NI 43-101 Technical Report on Resources and Reserves Yauricocha Mine Yauyos Province, Peru

Effective Date: October 31, 2019
Report Date: January 17, 2020

Prepared for

Sierra Metals Inc.

Report Prepared by

SRK Consulting (Canada) Inc.
2US043.004
January 2020

Signed by Qualified Persons:

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1 Executive Summary

This report was prepared as a Canadian National Instrument 43-101 (NI 43-101) Technical Report on Resources and Reserves (Technical Report) for Sierra Metals Inc. (Sierra Metals), previously known as Dia Bras Exploration, Inc., on the Yauricocha Mine (Yauricocha or Project), which is located in the eastern part of the Department of Lima, Peru. The purpose of this report is to present the Mineral Resource and Reserve estimates, operating and capital costs, description of the mining methods used, the processing plant, and the related surface and underground infrastructure.

The Consultants preparing this technical report are specialists in the fields of geology, exploration, Mineral Resource and Mineral Reserve estimation and classification, underground mining, geotechnical, environmental, permitting, metallurgical testing, mineral processing, processing design, capital and operating cost estimation, and mineral economics.

1.1 Property Description and Ownership

The Yauricocha Mine is in the Alis district, Yauyos province, department of Lima approximately 12 km west of the Continental Divide and 60 km south of the Pachacayo railway station. The active mining area within the mineral concessions is located at coordinates 421,500 m east by 8,638,300 m north on UTM Zone 18L on the South American 1969 Datum, or latitude and longitude of 12.3105º S and 75.7219º W. It is geographically in the high zone of the eastern Andean Cordillera, and within one of the major sources of the River Cañete which discharges into the Pacific Ocean. The mine is at an average altitude of 4,600 masl (Gustavson, 2015).

The current operation is an underground polymetallic sulfide and oxide operation, providing material for the nearby Chumpe process facility. The mine has been operating continuously under Sociedad Minera Corona S.A. (SMCSA or Minera Corona) ownership since 2002 and has operated historically since 1948. Sierra Metals, Inc. purchased 82% of SMCSA in 2011.

1.2 Geology and Mineralization

The Yauricocha Mine features several mineralized bodies, which have been emplaced along structural trends, with the mineralization itself related to replacement of limestones by hydrothermal fluids related to nearby intrusions. The mineralization varies widely in morphology, from large, relatively wide, tabular style (manto) deposits to narrow, sub-vertical chimneys. The mineralization features economic grades of silver (Ag), copper (Cu), lead (Pb) and zinc (Zn), with local gold (Au) to a lesser degree. The majority of the deposits are related to the regional high-angle NW-trending Yauricocha fault or the NE trending and less well-defined Cachi-Cachi structural trend. The mineralization generally presents as polymetallic sulfides but is locally oxidized to significant depths or is associated with Cu-rich bodies.

1.3 Exploration Status

The Yauricocha Mine is concurrently undertaking exploration, development and operations. Exploration is ongoing within the mine claim and is supported predominantly by drilling and exploration drifting. The mine is also currently producing multiple types of metal concentrates from several underground mine areas.

1.4 Mineral Resource Estimate

The understanding of the geology and mineralization, as reported in the Resource Statement for Yauricocha is based on a combination of geologic mapping, drilling and development sampling that guides the ongoing mine design. SRK has reviewed the methods and procedures for these data collection methods and notes that they are generally reasonable and consistent with industry best practice. The validation and verification of data and information supporting the Mineral Resource estimation has historically been deficient, but strong efforts are being made to modernize and validate the historic information using current, aggressive Quality Assurance / Quality Control (QA/QC) methods and more modern practices for drilling and sampling. SRK notes that most of the remaining resources in areas such as Mina Central and Cachi-Cachi (Figure 1-1) are supported by modern data validation and QA/QC, and that new areas like Esperanza feature extensive QA/QC and third-party analysis.

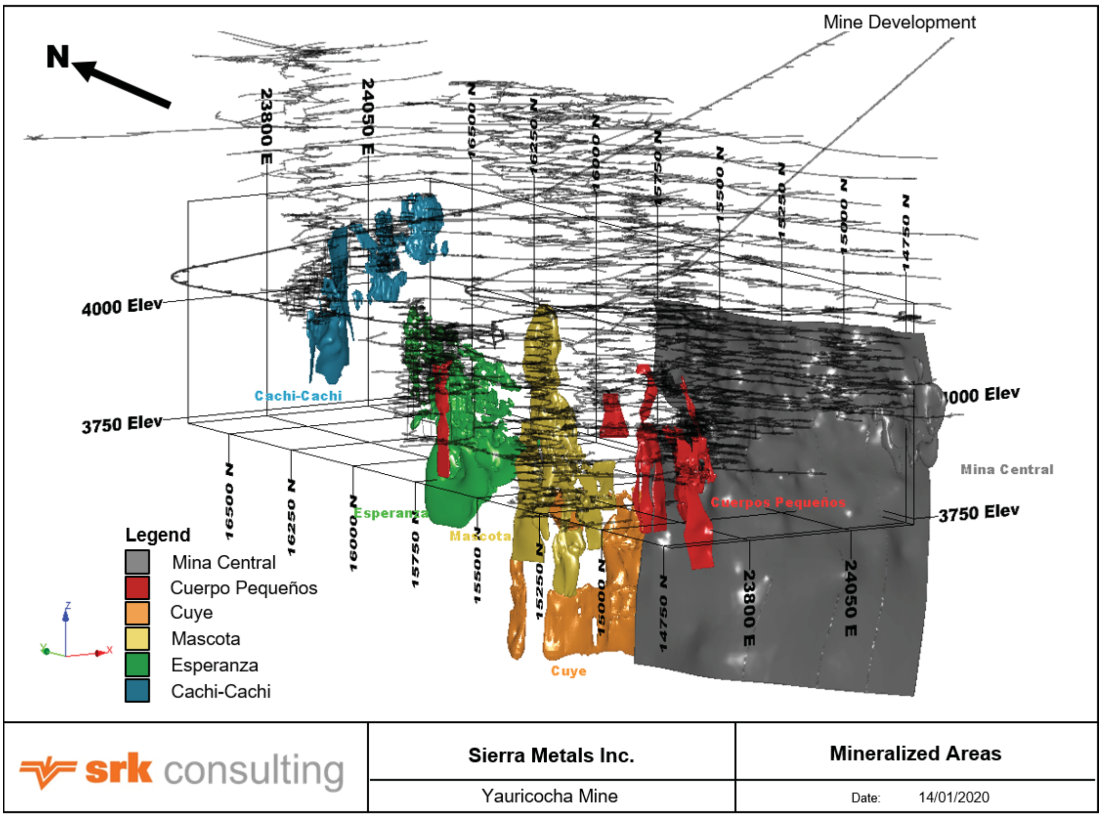


Figure 1-1: Modelled Mineralized areas Estimated at Yauricocha Mine

SRK notes that the geological modeling procedures currently implemented by the Yauricocha geologists are significantly different than that used in previous years and are now based on implicit modeling through Seequent Leapfrog® Geo 3D geology modeling software. This is consistent with industry best practice, and SRK notes that there have been advances in the detail and extent of geological modeling for most of the orebodies.

The procedures and methods supporting the Mineral Resource estimation have been developed in conjunction with Minera Corona geological personnel. The resource estimations presented herein have been conducted by SRK as independent consultants using supporting data generated by the site. In general, the geologic models are defined by the site geologists using manual and implicit 3D modeling techniques and are based on information from drilling and development. These models are used to constrain block models, which are flagged with bulk density, mine area, depletion, etc. Grade is estimated into these block models using both drilling and channel samples, applying industry-standard estimation methodology. Mineral Resources were estimated in Datamine Studio RM™ software and are categorized in a manner consistent with industry best practice. Mineral Resources are reported above reasonable unit value cut-off's applicable per mineralization type and the expected mining method.

SRK is of the opinion that the resource estimations are suitable for public reporting and are a fair representation of the in-situ contained metal for the Yauricocha deposit.

The October 31, 2019 consolidated audited Mineral Resource statement for the Yauricocha Mine is presented in Table 1.1. The detailed and individual tables for the Yauricocha areas are presented in Section 14 of this report.

Table 1-1: Consolidated Yauricocha Mine Mineral Resource Statement as of October 31, 2019

SRK Consulting (Canada), Inc. (1) (2) (3) (4) (5) (6) (7) (8) (9)

Classification	Volume (m^3) '000	Tonnes (kt)	Density (kg/m^3)	Ag (g/t)	Au (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)	Fe (%)	NSR (USD/t)	Ag (M oz)	Au (K oz)	Cu (M lb)	Pb (M lb)	Zn (M lb)	As (kt)	Fe (M t)
Measured	1,075	3,662	3.41	66.25	0.69	1.33	1.20	3.47	0.20	24.58	151	7.8	81.0	107.0	97.2	280.5	7.3	0.9
Indicated	2,603	8,989	3.45	45.67	0.56	1.27	0.72	2.81	0.14	25.59	125	13.2	160.5	251.8	142.3	557.5	13.0	2.3
Measured+ Indicated	3,678	12,651	3.44	51.63	0.59	1.29	0.86	3.00	0.16	25.29	132	21.0	241.5	358.8	239.5	838.0	20.3	3.2
Inferred	1,870	6,501	3.48	39.23	0.51	1.50	0.62	1.66	0.09	26.15	113	8.2	106.6	214.9	88.9	237.6	5.7	1.7

Notes

(1) Mineral Resources have been classified in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM") Definition Standards on Mineral Resources and Mineral Reserves, whose definitions are incorporated by reference into NI 43-101.

(2) Mineral Resources are reported inclusive of Mineral Reserves. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. All figures are rounded to reflect the relative accuracy of the estimates. Silver, gold, silver, copper, lead, zinc, arsenic (deleterious) and iron assays were capped / cut where appropriate.

(3) The consolidated Yauricocha Resource Estimate is comprised of Measured, Indicated and inferred material in the Mina Central, Cuerpos Pequeños, Cuye, Mascota, Esperanza and Cachi-Cachi mining areas.

(4) Polymetallic Mineral Resources are reported at Cut-Off values (COV)'s based on 2018 actual metallurgical recoveries and 2019 smelter contracts.

(5) Metal price assumptions used for polymetallic feed considered 2019 consensus pricing (Gold (US$1,303/oz), Silver (US$15.95/oz), Copper (US$2.94/lb), Lead (US$0.95/lb), and Zinc (US$1.24/lb).

(6) Lead Oxide Mineral Resources are reported at COV's based on 2016 actual metallurgical recoveries and 2016/2017 smelter contracts.

(7) Metal price assumptions used for lead oxide feed considered Long Term consensus pricing (Gold (US$1,314/oz), Silver (US$17.55/oz), Copper (US$3.11/lb), Lead (US$0.95/lb), and Zinc (US$1.08/lb).

(8) The mining costs are based on 2018 actual costs and are variable by mining method.

(9) The unit value COV's are variable by mining area and proposed mining method. The marginal COV ranges from US$46 to US$55.

1.5 Mineral Reserve Estimate (effective October 31st, 2019)

The Mineral Reserve Statement presented herein has been prepared for public disclosure.

The Mineral Reserves are estimated in conformity with CIM Mineral Resource and Mineral Reserves Estimation Best Practices Guidelines (November 2003) and are classified according to CIM Standard Definition for Mineral Resources and Mineral Reserves (May 2014) guidelines. The Mineral Reserve Statement is reported in accordance with NI 43-101.

The reference point at which the Mineral Reserve is identified is where the ore is delivered to the processing plant referred to as mill feed.

SRK notes that the reserve estimation procedures currently implemented by the Yauricocha mine planning personnel is evolving when compared to those used in previous years. These procedures are consistent with industry best practice though not fully compliant with latest industry best practice guidelines published by CIM on November 29th, 2019. The reserve estimation is now based on stope designs using the geology block models and stope optimization software, Mineable Shape Optimizer (MSO). The development design and schedule are based on the mine design tools in the Datamine Studio 5DP™ and scheduling software Datamine EPS™.

The Yauricocha Mineral Reserve Estimate is comprised of the Proven and Probable material in the Mina Central, Esperanza, Cachi-Cachi, Mascota, Cuye, and Cuerpos Pequeños mining areas.

The October 31, 2019 consolidated Mineral Reserve Statement for the Yauricocha Mine is presented in Table 1.2. The detailed and individual tables for the Yauricocha mining areas are presented in Section 15 of this report.

Table 1-2: Yauricocha Mine Consolidated Mineral Reserve Statement as of October 31, 2019

SRK Consulting (Canada), Inc. (1) (2) (3) (4) (5) (6)(7)

Mineral Type	Classification	Mineral Reserves						Contained Metal				
		Tonnes (kt)	Ag (g/t)	Au (g/t)	Cu (%)	Pb (%)	Zn (%)	Ag (M oz)	Au (K oz)	Cu (M lb)	Pb (M lb)	Zn (M lb)
Consolidated Feed	**Proven**	2,665	52.57	0.58	1.26	0.95	3.23	4.5	49.6	73.8	55.9	189.8
	Probable	5,775	43.69	0.47	1.07	0.70	3.00	8.1	86.4	136.0	88.6	382.2
Total Proven and Probable		8,439	46.49	0.50	1.13	0.78	3.07	12.6	136.0	209.8	144.5	572.0

(1) Mineral Reserves have been classified in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM") Definition Standards on Mineral Resources and Mineral Reserves, whose definitions are incorporated by reference into NI 43-101

(2) All figures are rounded to reflect the relative accuracy of the estimates. Totals may not sum due to rounding.

(3) The consolidated Yauricocha Reserve Estimate is comprised of Proven and Probable material in the Mina Central, Esperanza, Cachi-Cachi, Mascota, Cuye, and Cuerpos Pequeños mining areas.

(4) Mineral reserves are reported at unit value cut-offs values (COV) based on metal price assumptions*, variable metallurgical recovery assumptions**, and variable modifying factors***.

* Metal price assumptions considered are based on 2019 consensus pricing: Gold (US$/oz 1,354.00), Silver (US$/oz 17.82), Copper (US$/lb 3.08), Lead (US$/lb 0.93), and Zinc (US$/lb 1.08).

** Metallurgical recovery assumptions for the Yauricocha Mine are variable by mineralization style and degree of oxidation. Recovery is a function of grade and relative metal distribution in individual concentrates. The assumptions are built into the unit values for each area, as a function of the metallurgical recovery multiplied by the metal price.

*** Modifying factors such as dilution and mining recovery are based on historical mine to mill reconciliation and are variable by mining method and area.

(5) The mining costs are variable by mining method.

(6) Mining recovery and dilution have been applied and are variable by mining area and proposed mining method.

(7) The unit value COV's are variable by mining area and proposed mining method. The economic COV ranges from an NSR of US$71 to US$80.

1.6 Mining Methods

1.6.1 Mining

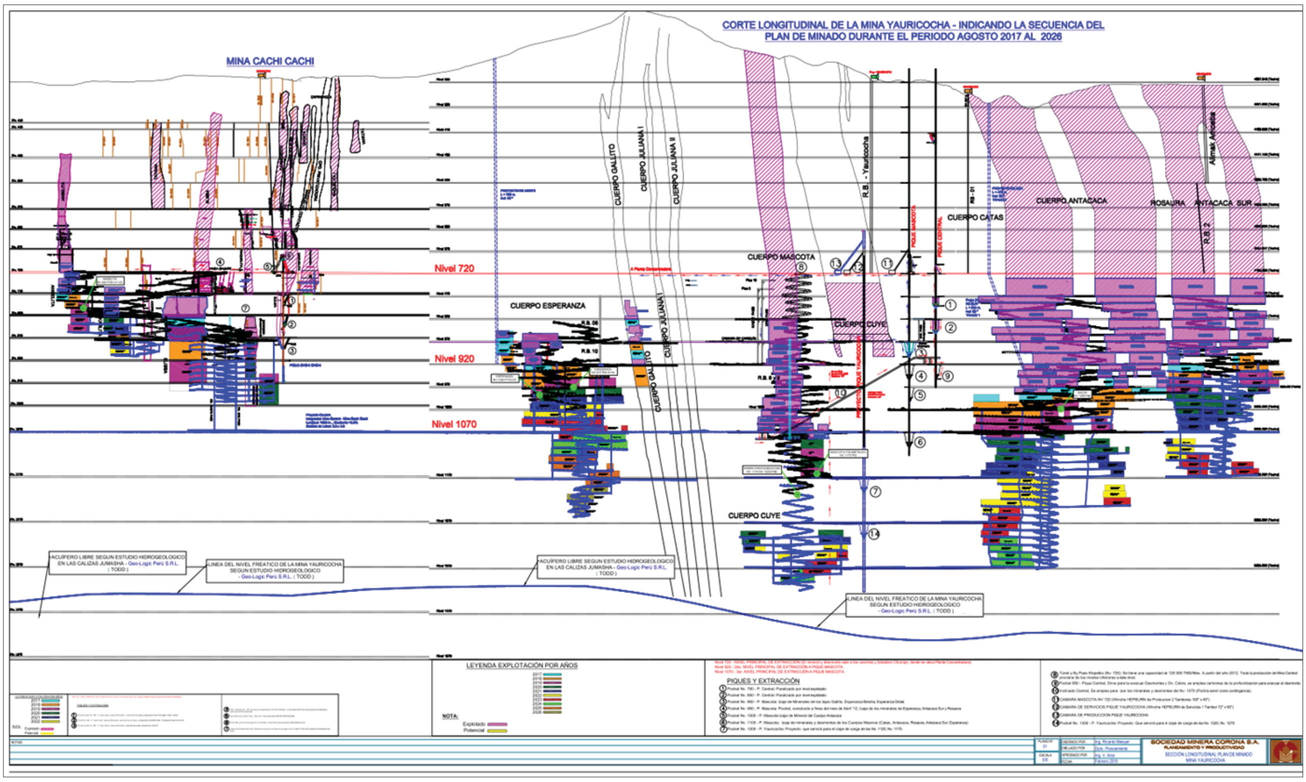
The primary mining method at Yauricocha is sub-level caving which accounts for 84% of production supplemented by a minor amount of overhand mechanized cut and fill. The mine production areas are grouped into six mining areas: Mina Central, Esperanza, Mascota, Cuye, Cachi-Cachi, and Cuerpos Pequeños.

Polymetallic sulfide ore accounts for more than 99% of the material mined at Yauricocha. Material classified as lead oxide can also be encountered, but it is a minor component of the overall tonnages in the reserves estimate.

The mine is accessed by two shafts, Central Shaft and Mascota Shaft, and the Klepetko and Yauricocha tunnels. Ore and waste are transported via the Klepetko Tunnel at the 720 level (elevation 4,165 masl) which runs east-northeast from the mine towards the mill and concentrator, and the 4.7 km Yauricocha Tunnel, commissioned in 2018, that also accesses the mine at the 720 level. The Yauricocha Tunnel was added to increase haulage capacity and serves as a ventilation conduit. Refer to Figure 1.1.

The Yauricocha Shaft, currently under construction, will provide access down to 1370 level and is expected to be in operational in 2022.

Mine production at Yauricocha is currently an average of 3,300 t/d with planned annual production of 1.2 million tonnes per year (Mt/y) for 6 years.



Source: Sierra Metals, 2019

Figure 1-2: Yauricocha Long Section Showing Mining Areas and Ore Zones (Looking Northeast)

1.6.2 Geotechnical

Geotechnical investigations have been conducted at the Yauricocha Mine to prepare a geotechnical model of ground conditions. The investigations involved preparing a major fault model, rock mass model, rock mass strength model, rock mass characterization, granular material (ore) classifications; underground traverse mapping, core logging, laboratory tests, shafts inspections, subsidence studies, preparation of a geotechnical database, and the implementation of a data collection process. In 2017, SRK confirmed that these activities complied with international standards and industry best practices.

Sierra Metals informed SRK that there have not been material changes to the geotechnical characterization and understanding since the last technical report. Three dimensional geotechnical models were developed in conjunction with SRK in 2015. SRK understands that these have not been maintained and there are no current three-dimensional geotechnical models for the mining areas. Using a central database and developing/maintaining integrated litho-structural and rock mass models is industry standard and best practice. Sierra Metals geotechnical department instead produces and uses two-dimensional plans which SRK notes are of good quality, illustrative and functional.

Mudflows are encountered at Yauricocha. At present, lower mined levels where mudflows are occurring are at the 820 level (elevation of 4,040 masl to 4,057 masl in the Antacaca and Catas ore bodies) and the 870 level (elevation of 4,010 masl to 4,093 masl in the Rosaura and Antacaca Sur ore bodies). All of the recorded mudflows have been located within ore bodies near the contact with the Jumasha limestone and the adjacent granodiorite and Celendín formation. The current understanding of mudflow conditions is sufficient to support the drawpoint design adjustments implemented by Yauricocha, mucking operations, and dewatering programs.

The ground control management level plans reviewed present a rock mass quality regime that is consistent with the conceptual geotechnical rock mass model, as well as the description of the domains and sub-domains from the 2015 technical report. The level plans and accompanying development profile and installation procedures are well developed and appropriate for operational application. The ground support designs were not reviewed in detail as part of this study, but an observation was made that the ground support type for good ground did not include any surface support. Unless there is a thorough and regimented check-scaling procedure ensured, industry standard is to have surface of mesh and/or shotcrete even in good ground.

SRK is of the opinion that the current understanding of subsidence and its effects is reasonable. The current understanding of in-situ and induced stress for the current mining areas is satisfactory, but for the deeper planned mining areas, site specific stress measurements and stress modelling are needed. The current understanding of the conditions leading to mudflow and the mitigation measures and practices put in place are reasonable; however, the potential occurrence of a mud rush event is an ever-present risk to be managed, particularly when entering new/deeper mining areas. Dewatering practices need to be maintained, existing drawpoints monitored, and new areas investigated prior to being developed.

1.6.3 Hydrogeology

Hydrogeological and hydrological information is available from multiple sources, including mine records and a large number of investigations or data compilations by external consultants. Mine operations have compiled significant information on flow rates and field water quality parameters (e.g., color, pH, conductivity, temperature) across much of the mine and developed maps summarizing locations and data. Numerous hydrogeological and hydrological studies have also been completed by external consultants (Geologic, 2014, 2015; Hydro-Geo Consultores, 2010, 2012, 2016; Geoservice Ingenieria 2008, 2014, 2016; Helium, 2018). Data has been collected from underground observations, pump tests, tracer tests, and surface water features.

Cumulative inflow into the mine was on the order of 100 L/s in 2017 (Helium, 2018). Inflow measurements have been collected at many locations (drainage drill holes and discrete inflows) and at different times, but data is somewhat inconsistent. Water enters the mine in widely distributed areas and drainage drill holes located on various levels.

Current observations and analyses suggest that inflow to both the subsidence (caving) zone and the mine will increase as the mine expands. Mitigation and management efforts should continue to understand the distribution of water and value in efforts to control or reduce inflow. One risk is mud rush, as described in Section 16.5.1.

Historically, the mine has been able to manage water sufficiently to allow mining to proceed. There is no reason to believe that this will change, but as the mine expands, water inflows should be expected to increase, and risks exist that could influence factors such as production rate (delays due to inflows) or safety (mud rush risk). Further work is required to improve understanding of the hydrogeological system and the magnitude of potential risk for new mining areas. Inflow reduction or management mitigation efforts should continue to be assessed, tested and implemented to reduce these risks.

1.7 Recovery Methods

Yauricocha's conventional processing plant consists of two parallel processing lines, one for polymetallic sulfide ore and one for oxide ore. Each circuit's unit processes include a crushing stage, grinding, multi-stage differential flotation, thickening and filtration.

Yauricocha polymetallic circuit has a nominal capacity of 3,000 t/d. The polymetallic plant is showing a consistent upward trend in throughput capacity. During the January to October 2019 period, the polymetallic circuit operated on average at 2,926 t/d of fresh feed. Silver is preferentially deported to the lead sulfide concentrate in an increasing proportion, starting in 2013 at 34.7%, and averaging 43.1% in the January to October 2019 period.

In the January to October 2019 period, the copper concentrate recovered 26.4% of the silver metals that translated in payable grade of 613.4 g/t Ag. Zinc concentrate recovered 8.9% of the silver metal. Zinc Concentrate accounts for the largest output of the concentrate streams. Zinc concentrate production ranged from 45,000 t/y to 56,000 t/y, or approximately 60% of the total tonnage produce from the polymetallic circuit.

In the first ten months of 2019 there was no treatment of oxide ore.

Approximately 11.52% of the mill feed tonnage leaves the site as concentrate (Table 1.3 Yauricocha Ore Processing and Concentrate Production for January to October 2019).

All concentrates are trucked off site.

Table 1-3: Yauricocha Ore Processing and Concentrate Production for January to October 2019

Processing Circuit	Stream	Tonnes	Throughput t/d (@ 365days/year)
Polymetallic	Fresh Ore	889,472	2,926
	Cu Concentrate	24,838	82
	Pb Concentrate	21,698	71
	Zn Concentrate	55,966	184
Oxide	Fresh Ore		
	Pb Concentrate		
	Pb Oxide Concentrate		
	Fresh Ore		
	Cu Oxide Concentrate		
	Fresh Ore		
	Cu Concentrate		

Source: Sierra Metals, 2019

1.8 Project Infrastructure

The site is a mature producing mine and mill, with all required infrastructure in place and functioning. The Project has highway access with two routes to support Project needs with the regional capital Huancayo (population 340,000) within 100 km. Personnel travel by bus to the site and live in one of the four camps (capacity approximately 2,000 people). There are currently approximately 1,700 personnel on-site (approximately 500 employees and 1,200 contractors).

The on-site facilities include the processing plant, mine surface facilities, underground mine facilities, tailings storage facility (TSF), and support facilities. The processing facility includes crushing, grinding, flotation; dewatering and concentrate separation, concentrate storage, and thickening and tailings discharge lines to the TSF.

The underground mine and surface facilities include headframes, hoist houses, shafts and winzes, ventilation structures, mine access tunnels, waste storage facilities, high explosives and detonator magazines, underground shops, and diesel and lubrications storage.

The support facilities include four camps where personnel live while on-site, a laboratory, change houses and showers, cafeterias, school, medical facility, engineering and administrative buildings, and miscellaneous equipment and electrical shops to support the operations.

The site has existing water systems to manage water needs on-site. Water is sourced from the Ococha Lagoon, the Cachi-Cachi underground mine, and recycle/overflow water from the TSF, depending on end use. Water treatment systems treat the raw water for use as potable water or for service water in the plant. Additional systems treat the wastewater for further consumption or discharge.

Energy for the site is available through electric power, compressed air, and diesel. The electric power is supplied by contract over an existing 69 kV line to the site substation. The power is distributed for use in the underground or at the processing facility. The current power load is 10.5 MVA with approximately 70% of this being used at the mine and the remainder at the mill and other facilities. The power system is planned to be expanded to approximately 14 MVA in 2020/2021. A compressed air system is used underground with an additional 149 KW compressor system being added, and diesel fuel is used in the mobile equipment and in the 895 kW backup electrical generator.

The site has permitted systems for the handling of waste including a TSF, waste rock storage facility, and systems to handle other miscellaneous wastes. The TSF has a capacity for 12 months at the current production levels. The TSF is being expanded with another lift in 2019/2020 to provide three more years of capacity. The three additional lift stages in total will provide the Project with approximately nine years of additional capacity. An on-site industrial landfill is used to dispose of the Project's solid and domestic waste. The Project collects waste oil, scrap metal, plastic, and paper which are recycled at off-site licensed facilities.

The site has an existing communications system that includes a fiber optic backbone with internet, telephone, and paging systems. The security on-site is managed through checkpoints at the main access road, processing plant, and at the camp entrances.

Logistics to the site are primarily by truck with the five primary concentrate products being shipped by 30 t to 40 t trucks to other customer locations in Peru. Materials and supplies needed for Project operation are procured in Lima and delivered by truck.

1.9 Environmental Studies and Permitting

SMCSA has all relevant permits required for the current mining and metallurgical operations to support a mining rate of 3,300 t/d. These permits include operating licenses, mining and process concessions, capacity extension permits, exploration permits and their extensions, water use license, discharge permits, sanitary treatment plants permit, and environmental management instruments among others.

SMCSA also has a Community Relations Plan including annual assessment, records, minutes, contracts and agreements.

Among the relevant permits, the following are highlighted:

- Land ownership titles;

- Public registrations (SUNARP) of:
  - Process concession,
  - Mining concession,
  - Constitution of "*Acumulación Yauricocha*", and
  - Land ownership and Records owned property (land surface) and lease; and
- 2016 water use right proof of payment.

On January 17, 2019, the bank (Santander) guarantee for the compliance of the Mine Closure Plan regarding Yauricocha Mine Unit Closure Plan Update (approved by Directorate Resolution N° 002-2016-MINEM-DGAAM) was renewed for US$13,693,757.

The Second Amendment of the Closure Plan (approved by Directorate Resolution N°063-2017-MEM-DGAAM, 02/28/2017) designates that the mining operator shall record the guarantee by varying annuities the first days of each year, so that the total amount required for final and post closure is recorded by January 2022 as shown in Table 1.4.

Table 1-4: Closure Plan - Annual Calendar for Guarantee Payment

Year	Annual	Accumulated	Situation
2017		14,458,801	Constituted
2018	-411,510	14,047,291	to constitute
2019	-353,534	13,693,757	to constitute
2020	-274,787	13,418,970	to constitute
2021	-154,459	13,264,511	to constitute
2022	90,700	13,355,211	to constitute

Source: Report Nº 112-2017-MEM-DGAAM/DNAM/DGAM/PC

Note: The amount includes tax (VAT, 18%)

Closure Plan costs are presented in Table 1.5.

Table 1-5: Closure Plan - Results of the Updated Cost Analysis (US$)

Description	Progressive Closure	Final Closure	Post Closure	Total
Direct costs	3,850,845.1 0	6,899,444.29	728,720.69	11,479,010.08
General costs	385,084.50	689,944.43	72,872.07	1,147,901.00
Utility	308,067.60	551,955.54	58,297.66	918,320.80
Engineering	154,033.80	275,977.77	29,148.83	459,160.40
Supervision, auditing & administration	308,067.60	551,955.54	58,297.66	918,320.80
Contingency	154,033.80	275,977.77	29,148.83	459,160.40
Subtotal	**5, 160,132.43**	**9,245,255.35**	**976,485.72**	**15,381,873.50**
VAT	928,823.84	1,664,145.96	175,767.43	2,768,737.23
Total Budget	**6,088,956.27**	**10,909,401.31**	**1,152,253.15**	**18,150,610.73**

Source: Report N° 2668384 with reference to Response of the Observation N° 2. Report N°004-2017-MEM-DGM-DTM-PCM

1.10 Capital and Operating Costs

Based on average mining/processing rate of 3,300 t/d, the Yauricocha reserves will support production until the end of 2026. The yearly capital expenditure for each of the main areas is summarized in Table 1.6.

Table 1-6: Capital Summary (US$000's)

Description	Total (2019-2023)	2019	2020	2021	2022	2023
Sustaining Capital	**74,900**	**19,850**	**21,950**	**14,800**	**10,500**	**7,800**
Mine Development	19,000	3,500	7,000	5,000	2,800	700
Equipment Sustaining	21,800	7,100	4,300	3,900	3,500	3,000
Concentrator Plant	4,200	1,600	800	700	600	500
Tailings Dam	5,100	1,600	1,900	1,600	-	-
Pumping System	700	700	-	-	-	-
Mine Camp	6,000	900	2,700	800	800	800
Ventilation	13,600	3,100	5,100	1,800	1,800	1,800
Environmental	500	350	150	-	-	-
Other	4,000	1,000	-	1,000	1,000	1,000
Expansionary Capital	**40,400**	**9,200**	**11,900**	**10,400**	**6,800**	**2,100**
Exploration	12,700	2,500	3,000	2,700	2,400	2,100
Yauricocha Tunnel	300	300	-	-	-	-
Yauricocha Shaft	27,400	6,400	8,900	7,700	4,400	-
Total Capital	**115,300**	**29,050**	**33,850**	**25,200**	**17,300**	**9,900**

Source: Sierra Metals, 2019

The Mine's operating costs were estimated based on 2018 actual costs provided by Sierra Metals. Table 1.7 and Table 1.8 present the summary of total operating costs and the summary of unit operating costs.

Table 1-7: Operating Cost Summary (US$000,000's)

Area	Total	2019	2020	2021	2022	2023	2024	2025	2026
Mine	390	63	66	69	66	53	42	27	3
Plant	77	12	13	14	13	11	8	5	1
G&A	84	13	14	14	13	11	10	78	11
Total	**$551**	**$89**	**$93**	**$97**	**$92**	**$75**	**$60**	**$40**	**$5**

Source: Sierra Metals, 2019

Table 1-8: Unit Operating Cost Summary (US$/t)

Area	Average	2019	2020	2021	2022	2023	2024	2025	2026
Mine	50.89	57.21	54.73	53.54	54.97	54.79	50.91	45.47	35.54
Plant	10.05	11.09	10.84	10.6	10.89	10.85	10.08	9.01	7.04
G&A	11.77	12.2	11.47	10.63	10.94	11.14	11.95	12.96	12.83
Total	**$72.71**	**$80.50**	**$77.04**	**$74.77**	**$76.80**	**$76.79**	**$72.94**	**$67.43**	**$55.41**

Source: Sierra Metals, 2019

1.11 Economic Analysis

Under NI 43-101 rules, producing issuers may exclude the information required for Economic Analysis on properties currently in production if the technical report does not include a material expansion of current production. Sierra Metals is a producing issuer, and the Yauricocha Mine is currently in production. In addition, no material expansion of current production is planned. Sierra Metals has performed an economic analysis of the Yauricocha Mine's life-of-mine plan using the estimates presented in this report and confirms that the outcome is positive cash flow that supports the statement of Mineral Reserves.

1.12 Conclusions and Recommendations

1.12.1 Geology and Mineral Resources

SRK is of the opinion that the exploration at Yauricocha is being conducted in a reasonable manner and is supported by an extensive history of discovery and development. Recent exploration success at Esperanza, Cuye, and other areas will continue to develop in the near term and SRK notes that other areas near the current mining operation remain prospective for additional exploration, and that these will be prioritized based on the needs and objectives of the Yauricocha Mine.

The current QA/QC program is aggressive and will be providing increased confidence in the quality of the analytical data for future mineral resource estimates.

SRK is of the opinion that the current procedures and methods for the data collection and validation are reasonable and consistent with industry best practices and that material changes have been made in the practices of sampling and downhole deviation measurement which improve confidence in the new drilling. However, there are opportunities to improve this going forward. For example, the current management of the "database" is effectively maintained through a series of individual Excel files, which is not consistent with industry best practice. Modern best practices generally feature a unified database software with all the information compiled and stored in one place, with methods and procedures in place to verify the data and prevent tampering.

SRK is of the opinion that the resource estimations are suitable for public reporting and are a fair representation of the in situ contained metal for the Yauricocha deposit.

1.12.2 Mineral Processing and Metallurgical Testing

SRK is the opinion that Yauricocha's operations is reasonably well operated and shows flexibility to treat multiples ore sources. The metallurgical performance, i.e., metal recovery and concentrate grade have been consistent throughout the period evaluated allowing them to produce commercial quality copper concentrate, copper concentrate, and zinc concentrate.

The spare capacity in their oxide circuit is an opportunity to source material from third-party mines located in the vicinity. The presence of arsenic is being well managed by blending ores in order to control the arsenic's concentration in final concentrates. Gold deportment seems an opportunity that Yauricocha may want to investigate, particularly by evaluating gravity concentration in the grinding stage, or alternatively in the final tails, or both.

1.12.3 Mineral Reserve Estimation and Mining Methods

The Yauricocha Mine is a producing operation with a long production history. SRK is of the opinion that the reserve estimations are suitable for public reporting and are a fair representation of the expected mill feed for the Yauricocha deposit. Continuous improvement processes are in place to regularly ensure that executed plans reflect good mine planning practices

SRK recommends the following:

- Effort be made to streamline and automate the mineral reserve estimation process to facilitate future mineral reserve estimates, reviews and audits.
- The mine planning group needs to review the latest version of the MRMR Best Practice Guidelines published by CIM on November 29th, 2019 and work towards implementing the best practices related to the mineral reserve estimation process. In particular, the MSO runs to be used for mineral reserve estimation should be based on a block model with the grades of the inferred mineral resource set to zero so that the inferred mineral resources are treated as waste.
- Reserve estimation runs in MSO should use a block model with inferred mineral resource grades set to zero, i.e. treat inferred mineral resources as waste.
- A robust mineral reserve to mine to mill reconciliation process needs to be established in order to provide proper backup for the dilution and mining recovery assumptions.
- An appropriate data collection system needs to be implemented to collect the required data to establish the above reconciliation process in a usable format. This is fairly easy to do for cut and fill, but much harder to do for sub-level caving areas.
- The Yauricocha Shaft project should be monitored closely in order to ensure timely access to reserves below 1070 level.
- A consolidated 3D LoM design should be completed to improve communication of the LoM plan, infill drilling requirements, and general mine planning and execution.

- The Base Case LoM plan based on mineral reserves only that was generated for this update should be maintained and used by Yauricocha to provide the medium and short-term mine production forecasts.
- The mine planning group should prepare one or more LoM plans which are more optimistic than the Base Case for use in strategic planning. Typically, the optimistic LoM plan includes inferred mineral resources designed to a conceptual level of detail and updated as the resource is moved to an Indicated or Measured category.

1.12.4 Geotechnical

SRK's recommendations are:

- Continue collecting geotechnical characterization data from mined drifts and exploration drillholes
- Maintain a central geotechnical database
- Develop and maintain geotechnical models, including structures and rock mass wireframes
- Conduct a program of stress measurement in the deeper planned mining areas
- Conduct numerical stress analyses of mining-induced stress effects on planned mining
- Continue a short-term to long-term dewatering programs with drainage systems
- Examine the current mine sequence and simulate the optimal mine sequence to reduce safety risks and the risk of sterilizing ore reserves due to unexpected ground problems
- Revisit the current ground control management plans to check that they are appropriate for the deeper mining areas

1.12.5 Recovery Methods

Yauricocha operates a conventional processing plant that has been subject to continuous improvements in the last several years of operation, most recently including improvements to the flotation unit process, installation of an x-ray slurry analyzer, and the addition of a mechanical rod feeder, for primary rod mill grinding, for improved safety and production. Overhaul of its concentrate thickener with torque monitoring and rake positioning system is planned in 2020 to improve underflow slurry density and increase concentrate filtration capacity. Work continues to de-bottleneck the plant to maximize capacity.

1.12.6 Environmental Studies and Permitting

SMCSA has all relevant permits required for the current mining and metallurgical operations to support a capacity of 3,300 t/d. SMCSA also has a Community Relations Plan including annual assessment, records, minutes, contracts and agreements.

The Environmental Adjustment and Management Program (PAMA), as established by the Supreme Decree Nº 016-93-EM, was the first environmental management tool that was created for mines and metallurgical operations existing before 1994 to adopt technological advances and / or alternative measures to comply maximum permissible limits for effluent discharge and emissions of mining-metallurgical activities. Since then, many environmental regulations have been enacted updating and/or replacing older regulations. The environmental certification for mining activities was transferred from the Ministry of Mining and Energy to the Ministry of Environment; specifically, to the National Service for Environmental Certification (SENACE) effective December 28, 2015.

Though SMCSA has updated its environmental baseline and adjusted its monitoring program by its Supporting Technical Report to the PAMA "Expanding the capacity of the Processing Plant Chumpe of the Accumulated Yauricocha Unit from 2500 to 3000 TMD" (Geoservice Ambiental S.A.C., ITS approved by Directorate Resolution N° 242-2015-MINEM-DGAAM), an important gap exists with reference to environmental and social impact assessment as referred to by the actual environmental protection and management regulation for operating, profit, general labor and mining storage activities (Supreme Decree N° 040-2014-EM, 11/12/2014), this was covered by the approval of the EIA on February 11, 2019.

In addition, SMCSA has two Supporting Technical Reports which authorize the construction of the technological improvement of the domestic waste water treatment system and the addition of new equipment and infrastructure in the Chumpe concentrator plant process. This last Supporting Technical Report (ITS) was approved in 2017 by Directorate Resolution N° 176-2017-MINEM-DGAAM.

SMCSA applied to SENACE to start the evaluation process of the “Environmental Impact Study of the Metallurgical Mining Components Update Project” (Geoservice Ambiental S.A.C., 2017) within the framework of the Supreme Decree N° 016-1993-EM, as this study was initiated before the enforcement of the D.S N° 040-2014-EM and in application of an exceptional procedure established by it. The EIA was obtained on February 11, 2019.

SMCSA also has a closure plan, which has been updated by three amendments. Table 1.10 through Table 1-11 summarize the results of the updated cost analysis, the annual investment plan and annual calendar for guarantee payment.

Table 1-9: Closure Plan - Results of the Updated Cost Analysis (US$)

Description	Progressive Closure	Final Closure	Post Closure	Total
Direct costs	3,850,845.1 0	6,899,444.29	728,720.69	11,479,010.08
General costs	385,084.50	689,944.43	72,872.07	1,147,901.00
Utility	308,067.60	551,955.54	58,297.66	918,320.80
Engineering	154,033.80	275,977.77	29,148.83	459,160.40
Supervision, auditing & administration	308,067.60	551,955.54	58,297.66	918,320.80
Contingency	154,033.80	275,977.77	29,148.83	459,160.40
Subtotal	**5, 160,132.43**	**9,245,255.35**	**976,485.72**	**15,381,873.50**
VAT	928,823.84	1,664,145.96	175,767.43	2,768,737.23
Total Budget	**$6,088,956.27**	**$10,909,401.31**	**$1,152,253.15**	**$18,150,610.73**

Source: Report N° 2668384 with reference to Response of the Observation N° 2. Report N°004-2017-MEM-DGM-DTM-PCM

Table 1-10: Closure Plan – Summary of Investment per Year (US$)

Year	Annual Investment	Totals	Closure Stage
2016	25,647.60	**5,160,132.43**	Progressive
2017	976,708.10		
2018	941,514.60		
2019	997,143.24		
2020	1,184,381.80		
2021	567,310.54		
2022	467,425.51		
2023	3,724,908.73	**9,245,255.35**	Final
2024	5,520,346.51		
2025	278,995.92	**976,485.72**	Post
2026	278,995.92		
2027	139,497.96		
2028	139,497.96		
2029	139,497.96		
Total	**15,381,873.50**	**15,381,873.50**	

Source: Report N° 2668384 with reference to Response of the Observation N° 2. Report N°004-2017-MEM-DGM-DTM-PCM

Table 1-11: Closure Plan - Annual Calendar for Guarantee Payment

Year	Annual	Accumulated	Situation
2017		14,458,801	constituted
2018	-411,510	14,047,291	to constitute
2019	-353,534	13,693,757	to constitute
2020	-274,787	13,418,970	to constitute
2021	-154,459	13,264,511	to constitute
2022	90,700	13,355,211	to constitute

Note: The amount includes tax (VAT, 18%)
Source: Report Nº 112-2017-MEM-DGAAM/DNAM/DGAM/PC.

1.13 Capital and Operating Costs

SRK is of the opinion that the operating and capital cost estimates are reasonable estimates of the cost to extract the current Mineral Reserves based on current knowledge.

2 Introduction and Terms of Reference

2.1 Terms of Reference and Purpose of the Report

This report was prepared as a Canadian National Instrument 43-101 (NI 43-101) Technical Report on Resources and Reserves (Technical Report) for Sierra Metals Inc. (Sierra Metals), previously known as Dia Bras Exploration, Inc., by SRK Consulting (Canada), Inc. (SRK) on the Yauricocha Mine (Yauricocha or Project).

The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in SRK's services, based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This report is intended for use by Sierra Metals subject to the terms and conditions of its contract with SRK and relevant securities legislation. The contract permits Sierra Metals to file this report as a Technical Report with Canadian securities regulatory authorities pursuant to NI 43-101, Standards of Disclosure for Mineral Projects. Except for the purposes legislated under provincial securities law, any other uses of this report by any third party is at that party's sole risk. The responsibility for this disclosure remains with Sierra Metals. The user of this document should ensure that this is the most recent Technical Report for the property as it is not valid if a new Technical Report has been issued.

This report provides Mineral Resource and Mineral Reserve estimates, and a classification of Mineral Resources and Reserves prepared in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum Standards on Mineral Resources and Reserves: Definitions and Guidelines, May 10, 2014 (CIM, 2014).

2.2 Qualifications of Consultants (SRK)

The Consultants preparing this technical report are specialists in the fields of geology, exploration, Mineral Resource and Mineral Reserve estimation and classification, underground mining, geotechnical, environmental, permitting, metallurgical testing, mineral processing, processing design, capital and operating cost estimation, and mineral economics.

None of the Consultants or any associates employed in the preparation of this report has any beneficial interest in Sierra Metals. The Consultants are not insiders, associates, or affiliates of Sierra Metals. The results of this Technical Report are not dependent upon any prior agreements concerning the conclusions to be reached, nor are there any undisclosed understandings concerning any future business dealings between Sierra Metals and the Consultants. The Consultants are being paid a fee for their work in accordance with normal professional consulting practice.

The following individuals, by virtue of their education, experience and professional association, are considered Qualified Persons (QP) as defined in the NI 43-101 standard, for this report, and are members in good standing of appropriate professional institutions. QP certificates of authors are provided in Appendix A. The QP's are responsible for specific sections as follows:

- Andre M. Deiss, BSc. (Hons), Pri.Nat.Sci, MSAIMM, SRK Principal Consultant (Resource Geology), is the QP responsible for the geology and Mineral Resources, Sections 7 through 12, 14 and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.
- Carl Kottmeier, B.A.Sc., P. Eng, MBA, SRK Principal Consultant (Mining), is the QP responsible for infrastructure, market studies, capital and operating costs, and economics, Sections 2 through 6, 18, 19, 20, 21, 22, 23, 24, 27, 28 and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.
- Daniel H. Sepulveda, BSc, SME-RM, SRK Associate Consultant (Metallurgy), is the QP responsible for mineral processing, metallurgical testing and recovery methods Sections 13, 17, and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.
- Dan Mackie, M.Sc., B.Sc., PGeo, SRK Principal Consultant (Hydrogeologist) is the QP responsible for hydrology and hydrogeology Section 16.5.2, and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.
- Jarek Jakubec, C. Eng. MIMMM, SRK Practice Leader/Principal Consultant (Mining, Geotechnical), is the QP responsible for Mining Reserves Section 15, Section 16 (except 16.5.2), and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.

2.3 Details of Inspection

Table 2.1 shows recent site visit participants.

Table 2-1: Site Visit Participants

Personnel	Expertise	Date(s) of Visit	Details of Inspection
Andre M. Deiss	Resource Geology, Mineral Resources	April 28 – May 3, 2019	Reviewed geology, resource estimation methodology, sampling and drilling practices, and examined drill core.
Jarek Jakubec	Geotechnical, Mining Reserves, Mining	Feb. 4 – 7, 2019	Assessed rock mass characterization activities and assess ground control conditions and mud rush issues. Tour of mine and surface facilities, mining methods.
Daniel H. Sepulveda	Metallurgy and Process	April 28 – May 3, 2019	Reviewed metallurgical test work, tailings storage, and process plant.

Source: SRK, 2019

2.4 Sources of Information

The sources of information include data and reports supplied by Sierra Metals personnel as well as documents cited throughout the report and referenced in Section 27.

2.5 Qualifications of SRK and SRK Team

The SRK Group comprises over 1,400 professionals, offering expertise in a wide range of resource engineering disciplines. The SRK Group's independence is ensured by the fact that it holds no equity in any project and that its ownership rests solely with its staff. This fact permits SRK to provide its clients with conflict-free and objective recommendations on crucial judgment issues. SRK has a demonstrated track record in undertaking independent assessments of Mineral Resources and Mineral Reserves, project evaluations and audits, technical reports and independent feasibility evaluations to bankable standards on behalf of exploration and mining companies and financial institutions worldwide. The SRK Group has also worked with a large number of major international mining companies and their projects, providing mining industry consultancy service inputs.

2.6 Effective Date

The effective date of this report is October 31, 2019.

2.7 Units of Measure

The metric system has been used throughout this report. Tonnes are metric of 1,000 kg, or 2,204.6 lb. All currency is in U.S. dollars (US$) unless otherwise stated.

3 Reliance on Other Experts

The consultant's opinion contained herein is based on information provided to the consultants by Sierra Metals throughout the course of the investigations. SRK has relied upon the work of other consultants in the project areas in support of this Technical Report.

The consultants used their experience to determine if the information from previous reports was suitable for inclusion in this technical report and adjusted information that required amending. This report includes technical information, which required subsequent calculations to derive subtotals, totals and weighted averages. Such calculations inherently involve a degree of rounding and consequently introduce a margin of error. Where these occur, the Consultants do not consider them to be material.

SRK received statements of validity for mineral titles, surface ownership and permitting for various areas and aspects of the Yauricocha Mine and reproduced them for this report. These items have not been independently reviewed by SRK and SRK did not seek an independent legal opinion of these items.

4 Property Description and Location

4.1 Property Location

The Yauricocha Mine is located in the Alis district, Yauyos province, department of Lima approximately 12 km west of the Continental Divide and 60 km south of the Pachacayo railway station. The active mining area within the mineral concessions is located at coordinates 421,500 m east by 8,638,300 m north on UTM Zone 18L on the South American 1969 Datum, or latitude and longitude of 12.3105º S and 75.7219º W. It is geographically in the high zone of the eastern Andean Cordillera, very close to the divide and within one of the major sources of the River Cañete, which discharges into the Pacific Ocean. The mine is at an average altitude of 4,600 masl. Figure 4.1 shows the project location.

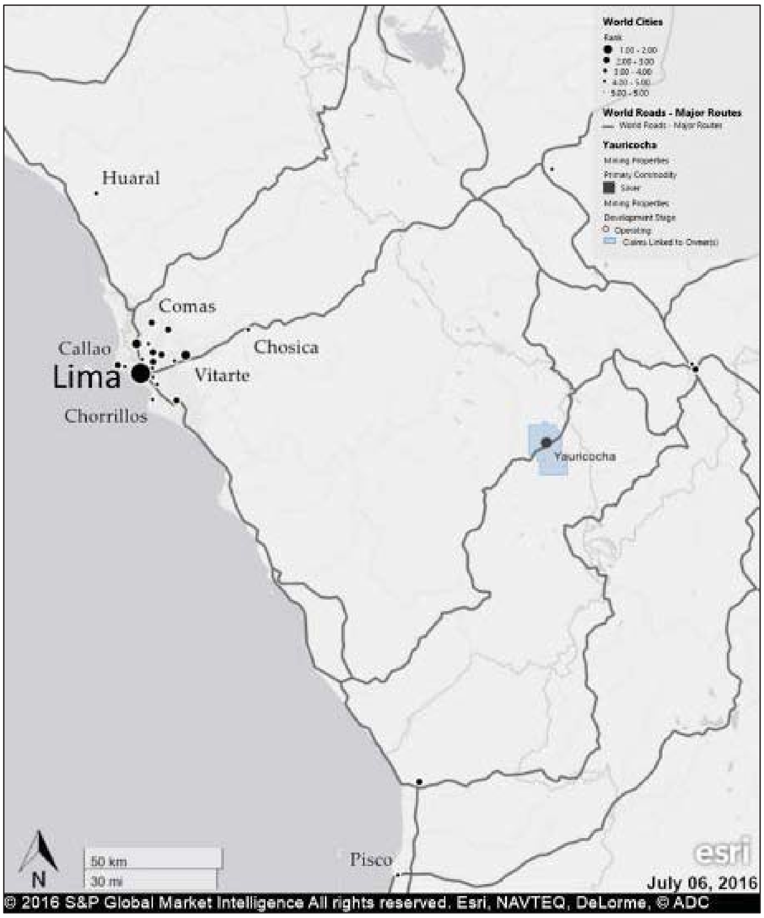


Figure 4-1: Yauricocha Location Map

4.2 Mineral Titles

The mining concession Acumulación Yauricocha (Figure 4.2) was transferred from Empresa Minera del Centro del Peru, the Peruvian state-owned mining entity, to Minera Corona in 2002 (Empresa Minera, 2002) for the sum of US$4,010,000, plus an agreement to invest

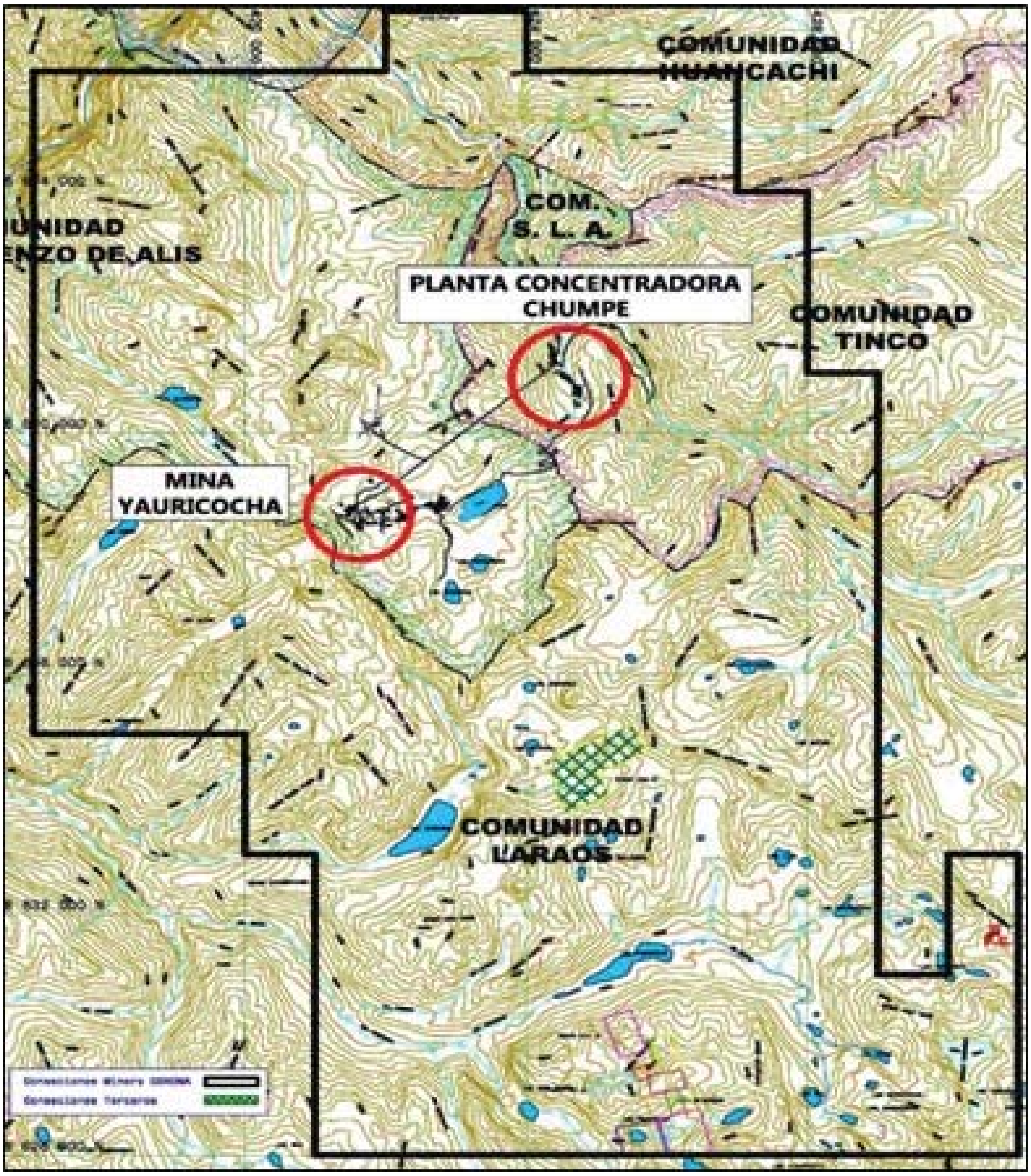
US$3,000,000.00 to project development or to the community, which has been completed. The Accumulation Yauricocha includes the mineral rights on 18,685 ha. It includes areas in the communities of San Lorenzo de Alis, Laraos, Tinco, Huancachi, and Tomas. Dia Bras purchased 82% of Minera Corona in May 2011. On December 5, 2012, Dia Bras Exploration changed its name to Sierra Metals Inc. According to information provided by Dia Bras, the mineral concessions are not subject to an expiration date and remain in effect as long as these two conditions are met:

1. Renewal payment is made to the Peruvian federal government in the amount of US$3 per hectare (ha); and

2. Annual minimum production amount of US$100/yr/ha.

No royalties are associated with the Yauricocha mineral concession.

Included within the above area is a processing site concession with an area of 148.5 ha with a permitted capacity of 2,500 dry t/d. This has been authorized by Resolution No. 279- 2010-MEM-DGM/V on July 14, 2010.



Source: Sierra Metals, 2019

Figure 4-2: Yauricocha Mineral Title Map

4.2.1 Nature and Extent of Issuer's Interest

As part of the mineral concessions transfer with Empresa Minera del Centro del Peru in 2002 (see Section 4.2), Minera Corona acquired approximately 677 ha of land and associated surface rights. A portion of the San Lorenzo Alis community is located within the 677 ha.

In 2007, Minera Corona entered into an additional agreement with the San Lorenzo Alis community (Villaran, 2009). Under this agreement, Minera Corona owns the surface rights and may conduct mining operations in the subject 677 ha through August 2, 2037, or until mine closure, whichever comes first. In exchange, Minera Corona is obligated to pay the San Lorenzo Alis community an annual fee. This fee is paid by Minera Corona every two years beginning on January 1, 2009, and surface rights remain in good standing. However, in February 2013 an addendum was signed which establishes that the payments must be made every year. This right of usufruct (beneficial use) has been registered before the Public Registry of Lima, Office of Cañete (Public Registry of Lima et al, 2013).

The Company has in place several land surface agreements by means of which the title holders of the land surfaces within the area of the Acumulación Yauricocha mining concession, grants the Company the right to use the superficial surface and execute mining activities. The agreements entered by the Company in this regard, are the following:

Lease Agreement: Huacuypacha

The Company has entered into a lease agreement with Mr. Abdon Vilchez Melo, regarding the surface land within the real property named Huacuypacha, located in Tinco, district of Alis, province of Yauyos, Department of Lima. This land is not registered in the Public Registry. By means of this agreement, the Company acquired the right to use said land, including access to water boreholes.

This agreement has been renewed in four opportunities. The term of the agreement expires on December 31, 2021.

Lease Agreement: Queka and Cachi-Cachi

The Company has entered into a lease agreement with the Family Varillas, in relation to land containing 56 ha located in district of Alis, province of Yauyos, Department of Lima. This land is not registered in the Public Registry. By means of this agreement, the landowner granted the use of the referred land in favor of the Company for a total payment of S/.31,500. In addition to the payment obligation, the Company has assumed the obligation to take care of all the environmental liabilities that its activities could generate.

This agreement has been amended in two opportunities. The term of the agreement expired on March 7, 2012. However, the company has signed a new agreement extending the term of the lease until March 7, 2022 in exchange for a one-time payment of S/.210,000.

4.3 Royalties, Agreements and Encumbrances

4.3.1 Debt

On March 11, 2019, the Company entered into a new six-year senior secured corporate credit facility ("Corporate Facility") with Banco de Credito de Peru that provides funding of up to $100 million effective March 8, 2019. The Corporate Facility provides the Company with additional liquidity and will provide the financial flexibility to fund future capital projects as well as corporate working capital requirements. The Company will also use the proceeds of the new facility to repay existing debt balances. The most significant terms of the agreement were:

- Term: 6-year term maturing March 2025
- Principal Repayment Grace Period: 2 years
- Principal Repayment Period: 4 years
- Interest Rate: 3.15% + LIBOR 3M

The Corporate Facility is subject to customary covenants, including consolidated net leverage and interest coverage ratios and customary events of default. The Company is in compliance with all covenants as of March 31, 2019. On March 11, 2019, Dia Bras Peru drew down $21.4 million from this facility. Interest is payable quarterly and interest payments will begin on the drawn and undrawn portions of the facility starting in June 2019.

Principal payments on the amount drawn from the facility will begin in March 2021. The Company repaid the amount owed on the Corona Acquisition Facility on May 11, 2019 using funds drawn from the new facility. The loan is recorded at amortized cost and is being accreted to face value over 6 years using an effective interest rate of 5.75%.

4.3.2 Royalties and Special Taxes

In 2011, the Peruvian Congress passed a new Mining Law effective in 2012. Under this law, a Special Tax and Royalty is introduced which applies to the operating margin of producing mining companies. The margin rates for a given interval of Earnings Before Interest and Tax (EBIT) are shown in Table 4-1. The total royalty is the summation of the special mining tax and the mining royalty.

Table 4-1: Royalty and Special Tax Scale

EBIT Margin	Special Mining Tax – Margin Rate	Mining Royalty – Margin Raw
0.00% 5.00%	0.00%	0.00%
5.00% 10.00%	2.00%	1.00%
10.00% 15.00%	2.40%	1.75%
15.00% 20.00%	2.80%	2.50%
20.00% 25.00%	3.20%	3.25%
25.00% 30.00%	3.60%	4.00%
30.00% 35.00%	4.00%	4.75%
35.00% 40.00%	4.40%	5.50%
40.00% 45.00%	4.80%	6.25%
45.00% 50.00%	5.20%	7.00%
50.00% 55.00%	5.60%	7.75%
55.00% 60.00%	6.00%	8.50%
60.00% 65.00%	6.40%	9.25%
65.00% 70.00%	6.80%	10.00%
70.00% 75.00%	7.20%	10.75%
75.00% 80.00%	7.60%	11.50%
80.00% 85.00%	8.00%	12.00%
85.00% 90.00%	8.40%	

Source: Gustavson, 2015

4.4 Environmental Considerations

The mine known as “Acumulación Yauricocha Unit” is located on the property of the San Lorenzo de Alis and Laraos Communities and in the buffer zone of the Nor Yauyos-Cochas landscape reserve. It was established by the Supreme Decree N° 033-2001-AG (06/03/2001) which has a Master Plan 2006-2011 by the National Institute of Natural Resources Natural Protected Area Office (INRENA, Instituto Nacional de Recursos Naturales, IANP, Intendencia de Áreas Naturales Protegidas).

SMCSA has managed its operations in Acumulación Yauricocha based on:

- The Environmental Adjustment and Management Plan (PAMA, Plan de Adecuación y Manejo Ambiental) presented by CENTROMIN (approved by Directorial resolution N° 015-97-EM/DGM, 01/03/1997);
- The modification of the implementation nine projects of the PAMA of the Yauricocha Production Unit presented by CENTROMIN, (approved by Directorial resolution N° 159-2002-EM-DGAA, 05/23/2002);
- The implementation of the PAMA “Yauricocha" Administrative Economic Unit by SMCSA (approved by Directorial resolution N° 031-2007-MINEM-DGM, 02/08/2007);
- The Mine Closure Plan (PCM) at feasibility level of the Yauricocha Mining Unit, presented by SMCSA (approved by Directorial resolution N° 258-2009-MINEM-AAM, 08/24/2009);
- Authorization to operate the Mill N° 4 (8'x10') and the amendment of the "Yauricocha Chumpe" Benefit Concession to the expanded capacity of 2500 TMD, presented by SMCSA (approved by Resolution N° 279-2010-MINEM-DGM-V, 07/14/2010);

- The Yauricocha Mining Unit Mine Closure Plan Update, presented by SMCSA (approved by Directorial resolution N° 495-2013-MINEM-AAM, 12/17/2013);
- Supporting Technical Reports to the PAMA (ITS, Informe Técnico Sustentatorio) "Expanding the capacity of the Processing Plant Chumpe of the Accumulated Yauricocha Unit from 2500 to 3000 TMD" (approved by Directorial resolution N° 242-2015-MINEM-DGAAM, 06/09/2015);
- Supporting Technical Report to the PAMA (ITS) "Technological improvement of the domestic waste water treatment system" (approved by Directorial resolution N° 486-2015-MINEM-DGAAM, 11/12/2015); and
- Approval of the amendment of the Closure Plan of the Yauricocha Mining Unit (approved by Directorial resolution N° 002-2016-MINEM-DGAAM, 01/08/2016).

The Supporting Technical Reports are prepared in compliance with the Supreme Decree N° 054-2013-PCM (article Art. 4) and R.M. N° 120-2014-MEM/DM, and refers to the modification of mining components, or extensions and upgrades in the mining unit, in exploration and exploitation projects when the environmental impacts are insignificant.

Environmental liabilities and permitting are discussed in further detail in Section 20. A list of approved environmental and closure permits is included in Section 20.1 Required Permits and Status.

4.5 Other Significant Factors and Risks

SRK is not aware of any additional significant factors or risks that affect access, title, right, or ability to perform work on the property.

5 Accessibility, Climate, Local Resources, Infrastructure and Physiography

Sections 5.1, 5.2, 5.3 and 5.4 of this Report have been excerpted from NI 43-101 Technical Report on the Yauricocha Mine, prepared by Gustavson Associates, report date May 11, 2015 and are shown in italics. Standardizations have been made to suit the format of this report; any changes to the text have been indicated by the use of [brackets].

5.1 Topography, Elevation and Vegetation

The topography of the Yauricocha mining district is abrupt, typical alpine terrain. Pliocene erosion is clearly recognizable in the undulating, open fields to the northeast of the Continental Divide while to the southeast the terrain is cut by deep valleys and canyons. The extent of this erosion is evidenced by mountain peaks with an average elevation of 5,000 masl.

To the southeast of the Continental Divide, the high valleys are related to the Chacra Uplift. Below 3,400 m elevation, this grand period of uplift is clearly illustrated by deep canyons that in some cases are thousands of meters deep. Valleys above 4,000 masl clearly demonstrate the effects of Pliocene glaciations, with well-developed lateral and terminal moraines, U-shaped valleys, hanging valleys and glacial lakes.

Vegetation in the Yauricocha area is principally tropical alpine – rain tundra. The flora is varied with species of grasses, bushes, and some trees. The biological diversity is typical of Andean alpine communities.

5.2 Accessibility and Transportation to the Property

The principal access to the Mine is the main Lima – Huancayo – Yauricocha highway. The highway is paved (asphalt) for the first 420 km, along the Lima – Huancayo – Chupaca interval. From Chupaca to the Mine the road is unpaved.

Another important access route is along the southern Pan-American Highway from Lima through Cañete to Yauricocha, through the valley of the Rio Cañete, for a distance of 370 km. The road is paved (asphalt) from Lima to Pacarán, and from Pacarán to the mine it is unpaved.

5.3 Climate and Length of Operating Season

The climate in the region is cool, with two well-demarcated seasons with daytime temperatures above 20ºC; the nights are cool with temperatures below 10 ºC. Operations are carried out year-round. The wet season extends from November to April, and during April and May there is broad vegetative cover. The dry season covers the remainder of the year.

During the wet season, snow and hail feed the glaciers, which subsequently feed streams that descend the mountainsides and feed the lakes below.

The climate factors do not affect the length of the operating season, and the mine operates continuously year-round.

5.4 Sufficiency of Surface Rights

Overall, the property position including mineral concessions and surface rights are expected to be sufficient for foreseeable mine activities. The project infrastructure is located within the area where Sierra Metals has surface rights. The Cachi-Cachi mine is located within the area of mineral rights, but outside of the area of surface rights. Cachi-Cachi is an underground mine, and surface access to Cachi-Cachi is located within the area of surface rights.

Of the 20 km length of the property along strike, approximately 4 km have been developed near the center of the property.

5.5 Infrastructure Availability and Sources

5.5.1 Power

The primary power is provided through the existing power system, Sistema Interconectado Nacional (SINAC) to the Oroya Substation. A three phase, 60 hertz, 69 kV power line owned and operated by Statkraft (SN Power Peru S.A.) through its subsidiary, Electroandes S.A. delivers electricity from the Oroya Substation to the Project substation at Chumpe. Power is transformed to 69 KV line voltage and approximately 9 MVA is supplied to the mine and 3.75 MVA is supplied to the processing plant.

5.5.2 Water

Water is sourced from Ococha Lagoon, Cachi-Cachi underground mine, and recycle/overflow water from the TSF depending on end use.

5.5.3 Mining Personnel

The largest community of substance is Huancayo located approximately 100 km to the east-northeast. Huancayo and the surrounding communities have a combined population of approximately 340,000 people. Huancayo is the capital of the Junin Region of Peru.

The employees live on-site at four camps and a hotel with capability to house approximately 2,000 people. The camps include the supervisory camp, the mill camp, and the mining camp that also houses mining contractors. There are approximately 1,700 people (500 employees and 1,200 contractors) currently working on the site.

5.5.4 Potential Tailings Storage Areas

A fifth expansion lift will be added to the existing TSF starting in June 2019 and this will add an additional storage capacity of 2.05 M tonnes equating to 31 months of storage. After this expansion, two more expansion lifts are planned. It is estimated that the TSF capacity at the end of the 7th stage of expansion will be 5.77 M tonnes equating to 7.4 years of storage. The TSF studies were completed by Geoservice S.A.C.

5.5.5 Potential Waste Disposal Areas

The Project site has existing permitted waste disposal areas as well as systems to handle miscellaneous wastes.

5.5.6 Potential Processing Plant Sites

The site has an existing mineral processing site that has been in use for several years.

6 History

6.1 Prior Ownership and Ownership Changes

The silver of Yauricocha was initially documented by Alexander von Humboldt in the early 1800s. In 1905, the Valladares family filed the claims of what is today the Yauricocha Mine. The Valladares family mined high grade silver ore for 22 years and in 1927, Cerro de Pasco Corporation acquired the Yauricocha claims. In 1948, Cerro de Pasco commenced mining operations at Yauricocha until the Peruvian Military Government nationalized Cerro de Pasco Corporation and Yauricocha became a production unit of State-owned Centromin Peru S.A. for 30 years. In 2002, the Yauricocha unit was privatized and purchased by Minera Corona. Dia Bras (Sierra Metals) acquired 82% of the total equity of Corona in May 2011.

Sierra Metals retains a 100% controlling ownership status in the Yauricocha Mine, through their subsidiary Sociedad Minera Corona S.A. (SMCSA). An unnamed private interest holds 18.16% equity ownership in Yauricocha, with Sierra Metals holding the remaining 81.84%.

6.2 Exploration and Development Results of Previous Owners

Prior to the 1970s detailed production records are unavailable. Since 1973, Company records indicate that Yauricocha has produced 13.6 Mt of mineralized material containing 63 Moz of silver as well as 378 kt of lead, 117 kt of copper and nearly 618 kt of zinc. Since 1979, Yauricocha has averaged 413,000 t of production per year. The historical estimates presented below predate CIM and NI 43-101 reporting standards and therefore cannot be relied upon. These estimates were not used as a basis for the current resource and/or reserve estimates, as the material has already been mined and processed.

Table 6.1 summarizes exploration and mining statistics under Corona ownership. Mineral inventory is derived from Company reports to Peruvian regulatory Authorities and are not CIM compliant. Mine production is derived from actual mine production records.

Table 6-1: Prior Exploration and Development Results

Year	Exploration (m)	Development & Infill (m)	Exploration & Development (m)	Drilling (DM) By Company (m)	Drilling (DDH) Contractor (m)	Mine Production (t)	Mineral (4) Inventory (t)
2002	2,726	1,160	3,886	1,887		124,377	344,630
2003	3,307	1,648	4,955	3,415		212,677	571,520
2004	1,778	2,245	4,023	2,970		233,486	1,001,350
2005	2,004	2,030	4,034	3,160	8,043	373,546	702,524
2006	788	1,998	2,786	2,999	10,195	487,909	6,371,845
2007	826	1,640	2,466	4,751	6,196	546,652	4,773,198
2008	796	1,584	2,380	5,379	13,445	690,222	4,720,606
2009	872	1,040	1,912	4,955	13,579	802,737	4,974,593
2010	454	632	1,086	4,615	3,527	837,389	5,379,526
2011	684	927	1,611	5,195	9,071	816,289	4,943,770
2012	921	609	1,530	11,532	31,257	872,869	5,246,000
2013	1730	839	2,569	10,653	16,781	840,711	6,394,000
2014	680	331	1,011	9,357	30,455	890,910	
2015	120	220	342	9,735	33,214	802,251	5,377,000 (3)
2016	920	5,319	6,239	9,145	42,020	847,467	
2017	865	7,655	8,520	7,384	49,715	1,009,635	8,917,000 (4)
2018 (2)	1,120	5,073	6,193	5,103	36,771	1,074,475	

(1) Except as noted below, Mineral Inventory included Proven and Probable Reserves and Indicated Resources as reported to the Peruvian Exchange and is not CIM compliant. These numbers are for historic information purposes only.

(2) Information as of December 31, 2018 Source: Sierra Metals 2019

(3) Proven and Probable Reserves reported by Gustavson on May 11, 2015 (excludes resources)

(4) Proven and Probable Reserves Reported by SRK, as of July 31, 2017 (excludes resources)

6.3 Historic Production

Historic production is listed in Table 6.2, and is based on actual Yauricocha Mine production reports.

Table 6-2: Historic Yauricocha Production

Fiscal Year	Data Source	Date Ended	Ore Processed (t)	Ag (oz)	Cu (t)	Zn (t)	Pb (t)
2001	Reported Actual	12/31/2001	235,000	1,124,086	530	15,136	8,402
2002	Reported Actual	12/31/2002	124,000	592,538	356	7,736	4,965
2003	Reported Actual	12/31/2003	213,000	898,066	803	11,389	6,540
2004	Reported Actual	12/31/2004	356,800	643,000	1,046	14,952	996
2005	Reported Actual	12/31/2005	374,642	868,000	2,491	22,657	6,883
2006	SNL Standardized Estimate	12/31/2006	269,333	915,717	3,902	20,620	7,070
2007	Reported Actual	12/31/2007	NA	NA	5,330	NA	NA
2008	Reported Actual	12/31/2008	NA	1,832,550	5,456	20,466	11,560
2009	Reported Actual	12/31/2009	790,743	NA	NA	NA	NA
2010	Reported Actual	12/31/2010	837,839	NA	NA	NA	NA
2011	Reported Actual	12/31/2011	816,289	1,230,000	3,348	9,946	8,723
2012	Reported Actual	12/31/2012	872,869	2,143,971	4,110	22,628	15,966
2013	Reported Actual	12/31/2013	837,496	1,866,769	2,955	23,050	16,808
2014	Reported Actual	12/31/2014	890,910	2,121,565	3,491	24,610	21,189
2015	Reported Actual	12/31/2015	829,805	1,791,056	2,525	19,086	17,885
2016	Reported Actual	12/31/2016	897,169	1,688,183	2,849	24,859	16,529
2017	Reported Actual	12/31/2017	1,023,491	1,414,087	5,316	34,088	12,685
2018	Reported Actual	12/31/2018	1,106,648	1,315,101	7,553	34,713	11,938

Source: Sierra Metals, 2019

Production figures are based on reported actuals.

7 Geological Setting and Mineralization

Sections 7.1, 7.2 and 7.3 of this Report have been excerpted from NI 43-101 Technical Report on the Yauricocha Mine, prepared by Gustavson Associates, report date May 11, 2015 and are shown in italics. Some new information has also been provided by Sierra Metals. Standardizations have been made to suit the format of this report; any changes to the text have been indicated by the use of [brackets].

7.1 Regional Geology

Most of the stratigraphy, structure, magmatism, volcanism and mineralization in Peru are spatially- and genetically-related to the tectonic evolution of the Andean Cordillera that is situated along a major convergent subduction zone where a segment of the oceanic crust, the Nazca Plate, slips beneath the overriding South American continental plate. The Andean Cordillera has a metamorphic rock basement of Proterozoic age on which Hercynian Paleozoic sedimentary rocks accumulated and were, in turn, deformed by plutonism and volcanism to Upper Paleozoic time. Beginning in the Late Triassic time, following Atlantic Ocean rifting, two periods of subduction along the western margins of South America resulted in the formation of the present Andes: the Mariana-type subduction from the Late Triassic to Late Cretaceous and Andean-style subduction from the Late Cretaceous to the present. Late Triassic to late Cretaceous Mariana-type subduction resulted in an environment of extension and crustal attenuation producing an oceanic trench, island arcs, and back arc basin from west to east. The back-arc basin reportedly has two basinal components, the Western Basin and Eastern Basin, which are separated by the Cusco – Puno high, probably part of the Maranon Arch. The basins are largely comprised of marine clastic and minor carbonate lithologies of the Yura and Mara Groups overlain by carbonates of the Ferrobamba Formation. The western back-arc basin, called the 'Arequipa Basin', is the present Western Andean Cordillera of Peru; the site of a Holocene magmatic belt that spans the Andes and was emplaced from Late Oligocene to 25 Ma.

The Western Andean Cordillera is recognized for its world class base- and precious-metal deposits, many of which have been intermittently mined since Incan time. Most of the metal deposits in Peru are spatially and genetically associated with metal-rich hydrothermal fluids generated along magmatic belts that were emplaced along convergent plate tectonic lineaments. Furthermore, many of these primary base-metal deposits have undergone significant supergene enrichment due to uplift and weathering over the last 30 Ma.

Radiometric studies have correlated the igneous host rocks and attendant hydrothermal alteration for some of the largest and richest porphyry copper deposits in the world along the Western Andean Cordillera from 6° to 32° south, including the Chalcobamba – Tintaya iron-gold-copper skarn and porphyry belt (30 to 35 Ma) in the main magmatic arc, southward through the Santa Lucia district (25 to 30 Ma) and into Chile. The Andahuaylas-Yauri Porphyry Copper Belt, a well-known 300 km long porphyry copper belt related to middle Eocene to early Oligocene calc-alkaline plutonism, is situated along the northeastern edge of the Western Andean Cordillera.

7.2 Local Geology

*The local geology of the Yauricocha mine has been well understood by Minera Corona personnel for a number of years, and is summarized as follows .*Figure 7.1 *and* Figure 7.2 *show the local surface geology of the Yauricocha area.*

Goyllarisquizga Formation

The oldest rocks exposed in the area are the lower Cretaceous Goyllarisquizga arenites. This formation is approximately 300 m thick and comprises thick gray and white arenites, locally banded with carbonaceous lutites as well as small mantos of low-quality coal beds and clay. In the vicinity of Chaucha, these arenites have near their base interbedded, red lutite. The arenites crop out in the cores of the anticlines southwest of Yauricocha, as beds dispersed along the Chacras uplift, and isolated outcrops in the Éxito zone.

Jumasha Formation

The mid-Cretaceous Jumasha Formation consists of massive gray limestone, averages 700 m thick, and concordantly overlies the Goyllarisquizga Formation. Intercalations of carbonaceous lutites occur at its base near the contact with the arenites. These layers are succeeded by discontinuous lenses of maroon and grey limestone, occasionally with horizons of lutite and chert about 6 m thick. Also present are pseudo-breccias of probable sedimentary origin and a basaltic sill.

Celendín Formation

The Celendín Formation concordantly overlies the Jumasha Formation and contains finely stratified silicic lutites with intercalations of recrystallized limestone of Santoniana age as well as the France Chert. The average thickness in the Yauricocha area is 400 m.

Casapalca Red Beds

The Casapalca red beds lay concordantly on the Celendín Formation with a gradational contact. It has been assigned an age between upper Cretaceous and lower Tertiary, but because of the absence of fossils its age cannot be precisely determined. It is composed primarily of calcareous red lutites, pure limestones, and reddish arenaceous limestone. Lava flows and tuffaceous beds have been occasionally reported.

Intrusions

Major intrusive activity occurred during the Miocene period. Radiometric K-Ar ages derived from biotite samples taken in the Yauricocha and Éxito areas yield an average age of 6.9 Ma. The intrusives cut the sediments at a steep angle and exhibit sharp contacts, as well as a tendency to follow the regional strike and dip of the structure. The intrusions vary in size from bodies of several hundred square meters to large masses that cover several square kilometers. Small intrusive compositions vary from granodiorite to quartz monzonite at margins and are typically porphyritic with phenocrysts of plagioclase, orthoclase, biotite, hornblende and quartz. The plagioclases vary from orthoclase to andesine.

Metamorphism

All the intrusions have produced metamorphic aureoles in the surrounding rocks. The extent, type, and grade of metamorphism vary greatly with the type of rock intruded. The rocks have been altered to quartzites, hornfelsed lutites, and recrystallized limestones. Locally, the intrusions have produced narrow zones of skarn of variable width. These skarn zones contain epidote, zoisite, tremolite, wollastonite, phlogopite, garnet, chlorite and diopside.

Structure

The Andean Cordillera uplift has dominated the structural evolution of the Yauricocha area through episodes of folding, fracturing, and brecciation associated with the local structure having a general NW-SE strike principally expressed as follows:

Folds

Various folds make up the principal structures of the Yauricocha area. The Purísima Concepcíon anticline and the France Chert syncline occur in the Mina Central area, while the Cachi-Cachi anticline and Huamanrripa al Norte syncline and the Quimpara syncline occur immediately to the south of Lake Pumacocha, north of Mina San Valentíne.

The Purísima Concepcíon anticline, located southwest of the Yauricocha Mine in the Mina Central area, is well defined by a tightly folded basaltic sill 17 m thick. The axial trace trends approximately N50W with a gentle SE plunge of 20°. In the axis of this anticline and towards Flanco East, the basaltic sill contains occurrences of disseminated gold in horizontal, silicic breccias.

The France Chert syncline is a tight fold, also in the Mina Central area, but located northeast of the mine. Its axial trace changes trend from N35W in the south to N65W in the north and has a SE40 plunge. The Yauricocha mineral deposit is found in the west flank of this fold and in banded limestones without subsidiary folding.

In the Mina Central area, the NW strike of the folded sediments was rotated about 30° clockwise horizontally. This distortion can be attributed to a basement shear fault that strikes NE-SW. The axial trace of the Cachi-Cachi-Prometida anticline strikes approximately N80W to N70W and its flanks dip to the north (Prometida) and south (Cachi-Cachi) with a plunge to the east. Mineralization in the vicinity of the major North Intrusive located 2 km north of Mina Central is associated with this fold.

The Quimpara syncline, located 1 km south of the discharge stream of Pumacocha Lake, has an axial trace that strikes N45W. Its east flank is in contact with the intrusive at an angle dipping 70° to 75°W. Its west flank dips about 80°E conformably with beds of dark gray limestone that are recrystallized in the vicinity of the contact. Garnets, magnetite and copper oxides occur in the same contact.

Fractures

Diverse systems of fractures were developed during episodes of strong deformation.

Folding occurred before and/or contemporaneous with intrusive emplacement. Primary fractures developed during folding along with longitudinal faults parallel to the regional strike of the stratigraphy. These faults combined to form the Yauricocha Fault along the Jumasha limestone-Celendín lutite contact. The Yauricocha Fault extends a great distance from the SE of the Ipillo mine continuing to the north behind Huamanrripa hill, parallel to and along Silacocha Lake.

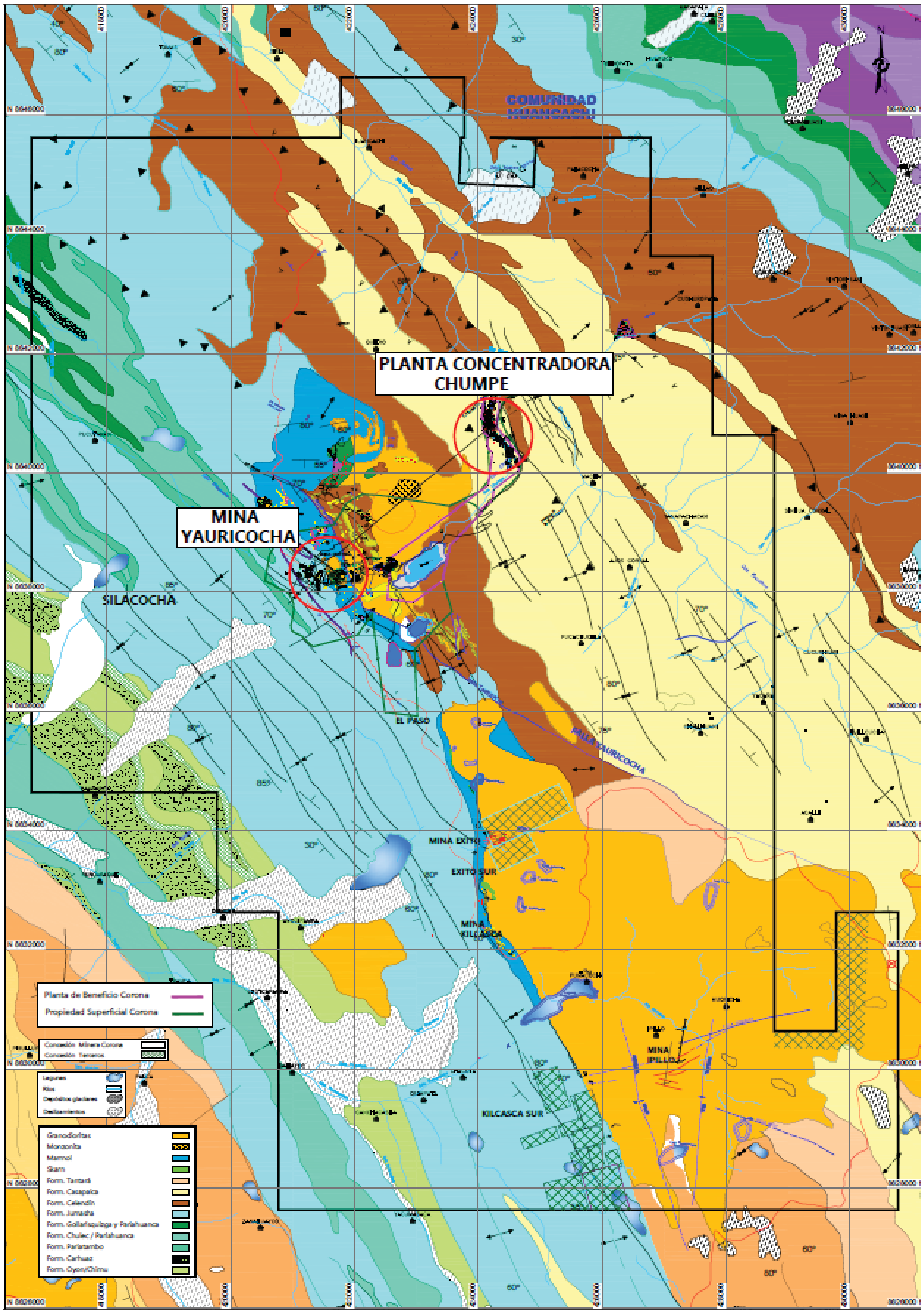
After the intrusions were emplaced, the strike of the folds NW of the mine was rotated by strong horizontal forces some 30°. As a result of this rotation, three sets of shears and joints were developed: NW-SE, NE-SW and E-W with dips of 50-80° NE or SW first, then 60-85° SE or NW, and finally N or S with nearly vertical dips. This set of fractures forms fault blocks that cut the dominant lithologies of the area and join with the Yauricocha Fault. The Yauricocha Fault is the most significant fault in the mining district and is a strong control on mineralization.

Contacts

The contacts of the Jumasha limestone-Celendín lutite, the Jumasha limestone-intrusions, and Celendín lutite-intrusions had major influence on the development of folds, fractures and ascension of mineralizing fluids.

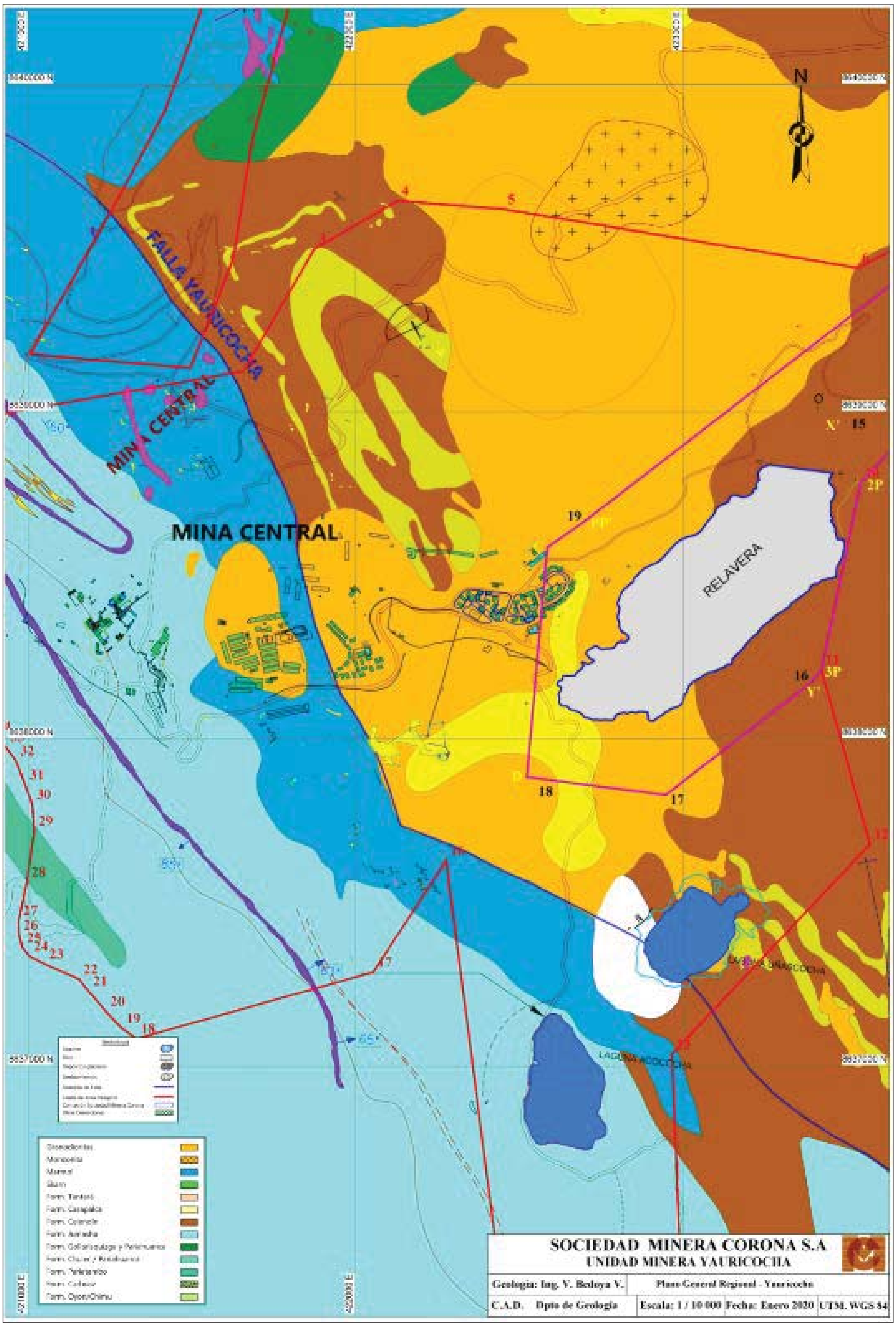
Breccias

The breccias that occur in the Yauricocha area typically follow structural lineaments and occur predominantly in the limestones associated with contacts and intersections of fractures. They form tabular and chimney-like bodies. Tectonic breccias, forming near intrusions or contacts, constitute some of the principal receptive structures for mineralization.



Source: Sierra Metals, 2019

Figure 7-1: Local Geology Map



Source: Sierra Metals, 2019

Figure 7-2: Geologic Map of Yauricocha Mine Area

7.3 Significant Mineralized Zones

Mineralization at the Yauricocha Mine is represented by variably oxidized portions of a multiple-phase polymetallic system with at least two stages of mineralization, demonstrated by sulfide veins cutting brecciated polymetallic sulfide mineralized bodies. The mineralized bodies and quartz-sulfide veins appear to be intimately related and form a very important structural/mineralogical assemblage in the Yauricocha mineral deposit. Comments herein made regarding the characteristics of the Yauricocha district apply directly to the Minera Corona Yauricocha Mine.

All parts of the property with historic exploration or current production activity are in the current area of operations. This area is nearly centered within the concession boundary and there is both space and potential to expand the resources and the operation both directions along the strike of the Yauricocha Fault.

Minera Corona has developed local classifications describing milling and metallurgical characteristics of mineralization at Yauricocha: polymetallic, oxide, and copper. “Polymetallic” mineralization is represented by Pb-Zn sulfides, often with significant Ag values, “oxide” refers to mineralization that predominantly comprises oxidized sulfides and resulting supergene oxides, hydroxides and/or carbonates (often with anomalous Au), and the “copper” classification is represented by high values of Cu with little attendant Pb-Zn.

8 Deposit Types

Section 8.1 of this Report have been excerpted from NI 43-101 Technical Report on the Yauricocha Mine, prepared by Gustavson Associates, report date May 11, 2015 and are shown in italics. Some new information has also been provided by Sierra Metals. Standardizations have been made to suit the format of this report; any changes to the text have been indicated using [brackets].

8.1 Mineral Deposit

Mineralization in the Yauricocha district is spatially and genetically related to the Yauricocha stock, a composite intrusive body of granodioritic to quartz monzonitic composition that has been radiometrically dated at late Miocene (approximately 7.5 million years old) (Giletti and Day, 1968). The stock intrudes tightly folded beds of the late Cretaceous Jumasha and Celendín Formations and the overlying Casapalca Formation (latest Cretaceous and Paleocene?). Mineralized bodies are dominantly high-temperature polymetallic sulfide bodies that replaced limestone. Metal-bearing solutions of the Yauricocha magmatic-hydrothermal system were highly reactive and intensely attacked the carbonate wall rock of the Jumasha and Celendín Formations, producing the channels in which sulfides were deposited. Base and precious metals were largely precipitated within several hundred meters of the stock (Lacy, 1949; Thompson, 1960). Skarn is developed adjacent to the stock but does not host appreciable amounts of economic mineralization (Alverez and Noble, 1988). Mineralization typically exhibits both vertical and radial zoning and there is a pronounced district zoning, with an inner core of enargite (the principal copper mineral) giving way outward to an enargite-chalcopyrite-bornite zone, which in turn is succeeded to the west by zones characterized by sphalerite, galena and silver (Lacy, 1949; Thompson, 1960).

The mineralized zones at Yauricocha are partially to completely oxidized and extend from the surface to below level 1220. Supergene enrichment is closely related to oxidation distribution. Supergene covellite, chalcocite and digenite are found where the sulfide minerals are in contact with oxidized areas.

Mineralization at Yauricocha very closely resembles that typified by polymetallic Ag-Au deposits, which comprise quartz-sulfide-carbonate fissure vein equivalents of quartz-sulfide and carbonate-base metal deposits. These deposits are best developed in Central and South America, where they have been mined since Inca times as important Ag sources. Quartz and pyrite of the quartz-sulfide Au +/- Cu mineralization suite typically occur early in the paragenetic sequence; carbonate-hosted mineralization and some polymetallic Ag-Au veins evolved at a later stage. Predominant controls on mineralization are structural, where dilatational structures, voids resulting from wall rock dissolution, and/or rheologic dissimilarities at contacts between units serve as enhanced fluid pathways for mineralizing solutions.

8.2 Geological Model

The geological model used for the Yauricocha deposit has been developed and verified through extensive exploration and mining activities during more than 50 years of mining. SRK is of the opinion that the geological model is appropriate and will continue to serve the company going forward

9 Exploration

Since 2016, surface exploration has focused more on areas surrounding the Central mine, mainly to the south of the mine in the areas of Doña Leone, El Paso, Success, Kilkasca and the South Yauricocha Fault. The work has consisted of detailed geological mapping, sampling for geochemical interpretation and focusing on areas with strong anomalies. During 2017, the Canadian company, Quantec Geoscience Ltd., was contracted to perform a surface geophysical study using the Titan 24 DC resistivity induced polarization (DCIP) & Magnetotelluric (MT) methods.

The Yauricocha mining district contains multiple polymetallic deposits represented by skarn and replacement bodies and intrusion-hosted veins related to Miocene-era magmatism. Mineralization is strongly structurally controlled with the dominant features being the Yauricocha Fault and the contact between the Jumasha limestones and the Celendín Formation (especially the France Chert). Exploration is being conducted to expand the mineralized zones currently being exploited as well as on prospects in the vicinity of the operations.

Exploration in or close to the mining operations is of higher priority since it is performed under existing governmental and community permits. Any exploration success can be quickly incorporated into defined resources and reserves and thus the business plan.

9.1 Relevant Exploration Work

Exploration in the district has been ongoing and work has been successful in delineating a number of targets (described above) for future drilling or exploration development. This work has included detailed geological mapping of the areas, surface rock chip sampling, and limited trench/channel sampling.

There have been satisfactory results with diamond drilling in the Cuye mineralized body where mineral resources have been identified. Similar results have occurred in the Central Mine where work has focused on identifying high-quality concentrations of silver, lead and zinc mineralization. In the Cachi–Cachi mine, mineral resources have been discovered in an area of skarn, and the Yoselim zone has been identified as having high polymetallic ore content.

During the period of June 3, 2017 to September 6, 2017, a geophysical survey was carried out with the Titan-24 DCIP & MT Survey method. A total of 20 DCIP-MT profiles (23 differentials) were carried out, ranging from 400 to 500 m covering 54.2 kilometers. Based on this work, several anomalous areas were identified, and priority has been given to diamond drilling these areas from surface. The most relevant targets are Doña Leona, El Paso-Éxito, Kilkasca, Victoria and Alida. These targets are scheduled to be evaluated with an initial stage of 20,000 meters of diamond drilling.

9.2 Sampling Methods and Sample Quality

Sampling of exploration targets generally features rock chip or hand samples taken by geologists from surface outcrops using rock hammers and chisels. These samples are point samples and should be considered indicative of mineralization rather than representative of any volume or tonnage.

In cases where channel or trench samples are collected, these are done so using pickaxes, shovels, chisels, hammers, and other hand tools, and are likely more representative of the mineralization as they are taken across the strike of mineralization observed at surface.

Regardless, the results of exploration related sampling in this context are used as guides for future drilling programs, rather than resource estimation.

9.3 Significant Results and Interpretation

Based on the 2017 surface geophysical work using the Titan-24 method, high priority areas have been defined for diamond drilling evaluation. The mine is waiting to receive permits to begin the work. The most relevant areas are Doña Leona, El Paso-Éxito, Kilkasca, Victoria and Alida. These areas are scheduled to be evaluated with an initial stage of 20,000 meters of diamond drilling. Additional mapping and sampling are also being conducted in the South Yauricocha Fault and South Kilkasca areas.

10 Drilling

10.1 Type and Extent

Minera Corona's Geology Department owns and operates two electro-hydraulic drills, the reach of which varies between 80 m and 150 m with a core diameter of 3.5 cm. The company also utilizes, or has previously utilized, the services of drilling contractors (MDH and REDRILSA) for deeper drillholes reaching up to 900 m in length. Core diameters are generally HQ and NQ, although selected infill drilling within the mine is drilled using a TT-46 (46mm) diameter.

Exploration (establishing continuity of mineralization) and development (reserve and production definition) drilling conducted by Minera Corona from 2002 to 2018 is detailed in Table 10.1.

Table 10-1: Yauricocha Exploration and Development Drilling

Year	Exploration and Development (m)	Drilling (DDH) by Company (m)	Drilling (DDH) by Contractor (m)
2002	3,886	1,887	-
2003	4,955	3,415	-
2004	4,023	2,970	-
2005	4,034	3,160	8,043
2006	2,786	2,999	10,195
2007	2,466	4,751	6,196
2008	2,380	5,379	13,445
2009	1,912	4,955	13,579
2010	1,086	4,615	3,527
2011	1,611	5,195	9,071
2012	1,530	11,532	31,257
2013	2,569	10,653	16,781
2014	1,011	9,357	30,455
2015	342	9,735	33,214
2016	6,239	9,145	42,020
2017	8,520	7,384	49,715
2018	6,193	5,103	36,771
2019 (1)	2,721	3,374	35,472

(1) Information updated as of Oct. 31, 2019.
Source: Sierra Metals, 2019

In addition to the drilling at Yauricocha, extensive channel sampling of the mineralized bodies is completed for grade control and development purposes. Channel sampling is conducted on perpendicular lines crossing the various mineralized bodies. Spacing between samples is variable, but generally the spacing is 2 m to 4 m. Material is collected on tarps across the channel sampling intervals and is then transferred to bags marked with the relevant interval. These data points are utilized in the Mineral Resource estimation. The general distribution of drilling and channel samples is shown in Figure 10.1

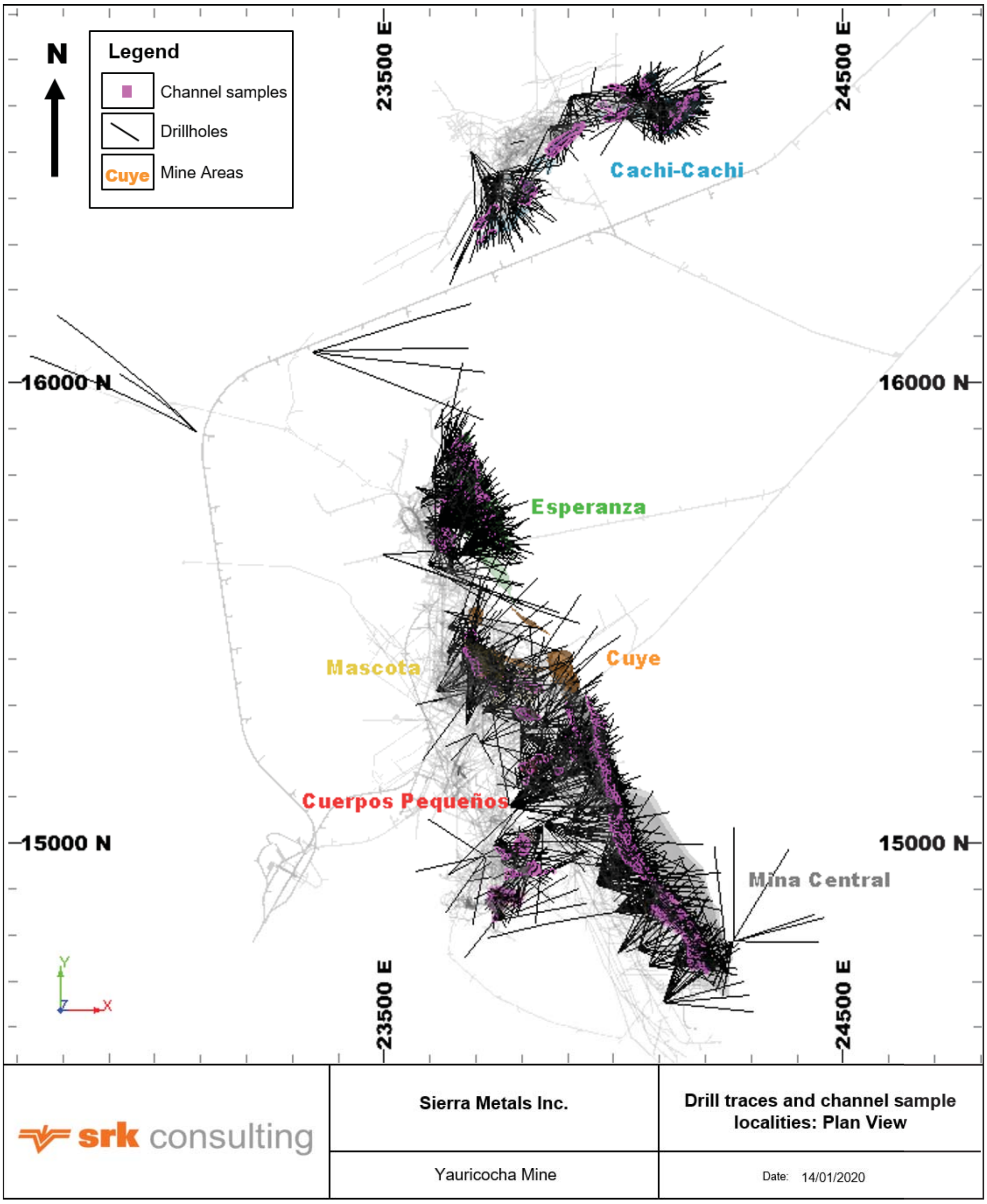


Figure 10-1: Extent of Drilling and Sampling

10.2 Procedures

10.2.1 Drilling

Modern drill collar locations are surveyed underground by the mine survey team. Where these types of surveys have been completed, collar locations are assumed to be accurate to less than 0.1 m. Historic drilling was not surveyed to the same level of detail, potentially decreasing the accuracy of the collar positions in space compared to modern holes. This effect would potentially decrease the accuracy of the geological model and resource estimation in these areas, but SRK notes that many of the areas supported by this historic drilling have already been mined.

While drill holes are currently surveyed down-hole for all new exploration drilling, this has not always been the case. Historic drill holes, as well as selected more recent holes that were not deemed to be long enough or otherwise designated non-critical for surveying, were not surveyed down-hole and the collar azimuth and dip are the only points of reference for the drill hole. SRK notes that all new holes now have down-hole surveys, and that most of these are in areas which are incorporated in the current update to the Mineral Resource estimation. While the nominal spacing of the survey has been 50 m, several the newer holes have been surveyed every 5 m to discern any potential risk of deviation affecting the accuracy of the interpretation.

A study of the deviation for the holes which have currently been surveyed showed that the average deviations (of more than 3,500 measurements) down-hole are only -0.06° bearing and 0.09° inclination. This would indicate that the lack of down-hole survey information is not necessarily a risk at Yauricocha, although SRK recommends continuing the practice of surveys and nominal intervals of 25 to 50 m to ensure quality of information.

SRK visited the core logging and sampling facilities at the mine site in early 2015, mid-2017, and in April 2019, and notes that the logging facility is clean and sufficiently equipped. Logging is conducted on paper and transferred to Microsoft Excel® worksheets. Details recorded include geotechnical information such as recovery and RQD, geologic information (lithology, alteration, mineralization, etc.), sampling information, as well as other parameters, which may not get incorporated into the digital database. Samples are selected by the geologist and placed in numbered plastic bags, along with a bar-coded sample ticket for tracking. Bags are tied tightly to prevent contamination during handling and transport.

Drill recovery is generally over 97%, and there appears to be no relationship between grade distribution and recovery.

Drill holes are split by hydraulic or manual methods where core is broken or poorly indurated and is sawn by rotary diamond saw blade when the core is competent. In both scenarios, care is taken to ensure that the sample is collected in a consistent and representative manner. SRK notes that sampling is only conducted in segments of core that are noted as having obvious mineralization during logging. This results in several occurrences where the first sample in a drill hole may be a very high grade one, or that there may be multiple high-grade samples with un-sampled intervals in between. These intervals have been considered as un-mineralized based on the assumptions made for the sampling or lack thereof and are flagged with a lowest-limit-of-detection value. For arsenic (AS), which is regarded as a deleterious element the intervals were left blank as well as for iron (FE), which is utilized to establish polymetallic mineralized zones in-situ density.

10.2.2 Channel Sampling

Channel samples are collected underground by the geology staff. Samples are collected via hammer and chisel, with rock chips collected on a tarp for each sample and transferred to sample bags. Typical sample intervals are 1 m along the ribs of crosscuts within stopes for the large mineralized zones, and 2 m across the back of the stopes for the small mineralized zones. Ideal weights are between 2.5 kg and 3 kg. The samples are placed in a plastic bag labeled with a permanent marker on the outside. A sample ticket displaying the number and bar code is inserted in the bag. The bags are tied to prevent outside contamination during their handling and transportation to the assay lab.

SRK notes that samples are not weighed to ensure representativeness, but geologists are involved in the channel sampling efforts to direct samplers to collect samples, which visually are representative of the mineralization.

10.3 Interpretation and Relevant Results

Drilling and sampling results are interpreted by Minera Corona site geologists and are reviewed in cross sections and plan/level maps. The relevant results are those featuring significant intervals of geologic or economic interest, which are then followed-up by further drilling or exploration development.

SRK notes that other sampling types are described in the documentation at Yauricocha, such as point samples, muck samples, and others. These sampling types are used for specialized purposes only and are not used in the resource estimation.

11 Sample Preparation, Analysis and Security

11.1 Security Measures

Core and channel sample material is stored at the mine site in a secure building and the boxes are well labeled and organized. The entire mine site is securely access-controlled. Samples submitted to third-party laboratories are transported by mine staff to the preparation laboratory in Lima. The channel samples are processed at Minera Corona's Chumpe laboratory located in the Concentrator Plant under the supervision of company personnel.

The on-site laboratory currently is not independently certified. Channel sample locations are surveyed underground by mine survey staff. Sample start and end-point locations are assumed to be accurate to centimeter accuracy.

11.2 Sample Preparation for Analysis

Samples are generally prepared by a primary and secondary laboratory:

- Primary: Chumpe Laboratory –Yauricocha Mine Site; Non-ISO Certified
- Secondary: ALS Minerals (ALS) – Lima; ISO 9001:2008 Certified

The majority of the sample preparation is completed at the Chumpe laboratory, except in cases where checks on the method of preparation are desired and ALS conducts sample prep on duplicate check assays.

11.2.1 Chumpe Laboratory

The majority of historical core samples, and effectively all channel samples have been prepared and analyzed by the Chumpe laboratory. Detailed procedures have been documented by Minera Corona and are summarized below (in italics).

Sample Reception

Channel samples and selected mine infill drilling are collected in the field by the geology staff and transported by Yauricocha personnel from the Yauricocha Mine or Klepetko Adit and are received at the reception counter at the Chumpe laboratory entrance. A log entry is made to record the number of samples being received. These samples are generally between 1.5 and 3.0 kg; are damp and received in plastic bags.

Preparation

Equipment used in sample preparation includes:

- *1 – Primary Jaw Crusher, Make – Denver, Jaw capacity – 5" x 6", Output – 70%, passing ¼ inch;*

- *1 – Secondary Jaw Crusher, Make – FIMA, Jaw capacity – 5” x 6”, Output –80%, passing No. 10 mesh;*
- *1 – Pneumatic Pulverizer, Make – Tmandina;*
- *2 – Sample Dryers, with temperature regulator;*
- *1 – ½” Stainless steel splitter, Make – Jones;*
- *Five compressed air nozzles;*
- *Stainless steel trays, 225 x 135 x 65 mm;*
- *Stainless steel trays, 300 x 240 x 60 mm;*
- *Plastic or impermeable cloth; and*
- *2” brushes.*

<u>Preparation Procedure</u>

Prior to beginning sample preparation, workers verify that:

- *The equipment is clean and free from contamination;*
- *The crushers and pulverizers are functioning correctly; and*
- *The numbering of the sample bags that all bags are unique and identifiable.*

The procedure at Chumpe to reduce the sample to a pulp of 150 gm, at 85% passing 200 mesh is:

- *Transfer the sample to the appropriate tray, depending on the volume of the sample, noting the tray number on the sample ticket;*
- *Insert a blank sample (silica or quartz) in each batch;*
- *Place in the Sample Dryer at a temperature of 115ºC;*
- *Code the sample envelopes with the information from the sampling ticket noting the sample code, the tray number, date and the quantity of samples requested on the sample ticket;*
- *Once dry, remove and place the tray on the worktable to cool;*
- *Pass 100% of the sample through the Primary Jaw Crusher when particle sizes exceed 1 inch, the resulting product is 70% passing ¼ inch;*
- *Pass the sample through the secondary crusher, the resulting product 80% passing -10 mesh;*
- *Clean all equipment after crushing of each sample using compressed air;*
- *Weigh the -10-mesh coarse material and record;*
- *Dump the complete sample into the Jones Splitter and split/homogenize to obtain an approximate 150 g split. Clean the splitter after each sample with compressed air;*

- *Put the 150g sample in numbered envelopes in the tray for the corresponding sample sequence;*
- *Pulverize sample using the cleaned ring pulverizer until achieving a size fraction of 85% - 200 mesh. Clean the ring apparatus after each sample with the compressed air hose;*
- *Transfer the pulverized sample to the impermeable sample mat, homogenize and pour into the respective coded envelope; and*

Clean all materials and the work area thoroughly

11.2.2 ALS Minerals

For core samples, bagged split samples are transported by the internal transport service from the core logging facility. Samples are transported by truck to Lima for submission to the ALS Minerals laboratory in Lima. ALS records samples received and weights for comparison to the Yauricocha geologist's records for sampling

Samples prepared at ALS Minerals exclusively include the 2016 to present exploration diamond drilling. SRK has not visited the ALS Minerals lab in Lima but notes that ALS Minerals-Lima is an ISO-Certified preparation and analysis facilities and adheres to the most stringent standards in the industry.

The PREP-31 method of sample preparation was used for all samples processed through ALS Minerals. This includes jaw crushing to 70% less than 2 mm, with a riffle split of 250 g, then pulverized using ring pulverizers to >85% passing 75 μm. Samples are tracked in barcoded envelopes throughout the process using internal software tracking and control measures. ALS is an industry leader in sample preparation and analysis and uses equipment that meets or exceeds industry standards.

11.3 Sample Analysis

Samples are generally analyzed by a primary and secondary laboratory:

- Primary: Chumpe Laboratory –Yauricocha Mine Site; Non-ISO Certified; and
- Secondary: ALS Minerals – Lima; ISO 9001:2008 Certified;
- Note: ALS is the primary laboratory for all diamond exploration drilling samples.

The Chumpe Laboratory provides all analyses used in the drilling/sampling database supporting the Mineral Resource estimation, whereas the ALS Laboratory is used exclusively as an independent check on the Chumpe laboratory for these samples.

11.3.1 Chumpe Laboratory

Core and channel samples from the mine are assayed utilizing two procedures. Silver, lead, zinc, and copper are assayed by atomic absorption (AA) on an aqua-regia digest. Gold is assayed by fire assay (FA) with an AA finish. Lower limits of detection (LLOD) are shown in Table 11.1, and are higher than those for ALS Minerals as Chumpe does not run the same multi-element analysis.

Table 11-1: Chumpe LLODS

Element	LLOD	Unit
Ag	0.2	ppm
Au	0.01	ppm
Cu	0.02	%
Pb	0.02	%
Zn	0.02	%

Source: Sierra Metals, 2019

11.3.2 ALS Minerals Laboratory

The core samples analyzed at ALS are analyzed for a suite of 35 elements using inductively coupled plasma atomic emission spectroscopy (ICP-AES) on an aqua-regia digest, generally used to discern trace levels of multiple elements. Samples are also analyzed using an AA method on an aqua-regia digest for accuracy at ore-grade ranges. Au is analyzed using FA (gravimetric finish) with an AA finish.

Lower limits of detection for the critical elements are shown in Table 11.2.

Table 11-2: ALS Minerals LLODs

Element	LLOD	Unit
Ag	0.2	ppm
Au	0.005	ppm
Cu	0.001	%
Pb	0.001	%
Zn	0.001	%

Source: Sierra Metals, 2019

11.4 Quality Assurance/Quality Control Procedures

Part of this section has been excerpted from NI 43-101 Technical Report on the Yauricocha Mine, prepared by Gustavson Associates, report date May 11, 2015 and is shown in italics. Standardizations have been made to suit the format of this report; any changes to the text have been indicated using [brackets].

Prior to 2012, Minera Corona did not utilize the services of an independent lab for data verification. The company used an internal QA/QC procedure at its assay lab (Chumpe) located in the Concentration Plant. Historically, the results have compared well with the metal contained in concentrates and further work on a formal external QA/QC procedure had not been pursued. Beginning in 2012, Minera Corona began to use external check assays as part of the validation system for the Chumpe lab data stream.

The current procedure includes certified standards, blanks, pulp duplicates, and sample preparation size review. These are processed at approximately one per 20 samples. External labs receive approximately one sample for each 15 processed internally. Gustavson did not have the opportunity to fully observe the laboratory operation; however, Gustavson has examined QA/QC records of certified standards for 2011 through 2014.

The results of the historical QA/QC show that the Chumpe laboratory generally performed well with respect to the standard blanks and duplicates submitted from the exploration department, but SRK notes that this has not been the case over the entire project history, with the Chumpe lab consistently missing targets for certain types of QA/QC. This resulted in a limited program of pulverized duplicate samples for every sample interval being submitted to ALS Minerals in Lima as a check on the Chumpe lab, where the results showed a consistent bias. Historically, Chumpe lab appeared to under-report Ag compared to ALS duplicates, although other metals appeared to be relatively consistent. For this reason, the mine abandoned the use of the Chumpe lab for the new exploration drilling, with all samples being sent to ALS Mineral in Lima prior to 2018. A number of improvements were implemented since 2018 at the Chumpe laboratory to improve the historical poor performance and increase its sample through put. There is a noticeable improvement in the Chumpe laboratory performance since 2018.

Currently, Minera Corona uses a very aggressive program of QA/QC for new exploration areas to mitigate uncertainty in analytical results. A subsequent and more detailed review of the QA/QC applied to new exploration efforts focused on Esperanza is discussed in Sections 11.4.1 through 11.4.3.

11.4.1 Standards

Minera Corona currently inserts standards or certified reference materials (CRM) into the sample stream at a rate of about 1:20 samples, although the insertion rate is adjusted locally to account for particular mineralogical observations in the core. Five standards have been generated by Minera Corona and certified via round robin analysis for the current exploration programs. These standards have been procured from Yauricocha material, and homogenized and analyzed by Target Rocks Peru S.A., a commercial laboratory specializing in provision of CRM to clients in the mining industry.

Each CRM undergoes a rigorous process of homogenization and analysis using aqua-regia digestion and AA or ICP finish, from a random selection of 10 packets of blended pulverized material. The six laboratories participating in the round robin for the Yauricocha CRM are:

- ALS Minerals, Lima;
- Inspectorate, Lima;
- Acme, Santiago;
- Certimin, Lima;
- SGS, Lima; and
- LAS, Peru.

The mean and between-lab standard deviations (SD) are calculated from the received results of the round robin analysis, and the certified means and tolerances are provided in certificates from Target Rocks. The certified means and expected tolerances are shown in Table 11.3

Table 11-3: CRM Expected Means and Tolerances

CRM	Certified Mean				Two Standard Deviations (between lab)			
Element	Ag (g/t)	Pb (%)	Cu (%)	Zn (%)	Ag (g/t)	Pb (%)	Cu (%)	Zn (%)
MAT-04	29.10	0.70	0.16	0.28	2.10	0.03	0.01	0.01
MAT-05	128.20	2.37	0.58	2.50	7.70	0.06	0.02	0.12
MAT-06	469.00	7.75	2.53	7.98	13.00	0.20	0.12	0.23
MCL-02	40.8	0.65	1.58	2.49	3.4	0.05	0.08	0.09
PLSUL-03	192.00	3.09	1.03	3.15	4.00	0.08	0.04	0.13
PLSUL-04	6.70	0.09	0.24	0.23	0.50	0.01	0.01	0.01
PLSUL-05	13.6	NA	0.49	0.47	1.00	NA	0.03	0.02
PLSUL-06	30.30	1.94	0.21	1.60	2.90	0.04	0.01	0.11
PLSUL-07	79.20	5.94	0.45	4.67	4.50	0.27	0.02	0.20
PLSUL-08	248.00	12.46	0.98	12.54	14.00	0.39	0.04	0.55

Source: Sierra Metals: 2019

During the 2017, 2018 and 2019 drilling campaigns an additional 11 CRMs were inserted into the sample stream at the Chumpe laboratory, one of which was designed specifically for Au inspection (MRISi81). The additional CRMs and their expected tolerances are shown in Table 11.4.

Table 11-4: 2017 – 2019 CRM Means and Tolerances

CRM	Certified Mean					Two Standard Deviations (between lab)				
Element	Au (g/t)	Ag (g/t)	Pb (%)	Cu (%)	Zn (%)	Ag (g/t)	Pb (%)	Cu (%)	Zn (%)	Au (g/t)
MRISi81	1.79									0.048
PLSUL-10		85.0	5.70	0.608	5.39	6.0	0.13	0.032	0.22	
PLSUL-14		25.5	0.857	0.032	5.17	0.9	0.06	0.0003	0.16	
PLSUL-15		22.7	0.6	0.041	0.97	1.7	0.02	0.002	0.04	
PLSUL-22		83	1.22	0.147	3.13	4.8	0.08	0.01	0.16	
PLSUL-24		114	3.69	0.272	7.72	4.0	0.19	0.016	0.26	
PLSUL-32		42.5	0.53	0.429	1.04	3.6	0.04	0.02	0.03	
PLSUL-33		51.1	0.65	0.738	2.35	3.7	0.03	0.038	0.10	
PLSUL-34		109	1.6	1.454	5.19	5.3	0.06	0.07	0.3	
ST1700013 (Oz/Tc)		0.799	0.167	0.226	0.467	0.052	0.008	0.012	0.028	
ST1700014 (Ox/Tc)		3.478	2.664	0.803	5.178	0.074	0.042	0.024	0.206	

Source: SRK Consulting: 2019

SRK notes that the CRMs are adequate for QA/QC monitoring and that in 2018 a rigorous QAQC program was set in place and maintained, including a recently included CRM for Au. Minera Corona has submitted 177 CRM to ALS Minerals in 2015-2017 for new drilling with an average insertion rate of about 5%. Between 2018 and 2019 a total of 435 CRMs were sent to ALS for independent checking and the Chumpe laboratory analyzed a total of 6,319 during that same timeframe. These two sets of CRMs were reviewed independently by SRK in 2019.

Figure 11.1 shows the performance of lead CRM, PLSUL-22, which was analyzed during the 2019 drilling campaign in the Esperanza area. All samples within this batch are unbiased and distributed evenly about the Expected value. Similarly, the CRM samples analyzed in 2019 at the Chumpe laboratory for zinc and silver are within acceptable limits (Figure 11.2 and Figure 11.3). CRM samples that repeatedly occur above or below the 3 standard deviations limit (+/-3SD) should be repeated along with +/- 5 samples above and below the erroneous CRM interval.

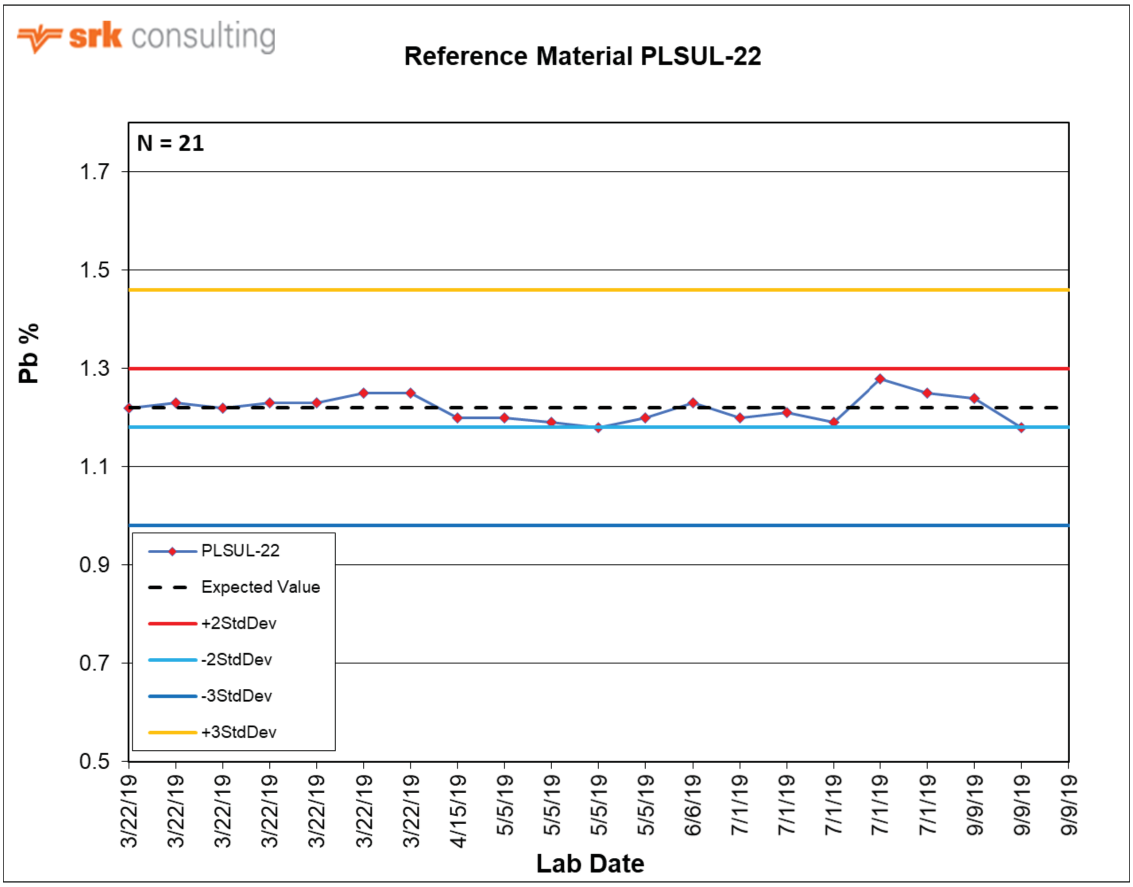


Figure 11-1: Lead CRM Analyses – Chumpe Laboratory 2019

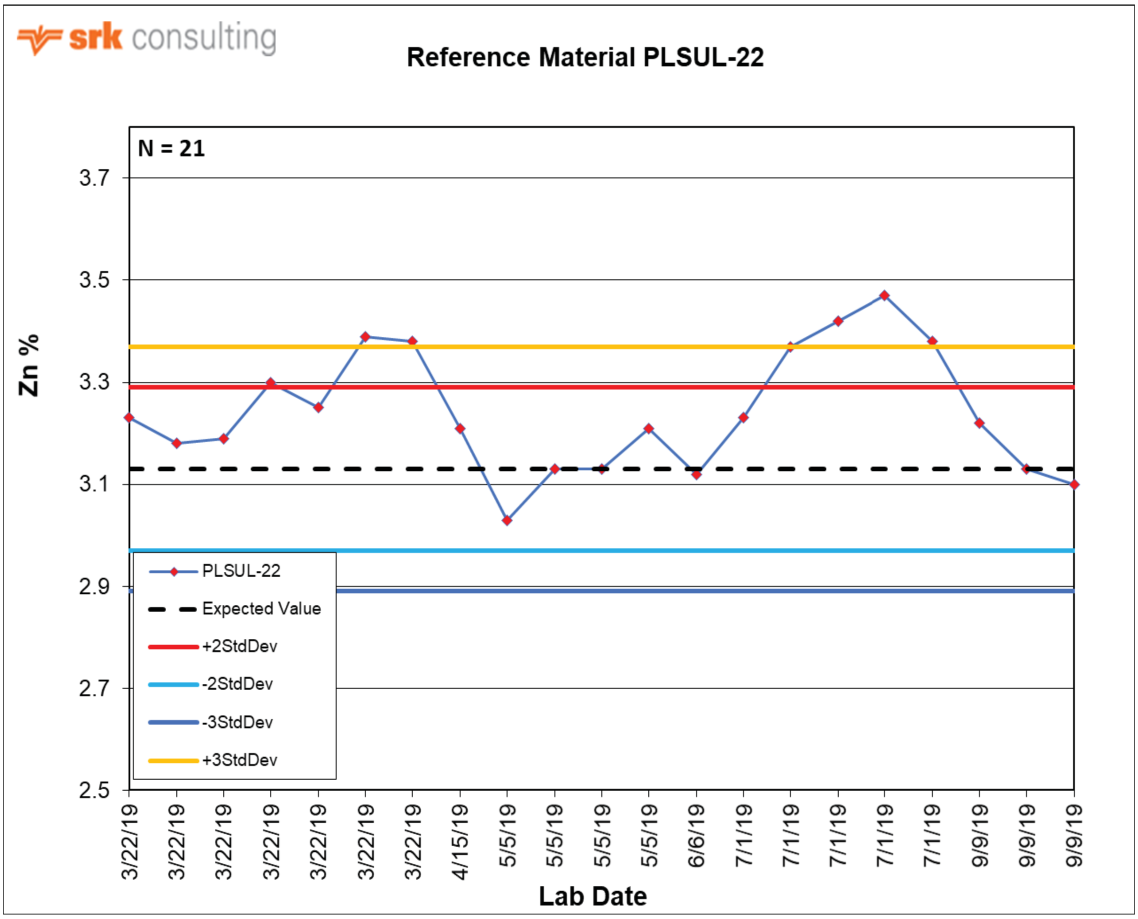


Figure 11-2: Zinc CRM Analyses – Chumpe Laboratory 2019

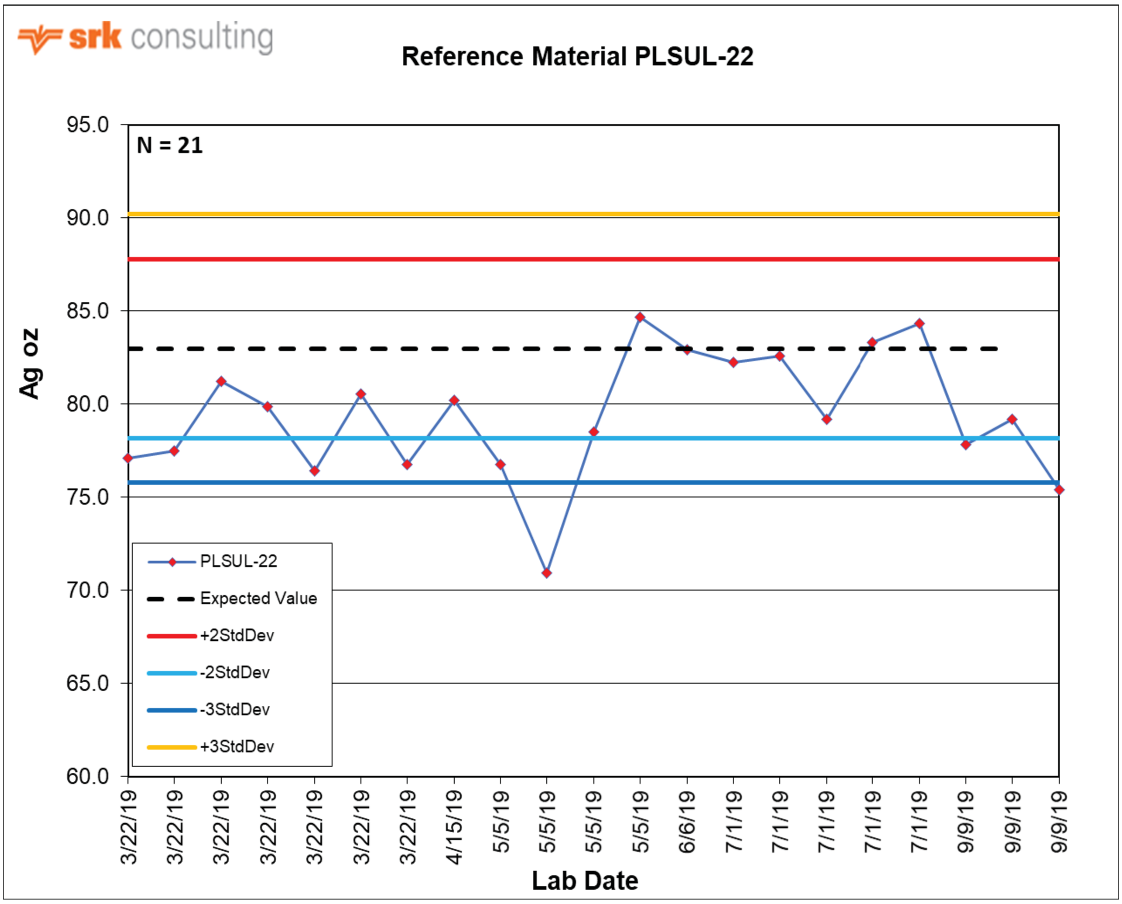


Figure 11-3: Silver CRM Analyses – Chumpe Laboratory 2019

Performance: ALS Minerals

SRK generally uses a nominal +/-3 SD criteria for evaluating failures of the CRM. The SD used is the between lab SD, as provided in the certificates from Target Rocks. SRK notes that failure rates for the CRM as provided are very high for Cu, which are due to rounding differences between lab certificates and CRM values. All other elements have minimal failure results, although CRM PLSUL-10 reports low results for Pb, which will need to be monitored in future.

The tabulated QA/QC results for the 2018 drilling campaign using ALS as the testing laboratory are shown in Table 11.5. In 2018, Corona submitted a total of 435 samples to ALS laboratories for independent checking. As is evident in Figure 11.4, the CRM PLSUL-10 has performed systematically below the reported expected value, but is within a 3 standard deviation range, signifying that there is an issue with the CRM reporting limits. Figure 11.5 and Figure 11.6 depict the zinc and silver charts of CRM PLSUL-10 respectively, and the same low bias is evident for these elements. Limited samples were sent to ALS in 2019, with the bulk of samples analyzed and tested at the Chumpe laboratory.

Table 11-5: 2018 CRM Performance Summary – ALS Minerals

STD	Total	Low 3SD	High 3SD	Failure % Low	Failure % High
Ag (g/t)					
PLSUL-22	99	0	0	0.00%	0.00%
PLSUL-24	109	2	0	1.83%	0.00%
PLSUL-10	13	0	0	0.00%	0.00%
PLSUL-14	36	0	34	0.00%	94.44%
PLSUL-15	12	0	0	0.00%	0.00%
All Ag	**269**	**2**	**34**	**0.74%**	**12.64%**
Pb (%)					
PLSUL-22	99	0	0	0.00%	0.00%
PLSUL-24	109	2	0	0.00%	0.00%
PLSUL-10	13	9	1	69.23%	7.69%
PLSUL-14	36	0	0	0.00%	0.00%
PLSUL-15	12	1	0	8.33%	0.00%
All Pb	**269**	**12**	**1**	**3.72%**	**5.77%**
Cu (%)					
PLSUL-22	99	0	6	0.00%	6.06%
PLSUL-24	109	1	19	0.00%	17.43%
PLSUL-10	13	0	1	0.00%	7.69%
PLSUL-14	36	36	0	100.00%	0.00%
PLSUL-15	12	0	1	0.00%	8.33%
All Cu	**269**	**37**	**27**	**13.38%**	**10.04%**
Zn (%)					
PLSUL-22	99	1	2	1.01%	2.02%
PLSUL-24	109	4	1	3.67%	0.92%
PLSUL-10	13	1	0	7.69%	0.00%
PLSUL-14	36	2	1	5.56%	2.78%
PLSUL-15	12	2	0	16.67%	0.00%
All Zn	**269**	**10**	**4**	**3.72%**	**1.49%**

Source: SRK, 2020

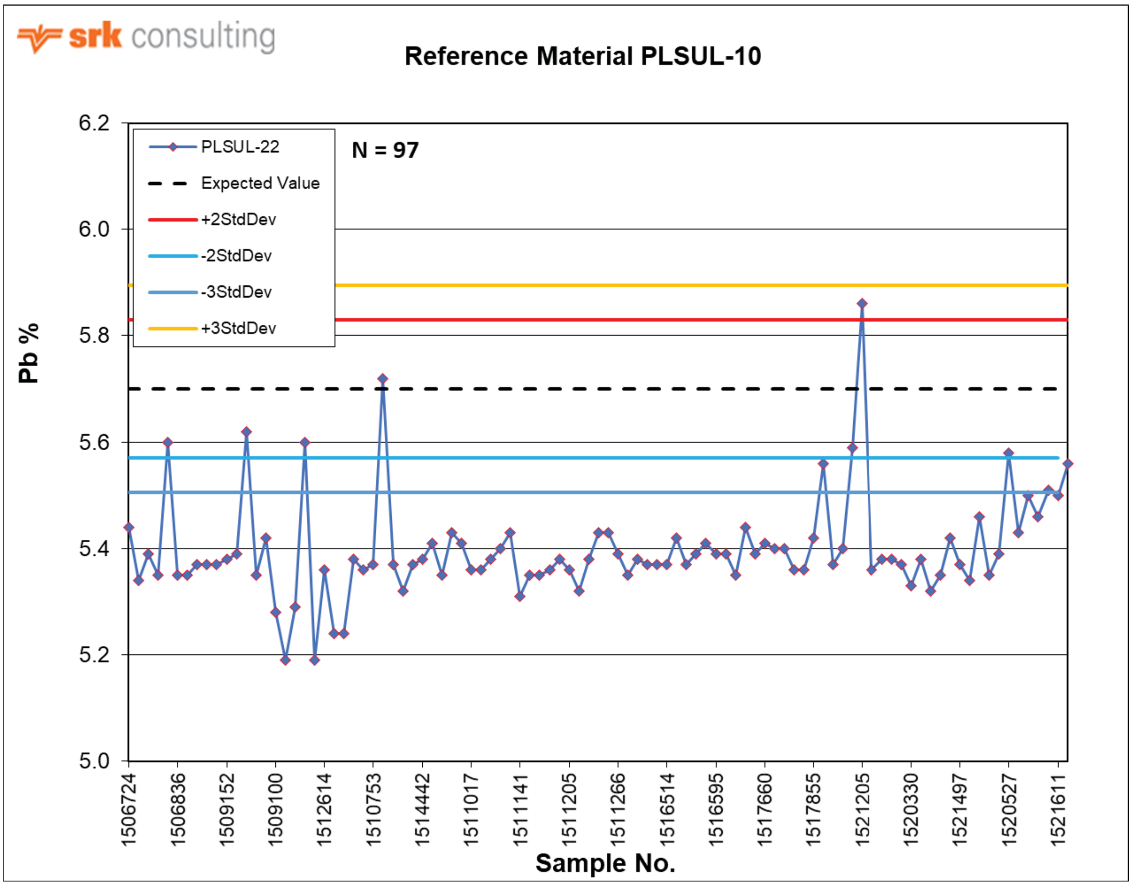


Figure 11-4: Lead CRM Analyses – ALS Laboratory 2018

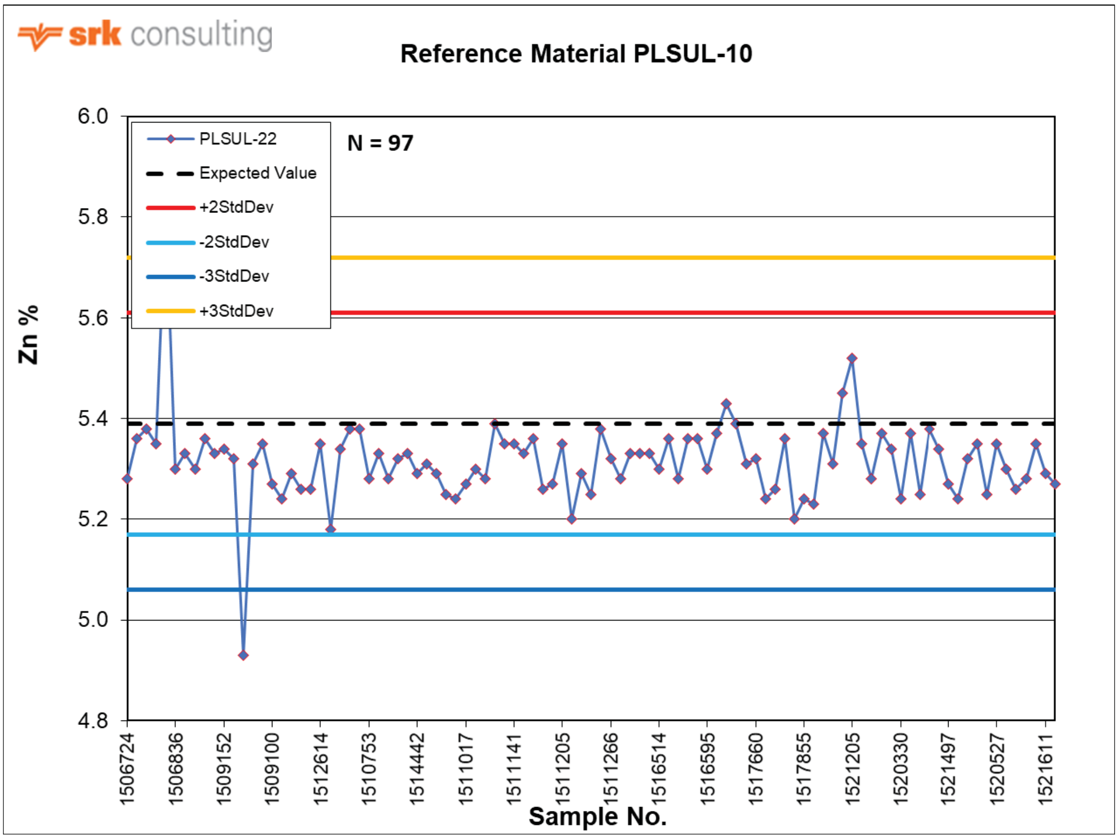


Figure 11-5: Zinc CRM Analyses – ALS Laboratory 2018

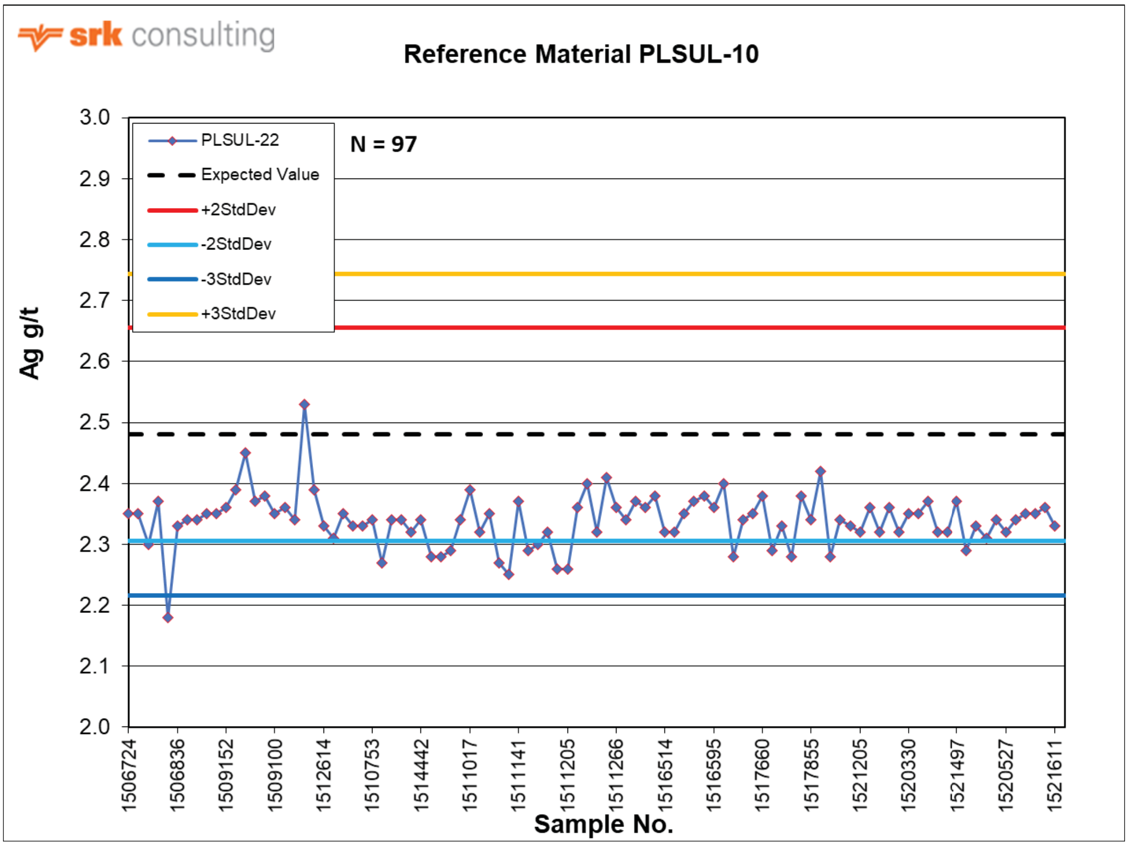


Figure 11-6: Silver CRM Analyses – ALS Laboratory 2018

Performance: Chumpe Laboratory

In 2018, Corona instigated a rigorous QAQC program whereby Standards, Duplicates (Core and Pulp) and Blanks were routinely inserted into the assay sample stream. Monthly QA/QC reports were generated onsite and the results confirm the improved performance of the Chumpe laboratory in more recent years whereby CRM failure rates have been significantly reduced. The performance of the 2018 and 2019 CRM's at the Chumpe Laboratory are summarized in Table 11.6. Significant under reporting of Pb, Cu and Zn were, however, still a problem for certain CRM's in 2018. CRM results in 2019 appear to be significantly improved. Laboratory reporting limits account for most of the Cu discrepancies, whereas CRM sample mix-ups also account for several of the failures

Table 11-6: 2018 CRM Performance Summary – Chumpe Lab

2018					
STD	**Total**	**Low 3SD**	**High 3SD**	**% Low**	**% High**
Ag (g/t)					
PLSUL-10	97	1	0	1.03%	0.00%
PLSUL-14	77	0	58	0.00%	75.32%
PLSUL-15	94	0	3	0.00%	3.19%
All Ag	**268**	**1**	**61**	**0.37%**	**22.76%**
Pb (%)					
PLSUL-10	97	87	0	89.69%	0.00%
PLSUL-14	77	0	0	0.00%	0.00%
PLSUL-15	94	0	1	0.00%	1.06%
All Pb	**268**	**87**	**1**	**32.46%**	**0.37%**
Cu					
PLSUL-10	97	30	0	30.93%	0.00%
PLSUL-14	77	76	1	98.70%	1.30%
PLSUL-15	94	3	48	3.19%	51.06%
All Cu	**268**	**109**	**49**	**40.67%**	**18.28%**
Zn					
PLSUL-10	97	1	1	1.03%	1.03%
PLSUL-14	77	0	2	0.00%	2.60%
PLSUL-15	94	85	4	90.43%	4.26%
All Zn	**268**	**86**	**7**	**32.09%**	**2.61%**
2019					
Ag (g/t)					
PLSUL-22	39	4	0	10.26%	0.00%
PLSUL-24	40	15	2	37.50%	5.00%
PLSUL-32	4	0	0	0.00%	0.00%
PLSUL-33	3	1	0	33.33%	0.00%
PLSUL-34	2	2	0	100.00%	0.00%
All Ag	**88**	**22**	**2**	**25.00%**	**2.27%**
Pb (%)					
PLSUL-22	39	0	0	0.00%	0.00%
PLSUL-24	40	2	3	5.00%	7.50%
PLSUL-32	4	0	0	0.00%	0.00%
PLSUL-33	3	0	0	0.00%	0.00%
PLSUL-34	2	0	0	0.00%	0.00%
All Pb	**88**	**2**	**3**	**2.27%**	**3.41%**
Cu (%)					
PLSUL-22	39	0	3	0.00%	7.69%
PLSUL-24	40	0	2	0.00%	5.00%
PLSUL-32	4	0	0	0.00%	0.00%
PLSUL-33	3	1	0	33.33%	0.00%
PLSUL-34	2	0	1	0.00%	50.00%
All Cu	**88**	**1**	**6**	**1.14%**	**6.82%**
Zn (%)					
PLSUL-22	39	0	7	0.00%	17.95%
PLSUL-24	40	3	3	7.50%	7.50%
PLSUL-32	4	0	2	0.00%	50.00%
PLSUL-33	3	0	0	0.00%	0.00%
PLSUL-34	2	0	0	0.00%	0.00%
All Zn	**88**	**3**	**12**	**3.41%**	**13.64**

Source: SRK, 2020

11.4.2 Blanks

Minera Corona currently inserts unmineralized quartz sand blanks into the sample stream at a rate of 1:20 samples, or adjusted as necessary, to ensure smearing of grade is not occurring immediately after higher grade intervals. Blanks are generally about 0.5 kg of silica sand, bagged and submitted in the sample stream along with the normal core samples. The results of the Blank analysis in 2019 show that based on a failure criterion of 5 times the LLOD, there are no systematic failures for the Chumpe samples (Table 11.7). LLODs for the Chumpe laboratory is presented in Table 11.8.

Between 2017 and 2019 a total of 6,754 Blanks were inserted into the sample stream at the Chumpe laboratory. Figure 11.7 displays 39 zinc samples from the Esperanza deposit, all of which are well below the 5 times LLOD failure criteria.

Table 11-7: 2019 Chumpe Blank Failures

Lab	Count	Failures				
		Ag	Pb	Cu	Zn	Au
Chumpe	47	0	0	0	0	0

Source: SRK, 2020
Failures assessed on a 5X LLOD basis.

Table 11-8: Lower Limits of Detection for the Chumpe Laboratory

Element	LLOD	Unit
Ag	3.43	ppm
Au	0.03	ppm
Cu	0.01	%
Pb	0.01	%
Zn	0.01	%

Source: Sierra Metals, 2019

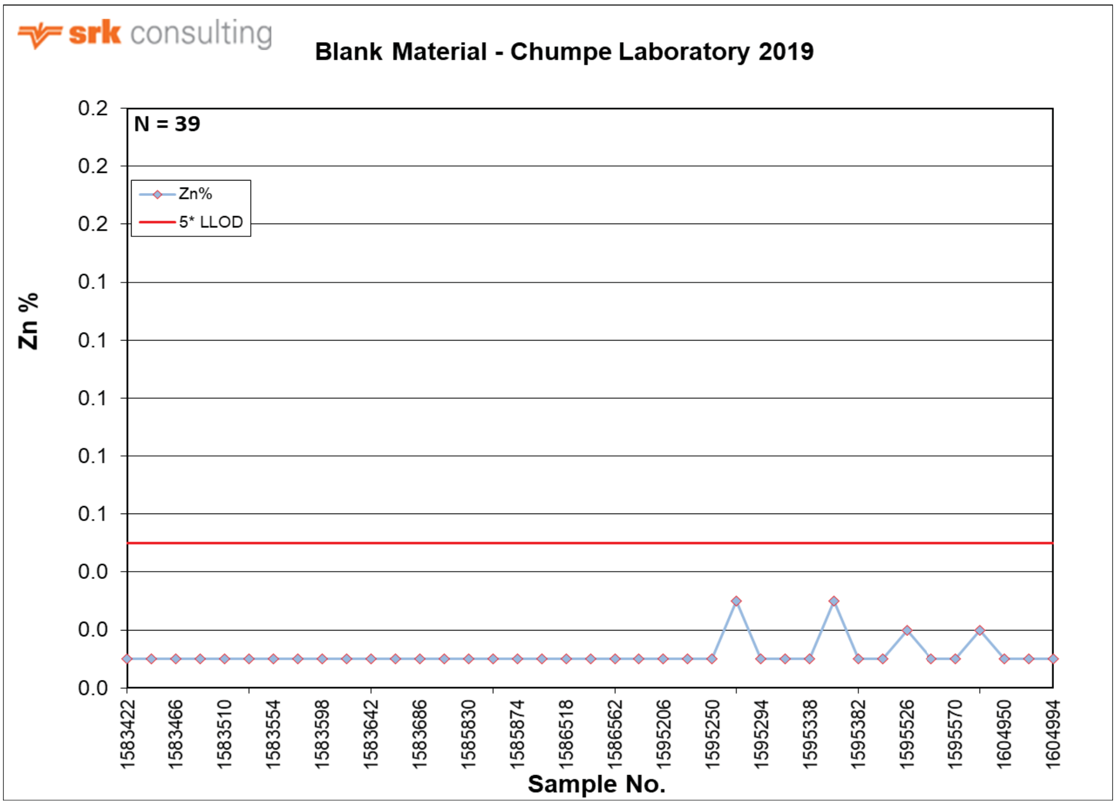


Figure 11-7: Zinc Blank Analyses – Chumpe Laboratory 2019

11.4.3 Duplicates (Check Samples)

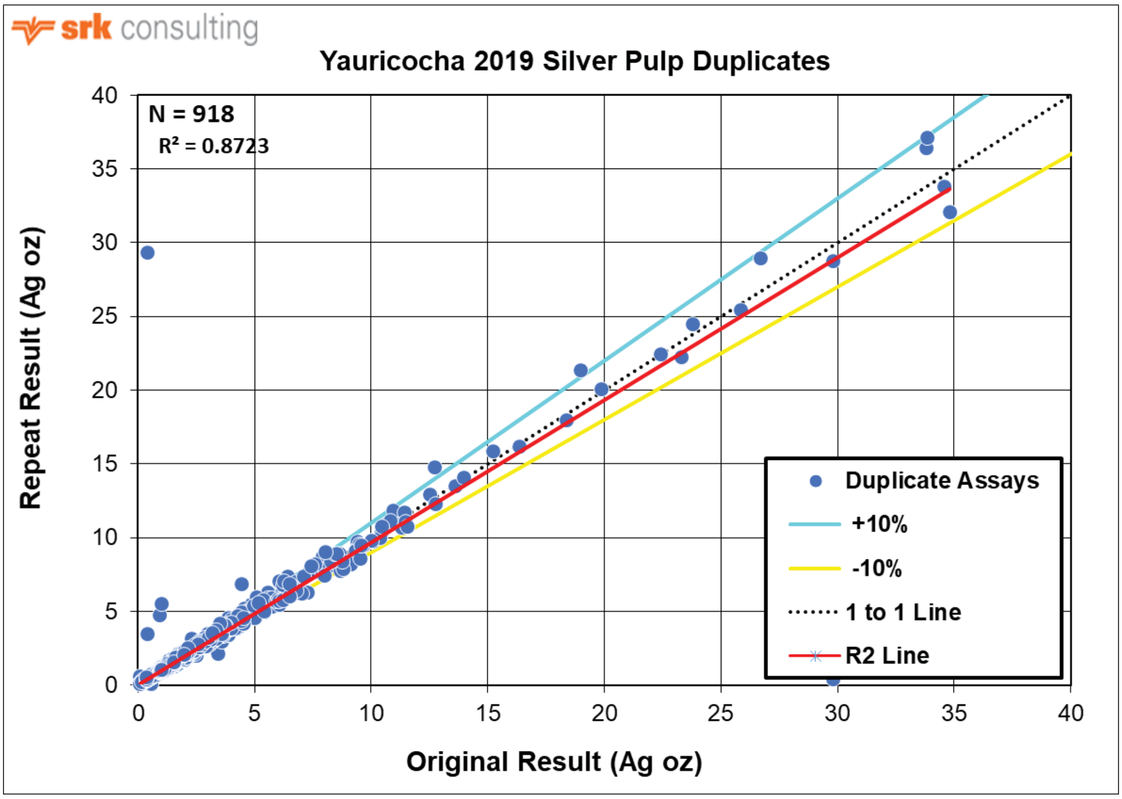
SRK was provided duplicate sample data for 2018 and 2019.

True duplicate samples such as the other half of split core or a crushed/pulverized sample resubmitted to the same laboratory are common practice for normal QA/QC programs but become less critical once development and mining continues. These samples are designed to check the primary assay laboratory's ability to repeat sample values or to check the nugget effect of the deposit very early on, but the inherent variability of the deposit is typically known at the production stage.

While Minera Corona did not submit true duplicate samples for the years preceding 2017, these intra-lab repeatability checks were instigated for the 2018 and 2019 drilling campaigns, for a combined total of 2,652 samples.

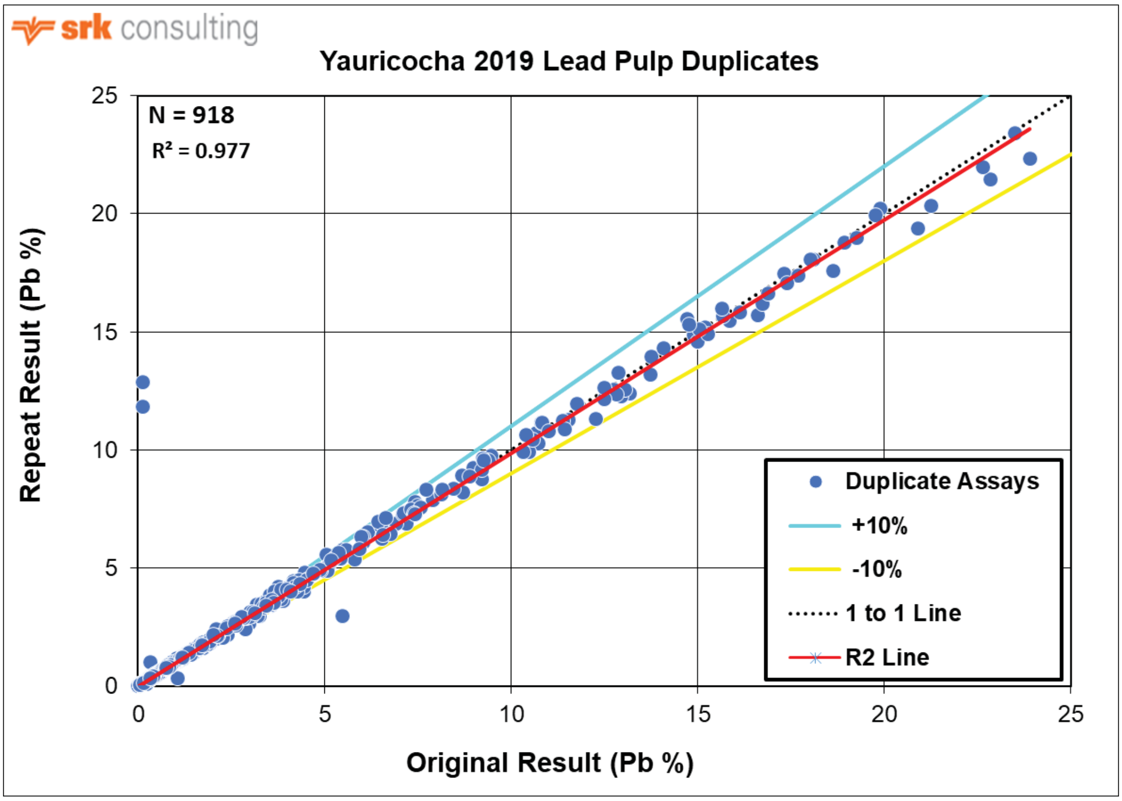
Minera Corona uses three types of check samples in the QA/QC program. These include twin (core) duplicates, coarse duplicates (crushed), and pulp duplicates (pulverized) to assess repeatability at the different phases of preparation between the site lab and third-party ALS lab.

In 2018 and 2019, pulp and core duplicate samples were routinely performed on all assay batches submitted to both ALS and Chumpe laboratory, for a total of 7,517 samples. Agreement between original samples and duplicate samples were found to be within acceptable limits for silver, lead and zinc (Figure 11.8, Figure 11.9, and Figure 11.10).



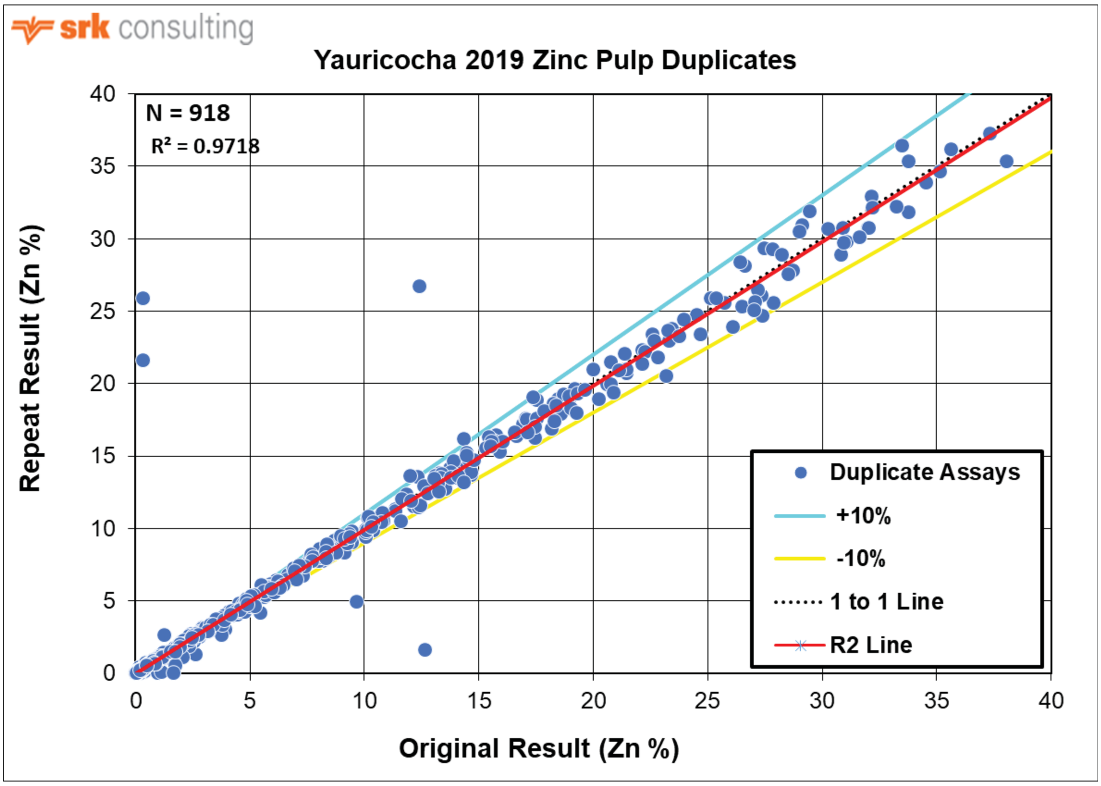
Source: SRK Consulting: 2019

Figure 11-8: 2019 Pulp Duplicate Ag Analyses



Source: SRK Consulting: 2019

Figure 11-9: 2019 Pulp Duplicate Pb Analyses



Source: SRK Consulting: 2019

Figure 11-10: 2019 Pulp Duplicate Zn Analyses

11.4.4 Actions

SRK notes that the actions taken by the exploration team at Yauricocha is documented in the QA/QC procedures for the mine. In the event that a failure is noted, the laboratory is contacted, and the source of the failure is investigated. There is no formal documentation for procedures involving re-runs of batches at this time, but SRK understands that this is the process being used. SRK notes that the QA/QC reports are not amended to reflect the new passing QA/QC and batch, and only reflect the initial failure and batch to track laboratory performance rather than the performance of reruns.

SRK is of the opinion that these actions are not consistent with industry best practice, which generally features a program of reanalysis upon failure of a CRM in a batch of samples. Subsequent to this are the incorporation of the revised samples into both the database and QA/QC analysis. SRK notes that this program is implemented at other Sierra Metals sites but is not well documented at Yauricocha.

11.4.5 Results

The results of the QA/QC program described above show relatively high incidence of failures across the board for all types of QA/QC, with the CRM and the obvious bias between check duplicates being the most concerning. SRK notes that the CRM failures are potentially due to ongoing sample mix-ups, but that this inherently represents a failure in the process that must be reviewed. SRK evaluated the CRM performance using more lenient tolerances than the CRM themselves recommend (+/-3SD vs +/-2SD) as the recommended certified performance ranges result in extreme failure rates.

If the SD and performance criteria for the CRM as calculated by Target Rocks is deemed reasonable, and it is determined that the laboratories should be able to meet the performance criteria, then this is a more serious matter. The laboratories are not capable of analyzing to the precision needed for these CRM, and the laboratory practices should be reviewed. Uncertainty in the accuracy and precision of the analyses would be introduced through this process, requiring some action in terms of the classification of the Mineral Resources.

SRK is aware that the bias of the Chumpe laboratory compared to ALS has been noted and that changes in procedures and hardware are still being implemented at Chumpe to better approximate the preparation and analysis methodology employed by ALS. QA/QC methods have been adjusted in recent years and the results from the 2018 and 2019 reflect the positive change.

11.5 Opinion on Adequacy

SRK is of the opinion that the database is supported by adequate QA/QC to have reasonable confidence to estimate Mineral Resources. SRK notes that the failures in the QA/QC should be addressed as soon as possible through review of the original CRM/Blanks and their performance limits, as well as reasons for consistent bias observed between the site Chumpe lab and ALS Minerals. SRK notes that these biases are conservative given that Chumpe is the source for the historical drilling database and current channel samples, and that the nature of the bias is not such that the entire resource would be under or over-stated.

SRK did not observe any consistent performance issues over time (2015-2019) at either lab, but rather noted isolated and apparently random failures for the CRM and blanks in particular. As noted, many of these can be attributed to sample mixing during QA/QC submittal or potential issues with the CRM, both problems in and of themselves. SRK continues to recommend that more attention is given to sampling and QA/QC in the future to continue to mitigate potential uncertainty in the analyses supporting the Mineral Resource. SRK also notes that any bias from the Chumpe analyses will likely be conservative due to the significant under reporting of Ag for Chumpe compared to ALS.

Although the performance and monitoring of the QA/QC samples is not consistent with industry best practices, SRK notes that the lack of precision in certain analyses (Ag, Zn, Pb, Cu) is less critical due to the nature of the mineralization and mining criteria at Yauricocha. Precision issues between 0.1% to 0.2% in the base metals is likely not sufficient to cause material issues in deciding whether material is mined or not, and these decisions are generally made with ongoing development samples and grade control entirely unsupported by detailed QA/QC. Thus, much of the risk associated with the analyses has already be borne by the active mining of multiple areas at Yauricocha and mitigated by ongoing profitable production. SRK is of the opinion that while these issues should be addressed going forward; they represent little risk to the statement of Mineral Resources at this time.

12 Data Verification

Other independent consultants such as Gustavson and Associates has verified the data supporting Mineral Resource estimation at Yauricocha since 2012. SRK notes that the data verification process is made difficult due to the lack of a compiled and well-ordered database for the overall mine area.

12.1 Procedures

For data prior to 2016, Gustavson reviewed the drill hole and underground channel samples databases for the Yauricocha project and compared the assay database with a separately maintained database of assay data which is described as 'laboratory data'. Chumpe lab does not provide a separately maintained database, nor are there assay certificates with which to compare the database.

In 2017, SRK reviewed individual analytical certificates from ALS Minerals and compared a random selection of 20 of these back to the database. No errors were noted in the values from the sheets to the digital database. SRK notes that this represented about 7% of the total assays.

For the 2019 database, SRK compared approximately 5% of the Chumpe Laboratory results for the period 2018 to 2019 back to the Chumpe Laboratory supplied Excel spreadsheets. No errors were noted between the two sources of results for silver, gold, lead, zinc and copper analytes. However, there were instances where arsenic and iron analytes where not available in the geological drillhole database. The entire analytical database was checked for further such instances and this information was sourced and updated where it was analyzed and available.

12.2 Limitations

SRK has not reviewed 100% of the analyses at Yauricocha against certified, independent assay certificates.

12.3 Opinion on Data Adequacy

SRK has relied upon the verification conducted by others previously and has conducted independent verification of assays to analytical certificates from ALS Minerals for the recent project history. SRK also notes that much of the risk associated with potential version control issues, database contamination or transposition, is borne-out through daily production in the currently operating underground mine.

SRK recommends the installation of a dedicated database management platform that will compile and validate the database used in Mineral Resource estimation against the actual certificates received from Chumpe, as well as make QA/QC management and database export more flexible and reliable.

13 Mineral Processing and Metallurgical Testing

13.1 Testing and Procedures

Yauricocha's facilities include a metallurgical laboratory at site. Sampling and testing of samples are executed on a as needed basis. Information available from site shows that Yauricocha has been testing various samples from the mineralized zones as follows:

- Samples from Mina Central – Cuerpo Esperanza: a polymetallic Ag-Cu-Pb-Zn material that at laboratory scale achieved comparable results to those achieved in the industrial scale plant. Three products resulted from the tests: copper concentrate, lead concentrate, and zinc concentrate. Silver is preferably deported to copper and lead concentrates. No deleterious elements were reported in the flotation concentrates.
- Samples from a polymetallic material: test results are comparable to those of the industrial scale plant. Three products resulted from the tests: copper concentrate, lead concentrate, and zinc concentrate. Silver is preferably deported to copper and lead concentrates. Yauricocha continues testing alternative flotation conditions and reagents to reduce arsenic and antimony presence in copper concentrate and lead concentrate.
- Samples from Mina Mario (Pb-Zn): successfully produce a good quality lead sulfide concentrate and found difficulties in achieving commercial quality zinc grades.
- Samples from Cuerpo Contacto Occidental: correspond to an oxide Ag-Pb material that successfully achieved good quality lead sulfide concentrate and lead oxide concentrate. Approximately 70% of the silver was deported to concentrates, with approximately 47% of the total being deported to lead oxide concentrate.
- Additionally, samples identified as sourced from: Angelita, Antacaca, Catas, Celia, Cuye Cobre, Cuye Polimetalico, Gallito, Karlita has been subject to mineralogy analysis and flotation testing.
- Samples from an oxide copper mineral: this sample achieved poor metallurgical performance that laboratory personnel attributed to high presence of copper carbonates. Additional tests are planned for these samples.
- Samples from Esperanza Norte: a copper bearing material that achieved reasonable copper recovery and concentrate grade but with high presence of arsenic. The laboratory personnel's recommendation is to blend this material in the mill feed.
- Samples from copper sulfide minerals: achieved high recovery and concentrate grade but with significant arsenic presence in the copper concentrate. The laboratory's recommendation is to batch processing this material in the plant.

13.2 Recovery Estimate Assumptions

Final concentrates in Table 13.1 for the January to October 2019 period show typical commercial concentrate grades. In the polymetallic circuit, the fresh feed assaying 1.1% Cu yielded a concentrate assaying 29.7% Cu at a recovery of 77.5% Cu. Deportment of Zn and Pb to copper concentrate translated in grade of 5.6% Zn and 1.7% Pb respectively which may trigger penalties from buyers. Silver recovery to copper concentrate reached 26.4% equivalent to 613 grams/tonne Ag in concentrate.

In terms of lead sulfide concentrate from the polymetallic circuit, 89.1% of the lead metal in fresh feed assaying 1.6% Pb was deported to a sulfide concentrate grading 57.7% Pb. Deportment of Cu and Zn to lead concentrate reached grades of 2.4% and 5.5% respectively. The large fraction of silver feeding the polymetallic circuit was deported to the lead concentrate; it reached 43.1% recovery for the period in question.

The zinc concentrate recovered 88.1% of the zinc metal or equivalent to a grade of 50.9% Zn in concentrate. Lead and copper recovery to the zinc concentrate translated in grades of 0.70% and 1.70%, respectively. Silver deportment to the zinc concentrate reached 8.9% or 92.6 grams/tonne.

Gold deportment is spread among all concentrate product and consequently it is unlikely that achieves payable levels. Yauricocha may want to look at opportunities to concentrate gold into a single product to reach payable levels, or alternatively attempt gravity concentration in the grinding stage and/or alternatively in the final flotation tails.

Table 13-1: Yauricocha Metallurgical Performance, January to October 2019

Processing Circuit	Stream	Tonnes	Concentrate Grade					Recovery (%)				
			Au	Ag	Pb	Cu	Zn	Au	Ag	Pb	Cu	Zn
			(g/t)	(g/t)	(%)	(%)	(%)					
Polymetallic	Fresh Ore	889,472	0.6	64.8	1.6	1.1	3.6	100	100	100	100	100
	Cu Concentrate	24,838	2.2	613.4	1.7	29.7	5.6	10.6	26.4	3	77.5	4.3
	Pb Concentrate	21,698	2.0	1145.1	57.7	2.4	5.5	8.5	43.1	89.1	5.4	3.7
	Zn Concentrate	55,966	0.5	92.6	0.7	1.7	50.9	4.9	8.9	2.6	9.9	88.1
Oxide	Fresh Ore	No oxide ore treatment during this period										
	Pb Concentrate											
	Pb Oxide Concentrate											
	Fresh Ore											
	Cu Oxide Concentrate											
	Fresh Ore											
	Cu Concentrate											

Source: Sierra Metals, 2019

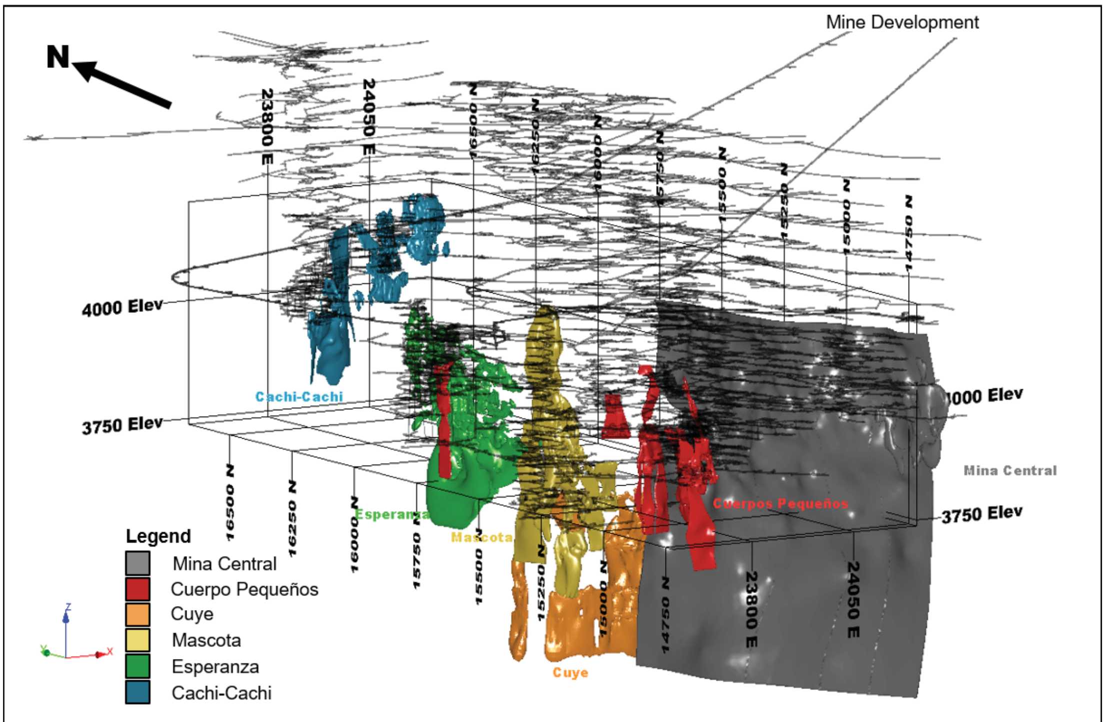
14 Mineral Resource Estimates

Mineral Resource Estimations have been conducted by the following Qualified Person, using various industry-standard mining software:

- Andre Deiss, Principal Resource Geologist of SRK Consulting (Canada) Inc.; Datamine Studio RM™ (Datamine).

SRK completed mineral resource estimations for the following mineralized areas (Figure 14-1):

- Mina Central;
- Esperanza;
- Mascota;
- Cuye;
- Cuerpos Pequeños; and
- Cachi-Cachi.



srk consulting	Sierra Metals Inc.	Mineralized Areas
	Yauricocha Mine	Date: 14/01/2020

Source: Sierra Metals, 2019

Figure 14-1: Modelled Mineralized areas Estimated at Yauricocha Mine

14.1 Drillhole/Channel Database

SRK received a drillhole database in digital Microsoft Excel™ (Excel) format. SRK notes that Minera Corona maintains their own database in an individual unprotected spreadsheet, without a clear chain of custody record. However, the use of a single repository Excel sheet is an improvement on the historical practice of utilizing individual Excel files for each mineralized zone respectively. No record is kept of the original source information as edits are made directly in the current spreadsheet tabs.

SRK is of the opinion that one of the largest and most critical deficiencies at Yauricocha is the lack of a well-maintained and protected geological relational database, which has the capability to track changes. This type of database would facilitate multi-faceted interrogations of the original and interpreted drillhole information available. Furthermore, it would permit flexibility and speed in manipulation and extraction of data for use in any mineral resource estimation. QA/QC results would be seamlessly available to allow for timeous interrogation and intervention on assay result failures.

14.2 Geologic Model

The geologic model was developed by Minera Corona geologists, primarily using Leapfrog® Geo software (Leapfrog). Three-dimensional (3D) models were derived from both drilling and channel samples, as well as incorporating mapping from mine levels and structural observations. Significant expansion and infill drilling between the end of 2017 and the effective date of the resource (October 31, 2019), has resulted in net changes in many areas of the Yauricocha deposit, improving the definition of the mineralized zones. Minera Corona geologists are responsible for the generation of the mineralized solids, allowing for the incorporation of detailed local geological information and hence producing more accurate representations of the mineralized zones as they are exposed on the mine. SRK noted that the mineralized zones at depth have a closer morphology to the actual mined areas, which was not the case prior to 2018. Historically the less informed areas of the models tended to be extremely optimistic for the respective mineralization style. This issue has been addressed since 2018 with additional infill drilling and the modification of the implicit modelling parameters utilized in Leapfrog. This has reduced the volumes of the respective mineralized bodies significantly in areas with a lower density of drilling intercepts.

There is currently no detailed structural or lithological stratigraphic geology model available for the mine. A regional structural model was commissioned by the mine. However, the results were not readily available for SRK to evaluate or comment on the validity thereof. A lithostratigraphic model would facilitate the mine planning process with regards to the ability to apply a lithostratigraphic waste density for dilution purposes.

Mineralization at Yauricocha encompasses two main styles, differentiated by scale, continuity, and exploration and development style, namely:

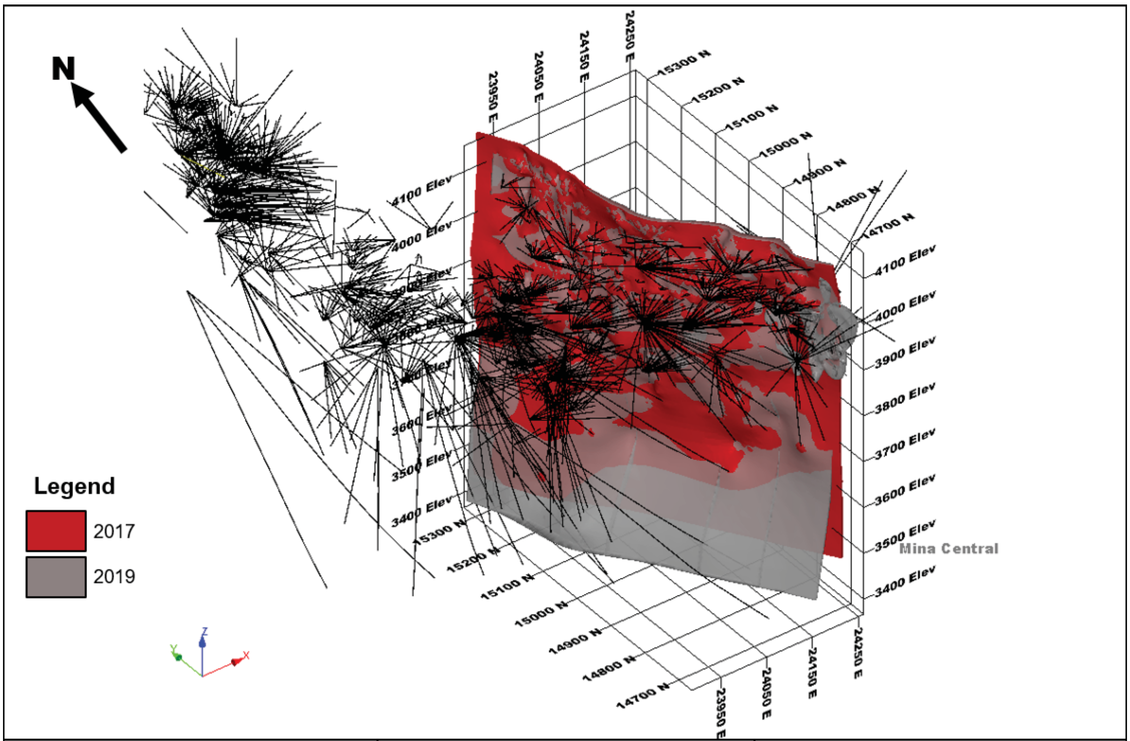
- Cuerpos Massivos (large bodies) are bodies formed along major structures of significant (several hundreds of meters) of vertical extent, consistent geometry, and significant strike length. The majority of the tonnage mined at Yauricocha is from these bodies, as they are easily intersected by targeted drilling and are mined by bulk mining methods; and

- Cuerpos Chicos (small bodies) are smaller mineralized bodies of high grades. They are often skarn bodies, are less continuous and less regular in form than the Cuerpos Massivos and are difficult to intersect except with carefully targeted drilling. They are typically mined by overhand cut and fill or similar high-selectivity mining methods. The mine has historically drifted into these zones and delineated them using localized channel sample data.

14.2.1 Mina Central

The geology model for Mina Central has been constructed by Corona site geologists. This model is based on implicit modeling of drilling and channel sampling, and encompasses the Antacaca, Catas, Rosaura, and Antacaca Sur areas, which are broken on geographic and infrastructure boundaries, rather than any mineralogic or geologic boundaries. The model is effectively continuous through all areas. The mineralization is domained using a steeply dipping, NW trending, tabular wireframe constructed in Leapfrog. Both channel sampling and drilling have been used to develop this model. SRK reviewed the wireframes collaboratively with Corona personnel and noted that it appears to be a reasonable representation of the polymetallic sulfide mineralization as logged and sampled in this area. The orebody has been expanded from the previous 2017 model based on revised interpretation and expanded drilling. An example of this model in the context of the previous model is shown in Figure 14-2.

In addition to the expanded extents of the Mina Central area, Corona geologists have modeled selected oxide zones in the Antacaca Sur area based on drilling and development data. This is considered a separate domain from the main Mina Central area for the purposes of data analysis and estimation.



srk consulting	Sierra Metals Inc.	Mina Central All 2017 and 2019 Mineralized Solids
	Yauricocha Mine	Date: 14/01/2020

Source: Sierra Metals, 2019

Figure 14-2: Mina Central Mineralized Model

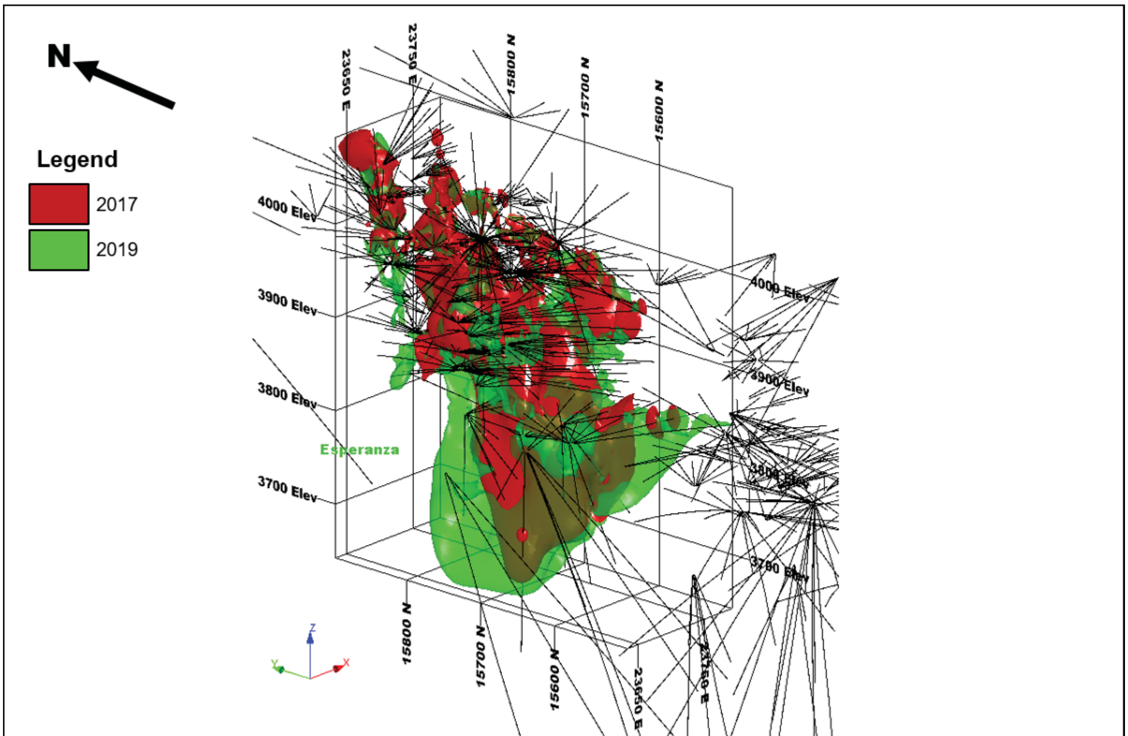
14.2.2 Esperanza

The geology model for Esperanza has been constructed by Corona site geologists. This model is based on a very detailed drilling program as well as cross-sectional and level mapping in order to capture the inherent complexity of this area. The model is implicitly modeled from a series of 8 different areas identified within Esperanza based on mineralogy or textures. These include 3 breccia zones, 1 copper zone, Esperanza North, Esperanza Distal, and a lower grade pyrite-rich area. Four of the zones where not estimated namely:

- Esperanza Breccia 1 (mined-out);
- Esperanza Breccia 2 (mined-out);
- Esperanza Cobre (mined-out); and
- Esperanza Pirita (not economic).

Esperanza, Esperanza Norte, Esperanza Distal and Esperanza Breccia 3, a newly discovered mineralized zone where all estimated as discrete mineralized zones. The model represents what appears to be a single primary feeder structure at depth, which splits into many “finger-like” smaller structures in the upper levels. With recent drilling this mineralization morphology has been was proven to some degree. Although general continuity along strike and down-dip is quite good, SRK notes that the mineralization varies dramatically in orientation and thickness, locally over short distances.

Examples of the Esperanza model in the context of the previous model are shown in Figure 14-3 and Figure 14-4.



srk consulting	Sierra Metals Inc.	Esperanza All 2017 and 2019 Mineralized Solids
	Yauricocha Mine	Date: 14/01/2020

Source: Sierra Metals, 2019

Figure 14-3: Esperanza Mineralized Model

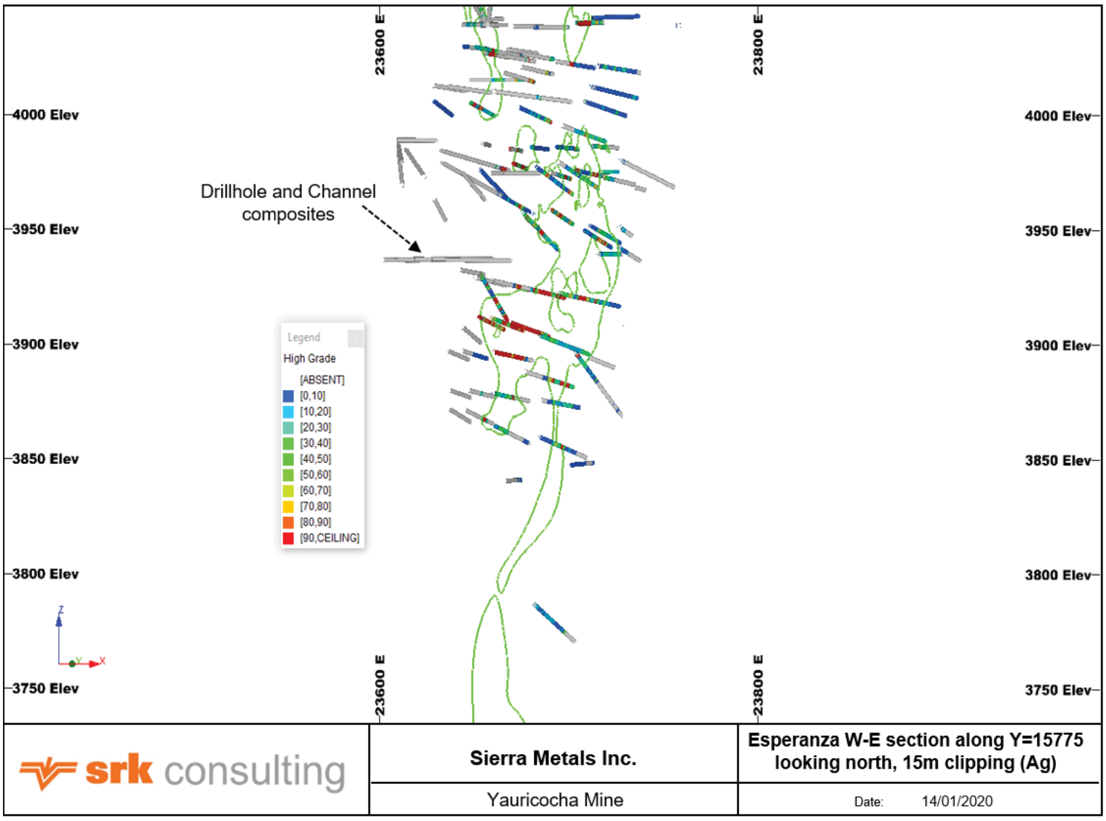


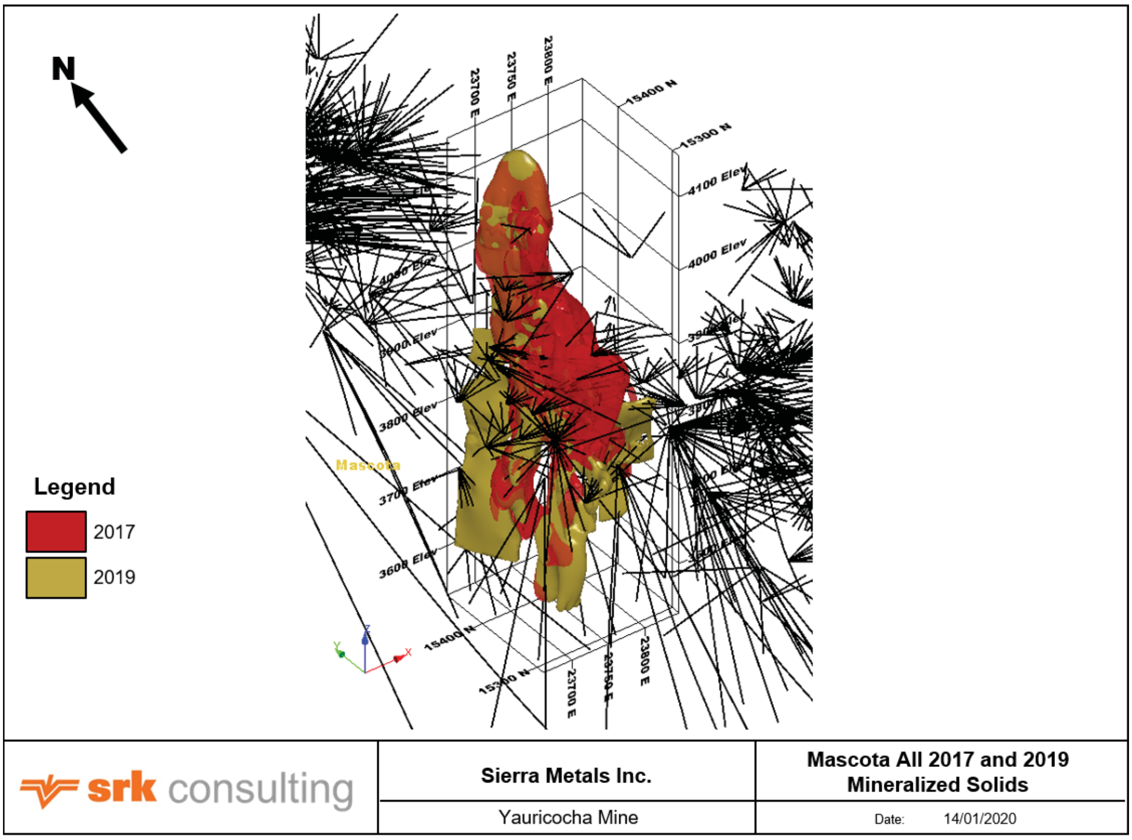
Figure 14-4: Cross-section of Esperanza Geological Model

14.2.3 Mascota

The geology model for Mascota has been constructed by Corona site geologists using implicit modeling in Leapfrog. The model is based on the grouped lithologies from drilling and sampling in the Mascota Mine area. The mineralization style is complex and many faceted. The geological models include copper-rich areas as well as the massive sulfide zones being explored at depth. These areas have been identified as Ag/Pb oxides, low-grade Ag/Pb oxides, Cu oxides, and polymetallic sulfides. They are considered as discrete by the Corona geologists and have been domained separately for the purposes of estimation. The following mineralized areas were estimated independently in the Mascota area:

- Mascota Oxide Cu Pb-Ag;
- Mascota Polymetallic North;
- Mascota Polymetallic East;
- Mascota Polymetallic (South) East;
- Mascota Polymetallic South; and
- Mascota Sur Oxide Cu.

An example of this model in the context of the previous model is shown in Figure 14-5.



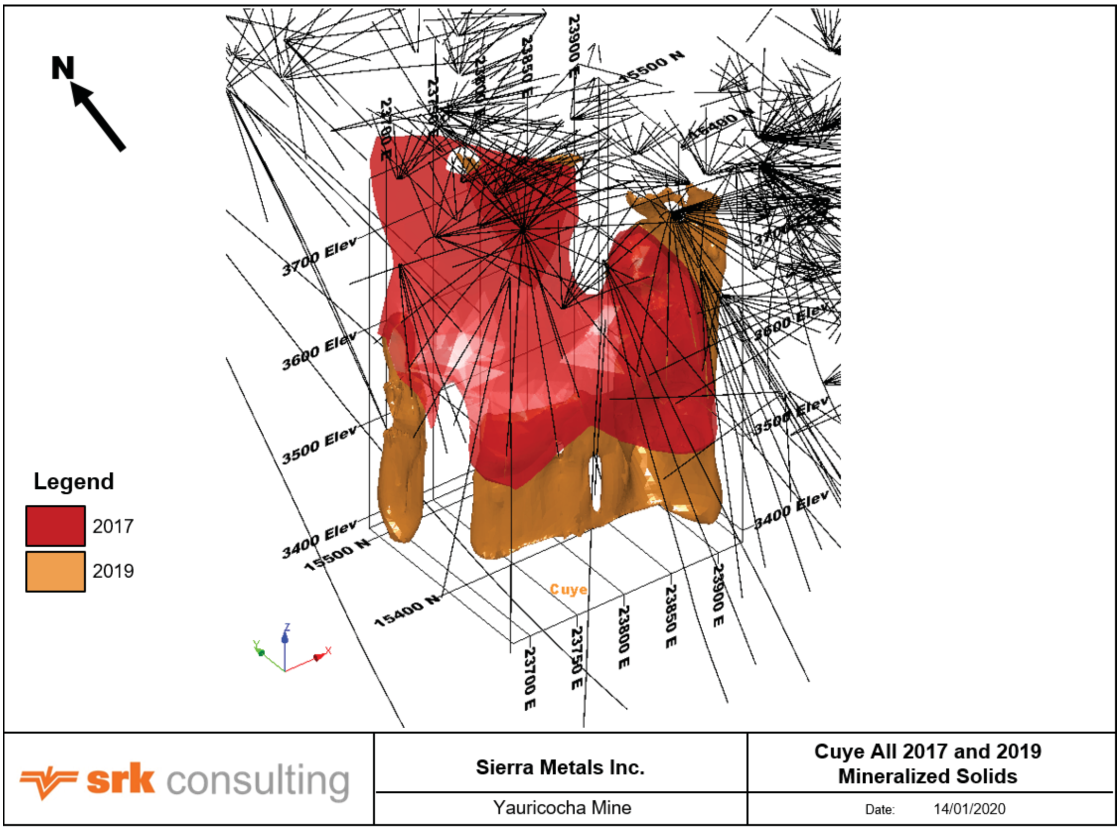
Source: Sierra Metals, 2019

Figure 14-5: Mascota Mineralized Model

14.2.4 Cuye

The Cuye orebody has previously been reported as a series of smaller bodies situated between the Mina Central and Mascota areas. Unlike the smaller bodies, the new intersections are thicker and more continuous, if lower grade. Also, they potentially allude to an extension of the Mina Central mineralization to the north, the size and morphology of the Cuye area has completely changed from previous reports and fits more closely with a tabular steeply dipping orebody along the trend of the Mina Central and Esperanza areas. At present, Cuye has only be sampled by relatively widely spaced drilling. It, like Esperanza, also features some pyrite-rich zones which have been modeled separately within the greater Cuye orebody. These areas have been excluded from the estimation as they are considered as waste rock for the mine.

An example of the Cuye orebody, compared with the previous model, is shown in Figure 14-6.



Source: Sierra Metals, 2019

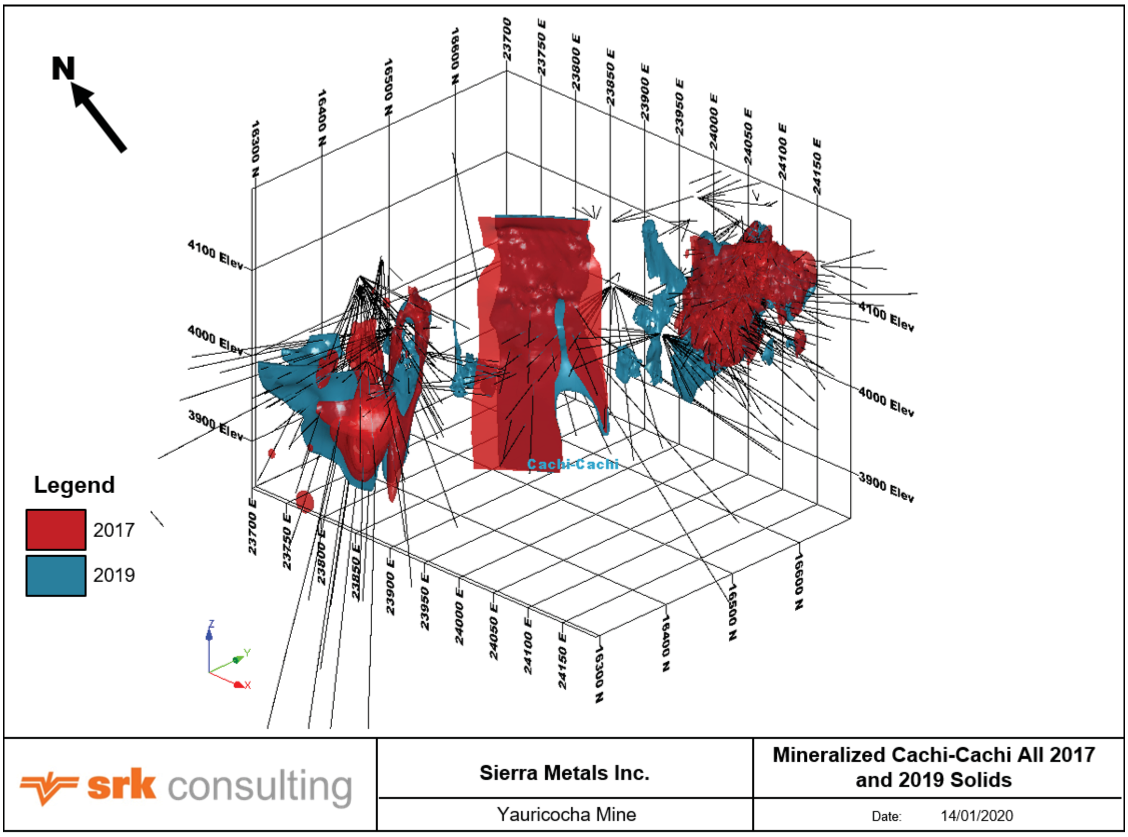
Figure 14-6: Cuye Mineralized Model

14.2.5 Cachi-Cachi

The geology model for Cachi-Cachi has been constructed by Corona site geologists. This model is based on cross-sectional and level mapping, and encompasses the massive orebodies that follow:

- Angelita;
- Carmencita;
- Karlita;
- Elissa;
- Celia;
- Escondida;
- Privatizadora;
- Vanessa;
- Yoselim; and
- Zulma (not estimated or mined).

These are discrete mineralized bodies with unique morphologies and mineralization. Carmencita, Vanessa and Yoselim are recently discovered mineralized zones and have been estimated in the 2019. The mineralization is domained using a variety of geometries and orientations, which are generally steeply dipping. Models are wireframes implicitly modeled in Leapfrog. Both channel sampling and drilling have been used to develop these models. SRK reviewed the wireframes collaboratively with Corona personnel and noted that it appears to be a reasonable representation of the polymetallic sulfide mineralization as logged and sampled in this area. An example of these models is shown in Figure 14-7.



Source: Sierra Metals, 2019

Figure 14-7: Cachi-Cachi Mineralized Models

14.2.6 Cuerpos Pequeños

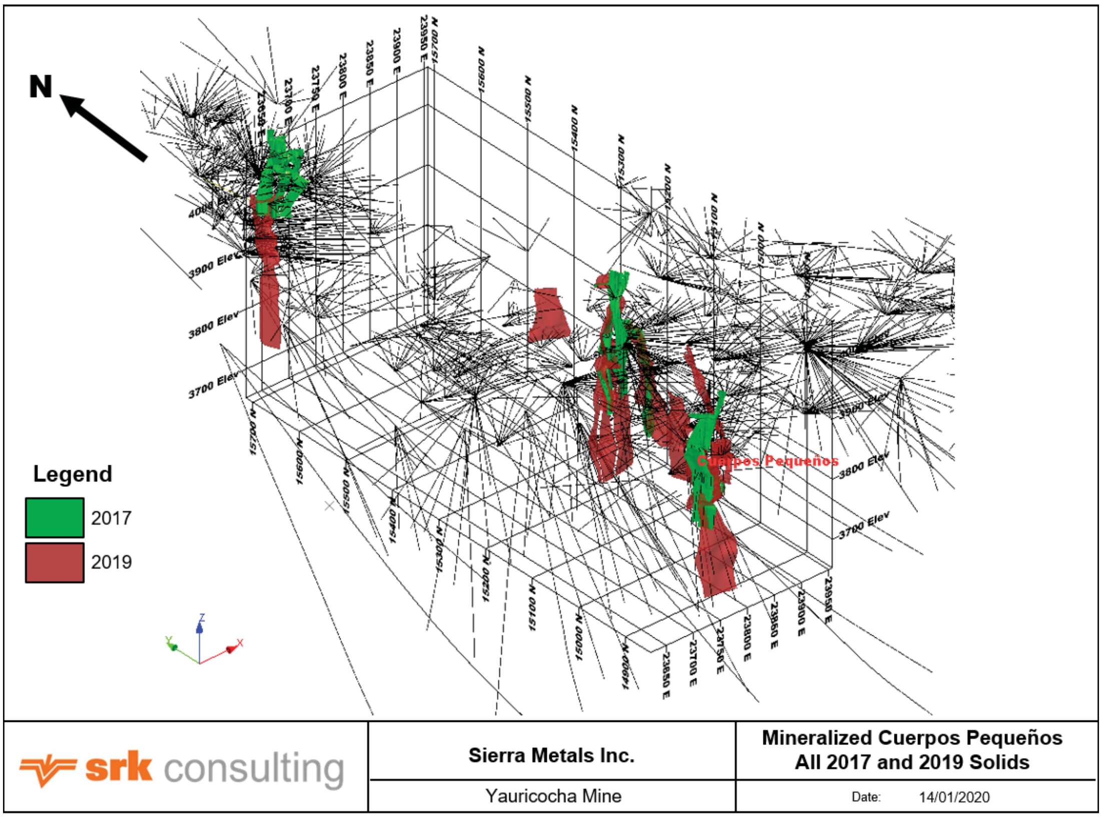
The geology models for the Cuerpos Pequeños has been constructed by Corona site geologists. These models are based on cross-sectional and level mapping as well as the drilling and channel sampling. Models generally encompass small chimney-shaped massive sulfide mineralization, which are considered discrete mineralized bodies with unique morphologies and mineralization (Figure 14-8).

The models included the following:

- Butz (mined-out);

- Contacto Oriental;
- Contacto Occidental;
- Contacto Occidental Oxide (not estimated or mined);
- Contacto Sur Medio (TJ6060);
- Contacto Sur Medio I (TJ8167);
- Contacto Sur Medio II (TJ1590); and
- Gallito.

An example of these models is shown in Figure 14.8.



Source SRK 2019

Figure 14-8: Cuerpos Pequeños Mineralized Models

The mineralization is domained using a variety of geometries and orientations, which are generally steeply-dipping. Models wireframes are implicitly modeled in Leapfrog. Both channel sampling and drilling have been used to develop these models. SRK reviewed the wireframes collaboratively with Corona personnel and noted that it appears to be a reasonable representation of the polymetallic sulfide mineralization as logged and sampled in this area.

The unpredictable nature of the orebodies and the exploration methodology used to delineate them makes for some uncertainty in the interpretation of the bodies, as they have been demonstrated to pinch and swell dramatically over short distances. Although an important source of Mineral Resources and production, these are not relied upon to the same degree as more massive bodies, such as Mina Central and Esperanza. SRK notes that there are several of the Cuerpo Pequeños-type orebodies that have not been modeled or estimated as a part of this report. However, which may have been included in previous reports and includes mineralization, which is currently or has been selectively mined in the past. This has historically made modeling and estimation of the smaller orebodies a distinct challenge, as the mineralization is often significantly or completely depleted through mining between the bi-annual modeling process.

14.2.7 Geology Model as Resource Domains

SRK considered the geology models to be hard boundaries, with respect to the resource estimation methods. However, for the purposes of exploratory data analysis, SRK grouped selected areas based on their geography or mineralogical relationships to ensure that the populations of data were sufficient to make informed decisions regarding compositing, capping, and variography.

For exploratory data analysis, SRK began with reviewing the sample distributions and mean grades for data within each local mineralization area. Based on the review of each local area, SRK elected to use each geologic domain (or subdomain) as a hard boundary to prevent estimation bias between adjacent smaller mineralized envelopes, which was evident from interim resource models produced by Corona resource geologists in 2018. The individual domains were grouped based on a combination of factors including proximity, relative data populations, and mineralization style. The length weighted means for the respective domains are shown below in Table 14-1, as well as the nomenclature and coding for the respective main domains shown in Table 14-2.

Table 14-1: Mean Grades per Mineralized Zone

AREA	Model Prefix	Details	Number of Samples	AG (ppm)	PB (%)	CU (%)	ZN (%)	AU (ppm)	AS (%)	FE (%)
Mina Central	ASO	Antacaca Sur Oxidos	951	152.05	1.75	0.51	1.21	1.23	0.33	30.58
Mina Central	MINAC	Catas / Rosaura / Antacaca Sur Polimetalico / Antacaca	16,379	51.84	0.76	0.95	2.93	0.70	0.14	28.41
Mascota	MAPE	Mascota Polymetallic East	400	113.17	1.68	0.99	9.48	0.68	0.13	26.42
Mascota	MAPN	Mascota Polymetallic North	324	231.85	13.35	0.43	25.48	0.55	0.08	12.1
Mascota	MAPS	Mascota Polymetallic South / Mascota Polymetallic (South) East	329	82.87	0.42	0.38	6.41	0.50	0.10	26.56
Mascota	MAS	Mascota Sur Oxide Cu	143	3.81	0.11	5.18	17.01	0.03	0.16	19.73
Mascota	MOX	Mascota Oxide Cu Pb-Ag	3,869	269.56	8.85	2.72	2.06	1.94	0.28	21.11
Esperanza	ESP	Esperanza	5,778	91.62	1.28	3.35	3.21	0.78	0.42	31.02
Esperanza	ESPBX	Esperanza Breccia 3	53	85.94	3.05	0.41	9.02	0.18	0.07	10.47
Esperanza	ESPD	Esperanza Distal	348	91.48	8.24	0.37	18.00	0.36	0.13	16.2
Esperanza	ESPN	Esperanza Norte	941	94.8	3.11	1.6	7.07	0.73	0.76	26.89
Cuye	CUYE	Cuye	774	34.56	0.21	1.6	1.93	0.68	0.16	29.07
Cuerpos Pequeños	BUT	Butz	229	79.44	1.92	0.27	5.94	0.33	0.06	12.13
Cuerpos Pequeños	COC	Contacto Occidental	362	162.17	4.10	0.25	13.58	0.57	0.08	17.66
Cuerpos Pequeños	COR	Contacto Oriental	589	152.38	3.10	0.77	13.94	0.54	0.55	19.12
Cuerpos Pequeños	CSM	Contacto Sur Medio (TJ 6060)	274	452.68	16.90	0.25	17.76	0.68	0.07	11.59
Cuerpos Pequeños	CSMI	Contacto Sur Medio I (TJ8167)	371	335.3	20.33	0.15	25.43	0.17	0.05	7.71
Cuerpos Pequeños	CSMII	Contacto Sur Medio II (TJ1590)	736	351.81	11.31	0.21	13.64	0.46	0.25	14.35
Cuerpos Pequeños	GAL	Gallito	324	94.33	4.06	1.71	13.45	0.41	0.33	24.36
Cachi-Cachi	ANG	Angelita	2,368	11.82	0.20	0.50	5.68	0.29	0.11	30.04
Cachi-Cachi	CAR	Carmencita	94	93.64	1.30	0.20	6.90	1.04	0.17	24.88
Cachi-Cachi	CEL	Celia	383	25.07	0.42	0.56	3.59	0.43	0.75	26.47
Cachi-Cachi	ELI	Elissa	1,004	110.14	2.39	0.19	10.05	0.36	0.30	20.53
Cachi-Cachi	ESC	Escondida	618	93.13	3.06	0.32	7.38	0.65	0.13	28.30
Cachi-Cachi	KAR	Karlita	1,496	92.47	1.51	0.82	5.68	0.72	0.22	30.67
Cachi-Cachi	PVT	Privatizadora	203	63.51	2.24	0.12	6.62	0.57	0.12	27.63
Cachi-Cachi	VAN	Vanessa	200	93.26	4.00	0.25	14.35	0.64	0.12	21.01
Cachi-Cachi	YOS	Yoselim	195	140.54	4.05	0.13	9.28	1.05	0.6	23.82

Table 14-2: Summary of Main Resource Domains in Geologic Models

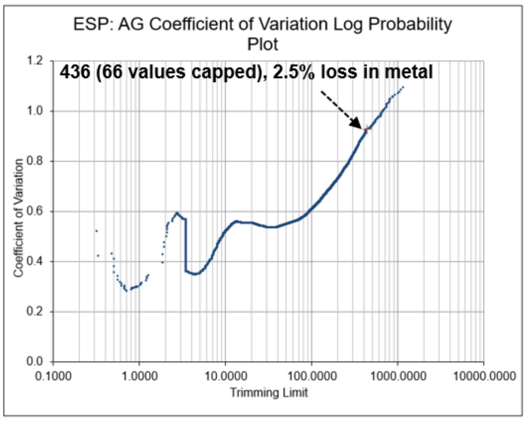
Area	Model Prefix	Domain Description
Mina Central	MINAC	Mina Central
	ASO	Antacaca Sur Oxidos
Esperanza	ESP	Esperanza
	ESPBX	Esperanza Breccia 3
	ESPD	Esperanza Distal
	ESPN	Esperanza Norte
Mascota	MAS	Mascota Sur Oxide Cu
	MAPN	Mascota Polymetallic North
	MAPE	Mascota Polymetallic East
	MAPS	Mascota Polymetallic South / South (East)
	MOX	Mascota Oxide Pb-Ag / Cu
Cuye	CUYE	Cuye
Cuerpos Pequños	COR	Contacto Oriental
	COC	Contacto Occidental
	CSM	Contacto Sur Medio (TJ6060)
	CSMI	Contacto Sur Medio I (TJ8167)
	CSMII	Contacto Sur Medio II (TJ1590)
Cachi-Cachi	ANG	Angelica
	CAR	Carmencita
	CEL	Celia
	ELI	Elissa
	ESC	Escondida
	KAR	Karlita
	PVT	Privatizadora
	VAN	Vanessa
	YOS	Yoselim

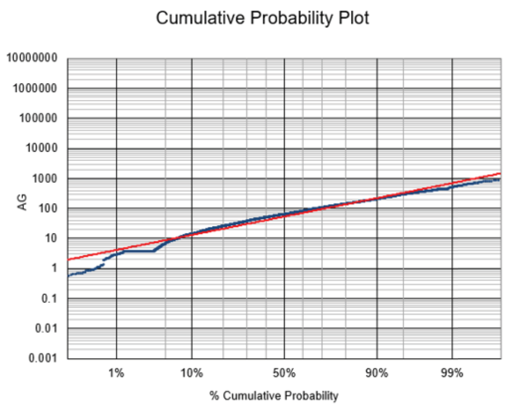
14.3 Assay Capping and Compositing

SRK conducted compositing and then capping for the drillhole and channel sampling databases supporting all the estimation domains.

14.3.1 Outliers

SRK reviewed the outliers for the original sample data in each area or domain using a combination of histograms, log probability plots, and descriptive statistics. Outliers are evaluated from the original, un-composited data, flagged by the 3D geologic model. An example of the log probability plot reviewed for Ag at Esperanza is shown in Figure 14-9.





Target Original	% Quantile From	To	No. of Samples	Mean Grade	Minimum Grade	Maximum Grade	Metal Content	% Metal
AG	0	10	579	7	0	13	3,882	1
AG	10	20	587	19	13	24	10,980	2
AG	20	30	585	29	24	35	17,112	3
AG	30	40	585	41	35	47	24,039	5
AG	40	50	585	54	47	60	31,296	6
AG	50	60	584	68	60	77	39,591	8
AG	60	70	583	89	77	100	51,762	10
AG	70	80	584	116	100	133	67,630	13
AG	80	90	582	158	133	194	91,932	18
AG	90	100	588	316	194	1,150	184,528	35
AG	90	91	58	200	194	205	11,520	2
AG	91	92	59	211	205	217	12,461	2
AG	92	93	58	225	217	231	12,987	2
AG	93	94	59	240	232	250	13,987	3
AG	94	95	59	262	251	272	15,360	3
AG	95	96	59	285	272	296	16,596	3
AG	96	97	59	314	296	330	18,334	4
AG	97	98	60	351	332	375	20,685	4
AG	98	99	58	412	375	479	23,932	5
AG	99	100	59	658	479	1,150	38,666	7
AG	0	100	5,842	90	0	1,150	522,753	100

Target Capped	% Quantile From	To	No. of Samples	Mean Grade	Minimum Grade	Maximum Grade	Metal Content	% Metal
AGC	0	10	579	7	0	13	3,882	1
AGC	10	20	587	19	13	24	10,980	2
AGC	20	30	585	29	24	35	17,112	3
AGC	30	40	585	41	35	47	24,039	5
AGC	40	50	585	54	47	60	31,296	6
AGC	50	60	584	68	60	77	39,591	8
AGC	60	70	583	89	77	100	51,762	10
AGC	70	80	584	116	100	133	67,630	13
AGC	80	90	582	158	133	194	91,932	18
AGC	90	100	588	293	194	436	171,255	34
AGC	90	91	58	200	194	205	11,520	2
AGC	91	92	59	211	205	217	12,461	2
AGC	92	93	58	225	217	231	12,987	3
AGC	93	94	59	240	232	250	13,987	3
AGC	94	95	59	262	251	272	15,360	3
AGC	95	96	59	285	272	296	16,596	3
AGC	96	97	59	314	296	330	18,334	4
AGC	97	98	60	351	332	375	20,685	4
AGC	98	99	58	409	375	436	23,628	5
AGC	99	100	59	436	436	436	25,697	5
AGC	0	100	5,842	87	0	436	509,480	100

srk consulting	Sierra Metals Inc.	Esperanza Ag Extreme value test
	Yauricocha Mine	Date: 14/01/2020

Source: SRK, 2019

Figure 14-9: Log Probability Plot for Capping Analysis – Esperanza Ag

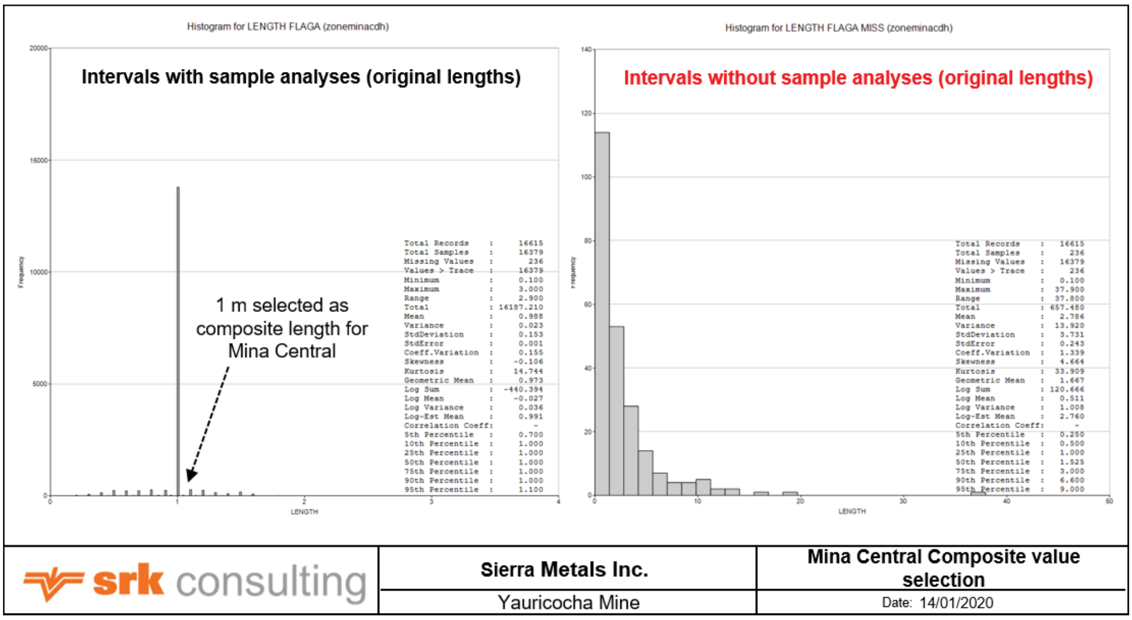
The capping value in this case lies between the 98-99th percentile range. This capping analysis reviewed the impact of the cap on several factors in the database, including total reduction in contained metal, percentage of samples capped, and reduction to the Coefficient of Variation (CV). All capping was completed after compositing. Capping limits assigned for each dominant volume per resource area estimated by SRK are shown in Table 14-3. Minor volumes may have different capping limits to prevent conditional bias in the resource estimate.

Table 14-3: Capping Limits for Dominant Volumes in Resource Areas

Area	Model Prefix	AGC (ppm)	PBC (%)	CUC (%)	ZNC (%)	AUC (ppm)	ASC (%)	FEC (%)
Esperanza	ESP	436.00	16.00	24.60	30.00	10.00	5.40	-
Cachi-Cachi	ANG	317.30	6.72	4.06	23.05	1.96	0.68	-
Esperanza	ESPN	450.70	-	29.30	-	7.43	5.00	-
Cuerpos Pequeños	GAL	409.71	17.23	10.63	-	1.57	1.91	41.56
Cachi-Cachi	KAR	894.60	19.33	7.55	-	5.76	1.48	-
Mascota	MAPE	446.90	14.20	11.10	-	3.82	0.58	-
Mascota	MAPN	424.50	30.75	-	42.80	0.88	0.15	31.40
Mascota	MAPS	145.90	0.87	1.29	-	0.76	0.19	-
Mascota	MAS	5.96	0.20	12.73	-	0.05	0.41	29.20
Mina Central	MINAC	850.00	21.60	14.40	35	16.20	2.10	64.00
Mascota	MOX	1,991.40	59.70	5.04	14.50	22.9	2.48	-
Cachi-Cachi	PVT	196.8	12.50	1.86	22.3	2.12	0.35	-
Cachi-Cachi	VAN	213.25	15.60	0.73	-	2.13	0.35	-
Cachi-Cachi	YOS	437.50	11.62	0.67	23.85	3.03	2.37	-
Mina Central	ASO	687.00	5.08	1.80	8.54	7.40	1.04	-
Cuerpos Pequeños	BUT	262.30	8.42	1.00	12.43	1.13	0.28	-
Cachi-Cachi	CAR	254.80	3.72	0.63	15.90	2.43	0.46	-
Cachi-Cachi	CEL	113.11	4.30	3.10	19.16	2.44	2.50	-
Cuerpos Pequeños	COC	656.22	12.61	1.21	39.90	2.37	0.21	-
Cuerpos Pequeños	COR	949.00	20.30	5.67	-	6.82	2.08	-
Cuerpos Pequeños	CSM	948.40	32.40	0.87	-	1.70	0.22	-
Cuerpos Pequeños	CSMI	606.60	-	0.35	42.95	0.68	-	22.30
Cuerpos Pequeños	CSMII	711.40	27.12	0.77	28.52	-	1.84	-
Cuye	CUYE	260.70	4.10	8.8	18.00	4.67	1.21	-
Cachi-Cachi	ELI	790.30	13.03	3.36	-	2.72	1.59	-
Cachi-Cachi	ESC	851.30	-	9.36	-	3.63	-	-
Esperanza	ESPBX	150.10	7.00	1.30	25.40	0.49	0.12	22.8
Esperanza	ESPD	-	23.90	2.30	-	1.16	0.61	-

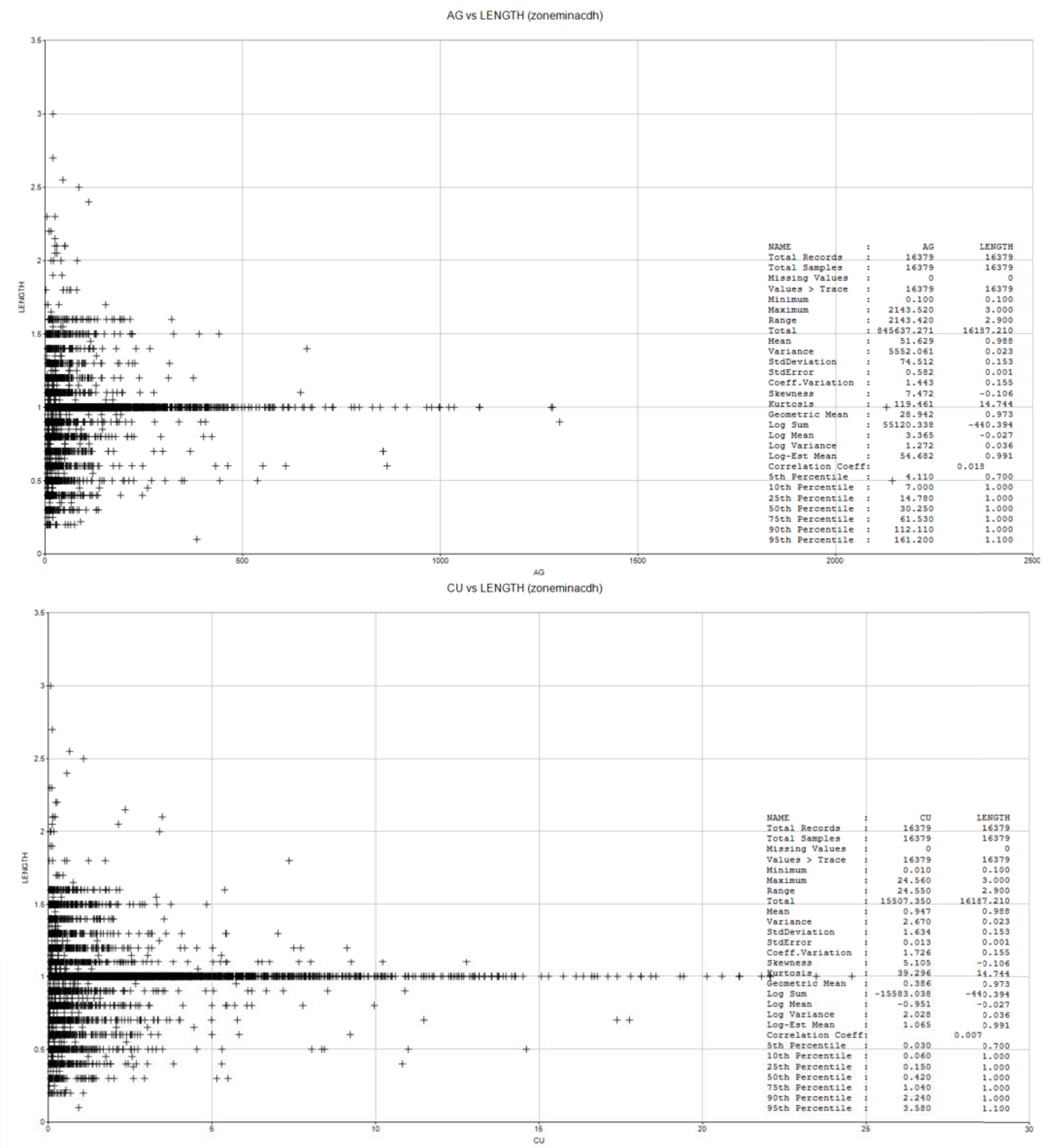
14.3.2 Compositing

SRK composited the raw sample data within the geologic wireframes using standard run lengths. These composite lengths vary between various areas, but the analysis is the same to ensure that the composites are representative of the Selective Mining Unit (SMU) and minimize variance at the scale of the estimation. The compositing analysis generally features a review of the variable sample lengths in a histogram as well as review of the sample lengths vs. grade scatter plots (Figure 14-10 and Figure 14-11) to ensure that there are not material populations of high grade samples above the nominal composite length. Composite lengths for each area are summarized in Table 14-4. All intervals without values were populated with trace values as only mineralized material is sampled by the mine geological staff. However, one exception to this was the arsenic and iron value, which were left blank. Arsenic is regarded as a deleterious element and iron is an integral part of the density relationship and is generally higher in mineralized zones. Initially a mean value was considered rather than allowing the estimate to establish a value. However, estimation artifacts resulted, hence the missing value route was taken for these arsenic and iron. Minor composite lengths were restricted in the compositing process by selecting MODE=1 in the Datamine's COMPDH process.



Source: SRK, 2019

Figure 14-10: Sample Length Histogram – Mina Central



srk consulting	Sierra Metals Inc.	Mina Central Length / Grade Bias Analysis for Ag (ppm) and Cu (%)
	Yauricocha Mine	Date: 14/01/2020

Source: SRK, 2019

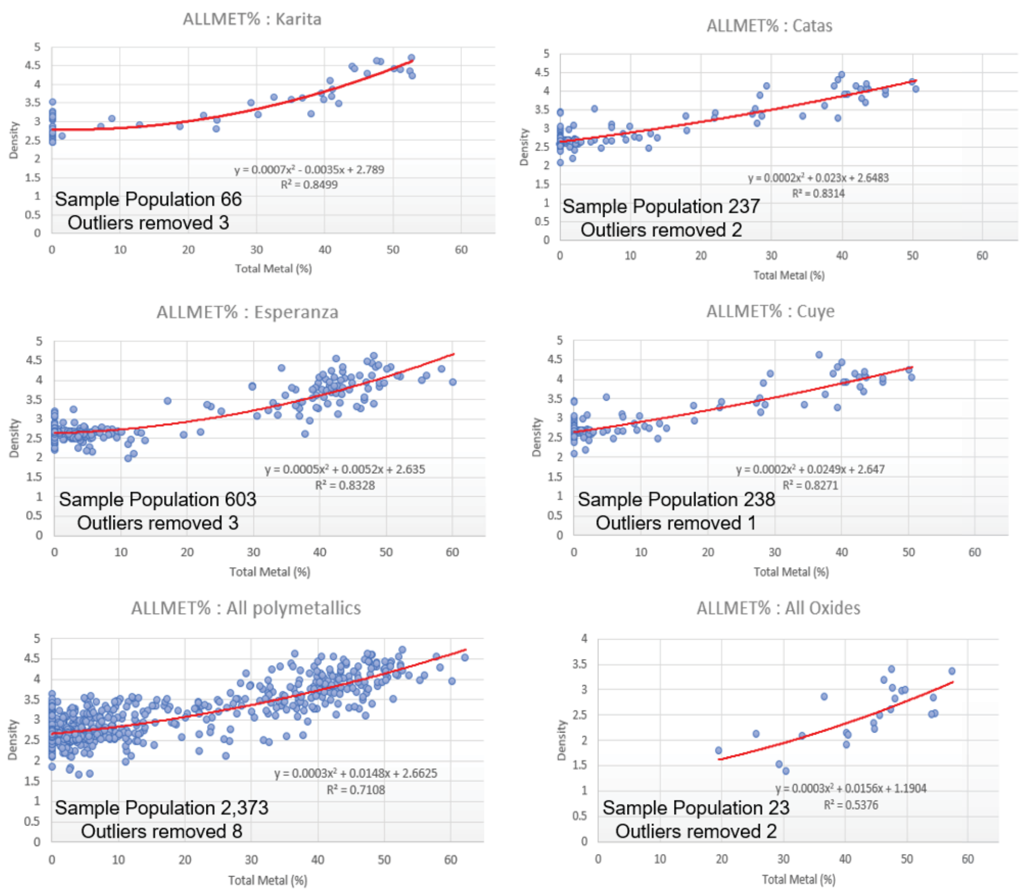
Figure 14-11: Length vs. Ag and Cu Plot – Mina Central

Table 14-4: Composite Statistics

Area	Model Prefix	Composite Length (m)	Minimum (m)	Mean (m)	Maximum (m)
Mina Central	ASO	1	0.50	0.99	1.10
Mina Central	MINAC	1	0.40	1.00	1.40
Mascota	MAPE	1	0.75	0.99	1.50
Mascota	MAPN	2	1.00	1.92	2.90
Mascota	MAPS	1	0.83	1.00	1.20
Mascota	MAS	1	0.80	0.99	1.30
Mascota	MOX	1	0.50	1.00	1.40
Esperanza	ESP	1	0.40	1.00	1.45
Esperanza	ESPBX	1	0.45	1.01	1.30
Esperanza	ESPD	1	0.83	1.00	1.25
Esperanza	ESPN	1	0.70	1.00	1.30
Cuye	CUYE	1	0.90	1.00	1.40
Cuerpos Pequeños	BUT	2	0.40	1.93	2.90
Cuerpos Pequeños	COC	1	0.30	0.96	1.50
Cuerpos Pequeños	COR	2	0.40	1.95	2.90
Cuerpos Pequeños	CSM	2	0.50	1.89	2.90
Cuerpos Pequeños	CSMI	2	0.40	1.88	3.00
Cuerpos Pequeños	CSMII	2	0.60	1.96	3.00
Cuerpos Pequeños	GAL	2	0.30	1.83	2.90
Cachi-Cachi	ANG	1	0.40	1.00	1.40
Cachi-Cachi	CAR	1	0.90	1.01	1.40
Cachi-Cachi	CEL	1	0.55	0.99	1.40
Cachi-Cachi	ELI	2	0.36	1.91	3.00
Cachi-Cachi	ESC	1	0.75	0.98	1.40
Cachi-Cachi	KAR	1	0.14	0.99	1.45
Cachi-Cachi	PVT	1	0.60	0.99	1.30
Cachi-Cachi	VAN	2	0.70	1.83	3.00
Cachi-Cachi	YOS	2	0.30	1.99	2.90

14.4 Density

Density determinations are based on bulk density measurements taken from representative core samples or grab samples in each area. The volume displacement method is utilized to establish the density of a sample. Historically, mine personnel assigned single bulk density to each mineralized area. However, this is an invalid assumption for mineral resources in polymetallic mineralization styles, as the density varies substantially from lower to higher grade metal content areas. The effect of applying a single density per mineralization zone based on current mining results, bias the overall tonnage to that respective metal content. Whereas, the grades vary significantly throughout the mineralized zones, substantiated by measurements taken on the mine site, as requested by SRK. SRK produced regression analyses of density versus total accumulated content i.e. silver, lead, copper, zinc, gold, arsenic and iron versus for specific mineralization styles and areas (Figure 14-12). A generalized polymetallic regression was utilized for polymetallic mineralization that did not have a statistical representative density population of samples. Unfortunately, the relationship was not representative with respect to the oxide mineralization. All regressions were limited to a maximum content of 55% as the predicated value deviates substantially after this point. Global values as supplied by Corona personnel, where applied to MAS (3.555), MOX (3.162) and ASO (3.162) respectively.

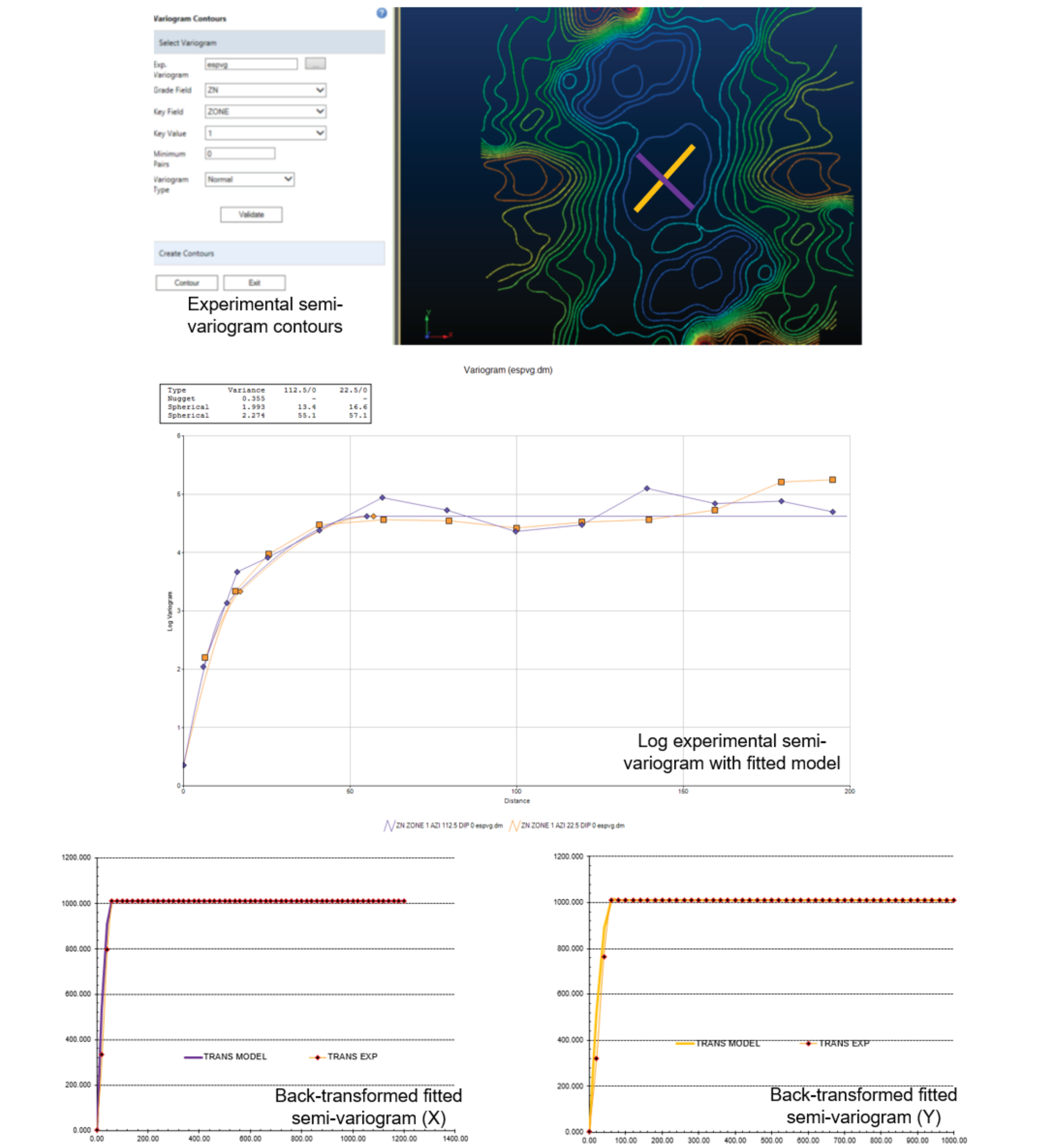


srk consulting	Sierra Metals Inc.	Density Regressions
	Yauricocha Mine	Date: 14/01/2020

Figure 14-12: Total Metal Content Versus Density Regressions

14.5 Variogram Analysis and Modeling

SRK conducted detailed variogram analysis to assess orientations and ranges of continuity within the orebodies. Directional variograms were calculated for the primary mineralization areas of Mina Central and Mascota, as the quantities of data and orientations of the orebodies are well-understood. Directional variograms defining an ellipsoid resulted in 3D continuity models for each element. In all cases, appropriate nugget effects were determined from downhole variograms then utilized in the directional variograms. A linear model of coregionalization was maintained for each continuity model, and the three variograms were plotted on a single graph to define the shape of the ellipsoid. The ellipsoids were reviewed against the data distribution to ensure reasonableness and consistency. The continuity parameters derived from the directional variography in each area and for each metal are used in the Ordinary kriging estimation process. A total of 183 variograms were modeled between SRK and Minera Corona staff. Table 14-5 details a subset of modeled variogram model as examples from Esperanza, Cuye and Mina central mineralized domains. In certain instances, log variograms were modeled and back transformed for estimation purposes (Figure 14-13). All variograms were normalized to allow estimation within sub-domains solids.



	Variance	Meters
Nugget	0.004	
C1	0.010	13.4
C2	0.986	55.1

Normalized Back-transformed fitted semi-variogram

	Variance	Meters
Nugget	0.004	
C1	0.010	16.6
C2	0.986	57.1

srk consulting | **Sierra Metals Inc.** | **Esperanza Zn semi-variogram**

Yauricocha Mine | Date: 14/01/2020

Figure 14-13: Example of modelling a log semi-variogram – Esperanza Zn (%)

Table 14-5: Datamine Normalized Modeled Semi-Variogram Examples

Model Prefix	VDESC	VREFNUM	VANGLE1	VANGLE2	VANGLE3	VAXIS1	VAXIS2	VAXIS3	NUGGET	ST1	ST1PAR1	ST1PAR2	ST1PAR3	ST1PAR4	ST2	ST2PAR1	ST2PAR2	ST2PAR3	ST2PAR4	ST3	ST3PAR1	ST3PAR2	ST3PAR3	ST3PAR4
ESP	Ag Norm	1	47.3	65.5	-65.3	3	2	1	0.141	1	6.6	6.2	3.2	0.565	1	40.7	55.9	7.1	0.294	0	0.0	0.0	0.0	0.000
ESP	PB Norm	2	47.3	65.5	-65.3	3	2	1	0.011	1	10.7	13.1	9.3	0.008	1	53.6	62.0	17.8	0.981	0	0.0	0.0	0.0	0.000
ESP	Cu Norm	3	47.3	65.5	-65.3	3	2	1	0.067	1	11.8	9.8	6.4	0.057	1	42.3	69.2	20.0	0.876	0	0.0	0.0	0.0	0.000
ESP	Zn Norm	4	47.3	65.5	-65.3	3	2	1	0.004	1	13.4	16.6	11.6	0.010	1	55.1	57.1	21.6	0.986	0	0.0	0.0	0.0	0.000
ESP	Au Norm	5	-20.0	80.0	0.0	3	2	1	0.080	1	5.5	5.5	5.5	0.489	1	44.3	44.3	7.0	0.431	0	0.0	0.0	0.0	0.000
ESP	As Norm	6	47.3	65.5	-65.3	3	2	1	0.057	1	10.8	10.8	3.0	0.436	1	39.2	39.2	7.0	0.507	0	0.0	0.0	0.0	0.000
ESP	Fe Norm	7	60.1	44.1	-76.0	3	2	1	0.179	1	4.2	6.4	3.6	0.262	1	10.3	43.0	6.7	0.257	1	48.5	99.5	10.5	0.302
CUYE	AGC Norm	1	-30.0	90.0	0.0	3	2	1	0.112	1	9.7	9.7	4.9	0.195	1	24.3	24.3	13.0	0.132	1	67.1	67.1	23.6	0.561
CUYE	PBC Norm	2	-30.0	90.0	0.0	3	2	1	0.100	1	7.8	7.8	4.0	0.542	1	24.5	24.5	8.2	0.358	0				
CUYE	CUC Norm	3	-30.0	90.0	0.0	3	2	1	0.302	1	10.3	10.3	7.0	0.353	1	28.6	28.6	15.6	0.172	1	73.3	73.3	23.9	0.173
CUYE	ZNC Norm	4	-30.0	90.0	0.0	3	2	1	0.003	1	12.4	12.4	10.6	0.116	1	35.5	35.5	25.4	0.881	0				
CUYE	AUC Norm	5	60.0	-22.5	90.0	3	2	1	0.125	1	6.6	7.8	2.9	0.230	1	20.7	36.9	7.5	0.645	0				
CUYE	ASC Norm	6	-30.0	90.0	0.0	3	2	1	0.173	1	3.4	3.4	3.0	0.272	1	18.5	18.5	6.7	0.201	1	32.4	32.4	9.8	0.354
CUYE	FEC Norm	7	-30.0	90.0	0.0	3	2	1	0.070	1	7.4	7.4	5.0	0.330	1	23.1	23.1	10.2	0.232	1	50.5	50.5	15.7	0.368
MINAC	AGC Norm	1	60.0	-67.5	90.0	3	2	1	0.167	1	9.5	4.7	5.0	0.338	1	20.7	15.4	7.0	0.261	1	23.9	52.1	12.0	0.234
MINAC	PBC Norm	2	60.0	-45.0	90.0	3	2	1	0.049	1	9.3	5.6	6.0	0.317	1	43.8	29.9	7.0	0.178	1	53.3	66.6	12.0	0.456
MINAC	CUC Norm	3	-30.0	-90.0	0.0	3	2	1	0.037	1	9.5	6.1	5.0	0.409	1	33.3	15.8	6.0	0.216	1	36.0	61.5	13.0	0.338
MINAC	ZNC Norm	4	60.0	-22.5	90.0	3	2	1	0.014	1	3.5	6.9	6.0	0.161	1	19.5	20.1	8.0	0.354	1	45.1	51.6	16.0	0.471
MINAC	AUC Norm	5	-30.0	-90.0	0.0	3	2	1	0.059	1	2.2	7.6	4.0	0.140	1	8.0	14.5	11.0	0.216	1	30.3	66.5	14.0	0.585
MINAC	ASC Norm	6	-30.0	-90.0	0.0	3	2	1	0.061	1	7.3	7.3	2.0	0.340	1	35.5	35.5	10.0	0.263	1	56.4	56.4	16.0	56.400
MINAC	FEC Norm	7	-30.0	-90.0	0.0	3	2	1	0.120	1	5.6	5.6	2.5	0.482	1	27.0	27.0	6.5	0.315	1	68.3	68.3	16.0	0.083

14.6 Block Model

Block models were generated by SRK in Datamine Studio RM™. Sub-blocking was utilized to approximate geologic contacts. Rotated block models were generated to assist in the mine planning process where mineralization solids crossed the orthogonal grid obliquely, facilitating less dilution in the stope optimization studies.

Blocks were flagged by mineralization area and domain. Details for the block models are summarized in Table 14-6.

Table 14-6: Block Model Parameters

Model Prefix	X (m) Parent	Y (m) Parent	Z (m) Parent	Range X (m)	Range Y (m)	Range Z (m)	Origin X (Local m)	Origin Y (Local m)	Origin Z (Local m)	Rotation ° (Datamine)	Rotation Axis (Datamine)
ANG	4	4	4	88	164	164	24,059	16,549	4,038	45	Z
ASO	4	4	4	72	204	292	24,227	14,640	3,827	-30	Z
BUT	2	2	2	38	72	104	23,827	15,246	3,873	-55	Z
CAR	2	2	2	82	44	78	23,805	16,450	3,939	-	Z
CEL	4	4	4	64	80	148	24,122	16,561	4,055	-50	Z
COC	2	2	2	106	66	378	23,786	15,137	3,683	-	Z
COR	2	2	2	72	84	232	23,892	15,168	3,682	-	Z
CSM	2	2	2	84	74	496	23,750	14,927	3,819	34	Z
CSMII	2	2	2	56	48	172	23,789	14,967	3,773	-21	Z
CSMI	2	2	2	76	86	300	23,777	14,828	3,648	-53	Z
CUYE	4	4	4	288	252	416	23,660	15,288	3,366	-	Z
ELI	2	2	2	40	136	302	23,838	16,504	3,850	50	Z
ESC	2	2	2	82	82	222	23,756	16,380	3,849	-	Z
ESP	4	4	4	180	448	532	23,716	15,431	3,602	-20	Z
ESPBX	2	2	2	64	48	268	23,656	15,666	3,884	0	Z
ESPD	4	4	4	52	84	144	23,670	15,648	3,824	-40	Z
ESPN	4	4	4	92	76	256	23,646	15,792	3,834	-30	Z
GAL	2	2	2	34	72	260	23,617	15,650	3,752	-	Z
KAR	2	2	2	86	124	198	24,002	16,589	3,964	34	Z
MAPE	2	2	2	76	96	356	23,755	15,319	3,524	-40	Z
MAPN	2	2	2	56	96	316	23,690	15,370	3,596	-30	Z
MAPS	2	2	2	92	96	228	23,838	15,286	3,618	-70	Z
MAS	2	2	2	40	52	78	23,721	15,297	3,697	28	Z
MINAC	4	4	4	180	768	832	24,194	14,640	3,346	-31	Z
MOX	4	4	4	92	152	520	23,750	15,298	3,645	-50	Z
PVT	2	2	2	54	152	158	23,682	16,323	3,841	55	Z
VAN	2	2	2	62	92	192	23,943	16,603	3,955	70	Z
YOS	2	2	2	46	106	174	23,683	16,349	3,841	45	Z

Source: SRK, 2019

14.7 Estimation Methodology

SRK utilized either Ordinary kriging (OK) or Inverse Distance to the Power 2 weighting (ID) to interpolate grade in all resource areas. The decision on the estimation type to use was based on the confidence of the geologist in the ability of the variography to reflect the continuity of grade within the mineralized body, as well as the need for some measure of declustering based on data spacing. In some cases where mineralized bodies could not be related to those with reasonable variograms, an Inverse Distance method was utilized. The estimation type and sample selection criteria were chosen to achieve a reasonably reliable local estimation of grade that does not bias the global resource estimation. SRK generally utilized the geology models as hard boundaries in the estimation and estimated blocks within these boundaries using the capped composites in the same boundaries. Ranges for interpolation were derived from omni-directional variogram analysis or continuity assumptions from site geologists based on underground mining observations. All estimations utilized both channel and drillhole samples. SRK utilized three nested estimation passes for each domain. Dynamic Anisotropy (DA) was utilized for several estimates as a static search orientation did not produce representative estimates. The search parameters where optimized in the larger mineralized areas by completing a Qualitative Kriging Neighborhood Analysis (QKNA). The search parameters where focused on the major NSR contributing element for any mineralized zone. Samples where limited per channel/drillhole source (MAXKEY). Additional estimates were completed for cross validation purposes. These included, Nearest Neighbor (NN), Arithmetic Mean (AV) and Inverse Distance to the Power 2. The kriging efficiency and the geostatistical RSlope values were calculated per Ordinary kriged estimate. Relevant details for specific areas are summarized below, and the complete estimation parameters are summarized in Table 14-7.

Table 14-7: Estimation Parameters

Model Prefix	Classifier	SDESC	SREFNUM	METHOD	X	Y	Z	ANGLE1	ANGLE2	ANGLE3	AXIS1	AXIS2	AXIS3	PASS 1		PASS 2			PASS 3			MAXKEY
					SDIST1	SDIST2	SDIST3							MIN	MAX	FACTOR	MIN	MAX	FACTOR	MIN	MAX	
ANG	ZNOK	ZN	4	DA	20	20	6	Variable	Variable	Variable	Variable	Variable	Variable	5	15	2	3	15	3	3	10	2
ASO	AGOK	AG	1	STATIC	20	20	8	-30	-80	0	3	2	1	5	15	2	3	15	3	3	10	2
BUT	ZNOK	ZN	4	STATIC	10	10	5	120	80	0	3	2	1	5	15	2	3	15	3	3	10	2
CEL	ZNOK	ZN	4	DA	15	15	5	Variable	Variable	Variable	Variable	Variable	Variable	5	15	2	3	15	3	3	10	2
COC	ZNOK	ZN	4	DA	25	25	6	Variable	Variable	Variable	Variable	Variable	Variable	5	15	2	3	15	3	3	10	2
COR	ZNOK	ZN	4	STATIC	15	15	8	48.7	-78.83	63.26	3	2	1	5	15	2	3	15	3	3	10	2
CAR	ZNID	ZN	4	DA	12.5	12.5	7.5	Variable	Variable	Variable	Variable	Variable	Variable	3	10	2	3	10	5	2	5	0
CSMII	ZNOK	ZN	4	STATIC	20	20	6	Variable	Variable	Variable	Variable	Variable	Variable	5	15	2	3	15	3	3	10	2
CSMI	ZNOK	ZN	4	STATIC	15	15	5	-35	-75	0	3	2	1	5	15	2	3	15	3	3	10	2
CSM	ZNOK	ZN	4	STATIC	15	15	5	50	-80	0	3	2	1	5	15	2	3	15	3	3	10	2
CUYE	CUOK	CU	3	DA	25	25	15	Variable	Variable	Variable	Variable	Variable	Variable	5	15	2	3	15	4	3	10	2
ELI	ZNOK	ZN	4	DA	20	20	6	Variable	Variable	Variable	Variable	Variable	Variable	5	15	2	3	15	3	3	10	2
ESC	ZNOK	ZN	4	DA	25	25	6	Variable	Variable	Variable	Variable	Variable	Variable	5	15	2	3	15	3	3	10	2
ESPD	ZNOK	ZN	4	STATIC	12.5	12.5	7.5	-40	-74	0	3	2	1	5	10	2	3	10	4	3	10	2
ESPN	ZNOK	ZN	4	STATIC	25	25	15	-30	70	0	3	2	1	5	10	2	3	10	4	3	10	2
ESP	CUOK	CU	3	STATIC	25	25	10	-20	80	0	3	2	1	5	15	2	3	15	4	3	10	2
ESPBX	ZNID	ZN	4	DA	12.5	12.5	7.5	Variable	Variable	Variable	Variable	Variable	Variable	3	10	2	3	10	5	2	5	0
GAL	ZNOK	ZN	4	STATIC	15	15	5	0	-90	200	3	2	1	5	15	2	3	15	3	3	10	2
KAR	ZNOK	ZN	4	STATIC	20	20	8	-50	-40	90	3	2	1	5	15	2	3	15	3	3	10	2
MAPE	ZNOK	ZN	4	STATIC	20	20	6	140	-90	0	3	2	1	5	15	2	3	15	3	3	10	2
MAPN	ZNOK	ZN	4	STATIC	20	20	6	150	90	0	3	2	1	5	15	2	3	15	3	3	10	2
MAPS	ZNOK	ZN	4	STATIC	12.5	12.5	6	110	80	0	3	2	1	5	15	2	3	15	3	3	10	2
MAS	CUID	CU	3	STATIC	20	20	8	28	-90	0	3	2	1	5	10	2	3	10	3	3	10	2
MINAC	ZNOK	ZN	4	DA	25	25	15	Variable	Variable	Variable	Variable	Variable	Variable	5	15	2	3	15	4	3	10	2
MOX	PBOK	PB	2	STATIC	20	20	6	0	-90	210	3	2	1	5	15	2	3	15	3	3	10	2
PVT	ZNOK	ZN	4	DA	20	20	6	Variable	Variable	Variable	Variable	Variable	Variable	5	15	2	3	15	3	3	10	2
VAN	ZNOK	ZN	4	STATIC	10	10	5	250	80	0	3	2	1	5	15	2	3	15	3	3	10	2
YOS	ZNOK	ZN	4	STATIC	20	20	6	0	-90	-40	3	2	1	5	15	2	3	15	3	3	10	2

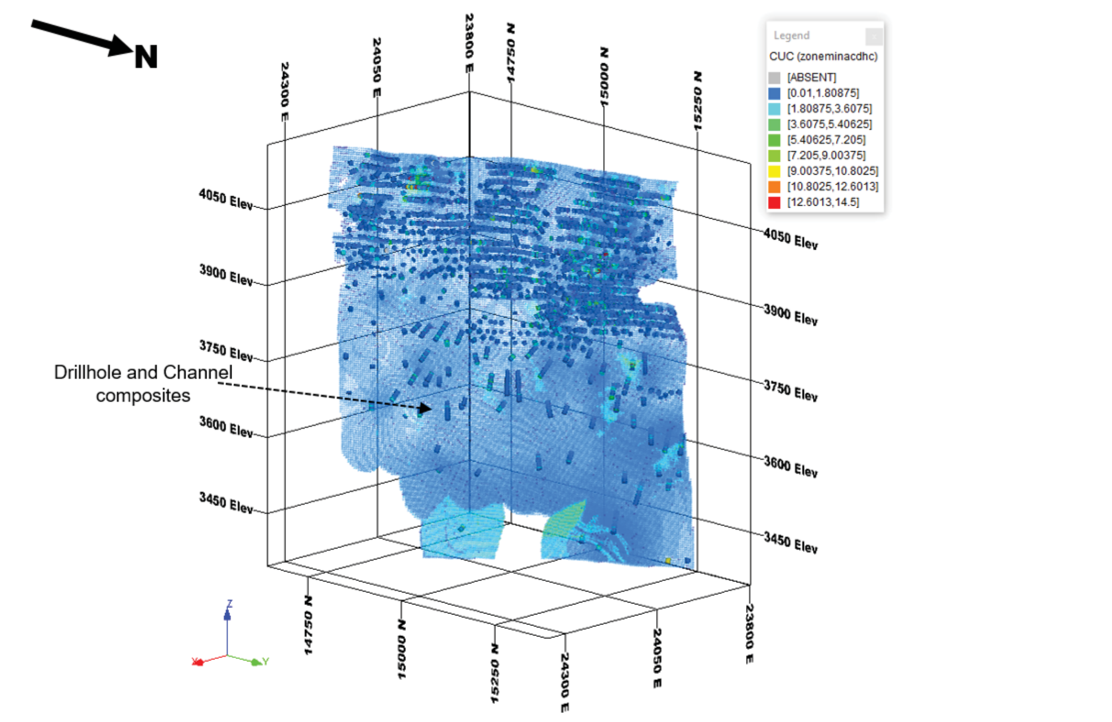
Source: SRK, 2019

14.8 Model Validation

All models have been validated utilizing visual and statistical measures to assess the probability of conditional bias in the estimation. Swath plots were also generated to validate the estimation. SRK is of the opinion that the validation of the models is sufficient for relying upon them as Mineral Resources. However, notes that the ultimate validation of the models is in the fact that the mine continuously produces material from the areas modeled and projected by the resource estimations. SRK notes that reconciliation of the production to the resource models is not a consistent part of the current validation methods but is under consideration by Sierra Metals for future models.

14.8.1 Visual Comparison

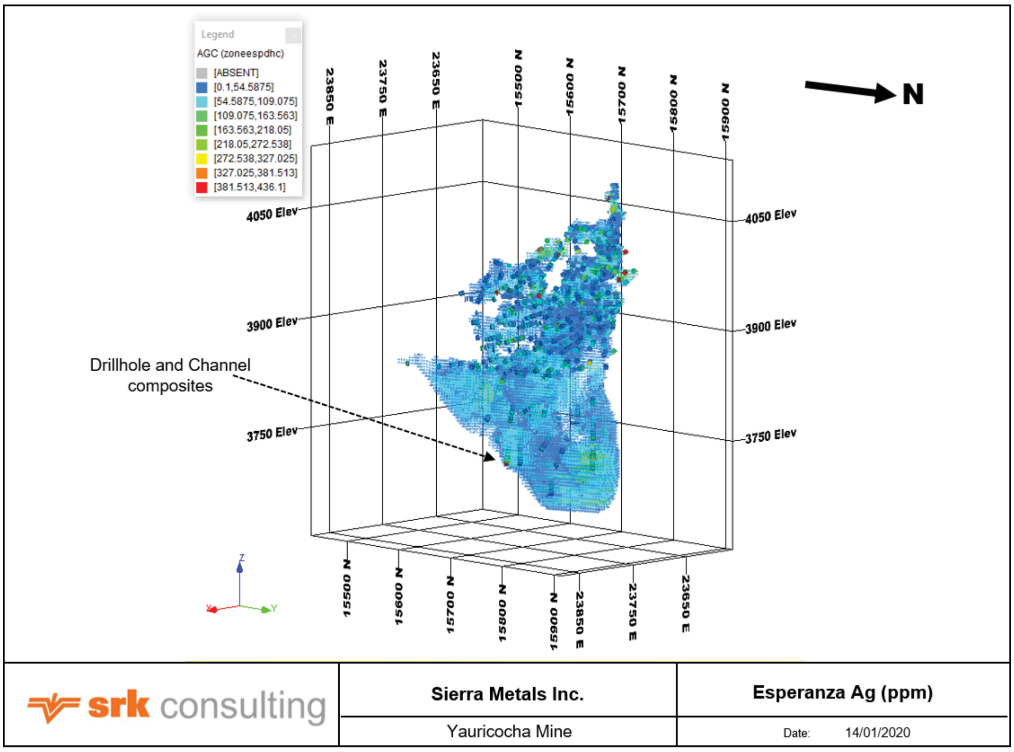
Both SRK and Minera Corona have conducted visual comparisons of the composite grades to the block grades in each model. In general, block grade distributions match well in level and cross-section views through the various orebodies. Some of these examples are shown in Figure 14-14 through Figure 14-16.



srk consulting	Sierra Metals Inc.	Mina Central Cu (%)
	Yauricocha Mine	Date: 14/01/2020

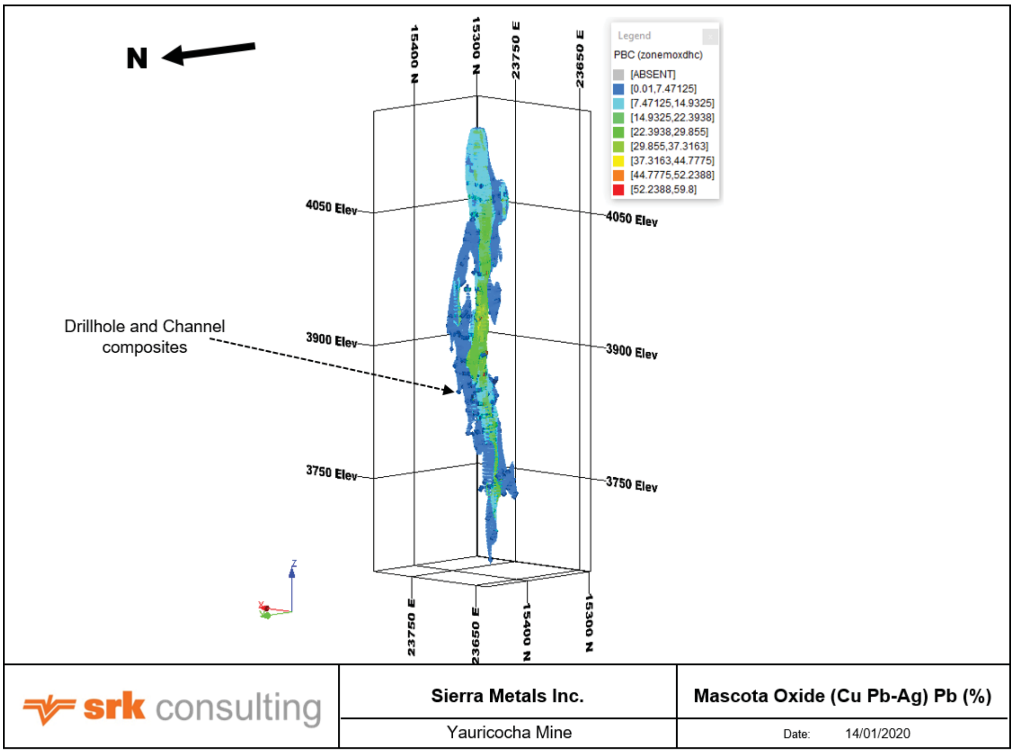
Source: SRK, 2019

Figure 14-14: Visual Block to Composite Comparison – Mina Central



Source: SRK, 2019

Figure 14-15: Visual Block to Composite Comparison - Esperanza



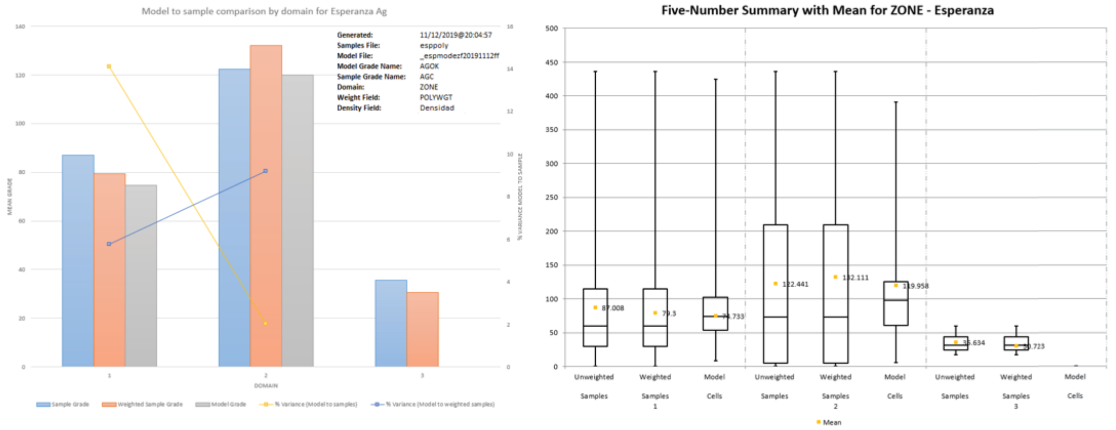
Source: SRK, 2019

Figure 14-16: Visual Block to Composite Comparison – Mascota

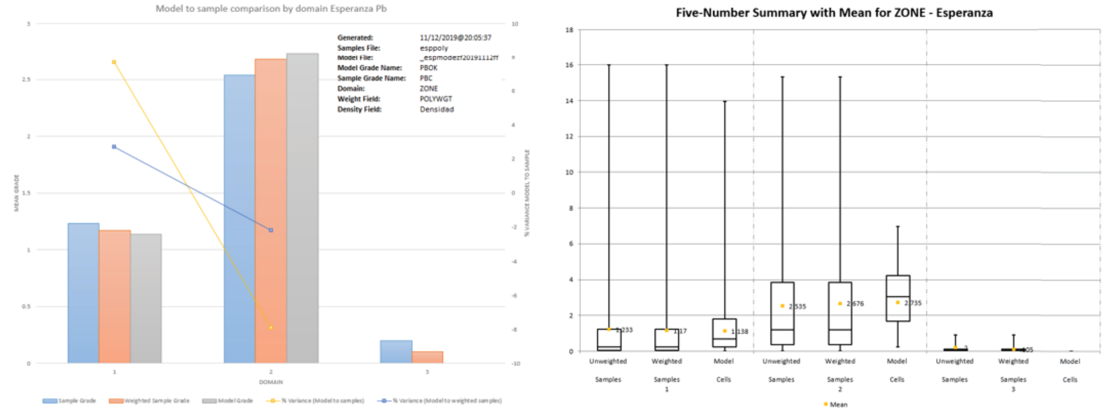
14.8.2 Comparative Statistics

SRK compared the estimated block grades to the composite grades utilized in the estimation, for the same zones and volumes to ensure that both are representative. SRK generally weighted the statistics by composite length or polygonal declustering with mineralized envelope constraints to weight for the composites, and by volume for the blocks. The results show that, in almost all cases, the blocks feature a lower or similar mean to the composite grades. An example of the estimate versus the composite statistics completed for Esperanza Ag (ppm) and Pb (%) are shown in Figure 14-17. These analyses were completed for all estimated values in all mineralized zones, to establish whether there was any over / under estimation. Where blocks locally exceed the composite grades, SRK notes that these appear to be limited occurrences, and generally the potentially over-estimated areas are in areas which have been mined previously or where very few samples occur within a respective mineralized envelope. An estimate should have a similar mean to the original composites. However, the estimates produce a smoothed result and the distribution of the estimated blocks will relative to the original composites will produce a narrower range histogram. This is evident from the box and whisker plots in Figure 14-17. SRK is of the opinion that these results show that there is reasonable agreement between the models and the supporting data, with low risk for global over-estimation.

ZONE AGOK / AGC	1			2			3		
	Unweighted Samples	Weighted Samples	Model Cells	Unweighted Samples	Weighted Samples	Model Cells	Unweighted Samples	Weighted Samples	Model Cells
No. of Records	5739	5739	336110	95	95	5913	8	8	-
No. of Samples	5739	5739	335992	95	95	5913	8	8	-
Minimum	0.1	0.1	8.44	0.5	0.5	5.56	17.68	17.68	-
Q1	29.48	29.48	53.47	4.65	4.65	60.51	24	24	-
Median	60	60	74.19	72.68	72.68	97.49	31.15	31.15	-
Q3	115.01	115.01	102.71	209.08	209.08	125.67	44.07	44.07	-
Maximum	436	436	424.49	436	436	391.23	59.9	59.9	-
Mean	87.01	79.3	74.73	122.44	132.11	119.96	35.63	30.72	-
Mean Diff v Model	12.28	4.57	-	2.48	12.15	-	-	-	-
%Mean Diff v Model	14.11	5.76	-	2.03	9.2	-	-	-	-
Std. Dev	84.5	82.28	37.02	136.69	131.32	75.78	13.29	13.12	-
Variance	7140.3	6769.79	1370.68	18683.09	17245.97	5742.21	176.5	172.2	-
%Coeff. Variation	97.12	103.76	49.54	111.63	99.4	63.17	37.28	42.71	-
MAD	56.75	56.75	30.94	105.94	105.94	50.27	10.84	10.84	-
Model Tonnes	-	-	4198345.1	-	-	19888.18	-	-	-



ZONE PBOK / PBC	1			2			3		
	Unweighted Samples	Weighted Samples	Model Cells	Unweighted Samples	Weighted Samples	Model Cells	Unweighted Samples	Weighted Samples	Model Cells
No. of Records	5739	5739	336110	95	95	5913	8	8	-
No. of Samples	5739	5739	336110	95	95	5913	8	8	-
Minimum	0.01	0.01	0.01	0.02	0.02	0.24	0.05	0.05	-
Q1	0.06	0.06	0.23	0.38	0.38	1.68	0.06	0.06	-
Median	0.23	0.23	0.7	1.18	1.18	3.05	0.09	0.09	-
Q3	1.22	1.22	1.81	3.84	3.84	4.22	0.12	0.12	-
Maximum	16	16	13.96	15.32	15.32	6.95	0.9	0.9	-
Mean	1.23	1.17	1.14	2.53	2.68	2.74	0.2	0.11	-
Mean Diff v Model	0.09	0.03	-	-0.2	-0.06	-	-	-	-
%Mean Diff v Model	7.66	2.69	-	-7.91	-2.2	-	-	-	-
Std. Dev	2.32	2.01	1.36	2.98	2.33	1.59	0.27	0.05	-
Variance	5.4	4.04	1.86	8.9	5.42	2.52	0.07	0	-
%Coeff. Variation	188.5	171.86	119.81	117.68	86.98	58.1	134.22	48.94	-
MAD	1.16	1.16	1.16	2.03	2.03	1.26	0.14	0.14	-
Model Tonnes	-	-	4198345.1	-	-	19888.18	-	-	-



srk consulting	Sierra Metals Inc.	Esperanza Mean Analysis Ag (ppm) and Pb (%)
	Yauricocha Mine	Date: 14/01/2020

Source SRK 2019

Figure 14-17: Esperanza Ordinary Kriging Result Comparison to Declustered Capped Composite Values

14.8.3 Swath Plots

SRK has compiled swath plots to validate the estimation. A swath plot is a graphical display of the grade distribution derived from a series of meter thickness bands (12.5, 25 and 8 m width in this case), or swaths, generated in the X, Y, and Z orientations through the deposit. Grade variations from the block model are compared using the swath plot to the distribution derived from the composites or other estimation methods. An example swath plots from Esperanza for all estimated grades is shown in Figure 14-18, illustrating the comparison between the OK estimation used for reporting to the original polygonal declustered composite grades. SRK notes that, in general the estimated grades represent a smoothed approximation of the composite grades.

SRK did not produce these plots for every mineralized body, as narrow and tabular orientations do not necessarily allow for the swath plots as a reasonable comparison. For those orebodies with broader and less tabular morphology, this comparison is more reasonable.

srk consulting	Sierra Metals Inc.	Esperanza Swath Analysis
	Yauricocha Mine	Date: 14/01/2020

Source: SRK, 2019

Figure 14-18: Esperanza Swath Plots

14.9 Resource Classification

SRK is satisfied that the geological modeling honors the current geological information and knowledge. The location of the samples and the assay data are sufficiently reliable to support resource evaluation. The sampling information was acquired primarily by core drilling or limited channel sampling.

The estimated blocks were classified according to:

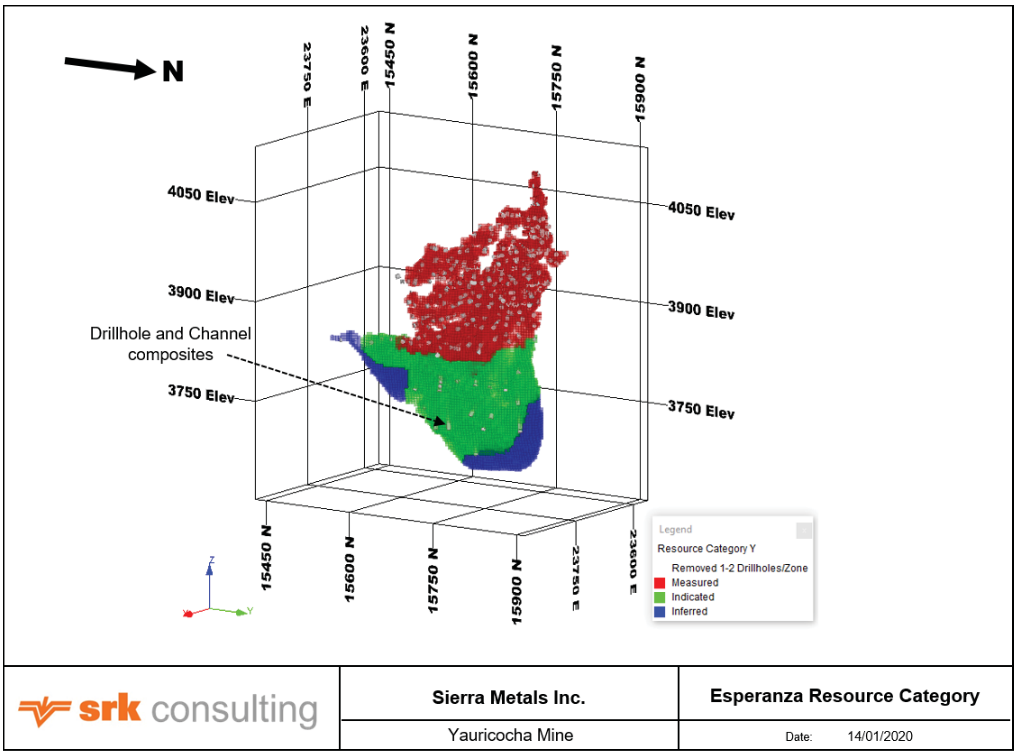
- Confidence in interpretation of the mineralized zones;
- Number of data (holes or channel samples) used to estimate a block; and
- Average distance to the composites used to estimate a block.

In order to classify mineralization as a Measured Mineral Resource the following statement must be considered: “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 detailed mine planning and evaluation of the economic viability of the deposit” (CIM Definition Standards on Mineral Resources and Mineral Reserves, May 2014). For the classification of Indicated Mineral Resources the CIM standard requires the following: “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”. SRK utilized the following general criteria for classification of the Mineral Resource:

- Measured: Blocks estimated with a distance of 10 to 25 m and informed by at least three drillholes;
- Indicated: Blocks estimated with a distance of 20 to 50 m and informed by at least two drillholes; and
- Inferred: Blocks estimated with a distance of 30 to 100 m and informed by at least two drillholes.

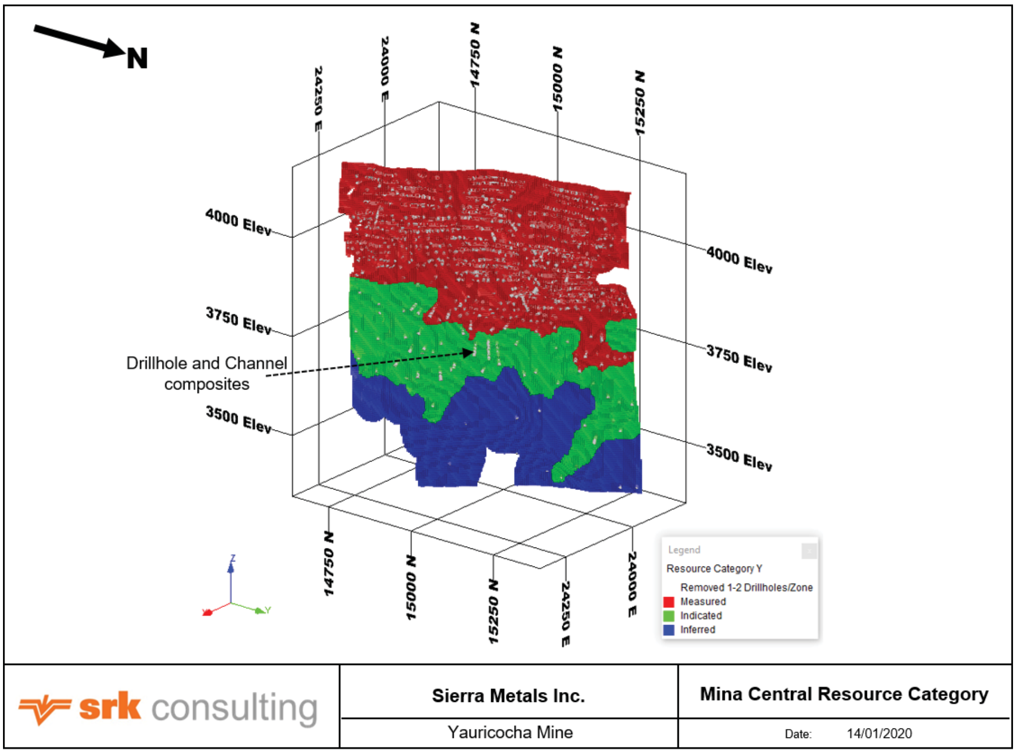
All solid envelopes containing 2 or less drillholes where decategorized from Mineral Resources. These areas should be considered as exploration areas and require additional drilling to satisfy CIM Definition Standards. The resource classification was initially scripted based on the range of influence of the dominant Net Smelter Return (NSR) contributor, generally zinc. A manual override of the isolated resource category blocks was completed in the Datamine’s graphical interface by selecting the respective parent cell centroids and assigning a representative / realistic resource category.

Examples of this scripted classification scheme are shown in Figure 14-19, Figure 14-20 and Figure 14-21. SRK notes that this scripted method is not perfect, and locally results in some classification artifacts along the margins of wide-spaced drilling or in areas where data spacing varies significantly. SRK notes that this is likely something that can be improved upon as additional drilling (currently underway) infills some of these areas.



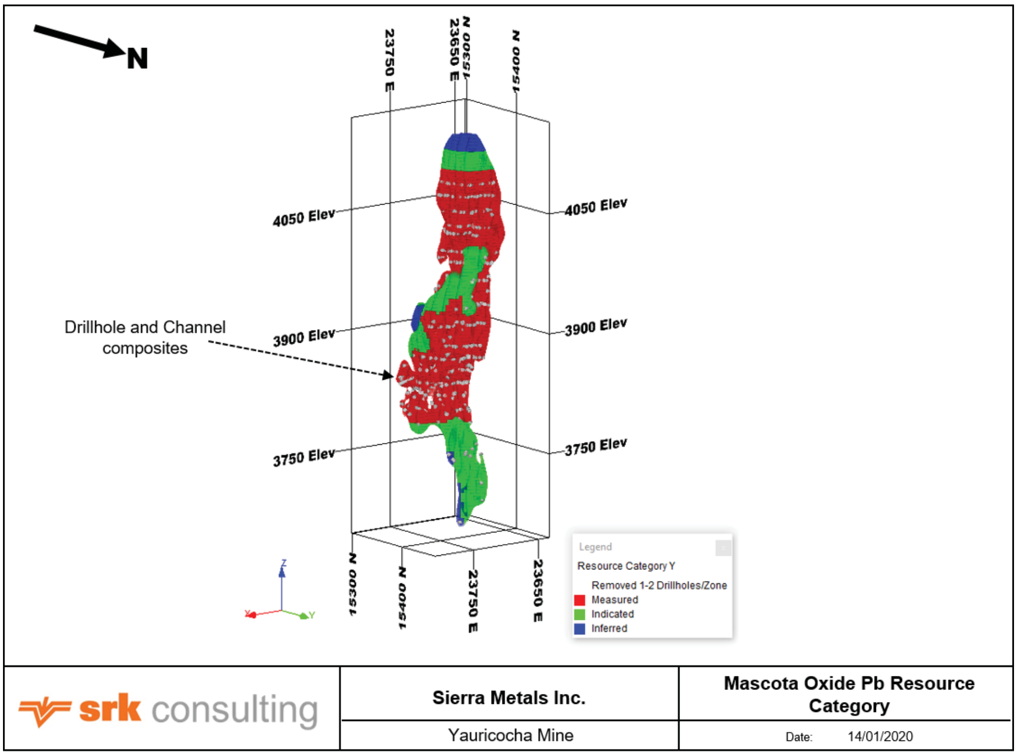
Source: SRK, 2019

Figure 14-19: Example of Scripted and Re-Classed Classification for Esperanza



Source: SRK, 2019

Figure 14-20: Example of Scripted and Re-Classed Classification for Mina Central



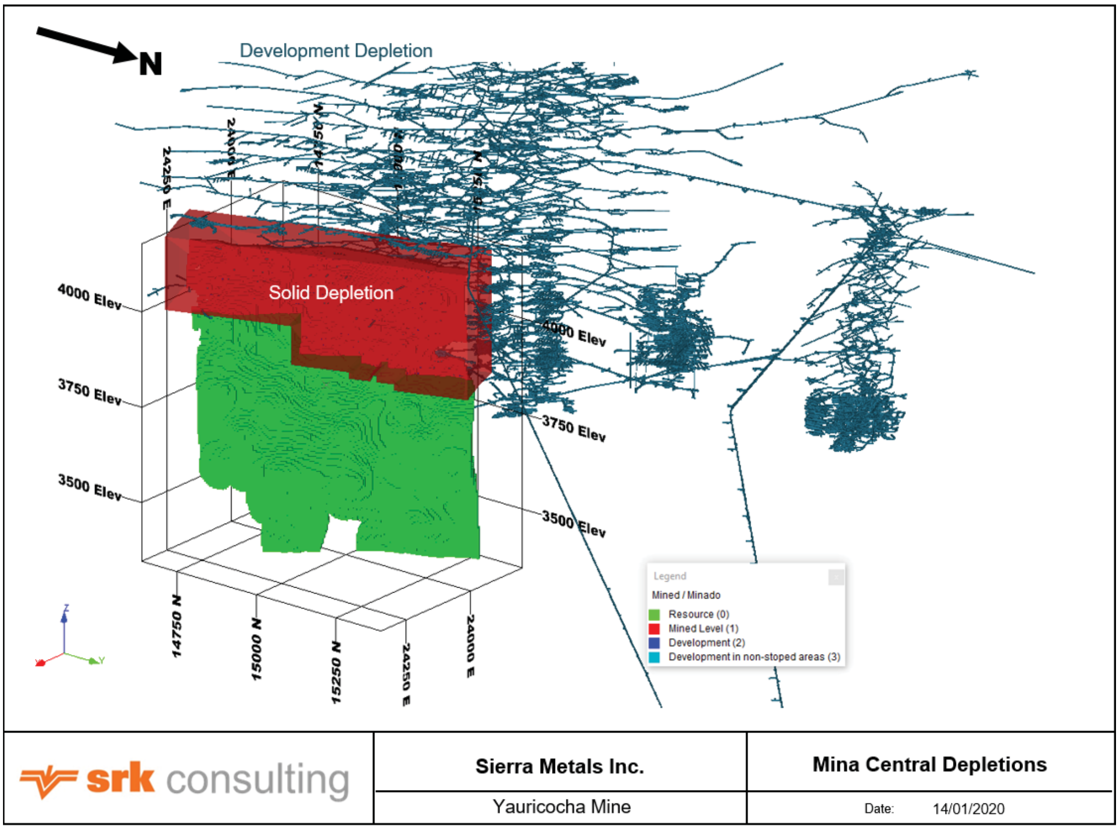
Source: SRK, 2019

Figure 14-21: Example of Scripted and Re-Classed Classification for Mascota Oxide Cu Pb-Ag

14.10 Depletion

RK depleted the block models using provided wireframe solids based on digitized polygons projected on long sections and cross-sections from Minera Corona. SRK notes that this is a conservative approach, given that it effectively ignores pillars or other areas which are known to have not been completely mined. However, SRK agrees with this approach and notes that extensive surveying of previously mined areas would need to be done in order to reasonably incorporate the remaining material above these levels. All material within each solid was flagged with a mined variable (MINED or Minado) in the block model, with 1 representing completely mined, and 0 representing completely available. An additional depletion of the resource models in areas where drift and development ends intersect the resource model was completed in 2019. Areas In mined areas a mined flag of 2 was assigned and in non-mined areas a mined flag of 3 was assigned.

An example of this is shown in Figure 14-22 for the Mina Central area.



Source: SRK, 2019

Figure 14-22: Example of Mining Depletion in Block Models – Mina Central

14.11 Mineral Resource Statement

CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) defines a Mineral Resource as:

"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 "reasonable prospects for economic extraction" requirement generally imply that the quantity and grade estimates meet certain economic thresholds and that the Mineral Resources are reported at an appropriate cut-off value (COV) considering extraction scenarios and processing recoveries. SRK is of the opinion that the costs provided by Minera Corona represent the approximate direct marginal mining and processing cost for various mining methods. To satisfy the criteria of reasonable prospect for economic extraction, SRK has calculated unit values for the blocks in the models based on the grades estimated, metal price assumptions, and metallurgical recovery factors in the form of a Net Smelter Return value. The NSR value also takes into consideration arsenic, as it is considered a deleterious element in the current smelter contracts. For the mineralized zones that are designated to be exploited utilizing a sub-level caving method, the block models were regularized to their respective parent cell and diluted at zero grade. This allowed for isolated sub-cells to fall below the COV and hence, be removed from the Mineral Resource, as these particular blocks do not satisfy the "*reasonable prospects for eventual economic extraction*" as stated in the CIM definitions.

The metal price assumptions have been derived from 2019 Consensus Commodity prices and are reasonable for the statement of Mineral Resources. These prices are generally higher than the previous technical report filed in 2017 and reflect the relative increase in commodities prices since this report. These prices are summarized in Table 14-8.

Table 14-8: Unit Value Price Assumptions

Consensus Pricing	Feed Type	Gold (US$/oz)	Silver (US$/oz)	Copper (US$/lb)	Lead (US$/lb)	Zinc (US$/lb)
2019	Polymetallic	1,303	15.95	2.94	0.95	1.24
2019 Long Term	Lead	1,314	17.55	3.11	0.95	1.08

Source: Sierra Metals, 2019

The metallurgical recovery factors are based on actual to-date 2019 metallurgical recoveries for the various processes and concentrates produced by the Yauricocha mine. SRK has considered that the mineralized bodies stated in Mineral Resources fall into one of three general categories in terms of process route: polymetallic sulfide, lead oxide, and copper sulfide. The copper sulfide process route was abandoned in 2017. The overwhelming majority of the orebodies are considered as polymetallic sulfide, with very limited production from Pb Oxide areas, and effectively no consistent production from Cu-oxide areas. Measured and Indicated Oxide material constitutes 2.2% of the total declared Measured and Indicated Mineral Resource for 2019. 1% of the Inferred Mineral Resources are regarded as oxide material. The summary of the recovery discounts applied during the unit value calculation are shown in Table 14-9. SRK notes that the recoveries stated for the unit value calculations do not consider payability or penalties in the concentrates, as these are variable and may depend on contracts to be negotiated.

Table 14-9: Metallurgical Recovery Assumptions

Date	Process Recovery	Ag (%)	Au (%)	Cu (%)	Pb (%)	Zn (%)
	Polymetallic	76	17	80	89	89
2019	Pb Oxide	51	53	0	65	0
	Polymetallic	67	16	65	85	89
2017	Pb Oxide	51	54	0	66	0
	Cu Oxide	28	0	39	0	0

Source: Sierra Metals, 2019

The general unit value calculation can then be summarized as the estimated grade of each metal, multiplied by the price (US$/g or US$/%), multiplied by the process recovery. This yields a dollar value of the block per tonne, which can be utilized to report resources above the break-even variable costs for mining, processing, and G&A. Minera Corona has provided these costs to SRK, noting that they are generalized given the flexibility of the mining methods within each area or individual mineralized body. For example, several mineralized bodies feature a majority of a specific mining method, but will locally utilize others on necessity, or require adjusted pumping capacity or ground conditions, which may locally move this cost up or down. SRK considers the application of a single unit value cut-off to each mineralized body as reasonable. The unit marginal cut-off values, as provided by Corona are summarized in Table 14-11.

Table 14-10: Unit Value Cut-off by Mining Method and Area (US$/t)

Description	Break-Even Cost 2017	Break-Even Cost 2019
Sub-level Caving: Conventional (SLCM1)	Not Used	46
Sub-level Caving: Mechanized, No Water (SLCM2)	41	47
Sub-level Caving: Mechanized, Low Water (SLCM3)	41	49
Cut and Fill: Overhead Conventional CRAM	42	55
Cut and fill: Overhead Mechanized	48	Not Used
Cut and Fill: Overhead Mechanized w/ Pillars	Not Used	Not Used

Source: Sierra Metals, 2019

The October 31, 2019, consolidated Mineral Resource statement for the Yauricocha Mine is presented in Table 14-11. The individual detailed Mineral Resource tables by area are presented in Table 14-12.

Table 14-11: Consolidated Yauricocha Mine Mineral Resource Statement as of October 31, 2019

SRK Consulting (Canada), Inc. (1) (2) (3) (4) (5) (6) (7) (8) (9)

Classification	Volume (m^3) '000	Tonnes (kt)	Density (kg/m^3)	Ag (g/t)	Au (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)	Fe (%)	NSR (USD/t)	Ag (M oz)	Au (K oz)	Cu (M lb)	Pb (M lb)	Zn (M lb)	As (kt)	Fe (M t)
Measured	1,075	3,662	3.41	66.25	0.69	1.33	1.20	3.47	0.20	24.58	151	7.8	81.0	107.0	97.2	280.5	7.3	0.9
Indicated	2,603	8,989	3.45	45.67	0.56	1.27	0.72	2.81	0.14	25.59	125	13.2	160.5	251.8	142.3	557.5	13.0	2.3
Measured+ Indicated	3,678	12,651	3.44	51.63	0.59	1.29	0.86	3.00	0.16	25.29	132	21.0	241.5	358.8	239.5	838	20.3	3.2
Inferred	1,870	6,501	3.48	39.23	0.51	1.50	0.62	1.66	0.09	26.15	113	8.2	106.6	214.9	88.9	237.6	5.7	1.7

Notes

(1) Mineral Resources have been classified in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM") Definition Standards on Mineral Resources and Mineral Reserves, whose definitions are incorporated by reference into NI 43-101.

(2) Mineral Resources are reported inclusive of Mineral Reserves. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. All figures are rounded to reflect the relative accuracy of the estimates. Silver, gold, silver, copper, lead, zinc, arsenic (deleterious) and iron assays were capped / cut where appropriate.

(3) The consolidated Yauricocha Resource Estimate is comprised of Measured, Indicated and inferred material in the Mina Central, Cuerpos Pequeños, Cuye, Mascota, Esperanza and Cachi-Cachi mining areas.

(4) Polymetallic Mineral Resources are reported at Cut-Off values (COV)'s based on 2018 actual metallurgical recoveries and 2019 smelter contracts.

(5) Metal price assumptions used for polymetallic feed considered 2019 consensus pricing (Gold (US$1,303/oz), Silver (US$15.95/oz), Copper (US$2.94/lb), Lead (US$0.95/lb), and Zinc (US$1.24/lb).

(6) Lead Oxide Mineral Resources are reported at COV's based on 2016 actual metallurgical recoveries and 2016/2017 smelter contracts.

(7) Metal price assumptions used for lead oxide feed considered Long Term consensus pricing (Gold (US$1,314/oz), Silver (US$17.55/oz), Copper (US$3.11/lb), Lead (US$0.95/lb), and Zinc (US$1.08/lb).

(8) The mining costs are based on 2018 actual costs and are variable by mining method.

(9) The unit value COV's are variable by mining area and proposed mining method. The marginal COV ranges from US$46 to US$55.

Table 14-12: Individual Mineral Resource Statement for Yauricocha Mine Areas as of October 31, 2019

SRK Consulting (Canada), Inc. (1) (2) (3) (4) (5) (6) (7) (8) (9)

		COV	47		Grades							Value	Contained Metal						
		Classification	Tonnes	Density	Ag	Au	Cu	Pb	Zn	As	Fe	NSR	Ag	Au	Cu	Pb	Zn	As	Fe
			(kt)	(kg/m^3)	(g/t)	(g/t)	(%)	(%)	(%)	(%)	(%)	(USD/t)	(K oz)	(K oz)	(K lb)	(K lb)	(K lb)	(kt)	(kt)
Mina Central - Polymetallic	Catas and Antacaca	Measured	867.9	3.51	28.98	0.71	1.01	0.15	2.47	0.18	26.27	95	808.6	19.72	19,232.40	2,822.10	47,235.10	1.578	228
		Indicated	2,780.30	3.52	25.06	0.6	1.14	0.18	2.16	0.12	26.52	95	2,239.80	53.94	69,804.90	11,314.30	132,605.70	3.432	737.4
		Measured+ Indicated	3,648.20	3.52	25.99	0.63	1.11	0.18	2.24	0.14	26.46	95	3,048.40	73.66	89,037.30	14,136.50	179,840.80	5.01	965.3
		Inferred	3,501.00	3.47	26.17	0.56	1.56	0.31	0.92	0.06	26.1	95	2,945.50	62.98	120,294.40	24,283.90	70,681.90	1.936	913.8

		COV	49		Grades							Value	Contained Metal						
		Classification	Tonnes	Density	Ag	Au	Cu	Pb	Zn	As	Fe	NSR	Ag	Au	Cu	Pb	Zn	As	Fe
			(kt)	(kg/m^3)	(g/t)	(g/t)	(%)	(%)	(%)	(%)	(%)	(USD/t)	(K oz)	(K oz)	(K lb)	(K lb)	(K lb)	(kt)	(kt)
Mina Central - Polymetallic	Rosaura and Antacaca Sur	Measured	431.7	3.33	45.15	0.62	0.65	0.77	2.92	0.14	19.94	104	626.6	8.56	6,225.40	7,288.90	27,772.70	0.617	86.1
		Indicated	723.5	3.41	33.33	0.5	0.9	0.18	1.54	0.12	24.26	78	775.4	11.68	14,348.10	2,943.40	24,632.00	0.84	175.5
		Measured+ Indicated	1,155.20	3.38	37.75	0.54	0.81	0.4	2.06	0.13	22.65	87	1,402.00	20.24	20,573.50	10,232.30	52,404.70	1.458	261.6
		Inferred	853.1	3.57	19.82	0.45	1.61	0.13	0.61	0.05	29.62	87	543.7	12.25	30,332.90	2,470.70	11,401.00	0.431	252.7

		COV	49		Grades							Value	Contained Metal						
		Classification	Tonnes	Density	Ag	Au	Cu	Pb	Zn	As	Fe	NSR	Ag	Au	Cu	Pb	Zn	As	Fe
			(kt)	(kg/m^3)	(g/t)	(g/t)	(%)	(%)	(%)	(%)	(%)	(USD/t)	(K oz)	(K oz)	(K lb)	(K lb)	(K lb)	(kt)	(kt)
Mina Central- Pb / Ag Oxide	Antacaca Sur Oxidos	Measured	128.1	3.16	202.31	1.59	0.24	2.45	0.54	0.35	30.33	90	833.2	6.54	672.2	6,930.90	1,514.60	0.446	38.9
		Indicated	59.7	3.16	162.5	1.1	0.4	1.99	0.99	0.29	31.27	71	311.9	2.12	520.1	2,622.40	1,298.70	0.17	18.7
		Measured+ Indicated	187.8	3.16	189.65	1.43	0.29	2.31	0.68	0.33	30.63	84	1,145.10	8.66	1,192.30	9,553.30	2,813.30	0.617	57.5
		Inferred	20.6	3.17	194.02	2.37	0.37	0.83	0.77	0.32	36.56	85	128.5	1.57	169.8	376.3	348.1	0.067	7.5

		COV	46 + 47 (10)		Grades							Value	Contained Metal						
		Classification	Tonnes	Density	Ag	Au	Cu	Pb	Zn	As	Fe	NSR	Ag	Au	Cu	Pb	Zn	As	Fe
			(kt)	(kg/m³)	(g/t)	(g/t)	(%)	(%)	(%)	(%)	(%)	(USD/t)	(K oz)	(K oz)	(K lb)	(K lb)	(K lb)	(kt)	(kt)
Esperanza - Polymetallic	**Esperanza, Esperanza Norte, Esperanza Distal, Esperanza Breccia 3 (11)**	Measured	1,461.20	3.36	64.87	0.7	2.27	1.13	2.84	0.24	26.93	179	3,047.50	32.96	73,030.70	36,451.80	91,387.50	3.565	393.5
		Indicated	1,996.80	3.3	60.61	0.52	1.85	1.03	2.98	0.2	26.14	161	3,890.90	33.46	81,579.50	45,383.00	131,402.60	3.963	521.9
		Measured+ Indicated	3,458.00	3.32	62.41	0.6	2.03	1.07	2.92	0.22	26.47	169	6,938.40	66.43	154,610.20	81,834.80	222,790.10	7.528	915.4
		Inferred	543.7	170.6	543.7	170.6	543.7	170.6	543.7	0.19	20.69	188	1,183.80	4.8	18,204.60	21,164.80	55,224.80	1.039	112.5

		COV	46 + 55 (10)		Grades							Value	Contained Metal						
		Classification	Tonnes	Density	Ag	Au	Cu	Pb	Zn	As	Fe	NSR	Ag	Au	Cu	Pb	Zn	As	Fe
			(kt)	(kg/m³)	(g/t)	(g/t)	(%)	(%)	(%)	(%)	(%)	(USD/t)	(K oz)	(K oz)	(K lb)	(K lb)	(K lb)	(kt)	(kt)
Mascota - Polymetallic and Cu / Pb / Ag Oxides	**Mascota Oxidos Cu Pb-Ag, Mascota Polymetallic North, Mascota Polymetallic East, Mascota Polymetallic (South) East, Mascota Polymetallic South and Mascota Sur Oxidos Cu (11)**	Measured	125	3.4	184.21	1.35	0.67	5.62	7.44	0.19	20.69	273	740.3	5.43	1,858.50	15,487.70	20,507.20	0.24	25.9
		Indicated	561.5	3.31	130.67	0.71	0.75	3.13	7.09	0.13	17.96	227	2,359.00	12.8	9,321.80	38,798.90	87,748.90	0.724	100.8
		Measured+ Indicated	686.5	3.33	140.42	0.83	0.74	3.59	7.15	0.14	18.45	236	3,099.30	18.23	11,180.30	54,286.60	108,256.10	0.964	126.7
		Inferred	264.9	3.46	153.3	1.07	0.55	2.44	5.65	0.1	24.2	200	1,305.60	9.08	3,204.60	14,275.60	33,007.40	0.258	64.1

		COV	46		Grades							Value	Contained Metal						
		Classification	Tonnes	Density	Ag	Au	Cu	Pb	Zn	As	Fe	NSR	Ag	Au	Cu	Pb	Zn	As	Fe
			(kt)	(kg/m³)	(g/t)	(g/t)	(%)	(%)	(%)	(%)	(%)	(USD/t)	(K oz)	(K oz)	(K lb)	(K lb)	(K lb)	(kt)	(kt)
Cuye - Polymetallic	**Cuye**	Measured	0	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0
		Indicated	2,137.00	3.59	24.59	0.55	1.5	0.2	1.43	0.14	27.55	98	1,689.80	37.55	70,587.70	9,227.00	67,445.70	2.911	588.8
		Measured+ Indicated	2,137.00	3.59	24.59	0.55	1.5	0.2	1.43	0.14	27.55	98	1,689.80	37.55	70,587.70	9,227.00	67,445.70	2.911	588.8
		Inferred	1,088.30	3.63	36.72	0.39	1.74	0.25	1.13	0.16	28.8	106	1,284.70	13.66	41,677.00	6,116.30	27,098.50	1.689	313.5

		COV	55		Grades							Value	Contained Metal						
		Classification	Tonnes	Density	Ag	Au	Cu	Pb	Zn	As	Fe	NSR	Ag	Au	Cu	Pb	Zn	As	Fe
			(k t)	(kg/m³)	(g/t)	(g/t)	(%)	(%)	(%)	(%)	(%)	(USD/t)	(K oz)	(K oz)	(K lb)	(K lb)	(K lb)	(kt)	(kt)
Cuerpos Pequeños - Polymetallic	**Butz (Mined-out)**	Measured	0	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0
		Indicated	0	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0
		Measured+ Indicated	0	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0
		Inferred	0	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0

		COV	55		Grades							Value	Contained Metal						
		Classification	Tonnes	Density	Ag	Au	Cu	Pb	Zn	As	Fe	NSR	Ag	Au	Cu	Pb	Zn	As	Fe
			(kt)	(kg/m³)	(g/t)	(g/t)	(%)	(%)	(%)	(%)	(%)	(USD/t)	(K oz)	(K oz)	(K lb)	(K lb)	(K lb)	(kt)	(kt)
Cuerpos Pequeños - Polymetallic	**Contacto Sur Medio: TJ6060, TJ8167 (I) and TJ1590 (II) [11]**	Measured	77.9	3.21	211.42	0.24	0.14	6.67	8.26	0.14	7.12	315	529.5	0.6	248.5	11,462.50	14,189.20	0.111	5.5
		Indicated	85	3.33	218.71	0.16	0.14	8.01	12.07	0.14	5.5	402	597.7	0.45	259.3	15,010.40	22,626.20	0.118	4.7
		Measured+ Indicated	162.9	3.27	215.22	0.2	0.14	7.37	10.25	0.14	6.28	360	1,127.20	1.05	507.7	26,472.90	36,815.40	0.23	10.2
		Inferred	72.3	3.35	230.29	0.15	0.12	8.92	11.53	0.09	5.09	411	535.3	0.35	190.7	14,216.90	18,376.80	0.065	3.7

		COV	55		Grades							Value	Contained Metal						
		Classification	Tonnes	Density	Ag	Au	Cu	Pb	Zn	As	Fe	NSR	Ag	Au	Cu	Pb	Zn	As	Fe
			(kt)	(kg/m³)	(g/t)	(g/t)	(%)	(%)	(%)	(%)	(%)	(USD/t)	(K oz)	(K oz)	(K lb)	(K lb)	(K lb)	(kt)	(kt)
Cuerpos Pequeños - Polymetallic	**Gallito**	Measured	23.5	3.36	53.47	0.23	0.72	3.33	9.69	0.18	14.41	260	40.4	0.17	374.3	1,723.40	5,022.60	0.042	3.4
		Indicated	4.4	3.38	31.1	0.14	0.08	2.89	10.59	0.1	11.93	237	4.4	0.02	7.5	280.2	1,027.40	0.005	0.5
		Measured+ Indicated	27.9	3.36	49.94	0.21	0.62	3.26	9.84	0.17	14.01	257	44.8	0.19	381.8	2,003.60	6,049.90	0.047	3.9
		Inferred	33.8	3.16	33.13	0.11	0.09	3.36	10.37	0.08	8.19	242	36	0.12	67.2	2,500.50	7,723.70	0.026	2.8

		COV	55		Grades							Value	Contained Metal						
		Classification	Tonnes	Density	Ag	Au	Cu	Pb	Zn	As	Fe	NSR	Ag	Au	Cu	Pb	Zn	As	Fe
			(kt)	(kg/m³)	(g/t)	(g/t)	(%)	(%)	(%)	(%)	(%)	(USD/t)	(K oz)	(K oz)	(K lb)	(K lb)	(K lb)	(kt)	(kt)
Cuerpos Pequeños - Polymetallic	**Oriental**	Measured	95.9	3.67	64.38	0.12	0.46	0.64	8.83	0.21	28.28	194	198.5	0.36	979.7	1,362.00	18,665.40	0.205	27.1
		Indicated	144.2	3.51	53.47	0.13	0.36	0.44	8.99	0.18	23.86	186	247.9	0.59	1,151.30	1,404.80	28,584.00	0.259	34.4
		Measured+ Indicated	240.1	3.57	57.83	0.12	0.4	0.52	8.93	0.19	25.63	189	446.4	0.95	2,131.00	2,766.80	47,249.40	0.464	61.5
		Inferred	16.6	3.46	33.54	0.11	0.19	0.41	5.84	0.11	25.28	122	17.9	0.06	71	151.2	2,137.60	0.018	4.2

		COV	55		Grades							Value	Contained Metal						
		Classification	Tonnes	Density	Ag	Au	Cu	Pb	Zn	As	Fe	NSR	Ag	Au	Cu	Pb	Zn	As	Fe
			(kt)	(kg/m³)	(g/t)	(g/t)	(%)	(%)	(%)	(%)	(%)	(USD/t)	(K oz)	(K oz)	(K lb)	(K lb)	(K lb)	(kt)	(kt)
Cuerpos Pequeños - Polymetallic	**Occidental [11]**	Measured	57.7	3.17	83.55	0.43	0.18	1.74	7.36	0.06	12.72	185	155	0.79	232.8	2,214.50	9,368.30	0.032	7.3
		Indicated	49.1	3.09	47.13	0.28	0.18	0.56	6.66	0.05	11.69	142	74.4	0.44	194.4	609.8	7,213.50	0.026	5.7
		Measured+ Indicated	106.8	3.13	66.81	0.36	0.18	1.2	7.04	0.05	12.24	165	229.4	1.23	427.3	2,824.30	16,581.80	0.058	13.1
		Inferred	0.4	4	31.1	0.08	0.1	0.05	4.6	0.02	7.28	90	0.4	0	0.9	0.4	40.6	0	0

		COV	47		Grades							Value	Contained Metal						
Cachi-Cachi - Polymetallic	Angelita	Classification	Tonnes (kt)	Density (kg/m^3)	Ag (g/t)	Au (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)	Fe (%)	NSR (USD/t)	Ag (K oz)	Au (K oz)	Cu (K lb)	Pb (K lb)	Zn (K lb)	As (kt)	Fe (kt)
		Measured	81.2	3.3	22.41	0.32	0.53	0.41	3.04	0.1	23.05	87	58.5	0.85	952.8	731.7	5,447.00	0.081	18.7
		Indicated	1.2	3	20.74	0.49	0.63	0.37	2.88	0.1	21.7	88	0.8	0.02	16.8	9.7	76.3	0.001	0.3
		Measured+ Indicated	82.4	3.3	22.38	0.33	0.53	0.41	3.04	0.1	23.03	87	59.3	0.87	969.6	741.4	5,523.20	0.082	19
		Inferred	0	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0
		COV	55		Grades							Value	Contained Metal						
Cachi-Cachi - Polymetallic	Carmencita [11]	Classification	Tonnes (kt)	Density (kg/m^3)	Ag (g/t)	Au (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)	Fe (%)	NSR (USD/t)	Ag (K oz)	Au (K oz)	Cu (K lb)	Pb (K lb)	Zn (K lb)	As (kt)	Fe (kt)
		Measured	0	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0
		Indicated	45.6	3.51	80.76	0.88	0.17	0.89	5.3	0.15	21.57	137	118.4	1.29	172.2	895.1	5,332.10	0.067	9.8
		Measured+ Indicated	45.6	3.51	80.76	0.88	0.17	0.89	5.3	0.15	21.57	137	118.4	1.29	172.2	895.1	5,332.10	0.067	9.8
		Inferred	3.5	3.18	52.43	0.33	0.12	0.51	3.66	0.24	17.31	89	5.9	0.04	9.3	39.2	282.4	0.008	0.6
		COV	47		Grades							Value	Contained Metal						
Cachi-Cachi - Polymetallic	Celia	Classification	Tonnes (kt)	Density (kg/m^3)	Ag (g/t)	Au (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)	Fe (%)	NSR (USD/t)	Ag (K oz)	Au (K oz)	Cu (K lb)	Pb (K lb)	Zn (K lb)	As (kt)	Fe (kt)
		Measured	9.7	3.23	19.56	0.45	0.46	0.38	2.45	0.16	23.37	72	6.1	0.14	97.9	82.2	524.7	0.015	2.3
		Indicated	0	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0
		Measured+ Indicated	9.7	3.23	19.56	0.45	0.46	0.38	2.45	0.16	23.37	72	6.1	0.14	97.9	82.2	524.7	0.015	2.3
		Inferred	0	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0
		COV	55		Grades							Value	Contained Metal						
Cachi-Cachi - Polymetallic	Elissa	Classification	Tonnes (kt)	Density (kg/m^3)	Ag (g/t)	Au (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)	Fe (%)	NSR (USD/t)	Ag (K oz)	Au (K oz)	Cu (K lb)	Pb (K lb)	Zn (K lb)	As (K t)	Fe (kt)
		Measured	19.3	3.22	142.14	0.58	0.65	1.63	6.46	0.21	14.73	203	88.2	0.36	276.7	693.1	2,749.60	0.041	2.8
		Indicated	46.9	3.03	147.76	0.62	0.76	1.73	4.58	0.18	10.31	180	222.8	0.93	783.1	1,786.80	4,734.90	0.083	4.8
		Measured+ Indicated	66.2	3.08	146.12	0.61	0.73	1.7	5.13	0.19	11.6	187	311	1.29	1,059.80	2,480.00	7,484.50	0.124	7.7
		Inferred	8.9	2.87	96.46	0.35	0.63	1.09	2.33	0.08	7.36	112	27.6	0.1	124.3	213	457	0.007	0.7
		COV	55		Grades							Value	Contained Metal						
Cachi-Cachi - Polymetallic	Escondida [11]	Classification	Tonnes (kt)	Density (kg/m^3)	Ag (g/t)	Au (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)	Fe (%)	NSR (USD/t)	Ag (K oz)	Au (K oz)	Cu (K lb)	Pb (K lb)	Zn (K lb)	As (kt)	Fe (kt)
		Measured	43.3	3.49	51.22	0.31	0.18	2.42	6.1	0.09	24.07	165	71.3	0.43	172	2,312.60	5,826.40	0.037	10.4
		Indicated	43.6	3.38	32.03	0.38	0.07	1.77	5.65	0.18	22.08	135	44.9	0.53	67	1,701.10	5,432.80	0.078	9.6
		Measured+ Indicated	86.9	3.43	41.59	0.34	0.12	2.1	5.88	0.13	23.07	150	116.2	0.96	239	4,013.70	11,259.20	0.115	20
		Inferred	33.6	3.29	21.29	0.26	0.04	1.1	4.69	0.09	21.3	105	23	0.28	26.9	817.7	3,475.80	0.03	7.2
		COV	55		Grades							Value	Contained Metal						
Cachi-Cachi - Polymetallic	Karlita	Classification	Tonnes (kt)	Density (kg/m^3)	Ag (g/t)	Au (g/t)	Cu (%)	Pb (%)	Zn (%)	As (%)	Fe (%)	NSR (USD/t)	Ag (K oz)	Au (K oz)	Cu (K lb)	Pb (K lb)	Zn (K lb)	As (kt)	Fe (kt)
		Measured	142.3	3.89	68.74	0.48	0.79	0.58	4.16	0.1	30.51	133	314.5	2.18	2,487.70	1,805.80	13,047.40	0.141	43.4
		Indicated	115.3	4.05	64.9	0.48	0.88	0.35	3.96	0.08	33.73	129	240.6	1.79	2,234.80	877.2	10,060.10	0.097	38.9
		Measured+ Indicated	257.6	3.96	67.02	0.48	0.83	0.47	4.07	0.09	31.95	131	555.1	3.97	4,722.50	2,683.00	23,107.50	0.237	82.3
		Inferred	11.1	4.11	73.98	0.48	1.04	0.21	2.65	0.06	34.35	114	26.4	0.17	255.1	50.3	649.5	0.007	3.8

		COV	55		Grades							Value	Contained Metal						
		Classification	Tonnes	Density	Ag	Au	Cu	Pb	Zn	As	Fe	NSR	Ag	Au	Cu	Pb	Zn	As	Fe
			(kt)	(kg/m^3)	(g/t)	(g/t)	(%)	(%)	(%)	(%)	(%)	(USD/t)	(K oz)	(K oz)	(K lb)	(K lb)	(K lb)	(kt)	(kt)
Cachi-Cachi - Polymetallic	Privatizadora	Measured	55.7	3.59	55.23	0.64	0.06	2.94	7.98	0.12	25.1	203	98.9	1.15	78.9	3,604.60	9,799.50	0.065	14
		Indicated	141.6	3.4	49.29	0.45	0.12	2.23	6.13	0.08	22.01	160	224.4	2.05	387.8	6,965.90	19,134.30	0.116	31.2
		Measured+ Indicated	197.3	3.46	50.97	0.5	0.11	2.43	6.65	0.09	22.88	172	323.3	3.2	466.7	10,570.50	28,933.90	0.181	45.1
		Inferred	15.6	3.25	40.47	0.26	0.09	0.95	3.5	0.1	21.84	91	20.3	0.13	31.7	326.7	1,204.40	0.016	3.4

		COV	55		Grades							Value	Contained Metal						
		Classification	Tonnes	Density	Ag	Au	Cu	Pb	Zn	As	Fe	NSR	Ag	Au	Cu	Pb	Zn	As	Fe
			(kt)	(kg/m^3)	(g/t)	(g/t)	(%)	(%)	(%)	(%)	(%)	(USD/t)	(K oz)	(K oz)	(K lb)	(K lb)	(K lb)	(kt)	(kt)
Cachi-Cachi - Polymetallic	Vanessa (11)	Measured	10.9	3.3	67.34	0.5	0.11	2.93	12.39	0.08	13.09	281	23.6	0.17	25.4	703.7	2,977.30	0.009	1.4
		Indicated	23.9	3.41	55.05	0.6	0.55	1.56	7.8	0.09	21.24	197	42.3	0.46	289.7	823.6	4,111.00	0.02	5.1
		Measured+ Indicated	34.8	3.38	58.9	0.57	0.41	1.99	9.24	0.08	18.69	223	65.9	0.64	315	1,527.40	7,088.30	0.029	6.5
		Inferred	14.1	3.44	58.24	0.74	0.47	1.58	9.31	0.09	20.71	221	26.4	0.34	145.3	492.3	2,894.00	0.013	2.9

		COV	55		Grades							Value	Contained Metal						
		Classification	Tonnes	Density	Ag	Au	Cu	Pb	Zn	As	Fe	NSR	Ag	Au	Cu	Pb	Zn	As	Fe
			(kt)	(kg/m^3)	(g/t)	(g/t)	(%)	(%)	(%)	(%)	(%)	(USD/t)	(K oz)	(K oz)	(K lb)	(K lb)	(K lb)	(kt)	(kt)
Cachi-Cachi - Polymetallic	Yoselim (11)	Measured	30.7	3.34	113.37	0.63	0.1	2.21	6.59	0.32	19.47	180	111.9	0.62	68.1	1,493.90	4,460.80	0.098	6
		Indicated	29.4	3.34	110.87	0.38	0.12	2.52	6.26	0.24	19.54	181	104.8	0.36	77.6	1,636.00	4,054.30	0.071	5.7
		Measured+ Indicated	60.1	3.34	112.15	0.51	0.11	2.36	6.43	0.28	19.5	181	216.7	0.98	145.7	3,129.90	8,515.10	0.169	11.7
		Inferred	19.6	3.27	105.69	1.02	0.22	3.28	6.04	0.21	16	198	66.6	0.64	95	1,415.80	2,609.80	0.042	3.1

Notes

(1) Mineral Resources have been classified in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM") Definition Standards on Mineral Resources and Mineral Reserves, whose definitions are incorporated by reference into NI 43-101.

(2) Mineral Resources are reported inclusive of Mineral Reserves. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. All figures are rounded to reflect the relative accuracy of the estimates. Silver, gold, silver, copper, lead, zinc, arsenic (deleterious) and iron assays were capped / cut where appropriate.

(3) The consolidated Yauricocha Resource Estimate is comprised of Measured, Indicated and inferred material in the Mina Central, Cuerpos Pequeños, Cuye, Mascota, Esperanza and Cachi-Cachi mining areas.

(4) Polymetallic Mineral Resources are reported at Cut-Off Values (COV)'s based on 2018 actual metallurgical recoveries and 2019 smelter contracts.

(5) Metal price assumptions used for polymetallic feed considered 2019 consensus pricing (Gold (US$1,303/oz), Silver (US$15.95/oz), Copper (US$2.94/lb), Lead (US$0.95/lb), and Zinc (US$1.24/lb).

(6) Lead Oxide Mineral Reserves are reported at Cut-Off Values (COV)'s based on 2016 actual metallurgical recoveries and 2016/2017 smelter contracts.

(7) Metal price assumptions used for lead oxide feed considered Long Term consensus pricing (Gold (US$1,314/oz), Silver (US$17.55/oz), Copper (US$3.11/lb), Lead (US$0.95/lb), and Zinc (US$1.08/lb).

(8) The mining costs are based on 2018 actual costs and are variable by mining method.

(9) The unit value COV's are variable by mining area and proposed mining method. The marginal COV ranges from US$46 to US$55.

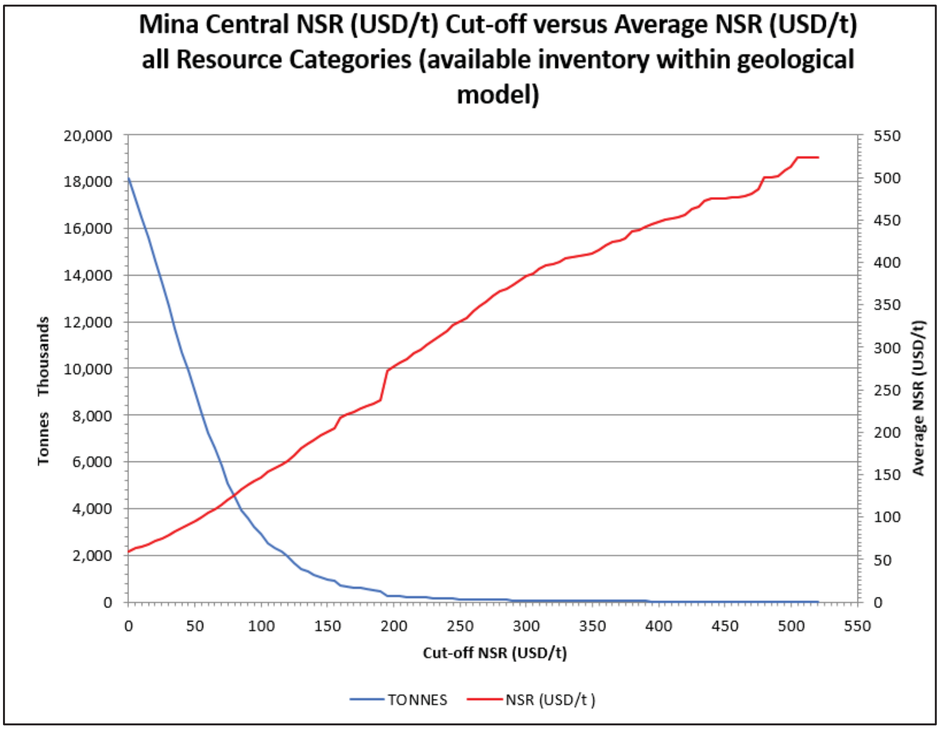
(10) Two or more mining methods employed, hence multiple cut-off applied to the respective regions.

(11) Addition of new zones or the removal of zone as mined-out.

14.12 Mineral Resource Sensitivity

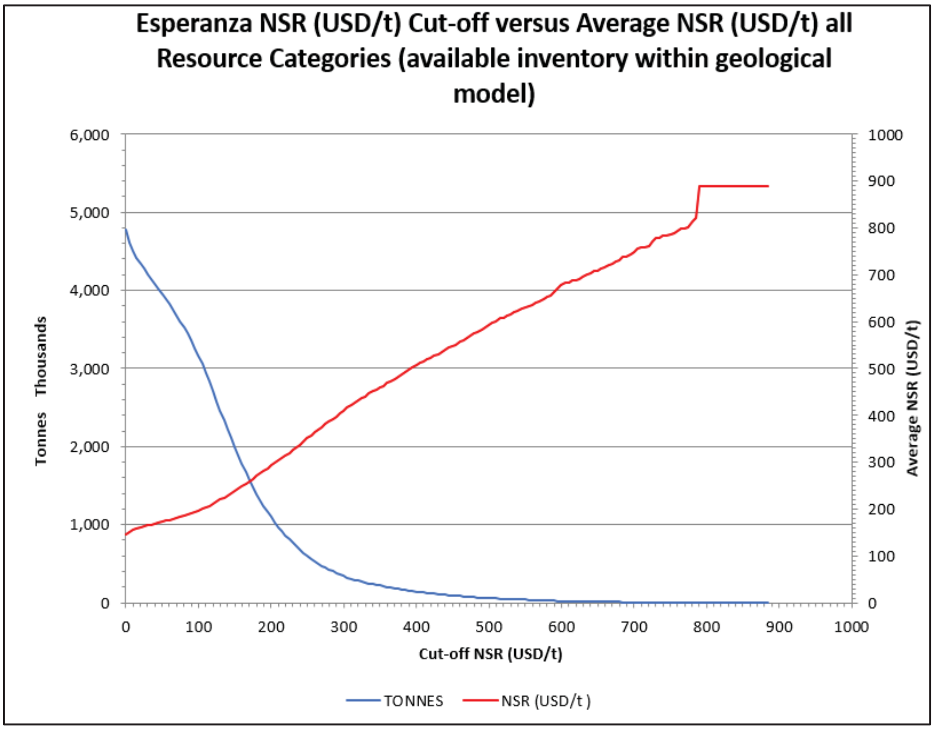
To demonstrate the sensitivity of the Mineral Resource estimations to factors such as changes in commodity prices or mining / processing costs, SRK has produced value vs. tonnage charts at various unit value cut-offs for each area, for all categories of resources. This shows that the majority of the Mineral Resources defined in Mina Central, Esperanza, Mascota, Cuye, Cuerpos Pequeños and Cachi-Cachi have some sensitivity to the unit value cut-off (varying in degree between mineralized bodies), and that this should be considered in the context of the impact on changing cost assumptions with respect to the contained Mineral Resources.

The grade tonnage charts for each area are shown in Figure 14-23 through Figure 14-27.



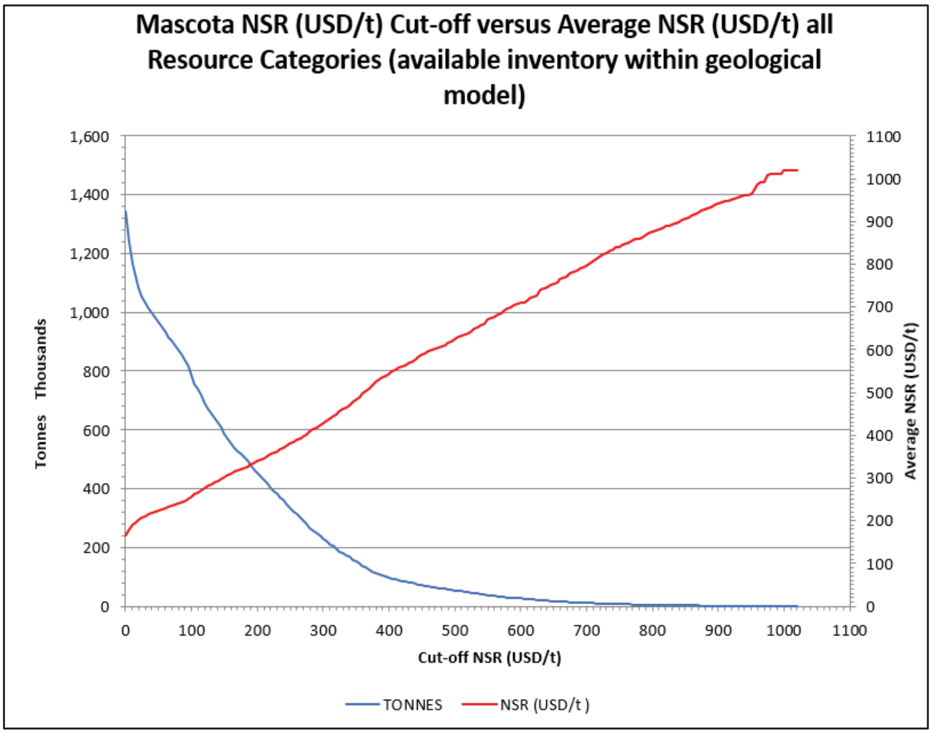
Source: SRK, 2019

Figure 14-23: Mina Central Value Tonnage Chart



Source: SRK, 2019

Figure 14-24: Esperanza Value Tonnage Chart



Source: SRK, 2019
Includes all Mascota Areas.

Figure 14-25: Mascota Value Tonnage Chart