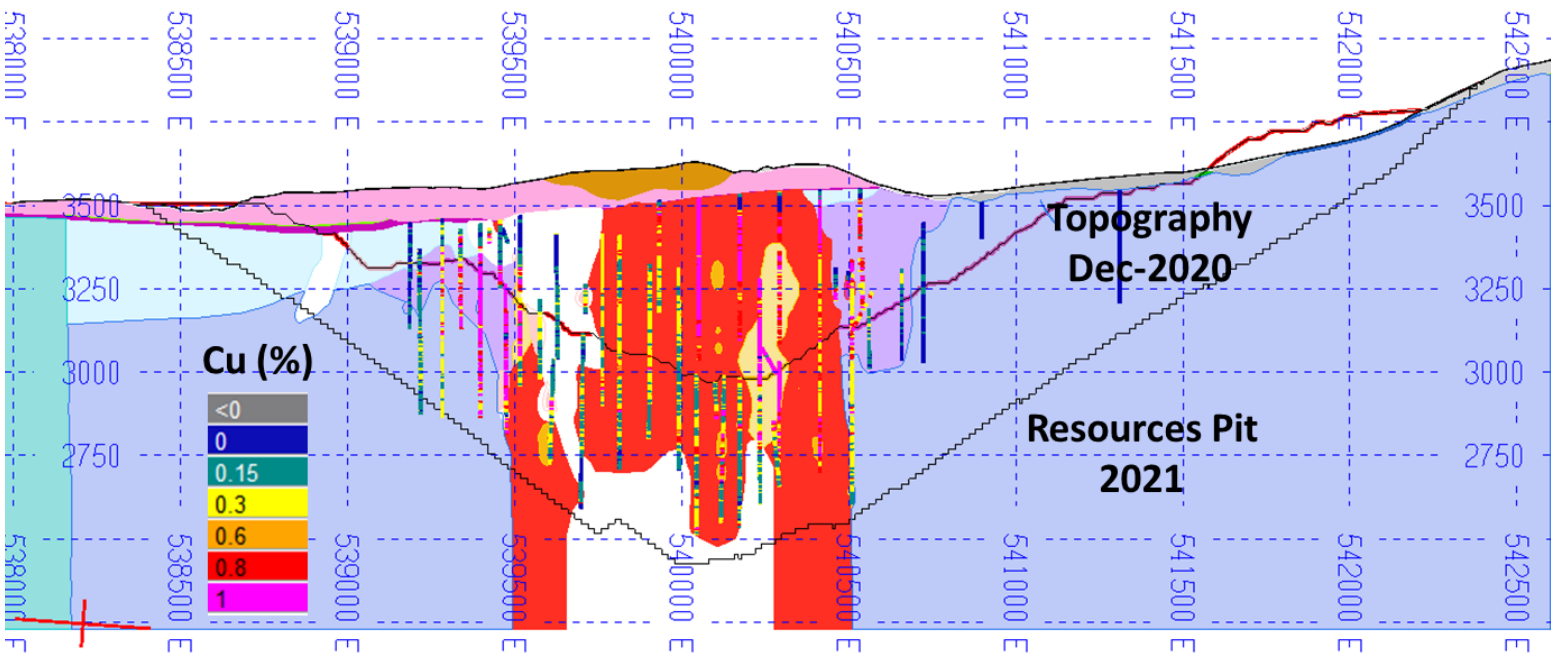
Note: Figure prepared by Southern Copper, 2021.

Figure 6-3: Geology Map



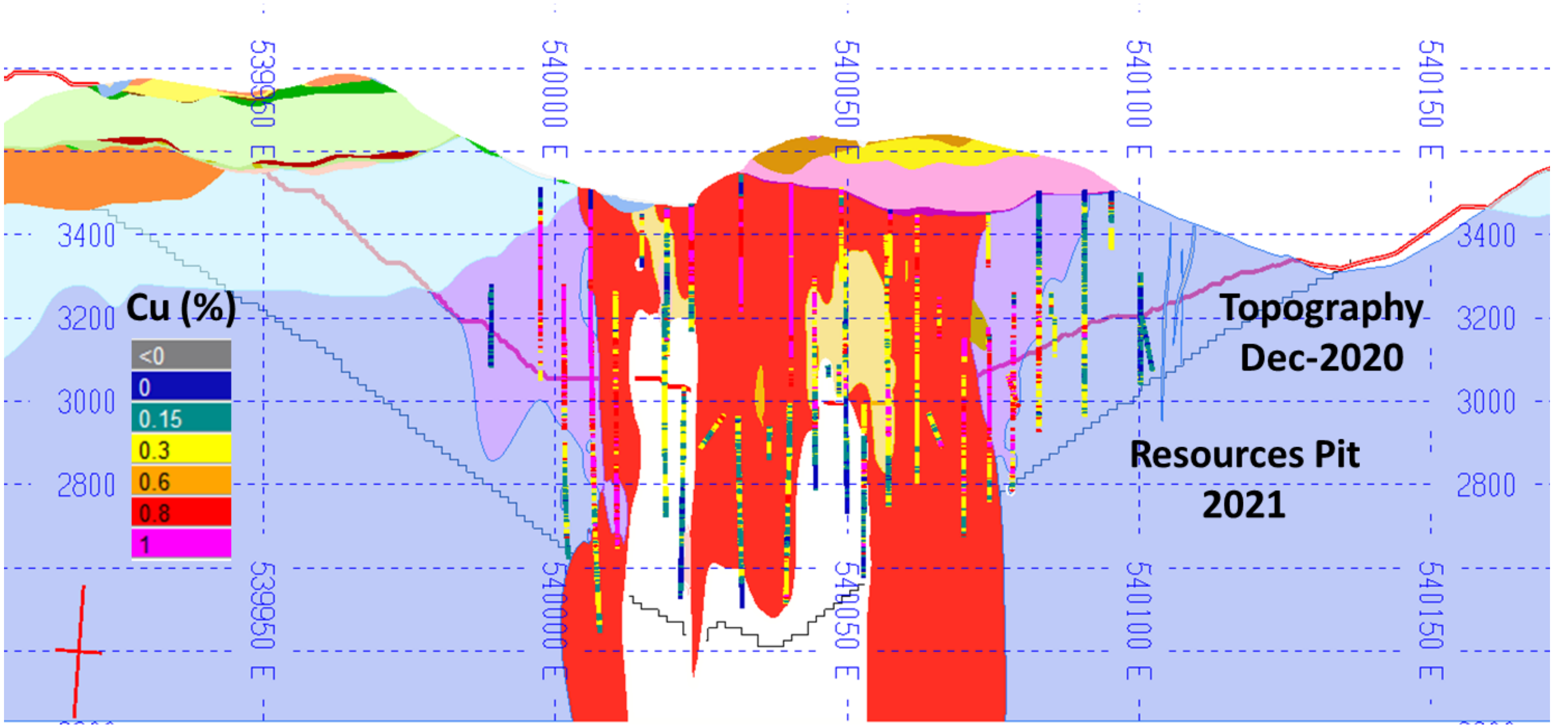
Note: Figure prepared by Wood, 2021.

Figure 6-4: Lithology Cross-Section (R–R')



Note: Figure prepared by Wood, 2021.

Figure 6-5: Lithology Cross-Section (32–32′)



Note: Figure prepared by Wood, 2021.

The first, pre-mineral intrusive in the mine area, situated approximately 1–2 km to the west of the deposit, was a north–south-elongated, 0.7 x 0.35 km, grey to grey-green holocrystalline to equigranular, medium grained, porphyritic diorite stock. This was followed by emplacement of three latite porphyry stages, producing a 2.5 x 0.7 km, northwest–southeast-elongated intrusive body. The latite multiphase intrusion hosts the mineralization.

The first magmatic pulse of the latite porphyry was concentrated in the southeastern part of the multiple intrusive mass and was responsible for the introduction of the bulk of the hypogene copper and molybdenite mineralization in the Cuajone orebody and the associated intense alteration of both the latite and surrounding Toquepala Group andesites and rhyolites. The intrusion is a porphyry with phenocrysts of quartz to 4 mm in diameter and laths of feldspar in a cryptocrystalline matrix. Alteration takes the form of a potassic core, characterized by biotite-magnetite-K feldspar-silica, grading upwards and outwards to biotite-magnetite-silica, which passes laterally into an extensive outer envelope of chlorite-epidote-calcite-pyrite propylitic alteration which has a radial extent of 4 km from the center of the deposit. The intensity of this alteration has masked the boundary between the latite porphyry and the surrounding Toquepala Group lithologies.

The second intrusive phase formed two bodies, a larger, ovoid 850 x 550 m mass immediately to the northwest of the first pulse, while a smaller 300 x 200 m plug occurs within the outcrop of the first pulse. Both exposures have only weak associated alteration and very minor, low-level copper and molybdenum mineralization. Breccia bodies were developed along the intrusive contacts with the other latite pulses and country rocks. These breccias comprise heterolithic clasts that range from well-rounded to angular within a matrix of latite porphyry.

The third magmatic pulse covers a surface area of around 800 m in diameter immediately to the northwest of the main primary latite porphyry outcrop and has only weak associated alteration and no copper or molybdenum mineralization. It is porphyritic with quartz grains up to 2 cm across in a microcrystalline to cryptocrystalline matrix.

At a late stage in the emplacement of the latite porphyry complex, and during an initial erosive period, the interaction of downward-percolating meteoric waters with the rising hypogene hydrothermal fluids produced an intense phyllic silica–sericite–pyrite zone that was superimposed on the upper parts of the mineralized system associated with the first latite porphyry pulse to develop a higher grade zone of copper–molybdenum ore with grades of >0.4% Cu as chalcopyrite and molybdenite. This alteration and mineralization style is principally developed within the Latite Porphyry and the Toquepala Group rhyolites, and only to a minor degree in the underlying andesites.

The Huaylillas Formation was deposited after the mineralizing event ended. It consists of conglomerate, tuff, vitrophyre, and trachyte, and is as thick as 230 m.

6.4.3 Structure

The regional structural trend is northwest–southeast. Those faults are shown on Figure 6-3.

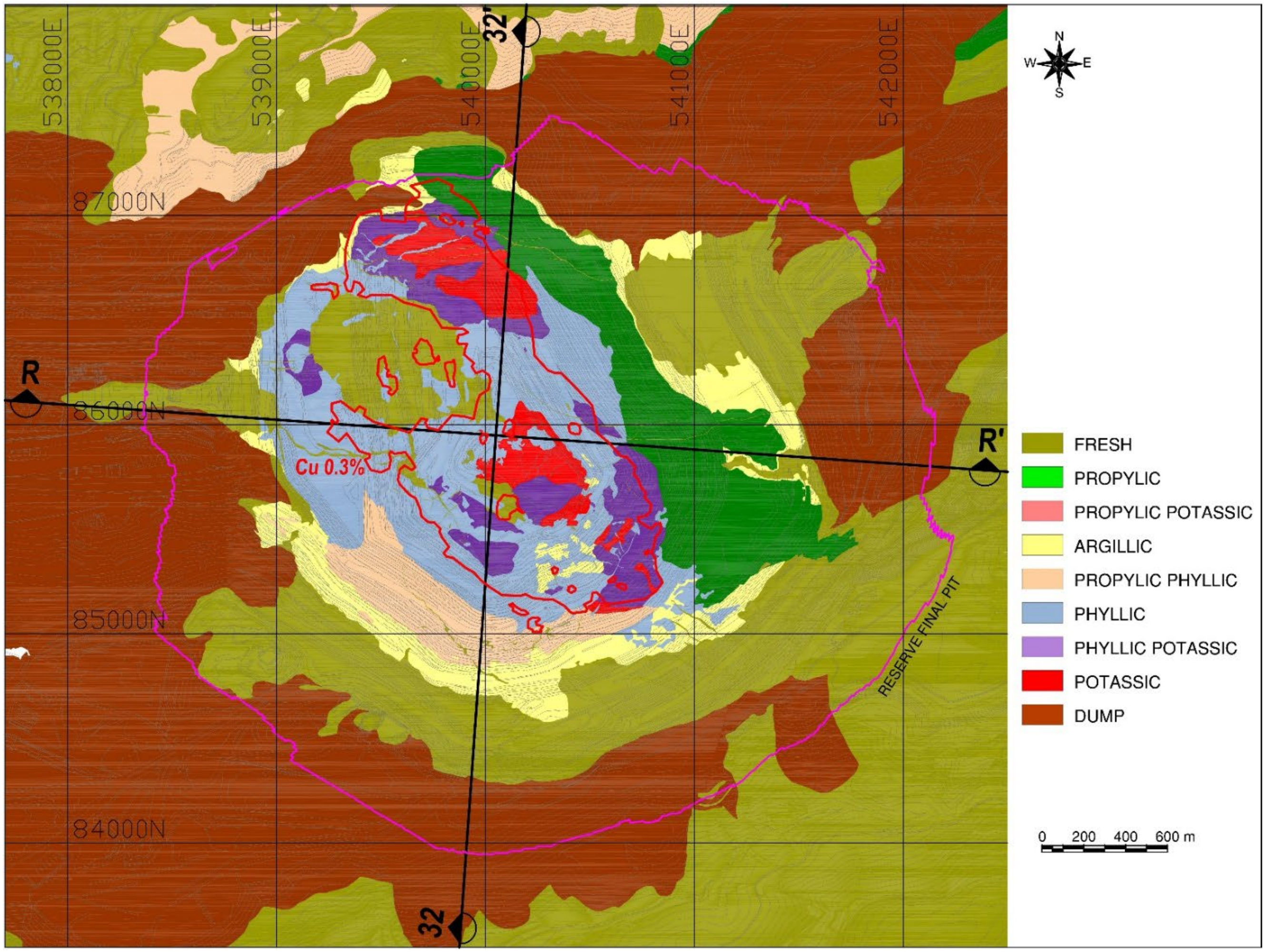
6.4.4 Alteration

The Cuajone porphyry deposit exhibits a zoned alteration pattern that includes potassic, propylitic, sericitic and intermediate argillic hydrothermal alteration styles. The alteration halo extends for about 3-4 km diameter. An alteration map is provided in Figure 6-6. Example cross-sections showing the alteration are included as Figure 6-7 and Figure 6-8. The major alteration types are summarized in Table 6-4.

6.4.5 Mineralization

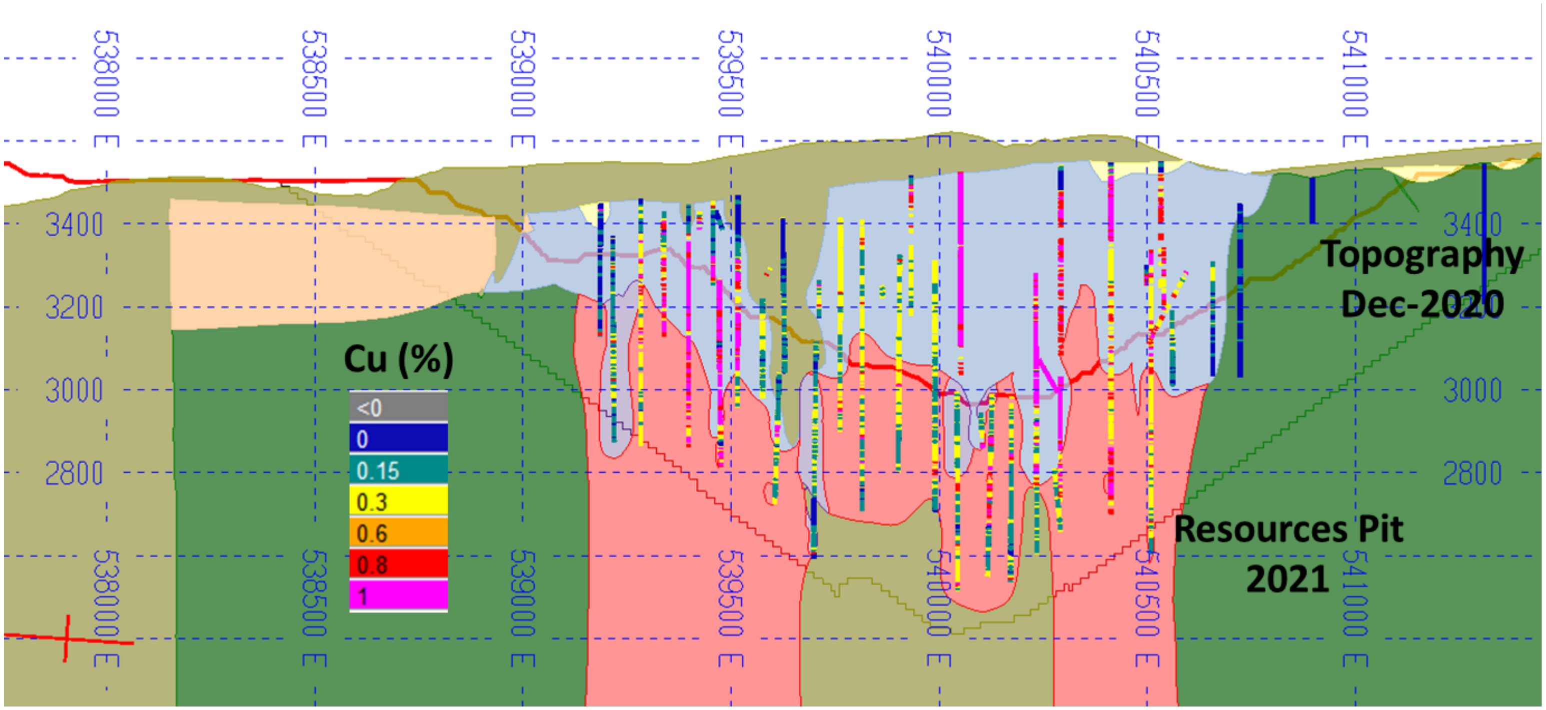
A mineralization map is provided as Figure 6-9. Example mineralization cross-sections are included as Figure 6-10 and Figure 6-11.

Figure 6-6: Alteration Map



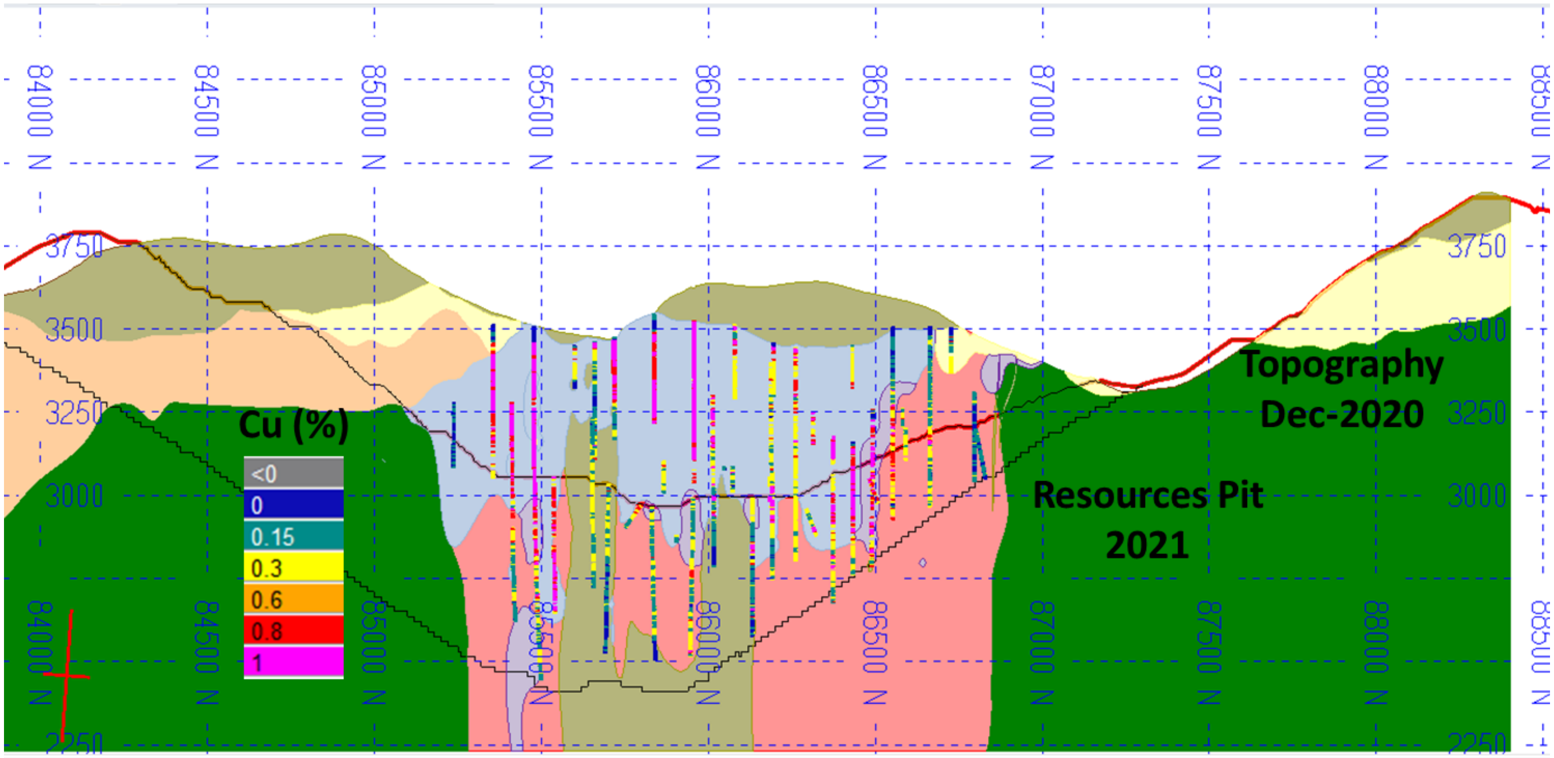
Note: Figure prepared by Wood, 2021.

Figure 6-7: Alteration Section (R–R')



Note: Figure prepared by Wood, 2021.

Figure 6-8: Alteration Section (32–32')

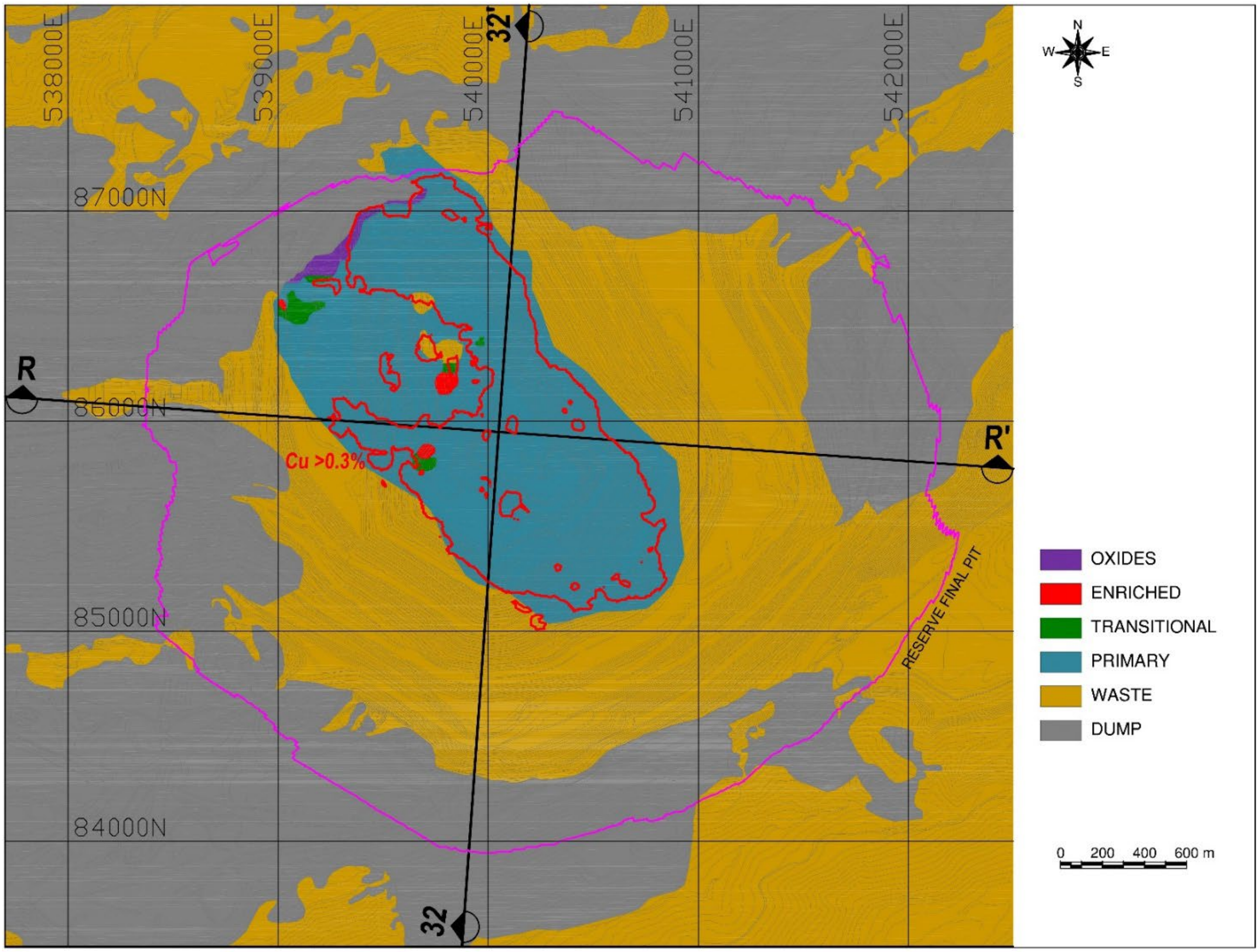


Note: Figure prepared by Wood, 2021.

Table 6-4: Alteration Assemblages

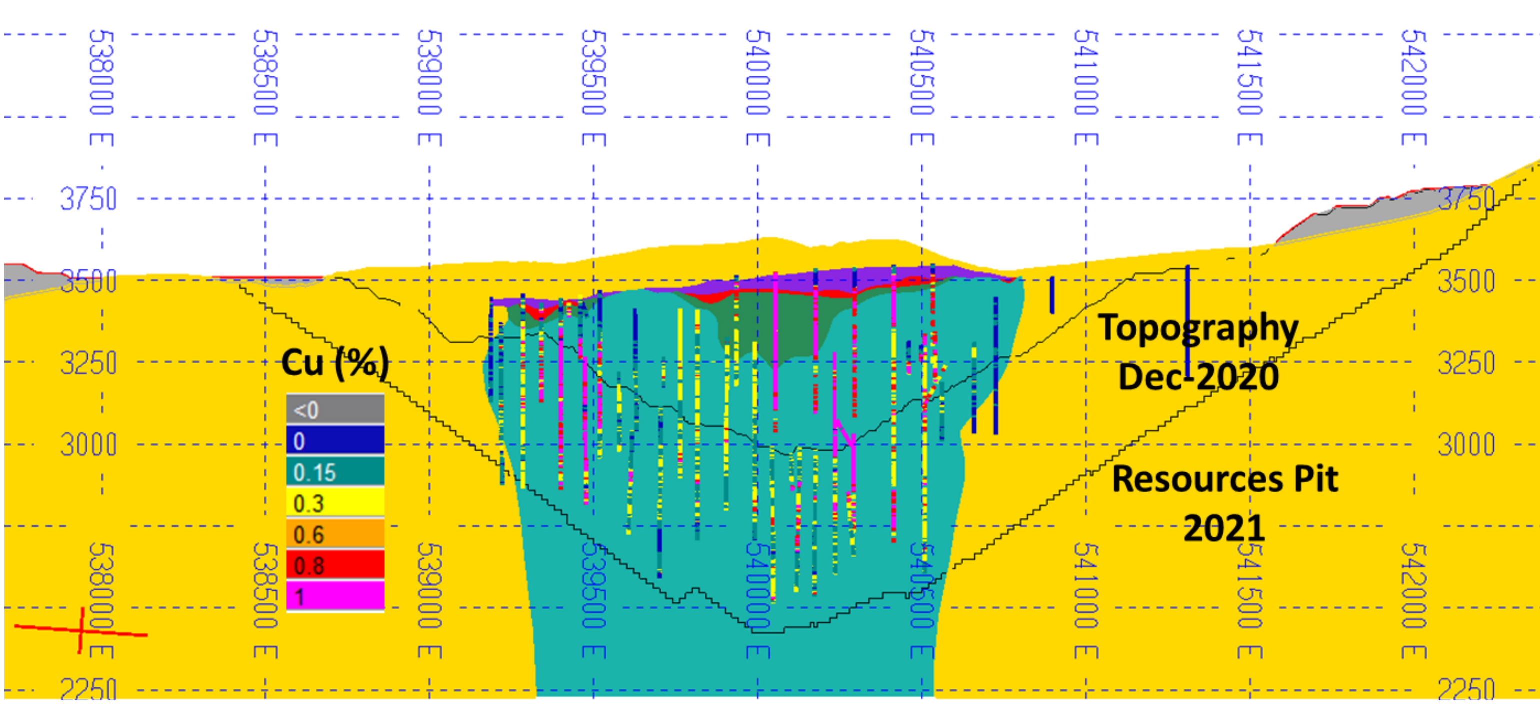
Alteration Type	Description
Potassic	An alteration assemblage of secondary biotite, magnetite, chlorite and some anhydrite. Primarily associated with the basaltic andesite and latite porphyry units.
Phyllic	Largely a retrograde alteration consisting of quartz, white mica (sericite), and pyrite. Chlorite, illite and secondary biotite occur more rarely. Best developed in the latite porphyry stock.
Argillic	Alteration assemblage of kaolinite, montmorillonite, dickite, and illite. Argillic alteration is almost exclusive to the basaltic andesite and seems to be of both hypogene and supergene origin.
Propylitic	Occurs mostly on the margins of the mineralized body and covers a halo of approximately 4 km. The mineral assemblage epidote, calcite, pyrite, and chlorite.
Silicic	Intense silicification is found within the non-leached rhyolite in the south of the ore zone, silica alteration has almost totally obliterated the original texture/mineralogy. The central breccia zone is also highly silicified, as are certain areas within the latite porphyry. In addition to matrix silicification, multiple quartz-veining stages are found in this alteration type.

Figure 6-9: Mineralization Map



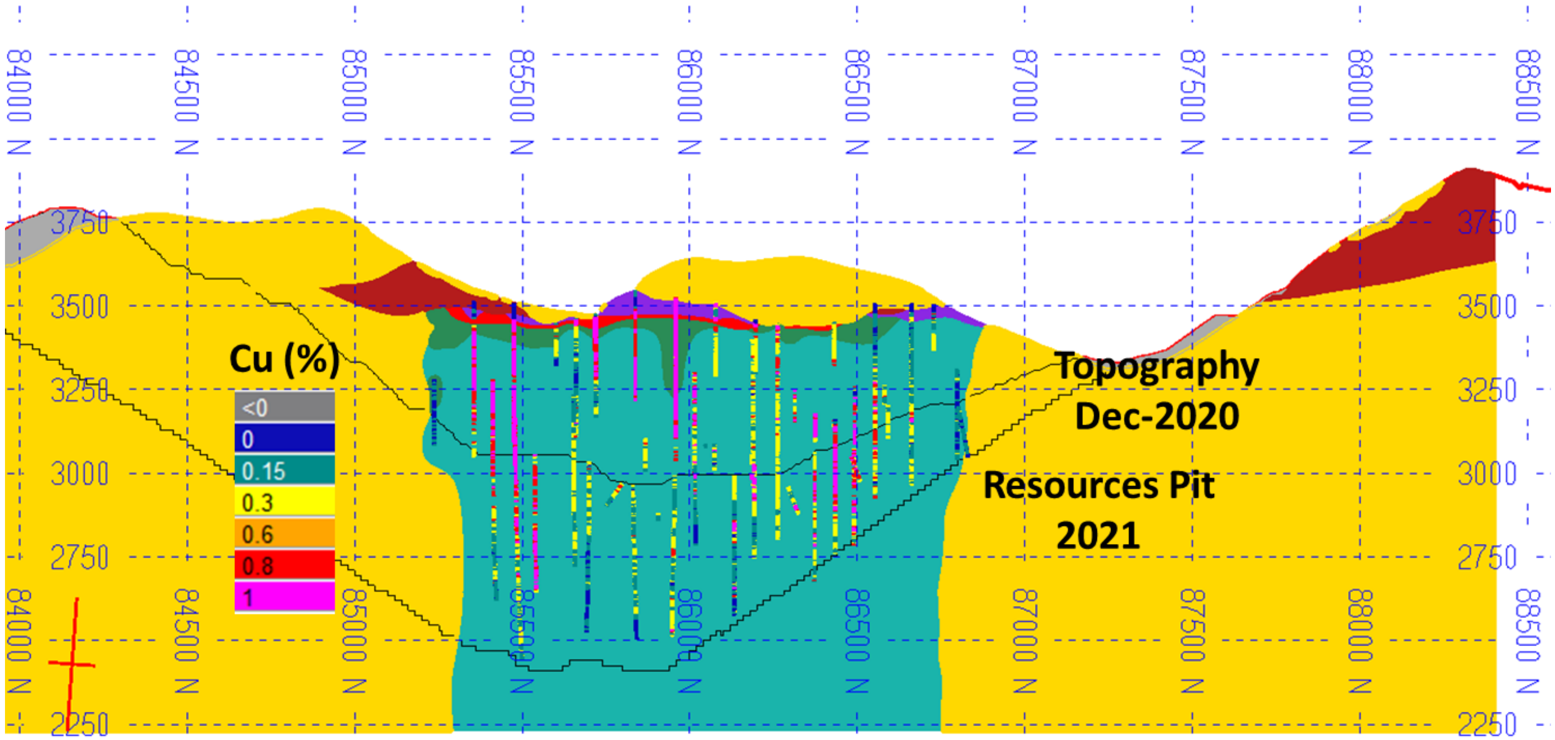
Note: Figure prepared by Wood, 2021.

Figure 6-10: Cross-Section Showing Mineralization (R–R′)



Note: Figure prepared by Wood, 2021.

Figure 6-11: Cross-Section Showing Mineralization (32–32′)



Note: Figure prepared by Wood, 2021.

6.4.5.1 Supergene

The 900 m wide hypogene ore zone was overlain by a secondary enrichment blanket that was about 20 m thick and averaged more than 0.75% Cu (PorterGeo, 2021).

The main chalcocite layer was overlain by 15–40 m of partially-oxidized upper zone averaging 0.60% Cu, where remnant chalcocite was apparent, but malachite and chrysocolla dominated. These were in turn overlain by a partially-preserved (maximum of 120 m thick) hematite-bearing leached cap that graded 0.01–0.12% Cu. Argillic alteration associated with the supergene ores included kaolinite, montmorillonite, illite and dickite.

6.4.5.2 Hypogene

Hypogene mineralization is distributed as follows:

- Basaltic andesite: 51%
- Latite porphyry: 47%
- Toquepala Group rhyolite: 1%
- Mineralized breccias: 1%.

The mineralogy is typically simple and consists of pyrite, chalcopyrite, and bornite, with sparse sphalerite, galena, and enargite. Hypogene mineralization represents >98% of the remaining mineralization within the Cuajone open pit.

7 EXPLORATION

7.1 Exploration

7.1.1 Grids and Surveys

Collar surveys are in the local Cuajone mine grid system; however, much of the information has been updated to UTM coordinates. The current block model is based on local mine grid coordinates. Future model updates are planned to use UTM coordinates.

The conversion from the mine grid to UTM was conducted in four phases, and completed in December, 2021. A cartographic LiDAR survey was completed using Leica ALS 70 HA equipment. In addition, coordinate transformation software for was developed. The final conversion has a rotation and translation of coordinates in the X and Y directions and an increase from 0 to 2 m in the Z direction due to the geoid model update.

Topographic survey data used to delimit topographic surfaces for mineral resource and mineral reserve estimates were acquired by the mine survey department using a differential GPS Trimble R8 Series 3 instrument.

7.1.2 Geological Mapping

A 1:100,000 scale geological map of the deposit area was prepared in 1968.

Pit mapping is conducted at 1:5,000 scale. Maps are used for ore control, geotechnical purposes, and updating the short-term mine models.

7.1.3 Geochemistry

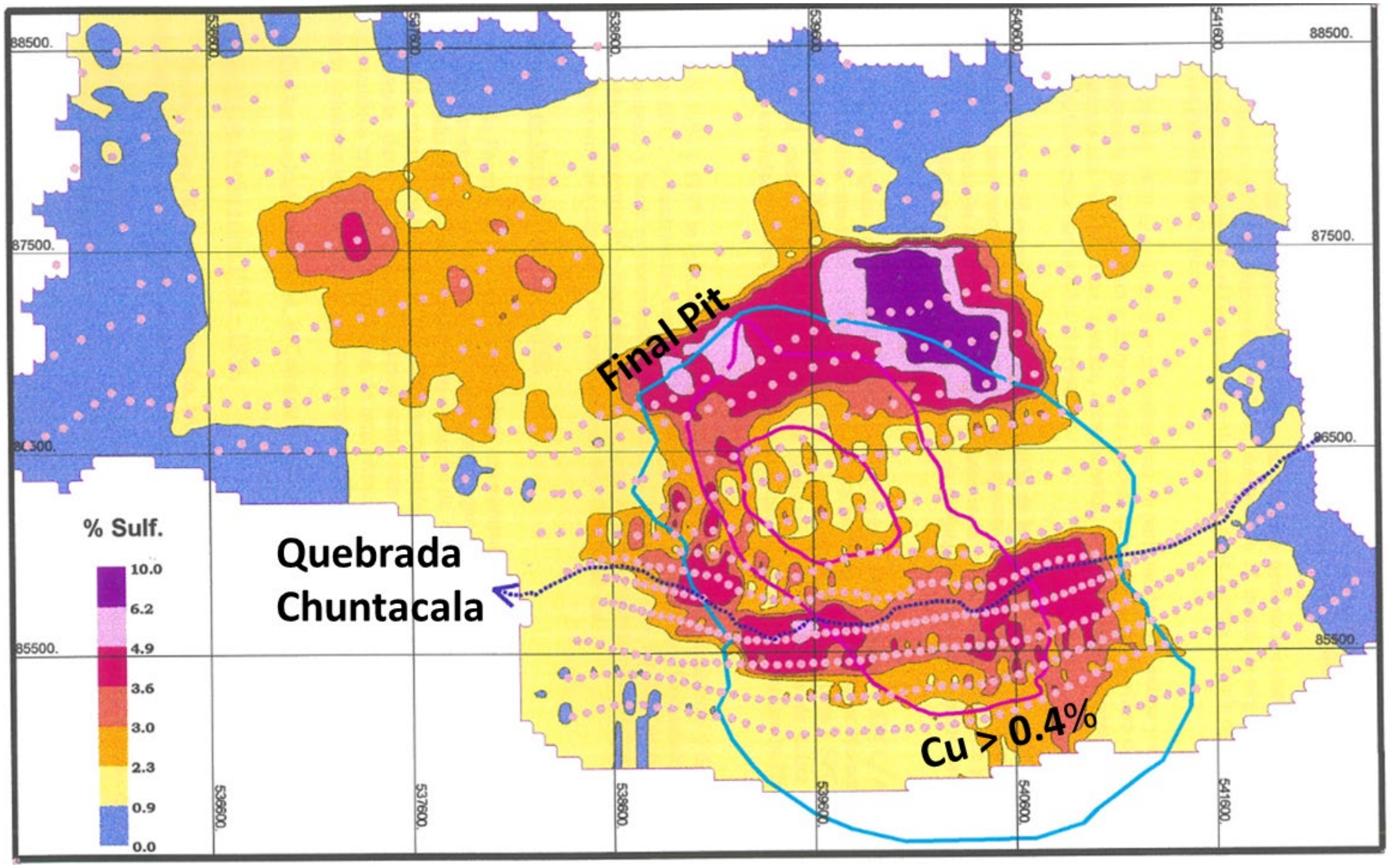
A total of 267 rock chip samples were taken in 1993 and assayed for copper, molybdenum, silver, and gold. The results obtained indicated prospective anomalies in the northwest sector where the current open pit is located.

7.1.4 Geophysics

Between 1951 and 1952, self-potential and resistivity surveys were completed (Figure 7-1). The anomalous responses outside the pit area were drill-tested by Asarco and Newmont.

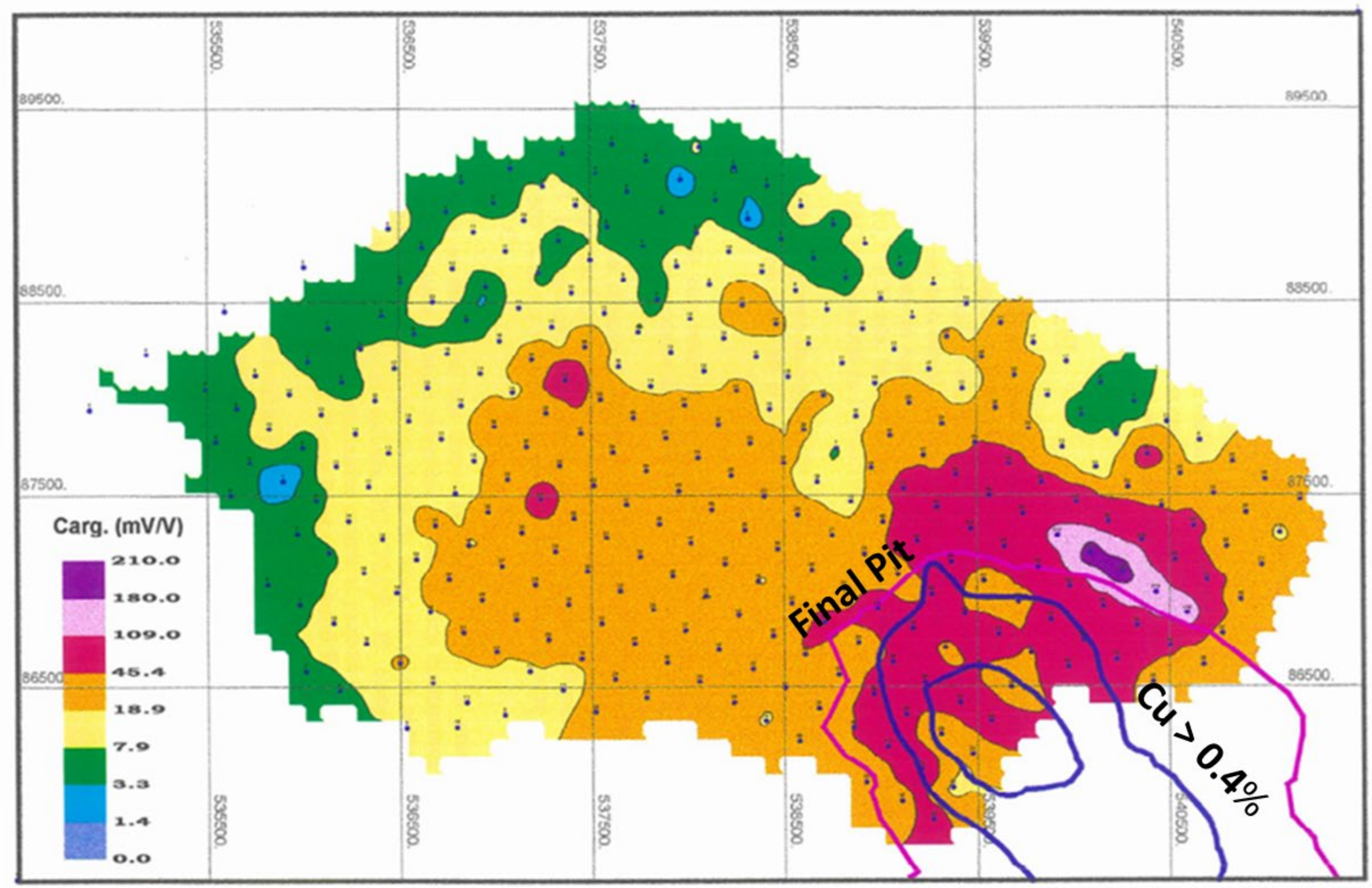
An induced polarization (IP) geophysical survey was completed in 1993 with the purpose of complementing existing information and delimiting mineralization in the northwest sector of the Cuajone pit (Figure 7-2).

Figure 7-1: Self Potential and Resistivity Summary Map (% sulfide)



Notes: Figure provided by Southern Copper, 2021. North is to top of map.

Figure 7-2: Induced Polarization: Chargeability



Note: Figure provided by Southern Copper, 2021. North is to top of map, grid is 1,000 m.

The more intense anomalies coincided with the mineralized body that was explored by a 1987–1988 drilling campaign. Northwest of the Torata River, two small IP anomalies were drilled in 1994, but yielded very low copper values.

7.1.5 Qualified Person's Interpretation of the Exploration Information

The mine has been operating since 1976, and all exploration data generated prior to mine start-up is long superseded by mining and drill data.

7.1.6 Exploration Potential

The deepest drill hole testing the Cuajone deposit at 2,380 m and encountered low-grade copper mineralization. The deposit remains open at depth.

7.2 Drilling

7.2.1 Overview

Drilling totals 1,600 core, churn and reverse circulation (RC) drill holes (446,593 m), and is summarized in Table 7-1. Drilling that supports mineral resource estimation consists of 870 core, churn and RC drill holes, (301,037 m). Drilling used in the mineral resource estimate is provided in Table 7-2. Drill collar locations are shown on a Project-basis in Figure 7-3 and the collars of those drill holes used in mineral resource estimation are shown in Figure 7-4.

Churn drill data were validated by twinning with core holes. RC holes were used for infill drilling within the pit.

Selected intervals were ignored by Hexagon, a third-party contractor to Southern Copper, in the construction of the mineral resources model, DHUSE=2. Such intervals were identified by using four filters that were the result of checks on vertical sections:

- Assays which are approximately 15 m in length, due to concerns over sample intervals crossing lithological contacts or not aligning with mining benches
- Drill holes with a single assay or drill holes with highly variable assay intervals (long and short assays). The average assay interval length of these holes was 29 m
- Drill holes without assays
- Assay intervals with lengths >5 m were omitted, in addition to the filters described above.

Table 7-1: Project Drill Summary Table

Year	Operator	Number of Drill Holes			Drilled Length (m)			Total Drill Holes	Total Drilled Length (m)
		Churn	Core	RC	Churn	Core	RC		
1942	Cerro De Pasco	—	40	—	—	12,366	—	40	12,366
1952	Newmont and Asarco	70	18	—	26,545	3,570	—	88	30,116
1965	Southern Copper	—	121	—	—	27,067	—	121	27,067
1980		—	43	—	—	11,592	—	43	11,592
1982		—	127	—	—	36,086	—	127	36,086
1991		—	24	—	—	4,636	—	24	4,636
1994		—	215	43		112,032	10,928	258	122,961
1998		—	60	48		5,678	5,815	108	11,494
2000		—	90	—	—	36,146	—	90	36,146
2002		—	7	—	—	1,561	—	7	1,561
2003		—	14	—	—	1,365	—	14	1,365
2004		—	29	—	—	2,089	—	29	2,089
2005		—	25	—	—	3,336	—	25	3,336
2006		—	46	—	—	4,673	—	46	4,673
2007		—	33	—	—	4,239	—	33	4,239
2008		—	20	—	—	3,295	—	20	3,295
2009		—	22	—	—	3,769	—	22	3,769
2010		—	37	—	—	4,503	—	37	4,503
2011		—	201	—	—	52,719	—	201	52,719

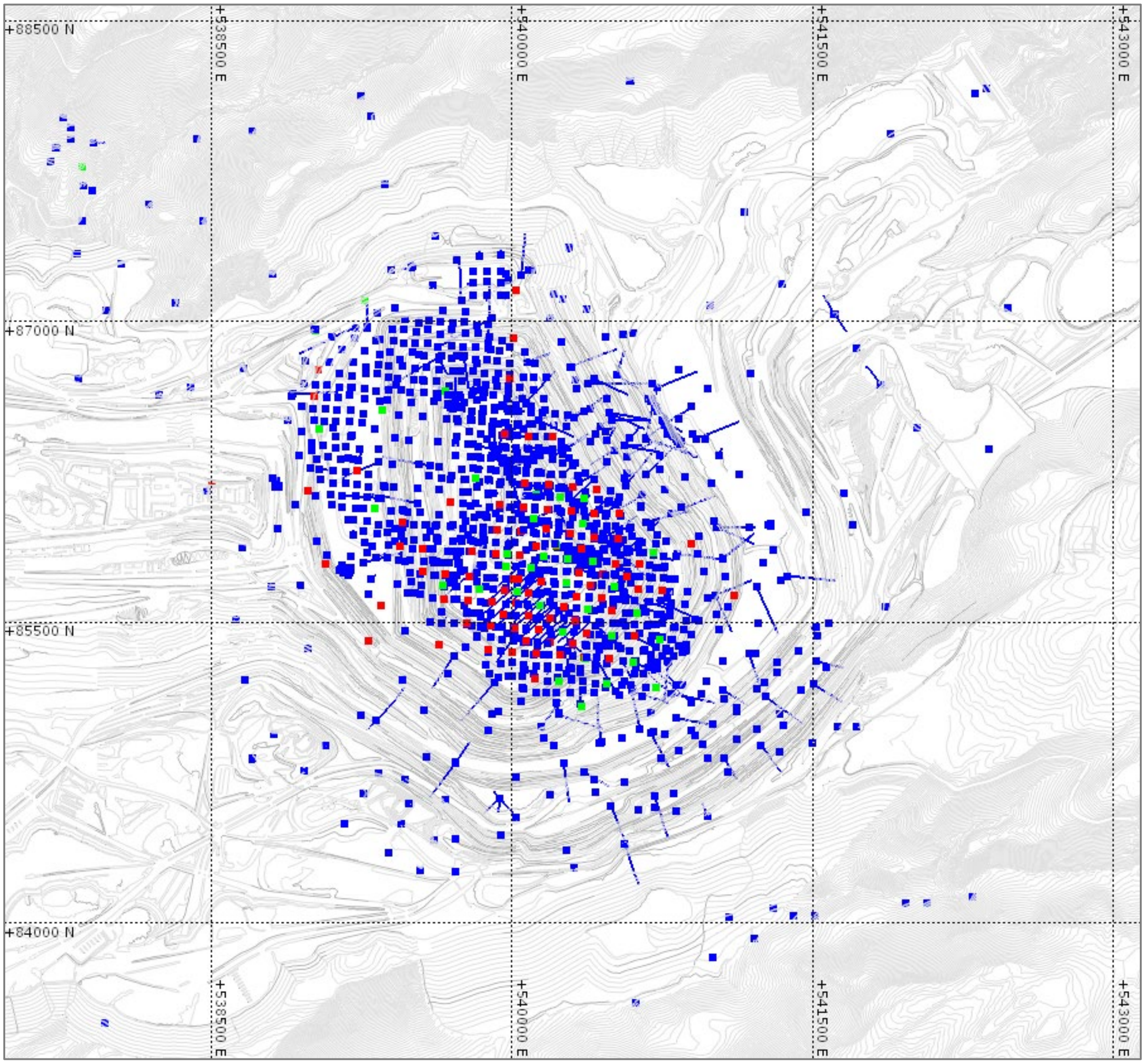
Year	Operator	Number of Drill Holes			Drilled Length (m)			Total Drill Holes	Total Drilled Length (m)
		Churn	Core	RC	Churn	Core	RC		
2012		—	31	—	—	6,857	—	31	6,857
2013		—	58	—	—	4,012	—	58	4,012
2014		—	21	—	—	5,825	—	21	5,825
2015		—	11	—	—	3,581	—	11	3,581
2016		—	14	—	—	3,407	—	14	3,407
2017		—	34	—	—	11,044	—	34	11,044
2018		—	32	—	—	12,622	—	32	12,622
2019		—	28	—	—	10,134	—	28	10,134
2020		—	14	—	—	3,900	—	14	3,900
2021		—	24	—	—	11,200	—	24	11,200
Total		***70***	***1,438***	***91***	***26,545***	***403,105***	***16,743***	***1,600***	***446,593***

Table 7-2: Drilling Supporting Mineral Resource Estimation

Year	Operator	Number of Drill Holes			Drilled Length (m)			Total Drill Holes	Total Drilled Length (m)
		Churn	Core	RC	Churn	Core	RC		
1942	Cerro de Pasco	—	39	—	—	12,167	—	39	12,167
1952	Newmont and Asarco	70	17	—	26,545	3,449	—	87	29,995
1980	Southern Copper	—	17	—	—	8,400	—	17	8,400
1982		—	1	—	—	276	—	1	276
1991		—	1	—	—	201	—	1	201
1994		—	208	39	—	110,977	10,308	247	121,285
1998		—	1	1	—	152	315	2	467
2000		—	85	—	—	35,284	—	85	35,284
2004		—	20	—	—	1,644	—	20	1,644
2005		—	8	—	—	1,005	—	8	1,005
2006		—	39	—	—	3,704	—	39	3,704
2007		—	24	—	—	3,082	—	24	3,082
2008		—	5	—	—	813	—	5	813
2009		—	2	—	—	565	—	2	565
2010		—	31	—	—	3,739	—	31	3,739
2011		—	140	—	—	36,201	—	140	36,201
2012		—	7	—	—	2,308	—	7	2,308
2013		—	13	—	—	2,350	—	13	2,350
2014		—	20	—	—	5,425	—	20	5,425

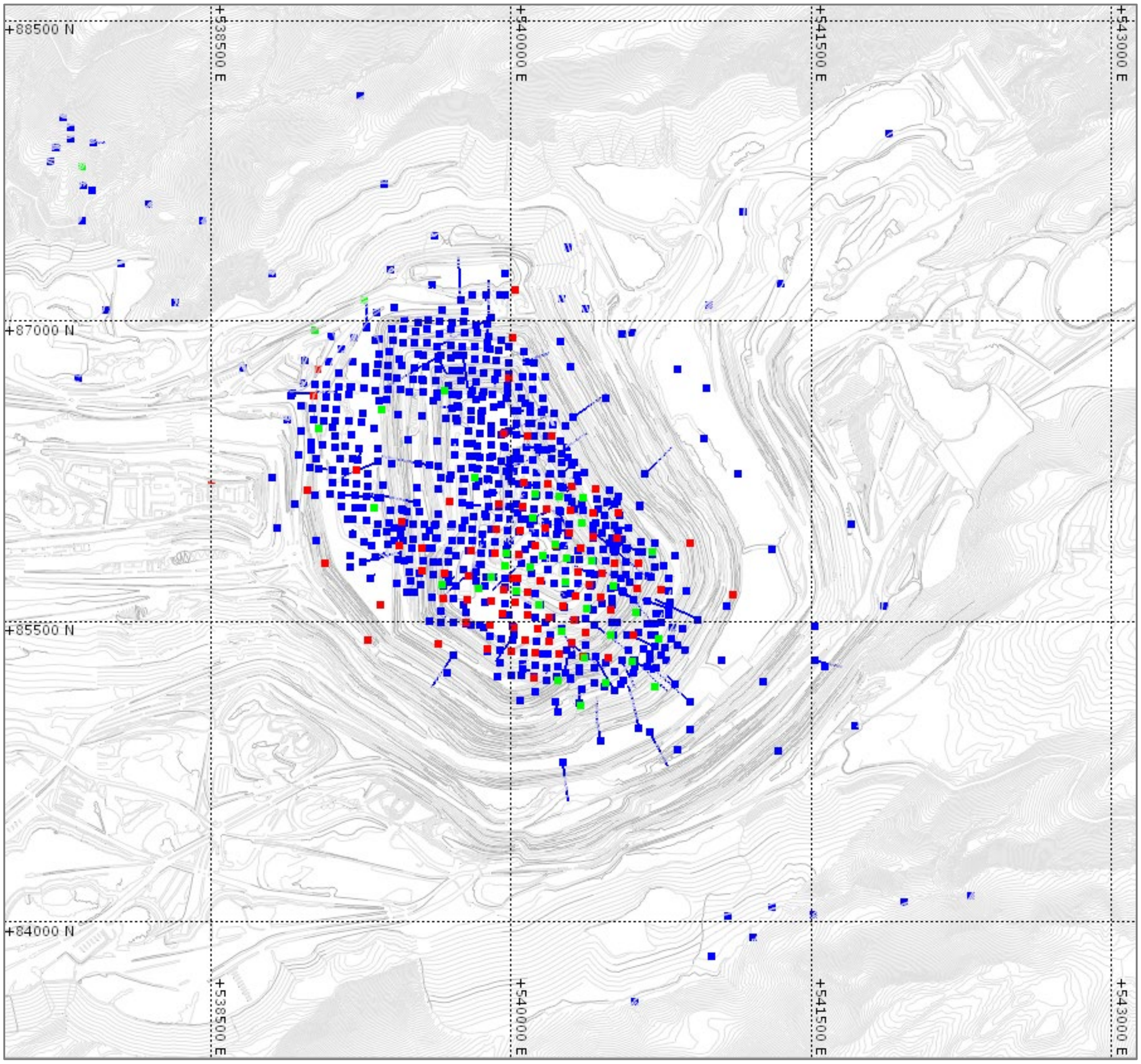
Year	**Operator**	**Number of Drill Holes**			**Drilled Length (m)**			**Total Drill Holes**	**Total Drilled Length (m)**
		Churn	**Core**	**RC**	**Churn**	**Core**	**RC**		
2015		—	11	—	—	3,581	—	11	3,581
2016		—	12	—	—	2,996	—	12	2,996
2017		—	20	—	—	7,550	—	20	7,550
2018		—	21	—	—	10,400	—	21	10,400
2019		—	18	—	—	7,600	—	18	7,600
Total		***70***	***760***	***40***	***26,545***	***263,869***	***10,623***	***870***	***301,037***

Figure 7-3: Property Drill Collar Location Plan



Note: Figure prepared by Wood, 2021.

Figure 7-4: Drill Collar Location Plan for Drilling Supporting Mineral Resource Estimates



Note: Figure prepared by Wood, 2021.

Wood does not agree with Hexagon's exclusion of this data, because data with variable lengths can be dealt with through the selection of an appropriate composite length. Wood completed a check on the impact of removing these data and concluded that the mineral resource estimate was not materially affected.

7.2.2 Drill Methods

Core drilling was the dominant form of drilling for all exploration. Where known, drill contractors included Boyles Brothers, Boart Longyear, Geotec Asociados, Britton Hermanos Perforaciones del Perú, Geodrill, and rigs operated by Southern Copper staff. The only rig type recorded is a Longyear 44 drill rig. Core diameters included HQ (63.5 mm), NQ (47.6 mm), HQ3 (61.1 mm) and NQ3 (45.1 mm).

Some RC drilling was completed. Drilling contractors and bit diameters are not recorded. Limited churn drilling was completed from 1952–1954. Those data are used to support mineral resource estimation because they were verified by core drilling.

Blasthole sampling, while used to validate the resource estimation, is not used in the estimation of grades for the resource model.

Holes are generally drilled vertically and collared on section lines spaced 50 m apart. A program with inclined core holes was completed in 1982. Holes were inclined at 45°–60^0. The azimuth of these holes was on a 50° azimuth. Those drill holes were drilled to define the orientation and extents of various intrusive lithologies within the Cuajone deposit.

7.2.3 Logging

Geological logs, at a minimum, record: logger name, date, coordinates of the hole, name of the hole, start-date of logging, azimuth, dip, logging interval equivalent to 3 m, core diameter, rock type, intensity of alteration minerals, rock quality designation (RQD), recovery, mineralization, and other information deemed important by the geologist responsible for the log. Log formats varied with time; but the basic information was always recorded. From 1942–2017, geological logging was done on paper.

From 1942–1988, the same format was used; depth, assays, geology, mineralization, type of casing and recovery were recorded.

From 1991–1999, the logging format changed to provide more detail to the alteration minerals, type of structure, RQD and types of limonite.

In 2001 and continuing to 2017, the logging format eliminated the option of types of limonite, added detail for mineral occurrence, grade estimate, rock hardness, and a log summary. More detail for alteration was required and structure was minimized.

From 2017 on, physical logging changed from paper to digital logging using GVMapper.

7.2.4 Recovery

Core recovery in most lithological units is >80%. Alluvium, upper tuff, basal conglomerate, rhyolitic conglomerate, and white agglomerate have recoveries <80%, but lithologies are on the edges of the mineralization and the poor recovery does not affect mineral resource estimation.

7.2.5 Collar Surveys

Collar surveys for the 2015–2021 drilling were performed by mine surveyors using Trimble R12 GPS instruments. No formal survey certificates were produced so the survey data in the database cannot be verified against an original hard-copy document.

The collar survey method for the earlier campaigns is not known and there is no original hard copy data to verify the collar locations in the database. Southern Copper has, whenever possible, picked up historical collar locations with modern equipment. Such surveys have largely confirmed the drill hole collar locations.

7.2.6 Downhole Surveys

The majority of the drill holes were vertical. The database does not record why certain drill holes and not others, were down-hole surveyed.

Downhole surveys were not systematically performed during the pre-2011 drill campaigns, with exception of some drill holes completed during the 2000 drill campaign.

Where information is available in the database, it is summarized below:

- From 1942–1980, downhole surveys were performed using Sperry Sun single- and multi-shot instruments. Survey intervals were typically spaced at about 50 m intervals
- From 1982–1996, the Sperry Sun single-shot instruments were used for downhole surveys. Survey intervals were typically about 100 m
- Records suggest that from 1996–2001, Eastman, CBC Welany, Christensen, Sperry Sun and WhipStock GmbH single-shot instruments were used

- From 2011 to 2013, Flexit and Peewee instruments were used
- Since 2013, downhole surveys were performed with Flexit instruments (3 m intervals; to about 2012), Devishot (50 m intervals; to about 2017) and Stockholm Precision Tools gyroscope (10 m intervals; to present)
- There is no record of declination corrections that must be applied to determine true north from magnetic instruments. In 1942, declination was about 5.33° E and it is now 6.45° W so the adjustment is not trivial. Wood cannot verify that declination was applied properly. This introduces a risk that the azimuth of angled drill holes is not accurate and thus samples are not accurately located which will cause estimated grades to be misplaced.

Gyroscopic downhole surveys were performed for 30% of the drill holes remaining (below current topography) in the mineral resource database. Of the drill holes below the end-of-year topography, 55% have directional surveys.

7.2.7 Comment on Material Results and Interpretation

The term "true thickness" is not generally applicable to porphyry-style deposits as the entire rock mass is potentially mineralized and there is often no preferred orientation to the mineralization so there is no "true thickness" in the sense of layered deposits. Thickness of mineralization in drill holes accurately reflects the "thickness" of the mineralization at the location of the hole.

Drilling and surveying were conducted in accordance with industry standard practices at the time the drill data were collected, and provide suitable coverage of the mineralization. The collar and downhole survey methods used provide reliable sample locations; however, there are a number of holes without downhole surveys and it is not clear from the record if declination corrections were properly applied. The lack of downhole surveys for some older drill holes and uncertainty about declination is potential source of error in the location of deeper drillhole intersections. The majority of drill holes are vertical so the lack of surveys is not considered to be a significant issue for the initial 100–200 m drilled depth.

In Wood's opinion, while there are uncertainties about downhole surveys for some holes, there are a sufficient number of properly surveyed holes to provide confidence that the quantity and quality of existing drilling data are sufficient to support mineral resource estimation. Wood recommends that all holes have well documented, proper collar and downhole surveys.

Geological and geotechnical logging procedures provide consistency in descriptions.

7.3 Hydrogeology

An updated conceptual hydrogeological model was produced for the Cuajone pit that serves as input for the geotechnical model in the pit. To understand hydrogeological dynamics, the following topics were analyzed:

- Analysis of hydrometeorological data
- Determination of the recharge and discharge to the system
- Evolution of groundwater levels in the area
- Analysis of permeabilities correlating to lithology
- Definition of hydrogeological units
- Groundwater movement and flow mechanisms.

7.3.1 Sampling Methods and Laboratory Determinations

Currently, the Cuajone pit drainage system consists mainly of natural channel control, construction of horizontal drains and pumping from the bottom of the pit. Hydraulic conductivities of the main hydrogeological units were estimated based on field tests.

No chemical analysis of groundwater have been performed so no water quality data exist.

7.3.2 Groundwater Models

A two-dimensional hydrogeological numerical model was built and calibrated to estimate the pore pressure in the slopes of the Cuajone open pit. Results of this modeling allowed generation of necessary input for stability analyses at inter-ramp and global level.

Over time a cone of depression has been generated around the pit from dewatering programs. The current groundwater flow is about 2.4 L/sec.

7.3.3 Water Balance

A water balance was generated for the mine, using the formula:

- Precipitation = evaporation + infiltration + surface runoff + mine drainage.

The average annual rainfall is 137 mm/a, while evaporation reaches 2,055 mm/a. The average annual potential infiltration is about 14.1 mm/a, which is equivalent to an annual average potential infiltration flow, for the 23.1 km^2 area of the Cuajone Operations sub-basin, of the order of 10.4 L/sec. Not all of the potential infiltration actually infiltrates. A portion of the flow is captured by mine drainage systems, leaving a potential infiltration flow of 7.8 L/sec.

7.3.4 Comment on Results

The hydrological data support the current pit dewatering parameters and assumptions.

7.4 Geotechnical

Open pit slope geotechnical analysis and design is supported by data gathered from 2001–2013 geotechnical drilling, laboratory testing, and bench-scale structural conducted by SRK (2016).

In the most recent geotechnical review and analysis of the 15-year pit (to 2028) that was used to support the production plan and final pit configuration, Southern Copper generated an updated geotechnical block model. That block model was based on historical geological and geotechnical information and updated geological/geotechnical, structural, and hydrogeological data derived from drilling and bench mapping. Various basic geotechnical units were also updated.

The updated structural model resulted in improved structural domains, and a conceptual hydrogeological model was produced based on those data.

7.4.1 Sampling Methods and Laboratory Determinations

Geological logging was used to develop rock mass rating (RMR) criteria (Bieniawski, 1976).

A program of laboratory testing of the samples obtained during geotechnical drilling was initiated in support of stability analysis of the bench level, inter-ramp and global mining designs. Testwork included unconfined compressive strength, point load, and direct shear tests. The laboratory used for the work is not recorded.

This work was used to generate the rock material parameters that were used for derivation of strength parameters in rock mass characterization and slope stability analyses.

A three-dimensional 3DEC model of the 15-year pit was compiled to verify the generation of potential macro-blocks or macro-wedges.

7.4.2 Comment on Results

Lithological and geomechanical logging protocols, and laboratory test equipment used, and quality assurance/quality control (QA/QC) checks on the logging and laboratory tests were not available for review by Wood.

Based on the 2016 SRK report:

- There is no information available as to any quality assurance or QA/QC procedures that may have been in place during data collection
- No procedures and protocols for mine design are currently in place
- No geotechnical risk register or seismic management plan is mentioned.

Wood's review of summaries of the field investigation and laboratory testing data presented in SRK (2016) indicate that the information used to support the SRK (2016) design of the open pit slopes appears to be consistent with generally-accepted industry standard practice for the level of geotechnical effort required to support pre-feasibility level open pit designs (Read & Stacey, 2010).

7.4.3 Facilities

7.4.3.1 Heap Leach Geotechnical

The solvent extraction heap leach facility has been inactive since 2018. The most recent geotechnical investigations by Anddes (2018) relate to the design of the physical stabilization of the heap. Previous geotechnical campaigns supported the original facility design. Available geotechnical data included sampling at specified locations and borrow sources, in-situ density tests, cone penetration tests, and seismic cone penetration tests. Facility location support testwork included test pitting within the facility footprint, and seven seismic refraction lines.

A review performed by Anddes (2020) and checks of the as-built plans presented by SKEX (2016) confirmed that the stability berm proposed in the detailed engineering for the solvent extraction heap leach facility (GreEngField–Anddes, 2014a), and confirmed in the technical memorandum prepared by Anddes (2015), was not built.

Phase IV of the heap leach facility was supported by geotechnical evaluations completed in 2014 and 2020. Testwork included test pits into the limits of the foundation, borrow source areas and waste material, in-situ density tests, natural density tests, Schmidt hammer tests, 23 seismic refraction lines, and a multichannel analysis of surface waves survey. No geotechnical or condemnation drilling was conducted within the footprint of the existing facilities. Given the proximity to the open pit, the existence of geological structures (faults) is expected.

7.4.3.2 Waste Rock Storage Facilities

Geotechnical investigation campaigns, consisting of test pits, in-situ density tests, and grain size distribution tests, were conducted for the WRSFs for closure purposes in 2008 and 2012. There is no information regarding the original design of the WRSFs.

8 SAMPLE PREPARATION, ANALYSES, AND SECURITY

8.1 Sampling Methods

Core was sampled on 3 m intervals. A geologist put a "cut line" on the core to guide core cutting. Core was cut with a diamond saw.

RC samples were sampled on 3 m intervals and split to 300–400 g. The splits were sent to the sample preparation laboratory.

Blasthole samples are sampled by cutting four channels on opposite sides of the cuttings pile. Samples are scraped from the walls of the channels and placed in a bag.

8.2 Sample Security Methods

Sample security from drill point to laboratory relied upon the fact that samples were either always attended to, or stored in a secure area prior to shipment to the external laboratory. Chain-of-custody procedures consisted of completing sample submittal forms to be sent to the laboratory with sample shipments to ensure that all samples were received by the laboratory.

8.3 Density Determinations

Density samples were 10–15 cm in length. There are a total of 24,174 measurements available in the database, obtained using the water displacement method.

A density quality control report included results for 210 control samples tested by the Certimin laboratory from drill samples completed in 2017–2019. Wood evaluated the obtained results using reduced major axis (RMA) plot and a reasonable correlation between the Southern Copper data and Certimin results was observed. Certimin results were 3.4% high than the Southern Copper data.

8.4 Analytical and Test Laboratories

Table 8-1 summarizes, to the extent known, the sample preparation and analytical laboratories used.

Table 8-1: Summary of Preparation and Analysis Laboratories

Date	Operator	Laboratory	Accreditations	Sample Preparation	Sample Analysis	Independent
1942–1945	Cerro De Pasco	Unknown	Unknown	Unknown	Unknown	Unknown
1952–1954	Asarco	Unknown	Unknown	Unknown	Unknown	Unknown
1965–1970	Southern Copper	Ilo Southern Copper Central Laboratory	none	Moquegua	Ilo Southern Copper Central Laboratory	no
1982-1988	Southern Copper	Ilo Southern Copper Central Laboratory	none	Moquegua	Ilo Southern Copper Central Laboratory	no
1991-1996	Southern Copper	Ilo Southern Copper Central Laboratory	none	Moquegua	Ilo Southern Copper Central Laboratory	no
1997-2002	Southern Copper	Ilo Southern Copper Central Laboratory	none	Moquegua	Ilo Southern Copper Central Laboratory	no
2004-2011	Southern Copper	Ilo Southern Copper Central Laboratory	none	Moquegua	Ilo Southern Copper Central Laboratory	no
2011-2019	Southern Copper	Ilo Southern Copper Central Laboratory	none	Moquegua	Ilo Southern Copper Central Laboratory	no
2013	Southern Copper	ALS Global	ISO 14001; ISO9001	Lima	Lima	yes
2014-2019	Southern Copper	Inspectorate Services Perú, S.A.C.	ISO 14001; ISO9001; ISO 17026	Arequipa	Lima	yes
2019	Southern Copper	Bureau Veritas	ISO 14001; ISO9001; ISO 17025	Arequipa	Lima	yes
2017-2019	Southern Copper	Certimin	ISO 14001; ISO9001; ISO 17026	Arequipa	Lima	yes

8.5 Sample Preparation

Sample preparation procedures at laboratories other than the Cuajone mine laboratory prior to 2017, were not provided to Wood.

Sample preparation in the Cuajone mine laboratory consisted of drying the sample, crushing, splitting in a riffle splitter to 100–150 g, and pulverization to 95% passing 105 µm (140 mesh).

Sample preparation from 2017 to the Report date at Certimin consisted of crushing to 90% passing 6 mm, crushing to 90% passing 2 mm (10 mesh), splitting to 200 g, and pulverization to 95% passing 105 µm (140 mesh).

8.6 Analysis

The Cuajone mine laboratory (1965–2021) performed a multi-element determination with an aqua regia digestion and atomic absorption spectrometry (AAS) finish on submitted exploration and blast hole samples. Components analyzed were total copper (CuT), acid soluble copper (CuS), cyanide soluble copper (CuCN), molybdenum, iron, iron oxide (FeOx), zinc, silver, and lead.

The Ilo smelter laboratory also performed multielement determinations for CuT, CuS, CuCN, molybdenum, silver, iron, Fe, iron oxide (FeOx), and zinc, using the same procedures as the Cuajone mine laboratory.

In 2013, ALS used a four-acid digestion with an inductively-coupled plasma (ICP) optical emission spectroscopy (OES finish) (method ME-ICP61) for CuT, iron, molybdenum, lead, zinc, arsenic and silver.

Certimin (2017–2019) performed multi-element determinations with a four-acid digestion and ICP-OES/ICP mass spectrometry (MS) finishes, and AAS. Elements such as CuT, CuS, CuCN, and FeOx were finished by AAS. All other elements except CO_3 and chlorine were finished by ICP. Carbonate was analyzed by LECO and chlorine was assayed with an ultraviolet absorption method.

8.7 Quality Assurance and Quality Control

Quality control programs for pre-2017 drill campaigns are not recorded. Southern Copper selected 160 samples (80 one-half core samples; 80 pulp samples) from 69 holes drilled in 1980, 1994, 2000, 2006, and 2011–2015 and sent them to Certimin for check assaying. Accuracy was judged by Wood to be generally acceptable, with bias for copper in core samples at -6.3% which is just outside the ±5% limits generally accepted by the industry. This result is acceptable considering the age of some of the drill core.

Quality control programs for exploration core holes and bast holes were implemented in 2017 with insertion of certified reference materials (standards), coarse blanks, fine blanks, twin samples, coarse duplicates, and pulp duplicates. The use of check samples was also adopted.

Sampling precision, sub-sampling precision and analytical precision were evaluated using twin samples, coarse duplicates, and fine duplicates, respectively. Southern Copper used the hyperbolic method for assessing sampling, sub-sampling and analytical precision. Max–min plots were constructed for copper and molybdenum. Precision is considered to be acceptable.

The standards used by Southern Copper were prepared by Target Rocks Perú S.A.C. using material from the Cuajone deposit. Standard certificates were provided by Smee & Associates Consulting Ltd. The standards showed acceptable bias. Some apparently out of control samples were observed; however, these are likely due to sample mix-ups and should be investigated.

Bureau Veritas Perú (Bureau Veritas) was sent a total of 268 pulp samples to evaluate the quality of the internal Ilo laboratory facility. These samples were obtained from 48 drill holes completed in 1982, 2009, 2011, 2012, 2017, and 2018. Results were processed by Wood using RMA plots, comparing the Ilo laboratory data against the Bureau Veritas results. Biases of the Ilo data relative to Bureau Veritas were acceptable for copper (-1.6%) and questionable for molybdenum (-6.3%).

Southern Copper personnel collected 40 samples per month during the months of December 2020 to March 2021 to send to Certimin to evaluate the quality of the primary Ilo laboratory. Results indicate acceptable correspondence between the two laboratories.

Coarse blanks and fine blanks analytical results do not indicate any significant contamination for copper and molybdenum in the period from 2017–2019.

Selected blasthole pulps from late 2020 and early 2021 that were analyzed at the internal Ilo laboratory were submitted to the Inspectorate laboratory in Lima (Inspectorate) for check assay. The results of the blasthole check assays are good. Means of the original and check assay results are close and the reproducibility of the original assays from the Ilo laboratory with the check assays from the external laboratory is good.

Selected drill hole sample pulps and archived core intervals from resource drill programs from the late 1990s to 2021, which were analyzed at the Cuajone mine laboratory until 2016 and at the Ilo laboratory from 2016 to 2020, were submitted to Inspectorate for check assay.

Reproducibility of the samples from before 2016 is poorer than expected, suggesting potential issues with sampling, sample preparation, assaying or database integrity for the samples analyzed at the Cuajone mine laboratory before the implementation of QA/QC programs and use of the Ilo laboratory.

8.8 Database

Data are currently managed using an acQuire database. User profiles and passwords are used to limit editorial access to the database. All data entry is validated using data masks that impose reasonable limits on the data. Data outside the limits are not allowed in the database and must be corrected.

8.9 Qualified Person's Opinion on Sample Preparation, Security, and Analytical Procedures

In Wood's opinion, the sample preparation procedures, analytical methods, QA/QC protocols, and sample security are acceptable to support mineral resource estimation.

9 DATA VERIFICATION

9.1 Data Verification by Qualified Person

9.1.1 Site Visit

Representatives from Wood visited the Cuajone Operations, as outlined in Chapter 2.4. Observations from the visit were incorporated into Wood's conclusions as appropriate to the discipline areas in this Report, or incorporated into the recommendations in Chapter 23.

9.1.2 Database Audit

Absence of original hard copy survey and assay certificates makes evaluation of database integrity impossible for data that predates 2017. Some data exist and those were used to verify data.

To assess data integrity, Wood performed comparisons of the Cuajone dataset and its available original sources including collar, survey, density, assay certificates and reports. A summary of the comparison follows:

- Collar location records for 47 drillholes were compared. No significant discrepancies were observed. Collar certificates for three drillholes were not available for review. In general, collar certificates formats are not adequate, lack of following information was observed: used equipment, signature of the person in charge, date, drill hole depth
- Discrepancies during downhole survey records review were observed at least five drill holes, which represent 10% drill holes reviewed. Southern Copper concluded that any the discrepancies were due to the methodology used to upload data in MineSight
- Wood compared 6,425 assay records from 48 drill holes against their respective assay certificates for copper and molybdenum which represent 4% of total records included in the database. No significant discrepancies were observed;
- 298 holes with copper grades were found to be excluded from the mineral resource estimate
- A small number of discrepancies were noted in recovery and RQD data. Those were resolved and were not considered to have any impact on the mineral resource estimate

- Wood compared 9,340 logging records against their respective log reports. Discrepancies for 515 records were observed, which represent an error rate of 6%. These discrepancies are, as yet, not resolved. The impact is that geological interpretations based on the records with discrepancies may cause local anomalies of geological contacts and thus possibly mislocate mineralization or other geological features. Such discrepancies result in a lower confidence in the geological model than if no such discrepancies were observed
- Wood compared 2,158 density records from 36 drill holes against their respective density reports. Three discrepancies were observed, which represent an error rate of 0.14%. Of the 50 drill holes selected for review, 14 do not have density data in the database (28%).

9.1.3 Peer Review

Wood requested that information, conclusions, and recommendations presented in the body of this Report be peer reviewed by Wood subject matter experts or experts retained by Wood in each discipline area as a further level of data verification.

Peer reviewers reviewed the information in the areas of their expertise as presented in this Report. This could include checks of numerical data, consistency of presentation of information between the different Report chapters, consistency of interpretation of the data between different discipline areas, checked for data omissions, verified that errors identified during Wood's gap analyses were appropriately addressed or mitigated, and reviewed the appropriateness of the individual QP's opinions, interpretations, recommendations, and conclusions as summarized by the QP Firm.

9.2 Qualified Person's Opinion on Data Adequacy

Wood considers that a reasonable level of verification has been completed, and that no material issues would have been left unidentified from the programs undertaken.

Wood is of the opinion that the data verification programs for Project data adequately support the geological interpretations, the analytical and database quality, and therefore support the use of the data in mineral resource estimation.

10 MINERAL PROCESSING AND METALLURGICAL TESTING

10.1 Test Laboratories

Historical testwork on which the plant designs were based was not available.

Two different laboratories were used to perform metallurgical testwork. The Southern Copper-operated Cuajone concentrator was used from 2007–2012, and is not independent. Inmet Chapi in Arequipa (Inmet) was used in 2008 and is an independent laboratory. There is no international standard of accreditation provided for metallurgical testing laboratories or metallurgical testing techniques.

Leach Inc., a metallurgical consultancy, was retained to provide advice to the Southern Copper metallurgical team.

10.2 Metallurgical Testwork

A total of 222 samples from the different mine zones were tested for Bond ball mill work index values (BWi), 201 at the Cuajone concentrator, and 21 at Inmet. Values ranged from 13.10–21.37 kWh/t.

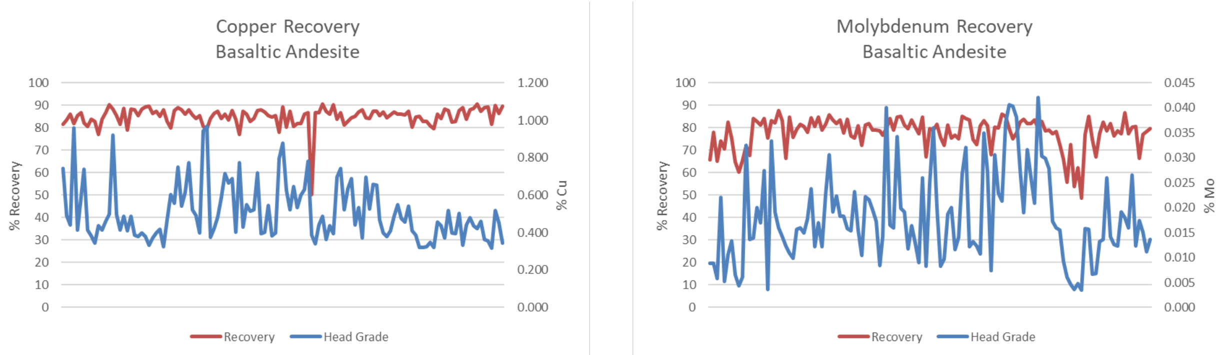
A total of 300 samples from different mine zones were subjected to copper and molybdenum flotation testing by the Cuajone concentrator, using standard plant conditions, and aiming to replicate plant operations. The results of this testing campaign were used to develop a recovery model for copper and molybdenum. Recovery results versus grade by lithology for copper and molybdenum are shown in Figure 10-1 to Figure 10-5. The variability in copper recovery is less than the variability of molybdenum for all major lithologies.

10.3 Oxide Recovery Estimates

10.3.1 Copper Recovery Equation

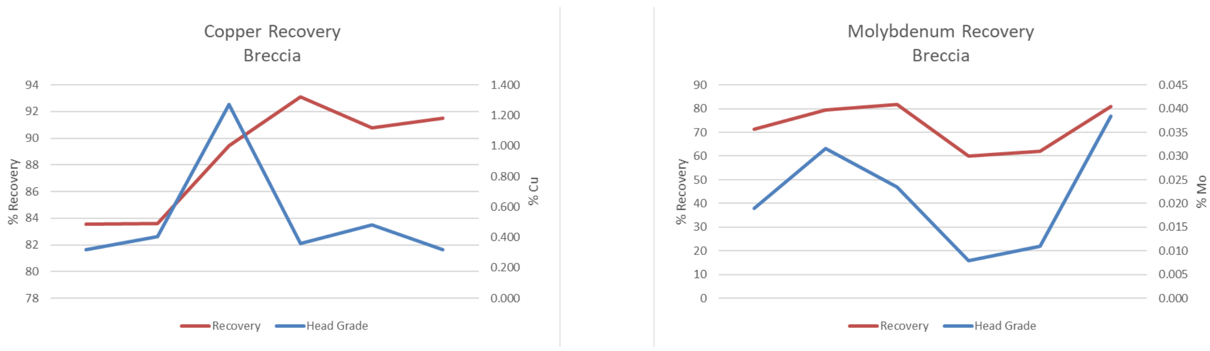
Predicting the copper production of the leach plant is based on an estimate of the grade of the ore to be processed, a testwork-obtained correlation between the three copper phases (acid soluble, cyanide soluble and insoluble), and the length of time the ore is leached. Corrections to the estimated recovery are made for the percentage minus 100 mesh and the percent carbonate ($CO_3^{=}$) in the ore.

Figure 10-1: Cu and Mo Recovery – Basaltic Andesite



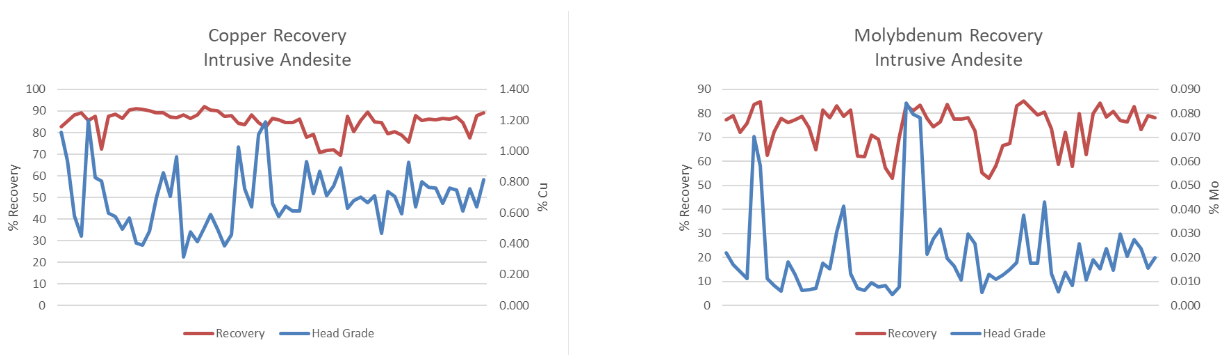
Note: Figure prepared by Southern Copper, 2021

Figure 10-2: Cu and Mo Recovery – Breccia



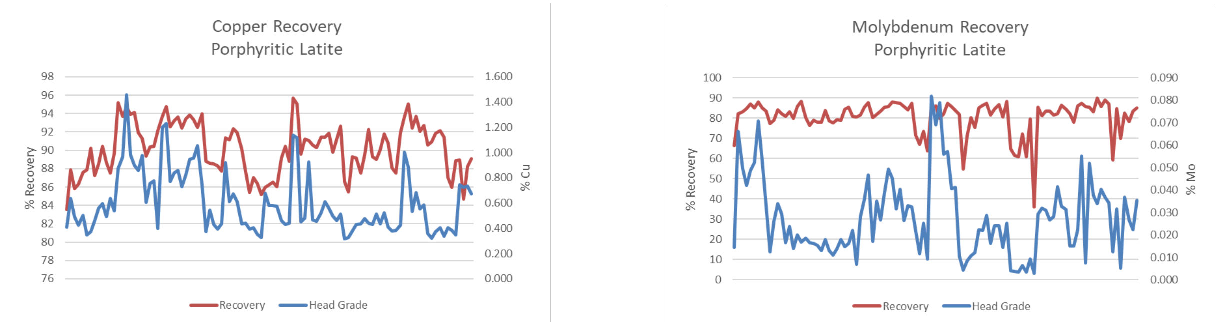
Note: Figure prepared by Southern Copper, 2021

Figure 10-3: Cu and Mo Recovery – Intrusive Andesite



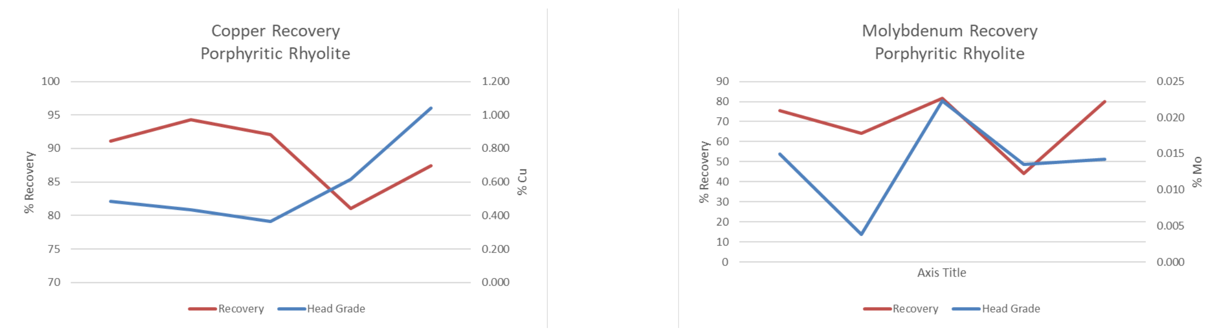
Note: Figure prepared by Southern Copper, 2021

Figure 10-4: Cu and Mo Recovery – Porphyritic Latite



Note: Figure prepared by Southern Copper, 2021

Figure 10-5: Cu and Mo Recovery – Porphyritic Rhyolite



Note: Figure prepared by Southern Copper, 2021

The estimated copper recovery was based on 2001 column testwork, and the sum of the recovery of each of the three copper phases. The equation for the base recovery is:

- % Recovered Cu = leach time/(leach time +8.12) * fraction of copper that is acid soluble + leach time /(1.06* leach time +16.16) * fraction of copper that is cyanide soluble after removing acid soluble copper + leach time /(6.12* leach time +220.15) * fraction or copper that is insoluble in acid or cyanide).

Oxide ore is leach for a period of 60 to 66 days. Table 10-1 lists the copper recovery for each of the three copper phases for 60, 66 and 70 days.

The derived equation is for a typical ore, however, and the recovery calculated by the above equation must be corrected for fines and carbonate concentrations.

Table 10-1: Copper Recovery by Phase

Time days	Cu Recovery (%)		
	CuS	CNCu	InsolCu
60	88.1	54.8	10.8
66	89.0	59.7	11.3
70	89.6	63.0	11.6

Note: CNCu = cyanide-soluble copper; InsolCu = copper that is not soluble in copper or acid.

The LOM head grade and copper recovery are expected at 0.497% (including the ore from the stockpile) and 57.74% respectively.

10.3.2 Fines Adjustment

The basic copper recovery equation assumes that the crushed ore contains 13% minus 100 mesh. Copper recovery from ores containing more or less than this amount will have copper recoveries greater or less than that predicted by the equation. If the ore contains less than 13% minus 100 mesh, then the following equation is used to calculate an adjustment to the calculated recovery:

- Adjustment factor = 35.075 * (% -100#)^3 + 3.527 * (% -100#)^2 - 0.0726* (% -100#) - 0.l315.

If the percentage of minus 100 mesh is greater than 13%, then the following equation is used to calculate an adjustment to the base recovery:

- Adjustment factor = - 0.3297 * (% -100#)^2 - 0.3442 * (% -100#) - 0.0075.

The adjustment factors given by the two equations require an understanding of the amount of the percent minus 100 mesh in the crushed ore that will be leached in the future.

An average obtained from historical data is used to estimate recoveries for short- and long-term production planning. Fines are about 21% minus 100 mesh historically.

The correlation coefficients for each of the two equations relating the percentage minus 100 mesh to recovery exceed 0.99.

10.3.3 Carbonate Adjustment

The basic copper recovery equation is adjusted for the percentage of carbonate in the ore beside the amount of minus 100 mesh in the crushed ore. This adjustment is necessary only if the CO_3= content is >2.7%. If the ore contains >2.7% CO_3= then the following equation is used to calculate reduction applied to the calculated recovery:

- Recovery factor = -498.83 * $(CO_3^{=})^3$ + 25.728 * $(CO_3^{=})^2$ +8.7246 * $(CO_3^{=})$ - 0.2438.

Unlike the percentage of minus 100 mesh in the crushed ore, the carbonate content is a characteristic of the ore that can be included in the geological model, and therefore can be used in a model for estimating the copper recovery that can be expected from heap leaching.

10.4 Sulfide Recovery Estimates

10.4.1 Throughput Models

A mathematical model for throughput prediction was developed based on the work index and grind size as defined by the weight percentage retained on a 65-mesh screen. This model, together with a copper and molybdenum flotation model for grade forecasting, was used to predict daily copper and molybdenum production.

A total of 167 measurements were made on the product of the two grinding circuits. The larger circuit comprises two large diameter mills with a combined capacity of about 29,750 dmt/d. The smaller circuit consists of small diameter mills which have a total capacity of about 57,500 dmt/d. Information recorded included the plant work index, percent operating time, and percent plus 65 mesh in the mill product for both the large and the small mills.

Mill production was then defined as:

- Large circuit: dmt/day = 40,627.6 - 1,117.05 * work index (large mills) + 358.817 * % +65 mesh (large mills)
- Small circuit: dmt/day = 86,655.3 - 3,028.41 * work index (general) + 835.838 * % +65 mesh (general).

The adjusted correlation coefficients for these equations were 0.7284 and 0.7803 for the small and large mills, respectively.

Leach Inc. reproduced the equations, with the following defined:

- Large circuit: dmt/day = 40,638.77 - 1,117.22 * work index (large mills) + 358.464 * % +65 mesh (large mills)
- Small circuit: dmt/day = 86,675.48 - 3,025.24 * work index (general) + 833.253 * % +65 mesh (general).

The adjusted correlation coefficients for these equations were 0.7280 and 0.7795 for the small and large mills, respectively. Differences between Leach Inc. and Southern Copper equations were attributed to a combination of different statistical packages used to derive the equations and rounding. The equations indicate that actual production will be within about 6% of the predicted production 95% of the time.

Additional analytical work by Southern Copper on the throughput model concluded that at a percentage +65 mesh of 23.50% the liberation of the copper species is adequate and good copper recoveries can be achieved. Therefore, it was concluded that it can safely be assumed that the percentage of +65 mesh in the equation can be replaced a constant value of 23.50%.

The equations developed by Leach Inc. were adjusted as follows:

- Large circuit: dmt/day =49,062.67 - 1,117.22 * work index (large mills)
- Small circuit: dmt/day = 106,256.93 - 3,025.24 * work index (small mills).

However, as the equations proposed by Leach Inc. are valid for a plant availability close to 100%, they were revised to adjust by an availability factor in accordance with the operational results, thus the resulting equations are as follows:

- Large circuit: dmt/day = (49,062.67 - 1,117.22 * work index) * % Availability (large mills)
- Small circuit: dmt/day = (106,256.93 - 3,025.24 * work index) * % Availability (small mills).

The initial equations included an additional increase in throughput of 4% because of the start-up of the high-pressure grinding rolls (HPGR) in the grinding circuit. However, operational results to date have shown that the plant throughput has increased by an average of 5.7%, therefore the throughput prediction equations were adjusted to correct for this factor.

The equations currently use by Southern Copper to predict the plant throughput are:

- Large circuit: dmt/d = (49,062.67 - 1,117.22 * work index) * (% Availability * 1.057/1.040) (large mills)
- Small circuit: dmt/d = (106,256.93 - 3,025.24 * work index) * (% Availability * 1.057/1.040) (small mills).

Figure 10-1 to Figure 10-5 show the variability of the copper and molybdenum recovery in relation to the percentage of copper and molybdenum content of the head grade by lithology for the 300 samples tested from different zones of the mine. It can be observed that the variation of the copper recovery is less significant than the molybdenum recovery for the major lithologies.

10.4.2 Copper Recovery Model

A 300-sample flotation test program was undertaken by Southern Copper to develop a mathematical relationship between the chemical composition of the ore and the rougher flotation recovery of copper and molybdenum. A standard flotation test protocol was used. Each test sample was assayed for CuT, CuS, molybdenum, iron, zinc and acid-soluble iron (ASFe).

An empirical equation was selected, and tested using multivariate regression analysis to determine which combination of the six independent variables generated the model equation which best fitted the laboratory-measured rougher copper recovery. Models for the three ore types, basaltic andesite, intrusive andesite and latite porphyry, were separately developed.

Both Southern Copper and Leach Inc. personnel developed recovery equations as follows:

- Basaltic andesite:
  - Southern Copper: Cu Recovery, % = 84.41 + 2.39 CuT - 189.8 CuS + 58.04 Mo - 0.2420 Fe + 34.23 Zn + 3.854 ASFe
  - Leach Inc.: Cu Recovery, % = 83.85 + 2.06 CuT - 188.7 CuS + 65.76 Mo + 31.60 Zn + 3.471 ASFe.
- Intrusive andesite:
  - Southern Copper: Cu Recovery, % = 96.12 - 9.67 CuT - 77.21 CuS + 0.2067 Fe - 63.89 Zn - 4.82 ASFe
  - Leach Inc.: Cu Recovery, % = 97.30 - 9.66 CuT - 93.63 CuS - 64.37 Zn - 4.11 ASFe
- Latite porphyry
  - Southern Copper: Cu Recovery, % = 90.12 + 6.51 CuT - 88.80 CuS - 60.35 Mo+ 0.4788 Fe - 82.31 Zn - 0.6148 ASFe
  - Leach Inc.: Cu Recovery, % = 90.06 + 6.39 CuT – 98.15 CuS - 60.19 Mo – 79.07 Zn + 0.4344 ASFe

- All ore types:
    - Southern Copper: Cu Recovery, % = 88.94 + 7.20 CuT - 189.3 CuS - 0.9374 Fe + 13.69 CuSCN + 1.745 ASFe
    - Leach Inc.: Cu Recovery, % = 88.92 + 7.20 CuT - 189.2 CuS - 0.9374 Fe + 13.69 CuSCN + 1.745 ASFe

A scale up factor of -3.2 was added to the all-ore-type equation to better reflect the plant metallurgical performance.

The LOM expected copper recovery is estimated at 84.73%. The forecast LOM copper concentrate grade is 25.42%.

10.4.3 Molybdenum Recovery Model

The molybdenum recovery was assumed to be a function of the flotation feed grade for molybdenum only; no other ore constituents were included in the model. Flotation test samples were divided into five groups based on the molybdenum grade of the sample, and an average molybdenum recovery was calculated for each of the five groups. In addition, 1,871 daily measurements were made of the plant recovery together with the daily molybdenum feed grade. The average molybdenum recovery in the laboratory test for feed samples containing more than 0.02% Mo in the plant data was 82.8% and had a standard deviation of 3.7%.

Further model development work that was completed by Southern Copper established two scale-up factors to better predict molybdenum recovery in the plant. These factors were defined based on operational experience and are:

- Regrind factor = 0.96
- Molybdenum plant factor = 0.92.

The predicted plant recovery was estimated as follows:

- % Mo plant recovery = % Mo rougher recovery * regrind factor * molybdenum plant factor.

Further development work based on plant data for the period March 2014 to January 2021 determined that an additional scale up factor should be issued to improve the prediction of the molybdenum recovery from the laboratory data (Table 10-2).

Table 10-2: Molybdenum Recoveries, Test vs Plant Actual

Head Grade Range (% Mo)		Add. Factor	Mo Recovery (%)	
			Model	Plant
<0.007		0.96	54.84	54.87
0.008	0.012	0.90	59.74	60.06
0.013	0.016	0.89	62.96	62.91
0.017	0.02	0.90	65.03	64.83
>0.021		0.87	63.76	63.85

The model recovery is very close to the actual plant recovery for the period indicated, which supports the use of this model in production plan forecasts.

The LOM expected molybdenum recovery is estimated at 62.84%. The LOM molybdenum concentrate grade forecast is 54.13%

10.5 Metallurgical Variability

A significant number of samples were selected by rock type/alteration for comminution and flotation testing (Figure 10-6 and Figure 10-7).

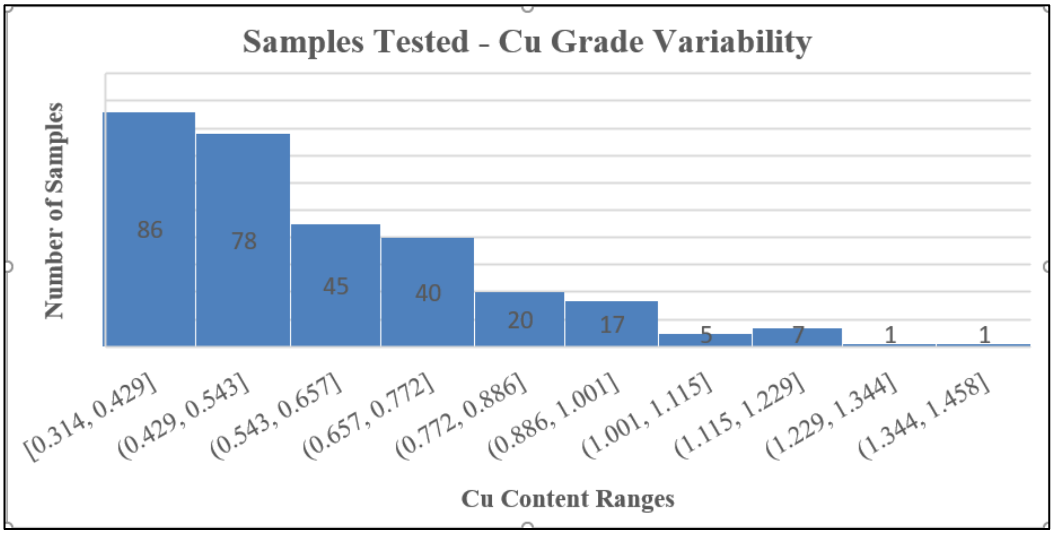
Tests were performed on samples that are considered to be representative of the different orebodies/zones and the mineralogy and alteration styles.

10.6 Deleterious Elements

The copper and molybdenum concentrates are considered clean concentrates as they do not contain significant amounts of deleterious elements.

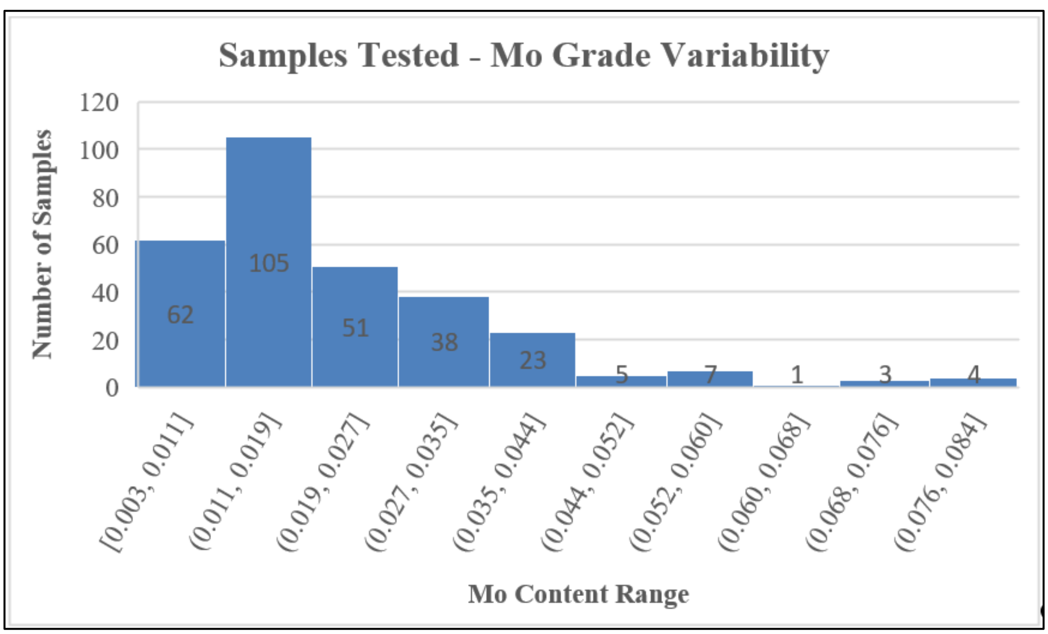
Average compositions of the copper and molybdenum monthly concentrate composites for the period 2019 to 2020 are provided in Table 10-3 and Table 10-4 respectively.

Figure 10-6: Copper Grade Variability Tests



Note: Figure prepared by Southern Copper, 2021

Figure 10-7: Molybdenum Grade Variability Tests



Note: Figure prepared by Southern Copper, 2021

Table 10-3: Copper Concentrate Average Grades, 2019–2020

	%Cu	%Ins	%Fe	%Mo	%CuS	%CNCu	% Ca	%Zn
Minimum	23.690	9.180	20.390	0.027	0.200	1.770	0.194	0.535
Maximum	26.150	13.660	28.890	0.157	0.580	5.350	0.358	1.306
Average	25.026	11.662	26.879	0.073	0.341	2.876	0.253	0.780
	%S	**% SiO_2**	**%Al_20_3**	**%ASFe**	**%Pb**	**%K**	**%Ni**	**%Co**
Minimum	27.700	6.936	1.190	0 .290	0.076	0.008	0.002	0.003
Maximum	36.810	11.460	3.450	0.740	0.283	0.102	0.009	0.012
Average	31.100	9.138	2.524	0.495	0.143	0.026	0.003	0.007
	%Mn	**%Mg**	**%As**	**%Na**	**Oz Ag**	**%$C0_3^=$**	**ppm Cl^-**	
Minimum	0.005	0.025	0.040	0.012	2.330	0.520	0.444	
Maximum	0.027	0.283	0.228	0.037	4.040	1.730	9.860	
Average	0.016	0.158	0.083	0.020	3.050	1.019	3.956	

Note: Ins = insoluble ; CNCu = cyanide-soluble copper.

Table 10-4: Molybdenum Concentrate Average Grades, 2019–2020

	%Cu	%Ins	%Fe	%Mo	%CuS	%CNCu	%Ca	%Zn
Minimum	0.509	1.790	1.460	51.822	0.001	0.037	0.118	0.022
Maximum	1.800	5.200	3.970	55.951	0.026	0.819	0.389	0.131
Average	0.852	3.282	2.383	54.022	0.011	0.225	0.190	0.044
	%S	**% SiO_2**	**%Al_20_3**	**%ASFe**	**%Pb**	**%K**	**%Ni**	**%Co**
Minimum	30.990	1.410	0.210	0.020	0.036	0.001	0.001	0.001
Maximum	42.770	4.840	1.040	0.110	0.087	0.018	0.006	0.050
Average	38.411	2.702	0.550	0.047	0.051	0.006	0.002	0.006
	%Mn	**%Mg**	**%As**	**%Na**	**Oz Ag**	**%$C0_3^=$**	**ppm Cl^-**	
Minimum	0.001	0.009	0.004	0.009	0.075	0.190	0.820	
Maximum	0.096	0.106	0.032	0.035	4.080	0.930	8.545	
Average	0 011	0.070	0.012	0.020	0.837	0.470	2.671	

Note: Ins = insoluble; CNCu = cyanide-soluble copper.

10.7 Qualified Person's Opinion on Data Adequacy

A significant amount of testwork have been performed on the sulfide and oxide ore that has allowed to develop a plant throughput, and a copper and molybdenum recovery models for the sulfide ore, and a copper recovery model for the oxide ore. Furthermore, the developed models have been improved and updated with time to take into account historical plant performance.

Testwork on the sulfide ore was performed on selected samples representing the main five rock types. The testing program included comminution and flotation testing for the sulfide ore. Sulfides samples prepared for flotation testing cover a wide range of copper and molybdenum content. Testwork on the oxide ore included column leach testing.

The available metallurgical testwork information is considered of an acceptable quality to support a pre-feasibility study, as well as classification of mineral reserves.

The copper concentrate produced is considered to be a clean concentrate and no penalties are expected as the concentrate does not contain any significant amounts of deleterious element.

11 MINERAL RESOURCE ESTIMATES

11.1 Introduction

A probability assisted constrained kriging (PACK) approach was used to estimate copper and molybdenum grades:

- Proportions of 12 lithology domains were calculated for each block using the lithology model wireframes
- Proportions of regular and anomalous grades were estimated for each lithology domain using an indicator set at the anomalous grade threshold. A hard boundary was used for blocks and composites above or below the top of primary sulfide horizon
- Grades were kriged for the normal and anomalous portions of each lithological unit present in every block. A hard boundary was used for blocks and composites above or below the top of primary sulfide horizon
- Final grades were calculated by weighting the proportion of normal and anomalous grades and proportion of each lithology domain in the block.

11.2 Exploratory Data Analysis

11.2.1 Anomalous Cu (total)

Hexagon completed a manual, subjective classification of assays in to anomalous (higher-grade) and non-anomalous (lower-grade or background) categories.

Non-anomalous values were classified based upon total copper grades whose behavior was considered to be characteristic of the type of lithology (pre-mineral, post-mineral, and mineralizing lithology groups).

Anomalous values were classified using the following criteria:

- ROCKV = 1. Total copper values in this code are hosted by pre- and post-mineral lithologies and is characterized by intervals with significantly higher total copper grades with respect to adjacent intervals. These intervals can be explained by the presence of mineralized veinlets in pre-mineralizing lithology or fragments of mineralization in post-mineralized lithologies

- ROCKV = 2. The total copper values in this code are hosted by pre-mineral lithologies displaying continuous intervals of mineralization
- ROCKV = 3. The total copper values in this code are hosted by mineralizing lithologies with higher total copper intervals in comparison to adjacent intervals and is characterized by intervals with high total copper grade followed by intervals of lower total copper grades, either as continuous or isolated intervals.

11.2.2 Acid and Cyanide Soluble Cu

Acid soluble copper (CuS) and cyanide soluble copper (CuCN) were determined on some, but not all samples. Four cases were identified:

- CuS assay only;
- CuCN assay only;
- CuS and CuCN assays;
- No CuS or CuCN assays.

CuS and CuCN were normalized to CuT (total copper) when CuS + CuCN > CuT in the oxide and transition zones. The solubility indices of CuS and CuCN were calculated as was the residual copper. The solubility indices that individually exceeded a value of 1.0 and the negative values of residual copper were coded as follows:

- Solubility index for CuS > 1.0 were encoded '1'
- Solubility index for CuCN >1.0 were encoded '2'
- Negative residual copper (CuS + CuCN >CuT) values were encoded with '3'.

The normalization of the grades of CuS and CuCN was performed as follows:

- CuS grades were set to the total copper values
- CuCN grades were set to total copper values
- Values were normalized using a factor derived from the two soluble copper grades.

11.2.3 Lithology Grouping

For estimation of CuT, CuS, CuCN, molybdenum and silver, lithology domains were consolidated into items SEC1 and SEC2.

The SEC1 item grouped post-mineral and pre-mineral lithologies with a non-anomalous classification. They were coded with codes 10 and 20. Lithologies not included in the grouping were due to the presence of anomalous total copper grade so their estimation was made independently considering these anomalies and maintained their original codes.

The SEC2 item grouped remaining post-mineral and pre-mineral lithologies with a non-anomalous classification in code 30. The unbundled lithologies kept their original codes.

11.3 Geological Models

Three dimensional models of lithology, alteration, and ore type were constructed in Leapfrog. Each block was assigned a percentage of each lithology, mineralization and alteration type. Intervals of logged lithology and alteration were used to construct respective models. To add additional control, in-pit mapping data of specific geologic contacts on bench plans at 15 m elevations were also used. Model blocks were coded with the 3D solids, created in Leapfrog and then imported into MineSight 3D. The deposit lithology was divided into the following categories:

- Cover (overburden)
- Post mineralization
- Mineralizing
- Pre-mineral.

Southern Copper interpreted eight geometric solids, comprising:

- Oxides
- Enriched
- Transitional
- Primary
- Leaching capping
- Sterile
- Sterile post-mineral
- Dump.

Eight geometric alteration solids were interpreted:

- Argillic
- Phyllic/potassic
- Potassic
- Phyllic
- Phyllic propylitic
- Propylitic
- Unaltered
- Backfill.

Geometallurgical zones were assigned based on the percentages of lithology, alteration, and mineralization types in each block.

11.4 Density Assignment

Lithology, alteration and mineralization domains were combined to produce geometallurgical domains for estimation of work index and the geometallurgical domains were also used for bulk density assignment.

The mean value of bulk density determinations was assigned to each geometallurgical domain for tonnage estimation.

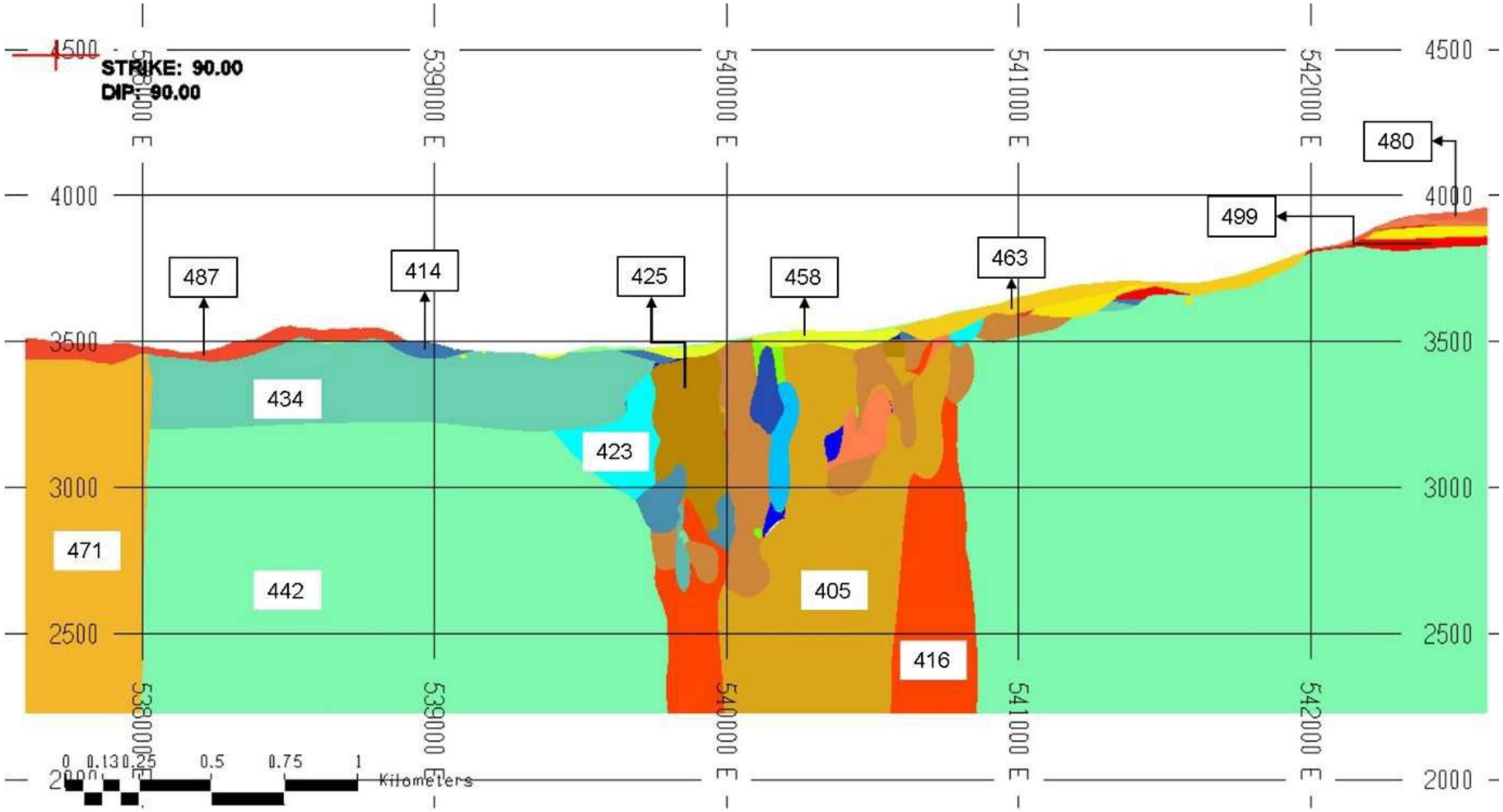
Near surface zones of oxidized material, mining fill and unconsolidated overburden have SG values of <2.0. Domains that have SGs between 2.00–2.60 are near-surface agglomerates or conglomerates. Also included in this group are lithologies that have undergone some degree of moderate oxidation. Domains with SG values >2.6 are hypogene lithologies, The pre-mineralization lithologies have the highest SG values, of >2.70.

Figure 11-1 shows the work index geometallurgical domains. Table 11-1 shows the densities assigned to each work index geometallurgical domain.

11.5 Grade Capping/Outlier Restrictions

No capping or outlier restriction has been used by Hexagon during mineral resource estimation. Wood checked the model on section and in plan and found minor evidence of over-projection of high grades. For future estimation, Wood recommends that a capping study is completed and outlier restriction is used to control grade estimation.

Figure 11-1: Work Index Geometallurgical Domains



Note: Figure provided by Southern Copper, 2021. 405 = potassic-altered porphyritic latite; 414 = argillic-altered porphyritic rhyolite; 416 = potassic-altered andesite breccia; 423 = phyllic-altered intrusive andesite; 425 = silicified intrusive andesite; 434 = phyllic-altered porphyritic rhyolite; 442 = propylitic-altered basaltic andesite; 458 = tuffaceous agglomerate; 463 = gray agglomerate; 471 = diorite; 480 = trachytic tuff; 487 = fill; 499 = fresh rhyolite.

Table 11-1: Specific Gravity by Work Index Assigned

Lithology	Alteration	Work-Index Code	Specific Gravity
Rhyolite porphyry	Phyllic	401	2.65
Breccia of rhyolite porphyry	Quartz–sericite	402	2.50
Latite porphyry	Silicification	403	2.65
Latite porphyry	Lattice structure	404	2.66
Latite porphyry	Potassic	405	2.65
Latite porphyry	Moderate silicification	406	2.63
Latite porphyry	Quartz–sericite	407	2.63
Latite porphyry	Fresh	408	2.67
Breccia of latite porphyry	Silicification	409	2.65
Breccia of barren latite porphyry	Silicification	410	2.65
Latite porphyry breccia	Silicification	411	2.66
Breccia of latite porphyry	Quartz–sericite	412	2.64
Breccia of barren latite porphyry fresh	Silicification	413	2.63
Rhyolite porphyry	Argillic	414	2.54
Basaltic andesite	Potassic	416	2.69
Basaltic andesite	Phyllic–potassic	417	2.70
Basaltic andesite	Argillic	419	2.60
Intrusive andesite	Phyllic–potassic	420	2.68
Intrusive andesite	Phyllic	423	2.72
Intrusive andesite	Lattice structure	424	2.67
Intrusive andesite	Silicification	425	2.69
Breccia of intrusive andesite	Argillic–potassic	426	2.68
Intrusive andesite	Phyllic	427	2.64
Intrusive andesite	Phyllic	428	2.67
Intrusive andesite	Phyllic–silicification	430	2.69
Breccia of rhyolite porphyry	Silicification	431	2.69
Basaltic andesite	Silicification	432	2.66
Latite porphyry	Phyllic–potassic	433	2.69
Rhyolite porphyry	Phyllic–propylitic	434	2.64

Lithology	Alteration	Work-Index Code	Specific Gravity
Breccia of basaltic andesite	Phyllic	435	2.7
Basaltic andesite	Propylitic	442	2.75
Coffee tuff		450	1.74
Alluvium		451	1.25
Upper agglomerate		452	1.88
Upper tuff		453	2.25
Lower agglomerate		454	2.04
Lower tuff		455	1.85
Crystal tuff		456	2.36
Basal conglomerate		457	2.36
Tuffaceous agglomerate		458	2.01
White tuff		459	1.79
Yellow/green conglomerate		460	1.5
Trachyte		461	2.33
Salmon tuff		462	1.92
Grey agglomerate		463	2.14
Rhyolite conglomerate		464	2.2
Granodiorite		465	2.65
Diorite		471	2.65
Andesite porphyry		472	2.4
Breccia pebble		473	2.05
Latite		474	2.65
Dike		478	2.69
Micaceous tuff		479	1.4
Trachyte tuff		480	1.91
Trachyte agglomerate		481	1.66
Colluvial		482	1.8
Doleritic conglomerate		484	2.34
Dump		487	1.8
Trachyte conglomerate		488	1.68

Lithology	Alteration	Work-Index Code	Specific Gravity
Dolerite		490	2.67
Crystal tuff vitrophyre		494	2.29
Trachyte Vitrophyre		496	2.21
Reworked Tuff		497	1.9
White Agglomerate		498	2.26
Rhyolite Fresh		499	2.56

11.6 Composites

More than 90% of the intervals of the exploratory holes have a length of 3 m. Data were composited to 3 m.

Four sets of composites were prepared:

- CuT grade estimation
- Hypogene CuS, CuCN, molybdenum and silver
- Solubility indices
- Secondary elements.

Histograms and cumulative probability plots were prepared for each composite set.

11.7 Variography

Variograms were prepared for the CuT, solubility index for CuS (ROX), solubility index for CuCN (RSUL), CuS (CUSAC), CuCN (CUSCN), molybdenum, silver, iron, and soluble Fe (FESAC). Ten sets of variograms were constructed.

Once the variogram maps for each element were completed, the orthogonal orientations were adjusted to each axis and the various directional variograms were exported, which were mostly modeled with two structures. To obtain the nugget effect, downhole variograms were created. In domains with a small number of samples, a generic isotropic 150 m variogram was used.

11.8 Estimation/interpolation Methods

The dimensions of the block in the three-dimensional model are 20 x 20 x 15 m. The block model covers an area of 4.8 km by 4.8 km in plan view and 1.74 km vertically.

The elements, parameters and estimation methods used in the mineral resource model were:

- Variables: copper, CUSAC, CUSCN, molybdenum, iron, arsenic, antimony, bismuth, lead, zinc, potassium, magnesium, sodium, calcium, AL_2O_3, chlorite, CO_3, manganese, FESAC, sulfur, selenium, SIO_2, and silver were estimated with ordinary kriging (OK). Blocks that were not estimated were assigned a mean grade according to their corresponding estimation domain
- Indicators of anomalous (higher-grade) total copper were estimated using OK.

To complement the global statistical reviews, estimates were constructed using polygonal and inverse distance to the second power (ID2) methods.

11.9 Validation

Wood completed visual inspection of copper and molybdenum models and geostatistical validation of global bias (comparison of OK and nearest neighbor (NN) models), local trends in grade profiles (swath plots using ID2 and NN estimates and declustered composites) and change of support for each estimation domain. Reconciliation was also used as a validation tool.

11.10 Confidence Classification of Mineral Resource Estimate

11.10.1.1 Mineral Resource Confidence Classification

Mineral resource classification was based on the distance from the block center to the closest estimation composite. Within the mined-out volume of 2015 through 2019, distances to the closest three and two holes for blocks were examined. For all quarters mined, except two of 18, the average three-hole distance approximated or was <50 m and the average two-hole distance was <45 m. Therefore, an average distance to the nearest two holes of 60 m was used to classify indicated mineral resources.

The final classification was:

- Indicated: 60 m average distance to the closest two drill holes; 30 m extrapolation around singe drill holes
- Inferred: maximum 300 m average distance to the closest two drill holes; restricted to 120 m average distance to the three closest composites to avoid classifying blocks with assigned grades as inferred mineral resources.

No measured mineral resources were classified.

Once blocks were flagged as indicated mineral resources with the above parameters, a smoothing exercise using a dilation/erosion methodology in the easting and northing directions, by bench was completed to assimilate and concentrate areas that were mostly indicated.

11.10.1.2 Uncertainties Considered During Confidence Classification

Following the analysis that classified the mineral resource estimates into the measured, indicated and inferred confidence categories, uncertainties regarding sampling and drilling methods, data processing and handling, geological modelling, and estimation were incorporated into the classifications assigned. The areas with the most uncertainty were assigned to the inferred category, and the areas with fewer uncertainties were classified as indicated.

11.11 Reasonable Prospects of Economic Extraction

11.11.1 Input Assumptions

Wood constrained the mineral resource estimate within a conceptual pit shell using a Lerchs-Grossmann algorithm and the parameters summarized in Table 11-2.

11.11.2 Commodity Price

Commodity prices used in resource estimation are based on long-term analyst and bank forecasts, supplemented with research by Wood's internal specialists. An explanation of the derivation of the commodity prices is provided in Chapter 16.2. The estimated timeframe used for the price forecasts is the 48-year LOM that supports the mineral reserve estimates.

11.11.3 Cut-off

The break-even cut-off grade for mineral resources was determined to be 0.130% Cu for sulfide mineralization. The internal break-even cut-off grade for mineral resources sent to the leach pad was 0.118% Cu.

Wood considers those blocks within the constraining resource pit shell and above the cut-off applied to have reasonable prospects for economic extraction.

Table 11-2: Input Parameters, Mineral Resource

Parameter	**Unit**	**Value**
Price		
Copper	US$/lb	3.80
Molybdenum	US$/lb	10.35
Mining		
Reference mining cost	US$/t	1.39
Incremental haulage cost up	US$/t	-
Incremental haulage cost down	US$/t	-
Processing		
Concentration process cost	US$/t	8.33
Leaching process cost	US$/t	4.70
Selling		
Concentration Cu payable price	US$/lb	3.46
Concentration Mo payable price	US$/lb	8.58
Leach Cu payable price	US$/lb	3.35
Average LOM recovery		
Concentration	%	84
Leaching	%	54
Cut-offs		
Sulfide internal cut-off	% Cu	0.130
Leachable internal cut-off	% Cu	0.118
Pit slopes		
Pit slope angles	Variable inter-ramp, degrees	40–50

Note: Numbers have been rounded.

11.11.4 QP Statement

Wood is of the opinion that any issues that arise in relation to relevant technical and economic factors likely to influence the prospect of economic extraction can be resolved with further work. Porphyry-copper style deposits are a well-known and studied deposit type, and Southern Copper has more than 45 years' experience with mining the Cuajone deposit.

There is sufficient time in the 48-year timeframe considered for the commodity price forecast for Southern Copper to address any issues that may arise, or perform appropriate additional drilling, testwork and engineering studies to mitigate identified issues with the estimates.

11.12 Mineral Resource Estimate

11.12.1 Mineral Resource Statement

Mineral resources are reported using the mineral resource definitions set out in SK1300, and are reported exclusive of those mineral resources converted to mineral reserves. The reference point for the estimate is in situ. The mineral resource estimate is current as at 31 December, 2021.

The indicated mineral resource estimates for the Cuajone Operations are provided in Table 11-3. The inferred mineral resource estimates are included in Table 11-4. Wood is the QP Firm responsible for the estimate.

11.12.2 Uncertainties (Factors) That May Affect the Mineral Resource Estimate

Areas of uncertainty that may materially impact all of the mineral resource estimates include:

- Changes to long-term metal price and exchange rate assumptions
- Changes in local interpretations of mineralization geometry such as presence of unrecognized mineralization off-shoots; faults, dikes and other structures; and continuity of mineralized zones
- Changes to geological and grade shape, and geological and grade continuity assumptions
- Changes to metallurgical recovery assumptions
- Changes to the input assumptions used to derive the open pit shell that is used to constrain the estimates

Table 11-3: Indicated Mineral Resource Statement

Process Type	Tonnage (kt)	Copper Grade (%)	Molybdenum Grade (%)	Contained Copper (klb)	Contained Molybdenum (klb)
Sulfide	282,338	0.47	0.02	2,943,603	105,843

Table 11-4: Inferred Mineral Resource Statement

Process Type	Tonnage (kt)	Copper Grade (%)	Molybdenum Grade (%)	Contained Copper (klb)	Contained Molybdenum (klb)
Sulfide	601,363	0.32	0.01	4,286,113	144,217
Oxide	89	0.12	—	240	—
Total	***601,452***	***0.32***	—	***4,286,353***	***144,217***

Notes to Accompany Mineral Resource Tables

1. Mineral resources are reported in situ and are current as at December 31, 2021. Mineral resources are reported exclusive of mineral reserves. Mineral resources that are not mineral reserves do not have demonstrated economic viability. Wood is the QP Firm responsible for the estimate.
2. Mineral resources are constrained within an optimized pit shell based on copper and molybdenum only. Mineral resources are reported within a conceptual pit shell that uses the following input parameters: metal prices of US$3.80/lb Cu and US$10.35/lb Mo; average metallurgical recovery assumptions of 84% for copper and 54% for molybdenum from a process plant and 47% copper recovery from a heap leach; based mining cost of US$ 1.39/t, mill process operating costs of US$8.33/t, leach costs of US$4.70/t; concentrate payable price of US$3.46, molybdenum concentrate payable price of US$8.58/t, and leach copper payable price of US$ 3.35/t.
3. Numbers in the table have been rounded. Totals may not sum due to rounding.

- Changes to the cut-off values applied to the estimates
- Variations in geotechnical (including seismicity), hydrogeological and mining assumptions
- Changes to environmental, permitting and social license assumptions.

Wood identified several factors that may result in poor validation results and other risks in the 2021 model:

- Issues with geological modeling especially the shapes and volumes of high-grade breccia units and lower grade dykes potentially having an impact on grade and tonnage above cut-off at bench-scale in the resource model used for long range planning
- Weakness in geological and spatial consistency of alteration modeling
- Over-projection (blowouts) of higher-grade mineralization in areas of sparse drilling around the edges of the main mineralized zone, narrower zones and especially at depth in blocks flagged as inferred mineral resources
- Predominantly vertical drilling does a poor job of defining vertical lithological contacts, ore-waste boundaries, and gradients in grade
- Use of unnecessarily short (3 m) composites given the selective mining unit dimensions for the Cuajone Operations led to rejection of approximately 30% of drill data having sample lengths >3m, resulting in a reduction in the confidence of mineral resource estimates because fewer data are used in grade estimation.

There are a number of blocks, primarily in lower-grade material that were not estimated with the parameters used and the average grade was assigned to these blocks. This risk was mitigated by modifying the distance used in classifying inferred mineral resources to a maximum distance of 120 m.

12 MINERAL RESERVE ESTIMATES

12.1 Introduction

Measured and indicated mineral resources were converted to mineral reserves. Inferred mineral resources were set to waste.

12.2 Development of Mining Case

12.2.1 Pit Optimization

Pit optimization was performed using the Lerchs-Grossmann (LG) algorithm implemented in GEOVIA Whittle software. A summary of the economic and operational parameters used for the pit optimization is presented in Table 12-1.

Nested pit shells were run from revenue factors ranging from 0.3 to 1.1 (Figure 12-1 and Figure 12-2). The revenue factor is a multiplier applied to the base metal price and, subsequently, used in the pit optimization. For example, a RF of 1.0 corresponds to a copper base price of $3.30/lb. A revenue factor of 0.5 multiplies the base metal price of by 0.5 to determine the price used in the optimization and pit shells.

In accordance with Southern Copper's corporate guidelines, which require that production and metal content are maximized, the revenue factor 1.0 pit shell was selected as the guide for the final pit design.

12.2.2 Block Model

The block model was updated to correct any existing gaps found during review of information provided by Southern Copper. These modifications were reviewed and approved by Southern Copper prior to the pit optimization step.

12.2.3 Adjustment Factors Based on Reconciliation Data

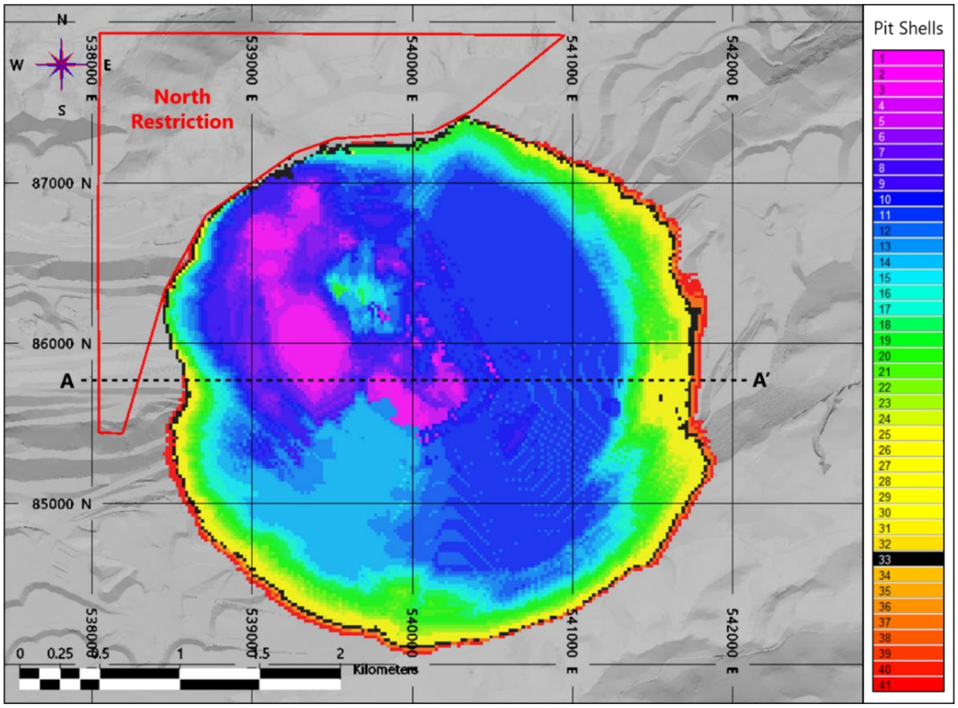
No mining dilution was considered because during grade reconciliation, no consistent bias was found that warranted application of a factor to the model. Instead, efforts were made to reclassify ore in mineralization extensions, which resulted in a 20% reduction of indicated mineral resources. Blocks without grade estimation support were reclassified as inferred.

Table 12-1: Economic and Operational Parameters Summary

Parameter	Unit	Reserves
Price		
Copper	US$/lb	3.30
Molybdenum	US$/lb	9.00
Mining		
Reference mining cost	US$/t	1.96
Incremental haulage cost up	US$/t	0.01
Incremental haulage cost down	US$/t	0.02
Processing		
Concentration process cost	US$/t	9.15
Leaching process cost	US$/t	4.70
Selling		
Concentration Cu payable price	US$/lb	2.98
Concentration Mo payable price	US$/lb	7.27
Leach Cu payable price	US$/lb	2.86
Average LOM recovery		
Concentration	%	85
Leaching	%	47

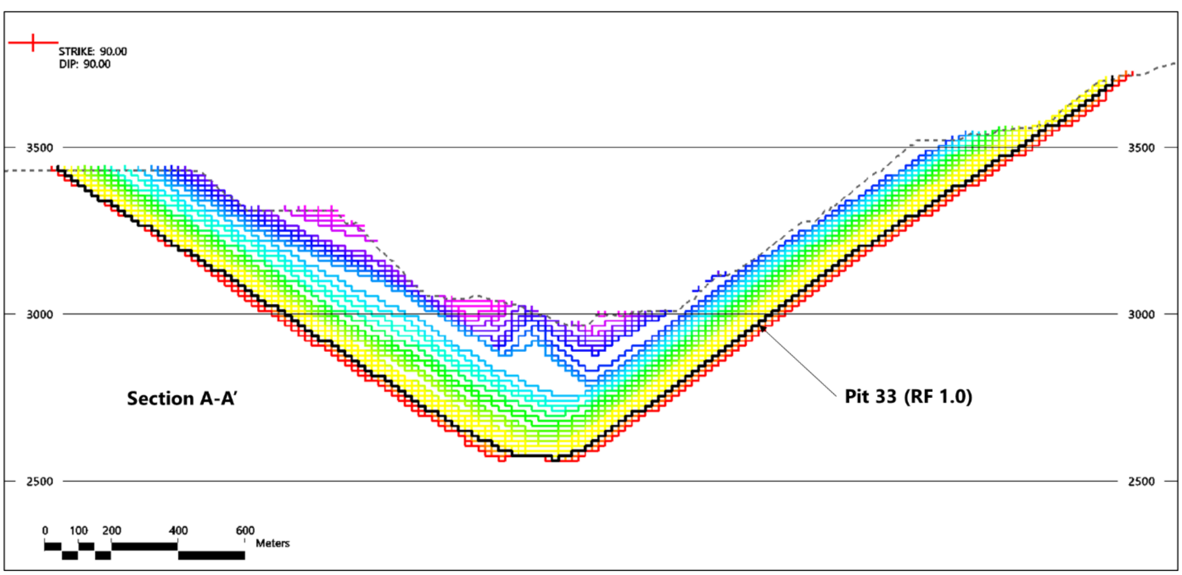
Note: Numbers have been rounded.

Figure 12-1: Nested Pit Shells from Pit Optimization (Plan View)



Note: Figure prepared by Wood, 2021

Figure 12-2: Nested Pit Shells from Pit Optimization (Section View)



Note: Figure prepared by Wood, 2021

A 100% mining recovery was used because no reduction due to operational issues was identified, and the reconciliation from mine to mill already included potential mining recovery losses.

12.2.4 Topography

Surface topography was provided by Southern Copper and corresponded to December 31, 2020. This surface was used to code the rock percentage in the block model item TOPO. Blocks above the surface were given a value of 0, blocks below the surface were given a value of 100, and blocks on the surface were given a value between 0–100.

12.2.5 Slope Angles

Geotechnical zones used for the pit optimization were based on guidance provided by SRK (2016).

The block model item GTZN was used to code the different geotechnical zones and corresponds to an overall slope angle assigned in Geovia Whittle software. Overall slope angles were estimated based on a preliminary final pit design developed by Wood (Table 12-2).

12.2.6 Metallurgical Recoveries

Copper metallurgical recoveries were calculated in the block model for each of the leach and concentrator processes, using formulae provided by Southern Copper that were reviewed by Wood.

The smelting recovery was set at 97.426%, and the refining recovery was 99.855%. Both values represent the average of historical smelting and refining recoveries at the Ilo smelter and refinery between 2018–2020.

The concentration metallurgical recovery for molybdenum was calculated in the block model using a formula provided by Southern Copper.

Table 12-2: Overall Slope Angle by Geotechnical Zones

Zone	GTZN Code	Overall Slope Angle (º)
NW	1	33.5
N	2	30.3
E1	3	31.0
E2	4	44.0
SE1	5	32.3
SE2	6	44.0
W1	7	33.5
W2	8	44.0
Pit bottom E	9	36.2
Pit bottom W	10	38.2
Fill	11	38.0

12.2.7 Mining Costs

The base mining cost used was US$1.389/t, and includes operating, general, and indirect costs. The mining sustaining cost used was US$0.567/t, and includes replacement capital costs for mining. Additionally, an incremental haulage cost of US$0.012/t was applied for each bench above the mining reference level and US$0.020/t for each bench below the reference level. The mining reference levels used were 3295 masl for ore and 3430 masl for waste.

12.2.8 Processing Costs

The sulfide ore process cost for material sent through the concentrator was S$8.329/t, and included operating, supervision, indirect, transportation by belt conveyor to the plant, G&A, and other costs charged to the process. The concentration sustaining cost was US$0.818/t, which included concentrator component replacement costs, and costs associated with tailings storage.

The leaching process cost used was S$4.698/t, and included leaching and plant indirect costs.

12.2.9 Smelting, Refining, and Selling Costs

Smelting and refining costs used were US$0.169/lb and US$0.039/lb of copper cathode, respectively, and correspond to the average smelting and refining operating costs from the Ilo smelter and refinery in the period 2018–2020.

The copper selling cost is inclusive of metallurgical deductions and allowance, ocean freight cost, and a copper cathode premium. The cathode premium reduced the selling cost, obtaining a final negative selling cost of -US$0.0063/lb of copper cathode.

A selling cost of US$1.446/lb was used for molybdenum, which includes freight and roasting costs.

12.2.10 SX/EW and Selling Costs

The SX/EW cost used was US$0.419/lb of copper cathode, which includes equipment replacement costs. An ocean freight cost of US$0.026/lb of copper cathode was assumed, which corresponds to the average 2018–2020 cost of sending the material to the Americas, Europe, and Asia.

A copper cathode premium of US$0.038/lb was applied.

12.2.11 Royalties

A 1% NSR royalty was applied for the pit optimization, which is the minimum Modified Mining Royalty (refer to discussion in Chapter 3.2.7).

12.2.12 Commodity Price

Long-term metal prices of US$3.30/lb Cu and US$9.00/lb Mo were used to estimate mineral reserves, and were provided by Southern Copper. Supporting information related to these prices can be found in Chapter 16.5.

12.2.13 Cut-off

Break-even NSR cut-off values were used to define the final pit. For the concentration process, a variable break-even NSR cut-off value from US$11.103/t to US$ 12.123/t was used. For the leaching process a variable break-even NSR cut-off value ranging from US$6.654/t to US$7.674 /t was used. This break-even cut-off value included mining, processing, sustaining, G&A, and other costs charged to the process.

There are two crushers, a main crusher for sulfide material at the entrance to the pit, and another crusher for leachable material adjacent to the Torata West waste rock storage facility (WRSF). Since the leachable material crusher is close to the WRSF, no differential cost between sending the material to the leach pad or to the WRSF was applied.

The internal cut-off where mining cost is not included is used to define the destiny of the material within pit shell. The Internal NSR cut-off is US$9.147/t for concentration process and US$4.698/t for leaching process.

The formulae used to estimate the concentration and leaching NSR cut-off values were:

- CCOV = (BMC + MSC + (IHC * NB)) + (CPC + CSC)
- LCOV = (BMC + MSC + (IHC * NB)) + (LPC)
- I-CCOV = (CPC + CSC)
- I-LCOV = LPC

Where: CCOV: concentration break-even NSR cut-off value (US$/t conc); LCOV: leaching break-even NSR cut-off value (US$/t leach); : I-CCOV: concentration internal NSR cut-off value (US$/t conc); : I-LCOV: leaching internalNSR cut-off value (US$/t leach); BMC: base mining cost (US$/t mined); MSC: mining sustaining cost (US$/t mined); IHC: incremental haul cost per bench (US$/t mined); NB: number of benches below mining reference level; CPC: concentration process cost including G&A and other costs (US$/t conc); CSC: concentration sustaining cost (US$/t conc); and LPC: leaching process cost (US$/t leached).

12.2.14 Pit Design

Figure 12-3 shows a plan view of the final pit design obtained for the Cuajone deposit. This final pit is the result of the extraction of nine mining phases, which are described in more detail in Chapter 13.4.

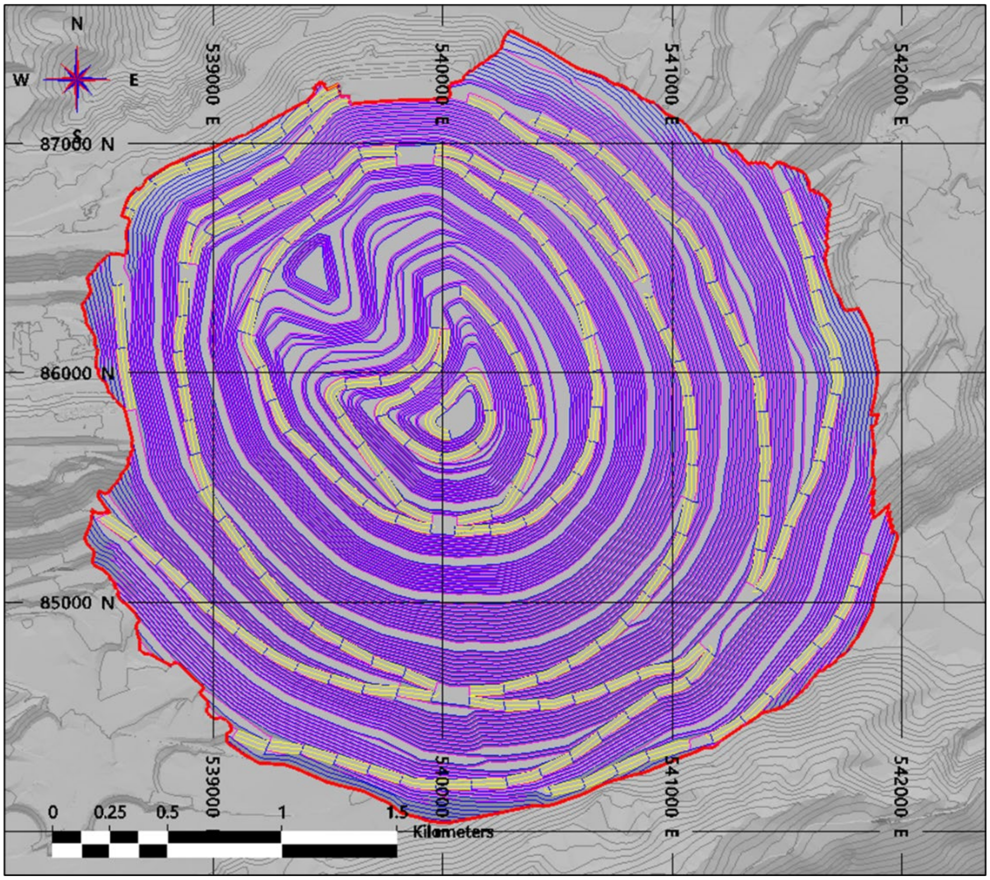
12.2.15 Ore Versus Waste Determinations

The criteria for the determination of ore and waste included the following:

- Sulfide material was evaluated for the concentration process. The economical sulfide material above the concentration break-even NSR cut-off value was defined as sulfide ore
- The remaining marginal sulfide material was evaluated for the leaching process. The marginal sulfide material above the leaching internal NSR cut-off value was defined as leachable material

- All remaining marginal sulfide material below the leaching internal NSR cut-off value was defined as waste. All other materials were also defined as waste.

Figure 12-3: Final Pit Design (Plan View)



Note: Figure prepared by Wood, 2021

The formulae used to calculate the concentration and leaching process material NSRs were:

- CNSR = CUG * CCUR * SMCUR * RFCUR * (CUP - SMC - RFC - CUSC) * (1 - ROY) * CF + MOG * CMOR * (MOP – MOSC) * (1 - ROY) * CF
- LNSR = CUG * LCUR * (CUP - SEC - OFC + CUCP) * (1 - ROY) * CF

Where: CNSR: concentration process material NSR (US$/t concentrate); LNSR: leaching process material NSR (US$/t leach); CUG: copper grade (%); MOG: molybdenum grade (%); CCUR: concentration copper recovery (%); CMOR: concentration molybdenum recovery (%); LCUR: leaching copper recovery (%); SMCUR: smelting copper recovery (%); RFCUR: refining copper recovery (%); CUP: copper price (US$/lb); MOP: molybdenum price (US$/lb); SMC: smelting cost (US$/lb Cu); RFC: refining cost (US$/lb Cu); CUSC: copper selling cost (US$/lb Cu); MOSC: molybdenum selling cost (US$/lb Mo); SEC: SX/EW cost (US$/lb Cu); OFC: ocean freight cost (US$/lb Cu); CUCP: copper cathode premium (US$/lb Cu); ROY: NSR royalty (Modified Mining Royalty) (%); and CF: conversion factor between units.

12.3 Mineral Reserve Estimate

12.3.1 Mineral Reserve Statement

Mineral reserves are reported using the mineral reserve definitions set out in SK1300. The reference point for the estimate is delivery to the process plant. Mineral reserves are summarized in Table 12-3. No proven mineral reserves have been estimated.

Wood is the QP Firm responsible for the estimate. The estimates are current as of December 31, 2021.

12.3.2 Uncertainties (Factors) That May Affect the Mineral Reserve Estimate

Areas of uncertainty that may materially impact the mineral reserve estimates include:

- Changes to long-term metal price and exchange rate assumptions
- Changes to metallurgical recovery assumptions
- Changes to the input assumptions used to derive the mineable shapes applicable to the open pit mining methods used to constrain the estimates
- Changes to the forecast dilution and mining recovery assumptions;
- Changes to the NSR cut-off values applied to the estimates;
- Variations in geotechnical (including seismicity), hydrogeological and mining method assumptions;
- Changes to environmental, permitting and social license assumptions.

A pit optimization sensitivity analysis was performed in Geovia Whittle software for the sulfide and leachable mineralization remaining in the Toquepala deposit by varying the copper price, base mining cost, concentration process cost, and concentration copper recovery.

The metal prices and metallurgical recoveries generate the greatest impact on the mineral reserves. Conversely, an increase of the mining and process costs does not generate a material impact on the mineral reserve estimates.

Table 12-3: Probable Mineral Reserve Statement

Process Type	Tonnes (kt)	Copper Grade (%)	Molybdenum Grade (%)	Contained Copper (klb)	Contained Molybdenum (klb)
Mill	1,333,559	0.492	0.017	14,452,169	507,620
Leach (from mine)	2,754	0.493	—	29,915	—
Leach (from stockpile)	19,252	0.497	—	211,084	—
Total	***1,355,565***	***0.492***	***—***	***14,693,167***	***507,620***

Notes to Accompany Mineral Reserves Table

1. Mineral reserves are current as at December 31, 2021. Wood is the QP Firm responsible for the estimate.
2. Mineral reserves are constrained within a smoothed designed pit based on copper and molybdenum only. The following parameters were used in estimation: assumption of open pit mining methods; assumption of heap leach and concentrate processing; copper price of US$3.30/lb, molybdenum price of US$9.00/lb; internal net smelter return cut-offs of US$9.147/t for concentrator, and an internal NSR cut-off of US$4.698/t for leaching process; mining recovery of 100%; variable metallurgical recoveries (average LOM recoveries of 85 % for copper by concentration, 63 % for molybdenum by concentration, and 47% for copper by leaching); average copper recoveries of 97.426% for smelting and 99.855% for refining; reference mining cost of US$1.95/t mined, with an additional US$0.012/t for up haulage costs and US$0.02/t for down haulage; average process costs of US$9.147/t for concentration and US$4.698/t for leaching; metal price deductions of US$0.208/lb for smelted and refined copper, US$1.446/lb for concentrated molybdenum, and US$0.419/lb for copper obtained by SX/EW; 1% royalty applied to the NSR
3. Numbers in the table have been rounded. Totals may not sum due to rounding.

13 MINING METHODS

13.1 Introduction

The Cuajone Operations use conventional truck-and-shovel open pit mining methods.

13.2 Geotechnical Considerations

Geotechnical criteria used in the pit optimization were provided in Chapter 12.2.5. The geotechnical zones in relation to the pit outline are shown in Figure 13-1 and the pit slopes used in mine design are included in Table 13-1.

The fill material parameters were used by default for all blocks with an undefined GTZN code.

13.3 Hydrogeological Considerations

Water that accumulates in the base of the pit is pumped out of the pit; the pumps are capable of extracting 120 L/sec. The water is used for dust suppression.

13.4 Operations

13.4.1 Pit Phases

The open pit mine has a circular conical shape with a diameter of approximately 3.0 km. Currently, the highest elevation of the pit walls is on the southeast wall at 3865 masl. The current bottom of the pit is at 2950 masl, while the depth of the final pit design will be at 2590 masl.

Nine pit phases remain in the life-of-mine (LOM) plan, starting with phase 6 and ending with phase 10C. The parameters used in the phase designs are summarized in Table 13-2. The final pit is shown by phase in Figure 13-2 and in cross-section view in Figure 13-3.

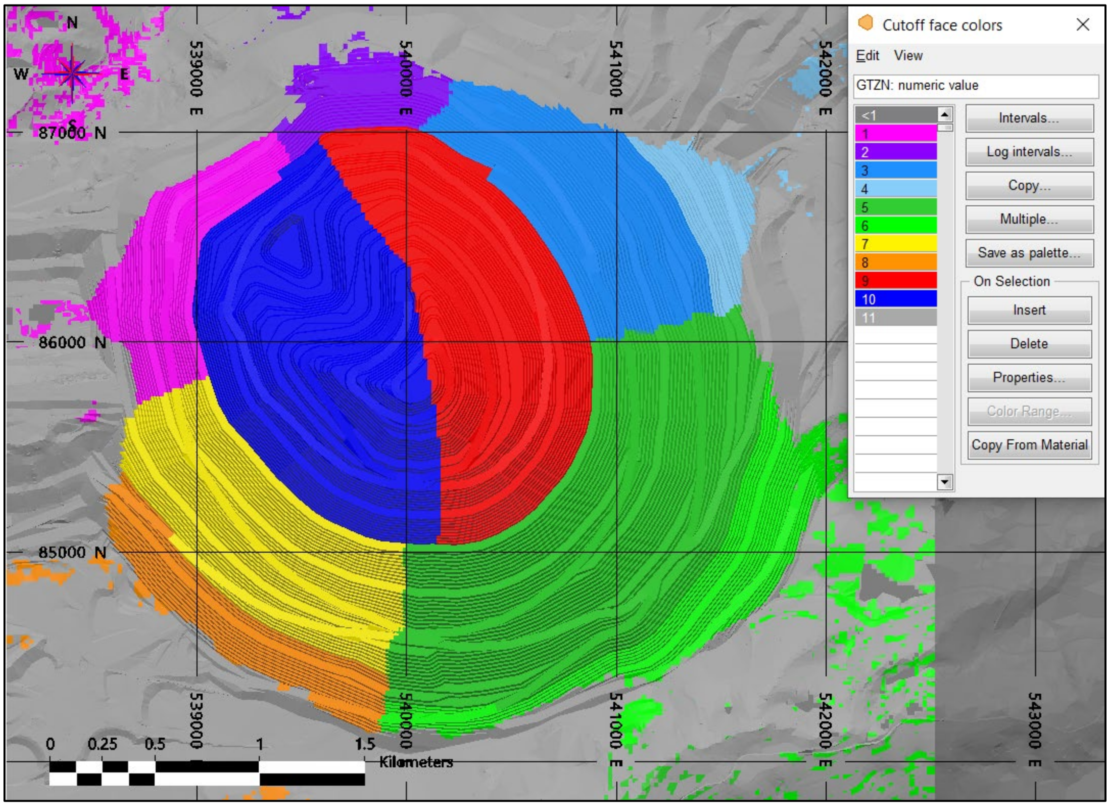
13.4.2 Throughput

The mine plan assumed a maximum mining capacity of 115 Mt of annual movement and a nominal processing rate of 90 kt/d of sulfide ore at the concentration facility.

13.4.3 Operations

The mining operations are shown in the flow diagram in Figure 13-4.

Figure 13-1: Geotechnical Zones Projected to Final Pit Design Surface



Note: Figure prepared by Southern Copper, 2021.

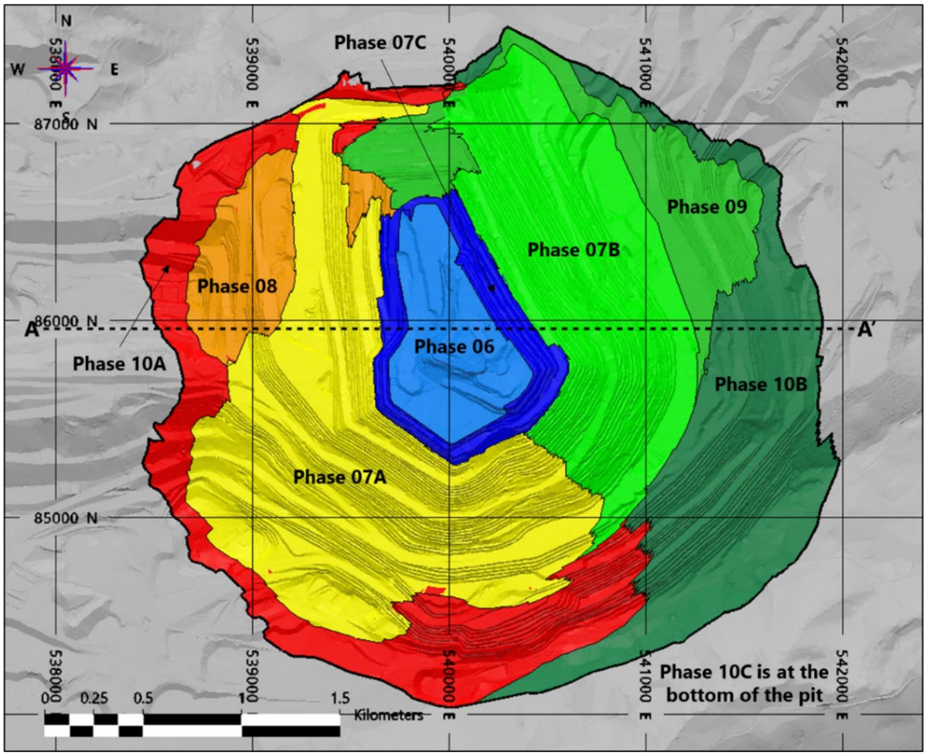
Table 13-1: Pit Slope Design Criteria by Geotechnical Zones

Zone	GTZN Code	Bench Height (m)	Bench Face Angle (º)	Inter-Ramp Angle (º)	Catch Berm Width (m)	Maximum Inter-Ramp Height (m)
NW	1	15	70	49	7.6	180
N	2	15	60	42	8.0	180
E1	3	15	60	42	8.0	150
E2	4	15	70	44	10.1	150
SE1	5	15	60	40	9.2	150
SE2	6	15	70	44	10.1	150
W1	7	15	60	45	6.3	180
W2	8	15	70	44	10.1	180
Pit bottom E	9	15	65	47	7.0	180
Pit bottom W	10	15	65	50	5.6	180
Fill	11	15	38	38	0.0	90

Table 13-2: Pit Design Criteria Summary

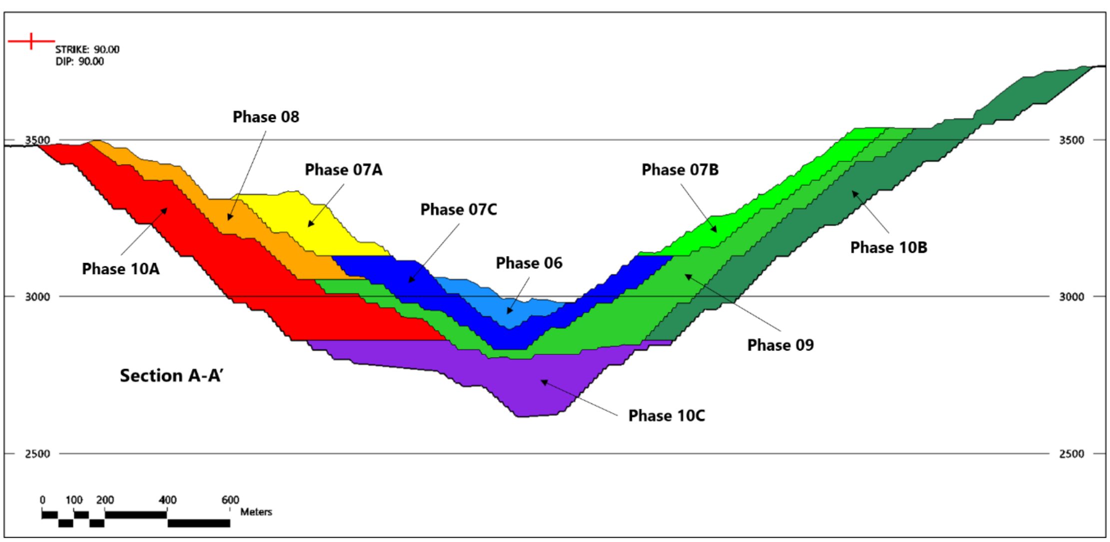
Design Criteria	Unit	Value
Bench height	m	15
Minimum mining width	m	80
Ramp width	m	40
Ramp gradient	%	10
Inter-ramp height	m	See Table 13-1
Geotechnical berm width	m	30-40
Bench face angle	degree	See Table 13-1
Inter-ramp angle	degree	See Table 13-1
Catch berm width	m	See Table 13-1

Figure 13-2: LOM Pit Phases



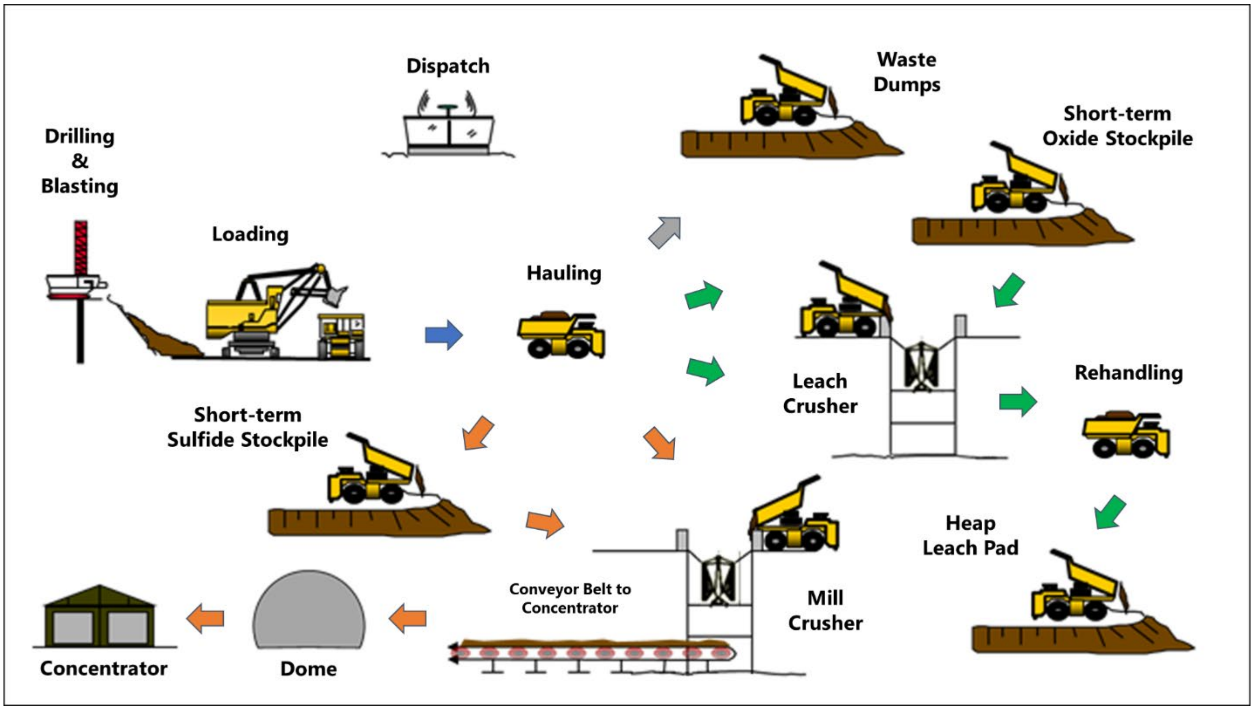
Note: Figure prepared by Southern Copper, 2021.

Figure 13-3: LOM Pit Phases, Section View



Note: Figure prepared by Southern Copper, 2021.

Figure 13-4: Mine Operation Flow Diagram



Note: Figure prepared by Southern Copper, 2021.

Mining is conducted using two 12-hr shifts. The mining operations can be summarized as:

- Initial drilling and blasting
- Loading, using shovels, of the blasted material into haul trucks
- Transport of ore and waste, depending on destination to WRSFs, run-of-mine (ROM) leach deposit, leach crusher, and mill crusher.

The mill crusher is located at elevation 3295 masl in the northern zone of the pit. Material is supplied either directly by haul trucks or is fed from a short-term sulfide stockpile near the crusher. From the crusher, the crushed material is transported using a 7 km long conveyor belt to the concentrator plant. The mill crusher throughput is a nominal 90 kt/d.

Material destined for the heap leach can be sent either directly to a short-term stockpile, or to the leach crusher that is located at elevation 3480 masl, 5.9 km southwest of the pit. Crushed leachable material is rehandled by loaders and trucks and deposited on a heap leach pad approximately 1.0 km northeast of the leach crusher.

13.4.4 Production Plan

The LOM plan assumes that all sulfide ore material goes directly to the mill crusher and all leachable material goes directly to the leach crusher. The point of transfer from mining to processing is at the point of the conveyors or delivery to the leach pad.

Three pit phases will be operational at any one time, to ensure that production rates can be met. A maximum mining capacity per phase of 80 Mt/a is assumed, with a maximum vertical advance rate of 10 benches per year. The mine plan assumes:

- 2022: phases 7A and 7B were undergoing stripping, and phase 6 was in production
- 2023: phase 8 will commence stripping, and phases 6, 7A and 7B will be in production
- 2025: phase 9 will commence stripping, and phases 7A, 7B, and 8 will be in production
- 2030: phases 10A and 10B will commence stripping, and phases 7A, 7B, 8, and 9 will be in production
- 2063: phase 10C will be in production.

Four WRSFs will be used:

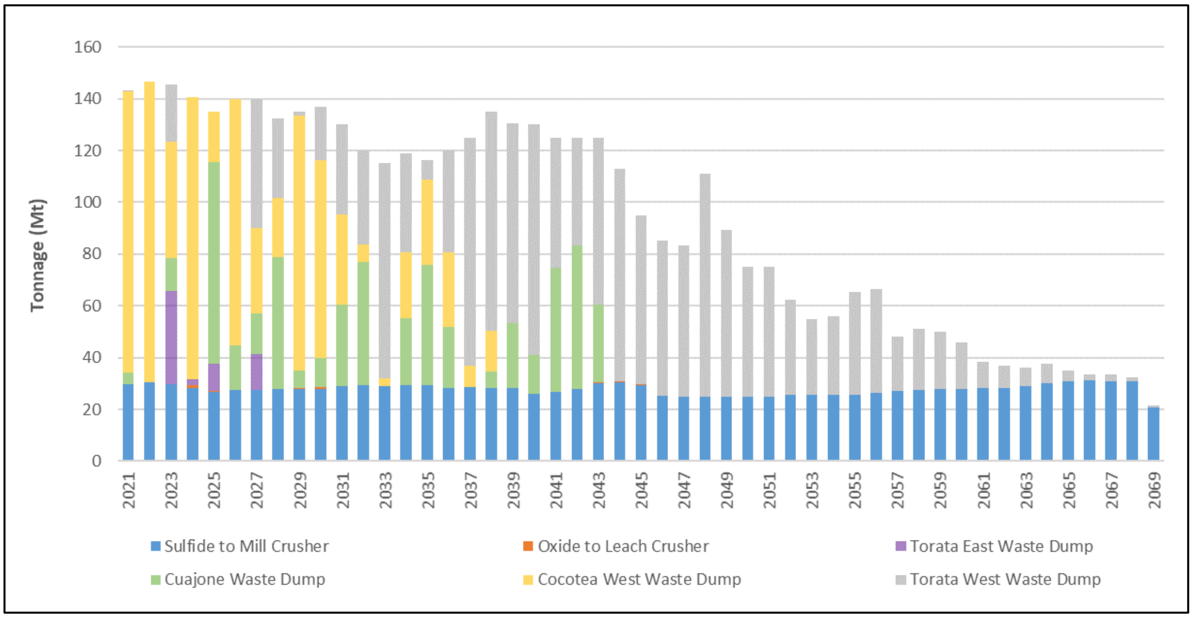
- The Torata east WRSF will receive material over the LOM, from phases 7B, 8 and 9
- The Cuajone WRSF will primarily receive material from phases 7B, 8, 9 and 10B
- The Cocotea WRSF will primarily receive material from phases 7A, 7B, 9, 10A, and 10B
- The Torata west WRSF will receive material mainly from phases 10A and 10 B.

The material movement envisaged in the LOM plan is provided in Figure 13-5.

Mill availability can vary, and Southern Copper has a formula that is used to predict the amount of material that can be fed to the plant based on a combination of the material work index and mill availability. This was used to estimate the amount of time needed to mine each block, and the mine plan was optimized to try and fill the mills based on the available time.

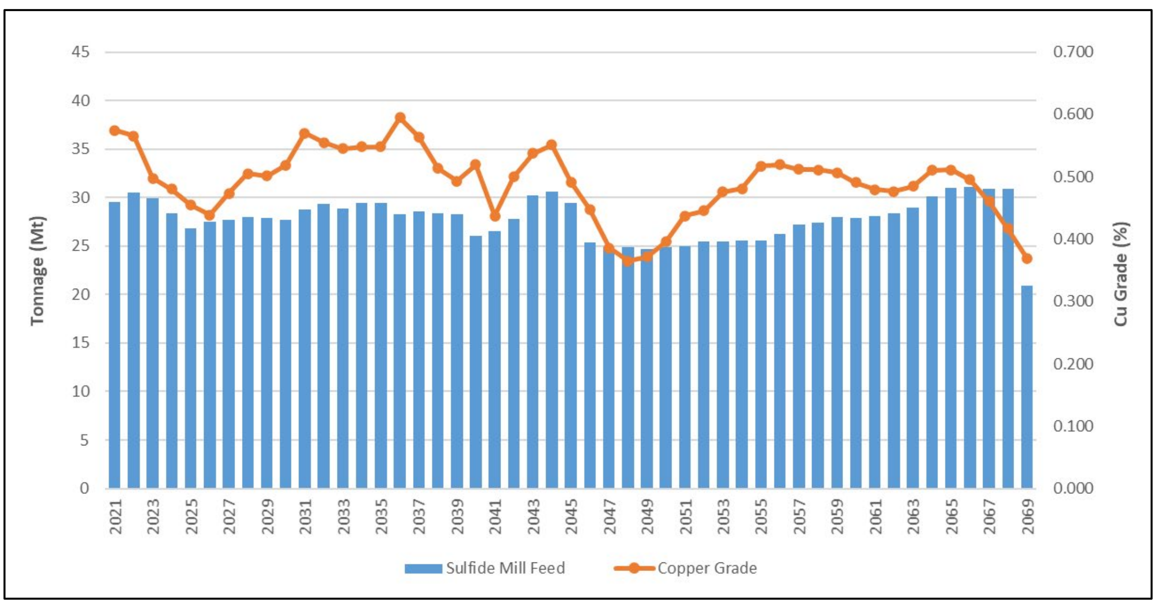
Figure 13-6 shows the feed to the plant ranging from approximately 25–30 Mt/a. The average copper grades vary from 0.3–0.6%.

Figure 13-5: LOM Material Movement by Destinations



Note: Figure prepared by Wood, 2021. Note that the tonnages shown for 2021 have been depleted from the mineral reserve estimate.

Figure 13-6: LOM Feed to Concentrator Plant



Note: Figure prepared by Wood, 2021. Note that the tonnages shown for 2021 have been depleted from the mineral reserve estimate.

Crush leach material is only generated in some years of the LOM plan (Figure 13-7). A maximum of 1 Mt is mined in 2024 and all leach material is mined out in 2045.

Table 13-3 shows the material movement on an annualized basis.

The final LOM pit layout plan is provided in Figure 13-8.

13.5 Equipment

Production drilling (10⅝–12¼ inch diameter) is carried out using electrical equipment for production drilling, and pre-split drilling (5 inch diameter) uses diesel equipment.

For blasting, Quantex explosive and electronic detonators are used in all blasts.

Electric shovels (bucket capacities from 56–74 yd^3) and front-end loaders are used to load haul trucks. The shovels are primarily used for the mining of final slopes, production, and ramps. The front-end loaders are generally used in narrower zones.

Haul trucks vary in capacity, from 218 to 360 t, and are used to transport material to the different end destinations, such as WRSFs, short-term oxide and sulfide stockpiles, leach crusher, and mill crusher.

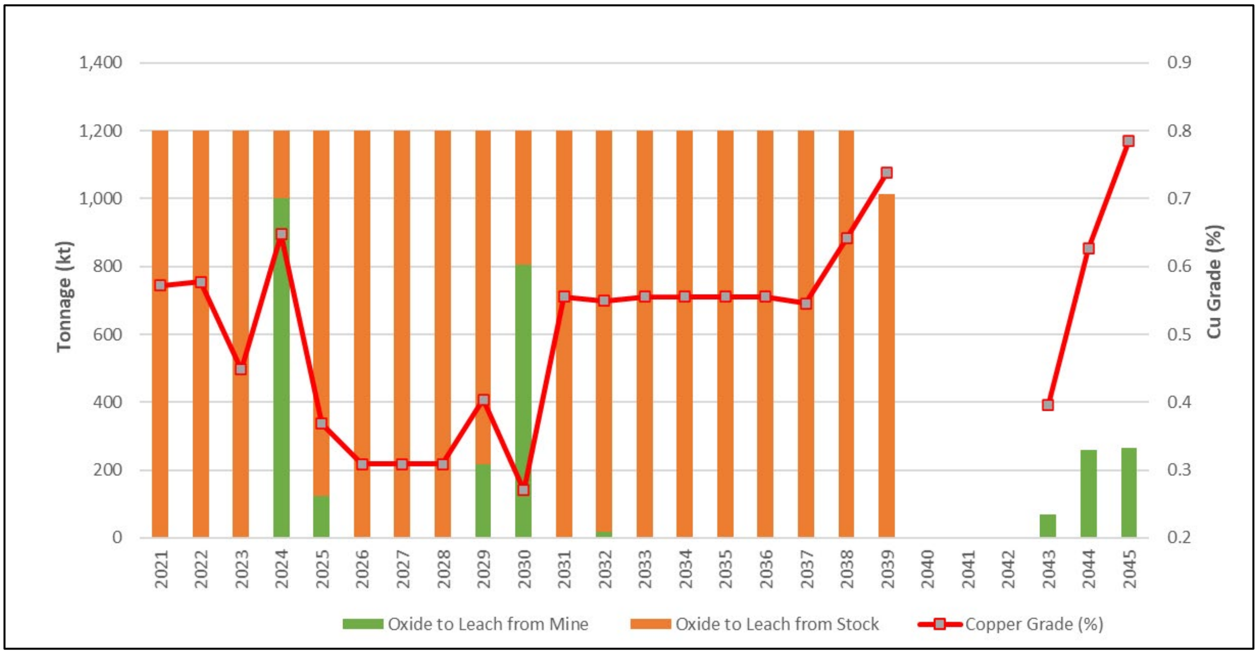
Track (crawler) dozers are used for ramp construction and pioneer phases, provide support to front-end loaders, and are used for WRSF maintenance. Wheel dozers are used primarily for road maintenance, in conjunction with motor graders. Water trucks are used for dust control. An excavator fleet is employed in slope profiling, mining of crests and narrow areas, pioneering phases, and reconfiguration of the WRSFs.

Equipment breakdowns by number and period are provided in Figure 13-9 to Figure 13-11. Peak requirements by machinery type are summarized in Table 13-4.

13.6 Personnel

Peak personnel numbers are estimated at 426 employees in the LOM plan, including technical, management, operational, and maintenance personnel.

Figure 13-7: LOM Feed to Leach Pad



Note: Figure prepared by Wood, 2021. Note that the tonnages shown for 2021 have been depleted from the mineral reserve estimate.

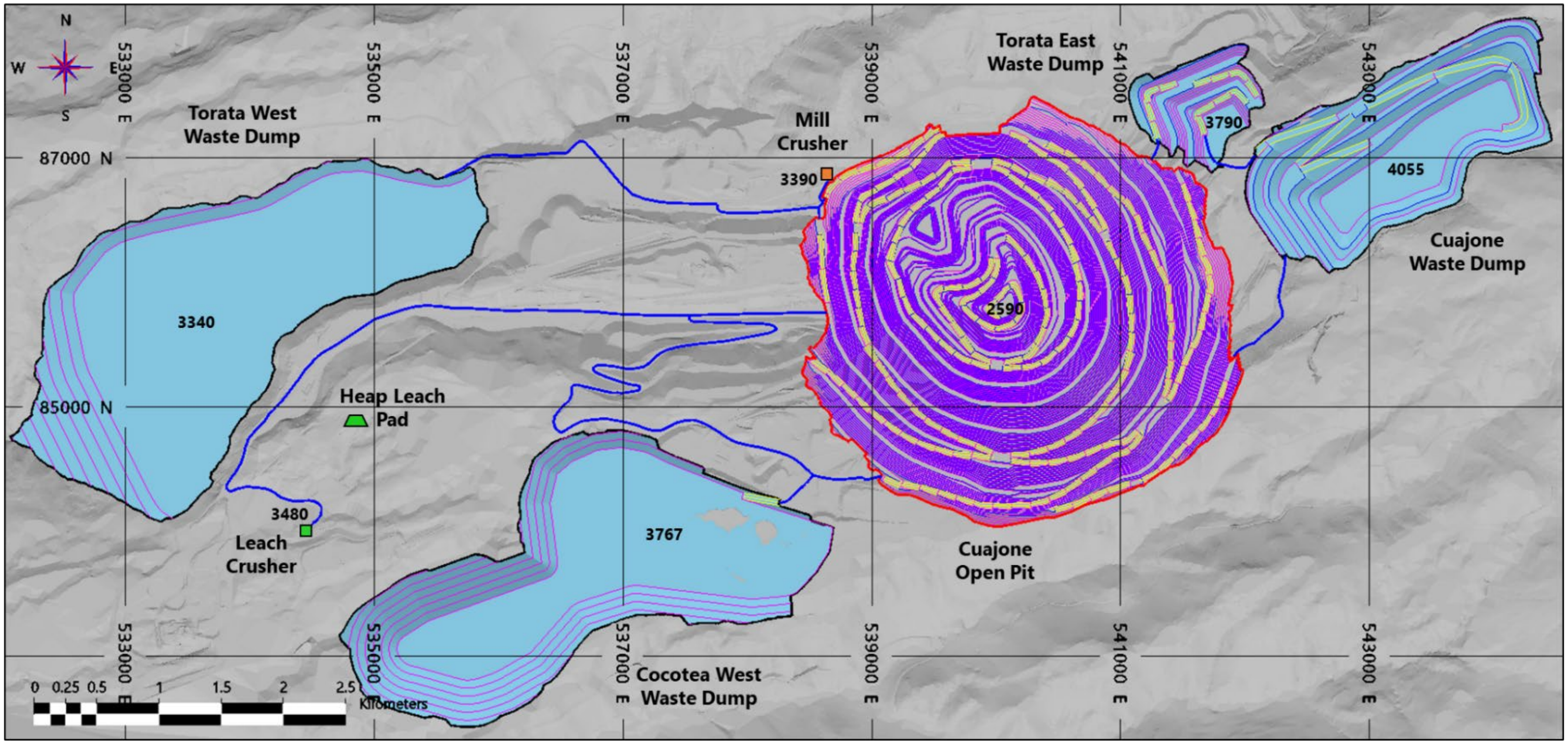
Table 13-3: LOM Material Movement Plan

Year	Period	Sulfide Material						Oxide Material from Mine			Oxide Material from Stockpiles		Waste Material by WRSF				All Materials
		Mill Crusher						Leach Crusher			Leach Crusher						
				Grade		Recovery											
		Tonnage (kt)	Work Index (kWh/st)	Cu (%)	Mo (%)	Cu (%)	Mo (%)	Tonnage (kt)	Grade Cu (%)	Recovery Cu (%)	Tonnage (kt)	Grade Cu (%)	Torata East Tonnage (kt)	Cuajone Tonnage (kt)	Cocotea West Tonnage (kt)	Torata West Tonnage (kt)	Grand Total Tonnage (kt)
2022	1	30,521	16.3	0.566	0.022	86.41	63.15				1,200	0.577		35	116,234		147,989
2023	2	29,898	16.6	0.497	0.022	86.25	63.24				1,200	0.448	35,777	12,870	44,846	22,090	146,681
2024	3	28,402	17.7	0.480	0.016	83.89	62.64	1,000	0.715	46.10	200	0.308	2,057		109,097		140,756
2025	4	26,833	18.8	0.455	0.013	83.14	61.98	122	0.896	42.16	1,078	0.309	10,659	77,849	19,538		136,078
2026	5	27,476	18.4	0.439	0.012	83.75	61.60				1,200	0.309		17,348	95,176		141,200
2027	6	27,662	18.3	0.473	0.011	83.83	61.13				1,200	0.309	13,605	15,824	32,827	50,081	141,200
2028	7	27,995	18.0	0.505	0.015	84.13	62.42				1,200	0.309		50,743	22,931	30,542	133,412
2029	8	27,850	18.1	0.502	0.014	84.02	62.42	217	0.129	67.51	983	0.464		6,911	98,507	1,516	135,983
2030	9	27,733	18.1	0.519	0.013	83.94	62.23	805	0.130	67.47	395	0.556		11,313	76,303	20,846	137,395
2031	10	28,804	17.4	0.570	0.015	84.48	62.70				1,200	0.556		31,609	34,926	34,661	131,200
2032	11	29,339	17.0	0.555	0.018	84.98	62.88	16	0.130	64.71	1,184	0.556		47,453	6,779	36,413	121,184
2033	12	28,888	17.3	0.545	0.018	84.94	62.97	1	0.130	64.74	1,199	0.556			2,937	83,174	116,199
2034	13	29,422	16.9	0.548	0.019	85.24	63.06				1,200	0.556		25,942	25,329	38,387	120,280
2035	14	29,446	16.9	0.548	0.020	85.26	63.08				1,200	0.556		46,515	32,911	7,216	117,288
2036	15	28,302	16.9	0.595	0.019	86.07	63.18				1,200	0.556		23,488	28,822	39,388	121200
2037	16	28,591	17.5	0.564	0.020	85.72	63.28				1,200	0.546		50	8,383	87,976	126,200

Year	Period	Sulfide Material						Oxide Material from Mine			Oxide Material from Stockpiles		Waste Material by WRSF				All Materials
		Mill Crusher						Leach Crusher			Leach Crusher						
				Grade		Recovery											
		Tonnage (kt)	Work Index (kWh/st)	Cu (%)	Mo (%)	Cu (%)	Mo (%)	Tonnage (kt)	Grade Cu (%)	Recovery Cu (%)	Tonnage (kt)	Grade Cu (%)	Torata East Tonnage (kt)	Cuajone Tonnage (kt)	Cocotea West Tonnage (kt)	Torata West Tonnage (kt)	Grand Total Tonnage (kt)
2038	17	28,396	17.0	0.514	0.024	85.56	63.55				1,200	0.642		6,127	15,639	84,838	136,200
2039	18	28,327	17.7	0.493	0.024	85.01	63.54				1,013	0.738		25,003		77,352	131,695
2040	19	26,030	19.4	0.520	0.017	84.02	62.77							14,809		89,161	130,000
2041	20	26,559	18.9	0.437	0.013	83.55	62.14							47,974		50,467	125,000
2042	21	27,818	18.0	0.500	0.015	84.58	62.58							55,634		41,548	125,000
2043	22	30,263	16.4	0.538	0.017	85.92	62.85	69	0.396	46.54				29,990		64,679	125,000
2044	23	30,646	16.2	0.551	0.017	86.78	62.81	260	0.626	44.98						82,010	112,915
2045	24	29,485	16.8	0.492	0.019	85.80	63.03	265	0.786	40.19						65,250	95,000
2046	25	25,387	19.8	0.448	0.016	84.18	62.83									59,613	85,000
2047	26	24,858	20.3	0.386	0.012	83.41	61.85									58,302	83,160
2048	27	24,843	20.4	0.365	0.011	83.08	61.37									86,351	111,195
2049	28	24,704	20.4	0.371	0.011	82.91	61.20									64,414	89,118
2050	29	24,901	20.2	0.396	0.010	82.84	60.95									50,099	75,000
2051	30	25,007	20.1	0.438	0.012	83.05	61.59									49,993	75,000
2052	31	25,512	19.8	0.446	0.011	83.14	61.44									36,897	62,409
2053	32	25,492	19.7	0.476	0.013	83.38	61.85									29,508	55,000
2054	33	25,543	19.7	0.481	0.013	83.30	62.03									30,272	55,815

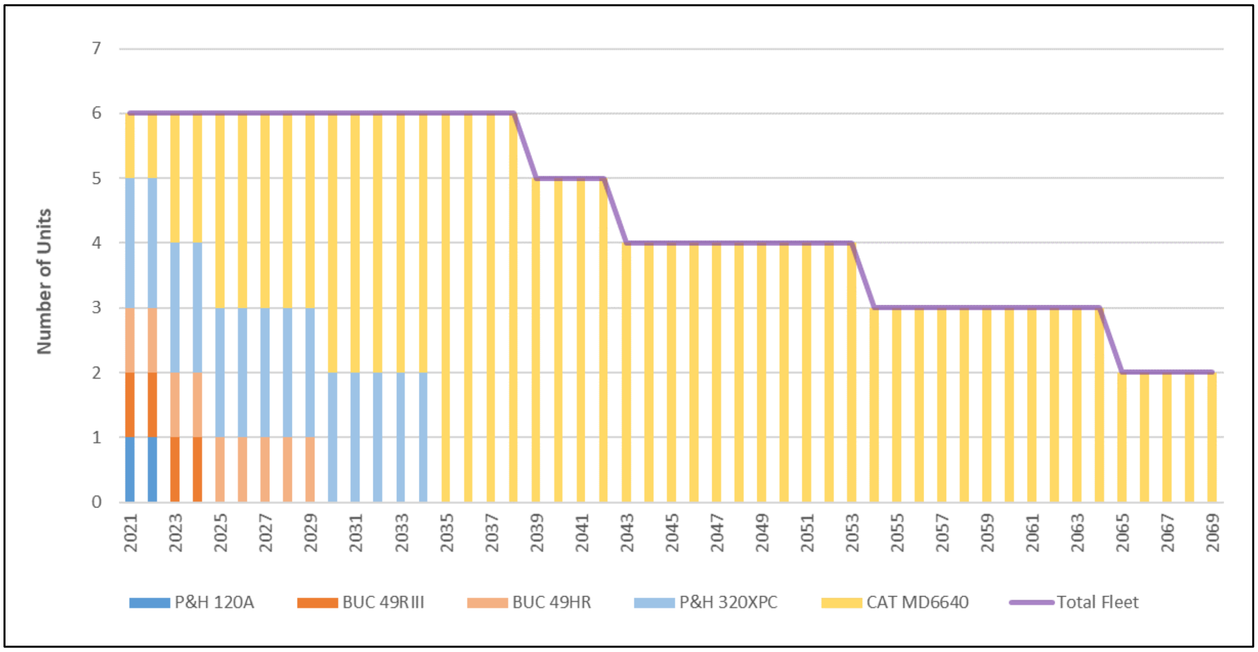
Year	Period	Sulfide Material						Oxide Material from Mine			Oxide Material from Stockpiles		Waste Material by WRSF				All Materials
		Mill Crusher						Leach Crusher			Leach Crusher		Torata East Tonnage (kt)	Cuajone Tonnage (kt)	Cocotea West Tonnage (kt)	Torata West Tonnage (kt)	Grand Total Tonnage (kt)
		Tonnage (kt)	Work Index (kWh/st)	Grade		Recovery		Tonnage (kt)	Grade Cu (%)	Recovery Cu (%)	Tonnage (kt)	Grade Cu (%)					
				Cu (%)	Mo (%)	Cu (%)	Mo (%)										
2055	34	25,519	19.7	0.517	0.016	83.48	62.70									39,674	65,192
2056	35	26,200	19.2	0.519	0.018	83.87	63.04									40,255	66,455
2057	36	27,227	18.4	0.512	0.016	84.16	62.79									21,013	48,239
2058	37	27,369	18.3	0.511	0.017	84.51	62.96									23,586	50,955
2059	38	28,011	17.8	0.507	0.016	84.53	62.69									21,989	50,000
2060	39	27,942	17.9	0.491	0.017	84.65	62.90									17,990	45,931
2061	40	28,059	17.8	0.479	0.016	84.65	62.74									10,221	38,280
2062	41	28,387	17.6	0.476	0.017	84.81	62.85									8,456	36,843
2063	42	29,003	17.2	0.485	0.018	85.10	63.05									7,083	36,086
2064	43	30,104	16.6	0.511	0.020	85.51	63.31									7,635	37,739
2065	44	30,973	16.0	0.512	0.022	86.03	63.49									4,027	35,000
2066	45	31,063	16.0	0.496	0.023	86.01	63.49									2,570	33,633
2067	46	30,932	16.1	0.461	0.025	85.92	63.57									2,459	33,391
2068	47	30,917	16.1	0.417	0.027	85.82	63.65									1,347	32,264
2069	48	20,919	16.0	0.369	0.030	85.55	63.83									629	21,548
Grand Total		***1,333,559***	***17.9***	***0.492***	***0.017***	***84.73***	***62.84***	***2,754***	***0.493***	***46.87***	***19,252***	***0.497***	***62,009***	***547,487***	***771,183***	***1,681,975***	***4,418,309***

Figure 13-8: LOM Layout Plan



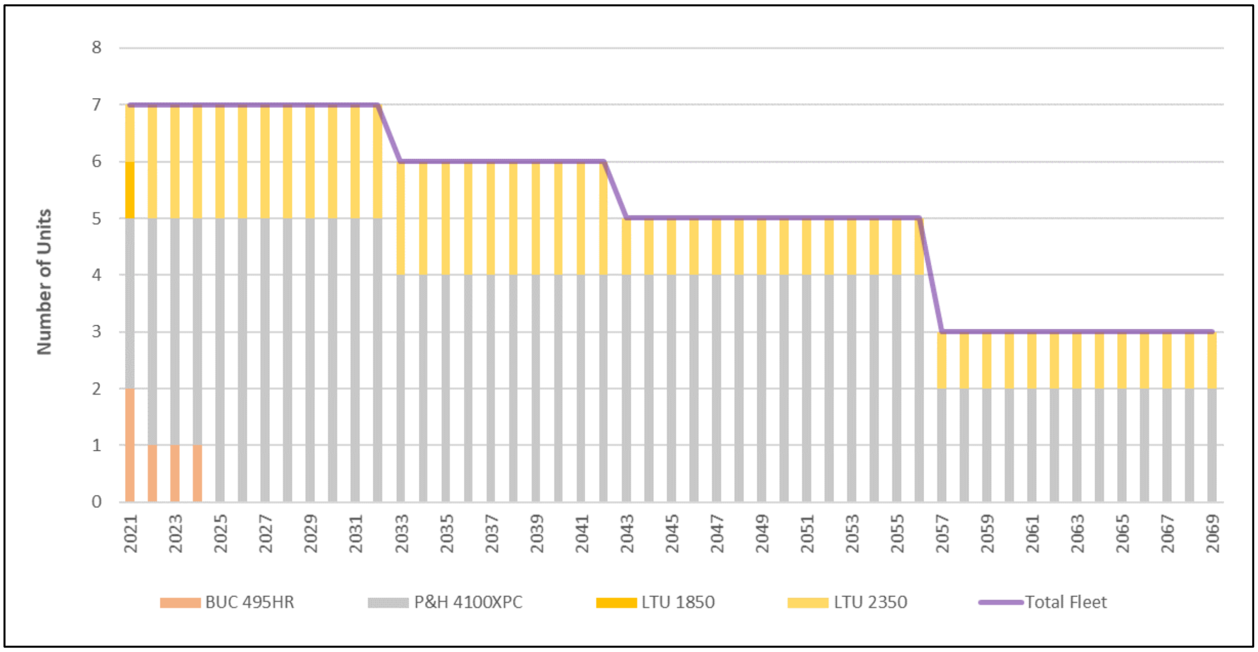
Note: Figure prepared by Wood, 2021.

Figure 13-9: LOM Drilling Equipment Requirements



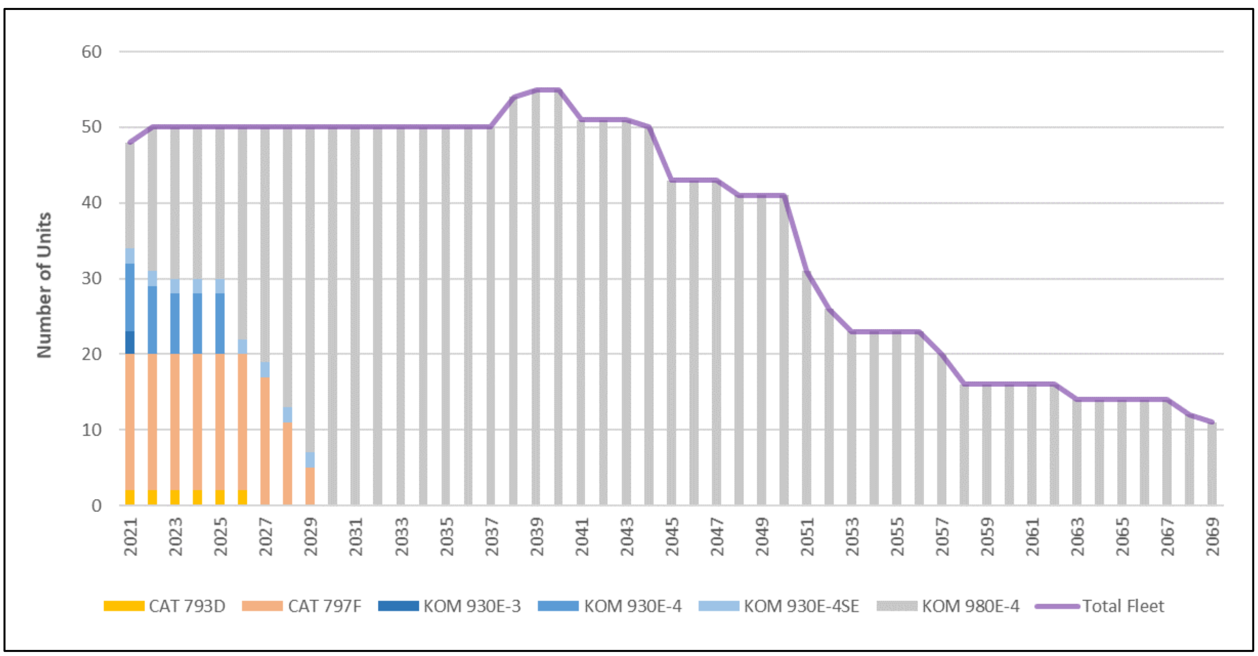
Note: Figure prepared by Wood, 2021.

Figure 13-10:LOM Loading Equipment Requirements



Note: Figure prepared by Wood, 2021.

Figure 13-11:LOM Haulage Equipment Requirements



Note: Figure prepared by Wood, 2021.

Table 13-4: LOM Peak Equipment Requirements

Area	Equipment Type	Peak
Drilling	P&H 120A – electric drill	1
	BUC 49RIII – electric drill	1
	BUC 49HR – electric drill	1
	P&H 320XPC – electric drill	2
	CAT MD6640 – electric drill	6
Loading	BUC 495HR – electric shovel	2
	P&H 4100XPC – electric shovel	5
	LTU 1850 – front-end loader	1
	LTU 2350 – front-end loader	2
Hauling	CAT 793D – truck	2
	CAT 797F – truck	18
	KOM 930E-3 – electric truck	3
	KOM 930E-4 – electric truck	9
	KOM 930E-4SE – electric truck	2
	KOM 980E-4 – electric truck	55
Support	CAT 966G – wheel loader	2
	CAT 988H – wheel loader	1
	CAT 992K – wheel loader	1
	CAT D10R – crawler dozer	1
	CAT D10T – crawler dozer	4
	CAT D11T – crawler dozer	5
	CAT 824H – wheel dozer	2
	CAT 824K – wheel dozer	1
	CAT 834H – wheel dozer	3
	CAT 834K – wheel dozer	3
	CAT 16M – motor grader	1
	CAT 24M – motor grader	3
	CAT 24 – motor grader	1
	CAT 785C – water truck	2
	CAT 785D – water truck	1

Area	Equipment Type	Peak
	CAT 793C – water truck	1
	CAT 793C – lowboy truck	2

14 PROCESSING AND RECOVERY METHODS

14.1 Process Method Selection

The process designs were based on existing technologies and proven equipment. The plant has an operating history of >45 years.

The Cuajone heap leach facility was designed to treat oxide ores and produce a copper-rich pregnant leach solution (PLS) that is sent to the Toquepala Operations for solvent extraction/electrowinning (SX/EW) recovery.

The Cuajone concentrator treats sulfide material to produce copper and molybdenum concentrates. Copper concentrates are sent to the Ilo smelter and refinery to produce copper cathodes as the final product. Molybdenum concentrates are bagged and sold as the final product.

The process and refinery plant designs were based on a combination of metallurgical testwork, previous study designs, previous operating experience. The designs are conventional and have no novel parameters.

14.2 Flowsheets

Summary flowsheets for the heap leach operation and concentrator are provided in Figure 14-1 and Figure 14-2, respectively.

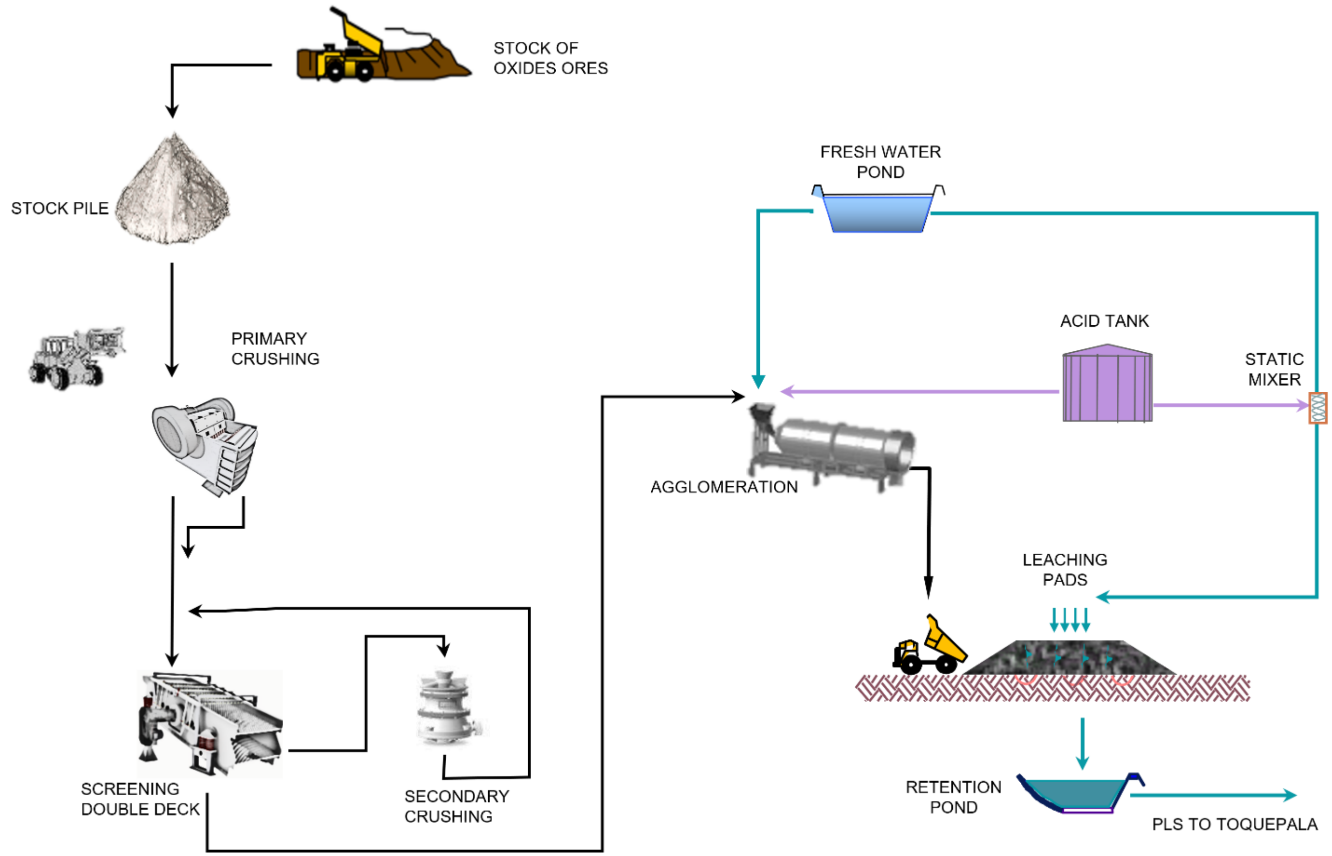
14.3 Oxide Heap Leaching Facilities

14.3.1 Overview

Oxide ore is treated in a conventional leaching process consisting of two stages of crushing, agglomeration and permanent leaching pads. The leach plant is located to the east of the Cuajone concentrator at an elevation of 3,475 masl. Two heap leach facilities, referred to as heap leach facility SX and heap leach facility Phase IV, are used.

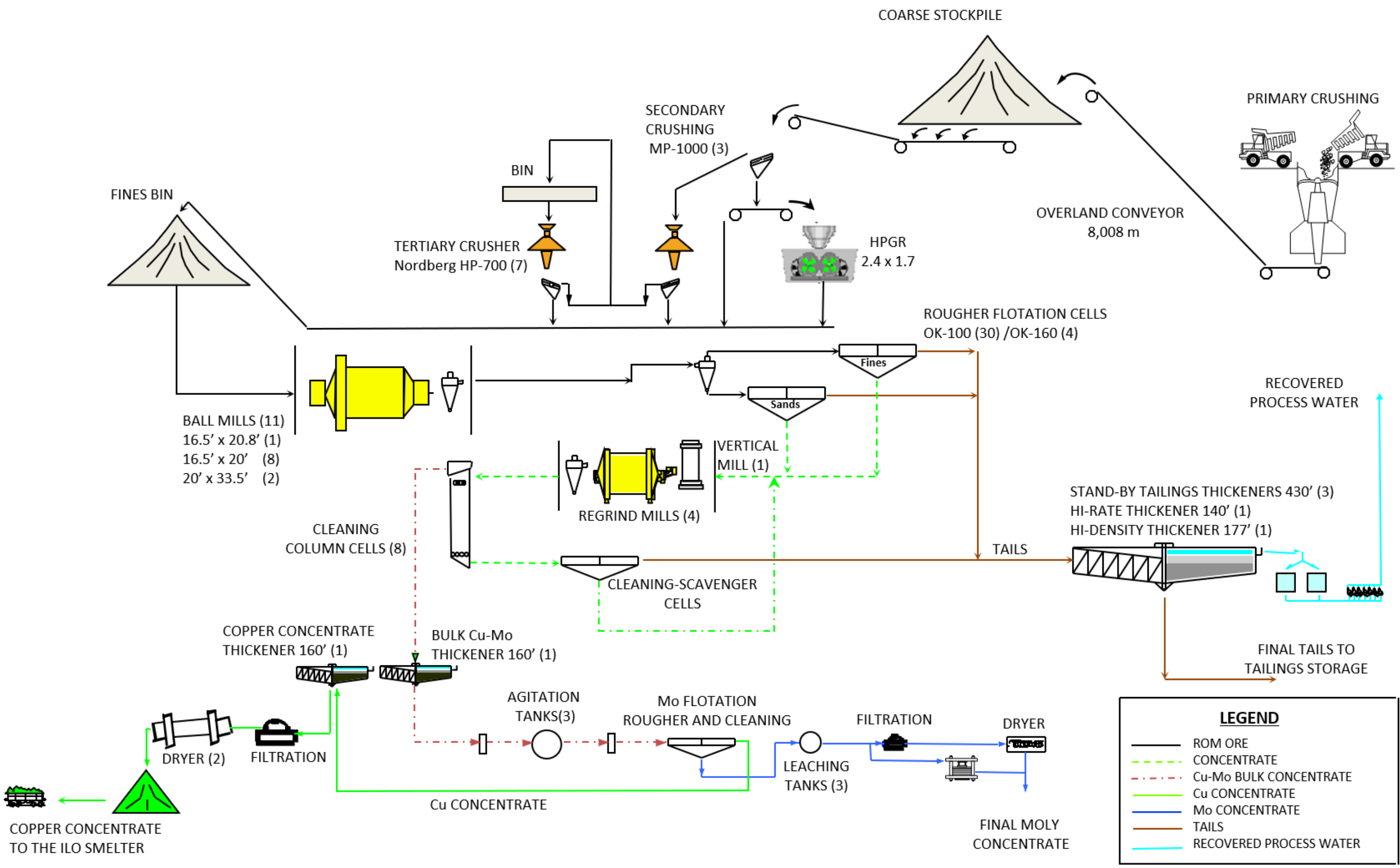
The SX facility consists of a double-lined pad with high-density polyethylene (HDPE) geomembranes in a valley bottom, extending 10 m up the valley walls, which acts as a leak detection system and a single-lined system in the remainder of the area. The liners were placed over a 30-cm-thick compacted soil line. The solution collection system consists of 100 mm diameter perforated HDPE pipe that feeds into larger, 300 mm solid HDPE pipes that in turn flow to the PLS pond. The SX facility has been inactive since 2018.

Figure 14-1: Simplified Process Flowsheet, Leach Plant



Note: Figure provided by Southern Copper, 2021.

Figure 14-2: Simplified Process Flowsheet, Sulfide Concentrator



Note: Figure provided by Southern Copper, 2021.

The Phase IV facility is a separate facility with a different lining system to that of the SX and is currently active. The liner system for the Phase IV facility comprises a linear low density polyethylene (LLDPE) geomembrane liner over a layer of compacted soil liner or geosynthetic clay liner. The solution collection piping system consists of 100 mm diameter perforated pipes, 200 mm and 300 mm double-walled perforated HDPE pipes, along with 50 mm diameter single walled perforated pipes. The Phase IV facility has its own pond system including a PLS pond and an overflow pond.

14.3.2 Crushing

The oxide ore is carried by trucks from the mine and transferred to an 80,000 t capacity oxide stockpile. From the stockpile, a front-end loader discharges the ore into a jaw crusher feed bin where the ore is classified via a static grizzly with an aperture of 500 mm. Oversize rocks are size-reduced by a mobile rock breaker. Undersize ore discharges onto the crusher feed bin.

The first crushing stage is carried out in a 30 x 42 inch jaw crusher with a closed side setting of 100 mm. Ore from the feed bin is sorted in a vibrating grizzly feeder with an aperture of 75 mm. Oversize ore from the feeder is discharged onto the jaw crusher.

Product from the jaw crusher joins the vibrating grizzly undersize material and is conveyed to an 8 x 20 ft double-deck vibrating screen with apertures of 25 and 17 mm.

Oversize ore from the screen is fed to a 60 inch secondary cone crusher thought a 24 t surge bin. The cone crusher produces a product of 80% passing ½ inch with a working closed side setting of 19–22 mm. Product from the cone crusher returns to the vibrating screen that works in closed circuit with the cone crusher.

The average LOM head grade and copper recovery is 0.497% (including ore in stockpile) and 57.74% respectively.

14.3.3 Agglomeration and Heap Leach Loading

Undersize product from the screening stage is then fed to an agglomeration drum. The ore feeding the drum is weighed on the conveyor to calculate the quantities of water and sulfuric acid used in the agglomeration process. The ratio of sulfuric acid added to the drum ranges from 20–25 kg of acid per tonne of ore and the resulting moisture in the agglomerate is 7%. The agglomerate is loaded onto 240 t trucks and transported to the leaching pad.

14.3.4 Leaching

At the leach pad, the agglomerate is deposited and spread, forming layers of 2.5 m height. A curing time of six days is allowed before the heap is irrigated. The leach pad is a permanent heap that is irrigated using sprinklers distributed on the surface of the heap, forming a rhomboid net of 5.5 x 5.5 m. The irrigation solution typically contains a sulfuric acid concentration of 6–15 g/L of water with a total flow of 115–145 m^3/hr. After an irrigation cycle of 60 days is completed, an upper heap is prepared on top of the leached layer. An impermeable plastic layer isolates the heap layers and a system of corrugated perforated pipes is placed on top of the plastic layer to allow the collection of the PLS.

The PLS is collected from the heap, through a network of collecting pipes, onto the collection ponds.

The sulfuric acid consumed in the leaching process is delivered by rail from an acid plant located in Ilo. From the train car vessel, the acid is discharged into a 227 m^3 storage tank and then sent to two daily usage tanks before it is mixed with water in a static mixer.

14.3.5 Solution Management

The PLS is collected in a 3,200 m^3 capacity PLS collection pond located downstream of the Phase IV leach pad. This capacity covers the solution generated under normal operations, including a volume occupied by sediments.

An 8,000 m^3 capacity overflow pond, located downstream from the HLF Phase IV PLS collection pond, complements the collection pond, by serving as a flood control pond especially during high rainfall events.

The copper-loaded PLS from the leach pad is piped to the SX/EW plant by a combination of pumping and gravity flow.

During 2021, the Cuajone leaching facility reported a PLS flow of 120 m^3/hr to the SX/EW plant, with approximately 3,604 t total contained copper, representing about 14% of the total produced copper at the Toquepala facility.

The total LOM production is estimated at 63,116 t of copper with a PLS flow to the SX/EW plant of 115 m^3/hr.

14.3.6 Equipment Sizing

The leach facility key equipment list is provided in Table 14-1.

Table 14-1: Key Equipment, Leach Facility

Description	Quantity	Function
Jaw crusher, Kueken 30 "x 42", 56 kW (75 HP)	1	Primary crushing
Cone crusher, Nordberg HP 500 60", 355 kW (500 HP)	1	Secondary crushing
Double deck screen, Tycan W.S. 8' x 20', 30 kW (40 HP)	1	Fines classification
Agglomeration drum, Fima Drum, 259 t/h	1	Agglomeration of fine ore

14.3.7 Power and Consumables

The leach plant uses power supplied from the Botiflaca sub-station (see Chapter 15.9).

Crushing represents around 57% of the plant consumed power with the remain being consumed by the heap irrigation pumping system. Power is also used for the pump booster system that transfers the PLS from the leach facility to the SX/EW plant. The power consumption in the leach plant for 2021 was 1,887,786 kWh with a unit rate of 2,343 kWh/t. There is sufficient power capacity available to support the LOM plan.

Chapter 15.10 discusses the sources of fresh water for leaching. All sources discharge into the Vina Blanca lagoon from where the fresh water is supplied to the leaching plant. At the plant, fresh water is required for the irrigation solution preparation and agglomeration. Water consumption during 2021 was 1.52 m^3/t, which is equivalent to a total annual consumption of 1,229,814 m^3. Water supplies are expected to be sufficient for the purposes of the LOM plan.

Sulfuric acid is used as the leaching reagent in the dissolution of copper oxides. During 2021, a total of 42,317 t of acid was required at the Cuajone leaching plant. The LOM plan envisages that the same consumables will be used for the duration of the LOM plan.

14.3.8 Personnel

There are 18 personnel employed at the leach facility and numbers are expected to remain the same for the LOM.

14.4 Sulfide Process Plant

14.4.1 Overview

The Cuajone concentrator commenced operations on November 25, 1976 and was initially designed to process 40,823 t/d. Following upgrades and plant modifications, the current plant capacity is 90,000 t/d.

Ore is treated in a conventional concentration circuit consisting of crushing, grinding and flotation of copper and molybdenum ores. Copper concentrate is transported by rail to the Ilo smelter/refinery for further treatment, whereas the molybdenum concentrate is sold to third parties as a final product.

14.4.2 Primary Crushing

Run-of-mine (ROM) material is received from the Cuajone open pit by truck and unloaded onto a 64 x 114 inch primary gyratory crusher located north of the pit. Crushed material is collected in a discharge box at the bottom of the crusher. An arrangement of three conveyors transports the crushed material for a distance of approximately 8,000 m to a temporary coarse stockpile that has a live capacity of 60,000 t.

14.4.3 Secondary and Tertiary Crushing

Three apron feeders reclaim ore from beneath the coarse ore stockpile and deliver it to three 6 x 16 ft double deck vibrating screen. Undersize material (-½ inch) discharges into a hopper that feeds a 2.4 m x 1.7 m HPGR with an installed power of 5.1 MW. The HPGR product is conveyed to a fines hopper that has a live capacity of 180,000 t.

The screened (+½ inch) oversize material gravity feeds to three 746 kW MP-1000 secondary crushers, and the product discharges onto three 10 x 21 ft (37 HP) secondary crushing banana screens.

The oversize stream (+½ inch) from the secondary crushing screens is fed to seven 522 kW HP-700 tertiary crushers through a tertiary hopper. The tertiary crushers work in closed circuit with seven 8 x 21 ft 30 HP tertiary crushing banana screens. The coarse product from the screens returns to the tertiary hopper. The fine product from the secondary and tertiary crushing screens is transported to the fines hopper.

14.4.4 Grinding

The grinding stage is carried out in a single stage. Material from the fines hopper is fed to a total of 11 ball mills, eight 16.5 x 20 ft mills rated at 2,240 kW, two 20 x 33.5 ft mills rated at 6,711 kW, and a 16.5 x 20.8 ft mill rated at 2,240 kW. A total of 30 feeders equipped with scales discharge the fine material to the feeders of each mill. All ball mills operate in closed circuit with a cluster of hydrocyclones per mill. Oversized underflow material returns to the ball mills for further grinding, and the finer overflow material is sent to the flotation circuit. Flotation feed is 80% passing 240 µm, and is monitored by particle size analyzers.

14.4.5 Rougher Flotation

Overflow slurry from the grinding circuit is fed to four cyclone banks, consisting of ten 20-inch cyclones each, to generate sands and slimes streams before rougher flotation. After cycloning, the underflow stream or sands that represents around 56% of the cyclone feed, is water diluted to 40% w/w solids and fed to the sands section of the rougher flotation. This consists of 16 tank cells distributed in three lines. Two lines consist of six 3,500 ft^3 cells each, and a third line has four 5,600 ft^3 cells. The overflow portion, or slimes, is diluted to 20% w/w solids and is fed to the slimes rougher flotation, consisting of three lines of six 3,500 ft^3 tank cells. Both rougher concentrates are collected in a re-grind distribution box. Tails from both rougher circuits are sent to a tailings distribution box.

14.4.6 Cleaner–Scavenger Flotation

Rougher flotation concentrates from the collection box are fed to two parallel re-grinding circuits (north and south) consisting of two 10.5 x 17 ft 447 kW ball mills, each operating in parallel with a cluster of twelve 10-inch cyclones. Rougher concentrate is re-ground to 80% passing 44 µm, and cyclone overflow is transferred to a cleaner distribution box in each circuit.

The cleaner distribution box feeds the material to four 10 x 44 ft (3,300 ft^3) column cells in each circuit or eight cells total. Tailings from the cleaner cells are pumped to the scavenger feed box where the slurry is split between the north and south scavenger circuits. Five 60 m^3 cells and six 38.2 m^3 cells comprise the north and south circuits respectively. Both scavenger concentrates are then re-ground in a 600 kW vertical mill operating in closed circuit with a cluster of six 20-inch cyclones. Overflow scavenger concentrate is then returned to the north cleaner distribution box. Tails from both scavenger circuits are sent to a tailings distribution box, joining the sands and slimes rougher tailings to form the final mill tailings.

The copper–molybdenum bulk concentrate from the cleaner column cells is then gravity fed to a 49 m diameter copper–molybdenum thickener, where it is thickened to 60% solids and pumped to the molybdenum plant.

14.4.7 Molybdenum Plant

The molybdenum plant processes the copper–molybdenum bulk concentrate in a rougher circuit and 10 cleaner stages. The bulk concentrate is fed to a rougher circuit that consists of six 300 ft^3 cells. Tails from the rougher stage are sent to the 49 m diameter copper concentrate thickener. Rougher concentrate is pumped to the 1st cleaner stage (eight 100 ft^3 cells) and the concentrate from the 1st cleaner is fed to the 2nd cleaner stage (sixteen 50 ft^3 cells). Tails from the 1st cleaner return to the bulk rougher stage.

Concentrate from the 2nd cleaner together with the 4th cleaner stage tails are fed to the 3rd cleaner stage, which consists of four 100 ft^3 cells. Concentrate from the 3rd cleaner is then pumped to the 4th cleaner stage together with tails from the column cell. The fourth cleaner concentrate overflows to the 5th cleaner stage producing a concentrate that is then pumped to the 6th cleaner stage. The fourth cleaner tails are return to the 3rd cleaner stage. The 4th and 5th cleaner stages consist of six 25 ft^3 cells in each stage.

The 6th, 7th, 8th, 9th, and 10th cleaner stages consist of twelve 25 ft^3 cells in total distributed in 4, 2, 2, 2, and 2 cells respectively. Concentrate from the 6th cleaner stage feeds the next cleaner stage and subsequently until a 10th cleaner concentrate is obtained. Tailings from the 6th cleaner stage are pumped to the column cell (214 ft^3). Tails from the column cell are returned as a feed to the 4th cleaner stage. The concentrate from the 10th cleaner stage together with the column cell concentrate are the final molybdenum concentrate that feeds a molybdenum thickener (7,070 ft^3, 3 HP).

The underflow concentrate from the molybdenum thickener is then leached in three tanks working in parallel (1,357 ft^3 each), filtered, dried and bagged.

In 2021 the molybdenum plant produced a total of 7,793 t of concentrate with a molybdenum grade of 53.76%.

The LOM expected molybdenum recovery is estimated at 62.84% based on an average molybdenum grade of 54.1%.

14.4.8 Filtration and Drying Plant

The copper concentrate (copper–molybdenum rougher tailings) is thickened in the copper concentrate thickener to 64% solids and fed to the copper concentrate storage tank. The concentrate is then pumped to four 12 x 18 ft (3 HP) drum filters to produce an intermediate concentrate cake with 14% moisture that is further reduced to 7–8% moisture by using two 10 x 60 ft (200 HP) rotary dryers. Alternatively, the filtration plant has a vertical Larox filter (100 HP) and a horizontal AFP IV 1500 filter press. Both filters produce concentrate cakes with 9% moisture and are used when required.

Final copper concentrate is transported by rail to the Ilo smelter and refinery for further processing.

In 2021 the Cuajone concentrator produced a total of 670,081 t (dry) of concentrate with a copper grade of 25.22% based on an average copper recovery of 84.70%.

The LOM expected copper recovery is estimated at 84.73% based on an average copper grade of 25.4%.

14.4.9 Tailings Thickening

All tailings generated in the flotation circuit are discharged to a tailings distribution box. Around 70% of the tails is thickened in a 54 m diameter hi-density thickener and the remaining 30% is thickened in a 42.6 m (140 ft) diameter Hi-rate thickener. The overflow water is recovered in a process water pond and recycled to the grinding and flotation circuits.

14.4.10 Tailings Transport and Disposal

The final thickened tailings contain 56.5% w/w solids and are sent to the Quebrada Honda TSF. The tailings are transported using a concrete tunnel that extends for 27 km from the Cuajone concentrator to Quebrada Cimarrona, where the tailings from the Cuajone concentrator join the tailings from the Toquepala concentrators. From that point on the tailings travel through the natural existing ravine to the Quebrada Honda TSF.

14.4.11 Equipment Sizing

A summary table that shows the sizing of the key equipment is provided in Table 14-2.

14.4.12 Power and Consumables

The concentrator uses power for crushing, ore conveying, grinding and flotation cells. The total ore processed in 2021 was 29,617,007 t with a power consumption rate of 19.71 kWh/t. Grinding and classification represented around 54.95% of the total consumed power.

Make up water is required to replace that trapped in concentrates, tailings sent to the TSF, and evaporation. The operation uses surface and underground water from a variety of sources.

Surface water was collected from the Suches lake, and groundwater was collected from the Titijones and Huaytire wells.

Other major consumables include flotation reagents such as: collector, frother, flocculant, sodium hydrosulfide (NaSH), diesel and lime. Steel grinding media are consumed in the ball mills. Most chemicals are delivered to site in bulk containers and stored in large tanks that are able to support the operation for several days.

Table 14-2: Key Equipment, Sulfide Concentrator

Description	Quantity	Function
Gyratory crusher, 64 "x 114"	1	Primary crushing
Cone crushers, MP-1000, 746 kW each	3	Secondary crushing
HPGR, 2.4 m x 1.7 m, 5.1 MW	1	Tertiary crushing
Cone Crushers, HP-700, 522 kW each	7	Tertiary crushing
Ball mills, 16.5′ D x 20′ L, 2,240 KW	8	Grinding
Ball mills, 20′ D x 33.5′ L, 6,711 kW	2	
Ball mill, 16.5′ D x 20.8′ L, 2,240 kW	1	
Ball mills, 10.5′ D x 17′ L, 447 kW	4	Rougher concentrate regrind
OK-100 tank cells, 3,500 ft^3	30	Rougher flotation
OK-160 tank cells, 5,600 ft^3	4	
Column cells, 10′ x 44′, 3,300 ft^3	8	Cleaner flotation
Wemco cells, 60 m^3	5	Cleaner–scavenger flotation
Dorr-Oliver cells, 38.2 m^3 (1,350 ft^3)	6	
Svedala vertical mill VTM 800, 600 kW	1	Scavenger concentrate regrind
OK-8 cells, 8 m^3 (300 ft^3)	6	Mo rougher
Denver cells DR-100, 2.8m^3 (100 ft^3)	8	Mo 1st cleaner
Gallagher cells, 1.42 m^3 (40 ft^3)	16	Mo 2nd cleaner
Denver cells DR-100, 2.8 m^3 (100 ft^3)	4	Mo 3rd cleaner
Denver cells DR-18SP, 0.71 m^3 (25 ft^3)	12	Mo 4th & 5th cleaner
Denver cells DR-18SP, 0.71 m^3 (25 ft^3)	12	Mo 6th to 10th cleaner
Column cell 34" x 30′, 6 m^3 (214 ft^3)	1	Mo column cleaning
Hi-density thickener, 54 m, 75 kW	1	Tailings thickening
Hi-density thickener, 42.6 m, 20 kW	1	

Utilities and consumables consumption rates are expected to be similar for the LOM plan.

14.4.13 Personnel

The concentrator employs 137 personnel. Personnel numbers are expected to remain the same for the LOM plan.

14.5 Ilo Smelter

14.5.1 Overview

The Ilo smelter commenced operations in 1960 to support the Toquepala Operations, and was expanded in 1976 to accommodate the Cuajone Operations. In 1995 a Teniente converter and the first acid and oxygen plants were implemented. At that time the Ilo smelter operated with two reverberatory furnaces and one Teniente converter as smelting units, seven Peirce Smith converters, two blister casting plants, and one acid and oxygen plant.

In 2007 a new smelter was commissioned with a nominal capacity of 1,200,000 t/a of copper concentrate. The new smelter consists of one single Isasmelt smelting unit associated with two rotary holding furnaces, four Peirce Smith converters, two anode furnaces associated with twin anode casting wheels, two acid plants, two oxygen plants, and auxiliary services plants.

The Ilo smelter processes the copper concentrates from the Cuajone and Toquepala concentrators and produces copper anodes for the Ilo refinery.

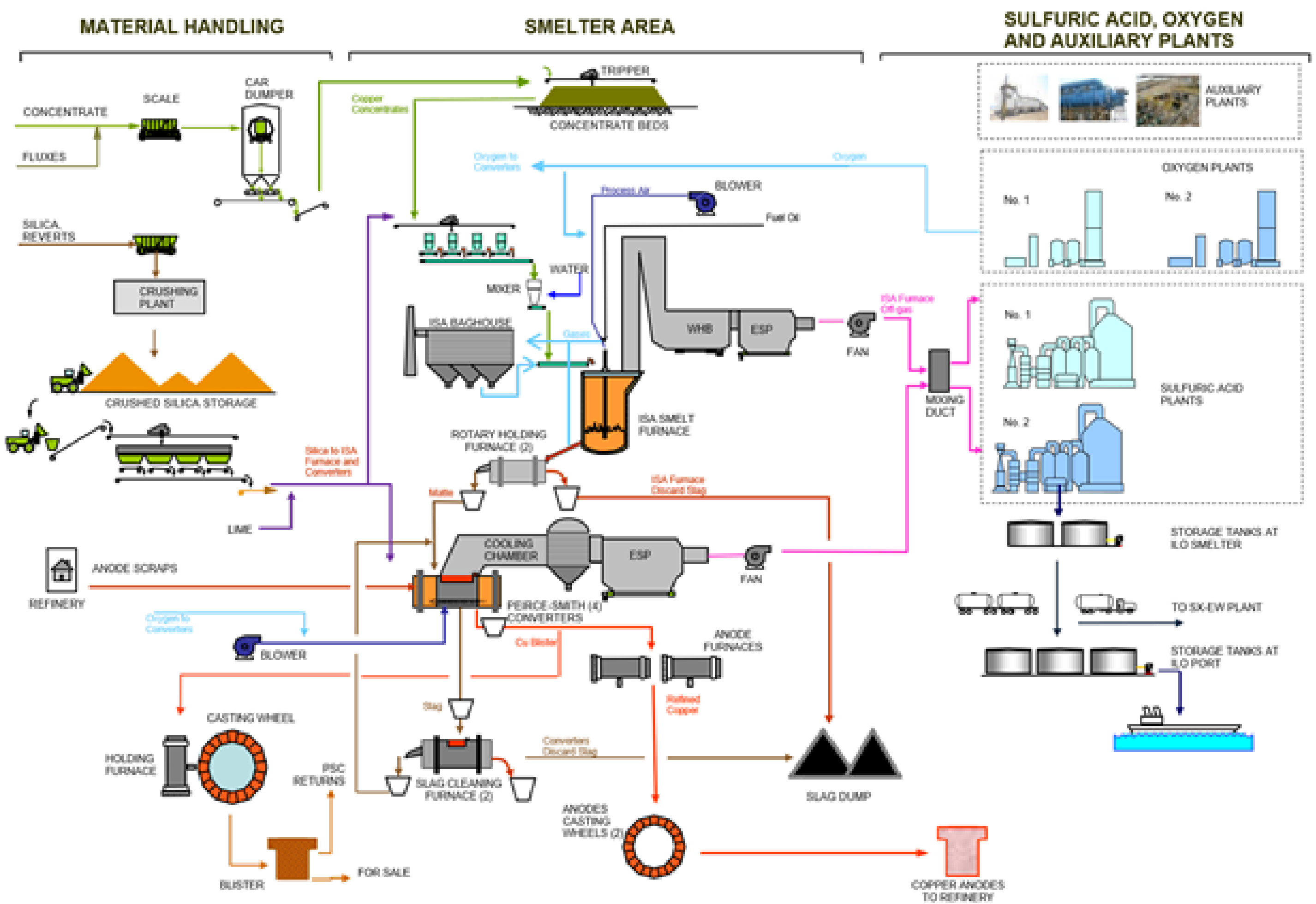
14.5.2 Flowsheet

The flowsheet for the Ilo smelter is provided in Figure 14-3.

14.5.3 Concentrate Smelting

At the smelter, the copper concentrate is mixed with silica flux before being fed to the smelting furnace. The primary smelting unit is an Isasmelt furnace which uses bath-smelting process technology. The furnace is a vertical refractory-lined vessel in which a specially-designed submerged-combustion lance is inserted into a bath of molten material. The furnace is continuously fed, through the lance, with copper concentrates and an oxygen-enriched air stream that creates vigorous agitation of the bath and rapid reaction rate.

Figure 14-3: Summary Flowsheet Ilo Smelter



Note: Figure prepared by Southern Copper, 2021.

The bath principally consists of molten iron–silicate slag and molten copper matte. Due to the turbulent state of the bath, the matte and slag are tapped out together periodically through a single tap hole to either of two rotary holding furnaces via water-cooled copper launders. At the RHFs the molten products are allowed to separate in a clean slag and matte molten phases that are poured separately. The rotary holding furnaces also provide surge capacity between the continuous operation of the Isasmelt furnace and the batch Peirce Smith converter cycles. Slag from the rotary holding furnaces is sent directly to the slag dump area.

The off-gas from the Isasmelt furnace, at approximately 1,050º C, is vented into a waste heat boiler where it is cooled to 350º C. Gases are then passed through a five-field electrostatic precipitator, where they are cleaned of entrained dust. Lastly, gases pass through a mixing duct and are combined with Peirce Smith converter off-gas streams before being treated in the sulfuric acid plants.

14.5.4 Matte Conversion

A 63% Cu copper matte molten phase from the rotary holding furnace vessels is treated in four Peirce Smith converters. Three Peirce Smith converters are hot while the fourth is on stand-by mode or under maintenance. At any time, a maximum of two converters are being blown. In the converters the copper matte is oxidized in two sequential steps:

- Iron sulfides in the matte are oxidized with oxygen-enriched air and added silica, producing slag that is sent to the two slag cleaning rotary furnaces, where pig iron is used as the reducing agent
- Copper sulfides contained in the matte are then oxidized with oxygen-enriched air to produce blister copper, containing approximately 99.3% copper.

The off-gases are diluted and collected by water cooled hoods and conducted by the gas handling system to the acid plant. The gas handling system consists of evaporative cooling chambers, a manifold, two electrostatic precipitators, fans and ductwork connecting to the mixing duct.

14.5.5 Anode Refining and Casting

The blister copper is refined in two anode furnaces by oxidation to remove sulfur with compressed air injected into the bath. Finally, the oxygen content of the molten copper is adjusted by reduction with the injection of liquefied petroleum gas with steam into the bath. Copper anodes containing approximately 99.7% copper are cast in two casting wheels and transported by railroad to the Ilo refinery located around 10 km southeast of the smelter. The smelter can also produce blister copper bars when the anode furnaces are under brick repair.

The generated gases are oxidized in an oxidation/dilution chamber, cooled, and then cleaned in a baghouse.

The typical composition of copper anode produced at the Ilo smelter is provided in Table 14-3.

14.5.6 Acid Plants

The off-gases from the smelter are treated in two acid plants (No.1 and No.2) to recover over 92% of the incoming sulfur, producing sulfuric acid at a concentration of 98.5%. The gas stream from the smelter with a concentration of 11.3% SO2 is split between the two plants, both being double absorption and double contact. Approximately 16% of the acid produced is used at the Cuajone and Toquepala facilities with the balance sold to third parties.

In 2010, the Ilo smelter marine trestle started operations. This facility allows the direct loading of sulfuric acid onto ships, avoiding hauling cargo through the city of Ilo. The 500-m-long marine trestle was the last part of the Ilo smelter modernization project. Currently all overseas shipments of sulfuric acid are made using the marine trestle.

14.5.7 Oxygen Plant and Ancillary Systems

The oxygen required within the smelter processes is generated by two oxygen plants. Oxygen plant No. 1 has a capacity of 272 st/d and Plant No.2 has a capacity of 1,045 st/d.

Concentrates from the Cuajone and Toquepala Operations are relatively clean, so all the metallurgical dust generated is recycled to the Isasmelt furnace. Arsenic trioxide is added to the copper in order to meet the required quality of the anode which will allow the co-precipitation of antimony and bismuth together with arsenic during the electrorefining process at the Ilo refinery.

The smelter includes a seawater intake system, two desalination plants to provide water for the process, and an electric substation.

14.5.8 Equipment Sizing

A list of the major mechanical equipment in the Ilo smelter is presented in Table 14-4.

Table 14-3: Average Chemical Composition of Anodes Produced

Cu (%)	As (ppm)	Bi (ppm)	Sb (ppm)	O_2 (ppm)	S (ppm)	Pb (ppm)	Zn (ppm)
99.77	387	100	45	888	24	80	9

Table 14-4: Ilo Smelter, Major Mechanical Equipment and Operational Parameters

Function	Description	Units	Value
Isasmelt furnace	Dimensions (height x ID)	m x m	17 x 5.5
	Capacity	t/a	1,2000,000
	Availability	%	86.5
	Target matte grade	%	63
	Oxygen enrichment	% O_2	65-70
Rotary holding furnaces	Units	number	2
	Dimensions (dia. x length)	m x m	4.7 x 15.3
	Reducing agent	—	Pig iron
	Discard slag target (Cu)	%	1.0
Peirce Smith converters	Units	number	4
	Dimensions (dia. x length)	m x m	3.96 x 10.7
	Tuyeres (number and diameter)	No. / inches	48 / 2
	Enriched air flow	Nm^3/h	46,800
	O_2 enrichment – slag blow	% O_2	24
	O_2 enrichment – copper blow	% O_2	22
Anode fire refining furnace	Units	number	2
	Dimensions (dia. x length)	m x m	4.6 x 10.7
	Capacity (each)	t	400
	Casting wheels	model	Twin M18 Outokumpu
	Capacity	t/h	100
Converter slag treatment furnace	Units	number	2
	Dimensions (dia. x length)	m x m	3.96 x 10.97
	Reducing agent, consumption	—	Pig iron
	Discard slag target	% Cu	0.9
	Sulfuric acid plant No.1: off-gas treatment, SO_2	Nm^3/h, (%)	112,568 (12.8)
	Sulfuric acid plant No.2: off-gas treatment, SO_2	Nm^3/h, (%)	304,580 (11.7)
	Oxygen plant No.1 capacity	t/d	272
	Oxygen plant No.2 capacity	t/d	1,045

Function	Description	Units	Value
	Oxygen produced, purity	% O_2	95

14.5.9 Power and Consumables

Consumptions of utilities and other consumables are expected to be similar for the LOM as seen in recent operations.

14.5.9.1 Power

The Ilo smelter currently uses power sourced from the state company Electroperu S.A, (Electroperu), a private power generator, Kallpa Generation S.A., (Kallpa) and a small portion is hydro-generated at the Cuajone facilities. Power is distributed over a 224-km closed loop transmission circuit, which is interconnected with the Peruvian electrical network.

The 2021 annual power consumption of the Ilo smelter was 342,110.2 MWh. The oxygen and acid plants accounted for around 63% of the total consumption.

There is sufficient power capacity available to support the LOM plan.

14.5.9.2 Water

Fresh water is required at the smelter cooling system, smelter boiler, and acid plant process. The water is supplied from seawater desalination plants.

Water supplies are expected to be sufficient for the purposes of the LOM plan.

14.5.9.3 Consumables

Consumables used in the smelter include fuel, refractory bricks, silica flux, and arsenic trioxide.

The LOM plan envisages that the same consumables will be used for the duration of the LOM plan.

14.5.10 Personnel

Personnel numbers at the Ilo smelter total 355 persons for operations and 392 persons for maintenance. Maintenance personnel provides service for both the smelter and the Ilo refinery.

14.6 Ilo Refinery

14.6.1 Overview

The Ilo refinery is located in the Pampa de Caliche at 9 km north of the city of Ilo. The original plant design was built in 1975 by Minero Perú with a treatment capacity of 150,000 t of 99.95% pure electrolytic copper cathodes per year. The plant was acquired by Southern Copper in 1994 and modernized to produce 246,000 t/a of copper cathodes. It was subsequently expanded to the current annual capacity of 294,763 t/a of copper cathodes. The Ilo refinery has the capacity to produce 125,000 kg Ag, 840 kg Au, and 50,000 kg Se annually.

14.6.2 Flowsheet

The current flowsheet is included as Figure 14-4.

14.6.3 Electrolytic Plant

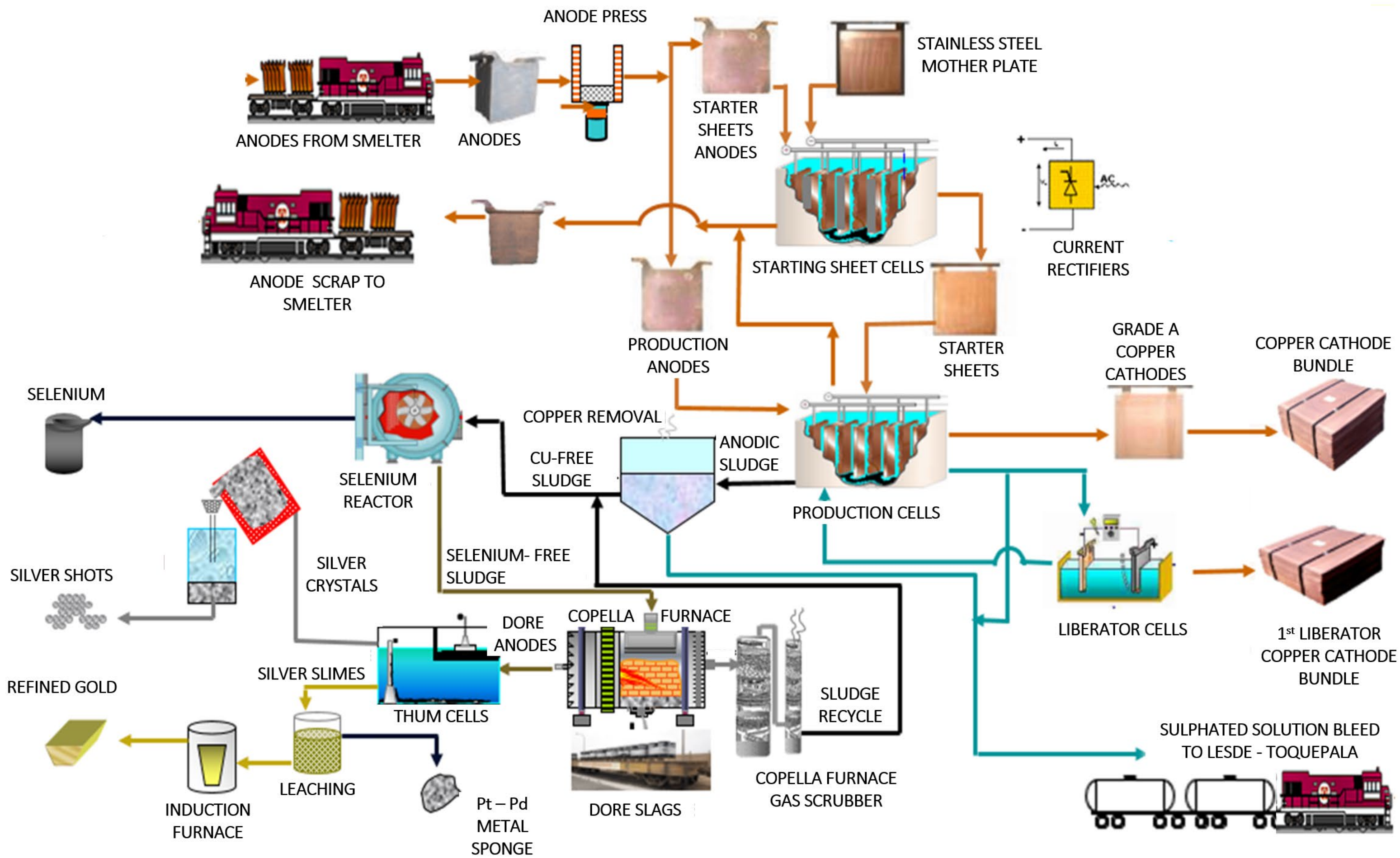
The anodes produced at the Ilo smelter are transported by rail to the Ilo refinery. After unloading they are pressed to improve their shape before being loaded to the electrolytic cells. The anodes are immersed in a cell contain copper sulfate and sulfuric acid in solution which serves as the electrolyte. By the action of electrical current the copper anode dissolves in the electrolyte and deposits on a cathode surface. This process produces cathodes with a 99.99% Cu content. Impurities such as arsenic, bismuth, antimony and sulfur are not deposited on the cathode and are eliminated in the electrolyte. Other valuable impurities such as gold, silver, platinum and selenium are recovered from the anode sludge in the precious metals plant.

The copper cathodes are produced in 996 commercial electrowinning cells including 52 starter cells in which starter cathode sheets are produced. Each commercial cell is loaded with 52 anodes of 435 kg and 53 starter cathodes of 7 kg. At the end of the electrorefining cycle, the cathodes are removed from the cells and rinsed in three stages: agitated hot water, high pressure hot water, and vapor rinse to eliminate sulfates from the surface of the cathodes.

Corroded anodes are rinsed at the end of the refining cycle using condensed hot water. Around 14% in weight of the total copper in anodes arriving at the refinery is returned to the smelter for recycling as corroded anodes.

In order to control the concentration of dissolved copper, a portion of the electrolyte is treated in the electrolytic liberator cells where insoluble anodes are used to produce cathodes of 99.99% Cu.

Figure 14-4: Summary Flowsheet Ilo Refinery



Note: Figure prepared by Southern Copper, 2021.

The anodic sludge produced in the electrolytic cells is received in settling tanks to separate it from the electrolyte, and then leached in oxidation tanks for 24 hr at 80º C with an aerated diluted acid solution to dissolve entrapped copper in the sludge. Copper-free sludge is then washed and centrifuged to obtain commercial anodic sludge with a moisture content of<14% and copper content of <2%. The commercial sludge is then sent to the precious metals plant for the recovery of silver, gold, selenium and small amounts of platinum and palladium.

To maintain the balance of impurities in the electrolyte, the resulting leach solution from the anodic sludge leaching is sent by rail to the Toquepala leaching plant.

The copper cathode production for 2021 was 260,177 t, and the average chemical composition is indicated in Table 14-5. The LOM cathode composition is expected to be similar to that shown.

14.6.4 Precious Metals Plant

The commercial anodic sludge is processed at the precious metals plant, with oxygen and sulfur dioxide, in an electric roaster oven to produce commercial selenium with a purity of 99.5%. Selenium-free sludge is then melted in a Copella furnace to produce doré anodes.

The doré anodes are placed on Thum cells for electro-refining, producing silver crystals and slimes. Produced silver crystals, with a purity of 99.99%, are melted in an induction furnace to generate commercial silver shot as a final product. The silver slime undergoes an acid digestion process to obtain gold dust that is then smelted to produce 99.99% pure gold bullion.

During 2021, the precious metals plant produced 123,950 kg Au, 215,762 g Au and 48,183 kg Se.

14.6.5 Equipment Sizing

The major mechanical equipment in the Ilo refinery is summarized in Table 14-6.

14.6.6 Power and Consumables

14.6.6.1 Power

The Ilo refinery uses the same power sources and network as outlined in Chapter 14.5.9.1. LOM requirements are estimated at an average 95 MW/a. The majority of the power requirement is from the electrolytic plant.

Table 14-5: Average Cathode Chemical Composition

Cu (%)	Ag (ppm)	Se (ppm)	Ni (ppm)	Pb (ppm)	Fe (ppm)	S (ppm)	Bi (ppm)	Sb (ppm)	As (ppm)	Te (ppb)	Zn (ppm)
99.998	10	0.01	0.01	0.01	0.01	5	0.01	0.01	0.01	0.01	0.01

Table 14-6: Ilo Refinery Major Mechanical Equipment and Design Parameters

Area	Description	Units	Value
Anodes	Commercial anode weight (per unit)	kg	435
	Commercial anode area (avg.)	m^2	0.855
	Stripper anode weight (per unit)	kg	445
	Dissolved anodes	t/d	810
	Composition: copper	%	>99.6
	Composition: oxygen	ppm	500–1,300
	Composition: sulfur	ppm	<45
	Composition: arsenic	ppm	280–550
Electrowinning cells – commercial and starter sheets	Number of cells	Units	996
	Anodes per cell	Units	52
	Cathodes per cell	Units	53
	Cathode starting weight	kg	7
	Electrolyte flow per cell	L/min	25
	Electrolyte total flow	m^3/hr	1494
	Current intensity	A	29,400
	Current density	A/m^2	277
	Current efficiency	%	97.5
Liberator electrowinning cells	Number of cells	Units	24
	Electrolyte flow per cell	L/min	25
	Electrolyte total flow	m^3/hr	60
	Current intensity	A	14,500
	Current density	A/m^2	137
	Current efficiency	%	95
Electrolyte composition	Copper	g/L	41–45

Area	Description	Units	Value
	Sulfuric acid	g/L	167–173
	Arsenic	g/L	7.5–10.5
	Antimony	g/L	≤0.45
	Bismuth	g/L	≤0.4
Cathode production and composition	Copper cathodes	t/a	294,763
	Cathode weight per unit	kg	180 ± 30
	Cathode length x width	m x m	1.02 x 1.02
	Copper	%	>99.99
	Silver	ppm	<20
	Sulfur	ppm	<10
Precious metals plant	Sludge treated	t/a	460
	Sludge composition: copper	%	<2.5
	Sludge composition: moisture	%	≤14.5
	Selenium electric oven – capacity	t/hr	2.6
	Copella oven – capacity	dry t/batch	10.2
	Silver refining cells	Units	27
	Silver refining cells current density	A	150
IDE Aquaport desalination plant		m^3/day	1,000
Steam system	Gonella	t/hr	20
	Cleaver & Brooks	t/hr	20
Rectifier commercial cells	Westinghouse (450 VDC)	KA	2 x 15
	Friem (460 VDC)	KA	2 x 20
Rectifier liberator cells	Friem (120 VDC)	KA	2 x 20

For 2021, the annual power consumption in the Ilo refinery was 91,281.96 MWh, and the electrolytic plant accounted for around 89% of the total consumption.

There is sufficient power capacity available to support the LOM plan.

14.6.6.2 Water

All water consumed in the Ilo refinery is desalinated seawater. For this purpose, the refinery has a desalination plant with a nominal capacity of 1,000 m^3 of treated water per day.

Water supplies are expected to be sufficient for the purposes of the LOM plan. Water consumption is expected to be in line with previous operating experience.

14.6.6.3 Consumables

Consumables used in the refinery include animal glue, thiourea, hydrochloric acid, and sulfuric acid. The precious metals plant uses diesel, sodium carbonate, sodium nitrate, borax, calcium carbonate, anthracite, nitric acid, hydrochloric acid, sulfur dioxide, and oxygen.

The LOM plan envisages that the same consumables will be used for the duration of the LOM plan.

14.6.7 Personnel

The personnel count for the Ilo refinery totals 221 persons for operations and 392 persons for maintenance. Maintenance personnel provides service for both the refinery and the Ilo smelter. Personnel numbers are expected to remain the same for the LOM.

15 INFRASTRUCTURE

15.1 Introduction

On-site infrastructure that supports the Cuajone Operations include:

- One open pit
- Four WRSFs
- Two oxide stockpiles
- Four leach pads
- Process facilities including concentrator and SX/EW
- Warehouses, workshops, and offices
- 138 kV and 220 kV power transmission lines
- Electrical substation and power distribution system
- Water handling facilities
- Permanent camp for operations
- Railway and rail yard.

Off-site infrastructure includes:

- Access road
- 138 kV and 220 kV power transmission lines
- Electrical substations and power distribution systems
- Railway
- Quebrada Honda TSF
- Water supply system
- Smelter, refinery and sulfuric acid plants in Ilo
- Port facilities in Ilo including dock and storage areas, rail yard, and wagon repair shop
- Port facilities in Tablones, where hydrocarbons and sulfuric acid are unloaded and sent to the mine site

- Simón railway yard, which has assembly and dispatch areas, as well as workshops and offices.

Additional key infrastructure required in the LOM plan to support operations includes a new TSF once the current TSF has reached capacity.

A layout plan showing the final configuration of the open pit and the WRSFs is shown in Figure 15-1.

15.2 Roads and Logistics

The Toquepala and Cuajone Operations, together with the Ilo smelter and refinery, are connected by a network of public roads and a private railway that is operated by Southern Copper.

15.2.1 Road

The Cuajone Operations are accessed from the city of Moquegua via the PE-36 South Interoceanic Highway, then along the Cuajone Road until the intersection with the mine access route at the mine gate. From Arequipa, the Pan-American Highway and the 34C highway are followed to Moquegua, and then via the same route from Moquegua to the mine site.

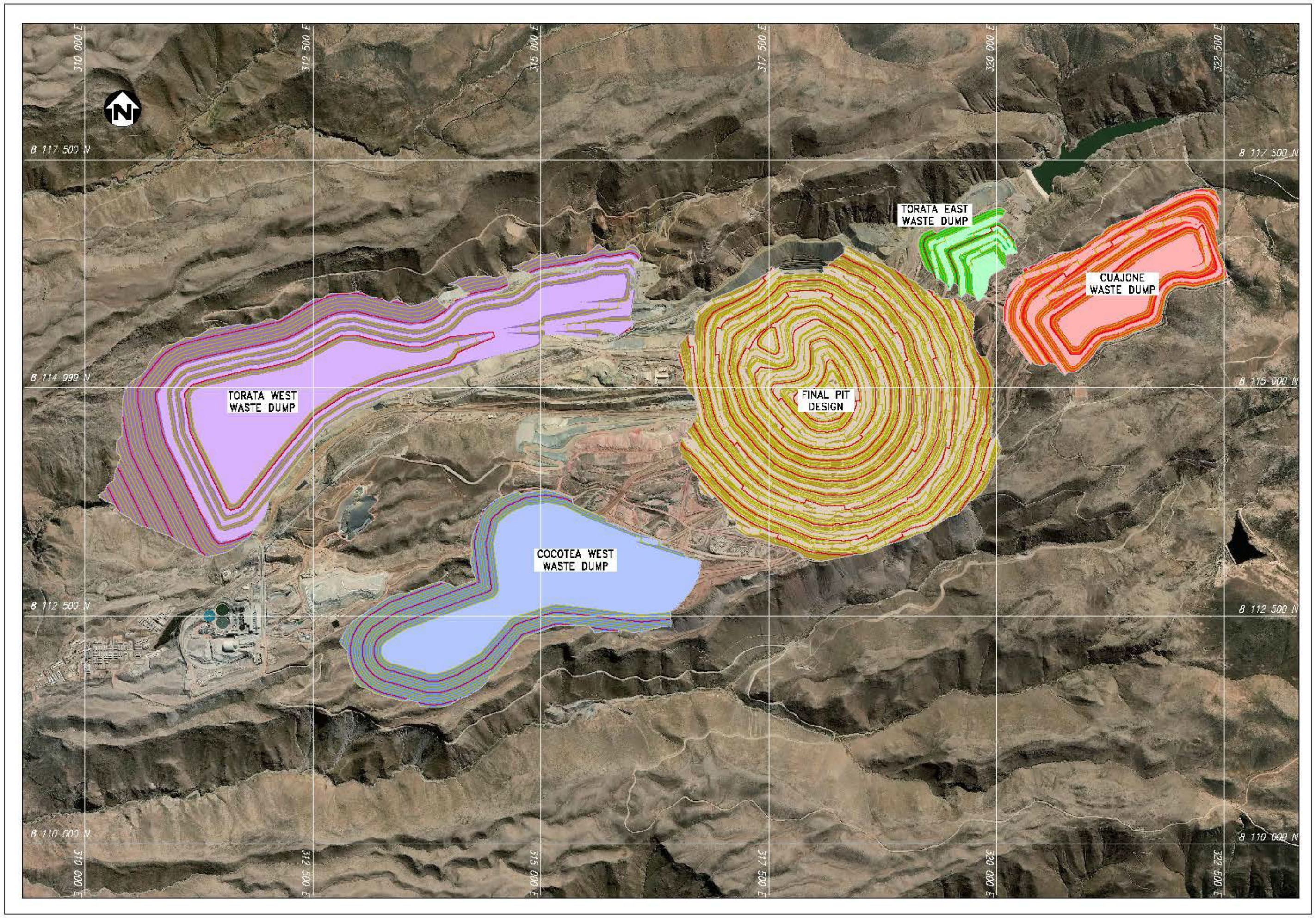
The Quebrada Honda TSF is about 120 km via local roads, south of the Cuajone Operations. It is accessed via the departmental road MO-107 from the town of Camiara, or via departmental roads MO-105 and MO-107. The Quebrada Honda TSF is approximately 47 km due south of the Cuajone Operations.

Personnel are transported to the mine site via the Cuajone road from the Villa Cuajone and Villa Botiflaca camps.

15.2.2 Rail

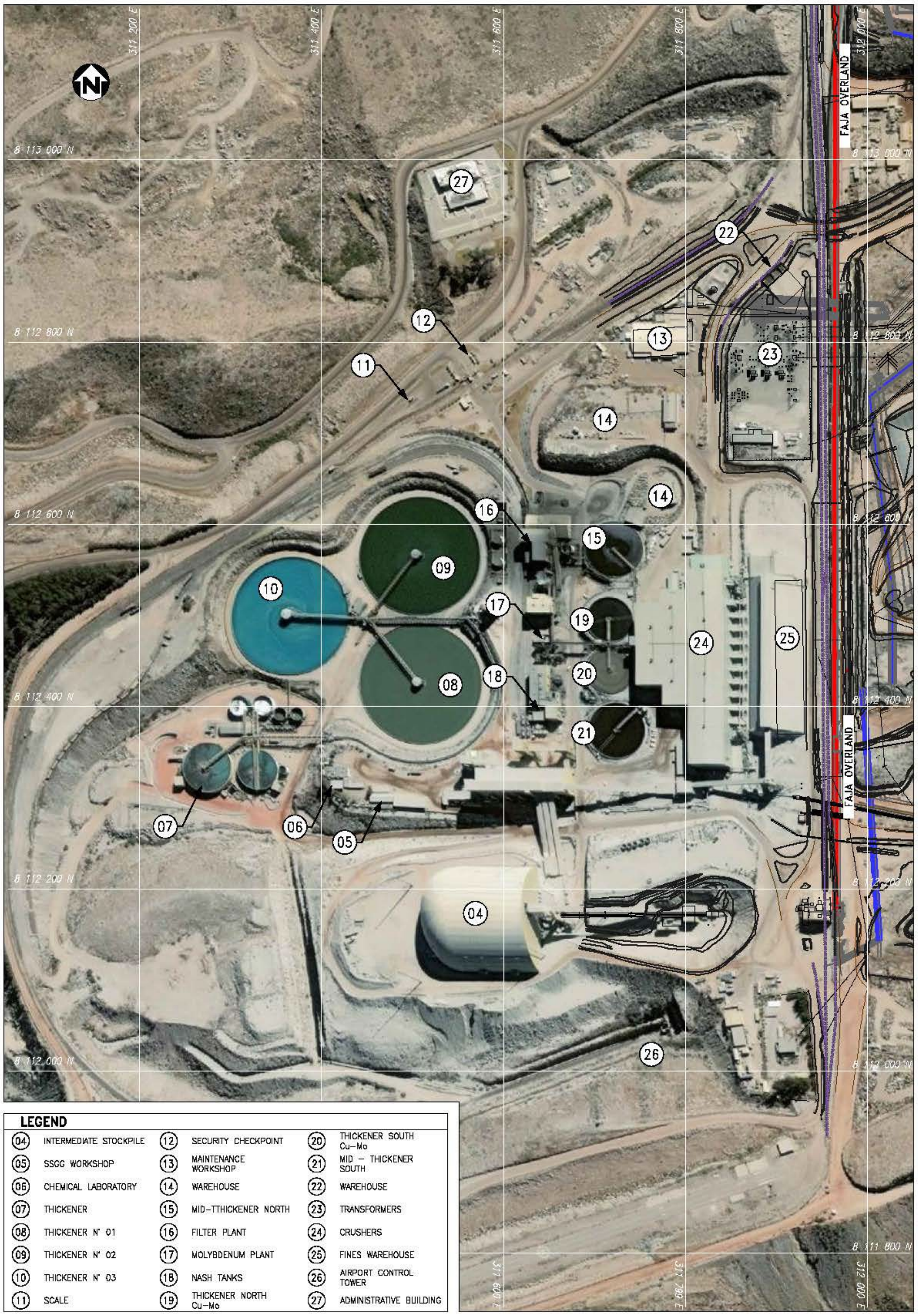
Railways extend from Ilo to Southern Copper's Toquepala Operations, and a spur railway runs from the Toquepala Operations to the Cuajone Operations. Supplies such as sulfuric acid, equipment, fuel, and mining supplies are transported to the operations using the rail network. Concentrates are railed from the mine site to the Ilo smelter/refinery, and cathodes produced at the refinery are railed to the Port of Ilo.

Figure 15-1: Open Pit and WRSF Layout Plan



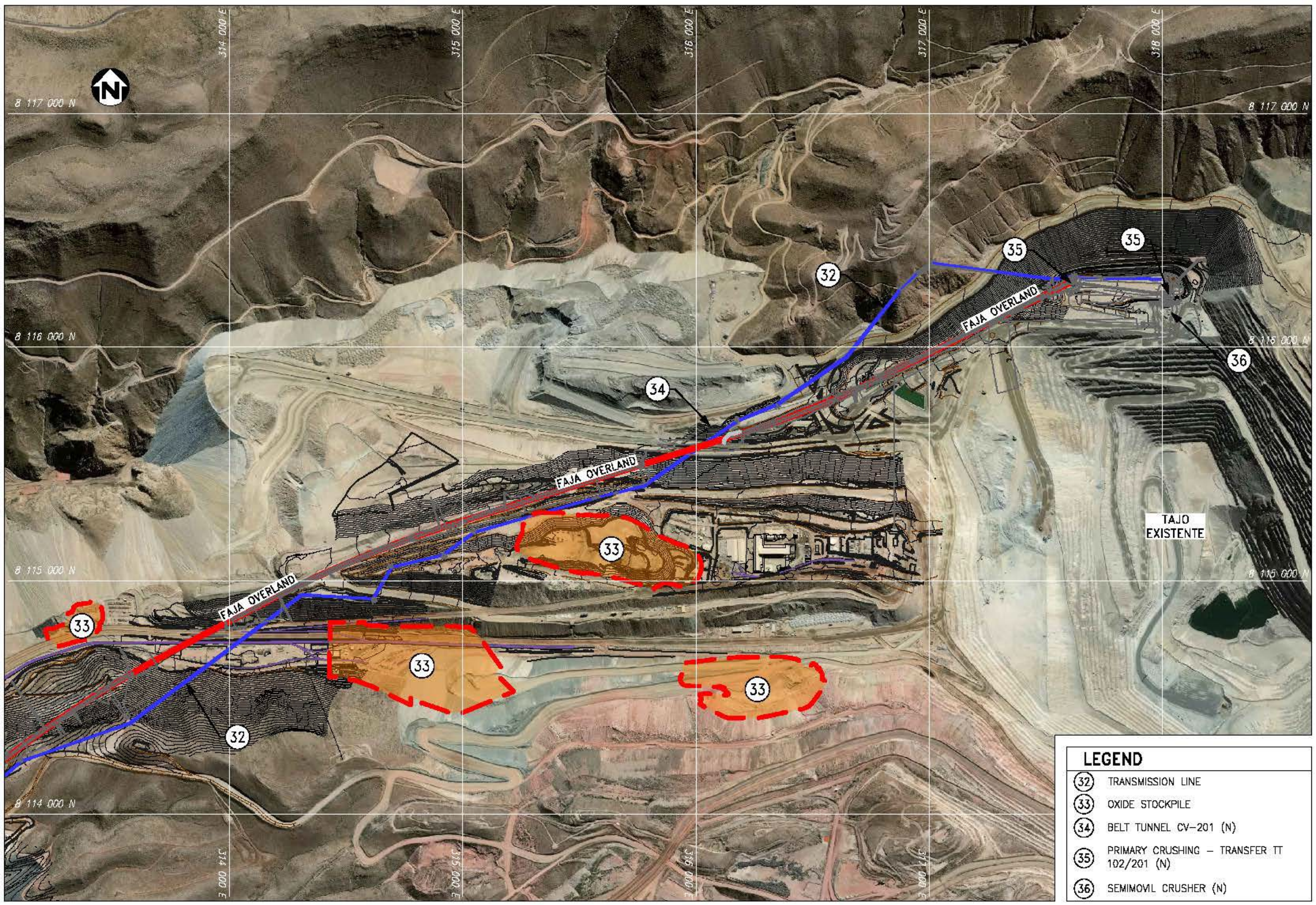
Note: Figure prepared by Wood, 2021.

Figure 15-2: Plant Infrastructure



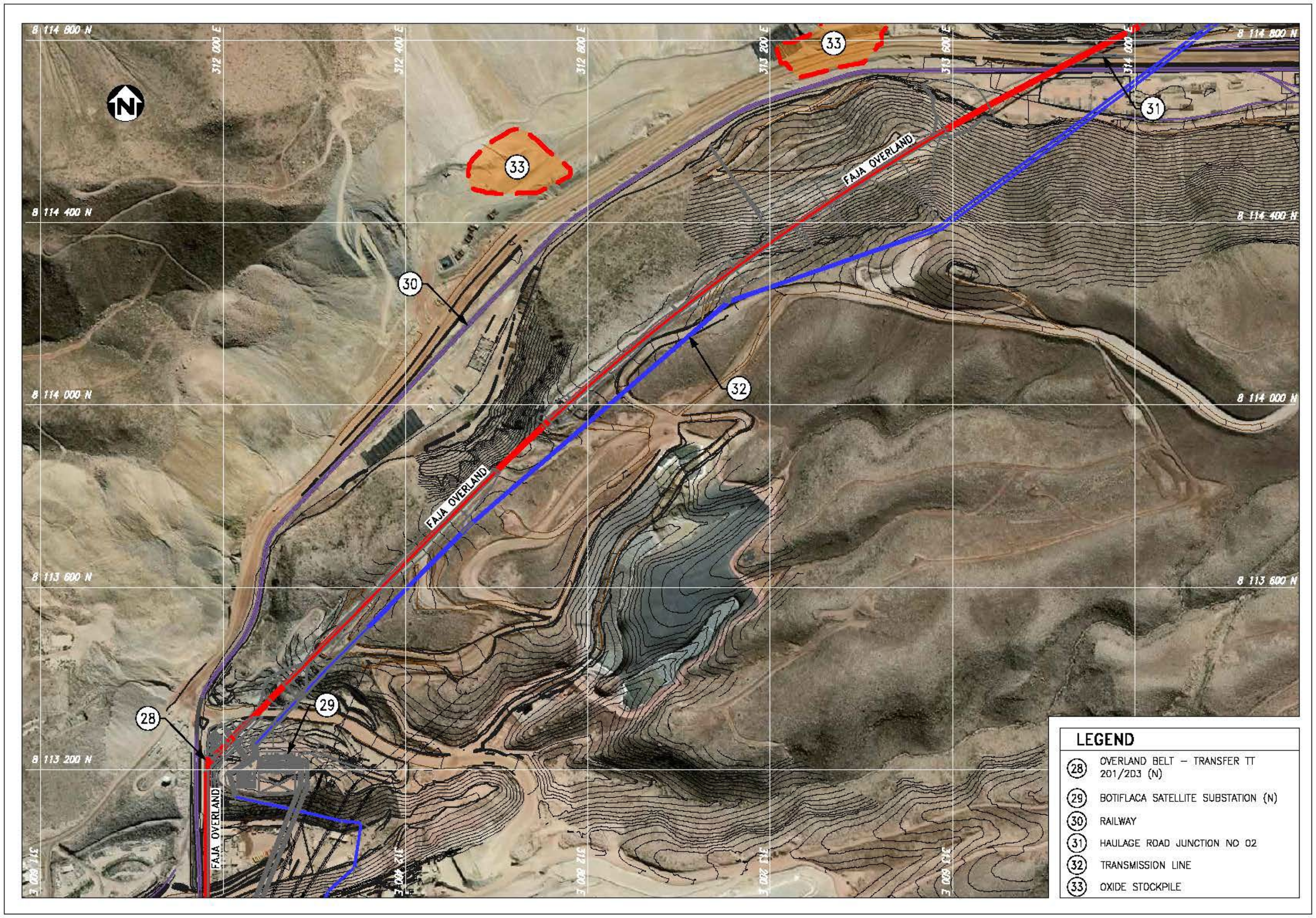
Note: Figure prepared by Wood, 2021. Faja = belt conveyor.

Figure 15-3: Overland Conveyor, Crusher and Stockpile Infrastructure



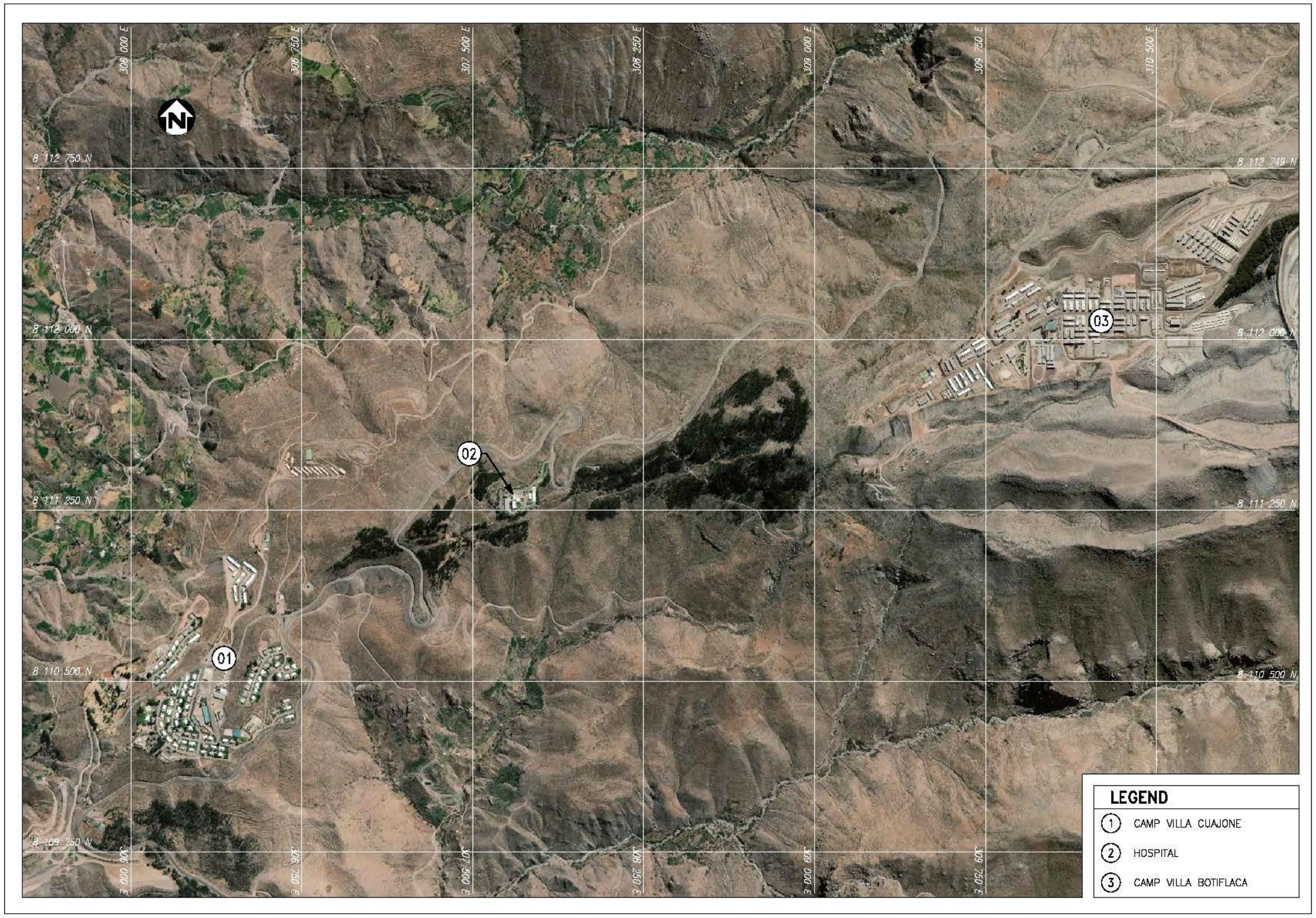
Note: Figure prepared by Wood, 2021. Faja = belt conveyor. Tajo existente = existing pit.

Figure 15-4: Overland Conveyor, Railway and Stockpile Infrastructure



Note: Figure prepared by Wood, 2021. Faja = belt conveyor.

Figure 15-5: Accommodations Infrastructure



Note: Figure prepared by Wood, 2021.

A railway yard that supports both the Toquepala and Cuajone Operations is located at Botiflaca, and provides maintenance facilities for light rail equipment and locomotives. In addition, the yard is used to assemble and dispatch of trains from the mill site and Botiflaca areas and has offices for train operations and track maintenance staff.

The Simón rail yard near the Port of Ilo includes a train assembly yard and train dispatch areas, balance-weighing of concentrates, anodes, blister, cathodes and loads, one diesel fuel tank for refueling locomotives, a locomotive workshop, and a train operations office.

15.2.3 Port

The Port of Ilo is a private port, operated by Southern Copper. It has two berths, and can take vessels to 40,000 deadweight. The port is the export point for copper cathodes, copper concentrate, sulfuric acid and molybdenum; and the import location for general containerized and loose cargo to support operations. Supporting the port is a 182 m-long pier, breakwater, offices storage terminals, warehouses and laydown areas, storage tanks and pipelines, spill containment infrastructure, enclosure fencing, and an operations control center.

The Tablones port terminal is located 15 km north of the Port of Ilo, and consists of two facilities:

- Marine trestle facility used to load sulfuric acid. The facility can accommodate a ship mooring capacity of up to 37,000 deadweight, and is 11 m deep and 180 m long
- Multiple buoy facility used to unload hydrocarbons. The facility can accommodate a tanker mooring capacity of up to 70,000 deadweight, and is 13 m deep and has a submarine pipeline that is 600 m long.

Supporting the port is an access road; enclosure fencing; a marine rock wall; an electrical power system that supplies 13.8 kV; spill containment infrastructure; hoses, pipes and cranes for product loading; mechanical equipment including plant and instrumentation air; and an operations center.

15.3 Stockpiles

ROM oxide ore is stored in two stockpiles located between the open pit and the leaching plant for further processing in the crushing/leaching plant.

15.4 Waste Rock Storage Facilities

The Cuajone Operations use four WRSFs (Table 15-1).

Table 15-1: Waste Rock Storage Facilities

Facility	Description
Torata Oeste	Located west and downstream of the Cuajone pit. Construction commenced in 1999. Remaining capacity is 1,634,085,931 m^3.
Torata Este	Located between the Torata river basin, upstream of the Cuajone pit and downstream of the Torata river dam. Construction commenced in 1976_. Remaining capacity is 32,693,629 m^3.
Cuajone	Located upstream of the Cuajone pit on the downstream ridge of the Cuajone Creek basin and the Chuntacala dam. Construction commenced in 1976. Remaining capacity is 290,665,923 m^3.
Cocotea	Located upstream of the Cuajone pit on the ridge between the Torata river basin and the Cocotea Creek basin. Construction commenced in 1976. Remaining capacity is 463,000,000 m^3.
1–5	Located downstream of the Cuajone pit, and is inactive.

The WRSF capacities are sufficient to support the LOM plan.

Southern Copper, however, is reviewing the potential to co-stack (dry-stack) tailings and waste rock, whereby filtered tailings would be co-disposed with waste rock at on-site facilities in order to provide additional tailings storage capacity once the existing Quebrada Honda TSF reaches its ultimate storage capacity in approximately the end of 2035. Under this scenario, additional areas would be required to allow WRSF expansion outside Southern Copper's current surface rights area. Southern Copper is of the opinion that the company will have sufficient time to acquire the necessary surface rights, as well as the respective permits and/or assignment of the mining concessions to support WRSF expansions. Land acquisition costs as provision for waste and tailings management space were included in the economic analysis in Chapter 19.

15.5 Tailings Storage Facilities

The Quebrada Honda TSF is the repository for tailings from the Toquepala and Cuajone Operations. It is situated southwest of the Toquepala Operations and south of the Cuajone Operations. Tailings deposition commenced in December 1996. When built the facility had a total ultimate capacity of 2,347 Mt. The remaining capacity is 1,050 Mt, which is sufficient to support about 14 years of production, from 2022–2035, based on the current production rates at the Toquepala and Cuajone Operations.

The TSF operates as a cross-valley impoundment and is confined by two dams constructed of compacted cyclone tailings sand. Among them, the main dam, located southwest of the impoundment, is being raised with the downstream construction method; and the lateral dam, located southeast of the impoundment is being raised with the center-line construction method. Tailings are discharged into the impoundment via steel and HDPE pipelines, and the resulting cyclone tailings sand is spread out over the cell (paddock) using graders. The tailings are further flattened using vibratory smooth rollers to achieve a minimum of 98% and 95% compaction (standard Proctor) for the main and lateral dams, respectively. The tailings supernatant pond is located at the north end of the impoundment away from the two dams where water is reclaimed and transported back to the process plant.

Additional tailings storage capacity will be required after approximately the end of 2035, see discussion in Chapter 18.2.1.

The former Ite tailings disposal area was located on a narrow coastal plain in southern Peru, approximately 50 km southwest of the port of Ilo. Tailings from Toquepala and Cuajone process plants were discharged into Ite Bay from 1959–1996. The Plan for Environmental Management and Adjustment (PAMA in the Spanish acronym) was completed in 1997, and covers rehabilitation.

15.6 Water Management Structures

The Cuajone mine is in a dry area with minor rainfall and surface runoff during the months of January to March. The surface drainage system, consisting of channels, ditches, retention ponds, evaporation ponds, and storage ponds, is used to divert rainwater away from the open pit and WRSFs.

No waters are discharged from the operations as no mining effluents are generated at the mine site. At Quebrada Honda, Southern Copper is authorized to dispose of decanted water from the tailings.

Water from the TSF is used in the process plant, following treatment in a neutralization facility.

The coarse ore stockpile and WRSFs use drainage channels for contact water management. The collected water is sent to a water treatment plant prior to discharge or use in the plant.

15.7 Built Infrastructure

All major infrastructure required for the LOM plan is built and operational.

15.8 Camps and Accommodation

Collectively, the Toquepala and Cuajone Operations, together with the Ilo smelter/refinery complex, have five accommodations areas that provide a permanent accommodation capacity of 4,756 persons. Temporary modular accommodation has the capacity to accommodate an additional 946 personnel.

The Cuajone Operations have two accommodations/village areas, Villa Cuajone and Villa Botiflaca, located to the west of the concentrator. These provide for residential requirements and have a hospital, schools, churches, markets, and a police presence.

15.9 Power and Electrical

The energy supply for the Cuajone Operations comes from the National Interconnected Electric System (SEIN), primarily from natural gas-fired thermal power plants located in the Chilca–Lima district of Peru, and Puerto Bravo in Mollendo and from the Antunez de Mayolo and Cerro del Aguila hydroelectric power plants.

Power is transmitted to the Southern Copper facilities in transmission networks of 500, 220 and 138 kV, using two Southern Copper-owned transmission lines of 138 kV (225 km long) and 220 kV (240 km long). The 138 kV line from Ilo is the primary source of power for the Cuajone Operations. Power is stepped down using a series of sub-stations, and distributed to the areas and equipment requiring electricity.

The Ilo facilities are supported by 564 MW of power supplied by SEIN, and 564 MW of gas reserve power from the southern Peru gas pipeline.

Southern Copper has an energy supply contract with the companies Kallpa and Electroperú and a maintenance contract for the transmission lines owned by Southern Copper and the main substations that are reported to Peru's *power* grid coordinator, Comité de Operación Económica del Sistema Interconectado Nacional (COES).

Electro Integra was retained to prepare a "Master Plan for Energy of the Three Operating Areas of Southern Copper" (the Toquepala and Cuajone Operations and the Ilo smelting/refining complex) to guarantee the energy supply for current operations and to establish competitive energy costs. Southern Copper has developed a "Comprehensive Plan to Address Power Cuts in the Southern Copper System" to address potential future brown-outs or power losses from the national grid.

15.10 Water Supply

Fresh water for the mine and process facilities is obtained from both ground and surface sources:

- Titijones, Huaitire and Vizcachas groundwater wells

- Suches lagoon
- Tacalaya and Honda streams.

Water is transported by a network of pipelines to the operations, where it is stored in the Viña Blanca reservoir, located 14 km from the Cuajone open pit. The reservoir has a storage capacity of 6 Mm^3, sufficient for a week of operations, in the event of an interruption in the upstream pipeline system. Pipelines from the reservoir can discharge 951 L/sec on average for use by the concentrator and other facilities.

Hydro 1, a hydroelectric power plant is powered by water from Titijones and discharges to Viña Blanca reservoir that also serves as a gravity flow compensation tank for the No.2 hydroelectric plant. Water is sent to the hydroelectric plant via an approximately 14 km long pipeline.

16 MARKET STUDIES

16.1 Markets

16.1.1 Copper

Copper futures are exchange-traded contracts on all of the world's major commodity exchanges. Copper is the world's third most widely used metal after iron and aluminum and is primarily consumed in industries such as construction and industrial machinery manufacturing.

The Cuajone Operations produce copper concentrates and copper cathodes.

Southern Copper provided Wood with an overview of the copper market as sourced from third-party experts, Wood Mackenzie, which was dated June, 2021. The report provided information on the copper market out to 2040, and covered information such as copper price forecasts, scenario modelling, demand in detail, and supply in detail.

These data support that there is a reasonable basis to assume that the key products will be saleable at the assumed commodity pricing for the LOM plan.

16.1.2 Molybdenum

Molybdenum is mainly used as an alloying agent in stainless steel, and also in the manufacture of aircraft parts and industrial motors. The biggest producers of the metal are: China, United States, Chile, Peru and Mexico. Molybdenum futures are available for trading in The London Metal Exchange (LME). Prices are generally determined by principal-to-principal negotiations between producers, trading houses, and end users.

The Cuajone Operations produce molybdenum concentrates.

16.1.3 Gold and Silver

Gold and silver is sold as contained in the copper concentrate and not as a separate product from the mine.

16.2 Market Strategy

Southern Copper employs a corporate strategy that is in line with the company's marketing experience, and experience with obtaining long-term contracts with strategic business partners in the Asian and European markets, as well as annual contracts with other active market participants.

Normally over 60% of the molybdenum concentrate is sold to Chile, with the remainder sold into the Northern Europe, Asia and the US markets.

Cathode copper is sold onto the Asian, European, Brazilian and/or North American markets.

16.3 Product Marketability, Cuajone Operations

The principal product specifications require copper concentrates to be free from radioactivity. Deleterious impurities harmful to smelting and/or refining processes, are based on the China Inspection and Quarantine Services limit specifications for the import of copper concentrates into China as follows:

- Pb ≤6.0%
- As ≤0.5%
- F ≤0.1%
- Cd ≤0.05%
- Hg ≤0.01%.

The principal payable commodities within the concentrates from the Cuajone Operations are copper, gold, silver, and molybdenum. Table 16-1 summarizes the average constituents of a copper concentrate batch from the Project. Table 16-2 summarizes the average constituents of a molybdenum concentrate batch from the Project.

16.4 Product Marketability, Ilo Smelter

The cathodes, anodes, and by-products produced at the Ilo smelter and refinery are readily marketable. The principal payable commodities are copper, silver, and gold.

Table 16-1: Copper Concentrate Quality

	Cu (%)	Ins (%)	Fe (%)	Mo (%)	CuS Ac (%)	CuS CN (%)
Minimum	23.690	9.180	20.390	0.027	0.200	1.770
Maximum	36.150	13.660	28.890	0.157	0.580	5.350
Average	25.026	11.62	26.879	0.073	0.341	2.876
	Ca (%)	**Zn (%)**	**S (%)**	**SiO_2 (%)**	**Al_2O_3 (%)**	**FeSAc (%)**
Minimum	0.194	0.535	27.700	6.936	1.190	0.290
Maximum	0.358	1.306	36.810	11.460	3.450	0.740
Average	0.253	0.780	31.100	9.138	2.524	0.495
	Pb (%)	**K (%)**	**Ni (%)**	**Co (%)**	**Mn (%)**	**Mg (%)**
Minimum	0.079	0.008	0.002	0.003	0.005	0.025
Maximum	0.283	0.102	0.009	0.012	0.027	0.283
Average	0.143	0.026	0.003	0.007	0.016	0.158
	As (%)	**Na (%)**	**Ag (g/t)**	**CO_3 (%)**	**Cl- (ppm)**	
Minimum	0.040	0.012	79.8857	0.520	0.444	
Maximum	0.228	0.037	138.5142	1.730	9.860	
Average	0.083	0.020	104.5714	1.019	3.956	

Table 16-2: Molybdenum Concentrate Quality

	Cu (%)	Ins (%)	Fe (%)	Mo (%)	CuSAc (%)	CuSCN (%)
Minimum	0.509	1.790	1.480	51.822	0.001	0.037
Maximum	1.800	5.200	3.970	55.951	0.026	0.819
Average	0.852	2.382	2.383	54.022	0.011	0.225
	Ca (%)	**Zn (%)**	**S (%)**	**SiO_2 (%)**	**Al_2O_3 (%)**	**FeSAc (%)**
Minimum	0.118	0.022	30.990	1.410	0.210	0.020
Maximum	0.389	0.131	42.770	4.840	1.040	0.110
Average	0.190	0.044	38.411	2.702	0.550	0.047
	Pb (%)	**K (%)**	**Ni (%)**	**Co (%)**	**Mn (%)**	**Mg (%)**
Minimum	0.036	0.001	0.001	0.001	0.001	0.009
Maximum	0.087	0.018	0.006	0.050	0.096	0.106
Average	0.051	0.006	0.002	0.006	0.011	0.070
	As (%)	**Na (%)**	**Ag (g/t)**	**CO_3 (%)**	**Cl- (ppm)**	
Minimum	0.004	0.009	2.5714	0.190	0.820	
Maximum	0.032	0.035	139.8857	0.930	8.545	
Average	0.012	0.020	28.6971	0.470	2.671	

Copper cathodes average:

- Copper: >99.99%
- Silver: <20 ppm
- Sulfur: <10 ppm
- Impurity levels: <1 ppm
- Weight: 180 ± 30 kg/cathode.

Copper anodes average:

- Copper: >99.6%
- Oxygen: 500–1,300 ppm

- Sulfur: <45 ppm
- Arsenic: 280–550 ppm
- Antimony: <90 ppm
- Bismuth: ≤255 ppm
- Lead: <190 ppm
- Zinc: <30 ppm.

Silver averages:

- Shot: 99.99% Ag.

Gold averages

- Bars: 99.99% Au.

Selenium averages

- Commercial: 99.00% Se.

16.5 Commodity Pricing

To establish the copper price forecasts Wood used a combination of information derived from 22 financial institutions, from pricing used in technical reports filed with Canadian regulatory authorities over the previous 12-month period, from pricing reported by major mining companies in public filings such as annual reports in the previous 12-month period, spot pricing, and three-year trailing average pricing. Wood considers that a long-term price forecast of US$3.30/lb Cu is reasonable.

It is in accordance with industry-accepted practice to use higher metal prices for the mineral resource estimates than the pricing used for mineral reserves. The copper price forecast of US$3.30/lb was increased by 15% to provide the mineral resource estimate copper price estimate of US$3.80/lb.

Wood reviewed the Southern Copper long term forecast price for molybdenum of US$9.00/lb, and concluded that the molybdenum price selected by Southern Copper is reasonable and conservative compared to what others have recently been using in the industry. Wood considers there is a reasonable probability that the realized price of molybdenum will be at or higher than forecast US$9.00/lb over the projected LOM. The Southern Copper molybdenum price forecast of US$9.00/lb was increased by 15% to US$10.35/lb to provide the input to the mineral resource constraining pit shell and NSR cut-off.

The forecasts used are:

- Mineral resources
  - Copper: US$3.80/lb;
  - Molybdenum: US$10.35/lb
- Mineral reserves:
  - Copper: US$3.30/lb;
  - Molybdenum: US$9.00/lb

Cashflows use the mineral reserves price forecasts.

The exchange rate for cashflow analysis purposes was US$1.00 = PENS/3.60. This exchange rate was provided by Southern Copper.

16.6 Contracts

Cuajone Operations concentrates are sent to the Ilo Smelter and Refinery for processing to produce refined cathodes. When the production from the Cuajone Operations exceeds the smelter's capacity, a portion is sold to third parties. In recent years, these sales to third parties Cuajone Operations concentrates have represented about 20–25% of the annual production. Approximately 95% of the production of refined cathodes is sold under annual contracts with industrial customers (mainly copper rod producers), with whom Southern Copper has had a commercial relationship for many years, and about 5% is sold on the spot market.

The largest in-place contracts other than for product sales cover items such as bulk commodities, operational and technical services, mining and process equipment, and administrative support services. Contracts are negotiated and renewed as needed.

Contract terms are typical of similar contracts that Southern Copper has entered into in Peru.

17 ENVIRONMENTAL STUDIES, PERMITTING, AND PLANS, NEGOTIATIONS, OR AGREEMENTS WITH LOCAL INDIVIDUALS OR GROUPS

17.1 Introduction

The Cuajone Operations commenced prior to any formal environmental laws being enacted in Peru. Southern Copper's operations are now subject to applicable Peruvian environmental laws and regulations. The Peruvian government, through MINAM, conducts annual audits of Peruvian mining and metallurgical operations. Through these environmental audits, matters related to environmental obligation, compliance with legal requirements, atmospheric emissions, effluent monitoring and waste management are reviewed. Southern Copper advised Wood that it is in material compliance with applicable Peruvian environmental laws and regulations. Peruvian law requires that companies in the mining industry provide assurances for future mine closure and remediation. In accordance with the requirements of this law, Southern Copper's closure plans were approved by MINEM.

On August 4, 1995, the combined Cuajone and Toquepala Operations submitted an EIA for the Cuajone–Toquepala Integrated Leaching Project, which was approved by Report No. 354-95-EM-DGM/DPDM. The Environmental Adequacy and Management Program for the Toquepala and Cuajone mining units and the Ilo processing plan was approved in 1997. In 1998, two EIAs were submitted, one for expansion of the Toquepala deposit and the second for flood control in the Torata River. The initial Cuajone Mine Closure Plan was submitted in 2008 with the first and second updates submitted in 2019.

Supporting technical reports for component modification projects for the Cuajone Operations were submitted in 2016, 2019, and 2021.

17.2 Baseline and Supporting Studies

Baseline studies were completed prior to mine start-up, and included assessments of air quality, noise, vibrations, water and sediment quality, flora and fauna surveys, and the human environment.

Baseline and supporting studies were completed in support of Project permitting, together with development of management plans to address major impacts. These included environmental impact assessments, environmental management plans, evaluation of flood controls on the Torata River, archaeological surveys, and closure planning.

The EIAs included an environmental management plan to mitigate potential impacts on water quality, biological resources, and socioeconomics. The EIAs were supported by supplemental technical reports that identified updated technologies and modifications to be implemented to complement actions identified in the original environmental management plan.

Southern Copper has been issued no Certificates of Non-existence of Archaeological Remains for the Cuajone Operations, because at the time the operations were permitted, there were no regulations requiring such certification. The first regulation on archaeological investigations was issued in January 2000 by Supreme Resolution N° 004-2000-ED, after approval of the Cuajone mining permits.

17.3 Environmental Considerations/Monitoring Programs

As per permit requirements, Southern Copper has a number of monitoring programs in place, and monitors surface water, ground water and air quality in accordance with commitments made in the Environmental Management and Adjustment Plan, Environmental Impact Study, Closure Plans and updates to those plans and studies.

17.4 Closure and Reclamation Considerations

The Mine Closure Plan for the Cuajone Operations was approved in 2009, and modifications were approved in 2012 and 2019.

Closure plans cover temporary, progressive and final closure stages, and post-closure maintenance and monitoring. The overall objective is to ensure that the final configuration of the facilities at closure is physically, chemically and hydrologically stable over the long term.

Closure costs are included in the mine site financial model as cash costs on an annual basis.

The closure plan for the Cuajone Operations was developed in 2019 and totals US$242 M:

- Progressive closure: US$114.7 M
- Final closure: US$124.6 M
- Post-closure: US$2.7 M.

Closure costs are inclusive of the Peruvian general sales tax.

For the economic analysis in Chapter 19, Wood assigned a proportional closure cost for the Quebrada Honda TSF, based on the LOM production plan for the operations and the tailings generated from this plan that require storage. This cost was estimated at US$9.9 M.

The economic analysis uses a total US$251.8 M closure estimate.

17.5 Permitting

The Toquepala Operations and the Ilo smelter/refinery have all of the required permits to operate (Table 17-1 and Table 17-2).

Additional permitting will be required to allow construction and operation of the dry-stack facility that is assumed to be used once the Quebrada Honda TSF capacity is reached in approximately the end of 2035. There is sufficient time for Southern Copper to obtain the required permits and authorizations prior to that date.

The operations maintain a permit register, which includes a record of the legal permits obtained, the approval authority, permit validity period and expiration dates, permit status (current, canceled or replaced) and whether or not the permit requires renewal. The operations also have a control and monitoring system to ensure that the requirements of each permit are monitored to comply with the relevant regulatory conditions imposed.

17.6 Social Considerations, Plans, Negotiations and Agreements

The area of direct Project influence was identified as the de Torata district. The area of indirect influence was identified as including the districts of Samegua, Moquegua, Carumas, Cuchumbaya and San Cristóbal de Calacoa (in Mariscal Nieto province); and, Omate, Puquina, Lloque, La Capilla, Matalaque, Ichuña, Yunga, Chojata, Coalaque and Ubinas (in Sanchez Cerro province).

Southern Copper has community programs in place as part of the company’s Social Management Plan that focus on a number of key goals, including:

- Co-existence with local communities on a good neighbors basis
- Promotion of local economic development
- Promotion of individual community member capabilities.

Table 17-1: Cuajone Operations Permits

Permit Number	Permit	Date Issued	Permit Authority
Environmental			
Report N° 354-95-EM-DGM/DPDM	Environmental Impact Assessment Cuajone–Toquepala Integrated Leaching Project	August 4, 1995	Ministry of Energy and Mines
R.D. N° 042-97-EM/DGM	Program for the Adaptation and Environmental Management of the Toquepala, Cuajone and Ilo production units	January 31, 1997	Ministry of Energy and Mines
Report N° 660-98-EM-DGM/DPDM	Environmental Impact Assessment of the SX/EW Toquepala Leaching Plant Tank House Expansion Project	November 10, 1998	Ministry of Energy and Mines
Report N° 661-98-EM-DGM/DPDM	Environmental Impact Assessment of the Torata River Flood Control Project	November 10, 1998	Ministry of Energy and Mines
R.D. N° 444-2012-MEM-AAM	Update of the Mine Closure Plan of the Cuajone Mining Unit	December 27, 2012	Ministry of Energy and Mines
R.D. N° 148-2016-MEM-DGAAM	Supporting Technical Report for the environmental technological improvement of the Cuajone Mining Unit and related works	May 6, 2016	Ministry of Energy and Mines
R.D. N°047-2019-SENACE-PE/DEAR	First Supporting Technical Report of the Cuajone–Toquepala Integrated Leaching Project	March 05, 2019	Ministry of Energy and Mines
R.D. N° 171-2019/MINEM-DGAAM	Second Update of the Mine Closure Plan of the Cuajone Mining Unit	October 10, 2019	Ministry of Energy and Mines
Water			
R.S. N° 534-72-AG	License in process of adaptation of 150 L/sec of the waters of the Ticalaya and Quebrada Honda.	June 15, 1972	Ministry of Agriculture
R.M. N° 00405-77-AG/DGA	License in the process of adapting the use of 60 L/sed of the waters of the Cinto-Quebrada Honda river	April 12, 1977	Ministry of Agriculture
R.M. 00899-79-AA-AGAS	License to annually extract 15,736,464 m^3 of groundwater through tubular wells drilled in the “Vizcachas” and “Titijones” hydrographic basins.	July 09, 1979	Ministry of Agriculture
R.D. N° 0062-83-AG-DGASI	License to annually extract up to 13,268,966 m^3 of groundwater extracted through four tube wells from the “Huaitire” basin	June 15, 1983	Ministry of Agriculture

Permit Number	Permit	Date Issued	Permit Authority
R.D. N° 053-88-AG-DGA	Modification of the R.S. N° 535-72-AG reducing the flow to 300 L/sec	April 10, 1988	Ministry of Agriculture
R.A. N° 002-94-DISRAG/ATDRL-S	License to annually extract 5,991,840 m^3 of groundwater captured from tubular wells TP-11 and TP-12 drilled in the “Huaitire-Gentilar” hydrographic basin	1994	Ministry of Agriculture
R.A. N°169-95-DISRAGT-ATDRLIS	License to use groundwater in the Vizcachas basin of up to 360 L/sec	July 12, 1995	Ministry of Agriculture
R.A. N° 020-2003-ATDR.M/DRA.MDO	Adequacy of the water use license granted by R.M. N ° 00899-79-AA/DGAS and R.A. N ° 002-94-DISRAG/ATDRL-S for water usage of 9,744,624 m^3	April 1, 2003	Ministry of Agriculture
R.A. N° 034-2005-DRA.T/GR.TAC-ATDRL/S	Groundwater use license with a flow of 162.2 L/sec, equivalent to an annual extraction of 5,115,139 m^3 captured by two tubular wells TP-14 and TP-15 located in the Huaitire-Gentilar basin.	January 28, 2005	Ministry of Agriculture
R.D. N° 271-2010-ANA/AAA I C-O	Regularization of the License for the use of surface water, reallocating volumes of the R.M. N ° 405-77-AG/DGA	December 31, 2010	National Water Authority
Construction and operation			
R.D. N° 150-81-EM/DCM	Approval of the concession of benefit of the Botiflaca Concentrator in 56 ha	August 14, 1981	Ministry of Energy and Mines
Report N° 266-99-EM-DGM/DPDM	Operation authorization of the Botiflaca Concentrator Processing Plant with a capacity of 87,000 t/d	July 20, 1999	Ministry of Energy and Mines
R.D. N° 155-96-EM/DGM	Approval of the title of concession of benefit "SX Cuajone Leaching Plant" with an area of 400 ha, and authorization of definitive operation of 2,100 t/d	May 06, 1996	Ministry of Energy and Mines
Resolution N° 090-2009-MEM-DGM/V	Modification of the concession of Benefit "SX Cuajone Leaching Plant" for expansion from 2,100 to 3,100 t/d	February 16, 2009	Ministry of Energy and Mines
Resolution N° 988-2009-MEM-DGM/V	Authorization of the operation of the benefit concession "SX Cuajone Leaching Plant" at 3,100 t/d	December 16, 2009	Ministry of Energy and Mines

Permit Number	Permit	Date Issued	Permit Authority
Resolution N° 379-2010-MEM-DGM/V	Modification of the Botilflaca Concentrator Benefit concession to increase installed capacity from 87,000 to 90,000 t/d	October 7, 2010	Ministry of Energy and Mines
R.D. N° 153-2012-MEM-DGM-V	Approval and authorization of inclusion of 3 facilities to the expansion project to 90,000 t/d	May 12, 2012	Ministry of Energy and Mines
Resolution N° 0173-2014-MEM-DGM/V	Authorization of the operation of the new facilities of the benefit concession "Concentradora Botiflaca" to 90,000 t/d	May 8, 2014	Ministry of Energy and Mines
Resolution N° 0439-2016-MEM-DGM/V	Approval of the expansion of the area of the "Concentradora Botiflaca" Benefit concession and additional facilities	July 22, 2016	Ministry of Energy and Mines
R.D. N° 0190-2016-MEM/DGM	Mining Technical Report for the authorization of construction and operation of a primary crusher in Pit, conveyor belts and energy supply area with area expansion and without modifying the installed capacity of 90,000 t/d in the Botiflaca Concentrator	July 22, 2016	Ministry of Energy and Mines

Table 17-2: Ilo Smelter/Refinery Permits

Permit Number	Permit	Date Issued	Permit Authority
R.D. N° 078-69-EM/DGM	Definitive operating authorization for the Ilo smelter, with a production of 400 st/d of blister copper	August 21, 1969	Ministry of Energy and Mines
Report N° 204-2000-EM-DGM-DPDM	Operation authorization of the "La Fundición" beneficiation concession with a capacity of 3,100 t/d of copper concentrate	June 20, 2000	Ministry of Energy and Mines
Resource N° 1961695	Operation authorization to capacity of 3,770 t/d	February 4, 2010	Ministry of Energy and Mines
Report N° 056-94-EM-DGM/DRDM	Operation authorization of the Ilo copper refinery with a capacity of 533 t/d for the treatment of blister copper	May 27, 1994	Ministry of Energy and Mines
Report N° 506-97-EM-DGM/DPDM	Authorization of the Ilo smelter, with an expanded capacity of 658 t/d	September 2, 1998	Ministry of Energy and Mines

Report N° 080-2002-EM-DGM/DPDM	Authorization for the operation of the Ilo smelter, with a capacity of 800 t/d	March 14, 2002	Ministry of Energy and Mines
Resolution N° 520-2010-MEM-DGM/V	Modification of the Ilo copper refinery beneficiation concession without modification of installed capacity	December 30, 2010	Ministry of Energy and Mines

The Social Management Plan is not currently formally incorporated into the base EIA or subsequent amendments. The programs under the Social Management Plan include:

- Corporate Linkage Program
- Communication and Information Program
- Institutional Linkage Program
- Operational and Administrative Materials Program
- Equipment, Service and Maintenance Program
- Education Program
- Sports Program
- Health and Safety Program
- Volunteering
- Human and Social Capital Development Program.

Reasonable mechanisms are being implemented to maintain relationships with surrounding communities, to mitigate any perceived social conflicts that could be associated with the Project

Southern Copper has communication channels and tools in place, based on the company's community development model, which allow the company to recognize potential conflicts early, to work with the community to find appropriate solutions to address their concerns, and generate positive social license conditions for the continued operation of Southern Copper's mining projects.

17.7 Qualified Person's Opinion on Adequacy of Current Plans to Address Issues

After reviewing the information provided, Wood is of the opinion that Southern Copper has appropriately implemented a system to identify and mitigate social issues that arise during operations. Wood considers that social risks to the project are well understood by Southern Copper and are manageable for the Cuajone Operations.

18 CAPITAL AND OPERATING COSTS

18.1 Introduction

Capital and operating cost estimates are at a minimum at a pre-feasibility level of confidence, with an accuracy range of ±25%, and an overall contingency of no more than 15%.

18.2 Capital Cost Estimates

18.2.1 Basis of Estimate

In general, the Cuajone Operations have the necessary facilities to carry out its current operations. Sustaining capital costs were estimated by area and allocated over time to support the proposed mine production schedule at current production throughputs, and include the following:

- Mining equipment fleet increase and replacement
- Leach pad expansion
- Quebrada Honda TSF raise
- Filtered tailings plant and land acquisition for waste and tailings management
- Primary crusher relocation
- Mine equipment and facilities maintenance
- Process facilities sustaining and maintenance
- Other general sustaining and maintenance

All capital costs were expressed in Q4 2021 US$ unless otherwise stated. Where costs used in the estimate were provided in currencies other than US$, the following exchange rate as provided by Southern Copper, was used:

- 2021: 1.00 US$ = 3.60 PENS/.

No allowances were made for fluctuations in exchange rates.

Mine equipment requirements were estimated by operating area (drilling, loading, hauling, support, etc.) based on the proposed LOM plan and equipment replacement ratios provided by Southern Copper. Capital costs for the major and support mine mobile equipment were based on purchases made by Southern Copper in 2020 and quotations obtained by Southern Copper in recent years. No contingency was applied to mining equipment costs.

Leach pad expansion costs were estimated based on a unit cost of US$2.9/t of oxide ore, derived from a recent leach pad expansion (new phase) executed by Southern Copper, and the feed tonnages as per the proposed production plan. This unit cost is inclusive of direct and indirect costs. It includes a contingency of approximately 10% of the direct and indirect cost.

The costs associated with the raise of the existing Quebrada Honda TSF accounts for the works to expand the TSF to its maximum design storage capacity until approximately the end of 2035, which include:

- Expansion of the TSF impoundment
- New electrical substation
- Main and lateral dykes drainage systems
- Relocation of the catchment pond of the lateral dyke
- Relocation of cyclone station 2101
- Relocation of offices, workshops, control room and tanks
- Supporting equipment, barges and lime plan sustaining costs.

The expansion of the TSF impoundment and new electrical substation costs are based on Southern Copper's budget for these works, which are currently being executed. Other costs were estimated by Southern Copper based on a combination of overall costs incurred in similar previous works executed, quantities derived from conceptual designs and unit costs from similar previous works executed, and costs allowances. Costs are inclusive of direct and indirect costs and a contingency of 20% of the direct and indirect costs. These costs were distributed between the Cuajone and Toquepala Operations proportionally to the tailings tonnages to be produced by each.

Additional tailings storage capacity is required to accommodate tailings from processing of the remaining LOM ore once the existing Quebrada Honda TSF reaches the ultimate storage capacity at approximately the end of 2035. Wood assumed dry-stack tailings as the preferred alternative to process and store the remaining tailings (starting from 2036). Costs from a 2020 internal study of another Southern Copper project that considered disposing tailings by commingling waste rock and filtered tailings materials were used and adjusted to account for difference in throughput to develop the capital cost estimate at a conceptual level, complemented with engineering judgement and costs derived from projects of similar applications. It is assumed that the Cuajone Operations will use a similar disposal method at on-site facilities, to be located within the Cuajone Operations area, in which waste rock will be used as a buttress material for the filtered tailings to where feasible to improve stability.

Capital cost estimates include costs for the procurement and development of required facilities for the thickening/drying/filtering process infrastructure for the tailings materials and subsequent disposal and compaction in the co-disposal facility. Indirect costs were applied based on benchmark factors. A contingency of 20% of the direct and indirect cost was included. Land acquisition costs as provision for waste and tailings management space were also included in the estimate. Land acquisition costs were provided by Southern Copper based on ongoing negotiations with land owners and market surveys. In addition, sustaining costs at US$0.56 M each year and US$11.3 M every three years were included for relocating conveyors for continued operation, equipment replacement, associated with the conveyor systems, and additional cost related to changing/updating filtering equipment.

To allow the pit development later in the LOM, it is estimated that the sulfide primary crusher will need to be relocated between 2041–2042. For operational purposes, it was assumed that a new primary crusher will be acquired and installed. The associated cost was estimated by Southern Copper at a conceptual level based on previous quotes for similar equipment from 2014 and cost allowances based on similar previous works executed by Southern Copper. The estimate includes the costs for the procurement and development of the required facilities. Indirect costs were applied based on benchmark factors. A contingency of 15% of the direct cost was included.

Mine equipment and facilities maintenance, process facilities sustaining and maintenance, and other general sustaining and maintenance costs were accounted for based on the following unit costs derived from the 2022–2026 sustaining and maintenance cost schedule developed by Southern Copper:

- Mining maintenance: US$0.16/t mined
- Processing facilities sustaining and maintenance:
    - Concentrator: US$0.34/t processed
    - LESDE area: US$309.65/t of cathode produced
    - Ilo smelter and refinery: US$28.00/t of concentrate treated

- Other sustaining and maintenance: US$0.14/t processed (concentration and leaching)

No contingency was applied on these estimates.

18.2.2 Capital Cost Estimate Summary

The sustaining capital cost estimate totals US$4,617.4 M (Table 18-1).

Capital costs were applied in the financial model excluding value-added tax.

18.3 Operating Cost Estimates

18.3.1 Basis of Estimate

Operating costs were based on actual costs and data from Southern Copper's operating mines in Peru, Wood's experience and the proposed mine and process plans.

18.3.2 Mining Costs

Operating costs incorporated operational life, average availabilities, and efficiencies for the major mine equipment fleet. The equipment operating time inputs were adjusted by Southern Copper to reflect operating considerations.

Inputs drill productivity and blasting accessory costs were provided by Southern Copper. Explosives costs were estimated by consumption ratios provided by Southern Copper, based on data from their operations.

The inputs and main consumable costs and operational parameters were provided by Southern Copper, according to historical data from the Cuajone Operations.

Vehicle speeds and diesel consumption were based on grouping roads with similar inclinations into segments.

The mine equipment power consumption rate was provided by Southern Copper. The estimated fuel price for the LOM was US$3.18/gal and the energy price was US$0.065/kWh.

The maintenance and repair cost includes the costs to repair and replace parts including rebuild labor. The replacement cost for truck tires was estimated at US$49,392 with a life of 5,529 hours.

Table 18-1: Sustaining Capital Cost Estimate

Area	Sustaining Capital Cost (US$ M)
Mining equipment	1,817.0
Leach pad expansion	64.2
Existing tailings storage facility (Quebrada Honda) raise	122.3
Filtering tailings plant, inc. land acquisition	594.5
Primary crusher relocation	60.6
Mine equipment and facilities maintenance	710.0
Process facilities sustaining and maintenance	1,061.7
Other general sustaining and maintenance	187.1
Total	***4,617.4***

Note: Numbers have been rounded. Totals may not sum due to rounding.

The technical manpower required was estimated based on the actual organizational structure.

Salaries were provided by Southern Copper.

The total material mined is estimated at 4,399 Mt. Mine operating costs are forecast to average US$2.03/t mined over the LOM. The mine cost increases gradually starting at US$1.91/t mined in year 1 (2022) to a cost of US$2.20/t mined in year 25 (2046), due to the increase in ex-pit hauling distance (waste dump facilities) and the deepening of the pit. In the last years of the LOM, the average cost is US$2.02/t mined until the end of the LOM, due to the reduction of waste material.

A cost of US$1.0/t reclaimed was applied to account for reclamation costs from the oxide stockpile, which includes ore loading, hauling and feeding to the leach pad.

18.3.3 Process Costs

Process operating costs were based on actual costs averages over the period 2017–2021, adjusted to account for the LOM based on expected variations of key commodities costs such as energy, consumables and services. Processing costs include concentration costs, leaching and SX/EW cathode recovery, and smelting and refining at Ilo, which are inclusive of:

- Labor costs
- Power and fuel costs for usage by equipment, vehicles and infrastructure

- Materials costs for the concentrator included consumables such as grinding media, crushing and grinding liners, and reagents. For the leach/SX/EW plant included costs of piping supplies and reagents such as sulfuric acid, cobalt sulfate, and extractants. For the smelter this cost element included the cost of silica, refractory and steel consumables, piping and electrical supplies, and liquid petroleum gas. For the refinery, this cost element included electrical supplies, reagents, piping and valves, and laboratory supplies
- The "services and other" cost element includes the cost of water, contractor work costs (operation and maintenance), laboratory services, and other indirect costs.

Although the SX/EW plant is located at the Toquepala Operations, cathode recovery costs were allocated to the Cuajone and Toquepala Operations in proportion to cathodes recovered from their copper content feeds.

Silver shots and gold-bearing doré bars are normally produced in the Ilo refinery; however, as neither revenue from the silver shots and gold-bearing doré bars nor the production costs of the silver shots and gold-bearing doré bars were considered in the economic analysis, the cost estimate reported for the Ilo refinery excludes the precious metals plant operating cost.

Operating costs estimates for the concentrator are presented in Table 18-2, for the LESDE facility in Table 18-3, for the Ilo smelter in Table 18-4, and for the Ilo refinery in Table 18-5.

In addition to the estimates described above, an alternate tailings processing and storage option is required to process the remaining life-of-mine (LOM) ore once the existing Quebrada Honda TSF reaches the ultimate storage capacity at approximately the end of 2035. Wood assumed dry stack tailings as the preferred alternative to process and store the remaining tailings (starting from 2036). Costs from a 2020 internal study of another Southern Copper project that considered disposing tailings by commingling waste rock and filtered tailings materials were used to develop the operating cost estimate at conceptual level, complemented with engineering judgement on costs derived from projects of similar applications. It is assumed that the Cuajone Operations will use a similar disposal method at on-site facilities in which waste rock will be used as a buttress material for the filtered tailings where feasible to improve stability. A cost of US$1.67/t was estimated, which includes filtering and thickening, tailing conveying and spreading and compaction of the tailing material.

Table 18-2: Cuajone Concentrator Operating Costs

	Adjusted Average 2017–2021 ($/t milled)
Labor	0.87
Fuels	0.05
Power	1.28
Materials	2.77
Services and others	0.91
Total Cost	***5.88***

Note: Numbers have been rounded. Totals may not sum due to rounding.

Table 18-3: Leaching and SX/EW Operating Costs

	Adjusted Average 2017–2021 ($/lb Cu recovered)
Labor	0.13
Fuels	0.03
Power	0.23
Materials	0.31
Services and Others	0.13
Total Cost	***0.83***

Note: Numbers have been rounded. Totals may not sum due to rounding.

Table 18-4: Ilo Smelter Operating Costs

	Adjusted Average 2017–2021 ($/t of concentrate processed)
Labor	34.90
Fuels	9.11
Power	18.89
Materials	40.95
Services and Others	30.97
Total Cost	***134.83***

Note: Numbers have been rounded. Totals may not sum due to rounding.

Table 18-5: Ilo Refinery Operating Costs

	Adjusted Average 2017–2021 ($/lb Cu produced)
Labor	0.0258
Fuels	0.0003
Power	0.0083
Materials	0.0080
Services and Others	0.0180
Total Cost	***0.0605***

Note: Numbers have been rounded. Totals may not sum due to rounding.

18.3.4 General and Administrative Costs

General and administrative costs are included in the corresponding mining and processing costs.

18.3.5 Operating Cost Estimate Summary

Table 18-6 is a summary of the operating cost estimates, exclusive of value-added taxes.

As Southern Copper assumes, in its cashflow planning, that the Tia Maria Project will source the required sulfuric acid for that operation from the Ilo smelter and refinery at the cost of production, which represents approximately 720,000 t/a, or about 60% of the total acid production from the Ilo smelter, over approximately 20 years. This cost was removed from the Ilo smelter operating costs.

Table 18-6: LOM Operating Cost Estimate

Description	Total (US$ M)	Unit Cost	
Mining	8,930.7	US$/t mined	2.03
Process	12,893.5	US$/t processed *	9.51
Total	***21,824.2***		

Note: Numbers have been rounded. Totals may not sum due to rounding. * Including sulfides and oxides.

19 ECONOMIC ANALYSIS

19.1 Forward-looking Information Caution

Certain information and statements contained in this section are forward-looking in nature and are subject to known and unknown risks, uncertainties, and other factors, many of which cannot be controlled or predicted and may cause actual results to differ materially from those presented here. Forward-looking statements include, but are not limited to, statements with respect to the economic and study parameters of the Cuajone Operations; mineral reserves; the proposed mine plan and mining strategy; ability of mine designs to withstand seismic events; dilution and extraction recoveries; processing method and rates and production rates; projected metallurgical recovery rates; infrastructure requirements; capital, operating and sustaining cost estimates; concentrates and cathodes marketability and commercial terms; the projected LOM and other expected attributes of the Project; the net present value (NPV); future metal prices and currency exchange rates; government regulations and permitting timelines; estimates of reclamation obligations; requirements for additional capital; environmental and social risks; and general business and economic conditions.

19.2 Methodology

The financial analysis was performed using a discounted cash flow (DCF) method. Net annual cash flows were estimated projecting yearly cash inflows (or revenues) and subtracting projected yearly cash outflows (such as capital and operating costs, royalties, and taxes).

The financial model that supports the mineral reserve declaration was a standalone model that calculated annual cash flows based on: scheduled ore production; assumed processing recoveries; metal sale prices and PENS/ to US$ exchange rate; projected operating and capital costs; and estimated taxes.

The financial analysis was based on an after-tax discount rate of 10%. Cash flows were assumed to occur at the end of each year and were be discounted to the beginning of 2022 (year 1 of the economic analysis).

Costs projected within the cash flows are based on constant Q4 2021 US dollars.

Revenue was calculated from the recoverable metal and the long-term forecasts of metal prices and exchange rates. Recoverable metal and products include those recovered at the Ilo smelter and refinery from the copper concentrate feed from the mine operation.

19.3 Input Parameters

19.3.1 Mineral Reserves and Mine Life

The mineral reserves estimate was summarized in Chapter 12.3. The projected mine life was provided in Chapter 13.5.

19.3.2 Metallurgical Recoveries

The metallurgical recoveries forecast was provided in Chapter 10.4.

19.3.3 Smelting and Refining Terms

The following long-term commercial terms and charges were used in the cashflow model. These were based on current contract terms. Transport costs were based on average costs incurred in 2019–2021 using normalized values to Q4 2021.

19.3.3.1 Copper Concentrate

The cashflow assumes, based on Southern Copper's forecast, that on average, in those years when the total annual copper concentrate production from Cuajone and Toquepala Operations is equal or less than the Ilo smelter nominal capacity (1.2 Mt/a of copper concentrate), all the copper concentrate from the Cuajone and Toquepala Operations will be treated at the Ilo smelter; and in those years when the total annual copper concentrate production from Cuajone and Toquepala Operations is higher than the Ilo smelter nominal capacity, 90% of the copper concentrate from the Cuajone and Toquepala Operations will be treated at the Ilo smelter, with the remaining 10% sent to third parties.

A concentrate transport loss of 0.2% was included, based on benchmarks. A concentrate moisture of 8.37%, which was the average value during 2021, was considered for the copper concentrate.

The following commercial terms were applied to the portion of the copper concentrate that is assumed to be sold to third parties:

- Pay factors:
  - Pay for 100% of Cu content, subject to a minimum deduction of 1.0 unit;
- Treatment and refining charges (TC/RCs):
  - TC = US$80.80/dmt;

- Cu RC = US$0.0808/lb Cu payable.

Ocean freight costs were estimated at US$40.80/t from the port of Ilo. These costs were based on average costs for 2020–2021. Land transport (by rail) and port costs were included in the operating costs.

19.3.3.2 Molybdenum Concentrate

Normally over 60% of the molybdenum concentrate is sold to Chile, with the remainder sold into the Northern Europe, Asia and the US markets. The following commercial terms were assumed:

- Pay factors:
  - Pay 100% for Mo content
- Treatment and refining charges:
  - Roasting charge of US$1.45/lb payable Mo. This cost was based on the average cost for 2019–2021, normalized to Q4 2021
- No price participation or penalties were applicable
- No transport losses were considered.

A concentrate moisture of 10.35% was used for the molybdenum concentrate, which was the average value in 2021.

Ocean freight costs were estimated at US$180.32/t of Mo contained in concentrate from the port of Ilo. This cost was based on the average cost for 2019–2021, normalized to Q4 2021. Land transport (by rail) and port costs were included in the operating costs.

19.3.3.3 Copper Cathodes

The copper cathodes produced are typically sold to different markets located in the Americas, Europe and Asia. The following commercial terms were assumed:

- Pay for 100% of the copper content subject to a premium of US$84.67/t. This cost was based on the average premium for 2019–2021, normalized to Q4 2021
- No price participation was applicable.

Ocean freight costs were estimated at US$57.65/t from the port of Ilo. This cost was based on the average cost for 2019–2021, normalized to Q4 2021. Land transport (by rail) and port costs were included in the operating costs.

19.3.3.4 Ilo Smelter and Refinery

19.3.3.4.1 Copper Blister/Anodes

Typically, about only about 4.50% of the copper anodes produced are sold to third parties, which are primarily located in Asia. Most of the anodes, 95.50%, are sent to the Ilo refinery for cathode production. The anode copper content is assumed at 99.777%. The remaining 0.223% of the anode content includes silver, gold, sulfur, oxygen and other elements, none of which are assumed payable. The following commercial terms were assumed:

- Pay factors:
  - Pay for 100% of the copper content subject to a deduction of 0.3%
- No price participation was applicable
- TC/RCs:
  - TC: zero
  - RC: US$177.13/t of anode. This cost was based on the average cost for 2019–2021, normalized to Q4 2021.

Ocean freight costs were estimated at US$68.55/t from the port of Ilo. This cost was based on the average cost for 2019–2021, normalized to Q4 2021. Land transport (by rail) and port costs were included in the operating costs.

19.3.3.4.2 Copper Cathodes

Cathode assumptions are the same as those detailed under Chapter 19.3.3.3.

19.3.3.4.3 Silver Shots

Silver shots produced are typically sold to the US, Brazil, Peru, Chile, Argentina and Colombia; however, for the economic analysis neither the silver shot revenue, nor the silver shot production costs, were considered.

19.3.3.4.4 Gold Dore Bars

All of the gold-bearing doré bars produced are sold locally in Perú; however, for the economic analysis neither the gold-bearing doré bars revenue, nor the gold-bearing doré bars production costs, were considered.

19.3.3.4.5 Sulfuric Acid

Approximately 88% of the sulfuric acid produced is sold within South America, with 60% of that acid production figure going to Chile, and 40% to Peru. The remaining 12% is used in the Cuajone and Toquepala Operations.

Southern Copper assumes, in its cashflow planning, that the Tia Maria Project will source the required sulfuric acid for that operation from the Ilo smelter and refinery at the cost of production, which represents approximately 720,000 t/year, or about 60% of the total acid production from the Ilo smelter.

All other revenue from acid sales apart from that from the Tia Maria project have been excluded from the financial model.

19.3.4 Commodity Price and Exchange Rate Assumptions

Revenue was calculated from the recoverable metal and the long term forecast of metal prices and exchange rates. Revenue from the sale of a copper concentrate is included, based on the contained metal, accountability factors and the long term forecast for metals prices and exchange rates. Recoverable metal and products include those recovered at the Ilo smelter and refinery from the Cu concentrate feed from the mine operation.

Commodity price and exchange rate forecasts were provided in Chapter 16.5.

19.3.5 Capital Costs

The capital cost estimate was summarized in Chapter 18.2.2.

19.3.6 Operating Costs

The operating cost estimate was summarized in Chapter 18.3.2.

19.3.7 Royalties

Special mining taxes and the modified mining royalty are discussed in Chapter 19.3.12. There are no other royalties payable on the Cuajone Operations.

19.3.8 Working Capital

Working capital provisions in the cashflow analysis included:

- 60 days in accounts receivable, including revenue
- 30 days in accounts payable, including concentrates, anodes and cathodes selling costs, operating costs, special mining tax and modified mining royalty.

19.3.9 Closure and Reclamation Costs

Closure costs were allocated in the relevant cashflow years based on the progressive, final and post closure schedule. It was assumed that closure cost accruals are not required and closure obligations will be satisfied by either escrow with other Southern Copper assets as collateral, a bond or a bank letter of credit.

The salvage value was assumed to be zero.

19.3.10 Financing

All expenditures were assumed to be financed with 100% equity; i.e., no debt was considered.

19.3.11 Inflation

No escalation or inflation was applied. All amounts were constant (real) Q4 2021 terms.

19.3.12 Taxation Considerations

The taxation modeled within the financial analysis is based on the taxation scheme that was provided and validated by Southern Copper.

The assumptions include:

- All expenses excluded the value-added tax (Impuesto General a las Ventas (IGV), except for closure costs which do include IGV
- Modified mining royalty (Law N° 29788)
- Special mining tax (Law N° 29789)
- Employee profit sharing of 8% of taxable income
- Corporate income tax rate of 29.5%
- Complementary mining pension fund applied at 0.5% of taxable income after employee profit sharing

- Tax loss carried forward not applicable.

Tax depreciation is straight line and is divided into the following categories:

- Non-depreciable: land acquisition
- 10 years (10% annual): mining and process equipment (including sustaining and maintenance items)
- 20 years (5% annual): filtering tailings plant and supporting infrastructure, primary crusher relocation, and Ilo smelter and refinery ongoing sustaining and maintenance items
- 30 years (3.3% annual): leach pad expansion, expansion of existing TSF, and other ongoing sustaining and maintenance items (not included in schedules above).

The same rates are used for financial depreciation.

Depreciation from previous expenditures and existing assets, including those from the Ilo smelter and refinery, in the amount of $671 M, as provided by Southern Copper, was accounted for in the financial model for both tax and financial depreciation.

19.4 Results of Economic Analysis

The Cuajone Operations are anticipated to generate a pre-tax NPV of US$2,528.5 M at a 10.0% discount rate and an after-tax NPV of US$1,553.8 M at a 10.0% discount rate.

As the mine is operating, and initial capital is already sunk, considerations of IRR and payback are not relevant.

A cashflow summary is provided in Table 19-1, and the LOM cashflow forecast on an annualized basis in Table 19-2 to Table 19-7.

Table 19-1: Summary of Economic Results

Description	**Units**	**Value**
Remaining mine life	Years	48
Copper payable	Mt	5.45
Molybdenum payable	Mt	0.14
After-Tax Valuation Indicators		
Undiscounted cash flow	US$M	9,285.1
NPV @ 10.0%	US$M	1,553.8
Sustaining capital	US$M	4,617.4
Closure cost (inc. IGV)	US$M	251.8
Mining operating cost	US$M	8,930.7
Process operating cost	US$M	12,893.5

Note: Numbers have been rounded. IGV = value-added tax (Impuesto General a las Ventas.

Table 19-2: Cash Flow Forecast on an Annual Basis (2022–2030)

	Unit	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030
Mine Production											
Waste mined	kt	3,062,744	116,269	115,584	111,154	108,045	112,524	112,338	104,217	106,933	108,462
Total ore mined	kt	1,336,313	30,521	29,898	29,402	26,955	27,476	27,662	27,995	28,067	28,538
Sulfide Ore Mined (concentration)											
Sulfides ore mined	kt	1,333,559	30,521	29,898	28,402	26,833	27,476	27,662	27,995	27,850	27,733
Cu head grade	%	0.492	0.566	0.497	0.480	0.455	0.439	0.473	0.505	0.502	0.519
Mo head grade	%	0.017	0.022	0.022	0.016	0.013	0.012	0.011	0.015	0.014	0.013
Oxide/Sulfide Ore Mined (leaching)											
Oxide ore mined	kt	2,754	—	—	1,000	122	—	—	—	217	805
Cu head grade	%	0.493	0.000	0.000	0.715	0.896	0.000	0.000	0.000	0.129	0.130
Process Production											
Feed to Mill (sulfides)											
Sulfide ore feed	kt	1,333,559	30,521	29,898	28,402	26,833	27,476	27,662	27,995	27,850	27,733
Cu feed grade	%	0.492	0.566	0.497	0.480	0.455	0.439	0.473	0.505	0.502	0.519
Mo feed grade	%	0.017	0.022	0.022	0.016	0.013	0.012	0.011	0.015	0.014	0.013
Feed to Leach (sulfide/oxide)											
Sulfide/oxide ore feed	kt	22,006	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
Cu feed grade	%	0.497	0.577	0.448	0.647	0.368	0.309	0.309	0.309	0.404	0.270
Metal Recovery											
Concentration											
Cu recovered	kt	5,554.2	149.2	128.3	114.4	101.4	101.0	109.8	119.0	117.4	120.7
Mo recovered	kt	144.7	4.2	4.1	2.8	2.2	2.0	1.9	2.7	2.5	2.3
Leaching											
Cu recovered	kt	63.1	4.6	3.5	4.0	2.6	2.3	2.3	2.3	3.0	2.0
Payable Metals											

	Unit	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030
Cu payable	kt	5,452.5	149.3	127.9	115.0	101.0	100.4	108.9	117.7	116.9	119.2
Mo payable	kt	144.7	4.2	4.1	2.8	2.2	2.0	1.9	2.7	2.5	2.3
Metal Value											
Cu payable value	US$000	40,091,856	1,097,121	939,624	844,983	741,886	738,202	801,012	864,928	858,770	876,893
Mo payable value	US$000	2,871,115	83,622	81,387	56,265	43,098	40,048	37,103	53,419	49,594	44,686
Total Metal Value	***US$000***	***42,962,971***	***1,180,743***	***1,021,011***	***901,248***	***784,985***	***778,250***	***838,115***	***918,346***	***908,364***	***921,579***
Treatment and Refining Charges (TC&RCs)											
Cu concentrate TC&RCs	US$000	(112,814)	(7,281)	(6,259)	(5,657)	(4,950)	—	—	(5,809)	(5,731)	—
Cu (Ilo) anodes TC&RCs	US$000	(41,347)	(1,043)	(897)	(799)	(709)	(785)	(853)	(832)	(821)	(938)
Mo concentrate TC&RCs	US$000	(462,310)	(13,465)	(13,105)	(9,060)	(6,940)	(6,448)	(5,974)	(8,602)	(7,986)	(7,195)
Total TC&RCs	***US$000***	***(616,471)***	***(21,789)***	***(20,261)***	***(15,516)***	***(12,599)***	***(7,233)***	***(6,827)***	***(15,242)***	***(14,538)***	***(8,133)***
Transport Costs											
SX/EW cathodes transport	US$000	(3,638)	(268)	(202)	(232)	(150)	(132)	(132)	(133)	(173)	(117)
Cu concentrate transport	US$000	(40,495)	(2,614)	(2,247)	(2,031)	(1,777)	—	—	(2,085)	(2,057)	—
Ilo anodes transport	US$000	(16,001)	(404)	(347)	(309)	(274)	(304)	(330)	(322)	(318)	(363)
Ilo cathodes transport	US$000	(284,513)	(7,176)	(6,169)	(5,497)	(4,879)	(5,399)	(5,869)	(5,725)	(5,649)	(6,451)
Mo concentrate transport	US$000	(26,093)	(760)	(740)	(511)	(392)	(364)	(337)	(485)	(451)	(406)
Total Transport Costs	***US$000***	***(370,740)***	***(11,221)***	***(9,705)***	***(8,580)***	***(7,473)***	***(6,198)***	***(6,668)***	***(8,750)***	***(8,647)***	***(7,337)***
Net Smelter Return	***US$000***	***41,975,759***	***1,147,733***	***991,045***	***877,151***	***764,913***	***764,819***	***824,620***	***894,354***	***885,179***	***906,109***
Production Costs											
Mining	US$000	(8,930,710)	(282,006)	(276,772)	(262,511)	(266,565)	(270,831)	(277,408)	(267,691)	(272,122)	(270,295)
Process	US$000	(12,893,527)	(275,706)	(257,640)	(241,567)	(222,181)	(231,744)	(238,587)	(238,805)	(238,305)	(245,644)
G&A	US$000	—	—	—	—	—	—	—	—	—	—
Total Production Costs	***US$000***	***(21,824,237)***	***(557,712)***	***(534,412)***	***(504,078)***	***(488,747)***	***(502,575)***	***(515,996)***	***(506,496)***	***(510,426)***	***(515,939)***

	Unit	Total	2022	2023	2024	2025	2026	2027	2028	2029	2030
MMR and SMT											
Modified Mining Royalty	US$000	(548,018)	(15,009)	(10,008)	(8,857)	(7,724)	(7,710)	(8,313)	(9,031)	(8,938)	(9,134)
Special Mining Tax	US$000	(462,329)	(15,097)	(9,904)	(7,138)	(3,947)	(3,474)	(4,754)	(7,272)	(6,569)	(6,982)
MMR and SMT	***US$000***	**(1,010,347)**	**(30,106)**	**(19,912)**	**(15,995)**	**(11,671)**	**(11,184)**	**(13,067)**	**(16,303)**	**(15,507)**	**(16,116)**
Net Operating Earnings	***US$000***	**19,141,176**	**559,915**	**436,721**	**357,078**	**264,495**	**251,060**	**295,557**	**371,554**	**359,245**	**374,053**
Taxes											
Employee profit share	US$000	(1,124,934)	(36,274)	(26,222)	(20,082)	(12,411)	(11,233)	(14,581)	(20,465)	(18,919)	(19,910)
Complementary mining pension fund	US$000	(64,684)	(2,086)	(1,508)	(1,155)	(714)	(646)	(838)	(1,177)	(1,088)	(1,145)
Income tax	US$000	(3,797,257)	(122,443)	(88,512)	(67,786)	(41,893)	(37,917)	(49,218)	(69,082)	(63,861)	(67,207)
Total Taxes	***US$000***	**(4,986,875)**	**(160,802)**	**(116,241)**	**(89,023)**	**(55,017)**	**(49,796)**	**(64,637)**	**(90,724)**	**(83,867)**	**(88,261)**
Capital Costs											
Sustaining capital	US$000	(4,617,405)	(145,954)	(116,664)	(132,900)	(148,833)	(130,213)	(130,591)	(106,440)	(121,494)	(83,427)
Total Capital Costs	***US$000***	***(4,617,405)***	***(145,954)***	***(116,664)***	***(132,900)***	***(148,833)***	***(130,213)***	***(130,591)***	***(106,440)***	***(121,494)***	***(83,427)***
Closure Cost											
Closure cost	US$000	(251,811)	—	—	—	—	—	—	—	(1,213)	(1,213)
Working Capital											
Change in Working Capital	US$000	0	(143,068)	23,254	16,390	17,165	1,658	(8,578)	(12,841)	1,832	(2,303)
Net Cash Flow											
Before tax	US$000	14,271,960	270,893	343,312	240,568	132,827	122,505	156,389	252,274	238,371	287,110
After tax	US$000	9,285,085	110,091	227,070	151,546	77,810	72,709	91,752	161,550	154,503	198,849

Note: Numbers have been rounded.

Table 19-3: Cash Flow Forecast on an Annual Basis (2031–2040)

	Unit	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Mine Production											
Waste mined	kt	101,196	90,644	86,111	89,657	86,641	91,698	96,409	106,604	102,355	103,970
Total ore mined	kt	28,804	29,356	28,889	29,422	29,446	28,302	28,591	28,396	28,327	26,030
Sulfide Ore Mined (concentration)											
Sulfides ore mined	kt	28,804	29,339	28,888	29,422	29,446	28,302	28,591	28,396	28,327	26,030
Cu head grade	%	0.570	0.555	0.545	0.548	0.548	0.595	0.564	0.514	0.493	0.520
Mo head grade	%	0.015	0.018	0.018	0.019	0.020	0.019	0.020	0.024	0.024	0.017
Oxide/Sulfide Ore Mined (leaching)											
Oxide ore mined	kt	—	16	1	—	—	—	—	—	—	—
Cu head grade	%	0.000	0.130	0.130	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Process Production											
Feed to Mill (sulfide)											
Sulfide ore feed	kt	28,804	29,339	28,888	29,422	29,446	28,302	28,591	28,396	28,327	26,030
Cu feed grade	%	0.570	0.555	0.545	0.548	0.548	0.595	0.564	0.514	0.493	0.520
Mo feed grade	%	0.015	0.018	0.018	0.019	0.020	0.019	0.020	0.024	0.024	0.017
Feed to Leach (sulfide/oxide)											
Sulfide/oxide ore feed	kt	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,013	—
Cu feed grade	%	0.556	0.550	0.555	0.556	0.556	0.556	0.546	0.642	0.738	0.000
Metal Recovery											
Concentration											
Cu recovered	kt	138.8	138.4	133.8	137.6	137.6	144.9	138.2	124.8	118.7	113.7
Mo recovered	kt	2.8	3.2	3.2	3.6	3.6	3.4	3.7	4.3	4.3	2.7
Leaching											
Cu recovered	kt	4.1	4.1	4.1	4.1	4.1	4.1	4.0	2.9	2.6	—
Payable Metals											

	Unit	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Cu payable	kt	138.7	138.5	134.0	137.7	137.6	144.6	138.0	124.1	117.9	110.4
Mo payable	kt	2.8	3.2	3.2	3.6	3.6	3.4	3.7	4.3	4.3	2.7
Metal Value											
Cu payable value	US$000	1,019,417	1,018,519	985,737	1,012,686	1,010,836	1,062,625	1,013,990	913,001	867,319	812,001
Mo payable value	US$000	55,469	64,450	63,565	70,919	72,252	66,515	72,721	84,883	84,866	54,101
Total Metal Value	***US$000***	***1,074,886***	***1,082,968***	***1,049,302***	***1,083,606***	***1,083,088***	***1,129,140***	***1,086,710***	***997,884***	***952,185***	***866,102***
Treatment and Refining Charges (TC&RCs)											
Cu concentrate TC&RCs	US$000	(6,775)	—	—	—	(6,716)	(7,070)	(6,743)	—	—	—
Cu (Ilo) anodes TC&RCs	US$000	(970)	(1,075)	(1,039)	(1,068)	(962)	(1,013)	(966)	(970)	(922)	(883)
Mo concentrate TC&RCs	US$000	(8,932)	(10,378)	(10,235)	(11,419)	(11,634)	(10,710)	(11,710)	(13,668)	(13,665)	(8,711)
Total TC&RCs	***US$000***	***(16,677)***	***(11,453)***	***(11,274)***	***(12,488)***	***(19,312)***	***(18,793)***	***(19,418)***	***(14,638)***	***(14,587)***	***(9,595)***
Transport Costs											
SX/EW cathodes transport	US$000	(238)	(236)	(238)	(238)	(238)	(238)	(232)	(169)	(152)	—
Cu concentrate transport	US$000	(2,432)	—	—	—	(2,411)	(2,538)	(2,420)	—	—	—
Ilo anodes transport	US$000	(376)	(416)	(402)	(413)	(372)	(392)	(374)	(375)	(357)	(342)
Ilo cathodes transport	US$000	(6,678)	(7,397)	(7,150)	(7,352)	(6,620)	(6,969)	(6,646)	(6,672)	(6,346)	(6,077)
Mo concentrate transport	US$000	(504)	(586)	(578)	(645)	(657)	(604)	(661)	(771)	(771)	(492)
Total Transport Costs	***US$000***	***(10,227)***	***(8,635)***	***(8,368)***	***(8,648)***	***(10,297)***	***(10,742)***	***(10,333)***	***(7,987)***	***(7,626)***	***(6,911)***
Net Smelter Return	***US$000***	***1,047,982***	***1,062,880***	***1,029,659***	***1,062,470***	***1,053,479***	***1,099,605***	***1,056,960***	***975,259***	***929,972***	***849,597***
Production Costs											
Mining	US$000	(263,346)	(256,591)	(245,999)	(246,700)	(233,360)	(242,211)	(260,417)	(281,151)	(277,312)	(272,365)
Process	US$000	(258,557)	(265,383)	(258,795)	(264,789)	(256,481)	(301,017)	(299,405)	(296,107)	(290,960)	(265,324)
G&A	US$000	—	—	—	—	—	—	—	—	—	—
Total Production Costs	***US$000***	***(521,903)***	***(521,973)***	***(504,794)***	***(511,489)***	***(489,841)***	***(543,227)***	***(559,822)***	***(577,258)***	***(568,272)***	***(537,689)***
MMR and SMT											
Modified Mining Royalty	US$000	(11,046)	(11,784)	(11,182)	(12,113)	(12,220)	(11,796)	(10,673)	(9,832)	(9,376)	(8,565)

	Unit	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Special Mining Tax	US$000	(11,694)	(12,320)	(11,749)	(12,582)	(12,648)	(12,435)	(10,273)	(6,585)	(5,527)	(4,084)
MMR and SMT	***US$000***	**(22,740)**	**(24,104)**	**(22,931)**	**(24,695)**	**(24,868)**	**(24,231)**	**(20,945)**	**(16,417)**	**(14,903)**	**(12,649)**
Net Operating Earnings	***US$000***	**503,340**	**516,803**	**501,934**	**526,286**	**538,769**	**532,146**	**476,192**	**381,584**	**346,797**	**299,259**
Taxes											
Employee profit share	US$000	(29,832)	(30,992)	(29,718)	(31,418)	(31,452)	(31,572)	(27,408)	(19,437)	(16,844)	(13,053)
Complementary mining pension fund	US$000	(1,715)	(1,782)	(1,709)	(1,807)	(1,808)	(1,815)	(1,576)	(1,118)	(969)	(751)
Income tax	US$000	(100,699)	(104,616)	(100,314)	(106,051)	(106,167)	(106,572)	(92,516)	(65,612)	(56,857)	(44,062)
Total Taxes	***US$000***	**(132,246)**	**(137,390)**	**(131,741)**	**(139,275)**	**(139,427)**	**(139,960)**	**(121,500)**	**(86,167)**	**(74,670)**	**(57,866)**
Capital Costs											
Sustaining capital	US$000	(99,798)	(113,541)	(205,374)	(223,926)	(362,534)	(107,585)	(112,621)	(166,924)	(111,145)	(92,092)
Total Capital Costs	***US$000***	***(99,798)***	***(113,541)***	***(205,374)***	***(223,926)***	***(362,534)***	***(107,585)***	***(112,621)***	***(166,924)***	***(111,145)***	***(92,092)***
Closure Cost											
Closure cost	US$000	(1,213)	(1,213)	(1,213)	(6,468)	(6,590)	(765)	(149)	(89)	(97)	(45)
Working Capital											
Change in Working Capital	US$000	(23,227)	(1,771)	3,989	(4,821)	(983)	(3,241)	8,086	15,077	6,615	10,983
Net Cash Flow											
Before tax	US$000	379,102	400,278	299,336	291,072	168,661	420,556	371,508	229,647	242,171	218,105
After tax	US$000	246,856	262,888	167,595	151,797	29,234	280,596	250,009	143,480	167,501	160,239

Note: Numbers have been rounded.

Table 19-4: Cash Flow Forecast on an Annual Basis (2041–2050)

	Unit	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Mine Production											
Waste mined	kt	98,441	97,182	94,668	82,010	65,250	59,613	58,302	86,351	64,414	50,099
Total ore mined	kt	26,559	27,818	30,332	30,906	29,750	25,387	24,858	24,843	24,704	24,901
Sulfide Ore Mined (concentration)											
Sulfides ore mined	kt	26,559	27,818	30,263	30,646	29,485	25,387	24,858	24,843	24,704	24,901
Cu head grade	%	0.437	0.500	0.538	0.551	0.492	0.448	0.386	0.365	0.371	0.396
Mo head grade	%	0.013	0.015	0.017	0.017	0.019	0.016	0.012	0.011	0.011	0.010
Oxide/Sulfide Ore Mined (leaching)											
Oxide ore mined	kt	—	—	69	260	265	—	—	—	—	—
Cu head grade	%	0.000	0.000	0.396	0.626	0.786	0.000	0.000	0.000	0.000	0.000
Process Production											
Feed to Mill (sulfide)											
Sulfide ore feed	kt	26,559	27,818	30,263	30,646	29,485	25,387	24,858	24,843	24,704	24,901
Cu feed grade	%	0.437	0.500	0.538	0.551	0.492	0.448	0.386	0.365	0.371	0.396
Mo feed grade	%	0.013	0.015	0.017	0.017	0.019	0.016	0.012	0.011	0.011	0.010
Feed to Leach (sulfide/oxide)											
Sulfide/oxide ore feed	kt	—	—	69	260	265	—	—	—	—	—
Cu feed grade	%	0.000	0.000	0.396	0.626	0.786	0.000	0.000	0.000	0.000	0.000
Metal Recovery											
Concentration											
Cu recovered	kt	97.0	117.6	139.9	146.6	124.4	95.8	80.0	75.4	76.1	81.7
Mo recovered	kt	2.2	2.6	3.2	3.3	3.6	2.6	1.9	1.7	1.6	1.6
Leaching											
Cu recovered	kt	—	—	0.1	0.9	1.0	—	—	—	—	—
Payable Metals											

	Unit	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Cu payable	kt	94.2	114.1	135.8	143.0	121.7	93.0	77.6	73.2	73.9	79.3
Mo payable	kt	2.2	2.6	3.2	3.3	3.6	2.6	1.9	1.7	1.6	1.6
Metal Value											
Cu payable value	US$000	692,686	839,584	997,735	1,050,875	894,014	683,941	571,054	538,255	543,264	583,114
Mo payable value	US$000	42,752	52,383	63,530	64,490	70,448	52,154	37,215	33,958	32,136	31,515
Total Metal Value	***US$000***	***735,439***	***891,966***	***1,061,264***	***1,115,365***	***964,462***	***736,095***	***608,269***	***572,213***	***575,399***	***614,630***
Treatment and Refining Charges (TC&RCs)											
Cu concentrate TC&RCs	US$000	—	—	(6,828)	(7,161)	(6,131)	—	—	—	—	—
Cu (Ilo) anodes TC&RCs	US$000	(753)	(913)	(978)	(1,024)	(869)	(744)	(621)	(585)	(591)	(634)
Mo concentrate TC&RCs	US$000	(6,884)	(8,435)	(10,230)	(10,384)	(11,344)	(8,398)	(5,992)	(5,468)	(5,175)	(5,075)
Total TC&RCs	***US$000***	***(7,637)***	***(9,348)***	***(18,035)***	***(18,570)***	***(18,343)***	***(9,142)***	***(6,614)***	***(6,053)***	***(5,765)***	***(5,709)***
Transport Costs											
SX/EW cathodes transport	US$000	—	—	(8)	(52)	(60)	—	—	—	—	—
Cu concentrate transport	US$000	—	—	(2,451)	(2,570)	(2,201)	—	—	—	—	—
Ilo anodes transport	US$000	(292)	(353)	(378)	(396)	(336)	(288)	(240)	(227)	(229)	(245)
Ilo cathodes transport	US$000	(5,184)	(6,284)	(6,730)	(7,050)	(5,977)	(5,119)	(4,274)	(4,028)	(4,066)	(4,364)
Mo concentrate transport	US$000	(389)	(476)	(577)	(586)	(640)	(474)	(338)	(309)	(292)	(286)
Total Transport Costs	***US$000***	***(5,864)***	***(7,113)***	***(10,144)***	***(10,654)***	***(9,215)***	***(5,881)***	***(4,852)***	***(4,564)***	***(4,587)***	***(4,896)***
Net Smelter Return	***US$000***	***721,937***	***875,505***	***1,033,085***	***1,086,141***	***936,903***	***721,073***	***596,803***	***561,596***	***565,047***	***604,025***
Production Costs											
Mining	US$000	(257,718)	(255,640)	(263,767)	(247,404)	(205,592)	(187,016)	(173,923)	(223,899)	(173,243)	(145,685)
Process	US$000	(259,218)	(281,987)	(305,789)	(313,908)	(293,105)	(250,197)	(236,106)	(232,719)	(231,683)	(235,857)
G&A	US$000	—	—	—	—	—	—	—	—	—	—
Total Production Costs	***US$000***	***(516,937)***	***(537,626)***	***(569,555)***	***(561,312)***	***(498,697)***	***(437,213)***	***(410,029)***	***(456,618)***	***(404,926)***	***(381,542)***
MMR and SMT											
Modified Mining Royalty	US$000	(7,278)	(8,826)	(10,432)	(10,968)	(9,461)	(7,270)	(6,017)	(5,662)	(5,696)	(6,089)

	Unit	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Special Mining Tax	US$000	(1,288)	(4,693)	(8,646)	(10,619)	(8,099)	(3,395)	(348)	—	(777)	(2,555)
MMR and SMT	***US$000***	**(8,566)**	**(13,520)**	**(19,078)**	**(21,587)**	**(17,560)**	**(10,665)**	**(6,364)**	**(5,662)**	**(6,474)**	**(8,645)**
Net Operating Earnings	***US$000***	**196,435**	**324,360**	**444,452**	**503,242**	**420,646**	**273,195**	**180,410**	**99,317**	**153,647**	**213,839**
Taxes											
Employee profit share	US$000	(4,465)	(14,624)	(24,112)	(28,285)	(22,362)	(10,906)	(882)	—	(2,592)	(8,349)
Complementary mining pension fund	US$000	(257)	(841)	(1,386)	(1,626)	(1,286)	(627)	(51)	—	(149)	(480)
Income tax	US$000	(15,073)	(49,363)	(81,391)	(95,478)	(75,483)	(36,814)	(2,976)	—	(8,750)	(28,183)
Total Taxes	***US$000***	**(19,795)**	**(64,827)**	**(106,889)**	**(125,390)**	**(99,130)**	**(48,347)**	**(3,908)**	**—**	**(11,491)**	**(37,013)**
Capital Costs											
Sustaining capital	US$000	(146,052)	(141,040)	(102,922)	(72,941)	(58,703)	(44,189)	(77,536)	(98,960)	(57,905)	(39,006)
Total Capital Costs	***US$000***	***(146,052)***	***(141,040)***	***(102,922)***	***(72,941)***	***(58,703)***	***(44,189)***	***(77,536)***	***(98,960)***	***(57,905)***	***(39,006)***
Closure Cost											
Closure cost	US$000	(97)	—	(191)	(9,524)	(9,521)	(9,521)	(44,665)	(10,240)	(6,762)	—
Working Capital											
Change in Working Capital	US$000	19,191	(23,380)	(23,785)	(9,279)	19,192	30,889	18,132	9,629	(4,727)	(8,172)
Net Cash Flow											
Before tax	US$000	69,477	159,940	317,553	411,499	371,613	250,374	76,341	(255)	84,253	166,661
After tax	US$000	49,682	95,113	210,664	286,109	272,482	202,027	72,433	(255)	72,762	129,648

Note: Numbers have been rounded.

Table 19-5: Cash Flow Forecast on an Annual Basis (2051–2060)

	Unit	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060
Mine Production											
Waste mined	kt	49,993	36,897	29,508	30,272	39,674	40,255	21,013	23,586	21,989	17,990
Total ore mined	kt	25,007	25,512	25,492	25,543	25,519	26,200	27,227	27,369	28,011	27,942
Sulfide Ore Mined (concentration)											
Sulfides ore mined	kt	25,007	25,512	25,492	25,543	25,519	26,200	27,227	27,369	28,011	27,942
Cu head grade	%	0.438	0.446	0.476	0.481	0.517	0.519	0.512	0.511	0.507	0.491
Mo head grade	%	0.012	0.011	0.013	0.013	0.016	0.018	0.016	0.017	0.016	0.017
Oxide/Sulfide Ore Mined (leaching)											
Oxide ore mined	kt	—	—	—	—	—	—	—	—	—	—
Cu head grade	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Process Production											
Feed to Mill (sulfide)											
Sulfide ore feed	kt	25,007	25,512	25,492	25,543	25,519	26,200	27,227	27,369	28,011	27,942
Cu feed grade	%	0.438	0.446	0.476	0.481	0.517	0.519	0.512	0.511	0.507	0.491
Mo feed grade	%	0.012	0.011	0.013	0.013	0.016	0.018	0.016	0.017	0.016	0.017
Feed to Leach (sulfide/oxide)											
Sulfide/oxide ore feed	kt	—	—	—	—	—	—	—	—	—	—
Cu feed grade	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Metal Recovery											
Concentration											
Cu recovered	kt	90.9	94.5	101.1	102.3	110.2	114.2	117.4	118.3	120.0	116.0
Mo recovered	kt	1.9	1.8	2.0	2.1	2.6	3.0	2.8	3.0	2.8	3.0
Leaching											
Cu recovered	kt	—	—	—	—	—	—	—	—	—	—
Payable Metals											

	Unit	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060
Cu payable	kt	88.2	91.7	98.2	99.3	107.0	110.7	113.8	114.7	116.5	112.7
Mo payable	kt	1.9	1.8	2.0	2.1	2.6	3.0	2.8	3.0	2.8	3.0
Metal Value											
Cu payable value	US$000	649,042	674,819	722,121	730,766	786,768	813,339	836,518	842,525	856,729	828,709
Mo payable value	US$000	36,968	35,606	40,185	41,404	50,601	58,717	55,379	58,945	55,282	59,825
Total Metal Value	***US$000***	***686,010***	***710,425***	***762,306***	***772,169***	***837,369***	***872,056***	***891,896***	***901,470***	***912,011***	***888,534***
Treatment and Refining Charges (TC&RCs)											
Cu concentrate TC&RCs	US$000	—	—	—	—	—	(5,571)	(5,730)	(5,771)	—	—
Cu (Ilo) anodes TC&RCs	US$000	(706)	(734)	(785)	(795)	(856)	(798)	(821)	(827)	(932)	(901)
Mo concentrate TC&RCs	US$000	(5,953)	(5,733)	(6,471)	(6,667)	(8,148)	(9,455)	(8,917)	(9,491)	(8,902)	(9,633)
Total TC&RCs	***US$000***	***(6,659)***	***(6,467)***	***(7,256)***	***(7,462)***	***(9,004)***	***(15,824)***	***(15,468)***	***(16,089)***	***(9,833)***	***(10,535)***
Transport Costs											
SX/EW cathodes transport	US$000	—	—	—	—	—	—	—	—	—	—
Cu concentrate transport	US$000	—	—	—	—	—	(2,000)	(2,057)	(2,072)	—	—
Ilo anodes transport	US$000	(273)	(284)	(304)	(308)	(331)	(309)	(318)	(320)	(361)	(349)
Ilo cathodes transport	US$000	(4,858)	(5,050)	(5,405)	(5,469)	(5,888)	(5,491)	(5,648)	(5,688)	(6,412)	(6,202)
Mo concentrate transport	US$000	(336)	(324)	(365)	(376)	(460)	(534)	(503)	(536)	(502)	(544)
Total Transport Costs	***US$000***	***(5,467)***	***(5,658)***	***(6,074)***	***(6,153)***	***(6,679)***	***(8,334)***	***(8,526)***	***(8,616)***	***(7,275)***	***(7,095)***
Net Smelter Return	***US$000***	***673,885***	***698,300***	***748,976***	***758,555***	***821,686***	***847,898***	***867,903***	***876,765***	***894,903***	***870,905***
Production Costs											
Mining	US$000	(146,792)	(122,713)	(109,167)	(111,176)	(130,582)	(134,501)	(96,762)	(102,620)	(101,338)	(93,241)
Process	US$000	(243,324)	(254,344)	(258,522)	(259,700)	(264,646)	(264,929)	(274,590)	(276,160)	(289,865)	(286,772)
G&A	US$000	—	—	—	—	—	—	—	—	—	—
Total Production Costs	***US$000***	***(390,116)***	***(377,057)***	***(367,689)***	***(370,876)***	***(395,228)***	***(399,430)***	***(371,352)***	***(378,780)***	***(391,203)***	***(380,013)***
MMR and SMT											
Modified Mining Royalty	US$000	(6,794)	(7,040)	(8,462)	(9,070)	(11,302)	(11,905)	(14,709)	(14,860)	(15,171)	(14,689)

	Unit	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060
Special Mining Tax	US$000	(4,613)	(6,148)	(8,809)	(9,321)	(11,231)	(11,780)	(13,957)	(14,100)	(14,389)	(13,947)
MMR and SMT	***US$000***	**(11,407)**	**(13,187)**	**(17,271)**	**(18,390)**	**(22,533)**	**(23,685)**	**(28,666)**	**(28,961)**	**(29,561)**	**(28,637)**
Net Operating Earnings	***US$000***	**272,362**	**308,055**	**364,016**	**369,288**	**403,925**	**424,783**	**467,885**	**469,025**	**474,139**	**462,255**
Taxes											
Employee profit share	US$000	(13,566)	(16,872)	(22,047)	(22,983)	(26,580)	(27,728)	(31,044)	(31,362)	(31,986)	(31,053)
Complementary mining pension fund	US$000	(780)	(970)	(1,268)	(1,322)	(1,528)	(1,594)	(1,785)	(1,803)	(1,839)	(1,786)
Income tax	US$000	(45,792)	(56,953)	(74,421)	(77,581)	(89,722)	(93,597)	(104,792)	(105,865)	(107,972)	(104,822)
Total Taxes	***US$000***	**(60,138)**	**(74,795)**	**(97,736)**	**(101,886)**	**(117,831)**	**(122,919)**	**(137,621)**	**(139,030)**	**(141,797)**	**(137,661)**
Capital Costs											
Sustaining capital	US$000	(54,130)	(53,759)	(69,441)	(67,169)	(62,481)	(125,040)	(105,599)	(69,397)	(43,524)	(48,342)
Total Capital Costs	***US$000***	***(54,130)***	***(53,759)***	***(69,441)***	***(67,169)***	***(62,481)***	***(125,040)***	***(105,599)***	***(69,397)***	***(43,524)***	***(48,342)***
Closure Cost											
Closure cost	US$000	—	—	—	—	—	—	—	—	—	—
Working Capital											
Change in Working Capital	US$000	(10,677)	(4,940)	(8,864)	(1,244)	(8,206)	(4,565)	(5,173)	(881)	(1,287)	2,906
Net Cash Flow											
Before tax	US$000	207,554	249,356	285,712	300,875	333,238	295,178	357,113	398,747	429,328	416,820
After tax	US$000	147,416	174,560	187,976	198,989	215,407	172,259	219,492	259,717	287,531	279,159

Note: Numbers have been rounded.

Table 19-6: Cash Flow Forecast on an Annual Basis (2061–2070)

	Unit	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
Mine Production											
Waste mined	kt	10,221	8,456	7,083	7,635	4,027	2,570	2,459	1,347	629	—
Total ore mined	kt	28,059	28,387	29,003	30,104	30,973	31,063	30,932	30,917	20,919	—
Sulfide Ore Mined (concentration)											
Sulfides ore mined	kt	28,059	28,387	29,003	30,104	30,973	31,063	30,932	30,917	20,919	—
Cu head grade	%	0.479	0.476	0.485	0.511	0.512	0.496	0.461	0.417	0.369	0.000
Mo head grade	%	0.016	0.017	0.018	0.020	0.022	0.023	0.025	0.027	0.030	0.000
Oxide/Sulfide Ore Mined (leaching)											
Oxide ore mined	kt	—	—	—	—	—	—	—	—	—	—
Cu head grade	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Process Production											
Feed to Mill (sulfides)											
Sulfide ore feed	kt	28,059	28,387	29,003	30,104	30,973	31,063	30,932	30,917	20,919	—
Cu feed grade	%	0.479	0.476	0.485	0.511	0.512	0.496	0.461	0.417	0.369	0.000
Mo feed grade	%	0.016	0.017	0.018	0.020	0.022	0.023	0.025	0.027	0.030	0.000
Feed to Leach (sulfide/oxide)											
Sulfide/oxide ore feed	kt	—	—	—	—	—	—	—	—	—	—
Cu feed grade	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Metal Recovery											
Concentration											
Cu recovered	kt	113.9	114.7	119.6	131.5	136.3	132.4	122.5	110.6	66.0	—
Mo recovered	kt	2.8	3.0	3.4	3.8	4.3	4.6	5.0	5.3	4.1	—
Leaching											
Cu recovered	kt	—	—	—	—	—	—	—	—	—	—
Payable Metals											

	Unit	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
Cu payable	kt	110.5	111.3	116.1	127.6	132.2	128.6	118.8	107.4	64.1	—
Mo payable	kt	2.8	3.0	3.4	3.8	4.3	4.6	5.0	5.3	4.1	—
Metal Value											
Cu payable value	US$000	813,162	819,030	854,248	938,945	971,236	945,726	872,606	789,941	471,558	—
Mo payable value	US$000	56,386	59,979	66,769	75,690	84,773	90,631	98,679	105,360	80,391	—
Total Metal Value	***US$000***	***869,547***	***879,010***	***921,017***	***1,014,635***	***1,056,008***	***1,036,357***	***971,285***	***895,301***	***551,950***	**—**
Treatment and Refining Charges (TC&RCs)											
Cu concentrate TC&RCs	US$000	—	—	—	—	(6,653)	—	(5,977)	—	—	—
Cu (Ilo) anodes TC&RCs	US$000	(884)	(891)	(929)	(1,021)	(953)	(1,029)	(856)	(859)	(513)	—
Mo concentrate TC&RCs	US$000	(9,079)	(9,658)	(10,751)	(12,188)	(13,650)	(14,593)	(15,889)	(16,965)	(12,945)	—
Total TC&RCs	***US$000***	***(9,964)***	***(10,549)***	***(11,680)***	***(13,209)***	***(21,256)***	***(15,622)***	***(22,723)***	***(17,824)***	***(13,458)***	**—**
Transport Costs											
SX/EW cathodes transport	US$000	—	—	—	—	—	—	—	—	—	—
Cu concentrate transport	US$000	—	—	—	—	(2,388)	—	(2,146)	—	—	—
Ilo anodes transport	US$000	(342)	(345)	(360)	(395)	(369)	(398)	(331)	(332)	(198)	—
Ilo cathodes transport	US$000	(6,086)	(6,130)	(6,393)	(7,027)	(6,557)	(7,078)	(5,891)	(5,912)	(3,529)	—
Mo concentrate transport	US$000	(512)	(545)	(607)	(688)	(770)	(824)	(897)	(958)	(731)	—
Total Transport Costs	***US$000***	***(6,941)***	***(7,020)***	***(7,360)***	***(8,110)***	***(10,085)***	***(8,300)***	***(9,265)***	***(7,202)***	***(4,458)***	**—**
Net Smelter Return	***US$000***	***852,643***	***861,441***	***901,977***	***993,316***	***1,024,668***	***1,012,435***	***939,297***	***870,275***	***534,034***	**—**
Production Costs											
Mining	US$000	(77,817)	(74,862)	(73,468)	(77,329)	(71,870)	(69,571)	(69,034)	(64,993)	(43,333)	—
Process	US$000	(286,238)	(289,247)	(297,123)	(313,190)	(313,997)	(321,044)	(305,535)	(305,676)	(201,061)	—
G&A	US$000	—	—	—	—	—	—	—	—	—	—
Total Production Costs	***US$000***	***(364,055)***	***(364,109)***	***(370,592)***	***(390,519)***	***(385,866)***	***(390,616)***	***(374,568)***	***(370,669)***	***(244,395)***	**—**
MMR and SMT											
Modified Mining Royalty	US$000	(15,012)	(15,651)	(17,511)	(21,381)	(23,841)	(23,480)	(20,940)	(17,131)	(8,058)	—

	Unit	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070
Special Mining Tax	US$000	(14,123)	(14,629)	(16,138)	(19,287)	(21,181)	(20,867)	(18,766)	(15,741)	(7,847)	—
MMR and SMT	***US$000***	**(29,135)**	**(30,280)**	**(33,648)**	**(40,669)**	**(45,023)**	**(44,347)**	**(39,705)**	**(32,873)**	**(15,905)**	**—**
Net Operating Earnings	***US$000***	**459,453**	**467,052**	**497,737**	**562,129**	**593,779**	**577,472**	**525,023**	**466,733**	**273,734**	**—**
Taxes											
Employee profit share	US$000	(31,035)	(31,841)	(34,392)	(39,750)	(42,576)	(41,968)	(38,267)	(33,396)	(18,088)	—
Complementary mining pension fund	US$000	(1,784)	(1,831)	(1,978)	(2,286)	(2,448)	(2,413)	(2,200)	(1,920)	(1,040)	—
Income tax	US$000	(104,759)	(107,482)	(116,090)	(134,179)	(143,716)	(141,664)	(129,170)	(112,730)	(61,058)	—
Total Taxes	***US$000***	**(137,578)**	**(141,154)**	**(152,459)**	**(176,215)**	**(188,739)**	**(186,045)**	**(169,637)**	**(148,047)**	**(80,186)**	**—**
Capital Costs											
Sustaining capital	US$000	(38,664)	(54,153)	(67,766)	(38,206)	(34,584)	(46,779)	(32,932)	(32,786)	(21,348)	—
Total Capital Costs	***US$000***	***(38,664)***	***(54,153)***	***(67,766)***	***(38,206)***	***(34,584)***	***(46,779)***	***(32,932)***	***(32,786)***	***(21,348)***	**—**
Closure Cost											
Closure cost	US$000	—	—	—	—	—	—	—	(6,827)	(6,895)	(19,030)
Working Capital											
Change in Working Capital	US$000	1,791	(1,402)	(5,975)	(12,987)	(6,002)	2,955	9,659	11,036	44,084	67,864
Net Cash Flow											
Before tax	US$000	422,581	411,497	423,997	510,936	553,193	533,649	501,751	438,157	289,574	48,834
After tax	US$000	285,003	270,343	271,537	334,721	364,454	347,604	332,113	290,110	209,388	48,834

Note: Numbers have been rounded.

Table 19-7: Cash Flow Forecast on an Annual Basis (2071–2077)

	Unit	2071	2072	2073	2074	2075	2076	2077
Mine Production								
Waste mined	kt	—	—	—	—	—	—	—
Total ore mined	kt	—	—	—	—	—	—	—
Sulfide Ore Mined (concentration)								
Sulfides ore mined	kt	—	—	—	—	—	—	—
Cu head grade	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mo head grade	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Oxide/Sulfide Ore Mined (leaching)								
Oxide ore mined	kt	—	—	—	—	—	—	—
Cu head grade	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Process Production								
Feed to Mill (sulfides)								
Sulfide ore feed	kt	—	—	—	—	—	—	—
Cu feed grade	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mo feed grade	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Feed to Leach (sulfide/oxide)								
Sulfide/oxide ore feed	kt	—	—	—	—	—	—	—
Cu feed grade	%	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Metal Recovery								
Concentration								
Cu recovered	kt	—	—	—	—	—	—	—
Mo recovered	kt	—	—	—	—	—	—	—
Leaching								
Cu recovered	kt	—	—	—	—	—	—	—
Payable Metals								

	Unit	2071	2072	2073	2074	2075	2076	2077
Cu payable	kt	—	—	—	—	—	—	—
Mo payable	kt	—	—	—	—	—	—	—
Metal Value								
Cu payable value	US$000	—	—	—	—	—	—	—
Mo payable value	US$000	—	—	—	—	—	—	—
Total Metal Value	***US$000***	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Treatment and Refining Charges (TC&RCs)								
Cu concentrate TC&RCs	US$000	—	—	—	—	—	—	—
Cu (Ilo) anodes TC&RCs	US$000	—	—	—	—	—	—	—
Mo concentrate TC&RCs	US$000	—	—	—	—	—	—	—
Total TC&RCs	***US$000***	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Transport Costs								
SX/EW cathodes transport	US$000	—	—	—	—	—	—	—
Cu concentrate transport	US$000	—	—	—	—	—	—	—
Ilo anodes transport	US$000	—	—	—	—	—	—	—
Ilo cathodes transport	US$000	—	—	—	—	—	—	—
Mo concentrate transport	US$000	—	—	—	—	—	—	—
Total Transport Costs	***US$000***	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Net Smelter Return	***US$000***	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Production Costs								
Mining	US$000	—	—	—	—	—	—	—
Process	US$000	—	—	—	—	—	—	—
G&A	US$000	—	—	—	—	—	—	—
Total Production Costs	***US$000***	**—**	**—**	**—**	**—**	**—**	**—**	**—**
MMR and SMT								
Modified Mining Royalty	US$000	—	—	—	—	—	—	—

	Unit	2071	2072	2073	2074	2075	2076	2077
Special Mining Tax	US$000	—	—	—	—	—	—	—
MMR and SMT	***US$000***	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Net Operating Earnings	***US$000***	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Taxes								
Employee profit share	US$000	—	—	—	—	—	—	—
Complementary mining pension fund	US$000	—	—	—	—	—	—	—
Income tax	US$000	—	—	—	—	—	—	—
Total Taxes	***US$000***	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Capital Costs								
Sustaining capital	US$000	—	—	—	—	—	—	—
Total Capital Costs	***US$000***	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Closure Cost								
Closure cost	US$000	(105,618)	(614)	(610)	(476)	(476)	(476)	—
Working Capital								
Change in Working Capital	US$000	—	—	—	—	—	—	—
Net Cash Flow								
Before tax	US$000	(105,618)	(614)	(610)	(476)	(476)	(476)	—
After tax	US$000	(105,618)	(614)	(610)	(476)	(476)	(476)	—

Note: Numbers have been rounded.

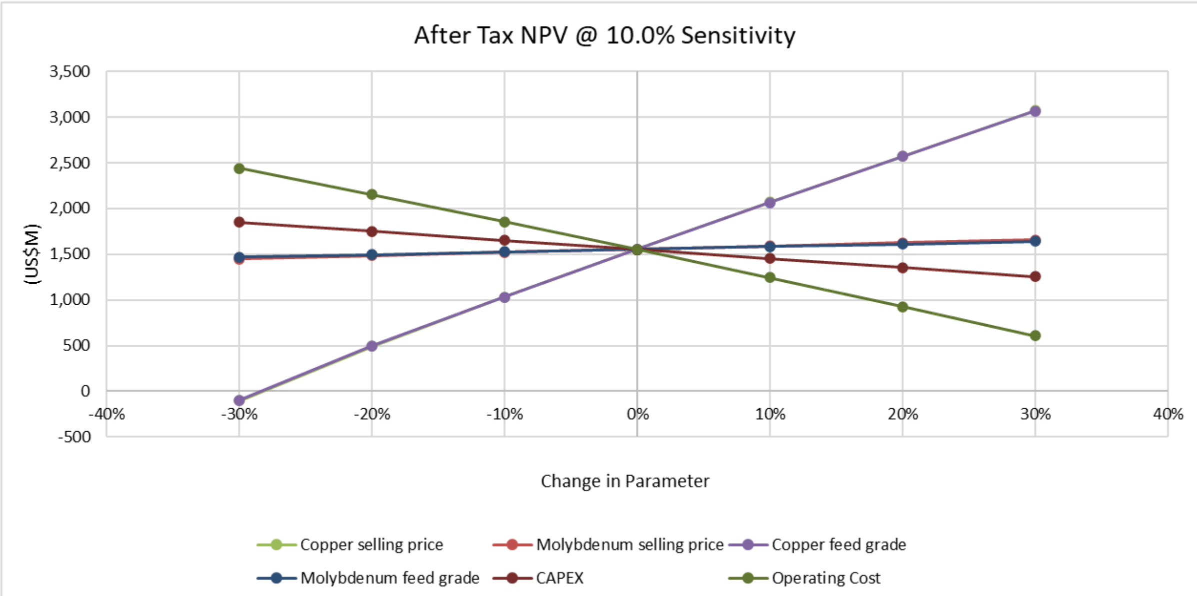
19.5 Sensitivity Analysis

A sensitivity analysis was performed to identify potential impacts on the after-tax NPV of variations in metal prices, grades, sustaining capital costs and operating costs. The results of this analysis are presented in Figure 19-1 (NPV). For the purpose of the sensitivity to metal grades, it was assumed that the capacity of the processing facilities are not a constraint.

The Cuajone Operations are most sensitive to fluctuations in copper price and grade. It is less sensitive to changes in operating costs and capital costs. The operations are least sensitive to variations in molybdenum price and grade.

Table 19-8 presents the after-tax NPV at a range of discount rates from 8–12% with the base case highlighted.

Figure 19-1: After-Tax NPV Sensitivity (10% discount rate)



Note: Figure prepared by Wood, 2021.

Table 19-8: After-Tax NPV Sensitivity to Discount Rates (base case is highlighted)

Discount Rate	After-Tax NPV (US$ M)
NPV @ 8%	1,959.1
NPV @ 9%	1,735.4
NPV @ 10%	**1,553.8**
NPV @ 11%	1,404.2
NPV @ 12%	1,279.4

20 ADJACENT PROPERTIES

This Chapter is not relevant to this Report.

21 OTHER RELEVANT DATA AND INFORMATION

This Chapter is not relevant to this Report.

22 INTERPRETATION AND CONCLUSIONS

22.1 Introduction

Wood notes the following interpretations and conclusions, based on the review of data available for this Report.

22.2 Mineral Tenure, Surface Rights, Water Rights, Royalties and Agreements

The Cuajone Operations and the Ilo smelter/refinery are owned and operated by Southern Peru Copper Corporation, Sucursal del Perú.

The Project consists of a single mining concession, "Acumulación Cuajone", which covers an area of 15,024.5 ha. Southern Copper also holds two beneficiation concessions.

Southern Copper holds a "right of free use" granted by the Peruvian State on the uncultivated lands in the Toquepala mining concession and Quebrada Honda TSF areas. This surface right will be maintained as long as the mining concessions remains in force.

There are granted easements covering the TSF and related facilities, the TSF pipelines, and water pipelines from the Suches lagoon to the Cuajone Operations.

Southern Copper has both groundwater and surface water usage licenses in place.

A mining royalty is payable to the Government of Peru, based on operating income margins with graduated rates ranging from 1–12% of operating profits. There is also a mining tax payable, based on operating income, with rates that range from 2–8.4%.

22.3 Geology and Mineralization

The Cuajone deposit is considered to be an example of a copper–molybdenum porphyry deposit.

The geological understanding of the settings, lithologies, and structural and alteration controls on mineralization is sufficient to support estimation of mineral resources.

22.4 Exploration, Drilling, and Sampling

The mine has been operating since 1976, and all exploration data generated prior to mine start-up is long superseded by mining and drill data.

Drilling totals 1,561 core, churn and RC holes for 437,060 m. Drilling that supports mineral resource estimation consists of 870 core, churn and RC drill holes (301,037 m).

No material factors were identified with the data collection from the drill programs that could significantly affect mineral resource estimation. Wood notes that no formal survey certificates were available; hence, survey data in the database could not be verified against an original hard-copy document.

The term “true thickness” is not generally applicable to porphyry-style deposits as the entire rock mass is potentially mineralized and there is often no preferred orientation to the mineralization. In areas that display porphyry-style mineralization, in general, most drill holes intersect mineralized zones at an angle, and the drill hole intercept widths reported for those drill holes are typically greater than the true widths of the mineralization at the drill intercept point.

Sampling methods, sample preparation, analysis and security were acceptable for mineral resource estimation. The collected sample data adequately reflect deposit dimensions, true widths of mineralization, and the style of the deposits. Sampling is representative of the copper and molybdenum grades.

Quality control programs for pre-2017 drill campaigns are not recorded. Quality control programs for exploration core holes and bast holes were implemented in 2017. Wood reviewed the available data and found no material issues. Southern Copper submitted selected samples that had been initially assayed at either the internal mine laboratory or the internal Ilo laboratory facility to external accredited laboratories for analytical checks. Results generally indicated acceptable correspondence. However, Wood noted that reproducibility of the samples from before 2016 is poorer than expected, suggesting potential issues with sampling, sample preparation, assaying or database integrity for the samples analyzed at the Cuajone mine laboratory before the implementation of QA/QC programs and use of the Ilo laboratory.

22.5 Data Verification

Wood is of the opinion that the data verification programs for Project data adequately support the geological interpretations, the analytical and database quality, and therefore support the use of the data in mineral resource estimation.

22.6 Metallurgical Testwork

Metallurgical testwork and associated analytical procedures were appropriate to the mineralization type, appropriate to establish the optimal processing routes, and were performed using samples that are typical of the mineralization styles found within the open pit.

Samples selected for testing were representative of the various types and styles of mineralization. Samples were selected from a range of depths within the deposit.

Recovery factors estimated are based on appropriate metallurgical testwork, and are appropriate to the mineralization types and the selected process routes.

The copper and molybdenum concentrates produced are considered clean concentrates as they do not contain significant amounts of any deleterious elements.

22.7 Mineral Resource Estimates

The mineral resource estimate for the Project conform to industry-accepted practices, and is reported using the definitions set out in SK1300.

There is upside potential for the estimates if mineralization that is currently classified as inferred can be upgraded to higher-confidence mineral resource categories.

Areas of uncertainty that may materially impact all of the mineral resource estimates include: changes to long-term metal price and exchange rate assumptions; changes in local interpretations of mineralization geometry such as presence of unrecognized mineralization off-shoots; faults, dikes and other structures; and continuity of mineralized zones; changes to geological and grade shape, and geological and grade continuity assumptions; changes to metallurgical recovery assumptions; changes to the input assumptions used to derive the conceptual open pit shell that is used to constrain the estimates; changes to the forecast dilution and mining recovery assumptions; changes to the cut-off values applied to the estimates; variations in geotechnical (including seismicity), hydrogeological and mining method assumptions; and changes to environmental, permitting and social license assumptions.

22.8 Mineral Reserve Estimates

The mineral reserve estimate for the Project conforms to industry-accepted practices, and is reported using the definitions set out in SK1300. Mineral reserves were converted from measured and indicated mineral resources, assuming conventional open pit mining methods and use of conventional equipment. Mineral resources were converted to mineral reserves using a detailed mine plan, an engineering analysis, and consideration of appropriate modifying factors.

Areas of uncertainty that may materially impact the mineral reserve estimates include: changes to long-term metal price and exchange rate assumptions; changes to metallurgical recovery assumptions; changes to the input assumptions used to derive the mineable shapes applicable to the open pit mining methods used to constrain the estimates; changes to the forecast dilution and mining recovery assumptions; changes to the NSR cut-off values applied to the estimates; variations in geotechnical (including seismicity), hydrogeological and mining method assumptions; and changes to environmental, permitting and social license assumptions.

22.9 Mining Methods

Open pit operations are conducted using conventional methods and a conventional truck and shovel fleet. Open pit mining operations are conducted year-round.

The mine plans are based on the current knowledge of geotechnical, hydrological, mining and processing information.

Nine pit phases remain in the LOM plan, starting with phase 6 and ending with phase 10C. Three pit phases will be operational at any one time, to ensure that production rates can be met. A maximum mining capacity per phase of 90 Mt/a is assumed, with a maximum vertical advance rate of 10 benches per year. The mine plan assumed a maximum mining capacity of 115 Mt of annual movement and a nominal processing rate of 90 kt/d of sulfide ore at the concentration facility.

22.10 Recovery Methods

The processing methods are conventional to the industry. The comminution and recovery processes are widely used with no significant elements of technological innovation.

The process plant flowsheet designs were based on testwork results, previous study designs and industry-standard practices.

The two Cuajone heap leach facilities were designed to treat oxide ores and produce a copper-rich PLS that is sent to the Toquepala Operations for SX/EW recovery. The Cuajone concentrator treats sulfide material to produce copper and molybdenum concentrates that are sent to the Ilo smelter and refinery to produce copper cathodes as the final product.

The process plants will produce variations in recovery due to the day-to-day changes in ore type or combinations of ore type being processed. These variations are expected to trend to the forecast recovery value for monthly or longer reporting periods.

The Ilo smelter processes the copper concentrates from the Cuajone and Toquepala concentrators and produces copper anodes for the Ilo refinery. The Ilo refinery has the capacity to produce 125,000 kg Ag, 840 kg Au, and 50,000 kg Se annually.

22.11 Infrastructure

Infrastructure required to support open pit mining operations is in place.

The remaining capacity in the Quebrada Honda TSF will support operations until approximately the end of 2035. Southern Copper is currently evaluating alternatives of TSF expansions or new disposal methods to accommodate additional tailings after the Quebrada Honda TSF reaches its ultimate capacity.

22.12 Market Studies

The marketing approach is consistent with what is publicly available on industry norms, and the information can be used in mine planning and financial analyses for the products from the Cuajone Operations in the context of this Report.

The principal payable commodities within the concentrates from the Cuajone Operations are copper, gold, and molybdenum. The cathodes, anodes, and by-products produced at the Ilo smelter and refinery are considered by Southern Copper to be readily marketable. The principal payable commodities are copper, silver, gold and selenium.

Southern Copper employs a corporate strategy that is in line with the company's marketing experience, and experience with obtaining long-term contracts with strategic business partners in the Asian and European markets, as well as annual contracts with other active market participants.

Normally over 60% of the molybdenum concentrate is sold to Chile, with the remainder sold into the Northern Europe, Asia and the US markets. Cathode copper is sold onto the Asian, European, Brazilian and/or North American markets.

To establish the copper price forecasts Wood used a combination of information derived from 22 financial institutions, from pricing used in technical reports filed with Canadian regulatory authorities over the previous 12-month period, from pricing reported by major mining companies in public filings such as annual reports in the previous 12-month period, spot pricing, and three-year trailing average pricing. Wood considers that a long-term price forecast of US$3.30/lb Cu is reasonable.

It is in accordance with industry-accepted practice to use higher metal prices for the mineral resource estimates than the pricing used for mineral reserves. The copper price forecast of US$3.30/lb was increased by 15% to provide the mineral resource estimate copper price estimate of US$3.80/lb.

Wood reviewed the Southern Copper long term forecast price for molybdenum of US$9.00/lb, and concluded that the molybdenum price selected by Southern Copper is reasonable and conservative compared to what others have recently been using in the industry. Wood considers there is a reasonable probability that the realized price of molybdenum will be at or higher than forecast US$9.00/lb over the projected LOM. The Southern Copper molybdenum price forecast of US$9.00/lb was increased by 15% to US$10.35/lb to provide the input to the mineral resource constraining pit shell and NSR cut-off.

Cuajone Operations concentrates are sent to the Ilo Smelter and Refinery for processing to produce refined cathodes. When the production from the Cuajone Operations exceeds the smelter's capacity, a portion is sold to third parties. In recent years, these sales to third parties Cuajone Operations concentrates have represented about 20–25% of the annual production. Approximately 95% of the production of refined cathodes is sold under annual contracts with industrial customers (mainly copper rod producers), with whom Southern Copper has had a commercial relationship for many years, and about 5% is sold on the spot market.

The largest in-place contracts other than for product sales cover items such as bulk commodities, operational and technical services, mining and process equipment, and administrative support services. Contracts are negotiated and renewed as needed. Contract terms are typical of similar contracts that Southern Copper has entered into in Peru.

22.13 Environmental, Permitting and Social Considerations

Baseline and supporting studies were completed in support of current and proposed mine designs, operations, and permitting.

As per permit requirements, Southern Copper has a number of monitoring programs in place.

The closure cost estimate for the Cuajone Operations is US$251.8 M.

The Cuajone Operations and the Ilo smelter/refinery have all of the required permits to operate. The operations maintain a permit register.

Southern Copper has communication channels and tools in place, based on the company's community development model, which allow the company to recognize potential conflicts early, to work with the community to find appropriate solutions to address their concerns, and generate positive social license conditions for the continued operation of Southern Copper's mining projects. Wood considers that social risks to the Project are well understood by Southern Copper and are manageable for the Cuajone Operations.

22.14 Capital Cost Estimates

Capital cost estimates are at a minimum at a pre-feasibility level of confidence, having an accuracy level of ±25% and a contingency range not exceeding 15%.

The capital cost estimate for the LOM is US$4,617.4 M.

22.15 Operating Cost Estimates

Operating cost estimates are at a minimum at a pre-feasibility level of confidence, having an accuracy level of ±25% and a contingency range not exceeding 15%.

The operating cost estimate for the LOM is 21,824.2 M.

22.16 Economic Analysis

The financial analysis was performed using a DCF method. Net annual cash flows were estimated projecting yearly cash inflows (or revenues) and subtracting projected yearly cash outflows (such as capital and operating costs, and taxes).

The financial analysis was based on an after-tax discount rate of 10%. Cash flows were assumed to occur at the end of each year and were be discounted to the beginning of 2022 (year 1 of the economic analysis). Costs projected within the cash flows are based on constant Q4 2021 US dollars. Revenue was calculated from the recoverable metal and the long-term forecasts of metal prices and exchange rates. Recoverable metal and products include those recovered at the Ilo smelter and refinery from the copper concentrate feed from the mine operation.

The Cuajone Operations are anticipated to generate a pre-tax NPV of US$2,528.5M at a 10.0% discount rate and an after-tax NPV of US$1,553.8 M at a 10.0% discount rate.

As the mine is operating, and initial capital is already sunk, considerations of IRR and payback are not relevant.

The Cuajone Operations are most sensitive to fluctuations in copper price and grade. It is less sensitive to changes in operating costs and capital costs. The operations are least sensitive to variations in molybdenum price and grade.

22.17 Risks and Opportunities

Factors that may affect the mineral resource and mineral reserve estimates were identified in Chapter 11.12.2 and Chapter 12.3.2 respectively.

22.17.1 Risks

Risks to the Cuajone Operations include:

- The mineral reserve estimates are sensitive to metal prices. Lower metal prices than forecast in the LOM plan may require revisions to the mine plan, with impacts to the mineral reserve estimates and the economic analysis that supports the mineral reserve estimates
- Geotechnical and hydrological assumptions used in mine planning are based on historical performance, and to date historical performance has been a reasonable predictor of current conditions. Any changes to the geotechnical, including seismicity, and hydrological assumptions could affect mine planning, affect capital cost estimates if any major rehabilitation is required due to a geotechnical (seismic) or hydrological event, affect operating costs due to mitigation measures that may need to be imposed, and impact the economic analysis that supports the mineral reserve estimates
- An increase in the clay content of the deposit could have an effect on the process flow, resulting in treatment capacity reduction and increases in operating costs when pumping tailings material to the TSF
- The Quebrada Honda TSF does not have sufficient storage capacity for the LOM. The mine plan and capital cost estimate assume that a new facility location can be obtained, designs completed and approved by the relevant regulatory authorities prior to approximately the end of 2035. If the TSF is not available by the time envisaged, this could affect the mineral reserves, capital and operating cost estimates, and the economic analysis

- Wood has assumed that the new TSF will be a co-stack (dry-stack) facility and has estimated capital and operating costs for such a facility. If the final TSF option uses a different disposal method, this could affect the mineral reserves, capital and operating cost estimates, and the economic analysis
- The new Global Industry Standard on Tailings Management (GISTM) provides a set of industry Standard to guide design and management of TSF's. Members and non-members of International Council on Mining and Metals (ICMM) are required to be in compliance with the GISTM over the next several years. The TSF design needs to be revisited and be revised as needed to be in full compliance with the recently-published global tailings standard (GISTM, 2020). This may result in changes to the design criteria. Such changes may result in increases to the capital cost estimates, and changes to the operating cost estimates, which could affect the mineral reserve estimates
- Labor cost increases or productivity decreases, particularly due to the impact of Covid-19, could also impact the estimated mineral reserves, operating cost estimates and the economic analysis
- Commodity price increases for key consumables such diesel, electricity, tires and chemicals would negatively impact the stated mineral reserves because of the effect on the forecast operating costs
- Assumed permitting and project development timelines may be longer than anticipated for the new TSF
- Political risk from challenges to mining licenses and/or Southern Copper's right to operate.

22.17.2 Opportunities

Opportunities include:

- Conversion of some or all of the measured and indicated mineral resources currently reported exclusive of mineral reserves to mineral reserves, with appropriate supporting studies;
- Upgrade of some or all of the inferred mineral resources to higher-confidence categories, such that such better-confidence material could be used in mineral reserve estimation;

- Higher metal prices than forecast could present upside sales opportunities and potentially an increase in predicted Project economics.

22.18 Conclusions

Under the assumptions presented in this Report, the Cuajone Operations have a positive cash flow, and mineral reserve estimates can be supported.

23 RECOMMENDATIONS

23.1 Introduction

The recommended work programs total US$1.2–US$1.9 M.

23.2 Internal Controls

In numerous cases when preparing this Report, Wood requested copies of internal protocols, management plans, and registers, which were not forthcoming. Wood recommends that Southern Copper establish a controlled document database where these types of documentation are stored and maintained for currency, so that they are readily available if requested by Southern Copper staff or external reviewers and auditors.

This work is estimated at US$0.1–US$0.2 M.

23.3 Database

A high rate of unavailable drill hole documentation was noted, and systematic storage of supporting documentation is not part of the current procedures. Wood recommends that a document storage system be implemented and all supporting documentation be properly stored.

A verification program to confirm recovery, logging, and density data should be completed. Only data that have been verified should be included in the Project database.

This work is estimated at US$0.2–US$0.3 M.

23.4 Mineral Resources

No capping or outlier restriction was used during mineral resource estimation; however, Wood found some evidence of over-projection of high grades. Wood recommends that a capping study is completed and grade capping/outlier restriction should be considered for controlling grade estimation.

This work is estimated at US$0.05–US$0.1 M.

23.5 Mine Plan

The mine plan should be reviewed to assess opportunities for smoothing the mine sequencing such that short-term periods in the current plan where economics are marginal can be mitigated or removed. The current plan focuses on tonnage movements, rather than focusing on economic outcomes, and a mine plan that is the reverse, economics over tonnage, should be examined.

This work is estimated at US$0.1–US$0.2 M.

23.6 Tailings Storage Facility

The new Global Industry Standard on Tailings Management (GISTM) provides a set of industry standards to guide design and management of TSFs. Members and non-members of International Council on Mining and Metals (ICMM) are required to be in compliance with the GISTM over the next several years. The TSF design needs to be revisited and be revised as needed to be in full compliance with the recently-published global tailings standard (GISTM, 2020). This work is estimated at US$0.1–US$0.2 M.

23.7 Tailings and Waste Management

The Quebrada Honda TSF capacity will be reached in approximately the end of 2035. For the purposes of this Report, Wood assumed that tailings and waste rock from the Cuajone Operations would be commingled and stored in a facility to be constructed in the operations area.

Southern Copper should review the most appropriate storage mechanisms for these materials for the LOM after approximately the end of 2035 based on LOM storage requirements and site conditions. Initial designs will be conceptual, and based on limited of geotechnical investigation and tailings characterization, but sufficient to support assessment of potential permitting and surface rights requirements.

This work is estimated at US$0.6–US$0.8 M.

23.8 Permitting

Southern Copper should determine what surface rights will need to be obtained in support of the preferred tailings and waste rock storage plan and the path needed to secure these rights and conclude the necessary agreements with current surface rights holders

Southern Copper should determine the permitting path, and numbers and types of permits and authorizations required to construct and operate the selected facility.

Southern Copper should confirm if any additional baseline studies will be required in support of permit applications for the preferred tailings and waste rock storage facility.

This work is estimated at US$0.05–US$0.1 M.

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24.2 Abbreviations and Symbols

Abbreviation/Symbol	Term
3D	three-dimensional
AAS	atomic absorption spectrometry
CuT	total copper
CuS	soluble copper
CuCN	cyanide-soluble copper
CUSAC	acid-soluble copper
ROX	solubility index for soluble copper
RSUL	solubility index for cyanide-soluble copper
CUSCN	cyanide-soluble copper
FESAC	soluble iron
EIA	Environmental Impact Assessment
G&A	general and administrative
GPS	global positioning system
HP	horse power
HPGR	high pressure grinding rolls
ICP-MS	inductively coupled plasma–mass spectrometry
ICP-OES	inductively coupled plasma-optical emission spectroscopy
klb	thousand pounds

Abbreviation/Symbol	Term
kW	kilowatt
kWh	kilowatt hour
kWh/t	kilowatt hour per tonne
LOM	life-of-mine
NSR	net smelter return
PLS	pregnant leach solution
OK	ordinary kriging
QA/QC	quality assurance and quality control
QP	Qualified Person
PEN	Peruvian currency, nuevo sol
RC	reverse circulation
RMA	reduced major axis
ROM	run-of-mine
RQD	rock quality designation
TCRC	treatment charge/refining charge
TSF	tailing storage facility
US	United States
US$	United States dollars
WRSF	Waste rock storage facility

24.3 Glossary of Terms

Term	Definition
alluvium	Unconsolidated terrestrial sediment composed of sorted or unsorted sand, gravel, and clay that has been deposited by water.
aquifer	A geologic formation capable of transmitting significant quantities of groundwater under normal hydraulic gradients.
argillic alteration	Introduces any one of a wide variety of clay minerals, including kaolinite, smectite and illite. Argillic alteration is generally a low temperature event, and some may occur in atmospheric conditions
ball mill	A piece of milling equipment used to grind ore into small particles. It is a cylindrical shaped steel container filled with steel balls into which crushed ore

Term	Definition
	is fed. The ball mill is rotated causing the balls themselves to cascade, which in turn grinds the ore.
beneficiation	Physical treatment of crude ore to improve its quality for some specific purpose. Also called mineral processing.
bullion	Unrefined gold and/or silver mixtures that have been melted and cast into a bar or ingot.
churn drill	Portable drilling equipment, usually mounted on four wheels and driven by steam-, diesel-, electric-, or gasoline-powered engines or motors
comminution/crushing/grinding	Crushing and/or grinding of ore by impact and abrasion. Usually, the word "crushing" is used for dry methods and "grinding" for wet methods. Also, "crushing" usually denotes reducing the size of coarse rock while "grinding" usually refers to the reduction of the fine sizes.
concentrate	The concentrate is the valuable product from mineral processing, as opposed to the tailing, which contains the waste minerals. The concentrate represents a smaller volume than the original ore
cut-off grade	A grade level below which the material is not “ore” and considered to be uneconomical to mine and process. The minimum grade of ore used to establish reserves.
data verification	The process of confirming that data has been generated with proper procedures, has been accurately transcribed from the original source and is suitable to be used for mineral resource and mineral reserve estimation
density	The mass per unit volume of a substance, commonly expressed in grams/ cubic centimeter.
dilution	Waste of low-grade rock which is unavoidably removed along with the ore in the mining process.
direct shear test	Method used to determine the shear strength of a material. Shear strength is defined as the maximum resistance that a material can withstand when subjected to shearing
easement	Areas of land owned by the property owner, but in which other parties, such as utility companies, may have limited rights granted for a specific purpose.
electrowinning.	The removal of precious metals from solution by the passage of current through an electrowinning cell. A direct current supply is connected to the anode and cathode. As current passes through the cell, metal is deposited on the cathode. When sufficient metal has been deposited on the cathode, it is removed from the cell and the sludge rinsed off the plate and dried for further treatment.
feasibility study	A feasibility study is a comprehensive technical and economic study of the selected development option for a mineral project, which includes detailed

Term	Definition
	assessments of all applicable modifying factors, as defined by this section, together with any other relevant operational factors, and detailed financial analysis that are necessary to demonstrate, at the time of reporting, that extraction is economically viable. The results of the study may serve as the basis for a final decision by a proponent or financial institution to proceed with, or finance, the development of the project. A feasibility study is more comprehensive, and with a higher degree of accuracy, than a pre-feasibility study. It must contain mining, infrastructure, and process designs completed with sufficient rigor to serve as the basis for an investment decision or to support project financing.
flotation	Separation of minerals based on the interfacial chemistry of the mineral particles in solution. Reagents are added to the ore slurry to render the surface of selected minerals hydrophobic. Air bubbles are introduced to which the hydrophobic minerals attach. The selected minerals are levitated to the top of the flotation machine by their attachment to the bubbles and into a froth product, called the "flotation concentrate." If this froth carries more than one mineral as a designated main constituent, it is called a "bulk float". If it is selective to one constituent of the ore, where more than one will be floated, it is a "differential" float.
flowsheet	The sequence of operations, step by step, by which ore is treated in a milling, concentration, or smelting process.
frother	A type of flotation reagent which, when dissolved in water, imparts to it the ability to form a stable froth
hanging wall	The wall or rock on the upper or top side of a vein or ore deposit.
heap leaching	A process whereby valuable metals, usually gold and silver, are leached from a heap or pad of crushed ore by leaching solutions percolating down through the heap and collected from a sloping, impermeable liner below the pad.
high pressure grinding rolls (HPGR)	A type of crushing machine consisting of two large studded rolls that rotate inwards and apply a high pressure compressive force to break rocks.
hydrometallurgy	A type of extractive metallurgy utilizing aqueous solutions/solvents to extract the metal value from an ore or concentrate. Leaching is the predominant type of hydrometallurgy.
indicated mineral resource	An 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 term adequate geological evidence means evidence that is sufficient to establish geological and grade or quality continuity with reasonable certainty. The level of geological certainty associated with an indicated mineral resource is sufficient to allow a qualified

Term	Definition
	person to apply modifying factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit.
induced polarization (IP)	Geophysical method used to directly detect scattered primary sulfide mineralization. Most metal sulfides produce IP effects, e.g. chalcopyrite, bornite, chalcocite, pyrite, pyrrhotite
inferred mineral resource	An 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 term limited geological evidence means evidence that is only sufficient to establish that geological and grade or quality continuity is more likely than not. 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. A qualified person must have a reasonable expectation that the majority of inferred mineral resources could be upgraded to indicated or measured mineral resources with continued exploration; and should be able to defend the basis of this expectation before his or her peers.
internal rate of return (IRR)	The rate of return at which the net present value of a project is zero; the rate at which the present value of cash inflows is equal to the present value of the cash outflows.
initial assessment	An initial assessment is a preliminary technical and economic study of the economic potential of all or parts of mineralization to support the disclosure of mineral resources. The initial assessment must be prepared by a qualified person and must include appropriate assessments of reasonably assumed technical and economic factors, together with any other relevant operational factors, that are necessary to demonstrate at the time of reporting that there are reasonable prospects for economic extraction. An initial assessment is required for disclosure of mineral resources but cannot be used as the basis for disclosure of mineral reserves
Lerchs–Grossmann	An algorithm used to design the contour of an open pit so as to maximize the difference between the total mine value of ore extracted and the total extraction cost of ore and waste
liberation	Freeing, by comminution, of particles of specific mineral from their interlock with other constituents of the ore.
life of mine (LOM)	Number of years that the operation is planning to mine and treat ore, and is taken from the current mine plan based on the current evaluation of ore reserves.
lithogeochemistry	The chemistry of rocks within the lithosphere, such as rock, lake, stream, and soil sediments

Term	Definition
measured mineral resource	A 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 term conclusive geological evidence means evidence that is sufficient to test and confirm geological and grade or quality continuity. 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.
mill	Includes any ore mill, sampling works, concentration, and any crushing, grinding, or screening plant used at, and in connection with, an excavation or mine.
mineral reserve	A mineral reserve is 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. The determination that part of a measured or indicated mineral resource is economically mineable must be based on a preliminary feasibility (pre-feasibility) or feasibility study, as defined by this section, conducted by a qualified person applying the modifying factors to indicated or measured mineral resources. Such study must demonstrate that, at the time of reporting, extraction of the mineral reserve is economically viable under reasonable investment and market assumptions. The study must establish a life of mine plan that is technically achievable and economically viable, which will be the basis of determining the mineral reserve. The term economically viable means that the qualified person has determined, using a discounted cash flow analysis, or has otherwise analytically determined, that extraction of the mineral reserve is economically viable under reasonable investment and market assumptions. The term investment and market assumptions includes all assumptions made about the prices, exchange rates, interest and discount rates, sales volumes, and costs that are necessary to determine the economic viability of the mineral reserves. The qualified person must use a price for each commodity that provides a reasonable basis for establishing that the project is economically viable.
mineral resource	A mineral resource 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.

Term	Definition
	The term material of economic interest includes mineralization, including dumps and tailings, mineral brines, and other resources extracted on or within the earth's crust. It does not include oil and gas resources, gases (e.g., helium and carbon dioxide), geothermal fields, and water. When determining the existence of a mineral resource, a qualified person, as defined by this section, must be able to estimate or interpret the location, quantity, grade or quality continuity, and other geological characteristics of the mineral resource from specific geological evidence and knowledge, including sampling; and conclude that there are reasonable prospects for economic extraction of the mineral resource based on an initial assessment, as defined in this section, that he or she conducts by qualitatively applying relevant technical and economic factors likely to influence the prospect of economic extraction.
net smelter return royalty (NSR)	A defined percentage of the gross revenue from a resource extraction operation, less a proportionate share of transportation, insurance, and processing costs.
open pit	A mine that is entirely on the surface. Also referred to as open-cut or open-cast mine.
ounce (oz) (troy)	Used in imperial statistics. A kilogram is equal to 32.1507 ounces. A troy ounce is equal to 31.1035 grams.
overburden	Material of any nature, consolidated or unconsolidated, that overlies a deposit of ore that is to be mined.
phyllic alteration	Minerals include quartz-sericite-pyrite
plant	A group of buildings, and especially to their contained equipment, in which a process or function is carried out; on a mine it will include warehouses, hoisting equipment, compressors, repair shops, offices, mill or concentrator.
point load test	A test that aims at characterizing rock materials in terms of strength
potassic alteration	A relatively high temperature type of alteration which results from potassium enrichment. Characterized by biotite, K-feldspar, adularia.
preliminary feasibility study, pre-feasibility study	A preliminary feasibility study (prefeasibility study) is a comprehensive study of a range of options for the technical and economic viability of a mineral project that has advanced to a stage where a qualified person has determined (in the case of underground mining) a preferred mining method, or (in the case of surface mining) a pit configuration, and in all cases has determined an effective method of mineral processing and an effective plan to sell the product. A pre-feasibility study includes a financial analysis based on reasonable assumptions, based on appropriate testing, about the modifying factors and the evaluation of any other relevant factors that are sufficient for a qualified

Term	Definition
	person to determine if all or part of the indicated and measured mineral resources may be converted to mineral reserves at the time of reporting. The financial analysis must have the level of detail necessary to demonstrate, at the time of reporting, that extraction is economically viable,
probable mineral reserve	A probable mineral reserve is the economically mineable part of an indicated and, in some cases, a measured mineral resource. For a probable mineral reserve, the qualified person's confidence in the results obtained from the application of the modifying factors and in the estimates of tonnage and grade or quality is lower than what is sufficient for a classification as a proven mineral reserve, but is still sufficient to demonstrate that, at the time of reporting, extraction of the mineral reserve is economically viable under reasonable investment and market assumptions. The lower level of confidence is due to higher geologic uncertainty when the qualified person converts an indicated mineral resource to a probable reserve or higher risk in the results of the application of modifying factors at the time when the qualified person converts a measured mineral resource to a probable mineral reserve. A qualified person must classify a measured mineral resource as a probable mineral reserve when his or her confidence in the results obtained from the application of the modifying factors to the measured mineral resource is lower than what is sufficient for a proven mineral reserve.
propylitic	Characteristic greenish colour. Minerals include chlorite, actinolite and epidote. Typically contains the assemblage quartz-chlorite-carbonate
probable mineral reserve	A probable mineral reserve is the economically mineable part of an indicated and, in some cases, a measured mineral resource. For a probable mineral reserve, the qualified person's confidence in the results obtained from the application of the modifying factors and in the estimates of tonnage and grade or quality is lower than what is sufficient for a classification as a proven mineral reserve, but is still sufficient to demonstrate that, at the time of reporting, extraction of the mineral reserve is economically viable under reasonable investment and market assumptions. The lower level of confidence is due to higher geologic uncertainty when the qualified person converts an indicated mineral resource to a probable reserve or higher risk in the results of the application of modifying factors at the time when the qualified person converts a measured mineral resource to a probable mineral reserve. A qualified person must classify a measured mineral resource as a probable mineral reserve when his or her confidence in the results obtained from the application of the modifying factors to the measured mineral resource is lower than what is sufficient for a proven mineral reserve.
qualified person	A qualified person is an individual who is a mineral industry professional with at least five years of relevant experience in the type of mineralization and type of deposit under consideration and in the specific type of activity

Term	Definition
	that person is undertaking on behalf of the registrant; and an eligible member or licensee in good standing of a recognized professional organization at the time the technical report is prepared. For an organization to be a recognized professional organization, it must: (A) Be either: (1) An organization recognized within the mining industry as a reputable professional association, or (2) A board authorized by U.S. federal, state or foreign statute to regulate professionals in the mining, geoscience or related field; (B) Admit eligible members primarily on the basis of their academic qualifications and experience; (C) Establish and require compliance with professional standards of competence and ethics; (D) Require or encourage continuing professional development; (E) Have and apply disciplinary powers, including the power to suspend or expel a member regardless of where the member practices or resides; and; (F) Provide a public list of members in good standing.
reclamation	The restoration of a site after mining or exploration activity is completed.
refining	A high temperature process in which impure metal is reacted with flux to reduce the impurities. The metal is collected in a molten layer and the impurities in a slag layer. Refining results in the production of a marketable material.
refractory	Gold mineralization normally requiring more sophisticated processing technology for extraction, such as roasting or autoclaving under pressure.
roasting	A high temperature oxidation process for refractory ores or concentrates. The material is reacted with air (possibly enriched with oxygen) to convert sulfur in sulfides to sulfur dioxide. Other constituents in ore (e.g. C, Fe) are also oxidized. The resulting calcine can then be leached with cyanide, resulting in economic gold recoveries.
rock quality designation (RQD)	A measure of the competency of a rock, determined by the number of fractures in a given length of drill core. For example, a friable ore will have many fractures and a low RQD.
royalty	An amount of money paid at regular intervals by the lessee or operator of an exploration or mining property to the owner of the ground. Generally based on a specific amount per tonne or a percentage of the total production or profits. Also, the fee paid for the right to use a patented process.

Term	Definition
run-of-mine	Rehandle where the raw mine ore material is fed into the processing plant's system, usually the crusher. This is where material that is not direct feed from the mine is stockpiled for later feeding. Run-of-mine relates to the rehandle being for any mine material, regardless of source, before entry into the processing plant's system.
qualified person	A qualified person is an individual who is a mineral industry professional with at least five years of relevant experience in the type of mineralization and type of deposit under consideration and in the specific type of activity that person is undertaking on behalf of the registrant; and an eligible member or licensee in good standing of a recognized professional organization at the time the technical report is prepared. For an organization to be a recognized professional organization, it must: (A) Be either: (1) An organization recognized within the mining industry as a reputable professional association, or (2) A board authorized by U.S. federal, state or foreign statute to regulate professionals in the mining, geoscience or related field; (B) Admit eligible members primarily on the basis of their academic qualifications and experience; (C) Establish and require compliance with professional standards of competence and ethics; (D) Require or encourage continuing professional development; (E) Have and apply disciplinary powers, including the power to suspend or expel a member regardless of where the member practices or resides; and; (F) Provide a public list of members in good standing.
solvent extraction-electrowinning (SX/EW)	A metallurgical technique primarily applied to copper ores, in which metal is dissolved from the rock by organic solvents and recovered from solution by electrolysis.
specific gravity	The weight of a substance compared with the weight of an equal volume of pure water at 4°C.
supergene	Mineral enrichment produced by the chemical remobilisation of metals in an oxidised or transitional environment.
tailings	Material rejected from a mill after the recoverable valuable minerals have been extracted.
triaxial compressive strength	A test for the compressive strength in all directions of a rock or soil sample
uniaxial compressive strength	A measure of the strength of a rock, which can be determined through laboratory testing, and used both for predicting ground stability underground, and the relative difficulty of crushing.

25 RELIANCE ON INFORMATION PROVIDED BY THE REGISTRANT

25.1 Introduction

Wood fully relied on the registrant for the guidance in the areas noted in the following sub-sections.

Wood considers it is reasonable to rely on Southern Copper because the company has considerable experience in developing and operating mines in Peru.

25.2 Macroeconomic Trends

- Information relating to inflation, interest rates, discount rates, foreign exchange rates, taxes.

This information is used in the economic analysis in Chapter 19. It supports the mineral resource estimate in Chapter 11, and the mineral reserve estimate in Chapter 12.

25.3 Markets

- Information relating to market studies/markets for product, market entry strategies, marketing and sales contracts, product valuation, product specifications, refining and treatment charges, transportation costs, agency relationships, material contracts (e.g. mining, concentrating, smelting, refining, transportation, handling, hedging arrangements, and forward sales contracts), and contract status (in place, renewals).

This information is used when discussing the market, commodity price and contract information in Chapter 16, and in the economic analysis in Chapter 19. It supports the mineral resource estimate in Chapter 11, and the mineral reserve estimate in Chapter 12.

25.4 Legal Matters

- Information relating to the corporate ownership interest, the mineral tenure (concessions, payments to retain, obligation to meet expenditure/reporting of work conducted), surface rights, water rights (water take allowances), royalties, encumbrances, easements and rights-of-way, violations and fines, permitting requirements, ability to maintain and renew permits, monitoring requirements and monitoring frequency, and bonding requirements.

This information is used in support of the property ownership information in Chapter 3, the permitting and closure discussions in Chapter 17, and the economic analysis in Chapter 19. It supports the mineral resource estimate in Chapter 11, and the mineral reserve estimate in Chapter 12.

25.5 Environmental Matters

- Information relating to baseline and supporting studies for environmental permitting, environmental permitting and monitoring requirements, ability to maintain and renew permits, emissions controls, closure planning, closure and reclamation bonding and bonding requirements, sustainability accommodations, and monitoring for and compliance with requirements relating to protected areas and protected species.

This information is used when discussing property ownership information in Chapter 3, the permitting and closure discussions in Chapter 17, and the economic analysis in Chapter 19. It supports the mineral resource estimate in Chapter 11, and the mineral reserve estimate in Chapter 12.

25.6 Stakeholder Accommodations

- Information relating to social and stakeholder baseline and supporting studies, hiring and training policies for workforce from local communities, partnerships with stakeholders (including national, regional, and state mining associations; trade organizations; fishing organizations; state and local chambers of commerce; economic development organizations; non-government organizations; and, state and federal governments), and the community relations plan

This information is used in the social and community discussions in Chapter 17, and the economic analysis in Chapter 19. It supports the mineral resource estimate in Chapter 11, and the mineral reserve estimate in Chapter 12.

25.7 Governmental Factors

- Information relating to taxation and government royalty considerations at the Project level.

This information is used in the economic analysis in Chapter 19. It supports the mineral resource estimate in Chapter 11, and the mineral reserve estimate in Chapter 12.