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# NI 43-101 Technical Report
# Mineral Resource Estimate
# Rodeo Project
# Rodeo, Durango, Mexico

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# 1.0 SUMMARY

This report has been prepared for the Golden Minerals Company (Golden Minerals) for the Rodeo project held by Minera de Cordilleras S.A. de R.L. de C.V. (Minera Cordilleras) a wholly-owned subsidiary of Golden Minerals.

This report has been prepared for the purposes of detailing exploration and drilling data collected by Minera Cordilleras as well as the results of an independent estimation of mineral resources completed by Tetra Tech for the Rodeo property.

## 1.1 LOCATION, PROPERTY DESCRIPTION & OWNERSHIP

The Rodeo project is located 2 km east of the town of Rodeo in Durango State, Mexico, **Figure 1-1** (Blanchflower, 2010). Basic amenities are available in the town of Rodeo. Large regional cities with full services are located within driving distance of the project; Torreon is located 189 km to the east, and Durango 157 km to the south. The center of the Rodeo deposit can be located using the following coordinate: latitude 25°9'2.7"N, longitude 105°31'4.2"W (WGS84).

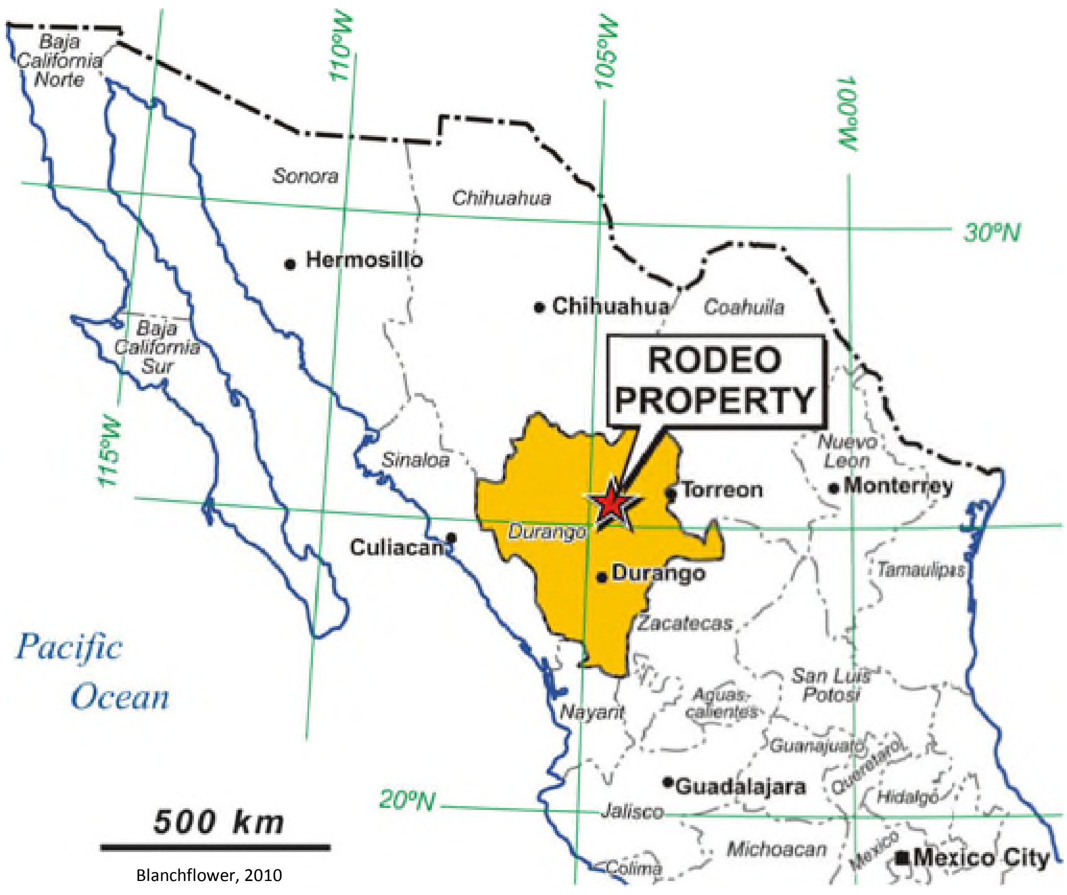


**Figure 1-1: Location Map**

The property contains two mineral concession totaling 1,865.7 hectares under purchase agreement with La Cuesta International, S.A. de C.V. a wholly owned subsidiary of La Cuesta International Inc.

## 1.2 GEOLOGY & MINERALIZATION

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

*At the Rodeo prospect, the "Rodeo" fault system consists of 3 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 gold anomalous rocks forming resistant NNW-trending ridges at the Rodeo Prospect. 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 kilometers, and the shear zones and hydrothermal system can be traced for 8 kilometers on the property. Individual feeder vein and breccia systems are up to 60 meters 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 1-2** shows the surface geology of the deposit area as well as where the majority of the drilling has been concentrated.

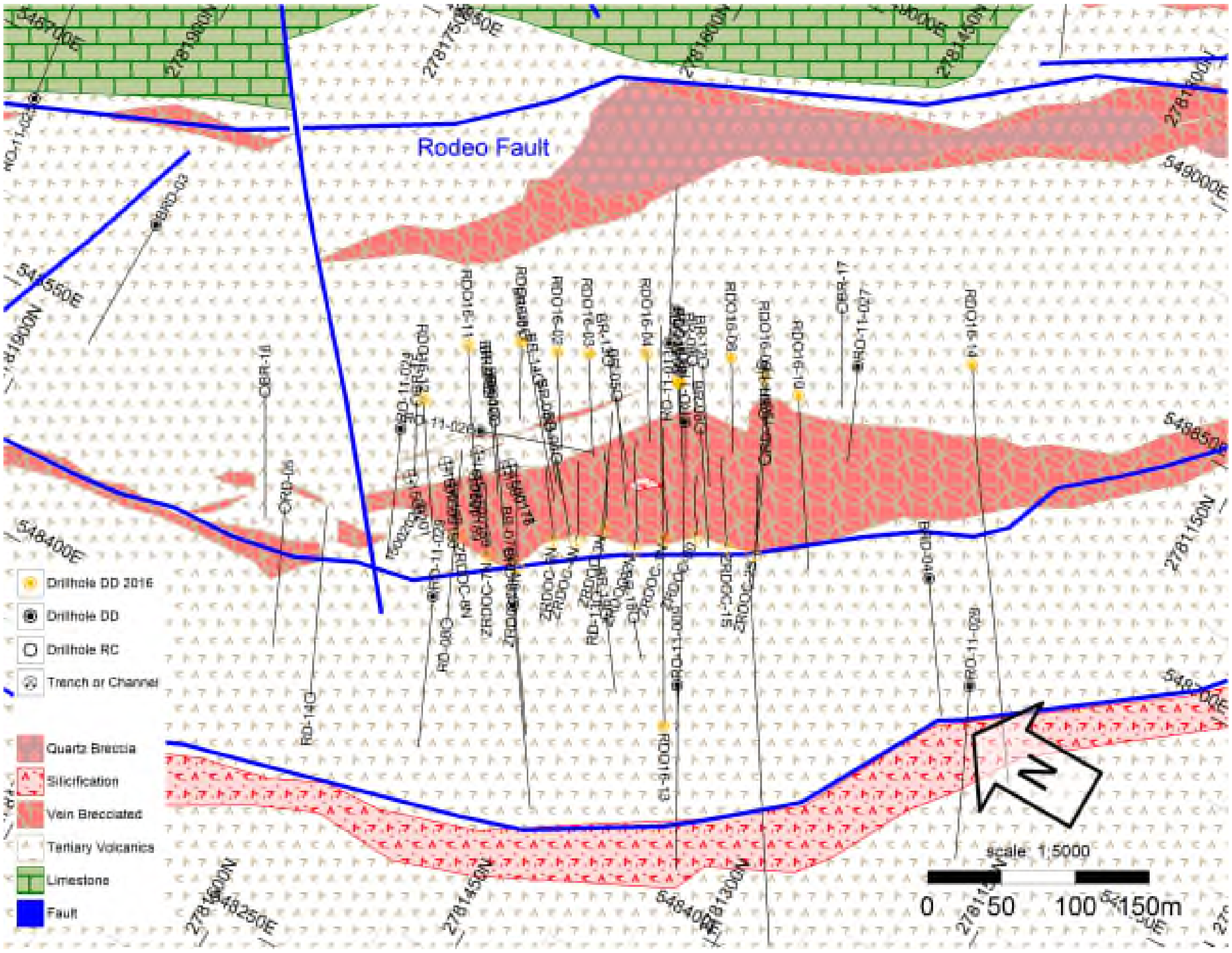


**Figure 1-2: Deposit Surface Geology**

## 1.3 Exploration, Drilling, Sampling & QA/QC

### *1.3.1 Exploration*

Exploration activities conducted by Minera Cordilleras consist of:

- Surface geologic mapping of the property and immediate deposit area;
- Creation of a topographic surface through point surveying; and
- Trench sampling.

Activities conducted by previous operators include:

- Surface geologic mapping property at 1:25,000 scale and immediate deposit area;
- Alteration intensity mapping;
- Airborne magnetic and radiometric survey, 1,519 line-kilometers in 2010 and 2011 (raw data has not been located or provided to the author);

- Induced polarization geophysical surveying, 42 line-kilometer in 2010 and 2011 (raw data has not been located or provided to the author);
- Large scale magnetic surveys are available from GSM;
- Using Landsat false color imagery to look for alteration signatures;
- Spectral analysis to determine alteration types; and
- The collections of approximately 1,800 rock and soil samples throughout the area.

### *1.3.2 Drilling*

The project database contains 84 drill holes, totaling 13,964 m, drilled from 1995 to 2016. Of the total, 9,287 m were drilled using diamond equipment and 4,677 m with RC equipment. **Table 1-1** summarizes the project drilling by company, year, and equipment type.

**Table 1-1: Project Drilling by Company and Type**

| Company | Year | Type | Length (m) |
|---|---|---|---|
| Monarch Resources | 1995 | RC | 2,289 |
| Canplats Resources Corp. | 2004 | RC | 2,387 |
| Canplats Resources Corp. | 2004 | DD | 78 |
| Canplats Resources Corp. | 2007 | DD | 1,034 |
| Camino Minerals Corp. | 2011 | DD | 6,090 |
| **Minera Cordilleras** | **2016** | **DD** | **2,084** |
| **Total** | | | **13,964** |

### *1.3.3 Sampling*

The property has experienced exploration and sampling by several companies and several campaigns. Descriptions of the activities from previous explorers are available in reports by Pryor and Blackwell, McNaughton, Durning and Hillemeyer, and Blanchflower. **Table 1-2** summarizes the various sampling activities from 1995 to present.

**Table 1-2: 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 | Half splits of HQ and NQ core |

| Company | Year | Type | No. of Samples | Analytical Lab | Au Procedure | ICP Procedure | QA/QC | Comment |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | records available | |
| 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 |

#### *1.3.4 QA/QC*

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

## 1.4 MINERAL PROCESSING & METALLURGICAL TESTING

Limited test work has been performed to date on material from the Rodeo deposit. The 2004 historic test work program at Process Research Associates (PRA) was focused on comparatively high grade samples, and consisted entirely of bottle roll testing over 48 hours. The details of the PRA test work, such as reagent consumptions, were not available for review.

For purposes of resource estimation, the use of 60% recovery for gold and 70% for silver under heap leach conditions is considered appropriate given the available data at this level of study. For mill recovery, the use of 77% gold and 90% silver were deemed appropriate based on the 48 hour 200 mesh bottle roll results.

## 1.5 MINERAL RESOURCE ESTIMATION

Resources have been estimated for the Rodeo deposit using a block model rotated to fit the deposit strike. Sub-blocking was used within the single high-grade domain only. Au and Ag grades have been estimated using Ordinary Kriging on parent blocks independently within and also outside of wireframe constrained domains. Reporting of estimated blocks has been constrained by a base case pit optimization using costs unique to mining followed by road trucking and processing at Golden Mineral's Velardeña cyanidation plant (Plant #2). An alternative standalone case using indicative heap leach processing costs is also shown to represent on site heap leach processing option.

Although the mineral resources are pit constrained using reasonable cost assumptions, detailed costing and economic evaluations have not been performed. The pit optimizations include resources that do not have demonstrated economic value and include inferred resources that are too speculative for definition of reserves.

Estimated indicated mineral resource within the base case pit constraint is shown in **Table 1-3**. Estimated indicated and inferred mineral resources within the alternative case pit constraint is shown in **Table 1-4**. Preliminary metallurgy suggests the Rodeo material may be amenable to cyanidation; differentiations between oxide and sulfide material has not been made.

**Table 1-3: Mineral Resource Estimate Base Case (Mill Processing Pit Constrained)**

| Classification | Cutoff AuEq g/t | Tonnes (M) | Au g/t | Ag g/t | Au toz (1000) | Ag toz (M) | Waste: Resource |
|---|---|---|---|---|---|---|---|
| Indicated | 0.83 | 0.4 | 3.3 | 11 | 46 | 0.2 | 0.91 |
| Inferred | - | - | - | - | - | - | - |

Notes:
(1) Cutoff grade and Au equivalent calculated using metal prices of $1,220 and $17 per troy ounce of Au and Ag, recoveries of 77% and 90% Au and Ag;
(2) Mineral Resources have been pit shell constrained using the Lerch Grossman algorithm with inputs of $7.5 mining, $10 trucking, and $20 processing costs per Tonne. A breakeven cutoff including trucking and processing costs per block was applied to a block model within the optimized shell;
(3) Metal prices do not exceed three-year trailing average as of the end of December 2016, per SEC guidance; and
(4) Reported indicated mineral resources are equivalent to mineralized material under SEC Industry Guide 7;

**Table 1-4: Mineral Resource Estimate Alternative Case (Heap Leach Processing Pit Constrained)**

| Classification | Cutoff AuEq g/t | Tonnes (M) | Au g/t | Ag g/t | Au toz (1000) | Ag toz (M) | Waste: Resource |
|---|---|---|---|---|---|---|---|
| Indicated | 0.17 | 3.6 | 0.8 | 12 | 94 | 1.4 | 0.53 |
| Inferred | 0.17 | 3.6 | 0.4 | 11 | 47 | 1.3 | 0.53 |

Notes:
(1) Cutoff grade and Au equivalent calculated using metal prices of $1,220 and $17 per troy ounce of Au and Ag, recoveries of 60% and 70% Au and Ag;
(2) Mineral Resources have been pit shell constrained using the Lerch Grossman algorithm with inputs of $3.4 mining cost, and $3.1 processing cost per Tonne. A cutoff including mining and processing costs per block was applied to a block model within the optimized shell;
(3) Metal prices do not exceed three-year trailing average as of the end of December 2016, per SEC guidance;
(4) Reported indicated mineral resources are equivalent to mineralized material under SEC Industry Guide 7; and
(5) Columns may not total due to rounding.

## 1.6 INTERPRETATIONS & CONCLUSIONS

Drill hole and trench samples have been collected and analyzed using industry standard methods and practices and are sufficient to characterize grade and thickness and support the estimation of mineral resources. Given the grade and tonnage of the mineral resources estimated as part of this report, it is recommended the project be advanced to the preliminary economic assessment (PEA) study stage.

The Rodeo project and deposit have several beneficial attributes which provide unique opportunities for Golden Minerals and justify further investigation by way of a Preliminary Economic Analysis:

- The Project is located in a jurisdiction familiar with mining. Local permitting authorities and the community are accustomed to mine development and the potential economic benefits;
- Opportunities exist for project development plans to include existing milling facilities owned by Golden Minerals. The deposit is within trucking range of Golden Mineral's cyanidation plant located at the Velardeña mine. This benefit is unique and potentially strategic for Golden Minerals;

- The highest grade portion of the resource is near surface and offers opportunities for potential project phasing, optimizations and tradeoffs; and

- Mineralization and indicator signatures have been observed throughout the claim area and much of the project area is untested by drilling or has been tested by preliminarily drilling on wide spaced centers. The Rodeo deposit has a relatively small footprint and the potential for additional discovery is good.

Project risks include:

- Only preliminary metallurgical studies have been completed for the Rodeo deposit resource material. Initially, the tests indicate Au and Ag recoveries for run of mine material could be very low. Details regarding cyanide consumption are unavailable;

- Mineral resources have been constrained by an optimized pit shell, however scoping study level costing for mining and processing have not been undertaken; and

- Pit shell constrained resources at lower cutoff grades, assuming heap leaching, are supported by inferred resources.

## 1.7 RECOMMENDATIONS

Given the grade and tonnage of the mineral resources estimated as part of this report, it is recommended the project be advanced to the PEA study stage. Based on this recommendation, the following are suggested:

- Further explore the project in an effort to increase tonnage and confidence of the currently defined resources;

- Engage a local environmental consultant to initiate permitting and define costs and timelines; and

- Perform additional metallurgical testing and characterization.

A breakdown of estimated costs for these activities is provided in Section 26.0.

# 2.0 INTRODUCTION

This report has been prepared for the Golden Minerals Company (Golden Minerals) for the Rodeo project held by Minera de Cordilleras S.A. de R.L. de C.V. (Minera Cordilleras), a wholly-owned subsidiary of Golden Minerals.

This report has been prepared for the purposes of detailing exploration and drilling data collected by Minera Cordilleras and the results of an independent estimation of mineral resources calculated by Tetra Tech utilizing the data collected at the Rodeo project.

Technical information, including locations, orientations, mapping and analytical data has been supplied by Minera Cordilleras, and have, in part, been verified through spot checking conducted by the author of this report while visiting the project. Information pertaining to title, environment, permitting and access has also been supplied by Minera Cordilleras and the author of this report has relied on the experts supplying this information. Introductory summaries pertaining to infrastructure, location, geology and mineralization have been primarily sourced from the previous NI 43-101 Technical Report for the property titled "*Technical Report on the Rodeo Property State of Durango, Mexico*" issued by Camino Minerals Corporation (Camino) in 2010 by J. Douglas Blanchflower (Blanchflower) of Minorex Consulting Ltd. (Minorex), text and figures from the report have been included and adapted in this report where appropriate along with citation.

The Rodeo project site was inspected on December 13$^{th}$ of 2016. The inspection entailed observations of drill hole collar locations and orientations, drill core, trench sample locations, mineralized outcrops, and geologic discussions with project staff.

## 2.1 UNITS OF MEASURE

All references to dollars in this report are to US dollars (US$) unless otherwise noted. Distances, areas, volumes, and masses are expressed in the metric system unless indicated otherwise.

For the purpose of this report, common measurements are given in metric units. All tonnages shown are in Tonnes of 1,000 kilograms, and precious metal grade values are given in grams per tonne (g/t), precious metal quantity values are given in troy ounces (toz). To convert to English units, the following factors should be used:

- 1 short ton = 0.907 tonne (T);
- 1 troy ounce = 31.1035 grams (g);
- 1 troy ounce/short ton = 34.286 grams per tonne (g/t);
- 1 foot = 30.48 centimeters (cm) = 0.3048 meters (m);
- 1 mile = 1.61 kilometer (km); and
- 1 acre = 0.405 hectare (ha).

## 2.2 Abbreviations

The following is a list of abbreviations used in this report.

| Abbreviation | Unit or Term |
|---|---|
| 2D | two-dimensional |
| 3D | three-dimensional |
| Ag | silver |
| As | arsenic |
| Au | gold |
| °C | degrees Celsius |
| cm | centimeter |
| $cm^3$ | cubic centimeters |
| CONAGUA | National Water Commission *(Comisión Nacional del Agua)* |
| Cu | copper |
| CUSTF | Change in Forestry Land Use *(Cambio de uso del suelo en terrenos forestales)* |
| ER | Risk Study *(Estudio de Riesgo)* |
| ETJ | Technical Justification Study *(Estudio Técnico-Justificativo)* |
| g | gram |
| g/t | grams per tonne |
| $g/cm^3$ | grams per cubic centimeter |
| Golden Minerals | Golden Minerals Company |
| GxT | grade multiplied by thickness |
| ha | hectare |
| ID | identification |
| IMMSA | Industrial Mineral de Mexico S.A. |
| INAH | National Institute of Archaeology and History *(Instituto Nacional de Arqueología e Historia)* |
| kg | kilogram |
| km | kilometer |
| $km^2$ | square kilometers |
| km/hr | kilometers per hour |
| LAU | Comprehensive Environmental License *(Licencia Ambiental Única)* |
| LGDFS | General Law of Sustainable Forestry Development (Ley General de Desarrollo Forestal Sustentable) |
| LGEEPA | General Law of Ecological Equilibrium and Environmental Protection *(Ley General del Equilibrio Ecológico y la Protección al Ambiente)* |
| LGPGIR | General Law for the Prevention and Integrated Waste Management *(Ley General para la Prevención y Gestión Integral de los Residuos)* |
| m | meter |
| M | million |
| MIA | Environmental Impact Statement *(Manifestación de Impacto Ambiental)* |
| Minera de Cordilleras | Minera de Cordilleras S.A. de R.L. de C.V. |
| Mm | millimeter |
| mm/yr | millimeters per year |

| **Abbreviation** | **Unit or Term** |
|---|---|
| Mya | million years before present |
| NOM | Official Mexican Standard *(Norma Oficial Mexicana)* |
| NI 43-101 | Canadian Securities Administrators' National Instrument 43-101 |
| NOM-120-SEMARNAT-1997 | Mexican Official Standard |
| NSR | Net Smelting Return |
| Pb | lead |
| PEA | Preliminary Economic Assessment |
| PMLU | Post-Mining Land Use |
| PPA | Accident Prevention Plan |
| ppm | parts per million |
| PROFEPA | Federal Bureau of Environmental Protection |
| Project | Rodeo |
| QA/QC | quality assurance/quality control |
| Sb | Antimony |
| SEDENA | Secretariat of National Defense *(Secretaría de la Defensa Nacional)* |
| SEMARNAT | Secretariat of Environment and Natural Resources (2001-) *(Secretaría de Medio Ambiente y Recursos Naturales [2001-)*) |
| SMT | Special Mining Taxes |
| T | metric ton |
| toz | Troy ounces |
| T/d | Tonnes per day |
| US$ | United States dollars |
| V | volt |
| Zn | Zinc |
| / | per |

# 3.0 RELIANCE ON OTHER EXPERTS

The author is relying on statements by Golden Minerals concerning legal and environmental matters included in Section 4.0 and 5.0 of this report.

The author is relying on statements and documents provided by Warren Rehn, President of Golden Minerals and Joaquín Rodríguez, Exploration Manager for Minera Cordilleras, regarding:

- Compliance requirements to continue exploration activities,
- Permitting requirements to initiate mining,
- Location of the concessions,
- Concession standing,
- Surface access agreements, and
- Royalty and purchase agreements relating to the concessions.

# 4.0 PROPERTY DESCRIPTION AND LOCATION

The Rodeo project is located 2 km east of the town of Rodeo in Durango State, Mexico, **Figure 4-1** (Blanchflower, 2010). Basic amenities are available in the town of Rodeo. Large regional cities with full services are located within driving distance of the project; Torreon is located 189 km to the east, and Durango 157 km to the south. The center of the Rodeo deposit can be located using the following coordinate: latitude 25°9'2.7"N, longitude 105°31'4.2"W (WGS84).

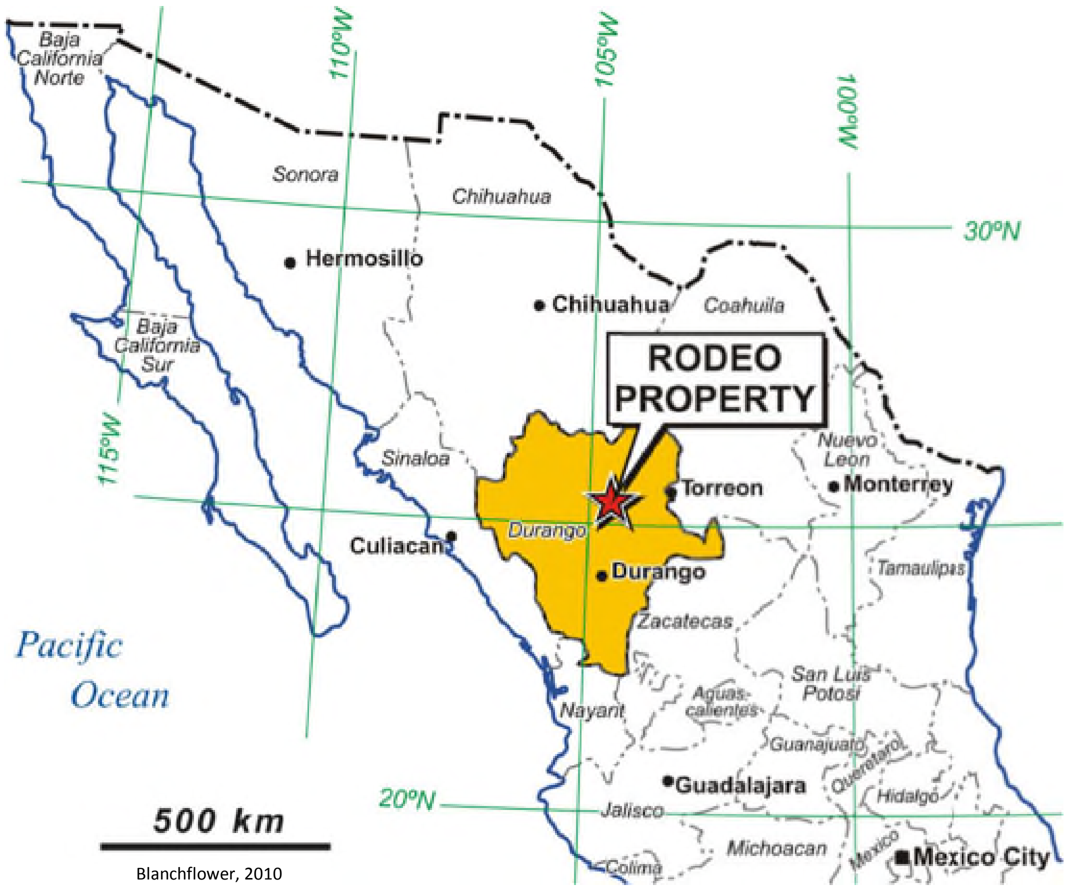


**Figure 4-1: Location Map**

The property contains two mineral concession totaling 1,865.7 hectares under purchase agreement with La Cuesta International, S.A. de C.V. a wholly owned subsidiary of La Cuesta International Inc. (La Cuesta), where Minera Cordilleras pays La Cuesta seventeen thousand five hundred dollars in 2017 escalating to a maximum of twenty thousand dollars per six months in 2018 as advanced royalties. On commencement of commercial production, La Cuesta is entitled to a 2% NSR royalty capped at five million dollars. **Figure 4-2** shows the concession boundary and **Table 4-1** details the concession information.

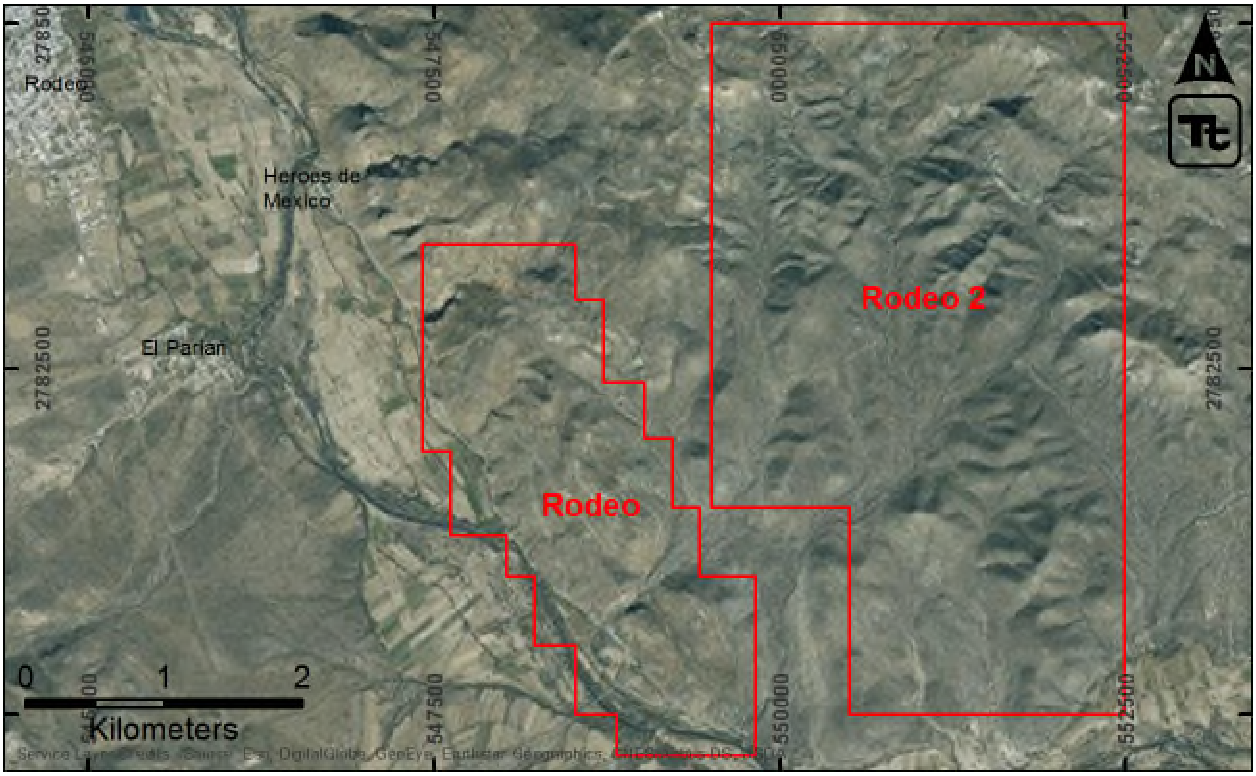


**Figure 4-2: Mineral Concession Boundaries**

**Table 4-1: Concessions Controlled by Minera Cordilleras**

| Concession Name | Title # | Concession Holder | Date of Filing | Filing No. | Expiry (Good Standing) | Minera Cordilleras' Arrangement | Hectares |
|---|---|---|---|---|---|---|---|
| Rodeo | 217885 | LA CUESTA INTERNACIONAL, S.A. DE C.V. (pending transfer to Minera Cordilleras) | 11 June 2002 | 30748 | 17 September 2052 | Purchase Agreement | 521.0 |
| Rodeo 2 | 222524 | Rojo Resources, S.A. de C.V. (pending transfer to Minera Cordilleras) | 6 February 2004 | 31305 | 20 July 2054 | Purchase Agreement | 1,344.7 |

## 4.1 Environmental and Permitting

The author is not aware of any outstanding environmental, reclamation or permitting issues that would impact future exploration work. Future exploration work will require both land access agreements with the local ejido and private land owners, and an exploration permit from the Secretaria of Natural Resources and Environment ('SEMARNAT').

The following outlines the general framework for permitting a mine in Mexico and the required permits. The Rodeo property is in the exploration and resource stage and is not considered an advanced property. Many of the permits discussed herein apply to the construction stage and are not currently being pursued.

### 4.1.1 Mexican Permitting Framework

Environmental permitting of the mining industry in Mexico is mainly administered by the federal government body SEMARNAT, the federal regulatory agency that establishes the minimum standards for environmental compliance. Guidance for the federal environmental requirements is largely held within the General Law of Ecological Equilibrium and Environmental Protection (Ley General Del Equilibrio Ecológico y la Protección al Ambiente, or LGEEPA). Article 28 of the LGEEPA specifies that SEMARNAT must issue prior approval to parties intending to develop a mine and mineral processing plant. An environmental impact assessment (by Mexican regulations called a Manifestación de Impacto Ambiental, or "MIA") must be filed with SEMARNAT for its evaluation and, if applicable, further approval by SEMARNAT through the issuance of an Environmental Impact Authorization; the document specifies approval conditions where works or activities have the potential to cause ecological imbalance or have adverse effects on the environment. Further requirements for compliance with Mexican environmental laws and regulations are supported by Article 27 Section IV of the Ley Minera and Articles 23 and 57 of the Reglamento de la Ley Minera. Article 5 Section X of the LGEEPA authorizes SEMARNAT to provide the approvals for the works specified in Article 28. The LGEEPA also contains articles for soil protection, water quality, flora and fauna, noise emissions, air quality, and hazardous waste management.

The National Water Law (Ley de Aguas Nacionales) provides authority to the National Water Commission (Comisión Nacional del Agua or CONAGUA), an agency within SEMARNAT, to issue water extraction concessions, and specifies requirements to be met by applicants.

Another important piece of environmental legislation is the General Law of Sustainable Forestry Development (Ley General de Desarrollo Forestal Sustentable - LGDFS). Article 117 of the LGDFS indicates that authorizations must be granted by SEMARNAT for land use changes to industrial purposes. An application for change in forestry land use (CUSTF) must be accompanied by a technical study that supports the Technical Justification Study (Estudio Técnico-Justificativo - ETJ). In cases requiring a CUSTF, a MIA for the change of forestry land use is also required.

Mining projects also must include a Risk Study (ER) and an Accident Prevention Plan (PPA) filed with SEMARNAT.

The General Law for the Prevention and Integrated Waste Management (Ley General para la Prevención y Gestión Integral de los Residuos - LGPGIR) also regulates the generation and handling of hazardous waste coming from the mining industry. Guidance for the environmental legislation is provided in a series of Official Mexican Standards (Norma Oficial Mexicana - NOMs). These regulations provide specific procedures, limits and guidelines and carry the force of law.

### 4.1.2 Project Permitting Requirements

There are a number of environmental permits required in order to advance the project to operation. Most mining regulations are at a federal level through SEMARNAT, but there are also a number that are regulated and approved at state and local level. There are three SEMARNAT permits that are required prior to construction; MIA, CUSTF and ER, which are described below.

**Environmental Impact Manifest** - Regulations within Mexico require that an MIA be prepared by a third-party contractor for submittal to SEMARNAT. The MIA must include a detailed analysis of climate, air quality, water, soil, vegetation, wildlife, cultural resources and socio-economic impacts.

**Study of Risk (ER)** - A second required permit is a Risk Study (*Estudio de Riesgo* - ER). A study is developed to obtain this permit. This study identifies potential environmental releases of hazardous substances and evaluates the risks in order to establish methods to prevent, respond to, and control environmental emergencies.

**Land Use Change (CUSTF)** - The third permit is Change in Forestry Land Use (*Cambio de uso del suelo en terrenos forestales* - CUSTF). In Mexico, all land has a designated use. The CUSTF is a formal instrument for changing the designation to allow mining on these areas. The CUSTF study is based on the Forestry Law and its regulations. It requires that an evaluation be made of the existing conditions of the land, including a plant and wildlife study, an evaluation of the current and proposed use of the land and impacts on natural resources and an evaluation of the reclamation and revegetation plans. The establishment of agreements with all affected surface land owners is also required.

**Other Registrations and Permits**

A project-specific comprehensive environmental license (Licencia Única Ambiental - LAU), which states the operational conditions to be met, is issued by SEMARNAT when the agency has approved the project operations.

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

An explosives permit is required from the Ministry of Defense (SEDENA) before construction or operations using explosives begins. Water discharge and usage must be granted by CONAGUA.

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

The key permits and the stages at which they are required are summarized in **Table 4-2**.

**Table 4-2: Key Permitting Requirements**

| Permit | Required Prior to this Mining Stage | Agency |
|---|---|---|
| Environmental Impact Assessment - MIA | Construction/Operation/Post-Operation | SEMARNAT |
| Land Use Change - CUSTF | Construction/Operation | SEMARNAT |
| Technical Justification Study - ETJ | Construction (Includes Conceptual Design) | SEMARNAT |
| Risk Study - ER | Construction/Operation | SEMARNAT |
| Construction Permit | Construction | Local Municipality |
| Explosive & Storage Permits | Construction/Operation | SEDENA |
| Archaeological Release | Construction | INAH |
| Water Use Concession | Construction/Operation | CONAGUA |
| Water Discharge Permit | Operation | CONAGUA |
| Unique Environmental License | Construction, Six Months Prior to Operation | SEMARNAT |
| Accident Prevention Plan | Operation | SEMARNAT |
| Hazardous Waste Generator | Operation | SEMARNAT/PROFEPA |

## 4.2 Significant Risk Factors

The author is not aware of any outstanding environmental, reclamation or permitting issues that would impact future exploration work.

The claims are located on the Ejido Francisco Márquez, Ejido Animas and Rancho La Pequeña (Private). Drilling by Minera Cordilleras has been conducted on the ranch only. Although the mineral rights are independent to the surface rights, access to the claim block is granted through an agreement between the current concession holder and the Ejido Francisco Márquez and Rancho La Pequeña which do not have a direct interest in the mineral claims. The author is unaware of any other significant risk factors that may affect access, title, or right or ability to perform work on the property.

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

The following section has been adapted from Blanchflower, 2010.

## 5.1 ACCESSIBILITY

The property covers the hills and flatlands bordering the Nazas River valley. Year-round vehicular access to the property is possible via Mexican Highway 45 that links the major cities of Durango in Durango State with Parral in Chihuahua State (see Figure 2). Approximately 6 km south of the town of Rodeo, near the village of Hidalgo de San Antonio, there is a junction of Mexican National Highways 45 and 34. Approximately 3 km northeast of this junction along paved Highway 34 there is a gravel road, about 500 m east of the Nazas River bridge, that leads north-northwesterly along the eastern side of the river to the village of Heroes de Mexico. A gated gravel access road that provides access to all of the drill sites within the property joins the Nazas River road about 500 m northwest of Highway 34. The access road crosses the Los Murcielagos arroyo and may be impassable for short periods following a heavy rainfall.

## 5.2 PHYSIOGRAPHY, CLIMATE AND VEGETATION

**Figure 5-1: Photo the Rodeo Property Looking North**

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 (aka 'arroyos'). Relief within the property is moderate with elevations ranging from approximately 1,310 to over 1,800 m amsl.

The climate is typical of the high-altitude Mesa Central region, dry and semi-arid. 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 vegetation is dominantly scrub bushes with various types of cacti, maguey, sage, coarse grasses and yucca, **Figure 5-1**. 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

There is a good network of roads in the region. Road access to the drilled areas and much of the western portion of the property is possible via multiple gravel roads from both Highways 45 and 34. The eastern portion of the property is accessible via gravel ranch roads or by hiking.

The Nazas River flows year-round despite the water extraction supporting local agricultural operations. The concessions are contained within the Rancho La Pequena and the Francisco Marquez and Animas Ejidos

The city of Rodeo with a population of just under 4,000 people is situated to the northwest of the concession on the western side of the Nazas river. It is an agricultural supply and commercial center on National Highway 45 between the major cities of Durango, to the south, and Parral, Chihuahua to the north. Most of the services and supplies required for exploration work in the area can be obtained locally or from the nearby historic mining cities of Durango, Parral, Torreon, and Chihuahua. Experienced mining personnel are also available throughout the region.

There is a 43.5 kilovolt power line that crosses the property and services the villages of Hidalgo de San Antonio and Buena Vista. The availability of the power line or potential power requirements of the project have not been investigated.

There are several sites within the property that would provide adequate space for future development of mining and associated facilities. Surface rights are owned by local cooperative farmers, landowners and ranchers, and their permission is required to conduct any physical work.  Drilling access roads should be planned to benefit the local ranchers with access. Gates and/or cattle guards would be required.

There is no permanent year-round water source in the immediate vicinity of the deposit. Drilling waters could be purchased from owners of the local water rights and trucked to the site.

# 6.0 HISTORY

The following section has been adapted from Blanchflower, 2010.

Romas and Rios (2003) documented two prospects, called the ‘Los Murcielagos’ gold-silver-lead-copper and ‘Francisco Marquez’ gold-copper prospects, in the vicinity of the Los Murcielagos arroyo on the Rodeo property. Little information is available on these historic prospects other than gold- and silver-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. (Monarch) in the 1990’s and by Canplats de Mexico, S.A. de C.V. (Canplats Mexico) a wholly owned subsidiary of Canplats Resource Corporation (Canplats) Mexico in 2003, 2004 and 2007. This work is summarized in **Table 6-1** which has been modified after McNaughton, 2004 and Charre, 2007.

**Table 6-1: Summary of Exploration History**

| Year | Description of Work |
|---|---|
| 1994 | La Cuesta discovers Rodeo prospect and explores the showing 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 gold and silver 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 gold mineralization along 200 m of the West Swarm Vein zone and discovered buried gold 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 gold-silver mineralization over widths of a few metres to over 8 m with grades ranging up to 1.065 gpT gold and 93.9 gpT silver. |
| 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 of 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. |
| 2011 | Camino conducts a drilling program that included 6,238.2 meters of diamond drilling in 29 holes located within a 7.0 by 2 kilometer 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 purchased 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 issued 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 back to La Cuesta. Rodeo 2 staked by Camino during the option period with La Cuesta reverted to La Cuesta under the existing agreement. |

# 7.0 GEOLOGICAL SETTING AND MINERALIZATION

## 7.1 Regional Geology

The following description of the regional geology is from the 1996 interim drilling report for the Rodeo concession by Blackwell and Pryor for Monarch.

*The Rodeo Concession lies on the eastern boundary of the Sierra Madre Occidental morphotectonic province (de Cserna, 1989). The Sierra Madre Occidental is a dissected volcanic plateau elongated in a NNW direction. It is approximately 1,200 km long and its average altitude is a little under 2,000 m amsl. The geology of the province has been divided into two principal volcanic groups, the upper and lower. The groups have been summarized below after de Cserna, 1989.*

- ***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 North West. 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 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 from a 1997 non-public report for the Rodeo concession by Hillemeyer and Durning for La Cuesta.

*The Rodeo Prospect 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.*

*The following description of the local and property geology has been adapted from a 1996 interim drilling report for the Rodeo concession by Blackwell and Pryor for Monarch.*

*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 & 1995) and the former, while having no strict stratigraphic assignation, are referred as the Rodeo Volcanics.*

- ***Rodeo Volcanics** (Oligocene? 23-34 Mya): Rhyolitic, rhyodacitic and andesitic (?) lithologies; including welded and non-welded (ash flow?) tuffs, ash flow breccias (?) to volcanic breccias.*
- ***Rodeo Fault**: Normal fault, dipping WSW.*
- ***Grupo Mezcalera** (Cretaceous 97.5-124 Mya): Thinly interbedded carbonates and clastics, ranging from and gradational between; limestones, argilaceous limestones, calcareous shales to 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 on the western margin of the concession. The topography in the Indidura Formation is not as dramatic and the exposure poorer. 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.*

*(Note that the terminology for the naming of the volcaniclastic rocks follows that suggested by Cas and Wright, 1987.).*

*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. (Note that here the terminology is after Ramsey and Huber, 1987.).*

- ***Rodeo Volcanics** (Tensional): Unfolded, dip at low angles (5-15 ) to 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 clastics to gently inclined sub-horizontal close chevron folds in more thickly interbeded units. Complex joint systems related to fold geometries. WSW-ENE compression.*

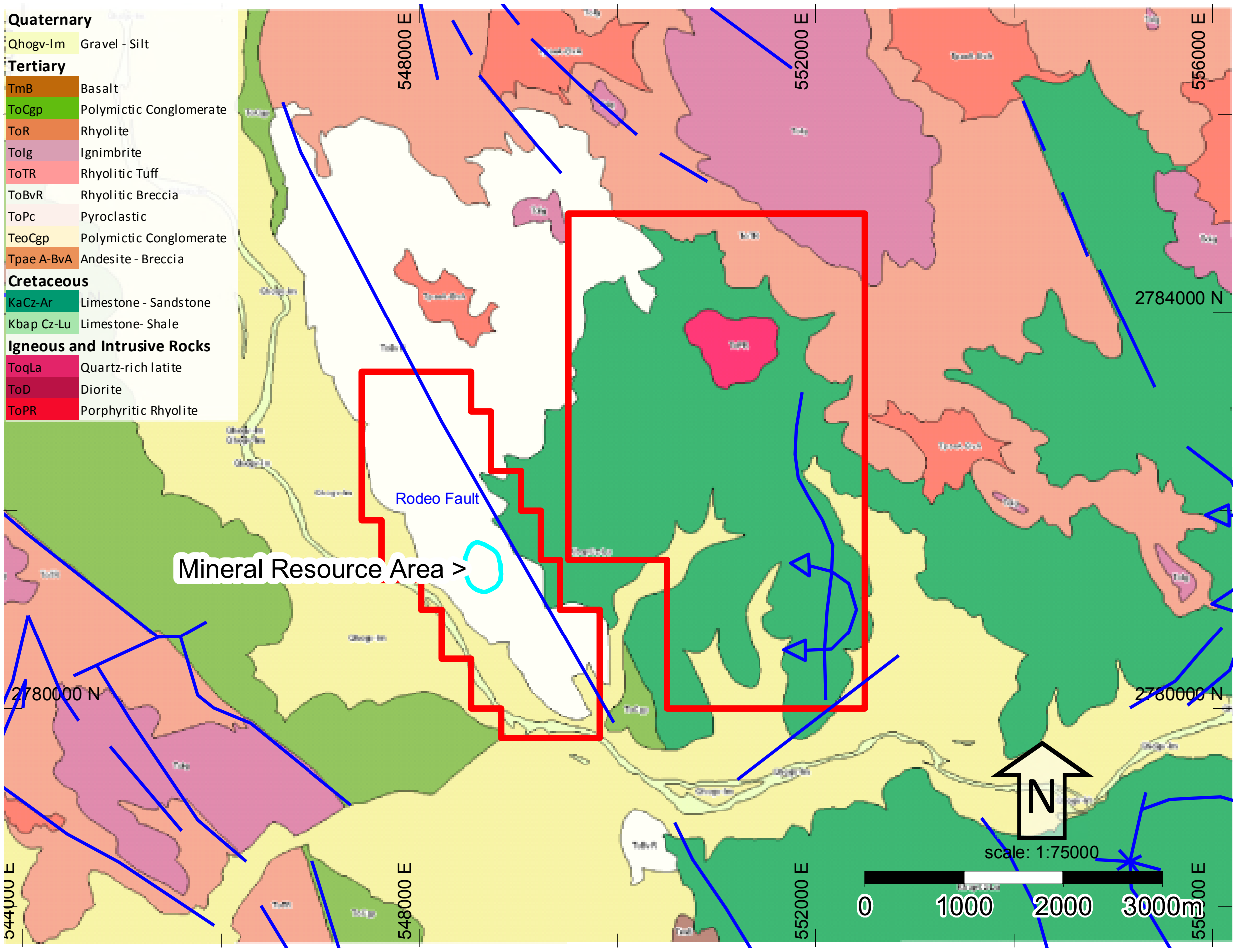


**Figure 7-1: Local and Property Surface Geology (Modified from GSM G13-D42, 2003)**

## 7.3 Deposit Geology

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

*At the Rodeo prospect, the "Rodeo" fault system consists of 3 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 gold anomalous rocks forming resistant NNW-trending ridges at the Rodeo Prospect. 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 kilometers, and the shear zones and hydrothermal system can be traced for 8 kilometers on the property. Individual feeder vein and breccia systems are up to 60 meters 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 7-2** shows the surface geology of the deposit area as well as where the majority of the drilling has been concentrated.

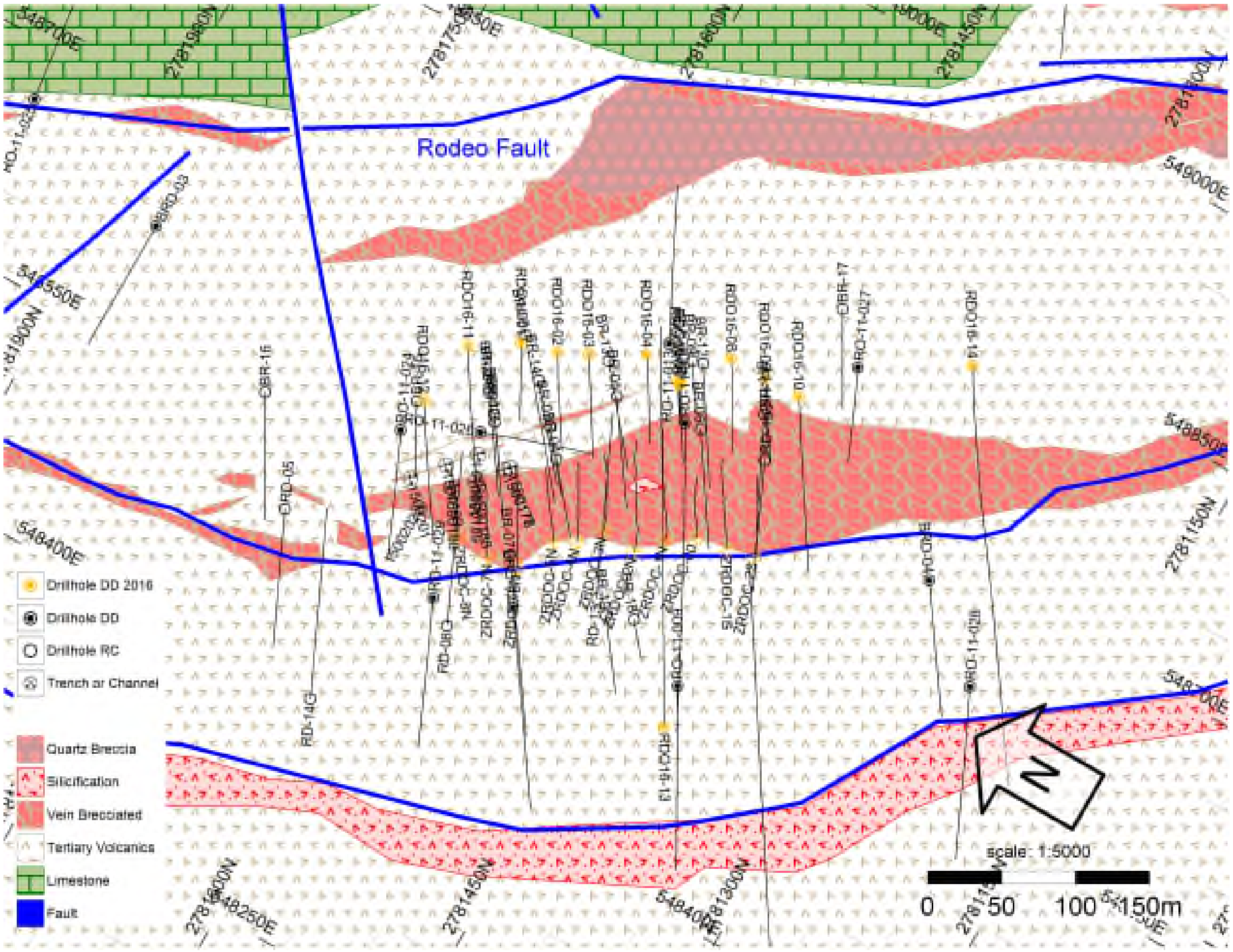


**Figure 7-2: Deposit Surface Geology**

## 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 but 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 that the Rodeo Fault played a role as a pathway at depth for the Rodeo deposit.

Quartz veins up to 15 meters 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, ancillary events both pre and postdating the high-grade event carry low-grade to anomalous levels of Au mineralization that could play an important role in evaluating the deposit for bulk tonnage potential.

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 associated to intense silica alteration of the host rock 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 and dip steeply to the east and west 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 Comino’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 to as much as 15. Examples are shown in **Figure 7-3** and **Figure 7-4**;

**Figure 7-3: Boulder of Stage 1 White Banded Quartz Vein with Bladed Calcite Replacement Textures**

**Figure 7-4: Bladed Calcite Replacement Texture in Stage 1 Vein**

- **Stages 2 and 3:** The 2 other stages in the form of small gray glassy quartz veinlets. These generally display weak banding and don't appear to host any sulphide. They clearly cut the first white quartz veins, **Figure 7-5**. 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;

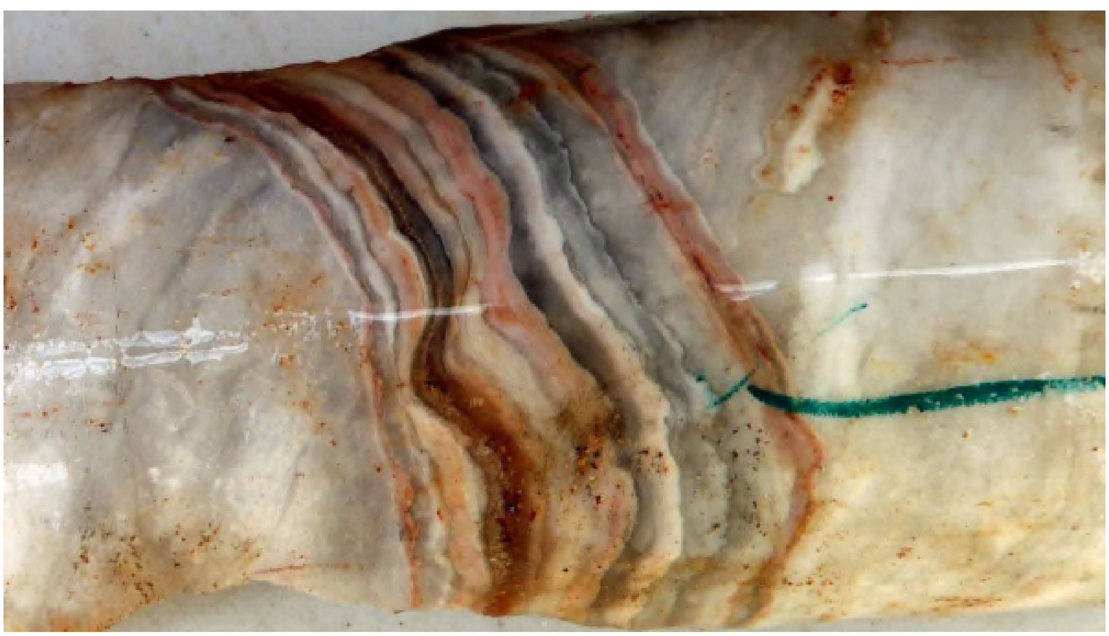

**Figure 7-5: Banded Vein Cutting Stage 1 White Vein**

- **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, **Figure 7-6** and **Figure 7-7**. High-grade mineralization exists as anomalous intervals in other stages types but this stage is consistently observed to occur along with high-grade;

**Figure 7-6: Stage 4 Black Vein (Main High-Grade Stage)**

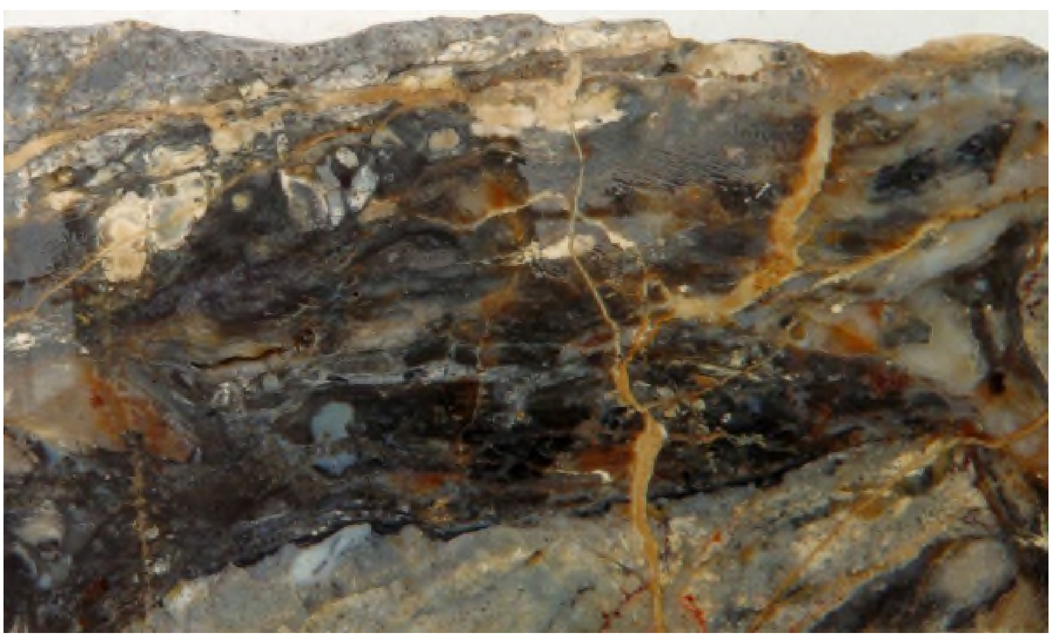

**Figure 7-7: Stage 4 Black Vein (Main High-Grade Stage) Cut by Blue Opaline Quartz and Breccia and Cemented by Smoky Quartz Hosting Fine Disseminated Pyrite (RO-11-001 37.3 Au g/t)**

- **Stage 5:** Several vein injection stages clearly postdates 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. Traces of very fine disseminated pyrite have been reported from this stage. These appear to be barren stages.

**Figure 7-8: 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-marcasite is often associated to the 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.

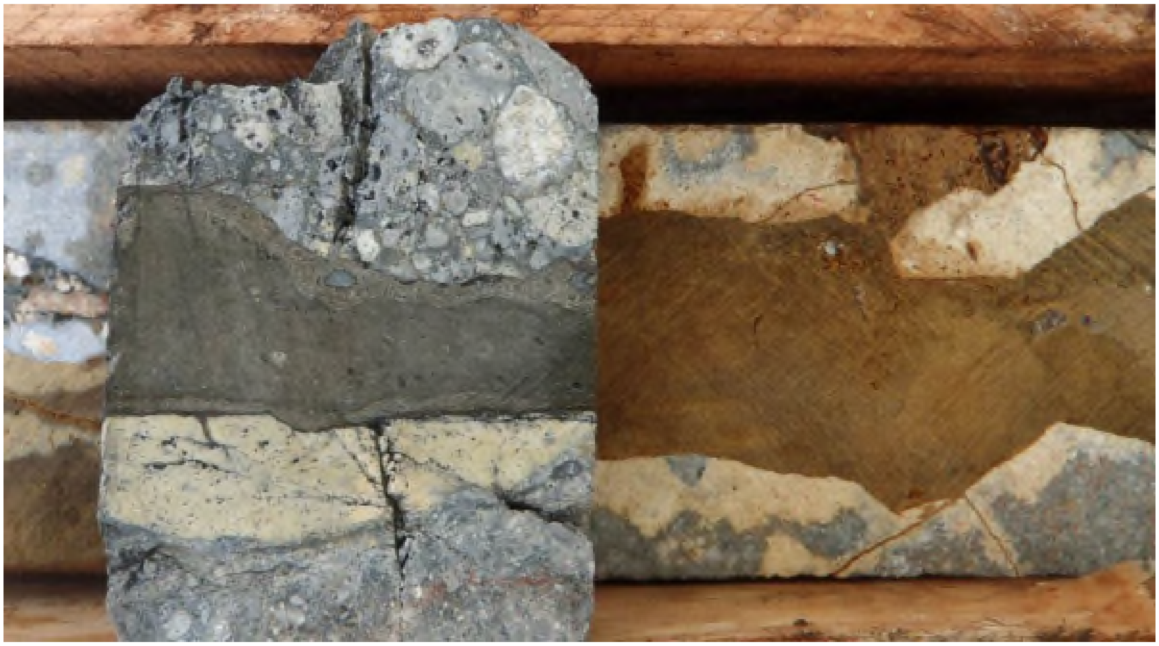

**Figure 7-9: Late Stage Pyrite-Marcasite Mineralization and its Oxidized Equivalent**

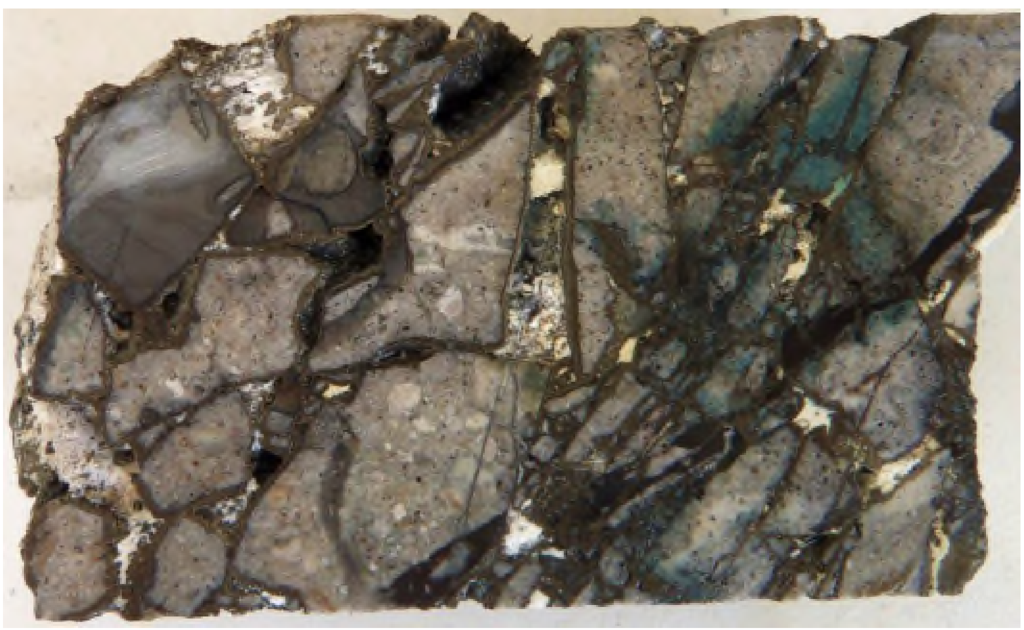

**Figure 7-10: Late Pyrite-Marcasite Cementing Breccias in Silicified Volcaniclastics**

# 8.0 DEPOSIT TYPES

The following section has been adapted from Blanchflower, 2010.

*The Rodeo property hosts gold- and silver-bearing mineralization with metallogenic characteristics commonly associated with a low-sulphidation (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 (Panteleyev, 1996).*

*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 (Panteleyev, 1996). Epithermal systems can be of any age, usually related to their host volcanic rocks but invariably slightly younger in age (0.5 to 1 Ma, more or less). Older epithermal deposits are less common due to the effects of erosion or metamorphism (Sillitoe, 1993).*

*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 (Panteleyev, 1996).*

*Low-sulphidation 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 (Sillitoe, 1993). Mineral deposition occurs as the fluids undergo cooling and degassing by fluid mixing, boiling and decompression (Panteleyev, 1996).*

*Mineralization is typically localized in structures but may occur in permeable lithologies. Upward-flaring mineralized zones centred on structurally-controlled hydrothermal conduits are common. Large (> 1 m wide and hundreds of metres in strike length) to small veins and stockworks are common with lesser disseminations and replacements. Vein systems can be laterally extensive but ore shoots have relatively restricted vertical extent. Higher grade mineralization is commonly found in dilational zones in faults at flexures and splays (Panteleyev, 1996).*

*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 sulphosalt 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 metres 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 is 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 (Panteleyev, 1996).*

*There are many documented examples of low-sulphidation epithermal-type mineral deposits. Since the early 1980's exploration for these types of deposits has focused along the Cordillera and Andean tectonic belt from Alaska to southern Chile. There are a number of international examples of low-sulphidation epithermal mineral deposits including: Toodoggone district deposits in British Columbia, Canada; Comstock and Aurora deposits in Nevada, USA; El Bronce, Chile; Guanajuato, Mexico; Colqui, Peru; and Ladolam in Lihir, Papua-New Guinea.*

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

*A schematic cross-section of the epithermal deposit model after Berger and Eimon, 1983 is shown in **Figure 8-1**.*

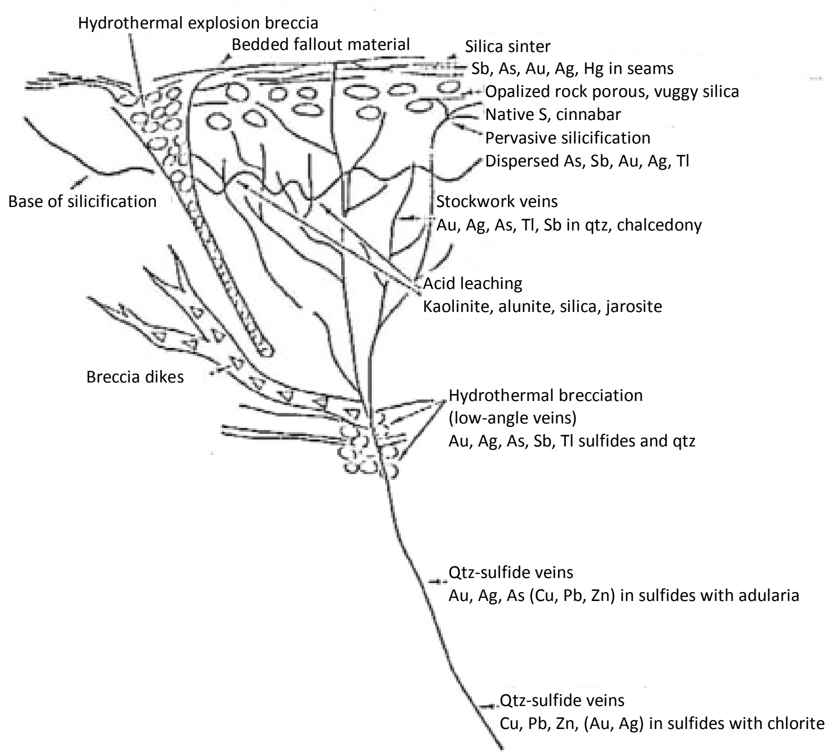


**Figure 8-1: Schematic Cross-Section of the Epithermal Deposit Model (after Berger and Eimon, 1983)**

# 9.0 EXPLORATION

Exploration activities conducted by Minera Cordilleras consist of:

- Surface geologic mapping of the property and immediate deposit area;
- Creation of a topographic surface through point surveying; and
- Trench sampling.

Activities conducted by previous operators include:

- Surface geologic mapping property at 1:25,000 scale and immediate deposit area;
- Alteration intensity mapping;
- Airborne magnetic and radiometric survey, 1,519 line-kilometers in 2010 and 2011 (raw data has not been located or provided to the author);
- Induced polarization geophysical surveying, 42 line-kilometer in 2010 and 2011 (raw data has not been located or provided to the author);
- Large scale magnetic surveys are available from GSM;
- Using Landsat false color imagery to look for alteration signatures;
- Spectral analysis to determine alteration types; and
- The collections of approximately 1,800 rock and soil samples throughout the area.
  - Few of the rock samples have recorded length and direction information, samples that do have this information have been used where appropriate.

The Rodeo and Rodeo 2 concession boundaries have been reduced since their initial staking, therefore portions of the activities of previous explorers have taken place outside the current concession boundaries.

Minera Cordilleras 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 with only few runs of with unsampled lengths greater than approximately 1 m. Trenches were mapped during collection followed by location corrections with a total station surveying instrument, as well as correction to the topographic surface.

The trenches are located 40 m west of the where the highest grade portion of the deposit is expected to outcrop because the silicification and mineralization does not outcrop through an apparently impermeable/less permeable volcanic layer. In the area of the trench samples this volcanic layer is absent and the silicification and mineralization is visible in outcrop however the Au grade is less than observed in the drilling in the best portion of the deposit. **Figure 9-1** shows the trench sample lines as well as colored coded Au grades. **Figure 9-2** shows two photos taken in the field of cut trench samples.

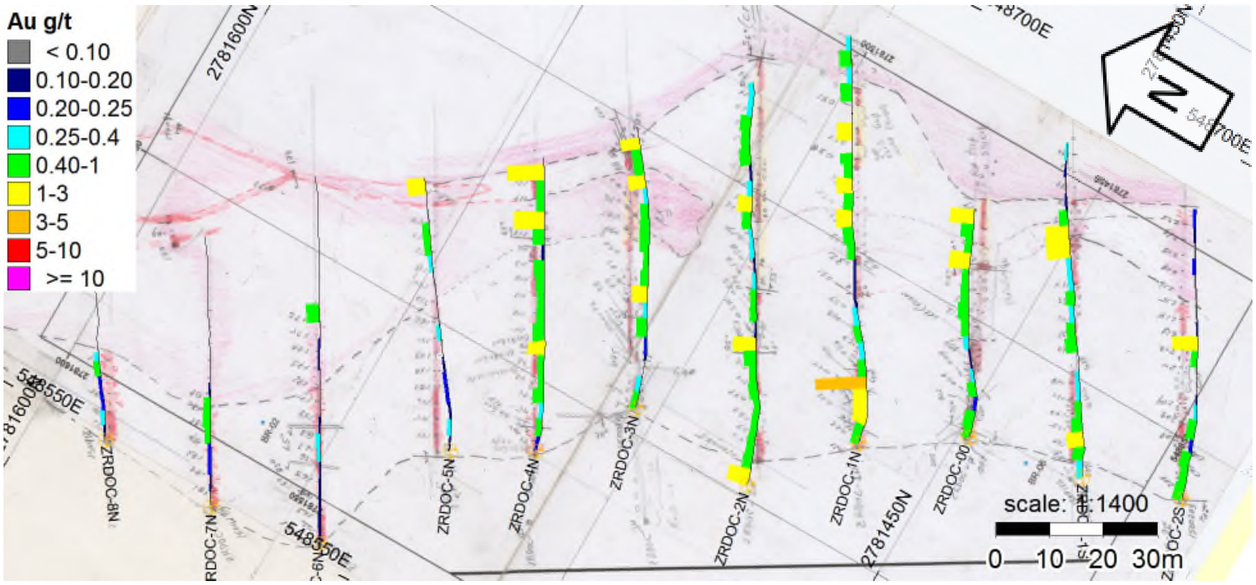


**Figure 9-1: Trench Sample Location Map**

**Figure 9-2: Trench Sample Photos**

The location details of the trenches are shown in **Table 9-1**. 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 Au g/t and a mean Ag grade of 1.4 Ag g/t. A summary of the significant trench samples is shown below in **Table 9-1**. Rock samples collected on the concessions are color coded based on Au grade in **Figure 9-3**.

**Table 9-1: Trench Locations**

| Trench Id | Easting | Northing | Elevation | Length (m) |
|---|---|---|---|---|
| ZRDOC-00 | 548630 | 2781448 | 1436.8 | 46.820 |
| ZRDOC-1N | 548619 | 2781465 | 1440 | 79.220 |
| ZRDOC-1S | 548634 | 2781426 | 1435.4 | 65.260 |
| ZRDOC-2N | 548602 | 2781479 | 1440.5 | 79.140 |
| ZRDOC-2S | 548640 | 2781408 | 1435.8 | 56.160 |
| ZRDOC-3N | 548604 | 2781504 | 1448.5 | 54.690 |
| ZRDOC-4N | 548588 | 2781516 | 1447.7 | 58.040 |
| ZRDOC-5N | 548580 | 2781530 | 1449.8 | 54.150 |
| ZRDOC-6N | 548553 | 2781542 | 1444.6 | 73.020 |
| ZRDOC-7N | 548549 | 2781563 | 1448.2 | 54.960 |
| ZRDOC-8N | 548550 | 2781586 | 1453.8 | 53.520 |

**Table 9-2: 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 | 14.9 |
| ZRDOC-4N | 1500121 | 53.88 | 56.71 | 2.74 | 6.6 |
| ZRDOC-4N | 1500117 | 44.84 | 48.02 | 2.21 | 1.5 |
| ZRDOC-2S | 1500212 | 29.07 | 32.05 | 1.9 | 1.9 |
| ZRDOC-00 | 1500019 | 43.79 | 46.69 | 1.765 | 3.8 |
| ZRDOC-1S | 1500135 | 43.96 | 47.07 | 1.74 | 2.7 |
| ZRDOC-1S | 1500136 | 47.07 | 50.04 | 1.73 | 2.3 |
| ZRDOC-2N | 1500054 | 26.94 | 29.73 | 1.7 | 4.9 |
| ZRDOC-2N | 1500045 | 0 | 3.46 | 1.61 | 7.6 |
| ZRDOC-00 | 1500016 | 35.11 | 38.17 | 1.505 | 1.3 |
| ZRDOC-3N | 1500091 | 50.72 | 52.72 | 1.405 | 3.6 |
| ZRDOC-5N | 1500159 | 51.11 | 54.15 | 1.33 | 1.1 |
| ZRDOC-3N | 1500087 | 43.31 | 45.92 | 1.26 | 0.4 |
| ZRDOC-4N | 1500098 | 19.76 | 23.04 | 1.26 | 1.3 |
| ZRDOC-1S | 1500124 | 6.6 | 9.74 | 1.235 | 1.8 |
| ZRDOC-1N | 1500036 | 50.24 | 52.99 | 1.165 | 1.3 |
| ZRDOC-1N | 1500034 | 43.9 | 47 | 1.15 | 3.5 |
| ZRDOC-1N | 1500039 | 59.98 | 63.14 | 1.14 | 0.9 |
| ZRDOC-3N | 1500079 | 21.41 | 24.56 | 1.14 | 2.4 |
| ZRDOC-2N | 1500064 | 54.63 | 57.58 | 1.075 | 2 |
| ZRDOC-1N | 1500022 | 3.68 | 6.88 | 1.055 | 5.3 |
| ZRDOC-1N | 1500023 | 6.88 | 11.97 | 1.03 | 3.3 |
| ZRDOC-1N | 1500024 | 11.98 | 14.22 | 3.76 | 14.9 |
| ZRDOC-4N | 1500121 | 53.88 | 56.71 | 2.74 | 6.6 |
| ZRDOC-4N | 1500117 | 44.84 | 48.02 | 2.21 | 1.5 |
| ZRDOC-2S | 1500212 | 29.07 | 32.05 | 1.9 | 1.9 |
| ZRDOC-00 | 1500019 | 43.79 | 46.69 | 1.765 | 3.8 |
| ZRDOC-1S | 1500135 | 43.96 | 47.07 | 1.74 | 2.7 |
| ZRDOC-1S | 1500136 | 47.07 | 50.04 | 1.73 | 2.3 |
| ZRDOC-2N | 1500054 | 26.94 | 29.73 | 1.7 | 4.9 |
| ZRDOC-2N | 1500045 | 0 | 3.46 | 1.61 | 7.6 |
| ZRDOC-00 | 1500016 | 35.11 | 38.17 | 1.505 | 1.3 |

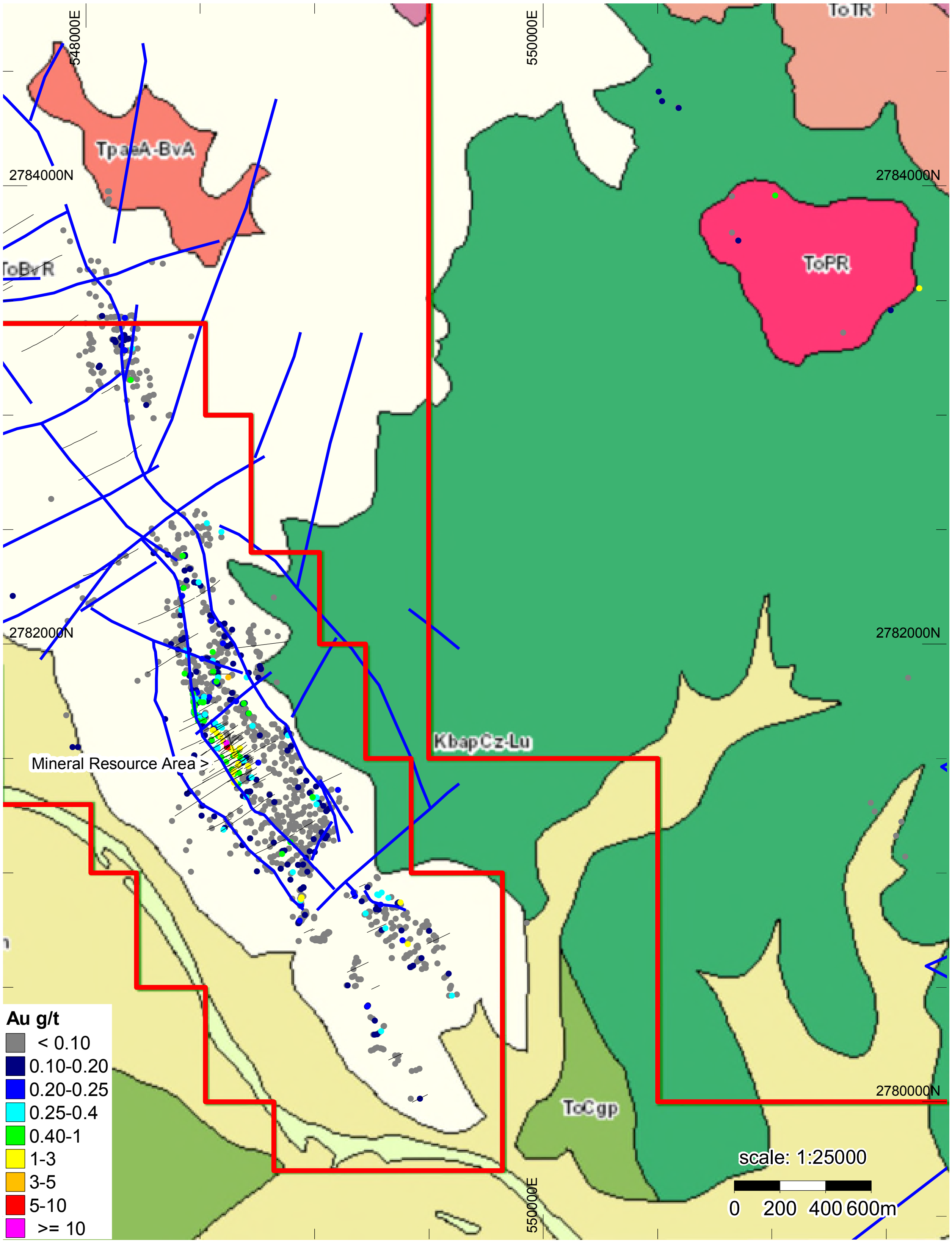


**Figure 9-3: Concession Rock Samples**

# 10.0 DRILLING

The project database contains 84 drill holes, totaling 13,964 m, drilled from 1995 to 2016. Of the total, 9,287 m were drilled using diamond equipment and 4,677 m with RC equipment. **Table 10-1** summarizes the project drilling by company, year, and equipment type.

**Table 10-1: Project Drilling by Company and Type**

| Company | Year | Type | Length (m) |
|---|---|---|---|
| Monarch Resources | 1995 | RC | 2,289 |
| Canplats Resources Corp. | 2004 | RC | 2,387 |
| Canplats Resources Corp. | 2004 | DD | 78 |
| Canplats Resources Corp. | 2007 | DD | 1,034 |
| Camino Minerals Corp. | 2011 | DD | 6,090 |
| **Minera Cordilleras** | **2016** | **DD** | **2,084** |
| **Total** | | | **13,964** |

The 2016 drill program by Minera was completed by Moles Drilling S.A. de C.V. of Jalisco, Mexico utilizing a track-mounted rig with a 1000 m depth capacity. Drill holes started as HQ size and reduced to NQ where necessary. Surface drill hole collar locations were surveyed by handheld GPS and then 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 and then down hole surveyed using a magnetic Reflex instrument.

Drill holes have primarily been oriented perpendicular to strike and inclined at approximately 55 degrees. The prevailing silicification of the Rodeo deposit dips from 35 to 55 degrees ESE along with the volcanic host; drill orientations have been aligned to intersect this strike and dip. Varying vein stages and structural controls cause the mineralization to exist at a range of dips from 35 degrees to near vertical.

Drilling is reported to be slow and difficult given the high level of silicification. Recovered core is broken with many zones of ruble. 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 10-2** shows core recovery vs. Au g/t for the 2016 drilling by Minera Cordilleras.

**Figure 10-1: Typical Drill Hole Recovery and RQD (RDO16-07 17 m)**

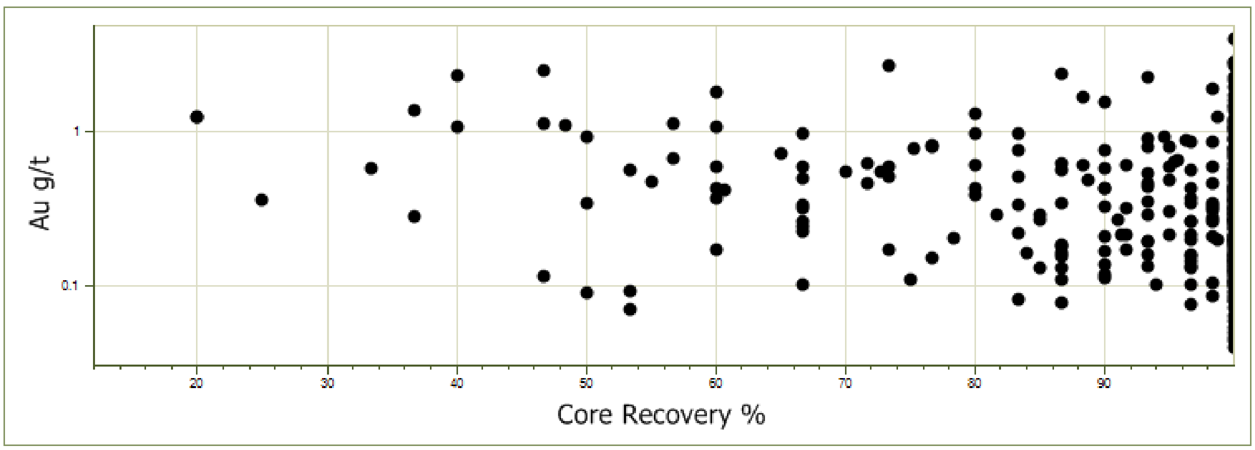


**Figure 10-2: Core Recovery vs. Grade 2016 Drilling**

Significant drill hole intercepts at shown in **Table 10-2**.

**Table 10-2: Significant High Grade Drill Hole Intervals**

| Hole Id | From | To | Length (m) | Au g/t | Ag g/t |
|---|---|---|---|---|---|
| BR-01 | 37.592 | 40.64 | 3.048 | 8.133 | 38 |
| BR-02 | 2.032 | 6.096 | 4.064 | 2.622 | 6.1 |
| BR-02 | 9.144 | 19.304 | 10.16 | 5.276 | 4.5 |
| BR-02 | 25.4 | 29.464 | 4.064 | 2.923 | 10.4 |
| BR-03 | 5.08 | 10.16 | 5.08 | 3.182 | 6.8 |
| BR-03 | 13.208 | 27.432 | 14.224 | 5.341 | 16.5 |
| BR-05 | 16.256 | 24.384 | 8.128 | 5.987 | 24.6 |
| BR-05 | 27.432 | 33.528 | 6.096 | 2.297 | 15.4 |
| BR-06 | 8.128 | 27.432 | 19.304 | 6.363 | 10.6 |
| BR-06 | 31.496 | 35.56 | 4.064 | 3.13 | 19.8 |
| BR-10 | 6.9 | 10.65 | 3.75 | 2.784 | 0 |
| BR-11 | 15.24 | 21.336 | 6.096 | 3.533 | 3.3 |
| BR-14 | 24.384 | 29.464 | 5.08 | 2.35 | 15.5 |
| BR-18 | 44.704 | 47.752 | 3.048 | 1.972 | 21.9 |
| BR-19 | 44.704 | 47.752 | 3.048 | 4.23 | 61.7 |
| BR-21 | 29.464 | 32.512 | 3.048 | 4.463 | 26.2 |
| BR-21 | 38.608 | 44.704 | 6.096 | 2.629 | 25.5 |
| RDO16-02 | 20.5 | 23.5 | 3 | 2.181 | 3.6 |
| RDO16-02 | 55.25 | 59.4 | 4.15 | 3.016 | 45.8 |
| RDO16-04 | 31 | 36.6 | 5.6 | 2.329 | 10.1 |
| RDO16-05 | 15.5 | 20.3 | 4.8 | 2.499 | 5.6 |
| RDO16-06 | 11.5 | 29.4 | 17.9 | 2.529 | 8.6 |
| RDO16-07 | 16 | 22 | 6 | 3.5 | 8.3 |
| RDO16-07 | 47 | 50.9 | 3.9 | 1.781 | 28.2 |
| RDO16-08 | 64 | 67.55 | 3.55 | 3.41 | 63.5 |
| RO-11-001 | 12.5 | 36.3 | 23.8 | 7.484 | 14.1 |
| RO-11-026 | 9.35 | 15.35 | 6 | 2.854 | 7.1 |
| RO-11-026 | 21 | 27 | 6 | 4.398 | 2 |
| RO-11-026 | 46.6 | 49.6 | 3 | 2.955 | 21.5 |
| RO-11-026 | 54.6 | 60.1 | 5.5 | 2.758 | 32.7 |

Drill holes located on the concession are shown in **Figure 10-3**. **Figure 10-4** shows the 2016 Minera Cordilleras drilling along with color coded Au grade intervals and the surface topography. **Table 10-3** details the name, location and associated surface information for the Project drilling.

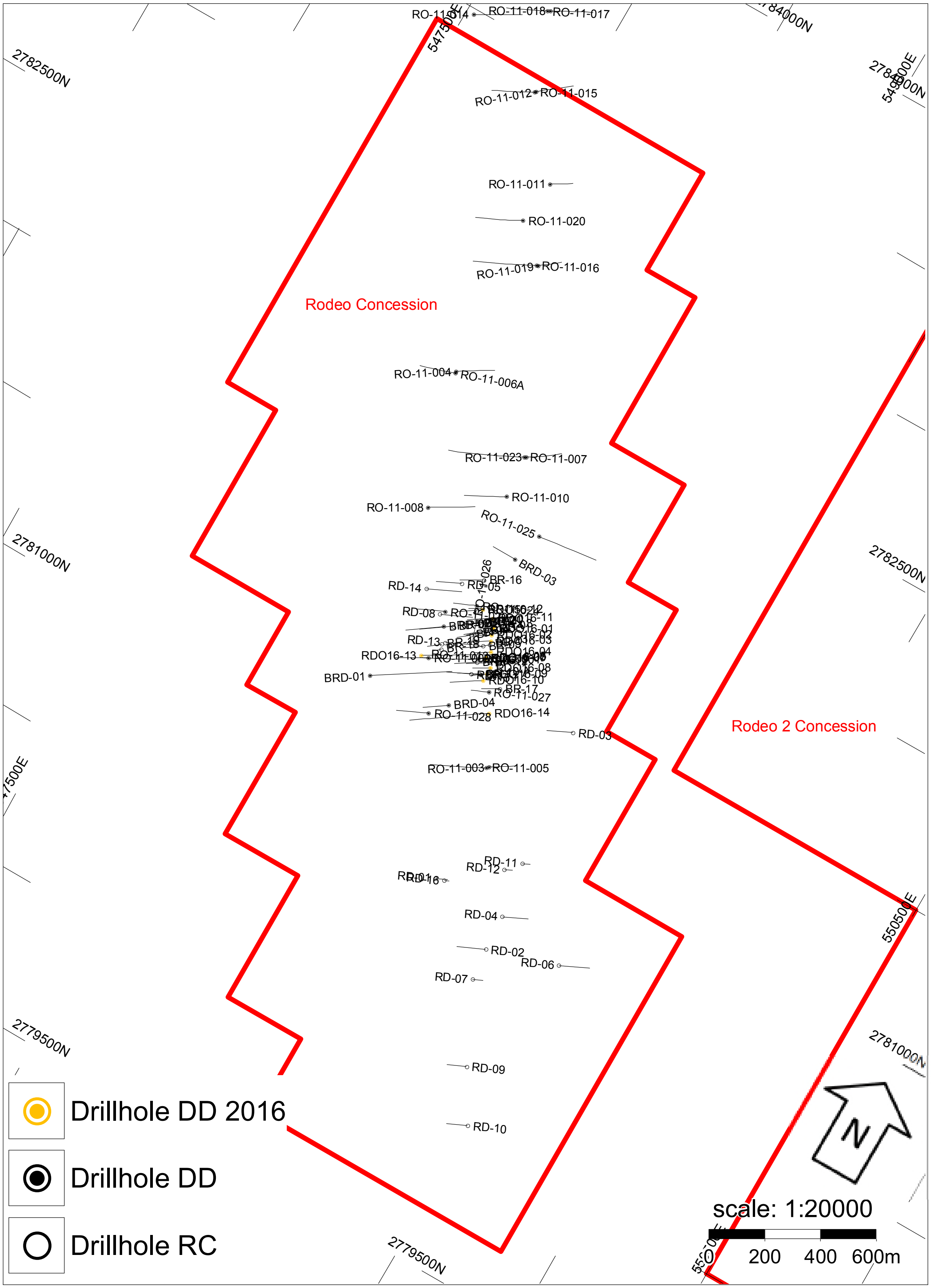


**Figure 10-3: Concession Drill Hole Location Map**

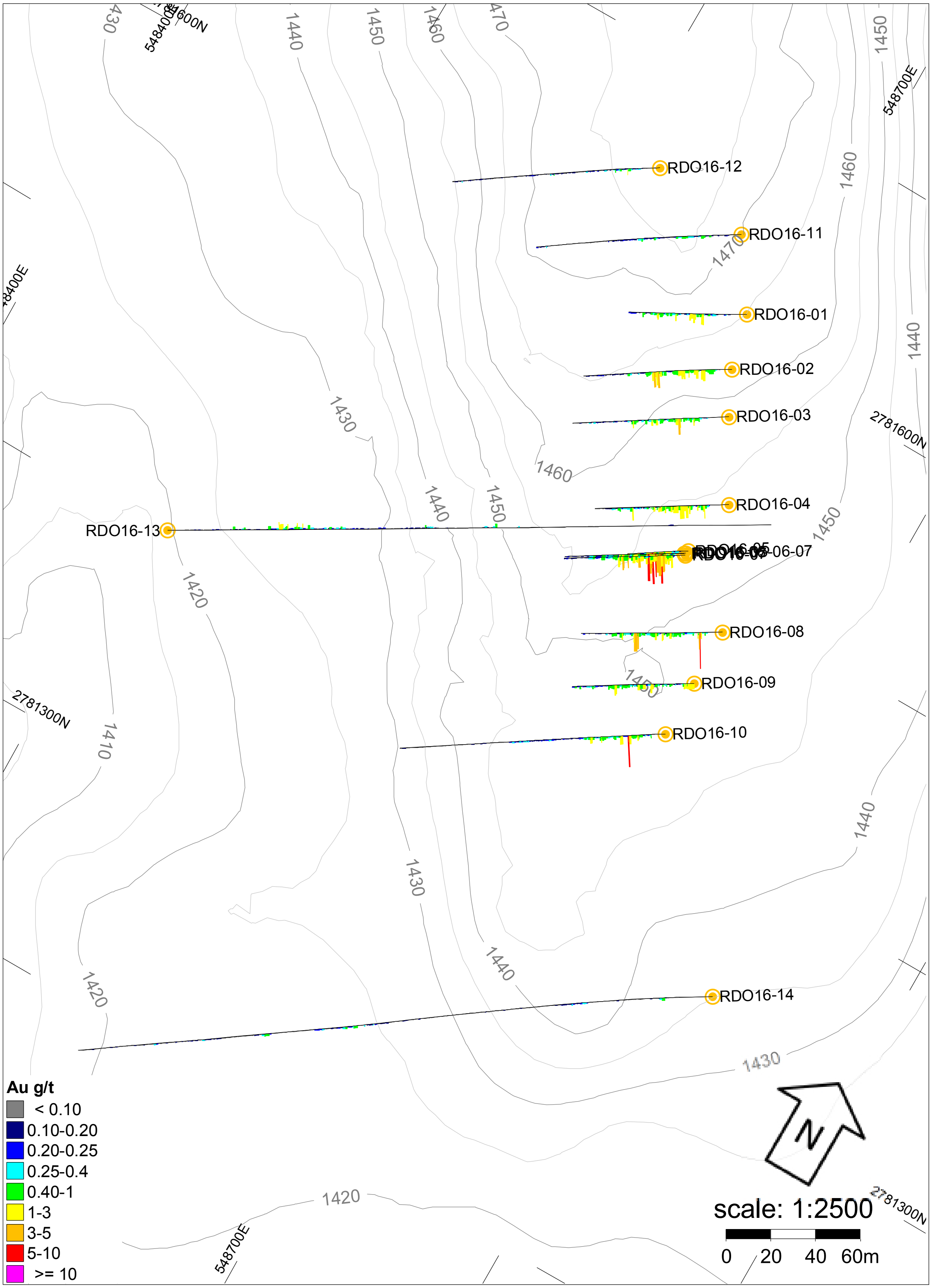


**Figure 10-4: Drill Hole Location Map Minera Cordilleras 2016**

## Table 10-3: Drill Hole Locations and Initial Orientations

| Hole Id | Easting | Northing | Elevation | Total Depth (m) | Initial Azimuth | Initial Dip | No. of Surveys | Type | Company | Year |
|---|---|---|---|---|---|---|---|---|---|---|
| BR-01 | 548634.8 | 2781607 | 1470.16 | 132 | 235 | -55 | 1 | RC | Canplats | 2004 |
| BR-02 | 548630.8 | 2781604 | 1469.81 | 58 | 235 | -57 | 1 | RC | Canplats | 2004 |
| BR-03 | 548646.4 | 2781570.6 | 1465.57 | 81 | 230 | -55 | 1 | RC | Canplats | 2004 |
| BR-04 | 548629.7 | 2781555.5 | 1464.9 | 126 | 230 | -65 | 1 | RC | Canplats | 2004 |
| BR-05 | 548686.7 | 2781541.5 | 1457.11 | 133 | 235 | -55 | 1 | RC | Canplats | 2004 |
| BR-06 | 548696.1 | 2781481.6 | 1453.4 | 142.2 | 236 | -55 | 1 | RC | Canplats | 2004 |
| BR-07 | 548558.6 | 2781550.4 | 1447.9 | 215 | 235 | -55 | 1 | RC | Canplats | 2004 |
| BR-08 | 548691.9 | 2781615.7 | 1463.41 | 178 | 230 | -50 | 1 | RC | Canplats | 2004 |
| BR-09 | 548733 | 2781509.3 | 1451.79 | 62 | 236 | -55 | 1 | RC | Canplats | 2004 |
| BR-10 | 548730.3 | 2781450.3 | 1450.64 | 20.35 | 235 | -50 | 1 | DD | Canplats | 2004 |
| BR-10-A | 548730.3 | 2781450.3 | 1450.64 | 58.05 | 235 | -50 | 1 | DD | Canplats | 2004 |
| BR-11 | 548726.2 | 2781449.2 | 1450.07 | 127 | 244 | -50 | 1 | RC | Canplats | 2004 |
| BR-12 | 548735 | 2781502.3 | 1450.79 | 131 | 237 | -50 | 1 | RC | Canplats | 2004 |
| BR-13 | 548704.7 | 2781558.2 | 1456.63 | 114 | 230 | -50 | 1 | RC | Canplats | 2004 |
| BR-14 | 548669.6 | 2781592.6 | 1464.82 | 125 | 230 | -55 | 1 | RC | Canplats | 2004 |
| BR-15 | 548616.5 | 2781656.9 | 1479.89 | 78 | 241 | -50 | 1 | RC | Canplats | 2004 |
| BR-16 | 548570.7 | 2781748.5 | 1484.8 | 122 | 240 | -45 | 1 | RC | Canplats | 2004 |
| BR-17 | 548814 | 2781439.2 | 1443.35 | 104 | 240 | -50 | 1 | RC | Canplats | 2004 |
| BR-18 | 548562.7 | 2781456.5 | 1428.42 | 103 | 230 | -74 | 1 | RC | Canplats | 2004 |
| BR-19 | 548555.3 | 2781474.1 | 1428.8 | 156 | 233 | -70 | 1 | RC | Canplats | 2004 |
| BR-20 | 548648.5 | 2781618.8 | 1473.96 | 69.09 | 235 | -58 | 1 | RC | Canplats | 2004 |
| BR-21 | 548645.8 | 2781617.1 | 1472.13 | 131 | 235 | -58 | 1 | RC | Canplats | 2004 |
| BRD-01 | 548388 | 2781248 | 1385 | 457.9 | 57 | -50 | 1 | DD | Canplats | 2007 |
| BRD-02 | 548528.8 | 2781531.2 | 1433.8 | 213.4 | 235 | -50 | 1 | DD | Canplats | 2007 |
| BRD-03 | 548631 | 2781868 | 1448 | 142.9 | 270 | -50 | 1 | DD | Canplats | 2007 |
| BRD-04 | 548685.1 | 2781297.2 | 1426.79 | 220 | 235 | -65 | 1 | DD | Canplats | 2007 |
| RD-01 | 548953 | 2780738 | 1295 | 91 | 65 | -60 | 1 | RC | Monarch | 1995 |
| RD-02 | 549236 | 2780609 | 1356 | 147.4 | 245 | -45 | 1 | RC | Monarch | 1995 |
| RD-03 | 549120 | 2781436 | 1340 | 150 | 245 | -51 | 1 | RC | Monarch | 1995 |
| RD-04 | 549229 | 2780739 | 1350 | 188 | 65 | -60 | 1 | RC | Monarch | 1995 |
| RD-05 | 548509.3 | 2781697.4 | 1472.75 | 146 | 245 | -50 | 1 | RC | Monarch | 1995 |
| RD-06 | 549491 | 2780690 | 1310 | 224 | 65 | -60 | 1 | RC | Monarch | 1995 |
| RD-07 | 549249 | 2780492 | 1380 | 60 | 65 | -50 | 1 | RC | Monarch | 1995 |
| RD-08 | 548495.9 | 2781563.5 | 1436.72 | 184 | 65 | -50 | 1 | RC | Monarch | 1995 |
| RD-09 | 549386 | 2780212 | 1292 | 166 | 245 | -65 | 1 | RC | Monarch | 1995 |
| RD-10 | 549495 | 2780031 | 1280 | 152 | 245 | -60 | 1 | RC | Monarch | 1995 |
| RD-11 | 549196 | 2780939 | 1269 | 60 | 65 | -60 | 1 | RC | Monarch | 1995 |
| RD-12 | 549151 | 2780888 | 1265 | 60 | 65 | -60 | 1 | RC | Monarch | 1995 |
| RD-13 | 548562 | 2781485.3 | 1430.71 | 220 | 65 | -55 | 1 | RC | Monarch | 1995 |
| RD-14 | 548406.8 | 2781618.6 | 1434.36 | 225 | 65 | -55 | 1 | RC | Monarch | 1995 |
| RD-15 | 548699.3 | 2781433.8 | 1447.95 | 178 | 245 | -60 | 1 | RC | Monarch | 1995 |
| RD-16 | 548984 | 2780747 | 1290 | 38 | 65 | -60 | 1 | RC | Monarch | 1995 |
| RDO16-01 | 548685.9 | 2781615.4 | 1464.98 | 89.4 | 239 | -55 | 4 | DD | MC | 2016 |
| RDO16-02 | 548692.5 | 2781590.9 | 1461.61 | 112.5 | 239 | -55 | 3 | DD | MC | 2016 |

**Table 10-3: Drill Hole Locations and Initial Orientations**

| Hole Id | Easting | Northing | Elevation | Total Depth (m) | Initial Azimuth | Initial Dip | No. of Surveys | Type | Company | Year |
|---|---|---|---|---|---|---|---|---|---|---|
| RDO16-03 | 548701.9 | 2781571.9 | 1458.94 | 119.1 | 239 | -54 | 2 | DD | MC | 2016 |
| RDO16-04 | 548721.5 | 2781537.8 | 1454.41 | 100 | 239 | -55 | 2 | DD | MC | 2016 |
| RDO16-05 | 548716 | 2781510.8 | 1453.01 | 46.7 | 239 | -55 | 2 | DD | MC | 2016 |
| RDO16-06 | 548715.1 | 2781509 | 1453.07 | 34 | 239 | -55 | 2 | DD | MC | 2016 |
| RDO16-07 | 548715.8 | 2781508.5 | 1452.88 | 91 | 239 | -55 | 3 | DD | MC | 2016 |
| RDO16-08 | 548747.5 | 2781487.1 | 1449.7 | 106.5 | 239 | -55 | 2 | DD | MC | 2016 |
| RDO16-09 | 548747.9 | 2781461 | 1449.04 | 91.5 | 239 | -55 | 4 | DD | MC | 2016 |
| RDO16-10 | 548748.1 | 2781434.9 | 1448.63 | 201 | 239 | -55 | 4 | DD | MC | 2016 |
| RDO16-11 | 548666 | 2781645.1 | 1470.28 | 155.5 | 239 | -55 | 3 | DD | MC | 2016 |
| RDO16-12 | 548619.6 | 2781652.7 | 1479.78 | 157 | 239 | -55 | 4 | DD | MC | 2016 |
| RDO16-13 | 548509.8 | 2781402.4 | 1419.18 | 380 | 60 | -45 | 8 | DD | MC | 2016 |
| RDO16-14 | 548824.9 | 2781343.9 | 1435.07 | 400 | 239 | -45 | 9 | DD | MC | 2016 |
| RO-11-001 | 548694.4 | 2781492.7 | 1455.1 | 304.5 | 240 | -50 | 4 | DD | Camino | 2011 |
| RO-11-003 | 548921 | 2781179 | 1415 | 144.5 | 58 | -45 | 2 | DD | Camino | 2011 |
| RO-11-004 | 548111 | 2782343 | 1408 | 218.2 | 57 | -50 | 3 | DD | Camino | 2011 |
| RO-11-005 | 548914 | 2781172 | 1409 | 310.5 | 240 | -50 | 2 | DD | Camino | 2011 |
| RO-11-006A | 548113 | 2782337 | 1404 | 208 | 250 | -50 | 3 | DD | Camino | 2011 |
| RO-11-007 | 548477 | 2782201 | 1440 | 370.5 | 242 | -45 | 5 | DD | Camino | 2011 |
| RO-11-008 | 548268 | 2781873 | 1423 | 268.5 | 60 | -50 | 3 | DD | Camino | 2011 |
| RO-11-009 | 548538.2 | 2781408.4 | 1424.62 | 192.2 | 240 | -50 | 3 | DD | Camino | 2011 |
| RO-11-010 | 548492 | 2782046 | 1450 | 212 | 241 | -45 | 2 | DD | Camino | 2011 |
| RO-11-011 | 548068 | 2783092 | 1470 | 129.8 | 60 | -50 | 2 | DD | Camino | 2011 |
| RO-11-012 | 547860 | 2783352 | 1495 | 204.5 | 50 | -50 | 3 | DD | Camino | 2011 |
| RO-11-013 | 548735.3 | 2781528.4 | 1452.28 | 163.4 | 62 | -50 | 2 | DD | Camino | 2011 |
| RO-11-014 | 547528 | 2783479 | 1493 | 278.5 | 60 | -50 | 3 | DD | Camino | 2011 |
| RO-11-015 | 547857 | 2783348 | 1495 | 231.2 | 241 | -50 | 3 | DD | Camino | 2011 |
| RO-11-016 | 548172 | 2782815 | 1450 | 305 | 242 | -45 | 3 | DD | Camino | 2011 |
| RO-11-017 | 547751 | 2783622 | 1550 | 220 | 243 | -50 | 3 | DD | Camino | 2011 |
| RO-11-018 | 547760 | 2783626 | 1550 | 229 | 60 | -50 | 3 | DD | Camino | 2011 |
| RO-11-019 | 548177 | 2782817 | 1450 | 121.6 | 51 | -45 | 2 | DD | Camino | 2011 |
| RO-11-020 | 548050 | 2782930 | 1478 | 262.5 | 240 | -50 | 3 | DD | Camino | 2011 |
| RO-11-021 | 547637 | 2783793 | 1544 | 245.5 | 58 | -50 | 2 | DD | Camino | 2011 |
| RO-11-022 | 547162 | 2784378 | 1464 | 323.3 | 60 | -45 | 4 | DD | Camino | 2011 |
| RO-11-023 | 548483 | 2782205 | 1440 | 187.5 | 60 | -50 | 2 | DD | Camino | 2011 |
| RO-11-024 | 548594.5 | 2781656.4 | 1476.33 | 124.5 | 245 | -50 | 2 | DD | Camino | 2011 |
| RO-11-025 | 548663.8 | 2781981.6 | 1436.82 | 328.5 | 82 | -47 | 3 | DD | Camino | 2011 |
| RO-11-026 | 548620.1 | 2781609.1 | 1471.41 | 108.6 | 160 | -45 | 2 | DD | Camino | 2011 |
| RO-11-027 | 548785.2 | 2781410.4 | 1443.83 | 93 | 245 | -45 | 2 | DD | Camino | 2011 |
| RO-11-028 | 548636.5 | 2781237.4 | 1422.21 | 162 | 244 | -45 | 2 | DD | Camino | 2011 |
| RO-11-029 | 548507.2 | 2781581 | 1442.2 | 143 | 245 | -45 | 2 | DD | Camino | 2011 |

# 11.0 SAMPLE PREPARATION, ANALYSES AND SECURITY

Data summarized in this section and utilized for estimation of resources was collected by Minera Cordilleras staff. The sample preparation, analyses and security procedures implemented by Minera Cordilleras 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.

The property has experienced exploration and sampling by several companies and several campaigns. 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 |

## 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 city of Rodeo, by truck. 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. 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 maximum of 2 m, with few exceptions up to 4.05 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 meters are annotated on the white plastic core box using a marker, **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 when complete. A tear-away sample tag system has not be implemented, but is recommended in the future. Five samples are grouped and placed in a large rice sack. The beginning and ending number of the five samples contained in the sack is written on the outside of the bag. The sack is also tied shut with twine when full.

**Figure 11-1: Drill Core Sampling**

### *11.1.2 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 were analyzed with ME ICP41 using aqua regia, a partial digestion. 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. Testing for Au was the same and is equivalent.

## 11.2 SECURITY

The core preparation facility is located 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 further stored within locked building in the facility when staff is not present. Samples are delivered to ALS Minerals in Chihuahua City, Chihuahua, Mexico (ALS Chihuahua) by Minera Cordilleras staff by road as needed, typically every two weeks during the drill hole campaign.

## 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 Minera Cordilleras 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), however only quality control standard samples triggered the GRA22 rerun.

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 rerun using (Ag-OG62).

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

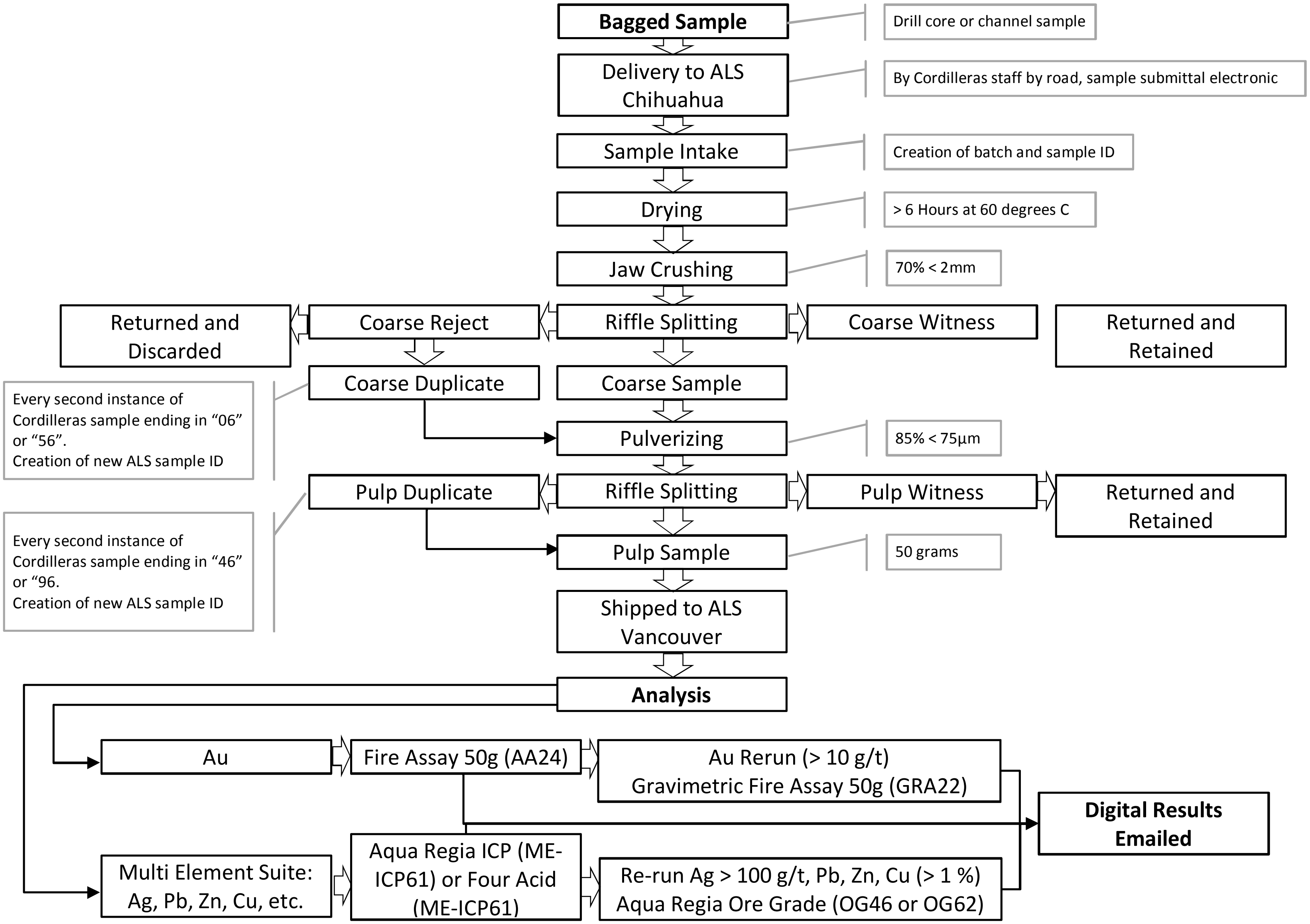


**Figure 11-2: Sample Analysis Flow Diagram**

## 11.4 Quality Assurance and Quality Control for Sample Analysis

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

The insertion of control samples is 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 sample.

**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** |

### *11.4.1 Quality Control Sample Performance*

QC sample performance was generally tracked throughout the campaign by Minera Cordilleras staff and no major issues were observed but results suggest standard control sample strategies could be refined. It is 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 Ap-49 should be discontinued because no instream samples trigged 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, 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 Minera Cordilleras staff.

**Table 11-5: Au Standard Reference Material Control Analysis**

| Standard | Count | Outliers | Failures |
|---|---|---|---|
| SE-44 | 38 | 1 | 3 |
| SP-49 | 38 (10 not reran) | 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 |

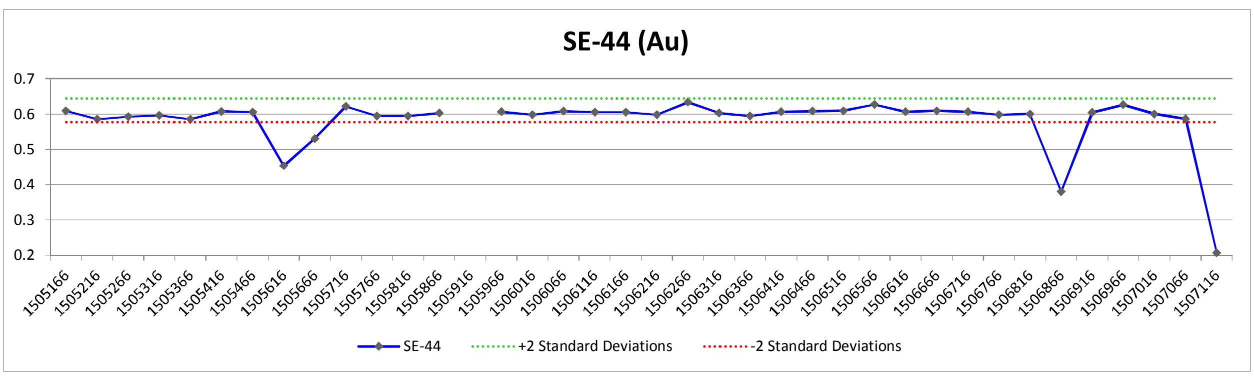


**Figure 11-3: Standard Performance SE-44 Au**

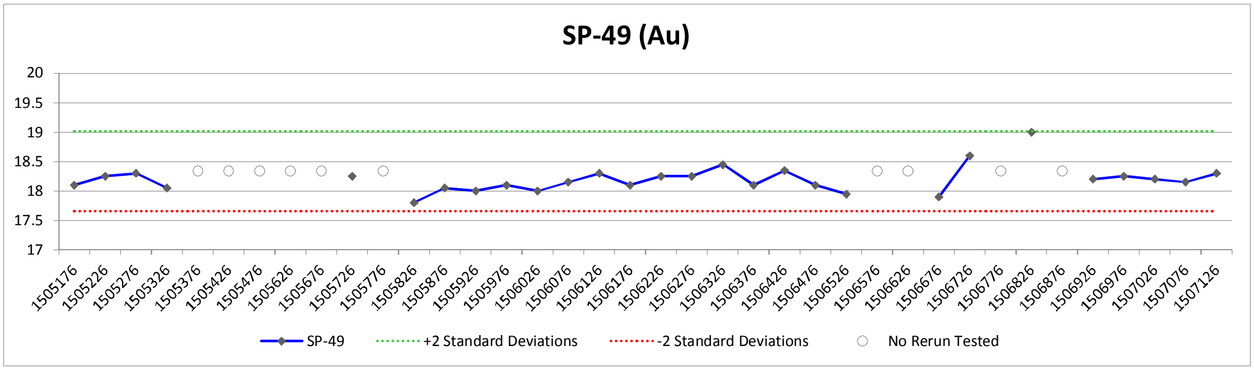


**Figure 11-4: Standard Performance SE-49 Au**

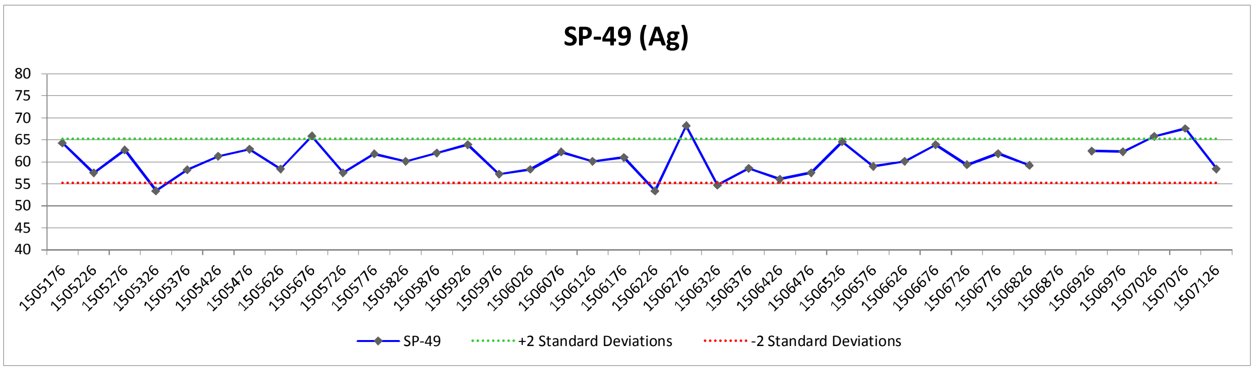


**Figure 11-5: Standard Performance SE-49 Ag**

The blank material was sourced from barren coarse sand. The performance of the 37 blanks submitted show no failures for Au or Ag.

**Figure 11-6** shows coarse and fine duplicate performance for Au and **Figure 11-7** shows coarse and fine duplicate performance for Ag. The performance of the fine and coarse duplicates show good reproducibility for both Au and Ag.

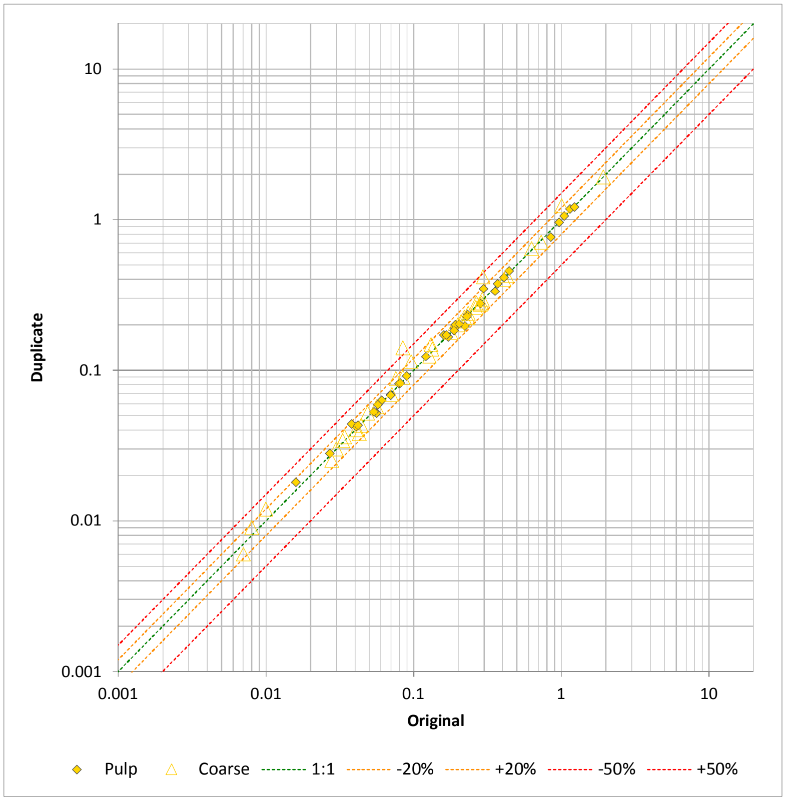


**Figure 11-6: Duplicates Coarse and Fine Au**

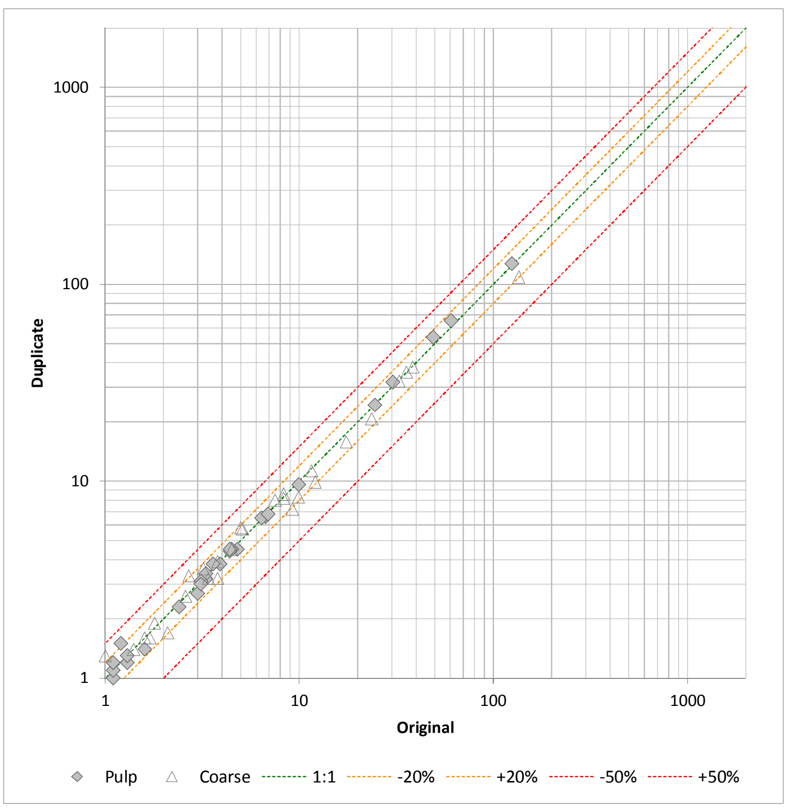


**Figure 11-7: Duplicates Coarse and Fine Ag**

# 12.0 DATA VERIFICATION

The quality of data collected by Minera Cordilleras 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 Minera Cordilleras, as well as existing physical and digital records and verification sampling performed by Minera Cordilleras, as well as the previous operators. Coupled with the data collected by Minera Cordilleras, data from previous explorers is sufficient to support the estimation of mineral resources, however details regarding QA/QC protocols and performance were not available for review.

The following section describes steps taken by the author of this report to verify data provided by the company. 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 generation of exploration by past explorers and the 2016 drilling campaign have confirmed the presence of mineralization, limited core resampling has been completed by previous authors and is included in **Table 12-2**.

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 collars locations and orientations were found to correspond to those provided by Minera Cordilleras.

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, the author has reviewed core photos of mineralized intervals and spot checked the assay database with the laboratory certificates provided.

At the time of the site visit, several physical sample witnesses were available in the Rodeo storage and logging facility. **Table 12-1** details the availability and conditions of physical samples.

**Table 12-1: Sample Witness Availability**

| Item | Condition | Availability at Rodeo Storage Facility |
|---|---|---|
| BR Series Pulps | Poor, damaged stacked boxes | Yes |
| BR Series RC Chips | Chip trays, reasonable condition | Yes |
| RD Series RC Chips | Chip trays, reasonable condition | Yes |
| BR and BRD Series Drill Core | NA | No |
| BRD Series Pulps | NA | Possibly with BR Pulps |
| RO-11 Series Drill Core | Intact half core in stacked wooden boxes, covered | Yes |
| RO-11 Series Pulps | Good, stacked boxes | Yes |
| RDO16 Series Drill Core | Intact half core in stacked plastic boxes, covered | Yes |
| RDO16 Series Pulps | Good, stacked boxes | Yes |

For purposes of data verification collected by previous explorers and at the request of the author, Mineral Cordilleras reanalyzed 94 pulps from Canplats BR series holes. For both Au and Ag, the duplicated values compared well on a cases by case basis with the original values stored in the project database. **Figure 12-1** shows a 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.

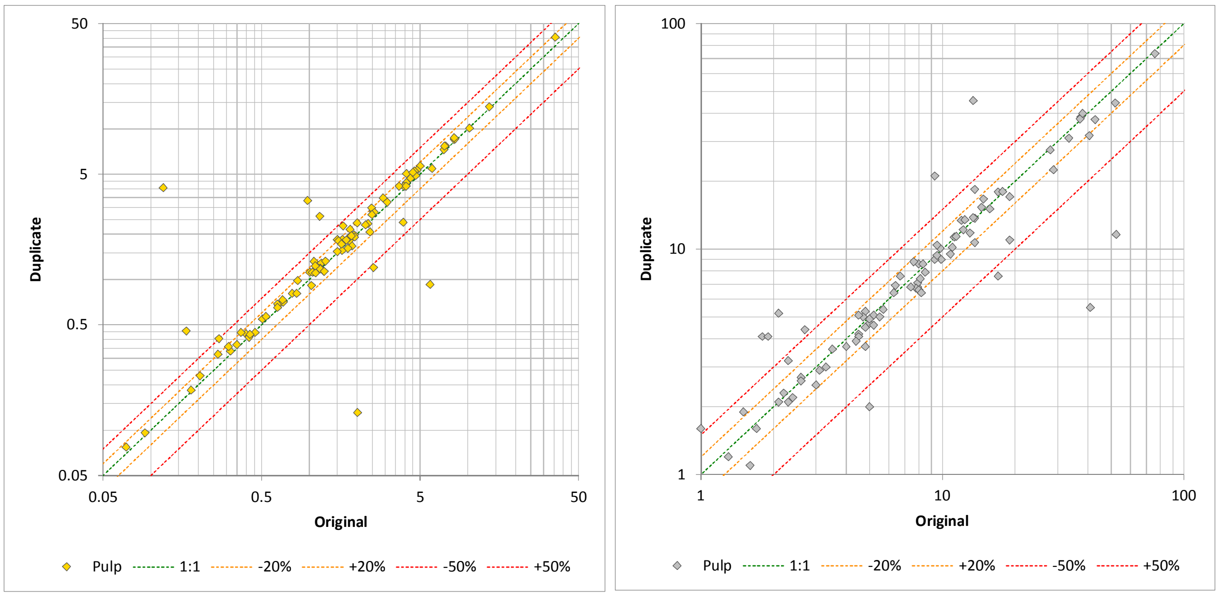


**Figure 12-1: Scatter Plot Pulp Duplicates**

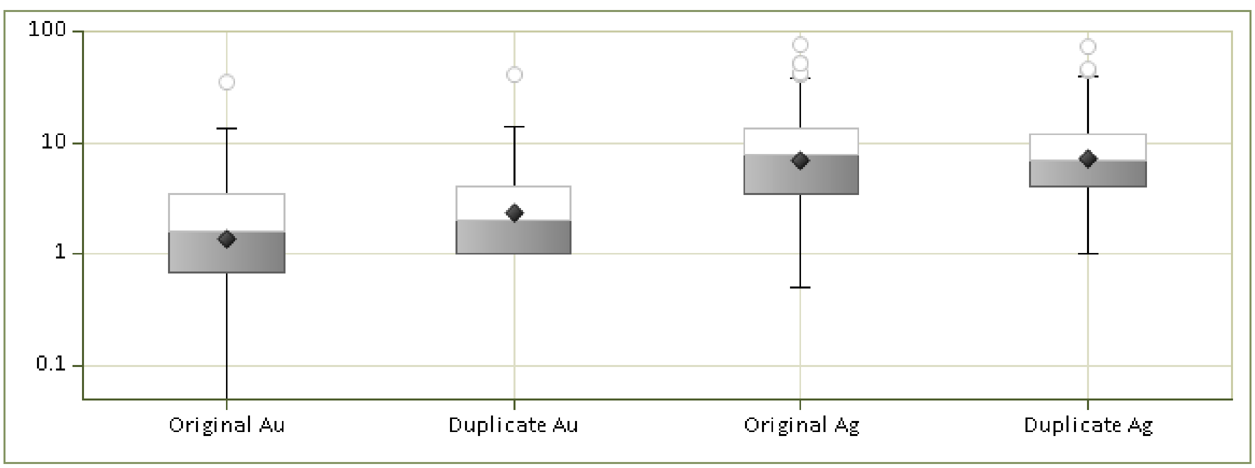


**Figure 12-2: Box Plot Pulp Duplicates**

Canplats analyzed 189 pulps from the BR drill hole series at Chemex with Au-SCR21 to determine if there was a grade bias between + and – 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.

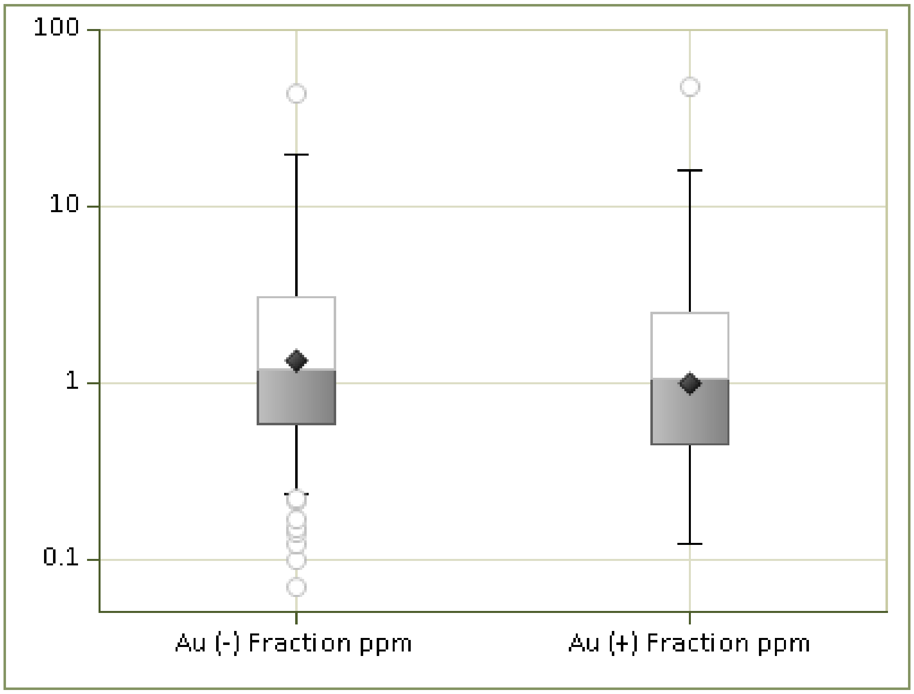


**Figure 12-3: Box Plot Au Screen Analysis Fraction Comparison**

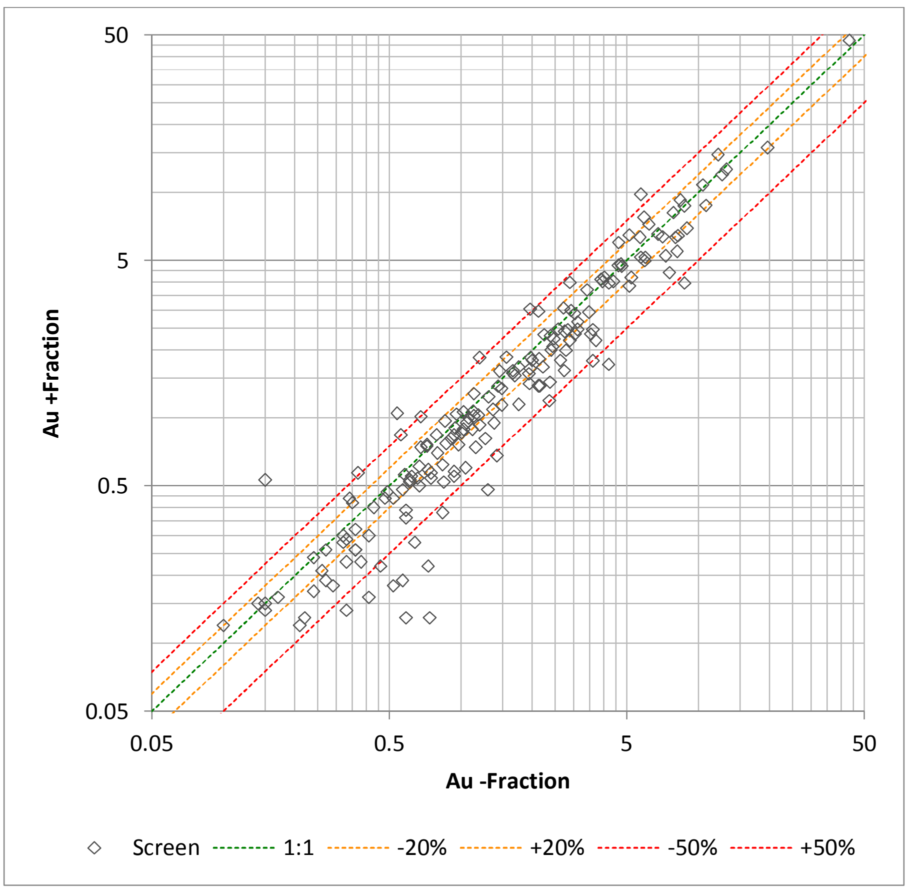


**Figure 12-4: Scatter Plot Au Screen Analysis Fraction Comparison**

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**.

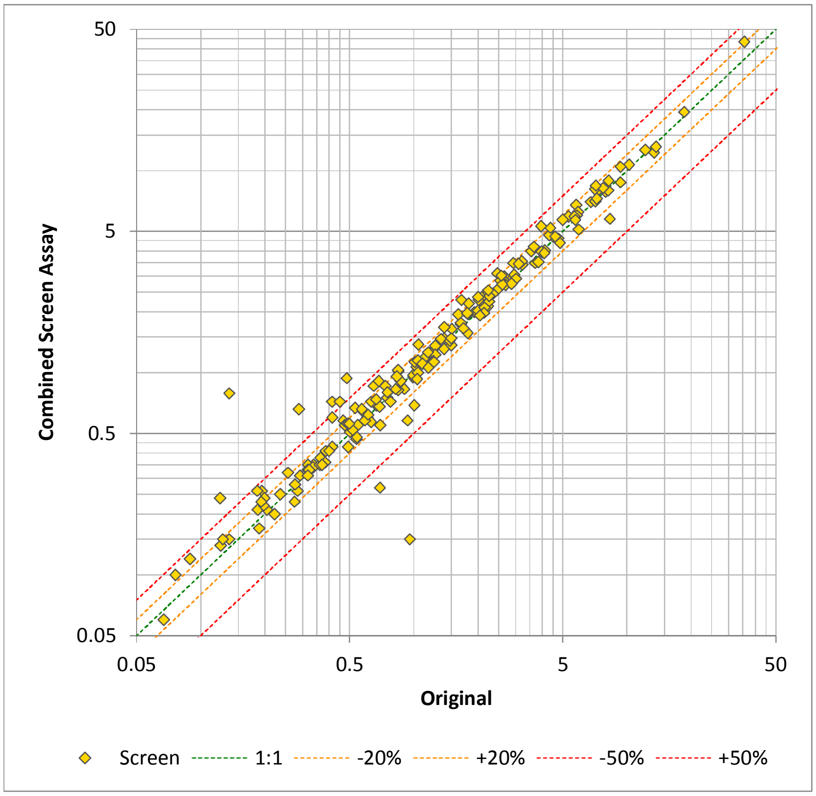


**Figure 12-5: Scatter Plot Screen Duplicates Au**

**Table 12-2** compares original sample values to verification samples collected by Blanchflower in 2009

**Table 12-2: 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 | 3.5 | 4.60 |
| BRD-02 | E014769 | 355189 | 91.8 | 92.8 | 1.585 | 0.677 | 2.4 | 4.6 |
| BRD-02 | E014770 | 355194 | 96.4 | 97.1 | 0.679 | 0.731 | 13.4 | 18.1 |
| BRD-02 | E014771 | 355214 | 117 | 118.8 | 1.210 | 1.445 | 41.9 | 61.8 |
| BRD-03 | E014772 | 355310 | 20.2 | 21.1 | 0.236 | 0.249 | 3.8 | 2.4 |
| BRD-03 | E014773 | 355314 | 23.85 | 25.35 | 0.341 | 0.272 | 9.5 | 8.2 |
| BRD-04 | E014774 | 355401 | 72.35 | 73.35 | 1.105 | 0.677 | 4.4 | 3.8 |
| BRD-04 | E014775 | 355451 | 150.6 | 152.15 | 1.800 | 1.835 | +100 | 130 |

# 13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

Limited test work has been performed to date on material from the Rodeo deposit. The 2004 historic test work program at Process Research Associates (PRA) was focused on comparatively high grade samples, and consisted entirely of bottle roll testing over 48 hours. The details of the PRA test work, such as reagent consumptions, were not available for review.

For purposes of resource estimation, the use of 60% recovery for gold and 70% for silver under heap leach conditions is considered appropriate given the available data at this level of study. For mill recovery, the use of 77% gold and 90% silver were deemed appropriate based on the 48 hour 200 mesh bottle roll results.

## 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 located in table.

**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 | 6.8 | 13.5 |
| 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 | 19.6 |
| BR5 25 to 38 | BR-05 | 25 | 38 | 1.91 | 10.3 |
| BR6 9 to 24 | BR-06 | 9 | 24 | 12.8 | 13.9 |
| 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 gold grades appeared uniform across various size fractions. However, silver 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 P80 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 gold and silver aided or hindered subsequent leaching responses. However, as discussed later in regards to the bottle roll testing, extraction of both gold and silver was noticeably improved at a P80 of 200 mesh, suggesting that liberation could potentially be a factor.

Based on input provided by Golden Minerals, it is also believed that the higher grade samples selected are more heavily silicified. If this were to prove applicable, specifically in regards to the gold and silver mineralogy, then it is possible that low grade materials may exhibit higher recoveries than their high grade counterparts under otherwise identical conditions. As no low grade material has been tested, this assumption is preliminary. For purposes of resource estimation, it is believed that this is sufficient justification for the use of higher recovery values for a lower grade resource than was obtained on the "as received" high grade samples from the 2004 PRA program. Follow up testing, in addition to that mentioned in the PRA report, is required to confirm the validity of this assumption.

### *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 (1500 to 4200 microns), at a retention time of 48 hours gold extraction ranged from 17% to 41% and silver extraction ranged from 27% to 56%, **Table 13-2**. Given the comparatively short retention times in relation to heap leaching conditions, it is not clear if extraction had plateaued or if further increases would have occurred with additional time. As discussed in regards to characterization, it is believed that these high grade samples were more heavily silicified, and potentially more refractory than low grade materials.

**Table 13-2: Bottle Roll Results - As Received (PRA 2004)**

| Sample ID | Head Au g/t | Head Ag g/t | P80 µm | Au Extraction % | Au Residue g/t | Ag Extraction % | Ag Residue g/t |
|---|---|---|---|---|---|---|---|
| BR2 02 to 29 | 2.45 | 4.65 | 3932 | 41.8 | 1.3 | 43.1 | 2.6 |
| BR3 06 to 13, 24 to 38 | 1.83 | 7.63 | 1512 | 37.7 | 1.25 | 44.1 | 4.8 |
| BR3 14 to 23 | 6.8 | 13.5 | 1548 | 41.3 | 3.69 | 51.9 | 7 |
| BR3 06 to 13, 24 to 38 | 1.83 | 7.63 | 1512 | 37.7 | 1.25 | 44.1 | 4.8 |
| BR5 17 to 24 | 5.64 | 19.6 | 3599 | 32.6 | 3.32 | 46.1 | 9.3 |
| BR5 25 to 38 | 1.91 | 10.3 | 2276 | 31.2 | 1.38 | 53.8 | 8.8 |
| BR6 9 to 24 | 12.8 | 13.9 | 1898 | 27.8 | 9.58 | 56.3 | 6.5 |
| BR6 25 to 35 | 3.04 | 8.82 | 4182 | 17.1 | 3.13 | 27.7 | 7.6 |

For the ground material (P80 = 74 microns), gold extraction ranged from 71% to 82%, and silver extraction ranged from 84% to 92%, **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 gold and silver, 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 | P80 µm | Au Extraction % | Au Residue g/t | Ag Extraction % | Ag Residue g/t |
|---|---|---|---|---|---|---|---|
| BR2 02 to 29 | 2.45 | 4.65 | 89 | 82.4 | 0.5 | 85.6 | 0.8 |
| BR3 06 to 13, 24 to 38 | 1.83 | 7.63 | 81 | 74.7 | 0.51 | 86.9 | 1.3 |
| BR3 14 to 23 | 6.8 | 13.5 | 69 | 78.1 | 1.55 | 85.4 | 2.4 |
| BR3 06 to 13, 24 to 38 | 1.83 | 7.63 | 81 | 74.7 | 0.51 | 86.9 | 1.3 |
| BR5 17 to 24 | 5.64 | 19.6 | 82 | 82.5 | 1.02 | 87.3 | 2.3 |
| BR5 25 to 38 | 1.91 | 10.3 | 78 | 75.5 | 0.55 | 84.9 | 1.8 |
| BR6 9 to 24 | 12.8 | 13.9 | 77 | 71.2 | 3.9 | 84.2 | 2.7 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| BR6 25 to 35 | 3.04 | 8.82 | 80 | 72.5 | 0.94 | 92.1 | 0.9 |

### 13.1.3 Reagent Consumptions

While the report indicated that reagent consumptions for sodium cyanide (NaCN) and lime were measured during the test work, this detailed data was not available for review. However, while the values were not explicitly given, the report did not affirmatively indicate consumptions were either high or low. For purposes of resource estimation it was assumed the reagent consumptions were considered "average" given the absence of discussion in the report.

Two process options are being contemplated for the Rodeo gold and silver bearing material. These options consists of constructing a heap leaching operation on site, or transporting the material to an existing mill facility at Velardeña. As detailed in Section 13, the lower grade material is potentially more amenable to heap leaching due to a lesser degree of silicification, however this has not been tested as of the time of this report. However, the high grade material exhibits favorable enhanced extractions under typical milling conditions, thus better justifying the costs to deliver it to a remote mill facility. A simplified process flowsheet is shown below in **Figure 13-1**. The mill features a conventional gold and silver cyanide leaching and Merrill-Crowe precipitation circuit.

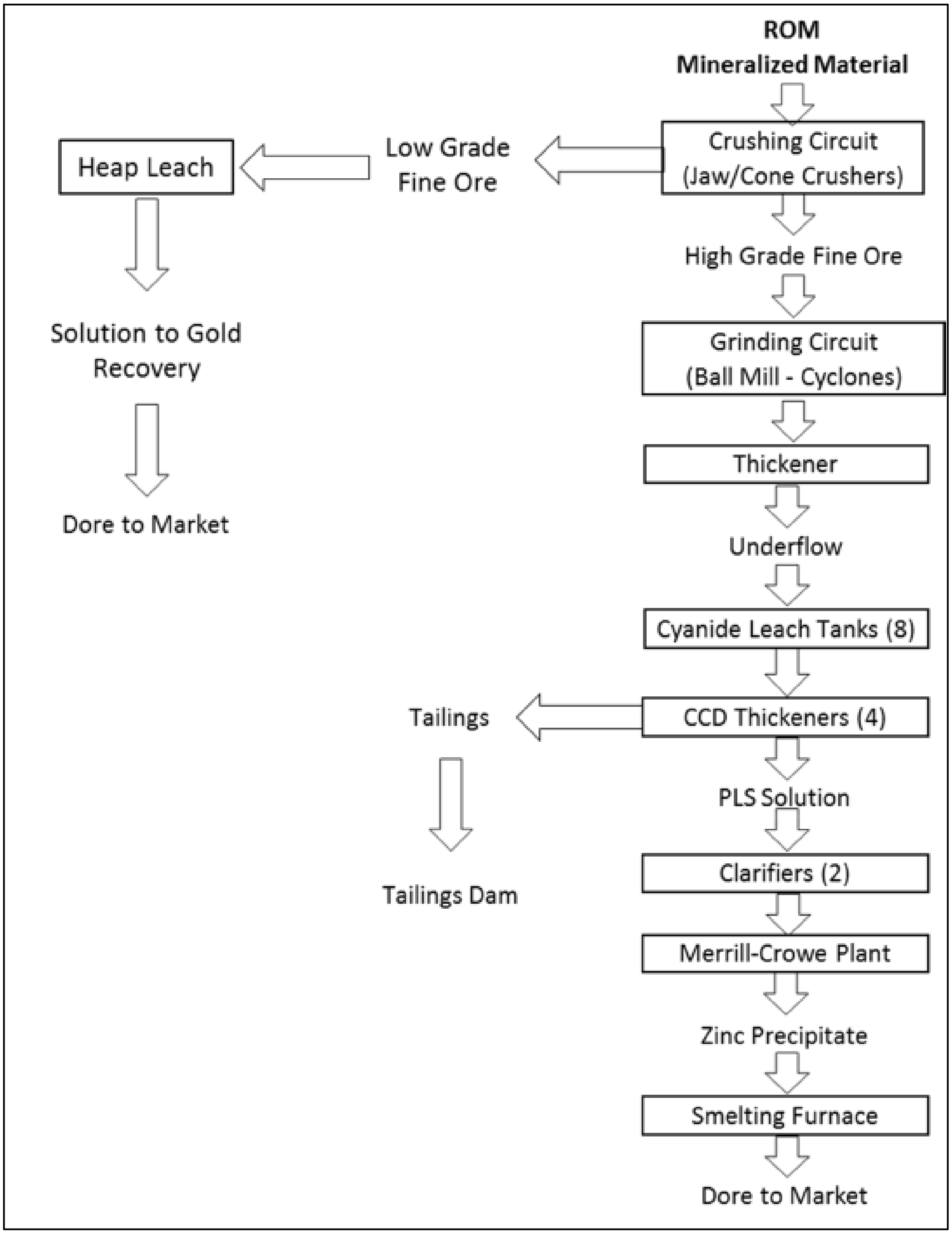


**Figure 13-1: Process Plant Flow Sheet for Velardeña Plant #2**

# 14.0 MINERAL RESOURCE ESTIMATES

Resources have been estimated for the Rodeo deposit using a block model rotated to fit the deposit strike. Sub-blocking was used within the single high-grade domain only. Au and Ag grades have been estimated using Ordinary Kriging on parent blocks independently within and also outside of wireframe constrained domains. Reporting of estimated blocks has been constrained by a base case pit optimization using costs unique to mining followed by road trucking and processing at Golden Mineral's Velardeña cyanidation plant (Plant #2). An alternative standalone case using indicative heap leach processing costs is also shown to represent on site heap leach processing option.

Although the mineral resources are pit constrained using reasonable cost assumptions, detailed costing and economic evaluations have not been performed. The pit optimizations include resources that do not have demonstrated economic value and include inferred resources that are too speculative for definition of reserves.

Estimated indicated mineral resource within the base case pit constraint is shown in **Table 14-1**. Estimated indicated and inferred mineral resources within the alternative case pit constraint is shown in **Table 14-2**. Preliminary metallurgy suggests the Rodeo material may be amenable to cyanidation; differentiations between oxide and sulfide material has not been made.

**Table 14-1: Mineral Resource Estimate Base Case (Mill Processing Pit Constrained)**

| Classification | Cutoff AuEq g/t | Tonnes (M) | Au g/t | Ag g/t | Au toz (1000) | Ag toz (M) | Waste: Resource |
|---|---|---|---|---|---|---|---|
| Indicated | 0.83 | 0.4 | 3.3 | 11 | 46 | 0.2 | 0.91 |
| Inferred | - | - | - | - | - | - | - |

Notes:
(1) Cutoff grade and Au equivalent calculated using metal prices of $1,220 and $17 per troy ounce of Au and Ag, recoveries of 77% and 90% Au and Ag;
(2) Mineral Resources have been pit shell constrained using the Lerch Grossman algorithm with inputs of $7.5 mining, $10 trucking, and $20 processing costs per Tonne. A breakeven cutoff including trucking and processing costs per block was applied to a block model within the optimized shell;
(3) Metal prices do not exceed three-year trailing average as of the end of December 2016, per SEC guidance; and
(4) Reported indicated mineral resources are equivalent to mineralized material under SEC Industry Guide 7;

**Table 14-2: Mineral Resource Estimate Alternative Case (Heap Leach Processing Pit Constrained)**

| Classification | Cutoff AuEq g/t | Tonnes (M) | Au g/t | Ag g/t | Au toz (1000) | Ag toz (M) | Waste: Resource |
|---|---|---|---|---|---|---|---|
| Indicated | 0.17 | 3.6 | 0.8 | 12 | 94 | 1.4 | 0.53 |
| Inferred | 0.17 | 3.6 | 0.4 | 11 | 47 | 1.3 | 0.53 |

Notes:
(1) Cutoff grade and Au equivalent calculated using metal prices of $1,220 and $17 per troy ounce of Au and Ag, recoveries of 60% and 70% Au and Ag;
(2) Mineral Resources have been pit shell constrained using the Lerch Grossman algorithm with inputs of $3.4 mining cost, and $3.1 processing cost per Tonne. A cutoff including mining and processing costs per block was applied to a block model within the optimized shell;
(3) Metal prices do not exceed three-year trailing average as of the end of December 2016, per SEC guidance;
(4) Reported indicated mineral resources are equivalent to mineralized material under SEC Industry Guide 7; and
(5) Columns may not total due to rounding.

## 14.1 Input Data

The project database contains 4,008 core, 3,209 RC and 193 trench sample intervals. Of those 2,613 core, 2,274 RC and 193 trench sample intervals are within the relevant resource area and were subsequently used for resource modeling. **Table 14-3** shows grade statistics for intervals within the resource modelling area. **Figure 14-1** shows the location of the input data intervals as AgEq g/t in plan view for both drill holes and channels before on mineral domain selections were made.

**Table 14-3: Input Data Statistics Raw Intervals**

| Dataset | Count | Mean Au | Mean Ag |
|---|---|---|---|
| RC | 2,274 | 0.34 | 6.7 |
| Diamond | 2,613 | 0.27 | 5.1 |
| Trenches | 193 | 0.58 | 1.4 |
| **All** | **5,080** | **0.31** | **5.7** |

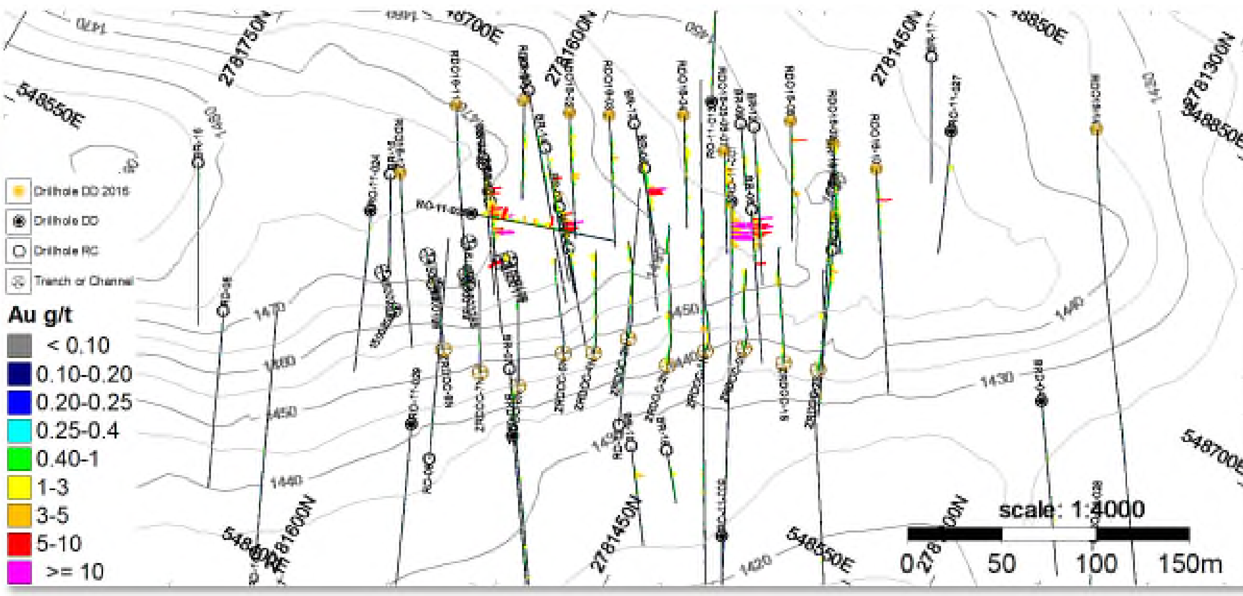


**Figure 14-1: Plan View Map Input Data Intervals AuEq**

## 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 18 g/t and 150 g/t for Ag. **Table 14-4** shows capping statistics and the effects on the population mean. **Figure 14-2** and **Figure 14-3** show probability plots for Ag and Au respectively. The figures show the erratic tails for both Au and Ag are relatively limited.

**Table 14-4: Capping Statistics in Mineralized Zones**

| Element | Uncapped Mean g/t | Upper Limit g/t | Number Capped | Capped Mean g/t |
|---|---|---|---|---|
| Au | 0.691 | 18 | 3 | 0.648 |
| Ag | 10.9 | 150 | 4 | 10.3 |

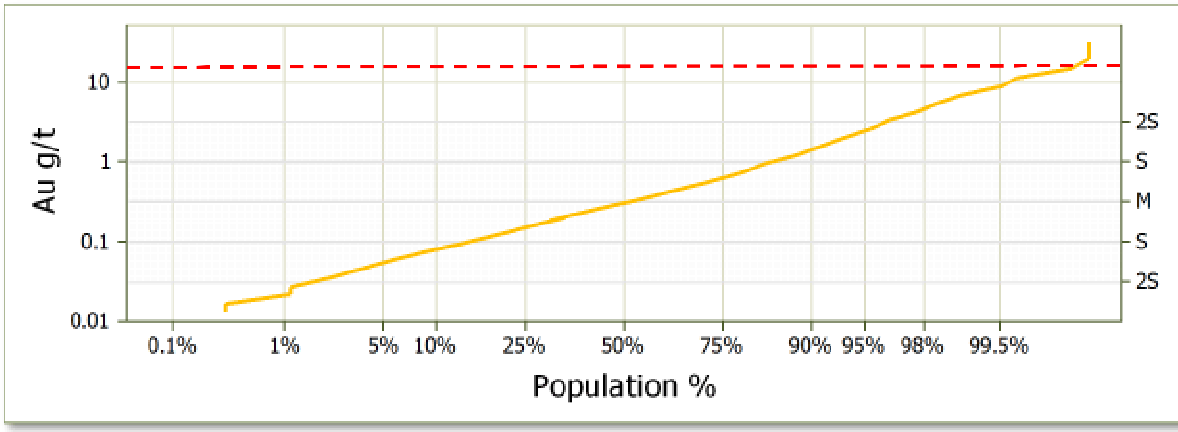


**Figure 14-2: Upper Limit Analysis Probability Plot Au**

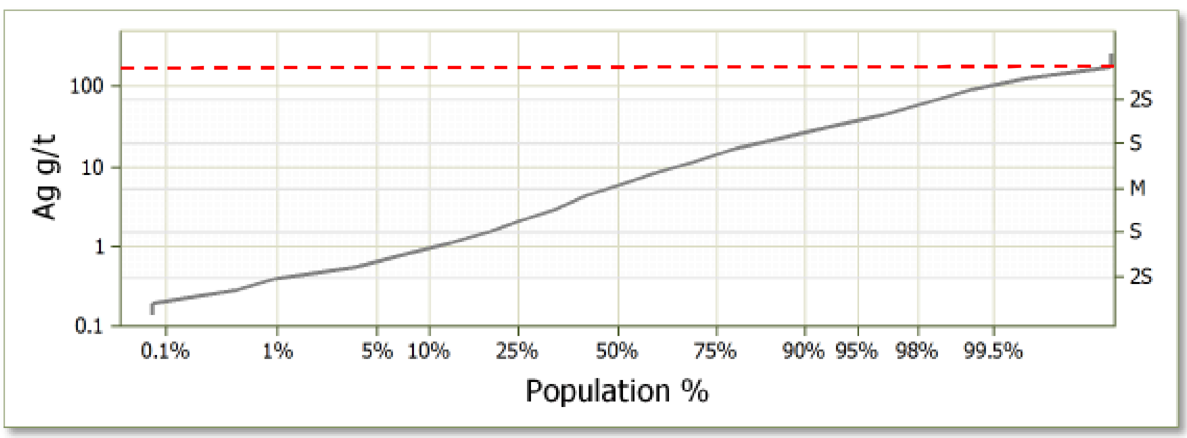


**Figure 14-3: Upper Limit Analysis Probability Plot Ag**

## 14.3 Compositing

Each drill hole and trench 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.

## 14.4 Mineral Zone Modeling

The Rodeo deposit is interpreted to be a highly silicified epi-thermal 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 deposit was first divided into two fault areas based on a fault hypothesized immediately west of the trenches striking parallel to the deposit. Intervals to the west of the high angle fault were labeled "west" and intervals to the east as "main". Following this division, intervals on the main side were domained initially by a broad domain of 0.1 g/t Au and above as a minimum boundary of mineralization, followed by a domain constraining 0.5 g/t Au grade population and above and finally a flat lying tubular domain containing the +1-2 g/t Au population. **Figure 14-4** shows the domains described above. The domains are listed in **Table 14-5**.

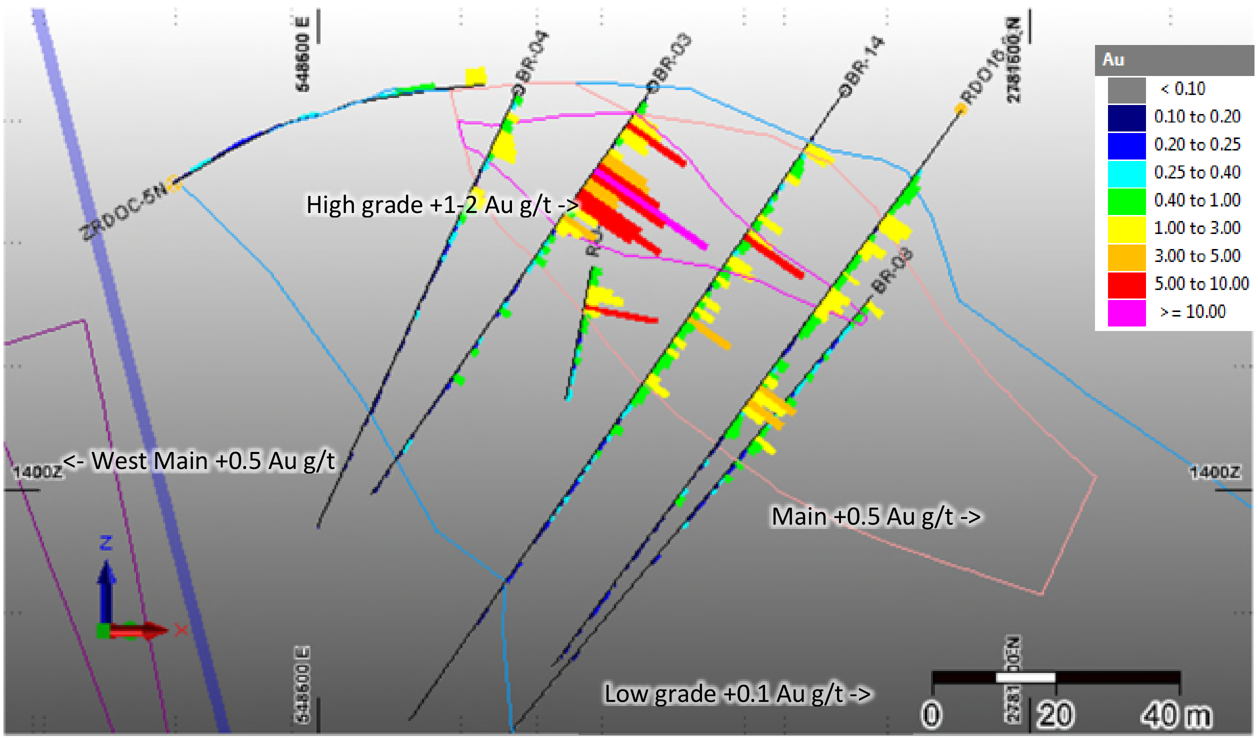


**Figure 14-4: Cross-Section Mineral Domains**

**Table 14-5: Mineral Domains**

| Area | Mineral Zone | Count | Au Mean | Au Variance | Ag Mean | Ag Variance |
|---|---|---|---|---|---|---|
| All | All | 2874 | 0.69 | 2.4 | 10.91 | 273.2 |
| Main | High | 326 | 2.8 | 13.83 | 10.8 | 103.73 |
| Main | Main | 451 | 0.81 | 0.55 | 12.06 | 341.32 |
| Main | Low | 1736 | 0.31 | 0.19 | 10.9 | 301.67 |
| West | Main | 189 | 0.54 | 0.38 | 9.72 | 233.62 |
| West | 1 | 93 | 0.35 | 0.06 | 11.73 | 273.64 |
| West | 2 | 31 | 0.38 | 0.12 | 5.43 | 31.73 |
| West | 4 | 48 | 0.39 | 0.08 | 7.76 | 44.64 |

**Figure 14-5** is a box and whisker plot comparing the population statistics of the resulting domains.

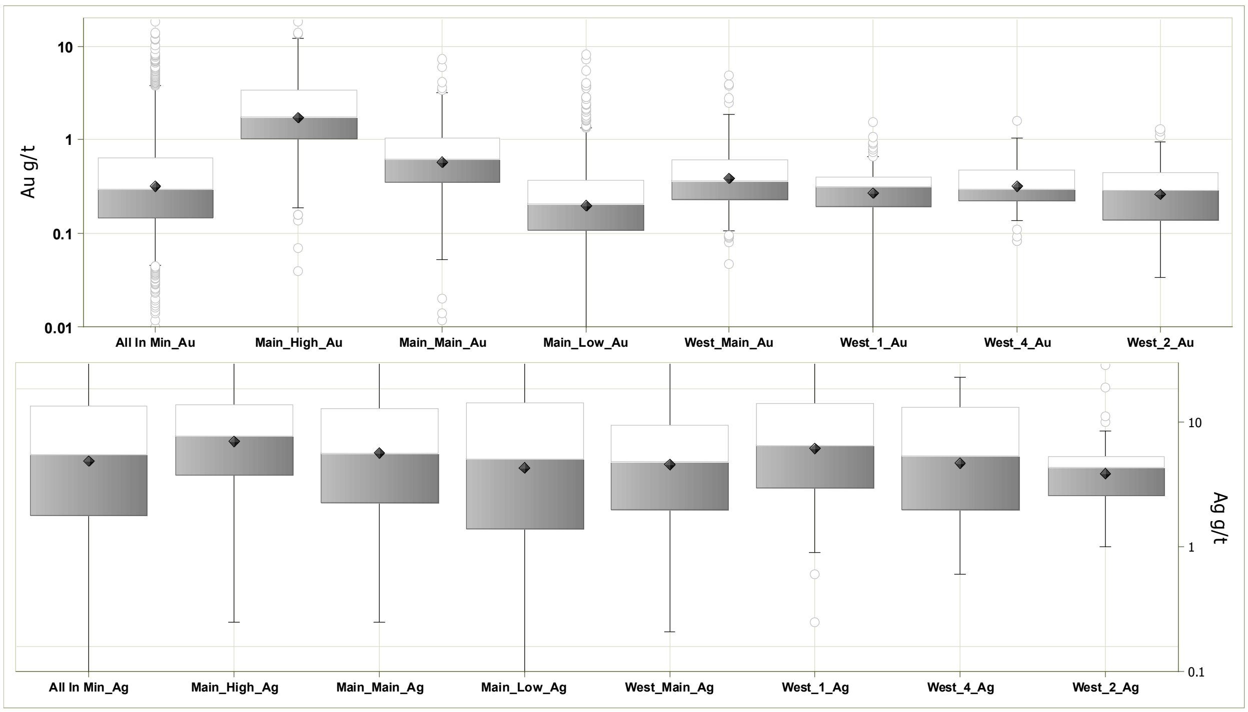


**Figure 14-5: Box and Whiskers Mineral Domains**

### *14.4.1 Density Determination*

Minera Cordilleras' geologists have made 488 measurements of core using the hanging in air and hanging in water method, the core was not coated.

Measurements within the mineral zones were evaluated for each domain and also 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 used to define blocks within the mineralization and a value of 2.41 g/cm$^3$ was used to define waste. **Figure 14-6** shows the measurements plotted in a box plot.

The samples were sourced from five holes drilled by Minera Cordilleras in 2016; holes: RDO16-01, 02, 04, 08, and 10. At present the dataset provides adequate coverage but does not allow for 3D modeling of SG. Additional samples to facilitate 3D modeling of SG is recommended.

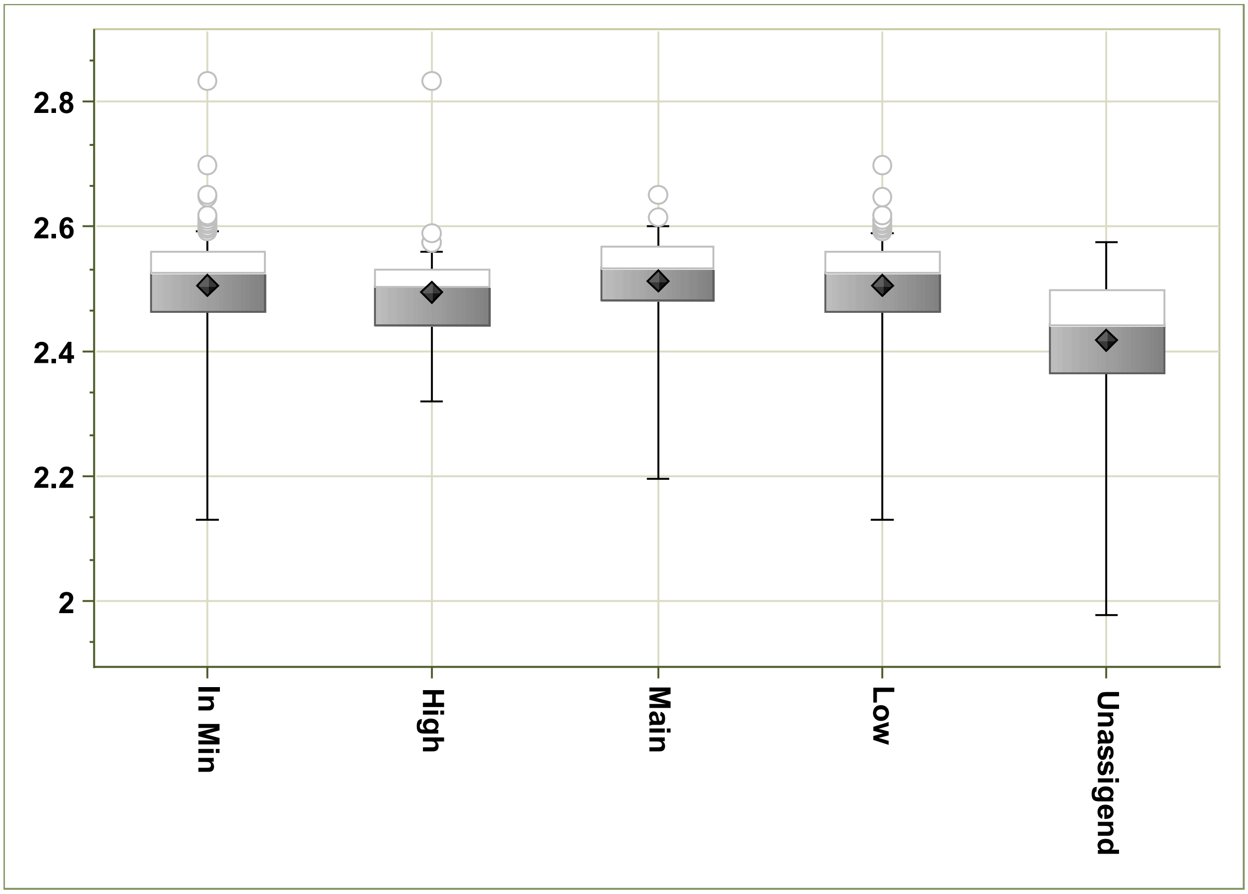


**Figure 14-6: Box and Whiskers Density Measurements**

## 14.5 Estimation Methods and Parameters

Resources have been estimated for the Rodeo deposit using a block model rotated to fit the deposit strike. Sub-blocking was used within the single high-grade domain only. Au and Ag grades have been estimated using Ordinary Kriging on parent blocks independently within and also outside of wireframe constrained domains.

### *14.5.1 Variography and Search*

Search orientation and preliminary experimental variography was explored through semivariogram mapping. Composites in the main area that are within any of the three mineral zones were used as input data for the analysis. **Figure 14-7** and **Figure 14-8** show the resulting semivariogram maps for strike and dip. In the figures cooler colors represent lower semi variance, meaning better correlation.

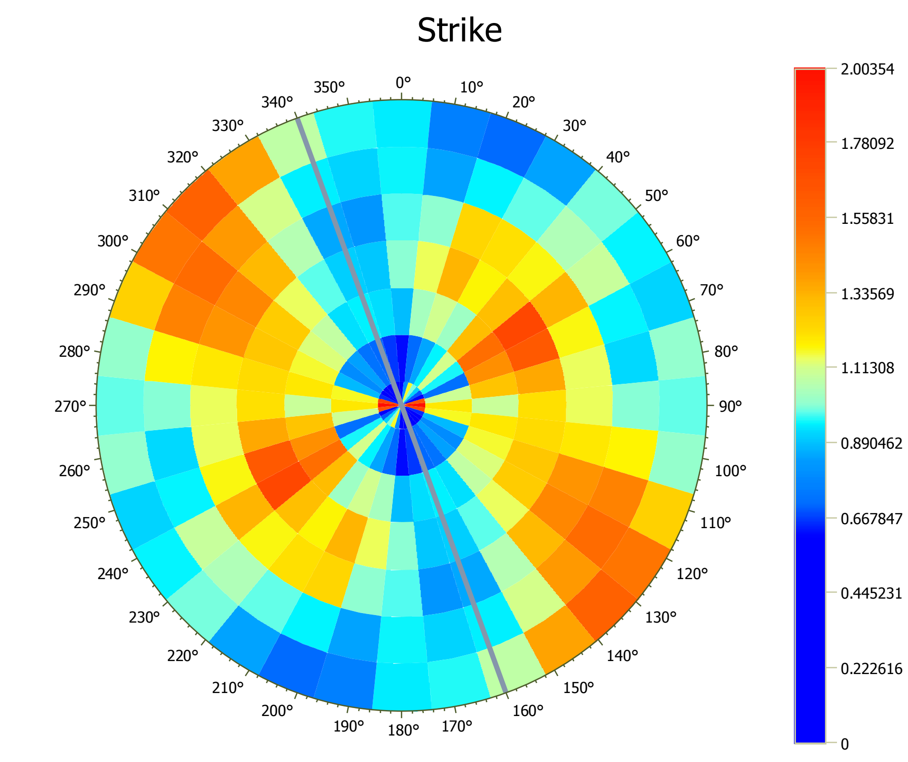


**Figure 14-7: Semivariogram Map Strike**

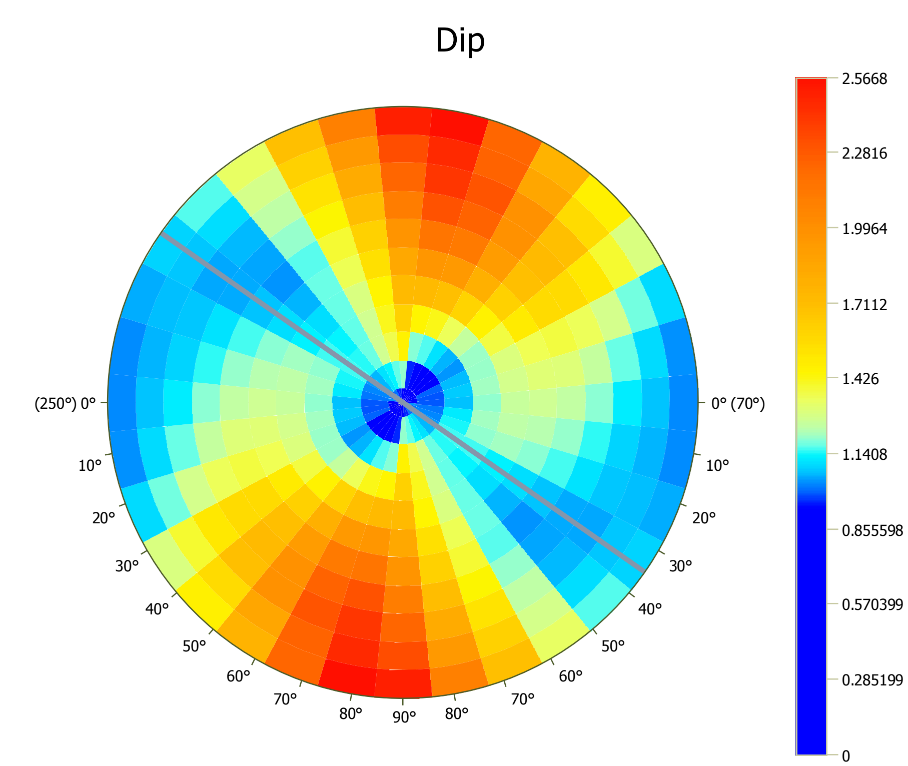


**Figure 14-8: Semivariogram Map Dip**

Down hole semivariograms were used to establish the nugget, **Figure 14-9**, and omnidirectional variograms were used to optimize the bin spacing.

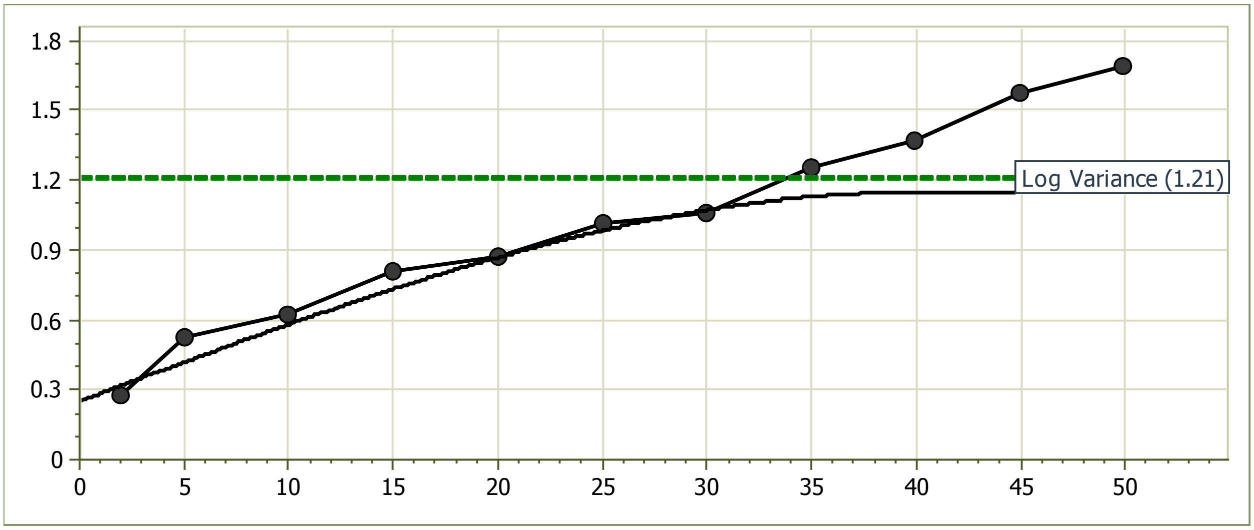


**Figure 14-9: Natural Log Transformed Downhole Variography Au**

Orientations determined from the semivariogram maps were used as inputs for semivariogram modeling. The grade distance relationship was investigated for Au and Ag using natural log transformed directional variography on composited intervals. Experimental and modelled semivariograms for Au and Ag are shown in **Figure 14-10** and **Figure 14-11**, **Table 14-6** details the modelled components. Nugget and sill portions have not been relativized to a total sill of 1 or 100% to correspond with the graphical output presented.

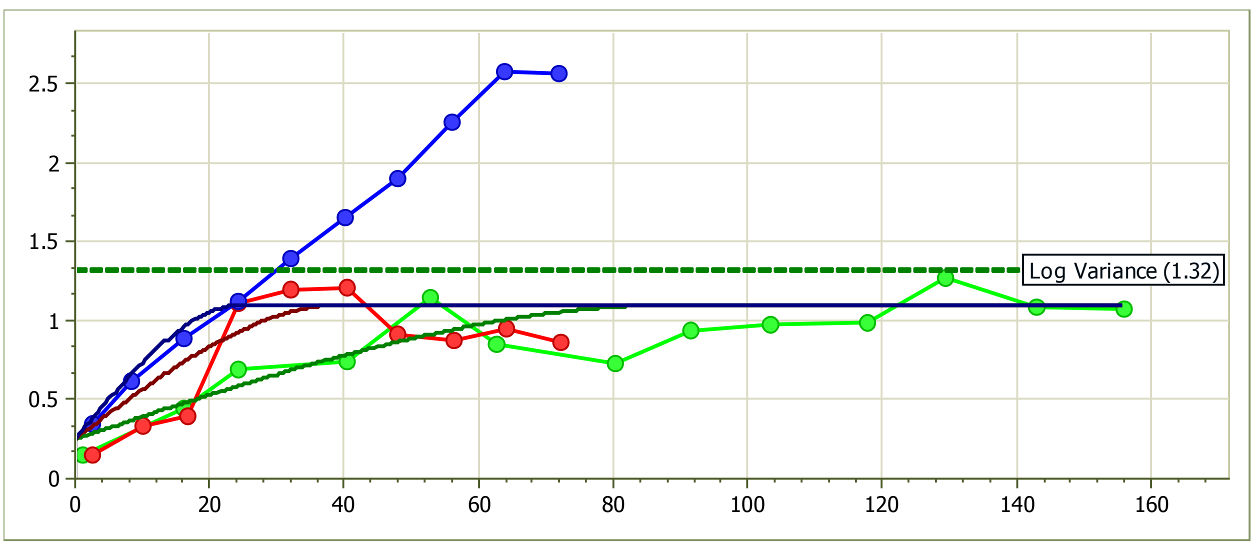


**Figure 14-10: Natural Log Transformed Directional Variography Au**

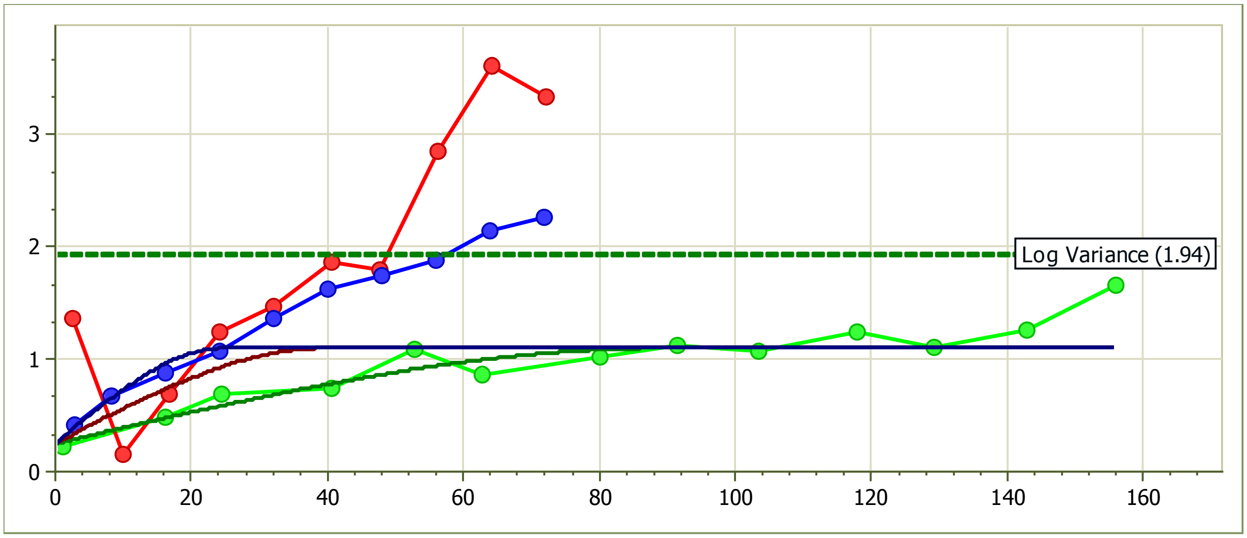


**Figure 14-11: Natural Log Transformed Directional Variography Ag**

**Table 14-6: Modelled Variograms**

| Element | Azi | Plunge | Fit Type | Nugget | Partial Sill | Range | Total Sill |
|---|---|---|---|---|---|---|---|
| Au Primary | 340 | 0 | Spherical | 0.25 | 0.85 | 90 | 1.1 |
| Au Secondary | 70 | 35 | Spherical | 0.25 | 0.85 | 40 | 1.1 |
| Au Tertiary | 250 | 55 | Spherical | 0.25 | 0.85 | 25 | 1.1 |
| Ag Primary | 340 | 0 | Spherical | 0.25 | 0.85 | 90 | 1.1 |
| Ag Secondary | 70 | 35 | Spherical | 0.25 | 0.85 | 40 | 1.1 |
| Ag Tertiary | 250 | 55 | Spherical | 0.25 | 0.85 | 25 | 1.1 |

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 14-7**. The block model was sub-blocked only to the high-grade domain, the remaining blocks were assigned to domains based on the location of the block centroid relative to the domain wireframe.

**Table 14-7: Block Model Setup Parameters**

| Direction | Origin (Corner) | Block Size m | Length m | Blocks Parent | Rotation About (Clockwise) | Sub-Block Min |
|---|---|---|---|---|---|---|
| X | 548500 | 10 | 700 | 70 | - | 5 |
| Y | 2780980 | 20 | 700 | 35 | - | 10 |
| Z | 1200 | 10 | 300 | 30 | -30 | 2.5 |

Grade attributes were estimated in three passes from small to large. Estimation for Au and Ag were limited to the size of the original parent block. Multiple sub-blocks with the same original parent block share the same estimations for Au and Ag. Sub-blocks were not amalgamated following estimation. Au and Ag was independently estimated within each modeled domain. **Table 14-8** details the search ellipse sizes, and orientations along with sample selection criteria for each estimation pass.

**Table 14-8: Ordinary Kriging Pass Parameters**

| Area | Mineral Zone | Strike | Dip | Pitch | Radius m | Aniso 2nd | Aniso 3rd | Drill Hole Min | Samples /DH Max | Samples Min | Samples Max |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Main | High Grade | 340 | 35 | 0 | 90 | 0.6 | 0.2 | 2 | 3 | 4 | 7 |
| Main | Main | 340 | 35 | 0 | 30 | 0.6 | 0.25 | 2 | 2 | 6 | 12 |
| Main | Main | 340 | 35 | 0 | 60 | 0.6 | 0.2 | 1 | 2 | 3 | 12 |
| Main | Main | 340 | 35 | 0 | 90 | 0.6 | 0.1 | 1 | 2 | 3 | 12 |
| Main | Main | 340 | 35 | 0 | 200 | 0.6 | 0.1 | 1 | 2 | 2 | 12 |
| Main | Low Grade | 340 | 35 | 0 | 100 | 0.6 | 0.25 | 1 | 2 | 3 | 12 |
| Main | Low Grade | 340 | 35 | 0 | 150 | 0.6 | 0.1 | 2 | 2 | 2 | 12 |
| Main | Low Grade | 340 | 35 | 0 | 250 | 0.6 | 0.1 | 1 | 2 | 4 | 12 |
| Main | Unassigned | 340 | 35 | 0 | 300 | 0.6 | 0.5 | 1 | 2 | 3 | 6 |
| West | Main | 340 | 80 | 20 | 90 | 0.6 | 0.25 | 1 | 2 | 3 | 12 |
| West | Main | 340 | 80 | 20 | 200 | 0.6 | 0.1 | 2 | 2 | 2 | 12 |
| West | 1 | 340 | 80 | 20 | 90 | 0.6 | 0.25 | 1 | 2 | 3 | 12 |
| West | 1 | 340 | 80 | 20 | 200 | 0.6 | 0.1 | 2 | 2 | 2 | 12 |
| West | 2 | 340 | 80 | 20 | 90 | 0.6 | 0.25 | 1 | 2 | 3 | 12 |
| West | 2 | 340 | 80 | 20 | 200 | 0.6 | 0.1 | 2 | 2 | 2 | 12 |
| West | 4 | 340 | 80 | 20 | 90 | 0.6 | 0.25 | 1 | 2 | 3 | 12 |
| West | 4 | 340 | 80 | 20 | 200 | 0.6 | 0.1 | 2 | 2 | 2 | 12 |
| West | Unassigned | 160 | 25 | 0 | 300 | 0.6 | 0.5 | 1 | 2 | 3 | 6 |

### *14.5.2 Mineral Resource Classification*

Mineral resource classification was established by evaluating the drill hole spacing of the composites and the distance to the nearest composite from a block. All blocks were initially classified as inferred. Following estimation, blocks greater than 90 m to the composite were set to zero Au and Ag. The remaining blocks were eligible for classification to indicated. Blocks were flagged as indicated that fell within an indicated triangulation. To construct the triangulation, the block model was filtered for blocks less then 25m to the nearest sample. The average drill hole spacing within the constructed triangulation is 13 m. **Figure 14-12** shows an example cross-section with block distance to the nearest composite, composite drill hole spacing and the boundary of the indicated classification triangulation. **Figure 14-13** shows a stacked histogram of block distance to the nearest composite for indicated and inferred blocks. **Figure 14-13** shows all blocks in the model, further classification refinement is made when the blocks are constrained by the pit shell optimization, blocks outside of both the base case and alternative case pit shell optimization are not considered resource.

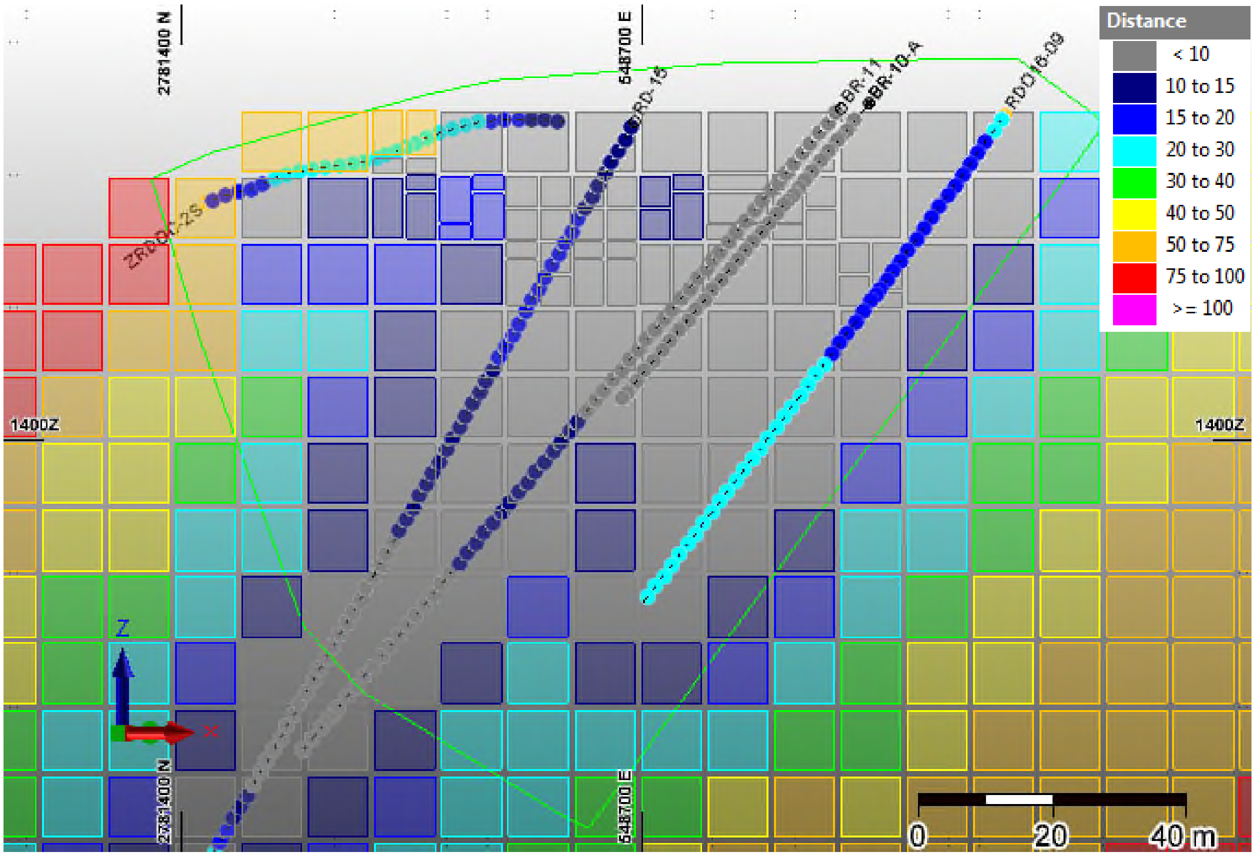


**Figure 14-12: Drill Hole Spacing and Distance to Nearest Composite**

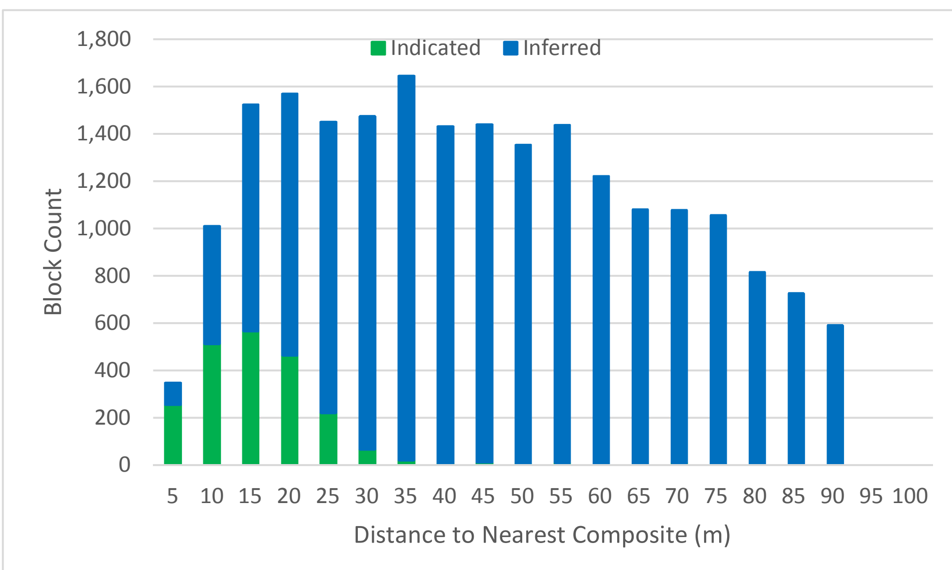


**Figure 14-13: Block Classification Distance to Nearest Composite**

### *14.5.3 Cutoff Grade and Pit Shell Optimization*

Cutoff grade has been calculated as Au equivalent accounting for Au and Ag grade and recovery, as well as reasonable cost and metal prices assumptions.

The base and alternative case cutoff grade was determined using the three-year trailing average prices for Au and Ag, through December 2016, and set slightly below the calculated three-year trailing average as mandated by the United States Securities and Exchange Commission (SEC).

Estimated blocks were constrained to two pits using the Lerch Grossman algorithm, the first representing the base trucking and mill cyanidation case and the second an onsite heap leaching case. The cutoff grade was applied to the blocks within both pit optimization case with the assumptions shown in **Table 14-9**.

**Table 14-9: Cutoff Grade and Pit Optimization Assumptions**

| Assumption | Base Case | Alternative Case |
|---|---|---|
| Process Type | Mill Cyanidation | Onsite Heap Leach |
| Au Price $/troy ounce | 1,220 | 1,220 |
| Ag Price $/troy ounce | 17 | 17 |
| Metallurgical Recovery Au | 77% | 60% |
| Metallurgical Recovery Ag | 90% | 70% |
| Mining $/T Material | 7.5 | 3.4 |
| Process $/T Resource | 30 | 3.1 |
| Pit Slope | 45° | 45° |
| Sell Cost $/troy ounce | 10 | 10 |
| Mining Dilution/Recovery | 1%/98% | 1%/98% |
| Cutoff Grade $/T | 32.5* | 6.5 |
| **Cutoff Grade AuEq** | **0.85*** | **0.17** |

(*) Cutoff only includes truck and process costs.

Three-dimensional views of the resulting pit shell optimizations are shown at the same scale and vantage point, looking to the northeast from above, the base case in shown in **Figure 14-14** and the alternative case in **Figure 14-15**.

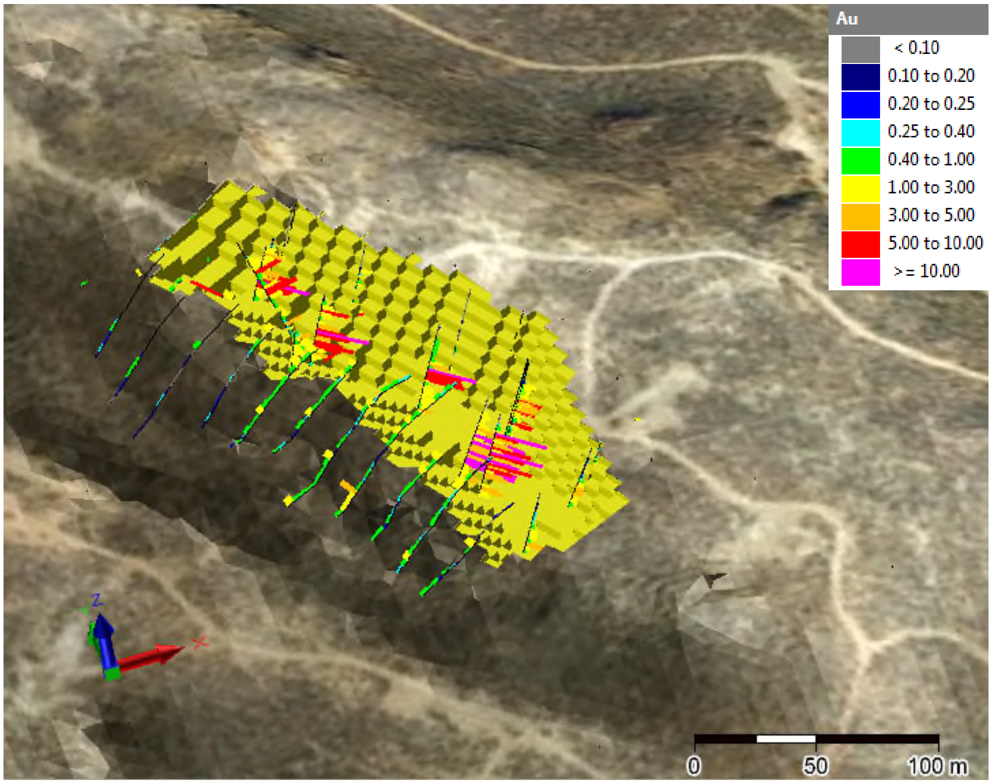


**Figure 14-14: 3D View Optimized Pit Shell and Au Drill Hole Intervals Base Case**

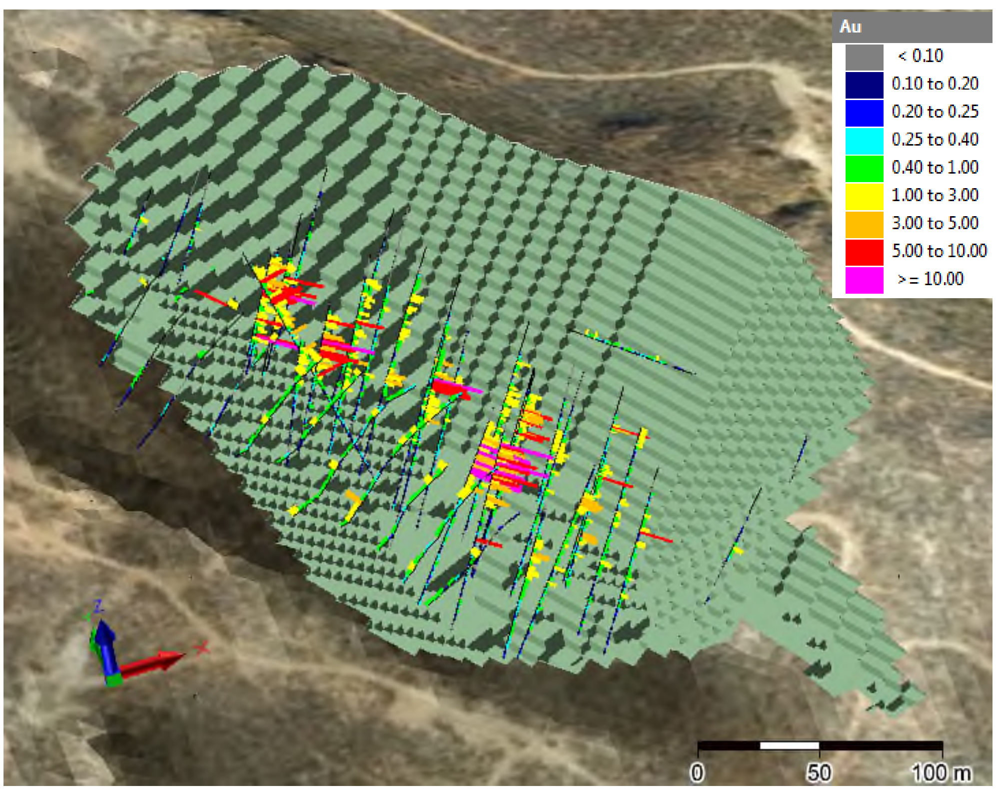


**Figure 14-15: 3D View Optimized Pit Shell and Au Drill Hole Intervals Alternative Case**

## 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 respects the input data. Verification figures have been included below.

**Figure 14-16** shows box and whiskers plots that compare the assay, composite, and block grade populations for both Au and Ag.

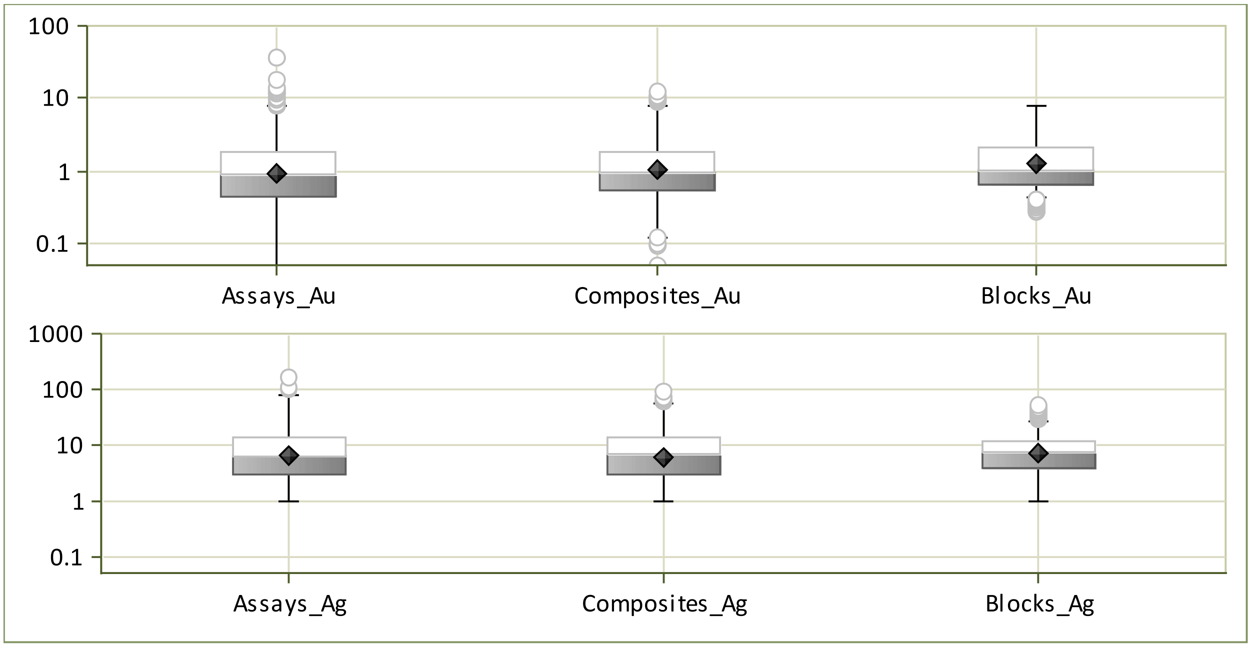


**Figure 14-16: Box Plot Population Comparison Au and Ag**

**Figure 14-17** shows swath plots for assay, composite, and block Au grades rotated to align with the strike of the deposit. **Figure 14-18** shows swath plots for assay, composite, and block Au grade rotated and inclined to fit the strike and the dip of deposit.

**Figure 14-19** shows an example cross-section of the resource model that includes drill hole data, the mineralized envelope boundaries, indicated resource classification boundary, resource pit constraints, and resulting Au block grades.

**Figure 14-20** shows an example cross-section of the distance from a block centroid to the nearest drill hole composites in reference to the indicated resource classification boundary.

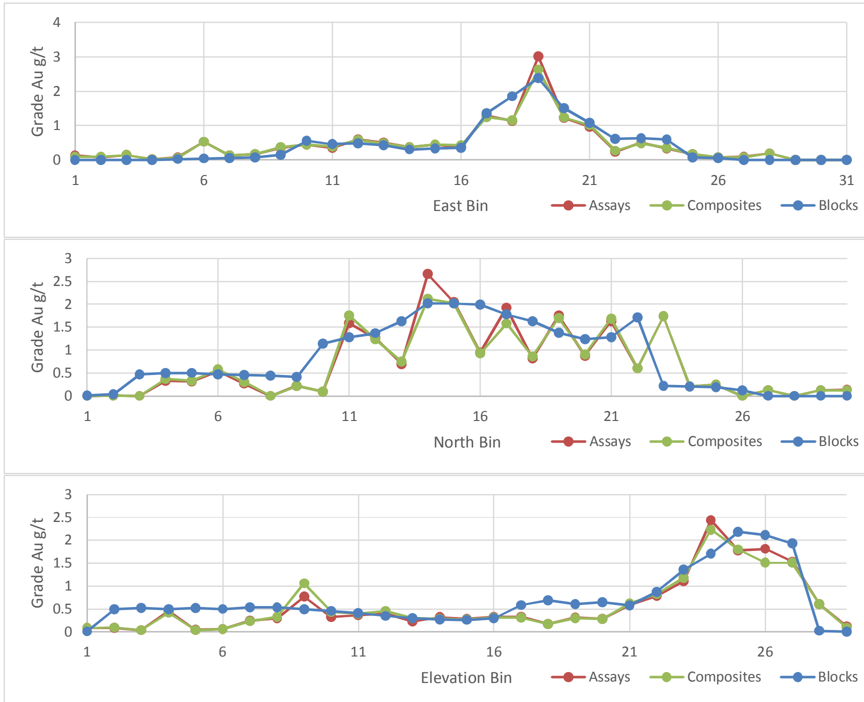


**Figure 14-17: Swath Plots Au - Orthogonal**

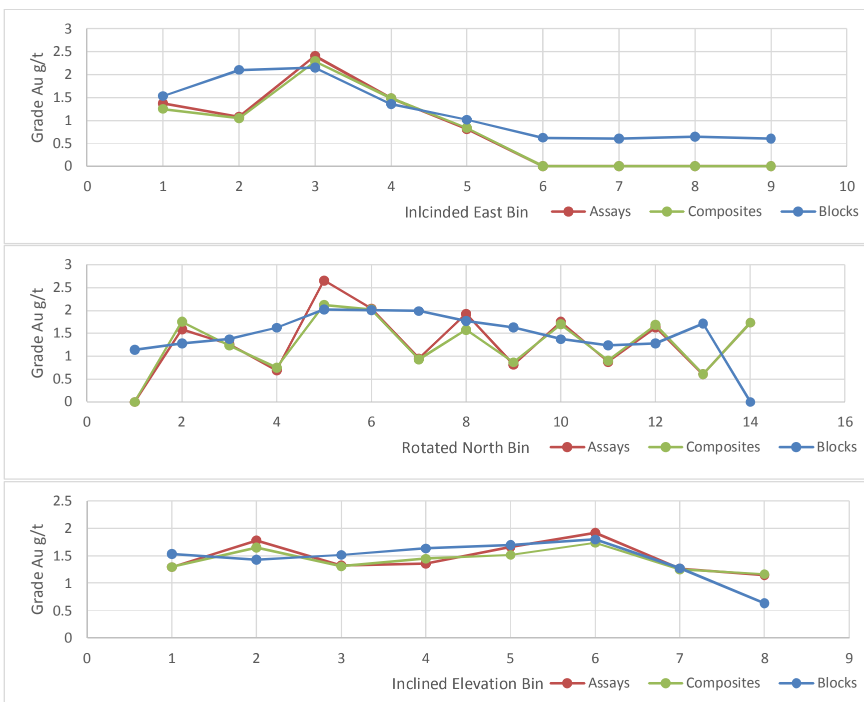


**Figure 14-18: Swath Plots Au – Strike and Dip Aligned**

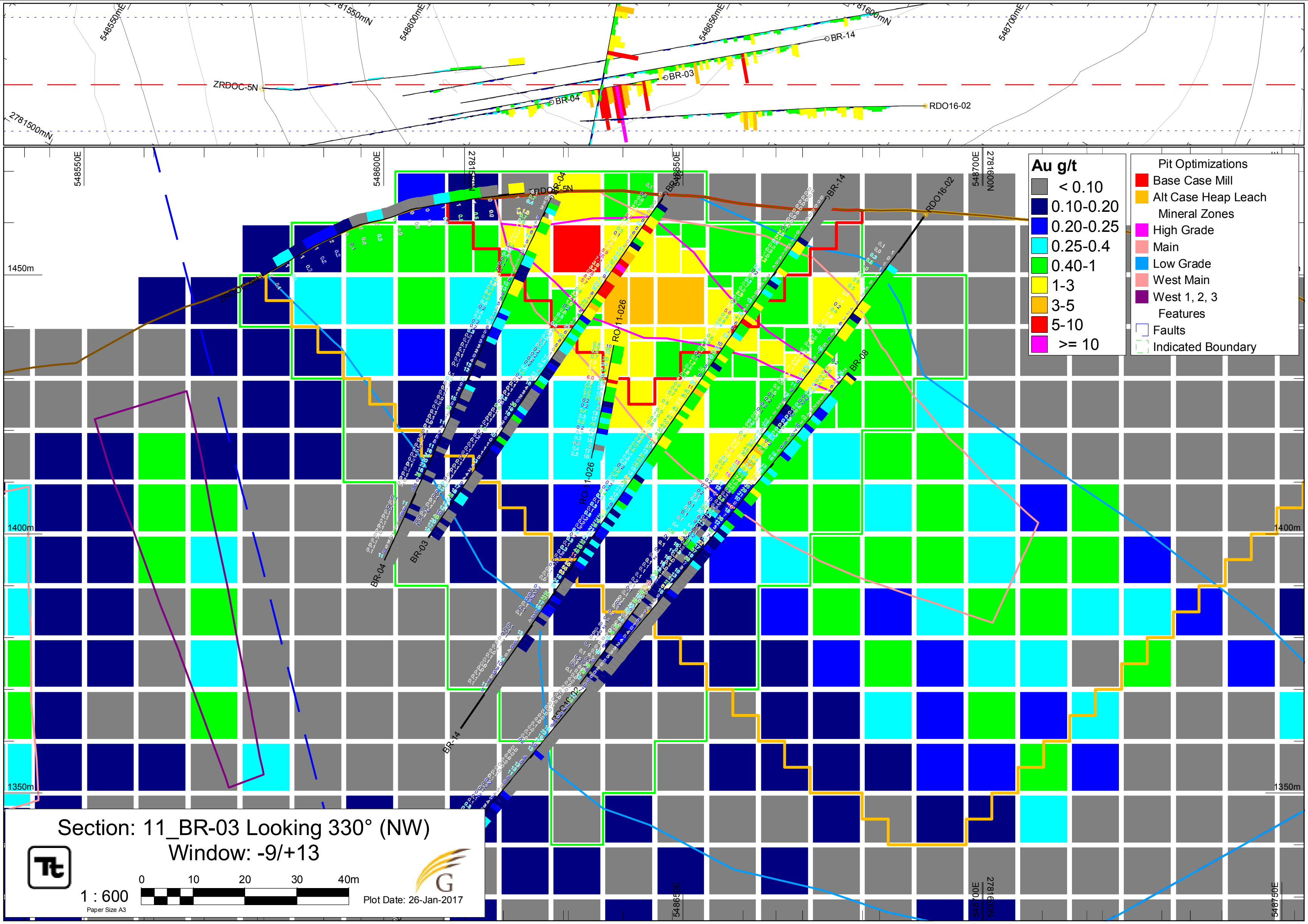


**Figure 14-19: Cross-Section 11_BR-03 Au**

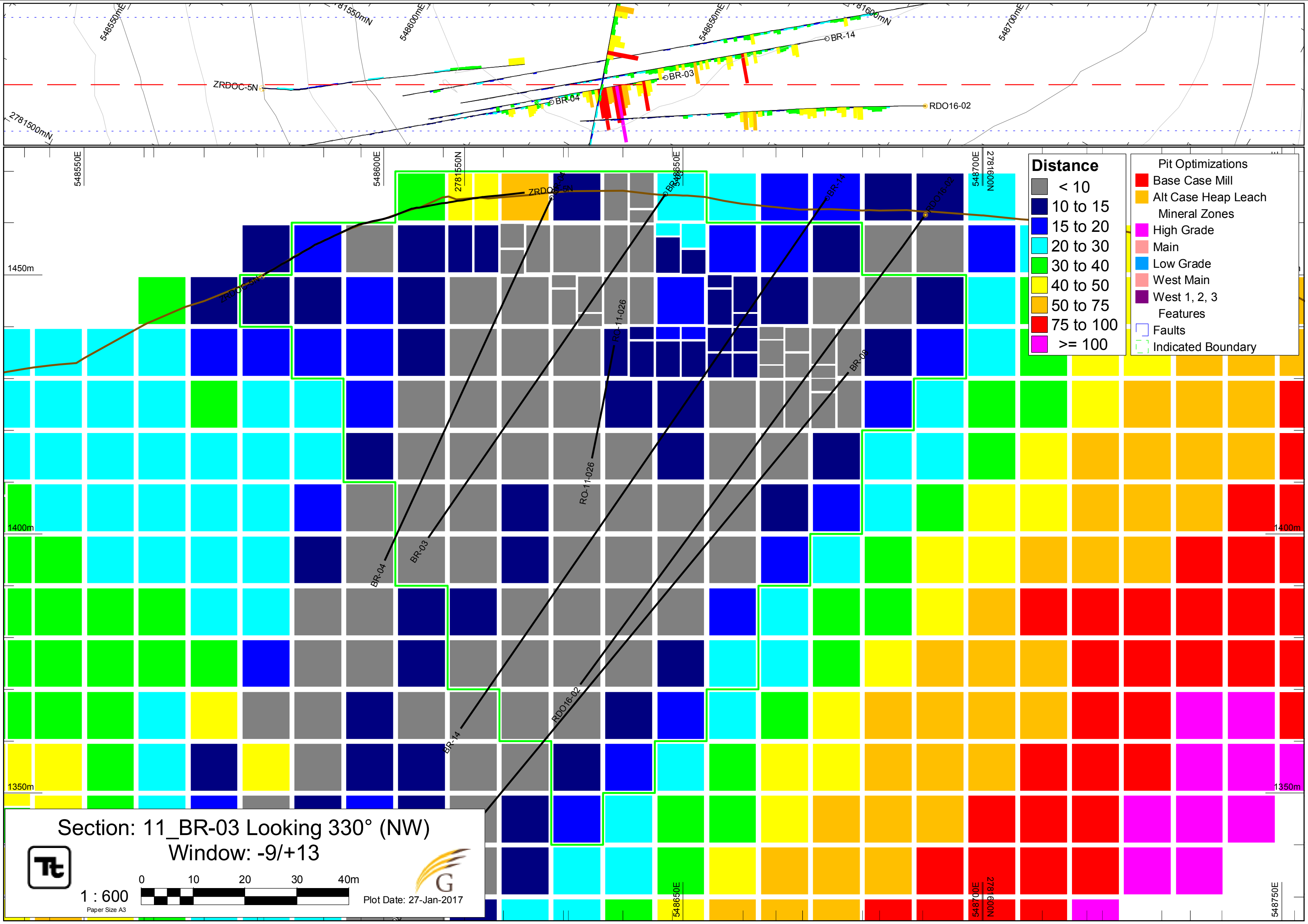


**Figure 14-20: Cross-Section 11_BR-03 Distance to Nearest Composite**

## 14.7 RELEVANT FACTORS

The inferred resources are primarily extrapolated down-dip from drill hole intersections. The down-dip extension of the deposit has not been observed and there is no known geologic reason why the mineralization would terminate before the Rodeo fault to the East. Additional down-dip drilling could alter the current estimation of inferred resources. Additional drilling is recommended to demonstrate the down-dip continuation of the mineralization. Additional infill drilling could lead to improved understanding of stockwork veining and preferred mineralization horizons which could alter the interpretation of the mineralizing controls and the estimation of resources.

The mining and processing costs used to constrain the resources by a pit shell are generalized industry costs. Mining, metallurgical, and geotechnical studies could materially alter the costs used to generate the pit constraints either positively or negatively.

There are no additional environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that the author of this report is aware of that could materially affect the mineral resource estimate. The project is not considered an advanced property; therefore many of the above factors require further investigation. It is possible that, with detailed investigation, complications with any or all of the above mentioned factors could arise, but currently no material complications are known.

Sections 15 through 22 apply to advanced properties only and have not been addressed in this report.

**15.0** Mineral Reserve Estimates

**16.0** Mining Methods

**17.0** Recovery Methods

**18.0** Project Infrastructure

**19.0** Market Studies And Contracts

**20.0** Environmental Studies, Permitting and Social Or Community Impact

**21.0** Capital And Operating Costs

**22.0** Economic Analysis

# 23.0 ADJACENT PROPERTIES

As a result in the reduction of the Rodeo and Rodeo 2 concession boundary no relevant properties are adjacent to the project.

# 24.0 OTHER RELEVANT DATA AND INFORMATION

Relevant data and information has been included within the respective sections.

# 25.0 INTERPRETATION AND CONCLUSIONS

Drill hole and trench samples have been collected and analyzed using industry standard methods and practices and are sufficient to characterize grade and thickness and support the estimation of mineral resources. Given the grade and tonnage of the mineral resources estimated as part of this report, it is recommended the project be advanced to the preliminary economic assessment (PEA) study stage.

The Rodeo project and deposit have several attributes that are beneficial and provide unique opportunities for Golden Minerals and justify further investigation by way of a Preliminary Economic Analysis:

- The Project is located in a jurisdiction familiar with mining. Local permitting authorities and the community are accustomed to mine development and the potential economic benefits;

- Opportunities exist for project development plans to include existing milling facilities owned by Golden Minerals. The deposit is within trucking range of Golden Mineral's cyanidation plant located at the Velardeña mine. This benefit is unique and potentially strategic for Golden Minerals;

- The highest grade portion of the resource is near surface and offers opportunities for potential project phasing, optimizations and tradeoffs; and

- Mineralization and indicator signatures have been observed throughout the claim area and much of the project area is untested by drilling or has been preliminarily drill tested on widely spaced centers. The Rodeo deposit has a relatively small footprint, the potential for additional discovery is good.

## 25.1 SIGNIFICANT RISK FACTORS

Project risks include:

- Only preliminary metallurgical studies have been completed for the Rodeo deposit resource material. Initially, the tests indicate Au and Ag recoveries for unground material could be very low. Details regarding cyanide consumption are unavailable;

- Mineral resources have been constrained by an optimized pit shell, however scoping study level costing for mining and processing have not been undertaken; and

- A pit shell constrained resource at a lower cutoff grade, assuming heap leaching, is supported by inferred resources.

# 26.0 RECOMMENDATIONS

Current estimation of resources indicate the Rodeo project warrants further advancement to the PEA study stage.

The following recommendations are made in context of the typical NI 43-101 project progression, from mineral resource to mineral reserves. The initial costs to follow that framework are summarized in **Table 26-1**.

**Table 26-1: Approximated Costs of Recommended Work**

| Recommendation | Quantity | Cost Range (thousands) |
|---|---|---|
| In Fill and Conversion Drilling | 2,000 m | $200-260 |
| Environmental Consultation | One Study | $50-75 |
| Metallurgical Testing | One Study | $25-50 |
| PEA | One Study | $75-150 |
| | **Total**: | **$350-535** |

## 26.1 Metallurgy and Process

Given the preliminary level of metallurgical testing, additional test work is recommended to confirm the assumptions used to inform the resource constraints. This test work should be performed on both low and high grade materials, and should initially focus on mineralogy and longer term leaching responses.

Prior to, or along with other leaching test work, a mineralogical evaluation should be performed on both low and high grade samples. This should provide a better understanding regarding the potential for, and extent of, any refractory conditions such as Au encapsulation in quartz or pyrite.

A 90 day minimum column leach test should be performed on low and high grade materials at a range of particle sizes typical of heap leaching operations. This is necessary to confirm the assumption that low grade material is less silicified and therefore more amenable to heap leaching. Additionally, this will also provide an indication of reagent consumptions, and allow for greater accuracy when evaluating the process OPEX. While the evaluation of lower grade material should be considered a priority, the results of this testing would also enable a more detailed evaluation of the high grade material's amenability to heap leaching in later test work.

Additional bottle roll testing should also be performed to confirm reagent consumptions as well as evaluate a minimum of 72 hours of leaching to evaluate if extractions were still increasing at 48 hours.

## 26.2 Environmental and Permitting

It is recommended that a local environmental consulting firm, experienced in the area of permitting and societal issues in the area, be retained to assist in baseline and background work that will be required as inputs into the feasibility and mine planning process. Additional work that shall be conducted, at a minimum, includes:

- Characterization of groundwater quality to include extracting samples from the sulfide zones of the mine;

- Surface water features and streams in the area of the mine should also be characterized for water quality to support continued mine planning for environmental concerns;

- A small number of core samples of both waste and mineralized rock should be submitted for initial static geochemical testing for acid base accounting (ABA);

- Preventive Notice (Informe Preventivo, or IP). At the beginning of the permitting process, SEMARNAT should visit the site to recommend whether an IP only, or an IP and an MIA will be needed. This report is intended to provide general information about the project and determine requirements of an MIA, and on what basis (regional or specific).

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# 28.0 DATE AND SIGNATURE PAGE

**CERTIFICATE OF AUTHOR**
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I Geoffrey Elson P.G., do hereby certify that:

a) I am currently employed by Tetra Tech located on 350 Indiana Street, Suite 500 Golden, Colorado 80401.
b) This certificate applies to the Technical Report titled "NI 43-101 Technical Report, Mineral Resource Estimate Rodeo Project, Rodeo, Durango, Mexico" (Technical Report), effective January 26, 2017, issued March 10, 2017.
c) I graduated with a bachelor's of science degree in geology from Michigan State University in 2006. I have worked as an exploration geologist and modeler continuously for nine years. I am a professional geologist in the State of Wyoming (#PG-3808) and a Registered Member of the Society for Mining, Metallurgy, and Exploration (SME) (#4168238). 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.
d) I visited and inspected the subject property on December 13$^{th}$ 2016.
e) I am responsible for all sections of this Technical Report that require responsibility.
f) I satisfy all the requirements of independence according to NI 43-101.
g) I have not had prior involvement with Golden Minerals on the property that is the subject of the Technical Report.
h) 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.
i) 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.
j) 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 March 10, 2017

"Geoffrey Elson P.G." - Signed
Signature of Qualified Person

Geoffrey Elson P.G.
Print name of Qualified Person