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Preliminary Economic Assessment Update

Rodeo Project | Durango State, Mexico

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APPENDICES

APPENDIX A: Drill Hole Locations
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ACRONYMS/ABBREVIATIONS

Acronym/Abbreviation	Definition
µm	Micron
3D	Three dimensional
cm	Centimeter
ft.	Feet
g	Gram
g/t	Grams/tonne
ha	Hectare
in.	Inch
k	Thousand
kg	Kilogram
km	Kilometer
kt	Thousand tonnes
KW	Kilowatt
kWh	Kilowatt-hour
LOM	Life of mine
m	Meter
M	Million
mm	Millimeters
Mt	Million tonnes
MXN	Mexican Pesos
mya	Million years ago
NPV	Net present value
NSR	Net smelter return
oz.	Troy Ounce
PEA	Preliminary Economic Assessment
QA/QC	Quality assurance/quality control
QP	Qualified Person
ROM	Run of mine
RQD	Rock Quality Designation
st	Short ton
t	Tonnes
tpd	Tonnes per day
USD	United States Dollars
yr	Year

1. SUMMARY

This Preliminary Economic Assessment (PEA) technical report has been prepared for the Golden Minerals Company (Golden Minerals) for their Rodeo project (the Project) located in the State of Durango, Mexico. The Project consists of an open pit mine that is held by Minera de Cordilleras S.A. de R.L. de C.V. (Minera Cordilleras), and an oxide processing plant (Plant 2) that is held by Minera William S.A. de R.L. de C.V. (Minera William). Both Minera Cordilleras and Minera William are wholly owned subsidiaries of Golden Minerals.

The Rodeo mining property consists of a historical mining district that has been partially developed by prospectors and explored by several mining corporations until its acquisition by Golden Minerals in 2015.

This report updates a PEA prepared by Mineral Resources Engineering entitled *NI 43-101 Technical Report: Preliminary Economic Assessment, Rodeo Project, Rodeo, Durango, Mexico*, with an effective date of April 1, 2020, and an issue date of May 27, 2020. This report incorporates additional exploration, Mineral Resource, and economic data generated by Golden Minerals. The Project began production operations without declared Mineral Reserves in January 2021.

1.1 Location, Property Description, and Ownership

The Rodeo Project is located 2 km east of the town of Rodeo in Durango State, Mexico, at latitude 25°9'2.7"N, longitude 105°31'4.2"W (WGS84) as shown in **Figure 1-1**. Full services are available in the large regional cities of Torreón (189 km to the east) and Durango (157 km to the south), with basic amenities available in the town of Rodeo.

Figure 1-1: Rodeo Project location map

The Project contains two mineral concessions totaling 1,865.7 hectares. The Rodeo R1 concession, which contains the open pit, is held under a purchase agreement subject to royalty payments with La Cuesta International S.A. de C.V., a wholly owned subsidiary of La Cuesta International, Inc. (La Cuesta). The Rodeo 2 concession was purchased by Minera Cordilleras from Rojo Resources and is wholly owned by Golden Minerals. Surface rights to the concessions are held by ejidos (rural agricultural cooperatives) and private landowners. Access to the concession areas is through surface rights agreements with the Francisco Márquez Ejido and the private owner of the Rancho La Pequeña. These agreements were formalized before a notary and are in good standing.

1.2 Geology and Mineralization

The following description of the deposit geology is modified from a 1997 non-public report by Hillemeyer and Durning for La Cuesta.

At the Rodeo Project, the Rodeo fault system consists of three major parallel shear zones and wall-rock fracture systems that are the principal feeder conduits for a high-level, Au-Ag epithermal mineral system. These major vein-filled structures appear to be feeder conduits responsible for the 1 km x 4 km area of silicified, clay altered, and Au anomalous rocks forming resistant NNW-trending ridges at the Rodeo Project. All three of the structures are wide, laterally persistent, well-developed feeder vein swarms with high-level, locally banded agate to chalcedonic quartz veins, stockworks and silicified breccias. In the area of principal interest, the structures are strongly veined, silicified, brecciated, and mineralized for over 4 km, and the shear zones and hydrothermal system can be traced for 8 km on the property. Individual feeder vein and breccia systems are up to 60 m thick. Flexures in the vein swarms and/or structural intersections provide brecciation and open conduits for intense, episodic fluid flow and silica deposition with the potential for ore-grade concentrations of precious metals, especially Au.

The immediate Rodeo deposit area is approximately 300 m along strike and 200 m wide and extends to a depth of 200 m below surface. The deposit strikes at 330° and dips to the ENE with various vein phases dipping from sub-vertical to 30°. The deposit is entirely hosted within Tertiary Rodeo volcanics that are strongly silicified and brecciated. The deposit is bound to the East by the Rodeo fault; however, drilling to date has not demonstrated that the deposit reaches or is truncated by the fault. Along strike to the north and south, the mineralization is offset slightly by near vertical faulting; mineralization does not terminate at these faults, but the intensity of the trend is either diminished or has yet to be located.

1.3 Exploration, Drilling, Sampling, and QA/QC

Exploration activities conducted by Golden Minerals consist of surface mapping, trench and surface sampling, topography surveys, a regional ASTER survey, and four drilling campaigns.

Eleven trench samples have been completed since 2015 and cut perpendicular to the strike of the Rodeo deposit. The project database contains 199 exploration drill holes, totaling 20,918 m, drilled from 1995 to 2021. Of the total, 13,083 m were drilled using diamond drilling core (DD) equipment, and 7,835 m with reverse circulation rotary (RC) equipment. **Table 1-1** summarizes the project drilling by company, year, and type.

Table 1-1: Project drilling by company and type

Company	Year	Type	Length (m)
Monarch Resources	1995	RC	2,251
Canplats Resources Corp.	2004	RC	2,396
Canplats Resources Corp.	2007	DD	1,034
Camino Minerals Corp.	2011	DD	6,090
Minera Cordilleras	2016	DD	2,084
Minera Cordilleras	2020	DD	1,414
Minera Cordilleras	2021	RC	3,187
Minera Cordilleras	2021	DD	2,462
Total			20,918

1.3.1 QA/QC

Golden Minerals' quality assurance (QA) measures involve the use of standard practice procedures for sample collection for drill core/RC, channel, surface and blastholes samples as described above; and include oversight by experienced geologic staff during the data collection process. Quality control (QC) measures implemented by Golden Minerals include in-stream sample submittal of standard reference material, blank material, and duplicate sampling.

1.4 Mineral Processing and Metallurgical Testing

Two metallurgical studies have been performed on mineralized material from the Rodeo Project: A study by Process Research Associates Ltd. (PRA) of Vancouver, BC, Canada in 2011, and a study by Resource Development Inc. (RDi) of Lakewood, Colorado USA in 2017. Both laboratories are independent of Golden Minerals. Both PRA and RDi found that the material was not amenable to a heap leach process, but showed positive results from an agitated leach process.

Golden Minerals' Plant 2 is in Velardeña, Durango, approximately 115 km from the Rodeo mine. The plant has a design capacity of 550 tpd of oxide material. The plant is a typical agitated leach processing facility with 84 hours of retention time in the agitation circuit. The plant also includes a refinery that has sufficient capacity to accommodate Rodeo's required doré production.

Golden Minerals demonstrated recovery of Au and Ag from Rodeo mineralized material at Plant 2 in 2021. Installation of an additional ball mill has provided the ability to process material with varying degrees of hardness at 520 tpd.

Gold (Au) and Silver (Ag) recoveries of 80% have been used for this PEA. These recovery values are based on achieving an overall grind of P_{80} 325 mesh (80% passing 325 mesh).

1.5 Mineral Resource Estimation

Resources have been estimated for the Rodeo deposit using a block model rotated to fit the deposit strike. Three grade domains were modeled at a grade of 1.6 g/t Au for the high-grade domain, 1.0 g/t Au for the low-grade domain, and 0.15 g/t Au for the mineralized domain. The block model estimation for Au and Ag grades was completed using ordinary kriging (OK). Data was flagged by domain and a soft boundary was used between the high-grade and low-grade domains, as well as the low-grade and mineralized domain boundary, for the purposes of estimation.

Resources were calculated with an effective date October 31, 2021. The Resources are reported at a cutoff of 1.0 g/t for stockpiling and 1.6 g/t for processing. Numbers reported as Resource are constrained to a mine design of 1.0 g/t and are reported in **Table 1-2**.

Table 1-2: Estimated Mineral Resources

Classification	Cutoff Au (g/t)	Tonnes	Au (g/t)	Au (oz)	Ag (g/t)	Ag (oz)
Low-grade (Stockpile)						
Measured	1.0	208,500	1.24	8,350	10.03	67,200
Indicated	1.0	56,400	1.18	2,140	5.18	9,400
Measured + Indicated	1.0	264,900	1.23	10,500	9.00	76,600
Inferred	1.0	1,500	1.20	58	4.09	198
High-grade						
Measured	1.6	310,700	3.11	31,100	13.10	131,000
Indicated	1.6	43,700	3.17	4,500	10.67	15,000
Measured + Indicated	1.6	354,400	3.12	35,600	12.80	146,000

Notes:
(1) Cutoff grade calculated using metal prices of $1,800 and $25 per troy ounce of Au and Ag, recoveries of 80% for Au and Ag;
(2) Mineral Resources have been pit shell constrained to the mine design, using a 1.0 g/t Au cutoff
(3) Columns may not total due to rounding

1.6 Mining Methods

Mining at the Project is conducted with traditional open pit mining methods. Blasted material is mined with a diesel excavator and high-grade mineralized material is loaded onto on-highway trucks for haulage to Plant 2, approximately 115 km from the mine site. Waste and low-grade mineralized material are hauled to dump and stockpile locations near the pit edge. Mining is conducted with two 5 m benches for a total double-bench height of 10 m. The design inter-ramp angle is 43°. Mining and hauling activities are conducted by contractors, with Golden Minerals personnel responsible for blasthole sampling, supervisory, administrative, and engineering tasks.

1.7 Recovery Methods

Mineralized material from the Rodeo mine is hauled approximately 115 km via on-highway trucks and stockpiled for process at the agitated leach plant in Velardeña, Durango (Plant 2). The plant is owned by Minera William S.A. de R.L. de C.V. and operated by Servicios Velardeña S.A. de C.V., both wholly owned subsidiaries of Golden Minerals. The plant has a design maximum throughput of 550 tpd and is currently operating at an average rate of 500 tpd. A jaw crusher followed by a cone crusher provide primary and secondary crushing of feed material. Crushed material enters a grinding circuit comprised of a 10.5 x 13 ft. ball mill and a recently installed 8 x 22 ft. regrind (secondary) mill, both in closed circuit with cyclones. The product from the mills at 80% passing 325 mesh is thickened and sent to a series of eight agitated lixiviation tanks where cyanide is added with a planned consumption of 3.0 to 3.1 kg/t. Precious metals are leached from the mineralized material at a design flow rate of 1,700 m^3/day and a total leaching time of 84 hours. Rich solution is separated using counter-current decantation and sent to the Merrill-Crowe circuit for clarification and precipitation of the Au and Ag that is then refined into Au and Ag doré bars for transport. Tailings from the decantation is sent to the tailings storage facility at the plant site.

1.8 Infrastructure

The Rodeo Project requires minimal infrastructure at the site due to the size and duration of the operation. As material is being processed off-site at the Velardeña plant, no processing infrastructure is present at Rodeo.

The primary road for mine access is gravel and is maintained in good condition for year-round use. Its design is adequate for the transportation of supplies onto the site as well as haulage of mineralized material from the Rodeo pit to the Velardeña plant. The waste rock dump and low-grade stockpile have sufficient capacity to meet the expected production from the pit.

1.9 Market Studies and Contracts

Detailed market studies were not performed or reviewed for the purposes of this PEA. The Rodeo Project is producing doré that meets industry standards for quality. Golden Minerals has a contract with Asahi Refining USA Inc. (Asahi) to refine the doré bars produced at the Velardeña plant. The contract has been executed and will expire December 31, 2023.

The Rodeo mine is operating as a contract mining operation with Triturados del Guadiana, S.A. de C.V. (TRIGUSA). The contract has been executed and is valid through the expected life of the Project.

1.10 Environmental Permitting

The Rodeo Project began operations in 2021. To comply with applicable federal, state, and municipal laws and regulations regarding environmental protection and mining operations, Golden Minerals reports that it holds and/or has applied for the permits, agreements, and other instruments required by law. Details of the permits obtained for the Project are available in **Section 20.3**.

1.11 Capital and Operating Costs

The Rodeo Project is currently in operation without quoted Mineral Reserves. Capital and operating cost estimates have been provided to Tetra Tech by Golden Minerals. They are based on production data from the 10 months of operations between start up and the effective date of this report and internal forecasts. Tetra Tech has reviewed the costs and found them to be consistent with standard industry practices.

Required capital costs for the Rodeo mine consists of an estimated $447k for closure and reclamation. No additional capital is required at the mine. No capital costs are estimated for Plant 2 for the remaining life of the Project.

Mine and plant operating costs are developed from production actuals and cost projections for the remainder of the mine life, and average $66.68/t-milled. Life of Mine (LOM) operating costs are estimated to total $23.4M.

1.12 Economic Analysis

An economic analysis was performed for the expected life of mine of the Project. The economic analysis is based on Mineral Resources that, by definition, are unlike Mineral Reserves and do not have demonstrated economic viability. Mineral Reserves have not been estimated for the Rodeo Project; however, the mine is in operation and is successfully selling doré for a profit. Production has validated the drilling, exploration, and Resource modeling at the site.

The LOM consists of 24 months of production and 12 months to perform closure and reclamation at the Rodeo property, with a starting point of November 1, 2021. The pre-tax NPV of the Project is $22.9M at a discount rate of 8%.

1.13 Interpretations and Conclusions

The Rodeo mine has been in production since Q1 2021. The operation utilizes contract drilling, mining, and hauling services, and processes mineralized material at Golden Minerals' wholly owned processing plant in Velardeña, Durango, Mexico. The Project has been successfully producing and selling doré to the market.

1.13.1 Geology and Resource

Tetra Tech has reviewed the Resource model for the Rodeo deposit estimated by Golden Minerals. The inputs, parameters, and estimation results are within industry standards. The estimation, classification, and reporting of the Resources constrained by the mine design are conservative in nature. Production data validates the previous drilling and Resource estimates.

1.13.2 Mining

Open pit surface mining is completed at the Rodeo site using a diesel excavator and over highway trucks to transport the mineralized material to the processing plant at the company's Velardeña property. Mine production averages 2,100 tpd of total movement and the pit has an expected mine life of 22 months. The LOM includes two additional months of production from the high-grade stockpile at the plant. Tetra Tech has reviewed the mine plan created by Golden Minerals and finds it to be within industry standards. The pit parameters are considered conservative in nature.

1.13.3 Metallurgy and Processing

The metallurgical report prepared by RDi for the Rodeo Project provided data sufficient for use in this PEA. Golden Minerals demonstrated recovery of Au and Ag from Rodeo mineralized material at Plant 2 in 2021. Installation of an additional ball mill circuit in April 2021 provided the ability to process material with varying degrees of hardness at a rate of 520 tpd.

The tailings storage facility at Plant 2 was expanded in 2019 to provide sufficient capacity for the Rodeo Project's tailings. Golden Minerals has a permit that will allow further expansion if required.

1.13.4 Environmental and Permitting

Tetra Tech has reviewed the available information on permits, agreements, and environmental aspects. Based on this information, Tetra Tech is unaware of any outstanding environmental or permitting issues that will affect the operation.

1.13.5 Economic Analysis

An economic analysis was performed for the expected 24-month LOM of the Project, starting November 1, 2021. The economic analysis is based on Mineral Resources that are not Mineral Reserves and do not have demonstrated economic viability. Mineral Reserves have not been estimated for the Rodeo Project. The pre-tax NPV of the Project is $22.9M at a discount rate of 8%. The Project is sensitive to metal prices and operating costs.

1.13.6 Significant Risk Factors

The decision to begin production at the Rodeo Project was not based on a Feasibility Study of Mineral Reserves demonstrating economic and technical viability. The Project is operating and selling a product and has a relatively short LOM. These factors reduce the economic and technical uncertainties for the Project. Risks include changes in agreements with landowners and/or communities for access, mining, and water use.

1.14 Recommendations

1.14.1 Geology and Resource

Exploration drilling efforts should continue to determine the limits of the deposit, where they have not already been defined. There is the potential for additional Resources in the area.

1.14.2 Mining

Golden Minerals should consider the economic viability of processing the stockpiled material, either after the mine life is exhausted, or through blending with the current mineralized material being sent to the processing plant.

1.14.3 Metallurgy and Processing

Based on Tetra Tech's review of the metallurgical testing, it is recommended that Golden Minerals continue to investigate ways to improve Au leach recovery through mineralogical studies and laboratory leach test work.

2. INTRODUCTION

This report has been prepared for Golden Minerals Company (Golden Minerals) for the Rodeo project (the Project) located in Rodeo, Durango, Mexico. The Project contains an open pit mine that is held by Minera de Cordilleras S.A. de R.L. de C.V. (Minera Cordilleras), and an existing oxide processing plant (Plant 2) that is held by Minera William S.A. de R.L. de C.V. Minera Cordilleras and Minera William are wholly owned Mexican subsidiaries of Golden Minerals.

This Preliminary Economic Assessment (PEA) Technical Report has been prepared to fulfill Golden Minerals' obligation to file a Technical Report in accordance with Section 4.2(1)(j)(ii) of Canadian National Instrument 43-101 – Standards of Disclosure for Mineral Projects (NI 43-101). This report has been prepared by Qualified Persons employed by Tetra Tech.

This PEA has been prepared for the purpose of reporting the results of a Mineral Resource estimate and economic analysis for the Project. This report updates a PEA prepared by Mineral Resources Engineering entitled *NI 43-101 Technical Report: Preliminary Economic Assessment, Rodeo Project, Rodeo, Durango, Mexico* with an effective date of April 1, 2020, and an issue date of May 27, 2020. This report incorporates additional exploration, Mineral Resource, and economic data generated by Golden Minerals. The Project began production operations without declared Mineral Reserves in January 2021.

Golden Minerals is a Delaware corporation based in Golden, Colorado, USA, and its shares are listed on the NYSE-American and the Toronto Stock Exchange under the symbol AUMN.

2.1 Sources of Information

The information contained in this report is based on information contained within previous technical reports prepared by Tetra Tech (2017) and Mineral Resources Engineering (2020), as well as the publications listed in **Section 27**. Where applicable and appropriate, content has been updated based on additional work performed by Tetra Tech or by Golden Minerals personnel. Tetra Tech's Qualified Professionals have reviewed the procedures and methodologies used to generate this data and have found it to meet industry standards.

Tetra Tech is relying on documents and data provided by Golden Minerals regarding:

- Drill hole database information
- Geological interpretation of the orebody
- Mine and plant production
- Mineral processing flowsheets and equipment for Plant 2
- Capital and operating costs
- Infrastructure
- Terms of material contracts and agreements
- Tax rates and royalty terms
- Environmental baseline data, closure plans, and monitoring programs
- Permitting requirements, status, and timelines

2.2 Property Inspection

Tetra Tech Qualified Persons (QPs) Dr. Guillermo Dante Ramírez-Rodríguez and Ms. Kira Johnson performed a site inspection January 18-21, 2022. During the inspection, they visited the Rodeo open pit mine, stockpiles, waste dumps, assay laboratory, and the processing plant.

2.3 Units of Measure

All currency is US dollars (USD), unless otherwise noted. Distances, areas, volumes, and masses are expressed using metric units unless indicated otherwise. All tonnages are in tonnes (1,000 kilograms), precious metal grade values are reported in grams per tonne (g/t), and precious metal quantities are presented as troy ounces (oz).

3. RELIANCE ON OTHER EXPERTS

Tetra Tech is relying on statements and information provided by Golden Minerals concerning legal, environmental, tax, and royalty matters included in this report.

Tetra Tech is relying on statements and documents provided by Warren Rehn, CEO of Golden Minerals, Robert Vogels, CFO of Golden Minerals, and Telésforo Martínez, Country Manager, Mexico Operations of Golden Minerals, and Aaron Amoroso, Mineral Resource Manager of Golden Minerals regarding:

- Resource estimation
- Mine and plant production data
- Legal status of mineral concessions
- Status and timelines of permits, contracts, and agreements required for the future or that are under negotiation
- Material contracts
- Mine closure plans and associated costs

A Title Opinion was provided by VHG, Servicios Legales, S.C., regarding the current legal status of the two Rodeo claims. The Rodeo mine closure plan was produced by Clifton Associates, Ltd. Natural Environment S.C.

4. PROPERTY DESCRIPTION AND LOCATION

The Rodeo Project is located 2 km east of the town of Rodeo in Durango state, Mexico, at latitude 25°9'2.7"N, longitude 105°31'4.2"W (WGS84) as shown in **Figure 4-1**. Full services are available in the regional cities of Torreón (189 km to the east) and Durango (157 km to the south), with basic amenities available in the town of Rodeo.

Figure 4-1: Rodeo Project location map

4.1 Mineral Tenure

The property contains two mineral concessions totaling 1,865.7 hectares. The Rodeo R1 concession, where the open pit is located, is held under an exploration agreement subject to advanced and actual royalty payments to La Cuesta International, S.A. de C.V., a wholly owned subsidiary of La Cuesta International, Inc. (La Cuesta). On commencement of commercial production, La Cuesta is entitled to a 2% NSR royalty from production. Once five million dollars has been paid under the agreement, the royalty reduces to 1%. The Rodeo 2 concession was purchased by Minera Cordilleras from Rojo Resources. Golden Minerals reports that it has filed an application with the Public Registry of Mining for an area reduction to 1,344.7 ha in the Rodeo 2 concession that has not yet been processed. The reduced concession boundaries are shown in **Figure 4-2**, and details of the concessions are listed in **Table 4-1**. All concessions are valid and there is no evidence of any lien, encumbrance, burden, or judicial proceeding currently affecting the concessions.

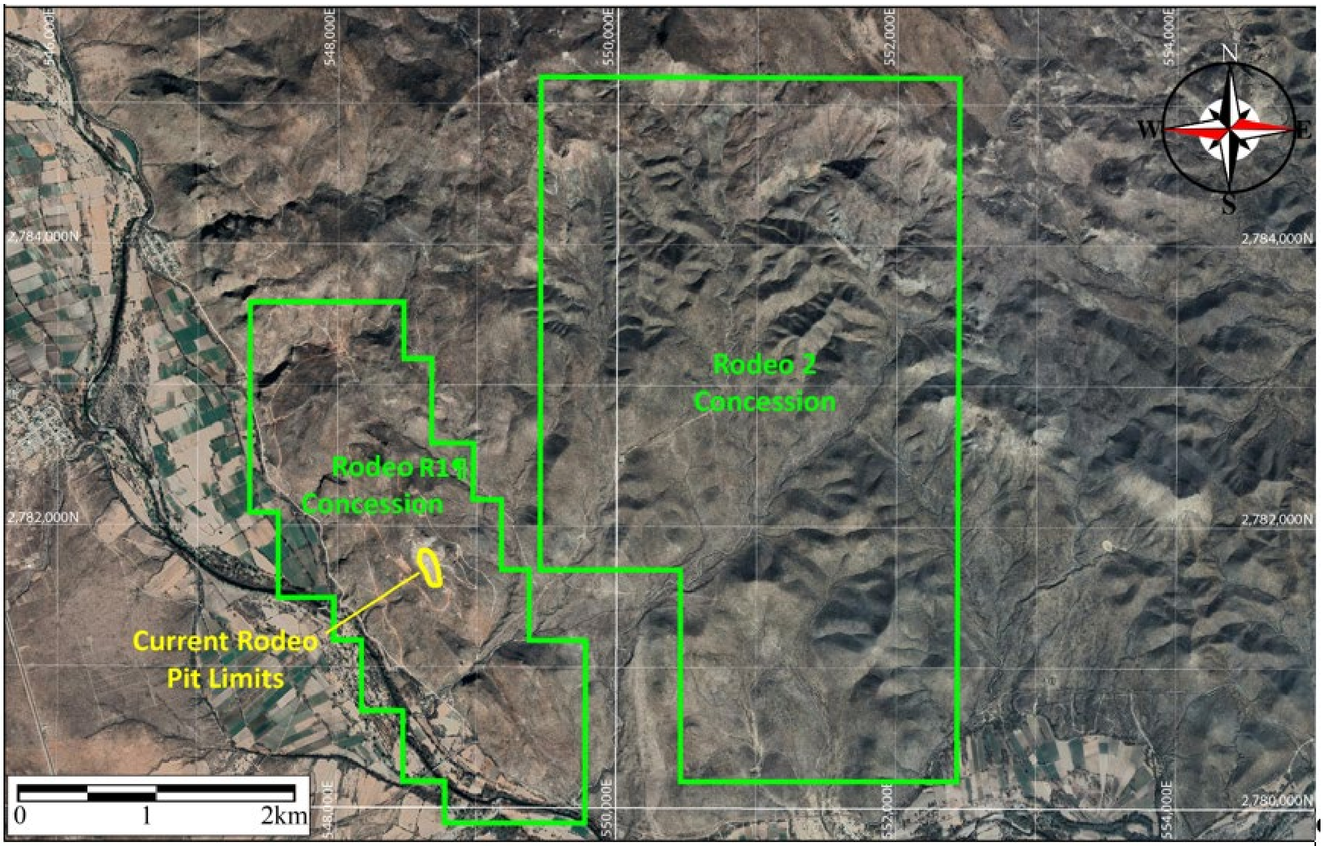


Figure 4-2: Mineral concession boundaries

Table 4-1: Concessions Controlled by Golden Minerals

	Lot	Holder	Area (ha)	Title	Type of Concession	Term	Location
1	Rodeo R1	La Cuesta International	521.0000	246464	Mining	Sep 17, 2052	Rodeo, Durango
2	Rodeo 2	Minera de Cordilleras	1,344.7345[1]	241666	Mining	Jul 20, 2054	Rodeo, Durango

4.2 Surface Rights

Surface rights to the concessions are held by ejidos (rural agricultural co-operatives) and private landowners. Access to the Project areas is through surface rights agreements with the Francisco Márquez ejido and the private owner of the Rancho La Pequeña. These agreements were formalized before a notary and are in good standing.

The surface agreement with the Francisco Márquez ejido allows Golden Minerals and its authorized contractors the right to access the two concessions with equipment and personnel to perform exploration and mining activities. The agreement is dated March 29, 2020 and is valid for ten years.

The surface agreement with the private landowner of the Rancho La Pequeña allows Golden Minerals and its authorized contractors rights of access and permission to perform mineral exploration, exploitation, and transportation within a 40-ha area. To retain these rights, Golden Minerals has agreed to pay $3,000 per hectare annually to the landowner, plus an additional fixed amount. The agreement is dated March 12, 2020 and is valid for ten years.

4.3 Encumbrances

Tetra Tech is not aware of any encumbrances, violations, or fines affecting the Rodeo Project.

4.4 Environmental Liabilities

The Project consists of an open pit mine and an off-site processing plant. The mine is currently in operation, and Golden Minerals has performed the required environmental studies and obtained the necessary permits for the operation as required by Mexican law. A closure and reclamation plan has been developed for the Rodeo open pit to address environmental liabilities that result from mining operations.

Tetra Tech is unaware of any outstanding environmental liabilities attached to the Rodeo Project and is unable to comment on any remediation, which may have been undertaken by previous companies.

4.5 Permitting

The Rodeo mine began operations in December 2020, and processing at Plant 2 began in January 2021. To comply with applicable federal, state, and municipal laws and regulations regarding environmental protection and mining operations, Golden Minerals reports that it holds and/or has applied for the permits, agreements, and other instruments required by law. Details of the required permits for the Project are available in **Section 20**.

4.6 Significant Risk Factors

Tetra Tech is not aware of any outstanding environmental, reclamation, or permitting issues that would impact future production from the Project.

The claims are located on the Ejido Francisco Márquez, Ejido Ánimas, and Rancho La Pequeña (private). Drilling by Golden Minerals has been conducted on Rancho La Pequeña only. Although the mineral rights are independent of the surface rights, access to the claim block is granted through agreements between Golden Minerals and the surface rights holders. The surface rights holders do not have a direct interest in the mineral claims. Tetra Tech is unaware of any other significant risk factors, which may affect the access, title, or right or ability to perform work on the property.

5. ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

5.1 Accessibility

There is an established network of roads in the region, including paved Mexican National Highways 45 and 34. Gravel roads intersecting the highways provide access to the concessions. The primary access road to the mine intersects Highway 34 and is suitable for year-round use.

5.2 Physiography, Climate, and Vegetation

The Rodeo property is situated within the Mesa Central physiographic region, between the mountain ranges of the Sierra Madre Occidental and Sierra Madre Oriental. The Nazas River valley is locally bounded to the west by the rugged mountains of the Pilar Sierra de San Francisco and to the east by the rolling hills and rounded mountains of the Pilar Sierra de Nazas. Bedrock exposures are common along ridge crests, road cuts, and drainages. Relief within the property is moderate with elevations ranging from approximately 1,310 to over 1,800 m above sea level.

The climate is dry and semi-arid, typical of the high-altitude Mesa Central region. Annual precipitation for the area is approximately 700 mm, mostly during the rainy season in June and July. Temperatures commonly range from 20° to 45°C in the summer and 15° to 0°C in the winter. The climate is suitable for year-round operation.

The vegetation is dominantly scrub bushes with various types of cacti, maguey, sage, coarse grasses, and yucca. The natural grasses are used to locally graze domestic livestock. Wild fauna is not abundant, but several varieties of birds, rabbits, coyote, lizards, snakes, and deer reportedly inhabit the area.

5.3 Local Resources and Infrastructure

The Nazas River flows year-round and provides a water source for local agricultural operations. Golden Minerals has reached an agreement with the Ejido Francisco Márquez to construct a pump station along the Nazas River to provide water for use at Rodeo. As part of the agreement, Golden Minerals agrees to pay the ejido an annual sum of $14,000 MXN (approximately $675 USD). Power to the mine is provided by diesel generators. Tanks are located on the property for water and diesel storage. The cities of Durango and Torreón have a rich history of mining and are a source of services and supplies required for the Project. Basic amenities and services are available in the nearby town of Rodeo. Experienced mining personnel are available throughout the region.

6. HISTORY

Two prospects, called the Los Murciélagos Au-Ag-Pb-Cu prospect and the Francisco Márquez Au-Cu prospect, were identified in the vicinity of the Los Murciélagos arroyo on the Rodeo property. Little information is available on these historic prospects other than Au- and Ag-bearing mineralization was apparently extracted from short adits driven in sheared and altered rhyolitic volcanic rocks.

Recent exploration work on the Rodeo property was carried out by La Cuesta and Monarch Resources de Mexico, S.A. de C.V. in the 1990s and by Canplats de Mexico, S.A. de C.V., a wholly owned subsidiary of Canplats Resource Corporation Mexico, in 2003, 2004, and 2007. Additional exploration work was performed by Camino Minerals Corporation, an entity formed by the acquisition of Canplats by Goldcorp Inc., in 2010 and 2011. In 2014, Camino relinquished its stake in the Rodeo concessions back to La Cuesta. **Table 6-1** summarizes the history of the Rodeo deposit.

Table 6-1: Summary of exploration history

Year	Description of Work
1994	La Cuesta initiates exploration work in the Rodeo prospect and explores the outcroppings under contract for Monarch Resources de Mexico, S.A. de C.V. (Hillemeyer, 1997).
1995	La Cuesta completes 1:5000 scale geological mapping.
1995	Explominerals is contracted to collect 109 rock chip samples using grid and selective sampling methods in February and March 1995. The samples are sent to Bondar-Clegg Lab for geochemical analysis (Durning and Hillemeyer, 1995b).
1995	Monarch completes a Phase I drilling program, including sixteen reverse circulation (RC) drill holes totaling 2,251 m (Hillemeyer, 1997). The drilling confirms strongly anomalous Au and Ag values at shallow depths, but does not adequately test the mineralization at depth.
2003	Canplats acquires the Rodeo Property from La Cuesta and conducts a rock geochemical sampling program comprising 422 chip samples, including 24 samples covering the area previously drilled by Monarch (Canplats News Release, 2004a).
2004	Canplats carries out an initial reverse circulation drilling program including 9 RC drill holes (1,123.7 m) that tested approximately 130 m of strike length along the West Vein Swarm zone. A Phase II diamond drilling program was completed in September 2004. It included the drilling of an additional twelve holes (BR-10 to -21) totaling 1,291.47 m (Davis, 2004e). It confirmed the presence of Au mineralization along 200 m of the West Swarm Vein zone and discovered buried Au mineralization at the new Ridge Zone.
2007	Canplats conducts a diamond drilling program to test the depth extent of known near-surface mineralization. Four diamond drill holes (BRD-01 to -04), totaling 1,070.75 m, were completed during the program. The drill holes intersected Au-Ag mineralization over widths of a few meters to over 8 m with grades ranging up to 1.065 g/t Au and 93.9 g/t Ag.
2010	Camino Minerals Corporation is formed as a result of the acquisition of Canplats by Goldcorp Inc. (Goldcorp) on February 3, 2010. The newly created Camino Minerals Corporation holds all the properties that Canplats held before acquisition, except for the Camino Rojo property. Rojo, a wholly owned subsidiary of Camino, acquired its interest in the Rodeo and Rodeo 2 concessions on February 3, 2010, pursuant to the terms of an asset transfer agreement between Canplats Mexico and Rojo, and a statutory plan of arrangement involving Canplats, Goldcorp Inc. and Camino that became effective on February 4, 2010.
2010	Camino issues Technical Report for the property.

Year	Description of Work
2011	Camino conducts a drilling program that included 6,238.2 meters of diamond drilling in 29 holes located within a 7 km by 2 km alteration footprint hosting the Rodeo Epithermal Vein System. The purpose of this program was to investigate the extension of the known mineralization to the north and south of the main mineralized zone as well as at depth.
2012	On March 16, 2012, Camino purchases the back-in rights that Silver Standard held with respect to each of the El Rincon Gold Project and the Mecatona Gold-Silver Project, and Silver Standard's right of first offer with respect to the Rodeo Gold Project (collectively, the Rights). In consideration for the transfer of the Rights, the Company issues to Silver Standard 500,000 of its common shares (Camino MDA, November 2012).
2014	Camino relinquishes its right to acquire the Rodeo concessions and the concessions reverted to La Cuesta. Rodeo 2 staked by Camino during the option period with La Cuesta reverts to La Cuesta under the existing agreement.
2015	The property is acquired by Minera de Cordilleras, a subsidiary of Golden Minerals Company, from La Cuesta International.
2016	Golden Minerals drills 14 holes, totaling 2,084 m, explores the NE down-dip continuation of the high-grade mineralization, conducts regional mapping and sampling, conducts metallurgical test work on the Rodeo mineralization, and completes a preliminary assessment report on the deposit.
2019	Golden Minerals conducts a regional mapping and sampling program that identifies additional exploration targets, and receives permits to conduct a Resource definition program at Rodeo, which is completed in 2020 and leads to the decision to start mining in December 2020.
2021	Doré production begins in January 2021. Additional Resource drilling is completed in 2021.

7. GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional Geology

The following description of the regional geology is adapted from (Blackwell and Pryor 1996).

The Rodeo concessions lie on the eastern boundary of the Sierra Madre Occidental morphotectonic province. The Sierra Madre Occidental is a dissected volcanic plateau, approximately 1,200 km long and its average altitude is a little under 2,000 m above sea level, elongated in a NNW direction. The geology of the province has been divided into two principal volcanic groups, the upper and lower.

- **Upper Volcanic Supergroup** (27-34 mya): Rhyolitic and rhyodacitic ignimbrites, caldera complex with associated high level intrusives, minor andesites, and mafic lavas
- **Lower Volcanic Complex** (45-100 mya): Andesitic to rhyolitic extrusives, intruded by batholithic complexes

The formation of these volcanic complexes can be related to late Mesozoic and Tertiary subduction processes along the Middle America Trench. The dominant structural event affecting these rocks, particularly the Upper Volcanic Supergroup, is a tensional one, possibly coeval with the spreading episode, which was opening the Gulf of California to the northwest. This event led to the formation of a complex of normal faults within and on the margins of the volcanics. Displacements on these faults is never very great, particularly on the eastern margin of the Sierra Madre Occidental, but tilting of structural blocks was extensive. Wedges of coarse clastic rocks now fill the associated half grabens. A number of these faults have been the loci of possible late-stage volcanic alteration/silicification/mineralization events which are the targets for exploration effort.

To the east of Rodeo lies the morphotectonic province of the Sierra Madre Oriental. This is largely composed of Mesozoic sedimentary rocks, evolving from a mixed clastic continental and marine succession with minor volcanics in the early part of the era, to platform and basinal carbonates by the Cretaceous. These rocks were subjected to a strong compressional tectonism-oriented WSW-ENE at the end of the Cretaceous. Again, this can be related to the subduction of the Cocos Plate beneath the North American Plate.

The boundary between the two tectonomorphic provinces, with their highly contrasting regional facies and structural style, is marked by a NNW trending normal fault or complex of faults. On the property that is the subject of this report, the structural trend is expressed by the Rodeo Fault, also known as the Falla Héroes de Mexico.

7.2 Local and Property Geology

The following description of the local and property geology is adapted from (Blackwell and Pryor 1996).

The Rodeo Project is located along a major northwest-trending system of basin-and-range normal faults juxtaposing silicified, iron-stained, and locally clay altered Tertiary intermediate-to-felsic volcanic and sub-volcanic rocks against altered, silicified, and brecciated Cretaceous silty limestones and shales. In the southern portion of the property, the Cretaceous rocks are on the NE side of the fault system (footwall) and the volcanic rocks are on the SW side of the fault system (hanging wall). At the north end of the property, the fault system juxtaposed volcanic rocks against volcanic rocks.

Mapping carried out by Monarch indicated the geology consists primarily of Tertiary/Oligocene acidic volcanics to the WSW separated from Mesozoic/Cretaceous carbonates by the NNW trending Rodeo Fault. The latter have been ascribed to the Indidura Formation (Durning and Hillemeyer, 1994 and 1995) and the former, while having no strict stratigraphic assignments, are referred to as Rodeo Volcanics.

- **Rodeo Volcanics** (Oligocene 23-34 mya): Rhyolitic, rhyodacitic, and andesitic lithologies; including welded and non-welded tuffs, and ash flow/volcanic breccias.
- **Rodeo Fault**: Normal fault, dipping WSW.
- **Grupo Mezcalera** (Cretaceous 97.5-124 mya): Thinly interbedded carbonates and clastics, grading between limestones, argillaceous limestones, and calcareous/black shales. Possibly interfingered with welded to non-welded tuffs in the northern part of the concession.

Generally, exposure of the Rodeo Volcanics is good, particularly in the east-west oriented arroyos and canyons along the western margin of the property. The topography in the Indidura Formation is not as dramatic and not as well exposed. The structural style of this unit is, however, easily seen in road cuttings on Highway 34 in the extreme south-eastern part of the concession.

The Rodeo Fault, which locally may vary from a single fracture to a multiple structure, dips at approximately 60° to the WSW (shallowing to 25° at depth), with a downthrow in the same direction, i.e., it is a normal fault. This dip, however, may not be regular and is possibly offset by smaller-scale antithetic faults. It has not been possible to determine the approximate amount of movement on this structure as the thickness of the stratigraphic units in the area is not known. In addition to separating rocks of differing ages and origins, the rocks on either side of the Rodeo Fault also belong to totally different structural regimes. The broad characteristics of each structural domain are summarized below.

- **Rodeo Volcanics** (tensional): Unfolded, dip at low angles (5-15) to the West. Systematic and non-systematic joint sets with the dominant trend sub-parallel to the Rodeo Fault, i.e., NNW.
- **Rodeo Fault** (tensional): Rodeo fault, strikes NNW, dips 60-25 degrees WSW.
- **Grupo Mezcalera** (compressional): Highly folded. Recumbent, sub-horizontal tight to isoclinal folds in thinly interbedded limestones and clastic to gently inclined sub-horizontal close chevron folds in more thickly interbedded units. Complex joint systems related to fold geometries. WSW-ENE compression.

Figure 7-1 shows the surface geology in the vicinity of the Rodeo concessions. **Figure 7-2** shows the local geology in cross section.

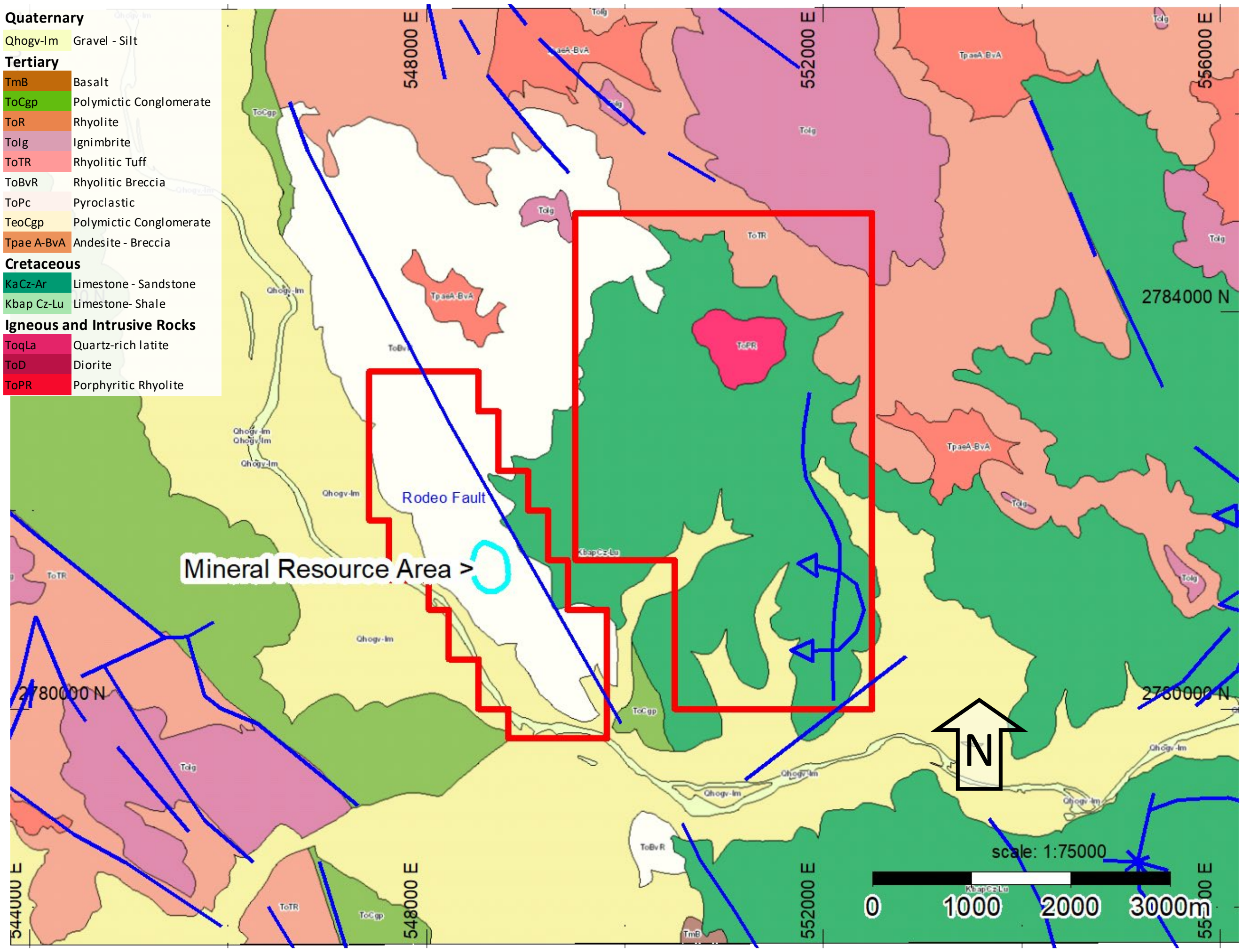


Figure 7-1: Local and property surface geology

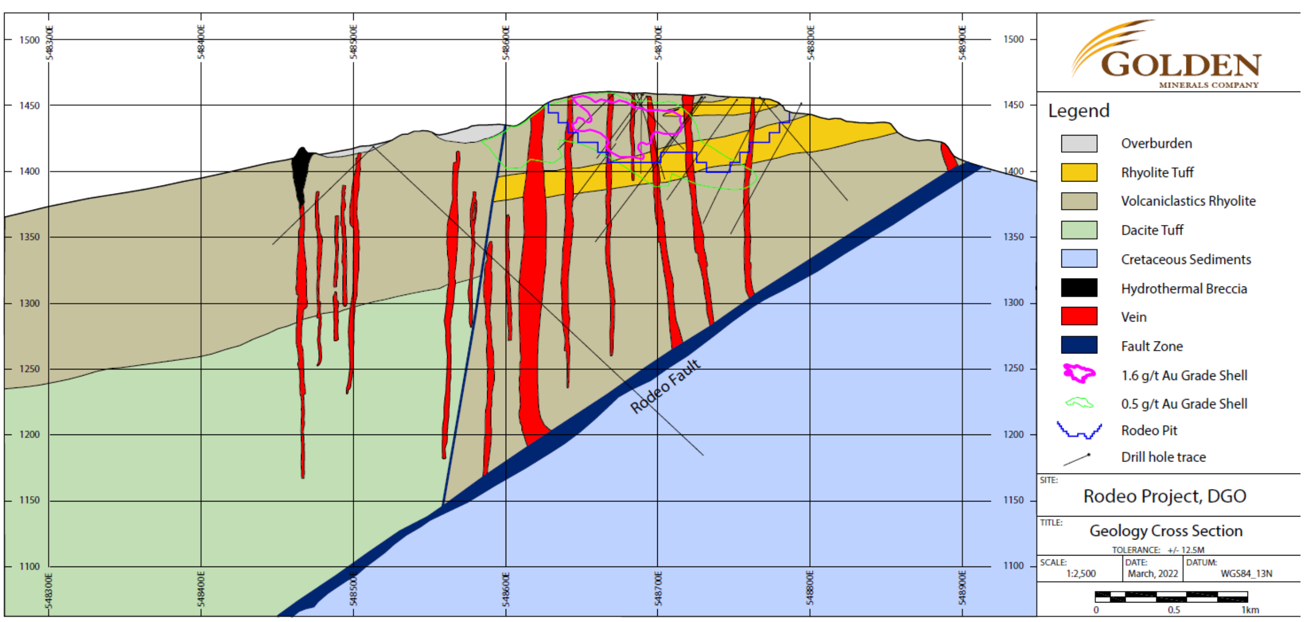


Figure 7-2: Local geology cross section

7.3 Deposit Geology

The following description of the deposit geology has been modified from a 1997 non-public report by Hillemeyer and Durning for La Cuesta.

At the Rodeo Project, the Rodeo fault system consists of three major parallel shear zones and wall-rock fracture systems that are the principal feeder conduits for a high-level, Au-Ag epithermal mineral system, that forms a. the 1 km x 4 km area of silicified, clay altered, and gold anomalous rocks forming resistant NNW-trending ridges. All three of the structures are wide, laterally persistent, well-developed vein swarms with high-level, locally banded agate to chalcedonic quartz veins, stockworks, and silicified breccias. In the area of principal interest, the structures are strongly veined, silicified, brecciated, and mineralized for over 4 km, and the shear zones and hydrothermal system can be traced for 8 km on the property. Individual vein and breccia systems are up to 60 m thick. Flexures in the vein swarms and/or structural intersections provide brecciation and open conduits for intense, episodic fluid flow and silica deposition with the potential for ore-grade concentrations of precious metals, especially gold.

The immediate Rodeo deposit area is approximately 300 m along strike and 200 m wide and extends to a depth of 200 m below surface. The deposit strikes at 330° and dips to the ENE with various vein phases dipping from sub-vertical to 30°. The deposit is entirely hosted within Tertiary Rodeo volcanics that are strongly silicified and brecciated. The deposit is bound to the east by the Rodeo fault, however drilling to date has not demonstrated that the deposit reaches or is truncated by the fault. Along strike to the north and south, the mineralization is offset slightly by near vertical faulting; mineralization does not terminate at these faults, but the intensity of the trend is either diminished or has yet to be located.

Figure 7-3 shows the surface geology of the deposit area as well as where most of the drilling has been concentrated.

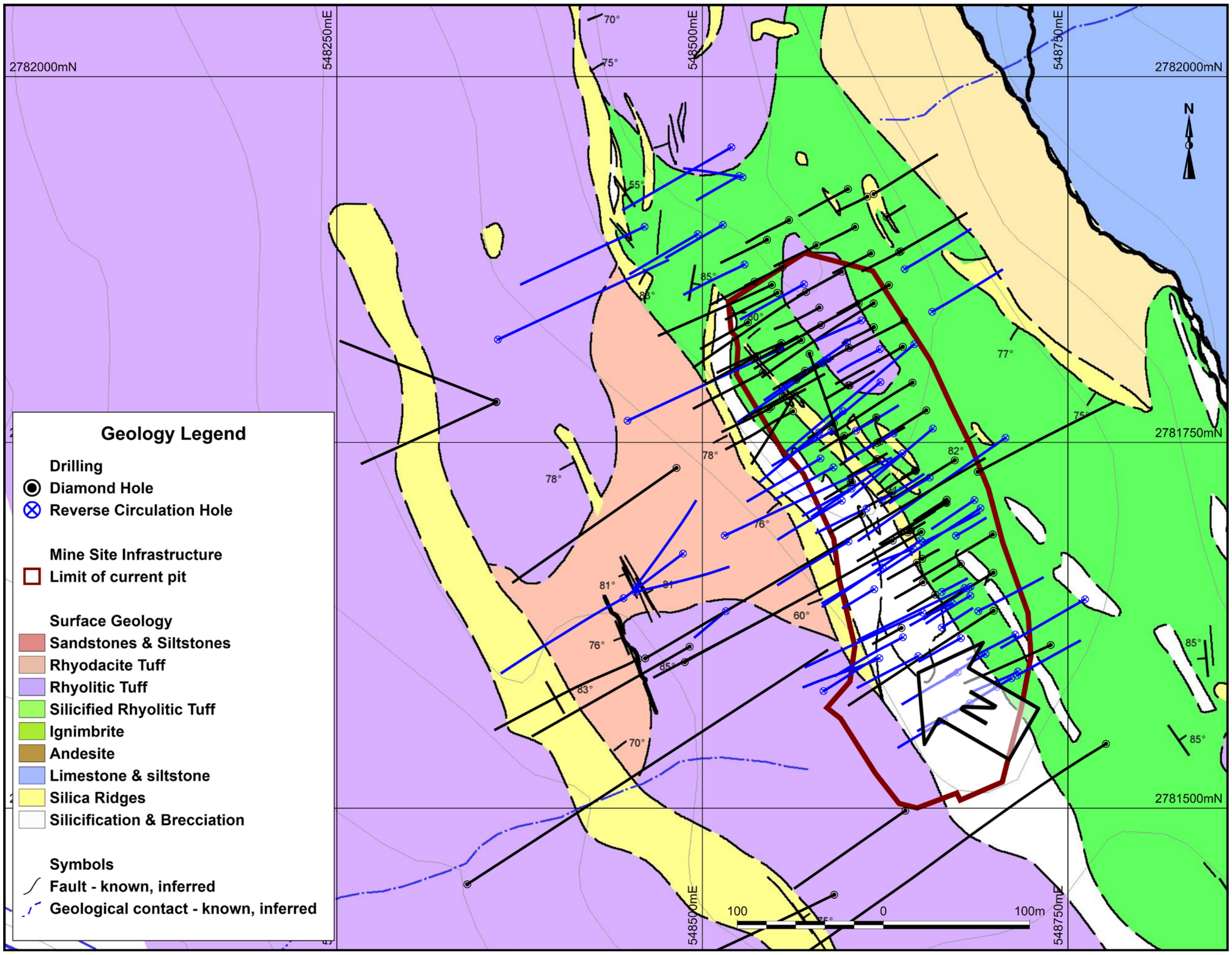


Figure 7-3: Deposit surface geology

7.4 Mineralization and Veining

The following has been adapted and updated from (Gaboury and Magallanes 2012).

The Rodeo deposit belongs to the epithermal low sulfidation (quartz adularia) type. The hydrothermal system was emplaced along major faults and various veins developed along several parallel structures in the hanging wall of the Rodeo Fault; however, at the Rodeo deposit very little mineralization is hosted in or centered on the Rodeo Fault itself. As the most significant structure locally, it is likely the Rodeo Fault played a role as a pathway at depth for the Rodeo deposit.

Quartz veins up to 15 m or more in width displaying classical epithermal textures such as complex banding, bladed calcite replacement, and several stages of vein injection and brecciation have been encountered in several holes throughout the property; however, high-grade Au mineralization appears to be limited to a distinct veining event. The gold event (Stage 4, or high grade) is associated to a restricted vein stage characterized by small smoky quartz veinlets cut by banded blue opaline quartz and later brecciated and cemented by glassy smoky quartz hosting very fine disseminated pyrite. The fine pyrite often found is associated with intense silica alteration of the host rock, and is possibly related to this event as anomalous gold is reported from the sampling of these zones. This stage is restricted to the main zone of the deposit and appears to form semi-horizontal envelopes with shallow dips to the east. In the main zone, the veinlets generally trend NNW dip a few degrees off vertical, as most of the other vein stages but the core angle in some holes suggest these veins may also have developed along ENE to EW structures. This stage is also weakly developed along some of the structures to the west of the main zone where it also appears to extend only to shallow depths. The envelope of the high-grade event appears to be restricted to a preferential volcanic layer or elevation (or both). Movement on the Rodeo Fault is likely responsible for the current orientation of the envelope.

Gaboury and Magallanes identified several vein types and stages following Camino's 2011 drill hole exploration program. The characteristics of the stages have been arranged in chronological order from earlies to latest:

- **Stage 1:** The first stage included classical epithermal veins characterized by moderately to well banded milky white quartz/adularia with locally well-developed bladed calcite replacement textures. These range from a few centimeters up to 15 cm. Examples are shown in **Figure 7-4** and **Figure 7-5**.

Figure 7-4: Boulder of Stage 1 white banded quartz vein with bladed calcite replacement textures

Figure 7-5: Bladed calcite replacement texture in Stage 1 vein

- **Stages 2 and 3:** The two other stages form small gray glassy quartz veinlets. These generally display weak banding and do not appear to host sulfides. They clearly cut the first white quartz veins as shown in **Figure 7-6**. These veins are thought to be only weakly anomalous in gold, but some may be richer in silver. In many cases they appear to overprint the textures in the large milky quartz veins, which suggest some of them could be closely related in time with the early stage. Core angles suggest these occur as a multidirectional stockwork-like array.

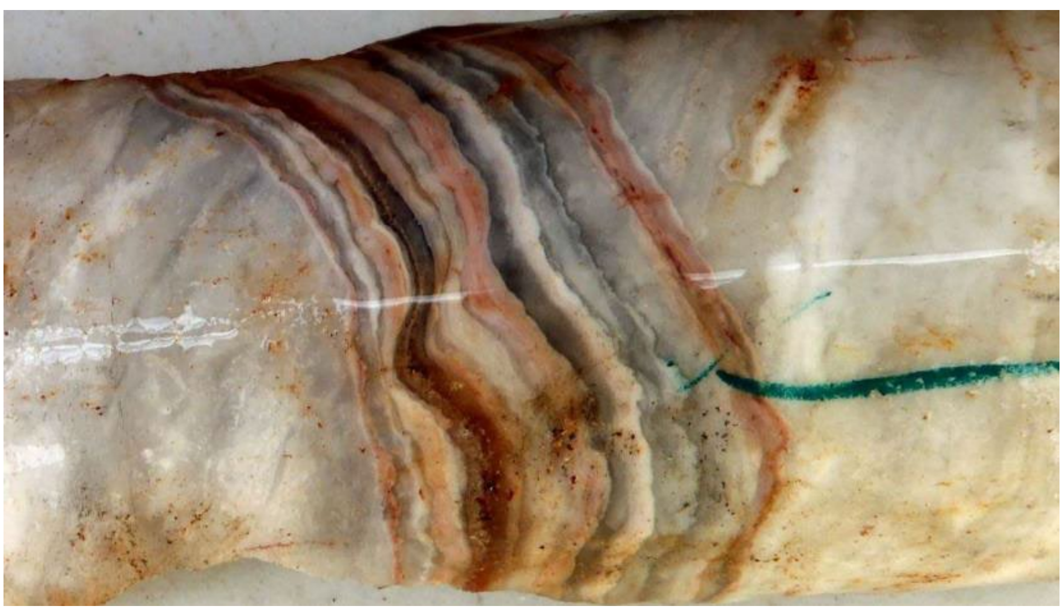


Figure 7-6: Banded vein cutting Stage 1 white vein

- **Stage 4 (High-grade):** The main high-grade stage is characterized by small smoky quartz veinlets cut by banded blue opaline quartz and later brecciated and cemented by glassy smoky quartz hosting very fine disseminated pyrite, as shown in **Figure 7-7** and **Figure 7-8**. High-grade mineralization exists as anomalous intervals in other stage types, but this stage is consistently observed to occur along with high-grade.

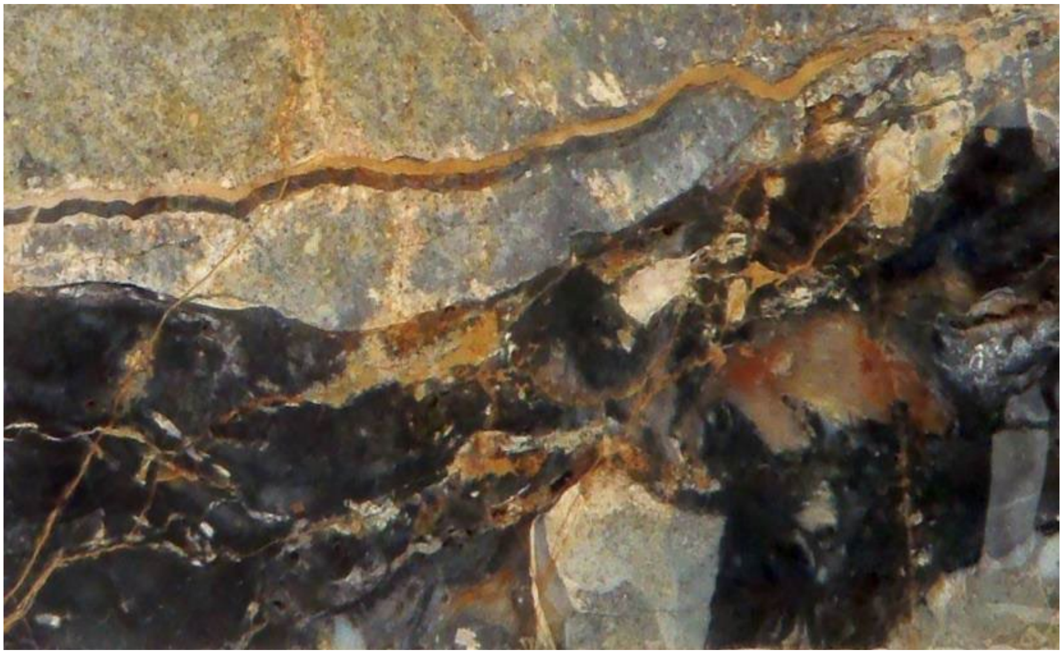


Figure 7-7: Stage 4 black vein (main high-grade stage)

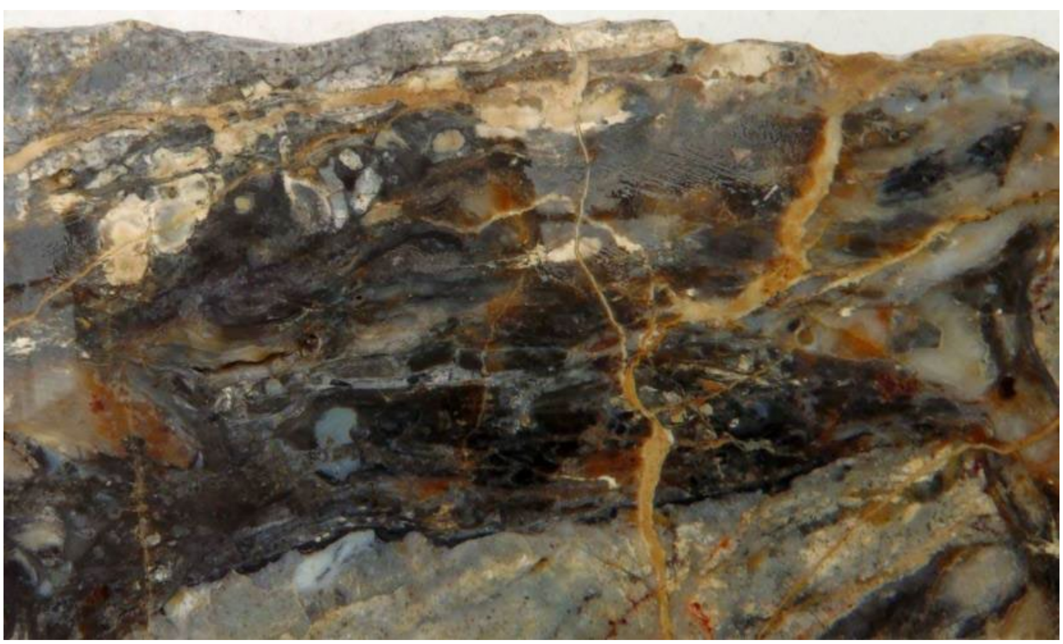


Figure 7-8: Stage 4 black vein (main high-grade stage) cut by blue opaline quartz and breccia and cemented by smoky quartz hosting fine disseminated pyrite (RO-11-001 37.3 Au g/t)

- **Stage 5:** Several vein injection stages clearly postdate the smoky quartz veinlets high-grade stage. These include at least one other stage of gray poorly banded veins as well as silica flooding often cementing small crackle breccias. This late stage of silica flooding often varies in color from beige to gray to almost black as shown in **Figure 7-9**. Traces of very fine disseminated pyrite have been reported from this stage. These appear to be barren stages.

Figure 7-9: Several stages of late silica cementing breccias

- **Stage 6:** One last post-mineral stage cuts all previously mentioned events. It is characterized by widespread pyrite-marcasite veinlets often cementing open space in small crackle breccias. Closer to surface, these veinlets are generally completely replaced by jarosite, limonite, and hematite. These oxide veinlets are very well developed in the main zone and clearly cut all previous vein stages; however, they appear to be only weakly anomalous in gold to barren. Disseminated pyrite and marcasite is often associated with veinlets. This vein stage is one of the most widespread and the one that appears to extend to greater depths along with the silica flooding stage. It may be responsible in part for the large zones of low-grade gold found below the main zone and along its extension to the north. Examples of the mineralization in this stage are shown in **Figure 7-10** and **Figure 7-11**.

Figure 7-10: Late-stage pyrite-marcasite mineralization and its oxidized equivalent

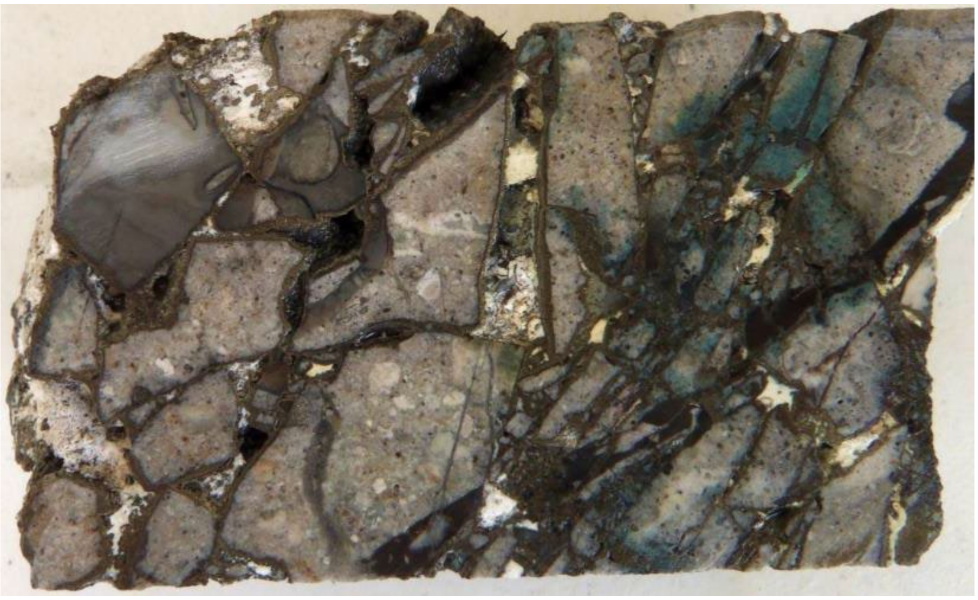


Figure 7-11: Late pyrite-marcasite cementing breccias in silicified volcanoclastics

8. DEPOSIT TYPES

The following section has been adapted from (Blanchflower 2010).

The Rodeo property hosts Au- and Ag-bearing mineralization with metallogenic characteristics commonly associated with a low-sulfidation (adularia-sericite) epithermal mineralizing system. Epithermal or high-level hydrothermal systems are defined to occur from depths of less than 2 km to surficial hot spring settings hosted by a variety of geological environments, but usually by Tertiary-age volcanic rocks associated with subduction zones at plate boundaries.

Volcanic rocks of calc-alkaline andesitic composition are the most common host rocks, usually in areas with bimodal volcanism and extensive subaerial ash flow deposits and less commonly associated with alkalic intrusive rocks, shoshonitic volcanics, or clastic and epiclastic sediments in intra-volcanic basins. Epithermal systems can be of any age, usually related to their host volcanic rocks but invariably slightly younger in age (approximately 0.5 to 1 mya,). Older epithermal deposits are less common because of erosion or metamorphism.

Regional tectonic settings for epithermal systems comprise volcanic island and continent-margin magmatic arcs or continental volcanic fields with extensional structures. Regional-scale fracture systems are common structural controls related to grabens, resurgent calderas, flow-dome complexes and, rarely, maar diatremes. Extensional structures in volcanic fields (normal faults, fault splays, ladder veins, cymoid loops, etc.) are common, as are local graben or caldera-fill clastic rocks. High-level (subvolcanic) stocks and/or dykes and pebble breccia diatremes may be present in the deposition environment, in addition to locally resurgent or domal structures related to underlying intrusions.

Low-sulfidation epithermal mineral deposits form in both subaerial, predominantly felsic, volcanic fields in extensional and strike-slip structural regimes and island arc or continental andesitic stratovolcanoes above active subduction zones. Near-surface hydrothermal systems are localized by structurally- and permeability-focused fluid flow zones where there are relatively dilute and cool mixtures of magmatic and meteoric fluids with temperatures between 200°C and 300°C. Mineral deposition occurs as the fluids undergo cooling and degassing by fluid mixing, boiling, and decompression.

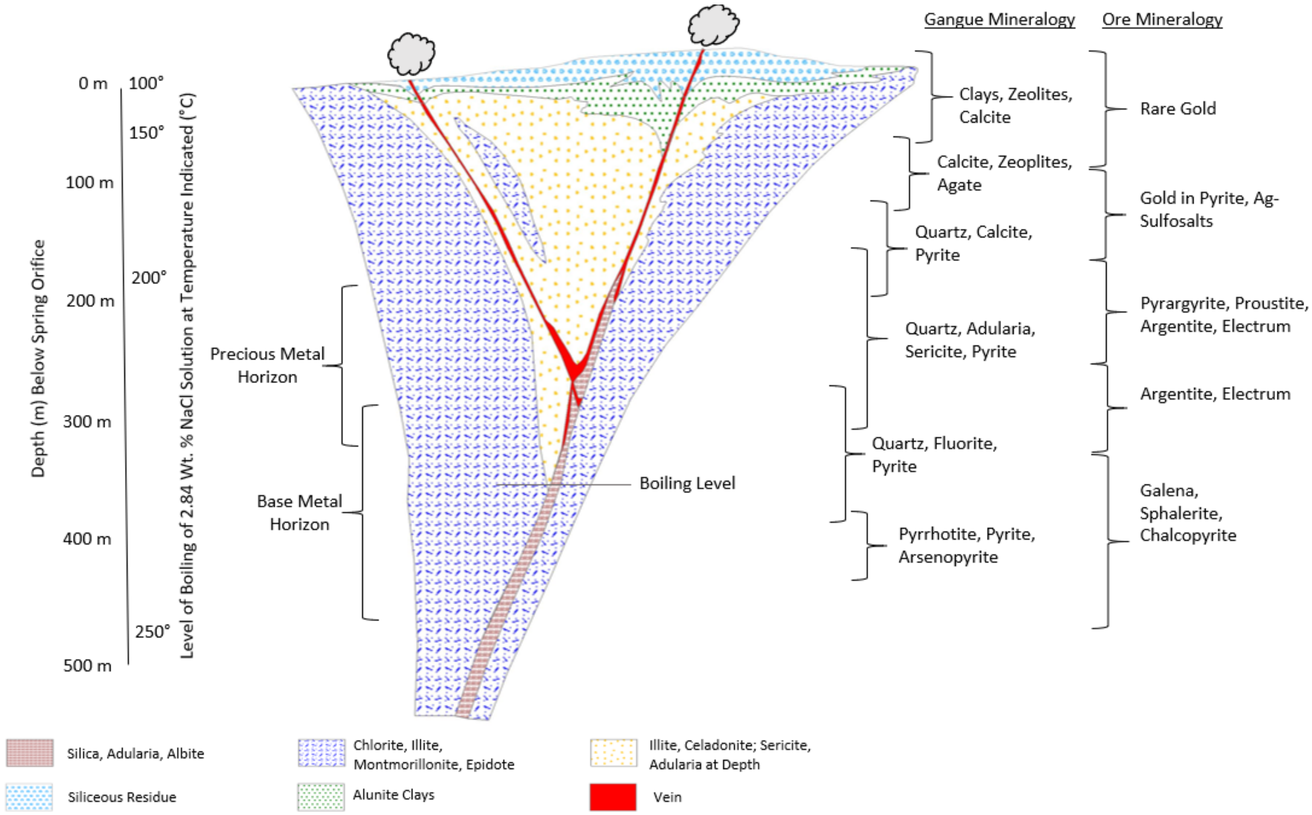
Mineralization is typically localized in structures but may occur in permeable lithologies. Upward-flaring mineralized zones centered on structurally controlled hydrothermal conduits are common. Large (> 1 m wide and hundreds of meters in strike length) to small veins and stockworks are common with lesser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

Quartz veins, stockworks, and silicified tectonic breccias commonly host gold, silver, electrum, argentite, and pyrite with lesser and variable amounts of sphalerite, chalcopyrite, galena, rare tetrahedrite and sulfosalt minerals. The mineralization commonly exhibits open-space filling textures and is associated with volcanic-related hydrothermal to geothermal systems. Mineral deposits are commonly zoned vertically over 250 to 350 m from a base metal-poor, gold- and 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.

Open-space filling, symmetrical and other layering, crustification, comb structure, colloform banding, and multiple brecciation are common vein textures. Repetitive generations of quartz and chalcedony are commonly accompanied by adularia and calcite, and pervasive silicification in vein envelopes are usually flanked by sericite-illite-kaolinite assemblages. Intermediate argillic alteration (kaolinite-illite-montmorillonite + smectite) may form adjacent to veining and advanced argillic alteration (kaolinite) may form along the tops of mineralized zones. Propylitic alteration dominates at depth and peripherally. Weathered bedrock exposures are often characterized by resistant quartz ledges and extensive flanking bleached, clay-altered zones with jarosite, and other limonite minerals.

The Rodeo property is situated in the highly productive central Mexican silver belt on the same regional structural feature that extends northwesterly to the Au-Ag (± Pb, Zn) districts of Indé and Magistral del Oro. (Hillemeyer, 1997).

A schematic cross-section of the epithermal deposit model is shown in **Figure 8-1**.



Modified after Buchanan, 1981

Figure 8-1: Schematic cross-section of the epithermal deposit model (modified from Buchanan, L.J., 1981)

9. EXPLORATION

Exploration activities conducted by Golden Minerals consist of:

- Surface geologic mapping of the property and immediate deposit area
- Trench sampling and surface sampling
- High-quality topography and aerial imaging from a drone survey conducted in 2020 and continued monthly drone images of the mine
- Regional ASTER survey
- Four drilling campaigns totaling 9,146 m

Activities conducted by previous operators include:

- Surface geologic mapping of the property and immediate deposit area at 1:25,000 scale
- Alteration intensity mapping
- Airborne magnetic and radiometric survey
- Induced polarization geophysical survey
- Large scale magnetic surveys are available from Servicio Geológico de México
- Landsat false color imagery to identify alteration signatures
- Spectral analysis to determine alteration types
- The collection of approximately 1,500 rock samples
- Some of the rock samples have recorded length and direction information; samples that do have this information have been used where appropriate
- Collection of 467 soil samples and 100 stream sediment samples

The Rodeo R1 and Rodeo 2 concession boundaries have been reduced since their initial staking; therefore, some of the previous exploration activity took place outside the current concession boundaries.

9.1 Trench Samples

Golden Minerals cut eleven trenches in 2015. The trenches were cut perpendicular to the strike of the Rodeo deposit using a gasoline-powered diamond saw and chipped into sample bags using a rock hammer. Care was taken to cut continuous samples but in many cases the terrain and vegetation caused gaps to exist in the lines. The trench lines are assumed to be continuous, although some have unsampled lengths greater than approximately 1 m where rock was not exposed. Trenches were mapped during collection followed by location corrections using a total station surveying instrument, as well as correction to the topographic surface.

The trenches are located 40 m west of the highest-grade portion of the deposit. The core of the deposit is not exposed at surface because it is covered by a volcanic layer. In the area of the trench samples this volcanic layer is absent and the silicification and mineralization is visible in outcrop.

Figure 9-1 shows a picture of the Rodeo pit highwall (looking northwest) showing the low-angle fault separating post-mineral volcanics from underlying mineralized rhyodacites. The red rectangle shows the approximate trench locations on the periphery of the Rodeo mineralized system.

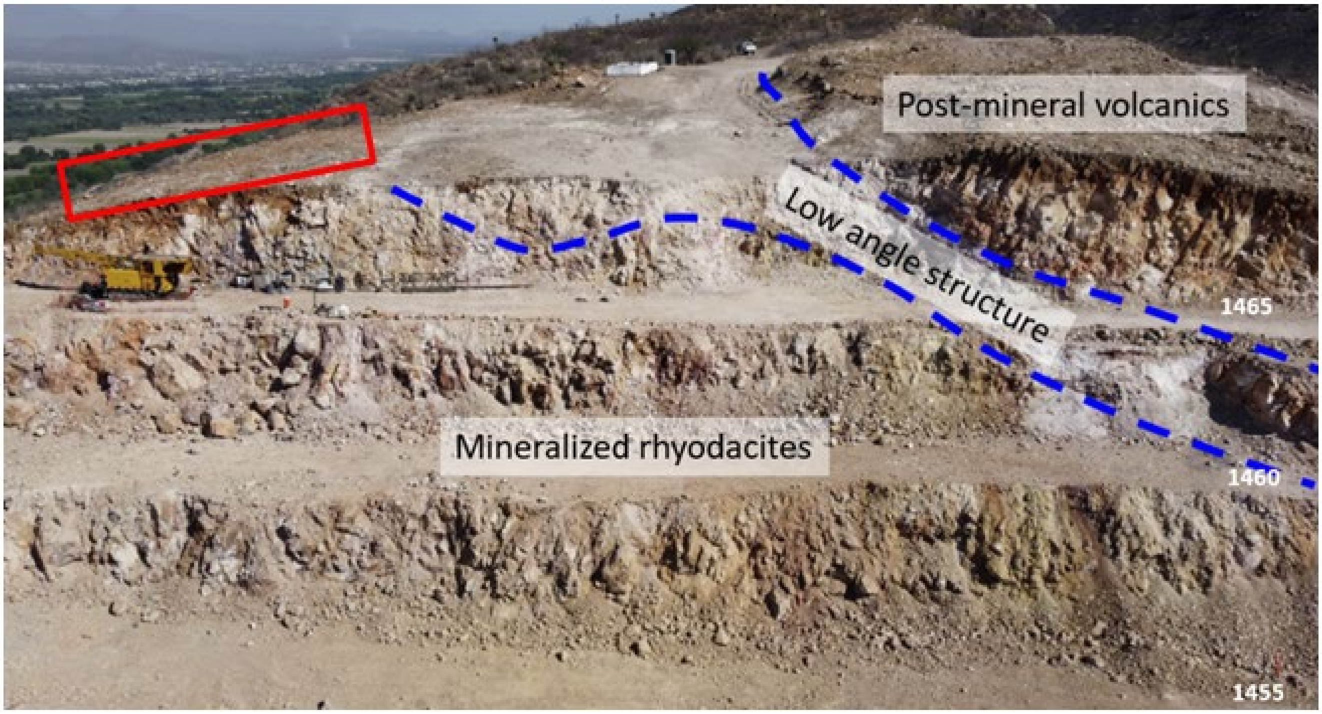


Figure 9-1: Rodeo trenching and pit highwall (looking NW)

A total of 178 samples were collected from the trenches and submitted to ALS Chemex for Au-AA24 and ICP ME-41 analysis. The samples have a mean Au grade of 0.55 g/t and a mean Ag grade of 1.40 g/t. A summary of the significant trench samples (Au greater than 1.0 g/t) is shown below in **Table 9-1**.

Table 9-1: Significant high-grade trench intervals

Trench ID	Sample ID	From	To	Au (g/t)	Ag (g/t)
ZRDOC-1N	1500024	11.98	14.22	3.76	14.90
ZRDOC-4N	1500121	53.88	56.71	2.74	6.60
ZRDOC-4N	1500117	44.84	48.02	2.21	1.50
ZRDOC-2S	1500212	29.07	32.05	1.90	1.90
ZRDOC-00	1500019	43.79	46.69	1.77	3.80
ZRDOC-1S	1500135	43.96	47.07	1.74	2.70
ZRDOC-1S	1500136	47.07	50.04	1.73	2.30
ZRDOC-2N	1500054	26.94	29.73	1.70	4.90
ZRDOC-2N	1500045	0.00	3.46	1.61	7.60
ZRDOC-00	1500016	35.11	38.17	1.51	1.30
ZRDOC-3N	1500091	50.72	52.72	1.41	3.60
ZRDOC-5N	1500159	51.11	54.15	1.33	1.10
ZRDOC-3N	1500087	43.31	45.92	1.26	0.40
ZRDOC-4N	1500098	19.76	23.04	1.26	1.30
ZRDOC-1S	1500124	6.60	9.74	1.24	1.80
ZRDOC-1N	1500036	50.24	52.99	1.17	1.30
ZRDOC-1N	1500034	43.90	47.00	1.15	3.50
ZRDOC-1N	1500039	59.98	63.14	1.14	0.90
ZRDOC-3N	1500079	21.41	24.56	1.14	2.40
ZRDOC-2N	1500064	54.63	57.58	1.08	2.00
ZRDOC-1N	1500022	3.68	6.88	1.01	5.30
ZRDOC-1N	1500023	6.88	11.97	1.03	3.30
ZRDOC-1N	1500024	11.98	14.22	3.76	14.90
ZRDOC-4N	1500121	53.88	56.71	2.74	6.60
ZRDOC-4N	1500117	44.84	48.02	2.21	1.50
ZRDOC-2S	1500212	29.07	32.05	1.90	1.90
ZRDOC-00	1500019	43.79	46.69	1.77	3.80
ZRDOC-1S	1500135	43.96	47.07	1.74	2.70
ZRDOC-1S	1500136	47.07	50.04	1.73	2.30
ZRDOC-2N	1500054	26.94	29.73	1.70	4.90
ZRDOC-2N	1500045	0.00	3.46	1.61	7.60
ZRDOC-00	1500016	35.11	38.17	1.51	1.30

9.2 Geochemistry

Golden Minerals compiled historic rock, soil, and stream sediment samples collected by previous operators. All location data was converted into UTM WGS84 datum, Zone 12 North, to allow samples to be visualized for the identification of additional Au-Ag occurrences within the property boundary.

In total 1,600 rock chip and channel samples, excluding the trenches, have been collected from the Rodeo Project. They show evidence for a large low-sulfidation epithermal system emplaced along a large NW-SE striking fault system.

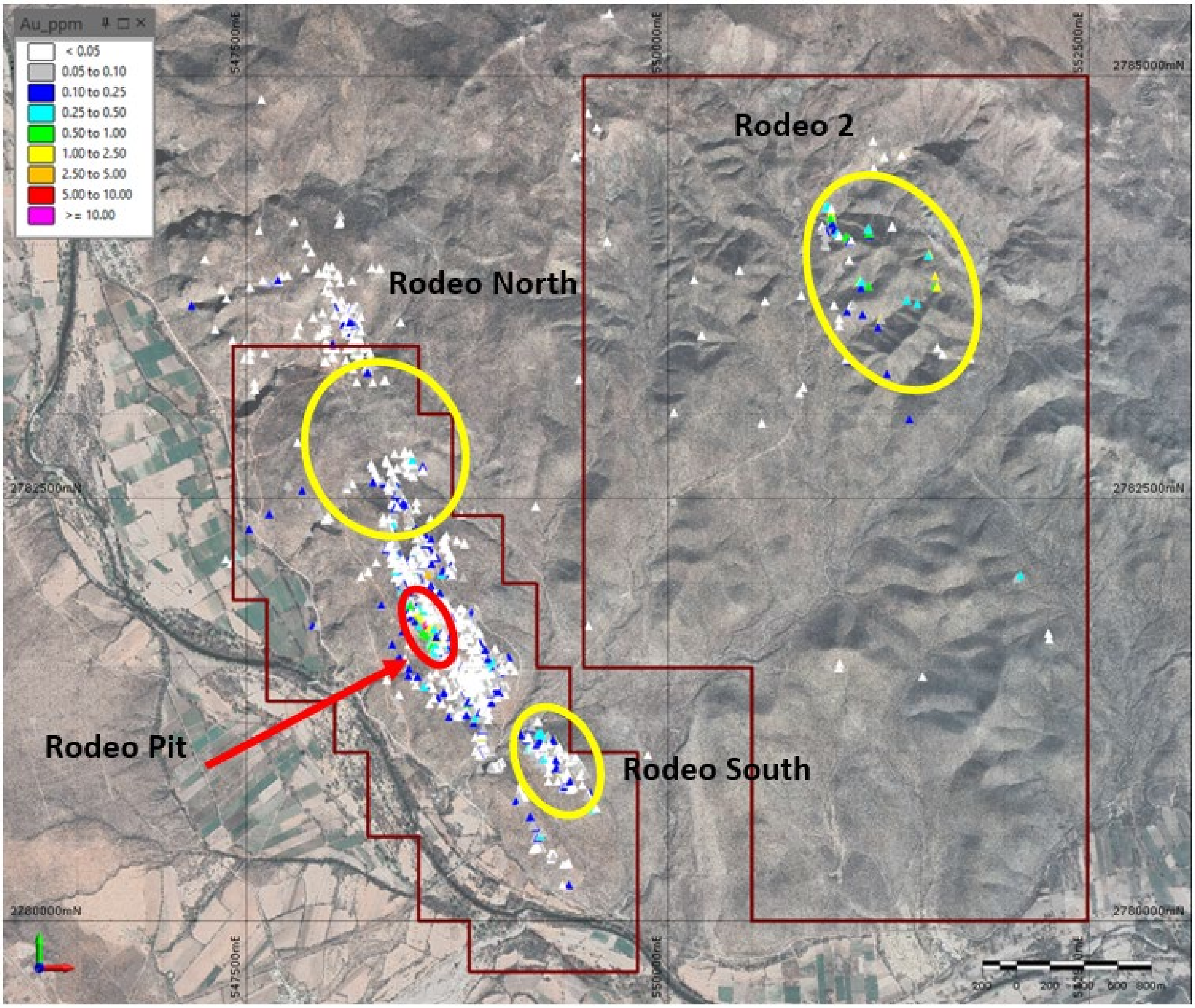


Figure 9-2: Rodeo property rock samples, Au values (ppm), and exploration targets (yellow)

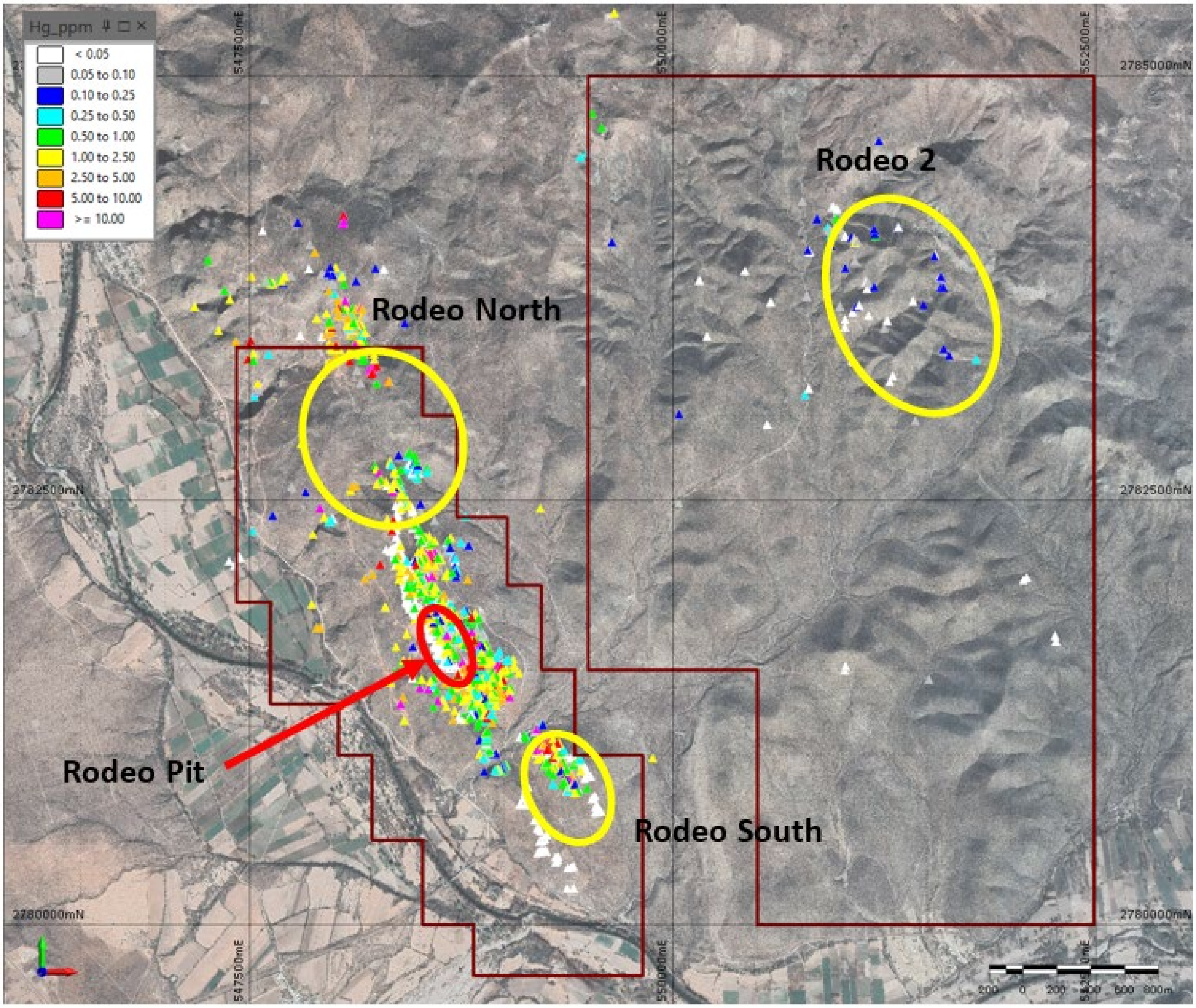


Figure 9-3: Rodeo property rock samples, mercury values (ppm), and exploration targets (yellow)

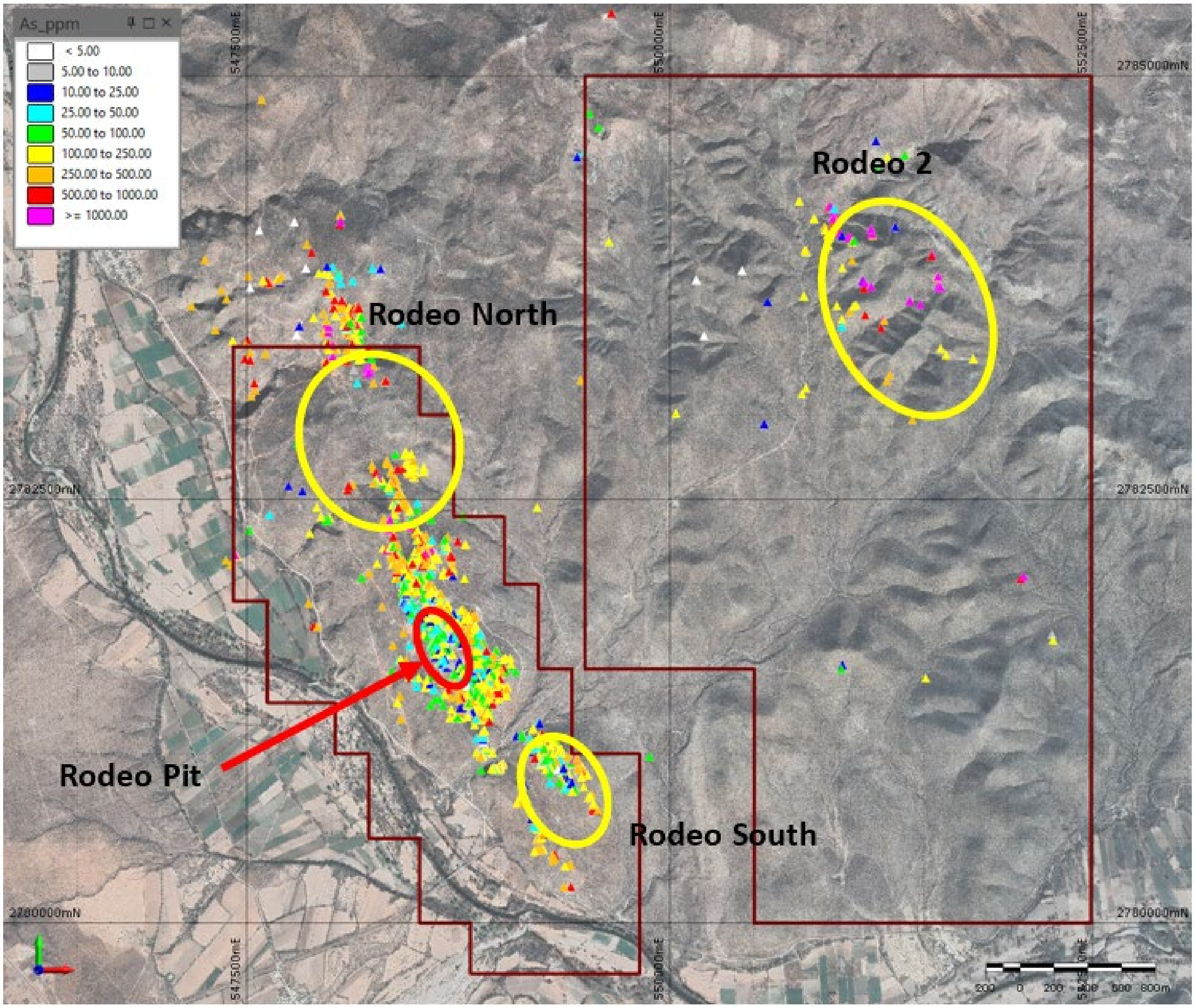


Figure 9-4: Rodeo property rock samples, arsenic values (ppm), and exploration targets (yellow)

Mercury and arsenic show large coincident anomalies along the Rodeo trend, suggesting that there could be additional preserved/shallowly eroded low-sulfidation epithermal systems along this fault system.

9.2.1 Rodeo North Target

The Rodeo North target consists of a 300 m x 30 m area of stockwork veined breccias along the contact of the limestones and rhyolites. All veining is high-level chalcedonic veins with minor sulfide casts.

9.2.2 Rodeo South Target

The Rodeo South target consists of a 400 m long by 100 m wide zone of brecciation, silicification, and multi-stage chalcedonic quartz veining (up to 5-6 m thick), with Fe oxide staining and local argillic alteration developed in strongly silicified rhyolites.

9.2.3 Rodeo 2 Target

The Rodeo 2 target is located 3.5 km to the northeast of the Rodeo pit. The geology is dominated by a series of basalts, rhyolite tuffs, andesites, and mafic dykes emplaced into and upon a series of Cretaceous sandstones, mudstones, and limestones of the Mezcalera formation.

Au mineralization appears to be associated with a series of mafic dykes, plugs, and breccias developed in silicified sediments. The mineralization is developed along several N-NW trending zones occurring in an area at least 4 km long by 1.2 km wide. The Au mineralization occurs within silica and clay alteration associated with disseminated pyrite within the dykes and in silicified breccias in the sediments along the dyke contacts.

9.3 Regional ASTER Studies

In 2021 Golden Minerals contracted Fathom Geophysics to conduct a regional Sentinel-2 and ASTER data study over the Rodeo project to identify characteristic alteration signatures associated with mineral systems in the Rodeo Mining District in central Durango State, Mexico.

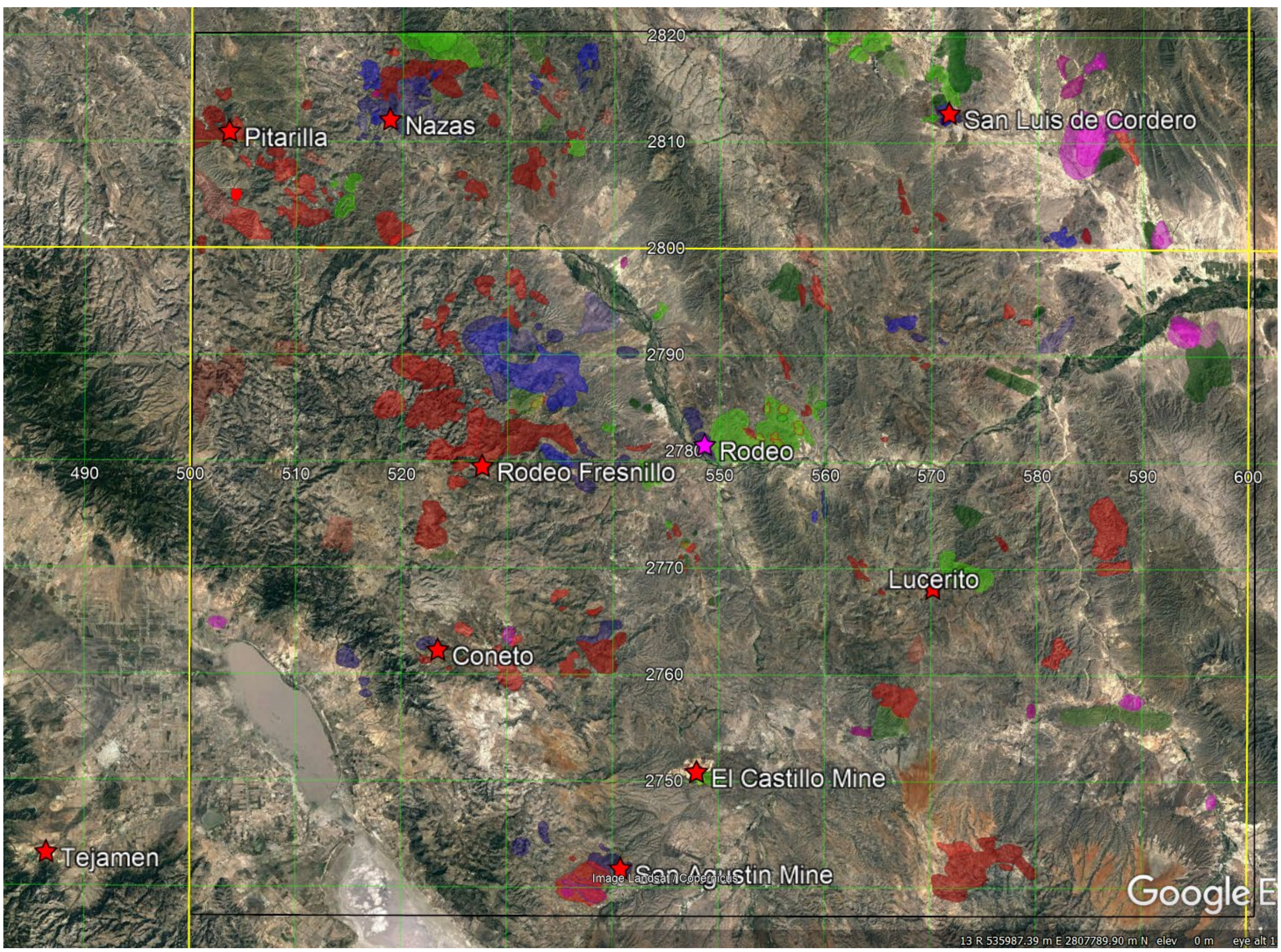


Figure 9-5: ASTER regional anomalies. Image showing areas that appear to contain potentially significant alteration zones

The polygons are shown over the Sentinel-2 true color image and correspond to the following type of alteration: green = pyrophyllite; blue = phyllic; red = argillic/advanced argillic; and magenta = lithocap. The color gradients of dark, intermediate, and light correspond to strong, moderate, and weak alteration, respectively. Highlighted are major mines and undeveloped projects in the Rodeo Mining District.

The study showed large phyllic and argillic anomalies associated with several large volcanic-hosted gold deposits (Pitarilla, San Agustin, Rodeo–Fresnillo), and phyllic and pyrophyllite anomalies associated with low-sulfidation epithermal deposits (Coneto and Rodeo). The study also showed several unexplored alteration systems that could host gold mineralization.

10. DRILLING

The project database contains 199 exploration drill holes, totaling 20,918 m, drilled from 1995 to 2021. Of the total, 13,083 m were drilled using diamond drilling core (DD) equipment and 7,835 m with reverse circulation rotary (RC) equipment. **Table 10-1** summarizes the project drilling by company, year, and type.

Table 10-1: Project drilling by company and type

Company	Year	Type	Length (m)
Monarch Resources	1995	RC	2,251
Canplats Resources Corp.	2004	RC	2,396
Canplats Resources Corp.	2007	DD	1,034
Camino Minerals Corp.	2011	DD	6,090
Minera Cordilleras	2016	DD	2,084
Minera Cordilleras	2020	DD	1,414
Minera Cordilleras	2021	RC	3,187
Minera Cordilleras	2021	DD	2,462
Total			20,918

Golden Minerals has continued exploration at the Rodeo site. From 2020-2021, an additional 117 exploration holes were drilled at the site for a total of 7,062 m of core and RC drilling. Diamond drilling was completed by Eco Drilling, utilizing a track-mounted rig with a 1,000 m depth capacity. Drill holes started as HQ size and reduced to NQ where necessary. Three PQ-diameter holes were drilled in 2020 to collect material for metallurgical samples. Reverse circulation drilling was conducted by Major Drilling utilizing a MX-47 rig.

Surface drill hole collar locations were surveyed by handheld GPS and by a professional surveyor with the aid of a differential GPS and total station. Drill hole orientations were established by measurements of casing using a field compass. For diamond drill holes the down-hole survey was conducted with a magnetic Reflex instrument. For the reverse circulation holes, down-hole surveys were conducted with an Axis gyro.

Drilling is reported to be slow and difficult given the high level of silicification. Recovered core is broken with many zones of rubble. Measurements indicate recovery is high but based on visual review, rock quality designation (RQD) is low.

Figure 10-1 shows typical recovery and RQD.

Figure 10-1: Typical drill hole recovery and RQD (RDO-20-090)

Drill holes located on site are shown in **Figure 10-2**. The name, location, and associated surface information for the drilling are available in **Appendix A** and significant drilling intercepts are available in **Appendix B**.

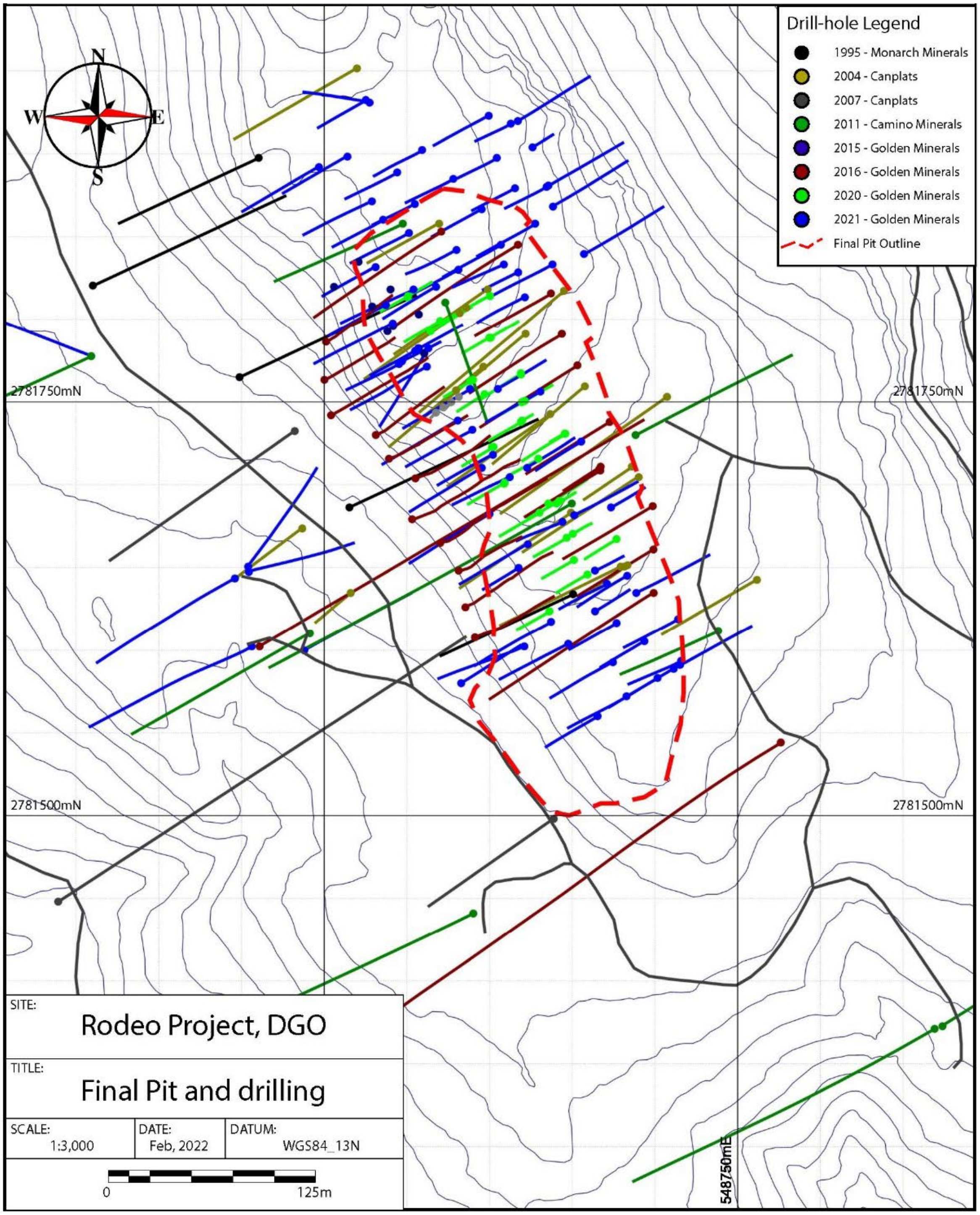


Figure 10-2: Drill hole location map

11. SAMPLE PREPARATION, ANALYSES, AND SECURITY

Data summarized in this section and utilized for estimation of Resources was collected by Golden Minerals staff. The sample preparation, analyses and security procedures implemented by Golden Minerals meet standard practices. The data collected is of adequate quality and reliability to support the estimation of Mineral Resources. Only project-level staff are involved with the selection, preparation, and delivery of samples to the laboratory.

Exploration and sampling at the property have been carried out by several companies over several campaigns, including open pit mining operations by Golden Minerals that commenced in late December 2020. Descriptions of the activities from previous explorers are available in reports by Pryor and Blackwell, McNaughton, Durning, and Hillemeyer, and Blanchflower. **Table 11-1** summarizes the various sampling activities from 1995 to present.

Table 11-1: Project sampling campaigns

Company	Year	Type	No. of Samples	Analytical Lab	Au Procedure	ICP Procedure	QA/QC	Comment
La Cuesta\ Monarch	1995	Rock	~1,400	Bondar Clegg	Unknown	Unknown	Unknown	Sub-crop sampling on 200 by 25 grid
Monarch	1995	RC	1,076	Bondar Clegg	Unknown	*Aqua Regia*	Mentioned, no records available	Half split of 2 m intervals at the rig further reduced to 5 kg
Canplats	2003	Rock	422	Bondar Clegg	Unknown	Unknown	Unknown	2 km along Rodeo fault
Canplats	2004	RC	2,161	Chemex	Au-AA23, Au-GRA21,	ME-ICP61, four acid	5% duplication, no records available	Two eighth splits of 1 m interval using 10 ft. rods
Canplats	2004	Pulp Au Screen	189	Chemex	Au-SCR21	NA	NA	Testing of BR series drill holes pulps
Canplats	2007	Core	437	Chemex	Au-AA23, Au-GRA21	ME-ICP61, four acid	Standard practice, no records available	Half splits of HQ and NQ core
Camino	2011	Core	1,886	ALS Chemex	Unknown	ME-ICP41, *Aqua Regia*	Unknown	2010 Technical Report pre-dates drilling
Minera Cordilleras	2015	Trench	178	ALS Chemex	Au-AA24, Au-GRA22	ME-ICP41, *Aqua Regia*	See Text	1-inch-wide channel cut with saw chipped with hammer
Minera Cordilleras	2016	Core	1,756	ALS Chemex	Au-AA24, Au-GRA22	ME-ICP61, four acid	See Text	Half splits of HQ and NQ core
Minera Cordilleras	2016	Pulp Duplicate	94	ALS Chemex	Au-AA24, Au-GRA22	ME-ICP61, four acid	NA	Duplicate testing of BR series drill hole pulps

Company	Year	Type	No. of Samples	Analytical Lab	Au Procedure	ICP Procedure	QA/QC	Comment
Minera Cordilleras	2020	Core	1,058	ALS Chemex	Au-AA23, Au-GRA21	NA	10% QAQC samples	Half split of HQ, some half split of PQ core
Minera Cordilleras	2020	Surface & Pit High Wall	27	Velardeña Lab	Fire Assay AA	NA	5% QAQC samples	Rock chip samples
Minera Cordilleras	2020-2021*	Pit Blastholes	9,712	Velardeña Lab	Fire Assay AA	NA	10% QAQC samples	Air core blasthole rig recovered chip samples
Minera Cordilleras	2021	Core	2,952	ALS Chemex	Au-AA23, Au-GRA21	NA	10% QAQC samples	Half split of HQ core
Minera Cordilleras	2021	RC	1,783	ALS Chemex	Au-AA23, Au-GRA21	NA	10% QAQC samples	Reverse circulation recovered rock chip samples
Minera Cordilleras	2021	Surface & Pit High Wall	501	Velardeña Lab	Fire Assay AA	NA	5% QAQC samples	Rock chip samples

**Number of blastholes for 2020-2021 as of Resource cutoff date 31-October-2021*

11.1 Sample Preparation

11.1.1 Drill Core

Diamond drill core is transported by truck from the rig to the core preparation site located in the town of Rodeo. Following geotechnical logging by field assistants, geologists log the core and select sample intervals. Sample intervals are selected only where the geologist anticipates mineralization to exist. In practice, the core is sampled extensively, but is not sampled continuously from top to bottom (note most holes from the 2020 and 2021 drilling campaigns were sampled from collar to end depth). Drill core that is selectively unsampled can be considered waste; however, no numeric value or null place holder is inserted in the project database. Sample selection begins and terminates at alteration or lithologic contacts, sampled at a minimum length of 20 cm and a maximum of 2 m, with a few exceptions exceeding 4.0-5.0 m. During the process of sample selection, the geologist draws a centerline to guide the core cutters. The center line is rotated by the geologist to align with the apex of observable vein structures to minimize sample selection bias.

A sample sheet is provided to the core cutters containing sample numbers and from/to intervals. In addition to a cut sheet, the sample number and interval are annotated on the white plastic core box using a marker as shown in **Figure 11-1**. Sample numbering begins where the previous sample batch left off. The core cutters have been instructed to cut the core down the marked centerline using an electric powered wet diamond saw, and to always place the right-hand portion of the cut core in the sample bag. Sections of broken core or low recovery are carefully divided to reduce bias; however, these sections are inherently less reliable than sections of competent core. The core cutters write the sample number using a marker on a clear plastic bag and tie off the bag using twine. A tear-away sample tag system has been implemented since Golden Minerals started drilling in 2016. Five samples are grouped and placed in a large rice sack. The beginning and ending numbers of the five samples contained in the sack are written on the outside of the bag. The sack is tied shut with twine when full.

Figure 11-1: Drill core sampling

11.1.2 RC Drill Cuttings

An RC drill rig was used for part of the 2021 drilling campaign in addition to a core drilling rig. The RC drill rig allowed for faster drilling of the deposit area where the geology, alteration, and structures were well known. Like the core sampling above, the resulting rock chips are placed in plastic trays and logged by the geologist. Samples were collected and organized on 2.0 m regular intervals for the entire hole. A rotary splitter was used to better split the material to a representative sample, reducing the sample by 75% down to a 25% sample. Clear sample bags were then filled with 5-6 kg of sample material, tagged using a sample book, sample number written on the sample bag, and then transported to ALS Chemex's samples preparation facility in Chihuahua, Chihuahua and assayed at ALS Chemex's analytical lab in Vancouver, Canada.

11.1.3 Trenches

Trench samples were cut using a gasoline powered diamond saw and chipped into sample bags using a rock hammer. Care was taken to cut continuous samples but in many cases the terrain and vegetation caused gaps to exist in the lines. The trench lines are assumed to be continuous with only runs of unsampled lengths greater than approximately 1 m being identified. Preparation, analyses, and security of trench and drill hole sampling are the same from placing the material in a clear plastic bag onward, with the one exception being the trench samples that were analyzed with ME ICP41 using *aqua regia*. The results of the multi-element analysis are not equivalent to the drill hole data that was analyzed using ME ICP61 that used four-acid near complete digestion. The trench samples were transported to ALS Chemex's samples preparation facility in Chihuahua, Chihuahua and assayed at ALS Chemex's analytical lab in Vancouver, Canada.

11.1.4 Blastholes

Blasthole drilling and sampling commenced in December of 2020 with the start of the open pit mining operation. The blastholes are drilled with a track-mounted air core rig which produces core cuttings very similar to an RC drill rig. The blastholes are drilled on a 5 m bench height with a single sample per blasthole (note there are some exceptions to shorter or longer blasthole samples due to the location of the blasthole on topography as well as some double benching). Sample material is collected in a specially designed geometric pan, and subsequent splitter, which helps collect a more representative sample. Sample material is then filled in a clear plastic bag, tagged using a sample book, sample number written on the sample bag, and then transported to the Velardeña lab for analysis of Au and Ag. The sample weights vary depending on the length of the blasthole, with 5 m samples weighing around 4-7 kg.

11.1.5 Surface and Pit Highwall

Surface and pit high wall samples are collected on the property and around the pit area. Samples are collected by rock hammer or circular saw, typically on structures or alternation zones. Sample material is then filled in a clear plastic bag, tagged using a sample book, sample number written on the sample bag, and then transported to the Velardeña lab for analysis of Au and Ag. The sample weights are generally around 4-7 kg.

11.2 Security

The core preparation facility is in the town of Rodeo and is enclosed by a cement wall and locked gate. Samples awaiting delivery to the ALS preparation facility in Chihuahua are further stored within a locked building in the facility when staff is not present. Samples are delivered to ALS Chemex in Chihuahua city, Chihuahua, Mexico (ALS Chihuahua) by Golden Minerals staff by road as needed.

11.3 Analyses

Sample batches are delivered to ALS Chihuahua for preparation and then shipped to Vancouver, British Columbia, Canada (ALS Vancouver) for analysis. The ALS Vancouver laboratory is independent of Golden Minerals and is ISO 17025 accredited, the accreditation of ALS Vancouver encompasses preparation processes completed at ALS Chihuahua.

Samples are initially analyzed for Au using fire assay with atomic absorption spectroscopy finish (AA24) with re-run for values exceeding 10 g/t Au using fire assay with gravimetric finish (GRA22).

Drill hole samples were analyzed for the basic multi-element suite using four-acid digestion followed by inductively coupled plasma-atomic emission spectroscopy (ME-ICP61). Trench samples were analyzed for the basic multi-element suite using *aqua regia* followed by inductively coupled plasma-atomic emission spectroscopy ME ICP41. Samples initially exceeding 100 g/t Ag are re-run using (Ag-OG62). Note that samples from the 2020 and 2021 drilling campaigns were only analyzed for Au and Ag using ALS Chemex.

Analysis flow is further described in graphic form in **Figure 11-2**.

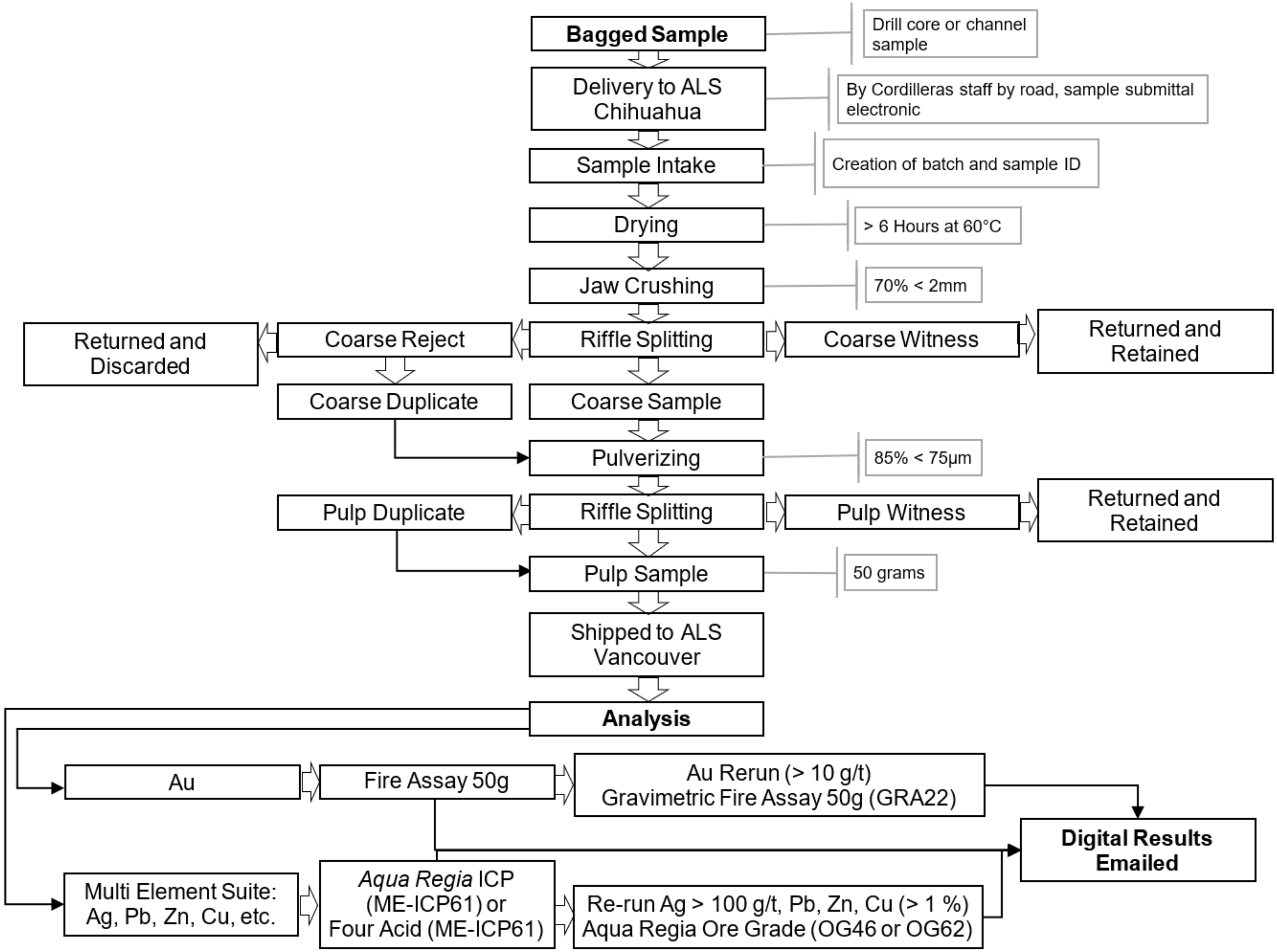


Figure 11-2: Sample analysis flow diagram

11.4 Quality Assurance and Quality Control for Sample Analysis

Golden Minerals' quality assurance (QA) measures involve the use of standard practice procedures for sample collection for drill core/RC, channel, surface, and blastholes samples as described above. This includes supervision by experienced geologic staff during the data collection process. Quality control (QC) measures implemented by Golden Minerals include in-stream sample submittal of standard reference material, blank material, and duplicate sampling.

Previous sampling campaigns included the insertion of control samples dictated by the last digit of the sample ID number, the sequence is independent of the drill hole or channel sample set and is continuous through the sampling campaign. For example, the first instance of a drill core sample ID ending in "36" or "86" is a blank sample and is placed in a sample bag rather than a collected core sample. On the next instance of a "46" or "96" the lab is instructed on the sample submittal sheet to create and test a fine duplicate following pulverizing. The next instance of a "06" or "56" the lab is instructed to create a coarse duplicate at the crushing stage. On the next instance of "16" or "66" a low-grade standard sample is placed in the sample bag instead of a collected sample and the next "26" or "76" a high-grade standard. For the 2016 drill campaign 1,756 core samples were submitted and 188 control samples were submitted for a submittal rate of about one control sample for every ten normal samples (see **Table 11-2**).

Table 11-2: Control sample submittal count drill hole campaign

Control Sample Type	Count
Standard High-Grade SP-49	38 (10 invalid; not rerun)
Standard Low-Grade SE-44	38
Fine Duplicate	37
Coarse Duplicate	38
¼ Core Field Split	-
Blank	37
Total	**188**

The more recent sampling (2020-2021 campaigns) employed a similar, but updated, QA/QC workflow procedure using regularly inserted blanks, duplicates, and standards on fixed sample numbers, accounting for approximately 10% of samples as control samples for drill holes and about 5% for blastholes. Standard material (CRM) from OREAS was used as it demonstrated greater performance and accuracy compared to other CRM brands used in the past (ex. Rock Labs). All standards used were checked thoroughly by both the on-site Velardeña lab and by ALS Chemex to ensure their integrity. Blank material was purchased and thoroughly tested by both ALS Chemex and the Velardeña lab to ensure the absence of Au and Ag. The blank material was stored in a safe and secure location, away from sample preparation areas to prevent contamination, with material pre-packaged into individual plastic bags to be inserted into the sample stream. Coarse duplicates were prepared in the field using a splitter to reduce potential sample bias. Additionally, umpire check assays of the on-site Velardeña lab are performed regularly by ALS Chemex to ensure the quality of the results.

11.4.1 Quality Control Sample Performance

Historical QC sample performance was generally tracked throughout the campaign by Golden Minerals staff and no major issues were observed. It was recommended that standard reference material with a grade closer to the Resource average for Au and Ag be sourced and tested more frequently to provide a consistent baseline. The use of standard SP-49 has been discontinued because no in-stream samples triggered the +10 Au g/t rerun; however, this SP-49 is 18.3 Au g/t and tests the performance of the GRA22 only. Submitting this standard did not track relevant lab performance.

Relevant QC sample performance is summarized below. Two standard references were implemented for testing and the certified values for each is shown in **Table 11-3** and **Table 11-4** below.

Table 11-3: Au standard reference material certified values

Standard	Source	Standard Grade g/t	95% Confidence Interval	Standard Deviation	Tested Count	Tested Mean	Tested Median
SE-44	RockLabs	0.61	0.006	0.017	38	0.58	0.60
SP-49	RockLabs	18.34	0.120	0.340	38	18.20	18.18

Table 11-4: Ag standard reference material certified values

Standard	Source	Standard Grade g/t	95% Confidence Interval	Standard Deviation	Tested Count	Tested Mean	Tested Median
SE-44	RockLabs	NA	NA	NA	38	NA	NA
SP-49	RockLabs	60.2	1	2.5	38	61	60

Standard performance is shown in **Figure 11-3** and **Figure 11-5**. Three failures based on poor performance for SE-44 were considered batch failures; the batches were evaluated by Golden Minerals staff.

Table 11-5: Au standard reference material control analysis

Standard	Count	Outliers	Failures
SE-44	38	1	3
SP-49	38 (10 not rerun)	6	0

Table 11-6: Ag standard reference material control analysis

Standard	Count	Outliers	Failures
SE-44	38	0	0
SP-49	38	6	0

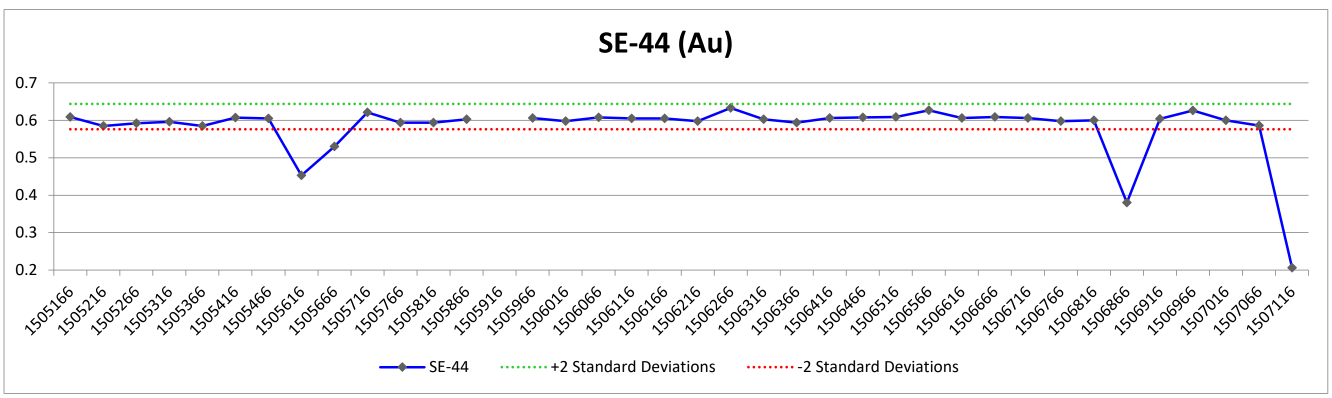


Figure 11-3: Standard performance SE-44 Au

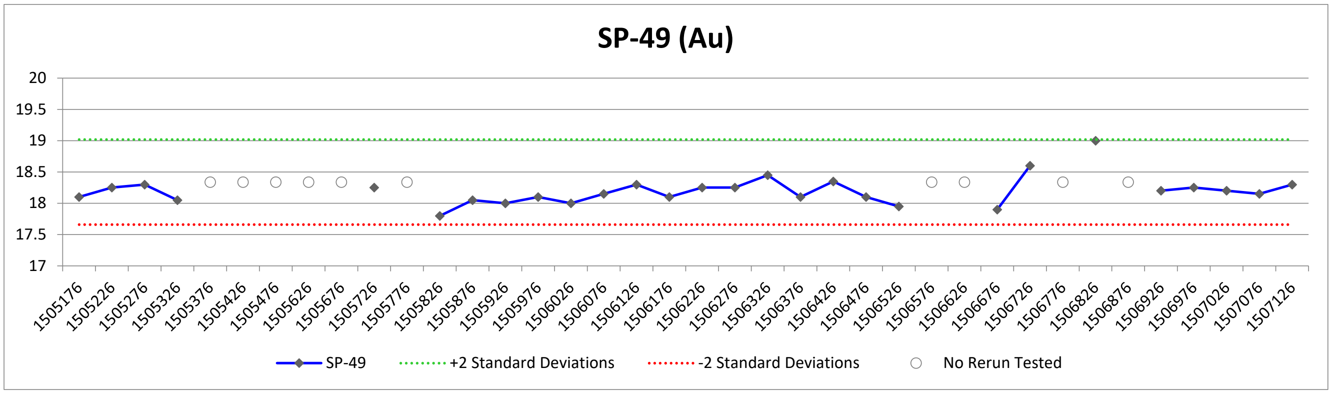


Figure 11-4: Standard performance SE-49 Au

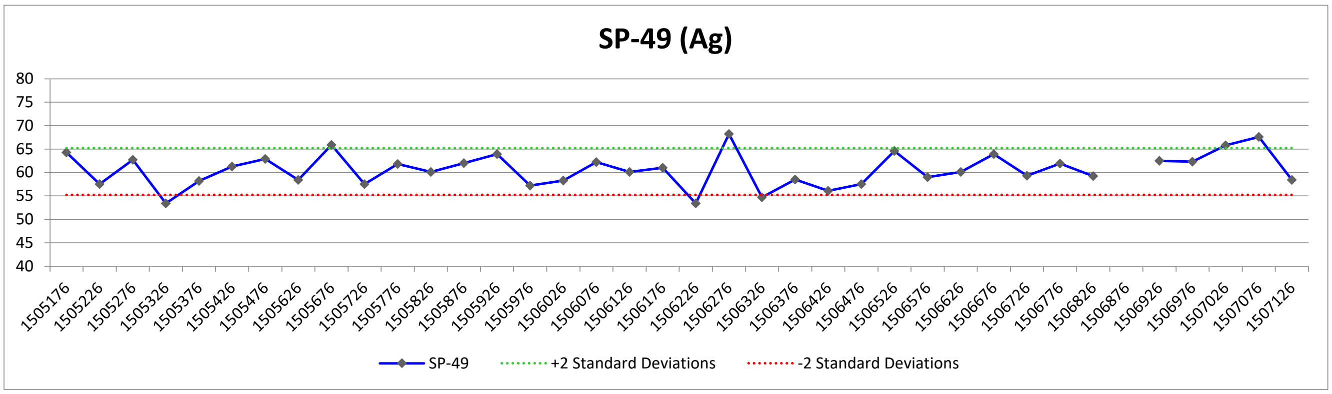


Figure 11-5: Standard performance SE-49 Ag

Currently used standards include OREAS 237 and 239 Au with the focus on Au values, as Au is the primary element of interest at Rodeo. The certified values for Ag are close to or below the lower detection limit (3.0 g/t Ag) for the analytical equipment at the Velardeña lab . Certified reference material that is similar in grade to the OREAS standards are used at the on-site Velardeña lab and the QAQC results are monitored by both the lab staff and senior Golden Minerals staff. Excerpts of standard performance for OREAS 237 and 239 Au can be seen in **Figure 11-6** and **Figure 11-7**.

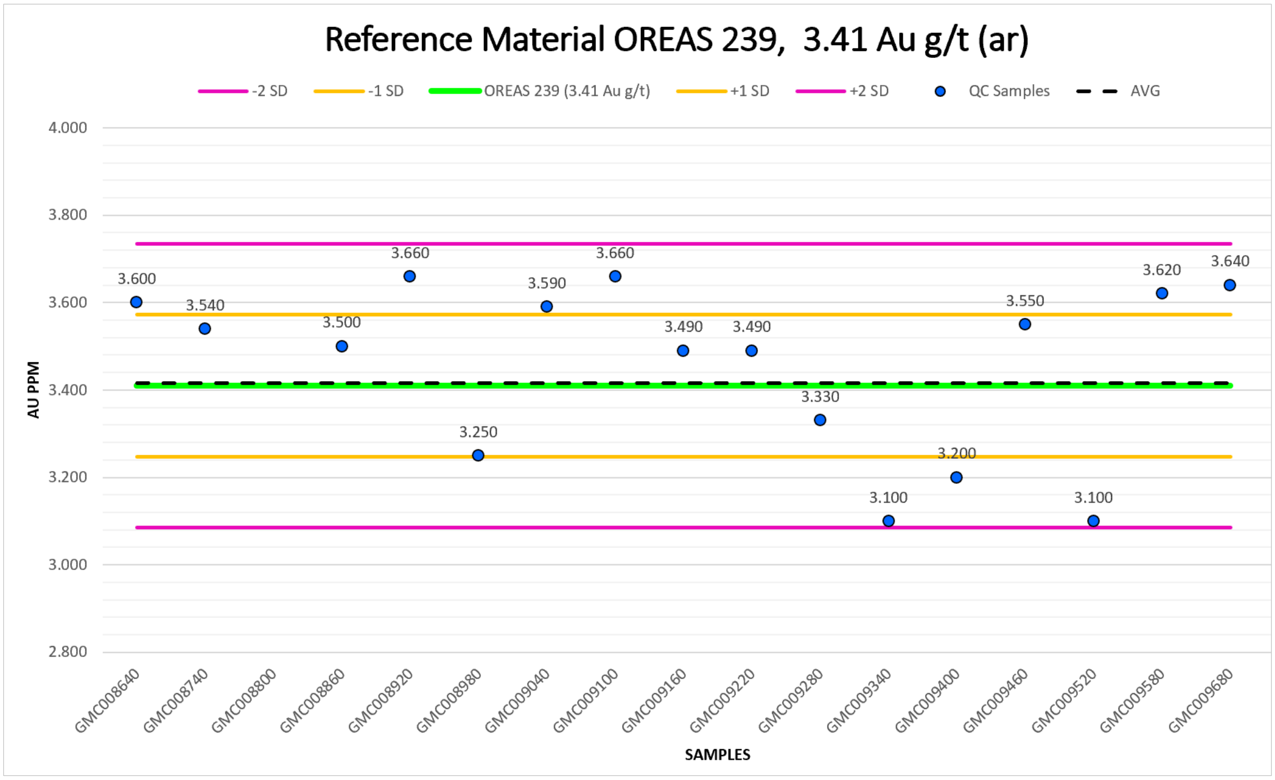


Figure 11-6: Standard performance for OREAS 239 Au

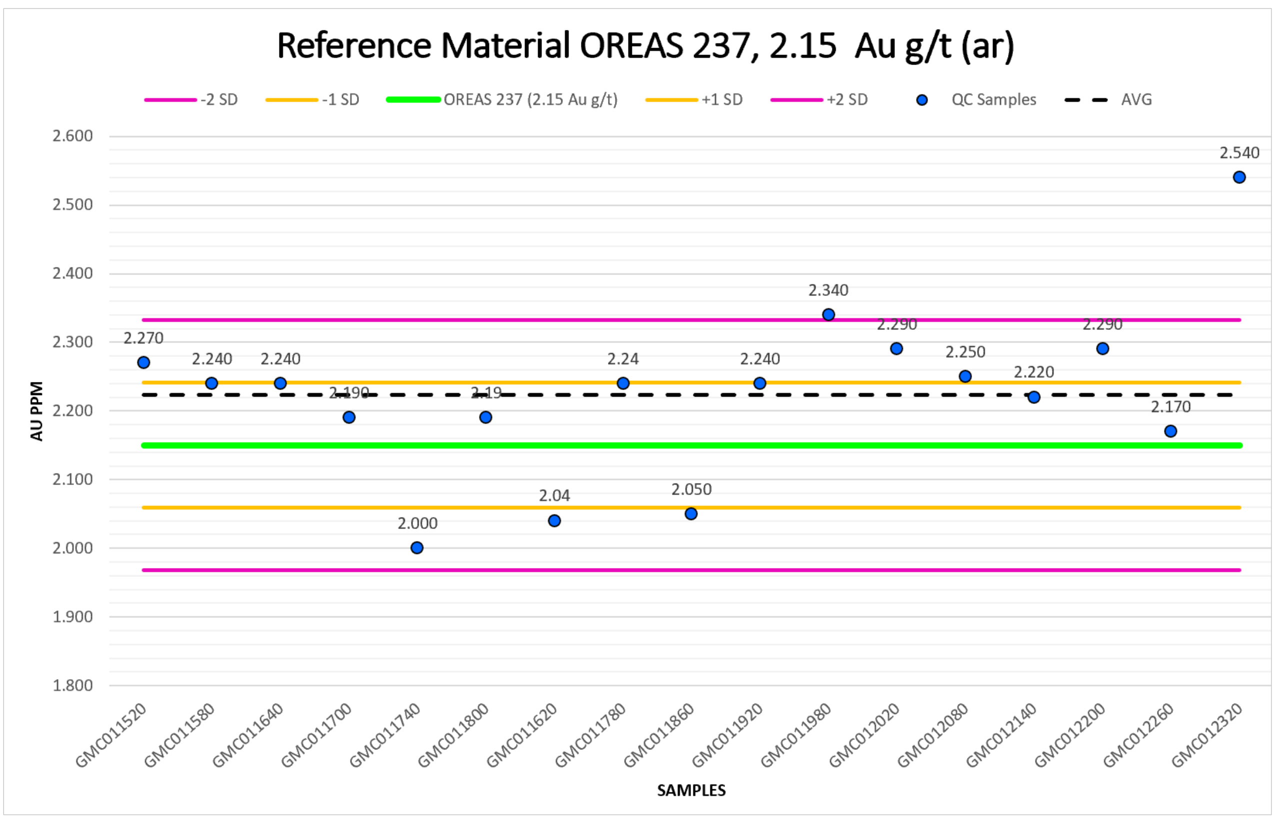


Figure 11-7: Standard performance for OREAS 237 Au

Historical blank material was sourced from barren coarse sand. The performance of the 37 blanks submitted show no failures for Au or Ag. The performance of the blank material has been consistently reliable during testing.

Previous work indicated a contamination of low-grade Ag in the blank material. The material being used for blanks was replaced and was sourced from Abrasivos de Laguna S.A. de C.V. Samples of the new blank material were submitted to both the Velardeña Lab and to ALS Chemex for analysis for Au and Ag to ensure that the material contained minimal Au and Ag. The results were in tolerance for blank material and both labs had similar results. The blank material is stored in a safe and secure location, in a very low contamination area, with material pre-packaged into individual plastic bags to be inserted into the sample stream.

As part of the updated QA/QC procedures, the QA/QC data is reviewed continually to check for problems with the analytical data including reviewing the standard, blank, and duplicate samples. Scheduled analytical maintenance occurs regularly with additional lab checks reviewed by lab management over short-term and long-term schedules.

Figure 11-8 shows historical coarse and fine duplicate performance for Au and **Figure 11-9** shows coarse and fine duplicate performance for Ag. The performance of the fine and coarse duplicates shows good reproducibility for both Au and Ag. Current coarse duplicate performance also shows good reproducibility.

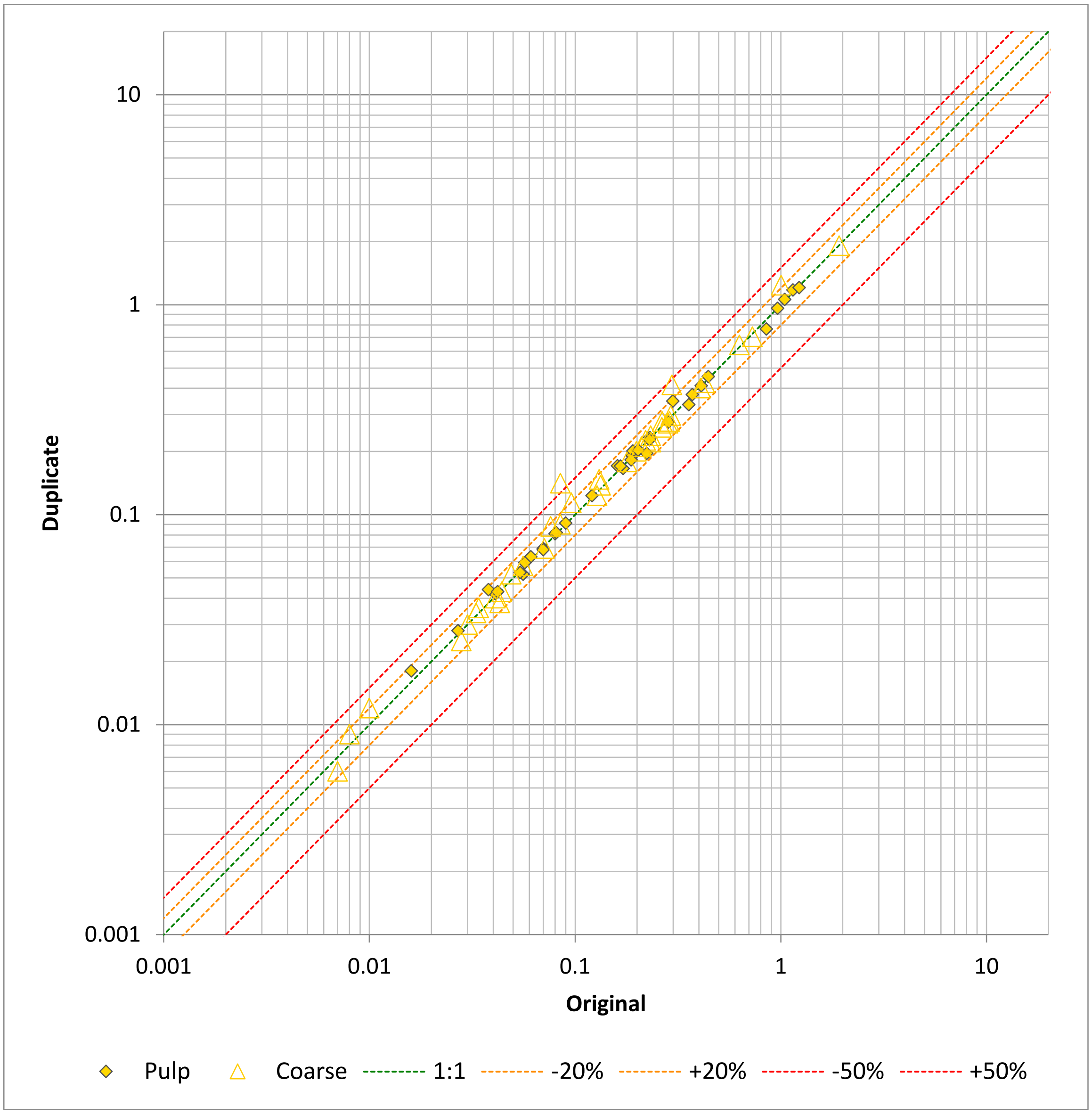


Figure 11-8: Duplicates coarse and fine Au

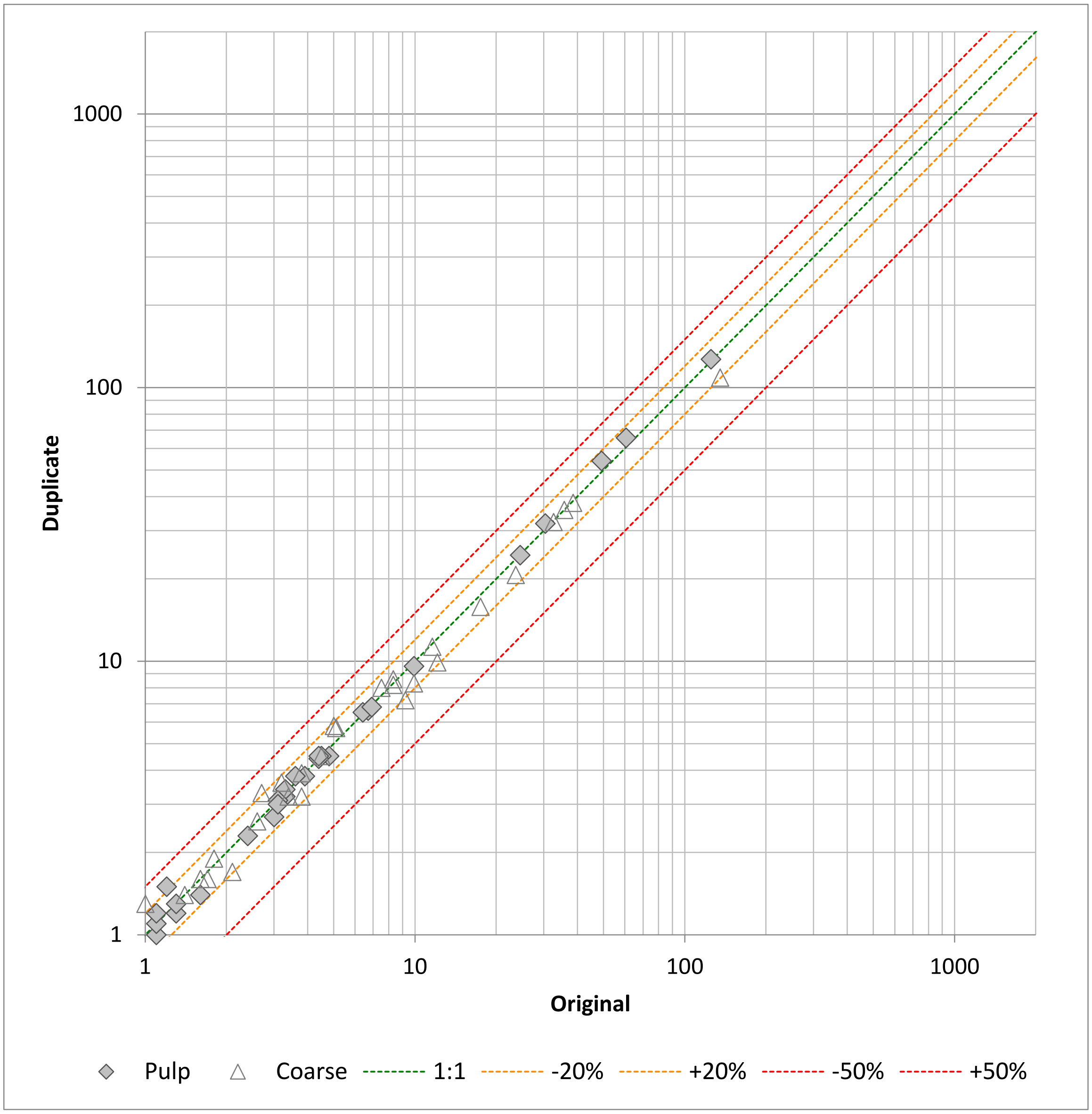


Figure 11-9: Duplicates coarse and fine Ag

Pulp duplicates are analyzed within the drill hole sample stream. Coarse duplicates are prepared in the field using a splitter to reduce potential sample bias. Review of the duplicates indicate good reproducibility. Any noted issues in the standards and duplicates are infrequent and do not suggest invalidation of the results from the on-site laboratory.

12. DATA VERIFICATION

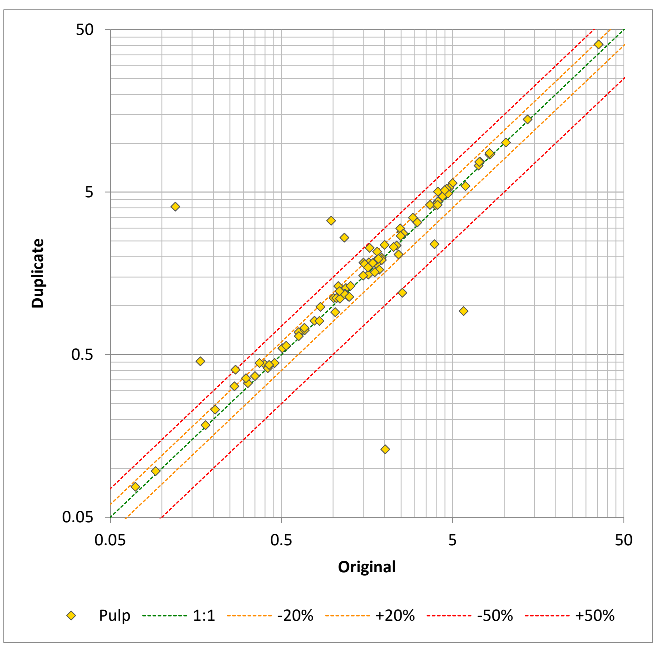
The quality of data collected by Golden Minerals meets industry standard practice and is sufficient to support the estimation of Mineral Resources. Data collected by previous operators has in part been verified by the corroborating data collected by Golden Minerals. Coupled with the data collected by Golden Minerals, data from previous explorers is sufficient to support the estimation of Mineral Resources; however, details regarding historic QA/QC protocols and performance were not available for review. The following section describes steps taken by Tetra Tech to verify data provided by Golden Minerals.

Data verification conducted during the site visit included observations of drill hole collar locations and orientations, drill core, trench sample locations, review of previously drilled core, recently drilled core, and RC chip trays. Mineralization was witnessed in outcrop and orientations were observed. Confirmatory sampling of drill core while conducting the site visit was not deemed necessary because several generations of exploration by past explorers and the drilling campaigns by Golden Minerals have confirmed the presence of mineralization. Limited core resampling has been completed by previous authors and is included in **Table 12-1**.

Drill hole collars and their orientations were observed in the field and a handheld global positioning system (GPS) was used to check their location. Verification of collar locations and orientations were found to correspond to those provided by Golden Minerals.

Core boxes from the following drill holes were reviewed along with the drill logs and analytical results: RDO16-06, RDO16-05, RDO16-13, and RO-11-01. The following chip trays were also reviewed: BR-03, BR-06, and BR-14. The textures observed are typical of epithermal veins including banding of quartz, quartz flooding, brecciation, and minor oxidation. In addition to visually reviewing core on site, Tetra Tech has reviewed core photos of mineralized intervals and spot checked the assay database with the laboratory certificates provided.

For purposes of data verification collected by previous explorers, Golden Minerals reanalyzed 94 pulps from Canplats BR series holes. For both Au and Ag, the duplicated values compared well on a case-by-case basis with the original values stored in the project database. **Figure 12-1** shows scatter plots of the original values vs the duplicated pulp values; Au is shown on the left and Ag on the right. **Figure 12-2** compares the populations by way of a box plots.



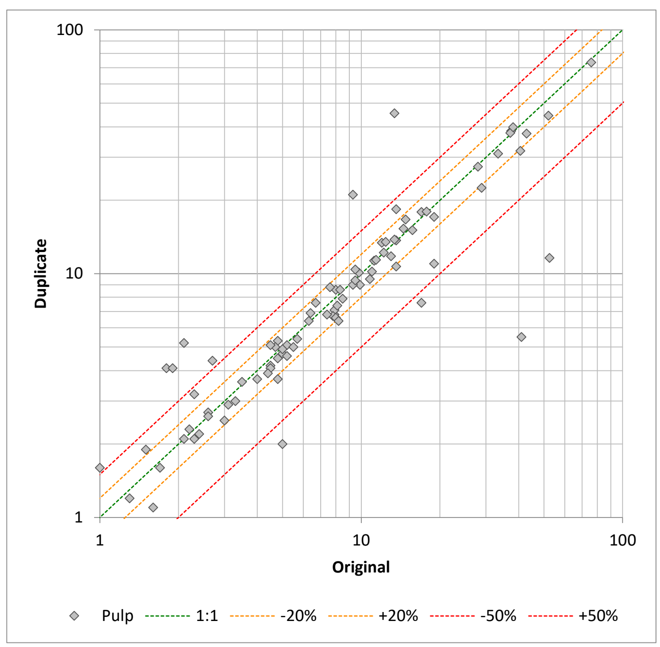


Figure 12-1: Scatter plot Pulp Duplicates

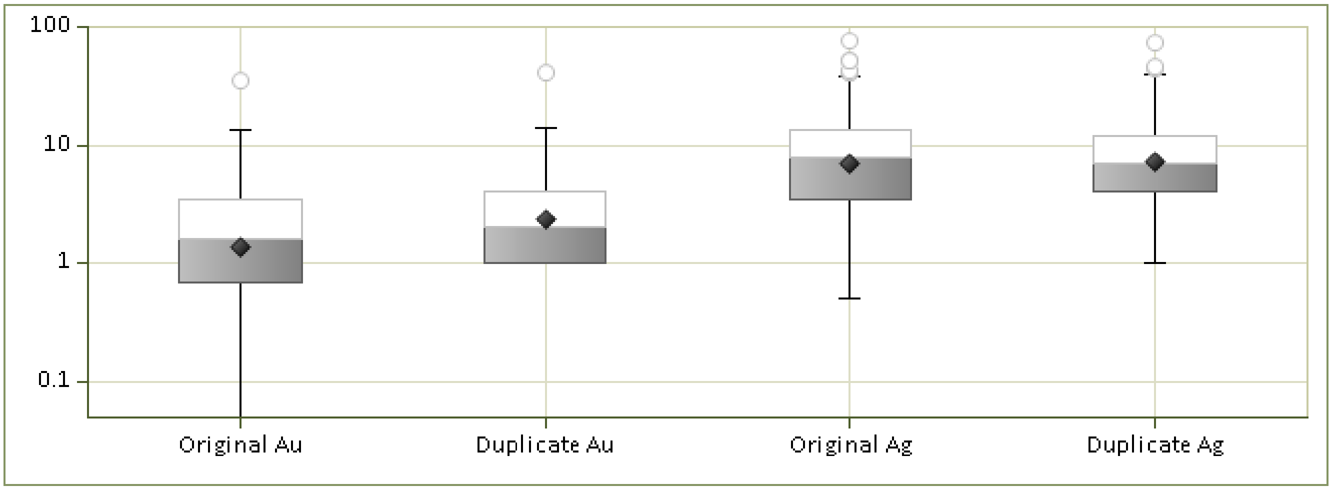


Figure 12-2: Box plot pulp duplicates

Canplats analyzed 189 pulps from the BR drill hole series at Chemex with Au-SCR21 to determine if there was a grade bias between ±100-micron fractions of the pulps. Based on the limited data set, **Figure 12-3** indicates that the undersized (-100-micron fraction) is biased slightly higher. The undersized fraction had a geometric mean of 1.32 and median of 1.2, where the oversized fraction had a geometric mean of 0.99 and median of 1.04. **Figure 12-4** shows a scatter plot on a sample-by-sample basis.

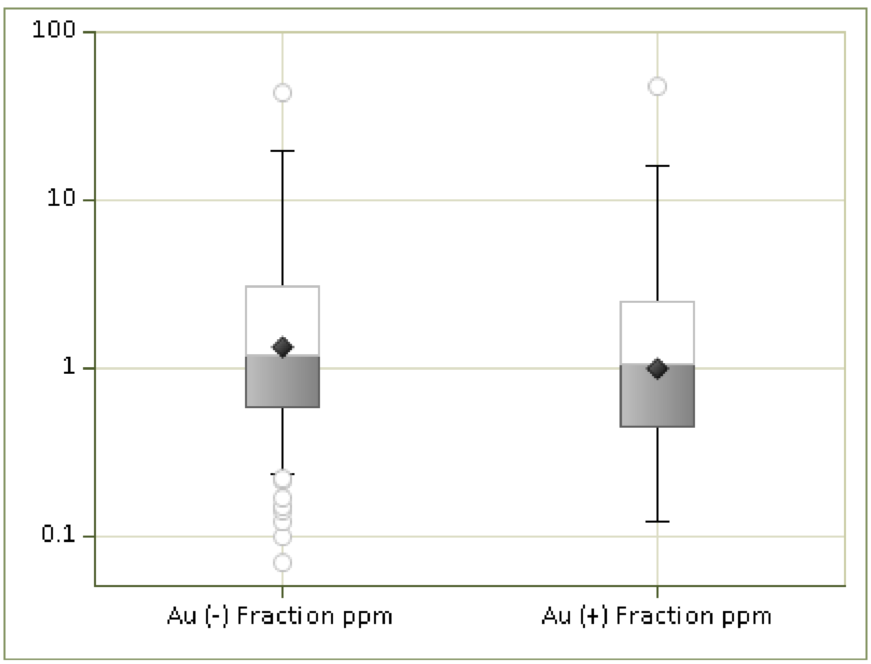


Figure 12-3: Box plot Au screen analysis fraction comparison

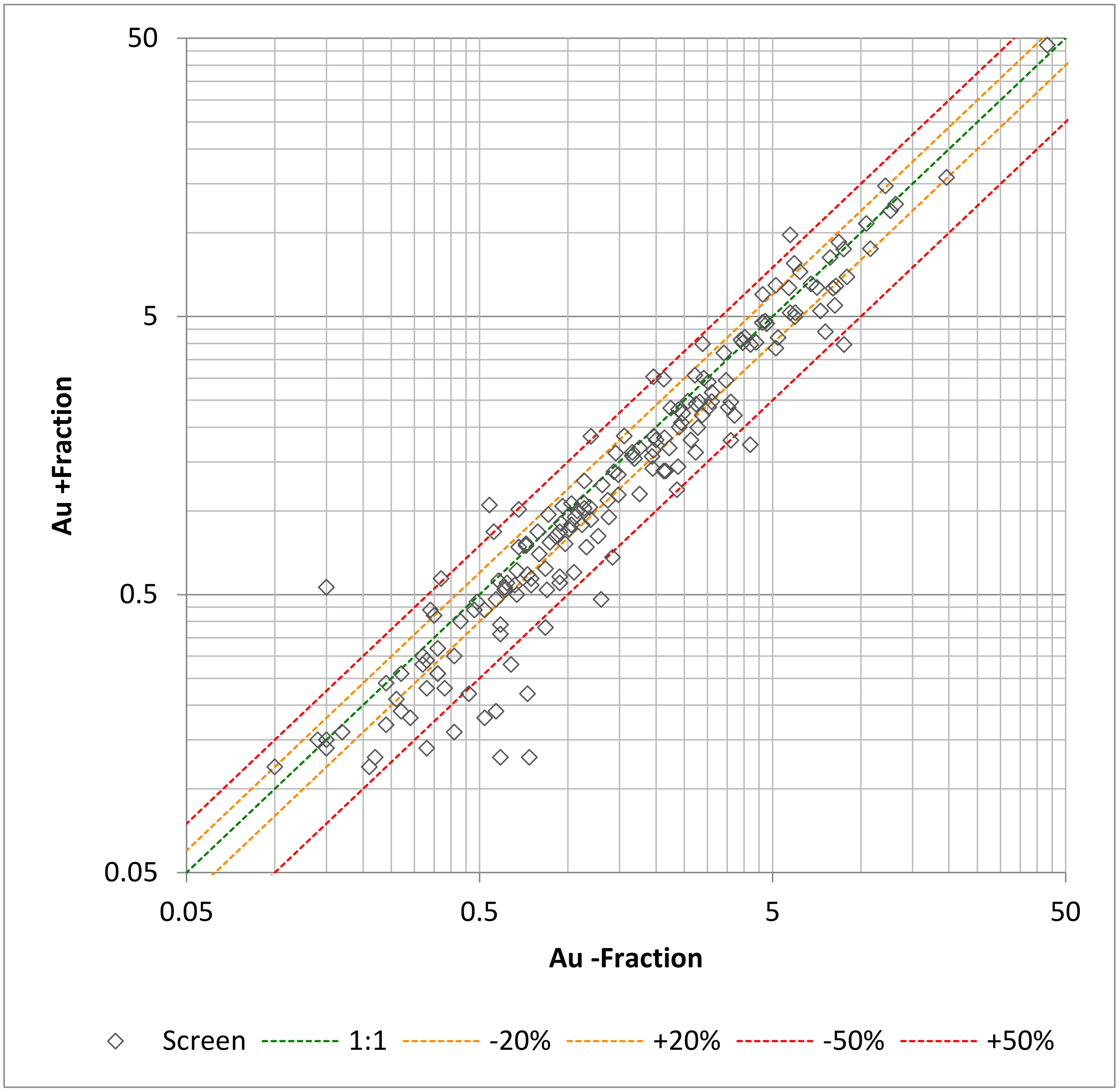


Figure 12-4: Scatter plot Au screen analysis fraction comparison

In terms of duplicate sampling for verification purposes, the screen analysis verified the original assays. A scatter plot comparing the original sample values to the weighted combined screen value is shown in **Figure 12-5**.

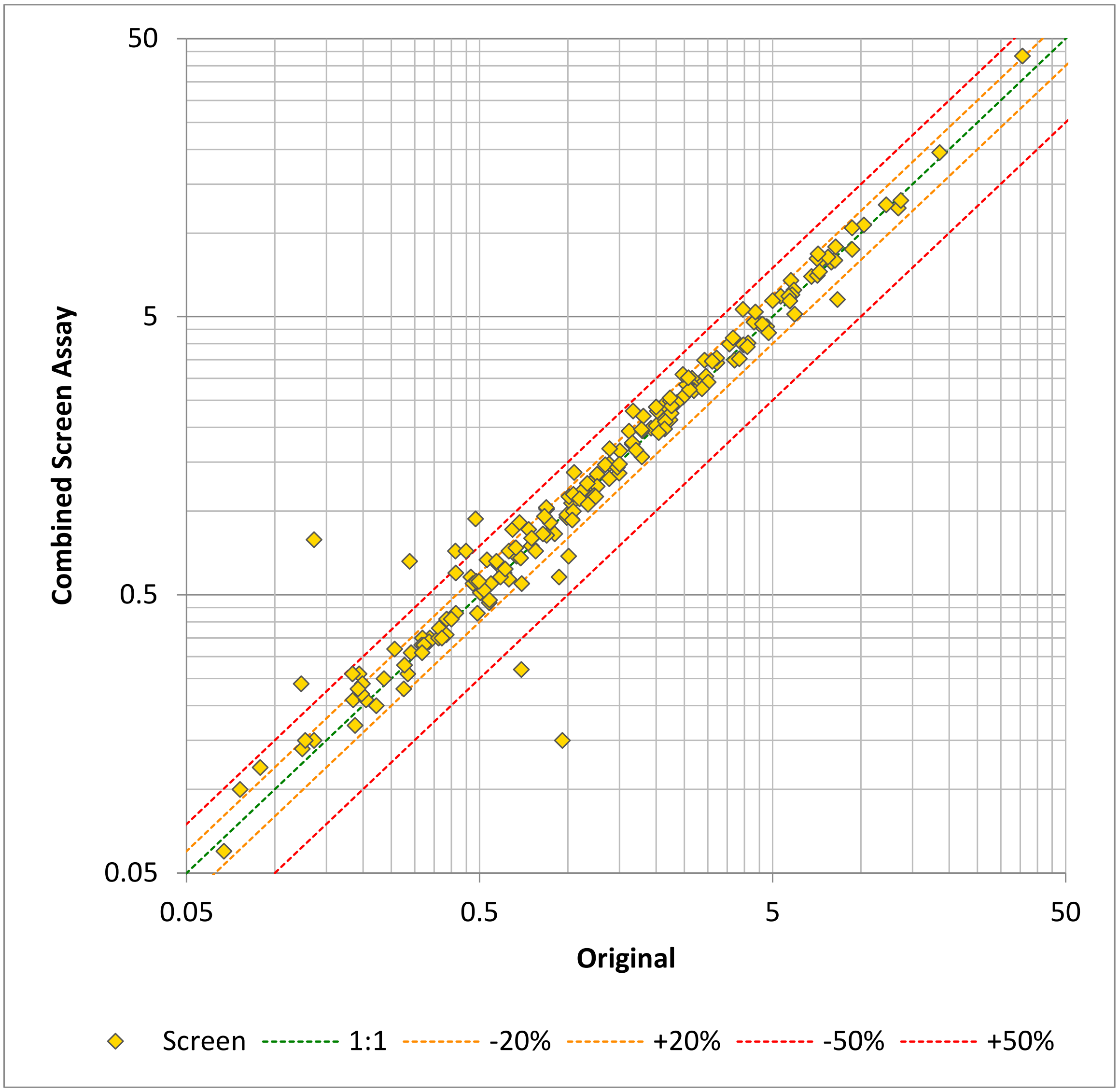


Figure 12-5: Scatter plot screen duplicates Au

Table 12-1 compares original sample values to verification samples collected by Blanchflower in 2009.

Table 12-1: Verification core sampling (Blanchflower 2010)

Hole ID	Verification ID	Original ID	From	To	Original Au g/t	Duplicate Au g/t	Original Ag g/t	Duplicate Ag g/t
BRD-01	E014764		312.90	314.10	0.048	0.030	3.50	4.60
BRD-02	E014769	355189	91.80	92.80	1.585	0.677	2.40	4.60
BRD-02	E014770	355194	96.40	97.10	0.679	0.731	13.40	18.10
BRD-02	E014771	355214	117.00	118.80	1.210	1.445	41.90	61.80
BRD-03	E014772	355310	20.20	21.10	0.236	0.249	3.80	2.40
BRD-03	E014773	355314	23.85	25.35	0.341	0.272	9.50	8.20
BRD-04	E014774	355401	72.35	73.35	1.105	0.677	4.40	3.80
BRD-04	E014775	355451	150.60	152.15	1.800	1.835	+100.00	130.00

13. MINERAL PROCESSING AND METALLURGICAL TESTING

Two metallurgical studies have been performed on mineralized material from the Rodeo project: A study by Process Research Associates Ltd. (PRA) of Vancouver, BC, Canada in 2004, and a study by Resource Development Inc. (RDi) of Lakewood, Colorado USA in 2017. Both laboratories are independent of Golden Minerals Company.

Based on the results of the metallurgical testing and production actuals from the process plant, metallurgical recovery assumptions used in this PEA are 80% for Au and 80% for Ag, assuming a grind size of 80% passing 325 mesh.

13.1 2004 PRA Test work Program

The 2004 PRA test work program consisted of preliminary sample characterization, as well as bottle roll cyanidation of 7 samples under "as received" particle sizes alongside testing at a P_{80} of 200 mesh. Seven samples were sourced from eight continuous intervals from RC rejects from four drill holes for testing. Sample intervals are shown in **Table 13-1**.

Table 13-1: 2004 Sample material drill hole intervals (PRA 2004)

Sample ID	Hole ID	From	To	Head Au g/t	Head Ag g/t
BR2 02 to 29	BR-02	2	29	2.45	4.65
BR3 06 to 13, 24 to 38	BR-03	6	13	1.83	7.63
BR3 14 to 23	BR-03	14	23	6.80	13.50
BR3 06 to 13, 24 to 38	BR-03	24	38	1.83	7.63
BR5 17 to 24	BR-05	17	24	5.64	19.60
BR5 25 to 38	BR-05	25	38	1.91	10.30
BR6 9 to 24	BR-06	9	24	12.80	13.90
BR6 25 to 35	BR-06	25	35	3.04	8.82

13.1.1 Characterization of Feed Samples

Amongst the seven samples tested, in all but one case, the Au grades appeared uniform across various size fractions. However, Ag grades were noticeably elevated in the minus 37 µm fraction for all "as received" samples tested.

No additional mineralogy was performed, nor was the "as received" particle size distribution provided beyond the reported P_{80} values. No size-by-size fraction testing was performed for the ground samples, either pre- or post-leaching. In the absence of size fraction analysis on ground samples, it is premature to assess the degree to which liberation of Au and Ag aided or hindered subsequent leaching responses. However, as discussed later regarding the bottle roll testing, extraction of both Au and Ag was noticeably improved at a P_{80} of 200 mesh, suggesting that liberation could potentially be a factor.

13.1.2 Bottle Roll Testing

Bottle roll testing was performed at a sodium cyanide concentration of 1 g/L at a pH of 10.5 for 48 hours for "as received" and ground samples.

For the coarse "as received" samples (1,500 to 4,200 microns), at a retention time of 48 hours Au extraction ranged from 17% to 41% and Ag extraction ranged from 27% to 56%, **Table 13-2**. Given the comparatively short retention times in relation to heap leaching conditions, it was not clear if extraction had plateaued or if further increases would have occurred with additional time.

Table 13-2: Bottle roll results – as received (PRA 2004)

Sample ID	Head Au g/t	Head Ag g/t	P_{80} µm	Au Extraction %	Au Residue g/t	Ag Extraction %	Ag Residue g/t
BR2 02 to 29	2.45	4.65	3,932	41.8	1.30	43.1	2.60
BR3 06 to 13, 24 to 38	1.83	7.63	1,512	37.7	1.25	44.1	4.80
BR3 14 to 23	6.80	13.50	1,548	41.3	3.69	51.9	7.00
BR3 06 to 13, 24 to 38	1.83	7.63	1,512	37.7	1.25	44.1	4.80
BR5 17 to 24	5.64	19.60	3,599	32.6	3.32	46.1	9.30
BR5 25 to 38	1.91	10.30	2,276	31.2	1.38	53.8	8.80
BR6 9 to 24	12.80	13.90	1,898	27.8	9.58	56.3	6.50
BR6 25 to 35	3.04	8.82	4,182	17.1	3.13	27.7	7.60

For the ground material (P_{80} = 74 microns), Au extraction ranged from 71% to 82%, and Ag extraction ranged from 84% to 92% as shown in **Table 13-3**. These conditions are more analogous to milling rather than heap leaching, and thus form the basis for the mill recoveries. In the case of both Au and Ag, neither metal appeared to have plateaued at 48 hours, which implies that longer retention times of 72 or 96 hours could potentially result in a higher recovery.

Table 13-3: Bottle roll results – ground (PRA 2004)

Sample ID	Head Au g/t	Head Ag g/t	P_{80} µm	Au Extraction %	Au Residue g/t	Ag Extraction %	Ag Residue g/t
BR2 02 to 29	2.45	4.65	89	82.4	0.50	85.6	0.80
BR3 06 to 13, 24 to 38	1.83	7.63	81	74.7	0.51	86.9	1.30
BR3 14 to 23	6.80	13.50	69	78.1	1.55	85.4	2.40
BR3 06 to 13, 24 to 38	1.83	7.63	81	74.7	0.51	86.9	1.30
BR5 17 to 24	5.64	19.60	82	82.5	1.02	87.3	2.30
BR5 25 to 38	1.91	10.30	78	75.5	0.55	84.9	1.80
BR6 9 to 24	12.80	13.90	77	71.2	3.90	84.2	2.70
BR6 25 to 35	3.04	8.82	80	72.5	0.94	92.1	0.90

13.2 2017 RDI Test Work Program

The objective of the RDi test program was to complete a leach test program to determine Au extractions from low grade and high-grade Au material from the project. RDi received 30 kg of sample which was crushed and split into 1 kg charges. Representative samples of both the high- and low-grade were pulverized and submitted for head analysis using fire assay, atomic absorption, acid digestion, and ICP techniques. The low-grade sample assayed at 1.37 g/t Au and 5.6 g/t Ag, while the high-grade sample assayed at 3.31 g/t Au and 14.0 g/t Ag. Samples were also submitted for mineralogical analysis. The primary mineralogy for both samples was quartz, representing approximately 92% of the low-grade sample and 76% of the high-grade sample. Au occurs as 2.5-to-5-micron grains locked in quartz. The mineralogy and head assays of the test samples can be considered representative of the mineralized material in the deposit.

The high-grade sample was subjected to flotation and cyanide bottle roll leach testing. Results of the flotation testing were poor; however, the bottle leach tests resulted in Au recoveries of 80.0% to 85.7% and Ag recoveries of 72.1% to 76.3%. Results from the bottle leach testing are shown in **Table 13-4**.

Table 13-4: Bottle leach test results (RDi 2017)

Grind (P_{80})	Extraction %		Residue Grade		Calc Head Grade		NaCN Consumption (kg/mt)	Lime Consumption (kg/mt)
	Au	Ag	Au (g/t)	Ag (g/t)	Au (g/t)	Ag (g/t)		
0 mesh	80.0	72.1	0.54	2.8	2.70	10.1	1.648	9.114
150 mesh	83.8	76.3	0.47	2.4	2.90	10.1	1.584	9.227
200 mesh	85.7	73.4	0.40	3.0	2.79	11.3	1.786	11.102

The low-grade sample was subjected to static leach testing. Results showed unfavorable Au and Ag extraction from static cyanide leaching.

Metal recovery in the bottle roll leach test was observed to be dependent on grind size. A Bond's Ball Mill Work Index test was completed with the sample at a closed size of 100 mesh (150 microns). The work index was determined to be 25.3 kWh/st, which indicates that the sample is very hard. Tetra Tech is unaware of any other processing factors or deleterious elements that could have a significant effect on potential economic extraction.

Based on the results of the metallurgical testing and production actuals from the process plant, metallurgical recoveries used in this PEA are 80% for Au and Ag, with a grind size of 80% passing 325 mesh.

14. MINERAL RESOURCE ESTIMATES

Mining from the Rodeo open pit began in December 2020 and doré production from Plant 2 began in January 2021. Doré is being sold by the company for a profit. This mining validates the exploration, drilling, and Resource estimation methods being used. A 3D block model was created for the Rodeo deposit by Golden Minerals and validated by Tetra Tech. Wireframes of the mineralized domains were created using Leapfrog software as a guide. Three domains were modeled based on Au grade properties, as well as geological and structural considerations. A high-grade domain was modeled for grades above 1.6 g/t Au, a low-grade domain was modeled for material with a grade of 1.0 g/t to 1.6 g/t Au, and a third domain was created for mineralized material between 0.15 g/t and 1.0 g/t Au. The Leapfrog wireframes were used as a guide to establish the domain wireframes in Micromine for estimation, using a sectional method to review and adjust the wireframes as appropriate. The deposit is steeply dipping, at approximately 75° along a strike of 330°. The block model estimation was completed using ordinary kriging (OK). Data was flagged by domain and a soft boundary was used between the high-grade and low-grade domains, as well as the low-grade and mineralized domain boundary, for the purposes of estimation.

Resources were calculated through the effective date October 31, 2021. The Resources are reported at a cutoff of 1.0 g/t for stockpiling and 1.6 g/t for processing. Numbers reported as Resources are constrained within the pit design and are reported in **Table 14-1**.

Table 14-1: Estimated Rodeo Resources for stockpile and processing

Classification	Cutoff Au (g/t)	Tonnes	Au (g/t)	Au (oz)	Ag (g/t)	Ag (oz)
Low-Grade (Stockpile)						
Measured	1.0	208,500	1.24	8,350	10.03	67,200
Indicated	1.0	56,400	1.18	2,140	5.18	9,400
Measured + Indicated	1.0	264,900	1.23	10,500	9.00	76,600
Inferred	1.0	1,500	1.20	58	4.09	198
High-Grade						
Measured	1.6	310,700	3.11	31,100	13.10	131,000
Indicated	1.6	43,700	3.17	4,500	10.67	15,000
Measured + Indicated	1.6	354,400	3.12	35,600	12.80	146,000

Notes:
(1) Cutoff grade calculated using metal prices of $1,800 and $25 per troy ounce of Au and Ag, recoveries of 80% for Au and Ag;
(2) Mineral Resources have been pit shell constrained to the mine design, using a 1.0 g/t Au cutoff
(3) Columns may not total due to rounding

14.1 Input Data

Data used to estimate the model included RC drill holes, DD drill holes, blasthole samples, and a limited number of surface trenches and pit samples. Careful attention was given to the blastholes to prevent bias due to the high density of data available. Blastholes were used in the estimation of blocks in Pass 1 in the high-grade domain and in Pass 1-2 in the low-grade and mineralized material domains. **Table 14-2** shows the input intervals for the mineralized material by type. **Figure 14-1** shows the location of the exploration drilling near the open pit mine design.

Table 14-2: Input data statistics

Data Type	Count	Mean Au (g/t)	Mean Ag (g/t)
RC	3,064	0.64	9.12
DD	4,455	0.78	7.39
Blasthole	9,700	1.38	3.83
Trench	193	0.57	1.38
Pit	16	1.21	3.00
All	17,428	1.09	5.64

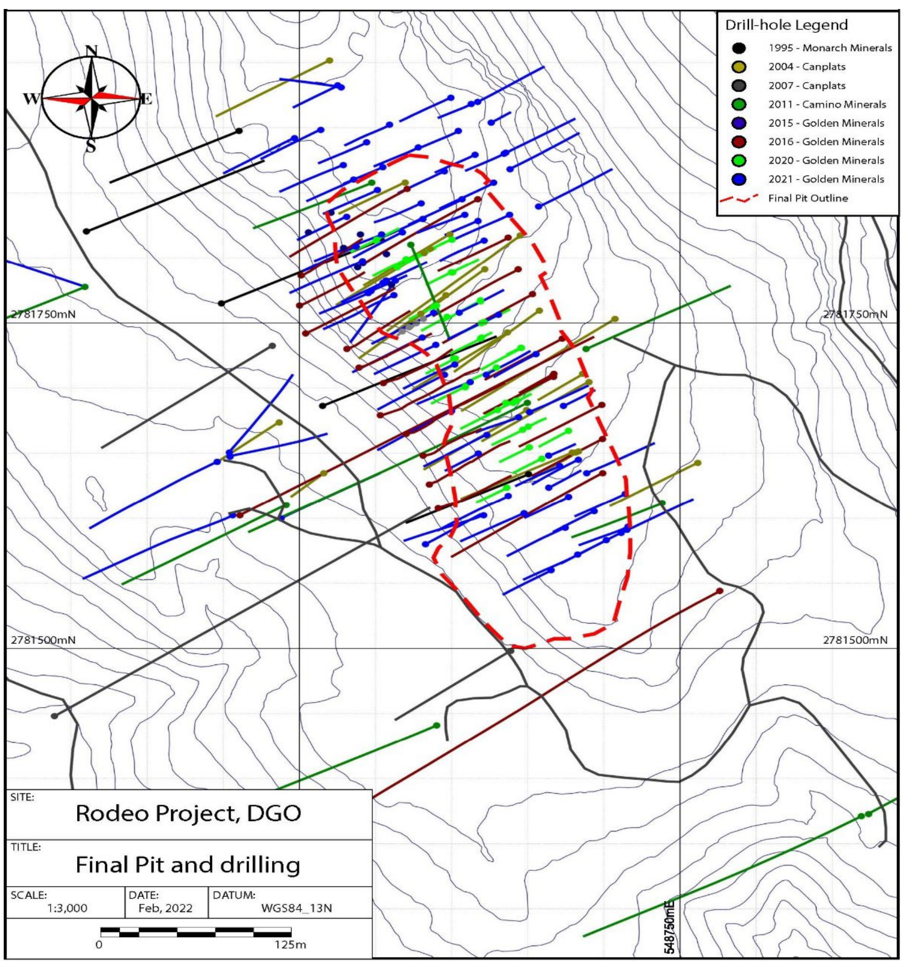


Figure 14-1: Plan view map of drilling locations

14.2 Grade Capping

Intervals from the combined drill hole and trench sample database that were within the mineral zones were analyzed as a natural log transformed population to determine upper grade limits. Upper limits were applied to raw sample values prior to compositing. The upper limit chosen for Au was 17 g/t and 140 g/t for Ag. **Table 14-3** shows capping statistics and the effects on the population mean. **Figure 14-2** shows the histogram of uncapped Au values for the exploration holes and **Figure 14-3** show the natural log probability plot of the uncapped Au values for the exploration holes. **Figure 14-4** shows the histogram of uncapped Au values and **Figure 14-5** show the natural log probability plot of the uncapped Ag values.

Table 14-3: Capping statistics in mineralized zones

Element	Uncapped Mean g/t	Upper Limit g/t	Number Capped	Capped Mean g/t
Au	1.09	17	51	1.07
Ag	5.64	140	6	5.63

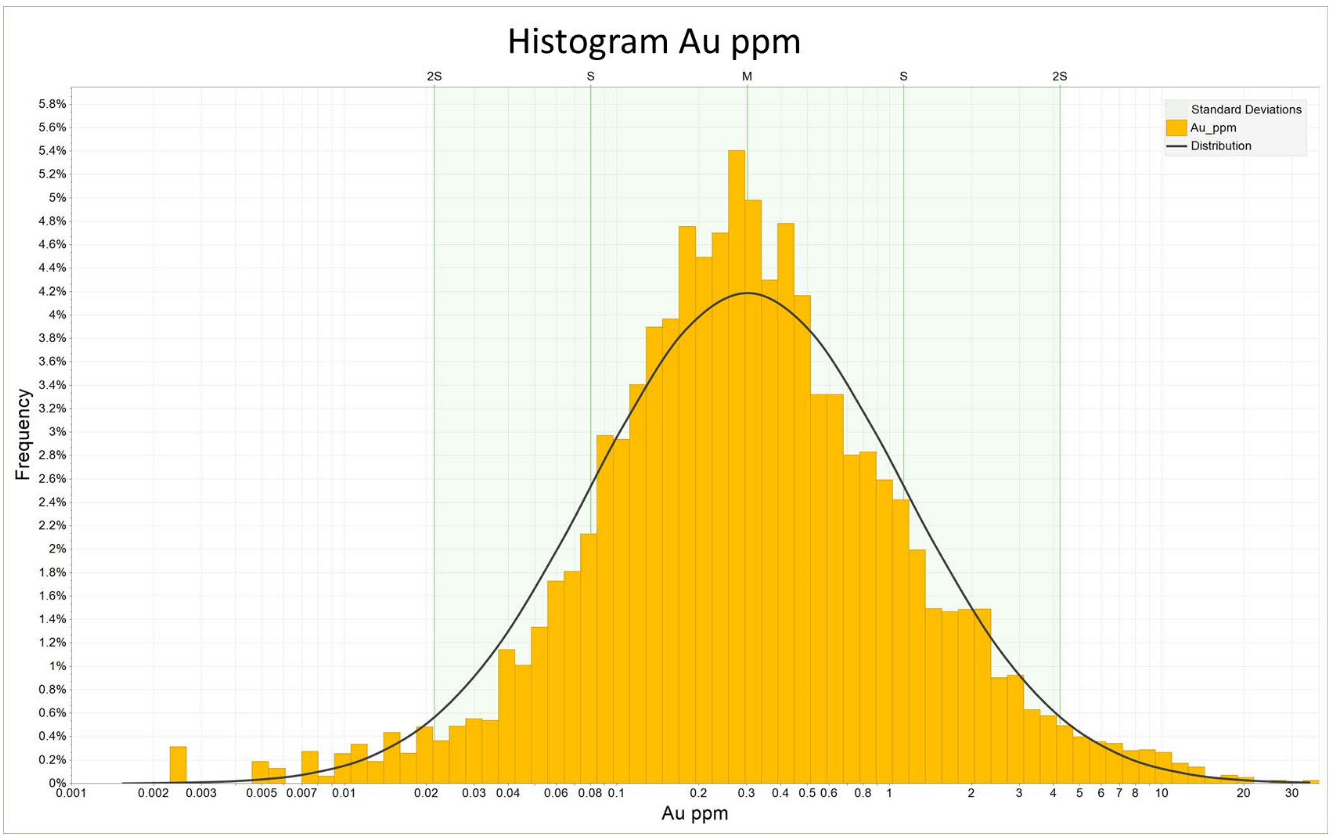


Figure 14-2: Histogram of uncapped Au values

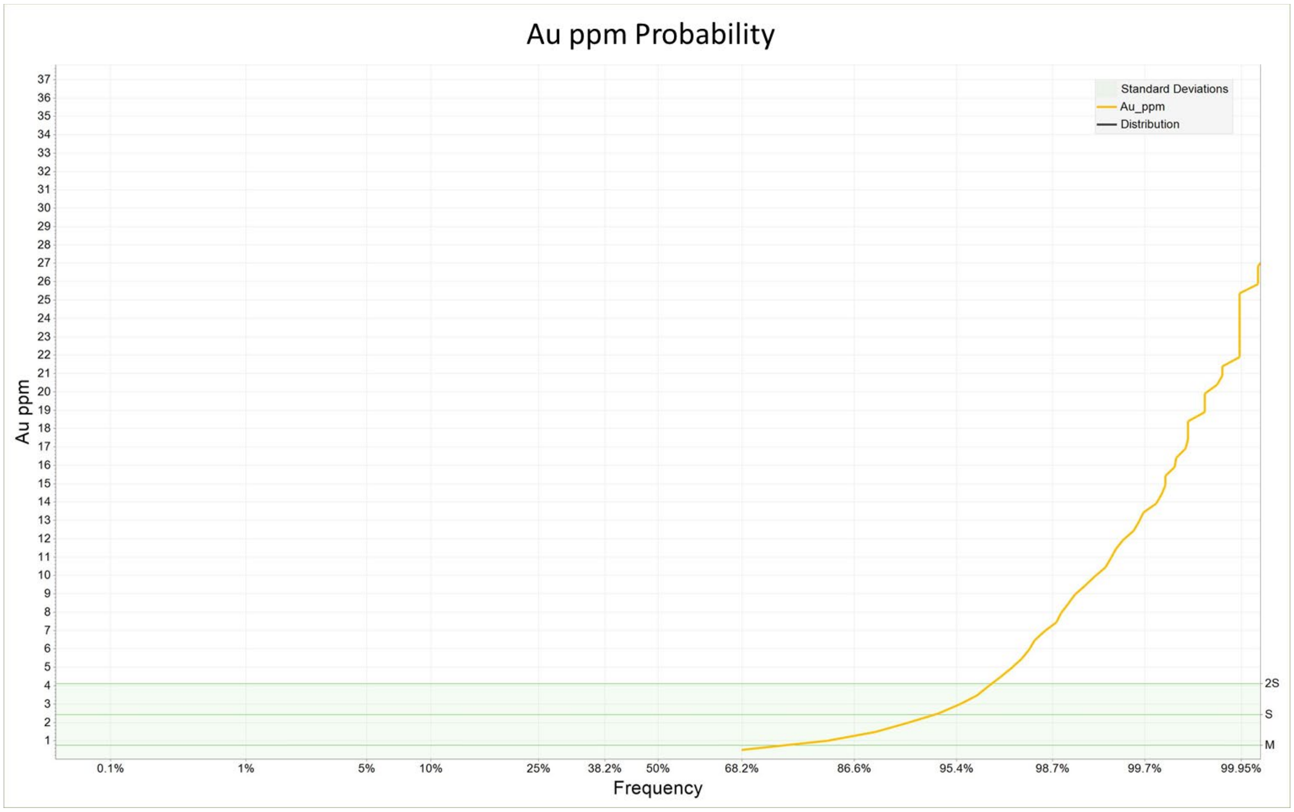


Figure 14-3: Upper limit analysis probability plot Au

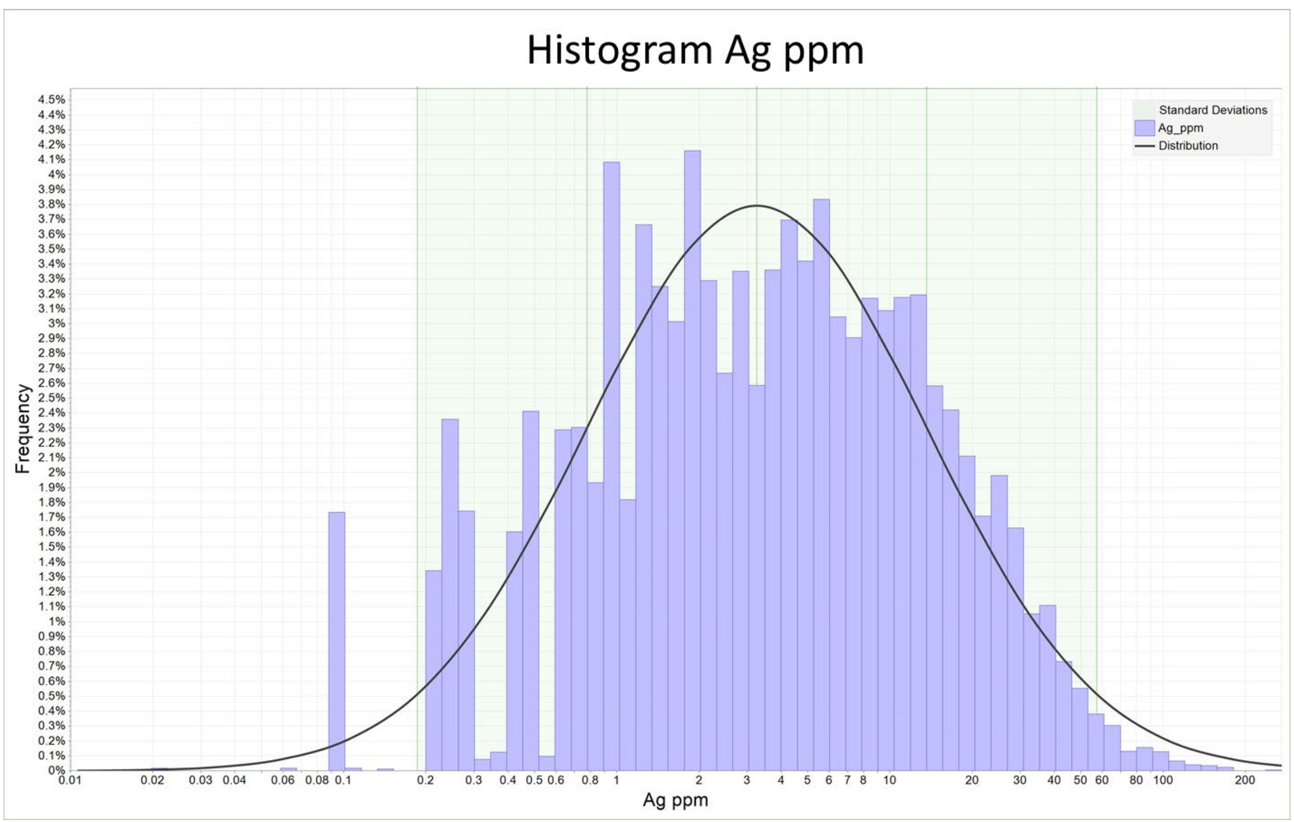


Figure 14-4: Histogram of uncapped Ag values

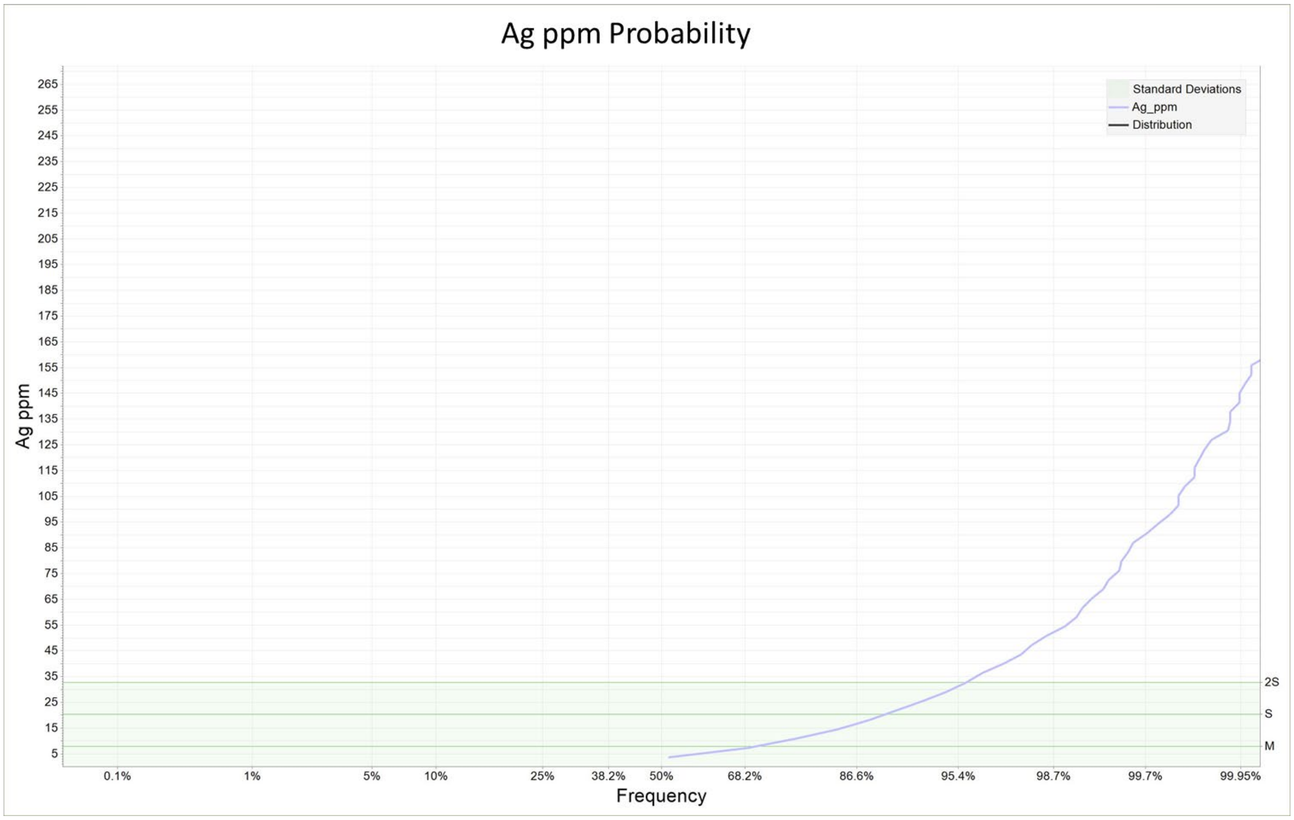


Figure 14-5: Upper limit analysis probability plot Ag

14.3 Compositing

Each drill hole that intersected the modeled mineral zones was composited into 2 m intervals and centroid coordinates were generated. New composites initiate at the mineral zone boundaries. Resulting composites less than 0.25 m were rejected. Trenches were composited at 3.5 m, and a single composite was created for each blasthole.

14.4 Mineral Zone Modeling

The Rodeo deposit is interpreted to be a highly silicified epithermal deposit, with multi-phase stockwork and massive veining preferentially deposited in amenable gently dipping volcanic horizons. The mineral zones have been modeled with the same strike and dip as the host volcanics.

The project database was used to create domain wireframes using implicit modeling in Leapfrog software. The wireframes were created using a sub-horizontal shallow plane with a NE dip and a base range of 65 m. The high-grade domain included material over 1.6 g/t Au and the low-grade domain included material between 1.0 g/t Au and 1.6 g/t Au. A mineralized domain was also modeled for material between 0.15 g/t Au and 1.0 g/t Au. The wireframes created in Leapfrog were imported into Micromine, and along with professional judgment and drill intercepts, were refined for use in the block model estimation.

Figure 14-6 shows the domains.

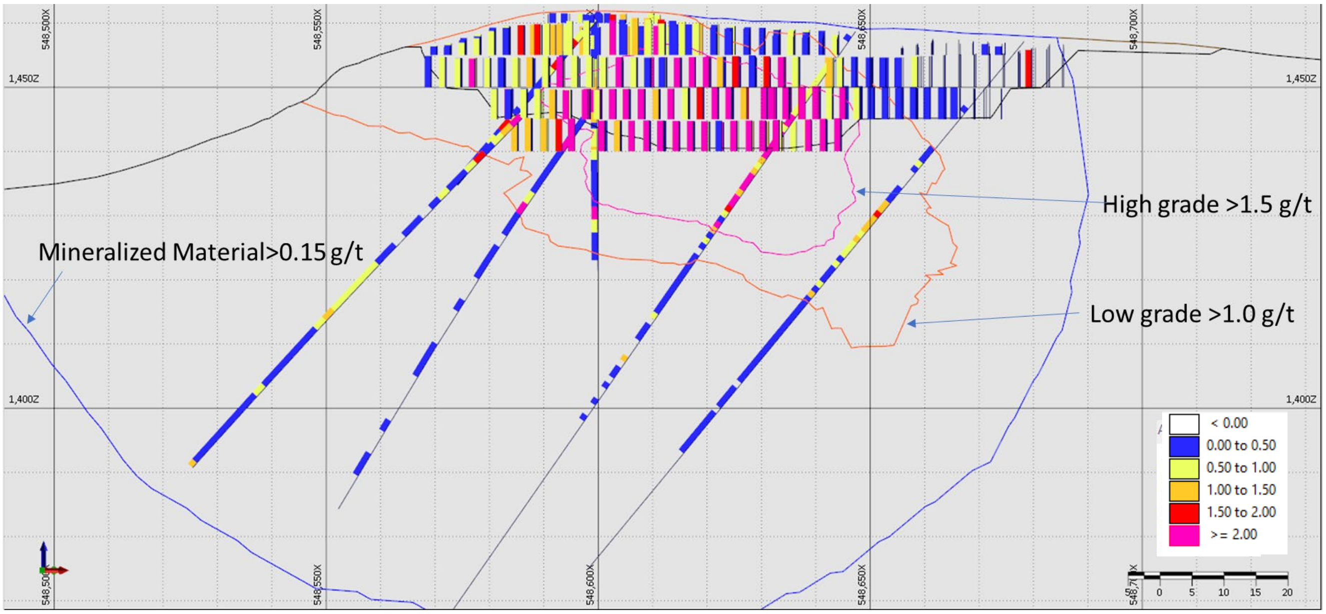


Figure 14-6: Cross-section mineral domains with drill and blast assays and October 31, 2021 pit survey

Figure 14-7 is a box and whisker plot comparing the population statistics of the resulting domains.

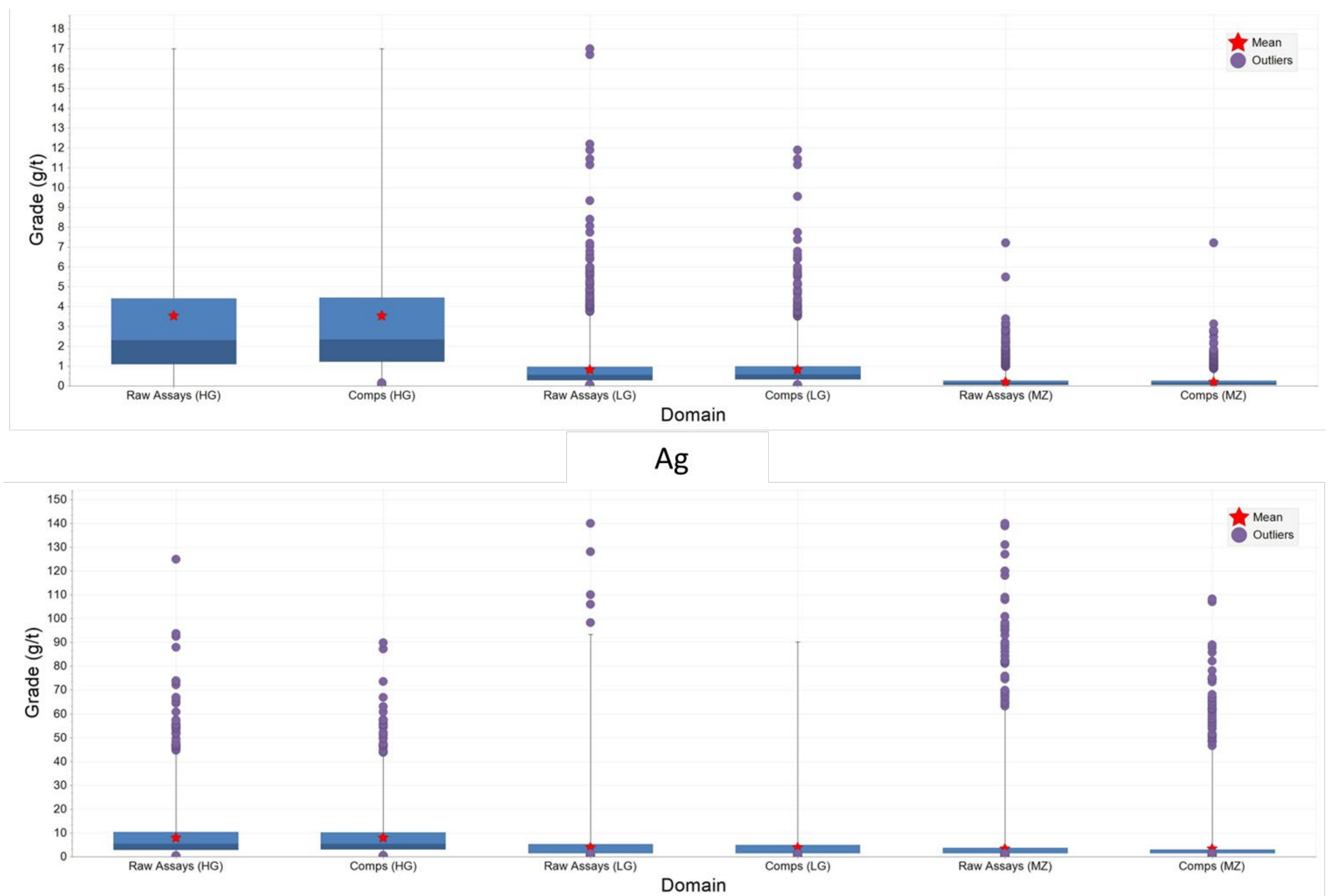


Figure 14-7: Box and whiskers of raw assays and composites by mineral domains for Au and Ag

14.4.1 Density Determination

Golden Minerals' geologists have made 1,272 measurements of core using the hanging in air and hanging in water method; the core was not coated.

Density measurements were taken from the 2020 and 2021 drilling, and some samples from 2016 were resampled as a verification. Additional measurements verified the densities used for previous Resource estimations.

Measurements within the mineral zones were evaluated for each domain and as a group. There appeared to be little difference between those samples within the different mineral domains. A fixed value of 2.5 g/cm^3 was assigned to blocks within the high-grade mineralization and a value of 2.41 g/cm^3 was assigned to low grade and waste blocks.

14.5 Estimation Methods and Parameters

Resources have been estimated for the Rodeo deposit using a block model rotated to fit the deposit strike. Au and Ag grades have been estimated using ordinary kriging within constrained domains.

14.5.1 Variography and Search

Search orientation and preliminary experimental variography was explored through semi-variogram mapping. Composites for exploration drilling in the main area that are within any of the three mineral zones were used as input data for the analysis. **Figure 14-8** and **Figure 14-9** show the resulting semi-variogram maps for strike and dip. In the figures cooler colors represent lower semi-variance, meaning better correlation.

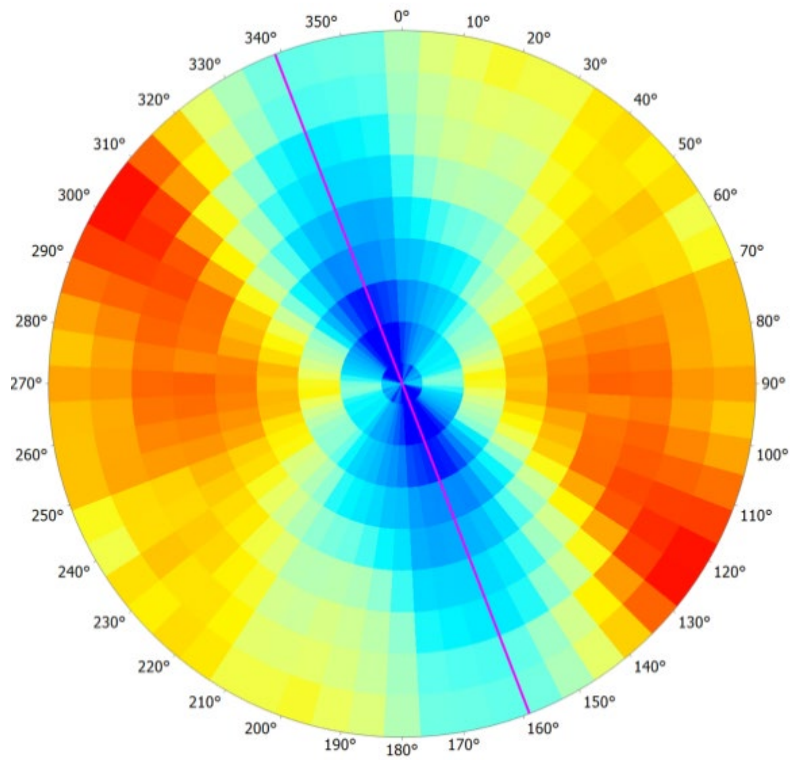


Figure 14-8: Semi-variogram map strike for Au

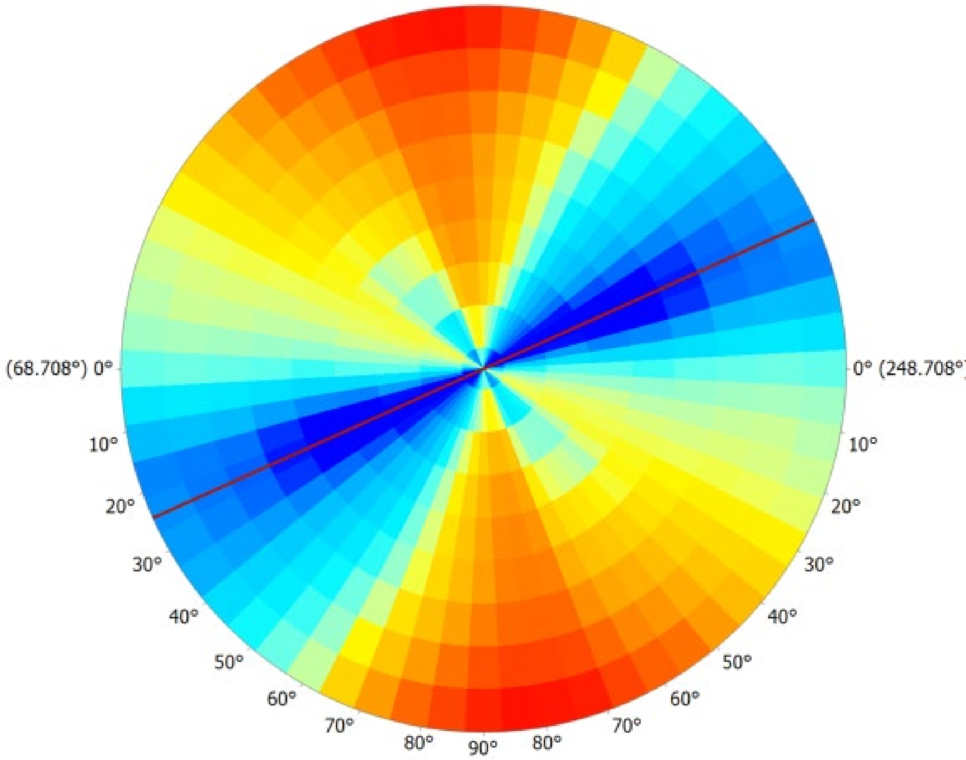


Figure 14-9: Semi-variogram map dip for Au

Semi-variograms were used to establish the search parameters for estimation. **Figure 14-10**, show the natural log transformed variogram, with green showing the primary axis, red showing the secondary axis, and blue showing the tertiary axis.

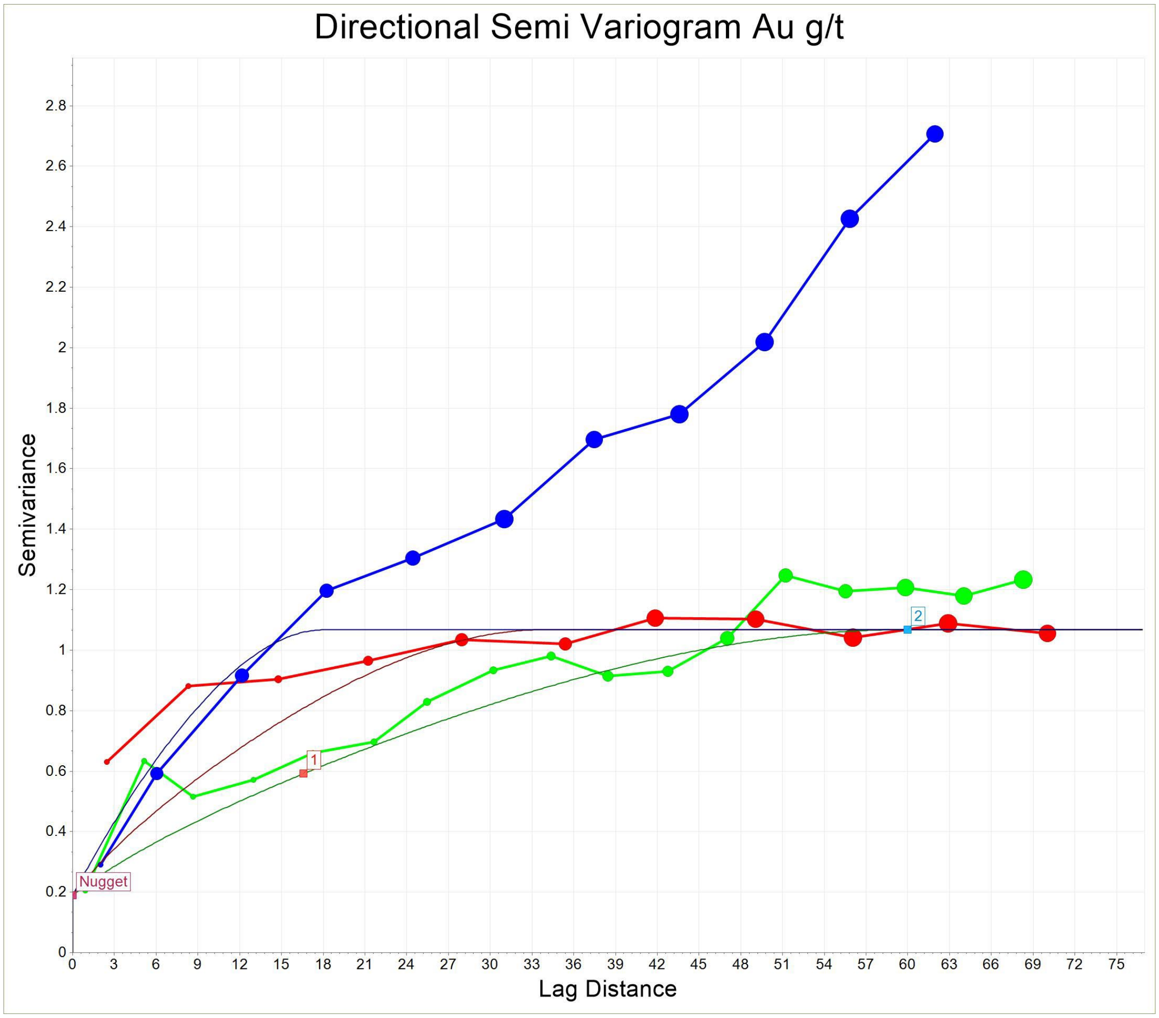


Figure 14-10: Natural log transformed variography - Au

Orientations determined from the semi-variogram maps were used as inputs for semi-variogram modeling. The grade distance relationship was investigated for Au and Ag using natural log transformed directional variography on composited intervals. Nugget and sill portions have not been relativized to a total sill of 1 or 100% to correspond with the graphical output presented.

Although grade-distance relationships were investigated and used as a guide the ultimate search distances, classifications, orientations, and anisotropies implemented were based on visual review of the mineralization and professional judgment.

A rotated block model was fit to the extents of the mineral domains with the parameters shown in **Table 14-4**. The block model was flagged by domain wireframe.

Table 14-4: Block model setup parameters

Direction	Origin (Corner)	Block Size m	Length m	Blocks	Rotation
X	548500	5	730	146	-
Y	2780980	5	1,010	202	-
Z	1200	5	500	100	330°

The block model estimation was completed using ordinary kriging. Data was flagged by domain and a soft boundary was used between the high-grade and low-grade domains, as well as the low-grade and mineralized domain boundary, for the purposes of estimation.

The estimation was performed in four passes for each domain. Details of the estimation passes can be found in **Table 14-5**.

Table 14-5: Estimation pass parameters

Pass	Method	Search Ellipse (m)	Sectors	Max Comp Per Sector	Comp Min	Comp Max
High-grade Domain						
First	OK	34-20-10	4	3	10	12
Second	OK	64-36-20	2	5	6	10
Third	OK	120-68-36	1	10	4	10
Fourth	OK	240-136-72	1	10	3	10
Low-grade Domain						
First	OK	34-20-10	4	3	10	12
Second	OK	64-36-20	2	5	6	10
Third	OK	120-68-36	1	10	3	10
Fourth	OK	240-136-72	1	10	2	10
Mineralized Domain						
First	OK	34-20-10	2	5	5	12
Second	OK	64-36-20	2	6	4	10
Third	OK	120-68-36	1	10	3	10
Fourth	OK	240-136-72	1	10	2	10

14.5.2 Mineral Resource Classification

Classification was considered using statistical analysis of the estimation pass, average and closest distance of the composites, and number of drill holes used to complete the estimation. Professional judgement was used to smooth out the classification boundaries using wireframes. **Table 14-6** lists the criteria for Measured, Indicated, and Inferred blocks. Blocks within the final mine design were designated as Inferred and coded with Indicated or Measured where the criteria were satisfied.

Table 14-6: Classification parameters

Classification	Closest Composite (m)	Average Distance to Composite (m)
Pass 1		
Measured	<15	<30
Indicated	<30	<60
Pass 2		
Measured	<10	<20
Indicated	<25	<50
Pass 3		
Measured	None	
Indicated	<30	<60 or 3 or more drill holes
Inferred	<60	<120 or 2 or more drill holes
Pass 4		
Measured	None	
Indicated	<30	<60 or 4 or more drill holes
Inferred	<60	<120 or 3 or more drill holes

14.5.3 Cutoff Grade and Pit Shell Optimization

Resources have been tabulated using a 1.0 g/t Au cutoff grade for stockpiling and 1.6 g/t Au for processing based on the assumptions shown in **Table 14-7**. The Resource tabulation is presented using the previous year average metal prices, considered with bank projections for the life of mine. The prices used are $1,800/oz-Au and $25/oz-Ag.

Table 14-7: Cutoff price assumptions

Assumption	Value
Au Price	$1,800
Au Recovery	80%
Mining Cost	$16.93
Processing Cost	$39.00

14.6 Model Verification

Resource estimations have been verified by visual review, population analysis, swath plots, and alternative estimation methods. Cross-section review of composite and block grades verify the estimation with respect to the input data. Verification figures have been included below. Blasthole testing during production has confirmed the block estimation methods to be reasonably accurate for a study of this level.

Figure 14-11 shows box and whiskers plots that compare the assay, composite, and block grade populations for Au for each domain.

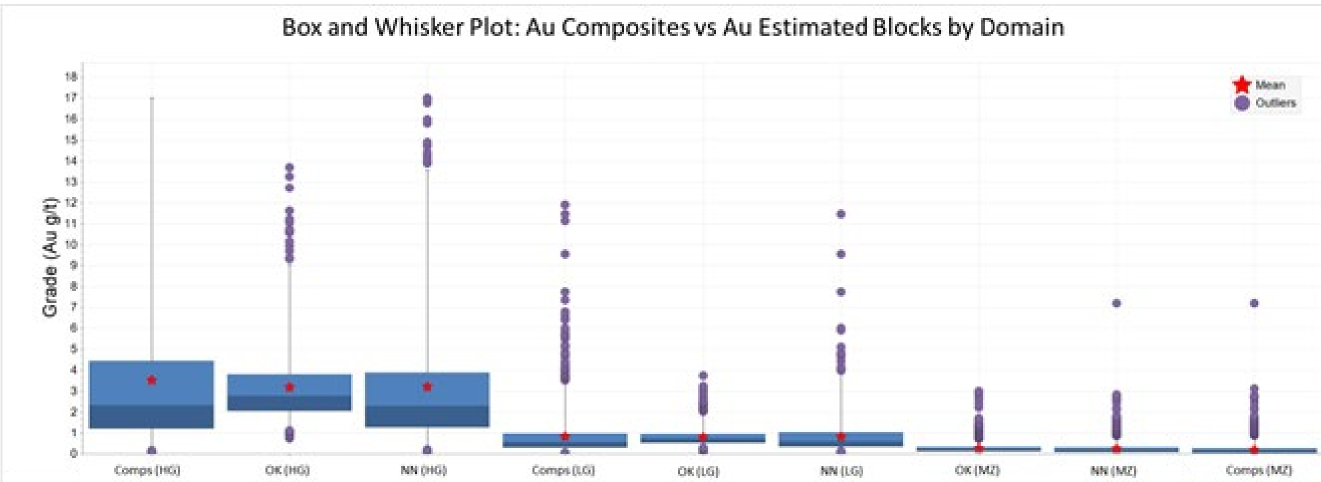


Figure 14-11: Box plot population comparison – Au by domain

Figure 14-12, **Figure 14-13**, **Figure 14-14**, and **Figure 14-15** show swath plots for Au for the assays, composites, and block grades.

Figure 14-16 shows an example cross-section of the Resource model that includes drill hole data, the mineralized envelope boundaries, Resource pit constraints, and resulting Au block grades.

Figure 14-17 shows an example cross-section of the distance from a block centroid to the nearest drill hole composites.

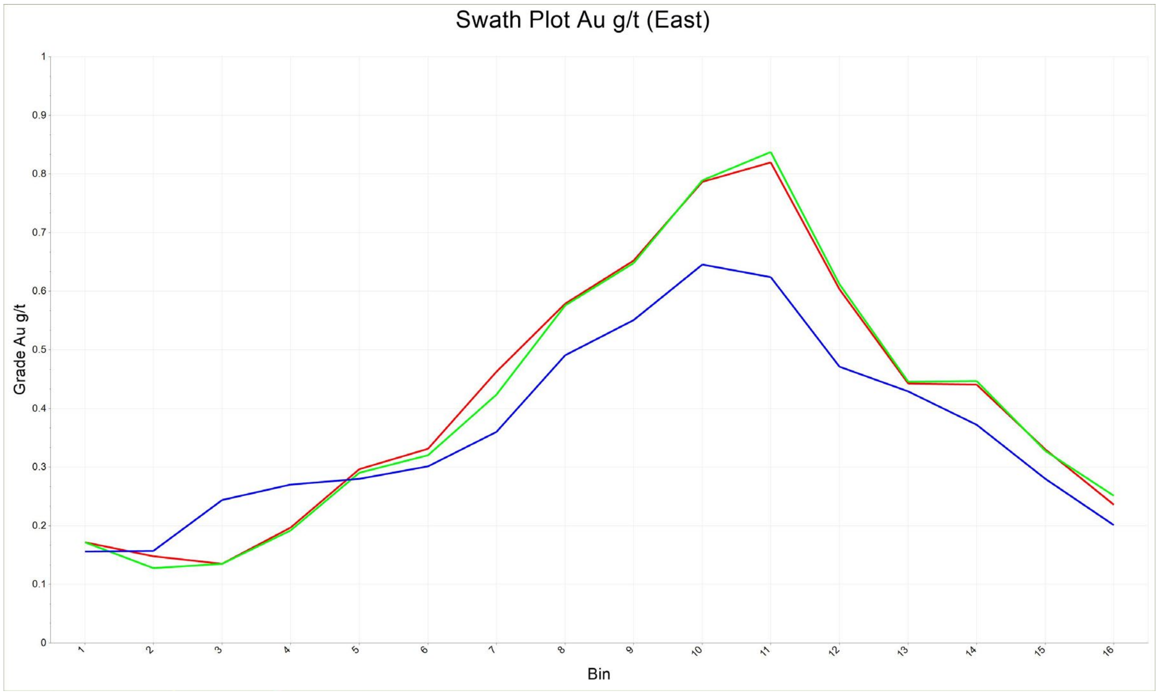


Figure 14-12: Swath plot for Au-easting

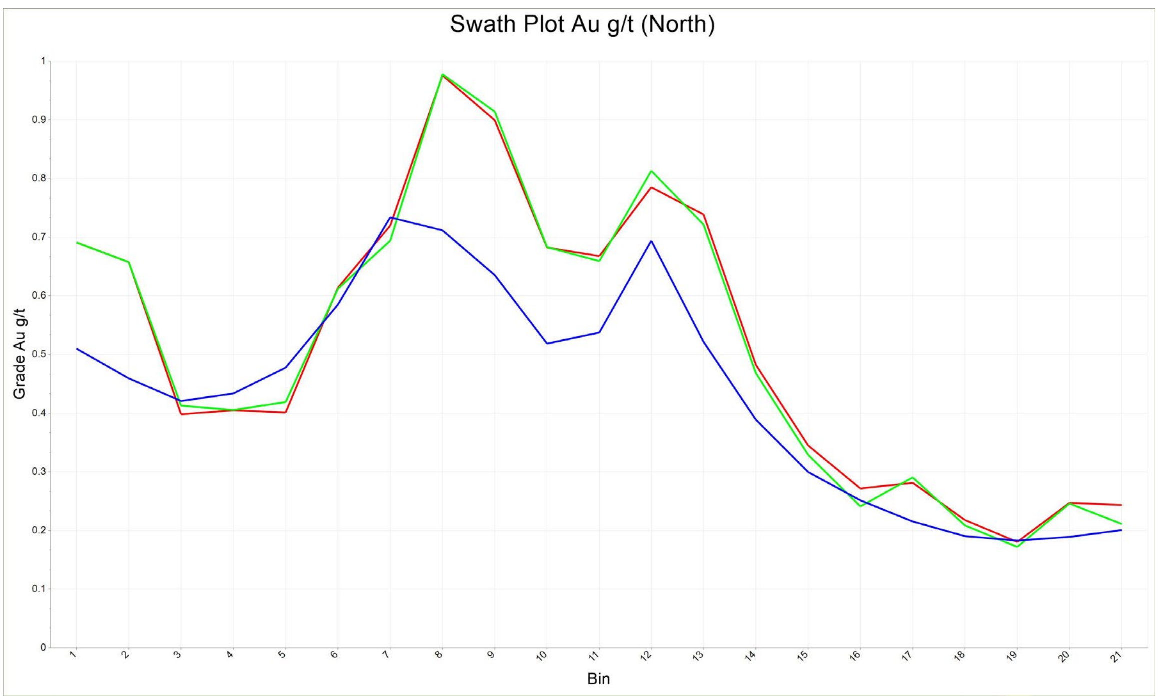


Figure 14-13: Swath plot for Au-northing

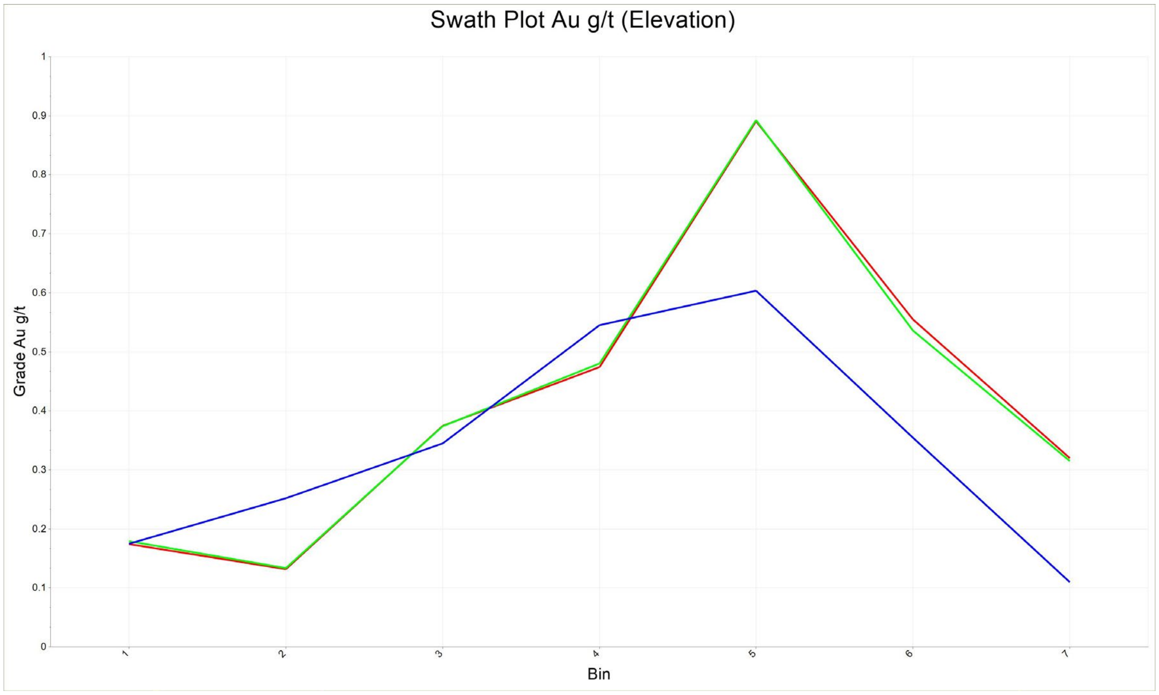


Figure 14-14: Swath plot for Au-elevation

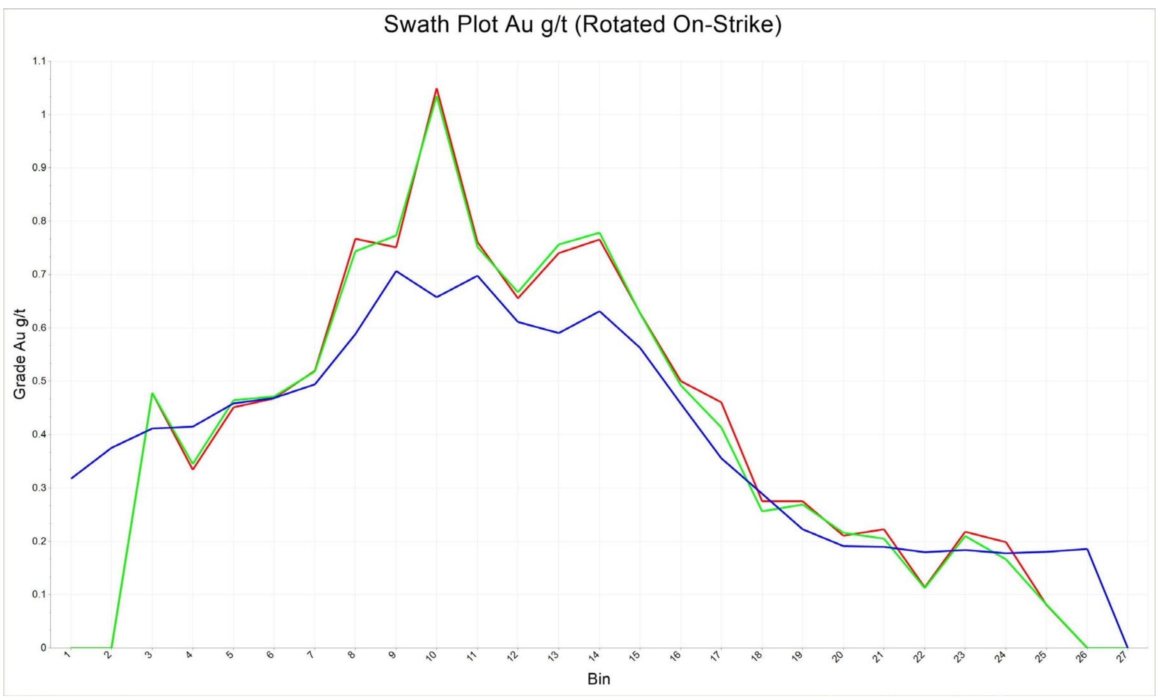


Figure 14-15: Swath plot for Au-along strike (330 degrees)

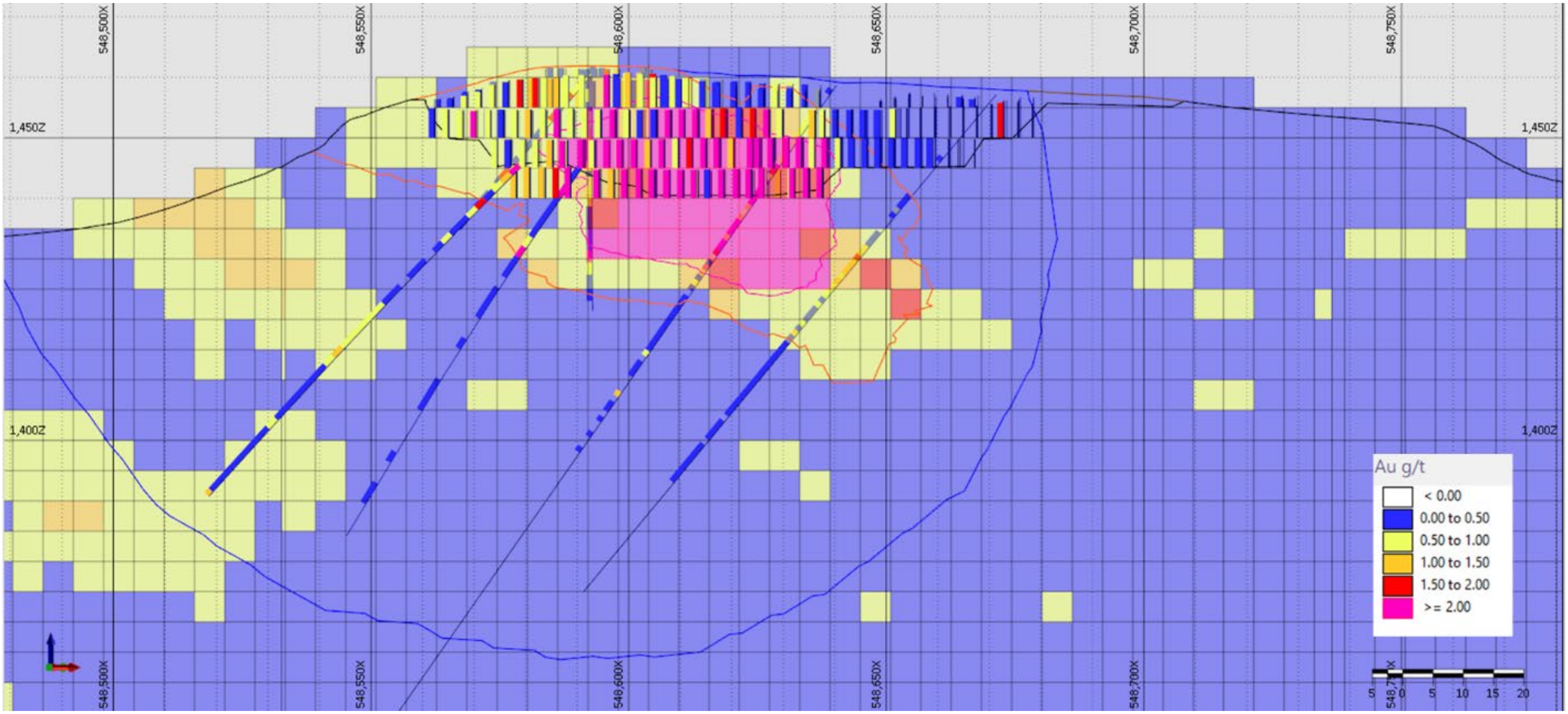


Figure 14-16: Cross-section of Rodeo block model and drilling with Au grades

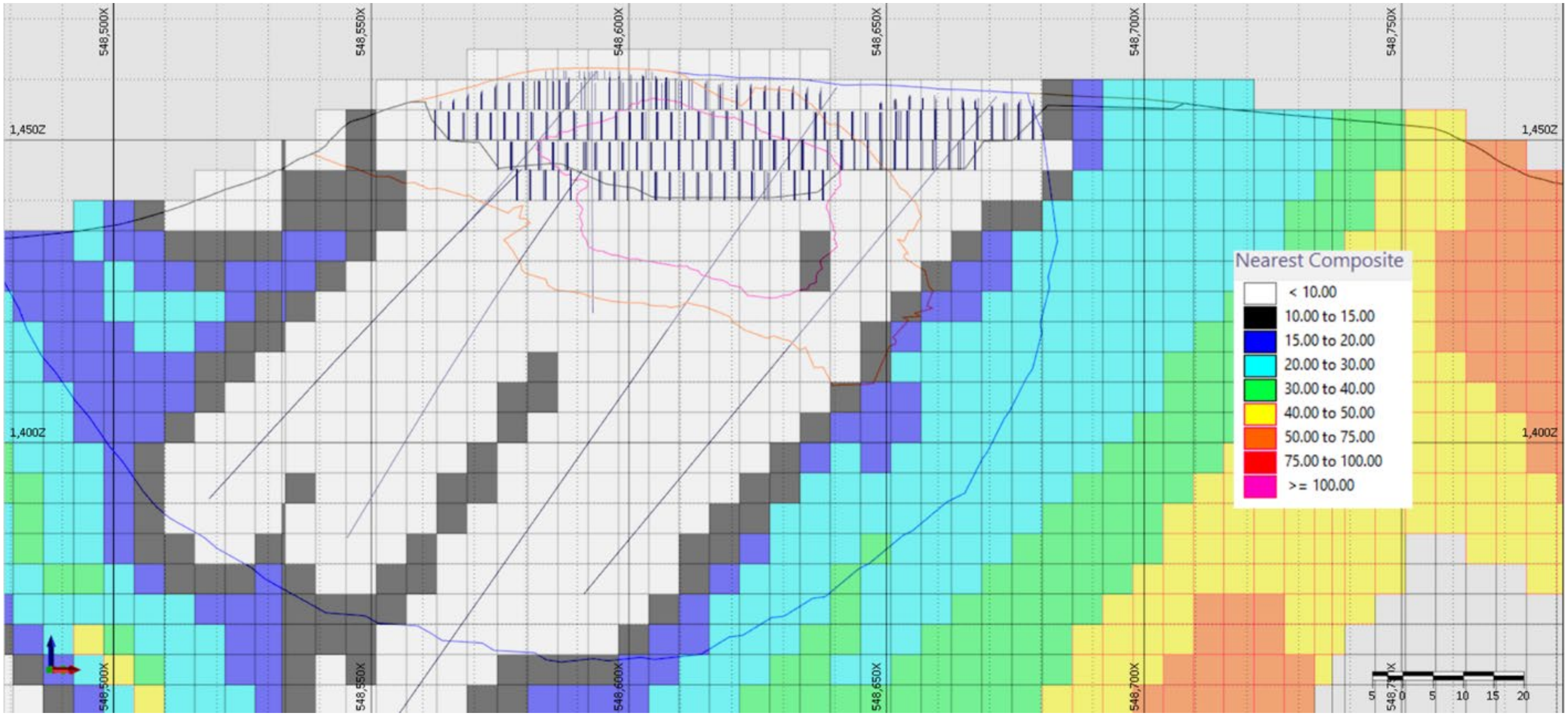


Figure 14-17: Cross-section with blocks colored by distance to nearest composite

14.7 Relevant Factors

Tetra Tech has reviewed the Resource model for the Rodeo deposit estimated by Golden Minerals. The inputs, parameters, and estimation results are within industry best practices. The estimation, classification, and reporting of the Resources constrained by the mine design are conservative in nature. Production data validates the previous drilling and Resource estimates. Exploration drilling efforts should continue to determine the limits of the deposit where they have not already been defined. There is potential for additional Resources within the Rodeo concessions.

There are no additional environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that Tetra Tech is aware of that could materially affect the Mineral Resource estimate.

15. MINERAL RESERVE ESTIMATES

Mineral Reserves were not estimated for the Rodeo Project.

16. MINING METHODS

Due to the near-surface nature and continuity of the orebody, mining at Rodeo is conducted with open pit mining methods. Blasted material is mined with a diesel excavator and loaded into on-highway trucks for haulage to the plant site approximately 115 km away from the mine. Loading and hauling to the plant is typically carried out on weekdays during the morning, to ensure adequate mineralized material delivery while allowing for mining of waste and low-grade materials to occur later in the day. If needed to supply mill feed, haulage to the plant may continue over the weekend. There are four stockpiles at the mine site for stockpiling mineralized material for potential future processing, and an additional stockpiling area exists at the plant. Mine production averages 2,100 tpd of total movement and the pit has an expected mine life of 22 months. **Figure 16-1** shows the final Rodeo pit design.

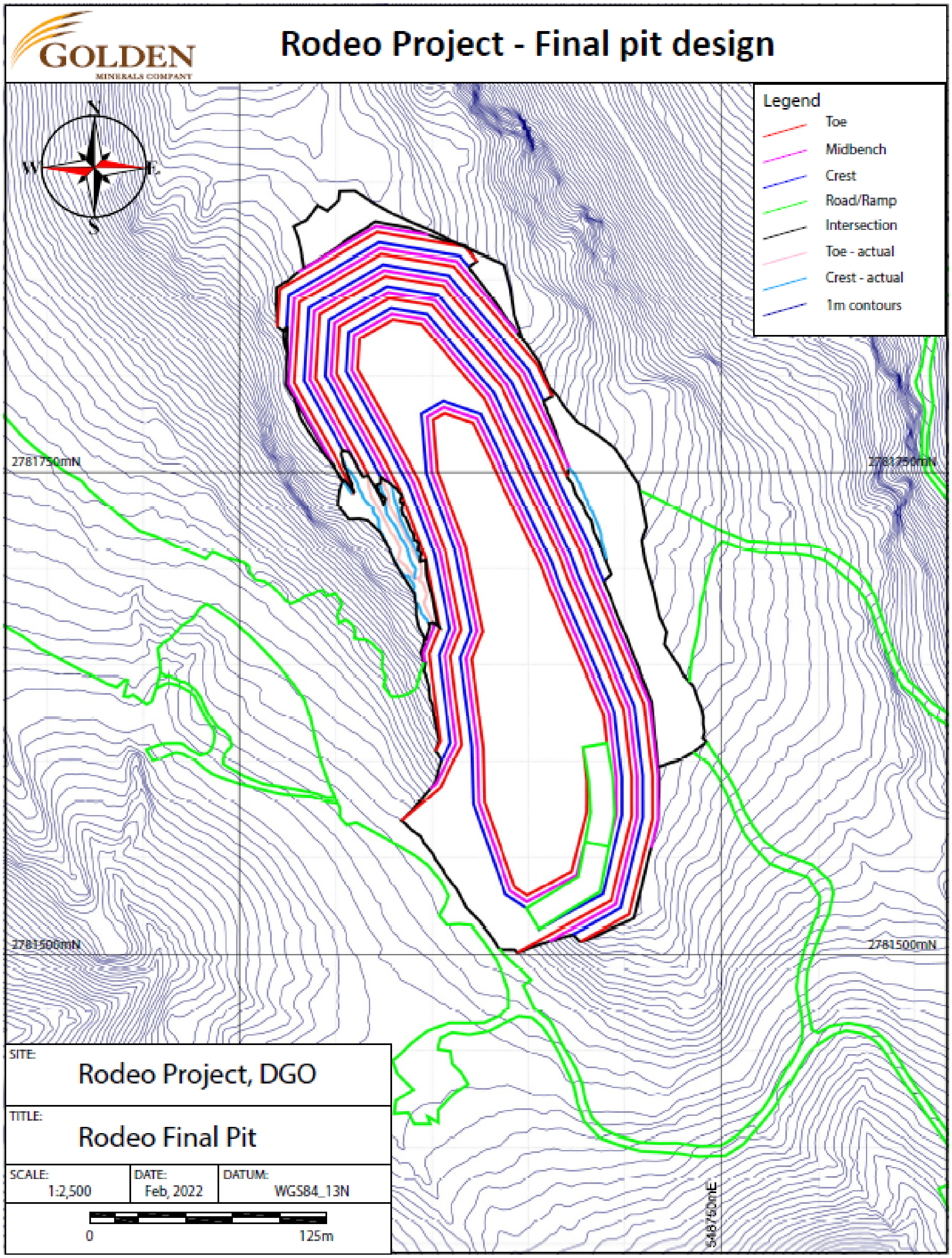


Figure 16-1: Rodeo final pit

No detailed geotechnical or hydrogeological studies have been performed for Rodeo. Parameters for pit design are shown in **Table 16-1**. Mining is conducted in 5 m benches, which are double benched to 10 m.

Table 16-1: Rodeo pit design parameters

Parameter	Value
Bench Face Angle	60°
Inter-ramp Angle	43°
Bench Height	10 m (2x 5 m benches)
Catch Bench Width	10 m

Mining and hauling to the plant are carried out using contractors. The mining equipment fleet available for use at the Project is shown in **Table 16-2**. Haul truck quantities vary depending on scheduled weekly deliveries to the plant.

Table 16-2: Contractor mining fleet

Equipment Type	Available Quantity
Bulldozers	2
Wheel Loaders	1
Track Excavators	1
Haul Trucks	4
Road Graders	1
Water Trucks	1
Track Drills	2
Drum Compactors	1

Labor requirements are minimal and are provided by the contractor. Golden Minerals personnel are responsible for blasthole sampling, supervisory, administrative, and engineering tasks.

17. RECOVERY METHODS

Mineralized material from the Rodeo mine is hauled approximately 115 km via on-highway trucks and stockpiled for process at the agitated leach plant in Velardeña, Durango (Plant 2). The plant is owned by Minera William S.A. de R.L. de C.V. and operated by Servicios Velardeña S.A. de C.V., both wholly owned subsidiaries of Golden Minerals. The plant has a design maximum throughput of 520 tpd and is currently operating at an average rate of 500 tpd.

A jaw crusher followed by a cone crusher provide primary and secondary crushing of feed material. Crushed material enters a grinding circuit comprised of a 10.5 x 13 ft. ball mill and a recently installed 8 x 22 ft. regrind (secondary) mill, both in closed circuit with cyclones. The product from the mills at 80% passing 325 mesh is thickened and sent to a series of eight agitated lixiviation tanks where cyanide is added with a planned consumption of 3.0 to 3.1 kg/t, and precious metals are leached from the mineralized material at a design flow rate of 1,700 m^3/day and a total leaching time of 84 hours.

Rich solution is separated using counter-current decantation and sent to the Merrill-Crowe circuit for clarification and precipitation of the Au and Ag to be refined into doré bars for transport. Tailings from the decantation are sent to the tailings storage facility at the plant site. A simplified flowsheet of the recovery process at the Velardeña plant is shown in **Figure 17-1**.

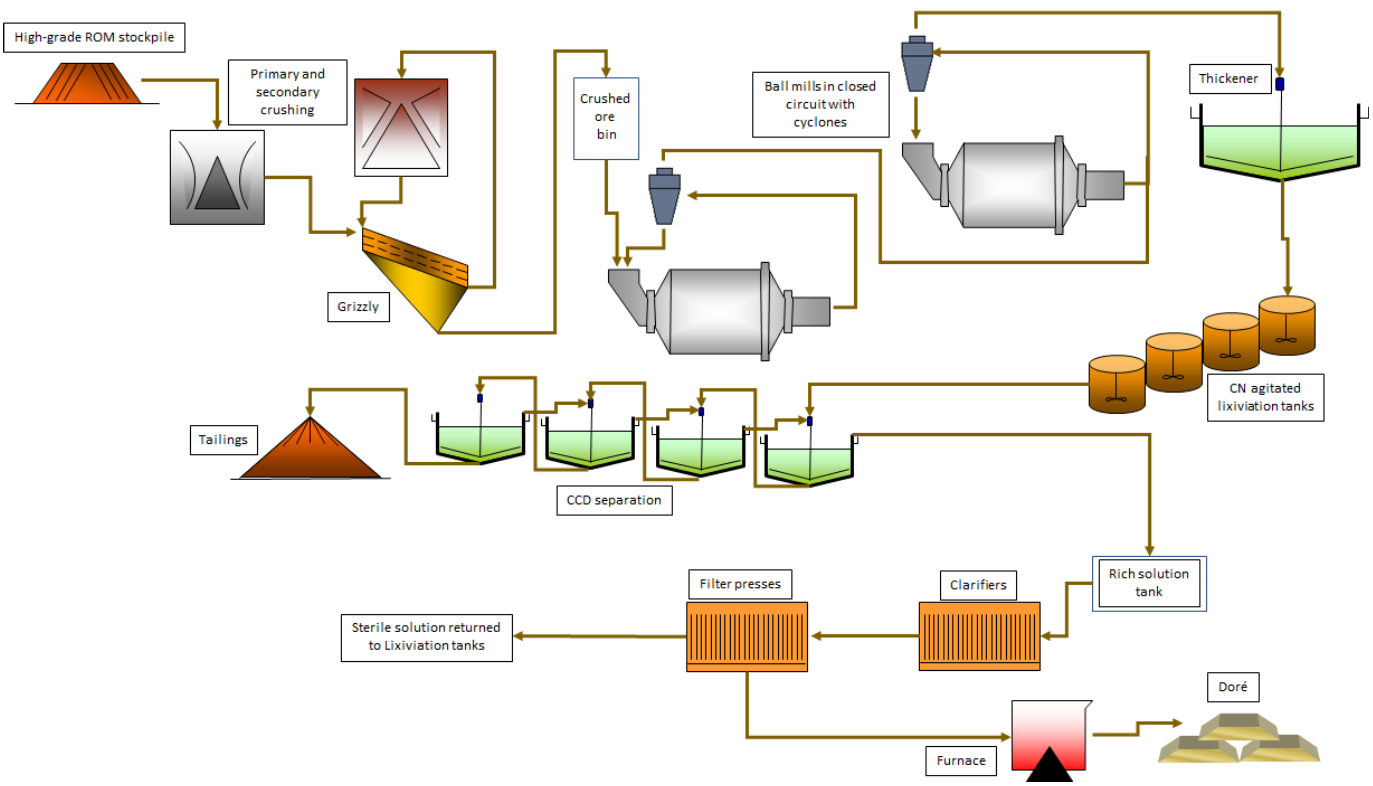


Figure 17-1: Plant 2 flowsheet

The plant facilities and equipment are in good operating condition. The tailings pond was recently expanded and is expected to have adequate capacity for the tailings generated by the Rodeo Project.

Budget and production results for January through October 2021 are summarized in **Table 17-1**. The plant has processed 119,848 t of mineralized material with an average head grade of 3.98 g/t-Au. Au recovery has averaged 75.5%, and Ag recovery has averaged 91.6%. In total, 2,084.82 kg of doré has been produced.

Table 17-1: Budget and production results

Parameter	Budget	Actual Jan-Oct 2021
Throughput		
Tonnes per Hour	18.6	17.0
Tonnes per Day	446	409
Grind		
% -325 mesh	80	79
Head Grade (g/t)		
Au	3.39	3.98
Ag	8.81	10.97
NaCN Consumption (kg/t)	3.0-3.1	2.81
Recovery (%)		
Au	82.5	75.5
Ag		91.6
Production (oz)		
Au	10,901	11,196
Ag	24,147	42,571

Water consumption at Plant 2 averaged 0.80 m^3/t from January through October 2021. Average power consumption at the plant was 831,000 kWh for the same period. The plant employs 98 workers.

Plant consumables for the January-October 2021 production period are summarized in **Table 17-2** below.

Table 17-2: Plant 2 consumables

	Consumables – Jan. 2021-Oct. 2021						
	Cyanide	Calcium/Lime	Flocculant	Zinc	Diatomaceous Earth	3" Balls	1.25" Balls
Period	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes
2021	336.35	220.01	1.27	45.57	12.02	361.98	80.90
	kg/t	kg/t	kg/t	kg/t	kg/t	kg/t	kg/t
2021	2.81	1.84	0.01	0.38	0.10	3.02	0.67

18. PROJECT INFRASTRUCTURE

The Rodeo Project requires minimal infrastructure at the site due to the size and duration of the operation. As material is being processed off-site at the Velardeña plant, no processing infrastructure is present at Rodeo.

Infrastructure at the Rodeo Project includes access roads, a waste rock dump, and low-grade mineralized material stockpiles. The primary road for mine access is gravel and is maintained in good condition for year-round use. Its design is adequate for the transportation of supplies onto the site as well as haulage of mineralized material from the Rodeo pit to the plant. The waste rock dump and low-grade stockpiles have sufficient capacity to meet the expected production from the pit. A layout of the key project infrastructure is shown in **Figure 18-1**.

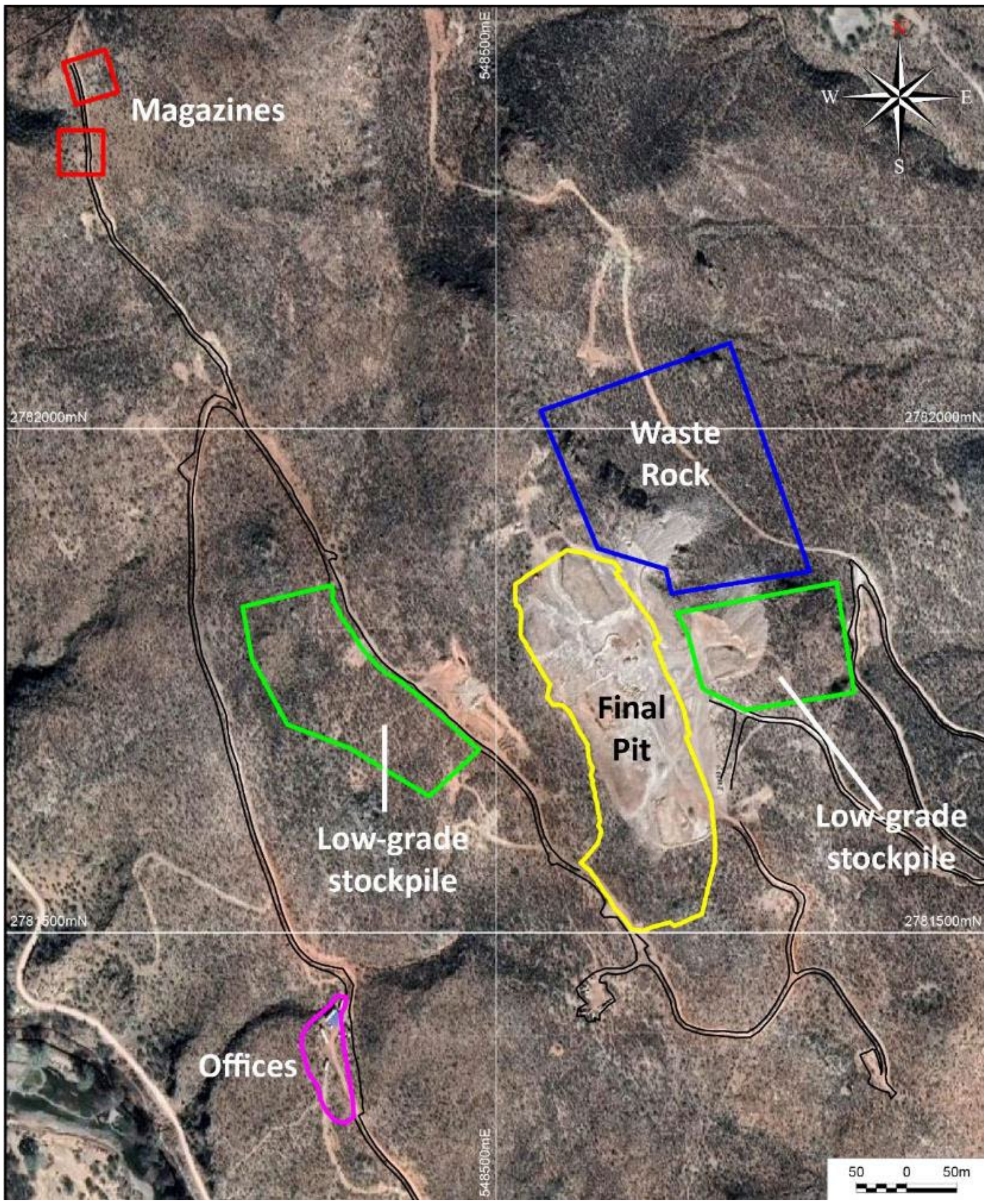


Figure 18-1: Rodeo Project infrastructure

19. MARKET STUDIES AND CONTRACTS

Detailed market studies were not performed or reviewed for the purposes of this PEA. The Rodeo Project is producing doré that meets industry standards for quality. Golden Minerals has a contract with Asahi Refining USA Inc. (Asahi) to refine the doré bars produced at the Velardeña plant. Asahi is independent of Golden Minerals, and is located in Salt Lake City, Utah, USA. Asahi provides credit for 99.9% of the Au and 98.0% of the Ag and applies a treatment charge of $0.35/oz of doré and a refining charge of $1.00/oz of recovered Au. The contract was renewed in March 2022 and will expire December 31, 2023.

The Rodeo mine is operating as a contract mining operation. Details of the material contracts related to drilling, mining, and hauling to Plant 2 are shown in **Table 19-1**.

Table 19-1: Material contracts for Rodeo operations

Contract Name	Purpose	Effective Date	Description	Contractor	Term	Comment
Mineral Transport from Rodeo Project to GM Velardeña Plant.	Transportation distance 115 km.	Contract from Aug 2, 2021.	Transportation via: Rodeo, Nazas, Prediceña and Velardeña.	Llanos de Zapata, S.P.R. Ced. AR6551/2021.	Duration to Dec 31, 2021 Renewable.	Insurance per Load $4,000. US.
Diamond Drilling Contract for Rodeo Project.+- 40 DHs t +-100 m depth.	Drilling 2,000 m in NQ, HQ and PQ	Duration of contract 4 months.	Drilling at the Rodeo Project 2,000 m, +- 100 ea. Diam. NQ, HQ, PQ.	Contractor Site: Tlajomulco de Zuñiga, Jalisco.	Contract: 4 Mo. Drill 2,000 m in 40 DHs.	Advance pay. $15,000 US + $3,000 mobilization.
Diamond Drilling Contract for Rodeo Project DH of 4.5" to 5.5" Diam.	Drilling 2,500 m minimum.	Contract from July 30, 2021/Copl.	Drilling at the Rodeo Project 2,500 m, Diam. 4.5 to 5.5 Inches.	Major Drilling de Mexico	Contract: Drill 2,500 m minimum.	Payments upon presentation of Invoice c/15 days.
Rental of Crushing Equipment for Excavation, Drilling & Construction	Workings at Rodeo Project.	Contract from Dec 2020	Machinery and equipment rented includes operators.	Triturados del Guadiana, S.A. de C.V.	Annual contract to Dec 31, 2021.	Contract extended by Golden Minerals.

Commodity price assumptions used in this PEA are based on bank projections for the life of mine. Commodity prices for Au and Ag are $1,800/oz and $25.00/oz, respectively.

20. ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

20.1 Environmental Baseline

The required Environmental Impact Statements and other baseline studies have been completed for the Project. The terrain in the Project area consists of relatively flat areas, irregular features, and an open valley topography of mountains with low hills where the slopes average 12°.

The soil represented is Chernozem (CH) and Leptosol (LP), which present a surface layer of light brown color that is low in organic matter and has low base content. These soils are of medium texture with stony surface.

Wildlife is relatively average for the region, dominated by avifauna and mammals, with some species of reptiles also present. The Nazas River runs nearby the Project, but no water sources are present at the mine.

Mining operations are developed in an area with xerophilic vegetation, where some threatened and protected species were considered for relocation. This zone contains 19 shrub species with ecological value, as well as 11 tree species, and 10 cacti and special plants.

Regarding fauna, 61 species of mammals (two threatened) have been identified, as well as 221 species of birds (seven threatened and 20 with special protection), 11 species of amphibians (one threatened and three with special protection), and 31 reptiles (eight threatened and six with special protection).

20.2 Requirements and Plans for Waste and Tailings Disposal, Site Monitoring, and Water Management during Operations and after Mine Closure

The open pit mine life is short and constrained within a relatively small footprint. Waste generation will be managed during mine operations and the waste rock will be part of the closure plan for the site. No tailings will be generated on site. Tailings are produced at Plant 2, which has sufficient tailings storage capacity for the LOM of the Project. Golden Minerals reports that it has the necessary permits and agreements to obtain water from the nearby Nazas River for mine operations. The water amount required for operations at the open pit is minimal. There will be no water remaining on site at closure.

20.3 Permitting Requirements and Status

The Rodeo Project is currently in operation. Low-grade mineralized material and waste rock are mined from the open pit and stored in low-grade stockpiles and waste dumps, respectively. High-grade mineralized material is hauled to Plant 2 for processing. Golden Minerals reports that it has all permits and agreements required to sustain operations at the Project. Required permits and their statuses are listed in **Table 20-1**. Tetra Tech is not aware of any performance or reclamation bond requirements for the Project.

Table 20-1: Environmental and legal documents for the Rodeo Project

Authorization	Number	Effective Date	Type	Expiration/ Duration
1. Change Use of Soil (CUS) in Forest Land.	SG/130.2.2/01423/20	Sep 22, 2020.	CUSTF - 13.1887 Ha.	5 years
2.A. Solid Waste Management.	SRNyMA. SMA.0861.2021	Jan 2021.	RERET-1-SRNYMA-426-21	1 year
2.B. Provisional Permit for Unloading. Contractor "HIDRO PLUS".	HLA190314B32.	Jan 4, 2021.	Direct Discharge from Plant.	Dec 31, 2021
3.A. Re-validation of General Permit for the Use of Explosives & Acc.	4596-Dgo.	Jan 1 to Dec 31, 2022.	Permit for use of Explosives.	Dec 31, 2022.
3.B. Re-validation of General Permit for the use of Explosives & Acc.	5219-Dgo.	Jan 1 to Dec 31, 2022.	Permit for use of Explosives.	Dec 31, 2022.
4 A. Re-validation of Permit for Management of Hazardous Waste.	MWIMJ1000421.	Nov 21,2014.	Mining Operations.	Extension 2025.
4 B. Re-validation of Permit for Management of Hazardous Waste.	10/EV-0561/05/08.	May 28, 2008.	Mining Operations.	Extension 2025.
4 C. Re-validation of Permit for Management of Hazardous Waste.	10/EV-0312/10/09.	Oct 15, 2009.	Mining Operations.	Extension 2025.
4 D. Re-validation of Permit for Management of Hazardous Waste.	10/EV-0225/04/18.	Apr 11, 2018.	Generator Operations.	Extension.
5. Second Notification in Environmental Impact.	SG/130.2.1.1/0013/22.	Jan 18, 2022.	Extension of Tailings Dam.6 yrs.	Extension due to inactivity.
7. Records of Management of Metallurgical Waste.	MWIMJ1000411.	Dec 11, 2017.	Application for Registration.	Approval July 31, 2018 (0006148).
8. Extension of Tailings Dam III, Phase 2A and 3A	SG/130.2.2/0132/2022	Jan 18, 2022.	Application Extension 2 years.	Approval for 2 more years.
9. Surface Rights Agreement with Ejido Francisco Márquez.	Ejido Francisco Márquez	Mar 29, 2020.	Rights to drive through Ejido.	Duration 10 years with ability to re-new

20.4 Community Relations and Social Responsibility

Golden Minerals reports it has reached several agreements with the communities and specific individuals of those communities. Agreements with the ejido for right of way of some specific zones of the project have been achieved. Owners of other private lands have agreed to lease portions of their land for mine operations.

20.5 Closure and Reclamation

Golden Minerals retained Clifton Associates Ltd. Natural Environment S.C. (Clifton), an independent environmental consulting firm based in Mexico, to provide an estimate of closure and reclamation costs for the Project. As Plant 2 is expected to continue processing material from other Golden Minerals operations once the Rodeo pit is exhausted, only the closure requirements for the mine are summarized in this section.

20.5.1 Area of Influence

The total area requiring closure and reclamation work is 15.9594 ha, as shown in **Table 20-2**.

Table 20-2: Works and areas of the Rodeo project

Works	Area (m^2)	Area (ha)
Waste Dump	43,731	4.3731
Stockpiles	42,691	4.2691
Open Pit Mine	64,335	6.4335
Powder Magazines	3,837	0.3837
Offices	5,000	0.5000
Total	**159,594**	**15.9594**

20.5.2 Closure Cost Estimate

Estimated costs for closure and reclamation of the Rodeo Project are shown in **Table 20-3**. These cost estimates include provisions for post-closure studies, maintenance, and monitoring of the restoration activities in the impacted areas.

Table 20-3: Closure cost estimate for the Rodeo Project

Site	Estimated Cost (USD)
Open Pit	12,364
Powder Magazines	4,249
Waste Dump	163,724
Impacted Roads	18,409
Stockpiles	38,967
Offices	8,212
Studies and Follow-up	87,237
Maintenance and Monitoring	113,552
Total	**446,714**

21. CAPITAL AND OPERATING COSTS

Capital and operating costs are estimated based on actual operating costs and Golden Minerals internal forecasts. Due to the short mine life of the Project, $447k for closure of the Rodeo mine site is included as capital cost; sustaining capital for the mine as well as capital expenditures for Plant 2 are not considered. As Plant 2 is expected to continue processing material from other Golden Minerals operations, closure costs for Plant 2 are not considered for the cost models of the Project.

Mining unit costs are summarized in **Table 21-1**.

Table 21-1: Rodeo Project unit costs

Item	Cost	Units
Mining – High-grade	$3.88	$/t-mined
Mining – Low-grade and Waste	$2.68	$/t-mined
Haulage to Plant 2	$13.05	$/t-hauled
Processing at Plant 2	$39.00	$/t-processed
G&A	$3.85	$/t-processed

Operating costs for the 24-month LOM total $23.4M with a unit cost of $66.68/t-milled. The operating costs are summarized in **Table 21-2** below.

Table 21-2: Operating cost summary

Description	LOM Cost ($000s)	Unit Cost ($/t-milled)
Mining	$3,790	$10.79
Processing	$18,278	$52.04
G&A	$1,352	$3.85
Total	**$23,421**	**$66.68**

22. ECONOMIC ANALYSIS

An economic analysis was performed for the expected life of mine of the Project. The economic analysis is based on Mineral Resources that, unlike Mineral Reserves, do not have demonstrated economic viability. Mineral Reserves have not been estimated for the Rodeo Project.

The LOM consists of 24 months of operation plus an additional 12 months to perform closure and reclamation at the Rodeo property. The start point for the LOM is November 1, 2021. General assumptions used in the economic analysis are shown in **Table 22-1**; no taxes were assumed for the economic analysis.

Table 22-1: Economic model assumptions

Description	Units	Value
Market Prices		
Au	$/oz	$1,800
Ag	$/oz	$25.00
Royalties		
La Cuesta	%	2.0%
Mexico Precious Metals	%	0.5%
Financial		
Discount Rate	%	8.0%

Results of the economic analysis are shown in **Table 22-2**. The pre-tax NPV of the Project is $22.9M at a discount rate of 8%.

Table 22-2: Economic model results

Description		Unit Cost ($/t-milled)	Total Value ($000s)
NSR			
	Net Revenue	$141.70	$49,767
Operating Costs			
	Mining	$10.79	($3,790)
	Processing	$52.04	($18,278)
	G&A	$3.85	($1,352)
	Operating Costs	$66.68	($23,421)
	Operating Margin	$75.01	$26,346
Capital Costs			
	Mining	-	$0
	Process Plant		$0
	Infrastructure	-	$0
	Closure	-	($447)
	Capital Costs	-	($447)
Royalties			
	La Cuesta	-	($995)
	Mexico Precious Metals	-	($249)
	Pre-tax Cash Flow	-	$24,655
	Pre-tax NPV 8%	-	$22,928

Annual pre-tax cash flow for the Project is shown in **Table 22-3**.

Table 22-3: LOM annual pre-tax cash flow

LOM Cash Flow	$000s			
Item	Total	Year 1	Year 2	Year 3
NSR				
Gross Payable	$50,392	$27,515	$22,877	
TCs, RCs, Freight	($625)	($294)	($331)	
NSR	**$49,767**	**$27,221**	**$22,546**	
Operating Costs				
Mining Costs	($3,790)	($2,100)	($1,690)	
Milling Costs	($18,278)	($9,561)	($8,717)	
Contingency and Other	($1,352)	($696)	($656)	
Operating Costs	**($23,421)**	**($12,358)**	**($11,063)**	
Operating Margin	**$26,346**	**$14,863**	**$11,483**	
Royalties				
La Cuesta	($995)	($544)	($451)	
Mexican Precious Metals	($249)	($136)	($113)	
Capital Costs				
Mine Capital Costs				
Processing Capital Costs				
Closure Costs	($447)			($447)
Pre-tax Cash Flow	**$24,655**	**$14,183**	**$10,919**	**($447)**
Pre-tax $NPV_{8\%}$	**$22,928**			

Sensitivity analyses on metal price and operating costs were performed on the economic model results. Due to the lack of capital cost requirements, no sensitivity analysis was conducted on capital costs. The results of the sensitivity analyses are shown in **Figure 22-1** and **Figure 22-2**. Results of the sensitivities show that a reduction in metal price by $100/oz would result in a 10% reduction in NPV, while a 10% increase in operating costs would result in a 9% decrease in NPV.

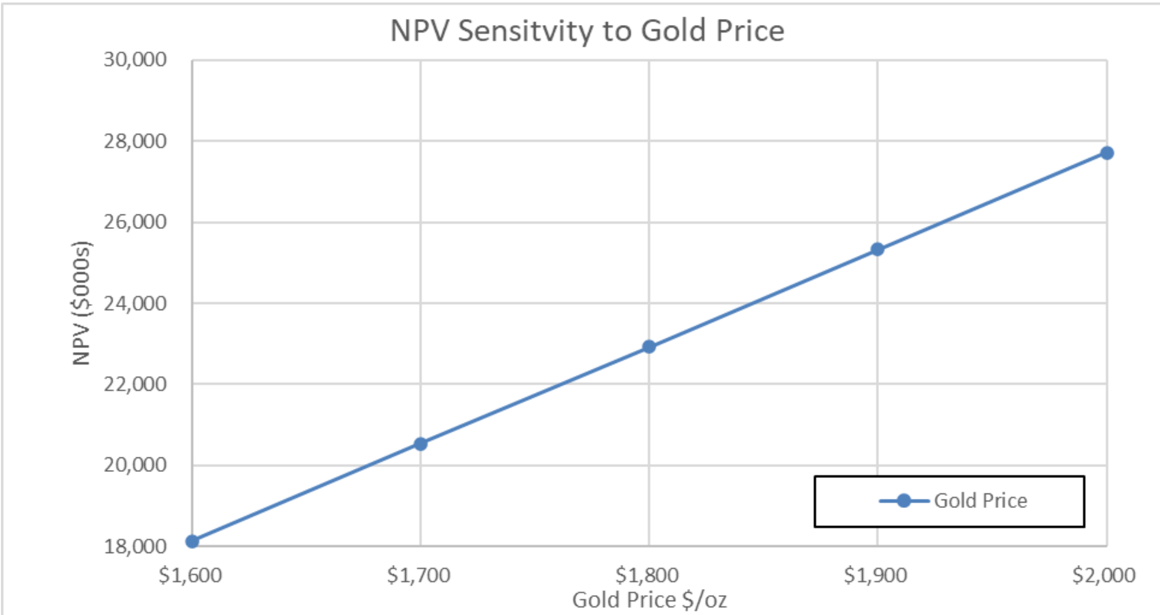


Figure 22-1: NPV sensitivity to Au price

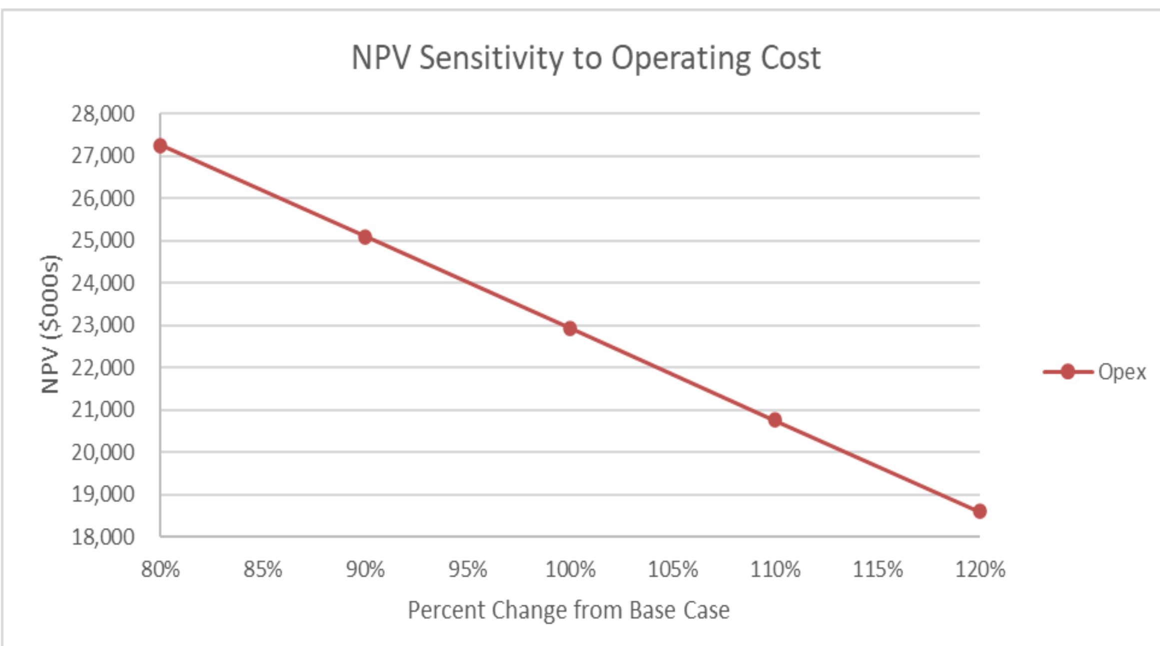


Figure 22-2: NPV sensitivity to operating cost

23. ADJACENT PROPERTIES

There are no relevant properties adjacent to the Project.

24. OTHER RELEVANT DATA AND INFORMATION

Tetra Tech is not aware of any additional information for which the exclusion thereof would render this report misleading.

25. INTERPRETATION AND CONCLUSIONS

The Rodeo Project has been in production since Q1 2021. The operation utilizes contract drilling, mining, and hauling services, and processes mineralized material at their wholly owned processing plant in Velardeña. The Project has been successfully producing and selling doré to the market.

25.1 Geology and Resource

Tetra Tech has reviewed the Resource model for the Rodeo deposit estimated by Golden Minerals. The inputs, parameters, and estimation results are within industry standards. The estimation, classification, and reporting of the Resources constrained by the mine design are conservative in nature. Production data validates the previous drilling and Resource estimates.

25.2 Mining

Open pit surface mining is completed at the Rodeo site using a diesel excavator and over highway trucks to transport the mineralized material to the processing plant at the company's Velardeña property. Mine production averages 2,100 tpd of total movement and the pit has an expected mine life of 22 months, and the LOM includes two additional months of production from the high-grade stockpile at the plant. Tetra Tech has reviewed the mine plan created by Golden Minerals and finds it to be within industry standards. The pit parameters are considered conservative in nature.

25.3 Metallurgy and Processing

The metallurgical report prepared by RDi for the Rodeo Project provided data sufficient for use in this PEA. Golden Minerals demonstrated recovery of Au and Ag from Rodeo mineralized material at Plant 2 in 2021. Installation of an additional ball mill circuit in April 2021 provided the ability to process material with varying degrees of hardness at a rate of 520 tpd.

The tailings pond at Plant 2 was expanded in 2019 making enough room available for the storage of the Rodeo Project's tailings. Golden Minerals has a permit that will allow further expansion of the pond if required.

25.4 Environmental and Permitting

Tetra Tech has reviewed the available information on permits, agreements, and environmental aspects. Based on this information, Tetra Tech is unaware of any outstanding issues on this regard that will affect the current operations or mine life.

25.5 Economic Analysis

An economic analysis was performed for the expected 24-month LOM of the Project, starting November 1, 2021. The economic analysis is based on Mineral Resources that are not Mineral Reserves and do not have demonstrated economic viability. Mineral Reserves have not been estimated for the Rodeo Project. The pre-tax NPV of the Project is $22.9M at a discount rate of 8%. The Project is sensitive to metal prices and operating costs.

25.6 Significant Risk Factors

The decision to begin production at the Rodeo Project was not based on a Feasibility Study of Mineral Reserves demonstrating economic and technical viability. The Project is operating and selling a product and has a relatively short LOM. These factors reduce the economic and technical uncertainties for the Project. Risks include changes in agreements with landowners and/or communities for access, mining, and water use.

26. RECOMMENDATIONS

The Project is currently operating without reported Mineral Reserves. The following recommendations for further work at the Project are summarized below; however, due to the short mine life the time and costs required to perform the recommended work may not contribute significant additional value to the Project. Consequently, the recommendations below are presented without estimated costs.

26.1 Geology and Resource

Exploration drilling efforts should continue to determine the limits of the deposit where they have not already been defined. There is potential for additional Resources within the Rodeo concessions.

26.2 Mining

Golden Minerals should evaluate the economic viability of processing the stockpiled low-grade material, either after the mine life is exhausted, or through blending with the current mineralized material being sent to the processing plant.

26.3 Metallurgy and Processing

Based on Tetra Tech's review of the metallurgical testing, it is recommended that Golden Minerals continues to investigate ways to improve Au leach recovery through mineralogical studies and laboratory leach test work.

27. REFERENCES

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Tetra Tech, Inc., 2017: NI 43-101 Technical Report, Mineral Resource Estimate, Rodeo Project, Rodeo, Durango, Mexico; technical report

28. DATE AND SIGNATURE PAGE

CERTIFICATE OF AUTHOR

Guillermo Dante Ramírez-Rodríguez, PhD, MMSAQP

Principal Mining Engineer of Tetra Tech

350 Indiana Street, Suite 500

Golden, Colorado 80401

Telephone: (303) 217-5700

I, **Guillermo Dante Ramírez-Rodríguez, PhD, MMSAQP**, of Golden, Colorado do hereby certify:

a) I am a Principal Mining Engineer with Tetra Tech, Inc. with a business address of 350 Indiana St., Suite 500, Golden, CO 80401.

a) This certificate applies to the Technical Report titled "Preliminary Economic Assessment Update Rodeo Project | Durango State, Mexico" with an effective date of October 31, 2021.

b) I have a Bachelor's degree in Mining and Metallurgical Engineering from the University of Zacatecas School of Mines in Mexico, and a Master and Doctorate degrees in Mining and Earth Systems Engineering from the Colorado School of Mines, in the United States of America. I am a QP member for the Mining and Metallurgical Society of America (Member No. 01372QP). I have over 35 years of professional experience since my graduation in 1987. I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").

c) I visited the property December 10,2019.

d) I am responsible for Sections 15, 16, 18-22, as well as portions of Sections 1, 2, and 24-27.

a) I satisfy all the requirements of independence according to NI 43-101.

b) I have read NI 43-101, Form 43-101 F1, and the Companion Policy to NI 43-101 (43-101 CP) and this Technical Report has been prepared in compliance with NI 43-101, Form 43-101 F1, and 43-101 CP.

c) As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

d) I consent to the filing of the Technical Report with any stock exchanges or other regulatory authority and any publication by them, including electronic publication in the public company files on the websites accessible by the public, of the Technical Report.

Dated May 6, 2022

"Guillermo Dante Ramírez-Rodríguez PhD, MMSAQP"

SIGNATURE OF QUALIFIED PERSON

Guillermo Dante Ramírez-Rodríguez PhD, MMSAQP

PRINT NAME OF QUALIFIED PERSON

CERTIFICATE OF AUTHOR

Randolph P. Schneider, QP
Associate Metallurgical Engineer of Tetra Tech

350 Indiana Street, Suite 500

Golden, Colorado 80401

Telephone: 303-217-5700

I, **Randolph P. Schneider, QP**, of Wellington, Colorado do hereby certify:

a) I am currently employed as subcontractor of Tetra Tech located at 350 Indiana Street, Suite 500, Golden, Colorado 80401.
b) This certificate applies to the Technical Report titled "Preliminary Economic Assessment Update Rodeo Project | Durango State, Mexico" with an effective date of October 31, 2021.
c) I am a Professional Metallurgist and a Registered Member of The Society for Mining, Metallurgy & Exploration, a member of the Canadian Institute of Mining, Metallurgy and Petroleum, a fellow of the Australasian Institute of Mining and Metallurgy, a QP member of Mining & Metallurgical Society of America (Member No. 01330), a member of the Extractive Metallurgy Chapter of Denver, and a member of the Colorado Mining Association.
d) I graduated from the Colorado School of Mines with BSc in Metallurgical Engineering. I have practiced my profession continuously since graduating and have more than 40 years' experience.
e) I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association and relevant work experience, I fulfill the requirements of a "qualified person" for the purposes of NI 43-101.
f) I visited and inspected the subject property on December 10, 2019.
g) I participated and am responsible for sections 13 and 17, and portions of Sections 1, 2, and 24-27 of this Technical Report.
h) I satisfy all the requirements of independence according to NI 43-101.
i) I have read NI 43-101, Form 43-101 F1, and the Companion Policy to NI 43-101 (43-101 CP) and this Technical Report has been prepared in compliance with NI 43-101, Form 43-101 F1, and 43-101 CP.
j) As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
k) I consent to the filing of the Technical Report with any stock exchanges or other regulatory authority and any publication by them, including electronic publication in the public company files on the websites accessible by the public, of the Technical Report.

Dated May 6, 2022

"Randolph P Schneider, MMSAQP"-Signed

Signature of Qualified Person

Randolph P Schneider, MMSAQP

Print name of Qualified Person

CERTIFICATE OF AUTHOR

Kira Lyn Johnson, MMSAQP

Senior Geological Engineer of Tetra Tech

350 Indiana Street, Suite 500

Golden, Colorado 80401

Telephone: (303) 217-5700

I, **Kira Lyn Johnson, MMSAQP**, of Golden, Colorado do hereby certify:

a) I am a Senior Geological Engineer with Tetra Tech, Inc. with a business address of 350 Indiana St., Suite 500, Golden, CO 80401.

b) T This certificate applies to the Technical Report titled "Preliminary Economic Assessment Update Rodeo Project | Durango State, Mexico" with an effective date of October 31, 2021.

c) I have a Bachelor's degree in Geological Engineering from South Dakota School of Mines and Technology. I am a QP member for the Mining and Metallurgical Society of America (Member No. 01539). I have 15 years of professional experience. I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument").

d) I inspected the property on December 10, 2019.

e) I am responsible for section 7-12, 14, and 23 of the report, as well as portions of Sections 1-6 and 24-27.

f) I satisfy all the requirements of independence according to NI 43-101.

g) I have read NI 43-101, Form 43-101 F1, and the Companion Policy to NI 43-101 (43-101 CP) and this Technical Report has been prepared in compliance with NI 43-101, Form 43-101 F1, and 43-101 CP.

h) As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

i) I consent to the filing of the Technical Report with any stock exchanges or other regulatory authority and any publication by them, including electronic publication in the public company files on the websites accessible by the public, of the Technical Report.

Dated May 6, 2022

"Kira Lyn Johnson, MMSAQP" - Signed

Signature of Qualified Person

Kira Lyn Johnson, MMSAQP

Print name of Qualified Person

APPENDIX A: Drill Hole Locations

Hole ID	Easting	Northing	Elevation	Total Depth (m)	Initial Azimuth	Initial Dip	Type	Company	Year
BR-01	548585.97	2781807.04	1470.16	132.0	235	-55	RC	548585.97	2004
BR-02	548581.97	2781804.04	1469.81	58.0	235	-57	RC	548581.97	2004
BR-03	548596.22	2781771.36	1466.06	81.0	230	-55	RC	548596.22	2004
BR-04	548579.73	2781756.88	1466.54	126.0	230	-65	RC	548579.73	2004
BR-05	548636.68	2781742.53	1458.69	133.0	235	-55	RC	548636.68	2004
BR-06	548649.25	2781683.03	1453.32	142.2	236	-55	RC	548649.25	2004
BR-07	548707.29	2781753.11	1452.44	215.0	235	-55	RC	548707.29	2004
BR-08	548644.96	2781817.12	1464.73	178.0	230	-50	RC	548644.96	2004
BR-09	548686.02	2781710.58	1451.70	62.0	236	-55	RC	548686.02	2004
BR-10	548683.32	2781651.36	1449.83	20.4	235	-50	RC	548683.32	2004
BR-10-A	548681.49	2781650.34	1450.64	58.1	235	-50	RC	548681.49	2004
BR-11	548679.31	2781650.55	1449.99	127.0	244	-50	RC	548679.31	2004
BR-12	548690.22	2781704.98	1451.14	131.0	237	-50	RC	548690.22	2004
BR-13	548657.64	2781759.46	1457.56	114.0	230	-50	RC	548657.64	2004
BR-14	548621.77	2781791.28	1465.79	125.0	230	-55	RC	548621.77	2004
BR-15	548569.53	2781858.20	1479.65	78.0	241	-50	RC	548569.53	2004
BR-16	548519.84	2781951.74	1483.02	122.0	240	-45	RC	548519.84	2004
BR-17	548761.70	2781642.78	1444.05	104.0	240	-50	RC	548761.70	2004
BR-18	548516.05	2781634.64	1427.95	103.0	230	-74	RC	548516.05	2004
BR-19	548486.75	2781674.00	1428.97	156.0	233	-70	RC	548486.75	2004
BR-21	548598.86	2781818.42	1473.82	131.0	235	-58	RC	548598.86	2004
BRD-01	548339.16	2781448.01	1385.00	457.9	57	-50	DD	548339.16	2007
BRD-02	548482.26	2781732.62	1432.71	213.4	235	-50	DD	548482.26	2007
BRD-03	548584.13	2782069.55	1445.27	142.9	270	-50	DD	548584.13	2007
BRD-04	548638.83	2781498.30	1428.43	220.0	235	-65	DD	548638.83	2007
RD-01	548904.16	2780938.01	1295.00	91.0	65	-60	RC	548904.16	1995
RD-02	549187.16	2780809.01	1356.00	147.4	245	-45	RC	549187.16	1995
RD-03	549071.16	2781636.01	1340.00	150.0	245	-50.5	RC	549071.16	1995
RD-04	549180.16	2780939.01	1350.00	188.0	65	-60	RC	549180.16	1995
RD-05	548460.42	2781897.44	1472.75	146.0	245	-50	RC	548460.42	1995
RD-06	549442.16	2780890.01	1310.00	224.0	65	-60	RC	549442.16	1995
RD-07	549200.16	2780692.01	1380.00	60.0	65	-50	RC	549200.16	1995
RD-08	548448.80	2781764.86	1436.11	184.0	65	-50	RC	548448.80	1995
RD-09	549337.16	2780412.01	1292.00	166.0	245	-65	RC	549337.16	1995
RD-10	549446.16	2780231.01	1280.00	152.0	245	-60	RC	549446.16	1995
RD-11	549147.16	2781139.01	1269.00	60.0	65	-60	RC	549147.16	1995
RD-12	549102.16	2781088.01	1265.00	60.0	65	-60	RC	549102.16	1995
RD-13	548515.24	2781686.34	1431.07	220.0	65	-55	RC	548515.24	1995
RD-14	548360.16	2781820.31	1432.36	225.0	65	-55	RC	548360.16	1995
RD-15	548650.50	2781633.82	1447.95	178.0	245	-60	RC	548650.50	1995

Hole ID	Easting	Northing	Elevation	Total Depth (m)	Initial Azimuth	Initial Dip	Type	Company	Year
RDO16-01	548637.07	2781815.39	1464.98	89.4	239	-55	DD	548637.07	2016
RDO16-02	548643.69	2781790.89	1461.61	112.5	239	-55	DD	548643.69	2016
RDO16-03	548653.09	2781771.87	1458.94	119.1	239	-54	DD	548653.09	2016
RDO16-04	548672.62	2781737.80	1454.41	100.0	239	-55	DD	548672.62	2016
RDO16-05	548667.14	2781710.81	1453.01	46.7	239	-55	DD	548667.14	2016
RDO16-06	548666.26	2781708.99	1453.07	34.0	239	-55	DD	548666.26	2016
RDO16-07	548666.99	2781708.54	1452.88	91.0	239	-55	DD	548666.99	2016
RDO16-08	548698.64	2781687.08	1449.70	106.5	239	-55	DD	548698.64	2016
RDO16-09	548699.07	2781660.96	1449.04	91.5	239	-55	DD	548699.07	2016
RDO16-10	548699.21	2781634.89	1448.63	201.0	239	-55	DD	548699.21	2016
RDO16-11	548617.16	2781845.07	1470.28	155.5	239	-55	DD	548617.16	2016
RDO16-12	548570.80	2781852.75	1479.78	157.0	239	-55	DD	548570.80	2016
RDO16-13	548460.94	2781602.37	1419.18	380.0	60	-45	DD	548460.94	2016
RDO16-14	548776.07	2781543.95	1435.07	399.5	239	-45	DD	548776.07	2016
RO-11-001	548649.74	2781688.71	1453.43	304.5	240	-50	DD	548649.74	2011
RO-11-003	548873.85	2781373.03	1407.62	144.5	58	-45	DD	548873.85	2011
RO-11-004	548069.47	2782536.48	1406.13	218.2	57	-50	DD	548069.47	2011
RO-11-005	548869.10	2781370.98	1407.32	310.5	240	-50	DD	548869.10	2011
RO-11-006A	548071.47	2782530.48	1405.68	208.0	250	-50	DD	548071.47	2011
RO-11-007	548432.10	2782397.04	1442.89	370.5	242	-45	DD	548432.10	2011
RO-11-008	548222.54	2782073.05	1417.88	268.5	60	-50	DD	548222.54	2011
RO-11-009	548491.29	2781610.44	1423.98	192.2	240	-50	DD	548491.29	2011
RO-11-010	548443.16	2782246.01	1450.00	212.0	241	-45	DD	548443.16	2011
RO-11-011	548019.16	2783292.01	1470.00	129.8	60	-50	DD	548019.16	2011
RO-11-012	547811.16	2783552.01	1495.00	204.5	50	-50	DD	547811.16	2011
RO-11-013	548688.29	2781729.86	1452.80	163.4	62	-50	DD	548688.29	2011
RO-11-014	547479.16	2783679.01	1493.00	278.5	60	-50	DD	547479.16	2011
RO-11-015	547808.16	2783548.01	1495.00	231.2	241	-50	DD	547808.16	2011
RO-11-016	548123.16	2783015.01	1450.00	305.0	242	-45	DD	548123.16	2011
RO-11-017	547702.16	2783822.01	1550.00	220.0	243	-50	DD	547702.16	2011
RO-11-018	547711.16	2783826.01	1550.00	229.0	60	-50	DD	547711.16	2011
RO-11-019	548128.16	2783017.01	1450.00	121.6	51	-45	DD	548128.16	2011
RO-11-020	548001.16	2783130.01	1478.00	262.5	240	-50	DD	548001.16	2011
RO-11-021	547588.16	2783993.01	1544.00	245.5	58	-50	DD	547588.16	2011
RO-11-022	547113.16	2784578.01	1464.00	323.3	60	-45	DD	547113.16	2011
RO-11-023	548438.23	2782399.65	1442.60	187.5	60	-50	DD	548438.23	2011
RO-11-024	548547.55	2781857.64	1476.26	124.5	245	-50	DD	548547.55	2011
RO-11-025	548615.16	2782182.15	1436.34	328.5	82	-47	DD	548615.16	2011
RO-11-026	548573.22	2781810.52	1472.33	108.6	160	-45	DD	548573.22	2011
RO-11-027	548738.24	2781611.47	1443.85	93.0	245	-45	DD	548738.24	2011

Hole ID	Easting	Northing	Elevation	Total Depth (m)	Initial Azimuth	Initial Dip	Type	Company	Year
RO-11-028	548590.15	2781440.87	1423.63	162.0	244	-45	DD	548590.15	2011
RO-11-029	548359.15	2781777.50	1431.66	143.0	245	-45	DD	548359.15	2011
RDO_20_001_M	548619.65	2781738.68	1459.70	45.0	60	-80	DD	548619.65	2020
RDO_20_002	548618.92	2781737.60	1459.74	35.0	240	-50	DD	548618.92	2020
RDO_20_003_M	548642.14	2781689.93	1454.22	40.0	0	-90	DD	548642.14	2020
RDO_20_004	548564.30	2781792.77	1471.00	50.0	60	-55	DD	548564.30	2020
RDO_20_005_M	548589.95	2781763.01	1466.04	40.0	0	-90	DD	548589.95	2020
RDO_20_006	548588.45	2781762.25	1466.14	30.0	240	-50	DD	548588.45	2020
RDO_20_007	548600.32	2781814.56	1473.42	50.0	240	-50	DD	548600.32	2020
RDO_20_008	548642.90	2781690.49	1454.24	40.0	240	-55	DD	548642.90	2020
RDO_20_009	548640.52	2781688.52	1454.24	45.0	60	-70	DD	548640.52	2020
RDO_20_010	548646.65	2781667.77	1452.20	40.0	240	-55	DD	548646.65	2020
RDO_20_011	548650.38	2781670.41	1452.24	40.0	60	-70	DD	548650.38	2020
RDO_20_012	548629.46	2781715.35	1456.96	35.0	240	-55	DD	548629.46	2020
RDO_20_013	548645.49	2781731.00	1456.78	19.0	240	-55	DD	548645.49	2020
RDO_20_013a	548645.78	2781730.46	1456.72	55.0	240	-55	DD	548645.78	2020
RDO_20_014	548618.99	2781766.88	1462.91	50.0	240	-55	DD	548618.99	2020
RDO_20_015	548597.03	2781754.56	1464.60	35.0	240	-55	DD	548597.03	2020
RDO_20_016	548599.86	2781788.88	1468.23	40.0	240	-60	DD	548599.86	2020
RDO_20_017	548659.23	2781645.94	1449.61	40.0	240	-55	DD	548659.23	2020
RDO_20_018	548636.19	2781623.25	1447.34	40.0	240	-55	DD	548636.19	2020
RDO_20_019	548550.49	2781813.74	1472.79	30.0	240	-50	DD	548550.49	2020
RDO_20_020	548550.69	2781814.25	1472.90	30.0	60	-55	DD	548550.69	2020
RDO_20_021	548600.20	2781814.54	1473.52	60.0	240	-80	DD	548600.20	2020
RDO_20_022	548570.17	2781799.00	1471.73	40.0	240	-50	DD	548570.17	2020
RDO_20_023	548630.17	2781682.93	1454.73	40.0	240	-45	DD	548630.17	2020
RDO_20_024	548601.48	2781722.53	1461.40	40.0	240	-90	DD	548601.48	2020
RDO_20_025	548602.41	2781722.68	1461.41	35.0	240	-50	DD	548602.41	2020
RDO_20_026	548608.85	2781701.01	1457.84	45.0	240	-55	DD	548608.85	2020
RDO_20_027	548609.21	2781701.29	1457.85	40.0	0	-90	DD	548609.21	2020
RDO_20_028	548650.99	2781654.40	1450.91	40.0	240	-55	DD	548650.99	2020
RDO_20_029	548618.93	2781767.13	1462.98	55.0	0	-90	DD	548618.93	2020
RDO_20_030	548676.76	2781666.99	1450.67	40.0	240	-55	DD	548676.76	2020
RDO_20_031	548619.49	2781749.70	1461.18	40.0	240	-55	DD	548619.49	2020
RDO_20_032	548621.37	2781750.57	1461.24	35.0	60	-55	DD	548621.37	2020
RDO_20_033	548635.50	2781688.64	1454.98	40.0	60	-45	DD	548635.50	2020
RDO_20_034	548600.72	2781789.13	1468.11	35.0	60	-55	DD	548600.72	2020
RDO_021_001	548554.85	2781869.86	1476.54	51.6	240	-60	DD	548554.85	2021
RDO_021_002	548581.14	2781830.18	1475.36	55.5	240	-55	DD	548581.14	2021
RDO_021_003	548606.84	2781844.93	1472.53	70.3	240	-55	DD	548606.84	2021

Hole ID	Easting	Northing	Elevation	Total Depth (m)	Initial Azimuth	Initial Dip	Type	Company	Year
RDO_021_004	548595.26	2781866.69	1474.87	60.5	240	-55	DD	548595.26	2021
RDO_021_005	548578.09	2781884.69	1477.43	63.5	240	-60	DD	548578.09	2021
RDO_021_006	548615.34	2781879.26	1471.20	52.0	240	-55	DD	548615.34	2021
RDO_021_007	548604.41	2781897.27	1471.91	50.5	240	-50	DD	548604.41	2021
RDO_021_008	548638.08	2781833.22	1466.51	82.5	240	-60	DD	548638.08	2021
RDO_021_009	548556.86	2781782.03	1464.80	59.8	60	-60	DD	548556.86	2021
RDO_021_010	548555.01	2781780.90	1464.72	60.0	240	-60	DD	548555.01	2021
RDO_021_011A	548617.27	2781828.82	1469.49	49.5	240	-60	DD	548617.27	2021
RDO_021_012	548635.59	2781880.68	1468.17	81.8	60	-50	DD	548635.59	2021
RDO_021_013	548634.48	2781879.95	1468.16	50.0	240	-55	DD	548634.48	2021
RDO_021_014B	548626.00	2781904.00	1470.00	25.7	60	-60	DD	548626.00	2021
RDO_021_015	548617.11	2781919.81	1471.40	80.2	60	-50	DD	548617.11	2021
RDO_021_016	548612.83	2781918.02	1470.67	50.0	240	-60	DD	548612.83	2021
RDO_021_017	548627.58	2781857.55	1468.62	72.6	240	-55	DD	548627.58	2021
RDO_021_018	548562.06	2781771.32	1459.33	75.0	240	-45	DD	548562.06	2021
RDO_021_019	548547.05	2781774.44	1464.56	54.3	60	-60	DD	548547.05	2021
RDO_021_020	548545.28	2781772.86	1464.49	52.0	240	-45	DD	548545.28	2021
RDO_021_021	548553.99	2781817.84	1472.97	86.0	246.5	-55	DD	548553.99	2021
RDO_021_022	548537.28	2781808.95	1471.70	70.0	240	-55	DD	548537.28	2021
RDO_021_023	548551.28	2781852.21	1475.79	69.4	240	-55	DD	548551.28	2021
RDO_021_024	548531.07	2781832.00	1472.93	66.8	240	-55	DD	548531.07	2021
RDO_021_025	548535.64	2781859.91	1476.06	72.5	240	-60	DD	548535.64	2021
RDO_021_026	548559.23	2781901.96	1477.82	60.0	240	-55	DD	548559.23	2021
RDO_021_027	548579.99	2781842.12	1477.54	60.0	240	-55	DD	548579.99	2021
RDO_021_028	548563.01	2781782.77	1464.76	79.3	210	-45	DD	548563.01	2021
RDO_021_029	548567.66	2781819.94	1472.97	66.7	240	-55	DD	548567.66	2021
RDO_021_030	548541.49	2781797.87	1471.39	87.4	240	-50	DD	548541.49	2021
RDO_021_031	548599.51	2781923.21	1470.43	68.2	240	-55	DD	548599.51	2021
RDO_021_032	548544.17	2781888.55	1477.24	62.5	240	-55	DD	548544.17	2021
RDO_021_033	548456.18	2781602.06	1418.77	151.7	240	-45	DD	548456.18	2021
RDO_021_034	548359.12	2781777.80	1431.22	160.2	290	-45	DD	548359.12	2021
RDO_021_035	548487.96	2781599.89	1422.18	103.1	60	-45	DD	548487.96	2021
RRC_021_001	548525.15	2781932.18	1479.79	52.0	240	-50	RC	548525.15	2021
RRC_021_002	548496.84	2781892.34	1475.06	88.0	240	-50	RC	548496.84	2021
RRC_021_003	548514.04	2781898.75	1475.99	71.0	240	-50	RC	548514.04	2021
RRC_021_004	548580.77	2781739.01	1445.01	74.0	240	-45	RC	548580.77	2021
RRC_021_005	548589.62	2781732.94	1444.82	68.0	240	-45	RC	548589.62	2021
RRC_021_006	548588.16	2781757.52	1444.88	70.0	240	-45	RC	548588.16	2021
RRC_021_007	548528.85	2781871.69	1475.50	70.0	240	-45	RC	548528.85	2021
RRC_021_008	548657.13	2781839.32	1465.41	80.0	60	-45	RC	548657.13	2021

Hole ID	Easting	Northing	Elevation	Total Depth (m)	Initial Azimuth	Initial Dip	Type	Company	Year
RRC_021_009	548638.38	2781868.46	1468.03	78.0	60	-45	RC	548638.38	2021
RRC_021_010	548673.45	2781686.23	1444.91	36.0	60	-50	RC	548673.45	2021
RRC_021_011	548670.94	2781640.07	1444.91	51.0	240	-50	RC	548670.94	2021
RRC_021_012	548647.56	2781603.95	1444.69	70.0	240	-45	RC	548647.56	2021
RRC_021_013	548637.17	2781616.90	1444.90	86.0	240	-50	RC	548637.17	2021
RRC_021_014	548674.59	2781592.88	1445.05	70.0	240	-50	RC	548674.59	2021
RRC_021_015	548602.03	2781718.45	1444.88	72.0	240	-55	RC	548602.03	2021
RRC_021_016	548630.76	2781756.21	1445.16	68.0	240	-55	RC	548630.76	2021
RRC_021_017	548595.33	2781710.25	1445.14	75.0	240	-45	RC	548595.33	2021
RRC_021_018	548676.81	2781616.29	1445.04	54.0	240	-50	RC	548676.81	2021
RRC_021_019	548693.64	2781605.47	1447.54	50.0	240	-50	RC	548693.64	2021
RRC_021_020	548713.96	2781618.70	1446.67	60.0	240	-50	RC	548713.96	2021
RRC_021_021	548655.39	2781725.98	1445.23	58.0	240	-55	RC	548655.39	2021
RRC_021_022	548683.24	2781645.16	1445.02	56.0	240	-50	RC	548683.24	2021
RRC_021_023	548682.75	2781571.61	1447.53	66.0	240	-50	RC	548682.75	2021
RRC_021_024	548701.56	2781582.85	1447.15	54.0	240	-50	RC	548701.56	2021
RRC_021_025	548665.29	2781559.78	1446.96	60.0	240	-50	RC	548665.29	2021
RRC_021_026	548599.94	2781682.28	1444.66	80.0	240	-45	RC	548599.94	2021
RRC_021_027	548623.13	2781664.42	1440.26	70.0	240	-45	RC	548623.13	2021
RRC_021_028	548446.00	2781643.60	1422.48	144.0	240	-45	RC	548446.00	2021
RRC_021_029	548454.04	2781650.89	1422.89	108.0	30	-45	RC	548454.04	2021
RRC_021_030	548454.48	2781647.62	1422.67	96.0	70	-45	RC	548454.48	2021
RRC_021_031	548621.01	2781602.51	1443.26	84.0	240	-45	RC	548621.01	2021
RRC_021_032	548612.18	2781704.91	1440.11	70.0	240	-55	RC	548612.18	2021
RRC_021_033	548621.36	2781813.67	1464.90	72.0	240	-60	RC	548621.36	2021
RRC_021_034	548608.65	2781833.39	1469.98	50.0	240	-45	RC	548608.65	2021
RRC_021_035	548651.18	2781681.57	1439.80	70.0	60	-50	RC	548651.18	2021
RRC_021_036	548644.00	2781677.58	1439.97	50.0	240	-50	RC	548644.00	2021
RRC_021_037	548688.68	2781634.71	1444.98	80.0	60	-50	RC	548688.68	2021
RRC_021_038	548715.78	2781593.40	1446.09	60.0	240	-50	RC	548715.78	2021
RRC_021_039	548715.17	2781590.74	1446.03	78.0	60	-50	RC	548715.17	2021
RRC_021_040	548527.46	2781931.25	1479.50	66.0	280	-50	RC	548527.46	2021
RRC_021_041	548605.00	2781758.00	1445.00	50.0	60	-45	RC	548605.00	2021
RRC_021_042	548663.71	2781647.88	1440.09	50.0	60	-65	RC	548663.71	2021
RRC_021_043	548617.51	2781649.70	1440.00	50.0	240	-60	RC	548617.51	2021
RRC_021_044	548622.71	2781710.53	1440.00	50.0	60	-45	RC	548622.71	2021
RRC_021_045	548711.34	2781588.82	1446.30	50.0	240	-50	RC	548711.34	2021
RRC_021_046	548663.80	2781623.52	1444.93	50.0	60	-60	RC	548663.80	2021
RRC_021_047	548582.83	2781580.08	1428.14	72.0	60	-50	RC	548582.83	2021

APPENDIX B: Significant Intervals

Hole Id	From	To	Length (m)	Au g/t	Ag g/t
BR-01	37.6	40.6	3.0	8.13	38
BR-02	2.0	6.1	4.1	2.62	6
BR-02	9.1	19.3	10.2	5.28	5
BR-02	25.4	29.5	4.1	2.92	10
BR-03	5.1	10.2	5.1	3.18	7
BR-03	13.2	27.4	14.2	5.34	17
BR-05	16.3	24.4	8.1	5.99	25
BR-05	27.4	33.5	6.1	2.30	15
BR-06	8.1	27.4	19.3	6.36	11
BR-06	31.5	35.6	4.1	3.13	20
BR-10	6.9	10.7	3.8	2.78	0
BR-11	15.2	21.3	6.1	3.53	3
BR-14	24.4	29.5	5.1	2.35	16
BR-18	44.7	47.8	3.1	1.97	22
BR-19	44.7	47.8	3.1	4.23	62
BR-21	29.5	32.5	3.1	4.46	26
BR-21	38.6	44.7	6.1	2.63	26
RDO16-02	20.5	23.5	3.0	2.18	4
RDO16-02	55.3	59.4	4.2	3.02	46
RDO16-04	31.0	36.6	5.6	2.33	10
RDO16-05	15.5	20.3	4.8	2.50	6
RDO16-06	11.5	29.4	17.9	2.53	9
RDO16-07	16.0	22.0	6.0	3.50	8
RDO16-07	47.0	50.9	3.9	1.78	28
RDO16-08	64.0	67.6	3.6	3.41	64
RDO-20-001M	28.0	32.4	4.4	6.53	36
RDO-20-003M	13.1	21.1	8.0	8.89	20
RDO-20-004	13.3	19.9	6.6	4.33	2
RDO-20-005M	3.9	20.7	16.8	7.11	19
RDO-20-006	6.3	17.2	10.9	5.28	10
RDO-20-007	20.3	25.9	5.6	4.10	8
RDO-20-008	15.4	26.4	11.0	7.51	24
RDO-20-010	17.6	23.9	6.4	5.06	13
RDO-20-011	13.3	19.1	5.8	7.17	10
RDO-20-012	15.0	26.3	11.3	7.38	13
RDO-20-012	27.3	32.5	5.2	11.77	30
RDO-20-013a	30.6	40.0	9.4	5.60	39
RDO-20-014	10.0	14.1	4.1	4.46	11
RDO-20-014	16.6	27.0	10.5	8.19	33
RDO-20-018	13.3	19.0	5.8	3.49	6
RDO-20-021	21.0	30.0	9.0	2.37	17

Hole Id	From	To	Length (m)	Au g/t	Ag g/t
RDO-20-028	13.1	28.2	15.2	3.48	12
RDO-20-029	11.4	17.9	6.5	3.67	16
RDO-20-029	24.2	27.6	3.4	2.71	25
RDO-20-029	32.8	43.1	10.3	3.55	63
RDO-20-031	8.7	17.8	9.1	6.32	12
RDO-20-032	1.5	7.1	5.6	2.25	5
RDO-20-033	14.0	18.4	4.5	4.68	41
RDO-21-003	15.7	19.6	3.9	6.70	19
RDO-21-009	1.4	5.5	4.1	5.19	12
RDO-21-009	24.5	27.6	3.2	9.30	26
RO-11-001	12.5	36.3	23.8	7.48	14
RO-11-026	9.4	15.4	6.0	2.85	7
RO-11-026	21.0	27.0	6.0	4.40	2
RO-11-026	46.6	49.6	3.0	2.96	22
RO-11-026	54.6	60.1	5.5	2.76	33
RRC_021_010	0.0	4.0	4.0	2.84	3
RRC_021_012	12.0	18.0	6.0	2.84	27
RRC_021_016	18.0	22.0	4.0	2.30	71
RRC_021_018	8.0	12.0	4.0	5.13	8
RRC_021_020	30.0	36.0	6.0	2.34	17
RRC_021_021	0.0	6.0	6.0	2.10	6
RRC_021_021	16.0	24.0	8.0	2.73	36
RRC_021_022	10.0	18.0	8.0	3.92	5
RRC_021_025	16.0	26.0	10.0	4.05	14
RRC_021_027	0.0	4.0	4.0	3.25	6
RRC_021_031	4.0	10.0	6.0	2.40	4
RRC_021_032	4.0	8.0	4.0	4.08	18
RRC_021_034	24.0	28.0	4.0	2.98	19
RRC_021_034	36.0	40.0	4.0	4.98	46
RRC_021_035	20.0	24.0	4.0	6.62	8
RRC_021_036	6.0	18.0	12.0	9.18	31
RRC_021_041	2.0	8.0	6.0	7.23	44
RRC_021_041	12.0	16.0	4.0	2.27	37
RRC_021_041	18.0	24.0	6.0	2.07	29
RRC_021_043	20.0	24.0	4.0	2.64	17
RRC_021_043	26.0	30.0	4.0	2.11	15
RRC_021_044	0.0	16.0	16.0	4.73	16
RRC_021_044	26.0	32.0	6.0	2.11	7