NI 43-101 Technical Report on the Mineral Resource Estimate of the El Quevar Project
Salta Province, Argentina

Prepared for: Argenta Silver Corp

Prepared by: Henry Kim, P. Geo.
Alan Drake, P.L. Eng.

Effective Date: September 30, 2024
Project No.: 262996

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CERTIFICATE OF QUALIFIED PERSON

Henry Kim, P.Geo.
Wood Canada Limited
111 Dunsmuir St, Suite 400
Vancouver, British Columbia, Canada V6B 5W3

I, Henry Kim, P.Geo., am employed as a Principal Resource Geologist with Wood Canada Limited.

This certificate applies to the technical report titled "NI 43-101 Technical Report on the Mineral Resource Estimate of the El Quevar Project, Salta Province, Argentina" with an effective date of September 30, 2024 (the "Technical Report").

I am registered as a Professional Geoscientist with Engineers and Geoscientists British Columbia. I graduated with a B.Sc. degree in geology from University of British Columbia in 2008. I completed the Applied Geostatistics Citation Program with the University of Alberta in 2014 and the specialized training cycle in mining Geostatistics with the Mines Paris and Geovariances in 2022.

I have practiced my profession for 16 years. I have been involved in exploration drilling programs involving core logging, sampling, QAQC, and database validation. I have conducted onsite grade control and management of mine operation crews for an open pit mine in eastern Canada. I have conducted audits and due diligence exercises on geological models, sampling databases, drill hole spacing studies, preparation of resource models, validation of mineral resource estimates, mineral resource estimates and conditional simulation studies on advanced mining studies, and active mine operations.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* (NI 43–101), for those sections of the Technical Report that I am responsible for preparing.

I visited the El Quevar property between September 24 and September 27, 2024.

I am responsible for Sections 1.1-1.5, 1.7-1.9, 1.11; Sections 2-12; Sections 14-24; Sections 25.1-25.4, 25.6, 25.7; Section 26 and Section 27 of the Technical Report.

I am independent of Argenta Silver Corp as independence is described by Section 1.5 of NI 43-101.

I have had no previous involvement with the El Quevar property.

I have read NI 43-101, and the sections of the Technical Report that I am responsible for have been prepared in compliance with that Instrument.

As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I am responsible for preparing contain all scientific and technical information that is required to be disclosed to make those sections of the Technical Report not misleading.

"signed and stamped"

____

Henry Kim, P.Geo.

Dated: October 16, 2024

CERTIFICATE OF QUALIFIED PERSON

Alan Drake, P.L.Eng.
Wood Canada Limited
111 Dunsmuir St, Suite 400
Vancouver, British Columbia, Canada V6B 5W3

I, Alan Drake, P.L.Eng., am employed as a Principal Metallurgist with Wood Canada Limited.

This certificate applies to the technical report entitled "NI 43-101 Technical Report on the Mineral Resource Estimate of the El Quevar Project, Salta Province, Argentina" with an effective date of September 30, 2024 (the "Technical Report").

I am a Professional Licensee Engineering with Engineers and Geoscientists British Columbia. I graduated from the Technicon Witwatersrand with a National Higher Diploma in Extraction Metallurgy in 1993.

I have practiced my profession for 31 years. I have been directly involved in metallurgical plant operations, process design, construction and commissioning of minerals processing and hydrometallurgical facilities for base and precious metals.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* (NI 43–101), for those portions of the Technical Report that I take responsibility.

I am responsible for Sections 1.1, 1.2, 1.6, 1.8, 1.10, 1.11; Section 2; Section 3; Section 12.1, 12.3; Section 13; Section 25.1, 25.5, 25.8; Sections 26.1, 26.3, 26.4; and Section 27 of the Technical Report.

I am independent of Argenta Silver Corp as independence is described by Section 1.5 of NI 43–101.

I have had no previous involvement with the El Quevar property.

I have read NI 43–101, and the parts of the Technical Report that I am responsible for have been prepared in compliance with that Instrument.

As of the date of this certificate, to the best of my knowledge, information and belief, the parts of the Technical Report that I am responsible for preparing contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

"signed and stamped"

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Alan Drake, P.L.Eng.

Dated: October 16, 2024

Important Notice

This report was prepared as a National Instrument 43-101 technical report for Argenta Silver Corp. (Argenta) by Wood Canada Limited (Wood). The quality of information, conclusions, and estimates contained herein is consistent with the terms of reference, constraints and circumstances under which the Report was prepared by Wood and are based on i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this Report.

This Report is intended to be used by Argenta subject to terms and conditions of its contract with Wood. That contract permits Argenta to file this Report as a technical report with Canadian securities regulatory authorities pursuant to provincial and territorial securities law. Except for the purposes legislated under Canadian provincial and territorial securities law, any other use of this Report by any third party is at that party's sole risk.

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1.0 SUMMARY

1.1 Introduction

Wood Canada Limited (Wood) has prepared a current technical report (the Report) under National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) for Argenta Silver Corp (Argenta) on the Mineral Resource estimate for the El Quevar property (the Project) located in the Salta Province of Argentina.

The Project is located in northwestern Argentina, approximately 300 km northwest of the provincial capital of Salta, within the San Antonio de los Cobres municipality, Salta Province. Figure 1-1 shows the location of the El Quevar property.

1.2 Terms of Reference

The Report was prepared for Argenta (formerly known as Butte Energy Inc.) to support their application to the TSX Venture Exchange to obtain their approval under exchange policy for the acquisition of the El Quevar property by purchasing 100% of the issued and outstanding shares of Silex Argentina S.A. (Silex Argentina), a wholly owned subsidiary of Golden Minerals Company that owns the Property. The terms of the deal were provided in the September 27, 2024 news release entitled "Butte Executes Definitive Agreement to Acquire El Quevar Silver Project". The Report is expected to be filed on SEDAR+ by Argenta in support of their first-time disclosure of the Mineral Resource estimate on the El Quevar property.

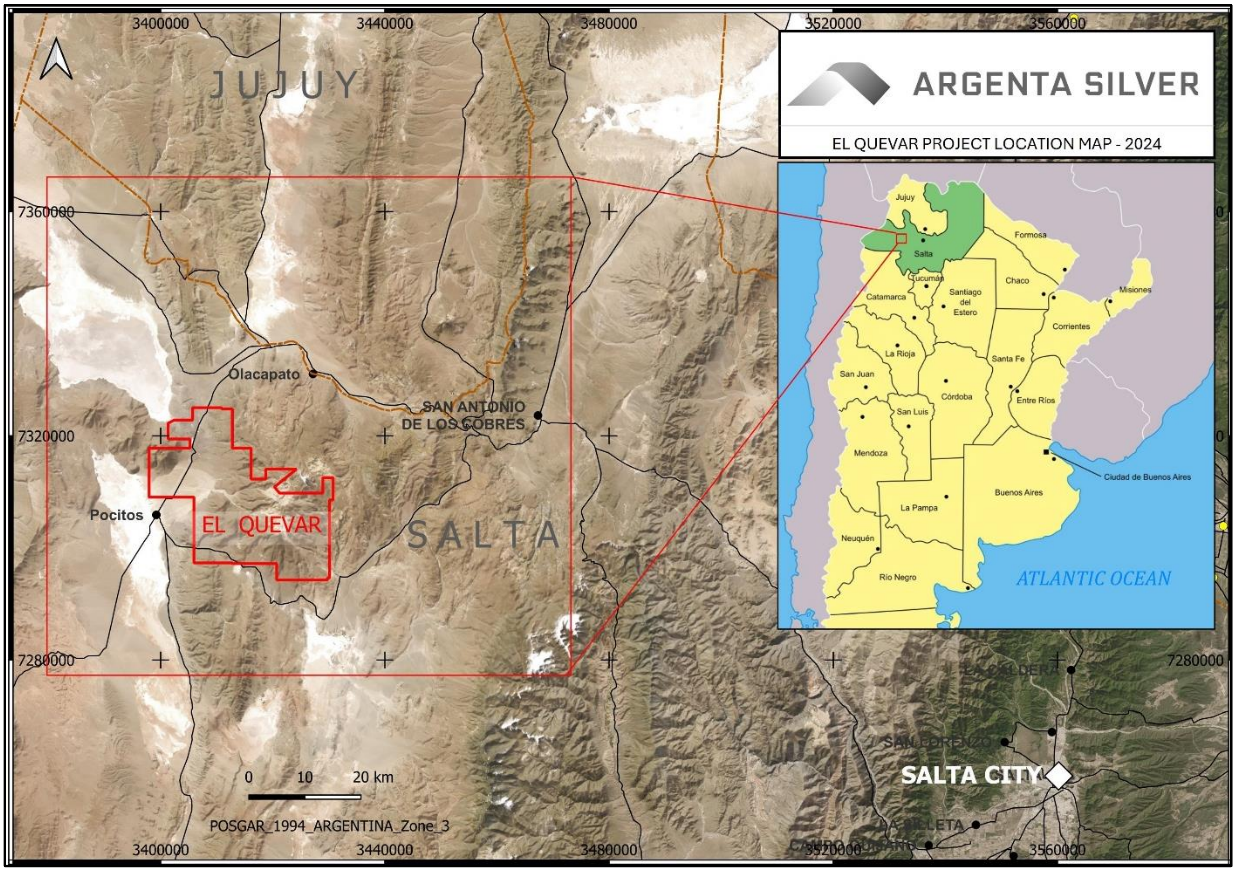
The Mineral Resource estimates were prepared in accordance with the 2019 CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines and reported in accordance with the 2014 CIM Definition Standards.

Measurement units used in this Report are metric and currency is expressed in US dollars (US$), unless stated otherwise. The Argentinean currency is the Argentine peso (AR$).

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

The El Quevar Property consists of 31 exploitation concessions totaling approximately 57,000 ha (Property). Providing certain obligations are met, including annual canon payments, the concessions are granted indefinitely. Concessions are held in the name of Silex Argentina S.A. (Silex Argentina), a wholly indirectly-owned subsidiary of Golden Minerals Company (Golden Minerals).

Figure 1-1: Property Location



Source: Argenta, 2024

Surface rights at the Property are owned by the province of Salta, and as a result there are no agreements required for access. The El Quevar area has no existing private properties or other infrastructure that would limit exploration activities. Silex Argentina holds seven easements, granted by the Province of Salta, which cover items such as, road access, power, water, and the camp and other infrastructure sites.

A 1% net smelter return (NSR) royalty is payable to Cascadero Minerals SA on the value of all minerals extracted from: the El Quevar II concession; and a 1% NSR royalty on one-half of the minerals extracted from the Castor concession. Silex Argentina can purchase one half of the combined royalty interests for $1 million in the first two years of production.

A 3% NSR provincial royalty is payable to the province of Salta based on the mine mouth value of minerals extracted from any of the concessions less costs of mineral processing and sale.

1.4 Geology and Mineralization

The Property is located along the southern margin of the Andean Central Volcanic Zone, within the Quevar volcanic complex (QVC). The QVC sits within a northeast-trending belt of Quaternary stratovolcanoes and associated domes. The Yaxtché deposit has been identified within the Quevar South alteration zone.

In the Yaxtché deposit area, an epiclastic unit consisting of a matrix-supported volcanic breccia is intruded by a complex of porphyritic dacite domes and associated breccias and flows.

The Yaxtché structural trend, a series of northeast–southwest-trending structure, has been interpreted to represent a listric fault.

Alteration exists, typical of that expected to occur with high-sulphidation epithermal deposits.

Silver mineralization at Yaxtché consists of as disseminations, open-space filling, and in massive veinlets or clots. Silver is the element of economic significance, and anomalous concentrations of copper, lead, zinc, and lesser gold occur locally. Mineralization exists as oxide (supergene), mixed (secondary enrichment), sulphide (hypogene).

The Yaxtché deposit remains open along strike and several areas adjacent to the resource estimate area have returned significant silver intercepts. Deeper drill holes at Yaxtché West extension show that significant widths and grades of silver mineralization continue down plunge on the Yaxtché trend.

Within the greater Quevar South project area, several additional prospects have been identified and remain to be fully tested.

1.5 Drilling, Sampling and Data Verification

Apex Silver and Golden Minerals completed drill campaigns from 2006–2020. These programs total 414 holes for 102,720 m.

Core has primarily been drilled at HQ size (63.5 mm core diameter). Occasional reductions to NQ size (47.6 mm) occurred in areas of poor ground conditions. Two drill holes of PQ size (85 mm diameter) were completed in 2011.

Geological logging included recording mineralization, alteration and alteration intensity, core recovery, rock quality designation (RQD) and mechanical and physical fracture frequency on the log sheet. Core was photographed.

Between April and August of 2012, 113 drill holes in the Yaxtché zone were re-logged on 29 cross sections spaced about 50 m apart, spanning the Yaxtché area. The purpose of the re-logging program was to standardize logging codes and facilitate reinterpretation of the Yaxtché deposit.

Portions of the core that were visually identified as being inside the mineralized zone were sampled, and 2 to 3 m shoulder was sampled on either side of the mineralized zone. Generally, the core sample intervals were a nominal 1 m length within the mineralized zone but could be longer or shorter due to a lithological boundary. Outside the mineralized zone, samples were typically 2 m in length.

Laboratories used during the drill and sampling campaigns were independent of Apex Silver and Silex Argentina with analysis typically completed on a full suite of elements. Early analytical programs relied upon the internal Alex Stewart laboratory QA/QC program as no independent quality assurance/quality control was in place. The QA/QC program instigated by Apex Silver use blanks, duplicates, and standard reference samples (SRMs). The sampling completed under Silex Argentina continued with the same insertion rates and materials as the Apex Silver programs.

Sample security procedures met industry standards at the time. Sample storage procedures are consistent with industry standards.

A site visit was conducted by the geology qualified person (QP) in September 2024.

1.6 Metallurgical Testwork

Initial testwork on the Yaxtché deposit was commissioned by Apex Silver in 2008 on sample composites from oxide, mixed supergene, and deeper sulphides. In 2009, Silex Argentina continued the metallurgical testwork to develop technical parameters and inputs for resource estimation.

Between 2008 and 2012 testwork was focused on sulphide mineralization from the underground portions of the deposit. Tests centred on optimizing sulphide flotation for composite samples from the Yaxtché West which concluded that acceptable silver recoveries could be obtained by flotation using commercially-available reagents.

High variabilities in silver recovery by flotation were noted from composites across the Yaxtché deposit indicating changes in silver minerology. Additional mineralogical and metallurgical testwork needs to be completed to identify the specific silver minerals in order to optimize the processing results.

There also seems to be a change in material hardness and abrasiveness across the deposit zones which should be investigated in future studies.

The assumed process method is selective rougher and cleaner flotation to produce a bulk silver concentrate. Although the implementation of cyanide leaching was not considered in this project analysis, it is recommended that economic trade-off studies be completed examining the various production options. Based on current testwork results, the bulk silver concentrate would contain elevated levels of arsenic, antimony and bismuth impurities, which would result in concentrate treatment charges and incur penalty charges.

1.7 Mineral Resource Estimate

Wood QP Kim reviewed and performed validation checks on the Mineral Resource model and based on the results prepared a revised Mineral Resource statement summarized in Table 1-1. The Mineral Resource estimate is based on an assumed underground mining method, silver price of $26/oz and is constrained within a mineralized envelope and above an elevated cut-off of 250 g/t Ag. A portion of the mineralization is oxide material that could be amenable to open-pit mining and a separate process recovery option which would require a different resource model than the one presented in this Report.

1.8 Interpretations and Conclusions

Drilling to date has identified a significant silver Mineral Resource with the opportunity for additional discovery.

1.9 Opportunities

There is potential to add to the Mineral Resources through the following:

- analysis of the Yaxtché oxide zone using open pit assumptions
- additional drilling of known prospects

Additional potential remains in the greater Quevar South project area, where previous exploration has identified styles of mineralization, alteration, and lithologies similar to those at Yaxtché. These areas warrant additional evaluation.

Table 1-1: Mineral Resource for the Yaxtché Deposit

Classification	Type	Tonnes (Mt)	Ag Grade (g/t)	Contained Ag Metal (Moz)
Indicated	Sulphide	2.63	487	41.1
	Oxide	0.30	434	4.2
	Total	**2.93**	**482**	**45.3**
Inferred	Sulphide	0.31	417	4.1
	Total	**0.31**	**417**	**4.1**

Note: 1) The independent Qualified Person who prepared the Mineral Resource estimate is Henry Kim. P.Geo., a Principal Resource Geologist with Wood.

2) The effective date of the estimate is September 30, 2024. Mineral Resources were prepared in accordance with the 2019 CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines and reported in accordance with the 2014 CIM Definition Standards.

3) Mineral Resources are constrained by an elevated cut-off of 250 g/t Ag that considered a silver price of $26/oz, mining operating costs of $60/t at an assumed production of rate 365,000 t/a, process operating costs of $25/t, G&A costs of $30/t and a range of metallurgical recoveries between 81% and 93%. The cut-off also considered a 3% NSR royalty payable to the Salta Province and a 0.5% NSR royalty on the Castor concession payable to Cascadero Minerals SA.

4) Reported Mineral Resources contain no allowances for hanging wall or footwall contact boundary loss and dilution. No mining recovery has been applied.

5) Rounding as required by reporting guidelines may result in apparent differences between tonnes, grade and contained metal content.

1.10 Risks

Risks associated with the Project include:

- Variations in silver mineralization mineralogy within the Yaxtché deposit could negatively impact the silver recovery and/or concentrate grade
- Higher concentrate impurities from arsenic, antimony and/or bismuth which could:
  - Increase the smelting charges and/or
  - Increase the penalties and/or
  - Cause the silver concentrate to be undesirable and possibly unmarketable.

1.11 Recommendations

The QP authors have recommended a two-phased exploration program totaling $3,750,000 where Phase 2 is not dependent on the results of Phase 1. Phase 1 includes geological data and interpretation activities, exploration geophysics and camp maintenance for a total of $500,000. Phase 2 includes exploration drilling and metallurgical testwork for a total of $3,250,000.

2.0 INTRODUCTION

2.1 Introduction

Wood has prepared a current NI 43-101 technical report for Argenta on the Mineral Resource estimate for the El Quevar property located in the Salta Province of Argentina.

2.2 Terms of Reference

The Report was prepared for Argenta (formerly known as Butte Energy Inc.) to support their application to the TSX Venture Exchange to obtain their approval under exchange policy for the acquisition of the El Quevar property by purchasing 100% of the issued and outstanding shares of Silex Argentina S.A. (Silex Argentina), a wholly owned subsidiary of Golden Minerals Company that owns the Property. The terms of the deal were provided in the September 27, 2024 news release entitled "Butte Executes Definitive Agreement to Acquire El Quevar Silver Project". The Report is expected to be filed on SEDAR+ by Argenta in support of their first-time disclosure of the Mineral Resource estimate on the El Quevar property.

The Mineral Resource estimates were prepared in accordance with the 2019 CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines and reported in accordance with the 2014 CIM Definition Standards.

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

2.3 Qualified Persons

The following individuals are QPs for their content in the Report and meet the definition as required by the NI 43-101:

- Mr. Henry Kim, Principal Resource Geologist, Wood (QP Kim)
- Mr. Alan Drake, P.L.Eng., Principal Metallurgist, Wood (QP Drake).

QP Kim takes responsibility for sections relating to geology and Mineral Resource estimation, specifically geological setting and mineralization, deposit types, exploration, drilling, sample preparation, analyses and security, Mineral Resource estimates as well as property description and location, accessibility, climate, local resources, infrastructure and physiography, and history and the parts of data verification and the summary, introduction, interpretation and conclusions, recommendations and references relating to those areas.

QP Drake takes responsibility for mineral processing and metallurgical testing and the parts of the summary, introduction, interpretation and conclusions, recommendations and references relating to the metallurgical content in the Report.

Wood also engaged its mining experts for assumed mining method, assumptions on mining constraints, and mining operating costs inputs to the assessment of reasonable prospects of eventual economic extraction (RPEEE) for the Mineral Resource estimates.

2.4 Effective Dates

The effective date of this Report is September 30, 2024 and the effective date of the Mineral Resource estimates is September 30, 2024.

2.5 Information Sources

The key information sources used to support the preparation of this Report include:

- the title opinion and expert and expert information provided by Argenta listed in Section 3
- The documents listed in Section 27.

Key sources of information for this Report include the following technical reports:

- Seibel, G., Thompson, J. E., Kustermeyer, A., and Pozder, S., 2018. El Quevar Project Salta Province, Argentina NI 43-101 Technical Report on Preliminary Economic Assessment, effective date September 4, 2018.
- Seibel, G., Colquhoun, W., and Rehn, W, 2018: El Quevar Project, Salta Province, Argentina, NI 43-101 Technical Report on Updated Mineral Resource Estimate: technical report prepared by Amec Foster Wheeler for Golden Minerals Company, effective date February 26, 2018.
- Gates, P.A. and Horlacher, C.F., 2012: NI 43-101 Technical Report for Resources Yaxtché Silver Deposit, El Quevar Property, Salta Province, Argentina: technical report prepared by Pincock, Allen and Holt for Golden Minerals Company, effective date 8 June, 2012.
- Lewis, W.J., and San Martin, A.J., 2010: NI 43-101 Technical Report and Updated Mineral Resource Estimate for the Yaxtché Silver Deposit El Quevar Project Salta Province, Argentina: report prepared by Micon International for Golden Minerals Company, effective date 10 August, 2010.

- Barnard, F., and Sandefur, R.L., 2010: NI 43-101 Technical Report Mineral Resource Estimate Update Yaxtché Silver Deposit El Quevar Project Salta Province, Argentina: report prepared by Chlumsky, Armbrust & Meyer, LLC for Golden Minerals Company, effective date 14 January, 2010.
- Barnard, F., and Sandefur, R.L., 2009a: NI 43-101 Technical Report Mineral Resource Estimate Yaxtché Silver Deposit El Quevar Project Salta Province, Argentina: report prepared by Chlumsky, Armbrust & Meyer, LLC for Golden Minerals Company, effective date 12 October, 2009.
- Barnard, F., and Sandefur, R.L., 2009b: Mineral Resource Estimate Yaxtché Central Zone Silver Deposit El Quevar Project Salta Province, Argentina: report prepared by Chlumsky, Armbrust & Meyer, LLC for Golden Minerals Company, effective date 15 August, 2009.
- Mach, L., Hollenbeck, P., Bair, D., and Kuestermeyer, A., 2009. NI 43-101 Technical Report on Resources Apex Silver Mines Corporation El Quevar Project Argentina: technical report prepared by SRK Consulting (US), Inc. for Apex Silver Mines Corporation, effective date January 31, 2009.

2.6 Site Visits and Scope of Personal Inspection

QP Kim visited the El Quevar property from September 24 to 27, 2024. The following activities were conducted QP Kim while on site:

- Visit on site core storage facilities
- Reviewed drill cores from selected drill holes
- Review the logged geological units
- Reviewed the assay intervals and matched them with visible mineralization
- Identified any major structures
- Matched the assay certificates to the assay database
- Visited several drill collar locations and measured the location with a handheld GPS
- Discussed geology and future exploration works on the property with site geologist
- Visited the entrance of the underground development portal
- Visited the El Quevar discovery outcrop
- Viewed the physical location and surface exposures around the Yaxtché deposit.

QP Drake did not visit the El Quevar property as there is no process facility on site and geometallurgical information in the core was verified by QP Kim during his site visit.

3.0 RELIANCE ON OTHER EXPERTS

3.1 Introduction

The QPs have relied upon the following other expert reports, which provided information regarding mineral rights, surface rights, royalties, environmental, permitting, social and community impacts, and taxation as follows.

3.2 Mineral Tenure, Surface Rights, and Royalties

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

- Mendilaharzu, D., 2024: Quevar Project Mining Concessions Title Opinion; report prepared by Diego Mendilarzu, Partner of Mendilahrzue & Associates, Mining and Corporate Law, attorneys at law licensed in Argentina, for Argenta Silver Corp., 26th August 2024.

This expert information is used to support the information on the current status of mining concessions owned by Silex Argentina, Argentine legislation relevant to the mining regime in Argentina, surface and water rights, environmental studies and permitting on the Project that are summarized in Section 4 of the Report. The information is also used to support the summary of this information in Section 1 and to support legal assumptions used in the assessment of RPEEE of the Mineral Resource estimates in Section 14.

4.0 PROPERTY DESCRIPTION AND LOCATION

4.1 Introduction

The Project is located in northwestern Argentina, approximately 300 km northwest of the provincial capital of Salta, within the San Antonio de los Cobres municipality, Salta Province.

The Property is located close to geographic coordinates 24.3° south latitude and 66.8° west longitude. The 1994 Argentinian Zone 3 GCS POSGAR coordinates for the Yaxtché zone are approximately 3,418,000 E and 7,307,000 N. Figure 1-1 shows the location of the El Quevar property.

4.2 Property and Title in Argentina

The following information has been provided by Argenta.

4.2.1 Mineral Tenure

According to Argentine law, Mineral Resources are subject to regulation in the provinces where the resources are located. Each province has the authority to grant mining exploration permits and mining exploitation concession rights to applicants. The Federal Congress has enacted the Argentine Mining Code (AMC) and other substantive mining legislation, which is applicable throughout Argentina; however, each province has the authority to regulate the procedural aspects of the AMC and to organize the enforcement authority within its own territory.

In the province of Salta, where the Project is located, all mining concessions are granted by a judge in the Salta Mining Court. The Property is comprised of exploitation concessions. Exploitation concessions are subject to a canon payment fee (maintenance fee) which is paid in advance twice a year (before June 30th and December 31st of each calendar year). Each time a new mining concession is granted, concession holders are exempt from the canon payment fee for a period of three years from the concession grant date. However, this exemption does not apply to the grant of vacant exploitation concessions; only to the grant of new mining concessions.

4.2.1.1 Mining Concessions

The ownership of a mine is acquired through a legal concession process, granted for an unlimited time and subject to the compliance of certain maintenance conditions, mainly related to the payment of mining fees and the implementation of an investment plan. The mining property is always subject to be revoked by failure to fulfill these conditions.

The mining property, though perpetual in nature, is subject to the fulfilment obligations known as "Amparo Minero", as described by the following:

- **Canon:** Each mining concession, once surveyed, is divided into measure units called "pertenencias". The amount of the canon of each mining concession, depends on the number of units (pertenencias) it has, according to a fixed annual amount per unit of measure, currently at AR$ 23,057 according to Law 27.701. The canon is paid in two installments per advance term due on June 30 and December 31 of each year.
- **Investment plan**: After the mining concession is granted (in the case of mines), the concessionaire must submit to the mining authority an estimate of the plan and amount of the fixed capital investments that intends to make in it. The investment plan includes mining works, construction of camps, buildings, roads and auxiliary exploration works, acquisition of machinery, equipment for exploitation and benefit of the mineral, etc. The estimated investments must be performed in full within five years counted from the presentation referred to in the previous paragraph, and the concessionaire may, at any time, introduce modifications that do not reduce the planned overall investment. The mining investment plan cannot be less than 300 times the annual canon that corresponds to the mine. The concessionaire must present to the mining authority, within a period of three months from the expiration of each of the five annual periods, an affidavit on the status of compliance with the investments estimated.

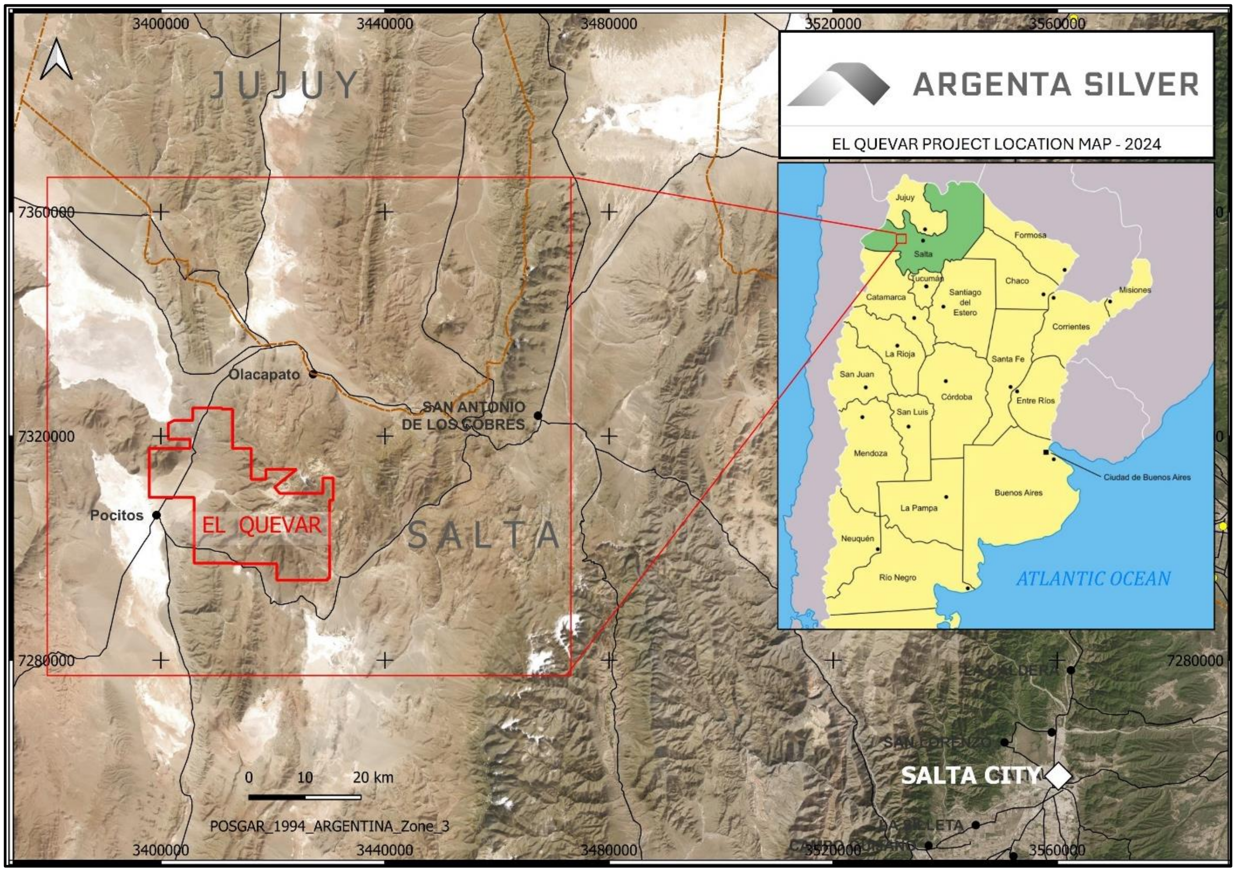
4.3 Surface Rights and Easements

The concession of a mine does not include the concession of surface rights. However, once the mining concession is granted, the concessionaire has the right to apply and obtain surface rights (through easements) from the same local granting authority, by providing compensation to the surface owner.

The easements are constituted after providing compensation for the value of the pieces of land occupied and the consequent damages to the occupation. If the land corresponding to a concession belongs to the Provincial State or Municipality, the constitution of the easement will be free.

The easement will continue while the mine is not declared vacant or abandoned. No fees or canon is required for the maintenance of the easements.

Figure 4-1: Project Location



Source: Argenta, 2024

4.3.1 Environmental Regulations and Permitting

In accordance with the AMC, an environmental impact assessment (EIA) must be submitted and approved by the local authority before any work is performed in a mining property. The Mining Secretary evaluates and approves the Environmental Impact report (EIR), issuing a resolution as an Environmental Impact Statement (EIS) for each stage. Even though the EIS has no term and does not expire, according with section 255 of the AMC, an EIR updated must be submitted every two years.

The principal permitting process, as well as regulatory activities during development and operations, are managed by Salta Province, through Salta Mining Court and Salta Mining Secretariat, among other public offices.

Approval of the EIA allows mining development to proceed, subject to obtaining sector permits for specific project facilities.

4.4 Property Ownership

Argenta acquired the Property via the acquisition of all issued and outstanding shares of Silex Argentina pursuant to a definitive share purchase agreement between Argenta and Golden Minerals, executed on September 27, 2024.

4.5 Mineral Tenure

The El Quevar property consists of 31 exploitation concessions with a combined area of approximately 56,706 ha (Property). Exploitation concessions are subject to an annual canon payment fee (refer to Section 4.2.1).

To maintain all the El Quevar concessions, Silex Argentina paid in the past the canon payment fees to the Argentine government accordingly. Canon for all concessions is in good standing until December 31, 2024. The last canon payment was made on June 25, 2024; the total amount for all the concessions was AR$ 13,278,238.35.

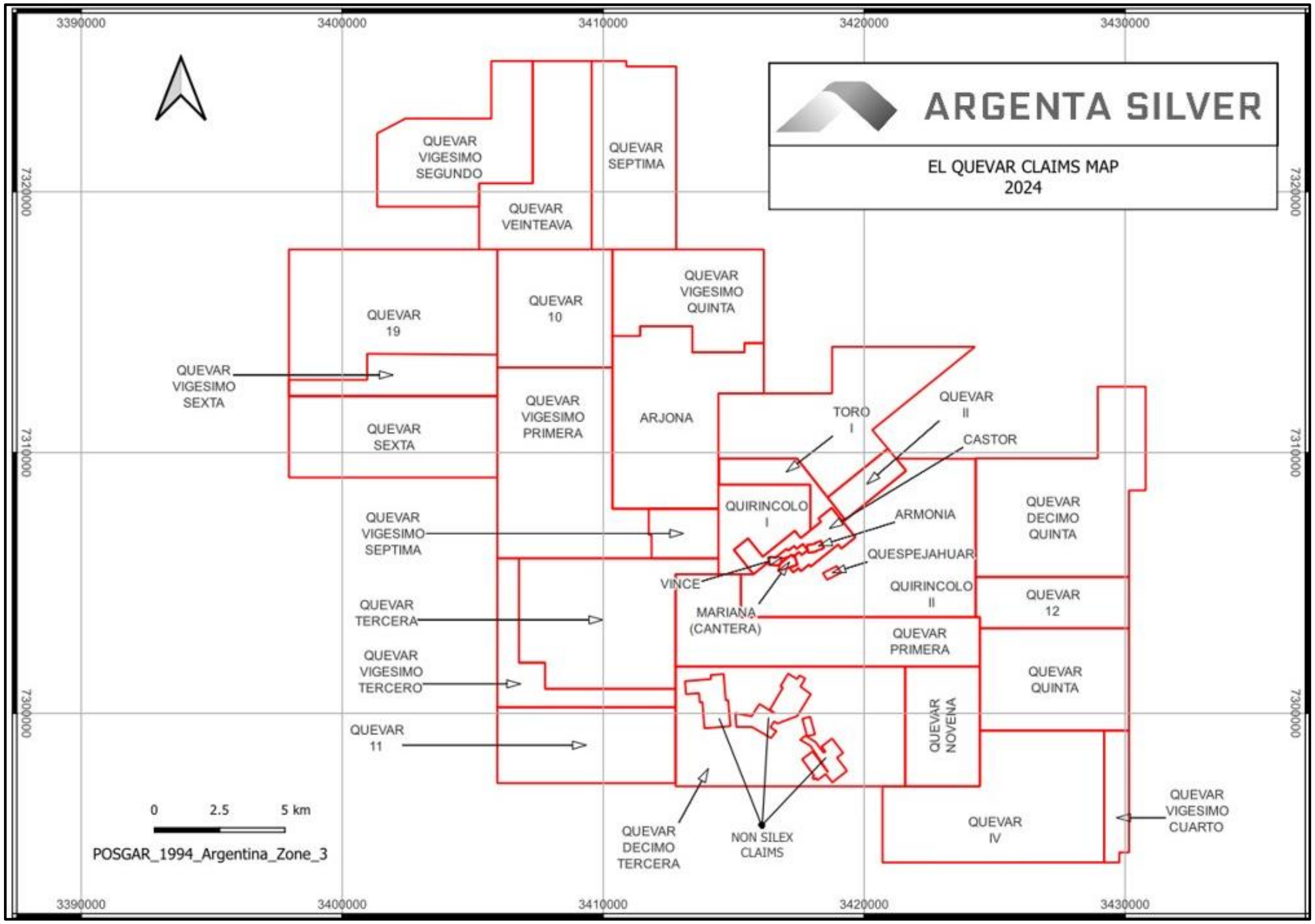
The concession holdings are summarized in Table 4-1 and shown in Figure 4-2.

Wood was provided with legal opinion that supports that Silex Argentina had met its obligations in terms of canon payments, legal labour and legal surveys and the submission of working and investment plans for the concessions, as of August 26, 2024.

Table 4-1: Mineral Tenure Table

Concession Name	File No.	Area (ha)
Arjona II	18080	3,000
Armonia	1542	18
Castor	3902	384
Mariana	15190	26
Quespejahuar	12222	18
Quevar 10	20219	1,997
Quevar 11	20240	1,988
Quevar 12	20360	1,146
Quevar 19	20706	3,500
Quevar Decima Quinta	20445	3,254
Quevar Décimo Tercera	20501	3,354
Quevar II	17114	330
Quevar IV	19558	3,500
Quevar Novena	20215	1,312
Quevar Primera	19534	2,626
Quevar Quinta	19617	2,242
Quevar Septima	20319	2,301
Quevar Sexta	19992	2,493
Quevar Tercera	19557	2,999
Quevar Veinteava	20988	2,151
Quevar Vigésimo Cuarto	21044	467
Quevar Vigésimo Primero	20997	3,500
Quevar Vigesimo Quinto	21054	1,993
Quevar Vigesimo Segundo	21042	2,143
Quevar Vigesimo Sexta	22087	992
Quevar Vigésimo Tercero	21043	995
Quevar Vigésimo Septima	22403	497
Quirincolo I	18036	3,500
Quirincolo II	18037	3,500
Toro I	18332	436
Vince	1578	44
		56,706

Figure 4-2: Mineral Tenure Layout Plan



Source: Argenta, 2024

4.6 Surface Rights and Easements

The Concessions are located over state lands belonging to the Province of Salta. Silex Argentina has all necessary surface rights. There are no restrictions on surface access to any of the areas encompassed by the concessions.

The company has been granted easements from the Province of Salta to further protect access rights. These easements are summarized in Table 4-2.

Table 4-2: Granted Easements

Easement No.	Type of Easement
19.137	Camp
21.003	Road
21.004	Waste rock facility
21.005	Water
21.006	Power
21.009	Services road
20.666	Plant

4.7 Water Rights

Water permits for exploration and other works have been granted according to two resolutions from the Water Secretariat including one that authorizes the use of 50 m^3/d in the Castor and Quirincolo concessions and one that authorizes the use of 10 m^3/d for camp and facilities.

4.8 Royalties and Encumbrances

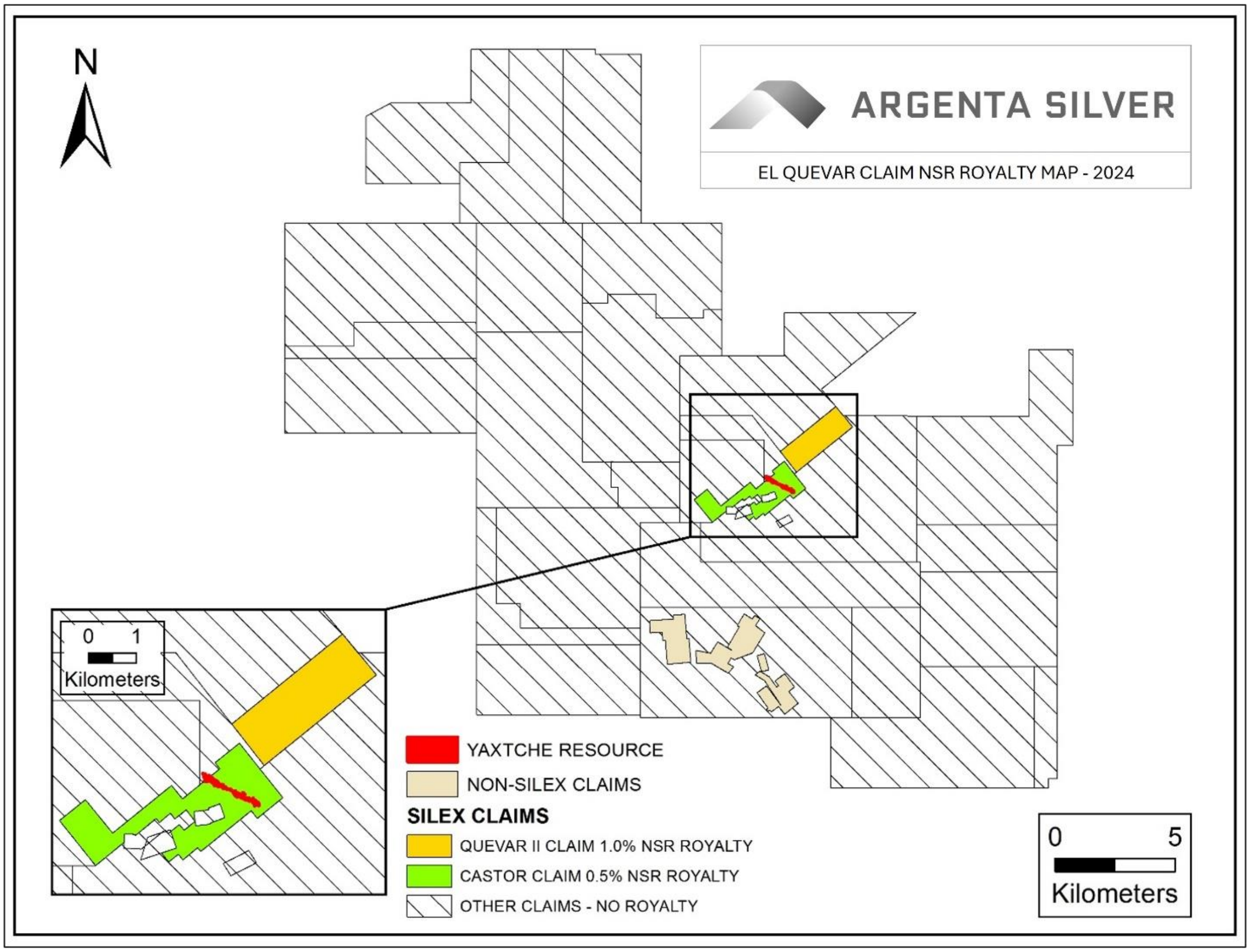
Silex Argentina is required to pay a 1% net smelter return (NSR) royalty on the value of all minerals (i.e. 100%) extracted from the El Quevar II concession and a 1% NSR royalty on one-half of the minerals (i.e. 50%) extracted from the Castor concession to Cascadero Minerals SA from whom the concessions were acquired. Silex Argentina can purchase one half of the combined royalty interests for $1 million during the first two years of production.

The Yaxtché deposit is located primarily on the Castor concession.

Silex Argentina is required to pay a 3% royalty to the Salta Province based on the mine mouth value of minerals extracted from any of the concessions less costs of processing and sales.

Figure 4-3 shows claims for which a private royalty obligation exists.

Figure 4-3: Mineral Resource Outline in Relation to Claim Boundaries



Source: Argenta, 2024

Note: Entire Property is subject to a 3% NSR royalty to the province of Salta.

4.9 Permitting Considerations

Silex Argentina has provided all necessary environmental reports describing various activities of exploration.

In August 2022, Silex Argentina received approval of the EIA for the Mine, for exploration stage (including drilling activities) by Resolution N° 115/22. The last environmental impact renewal report was submitted August 28, 2024. During the evaluation of the renewals, the previous EIA approved maintains its force until the renewal report, submitted August 28, 2024, is approved.

Silex Argentina have obtained permits to conduct proposed work on the Property.

4.10 Environmental Considerations

There are artisanal prospecting pits and minor workings within the Property area. There are small-scale workings at the El Queva (Jaguar or Mani) mine, which operated from 1968 to 1973. There is an expectation that there will be environmental liabilities associated with the artisanal and small-scale mining activity.

Silex Argentina has initiated reclamation activities on some of the historical disturbances including reclaiming and recontouring all pre-2012 trenches, drill stations, and some non-essential drill access roads.

Sulphide-bearing muck extracted from the decline was placed in lined and covered trenches, now fully recontoured, according to an approved reclamation plan.

Perlite quarries (see Section 6) are inactive. Silex Argentina will be responsible for reclamation of these quarries if any is required. To date, there has been no estimate or determination as to whether a liability exists.

4.11 Other Significant Factors and Risks

QP Kim was advised that Argenta is not aware of any significant environmental, social or permitting issues that would prevent future exploitation of the Yaxtché deposit or other mineral prospects identified on the Property.

Additionally, according to the investment attractiveness index discussed in the 2023 Fraser Institute Annual Survey of Mining Companies (Mejía and Aliakbari, 2024), Argentina (Salta) is ranked number 14 out of 86 jurisdictions in the world ranking of investment attractiveness index for favourable mining jurisdictions for investment.

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

5.1 Accessibility

The Property is accessed from Salta (capital of Salta Province) by following National Road 51 (NR51) to the turnoff to Provincial Road 27 (PR27) for approximately 226 km. From Salta to San Antonio de los Cobres, NR51 consists of either a paved or well-maintained gravel surface. Beyond San Antonio de los Cobres, NR51 is a well-maintained gravel road to the junction with PR27. From the intersection, the Property is accessed by driving south for approximately 30 km to the junction with the access road and then east, with the camp currently located approximately 10 km from the junction. Driving time from Salta to the Project camp is approximately four to five hours.

Salta is accessed by a number of highways and roads which connect it with the rest of Argentina, as well as with Chile and Bolivia. Salta has a major airport with daily flights to Buenos Aires as well as a number of other Argentinean and Bolivian cities.

A narrow-gauge railway which connects Salta with Antofagasta, Chile passes within 15 km of the Project area. The train runs from Salta to Socompa (the Chilean border) about six times a month, delivering goods to the mining industry in the Puna region.

5.2 Climate

The climate is characteristic of high mountain environments. The weather is extremely dry and ranges from polar conditions on the higher mountain peaks to arid steppe environments at the valley floors. Most precipitation falls between November and March as heavy rains, hail and snow. Total precipitation is variable and can range from 50 mm in dry years to 200 mm during wetter years. Temperatures during the winter months vary from 10ºC day during the day to -25ºC at night. During the summer months, temperatures in the daytime can reach 25ºC falling to -5º C at night. Moderate to high winds are characteristic of the winter months.

It is expected that any future underground mining operations will be conducted year-round. Exploration activities can be temporarily curtailed by rainfall or snow during the period from November to March.

5.3 Local Resources and Infrastructure

Salta (population over 700,000) is the major regional supply centre and has all major services.

The closest settlement, in a sparsely-populated area, is the town of Pocitos, 20 km southwest of the Project. The next closest settlement is San Antonio de los Cobres (population roughly 4,000), the local departmental government seat, about 90 km to the southeast of El Quevar, on the road to Salta. Minor services are available.

The 210,000 m3/d high-pressure Gasoducto Minero natural gas pipeline passes through the Project area, about 5 km west of the exploration camp. Gas is available for mining projects in Salta Province.

Grid electricity is potentially available from a 354 kV high-voltage power line, owned by Termo Andes, which passes 30 km north of Yaxtché (no spare capacity at present). There is currently no external electric power to El Quevar. Power to the exploration camp is supplied by two 275 kVA diesel generators.

Water for camp use is pumped from a 100 m deep well at a rate of about 10 m3/d, and can be expanded to about 50 m3/d by paying the required usage fees. Additional water resources sufficient for mineral processing use can be obtained from the same groundwater source.

The exploration camp, rated for 100 persons, is situated on the El Quevar III concession. The camp consists of accommodations, offices, and core splitting, logging, and equipment maintenance facilities.

Manpower can be sourced for exploration activities in the province.

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

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

5.4 Physiography

The Project is located in the altiplano (puna) region of the Puna Block of the central Andes, on the western slope of a volcanic edifice. The volcanic massif has two peaks, Nevado de Quevar (6,130 m) and Cerro El Azufre (5,840 m). Drainage from the edifice slopes has formed steep canyons, with the water draining to an extensive complex of alluvial fans that grade into three salt flats, Salar de Pocitos (elevation 3,700 m) to the southwest, Rincon (3,800 m) to the west, and Cauchari (3,900 m) to the northwest.

Most of the mineralized areas are located between 4,500 and 5,100 m above sea level, with the Yaxtché zone surface exposures located between 4,800 and 4,900 m. The exploration camp is located west of the deposit area where a canyon opens up into a large alluvial fan at an elevation of 4,000 m.

Vegetation is characteristic of steppe climates adapted to harsh conditions, consisting of clumps of spiny grass known as coirón or ichu with no native trees or large shrubs. Most of the Property area consists of barren outcrop, talus, alluvium and landslide blocks.

Wildlife is rare due to the altitude and aridity. Native wildlife observed has included tinamou (birds), ñandu (rhea), fox, vicuña (camelid), guanaco (camelid), and mountain lion. Domesticated livestock includes burros, sheep, cattle, llamas and alpacas.

6.0 HISTORY

6.1 Exploration History

The Property history is summarized in Table 6-1 as reported in Seibel et al. (2018).

6.2 Production

Small scale mining and prospecting on the Property is reported to have occurred intermittently since the 1800s. After 1930, access to the region improved, and mining and prospecting activity increased locally.

Production is not well documented. Sillitoe (1975) notes that the "*El Quevar mine has produced a little over 3,000 tons of ore during its intermittent operating life from 1968 to early 1973, with a maximum output of 1,270 tons in 1970. Ore grades are difficult to estimate but hand-cobbed material seems to have averaged about 8% Pb and 0.2% Ag*".

The El Quevar mine has also been referred to as the Jaguar Mine, and the mine area is now part of the Mani zone (Barnard, F. and Sandefur, R.L, 2009a).

There is no known commercial production of base metals, gold, or silver from the Property. Minor production of perlite has occurred; however, there are no official production figures.

Table 6-1: Property History

Year	Operator	Work Completed
1971 to 1974	Government-sponsored Plan NOA-1 (Northwest Argentina)	Completed geological field work and prospecting.
1970s	Fabricaciones Militares	Completed three or four holes, probably in Quevar North. No records of results have been located.
1970s	BHP-Utah Minerals International	Completed three holes in the Mani-Copán area just south of Yaxtché. No records of results have been located.
1990s	Industrias Peñoles	Surface sampling in Quevar South. No records of results have been located.
1997	Minera Hochschild	Completed six reverse circulation and diamond core holes in the Mani and Yaxtché West areas, as well as trenching across the Mani structure.
1999	Mansfield Minerals	Surface and pit samples at Yaxtché.
2004	Apex Silver Mines Corporation/ Apex Silver Mines Limited (Apex Silver)	Acquired property interest.
2004–2006	Apex Silver	Mapped in the Quevar South area at 1:5,000 and 1:10,000 scale; completed reconnaissance outcrop sampling using channel and select chip samples.
2006	Apex Silver	Joint venture signed with Hochschild Mining plc. (Hochschild); formed Minera El Quevar, 65% owned by Apex Silver and 35% by Hochschild.
2006	Apex Silver	Completed a core drilling program of 19 core holes (2,377 m) in the Quevar South area, targeting the Mani, Copán and Yaxtché structural trends.
2007	Apex Silver	19 core holes (2,482 m) completed on the Yaxtché structural trend; Mani zone, and Quevar North. Also excavated 16 trenches totaling 3,300 m; four trenches at Quevar North and 12 in Quevar South. Submitted 24 samples from six drill holes for petrographic and electron microscopy examination.
December 2007 to February 2008	Apex Silver	Ground induced polarization (IP)/resistivity geophysical survey with three dimensional (3D) pole/dipole over El Quevar South. Line separation was at 200 and 400 m with markers at 50 m intervals along lines.
2008	Apex Silver	43 core holes (10,651 m).
2009	Apex Silver/Golden Minerals	Following reorganization under Chapter 11 bankruptcy in 2009, Apex Silver becomes Golden Minerals.

Year	Operator	Work Completed
2009	Apex Silver/Golden Minerals	114 core holes (23,111 m) completed in the Castor and Quevar II areas in Quevar South. Initial and first update Mineral Resource estimates completed.
2009	Golden Minerals	13 core holes (1,414 m) Viejo Campo area. This area is not part of the current property holdings.
2010	Golden Minerals	Acquired Hochschild interest; consolidated ownership of the Minera El Quevar joint venture.
2010	Golden Minerals	67 core holes (20,302 m) completed at Yaxtché West, Yaxtché East, Yaxtché Extension, Mani Sub and Sharon. The Sharon area drilling is outside of current property holdings (1,017 m in six holes). Mineral Resource estimate update.
2011–2012	Golden Minerals	Construction of adit and decline to access the eastern part of the Yaxtché zone and to investigate the continuity of the mineralization by drifting, channel sampling and bulk sampling of development rounds. 125 core holes (38,967 m) completed at Yaxtché West, Yaxtché Central, Mani Sub and Carmen; some holes drilled for condemnation purposes.
2012	Golden Minerals	Mineral Resource estimate update.
2012–2013	Golden Minerals	16 core holes (2,433 m) drilled in exploration areas in Quevar South (Carla, Andrea, Puntana, Argentina) and Quevar North (Sharon, Amanda, Luisa, Julia) areas. Drilling in the Quevar North areas is outside of the current property holdings (seven drill holes, 895 m).

7.0 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional Geology

The Property is located along the southern margin of the Altiplano-Puna volcanic complex of the Andean Central Volcanic Zone (Figure 7-1). The complex was formed in late Miocene times as a result of intense and prolonged ignimbrite volcanism resulting in a major silicic volcanic province covering an area of ~50,000 km^2. Dominant features of the complex include several large nested caldera complexes from which major, regionally-distributed ignimbrite sheets were sourced (de Silva, 1989).

The Property is located within the Quevar volcanic complex (QVC) which is interpreted as one of the major ignimbrite sources on the Altiplano-Puna volcanic complex (de Silva et al., 2006). The main volcanic events within the El Quevar complex have been dated at 19–17 Ma, 13–12 Ma, 10 Ma, 7–6 Ma and 1–0.5 Ma.

7.2 Project Geology

7.2.1 Lithologies

The QVC sits within a northeasterly-trending belt of Quaternary stratovolcanoes and associated domes (refer to Figure 7-1). Locally, the volcanic stratigraphy includes extensive pyroclastic flows (lithic and crystal-lithic tuffs and ignimbrites), rhyolite flows, andesitic flows, and resurgent domes of dacitic composition. Doming is associated with multiple intrusions and mineralizing events.

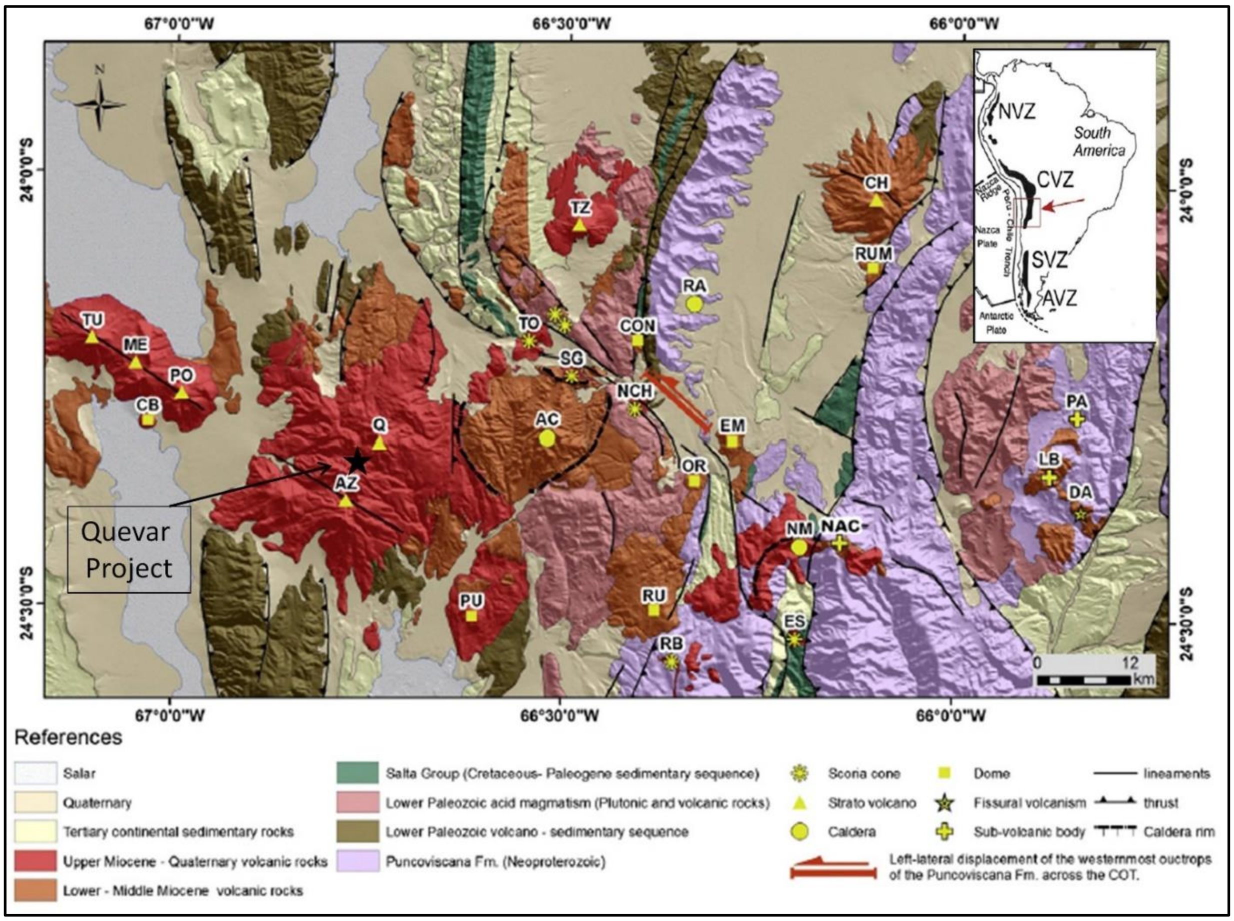
Locally, the volcanic rocks interfinger with Miocene to Pliocene age red sandstone that is correlative to the Pastos Grandes Group. Basement in the area is an Ordovician–Silurian marine sedimentary clastic suite consisting of shales and sandstones that have been greenschist metamorphosed to metapelites.

Late Pleistocene glaciation and fluvial and mass-wasting processes have eroded the complex, creating erosional windows, landslides and extensive alluvial fans.

7.2.2 Structure

The Quevar volcanic complex is structurally bounded by regional orogen-oblique 125° striking structures and orogen-parallel 025° striking lineaments characteristic of the structural evolution of the Puna Plateau (refer to Figure 7-1). Most notably, the orogen-oblique Calama-Olacapato-El Toro (COT) fault system bounds the complex to the northeast. The COT is considered one of the main northwest–southeast tectonic structures of the Puna Plateau and is an active fault zone associated with Miocene to Recent magmatic centers (Norini et al., 2013).

Figure 7-1: Regional Geology Plan



Source: Golden Minerals, 2018, Figure modified from Norini et al., 2013

Note: Stratovolcanoes in the immediate Project area: Q = Quevar; AZ = El Azufre. NVZ = Northern Volcanic Zone; CVZ = Central Volcanic Zone; SVZ = Southern Volcanic Zone; AVZ = Austral Volcanic Zone.

7.2.3 Alteration

The Property sits within one of three large erosional windows that have exposed expansive zones of steam-heated alteration (Figure 7-2). Such lithocaps have been widely reported within the high sulphidation epithermal environment above porphyry copper deposits. Mineralization was discovered at Yaxtché within a low-lying outcrop of leached and silicified dacite that is exposed at the base of the Quevar South alteration halo. With the exception of the surficial steam-heated alteration and a few scattered silicified outcrops, the bulk of information relating to hydrothermal alteration is known from drill core (see Section 7.3).

7.2.4 Mineralization

Silver is the element of economic significance at El Quevar and anomalous concentrations of copper, lead, zinc, and lesser gold occur locally. The nature of mineralization is consistent with that of a high- to intermediate-sulphidation state (see Section 8).

Mineralization occurs in various styles across the Project area from mineralized veins (e.g. Mani prospect) to disseminated and replacement style mineralization at Yaxtché.

Sillitoe (1975) noted the native sulphur deposits occur near the summits of Queva and El Azufre, with several small manganese deposits located around the periphery of the volcanic complex. The spatial and temporal relationships of the silver, sulphur, and manganese mineralization were used by Sillitoe to reconstruct an idealized paleo-hydrothermal system that formed above an inferred porphyry copper deposit.

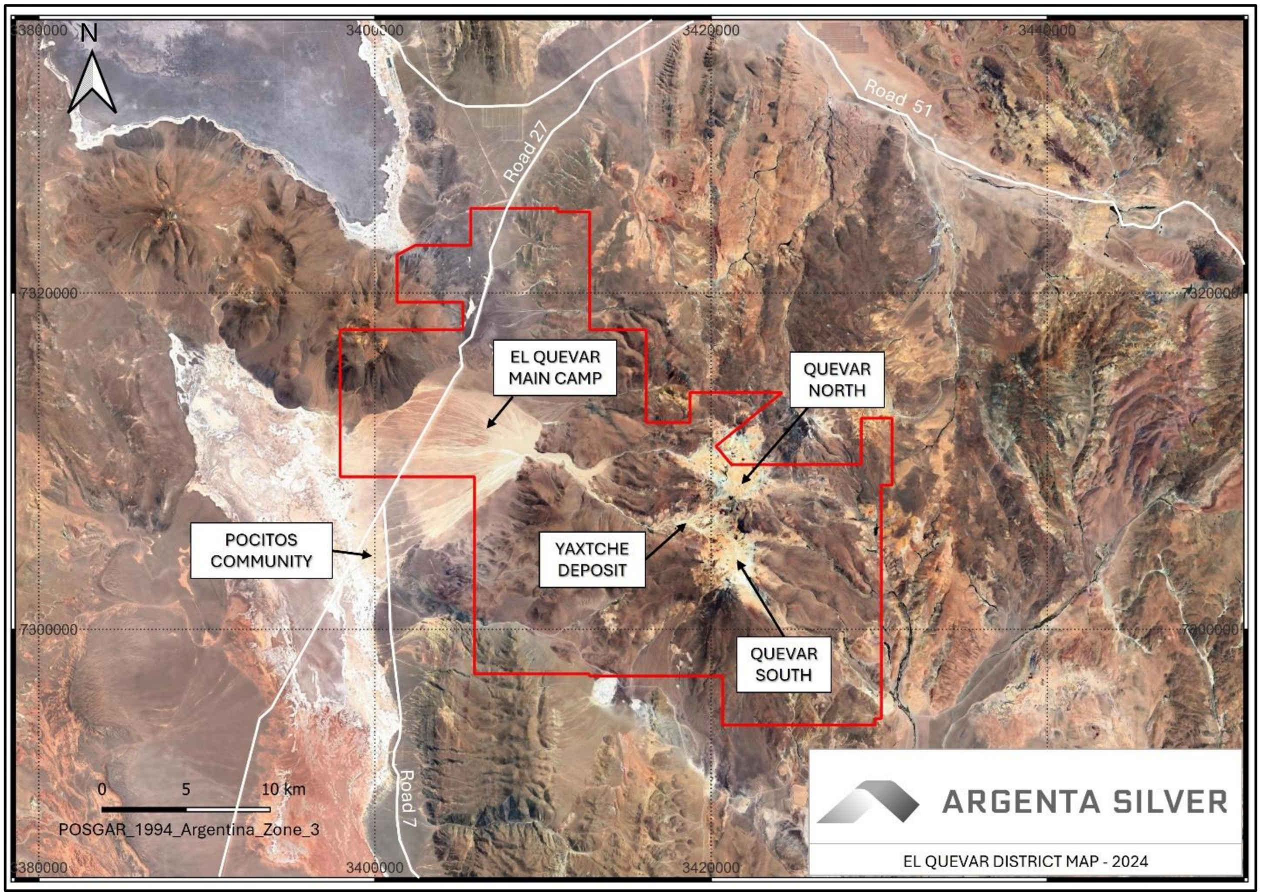
7.3 Deposit Description

7.3.1 Lithologies

The major lithologies within the Yaxtché deposit are depicted and summarized in Figure 7-3.

Although poorly exposed on surface, the most abundant rock type encountered in Yaxtché drill holes is the epiclastic unit (EP). This unit is characterized as a matrix-supported volcanic breccia with large (few centimetres to tens of centimetres), rounded to sub-rounded, polymictic volcanic clasts within a fine-grained matrix. The EP unit is interpreted to have formed as a debris flow.

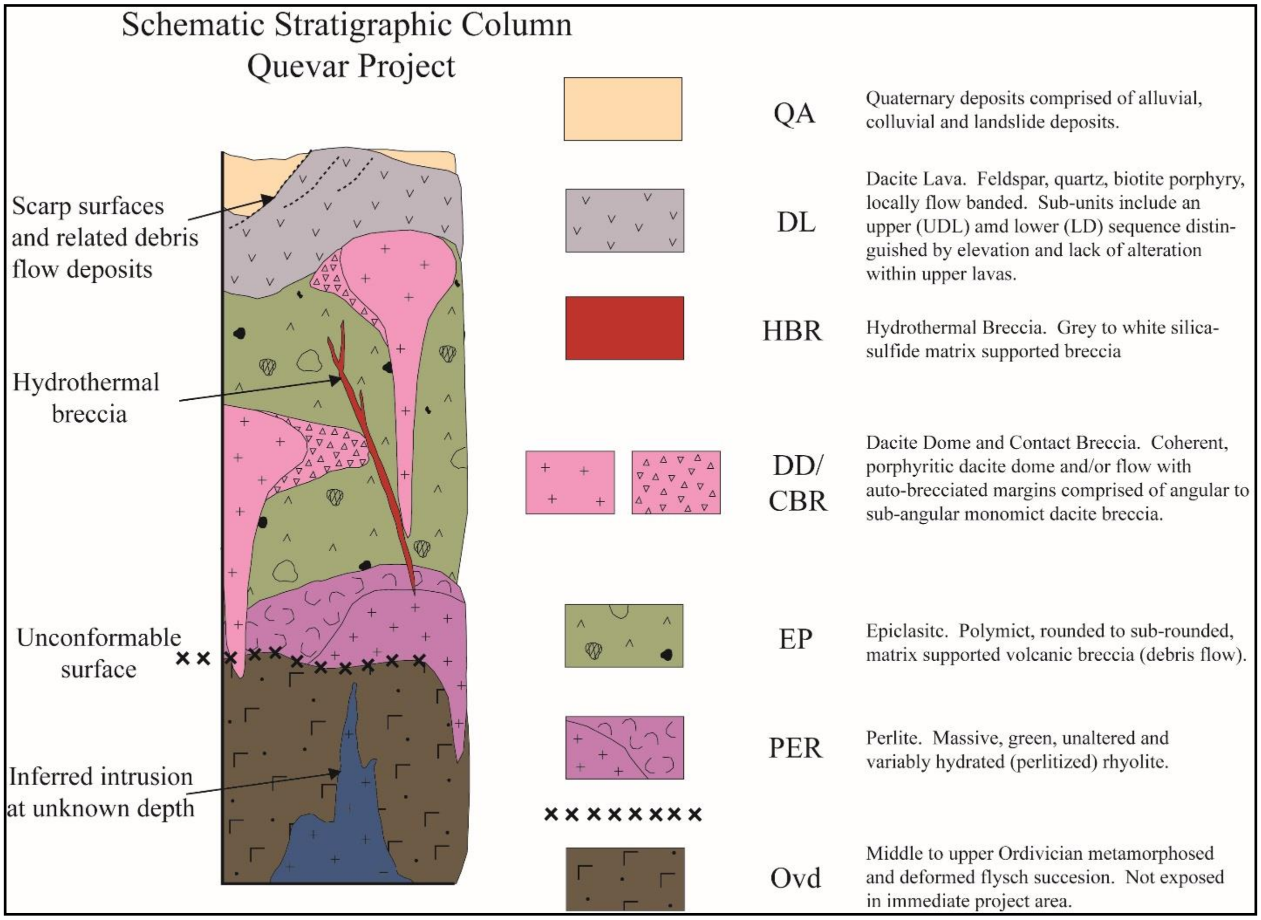
Figure 7-2: Yaxtché Deposit Outline Relative to Large Zones of Exposed Hydrothermal Alteration



Source: Argenta, 2024

Note: Red line represents the Silex Argentina claims boundary.

Figure 7-3: Schematic Stratigraphic Column

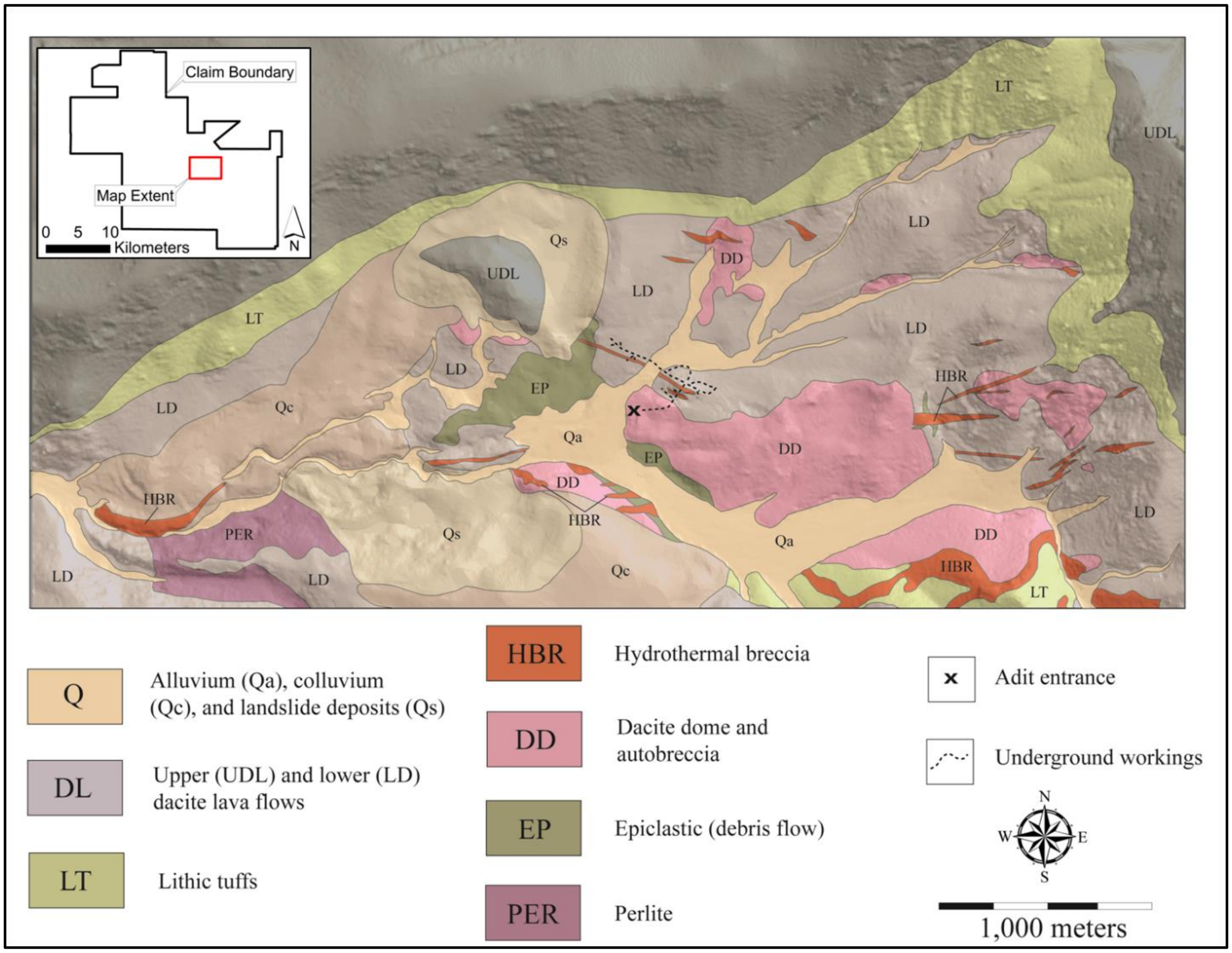


Source: Golden Minerals, 2018

A complex of porphyritic dacite domes and associated breccias have intruded within and atop the epiclastic unit. The coherent interiors of these domes (DD) are characterized by quartz-feldspars-biotite phenocrysts set within a fine-grained matrix of similar composition. Spatially associated with the dacite domes is a monomict, angular, clast- to matrix-supported volcanic breccia (CBR) that is interpreted to be the autobrecciated margin of the DD unit.

Stratigraphically atop the EP unit are a series of dacite–andesite flows (DL) that cap the volcanic succession and form prominent ridges in the Quevar South area (Figure 7-4). This volcanic succession is characterized by feldspar-phyric porphyritic lavas that represent a period of large-scale effusive volcanism in the area.

Figure 7-4: Quevar South Project Geology



Source: Golden Minerals, 2018

Note: Quevar South is situated within the area shown in Figure 7-2 as the Quevar South alteration zone.

The lavas have been sub-classified into an upper (UDL) and lower (LD) dacite flow succession. The distinction between these units appears to be based on their stratigraphic position (i.e., elevation) and/or the degree of hydrothermal alteration recognized. The uppermost dacite lavas are unaffected by hydrothermal alteration and are thus interpreted to be post-mineral flows.

7.3.2 Alteration

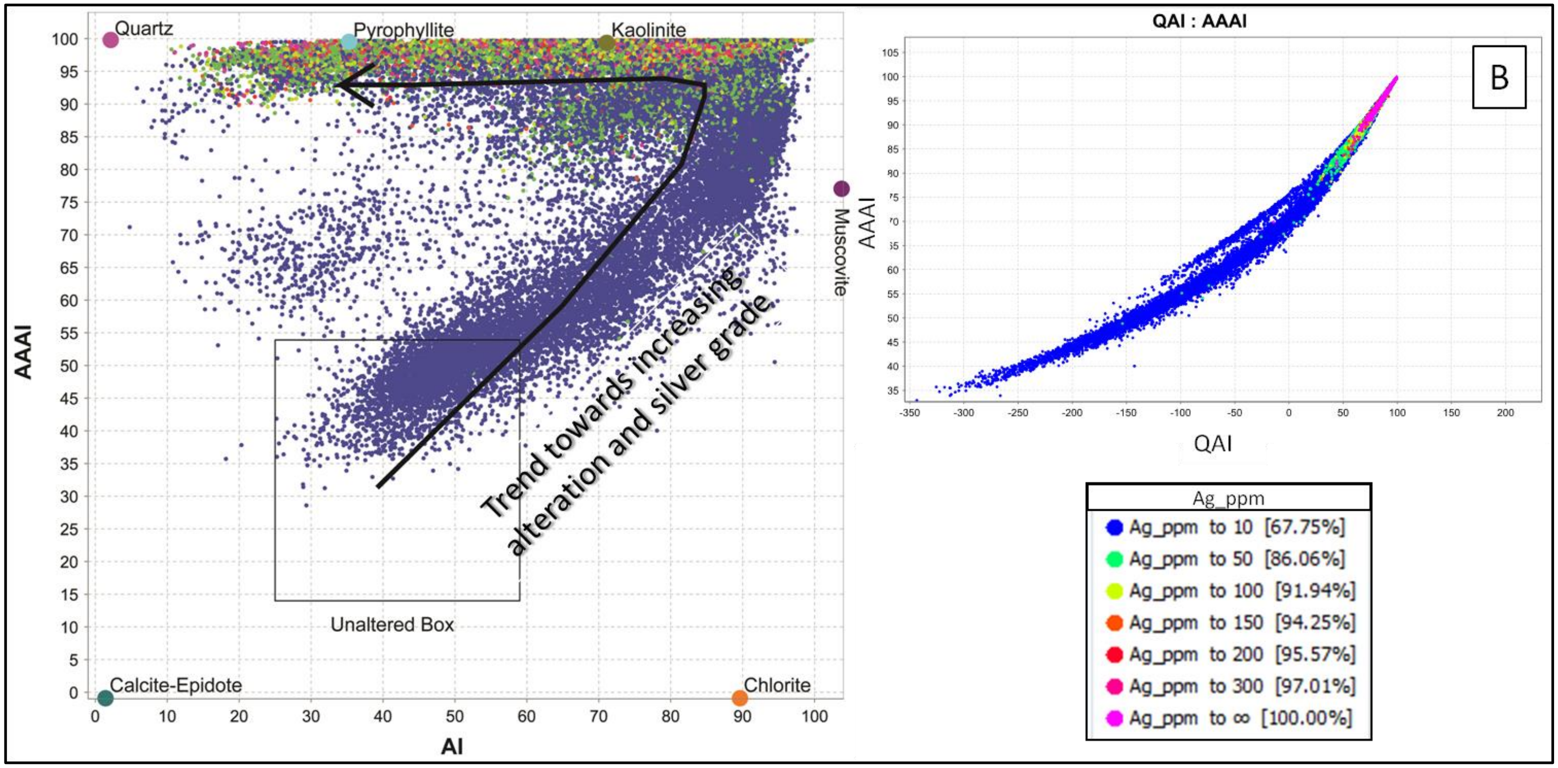
Hydrothermal alteration at the Project is summarized and updated from Corbett (2012). Zoned advanced argillic alteration at El Quevar is typical of that which might be expected to occur in association with high-sulphidation epithermal gold deposits. Elements of the zoned advanced argillic alteration from the centre outwards are classed as:

- Vuggy silica: forms as hot extremely acidic (pH 1–2) fluid leaches feldspars to provide rectangular pseudomorphous vugs after feldspar and participates in textural destruction to provide rounded vugs. The textural destruction caused by acidic alteration forms zones of enhanced permeability through which the later mineralized fluids ascended
- Pervasive silica: displays similarities to that developed in the core zones of many structurally-controlled zones of advanced argillic alteration, and occurs outboard of the leached vuggy silica domains
- Silica–alunite: develops in a marginal setting to the vuggy silica core as the causative hydrothermal fluid becomes progressively cooled and neutralized by reaction with wall rocks and so deposits alteration mineralogy typical of less acidic conditions of formation
- Kaolinite–dickite: forms marginal to the silica–alunite alteration by reaction with wall rocks of the progressively cooled and neutralized hydrothermal fluid
- Neutral argillic: characterized by silica–smectite–illite–ankerite ± pyrite is common outside the advanced argillic alteration and is interpreted to have developed in response to polyphasal dome emplacement. The smectite-rich alteration is apparent as swelling clays. The neutral argillic alteration is overprinted by the advanced argillic alteration
- Steam-heated: is apparent in the uppermost portions of El Quevar as typical powdery alunite–cristobalite–kaolin developed by reaction with wall rocks of acidic waters derived from the oxidation of rising H_2S above the water table. It therefore occurs as ‘blankets’ overlying many high-sulphidation epithermal systems
- Propylitic: occurs as the outermost zone of alteration at El Quevar and is characterized by a chlorite–epidote ± pyrite mineral assemblage yielding a distinctive green color to the affected rocks.

An attempt to quantify the effects of hydrothermal alteration has resulted in the development of the Quevar alteration index (QAI). The QAI tracks the changes of the mobile major elements, calcium, magnesium and sodium, in response to acid-leaching processes associated with hydrothermal alteration as described above.

The QAI follows the advanced argillic alteration index (AAAI) of Williams and Davidson (2004) but is specific to the Project area and the available chemical analyses. The relationship between the AAAI and the QAI is shown in Figure 7-5, together with the correlation of silver grade to alteration intensity.

Figure 7-5: Quevar Alteration Index



Source: Golden Minerals, 2018

The QAI is defined as

$$QAI = \frac{100(\text{SUM: LA Ca\% + LA Mg\% + LA Na\%}) - (\text{SUM: Ca\% + Mg\% + Na\%})}{(\text{SUM: LA Ca\% + LA Mg\% + LA Na\%})}$$

where LA stands for the average least altered composition for Quevar host rocks.

The QAI is an effective tool for determining hydrothermal fluid pathways that contain silver mineralization. Zones of leaching and feldspar destruction defined by the QAI are typically much broader than areas of silver mineralization, and thus has proven to be a useful exploration tool outside of the Yaxtché deposit.

7.3.3 Mineralization

Mineralization at Yaxtché consists of fine-grained black sulphides and sulphosalts that are difficult to identify in hand specimens. The mineralization occurs variously as disseminations, open-space filling, and in massive veinlets or clots. The identified mineralogy is consistent with that expected within a high- to intermediate-sulphidation epithermal deposit (refer to discussion in Section 8).

Based on petrographic studies, Golden Minerals' geologists have classified the mineralization by oxidation state (Table 7-1).

Table 7-1: Mineralization Styles by Oxidation State

Oxidation State	Minerals
Oxide (supergene)	Plumbojarosite, argentojarosite, limonite, stibiconite
Mixed (secondary enrichment)	Chalcocite, covellite, argentite, native silver, chlorargyrite: when rimming hypogene sulphides
Sulphide (hypogene)	Pyrite, galena, sphalerite, tetrahedite–-tennantite, complex Pb–Sb–Bi ± Ag sulphosalts, bismuthinite, stibnite, chalcopyrite

Note: As at the Report effective date, classification of oxidation state based on mineral assemblages had not been incorporated into the Quevar drill hole database.

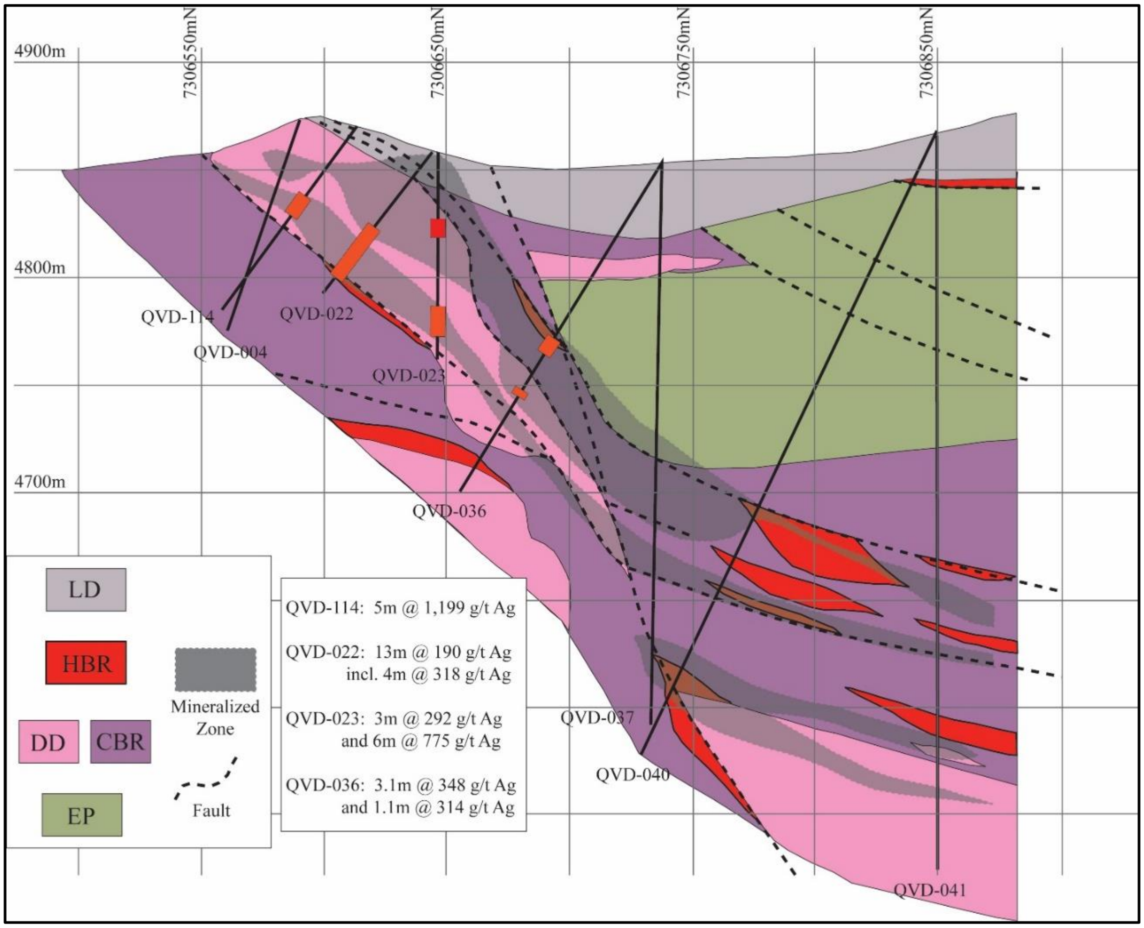
Coote (2010) observed:

- Tennantite–tetrahedrite is both intergrown with and overgrowing/replacing enargite–luzonite defining a trend of progressively decreasing sulphidation state of acid hydrothermal fluids with time at any given location within the hydrothermal system. The association of minor amounts of very fine-grained chalcopyrite with tennantite–tetrahedrite as overgrowths to or replacement of enargite–luzonite is consistent with the interpreted decreasing hydrothermal fluid sulphidation state. Sphalerite, locally abundant in association with the tennantite–tetrahedrite, formed about or after luzonite–enargite, also formed as a component of the physio-chemically evolving acid hydrothermal system
- Silver is mostly identified (from electron microprobe analyses and reflected light optical properties) as a component of the complex antimony- and lead-bearing and bismuth-rich sulphosalts which span the enargite–luzonite through to predominant tennantite–tetrahedrite paragenesis. It would appear that silver is poor in early bismuth-rich sulphosalts and rich in the later bismuth-rich sulphosalts that are mostly associated with tennantite/tetrahedrite. Silver mineralization therefore is also genetically associated with the evolving high-sulphidation system. Only minor to trace amounts of argentite are associated with tennantite–tetrahedrite and sphalerite.

Distinctive metal zonation patterns are recognized at Yaxtché. Patterns are broadly defined as a copper–gold assemblage at lower elevations, transitioning upwards into a silver–lead–zinc–barium–antimony metal assemblage at higher elevations. These zonation patterns suggest that physio-chemical gradients had a significant control on localization of silver bearing mineral assemblages. Corbett (2012) proposed that sites of bonanza grade silver mineralization may be a product of fluid mixing along structures as silver-bearing fluids mixed with low pH steam heated waters collapsing down faults.

Figure 7-6 shows a representative cross section through the Yaxtché deposit. Mineralization is controlled primarily by zones of high paleo-permeability. Permeability is controlled by zones of vuggy silica along the Yaxtché structural trend and is locally focused along dacite dome contacts where rheologic contrasts between the coherent dacite and permeable epiclastic units focused fluid flow. In addition, the intersection of northeast-trending faults and the Yaxtché structure resulted in zones of higher permeability and served as sites of silver-bearing mineral precipitation.

Figure 7-6: Yaxtché Cross-Section (looking northwest)



Source: Golden Minerals, 2018; modified after Cummings, 2010.

Note: Refer to Figure 7-4 for detailed geological legend.

8.0 DEPOSIT TYPES

Epithermal deposits have been variably classified on the basis of their alteration and gangue mineral assemblages, metal and sulphide contents, and their sulphide mineral assemblages. The Yaxtché deposit shows alteration assemblages typical of high sulphidation epithermal deposits (refer to Section 7.3) whereas the metal content and sulphide assemblages are characteristic of mineralizing fluids with an intermediate sulphidation state (Figure 8-1).

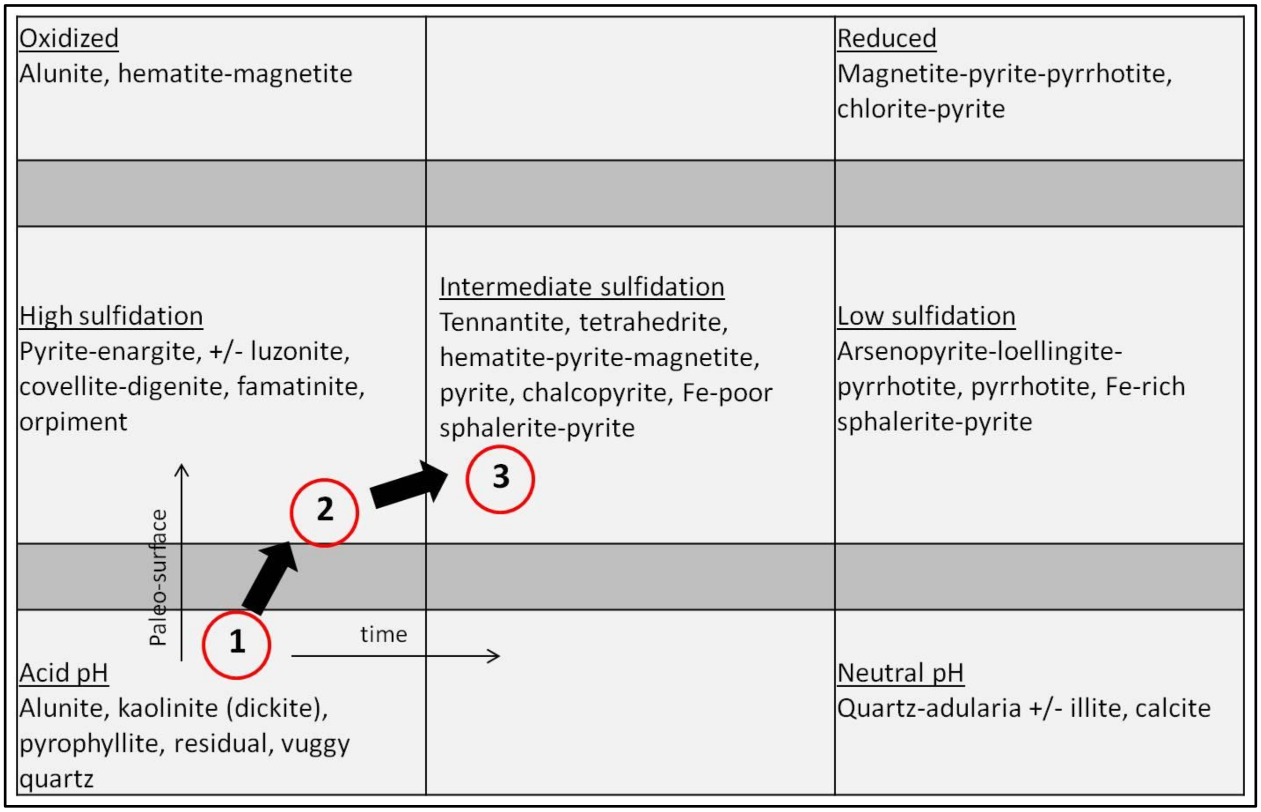
The transition from high- to intermediate-sulphidation state is thought to define an evolving epithermal system as high-sulphidation state metal-bearing fluids cooled and interacted with host rocks as they moved vertically and laterally though the Yaxtché structure. This is depicted in Figure 8-1 with three stages of primary fluid evolution:

- Alteration and gangue mineral assemblages related to acidic magmatic–hydrothermal fluids created permeability through acid leaching (i.e. vuggy silica)
- High-sulphidation state mineral assemblages (namely enargite–luzonite–famatinite) and metal contents (copper–gold dominant) formed at lower elevations within the Yaxtché structure
- Transition of high- to intermediate-sulphidation state as metal-bearing fluids ascended and further interacted with host rocks. The final phase of fluid evolution was critical for precipitation of silver-bearing minerals as tennantite–tetrahedrite became stable.

Sillitoe and Hedenquist (2003) defined the following key features of intermediate-sulphidation systems:

- Intermediate-sulphidation deposits occur in calc-alkaline andesitic–dacitic arcs, although more felsic rocks can locally act as mineralization hosts
- The arcs typically display neutral to mildly extensional stress states
- Deposits form under acidic, oxidizing conditions within 1 km of the surface and between temperatures of 150º and 250ºC
- Deposits show a large range in metal content and characteristics and can vary along the spectrum from gold-dominant to silver-dominant mineralization
- Although there is a large range of sulphide and sulphosalt minerals, these are dominated by sphalerite with low FeS content, and include galena, tetrahedrite–tennantite, and chalcopyrite. Sulphide abundance can vary from 5–20 vol%

Figure 8-1: Diagnostic Minerals of Various States of pH, Sulphidation and Oxidation State Used to Distinguish Epithermal Ore-Forming Environments

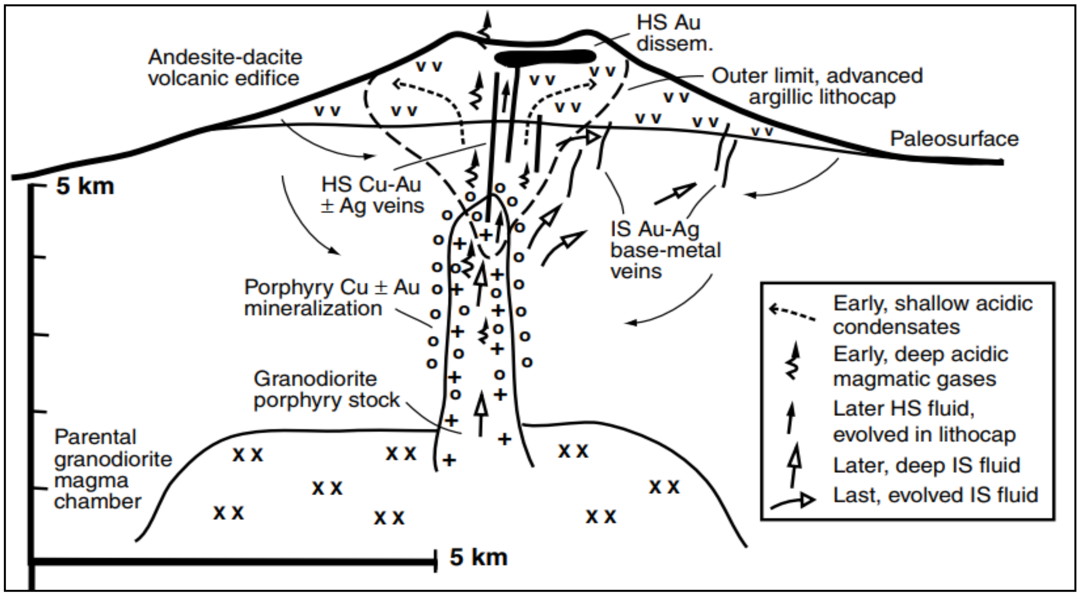


Source: Figure modified from Simmons et al., 2005

- Mineral assemblages typically contain Ag ± Pb, Zn (Au)
- The typical Ag:Au ratio is > 20:1
- Minor mineral associations can include Mo, As, Sb; may have associated tellurides
- Silica alteration can include vein-filling crustiform- and comb-textured veins
- Typical alteration assemblages include advanced argillic, alunite and kaolinite with pyrophyllite deeper in the system; the proximal alteration mineral is often sericite.

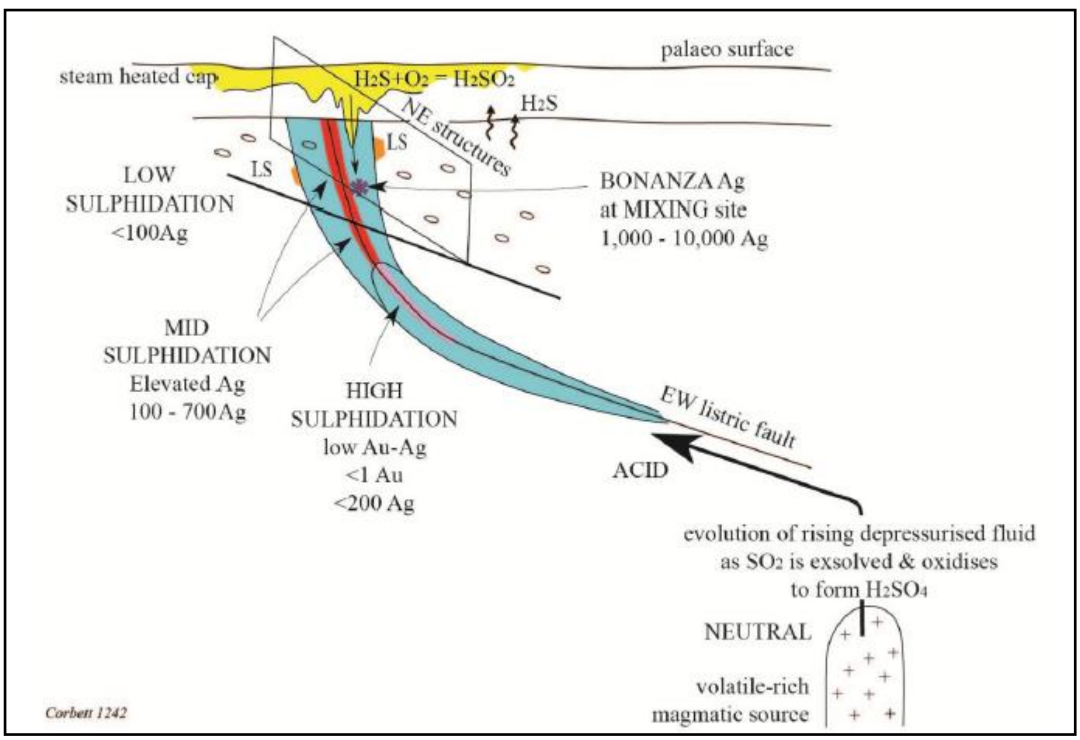
Figure 8-2 is a schematic diagram showing the general geological setting of high- to intermediate-sulphidation epithermal deposits. Corbett (2012) related the epithermal model to the Yaxtché silver deposit. Important aspects of this work include the proposed relationship between silver grade and sulphidation state of the metal-bearing fluids including zones of bonanza silver grades where collapsing steam-heated waters interacted with metal-rich fluids (Figure 8-3).

Figure 8-2: Schematic, Intermediate Sulphidation System



Source: Sillitoe and Hedenquist, 2003

Figure 8-3: Schematic Diagram of Yaxtché Hydrothermal Fluid Evolution



Source: Corbett, 2012

9.0 EXPLORATION

9.1 Grids and Surveys

Golden Minerals provided topographic control which was acquired by PDOP Servicios Topograficos (PDOP) during May–June 2008. PDOP used GPS Trimble R3 and Trimble ME Base Station instruments for the survey. The contour interval is 2 m, and the data are reported in the 1994 Argentinian Zone 3 GCS POSGAR coordinate system.

9.2 Geological Mapping

Surface mapping in the Quevar South area by Silex Argentina was completed at 1:5,000 and 1:10,000 scales during campaigns from 2006 through 2008.

Surface mapping by G. Cummins in 2010 was completed at a 1:2,000 scale and compiled at a 1:5,000 scale.

Silex Argentina personnel mapped surface trenches at a 1:500 scale between 2007–2008.

Geological mapping of the adit/decline in 2011 was completed at 1:50 and 1:100 scales and compiled at a 1:500 scale by Silex Argentina personnel.

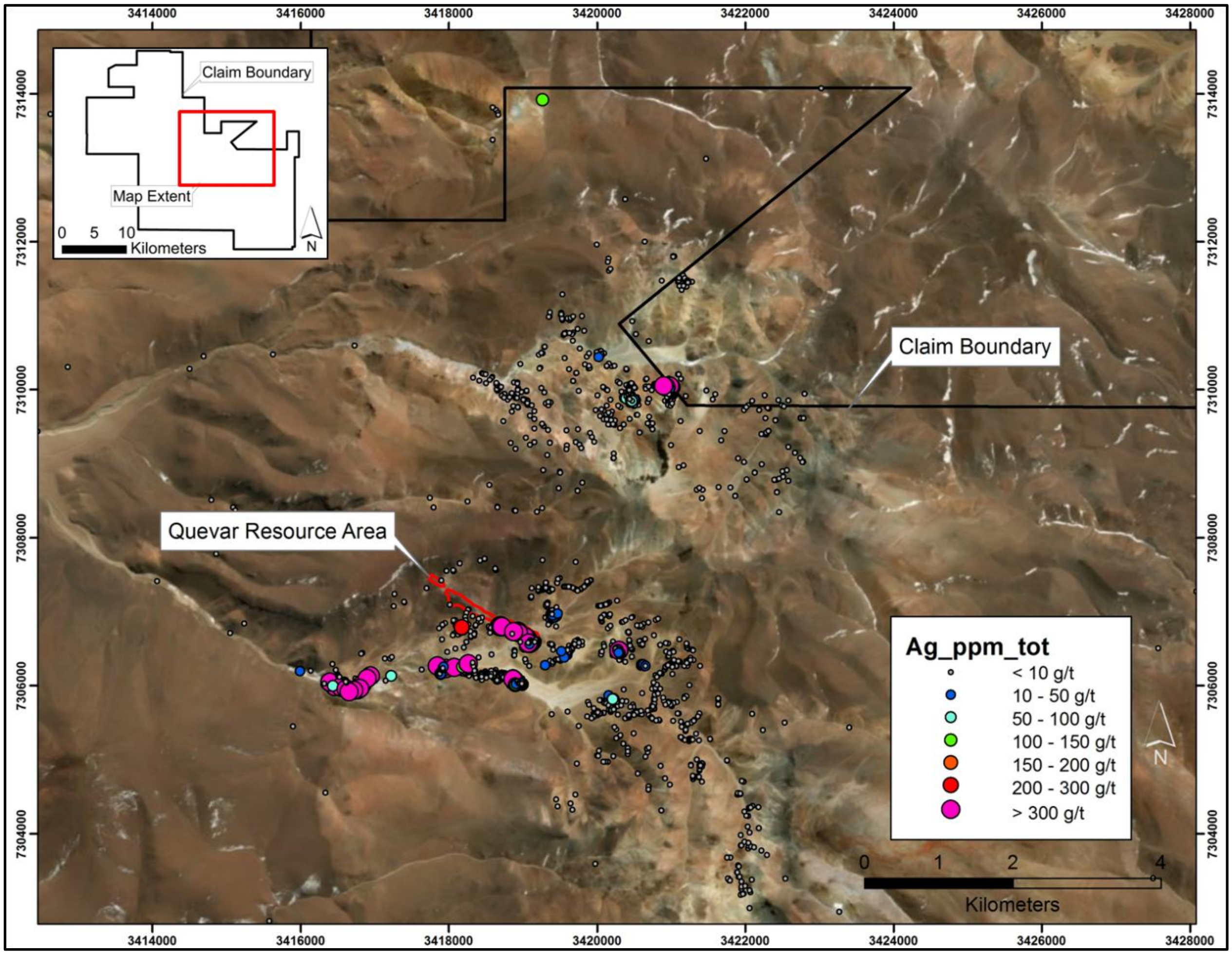
Geological mapping aided in the exploration effort by identifying the extent and zonations of that alteration related to mineralization by identifying the most favourable mineralization host unit—the epiclastic breccia volcaniclastic unit. Mapping the post-mineral volcanic units led to identification of prospective areas beneath unaltered surface exposures, especially in the Yaxtché West area.

A geological map of the Project area is included as Figure 7-4.

9.3 Geochemical Sampling

Exploration sampling was conducted by Silex Argentina from 2004–2013, with the majority of samples being collected between 2007–2008. The work programs included reconnaissance outcrop sampling using channel and select chip samples. Results from this sampling program were used to identify drill targets. In total over 3,100 surface samples have been collected from the Project area (Figure 9-1).

Figure 9-1: Rock Chip Sampling



Source: Golden Minerals, 2018

Note: Quevar Resource Area = Yaxtché deposit

9.4 Geophysics

A ground-based geophysical program was completed between December 2007 and February 2008, consisting of an IP/resistivity with 3D pole/dipole survey over Quevar South. This work was contracted to Quantec Geoscience Argentina S.A. based in Mendoza, Argentina. Lines were oriented north–south, with line separation at 200 m, and stations at 50 m intervals along lines. The instruments used were an Iris Elrec-6 receiver and an Iris VIP 3000 transmitter. The offset dipole array provided information to approximately 600 m depth at the centre of the survey.

Results of the IP survey have been reprocessed by EarthEx Geophysical Solutions Inc. Reprocessing of the data consisted of a new 3D inversion and interpreted cross-sections throughout the survey area. Results of the interpretation include:

- A well-defined high resistivity and high chargeability anomaly coincident with mineralization at Yaxtché Central. A cross-section showing the anomaly is provided in Figure 9-2)
- A conductivity high associated with mineralization at Yaxtché West
- Identification of targets with similar geophysical signatures to those identified at Yaxtché
- Recommendations for additional geophysical work to further define prospective areas.

High priority geophysical targets generated by Golden Minerals are summarized in Table 9-1 and the target locations are provided in Figure 9-3.

The various Yaxtché deposit zones and their locations are discussed further in Section 9.8. Locations of Yaxtché West and Yaxtché Central are included in the figures in Section 10.

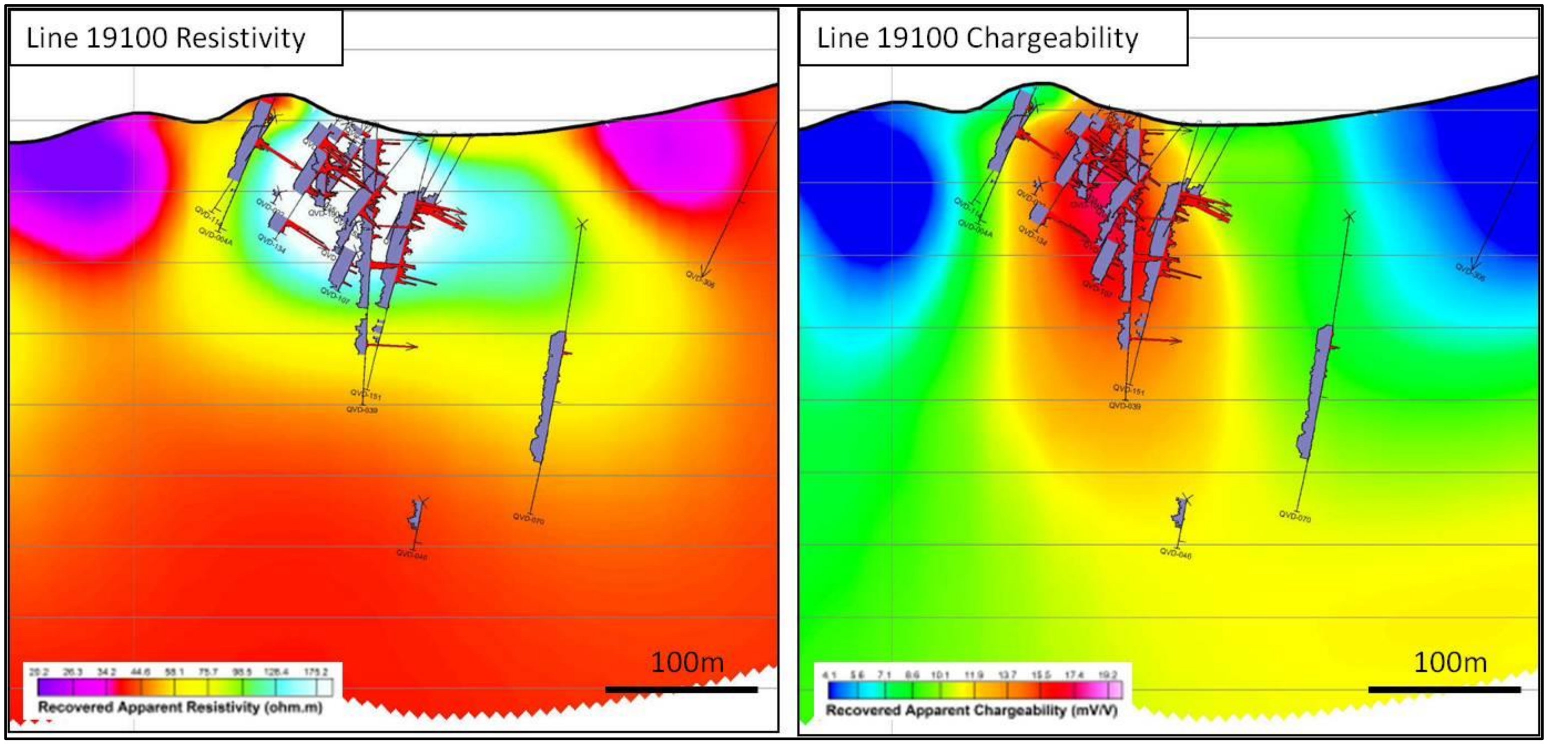
9.5 Trenching

Trenching was undertaken in 2007 and 2008, using a backhoe. Some encouraging results were returned; however, the method was slow, sometimes encountered thick overburden, and was discontinued.

In 2007, 16 trenches were excavated (four at Quevar North and 12 at Quevar South) with the aim of identifying and extending the known mineralized areas.

In 2008, approximately 2,800 m of trenching was completed in the Quevar South area with seven trenches targeting the Copán structure and 14 in the Yaxtché area. Three trenches returned elevated silver values, two at Yaxtché, and one in the northeast Yaxtché area.

Figure 9-2: Resistivity and Chargeability Anomalies Associated with the Yaxtché Central Deposit



Source: Golden Minerals, 2018

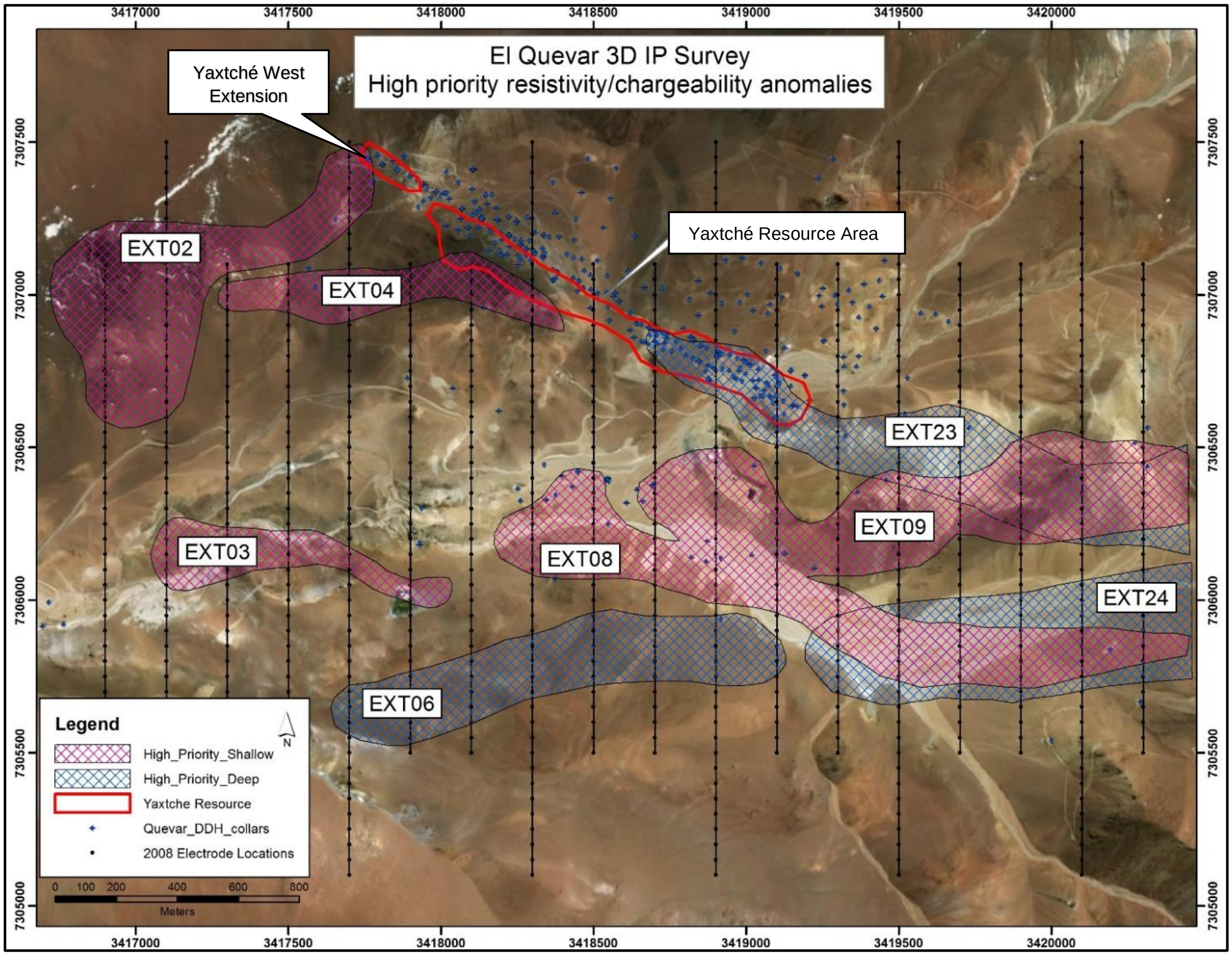
Note: Figure shows the resistivity and chargeability anomalies associated with Yaxtché Central. Grey drill hole histograms represent alteration intensity, and red histograms represent g/t silver assays.

Table 9-1: Geophysical Targets

Target Zones	Line Numbers	Description
EXT02	16900–17700	A shallow, pervasive, strongly resistive area with associated anomalous chargeability present in the northwestern corner of the survey area.
EXT03	17100–17900	A well-defined resistive trend sits at shallow to moderate depth, with a strong chargeable bullseye on line 17500.
EXT04	17300–18300	A resistive and chargeable trend that connects EXT02 to Yaxtché. The trend includes a chargeable bullseye on line 17700, in a conductive area.
EXT06	17700–19100	Deep chargeable feature in a mainly conductive area below a resistive cap, similar to the signature in the down-plunge area of the Yaxtché deposit.
EXT08	18300–20300	Strongly resistive trend with chargeable feature that plunges away from the resistive feature. This well-defined trend connects the Copán and Mani prospects and has some historical drilling.
EXT09	18700–20300	A discrete resistive trend at shallow to mid-depth correlates with chargeable bullseye features. The trend lies north of the Copán trend and to the south of the Yaxtché trend. It is well defined and continues east toward the Argentina prospect.
EXT23	18700–20300	Deep chargeable feature from east end of grid near the Argentina prospect. In places correlates with a resistive feature that shows some indication of dip. May be the connecting trend between Yaxtché and Argentina.
EXT24	19300–20300	Deep chargeable feature coming from east end of grid near the Argentina prospect. Appears to connect EXT08 and EXT06 and could be related to the Copán, Mani, and Vince prospects via EXT08.

Note: Prospect locations mentioned in the table are shown in Figure 9-3.

Figure 9-3: Quevar Interpreted Geophysical Targets



Source: after Golden Minerals, 2018

9.6 Decline/Adit

Information in this sub-section is summarized and updated from Pincock, Allen and Holt (Gates, and Horlacher, 2012).

In 2011, Golden Minerals completed installation of a decline (inclined adit) to access the eastern part of the Yaxtché zone and to investigate the continuity of the mineralization by drifting, channel sampling, and bulk sampling.

The decline (main ramp) was driven east then northward 260 m to the 4,774 m level. Exploration drifts were completed on mineralized structures and an exploration decline was driven at ~300°

azimuth (northwest) from the main ramp along the trend of and beneath the main Yaxtché mineralized structure. The exploration decline was stopped approximately 350 m west of the main ramp in an area of poor ground conditions (clay alteration). In total about 1,250 lineal metres of ramp, decline, and drifts were completed. No underground core drilling was undertaken.

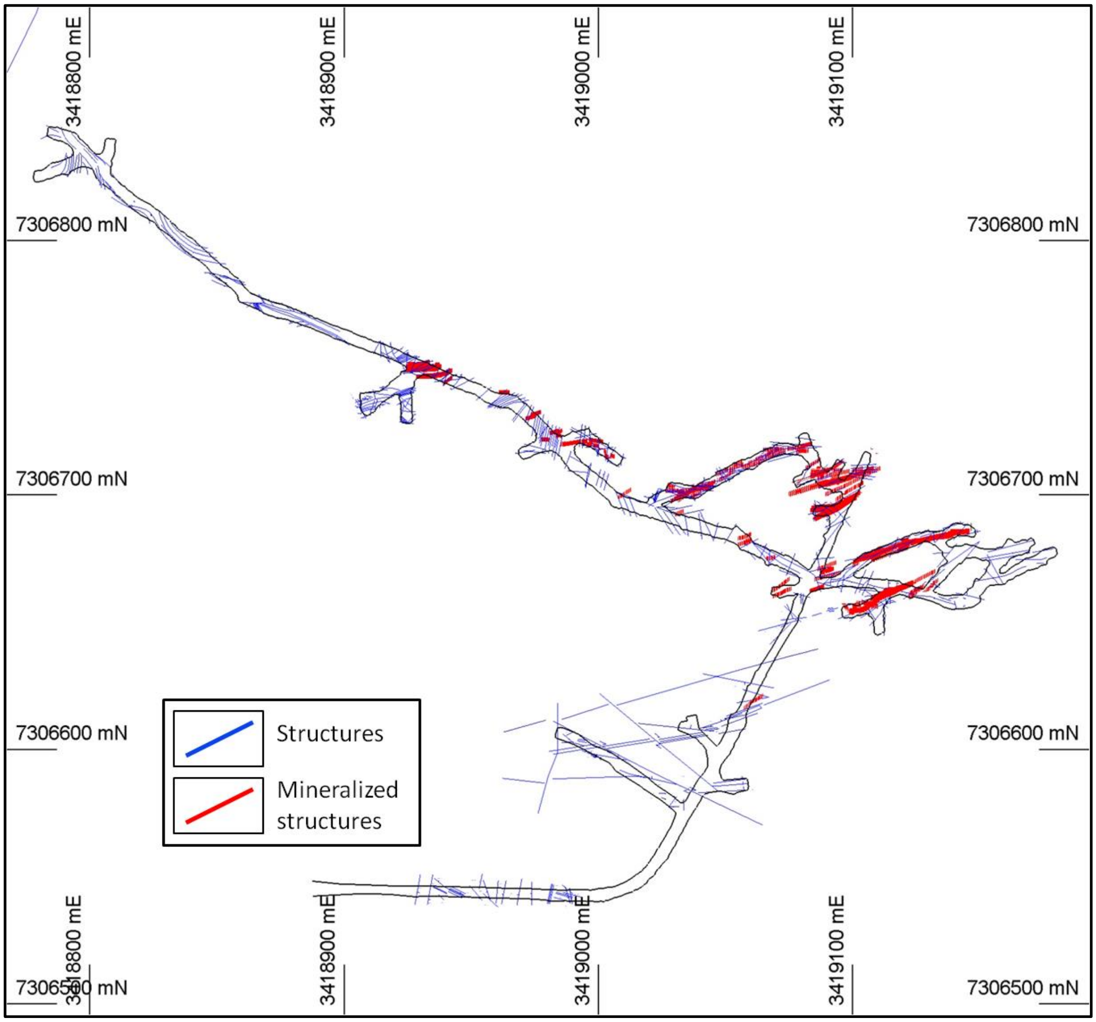
Geological, structural and mineralization mapping were completed at 1:50 and 1:100 scales that were compiled at a 1:500 scale (Figure 9-4).

Golden Minerals stockpiled and sampled the muck piles produced from each blasted round as the exploration drifts advanced.

Drifts were a nominal 4 x 4 m with each shot advancing the face approximately 3 to 4 m. The muck generated by each round was hauled to the surface. Visually-mineralized rounds were stockpiled in discrete, numbered piles which in total comprised approximately 20,000 t of material in 165 piles. Figure 9-5 shows the location and grade of the underground bulk samples. Each pile averaged approximately 121 t. Golden Minerals personnel sampled the stockpiles by digging 4 to 8 channels down the flank of each pile, and the material from each channel was bagged and sent for analysis. The average silver grade for all stockpiles was 117 g/t.

The exploration adit was designed for future production access and was therefore driven below the main mineralized zone. The higher-grade mineralized material encountered in the adit is hosted in narrow (<0.5 m wide) northeast-trending, near-vertical veins shown in red in Figure 9-4. Approximately 40% of the material from the adit was visibly mineralized and stockpiled. The sulphide material from these stockpiles has since been placed in clay-lined trenches to mitigate any possible acidic runoff from oxidation of the pyrite contained in the material.

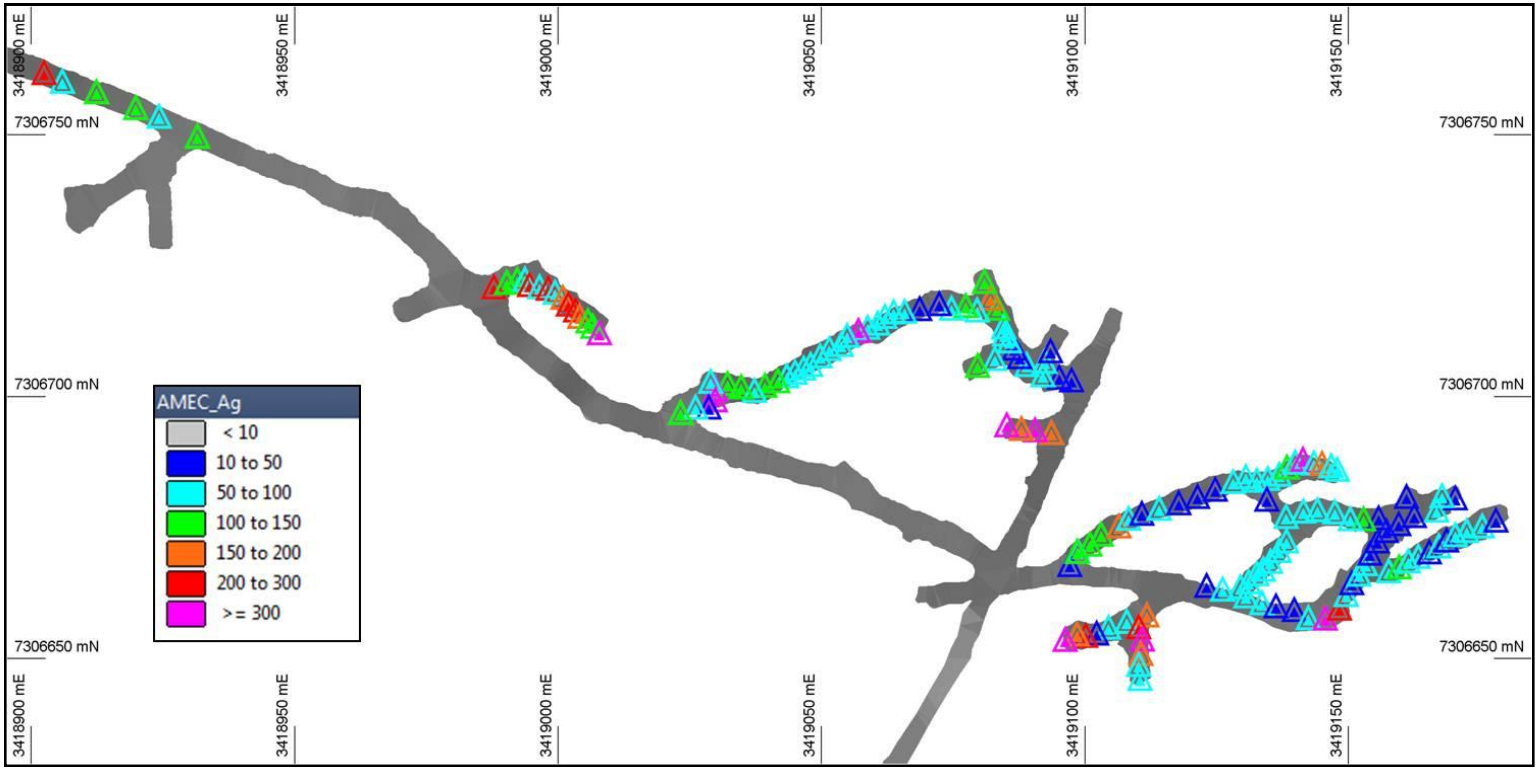
Figure 9-4: Results of Underground Structural Mapping



Source: Golden Minerals, 2018.

Note: Grid north is true north.

Figure 9-5: Plan Map Showing Location and Silver Grade of Underground Bulk Samples



Source: Golden Minerals, 2018

Note: Silver values shown in g/t. Grid north is true north.

9.7 Petrology, Mineralogy, and Research Studies

In 2008, Apex Silver submitted 24 samples from six drill holes in the Yaxtché structural zone to Brockway and Franquesa Consultores based in Santiago, Chile, for petrographic and reflected light microscopy work. Host rocks were identified as lithic tuff, volcanic breccia and altered volcanic breccia. Minerals identified in reflected light included pyrite, sphalerite, enargite, tennantite–tetrahedrite, covellite, pyrargyrite, chalcopyrite, galena, native silver and argentite. Fourteen of the 24 samples had additional electron microprobe work for confirmation of mineral species present and further identified argentojarosite and plumbojarosite.

In 2009, petrological and mineralogical examination of eight drill core samples from two diamond drill holes were analyzed by Dr. B.J. Barron, a consulting petrologist. The suite of samples was collected from drill holes QVD-036 and QVD-041, both drilled at the eastern end of the Yaxtché Central area. QVD-036 was drilled within the near-surface mineralized area of the Yaxtché structure, whereas QVD-041 was drilled approximately 200 m northeast and intersected the structure below the primary silver mineralization at Yaxtché Central.

X-ray diffraction (XRD) and field portable spectrographic analyses (PIMA) were reported for the same suite of samples by Lantana Exploration in 2009. The main minerals identified were: quartz, plagioclase feldspar, K feldspar, smectite, illite, kaolinite, dickite, calcite, alunite, pyrite, enargite, and barite. Results indicated that "*the silicate, sulphide, and sulphate mineral components and assemblages are consistent with alteration types that occur in high sulphidation systems*" (Camuti, 2009).

In 2010, 28 samples from 21 holes along the Yaxtché structure were submitted to Applied Petrologic Services & Research in Wanaka, New Zealand. The study concluded that "*gangue and mineralization mineralogy at Yaxtché are indicative of a high sulfidation epithermal system and chemical zonation defines a trend of decreasing sulfidation state as the ore-bearing fluids traveled upwards in a northwesterly direction along the Yaxtché structure*". Additional findings included (Coote, 2010):

- Petrological studies of diamond core identified silver-bearing and bismuth-rich sulphosalts related to a lateral and vertical variation in the sulphidation state as defined by the distribution of hypogene enargite–luzonite and tennantite–tetrahedrite
- Alteration and mineralization are developed locally in hydrothermally-brecciated and more extensively in tectonically shear/fragmented dacite/rhyodacite lithic fragmental textured rocks with a compositional and textural variation to indicate the rocks comprise a mixture of epiclastic and pyroclastic rocks and possible high-level intrusion breccias. The presence of eutaxitic lithic textures support the interpretation of pyroclastic rocks being present along the length of the Yaxtché structure

- Pervasive quartz, alunite, kaolin clay (locally dickite), and alunite together with pyrite and rutile define the acidic hydrothermal alteration. The crystallinity of the hydrothermal wall rock replacement and fracture/cavity-fill minerals together with the composition and morphology of the fluid inclusions in the hydrothermal quartz indicate wall rock interaction with hydrothermal fluids of pH less than four and temperatures between 200 and 230ºC
- Abundant enargite, luzonite, tennantite, and tetrahedrite intergrown with the acid alteration mineralogy defines a high sulphidation epithermal system. Native gold is intergrown with both enargite–luzonite and tennantite–tetrahedrite. Silver mineralization is mostly in the form of variably silver-rich, complex Ag–Cu–Sb–Pb–Bi sulphosalts that are associated with enargite–luzonite and tennantite–tetrahedrite and related acid alteration mineralogy. Zinc mineralization is defined by sphalerite mostly occurring as intergrowths with tennantite–tetrahedrite together with minor to trace amounts of argentite
- The distribution of silver relative to copper can be related to a spatial and temporal chemical zonation within the high-sulphidation system along the Yaxtché structural trend as defined by the distribution of enargite–luzonite and tennantite–tetrahedrite. The distribution of enargite–luzonite and tennantite–tetrahedrite can be interpreted in terms of a decrease in sulphidation state of hot acid fluids with time and elevation as they travelled upwards and in a north-westerly direction along the Yaxtché structure
- The complex geochemistry of the high-sulphidation system, including lead, zinc and silver, might in part be the result of remobilization of metals from a pre-existing mineralized source by hot acid fluids themselves entraining metals of magmatic source.

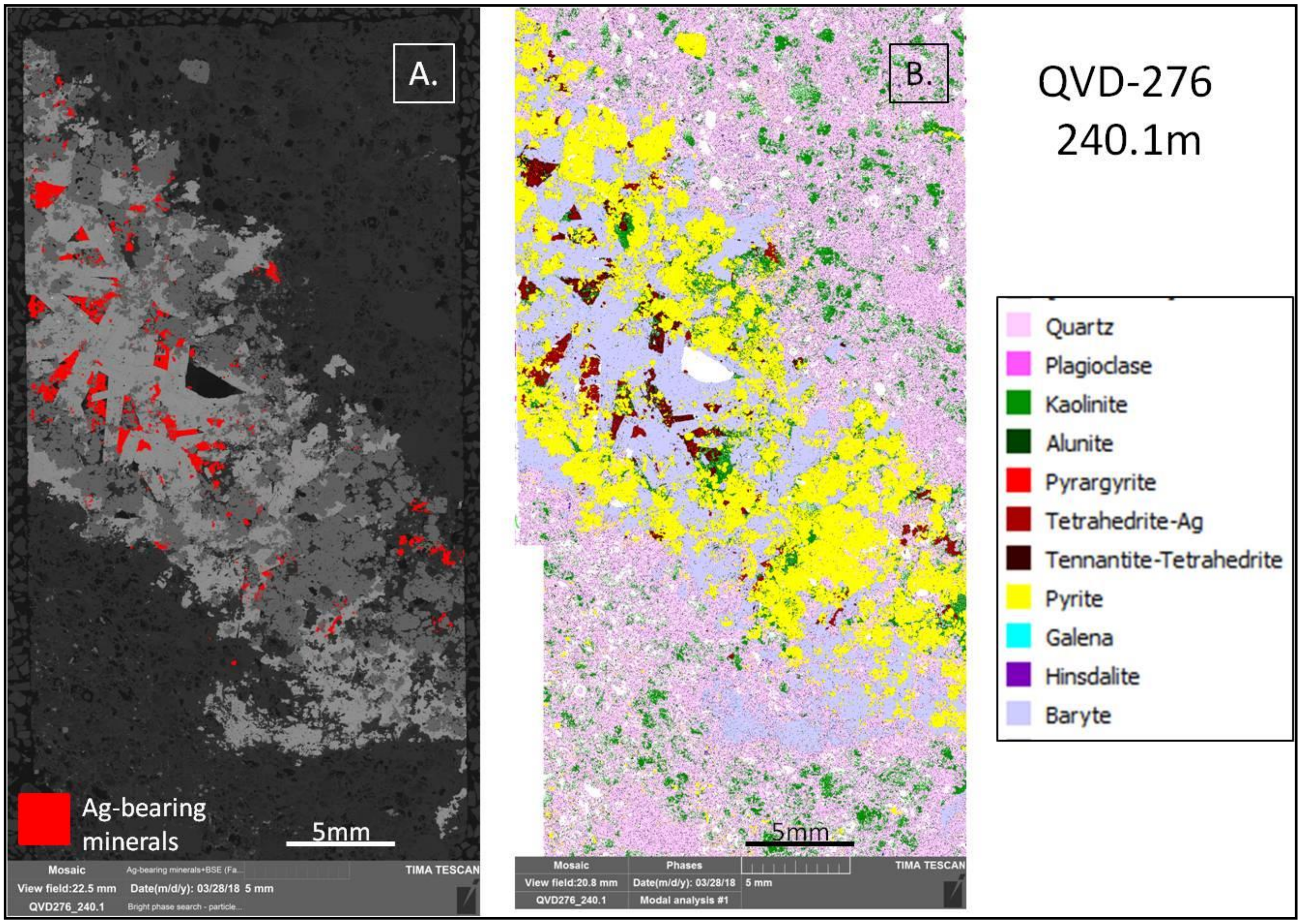
Thirteen polished sections were prepared at Spectrum Petrographics in Vancouver, Washington. The sections were taken from mineralized intervals from seven drill holes along a single cross-section from Yaxtché West.

The goals of the current study were to:

- Quantify the mineral assemblages for intervals with varying metal contents found at different elevations within the Yaxtché structure
- Provide paragenetic information between different minerals and mineral assemblages.

An image from this work is provided in Figure 9-6.

Figure 9-6: Automated Mineralogy of QVD-276 (preliminary results)



Source: Golden Minerals, 2018

Note: A. back scatter image, B. false colour mineral map.

10.0 DRILLING

10.1 Introduction

Two drill programs were completed by Fabricaciones Militares and BHP-Utah Minerals International in the 1970s. Six to seven drill holes appear to have been competed, but meterages are not known. There is no other available information on these programs.

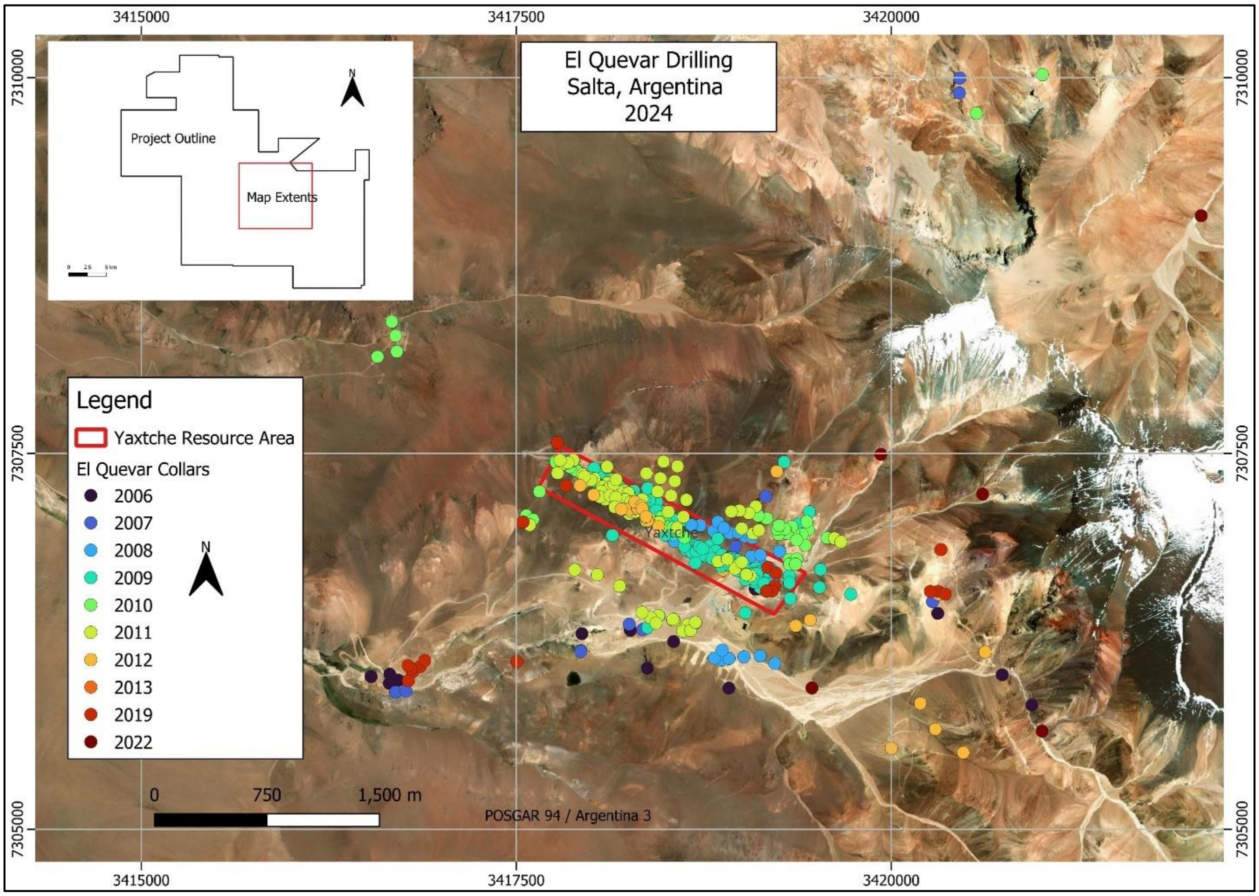
Apex Silver and Golden Minerals completed drill campaigns from 2006–2013 (Table 10-1). These programs total 417 holes for 104,163 m with 389 holes drilled on or around the Yaxtché deposit.

Figure 10-1 is a drill collar location plan that shows all drilling within the Property. The 2019 and the 2022 drill holes did not penetrate the current resource model.

Table 10-1: Drill Program Summary Table for Property

Year	Company	Number of Drill Holes	Meters Drilled
2006	Apex Silver	19	2,377
2007	Apex Silver	19	2,482
2008	Apex Silver	43	10,651
2009	Apex Silver	114	23,111
2010	Golden Minerals	61	19,272
2011	Golden Minerals	110	34,541
2012	Golden Minerals	24	5,963
2019	Golden Minerals	19	3,003
2022	Barrick	5	1,320
Total		**414**	**102,720**

Figure 10-1: Regional Drill Hole Location Plan



Source: Golden Minerals, 2024

10.1 Drill Methods

Table 10-2 summarizes the drilling companies that completed the core drilling, where known.

Core has primarily been drilled at HQ size (63.5 mm core diameter). Occasional reductions to NQ size (47.6 mm) occurred in areas of poor ground conditions. Two drill holes, QPD-01 and QPD-02, of PQ size (85 mm diameter) were completed in 2011.

Table 10-2: Drill Companies

Year	Drilling Company
2006	Major Perforaciones S.A.
2007	Bolland Minera S.A.
2008	Patagonia Drill
	Boart Longyear
	Falcon Drilling Ltd.
2009	Boart Longyear
2010	Major Perforaciones S.A.
2011-2012	Major Perforaciones S.A.
2012-2013	Major Perforaciones S.A.
2019	Eco Drilling S.A
2020	Hidrotec S.A

10.2 Logging Procedures

10.2.1 2006–2008 Drill Campaign

Information in this sub-section for the 2006–2008 drill campaigns is summarized from SRK (Mach, et al., 2009).

Core was placed in wooden boxes at the rig and moved to the core shed under the supervision of an operations chief or a technician. The core was either in the custody of the drilling contractor or Silex Argentina at all times.

The technician recorded hole number, start and end intervals, and marked up metre intervals on the core boxes. Geotechnical information such as recovery, rock quality designation (RQD) and mechanical and physical fracture frequency was recorded.

Geological logging was completed on paper sheets and later transferred to an electronic database. The paper log had sections for comments and a graphic log with a separate area for drawing fractures. Mineralization, alteration and alteration intensity were recorded on the log sheet and there was an area for sample interval, sample number and analytical results. The geologist marked the core for any additional observations including PIMA measurements.

A paper file was maintained for each stored drill hole with a checklist for items that must be completed for every hole and included in the file. This included a hole summary, geological log, geotechnical log, analytical results, drill reports, certificate from the surveyor, photographs, downhole survey information and density measurements.

Core was photographed.

10.2.2 2009 Drill Campaign

There are no reported differences in the logging procedures for the 2009 drill programs to those described for the 2006-2008 procedures reported by SRK (Mach et al., 2009).

10.2.3 2010 Drill Campaign

There are no reported differences in the logging procedures for the 2010 drill programs to those described by SRK (Mach et al., 2009).

10.2.4 2011–2012 Drill Campaign

There are no reported differences in the logging procedures for the 2011–2012 drill programs to those described by SRK (Mach et al., 2009). Lithology and alteration codes evolved in the 2011–2012 campaign as an effort was made to reconcile lithologies and alteration observed in surface mapping (Cumming, 2010) to the lithologies and alteration encountered in core.

10.2.5 2012 Re-Logging Campaign

Between April and August of 2012, 113 drill holes in the Yaxtché zone were re-logged on 29 cross sections spaced about 50 m apart. The purpose of the re-logging program was to standardize logging codes and facilitate reinterpretation of the Yaxtché deposit. The drill database was updated with geological codes based on the re-logging effort. Generation and interpretation of geological and geochemical cross sections at 1:1,500 scale was completed. as well as level plan maps in order to show the trend in the distribution of mineralization.

10.2.6 2012–2013 Drill Campaign

Methodology of drill core handling, logging and sampling followed the procedures described from the 2006–2008 campaign with the exception that PIMA spectral analysis was not completed, nor were collar survey certificates included in the drill hole documentation. The collar coordinates of these exploration drill holes were acquired using handheld global positioning system (GPS) units. No drilling in this campaign was located in the Yaxtché deposit. Lithology and alteration codes followed the units defined in the 2012 re-logging campaign.

10.2.7 2019 Drill Campaign

Methodology for drill core handling and sampling followed the procedures utilized in 2013. Drill logging was recorded digitally using Micromine Geobank Mobile logging software. Once the logging was validated and accepted by the geologist the Geobank software generated a CSV. File which was transferred to Mexico via cloud sharing software. The raw CSV, logging data was uploaded into Micromine Geobank drillhole database where it was validated by the database manager and later merged and reconciled with the associated assay results of the sampled core intervals. An independent contractor was contracted to survey final collar locations using a DGPS unit with base station and a report was provided to validate the information delivered.

10.2.8 2022 Drill Campaign

Methodology for this drilling campaign is assumed to be similar to the previous campaigns.

10.3 Core Recovery

The average core recovery for all Property drill holes averages 93.9% for over 30,000 measured intervals and is consistent with that reported in earlier technical reports.

10.4 Collar Surveys

10.4.1 2006–2008 Drill Campaign

Information in this sub-section for the 2006–2008 drill campaigns is summarized from SRK (Mach et al., 2009).

Drill sites were located using a handheld GPS receiver by a Silex Argentina technician. At the completion of the drill hole, the collar location was verified by the operations chief using a GPS instrument. Yaxtché drill hole collars from the 2006–2008 campaign were surveyed by PDOP. PDOP used a Trimble model R3 GPS and a Trimble model M3 total station for drill collar surveying. The collar coordinates were provided in the POSGAR 94 coordinate system using a Gauss Kruger projection.

10.4.2 2009 Drill Campaign

Drill sites were located using a handheld GPS receiver by a Silex Argentina technician. At the completion of the drill hole, the collar location was verified by the operations chief using a GPS instrument. Yaxtché drill hole collars from the 2006-2008 campaign were surveyed by PDOP

Servicios Topograficos (PDOP). PDOP used a Trimble model R3 GPS and a Trimble model M3 total station for drill collar surveying. The collar coordinates were provided in the POSGAR 94 coordinate system using a Gauss Kruger projection.

10.4.3 2010 Drill Campaign

The 2010 collar survey protocols remained the same as in 2009 with the exception that the surveys were performed by Golden Minerals personnel using a Trimble model R3 GPS and a Trimble model M3 total station for drill collar surveying rather than using an outside contractor. No survey certificates were placed in the drill hole files; however, the surveyed locations were entered into the database.

10.4.4 2011–2012 Drill Campaign

The 2011–2012 collar survey protocols remained the same as in 2009, with the exception that the surveys were performed by Golden Minerals personnel rather than an outside contractor. The same survey equipment was used, collar locations were entered into the database, but no survey certificates or documentation were placed in the drill hole files.

10.4.5 2012–2013 Drill Campaign

Exploration drill holes for the 2012–2013 campaign were outside of the Yaxtché resource area and the collar coordinates were acquired using handheld GPS units.

10.4.6 2019 Drill Campaign

Drillholes in the 2019 campaign were positioned using hand held GPS. At the end of the drilling campaign an independent contractor was sourced to survey the final collar location using a DGPS unit with base station. A collar location report was provided to certify the validity of the data.

10.5 Downhole Surveys

10.5.1 2006–2008 Drill Campaign

Information in this sub-section for the 2006–2008 drill campaigns is summarized from SRK (Mach et al., 2009).

After completion of a drill hole, the drilling contractor performed a downhole survey. During the 2008 drilling program, Falcon Drilling Ltd., provided a Sperry Sun and Patagonia Drill provided a Reflex Photobor. Downhole surveys were taken at 25 m intervals and checked by an operations chief.

10.5.2 2009 Drill Campaign

Downhole surveys were performed on all drill holes and are reported to have generally used a Reflex Photobor and in some cases a Sperry Sun. Readings were made at 25 m intervals.

10.5.3 2010 Drill Campaign

Downhole surveys were performed on all drill holes and are reported to have generally used a Reflex Photobor and in some cases a Sperry Sun. Readings were made at 25 m intervals.

10.5.4 2011–2012 Drill Campaign

Downhole survey instrumentation or reading intervals procedures are reported follow the same procedures used for the 2009–2010 drill programs.

10.5.5 2012–2013 Drill Campaign

Major Perforaciones reportedly used a Reflex magnetic survey tool to collect downhole survey readings at 25 to 50 m intervals.

10.5.6 2019 Drilling Campaign

Downhole surveys were performed on every hole using a Reflex magnetic survey tool. Surveys were taken every 30m where possible. The digital survey data was collected by the geologist directly from the Reflex instrument and converted into CSV files using Reflex proprietary software.

10.5.7 2022 Drilling Campaign

Downhole surveys were performed using a Stockholm Precision Tools gyroscope.

10.5.8 Magnetic Declination

The general protocol was that drill holes and downhole surveys used magnetic north, with no correction for declination.

Wood recommends that all survey information be reviewed to ensure that the data are being presented on the same basis.

Throughout the 2006–2014 period of exploration drilling, magnetic declination at the Project changed from 4.2° west in 2006 to 5.7° west in 2014 and was 6° west in 2019.

10.6 Sample Length/True Thickness

Most holes in the Yaxtché deposit were drilled so as to cross-cut the mineralized zone at a high angle in terms of dip, and nearly all holes were at right angles to the strike of the mineralized Quevar Breccia. The average angle of intercept was approximately 80°.

Pincock Allen and Holt (Gates and Horlacher, 2012) observed that drill collar azimuths were variable, as follows:

- "158 holes (58%) were oriented on an average azimuth of 209°
- 69 holes (25%) were oriented at an average azimuth of 155°.

The remaining 43 holes ranged from vertical (15) to 180° azimuth to variable azimuths.

The principal azimuth of 209º was oriented perpendicular to the strike of the mineralized Quevar Breccia (300° az)".

In 2011, Golden Minerals changed the drilling azimuth to 155° perpendicular to the 60–70° strike of extensional structures noted in the adit and associated underground workings. It was later noted that the drill holes drilled on the 155° azimuth encountered the mineralized structure at greater depth and had the same mineralized true thicknesses, indicating that holes with the 155° azimuth were cutting the principal structure on an oblique angle (Gates and Horlacher,, 2012).

Due to the nature of the mineralization occurring as shoots and veins, the true width of the mineralization will vary both along strike and in the down dip direction. In areas where the strike and dip of the mineralization are well established, a true width for the mineralized intersection may be estimated. However, in areas of poor surface exposure or where there is no drilling or poor drilling, the true width of the mineralization cannot be estimated.

10.7 Summary of Drill Intercepts

A drill section through the Yaxtché deposit illustrating the typical drill orientations in relation to the mineralization is illustrated in Figure 7-6. A plan view of the drill results for the Yaxtché West extension is illustrated in Figure 25-1.

Table 10-3 provides examples of the drill intercepts encountered in the Yaxtché deposit. All drill holes are within the mineralized envelope used in Mineral Resource estimation.

10.8 Reliability of Drilling Results

QP Kim has not identified any drilling, sampling or recovery factors that could materially impact the accuracy and reliability of the results.

Table 10-3: Drill Intercept Summary Table, Selected Intercepts

Drill Hole ID	Easting (X)	Northing (Y)	Elevation (Z)	Azimuth (degree)	Dip (degree)	Total Hole Depth (m)	Intercept Depth From (m)	Intercept Depth To (m)	Drilled Intersection Length (m)	Approximate True Thickness (m)	Avg. Grade (g/t)
QVD-077	3,418,823	7,306,864	4,661	94.8	87.7	231.6	188.6	200.6	12.0	9.0	336
QVD-129	3,419,027	7,306,692	4,771	208.0	62.2	82.0	57.0	82.0	25.0	24.4	57
including							61.0	63.0	2.0	1.7	152
							69.0	74.0	5.0	4.3	146
QVD-133	3,419,074	7,306,664	4,836	208.4	53.0	107.0	6.0	10.0	4.0	4.0	405
QVD-177	3,418,023	7,307,182	4,617	204.6	65.5	281.0	252.0	256.0	4.0	3.8	216
QVD-196	3,418,143	7,307,191	4,542	218.1	78.8	383.6	335.7	340.6	5.0	4.4	180
QVD-264	3,418,179	7,307,174	4,586	209.2	72.3	404.0	295.0	310.0	15.0	13.9	521
including							298.0	304.0	6.0	5.1	830
							306.0	309.0	3.0	2.6	567
QVD-301	3,418,420	7,306,991	4,680	157.2	64.4	327.0	199.0	217.0	18.0	15.5	34
QVD-343	3,418,161	7,307,168	4,617	165.4	64.5	402.0	267.0	271.0	4.0	3.6	154
QVD-343	3,418,165	7,307,151	4,580	165.7	64.3	402.0	308.0	312.0	4.0	3.6	245
QVD-348	3,418,224	7,307,031	4,551	163.4	65.5	389.3	364.3	370.3	6.0	5.3	284
QVD-361	3,418,307	7,307,064	4,670	158.8	71.4	320.4	221.3	233.3	12.0	10.3	693
including							226.3	228.3	2.0	1.7	676
							230.3	233.3	3.0	2.6	1,269

11.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

11.1 Sampling Methods

11.1.1 Core Sampling

The logging geologist was responsible for selection of sample intervals and samples for density measurements.

The geologist logging the core marked the sample intervals on the core. Generally, the sample intervals were a nominal 1 m length within the mineralized zone but could be longer or shorter due to a lithological boundary. Outside the mineralized zone, samples were typically 2 m in length. The entire mineralized zone was sampled, and 2 to 3 m shoulder was sampled on either side of the mineralized zone. Silex Argentina personnel did not always sample the entire length of the drill hole. In some drill programs such as the 2012 drill program, a 10 to 15 m shoulder was sampled; in others such as the 2009 program, the shoulder interval was 2 to 3 m.

If necessary, the geologist could also draw a longitudinal cut line on the core to guide the sample technician in splitting the core. Drill core was split using a core saw in competent zones and a trowel in broken zones.

11.1.2 Adit Sampling

Golden Minerals conducted an extensive 1 m chip–channel sampling program in the adit/decline and associated underground workings. The sampling consisted of chip–channels cut at the mining face, in the roof, ribs, and fault zone as exposed in the workings.

Bulk samples were also collected for each face advance as described in Section 9.6.

11.2 Density Determinations

SRK (Mach et al., 2009) noted that at the time, there had been 260 density determinations completed on core samples from 17 drill holes using the water displacement method.

During 2009, Golden Minerals measured an additional 600-plus samples from previous and current drilling, most of which were from outside the Yaxtché Central Zone, using the same methodology (Barnard and Sandefur, 2010). Chlumsky, Armbrust & Meyer noted that the measurement protocol used by Golden Minerals did not meet rigorous quality standards.

Chlumsky, Armbrust & Meyer was of the opinion that further work needed to be done to accurately determine the bulk densities of the various rock types. It was recommended that more rigorous procedures be used to ensure that samples are thoroughly dry and that volumes are accurately measured (e.g. by sealing cores in cellophane).

Chlumsky, Armbrust & Meyer prepared a scatter diagram, showing bulk density as a function of downhole distance below collar. There was no significant correlation between density and depth.

Micon (Lewis and San Martin, 2010) reported that Golden Minerals had updated and improved its density data with a new set of samples analyzed by SGS Peru S.A.C. (SGS Peru). A total of 190 samples from the mineralized zone were submitted for specific gravity testing in July 2010.

In 2018 Wood reviewed the density data spatially and statistically and created a density model that was used in the Mineral Resource estimate (see Section 14.4).

Density measurements were not taken in 2019 and are not evident in the 2022 logging procedures.

11.3 Analytical and Test Laboratories

Laboratories used during the drill and sampling campaigns are summarized in Table 11-1.

Table 11-1: Analytical and Preparation Laboratories

Year	Laboratory	Accreditation	Independent	Function
2006–2011; 2012–2013	Alex Stewart (Mendoza)	ISO 9001:2000	Yes	Sample preparation and analysis; check sampling for high-grade Ag samples
2006–early 2009, 2019, 2022	ALS Chemex (Lima)	ISO 9001:2000; Instituto Nacional de Normalizacion Chile ISO 17025.Of2005	Yes	Sample preparation and analysis
2009–2011	Acme (Mendoza)	IRAM – RI 9000-t 295 certification	Yes	Sample preparation and analysis
2010	SGS Peru (Lima)	ISO 9001; ISO/IEC Standard 17025 Guidelines	Yes	Sample analysis, density determinations
2012	American Assay Laboratories (Nevada)	ISO/IEC 17025:2005	Yes	Check laboratory for high-grade Ag samples

11.4 Sample Preparation and Analysis

11.4.1 Alex Stewart

The sample preparation procedure (P-5) consisted of the following steps:

- Receiving and checking sample identification numbers against submittal form
- Weighing
- Primary and secondary crushing to 80% passing 10 mesh
- Splitting in a riffle splitter to 800 g +100 g
- Grinding to 85% passing 200 mesh
- 200 g sample placed in a sample envelope.

The samples were analyzed for 39 elements by inductively coupled plasma (ICP); method ICP-MA-390) with four acid digestion of a 0.2 g sample. The lower and upper detection limits for silver in this package were 5 and 2,000 ppm, respectively. All samples were analyzed for silver and gold by fire assay of a 50 g sample with gravimetric finish for silver (method AG4A-50) and atomic absorption (AA) finish for gold (method Au450). The lower detection limit was 2 ppm for silver and 0.01 ppm for gold.

11.4.2 ALS Chemex

The sample preparation procedures (Prep-31) consisted of the following:

- Receiving and checking sample identification numbers against the submittal form
- Weighing
- Crushing to 70% passing 10 mesh
- Splitting to 250 g
- Pulverizing to 85% passing 200 mesh
- Placing sample in sample envelope.

Samples were analyzed for 33 elements by ICP (ME-ICP61) using four acid digestion, with lower and upper detection limits for silver of 0.5 and 100 ppm, respectively. The silver over-limits were analyzed by fire assay with AA finish (Ag-AA62) with lower and upper detection limits of 1 and 1,500 ppm, respectively. The resultant over-limits were analyzed by fire assay with gravimetric finish (AG-GRA22) with lower and upper detection limits of 5 and 10,000 ppm, respectively.

Gold was analyzed by fire assay with AA finish (Au-AA24) with lower and upper detection limits of 0.005 ppm and 10 ppm, respectively; gold over-limits were analyzed by fire assay with gravimetric finish (Au-GRA22), with lower and upper detection limits of 0.05 and 1,000 ppm, respectively. Over-limits of lead, zinc, and copper were analyzed by AA following a multi acid digestion.

11.4.3 Acme

The sample preparation procedures (R-200) consisted of the following:

- Receiving and checking sample identification numbers against the submittal form
- Weighing
- Crushing to 80% passing 10 mesh
- Splitting to 250 g
- Pulverizing to 85% passing 200 mesh
- Placing sample in sample envelope.

Samples were analyzed for 39 elements by ICP-mass spectrometry (MS) (Group 1DX) analysis. Sample splits of 0.5 g were leached in hot (95º C) aqua regia. The silver over-limits were analyzed by gravimetric finish (AG-G6-Grav) with lower and upper detection limits of 5 and 10,000 ppm, respectively. Gold was analyzed using method Au-GRA22, with lower and upper detection limits of 0.05 and 1,000 ppm, respectively. Over-limit samples of lead, zinc, and copper were analyzed by 7AR following a multi-acid digestion.

11.4.4 SGS

Less than 1% of the samples in the database were sent to SGS.

Samples were analyzed for 39 elements by ICP-MS (Group IDX) analysis. The silver over-limit analyses were analyzed by fire assay with gravimetric finish (AG-G6 -Grav) with lower and upper detection limits of 5 and 10,000 ppm. Gold was analyzed (Au-GRA22), with lower and upper detection limits of 0.05 and 1,000 ppm, respectively. Over-limit samples of lead, zinc, and copper are analyzed by 7AR with a multi-acid digestion.

11.5 Quality Assurance and Quality Control

No independent quality assurance and quality control (QA/QC) program was in place until drill hole QVD-043. The early analytical programs rely upon the internal Alex Stewart laboratory QA/QC program.

The QA/QC program instigated by Apex Silver could use two types of blanks, three types of duplicates, six precious metal standard reference samples (SRMs) and four base metal SRMs.

The QA/QC program used for surface samples (channel and select outcrop samples), consisted of a SRM, coarse blank, and pulp blank at a frequency of one per 50 samples or approximately 2%. For drill core, Apex Silver included one SRM every 20 samples (5%), a coarse duplicate every 20 samples (5%), a pulp duplicate every 20 samples (5%), a core duplicate every 50 samples (2%), and a pulp blank and coarse blank every 20 samples (5%).

Precious metals SRMs and coarse blank samples were site-specific. The precious metals SRMs were generated from material collected at the site and prepared by Alex Stewart. In Wood's opinion (Seibel et al., 2018), the site-specific SRMs were not created using industry-accepted practices, and thus should not be considered as true certified reference materials (CRMs) (see also discussion in Section 12.6.2). Wood selected almost 400 pulps and along with CRMs and blanks obtained from CDN Laboratories submitted the samples to ALS Chemex for analysis.

Coarse blank material was collected from a fresh dacite flow located approximately 3.5 km southeast of the camp. The flow is younger than the mineralization host at Yaxtché.

The fine blank material was purchased from Alex Stewart. The base metal SRMs were purchased from Geostats Pty Ltd. (Geostats) and were certified.

The QA/QC samples were inserted into the sample stream in two steps. At the El Quevar camp, coarse blanks and core duplicates were inserted into the sample shipment. The samples were taken to Salta by Apex Silver, and then shipped to either ALS Chemex or Alex Stewart for sample preparation. Each laboratory prepared the sample for analysis, after which all sample materials were returned to Silex Argentina's Mendoza office. Silex Argentina stored the reject materials, renumbered the samples, inserted the remaining QA/QC samples and submitted the pulps for analysis to the respective laboratories. Pulps prepared by ALS were returned to ALS for analysis and likewise pulps prepared by Alex Stewart were returned to Alex Stewart for analysis. The QA/QC samples submitted into the sample stream at this time included SRMs, pulp duplicates and pulp (fine) blanks.

The sampling completed under Golden Minerals continued with the same insertion rates and materials as the Apex Silver programs for both drill and underground sampling programs.

11.5.1 Results

QP Kim reviewed the reporting and analysis of the QA/QC program that was in place during the various drilling campaigns. The following summarizes those reports:

11.5.1.1 Pincock, Allen and Holt (2012)

Summary of Control Samples 2006-2011

- A total of 380 fine blanks and 1,283 coarse blanks were analyzed to test for cross-contamination from sample to sample during crushing and pulp separation. Of the 380 fine blanks assayed, only one sample was above 1 ppm Ag. Of the 1,283 coarse blanks assayed, 23 were above 1 ppm Ag. The results from the blank sample analysis indicated there was no contamination during the sample preparation stage
- Duplicate submission included 2,816 fine duplicate pairs, 1,424 coarse duplicate pairs, and 673 field duplicate pairs. A graphical check showed good correlation between original and duplicate samples analyzed for silver with the correlation coefficient R2-values ranging from 0.8756 to 0.9849. The three types of duplicate sample analyses that were routinely submitted by Silex Argentina showed acceptable levels of variance
- Silex Argentina SRM G997-5 was the only standard to stay within ±10% of the accepted value, based on graphical analysis. Analysis of the SRM STD-6 results show anomalous spikes likely due to laboratory errors or mislabelling. Ignoring the five outlier points, the graph of STD-6 displays good accuracy and precision over a long time period
- Review of the blank sample results does not indicate signs of sample cross-contamination during sample preparation
- Analysis of duplicates and SRMs suggest that silver assays are reasonably accurate and precise.

The analysis of blanks, duplicates and SRMs submitted by Silex Argentina to the laboratories was considered to provide positive indications that assay results from 2006 to 2011 were reliable and suitable for use in resource estimation.

There was a gap in Silex Argentina's submission of SRMs to the laboratories between approximately December 2009 and December 2011. Silex Argentina relied on internal control samples reported by Alex Stewart to assess QA/QC during this time.

Alex Stewart did not insert high-grade silver standards in the sample stream going to the fire assay-gravimetric analysis. Approximately 9% of the samples (~1,100) assayed were >200 ppm Ag, and did not have corresponding standards analyzed by fire assay gravimetric methods. The low to high-grade silver SRMs fell within their respective ±1 standard deviation.

To confirm the accuracy and precision of silver analyses on high-grade samples greater than 200 ppm Ag for the period December 2009 to August 2011 a total of 152 high-grade silver pulp samples were retrieved from storage in Argentina and forwarded to Minerals Exploration

Geochemistry (Reno) where the pulps were dried, blended and repackaged with new sample numbers. Three high-grade certified standards were inserted in the renumbered sample stream. Minerals Exploration Geochemistry forwarded 170 blinded splits to Alex Stewart and American Assay Laboratories in Reno. The high-grade check samples ranged from 200 to 9,500 ppm Ag, averaging 1,185 ppm with a median value of 642 ppm Ag. The samples were rerun for silver at the laboratories by fire assay-gravimetric on 25 g assay charges, necessitated by the shortage of material for some samples. The list of check samples with original analyses was kept confidential until the program was completed.

There was an acceptable correlation between the original assay value and the re-assay value from American Assay Laboratory, with an R2 value of 0.9205.

In addition, Minerals Exploration Geochemistry inserted three high-grade SRMs into the sample stream. SRM CU112 had one sample that fell just below two standard deviations of the 358.9 ppm accepted silver value and the other two SRMs fell within ±10% of the accepted value. The two internal SRMs, CU154 and OXQ75, inserted by American Assay Laboratory also fell within satisfactory upper and lower accepted ranges. In addition to the SRMs, American Assay Laboratory conducted 16 repeats of samples, and analysis of these samples revealed an R2 value of 0.9994.

A total of 170 high-grade samples were re-assayed by Alex Stewart and were compared to their original samples assayed. Original sample results showed good correlation with the re-assay sample results.

Three internal SRMs were inserted by Alex Stewart, and three by Minerals Exploration Geochemistry. All SRMs were within ±10% of their respective accepted values. Two of the three internal SRMs inserted by Alex Stewart also fell within ±10% of their respective accepted values. SRM 305-3 showed one sample falling below 10%. Alex Stewart assayed 18 duplicate pairs, and analysis of these samples revealed an R2 value of 0.9944.

11.5.1.2 Wood (2018)

During their site visit in 2018 Wood personnel selected 11 witness sample intervals, quartered the half core, and shipped the samples to the Alex Stewart laboratory in Mendoza Argentina. The silver assays recorded in the database were then compared to the silver assays received from the laboratory. The assays correlated within expected variances except for one assay pair where the high variance was attributed to difficulties in sampling the irregular patches of visible silver sulphides.

Wood personnel reviewed the QA/QC data supplied by Golden Minerals. The review focused on results obtained for SRMs, duplicates and blanks. There were no significant issues noted with the duplicate or blank QA/QC results.

A total of 472 samples (including CRMs and blanks) were submitted to ALS for analysis. Results of the re-sampling study agreed very closely to the previous silver assays.

The CRMs and blanks were obtained from Canadian Resource Laboratories Ltd, located in Langley, BC, Canada. The CRM results indicated acceptable assay accuracy was achieved by ALS and the blank samples did not indicate any signs of contamination during the analysis.

The results of the pulp submission confirm the previous results and provide sufficient QA/QC support for use of the analytical data in estimation of Mineral Resources.

11.6 Sample Security

The drill core is maintained in a facility at the El Quevar camp, before and directly after splitting. The overall facility has locked access and was under guard 24/7.

Older core was stored on pallets at the campsite. Golden Minerals or Apex Silver personnel were responsible for logging, sampling, splitting and shipping core to the laboratory facilities.

11.7 Comments on Section 11

Sample collection, preparation, analysis and security for underground sampling and core drill programs conducted since 2007 are in line with industry-standard methods for epithermal silver deposits.

Specific gravity data are measured from unwaxed core samples using the water displacement method. There are sufficient estimates to support tonnage estimates for the various lithologies.

Drill and underground sampling programs included insertion of blank, duplicate and SRM samples.

QA/QC program results do not indicate any problems with the analytical programs (refer to discussion in Section 12).

QP Kim is of the opinion that the sample preparation, security and analytical procedures are adequate and that the quality of the silver analytical data is sufficiently reliable to support Mineral Resource estimation without limitations on Mineral Resource confidence categories.

12.0 DATA VERIFICATION

12.1 Data Verification Completed by Current QPs

QP Kim and QP Drake performed appropriate data verification by checking information used in this Report with original source documents.

12.1.1 QP Desk Top Activities

The drill hole collars in the database were compared with the available topography surface on screen and the vertical difference determined. Several holes showed differences greater than 2 m, with three holes showing a difference of around 6 m.

To validate the trends observed in the mineralized envelope, a comparison was made between the logged lithology reported in the database drill hole with the mineralized envelope. This showed a reasonable correlation between units logged as hydrothermal breccia (HBR) and the mineralized envelope. This supports the strike/dip/plunge of the mineralized envelope does have reasonable support in the database.

Cross checking information in the Report for internal consistency was completed.

Engaged Project site personnel who have been involved with the Project for several years, and Argenta's legal advisors to answer specific questions regarding information used in the Report.

12.1.2 QP Site Visit Activities

QP Kim performed a site visit as part of his data verification (Section 2.6).

While on site, QP Kim visited the core storage facilities where core boxes are stacked in a well-organized manner both inside the core shack and outside.

Drill core from 12 drill holes were reviewed with cross-section maps, original drill logs, and assay certificates. Eight drill holes from the Yaxtché deposit on which there is a Mineral Resource estimate, and four drill holes from exploration targets showing elevated silver grades, including Argentina, Vince and Mani Extension. The two primary lithological units, dacite and volcanic tuff were observed with silver mineralization occurring within black to dark grey clasts surrounded by disseminated pyrite within both units. Locally brecciated units were observed at or near highly fractured zones, with some associated with mineralization. Mineralization is also strongly associated with different degrees/types of alteration, ranging from silicification, clay alteration, and other types of alterations identified with different colours such as pink, brown, green, and others. Mineralized intervals were often associated with zones of highly fractured intervals above and/or below with varying degrees of alteration. These observations generally correspond to the logged lithologies that support the silver mineralized envelope.

While reviewing the core, it was confirmed that the current sampling method includes determining mineralized intervals, sampling the mineralized intervals as well as sampling 2 to 5 m above and below the mineralized interval. QP Kim found visually identifying mineralized intervals to be difficult and recommends sampling the entire interval of core within the mineralized envelope in addition to the shoulders.

QP Kim visited eight drill hole locations, measured their coordinates with a hand-held GPS and compared them to the drill hole collar database. His findings demonstrated differences to be within acceptable limits.

QP Kim visited other areas of the Property including the entrance of the Yaxtché test production portal, the El Quevar discovery outcrop and a site lookout where the physical location and surface exposures around the Yaxtché deposit could be viewed.

12.2 Review of Data Verification Completed by Previous Qualified Persons

QP Kim reviewed the data verification reported by QPs from SRK (2009), Chlumsky, Armbrust & Meyer (2009a, 2009b, 2010), Micon (2010), Pincock, Allen and Holt (2012) and Wood (2018). This included data verification in the form of site visits, database checks, observing core logging, sampling and assay procedures, verifying collar locations, obtaining witness samples and compiling QA/QC sampling and examining the results.

QP Kim considers these activities supportive of QP Kim's opinion on reliability of the data.

12.3 Comments on Section 12

QP Kim is of the opinion that the verified data are adequate to support Mineral Resource estimation.

QP Drake is of the opinion that the metallurgical testwork is adequate for the purposes used in this Report.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction

Mineral processing and metallurgical testing for the Project focused on the testing of composite samples from the Yaxtché deposit. Major differences were noted in the mineralization between the upper and lower deposit domains with alteration observed in the upper domains of the eastern area of Yaxtché Central containing oxide minerals. The oxide mineralization in the eastern area of Yaxtché Central overlies mixed supergene and sulphide mineralization, whereas the mineralization in Yaxtché Central and of Yaxtché West comprises dominantly sulphides.

Initial testwork was commissioned by Apex Silver in 2008 at the Dawson Metallurgical Laboratory (DML) in Salt Lake City, Utah (now owned by FLSmidth). Composites for the initial 2008 testwork were designated as being oxide, mixed supergene, and deeper sulphides taking into consideration that both open pit and underground were potential mining options. In 2009, Golden Minerals assumed ownership of Property and continued the metallurgical testwork at DML. The objectives of the metallurgical tests were to develop technical parameters and inputs for the process plant including

- Process flow sheet
- Design criteria
- Consumables
- Material and water balances
- Optimizing processing results (such as grind size and silver recovery).

As project work progressed between 2008 and 2010 to identify the project's potential development, the DML testwork was refocused on the sulphide mineralization from the underground portions of the deposit.

Numerous metallurgical test programs were conducted on selected samples from the Yaxtché deposit between 2008 and 2012. The composites in the 2009 testwork were changed from mineralization type to deposit locations of east, west, central, sulphide and a master composite within Yaxtché Central. Subsequent tests in 2010–2012 centred on optimizing sulphide flotation for composite samples from the Yaxtché West (Yaxtché West master composite (YWMC-2010)) as the majority of the estimated Mineral Resources are contained in Yaxtché West.

Table 13-1 summarizes the historical metallurgical test programs for the Yaxtché deposit.

Table 13-1: Summary, Metallurgical Testwork Programs

Laboratory	Date	Samples	Testwork
DML	July 2008	6 composites; oxide, mixed and sulphide	Initial testwork on composite samples of oxide, mixed and sulphide samples for whole mineralization cyanidation; selective silver flotation and cyanidation of flotation tailings.
DML	January 2009	5 composites; master, east, west, central in Yaxtché Central and sulphide only	Continued testwork from 2008 program for whole composite cyanidation, sulphide flotation with cyanide leaching of sulphide concentrate and flotation tailings.
DML	September 2009	1 composite; sulphide medium and sulphide high grades	Bulk sulphide flotation and cyanidation of ultra-fine ground concentrate
DML	January 2010	4 composites; master, east, west and central in Yaxtché Central (sulphide only)	Continued testwork from 2009 program on the four composites for whole mineralization cyanidation, sulphide flotation with cyanide leaching of sulphide concentrate and flotation tailings.
DML	March 2010	January 2010 master composite	Continued selective flotation for copper/silver and cyanidation of flotation tailings on January 2010 master composite sample
JKTech/Hazen	April 2010	Specific areas within Yaxtché Central. and Yaxtché West.	Semi autogenous mill comminution (SMC); Bond ball mill work index (BWi); Bond abrasion index (Ai)
DML	June 2010	January 2010 west composite	Memorandum for completed testwork on January 2010 West Composite of March 15.
DML	February 2011	New YWMC-2010 west master; 129 individual samples from drill core and core rejects	Flotation and cyanidation testwork (with pressure oxidization (POX)) on new YWMC-2010 west master composite comprised of samples from October 2010 and March 2010 drill core and core rejects.
DML	October 2012	YWMC-2010 composite and May 2012 bulk sample	Continued testwork from 2011 program for flotation and cyanidation on YWMC-2010 composite and May 2012 bulk sample

13.2 Metallurgical Testwork

13.2.1 DML 2008 Testwork

Forty-five individual mineralized core samples from Yaxtché drill holes QVD-018 through QVD-022, and QVD024 were formed into six composites for the metallurgical test program. The composites were crushed to 10 Tyler mesh (1.68 mm) size and split into 1 kg charges. One charge from each composite was then split into four 250 g samples with two of the splits pulverized and submitted for head analysis. The composites were classified by degree of oxidation and grade (Table 13-2).

All tests were performed at a fine primary grind of approximately 80% passing 74 µm. No attempt was made to optimize either the cyanidation or flotation parameters.

Table 13-2: 2008 Composites for Metallurgical Testing

Type	Grade	Ag ppm	Au ppm	Pb %	Pbns %	Zn %	Znns %	Fe %	Bi %	As %	Sb %	Cu %	Stot %	Ssulph %	Sns %
Oxide	low	58	<0.17	0.41	0.02	0.023	0.0019	3.25	0.008	0.17	0.061	0.013	3.64	0.751	2.89
Mixed Oxide/ Sulphide	medium	251	<0.17	0.15	0.00	0.004	0.0019	2.18	0.082	.08	0.095	0.048	4.37	0.761	3.61
	high	2,020	0.27	1.02	0.12	0.022	0.002	4.16	0.086	0.37	0.302	0.016	3.24	1.04	2.20
Sulphide	low	72	<0.17	0.11	0.00	0.022	0.0018	4.83	0.022	0.04	0.042	0.07	7.50	0.376	7.12
	medium	193	0.17	0.28	0.03	0.097	0.002	4.06	0.043	0.05	0.8	0.136	6.28	0.498	5.78
	high	832	0.58	1.60	0.18	1.70	0.0283	12.50	0.184	0.21	0.396	0.822	17.20	0.6	16.60

Note: tot, sulph, ns refer to total, sulphide, and non-sulphide, respectively

The following procedures were used:

- Whole-mineralization cyanidation
- Selective silver flotation followed by bulk sulphide pyrite flotation of the silver tailings. Sequential silver–lead, zinc, and pyrite flotation schemes were evaluated on a high- grade sulphide sample containing significant amounts of silver, lead, and zinc
- Cyanidation of the pyrite flotation tailings.

Overall, the samples generally responded well to a combination of sulphide flotation (silver followed by pyrite) and cyanidation of flotation tailings. However, it was noted that in the sulphide composites, a significant portion of the recovered silver (about 60%) and zinc reported to the pyrite concentrate, and not to the selective silver concentrate. The very low-grade pyrite concentrate produced would be difficult to market and additional testwork would be required to investigate methods of recovering the silver from this product. The silver concentrates produced from the low-grade to high-grade sulphide composites tested contained elevated arsenic (1,780 to >10,000 ppm), antimony (2,310 to >10,000 ppm), and bismuth (859 to >10,000 ppm) values. No mineralogical examinations were made due to the limited quantity of silver concentrate produced in each test.

The high-grade sulphide concentrate was subjected to selective silver–lead flotation followed by zinc flotation which indicated a selective silver–lead and zinc flotation scheme is possible with this material. It was noted about 51% of the silver and lead and 44% of the copper reported to a silver concentrate and 83% of the zinc in the mineralized material reported to a zinc rougher concentrate. However, recoveries of lead (40%), copper (47%) and silver (32%) were still relatively high to the zinc concentrate, and additional testwork was recommended to increase recovery of these to a silver concentrate and improve overall economic potential.

Whole-mineralization cyanidation results yielded lower silver extractions than the leaching of flotation concentrates and tails. Generally, the sulphide samples indicated the lowest recovery, possibly due to the presence of silver sulphosalts. Cyanide consumptions for the whole-mineralization leach tests varied from 1.4 to 10.4 kg/t depending upon the sample tested, when 5 g/L NaCN leach solution strength was used. Leach kinetic curves indicated that almost all the leachable silver was extracted in 48 hours. The testwork results are summarized in Table 13-3.

Table 13-3: Summary of 2008 Test Results

	Ag Recovered % From Composite Material			Whole Mineralization Leach (%)	Head Assay[2]	
Composite	**Flotation**	**Float Tails Leach**	**Total[1]**		**Ag (oz/t)**	**S= (wt%)**
Low grade oxide	36.2	27.2	63.4	53.0	65.0	2.81
Mixed medium grade	74.5	15.2	89.7	83.0	314.0	3.48
Mixed high grade	78.1	11.6	89.7	83.4	1,785.0	2.30
Sulphide low grade	79.1	11.8	90.9	44.2	80.0	6.58
Sulphide medium grade	88.1	8.4	96.5	56.9	189.0	6.15
Sulphide high grade	95.7	3.7	99.4	62.4	839	16.56

Note: 1) Total = Flotation + flotation tails leach
2) Head assay back-calculated from flotation tests

Based on the DML 2008 metallurgical test results, the conceptual plant flowsheet for treating both oxides and sulphides would support the following processes:

- Primary crushing
- Semi-autogenous grind (SAG) and ball mill grinding with a vibrating screen and cyclones for size classification

- Rougher and cleaner flotation with regrind to produce a final sulphide silver concentrate, with the possible production of a separate zinc concentrate
- Thickening, filtering, and packaging for shipment of final sulphide silver and zinc concentrates
- Leaching (cyanide) of the flotation tailings
- Counter-current decantation circuit with thickeners producing a silver-bearing pregnant leach solution (PLS)
- Merrill-Crowe circuit for processing the PLS solution producing a doré for shipment to an off-site refinery
- Cyanide destruction circuit
- Disposal of final plant tailings.

13.2.2 DML 2009 Testwork

The DML 2008 testwork on the sulphide medium and sulphide high grade samples indicated good silver recovery by flotation (88% and 95%, respectively) but poor recovery by whole-mineralization cyanidation (57% and 62%, respectively). During September 2009, DML conducted cyanidation tests on an equal weight composite sample of sulphide medium and high grade material from the 2008 testwork program. The composite sample that was produced assayed at 513 g/t silver.

The composite sample was ground to a target 80% passing 75µm and processed by a standard bulk flotation to produce a concentrate with silver assayed at 1,969 g/t, a mass pull of 24.3%, and recovery to concentrate of 90.6%. The flotation concentrate was reground to 80% passing 12 µm, and then subjected to a two-stage cyanide leach for an initial 48 hours, after which the solution was replaced and the solids subjected to an additional 72 hours of leach time. The tests were performed at 20ºC and 50ºC. Table 13-4 below summarizes the results of the leach tests.

Table 13-4: Flotation Concentrate Leach

		NaCN Consumption (kg/t)		Ag Extraction (%)	
Test	**Temp(ºC)**	**48h**	**120h**	**48h**	**120h**
22	20	69	98	76.7	80.2
21	50	88	121	77.2	78.8

The results indicate that silver extractions increased from 77% to 80% with an additional 72 hours of leach time. There was no benefit to leaching at the higher temperature. The cyanide consumptions were very high, and increased substantially with the increased leach time. The leach was not optimized for cyanide consumption.

13.2.3 DML 2010 Testwork

Laboratory testwork was performed to investigate silver recovery by a combination of flotation and cyanidation of mineralized material and flotation products. The results were reported in January 2010 and updated in March 2010. A total of 116 assay reject samples were received for testing, of which 65 were used to make up composites representing the west, central and east areas, located within Yaxtché Central. The three composite samples were identified as west, central and east. An equal weight of each composite was then combined to form a master composite sample. Table 13-5 summarizes the head grades.

Table 13-5: Head Grades for Yaxtché Central 2010 Test Composites

	Head Grades									
	ppm		Weight %							
Composite	Au	Ag	Cu	Fe	Pb	Zn	S=	As	Bi	Sb
Master	0.185	517	0.41	4.24	0.46	0.16	4.02	0.15	0.10	0.15
West	<0.001	529	0.11	5.07	0.25	0.02	5.35	0.07	0.00	No assay
Central	0.008	313	0.03	2.64	0.90	0.35	2.13	0.06	0.10	No assay
East	0.218	658	1.02	0.47	0.22	0.09	4.89	0.28	0.20	No assay

The previous work performed on Yaxtché samples had indicated good silver recovery by flotation (+90%), but not by whole-mineralization cyanidation (±60%). Attempts to increase silver extraction by ultra-fine grinding of flotation concentrate and a two-stage, high concentration cyanide leach gave a 72% silver overall extraction with very high cyanide consumption.

A grind size of 80% minus 325 mesh (45 µm) was selected for the 2010 testwork. The leach cyanide concentration was determined according to the copper content of each composite material sample, to limit cyanide consumption. The NaCN concentration was added at a cyanide: copper ratio of 4.0:1 to supply sufficient cyanide for copper complexing, with only another 2 g/L NaCN added in excess.

The following tests were performed:

- Whole-mineralization cyanide leach with assay screen analysis of the leach residue
- Bulk sulphide flotation with assay screen analysis of the rougher tailings
- Cyanide leach of reground flotation concentrate with assay screen analysis of the leach residue
- Cyanide leach of rougher tailings with assay screen analysis of the leach residue
- Selective flotation for silver recovery
- Gravity concentration of ground mineralized material for free silver determination.

The first four tests were performed on each of the three samples and on an equal weight master composite. The last two tests were performed only on the master composite.

The mineralized material was treated by a combination of cyanide and flotation test procedures at a grind of 80% minus 45 µm. About 51% of the silver was leached from the master composite utilizing a whole-mineralization leach, whereas 81% was recovered by bulk sulphide flotation. The flotation concentrate was reground and leached, and the flotation tails leached separately, for a combined concentrate float/leach recovery of 60%. A total of 90% recovery was obtained from the combined bulk float concentrate plus leaching of the rougher tailings.

Very high cyanide consumption was noted for the cyanide leach of the master and east composites due mainly to the presence of copper in the mineralized material. Cyanide consumption of about 14 kg/t and 41 kg/t of mineralized material was determined for the two samples, respectively, and 1 to 2 kg/t for the other two samples, for the combined regrind concentrate and tailings leaches. The consumption was about the same as for the whole-mineralization leaches (the east composite was slightly less due to insufficient NaCN), even though the silver and copper extraction was significantly greater.

Table 13-6 summarizes the silver recovery by flotation and cyanide leaching.

Table 13-6: Summary of Silver Recovery by Flotation and Leaching at Yaxtché Central

Composite	Whole-mineralization Leach (%)	Flotation (%)	Concentrate Leach (%)	Rougher Tailings Leach (%)	Flotation Conc & Tails Leach (%)	Flotation Conc Leach & Tails Leach (%)
Master	51.2	81.2	61.9	49.8	90.6	59.6
West	59.3	90.6	61.5	52.1	95.5	60.6
Central	66.8	61.0	81.1	49.2	80.2	68.7
East	18.1	88.5	60.6	37.4	92.8	57.9

Source: Table adapted from the DML January 2010 metallurgical report.

Testwork continued on the master composite sample to investigate the effect of variations in the test procedure on overall silver recovery. The baseline procedure consisted of selective flotation of a silver/copper concentrate at ambient pH, followed by cyanide leaching of the flotation tailings. An assay screen analysis was determined on both the rougher tailings and the leach residue.

The reagents selected for the selective float were a dithiophosphinate (Aerophine 3418A) and a dithiophosphate (Aerofloat 242). The procedure included the following steps:

- Selective flotation at a grind of 80% passing 45 µm and 75 µm, using one or two rougher stages
  - A float test was run with reduced reagent (Aerophine only)
  - A float test was run including bulk sulphide recovery
  - A float test was conducted at 12 pH with lime addition
- Rougher tailings of the above tests were leached with 2 g/L NaCN solution
- Assay screen analysis of rougher tails of the above tests was performed (except T34)
- Assay screen analysis of leach residue of the above tests was performed
- A selective float test was run followed by cleaner flotation.

The silver flotation recovery ranged from 56% to 86% depending on the test conditions. Subsequent leaching of the flotation tailings resulted in an overall silver recovery (combined flotation concentrate, plus leach solution) ranging from 82% to 91%. Cyanide consumption was relatively low, averaging 1.0 kg/t, since most of the copper was removed into the concentrate, which was not leached. An average of 7% of the copper reported to the leach solution, for 220 ppm copper solution average. The results are summarized in Table 13-7.

Table 13-7: Summary of Yaxtché Central Master Composite Selective Flotation and Tailings Leach Recoveries

Grind P80 µm	# Rougher Stages	Flotation Conditions	Ag Float Concentrate (%)	Ag Tailings Leach (%)	Ag Flotation Conc & Tails Leach (%)	Cu Flotation Conc (%)
45	1	Baseline	58.4	26.2	84.6	83.7
45	2	Extended time	76.6	11.8	88.5	90.9
75	1	Coarser grind	55.6	26.9	82.5	79.0
75	2	Coarse + time	73.3	13.7	86.9	86.8
75	4	Bulk sulphide	80.9	9.7	90.6	88.0
45	3	pH12	85.5	5.7	91.2	95.4
75	1	Decreased reagent	57.4	24.6	82.0	80.3

A testwork program was undertaken on a master composite sample from Yaxtché West, and reported in September 2010 and updated in February 2011. Thirty-two individual core samples from certain areas of Yatxché West were blended to form a YWMC-2010 composite. The differential flotation and cyanidation testwork were performed following procedures similar to those used for the Yaxtché Central testing previously reported. The sample head grade is provided in Table 13-8.

Table 13-8: Head Grade Analysis, Yaxtché West Composite

	Head Grades				
Composite	**Ag (g/t)**	**Cu (wt%)**	**As (wt%)**	**Bi (wt%)**	**Sb (wt%)**
YWMC-2010	2,900	0.27	0.04	0.08	0.32

Silver rougher flotation recovery averaged 97%, with 9% to 12% mass pull under standard tests. Slightly less recovery was obtained when the material was less finely ground to a P_{80} passing 75 μm instead of P_{80} passing 45 μm. Extending the flotation time increased silver recovery to 98%, but the mass pull increased to 15%. Leaching of the rougher tailings resulted in an overall silver recovery of 99%. Cyanide consumption was relatively low, at just less than 1 kg/t of material, as most of the copper was removed by flotation and was not leached. An average of 1.5% of the total copper reported to the leach solution.

The baseline rougher flotation test was repeated and followed with cleaning with no additional reagent added. The rougher mass pull was 9.1% and this decreased to 5.5% for the cleaner for a flotation recovery of 95.7%. The rougher tails and cleaner tails were subjected to a 24-hour cyanide leach for an overall recovery of 98.9%. The results are summarized in Table 13-9.

Table 13-9: Summary of Yaxtché West Composite Selective Flotation and Tails Leach Recoveries

Grind P80 µm	# Rougher Stages	Flotation Conditions	Ag Float Concentrate (%)	Ag Tailings Leach (%)	Ag Flotation Conc & Tails Leach (%)	Cu Flotation Conc (%)
45	1	Baseline rougher	97.3	2.02	99.3	95.5
45	1	Repeat w/cleaner	96.8	2.42	99.2	93.7
45	1	Repeat w/cleaner*	95.7	3.20	98.9	92.4
45	2	Extended time	98.1	1.38	99.5	97.3
45	4	Bulk sulphide	98.5	1.08	99.6	95.0
75	1	Coarser grind	95.8	2.99	98.8	94.7
75	2	Coarser grind + time	98.3	1.24	99.5	97.3

Note: Leach performed on rougher and cleaner tails

The metallurgical response of Yaxtché Central and Yaxtché West composites was significantly different. For the Yaxtché Central composite, 58.4% of the silver was recovered into a high-grade flotation concentrate, with an additional 25.3% recovered in the leach of the flotation tails, for an overall 84% silver recovery. For the Yaxtché West composite, 97.3% of the silver was recovered into the flotation concentrate, with an additional 1.3% recovered in the tails leach, for an overall 99.3% recovery.

The difference in response may be due to differences in the silver mineralogy between the two zones. In the Yaxtché Central composite it was possible to make a selective initial flotation concentrate using a limited amount of copper mineral-selective collector (recovery of 86% of the copper but only 55% of the silver). Increasing amounts of collector in subsequent stages increased the silver recovery significantly and the copper recovery marginally. It is advantageous economically to recover as much of the silver as possible in to bullion, since higher treatment charges for flotation concentrate may be incurred, due primarily to the presence of arsenic, antimony and bismuth.

Increasing collector dosage in subsequent flotation stages for the Yaxtché West composite, up to and including a bulk concentrate, floated more mass, but with no increase in overall silver recovery.

Cleaning the high-grade rougher concentrate for both composites resulted in the rejection of a large amount of gangue material, with a resultant 50% reduction in concentrate mass and a corresponding increase in the assays of smelter penalty elements. For the Yaxtché West composite the cleaner flotation tails were leached, with much of the silver recovered. However, because of insufficient sample, the cleaner tails from the central cleaner test were not leached.

Testwork at both 45 µm and 75 µm grinds was evaluated, and although the difference is small, preliminary calculations indicated that the finer grind would be economically warranted.

The Yaxtché West master composite was ground to 80% passing 45 µm and a sample was leached for 72 hours for a leach recovery of 41%. A sample was leached under an oxygen overpressure of 50 psi for 16 hours. The leach recovery was 50% after 16 hours, although the kinetic curves showed the leach still continuing.

A POX test was performed at 200°C in an autoclave for 60 minutes. The POX residue was given a hot lime treatment for two hours to decompose jarosite mineralization that would form during POX treatment. The silver extraction after a 72-hour cyanide leach was 82%. The test was repeated at 225°C and the silver extraction was lower at 66%. Lime and cyanide consumptions were similar at 56 kg/t and 2.6 kg/t respectively.

Leach residues from the 200°C POX test were submitted for to DCM Science Laboratory for bulk mineralogy analysis. The analysis indicated the presence of a secondary gypsum, trace amounts of pyrite, and alunite that is partially coated with a rind that is probably plumbojarosite with an argentojarosite component.

13.2.4 JKTech/Hazen 2010 Testwork

Three samples from Yaxtché were sent to Hazen Research laboratory in Golden, Colorado in April 2010. The samples were from drill core from two areas of Yaxtché Central and one area in Yaxtché West. Testwork was done at Hazen based on JKTech test parameters and evaluated by JKTech. The objectives of the testwork were to determine the following comminution parameters:

- SMC and drop weight tests for SAG comminution
- Bond ball mill work index (BWi)
- Bond abrasion index (Ai).

Table 13-10 summarizes the test results for the JKTech/Hazen program.

Table 13-10: Results for the JKTech/Hazen Testwork

		Samples		
Test Parameter	**Unit**	**Yaxtché Central (east)**	**Yaxtché Central (west)**	**Yaxtché West**
BWi	kWh/t	15.5	9.4	14.2
Ai	g	1.0338	0.1885	0.1974
SMC testwork:				
A x b	Hardness	49.9	137.9	67.3
Drop weight index (DWi)	kWh/m^3	5.67	2.05	3.64
Drop weight index (DWi)	%	50	9	23

The results indicate significant variability between the samples for all test parameters. The samples from east Yaxtché Central, west Yaxtché Central and Yaxtché West can be classified as medium, very soft and soft, respectively. Additional testing across all mineralization zones is necessary to understand the variability.

13.2.5 DML 2011 Testwork

A total of 129 individual quarter split core and crushed coarse reject samples with a total mass of about 65 kg was received in October 2010. The samples represented mineralization from areas in Yaxtché West. The samples were combined with previously composited drill core and drill core reject material received in March 2010 to form a representative sulphide sample. A new blended-grade composite designated as YWMC-2010 was created using these samples. Figure 13-1 shows the drill core locations for the YWMC-2010 metallurgical samples.

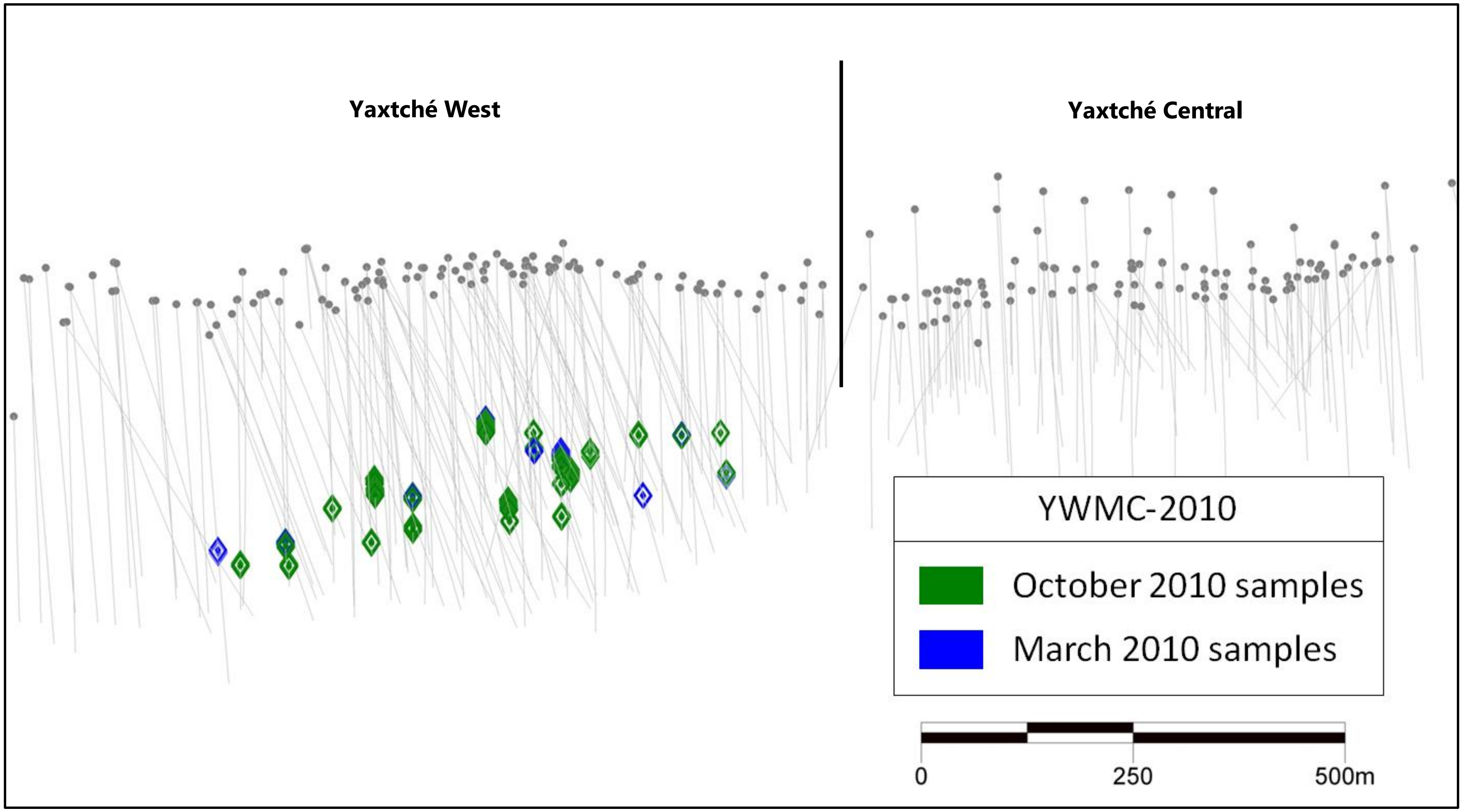
Previous work recommended further testwork on the Yaxtché West composite to determine if it would be possible to reject some silver minerals from the initial flotation concentrate to be recovered by leaching of the tails, as with the Yaxtché Central composite. In addition, due to the presence of high levels of deleterious elements in flotation concentrate in previous work, as an alternative flowsheet it was also recommended to investigate the pre-treatment of the mineralized material using POX to try and improve the low direct cyanidation recoveries. This testwork followed the flotation and cyanide leach procedures used in the previous work.

The following testwork was performed on sample composites at a grind size 80% passing 45 µm:

- Selective rougher flotation with cleaner to obtain a high grade silver concentrate
- Selective flotation with extended float time and reagent to increase recovery
- Selective flotation followed by bulk sulphide flotation to scavenge sulphides
- Cyanide leach of whole-mineralization and flotation tailings
- Cyanide leach of bulk concentrate and whole-mineralization after pre-treatment by autoclave POX.

Table 13-11 summarizes the head grade of the new YWMC-2010 composite.

Figure 13-1: YWMC-2010 Metallurgical Sample Drill Hole Locations (looking northeast)



Source: Golden Minerals, 2018

Table 13-11: Head Grade Analysis, YWMC-2010 Composite

Composite	Au (g/t)	Ag (g/t)	Cu (wt %)	Fe (wt %)	Pb (wt %)	Zn (wt %)	S= (wt %)	As (wt %)	Bi (wt %)	Sb (wt %)
YWMC-2010	0.022	745	0.17	3.55	0.32	0.12	3.50	0.037	0.049	0.14
Back-calculated[1]	0.036	743	0.18	3.43	0.33	0.10	3.89	0.029	0.050	0.15

Note: 1) Back-calculated average from T43–56, T62–63 for Ag, Cu, Fe, Pb, Bi, Sb; T53–56 for Au, Zn, S, As. Based on head analysis of samples received October 4, 2010.

Results of flotation testing on the YWMC-2010 composite using selective flotation procedures, indicated rougher silver recovery of about 92% to 95%, with about 6.5 % to 10.5% concentrate mass pull and copper recoveries of about 89% to 92%. However, due to the mineralogy of the mineralized material, potentially deleterious concentrate penalty elements also reported to the concentrate.

First stage rougher concentrates were cleaned in a single cleaning stage. Final cleaned concentrate grades of 4.8% Cu and 21,200 g/t Ag grades were obtained, compared to 7.5% Pb+Zn, 0.6% As, 3.6% Sb, and 1.2% Bi, into a 2.9% mass pull concentrate with 84% silver and 81% copper recovery.

Bulk sulphide flotation for pyrite recovery was used to increase silver and copper recovery. The recovery increases were not significant, with silver and copper increasing to 96% and 94%, respectively with a 13% to 14% concentrate mass pull. Table 13-12 summarizes the flotation results from the new YWMC-2010 composite.

Table 13-12: Batch Flotation Results 2011, YWMC-2010 Composite

		Concentrate Assay											Distribution	
Test Product	wt%	Au (g/t)	Ag (g/t)	Cu (wt %)	Fe (wt %)	Pb (wt %)	Zn (wt %)	S= (wt %)	As (wt %)	Bi (wt %)	Sb (wt %)	Insol (wt %)	Ag (%)	Cu (%)
Cleaner conc	2.92	0.104	21,200	4.79	28.7	4.68	2.83	33.3	0.62	1.17	3.56	11.8	83.8	80.9
Rougher conc	6.87	0.040	9,884	2.24	17.5	2.40	1.40	19.7	0.32	0.58	1.68	45.4	92.0	89.3

Note: T53: baseline selective float with 1 rougher, followed by 1 cleaner stage.

Cyanide leaching of whole-mineralization and flotation tailings for silver recovery was investigated. Less than 40% of the silver was recovered by cyanide leaching of whole-mineralization. About 50% of the silver present in flotation tailings was extracted by leaching in 48 hours with a relatively low cyanide consumption of about 0.5 kg/t. However, this only accounts for 2 to 4% in the mineralized material, since most of it was already recovered in the flotation concentrate.

The bulk sulphide concentrate was treated by POX at 225°C, followed by a hot lime treatment to decompose jarosite. The pre-treated sample was then cyanide leached with a 2g/L NaCN solution. Only 39% of the silver was extracted into the cyanide leach solution. Most of the copper was removed from the solids in the autoclave step, which was acidic. Leach rate data indicated that the silver which did leach was extracted during the first 2 hours of leaching.

The whole mineralization was directly leached for 72 hours with 2 g/L NaCN solution. The silver and copper extractions were low at 37% and 34%, respectively. The leach rate curves indicate that leaching was slow and not complete after 72 hours.

The whole-mineralization was pre-treated by POX at 200°C, followed by a hot lime treatment. The sample was filtered, washed and then cyanide leached with a 2 g/L NaCN solution. Test results indicated a 60% silver extraction. Most of the copper (83%) was removed in the acidic autoclave solution. Lime consumption for this test was 63 kg $Ca(OH)_2$ per tonne of material with most added to the hot lime step. The cyanide leach rate graph indicates that silver leaching was quite rapid, mostly occurring in the first eight hours of the leach test.

The original West Yaxtché whole-mineralization composite, which is similar to the YWMC-2010 composite, was also given the same treatment and submitted for mineralogy. About 85% sulphide oxidation was noted after the autoclave. Hematite that precipitated in the autoclave may also have encapsulated some silver, which would not be released during the jarosite conversion step. Rimming of alunite by jarosite, which was noted, would also possibly limit the effectiveness of hot lime treatment to decompose jarosite with the amount of lime added in the test. The combination of these three factors means the recovery of silver may be near to the limit for this sample. Additional work was recommended at higher lime levels to assess if this was the limiting factor to determine if silver recovery could be increased.

13.2.6 DML 2012 Testwork

This testwork phase provided results of continued work on the blended grade composite designated YWMC-2010 from the previous phase. A second bulk sample was also sent to Dawson for additional work. However, it was determined to be significantly lower in grade than expected and following some baseline background work, testing was suspended on this sample. The following testwork was performed on the YWMC-2010 sample ground to 80% minus 45 µm:

- Selective rougher flotation with two stages of batch cleaning, to try and obtain a higher grade of concentrate than obtained previously with one stage
- Repeat selective batch rougher and two stages of cleaning including a cleaner scavenger to define conditions for a subsequent locked cycle test

- A locked cycle flotation test using two cleaner stages, with no rougher concentrate regrind
- A second stage of lime treatment prior to cyanide leach of rougher flotation concentrate which had already been given POX plus hot lime treatment
- A second stage of lime treatment prior to cyanide leach of whole-mineralization which had already been given POX plus hot lime treatment.

Primary grind sensitivity and batch rougher cleaner flotation tests with and without rougher concentrate regrind were also conducted on the YWMC-2010 composite and other previous samples.

Table 13-13 summarizes the 2012 reported batch flotation results with the YWMC-2010 composite, relative to the baseline 2011 test result with only one stage of cleaning. The results of the batch flotation on the composite indicated 93% silver could be recovered to a 6.3% mass pull concentrate with a 10,340 g/t silver grade with a single cleaning stage. The silver recovery decreased to 92% with a 12,300 g/t silver grade after a second cleaning stage. The cleaner test was performed without regrind of the rougher concentrate. This compares to the earlier DML 2011 tests in which a 21,200 g/t silver concentrate was obtained. However, only one rougher stage was collected, and cleaning resulted in recovery decreasing to 84%.

Table 13-14 summarizes the flotation locked cycle tests performed. The results of the locked cycle flotation on the composite indicated 93% silver could be recovered to a 6.4% mass pull concentrate with a 10,600 g/t silver grade. The cleaner test was performed without regrind of the rougher concentrate. The relatively high content of arsenic, antimony and bismuth in the concentrate remains a marketing concern.

Table 13-15 summarizes the results of a primary grind sensitivity on the composite with and without concentrate regrind using a single cleaner stage.

Sedimentation and rheology tests were conducted on the flotation locked cycle test tailings. The results concluded that a high-rate thickener could produce an underflow slurry with a 64% to 67% solids concentration, which can be discharged using conventional centrifugal pumps.

Table 13-16 summarizes the head analysis of the October 2011 low grade Yaxtché West bulk sample on which some preliminary work was conducted to obtain background data. The silver grade of the bulk sample (83 g/t Ag) was significantly lower than the YWMC-2010 composite (745 g/t Ag) and previous samples. A grind study on the bulk sample showed that the mineralized material was significantly harder than the earlier composites. Most of the planned testing was suspended.

Table 13-13: Batch Flotation Results 2012, YWMC-2010 Composite

			Concentrate Assay											Distribution	
Test	**Test Product**	**Wt %**	**Au (g/t)**	**Ag (g/t)**	**Cu (wt %)**	**Fe (wt %)**	**Pb (wt %)**	**Zn (wt %)**	**S= (wt %)**	**As (wt %)**	**Bi (wt %)**	**Sb (wt %)**	**Insol (wt %)**	**Ag (%)**	**Cu (%)**
T64	#2 Cl Con	4.02	0.005	14,600	3.60	32.9	40.0	3.62	2.40	0.58	2.39	1.04	9.35	87.9	87.6
	#1 Cl Con	4.91	0.028	12,253	3.02	29.8	36.0	3.11	2.02	0.50	2.01	0.88	16.72	90.1	90.0
	#1 and #2 Ro Con	9.47	0.030	6,591	1.64	18.5	22.0	1.79	1.11	0.29	1.09	0.49	-	93.6	93.9
			Concentrate Assay											**Distribution**	
Test	**Test Product**	**Wt %**	**Au (g/t)**	**Ag (g/t)**	**Cu (wt %)**	**Fe (wt %)**	**Pb (wt %)**	**Zn (wt %)**	**S= (wt %)**	**As (wt %)**	**Bi (wt %)**	**Sb (wt %)**	**Insol (wt %)**	**Ag (%)**	**Cu (%)**
T65	#2 Cl Con	5.21	0.005	12,300	2.88	33.0	37.2	3.16	1.98	0.47	2.28	0.79	-	91.6	91.9
	#1 Cl Con	6.29	0.0331	10,340	2.42	29.4	33.1	2.71	1.67	0.40	1.92	0.67	-	92.9	93.3
	#1 and #2 Ro Con	11.60	0.039	5,772	1.35	18.4	21.0	1.63	0.95	0.23	1.07	0.38	-	95.6	96.0
	Cl Scav Con	0.70	0.105	1,450	0.33	17.8	20.1	0.69	0.42	0.11	0.26	0.13	-	1.5	1.4
			Concentrate Assay											**Distribution**	
Test	**Test Product**	**Wt %**	**Au (g/t)**	**Ag (g/t)**	**Cu (wt %)**	**Fe (wt %)**	**Pb (wt %)**	**Zn (wt %)**	**S= (wt %)**	**As (wt %)**	**Bi (wt %)**	**Sb (wt %)**	**Insol (wt %)**	**Ag (%)**	**Cu (%)**
T53	Cleaner Con	2.92	0.104	21,200	4.79	28.7	33.3	4.68	2.83	0.62	3.56	1.17	11.8	83.8	80.9
	Rougher Con	6.87	0.040	9,884	2.24	17.5	199.7	2.40	1.40	0.32	1.68	0.58	45.4	92.0	89.3

Note: T64 = baseline selective float with two roughers, followed by two cleaner stages. T65 = repeat baseline selective float T64 with two cleaners and one cl scavenger.
T53 = baseline selective float with one rougher, followed by one cleaner stage.

Table 13-14: Locked Cycle Flotation Results 2012, YWMC-2010 Composite

Product	Overall wt%	Assay						Distribution				
		Ag (g/t)	Cu (%)	Fe (%)	S (%)	Au (g/t)		Ag (%)	Cu (%)	Fe (%)	S (%)	Au (%)
#2 Cleaner Con	6.41	10,598	2.370	35.16	39.2	0.350		93.10	92.6	-	-	-
Cl Scav Tails	5.59	272	0.060	3.40	4.53	0.040		2.08	2.0	-	-	-
Ro Tails	88.01	40.0	0.010	1.07	3.04	0.016		4.82	5.4	-	-	-
Total / Avg	**100.00**	**730**	**0.164**	**3.39**	**4.56**	**0.039**		**100.00**	**100.0**	**-**	**-**	**-**
		Assay						**Distribution**				
Product	**Overall wt%**	**Pb (%)**	**Zn (%)**	**As (%)**	**Sb (%)**	**Bi (%)**	**Insol (%)**	**Pb (%)**	**Zn (%)**	**As (%)**	**Sb (%)**	**Bi (%)**
#2 Cleaner Con	6.41	2.53	1.71	0.40	1.89	0.63	11.3	52.3	90.9	77.9	80.9	85.3
Cl Scav Tails	5.59	0.32	0.04	0.02	0.07	0.030	84.6	5.7	1.9	3.4	2.6	3.5
Ro Tails	88.01	0.15	0.01	0.01	0.03	0.006	90.0	42.0	7.3	18.77	16.5	11.2
Total / Avg	**100.00**	**0.31**	**0.12**	**0.03**	**0.15**	**0.047**	**84.7**	**100.0**	**100.0**	**100.00**	**100.0**	**100.0**

Note: T66: metallurgical balance based on average of cycles 4–6.

Table 13-15: Grind Sensitivity Batch Flotation Results

Test #	Target P+ (µm) Ro Grind	Target P+ (µm) Cl Regrind	Cl Con (wt%)	Cleaner Concentrate Assay Au (g/t)	Ag (g/t)	Cu (wt %)	Fe (wt %)	Pb (wt %)	Zn (wt %)	S= (wt %)	As (wt %)	Bi (wt %)	Sb (wt %)	Insol (wt %)	Dist Cl = Scav. Con Ag (%)	Cu (%)
67	106	106	15.5	0.073	489	1.58	29.0	34.5	0.05	0.03	0.48	0.30	0.12	31.7	85.0	93.4
68	106	45	9.3	0.118	767	2.65	40.6	48.4	0.08	0.09	0.47	0.47	0.19	6.7	85.4	92.4
69	75	75	14.3	0.086	522	1.90	31.8	37.5	0.05	0.04	0.48	0.32	0.12	24.1	89.1	93.0
70	75	45	9.6	0.122	731	2.42	42.4	48.5	0.07	0.06	0.64	0.43	0.18	5.8	88.0	92.5
71	45	45	11.3	0.092	644	2.18	36.3	43.0	0.06	0.05	0.56	0.38	0.17	13.4	84.7	90.1

Note: selective flotation with/without regrind and 1 stage cleaning.

Tests indicated that silver could be recovered from this sample using the selective flotation procedure. However, the concentrate grade was low, with relatively high arsenic, antimony and bismuth contents. A higher silver concentrate grade could be obtained with a concentrate regrind. However, preliminary flotation tests on this sample did indicate comparable rougher recovery at 106 µm and 75 µm primary grind, and it may not be necessary to grind the mineralized material to the finer size. Additional tests on representative samples with typical silver grades would be needed to confirm this.

Table 13-16: Head Analysis of the October 2011 Low Grade Yaxtché West Bulk Composite

Composite	Au (g/t)	Ag (g/t)	Cu (wt %)	Fe (wt %)	Pb (wt %)	Zn (wt %)	S= (wt %)	As (wt %)	Bi (wt %)	Sb (wt %)
Bulk sample	0.019	83	0.27	5.39	0.02	0.01	7.46	0.081	0.021	0.06
Back-calculated [1]	0.005	88	0.27	5.66	0.03	0.01	7.14	0.078	0.023	0.06

Note: 1) Back-calculated average from T67–71. Head analysis of bulk sample received 17 May, 2011.

The results indicated an average silver recovery to the combined cleaner concentrate plus scavenger cleaner concentrate increased from 85% for a primary grind P_{80} minus 106 µm to 89% with a primary grind P_{80} minus 75 µm. Recovery did not improve with further grinding. The first cleaner concentrate grade averaged 500 g/t silver when the rougher concentrate was not re-ground, and 750 g/t silver when it was re-ground to a target of 45 µm. However, this compared with 10,000 g/t silver for the YWMC-2010 composite. About 15% of the mineralized material mass reported to the rougher stage, reduced to 9.5 % with one stage of cleaning.

An autoclave/hot lime leach alternative to extract the silver while excluding deleterious elements was investigated as recommended from the previous phase, without satisfactory results. Efforts to improve the silver recovery by including a second lime treatment stage were only partly successful. An overall recovery of 51% silver was achieved for the flotation concentrate and 70% for whole-mineralization. The presence of hematite that could encapsulate silver and the occurrence of silver containing lead locked in quartz was also noted in a mineralogical assessment of autoclave discharge in the previous testwork phase. The recovery of silver using this process alternative still appears to be mineralogically limiting, and further mineralogical studies and testwork are required to identify the factors negatively impacting silver recovery and assess the potential to improve the results.

13.3 Recovery Estimates

The metallurgical programs conducted at DML examined several processing options including:

- Whole mineralization cyanidation
- Whole mineralization cyanidation after POX
- Flotation (rougher and cleaner)
- Flotation and cyanidation of flotation tailings
- Flotation and cyanidation of flotation concentrate and flotation tailings
- Flotation and POX cyanidation of flotation concentrate and flotation tailings.

Although cyanide leaching was tested in the metallurgical programs, it was not included in the flowsheet due to projected poor economic return versus high capital and operating costs, as well as permitting/environmental concerns and project delays. However, future studies should include economic trade-off analyses for these processing options.

For the purposes of resource estimation, an assumption was made that process would involve rougher and cleaner flotation without cyanidation with treatment of the concentrate by third-party smelter refinery with an assumed payable for silver of 95%.

Table 13-17 summarizes the test parameters for the DML 2012 locked cycle tests.

The only payable metal in the flotation concentrate is silver. The combined assays for the copper, lead and zinc base metals only totaled 6.61% and would not be payable. The gold assay of 0.35 g/t is below the minimum payability cut-off of 1 g/t (see Table 13-14). Elevated assay levels for the impurities arsenic, antimony and bismuth were noted in the silver concentrate. At these levels, penalties would be expected for smelting terms.

13.4 Metallurgical Variability

Large variations in silver recovery were noted for selective flotation in the test programs, primarily being related to the testing parameters and deposit zone as summarized in Table 13-18.

These variations in silver recoveries from zone to zone likely indicate differences in silver mineralogy and lithology for recovery by flotation, but also could be due to the differences in silver grades between the samples. Comminution testing similarly indicated variability between the zones.

Table 13-17: DML 2012 Locked Cycle Test Parameters

Description	Unit	Values
Grind size P_{80}	µm	45
Grind solids	%	50
Rougher flotation first stage	min	5
Conditioner	min	2
Rougher flotation second stage	min	5
Cleaner flotation first stage	min	4
Cleaner scavenger flotation first stage	min	4
Cleaner flotation second stage	min	4
Cytec 3418A: ball mill	g/t	25
Cytec 3418A: conditioner	g/t	5
Cytec 3418A: cleaner scavenger first stage	g/t	2.5
Cytec 242: ball mill	g/t	25
Cytec 242: conditioner	g/t	5
Cytec 242: cleaner scavenger first stage	g/t	2.5
MIBC frother: rougher first stage	g/t	0.030
MIBC frother: rougher second stage	g/t	0.015
pH: rougher flotation first stage	-	6.8
pH: rougher flotation second stage	-	6.3
pH: cleaner flotation first stage	-	6.9
pH: cleaner scavenger flotation first stage	-	7.1
pH: cleaner flotation second stage	-	7.5

Table 13-18: Silver Recoveries by Selective Flotation and Deposit Zone

Area	Head Grade (Ag g/t)	Silver Recovery (%)	DML Test Data
Yaxtché West	745	93	DML 2012 program; tests 64-66; YWMC-2010 composite
Yaxtché Central	517	81	DML 2010 program; test 5; master composite
Yaxtché Central (west)	529	91	DML 2010 program; test 6
Yaxtché Central (central)	313	61	DML 2020 program; test 7
Yaxtché Central (east)	658	89	DML 2010 program; test 8

Note: Recovery assumptions used for the resource estimate are those for Yaxtché West and the master composite for Yaxtché Central.

13.5 Deleterious Elements

The flotation concentrate will contain high payable values of silver. However, no other payable metal values for copper, gold, lead or zinc are envisioned. Metallurgical testwork indicates that elevated concentrations of the deleterious elements bismuth, arsenic and antimony will be present in the silver concentrate, which would result in smelter penalties. Table 13-19 summarizes the concentrate assays based on the DML 2012 metallurgical testwork.

Table 13-19: El Quevar Concentrate Assays

Element	Unit	Assay
Silver	g/t	10,598
Lead	%	2.53
Zinc	%	1.71
Copper	%	2.37
Gold	g/t	0.350
Arsenic	%	0.40
Antimony	%	1.89
Bismuth	%	0.63

13.6 Comments on Section 13

Initial testwork was performed on material from samples selected and composited by mineralization type. Subsequent testing was performed on samples that were selected and composited to represent the different mineralized zones. The earlier testwork was carried out on composites from the eastern, central and western areas within Yaxtché Central. The latter testwork programs focussed on a Yaxtché West composite sample. The testwork programs included comminution, flotation, POX, cyanidation and sedimentation tests. The initial testing campaign covered a range of silver head grades, with the latter testing on predominantly high grade material.

The available metallurgical testwork information is considered to be of an acceptable quality and sufficient to support a silver resource estimate. The silver concentrate produced contains elevated concentrations of deleterious elements that will result in smelter penalties.

The early testwork on mineralization type showed significant variability in composition and response to the test methods. The latter testwork by zone also indicated significant variability in head grade, flotation recovery, concentrate grade, cyanide leach recovery and comminution properties. Flotation testwork should be conducted on fresh sample from Yaxtché Central and Yaxtché West, to improve silver recovery, concentrate grade and reduce the concentrations of deleterious elements in the concentrate. The testwork should include locked cycle testing to optimize process parameters and develop technical data as inputs into the design of the process plant.

The future comminution, flotation and cyanidation testwork should focus on developing an understanding of the variability by lithology within the Yaxtché deposit. Additional mineralogical studies are necessary to support the metallurgical testwork.

14.0 MINERAL RESOURCE ESTIMATES

14.1 Introduction

This section describes the updated Mineral Resource estimate for the Project. QP Kim reviewed and validated the resource model previously prepared by Wood personnel and based on that review prepared a revised Mineral Resource statement including updates to the economic parameters.

A hybrid silver model was constructed by first defining the overall geometry of the silver mineralization, and then estimating resources within the mineralized envelope using probability assigned constrained kriging (PACK). Major steps for the modelling process included:

- Perform exploratory data analyses (EDA) to better understand the geological controls on the silver mineralization
- Define the structural trends that control the geometry of the silver mineralization using geochemical depletion and enrichment studies, base-metal assay trends, and silver assay trends
- Construct a mineralized envelope that honours the structural trends defined during the EDA studies
- Estimate silver grades within the mineralized shell using PACK. PACK first constructs a probabilistic model or envelope using an indicator model within the implicit model shell. An indicator threshold is then chosen, and blocks with an estimated indicator above this threshold are used to define an envelope around the economic mineralization. Elements are then estimated into these blocks using ordinary kriging (OK) of only the composites within these blocks
- The PACK method prevents economic grades inside the probabilistic envelope from being smeared into the waste, and restricts low-grade material outside the probabilistic envelope from diluting the mineralized material inside the envelope
- A series of PACK models were constructed using a range of silver thresholds to evaluate how tonnages and silver grades vary using different silver thresholds. The models were then evaluated, and the model based on a 250 g/t Ag cut-off was selected for Mineral Resource estimation purposes.

14.2 Exploratory Data Analysis

14.2.1 Database and Statistical Studies

The database contained 389 drill holes with a total of 98,968.7 m of drilling in the Yaxtché area. Of this dataset, 331 drill holes (80,955.0 m) have collar coordinates within the Yaxtché deposit that were used to construct the Mineral Resource model.

In general, the drill hole spacing ranged from 5 to 60 m and averaged approximately 20 m. Azimuths of the drill holes range between 140–220º with two main populations orientated at 155º and 205º. Inclination of the drill holes varies from -45º to -90º with a median of -65º. A total of 51% of the 1 m drill hole intervals that did not display visual cues for mineralization and were not sampled. For these intervals silver, gold, copper, lead, and zinc assays were assigned a background value for statistical analyses and Mineral Resource estimation purposes.

For initial statistical studies, the drill data set was selected using all data within the Yaxtché area. Initial visual review of the data; however, showed distinct differences in assay values between Yaxtché West and Yaxtché Central.

To filter out non-mineralized material that may mask the EDA and capping studies, a mineralized envelope was constructed, and 1 m composites inside the envelope were used for EDA and capping studies. Initial studies were categorized using two domains, Yaxtché West and Yaxtché Central. Drill collar locations within each domain are shown in Figure 14-1.

The main EDA studies undertaken were:

- Univariate statistics for key elements
- Silver histograms and probability plots
- Boxplots categorized by alteration
- Boxplots categorized by lithology
- Correlation coefficients for key elements.

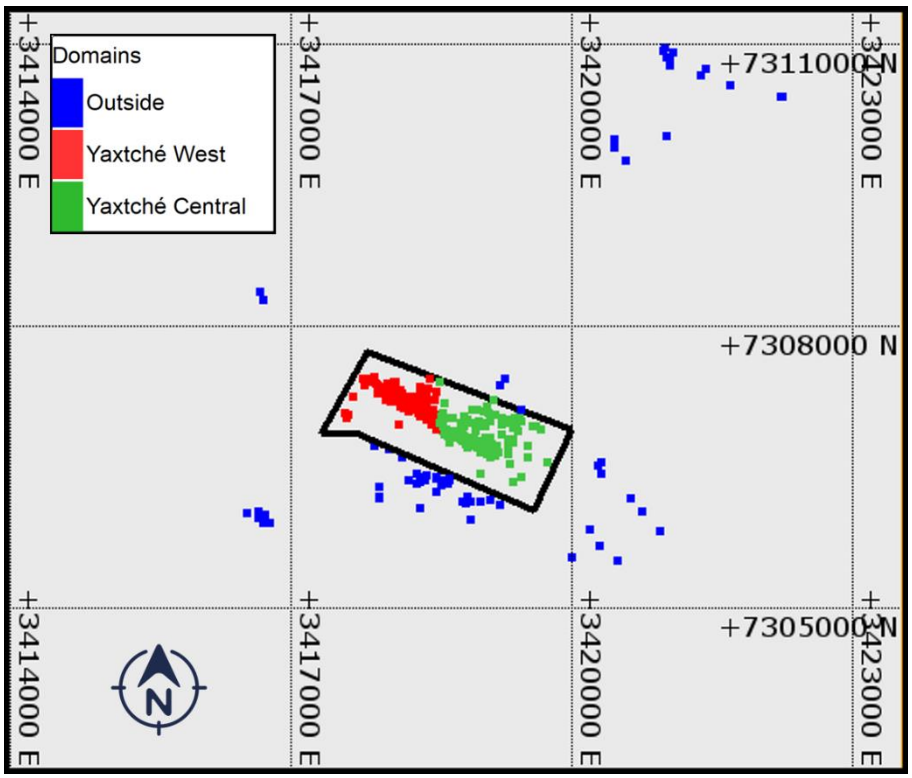
Key findings from the EDA statistical studies include:

- Although statistics for the key elements can be similar, visually-distinct spatial zonations were observed
- Silver appears to be a single population above 10 g/t Ag
- A significant portion of the silver composites within the mineralized envelope are lower grade, indicating that a modelling method such as PACK needs to be incorporated to

minimize diluting the higher-grade material Correlation coefficients show associations between Ag/Cu/As/Sb

- Although a stronger correlation probably exists between silver and sulphur on a mineralogical level as suggested by correlation between silver, arsenic and antimony, this correlation is probably masked by the much larger episode of non-argentiferous sulphide mineralization
- Statistics categorized by lithology should be used with caution as several of the codes are a combination of lithology and visually-observed alteration and mineralization. The contact breccia; however, does appear to control mineralization and should be evaluated in more detail for future models
- Boxplots show that higher alteration codes (3 is the highest) are correlated to lower calcium, magnesium and sodium grades and higher silver grades.

Figure 14-1: Yaxtché Domains with Drill Hole Collars in the Resource Database



Source: Wood, 2018

Note: This figure excludes drilling from 2019 and 2020 that were not used in estimation.

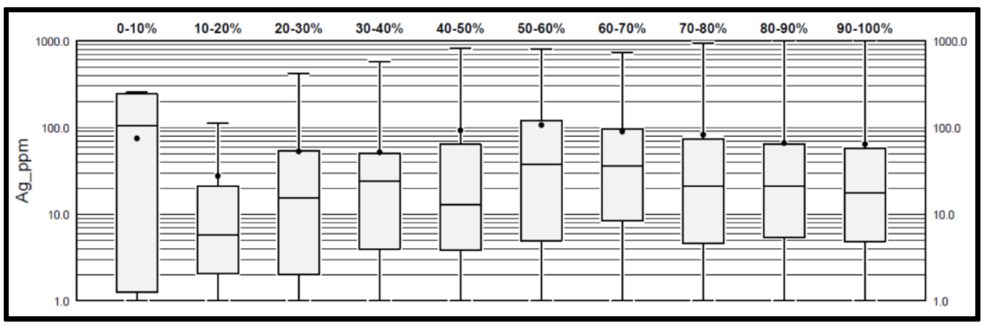
14.2.2 Core Recovery

The possible effects of low core recovery on grades were evaluated by constructing boxplots for silver, copper, lead, zinc, arsenic and antimony with the data binned by percent core recovery.

Results from the core recovery studies are as follows:

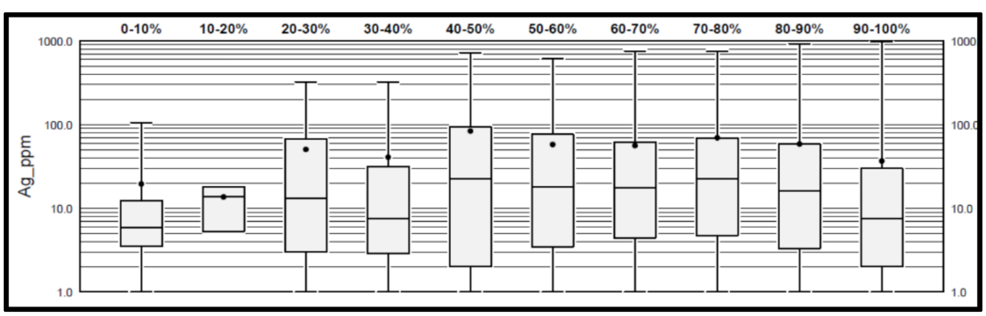
- In Yaxtché West, 93% of the samples have core recoveries greater than 80%, and 94% of the samples in Yaxtché Central have core recoveries greater than 80%, which are acceptable core recoveries for resource estimation
- There is no reliable determination if silver grades increase or decrease with lower core recoveries since there are very few samples with low core recoveries.
- Examples for silver are shown for Yaxtché West in Figure 14-2, and for Yaxtché Central in Figure 14-3.

Figure 14-2: Yaxtché West, Ag Grades Categorized by Core Recovery



Source: Wood, 2018

Figure 14-3: Yaxtché Central, Ag Grades Categorized by Core Recovery



Source: Wood, 2018

14.3 Geological Models

14.3.1 Visual Zonation Studies

In order to better understand the relationships between copper, lead, zinc, arsenic, antimony and silver zonations, wireframes were constructed for each of these elements and viewed visually. Thresholds used in Figure 14-4 through Figure 14-8 for copper, lead, zinc, arsenic, and antimony were adjusted to best illustrate the zonations, and do not correspond to any economic or metallurgical threshold. The mineralized envelope (in red) is shown as a reference. The zonations were later used to model these elements to better understand how these elements may affect metallurgical recoveries.

Key findings from the visual zonation studies are as follows:

- Copper typically occurs below the silver mineralization
- Lead and zinc occur together and are more extensive towards the western end of the silver mineralization
- Arsenic and antimony occur together within and below the silver mineralization.

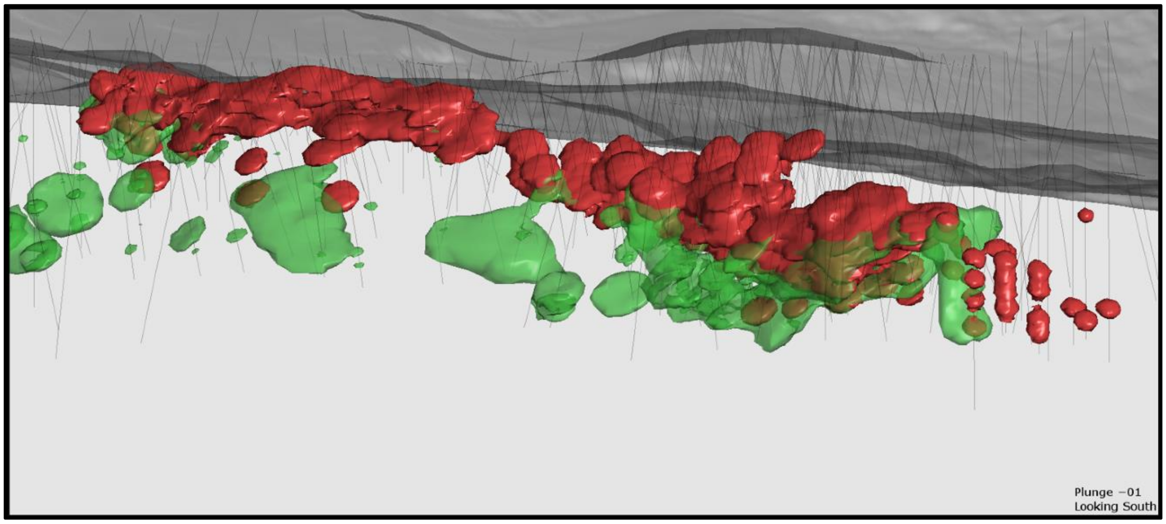
14.3.2 Alteration Model

EDA studies using boxplots showed that higher alteration intensity codes (visually logged codes that range from 0–3) correlate to higher silver grades and lower calcium, magnesium and sodium grades. Since the calcium, magnesium and sodium assays are more quantitative than the logged alteration codes, a Quevar alteration index (QAI) was created to better delineate the geometry of the alteration that can then be used to help define the geometry of the silver mineralization.

The derivation of the QAI is discussed in Section 7.2.3.

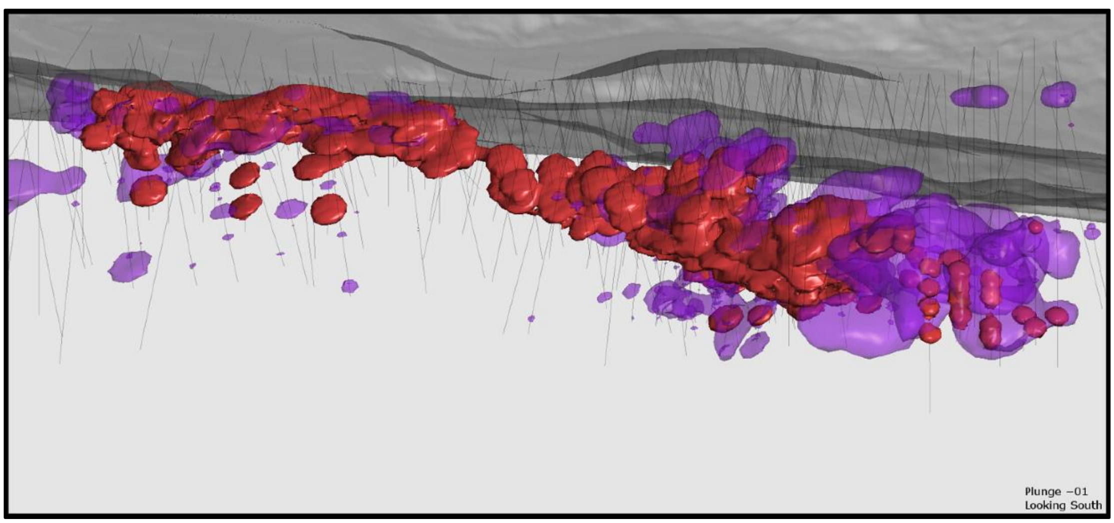
A wireframe was constructed for QAI review purposes, where samples have a 60% chance of having an QAI>40 (Figure 14-9 and Figure 14-10).

Figure 14-4: Perspective View Looking South of the Mineralized Envelope (red) in Relation to Cu Mineralization (green)



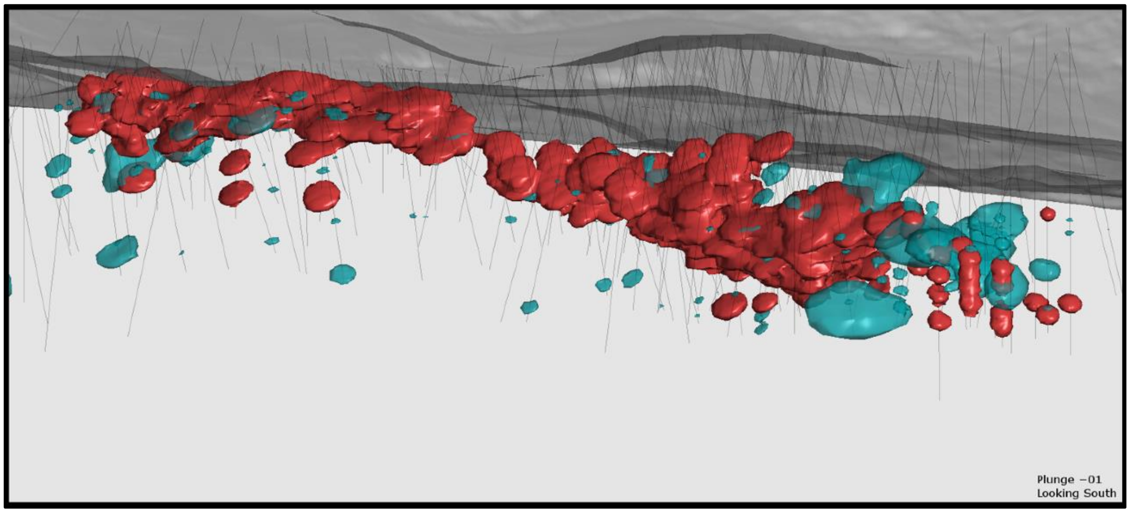
Source: Wood, 2018

Figure 14-5: Perspective View Looking South of the Mineralized Envelope (Red) in Relation to Pb Mineralization (Purple)



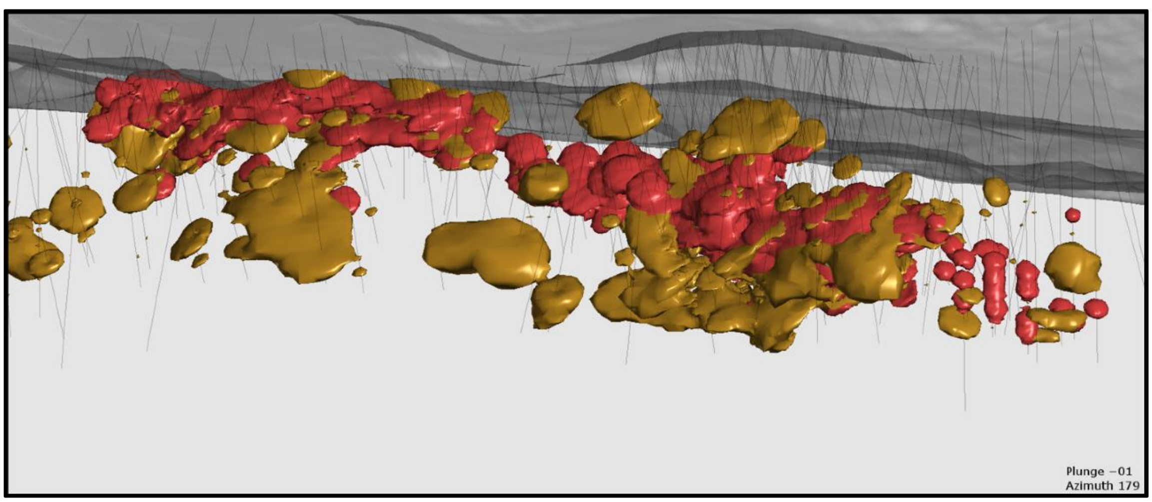
Source: Wood, 2018

Figure 14-6: Perspective View Looking South of the Mineralized Envelope (Red) in Relation to Zn Mineralization (Cyan)



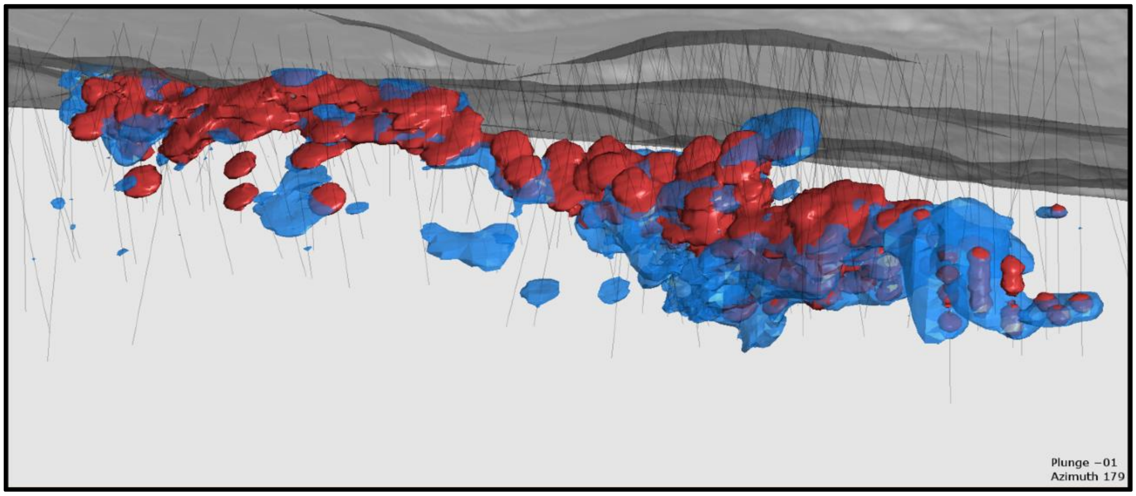
Source: Wood, 2018

Figure 14-7: Perspective View Looking South of the Mineralized Envelope (Red) in Relation to the As Mineralization (Brown)



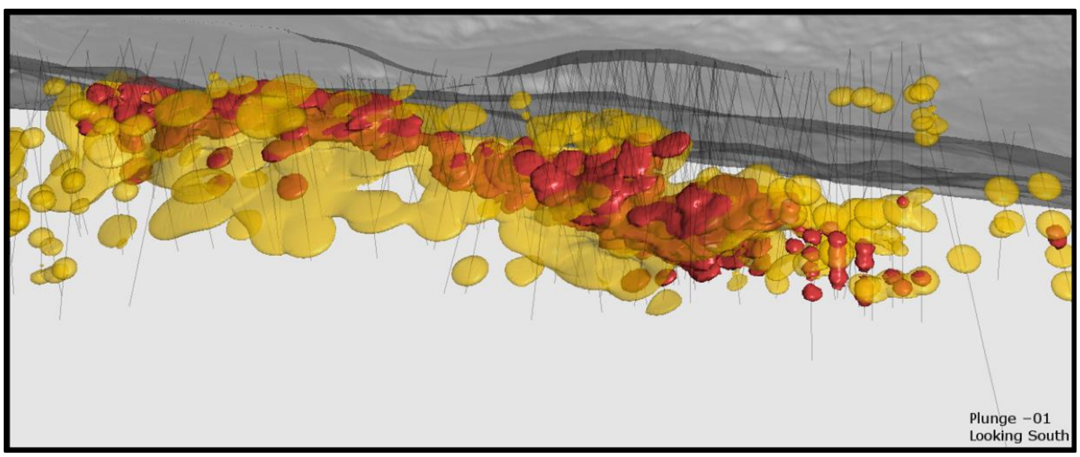
Source: Wood, 2018

Figure 14-8: Perspective View Looking South of the Mineralized Envelope (Red) in Relation to the Sb Mineralization (Blue)



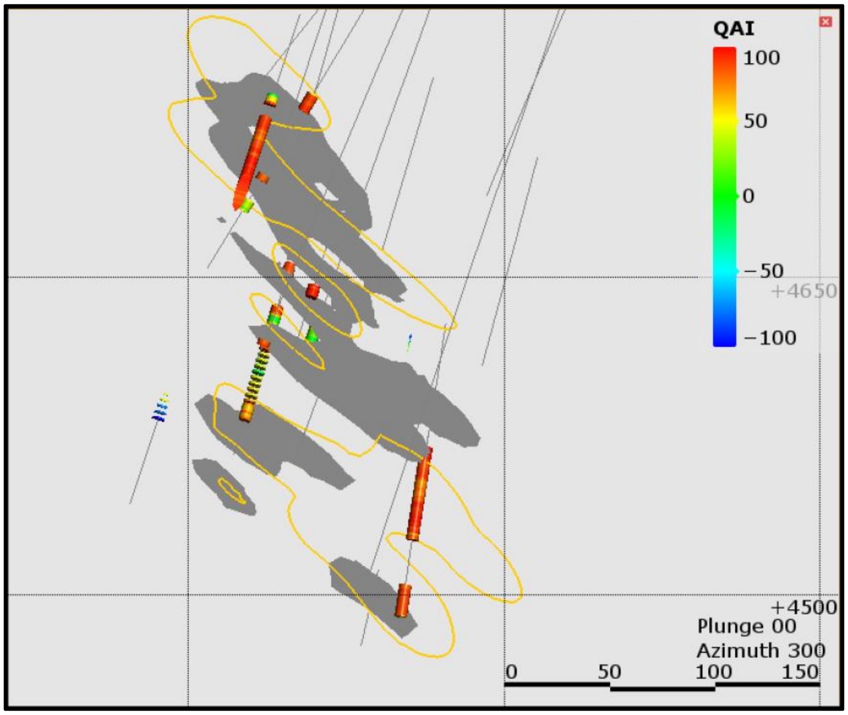
Source: Wood, 2018

Figure 14-9: Perspective View Looking South of the Mineralized Envelope (Red) in Relation to the QAI (Yellow)



Source: Wood, 2018

Figure 14-10: Cross Section Looking 300º Showing the Mineralized Envelope (Dark Gray) in Relation to the QAI (Yellow)



Source: Wood, 2018

Key findings from the alteration index studies are as follows:

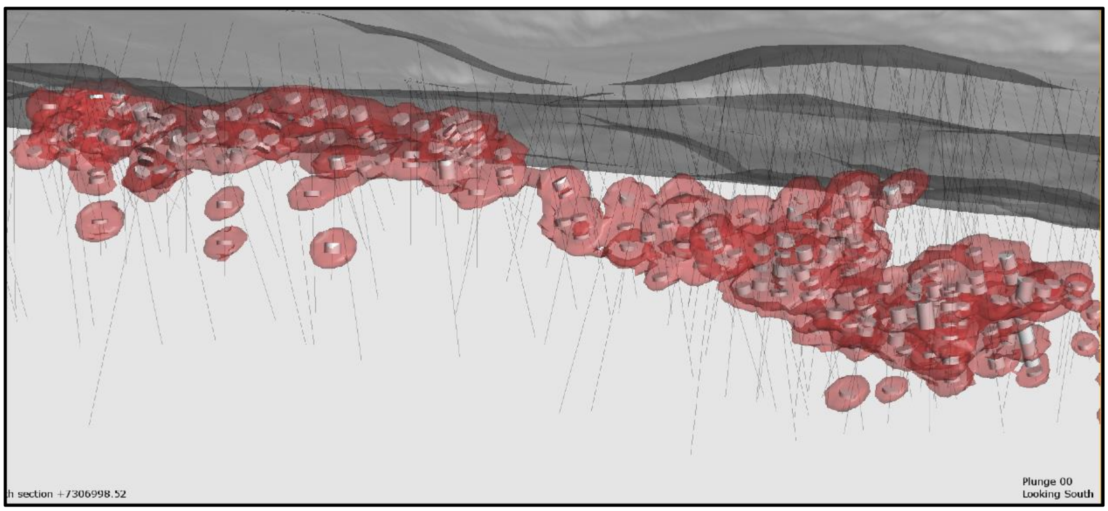
- Higher-grade silver mineralization correlates to more intense alteration
- Alteration can be more precisely quantified using the calcium, magnesium and sodium assays that are depleted during alteration using a relative QAI
- Although the QAI visually follows the silver mineralization, it is not an exact correlation and economic mineralization occurs both inside and outside of the QAI shells
- QAI can only be used to help define the geometry of the silver mineralization; it cannot be used alone to define the geometry of the silver mineralization. It should, however, be evaluated as an exploration tool to guide future drilling.

14.3.3 Silver Grade Shell

The limits of the potentially economic mineralization were established by constructing a mineralized envelope. The envelope was made within a defined boundary, sufficiently large enough to cover areas of interest for block modelling (refer to Figure 14-1). The edges of the envelope were softened to allow the mineralization to be projected along strike to a reasonable distance. Although this incorporates lower-grade composites into the envelope, the PACK estimation method excludes these low-grade assays from the mineralized envelope during grade estimation.

Structural trends controlling the silver mineralization were delineated using grade trends, the QAI, and key lithological units. The trends were recorded using digital terrain model wireframes (DTM). The composites and the structural trends were then used together to construct a mineralized envelope wireframe. The structural trends vary locally but generally strike 120° and dip -40° to the northeast (Figure 14-11).

Figure 14-11: Perspective View Looking South of the Mineralized Envelope (Red) and the Ag Composites >150 g/t (White)

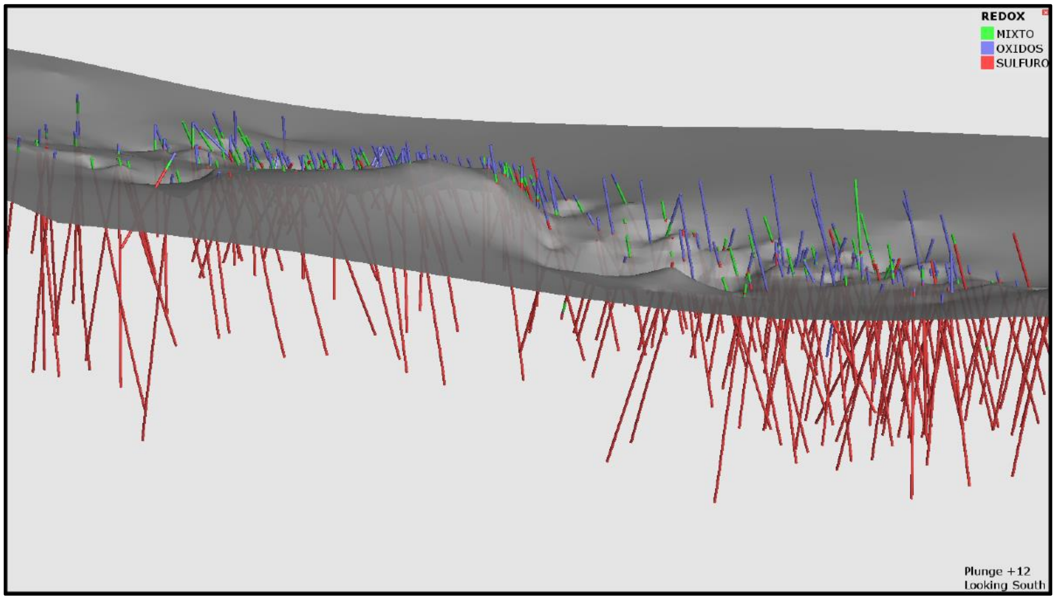


Source: Wood, 2018

14.3.4 Oxide–Sulphide Boundary

Visually-logged oxide, sulphide and mixed codes in the database were refined by comparing the logged codes to the core photos and codes in adjacent holes. Since the processing method currently being evaluated is a sulphide mill, the mixed material was combined with the oxide, and a near-horizontal DTM was constructed to delineate oxide above and sulphide below the DTM (Figure 14-12). There is an oxide portion that has the opportunity of being estimated as a lower-grade open-pit oxide deposit, but this would require a separate resource model designed using a lower-cut-off grade, refinement of the oxide–mixed logged codes, and consideration of resource estimate using the assumption of open pit methods.

Figure 14-12: Perspective View Looking South of the Oxide-Mixed-Sulphide Codes and the DTM used to Delineate Oxide and Sulphide in the Resource Model



Source: Wood, 2018

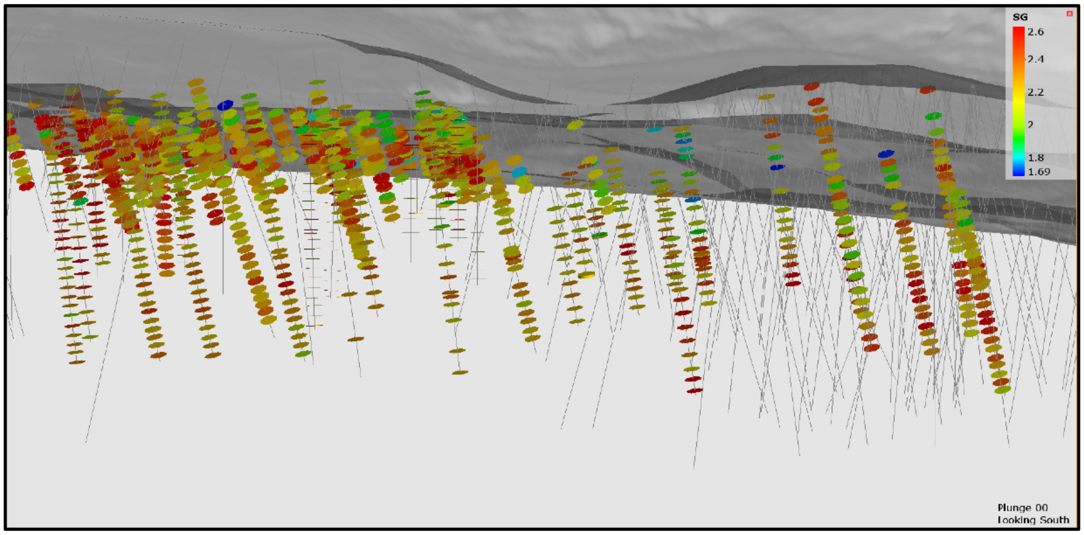
14.4 Density Assignment

Density measurements were performed on 1,568 unwaxed diamond-drill core samples by the on-site exploration geologists using the water displacement method. During a previous site visit, Wood personnel collected eight samples that had previously been measured for SG using un-waxed volumetric method by on-site Golden Minerals personnel. These samples were sent to Alex Stewart for re-analysis using both the waxed and unwaxed SG methods. Results showed little difference between the on-site unwaxed measurements and the waxed measurements at the laboratory.

Density data were recorded in the database and reviewed spatially and statistically. The spatial review showed the density samples to be representative of the deposit, Figure 14-13. Statistical review showed several density values fell outside the expected upper and lower density limits. These samples were determined to be outliers and removed (Figure 14-14).

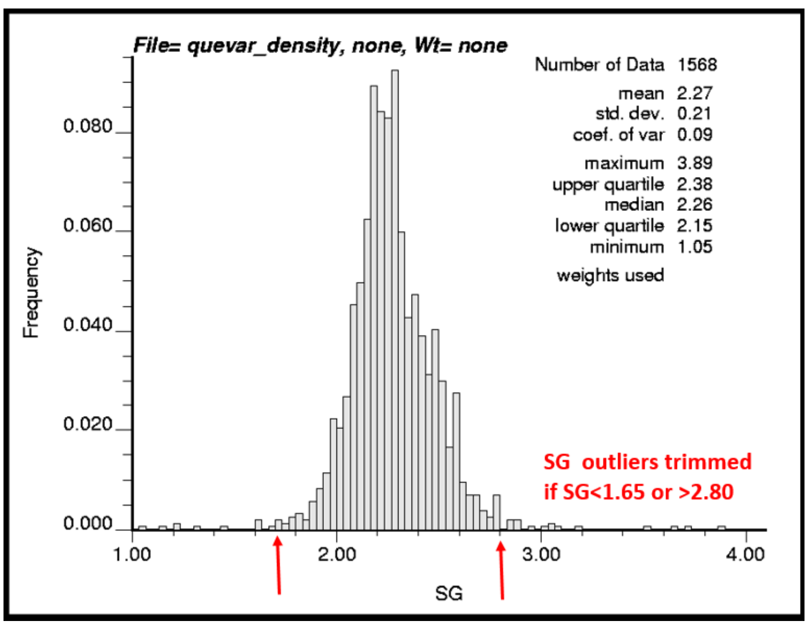
Density values were estimated into the block model separately for oxide and sulphide using inverse distance squared (ID2) method and an anisotropic flat-lying search (search distances in X and Y direction were three times the distances vertically) to reflect the near-horizontal oxide-sulphide boundary.

Figure 14-13: Perspective View Looking South of Distribution of Density Samples



Source: Wood, 2018

Figure 14-14: Histogram of SG Values Showing Lower and Upper Trimming



Source: Wood, 2018

14.5 Grade Capping/Outlier Restrictions

In mineral deposits having skewed distributions, it is not uncommon for 1% of the highest assays to disproportionately account for over 20% of the total metal content in the resource model. Although these assays are real and reproducible, they commonly show little continuity and add a significant amount of uncertainty to the Mineral Resource estimate.

Since high-grade material is not usually drilled to a suitable spacing to verify its spatial limits, the very high-grade assays should be constrained during Mineral Resource estimation to minimize the high risk of this material and local grade overestimation. One way to minimize the influence of these samples is to apply a top cut or cap grade to the assays before compositing and Mineral Resource estimation.

To determine an appropriate capping grade, capping studies were performed for Yaxtché West and Yaxtché Central domains. The capping studies performed were:

- Looking for kinks or discontinuities in cumulative log probability plot (CLPP)
- Decile analysis
- Quantifying the number of high-grade samples lying in close proximity to each other (Dist)
- Filtering higher-grade assays and filtering the assays to determine when the higher-grade assays begin to cluster together.

Results for each capping method were compared and a final capping threshold was selected (Table 14-1). Capping was performed on the 1 m composites before further compositing into the 2.5 m composites used for the Mineral Resource estimation.

For arsenic and antimony, no capping was applied since some assays exceed the upper limit of the assay method used. As a result, the arsenic and antimony models should be used with caution as the assays in the database and model may not represent the very high arsenic and antimony grades.

Table 14-1: Capping Thresholds, Final Capping Values Highlighted in Gray

Area	Metal	Units	CLPP	Decile	Dist	Visual	Avg	Final	Metal Removed (%)
Yaxtché West	Ag	ppm	1,800	1,902	1,500	1,640	1,711	1,800	12
	Au	ppm	0.35	0.28	0.40	0.25	0.32	0.32	32
	Cu	%	1.50	1.24	0.90	1.20	1.21	1.50	9
	Pb	%	4.00	3.22	3.00	2.70	3.23	4.00	12
	Zn	%	2.50	1.77	2.00	1.80	2.02	2.50	9
Yaxtché Central	Ag	ppm	1,500	1,899	1,400	1,288	1,522	1,600	15
	Au	ppm	0.60	0.34	0.40	0.12	0.37	0.50	15
	Cu	%	1.00	1.00	1.00	0.90	0.98	1.00	9
	Pb	%	4.00	2.90	2.00	3.80	3.18	4.00	5
	Zn	%	1.80	1.70	1.50	1.00	1.50	1.80	6

14.6 Composites

Samples were first capped and then composited into 2.5 m down-hole composite intervals corresponding to the proposed mining height. Statistics for 2.5 m composites within the mineralized envelope and 250 g/t Ag PACK envelope are summarized in Table 14-2. There is a high percentage of composites with silver grades below 150 g/t within the mineralized envelope. The PACK estimation method was selected for grade estimation as it excludes these lower-grade composites from being used during grade estimation. The last column in Table 14-2 provides the composite statistics used for final PACK grade estimation.

Table 14-2: Drill Composite Statistics (2.5 m capped composites)

	Within Mineralized Envelope								Within PACK Envelope
Statistic	Ag	Au	Cu	Pb	Zn	S	As	Sb	Ag
No. Samples	3,584	3,584	3,584	3,584	3,584	3,584	3,584	3,584	598
Mean	116 ppm	0.02 ppm	0.07%	0.22%	0.12%	4.23%	478 ppm	354 ppm	437 ppm
Std Dev	201.10	0.04	0.15	0.42	0.26	2.55	774.25	449.97	306.53
CV	1.74	2.69	2.19	1.93	2.20	0.60	1.62	1.27	0.70
Maximum	1,800 ppm	0.32 ppm	1.50%	4.00%	2.50%	13.75%	11,919 ppm	3,808 ppm	1,800 ppm
Q75	131 ppm	0.01 ppm	0.06%	0.21%	0.09%	6.02%	523 ppm	482 ppm	574 ppm
Q50	37 ppm	0.01 ppm	0.01%	0.11%	0.02%	3.92%	251 ppm	173 ppm	361 ppm
Q25	5 ppm	0.00 ppm	0.00%	0.03%	0.00%	2.26%	124 ppm	40 ppm	261 ppm
Minimum	0 ppm	0.00 ppm	0.00%	0.00%	0.00%	0.04%	3 ppm	0 ppm	0 ppm

Note: CV = coefficient of variation; Q75 = 75th percentile; Q50 = 50th percentile (median); Q25 – 25th percentile

14.7 Variography

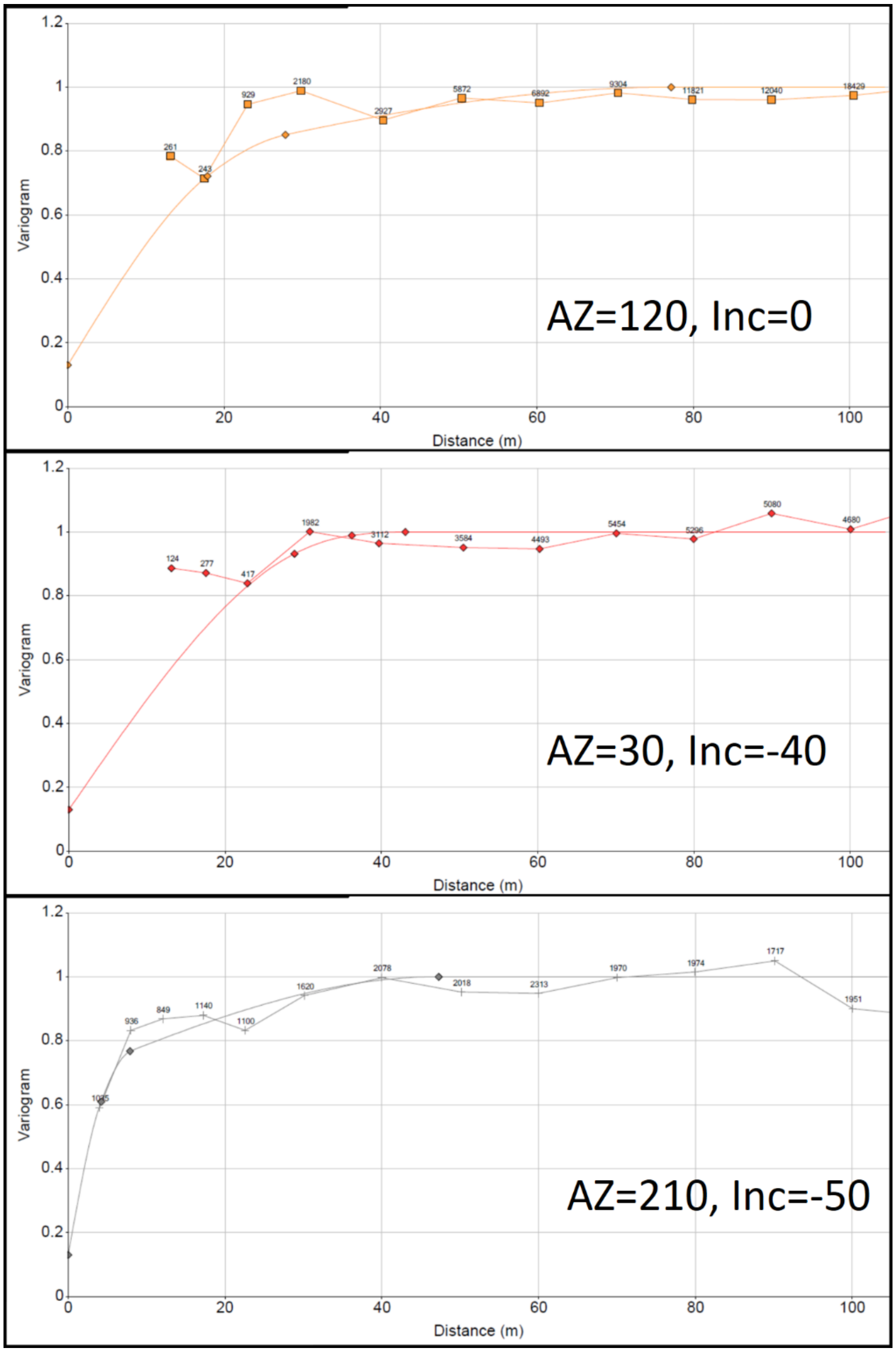
Review of the structural, assay trends and QAI studies showed that the trend of the silver mineralization is relatively consistent, following a strike of 120° and dipping at -40° to the northeast. As no obvious changes in direction were noted between Yaxtché West and Yaxtché Central, variograms and grade estimations were performed for both domains combined to avoid any unnecessary artefacts that may occur at domain boundaries if the domains were estimated separately. Any local variations within the overall trend were accounted for by using dynamic anisotropy during grade estimation which aligns the search ellipse with the structural trends for every block in the model during grade estimation.

Variograms (correlograms) were calculated and modelled following the main structural trend (along strike, down-dip, and perpendicular) for silver, gold, copper, lead and zinc using the 2.5 m composites within the mineralized envelope. The nugget effects for each variogram were first established using down-hole variograms and then directional variograms were modelled using the nugget effect. An example of modelled silver variograms in three primary directions are summarized in Table 14-3 and shown in Figure 14-15.

Table 14-3: Variogram Parameters

Azimuth / Inclination	Element	Left-hand Rotations Z / Y / X	Axis	Nugget Effect	Structures C1/C2/C3	Ranges a1/a2/a3
120 / 0	Ag	30 / 0 / 40	X	0.13	0.13 / 0.43 / 0.31	18 / 28 / 77
30 / -40			Y		0.13 / 0.43 / 0.31	29 / 36 / 43
210 / -50			Z		0.13 / 0.43 / 0.31	4 / 8 / 47
120 / 0	Au	30 / 0 / 40	X	0.05	0.09 / 0.47 / 0.39	14 / 47 / 160
30 / -40			Y		0.09 / 0.47 / 0.39	34 / 44 / 95
210 / -50			Z		0.09 / 0.47 / 0.39	5 / 11 / 140
120 / 0	Cu	30 / 0 / 40	X	0.21	0.28 / 0.25 / 0.26	14 / 42 / 140
30 / -40			Y		0.28 / 0.25 / 0.26	24 / 54 / 78
210 / -50			Z		0.28 / 0.25 / 0.26	9 / 32 / 87
120 / 0	Pb	30 / 0 / 40	X	0.20	0.3 / 0.2 / 0.3	20 / 52 / 100
30 / -40			Y		0.3 / 0.2 / 0.3	9 / 13 / 52
210 / -50			Z		0.3 / 0.2 / 0.3	18 / 42 / 48
120 / 0	Zn	30 / 0 / 40	X	0.20	0.05 / 0.59 / 0.16	11 / 27 / 84
30 / -40			Y		0.05 / 0.59 / 0.16	28 / 34 / 47
210 / -50			Z		0.05 / 0.59 / 0.16	5 / 13 / 40

Figure 14-15: Example Variograms for Ag



Source: Wood, 2018

14.8 Silver Estimation

The PACK estimation method was selected for its ease in constructing multiple models using different silver thresholds. The resulting tonnes and grades derived from these models were evaluated. Sensitivity models were constructed using silver thresholds of 150, 200, and 250 g/t Ag. A 250 g/t Ag model was selected for Mineral Resource estimation purposes.

The PACK estimation method for silver first constructs an indicator model based on a silver threshold, tags the estimated indicator into the composite file, and then estimates silver grades using only the blocks and composites with an estimated indicator above a specified value. The PACK modelling method also allows the model to be easily updated with additional drilling, modifications to the mining method, or changes in cut-off grades.

The main steps to construct the 250 g/t Ag resource model were as follows:

- The extents of the silver mineralization were defined using mineralized envelope as described in Section 14.3.3.
- The mineralized envelope was populated with blocks rotated 30º clockwise around the Z axis. A block size 5.0 m x 2.5 m x 2.5 m (along strike, perpendicular to strike, vertical) was selected to assist with mine planning, and the blocks were not sub-celled.
- The 2.5 m composites within the mineralized envelope were flagged and used to construct an indicator model. An indicator field was first added to the composites. If the silver grade was <250 g/t, the indicator was set to 0, if the Ag grade was ≥250 g/t, the indicator was set to 1.
- The indicators were estimated into the mineralized envelope using inverse distance to the third power (ID3) using parameters shown in Table 14-4.
- The estimated indicator values in the block model were then tagged back into the composites, and only blocks with an estimated indicator ≥0.30 were estimated using only those composites with tagged estimated indicator values ≥0.30.
  Figure 14-16 is an example cross section of the 250 g/t Ag indicator model within the mineralized envelope (black outline) showing estimated indicators in the model that range from 0–1 (coloured indicator), and composites (black = 1, gray = 0). Blocks with estimated indicators ≥0.30 are highlighted as solid blocks and form the Mineral Resource model.
- Figure 14-17 shows the silver grades estimated into the solid blocks using composites with estimated indicator ≥0.30, ordinary kriging, and the same estimation parameters as those used for the indicator model summarized in Table 14-4, with variogram parameters summarized in Table 14-3. Blocks with estimated indicator <0.30 (non-solid blocks) were

estimated using the same method but using composites with estimated indicators <0.30. These blocks were included to support future mine planning and dilution studies.

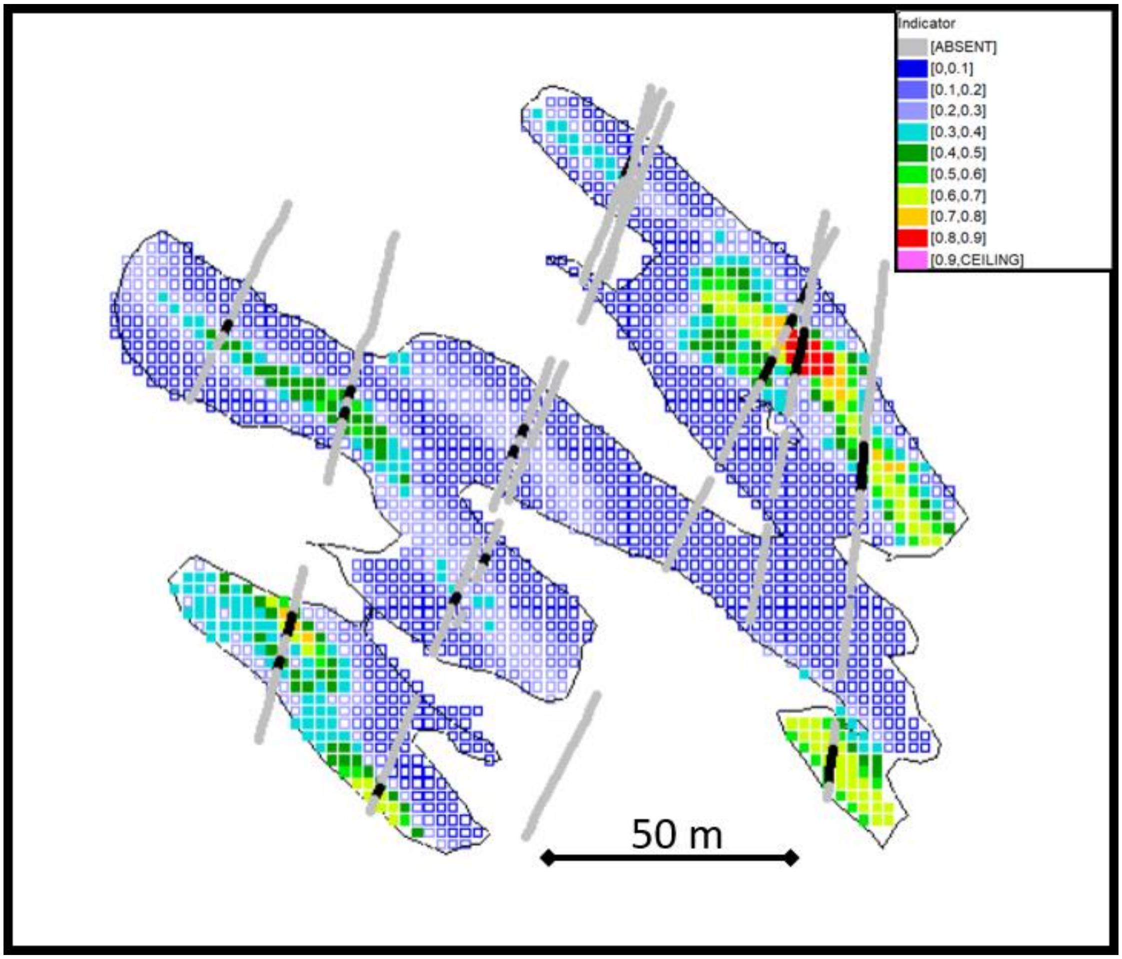
- The solid blocks in Figure 14-17 are the Mineral Resource model blocks. The continuity of the mineralization could be increased by lowering the silver threshold which will significantly increase the number of blocks (tonnes) at the expense of lowering the grade.

Table 14-4: Estimation Parameters

Azimuth / Inclination	Field	Left-hand Rotations Z / Y / X	Search Pass 1		Search Pass 2		Search Pass 3		Maximum No. per Drill Hole
			Distance (m)	Min / Max Comps	Distance (m)	Min / Max Comps	Distance (m)	Min / Max Comps	
120 / 0	All indicators and elements	30 / 40 / 0	20	3 / 8	30	3 / 8	40	1 / 8	2
30 / -40			20	3 / 8	30	3 / 8	40	1 / 8	2
210 / -50			10	3 / 8	15	3 / 8	20	1 / 8	2

Note: Comps = composites

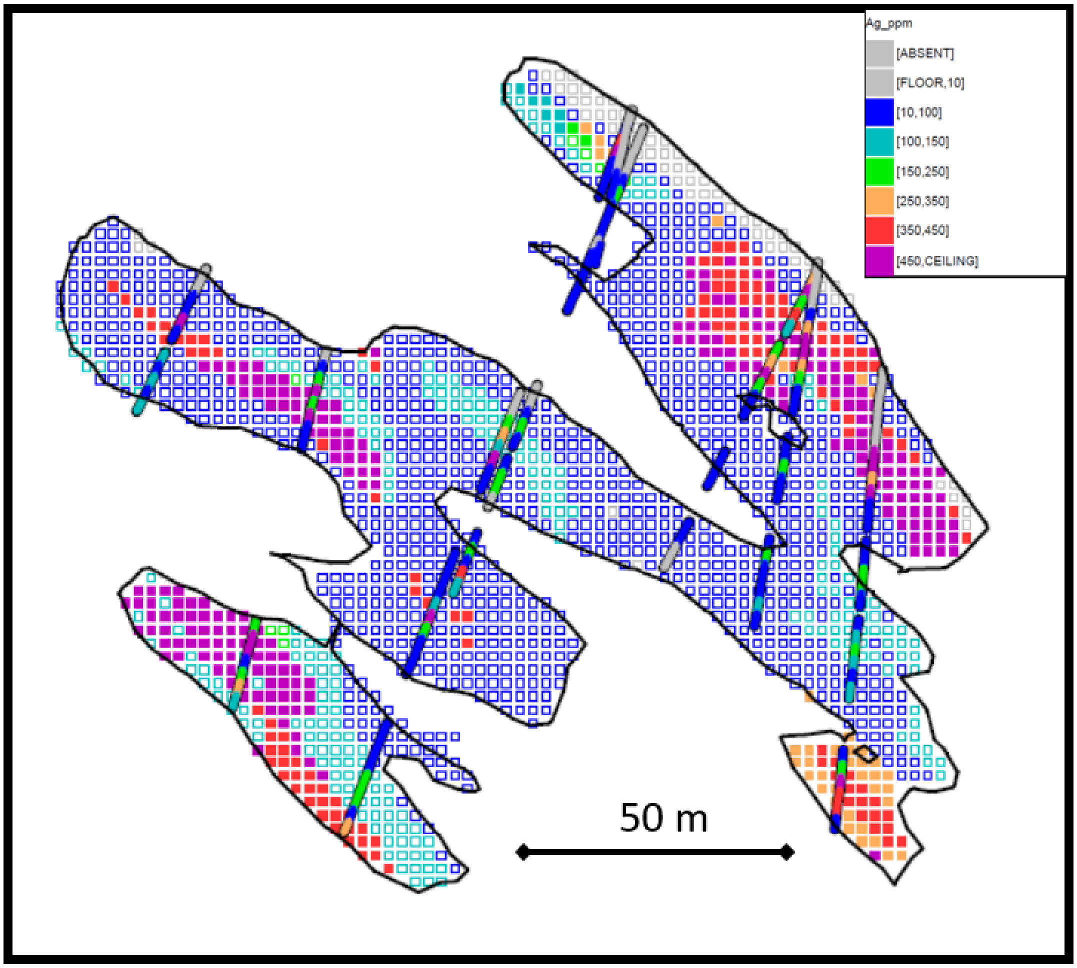
Figure 14-16: Example of Indicator Model using a 250 g/t Silver Threshold



Source: Wood, 2018

Note: Blocks with estimated indicator ≥ 0.3 are shown as solid. Composites coloured by indicator (black = 1, gray = 0)

Figure 14-17: Example of the PACK Ag Model



Source: Wood, 2018

Note: Blocks estimated within the indicator envelope are shown as solid blocks.

14.9 Metallurgical Models

Although silver, copper, lead, zinc, arsenic and antimony were estimated, the model was optimized to estimate the silver mineralization as it is the only economic contributor and only metal being reported as a Mineral Resource. Gold was estimated to determine if any significant gold credits could be expected, but gold grades were considered to be too low to warrant any further studies at this stage of Project evaluation.

Copper, gold, lead, zinc, arsenic and antimony were estimated to better understand the deposit and to assist with future metallurgical studies. Copper, gold, lead, zinc, arsenic and antimony were estimated into all blocks within the mineralized envelope using a PACK modelling method similar to the silver estimation. The only difference was that instead of using a silver threshold based on economics, the thresholds were selected if the copper, lead, zinc, arsenic and antimony grades were above a threshold that would result in a penalty when selling the concentrates. If the grades were below the metallurgical penalty threshold and an inflection was recognized in the probability plots, the PACK threshold was set to the inflection. If no inflection was noted, the element was modelled as a single domain.

PACK thresholds used are as follows:

- Copper: 0.2% threshold. If grades exceed this value, the concentrate may incur a copper penalty. However, the amount of high-grade copper is small enough that the penalty may be avoided through blending
- Lead: too low for metallurgical threshold; inflection at 0.01% was used to domain and model the higher grades
- Zinc: too low for metallurgical threshold, weak inflection at 0.2% was used to domain and model the higher grades
- Arsenic: 200 ppm threshold. If grades exceed this value, the concentrate may incur an arsenic penalty
- Antimony: 0 ppm threshold, as the concentrate is expected to incur an antimony penalty for all material.

14.10 Block Model Validation

14.10.1 Visual

The estimated silver grades in the model were compared to the composite grades by visual inspection in plan views, cross sections, and longitudinal sections. In general, the model and composite grades compared well.

14.10.2 Global Bias

The block model was checked for global bias by comparing the average silver, gold, copper, lead, and zinc grades (with no cut-off) from the model (OK grades) with means from nearest-neighbour (NN) estimates. The NN estimator produces a theoretically unbiased (de-clustered) estimate of the average value when no cut-off grade is imposed and provides a good basis for checking the performance of different estimation methods. In general, an estimate is considered acceptable if the bias is at or below 5%. Table 14-5 shows the bias results on a global basis.

Table 14-5: Global Bias by Metal

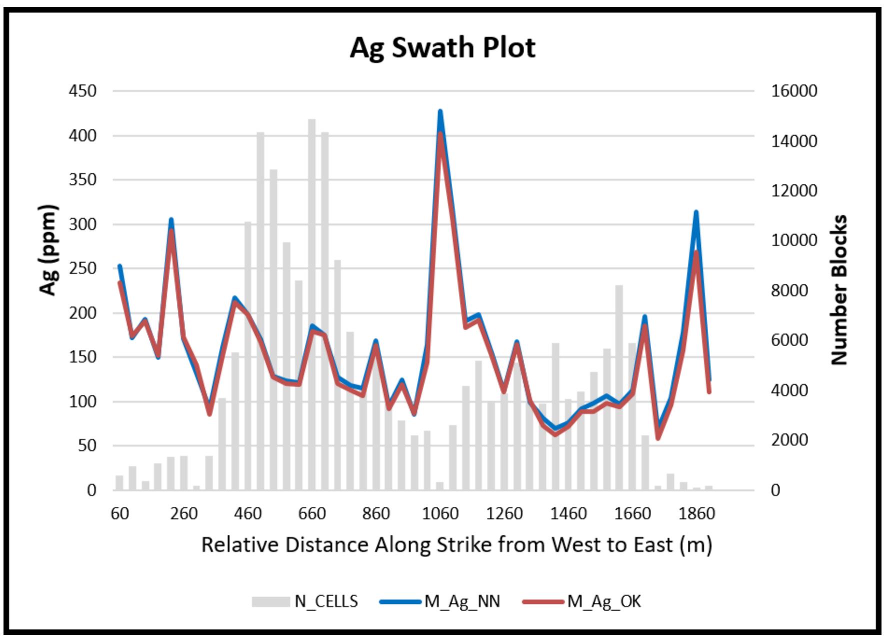
Domain	Units	Model OK	Model NN	Relative Diff
Ag	ppm	469	494	-4.9%
Au	ppm	0.02	0.02	-1.7%
Cu	%	0.40	0.42	-4.9%
Pb	%	0.23	0.23	0.4%
Zn	%	0.29	0.29	-3.4%

14.10.3 Local Bias

Local trends in the grade estimates (swath checks) were performed by plotting the mean silver values from the NN estimate versus the kriged results along strike, along dip-direction and vertical directions. Swath plots by direction are shown in Figure 14-18 through Figure 14-20.

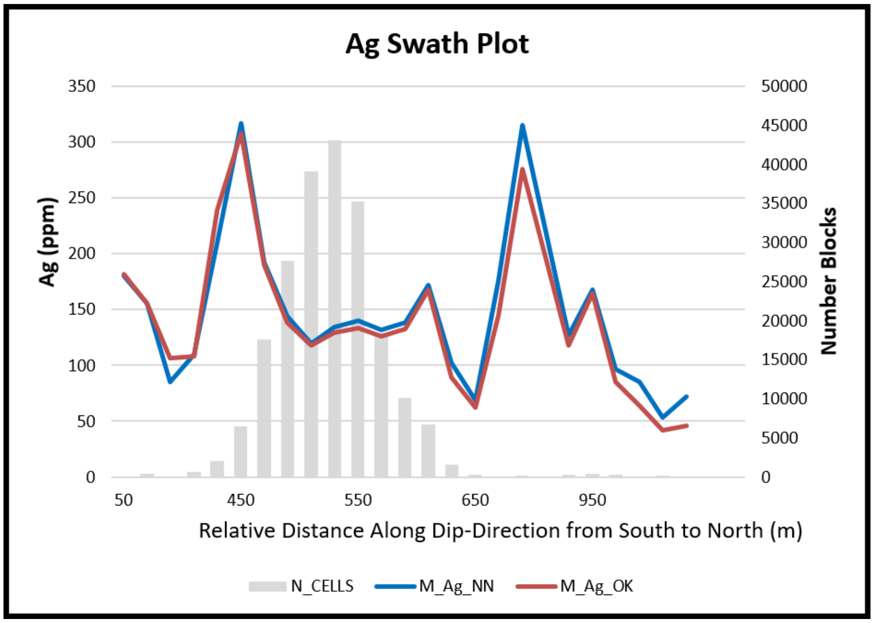
The swath grade profile plots help in assessing the local mean grades and are used to validate grade trends in the model. Although the global comparisons agree well, the swath plots illustrate the existence of slight local differences between the NN and kriged model grades. This is considered normal.

Figure 14-18: Ag Grade Trends Along Strike



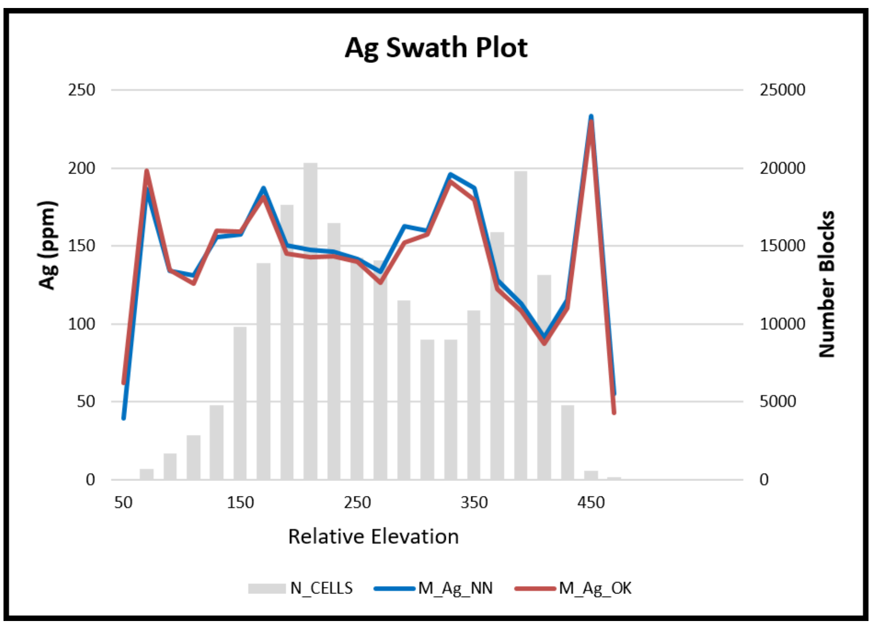
Source: Wood, 2018

Figure 14-19: Ag Grade Trends Along Dip-Direction



Source: Wood, 2018

Figure 14-20: Ag Grade Trends Along Relative Elevation



Source: Wood, 2018

14.11 Classification of Mineral Resources

Mineral Resources were classified using a common industry and Wood internal guideline that Indicated Mineral Resources should be quantified within relative ± 15% with 90% confidence on an annual basis and Measured Mineral Resources should be known within ± 15% with 90% confidence on a quarterly basis. At this level, the drilling is usually sufficiently close-spaced enough to permit confirmation (Measured) or assumption of continuity (Indicated) between points of observation.

For the Yaxtché model, a drill hole spacing study was performed to determine the nominal drill hole spacing required to classify material as Indicated. Material within the mineralized envelope not classified as Indicated was classified as Inferred, and no Measured is reported.

Confidence limits were calculated on a single block that represents one month's production (assuming 365,000 t/a). The confidence limits, a review of continuity on sections and plans, and an assessment of data quality were all used to determine that a minimum drill hole spacing of 30 by 30 m was necessary to meet the requirements for Indicated. The classification was then smoothed to remove the isolated blocks with a different classification than the surrounding blocks.

14.12 Reasonable Prospects of Eventual Economic Extraction

The Yaxtché deposit is amenable to underground mining methods. Underground mining assumes the random room-and-pillar underground mining method with silver concentrates produced and sold to a smelter.

The parameters used to constrain the Mineral Resource are summarized in Table 14-6. These parameters were used to determine a breakeven cut-off grade of approximately 135 to 155 g/t Ag. An elevated cut-off of 250 g/t Ag was selected.

Table 14-6: Parameters Used to Determine RPEEE

Parameter	Unit	Value
Silver price	$/oz	26
Metallurgical recovery (Ag)	%	81 to 93
Silver payability	%	95
Mining operating cost	$/t	60
Process operating cost	$/t	25
General and administrative cost	$/t processed	20

Note: Break-even cut-off using these parameters ranges from 135 to 155 g/t Ag. Royalties discussed in Section 4 were factored in the determination of the 250 g/t cut-off.

14.13 Yaxtché Mineral Resource Statement

Table 14-7 summarizes the Mineral Resource estimate for the Yaxtché deposit. The resource has been constrained using economic parameters reflecting underground mining methods and is reported at a silver cut-off of 250 g/t. A portion of the mineralization is oxide material that could potentially support an open-pit oxide operation, and would require a different resource model than the one presented in this Report.

Table 14-7: Mineral Resource Statement for the Yaxtché Deposit

Classification	Type	Tonnes (Mt)	Ag Grade (g/t)	Contained Ag Metal (Moz)
Indicated	Sulphide	2.63	487	41.1
	Oxide	0.30	434	4.2
	Total	**2.93**	**482**	**45.3**
Inferred	Sulphide	0.31	417	4.1
	Total	**0.31**	**417**	**4.1**

Note: 1) The independent Qualified Person who prepared the Mineral Resource estimate is Henry Kim, P.Geo, a Principal Resource Geologist with Wood.

2) The effective date of the estimate is September 30, 2024. Mineral Resources were prepared in accordance with the 2019 CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines and reported in accordance with the 2014 CIM Definition Standards.

3) Mineral Resources are constrained by an elevated cut-off of 250 g/t Ag that considered a silver price of $26/oz, a mining operating cost of $60/t at an assumed production of rate 365,000 t/a, a process operating cost of $25/t, general and administrative (G&A) costs of $20/t and a range of metallurgical recoveries between 81 and 93%. The cut-off also considered a 3% NSR royalty payable to the Salta Province and a 0.5% NSR royalty on the Castor concession payable to Cascadero Minerals SA.

4) Reported Mineral Resources contain no allowances for hanging wall or footwall contact boundary loss and dilution. No mining recovery has been applied.

5) Rounding as required by reporting guidelines may result in apparent differences between tonnes, grade and contained metal content.

14.14 Sensitivity of Mineral Resources to Cut-off Grade

Table 14-8 through Table 14-10 summarize the Yaxtché Mineral Resource at a range of cut-off grades. The base case Mineral Resource model reported at a 250 g/t Ag cut-off is highlighted in grey. All sensitivity numbers are reported within the 250 g/t Ag PACK model. If the sensitivity study was performed using a different silver threshold for the PACK model, differences in tonnages and grades between cut-offs would be much larger.

Table 14-8: Indicated Sulphide Resource Sensitivity Table

Cut-off Ag (g/t)	Tonnes (Mt)	Ag Grade (g/t)	Contained Ag Metal (Moz)
300	2.46	501	39.7
250	2.63	487	41.1
200	2.66	484	41.4
150	2.66	483	41.4

Note: The footnotes to Table 14-7 also apply to this table. Base case is highlighted.

Table 14-9: Indicated Oxide Resource Sensitivity Table

Cut-off Ag (g/t)	Tonnes (Mt)	Ag Grade (g/t)	Contained Ag Metal (Moz)
300	0.26	456	3.8
250	0.30	434	4.2
200	0.31	429	4.2
150	0.31	428	4.3

Note: The footnotes to Table 14-7 also apply to this table. Base case is highlighted.

Table 14-10: Inferred Sulphide Resource Sensitivity Table

Cut-off Ag (g/t)	Tonnes (Mt)	Ag Grade (g/t)	Contained Ag Metal (Moz)
300	0.25	449	3.6
250	0.31	417	4.1
200	0.32	408	4.2
150	0.33	403	4.3

Note: The footnotes to Table 14-7 also apply to this table. Base case is highlighted.

14.15 Factors That May Affect the Mineral Resource Estimate

Factors that may affect the Mineral Resource estimate include:

- Commodity price assumptions
- Changes in local interpretations of mineralization geometry and continuity of mineralization zones, and impact on mining selectivity
- Changes to geotechnical, hydrogeological, and metallurgical recovery assumptions
- Density and domain assignments

- Changes to assumed mining method which may change block size and orientation assumptions used in the resource model
- Input factors used to assess RPEEE
- Assumptions as to social, permitting and environmental conditions

There are no other currently-known environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that may affect the Mineral Resource estimate that have not been discussed in this Report.

15.0 MINERAL RESERVE ESTIMATES

This section is not relevant to this Report disclosing a Mineral Resource estimate for the El Quevar Property.

16.0 MINING METHODS

This section is not relevant to this Report disclosing a Mineral Resource estimate for the El Quevar Property.

17.0 RECOVERY METHODS

This section is not relevant to this Report disclosing a Mineral Resource estimate for the El Quevar Property.

18.0 PROJECT INFRASTRUCTURE

This section is not relevant to this Report disclosing a Mineral Resource estimate for the El Quevar Property.

19.0 MARKET STUDIES AND CONTRACTS

This section is not relevant to this Report disclosing a Mineral Resource estimate for the El Quevar Property.

20.0 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

This section is not relevant to this Report disclosing a Mineral Resource estimate for the El Quevar Property.

21.0 CAPITAL AND OPERATING COSTS

This section is not relevant to this Report disclosing a Mineral Resource estimate for the El Quevar Property.

22.0 ECONOMIC ANALYSIS

This section is not relevant to this Report disclosing a Mineral Resource estimate for the El Quevar Property.

23.0 ADJACENT PROPERTIES

This section is not relevant to this Report.

24.0 OTHER RELEVANT DATA AND INFORMATION

There are no additional data or information to make this Report understandable and not misleading.

25.0 INTERPRETATION AND CONCLUSIONS

25.1 Introduction

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

25.2 Mineral Tenure, Royalties, Surface Rights and Permits

Independent legal opinion provided to Wood supports that Silex Argentina currently holds a 100% interest in the Project. The title opinion has also confirmed the royalties payable on the Property.

Silex Argentina has all necessary surface rights. There are no restrictions on surface access to any of the areas encompassed by the concessions.

The Company is in compliance with all applicable environmental laws and has obtained all applicable environmental permits required to carry on its business and operations, including drilling.

25.3 Geology and Mineralization

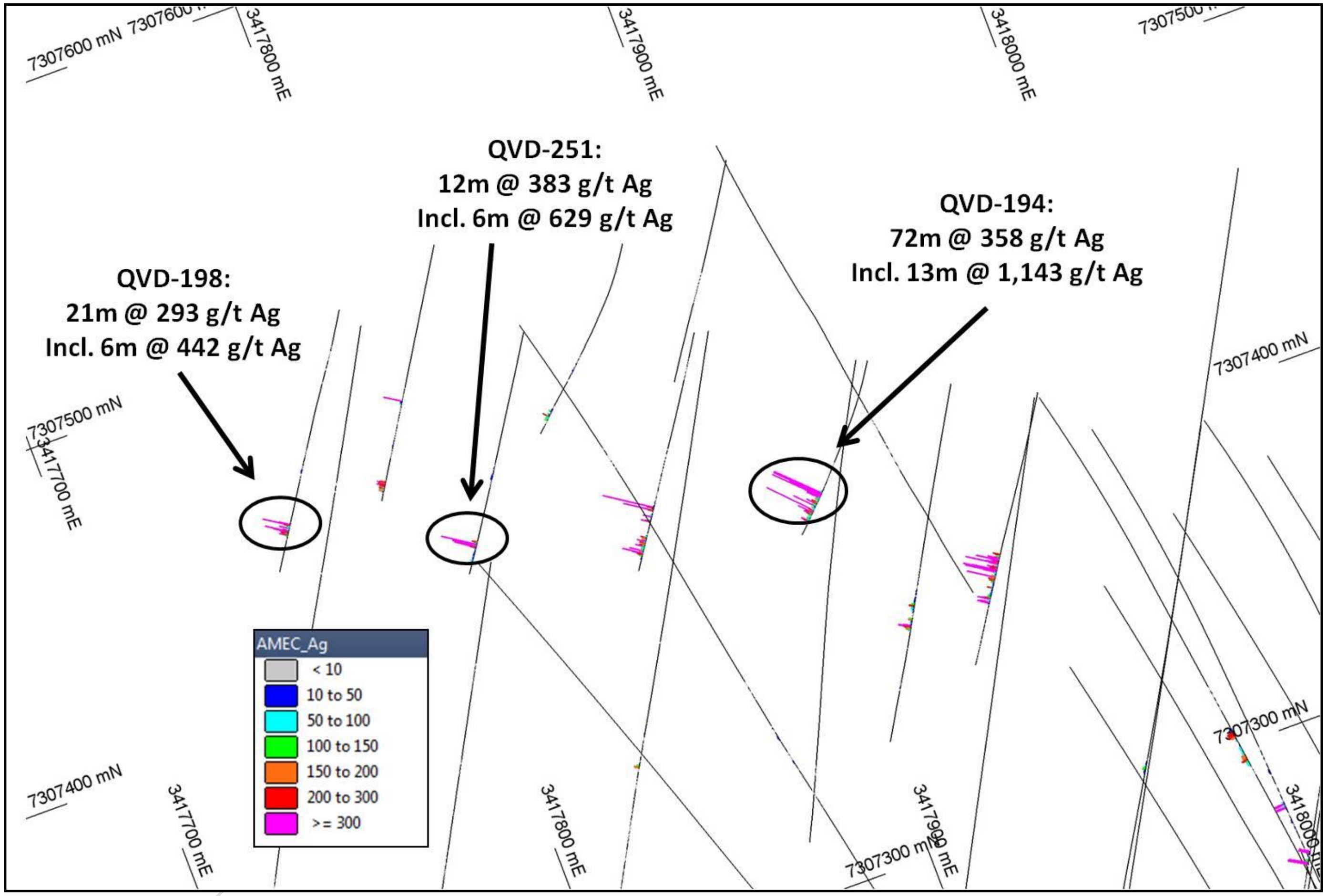
Silver mineralization at the Property is an example high-sulphidation epithermal silver deposits.

The geological setting, mineralization style, and structural and stratigraphic controls are sufficiently well understood to provide useful guides to exploration and Mineral Resource estimation.

25.3.1 Exploration Potential

The Yaxtché deposit remains open along strike and several zones adjacent to the resource estimate area have returned significant silver intercepts. Perhaps the most significant of these zones, the Yaxtché West extension, is highlighted in Figure 25-1. At approximately 500 m, these holes are among the deepest drilled in the Project area and show that significant widths and grades of silver mineralization continue down plunge of the Yaxtché trend. Drilling conditions in the area are difficult as thick Quaternary landslide deposits cover the bedrock.

Figure 25-1: Plan View Showing Selected Intervals Within Yaxtché West Extension Zone



Source: Golden Minerals, 2018

Note: Silver values in g/t. View is slightly rotated to show vertical drill holes. Grid north is true north.

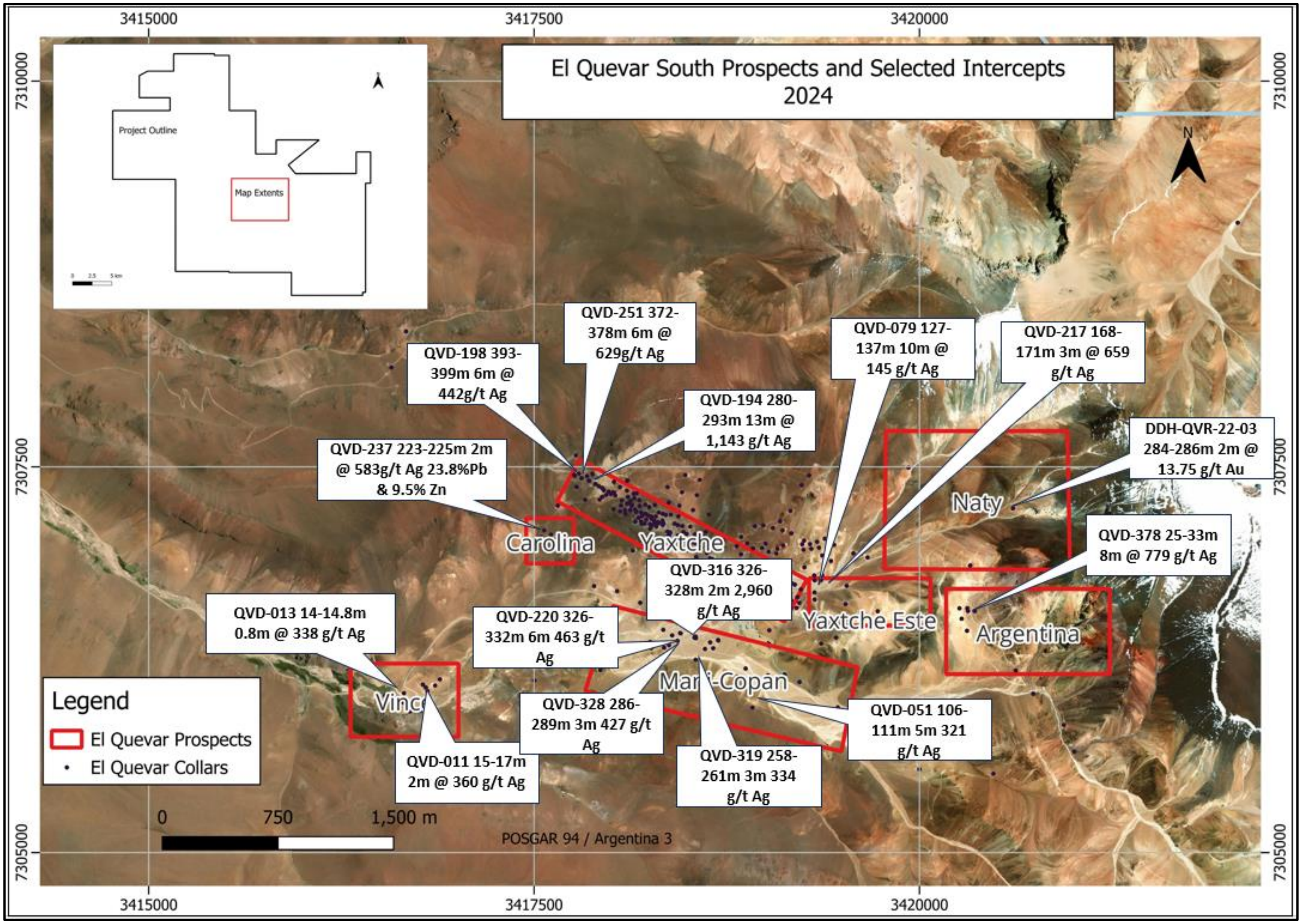
Within the greater Quevar South area, several additional prospects have been identified (Figure 25-2) and remain to be fully tested. These targets have been identified through various efforts, most notably that of Corbett (2009), Corbett (2012), and Spurney et al., (2013).

A summary of selected targets is provided in Table 25-1 (after Spurney et al., 2013). These targets are considered to be the highest priority as previous exploration has identified styles of mineralization, alteration, and lithologies similar to those at Yaxtché.

Collar information for the drill intercepts shown in Figure 25-1 and Figure 25-2 and discussed in Table 25-1 are provided in Table 25-2.

An illustration of subcropping and surface expression of mineralized trend is shown in Figure 25-3.

Figure 25-2: Identified Prospects Within Quevar South



Source: Argenta, 2024

Table 25-1: Prospects Within Quevar South

Prospect	Notes
Yaxtché East	Limited drilling (six holes) has been completed east of the current Yaxtché resource. Significant drill intercepts include QVD-079, drilled approximately 140 m east of Yaxtché Central which intercepted 10 m of 145 g/t Ag. A further 50 m east, QVD-217 intersected a 3 m interval grading 659 g/t from 168–171 m, including a 1 m interval of 1,831 g/t Ag. Other drill holes in the vicinity returned only low grade or anomalous silver mineralization, suggesting the geometry and/or controls of mineralization remain uncertain.
Argentina	Located approximately 1,100 m east of Yaxtché Central, the Argentina area has seen only limited exploration consisting of surface mapping/sampling, trenching, and three closely-spaced drill holes (QVD-02, QVD-32, and QVD-378). QVD-378 returned an 8 m wide intercept from 25–33 m grading 779 g/t Ag. The remaining drill holes appeared to have missed the structure altogether with no significant values reported from QVD-02, and a low-grade intercept returned from QVD-32. The interval was hosted in dacite and epiclastics cut by hydrothermal breccias exhibiting silicification and advanced argillic alteration. The zone lies along the eastern strike projection of the Yaxtché mineralized trend and contains similar lithologies, alteration styles and, potentially, silver grades.
Vince	The exploration target at Vince in map view consists of an arcuate, convex to the south, zone of silicification approximately 800 m long, with silver-bearing, quartz–barite–galena–sulphosalt mineralization in a thick dacite porphyry flow sequence (Figure 25-3). Surface sampling along a linear trend of subcrop has returned strongly anomalous results with many silver values in the 200–2,000 g/t range. Six widely-spaced drill holes testing this zone had varied success with two holes encountering thin zones of silver mineralization including 2 m of 360 g/t Ag from 15–17 m in QVD-011 and 0.8 m of 338 g/t Ag from 14–14.8 m in QVD-013. The remaining holes, QVD-017 and QVD-012 returned only minor anomalous silver values.
Mani–Copán	The Mani structural zone is located approximately 700 m southwest of Yaxtché and was an area of historical silver mining along high-grade structures. Sillitoe (1975) reported that small scale historical production was estimated to have produced approximately 3,000 t averaging 8% Pb and 2,000 g/t Ag. The Mani structure and its southeast extension (known as the Copán target) have been variably defined through surface sampling and drilling over a strike length of approximately 1,100 m. Limited drilling along the strike length has had varied results with intermittent high-grade and barren intercepts. A tight cluster of five drill holes with average spacing of approximately 10 m were collared approximately 650 m from the historical mine workings. These drill holes highlight the locally high-grade nature of mineralization within the Mani structure, with example intercepts including: 6 m of 463 g/t Ag, 0.73% Cu from 326–332 m in QVD-220; and 2 m of 2,960 g/t Ag, 1.6% Cu from 326–328 m in QVD-316.

Prospect	Notes
Carolina	Located 300 m southwest of Yaxtché West and covered by >50 m of overburden, four drill holes have tested the Carolina prospect. Only one of these holes intersected the targeted structure and thus its orientation remains to be defined. Assay results from the Carolina structure include 18 m at 193 g/t Ag, 7.8% Pb, 4.5% Zn from 207–225 m in drill hole QVD-237. Within this interval a 2 m wide high-grade zone containing abundant galena and sphalerite returned 583 g/t Ag, 23.8% Pb and 9.5% Zn from 223–225 m. No other drill holes returned significant silver values.
Naty	Located 950 m northeast of Yaxtché East. The target was tested by two drill holes in 2022. Drill holes were placed in a zone of steam heated alteration and small bodies of polymictic hydrothermal breccias at 5200 RL. The holes targeted a dacitic dome boundary cross cut by a regional northeast structure with a potential mineralized zone below 4850 RL. DDH-QVR-22-03 intercepted 13.75 g/t Au from 284–286 m and DDH-QVR-22-01 had no significant intercepts.

Table 25-2: Drill Intercepts for Drill Holes and Prospects Identified in Figure 25-1 and Figure 25-2

Drill Hole ID	Target	Easting (X)	Northing (Y)	Elevation (Z)	Azimuth (degree)	Dip (degree)	Total Hole Depth (m)	Intercept Depth From (m)	Intercept Depth To (m)	Silver Grade (g/t)
QVD-237	Carolina	3417566.20	7307088.15	4761.27	208	-61	416.5	219	225	308.5
QVD-248		3417610.09	7307061.25	4752.65	208	-61	206.35			NSV
QVD-334		3417588.88	7307025.29	4749.84	162	-60	286.5			NSV
QVD-011	Vince	3416715.01	7305992.50	4557.42	180	-50	129.4	15	17	359.5
QVD-012		3416653.66	7305971.47	4555.47	180	-60	140.3			NSV
QVD-013		3416531.76	7306016.40	4523.64	180	-63	89.5	14	14.8	338.0
QVD-017		3416656.05	7306032.67	4557.43	180	-58	89.3			NSV
QVD-028		3416694.63	7305913.79	4533.27	0	-90	77			NSV
QVD-029		3416764.34	7305920.30	4539.63	0	-60	55.75			NSV
QVD-079	Yaxtché East	3419319.15	7306686.27	4868.89	180	-65	332	128	129	404.7
including								133	134	606.7
QVD-183		3419320.09	7306640.05	4870.83	180	-65	204.5			NSV
QVD-208		3419317.67	7306795.66	4872.02	180	-65	434			NSV
QVD-212		3419368.98	7306798.25	4885.38	180	-65	440			NSV
QVD-214		3419320.04	7306764.36	4869.04	180	-60	365			NSV
QVD-217		3419361.48	7306764.85	4879.98	180	-58	420	167	177	375.6
QVD-002	Argentina	3420977.00	7310927.00	5110.7	145	-55	101			NSV
QVD-032		3420274.12	7306515.16	4981.56	180	-55	109.5			NSV
QVD-378		3420315.00	7306565.00	4996	190	-60	143	25	33	779.4

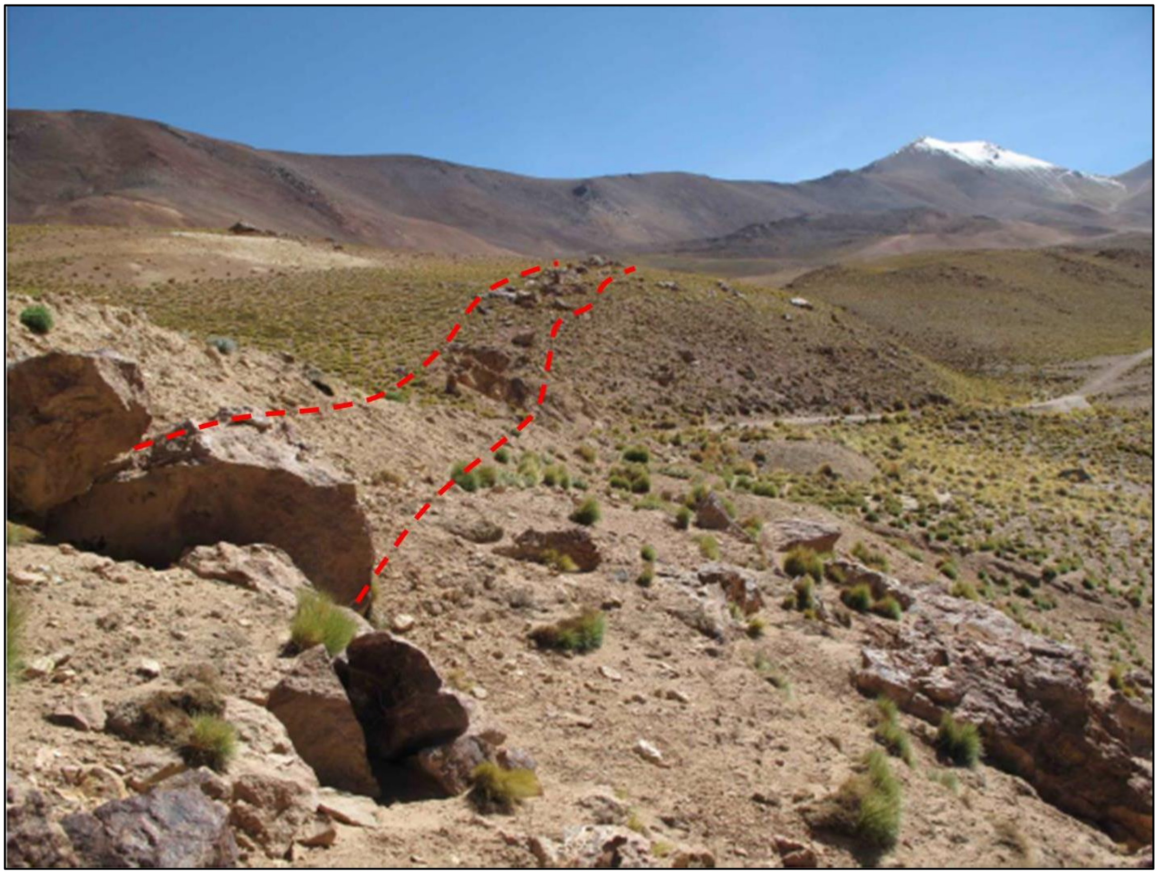
Drill Hole ID	Target	Easting (X)	Northing (Y)	Elevation (Z)	Azimuth (degree)	Dip (degree)	Total Hole Depth (m)	Intercept Depth From (m)	Intercept Depth To (m)	Silver Grade (g/t)
QVD-014	Copan	3418916.88	7305939.87	4807.47	0	-59	130			NSV
QVD-051		3418868.64	7306126.52	4775.53	180	-58	155	15	16	323.0
including								105	111	295.3
QVD-055		3418917.44	7306137.83	4777.43	180	-45	155	29	30	319.0
QVD-056		3418820.23	7306140.00	4773.15	180	-54	160			NSV
QVD-057		3418872.86	7306192.68	4773.71	180	-55	250	159	160	244.0
including								188	189	163.0
QVD-059		3419017.30	7306148.20	4783.69	180	-60	285			NSV
QVD-062		3419125.41	7306152.91	4801.89	180	-45	390			NSV
QVD-063		3419125.25	7306153.81	4801.82	180	-67	457.5	222	223	154.0
QVD-067		3419222.65	7306104.61	4812.01	180	-65	382.5			NSV
QVD-001	Mani	3421080.25	7310923.60	5143.65	155	-50	209	100	102	161.0
QVD-008A		3418260.53	7306325.12	4736.67	180	-68	138.5	46	49	165.0
QVD-026A		3418343.40	7306327.31	4738.77	180	-85	120.25	55	56	181.8
QVD-033		3418252.31	7306365.18	4729.14	0	-90	135.3			NSV
QVD-181		3418375.62	7306343.84	4740.32	172	-50	223.7	49.95	52.75	333.0
QVD-210		3418451.36	7306420.04	4750.53	140	-60	353.3	316	318	162.7
including								321	322	196.1
including								329	330	170.0
QVD-220		3418545.06	7306395.87	4760.99	140	-58	359	318	320	411.2
including								326	332	462.6
QVD-305		3418642.64	7306362.42	4767.5	150	-62	368			NSV
QVD-310		3418695.41	7306373.96	4772.84	150	-62	365			NSV
QVD-314		3418608.97	7306319.24	4761.52	150	-62	348	244	245	229.9
including								287	289	405.2

Drill Hole ID	Target	Easting (X)	Northing (Y)	Elevation (Z)	Azimuth (degree)	Dip (degree)	Total Hole Depth (m)	Intercept Depth From (m)	Intercept Depth To (m)	Silver Grade (g/t)
QVD-316		3418548.50	7306398.96	4761.13	140	-58	371.2	326	328	2960.1
including								336	339	329.2
QVD-319		3418662.19	7306323.85	4766.08	150	-58	329.5	258	261	334.1
including								289	290	178.6
QVD-321		3418540.71	7306393.06	4760.78	140	-58	371	323	326	1299.6
including								335	337	306.9
QVD-323		3418694.21	7306377.09	4772.99	170	-62	338	285	289	173.0
QVD-324		3418550.19	7306389.87	4761.08	140	-58	350	304	305	341.0
including								314	316	263.3
QVD-325		3418693.97	7306377.65	4773.04	170	-59	356			NSV
QVD-326		3418543.05	7306398.38	4760.97	140	-58	368	328	330	378.1
QVD-327		3418447.81	7306422.32	4750.27	145	-65	362	291	293	190.0
including								307	309	247.2
QVD-328		3418395.99	7306407.53	4743.8	150	-60	342.2	258	261	161.2
including								286	289	427.4
QVD-329		3418431.04	7306372.18	4746.81	150	-60	389	237	238	270.2
QVD-330		3418338.48	7306443.51	4741.81	150	-55	374.4	273	274	180.7

Drill Hole ID	Target	Easting (X)	Northing (Y)	Elevation (Z)	Azimuth (degree)	Dip (degree)	Total Hole Depth (m)	Intercept Depth From (m)	Intercept Depth To (m)	Silver Grade (g/t)
QVD-192	Yaxtché West Ext	3417943.15	7307362.91	4846.52	0	-90	485.5	290	337	325.6
QVD-192								349	350	222.0
QVD-192								367	377	248.3
QVD-194		3417900.29	7307387.79	4849.98	0	-90	385.1	280	352	358.0
QVD-195		3417855.35	7307410.42	4864.52	0	-90	428	312	319	1034.0
QVD-195								329	330	337.4
QVD-195								336	339	235.0
QVD-195								367	399	175.8
QVD-198		3417759.99	7307447.90	4890.72	0	-90	465.8	382	402	301.7
QVD-218		3417764.21	7307441.50	4890.27	208	-62	410			NSV
QVD-219		3417920.81	7307373.98	4844.98	208	-85	385	241	242	209.0
QVD-219								256	257	153.3
QVD-219								262	267	283.1
QVD-243		3417859.29	7307409.46	4864.54	208	-70	353.5	267	268	183.7
QVD-251		3417808.53	7307425.70	4875.52	0	-90	427	367	379	382.9
QVD-254		3417879.93	7307451.62	4881.71	0	-90	398.5			NSV
QVD-278		3417878.67	7307456.49	4881.72	150	-75	406.85			NSV
QVD-335		3417843.89	7307439.65	4878.15	0	-90	452	407	410	162.8
QVD-336		3417791.75	7307455.64	4894.4	0	-90	438	267	268	723.2
QVD-336								405	422	182.0

Note: NSV = no significant value

Figure 25-3: Vince Prospect



Source: Golden Minerals, 2018

Note: Photograph shows numerous in-line, subcropping blocks containing quartz, barite, galena, and silver sulphosalts that define the mineralized trend along the eastern segment of the Vince prospect. Photograph looks northeast. Due to the perspective view of the photograph, no scale can be provided.

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

Exploration completed to date has resulted in delineation of the Yaxtché deposit and a number of exploration targets. Drilling in 2019 and 2020, has focused on exploration targets to the east and southwest of the Yaxtché deposit and to test the extents of Yaxtché Central and Yaxtché West. Only one hole showed economically significant results.

Drilling, sampling, and analytical procedures generally met industry accepted practices and are considered adequate to support Mineral Resource estimation.

25.5 Metallurgical Testwork

Metallurgical testwork was completed over a five-year period from 2008 to 2012 on composite samples from the Yaxtché deposit. High variabilities in silver recovery by flotation were noted from the Yaxtché West (93%) and Yaxtché Central (61% to 91%) indicating changes in silver mineralogy. There also appears to be a change in hardness and abrasiveness of the mineralized material that should be further investigated.

Based on testwork results, the bulk silver concentrate contains arsenic, antimony and bismuth impurities, which will result in concentrate treatment charges and penalties.

The testwork results support the assumptions used in the resource estimate.

25.6 Mineral Resource Estimates

Silver is the only commodity considered to have RPEEE using a room-and-pillar underground mining method and flotation concentration process.

A number of factors were noted that may affect the Mineral Resource estimate, including: commodity price assumptions; changes in local interpretations of mineralization geometry and continuity of mineralization zones; changes to geotechnical, hydrogeological, and metallurgical recovery assumptions; density and domain assignments; changes to assumed mining method which may change block size and orientation assumptions used in the resource model; input factors used to assess RPEE; and assumptions as to social, permitting and environmental conditions.

25.7 Opportunities

There is potential to add to the Mineral Resources through the following:

- analysis of the Yaxtché oxide zone using open pit assumptions
- additional drilling of known prospects

Additional potential remains in the greater Quevar South project area, where previous exploration has identified styles of mineralization, alteration, and lithologies similar to those at Yaxtché. These areas warrant additional evaluation.

25.8 Risks

Risks associated with the Project include:

- Variations in silver mineralization mineralogy within the Yaxtché deposit could negatively impact the silver recovery and/or concentrate grade
- Higher concentrate impurities from arsenic, antimony and/or bismuth which could:
  - Increase the smelting charges and/or
  - Increase the penalties and/or
  - Cause the silver concentrate to be undesirable and possibly unmarketable.

26.0 RECOMMENDATIONS

26.1 Introduction

Recommendations have been broken into two phases. Phase 1 recommendations are made in relation to exploration geophysics activities and geological data and interpretation. Phase 2 recommendations are for exploration drilling and metallurgical testwork. Phase 2 is not dependent on Phase 1.

26.2 Phase 1

Recommendations for Phase 1 include:

- Geological and data interpretation ($110,000)
  - Re-log drill core and build a lithological model
  - Sample unsampled core that are within the mineralized envelope and oxide zones
  - Build an alteration model
  - Build a structural model
- Exploration geophysics ($315,000)
  - Exploration geophysics include ground induced polarization over known prospects or airborne magnetometer over the entire property.
- Camp maintenance ($75,000)

The total cost of Phase 1 is estimated to be $500,000.

26.3 Phase 2

Recommendations for Phase 2 include:

- Exploration drilling ($3,000,000)
  - eight infill and/or extension drilling at Yaxtché totaling 4,000 m
  - five drill holes to test known satellite targets totalling 2,500 m
- Metallurgical testwork from fresh or existing core including ($250,000):
  - Flotation testwork on fresh sample from Yaxtché Central and Yaxtché West, to improve silver recovery, concentrate grade and reduce the concentrations of deleterious elements in the concentrate. Locked cycle testing should be conducted to

optimize process parameters and develop technical data as inputs into the design of the process plant.

- Comminution, flotation and cyanidation testwork to develop an understanding of the variability by lithology within the Yaxtché deposit.
- Additional mineralogical studies are necessary to support the metallurgical testwork.

The total cost of Phase 2 is estimated to be $3,250,000.

26.4 Summary of Recommended Costs

The cost of the recommended activities is summarized in Table 26-1.

Table 26-1: Cost of Recommended Activities

Item	Cost ($000)
Phase 1	
Geological and data interpretation	110
Exploration geophysics	315
Camp maintenance	75
Sub-total	**500**
Phase 2	
Exploration drilling	3,000
Metallurgical testwork	250
Sub-total	**3,250**
Total	**3,750**

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