# TECHNICAL REPORT
# VETA GRANDE PROJECT
# ZACATECAS STATE, MEXICO

Prepared for:
SANTACRUZ SILVER MINING LTD.
Suite 880 - 580 Hornby Street
Vancouver, BC, V6C 3B6, Canada

Prepared by:
VAN PHU BUI, P.GEO.
MICHAEL F. O'BRIEN, P.GEO.

Report & Effective Date:
August 20, 2019

Report No. 16001RT005

# **CERTIFICATE AND SIGNATURE**, Van Phu Bui, P.Geo.

I, Van Phu Bui, of 33086 Hill Avenue, Mission, BC, V2V 2R6, Canada, do hereby certify that;

1. I am a consulting geologist and partner at ARC Geoscience Group with a business address of 600-1285 West Broadway, Vancouver, BC, Canada V6H 3X8.

2. I am a graduate of the University of British Columbia (2004) with a Bachelor of Science degree in Earth and Ocean Sciences.

3. I am a registered member in good standing of The Association of Professional Engineers and Geoscientists of British Columbia (Reg. No. 34774) since July 2010.

4. I have practiced my profession continuously since 2004 in the capacity of an exploration and consulting geoscientist in mineral exploration in Canada and abroad.

5. I have read the definition of "qualified person" set out in National Instrument 43-101 and certify that by reason of education, experience, and affiliation with a professional organization I meet the requirements of a "qualified person" as defined in National Instrument 43-101.

6. This report titled "**Technical Report, Veta Grande Project, Zacatecas State, Mexico**" dated effective August 20, 2019 (the "Technical Report"), is based on a study of the data and literature available on the Veta Grande Project. I am responsible for all sections of this report, except Section 14. I visited the property on July 9-10, 2019. No new material information has been collected since the date of the site visit.

7. I have not previously worked on this deposit.

8. As at the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading. I have read National Instrument 43-101 and the report titled "**Technical Report, Veta Grande Project, Zacatecas State, Mexico**" has been prepared in compliance with this National Instrument.

9. I am independent of the issuer as described in Section 1.5 of NI 43 -101.

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

Signed and dated this 20th day of August 2019

(signed) *Van Phu Bui*____ [Sealed]
Van Phu Bui, B.Sc., P.Geo.

# **CERTIFICATE AND SIGNATURE**, Michael F O'Brien, P.Geo.

I, Michael Frederick O'Brien, of 81-1380 Pinetree Way, Coquitlam, BC, V3E 3S6, Canada, do hereby certify that;

1. I am a consulting geologist at Red Pennant Communications & Geoscience, a company associated with Rockridge Partnership & Associates with a business address of 13693 230A Street, Maple Ridge, BC, Canada V4R 0G4.

2. I am a graduate of the University of the Witwatersrand (2002) with a Master of Science degree in Mineral Economics and of the University of Natal (1978) with a Bachelor of Science (HONS) degree in Geology.

3. I am a registered member in good standing of The Association of Professional Engineers and Geoscientists of British Columbia (Reg. No. 41338) since July 2014.

4. I have practiced my profession continuously since 1981 in the capacity of a mining geologist, resource estimation geologist, senior mining company manager and consulting geologist in Canada and abroad.

5. I have read the definition of "qualified person" set out in National Instrument 43-101 and certify that by reason of education, experience, and affiliation with a professional organization I meet the requirements of a "qualified person" as defined in National Instrument 43-101.

6. This report titled "**Technical Report, Veta Grande Project, Zacatecas State, Mexico**" dated effective August 20, 2019 (the "Technical Report"), is based on a study of the data and literature available on the Veta Grande Project. I am responsible for Section 14 of the report. I have not visited the property.

7. I have not previously worked on this deposit.

8. As at the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading. I have read National Instrument 43-101 and the report titled "**Technical Report, Veta Grande Project, Zacatecas State, Mexico**" has been prepared in compliance with this National Instrument.

9. I am independent of the issuer as described in Section 1.5 of NI 43 -101.

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

Signed and dated this 20th day of August 2019.

(signed) *Michael Frederick O'Brien* [Sealed]
Michael Frederick O'Brien, M.Sc., B.Sc.(HONS), P.Geo.

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# 1 SUMMARY

## 1.1 Introduction

This technical report presents an independent assessment of the Veta Grande project located in Zacatecas, Mexico. It includes an independent assessment and mineral resource estimate for the Panuco deposit located within the Zacatecas properties. The report supersedes three previous reports titled "Technical Report, Veta Grande Project, Zacatecas State, Mexico" dated May 17, 2016, "2016 Mineral Resource Estimate, Panuco Deposit, Zacatecas, Mexico" dated November 3, 2016, and "Technical Report, Veta Grande Project, Zacatecas State, Mexico" dated February 26, 2017. The effective date of this technical report is August 20, 2019.

Santacruz Silver Mining Ltd. contracted Van Phu Bui of ARC Geoscience Group Inc. to prepare an updated technical report for the Veta Grande project and Michael F. O'Brien of RockRidge Partnership & Associates to prepare an updated mineral resource estimate for the Panuco deposit. Both Bui and O'Brien are Qualified Persons as defined by National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101). The technical report and mineral resource estimate are prepared in accordance with NI 43-101. The effective date of the Panuco deposit mineral resource estimate is July 12, 2019.

Santacruz declared commercial production at the Veta Grande project on October 1, 2016 with initial mining activities focusing on the Veta Grande vein system from the Garcia underground mine and the La Canterra vein system from the Guadalupana underground mine. The decision to commence production at the Veta Grande project was not based on a feasibility study on mineral reserves demonstrating economic and technical viability. There is increased uncertainty and economic and technical risks of failure associated with this production decision.

The Panuco deposit is a low-sulfidation (silver-gold, ±lead+zinc) vein system located approximately five to twelve km north of the Veta Grande and La Cantera vein systems. The deposit consists of three vein structures: the Panuco Central vein, Panuco NW vein and Tres Cruces vein. The mineral resource estimate presented in this report for the Panuco deposit encompasses all three Panuco vein structures and includes mineralization defined by trenching and drilling over a surface distance of 2.4 km.

## 1.2 Location, Mining Concessions, Surface Rights and Permits

The Veta Grande project consists of 184 mining concessions covering an area of 8,944 hectares (22,102 acres) in the Zacatecas Mining District, Mexico. The project is centered near coordinate 751,119 m East and 2,527,830 m North (UTM Zone 13N – NAD27) on the 1:250,000 Zacatecas topographic map sheet F13-6. The Veta Grande project is divided into three concession groups, described as the Veta Grande properties, Minillas property and Zacatecas properties. Although the concession groups are mostly contiguous and have the possibility of sharing the same infrastructure, the nature of Santacruz's initial ownership of each concession group are materially different. For this reason, the report describes the three groups as individual properties within one project area.

Santacruz acquired the Veta Grande and Minillas properties through a Business Alliance Agreement with Minera Contracuña I, S.A. de C.V. on Oct 27, 2015. The agreement was subsequently amended on December 2, 2015 to include three additional concessions along the La Cantera vein structure (concession title 67352, 66826, and 165558). On June 14, 2017 and as revised on December 13, 2017 and further

revised on March 28, and August 27, 2018 Santacruz entered into an option agreement with Contracuña whereby Santacruz was granted an option to purchase a 100% interest in the Veta Grande and Minillas properties, for aggregate cash payments of $17,100,000 spread over a five-year period. The amended option agreement grants Contracuña a 1% net smelter royalty ("NSR") that commences December 14, 2022. Santacruz has the right to acquire the NSR at any time by paying Contracuña US$1,500,000.

Santacruz acquired the Zacatecas properties through an option agreement with Golden Minerals Company on May 2, 2016 for aggregate cash considerations of US $1,500,000. Option payment obligation required of Santacruz were satisfied in October of 2018. The Zacatecas properties is subject to a 2% royalty and a 1% royalty for minerals mined from the SAN GIL and SAN SABIANO concessions, respectively.

On November 30, 2017 Santacruz entered into a binding letter of intent with Carrizal Mining, S.A. de C.V., a private Mexican mining company, pursuant to which Carrizal Mining may acquire a 20% working interest in the Veta Grande project, by wholly funding the cost to increase the capacity of the Vetagrande mineral processing facility to 750 tpd and the cost to conduct up to 20,000 m of near mine exploration drilling at the Garcia, Armados and Navidad mine areas. The required earn-in expenditures were completed on May 22, 2019 and a 20:80 joint venture between Carrizal Mining (20%) and Santacruz (80%) was formed.

On May 21, 2019 Santacruz has entered into a purchase agreement to acquire 100% of the outstanding shares of PCG Mining S.A. de C.V. for aggregate cash considerations of US $1,100,000 and the issuance of 30 million Santacruz shares. PCG is a holding company that owns 100% of the outstanding shares of Carrizal Mining. As at the date of this technical report, Santacruz has acquired 50% of the outstanding shares of PCG. Through the completion of the purchase agreement, which is subject to receipt of necessary shareholder and regulatory approvals, Santacruz will indirectly own Carrizal Mining's 20% interest in the Veta Grande project.

Through the initial Business Alliance Agreement, Santacruz holds the necessary surface rights and environmental permits to carry out surface and underground exploration activities, underground development and extraction activities at Veta Grande and La Cantera vein systems, and to operate the Vetagrande mineral processing facility. In addition, Santacruz received an updated Environmental Use License on November 17, 2017 and authorization to conduct surface exploration activities, including drilling, in Garcia and Armados mine area (valid until January 16, 2021), Navidad mine area (July 3, 2021) and within the Minillas concessions (valid until January 21, 2022). Santacruz has not received authorization to carry out exploration work and have not obtained surface rights agreements with surface landowners (Ejidos) within the Zacatecas properties. The Panuco deposit is situated within the north-central area of the Zacatecas properties and centered on concession title 233300 (Panuco).

There are no known environmental liabilities associated with exploration, mining and mineral processing activities for the Veta Grande project or with the area immediate to the Panuco deposit. Activities related to the tailings storage facilities and Vetagrande mineral processing plant are managed through conditions set forth by the aforementioned environmental permit.

## 1.3 Exploration and Drilling

Santacruz has collected 472 surface rock samples (channel, chip and grab samples) on various vein exposures within the project area. From underground workings, a total of 2,808 underground channel

samples have been collected from at least five veins (La Cantera, Veta Grande, Armados, San Jose, and La Flor) from five underground workings (Armados, Garcia, Guadalupana, La Mecha and Cigarrero).

In August of 2016 Santacruz collected 41 chip samples across the width of the Panuco NW, Panuco Central and Tres Cruces veins. No other exploration activities have been conducted by Santacruz and the company has not performed drilling on the Panuco deposit.

Between January 24, 2018 and March 26, 2019 Santacruz completed 43 diamond drill holes totaling 13,665.60 m as part of the Phase 1 drill program related to the Carrizal Mining Option Agreement earn in. The work was designed to test for mineralization in proximity to and below the lowest known levels of the Armados, Garcia and Navidad underground workings. Significant mineralized intersections were encountered at the Veta Grande vein in the northwest area of and below the Garcia mine workings. At this location, assay results range from no significant intersections in VG18-009 up to 280.10 g/t Ag over 1.59 m true thickness in drill hole VG19-014A. Drilling within the Armados mine from the general ramp below Level-4 resulted in several significant intersections into the Armados vein that range from 129.67 g/t Ag to 235.69 g/t Ag over approximated true widths that range between 1.00 m to 3.76 m. Intersections into the Navidad vein range from trace Au and Ag up to 668.64 g/t Ag over 1.95 m true width in NA18-006. While Au concentration are generally low, Pb- and Zn-rich intersections appear more common than drill hole intersections from the Armados and Garcia mine areas. Overall, the Phase 1 drill program was successful at identifying additional mineralization below the known workings in each mine area tested.

## 1.4 Data Verification and Site Visit

During a site visit between July 9-10, 2019, ARC reviewed drill collar locations and mineralized drill core intersections for the 2018/2019 Phase 1 drill program completed at the Garcia, Armados and Navidad mine areas. ARC collected five quarter-core samples to verify the presence of mineralization. The five verification samples returned analytical results that include silver concentrations ranging between 10.20 g/t Ag to 575.30 g/t Ag. ARC performed a 10% quality control check on collar locations, mineralized drill core sample intervals, and geological descriptions. No material discrepancies were identified and ARC has no reason to doubt the authenticity and quality of the information. During the same site visit, ARC confirmed that no additional work has been performed on the Panuco deposit since the initial surface sampling program completed by Santacruz in 2016 and since the ARC's site visit on August 16-19, 2016.

## 1.5 Geology and Mineralization

The Veta Grande project is located near the southeastern boundary of the Sierra Madre Occidental physiographic province in north-central Mexico, within the State of Zacatecas and constitutes a portion of the Zacatecas Mining District and Mexican Silver Belt. The Zacatecas Mining District is comprised of three Mesozoic formations that are subsequently covered by Paleocene volcanic rocks and Quaternary cover.

The project concession boundaries covers a number of northwest-southeast striking, southwest dipping, low-sulphidation epithermal silver (+gold+lead+zinc) vein systems including Veta Grande, La Cantera and Panuco, among others. On surface, the veins can be traced over a distance of 2.4-3.0 km. Veins range from less than 1 m to over 30 m thick and consist of quartz, chalcedony, calcite and pyrite, often showing banded, colloform, crustiform, vuggy and/or brecciated textures. The dominant sulfide minerals include

sphalerite and galena along with argentite and native silver, and they occur as disseminations, bands, or zones of massive sulfide. Alteration around the veins ranges from weak to moderate pervasive silicification to narrow zones (1-5 m) of weak argillic and propylitic alteration immediately surrounding the veins. Locally, the veins are generally hosted within mafic to intermediate coherent volcanic rocks, intermediate volcanic tuffs and volcanosedimentary rocks, and clastic sediments. These units are subsequently cut by younger diorite to quartz-diorite dykes.

## 1.6 Mineral Resources

As at the effective date of this report, the Panuco deposit is the only mineral resource estimate calculated and reported for the Veta Grande project. Current mining operations at the Veta Grande vein system is being conducted in the absence of a mineral resource estimate. The Panuco mineral resource estimate has been changed since the previous technical report (with effective date of January 31, 2017). This is due to improvements in the geometric modelling process applied to develop the geometry of the veins and the consequent changes to the sample selections and compositing for the current estimation. The implicit modelling process applied to the current estimate better reflects the likely geometries of the veins than the former sectional interpretations. This has resulted in a more coherent selection of vein samples for the estimation. The application of dynamic anisotropy to the variogram and search orientations, combined with less angular vein geometry, provide improved spatial grade estimation with good correspondence between composite and block grade averages.

For the mineral resource estimate, the mineralized solids were filled using rotated block models with blocks measuring 20 m along strike and dip, and 1 m across strike. Sub-cells with precise boundary location were used to fill the models to represents accurate volumes when compared to the modelled vein solids. A slightly different rotation was applied to each vein block model to provide a best-fit for each particular vein strike and dip. Average specific gravity of 2.74 was applied to the vein portions of blocks while a value of 2.68 was assigned to the waste portions. Grades for gold, silver, lead and zinc were interpolated into blocks containing some percentage of veins by Ordinary Kriging (OK), in the case of the Panuco Central vein, and Inverse Distance Squared, in the case of Panuco NW and Tres Cruses vein. Each vein was estimated separately using only composites from that vein. Due to the sparsity of drill hole data both drill hole and surface trench composites were used. A comparison was made between the vein composites and the estimated blocks. The results show reasonable agreement with no bias indicated. The density of the data for all three veins and insufficient data to establish semivariograms for the Panuco NW and Tres Cruces veins has led to classifying all estimated blocks as Inferred.

An economic assessment or similar study has not been completed for the Panuco deposit and an economic cut-off value is unknown. The authors are of the opinion that based on the mineralization characteristics, grade, location and other factors described in this report the Panuco deposit has similarities to the Veta Grande vein system, which is located five km south of the Panuco deposit. Mining operations are currently conducted at a cut-off value of 100 g/t Ag.

Considering a cut-off value of 100.0 g/t AgEq for the Panuco deposit, the inferred mineral resource estimate results in 3,954,729 tonnes grading 136.00 g/t Ag, 0.14 g/t Au, 0.012% Pb and 0.110% Zn or 153.20 g/t AgEq. This equates to 19,472,901 ounces of AgEq as shown in Table 1-1.

**Table 1-1: Resource classed as Inferred within all mineralized Veins**

| Cut Off AgEq (g/t) | Tonnes > Cut-off t (m) | Ag (g/t) | Au (g/t) | Pb (%) | Zn (%) | AgEq (g/t) | AgEq (Ozs) |
|---|---|---|---|---|---|---|---|
| 70 | 5,633,142 | 117.66 | 0.13 | 0.010 | 0.088 | 133.0 | 24,079,401 |
| 75 | 5,405,259 | 119.98 | 0.13 | 0.010 | 0.090 | 135.5 | 23,548,065 |
| 80 | 5,142,065 | 122.60 | 0.14 | 0.011 | 0.094 | 138.5 | 22,892,412 |
| 90 | 4,477,091 | 129.62 | 0.14 | 0.011 | 0.102 | 146.4 | 21,069,521 |
| **100** | **3,954,729** | **136.00** | **0.14** | **0.012** | **0.110** | **153.2** | **19,472,901** |
| 115 | 3,196,451 | 145.94 | 0.15 | 0.012 | 0.118 | 163.9 | 16,847,056 |
| 125 | 2,512,119 | 156.72 | 0.15 | 0.013 | 0.126 | 175.8 | 14,199,767 |
| 140 | 1,921,356 | 169.60 | 0.16 | 0.014 | 0.126 | 189.3 | 11,696,524 |
| 150 | 1,505,278 | 181.28 | 0.17 | 0.014 | 0.124 | 201.5 | 9,753,081 |
| 175 | 915,428 | 207.87 | 0.18 | 0.014 | 0.108 | 228.2 | 6,715,702 |

Recoveries are based on actual recoveries from the Vetegrande mineral processing facility which is currently processing material from the nearby Veta Grande vein system.

The metal prices used in the silver equivalent estimate are listed below.

| | | |
|---|---|---|
| Gold price $1350/oz | Recovery - 52.2 % | Factor = Au *Rec*Price/31.1035 = 22.66 |
| Silver price $16/oz | Recovery - 62.1 % | Factor = Ag *Rec*Price/31.1035 = 0.32 |
| Lead price $0.90/lb | Recovery - 87.9 % | Factor = Pb% * 22.046223 * Rec * Price = 17.44 |
| Zinc price $1.10/lb | Recovery - 78.6 % | Factor = Zn% * 22.046223 * Rec * Price = 19.06 |

GMV = (Au *Rec*Price/31.1035) + (Pb% * 22.0462 * Rec * Price) + (Ag * Rec * Price/31.1035) + (Zn% * 22.0462 * Rec * Price)

AgEq = GMV / Ag Factor = GMV / 0.32

## 1.7 Conclusions and Recommendations

The Veta Grande project contains both advanced stage mining areas and exploration stage targets where low-sulfidation epithermal quartz veins host silver (+gold+lead+zinc) mineralization. The 2018/2019 Phase 1 drill program successfully tested the down dip extension of the Veta Grande, Armados veins and Navidad veins. The proximity of the Garcia mine to the mineral processing plant and encouraging results realized in drill holes VG19-010 and VG19-014a continue to make the Garcia mine an attractive target. A proposed drilling program consisting of 9 diamond drill holes totaling approximately 5,780 m is recommended for an estimated cost of US $976,820.

The Panuco deposit merits additional work based on the restated mineral resource estimate. A drilling program consisting of 9,500 m of diamond drilling, metallurgy test work and trenching is recommended for an estimated cost of US $1.8 million.

# 2 INTRODUCTION

The purpose of this report is to present an independent assessment and mineral resource estimate for the Panuco deposit located within the Veta Grande project, Zacatecas, Mexico. The report also includes updated information related to development and exploration activities for the project. The report is a combination of and supersedes three previous reports titled "Technical Report, Veta Grande Project, Zacatecas State, Mexico" dated May 17, 2016, "2016 Mineral Resource Estimate, Panuco Deposit, Zacatecas, Mexico" dated November 3, 2016, and "Technical Report, Veta Grande Project, Zacatecas State, Mexico" dated February 26, 2017.

Santacruz Silver Mining Ltd. (Santacruz) commissioned ARC Geoscience Group Inc. (ARC) to review the Veta Grande project and Panuco deposit, and to prepare a technical report. Santacruz commissioned Rockridge Partnership & Associates (Rockridge) to perform an updated estimate of the precious and base metal resources for the Panuco deposit based upon previous surface trenching and diamond drilling data produced by Minera de Cordilleras, S. de R.L. de C.V., (Minera de Cordilleras), a subsidiary of Golden Minerals Company (Golden Minerals). This technical report and mineral resource estimate was prepared in accordance with National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) and Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Best Practices and Reporting Guidelines.

The effective date of this technical report is August 20, 2019 and the effective date of the updated Panuco deposit mineral resource estimate is July 12, 2019.

## 2.1 Description of the Issuer

Santacruz is a Mexico focused silver company with a corporate objective to become a mid-tier silver producer. In addition to its Veta Grande project, the Company is currently operating the Rosario project and related silver properties in the State of San Luis Potosi. Since the previous technical report, Santacruz divested its interest in the Gavilanes, El Gachi, and San Filipe properties. Santacruz is listed on the TSX Venture exchange under the symbol 'SCZ'. The Company's registered office in Canada is located at Suite 880 - 580 Hornby Street, Vancouver, BC, V6C 3B6, Canada.

## 2.2 Qualified Person Field Examination

Van Phu Bui, P.Geo. of ARC conducted a site visit to the project between April 28$^{th}$-29$^{th}$, 2016. Bui reviewed the underground exposures of five veins (Armados, La Cantera, La Flor, Veta Grande, and San Jose) within the Veta Grande and La Cantera mining areas, surface exposures of the Veta Grande, Cinco de Mayo, and Navidad veins, and the Vetagrande mineral processing facility.

Between August 16$^{th}$-19$^{th}$, 2016, Bui conducted a follow-up site visit to the Veta Grande project. The Panuco deposit, various exploration targets within the Zacatecas properties, and the historical workings within the Minillas property were visited. Mineralized drill core intersections, drill hole collar locations, geological mapping and historical surface workings for the Panuco deposit were reviewed and verified for the purpose of supporting a mineral resource estimate.

Between July 9th–10th, 2019, Bui conducted another follow-up site visit to the Veta Grande project. Drill collar locations and mineralized drill core intersections for the 2018/2019 Phase 1 drill program completed at the Garcia, Armados and Navidad mine areas were reviewed and verified to support the preparation of the current technical report. During the same site visit, Bui confirmed that no additional work has been performed on the Panuco deposit since the initial surface sampling program completed by Santacruz in 2016.

Michael F. O'Brien, P.Geo, of Rockridge has not visited the Panuco deposit but has relied on the geological data and information verified by ARC.

Bui and O'Brien are Qualified Persons as defined by NI 43-101.

## 2.3 Information Sources and References

Information for this technical report includes ARC's field observations and information contained in assay certificates obtained directly from ALS Minerals, SGS de Mexico, S.A. de C.V. (SGS), and Actlabs México S.A. de C.V. (ActLabs). ARC also refers to information and data provided by Santacruz that includes but is not limited to geological, surface sampling and drill hole information, official concession documents, agreements, permits, environmental and geologic reports, production results and figures related to the Veta Grande project. The report also references published material as listed in Section 20.

## 2.4 Terms of Reference

Unless otherwise stated, all units reported in this technical report are based on the metric SI system (International System of Units) and the United States dollar (US $). All coordinates are presented using Universal Transverse Mercator Zone 13 North and North American Datum 1927 (UTM Zone 13N – NAD27).

Table 2-1: **Abbreviations, Acronyms, and Terms of Reference**

| Abbreviation | Term |
|---|---|
| % | percent |
| ° | degrees |
| °C | degrees Celsius |
| 3D | three dimensional |
| AA | atomic absorption |
| Ag | silver |
| AgEq | silver equivalent |
| Au | gold |
| az | azimuth |
| CIM | Canadian Institute of Mining |
| cm | centimeters |
| Cu | copper |
| DDH | diamond drill |
| DMT | dry metric tonnes |
| g | gram(s) |
| g/t and gpt | grams per tonne |
| GMV | gross metal value |
| GPS | global positioning system |
| ha | hectare(s) |
| HQ | HQ size core |
| ICP | Inductively Coupled Plasma |
| ID2 | inverse distance squared |
| ISO | International Organization for Standardization |
| kg | kilogram(s) |
| | |

| Abbreviation | Term |
|---|---|
| km | kilometer(s) |
| km2 | square kilometer(s) |
| m | meter(s) |
| masl | meters above sea level |
| mm | millimeter(s ) |
| Mt | million tonnes |
| NAD | North American Datum |
| NPI | net profit interest |
| NQ | NQ size core |
| NSR | net smelter royalty return |
| OK | Ordinary Kriging |
| oz | troy ounces |
| Pb | lead |
| ppm | parts per million |
| QAQC | quality assurance/quality control |
| Stx | stockwork zone |
| tpd | tonnes per day |
| tph | tonnes per hour |
| TREN | trench |
| TSF | tailings storage facility |
| UTM | Universal Transverse Mercator |
| Veta Grande | mineral project and vein system |
| Vetagrande | municipality of Vetagrande |
| ZMD | Zacatecas Mining District |
| Zn | zinc |

Table 2-2: **Conversion Factors**

| | |
|---|---|
| 1 troy ounce | 31.1034768 grams |
| 1 troy ounce per short ton | 34.2857 grams per metric tonne |
| 1 inch | 2.54 centimetres |
| 1 foot | 0.3048 metres |
| 1 hectare | 2.471 acres |

# 3 RELIANCE ON OTHER EXPERTS

ARC relied on the following information and experts:

- Section 4 – Property Description, Location and Status: Mining Concession title documents and Surface Rights documents were provided to ARC by Santacruz. ARC has reviewed said documents and has no reason to doubt their authenticity. ARC has not sought title opinion from a third-party law firm.

- Section 4 - Property Description, Location and Status: The legal translation of agreements were completed by and provided by an independent legal certified expert, Héctor Daniel Santillanes Chapa, with business address at Bavaria 2828, Rincón de Altavista, Monterrey, NL, MEXICO 64844. ARC reviewed both original signed versions and translated versions of said agreements.

# 4 PROPERTY DESCRIPTION, LOCATION AND STATUS

## 4.1 Property Description and Location

The Veta Grande project is located adjacent to the state city of Zacatecas, Mexico. Within the concession boundaries are the municipalities of Zacatecas, Vetagrande, Morelos, Panuco, and Casa de Cerros. The project is centered near coordinate 751,119 m East and 2,527,830 m North (UTM Zone 13N – NAD27) on the 1:250,000 Zacatecas topographic map sheet F13-6.

The project is located within the Mexican Silver Belt. The Mexican Silver Belt contains epithermal vein deposits within the Pachuca–Real del Monte, Guanajuato, Fresnillo, Taxco, Tayoltita, and Zacatecas mining districts. Mineralization is related to continental arc volcanism of the Sierra Madre Occidental and Sierra Madre del Sur (Camprubí and Albinson, 2007) and the ages of mineralization are estimated to be 48 to 18 Ma (Camprubí et. al., 2003).

The Veta Grande project consists of 184 mining concessions covering an area of 8,944 hectares (22,102 acres) in the Zacatecas Mining District, Mexico. The project is divided into three concession groups, described as the Veta Grande properties, Minillas property and Zacatecas properties (collectively “Veta Grande project”). The Panuco deposit is situated within the north-central area of the Zacatecas properties, centered on concession title 233300 (Panuco).

The Veta Grande properties comprise of 31 mining concessions totaling approximately 1,020 ha (2,520 acres). Within the Veta Grande properties, a group of seven contiguous concessions cover a portion of the Veta Grande vein system for approximately 3.0 km along a northwest-southeast strike length. Another group of eight concessions cover a portion of La Cantera vein system for approximately 2.7 km along a northwest-southeast strike length. The remaining 19 concessions occur as satellite parcels situated up to 60.0 km away from the municipality of Vetagrande.

The Minillas property consists of four mining concessions totaling approximately 98 ha (242 acres) and is located 32 km southeast from the municipality of Vetagrade, near a small village called Minillas.

The Zacatecas properties comprise of 149 mining concessions totaling approximately 7,826 ha (19,338 acres) and surround the Veta Grande properties.

Underground workings are situated within the Veta Grande properties, between the city of Zacatecas and the municipality of Vetagrande. Underground workings are also present within the Minillas property and have not been assessed by Santacruz.


**Figure 4-1: Map of Mexico and Location of Veta Grande Project**

All concessions are registered under the current licensee as outlined in Table 4-1 and a list of mining concessions are provided in Table 4-2. Impulsora Minera Santacruz, S.A. de C.V. is a Mexican subsidiary of Santacruz Silver Mining Ltd. (together “Santacruz”).

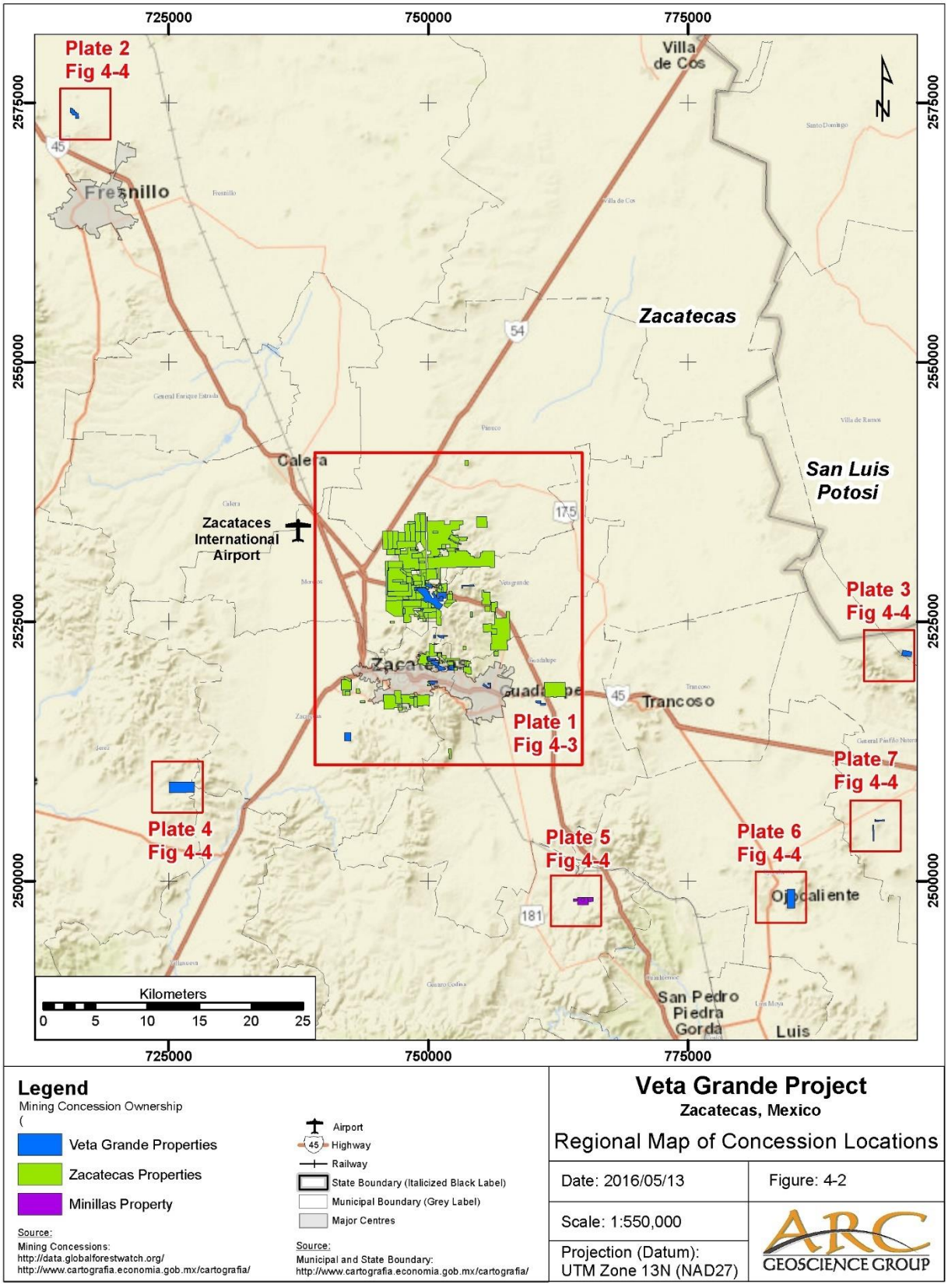


**Figure 4-2: Regional Map of Concessions**

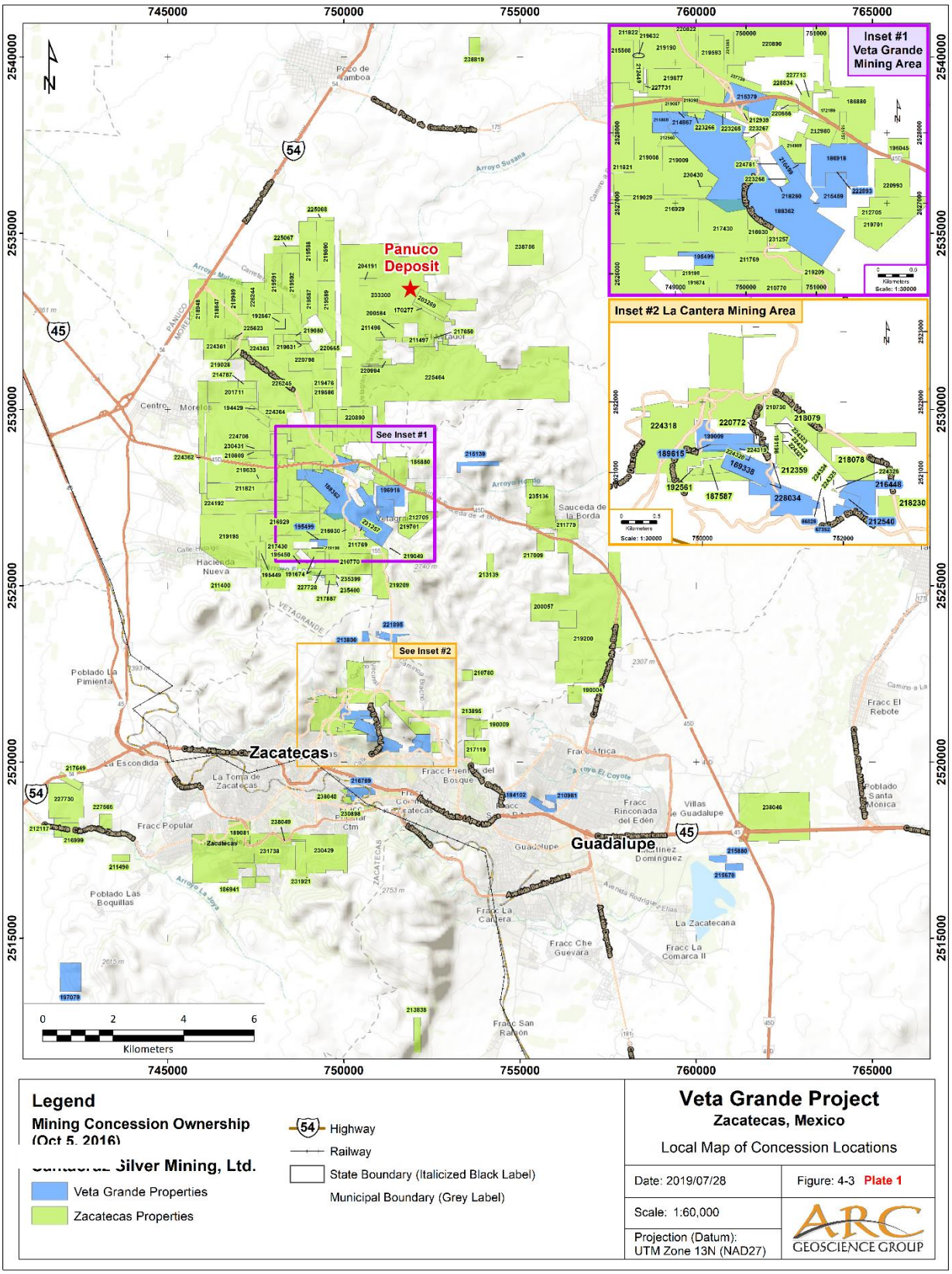


**Figure 4-3: Local Map of Concession Locations – Veta Grande and Zacatecas Properties**

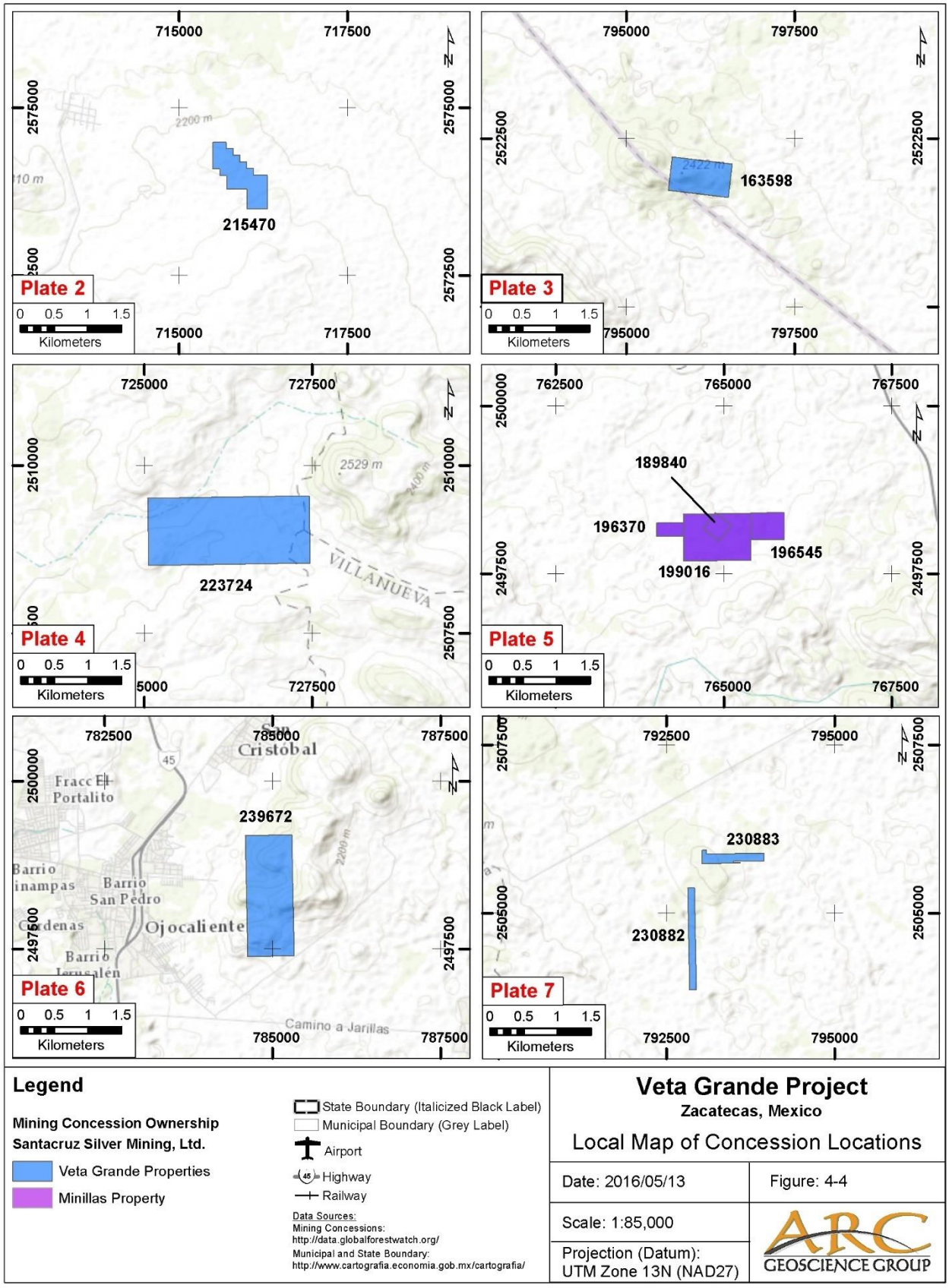


**Figure 4-4: Local Map of Concession Locations – Minillas Property and Other Concessions**

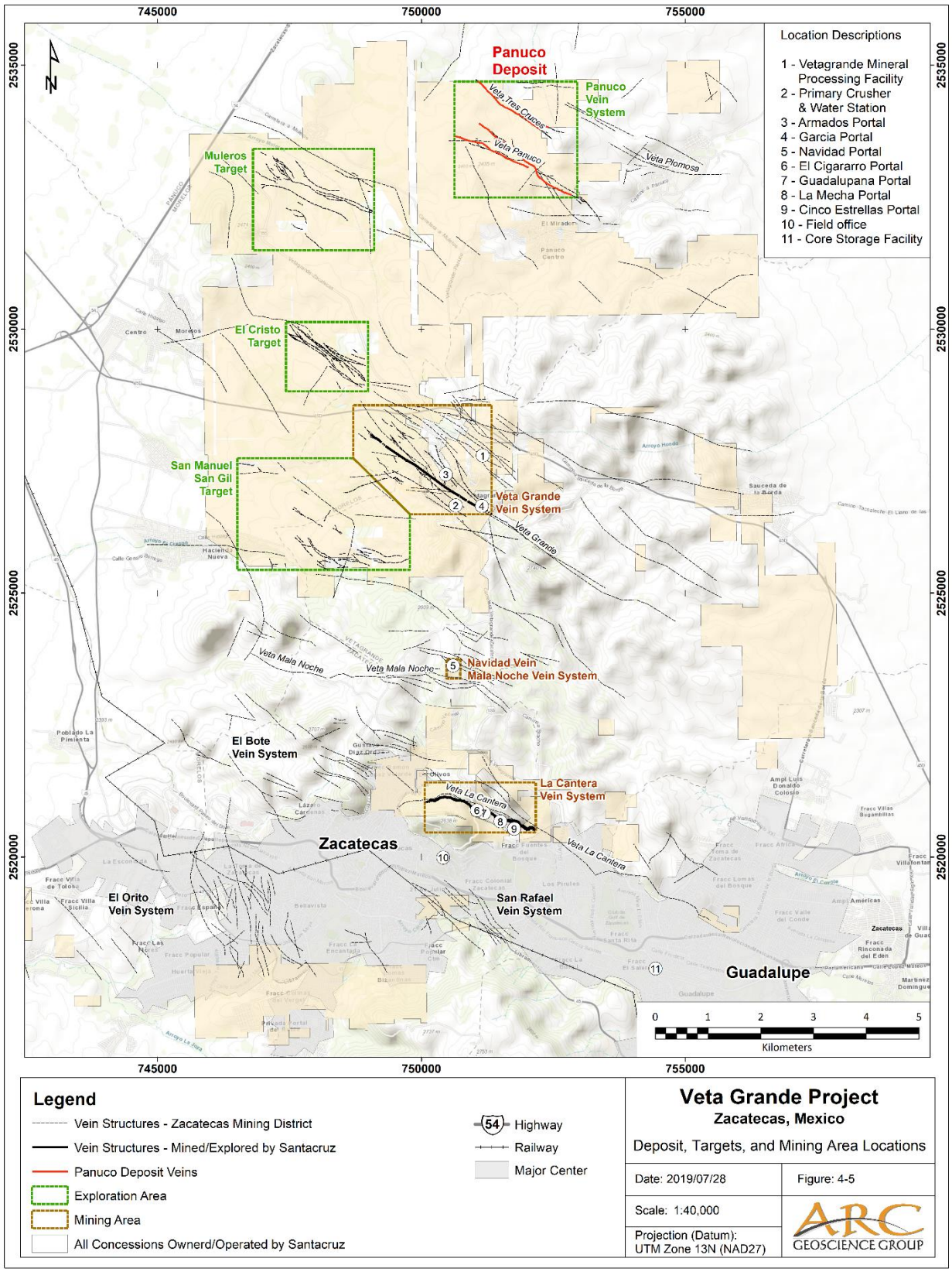


**Figure 4-5: Location Map of Deposit, Targets and Vein Systems**

Table 4-1: **Concession Ownership, Veta Grande Project**

| Group | Property Name | Current Licensee | Ownership | Area (ha) of Group |
|---|---|---|---|---|
| 1 | Veta Grande Properties | Impulsora Minera Santacruz, S.A. de C.V. | 100% | 1,019.95 |
| 2 | Minillas Property | Impulsora Minera Santacruz, S.A. de C.V. | 100% | 98.01 |
| 3 | Zacatecas Properties | Impulsora Minera Santacruz, S.A. de C.V. | 100% | 7,826.33 |

Table 4-2: **List of mining concessions**

*Note: For the purpose of this report, the "Area (ha)" is rounded to two decimal places.*

| Group | Concession Name | Title Number | Recording Title Date | Current Expiry Date | Area (ha) |
|---|---|---|---|---|---|
| 1 | NUEVO ROSARIO | 163598 | October 30, 1978 | October 29, 2028 | 45.00 |
| 1 | SAN RAFAEL | 169338 | November 11, 1981 | November 10, 2031 | 21.00 |
| 1 | AMPL. A SAN JUAN BAUTISTA | 186918 | May 17, 1990 | May 16, 2040 | 41.65 |
| 1 | LA CONTRACUNA I | 188362 | November 22, 1990 | November 21, 2040 | 200.66 |
| 1 | SAN PASCUAL | 215139 | February 8, 2002 | February 7, 2052 | 15.72 |
| 1 | LA FAJA | 222893 | September 14, 2004 | September 13, 2054 | 0.29 |
| 1 | CALIFORNIA | 184102 | February 15, 1989 | February 14, 2039 | 9.58 |
| 1 | SAN FELIPE | 210981 | February 29, 2000 | February 28, 2050 | 9.39 |
| 1 | VIRGEN DE LA PLATA | 197079 | August 27, 1993 | November 21, 2043 | 48.00 |
| 1 | LA GALLEGA | 212540 | October 31, 2000 | October 30, 2050 | 5.00 |
| 1 | NAVIDAD | 213800 | June 15, 2001 | June 14, 2043 | 5.63 |
| 1 | MINA GUADALUPITO FR 1 | 214867 | December 4, 2001 | February 1, 2051 | 0.78 |
| 1 | MINA GUADALUPITO FR 2 | 214868 | December 4, 2001 | December 3, 2051 | 7.47 |
| 1 | SAN TIBURCIO | 215379 | February 19, 2002 | February 18, 2052 | 21.00 |
| 1 | MORSE | 215459 | February 22, 2002 | February 21, 2052 | 18.26 |
| 1 | SAN GABRIEL | 215470 | February 22, 2002 | February 21, 2052 | 40.00 |
| 1 | OPALO | 215670 | March 5, 2002 | March 4, 2052 | 10.00 |
| 1 | SANTO NINO | 215880 | March 19, 2002 | March 19, 2052 | 9.12 |
| 1 | MONARCA | 216448 | May 17, 2002 | May 16, 2052 | 19.99 |
| 1 | SAN FRANCISCO | 216499 | May 17, 2002 | May 16, 2052 | 1.97 |
| 1 | STO. DOMINGO | 216789 | May 28, 2002 | May 27, 2052 | 22.03 |
| 1 | SAN MARTIN | 218260 | October 17, 2002 | October 16, 2052 | 0.10 |
| 1 | LA CHIRIPA | 221895 | April 7, 2004 | April 6, 2054 | 13.23 |
| 1 | SAN ISIDRO | 223724 | February 8, 2005 | February 7, 2055 | 240.00 |
| 1 | EL CHINO | 228034 | September 29, 2006 | September 28, 2056 | 29.98 |
| 1 | LA GLORIA FR | 230882 | October 26, 2007 | October 25, 2057 | 15.16 |
| 1 | LA GLORIA FR A | 230883 | October 26, 2007 | October 25, 2057 | 12.11 |

| Group | Concession Name | Title Number | Recording Title Date | Current Expiry Date | Area (ha) |
|---|---|---|---|---|---|
| 1 | EL PATROCINIO | 189615 | December 9, 1990 | December 4, 2040 | 9.27 |
| 1 | IXTOC | 195499 | September 14, 1992 | September 13, 2042 | 6.85 |
| 1 | SAN MACARIO | 199009 | February 11, 1994 | February 10, 2044 | 16.00 |
| 1 | OJOCALIENTE | 239672 | January 31, 2012 | January 30, 2062 | 124.65 |
| 2 | SAN JUAN | 196545 | July 23, 1993 | September 9, 2034 | 20.00 |
| 2 | DON VICENTE | 199016 | February 11, 1994 | October 26, 2033 | 61.01 |
| 2 | LA SORPRESA | 189840 | December 6, 1990 | December 5, 2040 | 9.00 |
| 2 | EL REFUGIO | 196370 | July 16, 1993 | December 18, 2041 | 8.00 |
| 3 | EL COMETA | 201711 | November 10, 1995 | October 10, 2045 | 76.02 |
| 3 | EL DORADO 2 | 231738 | April 15, 2008 | April 14, 2058 | 288.69 |
| 3 | EL DORADO 3 | 230429 | August 24, 2007 | August 23, 2057 | 128.80 |
| 3 | EL DORADO 7 | 238049 | December 7, 2011 | November 7, 2061 | 5.64 |
| 3 | EL SALVADOR | 204191 | December 18, 1996 | December 17, 2046 | 10.00 |
| 3 | ESPERANZA 1-06 | 227713 | July 28, 2006 | July 27, 2056 | 6.79 |
| 3 | ESPERANZA IV-06 FRACCIÓN II | 228834 | August 2, 2007 | July 2, 2057 | 0.92 |
| 3 | ESTRELLITA 1-06 | 227566 | June 7, 2006 | May 7, 2056 | 15.00 |
| 3 | LA VIRGEN 2 | 230898 | October 26, 2007 | October 25, 2057 | 5.43 |
| 3 | NAVIDAD 2 | 230431 | August 24, 2007 | August 23, 2057 | 20.00 |
| 3 | SAN FELIPE 2 | 235136 | October 15, 2009 | October 14, 2059 | 98.86 |
| 3 | SAN GIL | 217430 | July 16, 2002 | July 15, 2052 | 183.33 |
| 3 | SAN LAZARO 2 FRACC. 1 | 235399 | November 24, 2009 | November 23, 2059 | 0.23 |
| 3 | SAN LAZARO 2 FRACC. 2 | 235400 | November 24, 2009 | November 23, 2059 | 0.10 |
| 3 | SAN LUÍS DEL ORO 2 | 231921 | May 16, 2008 | May 15, 2058 | 30.61 |
| 3 | SANTA TERESA | 212449 | October 24, 2000 | October 23, 2050 | 7.57 |
| 3 | 2da. Ampl. a Santa Gabriela | 211769 | July 28, 2000 | July 27, 2050 | 57.22 |
| 3 | 3a. Ampliación al Patrocinio | 191198 | April 29, 1991 | April 28, 2041 | 4.78 |
| 3 | Quinta Ampl. al Patrocinio | 212359 | September 29, 2000 | September 29, 2050 | 5.63 |
| 3 | ALICA | 217650 | June 8, 2002 | May 8, 2052 | 6.55 |
| 3 | AMPL.A BUENA VISTA | 181757 | November 18, 1987 | November 17, 2037 | 6.37 |
| 3 | AMPL. EL PIRUL | 212117 | August 31, 2000 | August 30, 2050 | 17.90 |
| 3 | AMPL. SAGRADO CORAZÓN | 213895 | June 7, 2001 | May 7, 2051 | 10.99 |
| 3 | AMPL. SANTA GABRIELA | 210770 | November 26, 1999 | November 25, 2049 | 69.96 |
| 3 | AMPL. VIOLETA | 219029 | January 30, 2003 | January 29, 2053 | 9.44 |
| 3 | BELEM | 210780 | November 26, 1999 | November 25, 2049 | 9.00 |
| 3 | BETTY | 223265 | November 18, 2004 | November 17, 2054 | 0.92 |
| 3 | BETTY FRACCIÓN I | 223266 | November 18, 2004 | November 17, 2054 | 2.03 |
| 3 | BETTY FRACCIÓN II | 223267 | November 18, 2004 | November 17, 2054 | 2.69 |
| 3 | BETTY FRACCIÓN III | 224781 | July 6, 2005 | June 6, 2055 | 0.04 |
| 3 | BETTY FRACCIÓN IV | 223268 | November 18, 2004 | November 17, 2054 | 0.40 |
| 3 | BUENA VISTA | 172189 | October 26, 1983 | October 25, 2033 | 11.04 |

| Group | Concession Name | Title Number | Recording Title Date | Current Expiry Date | Area (ha) |
|---|---|---|---|---|---|
| 3 | CASTILLO 1 | 224192 | April 20, 2005 | April 19, 2055 | 64.26 |
| 3 | CASTILLO 2 | 224361 | April 27, 2005 | April 26, 2055 | 47.23 |
| 3 | CASTILLO 3 | 224362 | April 27, 2005 | April 26, 2055 | 64.72 |
| 3 | CASTILLO 4 | 219080 | April 2, 2003 | March 2, 2053 | 9.35 |
| 3 | CEVADA | 191674 | December 19, 1991 | December 18, 2041 | 23.79 |
| 3 | CUEVA SANTA | 213139 | March 16, 2001 | March 15, 2051 | 10.00 |
| 3 | DON JESÚS | 212939 | February 13, 2001 | December 2, 2051 | 5.58 |
| 3 | EL CRISTO | 194429 | December 30, 1991 | December 29, 2041 | 16.00 |
| 3 | EL DORADO | 189081 | May 12, 1990 | April 12, 2040 | 57.00 |
| 3 | EL DORADO 6 | 238048 | December 7, 2011 | November 7, 2061 | 7.73 |
| 3 | EL LOBO 1 | 225067 | December 7, 2005 | November 7, 2055 | 15.82 |
| 3 | EL LOBO 2 | 225068 | December 7, 2005 | November 7, 2055 | 8.32 |
| 3 | EL PIRUL | 216999 | May 6, 2002 | April 6, 2052 | 20.00 |
| 3 | EL PEÑON | 238819 | April 11, 2011 | March 11, 2061 | 30.00 |
| 3 | EL PORVENIR 8 | 196045 | September 23, 1992 | September 22, 2042 | 8.47 |
| 3 | EL PROGRESO | 221385 | March 2, 2004 | February 2, 2054 | 20.10 |
| 3 | ESMERALDA | 214767 | November 29, 2001 | November 28, 2051 | 10.00 |
| 3 | ESPERANZA | 212980 | February 20, 2001 | February 19, 2051 | 13.00 |
| 3 | ESTRELLITA | 220666 | September 9, 2003 | August 9, 2053 | 1.37 |
| 3 | ESTRELLITA MARINERA | 211490 | May 31, 2000 | May 30, 2050 | 10.00 |
| 3 | GABY | 219877 | April 29, 2003 | April 28, 2053 | 32.00 |
| 3 | IF FRACC. I | 211821 | July 28, 2000 | July 27, 2050 | 132.16 |
| 3 | IF FRACC. II | 211822 | July 28, 2000 | July 27, 2050 | 23.49 |
| 3 | IF II | 219190 | February 18, 2003 | February 17, 2053 | 45.19 |
| 3 | JARINA | 215508 | February 22, 2002 | February 21, 2052 | 29.04 |
| 3 | LA CARPA 2 | 220890 | October 24, 2003 | October 23, 2053 | 102.66 |
| 3 | LA CASTELLANA | 192561 | December 19, 1991 | December 18, 2041 | 2.00 |
| 3 | LA ESTRELLA | 227739 | October 8, 2006 | September 8, 2056 | 15.59 |
| 3 | LA FE 1 | 218078 | March 10, 2002 | February 10, 2052 | 49.30 |
| 3 | LA FE 3 | 218079 | March 10, 2002 | February 10, 2052 | 14.15 |
| 3 | LA FE 4 | 218230 | October 17, 2002 | October 16, 2052 | 9.00 |
| 3 | LA PLOMOSA | 238756 | October 25, 2011 | October 24, 2061 | 100.00 |
| 3 | LARGO II | 219209 | February 18, 2003 | February 17, 2053 | 67.39 |
| 3 | LARGO II FRACCIÓN I | 219049 | April 2, 2003 | March 2, 1953 | 0.07 |
| 3 | LARGO III | 219195 | February 18, 2003 | February 17, 2053 | 219.29 |
| 3 | LARGO IV | 219198 | February 18, 2003 | February 17, 2053 | 6.48 |
| 3 | LARGO VI | 224318 | April 22, 2005 | April 21, 2055 | 165.88 |
| 3 | LARGO VI FRACCIÓN I | 224319 | April 22, 2005 | April 21, 2055 | 0.06 |
| 3 | LARGO VI FRACCIÓN II | 224320 | April 22, 2005 | April 21, 2055 | 0.07 |
| 3 | LARGO VI FRACCIÓN III | 224321 | April 22, 2005 | April 21, 2055 | 0.22 |

| Group | Concession Name | Title Number | Recording Title Date | Current Expiry Date | Area (ha) |
|---|---|---|---|---|---|
| 3 | LARGO VI FRACCIÓN IV | 224322 | April 22, 2005 | April 21, 2055 | 0.13 |
| 3 | LARGO VI FRACCIÓN V | 224323 | April 22, 2005 | April 21, 2055 | 0.08 |
| 3 | LARGO VI FRACCIÓN VI | 224324 | April 22, 2005 | April 21, 2055 | 0.03 |
| 3 | LARGO VI FRACCIÓN VII | 224325 | April 22, 2005 | April 21, 2055 | 0.16 |
| 3 | LARGO VI FRACCIÓN VIII | 224326 | April 22, 2005 | April 21, 2055 | 0.03 |
| 3 | LARGO VI FRACCIÓN X | 220772 | September 30, 2003 | September 29, 2053 | 0.48 |
| 3 | LARGO VII FRACC. UNO | 226245 | February 12, 2005 | January 12, 1955 | 242.18 |
| 3 | LARGO VII FRACC. DOS | 226244 | February 12, 2005 | January 12, 1955 | 58.41 |
| 3 | LARGO VII FRACC. TRES | 225623 | September 23, 2005 | September 22, 2055 | 0.62 |
| 3 | LARGO VIII | 220993 | November 11, 2003 | October 11, 1953 | 27.35 |
| 3 | LARGO IX | 219631 | March 26, 2003 | March 25, 2053 | 5.95 |
| 3 | LARGO XI | 219632 | March 26, 2003 | March 25, 2053 | 0.53 |
| 3 | LARGO XII | 219633 | March 26, 2003 | March 25, 2053 | 1.19 |
| 3 | LAS PALOMITAS | 217009 | June 14, 2002 | June 13, 2052 | 25.00 |
| 3 | LOS DOS AMIGOS | 217119 | June 14, 2002 | June 13, 2052 | 43.75 |
| 3 | LOS ÁNGELES | 219476 | July 3, 2003 | June 3, 2053 | 10.00 |
| 3 | LOS MUERTOS | 211496 | May 31, 2000 | May 30, 2050 | 7.77 |
| 3 | MACARIO | 220665 | September 9, 2003 | August 9, 2053 | 29.61 |
| 3 | MACARIO II | 224363 | April 27, 2005 | April 26, 2055 | 135.22 |
| 3 | MARTHA | 227730 | October 8, 2006 | September 8, 2056 | 94.68 |
| 3 | MINA DE GUERREROS | 190004 | June 12, 1990 | May 12, 2040 | 20.00 |
| 3 | MONSERRAT | 219200 | August 18, 2003 | February 17, 2053 | 517.14 |
| 3 | NAVIDAD | 224706 | May 31, 2005 | May 30, 2055 | 366.01 |
| 3 | NAVIDAD FRACC. 1 | 224707 | May 31, 2005 | May 30, 2055 | 0.06 |
| 3 | OLGA | 227731 | October 8, 2006 | September 8, 2056 | 5.81 |
| 3 | PABELLÓN | 200057 | June 30, 1994 | June 29, 2044 | 89.00 |
| 3 | PANUCO | 233300 | January 23, 2009 | January 22, 2059 | 805.22 |
| 3 | PANUCO 2 | 225464 | September 9, 2005 | August 9, 2055 | 865.45 |
| 3 | PATRICIA | 224364 | April 27, 2005 | April 26, 2055 | 31.18 |
| 3 | PINO I FRACC. 1 | 219007 | January 28, 2003 | January 27, 2053 | 6.33 |
| 3 | PINO I FRACC. 2 | 219009 | January 28, 2003 | January 27, 2053 | 39.88 |
| 3 | PINO II | 219008 | January 28, 2003 | January 27, 2053 | 61.80 |
| 3 | PINO III | 219585 | March 18, 2003 | March 17, 2053 | 16.68 |
| 3 | PINO IV | 230430 | August 24, 2007 | August 23, 2057 | 2.86 |
| 3 | PUERTO DE LAS PALOMAS | 211497 | May 31, 2000 | May 30, 2050 | 24.20 |
| 3 | PURÍSIMA DEL DESIERTO | 212560 | October 31, 2000 | October 30, 2050 | 4.76 |
| 3 | REGINA | 187587 | May 7, 1990 | April 7, 2040 | 5.86 |
| 3 | REMEDIOS | 220798 | July 10, 2003 | June 10, 2053 | 50.00 |
| 3 | SAGRADO CORAZÓN | 190009 | June 12, 1990 | May 12, 2040 | 15.17 |
| 3 | SAN FELIPE | 211779 | July 28, 2000 | July 27, 2050 | 51.17 |

| Group | Concession Name | Title Number | Recording Title Date | Current Expiry Date | Area (ha) |
|---|---|---|---|---|---|
| 3 | SAN GABRIEL | 218947 | January 28, 2003 | January 27, 2053 | 85.00 |
| 3 | SAN GABRIEL | 218948 | January 28, 2003 | January 27, 2053 | 85.00 |
| 3 | SAN GABRIEL | 218989 | January 28, 2003 | January 27, 2053 | 77.01 |
| 3 | SAN JORGE | 211400 | May 23, 2000 | May 22, 2050 | 7.82 |
| 3 | SAN JORGE 2 | 217867 | September 18, 2002 | September 17, 2052 | 8.56 |
| 3 | SAN JOSÉ | 170277 | March 31, 1982 | March 30, 2032 | 10.00 |
| 3 | SAN JOSÉ II | 203269 | June 28, 1996 | June 27, 2046 | 40.00 |
| 3 | SAN JOSÉ DE GRACIA | 217649 | June 8, 2002 | May 8, 2052 | 14.00 |
| 3 | SAN JUAN | 214989 | January 29, 2002 | January 28, 2052 | 11.03 |
| 3 | SAN JUAN 1 | 238046 | December 7, 2011 | November 7, 2061 | 274.51 |
| 3 | SAN JUDAS TADEO | 213838 | March 7, 2001 | February 7, 2051 | 20.00 |
| 3 | SAN LÁZARO | 227728 | October 8, 2006 | September 8, 2056 | 9.76 |
| 3 | SAN LUÍS DE ORO | 186941 | May 17, 1990 | May 16, 2040 | 11.59 |
| 3 | SAN MANUEL | 195450 | September 14, 1992 | September 13, 2042 | 7.54 |
| 3 | SAN MANUEL | 210809 | November 30, 1999 | November 29, 2049 | 13.04 |
| 3 | SAN MARTÍN | 210730 | November 26, 1999 | November 25, 2049 | 14.39 |
| 3 | SAN MARTÍN FRACCIÓN I | 219390 | April 3, 2003 | March 3, 2053 | 5.32 |
| 3 | SAN MARTÍN | 219586 | March 18, 2003 | March 17, 2053 | 71.00 |
| 3 | SAN MARTÍN | 219587 | March 18, 2003 | March 17, 2053 | 60.75 |
| 3 | SAN MARTÍN | 219588 | March 18, 2003 | March 17, 2053 | 85.00 |
| 3 | SAN MARTÍN | 219589 | March 18, 2003 | March 17, 2053 | 71.88 |
| 3 | SAN MARTÍN | 219590 | March 18, 2003 | March 17, 2053 | 85.00 |
| 3 | SAN MARTÍN | 219591 | March 18, 2003 | March 17, 2053 | 85.00 |
| 3 | SAN MARTÍN | 219592 | March 18, 2003 | March 17, 2053 | 85.00 |
| 3 | SAN MARTÍN | 219593 | March 18, 2003 | March 17, 2053 | 58.44 |
| 3 | SAN MARTÍN | 220622 | April 9, 2003 | March 9, 2053 | 13.24 |
| 3 | SAN MARTÍN CABALLERO | 219028 | January 30, 2003 | January 29, 2053 | 25.00 |
| 3 | SAN PEDRO | 200584 | August 31, 1994 | August 30, 2044 | 16.00 |
| 3 | SAN PEDRO | 220994 | November 11, 2003 | October 11, 2053 | 12.55 |
| 3 | SAN RAFAEL | 212705 | November 22, 2000 | November 21, 2050 | 27.07 |
| 3 | SAN RAFAEL 2 | 219701 | February 4, 2003 | January 4, 2053 | 23.85 |
| 3 | SAN SABINO | 192567 | December 19, 1991 | December 18, 2041 | 9.00 |
| 3 | SANTA ELENA | 195449 | September 14, 1992 | September 13, 2042 | 10.00 |
| 3 | VILLA | 186880 | May 17, 1990 | May 16, 2040 | 36.34 |
| 3 | VIOLETA FRACC. I | 216929 | May 6, 2002 | April 6, 2052 | 122.64 |
| 3 | VIOLETA FRACC. II | 216930 | May 6, 2002 | April 6, 2052 | 14.37 |
| 3 | VIOLETA III | 231257 | January 25, 2008 | January 24, 2058 | 8.15 |
| | | | | Total Area (ha) | 8944.23 |

## 4.2 Verification of Title Status

In the verification of concession title ARC has relied upon official Mining Concession title documents from the Public Mining Registry, which is managed by the Direccion General de Mina and administered under the Secretaria de Economia, Mexico. These official documents were provided to ARC by Santacruz and comprise of scanned duplicate copies showing title number, concession name, concession type, recording title date, current expiry date, concession area in hectares, detailed description of concession location, and original signatures of the Direccion General de Minas and the Public Mining Registry.

ARC has no reason to doubt the authenticity of the aforementioned title documents relating to the Veta Grande, Minillas and Zacatecas properties. ARC has not sought title opinion from an independent law firm.

## 4.3 Grant of Concession

In accordance with the Mexican Mining Law (in force since 1992, amended 2014), mining concessions (previously separated as exploration concessions or exploitation concessions) have an expiry date of 50 years from the date of grant.

## 4.4 Taxes and Fees

To maintain concessions in good standing, the concession owner is required to pay annual taxes submitted through two (semiannual) payment terms. The fee for each concession is calculated based on the concession size (ha) and the number of years a concession has been in good standings within its grant period of 50 years. In addition, the concession owner is required to file annual documentation of exploration or development work on the concessions.

The total 2019 annual taxes are anticipated to be approximately MEX $3,025,764.

## 4.5 Agreements and Royalties

### 4.5.1 Contracuña Business Alliance Agreement

Impulsora Minera Santacruz, S.A. de C.V., a Mexican subsidiary of Santacruz Silver Mining Ltd., entered into a Business Alliance Agreement with Minera Contracuña I, S.A. de C.V., and Vetalinda Compania Minera, S.A. de C.V. (together "Contracuña") dated October 27, 2015. The terms of agreement include the temporary transfer 35 mining concessions totaling approximately 1,118 ha (Veta Grande properties and Minillas property), the Vetagrande mineral processing plant, current and former tailings dam, other facilities directly related to the mineral processing plant to Santacruz; and operating rights for an aggregate period of up to 30 years. The terms are subject to cash payments totaling US $500,000 and a 60:40 Net Profits Interest (NPI) with Santacruz holding 60% and Contracuña holding 40%. In the event the price of silver is greater than US $22 per ounce, the NPI changes to 55:45.

The Contracuña Business Alliance Agreement was amended on December 2, 2015 to include the lease of three additional concessions - Tres Estrellas (title 66826), Cinco Estrellas (title 67352), and La Mecha (title 165558). The lease of Tres Estrellas, Cinco Estrellas and La Mecha concessions were subsequently terminated on April 6, 2018 due to Santacruz's decision to halt production at the Guadalupana mine area.

### 4.5.2 Contracuña Option Agreement

On June 14, 2017 Santacruz entered into an option agreement with Contracuña whereby Santacruz was granted an option to purchase a 100% interest in the Veta Grande and Minillas properties, for aggregate cash payments of US$15,500,000 to be paid in five tranches over a two-year period ("Option Agreement"). The terms of the Option Agreement entitles Santacruz to 100% of the cash flows generated from mining operations conducted on the Veta Grande and Minillas properties and the agreement supersedes the Business Alliance Agreement.

As revised on December 13, 2017 and further revised on March 28, and August 27, 2018, the Option Agreement was amended. The amended terms consist of aggregate cash payments of US $17,100,000 spread over a five-year period. Details of the amended payment schedule are as follows:

a) US$500,000 paid on December 13, 2017 (paid);
b) US$100,000 on or before October 1, 2018 (paid);
c) US$100,000 on or before November 1, 2018 (paid);
d) US$750,000 on or before December 13, 2018 (paid);
e) US$1,400,000 on or before August 31, 2019;
f) US$3,000,000 on or before December 2, 2019;
g) US$3,000,000 on or before December 2, 2020;
h) US$4,000,000 on or before December 2, 2021; and
i) US$4,250,000 on or before December 2, 2022;

Santacruz concurrently executed on August 27, 2018 a promissory note (the "PromissoryNote") in favour of Contracuña in the amount of US $1,422,000. The Promissory Note is repayable on or before August 30, 2019 and relates to a trade payable balance owing to Contracuña at August 27, 2018. Failure by the Company to settle the Promissory Note by August 30, 2019 will constitute an event of default under the terms of the Option Agreement. In addition, the amended Option Agreement entitles Contracuña to a 1% net smelter royalty ("NSR") commencing on December 14, 2022. Santacruz has the right to acquire the NSR at any time by paying Contracuña US $1,500,000.

### 4.5.3 Golden Minerals Option Agreement

Santacruz entered into an option agreement with Golden Minerals Company ("Golden Minerals") and its subsidiaries on May 2, 2016 to acquire 100% interest in the Zacatecas properties for aggregate cash considerations of US $1,500,000 and royalty payments related to mining from the SAN GIL and SAN SABIANO concessions. The terms of the agreement are comprised of four parts:

A. Assignment of Rights Agreement entered between Minera Largos, S. de R.L. de C.V. ("Minera Largos"), and Santacruz dated May 2, 2016 for the assignment of 133 mining concession to Santacruz for the amount of US $1,400,000 (plus the income tax and value added tax). Santacruz fulfilled the option payments to Golden Minerals in October of 2018.

B. Assignment of Rights Agreement entered between Minera de Cordilleras, S. de R.L. de C.V., ("Cordilleras") and Santacruz dated May 2, 2016 for the assignment of 16 mining concessions to Santacruz for the amount of US $100,000 for the mining concessions, payable on the date of

signature of the agreement plus the income tax and value added tax. The payment was made in full as of May, 2016.

C. Acknowledgement and Assignment Agreement of Royalty Payment Obligation entered between Cordilleras and Santacruz dated May 2, 2016. Whereby Santacruz is subrogated to the fulfillment of all obligations in charge of Cordilleras and which derive from the Fibela Agreement and its attachments. The Fibela Agreement sets a royalty payment of 2% in favor of Mr. Juan Gilberto Fibela Hernández, or the amount of US $575,000 of the "ore" extracted only and exclusively from the mining concession called SAN GIL, title 217430.

D. Acknowledgement and Assignment Agreement of Royalty Payment Obligation entered between Minera Largos and Santacruz dated May 2, 2016. Whereby Santacruz is subrogated to the fulfillment of all obligations derived from a rights assignment agreement dated June 17, 2008 between Minera Águila Plateada, S.A. de C.V. and Cordilleras ("Original Rights Assignment Agreement"). The Original Rights Assignment Agreement sets a royalty payment of 1% in favor of Minera Águila Plateada, S.A. de C.V. of the "ore" extracted only and exclusively from the mining concession called SAN SABIANO, title 192567.

### 4.5.4 Carrizal Mining Option Agreement

On November 30, 2017 Santacruz entered into a binding letter of intent with Carrizal Mining, S.A. de C.V., a private Mexican silver producing Company ("Carrizal Mining"), pursuant to which Carrizal Mining may acquire a 20% working interest in the Veta Grande project by funding 100% of the cost to increase the Vetagrande mineral processing plant to 750 tpd milling capacity as well as providing funding and equipment to surface exploration drilling for up to 20,000 m of drilling at the Garcia mine, Armados mine, Navidad mine, and Panuco deposit area. The required earn-in expenditures were completed on May 22, 2019 and a 20:80 joint venture between Carrizal Mining (20%) and Santacruz (80%) was formed.

### 4.5.5 PCG Purchase Agreement

On May 21, 2019 Santacruz has entered into a purchase agreement to acquire 100% of the outstanding shares of PCG Mining S.A. de C.V. ("PCG"), which is a holding company that owns 100 % of the outstanding shares of Carrizal Mining. The shares of PCG are owned as to 50% each by two unrelated shareholders. One of the shareholders is at arm's length to Santacruz and the other shareholder is Carlos Silva, Santacruz's chief operating officer.

Consideration for the acquisition is as follows:

A. With respect to the acquisition of PCG shares from the arm's-length party, on closing a cash payment by Santacruz of US $500,000 and other consideration in the amount of approximately US $600,000, including the forgiveness of approximately US $450,000 in debt owed by the shareholder to Carrizal;
B. With respect the acquisition of PCG shares from Mr. Silva, on closing the issuance of 30 million shares of Santacruz to Mr. Silva at a deemed price of five cents per share.

As at the date of this technical report, Santacruz has acquired 50% of the outstanding shares of PCG. Santacruz plans to acquire the remaining 50% of such shares and, as a result, Santacruz will indirectly own 100% of Carrizal Mining, subject to receipt of necessary shareholder and regulatory approvals, and Carrizal Mining's 20% interest in the Veta Grande project.

## 4.6 Surface Rights

The following condensed interpretation and translation of the Mexican Mining Law on Surface Rights was extracted from the International Comparative Legal Guides website: http://www.iclg.co.uk/practice-areas/mining-law/mining-law-2016/mexico#chaptercontent1.

> "Mining concession holders may use lands where mining concessions are located. The use of the lands may be through ownership or possession of lands (e.g., Lease Agreements/Temporary Occupation Agreements/Expropriation through an Administrative Proceeding). The Mexican Constitution recognises the following surface rights:
>
> A. *Bienes Comunales* (social land granted to indigenous communities).
> B. *Ejidos* (social land granted to individuals or communities).
> C. National Land.
> D. *Zonas Federales* (Federal areas, beaches and river causes).
> E. Private Property.
>
> A private commercial mining company may acquire property types mentioned in points A, B and E above. Typically, the consideration payable for the lands is agreeable between the parties. In accordance with Mexican Mining Law, the mining activities should be preferred over any other use or exploitation of the land where the mining concessions are located, therefore the Mexican Mining Law and its Regulations provide the rules under which a mining concession holder may require the expropriation or the temporary occupation of the land when it does not reach an agreement with the landowner. In case of expropriation, the consideration is payable based on an appraisal made by an Agency of the Mexican Government."

ARC has reviewed the following Surface Rights Agreements related to the Veta Grande properties:

A. Agreement between Contracuña (Francisco Gutiérrez Castorena) and Vetagrande municipality for Navidad Concession (title 213800) for use of surface and subsurface land, with the consideration that locals will be employed.

B. Agreement between Contracuña (Francisco Gutiérrez Castorena) and the Regional Livestock Union of Zacatecas. Whereby the surface rights granted for mining concessions San Rafael, title 169338 and Chino, title 228034, with the consideration that Contracuña will provide equipment to farmers for any work necessary.

As at the effective date of this report, Santacruz does not have surface rights agreements with Ejidos within the Panuco deposit, Zacatecas properties, and Minillas property.

## 4.7 Environmental Liabilities and Permitting

### 4.7.1 Environmental Liabilities and Permitting Related to Mining Activities

Santacruz, through its Business Alliance with Contracuña, is in possession of the relevant environmental permits obtained from the Ministry of Environment and Natural Resources (Secretaria del Medio Ambiente y Recursos Naturales or "SEMARNAT") allowing the company to mine raw materials and produce concentrate. These include Single Environmental License No. LAU-32/0002-2002, Environmental Risk License No. DE-M-32-138-2002, and Environmental Impact Statement – Project CONTRACUÑA I, S.A. DE C.V., Resolution No. 1403. In addition, the Single Environmental License No. LAU-32/0002-2002 was updated on November 17, 2017 to include Santacruz as the registered holder of the license.

ARC is not aware of any current environmental liabilities associated with mining and mineral processing activities for the Veta Grande project, noting that activities related to the tailings storage facilities and mineral processing plant are managed through conditions set forth by the aforementioned environmental permits.

### 4.7.2 Environmental Liabilities and Permitting Related to Exploration Activities

Exploration activities in Mexico are regulated under Norma Oficial Mexicana NOM-120-ECOL-2011, which defines the impact mitigation procedures that must be followed for each exploration activity. Any activity that affects less than 25% of the project surface area is required to have a Preventative Report (Informe Preventivo) approved by the SEMARNAT, which defines the environmental mitigation and restoration procedures to be followed in carrying out the exploration activities.

Any activity that affect more than 25% of the project surface area is required to have a valid Environmental Impact Statement (Manifiesto de Impacto Ambiental) approved and issued by SEMARNAT. In addition, clearing of natural vegetation requires a Technical Justification Study (Estudio Técnico Justificativo) and Land Use Change Permit (Cambio de Uso de Suelos) approved and issued by SEMARNAT.

As at the effective date of this report, Santacruz has not received the Preventative Report authorization, Environmental Impact Statement, Technical Justification Study or Land Use Change Permit to carry out exploration work at the Panuco deposit, or adjacent exploration targets including Muleros, El Cristo and San Manuel-San Gil areas.

Drill sites and trench sites related to previous Panuco, Muleros, El Cristo and San Manuel - San Gil work programs have been reclaimed by previous operators. Historical artisanal surface workings up to 15 meters deep are present at Panuco, Muleros, El Cristo and San Manuel - San Gil areas. In addition, small waste rock piles related to previous exploitation currently exist at El Cristo and Minillas. Additional monitoring is required to assess for any potential future environmental liabilities.

Currently, Santacruz holds three multi-year Preventative Report authorizations in accordance to the following table:

**Table 4-3: Preventative Report Authorizations**

| Authorization # | Location | Work Allowed | Expiry Date |
|---|---|---|---|
| 32/IP-0117/01/18 | Garcia and Armados mine areas | Construction of 14 drill pads, completion of 32 diamond drill holes, the construction and reclamation of access roads, and the use of mine water for drilling operations. | January 16, 2021 |
| 32/DD-0014/06/18 | Navidad mine area | Access to and reclamation of pre-existing disturbed sites for the purpose of diamond drilling. | July 3, 2021 |
| 32/IP-0042/12/18 | Minillas mine area | Construction of 10 drill pads, completion of 10 diamond drill holes, the construction and reclamation of access roads, and the use of mine water for drilling operations. | January 21, 2022 |

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

## 5.1 Access

The current mining areas within the Veta Grande project are easily accessed by paved highway and municipal roads. The La Cantera mines are situated within the Zacatecas city limits and can be accessed immediately off the entrance of highway 155. The Navidad, Armados and Garcia mines, and the Panuco deposit are within 20 km from Zacatecas city and can be access by traveling north along highway 155. Other exploration targets within the Zacatecas properties are accessed through highway 45 and 45D. The Minillas property is accessed via highway 118 and is located within the municipality of Minillas, which is approximately 32 km southeast of Zacatecas city. Within each of the mining areas are dirt roads that can be driven by four-wheel drive vehicles and haul trucks. Within each of the exploration areas, including the Panuco deposit area, are a network of dirt roads that connect to various drill sites and historical workings. The Veta Grande project and mineral processing facility is centred at coordinates 751,119 m East and 2,527,830 m North (UTM Zone 13N – NAD27).

## 5.2 Physiography

The Veta Grande project is located in the Sierra Madre Occidental physiographic province near the boundary with the Mesa Central province (Mexican Plateau). The region is characterized by rounded northwest trending mountains. Elevations vary from 2,300 masl to 2,600 masl. The property is situated between forested and sub-tropical regions to the southwest, and desert conditions to the northeast. The climate in the region is semi-arid. Vegetation consists of natural grasses, mesquite or huizache and crasicaule bushes. Standing bodies of water are dammed as most streams are intermittent.

## 5.3 Climate

Temperatures range from 9°C to 22°C with an average daily mean temperature of 15°C. Maximum temperatures reach approximately 30°C to 38°C during the summer season and minimum temperatures in the winter season may produce freezing conditions and occasional snow. The rainy season occurs between June and September and the average annual precipitation is approximately 500 mm (Servicio Meteorológico Nacional, 2016). The operating season is year-round.

## 5.4 Infrastructure and Local Resources

The towns of Panuco, Vetagrande, Muleros, and Minillas offers little infrastructure other than grid power supplied by the Federal Electricity Commission (CFE) and groundwater from wells supplied by the state. For the project, the city of Zacatecas and neighboring city of Guadalupe are the primary supply centers with a skilled work force. Zacatecas is also connected by rail (Ferrocarrill Mexicano) to other major cities in Mexico and seaports including Manzanillo and Lazaro Cardenas on the west coast. Aside from a network of dirt roads for the purpose of accessing drilling sites within the Panuco deposit area and power grid transmission lines that service the adjacent town of Panuco, there are no other infrastructure within the immediate area of the Panuco deposit. The Panuco deposit has the opportunity to utilize existing project infrastructure related to the Veta Grande project.

# 6 HISTORY

The Zacatecas Mining District has had a long history of mining dating back to pre-colonial times when local indigenous people (Huichol people) mined silver (and some gold) from the oxide zones of the vein deposits located around what is now known as the State of Zacatecas.

Discovery of silver in the Zacatecas area occurred in 1546. By 1548, the Spaniards had begun production from three mines; the Albarrada Mine on the Veta Grande vein system, and the San Bernabe Mine and Los Tajos Mine on the Mala Noche vein system. By the late 1800's silver from the Zacatecas Mining District accounted for 60% of the value of all Mexican exports making it one of Mexico's wealthiest and largest districts of the era. According to Ponce & Clark (1988), the Mexican Geological Survey estimated that approximately 23,236,499 kg (747,076,679 Troy oz) of silver was produced from the Zacatecas Mining District between 1548 and 1987.

Historically only the oxide material was mined and the sulfide material was left behind and in some cases used as backfill. In the mid-1900's attempts were made to extract the silver and base metals from the sulfide material. Eventually, the lack of electric power, labour problems, and low metal prices forced many of the unprofitable mines to shut down.

## 6.1 Recent History – Veta Grande Properties

Recent history on the Veta Grande properties is not well documented. Contracuña became legal title holders of the mining concessions that include the Veta Grande and La Cantera mining areas in 1990. Contracuña subsequently received an Environmental Impact Statement in 1995 to construct the Vetagrande mineral processing facility. In 2007, Contracuña and Oro Silver Resources Ltd. ("Oro Silver") entered into letters of intent establishing the terms of exploration and option to purchase agreements for the Veta Grande concessions and mineral processing facility. Oro Silver carried out two seasons of surface and underground sampling programs on the Veta Grande, Armados, La Flor, and San Jose veins. Although the company had intentions to drill 5,000 meters in 2008, those work plans did not materialize.

On January 18, 2008, Oro released news with the following statement related to the Veta Grande properties at that time:

> "Oro Silver is aware of at least 24 horizontal underground holes drilled by Peñoles, most of them for production and less than 50 metres in length. This drilling is the only known modern exploration completed on the properties. Penoles reported intersections of 186 g/t Ag over 2.29 meters to 2,369 g/t Ag over 0.25 meters." (source: http://www.marketwired.com/press-release/oro-silver-reports-positive-results-on-vetagrande-underground-zacatecas-mexico-tsx-venture-osr-811895.htm).

ARC has not independently verified this information and is uncertain if the drilling mentioned by Oro Silver in the January 18, 2008 news release is directly related to the current Veta Grande mining area currently operated by Santacruz. Diamond drill core and drill collars were not identified during the April 28-29, 2016 site visit to the Veta Grande project.

## 6.2 Recent History – Zacatecas Properties

The recent history for the Zacatecas properties is also not well documented prior to the 1990's. In 1994, Minera Largo, S. de RL de CV, a subsidiary of Golden Minerals, acquired new concessions and initiated preliminary exploration work within the mining district of Zacatecas, including the present-day Zacatecas properties owned by Santacruz. Minor exploration activities, including the collection of approximately 2,000 surface samples, occurred between 1994 and 2005. Between 2006 and 2010, Golden Minerals undertook detailed geological mapping and geochemical sampling programs within the Zacatecas properties, including the Panuco deposit and the Muleros, El Cristo, San Manuel-San Gil exploration targets.

Between 2007 and 2011, Golden Minerals completed 36,178 meters of diamond drilling on the Panuco, Muleros, El Cristo and San Manuel-San Gil exploration targets, with over 64% of drilling meters completed at the Panuco deposit. A table summarizing the work undertaken at the various exploration targets is provided below.

**Table 6-1: Summary of previous exploration work completed by Golden Minerals**

| | Drill Holes (#) | Drill Holes (m) | Drill Hole Assays Samples (#) | Trench (#) | Trench (m) | Trench Samples | Grab/Chip Samples | Soil Samples |
|---|---|---|---|---|---|---|---|---|
| Panuco | 75 | 23,444 | 2,607 | 183 | 4,540 | 1,869 | 80 | |
| Muleros | 37 | 6,704 | 1,660 | 126 | 5,997 | 994 | 2 | |
| El Cristo | 8 | 2,854 | 455 | 84 | 4,108 | 1,625 | 46 | |
| San Gil | 9 | 3,176 | 968 | 17 | Unknown | 688 | 242 | 785 |
| | | | | | | | | |
| Total | 129 | 36,178 | 5,690 | 410 | 14,645 | 5,176 | 370 | 785 |

### 6.2.1 Panuco Deposit.

Between 2006 and 2009, Golden Minerals conducted mapping and reconnaissance work in the Panuco area. Three major vein structures striking northwest-south east and dipping to the southwest were identified. These veins were subsequently named Panuco NW, Panuco Central and Tres Cruces.

Between 2009 and 2011, over 1,869 chip samples were collected in 183 trenches across the three vein structures. Significant gold and silver assays were realized, including gold assays ranging between <0.0025 - 1.42 g/t Au and silver ranging between <0.25 – 1,125 g/t Ag.

In 2009, Golden Minerals completed 18 HQ diamond core holes totaling 4,556.6 m. Drilling focused on the southeast zone of the Panuco Central vein and along the strike length of the Tres Cruces vein. One drill hole was completed in the northern extent of the Panuco NW vein. Significant intersections in 2009 include:

PA09-01, 1.79 m grading 0.23 g/t Au, 516.69 g/t Ag, 0.14% Pb and 0.23% Zn.
PA09-04, 1.31 m grading 0.2 g/t Au, 314.33 g/t Ag, 0.03% Pb and 0.05% Zn.
(Reported in apparent thickness. Intersection width and grades reported from composites.)

In 2010, Golden Minerals completed 14 HQ diamond drill holes totaling 3,548.1 m. Drilling resumed in the same areas as in 2009, with infill and down dip exploration drilling of the southeast zone of the Panuco Central vein. The Tres Cruces vein was delineated with mineralized intersections spanning a 1,900 m strike

length. A second drill hole was completed in the northern extent of the Panuco NW vein. Significant intersections in 2010 include:

PA10-30, 2.79 m grading 0.37 g/t Au, 391.92 g/t Ag, 0.03% Pb and 0.04% Zn.
PA10-32, 4.54 m grading 0.11 g/t Au, 196.86 g/t Ag, 0.02% Pb and 0.04% Zn.
(Reported in apparent thickness. Intersection width and grades reported from composites.)

In 2011, Golden Minerals concluded its drilling campaign at the Panuco deposit with the completion of 43 HQ diamond drill holes totaling 15,339.0 m. Drilling delineated and connected the southeast zones of Panuco Central vein with its northwest extent and traced mineralization over a 2,400 m strike length. The Panuco NW vein was also delineated over a 1,400 m strike length. Significant intersections in 2011 include:

PA11-66, 1.82 m grading 0.09 g/t Au, 362.64 g/t Ag, 0.01% Pb and 0.02% Zn.
PA11-68, 1.50 m grading 0.54 g/t Au, 539.94 g/t Ag, 0.01% Pb and 0.01% Zn.
(Reported in apparent thickness. Intersection width and grades reported from composites.)

In total, Golden Mineral completed 23,444 meters in 75 drill holes (noting PA11-56 was abandoned and re-drilled as PA11-56A).

No further work was conducted at the Panuco target between 2012 and 2016.

### 6.2.2 Muleros Target

Between 2006 and 2010, approximately 996 surface samples were collected in outcrops and along 126 trenches that were excavated across the vein structures at the Muleros target. Silver assays average 40 g/t Ag, ranging from <5 g/t Ag to 793 g/t Ag. Gold assays average 0.08 g/t Au, ranging from <0.005 g/t Au to 3.3 g/t Au. Copper (1.19-465 ppm Cu), lead (<2-16,300 ppm Pb) and zinc (3-13,600 ppm Zn) were identified as being anomalous.

Between 2007 and 2008, Golden Minerals completed 37 HQ diamond drill holes totaling approximately 6,704 m. Drill holes were spaced 100-150 m along strike and averaged 120 m in length - the longest hole was 562.6 m long. The average drilling angle is -60° and the drilling campaign tested a vertical depth of about 100 meters from the surface.

Drilling encountered a rock package of andesite and volcanosedimentary units cut by late granodiorite dykes. Significant mineralized intersections include MU-07-01, which intersected 1.25 m of 0.08 g/t Au and 101 g/t Ag between 63.95 and 65.20 m and MU-07-07, which intersected 2.30 m of 1.56 g/t Au and 286.26 g/t Ag between 73.95 and 76.25 m (apparent thickness, un-cut and uncapped grades).

No further work was conducted at the Muleros target between 2009 and 2016.

### 6.2.3 El Cristo Target

Between 2006 – 2013, 1,625 trench chip samples and 466 outcrop samples were collected in various surface sampling programs at El Cristo Target. Silver assays range between <0.5 g/t Ag to 486 g/t Ag. Gold assays range between <0.005 g/t Au and 4.8 g/t Au. Lead assays range between <2 ppm and 33,300 ppm Pb. Zinc assays range between 6 ppm and 27,700 ppm Zn. Copper assays range between 1 ppm and 1,305 ppm Cu. Surface sampling data indicate that El Cristo is similar in precious metal concentrations and

contains higher base metal concentrations than the Panuco deposit and Muleros target, suggesting that the surface elevation at El Cristo is most likely deeper in the hydrothermal system than at Panuco and Muleros.

In 2010, Golden Minerals completed approximately 2,854 m of diamond drilling in eight drill holes at El Cristo. The majority of vein intersections encountered elevated lead and silver mineralization. As an example, CR-10-04 intersected several narrow zones of mineralization including 0.82 m of 0.341 g/t Au, 29.2 g/t Ag, 26,400 ppm Pb and 62,800 ppm Zn. Gold and silver concentrations are interpreted to be generally low. One of the best silver intersections was in drill hole CR-10-07, which intersected 0.6 m of 0.168 g/t Au, 145 g/t Ag, 759 ppm Pb and 2,620 ppm Zn at approximately 50 m depth below surface (apparent thickness and un-cut and uncapped grades).

No further work was conducted at the El Cristo target between 2011 and 2016.

### 6.2.4 San Manuel-San Gil Target

Between 2006 and 2013, Golden Minerals carried out a geochemical soil sampling program in an area measuring 4,200 m by 2,000 m, with a grid focused on a 1,500 m x 2,200 m area where 785 soil samples were collected at 50 m stations and 100 m line spacing at the San Manuel-San Gil target. Samples were analyzed for mobile metal ion (MMI) geochemistry. Several silver-lead-zinc zones were identified, including an area identified at coordinates 748,700 m East and 2,525,600 m North (concession title 195450 – San Manuel) that remains untested by drilling. In addition, Golden Minerals also completed two grid rock chip sampling programs totaling 180 samples. Trenching and the collection of 688 trench samples also focused within these two rock chip grid areas.

In 2011, Golden Minerals completed nine HQ sized diamond drill holes totaling 3,176 m. Exploration drilling produced encouraging results. Several narrow intersections with significant grade were identified. The best intersection was in MG-11-02, which intersected 1.56 m grading 0.36 g/t Au and 437.30 g/t Ag (apparent thickness and un-cut and uncapped grades).

No further work was conducted at the San Manuel-San Gil target between 2013 and 2016.

## 6.3 Recent History – Minillas Property

The following paragraphs on the recent history for the Minillas property is sourced from a technical report by Turner (1999) and Western Silver's Form 20-F (2002) which was filed with the US Securities and Exchange Commission (SEC). The current concessions referenced in this report as the Minillas property was once part of a larger property called San Jeronimo.

> *"The Minillas district was worked by small English and American mining companies in the late 1800's and continued up to the start of the Mexican revolution in 1911. Francisco Gutierrez staked the historic Minillas workings in the mid-1970's and shipped portions of the old dumps to the Fresnillo mill. Minera Fresnillo mapped and sampled the unflooded parts of the old mines in 1979. Minera Kennecott became interested in the Minillas District in 1996 and signed option agreements with the local concession owners. Kennecott then entered into a joint venture with Western Copper Holdings in 1997 and sold their interest to Western Copper Holdings in 1999."*

According to Western Copper Holdings, no drilling had occurred on the property prior to Western Copper's ownership. Between 1998-1999 Western Copper completed six drill holes on the San Jeronimo property. Both core drilling and reverse circulation (RC) drilling methods were used and the results are briefly described below.

Hole SJ-2 was drilled close to the Loreto shaft and intersected a strongly mineralized quartz vein containing ruby silver at 168.3 m downhole, with a 3.3 m interval averaging 541 g/t silver, 0.7% lead and 1.55% zinc.

Hole RC-3-99 tested a large zone of pervasive sericite-carbonate alteration along the Loreto vein and intersected a 38.1 m interval between 73.2 – 111.3 m which averaged 119.7 g/t silver, 0.72% lead and 1.24% zinc.

Hole RC-1-99 drilled near the San Jose shaft intersected massive sulfide mineralization between 45.7 – 48.7 m and averaged 0.56% copper, 0.38% zinc, 5.6 g/t silver and 0.02% lead. The best interval from 45.7 – 47.3 m contains 0.90% copper, 0.59% zinc and 8.6 g/t silver.

In 2000, Western Copper entered into an option agreement with Mauricio Hochschild & Cia Ltda. ("Hochschild"). In 2001, Hochschild drilled three holes to test a large Induced Polarization anomaly near the San Jose shaft.

Significant intersection encountered by Hochschild include hole HSJ-6, which was collared approximately 350 meters southwest of the San Jose shaft. HSJ-6 intersected a 3.05 meter interval beginning at 236.22 meters that averages 413.5 g/t silver (13.3 ounces per tonne), 0.38% lead and 0.78% zinc.

Hochschild followed up with an eight-hole Phase II drill program before returning the property to Western Copper in 2001.

At the effective date of this report, Santacruz has not conducted advanced exploration work at the Minillas property. Data compilation is ongoing and the total number of drill holes, total number of meters drilled, and total production numbers related to the current Minillas property is currently unknown.

## 6.4 Verification of Historical Information

ARC was able to verify drilling and surface trenching information from historical work completed at the Panuco deposit. Although ARC has reviewed reports, digital maps and databases related to historical work completed on other exploration targets within the Zacatecas and Minillas properties as mentioned herein, ARC has not completed sufficient work to verify the accuracy and authenticity of this information.

# 7 GEOLOGICAL SETTING AND MINERALIZATION

## 7.1 Regional Geology

The Zacatecas Mining District is known for its rich epithermal and mesothermal vein deposits containing economic grades of silver and gold with varying amounts of lead, zinc and copper. The district covers an area of over 700 square kilometers in north-central Mexico (Figure 7-1) along the eastern flank of the southern Sierra Madre Occidental province and the north-western limit of the Mesa Central physiographic province. The dominant features responsible for the localization of precious and base metals are believed to be Tertiary in age, likely related to the formation and destruction of a volcanic caldera complex and to a set of northerly trending basin and range fault structures (Ponce and Clark, 1988).

The Zacatecas Mining District is comprised of three Mesozoic formations that are subsequently covered by Paleocene volcanic rocks and Quaternary cover.

The Triassic Zacatecas Formation consists of the oldest rocks that outcrop in the district, exposed in the northwest and southwest areas from Zacatecas city. The formation is composed of a clastic sequence of greenschist facies rocks, including sericitic phyllites, metaschists with nodules of quartz and meta-arenites, metatuffs, metaconglomerates and metalimestones with phyllites. La Cantera – El Bote vein system and the deeper portion of the Mala Noche vein system are emplaced within this formation.

Overlying the Zacatecas Formation is the late Jurassic – early Cretaceous Chilitos Formation, which is composed of an extensive volcanosedimentary sequence that includes massive lavas and pillow lavas of basaltic-andesitic composition, interbedded with sedimentary rocks, volcaniclastic rocks and limestone. The Chilitos Formation also exhibits greenschist facies metamorphic grade and is in thrust contact with the Zacatecas Formation. The Chilitos Formation is host to several silver occurrences within the Zacatecas Mining District, including the Veta Grande, Panuco, Muleros, El Cristo and San Manuel-San Gil vein systems.

Overlying the Chilitos Formation is the Tertiary Red Conglomerate Formation. This 200 to 400 m thick polymictic conglomerate contains fragments of the Zacatecas and Chilitos Formations, and was most likely deposited during the Paleocene – Eocene time. Its main outcrops are located immediately south and southeast of Zacatecas city. The Red Conglomerate Formation surrounds and is present within La Cantera mine.

To the south of Zacatecas city, and overlying the Red Conglomerate Formation are younger Tertiary (Paleocene to Pliocene) rhyolitic ignimbrites and andesitic to rhyolitic tuffs. Late Neocene intrusions are present within the center of the Zacatecas Mining District. They are composed of pink aphanitic rhyolite similar to the Bufa flow dome located within Zacatecas city. Quaternary age alluvial deposits are composed of gravels, sands and silts.

The Zacatecas Mining District has experienced two periods of metamorphism. The older event was documented as being 140 and 200 Ma and the second event of metamorphism is thought to occur at 74.0 +/- 1.5 Ma (Ranson, 1975).

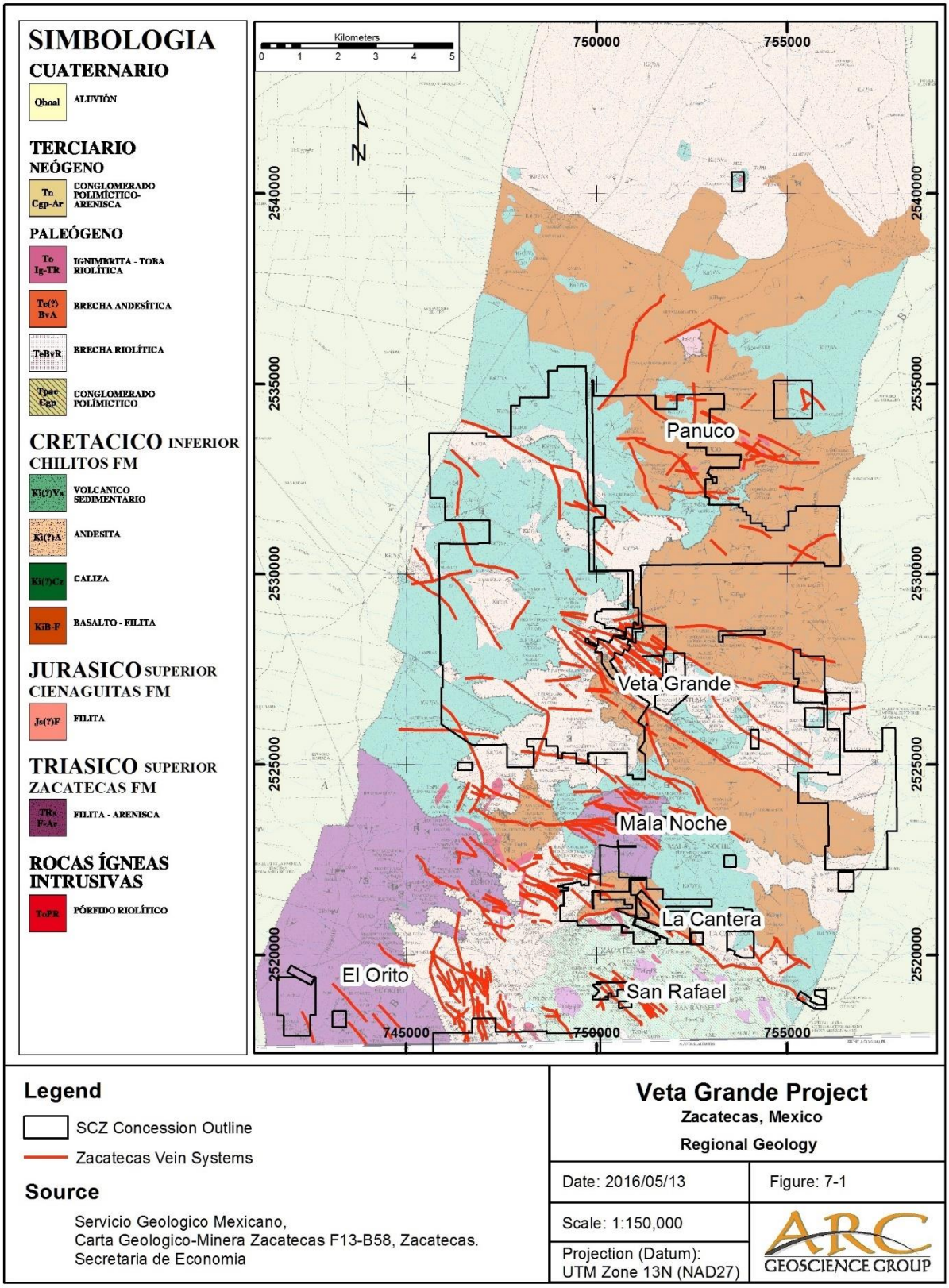


**Figure 7-1: Simplified Regional Geological Map, Zacatecas Mining District**
(modified from Servicio Geologico Mexicano, 2016).

The structural setting of the Zacatecas Mining District is interpreted to have been shaped by the formation and destruction of a volcanic caldera complex and formation of northerly trending basin and range fault structures. It is believed that two periods of collapse and three periods of uparching formed two cauldron blocks and created a rim zone, two hinge zones in addition to a series of well-developed regional sets of concentric and radial fractures. Although both are present within the district, the concentric jointing and fracturing predominate and had a profound influence on later deposition of mineral bearing fissure veins. The most prominent of these include the Mala Noche, Veta Grande, Tajos de Panuco and Plomosa vein systems (Ponce and Clark, 1988).

## *7.2* Regional Vein Deposits

The Zacatecas Mining District contains a significant number of mineralized veins. Based on their orientation, age and assemblage, the mineralized structures can be divided into three types of vein systems - the Ag-(Pb, Zn, Cu, Au) system, the Au-Ag-(Se) system and the fluorite-bearing vein system (located in the eastern rim zone) (Ponce and Clark, 1988).

The most extensive and economically important are the Ag-(Pb, Zn, Cu, Au) systems. These have been exploited historically in the Panuco, Veta Grande, Mala Noche, Bote, La Cantera and San Rafaél vein systems. This system forms long veins ranging from four to 16 km in length and one to 30 m in width oriented N 45° W to N 85° W with dips of 50° to 70° SW and 64° to 75° NE. This system is hosted primarily within the extensively propylitized Chilitos Formation with lesser occurrences within the Zacatecas Formation, the Zacatecas Red Conglomerate and some rhyolitic sub-volcanic bodies. Silver commonly occurs as but not limited to argentite, acanthite, silver sulphantimonides, and freibergite.

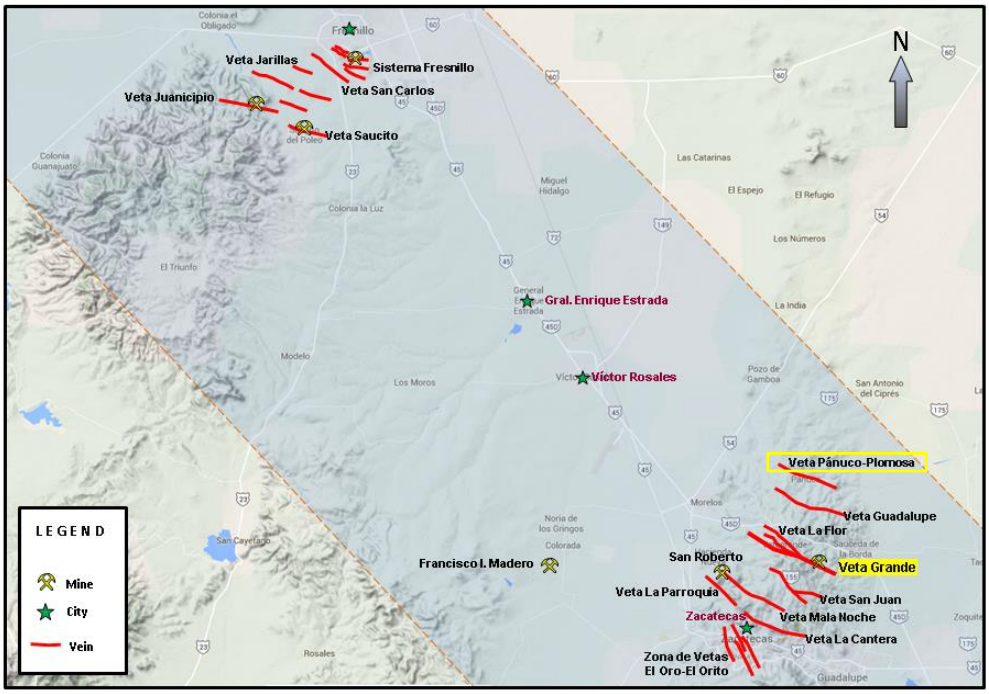


**Figure 7-2: Mexican Silver Belt through the Zacatecas Mining District**
(Santacruz, 2016)

## 7.3 Local Geology and Mineralization

The Veta Grande property is dominantly underlain by medium to dark green, fine grained to aphanitic (locally weakly porphyritic) andesitic volcanic rocks and volcanosedimentary rocks of the Chilitos formation (micro-diorite of Ponce et. al., 1988). The following paragraphs provide brief descriptions of the veins that are considered part of the mineralized vein systems being explored and/or exploited within the property.

### 7.3.1 The Veta Grande Vein System

The Veta Grande vein system has been estimated to be approximately 16 km long. Concessions owned and operated by Santacruz cover approximately three km of strike length at the northwest end of the vein system. The alteration consists of a 1-5 m narrow and vein-proximal zone of argillic alteration within weak to moderate and pervasive silicification peripheral to the vein structures. Pervasive oxidation of the vein structure exists at surface and continues to an average depth of approximately 30 m (Figure 7-3, a and b).

The Veta Grande vein is the principal vein structure within the Veta Grande vein system and is historically the most important vein of the Zacatecas Mining District. It varies from two to 30 m in width, averaging approximately 10 m wide. The vein strikes northwest-southeast and dips between 60-90$^{o}$ to the southwest. The vein consists of quartz, chalcedony and calcite and often exhibits colloform and crustiform textures with small to medium (1-5 mm) euhedral quartz crystals filling open space cavities. The dominant sulfide mineralization consists of pyrite, sphalerite, and galena, with rare chalcopyrite.

In the immediate vicinity of the Armados and Garcia portals are three known veins situated in the structural footwall of the Veta Grande vein. These veins are identified as Armados vein, San Jose vein, and La Flor vein. Each vein is compositionally and texturally similar to the Veta Grande vein (Figure 7-4, a and b). Vein thickness varies from <1 to >5 m and averages approximately 2-3 m wide and strikes northwest-southeast and dips between 50-60$^{o}$ to the southwest. The San Jose vein contain narrow zones (5-10 cm) of massive sulfide along vein margins (Figure 7-5, a and b) while the La Flor vein contains brecciated textures with small to medium (1-20 cm) angular clasts of argillic altered andesite that frequently occur within a sulfide-quartz matrix (Figure 7-6, a and b). The veins have been previously exploited from underground and are currently being explored and mined by Santacruz.

Additional subordinate veins have been identified on surface in the northwest exploration areas of the Veta Grande vein system. These veins are believed to be positioned in the structural footwall of Veta Grande and have surface exposures in historical mine workings. The veins are currently being assessed by Santacruz for their exploration potential.

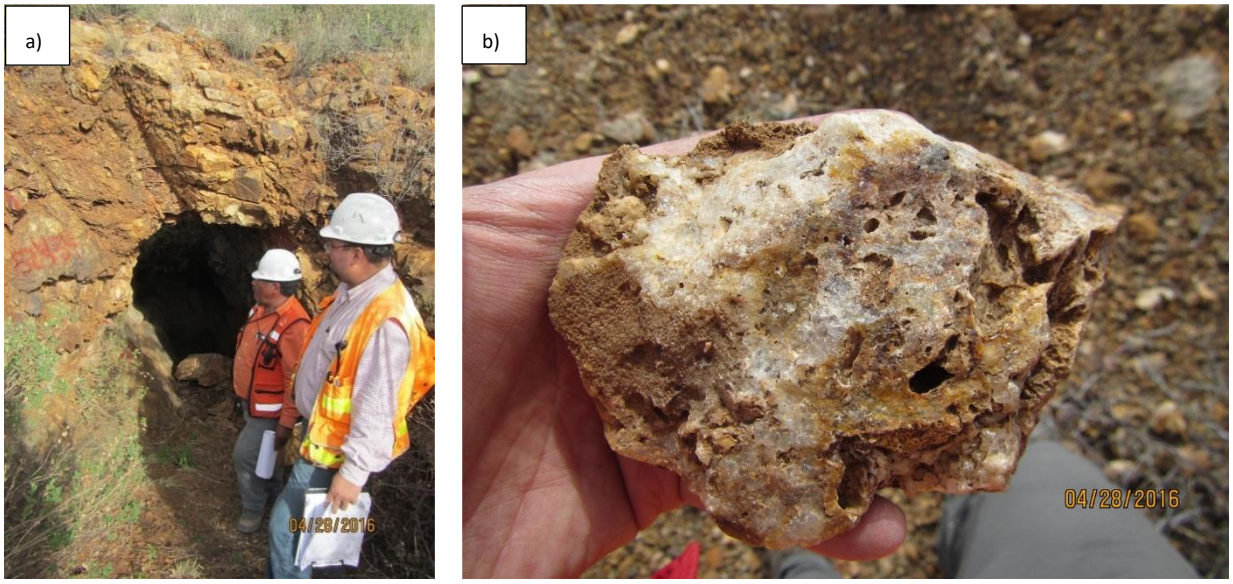


**Figure 7-3** Photos of the mineralized Veta Grande vein at surface.
Showing strong oxidation with vuggy quartz. a) Vein dips approximately 70° to the southwest (right), b) Hand sample of vuggy quartz from the Veta Grande vein.

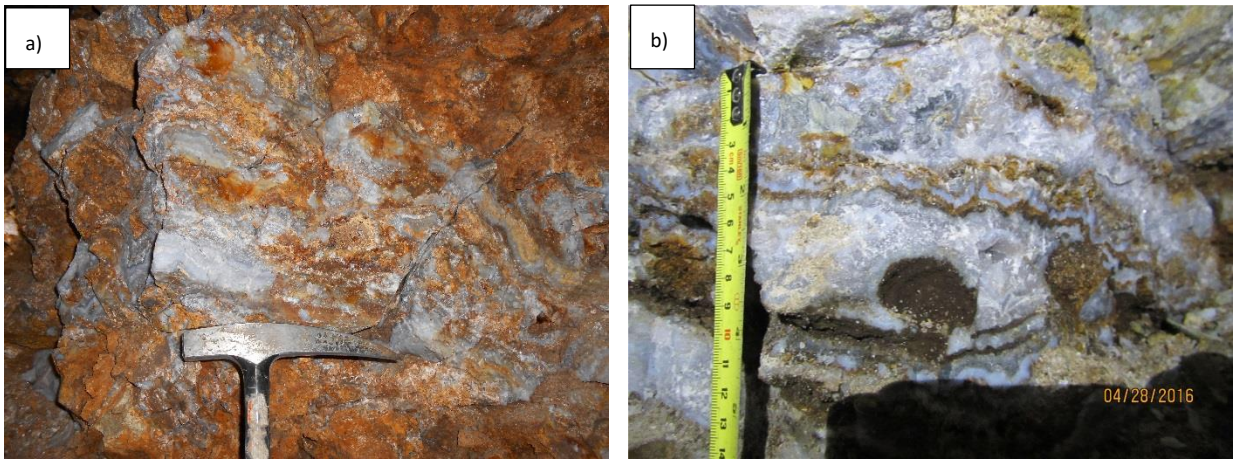


**Figure 7-4** Photos of the mineralized Armados vein from the Garcia underground.
Showing the transition from: a) oxide (Level 1 - near surface) to b) sulfide (Level 4).

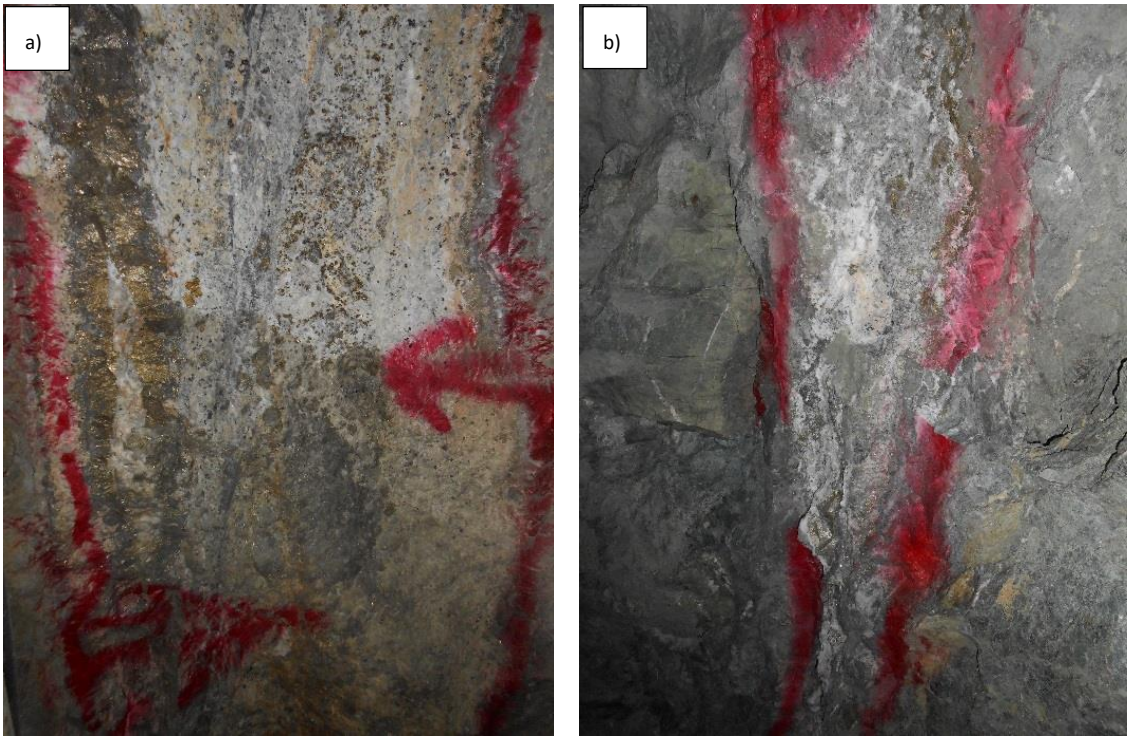


**Figure 7-5** Photos of the mineralized San Jose vein from the Garcia underground.
Showing: a) disseminated pyrite, sphalerite, and galena with massive sulfide at the margin of the vein, and b) a zone where the vein pinches to less than 1 m.

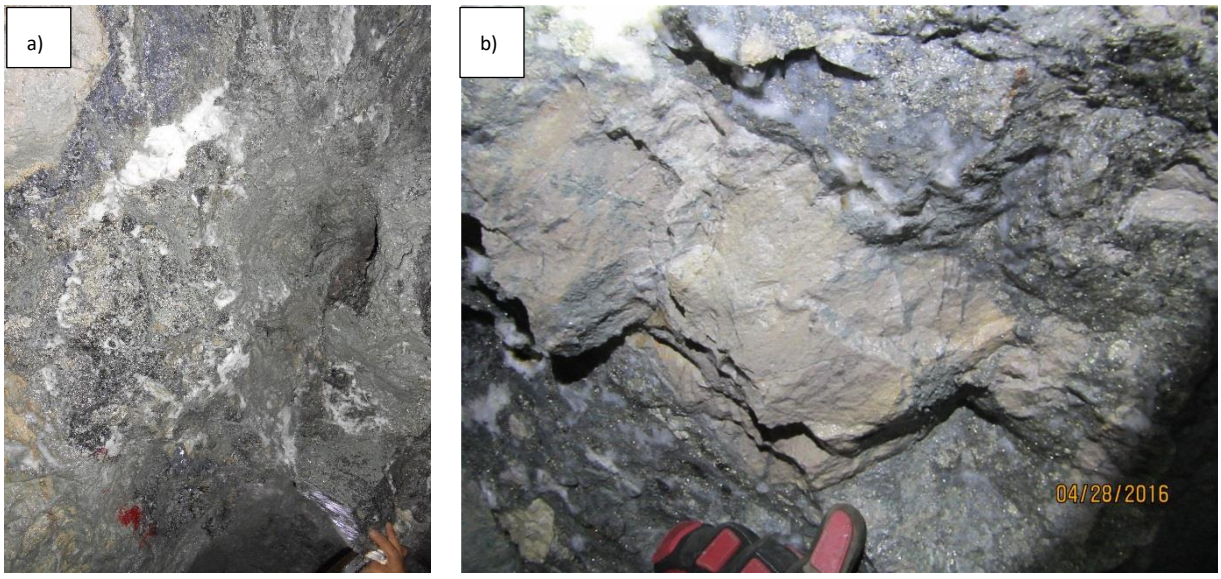


**Figure 7-6** Photos of the mineralized La Flor vein from the Garcia underground.
Showing: a) disseminated massive sulfide composed of galena, sphalerite, and pyrite, and b) massive sulfide surrounding a clast of argillic-altered andesite.

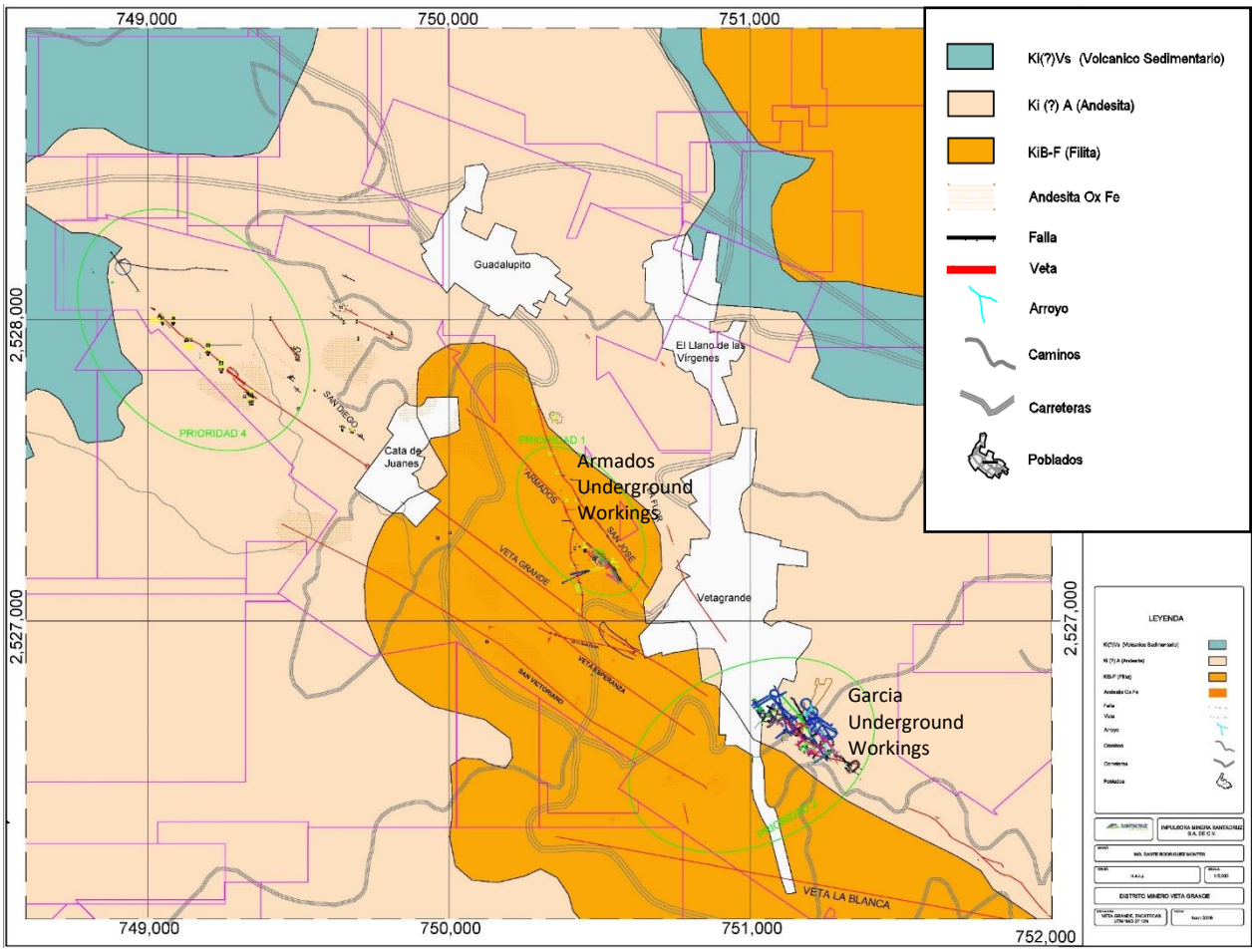


**Figure 7-7: Local Geology Map – Veta Grande Vein System**
(modified from Santacruz, 2016)

### 7.3.2 La Cantera Vein System

The La Cantera vein system is characterized by the La Cantera principal vein and subordinate veins in the footwall of the structure. The vein system is situated at the northern limits of Zacatecas city and approximately 10-12 km south of the Veta Grande vein system. It is one of the southernmost Ag-Pb-Zn-rich vein systems in the Zacatecas Mining District. The La Cantera vein is approximately <1 m to >20 m wide, with an average vein width of approximately 10 m. It strikes northwest-southeast and dips between 60-90° to the southwest. The La Cantera vein occupies a structural contact between andesitic volcanic rocks situated in the structural footwall of the vein and andesitic volcanic rocks and Red Conglomerate in the structural hanging wall of the vein. Late post-vein and post-mineral cross-faults cut the vein structure at various angles with minor displacement.

The vein is dominantly quartz in composition with colloform, crustiform and breccia vein textures. The breccia textures (Figure 7-8, a and b) consists of 1-10 cm angular fragments of weakly to moderately altered andesite volcanic rocks supported in a quartz-sulfide matrix. Mineralization at the La Cantera vein consists of fine to medium grained (0.1-1 cm), disseminated to massive pyrite, sphalerite, and galena (rare chalcopyrite) with native silver, and argentite. The La Cantera vein has a higher sulfide content compared

to the veins of the Veta Grande vein system and locally contains massive sulfide consisting of galena, sphalerite, and pyrite (Figure 7-8, b).

Alteration increases in intensity both toward the vein and toward the La Bufa rhyolitic intrusion in the northwest. The rhyolitic intrusion is weakly to moderately altered by kaolinite and imposes weak argillic alteration in the surrounding country rock. The La Cantera vein exhibits a pervasive moderate silicification with weak to moderate propylitic (chlorite-epidote±carbonate) alteration within several meters of the vein.

The La Cantera vein system exhibits the highest concentration of base metal sulfides on the project which may suggest a deeper level of emplacement at the La Cantera vein system with progressively shallower levels of emplacement to the north at the Veta Grande and Panuco vein systems.

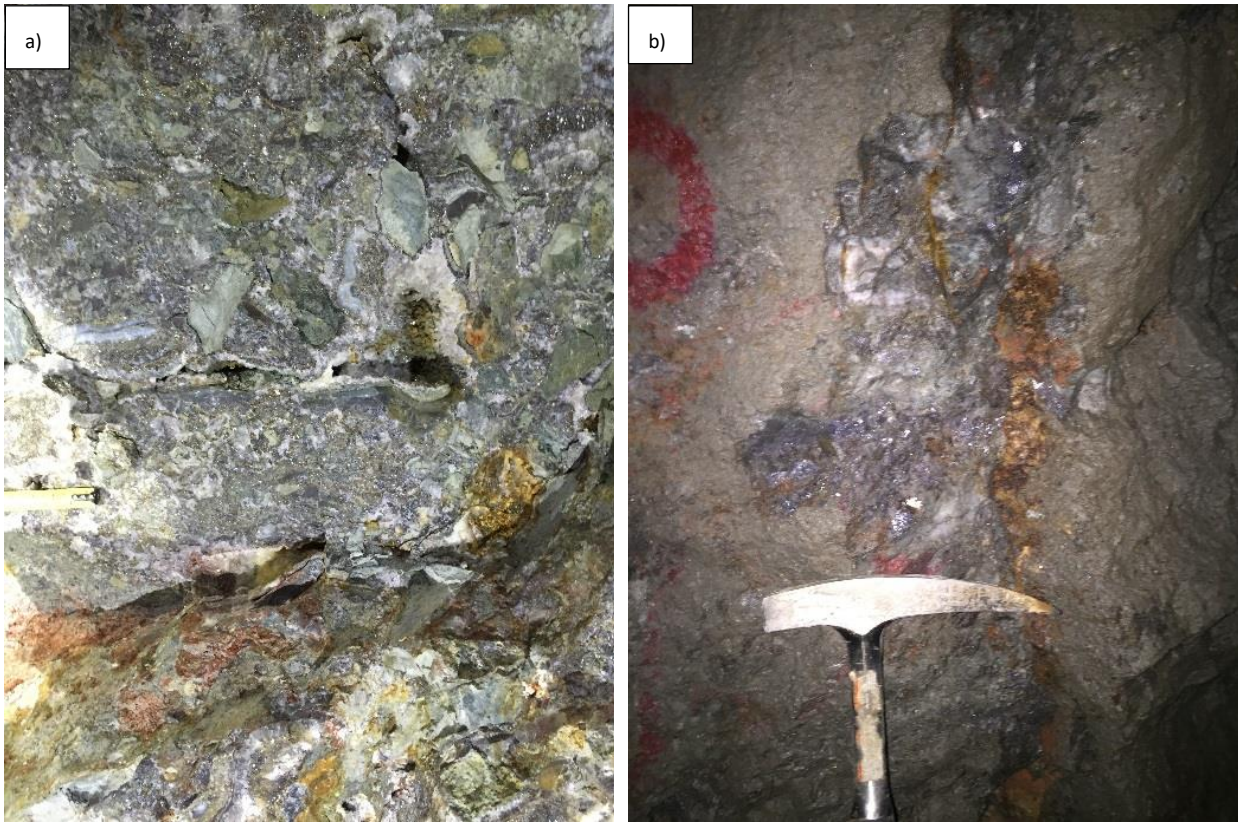


**Figure 7-8** Photos of the mineralized La Cantera vein from the Guadalupana underground.
a) vuggy quartz in andesite breccia with quartz-sulfide matrix,
b) massive sulfides (dominantly galena and sphalerite).

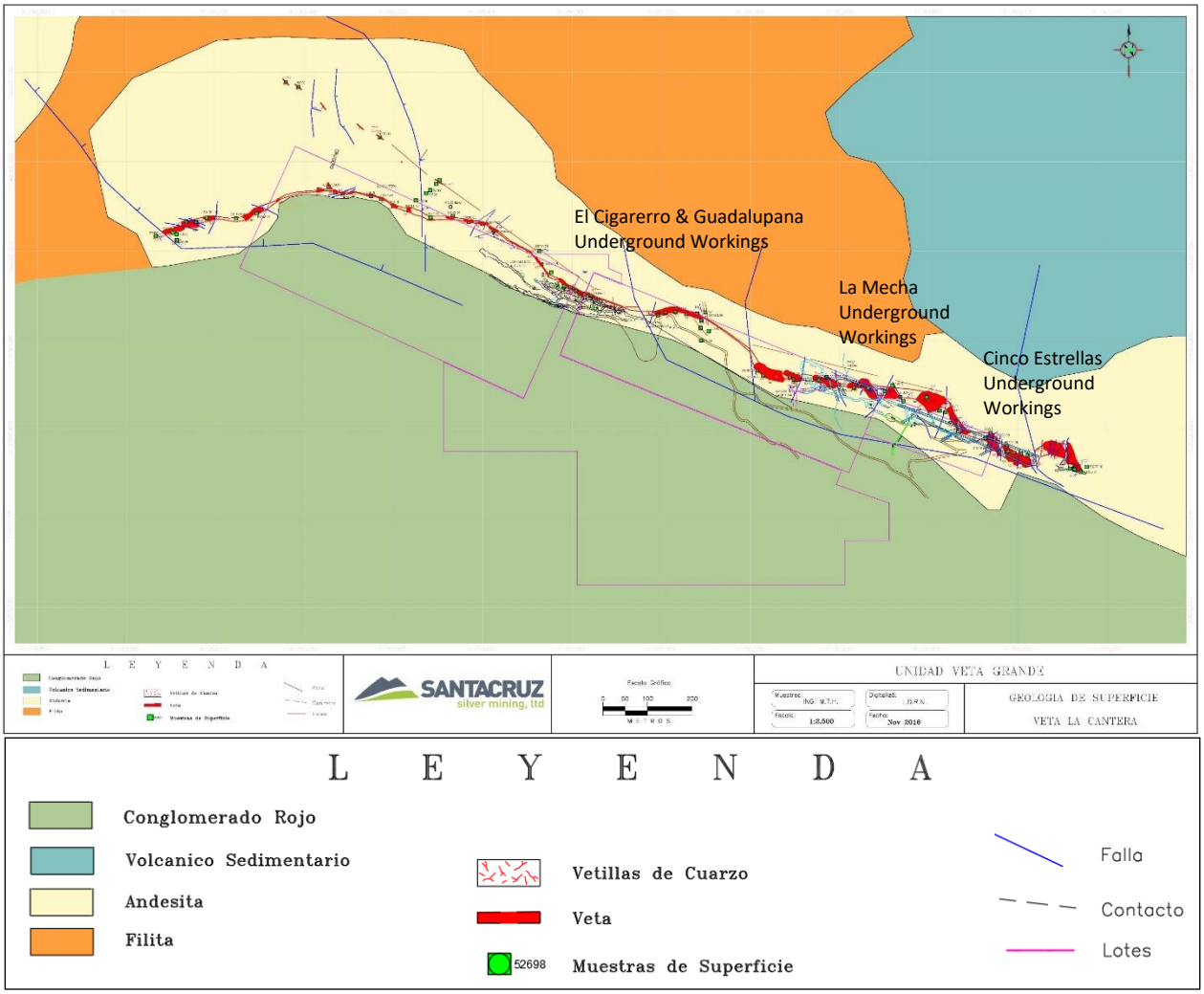


**Figure 7-9: Local Geology Map – La Cantera Vein System**
(modified from Santacruz, 2016)

### 7.3.3 Navidad Vein System

The Navidad vein system is comprised of the Navidad principal vein and subordinate veins in the footwall of the principal vein. Vein composition and alteration is similar to the La Cantera vein. The vein is approximately 10 m wide, strikes south-southeast and dips 60-90° to the southwest.

### 7.3.4 Muleros, El Cristo and San Manuel-SanGil Exploration Areas

The Muleros Target covers an area of approximately 408 Ha and is centered at coordinates 747,965 mE and 2,532,432 mN on concession title 224363 (Macario II). The center of the target area is located 3.8 km northeast of Morelos township and 6.1 km northwest of Vetagrande township. Four sub-parallel quartz-calcite veins striking 120°-130° outcrop along a two km strike length. Veins generally dip 75° to the southwest with local dips between 50°-85° to the southwest. Mineralization is primarily hosted in vein breccia averaging 1.0 m in true thickness, ranging from <1 m and up to 5 m in true thickness. Mineralization consists of argentite, pyrite, galena and sphalerite. Disseminated mineralization as quartz-pyrite zones occurring between veins have also been identified.

The El Cristo target covers an area of approximately 316 Ha and is centered at coordinates 748,266 mE and 2,529,455 mN on concession title 211822 (Morelos). The center of the target area is located between Muleros township and Vetagrande township. The El Cristo target is comprised of five to eight irregular to sub-parallel quartz-calcite veins striking 300°-310° azimuth along a 1.8 km strike length. The Papalote vein is identified as the main vein structure in the system. Veins are directly on trend with the Veta Grande vein system and they are interpreted to be the northwestern extension of Veta Grande. The vein structures are irregular and have dips ranging between 30° to 70° to the northeast and to the southwest. The structures occur as banded quartz-carbonate veins and breccia veins <0.2 m to 1.8 m wide. Mineralization is confined to the veins and consists of argentite, galena, sphalerite and minor chalcopyrite.

The San Manuel-San Gil target covers an area of approximately 828 Ha, and is centered at coordinates 748,044 mE and 2,526,254 mN on concession title 217430 (San Gil). The target hosts a series of east and northwest trending quartz-carbonate veins that dip to the north and south, with thicknesses varying from 0.1 m to 7.0 m, and lengths ranging from 400 to 1,400 m over a 2,000 m trend. Vein widths average approximately one meter. Mineralization and vein styles are similar to the El Cristo target.

### 7.3.5 Panuco Vein System

#### *7.3.5.1 Panuco Local Geology*

The Panuco deposit area consists of three packages of interbedded and intercalated rocks belonging to the Chilitos Formation. These units are subsequently cut by younger diorite to quartz-diorite dykes.

The first package consists of mafic to intermediate coherent volcanic units: including fine grained to feldspar porphyritic and pervasively chloritic andesites and basalts (Figure 7-11, photos 1 & 2). The second package consists of andesite tuffs and epiclastic units: including fine grained and foliated andesite ash tuff, brecciated lithic tuff with sandstones and shale clasts, and fine to medium grained reworked tuffs that are commonly described as volcanic shales and volcanic sandstones (Figure 7-11, photos 3 to 5). The third package consists of epiclastic and clastic units: including limestone, calcareous shales, greywacke, arenite and conglomerates (Figure 7-11, photo 6).

#### *7.3.5.2 Panuco Structure*

The Panuco deposit is defined by three prominent northwest-southeast trending and southwest dipping vein structures that have resulted from brittle fracturing. These vein structures are identified as the Panuco NW, Panuco Central and Tres Cruces. Displacement along and between these vein structures is currently unknown and presumed to be minor. Within the 1,000 m orthogonal distance between the Panuco NW vein and Tres Cruces, subordinate veins have been identified in sub-parallel orientation, particularly within the structural hanging wall of each vein. The Panuco NW vein has been traced over a strike length of 1,500 m, dipping between 54° and 78° to the southwest. Drilling has traced the vein approximately 480 m down dip from surface. The Panuco Central vein has been traced over a strike length of 2,300 m, dipping between 52° and 76° to the southwest. In the southeast area of the Panuco Central vein, drilling has traced the vein approximately 755 m down dip from surface. In the northwest area of the Panuco Central vein, drilling has traced the vein approximately 410 m down dip from surface. The Tres Cruces vein has been traced over a strike length of 870 m, dipping between 67° and 86° to the southwest. Drilling has traced the vein down dip to approximately 388 m below surface.

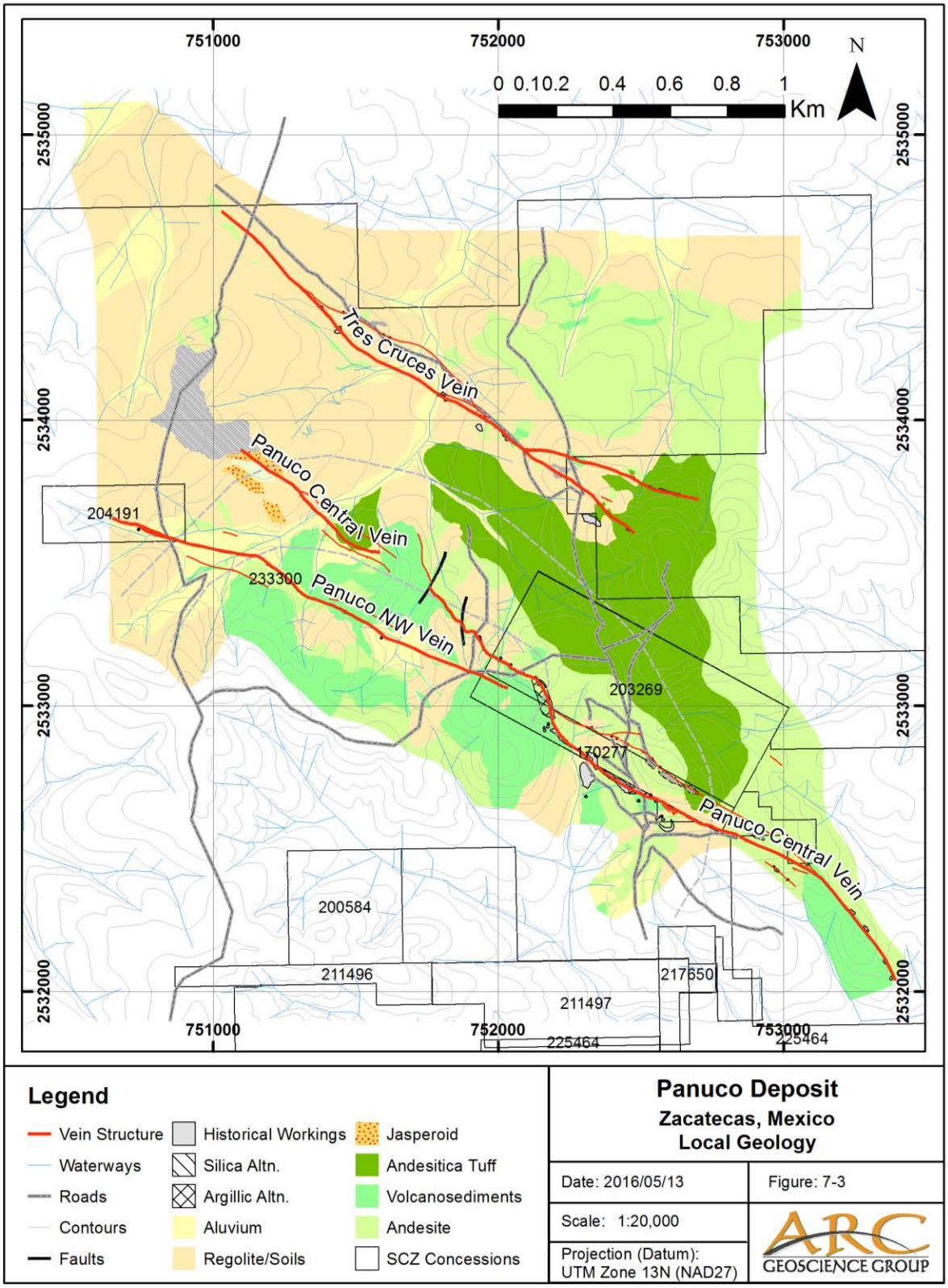


**Figure 7-10: Local Geology – Panuco Deposit**
(modified from Santacruz, 2016)


Photo 1. Andesite volcanic: fine grained, altered by quartz+pyrite. Cut by quartz-carbonate veinlets.


Photo 2. Andesite volcanic: porphyritic texture, 20% subhedral plagioclase crystals of <1-2 mm. Groundmass is chloritic and aphanitic.


Photo 3. Andesite Tuff: finely bedded (1 mm – 2 mm), fine-grained volcanic ash tuff, exhibits concoidal fracturing, and contains <1 mm quartz veinlets throughout.


Photo 4. Volcanic sediment (shale): black and fissile with 1-4 mm sized carbonate nodules.


Photo 5. Volcanic sediment (arenite): gritty and granular, medium-grained, 10% - 40% feldspathoids. Intercalated with 10 cm - 20 cm calcareous shale and limey horizons.


Photo 6. Clastic sediment (limestone): massive, cut by quartz veinlets of comb and cockade texture.

**Figure 7-11: Rock Types – Panuco Deposit**

#### *7.3.5.3 Panuco Mineralization*

Silver, gold, and base metal mineralization at the Panuco deposit is hosted in breccia veins, banded, crustiform and colloform quartz veins, and quartz vein stockwork within zones of strong argillic alteration. Mineralization is notably better formed within coherent andesite volcanic rocks and volcanosedimentary units.

The veins are composite in nature, with multiple pulses of quartz-sulfide precipitation and a late infill of quartz and/or carbonate (generally calcite). On surface and in drill core, the veins exhibit pinch and swell geometry, ranging from less than 10 cm to over 6 m. Vugs and bladed calcite indicate above boiling temperatures during emplacement. Visual identification of mineralized outcrops and drill core suggest that the dominant minerals of interest include galena, sphalerite, chalcopyrite, and argentite. Gangue minerals include pyrite, arsenopyrite, hematite, goethite, quartz, illite, calcite, and clay minerals.

#### *7.3.5.4 Panuco Vein and Mineral Paragenesis*

Petrographic and fluid inclusion study conducted by Microtermometria y Asesoria Geologica-Minera S.A. de C.V. (Microtermometria) conducted in October of 2011 suggest four stages of vein paragenesis at the Panuco deposit. From oldest to youngest, these are:

Stage 1: Mineralization of fine grained pyrite and arsenopyrite within wall rock surrounding the vein.

Stage 2: Emplacement of prismatic quartz, crystalline and jigsaw quartz, and banded sulfides with calcite and coarse jigsaw quartz. Sulfides include galena, pyrite, arsenopyrite, and minor sphalerite, chalcopyrite, and/or pyrrhotite (non-magnetic). Jigsaw quartz and banded calcite indicate fluid temperatures of <240°C.

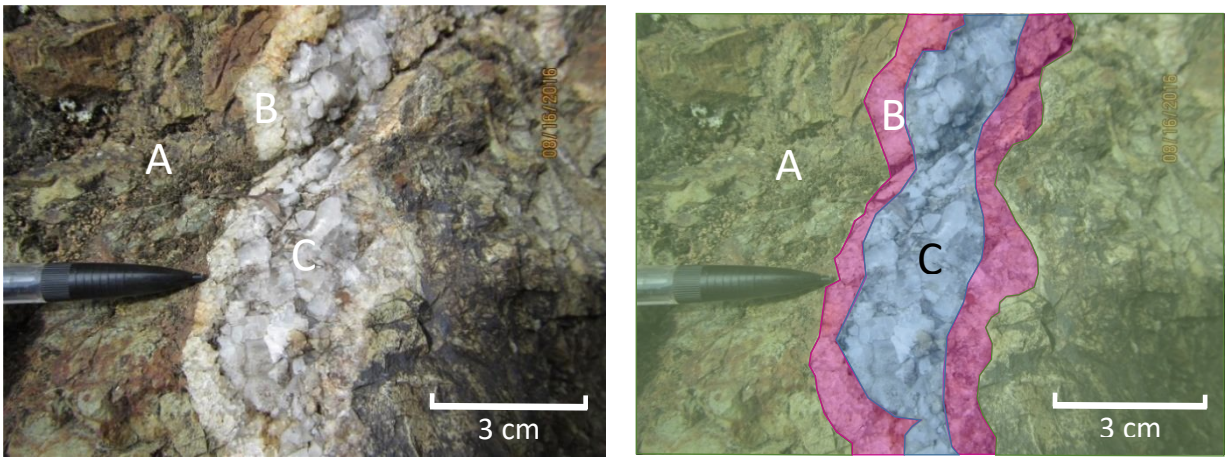


Photo 7. Example of: (A) Early stage brecciation of propylitic altered wall rock and quartz-sulfide replacement. (B) Crustiform quartz veinlet. (C) Late stage calcite infilling of vein.

**Figure 7-12: Vein Texture and Alteration – Panuco Deposit**

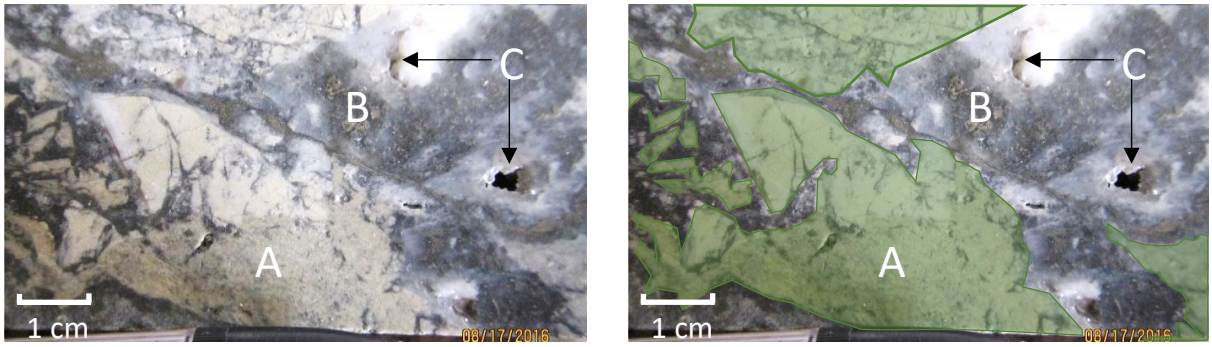


Photo 8. PA09-07. 204.3-204.73 m. Example of: (A) Vein containing breccia fragments of quartz+clay (illite) altered andesite volcanic rocks. (B) Vein filled by translucent quartz, minor milky white quartz, and sulfides. (C) Vugs indicate boiling and the relative level within the hydrothermal system.

**Figure 7-13: Vein Texture in Drill Core – Panuco Deposit**

Stage 3: Emplacement of coarse quartz veinlets. Fluid inclusion data indicate fluid temperatures of <240°C.

Stage 4: Emplacement of vug filling calcite. Calcite is non-platy, coarse and hosts fine primary growth zones with inclusions indicating fluid temperatures of <200°C.

Microtermometria suggests that the level of first boiling in the Panuco deposit is likely located at about 2100 m elevation. The presence of adularia identified at 2300 m elevation and at surface suggests that the top of the hydrothermal system is still present at the Panuco deposit.

#### *7.3.5.5 Panuco Alteration*

Quartz, illite and chlorite are the dominant alteration minerals present in the wall rock of the Panuco deposit and represent a pervasive propyllitic alteration halo that surrounds the vein system. On surface, hematite+goethite±limonite are observed within the top five to 30 m of the veins, as seen within historical workings.

Quartz+clay alteration is generally immediate to and within the hanging wall of the Panuco veins. The intensity of these argillic zones depends on lithology and permeability of the host rock. Strong argillic alteration can extend between one and 10 m on either side of the vein contact. Clay minerals are believed to be kaolinite, montmorillonite, and illite based on field observations and petrography work by Microtermometria.

Petrography work by Microtermometria on core samples also identified adularia near surface at the central portion of the Panuco Central vein.

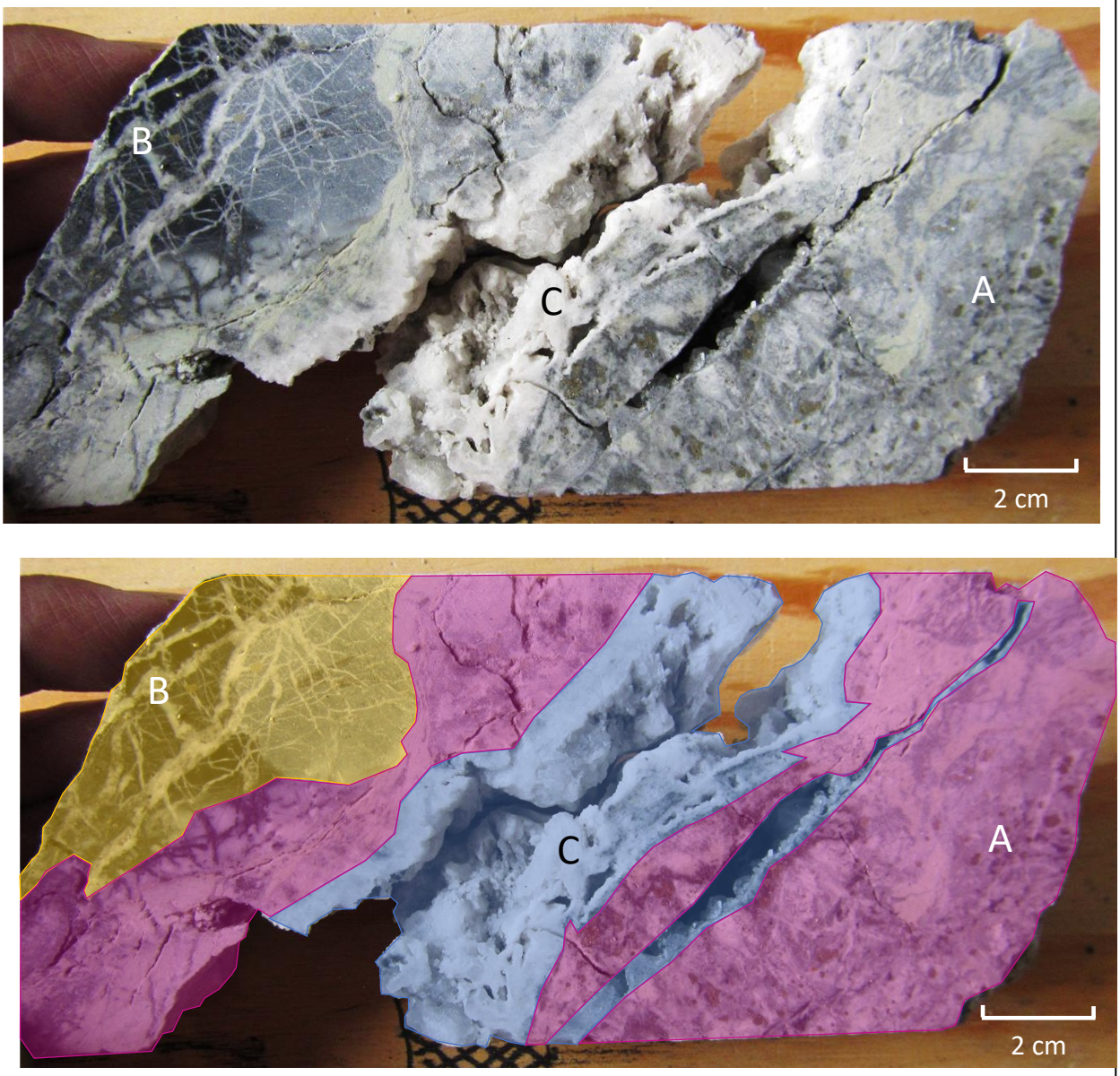


Photo 9. PA11-60. 298.73-299.68 m. Example of: (A) Early stage quartz+calcite+sulfide replacement within vein breccia. (B) Intermediate stage quartz stockwork cross-cutting earlier alteration and sulfide mineralization. (C) Late stage vuggy quartz+calcite+sulfide veinlet cross-cutting earlier stockwork and replacement mineralization.

**Figure 7-14: Mineral Paragenisis in Drill Core – Panuco Deposit**

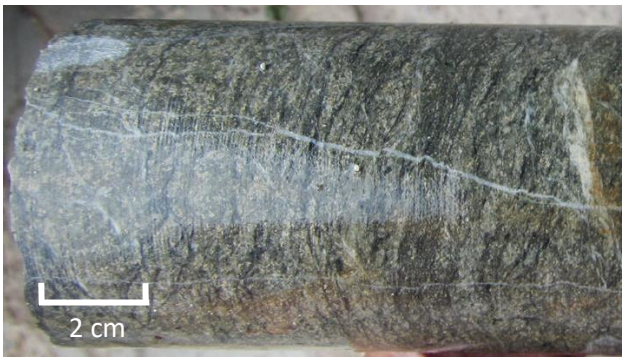


Photo 10. Drill hole PA10-20. At 112 m. Propylitic alteration in andesite tuff. Weak foliation bands of fine chlorite can be seen throughout the groundmass. Other alteration minerals include late carbonate and minor epidote.


Photo 11. Quartz+clay (illite and montmorillonite) alteration associated with disseminated pyrite in andesite volcanic host rock, cut by 0.2-1 cm wide quartz veinlets.

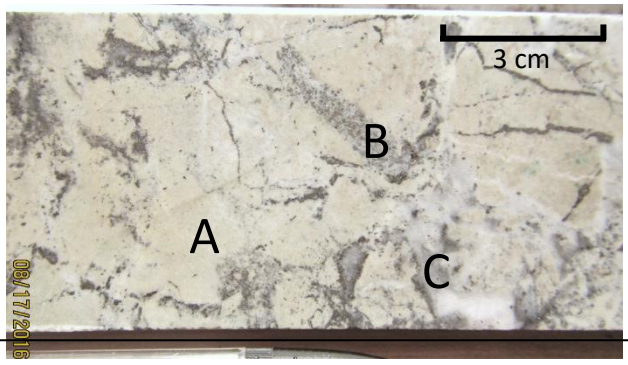


Photo 12. Drill hole PA10-20: Golden Minerals sample PA1020-115. 165.29-165.68 m. (A) Buff to cream domains are quartz+illite alteration of host rock. (B) Host rock fractures are filled by quartz-sulfide. (C) Late quartz-carbonate veinlets cut both host rock and quartz-sulfide domains.

**Figure 7-15: Alteration Types – Panuco Deposit**

### *7.3.5.6 Panuco Geologic Vein Model*

In 2016, a 3D geologic vein model of the Panuco veins were constructed by Santacruz using Datamine Studio EM software and manual modelling techniques based on the digitizing of core logs and drill hole data. In 2019, the Panuco veins were remodeled by Rockridge using Leapfrog Geo 3D. The application of implicit modelling techniques, changes to the sample selections and compositing, and use of all available trench intersections resulted in a better representation of the likely geometries of the Panuco veins. An example of the comparison between the 2016 and 2019 geological vein model for the Panuco Central vein is provided in Figure 7-16.

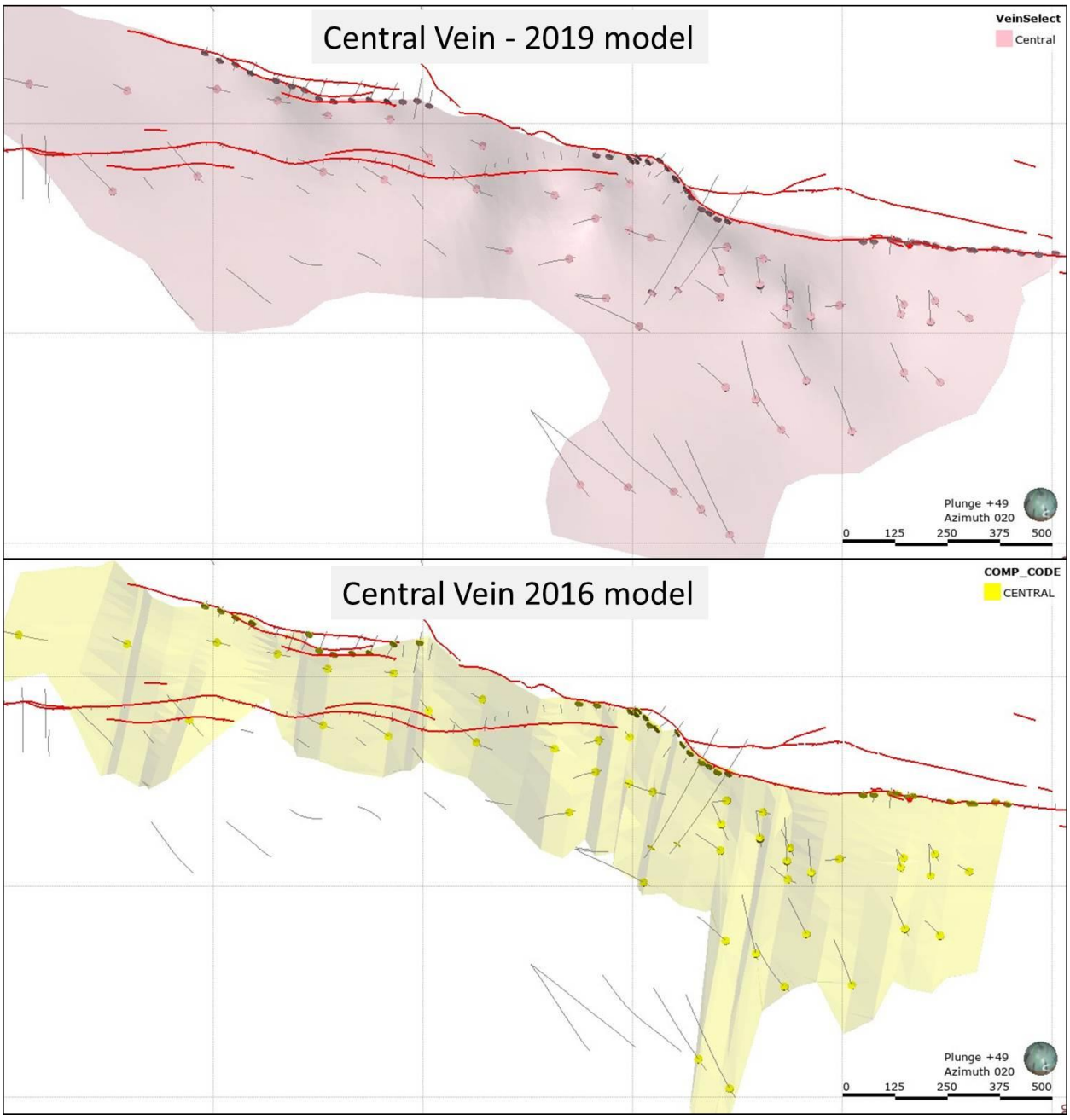


**Figure 7-16: Comparison of the 2016 and 2019 geological vein models for the Panuco Central vein**
*(Rockridge, 2019)*

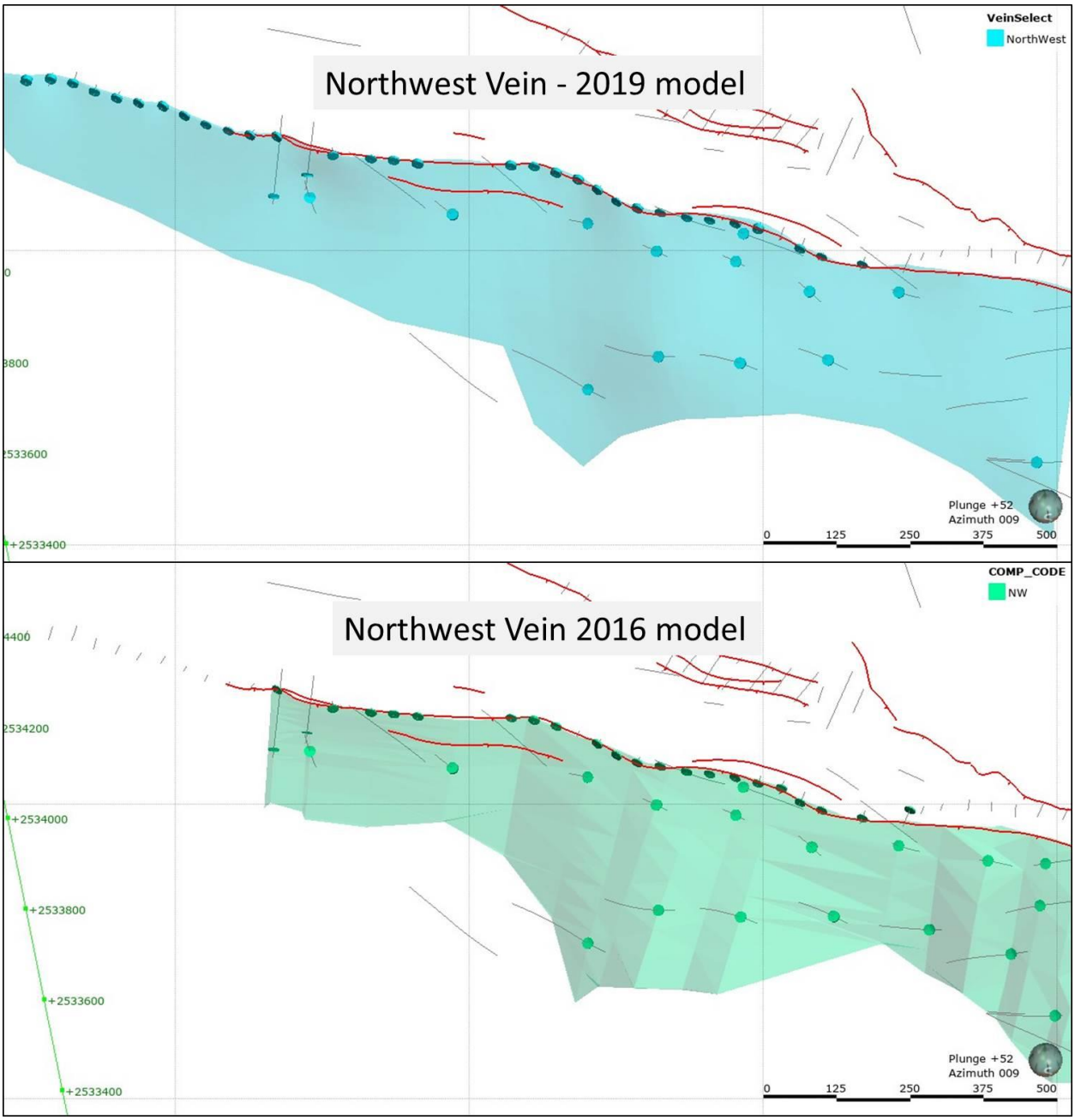


**Figure 7-17: Comparison of the 2016 and 2019 geological vein models for the Panuco NW vein**
*(Rockridge, 2019)*

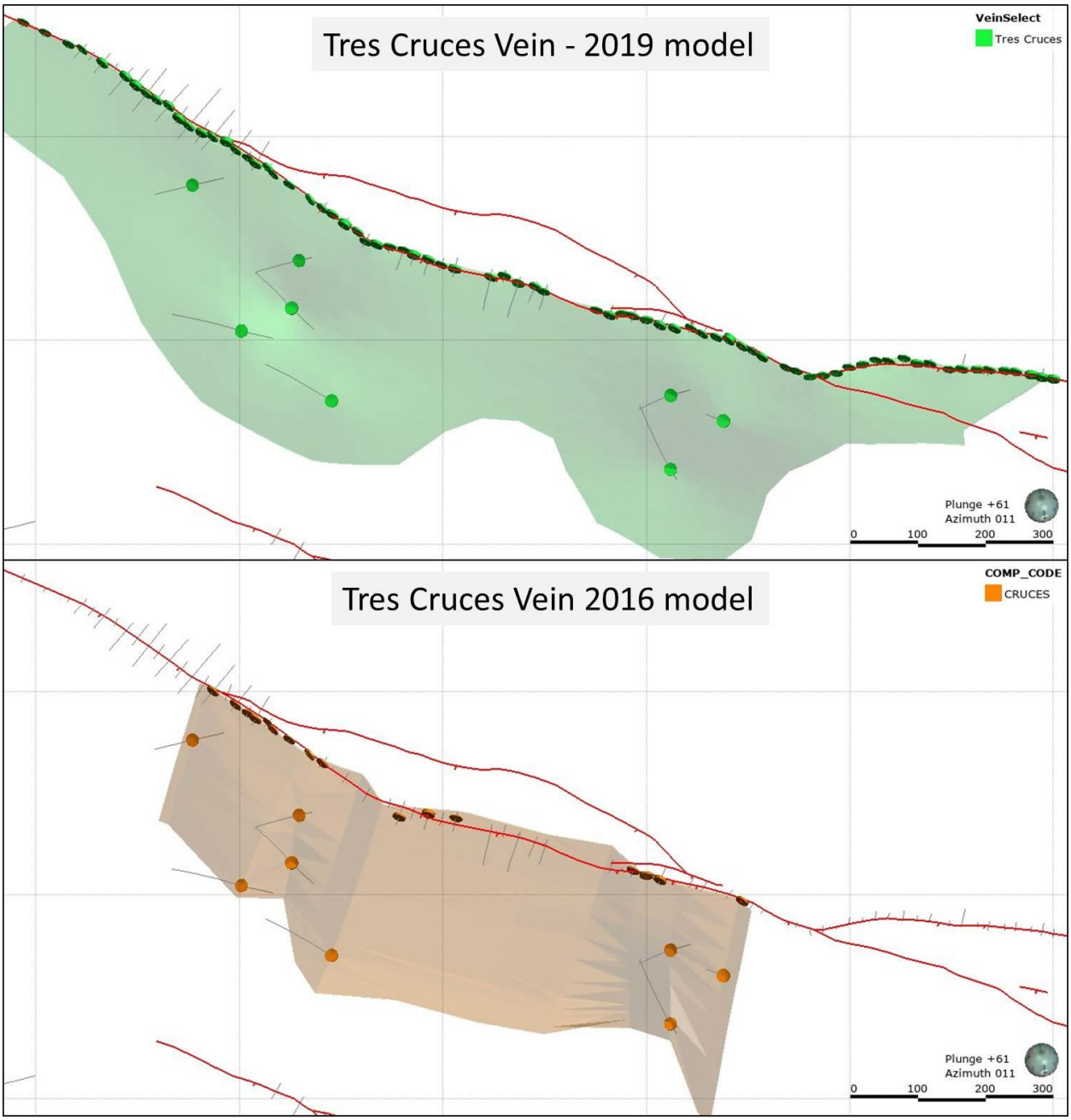


**Figure 7-18: Comparison of the 2016 and 2019 geological vein models for the Tres Cruses vein**
*(Rockridge, 2019)*

### 7.3.6 Minillas Vein System

According to Turner (1999), the Minillas property is located within an exposed erosional window of weakly metamorphosed submarine volcanic rocks of the Jurassic to Cretaceous age Chilitos formation. The erosional window is surrounded by post-mineral Tertiary rhyolites and the stratigraphy is intruded by fine grained felsic stocks.

The Loreto Vein is the principal vein in the system and is oriented at 270°-300° dipping 60°. It occupies the Auras fault that is interpreted to be a left lateral fault that has a strike length of 1.5 kilometers. On surface,

the vein is dominantly calcite and is associated with up to one meter of soft clay fault gouge. In drill core, the vein is seen to increase in quartz-chalcedony content at depth.

Silver mineralization occur as argentite and pyrargyrite (ruby silver) and the vein has been historically reported to contain low base-metal sulfides. Western Copper's DDH SJ-l intersected 0.9 meters of chalcedonic quartz-sulfide vein at a depth of 168 meters, which assayed 1,600 g/t silver, 2 percent lead and 4.5 percent zinc (Turner, 1999).

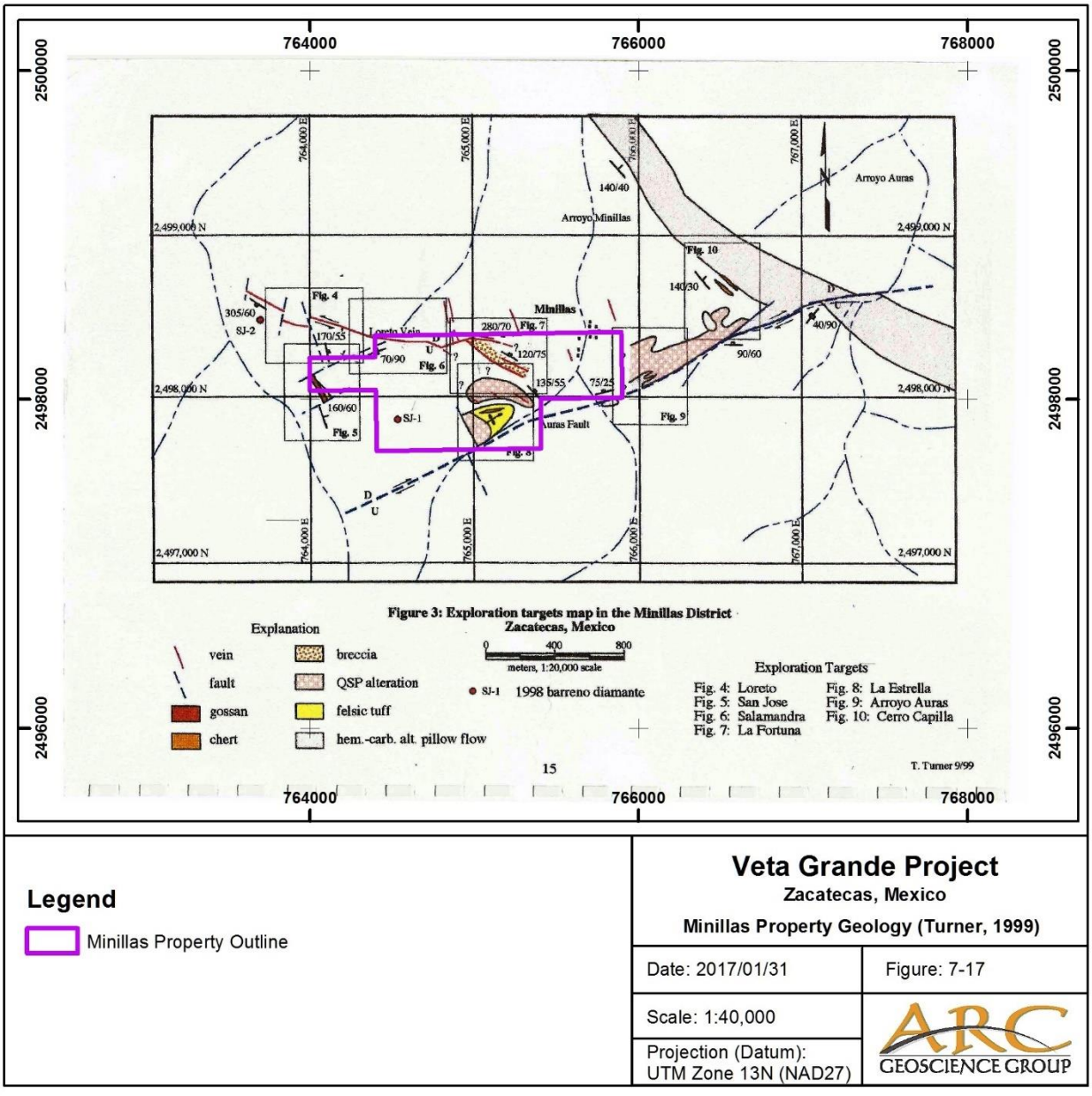


**Figure 7-19: Local Geology Map – Minillas Property**
(modified from Turner, 1999)

# 8 DEPOSIT TYPES

The majority of deposits within the Zacatecas Mining District are classified as low-sulfidation epithermal vein deposits. These deposits form in the upper level of the crust (within approximately one km of surface) and are generally associated with volcanism and intrusion of calc-alkaline magmas within island arc or continental margin magmatic arcs with regional scale faults (extensional) systems. These deposit types are generally Tertiary in age although significant older deposits have been found globally.

Epithermal deposits generally form as veins, stockwork or breccias within large scale structural zones that can extend up to several hundred meters along strike and range from several meters to <1 m wide in thickness. The higher grade ore shoots generally occur in local dilatational zones in faults and flexures, splays and jogs. Open space filling, symmetrical and banded layering are common textures within the veins with abundant colloform and crustiform textures along with multiple brecciation events.

Principal ore minerals in these veins are sphalerite, galena, chalcopyrite, pyrite, argentite, pyragonite, proustite, electrum, native silver, and native gold, while common gangue minerals include quartz, chalcedony, adularia, calcite, rhodochrosite and amethyst.

Alteration commonly consists of multiple generations of moderate to strong, pervasive quartz alteration (silicification) commonly accompanied by adularia and calcite. The pervasive quartz alteration is often flanked by advanced argillic alteration assemblages (kaolinite-alunite) near surface, intermediate argillic alteration assemblages (kaolinite-illite-smectite-sericite) at intermediate depths, and propylitic alteration assemblages at depth and peripherally.

These deposits are often vertically zoned with higher concentrations of gold and/or silver, along with mercury, tellurium, and antimony in the upper portions of these systems and higher concentrations of lead, zinc, and copper at the deeper levels (Figure 8-1).

Gold and silver grades in low-sulfidation epithermal systems can be very high, occasionally reaching gold grades on the order of tens of grams of gold per tonne and kilograms of silver per tonne. Low-sulfidation epithermal deposits typically average around 770,000 tonnes and average 7.5 g/t Au, 110 g/t Ag with minor Cu, Zn and Pb (Panteleyev, 1996).

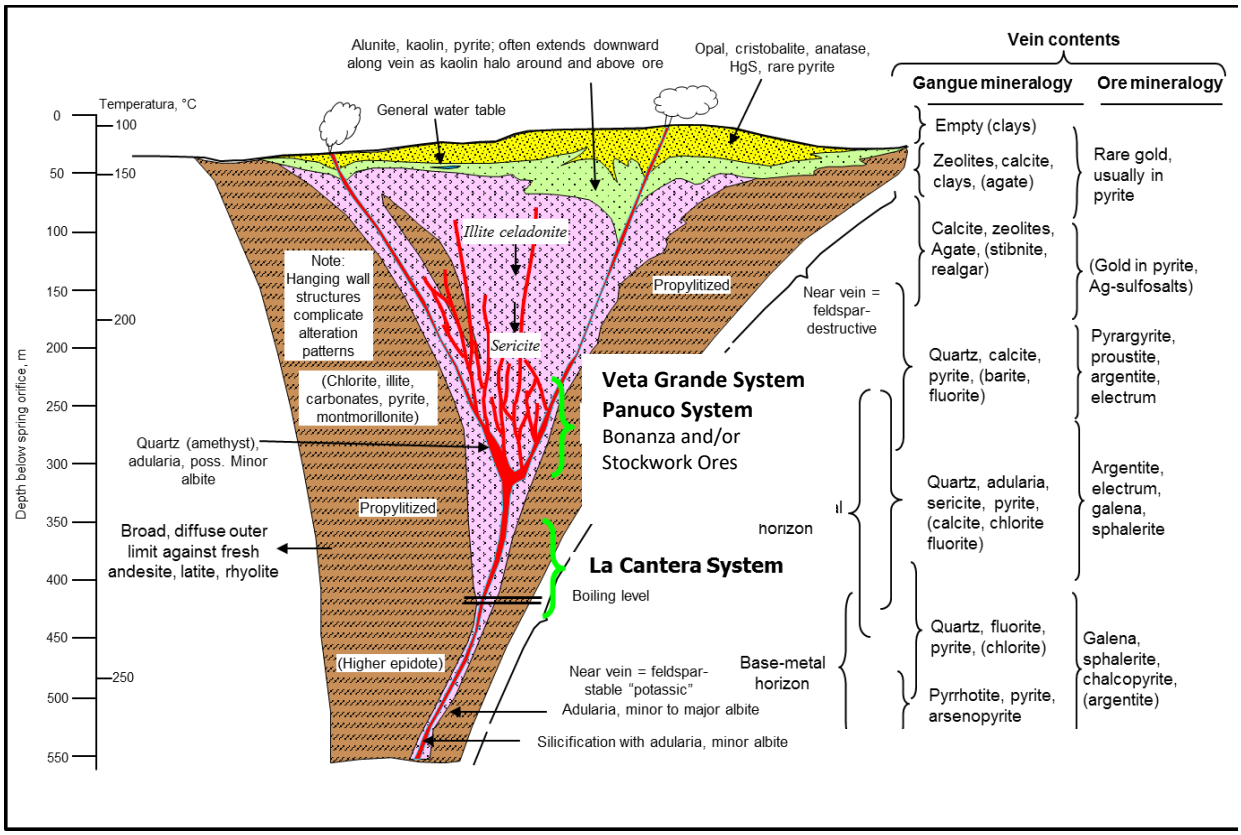


**Figure 8-1:** D**eposit Model – Low-Sulfidation Epithermal Vein Systems**
(Modified after Buchanan, 1981).

# 9 EXPLORATION

## 9.1 Surface Sampling

Between November 2015 and October 2016, Santacruz conducted preliminary surface sampling programs at various known veins exposures within the Veta Grande project area, including the Veta Grande, La Canterra and Panuco vein systems. Verifying the presence and grade of silver, gold and base metal mineralization was the purpose of the sampling programs.

Surface rock samples collected include chip samples from across a mineralized vein width as well as grab samples from mineralized outcrops. Additionally, Santacruz has exposed several new exploration targets (i.e. Cinco de Mayo vein) by digging shallow trenches and sampling vein material within the trenches. A total of 725 sample records are found within Santacruz's surface sampling database. Of this total, 472 rock samples and three soil samples are located within Satacruz's project area and are discussed herein. The balance of 250 sample records within the Santacruz surface sampling database related to the surface sampling of tailings material at the Vetagrande mineral processing facility, waste rock piles within Santacruz's concession boundaries and of vein exposures located outside of Santacruz' current concession boundaries. As such, these 250 sample records are noted by ARC and are not discussed under exploration.

Table 9-1 to Table 9-12 presents the summary statistics of assay results from the surface rock sampling. Figure 9-1 to 9-5 are range plot maps showing the distribution of assay results for gold, silver, lead, zinc, and copper.

Assay results indicate that silver is present in each vein system with elevated silver concentrations in the range of 100-250 g/t Ag. The upper range of silver concentration in the sample population is 250 - 495.20 g/t Ag and appears to occur more frequently in samples collected at the Veta Grande vein system. The highest silver concentrations were also identified at the Veta Grande vein system (from the Armados vein and the Veta Grande vein in the Cata de Juanes target area). Gold is present in low concentrations (0.05 - 0.20 g/t Au) along the strike length of each vein system. The upper range of gold concentrations in the sample population is 0.30 - 0.74 g/t Au and appears to occur more frequently in samples collected at the Veta Grande and Panuco vein systems, with the highest concertation identified at the Panuco vein system. Concentrations of zinc and copper are generally low. Within the population of samples, lead appears elevated (1.00 - 5.00% Pb) in the La Canterra vein system.

**Table 9-1: Surface Rock Sample Result Summary Statistics – Veta Grande vein**

| VETA GRANDE | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 53 | 53 | 53 | 53 | 53 | 31 |
| Max | 2.30 | 0.40 | 397.65 | 2.11 | 1.40 | 0.05 |
| Min | 0.20 | 0.01 | 0.00 | 0.01 | 0.04 | 0.01 |
| Range | 2.10 | 0.39 | 397.65 | 2.10 | 1.36 | 0.05 |
| Mean | 0.86 | 0.12 | 81.00 | 0.27 | 0.21 | 0.01 |
| Median | 0.80 | 0.10 | 35.33 | 0.12 | 0.16 | 0.01 |
| Std Dev | 0.45 | 0.11 | 103.75 | 0.42 | 0.20 | 0.01 |

**Table 9-2: Surface Rock Sample Result Summary Statistics – Armados vein**

| ARMADOS | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 5 | 5 | 5 | 5 | 5 | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Max | 0.90 | 0.43 | 463.19 | 0.20 | 0.38 | 0.01 |
| Min | 0.45 | 0.16 | 89.88 | 0.05 | 0.18 | 0.01 |
| Range | 0.45 | 0.28 | 373.30 | 0.15 | 0.20 | |
| Mean | 0.57 | 0.29 | 276.86 | 0.13 | 0.29 | |
| Median | 0.50 | 0.25 | 208.80 | 0.12 | 0.30 | |
| Std Dev | 0.19 | 0.12 | 168.32 | 0.06 | 0.07 | |

**Table 9-3: Surface Rock Sample Result Summary Statistics – Cata de Juanes vein**

| CATA DE JUANES | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 34 | 34 | 34 | 34 | 34 | 34 |
| Max | 1.80 | 0.63 | 495.20 | 12.55 | 1.56 | 0.11 |
| Min | 0.20 | 0.01 | 0.01 | 0.01 | 0.02 | 0.00 |
| Range | 1.60 | 0.63 | 495.20 | 12.54 | 1.55 | 0.11 |
| Mean | 0.75 | 0.17 | 81.61 | 0.88 | 0.24 | 0.03 |
| Median | 0.70 | 0.14 | 32.47 | 0.14 | 0.13 | 0.02 |
| Std Dev | 0.39 | 0.15 | 121.61 | 2.70 | 0.34 | 0.03 |

**Table 9-4: Surface Rock Sample Result Summary Statistics – Cinco de Mayo vein**

| CINCO DE MAYO | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 29 | 29 | 29 | 29 | 29 | 29 |
| Max | 2.00 | 0.13 | 32.67 | 0.36 | 0.35 | 0.02 |
| Min | 0.20 | 0.01 | 0.01 | 0.01 | 0.03 | 0.00 |
| Range | 1.80 | 0.12 | 32.67 | 0.35 | 0.33 | 0.01 |
| Mean | 0.98 | 0.07 | 13.40 | 0.12 | 0.13 | 0.01 |
| Median | 1.00 | 0.07 | 13.66 | 0.10 | 0.12 | 0.01 |
| Std Dev | 0.45 | 0.04 | 8.46 | 0.09 | 0.09 | 0.00 |

**Table 9-5: Surface Rock Sample Result Summary Statistics – Bonanzita vein**

| BONANZITA | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 4 | 4 | 4 | 4 | 4 | 4 |
| Max | 0.80 | 0.22 | 82.17 | 0.20 | 0.13 | 0.03 |
| Min | 0.40 | 0.05 | 16.32 | 0.12 | 0.06 | 0.03 |
| Range | 0.40 | 0.17 | 65.85 | 0.09 | 0.07 | 0.01 |
| Mean | 0.58 | 0.14 | 43.43 | 0.16 | 0.09 | 0.03 |
| Median | 0.55 | 0.14 | 37.62 | 0.16 | 0.09 | 0.03 |
| Std Dev | 0.17 | 0.07 | 30.97 | 0.04 | 0.03 | 0.00 |

**Table 9-6: Surface Rock Sample Result Summary Statistics – San Tiburcio vein**

| SAN TIBURCIO | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 3 | 3 | 3 | 3 | 3 | |
| Max | 0.85 | 0.13 | 41.28 | 0.30 | 0.20 | |
| Min | 0.50 | 0.06 | 2.77 | 0.05 | 0.06 | |
| Range | 0.35 | 0.07 | 38.51 | 0.26 | 0.14 | |
| Mean | 0.65 | 0.10 | 22.92 | 0.15 | 0.13 | |
| Median | 0.60 | 0.11 | 24.70 | 0.09 | 0.13 | |
| Std Dev | 0.18 | 0.04 | 19.32 | 0.14 | 0.07 | |

**Table 9-7: Surface Rock Sample Result Summary Statistics – San Odon vein**

| SAN ODON | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| Count | 7 | 7 | 7 | 7 | 7 | 7 |
| Max | 1.35 | 0.11 | 41.38 | 0.29 | 0.16 | 0.01 |
| Min | 0.40 | 0.06 | 16.83 | 0.02 | 0.06 | 0.01 |
| Range | 0.95 | 0.05 | 24.55 | 0.27 | 0.09 | 0.01 |
| Mean | 0.87 | 0.08 | 23.38 | 0.08 | 0.12 | 0.01 |
| Median | 1.00 | 0.08 | 22.60 | 0.04 | 0.13 | 0.01 |
| Std Dev | 0.35 | 0.02 | 8.41 | 0.10 | 0.04 | |

**Table 9-8: Surface Rock Sample Result Summary Statistics – La Cantera vein**

| LA CANTERA | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 280 | 280 | 280 | 280 | 280 | |
| Max | 1.60 | 0.74 | 141.99 | 4.41 | 2.14 | |
| Min | 0.20 | 0.00 | 0.00 | 0.01 | 0.01 | |
| Range | 1.40 | 0.74 | 141.99 | 4.40 | 2.13 | |
| Mean | 0.75 | 0.06 | 14.49 | 0.38 | 0.18 | |
| Median | 0.70 | 0.05 | 7.78 | 0.24 | 0.12 | |
| Mode | 0.80 | 0.01 | 0.01 | 0.32 | 0.11 | |
| Std Dev | 0.24 | 0.07 | 21.66 | 0.52 | 0.19 | |

**Table 9-9: Surface Rock Sample Result Summary Statistics – Collado vein**

| COLLADO | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 4 | 4 | 4 | 4 | 4 | |
| Max | 0.80 | 0.14 | 75.75 | 2.00 | 1.65 | |
| Min | 0.40 | 0.00 | 0.00 | 1.04 | 0.30 | |
| Range | 0.40 | 0.14 | 75.75 | 0.96 | 1.35 | |
| Mean | 0.63 | 0.07 | 28.53 | 1.45 | 0.75 | |
| Median | 0.65 | 0.08 | 19.19 | 1.38 | 0.53 | |
| Mode | | | | | | |
| Std Dev | 0.17 | 0.06 | 32.86 | 0.41 | 0.62 | |

**Table 9-10: Surface Rock Sample Result Summary Statistics – El Cristo target**

| EL CRISTO | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 7 | 7 | 7 | 7 | 7 | 7 |
| Max | 1.20 | 0.30 | 232.70 | 3.05 | 0.54 | 0.11 |
| Min | 0.85 | 0.01 | 0.01 | 0.01 | 0.07 | 0.02 |
| Range | 0.35 | 0.30 | 232.69 | 3.04 | 0.47 | 0.09 |
| Mean | 0.99 | 0.15 | 93.45 | 0.69 | 0.25 | 0.04 |
| Median | 1.00 | 0.15 | 78.52 | 0.35 | 0.22 | 0.03 |
| Std Dev | 0.11 | 0.10 | 78.88 | 1.05 | 0.17 | 0.03 |

**Table 9-11: Surface Rock Sample Result Summary Statistics – Panuco veins**

| PANUCO | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| Count | 41 | 41 | 41 | 41 | 41 | 41 |
| Max | 1.90 | 0.74 | 305.46 | 1.01 | 1.54 | 0.07 |
| Min | 0.25 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Range | 1.65 | 0.74 | 305.46 | 1.00 | 1.53 | 0.06 |
| Mean | 1.05 | 0.14 | 64.28 | 0.13 | 0.16 | 0.02 |
| Median | 1.00 | 0.09 | 18.43 | 0.07 | 0.07 | 0.02 |
| Std Dev | 0.90 | 0.09 | 0.01 | 0.02 | 0.01 | 0.01 |

**Table 9-12: Surface Rock Sample Result Summary Statistics – Other veins**

| OTHER | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) | SampleID |
|---|---|---|---|---|---|---|---|
| MINILLAS | 0.80 | 0.17 | 110.84 | 0.25 | 0.45 | 0.02 | 80405 |
| MULEROS | 1.00 | 0.38 | 459.28 | 0.17 | 0.08 | 0.03 | 80406 |
| SAN BORJA | 1.80 | 0.07 | 16.60 | 0.03 | 0.18 | 0.01 | 53405 |
| SAN MANUEL-SAN GIL | 1.00 | 0.12 | 55.16 | 1.28 | 0.28 | 0.06 | 80404 |
| SAN ODON | 1.20 | 0.04 | 5.25 | 0.34 | 0.30 | 0.01 | 52521 |

Three soil samples were collected in argillic alteration zones situated in forested areas along trend of the La Cantera vein structure. Samples were collected from top soil. One of the three soil samples returned anomalous concentrations of silver and gold, as presented in Table 9-13.

**Table 9-13: Surface Soil Sample Result Summary Statistics – La Cantera vein**

| Vein | Type | Au (ppm) | Ag (ppm) | Pb (pct) | Zn (%) | SampleID |
|---|---|---|---|---|---|---|
| LA CANTERA | Soil | 0.005 | 0.005 | 0.086 | 0.030 | 53033 |
| LA CANTERA | Soil | 0.005 | 0.005 | 0.104 | 0.064 | 53051 |
| LA CANTERA | Soil | 0.043 | 7.913 | 0.048 | 0.088 | 53063 |

## 9.2 Surface Sampling – Panuco Deposit

Between July 25 and August 5, 2016 Santacruz conducted a surface chip sampling program across the vein structures of Panuco NW, Panuco Central and Tres Cruces. A total of 41 rock chip samples were collected within the project area. These samples are part of the overall 472 surface rock samples collected by Santacruz and are reported in Table 9-11.

Chip samples were collected across the width of the vein structure and included altered and mineralized wall rock material on each shoulder of the vein structure when mineralization was identified. Sample lengths ranged between 0.25 m and 1.9 m, with an average length of approximately 1.0 m. Silver concentrations range between <0.01 g/t Ag and 305.46 g/t Ag.

Santacruz has not undertaken any other exploration activities in the Panuco deposit area.

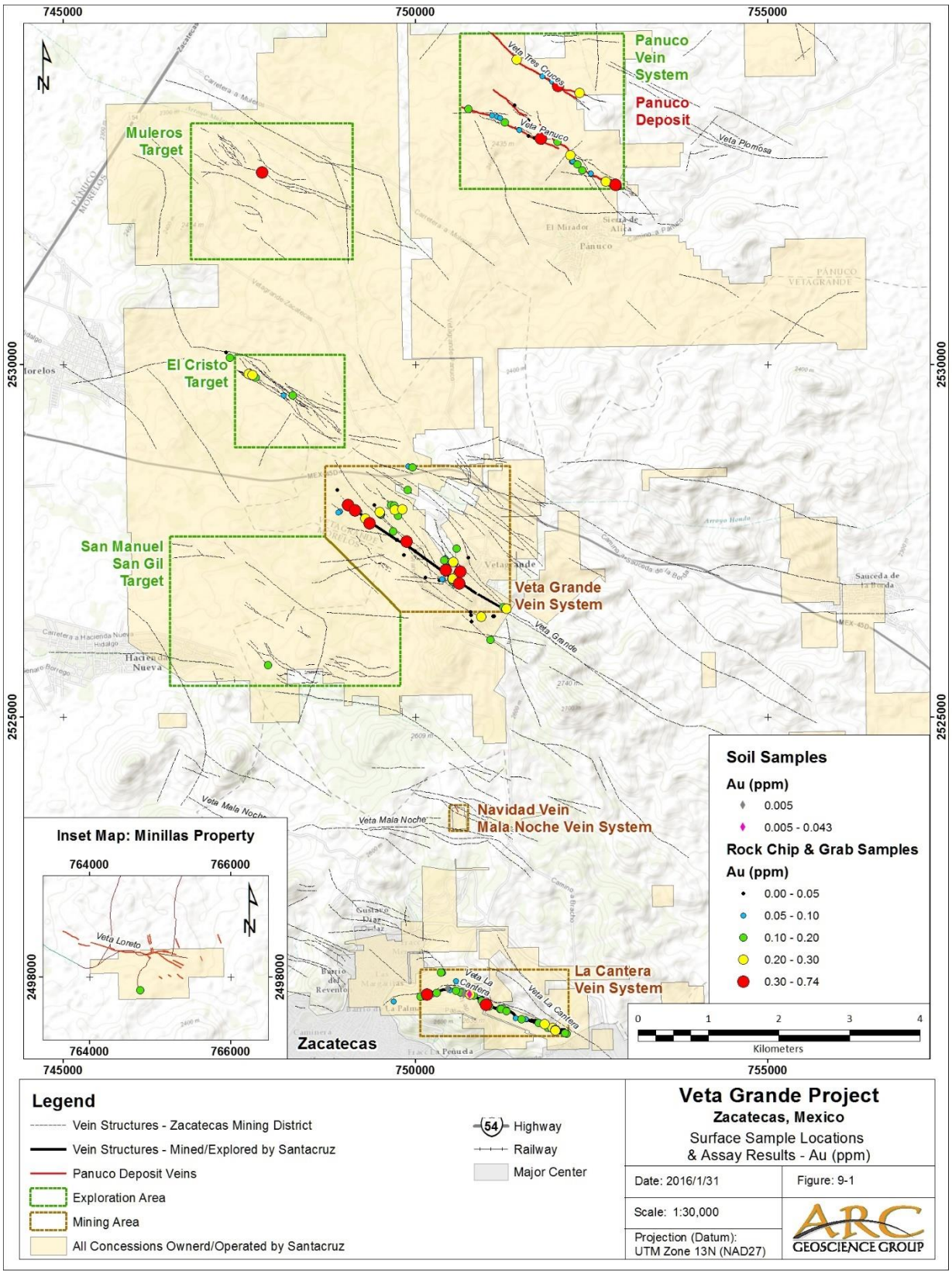


**Figure 9-1: 2015-2016 Surface Sample Results – Gold (ppm) Range Plot**

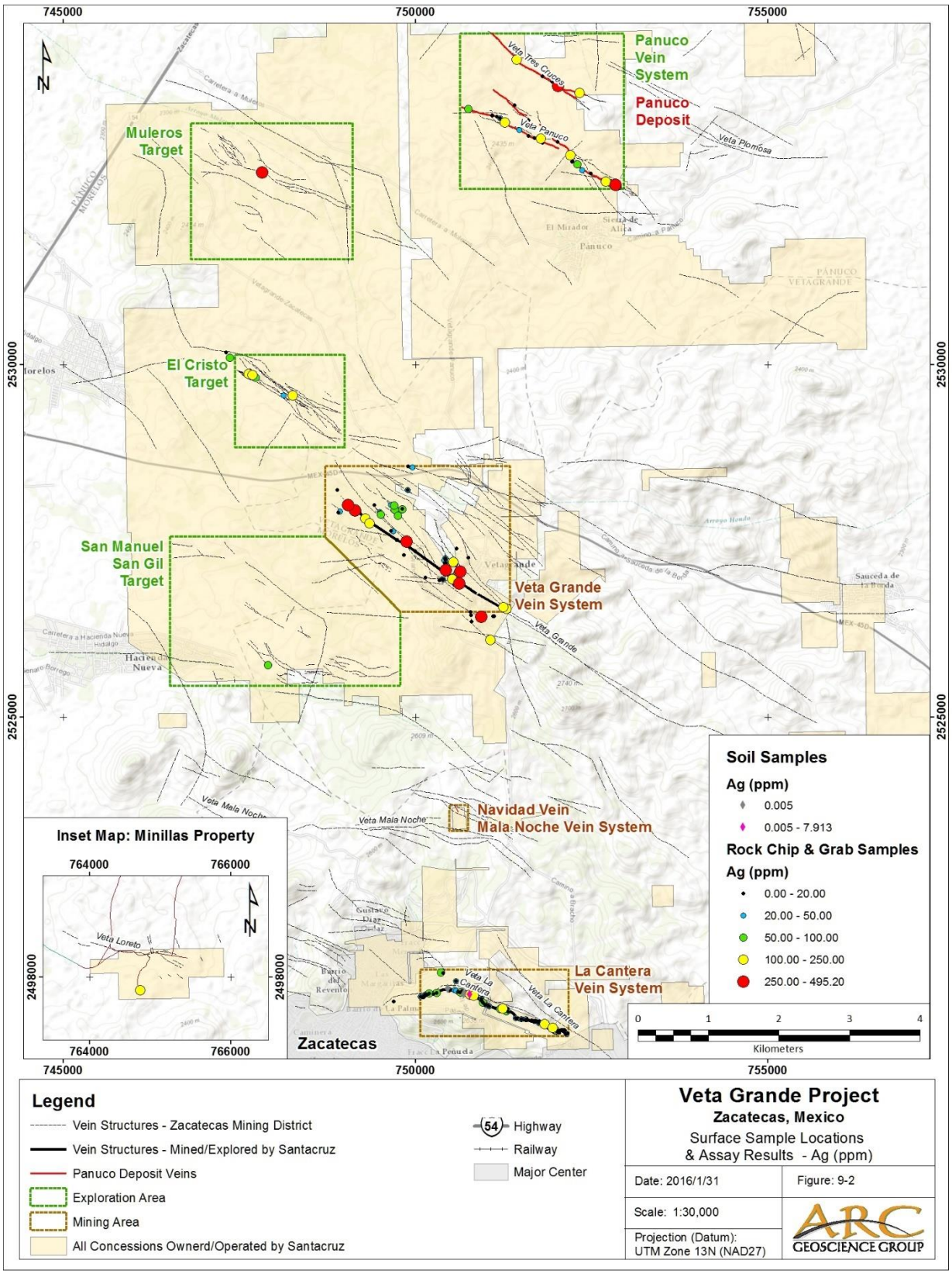


**Figure 9-2: 2015-2016 Surface Sample Results – Silver (ppm) Range Plot**

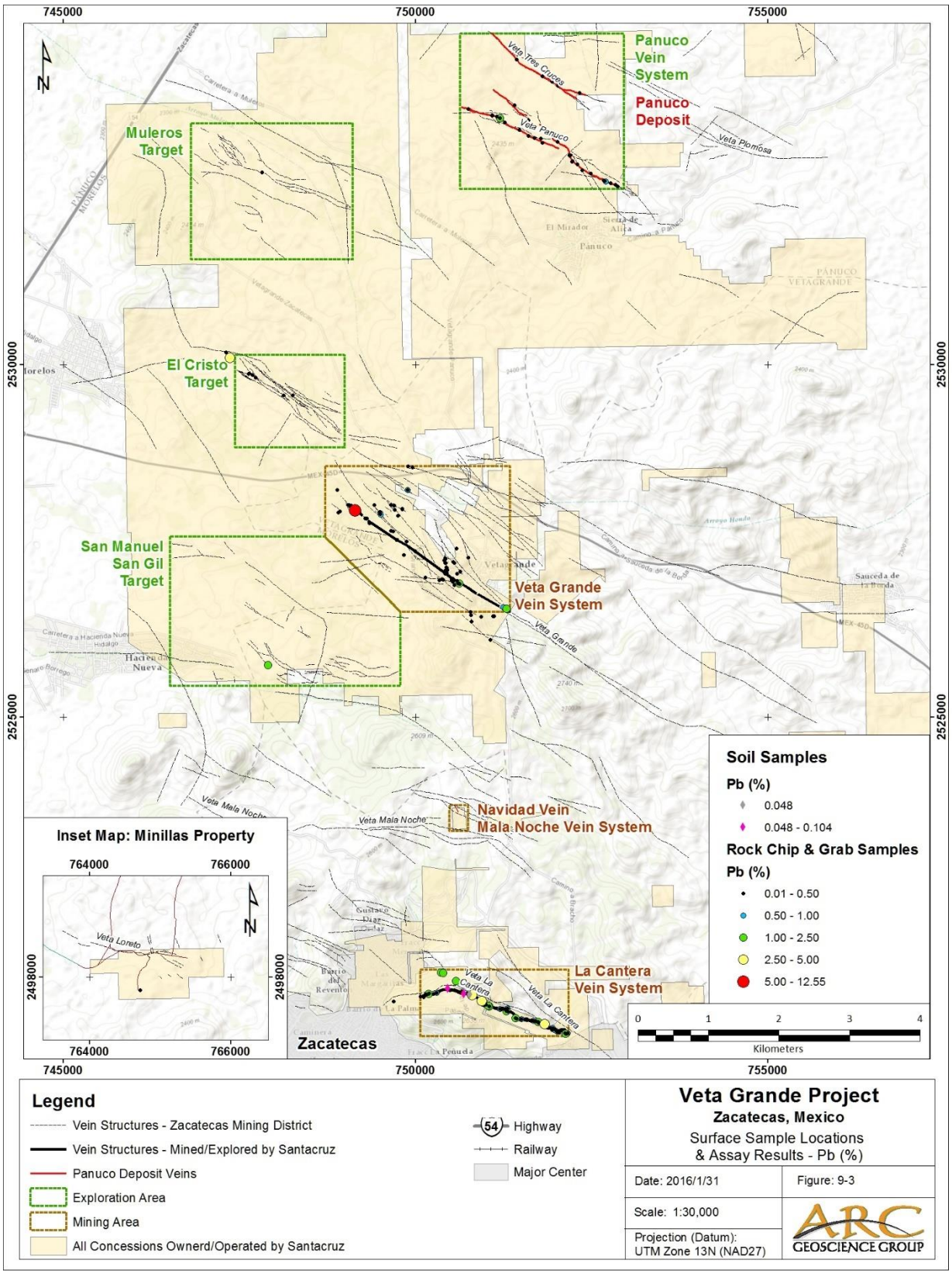


**Figure 9-3: 2015-2016 Surface Sample Results – Lead (%) Range Plot**

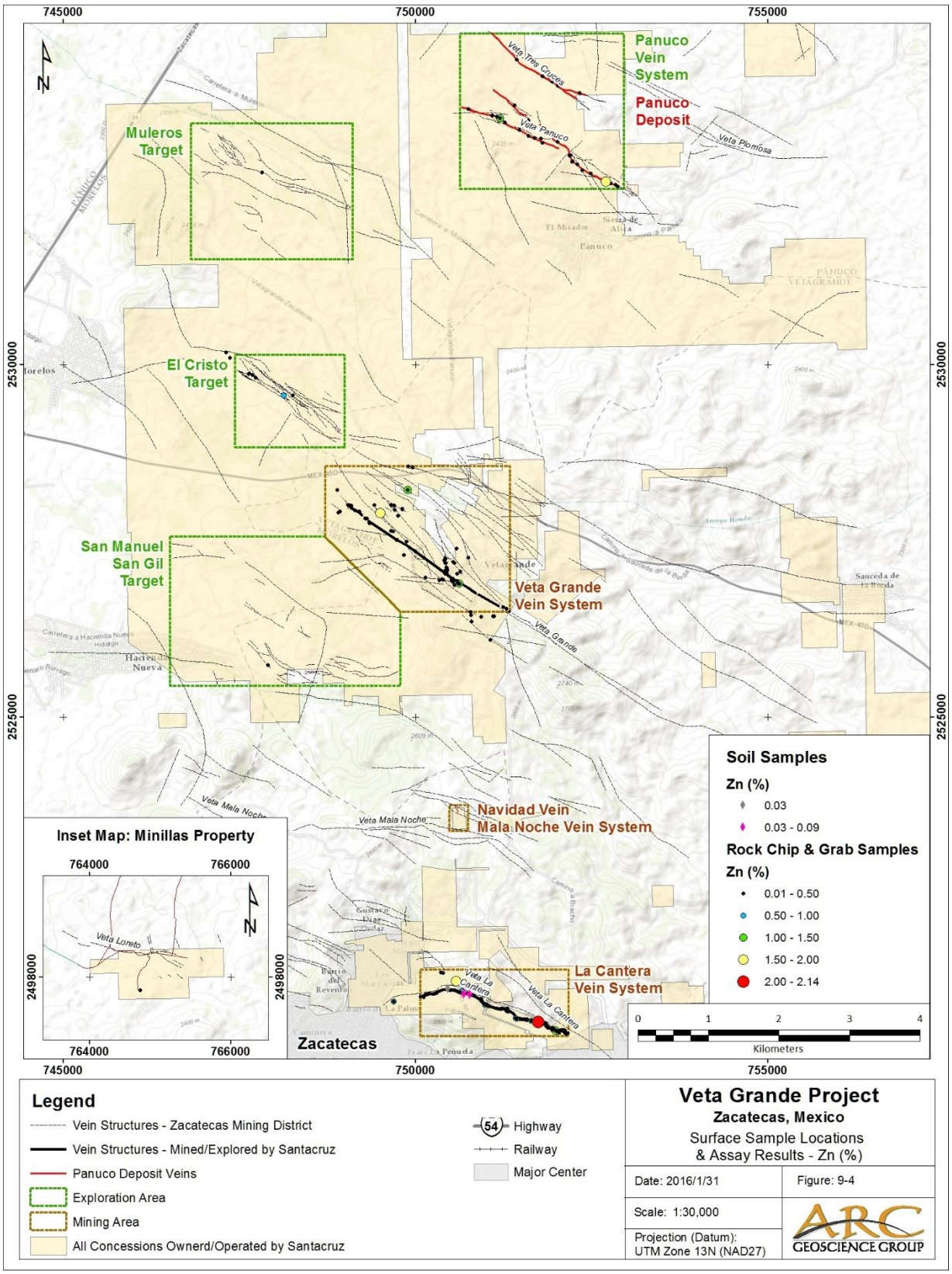


**Figure 9-4: 2015-2016 Surface Sample Results – Zinc (%) Range Plot**

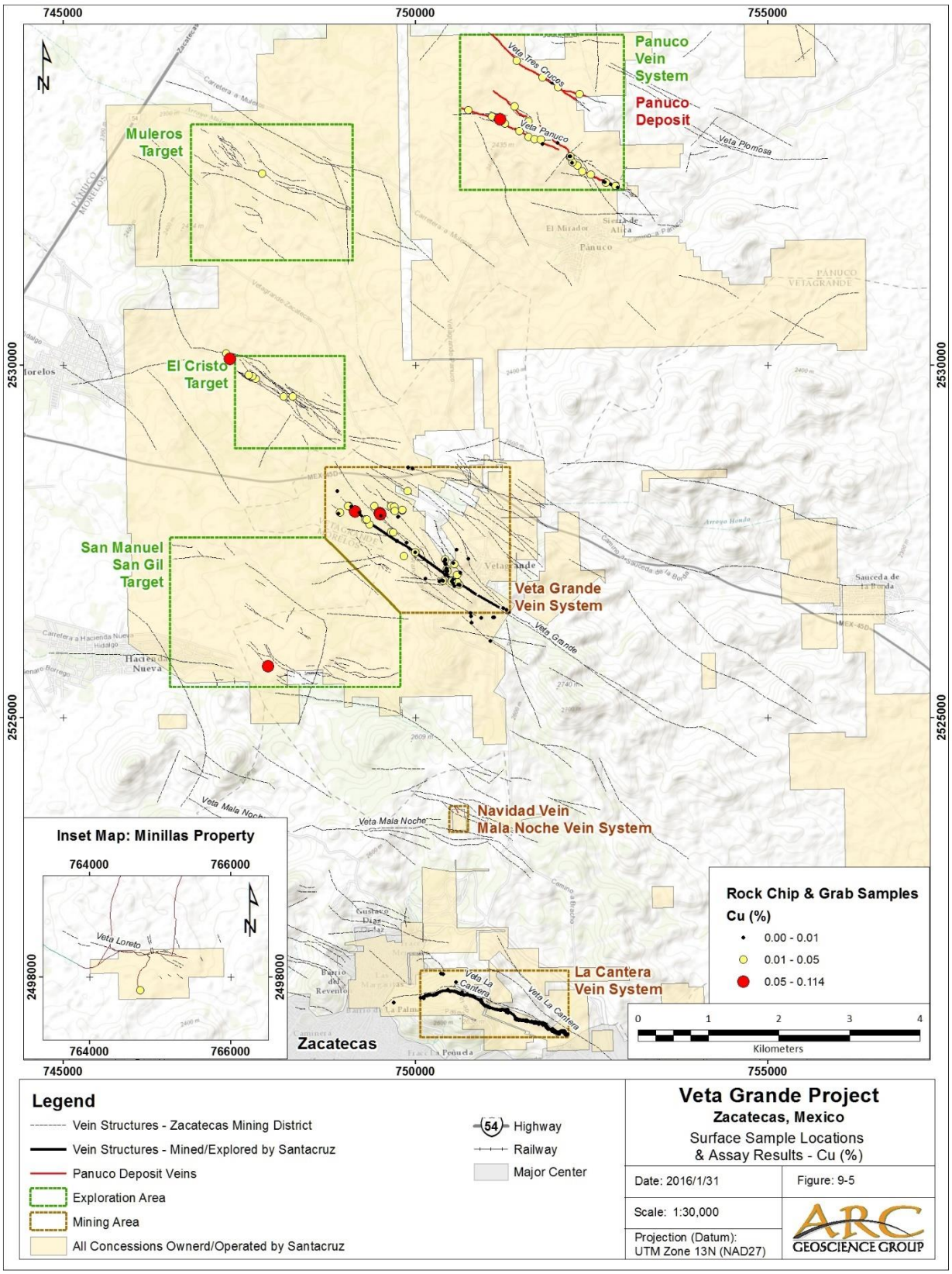


**Figure 9-5: 2015-2016 Surface Sample Results – Copper (%) Range Plot**

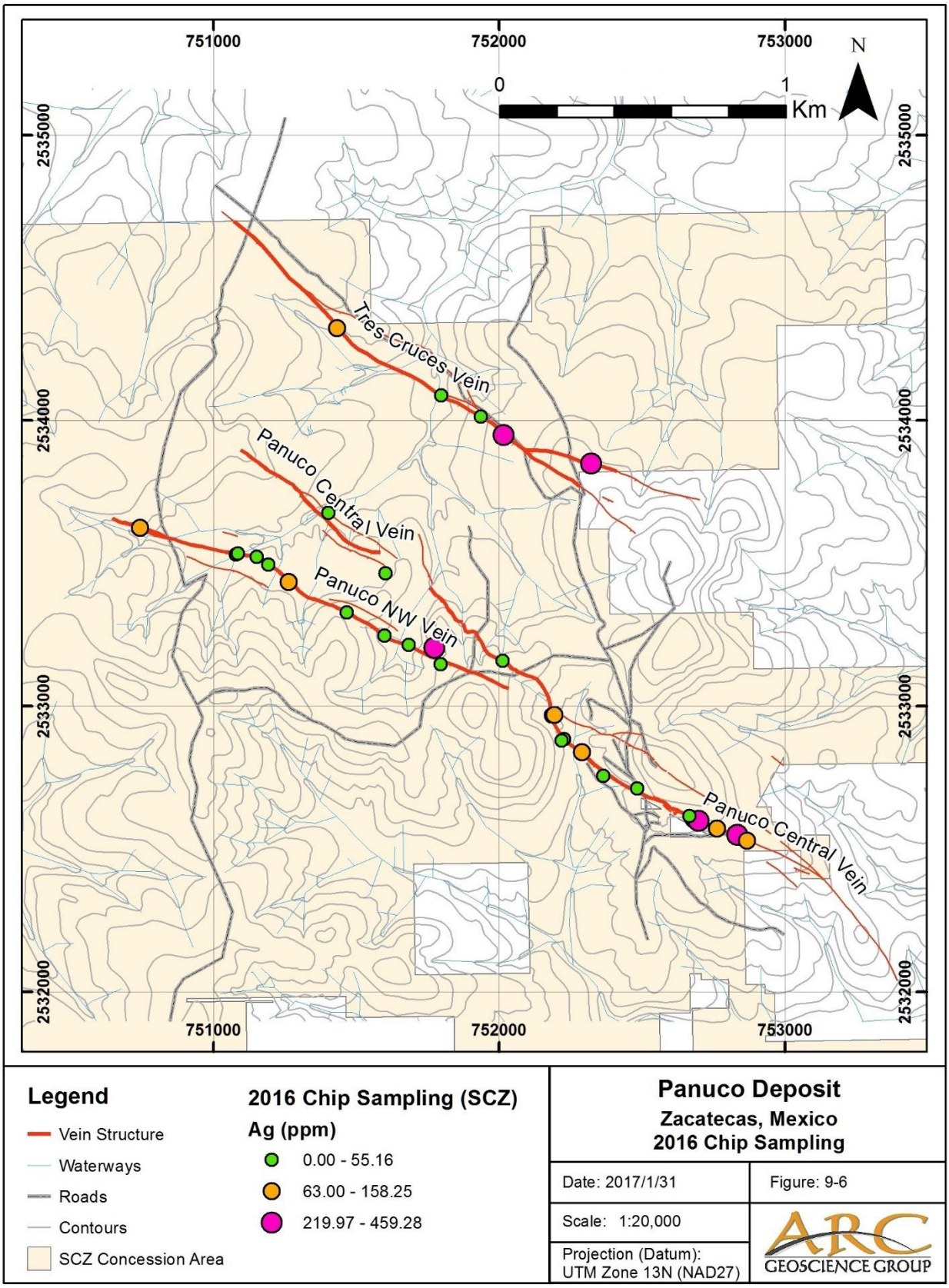


**Figure 9-6: Panuco Surface Sample Results – Silver (ppm) Range Plot**

## 9.3 Underground Channel Sampling

Between November 2015 and October 2016, Santacruz collected and received assays for 5,515 samples related to operations at its underground workings and mineral processing facility. Of this total, 2,808 samples are underground channel samples collected from vein exposures in pre-existing and recently developed areas. Channel samples were collected across the vein exposures along the back of the underground workings and along new working faces. Rock chips are collected in a continuous line along the channel and perpendicular to the strike of the vein. Samples are contiguous in channels with more than one sample. On average, channels are spaced at an interval of approximately two meters.

The underground channel sampling programs have outlined zones of silver (gold-lead-zinc) mineralization within each underground. The summary statistics provided in Table 9-14 to Table 9-22 considers all channel samples, including wall rock material, and does not represent the weighted average of metal concentrations across the true thickness of the vein for each channel location.

**Table 9-14: Underground Channel Sample Result Summary Statistics – Armados vein**

| ARMADOS | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 287 | 287 | 287 | 287 | 287 | 242 |
| Max | 2.00 | 2.01 | 2857.67 | 14.94 | 9.17 | 0.27 |
| Min | 0.30 | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 |
| Range | 1.70 | 2.01 | 2857.67 | 14.93 | 9.16 | 0.27 |
| Mean | 0.93 | 0.21 | 142.67 | 0.47 | 0.87 | 0.03 |
| Median | 1.00 | 0.15 | 62.14 | 0.20 | 0.34 | 0.02 |
| Mode | 1.00 | 0.11 | 0.01 | 0.12 | 0.17 | 0.01 |
| Std Dev | 0.33 | 0.23 | 256.07 | 1.21 | 1.24 | 0.04 |

**Table 9-15: Underground Channel Sample Result Summary Statistics – Flor vein**

| FLOR | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 556 | 541 | 556 | 556 | 556 | 169 |
| Max | 2.20 | 1.57 | 2614.48 | 25.89 | 38.29 | 2.14 |
| Min | 0.20 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| Range | 2.00 | 1.57 | 2614.48 | 25.89 | 38.28 | 2.14 |
| Mean | 0.79 | 0.10 | 51.60 | 1.37 | 2.25 | 0.21 |
| Median | 0.80 | 0.04 | 7.34 | 0.39 | 1.31 | 0.07 |
| Std Dev | 0.32 | 0.17 | 168.88 | 2.69 | 2.91 | 0.33 |

**Table 9-16: Underground Channel Sample Result Summary Statistics – San Felipe vein**

| SAN FELIPE | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 28 | 28 | 28 | 28 | 28 | 28 |
| Max | 1.50 | 1.19 | 1365.30 | 1.86 | 0.46 | 0.04 |
| Min | 0.40 | 0.02 | 2.33 | 0.06 | 0.01 | 0.01 |
| Range | 1.10 | 1.17 | 1362.97 | 1.80 | 0.45 | 0.03 |
| Mean | 0.92 | 0.18 | 141.99 | 0.60 | 0.19 | 0.03 |
| Median | 0.90 | 0.09 | 29.11 | 0.56 | 0.17 | 0.03 |
| Std Dev | 0.31 | 0.27 | 344.96 | 0.39 | 0.11 | 0.01 |

**Table 9-17: Underground Channel Sample Result Summary Statistics – San Jose vein**

| SAN JOSE | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 86 | 86 | 86 | 86 | 86 | 65 |
| Max | 1.20 | 1.81 | 3731.77 | 6.49 | 6.73 | 0.22 |
| Min | 0.20 | 0.01 | 0.01 | 0.02 | 0.07 | 0.01 |
| Range | 1.00 | 1.81 | 3731.77 | 6.47 | 6.66 | 0.21 |
| Mean | 0.60 | 0.33 | 308.47 | 1.03 | 2.03 | 0.05 |
| Median | 0.60 | 0.15 | 45.77 | 0.74 | 1.85 | 0.04 |
| Std Dev | 0.25 | 0.43 | 620.21 | 1.09 | 1.72 | 0.04 |

**Table 9-18: Underground Channel Sample Result Summary Statistics – Veta Grande vein**

| VETA GRANDE | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 93 | 93 | 93 | 93 | 93 | 55 |
| Max | 2.50 | 1.15 | 945.05 | 18.41 | 12.40 | 0.21 |
| Min | 0.20 | 0.01 | 0.01 | 0.02 | 0.05 | 0.01 |
| Range | 2.30 | 1.14 | 945.04 | 18.39 | 12.35 | 0.20 |
| Mean | 0.90 | 0.19 | 97.19 | 1.35 | 2.32 | 0.08 |
| Median | 0.85 | 0.12 | 36.17 | 0.50 | 1.45 | 0.08 |
| Std Dev | 0.42 | 0.22 | 153.52 | 2.87 | 2.56 | 0.06 |

**Table 9-19: Underground Channel Sample Result Summary Statistics – La Cantera vein**

| CANTERA | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 1425 | 1286 | 1425 | 1425 | 1425 | 1080 |
| Max | 2.00 | 10.01 | 4794.62 | 44.08 | 40.06 | 2.57 |
| Min | 0.10 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 |
| Range | 1.90 | 10.01 | 4794.62 | 44.06 | 40.06 | 2.57 |
| Mean | 1.01 | 0.13 | 51.45 | 1.53 | 2.72 | 0.06 |
| Median | 1.00 | 0.10 | 29.25 | 0.51 | 1.24 | 0.03 |
| Std Dev | 0.28 | 0.31 | 144.61 | 2.87 | 3.79 | 0.11 |

**Table 9-20: Underground Channel Sample Result Summary Statistics – La Cantera FTE NW**

| FTE NW | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 28 | 28 | 28 | 28 | 28 | 28 |
| Max | 1.50 | 0.18 | 112.79 | 5.86 | 11.25 | 0.15 |
| Min | 1.50 | 0.09 | 25.42 | 0.08 | 0.44 | 0.02 |
| Range | 0.00 | 0.09 | 87.37 | 5.79 | 10.81 | 0.14 |
| Mean | 1.50 | 0.12 | 53.02 | 0.90 | 3.28 | 0.05 |
| Median | 1.50 | 0.12 | 45.38 | 0.57 | 2.36 | 0.05 |
| Std Dev | 0.00 | 0.02 | 21.58 | 1.10 | 2.75 | 0.03 |

**Table 9-21: Underground Channel Sample Result Summary Statistics – Collado vein**

| COLLADO | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 272 | 179 | 272 | 272 | 272 | 251 |
| Max | 1.50 | 0.62 | 145.41 | 9.31 | 10.82 | 0.26 |
| Min | 0.20 | 0.01 | 0.01 | 0.01 | 0.13 | 0.00 |
| Range | 1.30 | 0.62 | 145.41 | 9.29 | 10.69 | 0.26 |
| Mean | 0.86 | 0.12 | 26.77 | 0.65 | 1.65 | 0.05 |
| Median | 0.88 | 0.10 | 22.08 | 0.32 | 1.12 | 0.04 |
| Std Dev | 0.25 | 0.08 | 23.45 | 1.00 | 1.70 | 0.05 |

**Table 9-22: Underground Channel Sample Result Summary Statistics – San Macario vein**

| SAN MACARIO | Width (m) | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) |
|---|---|---|---|---|---|---|
| Count | 27 | 27 | 27 | 27 | 27 | |
| Max | 1.10 | 0.16 | 43.44 | 2.16 | 0.94 | |
| Min | 0.30 | 0.01 | 0.01 | 0.01 | 0.12 | |
| Range | 0.80 | 0.16 | 43.44 | 2.15 | 0.81 | |
| Mean | 0.66 | 0.02 | 2.52 | 0.24 | 0.40 | |
| Median | 0.60 | 0.01 | 0.01 | 0.12 | 0.36 | |
| Std Dev | 0.21 | 0.03 | 8.89 | 0.46 | 0.20 | |

No additional exploration oriented surface and underground channel sampling programs were completed by Santacruz upon the Company commencing commercial production in October of 2016.

# 10 DRILLING

In accordance with the Carrizal Mining Option Agreement, Santacruz and Carrizal Mining conducted a diamond drilling campaign between January 24, 2018 and March 26, 2019 consisting of 43 diamond drill holes totaling 13,665.60 m ("Phase 1"). The Phase 1 drill program was designed to test for mineralization in proximity to and below the lowest known levels of the Armados, Garcia and Navidad underground workings. The drill pattern was designed to complete several fanned drill holes from each drill pad location. Drilling in a fan arrangement allows the operator to maintain a common azimuth orientation while adjusting the dip angle for each drill hole. The pattern is repeated for each desired azimuth orientation. Core recovery was achieved using standard core barrel and wire line method on a conventional hydraulic assisted drill rig.

Drilling metrics for this program are provided in Table 10-1. Drill hole locations are provided in Table 10-2 and Figure 10-1.

**Table 10-1: 2018/2019 Phase 1 Drilling Summary**

| Drill Rig | Core Size | Drill Pads | Target | Type | # of Holes | Total Metres |
|---|---|---|---|---|---|---|
| Diamec U6 | NQ | 2 | Armados | Underground | 8 | 1691.40 |
| Diamec U6 | NQ | 4 | Navidad | Surface | 20 | 3742.30 |
| C140 | HQ | 3 | Vetagrande | Surface | 15 | 8231.90 |
| | | 9 | Total | | 43 | 13665.60 |

Drilling at the Garcia mine area was completed from surface drill pads. The majority of the significant drill core intersections encountered at the Garcia mine occur in the northwest area of the mine. Intersections of the Veta Grande vein in the northwest area returned assay results ranging from no significant intersections in VG18-009 up to 280.10 g/t Ag over 1.59 m true thickness in drill hole VG19-014A. Intersections of the Veta Grande vein in the southeast region of the drilling area resulted in weak to modest Ag assay results ranging from 23.51 g/t Ag over 3.56 m in VG19-012 to 119.00 g/t Ag over 0.49 m true width in VG19-013. In contrast to the Armados vein, the Veta Grande vein intersections contain modest Pb and Zn concentrations. The results for the area intersected by VG19-010 and VG19-014A is encouraging as it indicates the potential for additional in situ mineralized quartz-calcite vein material to guide additional exploration towards the northwest.

Drilling within the Armados mine from the general ramp below Level-4 resulted in several significant intersections into the Armados vein that range from 129.67 g/t Ag to 235.69 g/t Ag over approximated true widths that range between 1.00 m to 3.76 m. Au, Pb and Zn concentrations are generally low for the Armados vein intersections. Approximately 80-110 m below the Armados vein are the San Jose, Santacruz, San Abraham and San Patrico veins. Drill intersections through these veins returned assay results ranging from 79.69 g/t Ag to 312.00 g/t Ag over true widths that range between 0.32 m to 0.95 m. Although the intersection widths are narrow, these veins carry anomalous Au ranging between trace and 1.91 g/t Au, as well as significant Zn and Pb content as shown in Table 10-4. Quartz-calcite filled vein intersections were commonly observed in the Armados vein while the veins in its structural footwall appear to be enriched in galena and sphalerite in the form of semi-massive to massive sulfide infilling of the structures.

Drilling at the Navidad mine area was completed from surface. The results indicate in situ quartz-calcite vein mineralization extends at approximately 40 vertical m below the Level-3. The drilling also confirmed continuity of mineralization across a strike length of 250 m along the vein. Drilling generally intersected the Navidad vein at or near the top of the drill hole and occasionally intersected the San Lorenzo vein near the bottom of the drill hole. Assay results are generally divided between Ag-rich/Au-Pb-Zn-poor intersections from the Navidad vein and Au-Ag-poor/Pb-Zn-rich intersections from the San Lorenzo vein.

Intersections into the Navidad vein range from trace Au and Ag, to 668.64 g/t Ag over 1.95 m true width in NA18-006. While Au concentration are generally low, Pb and Zn rich intersections appear more common than drill hole intersections from the Armados and Garcia mine areas.

Silver equivalent (AgEq) in the drill results provided in Table 10-3 to Table 10-5 assumes $1,281 per ounce Au (Pau), $15.25 per ounce Ag (Pag), $0.94 per pound Pb (Ppb), $1.20 per pound Zn (Pzn) and $2.70 per pound Cu (Pcu) with 100-per-cent metallurgical recovery. These prices were selected based on prices used by Santacruz to report financial statements in 2019. These prices do not match prices used in the mineral resource estimation in Section 14.

The formula used in the calculation is as follows:

AgEq (g/t) equals (Au multiplied by Pau divided by 31.1035) plus (Ag multiplied by Pag/31.1035) (plus Pb multiplied by Ppb multiplied by 22.05) plus by (Zn multiplied by Pzn multiplied by 22.05) plus (Cu multiplied by Pcu multiplied by 22.05) (Pag).

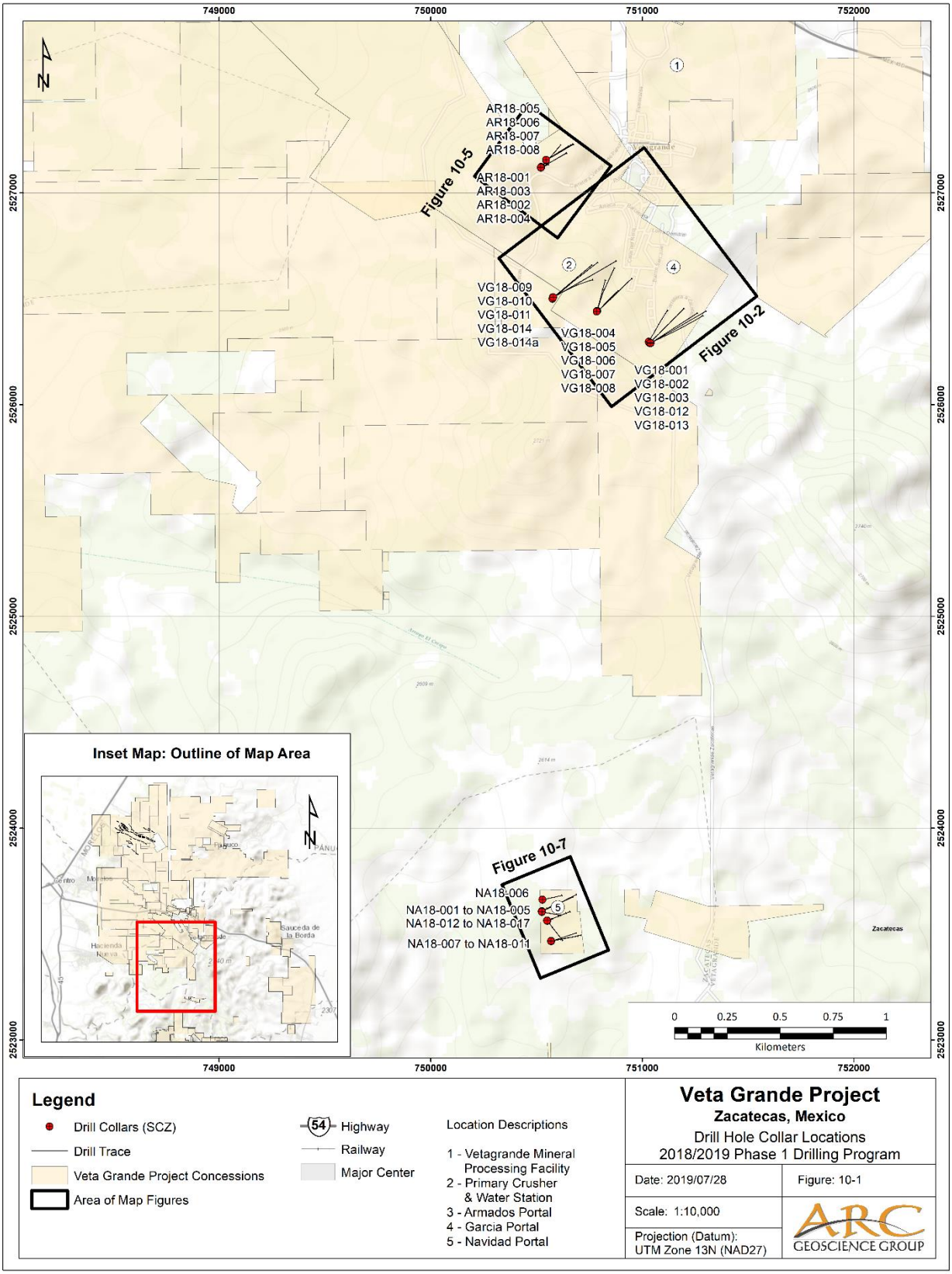


**Figure 10-1: Collar locations of 2018/2019 Phase 1 drill program**

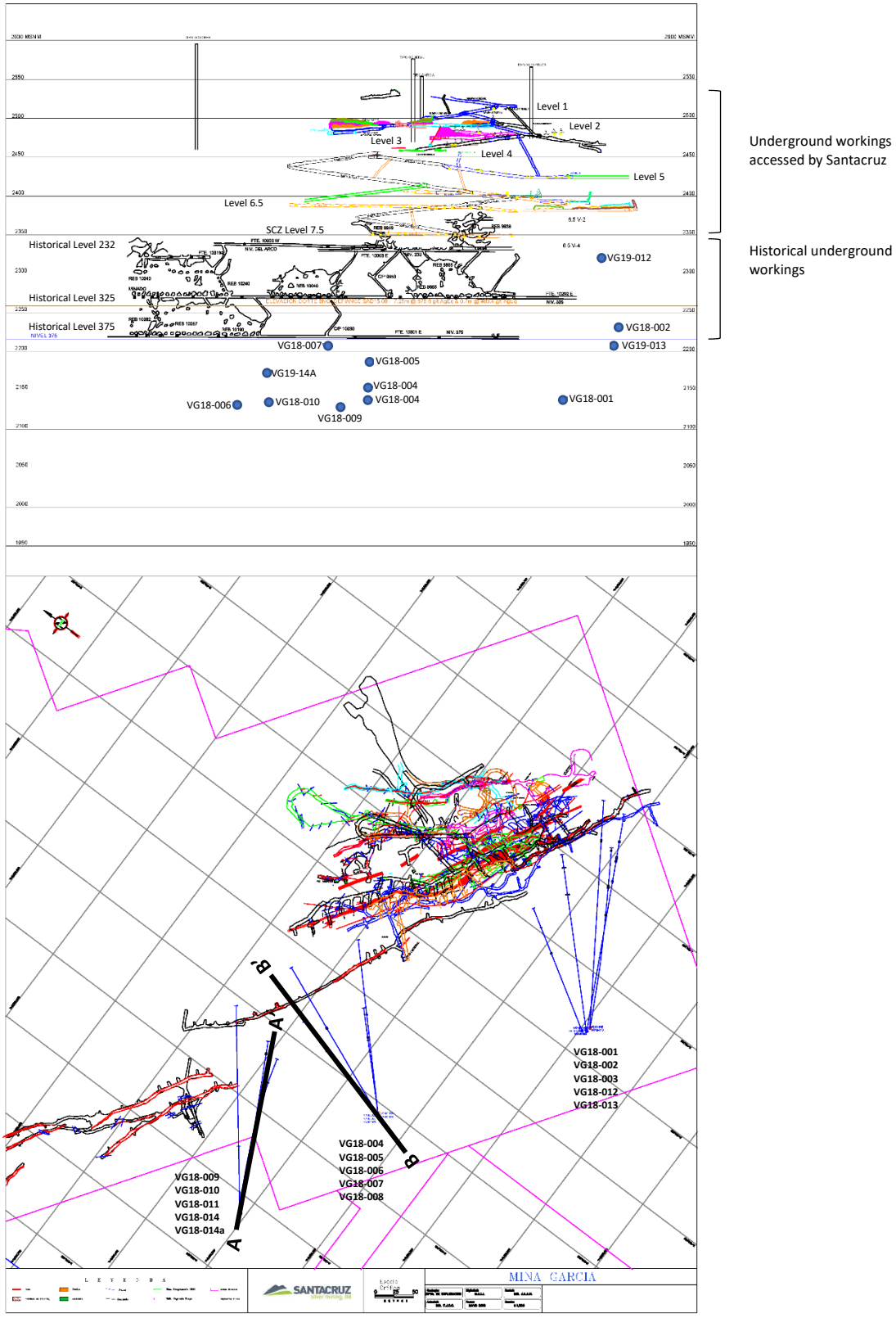


**Figure 10-2: Plan view and long section, Garcia mine area, Veta Grande vein system**
Plan view is rotated towards the northwest, modified from Santacruz, 2019.

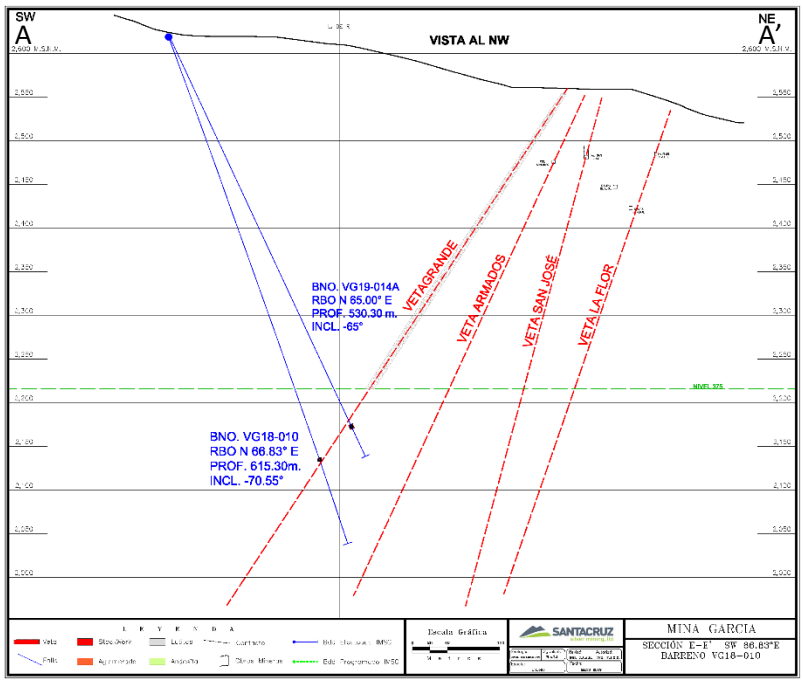


**Figure 10-3: Simplified cross-section A-A', Garcia mine area**
Modified from Santacruz, 2019

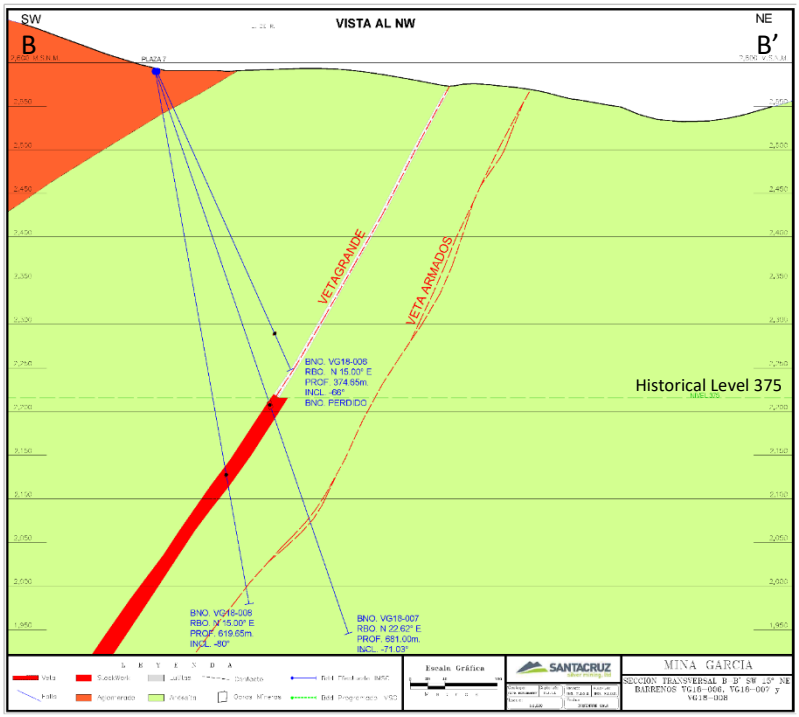


**Figure 10-4: Simplified cross-section B-B', Garcia mine area**
Modified from Santacruz, 2019

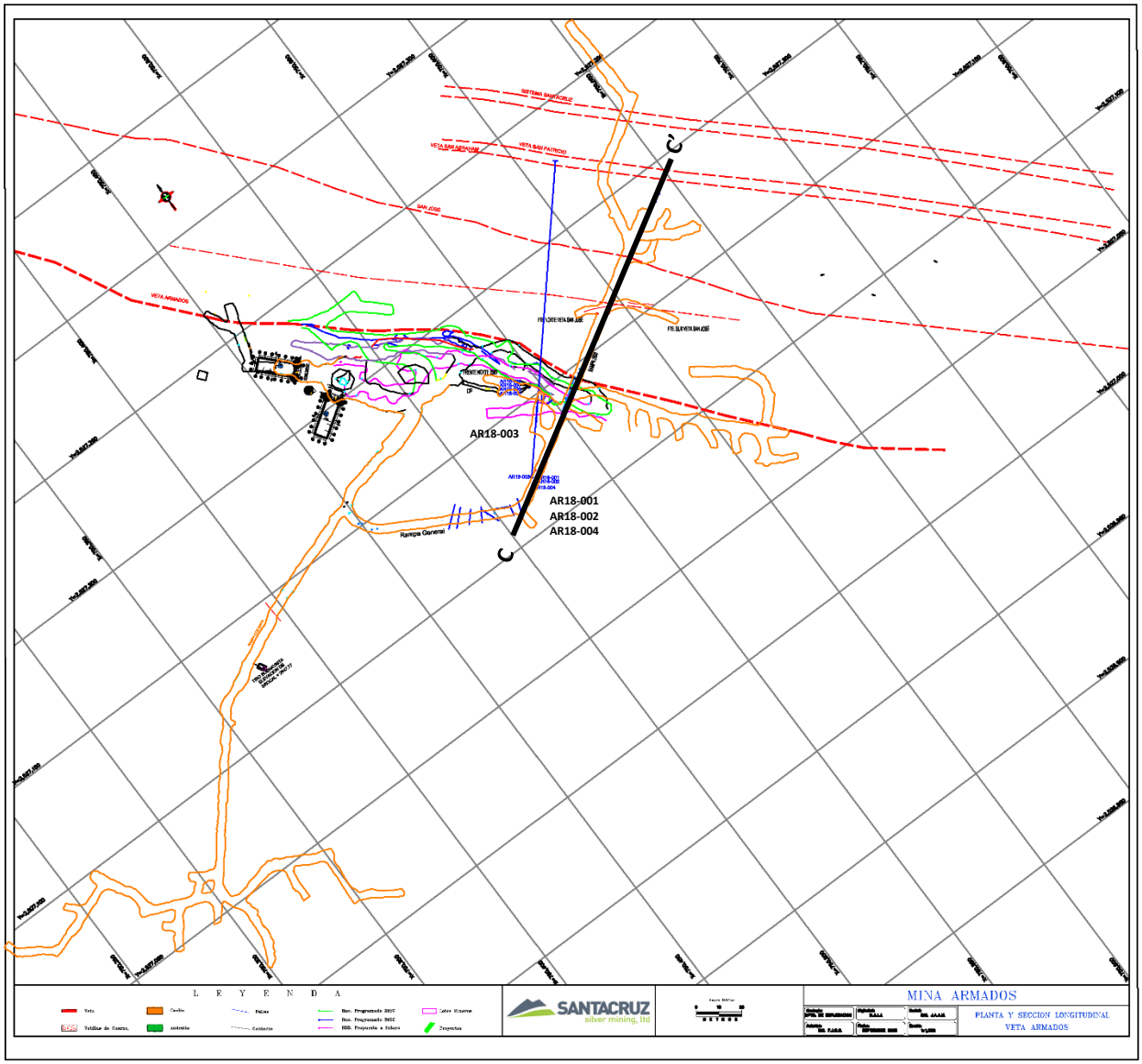


**Figure 10-5: Plan view, Armados mine area, Veta Grande vein system**

Plan view is rotated towards the northwest, modified from Santacruz, 2019

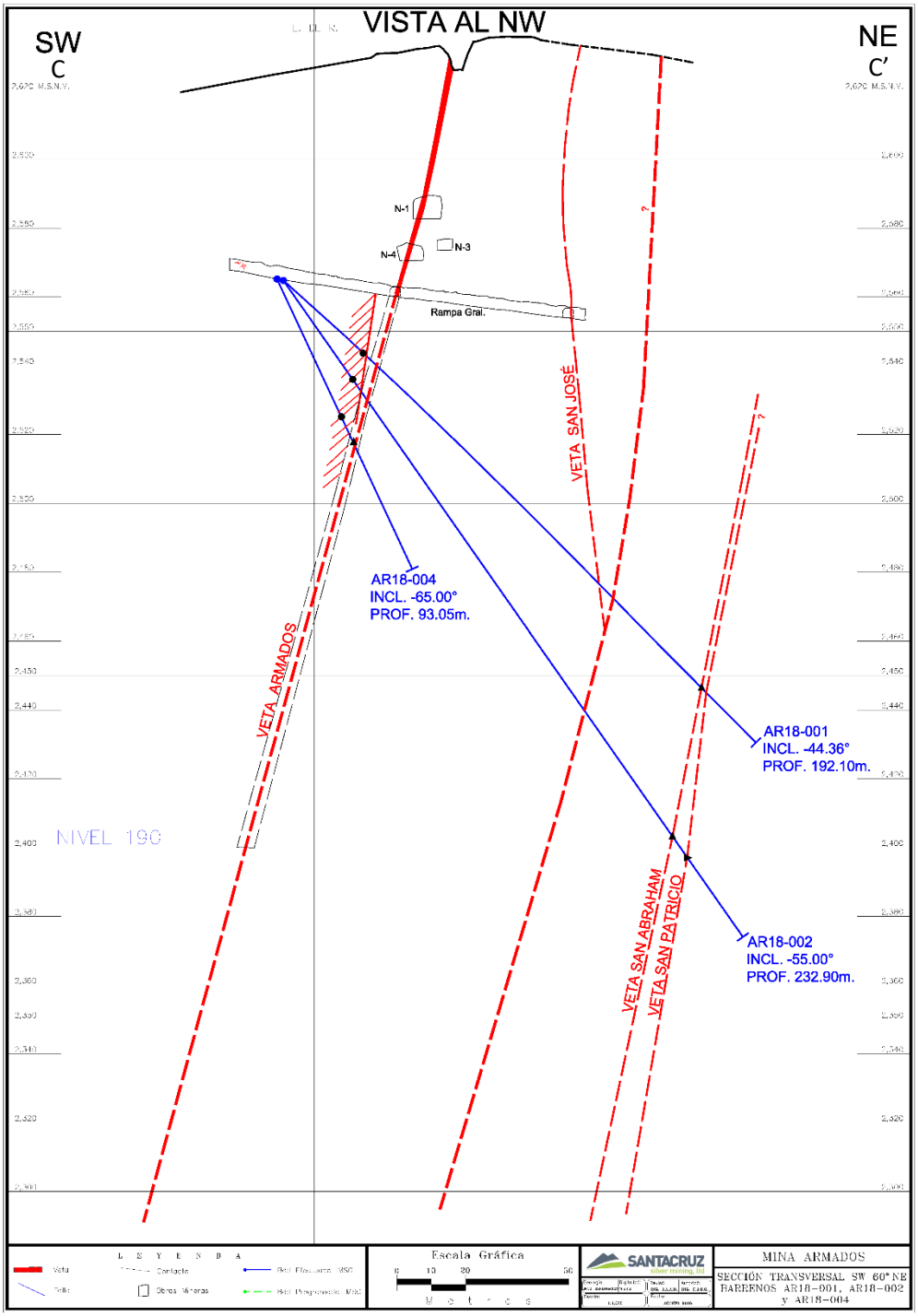


**Figure 10-6: Simplified cross-section C-C', Armados mine area**
Modified from Santacruz, 2019

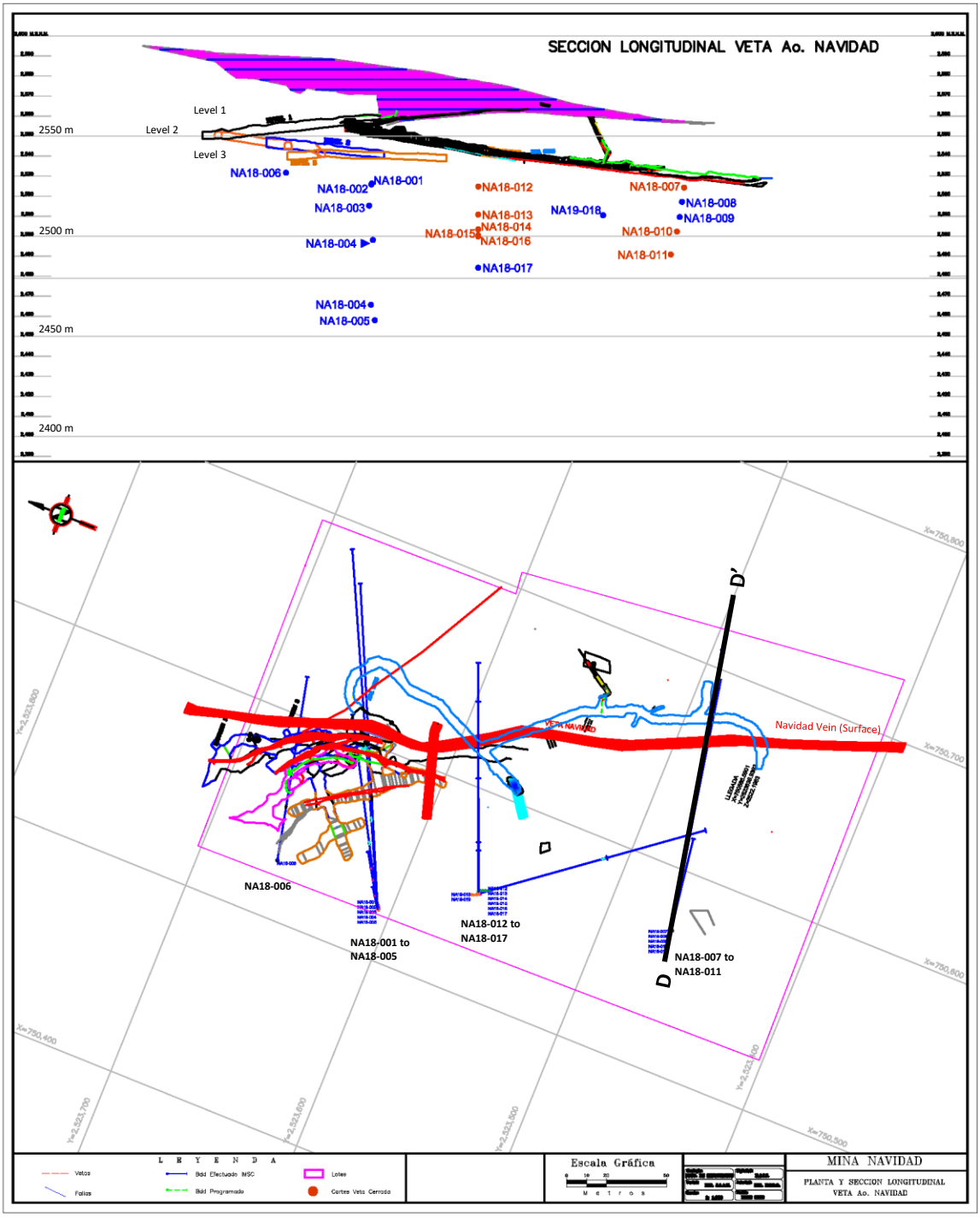


**Figure 10-7: Plan view, Navidad mine area, Navidad vein system**

Plan view is rotated towards the west-northwest, modified from Santacruz, 2019

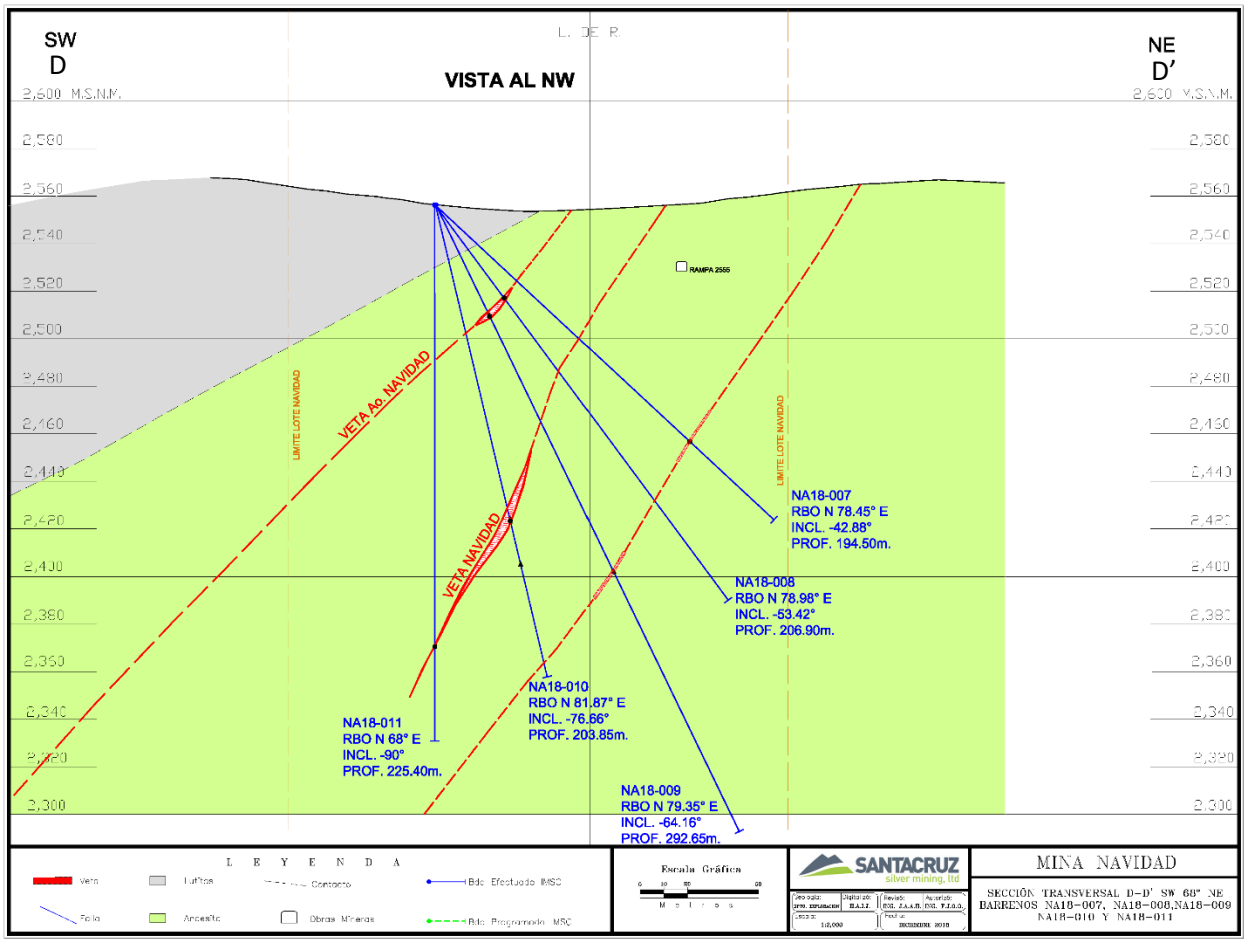


**Figure 10-8: Simplified cross-section D-D', Navidad mine area**
Modified from Santacruz, 2019

**Table 10-2: Drill hole coordinates and orientation information**

| BHID | Easting (m) | Northing (m) | Elevation (m) | Length (m) | Azimuth (°) | Dip (°) |
|---|---|---|---|---|---|---|
| AR18-001 | 750523 | 2527120 | 2564.79 | 192.10 | 60.40 | -42.10 |
| AR18-002 | 750523 | 2527120 | 2564.79 | 232.90 | 60.00 | -55.00 |
| AR18-003 | 750522 | 2527122 | 2565.35 | 154.70 | 43.10 | -24.60 |
| AR18-004 | 750521 | 2527119 | 2565.20 | 93.05 | 67.00 | -65.00 |
| AR18-005 | 750545 | 2527155 | 2556.95 | 240.90 | 58.00 | -58.80 |
| AR18-006 | 750545 | 2527155 | 2557.02 | 396.10 | 58.60 | -70.80 |
| AR18-007 | 750546 | 2527155 | 2557.33 | 213.65 | 60.20 | -44.50 |
| AR18-008 | 750546 | 2527155 | 2557.83 | 168.00 | 59.80 | -27.70 |
| NA18-001 | 750526 | 2523607 | 2576.71 | 220.20 | 65.00 | -42.80 |
| NA18-002 | 750526 | 2523607 | 2576.72 | 281.70 | 64.30 | -51.00 |
| NA18-003 | 750526 | 2523607 | 2576.72 | 208.55 | 56.50 | -57.00 |
| NA18-004 | 750525 | 2523607 | 2576.73 | 159.85 | 58.70 | -79.70 |
| NA18-005 | 750525 | 2523607 | 2576.74 | 201.50 | 55.40 | -87.10 |
| NA18-006 | 750529 | 2523662 | 2582.63 | 197.40 | 77.30 | -59.80 |
| NA18-007 | 750570 | 2523467 | 2556.24 | 194.50 | 79.30 | -41.20 |
| NA18-008 | 750570 | 2523467 | 2556.24 | 206.90 | 72.30 | -52.40 |
| NA18-009 | 750570 | 2523467 | 2556.20 | 292.65 | 78.40 | -63.20 |
| NA18-010 | 750570 | 2523467 | 2556.20 | 203.85 | 79.20 | -76.30 |
| NA18-011 | 750570 | 2523467 | 2556.23 | 225.40 | 68.00 | -90.00 |
| NA18-012 | 750551 | 2523563 | 2572.98 | 74.95 | 68.00 | -40.00 |
| NA18-013 | 750551 | 2523563 | 2572.99 | 171.65 | 68.00 | -56.00 |
| NA18-014 | 750552 | 2523563 | 2572.94 | 282.60 | 68.00 | -66.00 |
| NA18-015 | 750552 | 2523563 | 2572.94 | 80.15 | 68.00 | -72.00 |
| NA18-016 | 750552 | 2523563 | 2572.94 | 79.60 | 68.00 | -75.00 |
| NA18-017 | 750552 | 2523563 | 2572.94 | 216.25 | 68.00 | -90.00 |
| NA19-018 | 750551 | 2523563 | 2572.95 | 163.85 | 142.00 | -44.00 |
| NA19-019 | 750551 | 2523563 | 2572.95 | 152.20 | 142.00 | -75.00 |
| NA19-020 | 750526 | 2523604 | 2576.69 | 128.55 | 100.00 | -45.00 |
| VG18-001 | 751035 | 2526293 | 2583.74 | 531.15 | 46.7.0 | -62.00 |
| VG18-002 | 751034 | 2526291 | 2583.97 | 532.05 | 66.10 | -55.20 |
| VG18-003 | 751031 | 2526297 | 2589.05 | 751.50 | 28.60 | -74.40 |
| VG18-004 | 750787 | 2526442 | 2589.84 | 639.50 | 51.90 | -77.60 |
| VG18-005 | 750787 | 2526442 | 2589.85 | 750.45 | 53.10 | -69.00 |
| VG18-006 | 750786 | 2526441 | 2589.93 | 374.65 | 15.00 | -66.00 |
| VG18-007 | 750785 | 2526440 | 2589.99 | 681.00 | 17.80 | -68.80 |
| VG18-008 | 750785 | 2526440 | 2590.00 | 619.65 | 15.00 | -80.00 |
| VG18-009 | 750577 | 2526507 | 2618.94 | 634.05 | 52.00 | -65.00 |
| VG18-010 | 750579 | 2526506 | 2619.19 | 615.30 | 58.80 | -69.80 |
| VG19-011 | 750578 | 2526506 | 2619.11 | 503.15 | 59.90 | -46.70 |
| VG19-012 | 751040 | 2526291 | 2584.27 | 433.10 | 60.00 | -45.80 |
| VG19-013 | 751040 | 2526290 | 2584.27 | 450.00 | 57.30 | -54.30 |
| VG19-014 | 750576 | 2526500 | 2619.19 | 213.05 | 50.00 | -61.00 |
| VG19-014A | 750579 | 2526506 | 2619.19 | 503.30 | 50.00 | -61.70 |

**Table 10-3: Composited assay results, Garcia mine area, Veta Grande vein system**

| DDH | From (m) | To (m) | TW | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) | AgEq (g/t) | Vein |
|---|---|---|---|---|---|---|---|---|---|---|
| VG18-001 | 409.00 | 410.50 | 1.10 | 0.78 | 27.02 | 0.36 | 0.38 | 0.09 | 141.10 | Esperanza |
| and | 490.80 | 492.00 | 0.88 | 1.73 | 34.00 | 0.15 | 0.33 | 0.01 | 200.63 | Vetagrande |
| VG18-002 | No significant mineralized intersections | | | | | | | | | |
| VG18-003 | 477.55 | 479.10 | 1.10 | 0.76 | 36.35 | 0.35 | 0.38 | 0.13 | 153.11 | Esperanza |
| VG18-004 | 443.95 | 446.25 | 2.26 | 0.05 | 43.87 | 1.43 | 1.40 | 1.02 | 333.48 | Vetagrande |
| and | 459.20 | 465.55 | 4.86 | 0.16 | 30.48 | 0.14 | 0.70 | 1.89 | 337.29 | Vetagrande Lower |
| VG18-005 | 425.60 | 429.55 | 3.03 | 0.13 | 57.51 | 1.47 | 1.82 | 1.87 | 490.30 | Vetagrande |
| including | 426.65 | 427.10 | 0.45 | 0.07 | 195.00 | 10.20 | 11.20 | 0.58 | 1306.80 | Vetagrande |
| VG18-006 | 329.10 | 329.50 | 0.31 | 0.62 | 893.00 | 1.20 | 1.22 | 0.14 | 1078.44 | Other |
| VG18-007 | 399.55 | 400.60 | 0.80 | 0.10 | 22.00 | 0.24 | 2.99 | 0.11 | 215.61 | Vetagrande |
| and | 403.20 | 408.45 | 4.02 | 0.16 | 68.38 | 2.89 | 3.94 | 0.28 | 450.56 | Vetagrande |
| VG18-008 | 459.05 | 459.75 | 0.47 | 0.56 | 39.00 | 0.43 | 0.39 | 0.02 | 127.53 | Vetagrande |
| and | 464.05 | 464.75 | 0.47 | 0.77 | 41.00 | 1.33 | 2.69 | 0.09 | 318.51 | Vetagrande |
| and | 465.80 | 470.95 | 3.45 | 0.46 | 60.09 | 1.42 | 1.89 | 0.14 | 277.56 | Vetagrande |
| and | 471.50 | 472.20 | 0.47 | 0.33 | 40.00 | 0.58 | 0.41 | 0.08 | 123.32 | Vetagrande |
| VG18-009 | 494.75 | 495.80 | 0.94 | 0.62 | 50.00 | 0.02 | 0.02 | 0.03 | 107.39 | Other |
| and | 504.40 | 505.35 | 0.85 | 0.10 | 65.32 | 1.85 | 1.95 | 0.11 | 270.68 | Other |
| and | 514.50 | 515.30 | 0.72 | 0.02 | 53.00 | 3.27 | 3.46 | 0.13 | 395.76 | Other |
| and | 533.70 | 534.50 | 0.72 | 0.08 | 33.00 | 1.51 | 2.66 | 0.10 | 259.41 | Vetagrande |
| and | 538.00 | 538.60 | 0.54 | 0.04 | 36.00 | 2.07 | 1.46 | 0.12 | 220.18 | Vetagrande |
| VG18-010 | 512.45 | 515.50 | 2.40 | 0.88 | 227.51 | 2.71 | 2.64 | 0.19 | 581.47 | Vetagrande |
| including | 512.45 | 513.05 | 0.47 | 1.06 | 633.00 | 1.24 | 2.93 | 0.13 | 948.60 | Vetagrande |
| and | 528.60 | 529.80 | 0.95 | 0.22 | 18.50 | 0.47 | 1.56 | 0.09 | 152.52 | Other |
| and | 530.85 | 532.40 | 1.22 | 0.04 | 25.19 | 0.73 | 1.25 | 0.07 | 134.73 | Other |
| VG19-011 | No significant mineralized intersections | | | | | | | | | |
| VG19-012 | 329.60 | 331.60 | 1.78 | 2.41 | 64.68 | 2.65 | 7.64 | 0.16 | 810.21 | Vetagrande |
| and | 332.65 | 334.50 | 1.65 | 0.67 | 17.31 | 0.05 | 2.10 | 0.03 | 193.62 | Vetagrande |
| and | 335.05 | 336.90 | 1.65 | 1.27 | 31.76 | 0.08 | 3.49 | 0.12 | 344.85 | Vetagrande |
| and | 354.45 | 358.45 | 3.56 | 2.15 | 23.51 | 0.03 | 3.36 | 0.04 | 391.58 | Vetagrande |
| and | 360.35 | 361.00 | 0.58 | 0.97 | 11.00 | 0.01 | 1.10 | 0.01 | 153.55 | Vetagrande |
| and | 362.95 | 363.50 | 0.49 | 0.69 | 112.00 | 0.77 | 1.50 | 0.02 | 285.89 | Vetagrande |
| VG19-013 | 268.15 | 268.60 | 0.35 | 0.64 | 119.00 | 10.90 | 2.43 | 0.08 | 774.45 | Other |
| and | 346.05 | 347.35 | 1.02 | 1.61 | 79.69 | 0.04 | 3.97 | 0.05 | 437.13 | Esperanza |
| VG19-014 | No sampled analyzed | | | | | | | | | |
| VG19-014A | 489.85 | 491.70 | 1.59 | 0.61 | 280.10 | 3.60 | 3.24 | 0.22 | 684.94 | Vetagrande |
| Including | 490.55 | 491.00 | 0.47 | 0.44 | 512.00 | 0.49 | 0.89 | 0.08 | 627.12 | Vetagrande |
| and | 493.45 | 495.40 | 1.67 | 0.13 | 102.92 | 2.85 | 0.42 | 0.04 | 261.83 | Vetagrande |
| Including | 494.65 | 495.40 | 0.64 | 0.05 | 146.00 | 7.10 | 0.41 | 0.06 | 480.11 | Vetagrande |

Note: TW = True width (m)

**Table 10-4: Composited assay results, Armados mine area, Veta Grande vein system**

| DDH | From (m) | To (m) | TW | Au g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) | AgEq (g/t) | Vein |
|---|---|---|---|---|---|---|---|---|---|---|
| AR18-001 | 30.80 | 31.90 | 1.00 | 0.06 | 235.69 | 0.07 | 0.26 | 0.01 | 259.02 | Armados |
| and | 169.50 | 169.85 | 0.32 | 0.37 | 312.00 | 0.00 | 0.61 | 0.03 | 383.48 | San Abraham |
| AR18-002 | 34.30 | 36.00 | 1.40 | 0.06 | 167.51 | 0.06 | 0.17 | 0.00 | 185.65 | Armados |
| and | 196.85 | 198.00 | 0.95 | 1.36 | 235.09 | 7.52 | 8.75 | 0.19 | 1261.59 | San Abraham |
| Including | 197.25 | 198.00 | 0.62 | 1.91 | 306.61 | 11.50 | 13.30 | 0.28 | 1705.13 | San Abraham |
| and | 204.40 | 205.10 | 0.58 | 0.22 | 86.00 | 6.06 | 10.60 | 0.34 | 1090.09 | San Patricio |
| AR18-003 | 150.80 | 151.60 | 0.77 | 0.01 | 291.66 | 0.04 | 0.05 | 0.01 | 297.71 | San Abraham |
| AR18-004 | 43.45 | 47.60 | 3.76 | 0.02 | 129.67 | 0.03 | 0.09 | 0.01 | 138.42 | Armados |
| AR18-005 | 217.75 | 218.35 | 0.43 | 0.65 | 123.54 | 6.33 | 19.60 | 0.43 | 1748.77 | Santacruz |
| and | 226.80 | 227.30 | 0.36 | 0.71 | 79.69 | 1.81 | 9.19 | 0.18 | 818.13 | Santacruz |
| AR18-006 | 184.85 | 185.20 | 0.33 | 0.63 | 68.00 | 2.92 | 10.40 | 0.35 | 948.66 | San Jose |
| AR18-007 | No significant mineralized intersections | | | | | | | | | |
| AR18-008 | 113.95 | 114.65 | 0.36 | 0.06 | 304.00 | 0.00 | 0.83 | 0.02 | 363.28 | Santacruz |

Note: TW = True width (m)

**Table 10-5: Composited assay results, Navidad mine area, Navidad vein system**

| DDH | From (m) | To (m) | TW | Au (g/t) | Ag (g/t) | Pb (%) | Zn (%) | Cu (%) | AgEq (g/t) | Vein |
|---|---|---|---|---|---|---|---|---|---|---|
| NA18-001 | 72.25 | 73.75 | 0.36 | 0 | 105 | 0.04 | 0.07 | 0 | 111.21 | Navidad Upper |
| and | 159.5 | 160.35 | 0.51 | 0.2 | 65.41 | 0 | 1.08 | 0.4 | 199.75 | Other |
| NA18-002 | 67.15 | 68.1 | 0.82 | 0.01 | 284 | 0 | 0 | 0.07 | 293.42 | Navidad Upper |
| and | 88 | 89.55 | 1.34 | 0.57 | 19.29 | 0.56 | 2.07 | 0.26 | 253.26 | Navidad Upper |
| and | 94.35 | 95 | 0.56 | 1.6 | 69 | 4.71 | 9.52 | 0.89 | 1124.46 | Navidad |
| and | 127.75 | 129.65 | 1.65 | 0.81 | 38.16 | 3.25 | 11.3 | 0.01 | 960.57 | San Lorenzo |
| Including | 128 | 129 | 0.49 | 1.12 | 55 | 5.64 | 16.8 | 0.05 | 1299.82 | San Lorenzo |
| NA18-003 | 67.9 | 70.95 | 2.34 | 0.17 | 35 | 0.79 | 5.72 | 0.07 | 451.73 | Navidad Upper |
| NA18-004 | 79 | 81.1 | 1.48 | 0.12 | 312.67 | 0 | 0.53 | 0.29 | 393.25 | Navidad Upper |
| and | 111.1 | 111.6 | 0.38 | 0.3 | 0 | 0 | 1.42 | 0.16 | 132.83 | Navidad Upper |
| and | 112.85 | 113.45 | 0.46 | 0.33 | 0 | 0 | 6.12 | 0.1 | 421.96 | Navidad Upper |
| NA18-005 | No significant mineralized intersections | | | | | | | | | |
| NA18-006 | 56.6 | 58.75 | 1.95 | 0.17 | 668.84 | 0 | 0 | 0.12 | 698.35 | Navidad Upper |
| including | 56.6 | 57.5 | 0.82 | 0.29 | 1220 | 0.34 | 0.76 | 0.01 | 1301.11 | Navidad Upper |
| and | 61.75 | 62.55 | 0.75 | 0.02 | 128 | 0 | 0 | 0.07 | 138.17 | Navidad |
| NA18-006 | 168 | 170 | 1.88 | 0.56 | 129.15 | 0 | 3.03 | 0.63 | 444.62 | San Lorenzo |
| NA18-007 | 145.4 | 145.95 | 0.53 | 0.05 | 94 | 0.06 | 0.17 | 0.04 | 114.47 | Other |
| NA18-008 | 48.25 | 48.7 | 0.44 | 0.02 | 179 | 0.15 | 0.3 | 0.01 | 203.64 | Navidad Upper |
| NA18-009 | 51.2 | 51.75 | 0.52 | 0.2 | 761 | 0.86 | 1.84 | 0.04 | 918.11 | Navidad Upper |
| and | 163 | 163.4 | 0.34 | 0.05 | 11 | 0.09 | 4.59 | 0.02 | 268.87 | Other |
| and | 170.7 | 171.6 | 0.75 | 0.12 | 4 | 0.16 | 3.16 | 0 | 192.1 | Other |
| NA18-010 | 134.85 | 137.8 | 1.94 | 0.75 | 65.05 | 1.23 | 3.84 | 0.03 | 391.57 | Navidad |
| and | 143.5 | 144.2 | 0.46 | 0.06 | 4 | 0.26 | 1.62 | 0.01 | 108.61 | Other |
| and | 148.4 | 149.1 | 0.46 | 0.34 | 7 | 0.39 | 1.9 | 0.01 | 155.3 | Other |
| and | 165.55 | 166.25 | 0.46 | 0.03 | 14 | 1.18 | 4.38 | 0.02 | 304.6 | Other |
| NA18-011 | 185.3 | 186.3 | 0.42 | 2.02 | 48.5 | 2.05 | 4.25 | 0.09 | 544.09 | Navidad |
| NA18-012 | No significant mineralized intersections | | | | | | | | | |
| NA18-013 | 96.2 | 97 | 0.77 | 0.12 | 11 | 0.55 | 1.58 | 0 | 130.04 | Navidad |
| NA18-014 | No significant mineralized intersections | | | | | | | | | |
| NA18-015 | No significant mineralized intersections | | | | | | | | | |
| NA18-016 | No significant mineralized intersections | | | | | | | | | |
| NA18-017 | 112.2 | 113.25 | 0.58 | 0.08 | 8 | 0.83 | 1.61 | 0 | 137.13 | Navidad Upper |
| NA18-018 | No significant mineralized intersections | | | | | | | | | |
| NA18-019 | No significant mineralized intersections | | | | | | | | | |
| NA19-020 | 83.55 | 87.4 | 1.15 | 0.09 | 100 | 0.09 | 0.18 | 0.01 | 122.33 | Navidad |

Note: TW = True width (m)

# 11 SAMPLE PREPARATION, ANALYSES AND SECURITY

## 11.1 Samples Collected by Santacruz

Between November 2015 to September 2016, samples collected by Santacruz were delivered directly to the Rosario laboratory at the Rosario Mine, Charcas, San Luis Potosi, Mexico (approximately 3 hours drive east of Vetagrande town) by Santacruz staff. Between September 2016 to present, all samples, with the exception of drill core, collected at the Veta Grande project are prepared and analyzed at the Veta Grande laboratory at the Vetagrande mineral processing facility. Both the Veta Grande laboratory and the Rosario laboratory are owned by Santacruz and serves the Veta Grande and Rosario mining projects respectively. These laboratories are not considered independent laboratories and do not hold ISO certification. However, the laboratories are working towards ISO 9001/2008 certification. The following descriptions are summarized from Santacruz's Chemical Laboratory Procedures document (PROCEDIMIENTOS LABORATORIO QUÍMICO).

### 11.1.1 Sample Security

Surface and underground grab, chip, and channel samples are collected at the sample site and immediately placed into poly bags along with a sample identification tag and secured with tie straps. The location and length of sample are generally marked in the underground with red paint. Surface sample locations are further marked using aluminum tags. For samples collected at the processing plant, the samples are collected into containers that have a sealable lid. Sample location and sample identification tag numbers are recorded in the field and later transferred to a digital database prior to sample dispatch. Upon completion of the analytical procedures, pulp samples are discarded.

### 11.1.2 Sample Preparation

All samples received at the Veta Grande laboratory are logged into a control sheet for records. The wet weight of each sample is recorded. Samples are dried in an industrial drying oven at 150 °C for up to three hours. The dry weight of the sample is logged and the moisture content is calculated and recorded. Coarse material generally undergoes primary and secondary crushing, riffle splitting, and grinding to achieve a 300-400 g pulp at <75 µ. If required, particle size percentage is determined by sieve analysis for 200 mesh. The analyzed pulp material is then submitted for wet and dry analysis. Different sample types undergo slight variation in the sample preparation procedure to accommodate the original sample particle size and type (i.e. geological, conveyor belt, pulp, and cyclone samples).

### 11.1.3 Analyses

Analysis by 3-Acid Digestion: *"Acid digestion is the traditional method used in the preparation of various types of samples to completely transfer the analytes into solution to be analyzed in liquid form by analytical techniques such as Atomic Absorption Spectrometry. In most cases the digestion is carried out with nitric acid as it is suitable for the extraction of various metals and the addition of nitrates provide a good matrix for determinations by Atomic Absorption Spectrometry. However, some samples require adding different strong acids such as perchloric acid, sulphuric acid or hydrochloric acid to produce an acid digestion aggressive enough to ensure complete digestion.*

*Digestion methods are used to reduce interference due to the presence of organic material and convert the metals to a form that can be analyzed (usually a pure metal). This analysis method is based on heavy metals and strongly acidic digestion using a ratio of 20% $HNO_3$, 30% $HClO_4$ and 50% HCl."*

$$PbS + ZnS + CuFeS_2 + FeS + FeAsS \xrightarrow{HNO_3+HClO_4+HCl} Pb^{2+} + Zn^{2+} + Cu^{+} + Fe^{2+} + As^{+}$$

The equipment used at the Rosario laboratory to analyze Atomic Absorption Spectroscopy is the AAnalyst Perkin Elmer 200. An identical unit is installed at the Vetagrande laboratory.

Analysis by Fire Assay: *"This procedure applies to the determination of gold and silver by fire assay. The fire assay method produces a fusion of the sample using reagents and suitable fluxes to obtain two liquid phases: a slag phase mainly constituted by complex silicates and a metallic phase consisting of lead, which collects gold and silver. When the molten mixture is cooled, the lead remains in the background while a glassy slag remains on top. Precious metals are separated from the lead by a procedure called cupellation and subsequently are subjected to chemical analysis or gravimetric determination, according to final conditions of the sample."*

### 11.1.4 Quality Assurance Quality Control

The Rosario and Vetagrande laboratories incorporate the use of calibration standards in the operation of the AAnalyst Perkin Elmer 200 when performing Atomic Absorption Spectrometry analysis. In addition, duplicate of pulp are inserted into analytical procedures for fire assay. Field duplicate samples, coarse blank samples, pulp blank samples, and pulp standard samples ("QAQC samples") are not inserted into the sampling, preparation and analytical procedures.

### 11.1.5 Opinion

Having reviewed Santacruz's Chemical Laboratory Procedures document (PROCEDIMIENTOS LABORATORIO QUÍMICO) in detail, ARC has no reason to doubt the authenticity of the geochemical data within the surface sampling and underground sampling databases discussed in Section 12. With respect to Santacruz's Chemical Laboratory Procedures, the authors believe the procedures are adequate for Santacruz's internal reporting.

The authors recommend systematically incorporating QAQC samples into the sample submittal and analysis procedures. Systematic submittal of laboratory check samples to a certified external laboratory is also recommended.

Without ISO certification, it is recommended that any future drill core sample produced from the project be submitted to an IOS certified laboratory with adequate QAQC measures introduced into the sampling and analytical procedures.

## 11.2 Samples Collected by Golden Minerals – Panuco Deposit

### 11.2.1 Sample Security

Due to the historical nature of the Panuco drilling dataset, ARC was unable to review and verify the security protocols implemented by Golden Minerals in the handling, storage and transport of core and core samples. Core from the Panuco deposit has been transferred from Golden Mineral's storage facility to Santacruz's warehouse in Guadalupe. This warehouse is in an enclosed compound and is under

surveillance 24 hours a day seven days per week. Currently, all core boxes are labeled and fully enclosed in lidded boxes secured by twine and adhesive tape.

### 11.2.2 Sample Preparation

With respect to the Panuco deposit drill core, ARC was unable to review the sample preparation procedures protocols implemented by Golden Minerals due to the historical nature of the dataset and incomplete records.

Inspection of the Panuco drill core indicates selected core was sawn lengthwise in half, with one half sent for assay and the other half placed in the core box for archive. Sample intervals vary in length and individual samples have a median sample length of 0.60 m. Sample intervals honor geological, alteration and mineralization boundaries. Sample logs indicate that all core was photographed and logged for geological and structural features prior to sawing and sampling. Assay reports indicate that all samples were submitted to ALS Chemex (ALS Minerals), an ISO accredited and certified laboratory service. Samples were prepared at ALS Chemex in Zacatecas, Mexico, and were assayed at ALS Chemex in Vancouver, Canada.

At the laboratory, all samples were prepared by crushing 70% to <2 mm (CRU-31). The fines are rifle split and further pulverized to 85% passing <75 µ (PUL-31).

### 11.2.3 Sample Analysis

Pulps were analyzed by 33 element four acid ICP-AES (0.25 g by ME-ICP61) and fire assay with an AA finish for gold (50g by Au-AA24). Samples with gold results above 10 g/t using Au-AA24 were rerun using fire assay with a gravimetric finish (50g by Au-GRA22). Samples with silver above 100 g/t using ME-ICP61 was rerun using fire assay with a gravimetric finish (30g by Ag-GRA21). Over-limit for copper, lead and zinc using ME-ICP61 were rerun by an aqua regia digestion and ICP-AES finish (ME-OG62).

### 11.2.4 Quality Assurance Quality Control

Inspection of the Panuco drill core and review of the Panuco drilling database suggest that Golden Minerals had implemented a QAQC program that may be considered adequate for that time. However, field duplicates were not implemented and it is unclear if intra-laboratory duplicates or check assays procedures were implemented. Table 11-1 summarized the QAQC samples on record for the Panuco drilling database. However, due to incomplete sample ID records in the QAQC dataset, ARC was unable to correlate all QAQC samples in the Panuco drilling database to the ALS Chemex assay reports. As such, ARC is unable to provide a complete assessment of the data integrity surrounding the QAQC assay sample results.

### 11.2.5 Opinion

It is ARC's opinion that Golden Minerals made reasonable efforts to implement the appropriate QAQC program at the time of drilling at the Panuco deposit, particularly with the insertion of blanks and standard samples in the sample preparation and analytical procedures. Assay analysis was carried out by an ISO certified laboratory.

Santacruz will need to implement its own QAQC procedures in future drilling, including the use of blank, standard, field duplicate and/or intra-lab duplicate, and check assay procedures. Santacruz will also need

to maintain secure storage and transfer protocols. It is recommended that Santacruz retain the similar analytical procedures to ensure future assay results are consistent with the Golden Minerals dataset.

**Table 11-1: QAQC Sample Count, Panuco Drill Hole Database**

| | |
|---|---|
| BLK | 158 |
| N/CONTROL | 1 |
| S/CONTROL | 2 |
| STD A-1 | 37 |
| STD A-2 | 70 |
| STD B-1 | 66 |
| STD B-2 | 25 |
| Total QAQC | 359 |
| Total Samples | 2984 |
| Percentage QAQC | 12.03% |

## 11.3 2018/2019 Phase 1 drill program

### 11.3.1 Sample Security

During the drill program, drill core was transported by Company personnel via pickup truck from the drill site to the Veta Grande mineral processing facility for storage and processing. The Veta Grande mineral processing facility is fenced, gated and monitored by the Company's security personnel on a 24-hour basis. Core is secured within plastic core trays and stacked underneath a tin roof within the core yard. Samples prepared for analytical testing are collected by SGS laboratory personnel from the core yard and transported to the SGS laboratory in Durango.

### 11.3.2 Sample Preparation

Mineralized intersections are marked up by the logging geologist and recorded. Samples are sawn lengthwise in half, with one half sent for assay and the other half placed in the core box for archive. Sample intervals vary in length up to 3.5 m and individual samples have a median sample length of 0.65 m. Sample intervals honor geological, alteration and mineralization boundaries. Core photos indicate that all core was photographed and logged for geological and structural features prior to sawing and sampling. It was noted during ARC' site visit that specific gravity measurements were not collected on drill core in the field.

### 11.3.3 Sample Analysis

Half-core samples were sent to SGS Minerals Services in Durango, Mexico (ISO 17025 accredited), for preparation and analysis. Preparation by the laboratory include crushing the sample 70% to <2 mm. The fines are rifle split and further pulverized to 85% passing <75 µ. Pulp samples are analyzed for 33 elements

by four-acid digestion of a 0.5-gram sample followed by an ICP-AES (inductively coupled plasma atomic emission spectroscopy) finish. Over-limits for lead, zinc and copper were further analyzed by sodium peroxide fusion of a 0.5-gram sample followed by ICP-AES finish. Au and Ag was also analyzed by fire assay of a 30-gram sample followed by AAS (atomic absorption spectroscopy) finish for Au and gravimetric finish for Ag.

### 11.3.4 Quality Assurance Quality Control

Duplicates were inserted on per 15 to 40 mainstream samples, pulp blanks were inserted one per 15 and one per 30 mainstream samples, and pulp standard samples were inserted one per 20 to 30 mainstream samples. Due to the variability of sample batches and the number of selected samples per mineralized interval, the insertion of QAQC samples relied upon the judgement of the logging geologist and not random placement.

### 11.3.5 Opinion

Based on ARC's site inspection, the core logging and sampling facilities at the Veta Grande mineral processing plant appear to be adequate for the safety and proper handling of the drill core samples. It is also ARC's opinion that the QAQC protocol implemented and analytical methods chosen for drill core samples are in line with industry practice.

# 12 DATA VERIFICATION

## 12.1 Surface and Underground Sample Data

As disclosed in the previous technical report, ARC completed the verification of Santacruz's surface and underground exploration sample databases using original assay certificates. Approximately 98% of the relevant values in the surface sample database correlate with original assay certificates. Similarly, approximately 99.5% of the relevant values in the underground sample database correlate with original assay certificates. ARC has no reason to doubt the accuracy of this data.

## 12.2 Panuco Deposit Drilling Data

As disclosed in the previous technical report, ARC conducted a site visit to the Panuco deposit between August 16th and August 18th, 2016. Core from eleven of the 75 drill holes (representing a 14% check) were examined against Golden Mineral's core logs and sample logs. ALS Chemex assay reports were also visually checked against the mineralized intervals for these holes. No material discrepancies were identified and all intervals with high grade results appear to directly correlate to the presence of alteration, veining and sulfide mineralization in drill core.

24 of the 75 drill collars were verified in the field by ARC using a handheld field GPS. Drill collars were easily identified and within ± 8 m of the surveyed coordinates recorded in the Golden Minerals Panuco drilling database. Subsequent to ARC's on-site visit, Santacruz completed a drill collar surveying program using a GeoMax Total Station ZTR20 2". 69 of the 75 drill collars were located and surveyed by total station, representing 92% of the total drill holes. ARC compared the Golden Minerals collar coordinates with the Santacruz collar coordinates and identified position differences of <0.5 m. It is ARC's opinion that there are no material discrepancies in the surveyed collar locations within the Golden Minerals Panuco drilling database.

271 specific gravity measurements were completed by Golden Minerals. Each measurement was conducted by ALS Chemex using a 3.0 g sample of pulverized material with a paraffin coat (OA-GRA08a). Santacruz conducted 312 specific gravity measurements using the Archimedes methodology on ½ drill core samples. An average specific gravity measurement of 2.7 was achieved and appears to be in-line with specific gravity results from ALS Chemex (see section 14.5 for additional information).

Analytical results from 2,598 of 2,607 assay samples within the Golden Minerals Panuco drilling database was verified against a new independent assay database created by ARC. This new independent assay database was generated through the direct import of assay certificates received from ALS Chemex on September 20, 2016. The assay certificates correlate with 99.6% of the assay data in the Panuco drilling database, excluding QAQC samples. Records for nine assay samples could not be located.

Due to incomplete sample ID records in the QAQC dataset, ARC was unable to correlate all QAQC samples in the Panuco drilling database to the ALS Chemex assay certificates. As such, ARC is unable to provide a complete assessment of the data integrity surrounding the QAQC assay sample results.

Noting the incomplete nature of the QAQC sample records, it is ARC's opinion that the assay data within the Panuco drilling database is sufficient for the purpose of determining an Inferred mineral resource

estimation at this time based on ARC's ability of verify 99.6% of assay samples with assay certificates from ALS Chemex.

## 12.3 2018/2019 Phase 1 drill program

During a recent site visit between July 9-10, 2019, ARC reviewed drill collar locations and mineralized drill core intersections for the 2018/2019 Phase 1 drill program completed at the Garcia, Armados and Navidad mine areas. Geological and sample intervals marked in the core boxes were checked against core logs and core photos. All surface drill sites were reviewed and collar locations were checked against collar coordinate information using a handheld GPS. ARC also independently verified the 2018/2019 drill hole database and confirmed that all assay values match original assay certificates provided by SGS Minerals Services.

During the same site visit, ARC confirmed that no additional work has been performed on the Panuco deposit since the initial surface sampling program completed by Santacruz in 2016.

## 12.4 Field Check Samples

### 12.4.1 ARC verification samples

During the site visit on April 28-29, 2016, ARC collected six underground chip samples and three surface chip samples to verify the presence of mineralization at the Veta Grande and La Cantera mining areas. All chip samples were collected across the apparent width of the vein exposure and all grab samples are selected from a random location within the vein.

During a subsequent site visit on August 16-19, 2016 ARC collected one underground rock chip sample from the Navidad mining area and 13 surface rock chip/grab samples of veins from exploration targets within the Zacatecas and Minillas properties, including Panuco surface trenches. All chip samples were collected across the apparent width of the vein exposure and all grab samples are selected from random locations within the vein or rock pile. In addition, two verification samples of drill core were collected from Panuco . The results of the verification assays are provided in Table 12-2 and Table 12-3.

During a recent site visit on July 9-10, 2019 ARC collected five drill core samples, including three samples from NA18-010 and two samples from VG19-014A. The samples were half-core that was sawn lengthwise. The resulting quarter core was submitted for analysis and the remaining quarter-core was returned to the core box.

Each sample was collected in a poly bag along with a sample identification tag and secured with a plastic tie strap. The samples remained in the custody of ARC throughout each field visit and were delivered by ARC to Activation Laboratories Ltd. (ActLabs) in Guadalupe for geochemical testing for gold, silver, lead, zinc, and copper. ActLabs is located at Cantera 3200, Conjunto Industrial de la Plata, Guadalupe, Zacatecas C.P. 98604. ActLabs is ISO 9001-2008 certified (Nº MX14-266 and UKAS Nº MX14-267).

Samples were prepared under code RX1, including crush up to 90% passing 10 mesh, riffle split (250 g) and pulverize (mild steel) to 95% at 105µ. Gold was determined by fire assay under code: 1A2-50. Silver, lead, zinc and copper were determined by 4-acid digestion ICP-OES (37 element) under code: 1F2. Over limits for gold and silver were further determined by fire assay with a gravimetric finish under codes: 1A3-

30 and 8-Ag-50, respectively. Over limits for lead, zinc and copper were determined by Assay Grade 4-Acid Digestion ICP-OES under code: 8-4 Acid ICP-OES. ARC acknowledges that analysis for lead, zinc and copper by 4-acid digestion ICP-OES is not identical to analysis completed by the Rosario Laboratory where the analysis is determined by 3-acid digestion and atomic absorption (AA).

### 12.4.2 Results and Comparisons

Table 12-1 contains assay results of the verification samples collected. In total, 15 of 28 samples >100 g/t Ag returned concentrations ranging from 102.77 g/t Ag to 924.22 g/t Ag, confirming the presence of significant silver mineralization at the various surface exploration targets and underground mining areas within the Veta Grande, Zacatecas and Minillas properties.

With respect to the Panuco deposit, ARC's confirmation assay results for drill core poorly correlate with the Golden Minerals assay results. However, high concentrations of silver was identified in ARC's verification samples. Possible reasons for the poor correlation may include:

a) The verification samples were collected using a core splitter while the Golden Minerals sample was collected using a rock saw. The high impact sampling method of the core splitter may have contributed to loss in vein fill mineralization.

b) The verification sample comprised of a quarter-core split from the reaming half core. Depending on the degree of heterogeneity (nugget-effect), the quarter-core samples may not represent the same mineralization as the Golden Minerals half-core.

c) The Golden Minerals selection of half-core may have been subject to visual bias, where the better mineralized half-core was submitted for analysis.

It is ARC's opinion that the poor correlation is not unusual. Of greater importance is the identification of high concentrations of silver in the drill core verification sample.

The five rock chip samples collected from surface vein exposures at or near previous Golden Minerals trench sites were collected to verify mineralization at surface at the Panuco deposit. Table 12-4 and 12-5 compare assay results between Golden Minerals (GM) rock chip in trench samples and ARC's surface rock chip in vein samples. It is ARC's opinion that sample groups compare well with each other.

With respect to the 2018/2019 Phase 1 drill program completed by Santacruz, four out of five verification samples correlate well with the assay results reported by SGS Minerals Services. It is ARC's opinion that results are within acceptable limits.

## 12.5 Opinion

It is ARC's opinion that the information verified is adequate to support the underground and surface work reported herein.

**Table 12-1 Assay results of rock chip and rock grab verification samples.**

| Analyte | Ag | Ag | Au | Cu | Pb | Pb | Zn | Zn | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method Type | TD-ICP | FA-GRAV | FA-AAS | TD-ICP | TD-ICP | ICP-OES | TD-ICP | ICP-OES | | | | | | |
| Units | ppm | g/mT | ppm | ppm | ppm | % | ppm | % | Date Submitted | Area/Portal | Type | Level | Type | Sample Length (m) |
| Limit | 0.3 | 3 | 0.005 | 1 | 3 | 0.003 | 1 | 0.001 | dd-mm-yyyy | | | | | |
| 7601 | 8.1 | | 0.072 | 68 | 1110 | | 5370 | | 29-Apr-2016 | Guadalupana | UG | 2441 | C | 2.0 |
| 7602 | 72.3 | | 0.108 | 321 | > 5000 | 2.41 | > 10000 | 13.2 | 29-Apr-2016 | Guadalupana | UG | 2438 | G | - |
| 7603 | > 100 | 145.05 | 0.04 | 75 | 951 | | 881 | | 29-Apr-2016 | Veta Grande | S | | C | 0.4 |
| 7604 | > 100 | 225.98 | 0.005 | 13 | 302 | | 2640 | | 29-Apr-2016 | Armados | UG | 2568 | C | 3.5 |
| 7605 | > 100 | 437.27 | 0.956 | 211 | > 5000 | 0.856 | > 10000 | 1.03 | 29-Apr-2016 | Garcia | UG | 2582 | C | 0.2 |
| 7606 | 31.1 | | 0.291 | 442 | > 5000 | 0.706 | > 10000 | 2.44 | 29-Apr-2016 | Garcia | UG | 2490 | C | 2.0 |
| 7607 | 57 | | 0.562 | 484 | > 5000 | 1.8 | > 10000 | 4.41 | 29-Apr-2016 | Garcia | UG | 2470 | C | 1.40 |
| 7608 | > 100 | 226.11 | 0.048 | 23 | 362 | | 373 | | 29-Apr-2016 | Cata de Juanes | S | - | C | 1.40 |
| 7609 | > 100 | 265.02 | 0.042 | 130 | 1170 | | 3700 | | 29-Apr-2016 | Cata de Juanes | S | - | C | 0.30 |
| 7612 | 58.1 | | 0.054 | 39 | 9 | | 282 | | 19-Aug-2016 | Panuco | S | - | C | 0.90 |
| 7613 | > 100 | 209.94 | 0.603 | 110 | 139 | | 557 | | 19-Aug-2016 | Panuco | S | - | C | 1.60 |
| 7614 | > 100 | 268.59 | 0.138 | 52 | 235 | | 59 | | 19-Aug-2016 | Panuco | S | - | C | 0.90 |
| 7616 | > 100 | 134.33 | 0.085 | 65 | 140 | | 494 | | 19-Aug-2016 | Panuco | S | - | C | 1.00 |
| 7617 | > 100 | 110.83 | 0.105 | 232 | 133 | | 574 | | 19-Aug-2016 | Panuco | S | - | C | 0.80 |
| 7622 | > 100 | 148.67 | 0.016 | 9 | 16 | | 14 | | 19-Aug-2016 | Muleros | S | - | G | - |
| 7623 | > 100 | 102.77 | 0.398 | 29 | 220 | | 1070 | | 19-Aug-2016 | El Cristo | S | - | C | 1.50 |
| 7624 | 31.5 | | 0.054 | 16 | 354 | | 808 | | 19-Aug-2016 | El Cristo | S | - | C | 0.50 |
| 7625 | 94.5 | | 1.193 | 425 | > 5000 | 0.647 | 2090 | | 19-Aug-2016 | San Manuel San Gill | S | - | C | 1.10 |
| 7627 | 79.6 | | 0.013 | 147 | > 5000 | 0.867 | 4160 | | 19-Aug-2016 | Loreto | S | - | G | - |
| 7628 | > 100 | 924.22 | 0.008 | 309 | > 5000 | 0.793 | > 10000 | 1.69 | 19-Aug-2016 | Loreto | S | - | G | - |
| 7629 | 31.9 | | 0.031 | 175 | 818 | | 1060 | | 19-Aug-2016 | Loreto | S | - | C | 0.50 |
| 7630 | > 100 | 157.01 | 0.006 | 56 | 1170 | | 2780 | | 19-Aug-2016 | Loreto | S | - | C | 0.50 |
| 7631 | 19.1 | | 0.007 | 22 | 128 | | 676 | | 19-Aug-2016 | Navidad | UG | - | C | 7.00 |
| A09919 | 10.2 | | 0.014 | 24 | | | 963 | | 10-Jul-2019 | NA18-010 | DC | - | DC | 0.60 |
| A09920 | 34.3 | | 0.398 | 319 | 581 | 1.883 | >10000 | 3.239 | 10-Jul-2019 | NA18-010 | DC | - | DC | 0.40 |
| A09921 | 73 | | 1.07 | 414 | >5000 | 2.419 | >10000 | 6.063 | 10-Jul-2019 | NA18-010 | DC | - | DC | 1.55 |
| A09923 | >100 | 187.64 | 1.135 | 4470 | >5000 | 6.103 | >10000 | 7.006 | 10-Jul-2019 | VG19-014A | DC | - | DC | 0.70 |
| A09924 | >100 | 575.3 | 0.676 | 636 | >5000 | | >10000 | 1.222 | 10-Jul-2019 | VG19-014A | DC | - | DC | 0.55 |

Abbreviations: M = Minillas Property, VG = Veta Grande Properties, Z = Zacatecas Properties,
C = Chip, G = Grab, S = Surface, UG = Underground, V = Vein, DC = Drill Core

**Table 12-2: Verification sample results for drill core - gold and silver**

| HoleID | From | To | Length | Sample ID | | Au (ppm) | | Ag (ppm) | |
|---|---|---|---|---|---|---|---|---|---|
| | (m) | (m) | (m) | GM | ARC | GM | ARC | GM | ARC |
| PA09-07 | 255.18 | 255.58 | 0.4 | PA0907-165 | 7619 | 0.218 | 0.116 | 2190 | 150.33 |
| PA10-20 | 165.29 | 165.68 | 0.39 | PA1020-115 | 7620 | 0.185 | 0.132 | 1185 | 59.7 |

**Table 12-3: Verification sample results for drill core - lead and zinc**

| HoleID | From | To | Length | Sample ID | | Pb (ppm) | | Zn (ppm) | |
|---|---|---|---|---|---|---|---|---|---|
| | (m) | (m) | (m) | GM | ARC | GM | ARC | GM | ARC |
| PA09-07 | 255.18 | 255.58 | 0.4 | PA0907-165 | 7619 | 1195 | 32 | 1610 | 96 |
| PA10-20 | 165.29 | 165.68 | 0.39 | PA1020-115 | 7620 | 23 | < 3 | 166 | 53 |

**Table 12-4: Comparison of rock chip verification assay with Golden Minerals data for gold and silver**

| | | | Length (m) | | Au (g/t) | | Ag (g/t) | |
|---|---|---|---|---|---|---|---|---|
| VEIN | TRENCH | Sample | GM | ARC | GM | ARC | GM | ARC |
| PAN. CENTRAL | SN_K | 7612 | 3.6 | 0.9 | 0.06 | 0.054 | 92.22 | 58.1 |
| PAN. CENTRAL | SN_N | 7613 | 3.3 | 1.6 | 0.29 | 0.603 | 331.83 | 209.94 |
| PAN. CENTRAL | SN_C | 7614 | 3.45 | 0.9 | 0.09 | 0.138 | 18.74 | 268.59 |
| TRES CRUCES | ZR25_024 | 7616 | 2.8 | 1 | 0.08 | 0.085 | 325.75 | 134.33 |
| PAN. NW | ZR21_083 | 7617 | 3.2 | 0.8 | 0.06 | 0.105 | 75.58 | 110.83 |

**Table 12-5: Comparison of rock chip verification assay with Golden Minerals data for lead and zinc**

| | | | Length (m) | | Pb (%) | | Zn (%) | |
|---|---|---|---|---|---|---|---|---|
| VEIN | TRENCH | Sample | GM | ARC | GM | ARC | GM | ARC |
| PAN. CENTRAL | SN_K | 7612 | 3.6 | 0.9 | 0.0014 | 0.0009 | 0.0286 | 0.0282 |
| PAN. CENTRAL | SN_N | 7613 | 3.3 | 1.6 | 0.0139 | 0.0139 | 0.0483 | 0.0557 |
| PAN. CENTRAL | SN_C | 7614 | 3.45 | 0.9 | 0.0017 | 0.0235 | 0.0077 | 0.0059 |
| TRES CRUCES | ZR25_024 | 7616 | 2.8 | 1 | 0.0033 | 0.0140 | 0.0312 | 0.0494 |
| PAN. NW | ZR21_083 | 7617 | 3.2 | 0.8 | 0.0071 | 0.0133 | 0.0141 | 0.0574 |

# 13 MINERAL PROCESSING AND METALLURGICAL TESTING

Conventional metallurgical test work has not been completed for the Panuco deposit or any of the known veins at the Veta Grande project.

# 14 MINERAL RESOURCE ESTIMATES

RockRidge Partnership & Associates (RockRidge) was contracted by Santacruz Silver Mining Ltd. to complete a mineral resource estimate for a number of separate veins on the Veta Grande project located near the southeastern boundary of the Sierra Madre Occidental physiographic province in north-central Mexico, within the State of Zacatecas. The Veta Grande project consists of 184 mining concessions covering an area of 8,944 hectares (22,102 acres) in Zacatecas, Mexico. The concessions are divided into three groups, described as the Veta Grande properties, Minillas property and the Zacatecas properties (collectively "Veta Grande project"). This resource estimation is confined to three veins within the Zacatecas property known as the Panuco Central vein, Panuco NW vein and Tres Cruces Vein.

The resources were estimated by Michael F. O'Brien, P.Geo, who is a qualified person by virtue of education, experience and membership in a professional association. He is independent of the company applying all the tests in Section 1.5 of National Instrument 43-101. The effective date for this resource is July 12, 2019 the date the data was received. Mr. O'Brien has not visited the Property.

There appear to be no issues or factors that could materially affect the mineral resource estimate. This includes no issue involved with environmental permitting, legal, title, taxation, socio-economic, marketing, political, mining, metallurgy or infrastructure.

### 14.1.1 Data Analysis

The supplied data consisted of 75 drill hole collars, 866 down hole surveys and 2,607 assayed samples. A surface trench database totaling 183 trenches was also supplied. The trench database was validated and all overlap and duplicate errors were removed. After validation, 1,813 assays were available. Of the supplied assays gold, silver, lead and zinc were used for this resource estimation.

Three dimensional solids were modeled in Leapfrog software from intersections containing vein samples to constrain the three main mineralized veins, namely the Panuco Central vein, the Panuco Northwest vein and the Tres Cruces vein. Vein modeling was restricted to the three main veins. Secondary veins, splays and anastomosing veinlets were not modeled. Vein intersections were selected in drill holes and trenches based on grade and lithological information to represent a 3-dimensional model consistent with the mapped and sampled surface expressions on each vein (Figure 14-1 and Figure 14-2).

Of the supplied drill holes, 73 passed through one or more of the veins while of the supplied trenches 153 contained information for the three veins being estimated. The raw assay statistics are presented below in Table 14-1.

To determine if top cutting/capping of high-grade outliers were required, the grade distribution for each variable was examined for each vein structure. Coefficient of variation plots and lognormal cumulative frequency plots were produced for each metal within each vein. Trimming limits for each of the veins were determined. The trimming limits and number of samples capped are tabulated in Table 14-2 below.

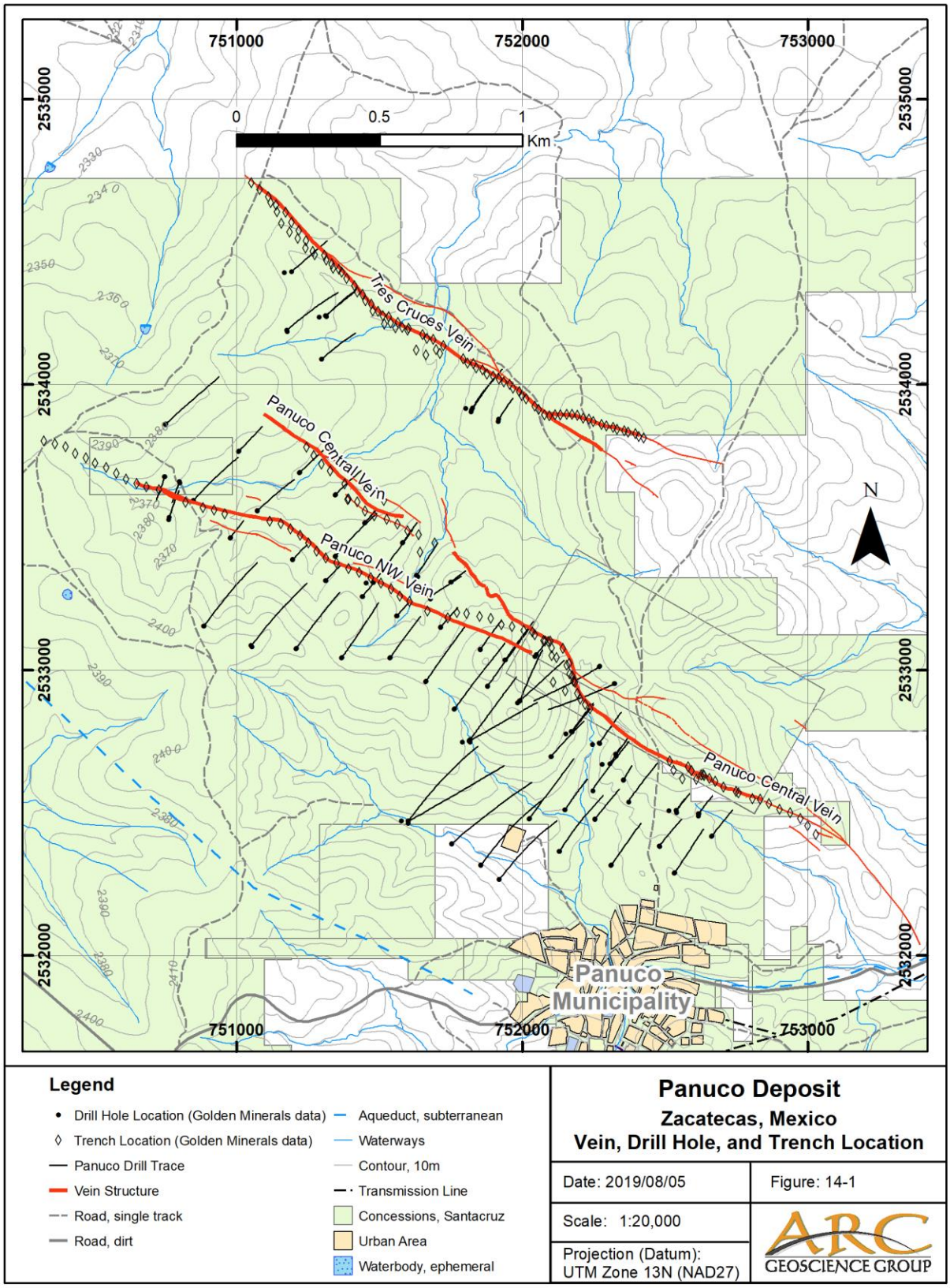


**Figure 14-1: Plan View Showing Panuco Vein Structures**

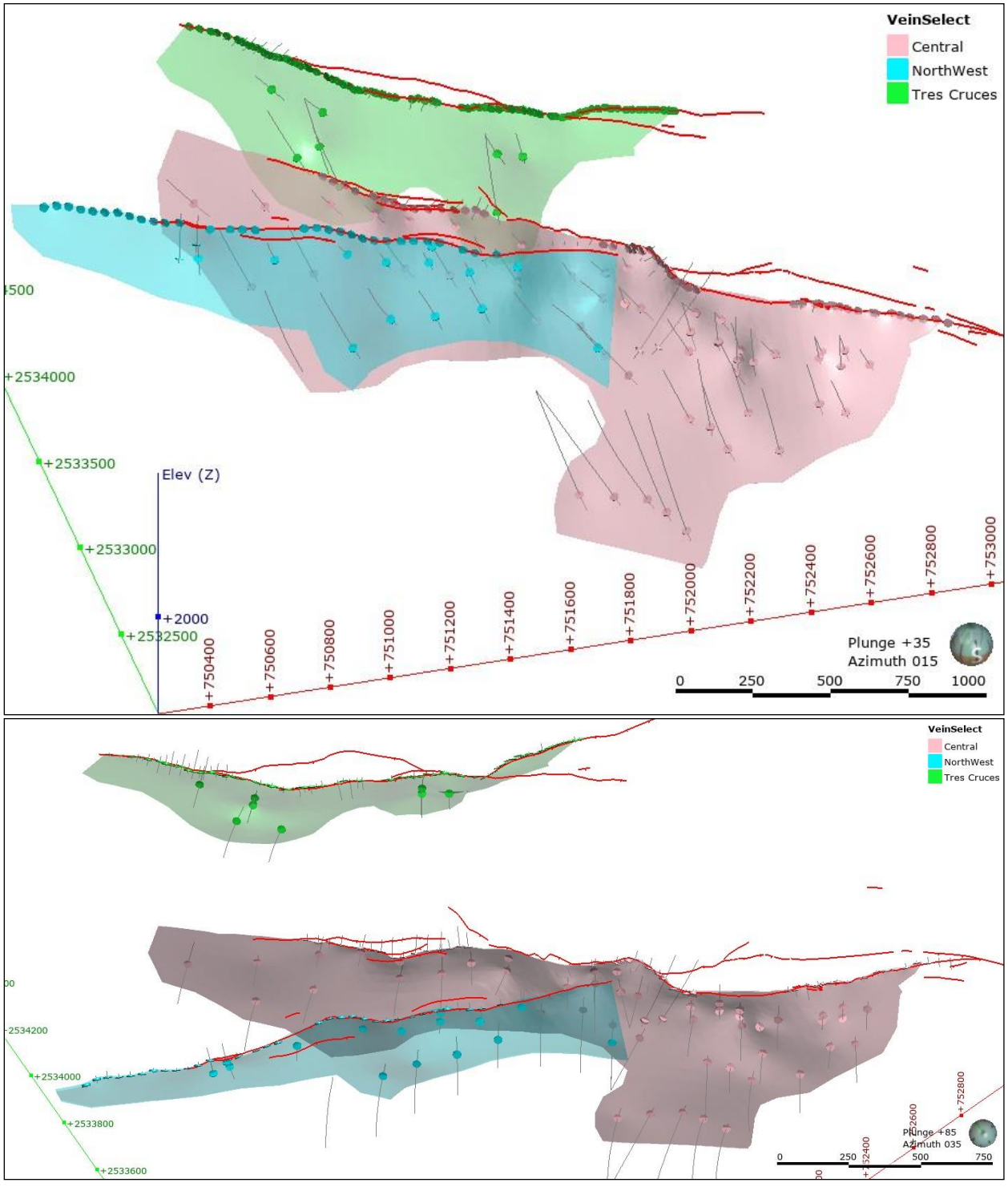


**Figure 14-2: Isometric Views Showing modeled Panuco Vein Structures**

**Table 14-1: Assay Statistics**

| Type | Vein | Variable | Count | Mean | Standard Deviation | Minimum Value | Maximum Value | Coefficient Of Variation |
|---|---|---|---|---|---|---|---|---|
| DDH & Trench | **Central** | Ag (g/t) | 384 | 119.5 | 257.1 | 0.25 | 1795 | 2.15 |
| | **NW** | | 221 | 41.5 | 185.3 | 0.25 | 2090 | 4.47 |
| | **Tres Cruces** | | 224 | 89.8 | 250.7 | 0.25 | 2870 | 2.79 |
| | **Central** | Au (g/t) | 384 | 0.14 | 0.21 | 0.003 | 1.55 | 1.51 |
| | **NW** | | 221 | 0.06 | 0.18 | 0.003 | 1.98 | 3.06 |
| | **Tres Cruces** | | 224 | 0.14 | 0.17 | 0.003 | 1.39 | 1.22 |
| | **Central** | Pb (%) | 384 | 0.05 | 0.19 | 0.001 | 2.07 | 3.93 |
| | **NW** | | 221 | 0.002 | 0.01 | 0.0001 | 0.06 | 2.59 |
| | **Tres Cruces** | | 224 | 0.004 | 0.01 | 0.001 | 0.12 | 2.55 |
| | **Central** | Zn (%) | 384 | 0.09 | 0.47 | 0.001 | 8.54 | 5.27 |
| | **NW** | | 221 | 0.01 | 0.01 | 0.0009 | 0.06 | 0.83 |
| | **Tres Cruces** | | 224 | 0.02 | 0.02 | 0.0013 | 0.24 | 1.50 |

**Table 14-2: Cap levels for veins**

| Domain | Variable | Cap Level | Number Capped | Percent Capped |
|---|---|---|---|---|
| **Central** | Au (g/t) | 1.3 g/t | 2 | 0.5% |
| | Ag (g/t) | 910 g/t | 11 | 2.9% |
| | Pb (%) | 0.3 % | 13 | 3.4% |
| | Zn (%) | 1.5 % | 3 | 0.8% |
| **Tres Cruces** | Au (g/t) | 1.39 g/t | 0 | 0% |
| | Ag (g/t) | 485 g/t | 3 | 1.3% |
| | Pb (%) | 0.39 % | 2 | 0.9% |
| | Zn (%) | 0.16 % | 2 | 0.9% |
| **NW** | Au (g/t) | 0.20 g/t | 8 | 3.6% |
| | Ag (g/t) | 320 g/t | 3 | 1.4% |
| | Pb (%) | 0.013% | 7 | 3.2% |
| | Zn (%) | 0.058 % | 1 | 0.5% |

The results from capping are tabulated in Table 14.3 with the coefficient of variation being reduced in all cases to reasonable levels.

**Table 14-3: Capped Assay Statistics**

| Vein | Variable | Number | Mean | Standard Deviation | Minimum Value | Maximum Value | Coefficient Of Variation |
|---|---|---|---|---|---|---|---|
| **Central** | Ag (g/t) | 384 | 105.8 | 187.9 | 0.001 | 910.0 | 1.78 |
| **NW** | | 221 | 27.2 | 55.7 | 0.250 | 320.0 | 2.05 |
| **Tres Cruces** | | 224 | 70.3 | 89.9 | 0.250 | 485 | 1.28 |
| **Central** | Au (g/t) | 384 | 0.14 | 0.20 | 0.001 | 1.3 | 1.48 |
| **NW** | | 221 | 0.04 | 0.05 | 0.002 | 0.2 | 1.26 |
| **Tres Cruces** | | 224 | 0.14 | 0.17 | 1.39 | 1.39 | 1.22 |
| **Central** | Pb (%) | 384 | 0.029 | 0.06 | 0.001 | 0.3 | 2.23 |
| **NW** | | 221 | 0.002 | 0.003 | 0.0001 | 0.013 | 1.46 |
| **Tres Cruces** | | 224 | 0.004 | 0.01 | 0.0001 | 0.039 | 1.82 |
| **Central** | Zn (%) | 384 | 0.05 | 0.11 | 0.001 | 1.5 | 2.8 |
| **NW** | | 221 | 0.01 | 0.01 | 0.001 | 0.058 | 0.82 |
| **Tres Cruces** | | 224 | 0.02 | 0.02 | 0.0013 | 0.16 | 1.34 |

## 14.2 Composites

Samples in vein material ranged from 0.09 m to 2.25 m in length. Composites of 1 m lengths were chosen as the median of the samples were at that length and naïve statistics indicated average lengths of between 0.7m for the Central Vein to 1m for the Tres Cruces vein. Small composites were eliminated by using a compositing method that forces all samples to be included in one of the composites by adjusting the composite length, while keeping it as close as possible to the selected 1m composite length. Composites were created from both drill holes and trenches.

**Table 14-4: 1 m Composite Statistics**

| Vein | Variable | Number | Mean | Standard Deviation | Minimum Value | Maximum Value | Coefficient Of Variation |
|---|---|---|---|---|---|---|---|
| **Central** | Ag (g/t) | 265 | 82.9 | 122.4 | 0.116 | 910 | 1.48 |
| **NW** | | 178 | 23.1 | 36.3 | 0.25 | 250.4 | 1.57 |
| **Tres Cruces** | | 212 | 67.2 | 73.9 | 0.25 | 485.0 | 1.10 |
| **Central** | Au (g/t) | 265 | 0.12 | 0.17 | 0.0001 | 1.15 | 1.35 |
| **NW** | | 178 | 0.04 | 0.14 | 0.003 | 0.20 | 1.08 |
| **Tres Cruces** | | 212 | 0.13 | 0.13 | 0.003 | 0.78 | 1.02 |
| **Central** | Pb (%) | 265 | 0.008 | 0.01 | 0.0001 | 0.03 | 1.25 |
| **NW** | | 178 | 0.002 | 0.002 | 0.0001 | 0.011 | 1.21 |
| **Tres Cruces** | | 212 | 0.004 | 0.010 | 0.001 | 0.034 | 1.62 |
| **Central** | Zn (%) | 265 | 0.05 | 0.12 | 0.0001 | 0.88 | 2.43 |
| **NW** | | 178 | 0.01 | 0.01 | 0.001 | 0.038 | 0.68 |
| **Tres Cruces** | | 212 | 0.02 | 0.02 | 0.0013 | 0.11 | 1.03 |

In addition to the variables shown, a full 33 element ICP package was available for analysis. To evaluate the relationships between variables a graphical tool called a dendrograph was used. The dendrograph is a graphical method of clustering that depends on the correlation coefficients shown along the Y axis. The results show different relationships between the minerals within each vein.

Within the Panuco Central vein gold, arsenic, silver and antimony are very well correlated and this group is then correlated with the group of zinc, cadmium, lead, copper and sulphur (see Figure 14-3).

Within the Tres Cruces vein gold, arsenic, copper, silver, antimony, lead, cadmium and zinc form a closely correlated group (see Figure 14-4).

Within the Panuco NW vein gold and silver are well correlated and associated with antimony, arsenic, thallium, bismuth, molybdenum and barium. The group of zinc, cadmium and lead are loosely correlated with the gold-silver group. Copper in this vein is not well correlated with any of the other base metals (see Figure 14-5).

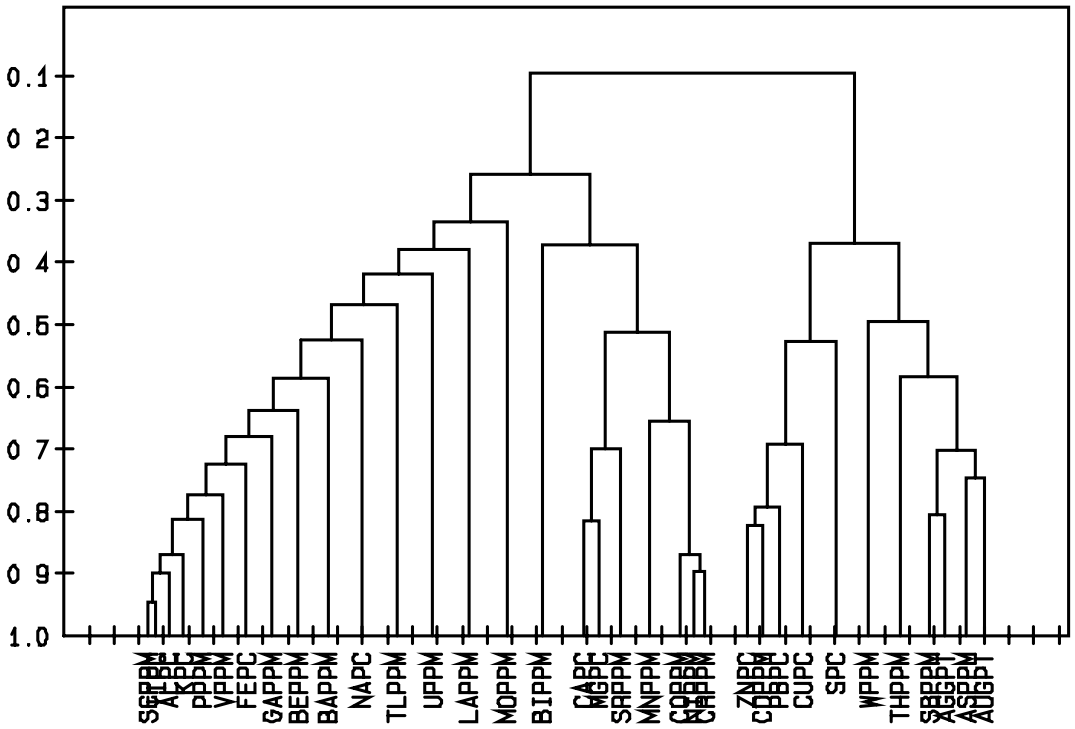


**Figure 14-3: Dendrograph for Panuco Central Vein**

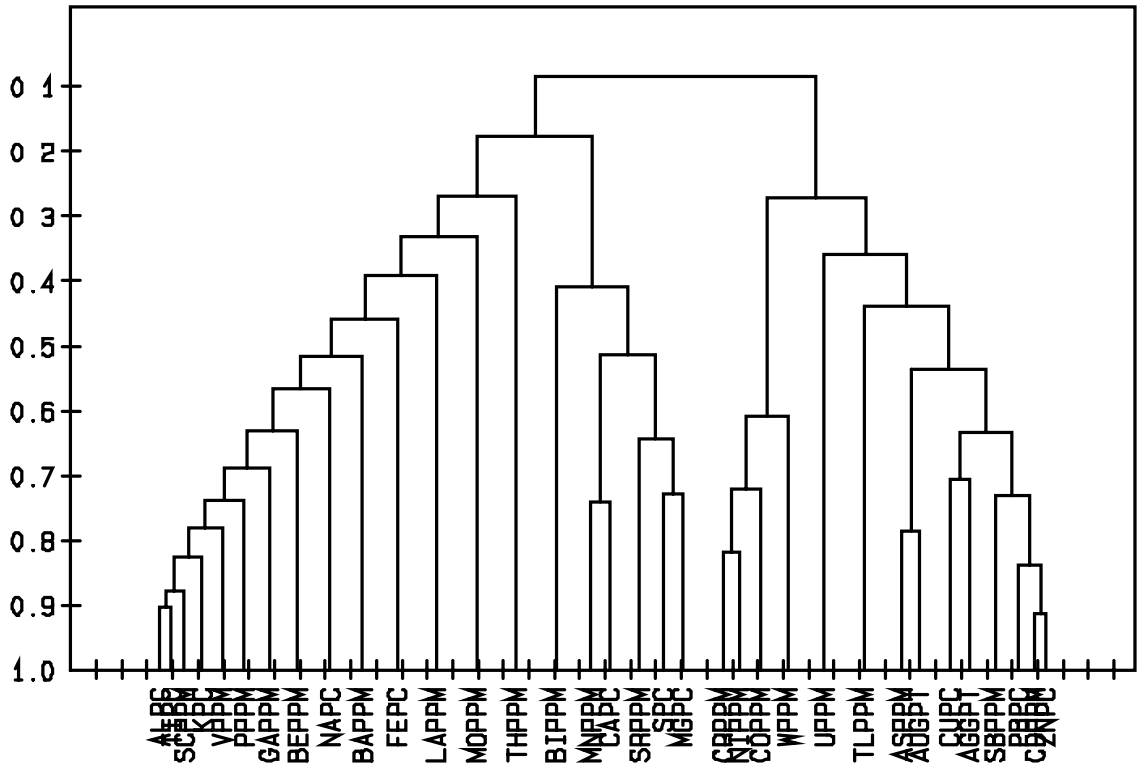


**Figure 14-4: Dendrograph for Tres Cruces Vein**

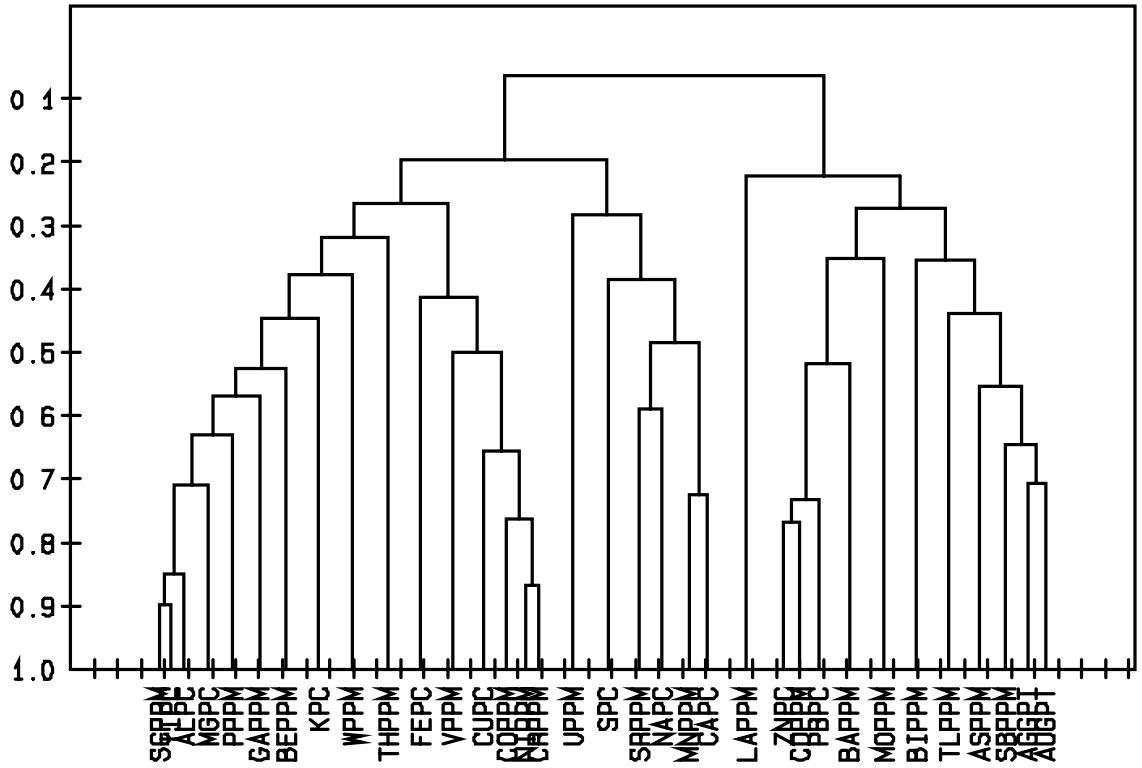


**Figure 14-5: Dendrograph for Panuco NW Vein**

## 14.3 Variography

Variography was attempted for Au, Ag, Pb and Zn within each of the three veins. The samples are clustered with closely spaced trench data and loosely spaced drill intersections down-dip. The only vein with sufficient data to produce meaningful models was the Panuco Central vein. Pairwise relative semi-variograms were used to model Au, Ag, Pb and Zn within the Panuco Central vein. No clear anisotropy could be observed in the plane of the vein. One-structure isotropic variogram models were fitted to the experimental semi-variograms for each of the four metals in the plane of the vein. Across dip semi-variograms were calculated to establish the nugget and model the across dip range.

The variogram model parameters are shown in Table 14-5.

**Table 14-5: Semivariogram Parameters for the Panuco Central vein**

| Variable | Azi | Dip | Nugget | Range in Plane | Range Across Dip | C1 |
|---|---|---|---|---|---|---|
| Au | 129° | 56.5° | 0.25 | 100m | 6.8m | 0.47 |
| Ag | | | 0.40 | 100m | 6.6m | 0.35 |
| Pb | | | 0.17 | 100m | 6m | 0.77 |
| Zn | | | 0.26 | 100m | 10m | 0.36 |

## 14.4 Block Model

The mineralized solids were filled using rotated block models with blocks measuring 20 m along strike and dip, and 1 m across strike. Sub-cells with precise boundary location were used to fill the models to represents accurate volumes when compared to the modelled vein solids. Each vein block model has a slightly different rotation to provide a best-fit for each particular vein strike and dip. An example of the block fill is shown in **Figure 14-6** below.

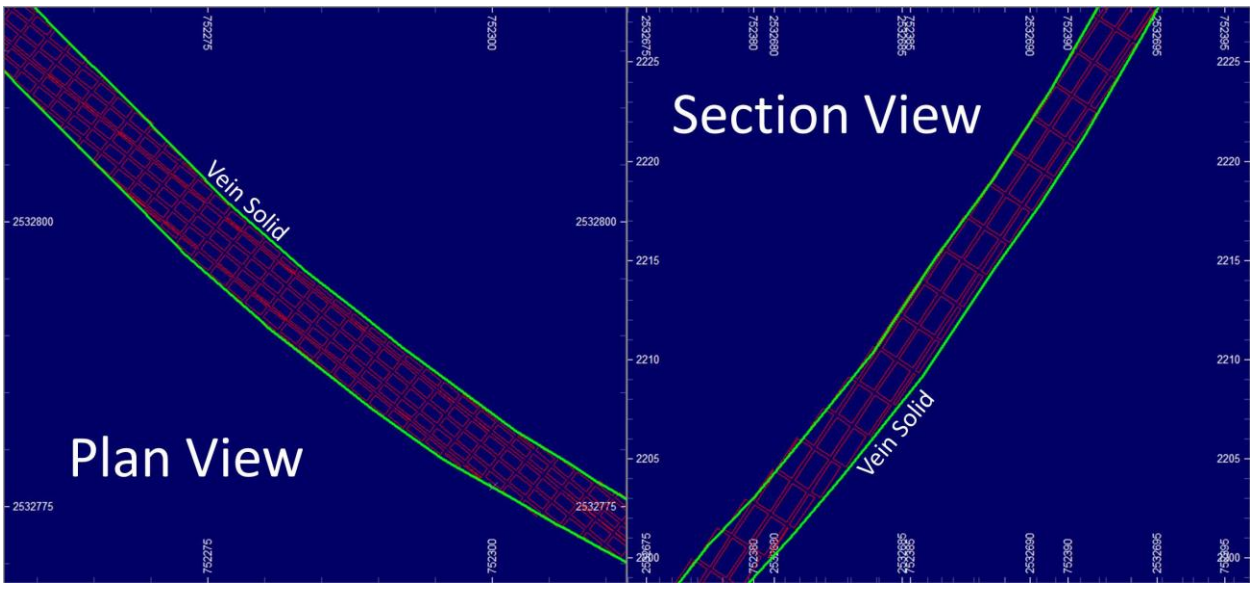


**Figure 14-6: Block fill - Panuco Central Vein**

## 14.5 Bulk Density

A total of 271 specific gravity measurements were completed by ALS Chemex using analytical procedure OA-GRA08a, which utilized a 3.0 g sample of pulverized material with a paraffin coat. The following is extracted from ALS Chemex Schedule of Services dated September 12, 2008:

> A prepared sample (3.0 g) is weighed into an empty pycnometer. The pyncometer is filled with a solvent (either methanol or acetone) and then weighed. From the weight of the sample and the weight of the solvent displaced by the sample, the specific gravity is calculated according to the equation below.

$$\text{Specific Gravity} = \frac{\text{Weight of Sample (g)}}{\text{Weight of solvent displaced (g)}} \times \text{Specific Gravity of Solvent}$$

The results are presented first sorted by lithology.

**Table 14-6: Specific Gravity Determinations sorted by Lithology**

| LITHOLOGY | Number | Minimum SG | Maximum SG | Average SG |
|---|---|---|---|---|
| Vein | 105 | 2.44 | 3.08 | 2.74 |
| Fault | 2 | 2.64 | 2.66 | 2.65 |
| Diorite Dyke | 16 | 2.28 | 2.80 | 2.63 |
| Sediments | 32 | 2.51 | 2.81 | 2.70 |
| Volcanic flows | 26 | 2.53 | 3.01 | 2.73 |
| Volcanic Tuff | 90 | 2.32 | 2.87 | 2.66 |
| Waste (non-vein material) | 166 | 2.28 | 3.01 | 2.68 |

To determine if specific gravity is a function of grade the vein samples can be sorted by silver equivalent. A silver equivalent value was determined for each sample using the following assumptions. Recoveries are based on actual recoveries from the Vetegrande mineral processing facility which is currently processing material from the nearby Veta Grande vein systems.

| | | |
|---|---|---|
| Gold price $1350/oz | Recovery of 52.2 % | Factor = Au *Rec*Price/31.1035 = 22.66 |
| Silver price $16/oz | Recovery of 62.1 % | Factor = Ag *Rec*Price/31.1035 = 0.32 |
| Lead price $0.90/lb | Recovery of 87.9 % | Factor = Pb% * 22.046223 * Rec * Price = 17.44 |
| Zinc price $1.10/lb | Recovery of 78.6 % | Factor = Zn% * 22.046223 * Rec * Price = 19.06 |

GMV = (Au *Rec*Price/31.1035) + (Pb% * 22.0462 * Rec * Price) + (Ag * Rec * Price/31.1035) + (Zn% * 22.0462 * Rec * Price)
AgEq = GMV / Ag Factor = GMV / 0.32

The correlation between AgEq grades and specific gravity is a very low ($r^2$ = 0.1380) within vein material (see Figure 14-5). This reflects the generally low lead and zinc grades in the Panuco veins with silver more associated with silver sulfosalts, argentite and arsenopyrite. This is also shown in the dendrograph plots (see Figures 14-3 to 14-5) with gold and silver closely correlated with arsenic in all veins.

For this resource estimate, an average specific gravity of 2.74 was applied to all veins.

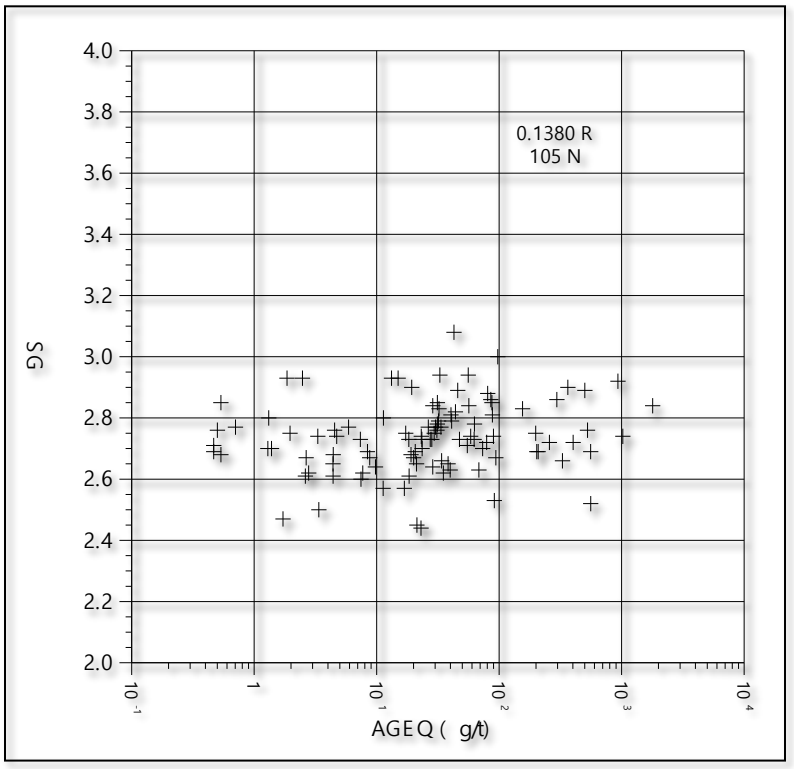


**Figure 14-7: Scatter plot for AgEq vs SG in Vein Samples**

## 14.6 Grade Interpolation

Grades for gold, silver, lead and zinc were interpolated into blocks using the following estimation algorithms:

1. Central - Ordinary Kriging
2. NW - Inverse Distance Squared
3. Tres Cruces - Inverse Distance Squared

Each vein was estimated separately using only composites from that vein. Due to the sparsity of drill hole data both drill hole and surface trench composites were used. The estimates were completed in a series of passes with the search dimensions varying as a function of the semivariogram range in each of the three principal directions. For the first pass the search ellipsoid dimensions were set to the semivariogram range for the variable being estimated. For blocks not estimated in the first pass a second pass using one and a half times the semivariogram range was completed. A third pass using twice the range was then run.

The first estimation iteration used search ellipsoids optimally aligned along strike and down dip for the vein being estimated. As a result of the small search distances in the across-dip (perpendicular to the vein) search direction, and the sinuous nature of the veins, the initial estimates generated using a constant variogram and search ellipsoid exhibited an artificially banded appearance, due to systematic artefacts

due to higher grade samples in the core of the veins being misaligned to the search ellipsoids. Misalignment of the search volume by even a few degrees can cause the extrapolation of ore into waste and waste into ore. A second and final estimation was set up using dynamic anisotropy, which allows the search volume to be oriented to follow the local trend of the mineralization precisely. Hangingwall and footwall wireframes were used as reference surfaces to orient the search for each individual block to be estimated. The results illustrate a dramatic improvement compared to the initial single ellipsoid search strategy. (See Figure 14-8 below)

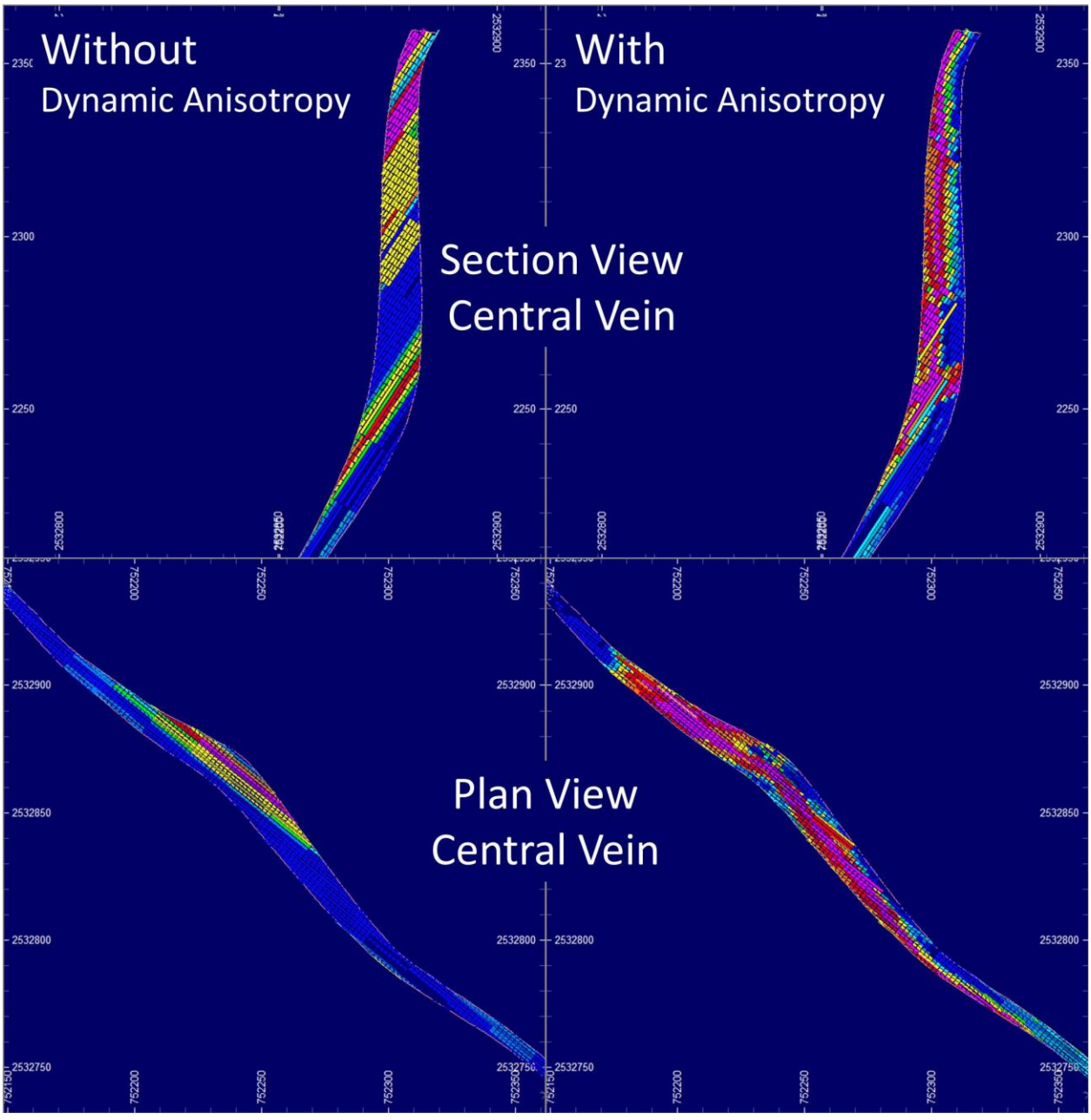


**Figure 14-8: Search strategy differences**

The search parameters for each of the veins are tabulated below.

**Table 14-7: Search Parameters**

| Pass No | Search Distances | | | Number of Samples | | Min No of Drill holes |
|---|---|---|---|---|---|---|
| | Strike | Dip | Across Dip | Minimum | Maximum | |
| 1 | 100 | 100 | 10 | 6 | 15 | 3 |
| 2 | 150 | 150 | 15 | 4 | 15 | 2 |
| 3 | 200 | 200 | 20 | 2 | 15 | 1 |

*Search angles determined by dynamic anisotropy angles from reference surface

## 14.7 Classification

Based on the study herein, delineated mineralization of the Panuco Deposit is classified as a resource according to the following definitions from National Instrument 43-101 and from CIM (2014):

*"In this Instrument, the terms "Mineral Resource", "Inferred Mineral Resource", "Indicated Mineral Resource" and "Measured Mineral Resource" have the meanings ascribed to those terms by the Canadian Institute of Mining, Metallurgy and Petroleum, as the CIM Definition Standards (May 2014) on Mineral Resources and Mineral Reserves adopted by CIM Council, as those definitions may be amended."*

The terms Measured, Indicated and Inferred are defined by CIM (2014) as follows:

*"A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling."*

*"The term Mineral Resource covers mineralisation and natural material of intrinsic economic interest which has been identified and estimated through exploration and sampling and within which Mineral Reserves may subsequently be defined by the consideration and application of Modifying Factors. The phrase 'reasonable prospects for economic extraction' implies a judgement by the Qualified Person in respect of the technical and economic factors likely to influence the prospect of economic extraction. The Qualified Person should consider and clearly state the basis for determining that the material has reasonable prospects for eventual economic extraction. Assumptions should include estimates of cut-off grade and geological continuity at the selected cut-off, metallurgical recovery, smelter payments, commodity price or product value, mining and processing method and mining, processing and general and administrative costs. The Qualified Person should state if the assessment is based on any direct evidence and testing. Interpretation of the word 'eventual' in this context may vary depending on the commodity or mineral involved. For example, for some coal, iron, potash deposits and other bulk minerals or commodities, it may be*

*reasonable to envisage 'eventual economic extraction' as covering time periods in excess of 50 years. However, for many gold deposits, application of the concept would normally be restricted to perhaps 10 to 15 years, and frequently to much shorter periods of time."*

**Inferred Mineral Resource**

*"An 'Inferred Mineral Resource' is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity. An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration."*

*"An 'Inferred Mineral Resource' is based on limited information and sampling gathered through appropriate sampling techniques from locations such as outcrops, trenches, pits, workings and drill holes. Inferred Mineral Resources must not be included in the economic analysis, production schedules, or estimated mine life in publicly disclosed Pre-Feasibility or Feasibility Studies, or in the Life of Mine plans and cash flow models of developed mines. Inferred Mineral Resources can only be used in economic studies as provided under NI 43-101."*

*"There may be circumstances, where appropriate sampling, testing, and other measurements are sufficient to demonstrate data integrity, geological and grade/quality continuity of a Measured or Indicated Mineral Resource, however, quality assurance and quality control, or other information may not meet all industry norms for the disclosure of an Indicated or Measured Mineral Resource. Under these circumstances, it may be reasonable for the Qualified Person to report an Inferred Mineral Resource if the Qualified Person has taken steps to verify the information meets the requirements of an Inferred Mineral Resource."*

**Indicated Mineral Resource**

*"An 'Indicated Mineral Resource' is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation. An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Mineral Reserve."*

*"Mineralisation may be classified as an Indicated Mineral Resource by the Qualified Person when the nature, quality, quantity and distribution of data are such as to allow confident interpretation of the geological framework and to reasonably assume the continuity of mineralisation. The Qualified Person must recognise the importance of the Indicated Mineral Resource category to the advancement of the feasibility of the project. An Indicated Mineral Resource estimate is of sufficient quality to support a Preliminary Feasibility Study which can serve as the basis for major development decisions."*

**Measured Mineral Resource**

*"A Measured Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit. Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation. A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proven Mineral Reserve or to a Probable Mineral Reserve."*

*"Mineralisation or other natural material of economic interest may be classified as a Measured Mineral Resource by the Qualified Person when the nature, quality, quantity and distribution of data are such that the tonnage and grade or quality of the mineralisation can be estimated to within close limits and that variation from the estimate would not significantly affect potential economic viability of the deposit. This category requires a high level of confidence in, and understanding of, the geology and controls of the mineral deposit."*

**Modifying Factors**

*"Modifying Factors are considerations used to convert Mineral Resources to Mineral Reserves. These include, but are not restricted to, mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors."*

For the Panuco veins geologic continuity has been established from surface mapping and trenching and drill hole logging. Three-dimensional vein solids were constructed to constrain the vein mineralization using all available data. Grade continuity was established for gold, silver, lead and zinc in the Panuco Central Vein. Since there was insufficient data to model reliable semivariograms for the other two veins only the Central Vein was estimated using ordinary kriging. The two remaining veins were estimated using the inverse distance estimator. Semivariograms for the Central vein were used to detect the search distances for the Central Vein and these distances were utilised for the Northwest and Tres Cruces Veins.

The density of the data was the limiting factor in classifying blocks, and therefore all blocks were classified as Inferred.

Results are tabulated at a range of silver equivalent cut-offs. Silver equivalent is determined for each block as follows:

| | | |
|---|---|---|
| Gold price $1350/oz | Recovery - 52.2 % | Factor = Au *Rec*Price/31.1035 = 22.66 |
| Silver price $16/oz | Recovery - 62.1 % | Factor = Ag *Rec*Price/31.1035 = 0.32 |
| Lead price $0.90/lb | Recovery - 87.9 % | Factor = Pb% * 22.046223 * Rec * Price = 17.44 |
| Zinc price $1.10/lb | Recovery - 78.6 % | Factor = Zn% * 22.046223 * Rec * Price = 19.06 |

GMV = (Au *Rec*Price/31.1035) + (Pb% * 22.0462 * Rec * Price) + (Ag * Rec * Price/31.1035) + (Zn% * 22.0462 * Rec * Price)

AgEq = GMV / Ag Factor = GMV / 0.32

Recoveries are based on actual recoveries from the Vetegrande Processing facility which is currently processing material from the nearby Veta Grande and La Cantara vein systems.

The “reasonable prospects for economic extraction” requirement generally implies that the quantity and grade estimates meet certain economic thresholds and that the mineral resources are reported at an appropriate cut-off grade taking into account extraction scenarios and processing recoveries. RockRidge considers the vein mineralization amenable to extraction by utilizing underground methods. No stope designs were applied, but the vein solids represent achievable conceptual stope volumes.

An economic assessment or similar study has not been completed for the Panuco deposit and an economic cut-off value is determined from the best historical and operational yields for the mining area. The authors are of the opinion that based on the mineralization characteristics, grade, location and other factors described in this report the Panuco deposit has similarities to the Veta Grande vein system, which is located five km south of the Panuco deposit. The Veta Grande mine is currently operating at a cut-off value of 100 g/t Ag. As such, the 100 g/t AgEq has been highlighted in the following tables with sensitivities shown above and below the highlighted cut-off.

**Table 14-8: Resource classed as Inferred within all Veins**

| Cut Off AgEq (g/t) | Tonnes > Cut-off t (m) | Ag (g/t) | Au (g/t) | Pb (%) | Zn (%) | AgEq (g/t) | AgEq (Ozs) |
|---|---|---|---|---|---|---|---|
| 70 | 5,633,142 | 117.66 | 0.13 | 0.010 | 0.088 | 133.0 | 24,079,401 |
| 75 | 5,405,259 | 119.98 | 0.13 | 0.010 | 0.090 | 135.5 | 23,548,065 |
| 80 | 5,142,065 | 122.60 | 0.14 | 0.011 | 0.094 | 138.5 | 22,892,412 |
| 90 | 4,477,091 | 129.62 | 0.14 | 0.011 | 0.102 | 146.4 | 21,069,521 |
| **100** | **3,954,729** | **136.00** | **0.14** | **0.012** | **0.110** | **153.2** | **19,472,901** |
| 115 | 3,196,451 | 145.94 | 0.15 | 0.012 | 0.118 | 163.9 | 16,847,056 |
| 125 | 2,512,119 | 156.72 | 0.15 | 0.013 | 0.126 | 175.8 | 14,199,767 |
| 140 | 1,921,356 | 169.60 | 0.16 | 0.014 | 0.126 | 189.3 | 11,696,524 |
| 150 | 1,505,278 | 181.28 | 0.17 | 0.014 | 0.124 | 201.5 | 9,753,081 |
| 175 | 915,428 | 207.87 | 0.18 | 0.014 | 0.108 | 228.2 | 6,715,702 |

**Table 14-9: Resource classed as Inferred within Panuco Central Vein**

| Cut Off AgEq (g/t) | Tonnes > Cut-off t (m) | Ag (g/t) | Au (g/t) | Pb (%) | Zn (%) | AgEq (g/t) | AgEq (Ozs) |
|---|---|---|---|---|---|---|---|
| 70 | 4,197,167 | 122.99 | 0.13 | 0.012 | 0.112 | 139.7 | 18,850,305 |
| 75 | 4,069,062 | 124.89 | 0.13 | 0.012 | 0.114 | 141.8 | 18,551,841 |
| 80 | 3,914,852 | 127.07 | 0.14 | 0.013 | 0.117 | 144.3 | 18,167,799 |
| 90 | 3,576,179 | 132.12 | 0.14 | 0.013 | 0.122 | 150.0 | 17,241,414 |
| **100** | **3,311,354** | **135.99** | **0.14** | **0.013** | **0.128** | **154.4** | **16,433,274** |
| 115 | 2,723,011 | 145.08 | 0.15 | 0.013 | 0.134 | 164.3 | 14,387,126 |
| 125 | 2,256,813 | 153.45 | 0.15 | 0.014 | 0.136 | 173.3 | 12,575,360 |
| 140 | 1,732,580 | 165.41 | 0.16 | 0.014 | 0.136 | 185.9 | 10,354,950 |
| 150 | 1,334,965 | 176.83 | 0.17 | 0.014 | 0.135 | 198.0 | 8,497,523 |
| 175 | 783,173 | 203.25 | 0.19 | 0.014 | 0.118 | 224.7 | 5,658,304 |

**Table 14-10: Resource classed as Inferred within Panuco NW Vein**

| Cut Off AgEq (g/t) | Tonnes > Cut-off t (m) | Ag (g/t) | Au (g/t) | Pb (%) | Zn (%) | AgEq (g/t) | AgEq (Ozs) |
|---|---|---|---|---|---|---|---|
| 70 | 468,604 | 85.86 | 0.08 | 0.004 | 0.018 | 92.5 | 1,393,160 |
| 75 | 429,093 | 87.64 | 0.08 | 0.004 | 0.018 | 94.3 | 1,300,815 |
| 80 | 383,010 | 89.58 | 0.08 | 0.004 | 0.019 | 96.3 | 1,186,025 |
| 90 | 181,890 | 99.78 | 0.09 | 0.004 | 0.021 | 108.0 | 631,322 |
| **100** | **110,908** | **108.35** | **0.09** | **0.005** | **0.023** | **116.7** | **416,112** |
| 115 | 52,167 | 120.93 | 0.09 | 0.005 | 0.025 | 129.2 | 216,746 |
| 125 | 34,349 | 126.14 | 0.09 | 0.005 | 0.027 | 134.2 | 148,178 |
| 140 | 1,953 | 147.42 | 0.11 | 0.005 | 0.026 | 156.8 | 9,844 |
| 150 | 996 | 159.01 | 0.12 | 0.005 | 0.026 | 169.0 | 5,413 |
| 175 | 284 | 181.61 | 0.13 | 0.005 | 0.028 | 193.0 | 1,763 |

**Table 14-11: Resource classed as Inferred within Panuco Tres Cruces Vein**

| Cut Off AgEq (g/t) | Tonnes > Cut-off t (m) | Ag (g/t) | Au (g/t) | Pb (%) | Zn (%) | AgEq (g/t) | AgEq (Ozs) |
|---|---|---|---|---|---|---|---|
| 70 | 967,370 | 109.93 | 0.17 | 0.004 | 0.017 | 123.3 | 3,835,936 |
| 75 | 907,104 | 113.24 | 0.17 | 0.004 | 0.017 | 126.7 | 3,695,409 |
| 80 | 844,203 | 116.86 | 0.17 | 0.005 | 0.017 | 130.4 | 3,538,589 |
| 90 | 719,022 | 124.73 | 0.17 | 0.005 | 0.018 | 138.3 | 3,196,784 |
| **100** | **532,467** | **141.84** | **0.14** | **0.006** | **0.021** | **153.2** | **2,623,516** |
| 115 | 421,272 | 154.59 | 0.13 | 0.006 | 0.023 | 165.6 | 2,243,184 |
| 125 | 220,957 | 194.85 | 0.14 | 0.011 | 0.037 | 207.8 | 1,476,229 |
| 140 | 186,822 | 208.63 | 0.14 | 0.012 | 0.041 | 221.7 | 1,331,729 |
| 150 | 169,317 | 216.51 | 0.14 | 0.012 | 0.043 | 229.7 | 1,250,145 |
| 175 | 131,971 | 235.37 | 0.14 | 0.014 | 0.048 | 248.8 | 1,055,634 |

*Note sum of three veins might not equal total veins due to rounding.

## 14.8 Block Model Validation

First a comparison was made between the vein composites and the estimated blocks. The results show reasonable agreement with minimal bias indicated.

**Table 14-12: Comparison between Composite and Block Grades**

| Vein | Variable | Composites | | Block Estimates | |
|---|---|---|---|---|---|
| | | Number | Mean Grade | Number | Mean Grade |
| Central | Ag (g/t) | 265 | 82.9 | 1,062,797 | 82.5 |
| | Au (g/t) | | 0.12 | | 0.11 |
| | Pb (%) | | 0.008 | | 0.009 |
| | Zn (%) | | 0.05 | | 0.07 |
| NW | Ag (g/t) | 178 | 23.1 | 536,210 | 21.63 |
| | Au (g/t) | | 0.04 | | 0.03 |
| | Pb (%) | | 0.002 | | 0.002 |
| | Zn (%) | | 0.01 | | 0.01 |
| Tres Cruces | Ag (g/t) | 212 | 67.2 | 363,860 | 61.9 |
| | Au (g/t) | | 0.13 | | 0.13 |
| | Pb (%) | | 0.004 | | 0.0032 |
| | Zn (%) | | 0.02 | | 0.015 |

A second check on the block model was completed by stepping through the block models on section and in plan at 20m intervals and comparing block grades with composites. A plan view showing drill hole composites and all estimated Ag blocks is shown as Figure 14-9. Considering the scarcity of data the results are reasonable with no significant bias.

As a third check, a cross-validation process called XVALID was followed in Datamine software. This process removes each composite in turn from the data and estimates it from the surrounding samples (also known as jack-knifing). Results were satisfactory for each vein and each variable.

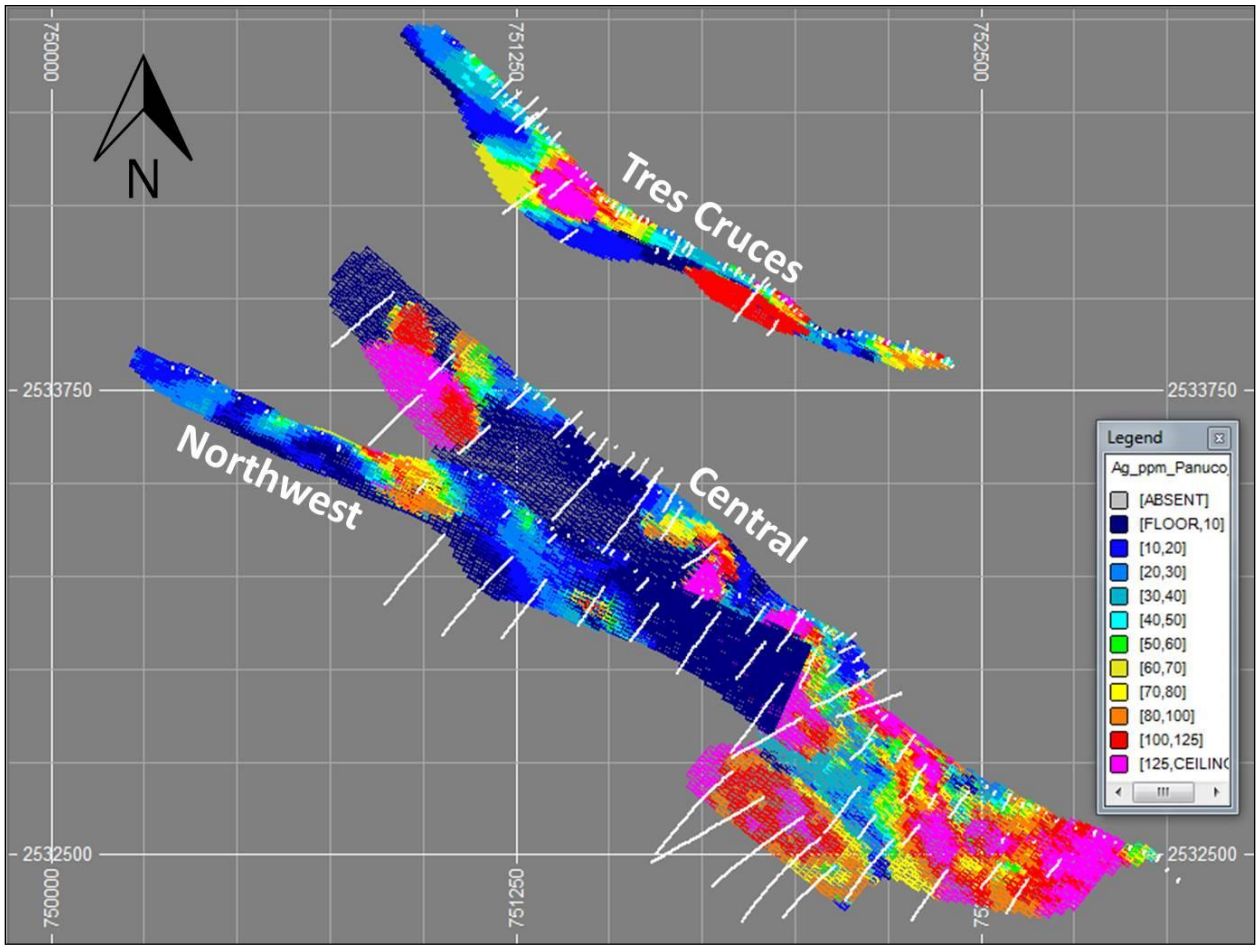


**Figure 14-9: Plan View Showing Estimated Ag Grades in Blocks and Drill Hole Traces**

## 14.9 Opinion

The mineral resource has been changed since the previous technical report (with effective date of January 31, 2017). This is due to improvements in the geometric modelling process applied to develop the geometry of the veins and the consequent changes to the sample selections and compositing for the estimation. We believe that the current implicit modelling process (carried out using Leapfrog Geo™) better reflects the likely geometries of the veins (as shown in Figure 14-2) than the former sectional interpretations. In our opinion, this has resulted in a more coherent selection of vein samples for the estimation. The application of dynamic anisotropy to the variogram and search orientations, combined with less angular vein geometry, provide improved spatial grade estimation with good correspondence between composite and block grade averages, as demonstrated in Table 14-12.

# 15 MARKET STUDIES AND CONTRACTS

## 15.1 Market Studies

Santacruz has not directly engaged independent third parties to complete market study research to support the company's mining and sales activities. Shipping, treatment and refining charges are based on in-house data generated from the previous and current extraction, mineral processing and agreements/contracts for the Veta Grande and Rosario operations.

## 15.2 Offtake Agreements

Santacruz entered a Zinc Concentrate Sales Agreement and a Lead Concentrate Sales Agreement (together "Offtake Agreements") with Trafigura Mexico S.A de C.V. ("Trafigura ") on January 13, 2017. The Offtake Agreement supersedes a previous agreement dated March 1, 2015. The Offtake Agreements were amended on December 20, 2017, August 8, 2018 and March 4, 2019. The Offtake Agreements refer to concentrates produced from the mineral processing facilities at the Rosario project ("El Rosario") and the Veta Grande project ("Vetagrande").

The amended terms of the Offtake Agreements include: Santacruz shall deliver 100% of El Rosario and Vetagrande zinc and lead concentrates (together "Concentrates") production, at a minimum of 7,000 DMT per year for zinc concentrate and a minimum of 4,000 DMT per year for lead concentrate, to be delivered in evenly monthly deliveries until December 2019, inclusive. Trafigura has the option to extend the terms of the Offtake Agreements up to December 2021 for the offtake of 100% of Santacruz's production of Concentrates under similar terms and conditions.

# 16 ADJACENT PROPERTIES

Several producing or advanced exploration properties within the Zacatecas Mining District are worth mentioning including the producing Cozamin mine owned by Capstone Mining Corp., San Acacio Property owned by Defiance Silver Corp. (located immediately adjacent to the Veta Grande project) and the El Compas property owned by Canarc Resource Corp.

## 16.1 Capstone's Cozamin Property

Capstone Mining Corp.'s Cozamin property consists of 90 mining concessions covering an area of approximately 4,202 ha. These concessions are located in the Morelos Municipality of Zacatecas, approximately 5 km north of the City of Zacatecas. The claims are 100% owned by Capstone Gold S.A. de C.V., a subsidiary of Capstone Mining Corp. The property covers a portion of the Mala Noche vein beneath the historical San Roberto mine. The vein itself strikes approximately east-west and dips on average 60$^{o}$ to the north. The vein consists of several anastomosing veins and the best mineralization is associated with zones where these structures coalesce into a single structure. Chalcopyrite, sphalerite, and galena are the dominant economic sulfide, with abundant (up to 15% of the vein) pyrite and pyrrhotite increasing in concentration down dip. Quartz, calcite, chlorite, epidote and minor sericite are the dominant gangue minerals. Moderate propyllitic alteration is generally restricted to approximately 3 m in the hangingwall and footwall of the vein. Mineralization at Cozamin is best described as zinc-rich epithermal mineralization overprinted by copper-rich mesothermal mineralization at depth. The mineralization on the Cozamin property may not be indicative of the mineralization on the Veta Grande project.

In 2006, the Cozamin Mine began commercial production at a rate of 1,000 tonnes per day. In 2018, the proven and probable reserve estimate for the Cozamin was reported as 6.20 Mt at 1.60% Cu, 0.71% Zn, 0.14% Pb, and 43 g/t Ag. The combined measured and indicated mineral resource estimate was reported as 17.29 Mt at 1.50% Cu, 1.25% Zn, 0.28% Pb, and 45 g/t Ag, with an additional inferred mineral resource of 16.95 Mt @ 1.11% Cu, 1.65% Zn, 0.29% Pb, and 44 g/t Ag, (Bush et al., 2019).

All information regarding the Cozamin property has been derived from the technical report dated January 24, 2019. ARC has not independently verified the information within the technical report.

## 16.2 Defiance Silver's San Acacio Property

Defiance Silver Corp.'s San Acacio property consists of 10 mineral concessions covering an area of approximately 746 ha. These concessions are located approximately 7 km northeast of the City of Zacatecas, Mexico. Defiance Silver has an option to acquire a 100% interest in the property by meeting certain obligations over a period of time. The property covers four veins including the Veta Grande, Veta Chica, Veta Blanca, and Veta Grande Intermedio. The veins are subparallel and strike approximately 150$^{o}$ east-southeast and dip approximately 60-70$^{o}$ to the southwest. The veins pinch and swell and range in thickness from 2-30 m. The dominant sulfide minerals are pyrite, sphalerite, and galena along with argentite, native silver, and rare chalcopyrite. Gangue minerals include quartz, chalcedony, amethyst, barite and calcite.

The San Acacio property is immediately adjacent the Santcruz's Veta Grande property and covers the south-eastern portion the Veta Grande vein system. The mineralization on the San Acacio Property may not be indicative of the mineralization on the Veta Grande project. In 2014, the total inferred mineral resource was reported as 2.9 Mt at 181 g/t Ag, and 0.16 g/t Au (Giroux et al., 2014).

All information regarding the San Acacio property has been derived from the technical report dated September 26, 2014. ARC has not independently verified the information within the technical report.

### 16.3 Canarc's El Compas Property

Endeavor Silver Corp.'s 100% owned El Compas property consists of 28 mineral concessions covering an area of approximately 3,990 ha and consists of the El Compas gold-silver property and a five-year renewable lease on the 500 tpd La Plata mineral processing plant. The property is located on the southern outskirts of the city of Zacatecas, Mexico.

The property covers five known veins with low-sulphidation epithermal mineralization. These veins are unique in the district in that they strike north-south and they are gold-rich, silver-poor compared to the east-southeast striking, silver-rich veins to the north of Zacatecas. These veins also have very low total sulfide with very low base metal content. These veins show finely banded, colloform, and crustiform open space fill textures, with bladed quartz after calcite. Sulfide content in the veins rarely exceeds 5% with pyrite and pyrrhotite being the most common sulfides. The mineralization on the El Compas property may not be indicative of the mineralization on the Veta Grande project.

In 2017, the indicated mineral resources was reported as 148,400 t @ 7.31 g/t Au and 104 g/t Ag, with an inferred mineral resource of 216,800 t at 5.38 g/t Au and 76 g/t Ag (Smith et al., 2017).

All information regarding the El Compas property has been derived from the technical report dated May 11, 2017. ARC has not independently verified the information within the technical report.

# 17 OTHER RELEVANT DATA AND INFORMATION

## 17.1 Vetagrande Mineral Processing Facility

The Vetagrande mineral processing facility includes crushing, milling and flotation equipment, assay preparation and analysis facilities, one tailings storage facility that includes two tailings ponds, concentrate drying ponds for zinc and lead concentrates, and a material stockpile area. The primary crusher is currently located at the historical Delores mine site, located approximately 1.3 km southwest of the mineral processing facility. Grid power to the Vetagrande mineral processing facility, Armados, Garcia, and Guadalupana underground operations are supplied via substation connections by the Federal Electricity Commission (CFE), which is the Government agency that supplies electric power. Water for underground development and surface site activities is extracted from the historical Delores mine site, in the same vicinity as the primary crushing plant. Water is piped to the mineral processing facility as well as transported to the various mine sites by water haul trucks. Mine labour force predominantly resides in the community of Vetagrande. Other areas where employees reside include but are not limited to Llano Grande, Zacatecas and Guadalupe. Currently the operation employs up to 77 workers distributed throughout the departments of crushing, plant operations, electrical and mechanical maintenance, in addition to technical staff.

## 17.2 Production

The Veta Grande project operated in a pre-commercial production phase through the end of the third quarter of 2016. Effective October 1, 2016, commercial production was declared. The decision to commence commercial production was not based on a feasibility study on mineral reserves demonstrating economic and technical viability. There is increased uncertainty and economic and technical risks of failure associated with this production decision.

Between Q4 2016 and Q4 2018, the Veta Grande project milled 280,954 tonnes of material and recovered approximately 421,452 ounces of silver, 906 ounces of gold, 1,482 tonnes lead, and 2,297 tonnes zinc.

**Table 17-1: Annual production figures from Veta Grande project**

| Summary of Production Results | 2018 | 2017 | 2016 | Total |
|---|---|---|---|---|
| Material Processed (tonnes milled) | 150,281 | 102,111 | 28,562 | 280,954 |
| Silver production (ounces) | 190,325 | 201,284 | 29,843 | 421,452 |
| Silver head grade (g/t) | 73 | 100 | 56 | 76 |
| Silver recovery (%) | 54 | 61 | 58 | 58 |
| Gold production (ounces) | 367 | 424 | 115 | 906 |
| Lead production (tonnes) | 784 | 466 | 232 | 1,482 |
| Zinc production (tonnes) | 1,112 | 803 | 382 | 2,297 |
| Development (metres) | 4,118 | 471 | N/A | 4,589 |

# 18 INTERPRETATION AND CONCLUSIONS

The Veta Grande project contains both advanced stage mining areas and exploration stage targets where low-sulfidation epithermal veins host silver (gold+lead+zinc) mineralization. The project includes open access to historical underground workings for continued exploration and development, a permitted and operating mineral processing facility with the a designed milling capacity of 750 tpd, and good infrastructure being situated between the municipality of Vetagrande and the state capital of Zacatecas. The project has access to electric power, highways, paved roads, civil amenities, and a local skilled labor force.

The Veta Grande project comprise of 8,965 hectares (22,154 acres) in the Zacatecas Mining District, Zacatecas, Mexico. It encompasses three significant vein systems known for silver mineralization in the district: Veta Grande, La Cantera, and Panuco. These vein systems have had extensive artisanal mining and small scale mining histories.

Oxide and sulfide bearing quartz veins within the La Cantera and Veta Grande vein systems strike northwest-southeast, generally dip southwest. They range in thickness from less than 1 m to over 30 m, average between 2-10 m, and in some instances have been traced along surface for several kilometers. The veins dominantly consist of quartz, chalcedony, and calcite and show colloform and crustiform textures with small to medium (1-5 mm) euhedral quartz crystals filling open space cavities. Brecciation textures are common and consist of 1-10 cm, angular fragments of weakly to moderately altered andesite in a quartz-sulfide matrix. Mineralization within the veins consists of fine to medium grained (0.1-1 cm), disseminated to massive, pyrite, sphalerite, and galena (with rare chalcopyrite) with native silver, and argentite. Historical mining on the project has generally focused on the near-surface, oxide facies of mineralization in the upper levels of the veins. The Garcia underground, one of the deepest underground workings in the region was mined to a depth of 350 m below surface.

A mineral resource as defined by “CIM Definition Standards for Mineral Resources and Reserves” has not been identified for the Veta Grande and La Cantera vein systems where mining and development operations are currently taking place. Furthermore, an economic assessment or similar study has not been conducted. The decision to commence commercial production at the Veta Grande project was not based on a feasibility study on mineral reserves demonstrating economic and technical viability. There is increased uncertainty and economic and technical risks of failure associated with this production decision.

The Panuco deposit is a mineral deposit with potential and merits additional work. The Panuco deposit is situated five to twelve kilometers north of the current mining areas. Panuco exhibits characteristics of a low-sulfidation epithermal vein deposit similar to the Veta Grande and La Cantera vein systems. The deposit is defined by three prominent northwest-southeast trending and southwest dipping vein structures that have resulted from brittle fracturing and the influx of metal rich hydrothermal fluids. These vein structures are identified as the Panuco NW, Panuco Central and Tres Cruces.

Silver, gold, and base metal mineralization at the Panuco deposit are hosted in breccia veins, banded, crustiform and colloform quartz veins, and quartz vein stockwork within zones of strong argillic alteration. The veins exhibit pinch and swell, ranging from less than 10 cm to over 6 m, and can be traced on surface and in drilling for over 2,400 m. Fluid inclusion data suggests that the level of first boiling in the Panuco

vein system is likely located at about 2100 m elevation. The presence of vugs, bladed calcite and adularia identified at 2300-2450 m elevation indicates that the top of the hydrothermal system is partly preserved at the Panuco deposit. The interpretation suggests that the prospective zone for silver and gold mineralization extends from surface to over 350 meters vertical depth. Additional work is required to test the down dip potential at the Panuco deposit.

O'Brien has provided an Inferred Mineral Resource Estimate at various cut-off values for AgEq. An economic assessment or similar study has not been completed for the Panuco deposit and an economic cut-off value is unknown. The authors are of the opinion that based on the mineralization characteristics, grade, location and other factors described in this report the Panuco deposit has similarities to the Veta Grande vein system, which is located five km south of the Panuco deposit. The Veta Grande project is currently operating at a cut-off value of 100 g/t Ag.

Considering a cut-off value of 100.0 g/t AgEq for the Panuco deposit, the Inferred Mineral Resource Estimate results in 3,954,729 tonnes grading 136.00 g/t Ag, 0.14 g/t Au, 0.012% Pb and 0.110% Zn or 153.20 g/t AgEq. This equates to 19,472,901 ounces of AgEq.

The mineral resource estimate has been changed since the previous technical report (with effective date of January 31, 2017). This is due to improvements in the geometric modelling process applied to develop the geometry of the veins and the consequent changes to the sample selections and compositing for the estimation. The current implicit modelling process better reflects the likely geometries of the veins than the former sectional interpretations.

The Veta Grande project is a project of merit and further exploration is warranted. The Veta Grande, Zacatecas and Minillas properties encompass other significant exploration targets outside of Veta Grande, La Cantera, and Panuco vein systems that require further exploration to assess their potential mineral endowment.

# 19 RECOMMENDATIONS

## 19.1 Veta Grande (Garcia mines)

The 2018/2019 Phase 1 drill program successfully tested the down dip extension of the Veta Grande, Armados veins and Navidad veins. The proximity of the Garcia mine to the mineral processing plant and encouraging results realized in drill holes VG19-010 and VG19-014a continue to make the Garcia mine an attractive target. A proposed drill plan consisting of 5,780 m is recommended to further explore the down dip and strike continuity of the mineralization to the northwest from drill hole VG19-014a. The average depth of drilling for each hole is expected to be 640 m. The anticipated expenditure to complete the work is US $976,820. The proposed cost assumes office supplies, equipment, machinery, computers, vehicles, and environmental permits and bonds have already been procured from the Phase 1 work. An itemized budget is provided in Table 19.1.

## 19.2 Panuco Deposit

ARC recommends a 9,500 m drilling program for the Panuco deposit with the aim of a) exploring for additional resources along strike towards the northwest and down dip extensions of the veins and b) infilling zones where geological information is sparse. Surface trenching is recommended to delineate the surface extension of the Panuco Central and Panuco NW veins towards the northwest. In addition, metallurgical test work is also recommended to determine if the Panuco deposit mineralization can be processed and recovered at the Vetagrande mineral processing facility.

The anticipated expenditure to complete the recommended work is US $1,784,500 and an itemized budget is provided in Table 19-2.

**Table 19-1: Recommended Work Program – Garcia mine, Veta Grande Vein**

| Item | Cost (US $) |
|---|---|
| Consumables | $87,856.00 |
| Salaries | $236,980.00 |
| Assaying | $73,984.00 |
| Drilling Contractor | $578,000.00 |
| **Total** | **$976,820.00** |

**Table 19-2: Recommended Work Program – Panuco Deposit**

| Item | Subtotal (US $) |
|---|---|
| Assaying | $121,600 |
| Consumables | $144,400 |
| Drilling Contractor | $950,000 |
| Metallurgy | $19,000 |
| Salaries | $389,500 |
| Trenching | $40,000 |
| Contingency | $120,000 |
| **Total** | **$1,784,500** |

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# APPENDIX 1

**Table 0-1: Listing of drill holes and trenches, Panuco deposit**
*(Drill holes and trenches used in the resource estimate are highlighted)*

| HOLE | EASTING | NORTHING | ELEVATION | HLENGTH | YEAR | HOLE_TYPE |
|---|---|---|---|---|---|---|
| PA09-01 | 752306.2 | 2532671 | 2334.36 | 249.5 | 2009 | DDH |
| PA09-02 | 752244.9 | 2532580 | 2326.38 | 365.1 | 2009 | DDH |
| PA09-03 | 752370.8 | 2532540 | 2339.84 | 241.9 | 2009 | DDH |
| PA09-04 | 752538.3 | 2532507 | 2350.45 | 149.3 | 2009 | DDH |
| PA09-05 | 752049.3 | 2533053 | 2377.37 | 104.2 | 2009 | DDH |
| PA09-06 | 751311.9 | 2534240 | 2335.37 | 196.9 | 2009 | DDH |
| PA09-07 | 751311.6 | 2534240 | 2335.33 | 403.3 | 2009 | DDH |
| PA09-08 | 751191.8 | 2534394 | 2340.89 | 251.5 | 2009 | DDH |
| PA09-09 | 750764.1 | 2533534 | 2364.54 | 236.9 | 2009 | DDH |
| PA09-10 | 751175.5 | 2534189 | 2346.03 | 438.25 | 2009 | DDH |
| PA09-11 | 751917 | 2533877 | 2334.4 | 200.3 | 2009 | DDH |
| PA09-12 | 751825.1 | 2533917 | 2324.39 | 456.55 | 2009 | DDH |
| PA09-13 | 751296.7 | 2534087 | 2332.08 | 355.9 | 2009 | DDH |
| PA09-14 | 752662.9 | 2532417 | 2341.99 | 200.25 | 2009 | DDH |
| PA09-15 | 752616.8 | 2532496 | 2352.33 | 173.2 | 2009 | DDH |
| PA09-16 | 752616.6 | 2532495 | 2352.31 | 153.75 | 2009 | DDH |
| PA09-17 | 752538.8 | 2532506 | 2350.55 | 148.5 | 2009 | DDH |
| PA09-18 | 752327.5 | 2532704 | 2334.81 | 231.25 | 2009 | DDH |
| PA10-19 | 751822.9 | 2533910 | 2323.95 | 291.85 | 2010 | DDH |
| PA10-20 | 752353.8 | 2532613 | 2346.48 | 237.25 | 2010 | DDH |
| PA10-21 | 752253.8 | 2532476 | 2317.7 | 316.5 | 2010 | DDH |
| PA10-22 | 750799.2 | 2533659 | 2362.9 | 118 | 2010 | DDH |
| PA10-23 | 750747.3 | 2533676 | 2369.8 | 160 | 2010 | DDH |
| PA10-24 | 752172.1 | 2532784 | 2363.91 | 172.3 | 2010 | DDH |
| PA10-25 | 752171.4 | 2532783 | 2363.87 | 301.6 | 2010 | DDH |
| PA10-26 | 752269.5 | 2532743 | 2337.51 | 206.5 | 2010 | DDH |
| PA10-27 | 752100 | 2532696 | 2371.86 | 301.5 | 2010 | DDH |
| PA10-28 | 752322.4 | 2532951 | 2353.17 | 340 | 2010 | DDH |
| PA10-29 | 752269.1 | 2532743 | 2337.4 | 196.6 | 2010 | DDH |
| PA10-30 | 752269.9 | 2533011 | 2350.43 | 364 | 2010 | DDH |
| PA10-31 | 751991.1 | 2532891 | 2390.1 | 301 | 2010 | DDH |
| PA10-32 | 751939.6 | 2533034 | 2397.9 | 241 | 2010 | DDH |
| PA11-33 | 751990 | 2532890 | 2390.04 | 333.95 | 2011 | DDH |
| PA11-34 | 751877.3 | 2532942 | 2395.34 | 351.85 | 2011 | DDH |
| PA11-35 | 751852 | 2533070 | 2385.5 | 200.7 | 2011 | DDH |
| PA11-36 | 751439.7 | 2533256 | 2373.6 | 140 | 2011 | DDH |

| HOLE | EASTING | NORTHING | ELEVATION | HLENGTH | YEAR | HOLE_TYPE |
|---|---|---|---|---|---|---|
| PA11-37 | 751195.5 | 2533385 | 2357.69 | 113.75 | 2011 | DDH |
| PA11-38 | 751311.6 | 2533312 | 2357.44 | 129.55 | 2011 | DDH |
| PA11-39 | 751560.2 | 2533188 | 2360.12 | 144.6 | 2011 | DDH |
| PA11-40 | 751713.8 | 2533149 | 2359.81 | 151.05 | 2011 | DDH |
| PA11-41 | 751750.1 | 2533307 | 2357.56 | 110.95 | 2011 | DDH |
| PA11-42 | 751580.6 | 2533445 | 2352.91 | 135.65 | 2011 | DDH |
| PA11-43 | 751448.4 | 2533514 | 2342.57 | 99.15 | 2011 | DDH |
| PA11-44 | 751345 | 2533613 | 2334.68 | 190.75 | 2011 | DDH |
| PA11-45 | 751219.7 | 2533691 | 2341.74 | 195.45 | 2011 | DDH |
| PA11-46 | 751006.6 | 2533765 | 2358.57 | 202.7 | 2011 | DDH |
| PA11-47 | 750977.6 | 2533462 | 2357.01 | 150 | 2011 | DDH |
| PA11-48 | 750750.7 | 2533859 | 2378.43 | 385.3 | 2011 | DDH |
| PA11-49 | 752478.8 | 2532383 | 2337.61 | 300.75 | 2011 | DDH |
| PA11-50 | 752532.3 | 2532288 | 2329.86 | 331.2 | 2011 | DDH |
| PA11-51 | 752310.6 | 2532315 | 2320.68 | 425.35 | 2011 | DDH |
| PA11-52 | 752128.8 | 2532364 | 2327.27 | 518.2 | 2011 | DDH |
| PA11-53 | 752149 | 2532509 | 2334.47 | 410.45 | 2011 | DDH |
| PA11-54 | 752024.5 | 2532478 | 2337.94 | 470.25 | 2011 | DDH |
| PA11-55 | 751761.9 | 2532862 | 2380.36 | 412.65 | 2011 | DDH |
| PA11-56 | 751816.8 | 2532755 | 2369.66 | 209.05 | 2011 | DDH |
| PA11-56A | 751814.4 | 2532751 | 2369.71 | 422 | 2011 | DDH |
| PA11-57 | 751677.2 | 2533256 | 2350.07 | 260.95 | 2011 | DDH |
| PA11-58 | 751629.6 | 2533330 | 2355.11 | 254.85 | 2011 | DDH |
| PA11-59 | 751477.8 | 2533305 | 2368.12 | 398.1 | 2011 | DDH |
| PA11-60 | 751661.5 | 2532959 | 2381.21 | 373.2 | 2011 | DDH |
| PA11-61 | 751536.4 | 2533042 | 2366.58 | 316.5 | 2011 | DDH |
| PA11-62 | 751344.9 | 2533397 | 2350.93 | 352.4 | 2011 | DDH |
| PA11-63 | 751367 | 2533042 | 2383.38 | 385.9 | 2011 | DDH |
| PA11-64 | 751071.2 | 2533556 | 2345.19 | 362.25 | 2011 | DDH |
| PA11-65 | 751207.9 | 2533074 | 2399.42 | 394.65 | 2011 | DDH |
| PA11-66 | 750848.7 | 2533594 | 2353.64 | 430.5 | 2011 | DDH |
| PA11-67 | 751050.5 | 2533084 | 2404.54 | 532.85 | 2011 | DDH |
| PA11-68 | 751854.4 | 2532315 | 2322.39 | 709.5 | 2011 | DDH |
| PA11-69 | 750884.6 | 2533152 | 2397.97 | 580 | 2011 | DDH |
| PA11-70 | 751600.5 | 2532471 | 2337.5 | 780.65 | 2011 | DDH |
| PA11-71 | 751813.7 | 2532751 | 2369.6 | 463.8 | 2011 | DDH |
| PA11-72 | 751601 | 2532470 | 2337.39 | 750.3 | 2011 | DDH |
| PA11-73 | 751752.7 | 2532390 | 2327.17 | 718 | 2011 | DDH |
| PA11-74 | 751917.9 | 2532266 | 2326.35 | 739.3 | 2011 | DDH |
| SN_A | 752165 | 2533023 | 2362 | 42 | | TREN |

| HOLE | EASTING | NORTHING | ELEVATION | HLENGTH | YEAR | HOLE_TYPE |
|---|---|---|---|---|---|---|
| SN_C | 752179 | 2532960 | 2346 | 24 | | TREN |
| SN_D | 752185 | 2532957 | 2348 | 4 | | TREN |
| SN_E | 752517 | 2532680 | 2365 | 18 | | TREN |
| SN_F | 752581 | 2532660 | 2379 | 10 | | TREN |
| SN_G | 752593 | 2532647 | 2375 | 10 | | TREN |
| SN_H1 | 752626 | 2532631 | 2373 | 10 | | TREN |
| SN_H2 | 752633 | 2532633 | 2368 | 8 | | TREN |
| SN_H3 | 752637 | 2532629 | 2371 | 4 | | TREN |
| SN_J | 752675 | 2532609 | 2365 | 10 | | TREN |
| SN_K | 752705 | 2532589 | 2366 | 8 | | TREN |
| SN_N | 752834 | 2532546 | 2354 | 8 | | TREN |
| SN_O | 752863 | 2532532 | 2349 | 4 | | TREN |
| SN_P | 752036 | 2533132 | 2371 | 12 | | TREN |
| SN_Q | 752080 | 2533101 | 2375 | 12 | | TREN |
| SN_R | 752092 | 2533098 | 2372 | 10 | | TREN |
| SN_S | 752098 | 2533100 | 2381 | 6 | | TREN |
| SN_T | 752104 | 2533049 | 2362 | 20 | | TREN |
| SN_U | 752142 | 2533075 | 2377 | 35 | | TREN |
| SN_V | 752174 | 2532978 | 2350 | 32 | | TREN |
| SN_W | 752655 | 2532619 | 2371 | 10 | | TREN |
| SN_X | 752749 | 2532574 | 2360 | 2 | | TREN |
| SN_Y | 752757 | 2532569 | 2361 | 4 | | TREN |
| SN_Z | 751388 | 2533597 | 2337 | 16 | | TREN |
| ZP32A_007 | 751171.7 | 2534602 | 2353.79 | 14.14 | | TREN |
| ZP33A_005 | 751137.7 | 2534627 | 2352.64 | 16.5 | | TREN |
| ZPP01_009 | 751191.7 | 2534566 | 2351.9 | 41.94 | | TREN |
| ZPP02_011 | 751218.1 | 2534539 | 2349.91 | 29.03 | | TREN |
| ZPP03_013 | 751243.3 | 2534502 | 2346.46 | 34.7 | | TREN |
| ZPP04_015 | 751266.2 | 2534465 | 2343.97 | 42.33 | | TREN |
| ZPP05_017 | 751308.2 | 2534453 | 2344.45 | 28.43 | | TREN |
| ZPP06_018 | 751333.2 | 2534421 | 2340.85 | 20.9 | | TREN |
| ZPP07_020 | 751358.6 | 2534402 | 2339.29 | 16.05 | | TREN |
| ZPP08_021 | 751367.9 | 2534393 | 2338.83 | 4.03 | | TREN |
| ZPP09_022 | 751386.2 | 2534371 | 2335.17 | 8.1 | | TREN |
| ZPP10_023 | 751413.1 | 2534345 | 2331.11 | 5.8 | | TREN |
| ZPP11_025 | 751440.9 | 2534315 | 2328.66 | 6.73 | | TREN |
| ZPP12_027 | 751472.2 | 2534280 | 2325.84 | 5.12 | | TREN |
| ZPP13_029 | 751496.2 | 2534255 | 2323.83 | 6.19 | | TREN |
| ZPP14_031 | 751533 | 2534237 | 2323.3 | 5.36 | | TREN |
| ZPP15_033 | 751565.2 | 2534216 | 2319.55 | 6.4 | | TREN |

| HOLE | EASTING | NORTHING | ELEVATION | HLENGTH | YEAR | HOLE_TYPE |
|---|---|---|---|---|---|---|
| ZPP16_035 | 751601.6 | 2534196 | 2313.99 | 8.38 | | TREN |
| ZPP17_036 | 751650.5 | 2534173 | 2314.4 | 9.6 | | TREN |
| ZPP18_038 | 751688 | 2534157 | 2316.56 | 7.89 | | TREN |
| ZPP19_041 | 751723.3 | 2534135 | 2315.75 | 7.55 | | TREN |
| ZPP20_040 | 751794.1 | 2534090 | 2312.38 | 3.47 | | TREN |
| ZPP21_043 | 751828.9 | 2534072 | 2318.95 | 5.25 | | TREN |
| ZPP22_045 | 751861.4 | 2534050 | 2324.23 | 7.69 | | TREN |
| ZPP23_047 | 751898.6 | 2534028 | 2328.83 | 7.78 | | TREN |
| ZPP24_050 | 751955.9 | 2533999 | 2335.48 | 5.77 | | TREN |
| ZPP25_052 | 751989.5 | 2533974 | 2338.78 | 5.55 | | TREN |
| ZPP26_054 | 752013.6 | 2533949 | 2341.86 | 6.23 | | TREN |
| ZPP27_055 | 752044.8 | 2533923 | 2346.81 | 5.22 | | TREN |
| ZPP28_057 | 752077.5 | 2533893 | 2351.92 | 10.19 | | TREN |
| ZPP29_059 | 752115.8 | 2533894 | 2358.12 | 5.51 | | TREN |
| ZPP30_061 | 752156 | 2533895 | 2363.83 | 6.39 | | TREN |
| ZPP31_063 | 752193.1 | 2533892 | 2367.99 | 8.45 | | TREN |
| ZPP32_065 | 752234.1 | 2533878 | 2370.43 | 7.83 | | TREN |
| ZPP33_067 | 752278.2 | 2533859 | 2370.62 | 9.79 | | TREN |
| ZPP34_069 | 752319.2 | 2533850 | 2367.81 | 10.14 | | TREN |
| ZPP35_070 | 752357.7 | 2533837 | 2367.88 | 11.64 | | TREN |
| ZPP36_072 | 752395.5 | 2533828 | 2368.28 | 8.76 | | TREN |
| ZPP37_074 | 752424.8 | 2533811 | 2369.36 | 15.26 | | TREN |
| ZR01_073 | 752408.7 | 2533817 | 2368.98 | 22.26 | | TREN |
| ZR01_102 | 750325.7 | 2533802 | 2382.12 | 16.78 | | TREN |
| ZR02_071 | 752371.5 | 2533832 | 2368.19 | 16.38 | | TREN |
| ZR02_101 | 750363.7 | 2533791 | 2384.15 | 30.38 | | TREN |
| ZR03_070 | 752332.8 | 2533842 | 2367.98 | 16.89 | | TREN |
| ZR03_100 | 750401.7 | 2533780 | 2385.32 | 33.71 | | TREN |
| ZR04_068 | 752295.5 | 2533854 | 2369.15 | 32.25 | | TREN |
| ZR04_099 | 750435.8 | 2533758 | 2383.94 | 23.33 | | TREN |
| ZR05_066 | 752249.8 | 2533870 | 2370.88 | 16.02 | | TREN |
| ZR05_098 | 750471.7 | 2533743 | 2382.88 | 21.13 | | TREN |
| ZR06_064 | 752213 | 2533881 | 2369.8 | 18.28 | | TREN |
| ZR06_097 | 750504.4 | 2533724 | 2383.4 | 18.01 | | TREN |
| ZR07_062 | 752174.4 | 2533894 | 2366.17 | 12.62 | | TREN |
| ZR07_096 | 750543.7 | 2533709 | 2384.01 | 19.11 | | TREN |
| ZR08_060 | 752134.3 | 2533894 | 2360.89 | 15.13 | | TREN |
| ZR08_095 | 750579.1 | 2533689 | 2380.28 | 13.87 | | TREN |
| ZR09_058 | 752095.2 | 2533889 | 2354.38 | 15.15 | | TREN |
| ZR09_094 | 750613.1 | 2533667 | 2375.18 | 13.85 | | TREN |

| HOLE | EASTING | NORTHING | ELEVATION | HLENGTH | YEAR | HOLE_TYPE |
|---|---|---|---|---|---|---|
| ZR10_056 | 752058.5 | 2533913 | 2348.61 | 8.69 | | TREN |
| ZR10_093 | 750649.6 | 2533652 | 2371.71 | 10.89 | | TREN |
| ZR11_053 | 751998.7 | 2533961 | 2340.02 | 12.04 | | TREN |
| ZR11_092 | 750685 | 2533640 | 2369.31 | 18.1 | | TREN |
| ZR12_051 | 751968.7 | 2533987 | 2336.76 | 17.42 | | TREN |
| ZR12_091 | 750728.8 | 2533631 | 2366.85 | 11.81 | | TREN |
| ZR13_049 | 751934.9 | 2534008 | 2333.39 | 20.32 | | TREN |
| ZR13_075 | 750821.1 | 2533587 | 2354.65 | 20.43 | | TREN |
| ZR14_048 | 751919 | 2534019 | 2331.12 | 22.78 | | TREN |
| ZR14_076 | 750882.7 | 2533567 | 2355.46 | 13.87 | | TREN |
| ZR15_046 | 751875.9 | 2534035 | 2325.99 | 33.38 | | TREN |
| ZR15_077 | 750920.6 | 2533559 | 2353.36 | 10.72 | | TREN |
| ZR16_044 | 751839.7 | 2534058 | 2320.99 | 24.4 | | TREN |
| ZR16_078 | 750959.4 | 2533546 | 2352.4 | 11.99 | | TREN |
| ZR17_042 | 751809.3 | 2534074 | 2315.43 | 23.63 | | TREN |
| ZR17_079 | 751115.4 | 2533521 | 2346.78 | 14.93 | | TREN |
| ZR18_039 | 751698.6 | 2534122 | 2317.82 | 37.04 | | TREN |
| ZR18_080 | 751154.5 | 2533512 | 2347.54 | 12.92 | | TREN |
| ZR19_037 | 751667.3 | 2534161 | 2316.51 | 22.84 | | TREN |
| ZR19_081 | 751188.1 | 2533493 | 2347.92 | 13.21 | | TREN |
| ZR20_034 | 751579.7 | 2534199 | 2315.91 | 23.61 | | TREN |
| ZR20_082 | 751222.2 | 2533472 | 2347.07 | 13.33 | | TREN |
| ZR21_032 | 751539.7 | 2534215 | 2320.47 | 23.44 | | TREN |
| ZR21_083 | 751251.2 | 2533444 | 2350.78 | 15.66 | | TREN |
| ZR22_030 | 751511.9 | 2534241 | 2323.03 | 15.55 | | TREN |
| ZR22_084 | 751280.1 | 2533415 | 2350.86 | 13.37 | | TREN |
| ZR23_028 | 751476.2 | 2534257 | 2323.53 | 25.27 | | TREN |
| ZR23_085 | 751312.2 | 2533392 | 2351.82 | 18.03 | | TREN |
| ZR24_026 | 751451.4 | 2534292 | 2326.04 | 21.72 | | TREN |
| ZR24_086 | 751349.7 | 2533375 | 2354.56 | 13.62 | | TREN |
| ZR25_024 | 751422.8 | 2534323 | 2329.88 | 21.96 | | TREN |
| ZR25_087 | 751392.4 | 2533354 | 2359.88 | 13.66 | | TREN |
| ZR26_019 | 751338.1 | 2534406 | 2338.86 | 56.77 | | TREN |
| ZR26_088 | 751429.7 | 2533341 | 2362.9 | 10.85 | | TREN |
| ZR27_018 | 751314.4 | 2534436 | 2342.11 | 51.64 | | TREN |
| ZR27_089 | 751469.7 | 2533322 | 2366.68 | 10.12 | | TREN |
| ZR28_016 | 751273.4 | 2534453 | 2343.1 | 82.25 | | TREN |
| ZR28_090 | 751505.9 | 2533304 | 2366.2 | 22.43 | | TREN |
| ZR29_014 | 751242.2 | 2534478 | 2343.84 | 104.6 | | TREN |
| ZR29_103 | 751540.8 | 2533284 | 2361.28 | 30.09 | | TREN |

| HOLE | EASTING | NORTHING | ELEVATION | HLENGTH | YEAR | HOLE_TYPE |
|---|---|---|---|---|---|---|
| ZR30_012 | 751214.2 | 2534511 | 2346.53 | 80.22 | | TREN |
| ZR30_104 | 751570.8 | 2533258 | 2356.53 | 31.45 | | TREN |
| ZR31_010 | 751185.3 | 2534533 | 2348.7 | 87.11 | | TREN |
| ZR31_105 | 751605.5 | 2533240 | 2352.23 | 14.89 | | TREN |
| ZR32_008 | 751156.2 | 2534564 | 2351.25 | 59.82 | | TREN |
| ZR32_106 | 751667.9 | 2533206 | 2351.33 | 31.56 | | TREN |
| ZR33_006 | 751141.3 | 2534605 | 2352.99 | 41.15 | | TREN |
| ZR33_108 | 751738.6 | 2533182 | 2361.22 | 43.18 | | TREN |
| ZR34_004 | 751118.6 | 2534637 | 2351.49 | 29.44 | | TREN |
| ZR34_109 | 751771.4 | 2533201 | 2364.9 | 16.98 | | TREN |
| ZR35_003 | 751111.6 | 2534656 | 2350.87 | 9.01 | | TREN |
| ZR35_110 | 751804.5 | 2533198 | 2370.28 | 17.56 | | TREN |
| ZR36_002 | 751080.5 | 2534681 | 2347.6 | 10.1 | | TREN |
| ZR37_001 | 751052 | 2534706 | 2344.6 | 14.52 | | TREN |
| ZR71_151 | 752219.9 | 2532879 | 2349.14 | 16.82 | | TREN |
| ZR72_152 | 752203.4 | 2532897 | 2351.81 | 19.58 | | TREN |
| ZR73_153 | 752193.5 | 2532917 | 2353.15 | 12.6 | | TREN |
| ZR74_154 | 752150.1 | 2532925 | 2361.1 | 19.34 | | TREN |
| ZR75_155 | 752108.9 | 2532957 | 2364.25 | 38.42 | | TREN |
| ZR76_156 | 751643.3 | 2533412 | 2360.23 | 131.43 | | TREN |
| ZR77_157 | 751693.5 | 2533444 | 2353.65 | 54.14 | | TREN |
| ZRT14_145 | 751517.8 | 2534212 | 2319.88 | 40.84 | | TREN |
| ZRT15_146 | 751556.4 | 2534197 | 2316.62 | 33.31 | | TREN |
| ZRT16_147 | 751598.3 | 2534189 | 2312.79 | 31.91 | | TREN |
| ZRT17_148 | 751629.9 | 2534120 | 2319.58 | 74.19 | | TREN |
| ZRT18_149 | 751663.5 | 2534103 | 2318.15 | 73.41 | | TREN |
| ZRT19_150 | 751712.2 | 2534109 | 2315.44 | 43.14 | | TREN |
| ZRT36_114 | 751850.5 | 2533187 | 2375.52 | 24.39 | | TREN |
| ZRT37_115 | 751890 | 2533179 | 2376.05 | 20.07 | | TREN |
| ZRT38_116 | 751926.7 | 2533157 | 2378.13 | 29.3 | | TREN |
| ZRT39_117 | 751964.7 | 2533152 | 2379.38 | 31.28 | | TREN |
| ZRT40_118 | 752005.5 | 2533138 | 2379.4 | 28.42 | | TREN |
| ZRT41_119 | 752043.4 | 2533123 | 2380.11 | 17.32 | | TREN |
| ZRT42_120 | 752073.9 | 2533102 | 2378.27 | 33.1 | | TREN |
| ZRT43_121 | 752103.2 | 2533076 | 2371.93 | 35 | | TREN |
| ZRT44_122 | 752119.9 | 2533043 | 2363.42 | 50.13 | | TREN |
| ZRT45_111 | 752156.4 | 2533017 | 2358.54 | 27.22 | | TREN |
| ZRT46_112 | 752165.7 | 2532985 | 2352.78 | 28.88 | | TREN |
| ZRT47_113 | 752237.1 | 2532863 | 2345.76 | 22.87 | | TREN |
| ZRT48_123 | 752530.5 | 2532648 | 2369.9 | 38.72 | | TREN |

| HOLE | EASTING | NORTHING | ELEVATION | HLENGTH | YEAR | HOLE_TYPE |
|---|---|---|---|---|---|---|
| ZRT49_124 | 752560.5 | 2532617 | 2369.59 | 56.76 | | TREN |
| ZRT50_125 | 752608.9 | 2532617 | 2371.02 | 39.13 | | TREN |
| ZRT51_126 | 752806.1 | 2532548 | 2357.21 | 21.17 | | TREN |
| ZRT52_127 | 752900.5 | 2532511 | 2349.2 | 22.02 | | TREN |
| ZRT53_128 | 752938.5 | 2532499 | 2345.23 | 20.58 | | TREN |
| ZRT54_129 | 752973.7 | 2532479 | 2340.32 | 28.25 | | TREN |
| ZRT55_130 | 752998.4 | 2532453 | 2334.5 | 33.08 | | TREN |
| ZRT56_130 | 753028.3 | 2532423 | 2327.85 | 41.13 | | TREN |
| ZRT57_131 | 751244.5 | 2533780 | 2349.92 | 29.94 | | TREN |
| ZRT58_132 | 751270.7 | 2533750 | 2343.64 | 35.92 | | TREN |
| ZRT59_133 | 751296.8 | 2533721 | 2338.48 | 36.91 | | TREN |
| ZRT60_134 | 751328.1 | 2533696 | 2332.17 | 49.84 | | TREN |
| ZRT61_135 | 751378.3 | 2533651 | 2334.15 | 36.86 | | TREN |
| ZRT62_136 | 751392.7 | 2533599 | 2337.73 | 68.85 | | TREN |
| ZRT63_137 | 751422.8 | 2533588 | 2338.17 | 67.19 | | TREN |
| ZRT64_138 | 751449.9 | 2533556 | 2339.63 | 87.25 | | TREN |
| ZRT65_139 | 751482.4 | 2533539 | 2340.55 | 32.92 | | TREN |
| ZRT66_140 | 751515.9 | 2533593 | 2337.06 | 18.35 | | TREN |
| ZRT67_141 | 751525.1 | 2533527 | 2342.39 | 78.26 | | TREN |
| ZRT68_142 | 751563.2 | 2533510 | 2346.03 | 69.19 | | TREN |
| ZRT69_143 | 751599.2 | 2533487 | 2349.38 | 76.33 | | TREN |
| ZRT70_144 | 751637.6 | 2533473 | 2355.61 | 37.67 | | TREN |