Yoquivo Project
Chihuahua, Mexico
NI 43-101 Technical Report on Mineral Resource Estimate

Prepared for:
Golden Minerals Company

Prepared by:
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Effective Date:
24 February, 2023

CERTIFICATE OF QUALIFIED PERSON

I, Todd Wakefield, RM SME, am employed as a Principal Geologist with Mine Technical Services Ltd., with an office address of 4110 Twin Falls Drive, Reno, NV, 89511.

This certificate applies to the technical report titled "Yoquivo Project, Chihuahua, Mexico, NI 43-101 Technical Report on Mineral Resource Estimate that has an effective date of 24 February, 2023 (the "technical report").

I am a Registered Member of the Society for Mining, Metallurgy & Exploration (RM SME), with a membership number of 4028798. I graduated from the University of Redlands with a Bachelor of Science degree in Geology in 1986, and the Colorado School of Mines with a Master of Science degree in Geology in 1989.

I have practiced my profession continuously since 1987. I have been directly involved in gold–silver exploration and mining projects in North and South America and Asia–Pacific, and I have been involved in evaluating geology, drilling, assaying, and data quality for scoping, pre-feasibility, and feasibility level studies.

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) for those sections of the technical report that I am responsible for preparing.

I visited the Yoquivo Project from 31 October 2022 to 4 November 2022.

I am responsible for Sections 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.14, 1.15, 1.16; Section 2; Section 3; Section 4; Section 5; Section 6; Section 7; Section 8; Section 9; Section 10; Section 11; Section 12; Section 15; Section 16; Section 17; Section 18; Section 19; Section 20; Section 21; Section 22; Section 23; Section 24; Sections 25.1, 25.2, 25.3, 25.4, 25.5, 25. 8, 25.9; Section 26; and Section 27 of the technical report.

I am independent of Golden Minerals Company as independence is described by Section 1.5 of NI 43–101.

I have had no previous involvement with the Yoquivo Project.

I have read NI 43–101 and the sections of the technical report for which I am responsible have been prepared in compliance with that Instrument.

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 those sections of the technical report not misleading.

Dated: 22 March, 2023

“Signed and stamped”

Todd Wakefield, RM SME

CERTIFICATE OF QUALIFIED PERSON

I, Edward J.C. Orbock III, RM SME., am employed as an Associate Principal Geologist with Mine Technical Services Ltd., with an office address of 4110 Twin Falls Drive, Reno, NV, 89511.

This certificate applies to the technical report titled "Yoquivo Project, Chihuahua, Mexico, NI 43-101 Technical Report on Mineral Resource Estimate that has an effective date of 24 February, 2023 (the "technical report").

I am a Registered Member of the Society for Mining, Metallurgy and Exploration (RM SME, #4038771). I graduated with a Master's of Science degree in Economic Geology from the University of Nevada, Reno, in 1992 and a Bachelor's of Science degree in Geology from the University of New Mexico, in 1981.

I have practiced my profession for over 37 years since graduation. I have been directly involved in exploration, operations, and resource modeling for precious, base metals and specialty metals projects in North and South America and Africa. I have experience in the geology of, exploration for, and modeling of Mineral Resources for narrow vein epithermal gold and silver deposits.

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) for those sections of the technical report that I am responsible for preparing.

I have not visited the Yoquivo Project.

I am responsible for Sections 1.1, 1.2, 1.12, 1.13, 1.14.2, 1.16; Sections 2.1, 2.2, 2.3, 2.5, 2.6; Section 3; Section 14; Sections 25.1, 25.7, 25.8.2; Section 26; and Section 27 of the technical report.

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Dated: 22 March, 2023

“Signed and stamped”

Edward J.C. Orbock III, RM SME

CERTIFICATE OF QUALIFIED PERSON

I, Brian Arthur, RM SME, am employed as an Associate Metallurgist with Mine Technical Services Ltd., with an office address of 4110 Twin Falls Drive, Reno, NV, 89511.

This certificate applies to the technical report titled "Yoquivo Project, Chihuahua, Mexico, NI 43-101 Technical Report on Mineral Resource Estimate that has an effective date of 24 February, 2023 (the "technical report").

I am a Registered Member of the Society for Mining, Metallurgy & Exploration (RM SME), with a membership number of 00093800. I graduated from the Montana College of Mineral Science and Technology, Butte, Montana, with a Bachelor of Science degree in Metallurgical Engineering in 1985, and a Master of Science Degree in Metallurgical Engineering in 1987.

I have practiced my profession for 35 years since graduation. I have been directly involved in numerous metallurgical studies and operating process facilities primarily in North America, but also on projects in South America. I have worked on epithermal gold–silver deposits and related treatment facilities in those regions.

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) for those sections of the technical report that I am responsible for preparing.

I have not visited the Yoquivo Project.

I am responsible for Sections 1.1, 1.2, 1.11, 1.14.1, 1.16; Sections 2.1, 2.2, 2.3, 2.6; Section 3; Section 13; Sections 25.1, 25.6, 25.8.1; Section 26; and Section 27 of the technical report.

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Dated: 22 March, 2023

“Signed and stamped

Brian Arthur, RM SME.

This report was prepared as National Instrument 43-101 Technical Report for Golden Minerals Company (Golden Minerals) by Mine Technical Services (MTS). The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in MTS's services, based on i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This report is intended for use by Golden Minerals subject to terms and conditions of its contract with MTS. Except for the purposed legislated under Canadian provincial and territorial securities law, any other uses of this report by any third party is at that party's sole risk.

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1.0 SUMMARY

1.1 Introduction

Mine Technical Services (MTS) prepared a technical report (the Report) for Golden Minerals Company (Golden Minerals) on the results of a Mineral Resource estimate for the Yoquivo Project (the Project) located in Chihuahua State, Mexico.

1.2 Terms of Reference

The Report was prepared to support the Golden Minerals news release entitled "Golden Minerals Announces 570 g/t Ag Eq. Initial Mineral Resource Estimate for Yoquivo Silver-Gold Project" dated 20 March, 2023.

Mineral Resources are reported in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves (May 2014; the 2014 CIM Definition Standards) and the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (November 2019; 2019 CIM Best Practice Guidelines).

Measurement units used in this Report are metric units and currency is expressed in US dollars (US$), unless stated otherwise. The Mexican currency is the Mexican peso ($MXN). The Report uses Canadian English.

1.3 Project Setting

The Yoquivo Project is located 210 km west–southwest of the city of Chihuahua, in Ocampo Municipality, Chihuahua State.

The Project can be accessed from the city of Chihuahua by the following route:

- Chihuahua City to Cuauhtemoc to La Junta to Basaseachi (location of the exploration base camp), a distance of 278 km on Mexico Highway 16.

To access the concession area, the route is:

- Basaseachi to the San Francisco de Yoquivo ejido via Chihuahua State Highway 227 (Basaseachi–San Juanito paved road) for 36.1 km, and then 5 km of unpaved road from the turnoff from Chihuahua State Highway 227.

The Project centre is an additional 3 km due south of the San Francisco de Yoquivo ejido and is accessed by a series of dirt roads and logging tracks.

The climate is classified as humid subtropical to humid continental depending on elevation. The average yearly maximum temperature is approximately 23ºC. Rainfall occurs mainly during the summer from July to September. Snow and rain occur sporadically during the winter months.

Exploration activities can be conducted year-round. Any future mining activity would also be year-round.

The closest town to the Project is Basaseachi, approximately 24 km to the northwest of the Project area. The town can support basic exploration activities, and currently Golden Minerals rents a house in Basaseachi as the base for Project exploration activities.

The area has a long tradition of mining, and within 50 km of the Project area are several large open pit and underground precious metal mines. These mines source the majority of their workforces from the local communities. There is sufficient skilled and unskilled labour in the communities near to the Yoquivo Project to provide skilled and unskilled labour for Project purposes.

The Comisión Federal de Electricidad (the state power company) constructed a 115 kV powerline to the town of Basaseachi in 2005, and the community of San Francisco de Yoquivo is connected to the main power grid. However, it is likely that these lines would need to be upgraded to support any future operations at the Yoquivo Project.

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

The Project is 100% held by Golden Minerals. Mineral title is currently in the process of transfer from the original concession holders to Golden Minerals' wholly-owned subsidiary, Minera de Cordilleras S. De R.L. de C.V. (Minera de Cordilleras).

The Project consists of seven mining concessions with an area totalling about 1,975 ha, located within the Ocampo municipality, Chihuahua State. In Mexico, mining concessions are granted by the Economy Ministry and are considered exploitation concessions with a 50-year term. All payments of mining duties and taxes for the concessions are up to date, and the required proof of annual labour forms have been filed for the concessions.

The claims are located on the San Francisco de Yoquivo ejido. Although the mineral rights are independent of the surface rights, access to the claim block is granted through an agreement between the concession holder and the San Francisco de Yoquivo ejido that does not have a direct interest in the mineral claims. Minera de Cordilleras signed a five-year temporary access agreement on 5 May, 2018 with the San Francisco de Yoquivo ejido to allow the company to conduct exploration activities within the mineral concessions. Golden Minerals is currently negotiating a new access agreement with the ejido to allow a continuation of exploration activities.

Water used in the exploration programs is purchased from the San Francisco de Yoquivo ejido, with payments based on each water truck load.

Third-party net smelter return (NSR) royalties are payable on all of the concessions, and range from 2–3%.

1.5 Environmental, Permitting, and Social Considerations

There are numerous historical mine workings, excavations, and dumps on, and adjacent to, the Project area. There are two small, non-operating processing plants within the Project area, but they are not under the control of Golden Minerals.

Some of the disturbances are on mineral concessions held by Golden Minerals. Environmental impacts within the Project site primarily result from historical activities. A site visit, conducted by SEMARNAT as part of the permit application in 2017, determined that the surface disturbances caused by historical mining activities, were “not significant”, and Golden Minerals are not liable for any rehabilitation of those surface disturbances.

Adjacent to the Project area, to the west in an excised concession from Golden Minerals’ holdings, a small custom mill is operating in the Trinidad area, processing material from artisanal miners (gambusinos) that is sourced from the surrounding mines and prospects including some mineralization mined from the Yoquivo Project area.

Gambusinos have been extracting small amounts of material from the Creel level of the San Francisco vein system and removing small historical mine dumps from the Project during Golden Minerals’ tenure ownership. Those impacts have been identified and documented by Golden Minerals’ staff. There is an expectation that Golden Minerals is not responsible for the current gambusino activity, as material is being removed from the Project area and processed at a toll mill outside the Project area, so there are no waste rock or tailings being generated within the Project boundaries.

Exploration activities such as rock and soil sampling, geological mapping and geophysical surveys can be conducted without environmental permits. An Informe Preventivo is in force for the area of the Yoquivo ejido that permits Golden Minerals to conduct drilling activities.

Golden Minerals, through Minera de Cordilleras, has written permission from the surface landowners to complete exploration on the Project but will need to negotiate agreements to initiate any future construction and mining activities.

1.6 Geology and Mineralization

The mineralization types within the vein systems at Yoquivo are examples of low-sulphidation systems.

The Yoquivo Project is located within the Sierra Madre Occidental volcanic belt (Sierra Madre), an arc formed by eastward subduction of the Pacific Plate. The Sierra Madre is a metallogenic terrane well known for its epithermal precious metal deposits, and is divided into late Cretaceous to early Tertiary calc-alkaline batholiths and equivalent volcano–sedimentary rocks referred to as the “Lower Volcanic Supergroup”, and two periods of major ignimbrite eruption, accompanied by minor andesite/basalt flows and rhyolitic domes, in the early Oligocene and early Miocene, that collectively constitute the “Upper Volcanic Supergroup”.

The Lower Volcanic Supergroup is represented in the Project area by volcanic andesites that are overlain discordantly by rocks of the Upper Volcanic Supergroup. The Upper Volcanic Supergroup is dominated by ignimbrites. Several rhyolitic domes intrude all of these units.

The mineralization on the Yoquivo Project consists of several epithermal quartz veins in four principal vein systems. Individual vein systems have been mapped and sampled over >3,000 m strike lengths and range from 0.2 m to >5 m in width.

The Pertenencia vein system consists of at least seven parallel quartz veins, vein breccias and stockwork zones with minor calcite veining and sulphides (pyrite with very minor sphalerite and galena). The vein system has been traced on surface and by drilling for at least 1,800 m along strike and for about 300 m down-dip.

The San Francisco vein system consists of a series of northeast–southwest-striking quartz veins, vein breccias and stockwork zones with minor calcite veining and sulphides (pyrite with minor sphalerite and galena). The San Francisco vein has a strike extent of at least 3,000 m and has been explored to about 300 m depth. Several zones of mineralization were historically mined on this vein to the 1,900 m elevation.

The Esperanza vein system consists of a single quartz vein and vein breccia zone associated with a steeply-dipping fault zone, which has been mapped and sampled over a 1,100 m strike length. At surface, several historical mine workings have exploited a 1–2 m wide chalcedony vein, and chalcedonic-cemented hydrothermal breccias.

The Dolar vein system comprises northeast–southwest-striking quartz veins, vein breccias and stockwork zones with minor calcite veining and sulphides (pyrite with very minor sphalerite and galena). The vein system has a known strike extent of about 1,850 m. Historical workings have been excavated along the vein.

In general, at surface, the veins are sulphide-poor, and have textures typical of a low-sulphidation epithermal environment, including fine colloform to crustiform banding, bladed calcite textures, and open-space filling textures. Outside of the principal mineralized structures and their adjacent stockwork zones, veins are mostly limited to isolated single veins, minor subparallel veins, or small patches of stockwork veins. Orientations of these minor veins are varied, but most commonly dip steeply to the southeast.

Veins have narrow haloes of silicification, local argillic alteration, and distally grade into weak chloritic alteration. The walls of the vein structure sometimes have sharp boundaries, but it is also quite common for the vein to consist of anastomosing veinlets and stockwork veinlets.

Sulphides are generally pyrite with rare argentite, and locally minor galena–sphalerite–chalcopyrite, and total sulphide content is generally <5%. In the oxide zone, the sulphides are leached, leaving either casts or pseudomorphs of goethite–hematite.

Although no mineralogical studies have been conducted on the Project mineralization, geological associations suggest that gold is likely to be in the form of native gold associated with pyrite and silver in the form of silver sulphides and sulfosalts. This is a typical association in low-sulphidation systems.

Golden Minerals' geologists believe that there is good potential to discover additional high-grade gold–silver mineralization on the northern part of the Pertenencia vein system as well as on the San Francisco and Esperanza vein systems. The Dolar vein drilling has intersected wide zones of veining, but the gold and silver grade distribution is erratic, suggesting that the drilling has intersected the upper parts of an epithermal vein. The San Antonio vein appears to have good potential to host economic mineralization because the surface sampling has returned elevated gold and silver grades, but at the Report effective date the vein had not been drill tested.

The potential of the Verde, La Texana and La Trucha veins are unknown. They have only been explored partially on surface and returned moderate gold and silver grades at surface. The veins may warrant a small drill program to test potential at depth.

The northwestern and southwestern Project extents, where limited mapping has been conducted and there are outcropping andesites below the upper volcanic ignimbrites and tuffs, may have potential to host veins within the andesite lithologies. There is also potential for the known veins to continue into these areas.

1.7 History

Companies that had a Project interest prior to Golden Minerals included Cia. Minera La Rastra, S.A., Mead Exploration Co., Sydney Resources Corporation (Sydney Resources), West Timmins Mining Inc. (West Timmins), and Konigsberg Corporation. Work completed included limited narrow-vein mining activities, surface geological and reconnaissance mapping, mapping and sampling of historical excavations, rock chip and channel sampling, a regional helicopter geophysical survey, and core drilling.

Golden Minerals obtained its Project interest in 2017, and at the Report effective date had completed surface geological and reconnaissance mapping, mapping and sampling of selected historical excavations, rock chip and channel sampling, core drilling, and initial internal metallurgical studies.

1.8 Drilling

The initial exploration drilling was conducted in 2007 by West Timmins, who drilled eight core holes totaling 2,473 m. Drill data from the West Timmins campaign are not used in Mineral Resource estimation because no original assay certificates, down-hole survey or assay quality assurance and quality control (QA/QC) data are currently available to Golden Minerals for this drilling campaign. In addition, no drill holes from this campaign intersected the Pertenencia vein system. From 2020 to 2022, Golden Minerals has drilled 70 core holes totaling 16,565 m. A total of 78 core holes, totaling 19,039 m have been drilled at Yoquivo.

Core sizes used for the various drill programs included NQ (47.6 mm core diameter) and BQ (36.4 mm) sizes by West Timmins, and HQ (63.5 mm) size by Golden Minerals. Drill holes in the Golden Minerals programs were typically drilled from the hanging wall side of the vein, perpendicular to and passing through the target structure, into the footwall and were extended an additional 40–50 m to anticipate possible changes on the dip of the structure, and to explore for additional potentially mineralized structures in the footwall of the principal structure.

Drill core from the Yoquivo drill programs was delivered to the core logging facility in Basaseachi by the drilling company at the end of each shift. Core was measured to confirm the recovery and calculate the rock quality designation (RQD). Recoveries during the Golden Minerals drill campaigns were generally excellent, averaging 98% overall. Core was logged by Golden Minerals geologists directly into Geobank Mobile logging software, capturing lithology, alteration, mineralization, and structural information.

Drill hole collar locations were initially surveyed by handheld global positioning system (GPS) instruments. Once the campaign was completed all drill hole locations were surveyed by a professional surveyor with a differential GPS. Actual orientations at the collars were established by measurements of surface casing using a field compass and a magnetic Reflex instrument was used to survey the orientation of the drill hole downhole. An initial survey was conducted approximately 15 m downhole to confirm the alignment of the drill hole with the planned orientation. Subsequent surveys were conducted every 50 m starting at 50 m until completion of the drill hole.

On average, the true width of mineralization is about 50–80% of the core length but varies depending on local orientation of the mineralized zones and the drill hole orientation.

1.9 Sampling

Surface samples were collected, where possible, by Golden Minerals personnel systematically along principal structures, from historical prospects, and surface mine workings. In addition, grab samples were collected from historical mine dumps and spoil heaps.

Underground samples were collected from all accessible underground workings. Samples were collected from vein structures and in the footwall and hanging wall to mapped structures. Sample lengths were dictated by structural thickness, with a minimum of 20 cm and no defined maximum, but typically do not exceed 2 m in length. Samples were initiated and terminated based on observable vein styles or mineral type difference across the vein. The hanging wall and footwall were also sampled up to 5 m on both sides of the mapped structure.

Core sample intervals ranged from 0.05–3.4 m depending on lithology, averaging 0.93 m. The length for each sample was selected to characterize specific textural, lithological, or compositional breaks. Samples narrower than 0.2 m were selected to sample individual mineralized structures. Longer sample lengths (2–3.4 m) were used to sample weakly-altered rocks to check for possible silver and gold mineralization.

Two core composites were collected for metallurgical testwork purposes.

The water immersion method was used on drill core from geologically and spatially representative locations to obtain bulk density measurements. Measurements were taken on whole core samples typically between 10–15 cm in length. Samples of all mineralized zones, structures, and lithologies were tested and, as at the end of 2022, 1,271 bulk density measurements were collected. In December 2022, 93 samples were submitted to the ALS laboratory facility in

Vancouver, Canada (ALS Vancouver) for bulk density determinations using the water displacement method on wax-coated samples from whole and half-core samples. Results are in line with the values obtained by Golden Minerals.

Sample preparation was undertaken at the ALS Chemex de México S.A. de C.V. laboratory in Chihuahua (ALS Chihuahua). ALS Chihuahua is independent of Golden Minerals, and accredited to ISO/IEC 17025:2017 standards. Samples were shipped to ALS Vancouver for analysis. ALS Vancouver is certified to ISO 17025:2017 (selected assay techniques) and ISO 9001:2015 standards, and is independent of Golden Minerals. Metallurgical testwork was completed at the Golden Minerals metallurgy laboratory in Velardeña, Durango State, Mexico, which is about approximately 600 km southeast of the Project. The laboratory is owned and operated by Golden Minerals and is not independent. There are currently no international accreditations other than chemical analyses for metallurgical testwork.

Upon delivery to ALS Chihuahua, all surface and underground samples were logged into the laboratory's tracking system. Then the sample was weighed and dried. The samples were then crushed (70% passing 2 mm). The sample was then split through a riffle splitter and a 250 g sub-sample was taken and pulverized (85% passing -200 mesh).

At ALS Vancouver, samples were assayed for gold by fire assay with an atomic absorption (AA) finish. Gold samples returning assay values >10 g/t Au were re-assayed by fire assay with gravimetric finish. Silver assays consisted of a four-acid digest with an inductively coupled plasma atomic emission spectrometry (ICP-AES) finish. Silver samples returning assay values >100 g/t Ag were re-assayed with a four-acid digest with and ICP-AES finish. Silver samples assaying >1,500 g/t Ag were re-assayed with fire assay with gravimetric finish, and silver samples returning assay values >10,000 g/t Ag were re-assayed by fire assay with gravimetric finish. Multi-element analysis consisted of a four-acid digest with an ICP-AES finish. Copper, lead and zinc samples returning values >10,000 ppm were re-assayed with a four-acid digest with an ICP-AES finish.

Golden Minerals implemented an industry standard QA/QC program including the submission of certified standard reference materials (standards), duplicates and blanks to the laboratory, and the results are reviewed regularly to ensure that appropriate and timely action is taken in the event of a QA/QC failure. The general protocol is one QA/QC sample for every nine routine samples. In the case of a QA/QC failure, the standard practice is to review the data for potential sample swap issues and then re-run 5–8 samples before and after the erroneous sample.

Golden Minerals compiled an extensive dataset for the Yoquivo Project that is stored and managed using Micromine Geobank database management system. The database is stored remotely at Golden Mineral's exploration offices in Torreon, Coahuila, where it is also backed-up on a local server. In addition, paper data are stored in the Torreon offices, and scanned and stored on the local server.

Samples collected in the field are stored in a locked area at the exploration camp in Basaseachi and transported by Golden Minerals employees to ALS Chihuahua. Chain-of-custody procedures consist of sample submittal forms that are emailed to the laboratory, and a physical copy of the submission form delivered with sample shipments to ensure that all samples are received by the laboratory. ALS Chihuahua provides a sample delivery receipt to Golden Minerals.

1.10 Data Verification

Golden Minerals uses database validation tools in Geobank to prevent incorrect data from entering the database. Once the data are imported into Micromine and Leapfrog software systems, the data are reviewed in two dimensions and three dimensions to confirm data quality and to ensure that there are no unreasonable downhole deviations or gaps in the logging or assay fields.

The QP visited the Yoquivo Project for a five-day period, from 31 October 2022 to 4 November 2022. During this period the QP:

- Visited the Pertenencia and San Francisco vein systems, and walked along outcrop exposures and historical excavations;
- Collected hand-held GPS coordinates for nine drill holes on the Project and compared the coordinates with those found in the database. The QP reviewed the drill hole coordinates with the digital topography and considers the database coordinates to be accurate and reliable for Mineral Resource estimation purposes;
- Collected six rock chip samples and five core samples during the site visit. Silver and gold assay results for rock chip witness samples indicate the presence of mineralization on surface and underground. The core witness samples confirm the presence of mineralization in the core intervals and generally are in reasonable agreement with the original assays;
- Examined drill core from drill holes YQ_021_006 and YQ_022_032. The style of mineralization observed by the QP is consistent with the low-sulphidation exploration model being employed by Golden Minerals.

The QP audited approximately 10% of the collar locations, downhole surveys, geological logs, and assays from the Project database to ensure that the digital database represents the original exploration records. The QP found the database accurately represents the original records and is acceptable for use in Mineral Resource estimation.

The QP visited the Golden Minerals metallurgy laboratory in Velardeña, Mexico, toured the facility and inspected the equipment and methods used to perform the metallurgical testwork. In the QP's opinion, the laboratory is adequately equipped to perform preliminary metallurgical testwork. The QP toured the ALS Chihuahua sample preparation facility and found it adequate to prepare core samples for analysis by ALS Vancouver.

1.11 Metallurgical Testwork

Two composite samples for preliminary testwork were generated by Golden Minerals from coarse rejects of Yoquivo core samples. These composites were designed to represent low grade and medium grade mineralized material at Yoquivo. Metallurgical investigations included creating composites, conducting head assays for gold, silver, cyanide soluble gold, and cyanide soluble silver, conducting duplicate bench top agitated leach tests, and flotation tests. Metallurgical tests were designed and conducted by Golden Minerals personnel at the Velardeña metallurgical laboratory.

Golden Minerals conducted 1,000 g bottle roll tests to simulate a leach circuit. The samples responded very well to cyanide leaching as gold recoveries were between 81.8% and 92.4%, and silver recoveries were between 77.6% and 92.5%. Both composites yielded higher gold and silver recoveries with higher NaCN concentrations. All recoveries were substantially higher than the amount of cyanide-soluble gold and silver predicted by shake tests.

Leach kinetics were slow as the gold and silver were still leaching when the majority of the tests were terminated. Between 30% and 70% of the gold leached in the first two hours with the remainder of the gold leached in a slow linear manner for the remainder of the test. Silver recoveries were a little slower, as between 15% and 55% of the silver leached in the first two hours and the remaining silver leached slowly throughout the remainder of the tests.

Flotation tests were conducted on 1,000 g splits from each composite. All flotation tests were conducted using a rougher-scavenger flotation scheme with common flotation reagents. Two different flowsheets were used. For one flowsheet, two concentrates were collected. The first concentrate was collected for one minute and the second concentrate was collected for the entire period between 1–13 minutes. The three remaining tests were conducted using a different flowsheet, where separate concentrates were collected at 1, 3, 5, 7, 9, 11 and 13 minutes.

The samples responded very well to flotation. Gold recoveries were between 84% and 95% and silver recoveries were between 82% and 89%. The flotation kinetics were quick as gold recoveries near 70% and silver recoveries near 60% were achieved in the first minute.

Recoveries of 85% for gold and silver were recommended by the QP for use in assessing reasonable prospects of eventual economic extraction when performing the Mineral Resource estimate. These forecasts can support estimation of Inferred Mineral Resources.

Insufficient samples have been conducted to qualify for variability testing.

No testwork has been conducted to determine if deleterious elements are present in sufficient quantities to impact the ability to produce, process, and sell a concentrate or that would increase the processing cost of either a leach circuit or a flotation circuit.

1.12 Mineral Resource Estimation

Geology models were provided in digital format from Golden Minerals. Golden Minerals geology staff used LeapFrog software to create lithology and vein solids. Grade shells within the vein solids were constructed using a 200 g/t silver equivalent (AgEq) cut-off grade. The AgEq equation uses US$1,840/oz Au and US$24/oz Ag metal prices in the following equation:

- AgEq = Ag g/t + Au g/t * (1,840/24).

Grade shell polygons were projected along strike 50 m from the last drill hole and extended down dip 100 m from the last drill hole. Where the AgEq vein grade shell true thickness was not at least 1 m thick, a footwall or hanging wall grade shell domain was drawn to bring the total grade shell thickness to 1 m.

Silver and gold boxplots show the majority of elevated silver and grades are associated with veins, breccia, and faults.

Resource model blocks were coded with the volume percent for each grade shell, footwall, and hanging wall, and were assigned a density of 2.43 g/cm^3.

An outlier restriction plan was implemented for silver and gold. For silver block grade estimation, composite grades were uncapped during estimation within 15 m of the drill hole. Beyond 15 m, the composite grades were capped during estimation to 3,000 g/t Ag. For gold block grade estimation, gold composite grades were uncapped within 15 m of the drill hole. Beyond 15 m, the composite grades were capped to 10 g/t Au.

Assays were composited to 0.5 m lengths along the drill hole trace honoring AgEq grade shell vein codes.

Grade interpolation for silver and gold used an inverse distance weighted to the third power (ID3) method to estimate grade into the model blocks. The general strike and dip orientation of the veins was visually determined to determine search ellipse orientation for grade estimation. A single estimation pass was used to estimate silver and gold in each of three grade shell domains (hanging wall, vein, and footwall), with a minimum of two composites, a maximum of six composites and no more than two composites from a single drill hole.

The block model estimates were checked using comparison of different declustering methods, visual comparison of block grades to composites on cross sections and levels, and comparison of global block statistics for different estimation techniques.

Resource model blocks were classified as Inferred Mineral Resources where they were within 50 m laterally or 100 m downdip from the nearest drill hole, and within a potentially mineable area of mineralization grading ≥200 g/t AgEq.

Resource model blocks that have reasonable prospects for eventual economic extraction were assessed by applying a minimum mining width of 1 m and an underground mining AgEq cut-off grade. An AgEq cut-off grade of ≥200 g/t was calculated using the following assumptions:

- Long-range silver and gold price guideline for cash-flow models in US$ plus 15%, which equated to a silver price of US$24/oz and a gold price of US$1,840/oz;
- Mining by traditional cut-and-fill methods;
- Silver and gold metallurgical recovery assumption of 85%;
- Average mining cost of US$75/t;
- Processing and general and administrative (G&A) costs of US$50/t;
- Silver and gold royalty of 2%;
- Transportation and selling cost for silver of US$0.95/oz and gold of US$15/oz.

The QP is of the opinion that there are reasonable prospects for eventual economic extraction for mineralized material ≥200 g/t AgEq that displays geological and grade continuity.

1.13 Mineral Resource Statement

Mineral Resources take into account geologic, mining, processing and potential economic constraints, and have been confined within appropriate underground mining widths and therefore are classified in accordance with the 2014 CIM Definition Standards.

The Qualified Person for the Mineral Resource estimate is Edward J.C. Orbock III, RM SME, an Associate Principal Geologist with MTS.

Mineral Resources are reported at a silver price of US$24/oz and a gold price of US$1,840/oz and have an effective date of 24 February, 2023.

Mineral Resources are stated, on an insitu basis, in Table 1-1, using cut-off grades appropriate for underground mineralization.

Factors that may affect the Mineral Resource estimate include: metal price and exchange rate assumptions; changes to the assumptions used to generate the silver equivalent grade 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; density and domain assignments; changes to geotechnical, mining and metallurgical recovery assumptions; changes to the input and design parameter assumptions that pertain to the underground mining assumptions used to constrain the estimates; and assumptions as to the continued ability to access the site, complete proposed exploration programs, and maintain the social license to operate.

A portion of the vein systems at Yoquivo have been the subject of historical mining. The majority of the historical mining has been conducted on the San Francisco vein system, but there is evidence that some historical mining has occurred on the Pertenencia and Esperanza vein systems. There is no evidence for mining on the Camila and Camila HW vein systems. There are some small prospect pits on the New vein system but no evidence of any historical mining.

Golden Minerals' drilling in the upper part of the Pertenencia vein system encountered old workings in some of the drill holes. Adjacent drill holes located <10 m away from those drill holes did not intersect workings, suggesting that the workings are small and erratic, and may represent development on the vein rather than large areas of stoping.

The QP's personal inspection indicated, for the workings visited, that the excavations appear minimal based on the size of the dumps associated with the portals/trenches. To the knowledge of Golden Minerals personnel, underground mapping was not conducted on the majority of the workings; the Creel zone of the San Francisco veins is an exception. No maps are currently available for the workings that are present in the area of the Mineral Resource estimate. The Mineral Resource estimate does not include any depletion due to historical mining. There is a risk, when excavation data are available, that some of the area included in the Mineral Resource estimate may have been historically mined out.

Table 1-1: Yoquivo Inferred Mineral Resource Statement

Vein	Area	Tonnes	Ag Grade (g/t)	Au Grade (g/t)	Silver Equivalent Grade (g/t AgEq)	Contained Ag (koz)	Contained Au (koz)	Contained Silver Equivalent (koz)
Pertenencia	Vein	220,000	510	2.6	710	3,620	18	5,010
	Crown pillar	24,000	1,680	6.2	2,160	1,310	5	1,690
	Subtotal	*244,000*	*630*	*2.9*	*850*	*4,930*	*23*	*6,690*
Camila	Vein	285,000	330	2.0	490	3,070	18	4,470
	Subtotal	*285,000*	*330*	*2.0*	*490*	*3,070*	*18*	*4,470*
Camila hanging wall	Vein	170,000	300	1.8	440	1,610	10	2,370
	Subtotal	*170,000*	*300*	*1.8*	*440*	*1,610*	*10*	*2,370*
New	Vein	103,000	580	1.4	690	1,920	5	2,280
	Crown pillar	15,000	420	2.2	590	210	1	290
	Subtotal	*118,000*	*560*	*1.6*	*680*	*2,130*	*6*	*2,570*
Esperanza	Vein	98,000	150	1.9	300	480	6	940
	Crown pillar	22,000	130	1.8	270	90	1	190
	Subtotal	120,000	*150*	*1.8*	*290*	*570*	*7*	*1,130*
Total		***937,000***	***410***	***2.1***	***570***	***12,300***	***64***	***17,230***

Notes to accompany Mineral Resource table:

1. Mineral Resources have been classified using the 2014 CIM Definition Standards, and have an effective date of 24 February, 2023.
2. The Qualified Person for the resource estimate is Edward J.C. Orbock III, RM SME, an Associate Principal Geologist with MTS.
3. Mineral Resources assume a traditional underground cut-and-fill mining method; a silver price of US$24/oz, a gold price of US$1,840/oz, a minimum mining width of 1 m; assumed silver and gold metallurgical recovery of 85%; an average mining cost of US$75 /t mined; average processing and general and administrative cost of US$50/t processed; transportation and selling cost of US$0.95/oz Ag and US$15/oz Au; and a gold and silver royalty of 2%.
4. Mineral resources are reported insitu within a grade shell constructed from composites above a cut-off grade of 200 g/t silver equivalent (AgEq), where AgEq = Ag g/t + Au g/t * (1,840/24), where 1,840 is the gold price per ounce in US$, and 24 is the silver price per ounce in US$.
5. All tonnage, grade and contained metal content estimates have been rounded; rounding may result in apparent summation differences between tonnes, grade, and contained metal content.

1.14 Risks and Opportunities

1.14.1 Risks

Risks at this stage of Project development primarily relate to the ability to continue good relations with the local ejidos such that surface rights and access to water for drill programs can continue.

Metallurgical tests completed to date are sufficient to indicate the potential recoverability of silver and gold to support Inferred Mineral Resource estimates. However, more detailed investigations, including variability tests, may result in changes to the assumed metallurgical recoveries used to support the estimate. No testwork has been completed as to whether potentially deleterious elements are present in the mineralization.

1.14.2 Opportunities

Opportunities include the upside potential represented by the northern part of the Pertenencia vein system as well as on the San Francisco and Esperanza vein systems. The Project area retains significant grassroots exploration potential represented by areas under volcanic cover rock, and the possibility of extensions to known vein systems.

The selection of the mining method used when assessing reasonable prospects of eventual economic extraction is based on limited information; more data including geotechnical data may allow use of different methods than the traditional cut-and-fill method assumed, which may result in additional mineralization able to be mined.

1.15 Interpretation and Conclusions

Under the assumptions in this Report, the estimation of Inferred Mineral Resources can be supported.

The Project shows good potential to discover additional high-grade gold–silver mineralization in the following areas:

- Northern part of the Pertenencia vein system;
- San Francisco and Esperanza vein systems.

Additional exploration is warranted on the Dolar and San Antonio vein systems.

The potential of the Verde, La Texana and La Trucha veins is unknown, but may warrant a small drill program to test potential at depth.

The northwestern and southwestern Project extents, where limited mapping has been conducted and there are outcropping andesites below the upper volcanic ignimbrites and tuffs, may have potential to host veins within the andesite lithologies. There is also potential for the known veins to continue into these areas.

1.16 Recommendations

A two-phase work program is recommended. The first phase should include rehabilitation of the existing artisanal mine workings at Pertenencia, mapping and sampling of those workings once accessible, and additional drill testing and metallurgical testwork at Pertenencia, culminating in an updated Mineral Resource estimate. The second phase, which is dependent on the results of the first phase, would include a reconnaissance geological mapping and sampling program, and infill and step-out drilling at Pertenencia, and drill testing of the Esperanza, Dolar, and San Francisco vein systems. The first work phase is estimated to require a budget of approximately US$1.8 M to complete. The proposed budget for the second phase is approximately US$2.4 M.

2.0 INTRODUCTION

2.1 Introduction

Mine Technical Services (MTS) has prepared a technical report (the Report) for Golden Minerals Company (Golden Minerals) on the results of a Mineral Resource estimate for the Yoquivo Project (the Project) located in Chihuahua State, Mexico (Figure 2-1 and Figure 2-2).

2.2 Terms of Reference

The Report was prepared to support the Golden Minerals news release entitled "Golden Minerals Announces 570 g/t Ag Eq. Initial Mineral Resource Estimate for Yoquivo Silver-Gold Project" dated 20 March, 2023.

Mineral Resources are reported in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves (May 2014; the 2014 CIM Definition Standards) and the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (November 2019; 2019 CIM Best Practice Guidelines).

Measurement units used in this Report are metric units and currency is expressed in US dollars (US$), unless stated otherwise. The Mexican currency is the Mexican peso (MXN$). The Report uses Canadian English.

2.3 Qualified Persons

The following persons serve as Qualified Persons (QPs) as defined in NI 43-101:

- Mr. Todd Wakefield, RM SME, Principal Geologist, Mine Technical Services;
- Mr. Edward J.C. Orbock III, RM SME, Associate Principal Geologist, Mine Technical Services;
- Mr. Brian Arthur, RM SME, Associate Metallurgist, Mine Technical Services.

Figure 2-1: General Project Location Map

Figure courtesy Golden Minerals, 2023.

Figure 2-2: Project Location Map

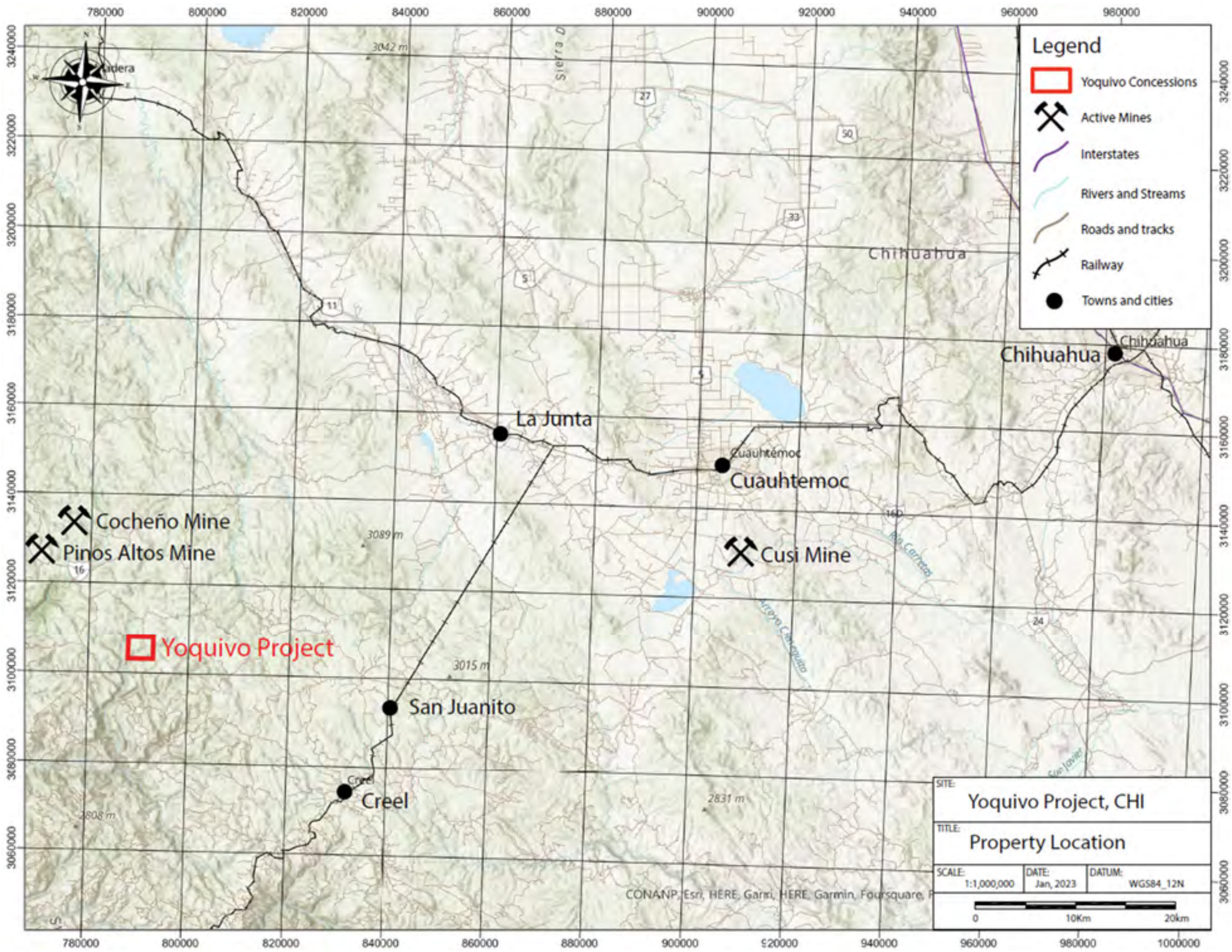


Figure courtesy Golden Minerals, 2023.

2.4 Site Visits and Scope of Personal Inspection

Mr. Todd Wakefield visited the Project site from 31 October 2022 to 4 November 2022. During that visit, he:

- Discussed project history, exploration progress, and database management and assay quality assurance and quality control (QA/QC) procedures with Golden Minerals staff;
- Inspected drill core from a representative mineralized intersection and reviewed drill core, coarse reject, and pulverized reject storage at the Golden Minerals' Velardeña facility,

located in Durango State, Mexico, which is about approximately 600 km southeast of the Project;

- Reviewed metallurgical testing procedures at the Velardeña metallurgical laboratory;
- Reviewed core logging, sampling, and density determination procedures with Golden Minerals staff at the Basaseachi logging facility;
- Collected hand-held global positioning system (GPS) coordinates from nine drill holes on the Project and compared the coordinates with those found in the database;
- Collected six rock chip samples from outcrop at the Pertenencia and San Francisco vein systems as independent check samples on the presence of mineralization;
- Directed sampling of five ¼ core samples as independent check samples on the presence of mineralization.

2.5 Effective Dates

The Report has a number of effective dates:

- Date of database closeout for Mineral Resource estimation: 6 December 2022;
- Date of Mineral Resource estimate: 24 February, 2023.

The overall report effective date is the date of the Mineral Resource estimate, and is 24 February, 2023.

2.6 Information Sources and References

The key information sources for the Report include the reports and documents listed in Section 3.0 (Reliance on Other Experts) and Section 27.0 (References) of this Report and were used to support the preparation of the Report.

Additional information was sought from Golden Minerals, and MTS personnel where required.

2.7 Previous Technical Reports

Golden Minerals has not previously filed a technical report on the Project.

In 2007, the following report was filed on the Project area by West Timmins Mining Inc.:

- Leonard, B., 2007: Independent Technical Report, Yoquivo Property, Chihuahua State, Mexico: report prepared by Caracle Creek International Consulting Inc. for West Timmins Mining Inc., effective date 28 June, 2007.

3.0 RELIANCE ON OTHER EXPERTS

3.1 Introduction

The QPs have relied upon the following other expert reports, which provided information regarding mineral rights, surface rights, property agreements, and royalties for use in sections of this Report.

3.2 Mineral Tenure

The QPs have not independently reviewed ownership of the Project 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 legal experts retained by Golden Minerals, and on information provided by Golden Minerals, through the following documents:

- VHG, Servicios Legales, S.C., 2023: Title Opinion, Minera de Cordilleras, S. de R.L. de C.V.: legal opinion prepared for Golden Minerals, 12 January, 2023, 12 p.
- Golden Minerals, 2022a: Yoquivo Project Concessions Payments - El Dollar Concessionaries José Alejandro Dozal González And Paola Gabriela Dozal González, Concessions El Dollar T. 214876, La Copa T.223499, San Francisco De Yoquivo T.220851, La Niña T. 217475, Dolores T. 216491, La Restauradora T. 217476: Excel spreadsheet.
- Golden Minerals, 2022b: La Esperanza Project Concessions Payments, La Esperanza Concession Title 218071 Concessionaries: Maria Esthela Parra Quezada, María Del Carmen Parra Quezada, Jesús Antonio Parra Quezada And Emiliano Hurtado Montaño Rep. Dealership Legal: Jesús Raúl Rodríguez Parra: Excel spreadsheet.

This information is used in Section 4 of the Report and in support of the Mineral Resource estimate in Section 14.

4.0 PROPERTY DESCRIPTION AND LOCATION

4.1 Introduction

The Yoquivo Project is located 210 km west–southwest of Chihuahua city, in Ocampo Municipality, Chihuahua State.

The Project centroid is latitude 28º 2' 20" north, longitude 108º 2 '55" west (WGS84).

The Yoquivo deposit centroid is latitude 28º 2' 21" north, longitude 108º 2' 16" west (WGS84).

4.2 Property and Title in Mexico

The QP has not independently verified the following information, which is in the public domain and was sourced from official Mexican Government websites.

4.2.1 Mineral Title

In Mexico, mining concessions are granted by the Economy Ministry and are considered exploitation concessions with a 50-year term.

Valid mining concessions can be renewed for an additional 50-year term as long as the mine is active, and the applicant has abided by all appropriate regulations and makes the application within five years prior to the expiration date.

All concessions must be surveyed by a licensed surveyor.

Mining concessions have an annual minimum investment that must be met, an annual mining rights fee to be paid to keep the concessions effective, and compliance with environmental laws. Minimum expenditures, pursuant to Mexican regulations, may be substituted for sales of minerals from the mine for an equivalent amount.

4.2.2 Surface Rights

Surface rights in Mexico are commonly owned either by communities (ejidos) or by private owners. Mexican mining law includes provisions to facilitate purchasing land required for mining activities, installations, and development.

4.2.3 Royalties

In 2013, the Mexican Federal government introduced a mining royalty, effective January 1, 2014, based on 7.5% of taxable earnings before interest and depreciation. In addition, precious metal mining companies must pay a 0.5% royalty on revenues from gold, silver, and platinum.

4.2.4 Water Rights

The National Water Law and associated regulations control all water use in Mexico. The Comisión Nacional del Agua (CONAGUA) is the responsible agency. Applications are submitted to this agency indicating the annual water needs for the mine operation and the source of water to be used. CONAGUA grants water concessions based on water availability in the source area.

4.2.5 Fraser Institute Survey

The QP used the 2021 Fraser Institute Annual Survey of Mining Companies report (the 2021 Fraser Institute Survey) as a credible source for the assessment of the overall political risk facing an exploration or mining project in Mexico. Each year, the Fraser Institute sends a questionnaire to selected mining and exploration companies globally. The Fraser Institute survey is an attempt to assess how mineral endowments and public policy factors such as taxation and regulatory uncertainty affect exploration investment.

The QP used the 2021 Fraser Institute survey because it is globally regarded as an independent report-card style assessment to governments on how attractive their policies are from the point of view of an exploration manager or mining company and forms a proxy for the assessment by industry of political risk in specific political jurisdictions from the mining industry's perspective.

Of the 84 jurisdictions surveyed in the 2021 Fraser Institute survey, Mexico ranks 34th for investment attractiveness, 54th for policy perception and 28th for best practices mineral potential.

4.3 Project Ownership

The Project is 100% held by Golden Minerals. Mineral title is currently in the process of transfer from the original concession holders to Golden Minerals' wholly-owned subsidiary, Minera de Cordilleras S. De R.L. de C.V. (Minera de Cordilleras).

4.4 Mineral Tenure

The Project consists of seven mining concessions with an area totalling about 1,975 ha, located within the Ocampo municipality, Chihuahua State, Mexico.

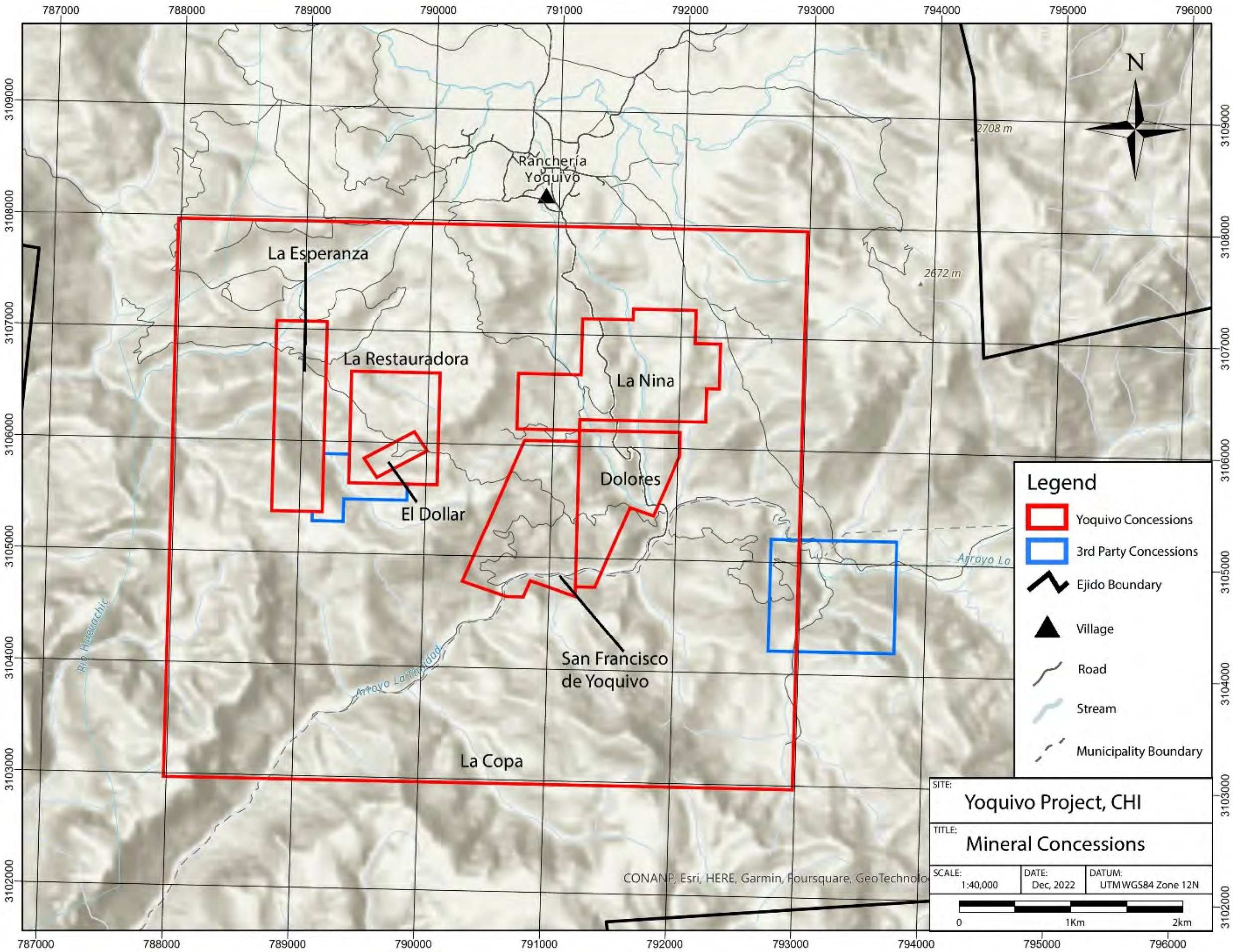
Table 4-1 summarizes the concessions, and Figure 4-1 shows the concession locations. There are third-party concessions within the La Copa concession (see Figure 4-1) that are excised from that concession.

The Yoquivo group of concessions (El Dollar, La Copa, San Francisco de Yoquivo, La Niña, Dolores, and La Restauradora) were acquired from Alejandro Dozal González and Paola Gabriela Dozal González in March 2022. The acquisition consisted of a total payment of US$480,000 over 54 months and payment of US$125,140 to settle all outstanding property taxes the original concessions owners owed to the Mexican government. All payments were made as required.

Table 4-1: Mineral Tenure Summary Table

Concession Name	Concession Holder	Original Concession Owner	Title Number	Area (ha)	Expiry Date	Bi-Annual Property Taxes (MXN$)
El Dollar	Minera de Cordilleras	Alejandro and Paola Dozal González	214876	9.19	3 December, 2051	1,736
La Copa	Minera de Cordilleras	Alejandro and Paola Dozal González	223499	1,552.12	11 January, 2055	293,133
San Francisco de Yoquivo	Minera de Cordilleras	Alejandro and Paola Dozal González	220851	91.06	15 October, 2053	17,197
La Niña	Minera de Cordilleras	Alejandro and Paola Dozal González	217475	122.00	15 July, 2052	23,041
Dolores	Minera de Cordilleras	Alejandro and Paola Dozal González	216491	71.63	16 May, 2052	Not applicable
La Restauradora	Minera de Cordilleras	Alejandro and Paola Dozal González	217476	60.81	15 July, 2052	11,485
La Esperanza	Minera de Cordilleras	Maria Esthela Parra Quezada, María del Carmen Parra Quezada, Jesús Antonio Parra Quezada and Emiliano Hurtado Montaño	218071	68.00	2 October, 2052	12,842
Totals				***1,974.81***		***372,961***

Figure 4-1: Mineral Tenure Location Plan



Note: Figure courtesy Golden Minerals, 2023.

The Esperanza concession was acquired from Maria Esthela Parra Quezada, María del Carmen Parra Quezada, Jesús Antonio Parra Quezada and Emiliano Hurtado Montaño on 29 July, 2019 for a total payment of US$250,000 over 36 months. All payments were made as required.

All payments of mining duties and taxes for the concessions are up to date, and the required proof of annual labour forms have been filed for the concessions.

4.5 Surface Rights

The claims are located on the San Francisco de Yoquivo ejido (Figure 4-2). Although the mineral rights are independent of the surface rights, access to the claim block is granted through an agreement between the concession holder and the San Francisco de Yoquivo ejido that does not have a direct interest in the mineral claims.

Minera de Cordilleras signed a five-year temporary access agreement on 5 May, 2018 with the San Francisco de Yoquivo ejido to allow the company to conduct exploration activities within the mineral concessions. As part of this agreement Minera de Cordilleras agreed to pay the San Francisco de Yoquivo ejido's outstanding property taxes, which totalled MXN$120,000, and agreed to pay the annual property tax, which amounts to about MXN$20,000/a.

Golden Minerals is currently negotiating a new access agreement with the ejido to allow a continuation of exploration activities.

4.6 Water Rights

Water used in the exploration programs is purchased from the San Francisco de Yoquivo ejido, with payments based on each water truck load. This is currently about MXN$800 per water truck load.

The San Francisco de Yoquivo ejido uses its own water trucks to pump water from the La Trinidad River to a series of temporary storage ponds close to the drill sites.

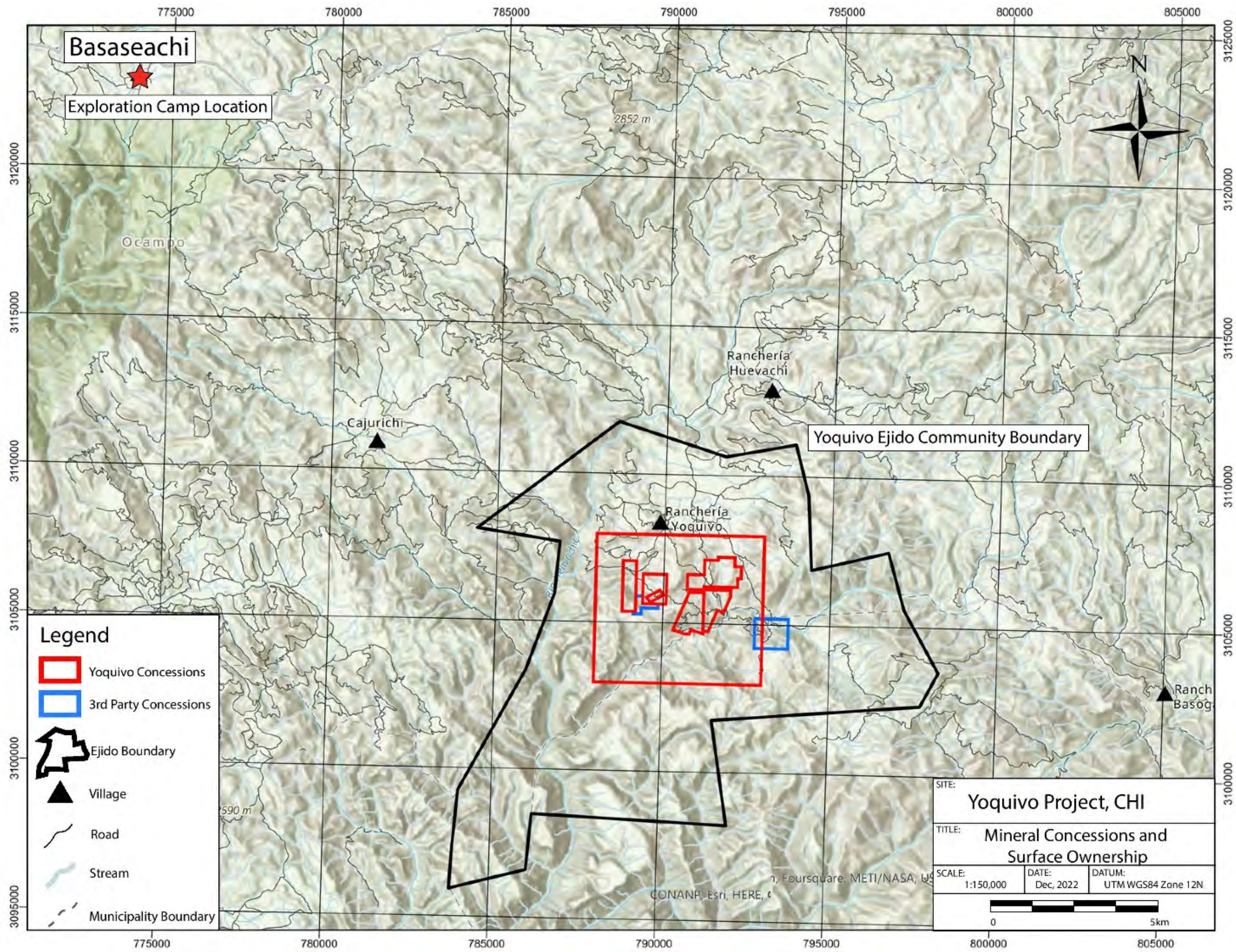
4.7 Royalties and Encumbrances

Third-party net smelter return (NSR) royalties are payable on all the concessions (see Table 4-2) and range from 2–3%.

4.8 Property Agreements

No other agreements, apart from the access agreement discussed in Section 4.5, apply to the Project.

Figure 4-2: Surface Rights Map, Project Area



Note: Figure courtesy Golden Minerals, 2023.

Table 4-2: Royalty Payments

Concession Name	Title Number	Royalty
El Dollar	214876	2% NSR Capped at US$2 million
La Copa	223499	
San Francisco de Yoquivo	220851	
La Niña	217475	
Dolores	216491	
La Restauradora	217476	
La Esperanza	218071	3% NSR Capped at US$800,000

4.9 Permitting Considerations

4.9.1 Permitting for Exploration-Stage Programs

Exploration activities such as rock and soil sampling, geological mapping and geophysical surveys can be conducted without environmental permits.

Drilling and mechanized trenching requires the filing of an Informe Preventivo with the Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT) if there is minimal construction of access roads and little or no cutting of trees. If significant construction of access roads and drill pads are required, approval from SEMARNAT must be obtained, in the form of an environmental impact manifest (MIA).

Surface access and/or use agreements with the surface rights owners are required for the application of both the Informe Preventivo and MIA.

An Informe Preventivo is in force for the area of the Yoquivo ejido that permits Golden Minerals to conduct drilling activities. The official notice 08/IP-0142/12/18 for the Informe Preventivo is dated January 16, 2019, and was issued by the Ministry of Environmental and Natural Resources to Minera de Cordilleras.

4.9.2 Permitting for Operations

There are a number of environmental permits required to put any project into operation. The majority of the mining regulations are at a federal level through SEMARNAT, but there are also a number of permits that must be obtained that are regulated and approved at state and local levels. Three SEMARNAT permits are required prior to any construction activities:

- Environmental impact manifest: an MIA must be prepared by a third-party contractor for submittal to SEMARNAT. The MIA must include a detailed analysis of climate, air quality, water, soil, vegetation, wildlife, cultural resources and socio-economic impacts of the contemplated operation;

- Estudio de riesgo or risk study (ER): must identify potential environmental releases of hazardous substances and evaluate associated risks to establish prevention methods, responses to, and control of, environmental emergencies;
- Cambio de uso del suelo en terrenos forestales or change in forestry land use (CUSTF): the CUSTF is a formal instrument for changing the designation to allow mining on these areas. The CUSTF study is based on the Forestry Law and its regulations. An evaluation must be completed that documents the existing land conditions, including vegetation and wildlife studies, includes an evaluation of the current and proposed use of the land and impacts on natural resources and provides an evaluation of the reclamation and revegetation plans. Agreements with all affected surface landowners are also required to have been completed.

A Project-specific Licencia Única Ambiental (LAU), which states the operational conditions to be met, is issued by SEMARNAT when that agency has approved the Project.

A construction permit is required from the local municipality and an archaeological release letter is required from the National Institute of Anthropology and History.

An explosives permit is required from the Ministry of Defense before any construction begins. Water discharge and usage must be granted by the Comisión Nacional del Agua (CONAGUA).

Operations involving collection, shipping, and/or storage services as well as reuse, recycling, treatment, incineration, and/or final disposal systems of hazardous waste require the operator to register as a hazardous waste generator with SEMARNAT, with a copy sent to the Procuraduria Federal de Proteccion al Ambiente (PROFEPA). Once the company is registered with PROFEPA as a hazardous waste generator, SEMARNAT assigns the company an environmental registry number that must appear on all reports that are filed with the authority.

The key permits required for an operation are summarized in Table 4-3.

4.10 Environmental Considerations

Exploration and mining activities in Mexico are regulated by the Ley General de Equilibrio Ecologico y Proteccion al Ambiente (LGEEPA), and the Reglamento en Materia de Impacto Ambiental (REIA).

Rules and laws pertaining to mining and exploration activities are administered by SEMARNAT and by PROFEPA, which is the agency that enforces SEMARNAT's laws and policies.

Activities that exceed specified disturbance limits require authorization from SEMARNAT and an MIA must be prepared.

Exploration activities that are expected to generate impacts to the physical or social environment that are assessed as potentially of low significance by the regulators are administered under Norma Oficial Mexicana-120-SEMARNAT-1997 (NOM-120-SEMARNAT-1997), and its subsequent modifications.

Table 4-3: Key Permits Required in Support of Any Future Operations

Permit	Required Prior to Mining Stage	Agency
Environmental Impact Assessment (MIA)	Construction/operation/post-operation	SEMARNAT
Cambio de uso del suelo en terrenos forestales (CUSTF)	Construction/operation	SEMARNAT
Technical justification study	Construction (includes conceptual design)	SEMARNAT
Risk study (ER)	Construction/operation	SEMARNAT
Construction permit	Construction	Local municipality
Explosive and storage permits	Construction/operation	SEDENA
Archaeological release	Construction	INAH
Water use concession	Construction/operation	CONAGUA
Water discharge permit	Operation	CONAGUA
Licencia única Ambiental (LAU)	Construction, six months prior to operation	SEMARNAT
Accident prevention plan	Operation	SEMARNAT
Hazardous waste generator	Operation	SEMARNAT/PROFEPA

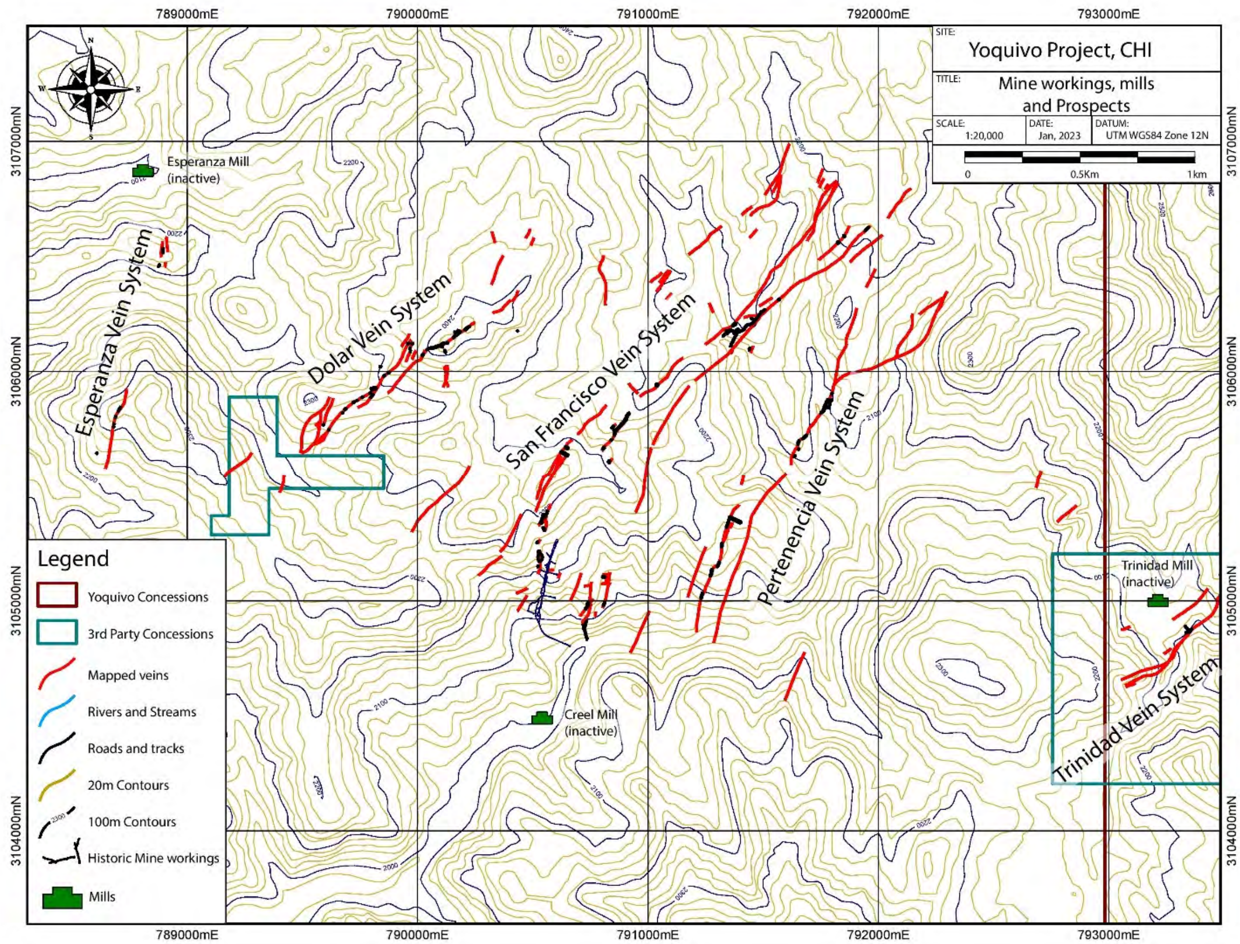
Note: SEMARNAT = Secretaría de Medio Ambiente y Recursos Naturales; PROFEPA = Procuraduria Federal de Proteccion al Ambiente; SEDENA = Secretaría de la Defensa Nacional; INAH = Instituto Nacional de Antropología e Historia; CONAGUA = Comisión Nacional del Agua.

The Project is not included within any specially protected, federally designated, ecological zones known as Áreas Naturales Protegidas.

The Yoquivo Project is within the Yoquivo Mining District and has been mined historically at small scales since the late 19th century. The mineralized bodies and the enclosing host rocks are anomalous in base and precious metals and have generated elevated metals values in sediments that extend well beyond known workings. The mineralized veins are characteristically low or moderate sulphidation but may have potential for acid rock drainage (ARD) and subsequent metal leaching.

There are numerous historical mine workings, excavations, and dumps on, and adjacent to, the Project area (Figure 4-3). There are two small processing plants within the Project area, but they are not under the control of Golden Minerals. The Esperanza mill is a small 20 t/d cyanide mill but has never operated. The Creel Mill was a 75 t/d flotation mill installed in the 1980s that has been partially dismantled, and is currently non-operational.

Figure 4-3: Historical Mine Working Location Map



Note: Figure courtesy Golden Minerals, 2023.

Some of the disturbances are on mineral concessions held by Golden Minerals. Environmental impacts within the Project site primarily result from historical activities. A site visit, conducted by SEMARNAT as part of the permit application in 2017, determined that the surface disturbances caused by historic mining activities, were “not significant”, and Golden Minerals is not liable for any rehabilitation of those surface disturbances.

Adjacent to the Project area, to the west in an excised concession from Golden Minerals’ holdings, a small custom mill is operating in the Trinidad area, processing material from artisanal miners (gambusinos) that is sourced from the surrounding mines and prospects including some mineralization mined from the Yoquivo Project area.

Gambusinos have been extracting small amounts of material from the Creel level of the San Francisco vein system, and removing small historical mine dumps from the Project during Golden Minerals' tenure ownership. Those impacts have been identified and documented by Golden Minerals' staff. There is an expectation that Golden Minerals is not responsible for the current gambusino activity, as material is being removed from the Project area and processed at a toll mill outside the Project area, so there are no waste rock or tailings being generated within the Project boundaries.

4.11 Social License Considerations

Golden Minerals, through Minera de Cordilleras, has written permission from the surface landowners to complete exploration on the Project but will need to negotiate agreements to initiate any future construction and mining activities.

Golden Minerals has built a good relationship with the San Francisco de Yoquivo community, has employed local workers as casual labourers, has employed local contractors for road repair and drill platform construction, and has locally hired water trucks to transport water to the drill sites.

4.12 QP Comments on "Item 4; Property Description and Location"

The QP notes:

- Legal opinion provided supports that Golden Minerals currently holds the seven concessions that comprise the Project area;
- Legal opinion provided supports that the mineral tenures held are valid and sufficient to support declaration of Mineral Resources;
- Access to the claim block is granted through an agreement between the concession holder and the San Francisco de Yoquivo ejido;
- Minera de Cordilleras signed a five-year temporary access agreement on 5 May, 2018 with the San Francisco de Yoquivo ejido to allow the company to conduct exploration activities within the mineral concessions;
- Water used in the exploration programs is purchased from the San Francisco de Yoquivo ejido, with payments based on each water truck load;
- Golden Minerals advised that the company has followed the environmental permitting policies outlined by SEMARNAT for all exploration activities completed by the company to date;
- Golden Minerals, through Minera de Cordilleras, has written permission from the surface landowners to complete exploration on the Project.

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

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

5.1 Accessibility

The Project can be accessed from the city of Chihuahua by the following route:

- Chihuahua City to Cuauhtemoc to La Junta to Basaseachi (location of the exploration base camp), a distance of 278 km on Mexico Highway 16.

To access the concession area, the route is:

- Basaseachi to the San Francisco de Yoquivo ejido via Chihuahua State Highway 227 (Basaseachi–San Juanito paved road) for 36.1 km, and then 5 km of unpaved road from the turnoff from Chihuahua State Highway 227.

The Project centre is an additional 3 km due south of the San Francisco de Yoquivo ejido (refer to Figure 2-2), and is accessed by a series of dirt roads and logging tracks.

The closest railway station is in San Juanito, 45 km east of the Project area.

5.2 Climate

There is no direct meteorological data collected for the Yoquivo Project area, and because regional and local climates in mountainous regions can be significantly different, the climate information presented in this sub-section was taken from a weather station at the Basaseachi Falls national park located 21 km to the northwest of the Project area. The climate is classified as humid subtropical to humid continental depending on elevation.

The average yearly maximum temperature is estimated to be approximately 23º C. The monthly maximum temperature is approximately 17º C in December and January, whereas the maximum monthly temperature is 30º C in July. Temperatures can drop to average minima of -1º C in December–January.

Rainfall occurs mainly during the summer from July to September. Snow and rain occur sporadically during the winter months. The average annual precipitation is approximately 1,500 mm, falling in two distinct wet seasons. Approximately 80% of the total rainfall occurs from June to September (a summer rain fall regime) and the balance falls during October to April (slight winter precipitation regime).

Exploration activities can be conducted year-round. Any future mining activity would also be year-round.

5.3 Local Resources and Infrastructure

The closest town to the Project is Basaseachi, approximately 24 km to the northwest of the Project area. The town can support basic exploration activities, and currently Golden Minerals rents a house in Basaseachi as the base for Project exploration activities.

The area has a long tradition of mining. Several large open pit and underground precious metal mines are operating within 50 km of the Project area. The Yoquivo Project lies about 36 km southeast of the Piños Altos, Ocampo, and El Cocheño mines, all large-scale open pit and underground operations that are exploiting low-sulphidation epithermal vein systems. The Orisyvo high-sulphidation deposit is located 25 km to the south of the Project area.

These mines source the majority of their workforces from the local communities, including the towns of Basaseachi, San Juanito, and La Junta. There is a department of mining, metallurgy and geology at the Universidad Autonoma de Chihuahua in the city of Chihuahua approximately 300 km to the west of the Project. Golden Minerals believes that there is sufficient skilled and unskilled labour in the communities near to the Yoquivo Project to provide skilled and unskilled labour for Project purposes.

The city of Cuidad Cuauhtémoc, situated 125 km to the northeast of the Project, hosts several universities and post-secondary schools. The principal industry is farming, particularly apple orchards and ranching.

The Comisión Federal de Electricidad (the state power company) constructed a 115 kV powerline to the town of Basaseachi in 2005, and the community of San Francisco de Yoquivo is connected to the main power grid. However, it is likely that these lines will need to be upgraded to support any future operations at the Yoquivo Project.

The Project area is covered by a number of rivers and streams. In support of exploration activities, Golden Minerals has hired water trucks owned by the Yoquivo ejido to transport water from the La Trinidad River to the various drill sites. Negotiations would be required in the future to acquire sufficient water rights to allow Golden Minerals to drill water wells to provide water for future operations.

Within the Project boundary there is sufficient land to allow for the construction of any future processing plant, tailings storage facility, waste rock facilities, mine offices, and a mine camp. Negotiations with the ejido will need to be conducted to acquire the surface rights for any such future facilities.

5.4 Physiography

The elevation in the Project area is rugged, and averages 1,979 masl. Topographic highs and lows can be approximately 600 m different in elevation.

The major drainages in the Project area are the La Trinidad and San Francisco streams. The closest major river to the Project is the Candameña River.

Vegetation is dominated by pine forests with minor oak and maple.

5.5 QP Comments on "Item 5; Accessibility, Climate, Local Resources, Infrastructure, And Physiography"

Any future mining operations are expected to be operated year-round.

There is sufficient suitable land available within the mineral tenure held by Golden Minerals for infrastructure such as tailings disposal, mine waste disposal, and process plant and related mine facilities.

A review of the existing power and water sources, manpower availability, and transport options indicates that there are reasonable expectations that sufficient labour and infrastructure will be available to support exploration activities.

6.0 HISTORY

6.1 Exploration History

The Project history is summarized in Table 6-1.

6.2 Production

There is no modern production from the Project area.

The only information on historical production dates from 1908–1925, quoted from Leonard (2007):

"The first 650 tons of ore which passed through the plant ran 36 g/t of gold and 4,200 g/t of silver. High-grade ore averaged 1,540 g/t of gold and 224,000 g/t of silver".

Table 6-1: Project History

Year	Operator	Work Completed
1867–1925	Unknown	Small scale underground mining operations, primarily on the San Francisco and La Esperanza veins.
Mid-1970s	Cia. Minera La Rastra, S.A.	Drove a tunnel 300 m parallel to the caved areas on the San Francisco vein; completed underground mapping and sampling. Drilled five holes, type and metreage unknown.
1976–1978	Mead Exploration Co.	Limited production from high-grade stringers
2004–2005	Sydney Resources Corporation (Sydney Resources)	Entered into an agreement with concession holder Jose Maria Dozal-Rascon to earn a 100% interest. Rock chip and channel sampling, with 657 samples collected on surface and 131 from underground. San Francisco-Los Angeles-La Cruz and Pertenencia-Dolores structures mapped at 1:5,000 scale.
2006–2008	West Timmins Mining Inc. (West Timmins)	Company formed by merger of Sydney Resources and Band-Ore Resources Ltd. in 2006. During 2007, completed 8 drill holes totaling 2,473.4 m of core drilling, which encountered narrow, high-grade gold–silver intercepts from a number of vein systems. Completed a regional helicopter geophysical survey (total field magnetics and electromagnetics) using a high resolution AeroTEM II system. Returned concessions to original concession holder in 2008.
2007	Konigsberg Corporation	Optioned concessions from West Timmins to obtain a 75% Project interest. Subsequently changed name to Gold Mountain Exploration. Minor reconnaissance sampling conducted (38 samples collected).
2017	Golden Minerals	Golden Minerals acquired the Yoquivo group of concessions.
2018		Mapped and sampled the San Francisco and Pertenencia veins and associated splays over a 2 km strike length. Collected 1,664 surface and underground rock chip samples.
2019		Data review to generate drill targets. Collected 370 rock samples. Contract signed to acquire the La Esperanza Concession.
2020		Phase 1: 3,348 m, 15-hole drill program targeting the Pertenencia, San Francisco and Esperanza vein systems. Collected 53 rock samples.
2021		Phase 2: 3,949 m, 21-hole drill program exploring the Pertenencia, Esperanza and Dolar vein systems. Drill holes were designed to follow up on the high-grade zones intersected by the 2020 drill program and to explore additional veins with

Year	Operator	Work Completed
		the aim of identifying new mineralized zones. Acquired high-resolution digital terrain model for Project area.
2022		Phase 3: 5,947.5 m, 24-hole drill program was designed to follow-up on high-grade intercepts reported from the 2021 drilling program, and to explore additional veins with the aim of identifying new high-grade zones. Collected 28 additional rock samples. Phase 4: 3,320.9 m, 10-hole drill program designed to follow-up on high-grade intercepts reported from the phase 3 program and to further explore the newly discovered Camila vein system. Completed initial internal metallurgical studies. Final property payments made for the Yoquivo and Esperanza concessions. Initiated transfer of concession ownership to Golden Minerals.

7.0 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional Geology

The Yoquivo Project is located within the Sierra Madre Occidental volcanic belt (Sierra Madre), an arc formed by eastward subduction of the Pacific Plate. The Sierra Madre is a metallogenic terrane well known for its epithermal precious metal deposits.

The lower part of the arc comprises late Cretaceous to early Tertiary calc-alkaline batholiths and equivalent volcano–sedimentary rocks referred to as the "Lower Volcanic Supergroup". These rocks represent magmatic activity during the Laramide orogeny (40–80 Ma) and were followed by two periods of major ignimbrite eruption in the early Oligocene and early Miocene epochs. Collectively these latter two eruptive periods constitute the "Upper Volcanic Supergroup". Minor andesite/basalt flows and rhyolitic domes accompanied the ignimbrites. Many low-sulphidation epithermal deposits in Mexico probably developed during the first ignimbrite phase, in a window between 27–40 Ma (Camprubí et. al., 2003). A regional geology map is provided as Figure 7-1. As noted in Section 5.3, and shown on Figure 7-1, the Project is within a 40 km radius of a number of operating precious metals mines.

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

7.2 Project Geology

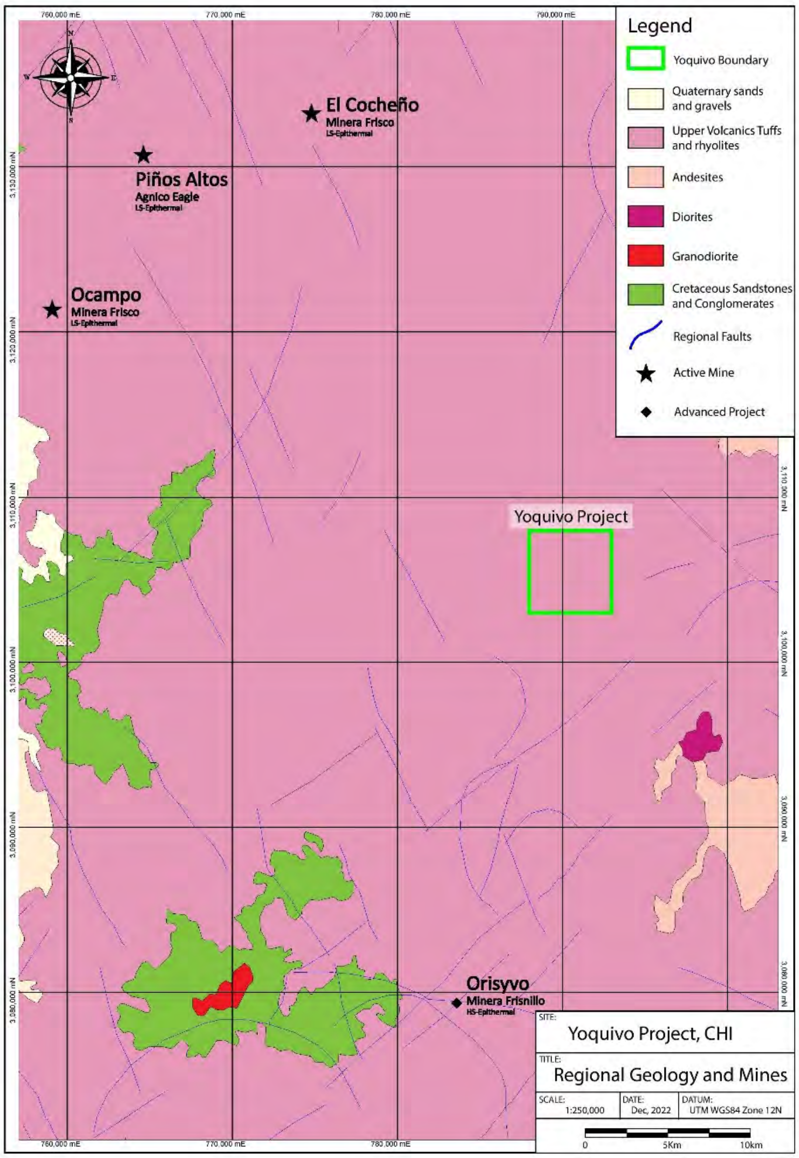
The Yoquivo Project is host to volcanic rock units belonging to both the Lower Volcanic Group and the Upper Volcanic Group. A stratigraphic column for the Project area is included as Figure 7-2.

The Lower Volcanic Group is represented in the Project area by volcanic andesites that are overlain discordantly by rocks of the Upper Volcanic Group. The Upper Volcanic Group is dominated by ignimbrites. Several rhyolitic domes intrude all of these units.

The oldest rocks exposed in the Project area are andesitic tuffs, lavas intercalated with rhyolitic tuffs, and sandy volcanoclastic rocks. The andesitic tuffs are greenish grey, with andesite and pumice lithic fragments and feldspar and biotite phenocrysts. The andesitic flows consist of intercalations of agglomerates and massive porphyritic layers. Intercalated within these flows are at least two rhyolitic tuff horizons, which can reach as much as 10 m in thickness. These horizons commonly display argillic alteration and are weakly oxidized.

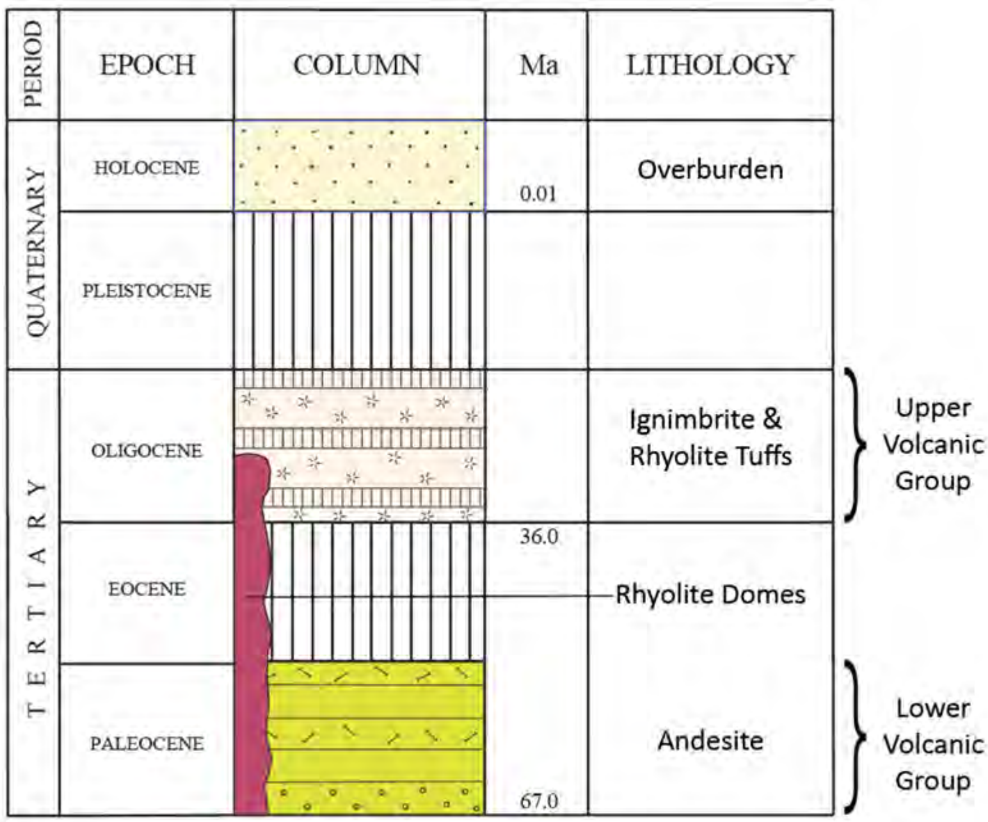
The Upper Volcanic Group rocks consist of vitro-crystalline and lithic tuffs of rhyolitic to dacitic composition, aphanitic vitreous tuffs, pyroclastic lithic tuffs ranging up to lapilli tuffs with fragments of variable composition, and volcanic breccias. Overlaying the tuffs are a series of dacitic to rhyolitic pyroclastic units.

Figure 7-1: Regional Geology Map



Note: Figure courtesy Golden Minerals, 2023. At this map scale, the separate lithologies of the of the Upper Volcanics cannot be differentiated.

Figure 7-2: Stratigraphic Column, Yoquivo Project Area



Note: Figure courtesy Golden Minerals, 2023.

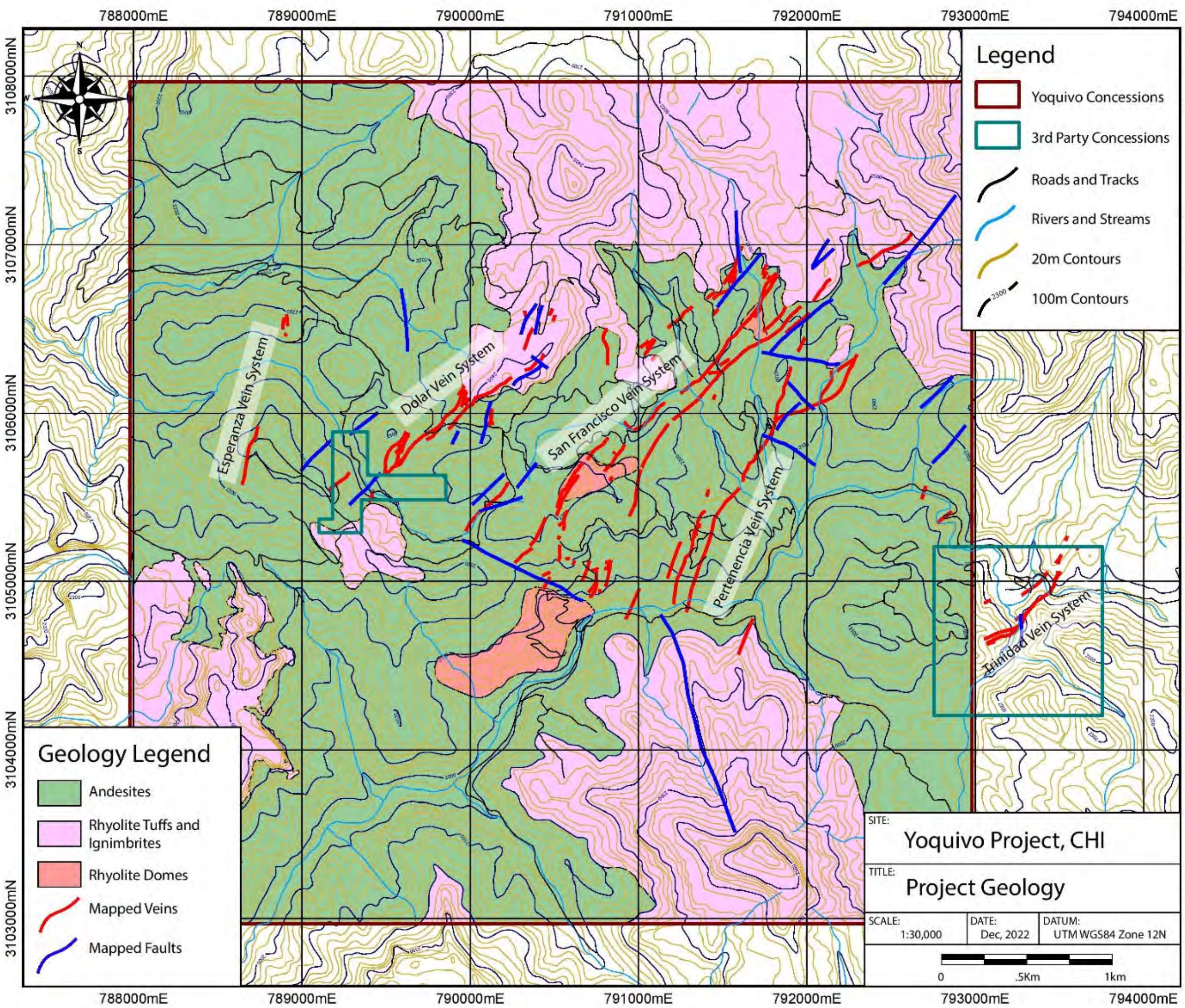
Several small rhyolite domes intrude the Lower Volcanic Group and the Upper Volcanic Group units above the El Dolar mine workings. The rhyolites are white to reddish beige, aphanitic to porphyritic and have well-developed flow banding. In addition, several rhyolite dykes have been identified in the northern part of the Pertenencia vein system.

Several silver–gold quartz vein deposits are embedded along a series of northeast–southwest striking shear zones and are discussed in more detail in Section 7.3.

7.3 Deposit Descriptions

The mineralization on the Yoquivo Project consists of several epithermal quartz veins in four principal vein systems. Individual vein systems have been mapped and sampled over >3 km strike lengths and range from 0.2 m to >5 m in width. The major vein systems are shown in Figure 7-3.

Figure 7-3: Vein Systems and Geology Map



Note: Figure courtesy Golden Minerals, 2023.

7.3.1 Pertenencia Vein System

The Pertenencia vein system consists of at least seven parallel quartz veins, vein breccias, and stockwork zones with minor calcite veining and sulphides (pyrite with very minor sphalerite and galena). An example cross-section is provided in Figure 7-4.

The vein system strikes N30ºE and dips at 60–85º to the southeast. It has been traced on surface and by drilling for at least 1,800 m along strike and for about 300 m down-dip.

Based on surface sampling, the vein system displays higher silver grades than gold grades.

7.3.2 San Francisco Vein System

The San Francisco vein system consists of a series of northeast–southwest-striking quartz veins, vein breccias, and stockwork zones with minor calcite veining and sulphides (pyrite with minor sphalerite and galena). An example cross-section is provided in Figure 7-5.

The San Francisco vein has a strike extent of at least 3,000 m and has been explored to about 300 m depth. Several zones of mineralization were historically mined on this vein to the 1,900 m elevation, approximately 100 m below the river level.

The vein system displays silver and gold grades.

7.3.3 Esperanza Vein

The Esperanza vein consists of a single quartz vein and vein breccia associated with a steeply dipping fault zone. The vein strikes N15ºE and dips at 70–75º to the east. An example cross-section is provided in Figure 7-6.

The vein has been mapped and sampled over a 1,100 m strike length.

At surface, several historical mine workings (see Figure 7-7) have exploited a 1–2 m wide chalcedony vein, and chalcedonic-cemented hydrothermal breccias.

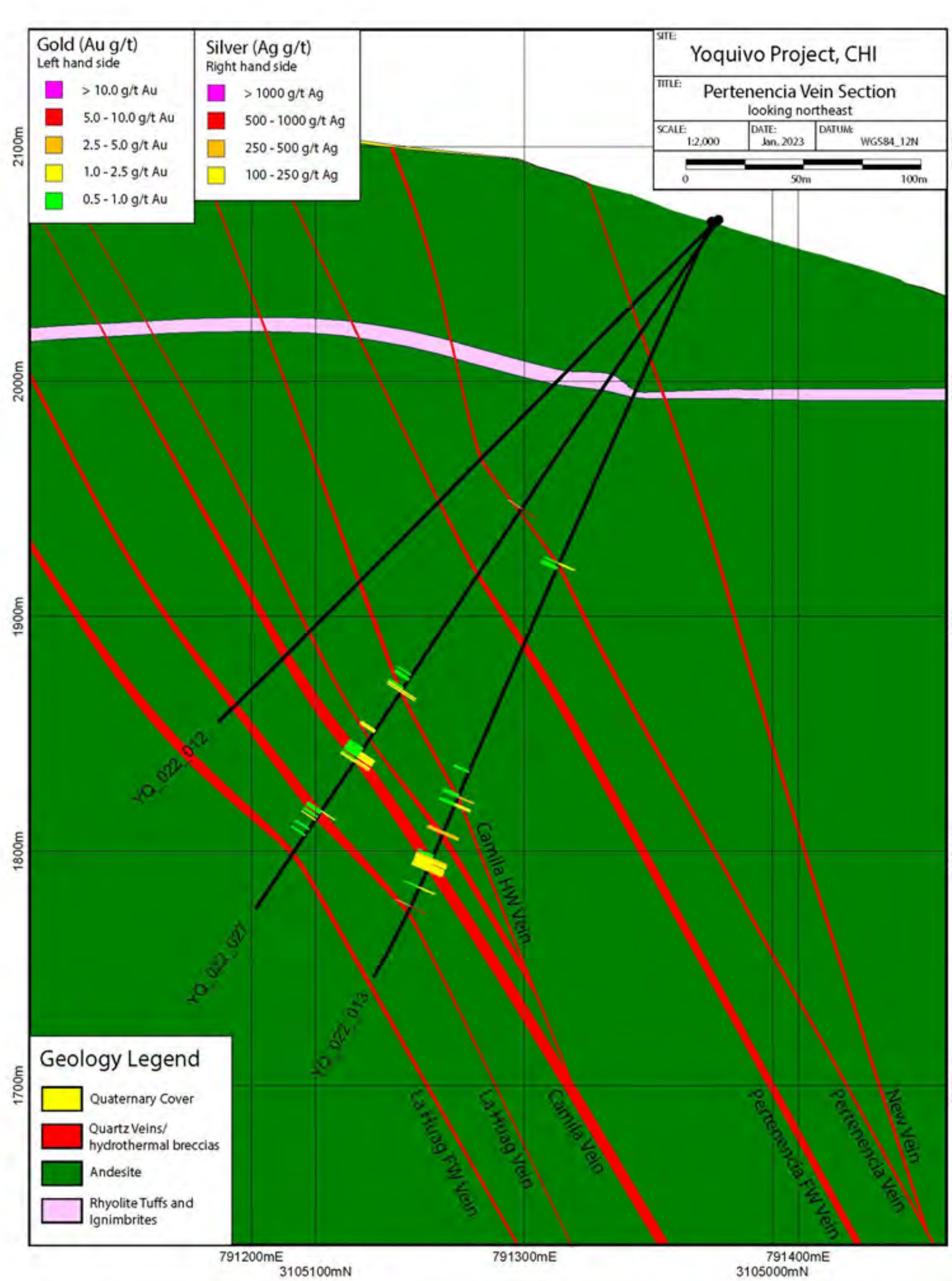
Based on surface sampling, the vein displays higher silver grades than gold grades.

7.3.4 Dolar Vein System

The Dolar vein system comprises northeast–southwest-striking quartz veins, vein breccias and stockwork zones with minor calcite veining and sulphides (pyrite with very minor sphalerite and galena). Historical workings have been excavated along the vein (Figure 7-8).

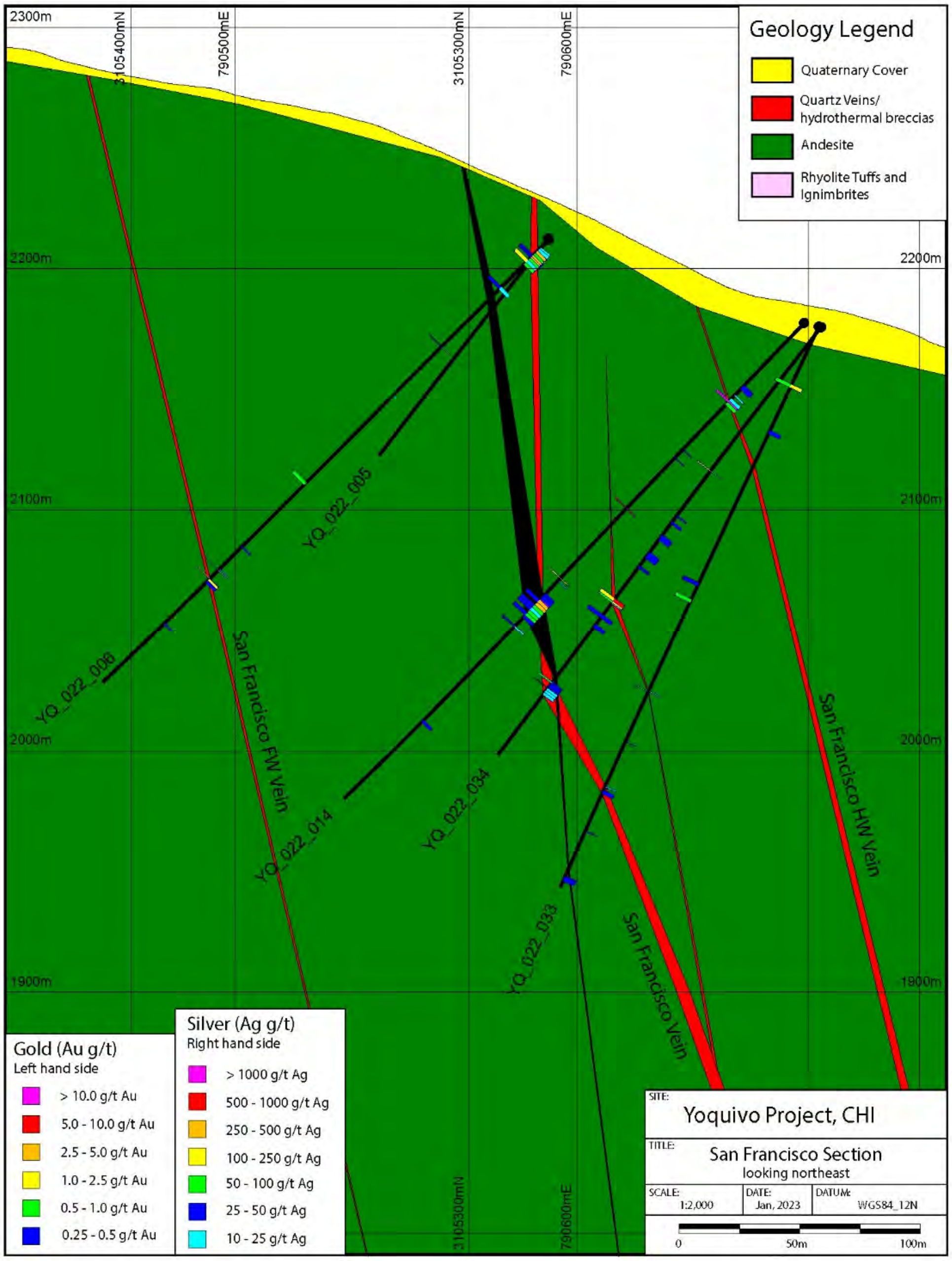
The vein system has a known strike extent of about 1,850 m and displays silver and gold grades.

Figure 7-4: Drill Cross Section, Pertenencia Vein System



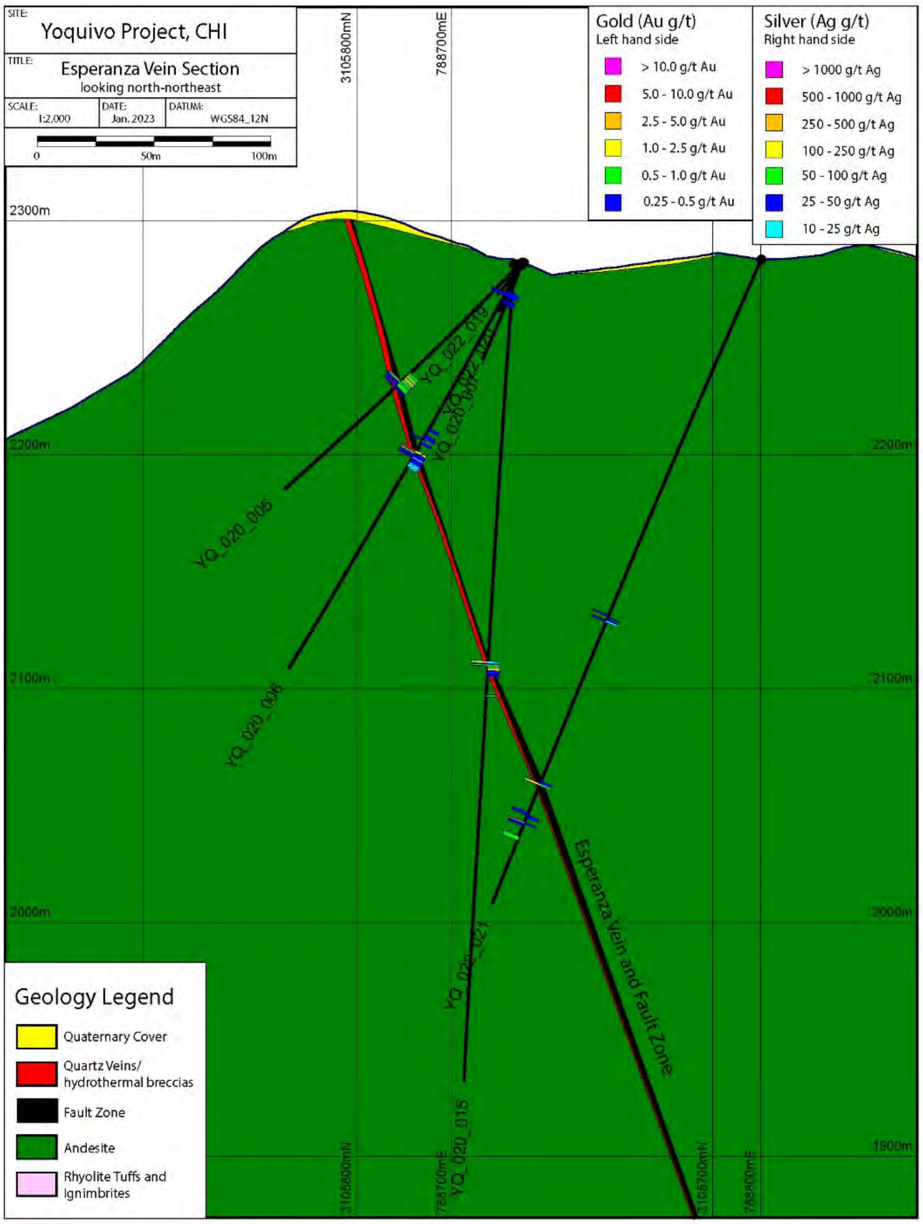
Note: Figure courtesy Golden Minerals, 2023.

Figure 7-5: Drill Cross Section, San Francisco Vein System



Note: Figure courtesy Golden Minerals, 2023.

Figure 7-6: Drill Cross Section, Esperanza Vein



Note: Figure courtesy Golden Minerals, 2023.

Figure 7-7: Historical Workings on the Esperanza Vein

Note: Photograph courtesy Golden Minerals, 2023. Photograph taken September 2018. Stope width in excavation shown ranges from 1–2.2 m in width. Photograph looks north.

Figure 7-8: Historical Workings on the Dolar Vein

Note: Photograph courtesy Golden Minerals, 2023. Photograph taken September 2018. Stope width in excavation shown ranges from 0.8–3.5 m. Photograph looks northeast. Human figure for scale.

7.4 Mineralization

Veins are generally sulphide-poor, and have textures typical of a low-sulphidation epithermal environment, including fine colloform to crustiform banding, bladed calcite textures, and open-space filling textures. Outside of the principal mineralized structures and their adjacent stockwork zones, veins are mostly limited to isolated single veins, minor subparallel veins, or small patches of stockwork veins. Orientations of these minor veins are varied, but most commonly dip steeply to the southeast.

Veins have narrow haloes of silicification, local argillic alteration, and distally grade into weak chloritic alteration. The walls of the vein structure sometimes have sharp boundaries, but it is also quite common for the vein to consist of anastomosing veinlets and stockwork veinlets.

Sulphides are generally pyrite with rare argentite, and locally minor galena–sphalerite–chalcopyrite, and total sulphide content is generally <5%. In the oxide zone, the sulphides are leached, leaving either casts or pseudomorphs of goethite–hematite. Minor goethitic and hematitic staining occurs along the vein exposure at surface. Although no mineralogical studies have been conducted on the Project mineralization, geological observations suggest that gold is likely to be in the form of native gold associated with pyrite and silver in the form of silver sulphides and sulfosalts. This is a typical association in low-sulphidation systems.

Several blind structures were intersected by the Golden Minerals drilling, and the drilling also returned anomalous to high-grade gold–silver grades, which occurred both within the principal structure and in peripheral stockwork zones that extend for several meters to tens of meters around the principal structures.

The majority of the drilling has been conducted on the Pertenencia vein system, with only minimal drilling conducted on the San Francisco, Esperanza and Dolar vein systems. The mineralogy in all of the veins appears to be very similar to that intersected in the Pertenencia drilling. It is unknown if the slightly different silver:gold ratios seen in the surface samples from the different vein systems will be replicated in future drilling data.

7.5 Prospects/Exploration Targets

Exploration potential is discussed in Section 9.8.

7.6 QP Comments on “Item 7: Geological Setting and Mineralization”

The geological understanding of the geological and mineralization setting at the Yoquivo deposit is acceptable to support Mineral Resource estimation.

8.0 DEPOSIT TYPES

8.1 Overview

The mineralization types within the vein systems at Yoquivo are examples of low-sulphidation systems.

The description for the low-sulphidation epithermal model is taken from Pantaleyev (1996).

8.1.1 Geological Setting

Low-sulphidation epithermal deposits are formed by high-level hydrothermal systems from depths of ~1 km to surficial hot-spring settings. Deposition is related to regional-scale fracture systems related to grabens, (resurgent) calderas, flow-dome complexes and rarely, maar diatremes. Extensional structures in volcanic fields (normal faults, fault splays, ladder veins and cymoid loops, etc.) are common; locally graben or caldera-fill clastic rocks are present. High-level (subvolcanic) stocks and/or dikes and pebble breccia diatremes occur in some areas. Locally resurgent or domal structures are related to underlying intrusive bodies.

Most types of volcanic rocks can host the deposit type; however, calc-alkaline andesitic compositions predominate. Some deposits occur in areas with bimodal volcanism and extensive subaerial ash-flow deposits. A less common association is with alkalic intrusive and shoshonitic volcanic rocks. Clastic and epiclastic sediments can be associated with mineralization that develops in intra-volcanic basins and structural depressions.

8.1.2 Mineralization

Mineralized zones are typically localized in structures but may occur in permeable lithologies. Upward-flaring mineralized zones centred on structurally controlled hydrothermal conduits are typical. Large (>1 m wide and hundreds of metres in strike length) to small veins and stockworks are common, with lesser disseminations and replacements. Vein systems can be laterally extensive, but mineralized shoots have relatively restricted vertical extent. High-grade mineralization is commonly found in dilational zones in faults at flexures, splays and in cymoid loops.

Textures typical of low-sulphidation deposits include open-space filling, symmetrical and other layering, crustification, comb structure, colloform banding and multiple brecciation.

Deposits can be strongly zoned along strike and vertically. Deposits are commonly vertically zoned over 250–350 m from a base metal poor, gold–silver-rich top to a relatively silver-rich base metal zone, and an underlying base metal-rich zone grading at depth into a sparse base metal, pyritic zone. From surface to depth, metal zones can contain gold–silver–arsenic–antimony–mercury, gold–silver–lead–zinc–copper, or silver–lead–zinc. In alkalic host rocks, tellurides, vanadium-mica (roscoelite), and fluorite may be abundant, with lesser molybdenite.

Pyrite, electrum, gold, silver, argentite; chalcopyrite, sphalerite, galena, tetrahedrite, silver sulphosalt, and/or selenide minerals are the main mineral species. Quartz, amethyst, chalcedony, quartz pseudomorphs after calcite, calcite, adularia, sericite, barite, fluorite, and calcium–magnesium–manganese–iron carbonate minerals such as rhodochrosite, hematite, and chlorite are the most common gangue minerals.

8.1.3 Alteration

Silicification is extensive in mineralization as multiple generations of quartz and chalcedony are typically accompanied by adularia and calcite. Pervasive silicification in vein envelopes can be flanked by sericite–illite–kaolinite assemblages. Intermediate argillic alteration (kaolinite–illite–montmorillonite (smectite)) forms adjacent to some veins; advanced argillic alteration (kaolinite–alunite) frequently forms along the tops of mineralized zones. Propylitic alteration dominates peripherally and at depth.

8.2 QP Comments on "Item 8: Deposit Types"

The QP considers that an epithermal model is a reasonable basis for exploration targeting for silver–gold mineralization in the Project area.

9.0 EXPLORATION

9.1 Grids and Surveys

Most of the location data collected on the Yoquivo Project by Golden Minerals was reported using the WGS84 UTM Zone 12 North coordinate system.

In 2021, Golden Minerals acquired an orthophoto covering 100 km^2 at 50 cm resolution from PhotoSat, Vancouver, from which PhotoSat generated 1, 5, and 10 m digital contours for the Project area.

All drill hole collars, including the 2007 drill holes completed by West Timmins, were surveyed with a differential GPS by Zigna Ingeniería Topográfica, a third-party surveying company based in Cuidad Cuauhtémoc, Chihuahua.

Historical surface and underground samples collected by West Timmins were collected in UTM NAD27 Zone 12 North coordinates. These data were converted to the UTM WGS84 Zone 12 North datum using MapInfo, and the updated locations were imported into Golden Minerals' sample database.

9.2 Geological Mapping

Sydney Resources completed reconnaissance geological mapping, scale unknown, during 2004. Detailed mapping was completed along the San Francisco–Los Angeles-La Cruz and Pertenencia–Dolores structures (Leonard, 2007).

There is moderate outcrop exposure at Yoquivo, and Golden Minerals completed a detailed surface mapping program along the main mineralized structures from 2018 to 2020, at a scale of 1:1,000. Locations of surface and historical mine workings were mapped at 1:250 scale. An example of the outcrop mapping data collected by Golden Minerals staff is provided in Figure 9-1.

9.3 Geochemical Sampling

Multiple campaigns for surface and underground sampling have been conducted at Yoquivo.

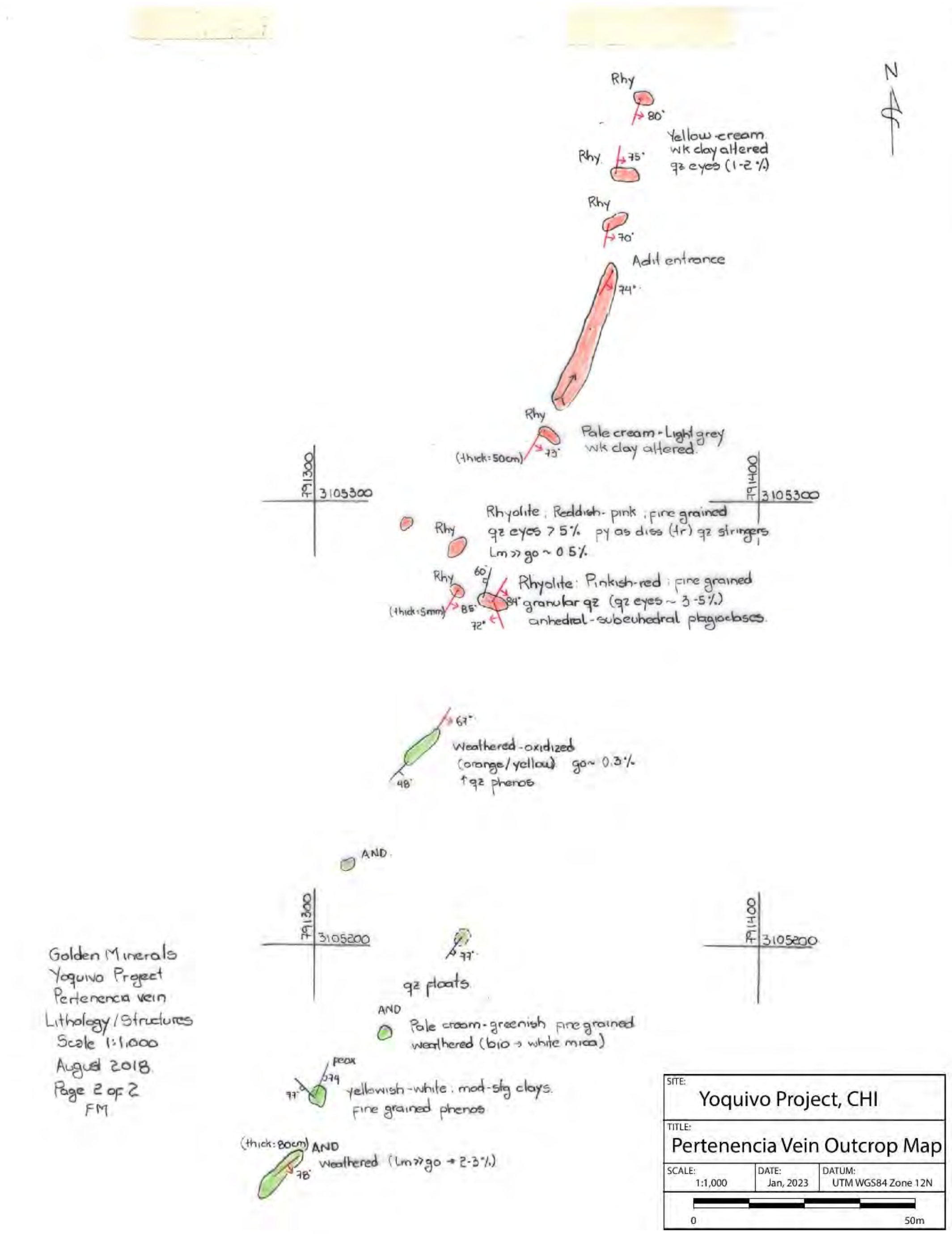
Sydney Resources collected channel, rock chip and dump grab samples during 2004–2005, with 657 samples collected on surface and 131 from underground.

West Timmins Mining collected 774 surface and underground samples between 2005 and 2008.

In 2007, Konigsberg Corporation conducted a reconnaissance sampling program at Yoquivo and collected 38 samples from around the Project.

From 2018 to 2022, Golden Minerals collected 1,555 surface channel, rock chip and grab samples around the Yoquivo Project, and in addition collected 590 underground channel and rock chip samples.

Figure 9-1: Example Outcrop Map



Note: Figure courtesy Golden Minerals, 2023.

Figure 9-2 shows the gold grades returned from the surface sampling. Figure 9-3 shows the silver grades.

9.4 Geophysics

No geophysical work has been conducted on the Project by Golden Minerals.

West Timmins stated that a regional helicopter geophysical survey (total field magnetics and electromagnetics) was completed over the entire Project area using a high resolution AeroTEM II system in 2007. Golden Minerals does not currently have access to any of the historical geophysical data or interpretations that may have been performed.

9.5 Pits and Trenches

Many historical (early 20th century) pits, adits and shafts have been developed along the principal vein systems (refer to Figure 4-3).

No trenching work has been undertaken by Golden Minerals on the Project.

9.6 Petrology, Mineralogy, and Research Studies

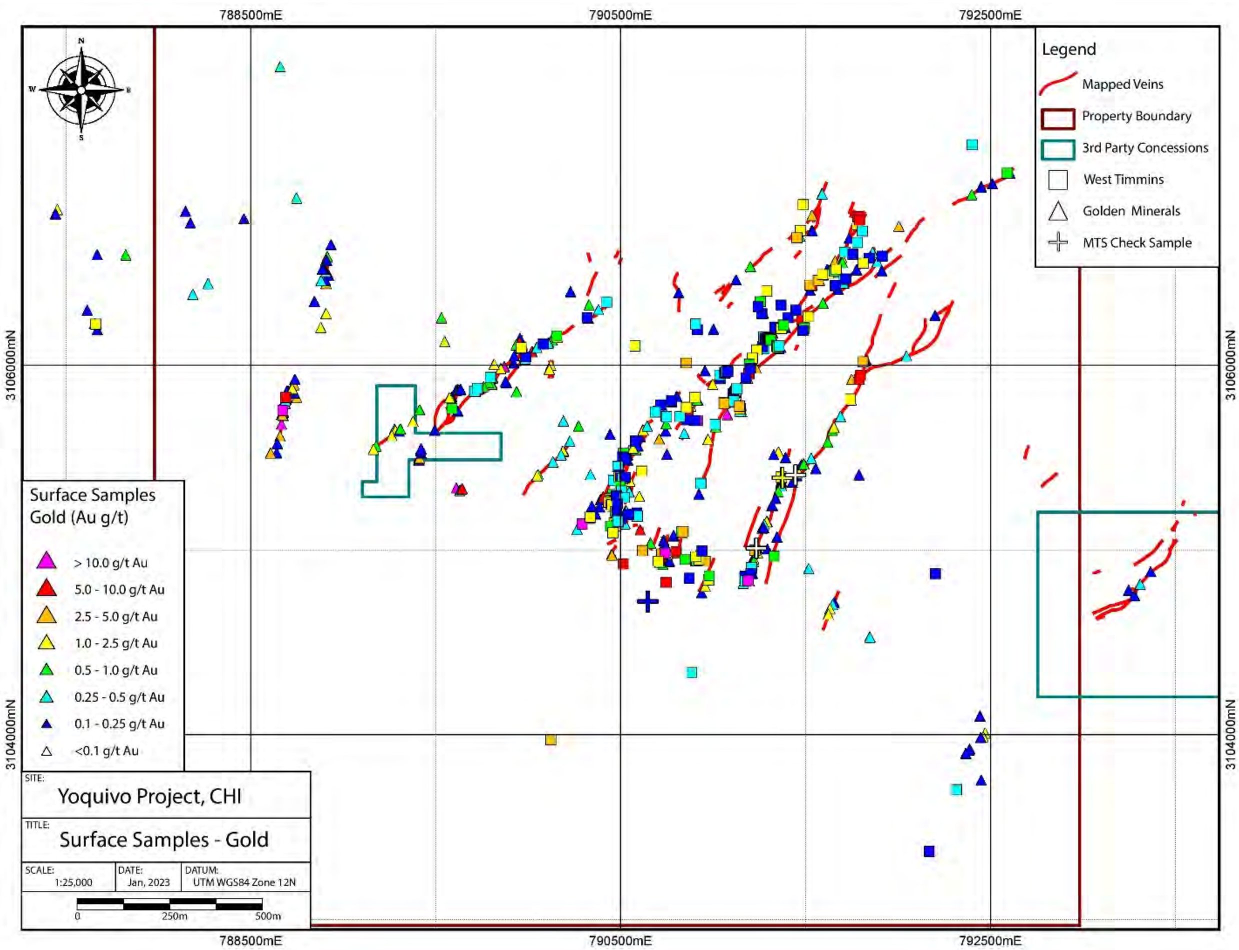
No petrographic studies have been completed on the Yoquivo Project.

In 2018–2019, Golden Minerals submitted 15 samples to Tawn Albinson of Mircotermometria y Asesoria Geologica-Minera S.A. de C.V., based in Mexico City, to conduct fluid inclusion analyses to assist in the reconstruction and estimation of geological levels within the epithermal system, as well as the petrographic characteristics of silica phases at Yoquivo.

The completed study showed that the Yoquivo fluid inclusions contained very low salinities, indicated the presence of adularia and that epidote was scarce, and showed the presence of silver sulphides in quartz, adularia, and rarely in base metal sulphides. In combination, Albinson concluded that the fluids are characteristic of low-sulphidation epithermal deposits (Albinson, 2019).

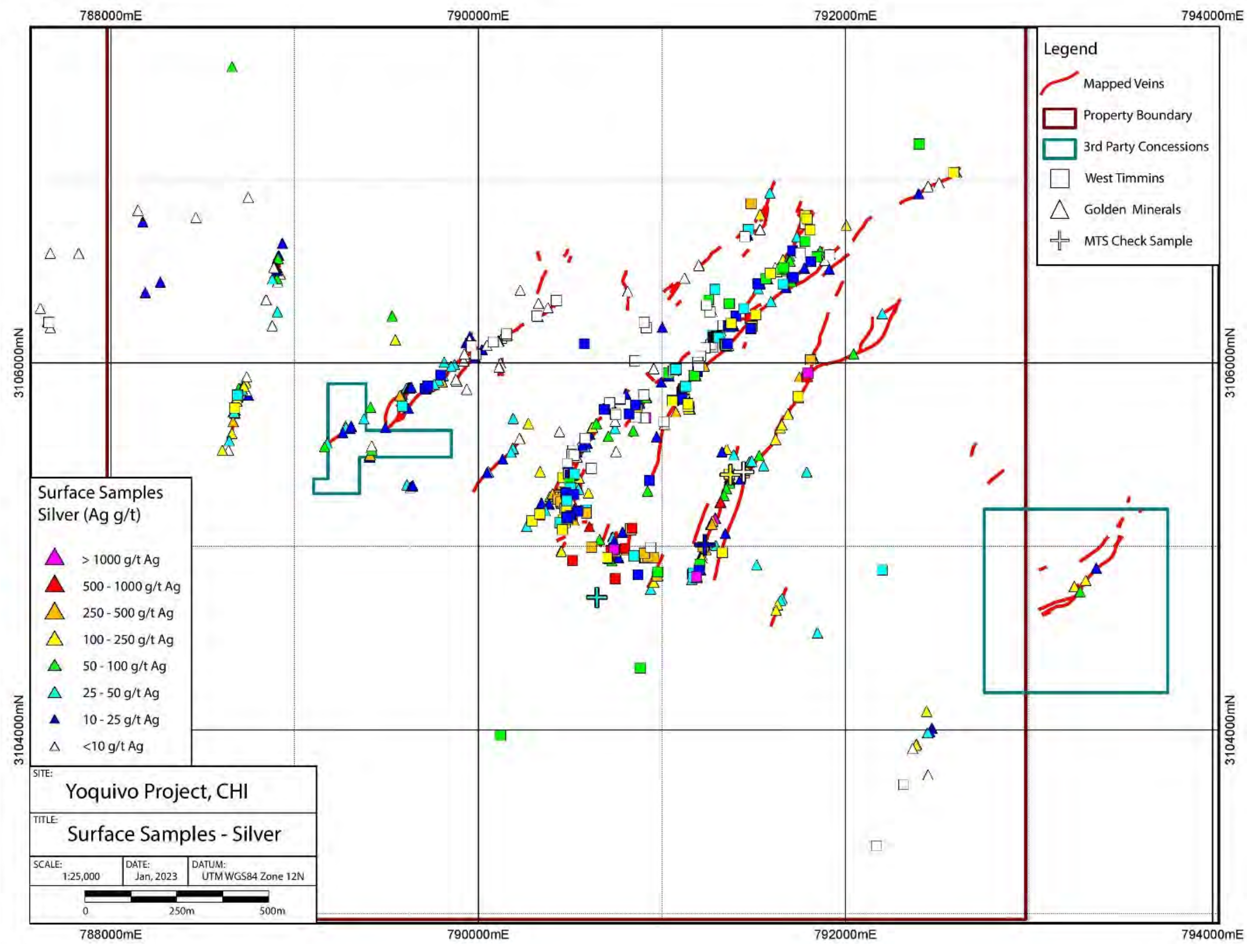
Comparison of Yoquivo to low- and intermediate-sulphidation deposits in Mexico suggested that the exposure level for most of the samples from Yoquivo corresponded to the upper parts of the epithermal system. As most mineralized zones in this type of deposit show the best grades in a central part of the system, the conclusion was that deeper drilling would be required to reach the geological level where the temperature isotherms of 260–280° C could be located. Drill holes aimed at 200–300 vertical metres below the present surface would likely reach a more optimum geological level within the system, and greater depths may be necessary for the higher level or more peripheral veins in the district (Albinson, 2019).

Figure 9-2: Gold Grades, Yoquivo Surface Samples



Note: Figure courtesy Golden Minerals, 2023.

Figure 9-3: Silver Grades, Yoquivo Surface Samples

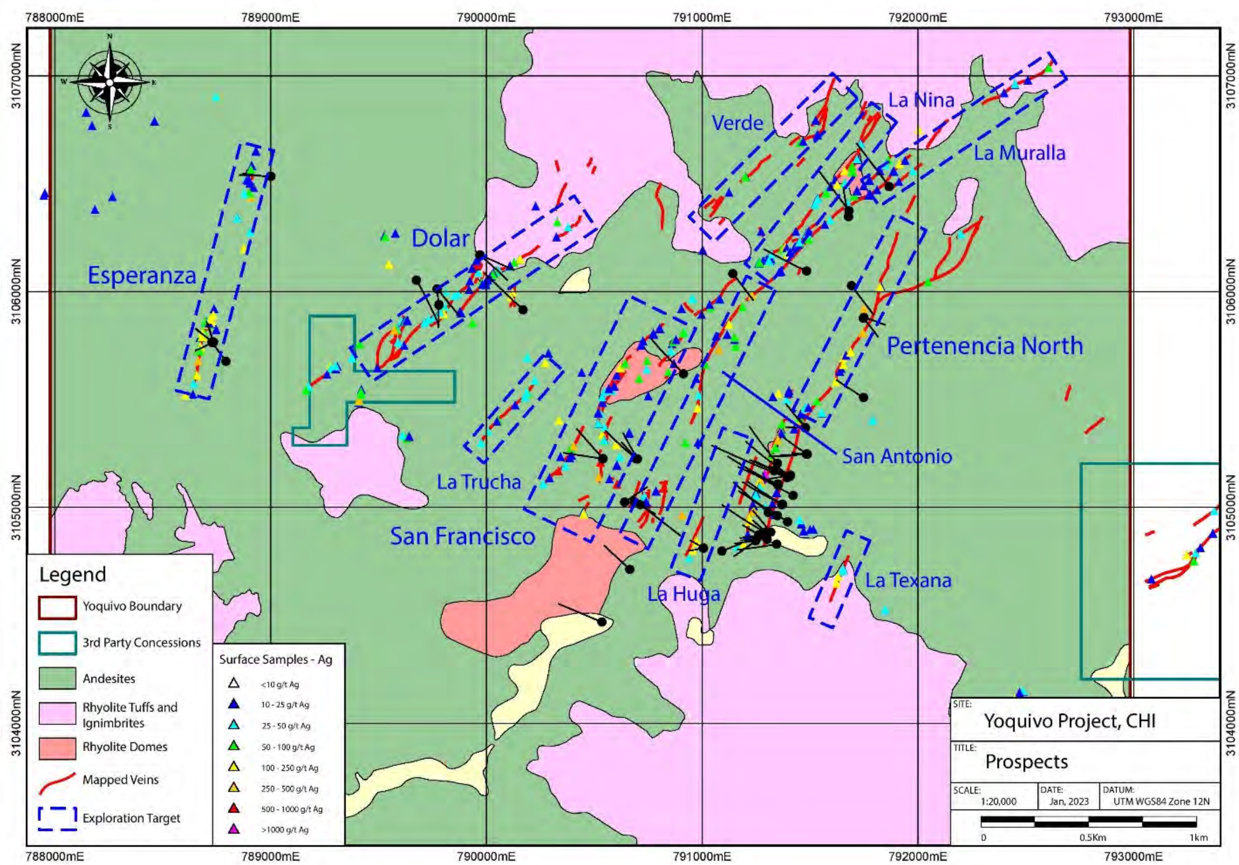


Note: Figure courtesy Golden Minerals, 2023.

9.7 Exploration Potential

Most of the drilling conducted by Golden Minerals at Yoquivo was focused on exploring the central part of the Pertenencia vein system (see Section 10). Minor drilling has been conducted on the Esperanza, San Francisco, La Huga and Dolar veins, and the drill holes have intersected intervals of potentially economic mineralization on several of these veins that require follow-up. Prospect areas are shown in Figure 9-4.

Figure 9-4: Prospect Location Map



Note: Figure courtesy Golden Minerals, 2023.

The strike extents for most known veins have been identified by exploration. In many cases, mineralized shoots at depth have not yet been defined nor have the down dip extensions been drilled out. There is potential for additional mineralization to be identified on many of the veins with further drilling.

9.7.1 Pertenencia North

Golden Minerals has focused drilling in the southern 800 m portion of the vein system. Four drill holes have been drilled exploring the northern continuation of the Pertenencia vein, with the results as summarized in Table 9-1. A number of the intercepts have encouraging gold and silver grades. The mineralization potential of footwall structures to the south of the Pertenencia vein system require exploration evaluation.

Table 9-1: Pertenencia North Drill Hole Intercepts

Hole_ID	Collar Easting (m)	Collar Northing (m)	Collar Elevation (m)	Azimuth (º)	Dip (º)	Total Depth (m)	From (m)	To (m)	Drilled Interval (m)	Au (g/t)	Ag (g/t)	AgEq (g/t)
YQ_022_015	791749	3105881	2060	108	-45	150	32.25	32.60	0.35	1.0	207	281
YQ_022_015							39.45	41.10	1.65	2.7	646	850
YQ_021_018	791747	3105877	2060	141	-45	150	142.85	144.70	1.85	1.4	184	289
YQ_021_021	791748	3105509	2041	301	-45	201	No significant results					
YO-07-04	791691	3106028	2080	143	-51	271	Did not intersect the Pertenencia vein system					

Note: Mineralized intercepts >100 g/t AgEq, where AgEq = Ag + (Au x 76.67). Silver equivalent grades were calculated using metal prices of US$1,840/oz Au and US$24/oz Ag. All numbers have been rounded.

9.7.2 San Francisco

The San Francisco vein has been explored by seven wide-spaced drill holes. The drilling intersected the principal San Francisco vein as well as a hanging wall and a footwall structure. Drill results are summarized in Table 9-2. A number of the intercepts have encouraging gold and silver grades in the area of the historical workings and along the hanging wall vein.

9.7.3 Dolar

The Dolar vein has been tested by six drill holes. Drill results are summarized in Table 9-3. Wide zones of veining and silicification were intersected, but only a few narrow, high-grade silver–gold zones were intersected, suggesting that the drilling has only explored the upper part of the vein system, above the boiling zone, and that more consistent mineralization may be found at depth.

9.7.4 Esperanza

The Esperanza vein has been tested by nine drill holes (Table 9-4). The drilling intersected narrow zones of gold–silver mineralization associated with silicified fault zones and hydrothermal breccias. The drilling appears to have intersected the upper part of an epithermal vein, suggesting that there is potential for higher-grade mineralization to be intersected at depth.

9.7.5 La Huga

The La Huga vein has been mapped and sampled over a 700 m strike length and was intersected by three wide-spaced drill holes (Table 9-5). The drilling intercepted a wide zone of veining, vein breccias and zones of silicification, but only returned a narrow zone of low-grade gold–silver mineralization.

9.7.6 La Muralla and La Niña Veins

The northern part of the San Francisco vein splits into two splays, the La Muralla and La Niña veins. They have been mapped and sampled over a 1,600 m strike length and have been tested by five widely-spaced drill holes (Table 9-6). The drilling intersected multiple veins, hydrothermal breccias and silicified shear zones, but only low-grade gold–silver mineralization was encountered. An evaluation of the geochemical data suggests that the drilling explored the upper part of a low-sulphidation epithermal vein and that wider zones of potentially economic mineralization may be found at depth.

Table 9-2: San Francisco Drill Hole Intercepts

Hole_ID	Collar Easting (m)	Collar Northing (m)	Collar Elevation (m)	Azimuth (º)	Dip (º)	Total Depth (m)	From (m)	To (m)	Drilled Interval (m)	Au (g/t)	Ag (g/t)	AgEq (g/t)	Vein
YO-07-01	791142	3106084	2145	143	-51	250	41.10	41.75	0.65	2.4	363	542	SF
YQ_020_014	790913	3105620	2230	316	-46	315	No significant results						
YQ_022_005	790540	3105225	2213	280	-46	265	9.00	10.25	1.25	0.1	214	222	SF
YQ_022_005							232.45	233.25	0.80	0.7	180	232	SF_FW
YQ_022_006	790541	3105226	2212	319	-45	261	6.60	10.80	4.20	0.2	229	241	SF
YQ_022_006							198.95	200.25	1.30	0.6	189	230	SF_FW
YQ_022_014	790692	3105227	2178	310	-46	275	43.50	45.70	2.20	7.4	1,253	1,808	SF_HW
YQ_022_014							158.55	162.00	3.45	0.2	448	463	SF
YQ_022_033	790699	3105225	2177	313	-65	256	No significant results						
YQ_022_034	790700	3105227	2176	330	-51	22	143.40	145.60	2.20	1.3	545	643	SF

Note: Mineralized intercepts >100 g/t AgEq, where AgEq = Ag + (Au x 76.67). Silver equivalent grades were calculated using metal prices of US$1,840/oz Au and US$24/oz Ag. Numbers have been rounded.

Table 9-3: Dolar Drill Hole Intercepts

Hole_ID	Collar Easting (m)	Collar Northing (m)	Collar Elevation (m)	Azimuth (º)	Dip (º)	Total Depth (m)	From (m)	To (m)	Drilled Interval (m)	Au (g/t)	Ag (g/t)	AgEq (g/t)
YQ_020_013	790170	3105916	2301	315	-45	350	Hole did not reach target					
YQ_021_008	789773	3106013	2245	141	-46	228	88.00	88.20	0.20	2.2	280	445
YQ_021_008							118.10	119.60	1.50	1.8	3	138
YQ_021_009	789773	3106013	2245	142	-60	210	No significant results					
YQ_021_011	789780	3105939	2254	181	-45	150	42.60	42.90	0.30	1.2	155	245
YQ_021_012	789780	3105940	2254	180	-65	120	93.10	94.05	0.95	9.2	763	1,455
YQ_021_013	789772	3106013	2245	173	-66	225	No significant results					
YQ_021_015	789675	3106054	2231	149	-52	351	No significant results					
YQ_022_017	789971	3106168	2341	263	-67	250	125.30	129.25	3.95	13.4	181	1,185
YQ_022_018	789971	3106170	2341	141	-45	250	No significant results					

Note: Mineralized intercepts >100 g/t AgEq, where AgEq = Ag + (Au x 76.67). Silver equivalent grades were calculated using metal prices of US$1,840/oz Au and US$24/oz Ag. Numbers have been rounded.

Table 9-4: Esperanza Drill Hole Intercepts

Hole_ID	Collar Easting (m)	Collar Northing (m)	Collar Elevation (m)	Azimuth (º)	Dip (º)	Total Depth (m)	From (m)	To (m)	Drilled Interval (m)	Au (g/t)	Ag (g/t)	AgEq (g/t)
YQ_020_005	788733	3105767	2282	306	-46	140	69.00	69.75	0.75	0.2	209	224
YQ_020_006	788734	3105766	2282	305	-61	200	91.90	93.75	1.85	3.3	69	314
YQ_020_007	788731	3105764	2281	244	-45	122	93.15	93.50	0.35	8.8	60	717
YQ_020_015	788729	3105766	2282	304	-86	350	170.00	170.90	0.90	2.3	39	209
YQ_020_015							172.90	174.00	1.10	0.2	321	335
YQ_021_010	789000	3106534	2197	273	-45	201	No significant results					
YQ_021_014	789001	3106535	2199	273	-65	291	No significant results					
YQ_022_019	788736	3105767	2283	340	-46	150	84.10	84.40	0.30	2.0	109	225
YQ_022_020	788735	3105768	2283	341	-60	180	107.20	108.20	1.00	3.6	512	779
YQ_022_021	788793	3105678	2283	322	-66	300	262.25	262.85	0.60	2.6	20	214

Note: Mineralized intercepts >100 g/t AgEq, where AgEq = Ag + (Au x 76.67). Silver equivalent grades were calculated using metal prices of US$1,840/oz Au and US$24/oz Ag. Numbers have been rounded.

Table 9-5: La Huga Drill Hole Intercepts

Hole_ID	Collar Easting (m)	Collar Northing (m)	Collar Elevation (m)	Azimuth (º)	Dip (º)	Total Depth (m)	From (m)	To (m)	Drilled Interval (m)	Au (g/t)	Ag (g/t)	AgEq (g/t)
YQ_021_019	791006	3104812	1992	300	-46	102	No significant results					
YQ_021_020	791005	3104812	1993	259	-46	102	65.15	65.65	0.50	0.6	243	289
YQ_022_030	791394	3105138	2090	291	-46	518	No significant results					

Note: Mineralized intercepts >100 g/t AgEq, where AgEq = Ag + (Au x 76.67). Silver equivalent grades were calculated using metal prices of US$1,840/oz Au and US$24/oz Ag. Numbers have been rounded.

Table 9-6: La Muralla and La Niña Drill Hole Intercepts

Hole_ID	Collar Easting (m)	Collar Northing (m)	Collar Elevation (m)	Azimuth (º)	Dip (º)	Total Depth (m)	From (m)	To (m)	Drilled Interval (m)	Au (g/t)	Ag (g/t)	AgEq (g/t)
YO-07-02	791680	3106376	2110	323	-51	361	No significant results					
YO-07-03	791867	3106488	2165	324	-51	400	194.90	195.85	0.95	2.4	503	684
YO-07-03							198.10	198.55	0.45	1.5	308	419
YQ_020_008	791484	3106095	2150	295	-46	300	No significant results					
YQ_022_016	791396	3104934	2020	303	-46	354	No significant results					

Note: Mineralized intercepts >100 g/t AgEq, where AgEq = Ag + (Au x 76.67). Silver equivalent grades were calculated using metal prices of US$1,840/oz Au and US$24/oz Ag. Numbers have been rounded.

9.7.7 San Antonio

The San Antonio vein has been mapped and sampled over a 1,300 m strike length. The structure had not been drilled at the Report effective date, but encouraging gold–silver grades were returned from surface samples.

9.7.8 La Trucha

The La Trucha structure is situated about 1,200 m west of the Pertenencia vein. The vein crops out in a stream bed and occurs as a 0.2–1.5 m wide quartz vein over a strike length of >500 m. The vein strikes 040° and dips steeply to the southeast. Sampling returned elevated gold–silver grades. Mapping suggests that the La Trucha structure could be the upper part of a low-sulphidation epithermal vein.

9.7.9 Verde

The Verde vein has been mapped and sampled over a 900 m strike length. Surface sampling and mapping indicate that the outcropping structure may represent the upper part of an epithermal vein system. While the vein is not a high-priority exploration target currently, additional investigation is warranted.

9.7.10 La Texana

The La Texana vein has been mapped and sampled over a 300 m strike length. Surface sampling returned anomalous gold and silver grades. While the vein is not a high-priority exploration target currently, additional investigation is warranted.

9.8 QP Comments on “Item 9: Exploration”

Golden Minerals’ geologists believe that there is good potential to discover additional high-grade gold–silver mineralization on the northern part of the Pertenencia vein system as well as on the San Francisco and Esperanza vein systems. The Dolar vein drilling has intersected wide zones of veining, but the gold–silver grade distribution is erratic, suggesting that the drilling has intersected the upper parts of an epithermal vein. The San Antonio vein appears to have good potential to host significant mineralization, and the surface sampling has returned good gold and silver grades, but to date the vein has not been drilled.

The potential of the Verde, La Texana and La Trucha veins is unknown. They have only been explored partially on surface and returned moderate gold and silver grades at surface. The veins may warrant a small drill program to test potential at depth.

The northwestern and southwestern Project extents, where limited mapping has been conducted and outcropping andesites occur below the upper volcanic ignimbrites and tuffs, may have potential to host veins within the andesite lithologies. There is also potential for the known veins to continue into these areas.

10.0 DRILLING

10.1 Introduction

A total of 78 core holes, totaling 19,039 m, have been drilled at Yoquivo.

The initial exploration drilling was conducted in 2007 by West Timmins, who drilled eight core holes totaling 2,473 m. Drill data from the West Timmins campaign were not used in Mineral Resource estimation because no original assay certificates, and no down-hole survey or assay QA/QC data are currently available to Golden Minerals for this drilling campaign. In addition, no drill holes from this campaign intersected the Pertenencia vein system.

From 2020 to 2022, Golden Minerals drilled 70 core holes totaling 16,565 m. All of the drill holes from the 2020–2022 drill campaigns were used to define the mineralized grade shells used in Mineral Resource estimation. A total of 38 drill holes from the 2020–2022 drill campaigns was used for interpolation.

A drill summary table is provided as Table 10-1, and a Project-scale drill collar location map as Figure 10-1. The drilling in the Pertenencia area is shown in more detail in Figure 10-2.

10.2 Drill Methods

The West Timmins drilling was completed at NQ (47.6 mm core diameter) and BQ (36.4 mm) sizes. The drill contractor is not known.

Golden Minerals used HQ (63.5 mm) core. Drilling was completed by Eco drilling S. de R.L. de C.V. from Guadalajara, Mexico using a track mounted rig with a 500 m depth maximum.

Drill holes in the Golden Minerals programs are typically drilled from the hanging wall side of the vein, perpendicular to and passing through the target structure, into the footwall and are extended an additional 40–50 m to anticipate possible changes on the dip of the structure, and to explore for additional potentially mineralized structures in the footwall to the principal structure.

10.3 Logging Procedures

10.3.1 West Timmins

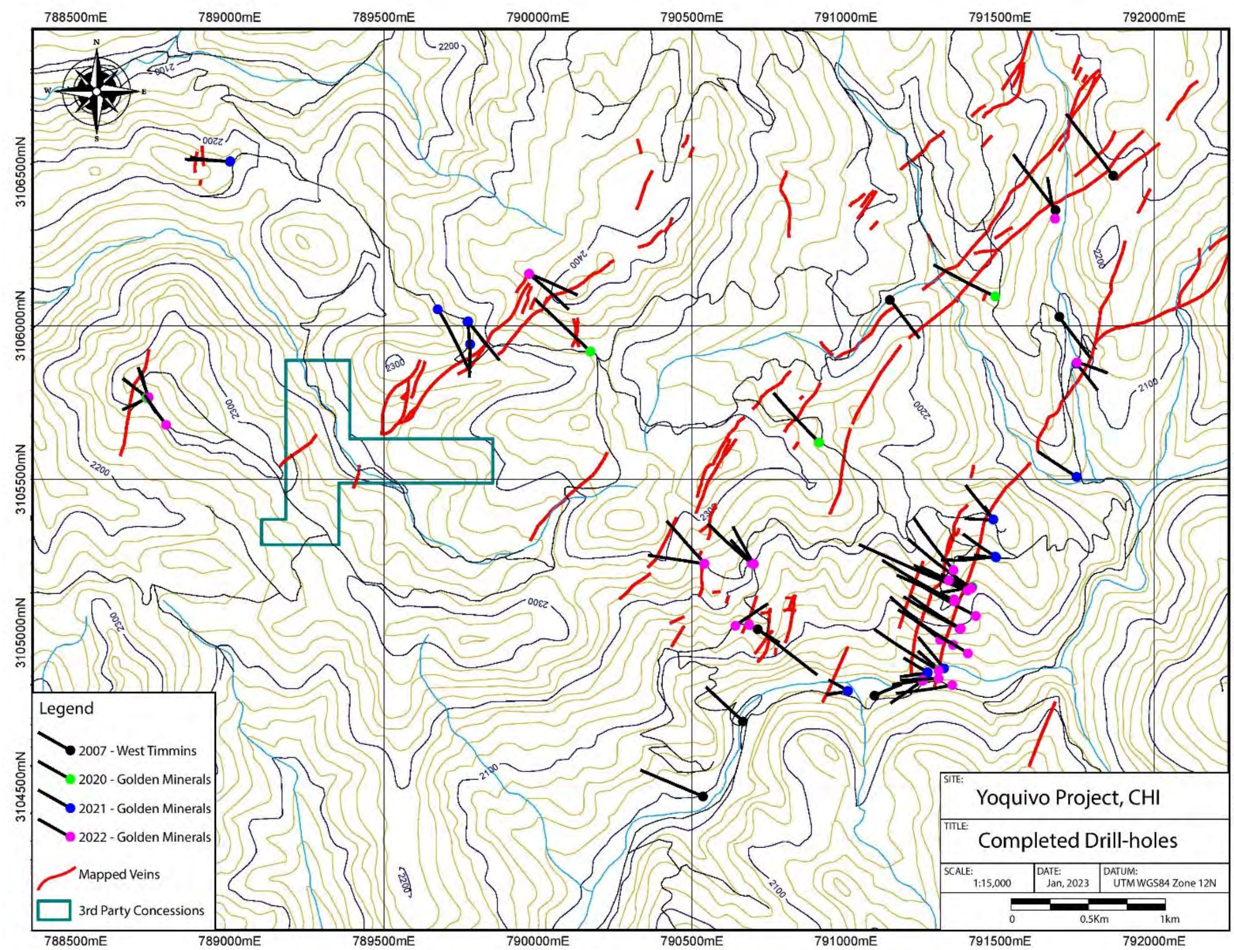
Scanned copies of West Timmins logs were digitized by Golden Minerals and entered into the Geobank Mobile database. No information on West Timmins logging procedures is available to Golden Minerals.

Table 10-1: Drill Summary Table

Year	Operator	No. Holes	Core Diameter	Meterage (m)	Purpose
2007	West Timmins	8	NQ/BQ	2,473	Exploration
2020	Golden Minerals	15	HQ	3,348	Exploration
2021		21	HQ	3,949	Exploration
2022		34	HQ	9,268	Exploration
Total		***78***		***19,039***	

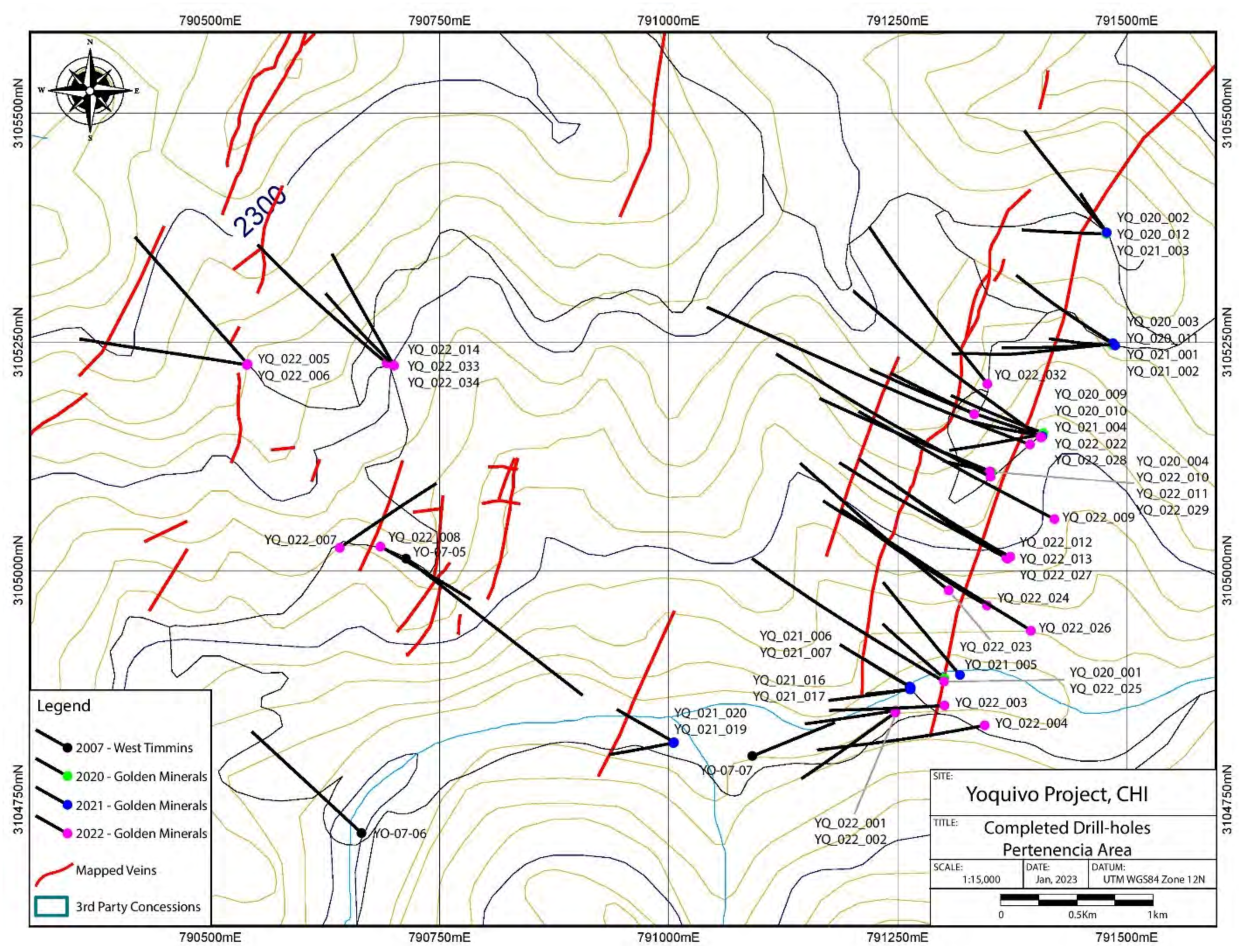
Note: metreage has been rounded.

Figure 10-1: Project Drill Collar Location Map



Note: Figure courtesy Golden Minerals, 2023.

Figure 10-2: Pertenencia Drill Collar Location Map



Note: Figure courtesy Golden Minerals, 2023.

10.3.2 Golden Minerals

Drill core from the Yoquivo drill programs was delivered to the core logging facility in Basaseachi by the drilling company at the end of each shift.

Golden Minerals technicians washed the drill core, verified drill lengths, and recorded recovery on wooden blocks inserted by the drilling company to confirm interval lengths and correct any errors. The technicians photographed the core dry and wet.

The core was measured to confirm the recovery and calculate the rock quality designation (RQD). All recovery and RQD measurements were entered into Geobank Mobile logging software.

The core was logged by Golden Minerals geologists directly into Geobank Mobile. Logging captured lithology, alteration, mineralization, and structural information from the drill core.

The geologists also marked intervals for sampling, which ranged from 0.05–3.4 m depending on lithology, averaging 0.93 m. The length for each sample was selected to characterize specific textural, lithological, or compositional breaks. Samples narrower than 0.2 m were selected to sample individual mineralized structures. Longer sample lengths (2–3.4 m) were used to sample for weakly altered rocks to check for possible anomalous silver and gold grades.

A flowsheet showing the logging and sampling procedures is provided as Figure 10-3.

10.4 Recovery

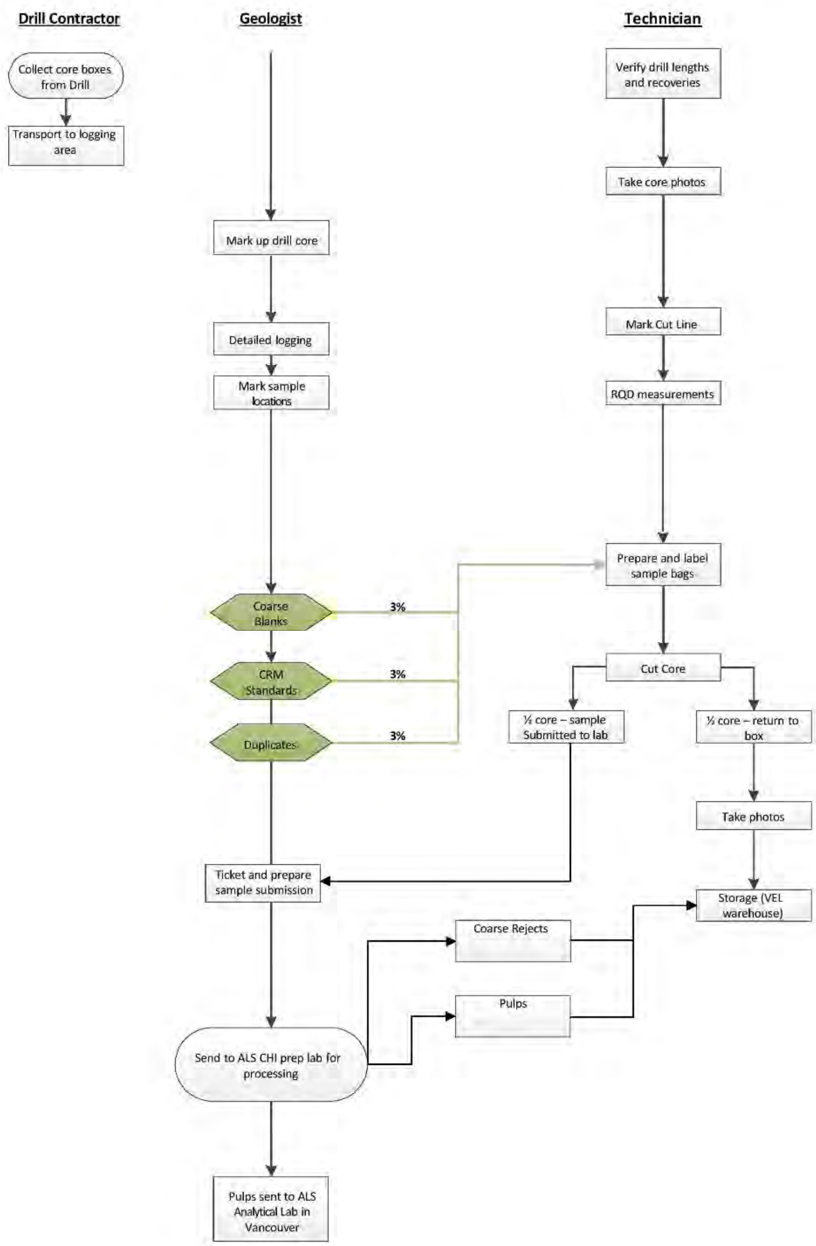
10.4.1 West Timmins

No information is currently available to Golden Minerals as to recoveries from the West Timmins drill campaign.

10.4.2 Golden Minerals

Drill recoveries during the Golden Minerals drill campaigns were generally excellent (Table 10-2), averaging 98% overall. Recoveries were poor from overburden and soil (<50%), and in and adjacent to fault zones (average recovery 89%). Recoveries in the vein zones were excellent, averaging >95% overall.

Figure 10-3: Logging and Sampling Flowsheet



Note: Figure courtesy Golden Minerals, 2023.

Table 10-2: Drill Recoveries, Golden Minerals Drill Campaigns

Lithology	Average Recovery (%)	Maximum Recovery (%)	Minimum Recovery (%)
Hydrothermal breccia	99	100	72
Breccia	100	100	100
Andesite	99	100	17
Dacite intrusive	97	100	77
Gabbro	100	100	100
Quaternary colluvium	39	52	26
Quaternary soil	48	100	10
Dacite	96	100	75
Volcanic rock (altered)	100	100	100
Rhyolite	99	100	17
Tuff	97	100	30
Fault	89	100	23
Fault breccia	100	100	100
Calcite vein	100	100	100
Quartz vein	99	100	97
Quartz–calcite vein	96	100	80
Quartz–sulphide vein	100	100	100
Sulphide vein	100	100	100
Average	***98***		

10.5 Collar Surveys

10.5.1 West Timmins

Using the drill hole collar coordinates from the scanned drill logs, Golden Minerals located the West Timmins drill hole pads in the field and created cement location monuments for each drill hole. The drill hole collar locations were surveyed by a professional surveyor with a differential GPS.

10.5.2 Golden Minerals

Drill hole collar locations were initially surveyed by handheld GPS and a cement monument was constructed at the site when drilling was completed. Each drill hole monument was marked with the drill hole name, the azimuth, the dip, and the total depth. Once the campaign was completed all drill hole locations were surveyed by a professional surveyor with a differential GPS.

10.6 Downhole Surveys

10.6.1 West Timmins

The azimuth and dip for the West Timmins drill holes were recorded on the scanned drill logs obtained by Golden Minerals. No information is currently available to Golden Minerals as to any downhole survey methods that may have been used during the West Timmins drill campaign.

10.6.2 Golden Minerals

Golden Minerals geologists orient each drill rig using front and back stakes with the planned azimuth. Actual orientations at the collars were established by measurements of surface casing using a field compass and a magnetic Reflex instrument was used to survey the orientation of the drill hole downhole. An initial survey was conducted approximately 15 m downhole to confirm the alignment of the drill hole with the planned orientation. Subsequent surveys were conducted every 50 m starting at 50 m until completion of the drill hole.

10.7 Sample Length/True Thickness

Mineralized structures (veins, hydrothermal breccias and fault/shear zones) generally strike at about 035º and dip at approximately 65º to the southeast. Most drill holes were collared in the hanging wall to the various Pertenencia veins, and were generally oriented at an azimuth of 295º.

On average, for the shallower drill holes (drilled at a -45º inclination) the true width of the mineralization is about 75–80% of the downhole drilled length but varies depending on local orientation of the mineralized zones and the drill hole orientation. For deeper drill holes (those drilled at -60º inclination), the true width of the mineralization is about 50–60% of the downhole drilled length.

Examples of the orientation of the drilling to mineralization are provided in Figure 7-4 to Figure 7-6.

10.8 Drill Intercepts

Information on the completed Golden Minerals drilling in the Pertenencia Vein system is summarized in Table 10-3.

Table 10-3 provides the collar location data and anomalous mineralized intercepts >200 g/t AgEq. Silver equivalent grades were calculated using metal prices of US$1,840/oz Au and US$24/oz Ag.

10.9 QP Comments on “Item 10: Drilling”

Drilling and surveying were conducted in accordance with industry-standard practices. The drilling as performed provides suitable coverage of the zones of silver–gold mineralization. Collar and down hole survey methods used generally provide reliable sample locations. Drilling methods provide good core recovery. Logging procedures provide consistency in descriptions.

These data are considered to be suitable for Mineral Resource estimation. There are no drilling or core recovery factors in the drilling that supports the estimates that are known to the QP that could materially impact the accuracy and reliability of the results.

Table 10-3: Drill Hole Intercepts, Pertenencia Vein System

Hole_ID	Easting (m)	Northing (m)	Elevation (m)	Azimuth (º)	Dip (º)	Total Depth (m)	From (m)	To (m)	Au (g/t)	Ag (g/t)	AgEq (g/t)
YQ_020_001	791301	3104882	1996.8	310.9	-45.5	128.00	94.10	94.30	1.21	145.0	237.4
							111.58	112.05	1.92	491.0	638.2
							112.92	114.43	0.77	147.0	205.7
							114.43	115.75	5.69	223.0	659.2
YQ_020_002	791478	3105368	2175.0	271.7	-65.8	231.00	192.25	192.80	1.14	423.0	510.0
YQ_020_003	791484	3105248	2143.2	264.4	-46.2	250.00	169.60	170.00	2.56	228.0	424.3
							235.20	235.90	2.18	401.0	568.1
YQ_020_004	791353	3105108	2099.0	282.4	-45.5	77.00	No significant intercept				
YQ_020_005	788733	3105767	2282.2	306.0	-45.8	140.00	69.00	69.75	0.20	209.0	224.6
YQ_020_006	788734	3105766	2282.4	305.1	-60.9	200.00	91.90	92.90	5.41	118.0	532.8
YQ_020_007	788731	3105764	2281.2	244.2	-44.7	122.00	93.15	93.50	8.76	60.4	732.0
YQ_020_008	791484	3106095	2149.7	295.1	-45.6	300.00	No significant intercept				
YQ_020_009	791409	3105151	2088.0	290.8	-60.6	225.00	96.65	96.95	0.54	211.0	252.3
							118.65	119.00	0.78	245.0	305.0
							183.90	184.20	0.93	135.0	206.6
							200.30	200.65	0.81	250.0	311.9
							200.65	201.25	1.71	527.0	657.7
							201.25	201.75	0.55	161.0	203.2
YQ_020_010	791408	3105149	2088.0	259.4	-60.6	210.00	126.70	127.70	1.37	224.0	328.7
							131.00	131.20	15.40	1,150.0	2,330.7
							132.00	133.10	1.74	186.0	319.4
							135.00	135.60	2.91	103.0	326.1

Hole_ID	Easting (m)	Northing (m)	Elevation (m)	Azimuth (º)	Dip (º)	Total Depth (m)	From (m)	To (m)	Au (g/t)	Ag (g/t)	AgEq (g/t)
							186.95	188.00	1.61	157.0	280.1
							209.60	210.00	0.81	144.0	206.3
YQ_020_011	791484	3105247	2143.0	266.9	-61.0	250.00	118.80	119.40	8.33	1,390.0	2,028.6
							119.40	120.80	4.38	892.0	1227.8
							122.10	123.35	0.98	166.0	241.4
							172.25	173.05	0.04	201.0	204.3
							173.90	174.40	0.60	479.0	525.2
YQ_020_012	791478	3105370	2175.0	320.1	-45.1	200.00	47.25	47.55	135.50	7,480.0	17,868.3
YQ_020_013	790170	3105916	2301.2	314.6	-45.2	350.00	No significant intercept				
YQ_020_014	790913	3105620	2230.0	315.6	-45.5	315.00	No significant intercept				
YQ_020_015	788729	3105766	2281.8	303.8	-85.7	350.00	170.00	170.90	2.27	38.9	212.9
							172.90	174.00	0.19	321.0	335.6
YQ_021_001	791485	3105249	2144.1	302.5	-58.3	250.00	243.05	243.55	0.27	329.0	350.0
YQ_021_002	791487	3105247	2143.6	272.0	-74.4	275.00	165.75	166.00	3.74	3,020.0	3,306.7
							166.00	167.40	0.20	662.0	677.3
							209.50	209.90	0.67	309.0	360.0
YQ_021_003	791478	3105370	2175.0	324.7	-64.3	120.00	63.90	64.05	0.82	156.0	219.2
YQ_021_004	791408	3105147	2087.4	279.9	-71.3	250.00	100.20	101.10	6.41	2,360.0	2,851.4
							125.75	126.00	0.92	313.0	383.8
							131.50	131.80	1.67	578.0	705.7
							133.00	133.40	1.12	369.0	454.9
							134.00	135.00	0.70	206.0	259.7
							139.05	139.70	0.62	179.0	226.8
							139.70	140.05	5.15	1,320.0	1,714.8

Hole_ID	Easting (m)	Northing (m)	Elevation (m)	Azimuth (º)	Dip (º)	Total Depth (m)	From (m)	To (m)	Au (g/t)	Ag (g/t)	AgEq (g/t)
							166.90	168.30	0.51	165.0	204.3
							195.40	195.60	0.02	200.0	201.3
							196.90	197.40	0.11	904.0	912.1
							215.25	216.40	0.22	237.0	253.7
YQ_021_005	791318	3104886	1996.8	319.7	-44.7	177.00	159.00	159.60	0.40	221.0	251.4
YQ_021_006	791263	3104873	1995.4	300.9	-44.8	123.00	63.80	64.00	0.63	155.0	203.0
							64.75	65.15	66.20	11,768.0	16,843.3
							65.15	65.50	188.50	21,447.0	35,898.7
							65.50	66.20	8.19	1,745.0	2,372.9
							66.20	66.70	0.33	389.0	414.5
							69.20	69.60	12.30	1470.0	2413.0
							70.60	70.90	6.65	1,330.0	1,839.8
							92.55	92.80	1.42	102.0	210.5
YQ_021_007	791264	3104873	1995.6	298.7	-69.6	171.00	74.30	75.00	3.63	12.6	290.9
YQ_021_008	789773	3106013	2245.3	141.1	-46.1	228.00	88.00	88.20	2.20	280.0	448.7
YQ_021_009	789773	3106013	2245.3	141.9	-60.0	210.00	No significant intercept				
YQ_021_010	789000	3106534	2198.6	272.7	-45.2	201.00	No significant intercept				
YQ_021_011	789780	3105939	2253.6	181.2	-45.0	150.00	42.60	42.90	1.21	155.0	247.4
YQ_021_012	789780	3105940	2253.6	180.1	-65.1	120.00	22.00	22.20	9.04	645.0	1,338.1
							56.35	56.60	1.66	201.0	328.3
							93.10	94.05	9.23	763.0	1,470.6
YQ_021_013	789772	3106013	2245.0	173.2	-65.7	225.00	No significant intercept				
YQ_021_014	789001	3106535	2199.2	272.6	-64.9	291.00	No significant intercept				
YQ_021_015	789675	3106054	2231.1	149.2	-51.6	351.00	No significant intercept				

Hole_ID	Easting (m)	Northing (m)	Elevation (m)	Azimuth (º)	Dip (º)	Total Depth (m)	From (m)	To (m)	Au (g/t)	Ag (g/t)	AgEq (g/t)
YQ_021_016	791263	3104870	1995.7	261.0	-46.5	126.00	64.95	65.15	40.70	7,920.0	11,040.3
							65.15	65.45	9.28	3,870.0	4,581.5
							65.45	65.80	16.20	6,350.0	7,592.0
							65.80	66.05	3.91	792.0	1,091.8
							66.05	66.40	2.63	468.0	669.6
							78.85	79.15	1.09	141.0	224.2
YQ_021_017	791264	3104870	1995.8	262.6	-66.9	126.00	No significant intercept				
YQ_021_018	791747	3105877	2060.0	140.2	-43.2	150.00	143.90	144.10	10.20	1,310.0	2,092.0
YQ_021_019	791006	3104812	1992.3	300.0	-45.7	102.00	No significant intercept				
YQ_021_020	791005	3104812	1992.7	258.9	-46.2	102.00	65.15	65.65	0.64	243.0	291.8
YQ_021_021	791748	3105509	2040.6	301.4	-44.9	201.00	50.50	50.70	1.91	148.0	294.1
YQ_022_001	791248	3104847	1996.4	261.0	-45.5	143.00	141.50	141.70	7.29	0.6	559.5
YQ_022_002	791248	3104845	1996.6	234.2	-45.5	180.00	49.30	50.30	1.82	297.0	436.5
YQ_022_003	791301	3104853	1999.9	266.2	-46.1	180.00	72.90	73.20	3.10	753.0	990.7
YQ_022_004	791345	3104831	2005.6	259.6	-45.2	261.00	No significant intercept				
YQ_022_005	790540	3105225	2212.9	279.7	-45.7	265.00	9.00	10.25	0.09	214.0	221.1
							232.45	232.75	1.59	368.0	489.9
YQ_022_006	790541	3105226	2212.2	318.9	-44.9	261.00	6.60	7.95	0.04	289.0	291.8
							9.10	10.05	0.35	294.0	320.9
							10.05	10.80	0.40	392.0	423.0
							198.95	199.15	2.43	549.0	735.3
YQ_022_007	790641	3105025	2117.7	54.4	-44.1	175.00	70.60	70.80	16.90	57.2	1,352.9
YQ_022_008	790685	3105026	2123.2	119.4	-45.2	162.00	141.50	141.90	30.80	5,260.0	7,621.3
							156.00	157.30	0.37	175.0	203.1

Hole_ID	Easting (m)	Northing (m)	Elevation (m)	Azimuth (º)	Dip (º)	Total Depth (m)	From (m)	To (m)	Au (g/t)	Ag (g/t)	AgEq (g/t)
YQ_022_009	791421	3105056	2063.0	297.2	-45.7	356.00	128.70	129.00	0.51	1,735.0	1,773.8
							133.10	133.70	0.61	178.0	224.7
							225.90	227.00	1.01	159.0	236.4
							227.00	227.45	1.16	212.0	300.9
							233.25	234.10	0.58	160.0	204.7
							234.10	235.15	0.78	141.0	200.6
							236.40	237.40	0.85	141.0	206.1
							240.00	240.85	0.77	170.0	228.7
							263.45	264.40	4.84	174.0	545.1
							281.25	282.00	1.44	165.0	275.0
							282.00	283.45	1.24	150.0	245.1
							283.45	284.60	1.96	159.0	309.3
							284.60	285.90	8.28	149.0	783.8
							285.90	286.80	13.00	124.0	1,120.7
							286.80	288.00	4.11	75.7	390.8
							288.00	289.45	1.40	97.0	204.0
							289.45	290.70	2.09	58.3	218.5
							293.65	295.00	1.64	143.0	268.7
							329.25	330.10	2.29	322.0	497.6
							332.30	332.40	1.24	225.0	319.7
YQ_022_010	791351	3105109	2099.7	293.0	-76.0	300.00	No significant intercept				
YQ_022_011	791350	3105109	2100.0	292.6	-46.3	300.00	70.15	70.35	4.01	692.0	999.4
YQ_022_012	791370	3105013	2067.6	298.6	-44.8	300.00	No significant intercept				
YQ_022_013	791369	3105014	2068.1	296.2	-65.3	352.80	159.20	159.75	0.79	191.0	251.7

Hole_ID	Easting (m)	Northing (m)	Elevation (m)	Azimuth (º)	Dip (º)	Total Depth (m)	From (m)	To (m)	Au (g/t)	Ag (g/t)	AgEq (g/t)
							267.60	268.10	0.54	448.0	489.5
							283.80	285.00	3.85	524.0	819.2
							296.25	297.00	3.27	374.0	624.7
							297.00	298.40	1.13	123.0	209.6
							299.00	300.30	1.90	243.0	388.7
							300.30	301.75	1.03	159.0	237.6
							301.75	302.10	1.54	429.0	547.1
							318.65	318.80	2.66	826.0	1,029.9
YQ_022_014	790692	3105227	2178.3	310.3	-45.9	275.00	45.00	45.70	23.30	3,850.0	5,636.3
							106.60	106.80	6.29	556.0	1,038.2
							146.50	146.75	1.25	337.0	432.5
							158.55	159.00	0.16	1,355.0	1,367.5
							159.00	160.50	0.35	366.0	392.5
							160.50	162.00	0.08	257.0	263.0
YQ_022_015	791749	3105881	2060.0	108.2	-44.8	150.00	32.25	32.50	0.98	207.0	282.0
							32.50	32.60	0.98	207.0	282.0
							40.55	41.10	6.92	1,640.0	2,170.5
YQ_022_016	791678	3106348	2107.3	348.8	-45.6	201.00	No significant intercept				
YQ_022_017	789971	3106168	2341.2	130.3	-45.8	250.00	126.00	127.15	6.73	116.0	632.0
							127.15	128.35	34.70	400.0	3,060.3
							128.35	129.25	2.57	88.4	285.4
YQ_022_018	789971	3106170	2341.0	113.3	-46.0	250.00	No significant intercept				
YQ_022_019	788736	3105767	2283.1	339.7	-46.3	150.00	84.10	84.40	1.95	109.0	258.1
YQ_022_020	788735	3105768	2283.1	341.5	-60.5	180.00	104.65	105.10	2.23	87.6	258.6

Hole_ID	Easting (m)	Northing (m)	Elevation (m)	Azimuth (º)	Dip (º)	Total Depth (m)	From (m)	To (m)	Au (g/t)	Ag (g/t)	AgEq (g/t)
							107.20	107.90	4.48	677.0	1,020.5
							107.90	108.20	1.42	126.0	234.5
YQ_022_021	788793	3105678	2283.4	322.4	-65.7	300.00	244.35	245.15	2.36	76.5	257.4
							262.25	262.85	2.59	19.8	218.4
YQ_022_022	791407	3105146	2087.5	293.1	-55.4	351.00	36.65	38.05	0.87	202.0	268.9
							38.05	39.30	6.64	811.0	1,320.1
							39.30	39.60	1.10	235.0	319.3
							39.60	41.05	2.28	391.0	565.8
							68.35	68.80	1.22	284.0	377.5
							221.15	222.00	1.76	250.0	384.9
							223.05	223.90	0.94	179.0	250.9
							233.10	234.00	0.58	162.0	206.5
							341.75	342.10	2.46	614.0	802.6
							342.10	342.50	0.45	180.0	214.4
							344.10	344.95	9.28	161.0	872.5
YQ_022_023	791306	3104978	2040.6	308.8	-45.0	304.65	94.45	94.60	2.16	222.0	387.6
							118.00	118.50	2.77	337.0	549.4
							212.45	212.60	2.68	563.0	768.5
YQ_022_024	791348	3104962	2033.4	299.4	-44.6	300.00	132.10	132.65	1.61	222.0	345.1
							134.10	135.50	0.72	166.0	221.4
							205.15	206.40	15.65	677.0	1,876.8
							206.40	206.80	0.09	216.0	222.6
YQ_022_025	791301	3104879	1997.1	300.8	-46.1	350.70	131.70	131.90	2.69	257.0	463.2
YQ_022_026	791396	3104934	2019.8	302.5	-46.1	353.80	192.35	193.45	0.57	448.0	491.5

Hole_ID	Easting (m)	Northing (m)	Elevation (m)	Azimuth (º)	Dip (º)	Total Depth (m)	From (m)	To (m)	Au (g/t)	Ag (g/t)	AgEq (g/t)
YQ_022_027	791373	3105015	2069.0	298.2	-55.3	353.75	148.80	148.90	4.01	780.0	1,087.4
							241.25	241.65	1.71	215.0	345.7
							242.20	242.60	1.32	148.0	249.2
							274.50	275.00	0.58	237.0	281.2
							275.00	275.90	0.58	237.0	281.2
							276.90	277.80	0.57	200.0	243.8
							277.80	278.40	1.82	479.0	618.5
							303.30	303.65	0.87	198.0	265.0
YQ_022_028	791406	3105146	2087.8	305.4	-44.0	350.20	34.20	35.15	3.81	1,585.0	1,877.1
							150.25	150.50	1.09	199.0	282.2
							172.50	172.95	13.15	1305.0	2,313.2
							239.25	240.40	4.69	1,650.0	2,009.6
							240.40	241.60	0.86	313.0	379.2
							241.60	242.85	1.47	485.0	597.7
YQ_022_029	791351	3105103	2098.7	297.1	-54.9	448.55	161.85	162.25	0.93	263.0	334.1
							303.75	303.90	2.10	113.0	274.0
							303.90	304.85	1.48	207.0	320.1
							312.00	312.45	1.19	150.0	240.9
							312.45	312.95	1.43	189.0	298.6
YQ_022_030	791394	3105138	2089.8	290.8	-45.7	518.40	139.95	140.50	5.90	49.2	501.5
							201.35	201.45	1.36	135.0	238.9
							238.85	239.75	1.57	99.9	220.3
							239.75	239.85	17.00	154.0	1,457.3
							240.35	240.55	4.16	168.0	486.9

Hole_ID	Easting (m)	Northing (m)	Elevation (m)	Azimuth (º)	Dip (º)	Total Depth (m)	From (m)	To (m)	Au (g/t)	Ag (g/t)	AgEq (g/t)
							267.15	267.60	2.95	116.0	342.2
							274.90	275.00	4.97	299.0	680.0
							275.00	275.60	4.97	299.0	680.0
							370.40	370.55	1.11	183.0	267.7
							442.95	443.05	4.28	15.5	343.6
							443.05	443.25	1.69	81.1	210.3
YQ_022_031	791333	3105171	2127.1	295.6	-49.7	158.60	44.35	44.60	10.30	1,360.0	2,149.7
							44.60	44.80	22.40	3,200.0	4,917.3
							44.80	44.95	27.70	4,000.0	6,123.7
							44.95	45.30	0.43	537.0	570.3
							46.20	46.45	0.61	353.0	399.8
YQ_022_032	791348	3105204	2132.6	321.1	-45.5	305.00	No significant intercept				
YQ_022_033	790699	3105225	2176.6	313.5	-64.8	256.20	No significant intercept				
YQ_022_034	790700	3105225	2176.4	330.1	-51.0	225.70	143.40	144.90	1.66	705.0	831.9
							144.90	145.60	0.55	202.0	243.8

Note: Mineralized intercepts >100 g/t AgEq, where AgEq = Ag + (Au x 76.67). Silver equivalent grades were calculated using metal prices of US$1,840/oz Au and US$24/oz Ag

11.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

11.1 Sampling Methods

11.1.1 West Timmins

Leonard (2007) noted in terms of geochemical sampling:

"Sample locations are marked in the field by aluminium metal tags engraved with the sample number. Local cattle have chewed some of the tags, making it difficult to find some of the sample locations."

Leonard (2007) noted in terms of drill core:

"All diamond drill core was split manually. After the core was split, one half is put into a sample bag and the other half is returned to the core tray. The core splitter was thoroughly cleaned after each sample has been collected. Each sample was completely described on a card with the appropriate sample number".

11.1.2 Golden Minerals

11.1.2.1 Surface Samples

Intensive surface sampling has been conducted over the entire Project area by Golden Minerals. Samples generally targeted rocks where veining and alteration were visible. Rock chip sample locations were marked on outcrop with red spray paint and labelled with their respective sample numbers with aluminium tags.

Initial rock chip sampling was conducted with a rock hammer and chisel to collect a representative sample. Once initial positive results were obtained, follow-up sampling was conducted by Golden Minerals personnel using a Stihl cement saw to cut two parallel cuts 5–10 cm apart. A rock hammer and chisel were used to cut out the rock between the two cuts to collect a representative channel sample of outcropping vein and hydrothermal breccias, and where possible, 2–3 m into the surrounding footwall and hanging wall rocks. Sample lengths ranged from 2 cm to 2.1 m.

Samples were collected, where possible, systematically along principal structures, from historical prospects, and surface mine workings. In addition, grab samples were collected from historical mine dumps and spoil heaps.

11.1.2.2 Underground Samples

Underground samples were collected from all accessible underground workings.

Geologists first surveyed the underground workings, and then mapped the structures and veins. Following mapping, the geologists used red spray paint to mark channel sample lines spaced along the strike of the drift. Samples were collected from vein structures and footwall and hanging wall to mapped structures. Sample lengths were dictated by structural thickness with a minimum of 20 cm with no defined maximum, but typically not exceeding 2 m in length. Samples were initiated and terminated based on observable vein styles or mineral type difference across the vein. The hanging wall and footwall were sampled up to 5 m on both sides of the mapped structure.

Under the supervision of a geologist, the samplers were instructed to fully chip away the entire painted portion of the channel sample indicated by the geologist. Using a rock hammer, chisel and five-pound sledgehammer, one sampler chipped the vein while another sampler held a sample bag to capture the sample. A tarpaulin was placed on the ground below the sample to collect any rock that was not collected in the sample bag.

The sample bag was annotated with a sample number that was also painted on the wall by the geologist. For hard-to-reach samples, samplers used a ladder to access the drift back while a helper positioned a tarpaulin on the ground to catch the chiseled material. The collected sample on the tarpaulin was then funneled into a sample bag. The tarpaulin was cleaned between the collection of each individual sample.

11.1.2.3 Drilling

After logging, the core was moved to the sampling area. The core was cut in half using a diamond saw when the rock was intact. For fault rubble zones, where the rock was too fractured or loose to make sawing representative, half of the split core was placed onto a metal tray which was also used to collect the sample fines representing that half of the core. The other half of the core was retained for future reference.

The samples were then placed into thick labelled plastic bags, along with a sample tag, and sealed using cable-ties that could only be opened using a knife. The samples were then placed in large sacks that could accommodate 5–8 samples and sealed with a plastic tie.

The samples were delivered weekly to the ALS Chemex de México S.A. de C.V. laboratory in Chihuahua (ALS Chihuahua) by members of the exploration team. The laboratory was responsible for preparation of the samples and for the subsequent analyses.

All core, pulp and coarse reject samples were transported by Golden Minerals from the ALS Chihuahua preparation laboratory to the Velardeña core shed.

11.2 Metallurgical Sampling

In November 2022, Golden Minerals conducted initial metallurgical testwork on material from the Yoquivo Project (see discussion in Section 13). Test material was sent to Golden Minerals' metallurgical laboratory at the Velardeña mine oxide plant, owned and operated by Minera William S.A. de C.V., a wholly-owned subsidiary of Golden Minerals, that operates the Velardeña mine facilities. All testwork was performed and managed by Golden Minerals personnel.

Material was selected to be of similar mineralization style and type. The mineralization type was determined from logging and indicated that most of the mineralization selected for metallurgical testwork was sulphide dominant. Coarse reject material from drill core was used as the source of the composites, and Golden Minerals geologists performed a visual check to make sure that the coarse reject material did not contain significant oxides.

The composite samples were created by mixing the coarse reject material at the Velardeña core shed using a riffle splitter to ensure that the material was uniformly mixed. The samples were placed into sealed buckets and transported by Golden Minerals vehicle to the Velardeña laboratory.

Two composites were generated. Average grades were calculated for each composite by weighing the amount of coarse reject material and applying the gold and silver assay value received from ALS in Vancouver, Canada (ALS Vancouver) for that specific sample. The composite material was selected to test:

- Low-grade mineralization: average grades of 1.5 g/t Au and 216 g/t Ag (Table 11-1);
- Medium-grade mineralization: average grades of 3.03 g/t Au and 398 g/t Ag (Table 11-2).

11.3 Density Determinations

Golden Minerals collected bulk density measurements as part of the logging process at the Basaseachi logging facility using the water immersion method on whole drill core from geologically and spatially representative locations. Measurements were taken on whole core samples typically between 10–15 cm in length. Samples of all mineralized zones, structures, and lithologies were tested and, as at the end of 2022, 1,271 bulk density measurements were collected.

In December 2022, 93 samples were submitted to ALS Vancouver for bulk density determinations using the water displacement method on wax-coated samples from whole and half-core samples to verify the data collected by Golden Minerals staff. Results from this sampling program were received in January 2023 and indicated a bulk density range from 1.93–2.76 g/cm^3, with an average density of 2.44 g/cm^3 (Table 11-3).

The density data do not show a significant difference between mineralized and unmineralized material or by the various lithologies drilled. The bulk density in quartz veins, quartz–calcite veins and hydrothermal breccias averaged 2.43 g/cm^3.

11.4 Analytical and Test Laboratories

11.4.1 West Timmins

Based on information provided in Leonard (2007), West Timmins used ALS for sample preparation and analysis. Sample preparation was competed at the ALS facility in Hermosillo, Sonora State, Mexico (ALS Hermosillo). Analysis was completed at ALS Vancouver.

Table 11-1: Low-Grade Composite Samples

Drill Hole	From (m)	To (m)	Gold Grade (g/t)	Silver Grade (g/t)	Weight (kg)
YQ_20_010	126.7	127.7	1.365	224	3.74
YQ_20_009	200.3	200.65	0.807	250	1.02
YQ_021_004	134	135	0.701	206	3.38
YQ_022_009	227	227.45	1.16	212	1.61
YQ_022_009	281.25	282	1.435	165	2.28
YQ_022_009	282	283.45	1.24	150	4.30
YQ_022_015	32.25	32.6	0.978	207	0.66
YQ_20_010	131	131.2	15.4	1150	0.4
Total Weight					***17.39***
Weighted Average			***1.5***	***215.5***	

Table 11-2: Medium-Grade Composite Samples

Drill Hole	From (m)	To (m)	Gold Grade (g/t)	Silver Grade (g/t)	Weight (kg)
YQ_20_011	117.8	118.2	3.19	218	1.65
YQ_021_008	88	88.2	2.2	280	0.67
YO-07-05	25.65	27.75	2.13	231	1.37
YQ_022_013	299	300.3	1.9	243	4.14
YQ_20_010	132	133.1	1.74	186	3.23
YQ_20_011	118.8	119.4	8.33	1390	1.95
Total Weight					***13.01***
Weighted Average			***3.0***	***398.2***	

Table 11-3: 2022 Specific Gravity Summary Table

Lithology	Number of Samples	Specific Gravity (Wax Coated) (g/cm^3)
Hydrothermal breccia	13	2.52
Andesite	34	2.43
Rhyolite	12	2.48
Quartz vein	20	2.40
Quartz calcite vein	14	2.40
Total	***93***	***2.44***

11.4.2 Golden Minerals

Sample preparation was undertaken at ALS Chihuahua. ALS Chihuahua is independent of Golden Minerals, and accredited to ISO/IEC 17025:2017 for selected analytical techniques.

Samples were shipped to ALS Vancouver for analysis. ALS Vancouver is certified to ISO 17025:2017 (selected assay techniques) and ISO 9001:2015 standards, and is independent of Golden Minerals.

Metallurgical testwork (discussed in Section 13), was completed at the Golden Minerals metallurgy laboratory in Velardeña. The laboratory is owned and operated by Golden Minerals and is not independent. There are currently no international accreditations other than chemical analyses for metallurgical testwork.

11.5 Sample Preparation

11.5.1 West Timmins

ALS Hermosillo dried the samples, crushed to a minimum of 75% -10 mesh, and pulverized to a minimum of 95% -150 mesh.

11.5.2 Golden Minerals

Drill core, surface, and underground samples from the Yoquivo Project were placed into plastic bags with a unique sample ID tag. The bags were sealed with cable-ties and taken weekly by company geologists to the ALS Chihuahua laboratory.

Upon delivery, samples were logged into the laboratory's tracking system. Samples were weighed and dried, crushed to 70% passing 2 mm, and pulverized to 85% passing -75 µm.

A flowsheet showing the sample preparation and analysis used by Golden Minerals is included as Figure 11-1.

11.6 Analysis

11.6.1 West Timmins

ALS Vancouver analyzed 30 g of material using a standard fire assay/atomic absorption or gravimetric finish for gold with ICP analyses for 30 additional elements. Samples with values >10 g/t Au were re-analyzed by fire assay and gravimetric finish.

11.6.2 Golden Minerals

After sample preparation, the prepared pulps for all samples (drill core, surface and underground samples) were shipped to ALS Vancouver for analysis. Samples were analyzed using the following techniques.

Gold was assayed using ALS code Au-AA23, with overlimit values re-assayed using method Au-GRA22:

- Gold samples were assayed by fire assay with an atomic absorption finish (detection range of 0.005–10 g/t Au);
- Gold samples returning assay values >10 g/t Au were re-assayed by fire assay with gravimetric finish (detection range of 0.05–10,000 g/t Au).

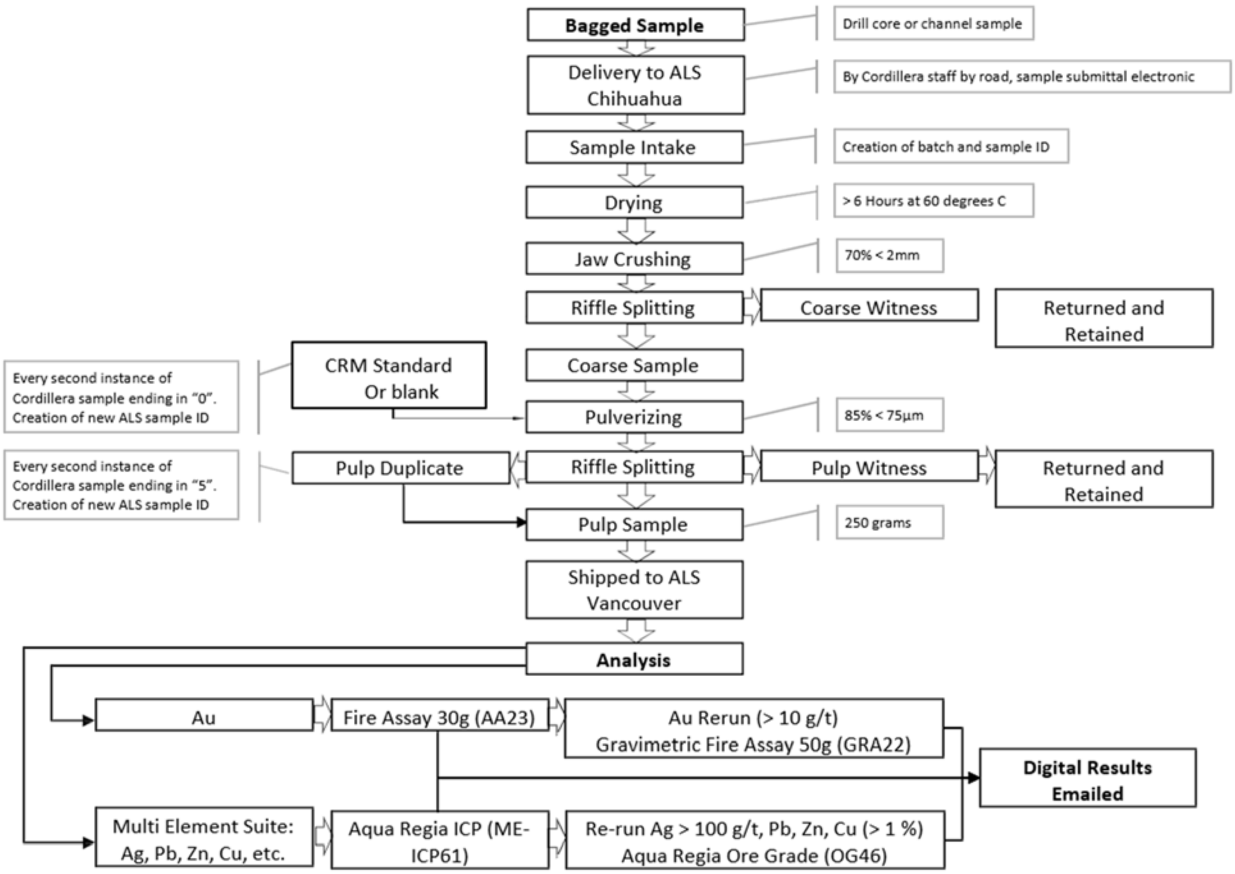
Silver was assayed using ALS code ME-ICP61, with overlimit assays re-assayed using methods OG62, ME-GRA22, and Ag-CON01:

- Four-acid digest with an inductively coupled plasma atomic emission spectrometry (ICP-AES) finish (detection range of 0.5–100 g/t Ag);
- Silver samples returning assay values >100 g/t Ag were re-assayed with a four-acid digest with and ICP-AES finish (detection range of 1–1,500 g/t Ag);
- Silver samples returning assays >1,500 g/t Ag were re-assayed by fire assay with gravimetric finish (detection range of 5–10,000 g/t Ag);
- Silver samples returning assays >10,000 g/t Ag were re-assayed by fire assay with gravimetric finish (detection range of 0.7–995,000 g/t Ag).

Multi-element analysis (including base metals) consisted of:

- Four acid digest with an inductively coupled plasma atomic emission spectrometry (ICP-AES) finish (detection range of 1–10,000 ppm Cu, and 2–10,000 ppm for lead and zinc);
- Copper, lead and zinc samples returning values >10,000 ppm were re-assayed with a four-acid digest with and ICP-AES finish (detection range of 0.001–50% Cu, 0.001–20% Pb, and 0.001–30% Zn).

Figure 11-1: Golden Minerals Sample Preparation and Analysis Flowsheet



Note: Figure courtesy Golden Minerals, 2023.

11.7 Quality Assurance and Quality Control

11.7.1 West Timmins

Leonard (2007) noted that:

"ALS Chemex completes routine quality assurance and control through the process of sample preparation and analysis. This includes but was not limited to air quality testing, sieve testing of coarse crushed and pulverised samples, preparation of sample blanks, and numerous analytical calibrations. Analyses of internal blanks and standards were reported to clients with the associated analytical data.

West Timmins inserted a field blank (an unmineralized portion of the diamond drill core) into the sample stream at regular intervals (every 15th sample) and alternated this with a sample duplicate from a previously sampled section of diamond drill core further up-hole. There were no apparent issues with data quality".

11.7.2 Golden Minerals

11.7.2.1 Insertion Protocols

Golden Minerals has implemented an industry standard QA/QC program including the submission of certified standard reference materials (standards), duplicates and blanks to the laboratory, and the results are reviewed regularly to ensure that appropriate and timely action is taken in the event of a QA/QC failure.

At present the protocol for the submission of QA/QC samples is one QA/QC sample for every nine routine samples.

In the case of a QA/QC failure, the standard practice is to review the data for potential translation issues (samples results swapped with an adjacent sample), and then re-run 5–8 samples on both sides of the erroneous sample.

In total, 665 QA/QC samples were submitted, or approximately 10.4% of the total number of samples submitted from the Golden Minerals Yoquivo drill programs.

11.7.2.2 Standards

Results of the regular submission of standards are used to identify problems with specific sample batches and long-term biases associated with the primary assay laboratory. Golden Minerals uses commercial CRMs purchased from OREAS based in Melbourne, Australia.

A total of 196 standard samples were submitted by Golden Minerals at an average frequency of one for every batch of 30 samples. Two different CRMs were used during the Yoquivo drill program. Results from the standards show adequate accuracy and no significant bias in the gold and silver assays.

Golden Minerals continually monitors the results from the standard samples to verify the quality of the results received from ALS Vancouver during the drilling campaign.

11.7.2.3 Blanks

Golden Minerals submits blank material to assess any contamination during sample preparation and to identify sample numbering errors. The blank material used is a silica sand purchased from Abrasivos Laguna SA de CV in Torreon, and used at the Velardeña laboratory. Prior to this material being used, several samples of the blank material were submitted to ALS Vancouver for check analysis to verify that they contained no significant gold or silver mineralization.

The results from this confirmation sampling indicated that the material had below detection limit gold and silver grades (<0.005 ppm Au and <0.5 ppm Ag) and was considered acceptable to be used as a blank for the Golden Minerals drill programs.

Blank samples were inserted at an average rate of approximately one per 20–25 samples, with a total of 279 blank samples (4.4%) analyzed during the 2020–2022 Golden Minerals drill campaigns. No significant carryover contamination is indicated in the gold and silver blank results.

Golden Minerals continually monitors the results from the blank samples to verify the quality of the results received from ALS Vancouver during the drilling campaigns.

11.7.2.4 Field, Coarse Reject, and Pulp Duplicates

Duplicate samples help to monitor preparation and assay precision and grade variability as a function of sample homogeneity and laboratory error. Golden Minerals currently does not insert a field duplicate, due to the remoteness of the field camp at Basaseachi from the core and sample storage warehouse in Velardeña. Instead, Golden Minerals directs the ALS Chihuahua laboratory to prepare two pulps from a single parent sample to make a pulp duplicate.

Pulp duplicates were inserted at an average rate of approximately one per 25–30 samples, with a total of 192 duplicate samples (3.0%) analyzed. Results returned from the duplicate program indicate adequate precision of the gold and silver assays.

Results from the duplicate samples are continually reviewed, and actions are taken according to the failure limits set at ± 10% of the original value. If there are multiple samples outside of these failure limits, the batch is requested to be repeated.

Golden Minerals plans to increase the quality of the duplicate sampling program by including field duplicates and coarse (crusher) duplicates as additional QA/QC checks.

11.7.3 Check Assays

At the Report effective date, no check assay samples had been submitted to a secondary laboratory to evaluate the accuracy of the results from ALS Vancouver.

11.8 Databases

Golden Minerals has compiled an extensive dataset for the Yoquivo Project that is stored and managed using the Micromine Geobank database management system designed for the mining and mineral exploration industry.

Field data (drilling and geotechnical data) are captured using Geobank Mobile logging software, and are transferred daily, via the internet, to the database.

The database includes a series of validations to prevent inaccurate data from being imported into the database. If any errors are flagged (e.g., overlapping intervals, data extending beyond hole depths or unknown codes), the data are not imported, and these errors are corrected in the field.

Assay data are imported directly from comma-separated value (csv) files sent from ALS Vancouver and compiled into final assay tables within the database. The database also flags and separates QA/QC samples into relevant tables.

The database is stored remotely at Golden Minerals' exploration offices in Torreon, Coahuila, where it is also backed-up on a local server. In addition, paper data (sample submissions, daily drilling reports etc.) are stored in the Torreon offices and scanned and stored on the local server.

11.9 Sample Security

11.9.1 West Timmins

Leonard (2007) stated that:

"Sample chain of control was maintained by West Timmins from the sample collection point until delivery to a representative from the analytical laboratory or until shipping directly to the sample preparation facility. Samples were bagged individually and tagged in the field then immediately collected into larger rice bags to be stored at the West Timmins field camp until bulk-shipped or transported. While stored in West Timmins' field camp, these "rice sacks" were tightly sealed using strapping tape that was immediately marked with an indelible marker".

11.9.2 Golden Minerals

Samples collected in the field are stored in a locked area at the exploration camp in Basaseachi and transported by Golden Minerals employees to ALS Chihuahua.

Chain-of-custody procedures consist of sample submittal forms that are emailed to the laboratory, and a physical copy of the submission form delivered with sample shipments to ensure that all samples are received by the laboratory. ALS Chihuahua provides a sample delivery receipt to Golden Minerals.

11.10 QP Comments on "Item 11: Sample Preparation, Analyses, and Security"

The QP is of the opinion that the sample preparation, analysis, quality control, and security procedures are sufficient to provide reliable silver and gold data to support estimation of Mineral Resources.

12.0 DATA VERIFICATION

12.1 Internal Data Verification

Golden Minerals conducted several digital and visual queries on the Yoquivo sample database. Golden Minerals uses database validation tools in Geobank to prevent incorrect data from entering the database, including:

- Intervals exceeding the total hole length;
- Gaps in lithology data;
- Negative length intervals;
- Positive down-hole dip measurements;
- Out-of-sequence and overlapping intervals;
- Sample intervals overlapping areas of no recovery (e.g., historical workings);
- No interval defined within analyzed sequences (not sampled or missing samples/results);
- Inconsistent drill hole labelling between tables;
- Invalid data formats, logging codes and out-of-range values;
- Unusual assay results, including excessively long assay intervals;
- Recovery and RQD values exceeding interval length.

After the data were imported into Micromine and Leapfrog software systems, the data were reviewed in two dimensions and three dimensions to confirm data quality and to ensure that there were no unreasonable downhole deviations or gaps in the logging and assay data fields.

12.2 External Data Verification

To date, no external verification of the exploration data has been performed, other than the QP's verification that is discussed in the next subsection.

12.3 Data Verification Performed by Qualified Person

The QP visited the Yoquivo Project for a five-day period, from 31 October 2022 to 4 November 2022.

12.3.1 Field Inspection

The QP visited the Pertenencia and San Francisco vein systems, and walked along outcrop exposures and historical excavations at the topographic top (2,200 masl) and base (2,000 masl) of the exposures.

Historical excavations observed included shallow surface trenches established along the strike of the vein system and shafts, declines, and adits accessing the historical underground mine workings. Vein orientations were collected where possible and generally trended northeast–southwest (averaging approximately 015º azimuth) with a dip of -70º to the east.

Mineralization consisted of white quartz vein, quartz vein stockwork, and quartz vein breccia hosted by rhyolite and andesite volcanic and intrusive rocks.

12.3.2 Collar Checks

The QP collected hand-held GPS coordinates for nine drill holes on the Project and compared the coordinates with those found in the database (Table 12-1). The differences in easting and northing are generally between 1–36 m. The difference in northing for drill holes YQ_022_010 and YQ_022_011 are likely due to less accurate readings from the hand-held GPS used by the QP. Elevation coordinates were not collected for some drill holes.

The QP reviewed the drill hole coordinates with the digital topography and considers the database coordinates to be accurate and reliable for Mineral Resource estimation purposes.

12.3.3 Witness Sampling

The QP collected six rock chip samples and five core samples during the site visit. The QP personally collected or supervised the sampling of the rock chip samples from surface outcrop exposures, trench walls, or underground workings and delivered the samples to ALS Chihuahua. Drill interval samples were selected by the QP and ¼ core samples were cut, sampled, bagged, and delivered to ALS Chihuahua by Golden Minerals staff.

Rock chip and core samples were analyzed by method Au-AA23 (gold by lead fire assay on a 30 g sample followed by AA) and ME-ICP61 (33 elements by four-acid digestion on a 0.25 g sample followed by ICP–AES). Samples reporting > 100 g/t silver were re-assayed by method Ag-OG62 (silver by four-acid digestion of a 0.4 g sample followed by ICP–AES).

Silver and gold assay results for rock chip witness samples are shown in Table 12-2 and indicate the presence of mineralization on surface and underground.

Silver and gold assay results for the original assays and the witness samples for core intervals are shown in Table 12-3. The ¼ core witness samples are not considered duplicate samples and so are not expected to be evaluated as such. However, the witness samples do confirm the presence of mineralization in the core intervals and agree reasonably well with the original assays except for the interval from drill hole YQ_020_011.

Table 12-1: Collar Checks

Drill Hole ID	Easting (m)	Northing (m)	Elevation (m)	Database Easting (m)	Database Northing (m)	Database Elevation (m)	Difference in Easting (m)	Difference in Northing (m)	Difference in Elevation (m)
YQ_20_001	791299	3104845	ND	791301	3104882	1996	-2	-37	ND
YQ_021_006	791299	3104845	ND	791263	3104873	1995	36	-28	ND
YQ_021_007	791299	3104845	ND	791264	3104872	1995	35	-27	ND
YQ_021_016	791299	3104845	ND	791263	3104870	1995	36	-25	ND
YQ_021_017	791299	3104845	ND	791264	3104870	1995	35	-25	ND
YQ_022_005	790541	3105227	2243	790539	3105225	2212	2	2	31
YQ_022_006	790541	3105227	2243	790540	3105225	2212	1	2	31
YQ_022_010	791374	3105391	2201	791351	3105108	2099	23	283	102
YQ_022_011	791374	3105391	2201	791350	3105108	2100	24	283	101

Note: Collar coordinates truncated to integer values for comparison purposes. ND = not determined.

Table 12-2: Rock Chip Witness Samples

Sample	Easting (m)	Northing (m)	Elevation (m)	Ag (g/t)	Au (g/t)	Sample Location
MCS002060	791374	3105391	2201	125	1.855	Mala Suerte decline
MCS002061	791445	3105405	2214	53.3	0.255	Tajitos vein prospect pit
MCS002062	791445	3105405	2214	9.5	0.020	Tajitos vein prospect pit
MCS002063	791234	3105008	2087	14.8	0.029	Pertenencia adit area
MCS002064	790646	3104721	1915	50	3.310	Creel Level adit (underground sample)
MCS002065	790646	3104721	1915	28.9	0.132	Creel Level adit (underground sample)

Note: Sample locations for Creel Level adit collected at the adit entrance.

Table 12-3: Core Witness Samples

Drill Hole ID	From (m)	To (m)	Interval (m)	Original Silver (g/t Ag)	Original Gold (g/t Au)	Witness Silver (g/t Ag)	Witness Silver (g/t Au)	Sample Location
YQ_020_011	117.8	118.2	0.4	218	3.19	70.8	0.335	Pertenencia
YQ_021_006	70.6	70.9	0.3	1,285	6.83	1,330	6.65	San Francisco
YQ_022_006	10.05	10.80	0.75	298	0.35	392	0.404	Pertenencia
YQ_022_013	283.8	285.0	1.2	414	3.28	524	3.85	Pertenencia
YQ_022_024	132.10	132.65	0.55	196	1.47	222	1.605	Pertenencia

12.3.4 Drill Core Review

The QP examined drill core from drill holes YQ_021_006 and YQ_022_032. Mineralized zones from YQ_021_006 are characterized as zones of quartz veining, calcite veining, sulphide mineralization, and brecciation. The host rocks are andesitic and lesser rhyolitic volcanic rocks. Significant variation in the texture of the andesitic rocks was observed. Core from YQ_022_032 is characterized by narrow white quartz veins and calcite veinlets and some breccia hosted by green andesitic volcanic rocks.

The style of mineralization observed by the QP is consistent with the low-sulphidation exploration model being employed by Golden Minerals.

12.3.5 Laboratory Visits

The QP visited the Golden Minerals metallurgy laboratory in Velardeña. The QP toured the facility and inspected the equipment and methods used to perform the metallurgical testwork. In the QP's opinion, the laboratory is adequately equipped to perform the preliminary testwork described in Section 13.

The QP toured the ALS Chihuahua sample preparation facility and found it adequate to prepare core samples for analysis by ALS Vancouver.

12.3.6 Database Audit

The QP audited approximately 10% of the collar locations, downhole surveys, geological logs, and assays from the Project database to ensure that the digital database represents the original exploration records.

No discrepancies were found between the database and the original records in the collar locations or silver and gold assays.

The QP found five data entry errors in the downhole surveys and Golden Minerals corrected these errors and completed a comparison of all downhole surveys in the database against the original records and corrected any errors that were found.

No errors were found in the geological logs, but the relogged intervals for one drill hole that was relogged in November 2022 was missing from the database. The intervals for this drill hole were replaced by the relogged intervals and Golden Minerals performed a check of the other drill holes that were relogged to ensure that the best logging information is in the database.

The QP finds the database accurately represents the original records and is acceptable for use in Mineral Resource estimation.

12.4 QP Comments on "Item 12: Data Verification"

The QP has the following observations as a result of the site visit and data verification checks:

- Field inspection, core inspection, and witness sample results indicate that the Yoquivo Project hosts significant precious metal mineralization in a low-sulphidation setting;
- Drill hole collar locations are accurate and acceptable for use in Mineral Resource estimation;
- The Golden Minerals metallurgical laboratory in Velardeña is adequately equipped to perform the preliminary testwork described in Section 13. The QP recommends that future metallurgical testwork be performed by an independent commercial laboratory;
- ALS Chihuahua is adequate to prepare core samples for analysis at ALS Vancouver;
- The Project database accurately represents the original exploration records and is acceptable to support Mineral Resource estimation.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction

Two composite samples were selected (see Section 11.2) from core coarse rejects for preliminary testwork, and designated as low-grade and medium-grade. The samples were placed into sealed buckets and transported by Golden Minerals personnel to the Golden Minerals-owned Velardeña laboratory.

Golden Minerals conducted several preliminary metallurgical tests during the fourth quarter of 2022 to determine if the mineralization in the Yoquivo deposit is amenable to cyanide leaching and flotation. The tests were designed and conducted by Golden Minerals personnel.

Testwork included creating composites; conducting head assays for gold, silver, cyanide soluble gold, and cyanide soluble silver; conducting bench top duplicate agitated leach tests; and flotation tests.

13.2 Metallurgical Testwork

13.2.1 Head Assays

The Velardeña laboratory undertook duplicate total gold and silver assays by fire assay using a 10 g fire assay in concert with an AA finish.

Aqua regia digestions were conducted to obtain lead, zinc, and copper assays in duplicate as well. Golden Minerals also conducted cyanide shake tests to predict the amount of cyanide soluble gold and silver in each composite at two different grind sizes, 85% passing 200 mesh and 100% passing 200 mesh. The splits were leached with a 5,000 ppm sodium cyanide solution at a pH of 11.0 and a temperature of 65º C for one hour. The test was repeated five times at both grind sizes. The resulting head assays and cyanide soluble gold and silver assays are presented in Table 13-1 to Table 13-3. The sample numbering refers to different splits of each of the two composites.

Table 13-1: Head Assays of Composites

Sample	Gold Grade (Au g/t)	Silver Grade (Ag g/t)
Low grade A	1.60	222
Low grade B	1.56	205
Low grade C	1.19	200
Medium grade A	3.18	327
Medium grade B	3.08	331
Medium grade C	2.74	309

Table 13-2: Percent Cyanide Soluble Gold Based on In-House Shake Test

Sample	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Average (%)
Low grade A	90.5	85.9	90.4	94.8	90.0	90.3
Low grade B	90.1	80.0	89.1	93.7	66.5	83.9
Medium grade A	80.2	77.9	75.2	86.2	68.1	77.5
Medium grade B	51.2	64.3	61.8	67.8	58.8	60.8

Table 13-3: Percent Cyanide Soluble Silver Based on In-house Shake Test

Sample	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Average (%)
Low grade A	85.9	86.3	87.4	86.8	85.3	86.4
Low grade B	80.1	67.0	78.9	74.9	57.1	71.6
Medium grade A	67.5	63.8	66.7	68.0	58.0	64.6
Medium grade B	53.0	54.3	53.1	49.2	54.9	52.9

13.2.2 Agitated Leach Tests

Golden Minerals conducted 1,000 g bottle roll tests to simulate a leach circuit. Each sample was tested at 2.5 g/L NaCN and 3 g/L NaCN for 96 hours. All other tests conditions were held constant.

The samples were ground to a nominal 75% -200 mesh prior to the leach. The pH was maintained above 10.5 with lime, and the slurry density was set at 50% solids. Tap water from the site was used as the source of water. The pH and sodium cyanide concentrations were monitored at 2, 6, 24, 48, 72 and 96 hours and adjusted as needed with lime and sodium cyanide to maintain the targets. Solution samples were also collected at the same time intervals and subjected to dissolved gold, silver, and copper assays.

The test conditions and results are summarized in Table 13-4 to Table 13-6.

The samples responded very well to cyanide leaching, as gold recoveries were between 81.8% and 92.4%, and silver recoveries were between 77.6% and 92.5%. Both samples yielded higher gold and silver recoveries with higher NaCN concentrations (Table 13-5). All recoveries were also substantially higher than the amount of cyanide-soluble gold and silver predicted by the shake tests.

Leach kinetics were slow, as the gold and silver were still leaching when the tests were terminated in all tests except the test with the higher NaCN dosage on the low-grade composite, as shown in Figure 13-1 and Figure 13-2.

Between 30% and 70% of the gold leached in the first two hours with the remainder of the gold leaching in a slow linear manner for the remainder of the test. Silver recoveries were similar to gold recoveries except a little slower, as between 15% and 55% of the silver leached in the first two hours and the remaining silver leached slowly throughout the remainder of the tests.

Sodium cyanide additions between 4.5 and 5.5 kg/t were required to maintain the 2.5 g/L and 3.0 g/L NaCN targets. Lime additions between 1.8 and 2.5 kg/t were needed to maintain pH levels above 10.5 throughout the tests.

13.2.3 Flotation Tests

Flotation tests were conducted on 1,000 g splits from each composite. All flotation tests were conducted using a rougher-scavenger flotation scheme with common flotation reagents. Two different flowsheets were used.

For one flowsheet, two concentrates were collected. The first concentrate was collected for one minute and the second concentrate was collected for the entire period between 1–13 minutes.

The three remaining tests were conducted using the flowsheet shown in Figure 13-3, where separate concentrates were collected at 1, 3, 5, 7, 9, 11, and 13 minute intervals.

A combination of a blended collector (RO2) with dithiophosphate and mercaptobenzothiazol plus Aero A3418 were used as collectors, A70 (MIBC) was used as the frothing agent, and T609 was also added as a dispersive agent. These reagents are all commonly used in base metal and precious metal flotation circuits. The RO2 and T609 are marketed by Quimica Teuton, S.A. DE C.V. Aero 3418 and A70 are marketed by Solvay.

Table 13-4: Bottle Roll Test Conditions

Sample	NaCN Concentration (g/L)	Grind Size (% passing 200 mesh)	Target pH	Solids (%)
Low grade A	2.5	74.63	>10.5	50
Low grade B	3.0	74.63	>10.5	50
Medium grade A	2.5	74.63	>10.5	50
Medium grade B	3.0	76.69	>10.5	50

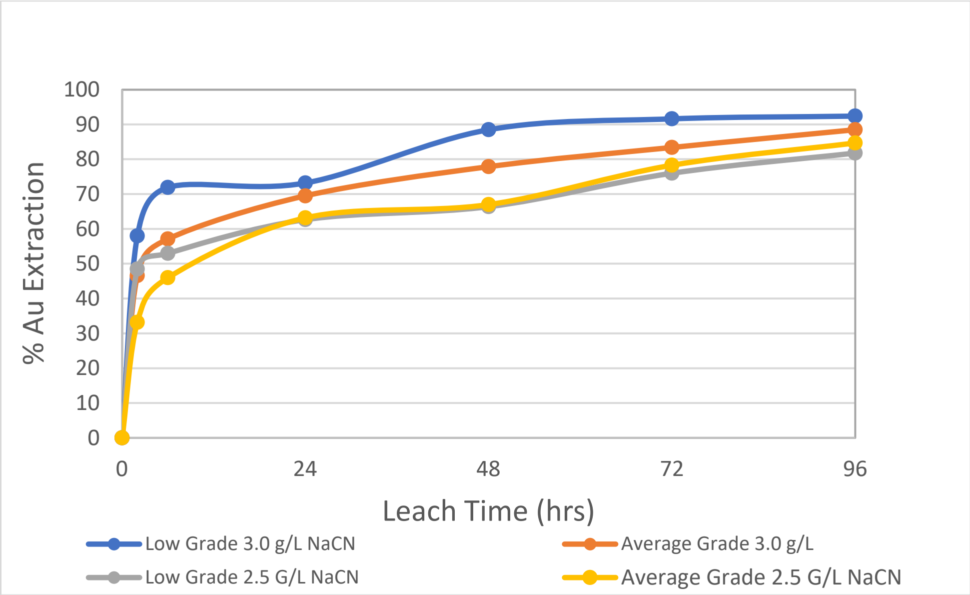
Table 13-5: Agitated Leach Test Results

Sample	NaCN Concentration (g/L)	Gold Extraction (%)	Silver Extraction (%)	Gold Accountability (%)	Silver Accountability (%)
Low grade A	2.5	81.8	90.9	125	114
Low grade B	3.0	92.4	92.5	134	120
Medium grade A	2.5	84.7	77.6	88	100
Medium grade B	3.0	88.5	85.5	132	111

Table 13-6: Lime and Sodium Cyanide Additions

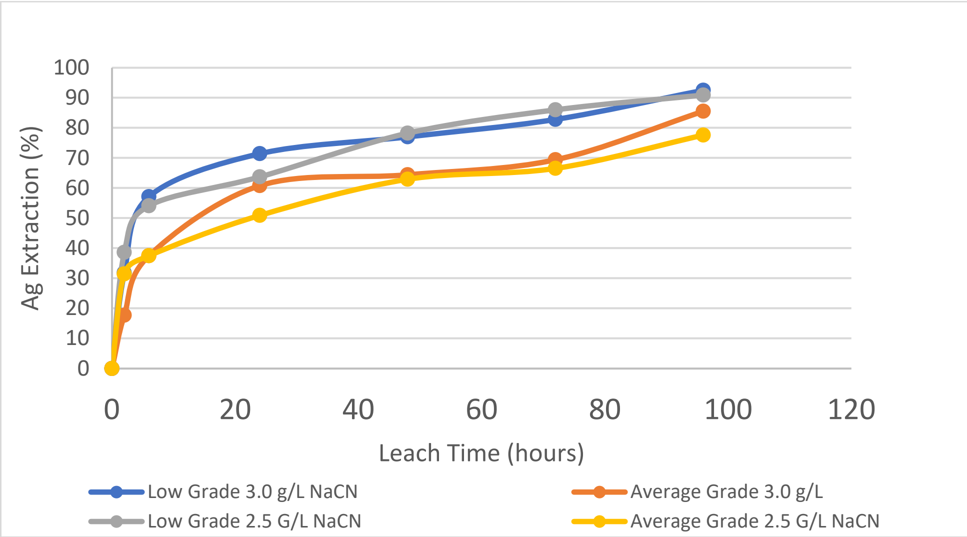
Sample	Target Concentration (g/L)	Total NaCN Added (g/L)	NaCN Consumption (kg/t)	Total Lime Added (kg/t)
Low grade A	2.5	5.63	3.14	1.8
Low grade B	3.0	5.55	3.10	2.5
Medium grade A	2.5	4.81	2.52	1.8
Medium grade B	3.0	4.55	2.03	2.5

Figure 13-1: Gold Leach Kinetics



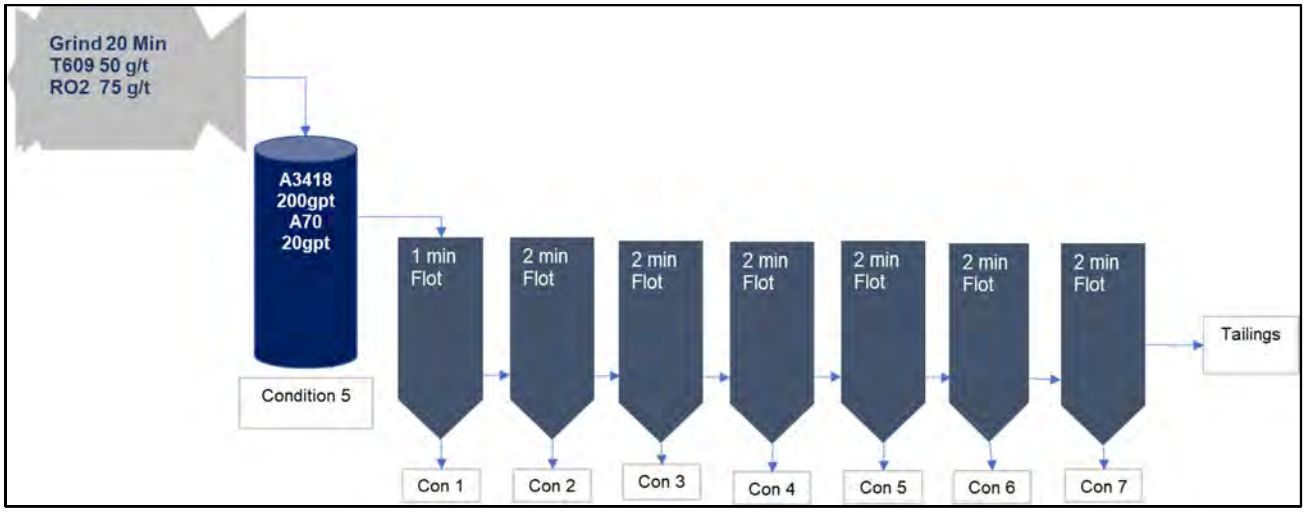
Note: Figure courtesy Golden Minerals, sourced from file "preliminar de yoquivo 1011202.xlsx." In this figure, average grade = medium grade.

Figure 13-2: Silver Leach Kinetics



Note: Figure courtesy Golden Minerals, sourced from file "preliminar de yoquivo 1011202.xlsx." In this figure, average grade = medium grade.

Figure 13-3: Flotation Test Flowsheet



Note: Figure courtesy Golden Minerals, sourced from file "Balance met 366372final.xlsx".

13.2.4 Flotation Results

The samples responded very well to flotation. Gold recoveries were between 84% and 95% and silver recoveries were between 82% and 89%. The flotation kinetics were quick as gold recoveries near 70% and silver recoveries near 60% were achieved in the first minute.

The gold and silver recoveries are summarized in Table 13-7 to Table 13-10.

13.3 Recovery Estimates

Recoveries of 85% for gold and silver were recommended by the QP for use in assessing reasonable prospects of eventual economic extraction when performing the Mineral Resource estimate. These forecasts can support estimation of Inferred Mineral Resources.

Recovery assumptions were based on the following:

- Initial metallurgical testwork conducted by Golden Minerals on material from the Yoquivo Project, summarized in Section 13.2;
- Reviewing other mining operations that use similar recovery technologies to that conceptually envisaged at Yoquivo.

Table 13-7: Summary Low Grade A Flotation Results

Low Grade A	Mass (%)	Au (g/t)	Ag (g/t)	Ag/Au	Au Distribution (%)	Ag Distribution (%)
Head assay	100.0	1.58	214	135		
Rougher concentrate	3.2	32.74	4,294	131	72.30	68.85
Scavenger concentrate	1.4	13.38	2,103	157	12.92	14.75
Final tailings	95.4	0.22	34	153	14.77	16.40
Calculated head	100	1.449	200	138	100.00	100.00
Recovery (%)	*4.6*	*85.80*	*83.93*	*NA*	*85.23*	*83.60*
Accountability (%)	*100*	*91.72*	*93.49*	*NA*	*NA*	*NA*

Note: Recovery = (metal in head – metal in tailings)/metal in head.
Back calculated recovery = (metal in concentrates)/(metal in tailings + sum of metals in concentrates).
Accountability = metal in head/(sum of metals in concentrate + metal in tailings).
NA = not applicable.

Table 13-8: Summary Low Grade B Flotation Results

Low Grade B	Mass (%)	Au (g/t)	Ag (g/t)	Ag/Au	Au Distribution (%)	Ag Distribution (%)
Head grade	100.0	1.58	214	135		
Flot 1; 1 min	2.00	40.35	5,048	125	59.58	53.85
Flot 2; 1–3 min	1.40	12.16	1,856	153	12.57	13.86
Flot 3; 3–5 min	1.20	3.39	586	173	3.00	3.75
Flot 4; 5–7 min	0.80	3.08	515	167	1.82	2.20
Flot 5; 7–9 min	1.50	2.61	461	177	2.89	3.69
Flot 6; 9–11 min	1.00	2.30	420	183	1.70	2.24
Flot 7; 11–13 min	0.80	2.68	447	167	1.58	1.91
Final tailings	91.30	0.25	38	152	16.85	18.51
Calculated head	100	1.354	187	138	100.00	100.00
Recovery (%)	*8.70*	*84.18*	*82.20*	*NA*	*83.15*	*81.49*
Accountability (%)	*100*	*85.72*	*87.81*	*NA*	*NA*	*NA*

Note: Recovery = (metal in head – metal in tailings)/metal in head.
Back calculated recovery = (metal in concentrates)/(metal in tailings + sum of metals in concentrates).
Accountability = metal in head/(sum of metals in concentrate + metal in tailings).
NA = not applicable.

Table 13-9: Summary Medium Grade A Flotation Results

Medium Grade A	Mass (%)	Au (g/t)	Ag (g/t)	Ag/Au	Au Distribution (%)	Ag Distribution (%)
Head grade	100.0	3.13	329	105		
Flot 1; 1 min	2.60	71.79	7,318	102	69.89	62.49
Flot 2; 1–3 min	1.40	25.09	3,148	125	13.15	14.47
Flot 3; 3–5 min	1.80	6.77	1,019	150	4.56	6.02
Flot 4; 5–7 min	2.00	2.48	388	156	1.86	2.55
Flot 5; 7–9 min	1.40	1.90	302	159	0.99	1.39
Flot 6; 9–11 min	1.40	1.76	279	159	0.92	1.28
Flot 7; 11–13 min	2.00	1.84	257	140	1.38	1.69
Final tailings	87.40	0.22	35	159	7.24	10.11
Calculated head	94	2.670	304	114	100.00	100.00
Recovery (%)	*12.60*	*92.93*	*89.29*	NA	*92.76*	*89.89*
Accountability (%)	*100*	*85.32*	*92.55*	NA	*NA*	*NA*

Note: Recovery = (metal in head – metal in tailings)/metal in head.
Back calculated recovery = (metal in concentrates)/(metal in tailings + sum of metals in concentrates).
Accountability = metal in head/(sum of metals in concentrate + metal in tailings).
NA = not applicable.

Table 13-10: Summary Medium Grade B Flotation Results

Medium Grade B	Mass (%)	Au (g/t)	Ag (g/t)	Ag/Au	Au Distribution (%)	Ag Distribution (%)
Head grade	100.0	3.13	329	105		
Flot 1; 1 min	1.40%	111.98	8,133	73	59.60	47.84
Flot 2; 1–3 min	0.80%	36.50	3,464	95	11.10	11.64
Flot 3; 3–5 min	1.00%	38.82	1,819	47	14.76	7.64
Flot 4; 5–7 min	1.00%	6.37	1,062	167	2.42	4.46
Flot 5; 7–9 min	2.20%	3.30	518	157	2.76	4.79
Flot 6; 9–11 min	1.80%	3.43	575	168	2.35	4.35
Flot 7; 11–13 min	2.00%	2.49	407	163	1.89	3.42
Final tailings	89.80%	0.15	42	280	5.12	15.85
Calculated head	97%	2.630	238	90	100.00	100.00

Medium Grade B	Mass (%)	Au (g/t)	Ag (g/t)	Ag/Au	Au Distribution (%)	Ag Distribution (%)
Recovery (%)	*10.20*	*95.21*	*87.23*	NA	*94.88*	*84.15*
Accountability (%)	*100*	*84.04*	*72.34*	NA	*NA*	*NA*

Note: Recovery = (metal in head – metal in tailings)/metal in head.
Back calculated recovery = (metal in concentrates)/(metal in tailings + sum of metals in concentrates).
Accountability = metal in head/(sum of metals in concentrate + metal in tailings).
NA = not applicable.

Current metallurgical tests were conducted on two composites with different grades. These composites were sourced from 14 intercepts from nine different drill holes that penetrated three different veins. Figure 13-4 shows a map of the drill holes and intercepts and their relative positions within the deposits. Most of the samples in the composite tests were sourced from the Pertenencia vein system.

Thus far the tests are sufficient to indicate potential recoverability of the gold and silver mineralization to support Inferred Mineral Resource estimates.

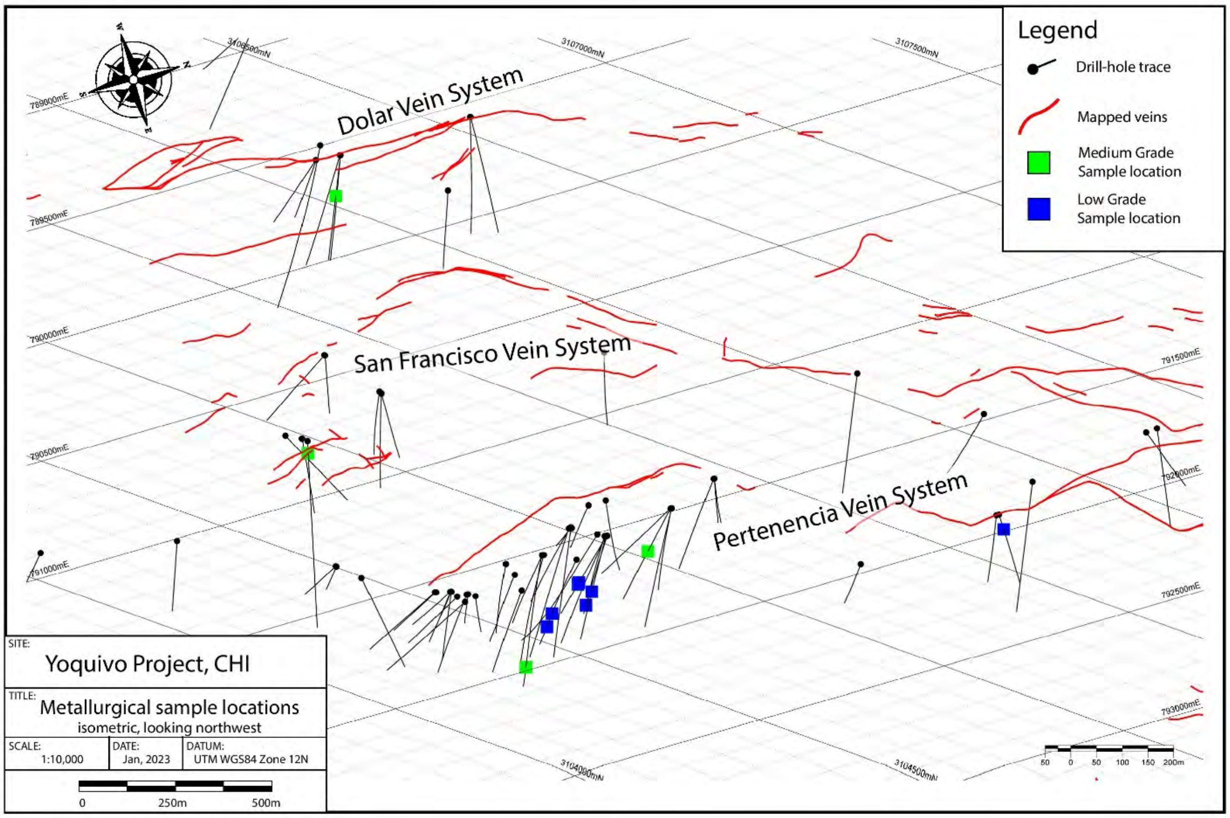
13.4 Metallurgical Variability

Insufficient samples have been conducted to qualify for variability testing.

13.5 Deleterious Elements

No testwork has been conducted to determine if deleterious elements are present in sufficient quantities to impact the ability to produce, process, and sell a concentrate or that would increase the processing cost of either a leach circuit or a flotation circuit.

Figure 13-4: Metallurgical Sample Location Plan



Note: Figure courtesy Golden Minerals, 2023.

13.6 QP Comments on "Item 13: Mineral Processing and Metallurgical Testwork"

The limited metallurgical testwork completed thus far has shown that gold and silver in the Yoquivo deposit can be recovered with cyanide leaching and flotation. Recovery forecasts can be used to support Inferred Mineral Resources.

Future test programs are needed to collect the following data as the Project is advanced.

- Metallurgical domains, variability testing: scoping efforts are needed to determine if metallurgical responses differ between the different veins or other metallurgical domains could exist within the Yoquivo deposit;

- Processing power and major wear part estimates: preliminary crushing and grind work index tests and abrasion tests should be conducted on selected samples to establish the general ranges of hardness and wear that should be applied to economic evaluations;
- Multielement and mineralogy tests: basic multielement and mineralogy analysis should be conducted on composites and concentrates to determine which minerals are responding to the metallurgical tests and if any deleterious elements are present that would significantly affect the process;
- Current core: Future metallurgical testwork needs to be sourced from current drill core to ensure metallurgical responses are not altered by weathering;
- Flotation cleaner tests: Preliminary flotation cleaner tests are needed to gain an early understanding of the grades and masses of the concentrates that should be applied to economic evaluations;
- Leach retention times: Leach tests should be conducted with longer leach times to determine the ultimate gold and silver leach recoveries that are possible for the mineralization.

14.0 MINERAL RESOURCE ESTIMATES

14.1 Introduction

The Mineral Resource estimates were prepared using 3-D models in the commercial mine planning software MinePlan3D® (version 16.0.2, build 84145-en-1690) with reference to the 2014 CIM Definition Standards and the 2019 CIM Best Practice Guidelines.

14.2 Geological Models

Geology models were provided in digital format by Golden Minerals. Golden Minerals geology staff used LeapFrog software to create lithology and vein solids. Information from drill hole geology logs and surface and subsurface mapping were used to develop the lithology models, while the vein models were based on logging, mapping, and assay data. Modeled lithological units consist of alluvium, andesite, rhyolite tuffs and sills, veins, and fault structures.

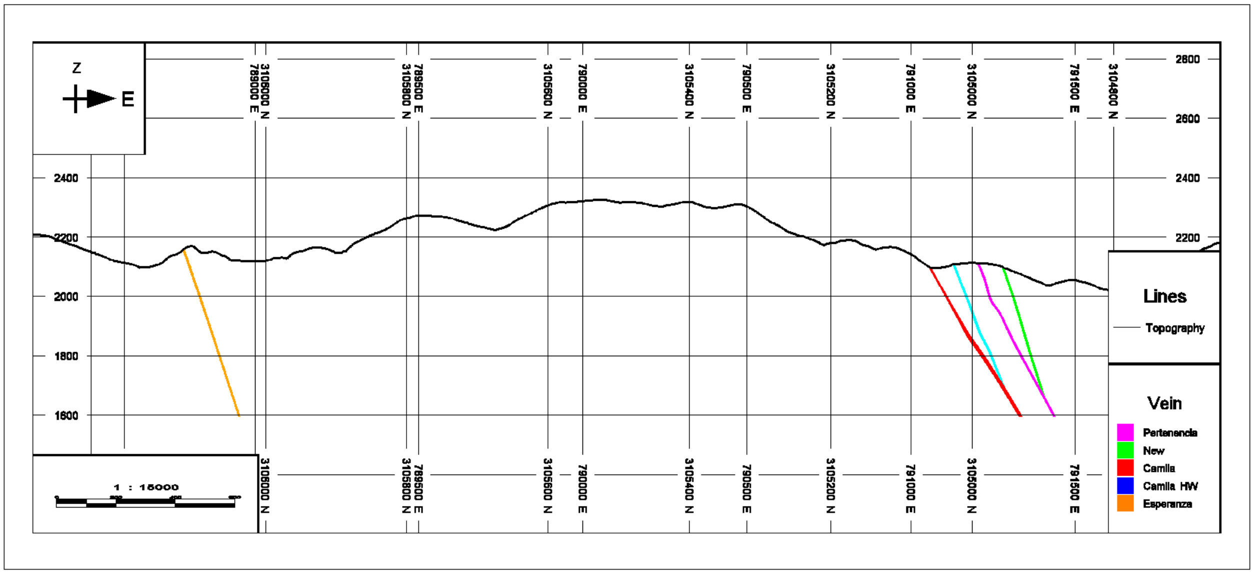
Grade shells within the vein solids were constructed within mineralized intercepts using a 200 g/t silver equivalent (AgEq) cut-off grade. The AgEq equation uses US$1,840/oz Au and US$24/oz Ag metal prices in the following equation:

- AgEq = Ag g/t + Au g/t * (1,840/24).

Silver-equivalent grade shells were constructed using composites for the Pertenencia, New, Camila, Camila hanging wall (HW), and Esperanza Veins (Figure 14-1). Other veins reviewed included the Dolar, San Francisco, La Huga, La Huga footwall (FW), Pertenencia FW, and Camila hanging wall splay (HW 01), which were determined to have insufficient drilling or grade continuity to estimate a Mineral Resource. Cross sections were created through each mineralized drill hole intercept perpendicular to the strike of the vein. An example cross-section is provided in Figure 14-2. Grade shell polygons were drawn encapsulating composites within mineralized intercepts ≥200 g/t AgEq. Polygons were projected along strike 50 m from the last drill hole and extended down dip 100 m from the last drill hole.

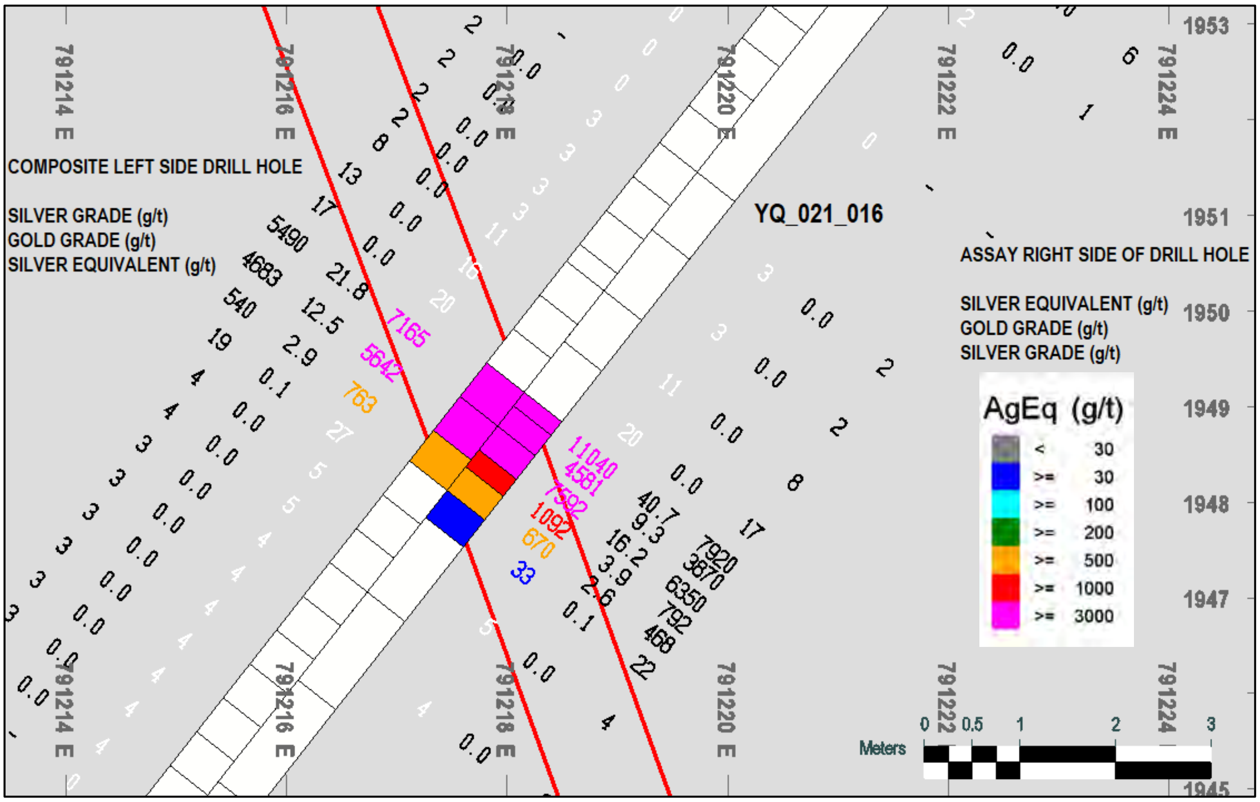
Where the AgEq vein grade shell true thickness was not at least 1 m thick, a footwall or hanging wall grade shell domain was drawn to bring the total grade shell thickness to 1 m. The determining factor as to a footwall or a hanging wall grade shell being drawn depended on which side had the higher AgEq grade adjacent to the vein grade shell.

Figure 14-1: Esperanza, Camila, Camila HW, New, and Pertenencia Veins



Note: Figure prepared by MTS, 2023. Figure looks north.

Figure 14-2: Example Cross Section, Pertenencia Vein



Note: Figure prepared by Mine Technical Services Ltd, 2023. Example from drill hole YQ_021_016 . Assay grades on right side of drill hole and composite grades on left side of drill hole.

14.3 Exploratory Data Analysis

Box plots, histograms, and cumulative probability plots by lithology were examined for gold and silver. The following lithology codes were used:

- Breccias: BXH, BXO, BXT;
- Andesite: IAN;
- Dacite: IDA;
- Granite: IGR;
- Alluvium: RCO, RSO;
- Volcanics: VDA, VRH, VTU;

- Faults: ZFO ZFX;
- Veins: ZVC, ZVO, ZVQ, ZVQC, ZVQS, ZVQX, ZVS.

Silver boxplots show the majority of the elevated silver grades are associated with veins, breccias, and faults (Figure 14-3).

Gold boxplots shows the majority of the elevated gold grades are associated with veins, breccias, and faults (Figure 14-4).

14.4 Block Model

The block model was constructed using a block size of 1 x 2 x 2 m. The block model is not rotated. The block model extents for Pertenencia, New, Camila, Camila HW, and Esperanza are listed in Table 14-1.

14.5 Density Assignment

Resource model blocks were coded by the vein, hanging wall, and footwall solids together with their respective volume percent. All mineralized volumes were assigned a density of 2.43 g/cm^3 (see discussion in Section 11.3).

14.6 Grade Capping/Outlier Restrictions

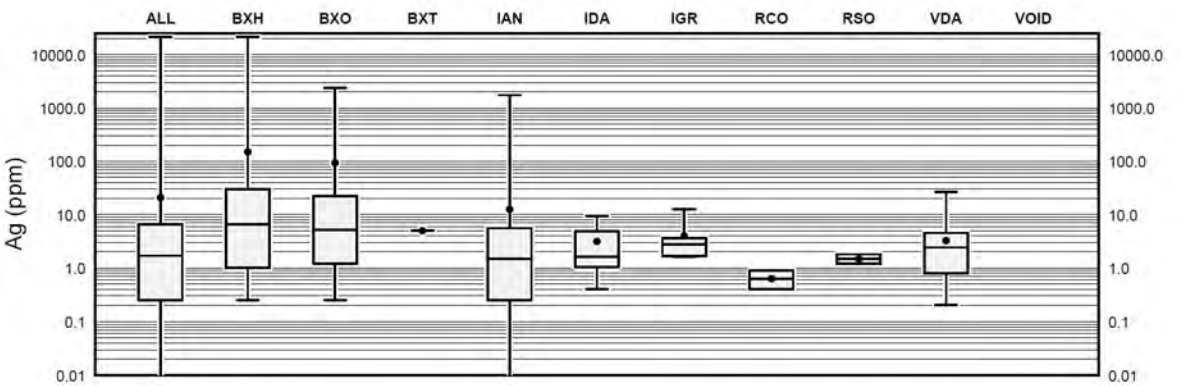
Grade capping analysis consisted of reviewing cumulative probability plots and decile analysis. Inflection points along the graphed line that represents a change in slope in a cumulative probability plot may indicate the presence of multiple sample populations.

Decile analysis of silver and gold indicates that grade capping/restriction is warranted as the 10th decile has more than twice the metal content of the ninth decile, the 100th percentile contains more than twice the metal of the 99th, and the 100th percentile contains more than 10% of the metal content as shown in Table 14-2 and Table 14-3.

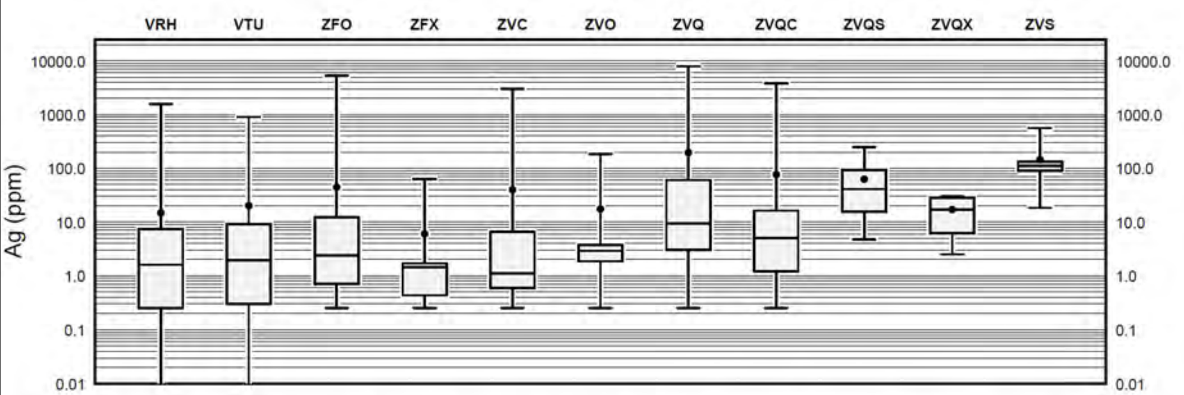
An outlier restriction plan for silver and gold was implemented. For silver block grade estimation, composite grades were uncapped during estimation within 15 m of the drill hole. Beyond 15 m, the composite grades were capped during estimation to 3,000 g/t Ag (refer to Table 14-2). A silver outlier grade of 3,000 g/t was selected from the mean grade of 99th percentile rounded up to the nearest thousand. The silver outlier restriction was applied to the Pertenencia and New veins.

For gold block grade estimation, gold composite grades were uncapped within 15 m of the drill hole. Beyond 15 m, the composite grades were capped to 10 g/t Au. A gold outlier grade of 8.280 g/t was selected due to being the maximum grade of the 99th percentile, and then rounded up to the nearest decile to 10 g/t Au (refer to Table 14-3). The gold outlier restrictions were applied to the Pertenencia, New, and Camila HW veins.

Figure 14-3: Silver Box Plot by Lithology



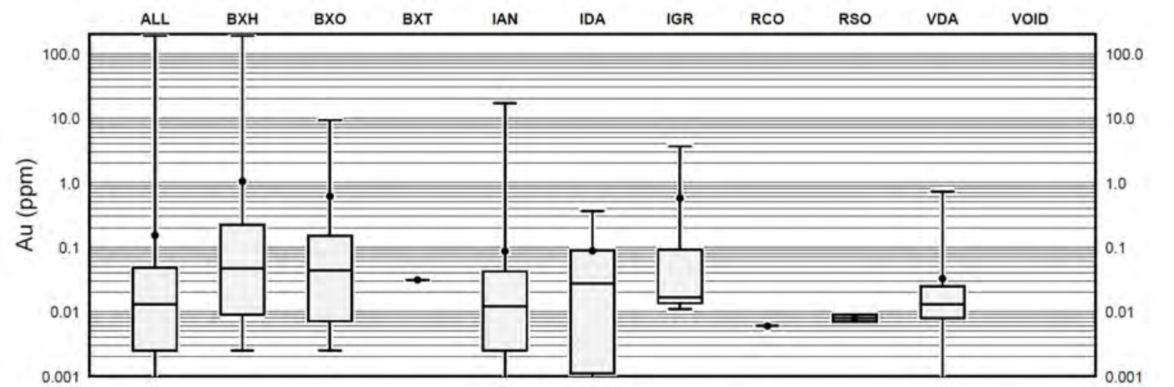
	ALL	BXH	BXO	BXT	IAN	IDA	IGR	RCO	RSO	VDA	VOID	
No. of data	6099	156	49	1	4610	6	5	2	2	22	0	No. of data
Mean	20.85	150.38	93.95	5.00	12.60	3.15	4.01	0.63	1.47	3.26	0.00	Mean
Maximum	21447.00	21447.00	2360.00	5.00	1745.00	9.40	12.60	0.90	1.80	26.50	0.00	Maximum
U.Quartile	6.60	30.26	22.28	0.00	5.60	4.83	3.66	0.90	1.80	4.53	0.00	U.Quartile
Median	1.70	6.60	5.18	0.00	1.50	1.64	2.77	0.63	1.47	2.42	0.00	Median
L.Quartile	0.25	1.00	1.21	0.00	0.25	1.04	1.67	0.40	1.20	0.80	0.00	L.Quartile
Minimum	0.00	0.25	0.25	5.00	0.00	0.40	1.60	0.40	1.20	0.20	0.00	Minimum
Variance	58222.99	1872556.75	151984.31	0.00	2774.94	10.76	13.97	0.06	0.09	17.19	0.00	Variance
CV	11.57	9.10	4.15	0.00	4.18	1.04	0.93	0.39	0.20	1.27	0.00	CV
Skewness	58.19	13.47	5.51	0.00	15.31	1.21	1.76	0.13	0.22	3.84	0.00	Skewness



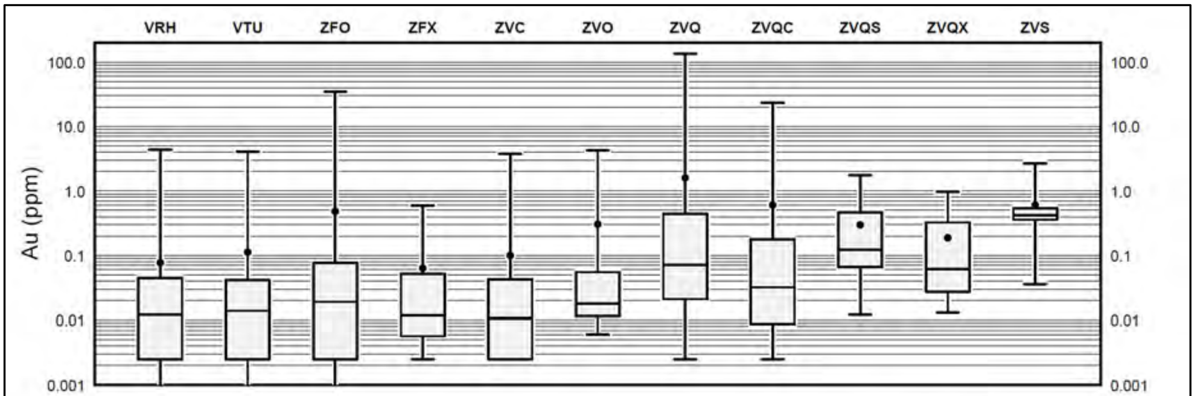
	VRH	VTU	ZFO	ZFX	ZVC	ZVO	ZVQ	ZVQC	ZVQS	ZVQX	ZVS	
No. of data	469	77	296	10	52	7	143	165	18	4	5	No. of data
Mean	14.81	20.12	44.55	6.04	39.92	17.43	195.83	76.92	62.58	17.03	144.86	Mean
Maximum	1585.00	904.00	5260.00	63.30	3020.00	183.00	7920.00	3850.00	250.00	30.00	563.00	Maximum
U.Quartile	7.40	9.13	12.22	1.70	6.55	3.70	60.51	16.29	93.51	28.35	132.48	U.Quartile
Median	1.60	1.93	2.40	1.43	1.10	2.90	9.46	5.07	41.10	17.00	111.81	Median
L.Quartile	0.25	0.30	0.70	0.43	0.59	1.85	3.00	1.21	15.61	6.15	90.47	L.Quartile
Minimum	0.00	0.00	0.25	0.25	0.25	0.25	0.25	0.25	4.70	2.50	18.30	Minimum
Variance	8127.21	7810.37	62319.48	271.96	90162.10	1971.90	807990.00	163475.88	4448.70	136.98	12379.12	Variance
CV	6.09	4.39	5.60	2.73	7.52	2.55	4.59	5.26	1.07	0.69	0.77	CV
Skewness	13.87	8.67	15.46	3.17	9.71	3.35	6.80	8.35	1.47	-0.12	3.13	Skewness

Note: Figure prepared by MTS, 2023.

Figure 14-4: Gold Box Plot by Lithology



	ALL	BXH	BXO	BXT	IAN	IDA	IGR	RCO	RSO	VDA	VOID	
No. of data	6096	156	49	1	4606	6	5	1	2	22	0	No. of data
Mean	0.1521	1.0415	0.6157	0.0310	0.0862	0.0876	0.5730	0.0060	0.0079	0.0324	0.0000	Mean
Maximum	188.5000	188.5000	9.2800	0.0310	16.9000	0.3640	3.6300	0.0060	0.0090	0.7240	0.0000	Maximum
U.Quartile	0.0480	0.2228	0.1490	0.0000	0.0420	0.0890	0.0904	0.0000	0.0090	0.0249	0.0000	U.Quartile
Median	0.0130	0.0470	0.0434	0.0000	0.0120	0.0271	0.0165	0.0000	0.0079	0.0131	0.0000	Median
L.Quartile	0.0025	0.0090	0.0071	0.0000	0.0025	0.0011	0.0135	0.0000	0.0070	0.0080	0.0000	L.Quartile
Minimum	0.0000	0.0025	0.0025	0.0310	0.0000	0.0000	0.0110	0.0060	0.0070	0.0000	0.0000	Minimum
Variance	4.3557	121.4199	3.6342	0.0000	0.2303	0.0142	1.6992	0.0000	0.0000	0.0108	0.0000	Variance
CV	13.7258	10.5803	3.0963	0.0000	5.5652	1.3609	2.2751	0.0000	0.1260	3.2101	0.0000	CV
Skewness	64.8925	15.5443	3.5171	0.0000	21.1987	1.6021	1.9187	0.0000	0.2236	6.3175	0.0000	Skewness



	VRH	VTU	ZFO	ZFX	ZVC	ZVO	ZVQ	ZVQC	ZVQS	ZVQX	ZVS	
No. of data	469	79	296	10	52	7	143	165	18	4	5	No. of data
Mean	0.0770	0.1123	0.4813	0.0635	0.1000	0.3044	1.5990	0.6060	0.2973	0.1878	0.6059	Mean
Maximum	4.3800	4.0700	34.7000	0.5950	3.7400	4.2800	135.5000	23.3000	1.7600	0.9770	2.6800	Maximum
U.Quartile	0.0448	0.0412	0.0762	0.0519	0.0426	0.0550	0.4411	0.1775	0.4640	0.3238	0.5390	U.Quartile
Median	0.0120	0.0138	0.0190	0.0117	0.0106	0.0179	0.0718	0.0320	0.1218	0.0610	0.4186	Median
L.Quartile	0.0025	0.0025	0.0025	0.0057	0.0025	0.0114	0.0210	0.0088	0.0662	0.0274	0.3584	L.Quartile
Minimum	0.0000	0.0000	0.0000	0.0025	0.0025	0.0060	0.0025	0.0025	0.0120	0.0130	0.0360	Minimum
Variance	0.1093	0.1687	7.9186	0.0238	0.1743	0.7927	96.0492	7.0993	0.1809	0.1049	0.3047	Variance
CV	4.2920	3.6579	5.8469	2.4309	4.1745	2.9249	6.1290	4.3971	1.4305	1.7246	0.9110	CV
Skewness	10.3004	7.7473	10.5000	3.0853	7.3914	3.8930	12.1301	7.1744	2.2419	1.9976	3.1567	Skewness

Note: Figure prepared by MTS, 2023.

Table 14-1: Block Model Extents

Vein	Model Parameter	Item	Value
Pertenencia, New, Camila, and Camila HW	Number of blocks	Columns	999
		Rows	610
		Levels	395
	Origin and rotation	Min X	790,885
		Min Y	3,104,590
		Max Z	2,340
		Rotation	None
	Block size	Column size	1 m
		Row size	2 m
		Level size	2 m
Esperanza	Number of blocks	Columns	210
		Rows	160
		Levels	205
	Origin and rotation	Min X	788,630
		Min Y	3,105,610
		Max Z	2,310
		Rotation	None
	Block size	Column size	1 m
		Row size	2 m
		Level size	2 m

Table 14-2: Silver Decile Analysis

Binstart	Binend	Number	Mean	Min	Max	CV	Var	STD	Content
0	100	184	417	1	11,768	2.346	957,063.750	978.296	100
0	10	18	66	1	103	0.140	86.180	9.283	1.592
10	20	14	118	105	129	0.017	4.035	2.009	2.635
20	30	17	137	129	143	0.010	1.799	1.341	3.388
30	40	18	149	143	157	0.008	1.378	1.174	3.452
40	50	12	162	159	166	0.006	0.813	0.902	3.972
50	60	19	183	167	201	0.019	12.394	3.520	4.185
60	70	19	221	202	243	0.018	16.377	4.047	5.374
70	80	21	313	243	391	0.052	260.715	16.147	7.776
80	90	21	535	401	780	0.059	988.786	31.445	13.233
90	100	25	2,258	792	11,768	0.026	51,292.473	226.478	54.393
90	91	1	792	792	792	0.000	0.000	0.000	0.389
91	92	2	813	811	826	0.001	0.247	0.497	2.237
92	93	3	919	892	1,150	0.011	96.801	9.839	3.797
93	94	3	1,317	1,305	1,330	0.001	0.971	0.986	2.848
94	95	3	1,410	1,360	1,470	0.003	18.900	4.347	3.465
95	96	1	1,585	1,585	1,585	0.000	0.000	0.000	2.961
96	97	2	1,668	1,650	1,735	0.002	14.096	3.755	4.755
97	98	1	1,745	1,745	1,745	0.000	0.000	0.000	2.402
98	99	5	2,933	2,360	4,000	0.027	6,115.703	78.203	10.383
99	100	4	8,606	6,350	11,768	0.026	51,292.473	226.478	21.155

Note: green cell is outlier capping selection value.

Table 14-3: Gold Decile Analysis

Binstart	Binend	Number	Mean	Min	Max	CV	Var	STD	Content
0	100	944	0.761	0.075	188.500	7.027	28.628	5.351	100.000
0	10	86	0.081	0.075	0.090	0.017	0.000	0.001	1.065
10	20	86	0.098	0.090	0.108	0.017	0.000	0.002	1.291
20	30	87	0.120	0.108	0.131	0.019	0.000	0.002	1.571
30	40	95	0.147	0.131	0.164	0.020	0.000	0.003	1.939
40	50	89	0.187	0.165	0.210	0.024	0.000	0.005	2.443
50	60	89	0.237	0.211	0.265	0.020	0.000	0.005	3.124
60	70	93	0.318	0.266	0.378	0.032	0.000	0.010	4.158
70	80	99	0.463	0.378	0.576	0.043	0.000	0.020	6.130
80	90	102	0.763	0.578	1.025	0.052	0.002	0.040	10.021
90	100	118	5.223	1.030	188.500	0.144	19.288	4.392	68.258
90	91	10	1.091	1.030	1.130	0.003	0.000	0.003	1.347
91	92	14	1.189	1.135	1.240	0.003	0.000	0.003	1.573
92	93	9	1.342	1.305	1.395	0.002	0.000	0.003	1.775
93	94	9	1.468	1.400	1.570	0.003	0.000	0.005	1.774
94	95	12	1.710	1.605	1.835	0.005	0.000	0.008	2.487
95	96	10	1.968	1.850	2.180	0.006	0.000	0.011	2.507
96	97	15	2.780	2.280	3.740	0.017	0.002	0.046	3.629
97	98	12	4.261	3.810	4.970	0.009	0.001	0.038	5.822
98	99	10	6.634	4.970	8.280	0.017	0.012	0.111	8.683
99	100	17	30.438	8.330	188.500	0.144	19.288	4.392	38.661

Note: green cell is outlier capping selection value.

14.7 Composites

Assays were composited to 0.5 m lengths along the drill hole trace honoring the AgEq grade shell vein codes. The last assay within the AgEq vein grade shell was added to the previous composite if its length was <0.25 m. A 0.5 m composite length was chosen to limit the smearing of high-grade values along a larger composite length, allowing uncapped grades to estimate blocks near the drill hole, and allowing a capped grade to be used to estimate blocks further away from the drill hole. One 0.5 m composite length is half the conceptual mining width of 1 m.

Table 14-4 lists statistics from uncapped and outlier-restricted silver composites used in grade estimation. Outlier restriction capped four Pertenencia vein silver composites and one New vein silver composite.

Table 14-5 list statistics from uncapped and outlier-restricted gold composites used in grade estimation. Outlier restriction capped five gold Pertenencia vein gold composites, one New vein gold composite and three Camila HW vein gold composites.

14.8 Variography

Variography analysis on silver and gold produced very poor quality variograms with high nugget values that are unreliable in determining correlation between samples. This is most likely due to the small number of mineralized composites, high sample value variability for silver and gold, and high co-efficient of variation values for silver and gold.

14.9 Estimation/Interpolation Methods

Grade interpolation for silver and gold used an inverse distance weighted (IDW) to the third power (ID3) method to estimate grade into the model blocks. The general strike and dip orientation of the veins was visually determined to determine search ellipse orientation for grade estimation.

Hexagon's MinePlan 3D IDW interpolation program defines a primary search cube originating from the center coordinate of the block that is the target of the grade estimation. The primary search ranges for composite selection for all estimations of silver and gold were set at 200 m east (X), 200 m north (Y), and 200 m in elevation (Z) with no rotations (Table 14-6). A secondary composite search was applied that formed an ellipse within the primary box that allows for azimuth, plunge, and dip rotation and ranges (Table 14-7). Vein azimuths range from 15–33.5º and dips range from 60–71º to the southeast.

A single estimation pass was used to estimate silver and gold in each of three grade shell domains (hanging wall, vein, and footwall), with a minimum of two composites, a maximum of six composites and no more than two composites from a single drill hole. Each block contains fields for vein code, vein volume percentage, and vein grades for silver and gold; hanging wall code, hanging wall volume percentage, and hanging wall grades for silver and gold; and footwall code, footwall percentage, and footwall grades for silver and gold (Figure 14-5).

Table 14-4: Silver Composite Statistics Used in Estimation

Capping	Domain Solid	Number	Mean	Minimum	Maximum	CV	STD	VAR
Uncapped	Pertenencia vein	51	1,031	42	13,704	2.5	2,564	6,573,917
	New vein	35	660	28	7,480	1.9	1,275	1,624,891
	Camila HW vein	15	396	141	1,181	0.7	272	73,872
	Camila vein	84	161	2	1,650	1.7	270	72,928
	Esperanza vein	14	195	39	677	0.9	173	29,818
	Pertenencia hanging wall	22	37	2	201	1.4	51	2,569
	New hanging wall	15	28	3	101	1.1	32	1,024
	Camila HW hanging wall	13	42	2	114	0.8	35	1,205
	Esperanza dilution	17	68	11	147	0.6	42	1,738
	Pertenencia footwall	20	40	4	99	0.9	35	1,191
	Camila HW footwall	14	67	13	148	0.6	42	1,743
Capped (outlier restriction	Pertenencia vein	51	570	42	3,000	1.4	823	676,817
	New vein	35	532	28	3,000	1.2	660	435,992

Note: CV = co-efficient of variation; STD = standard deviation, VAR = variance

Table 14-5: Gold Composite Statistics Used in Estimation

Capping	Domain Solid	Number	Mean	Minimum	Maximum	CV	STD	VAR
Uncapped	Pertenencia vein	51	6.4	0.1	98.3	2.9	18.3	334.9
	New vein	35	5.8	0.1	135.5	3.8	22.3	499.3
	Camila HW vein	15	4.0	0.3	15.7	1.4	5.4	29.4
	Camila Vein	84	1.5	0.0	13.0	1.5	2.4	5.6
	Esperanza Vein	14	2.7	0.1	8.8	1.0	2.5	6.5
	Pertenencia hanging wall	22	0.115	0.1	0.0	0.4	1.0	0.1
	New hanging wall	15	0.136	0.1	0.0	0.4	1.0	0.1
	Camila HW hanging wall	13	0.216	0.2	0.0	0.9	1.3	0.3
	Esperanza Dilution	17	0.3	0.0	1.9	1.3	0.4	0.2
	Pertenencia footwall	20	0.2	0.0	1.3	1.6	0.3	0.1
	Camila HW footwall	14	0.3	0.0	1.3	1.0	0.3	0.1
Capped (outlier restriction	Pertenencia vein	51	2.7	0.1	10.0	1.2	3.1	9.8
	New vein	35	2.2	0.1	10.0	1.1	2.5	6.4
	Camila HW vein	15	3.1	0.8	10.0	1.2	3.7	13.6

Note: CV = co-efficient of variation; STD = standard deviation, VAR = variance

Table 14-6: Primary Search Box

Vein	Strike* (Z rot º)	Pitch* (X rot º)	Dip* (Y rot º)	Y Range (m)	X Range (m)	Z Range (m)
Pertenencia	0.0	0	0	200	200	200
New	0.0	0	0	200	200	200
Camila	0.0	0	0	200	200	200
Camila HW	0.0	0	0	200	200	200
Esperanza	0.0	0	0	200	200	200

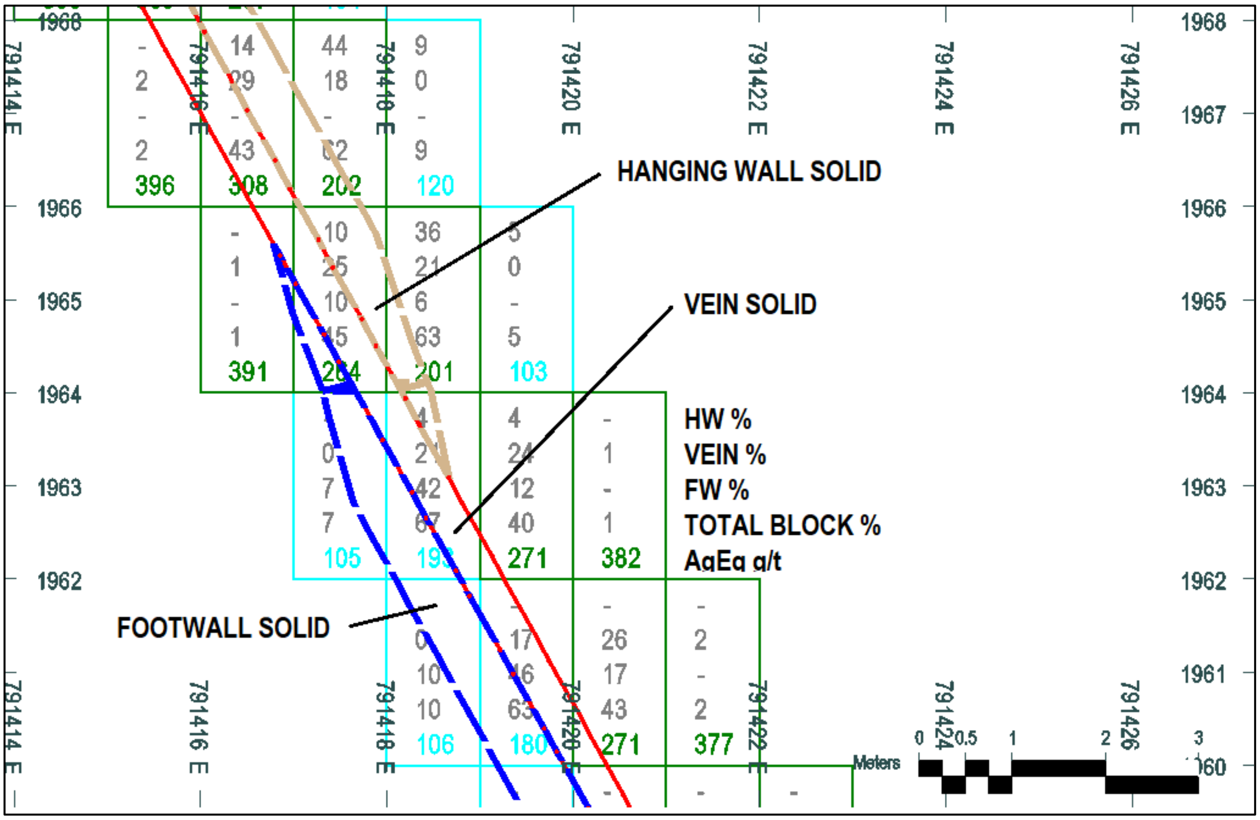
*Rotations are left-, right-, left-hand rule

Table 14-7: Secondary Search Ellipse

Vein	Strike* (Z rot º)	Pitch* (X rot º)	Dip* (Y rot º)	Y Range (m)	X Range (m)	Z Range (m)
Pertenencia	30.0	0	-70	200	200	100
New	25.0	0	-70	200	200	100
Camila	33.0	0	-60	200	200	100
Camila HW	33.5	0	-69	200	200	100
Esperanza	15.0	0	-71	200	200	100

*Rotations are left-, right-, left-hand rule

Figure 14-5: Pertenencia Vein Section 3105250N (east–west)



Note: Figure prepared by MTS, 2023. Pertenencia vein with hanging wall and footwall solids and resource model blocks displaying volume percent tagged from the solids.

Post-grade estimation processing was run to combine these volumes and grades into a single minable mineralized volume, an overall block silver grade, and an overall block gold grade. A block AgEq grade was calculated from the estimated block silver and gold values.

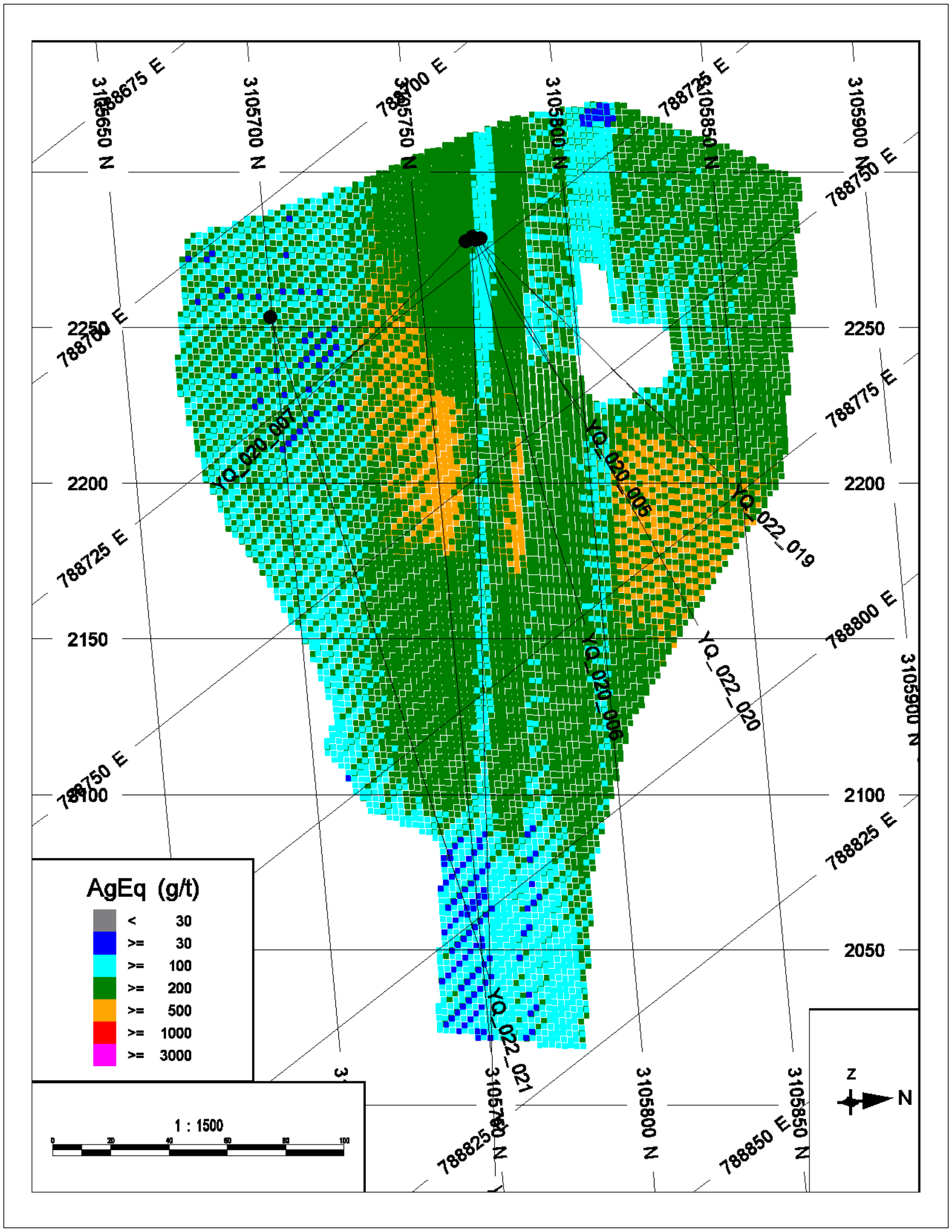
Figure 14-6 to Figure 14-10 show AgEq block grades through the Esperanza, Camila and Pertenencia veins.

14.10 Block Model Validation

Validation consisted of visual, statistical and alternative estimation methods.

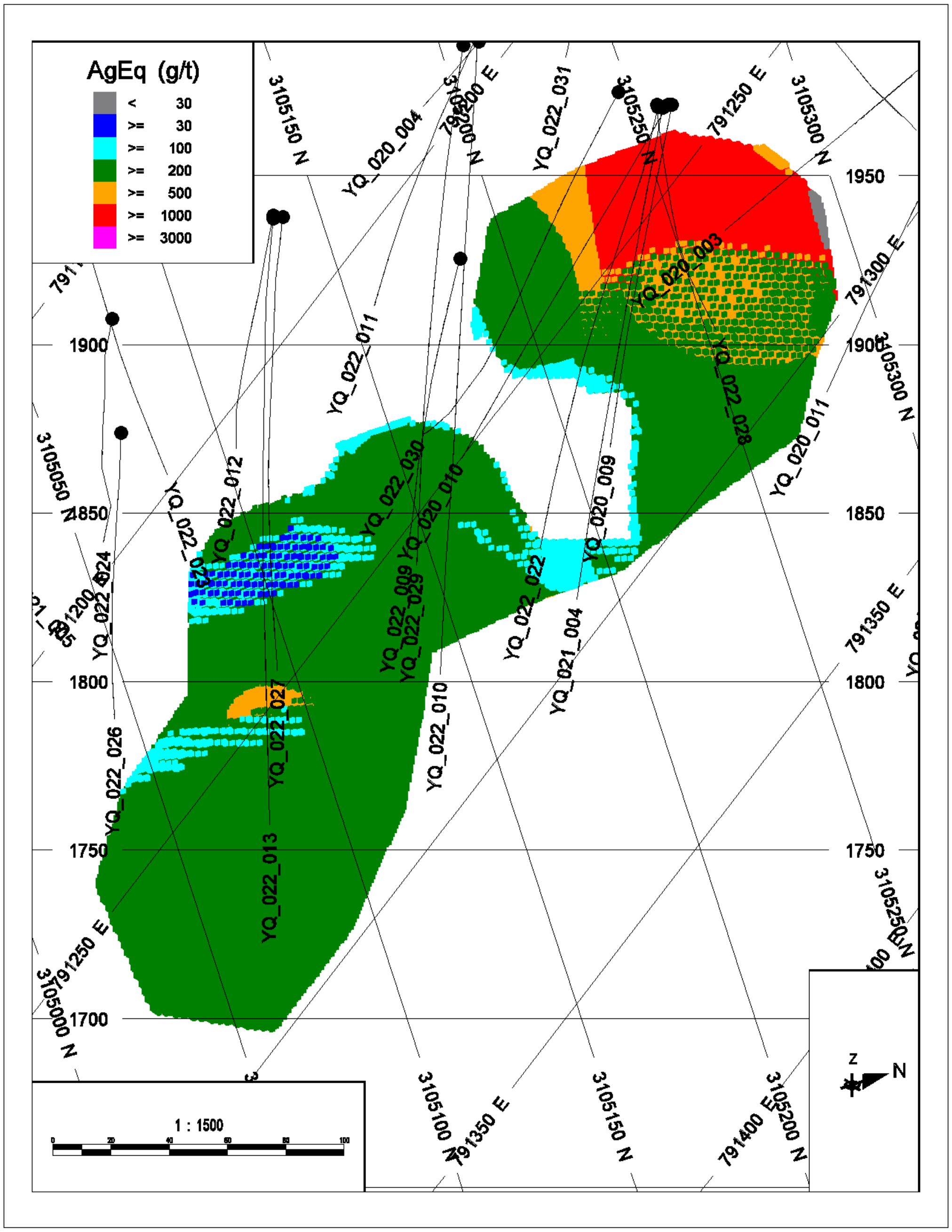
Silver and gold grades were visually inspected using cross sections and plans. Block grades from the ID3 estimate were compared to the composite grades and the comparisons looked reasonable (Figure 14-11).

Figure 14-6: Esperanza Vein Showing AgEq Block Grades (long section)



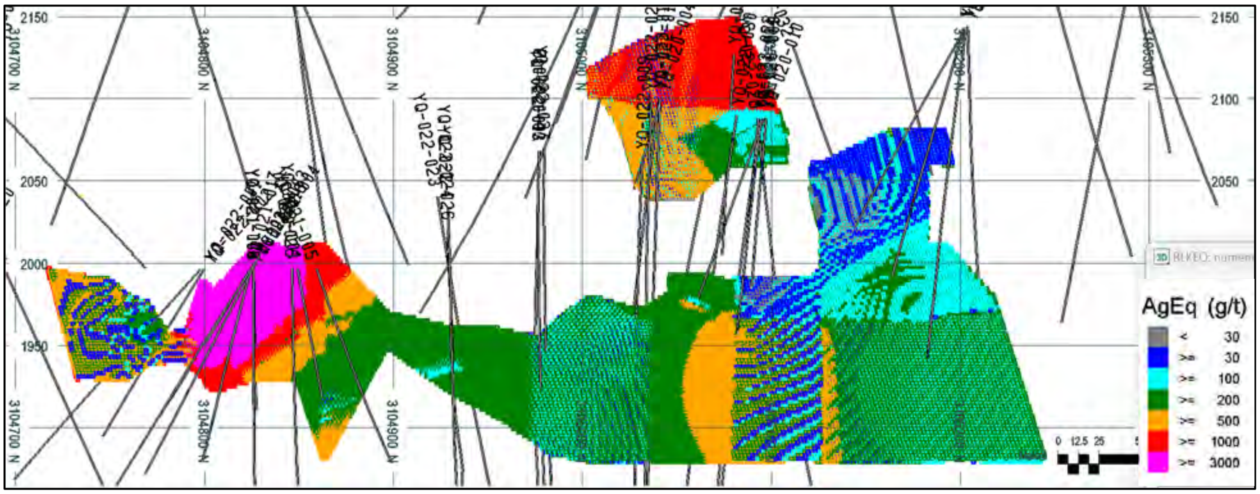
Note: Figure prepared by MTS, 2023. Section 1. Figure looks east–northeast.

Figure 14-7: Camila Vein Showing AgEq Block Grades (long section)



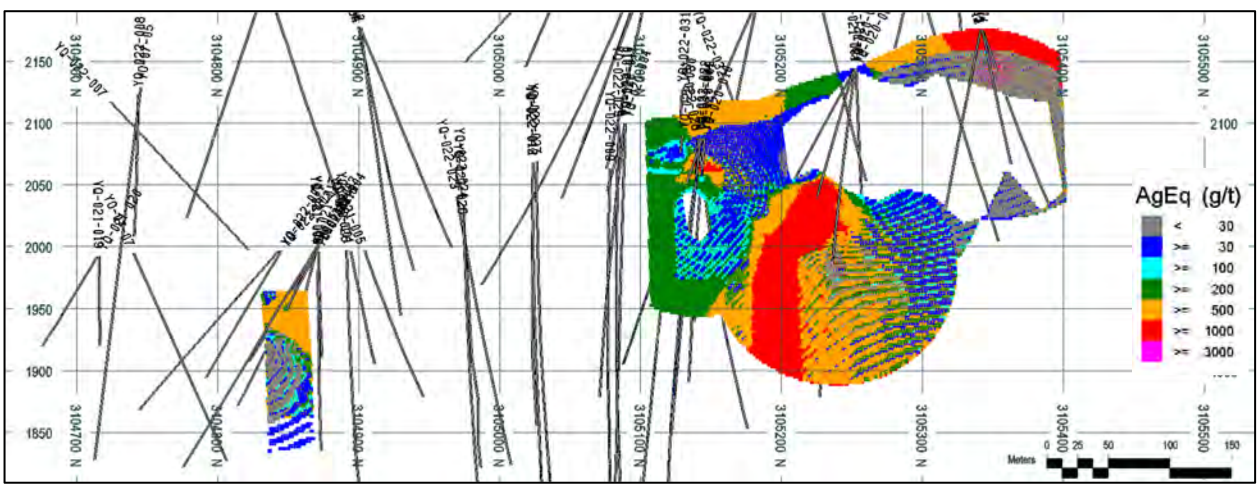
Note: Figure prepared by MTS, 2023. Section 4. Figure looks northeast.

Figure 14-8: Pertenencia Vein Showing AgEq Block Grades (long section)



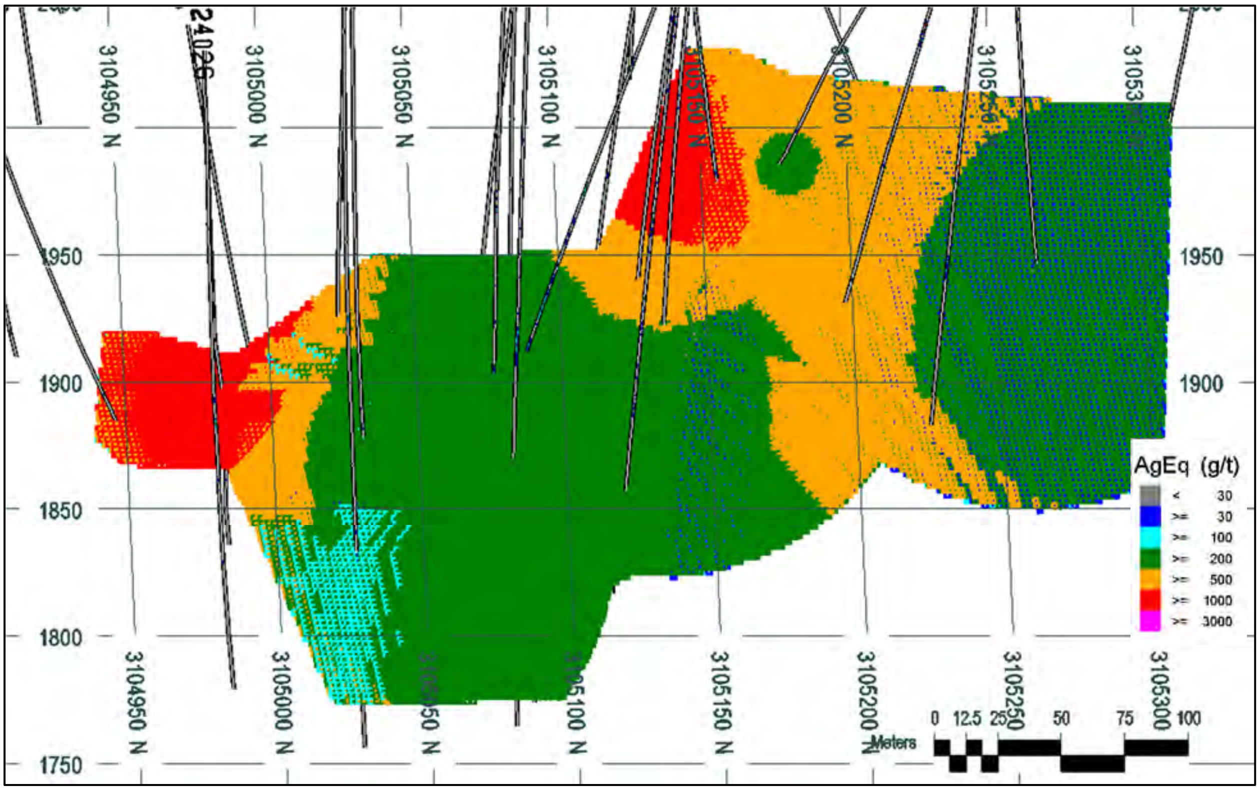
Note: Figure prepared by MTS, 2023. Figure looks northwest.

Figure 14-9: New Vein Showing AgEq Block Grades (long section)



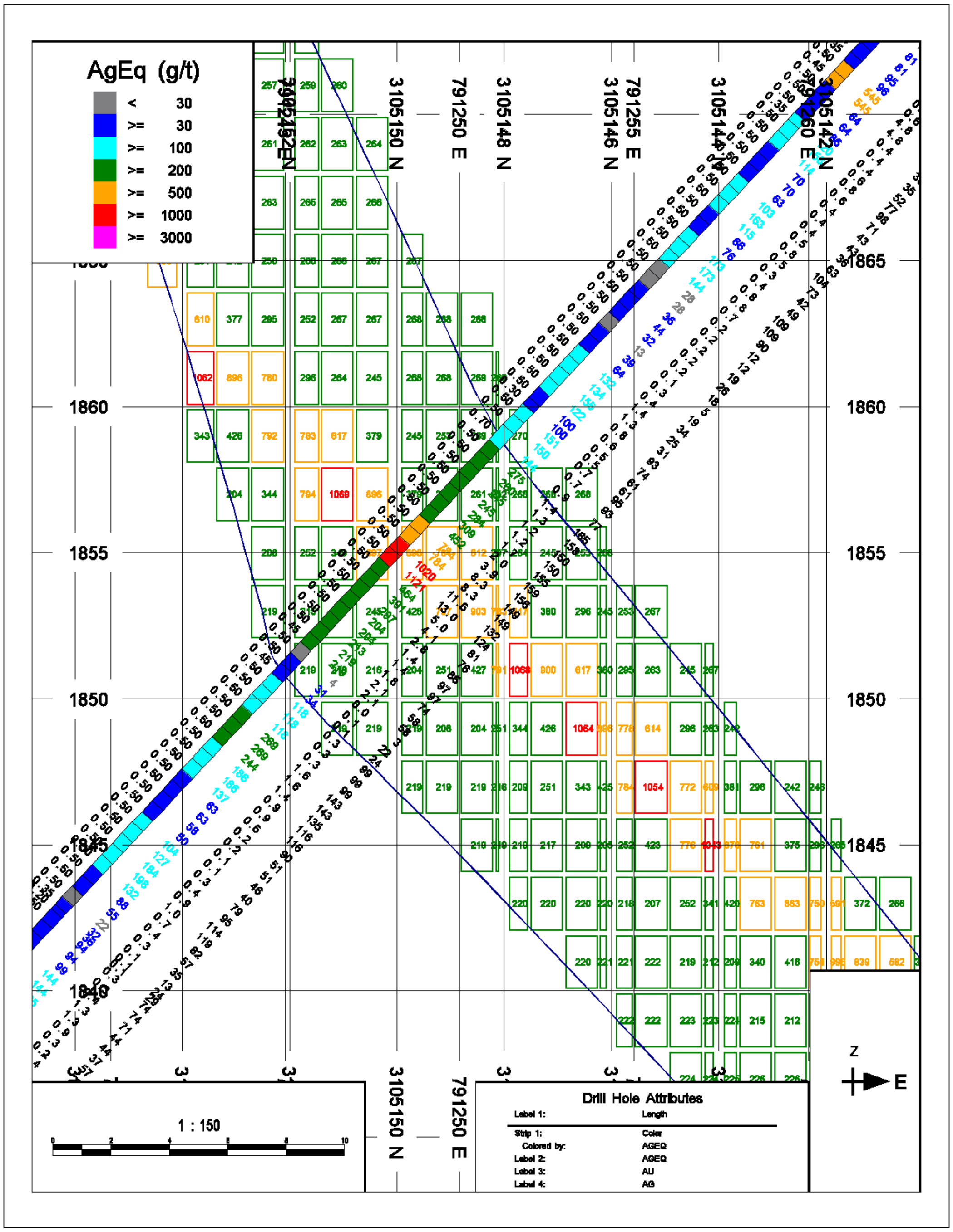
Note: Figure prepared by Mine Technical Services Ltd, 2023. Figure looks northwest.

Figure 14-10: Camila HW Vein Showing AgEq Block Grades (long section)



Note: Figure prepared by Mine Technical Services Ltd, 2023. Figure looks northwest.

Figure 14-11: Example Cross-Section, Camila Vein, Showing Block Model and Composites



Note: Figure prepared by Mine Technical Services Ltd, 2023.

A declustered composite distribution for silver and gold was completed by creating a nearest-neighbour (NN) model. The model was then compared to the ID3 block model to check for global bias. The NN model used the same block size of 1 m x 2 m x 2 m as the ID3 model. Nearest neighbour grade interpolation also honoured the outlier grade restrictions as applied to the ID3 silver and gold models.

The silver and gold models were checked for global bias by comparing the means of the ID3 model with means from the NN model. The NN model theoretically produces an unbiased estimate of the average grade value at a zero cut-off grade. For Measured and Indicated Mineral Resources, a relative percentage value of <5% difference between the means is an acceptable result and demonstrates a reasonable estimation of the global mean. With Inferred Mineral Resources, a higher percent relative difference of 10–15% is acceptable.

Table 14-8 shows relative percent differences between ID3 and NN average grades for silver for modeled veins. Results range between 6–11%, and are considered to be globally unbiased.

Table 14-9 lists the percent relative difference for gold. Percent relative differences between ID3 and NN mean grade range from 6–13%, and are considered to be globally unbiased.

14.11 Classification of Mineral Resources

Resource model blocks were classified as Inferred Mineral Resources where they were within 50 m laterally or 100 m downdip from the nearest drill hole, and a potentially mineable area of mineralization grading ≥200 g/t AgEq (Figure 14-12).

14.12 Reasonable Prospects of Eventual Economic Extraction

Blocks that have reasonable prospects for eventual economic extraction were assessed by applying a minimum mining width of 1 m and an underground mining AgEq cut-off grade. An AgEq cut-off grade of ≥200 g/t was calculated using the following assumptions:

- Long-range gold price guideline for cash-flow models in US$ plus 15%, which equated to a silver price of US$24/oz and a gold price of US$1,840/oz;
- Mining by traditional cut-and-fill methods;
- Silver and gold metallurgical recovery assumption of 85%;
- Average mining cost of US$75/t;
- Processing and general and administrative (G&A) costs of US$50/t;
- Silver and gold royalty of 2%;
- Transportation and selling cost for silver of US$0.95/oz and gold of US$15/oz.

The QP is of the opinion that there are reasonable prospects for eventual economic extraction for mineralized material ≥200 g/t AgEq that displays geological and grade continuity.

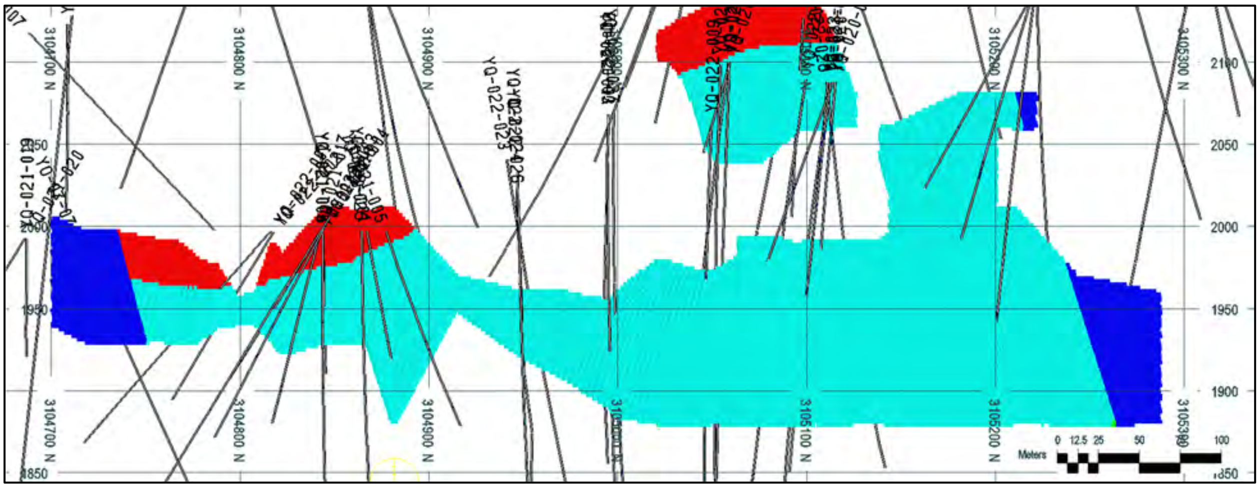
Table 14-8: Global Bias Check, Silver

Vein	Tonnes	Mean Ag Grade of IDW Model (g/t Ag)	Mean Ag Grade of NN Model (g/t Ag)	Relative Percent Difference (%)
Esperanza	67,744	215	213	1
Camila	293,782	333	368	10
New	93,423	703	752	7
Pertenencia	198,820	757	819	8
Camila HW	127,953	373	336	11

Table 14-9: Global Bias Check, Gold

Vein	Tonnes	Mean Au Grade of IDW Model (g/t Au)	Mean Au Grade of NN Model (g/t Au)	Relative Percent Difference (%)
Esperanza	67,744	2.89	2.61	11
Camila	293,782	1.98	2.13	7
New	93,423	1.91	1.69	13
Pertenencia	198,820	3.56	3.77	6
Camila HW	127,953	2.35	2.11	11

Figure 14-12: Pertenencia Vein and Pertenencia Crown Pillar (long section)



Note: Figure prepared by MTS, 2023. Figure looks northwest. Inferred Mineral Resources in cyan (within 100 m downdip and <50 m laterally from last drill hole) for Pertenencia. Red shows the Inferred Mineral Resources within the Pertenencia crown pillar. Blue blocks are unclassified, as they are >50 m laterally along strike from the last drill hole.

14.13 Mineral Resource Statement

Mineral Resources take into account geologic, mining, processing and potential economic constraints, and have been confined within appropriate underground mining widths and therefore are classified in accordance with the 2014 CIM Definition Standards.

The Qualified Person for the Mineral Resource estimate is Edward J.C. Orbock III, RM SME, an Associate Principal Geologist with MTS.

Mineral Resources are reported at a silver price of US$24/oz and a gold price of US$1,840/oz and have an effective date of 24 February, 2023.

Mineral Resources are stated, on an insitu basis, in Table 14-10, using cut-off grades appropriate for underground mineralization.

Table 14-10: Yoquivo Inferred Mineral Resource Statement

Vein	Area	Tonnes	Ag Grade (g/t)	Au Grade (g/t)	Silver Equivalent Grade (g/t AgEq)	Contained Ag (koz)	Contained Au (koz)	Contained Silver Equivalent (koz)
Pertenencia	Vein	220,000	510	2.6	710	3,620	18	5,010
	Crown pillar	24,000	1,680	6.2	2,160	1,310	5	1,690
	Subtotal	*244,000*	*630*	*2.9*	*850*	*4,930*	*23*	*6,690*
Camila	Vein	285,000	330	2.0	490	3,070	18	4,470
	Subtotal	*285,000*	*330*	*2.0*	*490*	*3,070*	*18*	*4,470*
Camila hanging wall	Vein	170,000	300	1.8	440	1,610	10	2,370
	Subtotal	*170,000*	*300*	*1.8*	*440*	*1,610*	*10*	*2,370*
New	Vein	103,000	580	1.4	690	1,920	5	2,280
	Crown pillar	15,000	420	2.2	590	210	1	290
	Subtotal	*118,000*	*560*	*1.6*	*680*	*2,130*	*6*	*2,570*
Esperanza	Vein	98,000	150	1.9	300	480	6	940
	Crown pillar	22,000	130	1.8	270	90	1	190
	Subtotal	120,000	*150*	*1.8*	*290*	*570*	*7*	*1,130*
Total		***937,000***	***410***	***2.1***	***570***	***12,300***	***64***	***17,230***

Notes to accompany Mineral Resource table:

1. Mineral Resources have been classified using the 2014 CIM Definition Standards, and have an effective date of 24 February, 2023.
2. The Qualified Person for the resource estimate is Edward J.C. Orbock III, RM SME, an Associate Principal Geologist with MTS.
3. Mineral Resources assume a traditional underground cut-and-fill mining method; a silver price of US$24/oz, a gold price of US$1,840/oz, a minimum mining width of 1 m; assumed silver and gold metallurgical recovery of 85%; an average mining cost of US$75 /t mined; average processing and general and administrative cost of US$50/t processed; transportation and selling cost of US$0.95/oz Ag and US$15/oz Au; and a gold and silver royalty of 2%.
4. Mineral resources are reported insitu above a cut-off grade of 200 g/t silver equivalent (AgEq), where AgEq = Ag g/t + Au g/t * (1,840/24), where 1,840 is the gold price per ounce in US$, and 24 is the silver price per ounce in US$.
5. All tonnage, grade and contained metal content estimates have been rounded; rounding may result in apparent summation differences between tonnes, grade, and contained metal content.

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

Factors which may affect the Mineral Resource estimates include:

- Metal price and exchange rate assumptions;
- Changes to the assumptions used to generate the silver equivalent 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;
- Density and domain assignments;
- Changes to geotechnical, mining and metallurgical recovery assumptions;
- Changes to the input and design parameter assumptions that pertain to the underground mining assumptions used to constrain the estimates;
- Assumptions as to the continued ability to access the site, complete proposed exploration programs, and maintain the social license to operate.

A portion of the vein systems at Yoquivo have been the subject of historical mining. The majority of the historical mining has been conducted on the San Francisco vein system, but there is evidence that some historical mining has occurred on the Pertenencia and Esperanza vein systems. There is no evidence for mining on the Camila and Camila HW vein systems. There are some small prospect pits on the New vein system but no evidence of any historical mining.

Golden Minerals' drilling in the upper part of the Pertenencia vein system encountered old workings in some of the drill holes. Adjacent drill holes located <10 m away from those drill holes did not intersect workings, suggesting that the workings are small and erratic, and may represent development on the vein rather than large areas of stoping.

The QP's personal inspection indicated, for the workings visited, that the excavations appear minimal based on the size of the dumps associated with the portals/trenches. To the knowledge of Golden Minerals personnel, underground mapping was not conducted on the majority of the workings; the Creel zone of the San Francisco veins is an exception. No maps are currently available for the workings that are present in the area of the Mineral Resource estimate. The Mineral Resource estimate does not include any depletion due to historical mining. There is a risk, when excavation data are available, that some of the area included in the Mineral Resource estimate may have been historically mined out.

15.0 MINERAL RESERVE ESTIMATES

This section is not relevant to this Report.

16.0 MINING METHODS

This section is not relevant to this Report.

17.0 RECOVERY METHODS

This section is not relevant to this Report.

18.0 PROJECT INFRASTRUCTURE

This section is not relevant to this Report.

19.0 MARKET STUDIES AND CONTRACTS

This section is not relevant to this Report.

20.0 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

This section is not relevant to this Report.

21.0 CAPITAL AND OPERATING COSTS

This section is not relevant to this Report.

22.0 ECONOMIC ANALYSIS

This section is not relevant to this Report.

23.0 ADJACENT PROPERTIES

This section is not relevant to this Report.

24.0 OTHER RELEVANT DATA AND INFORMATION

This section is not relevant to this Report.

25.0 INTERPRETATION AND CONCLUSIONS

25.1 Introduction

The QPs note the following interpretations and conclusions in their respective areas of expertise, based on the review of data available for this Report.

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

Legal opinion supports that the mineral tenure is valid.

Surface rights negotiated in 2018 were sufficient to allow exploration activities. Golden Minerals is currently negotiating a new access agreement with the ejido to allow a continuation of exploration activities.

Water used in the exploration programs is purchased from the San Francisco de Yoquivo ejido.

Third-party NSR royalties are payable on all of the concessions, and range from 2–3%.

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

25.3 Environmental, Permitting and Social Considerations

Environmental impacts within the Project site primarily result from historical activities. A site visit, conducted by SEMARNAT as part of the permit application in 2017 determined that the surface disturbances caused by historical mining activities were "not significant", and Golden Minerals is not liable for any rehabilitation of those surface disturbances.

Gambusinos have been extracting small amounts of material from the Creel level of the San Francisco vein system, and removing small historical mine dumps from the Project during Golden Minerals' tenure ownership. Those impacts have been identified and documented by Golden Minerals' staff. There is an expectation that Golden Minerals is not responsible for the current gambusino activity, as material is being removed from the Project area and processed at a toll mill outside the Project area, so there are no waste rock or tailings being generated within the Project boundaries.

An Informe Preventivo is in force for the area of the Yoquivo ejido that allows Golden Minerals to conduct drilling activities.

Golden Minerals, through Minera de Cordilleras, has written permission from the surface landowners to complete exploration on the Project.

25.4 Geology and Mineralization

The mineralization types within the vein systems at Yoquivo are examples of low-sulphidation systems.

The QP is of the opinion that the understanding of the geology and mineralization of the Yoquivo deposit is sufficient to support Mineral Resource estimation.

Golden Minerals' geologists believe that there is good potential to discover additional high-grade gold–silver mineralization on the northern part of the Pertenencia vein system as well as on the San Francisco and Esperanza vein systems.

Additional potential remains in the Dolar, Esperanza, Verde, La Texana and La Trucha vein systems, which are generally under-explored. The northwestern and southwestern Project extents have potential to host vein systems within andesite lithologies.

25.5 Exploration, Drilling and Analytical Data Collection in Support of Mineral Resource Estimation

Exploration programs that use an epithermal model to guide the drilling and exploration programs are appropriate for the Project area.

Exploration programs conducted to date have identified a number of areas with gold–silver mineralization within the Project area.

The quantity and quality of the lithological, RQD, collar and downhole survey data collected in the exploration and infill drill programs completed by Golden Minerals are sufficient to support Mineral Resource estimation.

The quality of the analytical data is sufficiently reliable to support Mineral Resource estimation.

The data verification programs undertaken on the data collected from the Project adequately support the geological interpretations, the analytical and database quality, and therefore support the use of the data in Mineral Resource estimation.

25.6 Metallurgical Testwork

Metallurgical testwork on the Yoquivo deposit and associated analytical procedures were performed by a mine laboratory operated by Golden Minerals that is not independent.

Testwork included creating composites; conducting head assays for gold, silver, cyanide soluble gold, and cyanide soluble silver; conducting bench top duplicate agitated leach tests; and flotation tests.

Recoveries of 85% for gold and silver were recommended for use in assessing reasonable prospects of eventual economic extraction when performing the Mineral Resource estimate. Thus far the completed metallurgical tests are sufficient to be indicative of potential recoverability of the gold and silver mineralization to support Inferred Mineral Resource estimates.

Insufficient samples have been conducted to qualify for variability testing.

No testwork has been conducted to determine if deleterious elements are present in sufficient quantities to impact the ability to produce, process, and sell a concentrate or that would increase the processing cost of either a leach circuit or a flotation circuit.

25.7 Mineral Resource Estimates

Mineral Resources are reported using the 2014 CIM Definition Standards, and assume underground cut-and-fill mining methods.

Factors that may affect the Mineral Resource estimate include: metal price and exchange rate assumptions; changes to the assumptions used to generate the silver equivalent grade 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; density and domain assignments; changes to geotechnical, mining and metallurgical recovery assumptions; changes to the input and design parameter assumptions that pertain to the underground mining assumptions used to constrain the estimates; and assumptions as to the continued ability to access the site, complete proposed exploration programs, and maintain the social license to operate.

A portion of the vein systems at Yoquivo have been the subject of historical mining. The majority of the historical mining has been conducted on the San Francisco vein system, but there is evidence that some historical mining has occurred on the Pertenencia and Esperanza vein systems. There is no evidence for mining on the Camila and Camila HW vein systems. There are some small prospect pits on the New vein system but no evidence of any historical mining.

Golden Minerals' drilling in the upper part of the Pertenencia vein system encountered old workings in some of the drill holes. Adjacent drill holes located <10 m away from those drill holes did not intersect workings, suggesting that the workings are small and erratic, and may represent development on the vein rather than large areas of stoping.

The QP's personal inspection indicated, for the workings visited, that the excavations appear minimal based on the size of the dumps associated with the portals/trenches. To the knowledge of Golden Minerals personnel, underground mapping was not conducted on the majority of the workings; the Creel zone of the San Francisco veins is an exception. No maps are currently available for the workings that are present in the area of the Mineral Resource estimate. The Mineral Resource estimate does not include any depletion due to historical mining. There is a risk, when excavation data are available, that some of the area included in the Mineral Resource estimate may have been historically mined out.

25.8 Risks and Opportunities

25.8.1 Risks

Risks at this stage of Project development primarily relate to the ability to continue good relations with the local ejidos such that surface rights and access to water for drill programs can continue.

Metallurgical tests completed to date are sufficient to indicate the potential recoverability of silver and gold to support Inferred Mineral Resource estimates. However, more detailed investigations, including variability tests, may result in changes to the assumed metallurgical recoveries used to support the estimate. No testwork has been completed as to whether potentially deleterious elements are present in the mineralization.

25.8.2 Opportunities

Opportunities include the upside potential represented by the northern part of the Pertenencia vein system as well as on the San Francisco and Esperanza vein systems. The Project area retains significant grassroots exploration potential represented by areas under volcanic cover rock, and the possibility of extensions to known vein systems.

The selection of the mining method used when assessing reasonable prospects of eventual economic extraction is based on limited information; more data including geotechnical data may allow use of different methods than the traditional cut-and-fill method assumed, which may result in additional mineralization able to be mined.

25.9 Conclusions

Under the assumptions in this Report, the estimation of Inferred Mineral Resources can be supported.

The Project shows good potential to discover additional high-grade gold–silver mineralization in the following areas:

- Northern part of the Pertenencia vein system;
- San Francisco and Esperanza vein systems.

Additional exploration is warranted on the Dolar and San Antonio vein systems.

The potential of the Verde, La Texana and La Trucha veins is unknown, but may warrant a small drill program to test potential at depth.

The northwestern and southwestern Project extents, where limited mapping has been conducted and there are outcropping andesites below the upper volcanic ignimbrites and tuffs, may have potential to host veins within the andesite lithologies. There is also potential for the known veins to continue into these areas.

26.0 RECOMMENDATIONS

26.1 Introduction

A two-phase work program is recommended. The first phase should include rehabilitation of the existing artisanal mine workings at Pertenencia, mapping and sampling of those workings once accessible, and additional drill testing and metallurgical testwork at Pertenencia, culminating in an updated Mineral Resource estimate. The second phase, which is dependent on the results of the first phase, would include a reconnaissance geological mapping and sampling program, and infill and step-out drilling at Pertenencia, and drill testing of the Esperanza, Dolar, and San Francisco vein systems. The first work phase is estimated to require a budget of approximately US$1.8 M to complete. The proposed budget for the second phase is approximately US$2.4 M.

26.2 Phase 1

Golden Minerals is planning to conduct an additional exploration and drilling program to expand and further define the extent of the mineralization within the Pertenencia vein system. Proposed activities include:

- Rehabilitation of the artisanal mine workings to determine their extents and location and extents of historical stopes to identify location and controls on mineralization;
- Completion of geological, structural, alteration and mineralization mapping within the artisanal mine workings;
- Completion of a 10,000 m surface drill program to identify additional mineralization within the Pertenencia vein system;
- Completion of metallurgical and comminution testwork:
    - Determine if metallurgical responses differ between the different veins or if other metallurgical domains exist within the Yoquivo deposit;
    - Complete crushing, grind work index, and abrasion tests on a variety of samples to establish the ranges of hardness and wear that should be expected during processing;
    - Investigate the impact of grind size on both leach and flotation recoveries;
    - Perform multielement and mineralogy analysis to determine if deleterious elements are present that could significantly affect the process or product saleability;
    - Complete additional flotation tests focusing on aspects such as reagent optimization, cleaner tests, cleaner concentrate processing, leach retention times, variability tests, dewatering tests.

Once all data are available and applicable data verification has been completed, a resource estimate update should be undertaken.

The drill program assumes an all-in cost of US$160/m, inclusive of drilling, assaying and support costs. The metallurgical program is estimated at US$60,000. The updated resource estimate is budgeted at US$125,000.

The overall budget required to complete the phase 1 recommendations totals approximately US$1.8 M.

26.3 Phase 2

The proposed second work phase is dependent on the results of the first phase. If conducted, the suggested program would include:

- Conduct a 4,000 m surface infill and step-out drill program at the Pertenencia vein system;
- Construct required additional road access to support planned drilling and exploration activities;
- Complete an 11,000 m surface drill program to explore for mineralization on the Esperanza, Dolar, and San Francisco vein systems;
- Undertake a reconnaissance geological mapping and sampling program to evaluate the bedrock exposures and determine if veins, stockworks, and mineralization are present in the northwestern and southwestern Project area.

The drill program assumes an all-in cost of US$161/m, inclusive of drilling, assaying and support costs.

The overall budget required to complete the phase 2 recommendations totals approximately US$2.4 M.

27.0 REFERENCES

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