FORTUNA
SILVER MINES INC.

Fortuna Silver Mines Inc.: Lindero Mine and Arizaro Project, Salta Province, Argentina

Technical Report
Effective Date: December 31, 2022

Prepared by

Eric Chapman, P.Geo.
Senior Vice President of Technical Services – Fortuna Silver Mines Inc.

Raul Espinoza, FAusIMM (CP)
Director of Technical Services – Fortuna Silver Mines Inc.

Mathieu Veillette, P.Eng., P.E.
Corporate Manager Water and Tailings – Fortuna Silver Mines Inc.

Dmitry Tolstov, MMSA (QP)
Independent Consultant

Suite 650, 200 Burrard Street, Vancouver, BC, V6C 3L6 Tel: (604) 484 4085, Fax: (604) 484 4029

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1 Summary

1.1 Introduction

This Technical Report (the Report) on the Lindero Mine and Arizaro Project in Salta, Argentina (the Property or the Lindero Property), has been prepared by Mr. Eric Chapman, P.Geo, Mr. Raul Espinoza, FAusIMM, Mathieu Veillette, P.Eng, and Dr. Dmitry Tolstov, MMSA QP, for Fortuna Silver Mines Inc. (Fortuna) in accordance with the disclosure requirements of Canadian National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* (NI 43-101). The Report discloses updated Mineral Resource and Mineral Reserve estimates, including the maiden estimation of Inferred Resources for the Arizaro Project, as well as details on the start of operations at the Lindero Mine.

1.2 Property description, location and ownership

The Property is located in the Argentine puna, a cool, arid zone with a minimum elevation of approximately 3,500 to 4,000 m. The climate is generally dry and windy; it can be cold and snowy during storms.

The Lindero Property is located 260 km due west of Salta, Argentina, the main service center of the region, at latitude 25° 05' south and longitude 67° 47' west. Drive time from Salta to the Property is approximately 7 to 7.5 hours, over a road distance of 420 km. The nearest town to the Property is Tolar Grande (population 250) located 75 km to the northeast.

The Property can be accessed via either road or by airplane. Access by road is via National Route 51, which passes through the towns of San Antonio de Los Cobres and Olacapato; and Provincial Route 27, via Pocitos and Tolar Grande. Access by plane is via charter flights that are scheduled three times a week from Salta to a runway strip located at the Salar de Arizaro, less than 10 kilometers from the mine. The flight takes approximately 35 minutes.

The Lindero Property contains two known porphyry gold-copper deposits. The Lindero Deposit which is the focus of current mining activities described in this report (the Lindero Mine); and the Arizaro Deposit which is located 3.2 km southeast of the Lindero Mine.

The mineral tenement holdings cover 3,500 ha, and comprise 35 pertenencias, each of 100 ha, which are constrained by Gauss Kruger Posgar co-ordinates generated by survey. Tenure is held in the name of Mansfield Minera S.A. (Mansfield), an indirectly wholly-owned subsidiary of Fortuna. There is no expiry date on the pertenencias, providing Mansfield meets expenditure and environmental requirements, and pays the appropriate annual mining fees.

A three percent provincial royalty "boca mina" is payable on revenue after deduction of direct processing, commercial, general and administrative costs. There are no royalties payable to any other third party.

Surface rights are owned by the provincial state (Propiedad Fiscal) of Salta. There are no reservations, restrictions, rights-of-way or easements on the Property to any third-party. Mansfield holds a registered camp concession, and a granted and surveyed access right-of-way. Water permits and rights of access to the Property are guaranteed through water and access licenses granted by the Mining Court of Salta.

In addition, Mansfield holds one mining concession and eight easements that cover the mine infrastructure (including the camp, plant, open pit, leach pad, and waste dump).

1.3 History

Gold–copper mineralization associated with potassic alteration was first discovered at the Property by Goldrock Mines Corp. (Goldrock) geologists in November 1999, and led to claim staking.

The area was explored using reconnaissance and detailed geological mapping, soil geochemistry (talus fines), trench sampling and mapping during 2000 and early 2001. As a result of this work, mineralization at what is now the Lindero and Arizaro deposits was identified in September 2000.

From April 2002 to March 2003, Rio Tinto had an option on the Property with Goldrock, during which time additional exploration including drilling was conducted at both Lindero and Arizaro with follow-up metallurgical testwork undertaken using Lindero core samples. An in-house preliminary Mineral Resource estimate for the Lindero Deposit was performed. As the tonnage and grade estimate did not meet Rio Tinto's corporate targets, the option was not exercised.

Goldrock resumed as project operator, and between 2005 and 2013 completed additional exploration and drilling at both the Lindero and Arizero deposits, but with a focus on progressing the technical potential of mining Lindero. Based on this, a Pre-Feasibility Study for the Lindero Deposit was completed by AMEC in 2010, assuming a production throughput of 30,000 tonnes of ore per day (AMEC Americas Ltd., 2010a; 2010b). In 2012, Goldrock commissioned Kappes, Cassiday & Associates (KCA) to complete a Feasibility Study using a reduced throughput of 18,750 tpd.

In 2015, Goldrock commissioned KCA to work with local engineering firms in advancing the engineering design for the Lindero Project to a basic engineering level and update the 2013 Feasibility Study. A new Feasibility Study incorporating these design changes, additional metallurgical testwork, and updated costs and gold price assumptions was filed by KCA in 2016 (KCA, 2016a).

In July 2016, Fortuna acquired all of the issued and outstanding shares of Goldrock, making Mansfield a wholly-owned subsidiary of Fortuna (Fortuna, 2016). Upon completion of the transaction, Fortuna continued to advance the optimization of the 2016 Feasibility Study through additional drilling as well as conducting tradeoff metallurgical tests and detailed engineering revisions with the objective of reaching a construction decision for the Lindero Project (Fortuna, 2017).

Fortuna continued the exploration of the Arizaro Deposit while progressing the technical studies and construction activities at Lindero with diamond drill programs executed in 2018, 2021 and 2022 culminating in the estimation of Mineral Resources as detailed in this Report.

Mining activities commenced at Lindero in September 2019 (Fortuna, 2019) with first placement of ore on the leach pad in July 2020 (Fortuna, 2020a) and doré production in October 2020 (Fortuna, 2020b). Total production since October 2020 through December 31, 2022 is estimated as 228,939 oz of gold doré bars.

1.4 Geology and mineralization

In the Central Andes, the altiplano or puna is a high plateau of more subdued relief between the Eastern Cordillera, a rugged region usually rising to between 3 km and 4.5 km, and the Western Cordillera, which is a high spine of mountains that may reach as much as 5 km in height. The Arizaro Volcanic Complex consists of two superimposed concentric volcanic centers, the Arizaro and the Lindero cones, located in the Archibarca volcanic arc at the southern margin of the Salar de Arizaro basin. Basement rocks crop out to the north of the Lindero Deposit and consist of coarse-grained Ordovician granites uncomformably overlain by Early Tertiary red bed sandstones. The Lindero–Arizaro complex, a series of diorite to monzonite porphyritic stocks, intrudes these units.

Lindero and Arizaro are examples of gold-rich porphyry copper deposits as described by Sillitoe (2000). More specifically, they show affinities with the porphyry gold deposit model (Rytuba and Cox, 1991; also termed dioritic porphyry gold deposits by Seedorff et al., 2005). These are exemplified by the Refugio, Cerro Casale, Marte, and Lobo gold deposits of the Miocene-age Maricunga belt, Chile, approximately 200 km south of Lindero. Vila and Sillitoe (1991) and Muntean and Einaudi (2000, 2001) described those deposits in detail.

The deposits of the Property area are considered to be examples of porphyry-style deposits, in particular gold-rich porphyries based on the following:

- High level (epizonal) stock emplacement levels in magmatic arc.
- High-level stocks and related dikes intrude their coeval and cogenetic volcanic piles. Intrusions range from fine through coarse-grained, equigranular to coarsely porphyritic.
- Mineralization in or adjoining porphyritic intrusions of quartz diorite/monzonite composition.
- Mineralization is spatially, temporally, and genetically associated with hydrothermal alteration of the intrusive bodies and host rocks.
- Gold–copper mineralization formed during intrusion of multiple phases of similar composition intrusive rocks.
- Large zones of quartz veining, stockwork mineralization, and disseminated pyrite.
- Tenor of gold and copper grades, i.e., large tonnage but low grade.

The weathered oxidation zone at Lindero is generally poorly developed and averages 44 m in thickness, while at Arizaro the oxidation zone is even less pronounced being just a few meters in thickness.

1.4.1 Lindero Deposit

Mineralized zones at the Lindero Deposit form a semi-circular shape about 600 m in diameter which extends to a depth of 600 m, consisting of four different zones at the surface. The distribution of gold–copper mineralization at Lindero shows a strong relationship to lithology, stockwork veinlets, and alteration assemblages. Higher grades of gold–copper (approximately 1 g/t Au and 0.1 % Cu) are commonly associated with sigmoidal quartz, quartz–magnetite–sulfide, biotite-magnetite–chalcopyrite, magnetite–chalcopyrite and quartz–limonite–hematite stockworks that are strongly associated with K-feldspar alteration. This association is very common in the east zone of the deposit, where the highest gold grades occur. At other locations where one or more stockwork types are missing or the intensity of fracturing is lower, mineralization tends to be weaker and the grades of gold tends to be lower (approximately 0.4 g/t Au).

At the Lindero Deposit, native gold and electrum are finely disseminated in subparallel to stockwork quartz + sulfide ± magnetite ± anhydrite veins and in some cases in matrices of hydrothermal breccias. Magnetite is common to abundant in mineralized zones. These mineralized stockworks and potassic alteration are interpreted to have formed as the result of degassing of the early intrusive bodies. Fluid pressures during degassing triggered fracturing of the intrusions and wall rock, allowing gold-rich fluids to circulate and precipitate, forming a gold–copper orebody. Later intrusions resulted in weak to moderate gold–copper mineralization forming mostly along and immediately fringing these intrusive contacts. Finally, post mineralized intrusives were overprinted onto the north and west of the deposit.

Gold mineralization at Lindero is characterized by native, free-milling gold associated with chalcopyrite and/or magnetite grains with rare interstitial quartz.

1.4.2 Arizaro Deposit

The Arizaro volcanic center is characterized by fine- to medium-grained hornblende diorite to monzonite porphyritic stocks. The Arizaro Deposit is dominated by a main, moderately to strongly mineralized intrusive unit that crops out in the central part of the prospect area. It consists of fine hornblende porphyritic diorite intruded by several stocks, dikes, igneous-cemented breccias and hydrothermal breccias. Smaller stocks are exposed in a few areas. Dikes of andesitic and dacitic composition are generally distributed radially to the main intrusive unit.

Several alteration assemblages are noted in the Arizaro Deposit area. Alteration patterns are semi-concentric and asymmetric, with a core of moderate to strong potassic alteration including zones of K-feldspar-rich magnetite–silica alteration. An incomplete rim of chloritic alteration is developed outboard of the potassic alteration. In the southeast part of the deposit, intermediate argillic alteration has formed and overprints potassic alteration. Sericitic and very weak argillic alteration (hydrolytic alteration) has developed in the volcanic tuffs. To the south and west of the deposit, chloritic alteration passes directly to propylitic alteration. An actinolite–magnetite alteration assemblage forms in the eastern part of the deposit area.

The Arizaro Deposit has mineralization styles with copper–gold grades that are strongly correlated with different alteration assemblages. Mineralization is mainly associated with potassic alteration. This occurs generally in multi-directional veins, vein stockworks and disseminations. In some areas, the vein density is high, forming vein stockworks in the intrusive rocks. These vein stockworks are limited to magnetite–biotite veinlets, quartz–magnetite–chalcopyrite veinlets, late magnetite breccias and in late-stage mineralization events, anhydrite–sulfide veinlets. Chalcopyrite and bornite are the main copper minerals. Gold is mainly associated with chalcopyrite, quartz, and anhydrite veinlets. Coarse gold was observed and confirmed with X-ray diffraction analysis in the University of Neuquen, Argentina, laboratory.

Understanding of the geological setting and model concepts for Lindero and Arizaro is adequate to provide guidance for exploration and development of the deposits.

1.5 Exploration, drilling and sampling

Multiple exploration programs have been conducted by Rio Tinto, Goldrock and Fortuna on the Lindero Property all under the management of Mansfield.

Exploration drilling comprises 233 diamond drill holes totaling 46,987 m at the Lindero Deposit, as well as 65 diamond drill holes totaling 16,165 m at the Arizaro Deposit that has been conducted over the last twenty years. Ground conditions are good with core recovery generally above 90 percent. Collars for all holes drilled since 2005 have been surveyed using differential GPS. Coordinates are projected on the WGS 84 Datum ellipsoid and calibrated according to the position of Geodetic point IGM N° PR-02-015, located a few kilometers from the Property. The results are available in geographic co-ordinates and in metric co-ordinates (UTM and Gauss Kruger), using the WGS 84 datum.

During Rio Tinto's exploration drilling campaign in 2002, undertaken by Connors Drilling, no downhole surveys were completed despite the fact that many of the holes extended beyond 300 m in depth. Holes drilled during the first Goldrock campaign were not originally downhole surveyed either. In June 2006, GEC-Geophysical Exploration & Consulting S.A. (GEC) was contracted by Goldrock to perform borehole surveying services with a Reflex Maxibor II System 3™ Probe (Maxibor™), which is not affected by magnetism. In 2008, Goldrock detected that the Maxibor™ surveys showed an unacceptably large deviation in the drill holes and a decision was made to re-survey all holes that showed a deviation of more than 5 percent. Comprobe Chile Ltd. (Comprobe) was contracted to re-survey the holes considered by Goldrock as having incorrect downhole deviations. A surface-recording gyroscopic instrument was used, and orientation and dip parameters were recorded every 10 m. For the 2016 to 2022 drilling campaigns, downhole surveys were conducted by the drilling contractor using Reflex™ gyroscopic equipment with readings taken at 5 to 10 m intervals.

All core was logged for geology and geotechnical characteristics. All logging was digital and has been incorporated into the Maxwell DataShed™ database system. Data was recorded initially with Excel™ templates, and later with Maxwell LogChief™ application using essentially the same structure. Separate pages were designed to capture metadata, lithology, alteration, veins, sulfide–oxide zones, sulfide–oxide surfaces, minerals (sulfides, oxides, and limonite), sulfates, structures (contacts, fractures, veins, and faults with attitudes to core axis), magnetic susceptibility, and special data (samples collected for geochemistry, thin section examinations, the core library, skeleton core, etc.). Intensity of alteration phases was recorded using a numeric 1 to 4 scale (weak, moderate, strong, complete); abundance of veins and most other minerals were estimated in volume percent.

Core samples are marked and collected on 2 m intervals that honor lithological boundaries. Samples weigh between 4 and 8 kg depending on core diameter and recovery. Channel samples were collected using a rock saw to cut a 2 x 3 cm channel in exposed bedrock in trenches and road cuts. The material was removed from the channel with a chisel. Sample preparation for most samples consisted of crushing to 70 percent passing 10 mesh and pulverization to 95 percent passing 150 mesh. Density samples are routinely collected by Mansfield personnel from drill core on approximate 10-m intervals. Samples consist of pieces of core approximately 7 cm in length and weighing between 93 g and 408 g.

All samples collected by Mansfield personnel were assayed for gold using a 30 g fire assay–atomic absorption (FA-AA) finish and a second aliquot was selected for copper analysis using aqua regia digestion and AA analyses. For the drill samples only, a full suite of trace elements was analyzed using an aqua regia digestion followed by inductively-coupled plasma (ICP) analysis. Assay results and certificates were reported electronically by e-mail.

Fortuna samples were sent to the ALS Global sample preparation facility in Mendoza, Argentina. Following drying at 55°C, the samples were weighed and the entire sample crushed using a two-stage method, first with a jaw crusher to 1 cm, and then by cone crusher to 70 percent passing 10 mesh. The entire crushed sample was then pulverized to a minimum of 95 percent passing 80 mesh. Pulverized samples were then split using a riffle splitter to generate a 300 g subsample that was pulverized to 95 percent passing 150 mesh. This subsample was then split again using a riffle splitter to generate three 100 g samples.

All samples were sent to accredited laboratories independent of Rio Tinto, Goldrock and Fortuna.

Implementation of a quality assurance/quality control (QAQC) program is current industry best practice and involves establishing appropriate procedures and the routine insertion of standard reference material (SRMs), blanks, and duplicates to monitor the sampling, sample preparation and analytical process. Fortuna implemented a full QAQC program to monitor the sampling, sample preparation and analytical process since 2016 in accordance with its companywide procedures. The program involves the routine insertion of SRMs, blanks, and duplicates. Evaluation of the QAQC data indicate that the data at both deposits are sufficiently accurate and precise to support Mineral Resource estimation.

The Arizaro and Lindero deposits were discovered in 1999 and 2000, respectively, as a result of a regional program of exploration. Major exploration programs conducted since discovery at the Property include:

- Goldrock campaign: August 2000 to October 2001, which included geologic mapping, soil sampling, and trench sampling.
- Rio Tinto campaign: May 2002 to February 2003, which included road sampling, geophysics (43 km of ground magnetics and 11 km of induced polarization (IP)), and drilling (10 holes for a total of 3,279 m at Lindero and 2 holes for a total of 629 m at Arizaro).
- Goldrock campaign: October 2005 to January 2008, which included geologic mapping and modeling, trenching, and a significant drilling program and metallurgical testwork at Lindero (106 holes for a total of 30,024 m).
- Goldrock campaign: September 2008 and August 2010 to November 2010, which consisted of additional drilling and metallurgical testwork at Lindero (23 holes) for the Pre-Feasibility Study.
- Goldrock campaign: May 2010 and February 2013 consisting of a drilling program and bottle roll tests at Arizaro (27 holes for a total of 8,225 m).
- Fortuna campaign: September 2016 to December 2016 consisting of 8 holes for metallurgical samples, 2 holes for geologic interpretation and 2 twin holes, all targeting the Lindero Deposit.
- Fortuna campaign: May to July 2018 consisting of 61 vertical holes for improved geological and grade estimation of material proposed for mining at Lindero, and from 2019 to 2021 to obtain fresh material for metallurgical samples.

- Fortuna campaign: July to September 2018 consisting of 12 holes to define the geology and mineralization characteristics of the magnetite breccias at the Arizaro Deposit.
- Fortuna campaign: March to April 2021, consisting of 18 holes focused on the areas planned for mining at Lindero in 2022. The purpose for the drilling campaign was similar to that for 2018, with 5 holes drilled to source samples for metallurgical column testing.
- Fortuna campaigns: October to December 2021 and April to July 2022 consisting of additional exploration drilling at Arizaro (24 holes for a total of 5,133 m).
- Fortuna campaign: March to April 2022, consisting of 10 holes for improved geological understanding focused on areas planned for mining at Lindero in 2023. The campaign included 3 holes drilled to source samples for metallurgical column testing.

The Lindero Deposit is a gold-rich porphyry with low-grade mineralization permeating throughout the deposit, making the calculation of true thickness impossible as no definitive across strike direction exists. The mineralization appears to be annular in shape at surface due to the intrusion of barren to low-grade intrusive rocks into the core of the system, but this circular shape is not representative of true thickness.

Gold–copper mineralization at Arizaro is associated with two different mineralizing events. The strongest is a non-outcropping intrusive which occurs in the north part of the porphyry with an elongated shape trending northeast to southwest for more than 400 m with an estimated average width of 60 m. The other mineralizing event is in the center of the system and is related to breccias and micro-breccias which have a semi-oval shape at surface. In the center, there is a higher-grade core with a semi-ellipsoidal form, extending north–south for 480 m with an estimated average width of 50 m.

1.6 Data verification

Fortuna conducted audits and verification of historical information as well as verifying new data generated since 2016 to support assumptions for the Mineral Resource and Mineral Reserve estimates reported in Section 14 and Section 15 of this Report. The verification process focused on the database; collars and downhole surveys; lithologic logs; assays; metallurgical results; and geotechnical parameters. Fortuna checked all collar and downhole survey information for each campaign against source documentation and completed a hand-held GPS survey of randomly selected drill hole collars. The results showed a good agreement with locations in the database. In August 2016, Fortuna initiated a comprehensive program of relogging Lindero and Arizaro core to verify the original lithologic descriptions. An additional relogging program was conducted on Arizaro historical drill core in 2021 due to geological reinterpretation based on results from the 2018 and 2021 drill campaigns.

Fortuna contracted Call & Nicholas Inc. (CNI) to validate all geotechnical data, data collection methods, slope stability analysis methods, and slope angle recommendations presented previously by other consultants to determine feasibility-level slope angle recommendations for design of the planned Lindero final pit.

The QP is of the opinion that the data verification programs performed on the data collected are adequate to support the geological interpretations, the analytical and database quality, and Mineral Resource estimation for the Lindero and Arizaro deposits.

1.7 Mineral processing and metallurgical testing

Mansfield has used commercial laboratories to execute multiple and extensive testing campaigns that have progressively optimized the metallurgical and process conditions for its permanent gold heap leach pad facility. Two initial campaigns conducted by Goldrock between 2004 and 2007 were followed by Fortuna's four major testing campaigns between 2016 and 2018 that supported the design of the industrial scale operation. Since the first ore was place on the leach pad in July 2020, Mansfield has been using its in-house laboratory to continuously support metallurgical parameters used in the LOM.

The metallurgical testing was initially focused on leaching conditions and included bottle rolls and leaching columns of various sizes under varying conditions of leaching and agglomeration. Additional testing, particularly for the crushing plant, was performed with major technology suppliers and concluded that using high-pressure-grinding-rolls (HPGR) in the tertiary crushing stage translated in faster leaching kinetics and ultimately higher gold extraction.

The pervasive presence of copper in the Lindero Deposit reflects in the dissolution of copper during the leaching of gold. Testing of the sulfidization-acidification-recycling-thickening (SART) process was successful in removing sufficient copper quantities (59 to 74 percent) from the pregnant leach solution (PLS) to guarantee the optimal performance of the adsorption-desorption-recovery (ADR) process downstream and quality of the doré. The copper precipitate also recovered silver at a rate of more than 90 percent.

A limited, preliminary metallurgical testing of the satellite Arizaro Deposit achieved comparable results to those observed for the Lindero Deposit.

1.8 Mineral Resources

Mineral Resource estimation for the Lindero and Arizaro deposits involved the use of drill hole data in conjunction with surface mapping to construct three-dimensional (3-D) wireframes to define individual lithologic structures and oxide–mixed–sulfide horizons if present. Drill hole samples were selected inside these wireframes, coded, composited and grade top cuts applied if applicable. Boundaries were treated as either soft, firm or hard with statistical and geostatistical analysis conducted on composites identified in individual lithologic units. Gold and copper grades were estimated into a geological block model consisting of 10 m x 10 m x 8 m selective mining units (SMUs). Grades were estimated by ordinary kriging (OK) and constrained within an ultimate pit shell based on estimated metal prices, actual costs as experienced at the Lindero Mine in 2022, geotechnical constraints, and metallurgical recoveries to fulfill the 'reasonable prospects for eventual economic extraction'. Estimated grades were validated globally, locally, and visually prior to tabulation of the Mineral Resources.

Resource confidence classification considers a number of aspects affecting confidence in the resource estimation including; geological continuity and complexity; data density and orientation; data accuracy and precision; grade continuity; and in the case of the Lindero Mine, simulated grade variability by mining period.

Mineral Resources exclusive of Mineral Reserves as of December 31, 2022 are reported in Table 1.1.

Table 1.1 Mineral Resources as of December 31, 2022

Deposit	Classification	Tonnes (000)	Au (g/t)	Cu (%)	Contained Au (koz)
Lindero	Measured	1,855	0.50	0.12	30
	Indicated	27,594	0.42	0.10	369
	Measured + Indicated	**29,448**	**0.42**	**0.10**	**399**
	Inferred	**24,087**	**0.47**	**0.11**	**364**
Arizaro	**Inferred**	**22,146**	**0.39**	**0.15**	**280**

Notes:

- Mineral Resources are as defined by the 2014 CIM Definition Standards for Mineral Resources and Mineral Reserves.
- Mineral Resources are exclusive of Mineral Reserves.
- Mineral Resources for the Lindero Deposit are estimated as of August 31, 2022 and reported as of December 31, 2022 taking into account production related depletion between September 1 to December 31, 2022. Mineral Resources for the Arizaro Deposit are estimated and reported as of December 31, 2022.
- Eric Chapman, P.Geo. (EGBC #36328) is the Qualified Person for mineral resources being an employee of Fortuna Silver Mines Inc.
- Lindero Mineral Resources are reported within a conceptual pit shell above a 0.23 g/t Au cut-off grade using a long-term gold price of US$1,840/oz, average mining costs at US$1.67 per tonne of material, with total processing and G&A costs of US$10.32 per tonne of ore and an average process recovery of 75 %. The refinery costs net of pay factor were estimated to be US$8.52 per ounce gold. Slope angles are based on 3 sectors (39°, 42°, and 47°) consistent with geotechnical consultant recommendations. Arizaro Mineral Resources are reported within a conceptual pit shell above a 0.25 g/t Au cut-off grade using the same gold price and costs as Lindero with an additional US$0.52 per tonne of ore to account for haulage costs between the deposit and plant. A slope angle of 47° was used for defining the pit.
- Mineral Resource tonnes are rounded to the nearest thousand.
- Totals may not add due to rounding.

Factors that may affect the estimates include metal price and exchange rate assumptions; changes to the assumptions used to generate the cut-off grade; changes in local interpretations of mineralization geometry and continuity of mineralized zones; changes to geological and mineralization shape and geological and grade continuity assumptions; variations in density and domain assignments; geometallurgical assumptions; changes to geotechnical, mining, dilution, and metallurgical recovery assumptions; change to the input and design parameter assumptions that pertain to the conceptual slope designs constraining the estimates; and assumptions as to the continued ability to access the site, retain mineral and surface rights titles, maintain environment and other regulatory permits, and maintain the social license to operate.

There are no other known environmental, legal, title, taxation, socioeconomic, marketing, political or other relevant factors that would materially affect the estimation of Mineral Resources or Mineral Reserves that are not discussed in this Report.

1.9 Mineral Reserves

Mineral Reserve estimates follow standard industry practices, considering only Measured and Indicated Mineral Resources as only these categories have sufficient geological confidence to be considered Mineral Reserves (CIM, 2014). Subject to the application of modifying factors, Measured Resources may become Proven Reserves and Indicated Resources may become

Probable Reserves. Mineral Reserves are reconciled monthly against production to validate the estimates.

Metal prices used for Mineral Reserve estimation were determined as of June 2022 by the corporate finance department of Fortuna from market consensus. Metallurgical recoveries are based on metallurgical test work conducted on samples obtained since 2017.

A breakeven cut-off grade was determined based on all variable and fixed costs applicable to the operation. These include exploitation and treatment costs, general expenses and administrative and commercialization costs (including doré transportation).

Mineral Reserves for the Lindero Deposit as of December 31, 2022 are reported in Table 1.2. Mineral Reserves are not estimated for the Arizaro Deposit.

Table 1.2 Mineral Reserves as of December 31, 2022

Deposit	Classification	Tonnes (000)	Au (g/t)	Cu (%)	Contained Metal Au (koz)
Lindero	Proven	25,505	0.61	0.08	504
	Probable	53,713	0.54	0.11	937
	Proven + Probable	**79,218**	**0.57**	**0.10**	**1,441**

Notes:

- Mineral Reserves are as defined by the 2014 CIM Definition Standards for Mineral Resources and Mineral Reserves.
- Factors that could materially affect the reported Mineral Reserves include; changes in metal price and exchange rate assumptions; changes in local interpretations of mineralization; changes to assumed metallurgical recoveries, mining dilution and recovery; and assumptions as to the continued ability to access the site, retain mineral and surface rights titles, maintain environmental and other regulatory permits, and maintain the social license to operate.
- Mineral Reserves for the Lindero Deposit are reported based on open pit mining within designed pit shells based on variable gold internal cut-off grades and gold recoveries by metallurgical type. Met type 1 cut-off 0.27 g/t Au, recovery 75.4%; Met type 2 cut-off 0.26 g/t Au, recovery 78.2%; Met type 3 cut-off 0.26 g/t Au, recovery 78.5%; and Met type 4 cut-off 0.30 g/t Au, recovery 68.5%. The cut-off grades and pit designs are considered appropriate for long term gold prices of US$1,600/oz. Assumptions used in the pit design are the same as those for the resources.
- Mineral Reserves are estimated as of August 31, 2022 and reported as of December 31, 2022 taking into account production related depletion between September 1 and December 31, 2022
- Mining recovery and dilution is accounted for during block regularization to 10 x 10 x 8 meter selective mining units.
- Raul Espinoza, FAusIMM Chartered Professional #309581 is the Qualified Person for mineral reserves, being an employee of Fortuna Silver Mines Inc.
- Mineral Reserve tonnes are rounded to the nearest thousand.
- Totals may not add due to rounding.

1.10 Mining methods

The mine at the Lindero Property is an owner-operated conventional open pit mining operation. The key mining fleet equipment is composed of six trucks with an operational capacity of 96 tonnes per unit and two 17 cubic yard wheel loaders.

Mining costs benefit from short haul distances from the pit to the primary crusher and waste dump. Maximum travel distance is in the range of 4.2 km to deliver waste to the dump at the end of the mine life. The LOM direct base mining cost is estimated at US$ 1.65 per tonne mined.

Mineral Reserves are estimated at 79.2 million tonnes as of December 31, 2022 which is sufficient for a 12 year life-of-mine (LOM) as of January 1, 2023, consisting of an annual average mill throughput rate of 18,493 tpd. The LOM annual average production will be approximately 100 koz of gold based on an average head grade of 0.56 g/t Au. The ratio of waste to ore over the LOM is 1.36 to 1.

The QP is of the opinion that:

- The mining method being used is appropriate for the Lindero Deposit being mined.
- The open pit, stockpile, waste dump designs, and equipment fleet selection are appropriate to reach production targets.
- The mine plan is based on successful mining philosophy and planning, and presents low risk.
- Inferred Mineral Resources have not been included in the mine plan and are considered as waste.
- The mobile equipment fleet presented is based on simulations and productivity data from the current operations.
- All mine infrastructure and supporting facilities meet the needs of the current mine plan and production rate.
- Major planned maintenance of the main equipment, such as loaders and trucks, have been covered in sustaining capital by purchasing additional equipment that can replace any possible lost production hours and not impact production targets.

1.11 Recovery methods

The Lindero Mine's recovery process includes a multi-stage crushing plant, an agglomerator, a permanent leach pad, a SART plant, an ADR plant, and smelting plant to produce doré bars. Additionally, the SART plant produces a precipitate containing large fractions of copper and silver from the PLS solution.

Water is obtained from multiple wells located in the vicinity of the mine site. Electrical power is sourced though diesel generators under a rental contract. The crushing plant consists of three stages with a target final product of 80 percent passing size (P80) of minus 6-8 mm. A primary jaw crusher operating in open circuit, a secondary stage using three parallel-operating cone crushers in inverse close-circuit with its own classification screen, and a tertiary stage using a single high pressure grinding roll operating in open circuit with a recirculation of its discharge.

The agglomeration stage mixes crushed ore with cement, concentrate cyanide solution and barren solution to produce a glomer with enough mechanical competence to allow percolation of the leaching solution during the entire life of the permanent multi-lift leach pad.

A permanent multi-lift leach pad is loaded using a series of grasshoppers and a radial stacker into, typically, 60 x 60 x 10 m cells that are irrigated for a total of 75 days. Initially the cells are irrigated with intermediate leach solution (ILS) for 30 days to produce a PLS from which the gold is later recovered, followed by a further 45 days of irrigation with barren solution to produce the ILS.

Low grade-cyanide soluble copper is pervasive throughput the deposit. To guarantee the efficiency of the downstream recovery processes, as well as the quality of the doré, a SART plant removes the vast majority of the copper and silver contained in the PLS to a precipitate. The copper precipitate is sold to the open market.

The PLS solution is then processed using activated carbon in the ADR plant to produce a high gold concentrate solution (eluate) that for security reasons is transferred to the smelter area. At the smelter, gold is converted to a solid using electrowinning then smelted into a doré bar using a propane furnace.

The Lindero Mine's operational metallurgical performance is progressively improving since first ore was loaded on the leach pad in July 2020. Throughput levels have increased as the operation has improved the mechanical availability of the crushing and stacking facilities.

The Lindero Mine's accumulated gold recovery as of December 31, 2022, reached 58.03 percent, which is line with management's expectations based on the loading of coarse size ore during the first 11 months of operation. This coarse ore accounts for 31.8 percent of the total ore tonnes and 31.1 percent of the total gold metal loaded on the leach pad as of yearend 2022. The accumulated gold recovery curve shows a consistent upward trend that will continue to increase provided Mansfield continue optimizing the performance of the crushing circuit.

1.12 Project infrastructure

The QP is confident that all mine and process infrastructure and supporting facilities have been included in the general layout to ensure that they meet the needs of the mine plan and production rate and notes that:

- The mine has good year-round access with significant road improvements undertaken for stretches of the road between Tolar Grande and the operation.
- The mine infrastructure has a compact layout footprint of approximately 60 ha.
- Major processing and support facilities located at the Lindero Mine include: primary, secondary and tertiary crushers; agglomerators; stacking system; leach pad; solution ponds; SART plant; ADR plant; power plant; truck shop; administrative offices; waste dump; warehouses; logging facility; chemical and metallurgical laboratories; and accommodation camp.
- Power is being generated on-site by a contractor through diesel-fuel generators with a hired capacity of 7.64 MW.
- Total water requirements vary between 90 and 100 m^3/hr and are primarily sourced from three existing wells located approximately 13 km southeast of the Mine.

1.13 Market studies and contracts

No market studies are currently relevant as the Lindero Mine will produce a readily-saleable commodity in the form of doré.

Mansfield has 14 major contracts for services relating to operations at the mine including mining activities, drilling, civil works, transportation, electrical installations, plant and mine maintenance, and the supply of reagents, cement and explosives. Mansfield also has agreed to contracts for its main services including power generation, catering, security, personnel transportation and product sales.

A long-term price estimate of US$1,600/oz has been applied, based on the mean consensus prices from 2022 to 2025 of US$1,719/oz weighted at 40 percent and the 10-year historical average of US$1,435/oz weighted at 60 percent.

The Lindero Mine product consists of doré bars containing an average of approximately 84 percent gold content for the mine life. Overall gold extraction in respect to ore placed on the heap leach is estimated to be approximately 75 percent.

The QP has reviewed the information provided by Fortuna on marketing, contracts, metal price projections and exchange rate forecasts, and notes that the information provided support the assumptions used in this Report and are consistent with the source documents, and that the information is consistent with what is publicly available within industry norms.

1.14 Environmental studies and permitting

In November 2011, the Salta Provincial government granted the principal environmental Declaración de Impacto Ambiental (DIA) permit, which is the primary mining permit required for development of a mine, enabling a project operator to start construction and proceed to full mine operating status. The Salta Provincial government has approved the three Environmental Impact Assessment (EIA) renewals submitted by Mansfield since November 2011, granting in each case a new DIA permit with the same faculties. The last update submitted in February 2021, is under evaluation by the authority of the Mining Secretary of Salta. During the evaluation of the renewals, the last approved EIA and the DIA permits remain valid and in force until renewal approval, which is expected later in 2023.

Specific approvals and permits are required for many aspects of the Mine. All necessary permits regarding mining operations were granted in a timely manner.

Since the discovery of gold mineralization at the Property in 2000, Mansfield has provided more than 20 environmental reports describing various activities such as extraction of samples at initial stages, soil sampling, a program of geophysical surveys, and details of access roads, drilling programs, camp installation, and runways. These reports each consist of a brief description of the environmental baseline, the Lindero Mine, environmental impact, and ways to prevent and mitigate that impact.

In December 2007, Mansfield presented an extensive environmental baseline report (EBL), completed by Vector Argentina, to the Secretariat of Mining for Salta Province.

That report included sections on geology, geomorphology, hydrology, sociology, archaeology, local flora and fauna, soil types, and climate and air quality. The EBL was accepted by the Mining Judge of Salta after being examined by environmental technicians of the Secretariat of Mining and the Provincial Secretariat of Environment. There are no known current environmental liabilities for this Project.

In September 2007, Mansfield installed a weather station at the site to record temperature, humidity, wind speed and direction, precipitation, atmospheric pressure, solar radiation, and evaporation. All of these parameters are recorded on a daily basis in a database at the camp.

The weather station allows the analysis of updated data daily and analysis of the data across time.

It is important to note that Mansfield has filed an advance activity report every six months since 2012, as established by DIA requirements. The last semi-annual report was submitted to the mining authorities in August 2022.

Mansfield received a mine permit to build a heap-leach gold mine for up to 30,000 tpd as detailed in the Pre-Feasibility Study (AMEC, 2010b).

Electrical, structural, building and seismic plans for the construction of the mine were reviewed and approved by COPAIPA (Dec 2013), the professional engineering institution that overlooks all construction in Salta Province. In 2017, COPAIPA approved additional permits for the construction of the agglomeration and SART plants that were added to the process design. Mansfield has obtained all necessary permits for the infrastructure that is required to support mining operations at the Lindero Mine.

Environmental risks during the closure stage will be reduced by remediation and monitoring work. At the closure stage, soil will be contoured by heavy machinery to minimize the long-term impact of mining activity and return the topography of the land to resemble prior conditions. However, the movement of soil, and thus the risk, will be significantly less than in the mining operations stage.

In November 2022, Mansfield filed a detailed closure plan report with the Secretary of Mining. This is the first detailed mine closure study presented in the Province of Salta.

One social-environmental risk will be the impact of closure on employment, directly and indirectly, to the surrounding communities. It will be imperative to implement measures to mitigate this impact during the mine's operation.

A significant environmental risk will also be present during the closure of facilities, which will cause significant production of non-hazardous industrial waste and hazardous products from the movement of heavy machinery. It will be essential to establish clear environmental policies with the contractors during this process.

One of the priorities of Mansfield is the care and protection of the environment. During the exploration and construction phases, an attempt was made to control to the greatest extent possible any potential environmental impacts on the area. The same effort is being made in the operational stage and will be made in the closure stages of the mine. Mansfield has defined environmental principles that will enable the development of mining operations efficiently from a productivity standpoint and from an environmental perspective.

It is the opinion of the QPs that the appropriate environmental, social and community impact studies have been conducted to date for the Lindero Mine. Mansfield has maintained all necessary environmental permits that are the prerequisites for the granting of mining permits.

1.15 Capital and operating costs

Capital and operating cost estimates are based on the established cost experience gained from the operation, projected budgets, and quotes from manufacturers and suppliers. Overall, the cost estimation is of sufficient detail that, with the current experience at the Lindero Mine, Mineral Reserves can be declared. All costs are US dollars (US$). No escalation factors have been applied to any costs, present or future capital. The total mine sustaining capital cost through the LOM is estimated to be US$ 196.4 million.

Major sustaining capital projects planned for 2023 include leach pad phase 2 expansion (US$ 17.5 million), heavy equipment replacement and overhaul (US$ 7.6 million) and plant spare parts (US$ 1.2 million).

The total LOM operating cost for the Lindero Mine is estimated at US$ 12.90 per tonne of ore processed.

Long-term projected operating costs are based on the LOM plan, mining and processing requirements, as well as historical information regarding performance, operational and administrative support demands. Operating costs include site costs and operating expenses to maintain the operation.

1.16 Economic analysis

Fortuna is using the provision for producing issuers, whereby producing issuers may exclude the information required under Item 22 of Form 43-101F1 - *Technical Reports* for technical reports on properties currently in production and where no material production expansion is planned.

The Mineral Reserve declaration in this Report is supported by a positive cashflow for the period set out in the LOMP based on the assumptions detailed in this Report.

1.17 Other relevant data and information

Goldrock commissioned Vector Argentina SA (Ausenco; 2010) and Conhidro (2013) to conduct a hydrologic study of the Property area, during the detailing of the environment base line map and EIA study. As part of the study, the Rio Grande hydrologic basin was defined through the evaluation of various field parameters and review of satellite images. The basin was determined to be 1,687 km^2 in size. Exploration for groundwater resources was undertaken, and successfully identified possible sources.

A number of geotechnical studies were performed at the Lindero Deposit and reviewed by CNI from 2017 to 2022. Those studies form the basis for the pit slope estimates used in the mining model for the Lindero Mine. Included in the studies were geotechnical surveys for heap leach and waste dumps. These studies are considered by the QP to be consistent with industry practices and adequate to support mine design.

1.18 Conclusions, risks, and opportunities

This Report represents the most accurate interpretation of the Mineral Reserve and Mineral Resource available as of the effective date of this report. The conversion of Mineral Resources to Mineral Reserves for the Lindero Deposit estimate was undertaken using industry-recognized methods, and estimated operational costs, capital costs, and plant performance data. Thus, it is considered to be representative of future operational conditions. This Report has been prepared with the latest information regarding environmental and closure cost requirements.

A number of opportunities and risks were identified by the QPs during the evaluation of the Lindero Mine and Arizaro Project.

Opportunities include:

- As mining has commenced at the Lindero Deposit, additional geotechnical data is being collected from the open pit that could support an increase in final pit slope angles, potentially decreasing stripping ratios and/or increasing Mineral Reserves.
- The Arizaro Deposit is not included in the current mine plan. However, it represents upside opportunity if a satellite mine can be developed on the Property that could supplement the Lindero operation.
- Infill drilling at both the Lindero and Arizaro deposits could support the conversion of Inferred Resources to Measured or Indicated Resources and, with the appropriate studies, to Mineral Reserves. This represents additional upside potential for the planned operation.
- The Lindero Deposit remains open at depth below the pit shell constrained reported reserves and resources. An area of interest has been identified by Fortuna during the drilling campaign carried out in 2016 with drill hole LDH-126 encountering 0.97 g/t Au over a 38 m interval (refer to discussion in Section 10). This is supported by historical drilling from 2007 including drill hole LDH-86 averaging 1.06 g/t Au over a 52 m interval which bottomed in mineralization. These intercepts warrant follow-up drill testing.
- There are several local exploration targets within the concession boundary, that with further work, represent upside opportunity to identify mineralization that can potentially add to the resource base.
- As mining has commenced, blasting fragmentation analysis is being conducted on an ongoing basis to optimize mining and processing productivity and reduce costs.
- Blasting trials on interim walls could result in the steepening of bench face angles and determine if pre-splitting final walls is required.
- Usage of 50-tonne capacity civil trucks instead of 96-tonne mining trucks could reduce both acquisition capital and maintenance costs.
- Mansfield plan to execute multiple projects in 2023 in the crushing and agglomeration areas that are intended to improve the long-term mechanical availability of those facilities.
- Improvements to the radial stackers traction system will increase its mechanical availability.

Risks include:

- Vibrations are impacting infrastructure associated with the primary crusher and agglomerator, which could potentially lead to damage to the supporting structure. Mansfield has strengthened the equipment and incorporated monitoring procedures to the primary crusher to help early identification of potential issues. External consultants have been engaged to assess the vibrations to ascertain if further remediation is required.
- Failure of strategic components of critical equipment in the processing plant could have a detrimental impact on planned throughput resulting in a reduction in gold production for a specific period of the year. Mansfield monitors critical

components and maintains an inventory of spare parts to reduce the potential impact of any such failure.

- Despite collection of data relating to soluble copper from blast holes since operations commenced, local behavior of cyanide-soluble copper is not fully understood and cannot be modeled due to insufficient assays from historical core. Levels of soluble copper could be higher than anticipated in certain areas of the deposit requiring adjustments to mine plans and schedules to reduce the impact in the plant. The presence of a SART plant greatly reduces the potential impact of soluble copper at the mine.
- Considerable new lithium projects are being proposed in the Salta province and there is a minor risk that one of these projects could access water from the same aquifer that the Lindero Mine uses for its supply. In addition, new projects could have an adverse impact on procurement, transportation and social conditions in the local area while increasing competition for skilled workers.
- Capital controls and duties on goods and services imported into Argentina are impacting the delivery of spare parts for mining and processing equipment, which can result in reduced equipment productivity and mechanical availability. To ensure smooth operations, the logistics area should continue to monitor and maintain a well-stocked inventory to resolve potential issues promptly. In addition, Mansfield has engaged with local suppliers to obtain spare parts to mitigate potential future mechanical problems that may arise.

1.19 Recommendations

Recommended work programs at the Lindero Mine and Arizaro Project are independent of each other and can be conducted concurrently unless otherwise stated and include:

- Continued work at the Arizaro Deposit that focuses on the controls of lithology, structure, and alteration on mineralization so as to determine the suitability of material as a potential feed for the Lindero Mine's processing facility and to support the estimation of Mineral Resources. It is recommended that a 3,000-m diamond drill program (approximately 15 holes at a 50 m spacing) is conducted as the next phase of work at a cost of approximately US$ 670,000.
- An infill drill program at the Lindero Deposit involving the drilling of approximately 2,000-m of diamond drill holes is recommended in 2023 to improve the geological understanding of material planned for extraction in 2024. The cost of such a drill program is estimated at approximately US$ 500,000.
- Exploration work to date on the Lindero concession has been focused on outcropping porphyry mineralization. It is recommended that Mansfield evaluate the property for mineralization beyond the two known porphyry systems at Lindero and Arizaro. For example, alteration zones and silica structures located within the concession, 2.5 km due south of the Lindero Mine, remain open for evaluation. Exploration work would primarily involve mapping and carry no additional cost to the operation.
- The cement in each lift on the heap will cure for several months before another lift is placed. It may be several years before any block of agglomerated ore receives 110 m of loading. It is recommended that a long-term stacking test be conducted to see if

ageing will improve the ability of the ore to support the 110-m height with less cement. The estimated cost of the testwork is US$ 20,000.

- A lysimeter test on site is recommended to obtain better data on evaporation and soil moisture content for improved pad water balance understanding. The estimated cost for tanks, piping, strain-gage loadcells, construction and installation is approximately US$ 10,000.
- Field scale permeability testing of ore with design cement content versus less to no cement content is recommended to determine if the site cement requirements could be decreased. The estimated cost for a tank, flow meter, construction and installation is approximately US$ 10,000.
- The extents of the Lindero Deposit rock quality designation (RQD) block model fails to reach the upper parts of the slope in a limited area in the southwest and north of the pit. It is recommended that new drill holes be planned to get information for the areas not covered by the RQD block model. An update of the RQD block model should be performed when this new information becomes available. The cost of a 2,000-meter geotechnical drill program to collect sufficient data is estimated at approximately US$ 500,000.
- Geotechnical drilling at the Arizaro Deposit to verify appropriate pit slope angles. The cost of a 3,000-meter geotechnical drill program to collect sufficient data for such an analysis is estimated at approximately US$ 750,000.
- It is recommended that Mansfield create a sulfide (pyrite) block model to proactively manage pockets of sulfide-rich waste rock (i.e. encapsulate potentially acid generating waste rock). This study can be conducted inhouse at no additional cost.
- A trade-off study is recommended to assess the option to excavate 16 m high benches without pre-splitting versus pre-splitting to excavate 8 m high benches, to steepen the pit walls. This study can be conducted inhouse at no additional cost.
- Drill and install additional piezometers (monitoring wells) to help verify aquifer adequacy and supply at approximately US$ 100,000.
- Conduct an overall site water balance and hydrogeology study with known supply and demand parameters. The cost of this study is estimated at approximately US$ 75,000.

In addition, it is recommended that Mansfield focus its metallurgical development on optimization initiatives including:

- The crushing and agglomeration plants may need additional reinforcement to their supporting structures. Once completed, the mechanical availability could improve along with throughput levels.
- The crushing plant's metallurgical performance is undergoing several infrastructure upgrades to consistently achieve the desired target particle size of 6-8 mm. In addition to the usual evaluation of alternative crushing chambers for the jaw and cone crushers, the HPGR's control logic should be reviewed to ensure minimal deviation from the roll's opening target set point.
- Mansfield need to continue improving the leach pad stacking system mechanical availability to increase the equipment utilization time of the agglomeration-stacking

circuit. Particular attention should be paid to, the radial stacker's driving system that may need reinforcement or replacement.

- The leach pad operating practices must be supported in the metallurgical development of the in-house laboratory. The design parameters defined during the development stage of the project are to be used as a starting point and continuous internal investigations used for updating and improving the operating parameters for all unit processes to support the Lindero Mine's LOM.
- It is recommended that the metallurgical laboratory facilities be carefully monitored and continuously upgraded to meet the requirements of the operation in a timely manner.
- The Lindero Mine's electrical power supply relies 100 percent on diesel generation under a rental contract. During 2022 the average energy cost was US$ 0.40/kWh which is high when compared to typical values in the industry but not unreasonable considering the remote nature of the operation in the Argentine puna. Mansfield are in the process of tendering bids for the installation of a solar power plant that will help provide supplementary power to the camp and other remote facilities.

All the above optimization recommendations can be conducted inhouse with associated costs incorporated into ongoing operational costs.

2 Introduction

2.1 Report purpose

This Technical Report (the Report) on the Lindero Mine and Arizaro Project (the Property or the Lindero Property), has been prepared by Mr. Eric Chapman, P.Geo, Mr. Raul Espinoza, FAusIMM (CP), Mr. Mathieu Veillette, P.Eng, and Mr. Dmitry Tolstov, MMSA (QP), for Fortuna Silver Mines Inc. (Fortuna) in accordance with the disclosure requirements of Canadian National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* (NI 43-101).

The mineral rights of the Property are held by Mansfield Minera S.A. (Mansfield) an Argentine subsidiary that is indirectly wholly-owned by Fortuna and is responsible for running the Lindero operation.

The primary purpose of this Report is to describe:

- Exploration and infill drilling activities conducted since February 23, 2016 (effective date of previous Technical Report).
- Mineral Resource and Mineral Reserve estimates for the Lindero Deposit reported as of December 31, 2022.
- Mineral Resource estimates for the Arizaro Deposit reported as of December 31, 2022.
- Metallurgical testwork conducted since February 23, 2016.
- Updated life-of-mine (LOM), capital and operational expenditures.
- Updated information regarding the completion of construction and commencement of mining and processing activities.
- Updated environmental and permitting information.

2.2 Scope of personal inspection

Mr. Eric Chapman has been employed as Fortuna's Senior Vice President of Technical Services since January 2021, and prior to that as Vice-President of Technical Services since January 2017 and prior to that as Mineral Resource Manager for Fortuna since May 2011. He has visited the property on multiple occasions, the most recent being on January 30, 2023. During his site visits Mr. Chapman regularly reviews data collection, drill core, storage facilities, processing plant, heap leach facility, database integrity, procedures, and geological model construction. Discussions on geology and mineralization are held with Mansfield personnel, and field site inspections performed, including a review of surface geology of the Lindero and Arizaro deposits, and inspection of operating drill machines. He works with the site geological personnel reviewing aspects of data storage (database) and analytical quality control.

Mr. Raul Espinoza has been the Director of Technical Services for Fortuna since July 2022. He most recently visited the property on January 30, 2023. During this visit Mr. Espinoza reviewed, existing infrastructure, mining methods, Mineral Reserve estimates, LOM and mine plan schedules, road access, and discussed environmental, social, permitting, operating and capital expenditure requirements with Mansfield personnel.

Mr. Mathieu Veillette has been the Corporate Manager Water and Tailings since August 2022. Mr. Veillette most recently visited the property on Dec 13, 2022 where he performed a field visit on the heap leach facility, open pit, waste dumps and water management facilities. He also reviewed and discussed with site personnel designs and procedures for the open pit, heap leach facility, waste dumps, geotechnical model and water balance.

Dr. Dmitry Tolstov is an independent metallurgical engineer who last visited the property on May 26, 2022 and has provided ongoing consultancy to the metallurgical and processing areas since December 2018. Dr. Tolstov has reviewed the metallurgical testwork data that supports the expected behavior of the plant and used for estimating gold recovery for the LOM.

2.3 Effective dates

The Report has the following effective dates:

- August 18, 2022: date of database cut-off for assays used in the Mineral Resource estimate for the Lindero Deposit.
- December 31, 2022: date of the Mineral Resource and Mineral Reserve estimates for the Lindero Deposit taking into account production related depletion to this date.
- December 31, 2022: date of database cut-off for assays used in the Mineral Resource estimate for the Arizaro Deposit.

The overall effective date of the Report is the date of the most recent supply of material information, being December 31, 2022.

2.4 Previous technical reports

All previously published Technical Reports on the Property are as follows (listed in reverse chronological order):

- Chapman, Gutierrez, Allard & Murrugarra, 2017. Technical Report on the Lindero Project, Salta Province, Argentina, prepared for Fortuna Silver Mines Inc., 23 February 2017.
- Kappes, Cassiday & Associates (KCA), 2016a. Technical Report update on the Lindero heap leach project, Salta Province, Argentina, prepared by Kappes, Cassiday & Associates for Goldrock Mines Corporation, 23 February 2016.
- KCA, 2013. Technical Report on the Lindero Heap Leach Project, Salta Province, Argentina: Prepared by Kappes, Cassiday and Associates for Goldrock Mines Inc., effective date 01 May 2013.
- AMEC Americas Ltd, 2010. Technical Report on the Lindero Project, Salta Province Argentina: Project No. 162667, Effective Date 02 March 2010.
- Godoy and Palmer, 2008. Technical Report on the Lindero Project, Salta Province, Argentina: Technical report prepared by Golder Associates Argentina SA for Mansfield Minerals Inc., effective date 8 August 2008.

- Fuchter and Rennie, 2003. Report on the Lindero Project, Salta Province, Argentina: Technical Report prepared by Roscoe Postle Associates for Mansfield Minerals Inc., effective date 16 October 2003.

2.5 Information sources and references

The main information sources referenced in this Report are listed below. For a full list of all information sources referenced in this Report the reader is referred to Section 27.

- Ausenco Vector, 2010. Environmental Impact Assessment, "Informe de Impacto Ambiental, Capitulo 2", October 2010.
- Call & Nicholas (CNI), 2017. Geotechnical Review and Feasibility-level Slope Angles for the Lindero Open-pit mine, unpublished report prepared by Call & Nicholas Inc. for Fortuna Silver Mines Inc., May 2017.
- Chapman, Gutierrez, Allard & Murrugarra, 2017. Technical Report on the Lindero Project, Salta Province, Argentina, prepared for Fortuna Silver Mines Inc., 23 February 2017.
- Call & Nicholas (CNI), 2022. Phase 1 Updated Geotechnical Pit Slope Design Work for the Lindero Open-Pit Mine Report prepared by Call & Nicholas Inc. For Fortuna Silver Mines Inc., Nov 2022.

Additional information was obtained from Mansfield personnel including technical and mine planning from Raul Correa (Technical Services Manager), mine geology from Marcos Jimenez (Geology Chief), exploration geology from Jorge Kesting (Director of Exploration), social, environmental and permitting guidance from Facundo Huidobro (Community Relations Manager) and Agustin Frezze (Legal Manager).

Some of the more commonly used acronyms used in the Report are detailed in Table 2.1.

Table 2.1 Acronyms

Acronym	Description
ADR	adsorption, desorption, recovery
AR$	Argentine Pesos
Ag	silver
Au	gold
CIC	carbon in column
cm	centimeters
Cu	copper
CV	coefficient of variation
DC	direct current
FY	fiscal year
g	gram
gpl	grams per liter
g/t	grams per metric tonne
ha	hectare
HPGR	high pressure grinding roll
hr	hour
kg	kilogram
km	kilometer
kg/t	kilogram per metric tonne

Acronym	Description
kPa	kilopascal
kV	kilovolt
kVA	kilovolt ampere
kW	Kilowatt(s)
kWh/t	kilowatt hours per metric tonne
l	liter
LOM	life-of-mine
m	meter
mm	millimeter
Ma	millions of years
masl	meters above sea level
Moz	million troy ounces
MW	megawatt
NaCN	Sodium cyanide
NaOH	sodium hydroxide
N	Newton
NI	National Instrument
NPV	net present value
oz	troy ounce
oz/t	troy ounce per metric tonne
ppm	parts per million
QAQC	quality assurance/quality control
QQ	quantile-quantile
RO	reverse osmosis
ROM	run of mine
RQD	rock quality designation
SART	sulfidization-acidification-recycle-thickening
SMU	selective mining unit
t	metric tonne
t/m^3	metric tonnes per cubic meter
tpd	metric tonnes per day
V	volts
yr	year
µm	micrometer
$/t	United States dollar per metric tonne
$/g	US dollar per gram

3 Reliance on Other Experts

The QPs have not independently reviewed ownership of the Lindero Mine area and any underlying property agreements, mineral tenure, surface rights, or royalties. The QPs have fully relied upon, and disclaim responsibility for, information derived from Fortuna and legal experts retained by Fortuna for this information through the following document:

- Estudio Juridico Diego Mendilaharzu & Associates, 2023: Legal Opinion Argentina - Mansfield Minera S.A. Internal report prepared for Fortuna Silver Mines Inc., dated January 16, 2023.

This information is used in Section 4 of the Report. The information is also used in support of the Mineral Resource estimate in Section 14, and the Mineral Reserve estimate in Section 15.

4 Property Description and Location

The Lindero Property is located 260 km due west of Salta City, Argentina. Drive time from Salta to the Property is approximately 7 hours, over a road distance of 420 km. The nearest town to the Lindero Property is Tolar Grande (population 250), located 75 km to the northeast. Access to the Property is via National Route 51, which passes through the towns of San Antonio de Los Cobres and Olacapato; and Provincial Route 27, via Pocitos and Tolar Grande. The Lindero Property is located at (Zone 19J) 7,226,220N and 2,623,090E based on the Posgar datum WGS 84 coordinate system used for legal land tenure in Argentina (Figure 4.1).

Figure 4.1 Map showing the location of the Lindero Property

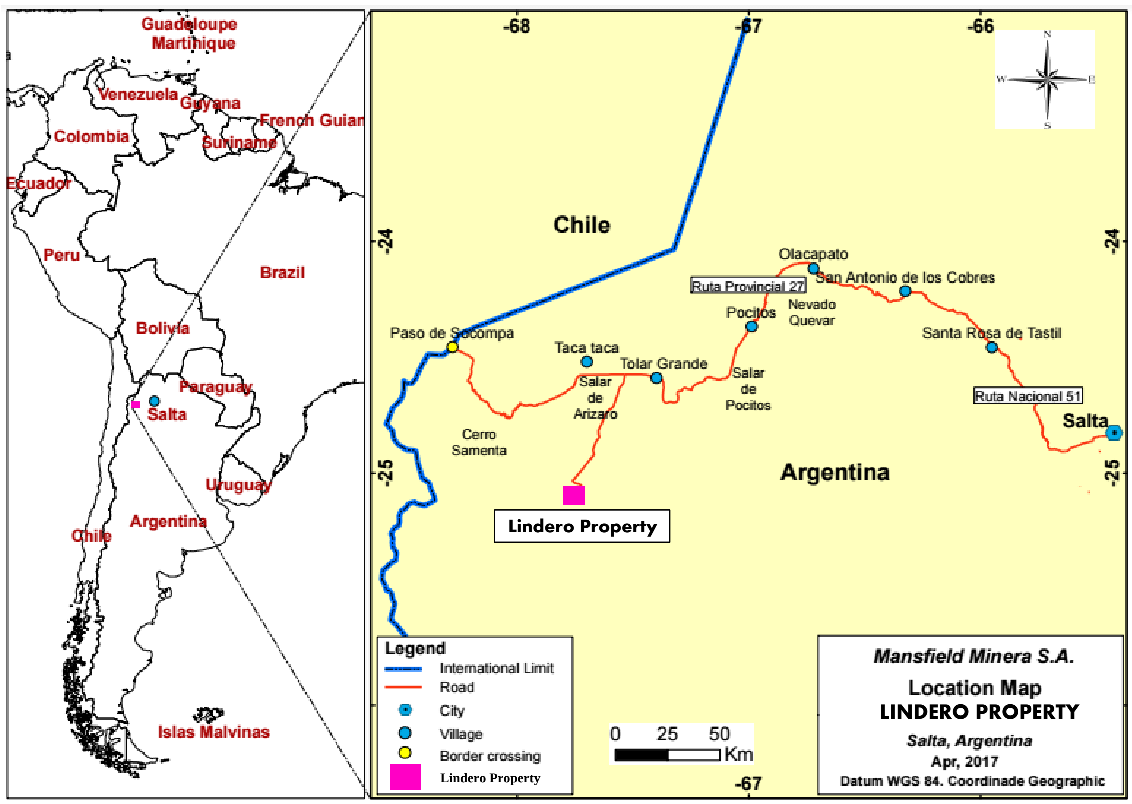


Figure prepared by Mansfield, 2017

4.1 Property and title in Argentina

4.1.1 Mineral title administration

Information in this section is sourced from the Estudio Juridico Diego Mendilaharzu & Associates (2023) legal opinion.

The Argentine Mining Code, which dates back to 1886, is the legislation that deals with mining in the country. Special regimes exist for hydrocarbons and nuclear minerals. In the case of most minerals, the Mining Code dictates that the owner of the surface is not the owner of the mineral rights; these are held by the Provincial State. The State is also bound by the Code to grant to whoever discovers a new mine the rights to obtain a "mining concession".

Owners must comply with three conditions; payment of an annual fee, investment of a minimum amount of capital, and the carrying out of a reasonable level of exploration or works. Failure to do so could lead to forfeiture of the property back to the State.

The Argentine Mining Law is a federally drafted law implemented through bi-lateral accords with the Provinces that have jurisdiction over mineral rights.

In 1993, Argentina implemented a new Mining Investment Law (No 24,196), a Mining Reorganization Law (No. 24,224), a Mining Modernization Law (No 24,498), a Mining Federal Agreement (No. 24,228), and a Financing and Devolution of IVA Law (No. 24,402). Amendments were also made to update the Mining Law (Decree 456/97). These amendments offered attractive economic incentives for exploration and mining to foreigners, and include both financial and tax guarantees. This group of laws also creates the basis for federal-provincial harmonization of mining rules such as import duty exemptions, unrestricted repatriation of capital and profits, and a 3 percent cap on provincial royalties.

In 2001, Law 25.429 "Update of the Mining Investment Law" was passed and in March 2004 approval was reached for a key provision of the Law allowing refund of the IVA (or value added tax) for exploration related expenses incurred by companies registered under the Mining Investment Law.

In 1995, Law N° 24.585 Environmental Protection (Mining Code) was passed and provides regulation for operations and environmental reporting at the exploration and exploitation levels.

In summary, the major changes to the mining code encompass:

- Exploration areas have been increased to a maximum of 200,000 ha per company and per Province.
- Exclusive aerial prospecting areas of 20,000 km^2 are also permitted.
- A guarantee of tax stability for 30 years.
- Expenditures made in prospecting, exploring and construction of mining installations are tax deductible and value added taxes are recoverable.
- Imports of capital goods, equipment and raw material are exempt from import duties.
- Royalties will not exceed 3 percent of the ex-mine value of the extracted mineral.
- Environmental funds to correct damage are required and are deductible from income taxes; a National system of permanent mining environmental monitoring is set up. Implementation at the provincial level has been variable.
- Systemization and digital conversion of mining property registers has been implemented to varying degrees of success in each Province and the definition by geographic co-ordinates now establishes mining rights.

4.1.2 Mineral title types

A Cateo (exploration right) is an area of land staked during the early stage of exploration. In Argentina, this is called the "Prospecting Stage". Cateos may be contiguous or separate and are subject to certain restrictions on size. A Cateo is sub-divided into 500 ha units with a defined exploration term determined by the cumulative number of units comprised. The maximum possible term is 1,100 days for the maximum lease size of 10,000 ha commencing from the grant date. Prior to its expiry, the holder of a Cateo may apply at any time for conversion to one or more 'Manifestación de Descubrimiento' (application period for a mining lease), which when granted, becomes a 'Mina' (mining lease) right within the perimeter of the Cateo up to its full area. Minas can also be established as the result of a discovery in open ground. A mining lease is subdivided into a minimum of two pertenencias, which are generally 6 ha for small deposits and 100 ha for larger, disseminated deposits.

To apply for a Manifestación, the applicant must present a representative sample of the outcrop as the discovery and indicate its coordinates and the surrounding area to be covered by the title. After about a six-month period the Manifestación will be registered and converted to a 'Mina' or mining lease. Conversions and applications are administratively dependent and not date-dependent and are therefore not automatic. Processing times from one provincial jurisdiction to another may vary.

The application authority for the Lindero Mine is the Salta Mining Secretary of Salta and the mining concession is granted by the Salta Mining Court house.

4.1.3 Surface rights

Access over surface property rights in Argentina for mining projects are granted by the mining authority for the Province (in Salta this is a Mining Judge), who are required to communicate with the surface owners and ensure that they cooperate with the activities of the exploration/mining companies. Notice can be difficult due to delayed filing of personal property title changes and registry as well as limited staffing and mobility of the relevant authorities. All mining and water rights must also be publicly announced by specific news agencies.

The Argentine legal and constitutional system grants mining properties all the guarantees conferred on property rights, which are absolute, exclusive and perpetual. Mining property may be freely transferred and purchased by foreign companies.

4.1.4 Environmental regulations

Mining in Argentina is governed by both federal legislation and provincial laws and decrees. The permitting process, as well as regulatory activities during development and operations, is managed by the Province. A mine is put into operation in two phases, starting with an Environmental Impact Assessment (EIA), and then a sector permitting phase. Approval of the EIA allows mining development to proceed, subject to obtaining sector permits for specific project facilities.

Law No. 24,585, which came into effect in 1995, incorporated a complementary title in the Mining Code relevant to the Environmental Protection for Mining Activity regulations. It also recognized complementary regulations approved by the Federal Mining Council (COFEMIN), completing the principles sustained in Article 41 of the National Constitution by setting a legal regime whose premise is to preserve the right of all inhabitants to enjoy a healthy environment through the balanced development of economic activities and processes that support them.

Law No. 24,585, established in the Federal Mining Council, details the necessary instruments for environmental administration of mining activities including; the EIA, whose presentation is compulsory for the mining activity holders before the beginning of operations; and the Statement of Environmental Impact, a statement issued by the relevant authority as an approval to the corresponding EIA.

Consequently, current environment management with regard to mining is based on the following legal regime:

- National Constitution.
- Title XIII Section Second of the Mining Council.
- Supplementary regulations and minimum requirements.
- Provincial decrees that established the application authority of the Title XXI Section Second of the Mining Council.
- Implementation of Provincial Decrees of the Supplementary Regulation and Resolutions of institutional character and of administrative internal procedure that complete environmental mining management (Law No.7,070 for Salta Province).

Law No. 24,585 covers the following activities:

- Prospecting, exploration, exploitation, development, preparation, extraction, and storage of mineral substances.
- Crushing, milling, extraction, pelletization, sintering, briquetting, primary manufacturing, calcination, melting, and refining; stone sawing, faceting, cutting, and polishing processes; any other process derived from new technologies; and the management and disposal of any kind of waste.

The regulations also take into account centralized and decentralized entities, and the national, provincial, and municipal companies that develop such activities.

Argentine Law No. 24,585 establishes that anyone performing mining activities is responsible for all environmental damage produced as a result of the non-fulfillment of the regulations. It is irrelevant whether the damage is caused directly by them or indirectly by persons under their control, or whether it is caused by the risk or vice inherent in the activity. Likewise, the holder of a mining right is jointly responsible for the damage caused by persons involved in mine exploitation.

Under the Environment Mining Management Procedure, prior to the commencement of mining activities that are subject to regulation, companies must prepare and have an environmental impact review (EIR) approved. The application authority evaluates and approves the EIR by means of a Statement of Environmental Impact for each of the effective implementation stages. The EIR must be renewed and lodged every two years.

The Statement of Environmental Impact (detailing actual site activity) must be presented to the authorities twice a year, and include submission of a report that contains results of any environment protection actions that were executed, and detailed information on the new environmental events that have occurred. Mansfield has submitted this report every six months since 2012. Under Law No. 25,675, industrial activities must obtain special insurance covering environmental risk.

4.2 Tenure

The Lindero Property was initially staked under a manifestation-of-discovery and was subsequently covered by legally-surveyed pertenencias, which were approved by, and registered in the Mining Court of Salta (File # 16,835) under the name of Onix Mine on March 30, 2001. The Lindero Deposit–Arizaro Project/Onix Mine was subsequently registered as a gold–copper mine in the name of Mansfield Minera S.A.

The mineral tenement holdings cover 3,500 ha (Figure 4.2), and comprise 35 pertenencias, each of 100 ha. The holdings are constrained by the Gauss Kruger Posgar coordinates listed in Table 4.1.

Figure 4.2 Location of the Lindero mineral tenement holdings

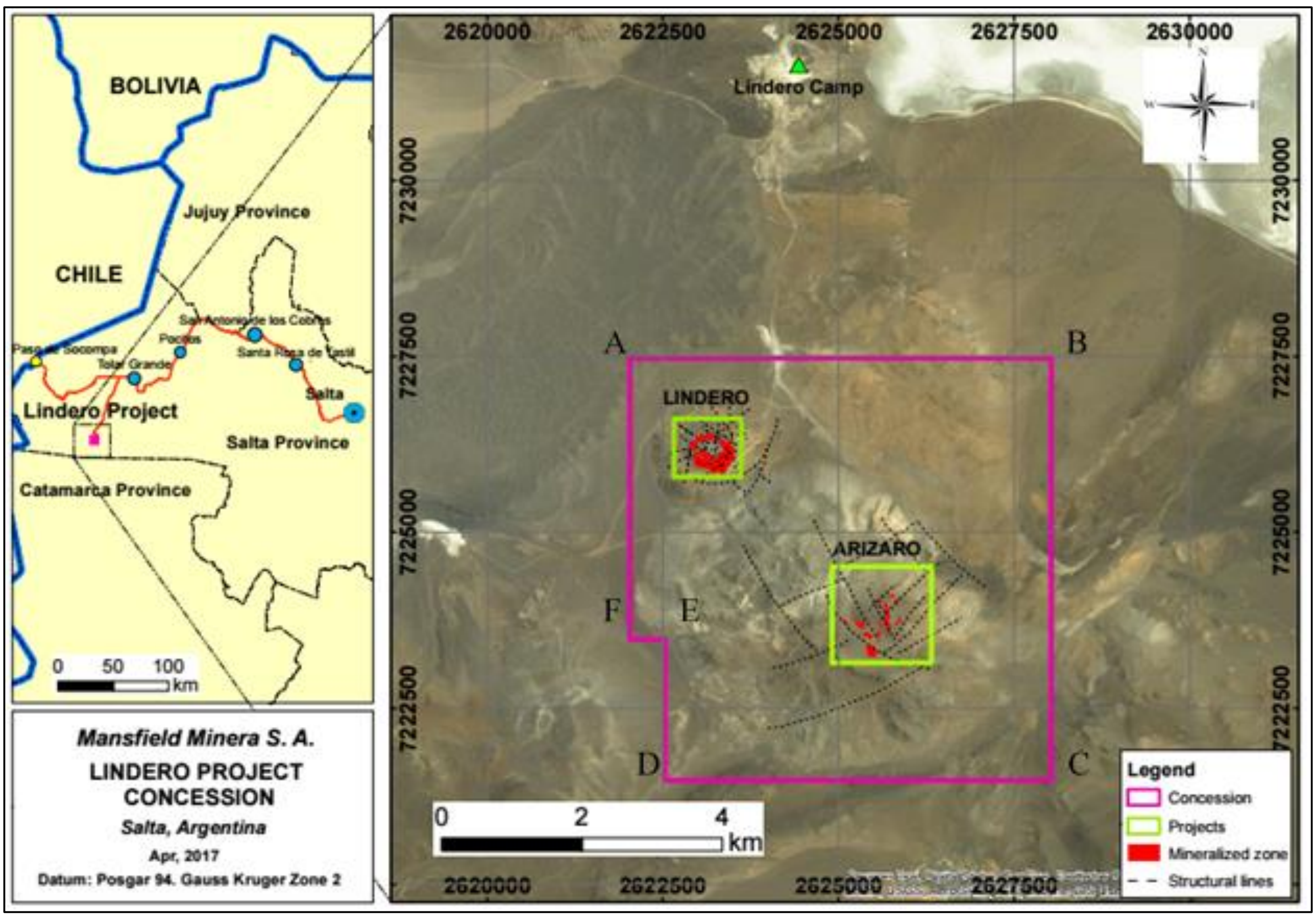


Figure prepared by Mansfield, 2017

Table 4.1 Tenure boundary coordinates

Point	Easting	Northing
A	2622009.93	7227690.07
B	2628009.90	7227690.07
C	2628009.90	7221690.11
D	2622509.93	7221690.11
E	2622509.93	7223690.09
F	2622009.93	7223690.09

The mining area boundaries have been appropriately surveyed to meet jurisdictional requirements. There is no expiry date on the pertenencias, providing Mansfield meets expenditure and environmental requirements, and pays the appropriate annual mining fees. The expenditure and environmental requirements have been met and the annual mining fees are AR$ 112,000 (approximately US$ 607 – December 2022). The mining fee is paid a year in advance in two parts, the first instalment on June 30 with the second paid on December 31. Such payments have been made as required, and as at the effective date of this Report, the tenements are in good standing.

4.2.1 Concessions and easements

In addition to the mining concession described above, Mansfield holds eight easements that cover the mine infrastructure (including the camp, plant, open pit, leach pad, and waste dump) as well as access routes for roads and water wells. A list of the mining concessions and easements showing the names, areas in hectares, and file identifiers are presented in Table 4.2.

Table 4.2 Mineral concessions and easements owned by Mansfield

Type of Concession	Name	File	Area (ha)
Mine	Onix	16835	3,500
Easement	Servidumbre de Campamento (camp)	17206	66
	Servidumbre de Camino y Agua (road and water)	18387	54
	Servidumbre de Campemento, Planta y Agua (camp, plant and water)	19200	2,924
	Servidumbre de Camino y Agua (road and water)	21995	13
	Servidumbre de Planta y Proceso (plant and processing area)	22093	214
	Servidumbre de Escombrera (waste dump)	22094	265
	Servidumbre Rajo Abierto (open pit)	22095	120
	Servidumbre de Campamento (camp)	22096	104

The easements for the plant, waste dump, open pit and other facilities, are granted by the application for the underlying mining tenements (the pertenencias), as the law does allow Mansfield to have double tenement holdings via easement over the area of the mine and process plant.

4.3 Surface rights

Access over surface property rights in Argentina is obtained through the Mining Authority, who are required to communicate with the surface owners and ensure that they cooperate with the activities of the exploration/mining companies. Notice can be difficult due to delayed filing of personal property title changes and registry, as well as limited staffing and mobility of the relevant authorities.

Private property rights are secure rights in Argentina, and the likelihood of expropriation is considered low. The Argentine legal and constitutional system grants mining properties all the guarantees conferred on property rights, which are absolute, exclusive and perpetual. Mining property may be freely transferred and purchased by foreign companies.

Surface rights for the Lindero Property are owned by the provincial state (Propiedad Fiscal) of Salta. There are no reservations, restrictions, rights-of-way or easements on the Property to any third-party.

4.4 Royalties

A three percent provincial royalty "boca mina" is payable on revenue after deduction of direct processing, commercial and general and administrative costs. There are no royalties payable to any other third party.

4.5 Environmental aspects

Mansfield is in compliance with Environmental Regulations and Standards set out in Argentine Law and has complied with all laws, regulations, norms and standards.

Since the discovery of gold mineralization at the Property in 2000, Mansfield has presented more than 20 environmental reports describing various activities such as extraction of samples at initial stages, soil sampling, a program of geophysical surveys, and details of access roads, drilling programs, camp installation, and runways. These reports consist of a brief description of the environmental baseline, the Lindero Mine, environmental impact, and ways to prevent and mitigate that impact. On many occasions, the Government of Salta Province has inspected the various activities.

In December 2007, Mansfield presented an extensive environmental baseline report (EBL), completed by Vector Argentina, to the Secretariat of Mining for Salta Province. The report included sections on geology, geomorphology, hydrology, sociology, archaeology, local flora and fauna, soil types, and climate and air quality. The EBL was accepted by the Mining Judge of Salta after being examined by environmental technicians of the Secretariat of Mining and the Provincial Secretariat of Environment.

In November of 2010, Mansfield submitted an EIA report (Ausenco Vector, 2010) for the Lindero Mine Project, and in November 2011, received approval of this EIA through the issue of the Declaración de Impacto Ambiental (DIA). An update, as per requirements, has been filed biannually since 2010 with the most recent submitted in February 2021. All the EIAs have been approved by the Salta Provincial government.

Mansfield has no knowledge of any further environmental liabilities related to any of the other concessions connected with the Property.

A summary of the major environmental related activities is detailed in Section 20.

4.6 Permits

Specific approvals and permits are required for many aspects of the Lindero Mine and are detailed in full in Section 20.

4.7 Comment on Section 4

In the opinion of the QP:

- Fortuna was provided with a legal opinion that verified at the date of the opinion that the mining tenure held by Mansfield is valid and that it has a legal right to mine the deposit.
- Minimum work requirements under the tenure grant have been met.
- Annual land usage and environmental compliance reports have been lodged.
- Mansfield has the exclusive right to prospect, explore, exploit and operate the mining concessions as described in Section 4.2.1, in accordance with the Argentine Mining Code, according to its rights, and corresponding to the terms set out in the environmental impact reports.
- Fortuna has no knowledge of any additional environmental liabilities related to any of the other concessions connected with the Property.
- Surface rights are held by the Salta Province. All required surface rights for construction of a mining operation and plant have been granted from the Provincial authorities.

Fortuna advised that to the extent known, there are no other significant factors and risks that may affect access, title or right or ability to perform work at the Property. The information discussed in this section supports the declaration of Mineral Resources and Mineral Reserves, and the development of a mine plan.

5 Accessibility, Climate, Local Resources, Infrastructure and Physiography

5.1 Access

Access to the Property from Salta is by paved roads for about 100 km and by all-weather dirt roads for about 350 km along National Highway 51 and Provincial Highway 27. The access route is from Salta to San Antonio de Los Cobres on National Highway 51 (140 km), continuing to the small town of Tolar Grande on Provincial Highway 27 (210 km) and then traveling southward along an undesignated route across the salar to the Property entrance (80 km). Access to the mine from the entrance is via dirt roads for approximately 5 km. Drive time from Salta to the Property is approximately 7 to 7.5 hours. Dirt roads require ongoing maintenance to ensure quality is maintained with works agreed between Mansfield and local authorities.

The Property can also be accessed by charter plane with flights scheduled three times a week from Salta to a runway strip located at the Salar de Arizaro, less than 10 kilometers from the mine. The flight takes approximately 35 minutes.

An extensive road network has been constructed by bulldozer on the Property to provide access to all facilities at the Lindero Mine, including to the pit, waste dump area, stockpiles and crushing area. A road has also been constructed from the Lindero Mine to provide access to the Arizaro Deposit.

Other areas within the concession are accessible by four wheel-drive (4 WD) truck or all-terrain vehicle (ATV).

5.2 Climate

The Property is in the Argentine puna, a cool, arid zone with a minimum elevation of approximately 3,500 to 4,000 m. The climate is generally dry and windy; it can be cold and snowy during storms.

In 2007, a weather station was installed at the Property. Based on records from the station, conditions include:

- Average annual rainfall of about 40 mm, distributed irregularly throughout the year. The most severe rainstorms registered were in January 2008, during which 82 mm fell in two days. The 100 year 24-hour rainfall event is 127 mm. Since the weather station only has the last five to six years of weather data, the heap leach and site water balance were based on historical rainfall data from the Salar de Pocitos, Unquillal and Hombre Muerto weather stations. Based on these three stations average rainfall was approximately 45 mm during the aforementioned period.
- The annual average temperature is 3.9°C. The warmest months are January, with an average temperature of 8.0°C, and February, with an average temperature of 8.4°C. The coldest month is July, with a monthly average temperature of -2.6°C. The maximum average high for a month is 30°C and the minimum average low for a month is -10°C.

- The annual average relative humidity is 33 percent, with a monthly average maximum of 45 percent in July, and an average minimum of 27 percent from November to February.
- The annual average barometric pressure is 75 kPa.
- Annual pan evaporation is about 2,700 to 2,800 mm.
- Winds are usually relatively calm but increase significantly from west to east in the afternoon and can exceed 100 km/h.

Based on the above, mining and processing activities are regarded as safe to be conducted year-round.

5.3 Topography, elevation and vegetation

The puna area is characterized by north–south-trending mountain ranges rising to over 6,000 m and intermontane basins with attendant salt lakes (salars) with a base level of 3,500 m. Elevations on the property range from 3,700 m to 3,990 m above sea level. The Lindero Deposit is located on the upper section of a conical hill which emerges from an extensive flat area with the Arizaro Deposit located on a hill 3.2 km to the southeast.

The almost total lack of rainfall in the puna determines a vegetational floor that corresponds to the "Province of puna" shrub steppe, an herbaceous steppe with vegetal associations consisting of añagua, lejía y tola, añagua y rica-rica, iros, muña-muña, viravira, and chachacoma, among others. There are many areas with no vegetation whatsoever.

The fauna corresponds to the Andean Patagonian sub-region, Andean district, represented mainly by camelids (llamas, vicunas, and guanacos). Donkeys have been incorporated into the landscape for the last 50 years and compete for pasture with other herbivores.

The Property falls within the 1,687 km^2 Rio Grande watershed. This watershed takes Salar de Arizaro as the local base level. The watershed has little runoff; the majority of the irregularities in the field consist of ephemeral water courses caused by sporadic rainfall. The extremely arid conditions of the region, combined with scarce to null vegetation, allows the little water that does fall to filter rapidly to the subsoil with limited erosion.

5.4 Infrastructure

The operation has an infrastructure consisting primarily of a main camp; administration buildings, process shop, warehouse, truck shop, heap leach facility, crushing and agglomerations facilities, ADR plant, SART plant, refinery building, cyanide mix building, reagents storage building, assay and metallurgical laboratory.

Staffing requirements for the Lindero Mine come primarily from within Argentina, and when possible, from the Province of Salta.

Power is generated on-site by a contractor through a 7.64 MW of hired capacity diesel oil plant.

Processing water requirements are currently about 80 m^3/hr and may go up to 100 m^3/hr. The majority of the water is sourced from two wells located approximately 13 km southeast of the mine site. Three wells adjacent to the main offices also provide additional processing water and camp water.

Waste is disposed of in compliance with local regulations. Hazardous waste, such as oil filters, used oil, and the like are transported to Salta and disposed of appropriately. Mansfield is registered at the local authority as a hazardous waste producer.

Additional details on the Lindero Mine infrastructure are provided in Section 18.

5.5 Sufficiency of surface rights

The mine site infrastructure has a compact layout footprint of approximately 60 ha, located around the Lindero open pit, see Section 18 for further details. The open pit and supporting infrastructure (other than the water borefield) is located well within the area of surface rights and 3,500 ha mineral tenement owned by Mansfield.

5.6 Comment on Section 5

In the opinion of the QP, the existing infrastructure, availability of staff, the existing power, water, and communications facilities, the methods whereby goods are transported to and from the mine site, and any planned modifications or supporting studies are well-established, or the requirements to establish such, are well understood by Fortuna, and support the declaration of Mineral Resources and Mineral Reserves and the proposed mine plan.

There are sufficient mineral tenure and surface rights held to support the LOM, with mining operations to be conducted on a year-round basis.

6 History

6.1 Ownership and exploration history

Gold–copper mineralization associated with potassic alteration was first discovered by Goldrock Mines Corp. (Goldrock") geologists at the Arizaro prospect in November 1999, and led to claim staking. The discovery was the result of a regional exploration program undertaken by Goldrock with the participation of Teck Corporation. The area had no previous history of exploration or metals mining, although Goldrock had previously discovered the Rio Grande property about 12 km to the northwest. The Arizaro prospect and surrounding area were explored using reconnaissance and detailed geological mapping, soil geochemistry (talus fines), and trench sampling and mapping during 2000 and early 2001. As a result of this work, the mineralization at what is now the Lindero Deposit was identified in September 2000 (Kesting and Huidobro, 2001).

From April 2002 to March 2003, Rio Tinto had an option on the Property with Goldrock, during which time geological mapping, ground magnetics and induced polarization (IP) geophysical surveying, road-cut and trench sampling, drilling of 10 core holes (3,279 m) at Lindero and two core holes at Arizaro (629 m), metallurgical testwork, and an inhouse preliminary Mineral Resource estimate for the Lindero Deposit were performed (Ruiz et al, 2003). As the tonnage and grade estimate did not meet Rio Tinto's corporate targets, the option was not exercised.

Goldrock resumed as project operator, and between 2005 and 2009 completed additional trenches, metallurgical testwork, geological mapping and a core-relog program, and generation of a 3-D geologic model for the Lindero Deposit. From 2005 to 2010, Goldrock drilled 129 drill holes (34,857 m) at the Lindero Deposit and from 2010 to January 2013 drilled 27 holes (8,223 m) at the Arizaro Deposit.

A Pre-Feasibility Study for the Lindero Deposit was completed by AMEC in 2010, assuming a production throughput of 30,000 tpd (AMEC Americas Ltd., 2010a; 2010b). In 2012 and 2013, Goldrock commissioned KCA to complete a Feasibility Study (the 2013 Feasibility Study) using a reduced throughput of 18,750 tpd (KCA, 2013).

In 2015, Goldrock commissioned KCA to work with local engineering firms in advancing the engineering design for the Project to a basic engineering level, and update the 2013 Feasibility Study incorporating some design changes requested by Goldrock. A new Feasibility Study (the 2016 Feasibility Study) incorporating these design changes, additional metallurgical testwork, and updated costs and gold price assumptions was prepared by KCA in 2016 (KCA, 2016a).

In July 2016, Fortuna completed the acquisition of all of the issued and outstanding shares of Goldrock, making it an indirect wholly-owned subsidiary of Fortuna (Fortuna, 2016). Upon completion of the transaction, Fortuna continued to advance the optimization of the 2016 Feasibility Study through the drilling of 12 drill holes (4,461 m) as well as conducting tradeoff metallurgical tests and detailed engineering revisions with the objective of reaching a construction decision for the Lindero Mine by the end of the second half of 2017 (Fortuna, 2017).

In mid-2018, Fortuna conducted an infill drilling program at the Lindero Deposit with the objective of improving the understanding of the material planned for mining in the first year of production. The program involved the drilling of 61 drill holes totaling 1,952 m. The program of 2018 was followed up with infill programs conducted from March to April 2021, comprising 18 holes totaling 1,607 m, and March to April 2022, comprising 10 holes totaling 1,102 m, focused on the areas planned for mining at Lindero in the following year with holes drilled used to source samples for metallurgical column testing.

At the Arizaro Deposit, Fortuna conducted a new exploration drilling campaign between July and September of 2018, consisting of 12 holes totaling 2,178.5 m (holes ARD-30 to ARD-41). The main objective of this campaign was to confirm the geometry of the mineralized hydrothermal magnetite breccias and to confirm core logs originally described in 2012 and relogged in 2017 to resolve discrepancies identified during modeling that related to the lithology described for some core. Upon completion of a relogging program in 2020, which resulted in a revised geological and mineralization interpretation, a new drilling campaign totaling 2,520.5 m (ARD-42 to ARD-53) was executed between October and December 2021. The primary objective of the program was to improve the geologic knowledge of the deposit and to investigate mineralization in the west of the porphyry system.

The most recent exploration conducted at Arizaro as of the effective date of this Report involved the drilling of 12 holes totaling 2,613.9 m (ARD-54A to ARD-65) between April and July 2022. The main purpose of this campaign was to follow up on previous drilling results to confirm and extend the continuity of mineralization in the center-northwest of the porphyry system and to gather sufficient information for Mineral Resource estimation.

6.2 Prior Mineral Resources and Mineral Reserve estimates

Mineral Resources were first estimated for the Lindero Deposit during 2003 (Fuchter and Rennie, 2003) and updated in 2008 (Godoy and Palmer, 2008), and again in late 2009 (AMEC Americas Limited, 2010a, 2010b).

Mineral Resources and Reserves for the Lindero Deposit were updated again in 2013 (KCA, 2013). Mineral Resources and Mineral Reserves were further revised in 2015 by MDA and DKT using updated operating costs and gold price assumptions and reported in the 2016 Feasibility Study (KCA, 2016).

Fortuna filed an updated Technical Report in 2017 (Chapman et al, 2017) to support the construction decision for the Lindero Mine and has subsequently updated the Mineral Resources and Reserves as of yearend on an annual basis since mining commenced in 2019.

All of the above are regarded as prior estimates. Current Mineral Resources and Mineral Reserves are reported in this Technical Report.

6.3 Production history

Mining commenced at Lindero in September 2019 (Fortuna, 2019) with first placement of ore on the leach pad in July 2020 (Fortuna, 2020a) and doré production in October 2020 (Fortuna, 2020b). A summary of production figures by year since 2020 through December 31, 2022 is detailed in Table 6.1.

Table 6.1 Production figures for the Lindero Mine as of December 31, 2022

Production	2020*	2021	2022	Total**
Ore placed on pad (t)	1,610,000	6,453,647	5,498,064	13,561,598
Head grade Au (g/t)	1.00	0.96	0.81	0.90
Doré Production Au (oz)	13,435	99,313	116,191	228,939
* Doré production commenced in October 2020				

7 Geological Setting and Mineralization

The geology of both the Lindero Deposit and the Arizaro Deposit are discussed in this section. The Arizaro Deposit was discussed in detail by KCA (2016a), and that information has been summarized in this section of the Report, along with the findings from exploration activities conducted since that report.

7.1 Regional geology

The Andean volcanic arcs are concentrated along the north-trending axis of the high Andes puna region, and along several northwest-trending structural transverse zones. The western part of the Salta Province is underlain by Paleogene and Neogene continental volcanic arcs and related sedimentary rock of the Andean cycle (Figure 7.1). Sedimentary rocks are deposited in large back-arc continental basins similar to the Siete Curvas basin, a portion of which is active and includes the Salar de Arizaro basin.

The Siete Curvas basin is a 100 km by 130 km extensional pull-apart basin filled with continental rocks including immature red beds, volcanic rocks, and evaporites. The active part of this basin is known as the Salar de Arizaro basin. South of the Salar de Arizaro basin, basement exposures are characterized by high- to medium-grade metamorphic rocks of Proterozoic age. To the east of the basin, Cambrian–Ordovician intrusive rocks and associated platform-shelf clastic sedimentary rocks with submarine volcanic facies crop out. The western part of the Salar de Arizaro basin is underlain by Cambrian to Ordovician and Permian to Jurassic intrusive rocks, and by volcanic rocks and porphyries of Eocene–Oligocene age. All these units are covered by Pliocene volcanic rocks of the Andean arc.

The Siete Curvas basin is bounded to the north and south by northwest transverse volcanic arcs of the Andean cycle. The Lindero and Arizaro Deposits are located in the southern Archibarca volcanic belt, (Figure 7.1), which is characterized by adjacent or superimposed stratovolcano complexes commonly manifested by eroded volcanic cones. Rocks exposed in these belts include andesite and dacite porphyries and coeval volcanic and volcaniclastic rocks.

The Siete Curvas basin is structurally bounded by large regional structures: to the north by the Calama–Olacapato–El Toro Transverse Structure, and to the south by the Archibarca Transverse Structure (Figure 7.1). The transverse zones are interpreted to be surface expressions of ancient deep crustal trans-lithospheric structures, which were initially related to the opening of the proto-Atlantic Ocean in the Cretaceous, and have been periodically reactivated (Richards, 2000). The East Fissure fault zone and the Pocitos linear zone bound the basin to the west and east, respectively (Figure 7.1). These regional north–south-trending structures are interpreted to represent suture zones of accreted terranes, similar to the West Fissure fault zone of northern Chile (Richards, 2000). Presently the trans-lithospheric structures mark the transition from flat-slab to steep-slab subduction off the west coast of South America.

Figure 7.1 Regional geology map of the Lindero Mine

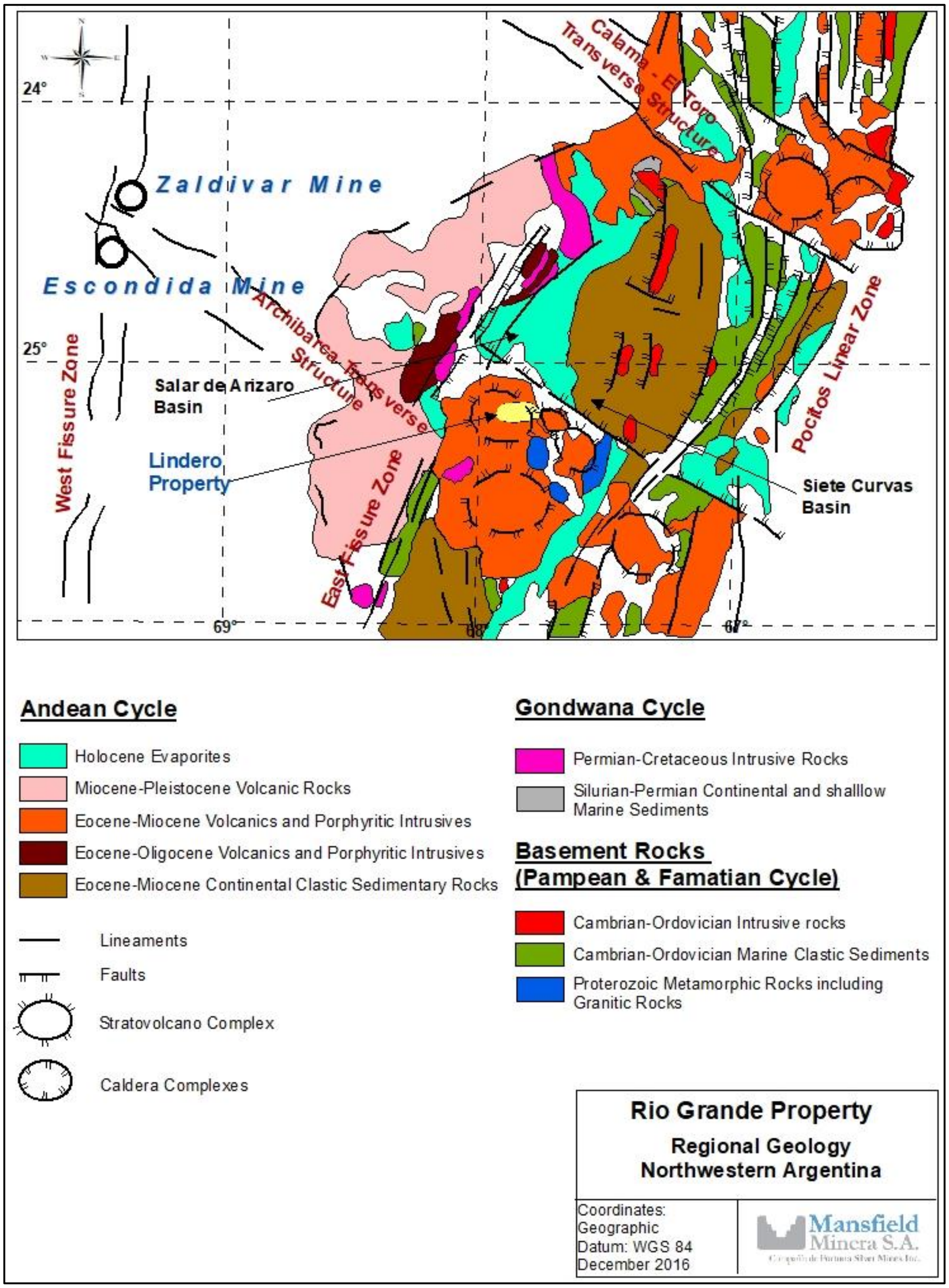


Figure prepared by Mansfield 2001, modified in 2016

7.2 Local geology

The Lindero and adjacent Arizaro Deposits are located in the Archibarca volcanic arc at the southern margin of the Salar de Arizaro basin (Figure 7.1). The deposits are part of the Arizaro volcanic-intrusive complex, which consists of diorite to monzonite porphyritic stocks, dacitic plugs, and numerous andesitic and dacitic radial dykes (Figure 7.2). Ordovician granite basement rocks crop out to the north and east of the Lindero Deposit. These are unconformably overlain by Paleogene red-bed sedimentary rocks that dip 10 to 30 degrees southwesterly.

This sequence is intruded by Miocene porphyries of the Lindero–Arizaro complex that host gold mineralization. The Lindero igneous center consists mostly of shallow intrusive rocks. The Arizaro system 3.2 km to the southeast also includes volcaniclastic mass-flows, tuffs, and fine-grained lava flows. Dating by $^{40}Ar/^{39}Ar$ methods indicates the igneous rocks range from 16.75 to 15.21 Ma at Lindero, and 16.35 to 15.66 Ma at Arizaro (Dow, 2002). All units are overlain by Pleistocene basaltic flows and volcaniclastic rocks from the Archibarca volcanic center.

Figure 7.2 Local geology of the Lindero Mine

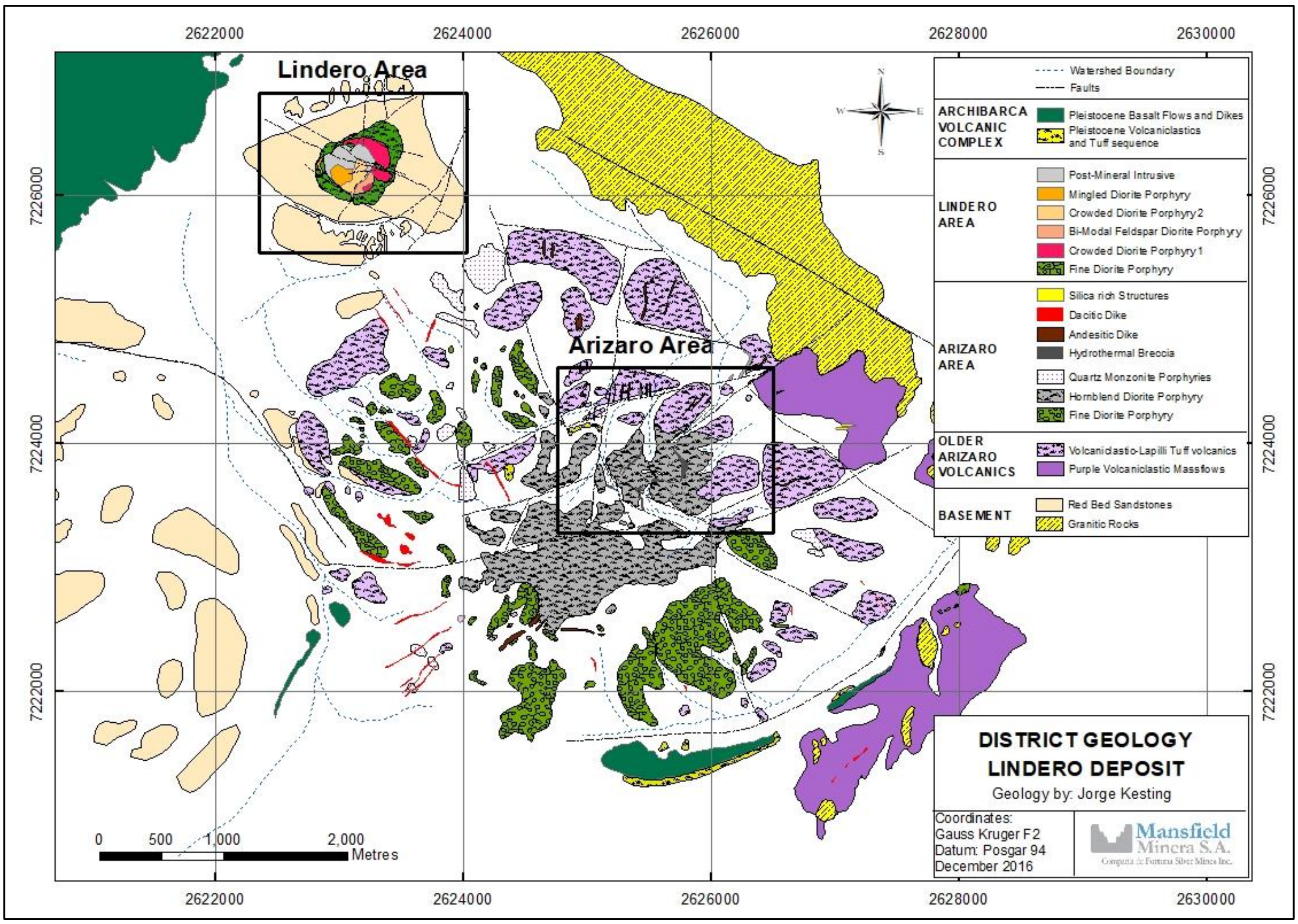


Figure prepared by Mansfield 2001, modified in 2016

7.3 Lindero Deposit

7.3.1 Lithology

Gold mineralization at Lindero is hosted in a multiphase Miocene intrusive complex. The complex is elongated to the northeast, 750 by 600 m at the surface, and cuts recrystallized Paleogene sandstones, siltstones and mudstones (Figure 7.3). Most drill holes near the border of the complex pass into the red-bed sequence at depth, highlighting an upwardly-flaring shape (Figure 7.4).

Figure 7.3 Geology of the Lindero Deposit (lithology codes detailed in text)

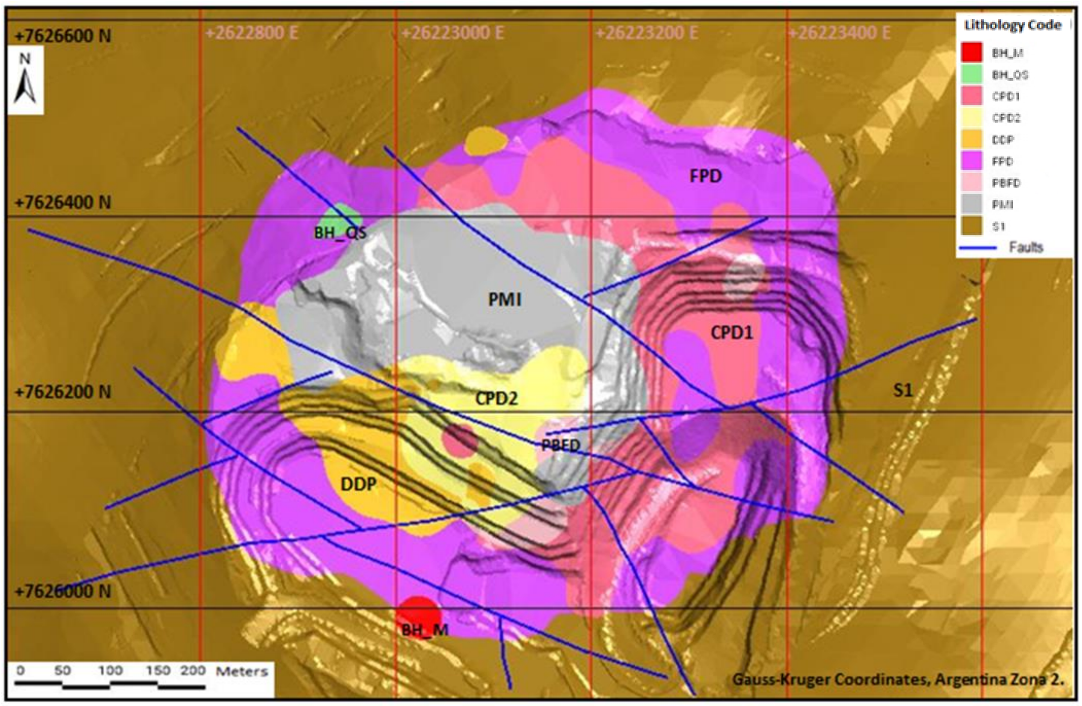


Figure prepared by Mansfield, 2022

Rock units recognized at the Lindero Deposit are briefly described below, in order from oldest to youngest.

- **Ordovician granite (rock code OG)** is distinguished from the Miocene intrusive rocks by its medium- to coarse-grained equi-granular texture consisting of quartz, plagioclase and K-feldspar. These granites are well exposed east of the Lindero Deposit (Figure 7.2), but in the deposit area occur only as clasts in S1, FPD and rarely CPD1.
- **Tertiary sedimentary rocks (S1)** are a sequence of well bedded arkose, greywacke, and subordinate mudstone and siltstone. These rocks form resistant hornfels within several hundred meters of the Lindero Deposit, in which the characteristic regional red color turns green, tan, or brown.
- **Granodiorite quartz porphyry (GQP)** contains 5 to 10 percent conspicuous quartz eyes, with plagioclase and lesser K-feldspar phenocrysts, in a

microcrystalline, quartz-rich groundmass. It is presently known only in a single dike cutting S1 in hole CON-02. It is inferred to be relatively early because it has not been observed cutting any phases of the Lindero Deposit.

- **Fine diorite porphyry (FPD)** forms most of the peripheral portions of the Lindero Deposit. Relatively sparse phenocrysts, totaling 25 to 40 percent of the rock, are mostly plagioclase that is rounded to irregular rather than tabular in shape. Lesser stubby hornblende prisms are also present. The microcrystalline to fine-grained groundmass consists mostly of plagioclase, with minor quartz, K-feldspar, and biotite. FPD probably consists of multiple sub-phases, including a marginal (speculated as early) phase with variable textures and common intrusive breccias, and a later sub-phase that contains minor CPD1 clasts.
- **Crowded diorite porphyry 1 (CPD1)** contains approximately 50 percent total phenocrysts, mostly of tabular plagioclase, with subordinate slender hornblende and ~2 percent pinhead-sized quartz eyes. The aphanitic to microcrystalline groundmass contains 5 to 15 percent quartz, which is distinctly coarser than other groundmass material and can be recognized with a hand lens.
- **Bimodal feldspar diorite porphyry (PBFD)** is a crowded porphyry similar to CPD1. It is distinguished by a distinct coarse (2–5 mm) population of plagioclase phenocrysts caused by a tendency of the plagioclase to cluster in glomerocrystic aggregates. The glomerocrystic texture is discernible with a hand lens.
- **Granitic dykes (GDK)** contain 30 to 45 percent phenocrysts of tabular plagioclase, slender hornblende, and minor biotite in aphanitic to microcrystalline groundmasses. These dikes are probably equivalent to CPD1 and/or CPD2.
- **Crowded diorite porphyry 2 (CPD2)** forms much of the south-central part of the deposit. It averages ~55 percent phenocrysts of dominantly tabular plagioclase; slender, commonly lineated hornblende; with minor biotite and quartz. The groundmass is aphanitic (<0.03 mm) and contains primary K-feldspar. CPD2 is very weakly veined and altered; biotitic alteration of hornblende is normally absent.
- **Mingled diorite porphyry (DDP)** is a hybrid, variably-textured rock, containing enclaves compositionally similar to the rock matrix but which vary in texture. Plagioclase, hornblende, and minor biotite and quartz phenocrysts total 35 to 45 percent of the rock. CPD2 clasts are characteristic, and biotitic alteration is normally absent.
- **Post-mineral intrusive (PMI)** forms most of the north-central part of the deposit. Plagioclase, hornblende and locally biotite phenocrysts totaling 35 to 45 percent of the rock are set in an aphanitic (<0.005 mm) groundmass. The unit is very weakly veined and altered, with biotitic alteration normally absent. The contact zones are characterized by common CPD2 clasts and conspicuously broken plagioclase phenocrysts, which are probably due to explosive venting of this unit. A legacy rock unit, ADK (andesitic dikes), has been reinterpreted as the chilled margin facies of PMI.

Magmatic–hydrothermal breccias (BxH) form relatively narrow bodies, typically less than 10 m in drilled thickness. They consist of angular to sub-rounded clasts of one or more rock types in matrices of hydrothermal material and rarely rock flour. Two styles of breccias are distinguished based on nature of the matrix material. In the quartz–sulfide type (BxH-qs), the matrix consists of quartz, gypsum and/or anhydrite, and sulfides. These are commonly strongly mineralized with chalcopyrite and gold. They cut S1, FPD, and CPD1, but none of the younger units. Breccias of the magnetite-type (BxH-mt), in contrast, have matrices of magnetite ± chlorite. The breccias are of variable ages, being most common cutting FPD and CPD1, but also cutting PBFD, CPD2, DDP and PMI. Those breccias cutting FPD and CPD1 are commonly well mineralized, whereas the latter breccias cutting the PBFD, CPD2, DDP and PMI group are typically barren.

Figure 7.4 West-east cross section through the Lindero Deposit (lithology codes detailed in text)

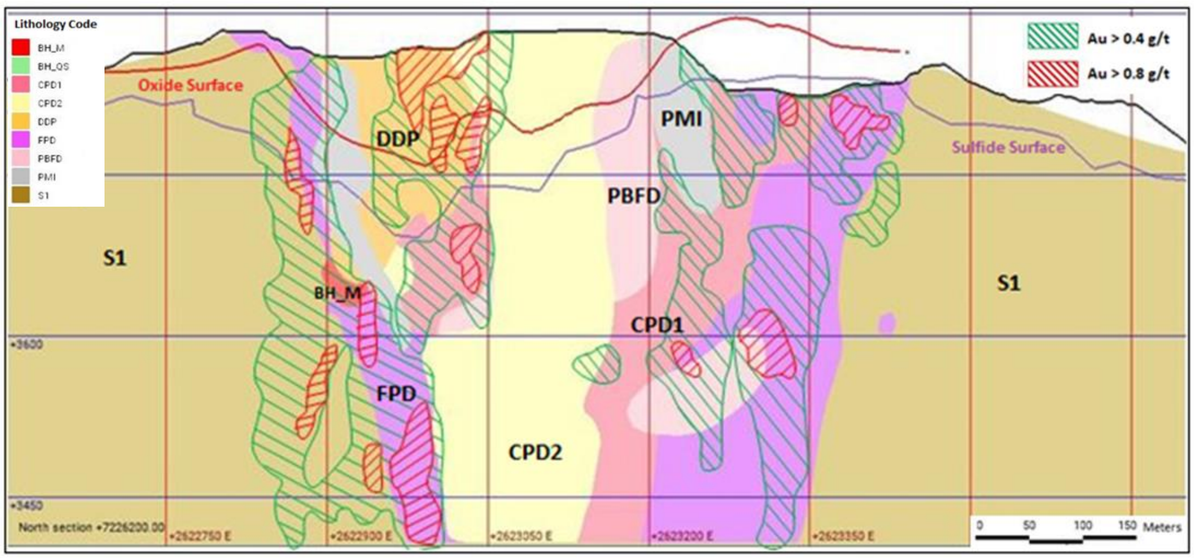


Figure prepared by Mansfield, 2022

The deposit consists of six major porphyry phases that form broadly concentric bodies, and several phases present as volumetrically minor dikes. In addition, two styles of magmatic–hydrothermal breccias are recognized.

As the rocks of the deposit are mineralogically similar, they are classified based primarily on textural variations (especially phenocryst abundance), age relationships, and their relative intensity of alteration and mineralization. The sequence of igneous phases is interpreted from crosscutting relationships at contacts, which are tracked using a matrix. Minor reversed relationships between FPD and CPD1 are observed and suggest that these units overlapped in time.

Petrographic work indicates that two compositional groups of rocks are present (Riedell, 2016a). The early porphyry phases that ring the deposit are mostly quartz diorites with 5 to 15 percent groundmass quartz. Younger phases in the core of the deposit contain primary K-feldspar in their groundmasses and are monzodiorites to quartz monzodiorites. Younger phases (especially the post-mineral intrusive or PMI unit) show increasing evidence of venting, such as fracturing of phenocrysts and potentially included pyroclastic surge horizons. The Goldrock rock names and codes first established, although not strictly correct, have been retained in this Report for consistency.

Hornblende from the relatively unaltered central intrusive rocks of the deposit yielded an $^{40}Ar/^{39}Ar$ age of 16.75±0.35 Ma, whereas biotite from altered rocks yielded an age of 15.21±0.11 Ma (Dow, 2002).

7.3.2 Alteration

Alteration assemblages at Lindero display a broadly concentric pattern centered on the core of the deposit. The central core, represented by PMI and CPD2 porphyries, is generally unaltered with local weak carbonate–chlorite–epidote alteration. Surrounding the weakly altered core is a zone of moderate to strong potassic alteration hosted in FPD, CPD1 and PBFD porphyries. Structurally-controlled hydrolytic (dominantly sericite) altered zones overprint potassic alteration, especially at shallow levels. The surrounding sedimentary sequence is affected by early contact metamorphism, by peripheral propylitization and/or weak epidote alteration, and by later argillic alteration. For descriptive purposes, alteration styles are divided into those considered early and higher temperature (potassic, propylitic, and hornfels), versus those forming later and at probably lower temperatures (chloritic, sericitic, argillic).

Early-stage alteration

Moderate to strong potassic (biotite–K-feldspar–magnetite) alteration is well developed throughout the better-mineralized parts of the Lindero system. It is defined primarily by partial to complete replacement of magmatic hornblende by aggregates of brown "shreddy" biotite. Chlorite commonly overprints hydrothermal biotite; the presence of earlier hydrothermal biotite is indicated because the chlorite inherits the shreddy habit. Biotite is less strongly replaced than hornblende, and plagioclase is generally unaffected. White hydrothermal K-feldspar is widespread within the broader zone of biotite-dominated potassic alteration. It occurs as rims on plagioclase phenocrysts, as halos around early veins and veinlets, and as patchy replacements of groundmass plagioclase. Almost all of the potassic-altered rocks are cut by quartz–sulfide and magnetite ± sulfide veins and veinlets, as described below. Intensity of veins is typically less than 10 percent by volume, but zones of very strong quartz stockwork to pervasive silicic alteration occur locally.

Contact metamorphism dominates early alteration in S1 wall rocks within several hundred meters of the Lindero Deposit. The resulting styles of hornfelses are dependent on primary lithology. Sandstones and siltstones form pale green quartz–biotite with or without sericite hornfels. Mudstones characteristically form tan to chocolate-brown quartz–biotite with or without K-feldspar hornfels. With increasing intensity of thermal effects, grain size of biotite increases, and K-feldspar becomes more abundant. Peripheral to hornfels zones, the red-bed sedimentary rocks are affected by propylitic alteration, ranging from weak epidote veining to strong epidote–calcite replacement. This alteration is not well understood because it occurs outside of the mineralized area.

Late-stage alteration

Intermediate- to late-stage alteration includes the following:

- Chlorite replacement of primary mafic minerals and hydrothermal biotite, which is common throughout the potassic zone. There is some suggestion that the intensity of chloritic overprint increases with depth.
- Sericitic alteration forms restricted zones overprinting potassic alteration, typically along late veins and structures.
- Relatively strong clay–sericite alteration affected the S1 sedimentary rocks outside the zone of strongest contact metamorphism.

It is noteworthy that sericitic alteration is rather restricted, and advanced argillic alteration completely absent, in the preserved and explored parts of the Lindero system.

7.3.3 Structural setting

The Lindero Deposit lies within the northwest–southeast-trending (120°) Archibarca transverse structural zone, which forms the dominant set of structures regionally and has been interpreted as controlling large-scale igneous volcanic activity and regional fluid outflow. The combination and intersection of the structures at Lindero are mainly responsible for the emplacement of the porphyries. Three principal sets of structures are recognized from surface mapping and drilling; in the order of importance these fault sets strike 110–130°, 55–75°, and 20–35°.

The most important northwest–southeast fault set comprises transtensional faults that have produced uplift of the central block relative to blocks to the north and south. The second set of structures, also transtensional, underlie the valley between the Lindero and the Arizaro intrusive deposits and controlled emplacement of andesitic and dacitic dikes. The third set of structures apparently controlled the emplacement of the porphyries, and may have provided conduits for mineralizing fluids.

Structures observed in drill core are normally unhealed and consist of fault breccia, zones of crushed rock, and minor gouge. True thicknesses of discrete faults range from centimeters to several meters; crushed zones range up to tens of meters in thickness. Attitudes relative to core axes suggest most faults dip within 30 degrees of vertical. Slickenlines are commonly observed on gypsum veins within fault zones, and most suggest that latest movement ranged from horizontal to oblique.

Very few structures can be reliably interpreted between drill holes in cross section. This partially reflects uncertainty as to the true orientation of structures given the lack of oriented drill core. In addition, cross-section interpretation suggests that later intrusions may have occupied and obliterated earlier structures especially in the deeper parts of the system, as in the subparallel dike-like roots of CPD2 and DDP (refer to Figure 7.4).

7.3.4 Mineralization

Gold mineralization in the Lindero Deposit is hosted mostly in four different bodies that form an annular shape at the surface (Figure 7.5). The annular shape is related to the distribution of the earlier, mineralized rock units comprising FPD, CPD1, and PBFD lithologies with the CPD2, DDP, and PMI porphyries in the center of the deposit forming the barren to low-grade core of the system.

The east/northeast body is the largest mineralized zone, extending north-south for 450 m. It is at least 190 m wide and extends for at least 300 m vertically, dipping steeply towards the center of the deposit. This body has the highest gold grades, averaging approximately 1.0 g/t Au. The southwest body forms an elliptical shape that is 270 m long, up to 100 m wide and extends for at least 400 m vertically. Grades average approximately 0.8 g/t Au. Mining in the first two years of operation has focused on extracting mineralized material from these two bodies with mapping in pit confirming the interpretation.

The northwest and west bodies are narrower, but thicken with depth, reaching a maximum width of 100 m. Both lie mostly beneath the PMI intrusion. Several other narrow mineralized bodies occur at depth, where bodies of well mineralized CPD1 and PBFD became rafted within the central, late- to post-mineral rock units.

Figure 7.5 Plan view of mineralized bodies of the Lindero Deposit

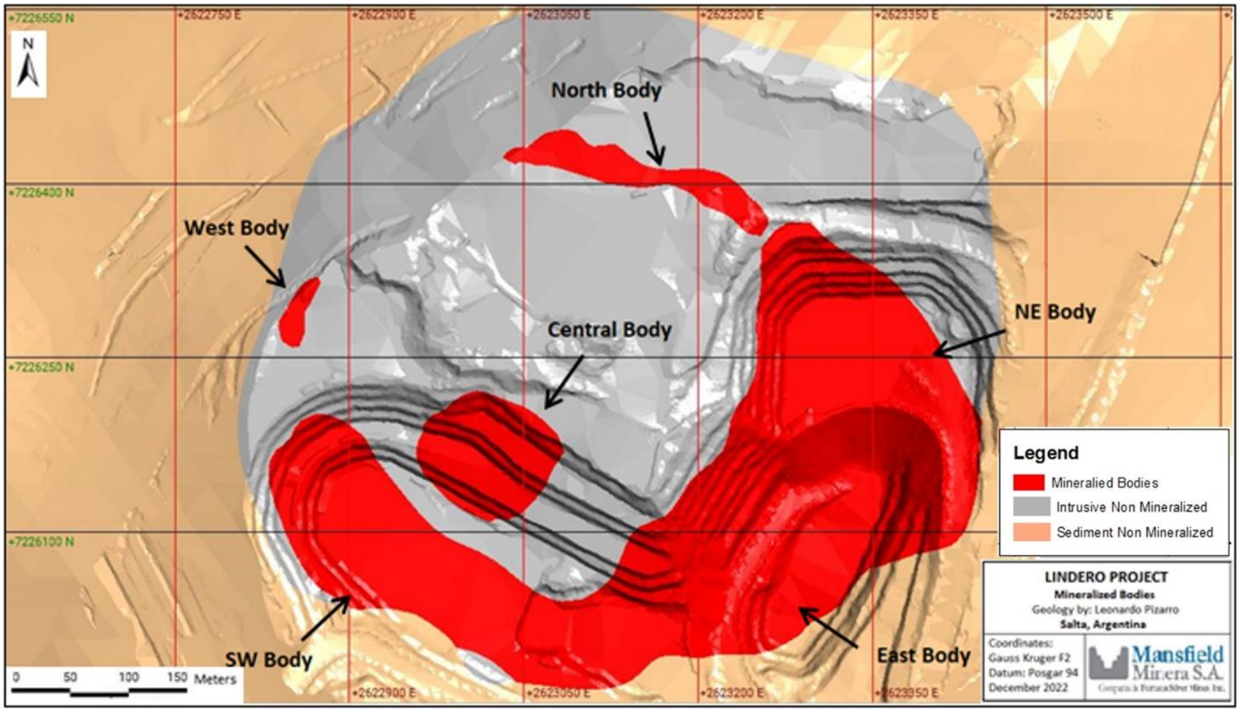


Figure prepared by Mansfield, 2022

7.3.5 Hypogene mineralogy

Gold–copper mineralization at Lindero is characterized by simple primary mineralogy, mostly subequal quantities of chalcopyrite and pyrite. Bornite and molybdenite also occur but are much less common. Traces of covellite, galena and sphalerite are observed locally. Free gold occurs in grains typically 20–30 µm to a maximum of 70 µm, associated with chalcopyrite and/or magnetite grains with rare interstitial quartz. Gold–copper mineralization is controlled primarily by quartz–sulfide and magnetite–sulfide veins as described in the next sub-section. Lesser mineralization occurs as disseminated grains and clusters of chalcopyrite ± magnetite at mafic mineral sites. Gold and copper grades decrease outwards due to an increase in the ratio of pyrite relative to chalcopyrite.

7.3.6 Vein types

Most veins are grouped according to the classification scheme of Gustafson and Hunt (1975) and Seedorff et al. (2005). The following sequence of vein types are recognized, from oldest to youngest, based on crosscutting relations. The majority of gold–copper mineralization is associated with the A-vein and magnetite–sulfide types, which are strongly developed in the potassically altered rocks that host the ore zones.

- Quartz–K-feldspar vein-dikes are thin, wispy to planar veinlets of aplitic quartz and K-feldspar without sulfides. They are uncommon, and to date have been noted only in CPD1.

- Barren magnetite films are hairline (<1-2 mm thick) veinlets of magnetite without sulfides that commonly form fine sheeted sets.
- EB veins are thin veinlets of green or brown biotite and rarely magnetite, that are typically quartz- and sulfide-poor. They have halos of albite or white K-feldspar.
- A-veins are early veinlets composed mostly of granular or sugary quartz (50 to 95 percent) and disseminated sulfides. They may also contain magnetite, K-feldspar, and/or anhydrite. They commonly show halos of white K-feldspar, but may lack alteration halos altogether. A-veins are commonly thin, 'wispy' or sigmoidal (S-shaped), discontinuous, and of short strike-length. Later A-veins become thicker and more planar. A-veins may appear banded (like many B-veins) where they are re-opened by central sulfide films or late gypsum veins. Their orientation is generally steep.
- Magnetite–sulfide veins differ from the barren magnetite films in being distinctly younger and containing significant quantities of copper sulfides. They range from thin hairlines to planar veins locally >10 mm thick. Some contain accessory clinopyroxene; these commonly contain bornite. Magnetite–-sulfide veins both predate and postdate A-veins, suggesting the two vein types overlapped in time.
- B-veins are planar veins comprising mostly quartz growing perpendicular to the vein walls (approaching cockscomb or "dog's-tooth" texture). They are generally banded due to centerlines or borders of sulfides, oxides, carbonates, and/or other minerals. They normally lack alteration envelopes. Relative to other porphyry systems, B-veins are very rare at Lindero.
- D-veins are planar sulfide-rich (commonly pyrite) veins with minor quartz, and with characteristic sericitic halos. In other systems they are relatively continuous, typically steep, and form radial and/or concentric patterns. They are rare in the explored rock at Lindero, but may have been more common at higher levels that are now eroded.
- Pyrite veins are thin pyrite-only veinlets, similar to D-veins but without the sericitic halo.
- Anhydrite/gypsum–sulfide veins are relatively late veinlets and veins dominated by gypsum and/or anhydrite with sulfides. They lack quartz and show no alteration halos.
- Gypsum veins are irregular to planar veinlets to veins of gypsum without anhydrite or quartz. They display a fibrous structure approximately perpendicular to vein walls. They normally lack sulfides, but commonly re-open A veins and appear rimmed by sulfides inherited from the older vein style. They are irregularly oriented, forming most of the low-angle veins present at Lindero. They are the latest vein type, related to recent surficial events as discussed below.

7.3.7 Relationship between intrusive phases and mineralization

The timing and genetic relationships between intrusive phases and alteration-mineralization have been inferred from two main types of evidence. Most important are paragenetic relations among alteration-mineralization and intrusive events, especially crosscutting relationships between veins and intrusive contacts, which are carefully tracked using a matrix. These are supplemented by spatial relationships in plan and section, especially the correlation of mineralized zones with specific intrusive contacts.

Several lines of evidence indicate that the majority of gold-copper at Lindero was introduced with the CPD1 porphyry:

- Gold–copper mineralized zones commonly straddle the contact of CPD1 with FPD, especially on the east and north sides of the deposit.
- When the original extent of CPD1 is restored by removal of younger intrusive phases in cross section (Section 7.3.9) the distribution of present-day gold zones is nearly symmetrical around the inferred original extent of this unit. (The east and southeast sides of the deposit are better mineralized largely due to the absence of late-to post-mineral units in this area).
- Logging across a number of CPD1–FPD contacts shows that the intensity of gold–copper bearing veins is similar in both units, with little or no change in gold grades at the contact (although a minor increase from CPD1 to FPD is observed in some holes). This suggests that the majority of mineralization in both units developed concurrently, following intrusion of CPD1.
- Disseminated chalcopyrite is most commonly observed in CPD1.
- No zones of significant mineralization have been found along contacts of FPD with its S1 country rocks. This suggests that FPD acted mainly as a passive host rock, and is well mineralized due to its proximity to the syn-mineral intrusion CPD1.

Nonetheless, evidence suggests that FPD introduced a minor amount of mineralization. Some CPD1 contacts truncate mineralized A veins, which requires a pre-CPD1 source intrusion, likely a sub-phase of FPD. Secondly, many mineralized veins in FPD are thicker and richer than those in CPD1. It is not certain if this reflects different physical properties of the two rocks (i.e., CPD1 at sub-magmatic temperatures intruding and fracturing brittle FPD), or if a minor period of mineralization affected FPD but not CPD1.

Mineralized magnetite–sulfide and A veins cut most younger intrusive phases, although vein abundance is generally lower than in CPD1 and FPD. This requires at least one mineralizing intrusion younger than CPD1. Some mineralized zones in section appear to follow the contacts of PBFD and DDP with older rocks, while the centers of both units tend to carry low grades. Both are interpreted to be sources of gold–copper mineralization but are less important than CPD1. There is no evidence for any contribution of gold or copper from CPD2 or PMI.

In summary, the principal mineral-related intrusion at Lindero is the CPD1 porphyry, with lesser contributions of gold and copper from FPD, PBFD, and DDP. FPD is the most important ore host because it forms the wall rocks to the syn-mineral CPD1. The importance of FPD as a host may also reflect a physical receptivity to gold mineralization, the influence of its own mineralized fluids, and/or peripheral effects of gold and copper introduced by the PBFD or DDP intrusive events.

7.3.8 Oxidation and supergene effects

Near-surface oxidation zonation at Lindero has been documented through systematic logging of sulfide and sulfate surfaces according to protocols in widespread use in porphyry copper deposits in northern Chile and elsewhere. The following surfaces are logged in each hole, and are used to define the oxide/sulfide and sulfate zones shown in Table 7.1.

- Top of sulfides (TS): First downhole appearance of sulfides.
- Top of dominant sulfides (TDS): Primary (and/or supergene) sulfides become dominant; equivalent to the base of oxidation (except for deeper oxidation along fracture zones, crushed zones, and faults).
- Top of gypsum (TGyp): First appearance of consistent gypsum veining.
- Top of anhydrite (TAnh): First appearance of anhydrite in veins.

As shown in Table 7.1, the TS and TDS surfaces delineate the oxide, mixed, and sulfide zones. In the oxide and mixed zones, primary chalcopyrite ± bornite is mostly oxidized *in situ* to neotocite (a brownish-black copper-bearing manganese-iron oxide mineraloid; Anderson, 1982) and chrysocolla. Rare secondary chalcocite coats fractures near the TDS surface in some holes. Pyrite is oxidized to goethite and minor jarosite. The depth of oxidation varies considerably across the system, imparting a concave-up shape to the TS and TDS surfaces (Figure 7.4). Oxidation is thickest in the younger rock units in the center of the deposit. The TS surface ranges from <10 m to ~150 m deep. Partial oxidation as defined by the TDS surface ranges from <20 m thick on the margins of the deposit to over 200 m thick in some central drill holes.

Table 7.1 Oxide/sulfide and sulfate zoning

OXIDE / SULFIDE ZONES	SURFACES	SULFATE ZONES	ROCK COMPETENCY
OXIDE		SULFATE-FREE ZONE	Fair to poor
	------- Top of Gypsum ------		
	----- Top of Sulfides ------	GYPSUM ZONE	Good to excellent
MIXED			
	Top of Dominant Sulfides		
SULFIDE	------ Top of Anhydrite -----		
		GYPSUM-ANHYDRITE ZONE	Fair to good

Sulfates are likewise zoned relative to the present surface. TGyp commonly occurs near the TS surface but may also be above or below it. TAnh typically lies well below TDS and is sub-horizontal rather than bowl-shaped. Based on patterns in other deposits, it is hypothesized that the primary sulfate phase was all anhydrite, occurring as an accessory in early A-veins as well as in late anhydrite-sulfide veins. Circulation of ground water up to the present time resulted in hydration of anhydrite to gypsum, which graded upwards from partial (gypsum-anhydrite zone; typically, 0.2 to 0.5 percent anhydrite and 1 to 2 percent gypsum) to complete (gypsum zone; averaging 2 to 5 percent gypsum). Above the gypsum zone, all sulfate is dissolved, producing vuggy cavities in A-veins that were formerly filled by anhydrite. An anhydrite-only zone without gypsum is hypothesized at depth but has not been penetrated by drilling to date.

As noted in Table 7.1, sulfate zoning has important implications regarding rock competency. The hydration reaction anhydrite to gypsum involves a volume increase, and so gypsum re-opened existing fractures such as A-veins and created new gypsum-only veins. Within the gypsum zone these fractures were healed, but in the surficial sulfate-free zone they became open fractures. Relatively common near-surface zones of strong fracturing resulted from this process. Rock permeability is hypothesized to decrease significantly from the sulfate-free to the gypsum zone, and to increase slightly into anhydrite-bearing rock at greater depth.

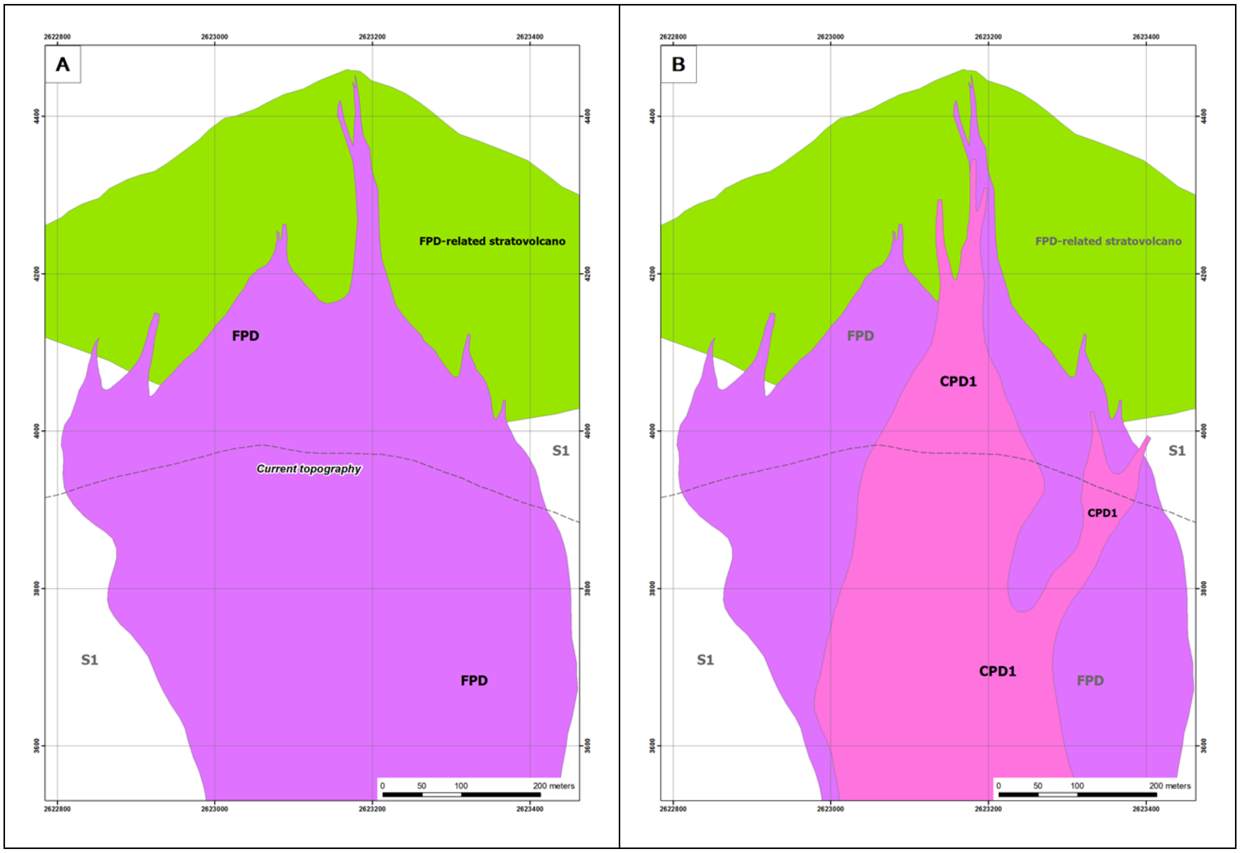
7.3.9 Evolution of the system

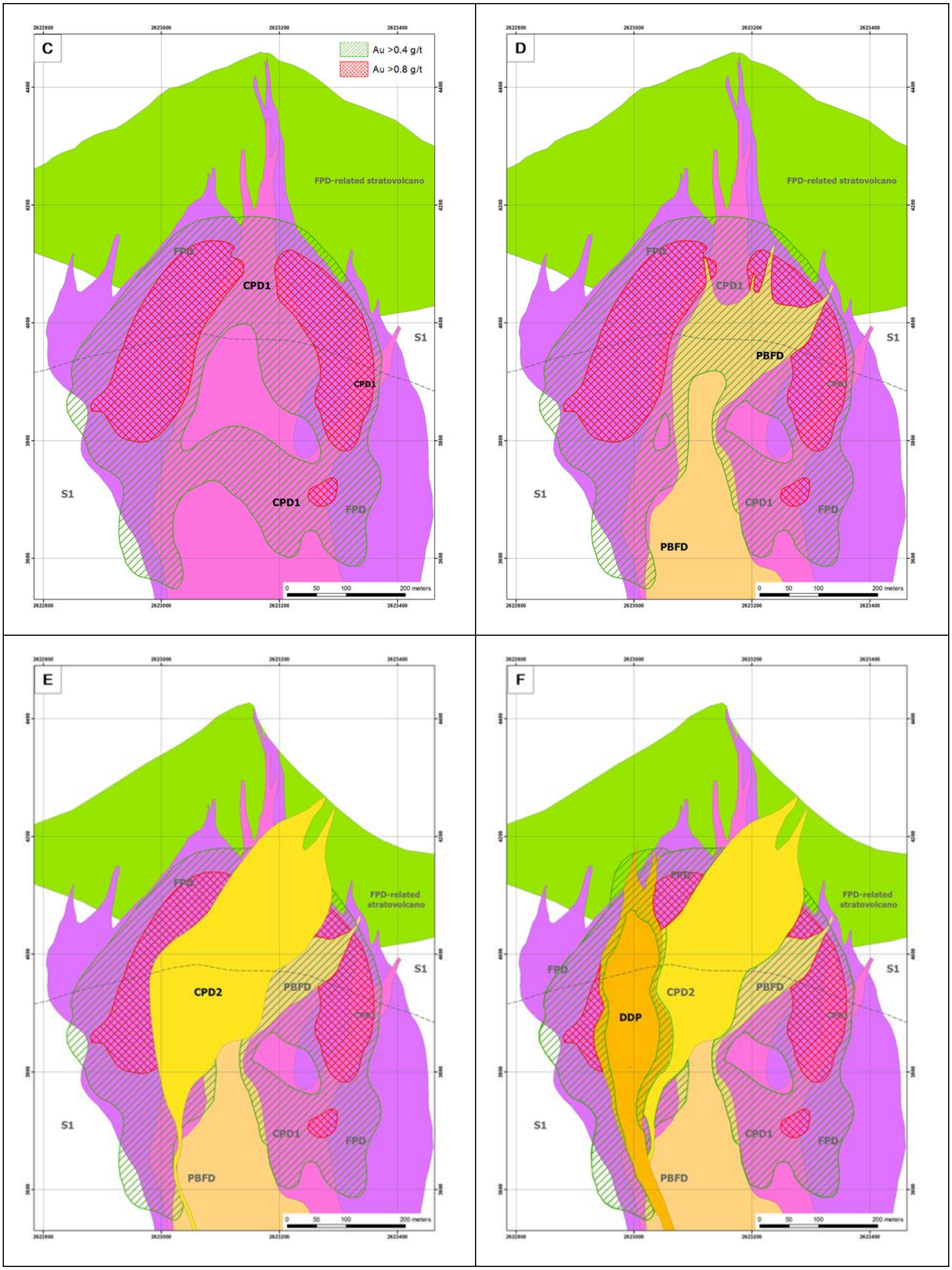
Figure 7.6 (panels A through H) illustrates the interpreted evolution of the Lindero Deposit along present-day west–east section 6120N (Figure 7.4). These interpretations have been compiled by removing rock units sequentially from youngest to oldest, and inferring earlier patterns of mineralization. Geology has been projected above the present surface based on relationships observed within the preserved rocks (such as textural evidence for venting); assumed symmetry of mineralized zones; and patterns observed in the upper levels of other, better preserved porphyry systems.

- **Panel A**: Several batches of FPD magma intruded into S1 sedimentary rocks approximately 17 million years ago, coalescing to form a stock 600–750 m across. It is hypothesized that one or more of these magmas erupted to form an overlying stratovolcano or dome, although there is no textural evidence for eruption, and any related volcanic rocks have been eroded. Most contact metamorphism of the red-bed sequence occurred at this time. Minor gold–copper mineralization formed in and possibly around FPD, but this is not shown as it cannot be discriminated from CPD1-related mineralization.
- **Panel B**: A stock, dikes and small masses of CPD1 porphyry intruded into the FPD stock. Reconstruction of the original extent of CPD1 from blocks rafted within younger units suggest CPD1 was emplaced nearly concentrically within FPD. Its present-day concentration on the east and north sides of the deposit is preserved, reflecting the absence of younger units in those areas.
- **Panel C**: The major stage of gold–copper mineralization immediately followed CPD1 intrusion. Potentially economic grade (>0.4 g/t) gold formed over a volume 500–550 m across and at least 500–600 m vertically. Gold–copper mineralization affected much of the CPD1 stock and extended up to 200 m into FPD and S1 wall rocks. Higher grade (>0.8 g/t) gold zones are concentrated along CPD1 contacts but are best developed in FPD. Gold–copper mineralization was accompanied by widespread development of potassic alteration with common to abundant A-type and magnetite–sulfide veins. The abundance of thin, wispy A veinlets and truly disseminated chalcopyrite in CPD1 suggest ductile and not brittle behavior, as compared with FPD-hosted veins that are coarser and more planar. The overall shape of potentially-economic grade material appears to have formed two inverted cup-shaped mineralized shells flanking CPD1, separated by a lower-grade gap.
- **Panel D**: A narrow stock of PBFD intruded approximately along the axis of the earlier FPD and CPD1 intrusions. Weak to moderate gold–copper mineralization formed mostly along and immediately fringing PBFD contacts, leaving a low-grade core in the center of the PBFD body.

- **Panel E**: CPD2 was emplaced slightly to the west of the axis of the FPD, CPD1 and PBFD intrusions. While this magma appears compositionally and texturally "fertile", it produced essentially no gold or copper mineralization and is poorly veined and altered. A likely explanation is that the CPD2 magma vented, with catastrophic loss of metal-bearing volatiles into the atmosphere. Substantial erosion of the volcanic edifice may have resulted from sector collapse accompanying the eruption(s).
- **Panel F**: A small stock of DDP intruded in the west–central part of the deposit. Weak to moderate gold–copper mineralization formed along its contacts.
- **Panel G**: After a period of significant erosion of the overlying volcano, PMI intruded along dikes in the north, west and east parts of the deposit. This magma clearly erupted as evidenced by intensely fractured plagioclase phenocrysts and local pyroclastic horizons. The dikes flared upward and coalesced into a series of flow-domes. PMI produced no gold or copper and remained very weakly altered. Based on the range of radiometric dates, this latest igneous activity was probably complete by 15 Ma.
- **Panel H**: The area was gradually eroded to current topography, exposing ore-grade gold in many areas, but also resulting in loss of considerable mineralized material. Oxidation of sulfides formed a goethite-neotocite-chrysocolla cap, with the oxide and mixed zones thickening from <20 m in the fringes of the system to >200 m in the center. Essentially no supergene-enriched mineralization developed, reflecting the low pyrite content of the ores that precluded significant leaching of copper (Anderson, 1982). Anhydrite in veins was partially to completely hydrated to gypsum, and dissolved completely from near-surface rocks.

Figure 7.6 Evolution of the Lindero Deposit




C
Au >0.4 g/t
Au >0.8 g/t
FPD-related stratovolcano
FPD
CPD1
S1
CPD1
CPD1
S1
FPD
0 50 100 200 meters
D
FPD-related stratovolcano
FPD
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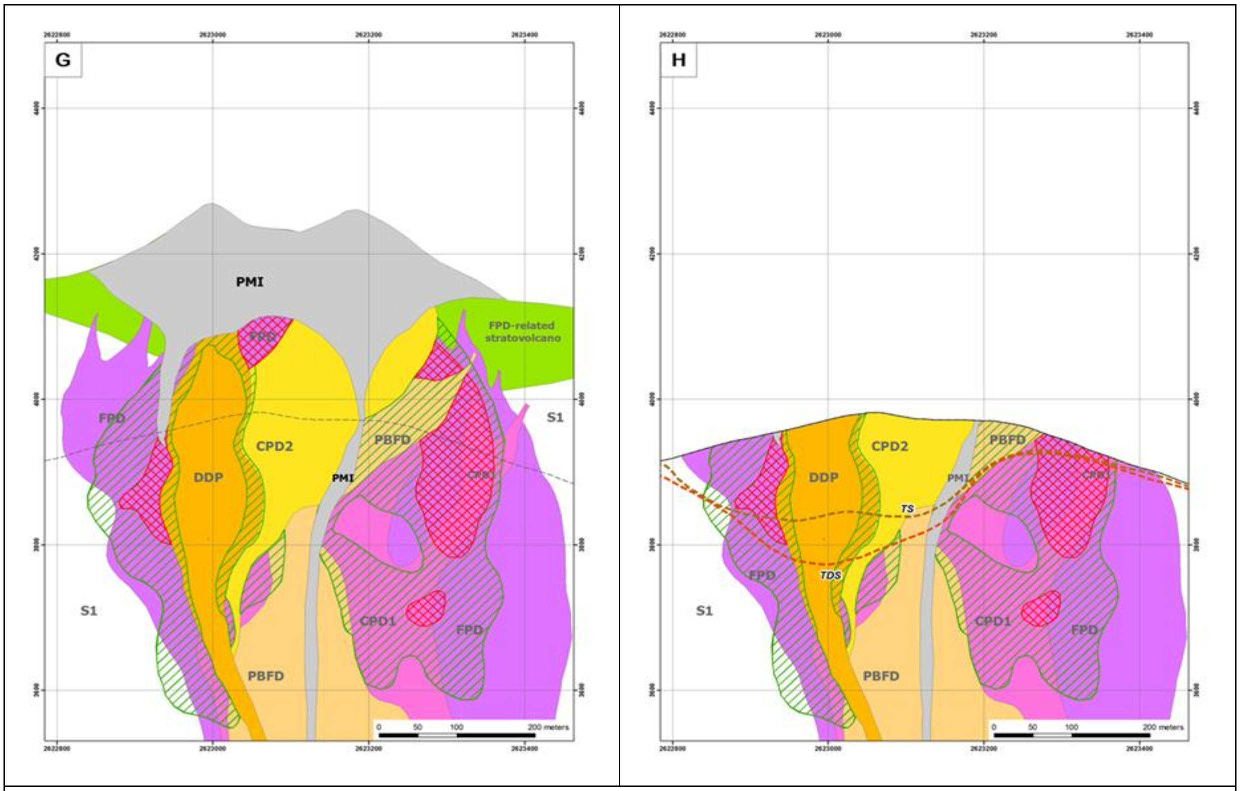


Figures prepared by Riedell and Mansfield, 2017

7.4 Arizaro Deposit

7.4.1 Local geology

The Arizaro Deposit is dominated by one main moderately to strongly mineralized intrusive unit that crops out in the central part of the prospect area (Figure 7.7). It consists of fine hornblende porphyritic diorite intruded by several stocks, dikes, igneous-cemented breccias and hydrothermal breccias. Smaller stocks are exposed in a few areas. Dikes of andesitic and tonalite composition are generally distributed radially to the main intrusive.

Relatively unaltered intrusive rocks from the Arizaro Deposit have yielded an $^{40}Ar/^{39}Ar$ age of 16.35+0.35 Ma (Dow, 2002). Different types of igneous-cemented breccias have been recognized:

- Magnetite-rich, igneous-cemented breccia with strong gold-copper mineralization.
- Biotite-rich, igneous-cemented breccia with gold-copper mineralization.
- Polymictic, igneous-cemented breccias.

At the margins of the intrusion to the north and east crop out two sequences of volcaniclastic mass-flows, crystalline lapilli tuffs, fine crystalline tuffs and fine-grained lava flows. The volcaniclastic rocks in contact with the intrusive body have undergone strong contact metamorphism. The volcaniclastic rocks are believed to represent the remnants of a volcanic edifice.

Figure 7.7 Arizaro Deposit geological map

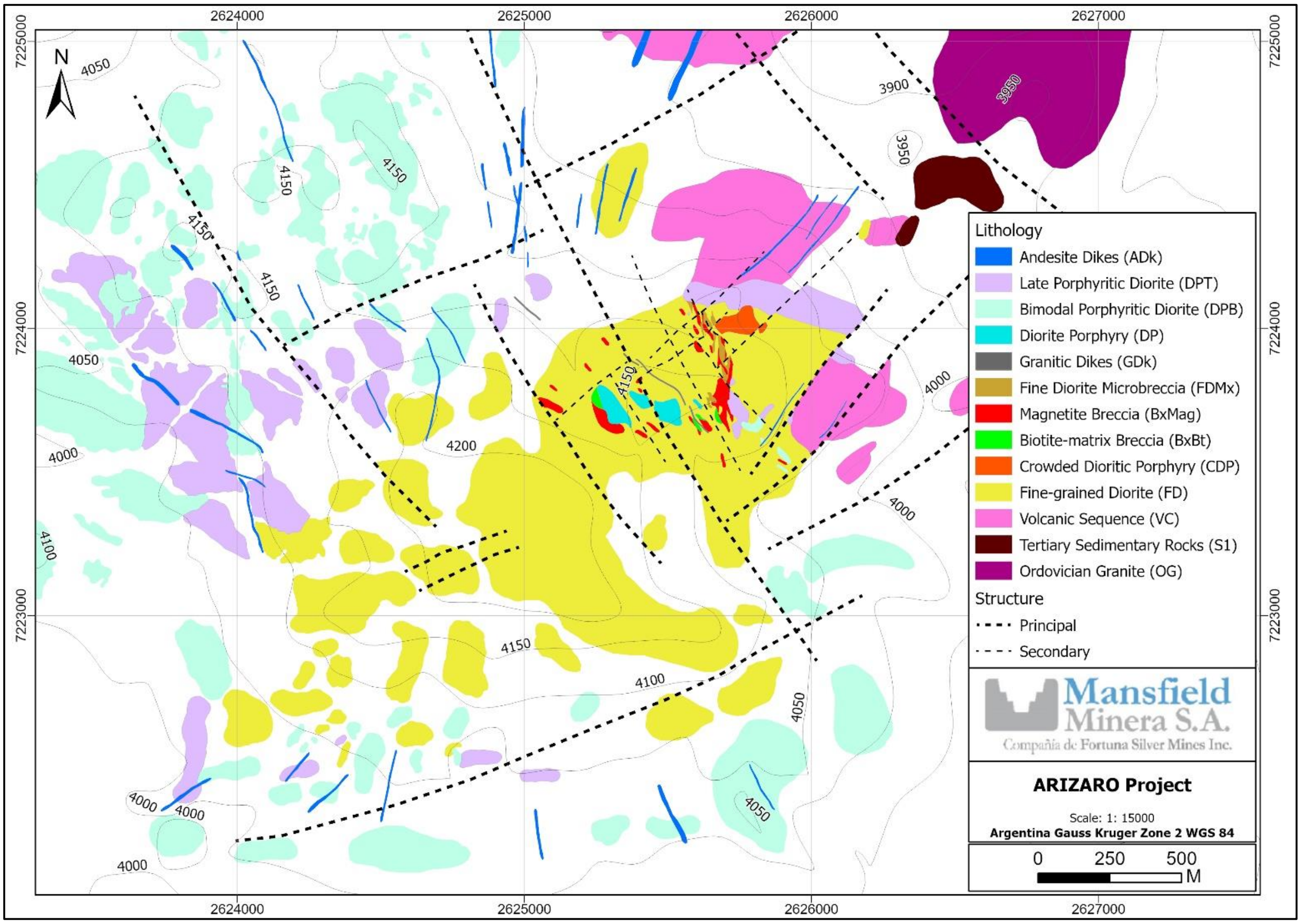


Figure prepared by Mansfield, 2022

7.4.2 Lithology

Several intrusive lithologies, extrusive rocks, and breccias have been recognized based on textural and mineralogical characteristics from field observations and descriptions of drill core (Figure 7.7). Listed in order from oldest to youngest, the primary units include:

- **Ordovician Granite (OG):** Intrusive rock with a medium to coarse granular texture composed of quartz, plagioclase and K-feldspar. These granites are well exposed in the northeast sector of Arizaro. Occasionally they can be observed as clasts within some dioritic intrusives.
- **Tertiary Sedimentary Rocks (S1):** Sequence of arkose, greywacke and subordinate mudstone and silt. These rocks form resistant banks that are several tens and even hundreds of meters in thickness within the Lindero-Arizaro deposits. These sediments have a characteristic reddish coloration and in areas can be greenish or brown.
- **Volcanic Sequence (VC):** The central porphyritic intrusives are ringed by a volcanic sequence which is a remnant of a volcanic edifice, consisting of volcaniclastic

deposits, lapilli crystal-lithic tuffs, fine grained crystal-lithic tuffs and fine-grained ash, and dacitic flows. The bedding planes of the volcaniclastics and tuffs located north of the deposit dip away from the volcanic center. This unit is commonly overprinted by intermediate argillic alteration, sericite alteration and advanced argillic alteration, commonly adjacent to mineralization.

- **Coarse Dioritic Porphyry (DPC):** Dominated by subrounded phenocrysts of plagioclase, approximately 2 – 3 mm, and occasional quartz and hornblende. It is common to find fragments of different types of rock within this unit, being mainly sedimentary, but including fragments of dacites, other volcanic rocks and granites.
- **Fine-grained Diorite (FD):** dominated by equigranular, fine-grained (2mm) plagioclase and quartz with up to 20 percent fine-grained hornblende. Interpreted to be the earliest intrusive rock and pre-mineral.
- **Crowded Dioritic Porphyry (CDP):** Contains 30 to 40 percent tabular plagioclase, 10 percent euhedral hornblende in a fine-grained groundmass of plagioclase and quartz. Fragments of FD appear to have been assimilated into the CDP. Considered to be the earliest and strongest mineralizing intrusive. Outcrops in only a small 40 x 100 m area in the northeast limit of the porphyry system but has been defined at depth by drilling in the north of the porphyry system with an elongated shape trending northeast to southwest.
- **Biotite-matrix Breccia (BxBt):** a magmatic-hydrothermal breccia consisting of a matrix and veinlets of fine-grained, secondary biotite with some magnetite. Considered to be intra-mineral.
- **Magnetite Breccia (BxMag):** a magmatic-hydrothermal breccia consisting of a dominant magnetite and lesser quartz, K-feldspar and secondary biotite matrix. As the biotite breccia above, considered intra-mineral.
- **Fine Diorite Microbreccia (FDMx):** This lithological description has been applied to differentiate this unit from the host rock (FD), where the diorite has been impacted by magmatic-hydrothermal fluids associated with the magnetite and biotite-matrix breccias (BXMag and BxBt), resulting in microbreccias of no more than 10 cm in size primarily in the fine-grained diorite. The unit is characterized by a higher degree of potassic alteration and, in most cases, display an increase in mineralization, generally adjacent to the BXMag and BxBt breccias (Figure 7.7).
- **Diorite Porphyry (DP):** Composed of 25 to 30 percent fine tabular plagioclase phenocrysts, 5 percent elongated hornblende, in a microcrystalline to fine aplitic matrix of plagioclase and quartz, with notable amounts of fine biotites. The occurrences of this porphyry are limited to some sectors in the west (close to ARD-03 and ARD-41) and in the extreme north. Likely corresponds to an inter-mineral intrusive as in areas it is moderately mineralized with sulfides and oxidized copper.
- **Diorite Porphyry 1 (DP1):** seen only in core, contains 20 percent sub-rounded plagioclase set in a very-fine-grained groundmass of quartz and plagioclase and <15 percent hornblende.
- **Diorite Porphyry 2 (DP2):** porphyry with 25 to 30 percent tabular, fine-grained plagioclase and 5 percent elongate hornblende in a very-fine-grained groundmass of plagioclase and quartz. First of the intrusive units considered as late-mineral.

- **Pebble Dike (PD):** seen only in core and limited to only a few drill holes. Made up of 70 percent rock flour and fractured, rounded to subrounded clasts of Ordovician granite (basement rock) and rhyolite of uncertain origin.
- **Bimodal Porphyritic Diorite (DPB):** contains 20 percent plagioclase phenocrysts both subrounded and tabular, 10 percent elongated hornblende in a very-fine-grained groundmass of dominant plagioclase and minor quartz. A post-mineral intrusive located in the west of the system.
- **Late Porphyritic Diorite (DPT):** intrusive-matrix breccia with 30 percent plagioclase and minor hornblende with a groundmass partially replaced by secondary K-feldspar. Locally contains subrounded clasts of basement rock.
- **Andesite Dikes (ADk):** consists of 10 percent plagioclase crystals and 2 to 5 percent hornblende disseminated in aphanitic, green to maroon, groundmass. Considered post-mineral being radially distributed around the main FD intrusive.
- **Tonalite Dikes:** seen only in core, coarse-grained quartz and plagioclase and minor hornblende, being post-mineral.

Volcanic rocks

The central porphyritic intrusive units are ringed by a volcanic sequence which is a remnant of a volcanic edifice. Exposures to the north, northeast and east of the deposit area show textural, lithological and structural differences between different volcanic units. The volcanic sequence consists of volcaniclastic deposits, lapilli crystal-lithic tuffs, fine-grained crystal-lithic tuffs and fine-grained ash. These volcanic rocks represent mass flow deposits – lahars, ash-flows and ash-fall deposits related to a volcanic center. The Central Arizaro porphyry intrudes the volcanic center, which has a metamorphic contact with the volcaniclastic rocks. Numerous dikes radiate from the volcanic center cutting the volcanic sequence. The bedding planes of the volcaniclastic rocks and tuffs located north of the deposit dip away from the volcanic center. This unit is commonly overprinted by intermediate argillic alteration, sericite alteration and advanced argillic alteration, commonly next to the main mineralized areas.

Interpretation of the field relationships between the intrusives and volcanic rocks suggests that the volcanic rocks are coeval with the Central Arizaro porphyry and that the Arizaro intrusive units were emplaced at shallow depths.

7.4.3 Alteration

Several alteration assemblages are noted in the deposit area. Some assemblages have an unusual alteration mineralogy for porphyry gold–copper deposits and both their spatial and temporal relations are complicated. This complication is thought to be due to the overlapping of multiple hydrothermal alteration events, the CDP intrusive event and a separate breccia event. Field mapping and drill core observations have been used to establish preliminary alteration assemblages and their spatial relationships (Figure 7.8).

Alteration patterns are semi-concentric and are asymmetric, with a core of moderate to strong potassic alteration including zones of K-feldspar-rich magnetite–silica alteration with an incomplete rim of chloritic alteration developed outboard of the potassic alteration, due to the breccia event, and a more extended moderate K-feldspar-magnetite alteration caused by the porphyry CDP mineralizing-alteration event. In the southeast part of the deposit, intermediate argillic alteration has formed and overprints potassic alteration. Sericitic and very weak argillic alteration (hydrolytic alteration) has developed in the volcanic tuffs. To the south and west of the deposit, chloritic alteration passes directly to propylitic alteration. An actinolite-magnetite alteration assemblage forms in the eastern part of the prospect; an altered sample yielded an $^{40}Ar/^{39}Ar$ age of 15.66+0.53 Ma (Dow, 2002). The main alteration assemblages identified at the Arizaro Deposit are as follows:

- Strong K-feldspar alteration which occurs principally related to the non-outcropping intrusive CDP, appears on the host rocks and in the intrusive. The alteration is associated with A-quartz type veinlets, producing pervasive, pseudo pervasive and selvage alteration, generally replacing biotite-magnetite alteration. In addition, K-feldspar magnetite-rich alteration (PO) forms a "pseudo" breccia texture and includes monomictic clasts with a dioritic composition and magnetite–anhydrite–chalcopyrite cement. The diorite clasts are rounded, K-feldspar–biotite-altered and locally cement-supported. This alteration occurs throughout the eastern part of the deposit area and follows a structural lineament. It is associated with the highest gold values.
- K-feldspar–biotite–magnetite alteration (PO) is characterized by strong, disseminated biotite replacing mafic minerals, with 4 to 5 percent disseminated magnetite. Biotite–magnetite–chalcopyrite veinlets are present with K-feldspar vein haloes. Gold–copper mineralization is hosted in veinlets and disseminations in the rock. The outer zone of this assemblage is characterized by a lack of K-feldspar veinlets, less intense biotite-magnetite stockworks and lesser amounts of disseminated magnetite. Generally, this style of alteration forms an oval–elliptical body in the central and western parts of the deposit. Biotite from a thoroughly biotite-altered rock produced an $^{40}Ar/^{39}Ar$ age of 15.46+0.11 Ma (Dow, 2002).
- K-feldspar-biotite-quartz veinlets (PO) are characterized by strong K-feldspar–biotite–quartz veining. K-feldspar is present as selvedges produced by the vein-forming fluids. This alteration assemblage is only developed in a small area.
- Chlorite clots (CL) form an unusual alteration assemblage represented by clots of chlorite developed pervasively throughout the rock, generally occurring at the edges of the K-feldspar–biotite alteration. It is associated with medium-grade gold–copper mineralization.
- Green biotite stockwork alteration (CL) is an intense green biotite alteration in a stockwork of veinlets that affects the FED diorite intrusion. The alteration produces a greenish color to the rock. This alteration assemblage is considered to be a post-mineralization alteration; no mineralization is associated with this alteration assemblage.
- Propylitic alteration (CL) is noted mainly to the southwest of the deposit area. This alteration assemblage is characterized by epidote, quartz, magnetite, chlorite and carbonates as veinlets and disseminations. The chlorite-dominated part of the assemblage occurs as a rim around weak potassic alteration. It consists of chlorite replacing mafic minerals (actinolite) with 1 to 2 percent disseminated magnetite. It is common to observe the chlorite replacing actinolite, which is in turn replaced by biotite near the potassic core. The epidote-dominated portion of the alteration assemblage occurs outboard of the chlorite-dominated propylitic assemblage and developed in the outer margins of the hydrothermal system. It represents the cooler, more distal portion of the alteration.
- Argillic alteration (ARS) is characterized by bleaching of the volcanic tuffs. White clays and very rare, patchy silica are present. The silica likely formed by devitrification

of volcanic glass within the tuffs. Destruction of the feldspars, formation of jarosite and limonite and replacement of the matrix by clays and silica are characteristics of this alteration assemblage.

- Supergene alteration includes the oxidation of copper minerals, mainly chalcopyrite to copper-bearing limonite and/or chrysocolla and the replacement of magnetite by hematite (martitized). This alteration is widespread over the system and is an effect of surficial weathering and oxidation.

Figure 7.8 Arizaro Deposit alteration map

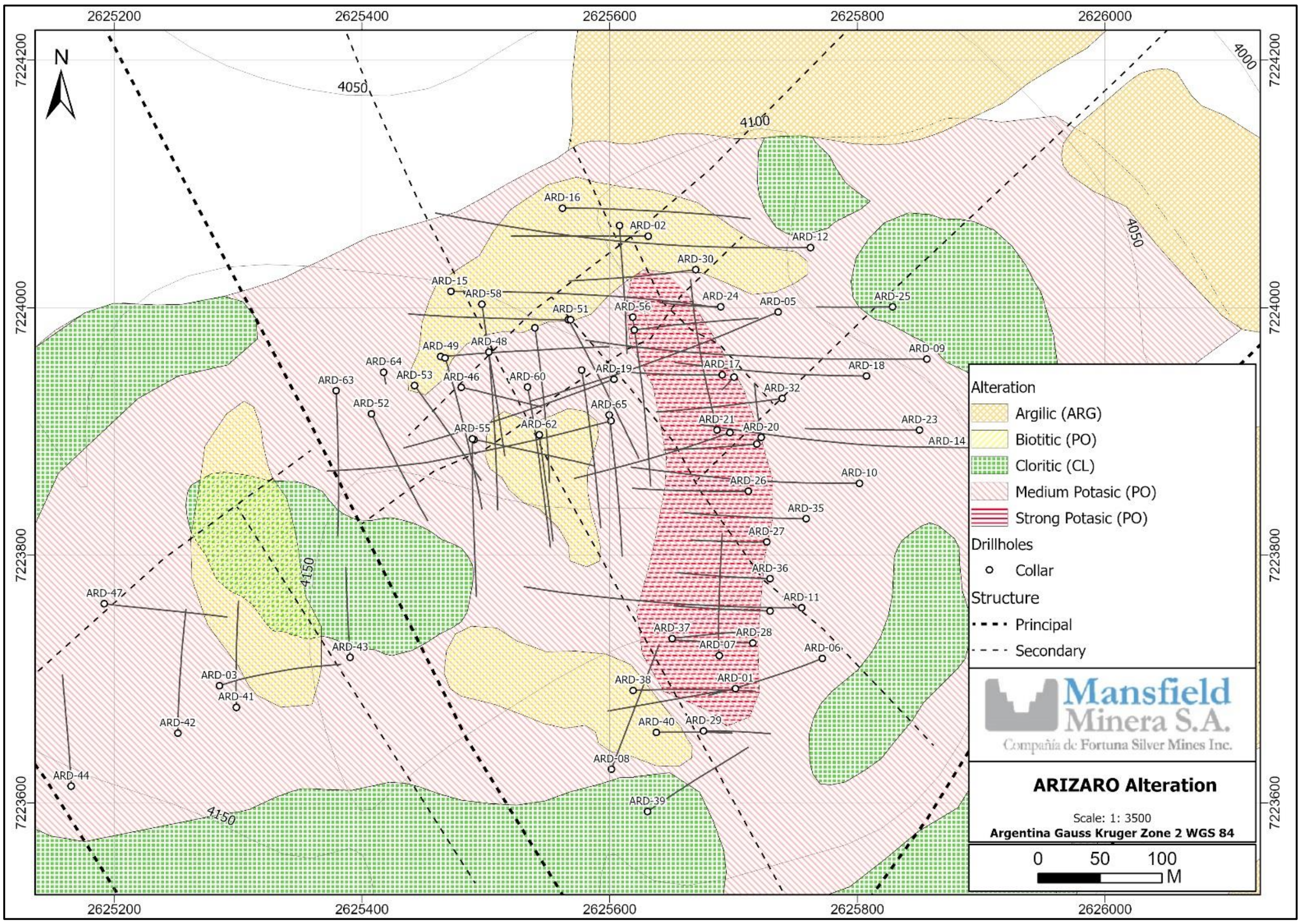


Figure prepared by Mansfield, 2022

7.4.4 Mineralization

Gold–copper mineralization is associated with two different mineralizing events. The strongest is a non-outcropping intrusive (CDP) which occurs in the north part of the porphyry with an elongated shape trending northeast to southwest for more than 400 m with an estimated average width of 60 m, producing an Au-Cu mineralized zone approximately 500m by 150m, with average grades of 0.5 g/t Au and 0.15 % Cu.

The other mineralizing event is in the center of the system and is related to breccias and micro-breccias which have a semi-oval shape at surface. In the center, there is a higher-grade core with a semi-ellipsoidal form, extending north–south for 480 m with an estimated average width of 50 m, averaging approximately 0.6 g/t Au at surface in the central core, and reducing to approximately 0.2 g/t Au on average in the margins of the body. Copper grades are more consistent across the deposit averaging 0.15 % Cu. The high relative gold to copper ratios suggests higher gold mobilization in the hydrothermal fluids with respect to copper and may be interpreted as representing the higher levels of metal precipitation from gold-rich, copper-poor, hydrothermal solutions.

The Arizaro Deposit has styles of mineralization with copper–gold grades which are strongly correlated with different alteration assemblages. Mineralization is mainly associated with potassic alteration. This occurs generally in multi-directional veins, vein stockworks and disseminations. In some areas, the vein density is high, forming vein stockworks in the intrusive rocks. These vein stockworks are limited to magnetite–biotite veinlets, quartz–magnetite–chalcopyrite veinlets, late magnetite breccias, and in late-stage mineralization events, anhydrite–sulfide veinlets.

Chalcopyrite and bornite are the main copper minerals. Gold is mainly associated with chalcopyrite, quartz, and anhydrite veinlets. Magnetite is common as massive replacements of the matrix in breccias, in veinlets and as disseminations. Dow (2002) reported the presence of elevated light rare earth elements (LREE) concentrations (La–Ce–Nd) hosted in monazite and allanite, and the presence of sub-micrometer-sized palladium intergrown with free gold in biotite-rich alteration assemblages.

Molybdenite is sporadically present and is associated with anhydrite–chalcopyrite veinlets. The presence of pyrite is limited to the distal margins of the system.

The copper oxide minerals found in the deposit include chrysocolla and brochantite. These occur as fracture-fill, fine veinlets with quartz ± sulfides and replacing feldspar crystals. The iron oxide minerals present are limonite, hematite, and very sporadic jarosite along fractures.

Coarse gold was observed and confirmed with X-ray diffraction analysis at the University of Neuquen, Argentina, laboratory, from drill hole ARD-14 (154.5 m) and was also identified macroscopically in an anhydrite–chalcopyrite–molybdenite vein.

7.5 Comment on Section 7

In the opinion of the QP, knowledge of the Lindero Deposit settings, lithologies, and structural and alteration controls on mineralization is sufficient to support Mineral Resource and Mineral Reserve estimation.

The Arizaro Deposit is at an earlier stage of exploration, and the controls of lithology, structure, and alteration on mineralization are currently understood to a sufficient level to support the estimation of Inferred Mineral Resources.

8 Deposit Types

8.1 Mineral deposit type

Early mapping at Lindero and Arizaro led Dow (2001, 2002) to interpret the mineralization as representative of iron oxide–copper–gold deposits. However, subsequent investigations led to the alternative interpretation that these are gold-rich porphyry copper deposits as described by Sillitoe (2000). More specifically, they show affinities with the porphyry gold deposit model (Rytuba and Cox, 1991; also termed dioritic porphyry gold deposits by Seedorff et al., 2005). These are exemplified by the Refugio, Cerro Casale, Marte, and Lobo gold deposits of the Miocene-age Maricunga belt, Chile, approximately 200 km south of Lindero. Vila and Sillitoe (1991) and Muntean and Einaudi (2000, 2001) described those deposits in detail. Seedorff et al. (2005) noted that porphyry gold systems are transitional into porphyry copper (gold, molybdenum) deposits associated with tonalitic or granodioritic intrusions (e.g., Los Pelambres, Chile; Batu Hijau, Indonesia).

The general characteristics of porphyry gold deposits are summarized as follows (from Rytuba and Cox, 1991; Vila and Sillitoe, 1991, Muntean and Einaudi, 2000, 2001; and Seedorff et al., 2005) and in Figure 8.1. Specifics applicable to the Maricunga belt are included for reference.

Figure 8.1 Porphyry gold (copper) model

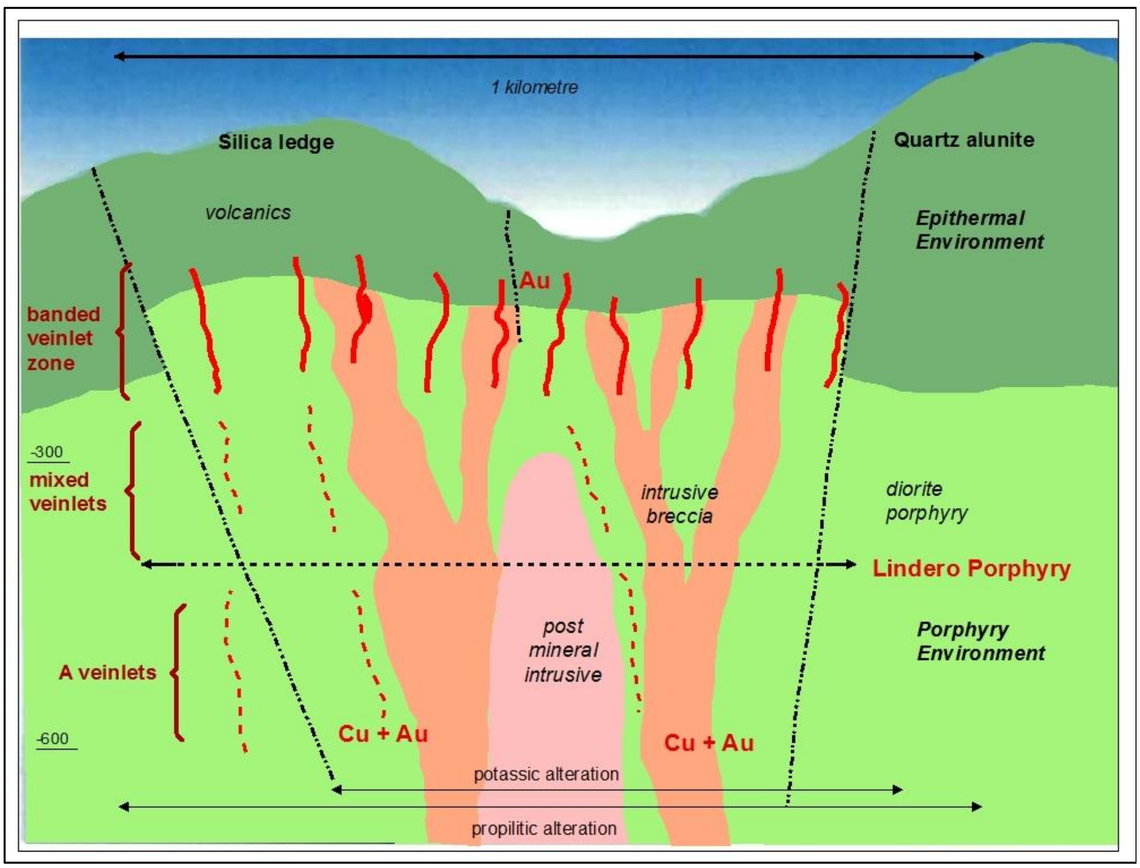


Figure from Belanger (2006) modified by Mansfield (2017)

8.1.1 Tectonic setting and age

Porphyry gold deposits form in volcanic arc systems developed along continental margins or island arcs. Deposits are localized by high-level multiphase porphyry stocks emplaced into the cores or flanks of andesitic to dacitic stratovolcanoes, probably associated with local extensional environments related to regional strike-slip faulting.

The vast majority of deposits are Miocene and younger.

8.1.2 Host rocks

Gold occurs in phenocryst-rich ("crowded") porphyries of diorite, quartz diorite or tonalite composition and in andesite to dacite flows, tuffs, and breccias of the stratovolcano edifice. Associated rocks may include dacitic domes and flows and intermediate ash flow tuffs. The mineral-related porphyries are described in detail at Refugio, Chile, where they are quartz diorite porphyries with subequal amounts of phenocrysts (plagioclase > hornblende > biotite) and microcrystalline groundmass (Muntean and Einaudi, 2000).

8.1.3 Ore and gangue mineralogy and texture

Native gold and electrum are finely disseminated in subparallel to stockwork quartz + sulfide ± magnetite ± anhydrite veins and in some cases in matrices of hydrothermal breccias. Magnetite is common to abundant in mineralized zones, averaging 2 to 10 percent in the Maricunga deposits – significantly more than in gold-deficient porphyry systems. Oxidized mineralization contains goethite, jarosite, hematite, and in some cases copper oxides. Sulfide mineralization contains pyrite (as much as 8 to 10 percent), chalcopyrite, and minor molybdenite. The deposits of the Maricunga belt exhibit distinctive gold-mineralized banded quartz veinlets, with dark inclusion- and magnetite-rich bands along their walls, occurring mostly higher in the system than A-type granular quartz–sulfide veins. Banded quartz veins are not generally observed in other types of porphyry deposits.

8.1.4 Wall rock alteration

Gold mineralization is associated with potassic alteration with abundant hydrothermal biotite, and/or by overprinted sericitic and sericite–chlorite–clay alteration. Potassic alteration is commonly overlain and overprinted by pyrite- and alunite-rich advanced argillic and vuggy silica alteration. Upper levels of systems may contain enargite-rich high-sulfidation gold–copper deposits.

8.1.5 Structural setting

The porphyry intrusions and related deposits are localized where regional fault zones intersect stratovolcanoes. Fault offset during porphyry crystallization results in sheeted and stockwork fracturing that controls mineralized veins and veinlets. Summit craters and small calderas are common in the volcanic edifices.

8.1.6 Typical size and dimensions

Tonnages mostly range from 40 to 250 Mt, with typical grades of 0.7-1.5 g/t Au and 0.05-0.2 % Cu. Mineralized bodies are typically steep tabular zones, 50 to 150 m wide, 500 to 600 m long, with vertical extents of 250 to 500 m. Alteration zones around the mineralization are typically 1 by 2 km in extent.

8.1.7 Weathering effects

Oxidation of sulfide minerals is critical in making low-grade mineralization amenable to cyanide heap leaching. Supergene copper enrichment is only incipiently developed.

8.1.8 Geochemical and geophysical signature

Porphyry zone deposits display deposit-to district-scale anomalies in gold, arsenic, mercury, copper, molybdenum, and lead. The overlying advanced argillic zone is also anomalous in antimony, bismuth, and tellurium.

Due to the high magnetite content, orebodies tend to exhibit strong positive magnetic anomalies.

8.1.9 Mineralization controls and exploration guides

The principal guide to mineralization is a sizable zone of magnetite-and biotite-rich potassic alteration and A veining developed in and surrounding a hypabyssal crowded porphyry of quartz dioritic to tonalitic composition. At higher levels, zones of advanced argillic (e.g., quartz-alunite "ledges") and vuggy silica alteration with high-sulfidation gold-copper and/or hot-spring mercury-sulfur mineralization may indicate the presence of porphyry gold mineralization at depth. Relict A-type veins persist into advanced argillic zones and provide an important vector to underlying porphyry mineralization.

8.1.10 Fluid inclusions

Fluid inclusions in the Maricunga belt deposits indicate that 'A veins' formed at temperatures as high as 700ºC and depths of 0.8 to 1.6 km. Higher-level banded quartz veins formed at maximum temperatures of 350ºC at depths of 0.2 to 1.0 km (Muntean and Einaudi, 2000, 2001). Porphyry gold deposits are interpreted to form at shallower paleodepths than other porphyry deposits.

8.2 Comparison with Maricunga belt deposits

The Lindero Property gold–copper system shares many attributes with the deposits of the Maricunga belt. The Miocene age, tectonic setting, mineralization-related quartz diorite porphyries, and important mineralization-stage biotitic alteration are similar to the Maricunga deposits. The resource tonnage and copper grades at the Lindero Deposit are similar to many of the Maricunga deposits, whereas gold grades at Maricunga are generally higher than at Lindero, averaging slightly over 1.0 g/t Au. Lindero is a magnetite-rich system, averaging 2.4 percent, which is at the low end of the range of Maricunga deposits (2 to 10 percent).

The Lindero Property differs from the Maricunga deposits, however, in its limited sericitic alteration and absence of advanced argillic alteration. Magnetite-dominant veins at Lindero are distinct from those in the Maricunga deposits; and the characteristic banded quartz veins of Maricunga are absent. While constraints as to depth of formation are not available at Lindero, these contrasts may simply reflect a deeper level of emplacement or erosion compared with the Maricunga belt deposits.

8.3 Comment on Section 8

In the opinion of the QP, the deposits of the Property are considered to be examples of porphyry-style deposits, in particular gold-rich porphyries based on the following:

- High-level (epizonal) stock emplacement levels in magmatic arc.
- High-level stocks and related dikes intrude their coeval and cogenetic volcanic piles. Intrusions range from fine through coarse-grained, equigranular to coarsely porphyritic.
- Mineralization in or adjoining porphyritic intrusions of quartz diorite/monzonite composition.
- Mineralization is spatially, temporally, and genetically associated with hydrothermal alteration of the intrusive bodies and host rocks.
- Gold–copper mineralization formed during intrusion of multiple phases of similar compositional intrusive rocks.
- Large zones of quartz veining, stockwork mineralization, and disseminated pyrite.
- Tenor of gold and copper grades, i.e., large tonnage but low grade.

Understanding of the geological setting and model concept of the Lindero and Arizaro deposits is adequate to provide guidance for exploration and development.

9 Exploration

The Arizaro and Lindero deposits were discovered in 1999 and 2000, respectively, as a result of a regional program of exploration undertaken by Goldrock (Kesting and Huidobro, 2001). The early exploration programs involved the collection of grab samples and the excavation of small trenches that identified the presence of mineralization with elevated copper and gold grades associated with both the Lindero and Arizaro deposits. Several exploration programs have been conducted by Rio Tinto, Goldrock, and Fortuna with all work under the management of Mansfield as summarized in Table 9.1.

Table 9.1 Summary of exploration programs at the Lindero Property

Year	Type of work	Company	Deposit
2000	Geology and alteration mapping at 1:20,000 & 1:10,000 & 1:5,000 scale	Goldrock	Both
2000	Soil sampling grid of 100 m x 50 m	Goldrock	Both
2001	Trenches totaling 1,752 m	Goldrock	Lindero
2001	Trenches totaling 3,845 m	Goldrock	Arizaro
2002	Road sampling totaling 3,500 m	Rio Tinto	Lindero
2002	Geophysics – 43 km of ground magnetics and 11 km of IP	Rio Tinto	Both
2002	Drilling totaling 3,279 m (10 holes)	Rio Tinto	Lindero
2002	Drilling totaling 629 m (2 holes)	Rio Tinto	Arizaro
2004	Metallurgical testwork on 30 samples	Goldrock	Lindero
2005	Trenches totaling 1,264 m (16 trenches)	Goldrock	Lindero
2005-2006	Drilling totaling 2,609 m (11 holes)	Goldrock	Lindero
2006	Geological mapping at 1:5,000 scale and 3D modelling	Goldrock	Lindero
2006	Trenches totaling 332 m (4 trenches)	Goldrock	Lindero
2007	Metallurgical testwork on bulk samples totaling 2,200 kg	Goldrock	Lindero
2006-2008	Drilling totaling 28,768 m (100 holes)	Goldrock	Lindero
2010	Drilling totaling 3,480 m (18 holes)	Goldrock	Lindero
2010-2011	Trenches totaling 2,490 m	Goldrock	Arizaro
2010-2013	Drilling totaling 8,225 m (27 holes)	Goldrock	Arizaro
2016	Metallurgical testwork on 4 x 750 kg of historical core	Fortuna	Lindero
2016	Metallurgical testwork on 2 x 300 kg of historical core	Fortuna	Lindero
2016	Drilling totaling 4,461 m (12 holes)	Fortuna	Lindero
2017	Metallurgical testwork on 2 x 600 kg of fresh core	Fortuna	Lindero
2017	Relogging program	Fortuna	Both
2018	Drilling totaling 1,952 m (61 holes)	Fortuna	Lindero
2018	Metallurgical testwork on 2 x 500 kg of fresh core	Fortuna	Lindero
2018	Trenches totaling 1,471 m (16 trenches)	Fortuna	Arizaro
2018	Drilling totaling 2,178 m (12 holes)	Mansfield	Arizaro
2021	Drilling totaling 1,607 m (18 holes)	Mansfield	Lindero
2021	Relogging and trench sampling program	Mansfield	Arizaro
2021-2022	Drilling totaling 5,133 m (24 holes)	Mansfield	Arizaro
2022	Drilling totaling 1,102 m (10 holes)	Mansfield	Lindero

9.1 Goldrock campaign (2000 to 2001)

The 2000 to 2001 campaign conducted by Goldrock comprised geological mapping with rock chip sampling, soil geochemistry grid sampling, and trenching at both deposits.

9.1.1 Geological mapping

Regional mapping, completed by December 2000, was initially carried out at scales of 1:20,000 and 1:10,000 accompanied by rock chip sampling, and was followed by detailed geological and alteration mapping of the Lindero and Arizaro deposits at 1:5,000 and 1:2,500 scales (Dow, 2001).

9.1.2 Soil (talus fines) geochemistry

Sampling was completed on a 100 m x 50 m grid and consisted of 15 north–south lines of approximately 1,000 m in length at the Lindero Deposit and 18 north-south lines of approximately 1,200 m length at the Arizaro Deposit, being spaced 100 m apart with stations/pickets located every 50 m along the line. The lines were surveyed using a hand-held global positioning system (GPS) unit. A total of 304 talus fines samples were collected over an area 1,400 m by 1,200 m at Lindero and 494 talus samples were collected over an area of 1,700 m by 1,500 m at Arizaro. Samples were collected from 20 cm-deep holes dug at each station. About 300–400 g of talus fines was sieved to 95 percent passing 80 mesh. Samples were then bagged, numbered, and submitted for analysis to Acme Analytical Laboratories (Argentina) S.A. (ACME) in Mendoza, Argentina.

At the Lindero Deposit, the results indicated a gold-in-talus-fines anomaly (>200 ppb Au) that covered an area of 300 m x 500 m in the southeast part of the grid, approximately coincident with the CPD1–FPD porphyry. Copper results indicated a circular donut-shaped anomaly (>250 ppm Cu) with a radius of about 200 m, centered on the intrusives and largely coincident with the CPD1–FPD porphyry and potassic alteration zones (Kesting and Huidobro, 2001).

At the Arizaro Deposit, the results defined an anomalous area with over 100 ppb Au that covered 600 m by 1,100 m and an almost coincident area with over 250 ppm Cu that covered an area of 550 m by 830 m with peak values associated with a zone of potassic alteration. The gold-copper anomaly margins were masked be alluvial and volcaniclastic cover (Kesting and Huidobro, 2001).

9.1.3 Trenching

The objective of the trenching program were to better define the rock types and alteration assemblages, to expose gold–copper mineralization for better characterization, and to assess the gold and copper content of the mineralized zones. The work was carried out with a hydraulic excavator supplied by a local contractor. The trenches were generally sampled at 2 m and 5 m intervals.

Samples were sent to ACME in Mendoza where gold grades were analyzed by fire assay with an atomic absorption finish (FA/AA) and copper was analyzed by AA. The data were presented on maps at a scale of 1:1,000 and in MapInfo™ format. Certain sections of continuous chip sampling were checked by analyzing diamond saw-cut channel samples taken from the same intervals.

Goldrock did not have a formal quality assurance/quality control (QAQC) program with well-defined and documented protocols and procedures in place for the trenching program. No estimate for analytical precision or accuracy was undertaken. Instead, Goldrock relied on ACME's internal checks in determining the reliability of the analyses. It should be noted that these trench samples have not been used in the estimation of Mineral Resources as detailed in this Report.

Lindero Deposit

Ten trenches, totaling 1,752 m, were excavated on the Lindero Deposit (Kesting and Huidobro, 2001). An access road exposed an additional 102 m of potassic-altered porphyry (trenches LC (N) and LC (S). The objectives of the trenching program were to better define the rock types and alteration assemblages, to expose gold–copper mineralization for better characterization, and to assess the gold and copper content of the mineralized zones. The work was carried out with a hydraulic excavator supplied by a local contractor. The trenches were sampled at 2 m and 5 m intervals except for 42 m where the alluvial cover was too deep (Table 9.2). Samples were collected by hand on a continuous chip basis or from channels cut by a diamond saw.

Table 9.2 Trench and road cut samples taken at Lindero in 2001 (see Figure 9.1 for locations)

Trench	Length (m)	Sample Interval (m)	Sample Type	No. of Samples	Results of interest
LD250N	225	5	chip	45	110 m averaging 404 ppb Au & 0.13 % Cu
LD50N	326	5&2	chip	132	74 m averaging 1,472 ppb Au & 0.12 % Cu
LDBL	136	2	chip	68	42 m averaging 1,029 ppb Au
LD50S	185	5	chip	37	50 m averaging 593 ppb Au & 0.22 % Cu
LD200S	116	2	chip	58	52 m averaging 436 ppb Au & 0.12 % Cu
LD300E	156	2	chip	78	110 m averaging 1,077 ppb Au & 0.11 % Cu
LD200E	208	2	chip	104	34 m averaging 1,644 ppb Au & 0.13 % Cu
LD50W	160	2	chip	80	38 m averaging 911 ppb Au & 0.21 % Cu
LD150W	80	5	chip	16	80 m averaging 442 ppb Au & 0.18 % Cu
LD200	160	5	chip	32	80 m averaging 442 ppb Au & 0.11 % Cu
LC (N)	14	2	chip	7	-
LC (S)	88	2	chip	44	-

A combination of trench mapping and sampling results indicated a semi-annular zone around the PMI–CPD2 porphyries with highest grades confined to the southeast corner of the mineralized zone. This zone measured some 550 m x 100 m, although there was evidence from the road-cutting to the south that the mineralization could be extended at surface for another 200 m of strike. In addition, a smaller zone of lower-grade mineralization was recognized from the semi-annular zone towards the center of the deposit area; this inner zone had dimensions of approximately 400 m x 70 m.

Arizaro Deposit

Eighteen trenches, totaling 3,845 m were excavated at the Arizaro Deposit (Kesting and Huidobro, 2001). The trenches were sampled at 2 m and 5 m intervals, except for 146 meters in trenches AZ 100 S and AZ 200 N, where the alluvial cover was too deep to allow exposure of the mineralization. A total of 1,670 samples were collected. by hand on a continuous chip basis or from channels cut by a diamond saw with results of interest presented in Table 9.3.

Table 9.3 Trench samples taken at the Arizaro Deposit in 2001

Trench	Length (m)	Sample Interval (m)	Sample Type	No. of Samples	Results of interest
AZ 00	638	2	Channel	319	38 m averaging 1,228 ppb Au & 0.43 % Cu and 58 m averaging 416 ppb Au & 0.3 % Cu
AZ-1	516	2	Channel & chip	257	64 m averaging 861 ppb Au & 0.31 % Cu
AZ 100 S	427	2	Channel & chip	196	20 m averaging 1,086 ppb Au & 0.36 % Cu and 44 m averaging 312 ppb Au & 0.31% Cu
AZ 80 W	134	2	Channel	67	16 m averaging 864 ppb Au & 0.31 % Cu
AZ 300 W	100	2	Channel	50	44 m averaging 689 ppb Au & 0.51 % Cu
AZ 50 N	206	2	Channel	103	16 m averaging 416 ppb Au & 0.30 % Cu
AZ BL	105	-	Channel & chip	43	22 m averaging 324 ppb Au & 0.31 % Cu
AZ 100 N	95	5	Chip	19	No results of interest
AZ 300 N	76	2	Channel	38	20 m averaging 657 ppb Au & 0.58 % Cu

9.2 Rio Tinto campaign (2002 to 2003)

The second exploration campaign was carried out by Rio Tinto after the signing of an option agreement in April 2002. The Rio Tinto program (Ruiz et al, 2003) was conducted between May 2002 and February 2003 and consisted of:

- Geological mapping.
- Geophysics (ground magnetics and induced polarization surveys).
- Road cut sampling.
- Drilling (detailed in Section 10.2).
- Metallurgical testwork (detailed in Section 13).

In January 2003, Rio Tinto completed a 3-D block model and a preliminary "mineral inventory" for the Lindero prospect based on the above work.

9.2.1 Geological mapping

Rio Tinto re-mapped the Lindero and Arizaro deposits in September 2002. Additional data from exposures on new access roads constructed by Rio Tinto, as well as from drill core recovered from the Rio Tinto drilling program, were included in the geological studies. While addition of this newly acquired data helped refine the deposit geology, no significant modifications to the geology as mapped by Goldrock were introduced. Geological data was presented on a map at a scale of 1:2,500.

Rio Tinto identified additional structural details for the deposit. Two main stockwork orientations were defined: a northwest orientation, dominant in the western and southwestern part of the intrusive complex; and, a northeast vein orientation dominant in the eastern part of the grid.

Five main mineralizing events were recognized on the basis of crosscutting vein relationships. The veins, from earliest to latest, were interpreted by Rio Tinto to be:

- First-stage, narrow (hairline) magnetite veins (1–5 g/t Au).
- A-type quartz veins with minor sulfides (<1 g/t Au; ±Cu).

- Second stage hairline magnetite veins (>1 g/t Au).
- Coarse magnetite veins with chalcopyrite (Cu).
- Quartz veins with pyrite (weak Au).

9.2.2 Geophysics

A total of 43 km of ground magnetic data and 11 km of gradient-array IP data was collected from the grid over the Lindero Deposit and a further 62.3 km of ground magnetic data and 17 km of gradient-array IP data from the Arizaro Deposit. The magnetic data was collected with a line spacing of 100 m with stations spaced every 10 m along the lines, whereas the IP/resistivity survey data were collected with a line spacing of 200 m with stations spaced every 50 m along the lines.

Roscoe Postle Associates (RPA) reviewed the work (RPA, 2003) and in their opinion, both surveys were appropriate for disseminated mineralization; however, the magnetic spacing resulted in a large spatial sampling bias, which precluded effective contouring (Fuchter and Rennie, 2003). The IP survey spacing was deemed appropriate for identification of large-scale anomalies.

The surveys were undertaken with common commercial geophysical instruments (GSM GEM-19™ magnetometers, Elrec-6™ receiver and VIP-3000™ transmitter) by Quantec's local subsidiary based in Mendoza. Basic processing was undertaken by Rio Tinto using Geosoft™ software, and maps were produced in MapInfo™ format. RPA questioned some of Rio Tinto's interpretations (RPA, 2003).

Ground magnetic, gradient-array IP and resistivity surveys conducted at the Arizaro Deposit confirmed the presence of a one-kilometer porphyry system that included a pyrite halo surrounding an area mapped as potassic alteration. Like the Lindero Deposit, a central low-resistivity zone was detected at the Arizaro Deposit that identified a possible central mineralized porphyry. The Arizaro porphyry Cu-Au deposit displays a clear geophysical data response to IP and ground magnetics.

9.2.3 Road-cut sampling

A total of 374 of the chip samples collected from 3.5 km of new roads constructed on the Lindero Deposit in 2002 were used by Rio Tinto in the construction of their block model. Continuous chip sampling was conducted over 3 to 5 m intervals, and submitted for analysis to the ALS Chemex laboratory in Mendoza. The sample preparation was performed in Mendoza, and a sub-sample of 100 g together with blanks, duplicates, and certified standards was shipped to ALS Chemex in Vancouver for Au + 35 element analyses (Au+35T package). Gold was assayed by FA/AA and the 35 elements by inductively coupled plasma (ICP).

RPA concluded that QAQC procedures were well documented and appropriate (Fuchter and Rennie, 2003). They reported that the additional road-cut sampling data confirmed and extended the known intersections of surface mineralization previously outlined in the trenching undertaken by Goldrock.

9.2.4 Drilling and core logging

A total of 3,279 m of core drilling in 10 holes was completed at the Lindero Deposit and 628.9 m of core drilling in 2 holes was completed at the Arizaro Deposit from May to December 2002 by Rio Tinto. The drilling campaign is described in Section 10.2 of this Report.

9.3 Goldrock campaign (2005 to 2010)

The next exploration campaign was conducted by Goldrock and was focused on the Lindero Deposit and consisted of:

- Geological mapping.
- Trenching.
- Digital satellite topographic survey.
- Drilling (described in Section 10.3).
- Road-cut sampling.
- Metallurgical testwork (detailed in Section 13).

9.3.1 Geological mapping

In 2007, previous drilling and trenching information was compiled in order to develop a geologic model for Lindero at a scale of 1:1,000. All drill holes were relogged. Trenches and roads were mapped in detail. A 1:2,000 topographic map was built, based on a satellite image AMEC (2010b).

9.3.2 Trenching

In 2005, Goldrock completed a trenching program at Lindero which was designed to define surface mineralization (AMEC, 2010b). Sixteen trenches totaling 1,234 m were excavated. Trenches were channel sampled every 2 m with a rock saw, and a total of 498 samples were collected.

Four additional trenches (332 m) were excavated in 2007 (NTR-01 to NTR-04) on the west zone of the Lindero Deposit, in order to characterize the nature of surface mineralization in that area. A total of 159 samples were taken.

A summary of trench locations and soil samples collected on the property over the successive exploration surveys is presented in Figure 9.1.

Figure 9.1 Trench locations and soil grid layout

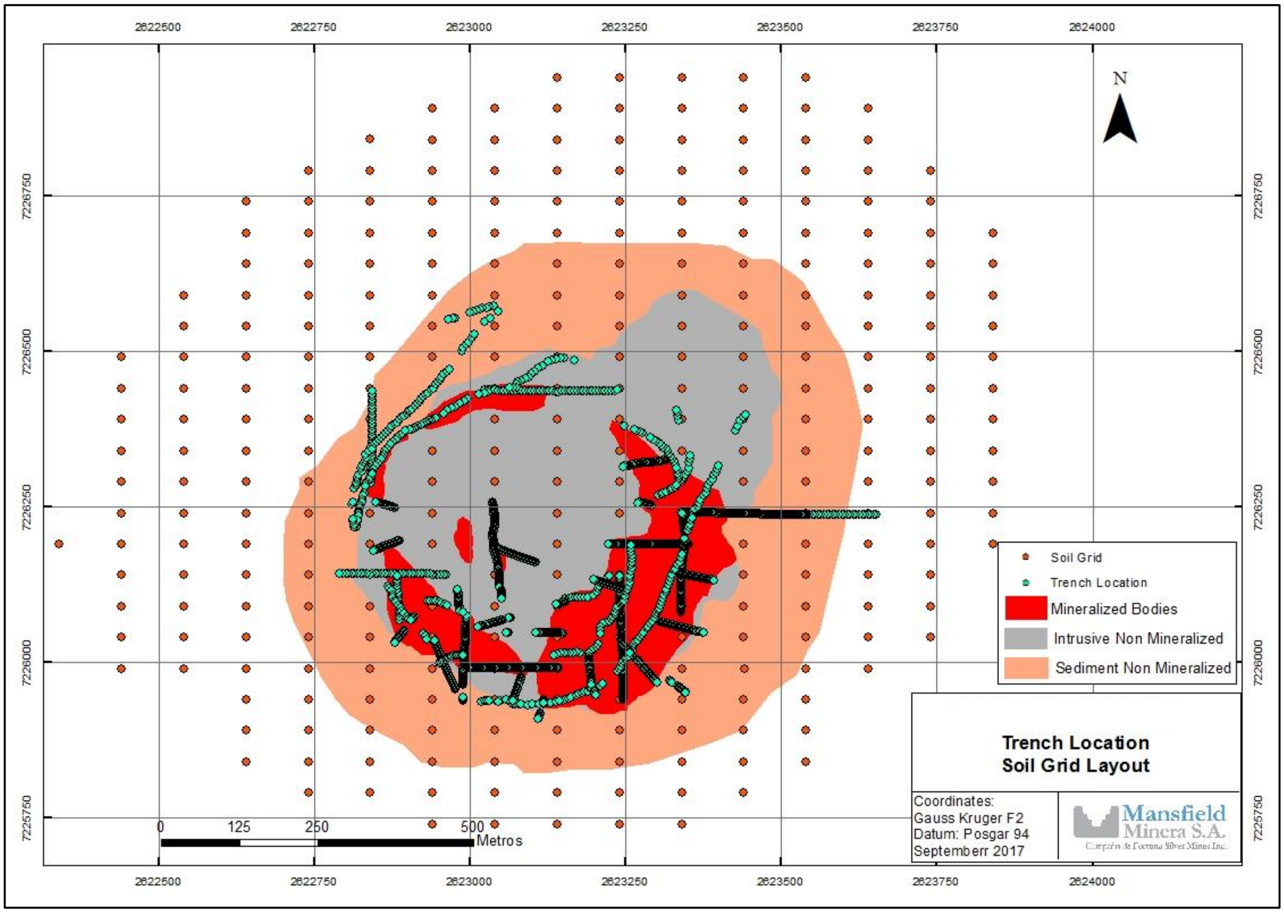


Figure prepared by Mansfield, 2017

9.3.3 Topographic survey

The Lindero Deposit topographic data was obtained from a QuickBird™, natural color, 64 cm pixel satellite image which covered 64 km². Fixed control points on the ground were used to rectify the image to the proper co-ordinate system. The QuickBird™ image was combined with a stereo Ikonos™ image, which covered 100 km², to generate a 1-m resolution digital elevation model (DEM). These two products were used to construct an ortho-rectification of the image, and Infosat™ using the PCI Geomatica Orthoengine™ software produced a topographic map with 5 m contour levels.

9.4 Goldrock campaign (2010 to 2013)

Between May 2010 and February 2013, Goldrock focused exploration on the Arizaro Deposit while geotechnical investigations and condemnation drilling was undertaken at the Lindero Deposit. The exploration programs included:

- Geological mapping.
- Trenching and road-cut sampling.

- Drilling (described in Section 10.4).
- Geotechnical and condemnation drilling.

Geological and alteration mapping was focused around 2,492 m of trenches and 175 m of road cuts, which were excavated to help define the mineralization on surface. Three phases of diamond drilling helped define gold mineralization of approximately 650 m by 600 m by 500 m in size.

9.4.1 Geological mapping

During the drilling campaign in 2011, detailed geological mapping was carried out at a 1:1,000 scale. Trenches, road cuts and existing outcrops facilitated the mapping. Detailed mapping of structures and veinlets in the trenches and road cuts defined two preferential directions of structures: a dominant northeast-southwest trend and subordinate northwest-southeast trend.

Although the mapping was performed in only one part of the Arizaro Deposit (the northeast sector), it was assumed that the preferential orientations of the structures and veinlets are consistent throughout the project area. No structural control on the mineralization was determined except in very specific cases. Drilling programs were designed considering the new geology and alteration mapping with holes located to test the most intense potassic alteration exposed at surface, which is mainly in the central part of the Arizaro Deposit.

9.4.2 Trenching and road-cut sampling

The objective of the trenching and road cut programs was to better define the lithological and alteration assemblages, to expose gold-copper mineralization for better characterization, and to sample and assay the gold and copper content of any mineralized zones.

A total of 34 rock-chip samples were collected from 175 m of a road cuts. Continuous chip samples were collected over 5 m intervals and submitted for analysis to Alex Stewart International's (Alex Stewart) laboratory in Mendoza. Gold was assayed by fire assay (FA), copper by atomic absorption (AA), and 39 additional elements by inductively coupled plasma (ICP). Results obtained from the road cut indicated the presence of gold and copper mineralization as did two trenches, totaling 212 m, excavated in November 2010.

Between May and June 2011, six additional trenches were excavated, totaling 2,265 m. Work was carried out using a bulldozer from a local contractor (AGV) and was supervised by Goldrock geologists. Samples were collected every 2 meters by chipping from east to west and from south to north; the trenches were mapped in detail. These trenches were designed to investigate soil anomalies (over 50 ppb Au) delineated by the grid soil sampling conducted in 2001.

9.4.3 Geotechnical and condemnation drilling at the Lindero Deposit

Between August and November 2010, six holes were drilled for geotechnical studies for the Lindero Deposit (AMEC, 2011). Five condemnation holes were drilled in strategic areas where important infrastructure such as leach pads and waste rock piles were planned. A total of 3,235.5 m was drilled in 11 holes. The locations and lengths of these drill holes are shown in Table 9.4.

Table 9.4 Drill hole locations for 2010 drill campaign

Hole I.D.	Easting (m)	Northing (m)	Elevation (m)	Azimuth (°)	Dip (°)	Depth (m)	Purpose
LGT-06	2622846	7226034	3919.6	225	75	350	Geotechnical
LGT-07	2622854	7226358	3908.3	315	75	350	
LGT-08	2623088	7226474	3919.7	360	75	350	
LGT-09	2623389	7226340	3940.4	060	75	350	
LGT-10	2623053	7225937	3942.2	180	75	350	
LGT-11	2623368	7226050	3909.8	125	75	350	
CON-01	2623939	7225801	3828.7	000	60	200	Condemnation
CON-02	2623540	7226013	3854.7	250	60	300	
CON-03	2623019	7225780	3893.7	290	60	200	
CON-04	2624147	7226481	3757.0	270	60	235.5	
CON-05	2622638	7226896	3755.1	140	60	200	

The geotechnical holes were planned by AMEC Earth & Environmental Americas (AMEC, 2011). These holes were part of geotechnical studies conducted by AMEC to complete open pit geotechnical design. The scope of work undertaken included:

- Selection of drill hole locations.
- Geotechnical logging and core orientation.
- Selection of representative samples for unconfined compression testing and direct shear testing.
- Completion of point load tests, core photography, and laboratory testing on selected samples.

The geotechnical holes were oriented with a Reflex Act™ instrument and downhole deviations were measured with a Reflex™ gyroscopic instrument.

The condemnation holes were drilled to demonstrate that the areas selected for leach pads, waste rock piles and other facilities on surface did not have underlying mineralization. Holes were logged and sampled with the same methodology as the geotechnical drill holes. The condemnation holes were down-hole surveyed.

Samples from the geotechnical and condemnation drill holes were collected every two meters and analyzed by Alex Stewart in Mendoza. A total of 1,881 samples were assayed by ICP analysis for 39 elements, and were analyzed for gold by FA (30 g charge). Goldrock inserted QAQC samples with the batches submitted to the analytical laboratory.

The assay results from the geotechnical holes showed weak mineralization. The assay results from the condemnation holes did not show any anomalous gold or copper values.

9.5 Fortuna campaign (2016 to 2022)

The most recent exploration campaigns have been conducted by Mansfield under the supervision of Fortuna. Tasks that have been completed since August 2016 include:

- Geological mapping and relogging.
- Trenching at the Arizaro Deposit.
- Investigation into soluble copper.

- Heterogeneity testwork.
- Geotechnical investigations.
- Drilling (described in Section 10.5).
- Metallurgical testwork (detailed in Section 13).

9.5.1 Geological mapping and relogging

Geological mapping of the entire surface area immediately southeast of Lindero up to and including the historic drilling at Arizaro was conducted in 2017. In addition, all historical drill core, for both the Lindero and Arizaro deposits, was relogged under the supervision of porphyry specialist, Brock Riedell. The work helped in refining the interpretation of the geological and alteration relationships between the varies lithologies and alteration assemblages, which are key to understanding the evolution of the porphyry systems and guiding exploration activities.

The relogging work on field mapping helped to identify the presence of a new zone of mineralization inn the center, northwest part of the Arizaro porphyry system.

9.5.2 Trenching at the Arizaro Deposit

Sixteen trenches, totaling 1,233.5 m, were sampled in 2021 and 2022 at the Arizaro Deposit. The objectives of the trenching program were to better define rock types and alteration assemblages, expose gold–copper mineralization for better characterization, and to obtain samples for assaying the gold and copper content in mineralized zones. The work was performed on historical trenches that were cleaned using shovels and brooms to remove alluvial cover. Samples were collected by hand, every 2 m (Table 9.5), on a continuous channel cut by diamond saw.

Samples were sent to ALS Laboratory in Mendoza where gold grades were analyzed by fire assay with an atomic absorption finish (FA/AA) and copper was analyzed by AA. The data analyzed using maps at a scale of 1:1,000 and in MapInfo™ format. Samples were using appropriate documented protocols and procedures including Fortuna's Quality Assurance/Quality Control (QAQC) program. Trench samples have not been used in the estimation of the Mineral Resource in this Report but help guide the geological interpretation.

Table 9.5 Trench samples taken at the Arizaro Deposit in 2021 and 2022

Trench	Length (m)	Sample Interval (m)	Sample Type	No. of Samples	Results of interest
Tc 4075	100	2	Channel	60	8 m averaging 0.64 g/t Au & 0.32 % Cu
Tc 4060	20	2	Channel	13	14 m averaging 0.44 g/t Au & 0.35 % Cu
Tc 4050	92	2	Channel	57	30 m averaging 0.33 g/t Au & 0.24 % Cu
Tc 4025B	23	2	Channel	16	No significant intervals
Tc 4025	94	2	Channel	59	34 m averaging 0.37 g/t Au & 0.35 % Cu
Tc 4000	94	2	Channel	59	21 m averaging 0.21 g/t Au & 0.41 % Cu
Tc 3970	80	2	Channel	42	No significant intervals
Tc 3950	74	2	Channel	47	No significant intervals
Tc 3925	64	2	Channel	37	44 m averaging 0.62 g/t Au & 0.16 % Cu
Tc 3875	98	2	Channel	60	40 m averaging 0.43 g/t Au & 0.20 % Cu
Tc 3850	106	2	Channel	64	No significant intervals

Trench	Length (m)	Sample Interval (m)	Sample Type	No. of Samples	Results of interest
Tc 3830	92	2	Channel	56	46 m averaging 0.61 g/t Au & 0.22 % Cu
Tc 3825W	150	2	Channel	91	No significant intervals
Tc 3810	16	2	Channel	10	8 m averaging 0.69 g/t Au & 0.41 % Cu
Tc 3795	66	2	Channel	41	10 m averaging 0.46 g/t Au & 0.24 % Cu and 8 m averaging 0.74 g/t Au & 0.29 % Cu
Tc 3765	64	2	Channel	40	20 m averaging 0.32 g/t Au & 0.20 % Cu

Based on the trench samples and follow up drilling it was possible to identify the CDP intrusive as a new zone of mineralization extending to the west. Additionally, it was possible to identify a zonation on the edges of the BxMg, where the host rock is observed, affected by the brecciation process, producing microbreccias. For modeling purposes, both lithologies were grouped within the BxMg domain.

9.5.3 Soluble copper investigation

As a component of the investigation work conducted by Fortuna in 2017 to characterize the Lindero Deposit, 1,536 samples were taken from eight drill holes spatially distributed around the deposit. Those samples were considered by Fortuna to be representative of the style of mineralization. All samples were submitted to ALS Global for assaying which included the evaluation of soluble copper via cyanide leach with an atomic absorption finish. Assays were entered into the Lindero database and cross-referenced using their intervals against the corresponding lithology description.

The assay results for the gold, total copper, and soluble copper, as well as the calculated soluble copper as a percentage of total copper (Sol Cu: Tot Cu (%)) were analyzed in order to better understand the behavior of soluble copper at the Lindero Deposit.

The level of soluble copper in the mineralized lithologic units ranges from 6.5 ppm to 2,530 ppm, depending on the copper minerals present. Soluble copper levels as a percentage of total copper appear to be consistent averaging between 9.3 % and 11.2 % in the major mineralized oxide and sulfide domains. Statistical analysis and scatter plots (Figure 9.2) demonstrate there is no significant correlation between total copper and cyanide-soluble copper.

Figure 9.2 Scatter plot of total copper : cyanide soluble copper

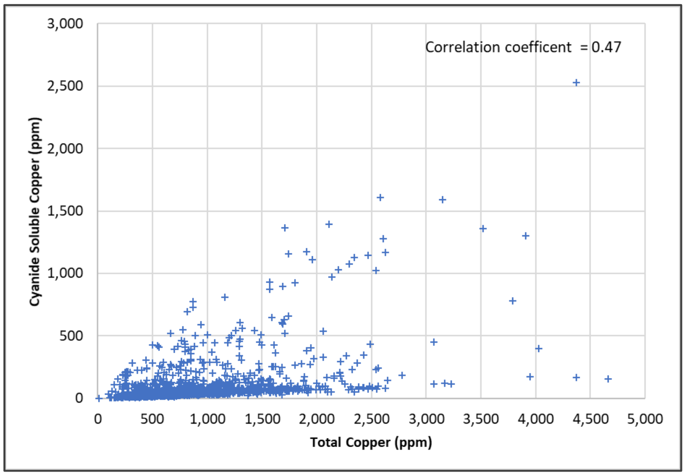


Figure prepared by Fortuna Silver Mines Inc., 2017

It would be logical to assume the sulfide domain would have a lower average soluble copper to total copper percentage, being dominated by low-solubility chalcopyrite (~6 %), but the occasional presence of highly-soluble bornite (~70 %) in the sulfide domains, albeit in small concentrations, results in a significant tail to the distribution. This is in contrast to the oxide domains that contain moderately soluble copper oxide species such as neotocite and chrysocolla (~15%), albeit in higher proportions. Subsequently, the soluble copper as a percentage of total copper in FPD/CPD1 sulfide averages 10.4 %, ranging between 2 % and 90 %; whereas in FPD/CPD1 oxide it averages 11.2 %, ranging between 2 % and 51 %.

Fortuna also commenced an investigation into the soluble copper at the Arizaro Deposit with the submission of 321 samples from historic core pulps sent to ALS Global for assaying with cyanide leach and an AA finish.

The level of soluble copper in the mineralized lithologic units ranges from 6.5 ppm to 2,530 ppm, depending on the copper minerals present. Soluble copper levels as a percentage of total copper appear to be consistent averaging between 9.3 % and 11.2 % in the major mineralized oxide and sulfide domains.

The archived pulp samples selected are considered to be representative of the oxide, mixed and sulfide mineralization, and the data will be used as a precursor to design possible future metallurgical testing at Arizaro.

9.5.4 Heterogeneity test

As part of the validation process, Fortuna opted to conduct a heterogeneity test on the most abundant ore type to determine the sampling characteristics of both gold and copper. The study uses the principles of the "Theory of Sampling" to determine the characteristics of the metals of interest.

Fortuna collected 87 half core samples totaling 492 kg from a variety of drill holes to represent the most commonly occurring ore type at the Lindero Deposit and transported this material to the Campos, Menichetti & Suarez Spa (CMS) Asociados laboratory in Santiago, Chile who conducted the heterogeneity testwork (CMS, 2016a, 2016b). The sample preparation report and all results were provided to Francis Pitard Sampling Consultants (FPSC) for statistical analysis. A report detailing the results and recommendations from the heterogeneity test was provided to Fortuna (FPSC, 2016), with a summary of the main points from that report detailed below:

- The heterogeneity of the tested ore is reasonably small, which is beneficial and leads to sampling and subsampling protocols that are relatively easy to implement.
- The heterogeneity of gold is substantially larger than the heterogeneity of copper, clearly suggesting that a substantial amount of gold is not associated with copper minerals. This is a warning for possible segregation problems in sampling and subsampling protocols.
- The experimental values obtained for the sampling constant are unusually low for copper, and very unusual for gold, which is beneficial for obtaining representative samples.
- Extraction errors and preparation errors taking place during the implementation of sampling protocols are not likely to introduce large sampling biases for copper and gold: This is a tremendous asset for the Lindero Mine.

Equipment selection for the chemical laboratory were based on the findings for this report, as well as the definition of the minimum mass requirements from blast holes to obtain a representative sample.

9.6 Geotechnical studies

A series of geotechnical studies have been conducted on the Lindero Deposit during the Goldrock campaigns by various consulting firms including Golder (2008), Seegmiller (2009), AMEC (2011), and Seegmiller (2013).

Fortuna contracted CNI to perform a review of all available geotechnical information (CNI, 2016a, 2017 and 2022).

Recommendations from the review work led to a site visit conducted from 9 to 12 August 2016, by Mr. Robert Pratt, P.E., Senior Engineer, and Mr. Francisco Sanz, Geotechnical Geologist, both of CNI, to the Lindero Property. During this site visit, the following tasks were completed (CNI, 2016a):

- Review of general geology and rock quality for various alteration types.
- Cell mapping of road cuts to collect rock fabric data.
- Sampling for laboratory testing.
- Review, validation, and correction of AMEC's oriented core.
- Measurement of spacing of gypsum-filled bedding joints (hole LGT-08).

The site visit was conducted in conjunction with a full review by CNI of previous geotechnical pit slope design work.

A second site visit was conducted by Mr. Francisco Sanz of CNI from 15 to 22 October 2016 (CNI, 2016b and 2017). The purpose of this visit was to collect data to address the limitations of the available geotechnical information noted during the review and August visit. The following were completed during the October site visit:

- A core drilling program was in progress at the time of the site visit, which provided an opportunity to collect geotechnical data. The drilling program consisted of core holes that were drilled primarily for metallurgical testing purposes. Geologists contracted by Fortuna were trained in geotechnical core logging.
- Three trenches were excavated for investigation and sampling of materials comprising the foundation of planned waste stockpiles.
- A database of all previous geotechnical data including geomechanical drilling data, oriented core data, and laboratory testing data was compiled by CNI and provided to Fortuna. QAQC checks were conducted on these data prior to providing the data.
- Fault projections developed by CNI were reviewed with Fortuna geologists. The conclusion of this work was that it is difficult to accurately project the faults into the subsurface because of good quality rock recorded in drill holes. The faults may be partially sealed with gypsum at depth. The projected faults are valid, given the available information. The position of the faults must be reviewed with surface mapping, when bench faces become available.

A report detailing the findings of the above work program and recommendations in respect to pit slope angles and geotechnical considerations for construction purposes was provided to Fortuna by CNI in May 2017 (CNI, 2017), and considered during the infrastructure and pit design processes.

A follow up geotechnical evaluation conducted by CNI comprising updated geotechnical pit slope design work was completed in November 2022 (CNI, 2022) to address 2017 design considerations recommended for the early stages of mining activities. A review of progress was performed by Mr. Christian Vallejos in January 2023 along with training on using drone technology for mapping using CNI methods. The following observations regarding the pit slope design were identified during the review:

- In the southeast Tertiary Red Beds sector, due to the potential for daylighted bedding, the achievable interramp angles range from 38 to 47 degrees and are dependent on the persistence and characteristics of the bedding. These characteristics cannot be well understood until they can be observed and mapped in substantial pit wall exposures.
- A low-strength surficial oxidized and anhydrite-leached zone is present at the surface. Slope angles are flatter in this zone. The variability in thickness of this zone will influence the wall design.
- Other zones of weak rock are expected to be associated with faults. The extent and character of these zones will influence pit slope stability.
- In high-strength igneous rocks, steep interramp angles are achievable depending upon mining and blasting practices. Best practices are needed to achieve interramp angles in the range of 50 degrees.
- The characteristics of prominent northeast-dipping joints will influence the stability and achievable slope angles for the southwest wall in igneous rocks. Observation of these characteristics in pit slope exposures is needed to determine final wall angles.

To address the aforementioned slope design considerations, an updated pit slope design study was performed. The study was subdivided into two phases. The first phase of work, addressed the following objectives:

- Provide guidelines for data collection, including priority targets for structural mapping. This data is to be used as the basis for the Phase 2 portion of the updated slope design study.
- Review of the current models and most recent geotechnical information to assess the possibility of updating the 2016 ISA and RQD block models.
- Review of the projected phases and provide slope angle recommendations for the mining of the phases internal to the final pit in a single bench, 8-meter-high, configuration.

Conclusions and recommendations from the first phase of work were as follows:

- The 2012 lithology model showed no changes in the position of the Red Beds/igneous contacts.
- The new RQD logging information validated the 2016 RQD model.
- The newly available geology and geotechnical information did not warrant an update of the RQD and ISA models.

- The extent of the RQD block model did not reach the upper parts of the slope in the southwest and a small area in the north of the pit. It was recommended that new drill holes be planned to get information for the areas not covered by the RQD block model. An update of the RQD block model should be performed when this new information becomes available.
- It is not expected that the waste dump located at the southwest wall of the pit can decrease stability due to excess surcharge loadings.
- Length and spacing information from the Red Beds bedding and cross joints must be mapped to be able to assess the impact of step-path failures on bench-scale and overall stability due to the potential for daylighted bedding. The CNI cell mapping methodology is recommended for this purpose.
- Based on the planned sequence, mapping of these units in key sectors in interim walls can be done from 2022 to 2025 prior to updating the final design and mining of the final wall.
- With optimized blasting, mining, and scaling techniques, interramp slope angles ranging from 50 to 56 degrees can be achievable for the Lindero final pit. Structural mapping, trials of final wall blasting, and mining should be done in the interim phases to assess the potential for steepening with blasting trials.
- CNI recommends performing drone flights to measure the achieved condition of bench faces and bench face angles and evaluate the results of mining and blasting practices. Cell mapping and structural data can also be obtained using this method.
- CNI can provide training to personnel on site on the mapping techniques.

Phase 2 work comprising of a site visit to conduct mapping, drone data collection and training in cell mapping and detailed-line mapping, to provide technical data to support slope stability evaluation is planned to be completed in 2023.

Geotechnical studies conducted as of the effective date of this Report are considered by the QP to be consistent with industry practices and adequate to support Lindero mine and waste dump designs. There have been no geotechnical studies as of the effective date of this Report on the Arizaro Deposit and assumptions for pit slope angles have been based on geological observations and conditions experienced at Lindero.

9.7 Hydrogeological studies

Hydrogeological studies were conducted by Vector Argentina on behalf of Mansfield in 2009 to locate adequate water sources for the Lindero Mine. Results were presented by Vector in two reports (Vector, 2009a, 2009b).

Several exploratory wells were drilled and pumping tests conducted in the mine area, notably in the Lindero, Arita, and Chascha sub-basins (Andina, 2011a-b, Conhidro 2013, Hidrotec 2012a-e).

Process water requirement is currently 80 m^3/hr but may increase to 100 m^3/h. The majority of the water is sourced from two wells located approximately 13 km southeast of the mine site. Three wells adjacent to the main offices also provide additional process and camp water.

An updated hydrogeological study and site wide water balance is expected to be conducted in 2023.

9.8 Petrography

A number of petrographic studies have been conducted on the Lindero Deposit, including one prepared for Rio Tinto by Dr. M.F. Marquez Zavalia (2002); and three prepared for Mansfield of which two were authored by Dr. L.T. Larson of LTL Petrographics (2004 and 2006), and the other conducted by Maria de Belen Palacio (2007). A summary of the findings follows:

- Base metal minerals were reasonably consistent with a few minor variations, and included magnetite, hematite, pyrite, and chalcopyrite with bornite, chalcocite, covellite, as well as goethite, cuprite, and malachite in relatively shallow and oxidized samples.
- The copper mineralization is primarily chalcopyrite, which is largely refractory to cyanide solutions, but the presence of cyanide-soluble copper minerals was also identified in both the oxide (chrysocolla) and sulfide (bornite) domains.
- Gold grains appeared in two dimensions to be largely encapsulated or partially encapsulated in chalcopyrite. Three out of four of the gold grains were only partially encapsulated; there was either a micro-fracture or a micro-inclusion at or near the boundary of the gold grain with a larger chalcopyrite grain.
- Potassium alteration is predominant in its feldspathic phase with intensity from light to very strong, being in the latter case a penetrative (pervasive) alteration with almost total rock replacement. A biotitic phase is also present although generally mild to moderate in intensity. Mild to moderate propylitic alteration (calcite + chlorite) is also present in most samples.
- Of the total of 37 samples examined by Dr. Larson, 19 percent contained microscopically-visible gold. Of 22 samples from the higher-grade portions of the orebody, 27 percent contained microscopically-visible gold; 83 percent of this subgroup contained gold associated with chalcopyrite.

The above observations were further supported by additional petrographic analysis conducted by Riedell (2016b) on behalf of Fortuna to investigate soluble copper behavior on samples obtained during the 2016 drill program.

9.9 Exploration potential

9.9.1 Lindero Deposit

The Lindero porphyry gold system remains open at depth below the pit shell used to constrain the Mineral Resources. An area of interest was identified by Fortuna during the drilling campaign in 2016 with drill hole LDH-126 encountering 0.97 g/t Au over a 38 m interval (from 444 m to 482 m down-the-hole). This is supported by historical drilling from 2007 including drill hole LDH-86 that averaged 1.06 g/t Au over a 52 m interval (from 400 m to 452 m down-the-hole), and which bottomed in mineralization. This is an area of high-grade gold mineralization worthy of additional exploration at depth.

9.9.2 Arizaro Deposit and other prospects

Since August 2016, Fortuna has completed the following work at the Arizaro Deposit aimed at geologic re-interpretation of the porphyry system, and identifying near surface gold resources that could potentially add economic benefit to the Lindero Mine:

- Relogging of 8,817 m (29 drill holes) of historic core - similar geology, alteration and mineralization are found at both Lindero and Arizaro deposits.
- Remapping (1:2,000 scale) of the entire surface area from immediately southeast of the Lindero Deposit including the zone of historic drilling at the Arizaro Deposit.
- Submission of 321 samples from historic core pulps for cyanide soluble copper analyses with resulting data used as a precursor to designing possible future metallurgical testing and subsequent, shallow drilling at the Arizaro Deposit.
- Drilling of the main breccia body totaling 2,178.5 m (12 holes) to define the size and shape.
- Execution of 16 trenches, totaling 1,233 m with the objective to better define the geology, alteration, and structure.
- Relogging of 41 holes totaling 10,995 m to reinterpret and improve the understating of the geology, mineralization, alteration and structure.
- Drilling of 25 drill holes totaling 5,132 m to investigate a newly defined mineralized structure orientated northeast to southwest.

Exploration work to date on the Lindero concession has been focused on outcropping porphyry mineralization. Fortuna continues to evaluate the property for mineralization beyond the two known porphyry systems of Lindero and Arizaro. Of particular interest for follow-up exploration is a zone of alteration and silica structures located within the concession, about 2.5 km due south of the Lindero Mine, and zones of alteration that are located along the trend of the recently discovered CDP mineralized porphyry. Detailed mapping and geophysics surveys are recommended to investigate these areas of interest, along with continued drilling of the Arizaro Deposit to investigate its extents and potential presence of higher-grade zones of mineralization that could be targeted for early extraction.

Exploration of these areas have become priorities since the commencement of production at the Lindero Mine.

9.10 Comment on Section 9

In the opinion of the QP:

- the mineralization style and setting of the Lindero Deposit is sufficiently well understood to support Mineral Resource and Mineral Reserve estimation.
- Exploration methods are consistent with industry practices and are adequate to support continuing exploration and Mineral Resource estimation.
- Exploration results support Fortuna’s interpretation of the geological setting and mineralization.

10 Drilling

10.1 Introduction

10.1.1 Lindero Deposit

A total of 37,864 m of diamond drilling in 132 holes was completed at the Lindero Deposit from April 2002 to November 2010 under the supervision of Goldrock and Rio Tinto (Table 10.1). An additional 101 holes totaling 9,122 m have been drilled under the supervision of Fortuna since 2015, primarily to collect fresh samples for additional metallurgical testwork and to improve the geological interpretation. All drill programs were managed by Mansfield. The following section does not include details of blast hole drilling as this information has been used in a limited manner for Mineral Resource estimation purposes.

Ground conditions were good, and core recovery was generally above 90 percent. All drilling was conducted by diamond core drilling methods.

Table 10.1 Drilling by company and period at the Lindero Deposit

Company	Period	Drill Holes	Hole Identifier	Diameter	Meters
Rio Tinto	2002	10	LID-1 to LID-10	HQ/NQ	3,279.58
Goldrock	2005/06	11	LDH-11 to LDH-21	HQ/NQ	2,609.24
	2006	17	LDH-22 to LDH-38	HQ/NQ	5,441.20
	2006/07	48	LDH-39 to LDH-86	HQ/NQ	14,541.07
	2007/08	30	LDH-87 to LDH-116	HQ/NQ	7,405.05
	2008	5	LGT-1 to LGT-5	HQ	1,353.29
	2010	11	LGT-6 to LGT-11 CON-01 to CON-05	HQ	3,235.50
Fortuna	2016	12	LDH-117 to LDH-128	HQ/NQ	4,461.58
	2018	61	LDH-129 to LDH-189	HQ	1,951.00
	2021	18	LDH-190 to LDH-206	HQ	1,607.80
	2022	10	LDH-207 to LDH-216	HQ	1,102.50
Totals	2002–2022	233			46,987.81

A total of 233 diamond core holes totaling 46,987 m have been drilled in the Lindero Deposit area (Figure 10.1) with most of the holes being generally orientated perpendicular to the mineralization, forming a radial pattern. The 5 condemnation holes drilled in 2010 were to ensure no mineralization existed under the proposed location for major infrastructure installations, each varying from 200 to 300 m. They have not been considered in subsequent sections as part of the Mineral Resource estimation process.

Samples were used not only to determine the distribution of mineralization and alteration in the deposit, but also for lithology, density, metallurgical and geotechnical tests.

All drill holes were drilled using HQ (63.5 mm core diameter) for the first 300 m and were subsequently reduced to NQ (47.6 mm). This reduction occurred due to the drill rig having insufficient power to drill HQ beyond 300 m. Table 10.2 details the diameter of all core drilled at the Lindero Deposit.

Table 10.2 Drilling by core size at the Lindero Deposit

Core Size (Diameter)	Meters	Percentage
HQ (63.5 mm)	37,716.90	80
NQ (47.6 mm)	8,316.79	18
Not recorded	954.12	2
Drill core diameter that was not recorded is related primarily to the condemnation holes drilled during the 2010 campaign in barren areas. Drill core is no longer available for these holes, but core photographs indicate that missing core was HQ in diameter.		

Figure 10.1 Drill hole location map for the Lindero Deposit

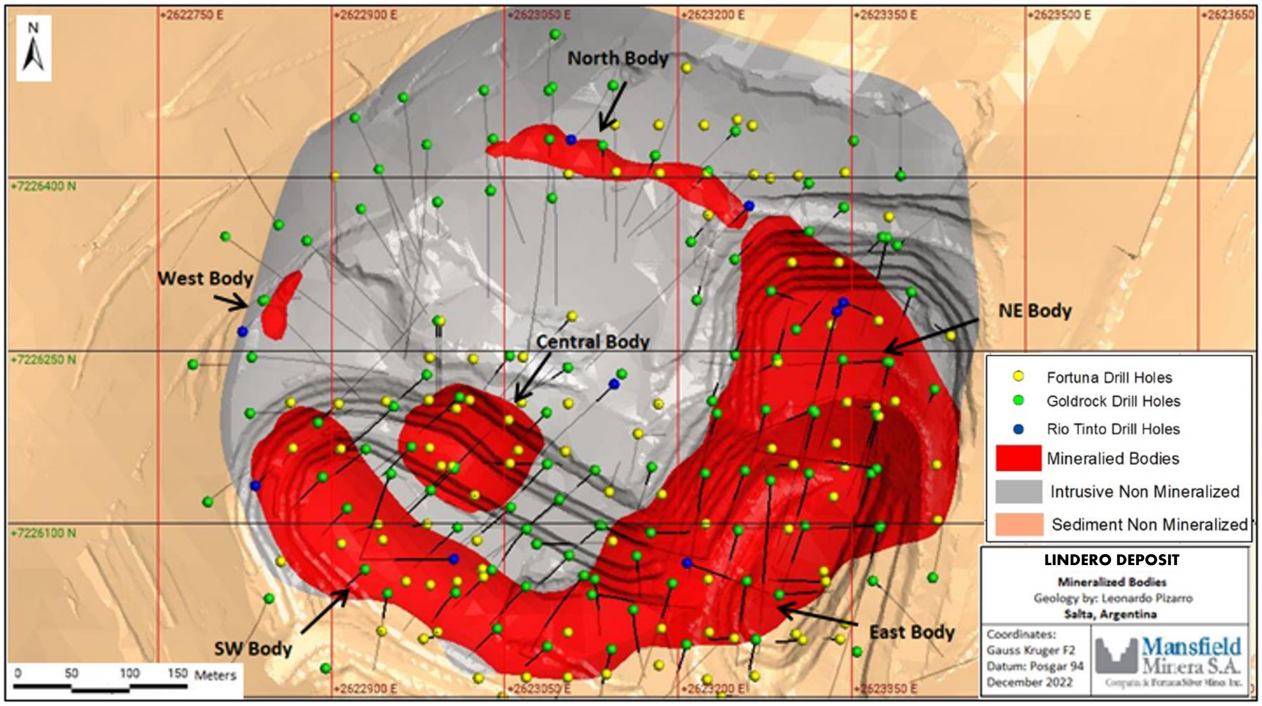


Figure prepared by Mansfield., 2022

10.1.2 Arizaro Deposit

A total of 16,167.8 m of diamond drilling in 65 holes was completed at the Arizaro Deposit, with 8,226 m in 29 holes completed between 2002 to 2013 under the supervision of Goldrock and Rio Tinto (Table 10.3). An additional 36 holes totaling 7,312.9 m have been drilled under the supervision of Fortuna since 2018, being conducted over three campaigns. All drill programs were managed by Mansfield.

Ground conditions were good, and core recovery was generally above 90 percent. All drilling was conducted by diamond core drilling methods with holes varying from 150 m to 501m. Holes were orientated perpendicular to the mineralization with angles varying between 50 degrees to vertical. All drill holes were drilled using HQ (63.5 mm core diameter) for the first 300 m and were subsequently reduced to NQ (47.6 mm). This reduction occurred due to the drill rig having insufficient power to drill HQ beyond 300 m.

Table 10.3 summarizes the different drilling campaigns conducted at the Arizaro Deposit.

Table 10.3 Drilling by company and period at the Arizaro Deposit

Company	Period	Drill Holes	Hole Identifier	Diameter	Meters
Rio Tinto	2002	2	ARD-01 to ARD-02	HQ/NQ	628.9
Goldrock	2011-13	27	ARD-03 to ARD-29	HQ/NQ	8,226.0
Fortuna	2018	12	ARD-30 to ARD-41	HQ	2,178.5
	2021-22	24	ARD-42 to ARD-65	HQ	5,134.4
Totals	2002–2022	65			16,167.8

Holes are generally orientated to explore two mineralization events, one running from the northeast to southwest and a second overprinting event running north-south.

Samples were used to primarily determine the distribution of mineralization, lithology, and alteration in the deposit.

Figure 10.2 Drill hole location map for the Arizaro Deposit

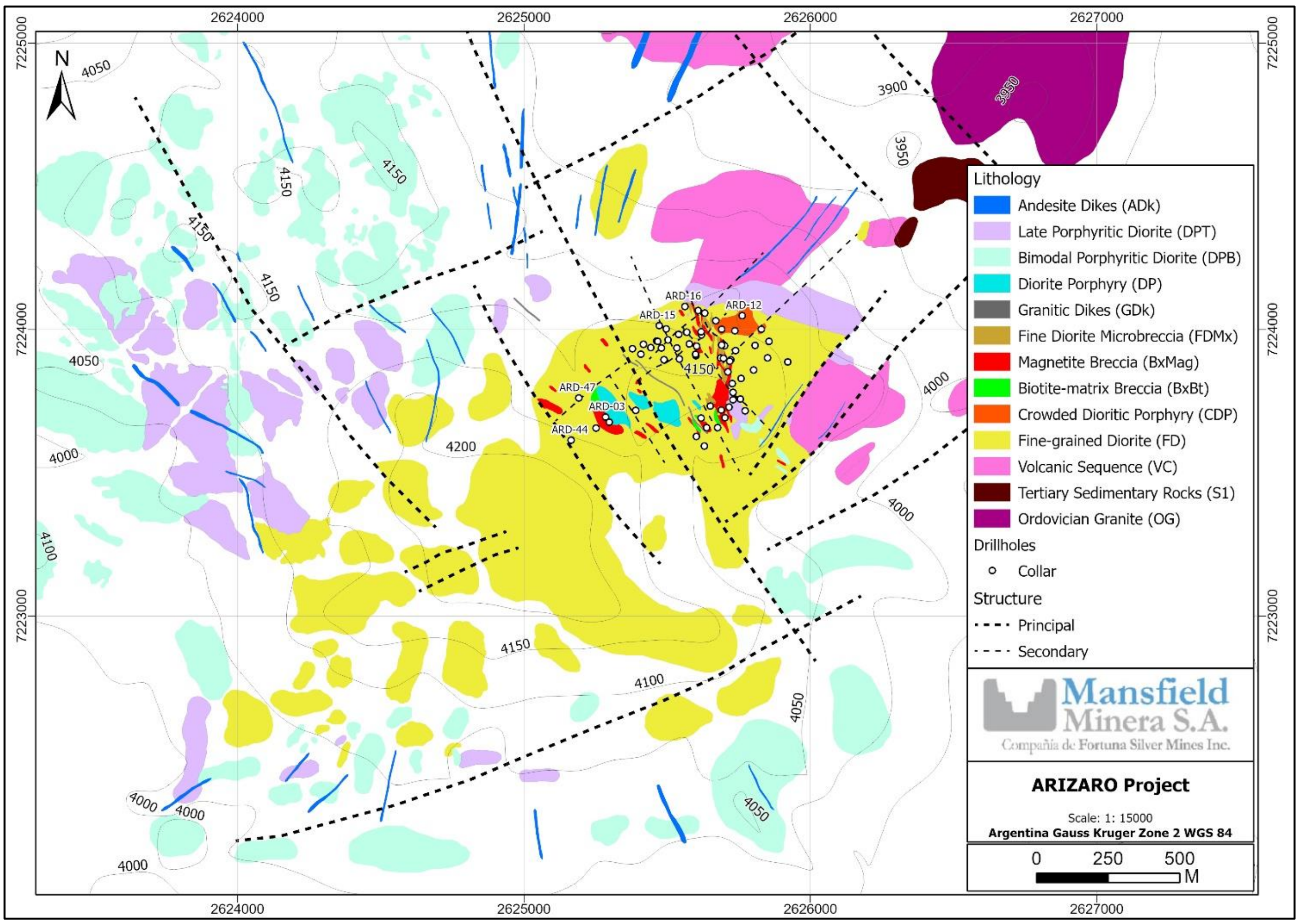


Figure prepared by Mansfield., 2022

10.2 Rio Tinto campaign (2002)

Rio Tinto completed a 10-hole core drilling campaign at Lindero and a 2-hole drill campaign at Arizaro, between April and December 2002. These holes were drilled by Connors Drilling from Mendoza, Argentina, using a Longyear 44 wireline drill rig.

Drill holes were cored at HQ size, and the core was logged on site by Rio Tinto geologists. Goldrock personnel helped with the logging and sampling of the core, which was subsequently stored in Goldrock's warehouse in Salta. Core logging was entered directly onto computer with drill logs produced on paper and CD-ROM. Drill sections were produced at a scale of 1:1,000. The holes at the Lindero Deposit were labeled LID-1 to LID-10 and totaled 3,279.12 m. The drilling was performed in two phases, with the first six holes testing the highest-grade trench results and the strongest alteration in outcrops, while the final four holes were intended to test the central part of the mineralized porphyry system and to define the extension of the mineralized zone outlined during the previous phase of drilling. The holes at Arizaro were labeled ARD-01 to ARD-02 and totaled 628.9 m.

Drilling conditions were good, and core recovery was generally above 90 percent, although LID-09 was abandoned in a fault zone (Fuchter and Rennie, 2003).

The drilling at the Lindero Deposit outlined gold–copper mineralization that is generally coincident with the CPD1-FPD (Rio Tinto code P2) porphyry and the annular potassic alteration zone, and is largely confined to the eastern, southeastern, and southern parts of the intrusive complex. Two higher-grade (~1 g/t Au) core zones were located within the general zone of mineralization. The Main High-Grade Zone (MVZ) described by Rio Tinto was a semi-annular zone was located in the core of the mineralization along the southeastern and southern part of the deposit and appeared to be controlled by the intersection of the west–northwest and north–northeast structural trends. The second, smaller, mineralized body, termed the Parallel High-Grade Zone (PVZ), was parallel to, and located inboard from, the MVZ largely within the DDP and PBFD (Rio Tinto code PA) porphyries in the central part of the intrusive complex.

At the Arizaro Deposit, drill hole ARD-01 was drilled to test two intervals of significant trench results (64 m averaging 0.86 g/t Au and 0.31 % Cu; and 32 m averaging 1.42 g/t Au and 0.50 % Cu) on the south side of the prospect. The hole encountered anomalous gold and copper zones at depth, although lower than those observed in the trenches at surface, that dipped to the north–northeast.

10.3 Goldrock campaigns (2005 to 2010)

Goldrock completed a total of six separate drill campaigns on the Lindero Deposit. Drill hole prefixes were changed to LDH for Goldrock drill holes drilled to assess the geology and mineralization from 2005 through January 2008; those drill holes were cored to HQ size, and the core was logged on site by Goldrock geologists.

In the first campaign, between October 2005 and February 2006, Patagonia Drilling Company completed drill holes LDH-11 to LDH-21 for a total of 2,609.24 m of core. Longyear 44 and F-2000 drill rigs were used during this campaign.

Subsequently, four more campaigns were conducted by Falcon Drilling Company (branch Barbados), using a Longyear 38 drill rig. The second campaign started in early 2006, the third between late 2006 and early 2007, the fourth from late 2007 to early 2008, the fifth in September 2008, and the sixth between August and November 2010, (Table 10-2).

In early 2006, holes LDH-22 to LDH-38 were drilled. During this second campaign, a total of 5,441.2 m was drilled, mainly in the eastern and southwestern part of the .

The third campaign began in late 2006 and terminated in mid-2007, totaling 48 holes (LDH-39 to hole LDH-86) and 14,569.9 m of core. During this campaign, the northern mineralized zone of the deposit was discovered after holes LDH-48 and LDH-50 intersected significant mineralization.

The fourth campaign from June 2007 to January 2008 comprised 30 holes (LDH-87 to LDH-116) for a total of 7,404.0 m of core.

The fifth campaign in September 2008 consisted of five geotechnical drill holes for a total of 1,353 m of core. The drill holes are located in the red-bed sedimentary rocks surrounding the mineralization. Geotechnical holes were assigned LGT- prefixes.

The sixth drill campaign from August to November 2010 consisted of 11 geotechnical and condemnation holes described in Section 9.4.

10.4 Goldrock campaigns (2010 to 2013)

Goldrock completed 8,226 m of diamond drilling in 27 drill holes in three different exploration campaigns between 2010 and 2013 in the Arizaro Deposit area. Drilling activities were supervised by Goldrock's project geologists.

Two different drilling companies were involved in this work. EcoMinera S.A. based in San Juan, Argentina, were responsible for drilling holes ARD-03 to ARD-08 between August 2010 and November 2010. The other holes were drilled by Falcon Drilling S.A. in two campaigns run from June 2011 to October 2011 (holes ARD-09 to ARD-16) and September 2012 to January 2013 (holes ARD-17 to ARD-29).

10.5 Fortuna campaigns (2016 to 2022)

10.5.1 2016 campaign

Fortuna conducted their first drill campaign from September to December 2016, drilling 12 holes totaling 4,461.58 m. The purpose for the drilling campaign was as follows:

- Provide fresh core for metallurgical testwork, with 8 holes (LDH-117 to LDH-124) being drilled around the deposit to provide fresh representative bulk samples of different metallurgical types.
- Improve the understanding in areas of geologic uncertainty with 2 holes (LDH-125 and LDH-126) being drilled near the center of the deposit to investigate the contact between mineralized and barren intrusive events.
- Confirm previously drilled assay results and improve the understanding of cyanide-soluble copper, with the drilling of 2 twin holes (LDH-127 and LDH-128) in the east of the deposit following the trace of two previously drilled holes (LDH-25 and LDH-112) from the Goldrock campaigns.

Falcon Drilling Company conducted the drilling using a DC Falcon HYDX-6 drill rig. Drill holes were cored to HQ or NQ size depending on resistance with depth, and all core was logged on site by Fortuna and Goldrock geologists in conjunction with the relogging of historical core. A geotechnical engineer from CNI (CNI, 2016b; 2017) was contracted to ensure appropriate geotechnical logging was conducted based on the method described in Section 10.5.2.

10.5.2 2018 campaign

Lindero Deposit

Fortuna conducted their second drill campaign from May to July 2018, drilling 61 vertical holes totaling 1,952 m focused on the areas planned for mining at Lindero in year one with holes ranging from 12 to 68 meters in length. The purpose for the drilling campaign was as follows:

- to improve the estimation of grades in mineralized areas with lower density of drilling.
- to better define the contact between mineralized and non-mineralized material at the periphery of the deposit and at the boundaries between lithologic units.
- to source fresh samples for complementary metallurgical column tests on Mineral Reserves scheduled for year one.

Falcon Drilling Company conducted the drilling using a DC Falcon HYDX-6 drill rig. Drill holes were cored to HQ size, and all core was logged on site by Mansfield geologists following the logging procedures.

Arizaro Deposit

Upon the completion of the Lindero Deposit drill campaign, Fortuna executed a new program at the Arizaro Deposit between July and September of 2018, consisting of 12 holes totaling 2,178.5 m (holes ARD-30 to ARD-41).

The main objective of this campaign was as follows:

- Confirm the geometry of the mineralized hydrothermal magnetite breccias.
- Improve the definition of the geology and mineralization of the porphyry system by generating geological E-W sections every 25 meters.
- Confirmation of core logs originally described in 2012 and relogged in 2017 as it came apparent during modeling that some discrepancies in the lithology existed for some holes.

The result of the campaign was to improve the geologically, structurally and alteration definition associated with the magnetite breccia, and the main mineralized body of the porphyry system. It was concluded that additional information was required to establish economic viability to allow the definition of a Mineral Resource.

10.5.3 2021 and 2022 campaigns

Lindero Deposit

Fortuna conducted their third and fourth drill campaigns from March to April 2021, drilling 18 holes totaling 1,607 m, and March to April 2022, drilling 10 holes totaling 1,102 m, focused on the areas planned for mining at Lindero in the following year. The purpose for the drilling campaign was similar to that stated for the 2018 campaign, with holes drilled to source samples for metallurgical column testing of material planned for mining.

As in 2018, the Falcon Drilling Company was contracted to conduct the drilling using a DC Falcon HYDX-6 drill rig. Drill holes were cored to HQ size, and all core was logged on site by Mansfield geologists following the logging procedures.

Arizaro Deposit

Upon completion of a relogging program in 2020, which resulted in a revised geological and mineralization interpretation, a new drilling campaign totaling 2,520.5 m (ARD-42 to ARD-53) was executed between October and December 2021. The primary objective of the program was to improve the geologic knowledge of Arizaro Deposit and to investigate mineralization in the west of the porphyry system that had been identified in hole ARD 04 and associated with the presence of the CDP intrusive.

The campaign consisted of 6 drill core holes (ARD-42 to ARD-47) which tested the western and northwestern part of the porphyry system. The drilling in the western area did not encounter significant mineralization, but holes ARD-45 and ARD-46 in the northwest encountered a new mineralized sector in the system. Based on these results an additional 6 drill holes (ARD-48 to ARD-53) were commissioned to follow up on the successful results.

The most recent campaign involved the drilling of 12 holes totaling 2,613.9 m (ARD-54A to ARD-65) between April and July 2022. The main purpose of this campaign was to follow up on previous drilling results to confirm and extend the continuity of mineralization in the center-northwest of the porphyry system and to gather sufficient information for a Mineral Resource estimation.

10.6 Geological and geotechnical logging procedures

10.6.1 Goldrock lithological core logging (2005 to 2013)

Goldrock standardized a rock unit classification, logging procedure, and log sheet structure that was used throughout initial logging of all Mansfield holes (LDH-11 through LDH-116, ARD-03 through ARD-29, LGT-01 through -LGT-11, and CON-01 through CON-05) as well as relogging of the Rio Tinto holes at the Lindero Deposit, LID-01 through LID-10, as well as the two holes drilled at the Arizaro Deposit, ARD-01 and ARD-02. The system used paper forms, and the data were subsequently entered into an Excel™ template. Geologic logging took place after the core was sampled, to take advantage of the flat sawed surface. Rock types and structure were recorded with alphanumeric codes, whereas alteration, veinlets, minerals, and oxidation were recorded by a 1 to 3 scale (weak, moderate, strong). A core library was developed to illustrate all rock and alteration types.

Initial geotechnical logging recorded only recoveries and RQD. From hole LDH-53 onwards, more detailed information was collected, including rock hardness index, rock weathering index, fracture frequency and type, roughness, infilling material and aperture of fractures. Additionally, core samples approximately 10 cm long were collected at 10 m intervals for bulk density measurements.

10.6.2 Fortuna relogging and drilling (2016 to 2023)

Between September 2016 and September 2017, a team of seven Fortuna and Mansfield geologists relogged all available core from LID-01 through LID-10, LDH-11 through LGT-116, ARD-01 through ARD-29, LGT-01 through LGT-11, and CON-02. In addition, core from infill holes LDH-117 through LDH-126 and twin holes LDH-127 (alongside LDH-112) and LDH-128 (twinning LDH-25) were logged during the same period. The program included approximately 40,000 m of historic and new core for the Lindero Deposit and 9,000 m of historic core for the Arizaro Deposit. An estimated 10 percent of historic core from the Lindero Deposit and 5 percent from the Arizaro Deposit could not be relogged since all of the core had been consumed for metallurgical studies. For the drilling conducted since 2018, both geological and geotechnical logging was conducted on whole core.

The logging program was designed around sets of cross sections oriented either south–north, northwest–southeast, southwest–northeast, or west–east to view all holes optimally, given the variety of drill azimuths. Every drill hole was "best-fit" to a particular section. Each geologist was assigned sets of parallel sections and was responsible for logging of holes assigned to that section, incorporating data from crossing holes logged by others, and ongoing cross-section interpretation of lithology, alteration, oxide/sulfide and sulfate zones. This plan ensured that 3-D interpretation proceeded concurrently with detailed logging.

All logging was digital and was incorporated daily into the Maxwell DataShed™ database system. Data were recorded initially with Excel™ templates, and later with the Maxwell LogChief™ application using essentially the same structure. Both input methods used pick-lists and data validation rules to ensure consistency between loggers. Separate pages were designed to capture metadata, lithology, alteration, veins, sulfide-oxide zones, sulfide-oxide surfaces, minerals (sulfides, oxides, and limonite), sulfates, structure (contacts, fractures, veins, and faults with attitudes to core axis), magnetic susceptibility, and special data (samples collected for geochemistry, thin section examinations, the core library, skeleton core, etc.). Intensity of alteration phases was recorded using a numeric 1 to 4 scale (weak, moderate, strong, complete); abundance of veins and most other minerals were estimated in volume percent.

A site visit conducted by CNI (2016b) included the training of logging geologists to record appropriate geotechnical information. The geotechnical logging program consisted of collection of the data fields including: recovery; length of broken core; number of whole core pieces; length 2x core diameter (RQD length); length of core longer than 0.3m; longest piece; average hardness (ISRM scale); length of core <= hardness R2; average angle to core axis primary joint set; number of joints in primary joint set; joint separation; joint roughness; joint infilling; and joint weathering. These data fields provide information regarding the degree of fracturing and hardness (strength) of whole core pieces. These data are useful for the assessment of rock quality for analysis of slope stability, prediction of in-situ and run-of-mine fragmentation, and the identification of fault zones, to assist in the geologic interpretation. A tablet-based data entry program was developed by Fortuna using the Maxwell LogChief™ software. Data checks were implemented into this program to prevent entry of erroneous data.

Contract geologists, when required, were also trained in sampling of core for geotechnical laboratory strength testing, including sampling of anhydrite fractures and intact sticks of core.

Between June 2021 and September 2021, a team of three Fortuna geologists relogged all available core at Arizaro from ARD-01 through ARD-41. The program involved examining approximately 11,033.4 m of historic core. Several changes were made to the previous logging principally in lithological units, intensity on magnetite alteration and veining, and the characteristics of the veining. The relogging exercise assisted in improving the interpretation of the geological and alteration assemblages and relationships, which are key to understanding the evolution of the porphyry system and identifying new exploration targets.

10.7 Drill core recovery

Ground conditions are generally good at both Lindero and Arizaro deposits, with highly competent rock present in most areas. Core recovery averages just over 90 percent at both deposits, although areas that are highly weathered or affected by faulting can result in recoveries of between 20 and 50 percent. It should be noted that records of core recovery were unavailable for Rio Tinto holes LID-01 to LID-10 as well as ARD-01 and ARD-02, but observations of historical core suggest recovery levels are similar to those observed for other drill programs.

An analysis of core recovery versus gold grade did not identify any significant bias in gold grade that might have occurred due to a loss of material.

10.8 Extent of drilling

Lindero Deposit

Drill holes are generally orientated perpendicular to the mineralization forming a radial pattern approximately 600 m across (Figure 10.1). In the eastern portion of the deposit, drill holes are orientated either perpendicular (azimuth 270°) or parallel (azimuth 190°) to the main mineralized body. Dips vary depending on the target and range from -50° to -90°, averaging -70°. The spacing between drill holes is between 40 m to 50 m at surface and tends to increase with depth. Drill hole depths vary according to the area and the purpose for which they were collared. The average depth is 300 m and the deepest hole reached a depth of 576 m.

Arizaro Deposit

Drill holes are generally oriented perpendicular to mineralization, with the azimuth changing depending on whether the target is the magnetite breccia or CDP. Dips also vary depending on the target, ranging from 50° to 89°, and averaging 70°. The spacing between drill holes is approximately 40 m to 50 m at surface and increases with depth. Drill hole depths vary depending on the target drilled and objective. Most of the holes are between 150 and 300 m, with 20 percent drilled from 300 m to 501.5 m. The average depth is 250 m.

10.9 Drill hole collar surveys

Drill hole collars were marked with PVC pipes introduced in the hole at surface and then cemented. Hole numbers were either sprayed with paint or engraved into the cement blocks. Metal tags were sometimes used to mark the hole number, depth, orientation and dip. The only hole drilled by Rio Tinto and Goldrock through January 2008 that was not marked properly was LID-04, which is positioned to one side of the main access road to the mine.

During Rio Tinto's 2002 exploration campaign collars were not surveyed. Collars have subsequently been re-surveyed, as discussed below.

All holes drilled from 2005 to 2018 as well as the 12 holes drilled during the 2002 campaign were surveyed by Servicios Topograficos with a differential GPS. Holes drilled since 2018 are surveyed by Mansfield's surveying department based at the mine site using differential GPS. Coordinates are projected on the WGS 84 Datum ellipsoid and calibrated according to the position of Geodetic point IGM N° PR-02-015, located a few kilometers from the Property. The results are available in geographic co-ordinates and in metric co-ordinates (UTM and Gauss Kruger), using the WGS 84 datum.

10.10 Downhole surveys

Downhole surveying is an important component of the drilling database and the lack of surveys impacts the reliability of the information collected, and the confidence level of the Mineral Resource estimates derived from the data.

During Rio Tinto's 2002 exploration drilling campaign, no downhole surveys were completed despite the fact that many of the holes extended beyond 300 m in depth.

Holes drilled during the first Goldrock campaign (October 2005 to February 2006) were not originally downhole surveyed. In 2005, Goldrock attempted to survey the holes but only a magnetic instrument was available, and measurements were of very poor quality.

In June 2006, GEC-Geophysical Exploration & Consulting S.A. (GEC) was contracted by Goldrock to perform borehole surveying services with a Reflex Maxibor II System 3™ Probe (Maxibor™), which is not affected by magnetism. This instrument was used from 2006 until early 2008. Downhole surveys were conducted both on the new holes and on the older holes drilled in the previous campaigns. Due to caving of the side-walls in holes LID-04, LID-08, LID-09 and LDH-15, no downhole surveys were performed.

In 2008, Goldrock detected that the Maxibor™ surveys showed an unacceptably large deviation in the drill holes, and a decision was made to re-survey all holes that showed a deviation of more than 5 percent.

Comprobe Chile Ltd. (Comprobe) was contracted to re-survey the holes considered by Goldrock as having incorrect downhole deviations. A surface-recording gyroscopic instrument was used, and orientation and dip parameters were recorded every 10 m. Eighty percent of the holes were re-surveyed, with most of the holes showing little deviation and the maximum deviation recorded was 8°. This survey meets or exceeds industry standards.

The Goldrock 2010 drill campaign at the Arizaro Deposit saw only two of the six holes surveyed. Subsequently, during the 2011 drill campaign Goldrock contracted Construccion & Mineria S.A., based out of Mendoza, to survey all holes and to re-survey the holes drilled the year before. Downhole surveys were conducted using Reflex™ gyroscopic equipment with readings taken at 5-m intervals. The same company was retained to conduct downhole surveys using the same equipment and methodology for the holes drilled during follow up campaigns covering holes ARD-17 to ARD-41.

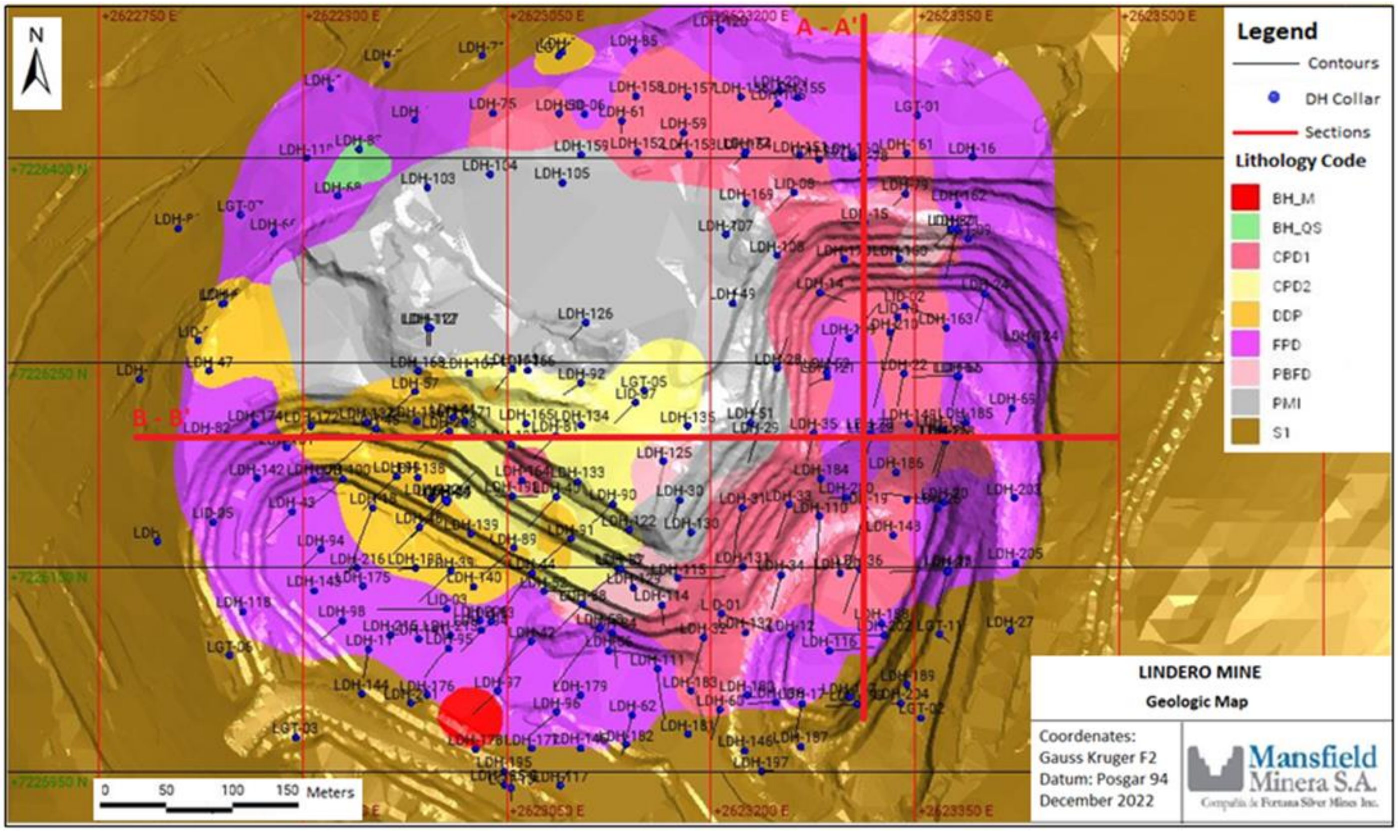
For the 2016 and 2018 drilling campaigns, Fortuna retained the services of Construccion & Mineria S.A., to complete downhole surveys for each hole upon completion.

For the 2021 and 2022 campaigns the drilling contractor rented the surveying equipment from Construccion & Mineria S.A. to complete the survey work. Downhole surveys were conducted using Reflex™ gyroscopic equipment with readings taken at 5 or 10 m intervals.

10.11 Drill sections

Representative drill sections displaying the lithologic interpretation of the Lindero Deposit are displayed in Figures 10.4 and 10.5. A plan view showing the location of the sections is provided in Figure 10.3.

Figure 10.3 Plan view of the Lindero Deposit showing location of sectional interpretations



Figures 10.3 to 10.5 prepared by Mansfield, 2022

Figure 10.4 Section A-A' displaying mineralization at the Lindero Deposit

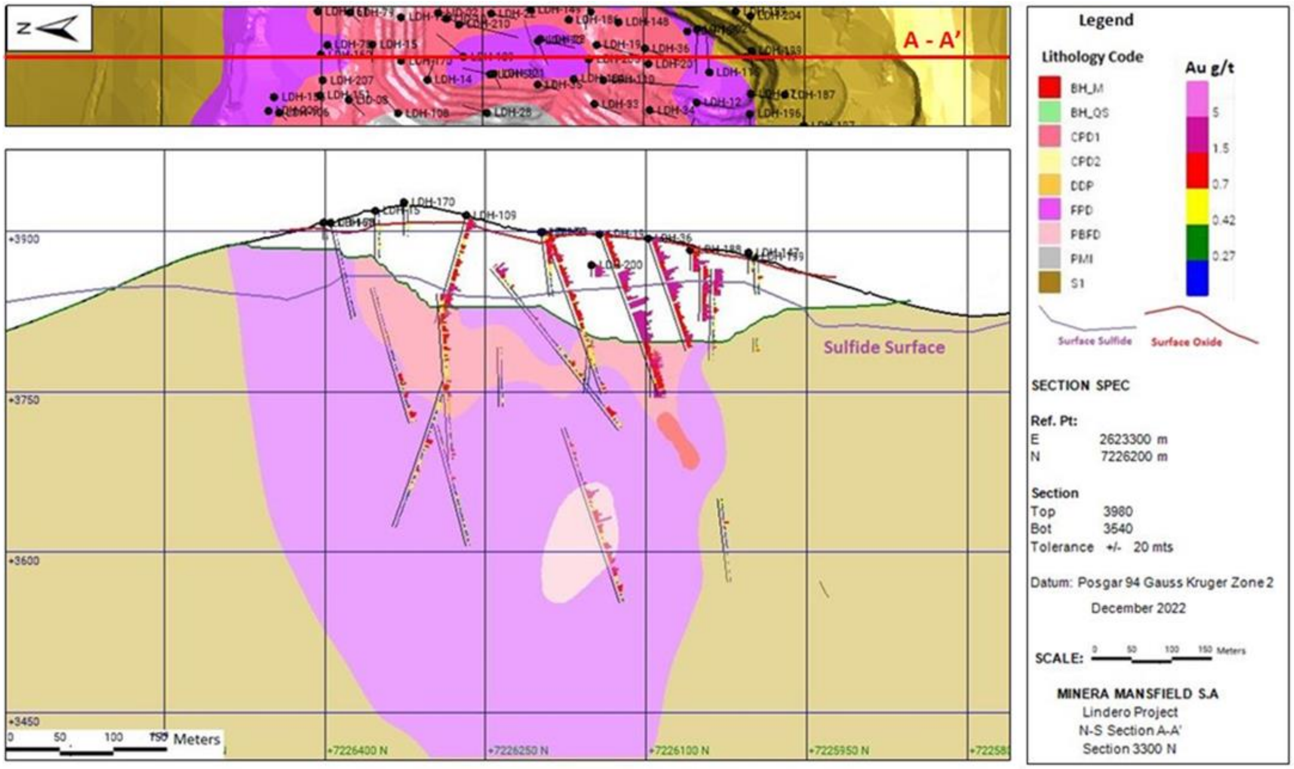
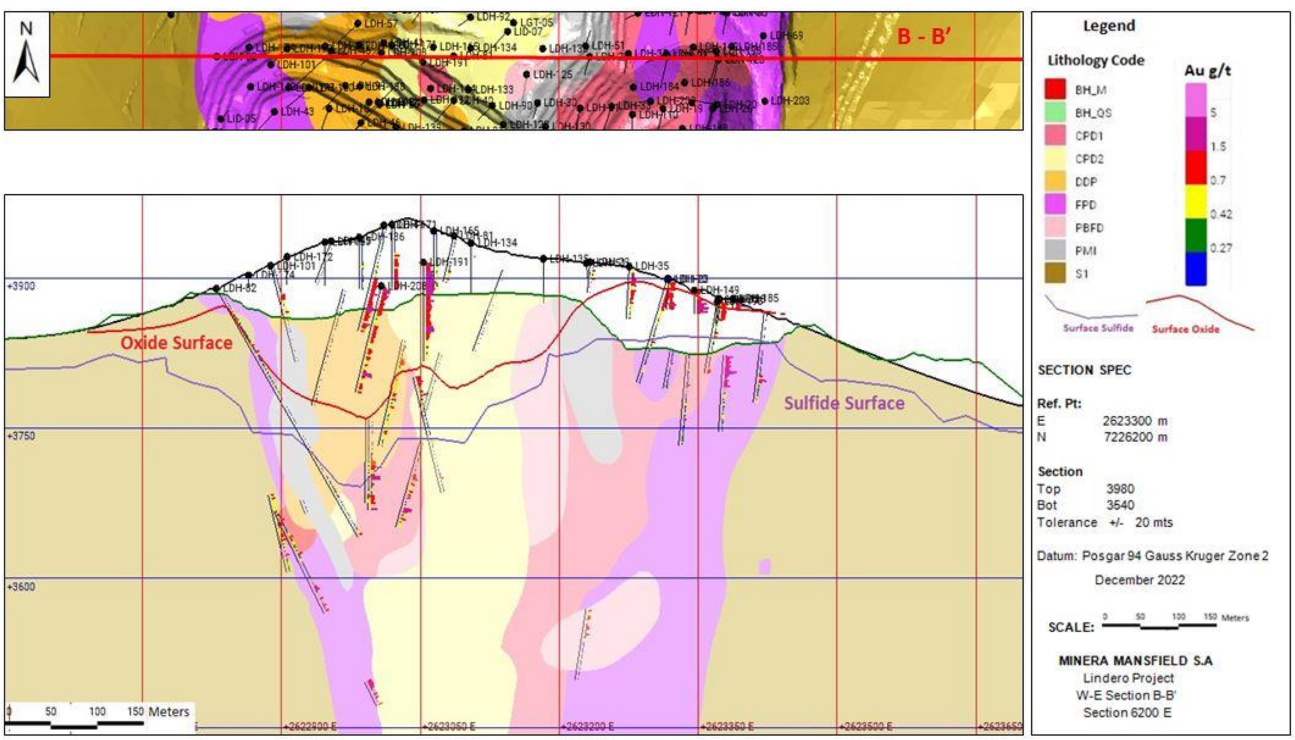
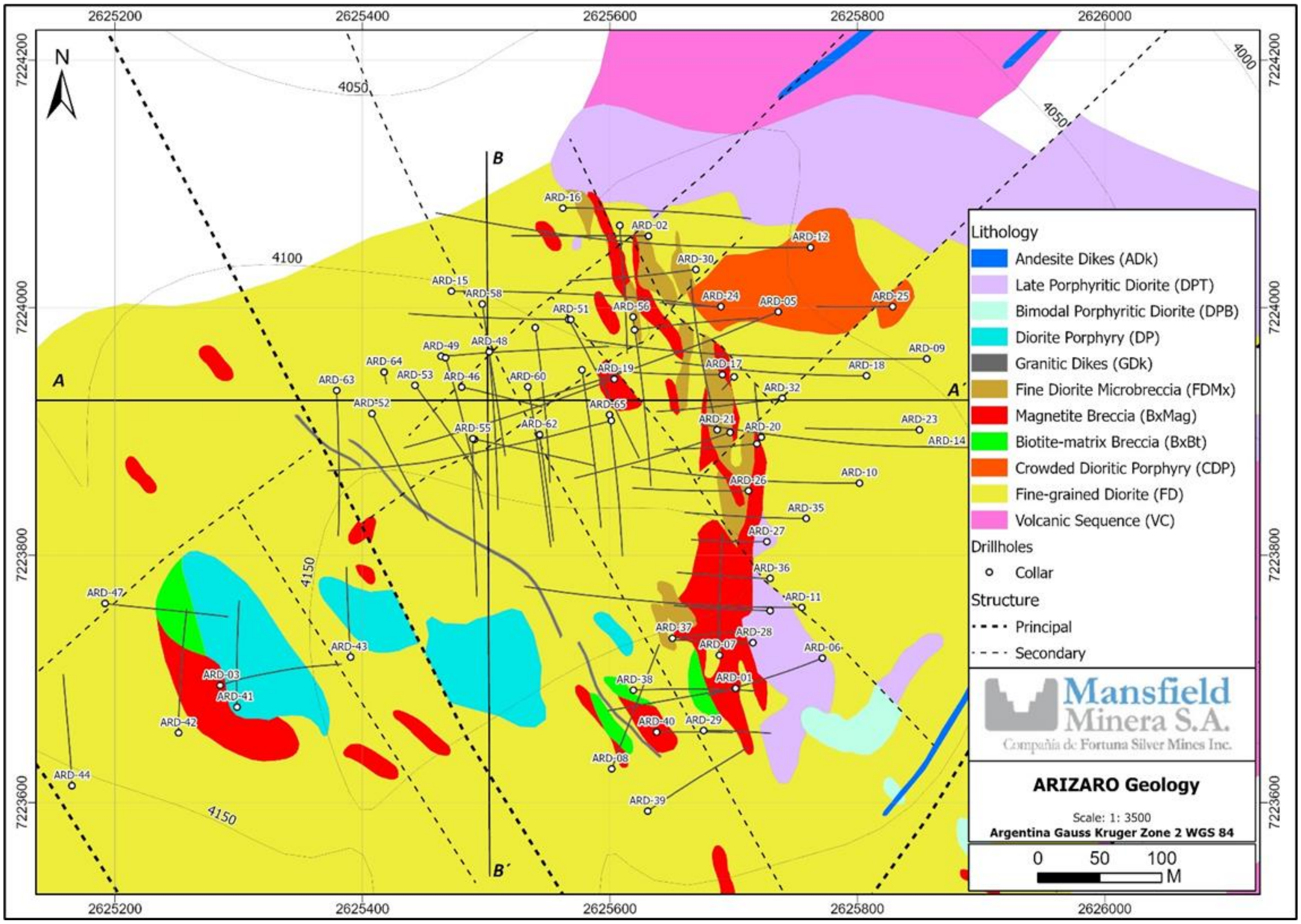


Figure 10.5 Section B-B' displaying mineralization at the Lindero Deposit



Representative drill sections displaying the lithologic interpretation of the Arizaro Deposit are displayed in Figures 10.7 and 10.8. A plan view showing the location of the sections is provided in Figure 10.6.

Figure 10.6 Plan view of the Arizaro Deposit showing location of sectional interpretations



Figures 10.6 to 10.8 prepared by Mansfield, 2022

Figure 10.7 Section A-A' displaying mineralization at the Arizaro Deposit

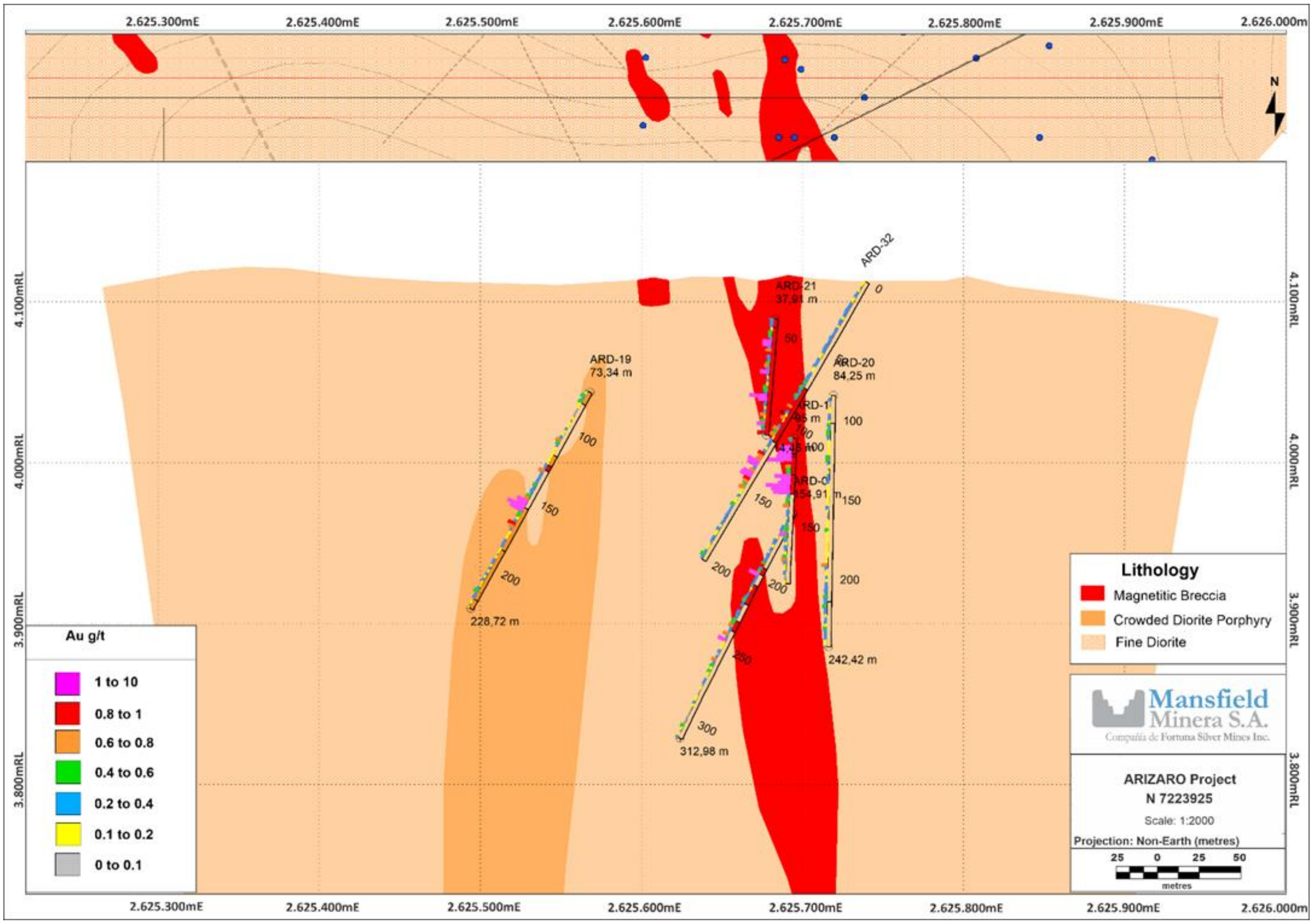


Figure 10.8 Section B-B' displaying mineralization at the Arizaro Deposit

10.12 Sample length versus true thickness

The Lindero and Arizaro deposits are gold-rich porphyries with low-grade mineralization permeating throughout the deposits, making the calculation of true thickness impossible as no definitive across strike direction exists.

Mineralization at the Lindero Deposit appears annular in shape at surface due to the intrusion of barren to low-grade intrusive units into the core of the system, but this circular shape is not representative of true thickness.

Mineralization at the Arizaro Deposit is associated with two events; a magnetite breccia that is exposed at surface and trends north to south and a crowded dioritic porphyry unit that trends northeast to southwest. The porphyry nature of the system means that gold intercepts are often not representative of true thickness.

10.13 Summary of drill intercepts

Table 10.4 provides a list of the drill hole intercepts for the Lindero Deposit and Table 10.5 summarizes drill hole intercepts for the Arizaro Deposit.

Table 10.4 Selected Lindero Deposit drill hole intercepts

Drill hole	Easting	Northing	Elevation	Azimuth (°)**	Dip (°)**	From (m)	To (m)	Interval (m)	Au (g/t)	Cu (%)
LID-01	2623207.23	7226065.06	3961.54	110	70	6	62	56	0.43	-
						122	316	194	0.62	-
LID-02	2623342.12	7226290.7	3953.44	110	71	3	196	193	0.76	-
LID-03	2623005.61	7226068.57	3963.59	270	60	3	159*	156	0.96	-
LID-04	2623126.57	7225887.79	3907.96	45	60	238	266	28	0.27	-
						340	389	49	0.46	-
LID-05	2622833.74	7226132.16	3931.51	45	71	38	300	262	0.64	-
LID-06	2623107.09	7226432.5	3934.45	45	70	4	126	122	0.37	-
LID-07	2623144.23	7226219.99	3966.1	225	61	152	562	410	0.53	-
LID-08	2623261.09	7226374.37	3962.15	225	60	6	54	48	0.46	-
LID-09	2622823.03	7226265.48	3926.58	45	60	40	52	12	0.36	-
LID-10	2623336.93	7226283.12	3953.74	195	50	3	455*	452	0.62	-
LDH-11	2622948.17	7226038.82	3942.2	190	70	3.1	61	57.9	0.63	0.14
LDH-12	2623258.47	7226049.53	3945.7	190	69	0	207	207	1.01	0.10
LDH-13	2623131.42	7226098.46	3971.38	110	69	12	366	354	0.61	0.08
LDH-14	2623279.85	7226301.46	3969.1	109	80	0	304	304	0.64	0.10
LDH-15	2623312.62	7226352.27	3961.69	270	70	14	250.15*	236.15	0.53	0.13
LDH-16	2623391.96	7226400.46	3940.73	0	60	No intervals of significance				
LDH-17	2623266.55	7225998.85	3929.33	192	68	0	100	100	1.12	0.14
LDH-18	2622950.84	7226142.57	3964.16	203	60	24	154.95*	130.95	0.84	0.19
LDH-19	2623312.38	7226142.74	3939.96	190	70	0	300.1*	300.1	1.53	0.13
LDH-20	2623370.85	7226146.58	3916.95	280	59	0	298.5*	298.5	0.54	0.07
LDH-21	2623379.99	7226347.03	3943.21	192	60	72	180*	108	0.72	0.13
LDH-22	2623341.7	7226241.3	3942.32	195	70	0	367.84*	367.84	0.52	0.08
LDH-23	2623317.58	7226195.19	3941.81	195	70	2.13	161.65*	159.52	0.80	0.07
LDH-24	2623401.05	7226299.97	3933.39	195	70	60	201.3	141.3	0.66	0.11
LDH-25	2623371.07	7226193.31	3921.84	196	70	3.05	297	293.95	0.65	0.10
LDH-26	2623366.13	7226142.52	3916.89	195	70	2	258.03	256.03	0.34	0.09
LDH-27	2623419.67	7226052.5	3891.89	15	60	108	156	48	0.29	0.07
LDH-28	2623248.76	7226245.27	3954.24	17	70	42	373.63	331.63	0.58	0.11
LDH-29	2623232.95	7226194.88	3958.65	195	70	60	344	284	0.56	0.07
LDH-30	2623176.67	7226148.28	3966.38	197	71	72	110	38	0.43	0.05
						168	226	58	0.69	0.10
						330	380.94*	50.94	0.60	0.16
LDH-31	2623222.72	7226142.93	3971.18	195	71	1.81	397.72	395.91	0.45	0.08
LDH-32	2623192.43	7226048.25	3961.38	198	72	30	218	188	0.42	0.08
LDH-33	2623257.16	7226145.05	3963.07	200	75	58	138	80	0.51	0.09
						196	264	68	0.42	0.06
LDH-34	2623251.26	7226093.45	3956.79	195	75	1.83	70	68.17	0.61	0.05
						110	258		0.39	0.06
						282	355.93*	73.93	0.47	0.10
LDH-35	2623274.94	7226197.57	3954.22	194	75	1.83	380.64*	378.81	0.47	0.06
LDH-36	2623309.17	7226097.76	3935.98	203	70	1.83	300.42*	298.59	0.95	0.11
LDH-37	2623373.18	7226095.41	3910.64	194	60	128	182	54	0.28	0.10
LDH-38	2623374.26	7226097.14	3910.63	270	58	18	315.17*	297.17	0.79	0.11
LDH-39	2623008.88	7226096.83	3968.48	225	70	62	212.39*	150.39	0.65	0.16
LDH-40	2623086.4	7226151.58	3984.23	225	70	36	186	150	0.48	0.11
						210	423.03	213.03	0.93	0.14
LDH-41	2623010.29	7226209.66	3994.73	225	70	40	138	98	1.07	0.21
						170	298	128	0.41	0.09

Drill hole	Easting	Northing	Elevation	Azimuth (°)**	Dip (°)**	From (m)	To (m)	Interval (m)	Au (g/t)	Cu (%)
LDH-42	2623067.94	7226045.49	3960.6	225	70	14	181.47*	167.47	0.76	0.17
LDH-43	2622892.36	7226140.42	3949.51	224	67	1.52	114.38*	112.86	0.79	0.19
LDH-44	2623068.45	7226095.46	3971.93	225	69	86	364	278	0.58	0.14
LDH-45	2622953.91	7226201.38	3978.85	225	60	100	289.75*	189.75	0.66	0.15
LDH-46	2622985.48	7226128.23	3968.4	223	72	94	315.67*	221.67	0.62	0.18
LDH-47	2622830.73	7226243.45	3931.97	90	68	42	358	316	0.71	0.18
LDH-48	2622982.34	7226427.39	3913.64	180	60	1.22	166	164.78	0.76	0.15
LDH-49	2623215.79	7226293.9	3962.69	15	71	146	349.91*	203.91	0.64	0.16
LDH-50	2623088.1	7226432.12	3931.95	180	59	0.61	136	135.39	0.97	0.17
LDH-51	2623228.75	7226205.49	3957.54	17	70	208	320	112	0.36	0.07
						342	359.66*	17.66	0.48	0.14
LDH-52	2623077.05	7226082.31	3969.1	91	70	94	399.55*	305.55	0.53	0.08
LDH-53	2623284.79	7226242.24	3953.53	13	73	1.52	300	298.48	0.69	0.09
LDH-54	2623006.43	7226148.23	3979.2	45	69	118	220	102	0.59	0.12
LDH-55	2623005.55	7226146.91	3979.3	225	70	2.13	88	85.87	0.34	0.08
						118	143.35*	25.35	0.33	0.09
LDH-56	2623124.83	7226038.61	3971.27	93	70	2.52	295.24*	292.72	0.36	0.08
LDH-57	2622982.23	7226229.04	3986.55	226	69	270	381.55*	111.55	0.52	0.11
LDH-58	2623117.76	7226054.31	3971.59	220	60	74	166	92	0.81	0.17
LDH-59	2623179.6	7226417.98	3948.28	200	60	10	74	64	0.39	0.09
LDH-60	2623206.4	7225994.53	3945.29	195	70	0	126	126	0.89	0.12
LDH-61	2623134.35	7226427.59	3942.38	180	58	1.52	94	92.48	0.59	0.11
LDH-62	2623141.9	7225990.47	3954.29	195	69	1.52	102	100.48	0.98	0.19
LDH-63	2622842.5	7226292.8	3925.2	86	60	2.44	65.88	63.44	0.57	0.14
LDH-64	2622843.27	7226290.65	3925.2	136	62	4.57	160	155.43	0.52	0.15
LDH-65	2623382.4	7226239.78	3930.49	194	70	1.52	232.1	230.58	0.82	0.10
LDH-66	2622878.55	7226344.21	3921.29	135	68	2.44	116	113.56	0.43	0.14
						286	348.3*	62.3	0.38	0.12
LDH-67	2623380.27	7226239.29	3931.09	270	59	0.91	118	117.09	1.34	0.12
						152	212	60	0.32	0.06
						274	341.6	67.6	0.36	0.07
LDH-68	2622925.56	7226371.35	3920.43	145	60	No intervals of significance				
LDH-69	2623420.98	7226215.52	3911.7	200	70	60	182	122	0.40	0.11
LDH-70	2623315.87	7226197.43	3941.55	248	71	2.13	400	397.87	0.45	0.07
LDH-71	2623031.54	7226474.43	3906.97	175	60	58	290	232	0.66	0.15
LDH-72	2622961.84	7226468.15	3893.33	170	61	34	473.05*	439.05	0.48	0.12
LDH-73	2623091.85	7226477.08	3919.81	180	60	32	234	202	0.66	0.15
LDH-74	2622779.9	7226237.14	3913.91	90	70	220	356	136	0.47	0.12
LDH-75	2623039.44	7226432.37	3925.16	170	60	2.44	94	91.56	0.79	0.18
LDH-76	2622792.75	7226118.07	3917.14	50	61	86	458	372	0.55	0.11
LDH-77	2623225.3	7226404.13	3952.22	220	61	12	76	64	0.61	0.12
LDH-78	2623312.33	7226394.03	3950.56	222	74	78	408	330	0.50	0.17
LDH-79	2623342.68	7226372.94	3951.22	225	69	72	292	220	0.55	0.14
LDH-80	2623376.02	7226348.19	3943.25	226	69	66	334	56	0.37	0.12
LDH-81	2623085.48	7226195.56	3984.96	225	70	30	184	154	0.83	0.14
						296	344	48	0.45	0.08
						390	405.65*	15.65	0.98	0.14
LDH-82	2622829.25	7226194.86	3932.15	88	59	36	124	88	0.40	0.11
						282	304	22	0.42	0.08
LDH-83	2622940.95	7226405.85	3908.58	160	60	6	38	32	0.55	0.11
						112	164	52	0.84	0.16
LDH-84	2623127.42	7226051.95	3971.55	170	74	6	334	328	0.57	0.11
LDH-85	2623143.15	7226478.69	3934.81	180	60	20	222	202	0.55	0.12
LDH-86	2622808.25	7226347.62	3896.09	126	59	118	452.01*	307.01	0.71	0.14
LDH-87	2623132.98	7226097.98	3971.41	228	72	94	344	250	0.63	0.12
						364	390	26	0.44	0.13
LDH-88	2623105.23	7226071.87	3969	220	70	86	251.62*	165.62	0.75	0.17
LDH-89	2623054.65	7226113.44	3978.55	224	72	62	338	276	0.64	0.14
LDH-90	2623127.62	7226145.58	3969.27	226	70	96	160	64	0.31	0.06

Drill hole	Easting	Northing	Elevation	Azimuth (°)**	Dip (°)**	From (m)	To (m)	Interval (m)	Au (g/t)	Cu (%)
						180	420.59*	240.59	0.62	0.11
LDH-91	2623096.69	7226120.24	3973.48	230	69	34	64	30	0.35	0.11
						86	361.42*	275.42	0.73	0.14
LDH-92	2623103.89	7226234.57	3975.16	233	69	150	178	28	0.29	0.10
LDH-93	2623038	7226059.08	3965.61	225	70	40	202	162	0.78	0.16
LDH-94	2622913.22	7226112.4	3950.09	225	75	0	144.87*	144.87	0.59	0.15
LDH-95	2623006.64	7226039.51	3957.54	225	70	0	100.04*	100.04	0.69	0.17
LDH-96	2623086.34	7225992.85	3946.36	225	69	2.17	75.03*	72.86	0.56	0.12
LDH-97	2623042.88	7226008.41	3948.44	226	70	3.66	102.17*	98.51	0.41	0.13
LDH-98	2622928.56	7226059.81	3940.76	225	70	0	100.04*	100.04	0.64	0.14
LDH-99	2622968.83	7226165.79	3973.04	226	69	4	72	68	0.53	0.13
						142	211.97*	69.97	0.83	0.24
LDH-100	2622929.32	7226163.65	3964.78	224	68	30	181.47*	151.47	0.82	0.20
LDH-101	2622887.86	7226186.79	3954.94	45	69	16	62	46	0.50	0.17
						370	400.46*	30.46	0.34	0.07
LDH-102	2622920.13	7226450.34	3887.07	155	60	126	298	172	0.68	0.15
LDH-103	2622991.4	7226377.91	3930.5	180	85	42	358	316	0.72	0.13
LDH-104	2623037.33	7226387.61	3936.69	0	88	86	367.89*	281.89	0.63	0.15
LDH-105	2623090.49	7226382.43	3946.32	0	87	78	378	300	0.83	0.17
LDH-106	2623248.93	7226439.25	3943	225	58	38	186	148	0.61	0.11
LDH-107	2623210.6	7226343.3	3968.04	40	70	80	224.33*	144.33	0.44	0.13
LDH-108	2623248.35	7226328.19	3972.8	46	68	20	129.84*	109.84	0.46	0.11
LDH-109	2623301.46	7226267.29	3957.58	45	69	1.21	171.9*	170.69	1.00	0.14
LDH-110	2623279.37	7226136.61	3953.44	181	52	3.35	239.47*	236.12	0.93	0.08
LDH-111	2623160.87	7226025.49	3968.94	176	68	32	165*	133	1.09	0.14
LDH-112	2622991.57	7226274.79	3972.64	181	69	232	299*	67	0.49	0.09
LDH-113	2623053.75	7226244.56	3984.3	220	69	128	226	98	0.57	0.11
						246	359.96*	113.96	0.58	0.09
LDH-114	2623163.44	7226071.06	3974.94	178	80	56	325.22*	293.22	0.42	0.08
LDH-115	2623175.6	7226091.34	3975.21	90	70	1.21	99.96*	98.75	0.67	0.09
LDH-116	2623286.86	7226037.8	3935.81	86	70	1.52	142	140.48	0.80	0.11
LDH-117	2623089.31	7225939.6	3925.4	32	71	6.5	50	43.5	0.35	0.14
						95	432	337	0.38	0.12
LDH-118	2622855.94	7226067.35	3925.95	345	85	No intervals of significance				
LDH-119	2622902.77	7226400.37	3903.64	180	73	148	346	198	0.50	0.12
						383	406	23	0.37	0.13
LDH-120	2623206.82	7226494.53	3934.78	196	75	103	159	54	0.37	0.14
						236	314	78	0.38	0.12
LDH-121	2623285.59	7226239.51	3952.99	247	79	0	160	160	0.47	0.06
						217	377	160	0.52	0.08
LDH-122	2623140.02	7226127.58	3967.9	24	85	335	387	52	0.36	0.07
LDH-123	2623004.17	7226149.57	3978.75	225	76	0	407	407	0.61	0.12
LDH-124	2623434.96	7226262.78	3915.9	305	67	130	313	183	0.34	0.09
LDH-125	2623165.11	7226177.73	3964.6	90	85	No intervals of significance				
LDH-126	2623107.87	7226279.55	3969.94	222	65	215.4	321	105.6	0.56	0.13
						444	515.58*	71.58	0.69	0.08
LDH-127	2622993.78	7226275.47	3972.12	180	70	205	300	95	0.71	0.12
LDH-128	2623372.97	7226192.79	3921.52	195	69	3	297	294	0.64	0.08
LDH-129	7226084.78	2623142.84	3932.6	0	90	0	56*	56	0.61	0.08
LDH-130	7226125.4	2623185.44	3926.5	0	90	No intervals of significance				
LDH-131	7226099.99	2623223.46	3922.92	0	90	0.8	53*	52.2	0.46	0.11
LDH-132	7226051.85	2623225.41	3914.05	0	90	1	40*	39	0.87	0.09
LDH-133	7226162.53	2623102.03	3934.68	0	90	1.1	52*	50.9	0.17	0.06
LDH-134	7226204.08	2623104.63	3934.82	0	90	No intervals of significance				
LDH-135	7226203.64	2623182.71	3919.25	0	90	No intervals of significance				
LDH-136	7226206.97	2622983.99	3940.49	0	90	24	52*	28	0.29	0.13
LDH-137	7226206.02	2622947	3935.77	0	90	No intervals of significance				
LDH-138	7226165.65	2622984.51	3931.91	0	90	2	44*	42	1.84	0.25
LDH-139	7226124.55	2623023.58	3938.25	0	90	0.3	52*	51.7	0.84	0.17

Drill hole	Easting	Northing	Elevation	Azimuth (°)**	Dip (°)**	From (m)	To (m)	Interval (m)	Au (g/t)	Cu (%)
LDH-140	7226085.5	2623025.55	3924.89	0	90	No intervals of significance				
LDH-141	7226047.11	2622985.12	3908.88	0	90	0.4	28*	27.6	0.82	0.14
LDH-142	7226165.33	2622866.27	3900.94	0	90	0	24*	24	0.48	0.14
LDH-143	7226082.61	2622908.28	3899.15	0	90	0	16*	16	0.65	0.15
LDH-144	7226007.07	2622943.37	3891.29	0	90	0	16*	16	0.22	0.08
LDH-145	7225967	2623104.67	3895.54	0	90	8	20*	12	0.42	0.09
LDH-146	7225965.14	2623224.75	3884.6	0	90	0	20*	20	2.15	0.19
LDH-147	7226004.47	2623301.49	3879.9	0	90	0	20*	20	0.46	0.11
LDH-148	7226123.29	2623333.85	3886.19	0	90	0	24*	24	0.90	0.09
LDH-149	7226205.15	2623345.56	3887.53	0	90	0	24*	24	1.62	0.12
LDH-150	7226326.21	2623338.44	3914.58	0	90	0	32*	32	0.45	0.10
LDH-151	7226402.07	2623265.21	3910.7	0	90	0	20*	20	0.36	0.15
LDH-152	7226404.54	2623145.93	3903.55	0	90	0	12*	12	0.28	0.07
LDH-153	7226403.4	2623183.62	3906.08	0	90	No intervals of significance				
LDH-154	7226403.29	2623224.5	3909.31	0	90	No intervals of significance				
LDH-155	7226444.71	2623263.79	3898.17	0	90	No intervals of significance				
LDH-156	7226445.12	2623222.02	3900.21	0	90	0	32*	32	0.25	0.13
LDH-157	7226445.29	2623182.85	3902.52	0	90	No intervals of significance				
LDH-158	7226445.66	2623144.89	3899.28	0	90	26	38	12	0.40	0.13
LDH-159	7226402.69	2623104.65	3899.57	0	90	36	48*	12	0.67	0.15
LDH-160	7226401.25	2623392.24	3897.96	0	90	No intervals of significance				
LDH-161	7226401.2	2623303.54	3907.77	0	90	No intervals of significance				
LDH-162	7226403.97	2623343.96	3900.63	0	90	No intervals of significance				
LDH-163	7226275.73	2623372.92	3898.69	0	90	1	24*	23	1.01	0.14
LDH-164	7226163.52	2623061.14	3953.17	0	90	0	66	66	1.20	0.19
LDH-165	7226205.29	2623064.11	3947.1	0	90	28	60*	32	0.44	0.14
LDH-166	7226244.43	2623065.41	3940.71	0	90	No intervals of significance				
LDH-167	7226242.66	2623022.38	3941.63	0	90	No intervals of significance				
LDH-168	7226243.74	2622984.73	3940.4	0	90	No intervals of significance				
LDH-169	7226367.3	2623225.69	3922.33	0	90	No intervals of significance				
LDH-170	7226326.2	2623297.81	3927.06	0	90	0.7	32*	31.3	0.35	0.08
LDH-171	7226207.03	2623019.15	3953.44	0	90	28	64*	64	0.88	0.21
LDH-172	7226203.58	2622905.93	3921.17	0	90	No intervals of significance				
LDH-173	7226164.59	2622907.84	3916.12	0	90	11.2	24*	12.8	1.36	0.26
LDH-174	7226204.85	2622864.55	3902.69	0	90	4	12*	8	0.18	0.07
LDH-175	7226086.05	2622944.01	3908.68	0	90	0	24*	24	0.21	0.04
LDH-176	7226006.21	2622991.53	3901.43	0	90	0.5	16*	15.5	0.41	0.10
LDH-177	7225966.95	2623068.3	3892.02	0	90	0	24*	24	0.42	0.14
LDH-178	7225966.14	2623026.94	3889.2	0	90	0	12	12	0.31	0.09
LDH-179	7226005.87	2623104.15	3910.91	0	90	8	26	18	0.30	0.04
LDH-180	7226005.98	2623226.39	3900.41	0	90	0	32*	32	1.20	0.08
LDH-181	7225977.42	2623183.11	3900.19	0	90	0	20*	20	1.72	0.18
LDH-182	7225969.81	2623137.46	3899.92	0	90	0	24*	24	1.39	0.28
LDH-183	7226009.2	2623185.12	3911.37	0	90	0	40*	40	1.14	0.16
LDH-184	7226164.99	2623280.62	3911.07	0	90	0	38*	38	0.33	0.04
LDH-185	7226205.91	2623387.06	3879.19	0	90	0	12*	12	1.76	0.11
LDH-186	7226169.57	2623336.1	3888.51	0	90	0	28*	28	2.24	0.13
LDH-187	7225968.08	2623266	3876.14	0	90	0	24*	24	2.33	0.20
LDH-188	7226058.84	2623325.32	3882.33	0	90	0	20*	20	1.64	0.20
LDH-189	7226013.72	2623344.14	3868.03	0	90	7	11	4	0.43	0.06
LDH-190	2623054.01	7226152.2	3915.603	270	77	4	12	8	0.47	0.07
						64	72	8	0.53	0.08
						98	104	6	0.84	0.11
LDH-191	2623052.88	7226189.84	3915.68	0	90	0	72	72	1.59	0.19
						72	98.6	26.6	0.61	0.11
LDH-192	2623054.01	7226152.2	3915.603	90	68	0	16	16	1.21	0.17
						16	36	20	0.67	0.11
						48	68	20	0.38	0.1
LDH-193	2622982.74	7226099.48	3916.225	263	80	94	106	12	0.32	0.09

Drill hole	Easting	Northing	Elevation	Azimuth (°)**	Dip (°)**	From (m)	To (m)	Interval (m)	Au (g/t)	Cu (%)
LDH-194	2623031.08	7226053.77	3915.765	0	90	0	20	20	1.64	0.17
						44	60	16	1.08	0.16
						62	84	22	1.25	0.17
LDH-195-G	2623048.39	7225940.09	3881.527	0	90	18	22	4	0.51	0.15
LDH-196	2623248.04	7226000.75	3875.828	270	70	0	8	8	1.82	0.11
						10	18	8	0.53	0.04
						18	30	12	0.42	0.07
						44	48	4	3.48	0.13
LDH-197	2623237.17	7225950.21	3875.871	88	79	0	18	18	1.40	0.17
						40	46	6	0.39	0.10
LDH-198	2623370.42	7226200.97	3876.305	268	79	0	6	6	0.90	0.10
						18	30	12	0.36	0.04
						66	73	7	0.63	0.07
LDH-199	2623307.06	7225999.25	3875.834	264	73	6	18	12	0.34	0.12
						18	26	8	0.79	0.18
						58	62	4	1.78	0.29
LDH-200	2623299.34	7226151.02	3868.322	267	77	0	22	22	2.12	0.13
						22	28	6	0.76	0.03
						28	52	24	1.95	0.16
						52	77.5	25.5	0.50	0.06
LDH-201	2623295.02	7226095.4	3867.869	0	90	0	55	55	2.57	0.12
						55	65	10	0.75	0.03
						85	93	8	0.27	0.02
LDH-202	2623327.17	7226049.98	3868.109	269	59	0	16	16	1.15	0.12
						16	62	46	1.48	0.12
						64	99	35	1.37	0.08
LDH-203	2623423.04	7226150.92	3854.326	269	84	97	100	3	0.46	0.11
LDH-204	2623339.69	7226000.11	3865.434	270	79	51	57	6	0.35	0.09
						75	80.5	5.5	0.66	0.18
LDH-205	2623423.84	7226102.92	3851.409	266	79	42	44	2	0.41	0.106
LDH-206	2623030.18	7226060.95	3915.768	0	90	44	57	13	1.31	0.17
						63	77	14	1.45	0.21
						96	100	4	0.66	0.14
						106	113.2	7.2	1.35	0.21
LDH-207	2623279.48	7226399.32	3884.031	270	65	18	24	6	0.45	0.16
						46	52	6	0.37	0.09
						94	104	10	0.73	0.16
						118	131.9	13.9	1.16	0.18
						149	154.2	5.2	1.10	1.18
LDH-208	2623007.7	7226199.57	3892.038	270	75	2	14	12	1.50	0.27
						16	28	12	1.21	0.22
						28	40	12	0.57	0.11
						42	58	16	0.88	0.15
						76	88	12	0.64	0.12
						88	92	4	2.40	0.27
						100	110	10	0.79	0.12
LDH-209	2623250.8	7226449.85	3884.537	**287**	90	81	89	8	0.33	0.14
						109	110	1	0.44	0.21
LDH-210	2623331.72	7226272.17	3868.646	180	80	8	38	30	1.57	0.19
						38	46	8	0.52	0.06
						46	54	8	2.14	0.19
						64	70	6	0.50	0.09
						94	100	6	0.66	0.07
						118	136	18	1.26	0.21
						136	140.5	4.5	0.43	0.07
LDH-211	2622979.33	7226000.32	3884.01	90	81	28	36	8	0.38	0.12
						60	68	8	0.42	0.12
						88	92	4	0.57	0.14
						104	106	2	0.47	0.17

Drill hole	Easting	Northing	Elevation	Azimuth (°)**	Dip (°)**	From (m)	To (m)	Interval (m)	Au (g/t)	Cu (%)
LDH-212	2622994.57	7226149.97	3891.846	270	90	0	4	4	1.14	0.19
						10	16	6	0.61	0.09
						38	46	8	0.91	0.15
						66	90	24	0.78	0.10
						110	116	6	1.46	0.18
LDH-213	2623008.34	7226049.97	3883.273	270	90	0	20	20	1.21	0.16
						22	30	8	1.60	0.27
						30	46	16	0.65	0.13
						46	48.7	2.7	1.81	0.31
LDH-214	2623343.85	7226149.22	3796.546	270	80	2	14	12	1.67	0.11
						18	32	14	1.43	0.11
						52	63.1	11.1	1.19	0.14
						78	80.5	2.5	0.68	0.07
LDH-215	2622964.17	7226049.92	3884.199	270	90	0	4	4	0.83	0.15
						17	28	11	0.55	0.13
						44	54	10	0.48	0.09
						72	78	6	0.51	0.12
						92.5	94	1.5	0.56	0.12
LDH-216	2622940.08	7226099.41	3884.206	270	80	0	16	16	0.60	0.16
						26	36	10	0.86	0.25
						46	56	10	1.08	0.23
						76	83.7	7.7	1.39	0.30
						114	122	8	0.46	0.13
CON-01	2623939.28	7225801.02	3828.69	0	60	No intervals of significance				
CON-02	2623540	7226012.65	3854.72	250	60	No intervals of significance				
CON-03	2623019.43	7225780.3	3893.7	290	60	No intervals of significance				
CON-04	2624147.09	7226481.24	3756.97	270	60	No intervals of significance				
CON-05	2622638.11	7226895.74	3755.13	140	60	No intervals of significance				
LGT-01	2623354.03	7226431.23	3937.02	0	90	No intervals of significance				
LGT-02	2623353.57	7225982.54	3900.72	0	90	188	201.47	13.47	0.48	0.15
LGT-03	2622890.77	7225972.41	3916.46	0	90	No intervals of significance				
LGT-04	2623097.2	7226516.22	3906.47	0	90	40	60	20	0.26	0.13
LGT-05	2623151.3	7226228.32	3965.33	0	90	No intervals of significance				
LGT-06	2622845.72	7226034.34	3919.62	225	77	No intervals of significance				
LGT-07	2622853.98	7226357.89	3908.27	315	75	0	52	52	0.27	-
LGT-08	2623087.59	7226474.29	3919.71	0	75	No intervals of significance				
LGT-09	2623388.8	7226340.2	3940.44	60	76	No intervals of significance				
LGT-10	2623052.53	7225936.84	3924.17	180	76	No intervals of significance				
LGT-11	2623367.88	7226049.68	3909.76	125	75	No intervals of significance				

* Bottomed in mineralization

** Azimuth and dip values taken at collar location

Table 10.5 Selected Arizaro Deposit drill hole intercepts

Drill hole	Easting	Northing	Elevation	Azimuth (°)	Dip (°)	From (m)	To (m)	Interval (m)	Au (g/t)	Cu (%)
ARD-01	2625701.40	7223689.90	4147	260	70	3.05	82	78.95	0.56	0.17
ARD-02	2625630.00	7224058.50	4104	270	70	60	90	30	0.45	0.27
						190	242	52	0.28	0.15
ARD-03	2625284.66	7223693.79	4145.33	73	70	10	34	24	0.70	0.36
ARD-04	2625600.79	7223907.67	4121.25	255	61	8	188	180	0.43	0.17
ARD-05	2625735.64	7223995.56	4097.77	250	62	84	242	158	0.50	0.16
ARD-06	2625771.57	7223715.96	4140.14	250	70	224	242	18	0.35	0.09
ARD-07	2625688.12	7223718.35	4149.56	355	69	2	148	146	0.29	0.17
ARD-08	2625601.28	7223626.5	4127.15	20	70	No intervals of significance				
ARD-09	2625855.97	7223957.64	4096.18	270	61	50	218	168	0.34	0.16
ARD-10	2625801.42	7223857.33	4118.42	270	61	1	40	39	0.46	0.15
						176	240	64	0.28	0.14
ARD-11	2625754.78	7223756.72	4138.85	270	61	156	208	52	0.29	0.09
ARD-12	2625761.88	7224047.82	4090.69	270	56	180	294	114	0.39	0.19
ARD-13	2625700.13	7223942.9	4110	235	86	12	180	168	0.61	0.22
including						100	130	30	1.81	0.40
ARD-14	2625920.88	7223885.92	4094.34	270	60	140	214	74	0.53	0.19
						274	318	44	0.29	0.19
ARD-15	2625471.81	7224012.30	4092.59	90	57	252	384	132	0.37	0.19
ARD-16	2625561.60	7224079.59	4085.50	90	61	24	64	40	0.24	0.14
ARD-17	2625690.60	7223944.96	4110.08	270	60	48	88	40	0.66	0.18
ARD-18	2625807.34	7223944.03	4106.10	270	60	0	246	246	0.40	0.18
ARD-19	2625603.21	7223941.35	4114.34	250	59	126	186	60	0.55	0.16
ARD-20	2625722.15	7223894.30	4121.20	350	81	202	274	72	0.32	0.21
ARD-21	2625686.34	7223900.40	4121.23	348	70	20	359	339	0.43	0.17
including						28	122	94	0.66	0.18
ARD-22	2625697.06	7223898.39	4121.17	250	60	4	244	240	0.28	0.12
ARD-23	2625849.97	7223900.35	4105.07	270	60	28	74	46	0.36	0.20
ARD-24	2625689.44	7224999.97	4102.05	270	78	90	250	160	0.64	0.24
including						120	224	104	0.82	0.26
ARD-25	2625828.12	7223999.83	4093.44	270	70	No intervals of significance				
ARD-26	2625711.68	7223850.91	4132.43	270	59	160	178	18	0.47	0.17
ARD-27	2625726.59	7223809.92	4142.78	270	67	26	136	110	0.53	0.20
ARD-28	2625715.16	7223728.32	4150.54	270	69	6	134	128	0.43	0.15
ARD-29	2625675.56	7223657.31	4140.19	90	70	22	50	28	0.44	0.22
ARD-30	2625669.47	7224030.73	4103	270	60	16	96	80	0.51	0.39
ARD-31	2625619.85	7223981.94	4110	90	60	90	108	18	0.46	0.24
ARD-32	2625739.34	7223926.68	4114	270	60	72	150	78	0.61	0.14
ARD-33	2625729.62	7223755.03	4146	270	60	44	74	30	0.53	0.15
ARD-34	2625718.71	7223889.79	4125	270	60	0	26	26	0.60	0.13
ARD-35	2625758.53	7223829.50	4132	270	60	82	154	72	0.53	0.23
ARD-36	2625729.64	7223780.96	4145	270	60	114	134	20	0.46	0.21
ARD-37	2625650.46	7223732.80	4153	90	65	58	64	6	1.19	0.56
ARD-38	2625618.90	7223690.89	4144	90	60	8	78	70	0.59	0.16
ARD-39	2625630.51	7223592.94	4118	55	60	4	18	14	0.30	0.10
ARD-40	2625637.86	7223656.93	4133	90	70	32	44	12	0.55	0.16
ARD-41	2625298.54	7223677.17	4150	359.65	60	8	90	82	0.70	0.28
ARD-42	2625251.28	7223656.22	4099.05	0	59	8	10	2	0.71	0.35
						32	38	6	0.33	0.13
ARD-43	2625390.52	7223717.44	4123.17	356	60	26	30	4	0.57	0.14
ARD-44	2625165.28	7223613.42	4108.00	357	60	No intervals of significance				
ARD-45	2625490.72	7223893.46	4086.79	101	59	10	14	4	0.82	0.16
						64	68	4	1.20	0.19
						68	96	28	0.57	0.20
						186	188	2	1.20	0.26
ARD-46	2625480.31	7223935.58	4073.53	103	70	0	16	16	0.57	0.17

Drill hole	Easting	Northing	Elevation	Azimuth (°)	Dip (°)	From (m)	To (m)	Interval (m)	Au (g/t)	Cu (%)
						80	92	12	1.20	0.22
						190	200	10	1.95	0.19
ARD-47	2625192.09	7223760.78	4082.23	96	60	190	194	4	1.62	0.66
ARD-48	2625502.59	7223964.18	4062.11	175	60	6	16	10	0.44	0.11
						76	84	8	1.58	0.19
						90	92	2	5.29	0.19
						212	251.5	39.5	0.51	0.09
ARD-49	2625463.58	7223960.52	4066.17	90	60	26	44	18	0.45	0.15
						236	244	2	1.04	0.42
ARD-50	2625566.73	7223990.28	4059.83	150	60	54	58	4	0.96	0.21
						192	220	28	0.38	0.16
ARD-51	2625568.58	7223990.44	4059.83	270	60	32	34	2	2.26	0.15
ARD-52	2625407.64	7223914.30	4089.03	152	60	66	80	14	0.52	0.16
						76	88	12	0.75	0.18
ARD-53	2625442.57	7223937.08	4077.03	145	60	55	66	11	0.91	0.25
						78	92	14	1.16	0.14
ARD-54A	2625467.24	7223959.28	4066.09	162	60	8	26	18	0.63	0.22
						210	224	14	0.64	0.13
ARD-55	2625489.16	7223894.08	4086.97	180.00	60	26	34	8	0.44	0.11
						102	124	22	0.67	0.21
						228	248	20	0.61	0.22
ARD-56	2625618.64	7223992.31	4066.60	172	58	78	86	8	0.44	0.23
ARD-57	2625539.71	7223983.64	4057.57	170.00	60	54	64	10	0.48	0.23
						200	226	26	0.45	0.11
ARD-58	2625496.98	7224002.82	4050.33	172.00	60	30	38	8	0.73	0.45
						114	130	16	0.57	0.18
						226	234	8	0.37	0.05
ARD-59	2625577.52	7223949.62	4068.17	171	59	88	96	8	0.37	0.21
						158	166	8	0.48	0.18
ARD-60	2625533.84	7223935.79	4070.27	169	59	22	34	12	0.52	0.22
						154	164	10	1.45	0.23
						234	240	6	0.41	0.08
ARD-61	2625607.97	7224066.31	4055.07	176	60	72	80	8	0.48	0.22
						160	164	4	0.99	0.37
						4.5	188	183.5	0.91	0.20
ARD-62	2625543.10	7223897.29	4082.31	171	59	4	70	66	0.42	0.20
						158	164	6	0.58	0.17
ARD-63	2625379.15	7223932.98	4085.60	178	60	204	210	6	0.40	0.12
ARD-64	2625417.59	7223947.95	4076.00	170	60	10	22	12	0.41	0.31
ARD-65	2625599.54	7223913.24	4078.38	172	57	2	22	20	0.41	0.31
						52	70	18	0.38	0.19
						118	126	8	0.34	0.15

10.14 Comment on Section 10

The QP has the following observations and conclusions regarding drilling conducted under Goldrock and Fortuna management in the period 2002 to 2022:

- Data was collected using industry standard practices.
- Drill orientations are appropriate to the orientation of the mineralization.
- Core logging meets industry standards for exploration of porphyry-style deposits.

- Geotechnical logging is sufficient to support Mineral Reserve estimation for the Lindero Deposit. The data for the Lindero Deposit have been reviewed by CNI with regards to suitability to support detailed mine planning.
- Collar surveys have been performed using industry-standard instrumentation. Uncertainty in collar locations related to surveying using compass and tape, have been incorporated into subsequent resource confidence category classification.
- Downhole surveys performed during the drill programs have been performed using industry-standard instrumentation. Uncertainties in the downhole locations have been incorporated into subsequent resource confidence category classification.

11 Sample Preparation, Analyses, and Security

Drilling in 2002 was performed by Rio Tinto and included 10 holes totaling 3,279.58 m of core at the Lindero Deposit and 2 holes totaling 628.9 m of core at the Arizaro Deposit sampled at intervals of 2 m. Sampling was performed by Rio Tinto personnel.

Goldrock drilled 122 diamond drill holes at the Lindero Deposit between 2005 and 2010 totaling 34,585.35 m of core as well as 27 diamond drill holes at the Arizaro Deposit between 2011 and 2013 totaling 8,226 m of core. Samples were collected at 2 m intervals, irrespective of lithology, representing approximately 8 kg of rock for HQ core size and 4 kg for NQ core size. All sampling was completed by Goldrock personnel. The majority of the Lindero Deposit holes (106) were drilled as part of the exploration program between 2005 and 2007, with an additional 5 holes drilled in 2008 and 11 holes drilled in 2010 for condemnation and geotechnical reasons.

Trenches excavated at the Lindero and Arizaro deposits by Goldrock in 2001 were sampled at 2 m and 5 m intervals either by hand on a continuous chip basis or from channels cut by a diamond saw; during the 2005 to 2011 period, trenches were channel sampled with a rock saw every 2 m.

Fortuna drilled 12 diamond drill holes at the Lindero Deposit between 2016 and 2017 totaling 4,461.58 m of core. Samples were collected on 2 m intervals. Eight holes were drilled to provide fresh core for metallurgical testwork, two holes were drilled to improve understanding in geologically complex areas and two holes were drilled as twins of previously drilled holes to validate reported grades.

Fortuna has drilled a further 89 diamond drill holes at the Lindero Deposit totaling 4,660 m of core and 36 diamond drill holes at the Arizaro Deposit totaling 7,312 m of core since 2018. Samples were collected on 2 m intervals to maintain sample support volume. Holes at the Lindero Deposit were drilled to improve the estimation of grades in mineralized areas with lower density of drilling, to better define the contact between mineralized and non-mineralized material at the periphery of the deposit and at the boundaries between lithologic units, and to source fresh samples for complementary metallurgical column tests on Mineral Reserves scheduled for mining and processing the following year. Holes at the Arizaro Deposit were drilled to improve the geologic interpretation of the porphyry mineralizing events in order to gain sufficient information to support the estimation of Mineral Resources.

Blast hole drilling commenced at the operation in September 2019, with the collected chip samples used for grade control purposes in the identification of mineralized and waste material prior to blasting.

11.1 Sample preparation prior to dispatch of samples

11.1.1 Core samples

Drill core is laid out for sampling and logging at the core logging facility at the camp. Sample intervals are marked on the core and depths recorded on the appropriate box.

A geologist is responsible for determining and marking the drill core intervals to be sampled, selecting them based on geological and structural logging. The first sample of each core hole is marked from the start of core recovery to an acceptable recovery interval (generally 2 m to 4 m from the surface). The remainder of the core is marked at 2 m intervals unless there is a distinct change in the geology. The numbering sequence used allows for the insertion of QAQC samples.

Once the core was marked, geotechnical logging was performed and then all core was systematically photographed within the box. The core is then halved using a diamond saw. The geologist carefully determines the line of cutting, in such a way that both halves of the core are representative. The core cutting process is performed in a separate building adjacent to the core logging facilities. Water used to cool the saw is not re-circulated but stored in a tank to allow any fines to settle before final disposal. Samples weighed between 4 kg and 8 kg depending on the diameter of the core. Field duplicates were prepared from quarter cores. Samples were collected in plastic bags and labelled. The remaining half or quarter cores were stored in the Lindero camp core storage facilities in wooden core boxes. Fortuna's policy is for field duplicates to be represented by half core not quarter core, and this policy will be implemented for future field duplicate sampling.

11.1.2 Blast hole samples

The blast hole piles are identified using a stake and colored ribbon with the blast hole identifier. The identification of each blast hole is the responsibility of the grade control geologist, with strict instructions that they are to follow the drilling design provided by the planning area. The geologist defines which blast hole will be sampled first and the subsequent sampling sequence ensuring the number of blast holes to be sampled matches with the design. If a discrepancy occurs the geologist contacts the planning area for confirmation, otherwise sampling can commence.

The first activity is to verify that the blast hole pile has not been contaminated by human activity or by debris or rock chips that do not originate directly from the drilling performed for that hole. In general, the blast pile is usually deformed and elongated in one direction due to the rotation of the drill rod. Sampling is performed along the axis of greatest length of the pile.

Using a customized shovel, a channel is carefully cut into the pile repeatedly being approximately 20 cm in width, and 20 to 30 cm in depth from top to bottom, with the first 5 cm from surface discarded to avoid potential contamination. Material collected is deposited in a plastic sample bag identified with the bench number and the blast hole identifier. The weight of the material collected in each cut should be approximately 6 to 7 kg, equivalent in the field to a total of four scoops, two on each side of the pile, to obtain a total sample of approximately 12 to 15 kg for each blast hole pile sampled.

A ticket with the sample number is placed inside the bag and the data relating to the sample is recorded on a spreadsheet. The bag is sealed with a plastic tie and left next to the sampled pile for collection.

11.1.3 Trench samples

The trenches were excavated, and any loose material cleaned off the bedrock. A rock saw was used to cut a 2 cm to 3 cm wide channel along the exposed bedrock. Samples were approximately 4 kg (based on volume calculations using an assumed bulk density of 2.5 g/cm^3).

Field duplicates were collected by taking a second channel sample adjacent to the original sample. Metal tags showing the trench number and sample number were attached to the bedrock exposure.

11.1.4 Bulk density determination

Density samples are routinely collected by Mansfield from drill core on approximate 10-m intervals. Samples consist of pieces of core approximately 7 cm in length and weighing between 93 g and 408 g.

Bulk density measurements were conducted on different intrusive rocks representing mineralized and unmineralized, oxide and sulfide mineralization, and from sedimentary rocks. The original method used was the American Standard Testing Materials (ASTM) Method C97. This method involved weighing a dried sample of core, immersing it in water to fill pore spaces, and then re- weighing the core in both air and water. However, the method can overestimate bulk density when the rock is porous so to confirm the initial results Goldrock re-assessed 840 of the samples using a wax-coating water immersion method (ASTM C914). Goldrock found the initial measurements to be reliable, except for oxidized pieces of rock, which gave different results when compared to the first method.

Fortuna conducted a verification of the density measurements obtained by Goldrock at the Lindero Mine with the re-submission of 30 of the historical density samples. Density tests for these samples were performed at the ALS Global laboratory in Vancouver using the OA-GRA08 methodology. This test consists of coating the core sample in paraffin wax, measuring the sample weight in air then suspending the sample in water and measuring the weight again. The bulk density is calculated using the following equation:

$$\text{Bulk density} = \frac{\Delta}{B - C - [(B - A) / Dwax]}$$

Where:

A = weight of sample in air

B = weight of waxed sample in air

C = weight of waxed sample suspended in water

Dwax = density of wax

Results of this analysis are included in Section 12.6 of this Report. Since 2016, density measurements conducted by Mansfield under the supervision of Fortuna have been conducted using the OA-GRA08 methodology.

11.2 Dispatch of samples, sample preparation, assaying and analytical procedures

11.2.1 Sample dispatch

Following the sawing of drill core or the collection of trench samples (described above) samples were placed in polyethylene sample bags with a sample tag detailing a unique sample identifier. The same sample identifier was marked on the outside of the bag and it was sealed with a cable tie. Secured sample bags were then placed in rice sacks labeled with the company name, number of samples contained in the sack and the sample number sequence. The rice sacks with the samples were then sealed with double cable ties and stored in a secure, dry and clean location. The rice sacks were subsequently transported by authorized company personnel to Salta prior to commercial transportation by truck to the selected sample preparation facility.

11.2.2 Sample preparation and assaying

Rio Tinto (2002)

All exploration core samples were sent to the ALS Chemex sample preparation facility in Mendoza, Argentina. Upon arrival a notification of sample reception was transmitted, and the samples entered into the laboratory sample management system. Following drying at 55°C, the samples are weighed, and the entire sample (4 to 8 kg) crushed using a two-stage method, first with a jaw crusher to 1 cm, and then by cone crusher so that a minimum of 70 percent passed a 10-mesh sieve. The entire crushed sample was then pulverized to a minimum of 95 percent passing 80 mesh. The pulverized samples were then split using a riffle splitter to generate a 300 g subsample and further pulverized so that a minimum of 95 percent passed 150 mesh. This subsample was then split again using a riffle splitter to generate three 100 g samples. These 100 g pulp samples were shipped by commercial air freight to ALS Chemex's analytical facility in Vancouver, British Columbia for analysis.

In Vancouver, samples were assayed for gold using fire assay with atomic absorption finish (FA-AA) and for 35 elements using inductively coupled plasma (ICP) spectrophotometry. Copper values above 1 % were re-run with atomic absorption. The sample charge for fire assay was 30 g. Assay results were reportedly provided in electronic format and in hard copy, although Mansfield does not have any copies of these original certificates.

Rio Tinto included pulp duplicates, coarse reject duplicates, blanks and standard reference materials (SRMs) in the drill sample submissions to the laboratory to monitor assay accuracy and precision. Samples were sent for check analyses to Alex Stewart laboratory in La Serena or the Bondar Clegg laboratory in Canada. A small number of samples were sent to ACME for metallic screen assays. Coarse reject and pulp duplicates were reportedly taken at an approximate rate of every 30 samples, while standards and blanks were inserted by the laboratory at a rate of 1 in every 20 samples (Fuchter and Rennie, 2013). Analysis of Rio Tinto's QAQC results are described in Section 11.4.

Goldrock (2005 to 2013)

Core and trench samples taken by Goldrock between 2005 and 2008 were placed in labeled plastic bags with plastic tags and then packaged into larger rice sacks before being sent to the ACME laboratory (ISO 9001:2000 certified) in Mendoza, Argentina for preparation and then to the Santiago laboratory in Chile for assaying. These included holes LDH-11 to LDH-116 and geotechnical holes LGT-01 to LGT-05. A list of samples and sacks was prepared for each shipment and a copy of the sample submittal form sent for filing to Goldrock's Salta office.

Sample preparation involved drying at 60°C, before the entire sample (4 to 8 kg) was crushed using a jaw crusher so that a minimum of 70 percent passed a 10-mesh sieve. The crushed sample was then split using a riffle splitter to generate a 500 g subsample which was homogenized prior to being pulverized so that a minimum of 95 percent passed a 200-mesh sieve. Pulverized samples were then split again using a riffle splitter to generate a two 100 g samples and one 300 g sample. The two 100 g pulp samples were shipped by commercial air freight to analytical facilities in Santiago, Chile for analysis. The 300 g sample was retained as a pulp reject by Goldrock at the storage facility at the Lindero Property.

All samples collected by Goldrock were assayed for gold using a 30 g FA-AA finish and a second aliquot was selected for copper analysis using aqua regia digestion and AA analyses. For the drill samples only, a full suite of trace elements was analyzed using an aqua regia digestion followed by ICP analysis. Assay results and certificates were reported electronically by e-mail. ACME used internationally accepted analytical techniques and SRMs at all levels of the sample preparation and sample assay procedure to monitor quality control. Additionally, the laboratory checked 12 percent of all assays with the submission of preparation (coarse reject) and laboratory (pulp) duplicates.

Goldrock included blanks, SRMs, quarter core field duplicates, and check assays in the drill trench sampling submissions to monitor assay accuracy and precision. Batches of samples were sent for duplicate analyses to Alex Stewart laboratory in Mendoza, Argentina or to La Serena, Chile. Additional check assays were sent to ALS Chemex in Mendoza, Argentina.

Core samples for holes drilled in 2010 to 2013 including 27 exploration holes ARD-03 to ARD-29 at Arizaro, geotechnical holes LGT-06 to LGT-11 and condemnation holes CON-01 to CON-05 were prepared in the same manner as described above but were sent to the Alex Stewart laboratory in Mendoza, Argentina albeit with the analysis for gold using a 50 g FA-AA finish. Goldrock also submitted blanks, SRMs, quarter core field duplicates, and check assays with these samples. Batches of samples were sent for duplicate analyses to ALS Chemex in Mendoza, Argentina. Analysis of Goldrock's QAQC results are described in Section 11.4.

Fortuna (2016 to 2022)

All exploration core samples were sent to the ALS Global sample preparation facility in Mendoza, Argentina. Upon arrival, a notification of sample reception was transmitted to Fortuna and the samples entered into the laboratory sample management system. Following drying at 55°C, the samples were weighed, and the entire sample (4 to 8 kg) crushed using a two-stage method, first with a jaw crusher to 1 cm, and then by cone crusher so that a minimum of 70 percent passed a 10-mesh sieve. The entire crushed sample was then pulverized to a minimum of 95 percent passing an 80-mesh sieve. Pulverized samples were then split using a riffle splitter to generate a 300 g subsample and further pulverized so that a minimum of 95 percent passed a 150-mesh sieve. This subsample was then split again using a riffle splitter to generate three 100 g samples. From 2016 to 2018, the 100 g pulp samples were shipped by commercial air freight to ALS Global's analytical facility in Vancouver, British Columbia for analysis. Since 2018, all pulp samples are shipped by commercial air freight to ALS Global's analytical facility in Lima, Peru for analysis.

At the ALS analytical facility, samples were assayed for gold using FA-AA and for 35 elements using a four-acid digestion prior to ICP spectrophotometry. Copper values more than 1 % were re-run with a four-acid digestion prior to an ICP-atomic emission spectroscopy (AES) or AA finish. Soluble copper was assayed using a cyanide leach atomic absorption finish. Assay results were provided in electronic format and in hard copy.

Fortuna submitted field duplicates, reject assays (coarse rejects), duplicate assays (pulps), check assays (pulps sent to an umpire laboratory) blanks and SRMs in the drill sample submissions to the laboratory to monitor assay accuracy and precision. Samples taken during the 2016 and 2018 campaigns were sent for check analyses to Bureau Veritas laboratory in Vancouver, Canada for assaying. Samples taken during the 2021 and 2022 campaigns were sent for check analyses to Bureau Veritas laboratory in Lima, Peru for assaying. Analysis of Fortuna's QAQC results are described in Section 11.4.

Mansfield (blastholes 2019 to 2022)

Blast hole samples, comprising a minimum of 10 kg, are sent to the Lindero onsite sample preparation and analytical facility for assaying. Upon arrival, a notification of sample reception is sent electronically to the geology department and the samples catalogued in the laboratory's management system.

The laboratory prepares the sample for assaying by first drying it at 110°C until a constant weight is obtained prior to crushing in a jaw crusher until 95 percent passes 0.335 cm. Using a rotary splitter, a 500 g sample is collected and fed to a ring and puck pulverizer and ground for no more than 2 minutes until 95 percent passes 106µ. A small Jones riffle splitter is then used to split the 500 g sample twice to obtain a 125 g subsample, which is then placed on a clean sheet of paper and at least 5 random increments of approximately 0.1 g are collected to form the 0.5 g required for copper assaying. At the same time at least 10 random approximately 3 g increments are collected to form the 30 g required for gold assaying by FA-AA.

11.3 Laboratory accreditation

The ALS Chemex laboratory used by Rio Tinto, Goldrock and Fortuna (renamed to ALS Global) is an independent, privately-owned analytical laboratory group. The Vancouver and Lima laboratory hold ISO 17025 accreditation. The Argentine laboratory holds ISO 9001:2000 certification.

ACME, used by both Rio Tinto and Goldrock was an independent, privately-owned American analytical laboratory group, founded in Canada, with two laboratories in North America, and five affiliate laboratories in South America: one each in Argentina, Peru, Ecuador, Brazil and Chile. ACME was acquired by Bureau Veritas in 2012. The Argentine and Chilean laboratories are ISO 9001:2000 certified.

Alex Stewart, used by both Rio Tinto and Goldrock is an independent, privately-owned laboratory, part of the Stewart Group. It is not known what certification the Argentina laboratory held at the time of the analytical work.

Bondar Clegg, used by Rio Tinto, was acquired by ALS Chemex in 2001, and laboratory facilities were merged where there were overlaps. The Chilean laboratory of ALS Chemex is ISO 9001:2000 certified.

The Bureau Veritas laboratory used by Fortuna as an umpire laboratory is an independent, privately-owned analytical laboratory group. The Vancouver laboratory holds ISO 9001:2000, ISO 14001:2004, and OHSAS 18001:2007 certification.

The Lindero Mine onsite laboratory used and operated by Mansfield for sample preparation and assaying of blast hole samples is an uncertified laboratory.

11.4 Sample security and chain of custody

Sample collection and transportation of drill core and trench samples is the responsibility of Mansfield's mine geology or exploration department.

Exploration core boxes are sealed and carefully transported to the core logging facilities located inside the core shed adjacent to the mine offices where there is sufficient room to lay out and examine the core. Once logging and sampling is completed, the core is transferred to a temporary storage facility. Core is stored chronologically and will be transported to a larger permanent storage facility, which is temporarily being used to store maintenance materials for the processing plant.

Unfortunately, coarse rejects from the Goldrock drill program were stored outside for several years resulting in the degradation of many of the plastic bags containing the samples. The coarse rejects were assessed in 2017 with most of the samples having to be disposed of due to poor condition. The remaining coarse rejects were transferred for storage in a separate warehouse on site. Pulps from the exploration and infill drill programs are stored in a secure and dry pulp storage facility.

Sample collection and transportation of blast hole chip samples is the responsibility of Mansfield's mine geology department. At the time of collection, a small sub-sample is collected in a chip tray and stored in the core storage facility for geological reference purposes.

Blast hole samples upon collection are carefully placed in a vehicle and transported immediately to the onsite laboratory for preparation.

All samples are retained in accordance with the Fortuna corporate sample retention policy. All drill core and coarse rejects and pulps from drill core are stored for the LOM.

11.5 Quality control measures

The implementation of a QAQC program is current industry best practice and involves establishing appropriate procedures and the routine insertion of SRMs, blanks, and duplicates to monitor the sampling, sample preparation and analytical process. Analysis of QC data is made to assess the reliability of sample assay data and the confidence in the data used for the estimation.

Rio Tinto (2002 to 2003)

QAQC procedures and protocols used by Rio Tinto in the sampling of the first drilling campaign are described in a report compiled by Rio Tinto (Ruiz, et al., 2003) for Goldrock.

The Rio Tinto report states that all samples taken at the Lindero and Arizaro deposits, including inserted QC samples, were sent first to the ALS Chemex laboratory in Mendoza for crushing, pulverizing and splitting. For drill holes LID-01 to LID-06 preparation duplicates were not inserted. For holes LID-07 to LID-10, one preparation duplicate (taken after cone crushing to 75 percent passing 10 mesh) and one laboratory duplicate (taken from a split at the end of pulverization, 95 percent passing 150 mesh) were inserted in every 30 samples with the objective of checking for splitting or laboratory errors. Samples were randomized. Independent checks assays were performed using Alex Stewart in Chile (31), and Bondar Clegg in Canada (112). Table 11.1 details the total number of QC samples submitted as a percentage of core samples during the Rio Tinto campaign.

Table 11.1 Summary of QC samples – Rio Tinto campaign

Sample Type	Number	Insertion Rate
Core samples	1,628	-
SRMs	72	4.4 %
Blanks	71	4.3 %
Preparation Duplicates	22	1.3 %
Laboratory Duplicates	71	4.3 %
Checks	143	8.8 %

Goldrock (Lindero Deposit 2005 to 2010)

QAQC procedures were implemented throughout the drill programs, and included SRMs, blanks, field duplicates and check samples. Drill holes LDH-11 to LDH-116 were submitted to ACME laboratory in Santiago, Chile during the drilling campaigns between 2005 and 2008. The geotechnical holes LGT-01 to LGT-05 were also sent for assaying to the ACME laboratory in 2008. However, holes LGT-06 to LGT-11 drilled in 2010 were analyzed at the

Alex Stewart laboratory in Mendoza, Argentina, along with the condemnation holes CON-01 to CON-05. The condemnation holes have not been considered in the below analysis as they encountered no mineralization. Table 11.2 details the total number of QC samples submitted as a percentage of core samples during all the Goldrock campaigns.

Table 11.2 Summary of Lindero Deposit QC samples – Goldrock campaigns

Sample Type	Holes LDH-11 to LDH-116		Holes LGT-01 to LGT-11	
	Number	Insertion Rate	Number	Insertion Rate
Core samples	14,821	-	1,716	-
SRMs	673	4.5 %	101	5.9 %
Blanks	664	4.5 %	101	5.9 %
Field Duplicates	669	4.5 %	101	5.9 %
Check Assay (Alex Stewart)	1,660	11.2 %	-	-
Check Assay (ALS Chemex)	1,660	11.2 %	81	4.7 %

Trench samples from the 2005 to 2006 exploration campaign were submitted along with blanks, field duplicates, and SRMs inserted in each batch of 30 samples. No check assay analyses were performed on the original trench sample assays. Trench samples have not been used in the 2022 resource update and therefore the QC results are not reported here.

Goldrock (Arizaro Deposit 2010 to 2013)

Goldrock inserted a total of 720 blanks, SRMs, and quarter-core field duplicates into the regular sample stream at the rate of one blank, standard, and duplicate in every batch of 20 samples sent to the lab (Table 11.3). The QA/QC sample ID followed in sequence with the regular samples so as to make them blind to the lab from a clerical stand-point.

In addition, 482 original pulps were sent to second and third labs for re-assay as a check on the original lab accuracy.

Table 11.3 Summary of Arizaro Deposit QC samples – Goldrock campaigns

Sample Type	Holes ARD-03 to ARD-29	
	Number	Insertion Rate
Core samples	4,403	-
SRMs	240	5.5 %
Blanks	240	5.5 %
Field Duplicates	238	5.4 %
Check Assay	482	10.9 %

Fortuna (Lindero Deposit 2016 to 2022)

Fortuna implemented a full QAQC program to monitor the sampling, sample preparation and analytical process for the 2016, 2018, 2021 and 2022 drilling campaigns in accordance with its companywide procedures. The programs involved the routine insertion of SRMs, blanks, and duplicates. Table 11.3 details the total number of QC samples submitted as a percentage of core samples during the four Fortuna drilling campaigns.

Table 11.4 Summary of Lindero Deposit QC samples – Fortuna campaigns

Sample Type	2016 Campaign		2018 Campaign		2021 Campaign		2022 Campaign	
	Number	Insertion Rate	Number	Insertion Rate	Number	Insertion Rate	Number	Insertion Rate
Samples	2,269	-	984	-	812		559	
SRMs	126	5.6 %	68	6.9 %	45	5.4 %	36	6.4 %
Blanks	130	5.7 %	77	7.8 %	44	5.4 %	38	6.7 %
Field Duplicates	124	5.5 %	39	3.9 %	44	5.4 %	28	5.0 %
Preparation Duplicates	123	5.4 %	43	4.4 %	41	5.0 %	28	5.0 %
Laboratory Duplicates	123	5.4 %	44	4.5 %	42	5.2 %	24	4.3 %
Duplicate Assay	55	2.4 %	31	3.1 %	25	3.0 %	34	6.1 %
Reject Assay	57	2.5 %	26	2.6 %	25	3.1 %	35	6.3 %
Check Assay	56	2.5 %	24	2.4 %	26	3.2 %	34	6.1 %

Fortuna (Arizaro Deposit 2018 to 2022)

Fortuna also implemented a full QAQC program to monitor the 2021 and 2022 drilling campaigns conducted at the Arizaro Deposit in accordance with its companywide procedures. The programs involved the routine insertion of SRMs, blanks, and duplicates. Table 11.5 details the total number of QC samples submitted as a percentage of core samples during the four Fortuna drilling campaigns.

Table 11.5 Summary of Arizaro QC samples – Fortuna campaigns

Sample Type	2018 Campaign		2021 Campaign		2022 Campaign	
	Number	Insertion Rate	Number	Insertion Rate	Number	Insertion Rate
Samples	1,070	-	1,002		1,297	
SRMs	63	5.8 %	72	7.2 %	99	7.6 %
Blanks	71	6.6 %	70	6.9 %	72	5.5 %
Field Duplicates	32	2.9 %	62	6.2 %	53	4.1 %
Preparation Duplicates	67	6.3 %	71	7.1 %	69	5.3 %
Laboratory Duplicates	65	6.1 %	65	6.5 %	50	3.8 %
Duplicate Assay	25	2.3 %	56	5.6 %	55	4.2 %
Reject Assay	19	1.8 %	55	5.5 %	55	4.2 %
Check Assay	42	3.9 %	55	5.5 %	55	4.2 %

Mansfield (blast holes 2019 to 2022)

Mansfield has also implemented a comprehensive QAQC program to monitor the sampling, sample preparation and analytical process for blast hole sampling which commenced in September 2019. The program includes the blind insertion of SRMs and blanks at a frequency of approximately 1 per 20 normal samples as well as the submission of duplicate samples to the umpire laboratories run by ALS Global at an insertion rate of between 1 in 20 to 1 in 40 samples (depending on the duplicate type) for verification of sampling and assay precision levels.

11.5.1 Standard reference materials

Standard reference materials are samples that are used to measure the accuracy of analytical processes and are composed of material that has been thoroughly analyzed to accurately determine its grade within known error limits. SRMs are inserted by the geologist into the sample stream, and the expected value is concealed from the laboratory, even though the laboratory will inevitably know that the sample is an SRM of some sort. By comparing the results of a laboratory's analysis of an SRM to its certified value, the accuracy of the result is monitored.

SRM results detailed in this Report are presented in a text and tabular form; however, results were assessed using time series graphs to identify trends or biases.

Rio Tinto (2002 to 2003)

Rio Tinto used three SRMs named R1, R2, and SOC with recommended values of 0.176 g/t Au, 1.238 g/t Au, and 0.215 g/t Au respectively. No documentation is available describing the origin or certification of the SRMs.

This analysis focuses on the submission of 72 standards with 1,628 samples at Lindero and Arizaro (submission rate of 1 in 23 samples) between 2002 and 2003 to the ALS Chemex laboratory.

Although the best value and standard deviations for the standards are unknown it is possible to surmise from the reported results that only two results lay significantly outside an expected range representing a pass rate of 97 percent. However, the accuracy of these samples cannot be verified and therefore this has been considered during resource classification.

Goldrock (Lindero Deposit 2005 to 2010)

Three different groups of SRMs were used for the Lindero Deposit. The first group consisted of three SRMs of different grades which are representative of the mineralization at the Lindero Deposit, and were used during the sampling of holes LDH-11 to LDH-33. These SRMs were certified by ACME in Santiago, Chile.

Sampling of drill holes LDH-34 to LDH-39 used four SRMs obtained from Silex (a subsidiary company of Apex Silver); however, no documentation exists of the best values.

The final group of SRMs was certified by Alex Stewart in 2016 in Mendoza and consisted of four different SRMs that were used during the sampling of drill holes LDH-40 to LDH-116 as well as the geotechnical holes LGT-01 to LGT-11.

A summary of the performance of each SRM is shown in Table 11.4. A fail as described in the tables below is any value being >± 3 standard deviations from the best value.

Table 11.6 SRM results for Lindero submitted by Goldrock 2005-2010

Standard	No. Submitted	Best Value (g/t)	Mean Value (g/t)	Bias (%)	No. fails	Pass rate (%)
STD 1 ACME	43	0.959	0.983	+2.5	0	100
STD 2 ACME	23	0.551	0.530	-3.8	10	57
STD 3 ACME	52	0.343	0.357	+4.1	4	92
STD 1 Silex	8	-	2.956	-	-	-
STD 2 Silex	7	-	2.197	-	-	-
STD 3 Silex	6	-	0.352	-	-	-
STD 4 Silex	10	-	0.160	-	-	-
STD 1 ASA - 2016	162	0.351	0.344	-2.0	9	94
STD 2 ASA - 2016	154	0.534	0.528	-1.1	4	97
STD 3 ASA - 2016	156	1.059	1.033	-2.5	7	96
STD 4 ASA - 2016	154	4.770	4.713	-1.2	0	100
TOTAL	775	-	-	-	34	96

The results presented in Table 11.4 are a summary of all SRMs submitted with drill core by Goldrock from 2005 to 2010. It should be noted that this information has also been assessed on a campaign-by-campaign basis to ensure reasonable levels of accuracy were achieved after each campaign.

It can be seen from the overall results that the levels of bias are low (less than 5 percent) with and a reasonable pass rate above 96 percent.

Fortuna concludes that the accuracy of the samples submitted by Goldrock between 2005 and 2010 are within acceptable ranges and suitable for estimation purposes.

Goldrock (Arizaro Deposit 2010 to 2013)

Eight SRMs of different grades which are representative of the mineralization at the Arizaro Deposit were used during the assaying of holes ARD-03 to ARD-29. All eight SRMs were created by Alex Stewart from Lindero mineralized material. The accepted gold values for each of the eight SRMs were determined using six repeat analyses conducted by ACME, ALS Chemex, Alex Stewart and OMAC Laboratories Ltd.

Results demonstrated that the levels of bias were on the low side (approximately 10 percent) for samples submitted to the Alex Stewart laboratory with an overall pass rate (less than ±3 standard deviation) of just 82 percent achieved. There is however evidence of mislabeling of a number of the standards based on the results and when this is accounted for and the mislabels removed the overall pass rate improves to 88 percent.

Fortuna (Lindero Deposit 2016 to 2022)

During the 2016 Fortuna drill campaign, a total of 126 SRMs were inserted into the sample analysis submissions along with 2,269 regular samples, resulting in an overall insertion rate of 1 in 18 samples. Fortuna used four SRMs (prepared and certified by Alex Stewart in 2007) to monitor the accuracy of results during the 2016 drilling program at the Lindero Deposit. For evaluation of the SRMs, Fortuna prepared control charts for each, as well as an accuracy plot. The results demonstrated that the levels of bias were low (less than 5 percent) with a reasonable pass rate of above 95 percent having been achieved.

During the 2018 drill campaign a total of 68 SRMs were inserted into the sample analysis submissions along with 984 regular samples, resulting in an overall insertion rate of 1 in 14 samples. The same four SRMs were submitted as had been for the 2016 drill program. Results for the 2018 campaign demonstrated that the levels of bias were low (less than 3 percent) with an overall pass rate (less than ±3 standard deviation) of above 99 percent achieved.

For the 2021 drill campaign a total of 45 SRMs were inserted into the sample analysis submissions along with 812 regular samples, resulting in an overall insertion rate of 1 in 18 samples. Four new SRMs, prepared and certified by Alex Stewart in 2019 were used to monitor the accuracy of results during the 2021 drilling program. Results for the 2021 campaign demonstrated that the levels of bias remained low with an overall pass rate (less than ±3 standard deviation) of above 99 percent achieved.

The 2022 drill campaign had a total of 36 SRMs inserted into the sample analysis submissions along with 559 regular samples, resulting in an overall insertion rate of 1 in 15 samples. The same four SRMs were submitted as had been for the 2021 drill program. Results for the 2022 campaign demonstrated an overall pass rate (less than ±3 standard deviation) of 100 percent was achieved.

Fortuna concluded that the accuracy of the samples submitted from 2016 to 2023 to monitor the drilling campaigns were within acceptable ranges and suitable for estimation purposes.

Fortuna (Arizaro Deposit 2018 to 2022)

For the 2018 drill campaign a total of 63 SRMs were inserted into the sample analysis submissions along with 1,070 regular samples, resulting in an overall insertion rate of 1 in 17 samples. The same four SRMs were used to monitor the accuracy of results during the 2018 drilling program as had been submitted by Goldrock between 2010 to 2013. Results for the 2018 campaign were greatly improved with significantly lower levels of bias and an overall pass rate (less than ±3 standard deviation) of above 92 percent achieved.

The 2021 drill campaign had a total of 72 SRMs inserted into the sample analysis submissions along with 1,002 regular samples, resulting in an overall insertion rate of 1 in 14 samples. Seven new SRMs, prepared and certified by Alex Stewart, along with three SRM's that had been used in the 2018 campaign, were inserted to monitor the accuracy of results during the 2021 drilling program. Results for the campaign demonstrated that the levels of accuracy had decreased, with an overall pass rate (less than ±3 standard deviation) of 78 percent achieved.

The 2022 drill campaign had a total of 99 SRMs inserted into the sample analysis submissions along with 1,297 regular samples, resulting in an overall insertion rate of 1 in 13 samples. Three of the same SRMs were submitted as had been used in the 2021 drill program with the addition of one new SRM that was also prepared and certified by Alex Stewart. Results for the 2022 campaign demonstrated an improvement in accuracy levels, with a pass rate (less than ±3 standard deviation) of 92 percent achieved.

Mansfield (blast holes 2019 to 2022)

From 2019 to December 31, 2022, Mansfield submitted 3,359 SRMs into the analysis with 46,734 regular blast hole samples, resulting in an overall insertion rate of 1 in 14 samples. Results demonstrated that accuracy levels are good, with an overall pass rate of 98 percent.

11.5.2 Blank samples

Field blank samples are composed of material that is known to contain grades that are less than the detection limit of the analytical method in use and are inserted by the geologist in the field. Blank sample analysis is a method of determining sample switching and cross-contamination of samples during the sample preparation or analysis processes.

Rio Tinto (2002 to 2003)

This analysis focuses on the submission of 84 blanks with 1,628 samples (submission rate of 1 in 20 samples).

Only one sample out of the 84 contained a gold assay greater than five times the analytical detection limit. The ALS Chemex blank analyses for the 2002 to 2003 drilling campaign are considered acceptable.

Goldrock (Lindero Deposit 2005 to 2010)

An intrusive granodiorite was used by Goldrock as a source for their blank samples. Rock samples were collected systematically at an intrusive batholith outcrop next to the road to the Lindero Property. The rock samples were broken in a plastic basin to avoid contamination from local soils or pebbles. Only homogeneous pieces of rocks were kept, by removing oxidized surfaces for instance. Finally, blank samples were bagged, labeled, and inserted in the sampling stream. This analysis focuses on the submission of 664 blanks submitted with 14,821 samples (submission rate of 1 in 22 samples) during the 2005 to 2008 drill campaign; and 101 blanks submitted to with 1,716 samples (submission rate of 1 in 17 samples) during the 2005 to 2008 drill campaign.

The ACME blank analyses for the 2005 to 2008 drill campaigns are considered acceptable. Only nine samples out of the 664 submitted contained a gold assay greater than five times the analytical detection limit, a pass rate of greater than 98 percent.

The blank analyses for the 2008 to 2010 drilling campaign are also considered acceptable. Only two samples out of 101 samples contained a gold assay greater than five times the analytical detection limit, a pass rate of greater than 98 percent.

Goldrock (Arizaro Deposit 2010 to 2013)

This analysis focuses on the submission of 240 blanks submitted with 4,403 samples (submission rate of 1 in 18 samples) during the 2010 to 2013 drill campaign. The blank analyses are considered acceptable with no samples returning a gold assay greater than five times the analytical detection limit, a pass rate of 100 percent.

Fortuna (Lindero Deposit 2016 to 2022)

Fortuna used quartz blank material purchased from SGS laboratory in San Juan for submission with samples obtained during the 2016, 2018, 2021 and 2022 drilling programs at the Lindero Deposit.

A total of 289 blanks have been inserted into the sample analysis submissions, during the infill drill campaigns conducted in 2016, 2018, 2021 and 2022, along with 4,624 regular samples, resulting in an overall average insertion rate of 1 in 16 samples.

Results for the blanks submitted since 2016 to monitor the numerous drilling campaigns are considered acceptable. None of the blanks submitted contained a gold assay greater than ten times the analytical detection limit, representing a pass rate of 100 percent.

Fortuna (Arizaro Deposit 2018 to 2022)

Fortuna also used quartz blank material purchased from SGS laboratory in San Juan for submission with samples obtained during the 2018, 2021 and 2022 drilling programs at the Arizaro Deposit.

A total of 216 blanks have been inserted into the sample analysis submissions, during the infill drill campaigns conducted in 2018, 2021 and 2022, along with 3,369 regular samples, resulting in an overall average insertion rate of 1 in 16 samples.

Results for the blanks submitted since 2018 to monitor the numerous drilling campaigns are considered acceptable. None of the blanks submitted contained a gold assay greater than ten times the analytical detection limit, representing a pass rate of 100 percent.

Mansfield (blast holes 2019 to 2022)

Mansfield uses basalt sourced from local intrusive as blank material for insertion with blast hole samples. Since 2019 to December 31, 2022, Mansfield submitted 3,425 blanks along with 46,734 regular blast hole samples, resulting in an overall insertion rate of 1 in 14 samples. Results demonstrated no significant contamination or sample switching was occurring at the on-site laboratory, with an overall pass rate of 99 percent.

11.5.3 Duplicate samples

The precision of sampling and analytical results can be measured by re-analyzing the same sample using the same methodology. The variance between the measured results is a measure of their precision. Precision is affected by mineralogical factors such as grain size and distribution and inconsistencies in the sample preparation and analysis processes. There are several different duplicate sample types which can be used to determine the precision for the entire sampling process, sample preparation, and analytical process. A description of the different types of duplicates used by Fortuna is provided in Table 11.7.

Numerous plots and graphs are used to monitor precision and bias levels. A brief description of the plots employed by Fortuna in the analysis of duplicate data, is described below:

- Absolute relative difference (ARD) statistics: relative difference of the paired values divided by their average.
- Scatter plot: assesses the degree of scatter of the duplicate result plotted against the original value, which allows for bias characterization and regression calculations.
- Ranked half absolute relative difference (HARD) of samples plotted against their rank percent value.

If both the original and duplicate result returned a value less than ten times the detection limit, the result was disregarded for the ARD analysis due to distortion in the precision levels at very low grades close to the limits at which the instrumentation can measure. These very low values are not seen as material and can distort more meaningful results if they are not removed.

Table 11.7 Duplicate types used by Fortuna

Duplicate	Description
Field	Sample generated by another sampling operation at the same collection point. Includes a second channel sample taken parallel to the first or the second half of drill core sample and submitted in the same or separate batch to the same (primary) laboratory.
Preparation	Second sample obtained from splitting the coarse crushed rock during sample preparation and submitted in the same batch by the laboratory.
Laboratory	Second sample obtained from splitting the pulverized material during sample preparation and submitted in the same batch by the laboratory.
Reject assay	Second sample obtained from splitting the coarse crushed rock during sample preparation and submitted blind to the same or different laboratory that assayed the original sample.
Duplicate assay	Second sample obtained from splitting the pulverized material during sample preparation and submitted blind at a later date to the same laboratory that assayed the original pulp.
Check assay	Second sample obtained from the pulverized material during sample preparation and sent to an umpire laboratory for analysis.

Rio Tinto (2002 to 2003)

One coarse duplicate (taken after cone crushing to 75 percent passing 10 mesh) and one pulp duplicate (taken from a split at the end of pulverization, 95 percent passing 150 mesh) were inserted in every 30 samples with the objective of checking for splitting or laboratory errors. Samples were randomized. Independent checks assays were carried out using Alex Stewart in Chile, and Bondar Clegg in Canada. Results for all duplicates submitted are displayed in Table 11.8.

Table 11.8 Duplicate results for gold - Rio Tinto

Type of Duplicate	No. of duplicates analyzed#	HARD* value at 90th percentile
Reject assays[1]	22	9.2
Duplicate assays[2]	71	10.3
Check Assays[3] (Alex Stewart)	38	21.2
Check Assays[3] (Bondar Clegg)	103	9.2

*HARD = Half Absolute Relative Difference
Results below detection limit and with insufficient mass removed from analysis
1. Acceptable HARD value for reject assays is less than 20%
2. Acceptable HARD value for duplicate assays is less than 10%
3. Acceptable HARD value for check assays is less than 10%

Precision for the 22 coarse duplicate samples submitted by Rio Tinto are seen as acceptable for gold assays. Fortuna calculated the half absolute relative difference (HARD) of the ALS Chemex laboratory to be ±9.2 percent for gold at the 90th percentile. Fortuna considers coarse duplicate assays to be acceptably precise if 90 percent of the assays show less than 20 percent HARD.

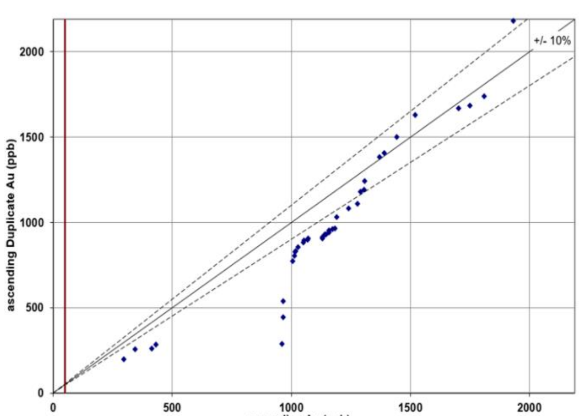
Fortuna calculated the ALS Chemex assay precision for duplicate assays to be ±10.3 percent for gold at the 90th percentile. Fortuna considers pulp duplicate assays to be acceptably precise if 90 percent of the assays show less than 10 percent HARD.

Both the coarse reject and pulps independently submitted by Rio Tinto to ALS Chemex display acceptable levels of precision for a gold deposit of this nature.

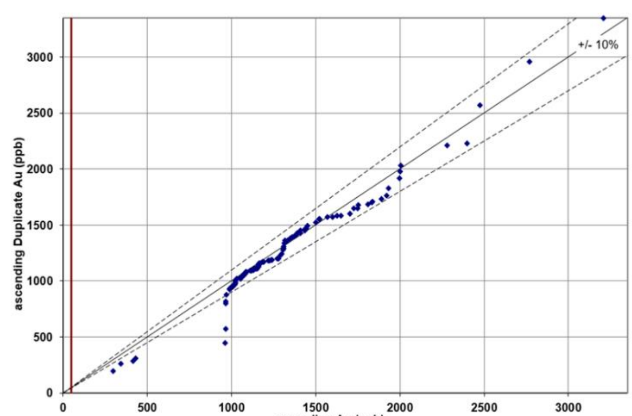
Rio Tinto sent samples for check assays to the Alex Stewart laboratory in La Serena, Chile and Bondar Clegg in Canada. Samples were selected with grades more than 0.90 g/t gold and 500 ppm copper. The results of the analyses show a negative bias in the ALS Chemex assays compared to the results of the other laboratories. This negative bias is at least partially caused by the selection of samples based upon grades, known as a selection bias. The ALS Chemex assays have a fixed lower limit based on the selection, whereas the check assays can return lower grades than this limit.

Fortuna examined the bias between the laboratories by examining quantile-quantile (Q-Q) plots for each of the umpire laboratories compared to the ALS Chemex results for the same samples (Figure 11.1).

Figure 11.1 Quantile-Quantile Plots for check assays



Q-Q Plot – Alex Stewart



Q-Q Plot – Bondar Clegg

Figure prepared by Fortuna Silver Mines Inc., 2017

Although it is not possible to definitively identify which laboratory was experiencing problems due to a lack of available supporting QC samples (i.e. standards/blanks) submitted with the check assays, it is believed that the poor results for duplicates submitted to Alex Stewart is likely a reflection of issues at the umpire laboratory rather than at ALS Chemex, especially with significant bias observed for gold assays less than 1,300 ppb Au. Check assays submitted to Bondar Clegg show minor bias, suggesting that the precision levels at ALS Chemex are acceptable.

Goldrock (Lindero Deposit 2005 to 2010)

Drill holes LDH-11 to LDH-116 were submitted to the ACME laboratory in Santiago, Chile during the drilling campaigns between 2005 and 2008. The geotechnical holes LGT-01 to LGT-05 were also sent for assaying to the ACME laboratory in 2008. However, holes LGT-06 to LGT-11 drilled in 2010 were analyzed at the Alex Stewart laboratory in Mendoza.

For drill holes LDH-11 to LDH-74 a field duplicate was inserted to ACME in each batch of 30 samples. Cross-laboratory check assays were performed on pulp sample material; samples were collected approximately every 10 samples. Two 100 g samples were split from the original pulp sample, with one sent to Alex Stewart in Mendoza, Argentina, and the other to the ALS Chemex in Mendoza (Argentina) and to La Serena (Chile) for assay. Assaying at Alex Stewart and ALS Chemex used a 50 g gold fire assay with an AA finish.

For drill holes LDH-75 to LDH-116, an SRM and field duplicate were inserted to ACME in every batch of 20 samples. Check assays were collected the same way as for holes LDH-11 to LDH-74, with one pulp for every 10 samples, and sent to the same reference laboratories.

For drill holes LDH-75 to LDH-116, field duplicates were collected at a frequency of no less than 15 samples. The half cores were sawed to quarter-core and stored in bags, with different labels to the regular samples, and then inserted in the sampling stream preparation and assaying by ACME laboratories. Check assays were collected as described above, with one pulp for every 10 samples, and sent to the same reference laboratories.

A detailed review of the results drill campaign by drill campaign was conducted by AMEC during the Feasibility Study and reported in the KCA (2016a) Technical Report.

Fortuna conducted a summary analysis of results for all duplicates submitted by Goldrock between 2005 and 2008 (holes LDH-11 to LDH-116) as well as by the individual campaigns described above and for the duplicates submitted for the geotechnical program drilled in 2008 and 2010 (LGT-01 to LGT-11). Fortuna concurred with the findings in the Feasibility Study in respect to individual campaigns.

Drill Campaign LDH-11 to LDH-116

Results for all duplicates submitted between 2005 and 2008 are displayed in Table 11.9.

Table 11.9 Duplicate results for gold – Goldrock (Lindero Deposit 2005 to 2008)

Type of Duplicate	No. of duplicates analyzed#	HARD* value at 90th percentile
Field duplicates[1]	665	19.7
Check Assays[2] (ALS Chemex)	1,601	13.5
Check Assays[2] (Alex Stewart)	1,566	15.7

*HARD = Half Absolute Relative Difference
Results below detection limit and with insufficient mass removed from analysis
1. Acceptable HARD value for field duplicates is less than 30 %
2. Acceptable HARD value for check assays is less than 10 %

Precision for quarter-core duplicate samples submitted is acceptable for gold assays. Fortuna calculated ACME assay precision to be ±19.7 percent for gold at the 90th percentile. Fortuna considers quarter-core duplicate assays to be acceptably precise if 90 percent of the assays show less than 30 percent half absolute relative difference. The levels of precision do vary between campaigns depending on numbers submitted and grade ranges but overall show an acceptable level of precision.

The Goldrock QAQC program is lacking in pulp duplicate analyses performed at the same laboratory using the same analytical procedures. As a substitute, Fortuna used the check assays to evaluate bias and precision, although this is not ideal as the precision values obtained are a combination of analytical, pulp sub-sampling and between laboratory variances. As such it is to be expected that the precision is somewhat lower than some laboratory duplicates analyzed under the same conditions as the original samples. Additionally, if deviations or bias exists it is impossible to tell which laboratory is at fault.

Fortuna calculated ACME to ALS Chemex assay precision to be ±13.5 percent for gold at the 90th percentile. Precision for the ACME to Alex Stewart was found to be ±15.7 percent. In addition, Q-Q plots were examined with no significant bias being observed above the line of significance (10 x the detection limit) for either of the umpire laboratories compared to the original assays. Fortuna considers this lack of bias to be acceptable for cross-laboratory pulp duplicates.

No SRMs or blanks were included in the check assay dispatches to control assay accuracy and contamination issues at the secondary check laboratories.

Drill Campaign LGT-01 to LGT-11

Duplicate results for the geotechnical drill holes drilled between 2008 and 2010 are displayed in Table 11.10.

Table 11.10 Duplicate results for gold – Goldrock (Lindero Deposit 2008 to 2010)

Type of Duplicate	No. of duplicates analyzed#	HARD* value at 90th percentile
Field duplicates[1]	79	22.0
Check Assays[2] (ALS Chemex)	77	11.0
Check Assays[2] (Alex Stewart)	71	19.3

*HARD = Half Absolute Relative Difference
Results below detection limit and with insufficient mass removed from analysis
1. Acceptable HARD value for field duplicates is less than 30 %
2. Acceptable HARD value for check assays is less than 10 %

Precision for quarter-core duplicate samples submitted is acceptable for gold assays. Fortuna calculated assay precision to be ±22.0 percent for gold at the 90th percentile. Fortuna considers quarter-core duplicate assays to be acceptably precise if 90 percent of the assays show less than 30 percent half absolute relative difference.

As in the prior years, the Goldrock QAQC program did not submit coarse reject or pulp duplicate samples for analyses at the same laboratory using the same analytical procedures. Similar to the results for 2005 to 2008, Fortuna used the check assays to evaluate bias and precision between the primary and umpire laboratories, although this is not ideal as per the reasons described above.

Fortuna calculated primary laboratory to ALS Chemex assay precision to be ±11.0 percent for gold at the 90th percentile. Precision for the duplicates submitted to Alex Stewart was found to be ±19.3 percent. Fortuna considers pulp duplicate assays to be acceptably precise if 90 percent of the assays show less than 10 percent half absolute relative difference. In addition, Q-Q plots were examined with no significant bias observed for the pulps sent to ALS Chemex but results from Alex Stewart indicated a low bias in the duplicate results for assays up to 0.12 g/t Au). Although the precision levels at the Alex Stewart laboratory do not achieve the desired levels and bias was observed in the results, it is believed that this is more a reflection of an issue in the umpire laboratory rather than at ACME as the results from the alternative umpire laboratory (ALS Chemex) are reasonable and unbiased. With this in mind, Fortuna considers the level of precision at the primary laboratory (ACME) to be acceptable for resource estimation purposes.

No SRMs or blanks were included in the check assay dispatches to control assay accuracy and contamination issues at the secondary check laboratories.

Goldrock (Arizaro Deposit 2010 to 2013)

Goldrock inserted 240 quarter-core duplicate samples into the sample stream, although two were removed from the analysis as having anomalous negative values (Table 11.11). The sample intervals that are being evaluated were not blind to the laboratory since both the duplicate, and corresponding original sample, are quarter-core samples and they are submitted in sequence. There is no physical distinction between the "original" and "duplicate" sample since they are both splits of the same half-core, collected, and then shipped to the lab together in sequence.

In addition, a split of the original sample pulp was sent to second and third laboratories as check assays. Alex Stewart was the primary lab for holes ARD-03 through ARD-08. Second and third laboratory pulp check analyses were conducted at ACME and ALS Chemex. For holes ARD-09 through ARD-29, ACME was the primary laboratory and second and third laboratory pulp check analyses were conducted at Alex Stewart and ALS Chemex. A total of 482 original sample pulps were re-assayed.

Table 11.11 Duplicate results for gold – Goldrock (Arizaro Deposit 2010 to 2013)

Type of Duplicate	No. of duplicates analyzed#	HARD* value at 90th percentile
Field duplicates[1]	238	29.4
ARD-03 to ARD-08 Check Assays[2] (ACME)	125	56.4
ARD-03 to ARD-08 Check Assays[2] (ALS Chemex)	125	59.8
ARD-09 to ARD-29 Check Assays[2] (Alex Stewart)	357	32.5
ARD-09 to ARD-29 Check Assays[2] (ALS Chemex)	357	31.7

*HARD = Half Absolute Relative Difference
Results below detection limit and with insufficient mass removed from analysis
1. Acceptable HARD value for field duplicates is less than 30 %
2. Acceptable HARD value for check assays is less than 10 %

The pulp duplicate results for the first drill campaign indicate a high average positive bias in both the ACME and the ALS Chemex duplicate analyses when compared to the Alex Stewart original assay values. Sample variance is also high at over 30% for both pulp duplicate check analyses. Conversely, in the second drill campaign, both the Alex Stewart and ALS Chemex pulp duplicate analyses show a significant negative average bias when compared against the original ACME assay values. Sample variance is lower than in the first drill campaign but is still considered high for pulp duplicate analyses.

The negative bias apparent in the Alex Stewart original assays imparts some conservatism to the resource estimate. In contrast, the apparent positive bias in the ACME original assays for holes ARD-09 through ARD-16 would result in an overstating of the resource grade. Fortuna has not evaluated the effect of the observed sample bias in the resource estimate but believes that there is low risk to the global resource estimate and an increased moderate risk in the local estimate of gold grades.

The high average sample variance values seen in the pulp duplicate analyses indicate a coarse gold nature to at least a portion of the gold mineralization. This imparts a moderate risk to the local gold estimate.

Fortuna (Lindero Deposit 2016 to 2022)

Drill holes LDH-117 to LDH-216 were submitted to the ALS Global sample preparation facility in Mendoza, Argentina. Pulp samples were shipped by commercial air freight to ALS Global's analytical facility in Lima, Peru for analysis.

Fortuna submitted field duplicates, reject assays (coarse rejects), duplicate assays (pulps), check assays (pulps sent to an umpire laboratory) with the drill sample submissions to the laboratory to monitor assay precision. Samples were sent for check analyses to Bureau Veritas laboratory in Lima, Peru for assaying.

Field, preparation, and laboratory duplicates were submitted at a frequency of no less than 1 in 20 samples. Reject assays, duplicate assays, and check assays were submitted at a frequency of no less than 1 in 40 samples. Standards and blanks were submitted with the duplicates sent to the umpire laboratory and showed reasonable levels of accuracy and no contamination or sampling switching issues. A summary of the duplicate results is displayed in Table 11.12.

Table 11.12 Duplicate results for gold – Fortuna (Lindero Deposit 2016 to 2022)

Type of Duplicate	2016		2018		2021		2022	
	No. of duplicates analyzed#	HARD* value at 90th percentile	No. of duplicates analyzed#	HARD* value at 90th percentile	No. of duplicates analyzed#	HARD* value at 90th percentile	No. of duplicates analyzed#	HARD* value at 90th percentile
Field duplicates[1]	124	19.0	39	11.5	44	19.0	28	14.2
Preparation duplicates[2]	122	7.7	40	6.7	41	6.7	28	5.3
Laboratory duplicates[3]	123	6.3	41	4.6	42	5.6	24	5.7
Reject assays[2]	57	11.7	26	4.8	25	5.3	35	4.8
Duplicate assays[3]	55	9.1	31	6.7	25	7.4	34	6.5
Check Assays[3]	56	10.9	24	5.2	26	5.5	34	6.2

*HARD = Half Absolute Relative Difference
Results below detection limit and with insufficient mass removed from analysis
1. Acceptable HARD value for field duplicates is less than 30 %
2. Acceptable HARD value for preparation duplicates and reject assays is less than 20 %
3. Acceptable HARD value for laboratory duplicates, duplicate assays, and check assays is less than 10 %

Precision for quarter-core duplicate samples submitted is acceptable for gold assays. Fortuna calculated assay precision to vary from ±11.5 percent and ±19.0 percent between 2016 and 2018 for gold at the 90th percentile. Fortuna considers quarter-core duplicate assays to be acceptably precise if 90 percent of the assays show less than 30 percent HARD.

Precision for preparation duplicate samples and reject assays submitted to ALS Global is acceptable for gold assays varying from ±5.3 percent and ±7.7 percent between 2016 and 2018. Fortuna considers coarse reject assays to be acceptably precise if 90 percent of the assays show less than 20 percent HARD.

Precision for laboratory duplicate samples and duplicate assays submitted to ALS Global is also acceptable for gold assays varying from ±4.6 percent and ±6.3 percent. Fortuna considers pulp assays to be acceptably precise if 90 percent of the assays show less than 10 percent HARD.

Levels of bias observed through Q-Q plots for the check assays submitted to an umpire laboratory compared to ALS Global were found to be insignificant, further establishing the confidence in the assay results for estimation purposes.

Fortuna (Arizaro Deposit 2018 to 2022)

Drill holes ARD-30 to ARD-65 were submitted to the ALS Global sample preparation facility in Mendoza, Argentina. Pulp samples were shipped by commercial air freight to ALS Global's analytical facility in Lima, Peru for analysis.

Fortuna submitted field duplicates (half core), reject assays (coarse rejects), duplicate assays (pulps), check assays (pulps sent to an umpire laboratory) with the drill sample submissions to the laboratory to monitor assay precision. Samples were sent for check analyses to Bureau Veritas laboratory in Lima, Peru for assaying.

A summary of the duplicate results is displayed in Table 11.13.

Table 11.13 Duplicate results for gold – Fortuna (Arizaro Deposit 2018 to 2022)

Type of Duplicate	2018		2021		2022	
	No. of duplicates analyzed#	HARD* value at 90th percentile	No. of duplicates analyzed#	HARD* value at 90th percentile	No. of duplicates analyzed#	HARD* value at 90th percentile
Field duplicates[1]	32	19.7	62	29.4	53	23.5
Preparation duplicates[2]	67	11.1	71	18.4	69	24.4
Laboratory duplicates[3]	65	9.1	65	14.4	50	12.6
Reject assays[2]	19	25.6	55	33.4	55	35.5
Duplicate assays[3]	25	16.4	56	39.8	55	25.4
Check Assays[3]	42	7.0	55	28.2	-	

*HARD = Half Absolute Relative Difference
Results below detection limit and with insufficient mass removed from analysis
1. Acceptable HARD value for field duplicates is less than 30 %
2. Acceptable HARD value for preparation duplicates and reject assays is less than 20 %
3. Acceptable HARD value for laboratory duplicates, duplicate assays, and check assays is less than 10 %

Precision for half-core duplicate samples submitted is acceptable for gold assays. Fortuna calculated assay precision to vary from ±19.7 percent and ±29.4 percent between 2018 and 2022 for gold at the 90th percentile. Fortuna considers half-core duplicate assays to be acceptably precise if 90 percent of the assays show less than 30 percent HARD.

Precision for preparation duplicate samples and reject assays submitted to ALS Global is generally acceptable with gold assays varying from ±11.1 percent and ±24.4 percent between 2018 and 2022. Fortuna considers coarse reject assays to be acceptably precise if 90 percent of the assays show less than 20 percent HARD.

Precision for laboratory duplicate samples and duplicate assays submitted to ALS Global is also generally acceptable with gold assays varying from ±9.1 percent and ±14.4 percent. Fortuna considers pulp assays to be acceptably precise if 90 percent of the assays show less than 10 percent HARD.

Levels of precision were lower for resubmitted samples sent to the same or umpire laboratories (Reject assays, duplicate assays and check assays) demonstrating the more variable nature of mineralization that exists at the Arizaro Deposit. The precision levels have been taken into account when classifying the Mineral Resource.

Mansfield (blast holes 2019 to 2022)

Mansfield submitted field duplicates, reject assays (coarse rejects), duplicate assays (pulps), check assays (pulps sent to an umpire laboratory) with the blast hole sample submissions to the on-site laboratory to monitor assay precision. Samples were sent for check analyses to ALS Global sample preparation facility in Mendoza, Argentina, with pulp samples shipped by commercial air freight to ALS Global's analytical facility in Vancouver, British Columbia for analysis.

Preparation and laboratory duplicates were submitted at a frequency of no less than 1 in 20 samples. Field duplicates, reject assays, duplicate assays, and check assays were submitted at a frequency of no less than 1 in 40 samples. Standards and blanks were submitted with the duplicates sent to the umpire laboratory and showed reasonable levels of accuracy and no contamination or sampling switching issues.

Precision levels for all duplicate types generally adhere to the minimum acceptance criteria as set out by Fortuna.

11.5.4 Conclusions regarding quality control results

Submission rates and accuracy levels (SRM submission), as well as sample contamination/switching (blank submission) for all laboratories is considered reasonable, with all campaigns showing pass rates of above 95 percent. The certificates for SRM's submitted during the Rio Tinto campaign are not available and therefore accuracy levels for these early holes cannot be confirmed and that has been taken into consideration during Mineral Resource confidence category classification.

During both the Rio Tinto and Goldrock drilling campaigns a limited number of duplicate types were submitted meaning that an analysis of each stage of the sample preparation process cannot be assessed. Nevertheless, field duplicates and check assays were submitted regularly, and both report reasonable levels of precision, with the exception of check assays submitted to Alex Stewart during the Rio Tinto drilling campaign. This is believed to represent an issue at the umpire laboratory rather than the primary (ALS Chemex) laboratory as the same pulps submitted to Bondar Clegg reported acceptable precision levels. Fortuna submitted a full suite of duplicate types during the 2016, 2018, 2021 and 2022 drilling campaigns and reasonable precision levels were observed for all duplicate types. It is common to encounter precision issues in gold deposits due to the highly heterogenous "nugget effect" nature of gold mineralization, however as demonstrated from the heterogeneity test (Section 9.5.3), the mineralization is very homogenous in nature at the Lindero Deposit with good gold grade continuity observed in relation to the intrusive events in the porphyry system.

The Arizaro Deposit QC results show a low bias in the Alex Stewart gold data within holes ARD-03 through ARD-08 and a high bias in the ACME data in holes ARD-09 through ARD-16. There is also evidence of a lack of precision, in the form of increased blank and SRM sample failures, in the ARD-09 through ARD-16 ACME data. These factors result in a low risk to the global estimate but an increased risk in the local gold grade estimate. The precision levels are much improved in holes ARD-17 to ARD-65 but variance is still greater than tolerance levels in the resubmitted pulps.

The high average sample variance values seen in the pulp duplicates indicate a coarse gold nature for at least a portion of the gold mineralization. This imparts a moderate risk to the local gold estimate. The Arizaro Deposits greater level of heterogeneity in gold mineralization has been accounted for during Mineral Resource classification.

All drilling data including QC results are stored in Maxwell GeoService's commercial SQL database system, DataShed™, which is stored on the Lindero server. All data must pass a series of validation checks prior to being imported into DataShed™. A dedicated data manager oversees data transfer with QC information exported into an Excel™ format for analysis. Mansfield are working with Maxwell to allow the automated evaluation of all QC information inside DataShed™ to remove the need for data exportation. Access to DataShed™ is limited to the database manager, being password protected and a backup of the database is taken automatically daily with hard copy discs being taken to Salta for storage weekly.

11.6 Comment on Section 11

Implementation of a quality assurance/quality control (QAQC) program is current industry best practice and involves establishing appropriate procedures and the routine insertion of SRMs, blanks, and duplicates to monitor the sampling, sample preparation and analytical process. Fortuna implemented a full QAQC program to monitor the sampling, sample preparation and analytical process since 2016 in accordance with its companywide procedures. The program involved the routine insertion of SRMs, blanks, and duplicates. Evaluation of the QAQC data indicates that the data is sufficiently accurate and precise to support Mineral Resource estimation.

It is the opinion of the QP that the sample preparation, security, and analytical procedures for samples taken at the Lindero and Arizaro deposits by both Goldrock and Fortuna have been conducted in accordance with acceptable industry standards and that assay results generated following these procedures are adequately precise and accurate for use in Mineral Resource and Mineral Reserve estimation.

12 Data Verification

12.1 Introduction

Fortuna has conducted numerous audits and verification of historical information as well as verifying new data generated since 2016 to support assumptions used in the most recent resource and reserve estimates. The verification process includes the following items:

- Database.
- Collars and down-hole surveys.
- Lithological logs.
- Assays.
- Metallurgical results.
- Geotechnical parameters.

12.2 Database

Mansfield stores all drilling data in Maxwell GeoService's commercial SQL database system, DataShed™, employing a dedicated data manager to oversee the data transfer. All data must pass a series of validation checks prior to being imported into DataShed™.

The database was then reviewed and validated by Mr. Alexander Delgado (MAusIMM) an employee of Fortuna. The data verification procedure involved the following:

- Evaluation of minimum and maximum grade values.
- Investigation of minimum and maximum sample lengths.
- Randomly selecting assay data from the databases and comparing the stored grades to the original assay certificates.
- Assessing for inconsistences in spelling or coding (typographic and case sensitivity errors).
- Ensuring full data entry and that a specific data type (collar, survey, lithology, and assay) is not missing.
- Assessing for sample gaps or overlaps.

Minor inconsistencies were discovered and corrected by Mansfield personnel.

12.3 Collars and downhole surveys

12.3.1 Collars

Fortuna checked all collar and downhole survey information for each campaign against source documentation. In addition, Fortuna completed a hand-held GPS survey of randomly selected drill hole collars. The results showed a good correlation with locations in the database.

Of the 233 holes drilled at Lindero and 65 holes drilled at Arizaro, 189 collars have been surveyed using differential GPS (Geodesico). Of the 23 drill holes that were not GPS surveyed these were related to condemnation and geotechnical drilling conducted in 2008 and 2010 with only three holes located in the area of mineralization. Trenches were surveyed using either a handheld GPS unit or compass and tape measure.

12.3.2 Downhole surveys

Of the 233 holes drilled at Lindero, 20 holes do not have validated downhole surveys. All holes drilled at Arizaro have validated downhole surveys.

A study of downhole deviations was conducted by AMEC in 2009 to determine whether unsurveyed drill holes or drill holes surveyed using the Maxibor™ instrument should be adjusted.

AMEC used the first and last downhole survey of each drill hole to calculate a total, accumulated azimuth and dip deviation. Vertical deviations in the dip of the drill holes as measured by Maxibor™ and gyroscope surveys are very similar.

Horizontal deviations in the azimuth of the drill holes; however, are different. The gyroscopic survey measurements show that 45 out of 53 drill holes (85 percent) deviated in a clockwise direction (i.e. following the rotation of the drill rod) while Maxibor™ measurements show 26 out of 50 drill holes (52 percent) deviating in an anti-clockwise direction.

In order to evaluate the risk associated with the Maxibor™ surveys, AMEC constructed a model using gyroscopic downhole surveys with a clockwise azimuth deviation. Each drill hole with a Maxibor™ survey was then evaluated against the model in order to determine the downhole depth at which the horizontal deviation became greater than 10 m in either the easting or northing direction. Results show that a total of 15 drill holes had horizontal deviations of greater than 10 m at downhole depths ranging from 150 m to 490 m.

The depth intervals of those drill holes with excessive horizontal deviations were flagged and were subsequently considered during resource classification.

Fortuna reviewed the analysis and findings from this investigation and are in agreement with the study and therefore have also taken into account the above during the resource classification.

The condemnation (5) and geotechnical drill holes (11) drilled in 2008 and 2010 did not have downhole surveys conducted. These holes were drilled to a maximum depth of 350 m with the condemnation holes drilled at 60^{o} angles and the geotechnical holes drilled vertically.

The 101 holes drilled since 2016 under the supervision of Mansfield and Fortuna were downhole surveyed using a Reflex Gyro™ survey instrument.

12.4 Lithological logs

In August 2016, Fortuna initiated a comprehensive program of relogging to verify the original lithological descriptions. An independent porphyry geology specialist was contracted to lead the relogging program. This involved relogging of holes on a systematic basis along a series of delineated sections to facilitate the generation of geological interpretational cross sections. A core library was created for each of the main lithological units for cross reference purposes and for each hole logged a representative sample was retained for each lithological unit for confirmatory purposes to resolve discrepancies in the sectional interpretations.

The logging process established cross cutting relationship between intrusive events and vein systems. This assisted in increasing the confidence in the geological interpretation.

Implementation of LogChief™ software during and subsequent to relogging ensures standardization of terms and provides a preliminary layer of verification that is actioned during the logging process.

Drill core is reviewed on a regular basis during regular site visits conducted by Mr. Eric Chapman, Senior Vice President of Technical Services for Fortuna, as part of the data verification process.

12.5 Assays

12.5.1 Rio Tinto

No assay certificates are available from the Rio Tinto drill campaigns. The data was stored in Excel™ spreadsheets. Fortuna has therefore not been able to verify the assay data against source documentation. The lack of assay certificates for the drill holes from the Rio Tinto drilling campaign was considered during resource classification.

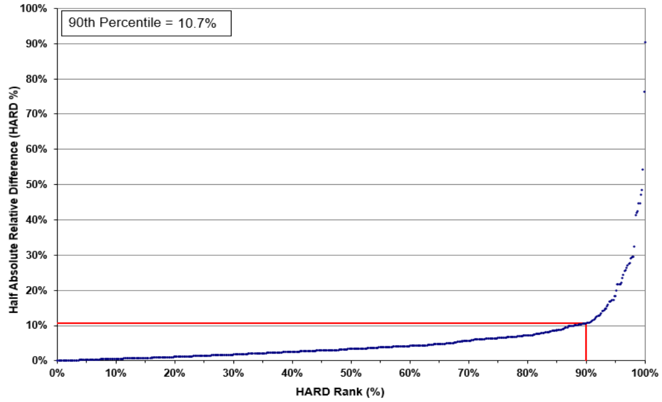
12.5.2 Goldrock

Of the 17,092 assays received by Goldrock during the drilling campaign between 2005 and 2008 original pdf certificates are missing for 5,166 of the samples assayed by ACME in 2007 with only the Excel™ spreadsheets available for review. Fortuna conducted an extensive search which included contacting multiple laboratories and previous consultants in the hope of recovering the missing assay certificates but without success. To validate the missing assays, Fortuna randomly selected 520 pulps representing all drill holes, lithologies, and a range of depths and assays of the samples for which certificates are missing (10 percent of the total) and resubmitted them for analysis at ALS Global. A statistical evaluation was conducted comparing the original reported values against the resubmitted check assays as shown in Table 12.1 and Figure 12.1.

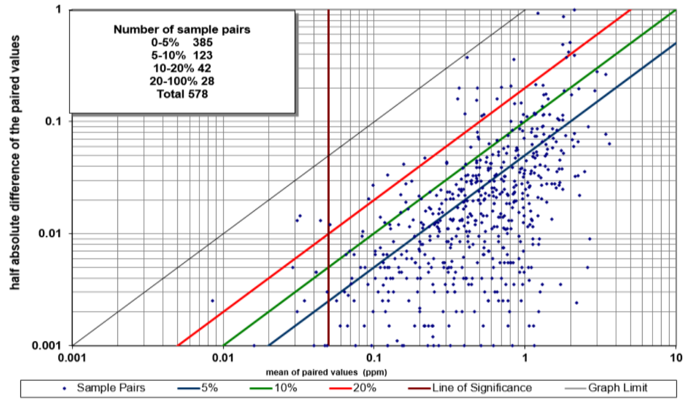
Table 12.1 Statistical analysis of original and resubmitted gold assays for samples missing certificates

Parameter	Original	Resubmission
Minimum (g/t)	0.011	0.006
Lower quartile (g/t)	0.25	0.24
Median (g/t)	0.53	0.51
Mean (g/t)	0.67	0.67
Geometric mean (g/t)	0.46	0.44
Log estimate mean (g/t)	0.73	0.74
Upper quartile (g/t)	0.94	0.94
Maximum (g/t)	3.69	3.69
Coefficient of variation	0.85	0.88
Standard deviation	0.57	0.59
Variance	0.33	0.35
Correlation coefficient	0.95	
Log correlation coefficient	0.97	
Half absolute relative difference[1]	10.7	
1. Acceptable HARD value for check assays is less than 10 %		

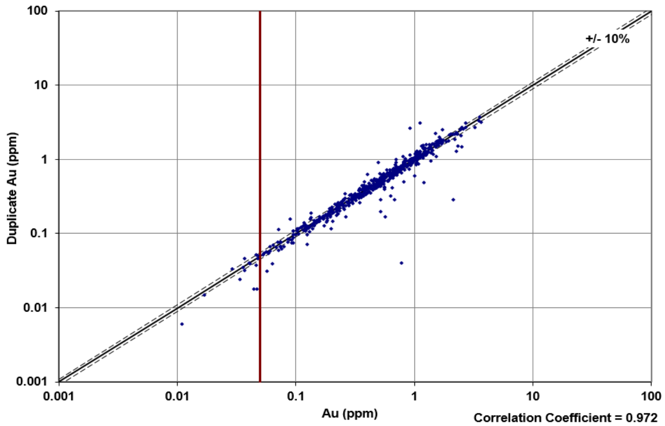
Figure 12.1 Check assay duplicate analysis for samples missing certificates



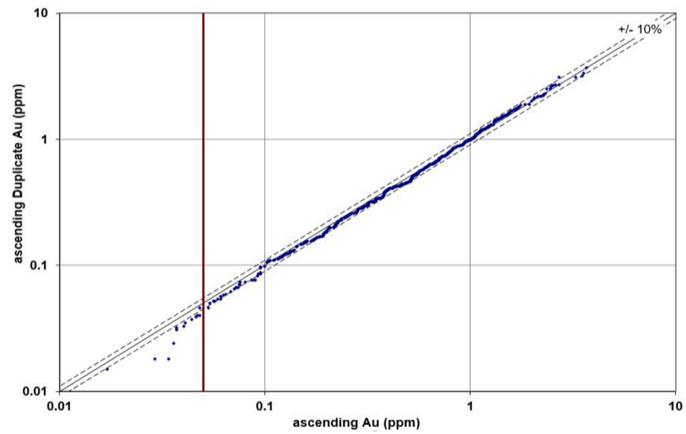
Ranked HARD plot



Precision Pairs Plot



Log scatter plot



Log Q-Q Plot

Figure prepared by Fortuna Silver Mines Inc., 2017

No significant deviation or bias was observed between the randomly selected check assays and the originals beyond that which would be expected when resubmitting pulps to an umpire laboratory. Subsequently, although the pdf certificates of the assays cannot be located, the QP considers the data in the Excel™ spreadsheets to be valid and acceptable for Mineral Resource estimation purposes.

12.5.3 Fortuna

A full QAQC program including the insertion of standards, blanks and duplicates was performed to validate the assays reported by ALS Global since 2016. A full description of the programs and results are provided in Section 11.5. Fortuna concluded that the reported assays were suitable for resource estimation purposes.

12.5.4 Mansfield

Mansfield utilize a similar QAQC program as described above to validate the assays obtained from blast hole samples used for grade control purposes. A full description of this program and its results is provided in Section 11.5. Blast hole assays are used in a limited capacity in the estimation of Mineral Resources.

12.6 Density measurements

12.6.1 Goldrock

To validate the historical density measurements used for estimating tonnage for the Lindero Deposit, Fortuna submitted 30 randomly selected density samples to ALS Global for analysis. The laboratory prepared the samples using the OA-GRA08 methodology using a wax coating and comparing the weight in air and weight in water of the selected samples. A comparison of the original and re-submitted density results are displayed in Table 12.2.

Table 12.2 Comparison of original and re-submitted density measurements

Sample ID	Original (g/cm^3)	Resubmission (g/cm^3)	Percentage Difference
D-52	2.67	2.69	1
D-55	2.55	2.67	5
D-57	2.67	2.75	3
D-60	2.63	2.65	1
D-65	2.72	2.68	-1
D-68	2.78	2.82	2
D-72	2.75	2.83	3
D-300	2.56	2.48	-3
D-304	2.57	2.59	1
D-318	2.59	2.55	-2
D-320	2.54	2.52	-1
D-403	2.59	2.50	-3
D-409	2.70	2.59	-4
D-413	2.73	2.78	2
D-415	2.60	2.67	3
D-444	2.66	2.69	1
D-449	2.62	2.63	0
D-452	2.53	2.46	-3
D-457	2.63	2.69	2
D-481	2.61	2.58	-1
D-483	2.63	2.63	0
D-488	2.61	2.62	0
D-615	2.57	2.60	1
D-617	2.59	2.58	-1
D-725	2.64	2.64	0
D-729	2.61	2.65	2
D-733	2.65	2.79	5
D-734	2.63	2.57	-2
D-735	2.68	2.73	2
D-737	2.72	2.61	-4
TOTAL	**2.63**	**2.64**	**0**

Although some minor variations are observed, the levels of variation are within expected levels of tolerance and the average density levels being reported show no significant deviation or bias. Fortuna concluded from the above verification that the historical density measurements appear reasonable and have been maintained for resource estimation.

12.6.2 Mansfield

Mansfield performs regular density measurements of samples from drill core and in pit with tonnage estimates validated against truck and belt weightometers.

12.7 Metallurgical results

An extensive program of metallurgical testwork was performed by Goldrock and validated by Fortuna through additional test programs since 2016 to support the construction decision and establish detailed processing plant and leach pad designs. Since first ore was place on the leach pad in July 2020, Mansfield has been using its in-house laboratory to continuously optimize the operational performance in support of the LOM. A description of this work is presented in Section 13.

12.8 Geotechnical parameters

Fortuna contracted CNI to validate all geotechnical data, data collection methods, slope stability analysis methods, and slope angle recommendations presented previously by other consultants to determine feasibility-level slope angle recommendations for design of the Lindero final pit. Based on the review, additional work, including a site visit in August 2016 and slope stability analysis work, were conducted by CNI to determine slope angles for feasibility design purposes.

An initial draft report was completed by CNI in early October 2016 (CNI, 2016). This report included recommendations for trenching to explore the character of materials to comprise the foundation of planned waste stockpiles where there was little drilling information.

The trenching work along with other tasks were completed during a site visit in late October 2016. An updated report was presented to Fortuna in May 2017 (CNI, 2017) which included the results of the trenching work, updated waste dump stability analysis, and study of the impacts of a revised geologic model provided in early 2017 on pit slope stability. The report also presented conclusions and recommendations for the final pit design as well as blasting and slope angle recommendations for the interim pit phases.

A subsequent update on the design report was performed by CNI in November 2022 (CNI, 2022). Site visits and design verifications were performed during early stages of mining and the conclusion of the report are:

- The 2012 lithology model shows no material changes in the position of the Red Beds/igneous contact.
- The new RQD logging information validates the 2016 RQD model.
- The newly available geology and geotechnical information does not warrant an update of the RQD and interramp slope angles (ISA) models.
- The extents of the RQD block model do not reach the upper parts of the slope in a limited area in the southwest and north of the pit. It is recommended that new drill holes be planned to obtain information for the areas not covered by the RQD block model. An update of the RQD block model should be performed when this new information becomes available.

- It is not expected that the waste dump located at the southwest wall of the pit will decrease stability due to excess surcharge loadings.
- Length and spacing information from the Red Beds bedding and cross joints must be mapped to be able to assess the impact of step-path failures on bench-scale and overall stability. The CNI cell mapping methodology is recommended for this purpose. Based on the planned sequence, mapping of this unit in key sectors of interim walls can be performed from 2023 to 2025 prior to updating the final design and establishment of the final pit wall.
- With optimized blasting, mining, and scaling techniques, interramp slope angles ranging from 50 to 56 degrees can be achieved for the Lindero final pit. Structural mapping and trials of final wall blasting should be done in the interim phases to assess the potential for steepening with blasting trials.
- CNI recommends performing drone flights to measure the achieved condition of bench faces and bench face angles while evaluating the results of mining and blasting practices. Cell mapping and structural data can also be obtained using this method.
- CNI proposed providing training to personnel on site on the mapping techniques in 2023.

All of the above recommendations were taken into account as part of the reserve estimation process conducted by Fortuna as described in Section 15.

12.9 Mine reconciliation

The ultimate validation of the Lindero Mine block model is to compare actual grades to predicted grades using the established estimation parameters. A comparison of the resource estimation against production polygons or diglines (mineralized material identified via blast holes as being above cut-off grade during extraction) from July 1, 2021 to June 30, 2022 indicates the parameters used in the estimation process are reasonable with a difference of less than 1 percent for tonnes and gold grades, with variations rarely exceeding 5 percent on a monthly basis.

12.10 Comment on Section 12

Fortuna has verified historical information as well as any new data generated since 2016 that has been used in the most recent resource and reserve estimates. The verification process focused on the database; collars and downhole surveys; lithological logs; assays; metallurgical results; and geotechnical parameters. Fortuna checked all collar and downhole survey information for each campaign against source documentation and completed a hand-held GPS survey of randomly selected drill-hole collars. The results showed a good correlation with locations in the database. In August 2016, Fortuna initiated a comprehensive program of relogging to verify the original lithological descriptions.

The QP is of the opinion that the data verification programs performed on the data collected are adequate to support the geological interpretations, the analytical and database quality, and Mineral Resource estimation at the Lindero Mine and Arizaro Project. This conclusion is based on the following:

- No material sample biases were identified from the QAQC programs. Analytical data that were considered marginal were accounted for in the resource classifications.
- Sample data collected adequately reflect deposit dimensions, true widths of mineralization, and the style of the deposits.
- External reviews of the database were performed in 2003, 2008, and 2009, producing independent assessments of the database quality. No significant problems with the database, sampling protocols, flowsheets, check analysis program, or data storage were noted.
- Mansfield compiled and maintains a relational database (DataShed™) for the Lindero Mine and Arizaro Project which contains all collar, assay, density, survey and lithology information as well as all associated QAQC data.
- Drill holes lacking surveyed collar coordinates have been resurveyed wherever possible and the original surveyor records stored.
- Assays obtained during Goldrock's drilling programs that lacked original assay certificates have been verified by a program of re-assaying of 10 percent of the pulps which indicated no significant bias between the original and reassayed results.
- Drill data are typically verified prior to Mineral Resource estimation, by running a software program check.
- Geotechnical parameters used in the Lindero Mine open pit and waste dump designs have been reviewed by CNI and confirmed as reasonable with established ongoing training and monitoring programs.
- Mine reconciliation results for 2022 indicate a strong correlation between the estimated tonnes and grade, and that experienced at the plant with differences being less than 2 percent for the year.

13 Mineral Processing and Metallurgical Testing

The Lindero Deposit has been the subject of multiple and extensive testing campaigns that progressively optimized its metallurgical and process design parameters whereas limited metallurgical testing has been conducted on samples from the Arizaro Deposit (Table 13.1).

At the Lindero Deposit, Goldrock initially conducted two primary testing campaigns between 2004 and 2007. After acquiring the project, Fortuna conducted four additional testing campaigns between 2016 and 2019 that supported or further optimized the metallurgical performance and economics of the project with a focus on:

- A third crushing stage using HPGR.
- Ore curing using cyanide.
- The removal of copper from the pregnant solution by using the sulfidization, acidification, recycling and thickening process, also known as SART.

The Arizaro Deposit was subject to preliminary metallurgical testing in 2013.

Metallurgical testing has continued since the Lindero Mine started operating in late 2020, with Lindero's onsite metallurgical laboratory regularly conducting tests to optimize the metallurgical performance of all unit processes of the industrial scale operation, including testing future ore samples as per the latest LOM plan.

Table 13.1 Summary of metallurgical testing programs for the Lindero Property

Year	Type of work	Company	Deposit
2004	Metallurgical testwork on 30 samples	Goldrock	Lindero
2007	Metallurgical testwork on bulk samples totaling 2,200 kg	Goldrock	Lindero
2013	Preliminary metallurgical testwork on 4 bulk samples	Goldrock	Arizaro
2016	Metallurgical testwork on 4 x 750 kg of historical core	Fortuna	Lindero
2016	Metallurgical testwork on 2 x 300 kg of historical core	Fortuna	Lindero
2017	Metallurgical testwork on 2 x 600 kg of fresh core	Fortuna	Lindero
2018	Metallurgical testwork on 2 x 500 kg of fresh core	Fortuna	Lindero
2021	Metallurgical testwork on 2 bulk samples	Mansfield	Lindero
2022	Metallurgical testwork on 3 bulk samples	Mansfield	Lindero

13.1 Historical metallurgical testwork by Goldrock

The following are key results and conclusions derived from the metallurgical testwork developed by Goldrock and summarized in the 2016 Technical Report (KCA, 2016a) and supported by the metallurgical laboratory reports (KCA, 2009; 2009a; 2012; 2013; 2014; 2016b).

Samples were classified by lithology and assigned to four metallurgical types: Met 1, Met 2, Met 3, and Met 4 as detailed in Table 13.2.

Table 13.2 Goldrock metallurgical sample classification

Lithology Code	Description	Mineralogical Grouping	Oxides/Fresh
FPD/CPD1	Fine Porphyry Diorite	MET 1	Fresh (sulfide)
PBFDox	Bi-Modal Porphyry	MET 1	Fresh (sulfide)
BxMagmt	Magmatic Breccia	MET 1	Fresh (sulfide)
FPDox	Oxide Fine Porphyry Diorite	MET 2	Oxide (incl. mixed)
DDP/DDPox	Mingled Porphyry	MET 3	Fresh (sulfide) & Oxides
SED	Sediments	MET 4	Fresh (sulfide) & Oxides
PMI	Post Mineral Quartz Diorite		Fresh (sulfide)

The metallurgical program was executed in six phases between 2004 and 2012 as follows:

- Phase I – October 2004: Bottle roll tests and three small columns were conducted on Met 1 and Met 2 samples. This program was noted in the 2016 Technical Report but no summary of results was given.
- Phase II – August 2006: 28 bottle roll tests were conducted on a range of crushed sizes and 15 column tests were performed on all four met types.
- Phase III – July/September 2007: Seventeen column tests were conducted on hammermill-crushed samples. The samples were reduced to nominal passing 9 mm. The four met types were represented.

Four additional column tests were conducted on HPGR-crushed materials reduced to nominal passing 9 mm. These materials were determined to be contaminated, resulting in increased cyanide consumption to "abnormally high values" although the gold extraction was deemed to be acceptable.

The characterization of the samples included testing to define the crushing work index (CWi), abrasion index (Ai) and the HPGR roll wear rate.

- Phase IV – March 2008: Material crushed by hammermill to nominal passing 6.3 mm was supplied for testing. These samples were not tested due to a contamination with boron during the crushing stage.
- Phase V – 2009: Met 2 samples were crushed in three different types of comminution equipment: a vertical shaft impactor (REMco), a cone crusher (Metso) and an HPGR (KHD Humboldt Wedag). Each sample was crushed to a nominal passing 6.3 mm. Two column tests were performed on each different crushed material.
- "All-OX" Tests (Phase VI) – 2012: These tests were conducted on oxidized material selected for the pad overliner.

The Phase III leaching results are presented in Figure 13.1. The samples were crushed to nominal size minus 9 mm. Leach solution application rate was between 10 $l/hr/m^2$ and 15 $l/hr/m^2$. Concentrations of approximately 0.2 gpl NaCN was used in the leach solutions. Tests were run in columns in closed cycle with activated carbon and ranged from approximately 1 m to 4 m tall. It should be noted that the legend in Figure 13.1 refers to the actual laboratory's test number. Trends without a Met Type designation are from the Phase I columns testing.

Figure 13.1 Extraction curves Phase III results

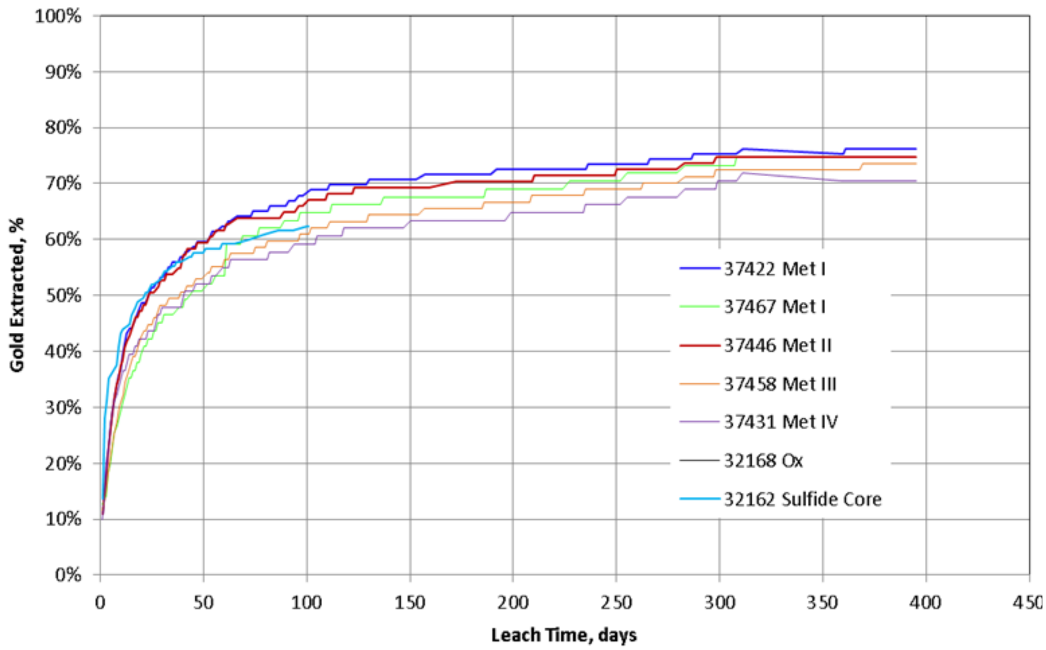


Figure prepared by Allard, 2017

Table 13.3 presents the test results as well as the "Field Au Extraction" or projection to industrial scale obtained by including an inefficiency factor that ranged from two to five percent.

Table 13.3 Reported gold extractions tests versus forecast to industrial scale

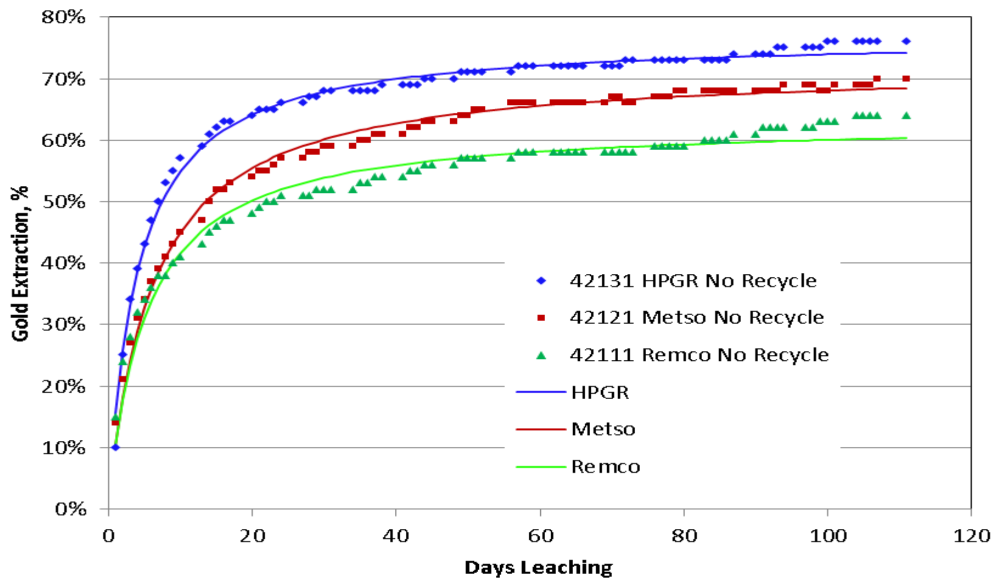
Met Type	2016 Technical Report	
	Test Au Extraction	Field Au Extraction
MET I	70.0%	68.0%
MET II	74.0%	74.0%
MET III	74.0%	69.0%
MET IV	67.0%	62.0%
Wt'd Avg.	70.7%	68.0%

The influence of crushing type on gold extraction was observed with the Phase V (Met II) tests. These tests used a single sample and crushed the material to test-size using three different types of crusher. Gold extraction curves are shown in Figure 13.2.

The column charges for the tests shown in Figure 13.2 were initially wet with 0.5 gpl NaCN solution then leached with low concentration cyanide solution (0.1 gpl). After about 40 days of leaching the solution application rate and cyanide concentration were progressively increased until they reached twice their initial value by day 70.

Figure 13.2 Phase V leach column extraction curves

Figure



prepared by Allard, 2017

The extraction kinetics observed in Figure 13.2 are significantly higher than those observed in Figure 13.1. It is also clear that crushing using a HPGR achieved faster kinetics and overall higher total extraction than what was achieved using the conventional cone crusher or the vertical shaft impactor (VSI).

With the purpose of confirming the improved relative extraction performance achieved when using HPGR equipment, the tails' assays by screen size and gold distribution were plotted as displayed Figure 13.3.

Figure 13.3 Phase V column test results – tails assays and gold distribution

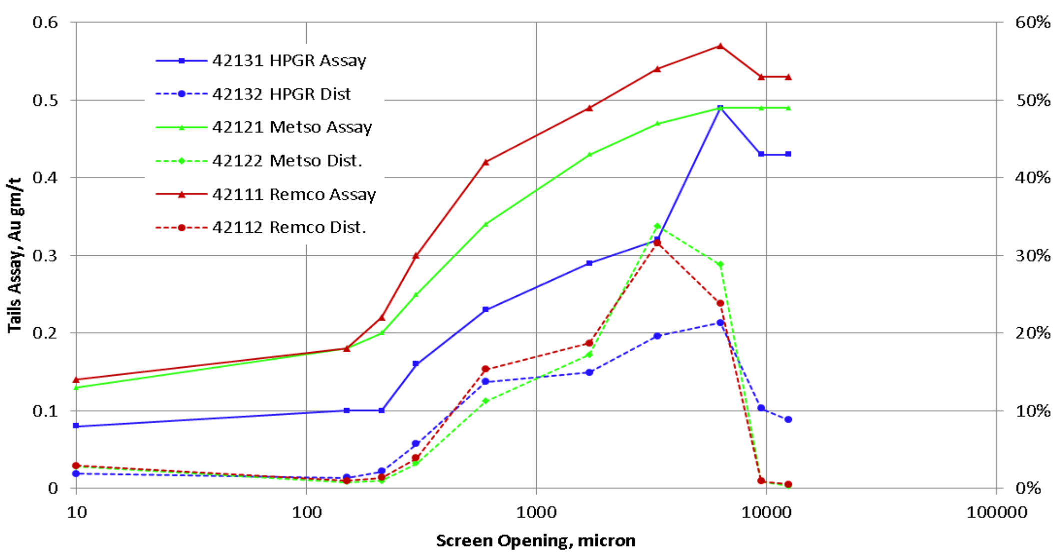


Figure prepared by Allard, 2017

Figure 13.3 confirms that the HPGR crushed material has lower tails assays across all particle sizes, and contained the same or lower residual metal, therefore higher extraction, in the whole size range.

The effect of cyanide concentration in the leaching solution was evaluated using bottle roll tests under 0.25 gpl NaCN and 1.0 gpl NaCN. See the gold extraction results in Figure 13.4.

Figure 13.4 Influence of cyanide concentration on gold extraction

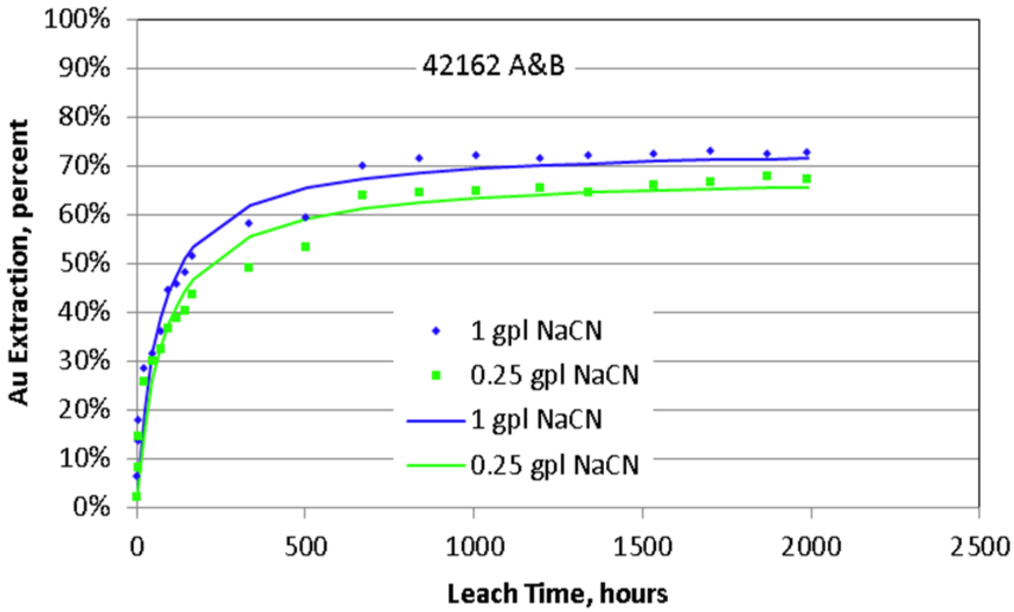


Figure prepared by Allard, 2017

Figure 13.4 shows that an additional approximately 5 percent extraction can be achieved with the higher cyanide concentration.

Silver extraction was ignored for most of the historical tests. Silver grade in the mineralized material is low, and with the lean cyanide conditions applied it is likely minor quantities of silver are leached to the pregnant solution.

Copper in the leach solutions was only sampled sporadically. Figure 13.5 shows a typical pattern of copper accumulation for a test where the leach conditions were not changed late during the test. Increasing the solution application rate to the columns late in the leach cycle had the side-effect of diluting the copper in solution and resulted in a misinterpretation of the data.

Cyanide consumption for most of the available column tests followed a pattern similar to that displayed in Figure 13.6, which is indicative of a leach system that is starved for cyanide.

Figure 13.5 Copper concentration in solution versus time

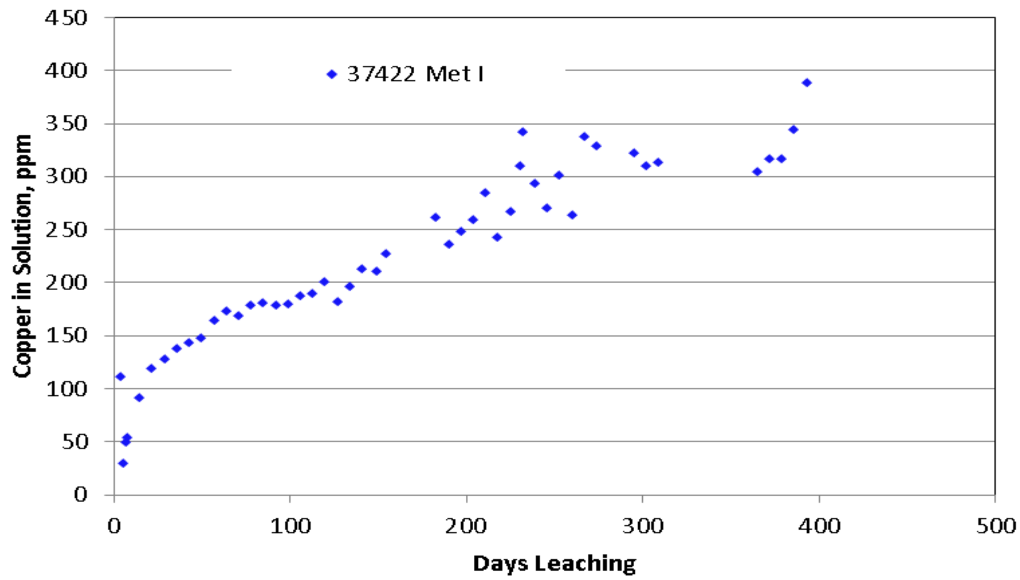


Figure prepared by Allard, 2017

Figure 13.6 Typical NaCN consumption versus leach time

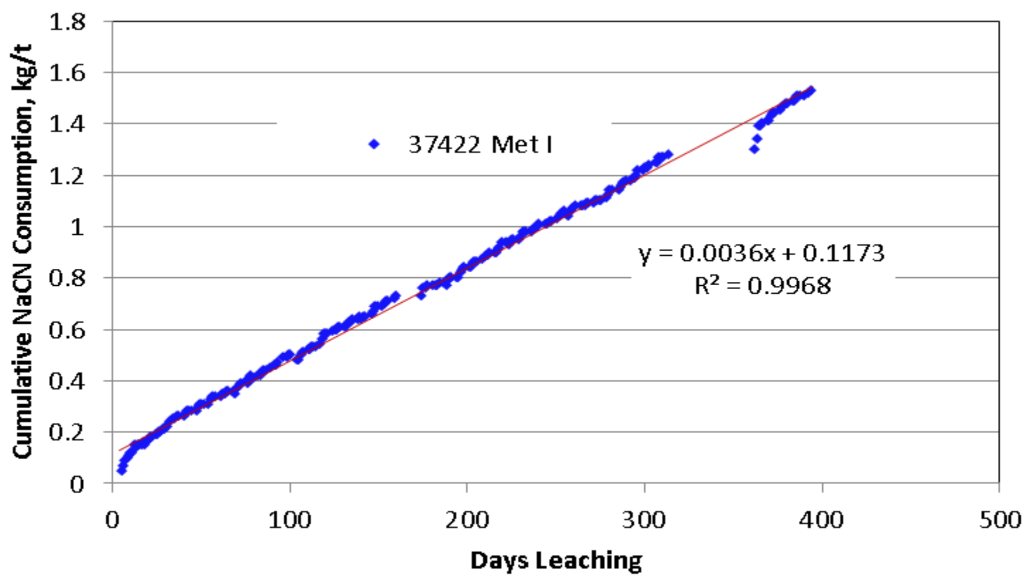


Figure prepared by Allard, 2017

There is a prevailing opinion in the industry that cyanide consumption from laboratory column tests are much higher than that experienced in the industrial scale operation with the same mineralized material. This is for the most part, true, but for the Lindero Mine it is necessary to consider the presence of copper. Discussions in the 2016 Technical Report indicate that this consideration will reduce cyanide consumption to 40 percent of the test values. This would result in a consumption of 0.45 kg/t. The cyanide consumption for Phase III was independently reviewed and the results presented in Table 13.4 where the same 40 percent reduction factor was applied to both sets of results.

Table 13.4 Cyanide consumptions by metallurgical type

Met Type	Phase III Review		2016 Tech. Report	
	Test NaCN (kg/t)	Field NaCN (kg/t)	Test NaCN (kg/t)	Field NaCN (kg/t)
MET I	1.6	0.62	1.1	0.44
MET II	2.0	0.80	1.3	0.52
MET III	1.3	0.51	1.0	0.40
MET IV	1.7	0.68	1.2	0.48
Wt'd Ave.	1.6	0.64	1.1	0.45

The tests depicted in Figure 13.7 show a different cyanide consumption curve when the samples were wetted with 0.5 gpl NaCN during the first days of leaching.

Figure 13.7 Phase V tests - cyanide consumptions by metallurgical type initially wetted with 0.5 g/l NaCN

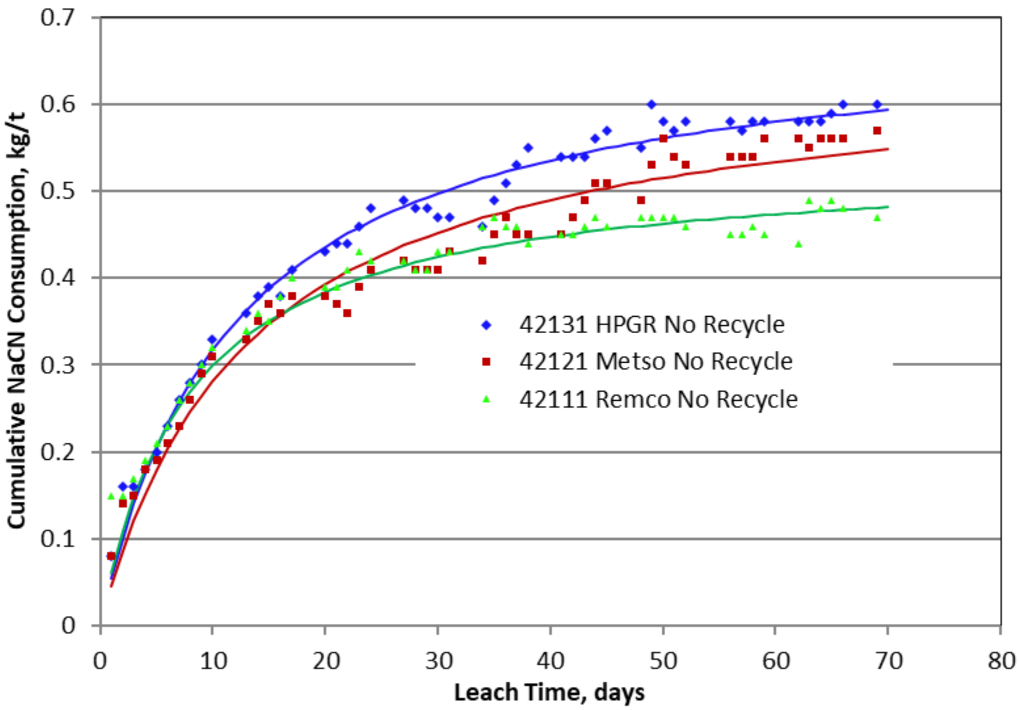


Figure prepared by Allard, 2017

Additional investigations included the Abrasion Index (Ai), the Crushing Work Index (CWi), and the wearing rate for HPGR equipment.

The Crushing Work index and Abrasion Index test were executed by Hazen Research Inc. and are presented in Table 13.5.

Table 13.5 Abrasion index and crushing work index

Test	Abrasion Index	Work Index (kWh/t)
1	0.4111	5.66
2	0.4685	5.37
3	0.4846	6.93
4	0.5437	-
5	0.3933	-
Average	0.460	5.99

The wearing rate tests for the HPGR equipment were executed by KHD Humboldt Wedag (KHD) using the unoxidized samples typical of Met 1 and the oxide samples typical of Met 2, as presented in Table 13.6.

Table 13.6 HPGR wear rates and roll life

<table>
<tr><th rowspan="2">Oxidation</th><th rowspan="2">Met Type</th><th rowspan="2">Specific Gravity</th><th rowspan="2">Wear Rate (g/min)</th><th colspan="3">Stud Length</th></tr>
<tr><th>45 mm</th><th>55 mm</th><th>65 mm</th></tr>
<tr><td>Hypogene</td><td>Met 1</td><td>2.69</td><td>0.0295</td><td>7,500 hrs</td><td>9,100 hrs</td><td>10,800 hrs</td></tr>
<tr><td>Oxide</td><td>Met 2</td><td>2.70</td><td>0.0147</td><td rowspan="2">13,300 hrs</td><td rowspan="2">16,200 hrs</td><td rowspan="2">19,000 hrs</td></tr>
<tr><td>Oxide</td><td>Met 2</td><td>2.67</td><td>0.0200</td></tr>
</table>

HPGR testing by KHD resulted in a recommended specific grinding force of 3.8 N/mm^2 to 4.0 N/mm^2.

13.2 Metallurgical testwork conducted by Fortuna (2016 to 2019)

Additional testing was completed by Fortuna as part of an investigation to clarify the results of the historical testing. The metallurgical testing reported in this study was supervised by Geoff Allard of Allard Engineering Services LLC of Tucson, Arizona USA.

The first round of metallurgical work conducted by Fortuna is documented in the report entitled "*Lindero Project – Metallurgical Report", 9 September 2017, Allard Engineering Services LLC* (Allard, 2017) and referred to as the "Met. Report 2017" in the following discussions. A second round of metallurgical work conducted in 2019 and focused on the testing of MET 2 material is documented in the report entitled "*Lindero Heap Leach Project – Metallurgical Report No.2", 27 August 2019, Allard Engineering Services LLC* (Allard, 2019) and is referred to as the "Met. Report 2019".

Metallurgical testing of the samples was conducted using the services of the following independent laboratories:

- Hydrogeosense Inc. (HGS) in Tucson, AZ USA was employed to investigate the physical characteristics of the samples to determine the necessity and extent of agglomeration required to support the design criteria requirement of a 110-meter high permanent heap.
- Base Metal Laboratories, Inc. (BML) in Kamloops, BC Canada was employed to determine the metallurgical response of the Lindero samples to high cyanide cure leaching.

A summary of the results reported from both investigations is presented below.

13.2.1 Samples selection

Fortuna collected five samples representing the four geological types previously identified as Met 1, Met 2, Met 3 and Met 4 as follows:

1. **Existing Core**: Core drilling at the Lindero Deposit has been conducted over the course of a decade or more. Core was available from these exercises to prepare a composite of the four met types. These composite samples were crushed with an HPGR at 3.8 N/mm^2.
2. **Tradeoff**: This sample was collected by taking low-grade intervals of the existing core to represent Met 1 and Met 2. These were used to determine if the physical characteristics of conventional-crushed (jaw/cone crushing) and lower pressure (3.3 N/mm^2) HPGR-crushed material would allow higher heap construction requiring less cement addition. No metallurgical testing was conducted on these samples.
3. **Fresh Core**: These samples were collected in the fall of 2016 from a new drilling program initiated to obtain verification data and metallurgical core. These samples represented Met 1 and Met 4 types. These composite samples were crushed with an HPGR at 3.8 N/mm^2 and a conventional jaw/cone crusher.
4. **Fresh Core**: These samples were collected in 2017 and represented Met 1. This sample was designated Met 1C. This composite was tested in a leach column using base-case conditions to allow comparison with the data obtained from leaching historic core.
5. **Fresh Core**: These samples were collected in October 2018 from an infill drill program to investigate mineralized material planned, at the time of the analysis, for mining in Year 1 and Year 2 of the LOM. These samples represented a) low-grade Met 2 and b) high-grade Met 2 with the results of the testwork detailed in the Met. Report 2019.

The Samples locations and their basic characteristics are presented in Figure 13.8 and Table 13.7. The weighted average gold and copper grade of the “Existing Core” and “Fresh Core” samples are representative of the life of mine average for the various ore types and the style of mineralization of the deposit as a whole.

Figure 13.8 Lindero Deposit sample location plan for 2016 to 2019 metallurgcal testwork

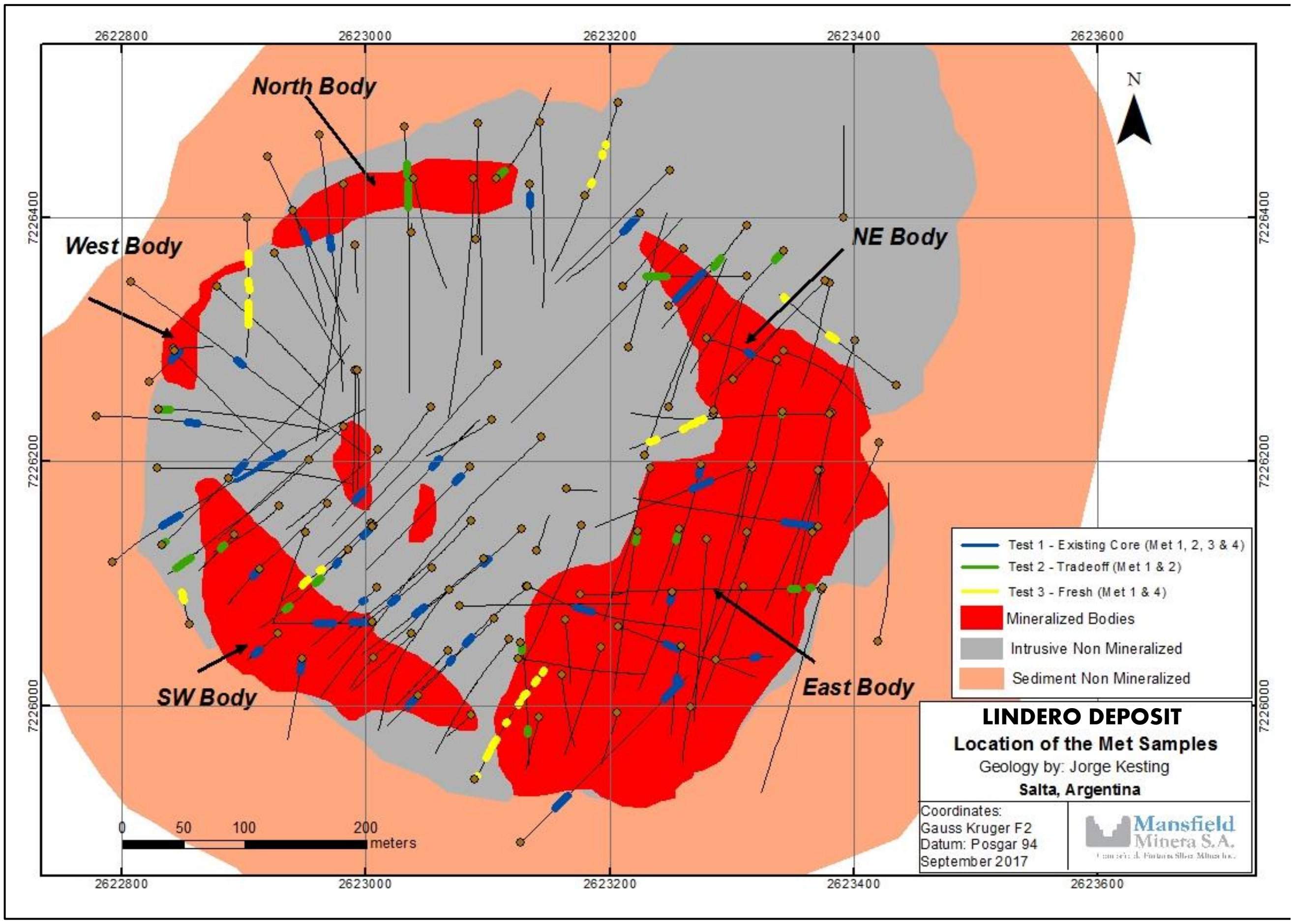


Figure prepared by Mansfield, 2017

Table 13.7 Characteristics for samples taken for the Lindero Deposit 2016 to 2019

Source	Met Type	Weight (kg)	Core length (m)	No. Drill holes sampled	Sample depth range (m)	Au (g/t)			Cu (%)		
						Min	Max	Wt'd Avg.	Min	Max	Wt'd Avg.
Existing Core	1	761.75	288	10	60 - 342	0.12	1.9	0.6	0.02	0.31	0.10
	2	786.93	306	13	0 - 52	0.14	2.4	0.73	0.02	0.40	0.13
	3	749.87	200	12	10 - 280	0.05	1.74	0.44	0.03	0.19	0.09
	4	762.54	236	11	50 - 370	0.08	1.91	0.42	0.03	0.37	0.11
Tradeoff	1	318.23	194	7	18 - 276	0.11	0.82	0.34	0.02	0.27	0.10
	2	324.79	198	14	0 - 128	0.08	0.87	0.37	0.02	0.24	0.09
Fresh Core (2016)	1	643.6	212	6	52 - 410	0.106	3.03	0.64	0.02	0.47	0.14
	4	609.4	182	7	6.5 - 309	0.058	1.275	0.47	0.02	0.27	0.11
Fresh Core (2017-19)	1C	748	239	4	31 - 332	0.067	2.550	0.672	0.01	0.40	0.10
	2 LG	504	164.3	16	0 - 52	0.074	0.549	0.317	0.01	1.24	0.10
	2 HG	510	169.9	11	0 - 48	0.265	2.670	1.174	0.02	1.58	0.21

13.2.2 Sample preparation

Sample preparation was conducted by BML in Kamloops, BC. Where needed, a pilot-scale HPGR crusher at the University of British Columbia was employed. Figure 13.9 shows the particle size distribution (PSD) for the "Existing Core" samples tested. Minor variations can be observed in the PSD between the various Met types, with Met 1 and Met 2 generating marginally more fines than Met 3 and Met 4.

Figure 13.9 "Existing Core" PSD after HPGR crushing

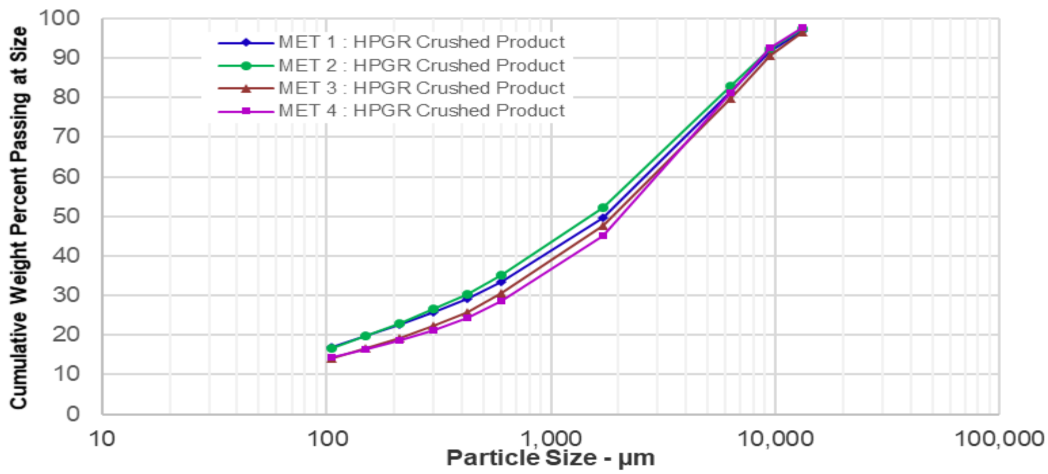


Figure prepared by Allard, 2017

Figure 13.10 compares the particle size distribution between the trade-off samples and the "Existing Core" samples, with the results showing that reducing the pressure in the HPGR creates a coarser product, and that using conventional crushing equipment generates even coarser product.

Figure 13.10 Comparison of PSD trade-off analysis of "Existing Core" samples

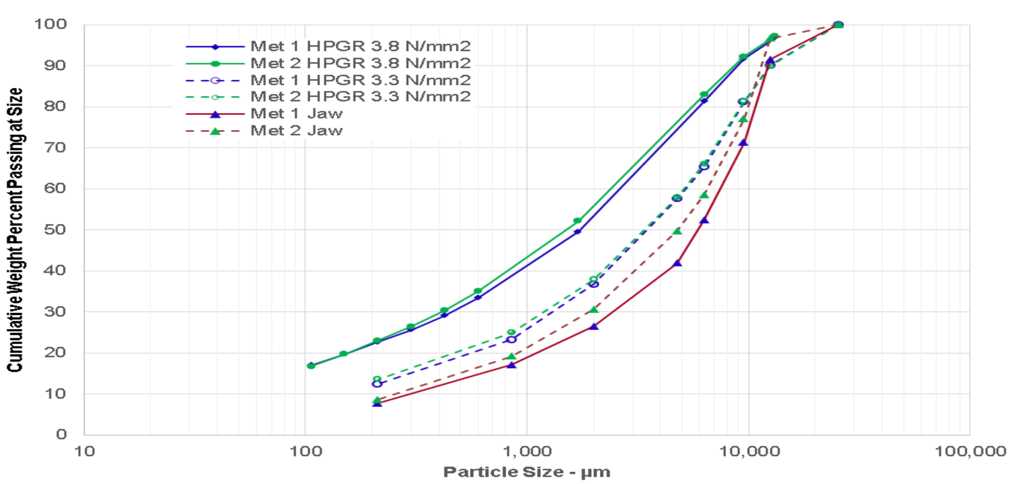


Figure prepared by Allard, 2017

Figure 13.11 shows the particle size distribution of the Met 1 and Met 4 "Fresh Core" samples with a coarser size than the corresponding "Existing Core" sample.

Figure 13.11 Met 1 and 4 crushed product PSD versus "Existing Core"

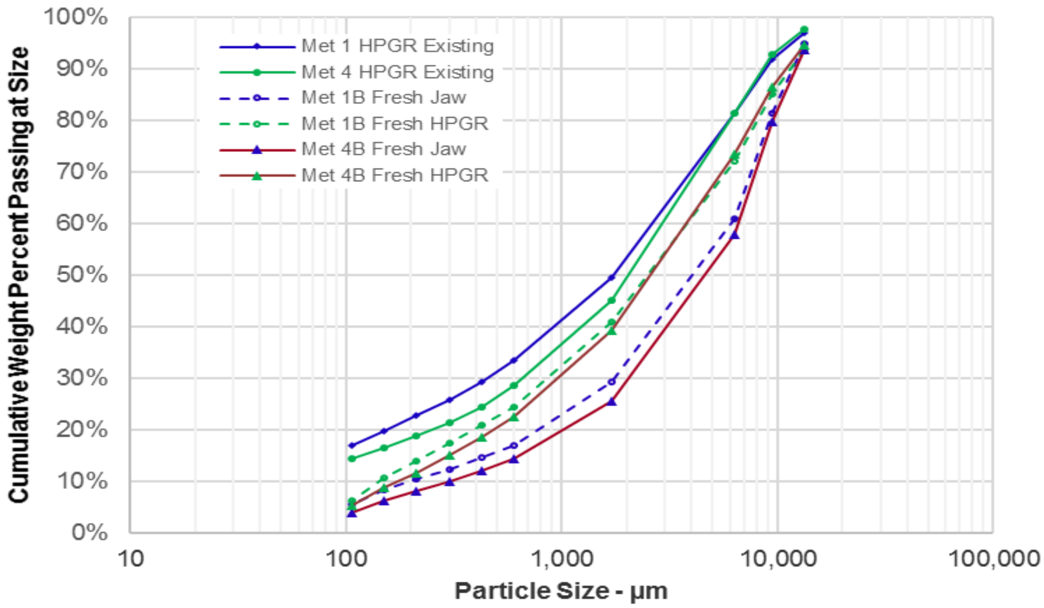


Figure prepared by Allard, 2017

Figure 13.12 shows the cumulative PSD for the Met 1C composite after HPGR crushing and Met 1 "Existing Core". Note that both size distributions are highly similar.

Figure 13.12 Met 1C PSD "Existing Core" versus "Fresh Core"

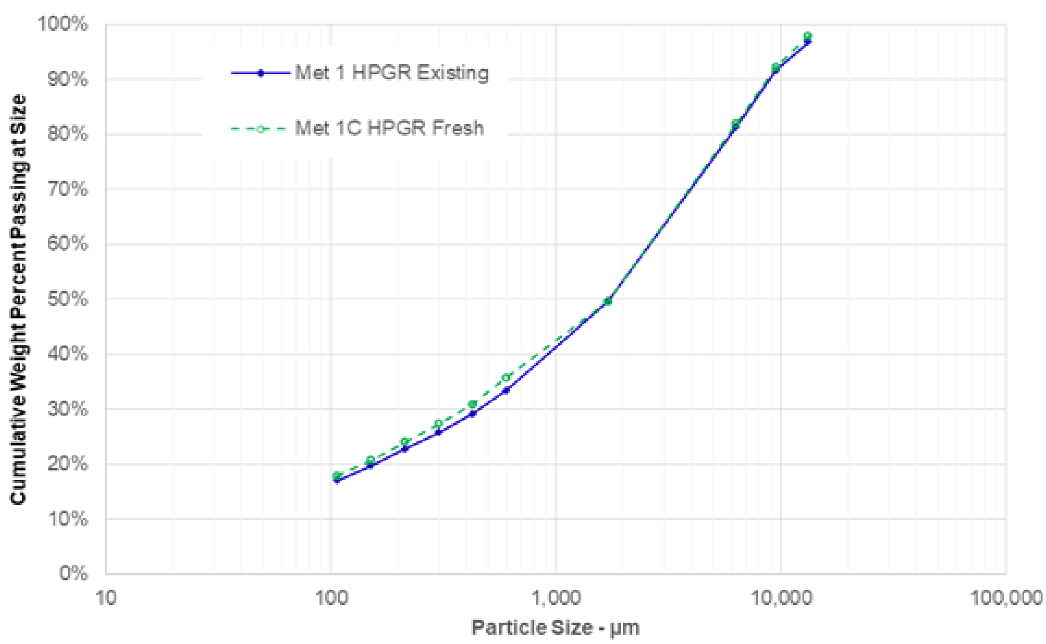


Figure prepared by Allard, 2019

Figure 13.13 compares the PSD for the Met 2 LG and Met 2 HG composites after HPGR-crushing and that of the Met 2 "Existing Core". The size distributions indicate minor differences between the samples. Met 2 HG appears to generate more fines than Met 2. Met 2 LG has a similar quantity of fines as Met 2 but it is coarser around 1,000 µm.

Figure 13.13 Met 2 sample PSD comparison

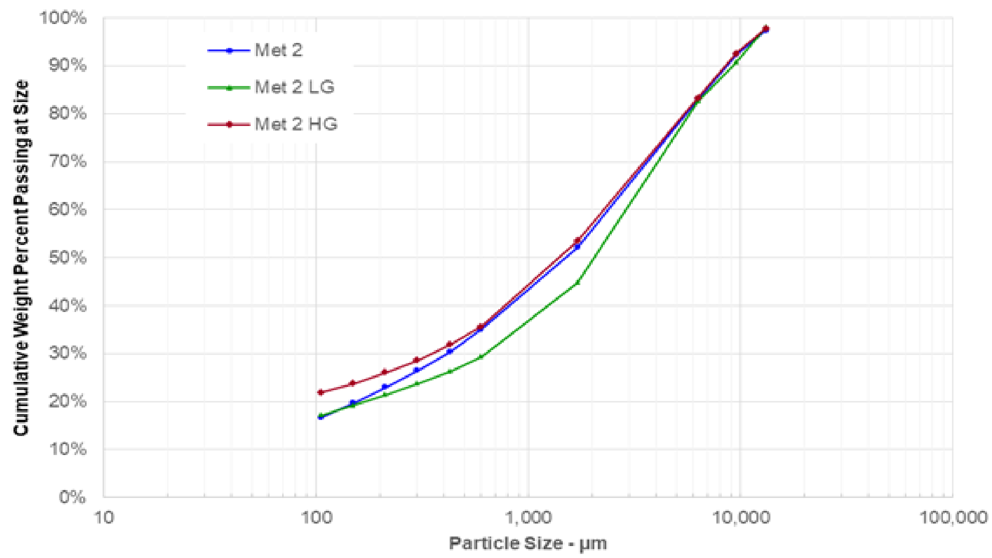


Figure prepared by Allard, 2019

Figure 13.14 compares the distribution of gold, silver and copper by size in Met 1 after the "Existing Core" sample was crushed with an HPGR. Note that the gold, silver and copper are distributed almost identically which indicates that the minerals hosting the three metals are closely associated. This pattern is typical of the materials tested.

Figure 13.14 Metals distribution by size – Met 1 Existing Core HPGR-crushed

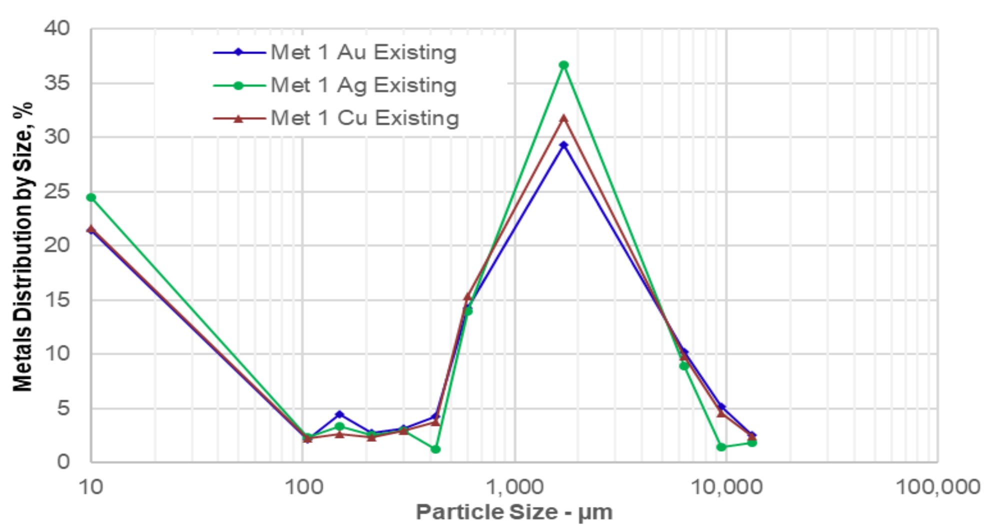


Figure prepared by Allard, 2017

13.2.3 Physical testing

HGS laboratories applied two types of tests when investigating the Lindero Deposit samples:

- The first used the “stacking test” where the agglomerated material is placed under load to determine its saturation flow. The porosity and bulk density are determined at each loading lift height up until the expected total heap height is achieved. A total of 78 stacking tests were conducted under various conditions of cement addition and cement type. Most of the work was conducted using Portland Type II cement as a basis, however, Argentinian available cement IRAM specification CPP40 and CPF40 was also tested. These local cements showed comparably good agglomeration results.
- The second test employed was a “hydrodynamic column” test. In this test, the metallurgical sample is placed in a column in lifts and each lift is loaded to achieve the same bulk density as experienced in the stacking tests. Two columns per sample were tested representing a 10-m lift and a 100-m total loading height. The test columns are suspended on load cells so that the mass of the column is continuously monitored. The columns are leached at various irrigation rates up to the design flow of 12 l/hr/m². Knowing the porosity of the charge and the mass of solution in the charge allows the calculation of solution saturation and holdup. A total of 16 hydrodynamic columns were tested.

Figure 13.15 shows a typical set of stacking test curves. The curves show the residual porosity (voids volume) of the Met 1 “Existing Core” agglomerated at various levels of cement addition versus loading height. The porosity is presented on a dry ore basis. The available void volume is reduced by adsorbed moisture, active holdup at 12 l/hr/m², and the criteria that 25 to 30 percent of the total void volume must remain (equivalent to 70 to 75 percent saturation limit) during leaching to avoid creating a phreatic level in the heap. As a rule-of-thumb when the total void volume is less than 30 percent the void volume is insufficient to maintain heap stability. At a criteria range of 70 to 75 percent this equates to 210 to 225 l/m³ of heap available for absorption (moisture that is held in place by surface tension after wetting), and active holdup. These values depend on the fines and level of agglomeration of a particular sample.

Figure 13.15 Stacking curve results at varying cement ratios

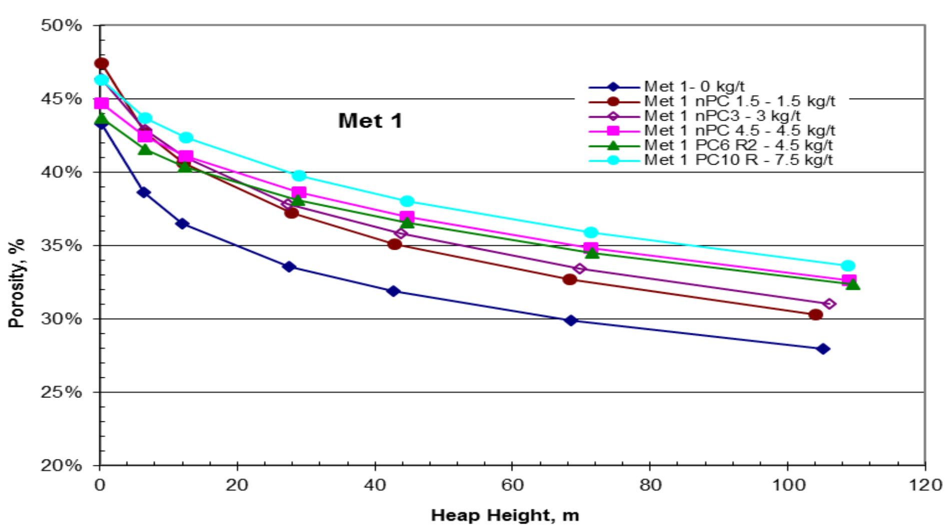


Figure prepared by Allard, 2017

Table 13.8 shows the hydrodynamic column data for the existing core. This is typical of the data generated by this test. As can be noted, the volumetric moisture content in l/m³ is very similar to the rule-of-thumb expectations noted above.

Table 13.8 Typical hydrodynamic column data

Property	Met 1 at 12 l/h/m²		Met 2 at 12 l/h/m²		Met 3 at 12 l/h/m²		Met 4 at 12 l/h/m²	
	10 m	100 m	10 m	100 m	10 m	100 m	10 m	100 m
Cement addition (kg/t)	4.5	4.5	4.5	4.5	1.5	1.5	1.5	1.5
Dry bulk density (m³/t)	1.598	1.834	1.545	1.773	1.66	1.847	1.656	1.854
Ore SG	2.717	2.717	2.727	2.727	2.734	2.734	2.69	2.69
Porosity (%)	42.3	33.4	44.5	35.7	40.4	33.3	39.5	32.3
Dynamic holdup (l/m³)	46	64	52	43	43	43	49	48
Static inventory (l/m³)	173	175	157	204	162	178	143	148
Vol. moisture content (l/m³)	218	239	209	247	205	222	193	196
Liquid saturation (%)	52.6	72.5	47.5	69.9	51.6	68.0	48.4	59.8

The prime consideration in determining the suitability of conditions for leaching in the proposed multi-lift heap leaching is the retention of porosity under load. Fine crushing and agglomeration increase the volume of solution that is held within the heap after free draining. This moisture reduces the void space available for the active holdup of leaching solutions and generates high saturation (percent of available voids filled by solution). Higher levels of adsorbed moisture will also increase the inventory as the heap height increases.

Analyses of the testwork by HGS in the Met Report 2017 indicate that the allowable heap height is dependent on several factors, including: solution application rate, metallurgical type, crushing equipment type, HPGR crushing force, crushed PSD, and cement addition.

The estimated allowable heights for crushed material are listed in Table 13.9 for varying crushing conditions. The "minimum porosity" is the minimum void volume, as a percentage of the total ore plus voids volume, that will allow a maximum of 70 percent saturation at 12 l/hr/m² and represents a magnitude similar to the 210 to 225 l/m³ above for the "Existing Core".

Table 13.9 Allowable heap heights at 70 percent saturation

Existing Designation	Crusher Type	Nom. $P_{80\,mm}$	Minimum Porosity (%)	Cement Addition (kg/t)		Heap Height (m)	
				Min.	Max.	Min.	Max
Met 1	HPGR 3.8	6.0	23.6	0.5	6.0	49	97
Met 2	HPGR 3.8	5.6	24.6	0.5	4.75	57	98
Met 3	HPGR 3.8	6.3	22.4	0.25	1.5	100	117
Met 4	HPGR 3.8	6.0	19.7	0.25	0.25	135	135
Tradeoff Designation	**Crusher Type**	**Nom. $P_{80\,mm}$**	**Minimum Porosity (%)**	**Cement Addition (kg/t)**		**Heap Height (m)**	
				Min.	**Max.**	**Min.**	**Max**
Met 1H	HPGR 3.3	9.3	18.6	0	0	124	124
Met 1J	Jaw/Cone	10.8	16.4	0	0	110+	110+
Met 2H	HPGR 3.3	9.2	18.2	0	0	167	167
Met 2J	Jaw/Cone	10.0	14.7	0	0	110+	110+
Fresh Designation	**Crusher Type**	**Nom. $P_{80\,mm}$**	**Minimum Porosity (%)**	**Cement Addition (kg/t)**		**Heap Height (m)**	
				Min.	**Max.**	**Min.**	**Max**
Met 1H	HPGR 3.8	8.1	18.4	0	1.5	112	119
Met 1J	Jaw/Cone	9.3	N/A	0	0	110+	110+
Met 4H	HPGR 3.8	7.8	18.4	0	1.0	116	145
Met 4J	Jaw/Cone	9.6	N/A	0	0	110+	110+

It is apparent that coarser crushing, whether using conventional equipment or an HPGR operating at a lower pressure, will allow stacking to 110 m high without agglomeration with cement. This is accompanied by a reduction in extraction.

13.2.4 Leach testing

A series of bottle roll tests and 32 small column tests were conducted by BML on the "Existing Core" to define the leach parameters for the cyanide cure and leach application rate for the 10 m leach columns. Agglomeration conditions were determined from the HGS test results. Conditions for the leach columns are presented in Table 13.10 and Table 13.11.

Table 13.10 Leach column conditions for "Existing Core"

Existing Test	10-meter Type	Weight (kg)	Lime (kg/t)	Cement (kg/t)	NaCN (kg/t)	Moisture% (w/w)	Cure days	Leach (l/hr/m²)	Leach days	Red. Flow at day No.	pH Target
CL-01	Met 1	443.4	0	4.5	0.75	7.10	4	12	101	40	10-10.5
CL-02	Met 2	432.8	0	4.5	0.75	6.90	4	12	101	54	10-10.5
CL-03	Met 3	475.9	0	1.5	0.75	5.90	4	12	101	39	10-10.5
CL-04	Met 4	446	0	1.5	0.75	5.10	4	12	89	39	10-10.5

Table 13.11 Leach column conditions for "Fresh Core"

Fresh Test	5-meter Type	Weight (kg)	Lime (kg/t)	Cement (kg/t)	NaCN (kg/t)	Moisture% (w/w)	Cure days	Leach (l/hr/m²)	Leach days	Red. Flow at day No.	pH Target
CL-05	Met 1B Jaw	222	0	4.5	0.75	6.50	4	12	95	31	10-10.5
CL-06	Met 1B HPGR	222	0	4.5	0.75	7.10	4	12	80	30	10-10.5
CL-07	Met 4B Jaw	222	0	1.5	0.75	5.00	4	12	90	30	10-10.5
CL-08	Met 4B HPGR	222	0	1.5	0.75	5.00	4	12	92	30	10-10.5
CL-09/10	Met 1C	440	0	4.5	0.75	7.13	4	12	139	53	10-10.5
CL-11	Met 2 LG	433	0	4.5	0.75	6.99	4	12	139	53	10-10.5
CL-12	Met 2 HG	446	0	4.5	0.75	7.02	4	12	196	60	10-10.5

Column test charges were weighed to ±30 kg and placed in a ¼ m^3 cement mixer with the lifters removed. A known amount of Portland Type II cement was added to the charge, with the exception of the CL-09/CL-10 testwork that used a combination of Portland cement and local sourced "filler" cement, the mixer sealed and rotated to mix the components. The mixing required approximately 30 seconds. A measured amount of concentrated cyanide solution was then added, and the contents again mixed. Sufficient tap water was then placed in the mixer to achieve the desired agglomeration moisture, with the exception of the CL-09/CL-10 testwork that used a combination of tap water and local sourced site water, and the mixer rotated for 2 to 3 minutes more. During this time, any material adhering to the drum was scraped off and coarse agglomerates migrating to the periphery of the drum were manually reintroduced to the tumbling mass.

Once the agglomeration was complete the charge was tipped out into buckets and lifted to the top of the section of column being loaded. This was repeated until the leach columns were filled.

Each test column was divided into 2.5 m flanged sections to ease loading. A 75 mm tube was lowered into the center of the column and filled with green agglomerates. As more agglomerates were added to the top, the tube was lifted to allow the agglomerates in the bottom to discharge gently and uniformly into the column. This was continued until each section was filled and a new section added.

Barren solution was made from tap water, adjusted to pH 10 to 10.5 with lime and made up to 0.25 gpl NaCN in a 5-gallon bucket. A separate bucket was made for each column. The bucket was weighed every morning to determine how much solution was applied to each column in the preceding 24 hours. Pregnant solution was allowed to discharge freely from the bottom of the column and was collected in a bucket. This bucket was weighed each day, sampled and replaced with an empty bucket. Activated carbon was added to the pregnant solution stirred, until the next morning when the carbon was removed, and added to the next day's pregnant solution. The solution after contact with the activated carbon was added to the barren solution bucket and made up for feed to the column. Each bucket was sampled for gold, silver, copper, pH, oxidation-reduction-potential (ORP) and weakly acid dissociable (WAD) cyanide.

Initial solution application rate was set at 12 $l/hr/m^2$ until the bulk of the extraction was achieved, then the application rate was reduced to 6 $l/hr/m^2$ to simulate a secondary leach cycle. The day on which the flow was reduced is noted in Table 13.10 and Table 13.11.

13.2.5 Gold extraction

The leaching performance curves presented in Figure 13.16 show fast extraction kinetics in the first 20 days. Met 3 and Met 4 are almost completely leached by day 40. Met 1 and Met 2 exhibit relative slower kinetics and continue the leaching for the duration of the test. Also note that Met 1 and Met 2 show no change to the rate of extraction when irrigation was lowered to 6 $l/hr/m^2$ by day 40 and day 54, respectively.

The slight increase in extraction at the end of the curves is due to rinsing the column to extract all the gold in the entrained solution.

Figure 13.16 "Existing Core" 10-m column gold extractions

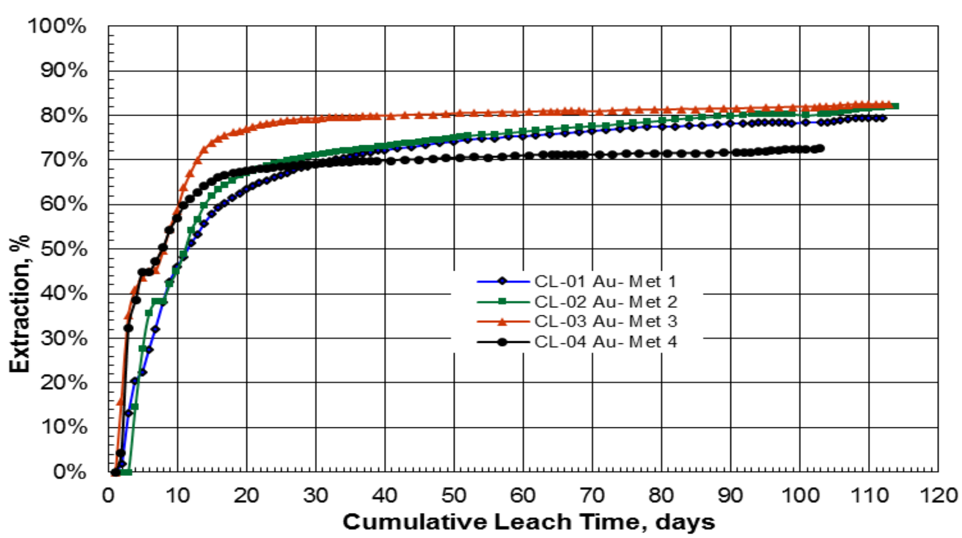


Figure prepared by Allard, 2017

Figure 13.17 shows the gold extraction curves for the "Fresh Core" 5-meter columns. They exhibit a comparable rapid extraction response to that observed in the "Existing Core" 10m-columns. The bulk of the extractable gold is obtained in the first 20 days of leaching. All the columns show slow leaching after day 20 up to day 60. The irrigation rate was lowered to 6 l/hr/m², around day 30, with no effect on the gold extraction rate.

The "Fresh Core" 5-m columns operated in a locked cycle with carbon in an identical manner to the "Existing Core" 10m-columns. Carbon was added more frequently to reduce the risk of breakthrough of gold on the carbon. It is apparent that this was inadequate to prevent some disruption in the gold extraction curve for CL-08. As with the earlier columns, some silver and a significant quantity of copper was returned to the barren feed tank.

The relative effect of the crushing equipment can be observed in Figure 13.17. The Met 1 HPGR test (CL-06) gold extraction was 11.3 percent higher than what was achieved by jaw-crushed Met 1. Similarly, HPGR crushing of Met 4 resulted in a 3.3 percent higher gold extraction than jaw-crushed Met 4.

Figure 13.17 "Fresh Core" 5-m column gold extractions - crushing equipment effect

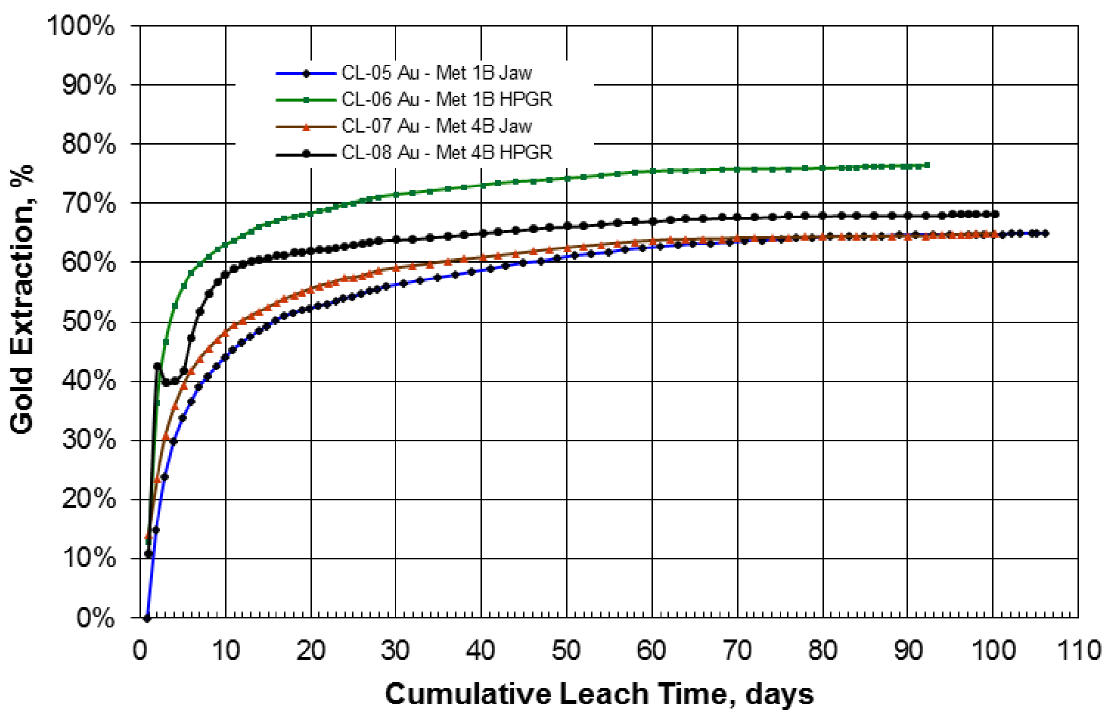


Figure prepared by Allard, 2017

Figure 13.18 compares the gold extraction curves for the Met 1 type in "Fresh Core" 5m-column and "Existing Core" 10m-column. Their initial gold extraction rates shown are similar; however, the extraction rate for the "Fresh Core" is lower after approximately day 17.

Figure 13.18 Met 1C "Fresh Core" and "Existing Core" columns – extraction kinetics comparison

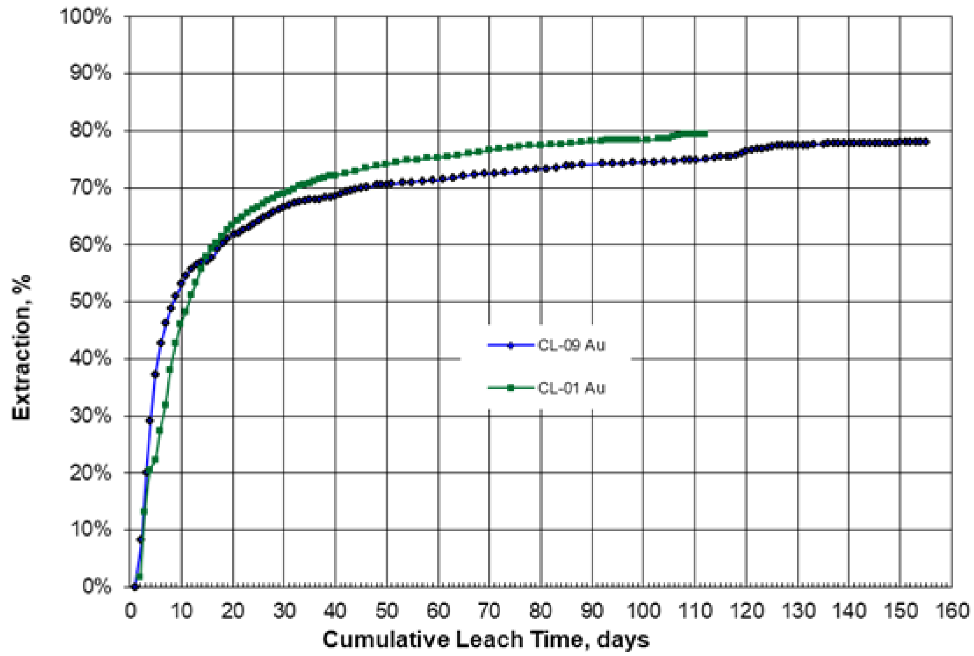


Figure prepared by Allard, 2019

Several small-scale tests were also performed on the Met 1C composite to determine the influence of water origin and cement type. Site water was shipped to BML for testing, and this was compared to local Kamloops tap water. Locally available "filler" cement was provided and compared to Portland Type II cement. Filler cement CPF 40 contains up to 40 percent lime.

HPGR-crushed Met 1C was agglomerated with the selected cement/water combination and placed in small columns. These columns were leached in open circuit. These tests were not leached to completion, but long enough to determine if the initial leach rates depended (or not) on the cement and/or site water.

The results detailed in Table 13.12 demonstrate that there is very little difference attributable to the specific water, or agglomeration agent used. The cyanide consumption values are low but may represent the difference between open-circuit and closed-circuit leaching. Open circuit leaching results in much lower copper concentrations in the pregnant solutions. This suggests that when the SART stage is incorporated, cyanide consumption may be reduced. Little difference was observed in the gold extraction as a function of leach time between the various tests.

Table 13.12 Met 1C Scoping column test results

Test	Water Source/cement	Retained Moist. %	Tails Assay			Extraction (%)			NaCN (g/t)	Lime (g/t)
			Au (g/t)	Ag (g/t)	Cu (%)	Au	Ag	Cu		
SCL-33	Site/Filler	12.5	0.165	0.30	0.09	75.7	50.8	19.8	0.05	0.09
SCL-34	Kamloops/Filler	12.7	0.161	0.25	0.09	74.6	53.9	18.8	0.11	0.04
SCL-35	Site/Portland	12.9	0.161	0.30	0.08	74.4	49.3	20.5	0.04	0.04
SCL-36	Kamloops/Portland	12.0	0.161	0.25	0.08	73.7	54.6	20.8	0.08	0.04

A sample of solution from the Met 1C leach tests was also tested using Merrill Crowe as a potential alternative to activated carbon. It was apparent from the results that Merrill Crowe precipitation, under the tested conditions, is not efficient, even after using 20 times the stoichiometric ratio of zinc.

Figure 13.19 shows the gold extraction curves for the Met 2LG and Met 2HG 10-m columns, CL-11 and CL-12, respectively. Data for Met 2 10-m column, CL-02(1) on "Existing Core" is also included for comparison. The initial gold extraction rates shown are similar for all the samples.

Compared to the "Existing Core" Met 2, the "Fresh Core" Met 2 seems to have a more defined transition between diffusion-controlled leaching and concentration gradient-controlled leaching regions. Although there are some variations in the curves, Met 2LG and Met 2 have similar gold extractions. Extraction of the Met 2HG appears to be higher (on a percentage basis) than the lower grade composites, although at the expense of significantly greater leach time.

The curves in Figure 13.9 allow for the following observations:

- Leaching of "Fresh Core" Met 2 core is faster than "Existing Core" Met 2. At Day 100, the gold extraction of "Fresh Core" was 2.0 percent higher than the "Existing Core" for Met 2LG and 5.2 percent higher for Met 2HG.
- The change to 6 l/hr.m² at Day 53/60 does not change the gold extraction rate.
- Leaching with SART effluent (Day 110/120) increases the extraction rate only slightly. It is not evident what will be the impact of incorporating the SART at the beginning of the leach cycle.

Figure 13.19 "Fresh Core" 10-m column gold extractions

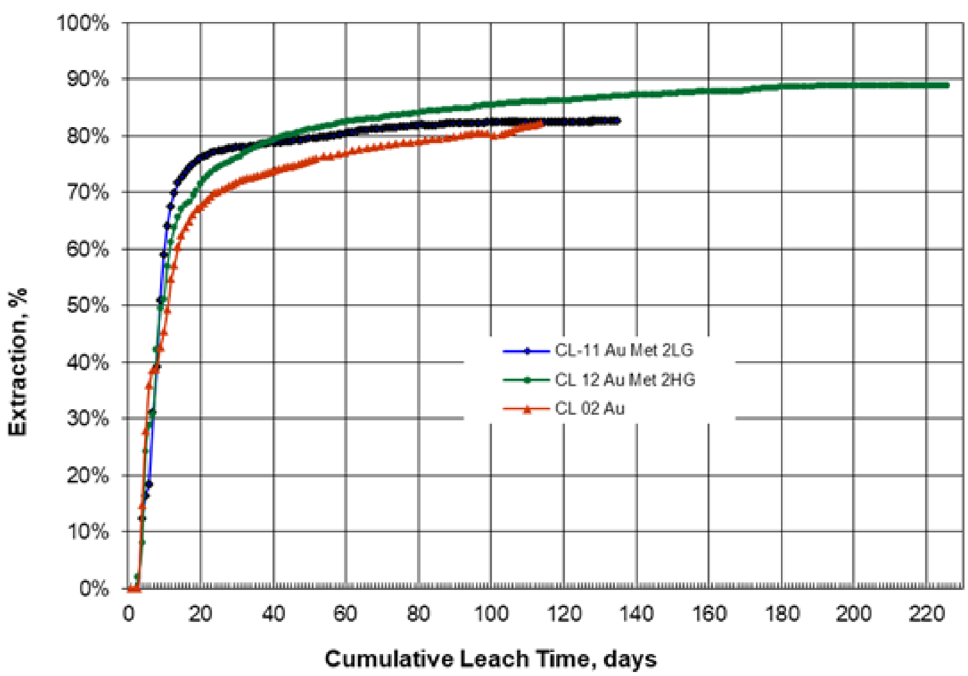


Figure prepared by Allard, 2019

Metal extraction from the major column test programs is summarized in Table 13.13 and Table 13.14. These results do not include field deductions to adjust for laboratory to industrial scale extractions.

The results show that the difference in gold extraction using conventional crushing as opposed to HPGR crushing (CL-01 versus CL-05) is as high as 14.4 percent for Met 1 and 7.5 percent for Met 4 (CL-04 versus CL-07). In general, any benefit obtained by coarse crushing to improve the heap stability is offset with a reduction in gold extraction.

The lower extractions observed between the "Existing Core" HPGR-crushed material and the same Met type for the "Fresh Core" HPGR-crushed material, i.e., CL-01 versus CL-06 and CL-04 versus CL-08, is likely due to reduced crushing efficiency achieved with a smaller sample size.

Gold extraction rate for both the high grade and low grade "Fresh Core" Met 2 was observed to be initially faster than the "Existing Core", but the high grade Met 2 "Fresh Core" required a longer leach time.

Table 13.13 "Existing Core" 10-m columns leaching results

Existing Test	Type	Head Assay			Tails Assay			Calculated Head			Extraction (%)			NaCN (kg/t)
		Au (g/t)	Ag (g/t)	Cu (%)	Au (g/t)	Ag (g/t)	Cu (%)	Au (g/t)	Ag (g/t)	Cu (%)	Au	Ag	Cu	
CL-01	Met 1	0.512	0.267	0.10	0.110	0.100	0.08	0.535	0.349	0.10	79.4	71.3	11.8	0.477
CL-02	Met 2	0.659	0.467	0.13	0.117	0.166	0.09	0.656	0.500	0.13	82.2	66.8	28.9	0.616
CL-03	Met 3	0.440	0.667	0.10	0.074	0.390	0.08	0.423	0.751	0.09	82.5	48.1	9.8	0.441
CL-04	Met 4	0.371	0.200	0.11	0.110	0.100	0.12	0.401	0.292	0.13	72.5	65.8	8.6	0.419

Table 13.14 "Fesh Core" 5-m columns leaching results

Fresh Test	Type	Head Assay			Tails Assay			Calculated Head			Extraction (%)			NaCN (kg/t)
		Au (g/t)	Ag (g/t)	Cu (%)	Au (g/t)	Ag (g/t)	Cu (%)	Au (g/t)	Ag (g/t)	Cu (%)	Au	Ag	Cu	
CL-05	Met 1B Jaw	0.589	0.417	0.13	0.176	0.100	0.11	0.503	0.285	0.12	65.0	64.9	8.5	0.499
CL-06	Met 1B HPGR	0.649	0.417	0.14	0.135	0.170	0.14	0.571	0.402	0.15	76.3	57.7	9.9	0.483
CL-07	Met 4B Jaw	0.444	0.586	0.10	0.149	0.163	0.10	0.425	0.444	0.11	65.0	63.3	9.0	0.508
CL-08	Met 4B HPGR	0.472	0.681	0.11	0.133	0.273	0.09	0.420	0.636	0.10	68.3	57.1	8.8	0.511
CL-09	Met 1C	0.553	0.567	0.10	0.140	0.27	0.08	0.635	0.63	0.10	77.9	57.8	20.1	0.480
CL-11	Met 2 LG	0.347	0.675	0.10	0.064	0.315	0.08	0.339	0.53	0.10	81.4	41.6	20.8	0.119
CL-12	Met 2 HG	1.178	0.507	0.14	0.132	0.437	0.13	1.133	0.806	0.16	88.7	47.5	20.1	0.856

13.2.6 Copper/silver extraction

Silver extraction was monitored throughout the leach tests. Table 13.13 and Table 13.14 suggest that silver extraction is directly proportional to that of gold. This is likely due to the test column not being starved for cyanide. Also, the presence of electrum in some samples indicates that gold extraction is somewhat dependent on silver extraction.

The percentage of copper extraction, for the "Existing Core" tests, ranges from a low of 8.6 percent for Met 4 to a high of 28.9 percent for Met 2. However, the copper represented by these extractions is 400 to 700 times higher than the gold extracted. It is apparent copper has a significant role to play at the Lindero Mine.

Figure 13.20 shows the copper concentration in the recirculating solution for the 10-m column "Existing Core" tests. It is apparent that the cyanide cure accelerates the early copper dissolution but the concentration in solution continues to increase over the duration of the leach.

Figure 13.20 Copper concentration in solution for "Existing Core" columns

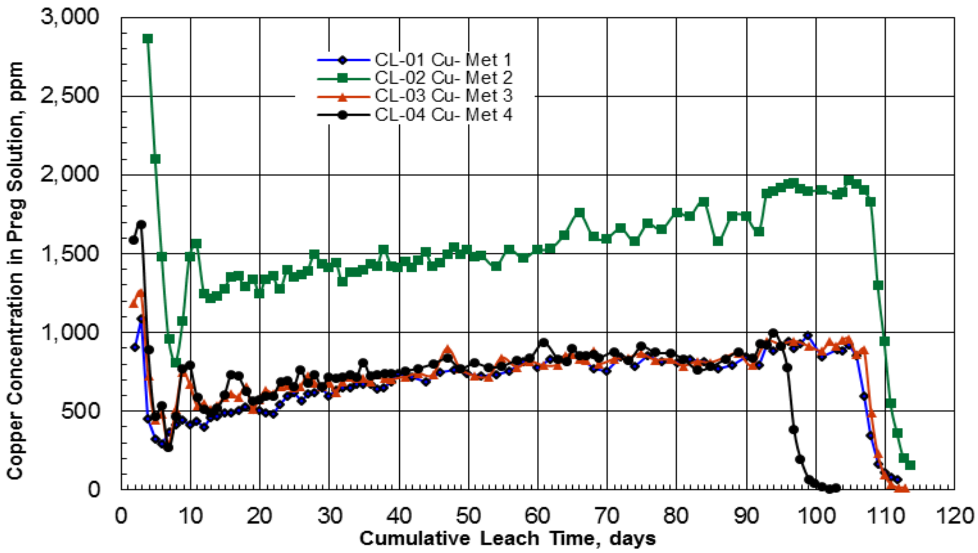


Figure prepared by Allard, 2017

13.2.7 Cyanide consumption

Pregnant and barren leach solutions generated during laboratory column and bottle-roll tests were analyzed for weak acid dissociable (WAD) cyanide.

WAD cyanide was the preferred method for determining cyanide, but the elevated copper levels in solution rendered the conventional free cyanide analysis inaccurate (free cyanide by silver nitrate titration).

The WAD cyanide analytical method selected for the work was the MP-WAD technique as described by Botz et al. (2013). WAD cyanide QAQC standards containing sodium cyanide and copper cyanide were routinely analyzed during the work.

Prior 10-m column calculation sheets used a total cyanide balance to determine consumption. This method tracked all solutions, including samples for an overall cyanide balance. Using SART effluents for leaching made this procedure difficult. Later it was observed that the WAD cyanide potentiometric procedure determined weak and dissociable cyanide rather than the more common weak acid dissociable cyanide. Consequently, the previous values corresponded to disassociated and theoretically recoverable cyanide by the SART process. In conclusion, a simple in-out balance around the leach column is sufficient to calculate the actual cyanide consumption.

Table 13.15 presents the calculated cyanide consumption using the revised method for all the 10-m column test conducted on Lindero Deposit composites. The average change to the cyanide consumption results is a reduction of 0.104 kg/tonne.

Table 13.15 Column tests for reagent consumption

Test	Met Type	Leach days	NaCN(1) (kg/t)	NaCN(2) (kg/t)	Lime(3) (kg/t)	Comment
CL-01	Met 1	103	0.477	0.342	0.001	10-meter HPGR
CL-02	Met 2	103	0.616	0.458	0.001	10-meter HPGR
CL-03	Met 3	102	0.441	0.385	0.001	10-meter HPGR
CL-04	Met	91	0.419	0.431	0.001	10-meter HPGR
CL-05	Met 1B	97	0.499	0.366	0.001	5-meter Jaw
CL-06	Met 1B	82	0.483	0.414	0.001	5-meter HPGR
CL-07	Met 4B	100	0.508	0.308	0.001	5-meter Jaw
CL-08	Met 4B	92	0.511	0.415	0.001	5-meter HPGR
CL-09	Met 1C	139	-	0.480	0.029	10-meter HPGR
CL-11	Met 2LG	105	-	0.119	0.049	10-meter HPGR
CL-12	Met 2HG	196	-	0.856	0.057	10-meter HPGR

Notes
1. NaCN consumptions calculated using previous report methodology
2. NaCN consumptions calculated using WAD in-out methodology
3. Hydrated lime $Ca(OH)_2$

Early in the testing campaign it became clear that the cure dosage at 0.75 kg NaCN/tonne was too high for the Lindero Deposit composites, nevertheless the cure dosage was maintained to avoid adding a new variable to the testing. The accepted process mass balance is based on a cure of 0.5 kg/tonne.

The actual cure dosage will vary from the base-case dosage dependent on feed grades, as it was observed with the Met 2LG/Met 2HG columns shown in Table 13.15. Despite the seemingly good correlation for the different Met Types, the data set is not sufficient to support a cure dosage proportional to the level of soluble copper in the feed.

13.2.8 Lime consumption

Hydrated lime $Ca(OH)_2$ consumption is presented in Table 13.15. The "filler" cement provides significant protective alkalinity to the solutions, so that as the time passes its capacity to maintain protective alkalinity is diminished. The average lime consumption for the longer-term leach columns (CL-09, CL-11 and CL-12) is 0.045 kg $Ca(OH)_2$/tonne and it is recommended that this amount of lime be added to the heap feed. This would equate to 0.033 kg CaO/tonne for quicklime.

13.2.9 Mercury

Previous test reports indicated that mercury concentration was low in Lindero Deposit materials. Various effluents were submitted for mercury analysis, and only one assayed above the detection limit. Considering the concentration ratio, the mercury in solutions would be approximately 1.0 ppb.

The bulk of any mercury in the pregnant solution from the heap will be precipitated in the SART process. The copper precipitates from the SART tests were sent for chemical analysis, including mercury.

Although mercury levels appear low it is recommended that the operations continue to monitor these levels during production

13.2.10 Sulfate

It is apparent that the Lindero Deposit metallurgical composites contain a soluble sulfate component which can accumulate as the leach progresses. The level of sulfate does not increase significantly in the SART effluent so it would appear that all the leach solutions will stabilize at a concentration in the range of 3 gpl.

13.2.11 SART laboratory testwork

Batch laboratory SART tests were conducted using samples of barren solution generated from column leach tests for the four Met types of "Existing Core" and the "Fresh Core" consisting of the Met 1C, Met 2LG, and Met 2HG composites. The primary objective of the tests on "Existing Core" was to generate copper-sulfide solids that could be assayed for metals content (Met 1 to Met 4). The assayed composition of the solids would be used to negotiate a contract for future sales of the SART copper-sulfide product. The objective of the tests on "Fresh Core" was to test carbon absorptions based on a variety of conditions. The efficiencies of copper and silver recoveries achieved during the tests are summarized in Table 13.16. Copper recoveries ranged from 28 to 95 percent, while silver recoveries ranged from 91 to 98 percent. The copper recoveries were significantly impacted by the dosage of NaHS. When a NaHS dosage of 120 percent stoichiometric was used a range of 82 to 92 percent copper recoveries was achieved. These results are consistent with the expected performance of the SART process.

Table 13.16 SART test results

Test No.	NaHS (% Stoich.)	pH	Recovery	
			Copper (%)	Silver (%)
MET-1-1	121	3.80	91	-
MET-1-2	120	3.50	89	97
MET-2-1	120	3.90	95	-
MET-2-2	120	3.80	90	98
MET-3-1	120	3.70	94	-
MET-3-2	120	3.80	88	98
MET-4-1	120	3.80	92	-
MET-4-2	120	3.80	89	92
MET-1C-AA-28	90	3.80	78	91
MET-1C-AA-29	101	4.20	78	97
MET-1C-AA-30	110	4.00	89	94
MET-1C-AA-31	120	4.00	91	97
MET-1C-AA-32	82	3.90	28	94
MET-1C-AA-33	91	3.90	36	97
MET-1C-AA-34	100	4.00	47	97
MET-1C-AA-35	109	4.00	51	97
MET-2LG-C-6	120	3.80	82	89
MET-2HG-C-7	120	4.00	91	98

Copper-sulfide solids generated in the laboratory SART tests were assayed for metals content and the results are summarized in Table 13.17. Since the tests were conducted with barren solution rather than pregnant solution, grades of gold and silver in the solids are relatively low. Higher grades of gold and silver are expected in the actual material, and this was taken into account when developing the mass balance for the SART plant. The assayed copper content in the solids ranged from 59 to 74 percent, which is consistent with solids generated from other SART plants.

Actual SART plant performance has demonstrated that NaHS addition of 20 mg/l to solution at pH 5 has resulted in 80 percent copper precipitation efficiency. These results are consistent with the historical laboratory testwork.

Table 13.17 SART copper-sulfide solids

Test No.	Cu (%)	Au (ppm)	Ag (ppm)	Zn (ppm)
MET-1	65.5	0.2	188	368
MET-2	58.8	0.1	84	>5,000
MET-3	73.6	0.1	79	185
MET-4	-	0.2	86	1,860

13.2.12 Carbon adsorption

Gold loading on carbon was lower than anticipated during the column tests. Carbon loading equilibrium has a significant impact on the adsorption, desorption, recovery (ADR) plant design and the heap inventory. In order to clarify the loading levels of the leach test solutions, carbon adsorption isotherms were generated at BML. Forty-four tests were conducted to investigate the carbon loading.

Residual leach solutions were processed through a bench-scale SART process to simulate the level of constituents in solution that might be experienced in the field. These solutions were reduced in gold from the locked cycle leach and reduced in silver and copper due to the SART process. These solutions were spiked with gold to roughly 2 ppm and assayed for gold, silver, copper and WAD cyanide.

The carbon and leach solution were combined in a jar which was capped and placed on a rolling table for a fixed amount of time. Contact time is typically set at 24 hours; however, the low gold loading rate prompted some tests to be run for 48 hours.

At the end of the contact time the carbon was filtered out and the filtrate was assayed for gold, silver, copper and WAD cyanide.

Adsorption coefficients of the Freundlich Adsorption Equation were calculated using the regression tools in Excel™. The Freundlich Equation is:

$$\frac{x}{m} = \mathrm{K}c^{1/n}$$

Where:

x is the mass of gold adsorbed on the carbon in grams

m is the mass of carbon in tonnes

K is a constant equivalent to, in this case, the adsorbed gold in g/t of carbon at equilibrium with 1 ppm in solution

c is the concentration of gold in solution in g/t (ppm)

n is a constant relating to the properties of the carbon

It is apparent that the loading is controlled by bulk diffusion limitations inherent in the test procedure. This has been mitigated by mixing the carbon and solutions more vigorously. The increase in gold loading on carbon with extended contact time may be an indication that the influence of bulk diffusion has not been entirely overcome with the increased agitation in the tests and higher agitation tests are in progress.

Testing shows that the loading is insensitive to pH and copper concentrations expected from a SART process. Gold loading on carbon has a slight inverse dependence with free cyanide concentration.

Testing to date results in a set of Freundlich isotherms as follows:

For 24 hr contact time:

$$\frac{x}{m} = 2250 \times c^{\frac{1}{3.46}}$$

For 48 hr contact time:

$$\frac{x}{m} = 3405 \times^{\frac{1}{2.38}}$$

The above equations are adequate for design of a conventional carbon-in-column circuit. It is anticipated the factors that influence a batch bench scale test will not be as prevalent in a continuous fluidized bed carbon adsorption column in the operation. However, carbon column designs will be optimized to maintain elevated interstitial solution velocities.

Carbon loading test on Met 1C SART effluent

Pregnant solutions were prepared using site water to leach agglomerated Met 1C ore. This solution was run through a SART process and used for carbon adsorption tests. Based on previous carbon loading results, the tests on Met 1C effluent were designed to investigate the impact of contact time on loading levels. Results showed that gold adsorption is improved with high agitation and longer contact time. Gold loading on the carbon increases proportionally to the contact time. It is apparent that equilibrium is not achieved in the times used for the test. The curve at 24 hours is acceptable for good gold loading in the field.

Carbon loading test on Met 2LG and Met 2HG

SART effluent from the scoping columns for Met 2LG and Met 2HG was used for carbon adsorption studies. Each test was run in parallel with one test at 20°C and the other at 6°C to determine the influence of temperature on loading.

From the results it was apparent that lower temperatures slow the loading of gold and copper onto activated carbon. Based on the “Max Cu” loading, it was also apparent that the negative impact of lower temperature is greater for copper than for gold (Met 2LG) but of similar magnitude for the higher-grade Met 2HG.

Carbon adsorption discussion

Considering the influence of the content of the metals in solution on the adsorption efficiency in ADR plant, many tests were completed simulating operation scenarios, of these tests the most significant observations are:

- Increasing the contact time increases the gold charge.

- Copper is charged at a high level in carbon.
- Fewer copper charges when using post-SART effluents.
- Lower temperatures tend to favor the adsorption of gold on carbon, since the reaction is exothermic, however, the rate of adsorption is slowed by lower temperatures.

Of the mechanisms that contribute to reaction rate kinetics (temperature, mixing rate, concentration, and competition for reaction sites) the one that seems to be controlling, in this case, is competition for adsorption sites.

There are several components in the ADR feed solution that may play a role in the carbon loading rate. Obviously, copper will play a role, but the solutions also contain zinc, strontium, calcium (precipitation as a carbonate) and perhaps others. Carbon fouling is very difficult to analyze in the laboratory, however, these species can be monitored and tested in the field to get a better understanding of the loading mechanisms.

As a check on the competition of inorganic salts on the carbon surface, a sample of carbon from CL-11 and CL-12 was soaked in 1% HCl solution. These carbons were used in the first contact with pregnant solutions at the start of leaching and should have the highest levels of absorbed and adsorbed species. The carbons were observed to evolve significant gas when wetted. Some of this may, of course, be due to carbon off-gassing when the liquid displaces the air in the pores, however, the volume and vigor of the off-gassing was greater than would be normally expected for degassing carbon. In addition, the pH of the acid solution rapidly rose to around pH 6.0. This would indicate acid was being consumed by reaction with carbonate precipitated on the carbon.

13.3 Metallurgical testwork by Mansfield

Continued metallurgical testing was undertaken by Mansfield as part of an ongoing investigation to clarify the results of the historical testing. The following types of investigation have been conducted at the Lindero Mine's on-site metallurgical laboratory: ore permeability testing on field generated agglomerates, bottle roll and column tests including monthly composites and many other routine tests to control the process.

13.3.1 Physical testing

Two types of tests have been conducted on a routine basis at the on-site metallurgical laboratory.

- A quick "dunk test" to determine the agglomerate strength has been performed daily. The test involves taking a sample of the agglomerated material from a recently configured leach cell, curing for 72 hours, and placing on a 10-mesh screen. The screen is then dunked for a short period of time into a bucket filled with water. The process is repeated several times as defined by a procedure. The fines passing through the screen are collected, dried, and weighed. Fine particles released from the agglomerate during tests are not securely attached and are quantified by the amount of fine particle migration through the test screen. The results are expressed as a percentage of the material retained on the screen. A bottom threshold of 85 percent has been established as an acceptable level which is supported by ore permeability tests under load. The critical parameter for agglomerate stability is the agglomerate's moisture content. The optimal moisture content for the Lindero Mine's ore has been confirmed to be 6.5 to 7 percent.

- Suitability for heap leaching flow for a sample is determined by placing the ore charge under load and measuring permeability. Resistance to flow (inverse of permeability) is determined at varying loads that represent a range between a single lift and the ultimate heap height. This test has also been performed daily. The results confirm that the recommended cement addition rate and moisture content during the agglomeration process are adequate to maintain hydraulic permeability for the designed height of the pad.

Further investigation will continue to optimize the reagent consumption for different ore types.

13.3.2 Leach testing

A series of small column tests have been conducted by the on-site laboratory to define the leach parameters for the cyanide cure based on 2.5-meter leach columns. The results have confirmed that the cyanide cure creates a very rapid initial extraction rate.

13.3.3 Gold extraction

The on-site metallurgical laboratory has been performing column leaching tests to determine the metals extraction and to evaluate the ore leaching behavior under different operational scenarios.

For the regular column tests the HPGR crushed material is collected daily and then amalgamated to represent a monthly composite sample. The monthly composite column test results determine the expected metal recovery levels for the ore placed on the pad for that particular month.

Current performance comparison to the design criteria

Results from the monthly composite column tests as well as the other tests have been compiled and analyzed. Figure 13.21 shows the data for typical PSD in the column tests performed on site compared to the PSD generated by laboratory equipment in historical tests.

The plant's size distribution profile differs from the one established in the design criteria. The current HPGR product has a lower proportion of material within the 1-3 mm size fraction, and higher proportion in plus 10-mm size fraction. The HPGR circuit is physically producing significantly less material of the mid-size fraction than was originally anticipated. The percentage of very fine fractions are quite similar since the fines come naturally from the ore body and are not dependent on crushing performance.

Monthly composite column leaching test results have demonstrated gold recoveries ranging from 60 to 77 percent for samples with typical head grades of 0.7 to 1.63 g/t Au and a granulometric composition of 80 percent passing (P80) 9.5 to 15.5 mm.

Figure 13.21 Laboratory versus plant performance PSD

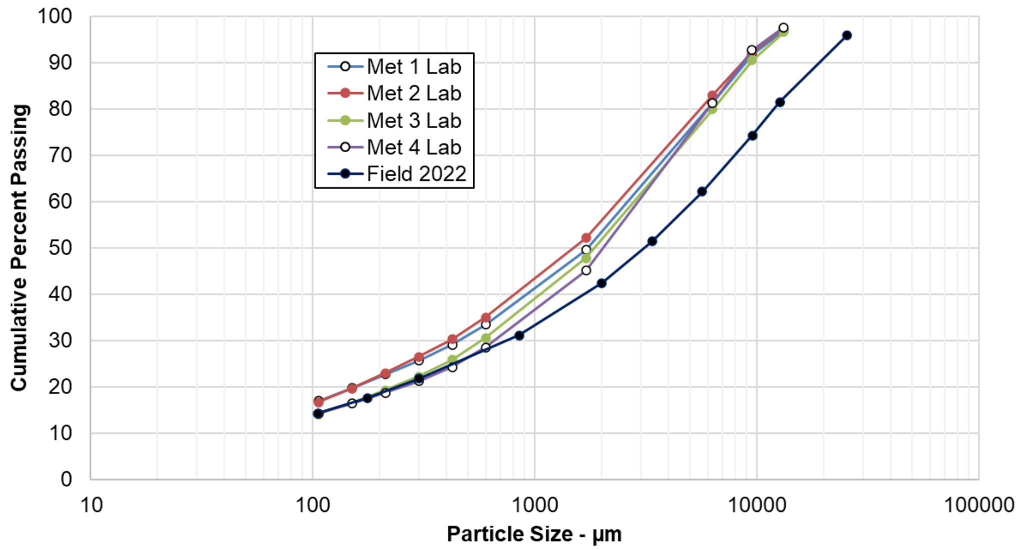


Figure prepared by Mansfield, 2022

Column tests with synthetic feed

The synthetic feed column test used the same material source as the other tests, but the ore was manually screened to match its granulometric composition with the designed ore size distribution. The objective of the test was to verify the ultimate gold recovery which should ideally match the designed recovery. For this reason, three samples were carefully prepared to maximize the ore size uniformity between the columns. At the same time each column had a different source of leaching cyanide solution: a regular synthetically prepared laboratory solution, the barren solution from the carbon column train 1 and the barren solution from the carbon column train 2. The main variable for these solutions was the presence of copper and associated chemical compounds. It varied from no presence of copper in the synthetic solution to up to 80 to 250 ppm of copper in the barren solutions.

The results demonstrated that the leaching kinetics are fast for all columns regardless of the solution source. Copper shows a reasonably consistent behavior across all tests. The ultimate gold recoveries for all three columns were quite similar at approximately 74 percent. These recoveries are higher than in most of the monthly composite column tests and quite similar to the recoveries established in the designed criteria. The main conclusion drawn from these tests is that the ore size fraction composition plays a leading role in determining the ore leaching performance and the ultimate gold recovery.

Process optimization

Operational management at Mansfield has recognized that in order to increase current gold recoveries the HPGR's final product must be further optimized to reach the 80 percent passing 6 mm from the actual average of minus 12 mm. The process optimization program has been developed and taken into the implementation stage. The program consists of the following main objectives: ensure the HPGR feed granulometry (product of primary/secondary crushing) is constantly achieving the 80 percent passing size (P80) of minus 25 mm; ensure the HPGR circuit recirculates loads of up to 25 percent; ensure a consistent HPGR performance at the recommended specific grinding force of 3.8 N/mm^2 to 4.0 N/mm^2.

13.4 Heap leach modeling

The heap leach and associated processes were modeled using METSIM simulation software (version 2015.08) to develop a dynamic mass balance for the life of the operation. The primary objectives were to estimate monthly metal productions for gold, silver and copper and to evaluate the buildup of copper that will occur in leach solution.

For the model, the heap leach was divided into about 1,700 3-D blocks to represent the geometric shape of the heap as it is stacked with ore. The heap blocks were sequentially filled with ore according to the mine plan, and leach extractions for gold, silver and copper were performed according to extraction curves established for each ore type.

Solution transport through the heap lifts was calculated according to the primary and secondary applications of leach solution to ore. The dynamic model tracked inventories in heap pore solution for water, cyanide and metals (Au, Ag, and Cu). Solution exiting the heap is managed by diverting the highest gold tenors to the pregnant leach solution (PLS) tank, while lower tenor solution was recycled and applied to the heap as intermediate leach solution (ILS).

A daily mass balance was calculated for the heap leach, solution ponds/tanks, the ADR plant and the SART plant. The size of the SART plant was varied in early modeling trials and it was determined to design the SART plant to treat 400 m^3/hr of pregnant solution.

13.5 Arizaro Deposit – bottle rolls

Coarse ore bottle roll tests were completed on four different drill core composites from the Arizaro Deposit (KCA, 2013a). The drill core was comprised of both fresh and oxide ore from drill holes ARD-02, -04, -05, -09, -10, -12, -13, -14, and -15. The samples were crushed to P80 passing 9.5 mm and the sodium cyanide concentration maintained in the tests was 1.0 gram per liter of solution. All four tests lasted 53 days. Tables 13.18 and 13.19 summarize the results of these bottle roll tests.

Table 13.18 Arizaro bottle roll tests – gold extraction and reagent usage

Ore Type	Calculated Head Au (g/t)	Extracted Au (%)	NaCN Consumption (kg/t)	$Ca(OH)_2$ Addition (kg/t)
1 – BX MAG (high grade)	1.86	67	2.50	1.00
2 – BX MAG (medium grade)	0.62	64	2.07	1.00
3 – FED (medium grade)	0.42	73	1.25	1.00
4 – FED (high grade)	1.04	72	3.79	1.00

Table 13.19 Arizaro bottle roll tests – silver and copper extraction

Ore Type	Calculated Head Ag (g/t)	Calculated Head Cu (g/t)	Extracted Ag (%)	Extracted Cu (%)
1 – BX MAG (high grade)	0.76	3,368	67	22
2 – BX MAG (medium grade)	0.49	2,241	50	26
3 – FED (medium grade)	0.45	1,993	43	17
4 – FED (high grade)	0.61	3,337	60	33

13.6 Comments on Section 13

It is the opinion of the QP, Lindero's metallurgical testing support has been developed to industry standards and is suitable for the design of the mineral processing facilities. The multiple testing campaigns executed between 2004 and 2019 show a consistent and systematic investigation of the key variables impacting the economic extraction of gold from the Lindero Deposit.

The Arizaro satellite deposit has been the subject of a preliminary set of metallurgical tests with promising results. Additional testing needs to be conducted on a laboratory scale. With the Lindero Mine operating, Mansfield could also take the opportunity to perform one or more large scale tests with material from the Arizaro Deposit in the plant or at the on-site metallurgical laboratory.

There are key aspects that Mansfield needs to investigate further, possibly using a combination of laboratory testing and industrial performance monitoring, these include:

- The entire metallurgical testing program was developed under the assumption of four ore types. Mansfield may want to use a combination of plant testing and laboratory testing to verify if the ore in the LOM is effectively showing a distinctive performance at industrial scale.
- The pervasive nature of copper in the Lindero and Arizaro deposits. Limiting copper deportment to the PLS would be a primary objective that may conflict with the extraction of gold. The use of the available SART plant should be considered as a safety step to ensure gold recovery and doré quality. Systematic testing and plant monitoring should support a technical and economically sound decision.
- The crushed ore PSD has a direct impact in the performance and demands of the downstream unit processes. Crushers are reasonably easy to adjust and/or modify. Testing the leaching performance within the capabilities of the crushing equipment should be investigated.
- Optimization of the agglomeration and curing stages is twofold, improving the extraction kinetics and the physical stability of the heap leach. Mansfield needs to closely monitor both stages as they have short- and long-term impacts on the safety and economics of the operation.
- Optimization of the irrigation cycle, including cyanide and lime addition should be regularly evaluated and optimized by using laboratory scale testing and plant performance analysis.
- Additional contaminants in the PLS appear of minor to negligible impact at this time, but regular monitoring is necessary to ensure their dissolution rate remains low enough and has no impact on gold extraction and recovery stages.

Mansfield needs to maintain a continuous metallurgical testing program using its in-house facilities. The focus of this testing program should be to guide the industrial scale operation towards maximizing recovery while lowering the operating expenditure requirements. More specifically, defining the optimum leaching conditions for its different ore types, including but not limited to irrigation cycle, cyanide and lime addition, PSD, agglomeration conditions and mechanical competence.

The metallurgical laboratory needs to work closely with the operating areas to ensure the metallurgical research is consistent with the capabilities of the industrial facilities, and if necessary, guide the modification of the current facilities with the purpose of maximizing the technical and economical performance of the Lindero Mine.

14 Mineral Resource Estimates

14.1 Introduction

The following chapter describes the Mineral Resource estimation methodology for the Lindero and Arizaro deposits.

14.2 Disclosure

Mineral Resources were prepared on behalf of Mansfield by Alexander Delgado (MAusIMM) with assistance from the Mansfield Technical Services team and reviewed by Eric Chapman (P.Geo.). Mr. Delgado and Mr. Chapman are Qualified Persons as defined in National Instrument 43-101 and employees of Fortuna.

Mineral Resources for the Lindero Deposit are estimated as of August 31, 2022 and reported as of December 31, 2022, taking into account production related depletion between September 1 and December 31, 2022. Mineral Resources for the Arizaro Deposit are estimated and reported as of December 31, 2022.

14.2.1 Known issues that materially affect Mineral Resources

Fortuna does not know of any issues that materially affect the Mineral Resource estimates. These conclusions are based on the following:

- **Environmental**: Mansfield is in compliance with Environmental Regulations and Standards set in Argentine Law and has complied with all laws, regulations, norms and standards at every stage of exploration, as detailed in Section 20.
- **Permitting**: Mansfield has represented that all necessary permits required to date for mining have been obtained and are in good standing.
- **Legal**: Mansfield has represented that there are no outstanding legal issues; no legal actions, and/or injunctions pending against the mine.
- **Title**: Mansfield has represented that the mineral and surface rights have secure title.
- **Taxation**: No known issues other than those discussed in Section 4.
- **Socio-economic**: Mansfield has represented that the operation has community support from the local town of Tolar Grande.
- **Marketing**: No known issues.
- **Political**: Mansfield believes that the current Government and Province are supportive of the Lindero Mine.
- **Other relevant issues**: No known issues have been identified based on current geotechnical and hydrogeologic studies.
- **Mining**: The Lindero Deposit is actively being mined as of the effective date of this Report.

- **Metallurgical**: Mansfield and Fortuna have conducted extensive metallurgical testwork using external consultants to define an appropriate processing circuit and heap leach design. This work has been described in Section 13.
- **Infrastructure**: All necessary infrastructure for mining and processing operations is in place as described in Section 18.

14.3 Assumptions, methods and parameters

The 2022 Mineral Resource estimates were prepared using the following steps:

- Data validation as performed by Fortuna and detailed in Section 12.
- Data preparation including importation to various software packages.
- Geological interpretation and modeling of lithologic domains.
- Coding of drill hole samples within lithologic domains (blastholes at the Lindero Deposit were limited to estimating blocks no more than two benches below the topographic surface as at the data cut-off date with much of this material extracted prior to reporting at yearend).
- Sample length compositing of drill hole samples.
- Exploratory data analysis of gold and copper.
- Analysis of boundary conditions.
- Analysis of extreme data values and application of top cuts.
- Unfolding of composites in the Lindero Deposit by lithological domains based on the morphology of the intrusives.
- Generation of indicators to identify high, medium and low gold grade domains in the Lindero Deposit for domaining and estimation purposes.
- Variogram analysis and modeling of indicator variograms.
- Probability assigned constrained kriging using dynamic anisotropy to identify high- and medium-grade domains for block modeling and composites.
- Estimation of gold and copper grades by ordinary kriging (OK) and nearest neighbor (NN) interpolation methods, using dynamic anisotropy in selected domains, and assignment of density values.
- Validation of estimated gold and copper grades.
- Classification of estimates with respect to 2014 CIM guidelines.
- Mineral Resource tabulation and reporting.

14.4 Supplied data, data transformations and data validation

Drilling information used in the 2022 Mineral Resource estimations is sourced from a Maxwell DataShed™ database.

14.4.1 Data transformations

All data is stored using the Gauss Kruger coordinate system (WGS 84 datum) commonly employed in Argentina and the same unit convention. Transformations of the supplied drill hole and channel information, including assay grades, were not required.

14.4.2 Software

The Mineral Resource estimates have relied on several software packages for undertaking modeling, statistical, geostatistical and grade interpolation activities. Wireframe modeling of the mineralized envelopes was performed in Leapfrog Geo™ version 2021.2.5. Data preparation, block modeling, unfolding and OK grade interpolations were performed in Datamine RM™ version 1.6.87.0. Statistical and variographic analyses were performed in Supervisor™ version 8.14.0.

14.4.3 Data preparation

Collar, survey, lithology, and assay data exported from the DataShed™ database provided by Mansfield was imported into Datamine™ and used to build 3D representations of the drill holes, blastholes and trenches, although trenches were used only for the geologic interpretation and blastholes were limited to estimate gold and copper grades only in the two benches below the current topographic surface with the majority of this material mined by the end of 2022. Assay values at the detection limit were adjusted to half the detection limit. Absent assay values were adjusted to a zero grade. A total of 228 surface drill holes totaling 45,852 m were used in the Lindero 2022 resource update, after the removal of 5 condemnation holes totaling 1,135 m that are outside the area of interest. A total of 65 surface drill holes totaling 16,165 m were used in the Arizaro resource estimate. The majority of drill core has been assayed. Table 14.1 details the data by deposit, company and sample type with Mansfield being responsible for collecting over 93 percent of the drilling data at Lindero and 96 percent of the drilling data at Arizaro.

Table 14.1 Data used in 2022 Mineral Resource update

Deposit	Company	Sample Type	Count	Meters	Percent of Total
Lindero	Rio Tinto	Surface diamond drill holes	10	3,279.58	7
	Goldrock	Surface diamond drill holes	122	35,329.85	77
	Fortuna	Surface diamond drill holes	96	7,242.88	16
	TOTAL	**n/a**	**228**	**45,852.31**	**100**
Arizaro	Rio Tinto	Surface diamond drill holes	2	628.93	4
	Goldrock	Surface diamond drill holes	27	8,224.80	51
	Fortuna	Surface diamond drill holes	36	7,312.20	45
	TOTAL	**n/a**	**65**	**16,165.93**	**100**

In addition to the holes listed in Table 14.1, a total of 46,734 blast holes totaling 400,702 m have been drilled at the Lindero Deposit as of the data cut-off date. These were used to refine the geologic interpretation and to estimate 15 meters below their spatial location, to improve the local estimate of benches planned for mining in the short-term, without influencing the estimate of blocks at depth planned for mining in the LOM.

14.4.4 Data validation

An extensive data validation process was conducted by Fortuna's Technical Services department prior to the Mineral Resource estimation. A detailed description of this process is provided in Section 12. Validation checks were also performed upon importation into Datamine™ mining software, and included searches for overlaps or gaps in sample and geology intervals, inconsistent drill hole identifiers, and missing data. No significant discrepancies were identified.

14.5 Lindero Deposit

14.5.1 Geological interpretation and domaining

Gold mineralization at the Lindero Deposit is hosted in a multiphase Miocene intrusive complex. The complex is elongated to the northeast, 750 by 600 m at the surface, and cuts recrystallized Paleogene sandstones, siltstones and mudstones (Figure 7.3). Most drill holes near the border of the complex pass into the red-bed sequence at depth, identifying an upwardly-flaring shape. Mansfield prepared 3-D mineralized solids using Leapfrog Geo™ to reflect the geological interpretations generated from cross-sectional and plan views. The geological models used to constrain the resource estimation comprised eight lithological models:

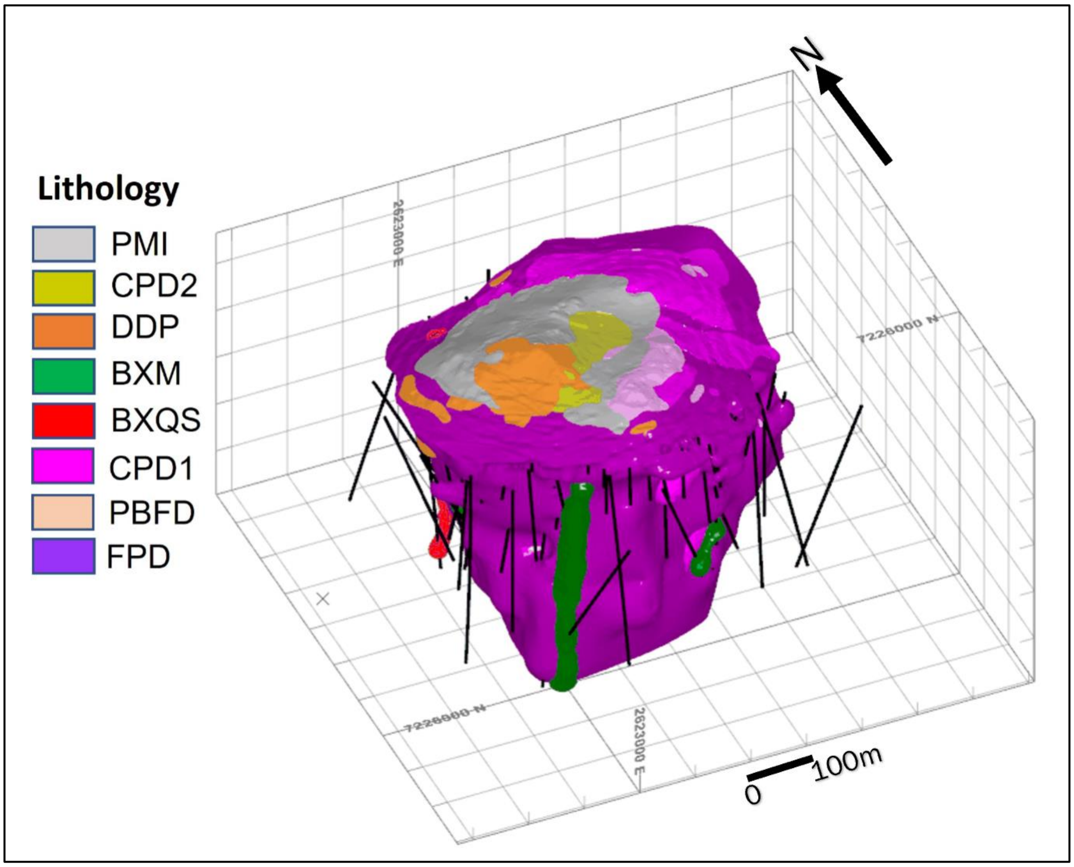
- **Fine diorite porphyry (FPD)** forms most of the peripheral portions of the Lindero Deposit being the youngest intrusive event. Gold mineralization was likely introduced into this lithology by the intrusion of the CPD1 unit.
- **Crowded diorite porphyry 1 (CPD1)** contains approximately 50 percent total phenocrysts, mostly of tabular plagioclase, with subordinate slender hornblende and ~2 percent pinhead-sized quartz eyes. The majority of gold-copper at Lindero was introduced with CPD1 porphyry. When the original extent of CPD1 is restored by removal of younger intrusive phases, the distribution of present-day gold zones is nearly symmetrical around the deposit.
- **Bimodal feldspar diorite porphyry (PBFD)** is a crowded porphyry similar to CPD1. Represents a small percentage of the intrusive complex and hosts medium-grade gold mineralization.
- **Mingled diorite porphyry (DDP)** This unit occurs at the center of the intrusive complex and is associated with CPD2. Hosts low- to medium-grade mineralization in the 0.1 g/t Au to 0.4 g/t Au range.
- **Tertiary sedimentary rocks (S1)** are a sequence of well-bedded arkose, greywacke, and subordinate mudstone and siltstone. These rocks form resistant hornfels within several hundred meters of the Lindero Deposit. Gold mineralization is present in this unit related to the contact with the FPD/CPD1 intrusions.
- **Crowded diorite porphyry 2 (CPD2)** forms much of the south–central part of the complex and is generally barren.
- **Post-mineral intrusive (PMI)** forms most of the north–central part of the complex, being the youngest intrusive event with no gold mineralization.

- **Magmatic-hydrothermal breccias (BX)** form relatively narrow bodies, typically less than 10 m in drilled thickness. Two styles of breccias are distinguished based on the nature of the matrix material. In the quartz–sulfide type (BX-QS), the matrix consists of quartz, gypsum and/or anhydrite, and sulfides with low/moderate gold mineralization that cut S1, FPD, and CPD1, but none of the younger units. Breccias of the magnetite-type (BX-M), in contrast, have matrices of magnetite ± chlorite and are commonly strongly mineralized with chalcopyrite and gold.

A 3-D perspective of the wireframes representing the intrusive events present at the Lindero Deposit is displayed in Figure 14.1.

In addition to the lithology domains, Mansfield constructed surfaces to represent the contact between the oxide and mixed horizon and the contact between the mixed and sulfide horizons to reproduce vertical trends in the gold grades (Figure 14.2).

Figure 14.1 3-D schematic of Lindero Deposit showing lithologic wireframes



Note: S1 lithology is not shown as it represents the country rock
Figure prepared by Fortuna, 2022

Figure 14.2 3-D schematic of Lindero Deposit showing oxide/sulfide horizons

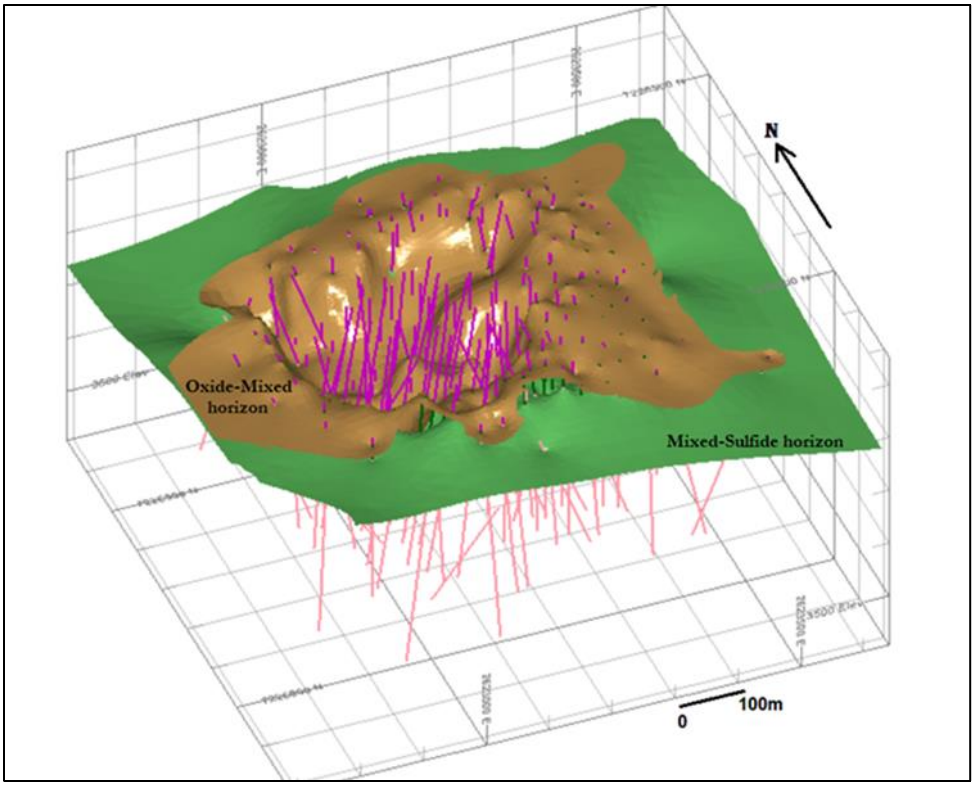


Figure prepared by Fortuna, 2022

Note that the oxide and mixed zones were combined and referred to as the 'oxide' domain for statistical analysis and estimation purposes.

Probabilistic grade shells

Fortuna used probability-assigned constrained kriging (PACK) to estimate the location of moderate and high gold grade regions of the deposit. PACK was designed to define economic envelopes around mineralized zones digitally that are difficult to outline and delineate using more traditional and labor-intensive methods such as wireframing. Probabilistic envelopes are first generated using indicators to define the limits of the economic mineralization and then the envelopes are used in the resource estimation to confine the higher-grade assays from smearing into lower-grade zones and restrict lower-grade assays from diluting the higher-grade zones.

PACK models were constructed for all domains except the barren PMI and CPD2 domains as follows:

- Indicator thresholds were selected for samples in all mineralized domains with grades above the threshold set to one and below to zero. Two thresholds were chosen to represent gold grade domains, 0.5 g/t Au for high grades and 0.2 g/t Au for moderate grades. One threshold of 0.1 % Cu was chosen to represent copper grades.
- Indicator values for the chosen thresholds were then unfolded to remove the circular nature of the mineralization and variograms modeled to represent the spatial variability of these indicators.

- Indicator values were estimated by OK into a 2 x 2 x 2 m block model using the modeled variograms and associated search neighborhoods that employed dynamic anisotropy (where the search ellipse orientation changes direction according to dip and strike values assigned to the block in relation to its location around the circular mineralized body).
- Upon completion of the estimate, all blocks with a probability value greater than or equal to 0.5 were assigned a code of one and blocks with a probability below 0.5 were assigned a code of zero.
- Three wireframes were generated identifying the location of the block codes equal to one for each of the three thresholds (high gold grade domains ≥0.5 g/t Au, moderate gold grade domains ≥0.2 g/t Au, and high copper grade domains ≥0.1 % Cu).
- The high gold grade wireframe (threshold of 0.5 g/t Au) was used to define a high gold grade domain in the strongly mineralized lithologies of FPD, CPD1, and S1
- The moderate gold grade wireframe (threshold 0.2 g/t Au) was used to define the moderate gold grade domain in the weakly mineralized lithologies of PBFD, DDP, and BX-M.
- The high copper grade wireframe (threshold 0.1 % Cu) was used to define the high copper grade domain in all mineralized lithologies.

The wireframes detailed above defining lithology, sulfide/oxide, and grade were used to define sub-domain codes as detailed in Table 14.2 that were used for controlling the estimation.

Table 14.2 Domains used in the Lindero Deposit 2022 Mineral Resource update

Lithology	Oxide/Sulfide	Grade Domain	Min Code	Rock Code	Domain Code
FPD	Sulfide	Low	1	1	10
		High			10.5
	Oxide/Mixed	Low			11
		High			11.5
CPD1	Sulfide	Low		2	20
		High			20.5
	Oxide/Mixed	Low			21
		High			21.5
S1	Sulfide	Low		7	70
		High			70.5
	Oxide/Mixed	Low			71
		High			71.5
PBFD	Sulfide	Low		3	30
		Moderate			30.2
	Oxide/Mixed	Low			31
		Moderate			31.2
DDP	Sulfide	Low		5	50
		Moderate			50.2
	Oxide/Mixed	Low			51
		Moderate			51.2
CPD2	Sulfide	n/a	2	4	40
	Oxide/Mixed	n/a			41

Lithology	Oxide/Sulfide	Grade Domain	Min Code	Rock Code	Domain Code
PMI	Sulfide	n/a	3	6	60
	Oxide/Mixed	n/a			61
BX-M	Sulfide	Low	4	9	90
		Moderate			90.2
	Oxide/Mixed	Low			91
		Moderate			91.2
BX-QS	Sulfide	n/a		8	80
	Oxide/Mixed	n/a			81

14.5.2 Exploratory data analysis

Compositing of assay intervals

Compositing of sample lengths was performed so that the samples used in statistical analysis and estimations have similar support (i.e., length). Mansfield sample drill holes at 2 m interval lengths, although this may be shortened at geological contacts. The vast majority of samples (>99 percent) were sampled on lengths of 2 m or less.

Based on the average sampling length and the selective mining unit, a 4 m composite was chosen as suitable.

Statistical analysis of composites

Exploratory data analysis was performed on drill hole and blast hole composites identified in each geological vein (Table 14.3). Statistical and graphical analysis (including histograms, probability plots, scatter plots) were investigated for each domain to assess if stationarity had been achieved.

Table 14.3 Univariate statistics for gold of undeclustered composites for the Lindero Deposit by domain

Lithology	Oxide/Sulfide	Grade Domain	Domain Code	Count	Minimum (g/t)	Maximum (g/t)	Mean (g/t)	Standard Deviation	Coefficient of Variation
FPD	Sulfide	Low	10	6,472	0.01	2.35	**0.25**	0.17	0.66
		High	10.5	7,062	0.02	8.51	**1.08**	0.60	0.56
	Oxide/Mixed	Low	11	9,310	0.01	2.56	**0.28**	0.18	0.64
		High	11.5	13,751	0.02	5.56	**1.05**	0.57	0.54
CPD1	Sulfide	Low	20	8,235	0.01	6.94	**0.30**	0.17	0.56
		High	20.5	10,040	0.02	7.50	**1.08**	0.62	0.57
	Oxide/Mixed	Low	21	9,964	0.01	6.94	**0.28**	0.18	0.66
		High	21.5	8,375	0.02	5.84	**0.97**	0.49	0.50
S1	Sulfide	Low	70	6,029	0.01	4.84	**0.16**	0.17	1.07
		High	70.5	1,546	0.13	4.84	**0.89**	0.41	0.46
	Oxide/Mixed	Low	71	4,618	0.01	1.01	**0.14**	0.12	0.83
		High	71.5	371	0.32	2.71	**0.86**	0.41	0.48
PBFD	Sulfide	Low	30	273	0.01	0.49	**0.10**	0.07	0.69
		Moderate	30.2	1,485	0.09	2.38	**0.64**	0.39	0.62
	Oxide/Mixed	Low	31	1,961	0.01	1.47	**0.07**	0.10	1.32
		Moderate	31.2	5,113	0.01	5.42	**0.66**	0.46	0.70
DDP	Sulfide	Low	50	34	0.03	0.20	**0.12**	0.05	0.45
		Moderate	50.2	31	0.20	1.10	**0.41**	0.20	0.48
	Oxide/Mixed	Low	51	6,593	0.01	1.49	**0.10**	0.08	0.82
		Moderate	51.2	11,038	0.02	3.81	**0.59**	0.42	0.72

Lithology	Oxide/Sulfide	Grade Domain	Domain Code	Count	Minimum (g/t)	Maximum (g/t)	Mean (g/t)	Standard Deviation	Coefficient of Variation
BX-M	Sulfide	Low	90	2	0.15	0.16	**0.16**	0	0.02
		Moderate	90.2	82	0.17	3.48	**0.55**	0.52	0.94
	Oxide/Mixed	Low	91	6	0.06	0.20	**0.12**	0.05	0.45
		Moderate	91.2	6	0.24	1.27	**0.62**	0.39	0.63
BX-QS	Sulfide	n/a	80	17	0.14	0.54	**0.27**	0.11	0.41
	Oxide	n/a	81	8	0.09	1.08	**0.52**	0.29	0.55
CPD2	Sulfide	n/a	40	285	0.00	1.56	**0.10**	0.15	1.47
	Oxide	n/a	41	7,950	0.00	3.99	**0.11**	0.21	1.88
PMI	Sulfide	n/a	60	668	0.00	2.24	**0.16**	0.25	1.57
	Oxide	n/a	61	22,078	0.00	4.91	**0.05**	0.14	2.64

Contact analysis

To determine whether composites should be used across lithological boundaries during gold and copper estimation, Fortuna constructed contact plots for the different combinations of lithological boundaries. Hard contacts (only those composites that lie within each domain are used for estimation in that domain) are generally justified if there is a substantial grade difference between the domains, and soft contacts (composites in adjacent domains are included in the estimation) are justified if the grade difference is minor or if the grades at the boundary are nearly identical. Firm boundaries are justified where grades change gradually across the contact. If a hard boundary was imposed where grades tend to change gradually, grades may be overestimated on one side of the boundary and underestimated on the opposite side.

Results from the Lindero Deposit contact profiles showed that hard, soft and firm contacts exist. Hard boundaries were defined using the 'MIN' code as detailed in Table 14.2. Firm boundaries were defined using the 'DOMAIN' code where modeling allowed composites on either side of the boundary to be used in estimation of blocks in the first pass but not in subsequent passes.

Extreme value treatment

Top cuts of extreme grade values prevent over-estimation in domains due to disproportionately high-grade samples. Whenever the domain contains an extreme grade value, this extreme grade will overly influence the estimated grade.

If the extreme values are supported by surrounding data, are a valid part of the sample population, and are not considered to pose a risk to estimation quality, then they can be left untreated. If the extreme values are considered a valid part of the population but are considered to pose a risk for estimation quality (e.g., because they are poorly supported by neighboring values), they should be top cut. Top cutting is the practice of resetting all values above a certain threshold value to the threshold value.

Fortuna examined the grades of gold and copper by each domain to identify the presence and nature of extreme grade values. This was done by examining the sample histogram, log histogram, log-probability plot, and by examining the spatial location of extreme values. Top cut thresholds were determined by examination of the statistical plots and determination of the effect of top cuts on the mean, variance, and coefficient of variation (CV) of the sample data. Top cut thresholds used for each domain are shown in Table 14.4.

Table 14.4 Lindero Deposit top cut thresholds by domain

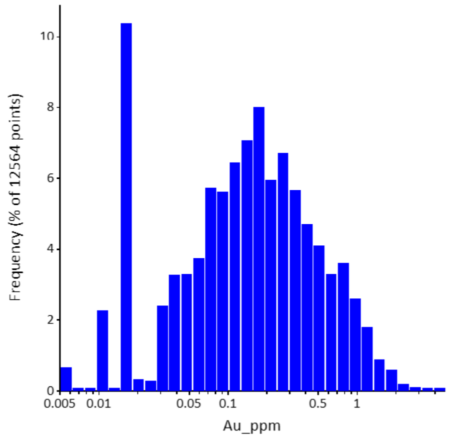
Lithology	Oxide/Sulfide	Grade Domain	Domain Code	Top cut (g/t)	Mean (g/t)	Top cut Mean (g/t)	Difference
FPD	Sulfide	Low	10	1.2	0.25	**0.25**	0%
		High	10.5	3.0	1.08	**1.06**	-1%
	Oxide/Mixed	Low	11	1.2	0.28	**0.27**	0%
		High	11.5	3.0	1.05	**1.04**	-1%
CPD1	Sulfide	Low	20	1.0	0.30	**0.30**	-1%
		High	20.5	2.8	1.08	**1.06**	-2%
	Oxide/Mixed	Low	21	1.0	0.28	**0.28**	-1%
		High	21.5	2.8	0.97	**0.97**	0%
S1	Sulfide	Low	70	0.65	0.16	**0.16**	-3%
		High	70.5	1.9	0.89	**0.88**	-1%
	Oxide/Mixed	Low	71	0.65	0.14	**0.14**	0%
		High	71.5	1.9	0.86	**0.84**	-1%
PBFD	Sulfide	Low	30	0.3	0.10	**0.10**	-1%
		Moderate	30.2	2.0	0.64	**0.63**	0%
	Oxide/Mixed	Low	31	0.3	0.07	**0.07**	-7%
		Moderate	31.2	2.0	0.66	**0.64**	-2%
DDP	Sulfide	Low	50	0.2	0.12	**0.12**	0%
		Moderate	50.2	1.1	0.41	**0.41**	0%
	Oxide/Mixed	Low	51	0.5	0.10	**0.10**	-1%
		Moderate	51.2	1.55	0.59	**0.57**	-2%
BX-M	Sulfide	Low	90	0.16	0.16	**0.16**	0%
		Moderate	90.2	1.1	0.55	**0.49**	-13%
	Oxide/Mixed	Low	91	0.2	0.12	**0.12**	0%
		Moderate	91.2	1.1	0.62	**0.59**	-5%
BX-QS	Sulfide	n/a	80	0.54	0.27	**0.27**	0%
	Oxide	n/a	81	0.55	0.52	**0.42**	-24%
CPD2	Sulfide	n/a	40	0.4	0.10	**0.09**	-9%
	Oxide	n/a	41	0.4	0.11	**0.09**	-23%
PMI	Sulfide	n/a	60	0.5	0.16	**0.13**	-24%
	Oxide	n/a	61	0.5	0.05	**0.05**	-14%

The application of the top cuts has not dramatically altered the mean of the sample data in most of the domains except for the Breccia (BX-M and BX-QS) domains. This is because these domains are defined by very few samples with a small number (2 to 3) having extreme values far in excess of any other composites. Once these composites are reset the effect on the mean is dramatic, but likely to be more representative of the domain.

The gold grade distribution presented for the mineralized lithologies is graphically displayed using histograms in Figure 14.3.

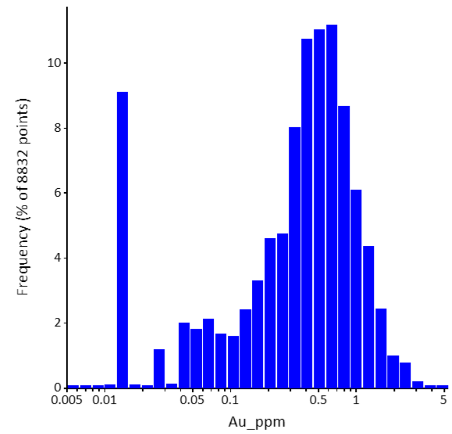
Figure 14.3 Gold grade distributions for Lindero Deposit mineralized lithologies

S1



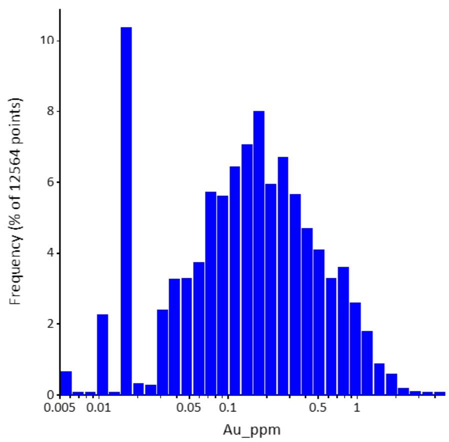
Log Histogram for Au (g/t)

PBFD



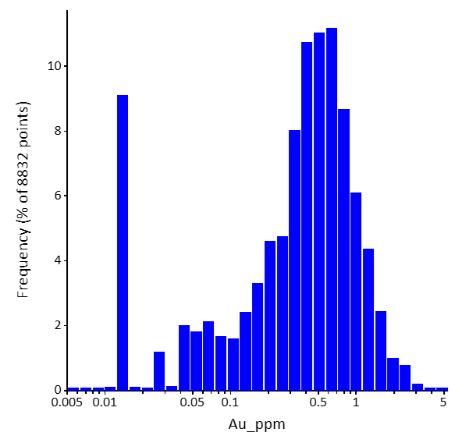
Log Histogram for Au (g/t)

S1



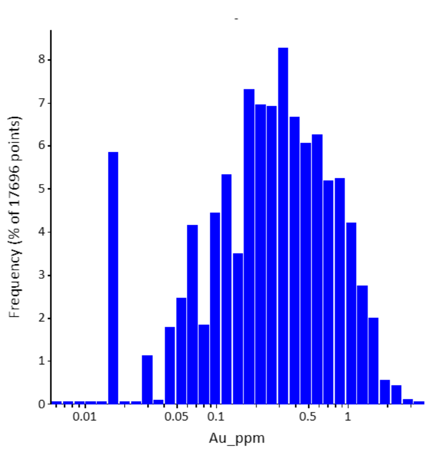
Log Histogram for Au (g/t)

PBFD



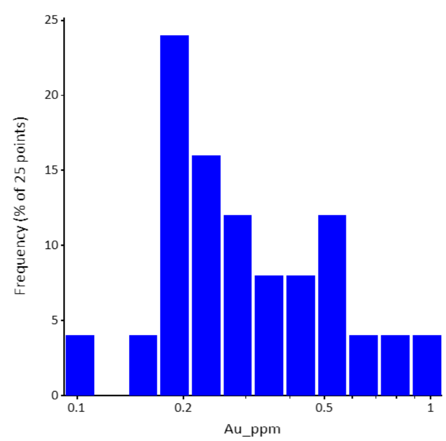
Log Histogram for Au (g/t)

DDP



Log Histogram for Au (g/t)

BX-M



Log Histogram for Au (g/t)

Grade correlation

It is important that the relationship between major constituents is maintained in each of the domains after estimation. Subsequently the correlation between gold and copper grades has been investigated.

A positive correlation exists between gold and copper composite grades in the primary mineralized domains with a correlation coefficient of 0.74. The correlation statistics are reinforced by examining scatterplots comparing gold and copper grades for all composites.

It is expected that similar correlation coefficients and positive grade relationships are present in the estimates. These correlations have been tested as part of the validation process as described in Section 14.5.5.

Unfolding

The main purpose of unfolding strata is to calculate the stratigraphic distances between points rather than straight line distances which is used for variogram calculation. The nature of the emplacement of multiple intrusive events into the S1 Redbeds at the Lindero Deposit has resulted in a hollow cylinder nature with the earliest mineralized FPD and CPD1 intrusive units being overprinted with later moderately mineralized (PBFD or DDP) or barren units (CPD2 and PMI). To account for the different orientation of the mineralized material, unfolding has been performed vertically around the body for variogram analysis.

Continuity analysis

Continuity analysis refers to the analysis of the spatial correlation between sample pairs to determine the major axis of spatial continuity. The analysis has been performed on the indicator thresholds; for each of the lithologic units; and for the defined mineralized units as described in Section 14.5.1.

Horizontal, across strike, and down dip continuity maps were examined (and their underlying variograms) for gold and copper to determine the directions of greatest and least continuity.

Continuity maps of the dip plane were examined to ascertain if a plunge was present in any of the domains. The presence of a distinctive plunge in the grade continuity could not be established for certainty in any of the domains and therefore variograms were modeled along strike (around the body) and down dip (vertical).

Variogram modeling

The next step is to model the variograms for the major, semi-major, and minor axes. This exercise creates a mathematical model of the spatial variance that can be used in ordinary kriging. The most important aspects of the variogram model are the nugget and the short-range characteristics. These aspects have the most influence on the estimation of grades.

The nugget effect is the variance between sample pairs at the same location (zero distance). Nugget effect contains components of inherent variability, sampling error, and analytical error. A high nugget effect implies that there is a high degree of randomness in the sample grades (i.e., samples taken even at the same location can have very different grades). The best technique for determining the nugget effect is to examine the downhole variogram calculated with lags equal to the composite length.

After determining the nugget effect, the next step was to model directional variograms in the three principal directions based on the directions chosen from the continuity maps (Figure 14.4). It was not always possible to produce a variogram for the minor axes, and in these cases the ranges for the minor axes were taken from the downhole variograms.

Figure 14.4 Modeled variograms for normal score Au grades for the Lindero Deposit in the unfolded FPD domain

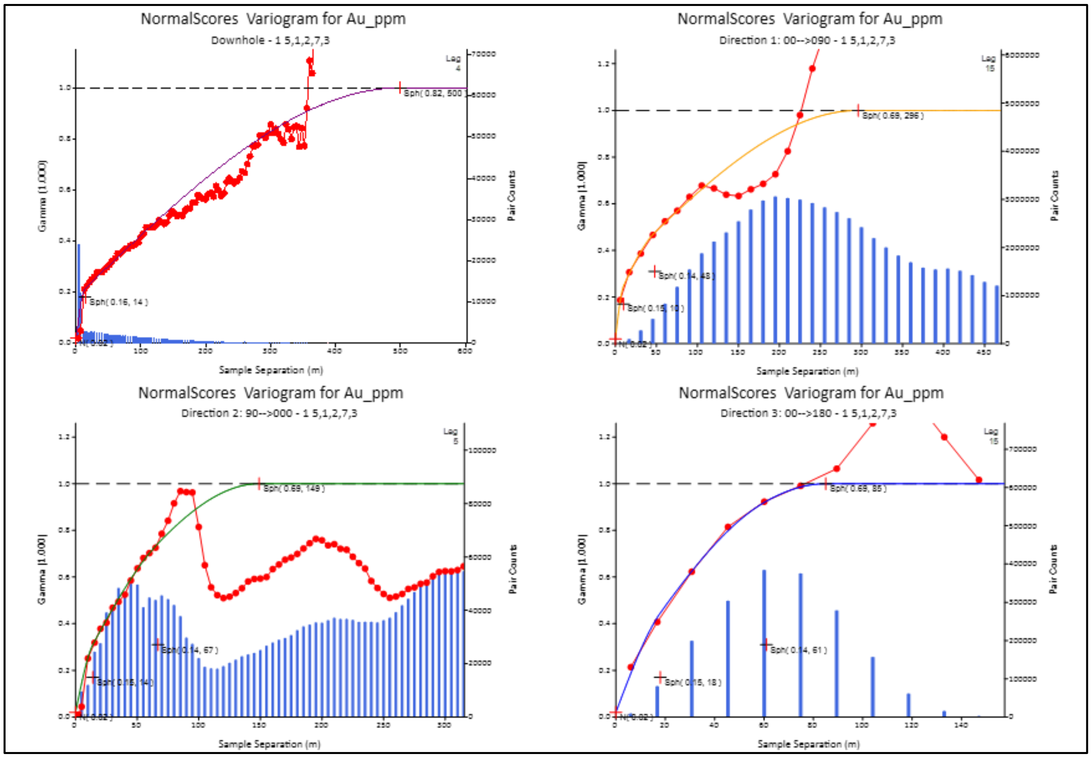


Figure prepared by Fortuna, 2022

Variogram parameters for the categorical indicators, each lithology, and the combined mineralized lithologies (see Table 14.2 for details of MIN 1) are detailed in Table 14.5. Continuity analysis and variogram modelling were conducted in Supervisor™ version 8. It should be noted that the variograms were modelled using Normal Score transformation and then back transformed prior to estimation with the parameters reported in Table 14.5 representing the back-transformed numbers.

Table 14.5 Lindero Deposit variogram model parameters

Domain	Metal	Major axis orientation	C_0§	C_1§	Ranges (m)†	C_2§	Ranges (m)†	C_3§	Ranges (m)†
0.2 g/t indicator	Au	90° → 000°	0.03	0.22	57,8,12	0.20	340,69,78	0.55	590,850,83
0.5 g/t indicator	Au	90° → 000°	0.02	0.27	29,8,15	0.32	54,78,56	0.39	250,367,58
0.1 % indicator	Cu	90° → 000°	0.33	0.20	15,24,42	0.20	64,64,58	0.27	439,462,78
FPD	Au	90° → 000°	0.02	0.17	10,14,18	0.16	59,67,61	0.65	286,149,85
	Cu	90° → 000°	0.08	0.20	27,35,81	0.32	273,136,85	0.40	466,540,133
CPD1	Au	90° → 000°	0.01	0.25	28,33,14	0.33	113,166,54	0.41	124,256,103
	Cu	90° → 000°	0.24	0.38	23,31,95	0.11	104,45,105	0.28	352,299,116
S1	Au	90° → 000°	0.03	0.24	17,27,46	0.23	188,205,59	0.51	897,924,60
	Cu	90° → 000°	0.14	0.29	169,72,12	0.25	237,361,48	0.31	410,1145,63
PBFD	Au	90° → 000°	0.02	0.14	6,14,8	0.25	21,37,37	0.59	152,130,70
	Cu	90° → 000°	0.03	0.11	11,37,17	0.34	141,82,55	0.52	374,165,76
DDP	Au	90° → 000°	0.02	0.22	27,17,45	0.36	100,45,49	0.40	592,170,51
	Cu	90° → 000°	0.03	0.18	29,48,8	0.48	104,63,30	0.31	386,79,99

Domain	Metal	Major axis orientation	C_0§	C_1§	Ranges (m)†	C_2§	Ranges (m)†	C_3§	Ranges (m)†
CPD2	Au	90° → 000°	0.02	0.40	10,11,16	0.29	72,34,72	0.29	184,458,137
	Cu	90° → 000°	0.05	0.18	17,129,72	0.26	220,156,97	0.52	234,166,101
PMI	Au	90° → 000°	0.02	0.58	9,15,9	0.23	30,28,25	0.17	147,90,308
	Cu	90° → 000°	0.10	0.14	6,30,27	0.48	40,70,127	0.29	89,242,332
BX-QS/M	Au	90° → 000°	0.02	0.14	12,38,16	0.32	80,74,68	0.52	309,210,70
	Cu	90° → 000°	0.12	0.21	20,29,32	0.24	102,97,81	0.42	647,412,102
MIN 1	Au	90° → 000°	0.02	0.14	12,38,16	0.32	80,74,68	0.52	309,210,70
	Cu	90° → 000°	0.12	0.21	20,29,32	0.24	102,97,81	0.42	647,412,102

Note: § variances have been normalized to a total of one; † ranges for major, semi-major, and minor axes, respectively; structures are modelled with a spherical model

Opinion on the quality of the modeled variograms

Modeling of variograms can be a subjective process depending on the quality of the experimental variograms. Confidence in the modeled variograms for the indicators, FPD, CPD1, and MIN 1 domains is high due to the clearly defined continuity displayed by the experimental variograms. The confidence is lower for the other domains due to the low composite numbers resulting in poorer experimental variograms. The BX-M domain has insufficient composites to allow modeling of variography and therefore the variogram corresponding to the MIN domain has been applied to the estimation of grades for this domain as this best represents general mineralization characteristics.

Block model

The ultimate purpose of the estimation process is to estimate the tonnes and grade of potentially economically recoverable resources in accordance with the proposed mining method to be employed at the mine. The block size for the Lindero Deposit model has been set at 10 m x 10 m x 8 m. The block size was chosen such that geological contacts are reasonably well reflected and to support an open pit mining scenario.

Block model parameters used for compiling the Lindero Deposit model are detailed in Table 14.6.

Table 14.6 Lindero Deposit block model parameters

Direction	Model Origin	Block size (m)	No. of blocks
Easting	2622500	10	125
Northing	7225600	10	120
Elevation	3396	8	75

The geometry of each of the lithologic units has also been considered in the block modeling process. Blocks are sub-celled to fit the contacts exactly during the modelling process, with the sub-celled model used for estimation before being regularized, with the predominant lithologic code associated with the full block size. In this way, external dilution has been accounted for at the edge of the mineralized units in relation to the block size. Table 14.7 details the codes assigned to the block model for reporting purposes.

Table 14.7 Lindero Deposit block model domain codes

Lithology	Oxide/Sulfide	Grade Domain	MIN Code	DOMAIN Code
FPD	Sulfide	Low	1	10
		High		10.5
	Oxide/Mixed	Low		11
		High		11.5
CPD1	Sulfide	Low		20
		High		20.5
	Oxide/Mixed	Low		21
		High		21.5
S1	Sulfide	Low		70
		High		70.5
	Oxide/Mixed	Low		71
		High		71.5
PBFD	Sulfide	Low		30
		Moderate		30.2
	Oxide/Mixed	Low		31
		Moderate		31.2
DDP	Sulfide	Low		50
		Moderate		50.2
	Oxide/Mixed	Low		51
		Moderate		51.2
CPD2	Sulfide	n/a	2	40
	Oxide	n/a		41
PMI	Sulfide	n/a	3	60
	Oxide	n/a		61
BX-M	Sulfide	Low	4	90
		Moderate		90.2
	Oxide/Mixed	Low		91
		Moderate		91.2
BX-QS	Sulfide	n/a		80
	Oxide	n/a		81

14.5.3 Grade estimation

Blocks within a mineralized domain were interpolated using composites assigned to the same domain. Fortuna chose to interpolate the grades using OK, as the variability in grade is not problematic. Hard, firm and soft contacts were defined between different domains and sub-domains as described in Section 14.5.2.

The sample data and the blocks were coded using the MIN and DOMAIN codes detailed in Table 14.7. Sample data was composited and, where necessary, top cut prior to estimation. Each block was discretized (an array of points to ensure grade variability is represented within the block) using an array of 27 points (3 x 3 x 3) in each block with grades interpolated into full parent cells (Datamine ESTIMA parameter PARENT=1).

A three-pass method was employed to assign estimated grades. The search strategy employed concentric expanding search radii restricted by the block domain code and the applicable variogram. The distances for the three passes were determined as follows:

- Pass 1: a short search radius derived from twice the distance between drill holes, based on typical drill hole spacing such that at least four drill holes would be found within the search ellipse. The MIN field was used to control the estimation to model hard boundaries between these units.

- Pass 2: an intermediate search radius derived by twice the typical drill hole spacing plus 10 percent to account for drill pattern irregularities. The DOMAIN field was used to control the estimation to model firm boundaries between these units.
- Pass 3: a larger, less restrictive search radius still adhering to the DOMAIN field but of a size that all blocks would have interpolated grades. This distance varied depending on the domain.

In the first and second passes, grade interpolation required a minimum of three composites, a maximum of 12 composites, and no more than two composites per drill hole. In the third pass, grade interpolation required a minimum of one composite, a maximum of 12 composites and no more than three composites per drill hole.

Dynamic anisotropy

Dynamic anisotropy is a tool in Datamine RM™ software that allows the estimator to account for gradual undulations or changes in orientation of the unit being estimated. It requires a dip and dip direction of the lithologic unit to be assigned to the block model based on the orientation of the hanging wall and/or footwall with these values being used to adjust the orientation of the variogram and search parameters during estimation.

By using this methodology, the deposit does not have to be split into separate sectors and results in a good representation of the circular nature of the mineralization.

14.5.4 Bulk density

There has been a total of 2,684 density measurements (2,439 drill core and 245 from the pit) taken at Lindero, although 870 samples were eliminated from the statistical analysis as duplicates and a further 4 were removed as outliers, leaving a total of 1,810 density measurements for the 2022 evaluation and the assignment of density by domain as summarized in Table 14.8.

Table 14.8 Bulk density statistics for the Lindero Deposit by domain

Lithology	Oxide/Sulfide	No. Samples	Mean (t/m^3)
FPD	Sulfide	96	**2.60**
	Oxide/Mixed	569	**2.52**
CPD1	Sulfide	47	**2.60**
	Oxide/Mixed	296	**2.58**
S1	Sulfide	174	**2.56**
PBFD	Sulfide	58	**2.63**
	Oxide/Mixed	59	**2.57**
DDP	Sulfide	141	**2.61**
	Oxide/Mixed	70	**2.61**
CPD2	Sulfide	63	**2.60**
	Oxide	52	**2.59**
PMI	Sulfide	96	**2.58**
	Oxide	55	**2.55**
BXH	Sulfide	34	**2.60**

It is recommended that the operation continues taking density measurements during production to better establish the characteristics of the deposit and potentially allow the estimation of density values into the block model.

14.5.5 Block model validation

The block model has been assessed using several standard industry techniques to confirm the validity of the estimates.

Global bias

Fortuna checked the gold model for global bias by comparing the means of the OK model with means from the NN model by domain. The NN model theoretically produces an unbiased estimate of average value at a zero-cut-off grade. A relative percentage value of less than 5 percent difference between the means is an acceptable result and indicates good correlation between the two models. All the domain estimates are within the 5 percent limit and indicate a good correlation except for the BX-M domain that shows a difference of 19.6 percent; however, this is due to the small volumes these domains represent that can be affected by isolated grades with the OK evaluation providing a more conservative estimate of the gold grades. Fortuna considers that this is acceptable when the global statistics are evaluated with the combined lithologies displaying an overall difference of less than 0.5 percent as shown in Table 14.9.

Table 14.9 Global bias check of Lindero Deposit estimates by rock type

Lithology	Rock Code	NN Mean Gold Grade (g/t)	OK Mean Gold Grade (g/t)	Relative Percent Difference
FPD	1	0.46	0.46	**-0.1**
CPD1	2	0.48	0.48	**0.5**
S1	7	0.23	0.23	**0.9**
PBFD	3	0.31	0.32	**2.7**
DDP	5	0.40	0.41	**1.9**
BX-M	9	0.58	0.48	**-19.6**
BX-QS	8	0.35	0.35	**-0.4**
CPD2	4	0.09	0.10	**4.7**
PMI	6	0.07	0.08	**1.7**
Global		0.33	0.33	**0.4**

Local bias

Fortuna completed a detailed visual validation of the Lindero Deposit resource model. Models were checked for proper coding of drill hole intervals and block model cells, in both section and plan. Coding was found to be properly done. Grade interpolation was examined relative to drill hole composite values by inspecting sections and plans. Checks showed good agreement between drill hole composite values and model cell values. An example of these sections is displayed in Figure 14.5 (plan) and Figure 14.6 (Section A-A' west–east) and Figure 14.7 (Section B-B' south-north) showing gold grades for the estimated block model and composites clipped to within 25 m of the section.

Figure 14.5 Plan view of the Lindero Deposit at 3788 m elevation displaying gold grades of block model and sections

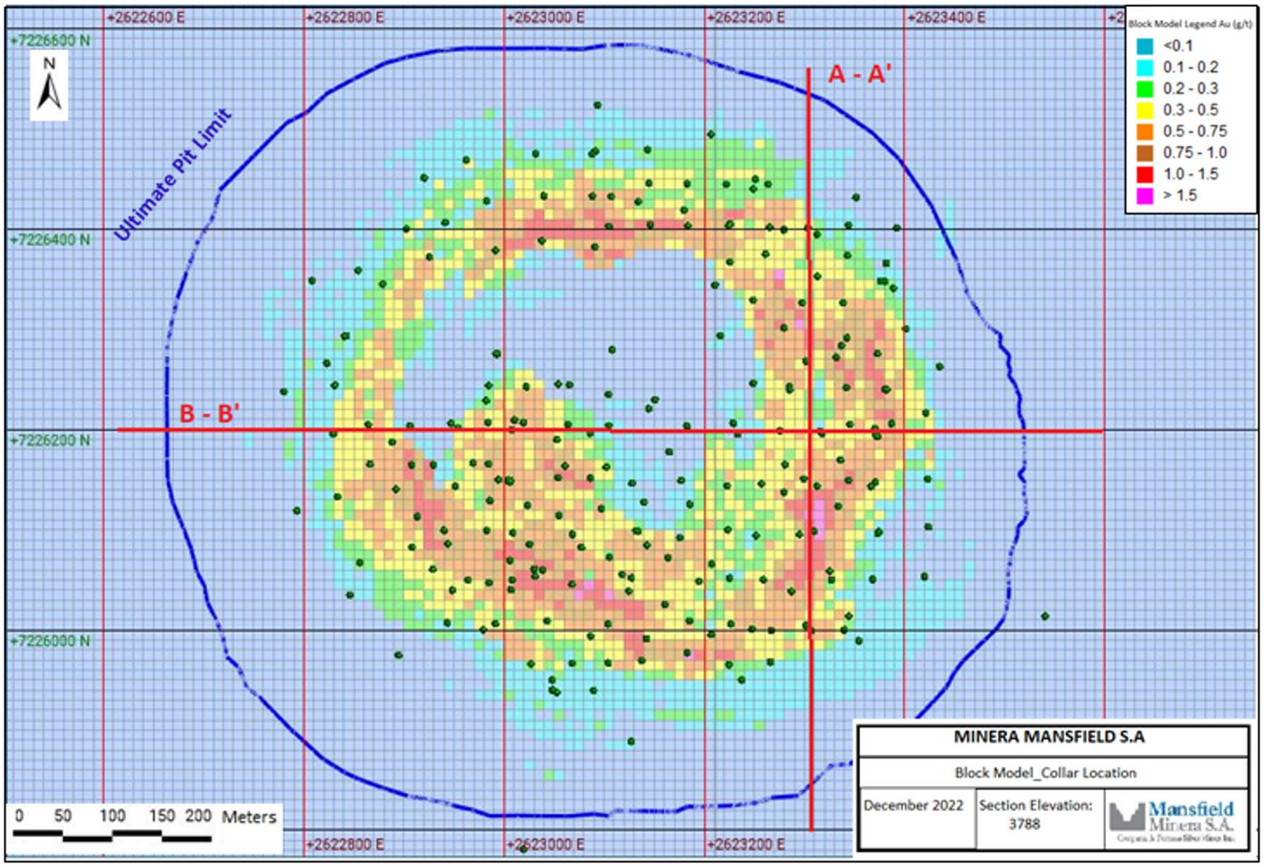


Figure prepared by Fortuna, 2022

Figure 14.6 West-east section A-A' view (7226200N) displaying gold grades of the Lindero Deposit block model and composites

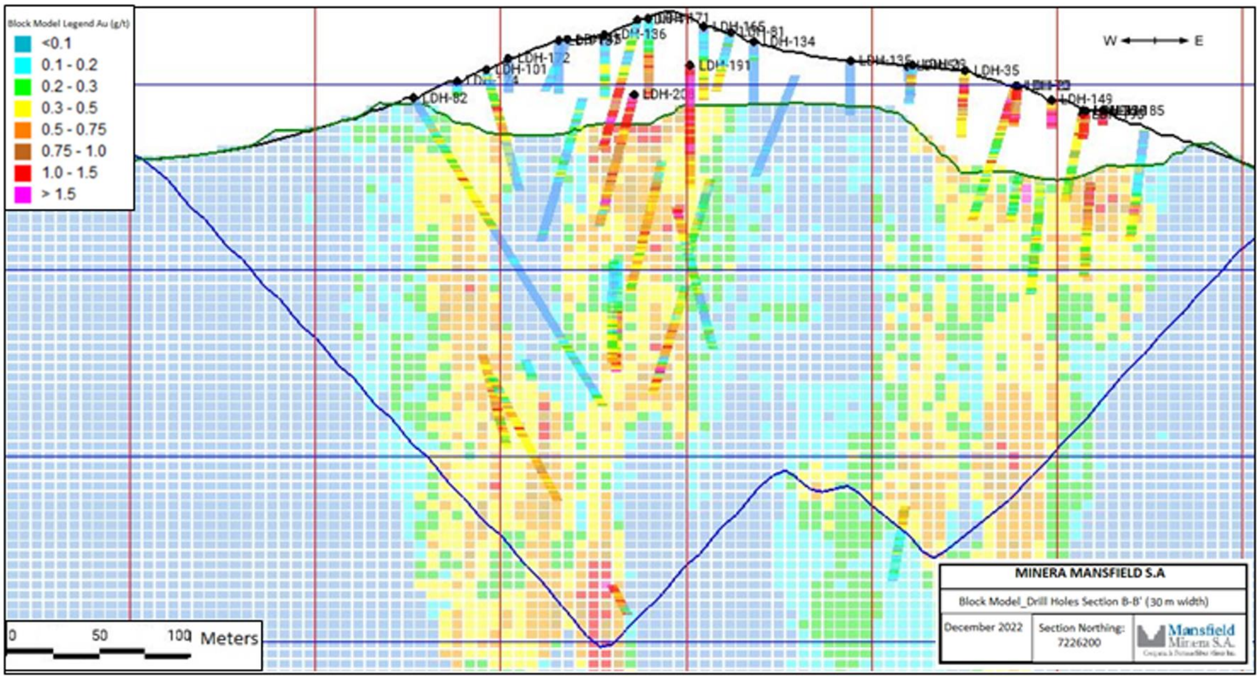


Figure prepared by Fortuna, 2022

Figure 14.7 South-north section B-B' view (2623300E) displaying gold grades of the Lindero Deposit block model and composites

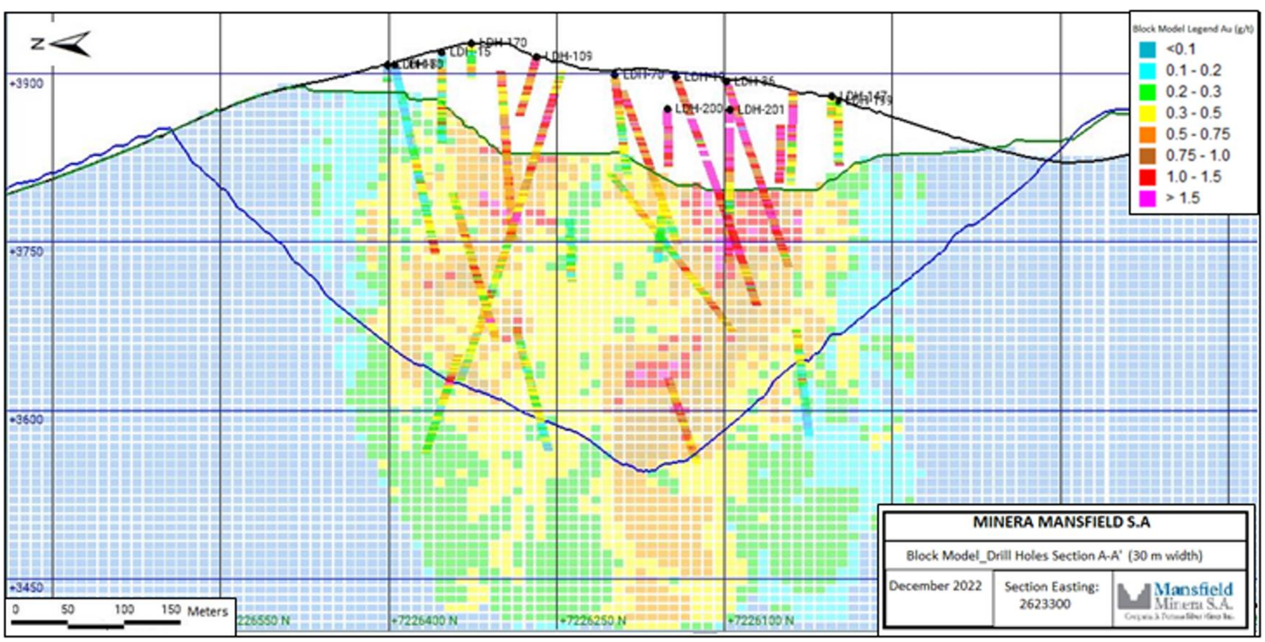


Figure prepared by Fortuna, 2022

Swath plot validation was performed that allows a visual comparison of local bias between the kriged estimates and declustered composite grades used in the estimate. The process separates the block model into user-defined orthogonal slices (swaths) along easting, northing, and elevation axis and calculates the average grade for each swath. Fortuna reviewed the swath plots and determined that gold grades from kriged block estimates and composites especially in more densely sampled areas with gold and copper grades having similar peaks and valleys and the block grades displaying reasonable levels of smoothing compared to the much smaller volume composites. This level of smoothing was further verified as detailed below. Fortuna concluded that the estimation was locally unbiased.

Mine reconciliation

The ultimate validation of the block model is to compare actual grades to predicted grades using the established estimation parameters. A comparison of the resource estimation against production polygons or diglines (mineralized material identified via blast holes as being above cut-off grade during extraction) from July 1, 2021 to June 30, 2022 as part of the operations ongoing reconciliation program is presented in Table 14.10.

Table 14.10 Lindero Mine reconciliation of resource block model versus production model

Period	Resource Model		Production Model		Percent Difference	
	Tonnes	Au (g/t)	Tonnes	Au (g/t)	Tonnes	Au (g/t)
Q3 and Q4 2021	4,267,960	0.79	4,303,119	0.79	0.8	0.0
Q1 and Q2 2022	5,145,369	0.68	5,174,136	0.68	0.6	0.5
Total	9,413,329	0.73	9,477,256	0.73	0.7	0.2

Results indicate the parameters used in the estimation process are reasonable with a difference of less than 1 percent for tonnes and gold grades with variations rarely exceeding 5 percent monthly.

14.6 Arizaro Deposit

14.6.1 Geological interpretation and domaining

Gold–copper mineralization is associated with two different mineralizing events. The strongest is a non-outcropping intrusive (CDP) which occurs in the north part of the porphyry with an elongated shape trending northeast to southwest for more than 400 m with an estimated average width of 60 m, producing an Au-Cu mineralized zone approximately 500m by 150m, with average grades of 0.5 g/t Au and 0.15 % Cu.

The other mineralizing event associated with the outcropping fine diorite micro breccia (FDMx) is in the center of the system and is related to breccias and micro-breccias which have a semi-oval shape at surface. In the center, there is a higher-grade core with a semi-ellipsoidal form, extending north–south for 480 m with an estimated average width of 50 m, averaging approximately 0.6 g/t Au at surface in the central core, and reducing to approximately 0.2 g/t Au on average in the margins of the body. Copper grades are more consistent across the deposit averaging 0.15 % Cu. The high relative gold to copper ratios suggests higher gold mobilization in the hydrothermal fluids with respect to copper and may be interpreted as representing the higher levels of metal precipitation from gold-rich, copper-poor, hydrothermal solutions. Mansfield prepared 3-D mineralized solids using Leapfrog Geo™ to reflect the geological interpretations generated from cross-sectional and plan views. The geological models used to constrain the resource estimation comprised eight lithological models:

- **Coarse Dioritic Porphyry (DPC):** Dominated by subrounded phenocrysts of plagioclase, approximately 2 – 3 mm, and occasional quartz and hornblende. It is common to find fragments of different types of rock within this unit, being mainly sedimentary, but including fragments of dacites, other volcanic rocks and granites.
- **Fine-grained Diorite (FD):** dominated by equigranular, fine-grained (2mm) plagioclase and quartz with up to 20 percent fine-grained hornblende. Interpreted to be the earliest intrusive rock and pre-mineral.
- **Crowded Dioritic Porphyry (CDP):** Contains 30 to 40 percent tabular plagioclase, 10 percent euhedral hornblende in a fine-grained groundmass of plagioclase and quartz. Fragments of FD appear to have been assimilated into the CDP. Considered to be the earliest and strongest mineralizing intrusive. Outcrops in only a small 40 x 100 m area in the northeast limit of the porphyry system but has been defined at depth by drilling in the north of the porphyry system with an elongated shape trending northeast to southwest.
- **Biotite-matrix Breccia (BxBt):** a magmatic-hydrothermal breccia consisting of a matrix and veinlets of fine-grained, secondary biotite with some magnetite. Considered to be intra-mineral.
- **Magnetite Breccia (BxMag):** a magmatic-hydrothermal breccia consisting of a dominant magnetite and lesser quartz, K-feldspar and secondary biotite matrix. As the biotite breccia above, considered intra-mineral.
- **Fine Diorite Microbreccia (FDMx):** This lithological description has been applied to differentiate this unit from the host rock (FD), where the diorite has been impacted by magmatic-hydrothermal fluids associated with the magnetite and biotite-matrix breccias (BXMag and BxBt), resulting in microbreccias of no more than 10 cm in size primarily in the fine-grained diorite. The unit is characterized by a higher degree of potassic alteration and, in most cases, display an increase in mineralization, generally adjacent to the BXMag and BxBt breccias.
- **Diorite Porphyry (DP):** Composed of 25 to 30 percent fine tabular plagioclase phenocrysts, 5 percent elongated hornblende, in a microcrystalline to fine aplitic matrix of plagioclase and quartz, with notable amounts of fine biotites. The occurrences of this porphyry are limited to some sectors in the west (close to ARD-03 and ARD-41) and in the extreme north. Likely corresponds to an inter-mineral intrusive as in areas it is moderately mineralized with sulfides and oxidized copper.
- **Porphyry Diorite vein fragments (PDvf):** Composed of subhedral to euhedral plagioclase phenocrysts comprising 25 to 30 percent of the groundmass, 8 percent elongated and non-oriented hornblende and minimal quartz <1 percent. Similar characteristics in respect to the CDP unit but includes quartz veinlets not observed in any other lithologies.

A 3-D perspective of the wireframes representing the intrusive events present at Arizaro is displayed in Figure 14.8.

Figure 14.8 3-D schematic of Arizaro Deposit showing lithologic wireframes

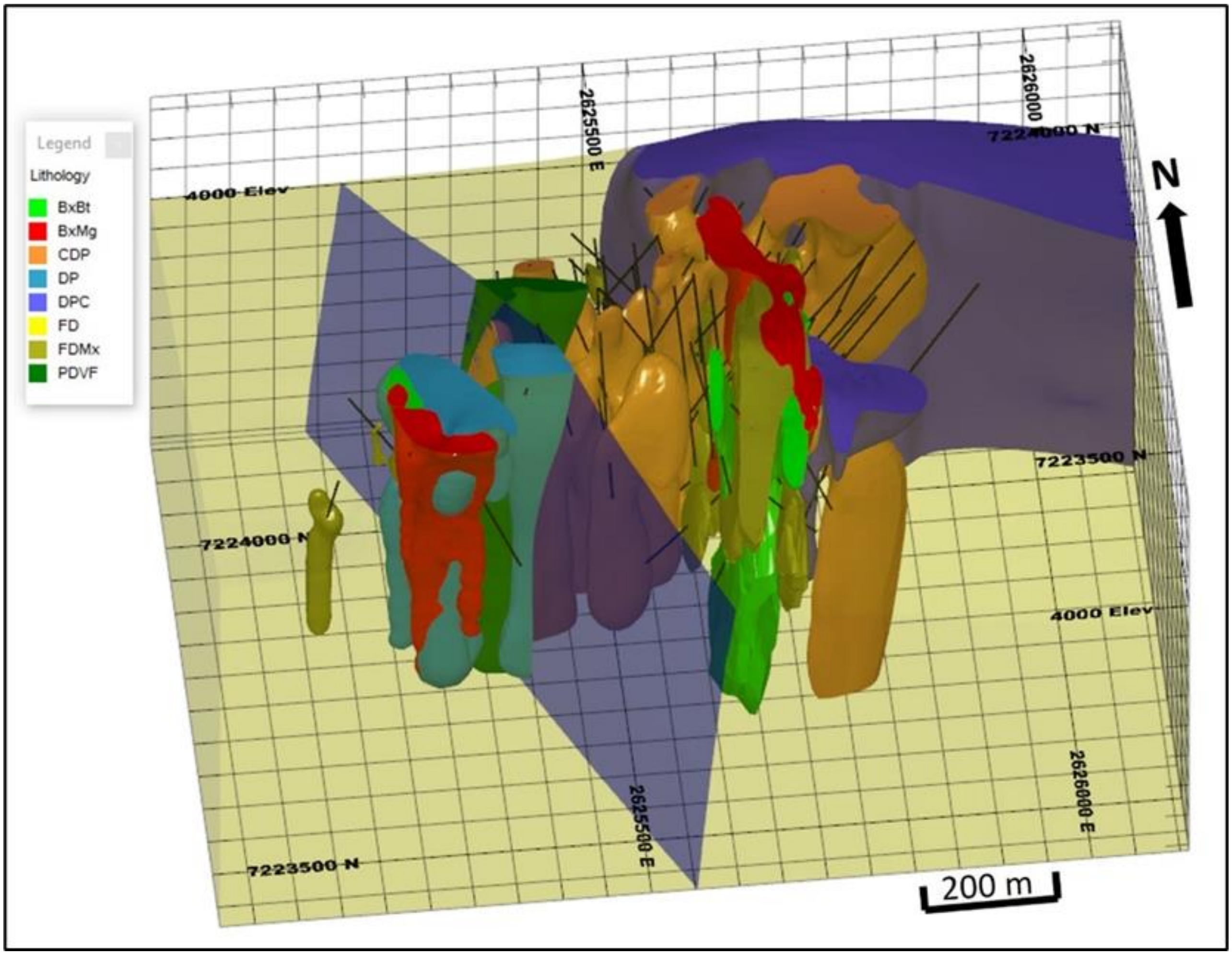


Figure prepared by Fortuna, 2022

Mansfield did not identify the presence of an oxide or mixed horizon to any significant depth that would impact the modeling and resource estimation, therefore lithology was the only geological control used in domaining and estimation at the Arizaro Deposit.

14.6.2 Exploratory data analysis

Compositing of assay intervals

Compositing of sample lengths was performed so that the samples used in statistical analysis and estimations have similar support (i.e., length). Mansfield sample drill holes at 2 m interval lengths although this may be shortened at geological contacts. The majority of samples (>99 percent) were sampled on lengths of 2 m or less.

Based on the average sampling length and the most likely selective mining unit, a 4 m composite was chosen as suitable. Composites honored lithologic boundaries.

Statistical analysis of composites

Exploratory data analysis was performed on drill hole composites identified in each of the lithologic units (Table 14.11). Statistical and graphical analysis (including histograms, probability plots, scatter plots) were investigated for each domain to assess if stationarity had been achieved.

Table 14.11 Univariate statistics for gold of undeclustered composites for the Arizaro Deposit by lithology domain

Lithology	Count	Minimum (g/t)	Maximum (g/t)	Mean (g/t)	Standard Deviation	Coefficient of Variation
BxBt	116	0.01	1.51	**0.27**	0.32	1.19
BxMg	367	0.01	8.83	**0.37**	0.59	1.58
CDP	471	0.02	2.34	**0.28**	0.26	0.94
DPC	61	0.02	0.30	**0.10**	0.06	0.54
FDMx	566	0.01	3.18	**0.35**	0.35	0.98
FD	55	0.01	1.20	**0.17**	0.24	1.36
DP	2,475	0.01	2.94	**0.26**	0.24	0.89
PDvf	38	0.04	0.44	**0.19**	0.09	0.46

Extreme value treatment

Fortuna examined the grades of gold and copper by each domain to identify the presence and nature of extreme grade values. This was done by examining the sample histogram, log histogram, log-probability plot, and by examining the spatial location of extreme values by lithology domain. Top cut thresholds were determined by examination of the statistical plots and determination of the effect of top cuts on the mean, variance, and coefficient of variation (CV) of the sample data. Top cut thresholds used for each domain are shown in Table 14.12.

Table 14.12 Arizaro Deposit top cut thresholds by lithology domain

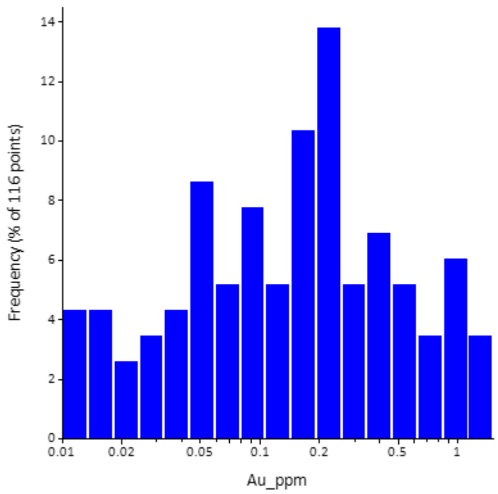
Lithology	Top cut (g/t)	Mean (g/t)	Top cut Mean (g/t)	Difference
BxBt	1.00	0.27	**0.26**	-3%
BxMg	2.00	0.37	**0.35**	-6%
CDP	1.50	0.28	**0.27**	-2%
DPC	0.25	0.10	**0.10**	-3%
FDMx	1.50	0.35	**0.35**	-1%
FD	1.20	0.17	**0.17**	-3%
DP	1.90	0.26	**0.26**	-1%
PDvf	0.35	0.19	**0.18**	-4%

The application of the top cuts has not dramatically altered the mean of the sample data in the domains and therefore are regarded as reasonable for estimation purposes, reducing the impact of outliers without impacting the overall metal content of the units.

The gold grade distribution presented by lithology is graphically displayed using histograms in Figure 14.9.

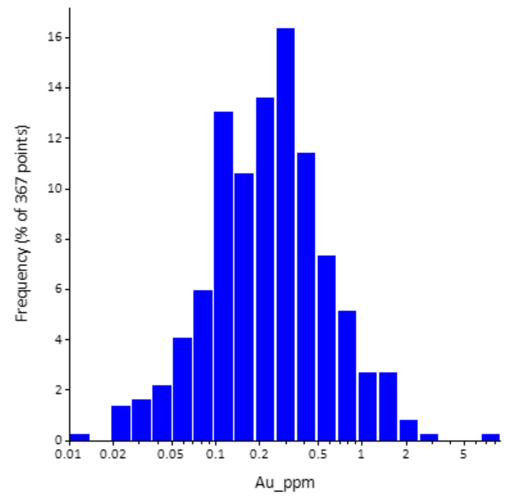
Figure 14.9 Gold grade distributions at the Arizaro Deposit by lithology

BxBt



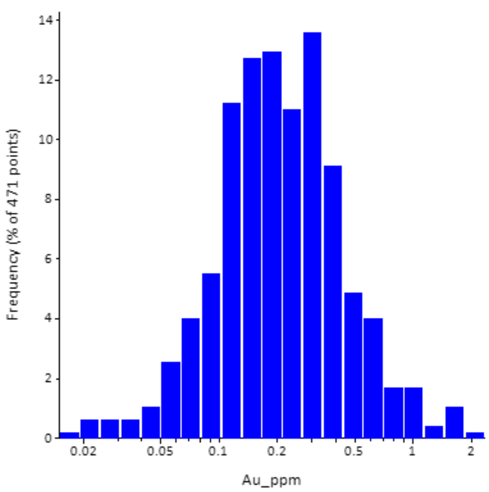
Log Histogram for Au (g/t)

BxMg



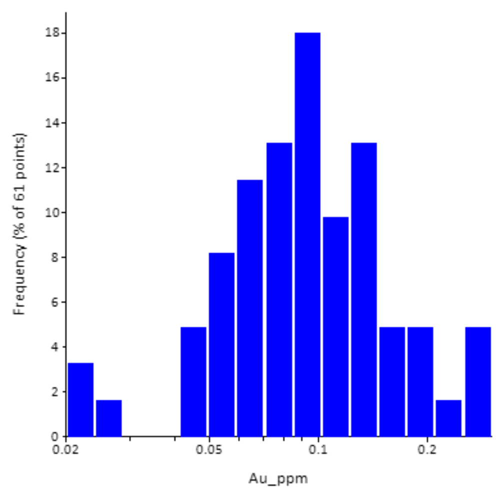
Log Histogram for Au (g/t)

CDP



Log Histogram for Au (g/t)

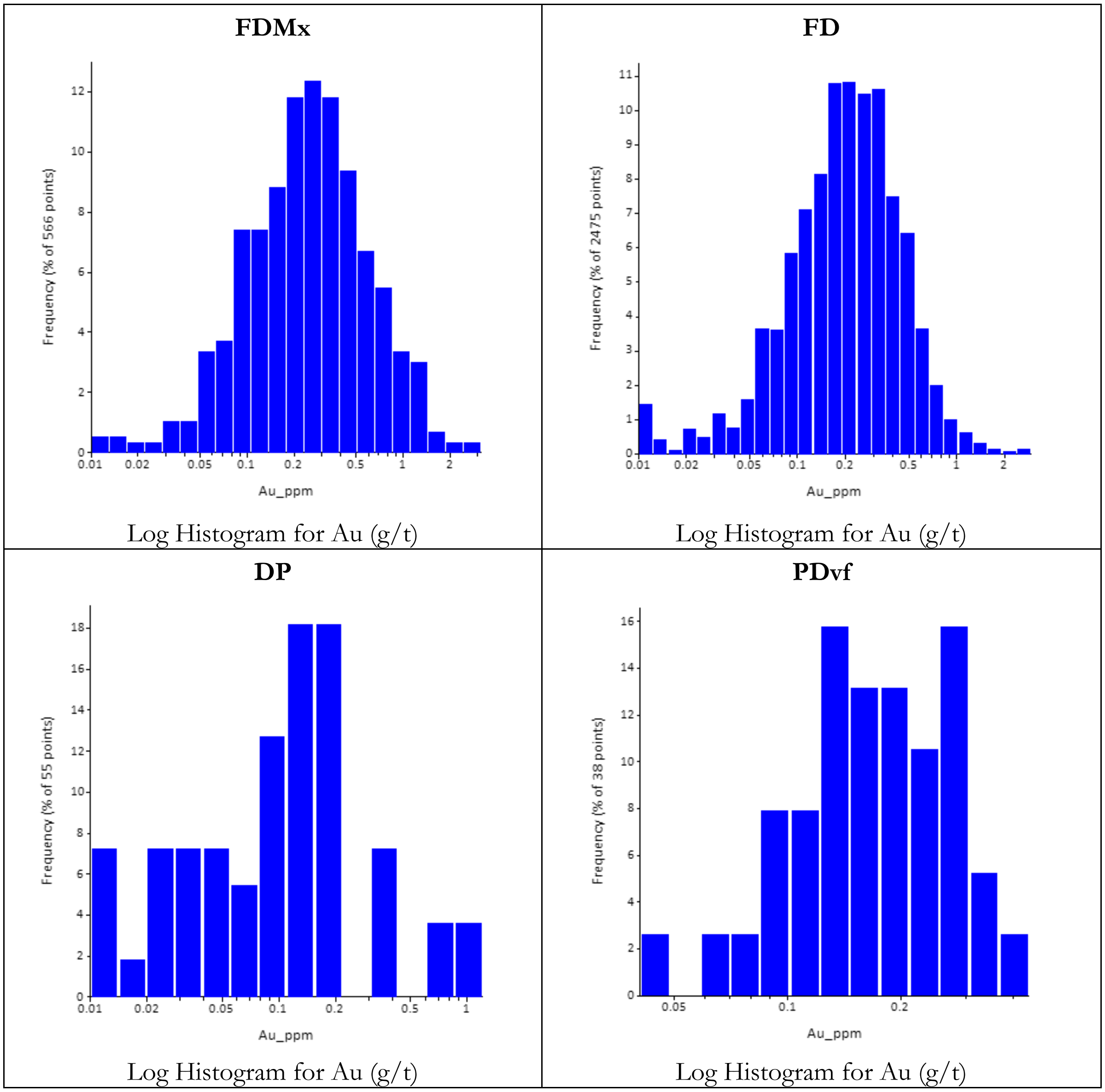
DPC



Log Histogram for Au (g/t)

Figure prepared by Fortuna, 2022

Figure 14.9 Gold grade distributions at the Arizaro Deposit by lithology (continued)



Grade correlation

A weak positive correlation exists between gold and copper composite grades in the primary mineralized domains with a correlation coefficient of 0.59. A similar correlation coefficient and positive grade relationships are present in the estimates. These correlations have been tested as part of the validation process.

Continuity analysis

As described for the Lindero Deposit, horizontal, across strike, and down dip continuity maps were examined for the two identified mineralization events at the Arizaro Deposit (and their underlying variograms) for gold and copper to determine the directions of greatest and least continuity.

Continuity maps of the dip plane were examined to ascertain if a plunge was present in either of the two domains. The presence of a distinctive plunge in the grade continuity could not be established for certainty in either of the domains and therefore variograms were modeled along strike (north-south for the mineralization associated with the breccias (BxBt, BxMg, DPC, and FDMx) and southwest-northeast for the mineralization associated with the CDP intrusive) and vertical or near vertical.

Variogram modeling

Directional variograms in the three principal directions were modeled for the lithologies associated with each of the two mineralization events, based on the directions chosen from the continuity maps. It was not always possible to produce a variogram for the minor axes, and in these cases the ranges for the minor axes were taken from the downhole variograms.

Figure 14.10 Modeled variograms for normal score Au grades at the Arizaro Deposit in the combined mineralized domains of 1, 2, 4 and 5

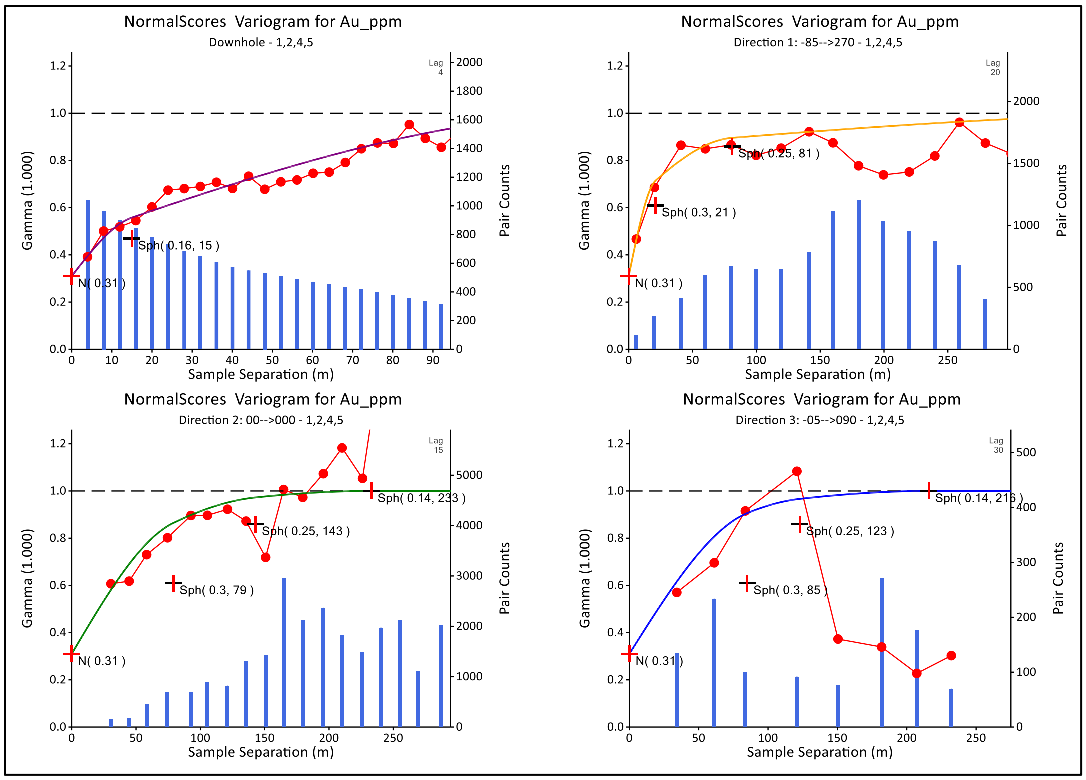


Figure prepared by Fortuna, 2022

Variogram parameters for the grouped mineralized lithologies is detailed in Table 14.13. Continuity analysis and variogram modelling were conducted in Supervisor™ version 8. It should be noted that the variograms were modelled using Normal Score transformation and then back transformed prior to estimation with the parameters reported in Table 14.13 representing the back-transformed numbers.

Table 14.13 Arizaro Deposit variogram model parameters

Domain	Metal	Major axis orientation	C_0§	C_1§	Ranges (m)†	C_2§	Ranges (m)†	C_3§	Ranges (m)†
BxBt, BxMg, DPC, FDMx (Combined)	Au	85° → 270°	0.39	0.31	21,79,85	0.20	81,143,123	0.10	471,233,216
CDP	Au	0° → 240°	0.32	0.32	136,55,20	0.36	172,255,40	-	-
Note: § variances have been normalized to a total of one; † ranges for major, semi-major, and minor axes, respectively; structures are modelled with a spherical model									

Opinion on the quality of the modeled variograms

Confidence in the modeled variograms for the combined breccia lithology domains is moderate due to the reasonably-defined continuity displayed by the experimental variograms. The confidence is lower for the CPD domain due to the low composite numbers resulting in poorer experimental variograms.

Block model

The ultimate purpose of the estimation process is to estimate the tonnes and grade of potentially economically recoverable resources in accordance with the proposed mining method to be employed at the mine. The block size for the Arizaro Deposit model has been set at 10 m x 10 m x 8 m. The block size was chosen such that geological contacts are reasonably well reflected and to support an open pit mining scenario.

Block model parameters used for compiling the Arizaro Deposit model are detailed in Table 14.14.

Table 14.14 Arizaro Deposit block model parameters

Direction	Model Origin	Block size (m)	No. of blocks
Easting	2625100	10	88
Northing	7223550	10	70
Elevation	3610	8	72

The geometry of each of the lithologic units has also been considered in the block modeling process. Blocks are sub-celled to fit the contacts exactly during the modelling process, with the sub-celled model used for estimation before being regularized, with the predominant lithologic code associated with the full block size. In this way, external dilution has been accounted for at the edge of the mineralized units in relation to the block size.

Blocks within a mineralized domain were interpolated using composites assigned to the same domain. Fortuna chose to interpolate the grades using OK, as the variability in grade is not problematic. Hard contacts were defined between different domains for estimation purposes.

The sample data and the blocks were coded using lithology. Sample data were composited and top cut prior to estimation. Each block was discretized (an array of points to ensure grade variability is represented within the block) using an array of 27 points (3 x 3 x 3) in each block with grades interpolated into full parent cells (Datamine ESTIMA parameter PARENT=1).

A three-pass method was employed to assign estimated grades. The search strategy employed concentric expanding search radii restricted by the block domain code and the applicable variogram. The distances for the three passes were determined as follows:

- Pass 1: a short search radius of derived from twice the distance between drill holes, based on typical drill hole spacing such that at least three drill holes would be found within the search ellipse. The lithology field was used to control the estimation to model hard boundaries between these units.

- Pass 2: an intermediate search radius derived double the size of the first pass to account for drill pattern irregularities. A minimum of three drill holes is required for the estimation of blocks and the lithology field is maintained to control the estimation.
- Pass 3: a larger, less restrictive search radius still adhering to the lithology field but of a size that all blocks would have interpolated grades. This distance varied depending on the domain.

In the first and second passes, grade interpolation required a minimum of six composites, a maximum of 20 composites, and no more than two composites per drill hole. In the third pass, grade interpolation required a minimum of four composites, a maximum of 20 composites and no more than two composites per drill hole.

14.6.3 Bulk density

There has been a total of 537 density measurements taken from drill core at the Arizaro Deposit, with two removed as outliers, leaving a total of 535 density measurements for the 2022 evaluation of density with the distribution summarized in Figure 14.11.

Figure 14.11 Arizaro Deposit density measurement distribution

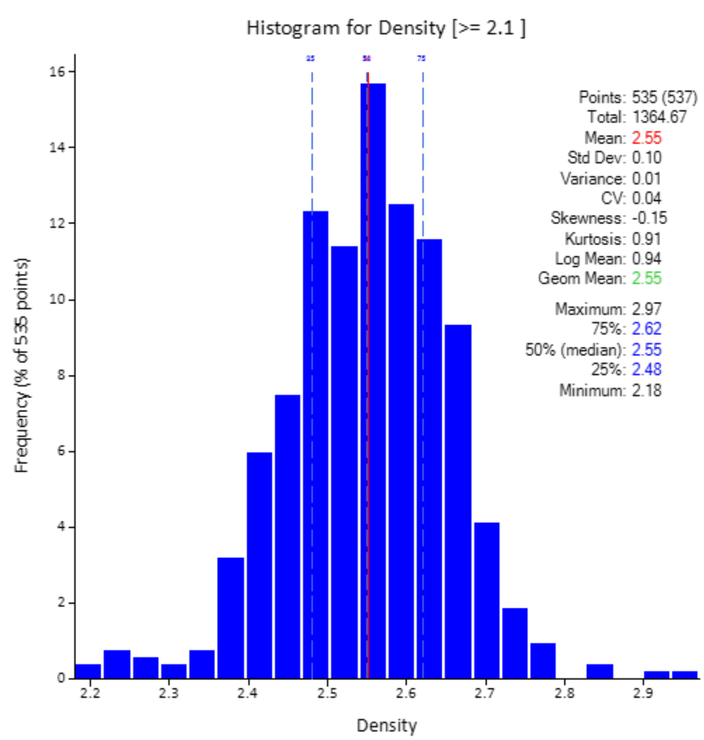


Figure prepared by Fortuna, 2022

For the 2022 Mineral Resource estimate the mean value of 2.55 g/cm³ has been assigned to all lithologies.

It is recommended that the operation continues taking density measurements during production to better establish the characteristics of the deposit and potentially allow the estimation of density values into the block model.

14.6.4 Block model validation

The block model has been assessed using several standard industry techniques to confirm the validity of the estimates.

Global bias

Fortuna checked the gold model for global bias by comparing the means of the OK model with means from the NN model by domain. The NN model theoretically produces an unbiased estimate of average value at a zero-cut-off grade. A relative percentage value of less than 5 percent difference between the means is an acceptable result and indicates good correlation between the two models. All the domain estimates are within the 5 percent limit and indicate a good correlation except for the BxBt and CDP domains that shows a difference of greater than 7 percent; however, this is due to the relatively low data density and gold grade in these domains. Fortuna considers that this is acceptable at this stage of the evaluation, especially when the global statistics are evaluated with the combined lithologies displaying an overall difference of less than 0.5 percent as shown in Table 14.15.

Table 14.15 Global bias check of the Arizaro Deposit estimates by rock type

Lithology	NN Mean Gold Grade (g/t)	OK Mean Gold Grade (g/t)	Relative Percent Difference
BxBt	0.27	0.25	**-7.7**
BxMg	0.32	0.32	**-0.5**
CDP	0.21	0.23	**7.0**
DPC	0.19	0.19	**0.8**
FDMx	0.28	0.27	**-1.9**
FD	0.26	0.25	**-2.7**
DP	0.23	0.23	**-0.9**
PDvf	0.10	0.10	**-0.6**
Global	0.24	0.24	**-0.4**

Local bias

Fortuna completed a detailed visual validation of the Arizaro Deposit resource model, checking for proper coding of drill hole intervals and block model cells, in both section and plan. Grade interpolation was examined relative to drill hole composite values by inspecting sections and plans. Checks showed good agreement between drill hole composite values and model cell values. An example of these sections is displayed in Figure 14.12 (plan) and Figure 14.13 (Section A-A' west–east) and Figure 14.14 (Section B-B' south-north) showing gold grades for the estimated block model and composites clipped to within 30 m of the section.

Figure 14.12 Plan view of the Arizaro Deposit at 4030 m elevation displaying gold grades of block model and sections

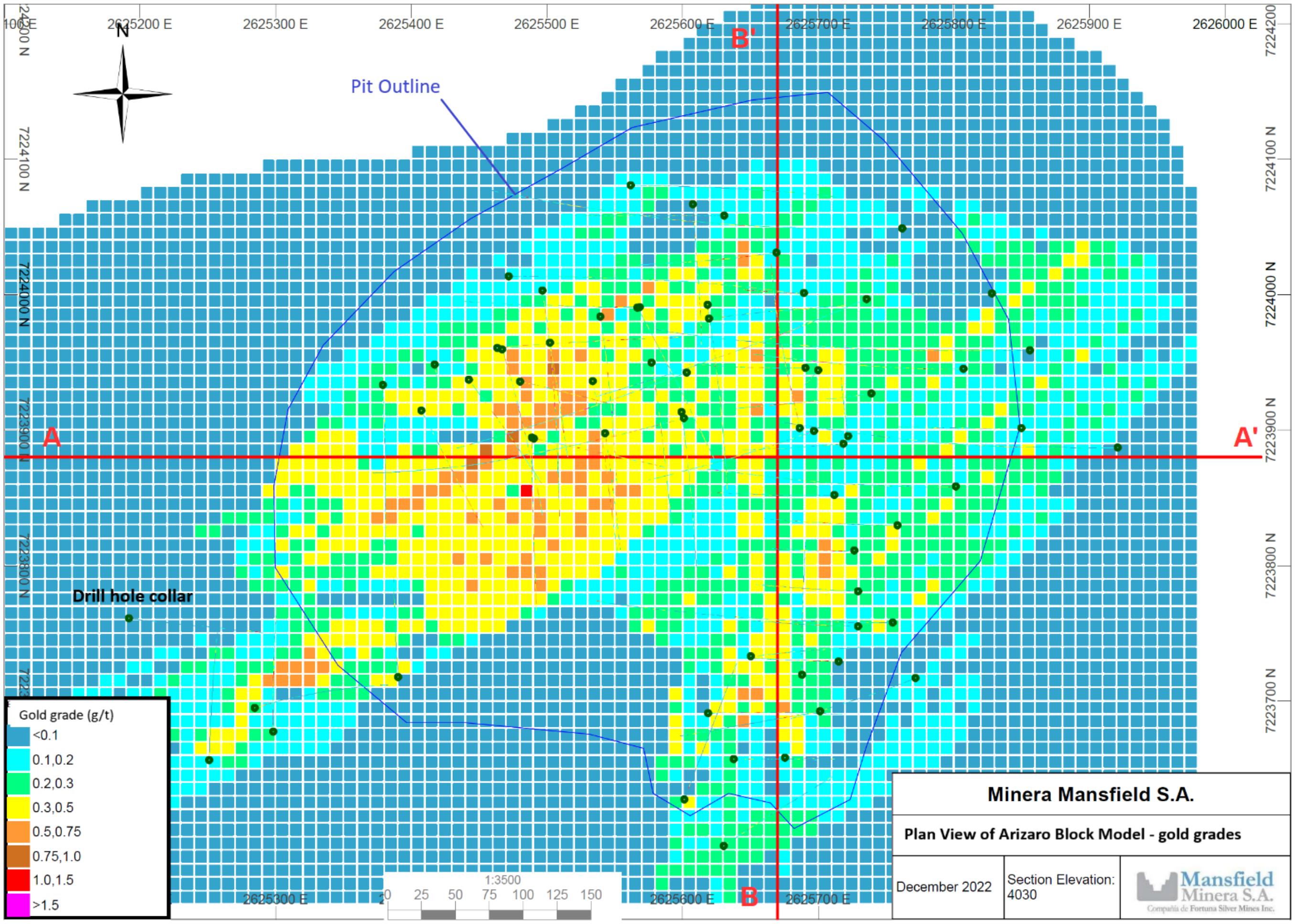


Figure prepared by Fortuna, 2022

Figure 14.13 West-east section A-A' view (7226165N) displaying gold grades of the Arizaro Deposit block model and composites

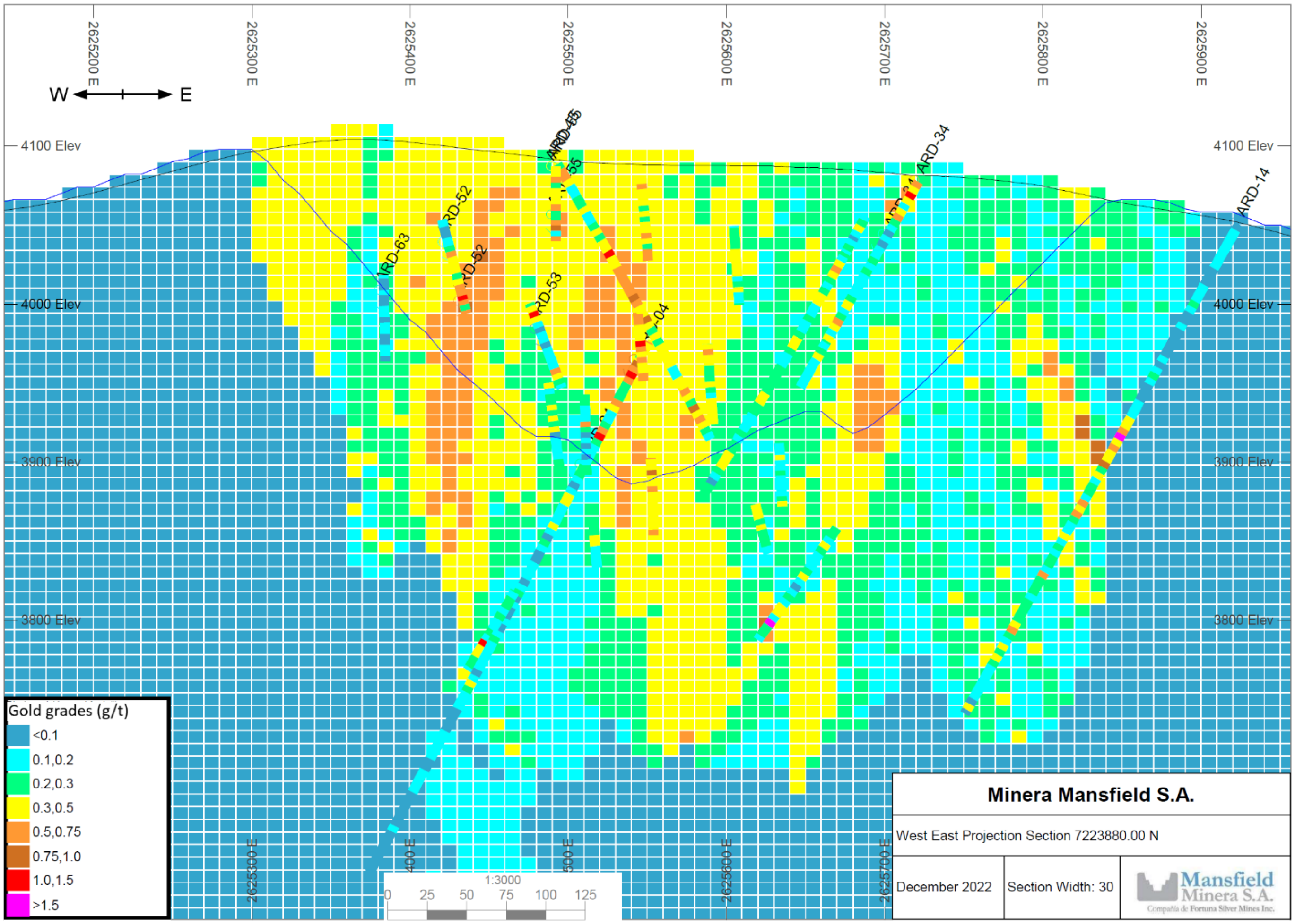


Figure prepared by Fortuna, 2022

Figure 14.14 South-north section B-B' view (2625680E) displaying gold grades of the Arizaro Deposit block model and composites

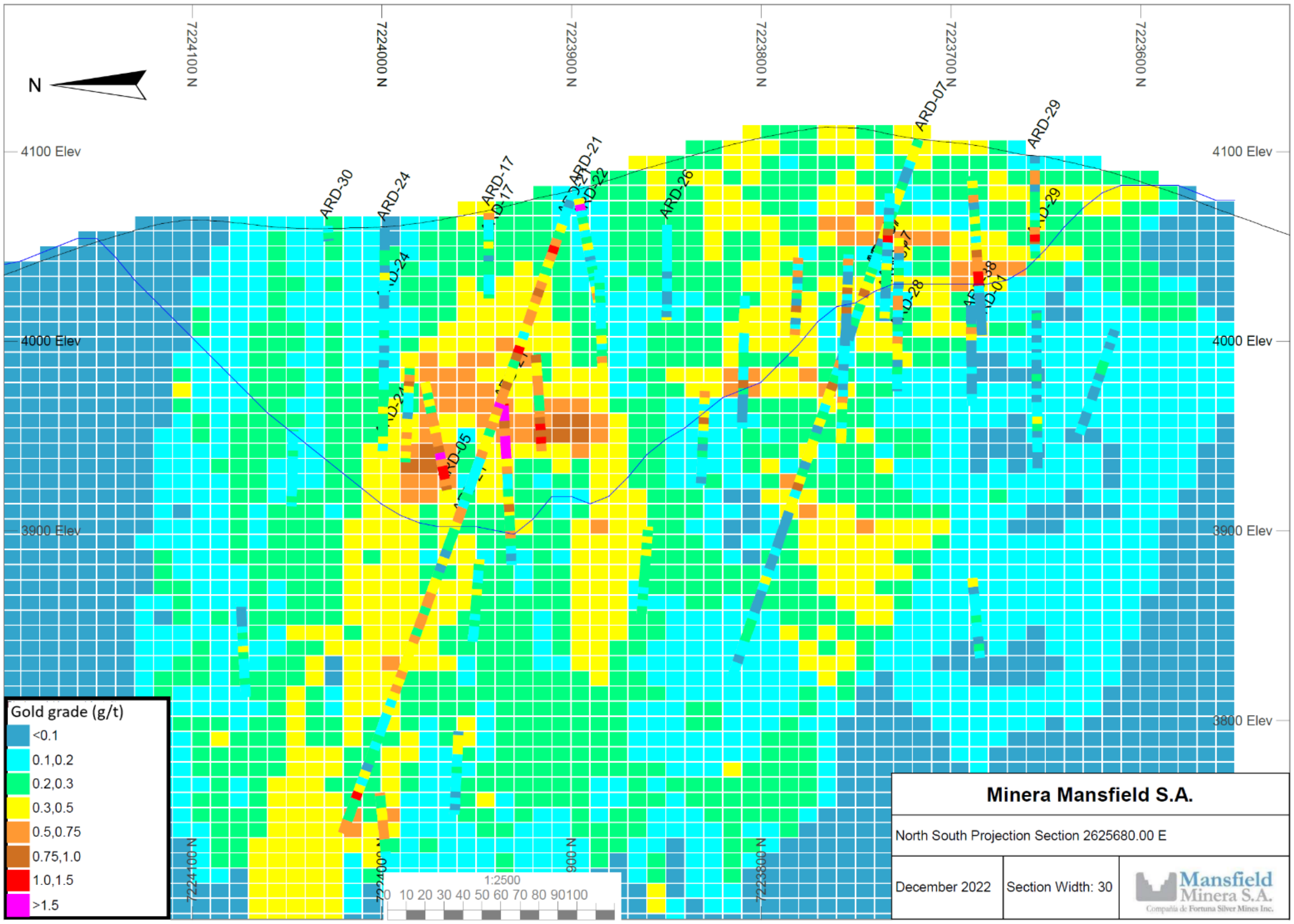


Figure prepared by Fortuna, 2022

Swath plot validation was performed that allows a visual comparison of local bias between the kriged estimates and declustered composite grades used in the estimate. The process separates the block model into user-defined orthogonal slices (swaths) along easting, northing, and elevation axis and calculates the average grade for each swath. Fortuna reviewed the swath plots and determined that gold grades from kriged block estimates and composites especially in more densely sampled areas with gold and copper grades having similar peaks and valleys and the block grades displaying reasonable levels of smoothing compared to the much smaller volume composites. This level of smoothing was further verified as detailed below. Fortuna concluded that the estimation was locally unbiased.

14.7 Mineral Resource classification

Resource confidence classification considers several aspects affecting confidence in the resource estimation, such as:

- Geological continuity (including geological understanding and complexity).
- Data density and orientation.
- Data accuracy and precision.
- Grade continuity (including spatial continuity of mineralization).

14.7.1 Geological continuity

Lindero Deposit

There is substantial geological information to support a good understanding of the Lindero gold-rich porphyry deposit. Drilling has been conducted on an approximate 35 m to 40 m grid at surface with holes tending to diverge at depth. The relatively simple geology of the Lindero Deposit has meant that drilling conducted to date has allowed a clear definition of the geological continuity of the intrusive events both horizontally and vertically to a high level of confidence. Relogging of all historical core, blast hole drilling and mapping of pit faces have confirmed and further improved the geologic understanding of the porphyry system.

Arizaro Deposit

The Arizaro Deposit is more geologically complex with two mineralized intrusive events overprinting one another. The central mineralization unit, characterized by breccias, has been drilled along its strike length at approximately 50 m centers. The geological continuity of the mineralization associated with these breccias is well established via multiple exploration programs. The larger scale gold-copper porphyry associated with the CDP intrusive striking southwest to northeast is not as well defined geologically with additional exploration required to improve the interpretation.

14.7.2 Data density and orientation

Lindero Deposit

Drill holes are generally orientated perpendicular to the mineralization forming a radial pattern approximately 600 m in diameter. In the eastern portion, drill holes are orientated either perpendicular (azimuth 270°) or parallel (azimuth 190°) to the main mineralized body. Dips vary depending on the target and range from -50° to -90°, averaging -70°. Drill hole depths vary according to the area and the purpose for which they were collared. The average depth is 300 m and the deepest hole reached a depth of 576 m. Infill drilling conducted since 2017 has focused on near surface resources planned for extraction in the following year, with holes generally being vertical and averaging just 30 m in depth, with only four holes being drilled deeper than 120 m.

Arizaro Deposit

At the Arizaro Deposit, drill holes have generally been orientated perpendicular to the two mineralization events, with a dip direction towards the east or west to define the north-south trending breccias along a strike length of approximately 400 m. Drill holes drilled to investigate the CDP intrusive have in general been orientated perpendicular to the southwest-northeast trending mineralization along a total strike length of approximately 600m. Dips vary depending on the target and range from -49° to -87°, averaging -62°. The average depth is 250 m and the deepest hole reached a depth of 500 m.

Geological confidence and estimation quality are closely related to data density and this is reflected in the classification.

14.7.3 Data accuracy and precision

Classification of Mineral Resource confidence is also influenced by the accuracy and precision of the available data. The accuracy and the precision of the data is determined through QAQC programs and through an analysis of the methods used to measure the data.

All exploration drill core has been sent to certified laboratories, including ACME, Alex Stewart, and most recently ALS Global for sample preparation and analysis.

Quality control results from the different laboratories indicate reasonable levels of accuracy with no material issues of sample switching or contamination indicated by blank submissions. However, certificates for SRMs submitted during Rio Tinto's campaign are not available and therefore accuracy levels for these early holes cannot be confirmed, and that has been taken into consideration during classification.

During both the Rio Tinto and Goldrock drilling campaigns a limited number of duplicate types were submitted meaning that an analysis of each stage of the sample preparation process cannot be assessed. Nevertheless, field duplicates and check assays were submitted regularly, and both show reasonable levels of precision.

Mansfield has submitted a full suite of duplicate types during their infill and blast hole drilling campaigns and reasonable precision levels were observed for all duplicate types. The mineralization is very homogenous in nature at both the Lindero and Arizaro deposits, as demonstrated by the heterogeneity test, with good gold grade continuity observed in relation to the intrusive events in the porphyry system. The QC results indicate that grades reported from all laboratories are suitable for Mineral Resource estimation.

14.7.4 Spatial grade continuity

Spatial grade continuity, as indicated by the variogram, is an important consideration when assigning resource confidence classification. Confidence in the variogram characteristics, such as the nugget variance and ranges, strongly influence estimation quality parameters.

Lindero Deposit

The variogram structures for the mineralized FPD, CPD1, and S1 lithologies are well defined and there is a high level of confidence in the modeled variograms.

The nugget effect and short-range variance characteristics of the variogram are the most important measures of continuity. The nugget variance is low for all modeled lithologies in respect to gold, ranging between 1 and 3 percent of total variance, indicating good grade continuity at short distances. Ranges (the distance at which continuity between sample grades is no longer present) are approximately 150 to 250 m vertically (down dip) and around the intrusive (along strike), while across the intrusive (across strike) is approximately 80 to 100 m for the main mineralized FPD/CPD1 units. These distances are typical for porphyry style mineralization and suggest that the drilling grid is reasonable for representative grade estimation.

Arizaro Deposit

The variogram structures for the mineralized breccia combined lithologies in the Arizaro Deposit are well defined and there is a reasonable level of confidence in the modeled variogram.

The nugget variance is moderate for the modeled lithologies in respect to gold, being approximately one third of total variance, indicating variable grade continuity at short distances. Ranges are approximately 70 to 100 m vertically (down dip), 230 to 250 m along the trend of the intrusive (along strike), while across the intrusive (across strike) is approximately 40 to 90 m. These distances are not uncommon for porphyry style mineralization and are representative of the more complex nature of the mineralization style at the Arizaro Deposit.

14.7.5 Classification

Geostatistics provides an assortment of tools to establish confidence levels on resource estimates. The simplest of these methods involves evaluation of estimation variances for large blocks. This method gives an estimate of global confidence or confidence over large production areas. The method is not dependent on the local data.

Mineral Resources at the Lindero Deposit have been classified as Measured, Indicated and Inferred based on the data density as detailed below.

Mineral Resources at the Arizaro Deposit have been classified as Inferred only based on the data density and complex nature of the lithological, alteration and structural controls.

Inferred drill hole grid spacing

Mineral Resources were classified as Inferred when a block was located within 70 m of the nearest composite. Drill hole spacing for Inferred Mineral Resources would broadly correspond to blocks with grades extrapolated within 70 m from the nearest drill hole.

Indicated drill hole grid spacing

AMEC calculated the confidence limits for determining the appropriate drill grid spacing for Indicated Mineral Resources (KCA, 2016a) at the Lindero Deposit. This evaluation determined that Indicated Mineral Resources should be known within ±15 percent with 90 percent confidence on an annual basis (production year) and Fortuna agrees with this criterion.

A drill grid spacing of 75 m gives 90 percent confidence levels in individual domains ranging from ±8 to ±11 percent for an annual product increment and is within the suggested limits of ±15 percent.

Mineral Resources were classified as Indicated when a block was located within 54 m of the nearest composite and one additional composite from another drill hole was within 90 m. Drill hole spacing for Indicated Mineral Resources broadly correspond to a 75 m x 75 m grid.

Classification was manually adjusted in peripheral areas of the drill grid so that blocks extrapolated greater than 30 m from the closest drilling were classified as Inferred.

Measured drill hole grid spacing

AMEC calculated the confidence limits for determining appropriate drill grid spacing for Measured Resources (KCA, 2016a) at the Lindero Deposit. This evaluation determined that

Measured Mineral Resources should be known within ±15 percent with 90 percent confidence on a quarterly basis (production quarter) and Fortuna agrees with this criterion.

A drill grid spacing of 37.5 m gives 90 percent confidence levels in individual domains ranging from ±8 to ±11 percent for a quarterly product increment.

Mineral Resources were classified as Measured when a block was located within 35 m of the nearest composite and two composites from two additional drill holes was within 45 m. Drill hole spacing for Measured Mineral Resources broadly correspond to a 37.5 m x 37.5 m grid.

14.7.6 Comments regarding classification

The Mineral Resource confidence classification of the Lindero Deposit model incorporated the confidence in the drill hole data, the geological interpretation, geological continuity, data density and orientation, spatial grade continuity, and estimation quality. The resource models were coded as Inferred, Indicated, and Measured in accordance with CIM (2014) standards.

Fortuna visually reviewed the continuity of resource blocks with gold grades equal to or greater than the base case cut-off of 0.23 g/t Au in section and plan. The Mineral Resource model showed good grade and geologic continuity in areas of the FPD/CPD1 domains with 37.5 m drill spacing, and adequate continuity for grade interpolation and open-pit mine planning along strike and dip in areas with drill hole spacing at 75 m with a distance of less than 30 m extrapolation away from the drilled area.

Geological and grade continuity in the central and western parts of the intrusive complex is complicated by the occurrence of multiple intrusive events and magmatic breccias which increase the uncertainty in this area. Therefore, blocks within this area were downgraded to the Indicated category.

In addition, areas with the majority of the composites derived from drill holes with uncertain locations or assays with no supporting laboratory certificates were downgraded from the Measured to the Indicated category.

The above criteria ensure a gradation in confidence from Inferred to Indicated to Measured Mineral Resource blocks. It also ensures that blocks considered as Measured are informed from at least three sides, blocks considered as Indicated from at least two sides, and blocks considered as Inferred from at least one side. A plan section displaying the classification at the Lindero Deposit is displayed in Figure 14.15.

Figure 14.15 Plan section of the Lindero Deposit displaying Mineral Resource categorization

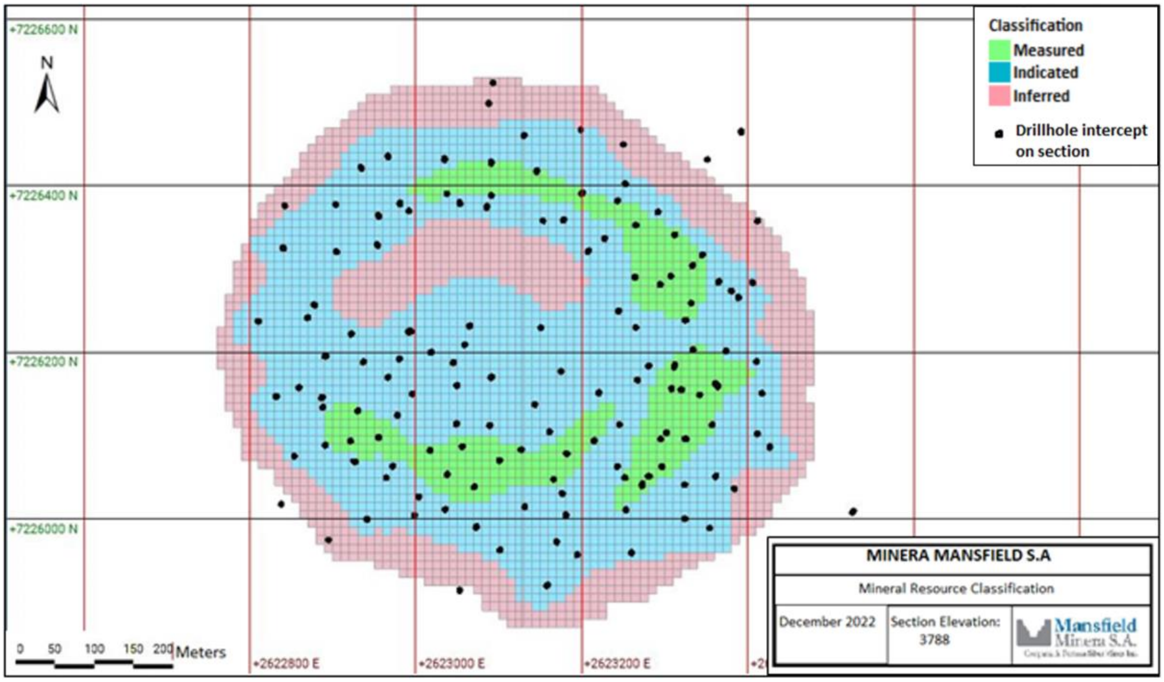


Figure prepared by Fortuna, 2022

Mineral Resource confidence classification for the Arizaro Deposit model has been restricted to Inferred due to the complex lithological controls related to the intrusive and breccia events described in Section 7.4.

14.8 Mineral Resource reporting

14.8.1 Reasonable prospects for eventual economic extraction

To assess reasonable prospects of economic extraction as required by the definition of Mineral Resource by the CIM, the mineralization was confined within a Lerchs–Grossmann (LG) optimization. Fortuna considered that the mineralized material that displays geological and grade continuity, and which falls within a pit shell constructed using reasonable economic parameters is likely to support economic extraction. A gold price of US$1,840/oz was used to generate the ultimate pit shell along with the processing and mining costs as detailed in Table 14.16.

Table 14.16 Cost assumptions for ultimate pit design purposes

Cost	Price (US$)
Average mining cost	$1.67/t
Ore processing and G&A cost	$10.32/t of ore
Treatment and refining cost	$8.52/oz

For Lindero, an average metallurgical recovery rate of 75 percent was used for the evaluation based on the metallurgical testwork conducted since 2017. Slope angles of 39°, 42°, and 47°

were assigned to three separate sectors of the ultimate pit, based on the geotechnical report completed by CNI (2017).

For the Arizaro Deposit, it was assumed that mineralized material will be processed at the Lindero plant at a comparable mining cost (plus US$0.52 per ore tonnes to account for haulage from the deposit to the plant), and the same ore processing cost, general/administrative costs, treatment/refining costs, and metallurgical recovery rate. The ultimate pit shell used to constrain the resources was based on slope angles of 47° comparable to the steepest angles applied to the Lindero pit as the host rocks are similar in nature.

Fortuna calculated a marginal cut-off grade for the Lindero and Arizaro deposits using gold price, ore-based costs, and metallurgical recovery. The marginal cut-off is based on the generally-accepted practice that a decision is made at the pit rim if mined material above the marginal cut-off grade will lose less money if it is sent to the mill rather than if it is sent to the waste dump.

Revenue per gram was calculated using the metal price per gram of gold with an increase of 15 percent to represent upside long-term metal prices multiplied by the process recovery (75 percent). Total mill feed-based costs are shown in Table 14.16.

The cut-off grade was calculated using the following formula:

Cut-Off Grade = Total Mill Feed Costs / (Revenue per Gram x Metallurgical Recovery)

Fortuna determined a marginal cut-off grade of **0.23 g/t Au** for reporting resources at the Lindero Mine and **0.25 g/t Au** for reporting resources at the Arizaro Project.

It is the opinion of the QP that by constraining the Mineral Resources within an open pit shell based on established mining and processing costs; recommended slope angles based on independent geotechnical investigations; metallurgical recoveries from extensive testwork; reasonable long-term metal prices; and the application of a transparent marginal cut-off grade, the Mineral Resources do have '*reasonable prospects for eventual economic extraction*' (CIM, 2014).

14.8.2 Mineral Resource statement

Eric Chapman P. Geo. is the QP for the Mineral Resource estimates for the Lindero and Arizaro deposits. Mineral Resources have an effective date of December 31, 2022. Mineral Resources are summarized in Table 14.17. Mineral Resources are reported based on a 10m x 10m x 8m selective mining unit within an ultimate pit shell using a 0.23 g/t Au cut-off grade for the Lindero Deposit and a 0.25 g/t Au cut-off grade for the Arizaro Deposit. The Measured and Indicated Mineral Resources are exclusive of those Mineral Resources modified to produce the Mineral Reserves through the process described in Section 15.

Table 14.17 Mineral Resources exclusive of Mineral Reserves reported as of December 31, 2022

Deposit	Classification	Tonnes (000)	Au (g/t)	Cu (%)	Contained Au (koz)
Lindero	Measured	1,855	0.50	0.12	30
	Indicated	27,594	0.42	0.10	369
	Measured + Indicated	**29,448**	**0.42**	**0.10**	**399**
	Inferred	**24,170**	**0.47**	**0.11**	**365**
Arizaro	**Inferred**	**22,146**	**0.39**	**0.15**	**280**

Notes on Mineral Resources:

- Mineral Resources are as defined by the 2014 CIM Definition Standards on Mineral Resources and Mineral Reserves.
- Mineral Resources are estimated as of August 31, 2022 and reported as of December 31, 2022 taking into account production related depletion between September and yearend 2022.
- Mr. Eric Chapman P. Geo, a Fortuna employee, is the Qualified Person for the estimate.
- Mineral Resources are reported exclusive of Mineral Reserves.
- Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
- Factors that could materially affect the reported Mineral Resources include; changes in metal price and exchange rate assumptions; changes in local interpretations of mineralization; changes to assumed metallurgical recoveries, mining dilution and recovery; and assumptions as to the continued ability to access the site, retain mineral and surface rights titles, maintain environmental and other regulatory permits, and maintain the social license to operate.
- Resources are reported at a 0.23 g/t Au cut-off grade for Lindero and at a 0.25 g/t Au cut-off grade for Arizaro.
- Mineral Resources for Lindero are reported within a conceptual pit shell using a long-term gold price of US$1,840/oz, average mining costs at US$1.67 per tonne of material, with total processing and G&A costs of US$ 10.32 per tonne of ore and an average process recovery of 75 %. The refinery costs net of pay factor were estimated to be US$ 8.52 per ounce gold. Slope angles are based on 3 sectors (39°, 42°, and 47°) consistent with geotechnical consultant recommendations. Mineral Resources for Arizaro are reported within a conceptual pit shell using the same gold price and costs as Lindero with an additional US$0.52 per tonne of ore to account for haulage costs between the deposit and plant. A slope angle of 47° was used for defining the pit.
- Mineral Resource tonnes are rounded to the nearest hundred thousand.
- Totals may not add due to rounding.

14.8.3 Lindero Deposit Mineral Resources by key geologic attributes

The following section provides a breakdown of the resources based on various key geologic attributes. It important to note that all numbers presented in this section are not additive to the Lindero Deposit Mineral Resources presented in Table 14.17. A cornerstone of this analysis involves the evaluation of the Mineral Resource inclusive of Mineral Reserves for the Lindero Deposit, as summarized in Table 14.18. Mineral Resources are reported as undiluted and in-situ using a 0.23 g/t Au cut-off grade within an ultimate pit shell.

Table 14.18 Lindero Deposit Mineral Resources inclusive of Mineral Reserves reported as of December 31, 2022

Category	Tonnes (Mt)	Au (g/t)	Cu (%)	Contained Metal
				Au (Moz)
Measured	27.4	0.61	0.12	0.53
Indicated	81.3	0.50	0.10	1.31
Measured + Indicated Resources	108.7	0.53	0.11	1.84
Inferred Resources	24.2	0.47	0.11	0.37

Notes on Mineral Resources:

- Mineral Resources are as defined by the 2014 CIM Definition Standards on Mineral Resources and Mineral Reserves.
- Mineral Resources are estimated as of August 31, 2022 and reported as of December 31, 2022 taking into account production related depletion between September and yearend 2022.
- Mr. Eric Chapman P. Geo, a Fortuna employee, is the Qualified Person for the estimate.
- Mineral Resources are reported inclusive of Mineral Reserves and do not include stockpiled material.

- Factors that could materially affect the reported Mineral Resources include; changes in metal price and exchange rate assumptions; changes in local interpretations of mineralization; changes to assumed metallurgical recoveries, mining dilution and recovery; and assumptions as to the continued ability to access the site, retain mineral and surface rights titles, maintain environmental and other regulatory permits, and maintain the social license to operate.
- Resources are reported at a 0.23 g/t Au cut-off grade.
- Mineral Resources are reported within a conceptual pit shell using a long-term gold price of US$1,840/oz, average mining costs at US$ 1.67 per tonne of material, with total processing and G&A costs of US$ 10.32 per tonne of ore and an average process recovery of 75 %. The refinery costs net of pay factor were estimated to be US$ 8.52 per ounce gold. Slope angles are based on 3 sectors (39°, 42°, and 47°) consistent with geotechnical consultant recommendations.
- Measured Resources include 7.9 million tonnes of stockpiled material averaging 0.48 g/t Au containing 0.12 Moz of gold.
- Mineral Resource tonnes are rounded to the nearest hundred thousand.
- Totals may not add due to rounding.

Table 14.19 shows the breakdown of the Mineral Resources in-situ (excluding stockpiles) reported by oxide or sulfide domain inside the ultimate pit shell above the 0.23 g/t Au cut-off grade. It can be seen from this breakdown that approximately 85 percent of the Measured + Indicated Mineral Resources that are yet to be mined are associated with sulfide material, and 15 percent with oxide. Metallurgical studies have shown that both materials will be treated in the same manner, but slightly higher recoveries can be expected from oxide material (Section 13). Higher levels of soluble copper tend to be associated with the oxide material, and this has been accounted for with the construction of the SART plant.

Table 14.19 Lindero Deposit Mineral Resources inclusive of Mineral Reserves by oxide/sulfide domain reported as of December 31, 2022

Domain	Category	Tonnes (Mt)	Au (g/t)	Cu (%)	Contained Metal
					Au (Moz)
Oxide	**Measured**	2.1	0.78	0.14	0.05
	Indicated	12.9	0.51	0.10	0.21
	Measured + Indicated Resources	15.0	0.54	0.11	0.26
	Inferred Resources	0.3	0.27	0.09	0.00
Sulfide	**Measured**	17.4	0.64	0.11	0.36
	Indicated	68.4	0.50	0.11	1.10
	Measured + Indicated Resources	85.8	0.53	0.11	1.46
	Inferred Resources	23.9	0.47	0.11	0.36

Refer to notes on Mineral Resources below Table 14.18. Mineral Resources in Table 14.19 are not additive to the Mineral Resources reported in Table 14.17 or Table 14.18. Mineral Resources reported in Table 14.19 do not include stockpiled material.

Table 14.20 shows the breakdown of the Mineral Resources reported by lithology inside the ultimate pit shell above the 0.23 g/t Au cut-off grade. It should be noted that 75 percent of the Measured + Indicated Resource gold metal content is associated with the FPD and CPD1 mineralized units, underlying the importance of these intrusive rocks. It is also important to note that tonnes associated with the barren CPD2 and PMI units are the result of the coding process of whole blocks to a particular rock code. Blocks located at the boundary of two rock types are assigned the code of the predominant lithology. If the majority of the block is in the CPD2 or PMI lithology it is assigned this rock code, even though the lesser percentage if mineralized material within the block may result in the whole block grade being above the cut-off and reported in the resource. In this way dilution is being accounted for at the SMU scale for the resource block model.

Table 14.20 Lindero Deposit Mineral Resources inclusive of Mineral Reserves by lithology reported as of December 31, 2022

Lithology	Category	Tonnes (Mt)	Au (g/t)	Cu (%)	Contained Metal
					Au (Moz)
FPD	Measured	9.0	0.70	0.13	0.20
	Indicated	35.3	0.55	0.12	0.62
	Measured + Indicated	44.2	0.58	0.12	0.82
	Inferred	11.3	0.51	0.12	0.19
CPD1	Measured	9.2	0.62	0.10	0.18
	Indicated	19.3	0.46	0.09	0.29
	Measured + Indicated	28.5	0.51	0.09	0.47
	Inferred	1.5	0.40	0.08	0.02
PBFD	Measured	1.0	0.63	0.10	0.04
	Indicated	3.3	0.52	0.07	0.06
	Measured + Indicated	4.4	0.49	0.07	0.07
	Inferred	1.1	0.58	0.08	0.02
DDP	Measured	0.1	0.76	0.14	0.00
	Indicated	6.8	0.51	0.09	0.11
	Measured + Indicated	7.0	0.52	0.09	0.12
	Inferred	0.2	0.39	0.07	0.00
S1	Measured	0.0	0.54	0.11	0.00
	Indicated	12.6	0.45	0.11	0.18
	Measured + Indicated	12.6	0.45	0.11	0.18
	Inferred	9.2	0.43	0.11	0.13
BX-M	Measured	0.1	0.30	0.12	0.00
	Indicated	0.9	0.38	0.10	0.01
	Measured + Indicated	0.9	0.37	0.10	0.01
	Inferred	0.2	0.31	0.12	0.00
BX-QS	Measured	0.1	0.89	0.11	0.00
	Indicated	0.8	0.56	0.13	0.02
	Measured + Indicated	1.1	0.58	0.13	0.02
	Inferred	0.3	0.56	0.11	0.01
CPD2	Measured	0.0	0.32	0.08	0.00
	Indicated	1.0	0.31	0.10	0.01
	Measured + Indicated	1.0	0.31	0.10	0.01
	Inferred	0.1	0.32	0.07	0.00
PMI	Measured	0.1	0.44	0.07	0.00
	Indicated	1.6	0.31	0.07	0.01
	Measured + Indicated	1.2	0.32	0.07	0.01
	Inferred	0.4	0.26	0.09	0.00

Refer to notes on Mineral Resources below Table 14.18. Mineral Resources in Table 14.20 are not additive to the Mineral Resources reported in Table 14.17, Table 14.18 or Table 14.19. Mineral Resources reported in Table 14.19 do not include stockpiled material.

A sensitivity analysis has been conducted on the resources to evaluate the effect of changing cut-off grades on tonnes and grade with the results reported in Table 14.21. The base case is highlighted.

Table 14.21 Lindero Deposit Mineral Resources inclusive of Mineral Reserves as of December 31, 2022 reported at a range of gold cut-off grades

Category	Au Cut-off (g/t)	Tonnes (000)	Au (g/t)	Cu (%)	Contained Metal
					Au (Moz)
Measured	**0.23**	**19.5**	**0.66**	**0.12**	**0.41**
	0.3	18.6	0.68	0.12	0.40
	0.4	15.9	0.73	0.13	0.37
	0.5	12.7	0.80	0.13	0.33
Indicated	**0.23**	**81.3**	**0.50**	**0.10**	**1.31**
	0.3	65.8	0.55	0.11	1.17
	0.4	46.7	0.64	0.12	0.96
	0.5	32.5	0.72	0.13	0.76
Measured + Indicated Resources	**0.23**	**100.8**	**0.53**	**0.11**	**1.72**
	0.3	84.4	0.58	0.11	1.58
	0.4	62.6	0.66	0.12	1.33
	0.5	45.3	0.75	0.13	1.08
Inferred Resources	**0.23**	**24.2**	**0.47**	**0.11**	**0.37**
	0.3	17.5	0.55	0.12	0.31
	0.4	11.4	0.66	0.13	0.24
	0.5	8.3	0.74	0.13	0.20

Refer to notes on Mineral Resources below Table 14.18. Mineral Resources in Table 14.21 are not additive to the Mineral Resources reported in Table 14.17, Table 14.18, Table 14.19 or Table 14.20. Mineral Resources reported in Table 14.19 do not include stockpiled material.

14.8.4 Comparison to previous estimate

The primary reasons for changes in the reported Mineral Resources for the Lindero Deposit compared to the previous estimate reported as of December 31, 2021 are due to:

- Production related depletion that resulted in a reduction of 5.4 Mt containing 144 koz of gold that have been placed on the leach pad for processing.
- Increase in the stockpile from 4.7 Mt containing 74 koz of gold to 7.9 Mt containing 122 koz of gold.
- The update of cost increases for defining pit limits and adjustments in estimation parameters resulted in a net decrease of 6.4 Mt containing 66 koz of gold.
- Pit optimization based on long term gold metal price of US$1,840/oz resulted in an increase of 5.2 Mt containing 65 koz of gold in Measured and Indicated Resources and an increase of 1.3 Mt containing 17 koz of gold of Inferred Resources.
- Change in reporting cut-off grade from 0.20 g/t Au to 0.23 g/t Au due to an increase in mining costs resulted in a decrease of 6.6 Mt containing 44 koz of gold in Measured and Indicated Resources and a decrease of 4 Mt containing 28 koz of gold of Inferred Resources.

14.9 Comment on Section 14

The QP is of the opinion that the Mineral Resources for the Lindero and Arizaro deposits, which have been estimated using core drill and limited blast hole data, have been performed to industry best practices, and conform to the requirements of CIM (2014). The Mineral Resources are acceptable to support declaration of Mineral Reserves.

Furthermore, it is the opinion of the QP that by constraining the Mineral Resources within an open pit shell based on established mining and processing costs; recommended slope angles based on independent geotechnical investigations; metallurgical recoveries from extensive testwork; reasonable long-term metal prices; and the application of a transparent marginal cut-off grade, the Mineral Resources have 'reasonable prospects for eventual economic extraction'.

15 Mineral Reserve Estimates

This section provides details of the Mineral Reserve estimation methodology performed in September 2022 based on the updated Mineral Resources as well as adjustments made to account for updated operating costs.

Mineral Resources have been reported in three categories, Measured, Indicated, and Inferred. The Mineral Reserve estimate has considered only Measured and Indicated Mineral Resources defined for the Lindero Deposit as these categories have sufficient geological confidence to be considered Mineral Reserves (CIM, 2014). Measured Resources may become Proven Reserves and Indicated Resources may become Probable Reserves. Mineral Reserves have not been estimated for the Arizaro Deposit as Mineral Resources are classified as Inferred as at the effective date of this Report.

15.1 Mineral Reserve methodology

An economic pit shell generated using cost criteria, metallurgical recoveries, geological and geotechnical considerations guides the final pit design. The economic pit shell used to define the final pit limit was developed using Datamine's NPV Scheduler™ software (NPVS). NPVS uses the Lerchs-Grossman (LG) algorithm to define blocks that can be mined at a profit. The Mineral Reserve estimation procedure for the Lindero Deposit is defined as follows:

- Review of Mineral Resources in longitudinal sections and grade–tonnage curves.
- Define economic parameters for calculating an appropriate cut-off grade to be applied to the open pit optimization such as downstream costs, process and mining costs, haulage incremental cost, metallurgical recoveries by mineralization type, and sustaining capital.
- Slope parameters based on geotechnical considerations were applied to the pit optimization and subsequently used to generate overall slope angles for the block model.
- Inferred Mineral Resources are considered as waste material in the optimization process.
- Compute the dollar value for each block to define blocks that can be mined at a profit based on the LG algorithm.
- Perform a LG pit optimization using Datamine's NPV Scheduler™.
- Pit shells are calculated undiscounted, for best-case vs worst-case analysis and generation of the optimum pit shell. An 8 percent discount rate is applied for NPV calculation.
- Mineral Reserves are reported within an ultimate pit design at variable cut-off grades that are based on the process type, operating costs and metallurgical recovery.
- A dilution allowance for the Mineral Reserve estimate is applied using diluted model grades. The diluted model, which was built from the Mineral Resource block model, incorporates dilution and ore loss, and eliminates the need for applying additional factors.

- Depletion of material mined between September and yearend 2022. Mineral Reserve tabulation and reporting as of December 31, 2022.

15.2 Mineral Resource handover

The Mineral Resources inclusive of Mineral Reserves as reported in Table 14.18 contain mineralization that has been classified into the Measured, Indicated and Inferred categories.

Upon receipt of the block model a review was conducted to confirm the Mineral Resources were reported correctly and to validate the various fields in the model.

For estimating Mineral Reserves, only Measured and Indicated Mineral Resources were considered in the open pit optimization process. Inferred Mineral Resources were treated as waste material.

The Mineral Reserve estimation process considered the Mineral Resources above a 0.23 g/t Au cut-off grade.

15.3 Key mining parameters

15.3.1 Dilution and mining loss

The geologic model was constructed using 10 x 10 x 8 m blocks for the selective mining unit, with the concept that mining in ore would generally be performed on 8 m benches. The gold grades in the Mineral Resource block model have been estimated with the appropriate degree of smoothing to account for expected dilution levels at the 10 x 10 x 8 block size and include external dilution at the contacts of ore-waste boundaries at this scale. No additional dilution or ore loss is expected beyond that which is accounted for in the model therefore eliminating the need for the application of additional mining recovery or dilution factors.

15.3.2 Pit slope parameters

Pit slope parameters based on geotechnical considerations as detailed in Sections 9.6 and 24.2 were applied to the pit design along with ramps and catch benches, and subsequently used to generate overall slope angles. The overall slope angles used in the pit optimization are shown in Table 15.1.

Table 15.1 Overall slope angles used in the pit optimization process

Domain	Domain model Code	Mine Planning Azimuth (°)		Overall slope angle (°)
		From	To	
Red Bed Sediments	1	0	120	47
		120	150	42
		150	360	47
Intrusive	2	0	220	47
		220	260	42
		260	360	47
RQD < 40	3	0	360	39

15.3.3 Metallurgical recoveries

Gold recovery is determined by metallurgical type as detailed in Section 13. The expected average gold recovery by metallurgical type is shown in Table 15.2.

Table 15.2 Process recoveries

Ore type	unit	Gold % Extracted recovery
Met 1	%	75.4
Met 2	%	78.2
Met 3	%	78.5
Met 4	%	68.5

15.3.4 LG optimization parameters

The Mineral Reserve estimate was prepared using the August 31, 2022 topographic survey and depleted based on the December 31, 2022 topographic survey conducted by the surveying company (Section 9.3.3) and the optimization parameters detailed in Table 15.3.

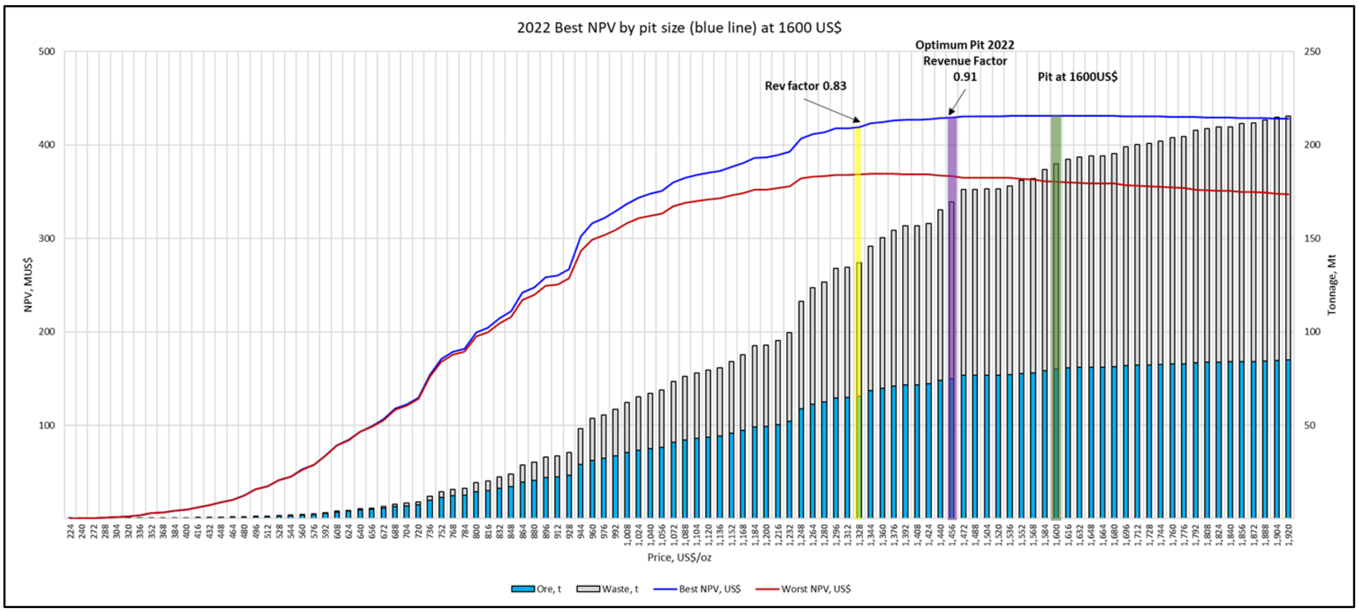
Table 15.3 LG optimization parameters

Parameter	Units	Cost / Assumption
Gold Price	US$/oz	1,600
Royalty (3 %)	US$/oz	30.2
Refining & Selling	US$/oz	8.5
Mining Cost	US$/t mined waste	1.65
	US$/t mined ore	1.71
Bench Height	m	8
Haulage Increment cost to process	US$/t mined	0.06
G&A	US$/t ore	2.93
Processing Cost	US$/t ore	6.89
Capex to opex mine cost	US$/t ore	0.137
Capex to opex process cost	US$/t ore	0.499
Recovery Met 1	%	75.4
Recovery Met 2	%	78.2
Recovery Met 3	%	78.5
Recovery Met 4	%	68.5
Overall Slope Angle	degrees	by domain
Breakeven Cut-off Met 1	**g/t**	**0.32**
Breakeven Cut-off Met 2	**g/t**	**0.31**
Breakeven Cut-off Met 3	**g/t**	**0.31**
Breakeven Cut-off Met 4	**g/t**	**0.35**
Discount rate	%	8
Incremental Cut-off Met 1	**g/t**	**0.27**
Incremental Cut-off Met 2	**g/t**	**0.26**
Incremental Cut-off Met 3	**g/t**	**0.26**
Incremental Cut-off Met 4	**g/t**	**0.30**

Capex that is impacted by an incremental increase in Mineral Reserves has been accounted for in the cut-off grade calculation, firstly as mine operating cost (capex to opex mine cost) related to equipment reparation, and spare parts that do not represent an extension in equipment life; and secondly as the cost in expanding the leach pad (capex to opex process cost) related to the phase 2 expansion. Sustaining costs for site infrastructure not directly related to mining, processing or closure cost are not included in the cut-off calculation.

Incremental (referred to as the open pit discard cut-off grade in the CIM best practice guidelines 2019) and breakeven cut-off grades were calculated based on the aforementioned economic parameters. The incremental cut-off grade assumes an economic pit has been defined and considers the mining cost as a sunk cost. The breakeven cut-off grade includes mining cost considerations. A discount rate of 8 percent was used to compare different pits generated for different revenue factors (Figure 15.1) on a best case and worst-case scenario in order to select the optimum final pit (RF=0.91).

Figure 15.1 Pit optimization



15.4 Mineral Reserves

The Lindero Deposit Mineral Reserves are reported in Table 15.4, based on an incremental cut-off grade which assumes that an economic pit has been defined. Mineral Resources exclusive of Mineral Reserves are reported in Table 14.17.

Table 15.4 The Lindero Deposit Mineral Reserves as of December 31, 2022

Classification	Tonnes (000)	Au (g/t)	Cu (%)	Contained Metal
				Au (koz)
Proven	25,505	0.61	0.08	504
Probable	53,713	0.54	0.11	937
Proven + Probable	**79,218**	**0.57**	**0.10**	**1,441**

Notes:

- Mineral Reserves are as defined by the 2014 CIM Definition Standards for Mineral Resources and Mineral Reserves.
- Mineral Reserves are estimated as of August 31, 2022 and reported as of December 31, 2022 taking into account production related depletion between September and yearend 2022.
- Factors that could materially affect the reported Mineral Reserves include changes in metal price and exchange rate assumptions; changes in local interpretations of mineralization; changes to assumed metallurgical recoveries, mining dilution and recovery; and assumptions as to the continued ability to access the site, retain mineral and surface rights titles, maintain environmental and other regulatory permits, and maintain the social license to operate.
- Mineral Reserves for the Lindero Deposit are reported based on open pit mining within designed pit shells based on variable gold cut-off grades and gold recoveries by metallurgical type. Met type 1 cut-off 0.27 g/t Au, recovery 75.4 %; Met type 2 cut-off 0.26 g/t Au, recovery 78.2 %; Met type 3 cut-off 0.26 g/t Au, recovery 78.5 %; and Met type 4 cut-off 0.30 g/t Au, recovery 68.5 %.
- The cut-off grades and pit designs are considered appropriate for long term gold prices of US$1,600/oz less 3 % gross royalty and refinery costs net of pay factor estimated to be US$ 8.5 per ounce gold.
- Mineral Reserves are reported within the final pit design shell using a long-term gold price of US$1,600/oz, average mining costs at US$1.67 per tonne of material, with total processing cost of US$ 6.89 per tonne of ore, G&A costs of US$ 2.93 per tonne of ore and capex to opex process cost (for leach pad expansion) of US$ 0.50 and an average process recovery of 75 %. The refinery costs net of pay factor were estimated to be US$ 8.52 per ounce gold. Slope angles are based on 3 values (39°, 42°, 47°) consistent with geotechnical consultant recommendations.
- Raul Espinoza, FAusIMM Chartered Professional #309581 is the Qualified Person for reserves, being an employee of Fortuna Silver Mines Inc.
- Mineral Reserve tonnes are rounded to the nearest thousand.
- Totals may not add due to rounding.

15.5 Comments on Section 15

Mineral Reserves at the Lindero Deposit are extracted using a conventional open pit mining method, and in the opinion of the QP, are reported appropriately with the application of reasonable mining recovery and dilution factors incorporated into the block model, a transparent incremental and breakeven cut-off grades based on estimated mining, processing and smelting costs from current operational information; estimated metallurgical recoveries from the feasibility study and extensive current operational testwork on the different metallurgical types; and reasonable long-term metal prices based on market consensus.

The QP is of the opinion that the Lindero Deposit Proven and Probable Mineral Reserve estimate has been undertaken with reasonable care and has been classified using the 2014 CIM Definition Standards. Mineral Reserves are to be extracted using open pit mining methods. Furthermore, it is the QP's opinion that Mineral Reserves are unlikely to be materially affected by mining, metallurgical, infrastructure, permitting or other factors.

16 Mining Methods

This section summarizes the mine design and planning work completed to support the preparation of the Lindero Deposit Mineral Reserve statement. Mining method selection is also critical as it impacts dilution, productivity, product consistency, production capacity, and sequence of extraction.

The Lindero Deposit is suitable for open pit mining methods. Gold grade distribution and the results of the mineral processing testing indicates that ore from the Lindero Deposit can be processed by conventional heap leaching methods.

Hydrological considerations and geotechnical studies are discussed in Section 24. Additional information on geotechnical considerations is provided in Section 9.6.

16.1 Material types

Material is divided into ore and waste categories for scheduling purposes. Waste consists of material that is not classified as either Proven or Probable Mineral Reserves. Ore is categorized by grade, resource classification, and metallurgical type.

16.1.1 Waste material

Waste material is currently being placed in the waste dump immediately to the west of the crusher as a valley fill.

16.1.2 Metallurgical material types

Mineral Reserves above cut-off grade and inside of the pit were classified by both grade and metallurgical domain. The ore types consist of low-grade and medium grade, using minimum cut-off grades of 0.26 and 0.42 g/t Au respectively as grade breaks. The minimum cut-off grades were based on cut-off grades determined for each metallurgical type: 0.27 g/t Au, 0.26 g/t Au, 0.26 g/t Au, and 0.30 g/t Au for Met 1, Met 2, Met 3, and Met 4 material respectively. All ore is either fed directly to the crusher or placed in stockpiles near the crusher.

16.2 Mining methods

The Lindero Mine is an open pit truck and wheel loader operation. The truck and wheel loader method provide reasonable cost benefits and selectivity for this type of deposit. Only open pit mining methods are considered for mining at the Lindero Deposit.

16.2.1 Pit designs

Detailed pit design was completed, including an ultimate pit and seven internal phased pits. The ultimate pit was designed to allow mining of mill feed material identified by NPVS optimization while providing safe access for people and equipment. Internal pits or phases within the ultimate pits were designed to enhance mine economics by providing higher-value material to the leach pad earlier in the mine life.

16.2.2 Bench height

Pit designs were developed based on 8 m benches for mining. This corresponds to the resource model block heights, and Fortuna believes this to be reasonable with respect to dilution and equipment anticipated to be used in mining.

16.2.3 Ultimate pit and pit phase design slopes

Ultimate pit and pit phases or pushbacks slope parameters were provided in a report by CNI (2017). Slope recommendations were given as double and single bench parameters for the corresponding domains as shown in Table 16.1 for the ultimate pit design and Table 16.2 for internal phase designs or pushbacks. For pushbacks, the Lindero Mine is using the single bench option.

Table 16.1 Final pit design slope parameters

Domain	Domain model Code	Mine Planning Azimuth (°)		Inter-ramp slope angle (°)	Design Bench Height (m)	Benching Increment	Catch Bench (m)	Bench Face (°)
		From	To					
Red Bed Sediments	1	0	120	50	16	Double	7.7	70
		120	150	45	16	Double	7.5	62
		150	360	50	16	Double	7.7	70
Intrusive	2	0	220	50	16	Double	7.7	70
		220	260	45	16	Double	7.5	62
		260	360	50	16	Double	7.7	70
RQD < 40	3	0	360	42	8	Single	4.4	60

Table 16.2 Pushback design slope parameters

Domain	Domain model Code	Mine Planning Azimuth (°)		Inter-ramp slope angle (°)	Design Bench Height (m)	Benching Increment	Catch Bench (m)	Bench Face (°)
		From	To					
Red Bed Sediments	1	0	120	44	8	Single	4.4	64
		120	150	42	8	Single	4.4	61
		150	360	44	8	Single	4.4	64
Intrusive	2	0	220	44	8	Single	4.4	64
		220	260	42	8	Single	4.4	61
		260	360	44	8	Single	4.4	64
RQD < 40	3	0	360	42	8	Single	4.4	60

16.2.4 Haulage considerations

Ramps were designed to have a maximum centerline gradient of 10 percent. In areas where the ramps may curve along the outside of the pit, the pit inside gradient may be as much as 11 or 12 percent for short distances.

Ramp width was determined as a function of the largest truck width to be used in mine planning. Design criteria accounts for 3.5 times the width of the truck for running room in areas using two-way traffic. An additional width is added to the ramp for a single safety berm at least two thirds of a tire height inside the pit. For roads designed outside of the pit, an additional safety berm is accounted for in the road width.

The mining truck fleet has an operational capacity of 96 tonnes per unit. The phases were designed to have 24.5 m wide ramps where two-way traffic is anticipated.

A vertical section displaying haulage road design parameters is provided in Figure 16.1.

Figure 16.1 Plan section displaying haul road design parameters

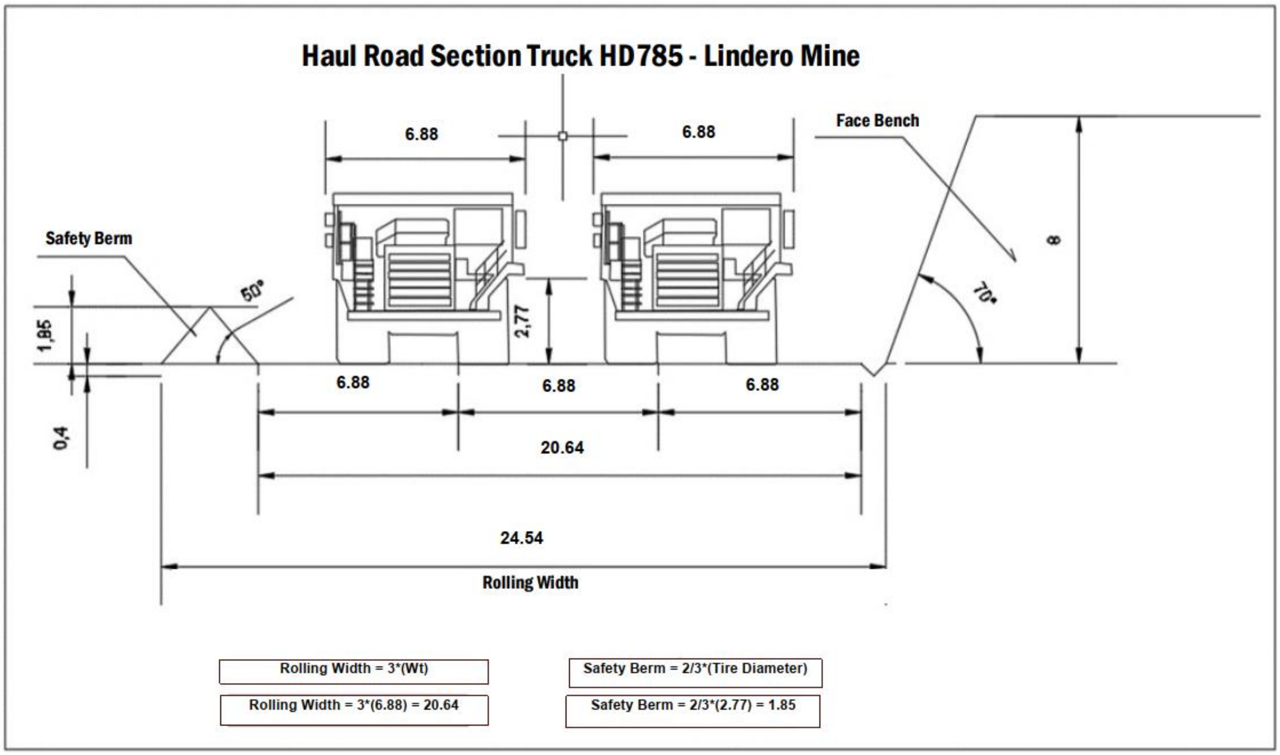


Figure from Thompson, 2015 and modified by Fortuna

16.2.5 Ultimate pit and pit phasing

The ultimate pit limit uses the pit shell generated by Datamine's NPVS open pit optimization software.

The mine operating costs used for pit optimization include ongoing major mine equipment capital costs. The mine equipment sustaining capital cost estimate is used in the economic model to simulate mine capital expenditures when generating the economic pit shell.

The LG method was used for pit optimization. This process aims to maximize cash flow by applying a factor that multiplies the price to generate LG phases (or pit shells) at different prices to obtain the revenue factor (RF) with the highest NPV. In the case of Lindero, the RF=0.91 was determined as the optimum final pit and used for the design of the ultimate pit shell.

The ultimate pit design is circular with a maximum diameter of 850 m. Figure 16.2 shows a plan view of the ultimate pit design.

Figure 16.2 Ultimate pit design

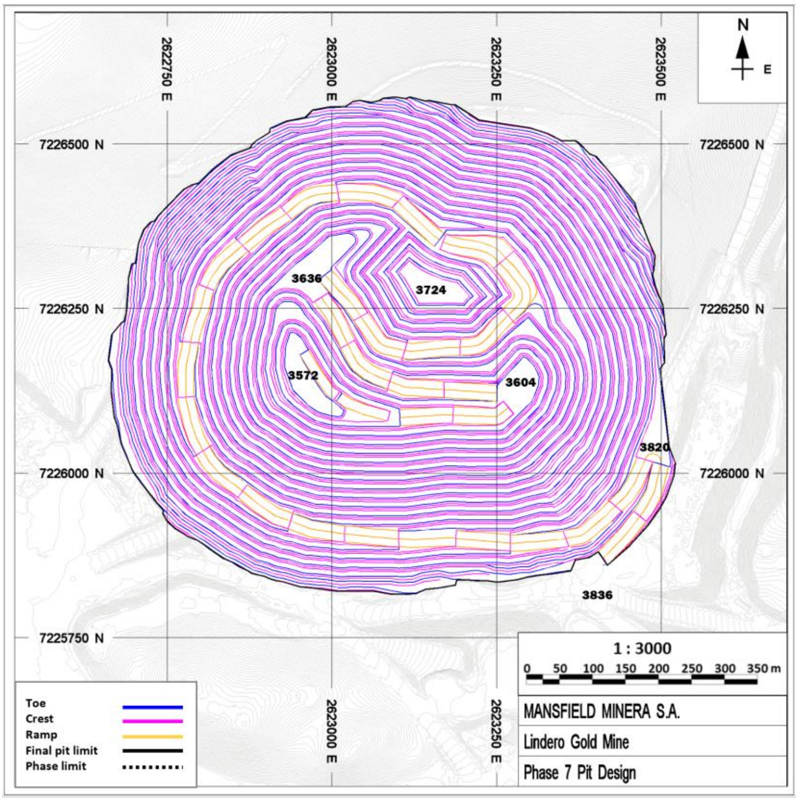


Figure prepared by Fortuna, 2022

The ultimate pit and internal phases or pushbacks were designed to maximize NPV and cash flow of the operation. A pushback is a series of manageable internal phases that allows the open pit to be mined, therefore an analysis to defined them was conducted in order to maximize value of the mineral or cash flow by prioritizing the higher value mining blocks while reducing the stripping ratio. Additionally, the mining sequence was defined in a way that ensures appropriate preparation for subsequent mining targets or blocks to be exposed, therefore providing better mineral selectivity.

Seven phases or pushbacks have been designed. Figures 16.3 to 16.8 show the pit designs for phases 1 to 6 with Phase 7 corresponding to the ultimate pit design. Phase 1 was completed in 2022 and phases 2 and 3 are currently being mined. At the end of 2023, phase 2 is planned to be completed and the mine will continue with extraction from phase 4. The subset of the Mineral Reserve for each pit phase is detailed in Table 16.3.

Figure 16.3 Phase 1 pit design (2019 to 2022)

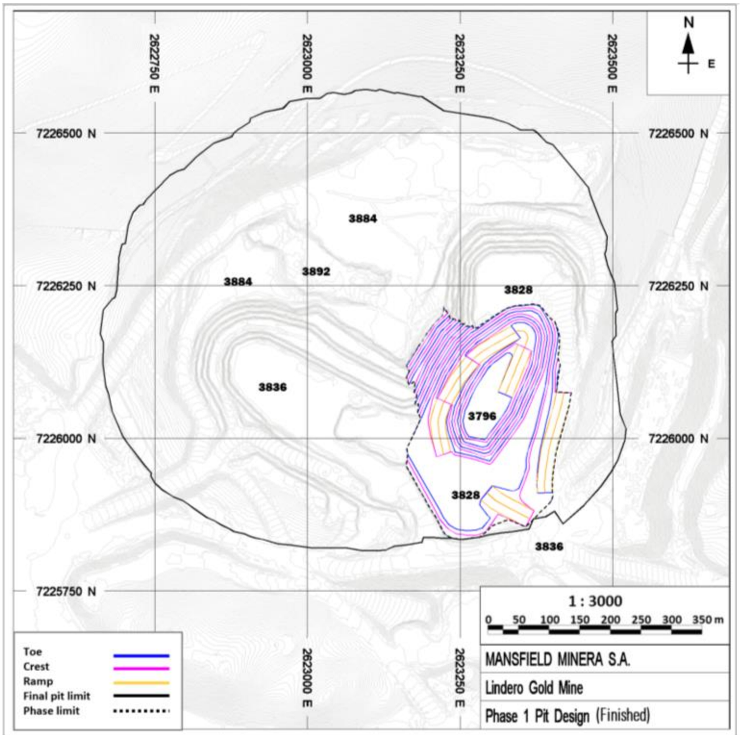


Figure prepared by Fortuna, 2022

Figure 16.4 Phase 2 pit design (2019 to 2023)

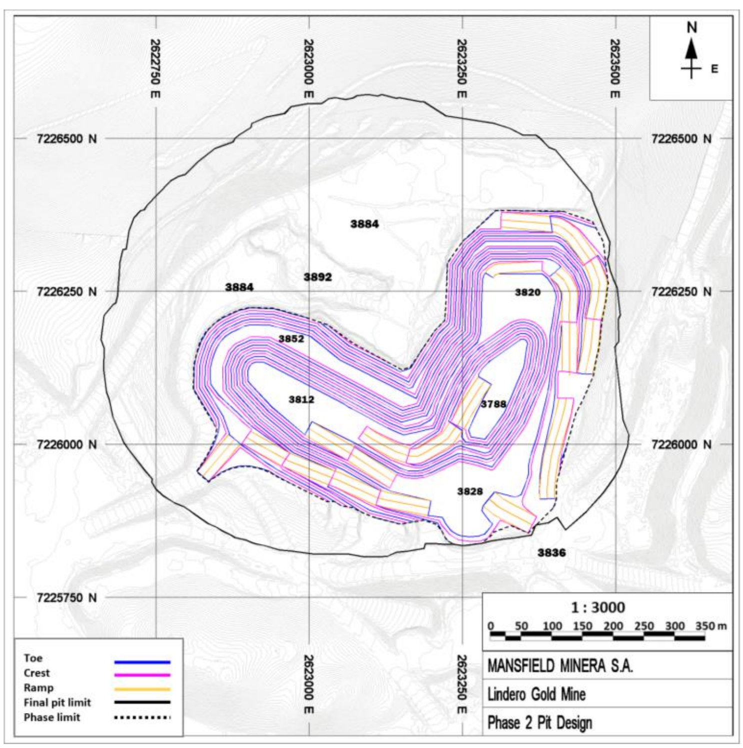


Figure prepared by Fortuna, 2022

Figure 16.5 Phase 3 pit design (2021 to 2025)

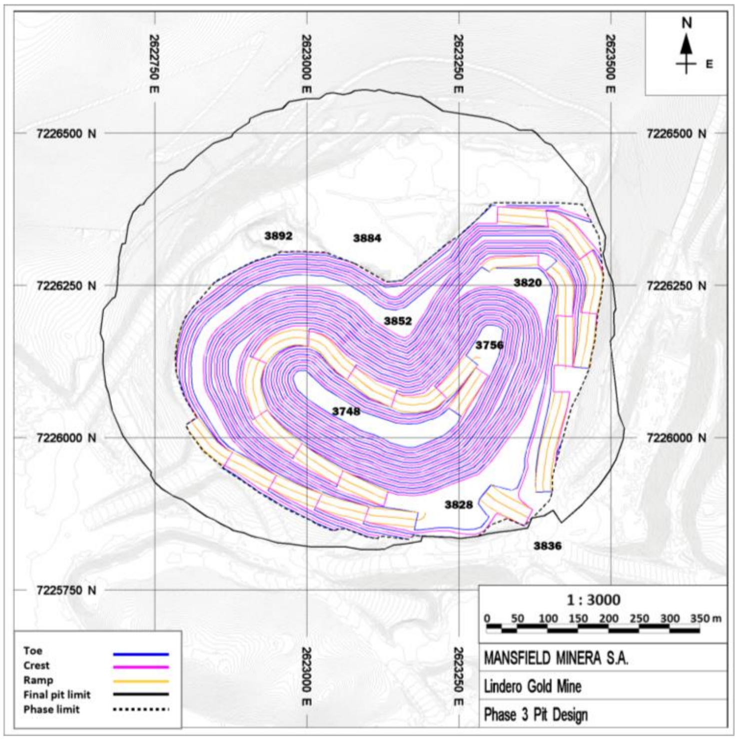


Figure prepared by Fortuna, 2022

Figure 16.6 Phase 4 pit design (2023 to 2028)

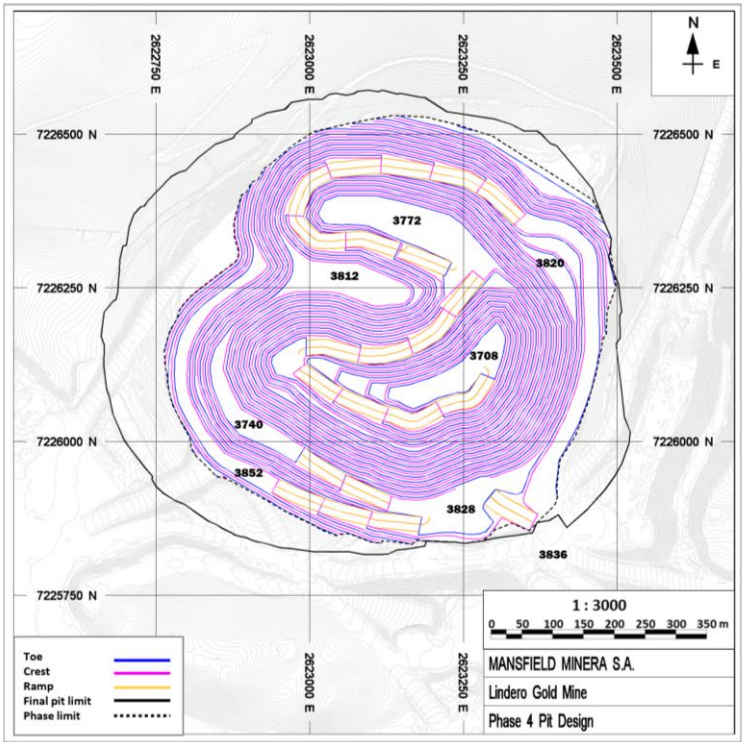


Figure prepared by Fortuna, 2022

Figure 16.7 Phase 5 pit design (2025 to 2030)

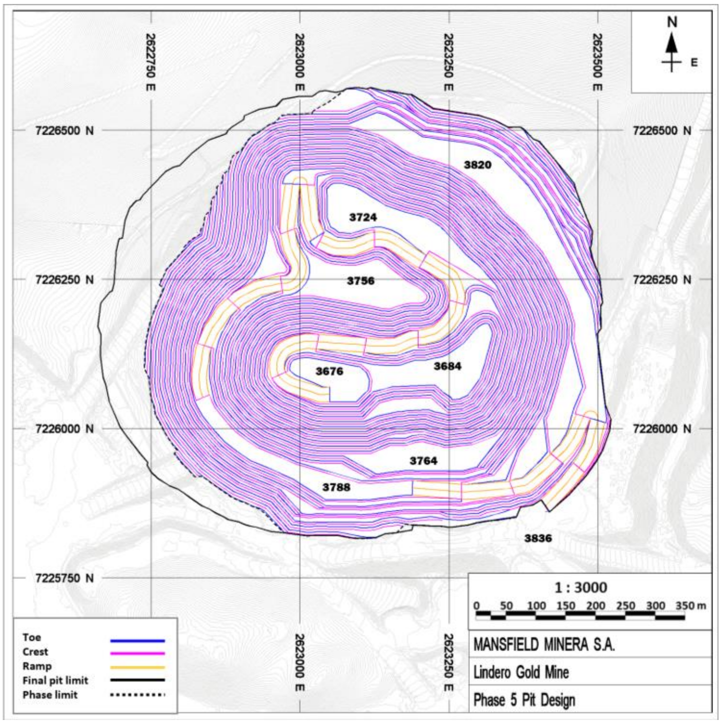


Figure prepared by Fortuna, 2022

Figure 16.8 Phase 6 pit design (2027 to 2033)

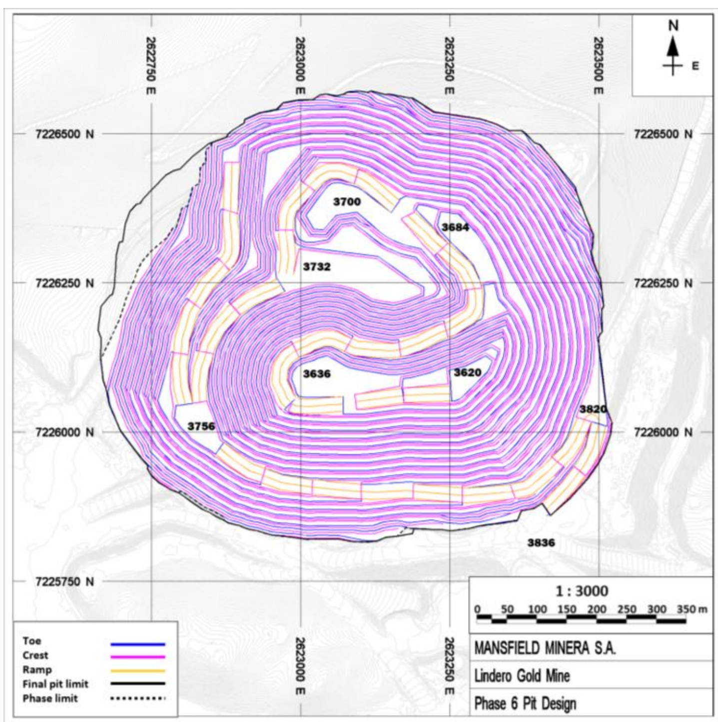


Figure prepared by Fortuna, 2022

Table 16.3 Lindero Deposit Mineral Reserves and associated waste by phase

	Proven			Probable			Total Proven & Probable			Waste	Total	Strip Ratio
Phase	Tonnes (000's)	Au (g/t)	Au (koz)	Tonnes (000's)	Au (g/t)	Au (koz)	Tonnes (000's)	Au (g/t)	Au (koz)	Tonnes (000's)	Tonnes (000's)	
Phase 1	122	0.79	3	148	0.74	4	239	0.76	7	73	312	0.2
Phase 2	616	0.82	16	1,298	0.68	28	1,913	0.72	45	304	2,217	0.2
Phase 3	3,474	0.67	75	7,326	0.56	131	10,800	0.59	206	7,140	17,940	0.7
Phase 4	5,531	0.71	126	9,443	0.52	158	14,974	0.59	284	20,908	35,882	1.4
Phase 5	3,283	0.71	75	11,554	0.54	201	14,838	0.58	276	25,722	40,559	1.7
Phase 6	3,101	0.56	56	13,471	0.53	229	16,571	0.54	285	25,093	41,665	1.5
Phase 7	1,502	0.64	31	10,472	0.55	186	11,975	0.56	217	17,666	29,641	1.5
Total	**17,629**	**0.67**	**382**	**53,712**	**0.54**	**937**	**71,341**	**0.58**	**1,319**	**96,875**	**168,216**	**1.4**

Note: Total tonnage reported for proven and probable reserves excludes 7.9 Mt averaging 0.48 g/t Au containing 122 koz of gold located in stockpiles as of December 31, 2022

16.3 Mine waste dump

Waste rock material is placed in the waste dump immediately to the west of the crusher as a valley fill. The total waste dump capacity is approximately 120 million tonnes.

The waste dump stability analysis was conducted by CNI (2017) and updated in 2022 (CNI, 2022). The overall slope and single lift heights were analyzed utilizing the SLOPE/W™ slope stability software and Spencer´s method of slices.

The waste dump design consists of two consecutive lifts of 100-m height for facility lift phases 1 and 3, and an additional 50-m height lift for facility lift phase 2 that serves as a buttress for the facility phase 1 lift, resulting in a total facility storage height of 205 m. The slope of the lifts is designed at a 37° angle. A variable offset between the lifts and ramp is included on each lift. The result is a maximum overall angle of 26°. Figure 16.9 shows a plan view of the waste dump location with respect to the final pit. Figure 16.10 shows a cross section of the static analysis of the waste dump resulting in a safety factor above 1.3.

The 2022 study reviewed the waste dump – open pit interaction to account for the possibility of earthquake induced slope displacements in respect to minimum recommended distances between the waste dump toe and pit crest. Both static and pseudo static conditions were assumed in the analyses. The conclusion from this study was that the southwest portion of the Lindero final pit will be excavated in high RQD rock and given the high factors of safety obtained under static and pseudo static conditions, it is highly unlikely that the potential surcharge loadings caused by the waste dump could affect the stability of the southwest wall of the pit. Figure 16.11 shows that the proximity of the waste dump to the pit wall does not negatively impact the stability of the pit wall.

Figure 16.9 Waste dump location plan

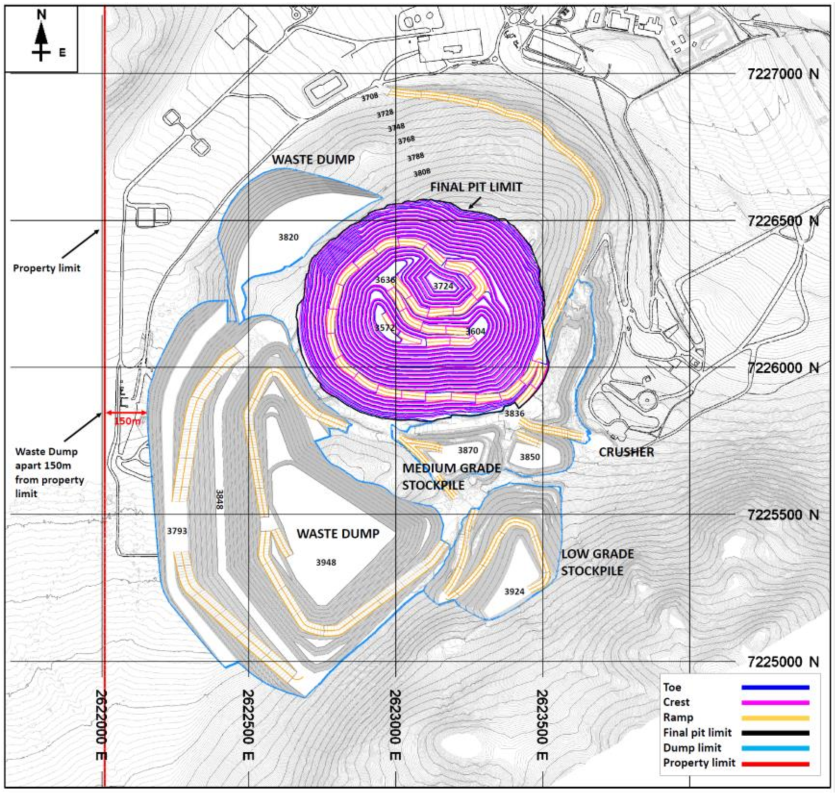


Figure prepared by Fortuna, 2022

Figure 16.10 Cross section of static analysis results

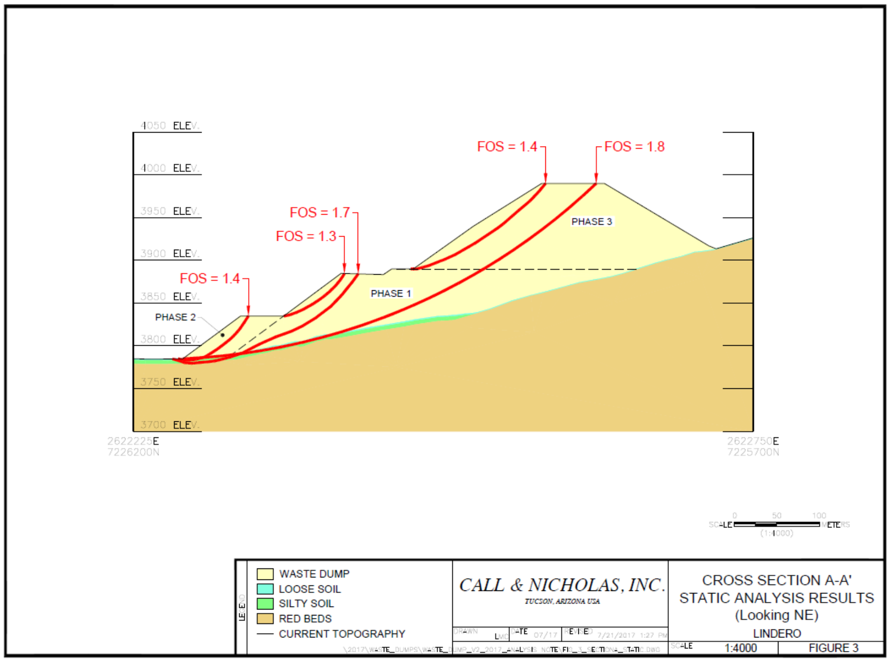


Figure prepared by CNI, 2017

Figure 16.11 Waste dump surcharge impact on pit slope stability

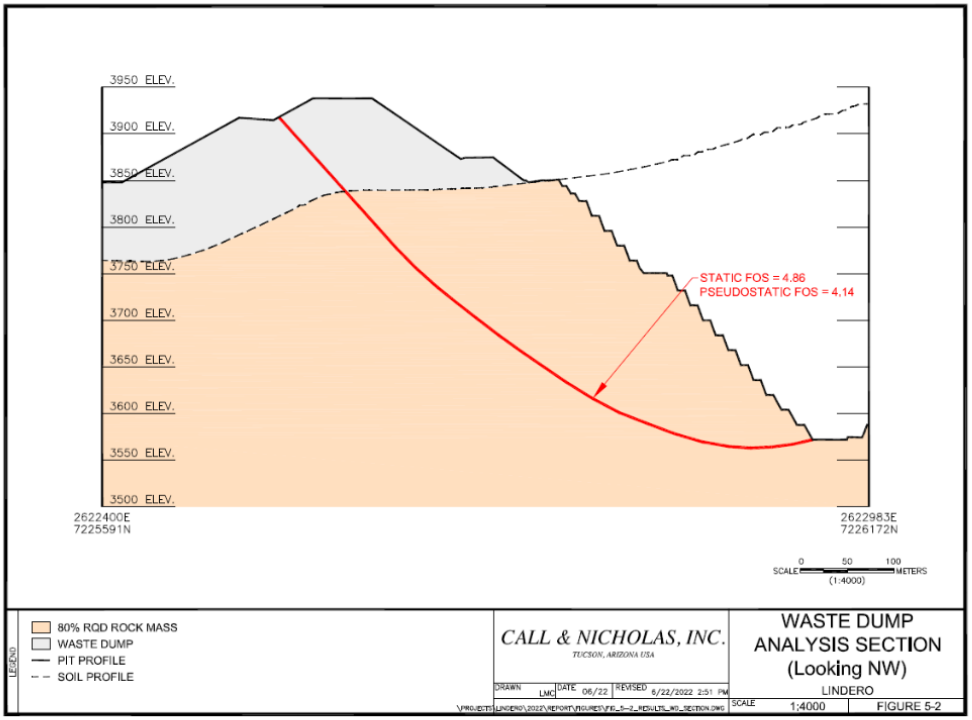


Figure prepared by CNI, 2022

16.4 Mine production schedule

Proven and Probable Mineral Reserves were used to schedule the mine production with Inferred Mineral Resources inside the pit considered as waste. The final production schedule uses trucks and wheel loaders as required to extract mineralized material to be fed into the crusher plant and maintain stripping requirements for each phase.

Table 16.4 details the planned mine production schedule, including re-handle from stockpile. Ore production will consist of Proven and Probable Mineral Reserves mined from the pit. The material stockpiled will be divided into two classes by grade: medium grade is ore equal to or above a 0.42 g/t Au cut-off; low grade is ore equal to or above 0.26 g/t Au but below a 0.42 g/t Au cut-off grade.

The annual process production rate for 2023 is estimated to be 6,321,000 t, ramping up in 2024 to 6,600,000 t, and thereafter to 6,750,000 t, which represents a daily rate of 18,493 t for 365 calendar days.

Mining rates will vary, and ore will be hauled to either the crusher or a nearby stockpile. Stockpiles will be maintained to smooth production to the crusher, as well as to optimize mine economics by allowing higher-grade material to be fed before lower-grade material. All high-grade material will be hauled directly to the crusher.

When possible, material will be fed directly into the crusher to reduce rehandle costs. Table16.4 shows the planned production schedule and stockpile rehandle.

Table 16.4 Proposed production schedule including stockpile rehandle

Parameter	Units	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031	FY2032	FY2033	FY2034	Total
Plant Days		365	365	365	365	365	365	365	365	365	365	365	365	
Mine Days		365	365	365	365	365	365	365	365	365	365	365	365	
Ore to Crusher	kt	6,321	6,600	6,750	6,750	6,750	6,769	6,750	6,750	6,750	6,769	6,750	5,363	**79,072**
Au	g/t	0.67	0.62	0.62	0.57	0.57	0.56	0.59	0.53	0.55	0.54	0.56	0.34	**0.56**
Cu	%	0.09	0.11	0.10	0.08	0.11	0.11	0.11	0.11	0.10	0.11	0.10	0.05	**0.10**
Oz Recovery	%	76.42	76.25	75.58	75.80	75.20	75.19	75.27	74.74	74.76	74.10	74.98	75.51	**75.33**
Oz Extracted	koz	104	101	102	93	93	92	97	86	89	88	91	45	**1,080**
Oz Contained	koz	136	132	135	123	124	122	129	115	119	118	122	59	**1,433**
ROM to Crusher	**kt**	**4,057**	**6,280**	**5,610**	**4,767**	**6,750**	**6,769**	**6,750**	**6,750**	**6,750**	**6,100**	**6,024**	**-**	**66,607**
MG Out Stock	kt	2,264	320	1,140	1,983	-	-	-	-	-	-	-	-	**5,707**
Au	g/t	0.54	0.54	0.54	0.54	-	-	-	-	-	-	-	-	**0.54**
MG In Stock	kt	643	-	-	-	-	-	-	-	-	-	-	-	**643**
Au	g/t	0.51	-	-	-	-	-	-	-	-	-	-	-	**0.51**
MG Stock Balance	kt	3,443	3,123	1,983	-	-	-	-	-	-	-	-	-	**-**
Au	g/t	0.54	0.54	0.54	-	-	-	-	-	-	-	-	-	**-**
LG Out Stock	kt	–	–	–	–	–	–	–	–	–	669	726	5,363	**6,758**
Au	g/t	–	–	–	–	–	–	–	–	–	0.34	0.34	0.34	**0.34**
LG In Stock	kt	2,123	1,260	250	18	47	25	31	12	10	24	42	-	**3,841**
Au	g/t	0.34	0.33	0.30	0.28	0.29	0.28	0.30	0.28	0.29	0.28	0.30	-	**0.33**
LG Stock Balance	kt	5,040	6,300	6,550	6,568	6,614	6,639	6,670	6,682	6,692	6,047	5,363	-	-
Au	g/t	0.35	0.35	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	-	-
Waste	**kt**	**7,986**	**9,664**	**10,546**	**11,587**	**11,043**	**10,858**	**9,118**	**8,247**	**8,031**	**7,883**	**1,738**	**-**	**96,701**
Total Movement	**kt**	**17,221**	**17,647**	**17,577**	**18,376**	**17,864**	**17,825**	**16,058**	**15,159**	**14,939**	**14,823**	**8,542**	**5,417**	**181,446**
SR:	w/o	1.17	1.28	1.80	2.42	1.62	1.60	1.34	1.22	1.19	1.29	0.29	-	**1.36**
Throughput Ore	tpd	17,318	18,082	18,493	18,493	18,493	18,545	18,493	18,493	18,493	18,545	18,493	14,694	-
Production	tpd	40,976	47,471	45,033	44,911	48,943	48,836	43,994	41,531	40,928	38,777	21,413	147	-
Movement	tpd	47,180	48,348	48,155	50,344	48,943	48,836	43,994	41,531	40,928	40,611	23,402	14,840	-

Note: The production schedule was prepared in September 2022. There is a difference of 146 kt between the final tonnage reported for mineral reserves at the end of December 2022 (79,218 kt) and the prepared schedule (79,072 kt). This difference includes the material movements between the planned stock for Q4-2022 and the actual stock (116 kt), as well as adjustments for mining and reconciliation (30 kt). These differences correspond to the difference of 146 kt between the tonnages in the 2022 LOM and the declared mineral reserves and are not material for the purpose of this Report.

16.5 Equipment selection and productivities

The Lindero Mine is an open pit using conventional haul trucks and wheel loader equipment. The owner-mining covers the conventional practices of loading, hauling, drilling, and blasting throughout the LOM.

The current mining fleet consists of two 17 yd^3 wheel loaders to load 6 trucks with operational capacity of 96 tonnes per unit, with additional haul trucks to be purchased from 2025 in the LOM as part of the mines sustaining capex. Average productivity is estimated to be 1,296 tonnes per operating hour which includes an 88 percent mechanical availability and 86 percent of effective usage. It is based on 18 operating hours of availability per 24-hour day, considering time for startup, breaks, safety meetings, and shutdown.

Truck productivity for owner-mining operations is based on haul and return speeds for each segment of travel. 3-D line segments were drawn using MineSight™ haulage mine planning software, and the speeds were flagged by using rimpull curves for Komatsu HD785 trucks. The haulage profile represents the travel routes along inpit ramps and external pit roads. Scheduled optimizer and haulage from MineSight™ software were used for scheduling, as well as to report the truck hours required based on profiles and speeds.

Available truck hours were based on average 18 operating hours per 24-hour day and adjusted by truck availability considered at 88 percent for the entire truck fleet.

Haul truck and wheel loader equipment fleet estimates for the LOM including mine plan sustaining capex based on simulation analysis are shown in Figure 16.12.

Figure 16.12 Fleet equipment for hauling and loading

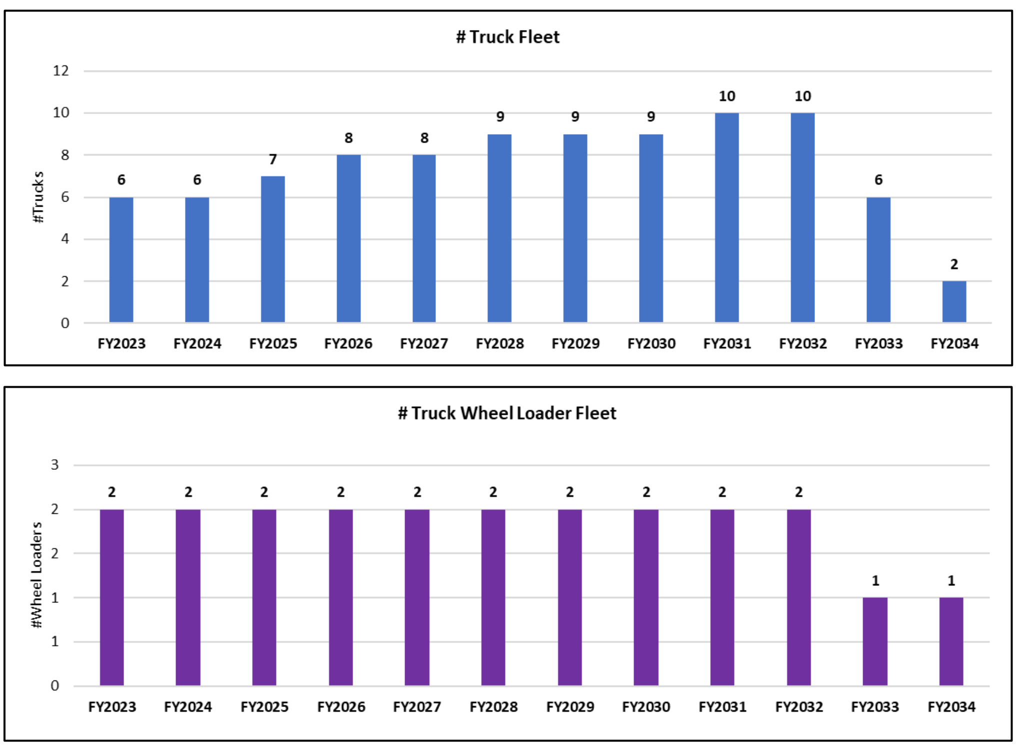


Figure prepared by Fortuna, 2022

16.6 Mine personnel

The Lindero mining operation is owner-operated using conventional open pit operational practices, with drilling, blasting, loading, hauling, support, and administrative functions. The mine is scheduled to operate 365 days per year, 24 hours per day, with two 12-hour shifts per day for both mine operations and maintenance activities.

The mine organization includes several functional groups for specific areas, such as mine operations (drilling, blasting, loading, hauling and mine maintenance), processing (crushing, leaching, refining, and plant maintenance), chemical laboratory, technical services (geology and mine planning, including geotechnical engineering and surveying) and projects. The organization also includes dedicated staff for health, safety, sustainability, and environmental compliance, as well as administrative and logistics supports.

The director of operations reports to the country director and oversees dedicated production functional groups including mining operations, technical services (mine planning, geology, geotechnical engineering, and surveying), processing (crushing, heap leaching, metallurgy and refining, plant maintenance and engineering), laboratory and infrastructure projects.

Other functional groups work in areas such as safety, security and environmental compliance, finance and administration, and legal support as shown in Figure 16.11.

Total mining manpower is projected to be 340 internal employees and 85 contractor employees.

As of 2023, the total number of personnel working at Lindero is 600 employees, distributed between 274 Mansfield employees, 88 support contractors, 37 operations contractors, and 200 contractors assigned to construction projects such as the expansion of the heap leach pad. The number of personnel will vary as projects are completed over time.

Figure 16.13 Owner mining mine organization chart

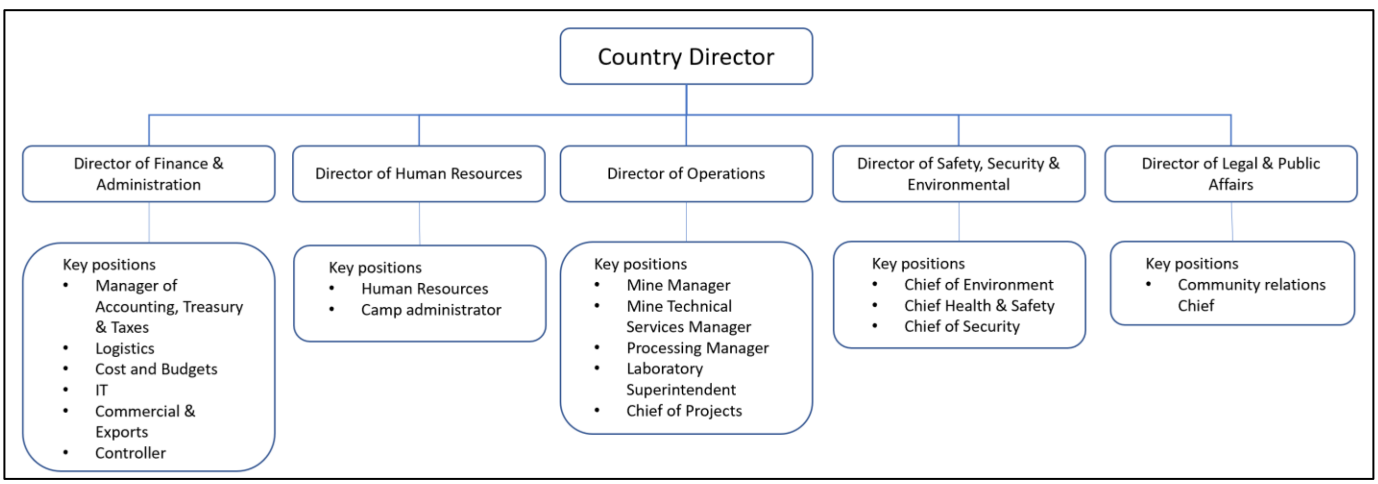


Figure prepared by Fortuna, 2022

16.7 Comments on Section 16

The QP is of the opinion that:

- The mining method being used is appropriate for the deposit being mined. The open pit, stockpile, waste dump designs, and equipment fleet selection are appropriate to reach production targets.
- The mine plan is based on successful mining philosophy and planning, and presents low risk.
- Inferred Resources are not included in the mine plan.
- The mobile equipment fleet presented is based on simulations and current operational performance.
- All mine infrastructure and supporting facilities meet the needs of the current mine plan and production rate.
- Major planned maintenance of the main equipment, such as loaders and trucks, have been accounted for in sustaining capital costs based on the purchase of additional equipment to eliminate loss in production hours and maintain production targets.
- Additional auxiliary equipment, especially dozers are rented depending on the requirements of mine operation.

17 Recovery Methods

Mansfield started commissioning its processing facilities at the Lindero Mine in 2020. Ore was first loaded onto the leach pad in July 2020, with the first doré being poured in July 2020 as a component of commissioning.

The Lindero Mine's processing facilities include a conventional three-stage crushing plant, an agglomerator, and a permanent leach pad that is loaded using grasshoppers and a radial stacker.

Leaching solutions are irrigated using a system of ponds, pumps, pipes and ultimately solution drippers that control the irrigation rate on the leach pad surface. Percolating solutions are collected at the bottom of the leach pad using a combination of berms, ditches and pipes to transfer them to solution ponds for storage and distribution.

Metals in solution are recovered from the pregnant leach solution (PLS) sequentially. Initially a SART plant recovers copper and silver along with minor gold into a precipitate, then a carbon ADR and smelter plant recover gold and silver along with minor portions of primarily copper into a doré bar.

A simplified flow diagram of the process is detailed in Figure 17.1 and the general site plan showing the process facilities is included as Figure 17.2.

Figure 17.1 Lindero Mine simplified block flow diagram

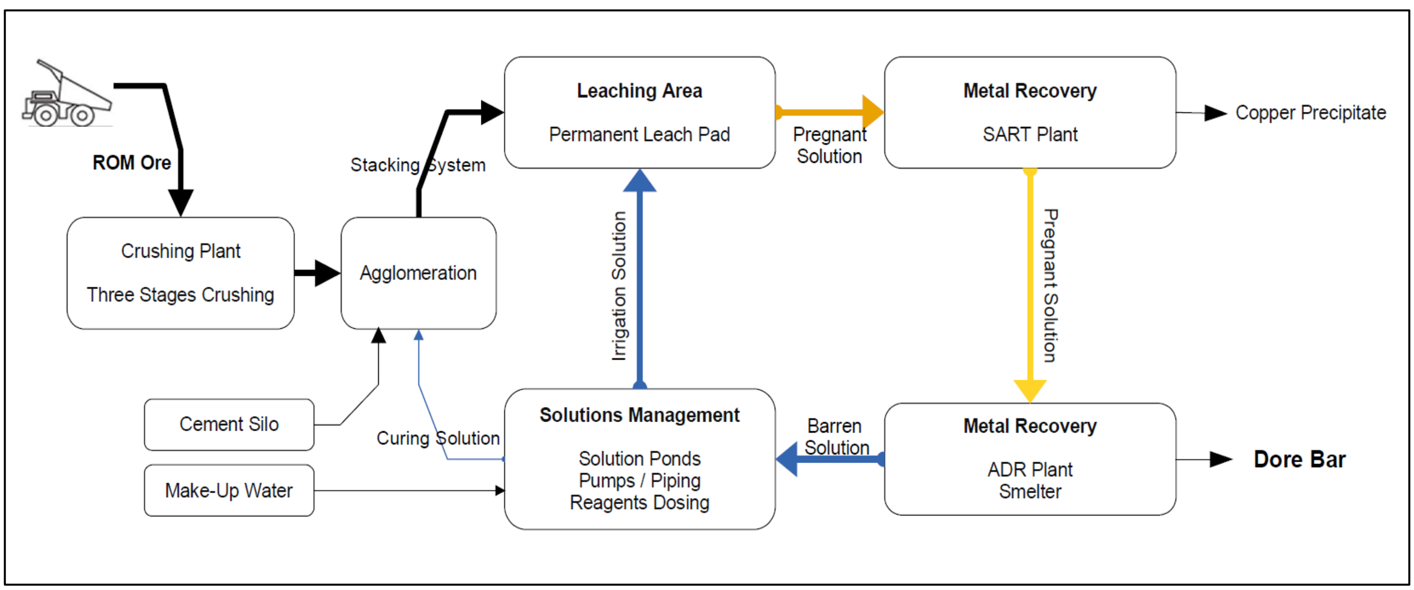


Figure prepared by Daniel Sepulveda, 2022

Figure 17.2 Simplified site plan showing process-related facilities

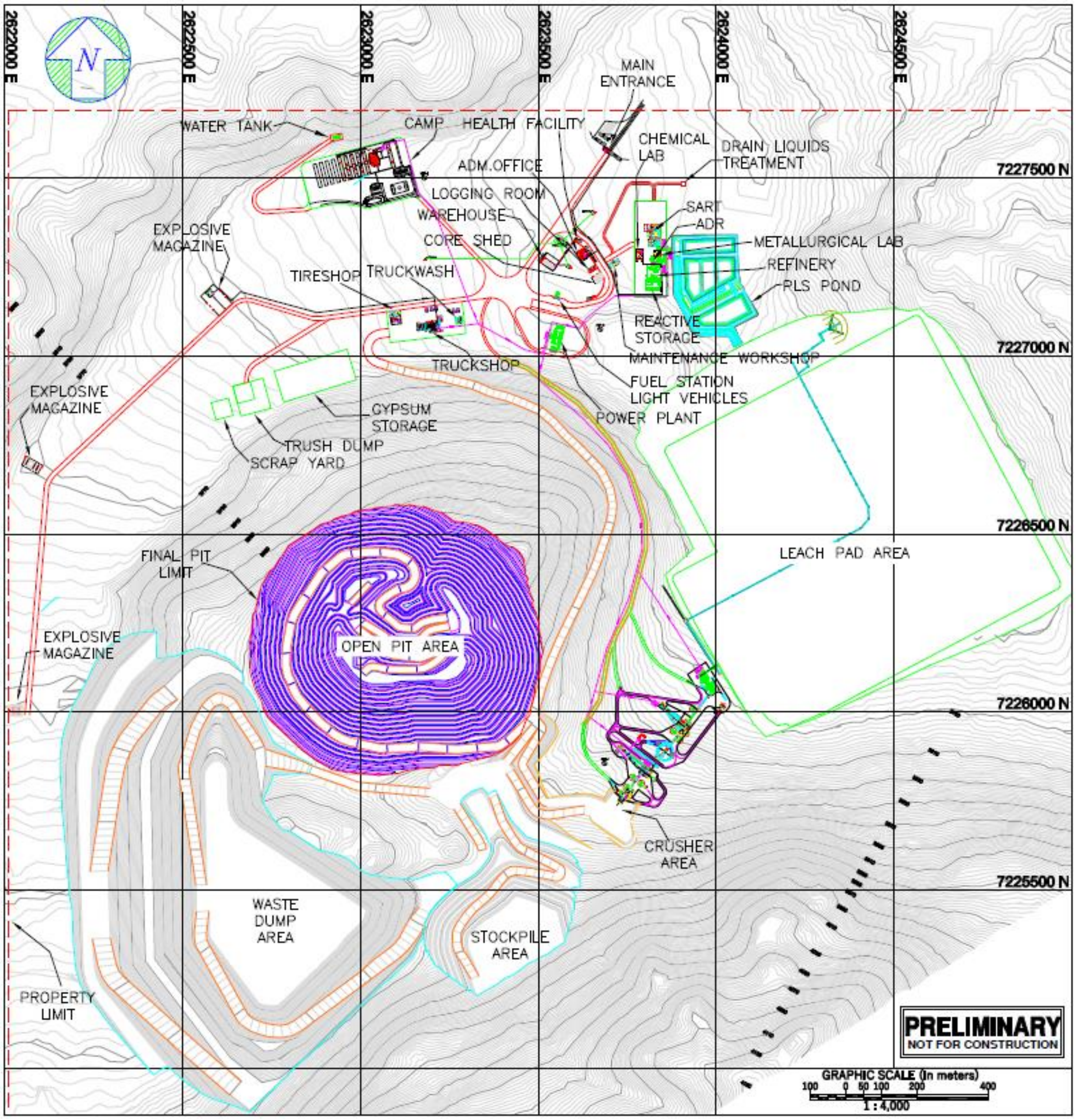


Figure prepared by Saxum, 2017

17.1 Crushing plant

Run-of-mine (ROM) ore is received from the open pit mine in 96-tonne surface haul trucks and dumped in a 200-tonne capacity ROM hopper.

The crushing plant consists of three crushing stages. The primary stage uses a jaw crusher operating in open circuit. The secondary stage operates three cone crushers in close-circuit with their respective vibrating screens. The third stage operates a HPGR in open circuit with a fraction of its product being recirculated (Figure 17.3).

Figure 17.3 Simplified crushing flowsheet

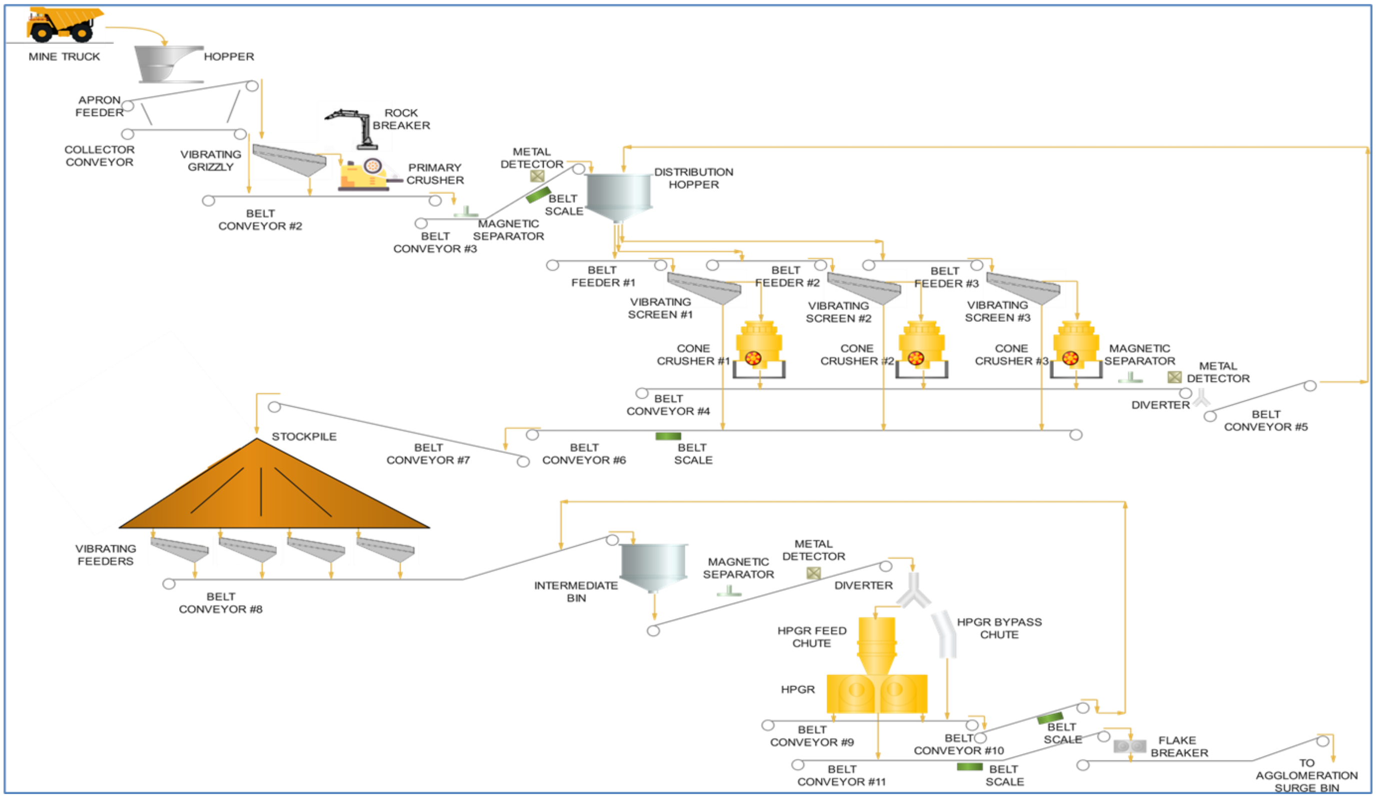


Figure prepared by Mansfield, 2022

The primary crushing stage uses a 1.2 m x 7.9 m apron feeder reclaiming ore from the ROM hopper and feeds a 150 mm-opening vibrating grizzly. The grizzly's oversize stream feeds a 1,500 mm x 1,300 mm primary jaw crusher. The grizzly's under size stream is recombined with the jaw crusher product on the primary crusher's discharge conveyor which feeds a 175- tonne secondary crushing distribution bin. A tramp metal electromagnet and metal detector installed on the primary crusher discharge conveyor protects the secondary crushers.

Ore from the secondary distribution hopper is reclaimed using belt feeders to three identical parallel operating lines. Each secondary crushing line includes a 1.8 m x 6.1 m double deck vibrating screen and 300 kW cone crusher. The vibrating screen's oversize stream feeds the cone crusher. The cone crusher product is returned to the secondary distribution hopper. The vibrating screen's under size stream becomes final product from the secondary crushing stage and it is transferred to a 50,000 tonne total capacity stockpile.

Stockpiled ore is reclaimed using vibrating feeders discharging on a conveyor that feeds a 140-tonne tertiary crusher surge bin. Discharge from the surge bin is conveyed to the HPGR's feed chute. A tramp metal electromagnet and metal detector are installed immediately before the feed chute.

The HPGR is a Weir-KHD Model RPS 16-170/180 with 1.7 m diameter by 1.8 m wide rolls. The HPGR's "edge" material which represents roughly 25 percent of the total product is recycled back to the HPGR feed bin. The center product becomes the final crushing stage product and is transferred to the agglomeration stage.

Observations showed that HPGR crushing would generate flakes of material when treating the Lindero Deposit ore. These flakes are sufficiently durable that they survive the agglomerating drum and pass to the heap without being agglomerated. In order to break these flakes, a Gundlach continuous tooth roll crusher has been placed in the circuit. The roll crusher contains two opposing inter-meshed timed rolls with a 25 mm gap. A fixed scalping screen diverts any non-flaked material around the crusher. The product of the de-flaking crusher reports to the agglomeration surge bin.

At the time the QP visited the site to inspect the Lindero Mine's processing facilities, it was observed that the crushing plant has been subject of multiple improvements to its supporting structures, and that additional work is necessary to ensure medium- and long-term mechanical availability. Additionally, the level of abrasion identified during the testwork campaigns should be paid close attention to and factored in the maintenance programs.

17.2 Agglomeration plant and stacking system

The agglomeration plant mixes crushed ore with cement and cyanide solution to produce glomer of enough mechanical competence to withstand the static load from the multi-lift permanent leach pad while allowing percolation and contact of the leaching solution irrigated on the leach pad surface. A simplified flowsheet of the system is displayed in Figure 17.4.

Figure 17.4 The Lindero Mine agglomeration, leaching and solution ponds simplified flowsheet

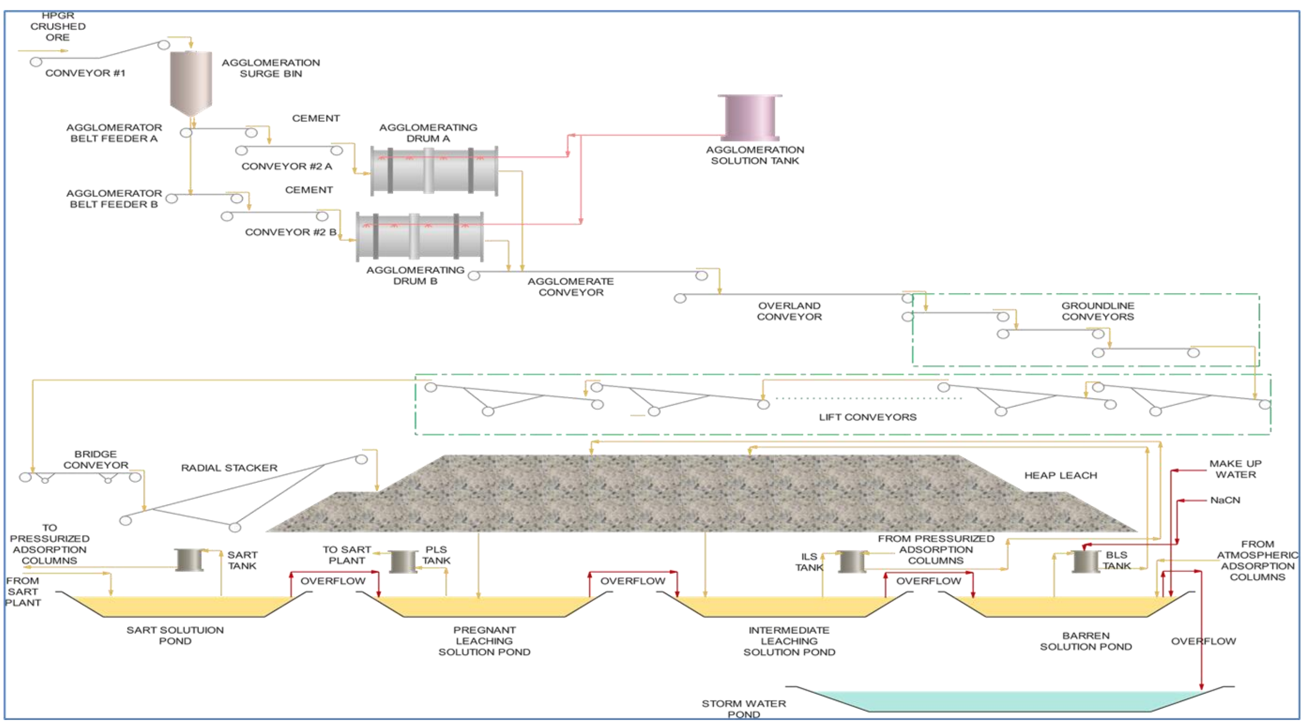


Figure prepared by Mansfield, 2022

A 1,000-tonne capacity surge bin receives the final product from the crushing plant. Belt feeders reclaim the ore from the surge bin and feed two parallel operating 3.66 x 12 m variable speed agglomeration drums.

Two silos of 325 tonnes each store the locally sourced cement with the specification "Cemento Filler CPF40" as per the Argentinian Standards & Certification Institute. Cement is delivered by silo trucks and loaded onto the silos using their portable pneumatic system. Cement is metered at a rate ranging from 0.25 to 6.5 kg/t to the agglomeration drum's feed conveyor.

Concentrated cyanide solution as well as barren solution are sprayed onto the ore and cement mix in a proportion to ensure that the material will not stick to the stacking conveyor's belts, and also so that the glomer's will not release any solutions while in transit to the leach pad.

The agglomerated ore stacking system includes a combination of fixed conveyor, mobile conveyor belts (also known as grasshoppers), and a radial stacker that transfers the material from the agglomeration plant to the leach pad. During normal operation, the radial stacker rotates approximately 170 degrees and progressively moves in reverse while discharging ore that forms the leach pad cells of typically 60 x 60 x 10 m height. In some instances, because of the overall geometry of the permanent leach pad, the radial stacker can operate forwards to assist stacking.

The mobile conveyors include the 30 m length grasshoppers, a jump conveyor that is used to feed the radial stacker, and the radial stacker that loads up to 10 meters and has an extendable arm (stinger) that provides an additional maximum 2-meter reach that allows the tonnage loaded to be increased without having to move the equipment, therefore reducing the number of moves. The quantity of grasshoppers increases with time because the additional number of lifts equates to a longer path to reach the new leach cells location.

Recently, the stacking plan was reviewed as part of the basic engineering for Phase 2 of the leach pad expansion. The new plan considers changing the staking direction from east to west as opposed to the current north-south sequence. This approach will allow the operation to significantly reduce upstream process shutdowns during stacking equipment relocation, reduce the overall number of grasshoppers required, increase flexibility in the stacking system, and maintain the ability to expand the leach pad to the south, beyond Phase 2, without major infrastructure changes.

At the time of the QP site visit to the Lindero Mine's processing facilities, the radial stacking equipment was being repaired, consequently the leach cells were being loaded using a front-end loader. In addition, the agglomeration plant was observed to have been the subject of multiple improvements to its supporting structures, and it appeared that additional work is necessary to ensure the long-term performance of the facility.

17.3 Leaching and solutions handling

The permanent leach pad was designed for approximately 93 million tonnes of ore when considering an average bulk density of 1.60 t/m^3, and will cover approximately 106 hectares of lined surface.

The original design considers building the leach pad in two phases with phase 1 accounting for 44 percent of the total base area. Phase 2 is scheduled to begin construction in 2024. A leak-detection system is installed below the leach pad. A system of berms to segregate the percolating solutions include down slope berms of 2.0 m height with 1.5:1 (horizontal: vertical) slopes, exterior berms for the up-slope and sides are 1.2 m high with a similar profile. Interior berms separating the cells are 1.5 m high. The leach pad base is built of a combination of low permeability soil (natural soil mixed with bentonite) and geosynthetic clay liner (GCL) overlain by a 1.5 mm linear low-density polyethylene (LLDPE) single-side textured geomembrane liner. The low permeability soil liner is used in the toe area for stability purposes. In the remaining area, GCL is placed over compacted native soil.

The irrigation system is installed on a newly loaded cell. An array of drippers covers the typical surface area cell size of 60×60 m, with additional units installed in the leach cells slope.

The actual leaching cycle begins with four days of curing time, which is understood as the time when the curing solution that is applied during agglomeration is allowed to react with ore. Irrigation begins applying intermediate-leach solution (ILS) at 12 $l/m^2/h$, equivalent to 43.2 m^3/h, per cell of 3,600 m^2 for 30 days. The percolating solutions resulting from irrigating with ILS becomes PLS that is diverted to the PLS pond. During the following 45 days, the cell is irrigated with barren solution at a rate of 9 $l/m^2/h$, equivalent to 32.4 m^3/h. The percolating solutions resulting from irrigating with barren solution becomes ILS and is diverted to the ILS pond to be used for irrigating newly loaded cells.

The process pond system includes four active ponds separated by berms to allow overflow solution to flow between them. A fifth pond, the storm water pond, is used for emergency situations such as high rainfall events where flow in excess of the installed capacity in the operating solution system will overflow to this pond.

Process ponds are sized to contain a working volume of 24 hours at the total heap irrigation flow rate (primary and secondary), plus a drain-down volume equal to 24 hours at the total heap irrigation flow rate. The combined capacity of the process ponds is 50,000 m^3, with the capacity of the storm water pond also being 50,000 m^3. The combined capacity of these ponds is sufficient to contain a 100-year, 24-hour rainfall event of 56.1 mm.

The ponds are constructed of a layer of GCL placed on compacted soil, followed by a secondary liner of 1.5 mm high density polyethylene (HDPE). A geonet has been placed on top of the secondary liner followed by a 1.5 mm HDPE primary liner.

17.4 Metal recovery plants

The recovery of metals from the PLS at the Lindero Mine takes place in three major sequential unit processes:

- Initially, the SART plant removes the majority of copper and silver, along with minor portions of gold to become copper precipitate suitable for commercialization. The cyanide associated to copper is also recovered and recycled to the main leaching plant.
- Secondly, the effluent PLS from the SART plant is processed at the ADR plant to remove the precious metals into a high concentration solution (eluate) that for security reasons is transferred to the smelter areas for final gold recovery.
- Finally, at the smelter, the precious metals are recovered from the eluate solution into solids using electrowinning. The solids feed the smelting furnace to produce a doré bar that is sold to the markets.

17.4.1 SART plant

The SART process removes copper from pregnant solution as copper-sulfide solids that is sold to markets as copper precipitate. Free cyanide will also be regenerated in the process as a result of copper removal, thereby reducing the overall consumption of NaCN at the site.

Construction of the SART plant was completed in June 2021. During the initial period of leaching when the SART was not in operation, the concentration of copper in PLS reached 700 ppm. As a result, a higher consumption of NaCN was necessary to maintain gold recovery. Once the plant was commissioned, the copper level has gradually reduced to 500 ppm by the end of 2021 and stabilized at around 300 ppm by the end of 2022.

The SART process is shown in Figure 17.5. Pregnant solution from the heap leach at a design flow rate of 400 m3/h is fed to the SART. Sulfuric acid (H_2SO_4) is injected into the solution to lower the pH to approximately 5.0, and sodium hydro-sulfide (NaHS) is added to precipitate copper sulfide solids as synthetic chalcocite (Cu_2S) along with silver sulfide solids in the form of Ag_2S. Copper sulfide solids are thickened and then filtered for final dewatering. The final copper-sulfide filter cake is bagged in 1.0 tonne supersacks, and then transported off-site for sale.

The copper sulfide section of the SART plant has solutions at pH 5.0 which generate low levels of hydrogen cyanide (HCN) and hydrogen sulfide (H_2S) gases. To prevent release of these gases, associated equipment is fully enclosed and ventilated to a high efficiency via a gas scrubbing system. Hazardous gas monitors are located throughout the SART plant to ensure a safe working environment. Process equipment containing low-pH liquids are constructed of stainless steel for corrosion resistance. Acid-resistant concrete coating is used in areas where sulfuric acid is handled. Three separate secondary containment areas are provided for the sodium hydro-sulfide area, the sulfuric acid area and for the main SART plant area. The main SART plant area secondary containment is configured to overflow into the SART pond.

Overflow solution from the copper sulfide thickener is adjusted to pH 10.5 using lime slurry. Gypsum solids formed during neutralization are removed from the solution using a thickener and then filtered for additional dewatering. The filtered gypsum solids are permanently disposed of at a dedicated location on site. The thickener overflow solution is low in copper and high in free cyanide, and it overflows into the SART pond before being pumped to the ADR plant.

Figure 17.5 Lindero Mine metal recovery SART and ADR plants simplified flowsheet

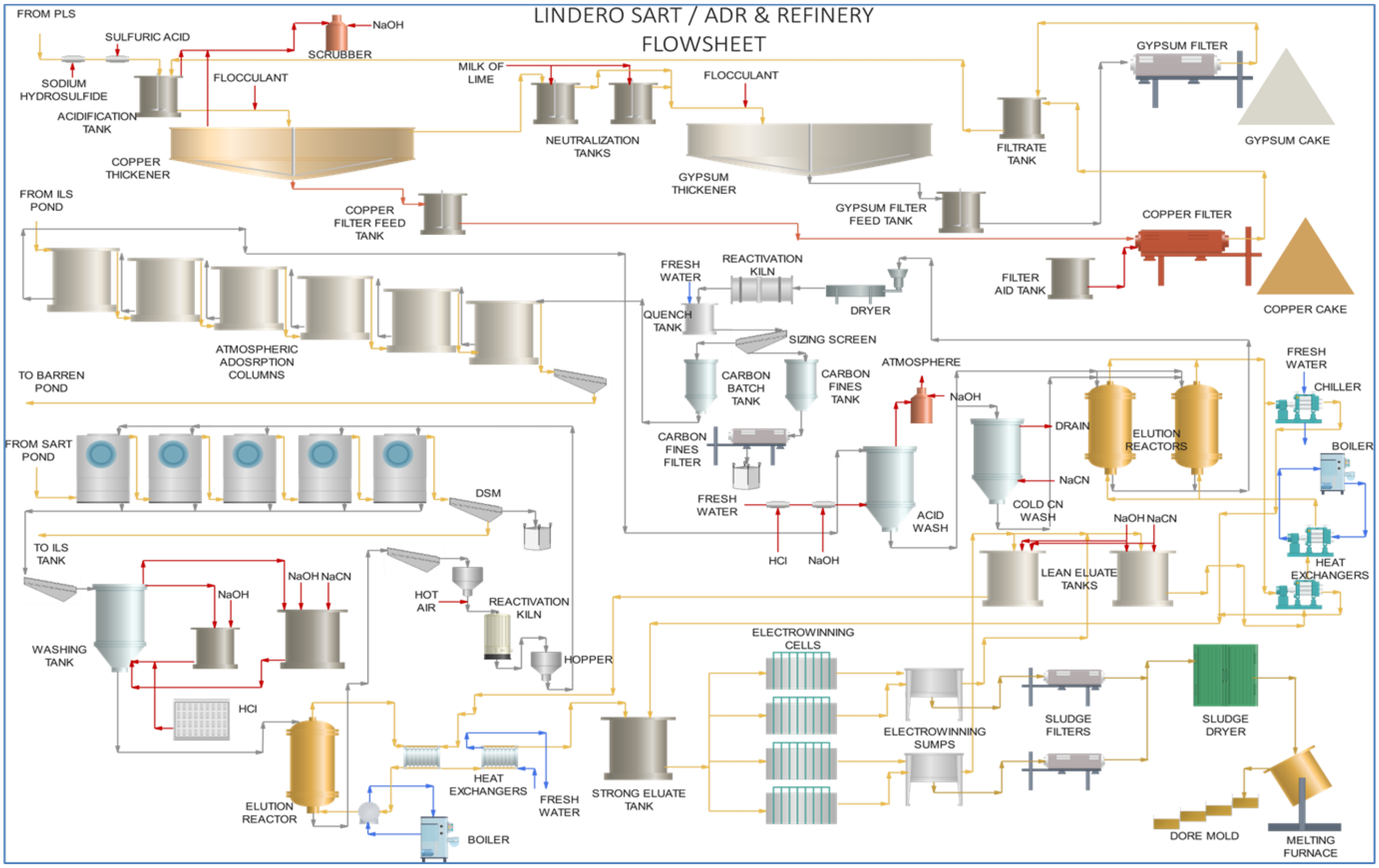


Figure prepared by Mansfield, 2022

17.4.2 ADR plant

The adsorption of gold with activated carbon takes place on two trains of columns, the carbon-in-column 1 or CIC-1 has six atmospheric columns and approximately 3 tonnes of activated carbon each, and the CIC-2 train has five closed columns that can each hold approximately 6 tonnes of activated carbon.

CIC-1 is configured as an up-flow cascading circuit where each column is elevated above the next and solution flow from one column to the next is by gravity. As the carbon in the first column becomes loaded with metals it is removed from the column using a pump. When the first column is empty the carbon batch in the second column is transferred to the first column using an educator. This is repeated until the sixth and last column is empty. The last column is then filled with a batch of freshly reactivated carbon. The amount of carbon on each column and the contact time between the solution and carbon are the main parameters in controlling the optimal efficiency for gold recovery. Solution overflowing the last column is barren and passes over a screen to retain any potential carbon particles before being transferred to the barren pond.

Activated carbon regularly scales up with carbonate during the adsorption cycle. Scaling is caused by the calcium in the lime used for pH control and CO_2 absorbed from the atmosphere. Typically, carbonate scale does not interfere with gold adsorption onto carbon but will extend the elution time and consume more carbon during reactivation. Scale is removed by soaking the carbon in a hydrochloric (HCl) acid solution.

The carbon from the CIC stage is dewatered and discharged into the acid wash fiber reinforced plastic (FRP). The acid wash solution is made up of approximately 3 percent HCl and it is recirculated through the bed of carbon, with additional acid injected into the recirculating stream as required until the pH of the circulating stream stabilizes below 1.0, which takes approximately two hours. The solution is then drained, and the carbon is rinsed with a sodium hydroxide solution to neutralize the acid. The neutralization step is required to reduce the evolution of hydrogen cyanide (HCN) and the corrosion in subsequent unit operations. The neutralized carbon is transferred by pump to the cold cyanide wash circuit.

Hydrogen cyanide monitoring is performed in the area to notify operators if HCN gas is present. The acid wash area is isolated from the rest of the plant by low containment walls with a separate gravity sump that flows to the barren pond. The floor is acid resistant coated. All trench drains and sumps in the ADR are fitted with carbon retention screens to prevent carbon from reaching the ponds through the plant drains. If circumstances arise that require the discharge of significant quantities of acid solution to the gravity sump, then caustic solution is added to the sump to partially neutralize the acid.

Since HCl is a gas at room temperature, and the facilities are at high elevation, all the tanks that contain acid are sealed and are vented to a caustic scrubber. An induced draft fan maintains a slight negative pressure on the tanks to minimize acid vapor from entering the operating area. Overflow of the scrubber sump reports to the acid gravity drain.

Copper adsorbed onto the activated carbon is detrimental to the electrowinning circuit and the quality of the doré bar. In the electrowinning circuit the copper can manifest itself as a dendritic formation which grows rapidly and can short circuit the cathode to the anode. High copper content in the doré is penalized by the market.

The arrangement of the cold cyanide wash circuit is similar to the acid wash circuit but is constructed of epoxy-lined carbon steel. Dewatered carbon reports to the cold cyanide wash tank where it is combined with a recirculating stream of 3 percent NaCN solution for two hours. Once the cycle is complete the carbon is drained and transferred by pump to the carbon elation column, and the solution is discharged to the pregnant solution pond.

The carbon elution circuit removes the gold from the carbon into a solution (eluate). The elution solution consists of reverse osmosis (RO) water with NaOH to achieve a high pH.

Elution solution is stored in the lean eluate tank which is insulated and constructed of epoxy lined carbon steel. The solution is pumped through heat exchangers where it is heated to approximately 150°C and then pumped upwards through the elution column containing the loaded carbon. The gold loaded solution then flows to the strong eluate tank from where it is pumped to the electrowinning area. After electrowinning the gold, the lean eluate solution returns to the lean eluate tank for recycling to the elution column.

Once the elution cycle is complete, the carbon is cooled, drained, and transferred by pump to either the carbon sizing screen or the reactivation kiln.

As carbon is processed through each unit operation a small portion degrades into fines. The fines are removed during each cycle and are replaced with new carbon. The carbon is thermally reactivated in two available kilns. The first kiln has the capacity to reactivate 100 percent of the CIC-1. The wet carbon is heated to 650°C in a steam atmosphere in a rotary kiln where the conditions are such that the carbon activity is restored. The white-hot carbon is discharged sub-surface into a tank filled with water to cool and quench the carbon. The quenched carbon is transferred by pump to the carbon sizing screen. The carbon sizing screen is a wet, horizontal vibrating screen with an 850 µm aperture where the finer fractions are discharged to a tank. The coarser fractions report to a holding tank for return to the CIC circuit. Fines from the carbon-sizing screen are pumped through a plate and frame filter to dewater the fines. When the filter is full, the cake is blown down with compressed air and the cake is manually discharged into a supersack and stored.

The second kiln operates with the CIC-2 circuit using a new vertical 125 kg/h kiln that is being commissioned as of the effective date of this Report.

17.4.3 Smelter

The smelter facilities are fully fenced, secured with guards, cameras, metal detectors and built with solid walls for added security. The smelter also includes a safe to store doré bars.

In the smelter area gold is removed from the strong eluate by electro-plating on a stainless-steel mesh. A direct current (DC) is passed through the solution and the gold plus any silver or copper is reduced at the cathode to form metallic plating. The elevated voltage generates hydrogen gas (at the cathode) which dislodges some of the plated material, which falls to the bottom of the cell as a metallic sludge. Two pairs of electrowinning cells are included at the operation (two cells in parallel for each CIC circuit). Periodically the cathodes are removed, and the adhering gold sludge washed off. The sludge in the bottom of the cell is removed, and all the gold sludge filtered. The filter cake is dried and sent to the refinery. No mercury is present therefore there is no need for retorting.

In the smelter, the filtered gold sludge is mixed with fluxes and smelted in a propane-fired nose-pour crucible furnace. The mixture is heated until impurities are melted into a slag. The slag is poured off, and the liquid metal remaining is poured into molds where it is allowed to cool and solidify into a doré bars. The doré is cleaned, weighed and shipped offsite.

Combustion products from the smelting furnace are vented from the refinery through a bag house. Any dust in the bag house is occasionally returned to the furnace.

Slag handling equipment is included to recover any prills (droplets of metal that solidify in the slag) that may form. Residual slag is either stored, or manually added to the crushing circuit for blending with the ore and placed on the heap.

17.5 Metallurgical and chemical laboratories

The metallurgical laboratory facilities available at the Lindero Mine have limited capacity to adequately support the continuous improvement of the operation. Additional infrastructure and equipment will be necessary as the operation matures. The metallurgical laboratory is responsible for developing the support to improve efficiencies and therefore continuous improvement of all unit processes supporting the LOM.

The chemical assays laboratory appears well equipped and organized to satisfy the operational demands in terms of quality and quantity. Regular quality controls are performed with third-party commercial laboratories located in Argentina.

17.6 Major process reagents, consumables and power

A forecast of the consumption of major reagents at the Lindero Mine is presented in Table 17.1.

Table 17.1 Lindero Mine reagent consumption forecast

Consumable	Year											
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Cement Consumption (t)	12,136	13,200	15,525	12,150	8,100	5,415	5,400	5,400	5,400	5,415	5,400	4,291
Cement ratio (kg/t)	1.92	2.00	2.30	1.80	1.20	0.80	0.80	0.80	0.80	0.80	0.80	0.80
NaCN Consumption (t)	1,898	1,980	2,025	2,025	2,025	2,031	2,025	2,025	2,025	2,031	2,025	1,609
NaCN ratio (kg/t)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Carbon consumption (t)	126	130	130	130	130	130	130	130	130	130	130	130
Elution Cycles	986	986	986	986	986	986	986	986	986	986	986	986
HCl Consumption (000’s kg)	146	146	146	146	146	146	146	146	146	146	146	146
NaCN Consumption in Elution (000’s kg)	326	326	326	326	326	326	326	326	326	326	326	326
NaOH Consumption (000’s kg)	228	267	267	267	267	267	267	267	267	267	267	267
Antiscalant Scale Guard NALCO 9714 (000’s kg)	95	60	60	60	60	60	60	60	60	60	60	60
Antiscalant Scale Guard NALCO 9729 (000’s kg)	38	24	24	24	24	24	24	24	24	24	24	24
Silica consumption (000’s kg)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Sodium Carbonate consumption (000’s kg)	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Borax consumption (000’s kg)	4.3	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Diatomaceous earth (000’s kg)	146	146	146	146	146	146	146	146	146	146	146	146
LPG (000’S liters)	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080	1,080
Hydrated Lime (t)	2,300	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Crucibles (each unit)	6	6	6	6	6	6	6	6	6	6	6	6
Refinery Supplies (US$000’s)	502	566	566	566	566	566	566	566	566	554	547	540
Metallurgical Laboratory supplies (US$000’s)	102	109	109	109	109	109	109	109	109	107	102	98
Chemical Laboratory Supplies (US$000’s	508	508	508	508	508	508	508	508	508	440	420	385

A description of key reagents and consumables is as follow:

- **Water**: Raw water is available from wells and is used as makeup for the heap leach. Evaporation from leaching operations and adsorption by the ore represents the bulk of the water requirement for the processing area. Raw water has a high total of dissolved solids (TDS) content and is unsuitable for certain process requirements. A water softener and RO unit increase the quality of water for certain uses. Soft water is required for use in safety showers, eyewashes and cathode washing in the refinery. The safety water system is fitted with a water heater and thermostatic bypass valves at each safety station that allows recirculation of cooler water from the stations to return to the soft water tank and allows lukewarm warm water to fill the lines. Softened water also feeds the RO unit where it is used to make up elution solution, boiler solution as needed, and in the metallurgical laboratory.

- **Cyanide**: Concentrated cyanide solution is prepared in a dedicated mix building separated from the rest of the processing facility. Two carbon steel tanks are used in the mix building for preparing cyanide solution. Sodium cyanide arrives to site as briquettes in 1 tonne bags. One of the tanks is filled with water and sufficient NaOH is added to elevate the pH. The cyanide bags are emptied into the tank and the agitator started. Once the briquettes are dissolved the solution is pumped to a second tank where it is mixed to 23 percent NaCN by weight in solution. A portion of the concentrated cyanide solution is pumped to the storage tank at the agglomeration area. Hydrogen cyanide monitors are included in this area to notify the operators if HCN gas is present. The cyanide mix area is inside a containment wall that contains the total volume of the two tanks.

- **Hydrated lime ($Ca(OH)_2$)**: Used in the SART plant to neutralize treated solution to a pH of about 10.5. Hydrated lime is delivered to site by silo truck and unloaded into a dedicated storage silo located near to the SART plant area. Batches of lime slurry are prepared on an as needed basis.
- **Activated Carbon**: Coconut shell activated carbon is delivered to the operation in supersacks. Typically, dry activated carbon has a dry bulk density of 0.48 t/m^3 due to the large quantity of pores created in the activation process. Dry carbon needs to soak in water to allow the pores to fill and displace the air in the pores; otherwise, the carbon would float in the process. Typically, 24 to 48 hours is sufficient to displace the air. An agitated tank is provided to soak the fresh carbon. In addition to de-gassing the carbon, the agitator action abrades the carbon edges, and breaks up any fragile pieces before they are introduced into the process. Degassed and abraded carbon is stored under water in this tank and transferred to the carbon sizing screen as necessary to make up the unit batch of carbon.
- **Hydrochloric acid**: Used in the carbon acid-wash circuit. HCl is available as a 34 percent solution in 1,000-l totes. This solution is metered directly into the process stream as necessary.
- **Sodium hydro sulfide (NaHS)**: Used in the SART plant to precipitate copper as sulfide. NaHS is delivered to site in dry one-tonne supersacks and stored indoors until needed in the process. Concentrated NaHS solution is periodically prepared in the SART plant and added to the process at a rate proportional to the concentration of copper in solution.
- **Sulfuric acid (H_2SO_4)**: Used in the SART plant to adjust the pH of incoming pregnant leach solution to approximately pH 5.0. Sulfuric acid is delivered to site via bulk tanker truck as concentrated solution (93 to 96 percent strength). A dedicated sulfuric acid storage tank is located in the SART plant area.
- **Sodium hydroxide (NaOH)**: Used in the SART and the ADR plant. Sodium hydroxide is delivered to site in solid flake form in 25-kg bags or 1-tonne supersacks. A mix tank and storage tank are used to prepare a solution at 25 percent strength. The uses of NaOH in the SART plant are in the gas scrubber and for neutralization of copper-sulfide solids ahead of filtration. The uses of NaOH in the ADR plant are for carbon stripping (NaCN/NaOH solution), neutralization of acid wash solution, acid scrubber and pH adjustment of the cyanide mix solution.
- **Diatomaceous earth (DE)**: Used as a pre-coat filtration aid in the SART plant for the copper-sulfide solids. The material is delivered to site in 25-kg bags or 1-tonne supersacks. Diatomaceous earth slurry is prepared as needed for filter cloth pre-coat. The smelter uses a small amount of DE as filter aid to assist with dewatering of the gold sludge. This is prepared manually in the smelter.
- **Flocculant**: Used in the SART plant thickeners to assist with solids settling. Flocculant are delivered in dry form in 25-kg bags and fed to an automated system for make-up and dosing of flocculant solutions to the SART thickeners.
- **Antiscalant**: Metered into the barren and intermediate solutions that flow to the heap to protect the emitters from calcium-based scaling. Antiscalant is also dosed into neutralized solution produced by the SART plant to reduce the potential for

calcium-based scaling in downstream equipment. Antiscalant is delivered to site in concentrated liquid form in 1,000-liter totes.

- **Electrical power**: The operations power supply relies 100 percent on diesel generation from dedicated gensets under a rental contract. The commercial terms are based on a fixed charge plus variable rate on the effective kWh demanded. Note that for 2022, Lindero consumed 37,622,315 kWh at a cost of US$ 0.40/kWh, of which only US$ 0.33/kWh or 82.5 percent was attributable to the cost of diesel. The processing area accounted for US$ 2.4/tonne or 21.1 percent of the total energy cost. Power consumption is further detailed in Section 18.2 of this Report.

17.7 Water balance

Monthly precipitation data for the Lindero Mine area covering the period 1992 to 2016 (25 years) was obtained from registered data at the: Unidad Lindero (3,926 masl) and Campamento Fénix - Salar de Hombre Muerto (3,990 masl) stations. The data indicates that the average annual precipitation for the Property is approximately 71.7 mm (Table 17.2).

Table 17.2 Lindero Mine area precipitation data

Month	Maximum (mm)	Minimum (mm)	Average (mm)
Jan	108.4	0.0	26.8
Feb	73.6	0.0	20.0
Mar	104.8	0.0	9.7
Apr	11.0	0.0	1.3
May	16.2	0.0	1.4
Jun	5.0	0.0	0.9
Jul	20.0	0.0	2.1
Aug	7.0	0.0	0.8
Sep	8.0	0.0	1.2
Oct	0.0	0.0	0.0
Nov	3.0	0.0	0.2
Dec	73.0	0.0	7.4
Annual	**176.5**	**0.0**	**71.7**

To characterize the annual evaporation, the information available from the Campamento Fénix del Salar del Hombre Muerto station was used, due to similar geographic conditions and proximity to the Property. The estimated average annual evaporation for the mine is 2,750 mm.

The representative monthly evaporation data for the mine was obtained from the Socaire station and adjusted by a factor of 1.4 in order to obtain the monthly evaporation data. Table 17.3 shows the estimated average, maximum and minimum monthly evaporation data for the mine.

Table 17.3 Evaporation data for Lindero mine area

Month	Minimum (mm)	Maximum (mm)	Average (mm)
Jan	274.0	315.7	291.2
Feb	187.3	264.7	231.1
Mar	224.3	266.7	248.5
Apr	183.7	221.1	205.3
May	158.3	183.8	173.4
Jun	28.3	166.7	131.5
Jul	150.1	180.0	164.3
Aug	191.3	208.9	197.0
Sep	234.8	242.5	238.0
Oct	258.1	289.9	275.7
Nov	220.7	302.1	283.3
Dec	297.9	327.9	310.8
Annual	**2,520.8**	**2,857.0**	**2,750.0**

A water balance was calculated for the processing of 18,750 tonnes per day of fresh ore during Phase 1 and Phase 2 of the heap leach pad. For all scenarios, it was calculated that makeup water will be required. Table 17.4 presents the results of the minimum, maximum and average freshwater requirements during the operation of the leach pad.

Table 17.4 Leach pad fresh water requirements

Month	Minimum (m^3/hr)	Maximum (m^3/hr)	Average (m^3/hr)
Jan	0.0	37.3	31.9
Feb	2.6	37.2	31.7
Mar	0.0	37.1	34.6
Apr	30.8	37.1	36.7
May	35.0	36.9	36.8
Jun	35.1	36.9	36.7
Jul	34.8	36.9	36.7
Aug	35.4	37.0	36.9
Sep	35.5	37.1	37.0
Oct	35.9	37.2	37.1
Nov	35.8	37.3	37.1
Dec	4.9	37.3	35.7
Annual	**23.1**	**43.3**	**37.1**

On an annual basis, the water balance should remain relatively constant during the operating life of the heap leach. The minimum, maximum and average values of annual freshwater demand are equal to 23.1 m^3/hr, 43.3 m^3/hr, and 37.1 m^3/hr respectively.

The operation is currently using approximately 80 m^3/hr although it is forecast that this may increase to approximately 100 m^3/hr based on average requirements for the heap leach. As the water balance in the heap leach pad uses agglomerated ore, the water added in the crushing and agglomeration circuits has been included in the projection. The figures also include the water losses in the precipitates from the SART plant that are filtered to a 50 percent moisture content.

Figure 17.6 shows the water balance block diagram for the mine site.

Figure 17.6 Lindero Mine simplified water balance flow diagram

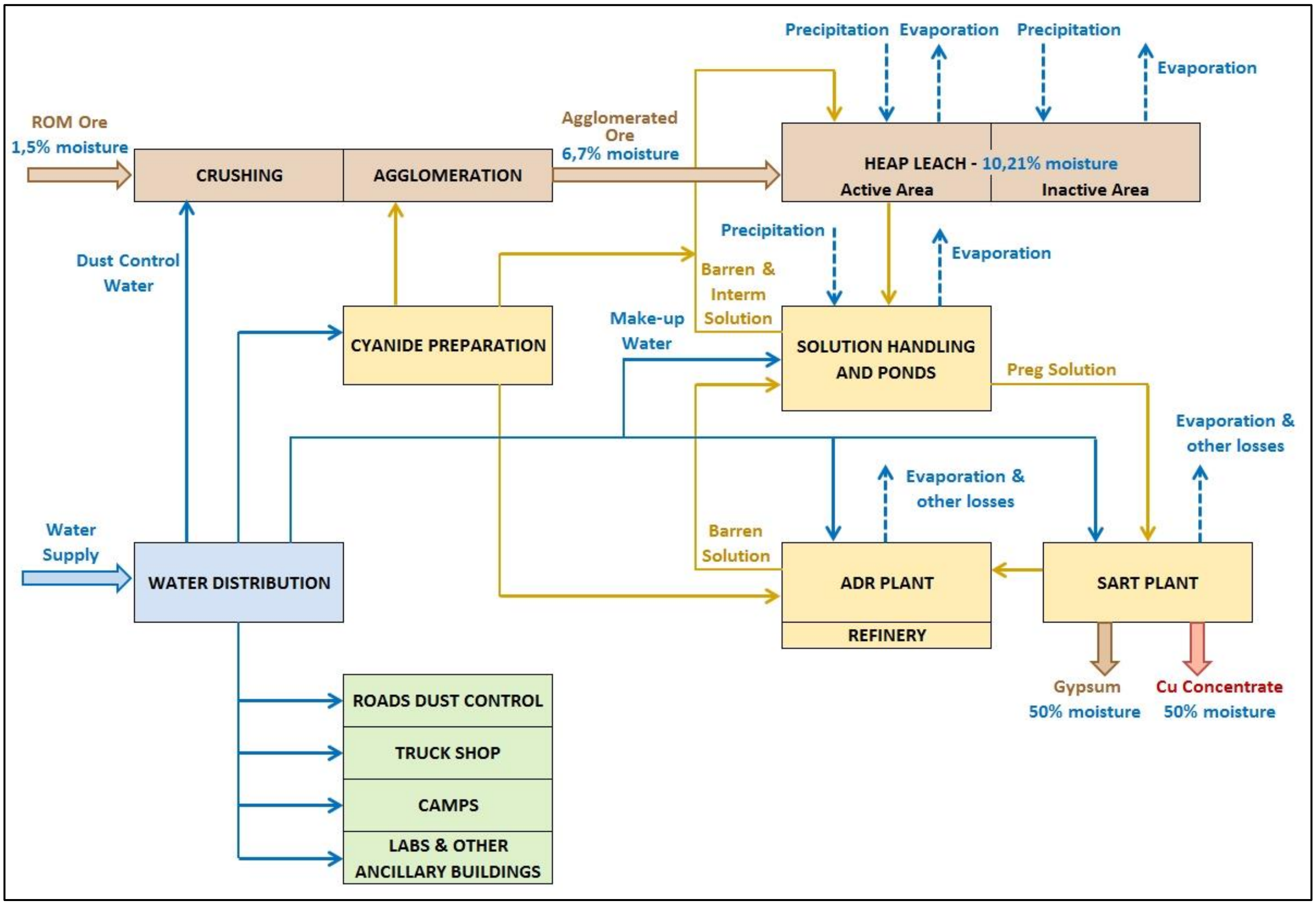


Figure prepared by Anddes, 2017

17.8 Operational results

The Lindero Mine operational statistics, starting when the first ore was loaded on the leach pad in July 2020, to December 31, 2022, are presented in Table 17.5 and Figure 17.7. The following can be noted:

- Between July and December 2020 only primary and secondary crushed ore was loaded on the leach pad. This ore totaled 1,609,887 tonnes grading 1.0 g/t Au, and it was loaded using dump trucks and a front-end loader to build the leach cells.
- The stacking system started operating in January 2021.
- Between February and May 2021, run-of-mine size ore was loaded onto the leach pad. A total of 1,373,958 tonnes grading 0.57 g/t Au was loaded using dump trucks and a front-end loader.
- An additional 89,941 tonnes grading 1.01 g/t Au of coarse crushed ore (diverter) was loaded between March and May 2021.
- As of December 31, 2022, ore loaded on the leach pad totaled 13,561,598 tonnes grading 0.905 g/t (Table 17.5). Out of the total ore loaded 68.2 percent has been

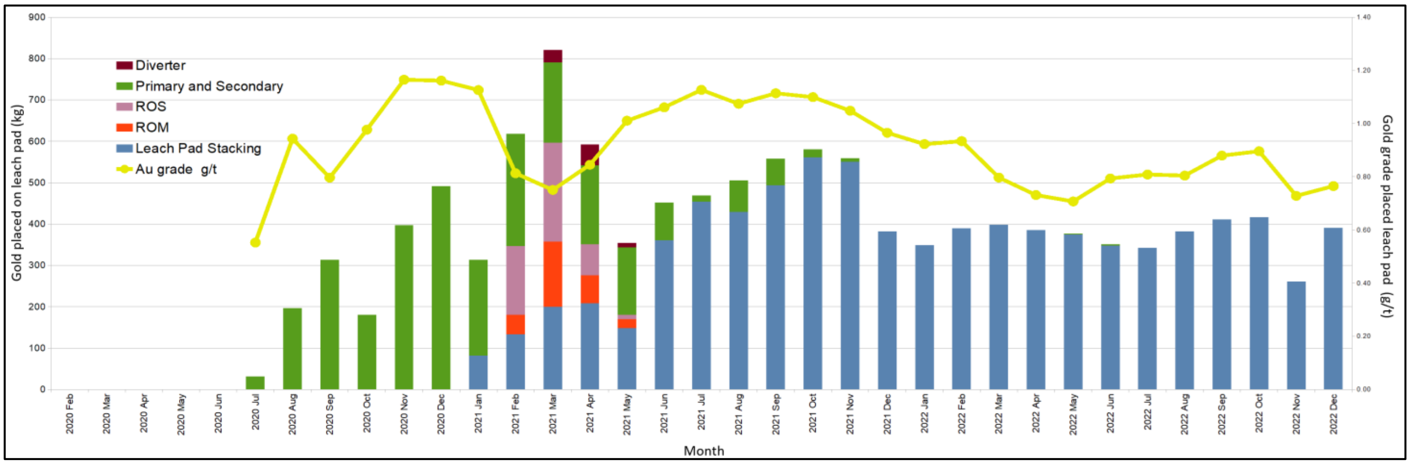
processed through the tertiary crusher and the balance (31.8 percent) is of coarser size.

- In terms of gold loaded on the leach pad, 68.9 percent has been subject to processing through the tertiary crusher and the balance (31.1 percent) of the loaded gold is of coarse size material.

Table 17.5 Lindero Mine leach pad loading statistics 2020 to 2022

Source	Ore tonnes	Percentage	Gold content (kg)	Gold grade (g/t)
Leach pad stacking ore	9,248,168	68.2	8,452	0.914
Coarse size ore	4,313,430	31.8	3,818	0.885
Total	**13,561,598**	**100**	**12,271**	**0.905**

Figure 17.7 Lindero Mine ore characteristics loaded on leach pad 2020 to 2022



The Lindero Mine's first doré bar produced in July 2020 as a component of commissioning, weighed 8.03 kg, and assayed 83.83 percent gold, equivalent to 216.42 ounces, 6.90 percent silver, equivalent to 17.81 ounces, and 9.27 percent impurities. As of December 31, 2022, the total accumulated doré production has been 7,120 kilograms or 228,923 ounces, which is equivalent to an overall gold recovery of 58.03 percent (Table 17.6).

Table 17.6 Lindero Mine leach pad production statistics 2020 to 2022

Stream	Ore tonnes	Gold content (kg)	Gold grade (g/t)
Leach pad stacking ore	9,248,168	8,452	0.914
ROM ore	491,707	293	0.596
ROS ore	882,251	492	0.558
Primary and Secondary ore	2,849,531	2,943	1.033
Diverter ore	89,941	91	1.007
Total	**13,561,598**	**12,271**	**0.905**

Doré production	**kg**	**7,120**	
	oz	**228,923**	*

Accumulated Au Recovery	**%**	**58.03**

*Number differs from officially disclosed (228,939 oz) due to rounding procedures

The actual performance of a permanent leach pad is better assessed on an accumulated basis as presented in Figure 17.8 and Figure 17.9.

The following observations can be noted:

- Low gold recoveries were achieved in the early days of the leach pad, this is due to the loading of coarse ore sizes including run-of-mine material.
- The gold recovery curve shows a consistent upward trend typical of permanent leach pads in the industry.
- Accumulated gold recovery to December 31, 2022, is 58.03 percent.
- The higher quantity of gold placed on the leach pad during the first quarter of 2021 did not translate to a proportional increase in gold production, due to the coarse size nature of the ore placed.

Figure 17.8 Lindero Mine gold placed and recovered by month

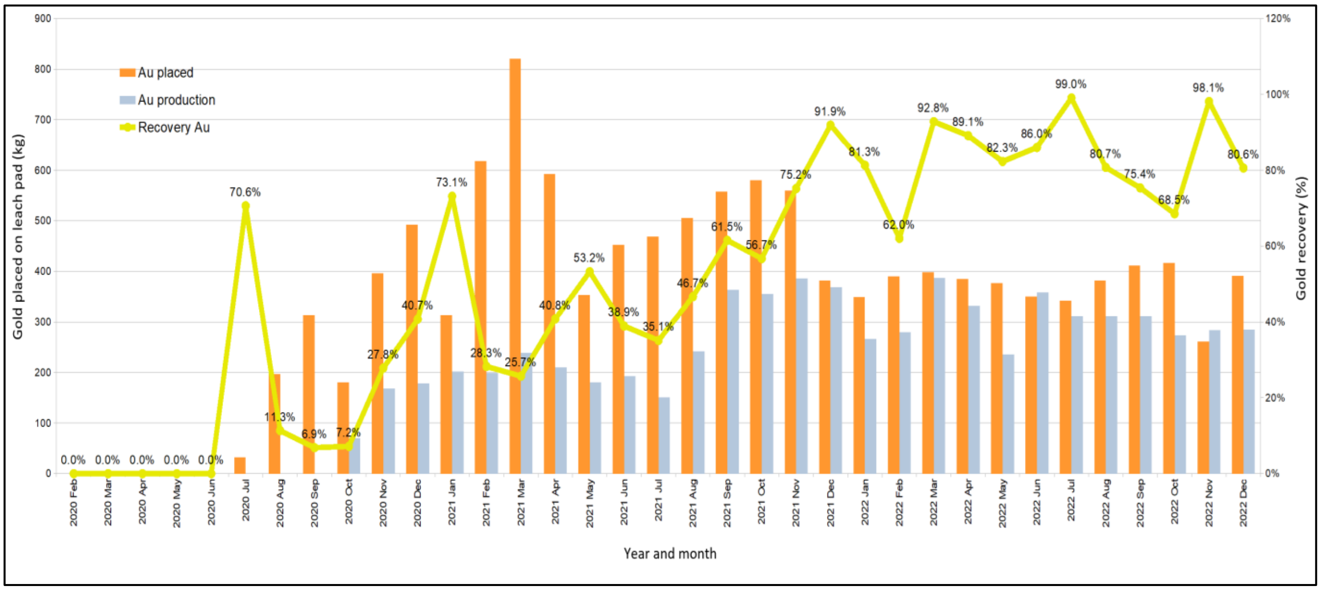
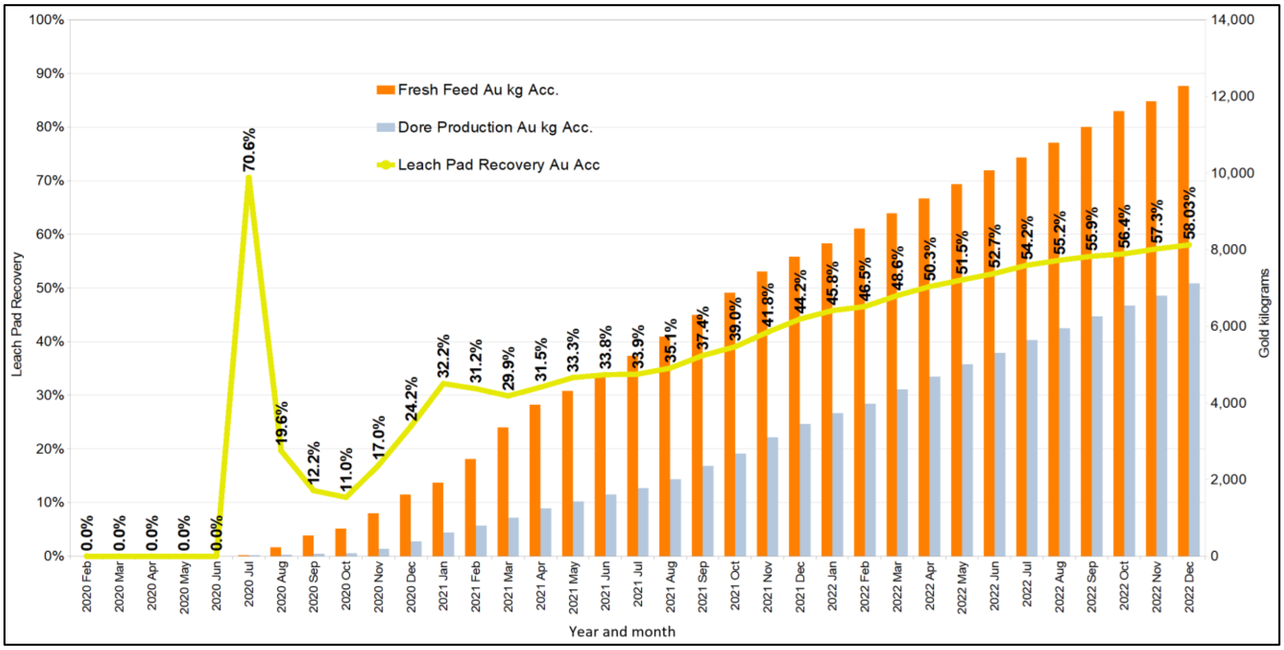


Figure 17.9 Lindero Mine ore characteristics loaded on leach pad 2020 to 2022



17.9 Sustaining projects

Mansfield is considering the following sustaining development projects in the processing area:

- Expansion of the leach pad. The Phase 2 of the leach pad is expected to start construction in 2024 and will increase the total surface by approximately 60 hectares.
- Expansion of the irrigation capacity. The current total nominal irrigation capacity is 800 m^3/hr and is planned to be increased by 50 percent in 2024.
- Execution of multiple projects in 2023 in the crushing and agglomeration areas that are intended to improve the long-term mechanical availability of those facilities.
- Improvements to the radial stackers traction system that will increase its mechanical availability.
- The cement in each lift on the heap will cure for several months before another lift is placed. It may be several years before any block of agglomerated ore receives 110-m of loading. Long-term stacking tests are being conducted to see if ageing will improve the ability of the ore to support the 110-m height with less cement.

17.10 Comment on Section 17

The QP considers the Lindero Mine's facilities based on conventional technology, and its design follows industry best practices.

The actual average ore throughput for the last six months of 2022 reached 14,755 tpd or 78.7 percent of the 18,750 tpd design capacity. Throughput levels have increased as the operation has improved and continues to improve the mechanical availability of the crushing and stacking facilities.

The Lindero Mine's accumulated gold recovery as of December 31, 2022, reached 58.03 percent, which is line with management's expectations based on the loading of coarse size ore during the first 11 months of operation. This coarse ore accounts for 31.8 percent of the total ore tonnes and 31.1 percent of the total gold metal loaded on the leach pad as of yearend 2022. The accumulated gold recovery curve shows a consistent upward trend that will continue to increase provided Mansfield continue optimizing the performance of the crushing circuit.

Electrical power is sourced from diesel generators under a rental contract. During 2022, the average energy cost reached US$ 0.40/kWh which is high when compared to typical values in the industry but not unreasonable considering the remote nature of the operation in the Argentine puna. Mansfield are in the process of tendering bids for the installation of a solar plant that will help provide supplementary power to the camp and other remote facilities.

18 Project Infrastructure

Infrastructure and services have been constructed to support the Lindero Mine operations. A layout plan displaying the location of the major infrastructure components is displayed in Figure 17.1. The mine infrastructure includes the following major areas:

- Access roads.
- Power connection and supply from diesel generators to site facilities.
- Process water supply and distribution, including a fire water system.
- Potable water system.
- Sewage system.
- Project buildings, including:
  - Administration building.
  - ADR process area/building.
  - SART process area/building.
  - Agglomeration process area/building.
  - Refinery building.
  - Reagent storage.
  - Process shop.
  - Chemical and metallurgic laboratory buildings.
  - Mine truck shop.
  - Light vehicles shop.
  - Crushing plant shop.
  - Guard house.
  - Dispatch office.
  - Infirmary.
  - General warehouse.
- Liquefied petroleum gas and diesel fuel storage systems.
- Explosives storage.
- Personnel camps for construction and operations, including a dining and recreation area, and a laundry building.
- Miscellaneous site services such as:
  - Security.
  - First aid.
  - Communications.

- Employee transport.
- Solid waste disposal.

18.1 Access roads and site access

Access to the Property from Salta is by paved roads for about 100 km and by all-weather dirt roads for about 350 km along National Highway 51 and Provincial Highway 27. The access route is from Salta to San Antonio de Los Cobres on National Highway 51 (140 km), continuing to the small town of Tolar Grande on Provincial Highway 27 (210 km) and then traveling southward along an undesignated route across the salar to the Property entrance (80 km). Access to the mine from the entrance is via dirt roads for approximately 5 km. Drive time from Salta to the Property is approximately 7 to 7.5 hours. Dirt roads require ongoing maintenance to ensure quality is maintained with works agreed between Mansfield and local authorities.

The Property can also be accessed by charter plane with flights scheduled three times a week from Salta to a runway strip located at the Salar de Arizaro, less than 10 kilometers from the mine. The flight takes approximately 35 minutes.

An extensive road network has been constructed to provide access to all facilities at the Lindero Mine, including the pit, waste dump area, stockpiles, crushing area, leach pad, storage facilities and truck shop.

The general mine location is shown in Figure 4.1.

18.2 Power supply

18.2.1 Power requirements

The main power source for the Lindero Mine is based on diesel-fueled centralized generators. Diesel is provided by trucks from the city of Güemes in Salta Province.

The centralized generators are owned and operated by an external contractor (Secco). The plant contains 12 generators with CAT 3516B diesel engines and three-phase generators that produce power at a low voltage of 380 volts. Each generator produces a nominal power output of 1.4 MW. Together, the generators provide a contracted power capacity of 7.64 MW. This capacity is calculated based on the operation of 11 generators with one generator held on standby, taking into account performance losses due to high altitude and a working capacity of 80%. The aim is to maintain a reserve energy capacity to absorb peak load or account for the failure of any one generator.

The electric generator has 10 diesel fuel tanks with a capacity of 50,000 l each for storage and a daily use tank of 10,000 l. They have a fuel and oil pump room, as well as tanks for storage of new and used oils. There is also an electric room with its own transformer and an operation control room that has a Scada system for operation on the generator premises.

The electrical power average consumption in 2022 and percentage of distribution is presented in Table 18.1.

Table 18.1 Power consumption by area

Area	Million kWh/year	Percent of the Total
Crushing Primary – Secondary	460,709	13.41
Crushing Tertiary HPGR	1,201,696	34.98
Crushing Agglomeration	297,630	8.66
Crushing Stacking	221,175	6.44
ADR Plant	392,634	11.43
Ponds	537,916	15.66
SART Plant	219,740	6.40
Camps - Truck shop	104,245	3.03
Total	**3,435,745**	**100.00**

18.2.2 Emergency power and other external sources

There are other sectors that are not supplied from the main power source, because of their distant location, and they were designed to work with their own generator system close to each sector. These sectors are the aqueducts; active mine offices; mine entry control point 1 and temporary camps.

Also, there is a proposal to install emergency generators on critical circuits. The capacity of these generators should be related to the energy required by these circuits, but it needs to be reviewed in the future as the power supply from the centralized generator plant is quite reliable.

18.3 Water supply

The Lindero Mine requires water for the following uses:

- Mining operations for dust control.
- Crushing for dust control.
- Agglomeration process.
- Makeup water for the heap leach pad.
- Process plant and laboratory.
- Main camp and administration.
- Construction activities.
- Fire water.

The maximum forecasted monthly water demand for the Mine is estimated at 27.2 l/s (97.7 m^3/hr) for the full processing tonnage for all site facilities including the heap leach, crusher dust control, road dust suppression, and infrastructure (see Table 17.7).

A summary of the predicted maximum monthly water demands for the Lindero Mine is shown in Table 18.2.

Table 18.2 Forecast site water demand

Description	Demand (m^3/hr)	Demand (l/s)
Heap leach	37.1	10.3
Crushing, dust control & agglomeration	40.2	11.2
Road dust control	12.8	3.5
SART plant, loss in copper concentrates and gypsum	1.3	0.4
Other demands at ADR and SART plants	1.0	0.3
Truck shop	1.0	0.3
Camp usage (including offices and warehouse)	3.3	0.9
Laboratories and other ancillary buildings	1.0	0.3
Total Water Required	**97.7**	**27.2**

18.3.1 Water source – wells

Significant work was completed in locating adequate water sources for the Lindero Mine. Hydrology and hydrogeology studies were conducted to identify the Rio Grande basin and its several sub-basins, followed by geo-electric profiling to determine drilling targets (Vector, 2009a; Vector, 2009b). These initial exploratory activities are discussed in Section 24.1. An updated study will be completed in 2023.

Several exploratory wells were drilled, and pumping tests conducted in the Lindero Mine area, notably in the Lindero, Arita, and Chascha sub-basins (Andina, 201la-b, Conhidro, 2013, Hidrotec 2012a-e). The results of the well pumps are shown in Table 18.3 and the well locations in Figure 18.1.

Table 18.3 Summary of well locations and tests

Well Name	Easting	Northing	Elevation (masl)	Distance from Lindero	Well Depth (m)	Date Drilled	Verified Flow (m^3/hr)
Andina 1	2,624,477	7,233,475	3,497	6 km North	59	Jan-11	1.2
Andina 2	2,635,923	7,225,160	3,499	13 km East	130	Mar-11	26.5
Andina 3	2,635,876	7,225,156	3,536	13 km East	142	Jan-13	74
Andina 4	2,635,671	7,225,146	3,536	13 km East	120	Mar-19	56
Lindero 2	2,623,177	7,227,294	3,687	0.5 km North of Pit	102	Feb-12	14.7
Lindero 3	2,623,653	7,227,250	3,686	0.5 km North of Pit	120	Apr-12	31
Lindero 5	2,623,656	7,227,401	3,701	0.5 km North of Pit	157	Dec-12	7.7
Emboscadero	2,619,605	7,225,000	3,738	4 km West of Pit	142	Jan-13	3.5

Figure 18.1 Well test locations

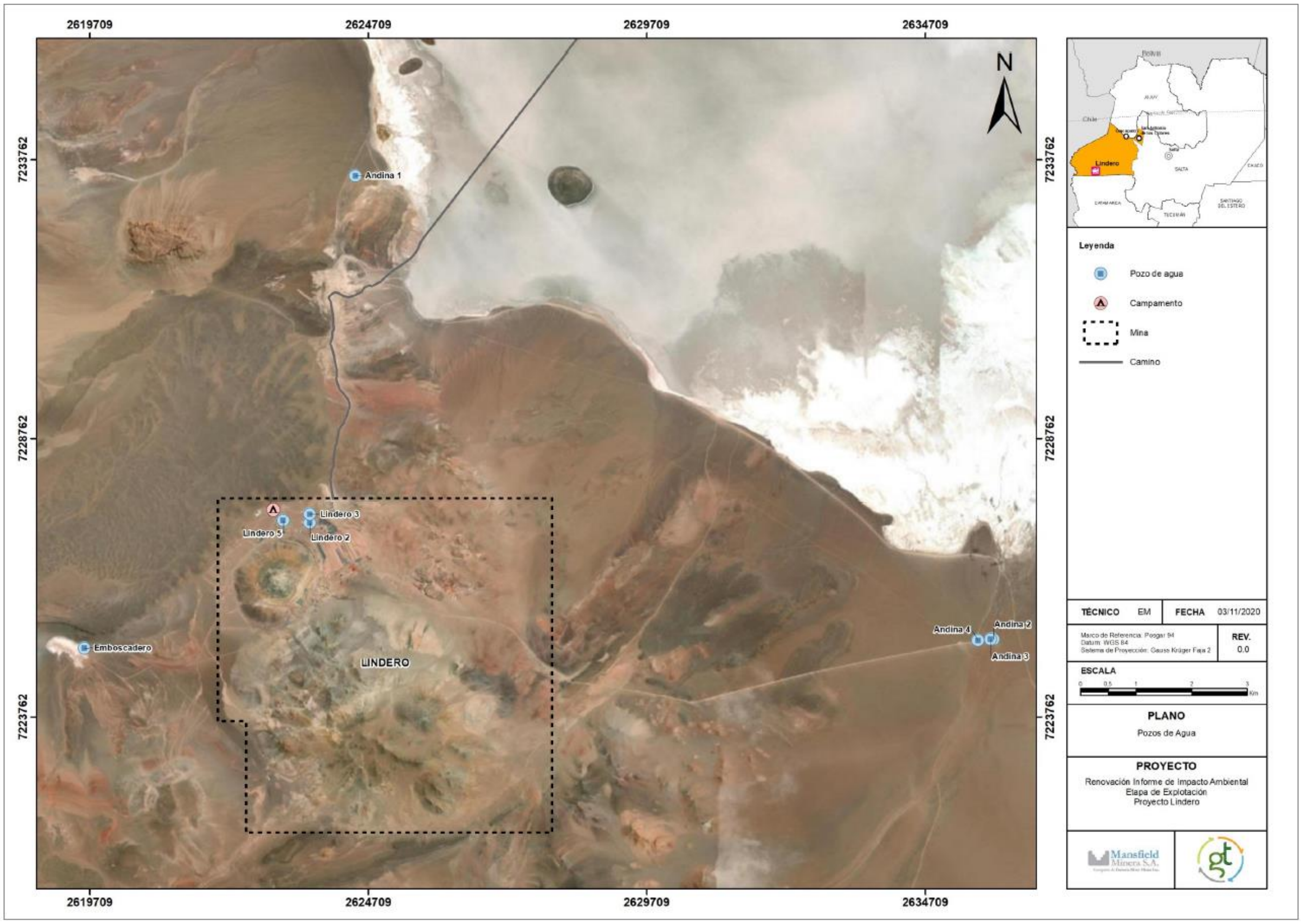


Figure from GT Ingeneria, 2020

The majority of the water required for production is satisfied using two wells located about 13 km to the east of the site in the Chascha area, carrying water to site via a buried pipeline (Andina 3 and Andina 4). The Andina 2 well is used for monitoring. The off-site well pumps combined are designed to provide up to 230 m^3/hr continuously. The water pipeline system is designed for a flow rate of 230 m^3/hr, which considers flow from both of the Chascha area wells operating simultaneously. Three local wells are also used to supply process water and camp water as required. Table 18.4 provides average flows from the five operating wells from 2021 to 2022 which provides a good example of water requirements for phase 1 operations. Wells that were not successful or had lower yields were converted to piezometers for groundwater monitoring.

The water pipeline consists of the well field area and two booster stations located approximately 2.3 km and 4.9 km west of the well field. Power to each of the three areas is provided by local diesel generators (one operating and one on standby at each location). Each of the booster stations is equipped with a surge tank of approximately 35 minutes capacity at the nominal flow, and booster pumps.

Table 18.4 Operation average well flows from 2021 to 2022

Well Name	Monthly Average (m^3/hr)
Lindero 2	0.5
Lindero 3	4
Lindero 5	5.5
Andina 3	24
Andina 4	46
Total	80

18.3.2 Raw water and fire water distribution

There are two main reservoir tanks for combined raw water/fire water storage for the Lindero Mine, fed by the water pipeline.

The primary tank has a capacity of approximately 900 m^3 and is located near the surge bin for the agglomeration plant. The tank supplies all road and crusher dust control, crusher cleaning water, fire water for crusher and agglomeration areas. Gravity feeds the secondary tank. The fire water reserve capacity is 120 m^3, based on a fire water site analysis conducted by Saxum.

The secondary tank has a capacity of approximately 440 m^3 and is located near the process plant area. This tank supplies all processing water for the heap leach build up, and fire water for the entire process plant area, administration building area, truck shop area, camp area and explosives magazine. The fire water reserve capacity is 240 m^3, based on the fire water site analysis conducted by Saxum.

18.3.3 Potable water system

A potable water system has been installed to supply potable water to the camp area. The potable water system consists of a pre-filtration unit coupled to a reverse osmosis unit and associated piping, tankage, and controls. Chemical controls are included for preservation in the potable water storage tank.

18.3.4 Sewage treatment system

An anaerobic sewage treatment system has been installed near the main camp to treat wastewater generated on-site. Effluents from the treatment plant can be reused as make-up water for the heap leach barren solution tank or reintegrated into the environment via leach fields.

18.4 Process area buildings

Most of the process buildings for the Lindero Mine were constructed as steel frame buildings with modular thermo-acoustic panels. In general, these are pre-engineered and pre-fabricated steel buildings which include all structural members, exterior doors and windows, roofs, insulation, interior and exterior wall panels and all connectors required to erect and assemble the building on-site.

For the refinery, a reinforced concrete block/masonry type building design has been used for security purposes.

18.4.1 Administration building

The administration building was constructed as a pre-engineered steel frame and plasterboard type building. The building is mounted on a concrete slab to minimize on-site installation time, as per the design developed by Saxum. The administration building has a footprint of about 520 m^2 in total, which includes offices, meeting room, bathrooms, IT and server room, and storage room. General and administrative staff along with certain key management in both operations and mining use the administration building.

18.4.2 Guard house

A guard house is located at the mine entrance. The guard house includes an office, a training room, a security inspection area and rest rooms for the security personnel. The entrance is continuously monitored.

18.4.3 Process shop

The process shop is a 300 m^2 pre-engineered steel building located close to the process area. The process shop has a main work area for repairs and maintenance of equipment from the process plant, and includes an office area, toilet facilities, and tool rooms.

18.4.4 Warehouse

The warehouse is a 672 m^2 pre-engineered steel building located near the administration building. The warehouse contains critical spares for the process areas and includes an office area, bathroom and a reception area. Adjacent to the building, another 672 m^2 fenced area with a concrete floor is available to serve as a repository for major spares and equipment.

18.4.5 ADR plant building

The ADR plant is housed in a pre-engineered steel building. The building accommodates the pressure stripping circuit, acid wash, carbon regeneration, and caustic and cyanide mixing areas.

The carbon columns are located outside of the ADR building.

The ADR building is located in the same general area as the chemical and metallurgical laboratory where the chemical analysis of samples from the ADR plant is performed.

The ADR building, refinery and SART building has a footprint of approximately 3,120 m^2.

18.4.6 SART filter building

The majority of the equipment associated with the SART plant is located outdoors, with the following exceptions:

1. The two flocculant systems are located inside to prevent exposure to wind, rain and to protect against frost. Space has been provided in the enclosure for the storage of two stacked pallets of dry flocculant (25 kg bags).
2. The copper and gypsum filters are located inside the filter building, along with the associated hopper, screw feeder, copper bagging system and the gypsum filter cake

dumping area. At the floor level of the filter building, space is available for the storage of about 10 to 20 one-tonne supersacks of copper filter cake. Bagged copper filter cake is stored to prevent exposure to water and sunlight, and water-tight bags are used in the system.

18.4.7 Refinery building

The refinery is located adjacent to the ADR building, in a fenced area, and is constructed of reinforced concrete block/masonry with a steel roof. A separate secure staging area has been included at the entrance of the building. The interior and exterior of the building is under surveillance via cameras and closed-circuit television.

18.4.8 Cyanide mix building

Cyanide solution is prepared in a separate, limited-access building. This building is located in the fenced enclosure for cyanide storage and contains an agitated mix tank and a day tank for the cyanide solution. This building is 70 m^2 and consists of an upper "mixing level" and a lower "pumping level". The lower portion of the building is supported by a concrete containment wall of sufficient height to contain the total volume of the two tanks. The building is fitted with HCN gas monitors and ventilation.

18.4.9 Laboratory

Full-service laboratory facilities include a chemical laboratory and a metallurgical laboratory. The facilities of the laboratories include:

- Pre-engineered steel frame and plasterboard building.
- support slabs for equipment.
- concrete sidewalks/halls.
- a fire assay laboratory section consisting of:
  - concrete columns.
  - masonry type walls.
- office sector constructed with modular wall panels.
- bathrooms with ceramic tile floors.
- wet laboratory areas with ceramic floors.
- a sample preparation area.
- a fire assay area.
- data input, atomic absorption, and weighing areas.
- a metallurgical laboratory area located adjacent to the ADR plant.

18.4.10 Reagents storage area

The reagents storage area is located outdoors in a fenced in area, with concrete secondary containment. For the caustic storage, a container has been placed inside the fenced area. Fluxes for the smelting of doré are stored inside the refinery. Each containment area drains to a floor sump equipped with a small sump pump in case of spills or heavy rain .

18.4.11 Mine area buildings

Mining operations are housed in a series of buildings located in an area adjacent to the administration building.

18.4.12 Truck shop

The truck shop is located to the west of the administration building and is connected to the haul road from the pit and crushing areas. The shop is approximately 700 m^2 in area and has two work bays to accommodate the earthmoving equipment.

The shop has concrete floors and metal sidings and is stocked with equipment to facilitate all anticipated repairs on the earthmoving fleet. Areas have been allocated for mechanical, electrical, welding, and maintenance activities. Near the shop building is an outdoor truck wash area. The wash down drainage from equipment washing is directed to an oil-water separator. A tire repair area is also available adjacent to the truck shop building.

The shop is equipped with a large air compressor/receiver to service the wash down area and other tooling.

Offices and a break area are provided in the building.

Equipment spares for the mining area are stored in the warehouse with over size storage in an adjacent fenced storage area.

A single bay light vehicles maintenance building is located next to the truck shop.

18.5 Explosive storage

The bulk explosives facility is divided into three areas, with each area being more than 650 m from each other. These three areas are comprised of the following:

- Storage for up to 250 t low density ammonium nitrate (under construction with an estimated completion by the third quarter of 2023).
- Storage of sensitized pumped emulsion blend in eight 33 t silos.
- Primary explosives and detonators storage. These materials are stored in two separate shipping containers.

All of the containers are situated within a secure area, surrounded by fencing, and managed accordingly with regular security patrols.

Raw materials, such as emulsion explosives, fuel oil, and primary explosives (dynamite and booster) and blasting accessories used in the explosive manufacturing process, are brought to site by road and stored at the explosives facility site until required.

18.6 Camp

A main camp has been constructed for the Lindero Mine, located to the north of the pit. The camp consists of modular dormitory-style facilities for workers and supervisors, with a total capacity of 501 rooms. Currently, 362 beds are occupied, with 205 belonging to Mansfield employees and 157 to contractors and visitors.

A kitchen, recreation area, and dining facility are located adjacent to the staff housing. The dining area is a large single room with adjacent bathrooms. The kitchen includes all facilities necessary to prepare meals for the operation's workforce (kitchen equipment is provided under a catering contract). The recreation area includes a TV room, internet café, and additional room for table games.

A 60 m^2 laundry room has been included in the camp and is located next to the dining and recreation building. This building also contains a separate electrical room for distribution of power to the camp.

18.7 Diesel fuel delivery and storage systems

Diesel fuel is delivered to the mine site via contractor owned tanker trucks and stored in 50 m^3 tanks on site. Three tanks store diesel fuel for mine vehicles, and five tanks store fuel for light vehicles and for power generation. Each storage tank is contained in a lined basin to assure no fuel is leaked to the environment. Fuel trucks are used to deliver fuel to the mine mobile equipment.

18.8 Site services

18.8.1 First aid

Emergency medical staff are available at an on-site clinic located near the administration building. Medical personnel are contracted by Fortuna. The medical staff includes one on-site nurse, one assistant/ambulance driver, and one on-call doctor. The contract also includes a 4-wheel drive ambulance.

18.8.2 Communications

An internet protocol telephone system is used for off-site communications. The system includes a device for connecting to the public network, voice mail, and direct selection of extension numbers. The telephone switchboard shares installations with the data network, which has power and air conditioning back-up support systems. Phones are installed in all buildings and facilities. Cellular telephone and internet coverage is available in the camp and mining areas.

Hand-held and base station radios are provided for survey and ore control personnel, geologists, and operators for on-site communications. Mobile equipment is equipped with radios.

18.8.3 Transportation

Lindero personnel are transported to the mine from nearby communities and the city of Salta and reside in the camp during work periods. There is also a charter plane with flights scheduled three times a week from Salta to a runway strip located at the Salar de Arizaro to transport supervisors and managers to the mine site.

18.8.4 Solid waste disposal

Solid waste is disposed of in a manner complying with local regulations. Allowable products are disposed of in a solid waste landfill constructed on site. Products not allowed to be disposed of in the landfill are transported to appropriate facilities off site.

18.8.5 Site fencing

The Property is very remote and, as such, it is not considered to be necessary to fence the entire mine site. Specific parts of the mine facilities are fenced, including chain-link security fences around the refinery, the electrical substation, the warehouse yard, processing ponds and the magazines. Fencing has also been installed off-site around the remote well field and booster stations to secure the well pumps and generators in that area.

18.9 Comments on Section 18

The QPs have reviewed the information provided by Fortuna and inspected the facilities described in this Report during site visits.

19 Market Studies and Contracts

19.1 Market Studies

No market studies are currently relevant as the Lindero Mine produces a readily saleable commodity in the form of doré.

19.2 Commodity price projections

The Fortuna financial department has provided Mansfield with metal price using 10-year historical average and consensus commodity price projections to be used in their analysis and as used in this Report. Fortuna established the pricing using a consensus approach based on long-term analyst and bank forecasts prepared in May 2022.

The QPs have reviewed the key input information and consider that the data reflects a range of analysts predictions that are consistent with those used by industry peers. Based on these sources, historical average data and price projections are considered acceptable as long-term consensus prices for use in mine planning and financial analyses for the Lindero Mine in the context of this Report.

The long-term price forecasts that are applicable to the Lindero Mine and Arizaro Deposit are summarized in Table 19.1.

Table 19.1 Long-term concensus commodity price projections

Commodity	2022	2023	2024	2025	Average
Gold (US$/oz)	1,869	1,820	1,754	1,683	1,719

A long-term price estimate of US$1,600/oz has been applied, based on the mean consensus prices from 2022 to 2025 of US$1,719/oz weighted at 40 percent and the 10-year historical average of US$1,435/oz weighted at 60 percent.

Mansfield has used an Argentine peso exchange rate of 136 pesos to the US dollar for financial analysis purposes, which conforms with general industry-consensus.

19.3 Contracts

19.3.1 Gold doré production

The Lindero Mine produces doré bars containing an estimated gold content averaging 84 percent for the LOM. Doré bars are stored in a secure vault at the plant and transported by a security company via armored car from the Property to Salta prior to shipping overseas for refining.

In addition to the gold doré, a copper by-product results from the operation of the SART plant in the form of a copper precipitate, that is estimated to represent 1 percent of sales. The copper by-product is not a revenue generator, but it is expected to be produced throughout the rest of the LOM.

When a shipment of doré is sent to the refiner, the refiner melts it and samples the melt. The refiner can also drill the doré for samples as per the agreed contract. Settlement is decided as per agreements between the refiner and Mansfield. If the samples do not agree within set splitting limits, settlement is then based on umpire assays from a mutually agreed upon umpire assayer.

Table 19.2 summarizes the estimated production of ounces of gold by year for the remainder of the LOM.

Table 19.2 Forecast summary of estimated gold production

Year	Gold extracted to doré (oz)
2023	100,922
2024	104,179
2025	99,001
2026	91,961
2027	83,923
2028	95,455
2029	88,322
2030	83,119
2031	88,412
2032	82,349
2033	84,878
2034	41,552
2035	60,410
Total	**1,104,482**

Overall gold extracted in respect to ore placed on the heap leach is estimated to be approximately 75 percent. Silver will also be recovered but is not reported in the Mineral Reserve estimations, as concentrations are generally below the detection limit and regarded as insignificant. Silver production is not used in the cash flow model. It represents a minor upside to the mine.

Precious metal refining companies are tendered on an annual basis to obtain budgetary quotes for refining, transportation, and insurance. The entire mass of the doré, including silver and copper, incurs a treatment charge. As silver revenue is not included in the mine economics, no silver refining charge is considered.

19.3.2 Operations

Mansfield has 14 major contracts for services relating to operations at the mine including mining activities, drilling, civil works, transportation, electrical installations, plant and mine maintenance, and the supply of reagents, cement, and explosives. Mansfield also has contracts in place for its main services including power generation, catering, security, personnel transportation, and product sales. The costs of such contracts are accounted for the capital and operating expenditures depending on work performed. Contracts are negotiated and renewed as needed. Contract terms are typical of similar contracts in Argentina, based on the experience of Fortuna.

19.4 Comments on Section 19

The QPs have reviewed the information provided by Fortuna on marketing, contracts, metal price projections and exchange rate forecasts, and note that the information provided is consistent with the source documents used, and that the information is consistent with what is publicly available on industry norms. The information can be used in mine planning in the context of this Report.

Long-term metal price assumptions used in this Report are based on historical average and consensus of price forecasts for those metals estimated by numerous analysts and financial institutions. The analyst and bank forecasts are based on many factors that include historical experience, current spot prices, expectations of future market supply, and perceived demand. Over a number of years, the actual metal prices can change, either positively or negatively from what was earlier predicted. If the assumed long-term metal prices are not realized, this could have a negative impact on the operation's financial outcome. At the same time, higher than predicted metal prices could have a positive impact.

20 Environmental Studies, Permitting and Social or Community Impact

Most of the information included in this section is sourced from the EIA report first prepared by Ausenco Vector (2010) and its subsequent updates filed in 2013, 2015, 2018 and 2021 with the Salta Provincial government. Where applicable, this section has been updated with the most recent information available as of the effective date of this Report.

20.1 Regulation and permitting

In November 2011, the Salta Provincial government granted the principal environmental DIA permit, which is the primary mining permit required for a mining project's development, enabling a project operator to start construction and proceed to full mine operating status. The Salta Provincial government has approved the three EIA renewals submitted by Mansfield since November 2011, granting in each case a new DIA permit with the same faculties.

Mansfield had received a mine permit to build a heap-leach gold mine for up to 30,000 tpd as detailed in the Pre-Feasibility Study (AMEC, 2010b).

The 2016 Feasibility Study submitted by KCA (2016a) altered the mining rate to 18,750 tpd using a variable cut-off grade of approximately 0.3 g/t Au, increasing average grades early in the production schedule and lowering initial capital requirements.

The 2017 Feasibility Study maintained the same mining rate but made adjustments to the process design and subsequent capital and operating expenditure. These changes were reported to the relevant government authorities, and the Secretary of Mining of the Province of Salta.

20.1.1 Environmental requirements

The environmental legislation relevant to the Lindero Mine is as follows:

- National Law No. 24,585, of the Environmental Protection for Mining Activity Act, incorporated into the Mining Code. The scope of this Act was adapted by the Salta Province for application to any mining activity within its territory. Salta Province stipulates that the Mining Secretary is the implementing authority. The submission of environmental impact reports and the corresponding monitoring is the responsibility of this government authority.
- Provincial Environmental Protection Law No. 7,070. This law declares that it is a matter of Provincial public order that all necessary actions, activities, programs, and projects must be carried out to preserve, protect, defend, improve, and restore the environment and natural resources within a framework of sustainable development. The Provincial government is tasked to act as above except in matters governed by special laws such as Law No. 24,585.
- Civil Code, Art 14 and 240, fall under the category of "collective rights" as recognized by the National Constitution (also called rights of the 3rd generation, with its peculiarities such as rights that do not belong to an

individual, but everyone). Article 14 states, "*the law does not protect abuse of individual rights where they may affect the environment and collective rights in general*." Article 240 regulates the limits on the exercise of individual property rights including environmental rights.

Article 41 of the National Constitution refers to the rights of individuals residing in an area of productive activity to enjoy a healthy environment without compromising future generations. It also indicates that the Argentine State and Provincial governments will issue rules as appropriate to their jurisdictions. Other related legislation includes:

- Mining Code of the Argentine Republic.
- Law No. 24,051: Hazardous Waste.
- Law No. 24,196: Mining Investments.
- Law No. 25,612: Comprehensive Management of Industrial Waste and Service Activities.
- Law No. 25,675: General Environment.
- Law No. 25,688: Environmental Water Management.
- Law No. 25,743: Cultural and Archaeological Heritage.
- Law No. 25,831: Free Access to Public Environmental Information.
- Provincial Constitution, Articles No. 30, 79, 81, 82.
- Provincial Law No. 7,017: Water Code of Salta Province.
- Provincial Laws No. 7, 107: Protected Areas.
- Provincial Law No 8164: Royalties. Local Supplier Registration of Salta Province.
- Provincial Resolution 84/22: Registry of mining suppliers.
- Provincial Resolution 087/2018 Social and economic impact tables.
- Provincial Resolution 3652/10 Annual analysis of drinking water.
- Provincial Resolution 197/2023 Provision of housing modules for control and inspection authorities of Mining Secretary of Salta Province.
- Articles corresponding to bylaws 29/2018: Environmental Code of the Municipality of Tolar Grande.

20.1.2 Environmental obligations

According to Provincial Law 7070, Article 41, Decrees 3097/00 and 1587/03, the technical manager of any environmental work must be registered as an Environmental Impact Evaluator in the Ministry of Environment and Sustainable Development of Salta Province. Maintenance of this registration requires biannual re-enrollment and the updating of the technical manager's curriculum vitae. An EIA must be signed as an affidavit, and the person signing the EIA is liable under civil and criminal law for the content of the report. The directors of the company that own the mining concession are also liable. If environmental damage occurs through mining activity, the mining company may be responsible in the following ways:

- Environmental (recovery to the State prior to production).
- Civil (compensation).
- Administrative (fines).
- Criminal (jail).

Where damage is caused by legally sanctioned persons, the legislation states that authorities and professionals are responsible to the extent of their participation.

20.1.3 Other obligations

In November 2011, Mansfield received approval of the EIA for the Lindero Mine. The EIA was prepared by Ausenco Vector (2010) and presented to the Provincial government. An update was submitted in November 2013, a further update in December 2015, a third one on March 2018 and the most recent update made by GT Ingeniería SA was submitted in February 2021. Updates submitted (as biannual renewals) in 2013, 2015 and 2018 were approved by the Salta Provincial government. The last update submitted in February 2021, is under evaluation by the authority of the Mining Secretary of Salta. During the evaluation of the renewals, the last approved EIA and the DIA permits remain valid and in force until renewal approval is obtained, which is expected later in 2023.

The DIA issued as a response to the EIA included several points detailing the obligations of Mansfield to the government, and the following are noted as being significant:

- In each of the periodic extensions attached to the Application Authority, or biannual EIA renewals, Mansfield and the Environmental Professionals Assessors must satisfy all requirements of Resolution No. 172/10 of the Ministry of Economic Development and Resolution N° 448/09 of the Mining Secretary.
- All future EIA filings must be consistent in the various stages with the Fixed Capital Investment under Articles 217 and 218 of the Mining Code.
- Mansfield must satisfy the requirements of Water Code (Law 7017) and Decree N° 2.299 of its own integral regulations and resolutions of the Water Resources Ministry with reports on the status of the different concessions required to be presented annually.
- Transport, storage, use and disposal of explosives detonators and blasting accessories for use in blasting shall be governed by regulations from ANMAC (National Weapons Register). In Argentina, acts with explosives within the civil (mining) area, are governed by the "National Law on Firearms and Explosives No. 20,429, Decree No. 302/83". The powder magazines are certified through the National Agency of Controlled Materials. This certification was granted on August 13, 2019 and must be revalidated every four years.
- Mansfield must allow free access to the supervisory government officials from the Provincial government including environmental, health and safety officials, and also officials to review production and cost control data for the

determination of Provincial mining royalties. Periodical field inspections have been undertaken by the mining authorities since operations began.

- All service companies that work at the Lindero Mine shall comply with the Environmental Mining Law, and the Occupational Health and Safety Law.
- All mining input suppliers (such as lime, bentonite, drilling and other additives) must have an environmental quality certificate demonstrating compliance with the Environmental Mining Law. Mansfield endeavors to ensure that all input suppliers comply with the applicable environmental laws.
- Any changes to the original mine design, including new development and evaluations, which have not been reported in updates required by law or the implementing authority, shall be reported immediately to the implementing authority.
- Mansfield must provide an environmental procedures manual that describes all security measures and contingency plans for each activity related directly or indirectly to the Lindero Mine, including for all carriers and drivers specific to the type of load transported.
- Any proposed alternative road route must be approved by the competent authorities and incorporated into the monitoring plan.
- Mansfield must instruct and provide training to all personnel and contractors with respect to environmentally responsible behavior (Law 24,585, Article 3).
- Environmental emergency plans shall "be run periodically" through practice trials and shall be evaluated to ensure an excellent response in the case of a real emergency.
- Mansfield must submit to the EMA annually an update of the satellite image of the area of influence of the mine (mapping the progress of the operation). This image will demonstrate the environmental impact of the mine. The image is required to be in multispectral digital format, with 2.4 m resolution similar to that provided in the environmental permit application.
- Mud from treatment plants must be treated by authorized hazardous waste operators and Mansfield is required to submit monthly return receipts thereof to the Water Resources Secretary and the Mining Ministry.
- Mansfield must minimize irreversible landscape impact during the closure and post closure phases. In November 2022, Mansfield filed a detailed Closure Plan Report with the Mining Secretary of Salta.
- Mansfield shall not mix or bury hazardous waste or industrial tires. Mansfield is registered in the Registry of Generators, Transporters and Operators of Hazardous Waste, in the category of Generator, by Resolution No. 045/14 of the Authority of Application of Law No. 7070, with registration number 408.
- All hazardous waste such as oils, hydrocarbons, contaminated soils, etc. shall be evacuated from the Mine and disposed of by authorized operators and carriers, such disposal is to be recorded in a Registry Book which must be available to the relevant authorities.

- Mansfield shall immediately inform the relevant authority of all oil spills and hazardous substance accidents on routes within the Province or on the Property. In all cases, Mansfield shall immediately provide and implement a contingency plan.
- The calculation and design of the heap leach pad must comply with building regulations and standards according to applicable international rules and guidelines, and all available national and provincial precedents.
- Necessary measures must be taken to implement and ensure a continuous and permanent quality control during the installation of the membranes, drainage material and waterproof substrate in the leaching system, to ensure compliance with the provisions of the EIA.
- Prior to construction, an electronic monitoring plan for leak detection in the leach pad was issued by the EMA (according to the environmental and safety point of view).
- Mansfield must submit a monthly field survey undertaken to detect leaks in the leaching system, detailing visual inspection and systematic pattern on the slopes of the heap leach pad bases and sectors topographically lower around the stack, and to detect areas with moisture or water surge that may come from a leak, in addition to the control methods contemplated in the EIA.
- Mansfield shall ensure that the theoretical models presented in the EIA are consistent with the methodical observation of the performance of the waste dump and leaching systems. These results shall be reported and submitted semiannually to the EMA.
- At Mansfield's expense, the EMA may carry out excavations in the waste dump area or any other area affected by the mine to determine if an improper environmental incident has occurred.
- All changes in the mine that impact water use or that generate unanticipated effects on the EIA will be reported to the Application Authority.
- Mansfield must submit semiannual reports on environmental monitoring hydrochemistry, hydrogeology, climate, flora and fauna monitoring, waste management, security checks, health and hygiene, with details of subcontractors, their actions, impacts and assigned responsibilities in the monitoring process, or collaboration in monitoring plans and controls.
- Five years prior to the mine closure, Mansfield must submit a closure and post closure plan, together with its monitoring plans for all environmental components, to EMA for approval. It must include a traffic and access plan to prevent accidents and to control the process. Mansfield submitted a closure and post closure plan in November 2022 to the EMA for approval, together with its monitoring plans for all environmental aspects.

20.1.4 Permitting

Mining in Argentina is governed primarily by Federal legislation, Provincial laws and decrees, and by Municipality regulations and controls. The principal permitting process, as well as regulatory activities during operations, are managed by Salta Province through the Salta Mining Court and Salta Mining Secretariat, in conjunction with other public offices.

Approval of the Environmental Impact Assessment allows mining development to proceed, subject to obtaining sector permits for specific project facilities.

Environmental Impact Assessment

In November 2011, Mansfield received approval of the EIA for the mine, regarding the construction and operational stages. This is the primary mining permit required for the development of the operation, enabling a project operator to start construction and proceed to full mine operating status. The EIA was renewed three times in 2014, 2016 and 2019. In the last case by Resolution N° 265/19.

The EIA report describes and assesses associated environmental impacts for exploitation of the Lindero Deposit via an open pit and the heap leach processing of ore, as described in the 2016 Feasibility Study.

The most recent DIA for construction and operation was approved in October 2019. This document is the guiding operating permit during the life of the mine. It is also a requirement for the granting of most sector permits for the operation. The DIA establishes multiple conditions that must be met in relation to social, environmental, health and safety and tax matters.

The renewal of the last environmental impact report approved, was submitted on February 2, 2021 and is under evaluation by the authority at the Mining Secretary of Salta. During the evaluation of the renewals, the last EIA approved maintains its force until renewal approval.

The Salta Province supports responsible mining, and the Secretary of Mining is intent on streamlining the EIA review and approval processes. A Multidisciplinary Mine Environmental Evaluating Commission (Comisión Evaluadora Multidisciplinaria Ambiental Minera) has been assembled to revise the EIA process.

Sector permits

Specific approvals and permits are required for many aspects of the Mine, including:

- Work authorization for foreign professionals.
- On-site bulk fuel storage.
- Domestic and industrial effluents.
- Authorization for explosives use and storage.
- Authorization for chemical precursors use and storage.
- Water management.
- Mine operations.
- Communications.

All necessary permits regarding construction of the Mine were granted in a timely manner.

Permitting agencies

Permitting government agencies are listed in Table 20.1, including a summary of the most important required approvals and permits.

Table 20.1 Required key permits and authorizations

Area	Key permits and Authorizations	Jurisdiction
Mining Law 24, 196	Certificate of Registration under number 242	Secretaría de Minería de la Nación
Import and export	Certificate of Import and Export (done)	Customs
Mining Property	Onix mine - File 16,835 granted	Salta Mining Court House
Surface Rights	File 17,206 Arita camp rights (granted) File 18,387 right of way and water rights (granted) File 19,200 Water rights (granted) File 21,995 Surface water right and pipeline File 22,096 Camp rights (mine site) File 22,093 Plant and process easement File 22,094 Waste dump easement File 22,095 Open Pit easement	Salta Mining Court House
Water Resources	Water Concession for Mining Activity Use File 34-13173/12 Mine site Hole 1 File 34-56786/12 Mine site Hole 3 File 34-223780/12 Mine site Hole 2 File 34-42367/10 Chascha area Hole 1 File 34-23834/13 Chascha area hole 2 File 34-6251/05 Arita Camp superficial water	Secretaría de Recursos Hídricos de Salta
Waste Management	Disposal of Hazardous Waste via Landfill Pathogenic Waste Provincial Registration as Generator, Operator and transporter of Hazardous Wastes (registered, needs upgrade)	Secretaría de Ambiente y Desarrollo Sustentable. Secretaría de Minería. Municipio de Tolar Grande
Environmental Management	Environmental Impact Declaration (Approval of Environmental Impact Statement, art.250 Mining Code, art.34 of Provincial Law 7,141) Comply with the DIA requirements	Secretaría de Minería de Salta
Camp qualification	Arita Camp municipal qualification (is process of renewal)	Municipio de Tolar Grande
Explosives	Registration for Explosives Users (Mansfield Minera S.A.) Registration for Users and Vendors of Explosive Services (vendor) Certification of Powder Magazines (Mansfield Minera S.A.) Storage of Ammonium Nitrate and Controlled Products (Mansfield Minera S.A.)	Ministerio del Interior Registro Nacional de Armas (RENAR)
Contract foreign professionals	Hire foreign professionals	RENURE (Migrations)
Fuel	Registration in the Liquid Fuel Dispensing Registry or National Liquid Petroleum Gas Registry (contractor)	Secretaría de Energía
Chemicals	Storage and use of chemical products	SEDRONAR – R.N.P.Q (Registro Nacional de Precursores Químicos)
Communications	Use of satellite telephone and internet Use of VHF handheld radios	Private contracts with vendors. Comisión Nacional de Comunicaciones
Cultural and Natural Heritage	Notification of Accidental Discovery of Artifacts Potentially Relevant to Cultural or Natural Heritage of the Province. Request for Liberation of an Area (i.e., free of culturally significant artifacts)	Secretaría de Cultura de la Provincia de Salta
Health	Authorization for Installation and Operation for Food Preparation and Operation of Dining Area Authorization to Operate Water Potabilization Plant Potable Water Certificate	Municipio de Tolar Grande/AOMA (Mining Union)

Area	Key permits and Authorizations	Jurisdiction
	Medical Post, Doctors and Ambulances Emergency Plan for Contingencies Health Security in Mining Activities	
Transit and transportation	Transit of special machinery and gasoline	National roads: Vialidad Nacional Provincial roads: Vialidad de la Provincia
Use of Soil	Quarry Concession in fiscal provincial areas	Juzgado de Minas de la Provincia de Salta
Water Management Works and Structures	Authorization for construction a water management structure Water management works Approval and authorization to operate Environmental impact report for the water pipes and construction	Secretaría de Recursos Hídricos de la Provincia de Salta Secretaría de Minería
Mining Operations	Mining producer registration Ore transport guidelines Notice of start-up of mining activity Notice of suspension of operations or abandonment Habilitation plant and facilities	Secretaría de Minería de Salta Municipio de Tolar Grande
Closure Plan	Mining Closure Assessment	Secretaría de Minería de Salta

Environmental reports

Since the discovery of gold mineralization at the Lindero Deposit in 2000, Mansfield has provided more than 20 environmental reports describing various activities such as extraction of samples at initial stages, soil sampling, a program of geophysical surveys, and details of access roads, drilling programs, camp installation, and runways. These reports each consist of a brief description of the environmental baseline, the Mine, environmental impact, and ways to prevent and mitigate that impact.

In December 2007, Mansfield presented an extensive environmental baseline report (EBL), completed by Vector Argentina, to the Secretariat of Mining for Salta Province.

That report included sections on geology, geomorphology, hydrology, sociology, archaeology, local flora and fauna, soil types, and climate and air quality. The EBL was accepted by the Mining Judge of Salta after being examined by environmental technicians of the Secretariat of Mining and the Provincial Secretariat of Environment. There are no known current environmental liabilities for this Project.

In September 2007, Mansfield installed a weather station (Davis Vantage PRO2™) at the site to record temperature, humidity, wind speed and direction, precipitation, atmospheric pressure, solar radiation, and evaporation. All of these parameters are recorded on a daily basis in a database at the camp. The weather station allows the analysis of updated data daily and analysis of the data across time.

It is important to note that Mansfield has filed an advance activity report every six months since 2012, as established by DIA requirements. The last semiannual report was submitted in August 2022 to the mining authorities.

20.2 Environmental baseline

20.2.1 Location and access routes

The Lindero Mine is located southwest of the southern edge of Arizaro Salar in the department of Los Andes, approximately 420 km from the city of Salta by road, 160 km of the road is paved and 260 km is unpaved. The Mine is located 60 km from the Salta–Antofagasta railway line, 130 km from the 345 kV Salta–Escondida power transmission line, and 160 km from the puna gas pipeline.

Mansfield has also constructed a permitted airstrip approximately 10 km from the mine. The flight time to Salta is 40 minutes.

20.2.2 Climatology

The Mine is located in the Andean puna, an area with a very harsh climate, which is characteristic of heights over 3,500 m. In general terms, this is a region of aridity that displays distinctly continental features.

The climate is dry and cold, with substantial daily temperature variations in both summer and winter. The temperature in winter averages 5°C. In summer, the maximum temperature can be as high as 30°C.

The annual average rainfall does not typically exceed 50 mm. Rainfall starts in December and ends in March, but precipitation in the form of snow or sleet can still fall in the months of June, July, and August. The lack of moisture produces static and lightning electric charges and discharges, as well as static electricity in devices and appliances.

Winds are usually relatively calm during the night and mornings, but increase significantly from west to east in the afternoon, especially during the winter months, with recorded speeds exceeding 100 km/h.

Since production commenced in 2020, the average wind speed in the winter months, from January to June, has been recorded as 21.3 km/h from a predominantly westerly direction, with a maximum speed of 99.8 km/h registered on June 1, 2022.

Air quality is generally good, except when the wind carries dust that may interfere with breathing. Low oxygen levels, and reduced air pressure caused by altitude can result in mountain sickness (soroche), a common illness on the puna.

20.2.3 Air quality

Weather conditions in the area contribute to the generation of dust, including ultra-fine dust particles generated by soil erosion. This is especially the case when weather conditions discharge soil layers, causing increased levels of suspended particles in the atmosphere. Removal of material by mining activity will cause an increase in wind erosion and fine material blasting (silt, clay, and sand).

In the EIA report, air quality was analyzed, with the results indicating that for selected pollutants, the concentrations are below the guideline levels established by current legislation. The results also correspond to natural levels at each site, with levels of pollutants from activities carried out in the area at the time of evaluation corresponding to levels of wind-borne particulate matter.

Since 2017 participative air sampling has been carried out periodically according to resolution 004/18. This involves community members, government authorities and other agencies participating in the sampling process and discussing results.

In February 2012, Ausenco Vector submitted an air quality modeling report. This report was carried out to determine the effects of the then proposed Project on the air quality in the immediate environment in which the mine would be located. This report presented an estimation of emissions and modeling results of air quality during construction and mining, and concluded that there will not be adverse effects on the most important town near the

Mine (Tolar Grande) nor are adverse effects expected in rural settlements or in Antofallita and Cavi Vega.

Air quality samples were taken during construction at pre-established points in the mine area and nearby towns such as Tolar Grande located 70km away. Sampling continues to be taken at these points during the operational phase of the mine.

Participatory air quality sampling with the government and the community is carried out on a routine basis.

Since production commenced, two measurement points continue to be monitored, one upwind and one downwind of the possible emitting sources such as the open pit. Air quality measurements, both upwind and downwind of the plant, showed concentrations that adequately comply with the air quality guideline levels.

20.2.4 Water quality

For the EIA studies, physical–chemical analyses were performed at the Environmental Studies Laboratory (National University of Salta) and at Alex Stewart Assayers Argentina S.A. in Mendoza. During the pre-feasibility phase, control analyses were performed at the Induser laboratory in Salta.

The selected parameters for the laboratory analyses corresponded to those established in Annex IV of Law No. 24,585–Environmental Legal Framework for Mining Activities. In the EBL study, the results were compared with the water quality guideline levels established in Annex IV of Law No. 24,585, both for drinking water and protection of water life, and with the values specified in the Argentine Food Code.

The analyzed surface water bodies are mainly used for drinking by native fauna and for general domestic consumption by residents of the area. Water from water bodies assessed in the Lindero Mine area was used for exploration-related activities and for some domestic uses. Bottled potable drinking water is presently imported to the Lindero Mine from the city of Salta for culinary purposes, and human consumption in the camps, offices and work areas. Mansfield is presently working on the permitting and installation of a reverse osmosis plant at the operation.

It is important to note that a permanent physical and chemical participative sampling program (with authorities and local communities) of all water points (wells) in the mine area and other pre-established points such as Tolar Grande, Cavi and Antofallita is routinely conducted. The objective is to monitor the quality and quantity of water before and during the mining operation. The results of all water samples are analyzed and presented to provincial and municipal agencies and the results discussed with the community in general.

Water sampling also includes all effluents from the Lindero Mine, in this case from the camps facilities.

The established frequency of sampling and analysis for water quality and treated effluents is currently quarterly. In this way, Resolution 011/01 of the Ministry of Environment and Sustainable Development of the Province of Salta is being met.

20.2.5 Hydrology

According to the EIA, the Rio Grande basin and watershed take the Arizaro Salar as the local base level.

The aridity of the climate combined with extreme evaporation conditions means there are few permanent water courses or superficial sources in the area. The biggest water potential is found underground and comes from the contribution of elevated areas surrounding the different basins where precipitation is higher (recharge areas).

The Rio Grande basin has an area of 1,687 km² and consists of numerous sub-basins, including the Rio Grande peninsula, Lindero, Arita, and Chaschas. Most of these sub-basins are tributaries of the Arizaro Salar, with the remaining defined sub-basins, Cori and Emboscadero, forming from centripetal flow. In its lower regions, the Rio Grande basin has numerous flat lowlands with lagoons fed by springs that reach their peak during the winter months.

An updated hydro-geological study was performed by GT Ingeniería between August and December 2022. The final report was submitted to Mansfield in the first week of January 2023 and is under evaluation prior to final documentation, approval and filing with the applicable authorities (mining and water).

20.2.6 Soil science

Soils are typical of a desert environment with extreme conditions, being composed of accumulations of alluvial, colluvial and wind deposits that are characteristic of the Puna.

Extreme arid conditions result in skeletal soils with very little organic content. The extreme conditions and the scarce presence of basins with permanent water make this one of the most inhospitable areas of the puna.

According to the soil atlas of the Argentine Republic–Salta Province (1:500,000 scale) developed by the National Institute for Agricultural Technology (INTA) the following taxonomical classifications apply to the study area:

- Order: Entisols.
- Suborder: Ortentes.
- Major Group: Torriortentes.
- Sub-group: Lithic and Typical.

20.2.7 Fauna and flora

In the Property area, weather conditions substantially affect vegetation growth. The almost total lack of rainfall in the puna determines a vegetation floor that corresponds to the "Province of puna" shrub steppe, an herbaceous steppe. Key flora includes; añagua, lejía y tola, añagua y rica–rica, iros, muña–muña, vira–vira, and chachacoma. There are some areas with no vegetation whatsoever.

The fauna is typical of the Andean Patagonian sub-region, Andean district, and is mainly represented by camelids (the llamas, vicunas, and guanacos). Donkeys have been incorporated into the landscape during the last 50 years and compete for pasture with other herbivores.

Carnivorous animals such as the fox, skunk, and lynx, and rodents such as "the hidden" (a kind of mole), small guinea pig (cuis), mouse, and chinchillas, are present. Bird life can include the Andean ostrich (rhea or small ostrich), hill partridge, ordinary coot, lapwing, and parinas (flamingos). Reptiles are represented by lizards, which are common, and snakes, which are very rare.

20.2.8 **Ecosystem characterization**

The EIA included a detailed description of the eco-regions for the exploration-construction phase by characterizing the eco-regions, the communities, and various agencies involved in the Lindero Mine area, and their interactions. Ecosystem characterization allows a more complete understanding of the existing interactions between a given project and the environment, and vice versa.

Eco-regions, or biomes present in the Lindero Mine area are the puna eco-region and the high Andean eco-region. These eco-regions were divided into ecological units summarized by descriptions of the soil, flora, and fauna, and their particularities and interactions (shelters, niches, eco-tones, barriers, and corridors comprising areas of frequent use). The degree of disturbance that these communities are experiencing due to human activity is currently being evaluated.

20.2.9 **Local ecosystem characterization**

To characterize the local ecosystem presented in the EIA, a summary of environmental conditions of the area was formulated, based on the data from baseline studies, including flora (Vector, 2007a), fauna (Vector, 2007b), soil (Vector, 2007c), social (Vector, 2007d), and other environmental reports and studies.

20.2.10 **Identification of protected areas**

The nearest protected area to the Lindero Mine is the Provincial Fauna Reserve of Los Andes (protected since 1980), located 45 km to the north.

The Provincial System of Protected Areas of Salta (PSPAS) was created in 2000 by Act No. 7,107. Until then the Province of Salta lacked a legal framework for the protection of existing natural areas associated with a production area. The PSPAS comprises the protected areas of the Province, and its goal is to promote the management and effective protection of national parks, reserves, and natural and cultural monuments of the Province.

In 2018, the study for the integral and development plan for the "*Los Andes Wildlife Reserve, the Provincial Wildlife Refuge Laguna Socompa and Provincial Refuge for wildlife of the Ojos de Mar*", was approved under resolution 428/18 by the Salta Secretary of Environment and Sustainable Development of the Salta Province.

The Lindero Mine area is highlighted by the red circle in Figure 20.1 which shows the location of the mine to the south of the nearest protected areas.

Figure 20.1 Location of National Parks

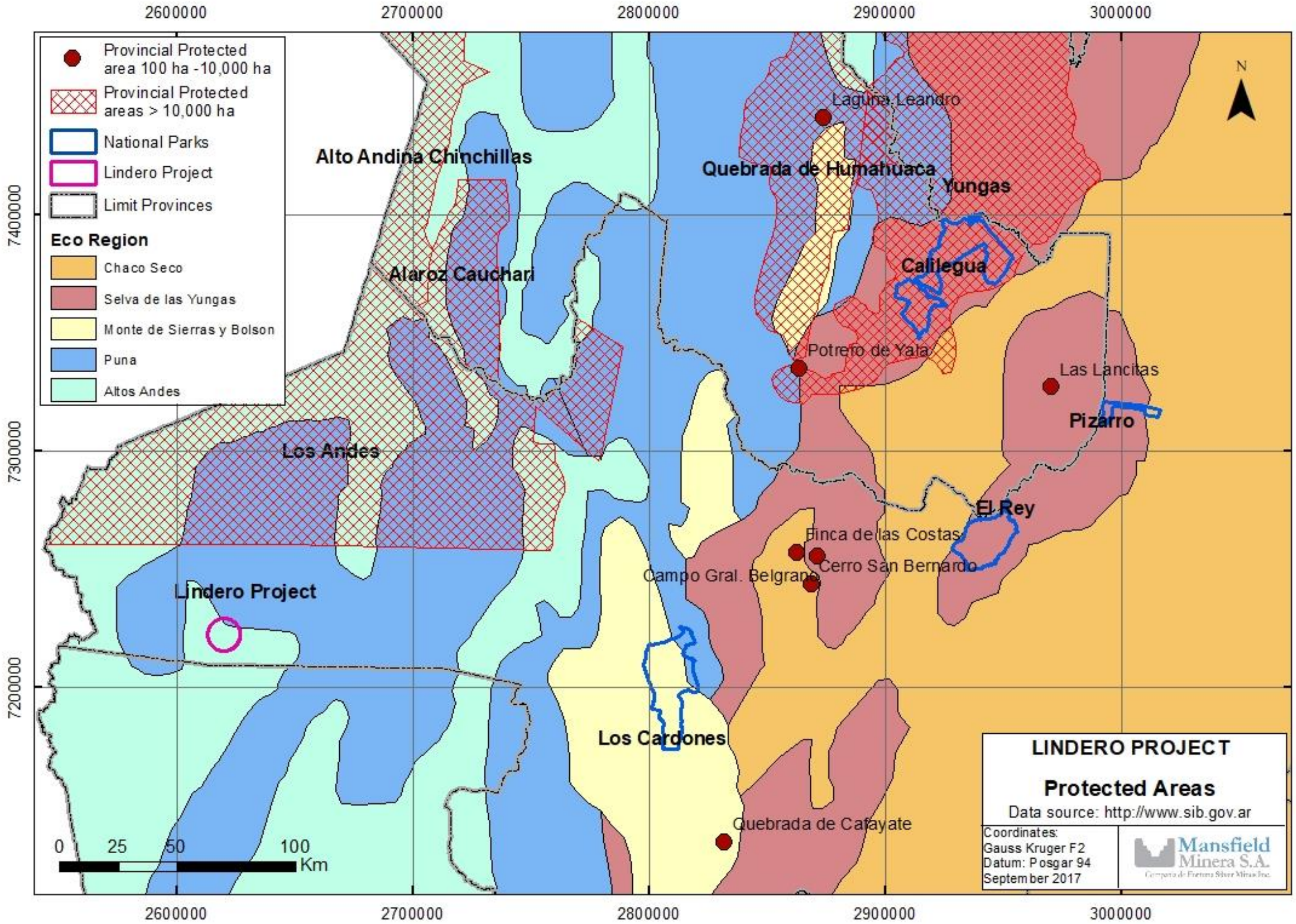


Figure from www.sib.gov.ar and modified by Mansfield, 2017

20.2.11 Archaeology

Prospecting undertaken in the region shows the presence of archaeological points of interest in scattered and isolated localities. These points comprise four main zones, as shown in Figure 20.2.

Figure 20.2 Location of archaeological sites

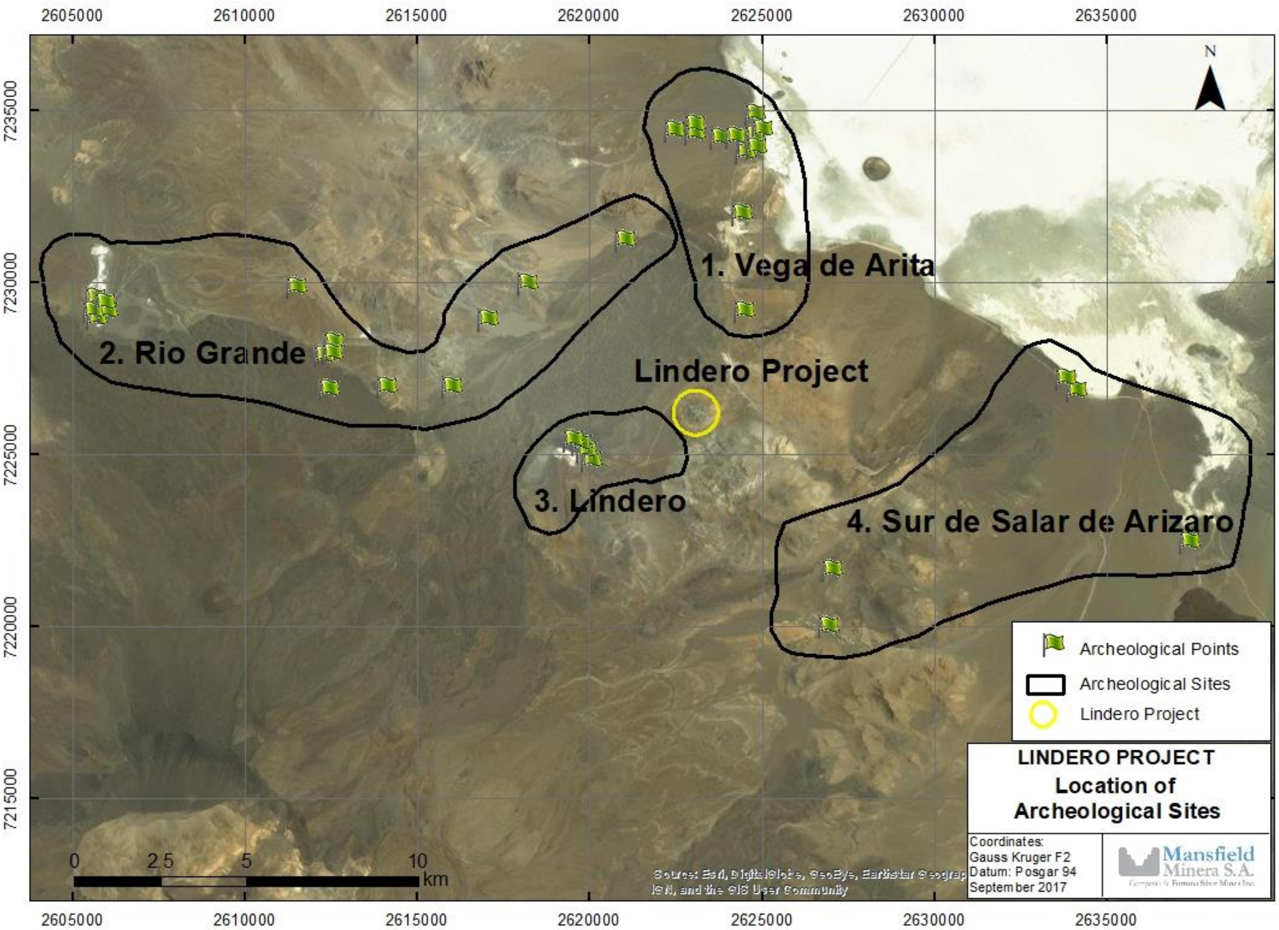


Figure prepared by Vector (2007e) and modified by Mansfield, 2017

Prospecting undertaken in the areas of primary or direct impact of the Lindero Mine indicated no archaeological and historical sites were present. However, along the access roads to the Mine and in other areas of influence, 36 archaeological sites were located. These sites were grouped into four sectors based on the proximity to the Lindero Mine.

The chronology of the identified archaeological sites situates them at the end of the Pre-ceramic or Paleoindian periods (7,000 BCE onwards), as set out in the EBL (Vector, 2007e). The age of these sites in the Arizaro Salar gives them patrimonial significance.

The key sites are as follows:

- Arita vega and camp sectors.
- Arita vega.
- The camp area.
- Rio Grande sector.
- Sites south of Rio Grande Hill.

- Lindero sector.
- Emboscadero vega.
- Arizaro Salar south sector.
- Cavi vega.
- Outcrop site in Arizaro Salar.
- Chaschas vega.

In 2018, Mansfield arranged for a local archaeology consultant to prepare a management plan related to the preservation of the heritage sites adjacent to Lindero during the construction and operation of the mine. The document was filed with the "Museo de Antropología de la Ciudad de Salta (Anthropology Museum of Salta City). The main conclusion from that report was that no heritage assets were registered as exposed on surface, therefore, no mitigation measures were required, such as direct archaeological intervention ("archaeological rescues") during the construction stage to correct unforeseen impact situations.

20.2.12 Environmental risks

Risk assessment

Irreversible impacts are those changes to the environment that persist indefinitely because it is not feasible to mitigate or restore the environment to an original or equivalent condition. Such irreversible impacts of the mine will be related to the pit, waste dump, and heap leach pads, as these works will permanently modify the local landscape.

Risk register

In each stage of mine development, an analysis of associated potential environmental risks must be undertaken. Potential risks will be considered at the stages of operation, closure, and post-closure of the mine. All of the facilities will be designed to provide safe operating conditions in order to reduce potential impacts on surface waters in the mine's area of influence.

Operations

The topography of the land will be altered by mineral extraction, especially in the area of the pit and by construction of the waste dumps and heap leach area. The modifications made by the waste dumps and the heap leach area do not represent geomorphological risks because they will be installed on sites that have no relevant natural hazards and will be designed to withstand earthquakes and extreme rainfall events.

Dump or sterile rock deposit

While it is predicted that the waste dump area will have adequate long-term stability, monitoring of slope stability and deformation of the dump must be carried out on a continuous basis during its construction. In the case of the waste dump, its development has been executed in accordance with its design with no observations of subsidence as of the effective date of this Report. Any cracks that may be identified are surveyed, monitored, and subsequently remediated to enable the sectors for loading. The waste dump is located in a dry environment with no adverse issues related to wind erosion identified as of the effective date of this Report. The material is granulometrically varied, forming a 37° slope, that includes slight localized bulging, but nothing that interferes with the footing design. No instabilities have been identified.

Water

The risk of water pollution will always be an issue for consideration and control. Monitoring and sampling will be constant, and the results reported to the relevant authorities. A comprehensive program of monitoring downstream water quality at several points has been implemented in order to put aside any uncertainty about potential contamination. Normally in this type of mine there are concerns about the risks of acid drainage and cyanide presence from the leach circuit although this is minimized by the lack of precipitation and drainages.

Water extraction from two wells in the Chascha area, 13 km east of the Lindero Mine, create a low risk of reducing the down slope subterranean flow of fresh water to the salar. There is no production activity (farming or residential) in the sub-basin or near the shore of the Arizaro Salar from where the water will be taken.

Water for human consumption is brought bottled, in 1,000-liter containers, from the city of Salta.

Air quality

The operation generates emissions of particulate material (dust) in the mine and plant area, mainly from mining operations such as drilling and blasting, movement of vehicles on dirt roads, loading and unloading of mined materials; and mineral processing operations such as crushing and agglomeration.

A plan for monitoring, control, and mitigation or reduction of suspended particulate material (dust) has been implemented through the installation of various types of dust suppressants and road irrigators, using brackish water as a flocculent of airborne dust. The nearest community is not downwind of the mine.

Gas pollution from vehicles and generators, the gold smelting furnace, the carbon regeneration furnace, and the analytical and metallurgical laboratory, is carefully controlled and mitigated.

Soil

Both the leaching area and process plant were designed as closed circuits and therefore no soil contamination is expected. There is, however, always a potential risk of failure in the leach circuit, in the transfer of solutions to different facilities, from drainage of leaching solutions from pads and ponds, and from heavy precipitation that may cause solution in the circuit to exceed levels. A contingency (excess) pond has been constructed to provide protection against such events.

The ADR and SART plants have a central drainage system to collect any spillage and send it to the containment ponds.

During operations, closure, and post-closure, events or situations of low probability of occurrence may arise involving the contamination of the land, such as an oil spill, chemical spill, or accidental discharge of process solutions. Each of these events will have health and safety action plans and environmental remediation plans as necessary.

Flora and fauna

Flora may be at risk where mining activities are undertaken, such as at the waste dump areas or in the vicinity of the open pit, and where blasting, processing, crushing, and material transport activities occur and on roads. All these activities can cause deposition of particulate matter.

Human activity, particularly household waste, can attract animals to the area, especially foxes. By regular soil covering in the disposal pit, the likely access by animals can be reduced.

Sites of archaeological interest

No sites of archaeological significance were found in the area that are directly affected by mining activity. The nearest sites are the Arita vega and the south sector of the Arizaro Salar.

Noise

Due to the location of the mine, the environmental noise impact will be virtually nil for nearby residents and local wildlife. Noise and vibration controls have been installed where necessary.

Closure and post closure phase

Environmental risks during the closure stage will be reduced by remediation and monitoring work. At the closure stage, soil will be contoured by heavy machinery to minimize the long-term impact of mining activity and return the topography of the land to resemble prior conditions. However, the movement of soil, and thus the risk, will be significantly less than in the mining operations stage.

In November 2022, Mansfield filed a detailed closure plan report with the Secretary of Mining. This is the first detailed mine closure study presented in the Province of Salta.

One social-environmental risk will be the impact of closure on employment, directly and indirectly, to the surrounding communities. It will be imperative to implement measures to mitigate this impact during the mine's operation.

A significant environmental risk will also be present during the closure of facilities, which will cause the production of significant non-hazardous industrial waste and hazardous products from the movement of heavy machinery. It will be essential to establish clear environmental policies with the contractors during this process.

The landscape is an important factor to be considered during this stage because the mine will have a definite and obvious impact on the natural landscape. To the extent possible, the impact on the landscape will be minimized.

20.2.13 Environmental management plan

One of the priorities of Mansfield is the care and protection of the environment. During the exploration and construction phases, an attempt was made to control to the greatest extent possible any potential environmental impacts on the area. The same effort is being made in the operational stage and will be made in the closure stages of the mine. Mansfield has defined environmental principles to enable the development of mining operations efficiently from a productivity standpoint and from an environmental perspective, which include:

- Comply with existing environmental laws and regulations.
- Establish and maintain an environmental management program to guide operations.
- Involve the entire staff of Mansfield and contractors in the Environmental Management Plan (EMP).
- Promote environmental awareness among employees and the communities where operations occur.
- Mitigate the potential environmental impacts that do occur and support environmental improvement programs for common benefit.

The EMP defines the criteria, the design of specifications, and management practices that are applied to the Lindero Mine to mitigate, control, and monitor changes in the baseline conditions during operations, closure, and post-closure of the mine.

Corresponding prevention measures, mitigation of potential environmental impacts, as well as rehabilitation measures, are outlined as appropriate.

Prevention measures will avoid potential environmental impacts, while mitigation actions are intended to minimize, correct, or compensate for environmental impacts of the Lindero Mine at different stages. Measures to increase, improve, and enhance the positive environmental impacts caused by the Mine will also be implemented.

An environmental contingency plan has been implemented in order to predict potential environmental incidents.

Measuring conditions

The following criteria were applied when identifying the environmental protection measures proposed for the Lindero Mine:

- A clear and understandable proposal allowing reliable and consistent implementation.
- Technically feasible activities that can be reliably implemented in practice.
- Proposed measures that are economically appropriate to the scale of the Lindero Mine.
- Ease of monitoring and control during the different stages of the mine life.

The Protection for Mining Activity Plan (PMA) that Mansfield has implemented for the exploitation phase of the Lindero Mine follows the considerations established in Law No. 24,585 of the Environmental Protection for Mining Activity Act.

Erosion control works such as trenches and gabions are built as necessary to ensure the physical stability of the facilities against possible flooding caused by rare heavy rains.

The stability of the waste dumps, heap leach pads, and pit are monitored continuously to prevent any slippage or collapse. In the bank area of the heap leach, piezometers have been installed to continuously measure pore pressures in order to detect the formation of phreatic levels in the slope that may cause slope failures.

In the construction and closure phases, the heap leach pads will have an appropriate slope. Berms have been built around the pad perimeter to prevent any overflow. Drainpipes are maintained around the pad perimeter in case of possible storm waters.

A closed-circuit leach system was designed to minimize fresh water requirements, prevent discharges to the environment, and maximize the reuse of all process solutions. As a control measure, water downstream of the leaching zone, plant, and sterile tank are monitored regularly to identify any abnormalities in the chemical properties of the groundwater.

Contingency measures will be implemented to mitigate or remedy any impact which may occur. In the leaching circuit, a contingency (excess) pond has been built to absorb solution in the leaching area and other ponds in the event of a malfunction of the leach circuit. As a corrective measure, downstream areas have been designed to recover any leaching solution and return them to the circuit. In the waste dump area, the water and soil are monitored for acid rock drainage (ARD) using an acid–base-accounting (ABA) testwork. In early 2022, ABA tests were performed by Alex Stewart International Argentina S.A. laboratory on 20 samples collected in February, with additional tests planned annually. Travertine (abundantly located nearby) can be used for neutralization of acid if required.

Reclamation of the site during the closure and post-closure phases will help to reinforce all other measures taken.

One of the environmental risks previously identified is the impact on the landscape of vehicular traffic, such as new roads, spills, hazardous waste such as fuel and diesel oil, cargoes such as process reagents, and dispersion of these residues in the soil and air. Preventive measures have been implemented to mitigate these risks. Contractors are required to have a program of security and risk prevention for vehicles, adjusted to the mine's regulations in regard to maintenance of vehicles, traffic speeds, night traffic restrictions, driver-training requirements, and load handling.

As an additional preventive measure, signs have been installed along the roads in areas that are considered to be dangerous. Communications between vehicles and the control center have been established throughout the Lindero Mine. Communications have also been established between the mine and various control points on the access routes, such as at Salta and Pocitos for monitoring vehicle status, load and source data, and estimated times of arrival. If any environmental accident occurs, a contingency plan will be triggered to avoid a significant environmental impact.

A lesser environmental risk related to vehicular traffic is that of emissions of particulate material (dust) and exhaust gases. As a precautionary measure regarding exhaust gases, no vehicles on the Property can be more than 15 years old, and all must comply with current national legislation with respect to a mandatory technical review. To minimize emissions of particulate matter (dust), besides the restrictions on speed limits, water trucks wet the roads on a regular basis.

Regulations require that vehicles are maintained to minimize noise and vibrations with measures established requiring drivers and contractors to ensure loads are well secured prior to transportation.

Experience in the puna region has shown that the use of brackish water or brine that can be easily sourced from the Arizaro Salar, can achieve 80 percent efficiency in the reduction of particulate matter (dust) emissions into the atmosphere. The conventional method of using fresh water is estimated to function at 60 percent efficiency. Therefore, using brackish water decreases the volume of fresh water used for dust suppression. Atmospheric particulates (PM10) is regularly monitored in the mine area and surrounding communities to establish comparative benchmarks against the environmental baseline. The results of the monitoring program are shared with the local population. Company policy dictates that the operation must not only be environmentally and socially sustainable, but the awareness of social and environmental status must be demonstrated to the local community and other stakeholders.

Emissions of blasting products and gases into the atmosphere are limited in duration (time). There is approximately will one blast per day, and at this frequency the effects are not anticipated to be significant. As a preventive measure, emissions are monitored and if necessary, the blasting procedure is adjusted to reduce the excessive release of particulates (dust) into the atmosphere.

To mitigate the risk of environmental impact from solid waste and domestic and industrial fluids, a comprehensive plan has been established for managing these wastes, including classification by type, hazard, and recyclability. The waste management plan is presented as a compulsory preventive measure during the induction process when personnel enter the Property. A location adjacent to the operation has been designated as the waste storage area with a small wire fence surrounding it to prevent entry of persons or animals, which helps to avoid dispersion of the waste by wind.

The entrance to the waste storage area is controlled by Mansfield staff that record the quantity, type, origin, and contractor delivering the waste. A waste management plan establishes the guidelines for removal, transportation, and final disposal of this waste. It is a contractual requirement that contractors who are hazardous-waste generators register with the Province of Salta under current regulations and, upon final payment of the contract, a certificate of final disposal of waste removed from the mine is required.

As a mitigation measure, practices have been established that decrease the amount of waste generated at the Lindero Mine, such as the use of reusable drinking water containers. Grey water from the kitchen and showers, and black water from the toilets, are dealt with appropriately (treated and used in the leaching process). Wastewater treatment is conducted using a water treatment plant sized for the camp and offices.

Flora and fauna should not be significantly affected as the main operational activities take place in areas where there are no significant numbers of plants or animals. However, some consideration has been given to marking areas such as the Emboscadero area where wildlife such as flamingos and vicuñas and micro-organisms are known to occur.

Mansfield has banned pets, hunting, and other activities that could scare away native animals from the Property and permitted surrounding areas agreed by government officials.

Mansfield continues to hold regular information meetings regarding the Lindero Mine with the surrounding communities. Meetings have been conducted with the community to create co-operative mining services (i.e. catering and cleaning services). After the permanent mine closure, the camp facilities may provide alternative employment such as tourist accommodations.

While the construction and improvement of roads can cause an environmental impact on the landscape and soil, there will likely be a positive impact from a social perspective for those people living in isolated areas. These inhabitants will have better roads, the flow of tourists in the region may increase, and the local economies may have better opportunities for growth.

To mitigate the strong, negative social impact when a company withdraws from an activity such as a mining operation, it is necessary to implement measures during the operations stage. These measures could include employment training that will be useful to the employees after the closure of the mine.

20.2.14 Issues of environmental concern

The following list specifies the most important issues to be considered from an environmental perspective that must be detailed in the EMP.

- Surveys of residents living in communities near the mine.
- Interests of those agencies evaluating the EIAs.
- Special requests by the Ministry of Environment and Production of the Province of Salta (DIA, Environmental Impact Declaration).
- Publications by Argentine media.
- Mining activity of concern to Argentine citizens.
- Statements by non-governmental organizations (NGOs), politicians, and other opinion makers.

The key areas of community environmental concern are:

- Use of cyanide processes in the mine: special care has been placed on the prevention and establishment of monitoring controls of this input for transport, use, and final disposal. Meetings are held periodically with the community about the use and transport of cyanide and sodium, which comes from Australia and China via Chile to Lindero. Transportation companies today comply with the International Code for the Use of Cyanide in Mining.
- Water use by the process plant and leach pads: publications and comments concerning the excessive use of water and water pollution due to mining activities are common. Mansfield has implemented a water monitoring program with the process being a participatory activity in which companies, governments, NGOs, and the community are involved. It is recommended that water quality data be communicated with higher frequency than that required by the supervisory authority. It should be noted that there are no water effluents at the Lindero Mine.
- Transparency and dialogue: the population from the nearby communities expects the Lindero Mine to engage in constant communication within the direct area of influence of the operation. This includes Cavi the nearest community at 15 km away from Lindero Mine, Tolar Grande, Antofallita, Salar de Pocitos, Olacapato and San Antonio de los Cobres. A community engagement plan has been established, implemented, and is revised annually to manage concerns.
- Effects of blasting operations on the environment: detailed information on the rock blasting process is disseminated to stakeholders.
- Doubts concerning the environmental and social impact of the closure and post-closure phases: the implementation of plans to minimize environmental

impacts after the mine closure will be described in greater detail during the later stages of mining operations. Details about the ongoing work carried out must be communicated during these stages to minimize a traumatic and abrupt change during the closure process. There must be an open and honest communication with stakeholders about the final status of the mine, especially its open pit, waste dumps, and heap leach pads, which will be the largest remnants of the mine on the landscape.

20.2.15 Operations and management

An environmental monitoring program has been initiated at the operation, which includes a community input plan. This allows Mansfield to hear directly from residents regarding what they expect from Mansfield on issues relating to the environment. Responding to these concerns quickly and honestly shows the community that Mansfield takes its concerns seriously. The goal of the input plan is to have the local people consider Mansfield as an important part of the local community, with an open-door policy for the population in general.

While there are strict requirements from the competent authority (Secretariat of Mining of the Province) for items such as the EIAs and the respective biannual renewal reports, it is proposed that environmental monitoring reports generated internally by Mansfield every six months are submitted to the enforcement authority and the community in general. This will provide more contact with the government and community.

Environmental remediation costs will decrease upon closure if all measures are taken to mitigate negative impacts and appropriate remediation is conducted from the commencement of mining activities.

20.3 Community relations

20.3.1 Social-economic and cultural aspects

The nearest town to the mine is Tolar Grande (head of the Municipality) located 75 km from the Lindero Mine reached by Provincial Route No. 27. The municipality covers 13,785 km² and has a population of approximately 250 inhabitants, most of whom live in the town of Tolar Grande.

The area in which the Lindero Mine is located is an area with a very low population density, with no permanent human settlements recorded at the conglomerate level in its surroundings. There is a meager use of the land characterized only by the use of the soil for very sporadic grazing of cattle and seasonally inhabited, with some rural posts that disappear in periods of greater inclement weather.

According to the climate and the characteristics of the soil, the agricultural possibilities are practically non-existent and where present, have very poor development and are restricted to usage by locals only. There are two families that live near the Lindero Mine, in small rural posts of one family each, approximately 15 kilometers from the mine. These two families live with cattle they raise adjacent to a "vega" (natural upwelling of fresh water).

The two families and the town of Tolar Grande constitute, from a social and community perspective, the area of direct influence of the Lindero Mine. The fundamental criterion for the identification of the zone of direct influence consisted of the weighting of a geographical type variable that determined the human settlement closest to the mine: the town of Tolar Grande delimited according to the impacts generated from the development of the activity on the common resources they share (soil, water, air, earth) and the potential alterations in the socioeconomic aspects.

The low population density and isolation are the main characteristics of the town. Difficulties in obtaining provisions, transportation, and communication are a constitutive part of the Tolarean society. The roads are generally in poor condition, poor communications and transportation problems mean that the life of this community remains in oscillating isolation. The same occurs with places that are isolated in the summer due to the rains or in the winter due to snow, for which reason they periodically remain uninhabited.

Given the high frequency of the transport of materials and supplies to the Lindero Mine via access roads, it is considered pertinent to establish the localities of Olacapato and Salar de Pocito, and the town of San Antonio de Los Cobres (Municipality head of Los Andes Department) within the area of indirect influence.

The original inhabitants of the Los Andes department (that includes San Antonio de los Cobres and the Tolar Grande Municipality), belong to the Kolla aboriginal ethnicity. Most of the inhabitants in the direct area of influence (Tolar Grande town, Paraje Cavi and Paraje Antofallita), belong to the aboriginal community called the "Kolla Community of Tolar Grande". This original community has been formally recognized by the Province of Salta as an original aboriginal community, with legal status, with registration number # 164/02.

The Lindero Mine area is not located in an area of direct historical value. The socio-cultural study conducted in the EBL indicates a positive trend in terms of mine impact.

The mine is located in an area where mining activity has historically taken place. For this reason, all of the people interviewed from the local community demonstrated knowledge of the mining activity in the area. Most residents interviewed highlighted mining activity as a job generator in the region.

The perception surveys carried out by the social evaluators (in the latest social impact reports carried out), through personal interviews with the inhabitants of the areas of direct influence, evidenced that there is a high social acceptance in relation to the development of the mining industry in the understanding that it guarantees better living conditions, in its sanitary aspects, especially labor and social in the surrounding population. The environment is a serious issue for the residents. Although they believe that the mining activity does not substantially affect the environment, they refer to certain risks, such as water use, dust pollution, and the effects on the people living in the vicinity of the mine.

20.3.2 Stakeholder engagement

Since 1994, when Mansfield initiated the first exploration activities in the Salta Puna Region, it has communicated information regarding exploration work performed within the territory of the Municipality of Tolar Grande and then the discovery and development of the Lindero Mine and participated in many social activities in order to answer questions from the Tolar Grande community.

When construction of the Lindero Mine was completed, Mansfield opened a permanent office in the town of Tolar Grande to develop a direct and fluid communication with the community, to answer questions, requirements, or complaints. This office is open to the public throughout the week.

In recent years, Mansfield has involved the community in taking environmental samples (water, soil, and air) and discussing the results to inform the community on environmental issues. The community has actively participated in the environmental monitoring during the construction of Lindero and the first years of operation, together with Mansfield, municipality and provincial authorities.

As viewed by local residents, the relationship between mining activity and job generation has three main aspects. First, the region has a history of mining activity, so the people are familiar with what it means to the area. Second, several people in Tolar Grande worked on the exploration phase at Lindero and other mining ventures, so the mine is familiar. Finally, there is the belief that new mines will provide jobs and help avoid the migration of young people to larger towns or cities.

The aforementioned was reflected during the construction of the Lindero Mine and the beginning of the operation. Mansfield carried out a survey together with the Municipality and the Kolla Community of Tolar Grande, in order to identify and prioritize the employable base of the Tolar Grande community, which led to the majority of people who were looking for a job being hired by Mansfield or its contractors.

Employment at the mine is valued because it offers comparatively better salaries, establishes access to social security, and now, due to better mining technology, is seen as less difficult and labor intensive than in the past. One reason for the positive opinions is the pursuit of opportunities that can provide training for future careers in mining.

In relation to the economic benefit that the mining activity supplies, some respondents recognized that the limited mine life is a negative aspect. This is exemplified by local experiences with the La Casualidad Mine, where the mining boom was followed by total abandonment.

In the initial stages of development of Lindero, traffic in the area generated an indirect positive impact on the lives of isolated villagers. Communication with friends and family increased due to the visits and packages they received via Mansfield vehicles that regularly travel to urban centers.

Currently, mining activity has grown significantly in the area, not only due to the development and operation of the Lindero Mine, but also due to the rise and development of lithium projects. Within the Municipality area, there are currently several projects under exploration and one under construction (Mina Mariana), which has also had a positive impact on employment, development, and infrastructure in Tolar Grande.

20.3.3 Community development

Continuous contact and work between Mansfield and the Community of Tolar Grande dates back to 1994. Mansfield has contributed to the community since the beginning of the regional exploration works, to the development and education of the local population, particularly with regards to potential mining activities and the development of the mine. This contribution was initially provided through technical talks to the community, contributions, agreements and the organization of visits to Lindero for local authorities, teachers, and students.

Mansfield places a high priority on employment of local workers, knowing that mining development can have a remarkably positive socio-cultural impact. For the exploration and construction phases, staff were recruited from the communities of the Puna Region, mainly from the direct area of influence and from the other villages and towns in the puna

(Antofallita, Tolar Grande, Olacaparo, Salar de Pocitos, San Antonio de los Cobres, and Santa Rosa de los Pastos Grandes). These individuals demonstrated a significant change in attitude regarding responsibility and predisposition towards private activity (mining). It is worth mentioning that the constant training received in their work, has giving them experience as trained personnel for future mining in the area.

During the construction phase of the Lindero Mine, Mansfield hired a large number of people from the local puna communities, with no mining experience, to train them for future operational tasks. Training courses were held for mine plant personnel and heavy equipment operators, with positive results. Many of these personnel currently work in the Lindero Mine operation. Additionally, recently Mansfield has encountered mobility of personnel trained by Mansfield who, due to their mining experience, have moved to lithium mining companies working in the Province.

In order to guarantee the security of the local population and visitors to the region, Mansfield, with other exploration companies and the municipality of Tolar Grande, have regular meetings in which emergency, safety and security measures are discussed, and related operating protocols agreed upon. For example, a map of the area has been produced that shows the location of roads, mining camps, areas covered by cellular phone towers, shelters, and nature reserves.

All issues discussed with the community are considered of great importance by Mansfield and are debated internally by management as part of a Community Relations Committee.

At the beginning of construction of the Lindero Mine in 2018, Mansfield signed two local social agreements of mutual collaboration (general frame agreement). One with the Kolla Community of Tolar Grande (aboriginal community) and one with the Municipality of Tolar Grande. These agreements established the bases of mutual collaboration and relationship between the Company and local stakeholders (Community and Municipality) during both the construction and the exploitation stages of the Lindero Mine.

These agreements are aimed at contributions agreed upon between the Company and the community or government in order to contribute to the integral growth of the community, especially in education, health, labor development and infrastructure.

According to the agreement, results and objectives are revised and approved by the Community Assembly annually, together with the Company. Since its signature, four annual periods have been evaluated, discussed, and approved.

More than twenty agreements were signed during the construction and the commencement of operations at Lindero, including with other stakeholders from the indirect area of influence. These agreements maintain as a central objective education, health, development of local suppliers, infrastructure, and transport among others.

Among these agreements can be highlighted the following:

- Agreement with the Ministry of Education of Salta, for the development of education in the Puna Region.
- Provision of internet service to Tolar Grande.
- Tolar Grande secondary school computer room infrastructure and equipment.
- Construction of a heating system in the elementary and high school in Tolar Grande.

- Contribution of fodder for small cattle for the Cavi and Antofallita areas.
- Agreement with Paraje Cavi for infrastructure development.
- Financing of the health center of Tolar Grande.
- Donation of an ultrasound machine to the health center of Tolar Grande.
- Financing of the transportation system.
- Agreement with the Catholic University of Salta for the implementation of the Virtual University Center in Tolar Grande.
- Agreements with the National University of Salta.
- Funding of college scholarships.
- Welding courses in San Antonio de Los Cobres and Tolar Grande.
- Gastronomy courses in San Antonio de Los Cobres.
- Construction of a water storage system and perimeter fencing for the Sarmiento School in San Antonio de los Cobres.
- Contributions to the San Antonio de los Cobres Hospital.
- Road maintenance (provincial route N27).

According to the antecedents as detailed in the most recently approved EIA, the renewal submitted in 2021, and the agreement signed with the Tolar Grande Municipality and Kolla Community, Mansfield has contributed to the development of the town and education of the local population. This contribution has been carried out through different actions, technical talks to the community and the organization of visits to the Lindero Mine for local authorities, teachers, and students.

In addition, prior to construction activities, a formal public declaration of support for the Lindero Mine was issued by the Provincial government, recognizing the Lindero Mine as the priority development project for the Salta Province.

Mansfield has participated in numerous meetings with the Tolar Grande community to communicate the progress of the Lindero Mine. In 2018 the Ministry of Mining of Salta issued Resolution 235/18 that requires Mansfield's participation in the "Mesas sociales" (roundtable social dialogue). This involves mining companies meeting periodically with social and governmental organizations of the community in the presence of a representative of the Mining Secretary to discuss social issues and claims that may have arisen. Minutes are released from each of these meetings in accordance with ILO (OIT) Convention 169.

20.4 Closure

20.4.1 Legal requirements and other obligations

Although there is no law in the Argentine Republic or in the Province of Salta that regulates the instance of mine closure, general guidelines for the closure of mines with financial guarantees and a resource guide of good practices for mine closure were published between 2019 and 2021:

- Mine Closure Good Practice Resource Guide, prepared by the National Directorate of Sustainable Mining Production of the Mining Policy Secretariat of the Ministry of Production and Labor, Presidency of the Nation, published in August 2019.
- General Guidelines for the Closure of Mine with Financial Guarantees in the Argentine Republic, Resolution 161/2021, Ministry of Productive Development of the Nation, published in June 2021.

The mine closure plan will consider the requirements stated by:

- National Constitution, Article 41.
- Provincial Constitution, Articles 30, 79, 81, 82.
- Mining Code of the Argentine Republic.
- Mining Investments Law 24.196.
- Water Code of Salta Province, Law 7.017.
- General Environmental Law 25.675.
- National Law of Environmental Protection 24.585.
- Provincial Law of Environmental Protection 7.070.
- Provincial Law of Protective Areas 7.107.
- Environmental Code, Municipality of San Antonio de los Cobres, Bylaw Articles 005/2008.
- Cultural and Archaeological Heritage Law 25.743.
- Environmental Impact Assessment (EIA) report, provincial resolution of the Ministry of Economic Development, Mining Secretariat 316/2011.

20.4.2 Closure management

Closure considerations

The Lindero Mine is being managed to fully protect human life and the environment. The objective of the closure plan is to ensure that after mining activities cease, the land and communities are left in a state that allows maximum opportunities for the future.

Closure plan

The mine is anticipated to have an operational lifespan of approximately 12 years with closure activities anticipated to start in 2034. The first detailed closure plan of the Lindero Mine was developed and submitted to the mining authority on November 30, 2022 (as per conditions contained in the granted environmental development permit). This is the first detailed mine closure study to be presented in the Province of Salta.

Due to the dynamic nature of mine closure planning, periodic reviews are required to reflect the changing circumstances of the mining operation. Technical reports will project the mine situation at the time of the closure, including the environmental and cumulative effects on the area. Periodic revisions of the closure plan will incorporate this information to ensure all impacts that can be anticipated are dealt with. The closure plan must ensure site water quality and the long-term stability of the heaps, waste-rock storage areas or other stockpile storage areas with these objectives being achieved through monitoring. It is envisaged that a period of post-reclamation monitoring will be required until it has been satisfactorily demonstrated by the results of site monitoring that reclamation measures have achieved the required outcomes and are self-sustaining.

Post-reclamation tasks will include:

- Repair of internal roads.
- Ensuring the chemical and physical stability of the heap leach area.
- Ensuring the physical stability of the waste dumps.
- Removal of smaller structures built at ground level.

The main objectives of the closure plan are to:

- Comply with the regulatory requirements to which Mansfield has committed regarding the final closure of the mine.
- Prevent, minimize, and mitigate adverse environmental impacts.
- Leave the site in a condition in which environmental and public safety are protected.
- Comply with all social obligations so as to retain the confidence of the stakeholders in the mining sector.

Closure plan phases

The closure plan proposed by Mansfield includes the following phases:

- Progressive closure, which includes those activities that occur during operation of the mine. This phase includes reclamation activities that take place simultaneously with mine operations, such as waste dump and road reclamation.
- Final closure, which includes the reclamation of the land no longer being used by operations, such as the internal roads, crushing plant, and camp, and integration of permanent infrastructure into the landscape. This phase includes the closure of the heap leach, process plant, and pit areas.
- Post-closure, which includes monitoring of the physical and geochemical stability of the reclaimed areas following the progressive and final phases of closure. This phase includes monitoring and if necessary, maintenance activities.

During the progressive and final phases of closure, it is necessary to consider the dismantling of equipment and facilities, the demolition of smaller structures built at ground level, the stabilization of waste, and the physical and chemical stability of the site.

20.4.3 Reclamation and closure of affected areas

Facilities and infrastructure

In addition to the ADR, SART and laboratory infrastructure, the mine is comprised of an administrative office, warehouse and maintenance buildings and accommodation buildings with living facilities.

The camp and the other buildings have been built with materials that allow their dismantling and removal from the mine site. Part of the camp might be kept to be used in future mining activities or for possible tourism, which would be beneficial to the local community.

Utility poles, power lines, and any generators and transformers will be removed from the site. Any perimeter fencing will be dismantled and removed.

Dismantling of plant facilities will include clearing all valuable or usable materials out of the facilities, and then dismantling, disassembling, and disposing of the facilities.

The ADR and SART plants and the adjacent laboratory will be removed once they are no longer needed to support residual leaching and drain-down activities.

Fuel storage tanks will be emptied, washed, dismantled, and removed from the site.

For all areas, ground and concrete conditions will be evaluated visually and chemically to determine if areas or components with traces of fuel will require special treatment.

Open Pit

All equipment will be removed from the pit area. However, because of its size, the mine pit itself cannot be reclaimed to its original status. In the meantime, rock barriers will be erected to keep people away from dangerous areas.

Heap leach

The heap leach system has been designed and built so as to minimize the need for long term active maintenance of the site in the post-closure period. However, closing the heap leach area will still require recovery and recycling of heap-leach solution, chemical stabilization of the heap leach area, landscaping of the area to manage run-off, and road removal.

The chemical stability of the leaching pad is aimed at decontaminating the leaching circuit, including the mineral piles, the cyanide solution pumping and circulation systems, irrigation systems and process ponds (located in the processing plant). Through the application of chemical stabilization measures, the aim is to achieve a quality of water compatible with the guide levels indicated in current legislation.

Currently, tests are carried out on columns with different degrees of compaction in order to determine the necessary volumes of washing water, the efficiency of cyanide destruction and the time that this activity requires. Likewise, the dissolution of metals in the cyanidation process are evaluated, in order to take measures aimed at the geochemical stabilization of the material stored in the leach pad. Throughout these tests, parameters including pH, gold concentration, volume of solution collected, and cyanide concentration are measured.

It is also necessary to maintain the heap leach area with an adequate slope that is smoothed and rounded to prevent water from concentrating which prevents erosion during unusual precipitation events. Gutters are left in place to handle storm runoff.

The management of superficial drain-down will be improved during closure activities through the creation of stable channels with few or no long-term maintenance requirements.

The major activities surrounding closure of the heap leach are proposed as follows:

- 2034 – Residual leaching will continue at a reduced NaCN level, to rinse out remaining recoverable gold while preparing the heap for rinsing.
- 2035 – A period will follow active leaching where rinsing of the heap with low level (residual) cyanide solution occurs. No new cyanide will be added to the leach solution during this time. The addition of raw water to the circuit will be maximized to dilute cyanide concentration and the leach solution will be applied with sprinklers to maximize evaporation rates and reduce solution inventory. If necessary, evaporators will be used to assist in solution reduction.
- 2035 – The heap will be closed in a sequential manner, consisting of shutting off rinse solution, draining of upper lifts, followed by rounding and smoothing of heap benches.
- 2036 – Reclamation of heap leach and ponds by constructing evapotranspiration basins in existing ponds to collect and evaporate drain down solution from the heap. These basins will also serve to collect and evaporate future design storm run-off from the heap leach pad and ponds areas.

Cyanide and metals will be reduced in the heap leach effluents until acceptable standards are met. This reduction will be achieved through;

- Recirculation of the solution.
- Natural mechanisms of cyanide degradation such as UV and air destruction.
- Formation of chemical complexes (most cyanide complexes are less toxic than the cyanide).
- Precipitation of insoluble cyanide salts.
- Natural biological degradation.

If the above mechanisms are not satisfactory in reducing cyanide levels, additional processes such as water treatment and chemical destruction processes can be considered during the closure phase. It is currently assumed these additional processes will not be necessary.

Waste dump

One area is being used for waste rock storage, to the southwest of the pit. Waste rock is sampled, analyzed using acid-generating static tests, and classified during mine operations. The physical stabilization work for waste rock storage is ongoing during the operation of the mine to smooth the projected local and global slopes, mainly to guarantee safety in nearby areas in the event of a possible detachment of material. Final reclamation of the waste dump will occur in 2034 once the pit is mined out and there is no need for waste rock disposal.

Acid drainage

Two fundamental conditions must be present for the generation of acid drainage: plentiful rainfall and the presence of abundant sulfide-rich minerals in the host rocks. The mine is located in an extremely arid region with an average rainfall of approximately 50 mm per year. The host geology and mineralization contain some sulfide-rich minerals (i.e. pyrite) making the probability of acid generation unlikely. Additionally, the host rocks contain minerals such as carbonates and epidotes that are expected to counteract or buffer against acid generation. The mine and dumps are located in a closed basin with no external drainage. For identified higher sulfide-rich zones (i.e. the northern portion of the pit) material extracted from these areas will be tested, monitored and waste containing higher pyritic content will be encapsulated within the dump footprint to ensure it is not placed within 40 m of the final surface limit of the waste rock dump. It is recommended that the operations generate a sulfide (pyrite) block model to proactively plan material placement.

Domestic and industrial waste

The Lindero Mine will follow a very strict policy during its lifetime regarding the management of waste to minimize remediation at closure. This policy will classify waste for recycling or final treatment.

Superficial infrastructure related to domestic and industrial waste will be removed, such as the fence around the depot. Industrial and hazardous waste itself is periodically removed from the mine to the appropriate facilities. Under the waste management plan, non-recyclable domestic waste, which is projected to be mainly organic, will be duly isolated, backfilled, and landscaped. The need for further treatment for all waste will be evaluated by trained personnel as necessary.

Backfilled areas will be contoured to allow superficial water to flow naturally in case of rain and then covered with a 0.5 m layer of surface material from the area to allow natural re-vegetation. Before backfilling, the material coming from the foundation structure demolition, if there is any, will also be deposited in the waste dump to help protect against erosion. An inspection by both the operating and community authorities will be made before the closure of the waste depots.

Water wells

Prior to final closure, it will be evaluated which water wells need to be maintained and which ones removed in order to carry out the monitoring tasks.

Production water wells will be abandoned in accordance with government regulations or transferred to support an approved post-mining land use. Monitoring wells will be abandoned when the government and company decide that they are no longer needed for long-term monitoring purposes.

Aqueduct

The aqueduct closure strategy is the complete removal of the pipeline and the reclamation of the affected sites (water intake, filters, storage, among others) to a condition similar to that found at the time of intervention.

The beginning of the closing activities of these facilities is subject to the cessation of operations, as well as the result of the agreements reached with third parties, the Enforcement Authority, or the municipality regarding its retention, taking into account the strategic value of this type of infrastructure for the development of other mining and/or tourism projects.

Internal and access roads

All roads within the Property, including remnants of old access roads, will be reclaimed. Use of the access road will be restricted during and after the closure. A minimum number of internal access roads will be kept open so that monitoring and inspections of specific areas of the Property can be made. These inspection areas will include the pit, waste dumps, water wells, heap leach and surface water areas.

20.4.4 Monitoring during closure

The environmental monitoring plan implemented during the operation stage will continue in force during closure activities. The monitoring plan will be updated as the mine approaches the closure stage, with elements added and deleted as appropriate to the conditions.

20.4.5 Post-closure monitoring

Post-closing activities will be carried out for at least five years after the final closure of the Lindero Mine, according to reference standards in order to ensure their intended objectives including:

- Confirming the long-term physical and chemical stability of reclaimed surfaces such as pit, waste dumps, and heap leach areas.
- Monitoring groundwater and surface water flows.
- Evaluating the heap drainage water content.
- Evaluating the achievement of water quality standards in the area affected by the mine.
- Monitoring flora and fauna in the area affected by the operation.
- Monitoring the social impacts of closure.

The post-closure monitoring program, including monitoring, will be carried out with the participation of the community of Tolar Grande and the provincial government authorities.

20.4.6 Closure costs

Costs of mine closures and reclamation of mine sites vary considerably due to factors such as location, climate, rainfall, environmental vulnerability, age of the mine, mining method, minerals being mined, waste characteristics, and labor costs. Closure cost estimates should be reviewed regularly to reflect changing circumstances and adjusted according to inflation and work requirements, as well as undergo a thorough reassessment on a predetermined cycle to account for changing community standards and expectations.

In 2022, GT Soluciones Integrales conducted a review of total closure costs for the Lindero Mine that are estimated at US$ 24 million, comprised of the following costs:

- Closure cost of physical components (facilities): US$ 21.8 million.
- Closure cost of social component: US$ 0.5 million.
- Monitoring cost during closure and post closure stages: $ 1.7 million.

A summary of the annual costs by mining stage is presented in Table 20.2.

Table 20.2 Estimated closure costs by stage and year

Stage	Closure planning (2029-2033)					Closure (2034-2035)		Post closure (2036-2040)				
Year	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Cost (US$ 000's)	180	180	641	515	1,149	9,317	7,038	1,512	891	910	854	816
Percentage	0.75	0.75	2.67	2.14	4.79	38.82	29.33	6.30	3.71	3.79	3.56	3.40

20.5 Greenhouse gas (GHG) emissions

Given its remote location, connection to Argentina's national grid is impossible for the operation. For this reason, the Lindero Mine relies on a diesel-powered electricity generating plant. In 2022, total GHG emissions (Scope 1+2) were 49,414 tCO2e; GHG emissions intensity by mineral processed was 9.00 tCO2e/kt and by gold production was 0.42 tCO2e/oz. These annual emissions are expected to remain within a similar range for the life of the mine.

In 2021, a climate change strategy was developed at the corporate level for Fortuna, which includes the Lindero Mine. This strategy is aligned with the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD). After completing an on-site study in 2022, it was decided to move towards the implementation of a solar renewable energy generation plant to supply the Lindero Mine with part of its energy consumption. The operation is currently in the bidding process for this service and aims to implement start-up in either late 2023 or 2024.

20.6 Comment on Section 20

It is the opinion of the QP that the appropriate environmental, social and community impact studies have been conducted to date at the Lindero Property and Mansfield has maintained all necessary environmental permits required for operations.

During the operational and closure phases of the mine, it is recommended that Mansfield:

- Maintain continuous communication with stakeholders.
- Conduct air quality sampling in camp locations and operating facilities, as well as on routes near local villages.
- Monitor during the stages of operation and closure so as to remain aware and keep control of any possible impacts caused by the mine.
- Give priority to the changes in the region from which the community will benefit, such as road construction.
- Conduct flora and fauna monitoring surveys periodically.
- Perform soil monitoring at vulnerable points once a year during the lifetime of the mine and five years after its closure. These vulnerable points correspond to areas where liquids, effluents, or solid waste disposal will be handled including

the waste dump area; workshop areas; sanitary landfill areas; temporary hazardous waste management areas; process plant area; and heap leach area.

- Estimate a sulfide (pyrite) block model to proactively manage pockets of sulfide-rich waste rock to encapsulate potentially acid generating rock in the waste dump.

21 Capital and Operating Costs

21.1 Introduction

The Lindero Mine is a producing operation managed by Mansfield Minera S.A. having mined an open pit operation continuously since October 2020. Capital and operating cost estimates are based on the established cost experience gained from the operation, projected budgets, and quotes from manufacturers and suppliers. Overall, the cost estimation is of sufficient detail that, with the current experience of operating at the Lindero Mine, Mineral Reserves can be declared.

21.2 Sustaining capital costs

The capital costs include all investments in ongoing brownfield exploration, rebuilding of mine equipment, major overhauls or replacement, plant equipment, maintenance and energy, and capitalized stripping to maintain the mine and plant facilities to sustain the continuity of the operation. These capital costs are divided into three main areas: brownfields exploration, capitalized stripping, and equipment and infrastructure.

Brownfield exploration involves the investigation of areas to increase the confidence in currently defined Mineral Resources with infill delineation drilling included in these costs. This activity is focused on evaluating the Lindero Deposit but also includes targets local to the Lindero Mine that may use the same infrastructure, such as the Arizaro Deposit.

Capitalized stripping refers to the cost of removing the overburden or waste rock that overlays a mineral deposit in order to access and extract the mineralized material.

Equipment and infrastructure costs are attributed to all departments of the operation including mine, plant, heap leaching facilities, maintenance, energy, safety, information technology, administration and human resources, logistics, geology, planning, laboratory, environmental and includes funds set aside for mine closure restoration. Projected major sustaining capital projects at the Lindero Mine include leach pad phase 2 expansion (US$ 17.5 million), heavy equipment replacement and overhaul (US$ 7.6 million) and plant spare parts (US$ 1.2 million).

Table 21.1 details the capital cost summary by area for the sustaining capital requirements.

Table 21.1 Summary of projected major capital costs for the LOM

Capital expenditures	Units	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Brownfields exploration	US$ M	0.3	0	0	0	0	0	0	0	0	0	0
Capitalized stripping	US$ M	12.1	9.8	6.6	13.1	6.9	9	7.8	1.6	10.8	0.8	0
Equipment & infrastructure	US$ M	30.3	23.1	18.6	6.6	6.4	11.3	5.4	5.2	5.6	3.1	1.9
Total	**US$ M**	**42.7**	**32.9**	**25.2**	**19.7**	**13.3**	**20.3**	**13.2**	**6.7**	**16.4**	**3.9**	**1.9**

21.3 Operating costs

Long-term projected operating costs are based on the LOM mining and processing requirements, as well as historical information regarding performance, operational and administrative support demands. Operating costs include site costs and operating expenses to maintain the operation. These operating costs are analyzed on a functional basis and the cost structure may not correspond to the operating costs reported by financial statements of Fortuna. Site costs relate to activities performed on the Property including mine, plant, general services, and administrative service costs. Other operating expenses include costs associated with doré transportation and community support activities.

The total LOM operating cost for the Lindero Mine is estimated at US$ 12.90 per tonne of ore processed. Table 21.2 summarizes the breakdown of the operating cost projection.

Table 21.2 Lindero Mine average operating cost projection

Description	Cost (US$/t ore)
Mine	2.8
Plant	6.7
General Services	2.0
Administrative Services mine	1.0
Distribution and gold refining costs	0.2
Community relations	0.1
Total	**12.9**

Note: Costs are based on average estimated costs from the fourth quarter 2022 to end of mine life

Table 21.3 summarizes the process operating cost forecast for the LOM.

Table 21.3 Operating cost forecast by year (million US$)

Cash cost per tonne	Unit	2023	2024	2025	2026	2027	2028-2034
Mine	(US$/t ore mined)	3.4	2.7	3.3	4.0	2.9	2.6
Plant	(US$/t processed ore)	8.8	7.5	7.3	7.0	6.6	5.7
Indirect	(US$/t processed ore)	3.7	3.2	3.1	3.0	3.0	2.7
Other - On site support	(US$/t processed ore)	0.5	0.3	0.3	0.3	0.3	0.3
Cash cost per tonne		**16.5**	**13.9**	**14.0**	**14.4**	**12.8**	**11.3**
Cash cost per ounce	US$/oz	854	823	855	877	862	835
AISC per ounce sold	US$/oz	1,480	1,319	1,288	1,279	1,216	1,124

21.4 Comment on Section 21

The capital and operating cost provisions for the LOM that support the declaration of Mineral Reserves have been reviewed and are regarded as reasonable by the QP based on industry standard practices and actual costs observed in 2022. The basis for the estimates is appropriate for the known mineralization, mining and production schedules, marketing plans, and equipment replacement and maintenance requirements.

22 Economic Analysis

22.1 Economic analysis

Fortuna is using the provision for producing issuers, whereby producing issuers may exclude the information required under Item 22 of Form 43-101F1 - *Technical Reports* for technical reports on properties currently in production and where no material production expansion is planned.

The Mineral Reserve declaration is supported by a positive cashflow.

22.2 Comments on Section 22

An economic analysis was performed in support of estimation of the Mineral Reserves; this indicated a positive cashflow for the period set out in the LOM plan using the assumptions detailed in this Report.

23 Adjacent Properties

This section is not relevant to this Report.

24 Other Relevant Data and Information

24.1 Hydrology

The hydrogeology of the area is summarized in this sub-section. Additional information is available in Section 9.7, Section 18.3.1, and Section 20.1.2.

24.1.1 General characteristics and climate

The Lindero Mine is located within the puna region, which has a desert/arid climate. Rainfall in the region normally does not typically exceed 50 mm per year, evapotranspiration values are high and exceed 2,500 mm per year, and the soil retention capacity is low at 50 mm. These characteristics result in a significant deficit of water throughout the year, evidenced by the desert landscape. The only surface runoff is observed during the few precipitation events in summer. Very few permanent streams are observed, and generally streams are temporary, and lagoons (vegas) are very small.

The regional geomorphology described in the environmental baseline study and environmental impact assessment study outlines an extensive environment of quaternary and tertiary sedimentary basins and valleys formed by ancient alluvial cones, coalescent alluvial deposits and salt lakes. The ranges of higher altitude formed by volcanic and intrusive rocks are zones where precipitation (mainly snow) is more significant; these ranges recharge the lower alluvial basins.

24.1.2 Hydrology and hydrogeology

Goldrock commissioned Vector Argentina SA (Ausenco; 2010) and Conhidro (2013) to conduct a hydrologic study of the area, during the detailing of the environment base line map and EIA study. As part of the study, the Rio Grande hydrologic basin was defined through the study of various field parameters and review of satellite images. The basin was determined to be 1,687 km^2 in size. The basin includes seven hydrologic sub-basins, namely the Rio Grande, Peninsula, Cori, Arita, Chascha, Lindero and Emboscadero. Because of proximity to the mine, only the four sub-basins Arita, Chascha, Lindero and Emboscadero were studied with the purpose of finding water supply for the operation. These sub-basins are briefly described below:

- Chascha sub-basin - the most extensive in the area at 808 km^2, Chascha is characterized by a big wide alluvial valley flanked by rocky outcrops with temporary streams, and some springs (vegas) and temporary snow cover.
- Lindero sub-basin – this basin extends for 234.8 km^2 entirely in the area of the Project. Streams are temporary and weakly developed, and the heads of the fluvial streams are in the Archibarca volcano.
- Emboscadero sub-basin – this basin is the smallest of those reviewed, and extends for 22.2 km^2, and can be considered part of the Lindero sub-basin.
- Arita sub-basin – this basin is located farthest south of the studied areas, is about 58.4 km^2 and is primarily a large flat area adjacent to the salar Arizaro. Some springs were identified, but no streams were recognized in this sub-basin.

Based on regional data, the recharge rates of the basins were estimated. Those rates are summarized in Table 24.1. This estimate reveals that the Chascha sub-basin, 13 km to the east of the Project, has the highest aquifer recharge. The Andina 2 and Andina 3 water wells in the Chascha sub-basin have demonstrated a production potential of 70 m^3/h and 100 m^3/h respectively.

Table 24.1 Recharge rates of Arita, Chascha, Lindero and Emboscadero sub-basins

Sub-Basin	Surface (km^2)	Recharge (Hm^3/year)
Chascha	808.4	1.46
Lindero	234.8	0.42
Arita	58.4	0.11
Emboscadero	22.2	0.04

24.1.3 Geo-electric exploration

A geo-electric exploration program was completed to identify those sedimentary facies that allow the storage and movement of groundwater, to help define the drilling targets. A total of five areas were chosen, where 31 vertical electrical soundings were performed.

The area with the highest hydrogeological interest based on the results of the geoelectric profiles was the Chascha area, where subsequently two wells were drilled (Andina 3 and 4) with very positive results. Wells that not successful or with less yield were converted to piezometers for groundwater monitoring.

During January 2012, Hidrotec conducted a geoelectrical profile in the sub-basin Lindero-Emboscadero near the Project site, with the focus to assess water resource possibilities close to the site and thus to reduce potential water supply costs. This area was determined to have sufficient potential to provide construction water requirements, while the permanent bore field in the Chascha region is being developed. Therefore, three new wells were established near site (Lindero 2, 3 and 5).

24.2 Geotechnical studies

This subsection summarizes the geotechnical investigations conducted previously by Goldrock prior to the 2013 Feasibility Study. Additional information can be found in Section 9.6 and KCA (2016a).

These studies were carried out by various consultants and relate to the leach pad, ponds, and open pit areas. The following is a list of geotechnical investigation documents previously developed in the leach pad area.

- The Mines Group Inc., "G-3 Lindero Test Pits 1-21", 2010.
- AMEC, "Plant Site Foundation Geotechnical Report Feasibility Level, Lindero Project", 2011.
- Logging form and RQD of drill hole LP.
- Logging form and RQD of drill holes CON 1-2-3-4-5.

- Sergio R. López - Geologist, "Prospecting by Clays for construction of the leach pad around the Lindero (Gold) project, department Los Andes, Salta, Argentina", 2013.
- Faculty of Exact, Physical and Natural Sciences, UNC, "Soils and clays characterization for bed support for the leach pad of Lindero Project in Salta Puna - Salta - Argentina", 2014.

In the years 2010 to 2014, as part of the investigations by different consultants involved in the development of the feasibility engineering for the heap leach pad, 21 pits were executed without sampling, four topsoil samplings were taken and seven geotechnical holes were drilled. In addition, two condemnation drill holes were drilled. For the low permeability soil (clay liner) study, sampling was also conducted.

Several sources of low permeability soil (clay) were investigated in an October 2013 study. The search was concentrated within 25 km and identified several areas of potential clay borrow sources. Clays from the edge of the Salar de Arizaro were considered to be the best quality.

A laboratory test program on low permeability soil samples was completed and subgrade material was extracted to determine the conditions for the formation of a suitable soil liner. The in-situ soils are clayey or silty sand. Permeability tests were performed to find optimum compaction and moisture to attain the low permeability required for heap leach liners.

In 2015, designs of the pad and ponds were updated and geotechnical investigations to support the designs were completed. The geotechnical investigation included the execution of test pits, trial pads with on-site density tests, plate tests and infiltrometry tests; identification of quarries for soil liner, sampling, soil mechanics lab tests for mineral and material to be used as overliner.

All historical geotechnical studies were assessed by CNI in 2017 who conducted additional testwork and evaluations to provide updated recommendations and conclusions as detailed in Section 9.6.

A subsequent update on the design report was performed by CNI in November 2022 (CNI, 2022). Site visits and design verifications were performed during early stages of mining and the conclusion of the report were as follows:

- The 2012 lithology model shows no material changes in the position of the Red Beds/igneous contact.
- The new RQD logging information validates the 2016 RQD model.
- The newly available geology and geotechnical information does not warrant an update of the RQD and ISA models.
- The extents of the RQD block model do not reach the upper parts of the slope in a limited area in the southwest and north of the pit. It is recommended that new drill holes be planned to get updated information for the areas not covered by the RQD block model. An update of the RQD block model should be performed when this new information becomes available.
- The waste dump located at the southwest wall of the pit is not expected to decrease stability due to excess surcharge loadings.

- Length and spacing information from the Red Beds bedding and cross joints must be mapped to be able to assess the impact of step-path failures on bench-scale and overall stability. The CNI cell mapping methodology is recommended for this purpose. Based on the planned sequence, mapping of this unit in key sectors in interim walls can be done from 2023 to 2025, prior to updating the final design and establishing the final pit wall.
- With optimized blasting, mining, and scaling techniques, interramp slope angles ranging from 50 to 56 degrees can be achievable for the Lindero Mines' final pit. Structural mapping, trials of final wall blasting, and mining should be done in the interim phases to assess the potential for steepening with blasting trials.
- CNI recommends performing drone flights to measure the achieved condition of bench faces and bench face angles and evaluating the results of mining and blasting practices. Cell mapping and structural data can also be obtained using this method.
- CNI proposed providing training to personnel on site on the mapping techniques in 2023.

All of the above recommendations were taken into account as part of the Mineral Reserve estimation process conducted by Fortuna as described in Section 15.

24.3 Comments on Section 24

A number of geotechnical studies were performed at the Lindero Deposit. Those studies form the basis for the pit slope estimates used in the mining model. Included in the studies were geotechnical surveys for heap leach and waste dumps. These studies are considered by the QP to be consistent with industry practices and adequate to support mine design.

25 Interpretation and Conclusions

The QPs note the following interpretations and conclusions in their respective areas of expertise, based on the review of data available for this Report.

25.1 Mineral tenure, surface rights, water rights, royalties and agreements

Fortuna was provided with a legal opinion that supports that the mining tenure held by Mansfield for the Property is valid and that Fortuna has a legal right to mine the deposit.

Minimum work requirements under the tenure grant have been met. Annual land usage and environmental compliance reports have been lodged. Fortuna has no knowledge of any additional environmental liabilities related to any of the other concessions connected with the property.

The mineral tenement holdings cover 3,500 ha, and comprise 35 pertenencias, each of 100 ha, which are constrained by Gauss Kruger Posgar co-ordinates generated by survey. Tenure is held in the name of Mansfield, an indirect wholly-owned subsidiary of Fortuna. There is no expiry date on the pertenencias, providing Fortuna meets expenditure and environmental requirements, and pays the appropriate annual mining fees.

A three percent provincial royalty “boca mina” is payable on revenue after deduction of direct processing, commercial and general and administrative costs. There are no royalties payable to any other third party.

Specific approvals and permits are required for many aspects of the Lindero Mine under appropriate Provincial and Federal laws.

In November of 2010, Mansfield submitted an EIA report (Ausenco Vector, 2010) for the Lindero Mine Project, and in November 2011, received approval of this EIA through the issue of the DIA. An update, as per requirements, has been filed biannually since 2010 with the most recent submitted in February 2021. All the EIAs have been approved by the Salta Provincial government.

Surface rights are owned by the provincial state (Propiedad Fiscal) of Salta. There are no reservations, restrictions, rights-of-way or easements on the Property to any third-party. Mansfield holds a registered camp concession, and a granted and surveyed access right-of-way. Water permits and rights of access to the Lindero Mine are guaranteed through water and access licenses granted by the Mining Court of Salta.

25.2 Geology and mineralization

The Arizaro Volcanic Complex consists of two superimposed concentric volcanic centers, the Arizaro and the Lindero cones, located in the Archibarca volcanic arc at the southern margin of the Salar de Arizaro basin. Basement rocks crop out to the north of the Lindero Deposit and consist of coarse-grained Ordovician granites unconformably overlain by Early Tertiary red bed sandstones. The Lindero–Arizaro deposits, a series of diorite to monzonite porphyritic stocks, intrudes these units.

Mineralized zones at the Lindero Deposit form a semi-circular shape about 600 m in diameter which extends to a depth of 600 m, consisting of four different zones at the surface. The distribution of gold–copper mineralization at the Lindero Deposit shows a strong relationship to lithology, stockwork veinlets, and alteration assemblages. Higher grades of gold– copper (approximately 1 g/t Au and 0.1 % Cu) are commonly associated with sigmoidal quartz, quartz–magnetite–sulfide, biotite-magnetite–chalcopyrite, magnetite–chalcopyrite and quartz–limonite–hematite stockworks that are strongly associated with K-feldspar alteration. This association is very common in the east zone of the deposit, where the highest gold grades occur. At other locations where one or more stockwork types are missing or the intensity of fracturing is lower, mineralization tends to be weaker and the grades of gold tends to be lower (approximately 0.4 g/t Au).

Gold mineralization at the Lindero Deposit is characterized by native, free milling gold associated with chalcopyrite and/or magnetite grains with rare interstitial quartz.

The weathered oxidation zone at the Lindero Deposit is generally poorly developed, and averages 44 m in thickness.

The Arizaro volcanic center is characterized by fine- to medium-grained hornblende diorite to monzonite porphyritic stocks. The Arizaro Deposit is dominated by a main, moderately to strongly mineralized intrusive unit that crops out in the central part of the prospect area. It consists of fine hornblende porphyritic diorite intruded by several stocks, dikes, igneous-cemented breccias and hydrothermal breccias. Smaller stocks are exposed in a few areas. Dikes of andesitic and dacitic composition are generally distributed radially to the main intrusive unit.

Several alteration assemblages are noted in the Arizaro Deposit area. Alteration patterns are semi-concentric and asymmetric, with a core of moderate to strong potassic alteration including zones of K-feldspar-rich magnetite–silica alteration. An incomplete rim of chloritic alteration is developed outboard of the potassic alteration. In the southeast part of the deposit, intermediate argillic alteration has formed and overprints potassic alteration. Sericitic and very weak argillic alteration (hydrolytic alteration) has developed in the volcanic tuffs. To the south and west of the deposit, chloritic alteration passes directly to propylitic alteration. An actinolite–magnetite alteration assemblage forms in the eastern part of the deposit area.

Gold–copper mineralization at the Arizaro Deposit is associated with two different mineralizing events. The strongest is a non-outcropping intrusive which occurs in the north part of the porphyry with an elongated shape trending northeast to southwest for more than 400 m with an estimated average width of 60 m. The other mineralizing event is in the center of the system and is related to breccias and micro-breccias which have a semi-oval shape at surface. In the center, there is a higher-grade core with a semi-ellipsoidal form, extending north–south for 480 m with an estimated average width of 50 m. The Arizaro Deposit has mineralization styles with copper–gold grades that are strongly correlated with different alteration assemblages. Mineralization is mainly associated with potassic alteration. This occurs generally in multi-directional veins, vein stockworks and disseminations. In some areas, the vein density is high, forming vein stockworks in the intrusive rocks. These vein stockworks are limited to magnetite–biotite veinlets, quartz–magnetite–chalcopyrite veinlets, late magnetite breccias and in late-stage mineralization events, anhydrite–sulfide veinlets. Chalcopyrite and bornite are the main copper minerals. Gold is mainly associated with chalcopyrite, quartz, and anhydrite veinlets. Coarse gold was observed and confirmed with X-ray diffraction analysis in the University of Neuquen, Argentina, laboratory.

The Lindero Deposit settings, lithologies, and structural and alteration controls on mineralization is sufficient to support Mineral Resource and Mineral Reserve estimation. The Arizaro Deposit is at an earlier stage of exploration, and the controls of lithology, structure, and alteration on mineralization are currently sufficiently understood to support estimation of Inferred Mineral Resources.

25.3 Exploration, drilling and analytical data collection in support of Mineral Resource estimation

Drill holes drilled under Mansfield management in the period from 2002 to 2016 have data collected using industry-standard practices. Drill orientations are appropriate to the orientation of the mineralization and core logging meets industry standards for exploration of a porphyry-style deposit.

Geotechnical logging is sufficient to support the Mineral Resource estimation, with the data for the Lindero Deposit having been reviewed by AMEC in 2010, and CNI since 2017, with regards to suitability to support detailed mine planning.

Collar surveys have been performed using industry-standard instrumentation. Uncertainty in collar locations of Lindero Deposit drill holes, surveyed using compass and tape, have been incorporated into subsequent resource classification.

Downhole surveys performed during the drill programs have been performed using industry-standard instrumentation. Uncertainties in the downhole locations of the Lindero Deposit drill holes have been incorporated into subsequent resource confidence category classification.

All collection, splitting, and bagging of trench and core samples were carried out by Mansfield personnel from 2000 to 2016 except for campaigns conducted by Rio Tinto. No material factors were identified with the drilling programs that could affect Mineral Resource or Mineral Reserve estimation.

Sample preparation and assaying for samples that support Mineral Resource estimation has followed approximately similar procedures for most drill programs since 2000. The preparation and assay procedures are adequate for the type of deposit and follow industry standard practices.

Sample security procedures met industry standards at the time the samples were collected. Current core and pulp sample storage procedures and storage areas are consistent with industry standards, although the storage of coarse rejects had to be improved as many of these samples were stored outside and subsequently damaged.

In 2009, an independent audit of the information used for the estimation of resources and reserves was conducted by AMEC and summarized in the KCA (2016a) Technical Report. The work included independent audits of the database, collar and downhole surveys, drill logs, assays, bulk density measurements, core recovery, and QAQC results.

The 2009 audit concluded that the data verification programs undertaken on the data collected from the Lindero Deposit up to 2009 support the geological interpretations, and the analytical and database quality, and therefore the data can support Mineral Resource estimation.

Fortuna has conducted numerous audits and verification of historical information as well as verifying new data generated since 2016 to support assumptions used in the most recent resource and reserve estimates. The verification process includes analysis of the database; collars and downhole surveys; lithological logs; assays; metallurgical results; and geotechnical parameters. Fortuna checked all collar and downhole survey information for each campaign against source documentation and completed a hand-held GPS survey of randomly selected drill-hole collars. The results showed a good agreement with locations in the database. In August 2016, Fortuna initiated a comprehensive program of relogging to verify the original lithological descriptions, with further relogging programs of the Arizaro Deposit core conducted in 2017 and 2021 to improve geological interpretations.

Fortuna contracted CNI to validate all geotechnical data, data collection methods, slope stability analysis methods, and slope angle recommendations presented previously by other consultants to determine feasibility-level slope angle recommendations for design of the planned Lindero final pit. CNI continue to provide support and review of the geotechnical data during mining operations.

The QP is of the opinion that the data verification programs performed on the data collected are adequate to support the geological interpretations, the analytical and database quality, and Mineral Resource estimation at the Lindero Mine and Arizaro Project. This conclusion is based on the following:

- No material sample biases were identified from the QAQC programs. Analytical data that were considered marginal were accounted for in the resource classifications.
- Sample data collected adequately reflect deposit dimensions, true widths of mineralization, and the style of the deposits.
- External reviews of the database were performed in 2003, 2008, and 2009, producing independent assessments of the database quality. No significant problems with the database, sampling protocols, flowsheets, check analysis program, or data storage were noted.
- Mansfield compiled and maintains a relational database (DataShed™) for the Lindero Mine and Arizaro Project which contains all collar, assay, density, survey and lithology information as well as all associated QAQC data.
- Drill holes lacking surveyed collar coordinates have been resurveyed wherever possible and the original surveyor records stored.
- Assays obtained during Goldrock's drilling programs that lacked original assay certificates have been verified by a program of re-assaying of 10 percent of the pulps which indicated no significant bias between the original and reassayed results.

Drill data is typically verified prior to Mineral Resource estimation, by running a software program check.

25.4 Metallurgical testwork

The Lindero Deposit has been the subject of multiple and extensive testing campaigns that progressively optimized its metallurgical and process design parameters. The two initial campaigns conducted by Goldrock between 2004 to 2007 were followed by Fortuna's four major testing campaigns between 2016 and 2018 that support the design of the industrial scale operation. Since the first ore was place on the leach pad in July 2020, Mansfield has been using its in-house laboratory to continuously support metallurgical parameters used in the LOM.

The metallurgical testing was initially focused on leaching conditions and included bottle rolls and leaching columns of various sizes under varying conditions of leaching and agglomeration. Additional testing, particularly for the crushing plant, was performed with major technology suppliers and concluded that using HPGR in the tertiary crushing stage translated in faster leaching kinetics and ultimately higher gold extraction.

The pervasive presence of copper in the Lindero Deposit reflects in the dissolution of copper during the leaching of gold. Testing of the SART process was successful in removing sufficient copper quantities (59 to 74 percent) from the PLS to guarantee the optimal performance of the ADR process downstream and quality of the doré. The copper precipitate also recovered silver at a rate of more than 90 percent.

A limited, preliminary metallurgical testing of the satellite Arizaro Deposit achieved comparable results to those observed for the Lindero Deposit.

It is the opinion of the QP that the Lindero Deposit samples tested represent the orebody with respect to grade and metallurgical response. The differences between metallurgical lithologies are minimal with regard to extraction.

25.5 Mineral Resource estimation

Mineral Resource estimation involved the use of drill hole data in conjunction with surface mapping to construct three-dimensional (3-D) wireframes to define individual lithologic structures and oxide–mixed–sulfide horizons. Drill hole samples were selected inside these wireframes, coded, composited and grade top cuts applied if applicable. Boundaries were treated as either soft, firm or hard with statistical and geostatistical analysis conducted on composites identified in individual lithologic units. Gold and copper grades were estimated into a geological block model consisting of 10 m x 10 m x 8 m selective mining units (SMUs). Grades were estimated by ordinary kriging (OK) and constrained within an ultimate pit shell based on estimated metal prices, actual costs, geotechnical constraints, and metallurgical recoveries to fulfill the 'reasonable prospects for eventual economic extraction'. Estimated grades were validated globally, locally, and visually prior to tabulation of the Mineral Resources.

Resource confidence classification considers a number of aspects affecting confidence in the resource estimation including; geological continuity and complexity; data density and orientation; data accuracy and precision; grade continuity; and simulated grade variability for Lindero.

The QP is of the opinion that the Mineral Resources of the Lindero and Arizaro deposits, which have been estimated using drill core data, have been performed to industry best practices, and conform to the requirements of CIM (2014). The Mineral Resources are sufficient confidence to support declaration of Mineral Reserves for the Lindero Deposit.

Furthermore, it is the opinion of the QP that by constraining the Lindero Deposit Mineral Resources within an open pit shell based on established mining and processing costs; recommended slope angles based on independent geotechnical investigations; metallurgical recoveries from extensive testwork; reasonable long-term metal prices; and the application of a transparent incremental cut-off grade, the Mineral Resources have 'reasonable prospects for eventual economic extraction'.

25.6 Mineral Reserve estimation

Mineral Reserve estimates have considered only the Lindero Deposit Measured and Indicated Mineral Resources as only these categories have sufficient geological confidence to be considered Mineral Reserves (CIM, 2014). Subject to the application of certain economic and mining-related qualifying factors, Measured Resources may become Proven Reserves and Indicated Resources may become Probable Reserves.

The Mineral Reserve estimation procedure for the Lindero Deposit is defined as follows:

- Handover and review of Mineral Resources in longitudinal sections and grade–tonnage curves.
- Definition of economic parameters for calculating an appropriate cut-off grade to be applied to the open pit optimization such as downstream costs, process and mining costs, haulage incremental cost, metallurgical recoveries by mineralization, and sustaining capital.
- Slope parameters based on geotechnical considerations were applied to the pit optimization and subsequently used to generate overall slope angles for the block model.
- Inferred Mineral Resources are considered as waste material in the optimization process.
- Compute the dollar value for each block to define blocks that can be mined at a profit in the LG algorithm.
- Performed a LG pit optimization using Datamine's NPV Scheduler™.
- Pit shells are calculated undiscounted, for best-case vs worst-case analysis and generation of the optimum pit shell. An 8 percent discount rate is applied for NPV calculation.
- Mineral Reserves are reported within an ultimate pit design at variable cut-off grades that are based on the process type, operating costs and metallurgical recovery.
- A dilution allowance for the Mineral Reserve estimate is applied using diluted model grades. The diluted model, which was built from the Mineral Resource block model, incorporates dilution and ore loss and eliminates the need for applying additional factors.
- Mineral Reserve and Mineral Resources exclusive of Mineral Reserves tabulation and reporting as of December 31, 2022.

Mineral Reserves will support a 12-year LOM consisting of 365 days in the year for production and an annual process production rate estimated as 6,321,000 t for 2023, ramping up to 6,600,000 t in 2024, and thereafter to 6,750,000 t, which represents an average daily rate of 18,493 t. The ratio of waste to ore over LOM is 1.36 to 1.

The conversion of Mineral Resources to Mineral Reserves was undertaken using industry-recognized methods, estimated operational costs, capital costs, and plant performance data. Thus, it is considered to be representative of future operational conditions. This Report has been prepared with the latest information regarding environmental and closure cost requirements.

25.7 Mine plan

The Lindero Mine is an owner-operated conventional open pit mining operation. The key mining fleet equipment is composed of six trucks with an operational capacity of 96 tonnes and two 17 cubic yard wheel loaders.

Mine production will consist of the extraction of Proven and Probable Mineral Reserves from the pit. Material stockpiled is divided into two classes by grade: medium-grade ore equal to or above a 0.42 g/t Au cut-off, and low-grade ore equal to or above 0.26 g/t Au but below a 0.42 g/t Au cut-off grade.

Mining costs benefit from short haul distances from the pit to the primary crusher and waste dumps. Maximum travel distance is in the range of 4.2 km to deliver waste to the dump at the end of the mine life. LOM direct average mine cost is estimated at $1.67 per tonne mined.

The QP is of the opinion that:

- The mining method being used is appropriate for the deposit being mined. The open pit, stockpile, waste dump designs, and equipment fleet selection are appropriate to reach production targets.
- The mine plan is based on successful mining philosophy and planning, and presents low risk.
- Inferred Resources are not included in the mine plan.
- The mobile equipment fleet is based on simulations and productivity data collected since the beginning of production at the Lindero Mine.
- All mine infrastructure and supporting facilities meet the needs of the current mine plan and production rate.
- Major planned maintenance of the main equipment, such as loaders and trucks, have been accounted for in sustaining capital costs based on the purchase of additional equipment to eliminate loss in production hours and maintain production targets.
- Additional auxiliary equipment, especially dozers are rented depending on the requirements of mine operation.

25.8 Recovery

The Lindero Mine's operational metallurgical performance is progressively improving since first ore was loaded on the leach pad in July 2020. In terms of throughput, the last six months of 2022 achieved 14,755 tpd or 78.7 percent of the 18,750 tpd design capacity.

The Lindero Mine's accumulated gold recovery as of December 31, 2022 reached 57.83 percent. The recovery value is a consequence of the coarse size ore loaded during the first 11 months of operation. This coarse ore accounts for 31.8 percent of the total ore and 31.1 percent of the total gold metal loaded on the leach pad. Additionally, leach pad control practices can be further improved, and this will reflect in overall metallurgical performance and gold production. Lifetime doré production as of December 31, 2022, totals 9,522 kilograms averaging 74.78 percent gold, equivalent to 228,924 ounces, and 8.2 percent silver, equivalent to 25,102 ounces.

Additional improvements are necessary in the crushing, agglomeration, and ore stacking stages to increase short- and long-term mechanical availability, and if executed correctly, will impact positively on ore throughput and overall metallurgical recovery as well as operating costs at the mine. Leach pad control practices can be further improved, and this will also reflect in overall metallurgical performance and gold production. Overall, the accumulated gold recovery curve shows a consistent upward trend that will continue to increase provided Mansfield implement the necessary improvements.

25.9 Infrastructure

The QP is confident that all mine and process infrastructure and supporting facilities have been included in the general layout to ensure that they meet the needs of the mine plan and production rate and notes that:

- Lindero is located 260 km due west of the city of Salta, the main service center for the mine and the region. Drive time from Salta to the mine is approximately 7.5 hrs over a road distance of 420 km with good year-round access.
- The mine site infrastructure has a compact layout footprint of approximately 60 ha.
- Major processing and support facilities located at the Lindero Mine include: primary, secondary and tertiary crushers; agglomerators; stacking system; leach pad; solution ponds; SART plant; ADR plant; power plant; truck shop; administrative offices; waste dump; warehouses; logging facility; chemical and metallurgical laboratories; and accommodation camp.
- Power is based on diesel-fueled centralized generators, owned and operated by an external contractor. The plant contains 12 generators with diesel engines and three-phase generators that produce power at a low voltage of 380 volts, and connected to a voltage step-up transformer with an output voltage of 6.6 kilovolts.
- Total water requirement is currently approximately 80 m^3/hr but may increase to 100 m^3/hr. The majority of the water is sourced from two wells located approximately 13 km southeast of the mine site. Three wells adjacent to the main offices also provide additional process water and camp water.

25.10 Markets and contracts

No market studies are currently relevant as the Lindero Mine produces a readily saleable commodity in the form of doré.

When a shipment of doré is sent to the refiner, the refiner melts it and samples the melt. The refiner can also drill the doré for samples as per the agreed contract. Settlement is decided as per agreements between the refiner and company. If the samples do not agree within set splitting limits, settlement is then based on umpire assays from a mutually agreed upon umpire assayer.

A long-term price estimate of US$1,600/oz has been applied, based on the mean consensus prices from 2022 to 2025 of US$1,719/oz weighted at 40 percent and the 10-year historical average of US$1,435/oz weighted at 60 percent.

Mansfield has 14 major contracts for services relating to operations at the mine including related to mining activities, drilling, civil works, transportation, electrical installations, plant and mine maintenance, and the supply of reagents, cement, and explosives. Mansfield also has entered into contracts for its main services including power generation, catering, security, personnel transportation, and product sales. The costs of such contracts are accounted for in the capital and operating expenditures depending on work performed. Contracts are negotiated and renewed as needed. Contract terms are typical for similar contracts in Argentina, based on the experience of Fortuna.

The Lindero Mine produces doré bars containing an estimated gold content averaging 84 percent for the LOM. Doré bars are stored in a secure vault at the plant and transported by a security company via armored car from Lindero to Salta prior to shipping overseas for refining.

25.11 Environmental, permitting and social considerations

In November 2011, the Salta Provincial government granted the principal environmental Declaración de Impacto Ambiental (DIA) permit, which is the primary mining permit required for Lindero Mine development, enabling a project operator to start construction and proceed to full mine operating status. The Salta Provincial government has approved the three Environmental Impact Assessment (EIA) renewals submitted by Mansfield since November 2011, granting in each case a new DIA permit with the same faculties. The last update submitted in February 2021, is under evaluation by the authority of the Mining Secretary of Salta. During the evaluation of the renewals, the last approved EIA and the DIA permits remain valid and in force until renewal approval, which is expected later in 2023.

Specific approvals and permits are required for many aspects of the mine. All necessary permits regarding mining operations were granted in a timely manner.

Since the discovery of gold mineralization at Lindero Mine in 2000, Mansfield has provided more than 20 environmental reports describing various activities such as extraction of samples at initial stages, soil sampling, a program of geophysical surveys, and details of access roads, drilling programs, camp installation, and runways. These reports each consist of a brief description of the environmental baseline, the Lindero Mine, environmental impact, and ways to prevent and mitigate that impact.

In December 2007, Mansfield presented an extensive environmental baseline report (EBL), completed by Vector Argentina, to the Secretariat of Mining for Salta Province. That report included sections on geology, geomorphology, hydrology, sociology, archaeology, local flora and fauna, soil types, and climate and air quality. The EBL was accepted by the Mining Judge of Salta after being examined by environmental technicians of the Secretariat of Mining and the Provincial Secretariat of Environment. There are no known current environmental liabilities for the Lindero Mine.

In September 2007, Mansfield installed a weather station at the site to record temperature, humidity, wind speed and direction, precipitation, atmospheric pressure, solar radiation, and evaporation. All of these parameters are recorded on a daily basis in a database at the camp. The weather station allows the analysis of updated data daily and analysis of the data across time.

It is important to note that Mansfield has filed an advance activity report every six months since 2012, as established by DIA requirements. The last semiannual report was submitted to the mining authorities in August 2022.

Mansfield received a mine permit to build a heap-leach gold mine at up to 30,000 tpd as detailed in the Pre-Feasibility Study (AMEC, 2010b).

Electrical, structural, building and seismic plans for the construction of the mine were reviewed and approved by COPAIPA (Dec 2013), the professional engineering institution that overlooks all construction in Salta Province. In 2017, COPAIPA approved additional permits for the construction of the agglomeration and SART plants that were added to the process design. Mansfield has obtained all necessary permits for the infrastructure that is required to support mining operations at Lindero.

Environmental risks during the mine closure stage will be reduced by remediation and monitoring work. At the mine closure stage, soil will be contoured by heavy machinery to minimize the long-term impact of mining activity and return the topography of the land to resemble prior conditions. However, the movement of soil, and thus the risk, will be significantly less than in the mining operations stage.

In November 2022, Mansfield filed a detailed closure plan report with the Secretary of Mining. This is the first detailed mine closure study to be presented in the Province of Salta.

One social-environmental risk will be the impact of closure on employment, directly and indirectly, to the surrounding communities. It will be imperative to implement measures to mitigate this impact during the mine's operation.

A significant environmental risk will also be present during the closure of facilities, which will cause significant production of non-hazardous industrial waste and hazardous products from the movement of heavy machinery. It will be essential to establish clear environmental policies with the contractors during this process.

One of the priorities of Mansfield is the care and protection of the environment. During the exploration and construction phases, an attempt was made to control to the greatest extent possible any potential environmental impacts on the area. The same effort is being made in the operational stage and will be made in the closure stages of the mine. Mansfield has defined environmental principles that will enable the development of mining operations efficiently from a productivity standpoint and from an environmental perspective.

It is the opinion of the QPs that the appropriate environmental, social and community impact studies have been conducted to date for the Lindero Mine. Mansfield has maintained all necessary environmental permits that are the prerequisites for the granting of mining permits.

25.12 Capital and operating costs

Capital and operating costs for the Lindero Mine are based on the established cost experience gained from the operation, projected budgets, and quotes from manufacturers and suppliers.

Total sustaining capital cost is estimated to be US$ 196.4 million through the LOM. These capital costs are divided into three main areas: brownfields exploration, capitalized stripping, and equipment and infrastructure.

Major sustaining capital projects planned for 2023 include the leach pad phase 2 expansion (US$ 17.5 million), heavy equipment replacement and overhaul (US$ 7.6 million) and plant spare parts (US$ 1.2 million).

The total average LOM operating cost for the Lindero Mine is estimated as US$ 12.90 per tonne of ore processed.

25.13 Economic analysis

Fortuna is using the provision for producing issuers, whereby producing issuers may exclude the information required under Item 22 of Form 43-101 - *Technical Reports* for technical reports on properties currently in production and where no material production expansion is planned.

The Lindero Deposit Mineral Reserve declaration is supported by a positive cashflow.

25.14 Risks and opportunities

A number of opportunities and risks were identified by the QPs during the evaluation of the Lindero Property.

Opportunities include:

- As mining has commenced at the Lindero Deposit, additional geotechnical data is being collected from the open pit that could support an increase in final pit slope angles, potentially decreasing stripping ratios and/or increasing Mineral Reserves.
- The Arizaro Deposit is not included in the current mine plan. However, it represents upside opportunity if a satellite mine can be developed on the Property that could supplement the Lindero operation.
- Infill drilling at both the Lindero and Arizaro deposits could support the conversion of Inferred Resources to Measured or Indicated Resources and, with the appropriate studies, to Mineral Reserves. This represents additional upside potential for the planned operation.
- The Lindero Deposit remains open at depth below the pit shell constrained reported reserves and resources. An area of interest has been identified by Fortuna during the drilling campaign carried out in 2016 with drill hole LDH-126 encountering 0.97 g/t Au over a 38 m interval (refer to discussion in Section 10). This is supported by historical drilling from 2007 including drill

hole LDH-86 averaging 1.06 g/t Au over a 52 m interval which bottomed in mineralization. These intercepts warrant follow-up drill testing.

- There are several local exploration targets within the concession boundary, that with further work, represent upside opportunity to identify mineralization that can potentially add to the resource base.
- As mining has commenced, blasting fragmentation analysis is being conducted on an ongoing basis to optimize mining and processing productivity and reduce costs.
- Blasting trials on interim walls could result in the steepening of bench face angles and determine if pre-splitting final walls is required.
- Usage of 50-tonne capacity civil trucks instead of 96-tonne mining trucks could reduce both acquisition capital and maintenance costs.
- Mansfield plan to execute multiple projects in 2023 in the crushing and agglomeration areas that are intended to improve the long-term mechanical availability of those facilities.
- Improvements to the radial stackers traction system will increase its mechanical availability.

Risks include:

- Vibrations are impacting infrastructure associated with the primary crusher and agglomerator, which could potentially lead to damage to the supporting structure. Mansfield has strengthened the equipment and incorporated monitoring procedures to the primary crusher to help early identification of potential issues. External consultants have been engaged to assess the vibrations to ascertain if further remediation is required.
- Failure of strategic components of critical equipment in the processing plant could have a detrimental impact on planned throughput resulting in a reduction in gold production for a specific period of the year. Mansfield monitors critical components and maintains an inventory of spare parts to reduce the potential impact of any such failure.
- Despite collection of data relating to soluble copper from blast holes since operations commenced, local behavior of cyanide-soluble copper is not fully understood and cannot be modeled due to insufficient assays from historical core. Levels of soluble copper could be higher than anticipated in certain areas of the deposit requiring adjustments to mine plans and schedules to reduce the impact in the plant. The presence of the SART plant greatly reduces the potential impact of soluble copper at the mine.
- Considerable new lithium projects are being proposed in the Province of Salta and there is a minor risk that one of these projects could access water from the same aquifer that the Lindero Mine uses for its supply. In addition, new projects could have an adverse impact on procurement, transportation and social conditions in the local area while increasing competition for skilled workers.
- Capital controls on goods and services imposed on imports to Argentina are impacting the delivery of spare parts for mining and processing equipment,

which can result in reduced equipment productivity and mechanical availability. To ensure smooth operations, the logistics area should continue to monitor and maintain a well-stocked inventory to resolve potential issues promptly. In addition, Mansfield has engaged with local suppliers to obtain spare parts to mitigate potential future mechanical problems that may arise.

26 Recommendations

Lindero has successfully transitioned from a feasibility study, through construction into a fully operational open pit mine.

Recommendations for the next phase of work have been broken into those related to ongoing exploration activities and those related to additional technical studies. Recommended work programs are independent of each other and can be conducted concurrently unless otherwise stated.

26.1 Exploration

26.1.1 Arizaro Deposit

Continued work at the Arizaro Deposit is recommended to focus on the control of lithology, structure, and alteration on mineralization so as to determine the suitability of material as a potential feed for the Lindero Mine's processing facility and to support the estimation of Mineral Resources. It is recommended that a 3,000-m diamond drill program (approximately 15 holes at a 50 m spacing) is conducted as the next phase of work at a cost of approximately US$ 670,000.

26.1.2 Lindero Deposit

An infill drill program involving the drilling of approximately 2,000-m is recommended for 2023 to improve the geological understanding of material planned for extraction in 2024. The cost of such a drill program is estimated at approximately US$ 500,000.

26.1.3 Other

Exploration work to date on the Lindero Property has been focused on outcropping porphyry mineralization. It is recommended that Mansfield evaluate the property for mineralization beyond the two known porphyry systems at Lindero and Arizaro. For example, alteration zones and silica structures located within the concession, 2.5 km due south of the Lindero Mine, remain open for evaluation. Exploration work would primarily involve mapping and carry no additional cost to the operation.

26.2 Technical

The following technical studies are recommended to improve the understanding of the Lindero Mine:

26.2.1 Metallurgical

The Lindero Mine has been operating since July 2020 and its metallurgical performance is incrementally improving, therefore the key focus of its metallurgical development must now be on optimization with the following initiatives recommended:

- The crushing and agglomeration plants may need additional reinforcement to their supporting structures. Once completed, the mechanical availability could improve along with throughput levels.
- The crushing plant's metallurgical performance is undergoing several infrastructure upgrades to consistently achieve the desired target particle size of 6-8 mm. In addition to the usual evaluation of alternative crushing chambers for the jaw and cone crushers, the HPGR's control logic should be reviewed to ensure minimal deviation from the roll's opening target set point.
- Mansfield needs to continue improving the leach pad stacking system mechanical availability to increase the equipment utilization time of the agglomeration-stacking circuit. Particular attention should be paid to, the radial stacker's driving system that may need reinforcement or replacement.
- The leach pad operating practices must be supported in the metallurgical development of the in-house laboratory. The design parameters defined during the development stage of the project are to be used as a starting point and continuous internal investigations used for updating and improving the operating parameters for all unit processes to support the Lindero Mine's LOM.
- It is recommended that the metallurgical laboratory facilities be carefully monitored and continuously upgraded to meet the requirements of the operation in a timely manner.
- The Lindero Mine's electrical power supply relies 100 percent on diesel generation under a rental contract. During 2022 the average energy cost was US$ 0.40/kWh which is high when compared to typical values in the industry but not unreasonable considering the remote nature of the operation in the Argentine puna. Mansfield are in the process of tendering bids for the installation of a solar power plant that will help provide supplementary power to the camp and other remote facilities.

All the above recommendations can be conducted inhouse with associated costs incorporated into ongoing operational costs.

26.2.2 Environmental, social and permitting

In addition, during mining operations it is recommended that Fortuna:

- Submit EIA update reports as required.
- Continue conducting air quality sampling in camp locations and operating facilities, as well as on routes near local villages.
- Operations should create a sulfide (pyrite) block model to proactively manage pockets of sulfide-rich waste rock (i.e. encapsulate potentially acid generating waste rock). This study can be conducted inhouse at no additional cost.

26.2.3 Geotechnical and hydrogeology

It is recommended that the operation performs the following geotechnical studies:

- The cement in each lift on the heap will cure for several months before another lift is placed. It may be several years before any block of agglomerated ore receives 110 m of loading. It is recommended that a long-term stacking test be conducted to see if ageing will improve the ability of the ore to support the 110-m height with less cement. The estimated cost of the testwork is US$ 20,000.
- A lysimeter test on site to obtain better data on evaporation and soil moisture content for improved pad water balance understanding. The estimated cost for tanks, piping, strain-gage loadcells, construction and installation is approximately US$ 10,000.
- Field scale permeability testing of ore with design cement content versus less to no cement content to determine if the leach pad cement requirements could be decreased. The estimated cost for a tank, flow meter, construction and installation is approximately US$ 10,000.
- A trade-off study is recommended to assess the option to excavate 16 m high benches without pre-splitting versus pre-splitting to excavate 8 m high benches, to steepen the pit walls. This study can be conducted inhouse at no additional cost.
- The extents of the Lindero Deposit RQD block model fails to reach the upper parts of the slope in a limited area in the southwest and north of the pit. It is recommended that new drill holes be planned to get information for the areas not covered by the RQD block model. An update of the RQD block model should be performed when this new information becomes available. The cost of a 2,000-meter geotechnical drill program to collect sufficient data is estimated at approximately US$ 500,000.
- Geotechnical drilling at the Arizaro Deposit to verify appropriate pit slope angles. The cost of a 3,000-meter geotechnical drill program to collect sufficient data for such an analysis is estimated at approximately US$ 750,000.
- Drill and install additional piezometers (monitoring wells) to help verify aquifer adequacy and supply at approximately US $100,000.
- Conduct an overall site water balance and hydrogeology study with known supply and demand parameters. The cost of this study is estimated at approximately US$ 75,000.

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Certificates

CERTIFICATE of QUALIFIED PERSON

(a) I, Eric N. Chapman, Senior Vice President of Technical Services for Fortuna Silver Mines Inc., 650-200 Burrard St, Vancouver, BC, V6C 3L6 Canada; do hereby certify that:

(b) I am the co-author of the technical report titled Fortuna Silver Mines Inc. Lindero Mine and Arizaro Project, Salta Province, Argentina dated December 31, 2022 (the "Technical Report").

(c) I graduated with a Bachelor of Science (Honors) Degree in Geology from the University of Southampton (UK) in 1996 and a Master of Science (Distinction) Degree in Mining Geology from the Camborne School of Mines (UK) in 2003. I am a Professional Geologist of the Association of Professional Engineers and Geoscientists of the Province of British Columbia (Registration No. 36328) and a Chartered Geologist of the Geological Society of London (Membership No. 1007330). I have been practicing as a geoscientist and preparing resource estimates for approximately twenty years and have completed more than thirty resource estimates for a variety of deposit types such as epithermal gold/silver veins, porphyry gold deposits, and volcanogenic massive sulfide deposits. I have completed at least fifteen Mineral Resource estimates for precious metal projects over the past five years.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 Standards of Disclosure for Mineral Projects ("NI 43–101").

(d) I last visited the property on January 30, 2023.

(e) I am responsible for the preparation of sections 1.1 to 1.6, 1.8, 2 to 9.5, 9.8 to 12.6, 12.9, 14, 25.1 to 25.3, 25.5, 26.1, and the conclusions derived therefrom in sections 1.18, 1.19, 12.10, and 25.14.

(f) I am not independent of Fortuna Silver Mines Inc ("Fortuna") as independence is described by Section 1.5 of NI 43–101. I am a Fortuna employee.

(g) I have been an employee of Fortuna since May 2011 and involved with the property that is the subject of the Technical Report since August 2016.

(h) I have read NI 43–101 and Form 43-101F1, and the sections of the Technical Report for which I am responsible have been prepared in compliance with that Instrument and Form.

(i) As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Vancouver, BC, this 28th day of March 2023.

[signed]

Eric N. Chapman, P. Geo., C. Geol. (FGS)

CERTIFICATE of QUALIFIED PERSON

(a) I, Raul Espinoza, Technical Services Director of Fortuna Silver Mines Inc., 650-200 Burrard St, Vancouver, BC, V6C 3L6 Canada; do hereby certify that:

(b) I am the co-author of the technical report titled Fortuna Silver Mines Inc. Lindero Mine and Arizaro Project, Salta Province, Argentina dated December 31, 2022 (the "Technical Report").

(c) I graduated with a Bachelor of Science Degree in Mining Engineering from Pontificia Universidad Catolica del Peru in 2001 and a Master of Engineering Science in Mining from Curtin University, Australia, in 2014. I am a Fellow member of the Australasian Institute of Mining and Metallurgy and registered as a Chartered Professional in Mining - FAusIMM (CP) with Membership No. 309581. I have practiced my profession for 22 years and been preparing reserve estimates for approximately 11 years. My experience has covered operational, technical, managerial and consultancy functions for open pit mines, from early-stage projects through to producing mines in Argentina, Peru, Chile, Australia, and Canada.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 Standards of Disclosure for Mineral Projects ("NI 43–101").

(d) I last visited the property on January 30, 2023.

(e) I am responsible for the preparation of sections 1.9, 1.10, 1.12 to 1.16, 15, 16 (with the exception of section 16.3), 18 to 23 (with the exception of section 18.3), 25.6, 25.7, 25.9 to 25.13, and 26.2.2, and the conclusions derived therefrom in sections 1.18, 1.19, and 25.14.

(f) I am not independent of Fortuna Silver Mines Inc ("Fortuna") as independence is described by Section 1.5 of NI 43–101. I am a Fortuna employee.

(g) I have been an employee of Fortuna and involved with the property that is the subject of the Technical Report since June 2022.

(h) I have read NI 43–101 and Form 43-101F1, and the sections of the Technical Report for which I am responsible have been prepared in compliance with that Instrument and Form.

(i) As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Vancouver, Canada, this 28th day of March 2023.

[signed]

Raul Espinoza, FAusIMM (CP)

CERTIFICATE of QUALIFIED PERSON

(a) I, Dmitry Tolstov, an independent consulting engineer, 10-49 Verhnie Polya street, Moscow, Russia; do hereby certify that:

(b) I am the co-author of the technical report titled Fortuna Silver Mines Inc. Lindero Mine and Arizaro Project, Salta Province, Argentina dated December 31, 2022 (the "Technical Report").

(c) I graduated with a Master of Science Degree in Mining from the Moscow Mining Academy in 1994 and PhD in Metallurgy in 2002. I am a Qualified Professional with the Mining & Metallurgical Society of America (MMSA, Membership No. 1573QP). I have practiced my profession continuously for 27 years in mineral processing and metallurgy fields. The majority of my experience has been in managing process and metallurgical operations, design and development of precious and base metal assets as well as managing projects and studies for operations around the world.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 Standards of Disclosure for Mineral Projects ("NI 43–101").

(d) I last visited the property on May 26, 2022.

(e) I am responsible for the preparation of sections 1.7, 1.11, 12.7, 13, 17 (with the exception of section 17.7), 25.4, 25.8, and 26.2.1, and the conclusions derived therefrom in sections 1.18, 1.19, and 25.14.

(f) I am independent of Fortuna Silver Mines Inc ("Fortuna") as independence is described by Section 1.5 of NI 43–101.

(g) I have been involved with the property that is the subject of the Technical Report since December 2018.

(h) I have read NI 43–101 and Form 43-101F1, and the sections of the Technical Report for which I am responsible have been prepared in compliance with that Instrument and Form.

(i) As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Moscow, Russia, this 28th day of March 2023.

[signed]

Dmitry Tolstov, MMSA QP

CERTIFICATE of QUALIFIED PERSON

(a) I, Mathieu F. Veillette, Corporate Manager Water and Tailings for Fortuna Silver Mines Inc., 650-200 Burrard St, Vancouver, BC, V6C 3L6 Canada; do hereby certify that:

(b) I am the co-author of the technical report titled Fortuna Silver Mines Inc. Lindero Mine and Arizaro Project, Salta Province, Argentina dated December 31, 2022 (the "Technical Report").

(c) I graduated with a Bachelor of Science Degree in Civil Engineering in 1997 from Queen's University and a Graduate Diploma Business Administration from Simon Fraser University in 2018. I am a Professional Engineer of the Association of Professional Engineers and Geoscientists of the Province of British Columbia (Registration No. 28397), also a Professional Engineer from Colorado (Registration No. 36639) and Alaska (Registration No. 10914). I have practiced my profession continuously for 25 years in geotechnical and water management related fields. The majority of my experience has been in the mining industry including international projects on all stages of the mining process from advanced exploration through decommissioning and reclamation. My relevant work experience includes analysis, site investigations, design, construction, dewatering and operation of open pits, waste dumps, heap leach pads, tailings storage facilities, process ponds, water dams, diversion structures and other mining facilities in Canada (BC, QC), USA (CO, UT, NM, AZ, MT, AK, SC), México, Panamá, Venezuela, Guyana, Peru, Chile, Argentina, Bolivia, Australia, New Zealand and New Caledonia.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 Standards of Disclosure for Mineral Projects ("NI 43–101").

(d) I have visited the property on December 13, 2022.

(e) I am responsible for the preparation of sections 1.17, 9.6, 9.7, 12.8, 16.3, 17.7, 18.3, 24, 26.2.3, and the conclusions derived therefrom in sections 1.18, 1.19, 12.10, and 25.14.

(f) I am not independent of Fortuna Silver Mines Inc ("Fortuna") as independence is described by Section 1.5 of NI 43–101. I am a Fortuna employee.

(g) I have been an employee of Fortuna since August 2022 and involved with the property that is the subject of the Technical Report since September 2022.

(h) I have read NI 43–101 and Form 43-101F1, and the sections of the Technical Report for which I am responsible have been prepared in compliance with that Instrument and Form.

(i) As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated at Vancouver, Canada, this 28th day of March 2023.

[signed]

Mathieu F. Veillette, P.Eng. (BC), P.E. (AK, CO)