Rock solid resources.
Proven advice.™

NEXA RESOURCE S.A.

TECHNICAL REPORT ON THE HILARIÓN PROJECT, DEPARTMENT OF ANCASH, PERU

NI 43-101 Report

Qualified Persons:
Jason J. Cox, P.Eng.
Normand L. Lecuyer, P.Eng.
Rosmery J. Cárdenas Barzola, P.Eng.
Brenna J.Y. Scholey, P.Eng.
Luis Vasquez, M.Sc., P.Eng.

February 14, 2020

Report Control Form

Document Title	Technical Report on the Hilarión Project, Department of Ancash, Peru		
Client Name & Address	Nexa Resources S.A. Rua Guaicuí, 20 – 14° Andar Belo Horizonte/MG 30380-380		
Document Reference	Project # 3138	***Status & Issue No.***	FINAL Version
Issue Date	February 14, 2020		
Lead Authors	Jason J. Cox Normand L. Lecuyer Rosmery J. Cárdenas Barzola	(Signed) (Signed) (Signed)	
Peer Reviewer	Luke Evans David Robson Torben Jensen	(Signed) (Signed) (Signed)	
Project Manager Approval	Jason J. Cox	(Signed)	
Project Director Approval	Deborah A. McCombe	(Signed)	

Report Distribution

Name	No. of Copies
Client	
RPA Filing	1 (project box)

Roscoe Postle Associates Inc.
55 University Avenue, Suite 501
Toronto, ON M5J 2H7
Canada
Tel: +1 416 947 0907
Fax: +1 416 947 0395
mining@rpacan.com

TABLE OF CONTENTS

PAGE

LIST OF TABLES

LIST OF FIGURES

PAGE

1 SUMMARY

EXECUTIVE SUMMARY

Roscoe Postle Associates Inc. (RPA) was retained by Nexa Resources S.A. (Nexa) to prepare an independent Technical Report on the Hilarión Project (the Project or the Property), located in southeastern Department of Ancash, Peru. The purpose of this report is to support the disclosure of an updated Mineral Resource estimate and document the results of a Preliminary Economic Assessment (PEA) for the Hilarión Project. This Technical Report conforms to National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101).

Nexa is a publicly traded company on the Toronto Stock Exchange (TSX) and the New York Stock Exchange (NYSE). It is a reporting issuer in all provinces and territories of Canada and is under the jurisdiction of the Ontario Securities Commission.

Nexa has a diversified portfolio of polymetallic mines (zinc, lead, copper, silver, and gold) and also greenfield projects at various stages of development in Brazil and Peru. In Brazil, Nexa owns and operates the Vazante and Morro Agudo underground mines (Zn and Pb), the Aripuanã project (Zn, Pb, and Cu), which is currently under construction, and the Caçapava do Sul project (Zn, Pb, Cu, and Ag). It also operates two zinc smelters in Brazil (Três Marias and Juiz de Fora). In Peru, Nexa operates the El Porvenir (Zn-Pb-Cu-Ag), Cerro Lindo (Zn-Cu-Pb-Ag), and Atacocha (Zn-Cu-Pb-Au-Ag) underground mines. The development projects in Peru include Magistral, Shalipayco, Florida Canyon (JV with Solitario), Hilarión, and Pukaqaqa. Nexa also operates one zinc smelter in Peru (Cajamarquilla).

The Project consists of 71 mineral rights, including 70 mineral concessions and one mineral claim, covering a total area of approximately 15,364.20 ha located in southeastern Department of Ancash, approximately 230 km north of the capital of Lima. The Property is accessible by road.

Skarn mineralization at the Property occurs as vertical tabular zones containing sulphide zinc, lead, silver, and copper. The current Mineral Resources are contained within two deposits, Hilarión and El Padrino, located approximately three kilometres apart. Underground development of the two deposits is contemplated, initially exploited as two separate mines, joining up underground later in the mine life.

This PEA study considers only the production from the Hilarión deposit, while the smaller El Padrino deposit would provide additional future potential. The proposed operation will consist of a 10,000 tonnes per day (tpd) mine and a conventional comminution and flotation plant producing saleable bulk lead-silver and zinc concentrates at a throughput of 3.65 Mtpa. The potential to produce a copper concentrate if processing ore from El Padrino will be evaluated in future test work.

CONCLUSIONS

In RPA's opinion, considering the large base of Mineral Resources, good prospects to increase resources, and synergies with the Cajamarquilla smelter, further work to advance the Project is merited, especially in an environment of higher metal prices.

GEOLOGY AND MINERAL RESOURCES

Hilarión Deposit

- The Mineral Resource model was prepared by Nexa in 2017. The resource block model and resource estimate have been audited and accepted by RPA.
- Incorporating the 2018-2019 drilling will result in a minor increase in the resources.
- Measured and Indicated Mineral Resources are estimated to total 58.0 Mt at 3.52% Zn, 0.64% Pb, and 28.6 g/t Ag. In addition, Inferred Mineral Resources are estimated to total 21.5 Mt at 3.28% Zn, 0.78% Pb, and 28.5 g/t Ag.
- The deposit contains significant zinc, silver and lead mineralization hosted in the Pariatambo limestone formation. There are a number of sub-parallel dikes and two intrusive stocks that cut the limestone rocks to produce the skarn mineralization.
- Hilarión has features of both skarn and carbonate replacement (CRD) mineralization.
- A large Project database containing geological and geochemical information has been compiled forming the foundation upon which future exploration programs can be designed.
- Sampling and assaying are adequately completed and have been generally carried out using industry standard quality assurance/quality control (QA/QC) practices. The database is suitable to support a Mineral Resource estimate.
- The 2010-2014 standards have a low bias across the board for silver (-8% to -12%). The 2010 standards show a low bias as well, but of a lower magnitude. This imparts a conservative bias to the silver assays.
- The assumptions, parameters, and methodology used for the Hilarión Mineral Resource estimates are appropriate for the style of mineralization and mining methods.

- A number of polymetallic prospects located near the deposits have been outlined and warrant additional exploration.
- The 2018-2019 exploration program has been successful in delineating mineralization at Hilarión North, which has good exploration potential.
- There is good potential to increase the estimated resources using all elements of interest for wireframing, not just zinc. This approach would be particularly beneficial in Domain 33 which includes copper mineralization, which is currently not included in the mineralization wireframes. A small number of drill holes from the 2018-2019 drilling intersected good zinc and copper mineralization so there is good potential to increase the Domain 33 resources with more drilling in the future.

El Padrino Deposit

- The Mineral Resource estimate was prepared by RPA.
- Indicated Mineral Resources are estimated to total 1.0 Mt at 4.31% Zn, 0.26% Pb, 33.9 g/t Ag, and 0.16% Cu. In addition, Inferred Mineral Resources are estimated to total 3.8 Mt at 4.87% Zn, 0.18% Pb, 27.7 g/t Ag, and 0.48% Cu.
- The geology and mineralization of the El Padrino deposit is similar to that of the Hilarión deposit.
- Protocols for drilling, sampling, analysis, security, historical data verification, and database management meet industry standard practices. The drill hole database was verified by RPA and is suitable for Mineral Resource estimation work.
- Significant exploration potential exists at El Padrino. Areas of interest include the immediate extension of the known zones, the monzonite contact at depth, a 500 m long zone located directly to the south, the area north of the El Padrino stock, and others.

MINING

- The Hilarión Project contemplates the exploitation of the Mineral Resources of the Hilarión deposit at a planned rate of 10,000 tpd over a sixteen-year period.
- A pre-production period of three years including the ramp up period in year three will allow for the start of full production beginning in year four.
- Proposed mining methods include Sub-level Longhole Stoping (SLS) with backfill and Transverse Longhole Stoping (TLS), which are suitable for the ground conditions and geological setting of the Hilarión deposit.
- The stability analysis information and calculations completed by Nexa in past studies and data evaluated by RPA permitted confidence in the mining methods selected.
- The productivity assumptions utilized for the study were assessed using various methods to confirm the mining rate used.
- The ground support design for the Hilarión rock mass is based on relatively detailed analysis using rock mass strength information from testing and determination of RMR values allowing for selection of support requirements.
- The level of dilution and extraction factors utilized were assessed based on the stope dimensions, rock mass quality, and stoping techniques to be employed, as well as the equipment limitations in confined spaces confirming extraction losses.

- The pre-production development has been scheduled to support the planned production rate at Hilarión with a ramp-up time to allow reaching maximum production levels desired.
- The backfill design using both paste fill and waste rock fill will provide the support requirements necessary for mining the Hilarión deposit, based on work by Golder and RPA's assessment.
- The production rate assumptions and Life of Mine (LOM) plan are based on achievable performance rates and schedules as well as employee productivity based on reliable estimates from first principals and also benchmarking.
- The mine equipment selection for the Hilarión project, was based on the mode of access, production level desired and mine layout to optimize equipment sizes, haul distances, and mine infrastructure requirements such as ventilation, dewatering and underground services.
- The mine infrastructure for the production at Hilarión, including ventilation, dewatering, power distribution, and surface facilities including the Azulmina tailings storage facility (TSF) appears to be reasonable at the PEA level of study.
- RPA carried out a comparison of two plant locations, the "Plant 1" location near the Azulmina TSF, near the town Huallanca, and an alternate "Plant 2" location near the Quenhua Ragra TSF, near the town of Pachapaqui. The result of the comparison showed a higher Net Present Value (NPV) and Internal Rate of Return (IRR) at the Plant 1 location, which was selected as RPA's base case.
- The El Padrino deposit would not add significant advantage to the PEA at this time given the smaller resource available and anticipated higher production cost due to the requirement for more selective mining methods.
- A LOM plan based on the current Mineral Resources was prepared indicating positive economics based on the estimated preproduction capital cost of $585 million, and additional $165 million in sustaining capital, which includes $44 million in mine closure cost. Additional mining options using pillars and reducing the dependence on cemented tailings would potentially improve the economics and should be assessed.

METALLURGY AND MINERAL PROCESSING

- RPA has reviewed information about the locations from which the Hilarión 2015 pilot plant composite samples were sourced and considers them sufficiently representative to provide indicative product quality and metallurgical response to the optimized pilot plant flow sheet.
- Metallurgical test work has been conducted by several laboratories using samples from Hilarión since 2006, culminating in flotation pilot test work by Certimin in 2015.
- To date, two phases of preliminary test work have been conducted using samples from El Padrino in 2018 and 2019.
- The Hilarión test work results indicate that recoveries of approximately 86% lead and 90% zinc with lead concentrate grades of approximately 55% and zinc concentrate grades of approximately 50% can be achieved with the optimized flowsheet conditions that have been developed. Recovery of silver to the lead concentrate of approximately 79% to 80% was achieved in pilot test work.

- Flotation is complicated by the presence of non-sulphide lead minerals and high concentrations of pyrrhotite.
- The quality of the zinc concentrate is directly related to the quantity of pyrrhotite in the samples. High quantities of pyrrhotite result in zinc concentrate that contains high concentrations of iron which correspondingly reduces the zinc grade of the concentrate.
- The concentrates contain low concentrations of arsenic, antimony, and other deleterious materials, and therefore RPA is of the opinion that these materials will not impact the economics of the project.
- Samples from El Padrino used for metallurgical test work were selected to be representative of lithology, and grades of Cu, Pb, and Zn. In RPA's opinion, the samples were sufficiently representative to provide indicative metallurgical response to testing.
- El Padrino test work results have shown that it is a complex deposit with varying metallurgical response depending on lithological zones from which samples were sourced.
- Blending of the plant feed will make it difficult to maintain product quality and recovery.
- The El Padrino test work did enable the identification of a preliminary reagent scheme and flotation conditions, which will require further definition and optimization in subsequent test work.
- Further test work is necessary to determine whether or not El Padrino material can be effectively processed to produce saleable products.

ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

- No known environmental issues were identified from the documentation review. The Project complies with applicable Peruvian permitting requirements. The approved permits address the authority's requirements for mining exploration activities.
- Usual components of the environment that could potentially be affected by the Project such as water resources, air quality, and flora and fauna have been evaluated through various environmental studies according to the Peruvian environmental legislation. The existing glaciers are considered to be a sensitive component of the environment in the Project area. Monitoring of the glaciers has been conducted since 2008. Based on the monitoring results, no adverse effects from the Project exploration activities to the glaciers have been identified.
- There is an Environmental Management Plan in place for the exploration phase, which includes a complete monitoring program for surface water quality and sediment quality, mining effluent discharges, groundwater quality, air quality, noise, and flora and fauna (terrestrial and aquatic). Nexa reports the results of the monitoring program to the authorities according to the frequency stated in the approved resolutions and no compliance issues have been raised by the authorities.
- A conceptual Mine Closure Plan has been developed for all the mine components within the context of Peruvian legislation as part of the environmental impact assessment studies.
- The social due diligence review indicates that at present, Nexa's plans and current programs at the proposed Hilarión site in Peru are a positive contribution to sustainability and community well-being. Nexa has established and continues to

implement its various Corporate policies, procedures, and practices in a manner broadly consistent with relevant International Finance Corporation (IFC) Performance Standards.

RECOMMENDATIONS

RPA has the following recommendations by area.

GEOLOGY AND MINERAL RESOURCES

Hilarión Deposit

- Update the Mineral Resource block model with the 2018-2019 drilling data.
- Increase the number of density samples collected in the mineralized domains to obtain more representative range of values for the deposit. Investigate the relationship between grade and density and consider a function that could be used to estimate local density and update the density values in the block model with the 2018-2019 density measurements.
- Drilling at Hilarión should focus on delineating and expanding the resource and exploring the downdip extension of the mineralization. The key mineralized contact should be explored towards the northwest, southeast and at depth.
- Evaluate the potential of including the mineralization intercepts that were not used in the current 2017 models and carry out additional drilling to improve the understanding of the continuity of mineralization.
- Use all the contributing metals for modelling and consider modelling by element if both spatial and statistical correlations are not reasonable.
- Perform additional modelling work including lithology, stratigraphy, and structural interpretations to improve the understanding of the controls on mineralization and grade distributions. The goal of this work is to improve future estimates and to define new exploration targets. Post-mineralization dikes are important features to model to permit the assignment of internal waste into the resource block models.
- Revisit variography and conduct trend analysis by mineralization domain for zinc, lead, silver, and copper.
- Document data validation checks of all core and channel sample data prior to entry into the master database.

El Padrino Deposit

- Continue exploration outside the areas of known mineralization.
- Amend the QA/QC database to include a flag for the different types of duplicate control samples.

MINING

- With the positive economics shown in this PEA, mine engineering and planning should be advanced to the next level of detail to support detailed cost estimates for the Project as part of a Pre-Feasibility Study (PFS) for the Property.

- Additional diamond drilling north of the Hilarión deposit, or the "Gap" area, should continue to increase Mineral Resources and extend the mine life.
- Test work should be carried out to confirm parameters for the paste fill.
- In future studies, a trade-off study on the TLS method of stoping should be assessed using rib pillars and sill pillars for support, thereby reducing the amount of paste fill required and the impact on operating costs and mine productivity versus the loss of resources in the pillars.
- RPA assessed two plant site options at a preliminary level only and this should be examined in further detail in future studies.

METALLURGY AND MINERAL PROCESSING

- Appropriate and representative variability samples of material should be collected from Hilarión and El Padrino and a systematic test program should be undertaken to advance the testing using the optimized test conditions that have been developed during past test work programs. The sample locations and sample types should be carefully documented and included in the metallurgical reports so that the information is easily available and accessible for future reporting. The test program should be designed to confirm how appropriate the current conceptual flowsheet is for all material types that will be processed over the life of the mine.
- Since the flotation results are highly dependent upon the quantity of pyrrhotite contained in the metallurgical samples, RPA also recommends that a geometallurgical program be implemented to ensure that there is a good understanding of the mineralization types that will be encountered during mining and processing and how the metallurgical results will vary depending on the ore types and grades.
- The acid generation potential of the Hilarión flotation tailings warrants further testing and mitigation.

ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

- Continue to implement the Environmental Management Plan, which monitors and manages potential environmental impacts resulting from the exploration activities to inform future permit applications and the detailed Mine Closure Plan still to be developed.
- Due to the lack of documentation on the impacts to the District of Huallanca, additional site-specific studies and documentation should be collected and reviewed to confirm the findings of this review.
- Nexa should have formal agreements in place with any persons potentially affected by involuntary resettlement as soon as possible. As the mitigation measures in the Social Management Plan are executed with respect to any resettlements, it is recommended that Nexa also refer to relevant IFC standards and update the socio-economic baseline information and its practices and procedures accordingly.
- Nexa should implement its Social Management Plan, providing social benefits to all the nearby communities including those inside and outside of Huallanca, due to the close proximity of these settlement areas to each other and the Project site.

- Further human health risk assessments should be conducted to determine if potential air and water impacts (all predicted to be within regulatory standards) will affect the local population, wildlife, or feedstock.
- Site specific policies on worker's rights and an occupational health and safety (OHS) program should be developed and implemented prior to construction and operations.
- A "Chance Find" procedures should be developed and implemented prior to any further ground disturbing activities at the Project site.

PROPOSED PROGRAM AND BUDGET

The Property hosts two multi-element deposits, each encompassing various styles of mineralization. Each deposit, plus the Property overall, merits considerable exploration and development work. The primary objective of Nexa's proposed 2020 program, consisting of 6,000 m of drilling, is the expansion of the Hilarión North potential, and testing the Eureka and Mia targets. In addition, a geological mapping is planned at El Padrino South. This plan is aligned with the main objective to investigate the area between the Hilarión and El Padrino deposits. RPA concurs with Nexa's planned work program and budget of $5.3 million for 2020.

ECONOMIC ANALYSIS

The economic analysis contained in this report is based, in part, on Inferred Mineral Resources, and is preliminary in nature. Inferred Mineral Resources are considered too geologically speculative to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves. There is no certainty that economic forecasts on which this PEA is based will be realized.

An after-tax Cash Flow Projection has been generated from the LOM production schedule and capital and operating cost estimates and is summarized in Table 1-1. A summary of the key criteria is provided below.

ECONOMIC CRITERIA

PHYSICALS

- Pre-production period of approximately 24 months.
- Mine life of 16 years.
- The LOM plan includes two years of development and one year of ramp-up to 10,000 tpd.
- Total processing of 44.7 million tonnes grading 3.54% Zn, 0.72% Pb, 0.06% Cu, 30.43 g/t Ag.

- Mill recovery averaging 90% for zinc, 86% for lead, 80% for silver, with no copper recovered.

REVENUE

- Zinc concentrate averages 84% payable, with lead concentrate averaging 95% payable for silver, and 94.5% payable for lead, net of minimum deductions.
- Metal prices used are US$17/oz for silver, US$0.91/lb for lead, and US$1.17/lb for zinc with all costs in US dollars.
- Revenue is recognized at the time of production.
- Since the revenue is based on the integration of Nexa's Cajamarquilla smelter, standard third-party smelter terms were not used. This provides an upside on recovery payability, and smelter costs, for zinc concentrate.

COSTS

- Pre-production capital expenditure is US$585 million
- Total LOM capital expenditures are US$750 million
- Average operating cost over the LOM is US$34.45/t processed.

TAXES

- The mining taxes were based on a rate of 8%, with income taxes based on a rate of 29.5%

TABLE 1-1 LOM CASH FLOW SUMMARY
Nexa Resources S.A. - Hilarión Project

	INPUTS	UNITS	TOTAL	Year -2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
MINING																					
Underground																					
Operating Days	360	days	5,760			360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360
Tonnes milled per day		tpd	7,759			3,058	10,390	10,337	10,142	10,340	10,379	10,319	10,288	10,257	10,311	10,394	7,072	5,870	1,561	2,223	1,201
Production Tonnes		000 t	44,691	160	274	667	3,740	3,721	3,651	3,722	3,736	3,715	3,704	3,692	3,712	3,742	2,546	2,113	562	800	432
Ag Grade		g/t	30.43	50.19	33.10	31.72	40.53	32.14	32.68	24.24	24.24	24.35	26.11	25.87	26.29	32.80	35.25	37.70	41.64	47.50	38.30
Cu Grade		%	0.06%	0.04	0.03	0.03	0.04	0.05	0.05	0.10	0.10	0.07	0.05	0.03	0.02	0.03	0.05	0.08	0.16	0.14	0.07
Pb Grade		%	0.72%	1.04	0.74	0.66	0.82	0.64	0.69	0.42	0.39	0.45	0.64	0.70	0.67	1.02	1.11	1.12	1.08	1.46	1.31
Zn Grade		%	3.54%	3.32	3.41	3.04	2.91	3.01	3.15	3.82	4.14	3.96	3.84	3.53	3.61	3.42	3.49	3.72	4.15	3.48	3.45
Waste		000 t	7,459	719	690	443	639	558	407	561	606	496	392	390	397	355	369	268	127	42	-
Total Moved		000 t	52,150	878	964	1,110	4,379	4,279	4,058	4,283	4,342	4,211	4,095	4,083	4,109	4,097	2,915	2,382	689	842	432
PROCESSING																					
Mill Feed		000 t	44,691			1,101	3,740	3,721	3,651	3,722	3,736	3,715	3,704	3,692	3,712	3,742	2,546	2,113	562	800	432
Ag Grade		g/t	30.43			34.75	40.53	32.14	32.68	24.24	24.24	24.35	26.11	25.87	26.29	32.80	35.25	37.70	41.64	47.50	38.30
Cu Grade		%	0.06%			0.03%	0.04%	0.05%	0.05%	0.10%	0.10%	0.07%	0.05%	0.03%	0.02%	0.03%	0.05%	0.08%	0.16%	0.14%	0.07%
Pb Grade		%	0.72%			0.74%	0.82%	0.64%	0.69%	0.42%	0.39%	0.45%	0.64%	0.70%	0.67%	1.02%	1.11%	1.12%	1.08%	1.46%	1.31%
Zn Grade		%	3.54%			3.17%	2.91%	3.01%	3.15%	3.82%	4.14%	3.96%	3.84%	3.53%	3.61%	3.42%	3.49%	3.72%	4.15%	3.48%	3.45%
Contained Ag		oz	43,724,227		-	1,230,003	4,873,775	3,844,949	3,836,350	2,900,906	2,911,487	2,908,160	3,109,272	3,071,447	3,137,533	3,946,565	2,885,019	2,561,537	752,466	1,222,252	532,506
Contained Cu		t	25,027		-	308	1,317	1,825	1,742	3,673	3,717	2,521	1,729	944	823	1,164	1,344	1,623	925	1,089	284
Contained Pb		t	322,679		-	8,109	30,541	23,896	25,170	15,484	14,511	16,902	23,696	25,906	24,955	38,308	28,192	23,602	6,051	11,707	5,650
Contained Zn		t	1,583,257		-	34,913	108,784	112,085	114,985	142,355	154,636	147,129	142,343	130,443	134,101	127,800	88,849	78,679	23,352	27,882	14,923
Recovery Grade																					
Cu Concentrate	Recovery #1	%																			
Ag	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Cu	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pb	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Zn	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pb Concentrate	Recovery #2	%																			
Ag	80.00%		80.00%		80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%
Cu	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pb	86.00%		86.00%		86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%
Zn	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Zn Concentrate	Recovery #3	%																			
Ag	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Cu	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pb	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Zn	90.00%		90.00%		90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%
Net Recovery		%																			
Ag			80.00%		80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
Cu			0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pb			86.00%		86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%
Zn			90.00%		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Total Average Recovery			80.36%			80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
Recovered Amount																					
Cu Concentrate	**Recovery #1**																				
Ag		**oz**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cu		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pb		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zn		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pb Concentrate	**Recovery #2**																				
Ag		**oz**	**34,979,381**		-	**984,002**	**3,899,020**	**3,075,959**	**3,069,080**	**2,320,725**	**2,329,190**	**2,326,528**	**2,487,417**	**2,457,158**	**2,510,027**	**3,157,252**	**2,308,015**	**2,049,229**	**601,973**	**977,802**	**426,005**
Cu		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pb		**t**	**277,504**		-	**6,974**	**26,265**	**20,550**	**21,646**	**13,316**	**12,479**	**14,535**	**20,379**	**22,279**	**21,461**	**32,945**	**24,245**	**20,298**	**5,204**	**10,068**	**4,859**
Zn		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zn Concentrate	**Recovery #3**																				
Ag		**oz**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cu		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pb		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zn		**t**	**1,424,931**		-	**31,421**	**97,906**	**100,876**	**103,486**	**128,119**	**139,173**	**132,416**	**128,109**	**117,399**	**120,691**	**115,020**	**79,964**	**70,811**	**21,016**	**25,094**	**13,431**
Grades in Concentrate																					
Cu Concentrate		dmt	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag grade in concentrate	0.00	g/t	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cu grade in concentrate	0.00%	%	0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pb grade in concentrate	0.00%	%	0.00%																		
Zn grade in concentrate	0.00%	%	0.00%																		
Concentrate Moisture	0.00%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cu Concentrate		wmt	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pb Concentrate		dmt	504,553		-	12,680	47,754	37,364	39,356	24,211	22,689	26,428	37,052	40,507	39,020	59,899	44,083	36,906	9,462	18,305	8,835
Ag grade in concentrate		g/t	3,921			4,389	4,617	4,656	4,410	5,421	5,806	4,978	3,797	3,430	3,638	2,981	2,961	3,140	3,598	3,021	2,727
Cu grade in concentrate	0.00%	%	0.00%			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pb grade in concentrate	55%	%	55.00%		55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%
Zn grade in concentrate	0.00%	%	0.00%			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Concentrate Moisture	10.00%				10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Pb Concentrate		wmt	560,614		-	14,089	53,060	41,516	43,729	26,902	25,210	29,364	41,169	45,008	43,356	66,555	48,981	41,006	10,513	20,339	9,817
Zn Concentrate		dmt	2,849,863		-	62,843	195,812	201,753	206,972	256,238	278,345	264,832	256,218	234,798	241,381	230,040	159,928	141,622	42,033	50,187	26,861
Ag grade in concentrate	0.00	g/t	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cu grade in concentrate	0.00%	%	0.00%			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pb grade in concentrate	0.00%	%	0.00%			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Zn grade in concentrate	50%	%	50.00%		50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Concentrate Moisture	10.00%				10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Zn Concentrate		wmt	3,166,514		-	69,825	217,568	224,170	229,969	284,709	309,273	294,258	284,686	260,886	268,201	255,600	177,697	157,358	46,703	55,764	29,846
Total Tonnes Concentrate		wmt	3,727,128		-	83,914	270,629	265,686	273,698	311,611	334,483	323,622	325,855	305,894	311,557	322,154	226,678	198,364	57,216	76,103	39,663
Total Recovered																					
Ag		**oz**	**34,979,381**		-	**984,002**	**3,899,020**	**3,075,959**	**3,069,080**	**2,320,725**	**2,329,190**	**2,326,528**	**2,487,417**	**2,457,158**	**2,510,027**	**3,157,252**	**2,308,015**	**2,049,229**	**601,973**	**977,802**	**426,005**
Cu		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pb		**t**	**277,504**		-	**6,974**	**26,265**	**20,550**	**21,646**	**13,316**	**12,479**	**14,535**	**20,379**	**22,279**	**21,461**	**32,945**	**24,245**	**20,298**	**5,204**	**10,068**	**4,859**
Zn		**t**	**1,424,931**		-	**31,421**	**97,906**	**100,876**	**103,486**	**128,119**	**139,173**	**132,416**	**128,109**	**117,399**	**120,691**	**115,020**	**79,964**	**70,811**	**21,016**	**25,094**	**13,431**
REVENUE																					
Metal Prices																					
Au		US$/oz Au	$1,297.32		$1,300	$1,271	$1,222	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305
Ag		US$/oz Ag	$16.96		$16.62	$16.53	$16.16	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05
Cu		US$/lb Cu	$2.95		$2.83	$2.84	$2.85	$2.87	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97
Pb		US$/lb Pb	$0.91		$0.92	$0.91	$0.89	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91
Zn		US$/lb Zn	$1.21		$1.15	$1.14	$1.17	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21

	INPUTS	UNITS	TOTAL	Year -2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
Concentrate Payable %																					
Cu Concentrate Payable %																					
Payable Ag		%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Payable Cu		%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pb Concentrate Payable %																					
Payable Ag		%				95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Payable Pb		%				94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%
Zn Concentrate Payable %																					
Payable Ag		%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Payable Zn		%				97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%
Concentrate Payable																					
Cu Concentrate Payable																					
Payable Ag		oz	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Payable Cu		t	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pb Concentrate Payable																					
Payable Ag		oz	33,230,412			934,802	3,704,069	2,922,161	2,915,626	2,204,688	2,212,730	2,210,201	2,363,046	2,334,300	2,384,525	2,999,389	2,192,614	1,946,768	571,874	928,912	404,705
Payable Pb		t	262,367			6,594	24,832	19,429	20,465	12,590	11,798	13,743	19,267	21,064	20,291	31,148	22,923	19,191	4,920	9,519	4,594
Zn Concentrate Payable																					
Payable Ag		oz	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Payable Zn		t	1,389,308			30,636	95,458	98,355	100,899	124,916	135,693	129,106	124,906	114,464	117,673	112,144	77,965	69,041	20,491	24,466	13,095
Gross Revenue (less losses)																					
Ag Gross Revenue		US$ 000	$562,815			$15,452	$59,858	$49,825	$49,713	$37,591	$37,729	$37,685	$40,292	$39,801	$40,658	$51,142	$37,386	$33,194	$9,751	$15,839	$6,900
Cu Gross Revenue		US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pb Gross Revenue		US$ 000	$524,596			$13,187	$48,895	$38,912	$40,986	$25,214	$23,629	$27,523	$38,587	$42,185	$40,637	$62,380	$45,909	$38,434	$9,854	$19,064	$9,201
Zn Gross Revenue		US$ 000	$3,704,302			$77,268	$246,584	$261,934	$270,123	$334,421	$363,273	$345,636	$334,394	$306,438	$315,030	$300,228	$208,724	$184,833	$54,858	$65,500	$35,057
Total Gross Revenue		**US$ 000**	**$4,791,713**			**$105,908**	**$355,336**	**$350,671**	**$360,823**	**$397,227**	**$424,630**	**$410,844**	**$413,272**	**$388,425**	**$396,325**	**$413,750**	**$292,018**	**$256,461**	**$74,462**	**$100,403**	**$51,159**
Total Charges																					
Transport																					
Cu Concentrate	US$00.00 / wmt conc	US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pb Concentrate	US$131.00 / wmt conc	US$ 000	$73,440			$1,846	$6,951	$5,439	$5,729	$3,524	$3,303	$3,847	$5,393	$5,896	$5,680	$8,719	$6,416	$5,372	$1,377	$2,664	$1,286
Zn Concentrate	US$55.50 / wmt conc	US$ 000	$175,742			$3,875	$12,075	$12,441	$12,763	$15,801	$17,165	$16,331	$15,800	$14,479	$14,885	$14,186	$9,862	$8,733	$2,592	$3,095	$1,656
Treatment																					
Cu Concentrate		US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pb Concentrate		US$ 000	$62,565			$1,572	$5,922	$4,633	$4,880	$3,002	$2,813	$3,277	$4,594	$5,023	$4,839	$7,428	$5,466	$4,576	$1,173	$2,270	$1,096
Zn Concentrate		US$ 000	$690,298			$15,222	$47,430	$48,869	$50,133	$62,066	$67,421	$64,148	$62,061	$56,873	$58,468	$55,720	$38,738	$34,304	$10,181	$12,156	$6,506
Refining cost																					
Ag (==>Cu)	US$0.00 / oz	US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ag (==>Pb)	US$1.5 / oz	US$ 000	$49,846			$1,402	$5,556	$4,383	$4,373	$3,307	$3,319	$3,315	$3,545	$3,501	$3,577	$4,499	$3,289	$2,920	$858	$1,393	$607
Cu	US$0.00 / lb	US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pb	US$0.00 / lb	US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Market Participation																					
Cu		US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pb		US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Zn		US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Smelter Penalties																					
Cu Concentrate	US$0.00 / dmt	US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pb Concentrate	US$0.00 / dmt	US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Zn Concentrate	US$0.00 / dmt	US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Charges		US$ 000	$1,051,890			$23,917	$77,933	$75,765	$77,879	$87,701	$94,021	$90,918	$91,394	$85,773	$87,448	$90,552	$63,772	$55,906	$16,182	$21,579	$11,151
Net Smelter Return		**US$ 000**	**$3,739,824**			**$81,990**	**$277,403**	**$274,905**	**$282,944**	**$309,526**	**$330,609**	**$319,926**	**$321,879**	**$302,652**	**$308,877**	**$323,199**	**$228,246**	**$200,556**	**$58,281**	**$78,824**	**$40,007**
Royalty NSR		US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Net Revenue		**US$ 000**	**$3,739,824**			**$81,990**	**$277,403**	**$274,905**	**$282,944**	**$309,526**	**$330,609**	**$319,926**	**$321,879**	**$302,652**	**$308,877**	**$323,199**	**$228,246**	**$200,556**	**$58,281**	**$78,824**	**$40,007**
Unit NSR		**US$/t milled**	**$83.68**			**$74.47**	**$74.17**	**$74**	**$77**	**$83**	**$88**	**$86**	**$87**	**$82**	**$83**	**$86**	**$90**	**$95**	**$104**	**$98**	**$93**
CUT-OFF GRADE																					
Net Revenue by Metal																					
Ag		%	14%			17%	20%	17%	16%	11%	10%	11%	11%	12%	12%	14%	15%	15%	15%	18%	16%
Cu		%	0%			0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pb		%	10%			12%	13%	10%	11%	6%	5%	6%	9%	10%	10%	14%	15%	14%	13%	18%	17%
Zn		%	76%			71%	67%	73%	73%	83%	84%	83%	80%	78%	78%	71%	70%	71%	72%	64%	67%
						100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Revenue per Metal Unit (NSR Factor)																					
Ag		$/g Ag	$0.38			$0.66	$0.36	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38
Cu		$/% Cu	$0.00			$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Pb		$/% Pb	$12.04			$0.22	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12
Zn		$/% Zn	$17.93			$0.29	$0.17	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18
OPERATING COST																					
Mining (Underground)		US$/t milled	$18.20			$13	$19	$18	$17	$19	$19	$19	$19	$18	$18	$17	$19	$18	$21	$16	$13
Processing	$13.25/t milled	US$/t milled	$13			$13	$13	$13	$13	$13	$13	$13	$13	$13	$13	$13	$13	$13	$13	$13	$13
G&A	$3.00/t milled	US$/t milled	$3			$3	$3	$3	$3	$3	$3	$3	$3	$3	$3	$3	$3	$3	$3	$3	$3
Total Operating Cost		**US$/t milled**	**$34**			**$29**	**$35**	**$34**	**$34**	**$35**	**$35**	**$35**	**$35**	**$35**	**$34**	**$33**	**$35**	**$34**	**$38**	**$32**	**$30**
Mining (Underground)		US$ 000	$813,243			$13,988	$70,224	$67,360	$63,686	$71,590	$71,881	$69,968	$69,026	$67,852	$66,115	$63,987	$48,486	$38,365	$11,960	$12,994	$5,761
Mining - Transverse stopes		US$ 000	$233,519			$0	$28,870	$36,503	$27,533	$20,739	$25,232	$27,799	$22,566	$18,431	$21,160	$4,687	$0	$0	$0	$0	$0
Mining - Longitudinal stopes		US$ 000	$319,447			$3,436	$16,369	$10,752	$15,454	$27,033	$24,007	$20,294	$23,343	$26,918	$27,768	$43,390	$30,973	$26,723	$6,873	$10,353	$5,761
Mining - Ore Development		US$ 000	$92,264			$10,553	$6,105	$2,716	$8,714	$7,454	$5,701	$7,918	$11,072	$11,321	$4,903	$4,664	$6,207	$2,991	$1,294	$651	$0
Mining-Waste Development		US$ 000	$168,013			$0	$18,880	$17,389	$11,985	$16,364	$16,942	$13,956	$12,044	$11,182	$12,284	$11,246	$11,307	$8,651	$3,793	$1,990	
Processing		US$ 000	$592,330			$14,593	$49,573	$49,321	$48,393	$49,334	$49,521	$49,234	$49,088	$48,938	$49,198	$49,596	$33,744	$28,008	$7,450	$10,607	$5,732
G&A		US$ 000	$134,114			$3,304	$11,224	$11,167	$10,957	$11,170	$11,213	$11,147	$11,114	$11,080	$11,139	$11,229	$7,640	$6,341	$1,687	$2,402	$1,298
Total Operating Cost		**US$ 000**	**$1,539,687**			**$31,885**	**$131,020**	**$127,848**	**$123,036**	**$132,094**	**$132,615**	**$130,349**	**$129,228**	**$127,871**	**$126,453**	**$124,813**	**$89,871**	**$72,714**	**$21,097**	**$26,003**	**$12,791**
Unit Operating Cost		US$/t milled	$58			$51	$56	$55	$55	$59	$61	$60	$60	$58	$58	$58	$68	$61	$66	$59	$55
Operating Cashflow		US$ 000	$2,200,137			$50,105	$146,382	$147,058	$159,908	$177,432	$197,995	$189,577	$192,651	$174,781	$182,424	$198,386	$138,375	$127,842	$37,184	$52,821	$27,216
CAPITAL COST																					
Direct Cost																					
Mining		US$ 000	$102,723	$24,722	$34,740	$43,261	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Processing		US$ 000	$221,304	$0	$132,118	$89,187	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Infrastructure		US$ 000	$37,112	$3,663	$8,513	$24,936	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Direct Cost		**US$ 000**	**$361,140**	**$28,385**	**$175,371**	**$157,384**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Other Costs																					
EPCM / Owners / Indirect Cost	30%	US$ 000	$106,945	$8,288	$51,205	$47,453	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal Costs		**US$ 000**	**$468,085**	**$36,673**	**$226,576**	**$204,836**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Contingency	25%	US$ 000	$117,021	$9,168	$56,644	$51,209	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Initial Capital Cost		**US$ 000**	**$585,106**	**$45,841**	**$283,220**	**$256,045**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Sustaining		US$ 000	$120,991			$11,606	$8,022	$2,764	$48,150	$1,093	$954	$954	$47,450	$0	$0	$0	$0	$0	$0	$0	
Equipment Replacement		US$ 000	$0																		
Reclamation and closure		US$ 000	$44,000			$0	$0	$0	$0	$0	$0	$0	$0	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$15,000	$20,000
Total Capital Cost		**US$ 000**	**$750,097**	**$45,841**	**$283,220**	**$267,652**	**$8,022**	**$2,764**	**$48,150**	**$1,093**	**$954**	**$954**	**$47,450**	**$1,500**	**$1,500**	**$1,500**	**$1,500**	**$1,500**	**$1,500**	**$15,000**	**$20,000**
PRE-TAX CASH FLOW																					
Net Pre-Tax Cashflow		US$ 000	$1,450,040	-$45,841	-$283,220	-$217,547	$138,361	$144,294	$111,759	$176,339	$197,041	$188,623	$145,201	$173,281	$180,924	$196,886	$136,875	$126,342	$35,684	$37,821	$7,216
Cumulative Pre-Tax Cashflow		US$ 000		-$45,841	-$329,060	-$546,607	-$408,247	-$263,953	-$152,194	$24,145	$221,186	$409,809	$555,010	$728,292	$909,215	$1,106,101	$1,242,977	$1,369,319	$1,405,003	$1,442,824	$1,450,040
Mining Taxes		US$ 000	$180,471	$0	$0	$820	$9,042	$10,225	$11,157	$13,565	$15,720	$14,827	$14,783	$12,276	$13,707	$22,452	$15,468	$14,252	$3,978	$6,009	$2,191
Income Tax		US$ 000	$422,200	$0	$0	$0	$21,291	$24,185	$26,442	$31,370	$37,212	$34,781	$34,265	$29,210	$31,346	$53,735	$36,730	$33,786	$9,175	$13,714	$4,957
After-Tax Cashflow		US$ 000	$847,368	-$45,841	-$283,220	-$218,367	$108,028	$109,884	$74,160	$131,404	$144,109	$139,015	$96,153	$131,796	$135,871	$120,699	$84,678	$78,304	$22,531	$18,098	$68
Cumulative After-Tax Cashflow		US$ 000		-$45,841	-$329,060	-$547,427	-$439,399	-$329,515	-$255,355	-$123,951	$20,158	$159,172	$255,325	$387,121	$522,992	$643,691	$728,368	$806,672	$829,203	$847,301	$847,368
PROJECT ECONOMICS																					
Pre-Tax IRR		%	22.4%																		
Pre-tax NPV at 8% discounting	8.0%	US$ 000	$510,768																		
Pre-tax NPV at 10% discounting	10.0%	US$ 000	$384,632																		
Pre-tax NPV at 12% discounting	12.0%	US$ 000	$283,722																		
After-Tax IRR		%	15.5%																		
After-Tax NPV at 8% discounting	8.0%	US$ 000	$230,786																		
After-Tax NPV at 10% discounting	10.0%	US$ 000	$148,748																		
After-tax NPV at 12% discounting	12.0%	US$ 000	$83,546																		

CASH FLOW ANALYSIS

Considering the Project on a stand-alone basis, the undiscounted pre-tax cash flow totals $1,450 million over the mine life, and simple payback occurs five years from the start of production. The after-tax cash flow totals $847 million.

NPVs at a range of discount rates is:

- Pre-tax 8% = $511 million
  10% = $385 million
  12% = $284 million
- After-tax 8% = $231 million
  10% = $149 million
  12% = $84 million

The pre-tax IRR is 22.4%, with an after-tax IRR of 15.5%.

SENSITIVITY ANALYSIS

Project risks can be identified in both economic and non-economic terms. Key economic risks were examined by running cash flow sensitivities:

- Metal prices
- Exchange rate
- Head grades
- Recovery
- Operating costs
- Capital costs

Pre-tax NPV sensitivity over the base case has been calculated for -20% to +20% variations. The operating and capital costs are estimated at -15% to +35% and zinc recovery is estimated at -3%, -5%, +2% and +5%.

The sensitivities are shown in Figure 1-1 and Table 1-2.

FIGURE 1-1 PRE-TAX SENSITIVITY GRAPH

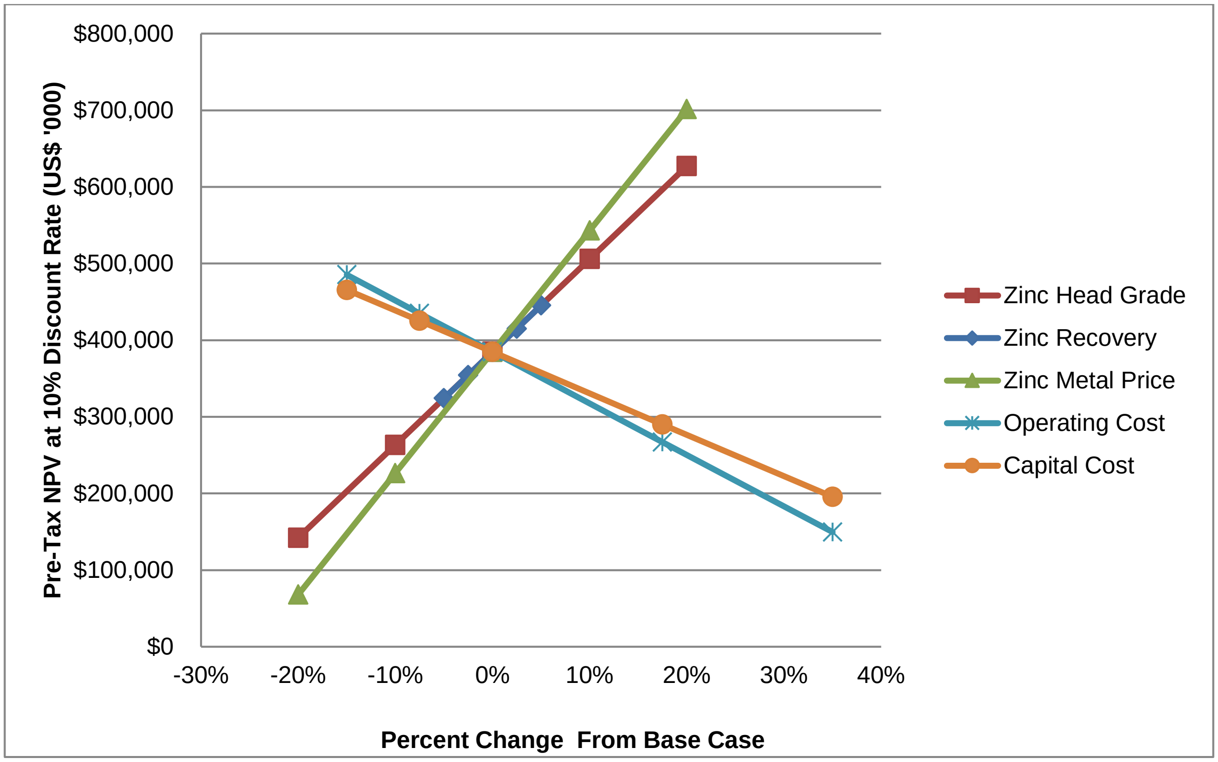


TABLE 1-2 PRE-TAX SENSITIVITY ANALYSES
Nexa Resources S.A. – Hilarión Project

NPV@10% US$ (000)	-20%	-10%	Base Case	10%	20%
Head Grade	142,189	263,410	384,632	505,853	627,074
Recovery	324,021	354,326	384,632	414,937	445,242
Metal Prices	80,605	232,618	384,632	536,645	688,659
Operating Cost	485,343	434,987	384,632	267,136	149,640
Capital Cost	465,630	425,131	384,632	290,133	195,635
Parameters					
Head Grade (%Zn)	2.83%	3.19%	3.54%	3.90%	4.25%
Recovery (%)	86%	88%	90%	92%	95%
Metal Prices (US$/lb Zn)	0.93	1.04	1.16	1.28	1.39
Operating Cost (US$000)	1,308,734	1,424,210	1,539,687	1,809,132	2,078,577
Capital Cost (US$000)	637,582	693,840	750,097	881,364	1,012,631

TECHNICAL SUMMARY

PROPERTY DESCRIPTION AND LOCATION

The Project is located in the Department of Ancash, approximately 230 km north of the capital of Lima and approximately 80 km south of the city of Huaraz. The centre of the Project is approximately at Universal Transverse Mercator (UTM) co-ordinates 8,895,000m N and 282,000m E (WGS 84, Zone 18S). The Property can be reached by vehicle via a secondary road off of Route 3N (Longitudinal de la Sierra).

LAND TENURE

The Project consists of 71 mineral rights, including 70 mineral concessions and one mineral claim, located in the districts of Aquia, Huallanca, and Huasta, Province of Bolognesi, Department of Ancash, Peru. These mineral rights have a total area of approximately 15,364.20 ha.

Of the 71 mineral rights comprising the Project, 59 mineral concessions are registered in the name of Nexa Peru and ten are registered in the name of Compañía Minera Gaico S.A. (Gaico), a company 93.4% owned by Nexa. Two mineral concessions are held jointly by Gaico (50%) and the Estate of Mr. Arnulfo Carbajal (50%).

EXISTING INFRASTRUCTURE

Access to the Hilarión Project is from Lima by road, including 437 km of paved road to Pallca, followed by 15 km of dirt road to the Project. The only existing infrastructure on the site is unpaved roads and exploration drill roads used to access drill sites, and a well-established exploration camp which includes buildings for logging and drill core storage.

HISTORY

Hilarión was first explored in 1975 by Mitsubishi Corporation, which drilled approximately 9,000 m on the Property before it was acquired in 1982 by Compañía Minera Hilarión (Minera Hilarión), a subsidiary of Compañía Minera – Milpo S.A.A. (Milpo), which added another 2,679 m of drilling. The Property was inactive from 1987 until 2001. By that time, the core from previous drilling campaigns on the Property was in poor condition. In addition to mapping, remote sensing, topographical and geophysical surveys, Milpo completed four drilling campaigns totalling approximately 242,000 m on Hilarión and approximately 33,000 m on El Padrino to 2014. Milpo was renamed Nexa Peru in 2017.

GEOLOGY AND MINERALIZATION

The Project is located in the Central Andes in Peru. The Central Andes developed as a typical Andean-type orogen through subduction of oceanic crust and volcanic arc activity. The Central Andes includes an ensialic crust and can be subdivided into three main sections which reveal different subduction geometry as well as different uplift mechanisms. The Northern Sector of the Central Andes, which hosts the Project, developed through extensional tectonics and subduction during early Mesozoic times. The sector was uplifted due to compression and deformation towards the foreland. In the last 5 Ma, a flat-slab subduction developed (Peruvian Flat Slab Segment).

The mineralization at Hilarión–El Padrino occurs along the contacts of dikes but also as discrete tabular vertical zones. The zones are elongated parallel to the main northwest-southeast structures, which is also the direction of most of the dikes. The Hilarión deposit consists of multiple zones that vary from 3 m to 65 m in thickness and from 100 m to 1,500 m along strike.

The mineralization in the Project area consists of sulphides containing potentially economic concentrations of Zn-Ag-Pb-(Cu-Au) that have formed during the interaction between magmatic hydrothermal fluids and the country limestone (skarn).

Lithology, structure, and proximity to the intrusive are the main controls for Hilarión–El Padrino mineralization. The host rock for the mineralization is the upper member of Pariatambo Formation, which consists of tens of centimetre-scale nodular limestone beds interlayered with bituminous black marl. This combination of rocks is an outstanding chemical trap to cause sulphide precipitation as the acid hydrothermal fluid was neutralized by limestone and reduced by contact with bitumen.

EXPLORATION STATUS

The Project is at an advanced exploration stage. Since 2005, Nexa Peru has drilled 614 diamond drill holes for a total of approximately 261,000 m at the Hilarión deposit and 87 diamond drill holes for a total of approximately 38,300 m at the El Padrino deposit. In 2018 and 2019, Nexa drilled 11 drill holes totalling 13,027.55 m at Hilarión North and six drill holes totalling 4,098.2 m targeted the Hilarión Cuerpo 33. The results confirmed the continuity of the mineralization at Cuerpo 33 domain, and the new discovery at Hilarión North. The 2018-2019 exploration program was successful in delineating and confirming Hilarión North with good exploration potential for more mineralization along strike to the north and down dip. A number of good exploration targets exist at both Hilarión and El Padrino which require further exploration.

MINERAL RESOURCES

The Mineral Resource estimate for the Project is summarized in Table 1-3 with an effective date of December 31, 2019. The estimate is based on a potential underground mining scenario. Net smelter return (NSR) cut-off values for the Mineral Resources of each deposit were established using metal process, metallurgical recoveries, and smelter terms. No value has been assigned to the low grade copper mineralization present at Hilarión. Copper has been estimated in the Hilarión block model but has not been included in the Hilarión Mineral Resource estimate.

The Mineral Resource estimate conforms to the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves dated May 10, 2014 (CIM (2014) definitions).

TABLE 1-3 HILARIÓN PROJECT MINERAL RESOURCE ESTIMATE – DECEMBER 31, 2019

Nexa Resources S.A.– Hilarión Project

			Grade				Contained Metal			
Deposit	**Classification**	**Tonnes (Mt)**	**Zinc (%)**	**Lead (%)**	**Silver (g/t)**	**Copper (%)**	**Zinc (000 t)**	**Lead (000 t)**	**Silver (000 oz)**	**Copper (000 t)**
Hilarión	Measured	24.73	3.43	0.72	32.8	-	847.2	177.3	26,107	-
	Indicated	33.27	3.59	0.59	25.5	-	1,195.8	195.2	27,287	-
	M + I	**58.00**	**3.52**	**0.64**	**28.6**	**-**	**2,043.0**	**372.5**	**53,394**	**-**
	Inferred	21.54	3.28	0.78	28.5	-	706.1	167.6	19,763	-
El Padrino	Measured	-	-	-	-	-	-	-	-	-
	Indicated	0.95	4.31	0.26	33.9	0.16	41.1	2.4	1,038	1.6
	M + I	**0.95**	**4.31**	**0.26**	**33.9**	**0.16**	**41.1**	**2.4**	**1,038**	**1.6**
	Inferred	3.80	4.87	0.18	27.7	0.48	185.1	6.7	3,380	18.3
Total	**Measured**	**24.73**	**3.43**	**0.72**	**32.8**	**-**	**847.2**	**177.3**	**26,107**	**-**
	Indicated	**34.23**	**3.61**	**0.58**	**25.7**	**-**	**1,237.0**	**197.7**	**28,326**	**-**
	M + I	**58.96**	**3.53**	**0.64**	**28.7**	**-**	**2,084.1**	**374.9**	**54,433**	**-**
	Inferred	**25.34**	**3.52**	**0.69**	**28.4**	**-**	**891.2**	**174.3**	**23,144**	**-**

Notes:
1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated at an NSR cut off value of US$35/t for SLS resource shapes for Hilarión Deposit, and an NSR cut-off value of US$45.00/t for SLS resource shapes and US$50.00/t for R&P resource shapes for El Padrino Deposit.
3. Mineral Resources are estimated using an average long-term metal prices of Zn: US$2,956.65/t (US$1.34/lb); Pb: US$2,303.14/t (US$1.04/lb); Cu: US$7,523.30/t (US$3.41/lb); and Ag: US$19.61/oz.
4. A minimum mining width of three metres was used for Hilarión and El Padrino.
5. Bulk density varies depending on mineralization domain.
6. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
7. Numbers may not add due to rounding.

RPA has reviewed and revised as required the Mineral Resource assumptions, input parameters, geological interpretation, and block modelling procedures and is of the opinion that the Mineral Resource estimate is appropriate for the style of mineralization and that the block model is reasonable and acceptable to support the 2019 Mineral Resource estimate.

RPA is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate.

HILARIÓN DEPOSIT

RPA has reviewed Nexa's Mineral Resource estimate for the Hilarión deposit. RPA is of the opinion that the Mineral Resource estimate is appropriate for the style of mineralization and that the 2017 resource block model is reasonable and acceptable to support the Mineral Resource estimate. Incorporating the 2018-2019 drilling will result in a minor increase in the resources.

The Mineral Resource estimate at the Hilarión deposit was performed for 66 mineralization wireframes generated in 2014 by the Nexa geologists using Leapfrog Mining software. A percent block model measuring 3 m by 6 m by 6 m for the mineralization wireframes was generated using MineSight software. Blocks were interpolated for zinc, lead, silver, and copper using Ordinary Kriging (OK). A two-pass search strategy was with a yield restriction for outlier values was applied when estimating the grades for the blocks contained within the mineralized wireframes. In 2019, the MineSight resource model was converted by Nexa into a sub-blocked Datamine block model for resource reporting. RPA used the Datamine block model for the PEA work. A sub-blocked block model measuring 6 m by 6 m by 6 m, sub-celled to a minimum of 1 m by 1 m by 1 m for the mineralization wireframes.

Mineral Resources at Hilarión are reported within resource shapes generated in Deswik Stope Optimizer software, satisfying minimum mining size, Net Smelter Return (NSR) cut-off values of US$35/t for SLS resource shapes based on an underground mining scenario and continuity criteria. Blocks were classified as Measured, Indicated, and Inferred by Nexa using a distance based criteria.

EL PADRINO DEPOSIT

The Mineral Resource estimates were prepared by RPA and constrained by 29 mineralization wireframes. The geological model, mineralization wireframes, and block model were completed by RPA using Leapfrog Geo software and Datamine Studio 3. Zn, Pb, Cu, and Ag assays were capped at various levels prior to compositing to 1.5 m. A high grade distance restriction was applied to some zones and were based on visual inspection of resulting unrestricted estimates. Variograms were modelled and used to support search criteria, classification criteria, and for input during validation. Densities were assigned to blocks by regressing density against Zn values for all zones except for two Cu rich zones which were assigned a fixed density.

A sub-blocked block model measuring 3 m by 3 m by 3m, sub-celled to a minimum of 1 m by 1 m by 1 m for the mineralization wireframes was generated using Datamine Studio 3 software. Blocks were interpolated with zinc, lead, silver, and copper grades using Inverse Distance squared (ID^2) using a three-pass search strategy and dynamic anisotropy.

Mineral Resources at El Padrino are reported within resource shapes generated in Deswik Stope Optimizer software, satisfying minimum mining size, NSR cut-off values of US$45/t for SLS resource shapes and US$50/t for R&P resource shapes based on an underground mining scenario and continuity. Blocks were classified as Indicated and Inferred using a distance based criteria.

MINING

A number of mining related studies have been carried out for Hilarión by Nexa in the past, which provided a useful basis of reference for the current study.

The combined Hilarión Project includes the Hilarión deposits and the El Padrino deposit, located approximately 3 km along strike. The present PEA considers only the larger Hilarión deposits.

The mining methods are envisaged to be SLS with backfill and TLS using primary and secondary stopes. Sublevel Open Stoping (SLOS) may also be applied in suitable areas of the deposits. A mixture of cemented paste fill (CPF) and unconsolidated fill will be used in the stopes as part of the mining method. The TLS stopes make up approximately 37%, while the

SLS stope make up approximately 54% with the balance of the 8% made up from development muck.

The Hilarión Project will be accessed using multiple ramp entry points, a 3 km conveyor tunnel, and a system of internal ramps.

Mineralized material would pass through a primary gyratory crusher located underground prior to being transported to surface via a conveyor system. A system of ventilation raises would provide the required volume of ventilation to the various mining areas with entry and exhaust systems to reduce recirculation as much as possible. Conventional underground heavy mobile equipment consisting of load haul dump (LHD) equipment and underground haul trucks will be used to deliver mineralized material to the ore pass systems developed in each area of the mine. The location of the crusher will enable most of the stope mucking to be done using the LHDs with relatively short haulage to strategically located raises.

In RPA's opinion, the proposed mining methods are appropriate and reasonable for the anticipated conditions. RPA's suggests that the use of TLS with a primary and secondary mining sequence could be considered for mineralization widths that exceed ten metres.

MINERAL PROCESSING

Metallurgical test work for Hilarión has gone through a number of stages and numerous tests using composite and bulk samples. Recovery of lead and zinc is complicated by the presence of non-sulphide lead minerals and high quantities of pyrrhotite. Flotation conditions have been optimized such that lead recovery and zinc recoveries are approximately 86% and 90% to concentrates with a lead grade of approximately 55% lead and zinc grade of approximately 50%. The test work also shows that flotation performance is highly dependent upon the amount of pyrrhotite contained in the samples. As the amount of pyrrhotite in the samples increased, the grade of the zinc concentrate decreases.

The processing plant conceptual design is based on Hilarión pilot plant test work conducted at Certimin in 2015, as well as earlier bench scale test work, typical processing methods for polymetallic deposits of this sort, and design criteria provided by RPA and Nexa. The processing of ore from the El Padrino deposit was not considered in the design of the processing plant due to the complex nature of the ore and the early stage of test work on El Padrino material.

The plant will process approximately 3.65 Mtpa through conventional comminution and flotation circuits to produce saleable bulk (lead-silver), and zinc concentrates. The potential to produce a copper concentrate if processing ore from El Padrino will be evaluated in future test work. In addition, future test work will be aimed at optimizing the process flow sheet and reagent scheme to maximize the recovery of valuable metals while minimizing costs of consumables and reagents.

ENVIRONMENTAL, SOCIAL AND PERMITTING CONSIDERATIONS

The Project is located within the Aguascocha Sub Cuenca Chiuruco watershed in proximity to two lakes: the upper Aguascocha lagoon and the lower Aguascocha lagoon. Existing mountain glaciers above the Aguascocha lagoons are considered to be a sensitive component of the environment in the Project area. The climate is typical for the Andes Mountains; very cold, pronounced, and dry winters that typically last from December to April. During the rainy season, the Chiuruco Valley provides sufficient water to support local populations, farming, and mining activities.

Extensive baseline data have been collected during the development of the environmental impact studies for the Project and physical, biological, and social baseline characterizations have been completed.

Separate environmental studies have been conducted for the development of Hilarión and El Padrino deposits. All environmental studies completed up to 2019 and 2017 for Hilarión and El Padrino, respectively, have been developed for exploration activities. The only environmental study conducted for extraction activities is the Environmental Impact Assessment (EIA) completed for El Padrino in 2018 and submitted to the Peruvian authorities in 2019. This study is currently under review and pending approval by the regulator.

Pursuant to classification of projects in Peru requiring governmental approval, Hilarión and El Padrino are Category II and Category III projects, respectively. Category II projects are defined as those with moderate potential adverse impacts that can be mitigated with relatively simple mitigation measures, which require a "semi-detailed" EIA (EIA-sd). Category III projects, conversely, are defined as those with significant potential adverse impacts (quantitative or qualitative), which require a "detailed" EIA (EIA-d).

Several modifications of the EIA-sd for Hilarión have been submitted to the Peruvian authorities for evaluation. The most recent, fifth, EIA-sd having been submitted in December 2019, to obtain approval for new exploration platforms, access roads to the new platforms, auxiliary components, and a revised drilling schedule. This study is currently under review and pending approval by the regulator.

The EIA-d for El Padrino was submitted to the Peruvian Ministry of Energy and Mines for evaluation in November 2018 to obtain approval for underground mining, the construction of three tunnels that will provide access of personnel and equipment to the extraction zone, two waste rock dumps, one temporary ore stockpile, sedimentation ponds, and auxiliary components (offices, power stations, water tanks, warehouse, workshop, etc.).

The Project area is accessible by road and is located in close proximity to three rural districts: Aquia, Huallanca, and Huasta. The local communities potentially impacted by the Project activities are Huallanca, Chiuruco (located in the District of Huallanca), Aquia, and annexes of Aquia. Project facilities required for operation will likely be located within the District of Huallanca, with the communities of Huallanca and Chiuruco being predominantly effected.

In order to manage communications with the public, Nexa has already developed relationships with the local community including a local office and physical presence. The offices allow visitors to speak with Project staff and learn more about the Project. Nexa also conducts targeted briefings and information sessions with various community stakeholder groups. The Social Management Plan details how the Project and related impacts will be communicated to the public, how relationships will be fostered, and a contingency plan to mitigate potential social risks.

Conceptual Mine Closure Plans (MCP) have been developed for all components of Hilarión and the El Padrino, in compliance with applicable Peruvian legislation. The plans address temporary, progressive, and final closure actions, in addition to post closure inspection and monitoring. Two years prior to final closure, a detailed version of the MCP will have to be prepared and submitted to the Peruvian Ministry of Energy and Mines for review and approval.

CAPITAL AND OPERATING COSTS

The capital costs for the Project are shown in Table 1-4. The capital costs reflect the mode of access selected made possible by the orebody geometry as well as other site features such as the main tailings area, access points, and available National Grid power supply.

TABLE 1-4 CAPITAL COSTS
Nexa Resources S.A. - Hilarión Project

Description	Capital Cost (US$000)
Mine	102,723
Processing	221,304
Infrastructure	37,112
Indirect Cost	106,945
Contingency	117,021
Sub-total	**585,106**
Sustaining	120,991
Closure	44,000
Total	**750,097**

The operating costs are shown in Table 1-5. The operating costs reflect the possibility to utilize highly productive bulk mining methods, effective material handling systems, and available experience manpower in the country.

TABLE 1-5 OPERATING COSTS
Nexa Resources S.A. - Hilarión Project

Description	Cost/Yr. (US$000)	Unit Cost (US$/t Processed)
Mine	65,509	18.20
Processing	47,714	13.25
G&A	10,803	3.00
Total	**124,026**	**34.45**

2 INTRODUCTION

Roscoe Postle Associates Inc. (RPA) was retained by Nexa Resources S.A. (Nexa) to prepare an independent Technical Report on the Hilarión Project (the Project or the Property), located in southeastern Department of Ancash, Peru. The purpose of this report is to support the disclosure of an updated Mineral Resource estimate and document the results of a Preliminary Economic Assessment (PEA) for the Hilarión Project. This Technical Report conforms to National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101).

Nexa is a publicly traded company on the Toronto Stock Exchange (TSX) and the New York Stock Exchange (NYSE). It is a reporting issuer in all provinces and territories of Canada and is under the jurisdiction of the Ontario Securities Commission.

Nexa has a diversified portfolio of polymetallic mines (zinc, lead, copper, silver, and gold) and also greenfield projects at various stages of development in Brazil and Peru. In Brazil, Nexa owns and operates the Vazante and Morro Agudo underground mines (Zn and Pb), the Aripuanã project (Zn, Pb, and Cu), which is currently under construction, and the Caçapava do Sul project (Zn, Pb, Cu, and Ag). It also operates two zinc smelters in Brazil (Três Marias and Juiz de Fora). In Peru, Nexa operates the El Porvenir (Zn-Pb-Cu-Ag), Cerro Lindo (Zn-Cu-Pb-Ag), and Atacocha (Zn-Cu-Pb-Au-Ag) underground mines. The development projects in Peru include Magistral, Shalipayco, Florida Canyon (JV with Solitario), Hilarión, and Pukaqaqa. Nexa also operates one zinc smelter in Peru (Cajamarquilla).

The Hilarión Project consists of 71 mineral rights, including 70 mineral concessions and one mineral claim, covering a total area of approximately 15,364.20 ha located in southeastern Department of Ancash, approximately 230 km north of the capital of Lima. The Property is accessible by road.

This report is considered by RPA to meet the requirements of a Preliminary Economic Assessment as defined in Canadian NI 43-101 regulations. The economic analysis contained in this report is based, in part, on Inferred Mineral Resources, and is preliminary in nature. Inferred Mineral Resources are considered too geologically speculative to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves. There is no certainty that economic forecasts on which this PEA is based will be realized.

SOURCES OF INFORMATION

Jason J. Cox, P.Eng., RPA Principal Mining Engineer, and Normand L. Lecuyer, P.Eng., RPA Principal Mining Engineer, visited the Nexa office in Lima and the Hilarión property from June 17 to 20, 2019. Rosmery J. Cárdenas Barzola, P.Eng., RPA Principal Geologist, visited the Nexa office in Lima on June 12 and 13, 2017 and the Hilarión property on June 15, 2017.

During the site visit, RPA reviewed logging and sampling methods, inspected core from drill holes, and held discussions with Nexa personnel.

Technical documents and reports on the deposit were reviewed and obtained from Project personnel while at the site. The Mineral Resource files were transferred to RPA via a File Transfer Protocol (FTP) or by email.

Discussions were held with the following Nexa personnel:

- Thiago Nantes Teixeira — Mineral Resources and Mineral Reserves Committee
- Priscila Artioli — Mineral Resources and Mineral Reserves Committee
- Taco Huaylla Juan Carlos — Project Manager Geologist
- Jean Paul Guzman — Greenfield Exploration Manager
- Jerry Huaman — Resource Manager, Nexa Peru
- Eduardo León Vásquez — Corporate Manager, Development and Project Execution
- Yessica Inocente — Database Administrator
- Jorge Hinostroza — Senior Associate Resource Geologist
- Pablo Javier Peña Campos — GIS Administrator
- Patsy Quinte — Environmental Affairs Engineer for Hilarión
- Santiago Mendoza — Community Relations Manager for Hilarión

The Qualified Persons (QP) for this Technical Report are Normand L. Lecuyer, P. Eng., Jason J. Cox, P.Eng., Rosmery J. Cárdenas Barzola, P. Eng., Brenna J.Y. Scholey, P.Eng., Principal Metallurgist, and Luis Vasquez, M.Sc., P.Eng., Senior Environmental Consultant and Hydrotechnical Engineer, SLR Consulting (Canada) Ltd. (SLR). Mr. Cox prepared Sections 15, 18, 19, 21, 22, and 24; Mr. Lecuyer prepared Section 16; Ms. Cárdenas Barzola prepared Sections 4 to 12, 14, and 23; Lance Englebrecht, RPA Principal Metallurgist, prepared Sections 13 and 17 under the supervision of Ms. Scholey; and Mr. Vasquez prepared Section 20. All QPs share responsibility for Sections 1, 2, 3, 25, 26, and 27.

The documentation reviewed, and other sources of information, are listed at the end of this report in Section 27 References.

LIST OF ABBREVIATIONS

Units of measurement used in this report conform to the metric system. All currency in this report is US dollars (US$) unless otherwise noted.

a	annum
A	ampere
bbl	barrels
btu	British thermal units
°C	degree Celsius
C$	Canadian dollars
cal	calorie
cfm	cubic feet per minute
cm	centimetre
cm^2	square centimetre
d	day
dia	diameter
dmt	dry metric tonne
dwt	dead-weight ton
°F	degree Fahrenheit
ft	foot
ft^2	square foot
ft^3	cubic foot
ft/s	foot per second
g	gram
G	giga (billion)
Gal	Imperial gallon
g/L	gram per litre
Gpm	Imperial gallons per minute
g/t	gram per tonne
gr/ft^3	grain per cubic foot
gr/m^3	grain per cubic metre
ha	hectare
hp	horsepower
hr	hour
Hz	hertz
in.	inch
in^2	square inch
J	joule
k	kilo (thousand)
kcal	kilocalorie
kg	kilogram
km	kilometre
km^2	square kilometre
km/h	kilometre per hour
kPa	kilopascal
kVA	kilovolt-amperes
kW	kilowatt
kWh	kilowatt-hour
L	litre
lb	pound
L/s	litres per second
m	metre
M	mega (million); molar
m^2	square metre
m^3	cubic metre
µ	micron
MASL	metres above sea level
µg	microgram
m^3/h	cubic metres per hour
mi	mile
min	minute
µm	micrometre
mm	millimetre
mph	miles per hour
MVA	megavolt-amperes
MW	megawatt
MWh	megawatt-hour
oz	Troy ounce (31.1035g)
oz/st, opt	ounce per short ton
PEN	Peruvian sol
ppb	part per billion
ppm	part per million
psia	pound per square inch absolute
psig	pound per square inch gauge
RL	relative elevation
s	second
st	short ton
stpa	short ton per year
stpd	short ton per day
t	metric tonne
tpa	metric tonne per year
tpd	metric tonne per day
US$	United States dollar
USg	United States gallon
USgpm	US gallon per minute
V	volt
W	watt
wmt	wet metric tonne
wt%	weight percent
yd^3	cubic yard
yr	year

3 RELIANCE ON OTHER EXPERTS

This report has been prepared by RPA for Nexa. The information, conclusions, opinions, and estimates contained herein are based on:

- Information available to RPA at the time of preparation of this report,
- Assumptions, conditions, and qualifications as set forth in this report.

For the purpose of this report, RPA has relied on ownership information provided by Nexa, regarding title to the Hilarión Project. Nexa provided a legal review and opinion dated January 7, 2020 (Nexa, 2020). This information was used in Sections 1 and 4 of this report

Except for the purposes legislated under provincial securities laws, any use of this report by any third party is at that party's sole risk.

4 PROPERTY DESCRIPTION AND LOCATION

The Project is located in the north central portion of Peru, in the Department of Ancash, approximately 230 km north of the capital of Lima and approximately 80 km south of the city of Huaraz. The centre of the Project is located at approximately 77°00'W Longitude and 09°59'S Latitude at elevations between 4,500 MASL to 5,100 MASL (Figure 4-1). The approximate Universal Transverse Mercator (UTM) co-ordinates of the centre of the currently defined Hilarión mineralization are 8,985,625mN and 280,050mE (Zone 18S, datum PSAD 1956).

The Project is located within a rectangular area with dimensions of approximately 22 km east-west and 15 km north-south. The approximate centre of this rectangular area is located at Universal Transverse Mercator (UTM) co-ordinates 8,895,000m N and 282,000m E (WGS 84, Zone 18S).

LAND TENURE

The Project consists of 71 mineral rights, including 70 mineral concessions and one mineral claim, located in the districts of Aquia, Huallanca, and Huasta, Province of Bolognesi, Department of Ancash, Peru (Figure 4-2). These mineral rights have a total area of approximately 15,364.20 ha.

Table 4-1 lists all the subject mineral rights and relevant tenure information including concession codes and names, titleholder, dates granted, file and resolution numbers, and areas.

Mineral concession Fuego Cinco M (Code 010052315), partially overlaps the archaeological site "ICHIQMONTE", declared by National Directorate Resolution N° 562/INC. Hence, the mineral rights holder will not be able to conduct exploration and/or mining activities in the area overlapping the archaeological site unless due archaeological clearance is obtained.

Mineral concessions Mina Ibet 2007 I M and Hilarión 33 overlap lagoons Contaycocha and Susococha. If any of these water bodies are affected by exploration or mining activities, it will be necessary to obtain applicable governmental licences, permits, and/or authorizations prior to commencement of any activities.

Pursuant to information provided by the Peruvian Institute of Geology, Mining, and Metallurgy (INGEMMET) and National Service of Natural Protected Areas (SERNANP), there is a private conservation area, Microcuenca de Paria (767.35 ha), overlapping the Hilarión 16, Hilarión 17, Hilarión 18, Hilarión 19, Hilarión 20, and Chaupijanca 7 concessions.

Of the mineral rights comprising the Project, 59 mineral concessions are registered in the name of Nexa Resources Peru S.A.A. (Nexa Peru), a wholly-owned subsidiary of Nexa, and ten are registered in the name of Compañía Minera Gaico S.A. (Gaico), a company that is 93.4% owned by Nexa.

Two mineral concessions related to the Project are currently held jointly by Gaico (50%) and the Estate of Mr. Arnulfo Carbajal (50%).

TABLE 4-1 TENURE DATA
Nexa Resources S.A. – Hilarión Project

No.	Code	Concession	Title Holder	Date Granted	Status	Area (ha)	Public Registry Record*
1	010051916	Albana I M	Nexa Resources Peru S.A.A.	04/01/2016	D.M. Titulado D.L. 708	93.31	
2	010051816	Albana III M	Nexa Resources Peru S.A.A.	04/01/2016	D.M. Titulado D.L. 708	11.36	
3	010059312	Camical M	Nexa Resources Peru S.A.A.	02/01/2012	D.M. Titulado D.L. 708	359.85	
4	010310718	Cassiopea N	Nexa Resources Peru S.A.A.	01/08/2018	D.M. Titulado D.L. 708	463.37	
5	010847995	Chaupijanca 2	Nexa Resources Peru S.A.A.	05/09/1995	D.M. Titulado D.L. 708	106.63	P-02028918
6	010848095	Chaupijanca 3	Nexa Resources Peru S.A.A.	05/09/1995	D.M. Titulado D.L. 708	4.01	P-02028919
7	010848095A	Chaupijanca 3-A	Nexa Resources Peru S.A.A.	05/09/1995	D.M. Titulado D.L. 708	0.03	P-12116319
8	010848195	Chaupijanca 4	Nexa Resources Peru S.A.A.	05/09/1995	D.M. Titulado D.L. 708	580.63	
9	010848295	Chaupijanca 5	Nexa Resources Peru S.A.A.	05/09/1995	D.M. Titulado D.L. 708	38.72	P-02028921
10	010860995	Chaupijanca 6	Nexa Resources Peru S.A.A.	14/09/1995	D.M. Titulado D.L. 708	194.18	P-02028922
11	010054104	Chaupijanca 7	Nexa Resources Peru S.A.A.	02/03/2004	D.M. Titulado D.L. 708	74.19	P-11725163
12	07002568X01	Cusi I	Nexa Resources Peru S.A.A.	20/07/1987	D.M. Titulado D.L. 109	19.39	P-20003039
13	010052315	Fuego Cinco M	Nexa Resources Peru S.A.A.	05/01/2015	D.M. Titulado D.L. 708	591.92	
14	010326211	Hilarión 69	Nexa Resources Peru S.A.A.	03/05/2011	D.M. Titulado D.L. 708	860.08	
15	07001339X01	Hilarión 12	Nexa Resources Peru S.A.A.	09/09/1964	D.M. Titulado D.L. 109	461.74	P-20000343
16	0701339AX01	Hilarión 12 Fraccionado	Nexa Resources Peru S.A.A.	09/09/1974	D.M. Titulado D.L. 109	3.56	P-11110849
17	07001340X01	Hilarión 14	Nexa Resources Peru S.A.A.	09/09/1974	D.M. Titulado D.L. 109	417.53	P-20000344
18	07001341X01	Hilarión 15	Nexa Resources Peru S.A.A.	09/09/1974	D.M. Titulado D.L. 109	599.34	P-20000345
19	07001342X01	Hilarión 16	Nexa Resources Peru S.A.A.	09/09/1974	D.M. Titulado D.L. 109	585.14	P-20000346
20	07001343X01	Hilarión 17	Nexa Resources Peru S.A.A.	04/10/1974	D.M. Titulado D.L. 109	576.00	P-20000347
21	07001475X01	Hilarión 18	Nexa Resources Peru S.A.A.	13/12/1977	D.M. Titulado D.L. 109	500.00	P-20000348
22	07001476X01	Hilarión 19	Nexa Resources Peru S.A.A.	13/12/1977	D.M. Titulado D.L. 109	658.00	P-20000349
23	07001477X01	Hilarión 20	Nexa Resources Peru S.A.A.	13/12/1977	D.M. Titulado D.L. 109	810.48	P-20000350
24	07001478X01	Hilarión 21	Nexa Resources Peru S.A.A.	13/12/1977	D.M. Titulado D.L. 109	624.76	P-20000351

No.	Code	Concession	Title Holder	Date Granted	Status	Area (ha)	Public Registry Record*
25	07001479X01	Hilarión 22	Nexa Resources Peru S.A.A.	13/12/1977	D.M. Titulado D.L. 109	604.04	P-20000352
26	07001480X01	Hilarión 23	Nexa Resources Peru S.A.A.	13/12/1977	D.M. Titulado D.L. 109	664.33	P-20000353
27	07002043X01	Hilarión 29	Nexa Resources Peru S.A.A.	05/11/1980	D.M. Titulado D.L. 109	0.23	P-20001759
28	0702043AX01	Hilarión 29 A Fraccionado	Nexa Resources Peru S.A.A.	05/11/1980	D.M. Titulado D.L. 109	572.23	
29	0702043BX01	Hilarión 29 B Fraccionado	Nexa Resources Peru S.A.A.	05/11/1980	D.M. Titulado D.L. 109	3.68	
30	0702043CX01	Hilarión 29 C Fraccionado	Nexa Resources Peru S.A.A.	05/11/1980	D.M. Titulado D.L. 109	1.57	
31	07002045X01	Hilarión 33	Nexa Resources Peru S.A.A.	05/11/1980	D.M. Titulado D.L. 109	25.19	P-20001760
32	0702045AX01	Hilarión 33 Fraccionado	Nexa Resources Peru S.A.A.	05/11/1980	D.M. Titulado D.L. 109	1.21	P-11030437
33	07002385X01	Hilarión 35	Nexa Resources Peru S.A.A.	02/05/1984	D.M. Titulado D.L. 109	0.49	P-20005676
34	010196008	Hilarión 6m	Nexa Resources Peru S.A.A.	13/03/2008	D.M. Titulado D.L. 708	6.81	
35	010310712	Hilarión 71	Nexa Resources Peru S.A.A.	03/08/2012	D.M. Titulado D.L. 708	18.33	
36	010310212	Hilarión 72	Nexa Resources Peru S.A.A.	03/08/2012	D.M. Titulado D.L. 708	46.61	
37	010310312	Hilarión 73	Nexa Resources Peru S.A.A.	03/08/2012	D.M. Titulado D.L. 708	1.32	P-13257396
38	010310512	Hilarión 75	Nexa Resources Peru S.A.A.	03/08/2012	D.M. Titulado D.L. 708	245.04	
39	010520407	Hilarión M1	Nexa Resources Peru S.A.A.	11/10/2007	D.M. Titulado D.L. 708	556.07	P-12174758
40	07000695X01	Hilarión No. 11	Nexa Resources Peru S.A.A.	07/09/1962	D.M. Titulado D.L. 109	80.00	P-02017439
41	010578807	J Jerry 2	Nexa Resources Peru S.A.A.	05/11/2007	D.M. Titulado D.L. 708	64.38	
42	010052115	Mina Bendita I M	Nexa Resources Peru S.A.A.	05/01/2015	D.M. Titulado D.L. 708	141.71	
43	010051715	Mina Bendita M	Nexa Resources Peru S.A.A.	05/01/2015	D.M. Titulado D.L. 708	400.00	
44	07000769X01	Mina Hilarión	Nexa Resources Peru S.A.A.	04/07/1963	D.M. Titulado D.L. 109	20.00	P-02020165
45	07000848X01	Mina Hilarión 2	Nexa Resources Peru S.A.A.	01/12/1964	D.M. Titulado D.L. 109	60.00	P-02017723
46	010103714	Mina Ibet 2007 I M	Nexa Resources Peru S.A.A.	02/01/2014	D.M. Titulado D.L. 708	32.69	
47	010103814	Minera Viviana M	Nexa Resources Peru S.A.A.	02/01/2014	D.M. Titulado D.L. 708	404.26	
48	010104214	Mosquetero 12 M	Nexa Resources Peru S.A.A.	02/01/2014	D.M. Titulado D.L. 708	53.01	
49	010104314	Mosquetero 8 M	Nexa Resources Peru S.A.A.	02/01/2014	D.M. Titulado D.L. 708	262.43	P-13318135

No.	Code	Concession	Title Holder	Date Granted	Status	Area (ha)	Public Registry Record*
50	010104414	Mosquetero 9 M	Nexa Resources Peru S.A.A.	02/01/2014	D.M. Titulado D.L. 708	400.00	
51	07000256X01	Salvador	Nexa Resources Peru S.A.A.	19/08/1955	D.M. Titulado D.L. 109	18.00	P-02016234
52	07000656Y01	San Antonio	Nexa Resources Peru S.A.A.	23/09/1960	D.M. Titulado D.L. 109	34.96	P-02014533
53	07002598X01	San Martin De Porres Jm	Nexa Resources Peru S.A.A.	02/05/1988	D.M. Titulado D.L. 109	150.00	P-20003206
54	07000226X01	San Miguel	Nexa Resources Peru S.A.A.	16/11/1944	D.M. Titulado D.L. 109	60.00	P-02016217
55	07000585X01	Santa Rosa No. 2	Nexa Resources Peru S.A.A.	23/09/1960	D.M. Titulado D.L. 109	39.96	P-02014364
56	010060412	Ushpa 11 M	Nexa Resources Peru S.A.A.	02/01/2012	D.M. Titulado D.L. 708	998.84	
57	010060212	Ushpa 15 M	Nexa Resources Peru S.A.A.	02/01/2012	D.M. Titulado D.L. 708	117.38	
58	07000782X01	El Burro	Compañia Minera Gaico S.A.	23/08/1963	D.M. Titulado D.L. 109	39.96	F-239425
59	07000783X01	El Burro No. 2	Compañia Minera Gaico S.A.	23/08/1963	D.M. Titulado D.L. 109	49.95	F-007057
60	07000257X01	Etna	Compañia Minera Gaico S.A.	19/08/1955	D.M. Titulado D.L. 109	20.00	F-148165
61	07002020X01	Jupiter	Compañia Minera Gaico S.A.	26/11/1949	D.M. Titulado D.L. 109	6.00	F-119031
62	07000818X01	Mina Pella	Compañia Minera Gaico S.A.	03/06/1964	D.M. Titulado D.L. 109	12.00	F-205331
63	07000659X01	Omega	Compañia Minera Gaico S.A.	08/11/1951	D.M. Titulado D.L. 109	29.97	F-204447
64	07000658X01	Pravda	Compañia Minera Gaico S.A.	08/11/1951	D.M. Titulado D.L. 109	15.98	F-204453
65	07001268X01	Pravda No. 2	Compañia Minera Gaico S.A.	10/04/1973	D.M. Titulado D.L. 109	7.99	F-006303
66	07000468X01	San Judas	Compañia Minera Gaico S.A.	01/07/1957	D.M. Titulado D.L. 109	45.00	F-205323
67	07000789X01	Ucrania	Compañia Minera Gaico S.A.	28/01/1952	D.M. Titulado D.L. 109	12.00	F-049375
68	07001622X01	Excelsior	Compañia Minera Gaico S.A./Sucesión Arnulfo Carbajal	14/03/1949	D.M. Titulado D.L. 109	6.00	P-20002722
69	07001943X01	Sirena Encantadora	Compañia Minera Gaico S.A./Sucesión Arnulfo Carbajal	05/05/1948	D.M. Titulado D.L. 109	16.00	P-02002724
70	010051716	Albana II M	Nexa Resources Peru S.A.A.	04/01/2016	D.M. Titulado D.L. 708	49.85	
71	010415518	Macha 8M	Nexa Resources Peru S.A.A.	05/11/2018	D.M. en Trámite D.L. 708	334.51	
						15,364.20	

Notes.
*Some of the records are being updated by the National Office of the Superintendent of Public Registers (SUNARP).

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Location Map

February 2020

Source: CIAmap, 2015.

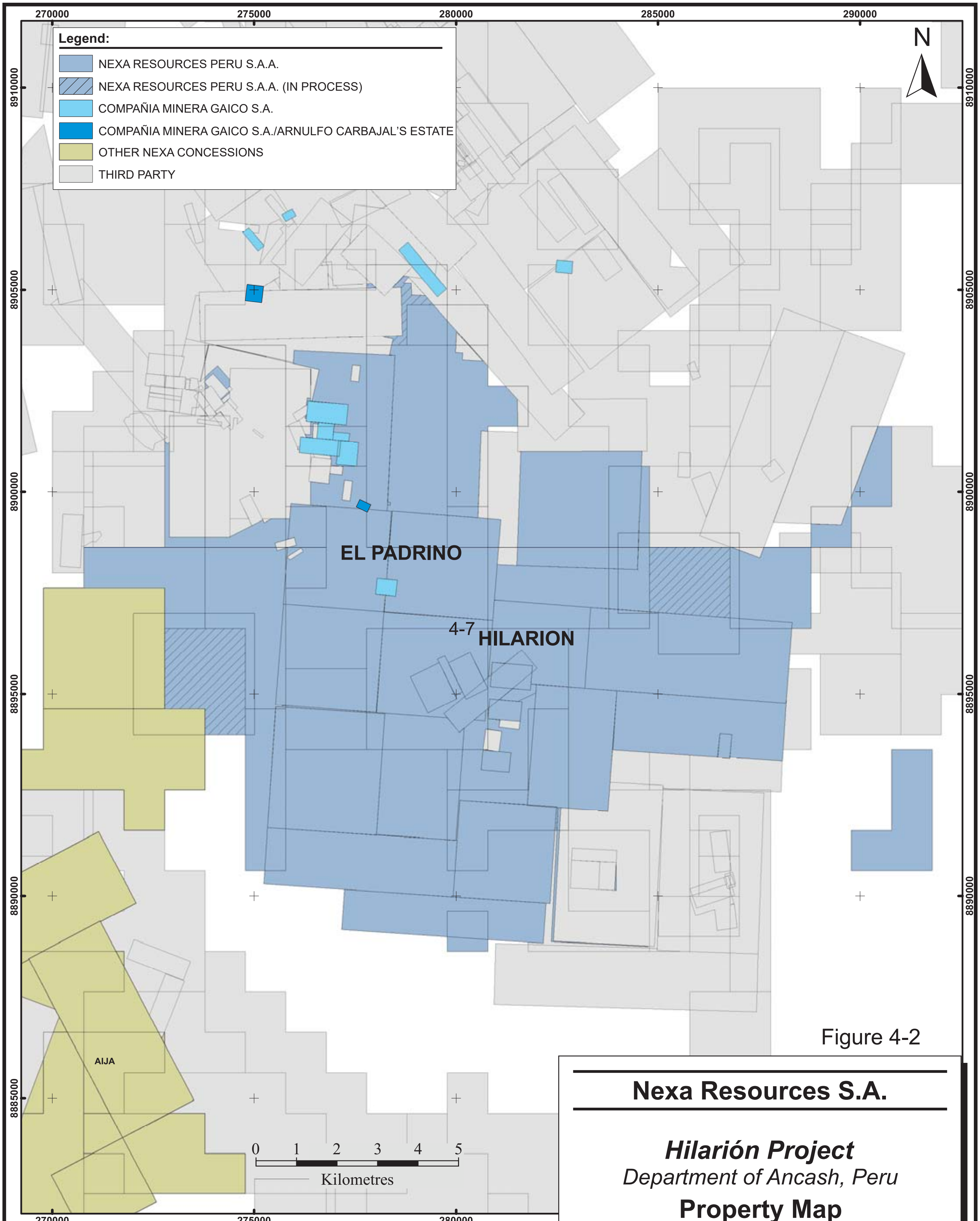


Figure 4-2

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Property Map

February 2020

Source: Nexa, 2019.

MINING RIGHTS

According to Peruvian General Mining Law (the Law):

- Mineral concessions grant their holder the right to explore, develop, and mine minerals located within their internal boundaries
- A mineral claim is an application to obtain a mineral concession. Exploration, development, and exploitation works may be initiated once title to the concession has been granted, except in areas that overlap with pre-existing claims or concessions applied for before December 15, 1991. Upon completion of the title procedure, resolutions awarding title must be recorded with the Public Registry to create enforceability against third parties and the State.
- Mineral rights are separate from surface rights. They are freely transferable.
- A mineral concession by itself does not authorize the titleholder to carry out exploration or exploitation activities, but rather the titleholder must first:
  i. Obtain approval from the Culture Ministry of the applicable archaeological declarations, authorizations, or certificates;
  ii. Obtain the environmental certification issued by the appropriate environmental authority, subject to the rules of public participation;
  iii. Obtain permission for the use of land (i.e., obtain surface rights) by agreement with the owner of the land or the completion of the administrative easement procedure, in accordance with the applicable regulation;
  iv. Obtain the applicable governmental licences, permits, and authorizations, according to the nature and location of the activities to be developed.
  v. Conduct consultations with indigenous peoples under the Culture Ministry, should there be any affected by potential exploitation of the mineral concession, as per International Labour Organization (ILO) Convention 169.
- Mineral rights holders must comply with the payment of an annual fee of $3.00 per hectare per year, on or before June 30 of each year.
- Holders of mineral concessions must meet a Minimum Annual Production Target (MAPT) or spend the equivalent amount in exploration or investments before a statutory deadline. When the deadline is not met, a penalty must be paid as described below:
  - Mineral concession titleholders must meet a statutory MAPT of approximately US$1,200.00 per hectare per year for metallic concessions, within a statutory term of ten years from the date that the concession is granted. The applicable penalty is 2% of the MAPT per hectare per year from the 11th year until the 15th year. Starting in the 16th year and until the 20th year, the applicable penalty is 5% of the MAPT per hectare per year and starting in the 21st year and until the 30th year, the applicable penalty is 10% of the MAPT per hectare per year. After the 30th year if the MAPT is not met, the mining concession will lapse automatically.
- Mineral concessions may not be revoked as long as the titleholder complies with the Good Standing Obligations, according to which mineral concessions will lapse automatically if any of the following events takes place:
  i. The annual fee is not paid for two years.
  ii. The applicable penalty is not paid for two consecutive years.
  iii. A concession expires if it does not reach the minimum production in the year 30, and the company cannot justify the non-compliance up to five additional years due to reasons of force majeure described in the current legislation.

- Agreements involving mineral rights (such as an option to acquire, a mining lease, or the transfer of a mineral concession) must be formalized through a deed issued by a public notary and must be recorded with the Public Registry to create enforceability against third parties and the Peruvian State.

Table 4-2 lists the fees related to the Project concessions. Nexa states that all annual fees applicable to the Project priority concessions have been paid in full up to 2019; payments applicable to non-priority concessions have been delayed by one year. All penalties applicable to the Project mineral concessions have been paid up to 2019 as indicated in Table 4-2.

TABLE 4-2 HOLDING COSTS
Nexa Resources S.A. – Hilarión Project

N	Code	Concession	Annual Fee (US$)	Penalty (US$)	Total Payment 2019 (US$)
1	010051916	Albana I M	279.94	0.00	279.94
2	010051716	Albana II M	900.00	0.00	900.00
3	010051816	Albana III M	34.08	0.00	34.08
4	010059312	Camical M	1,079.54	0.00	1,079.54
5	010310718	Cassiopea N	0.00	0.00	0.00
6	010847995	Chaupijanca 2	319.88	2,681.79	3,001.67
7	010848095	Chaupijanca 3	12.04	100.98	113.02
8	010848095A	Chaupijanca 3-A	0.09	0.72	0.81
9	010848195	Chaupijanca 4	1,741.89	11,612.58	13,354.47
10	010848295	Chaupijanca 5	116.17	973.99	1,090.16
11	010860995	Chaupijanca 6	582.54	4,883.96	5,466.50
12	010054104	Chaupijanca 7	222.57	1,866.01	2,088.58
13	07002568X01	Cusii	58.16	487.58	545.74
14	07000782X01	El Burro	119.87	1,004.99	1,124.86
15	07000783X01	El Burro No 2	149.84	1,256.23	1,406.07
16	07000257X01	Etna	60.00	503.03	563.03
17	07001622X01	Excelsior	18.00	150.91	168.91
18	010052315	Fuego Cinco M	1,775.75	0.00	1,775.75
19	010326211	Hilarión 69	2,580.23	0.00	2,580.23
20	07001339X01	Hilarión 12	1,385.22	11,613.48	12,998.70
21	0701339AX01	Hilarión 12 Fraccionado	10.69	89.64	100.33
22	07001340X01	Hilarión 14	1,252.59	10,501.48	11,754.07
23	07001341X01	Hilarión 15	1,798.01	15,074.23	16,872.24
24	07001342X01	Hilarión 16	1,755.43	14,717.21	16,472.64
25	07001343X01	Hilarión 17	1,728.01	11,520.03	13,248.04
26	07001475X01	Hilarión 18	1,500.00	10,000.02	11,500.02
27	07001476X01	Hilarión 19	1,974.00	13,160.01	15,134.01
28	07001477X01	Hilarión 20	2,431.43	16,209.51	18,640.94
29	07001478X01	Hilarión 21	1,874.29	15,713.77	17,588.06
30	07001479X01	Hilarión 22	1,812.12	15,192.50	17,004.62

N	Code	Concession	Annual Fee (US$)	Penalty (US$)	Total Payment 2019 (US$)
31	07001480X01	Hilarión 23	1,993.00	16,708.95	18,701.95
32	07002043X01	Hilarión 29	0.68	5.69	6.37
33	0702043AX01	Hilarión 29 A Fraccionado	1,716.69	11,444.63	13,161.32
34	0702043BX01	Hilarión 29 B Fraccionado	11.03	92.50	103.53
35	0702043CX01	Hilarión 29 C Fraccionado	4.71	39.45	44.16
36	07002045X01	Hilarión 33	75.56	633.52	709.08
37	0702045AX01	Hilarión 33 Fraccionado	3.64	30.55	34.19
38	07002385X01	Hilarión 35	1.48	12.42	13.90
39	010196008	Hilarión 6 M	20.42	136.14	156.56
40	010310712	Hilarión 71	55.00	0.00	55.00
41	010310212	Hilarión 72	139.82	0.00	139.82
42	010310312	Hilarión 73	3.97	0.00	3.97
43	010310512	Hilarión 75	735.11	0.00	735.11
44	010520407	Hilarión M I	1,668.20	13,985.90	15,654.10
45	07000695X01	Hilarión No 11	240.00	2,012.12	2,252.12
46	010578807	J Jerry 2	193.13	386.26	579.39
47	07002020X01	Jupiter	18.01	120.05	138.06
48	010415518	Macha 8m	0.00	0.00	0.00
49	010052115	Mina Bendita I M	425.13	0.00	425.13
50	010051715	Mina Bendita M	1,200.00	0.00	1,200.00
51	07000769X01	Mina Hilarión	60.00	503.01	563.01
52	07000848X01	Mina Hilarión 2	180.00	1,509.08	1,689.08
53	010103714	Mina Ibet 2007 I M	98.07	0.00	98.07
54	07000818X01	Mina Pella	36.00	240.00	276.00
55	010103814	Minera Viviana M	1,212.78	0.00	1,212.78
56	010104214	Mosquetero 12 M	159.04	0.00	159.04
57	010104314	Mosquetero 8 M	787.30	0.00	787.30
58	010104414	Mosquetero 9 M	1,200.00	0.00	1,200.00
59	07000659X01	Omega	89.91	753.80	843.71
60	07000658X01	Pravda	47.95	401.99	449.94
61	07001268X01	Pravda No 2	23.97	200.99	224.96
62	07000256X01	Salvador	54.00	360.00	414.00
63	07000656Y01	San Antonio	104.89	879.40	984.29
64	07000468X01	San Judas	135.00	899.99	1,034.99
65	07002598X01	San Martin De Porres Jm	450.00	3,772.72	4,222.72
66	07000226X01	San Miguel	180.00	1,509.08	1,689.08
67	07000585X01	Santa Rosan° 2	119.88	1,005.03	1,124.91
68	07001943X01	Sirena Encantadora	48.00	320.00	368.00
69	07000789X01	Ucrania	36.00	240.00	276.00
70	010060412	Ushpa 11 M	2,996.53	0.00	2,996.53
71	010060212	Ushpa 15 M	352.14	0.00	352.14
	TOTALS		**44,449.42**	**217,517.90**	**261,967.30**

The holder of a mining concession is entitled to all the protection available to all holders of private property rights under the Peruvian Constitution, the Civil Code, and other applicable laws. A Peruvian mining concession is a property-related right; distinct and independent from the ownership of land on which it is located, even when both belong to the same person. The rights granted by a mining concession are defensible against third parties, are transferable and chargeable, and, in general, may be the subject of any transaction or contract.

To be enforceable, any and all transactions and contracts pertaining to a mining concession must be entered into a public deed and registered with the Public Mining Registry (*Registro Público de Minería*). Conversely, the holder of a mining concession must develop and operate its concession in a progressive manner, in compliance with applicable safety and environmental regulations and with all necessary steps to avoid third-party damages. The concession holder must permit access to those mining authorities responsible for assessing that the concession holder is meeting all obligations.

SURFACE RIGHTS

Surface rights are not included in mineral rights, and permission must be obtained from owners and local leaders (when surface rights are owned by local communities) in writing, before commencing drilling activities. Companies must obtain a government permit prior to commencing any drilling or major earth moving programs, such as road and drill pad construction. Depending on the scale of work intended, exploration programs must be presented to the Ministry of Energy and Mines, which then will grant an approval to initiate activities provided the paperwork is in order. All major ground disturbances must be remediated and recontoured following completion of the work activities.

ROYALTIES AND OTHER ENCUMBRANCES

Nexa states that based on the information gathered from the Public Registry and to the best of its knowledge, the mineral rights comprising the Project have no liens/encumbrances.

RPA is not aware of any environmental liabilities on the Property. Nexa reports that it has all required permits to conduct the proposed work on the Property. RPA is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform the proposed work program on the Property.

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

ACCESSIBILITY

The Project is located approximately 80 km south of the city of Huaraz in the Districts of Huallanca, Huasta, and Aquia, Province of Bolognesi, Department of Ancash, and approximately 13 km southwest from the town of Huallanca. Huaraz is the capital of the Department of Ancash and has a population of approximately 137,000 in its metropolitan area. Access to the Property by road from Lima, via the cities of Pativilca, Conococha, and Pachapaqui, takes an estimated seven hours to travel approximately 400 km. Alternatively, access to the Property by road from Huaraz is south along paved Route 3N (Longitudinal de la Sierra), through Huallanca to the Pallca turn-off, then south along a secondary road for a distance of approximately 15 km.

CLIMATE

In the Peruvian Andes, temperature is proportional to altitude, varying from temperate (annual average of 18°C) in the low-lying valleys to frigid (annual average below 0°C) in the highest elevations. The maximum temperature is often steady throughout the year, the low varying due to the presence of clouds in the rainy season.

The Project area is characterized by a distinct wet season from December to March in which precipitation varies from 500 mm to 1,000 mm and dry, semi-frigid winters with snow occurring at elevations above 3,950 MASL.

Work can be performed year-round.

INFRASTRUCTURE

The only existing infrastructure on the site is unpaved roads and exploration drill roads used to access drill sites, together with a well-established exploration camp which includes buildings for logging and drill core storage.

LOCAL RESOURCES

Minimal services are available in the peasant communities proximal to the Property. A greater range of services is available in the town of Huaraz (population 137,000) including temporary and permanent accommodations, medical services, fuel, building supplies, postal and police services, and restaurants.

PHYSIOGRAPHY

The relief in the area of the Property is typical of glaciated mountainous terranes characterized by U-shaped valleys and tarns located at the base of ancient cirques. Morainal deposits exist locally at the base of glacial valleys.

RPA is of the opinion that, to the extent relevant to the mineral project, there is a sufficiency of surface rights and water for Project operations.

6 HISTORY

PRIOR OWNERSHIP

The area of the current Property was held and explored by the Mitsubishi Corporation (Mitsubishi) from 1975 to 1982. The Property has been held by Compañía Minera - Milpo S.A.A. (Milpo) or its subsidiary company, Compañía Minera Hilarión (Minera Hilarión), since 1982. In 2017, Milpo changed its name to Nexa Peru.

EXPLORATION AND DEVELOPMENT HISTORY

Work completed by Mitsubishi is summarized in Table 6-1.

TABLE 6-1 HISTORICAL WORK
Nexa Resources S.A.– Hilarión Project

Years	Company	Activity	Details
1979	Mitsubishi	Drifting	1,300 m adit on 4,750 m level
Until 1980	Mitsubishi	Topographic Mapping	Photogrammetric survey with contour lines at 5 m intervals from aerial photos
Until 1980	Mitsubishi	Drilling	37 holes totalling 9,058.97m
Until 1980	Mitsubishi	Geological Mapping and Sampling	Detailed mapping and sampling on surface and in adit
1980	Mitsubishi	Resource Estimation	

HISTORICAL RESOURCE ESTIMATES

In 1980, Mitsubishi estimated unclassified resources of 11,316,470 tonnes grading 7.6% Zn, 2.2% Pb and 2.2 oz/ton Ag. In 1982, Minera Hilarión estimated unclassified resources of 7,437,763 tonnes grading 6.2% Zn, 1.8% Pb and 1.8 oz/ton Ag. These estimates are considered to be historical in nature and should not be relied upon. A qualified person has not done sufficient work to classify the historical estimate as current Mineral Resources and Nexa is not treating these historical estimates as current Mineral Resources.

Nexa Peru completed Mineral Resource estimates in 2006, 2008, 2012, 2014, and 2017. These Mineral Resource estimates are superseded by the estimate presented in Section 14 of this report.

PAST PRODUCTION

There has been no past production from the Property.

7 GEOLOGICAL SETTING AND MINERALIZATION

REGIONAL GEOLOGY

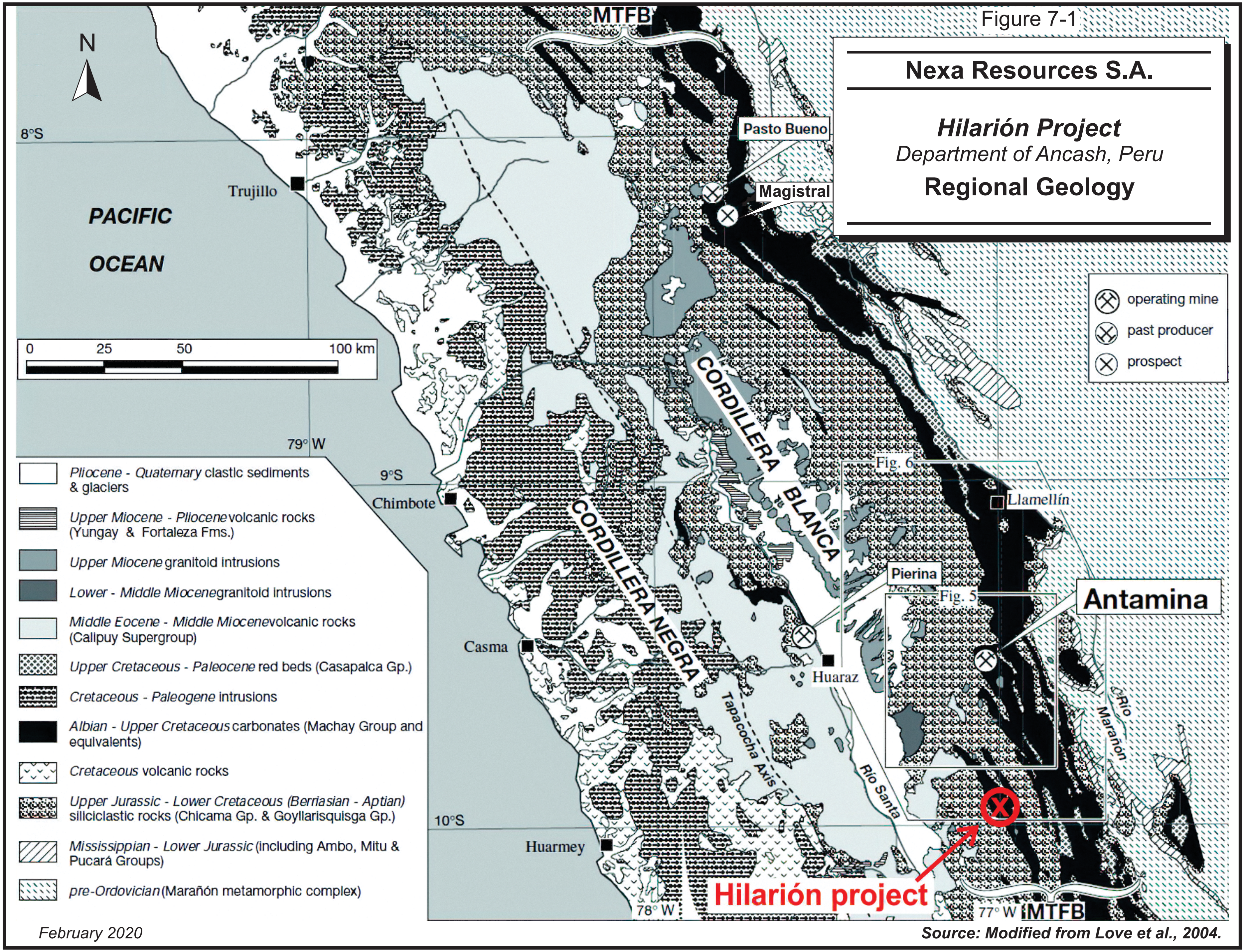
The South American Platform is generally composed of metamorphic and igneous complexes of Archean/Proterozoic age and makes up the continental interior of South America. The Platform consolidated during Late Proterozoic to Early Paleozoic times in the course of the Brasiliano/Pan-African orogenic cycle during which the amalgamation of different continents and micro continents with closure of several ocean basins led to the formation of the Supercontinent Gondwana. Archean and Proterozoic rocks are exposed in three major shield areas within the framework of Neoproterozoic fold belts (Guiana, Central Brazil, and Atlantic shields). The western continental margin of the South American Plate developed at least since Neoproterozoic to Early Paleozoic times and constitutes a convergent margin, along which eastward subduction of Pacific oceanic plates beneath the South American Plate takes place. Through this process the Andean Chain, the highest non-collisional mountain range in the world, developed. The eastern margin of the South American Plate forms a more than 10,000 km long divergent margin, which developed as a result of the separation of the South American Plate and the African Plate since the Mesozoic through the opening of the South Atlantic and the break-up of Gondwana. The northern and southern margins of the South American Plate developed along transform faults in transcurrent tectonic regimes due to the collision of the South American Plate with the Caribbean and Scotia Plates. The South American Plate reveals a long and complex geologic history (Engler, 2009).

Most of the stratigraphy, structure, magmatism, volcanism, and mineralization in Peru is spatially and genetically related to the tectonic evolution of the Andean Cordillera of the western seaboard of South America. The cordillera was formed by actions related to major subduction events that have continued to the present from at least the Cambrian (Petersen, 1999) or late Precambrian (Clark et al., 1990; Benavides-Caceres, 1999). The formation of the Andean Cordillera is, however, the result of a narrower period stretching from the Triassic to present when rifting of the African and South American continents formed the Atlantic Ocean. Two periods of this later subduction activity have been identified (Benavides-Caceres, 1999): Mariana type subduction from the late Triassic to late Cretaceous; and Andean type subduction from the late Cretaceous to present.

The geology of Peru, from the Peru-Chile Trench in the Pacific to the Brazilian Shield, is defined as three major parallel regions, from west to east: the Andean Forearc, the High Andes, and the Andean Foreland. All three of these regions formed during Meso-Cenozoic evolution of the Central Andes. The Property lies within the High Andes region. A simplified geology map of Peru is shown in Figure 7-1 and a regional morpho-structural map is shown in Figure 7-2.

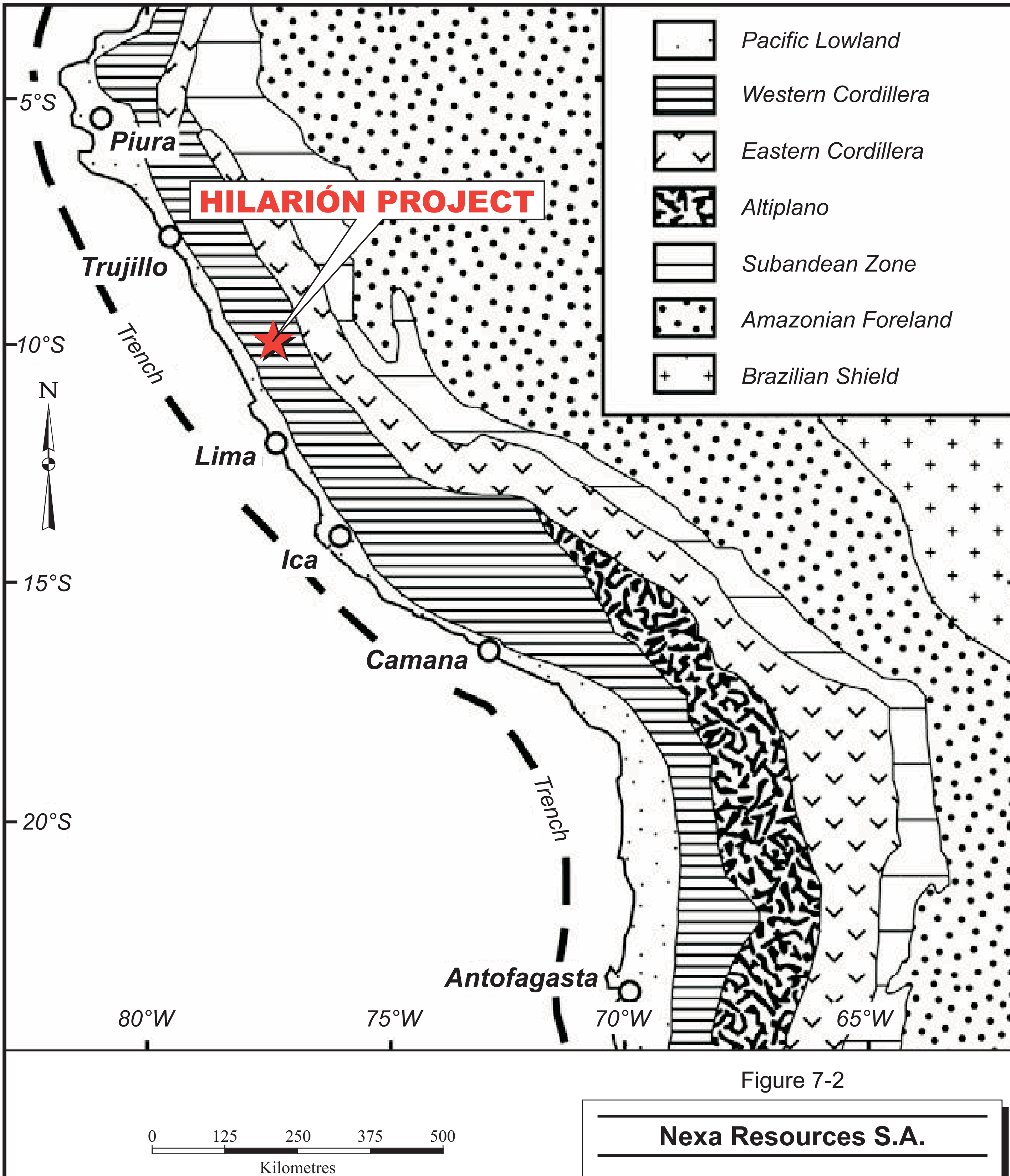
The High Andes can be divided into three sections, from west to east:

1. The Western Cordillera is made up of Mesozoic-Tertiary age rocks, dominated by the Coastal Batholith which consists of multiple intrusions with ages ranging from Lower Jurassic to Upper Eocene. The belt is up to 65 km across by 1,600 km long running sub-parallel to the Pacific coast, extending into Ecuador and Chile. The Project is located within the Western Cordillera.
2. The Altiplano is a high internally drained plain situated at a mean elevation of approximately 4,000 m, slightly below the average altitudes of the Western and Eastern Cordillera. It is 150 km wide and 1,500 km long, extending from northern Argentina to southern Peru.
3. The Eastern Cordillera forms a 4,000 m high and 150 km wide plateau. During the Cenozoic era, the arc has been uplifted forming the Eastern Cordillera. Stratigraphically, the High Andes zone consists of, from west to east, an intra-arc trough, a deep basin, a continental shelf, and the Marañón metamorphic complex (the Marañón Complex). In general, the formations become progressively older from west to east, spanning from the mid-Tertiary to the Neoproterozoic-Paleozoic.



February 2020

Source: Modified from Love et al., 2004.



Source: After Jaillard et al., 2000 and Sebrier et al., 1988.
In Wipf, 2006. PGS Pacific Geological Services.

February 2020

Figure 7-2

Nexa Resources S.A.

Hilarión Project
Department of Ancash, Peru
Morphostructural Map

LOCAL GEOLOGY

The Project is located at Cordillera Huallanca (Central Andes in Peru), which is the southeastern continuity of Cordillera Blanca. The Cordillera Huallanca lies in the eastern part of the Cordillera Occidental, southeast of the Cordillera Blanca, and west of the Río Marañón valley.

Jurassic to Cretaceous age (152 to 84 Ma) shale, sandstone, marl, and limestone comprise the Cordillera Huallanca. Stocks and dikes of dioritic composition (6.11 ± 0.15 Ma) crosscut the sedimentary assemblage.

Figure 7-3 illustrates the local geology and Figure 7-4 illustrates the local stratigraphic column.

From the oldest to the youngest, the sedimentary assemblage consists of:

- Oyón Formation: fine-grained grey sandstone, shale, and coal horizons. This formation has a thickness of approximately 400 m, and its age is possibly Tithonian (152 to 145 Ma).
- Chimú Formation: interlayered sandstone and black shale containing five metre thick coarse grained sandstone horizons. This formation has a thickness approximately 490 m, and its age is between Tithonian and Valanginian (152 to 133 Ma).
- Santa Formation: limestone and chert at the base with limestone at the top (grainstone mainly). This formation has a thickness of approximately 140 m, and its age is possibly Valanginian (140 to 133 Ma).
- Carhuaz Formation: fine grained reddish sandstone and shale interlayered with thin carbonate beds. This formation has a thickness of approximately 515 m, and its age is between Valanginian and Barremian (140 to 125 Ma).
- Farrat Formation: this formation is a marker as it consists of a massive 30 m thick sandstone bed. At the base, fine grained sandstone and shale occur. This formation has no fossils, however, its stratigraphic position suggests a possible Aptian age (125 to 113 Ma).
- Pariahuanca Formation: wavy laminated brownish colour, fine to medium grained sandstone with interlayered marl at the base and top. This formation has a thickness of approximately 65 m, and its age is possibly lower Albian (113 to 108 Ma).
- Chulec Formation: interlayered limestone and marl containing beds of sandy limestone (grainstone). At the top, this formation is marked by bituminous shale overlain by a metric-scale marl horizon. This formation has a thickness of approximately 120 m, and the age is possibly middle Albian (108 to 103 Ma).

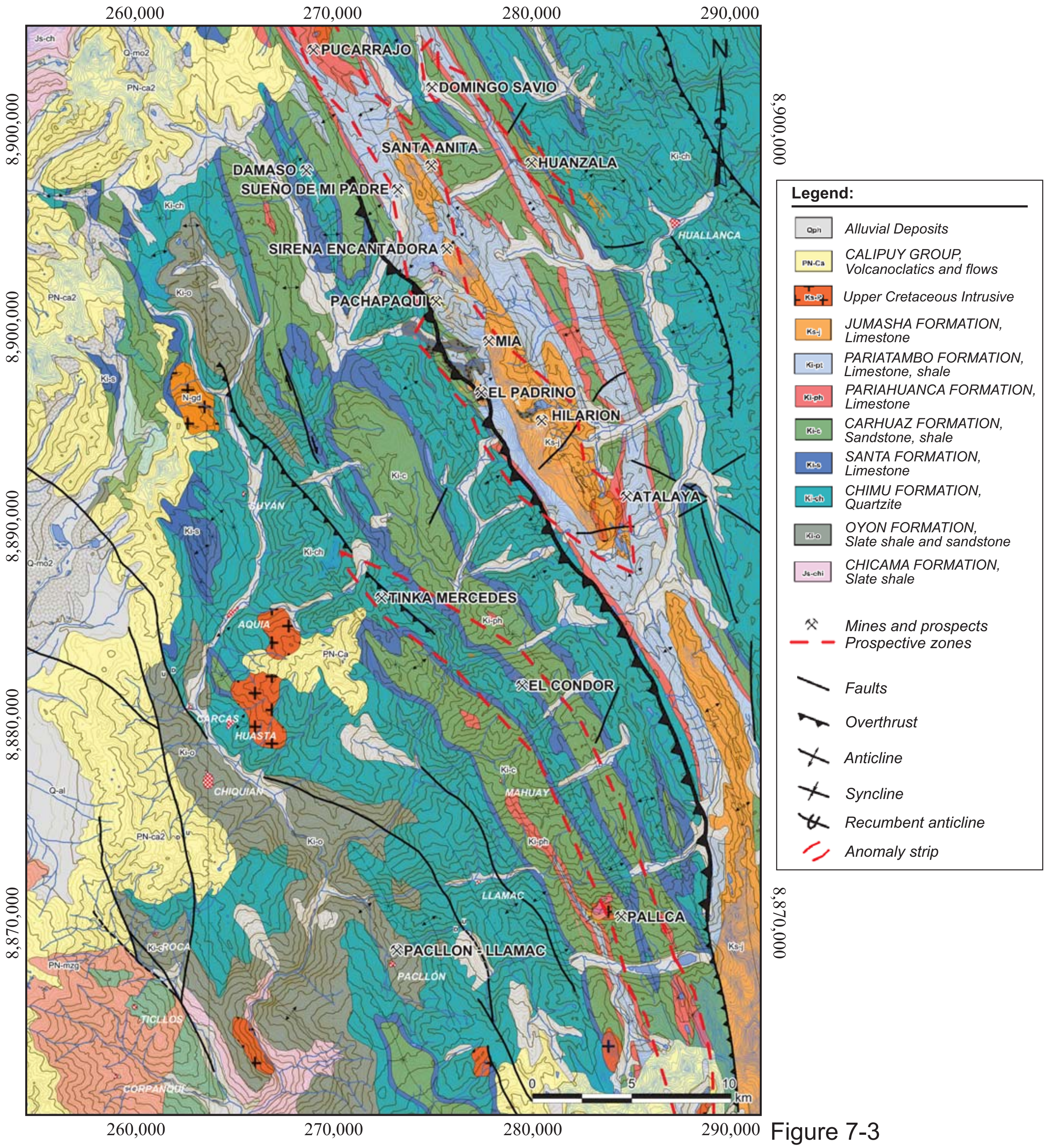


Figure 7-3

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Local Geology

February 2020

Source: Nexa, 2017.

ERA	SYSTEM	SERIE	LITHOGRAPHIC UNITS		SYMBOL	IGNEOUS ROCKS
Cenozoic	Quaternary		Alluvial Deposit		Q-al	
			Glaciofluvial Deposit		Q-glf	
			Morrenicos Deposits		Q-mo	
					Q-mo1	
					Q-mo2	Neogene Intrusives N-gd Granodiorite
	Neogene		Calipuy Group		PN-Ca2	
	Paleogene				P-Ca1	
Mesozoic	Cretaceous	Upper	Casapalca Formation		KsP-c	
			Celendin Formation		Ks-ce	
			Jumasha Formation		Ks-j	
		Lower	Pariatambo Formation		Ki-pt	
			Pariahuanca Formation		Ki-ph	
			Goyllarisquizga Group	Carhuaz Formation	Ki-g: Ki-c	
				Santa Formation	Ki-g: Ki-s	
				Chimu Formation	Ki-g: Ki-ch	
			Oyon Formation		Ki-o	
	Jurassic	Upper	Chicama Formation		Js-ch	

Figure 7-4

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Stratigraphic Column

February 2020 ***Source: TWP Sudamerica S.A., 2013.***

- Pariatambo Formation: host rock for the Hilarión mineralization consisting of a sedimentary sequence deposited during the anoxic Albian event. This formation has a lower member consisting of nodular limestone (host rock for Hilarión mineralization) interlayered with bituminous black marl, and an upper member formed by interlayered limestone and bituminous black shale. This formation has thickness of approximately 150 m, and its age is possibly upper Albian (103 to 100 Ma).
- Jumasha Formation: thick dark coloured limestone and dolostone beds interlayered with thin dark grey marl horizons. It has a thickness of approximately 270 m, and its age is possibly upper Albian to Santonian (103 to 84 Ma).

This sedimentary assemblage includes two transgressive sequences separated by a disconformity thought to be a result of late-middle Albian uplift and erosion related to the Mochica orogeny (Mégard, 1984). This sequence began with the Albian shallow-water, carbonate rich Inca, Pariahuanca and Chulec formations, and culminated in the deeper-water, anoxic, middle Albian Pariatambo Formation. The sedimentation interval between the Pariahuanca and Celendín formations (at the top of Jumasha Formation) is also known as Machay Group (Albian to Upper Cretaceous deposition).

This sedimentation assemblage was affected by several tectonic cycles, the most important being the Incaic events:

- The Incaic I compressive event, occurring between 59 and 55 Ma, terminated the Cretaceous to Paleocene deposition throughout the Peruvian Andes, and produced a major hiatus and unconformity. It also formed the Incaic Fold and Thrust belt, that extended from the Coastal block, including the rigid Coastal batholith in the west, to the Marañón arch in the east. This represents an eastward migration of deformation from the previous Peruvian Fold and Thrust belt. Erosion related to this orogenic pulse to the north of Cajamarca beveled rocks from the Proterozoic to the Coastal batholith and removed as much as three to four kilometres of roof rocks from the latter, to form the Caldera erosion surface. Between the Abancay deflection and just south of Cajamarca, the Incaic Fold and Thrust belt is divided into two by the longitudinal Incaic megafault, which is marked by the Cordillera Blanca fault system, interpreted to represent a steep, deep-seated reverse fault. To the west of this structure, compression did not result in significant deformation. In contrast, immediately to the east of the megafault, the rocks were not only strongly folded but also developed a fracture schistosity, with almost vertical fractures that are cut by thrust faulting. These differences are reflected by the nature of the unconformity, which cuts gently folded Albian sedimentary rocks and the Coastal batholith to the west, and strongly folded Jurassic and Cretaceous formations to the east (Benavides-Caceres, 1999).
- The Incaic II compressive event, occurring from 43 to 42 Ma, was focused on the same Incaic Fold and Thrust belt between the Coastal block and the Marañón arch as the Incaic I event. It produced the major Incaic II unconformity, the Laderas erosion surface, which is conspicuous throughout the Peruvian Andes. This event is interpreted to be related to a global period of greater tectonic activity, including a strong increase in convergence rate and change of relative plate motion between the Farallon and South American plates by 42 Ma (Pardo-Casas and Molnar, 1987).

The composite Incaic Fold and Thrust belt resulted from major compression and shortening imposed during both the Incaic I and II orogenic pulses and indicates compression in a southwest-northeast direction. Between the Abancay deflection in the south, and just south of Cajamarca in the north, the eastern margin of the belt is characterized by a narrow imbricate zone of stacked bedding plane overthrusts over a width of approximately five kilometres, thrust directly against the Marañón arch (Wilson et al., 1967). Individual thrusts are as much as 25 km in length and are generally controlled by ductile Albian and Upper Cretaceous platform carbonates. To the south of Cerro de Pasco, these thrusts have, in turn, been folded with steep axial planes, flattening fabrics, and the development of schistosity (Benavides-Caceres, 1999).

During early to middle Miocene until the late Miocene (16 to 8 Ma), a magmatic arc developed in the Cordillera Blanca region. This produced a series of intrusive bodies, spread from the middle part of the Pacific slope of the Cordillera Occidental, through the high plateaus and into the Cordillera Oriental. While generally of small size, a prominent exception is the Cordillera Blanca batholith in central to northern Peru. The smaller intrusions include stocks of 13.0 to 14.0 Ma tonalites, 10.5±0.3 Ma granodiorite, 13.5 and 12.7 Ma granites, 10.0 and 7.8 Ma porphyry complexes, 15.0 Ma monzonites, 15.2 and 13.1 Ma rhyodacite at Cerro de Pasco; 8.3 to 8.2 Ma Morococha quartz monzonite porphyry; 9.8 Ma Antamina porphyry; 15.3 to 14.6 Ma Magistral diorite to quartz monzonite; 14.1 Ma diorite and the 9.0 to 6.8 Ma quartz, feldspar and granodiorite porphyries at Toromocho. The Cordillera Blanca batholith is approximately 200 km x 10 km to 20 km in dimension, with apophyses giving a width of 30 km to 35 km. It plunges to both north and south, as expressed by a string of individual stocks of similar lithology and age. It was emplaced along the Cordillera Blanca fault zone, part of the Incaic megafault system, which marks the western boundary of the more heavily deformed section of the Incaic Fold and Thrust belt. It is essentially composed of a leucogranodiorite with subsidiary tonalite and granodiorite and monzogranite, surrounded by a spectacular metamorphic aureole. Atherton and Petford (1996) and Petford and Atherton (1996) described it as a high sodium leucogranodiorite, with minor diorite and tonalite, and to have calc-alkaline composition with >70% SiO_2 and a trondhjemitic character. The batholith rocks have well-defined planar foliation that is particularly intense close to the western fault zone. K/Ar age determinations for the Cordillera Blanca batholith (Landis and Rye, 1974; Stewart et al., 1974; Cobbing et al., 1981; Petford and Atherton, 1992) fall into two broad groups: an older 12.0 to 9.0 Ma tonalite-granodiorite, and a younger 6.3 to 2.7 Ma leucogranite forming the bulk of the batholith. The 12.0 to 9.0 Ma group is thought to have been emplaced at depths of approximately five kilometres below the Quechua I surface, accompanying intense sinistral transtensional faulting. The 8.0 to 7.0 Ma magmatic gap is attributed to the Quechua II orogenic pulse, followed by a return to an extensional regime from 7.0 to 5.0 Ma, terminated by the weak compressive 5.0 to 4.0 Ma Quechua III deformation, and the resumption of extension from 4.0 Ma to the present (Benavides-Caceres, 1999).

This regional Miocene igneous activity is responsible for the formation of the Hilarión – El Padrino deposits, as the local geology shows similar intrusive rocks in composition, intrusion style, and the Atalaya stock at the Compañia Minera Santa Luisa property, a few kilometres south of Hilarión deposit. The emplacement of the intrusive bodies in the region was controlled by pre-existing structures, especially the ones in the "Andean" northwest-southeast direction, although, to a lesser extent, intrusive rocks may occur in an east-west direction.

PROPERTY GEOLOGY

The mineralization in the area consists of sulphides containing potentially economic concentrations of Zn-Ag-Pb-(Cu-Au) that have formed during the interaction between magmatic hydrothermal fluids and the country limestone (skarn).

Lithology, structure, and proximity to intrusive rocks are the main controls for Hilarión – El Padrino mineralization. The host rock for the mineralization is the upper member of Pariatambo Formation, which consists of tens of centimetre-scale nodular limestone beds interlayered with bituminous black marl. This combination of rocks is an outstanding chemical trap to cause sulphide precipitation as the acid hydrothermal fluid was neutralized by limestone and reduced by contact with bitumen.

Structures, however, are a necessary element to allow the fluid to percolate and to react. The sedimentary package generally has sub-vertical to steeply dipping bedding towards the northwest. Bedding is folded in a series of anticlines and synclines and is additionally affected by normal faults and reverse faults. These faults are considered older than the mineralization and have played the role of fluid pathways rather than orebody disrupters. Structures that control the orebody position have directions of northwest-southeast, northeast-southwest, and east-west. The best thickness and metal grades in the deposit are found at the intersection between one or more of these structures and the Pariatambo formation. The northwest-southeast is the most prominent fault system in the area and consists of several sub-vertical reverse faults (Jacay et al., 2008). These faults are parallel to the Andean trend and to fold axes, giving rise to duplex-type replications. This system controls the orientation of stocks, dikes, and sills, which are frequently accompanied by mineralized bodies.

Porphyry of dacitic (quartz and feldspar phenocrysts) and dioritic (feldspar phenocrysts) composition occurs in the form of dikes and stocks. In the Project area, there are two adjacent stocks (Hilarión and Hilarión Sur), both located in the southern part of the deposit. The Hilarión stock has dimensions of 220 m x 200 m, whereas Hilarión Sur stock has dimensions of 600 m x 220 m. These stocks are hosted by the Pariatambo Formation, and drilling has proven them to be sub-vertical and continuous at least to the elevation of 4,000 MASL (or 1,000 m below surface). The dikes were emplaced along pre-existing structures (zones of weakness). Mineralization at Hilarión is coincident with the area of highest dike density. Dike thickness varies from 0.5 m to 8.0 m and they reach 50 m to 1,500 m in length. Macroscopically they are light gray to white, have a porphyritic texture with feldspar phenocrysts.

The property geology is shown in Figure 7-5.

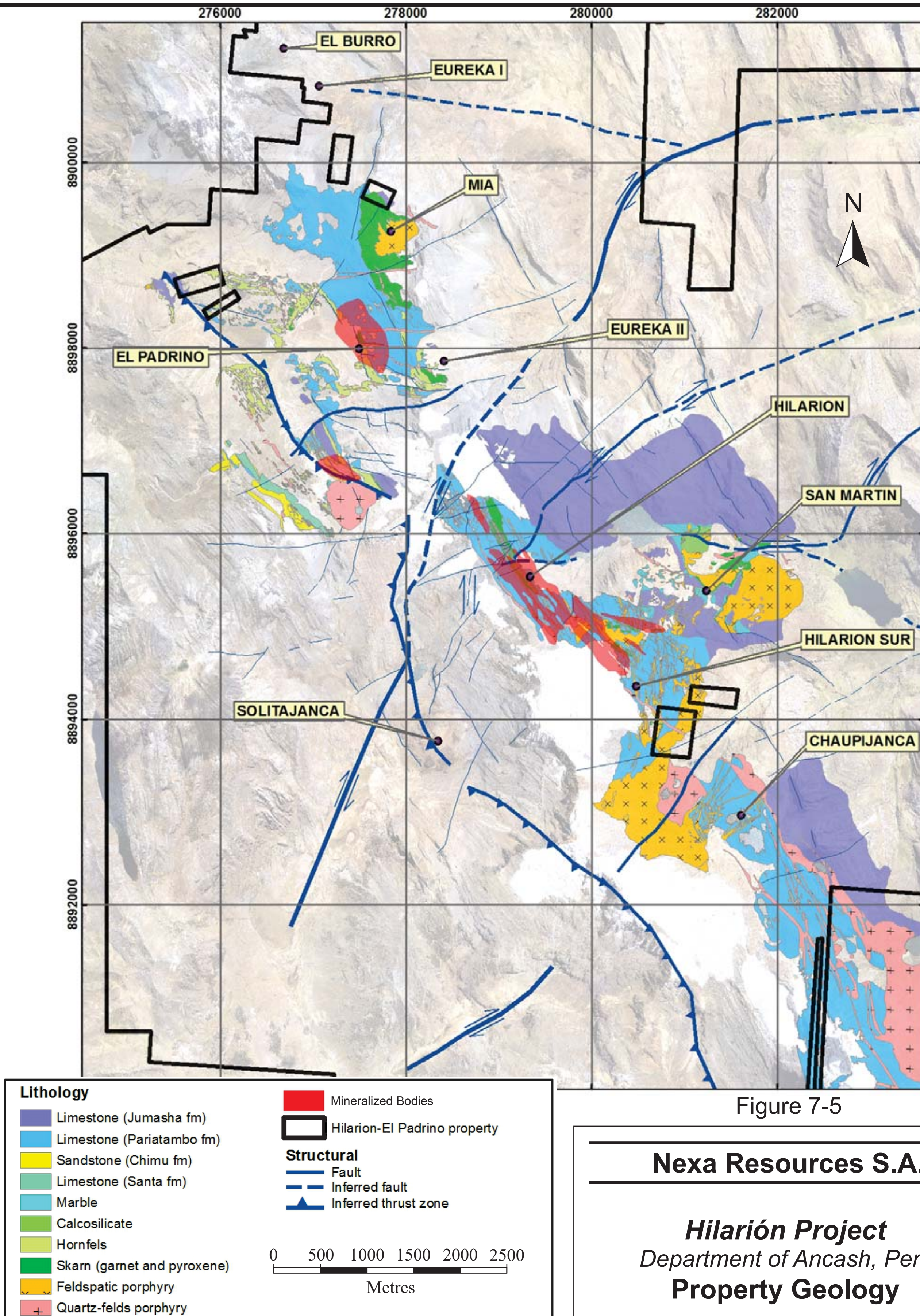


Figure 7-5

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Property Geology

February 2020

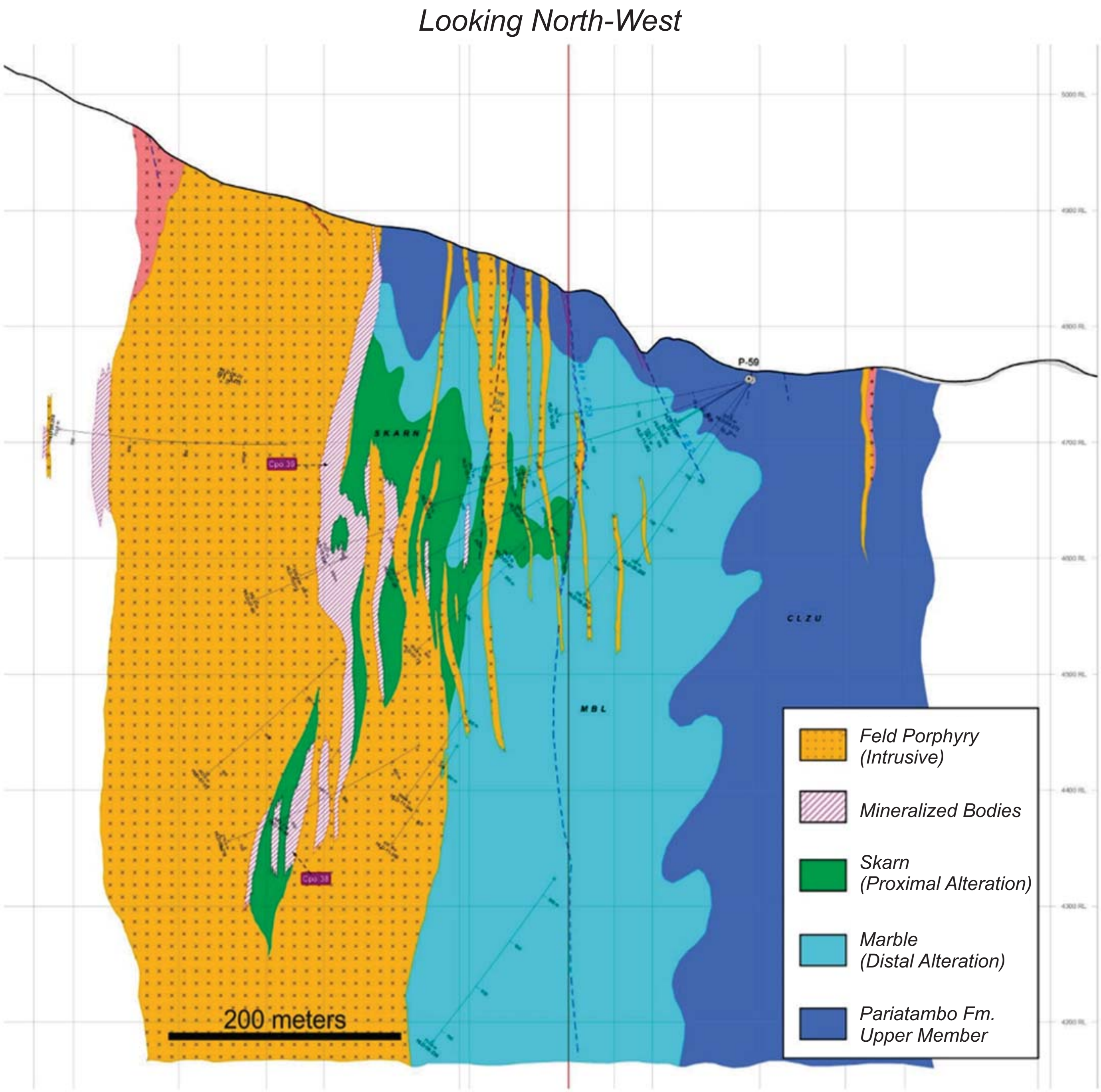
Source: Nexa, 2019.

MINERALIZATION

The mineralization at Hilarión–El Padrino occurs along the contacts of dikes but also as discrete tabular vertical zones. The zones are elongated parallel to the main northwest-southeast structures, which is also the direction of most of the dikes. The Hilarión deposit consists of multiple mineralized zones that vary from 3 m to 65 m in thickness and from 100 m to 1,500 m along strike.

The alteration and mineralization assemblage at Hilarión–El Padrino show overlapping phases of hydrothermal mineral formation, confirming the typical multi-pulse style of this type of mineralization (skarn). The most distal parts of the system are composed of an alteration assemblage of garnet (andradite more distal and grossularite more proximal) and pyroxene (diopside and hedenbergite). Closer to the heat source, this assemblage is overprinted by the minerals of economic interest: sphalerite-marmatite, galena, argentiferous galena and argentite, associated with pyrite and pyrrhotite. This ore has semi-massive to massive texture. Pyrrhotite is more abundant in the zones adjacent to the intrusive bodies, and at depth it can be found where chalcopyrite occurs.

Figure 7-6 illustrates a typical section through the Hilarión deposit.



Typical section through the Hilarión deposit

Figure 7-6

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Typical Cross Section

February 2020

Source: Nexa, 2017.

8 DEPOSIT TYPES

The mineralization at Hilarión is found in association with a Zn-Pb-Ag skarn system. Skarn mineralization is hosted by contact, metasomatic calc-silicate rocks proximal to intrusive rocks. They typically form by contact metamorphism of a carbonate rich rock. The reader is referred to Meinert (1993), Dawson et al. (1984) and Einaudi et al. (1991) for more detailed descriptions of skarn systems.

The following is taken from Rogers et al. (1995).

Host rocks consist of magnesian skarn and calcic skarn which were formed from the metasomatic replacement of dolomite and limestone, respectively. Metasomatized rocks consist of limestone, dolomite, and calcareous clastic sedimentary rocks. Associated intrusive rocks include gabbro to granite and diorite to syenite for Zn-Pb-Ag and W-Mo skarns and two-mica, S-type granite-granodiorite for Sn-W skarns.

Skarns are typically coarse grained, granoblastic to hornfelsic. Their associated intrusives display a variety of textures from equigranular to porphyritic to aphanitic. Dikes are common. They range in age from Precambrian to Recent but on a worldwide basis are most common in the Phanerozoic.

Generally, skarns are associated with late-orogenic or post-orogenic intrusions developed in collisional, continental margin, orogenic belts. On a local scale, features such as shallow pluton/carbonate contacts, irregularities in the contact, stockwork fracturing at the contact and structural and/or stratigraphic traps in the host rock may influence the skarn formation.

Skarn mineralization varies from massive to disseminated and/or interstitial. Irregular, tabular, vein-like, and peneconcordant bodies are possible. Mineralized zones may occur within the causative intrusion (endoskarn) or adjacent to the intrusion (exoskarn) up to several tens to hundreds of metres away if controlled by structural and/or stratigraphic features.

Extensive skarn mineralogy associated with contact metasomatism results in prograde Ca-Fe-Mg-Mn silicates including hedenbergite, andradite, forsterite, serpentine, spessartine, diopside, epidote, wollastonite, tremolite, idocrase, tourmaline and greisen (quartz-muscovitetopaz-fluorite) and retrograde chlorite, actinolite, and clay minerals. Zonal alteration patterns are common.

Geological controls on skarn mineralization include relatively thick, pure, and impure limey rocks; shallow-dipping pluton/carbonate traps, irregularities in the pluton/carbonate contacts; structural and stratigraphic traps or controls in the host rocks; and stockwork fracturing along the pluton/carbonate contacts. Faults, contacts, bedding, breccias, crosscutting dikes, or structures control the location of the deposits at a distance from the pluton.

Cu +/- Au skarns may be zoned from a Cu-Au rich inner zone to a Zn-Pb-Ag outer zone. Copper skarn mineralogy may consist of chalcopyrite, magnetite, bornite, molybdenite, pyrite, and pyrrhotite plus a variety of lesser sulphides.

9 EXPLORATION

Work performed on the Property prior to its acquisition by Nexa Peru is covered in Section 6 of this report.

The work on the Property completed by Nexa Peru is summarized in Table 9-1.

TABLE 9-1 HILARIÓN PROJECT EXPLORATION
Nexa Resources S.A.– Hilarión Project

Years	Company	Activity	Details
1982	Minera Hilarión	Drilling	9 holes totalling 2,678.6 m
1982	Minera Hilarión	Drifting	200 m adit on 4,800 m level
1982	Minera Hilarión	Resource Estimation	
1982-1987	Minera Hilarión	Drifting	San Miguel area
2001	Nexa Peru	Topographic Mapping	Surveying of grids and control points for mapping; Digitizing maps at 1:5,000 and 1:25,000 scales
2001	Nexa Peru	Geology	District geological survey and detailed geological mapping at 1:2,500 scale
2002	Nexa Peru	Geology	Detailed mapping of prospects: El Padrino, Chaupijanca, El Burro, Eureka II, Santa Clara
2002	Nexa Peru	Geophysics	12.5 km of HLEM at Hilarión, El Padrino, Santa Clara
2002	Nexa Peru	Geophysics	3.95 km of pole-dipole and gradient array induced polarization (IP) at Hilarión and Eureka II
2002	Nexa Peru	Geophysics	6.6 km of magnetics at Santa Clara
2005	Nexa Peru	Topographic Mapping	Established topographic control points with differential GPS for aerial photogrammetry and surveying
2005	Nexa Peru	Aerial Photogrammetry	Acquisition of Quick Bird satellite image. Photogrammetry survey at 5m contour intervals. Geo-referencing of image and orthophoto
2005	Nexa Peru	Geology	Re-logging of drill core and re-mapping of adits
2005-2006	Nexa Peru	Drilling	Phase 1 drilling: 21 holes totalling 5,355.20 m on surface and underground at Hilarión.
2005-2008	Nexa Peru	Sampling	Re-sampling of 4,750 m and 4,800 m level adits
2007	Nexa Peru	Drilling	Phase 2 drilling: 120 holes totalling 36,880.35 m on surface and 7,870.70 m underground at Hilarión. Cross-cutting on 4,540 level.
2008-2011	Nexa Peru	Drilling	Phase 3 drilling: 290 holes totalling 137,434.7 m from surface and underground on Hilarión. Sixty-three holes totalling 27,039.4 m on El Padrino.

Years	Company	Activity	Details
2012-2013	Nexa Peru	Drilling	Definition drilling: 165 holes totalling 56,107 m on Hilarión. Sixteen holes totalling 6,486.1 m on El Padrino.
2014	Nexa Peru	Drilling	Thirteen holes totalling 4,765.3 m on El Padrino.
2018-2019	Nexa Peru	Drilling	17 drill holes totalling 17,125.75 m on the Hilarión Project.
2019	Nexa Peru	Mapping	191 ha on the Mia and Hilarión South zones at 1:2,000 scale.

CURRENT WORK

In 2019, Anglo Peruana Terra (APT) conducted a 1:2,000 detailed geological mapping on the Mia target covering an area of 179 ha and on Hilarión South covering an area of 37 ha (APT, 2019). This program was accompanied by geochemical sampling of rock outcrops. The results of the surface sampling in the Mia target are shown in Figure 9-1 and the Hilarión South area in Figure 9-2.

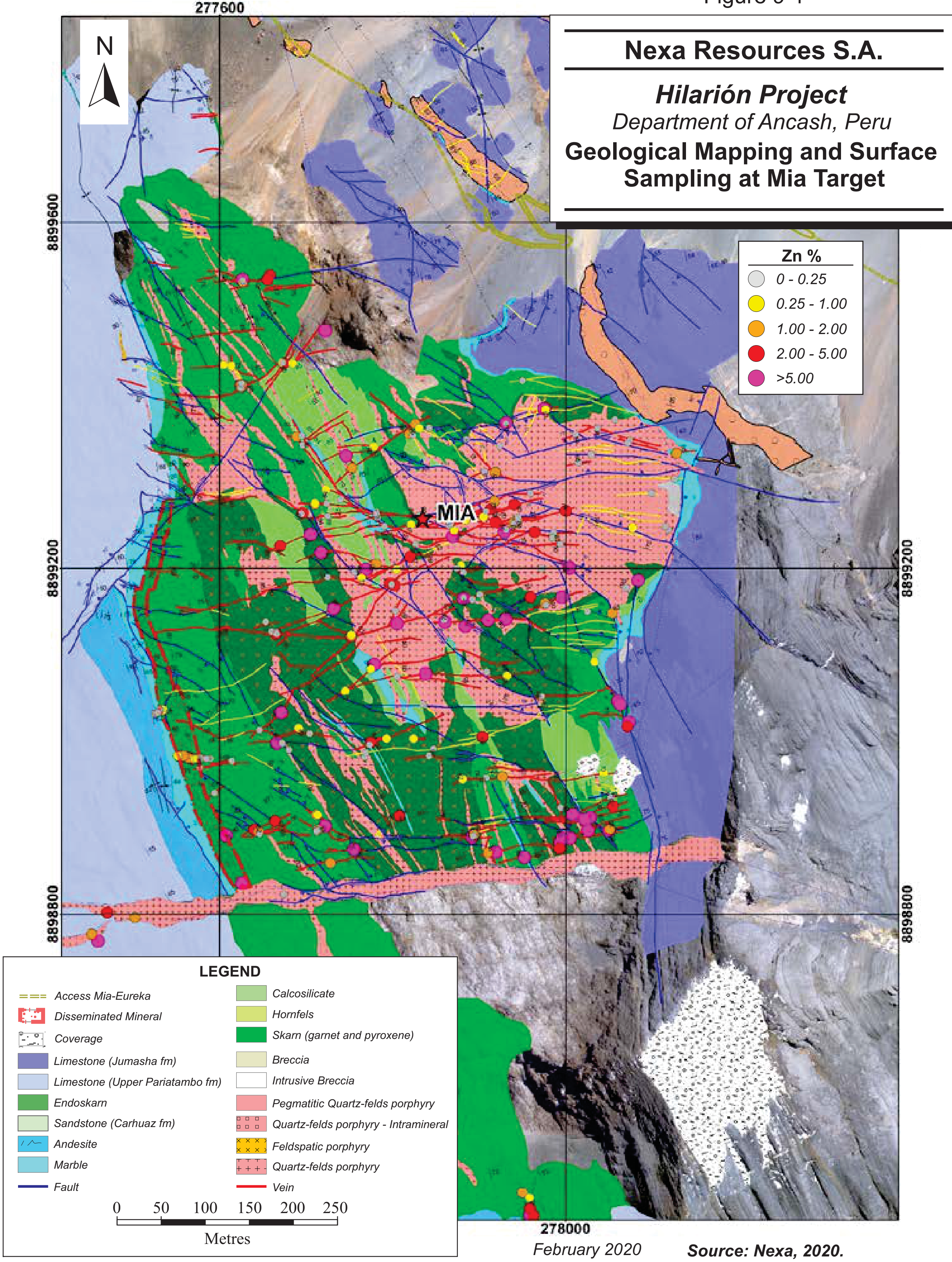
Figure 9-1

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Geological Mapping and Surface Sampling at Mia Target



February 2020

Source: Nexa, 2020.

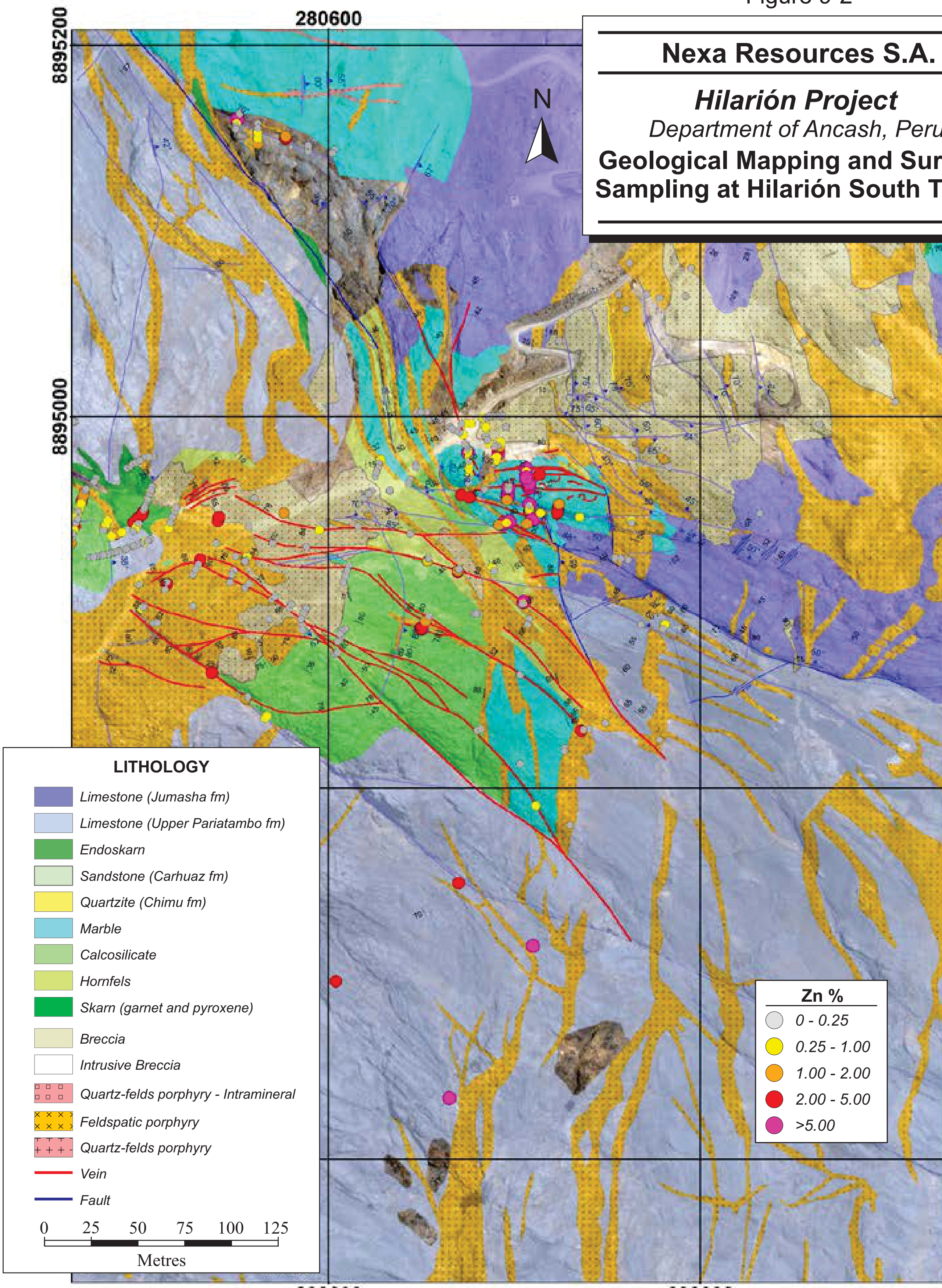
Figure 9-2

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Geological Mapping and Surface Sampling at Hilarión South Target



February 2020

Source: Nexa, 2020.

HILARIÓN NORTH POTENTIAL

In 2018 and 2019, Nexa carried out drilling at the Hilarión North exploration target focusing on investigating the northward extension of the Hilarión mineralization. The results confirmed that the skarn mineralization extends further to the north of the Hilarión deposit and is hosted in the same rocks and shows the same mineralization styles. The 2018-2019 exploration program was successful in delineating and confirming that there is good exploration potential at the Hilarión North target.

Hilarión North occurs in the Pariatambo Formation containing nodular limestone and mudstone and the Jumasha Formation containing grey limestone with chert and fossils. These formations are intruded with quartz-feldspar dacitic porphyry (PQF) and feldspar dioritic porphyry (PFFD) dikes and sills. The bulk of the mineralization is located along the contact of the host rocks and the intrusive rocks in the skarn, with some mineralization in the marble rocks, and lesser mineralization in the skarnoids. At surface, there are many outcrops with intense fractured calcite-quartz veinlets with sulphides confirming that the mineralization extends to the north. In Figure 9-3, a cross section shows mineralization intercepts and the related geological interpretation at Hilarión North.

Based on the geological and structural mapping, and core logging, Nexa prepared mineralization solids in the Hilarión North in order to estimate the exploration potential in this area. Figure 9-4 shows the mineralized solids in a longitudinal section at Hilarión North.

RPA has reviewed the geological interpretation that continues beyond the Hilarión deposit in the Hilarión North area and is of the opinion that the exploration potential ranges from approximately 30 Mt to 80 Mt at grades ranging from 3% ZnEq to 5% ZnEq.

The zinc equivalency (ZnEq) was calculated based on the following metal prices: Zn: US$2,921.95/t (US$1.33/lb); Pb: US$2,242.43/t (US$1.02/lb); Cu: US$6,523.04//t (US$2.96/lb); Mo: US$20,988.00/t (US$9.52/lb); Ag: US$15.71/oz and Au: US$1,268.49/oz, and the following metallurgical recovery assumptions: Zn=90%, Pb=95%, Cu=95%, Mo=65%, Au=80%, Ag=60%

The potential quantity and grade of the exploration target is conceptual in nature, and there has been insufficient exploration to define a Mineral Resource in this area. It is uncertain if further exploration will result in the target being delineated as a Mineral Resource.

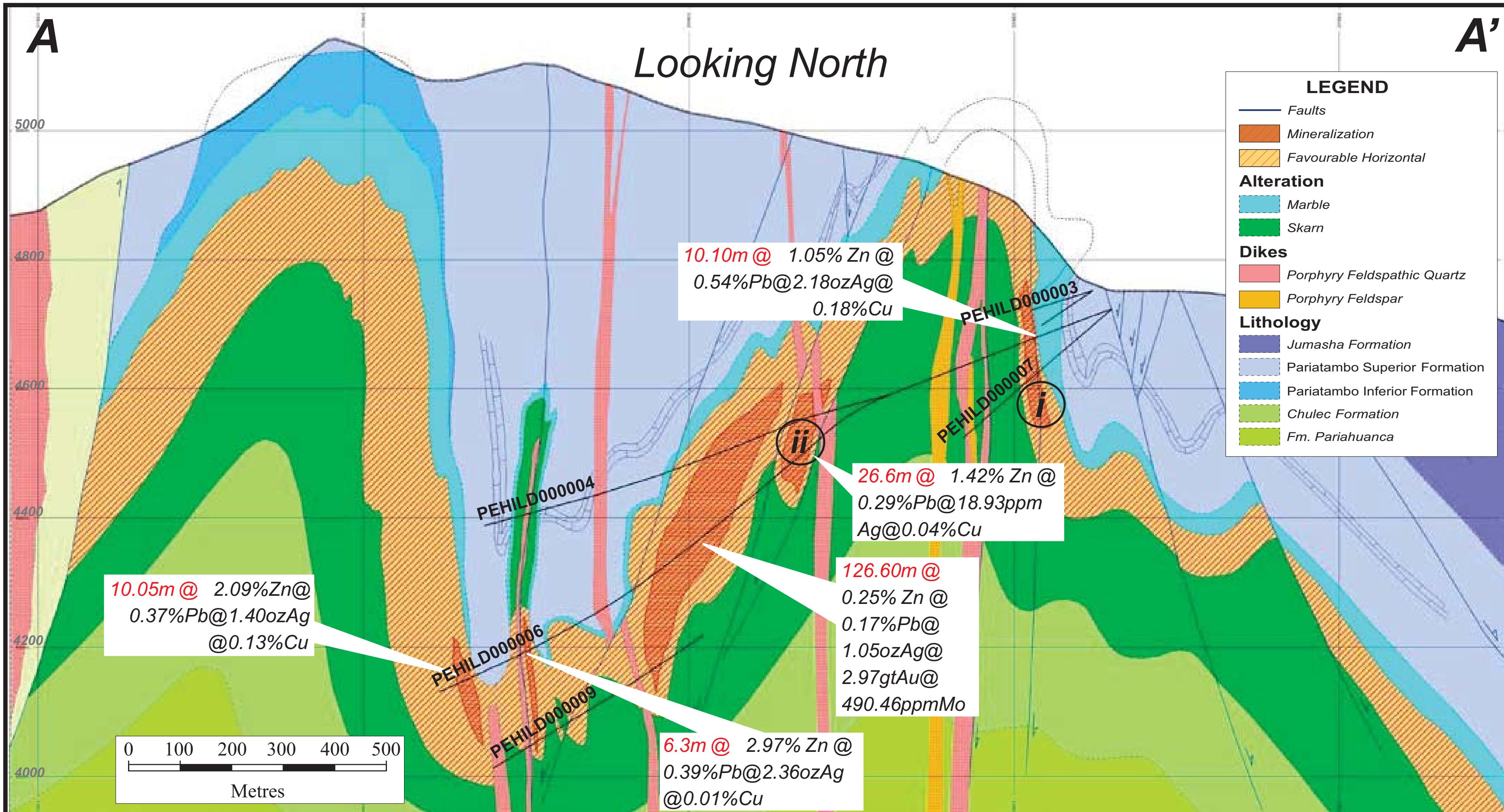


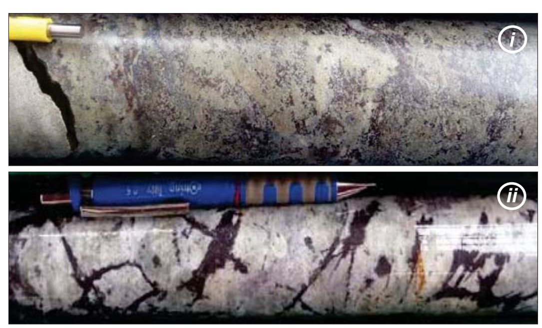
Figure 9-3

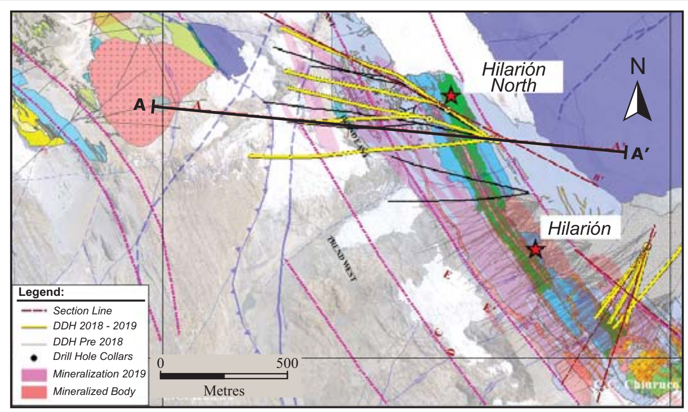
Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Hilarión North Interpreted Geology and Mineralized Zones Cross Section



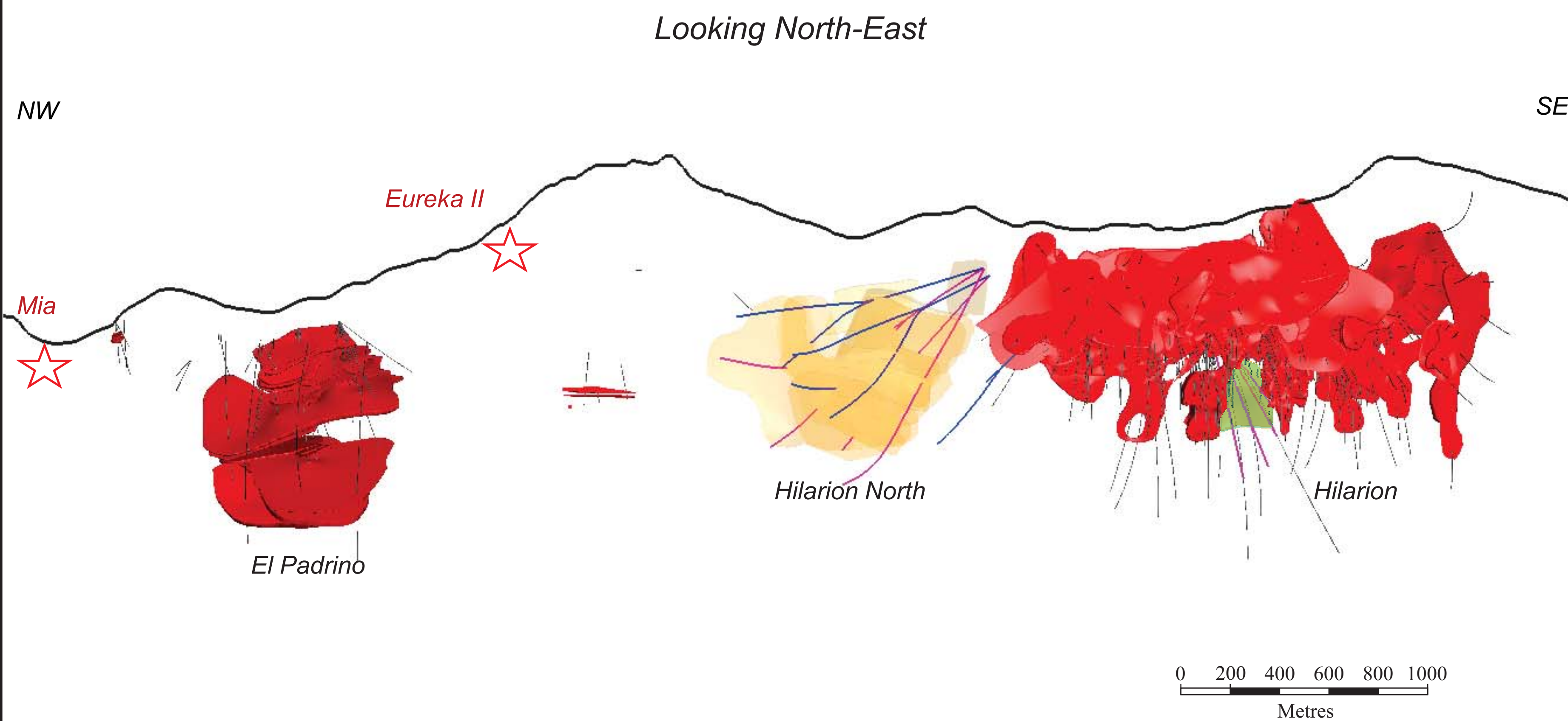


February 2020

Source: Nexa, 2019.

RPA

www.rpacan.com



Legend:

- *2019 Drilling*
- *2018 Drilling*
- *Pre-2018 Drilling*
- *Skarn Deposits*
- *Hilarion North Exploration Target*
- *Cuerpo 33 Mineralization Extension*
- *Other Exploration Targets*

Figure 9-4

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Hilarión North Potential

February 2020

Source: Nexa, 2019.

EXPLORATION POTENTIAL

Figure 9-5 illustrates the northwest-southeast oriented longitudinal section through the El Padrino and Hilarión deposits. Good exploration potential exists in the following areas:

- Step-out drilling on the El Padrino stratigraphic and cross-cutting zones. Most zones remain open along strike and at depth, and there is good potential to increase the resource.
- The resource may be expanded to the southeast where high grade stratabound mineralization was intercepted deep in hole PAD-11-48. Further drilling in this area could define more zones of stratabound mineralization.
- The monzonite contacts at depth at El Padrino is another good target. Intense alteration, a copper-rich geochemical signature and strong, continuous mineralization (including semi-massive sulphides) at depth appear to be related to the underlying monzonite intrusion (Zones 201 and 202). Currently, drilling in much of the 201 and 202 domains is very wide spaced at depth. Infill and step-out targeting will increase resources in these domains.
- No drilling has been carried out yet on a 500 m long zone directly south of the El Padrino deposit. This zone, Padrino South, may be prospective, particularly in an area where a porphyry swarm mapped at surface intersects the southward continuation of the limestone-capped anticline which hosts the majority of Indicated Mineral Resources at El Padrino (see Section 14). This zone may be tested from existing drill roads at surface.
- The area directly north of the El Padrino stock, which currently hosts a small resource (Zones 601–603) based on four drill holes, is another relatively under explored target. This area has some similarities to El Padrino, including mineralization hosted along bedding, mineralization hosted within cross-cutting structures, and enrichment of copper at depth relative to zinc, silver, and lead. Step-out drilling in this area is likely to encounter further mineralization, and more drilling is needed to properly characterize the structure and lithologic regime in this area.
- An untested three-kilometre gap between Hilarión and the Eureka and Mia targets represents another area that should be drilled. This zone could either be accessed and drilled from underground or drilled using directional drilling. Nexa is currently using directional drilling, with permits for tunneling being in progress.
- A four-kilometre long zone to the southeast of the Hilarión deposit has outcropping mineralization on the Property. This zone was historically broken into the Hilarión Sur and Chaupijanca targets. Nexa is planning to build new access from surface towards Chaupijanca.
- A two and half kilometre long target exists to the northwest of El Padrino (between El Padrino and Pachapaqui). This area is poorly explored and includes the Mía target, where mineralized intrusive has been identified at surface developing a halo of skarn with sphalerite, galena, argentite, and chalcopyrite. East-west veins were also observed.

In addition, the San Martin target is located 1.5 km to the east of the Hilarión deposit. The San Martin target comprises a quartz feldspar porphyry intruding the Jumasha Formation. A high chargeability IP anomaly and mineralization identified in exploration tunnels, underground channel samples, and historical excavation from artisanal mining are known. Figure 9-6 shows the location of each of the exploration targets.

RPA recommends that Nexa continues its program of structural-geological mapping and interpretation with additional exploration drilling to improve the understanding of the most important structures on the Property.

In RPA's opinion, the geological setting of the Hilarión Project presents excellent exploration potential, as several targets have already been identified within two to three kilometres from the Hilarión deposit. To date, the mineralization remains open to the northwest and the southeast of the Hilarión area.

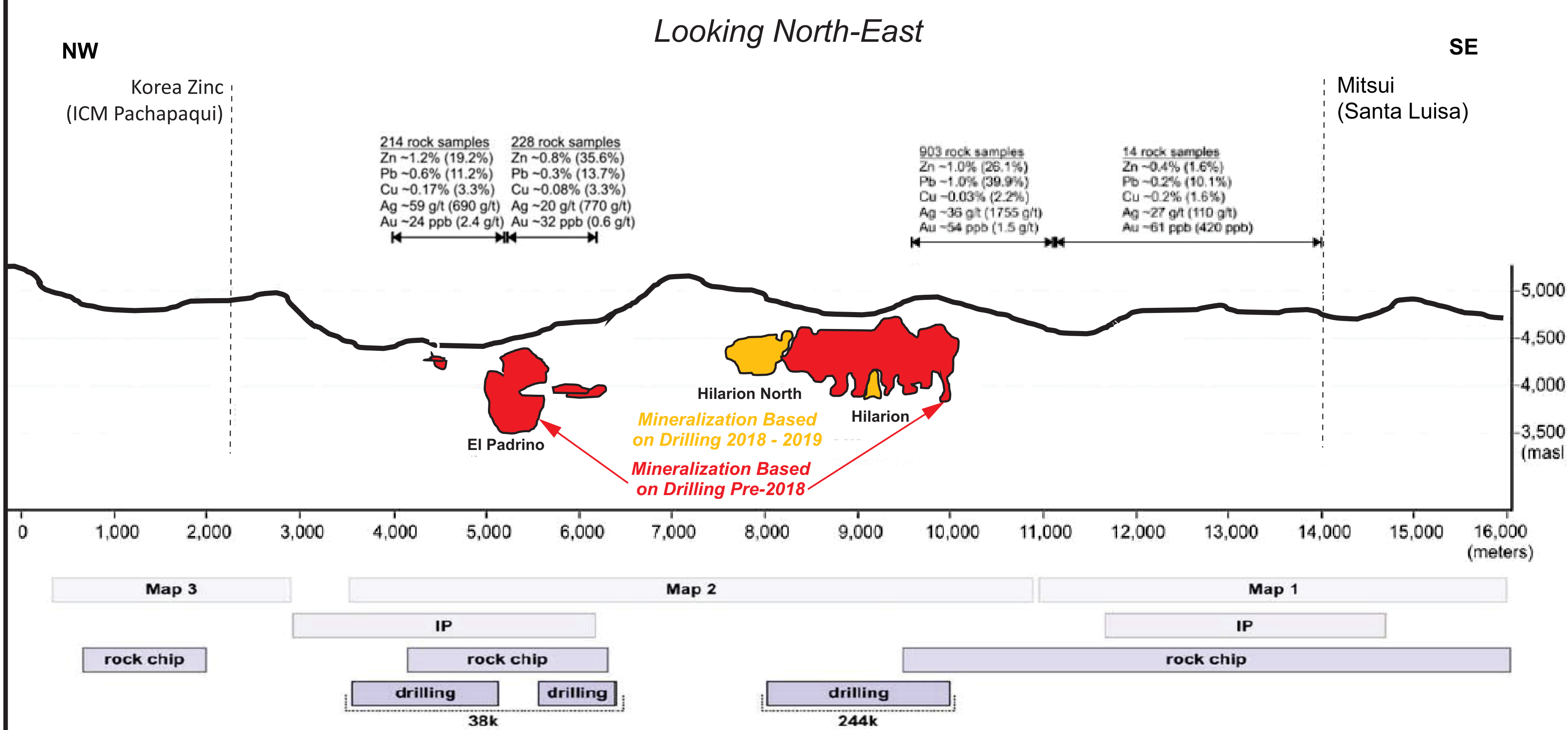


Figure 9-5

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Longitudinal Section of the Hilarión Project

February 2020

Source: Nexa, 2019.

RPA

www.rpacan.com

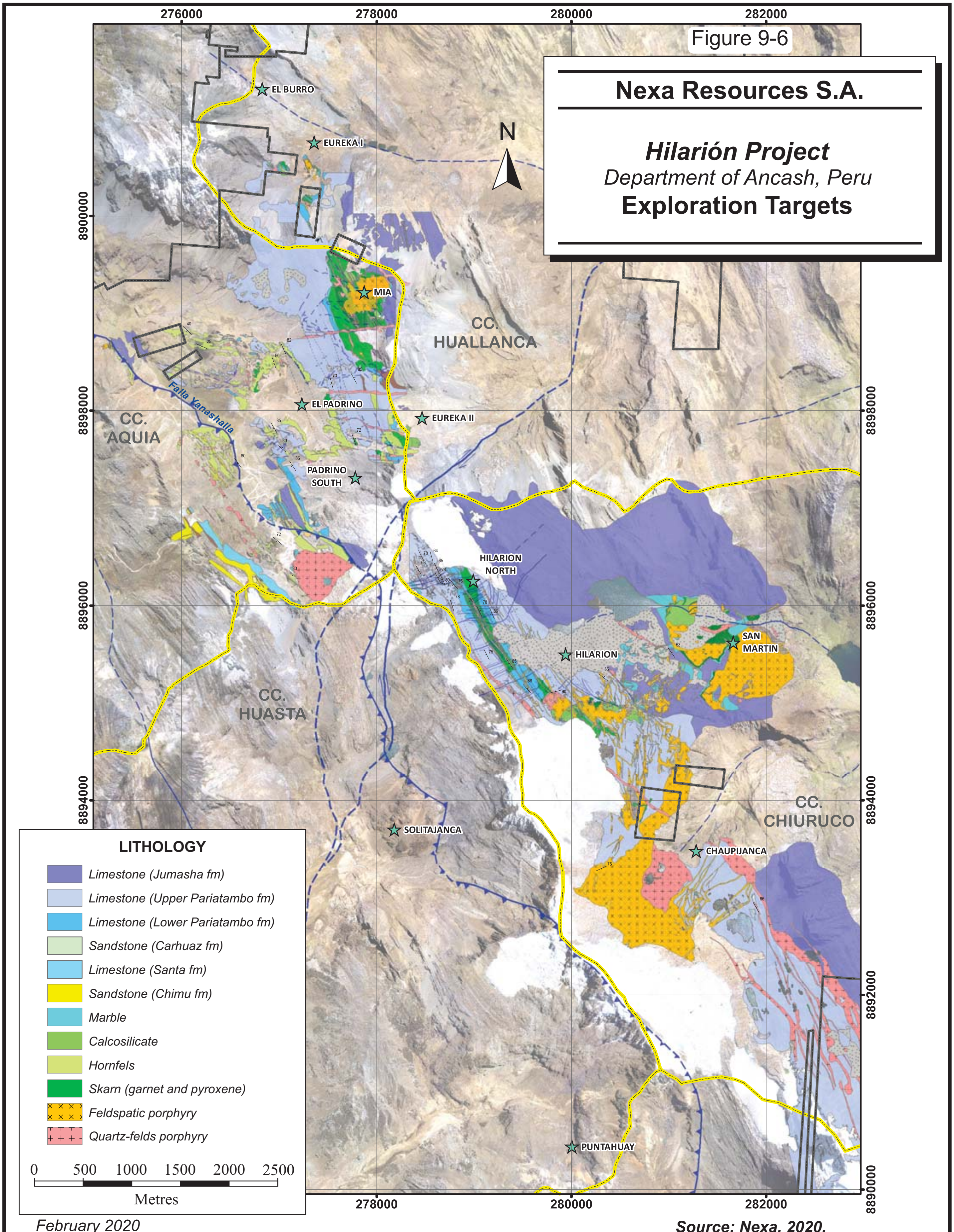


Figure 9-6
Nexa Resources S.A.
Hilarión Project
Department of Ancash, Peru
Exploration Targets
N
276000
278000
280000
282000
8900000
8898000
8896000
8894000
8892000
8890000
EL BURRO
EUREKA I
MIA
CC. HUALLANCA
Falla Yanashalla
EL PADRINO
EUREKA II
CC. AQUIA
PADRINO SOUTH
HILARION NORTH
HILARION
SAN MARTIN
CC. HUASTA
CC. CHIURUCO
SOLITAJANCA
CHAUPIJANCA
PUNTAHUAY
LITHOLOGY
Limestone (Jumasha fm)
Limestone (Upper Pariatambo fm)
Limestone (Lower Pariatambo fm)
Sandstone (Carhuaz fm)
Limestone (Santa fm)
Sandstone (Chimu fm)
Marble
Calcosilicate
Hornfels
Skarn (garnet and pyroxene)
Feldspatic porphyry
Quartz-felds porphyry
0 500 1000 1500 2000 2500
Metres
February 2020
Source: Nexa, 2020.

10 DRILLING

HILARIÓN DEPOSIT

Table 10-1 summarizes the drilling performed on the Hilarión deposit, including historical drilling by Mitsubishi and Minera Hilarión. From 2005 to 2013, Nexa Peru completed 597 diamond drill holes (DDH) for a total of approximately 243,960 m, both from surface and underground. A more recent drilling was carried out by Nexa Peru in 2018 and 2019 and included 17 DDH for a total of 17,125.75 m.

No reverse circulation drilling has been performed at the Project.

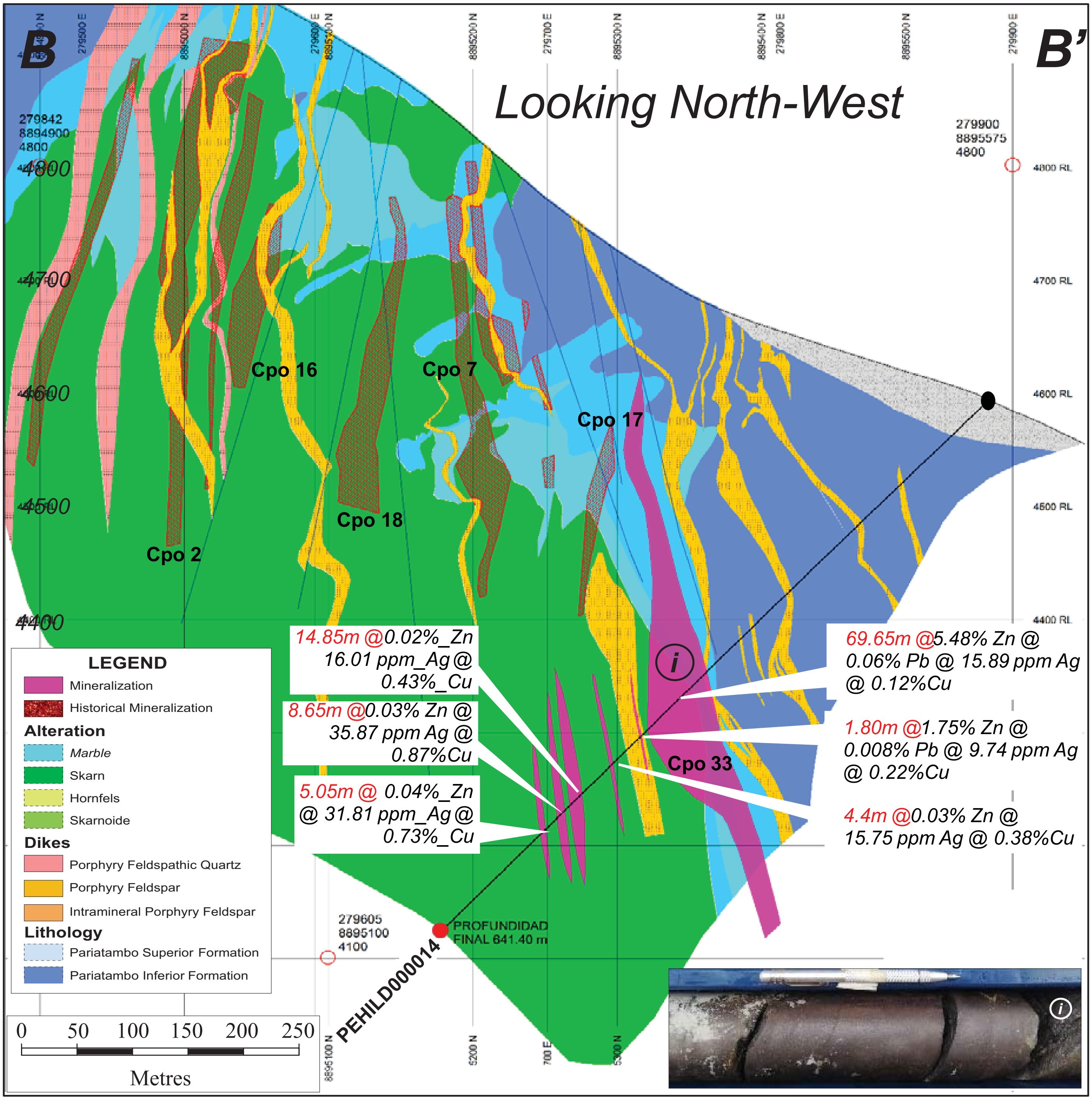
TABLE 10-1 SUMMARY OF HILARIÓN DEPOSIT AREA DRILLING
Nexa Resources S.A.– Hilarión Project

Years	Operator	Drilling Type	No. of Holes Drilled	Meterage Drilled	Comments
Pre-1980	Mitsubishi	DDH	37	9,059.0	Exploration
1980-1982	Minera Hilarión	DDH	9	2,678.6	Exploration
2005-2006	Nexa Peru	DDH	22	5,354.9	Phase I, surface & U/G
2007	Nexa Peru	DDH	120	45,092.1	Phase II, surface & U/G
2008	Nexa Peru	DDH	137	84,674.8	Phase III, surface & U/G
2010	Nexa Peru	DDH	51	15,600.8	Phase III, surface & U/G
2011	Nexa Peru	DDH	102	37,130.7	Phase III, surface & U/G
2012	Nexa Peru	DDH	114	38,081.2	Definition Drilling
2013	Nexa Peru	DDH	51	18,025.8	Definition Drilling
2018-2019	Nexa Peru	DDH	17	17,125.75	Exploration and Definition Drilling
Total			**660**	**272,823.65**	

Nexa treats drilling prior to 2005 as historical drilling. In 2005-2006, Nexa Peru performed data verification tests on the historical data, including twinning of historical drill holes and channel samples. Results from this testing seemed to indicate a high bias in historical data. Additionally, historic drill core was in poor condition, and assay certificates were not available for any of the historic sampling. As a result, Nexa considers the 46 drill holes drilled by Mitsubishi and Minera Hilarión to be unreliable. These drill holes have been excluded from the database and are not used in the resource estimate described in this report.

The 2005 to 2006 drilling was contracted to Explomin del Peru S.A.C. (Explomin). The holes drilled in 2005 used BQ equipment while those drilled in 2006 used NQ equipment. In 2007, drilling was contracted variously to Explomin, Geotech Drilling Services Ltd. (Geotech), and Vankar (Vankar). Surface holes were typically started with HQ diameter core, reducing to NQ diameter core as required. Underground holes were drilled with NQ equipment. In 2008, drilling was contracted variously to Explomin, Geotech, Geodrill Limited (Geodrill) and Geotecnia Peruana S.R. Ltda. (Geotecnia Peruana). Surface holes were typically started with HQ equipment, reducing to NQ equipment as required and underground holes were drilled with NQ equipment, reducing to BQ equipment as required. Drilling from 2010 to 2013 was contracted to Redrilsa Drilling S.A. (Redrilsa) with holes collared with HQ equipment, reducing to NQ as required. In 2018 and 2019, Explomin carried out directional drilling to explore potential resources in the northwestern portion of the Hilarión deposit. This drilling included 11 drill holes totalling 13,027.55 m. In 2019, Remicsa Drilling S.A (Redrilsa) also performed six drill holes totalling 4,098.2 m located in proximity of Cuerpo 33 at Hilarión confirming and extending the mineralization in this zone. Figure 10-1 illustrates a cross section showing mineralization intercepts and the related geological interpretation in the Cuerpo 33 domain at Hilarión.

The 2018–2019 drilling was not included in the resource database for Hilarión as the Mineral Resources were not updated with this data. RPA recommends updating the Mineral Resources with the 2018-2019 drilling, however, in RPA's opinion, the new data would not make a significant change to the Mineral Resources.



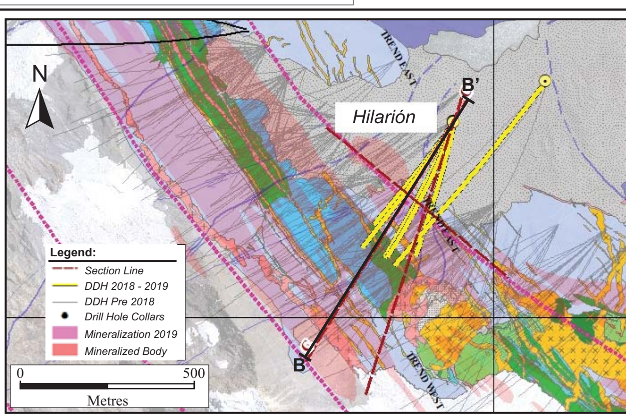


Figure 10-1

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Hilarión Interpreted Geology and Mineralized Zones Cross Section

February 2020

Source: Nexa, 2019.

EL PADRINO DEPOSIT

From 2008 to 2014, Nexa Peru completed 87 diamond drill holes for a total of approximately 38,291 m from surface. No reverse circulation drilling was performed. Table 10-2 summarizes the drilling performed on the El Padrino deposit.

TABLE 10-2 SUMMARY OF EL PADRINO DRILLING
Nexa Resources S.A.– Hilarión Project

Year	Operator	Drilling Type	No. of Holes Drilled	Metreage Drilled	Comments
2008	Nexa Peru	DDH	26	9,990.61	PAD-08-01 – PAD-08-26
2009	Nexa Peru	DDH	6	1,793.45	PAD-09-27 – PAD-09-32
2010	Nexa Peru	DDH	8	6,644.85	PAD-10-33 – PAD-10-40
2011	Nexa Peru	DDH	18	8,610.50	PAD-11-41 – PAD-11-58
2012	Nexa Peru	DDH	3	1,432.30	PAD-12-59 – PAD-12-61
2013	Nexa Peru	DDH	16	6,541.00	PAD-13-62 – PAD-13-77
2014	Nexa Peru	DDH	10	3,278.15	PAD-14-78 – PAD-14-87
TOTAL			**87**	**38,290.86**	

At various times from 2008 to 2014, the drilling was contracted to Geotecnia Peruana, Minera El Muki S.A., and Redrilsa. All holes were collared with HQ equipment and reduced to NQ as drilling conditions dictated. Occasionally, the hole was further reduced to BQ.

Figure 10-2 illustrates the location of the holes drilled on the project.

DRILLING AND SAMPLING PROCEDURES

Surface drill hole collars were spotted using a handheld GPS instrument, and coordinates for all holes were afterwards surveyed using a total station. The azimuth and dip of the holes was established using a compass and inclinometer. The orientation of the holes with depth was determined using a variety of downhole survey instruments over time. Up until mid-2013, readings were taken by the drillers, nominally at 50 m intervals. Afterwards, the readings were taken at nominal five metre intervals.

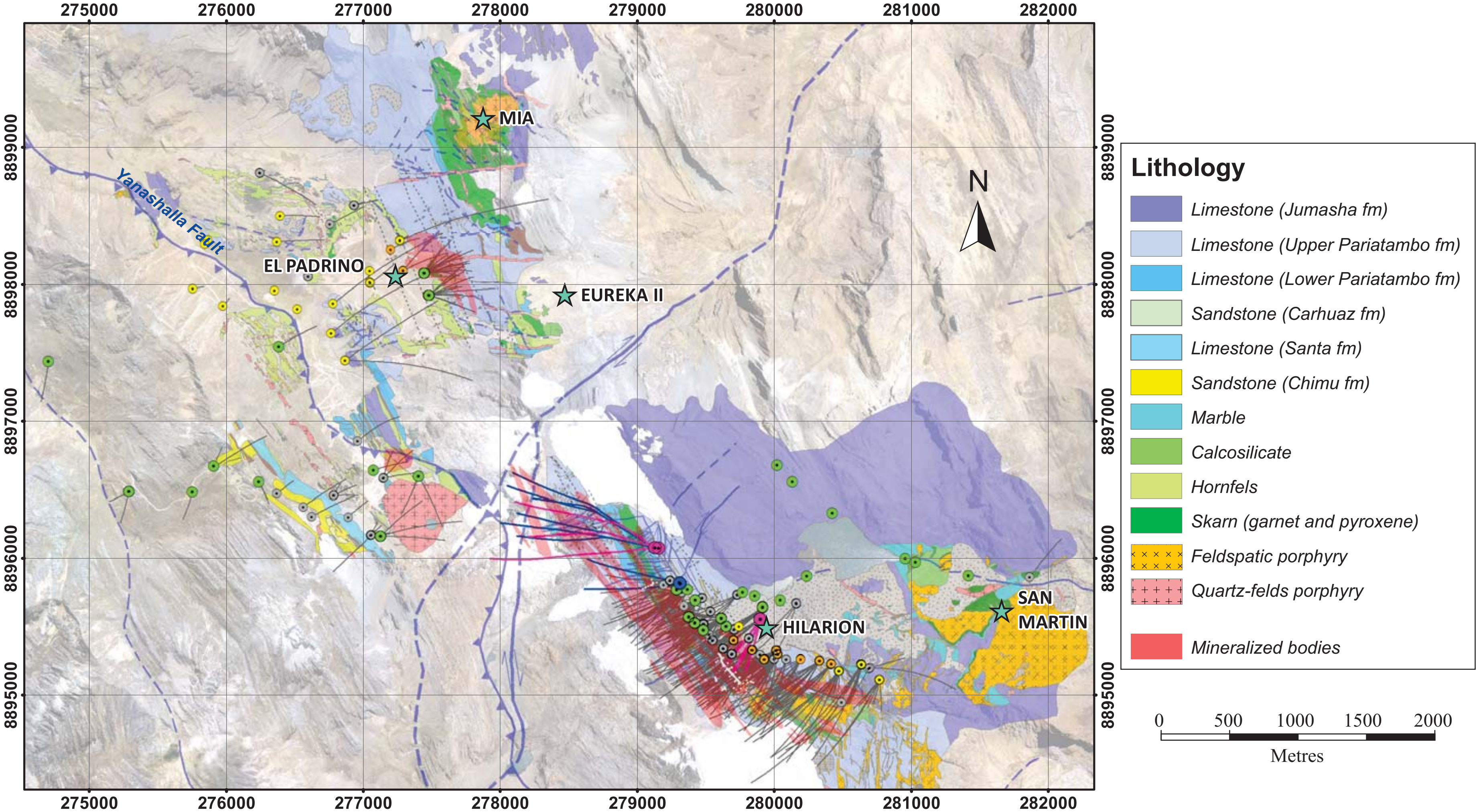
Casings were pulled upon completion of the surface holes and the location of the holes was surveyed.

Drill core was placed sequentially in plastic core boxes at the drill by the drillers. The core was then delivered on a daily basis to Nexa's secure logging facility by the drilling contractor. At the logging facility, depth markers and core box numbers were checked, and the core was cleaned and reconstructed.

From the drill site to the sample preparation facility, the following protocol was followed:

- Drill core was collected from the drill platform and transported by vehicle to the Hilarión camp.
- Lithology, structure, mineralogy, and alteration were logged graphically onto gridded paper by company geologists and sample intervals were marked on the core. QA/QC sampling was also marked onto the core at this stage.
- Rock quality designation (RQD), recovery, structure, and fracture logging were also performed at the logging stage. Core recovery data was collected systematically and stored in digital format. Core recovery was in the order of 80% to 90%. It was generally variable where drilling intersected the hanging wall and footwall of intrusive and mineralized bodies, depending on the degree of alteration and fracturing. Skarn and intrusive areas are more competent (TWP, 2013).
- The sample length was generally between 0.65 m and 2.1 m, with samples not taken across geological boundaries. Nexa used numbered sample tags of which two parts were glued inside the core boxes at the start and end of each sampling interval.
- Core photos were taken with a digital camera.
- Drill core was cut using a diamond saw on a centre line into two equal parts. One half was put in plastic sample bags with a third part of the sample tag and the bag was labelled with the sample number from the tag. Bagged split samples were then packed in larger bags with control samples and sent to the assay laboratory.
- During 2005 to 2013, Nexa personnel delivered the split core samples to Huaraz on a regular basis; from there, split samples were transported by a bonded carrier to Lima for analysis. Sample rejects (i.e., > 10 mesh fraction) are stored at the laboratory.
- In 2018, samples were transported by contract personnel using a private truck from the site to ALS Lima. Sample rejects and pulps are stored at the site.
- Core boxes are stored on racks at the core logging facility for later retrieval if required.

In RPA's opinion, the drilling, core handling, logging, and sampling procedures and the security of the shipping procedures employed at the Project meet industry standards.



TIME			HILARION	PADRINO	TOTAL	
2005	-	2008	279	26	**305**	
2009	-	2010	51	14	**65**	
2011	-	2012	216	21	**237**	
2013	-	2014	51	26	**77**	
2018	-		8		**8**	
2019	-		9		**9**	

DDH - Annual

- *2005 - 2008*
- *2009 - 2010*
- *2011 - 2012*
- *2013 - 2014*
- *2018*
- *2019*

Figure 10-2

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Hilarión Project Drill Hole Plan

February 2020

Source: Nexa, 2019.

RPA

www.rpacan.com

11 SAMPLE PREPARATION, ANALYSES, AND SECURITY

SAMPLE PREPARATION

Batches of samples were dried in stainless steel trays in an oven at either 60°C or 100°C until humidity reached a desired level. They were then crushed in a jaw crusher using quartz flushes and compressed air to clean the equipment between samples. Secondary crushing was then performed with a roller crusher which is cleaned in the same manner. Secondary crushed samples were run three times through a Jones riffle splitter for homogenization and the split positions switched before selection of the sub-sample for pulverization. Pulverizers used a ring and bowl configuration. Compressed air and occasionally quartz flushes were used to prevent sample contamination and industrial alcohol was added to prevent samples from adhering to the bowl walls. Pulps were run through a secondary splitter and reject pulp duplicates were packed and stored for future usage.

From 2005 to 2013, sample preparation protocols included crushing of up to 8 kg to #10 Tyler mesh (1.70 mm), pulverizing a 250 g sub-sample from 85% to # -200 Tyler mesh (75 µm) to obtain 50 g pulp samples (G0201) for testing at the CERTIMIN S.A. (CERTIMIN) laboratory.

In 2018 and 2019, the ALS Global laboratory (ALS) in Lima was used for sample preparation. Sample preparation protocols included primary and secondary crushing up to 70% passing minus 2 mm and pulverizing 250 g pulps to 85% passing 75 µm.

DENSITY MEASUREMENTS

The density of core samples was measured using the water immersion method at the site. Samples were weighed dry and then weighed suspended in distilled water. A formula using the two measurements was then applied to determine the density of the sample.

The formula used for dry samples was:

$$SG = (\text{dry weight}) / (\text{dry weight} - \text{weight in water})$$

From 2005 to 2013, a total of 36,690 density measurements were taken at the Hilarión deposit. In 2018 and 2019, an additional 7,983 density samples were taken at the Hilarión North and Hilarión.

Senior Geotechnical staff reviewed core logs produced by the geologist and selected approximate 10 cm intervals for density measurement. The geotechnician ensured that the measurement apparatus was set up for optimal stability and cleanliness and that the scale was calibrated before each session. Dry samples representative of logged interval lithology, mineralization, alteration, and structure were visually selected from core boxes and brushed to remove debris, marked for their location in the core box, and transferred to a temporary holding box before being moved to the density measurement station.

Since 2005, a total of 44,493 density samples have been taken at the Hilarión deposit. Density sampling at El Padrino has been much more limited; only 114 density samples have been taken to date.

SAMPLE ANALYSIS

During the 2005 to 2013 drilling programs, samples were analyzed in Lima at the laboratory of CERTIMIN (prior to 2012 known as CIMM PERU S.A.). CERTIMIN is accredited to ISO - 9001: 2008, NTPISO and TEC 17025-2006. Since 2018, Nexa has used ALS in Lima. ALS geochemical laboratories are accredited to ISO/IEC 17025:2005 for specific analytical procedures. Both CERTIMIN and ALS laboratories are independent of Nexa. In RPA's opinion, the sample analysis methods are acceptable for the purposes of a Mineral Resource estimate. Tables 11-1 and 11-2 summarize the assay methods used for Hilarión and El Padrino, respectively.

TABLE 11-1 SUMMARY OF HILARIÓN DEPOSIT ASSAY METHODS
Nexa Resources S.A.– Hilarión Project

Laboratory	Element	Units	Service Method Code	Method	Detection Limit Upper	Detection Limit Lower	Method Description
CERTIMIN	Ag	g/t	Ag-AAAR02		<10	>2,000	AAS: Ore
CERTIMIN	Ag	g/t	Ag-AAMA01		<0.5	>300	AAS: Geochemistry Multiacid Digestion
CERTIMIN	Ag	g/t	Ag-AAMA02		<10	>2,000	AAS: Ore - Multiacid Digestion
CERTIMIN	Ag	ppm	G0145		<0.2	>100	ICP OES: Multi-elemental Analysis - Trace - Aqua Regia Digestion
CERTIMIN	Ag	ppm	G0146	IC-VH-33	<0.2	>100	ICP: Multi-elemental Analysis - Aqua Regia Digestion
CERTIMIN	Ag	ppm	ICP-AR01	G0145	<0.2	>100	ICP OES: Trace - Aqua Regia Digestion
CERTIMIN	Ag	ppm	G0099	IC-VH-01	<0.5	>300	AAS: Geochemistry Multiacid Digestion
CERTIMIN	Ag	ppm	G0001	IC-VH-15	<10	>1,000	AAS: Ore - Disintegration - acid Digestion Aqua Regia
CERTIMIN	Ag	ppm	G0002	IC-VH-13	<10	>1,000	AAS: Ore - Total Disintegration
CERTIMIN	Ag	ppm	G0008	IC-EF-15	<100	>10,000	Fire Assay: Gravimetric
CERTIMIN	Ag(1)	g/t		IC-VH-01	<0.5	>300	AAS: Geochemistry Multiacid Digestion
CERTIMIN	Ag(2)	g/t	G0077	IC-VH-13	<0.01	>30	AAS: Ore - Multiacid Digestion
CERTIMIN	Ag	g/t		HF-13/AA	<0.5	>300	AAS: Hydrofluoric acid
CERTIMIN	Ag	ppm			<0.2	>100	ICP: Multi-elemental Analysis - Aqua Regia Digestion
CERTIMIN	Pb	ppm	G0145		<2	>10,000	ICP OES: Multi-elemental Analysis - Trace - Aqua Regia Digestion
CERTIMIN	Pb	ppm	G0146	IC-VH-33	<2	>10,000	ICP: Multi-elemental Analysis - Aqua Regia Digestion
CERTIMIN	Pb	ppm	ICP-AR01	G0145	<2	>10,000	ICP OES: Trace - Aqua Regia Digestion
CERTIMIN	Pb	ppm	G0159	IC-VH-01	<5	>10,000	AAS: Geochemistry Multiacid Digestion
CERTIMIN	Pb	ppm	Pb-AAMA01		<5	>10,000	AAS: Geochemistry Multiacid Digestion
CERTIMIN	Pb	%	Pb-AAAR02		<0.01	>30	AAS: Ore Digestion Aqua Regia
CERTIMIN	Pb	%	G0076	IC-VH-15	<0.01	>30	AAS: Ore - Disintegration - acid Digestion Aqua Regia
CERTIMIN	Pb	%	G0077	IC-VH-13	<0.01	>30	AAS: Ore - Total Disintegration
CERTIMIN	Pb	%	Pb-AAMA02		<0.01	>30	AAS: Ore - Multiacid Digestion
CERTIMIN	Pb	%	G0339		<10	>80	Volumetric Method - Lead Determination
CERTIMIN	Pb(1)	ppm		IC-VH-01	<5	>10,000	AAS: Geochemistry Multiacid Digestion
CERTIMIN	Pb(2)	%		IC-VH-13	<0.01	>30	AAS: Ore - Multiacid Digestion
CERTIMIN	Pb(2)	g/t		IC-VH-13	<0.01	>30	AAS: Ore - Multiacid Digestion
CERTIMIN	Pb	%		HF-13/AA	<0.001	-	AAS: Hydrofluoric acid
CERTIMIN	Pb	ppm		HF-13/AA	<5/<0.001	-	AAS: Hydrofluoric acid
CERTIMIN	Pb	ppm			<2	>10,000	ICP: Multi-elemental Analysis - Aqua Regia Digestion
CERTIMIN	Zn	ppm	G0145		<0.5	>10,000	ICP OES: Multi-elemental Analysis - Trace - Aqua Regia Digestion
CERTIMIN	Zn	ppm	G0146	IC-VH-33	<0.5	>10,000	ICP: Multi-elemental Analysis - Aqua Regia Digestion
CERTIMIN	Zn	ppm	ICP-AR01	G0145	<0.5	>10,000	ICP OES: Trace - Aqua Regia Digestion
CERTIMIN	Zn	ppm	Zn-AAMA01		<1	>25,000	AAS: Geochemistry Multiacid Digestion
CERTIMIN	Zn	%	Zn-AAMA02		<0.01	>20	AAS: Ore - Multiacid Digestion
CERTIMIN	Zn	%	Zn-AAMA02		<0.01	>25	AAS: Ore - Multiacid Digestion
CERTIMIN	Zn	%	Zn-AAMA02		<0.01	>30	AAS: Ore - Multiacid Digestion
CERTIMIN	Zn	%	G0387	IC-VH-15	<0.01	>30	AAS: Ore - Disintegration - acid Digestion Aqua Regia
CERTIMIN	Zn	%	G0388	IC-VH-13	<0.01	>30	AAS: Ore - Total Disintegration
CERTIMIN	Zn	%	Zn-AAMA02		<0.01	>50	AAS: Ore - Multiacid Digestion

Laboratory	Element	Units	Service Method Code	Method	Detection Limit Upper	Detection Limit Lower	Method Description
CERTIMIN	Zn	%	Zn-AAAR02		<0.01	>50	AAS: Ore Aqua Regia Digestion
CERTIMIN	Zn	%	Zn-VOL01		<10	>65	Zinc Determination - Volumetric Method
CERTIMIN	Zn	%	G0338	IC-VH-08	<10	>60	Zinc Determination - Volumetric Method
CERTIMIN	Zn(1)	%		IC-VH-01	<0.01	>20	AAS: Geochemistry Multiacid Digestion
CERTIMIN	Zn(1)	ppm		IC-VH-01	<1	>25,000	AAS: Geochemistry Multiacid Digestion
CERTIMIN	Zn(2)	%		IC-VH-13	<0.01	>20	AAS: Ore - Multiacid Digestion
CERTIMIN	Zn(3)	%		IC-VH-08	>10	>60	Volumetric Determination Zinc / EDTA
CERTIMIN	Zn	%		HF-13/AA	<0.01	-	AAS: Hydrofluoric acid
CERTIMIN	Zn	ppm		IC-VH-01	<1	>25,000	AAS: Geochemistry Multiacid Digestion
CERTIMIN	Zn	ppm			<0.5	>10,000	ICP: Multi-elemental Analysis - Aqua Regia Digestion
CERTIMIN	Cu	ppm	G0145		<0.5	>10,000	ICP OES: Multi-elemental Analysis - Trace - Aqua Regia Digestion
CERTIMIN	Cu	ppm	G0146	IC-VH-33	<0.5	>10,000	ICP: Multi-elemental Analysis - Aqua Regia Digestion
CERTIMIN	Cu	ppm	ICP-AR01	G0145	<0.5	>10,000	ICP OES: Trace - Aqua Regia Digestion
CERTIMIN	Cu	ppm	Cu-AAMA01		<1	>25,000	AAS: Geochemistry Multiacid Digestion
CERTIMIN	Cu	ppm		IC-VH-01	<1	>25,000	AAS: Geochemistry Multiacid Digestion
CERTIMIN	Cu	ppm	G0124	IC-VH-01	<1	>25,000	AAS: Geochemistry Multiacid Digestion
CERTIMIN	Cu	%	Cu-AAMA02		<0.01	>30	AAS: Ore - Multiacid Digestion
CERTIMIN	Cu	%	G0038	IC-VH-15	<0.01	>30	AAS: Ore - Disintegration - acid Digestion Aqua Regia
CERTIMIN	Cu	%	G0039	IC-VH-13	<0.01	>30	AAS: Ore - Total Disintegration
CERTIMIN	Cu(1)	ppm		IC-VH-01	<1	>250,000	AAS: Geochemistry Multiacid Digestion
CERTIMIN	Cu(2)	%		IC-VH-13	<0.01	>30	AAS: Ore - Multiacid Digestion
CERTIMIN	Cu	ppm		HF-13/AA	<1	-	AAS: Hydrofluoric acid
CERTIMIN	Cu	ppm			<0.5	>10,000	ICP: Multi-elemental Analysis - Aqua Regia Digestion
ALS	Ag	ppm	ME-MS61		<0.01	>100	ICP-MS: 48 elements four acid digestion
ALS	Ag	ppm	Ag-OG62		<1	>1500	Ore Grade Ag - Four acid digestion ICP-AES
ALS	Ag	ppm	Ag-GRA21		<5	>10000	Gravimetric: Ag by fire assay and gravimetric finish
ALS	Cu	%	ME-MS61		<0.00002	>1	ICP-MS : 48 elements four acid digestion
ALS	Cu	%	Cu-OG62		<0.001	>40	Ore Grade Cu - Four acid digestion ICP-AES
ALS	Cu	%	Cu-VOL61		<0.01	>100	Potentiometric Titration for the Determination of Copper - HNO3-HCl-H2SO4-HF Digestion
ALS	Pb	%	ME-MS61		<0.00005	>1	ICP-MS : 48 elements four acid digestion
ALS	Pb	%	Pb-OG62		<0.001	>20	Ore Grade Pb - Four acid digestion ICP-AES
ALS	Pb	%	Pb-VOL70		<0.01	>100	Volumetric Titration with EDTA for the Determination of Lead - HNO3-HCl-H2SO4-HF Digestion
ALS	Zn	%	ME-MS61		<0.0002	>1	ICP-MS : 48 elements four acid digestion
ALS	Zn	%	Zn-OG62		<0.001	>30	Ore Grade Zn - Four acid digestion ICP-AES
ALS	Zn	%	Zn-VOL70		<0.01	>100	Volumetric Titration with EDTA for the Determination of Zinc - HNO3-HCl-H2SO4-HF Digestion
ALS	Mo	ppm	ME-MS61		<0.05	>10000	ICP-MS : 48 elements four acid digestion
ALS	Mo	%	Mo-OG62		<0.001	>10	Ore Grade Mo - Four acid digestion ICP-AES

TABLE 11-2 SUMMARY OF EL PADRINO DEPOSIT ASSAY METHODS

Nexa Resources S.A.– Hilarión Project

Laboratory	Element	Units	Method	Detection Limit Upper	Detection Limit Lower	Method Description
CERTIMIN	Ag	g/t	Ag-AAAR02	<10	>2,000	AAS: Ore - Aqua Regia Digestion
CERTIMIN	Ag	g/t	Ag-AAMA01	<0.5	>300	AAS: Geochemistry - Multi-acid Digestion
CERTIMIN	Ag	g/t	Ag-AAMA02	<10	>2,000	AAS: Ore - Multi-acid Digestion
CERTIMIN	Ag	ppm	G0001	<10	>1,000	Atomic Absorption: Ore
CERTIMIN	Ag	ppm	G0002	<10	>1,000	Atomic Absorption: Ore
CERTIMIN	Ag	ppm	G0099	<0.5	>300	Atomic Absorption: Trace
CERTIMIN	Ag	ppm	G0146	<0.2	>100	ICP-OES: multi-element analysis
CERTIMIN	Ag	ppm	ICP-AR01	<0.2	>100	ICP: Aqua Regia Digestion (36 Elements)
CERTIMIN	Pb	%	G0076	<0.01	>30	Atomic Absorption: Ore
CERTIMIN	Pb	%	G0077	<0.01	>30	Atomic Absorption: Ore
CERTIMIN	Pb	ppm	G0146	<2	>10,000	ICP-OES: multi-element analysis
CERTIMIN	Pb	ppm	G0159	<5	>10,000	Atomic Absorption: Trace
CERTIMIN	Pb	%	G0339	<10	>80	Volumetric method - Lead determination
CERTIMIN	Pb	%	G0387	<0.01	>30	Atomic Absorption: Ore
CERTIMIN	Pb	ppm	ICP-AR01	<2	>10,000	ICP: Aqua Regia Digestion (36 Elements)
CERTIMIN	Pb	%	Pb-AAAR02	<0.01	>30	AAS: Ore - Aqua Regia Digestion
CERTIMIN	Pb	ppm	Pb-AAMA01	<5	>10,000	AAS: Geochemistry - Multi-acid Digestion
CERTIMIN	Pb	%	Pb-AAMA02	<0.01	>30	AAS: Ore - Multi-acid Digestion
CERTIMIN	Zn	%	G0038	<0.01	>30	Atomic Absorption: Ore
CERTIMIN	Zn	ppm	G0146	<0.5	>10,000	ICP-OES: multi-element analysis
CERTIMIN	Zn	ppm	G0171	<1	>25,000	Atomic Absorption: Trace
CERTIMIN	Zn	%	G0338	<10	>60	Volumetric method - Zinc determination
CERTIMIN	Zn	%	G0387	<0.01	>30	Atomic Absorption: Ore
CERTIMIN	Zn	%	G0388	<0.01	>30	Atomic Absorption: Ore
CERTIMIN	Zn	%	G0388	<0.01	>30	Atomic Absorption: Ore
CERTIMIN	Zn	ppm	ICP-AR01	<0.5	>10,000	ICP: Aqua Regia Digestion (36 Elements)
CERTIMIN	Zn	%	Zn-AAAR02	<0.01	>20	AAS: Ore - Aqua Regia Digestion
CERTIMIN	Zn	ppm	Zn-AAMA01	<1	>25,000	AAS: Geochemistry - Multi-acid Digestion
CERTIMIN	Zn	%	Zn-AAAR02	<0.01	>30	AAS: Ore - Aqua Regia Digestion
CERTIMIN	Zn	%	Zn-AAMA02	<0.01	>20	AAS: Ore - Multi-acid Digestion
CERTIMIN	Zn	%	Zn-AAMA02	<0.01	>30	AAS: Ore - Multi-acid Digestion
CERTIMIN	Zn	%	Zn-AAMA02	<0.01	>50	AAS: Ore - Multi-acid Digestion
CERTIMIN	Cu	ppm	Cu-AAMA01	<1	>25,000	AAS: Geochemistry - Multi-acid Digestion
CERTIMIN	Cu	%	Cu-AAAR02	<0.01	>30	AAS: Ore - Aqua Regia Digestion
CERTIMIN	Cu	%	Cu-AAMA02	<0.01	>30	AAS: Ore - Multi-acid Digestion
CERTIMIN	Cu	%	G0038	<0.01	>30	Atomic Absorption: Ore
CERTIMIN	Cu	%	G0039	<0.01	>30	Atomic Absorption: Ore
CERTIMIN	Cu	ppm	G0124	<1	>25,000	Atomic Absorption: Trace
CERTIMIN	Cu	ppm	G0146	<0.5	>10,000	ICP-OES: multi-element analysis
CERTIMIN	Cu	ppm	ICP-AR01	<0.5	>10,000	ICP: Aqua Regia Digestion (36 Elements)

DATABASE MANAGEMENT

Database management was carried out by a dedicated onsite geologist under the supervision of the Project Geologist. Sample intervals were recorded to drill logs along with other data including percent recovery, RQD, lithology, alteration, mineralization, structure, and veins. Core was photographed after logging, then marked for sampling. Logged information was then transcribed into digital files in Excel format and imported to the GeoExplo database management system. Nexa is in the process to transfer the database to Datamine's Fusion system. Pre- 2018 drilling, original drill logs, structural logs, geotechnical logs, and details related to the hole were stored on site in a folder specific to each drill hole. Folders were clearly labelled and stored in a cabinet in the office. For the 2018-2019 drilling campaign the drill hole data was entered into REFLEX IQ-LOGGER hand-held structural logging device.

CERTIMIN and, starting in 2018, ALS sent analytical results to Nexa in Excel and PDF formats. All QC information related to the Mineral Resource database was stored in Excel spreadsheets. Physical copies of the data were also delivered as analysis certificates. All certificates contained control samples. Assay certificate information was entered into the Nexa database as certificates were received. Assay certificates were mailed to the site by ALS and emailed to appropriate Nexa employees. Certificates were reviewed by geologists prior to uploading to GeoExplo for the 2012 to 2014 drilling campaign and to Fusion for the 2018 to 2019 drilling campaign.

The Hilarión deposit database consists of 61,789 samples. This includes 61,258 samples in 614 drill holes, and 531 samples in 211 underground channels. The El Padrino deposit database consists of 11,700 samples in 87 drill holes.

SAMPLE CHAIN OF CUSTODY AND STORAGE

Core boxes were transported every day to the core shed by personnel from the drilling company. Samples were transported by company or laboratory personnel using corporately owned vehicles. Core boxes and samples were stored in safe, controlled areas.

Chain-of-custody procedures were followed whenever samples were moved between locations and to and from the laboratory, by the filling out of sample submittal forms.

QUALITY ASSURANCE/QUALITY CONTROL

Quality Assurance (QA) consists of evidence to demonstrate that the assay data has precision and accuracy within generally accepted limits for the sampling and analytical method(s) used in order to have confidence in the resource estimation. Quality control (QC) consists of procedures used to ensure that an adequate level of quality is maintained in the process of sampling, preparing, and assaying the drill core samples. In general, QA/QC programs are designed to prevent or detect contamination and allow analytical precision and accuracy to be quantified. In addition, a QA/QC program can disclose the overall sampling – assaying variability of the sampling method itself.

HILARIÓN

A QA/QC program for Hilarión was in place throughout the drilling campaigns. Blanks, field duplicates, coarse reject duplicates, and pulp duplicates were assayed. Drilling on the Project started in 2005 and lasted until 2014, however, coarse reject duplicates and pulp duplicates were assayed only for the 2013-2014 drill program and it is not specified whether it was the same laboratory or an alternate one. During 2018, Nexa incorporated systematic external checks into the QA/QC program using pulp samples and including blanks and CRMs. Check assay programs were also carried out for the 2013-2014 drilling campaign.

Assay acceptance criteria followed during the QA/QC program for Hilarión included the following:

- Blanks: assay value should not exceed five times the practical detection limit.
- Duplicates:
- Field sample duplicate – relative error <30%
- Coarse reject duplicate – relative error <20%
- Pulp duplicate – relative error <10%
- Certified reference materials (CRM):
    - Good – absolute values <5%
    - Acceptable - absolute values between 5% and 10%
    - Unacceptable – absolute value >10%
- External checks <5%

CAMPAIGNS (2007-2014)

Blanks

Coarse blank material inserted in the sample stream was used to monitor the contamination during sample processing. A total of 1,785 blank samples were sent for analysis, resulting in an overall insertion rate of 3.3%, which is slightly below the recommended 5% insertion rate.

RPA identified five mis-labelled samples, three CRMs, and two field samples. RPA removed these five samples prior to analysis. Figures 11-1 to 11-3 show the overall blank assays for Zn, Pb, and Ag. respectively. The performance of the blank material is within expected limits.

FIGURE 11-1 HILARIÓN DEPOSIT BLANK ZN ASSAYS (2007-2014)

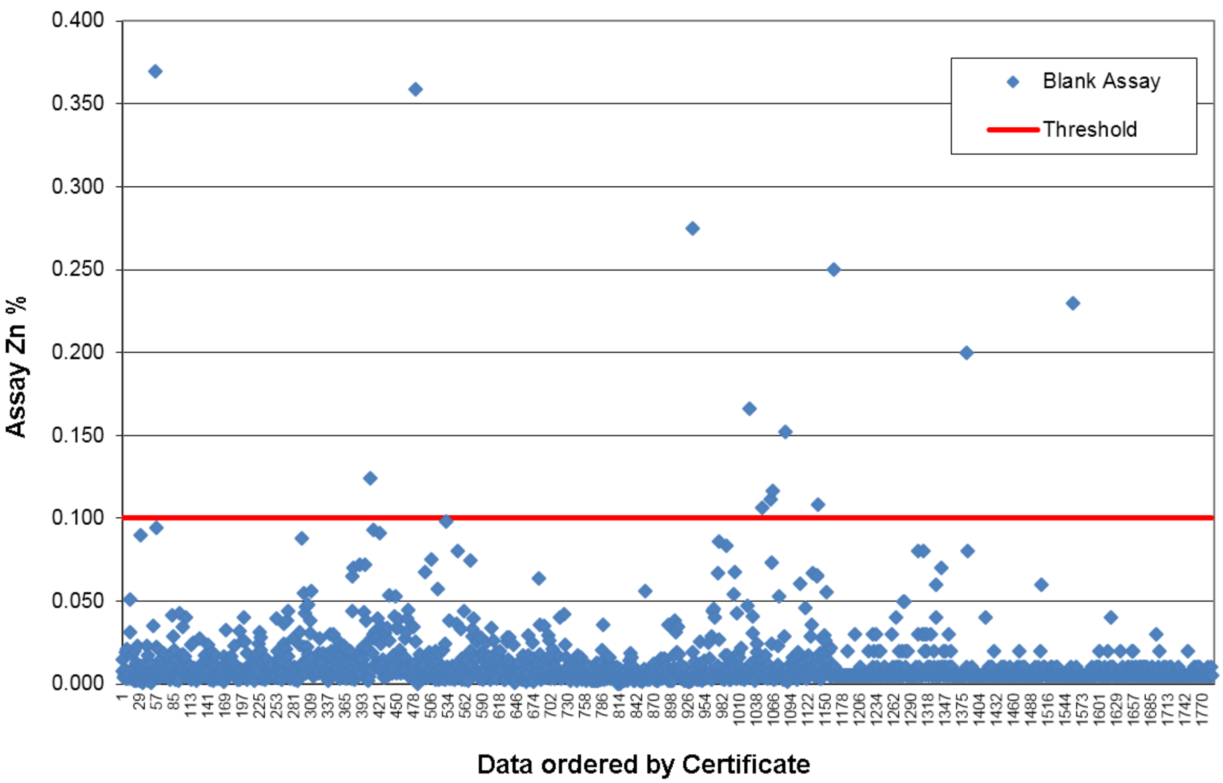


FIGURE 11-2 HILARIÓN DEPOSIT BLANK PB ASSAYS (2007-2014)

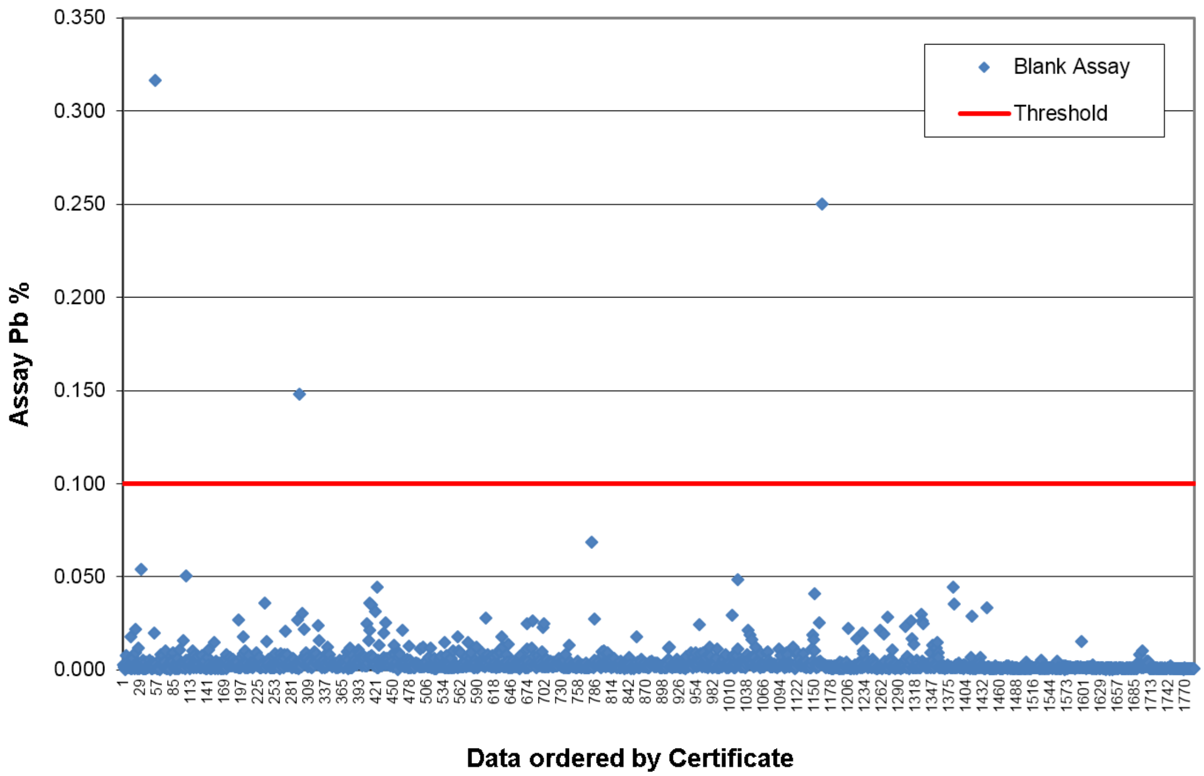
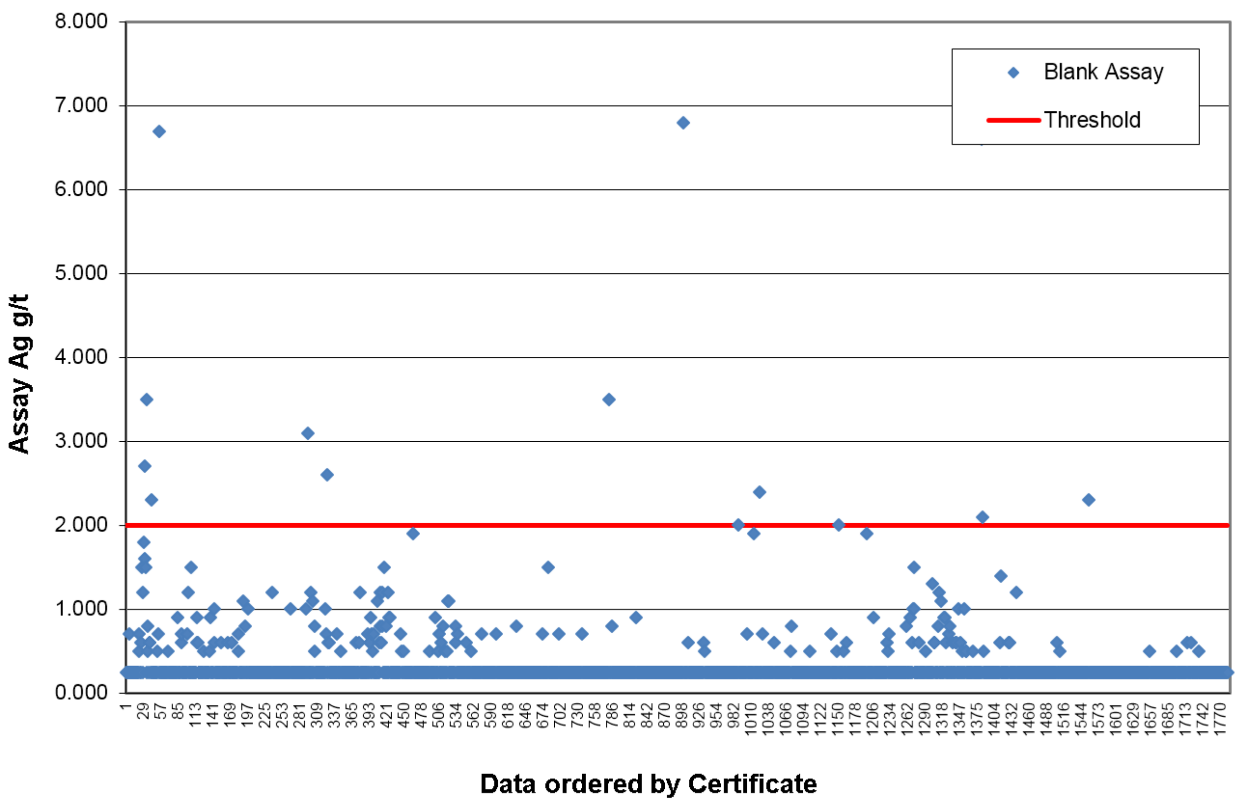


FIGURE 11-3 HILARIÓN DEPOSIT BLANK AG ASSAYS (2007-2014)



Certified Reference Material and In-House Standards

A total of nine different types of CRMs and in-house standards were used at Hilarión for low, medium, and high grades. The in-house standards used in 2007-2008 (STD-1, STD-2, and STD-3) were assayed only by CERTIMIN, with no round robin checks, hence are not fully certified. The in-house standards STD1000047, STD1000048, and STD1000049, used in 2010-2014, underwent round robin testing at six different laboratories by Société Générale de Surveillance (SGS) Lima, on behalf of Nexa Peru. The CRMs OREAS-131a, OREAS-132a, and OREAS-133a, used in 2010, were certified by Ore Research & Exploration Pty Ltd.

A total of 1,841 CRMs were submitted, resulting in an insertion rate of 3.4%, which is slightly low compared to RPA's recommended 5%. RPA identified one CRM mis-labelling and one blank sample flagged as CRM. The CRM label was corrected, and the blank sample was removed from the data pool. Table 11-3 lists the certified values of the CRMs for Zn, Pb, and Ag and a summary of the assay performance for the CRMs.

TABLE 11-3 2007-2014 HILARIÓN DEPOSIT IN-HOUSE STANDARDS AND CRM CERTIFIED VALUES AND PERFORMANCE
Nexa Resources S.A.– Hilarión Project

CRM	Period	Element	Certified Value	SD	Count	Mean	Bias
STD-1	2007-2008	Zn%	5.69	0.11	160	5.69	0.07%
		Pb%	1.43	0.03	160	1.43	-0.03%
		Ag (g/t)	38.44	1.102	160	38.46	0.05%
STD-2	2007-2008	Zn%	11.36	0.19	164	11.36	-0.01%
		Pb%	1.77	0.03	164	1.77	-0.18%
		Ag (g/t)	86.89	2.036	164	86.94	0.05%
STD-3	2007-2008	Zn%	2.57	0.04	160	2.57	0.15%
		Pb%	0.99	0.01	160	0.99	0.01%
		Ag (g/t)	28.43	0.93	160	28.48	0.17%
ST1000047	2010-2014	Zn%	4.94	0.04	433	5.01	1.36%
		Pb%	1.06	0.06	433	1.06	0.09%
		Ag (g/t)	51	1.3	428	46.86	-8.12%
ST1000048	2010-2014	Zn%	12.44	0.19	397	12.46	0.14%
		Pb%	6.5	0.12	397	6.56	0.89%
		Ag (g/t)	183	3	393	176.79	-3.39%
ST1000049	2010-2014	Zn%	2.47	0.04	362	2.54	2.83%
		Pb%	1.42	0.04	362	1.41	-0.54%
		Ag (g/t)	42	0.9	359	38.24	-8.95%
OREAS-1 (OREAS131a)	2010	Zn%	2.83	0.05	63	2.82	-0.46%
		Pb%	1.72	0.02	63	1.74	1.42%

CRM	Period	Element	Certified Value	SD	Count	Mean	Bias
		Ag (g/t)	30.9	0.9	63	29.73	-3.80%
OREAS-2 (OREAS132a)	2010	Zn%	4.98	0.07	52	4.95	-0.69%
		Pb%	3.64	0.05	52	3.67	0.72%
		Ag (g/t)	57	1.3	52	54.33	-4.68%
OREAS-3 (OREAS133a)	2010	Zn%	10.87	0.08	49	10.63	-2.16%
		Pb%	4.9	0.15	49	5.18	5.71%
		Ag (g/t)	100	1	49	98.97	-1.03%

The zinc standards show a bias ranging from a low of -2.16% to a high of 2.83%. Generally, the OREAS standards are biased low, while the ST1000047-1000049 are biased high. Figure 11-4 shows the zinc assay performance of the ST1000047 based on the mean of the samples, which appears to be more representative than the mean of the standard.

The lead standards show a good behaviour, except for the OREAS133a where a bias high of 5.71% was noted. An example of lead assay performance for the ST1000048 is shown in Figure 11-5.

The 2010-2014 standards have a low bias across the board for silver (-8% to -12%). The 2010 standards show a low bias as well, but of a lower magnitude. This imparts a conservative bias to the silver assays. Figure 11-6 shows the ST1000047 control chart, based on the mean of the samples, which appears to be more representative than the mean of the standard

A secondary laboratory used for external assay checks would help identify potential issues with the CRM performance. RPA recommends ongoing monitoring of QA/QC results and including blanks and CRMs when pulp duplicates are sent to a secondary laboratory.

FIGURE 11-4 HILARIÓN DEPOSIT CRM ZN PERFORMANCE FOR ST1000047 (2007-2014)

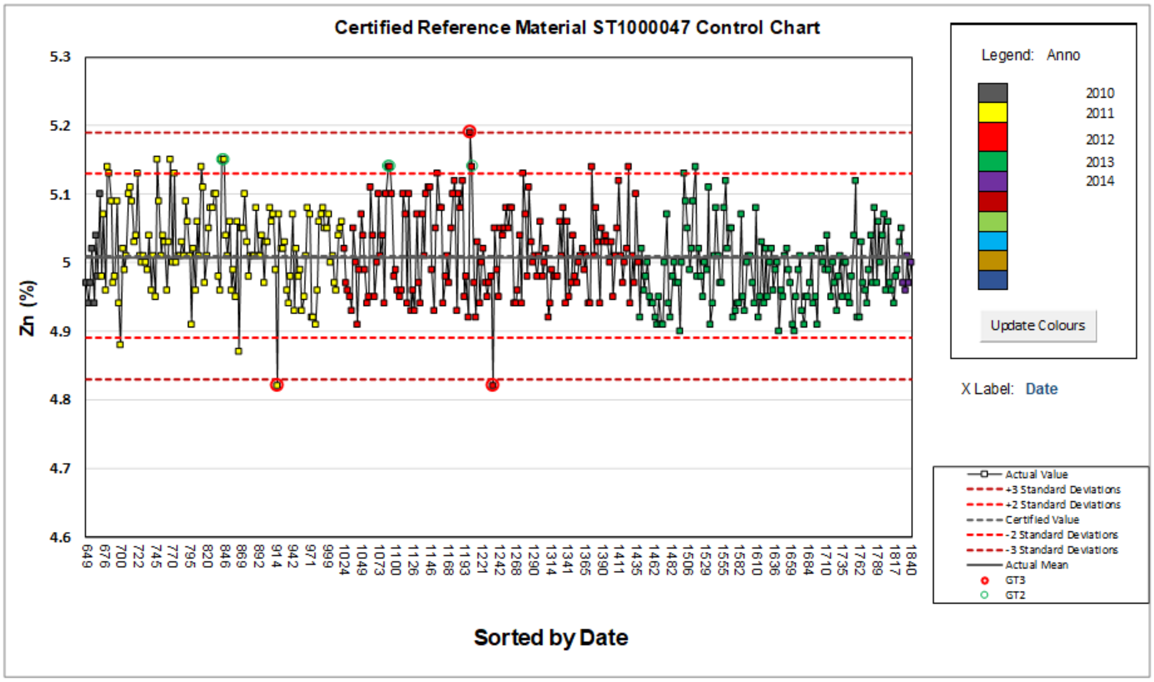


FIGURE 11-5 HILARIÓN DEPOSIT CRM PB PERFORMANCE FOR ST1000048 (2007-2014)

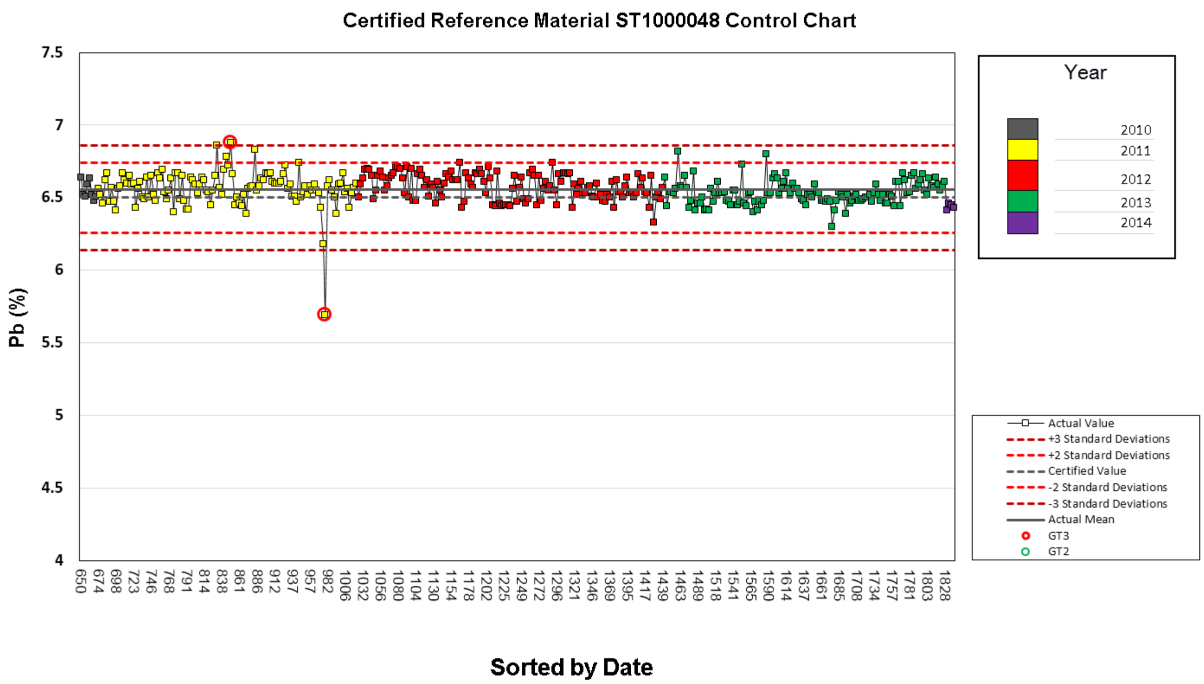
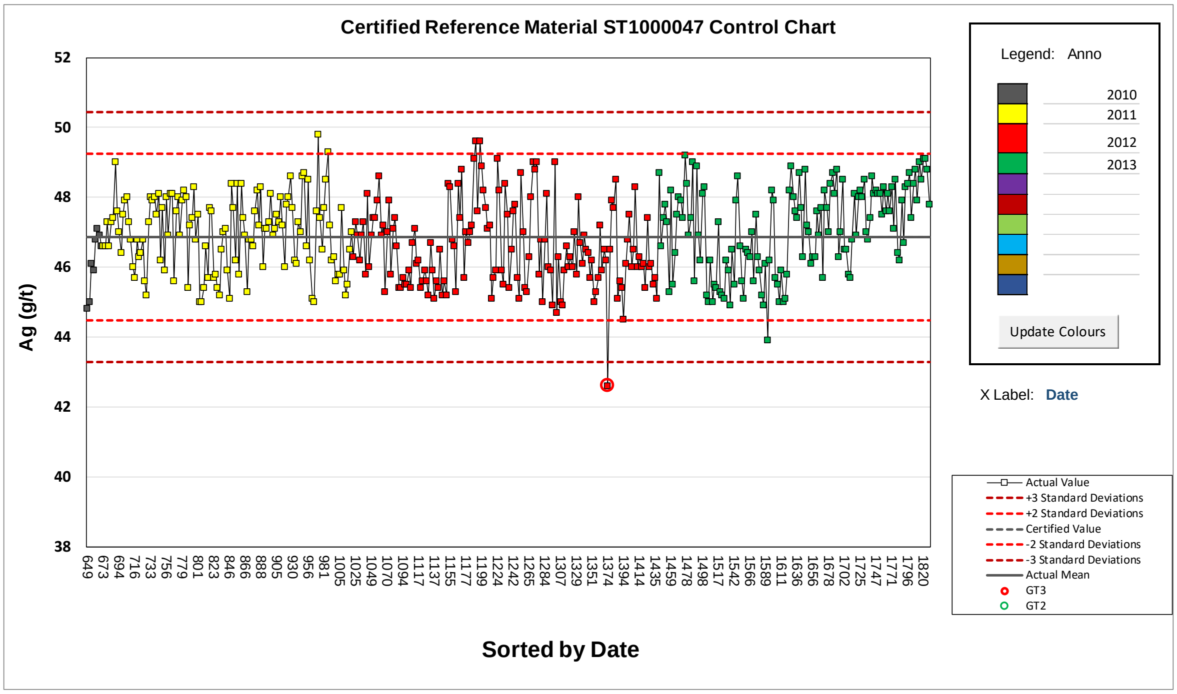


FIGURE 11-6 HILARIÓN DEPOSIT CRM AG PERFORMANCE FOR ST1000047 (2007-2014)

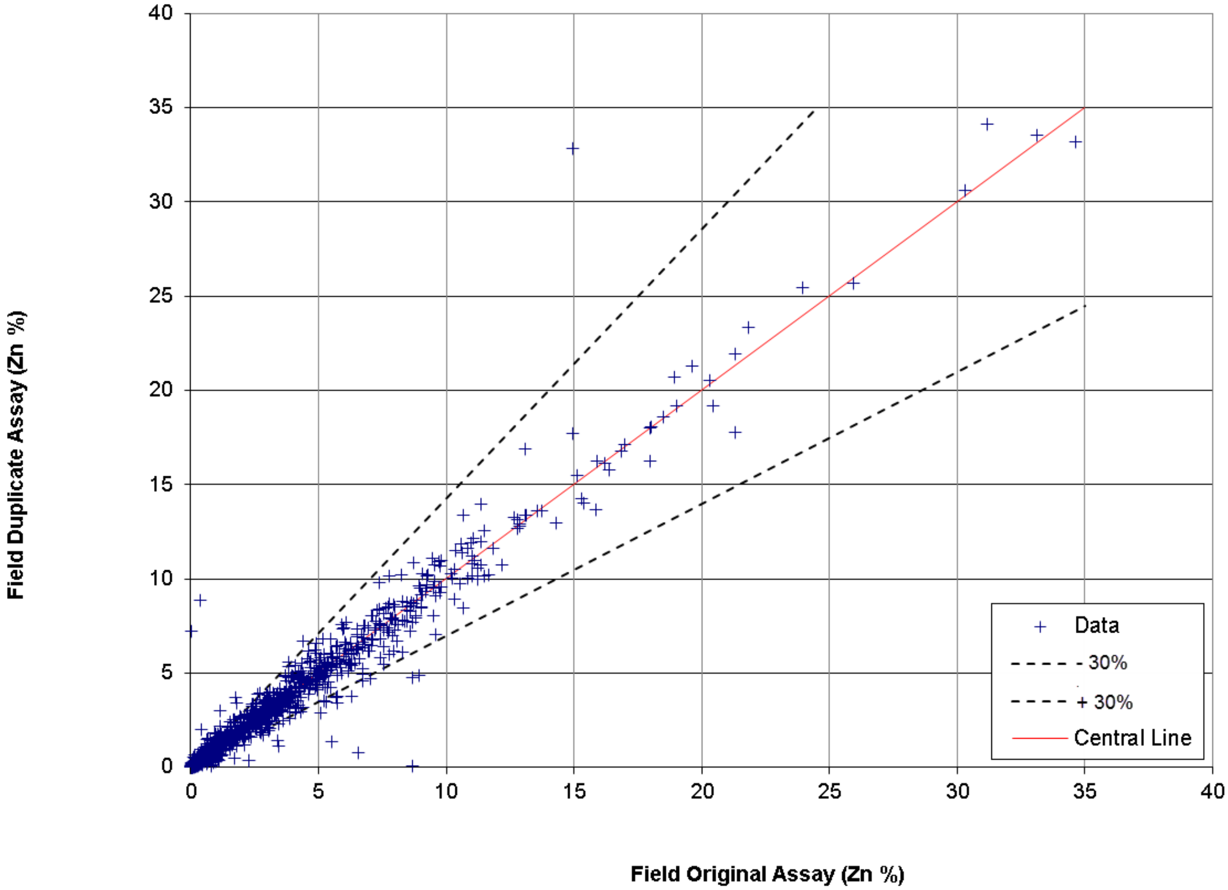


Duplicate Samples

Field sample duplicates, consisting of quartered core, are inserted in the sample stream immediately after the original sample in order to assess the variability of closely spaced samples. A total of 1,564 field sample duplicates were assayed, resulting in an insertion rate of 2.9%.

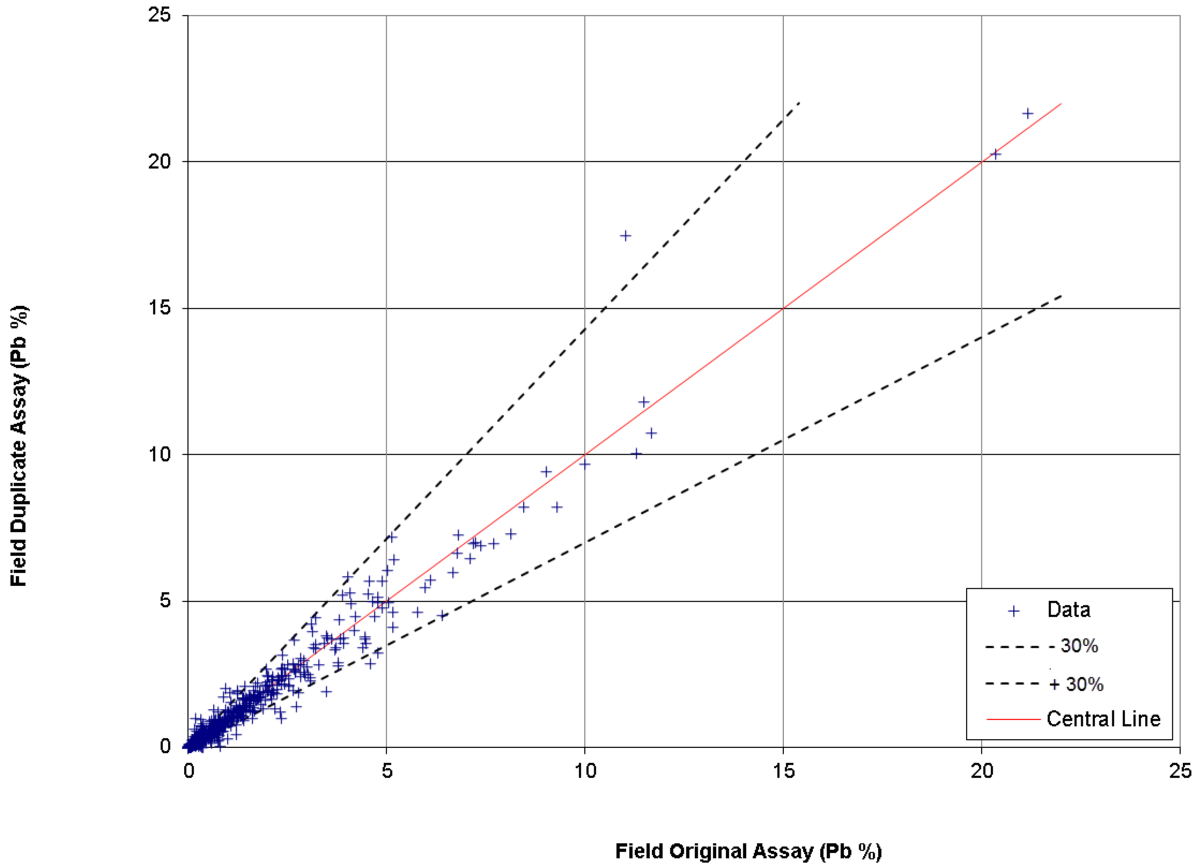
Field sample duplicate performance is shown in Figures 11-7 to 11-9.

FIGURE 11-7 HILARIÓN DEPOSIT FIELD SAMPLE DUPLICATE PERFORMANCE – ZN (2007-2014)



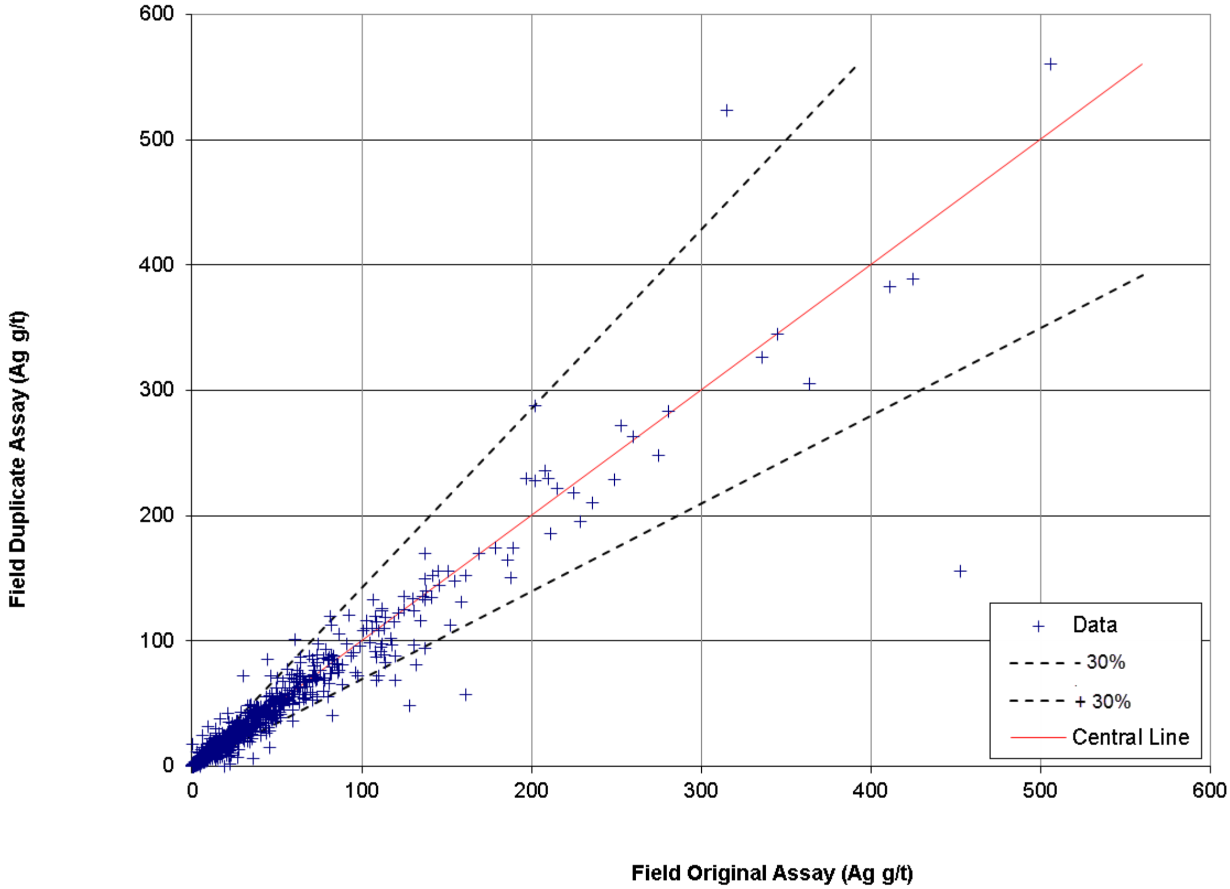
In Figure 11-7, approximately 24% of the pairs fall outside the 30% relative difference threshold.

FIGURE 11-8 HILARIÓN DEPOSIT FIELD SAMPLE DUPLICATE PERFORMANCE – PB (2007-2014)



In Figure 11-8, approximately 26% of the pairs fall outside the 30% relative difference threshold.

FIGURE 11-9 HILARIÓN DEPOSIT FIELD SAMPLE DUPLICATE PERFORMANCE – AG (2007-2014)



In Figure 11-9, approximately 18% of the pairs fall outside the 30% relative difference threshold.

Coarse reject duplicate performance is shown in Figures 11-10 to 11-13.

FIGURE 11-10 HILARIÓN DEPOSIT COARSE REJECT DUPLICATE PERFORMANCE – PB (2007-2014)

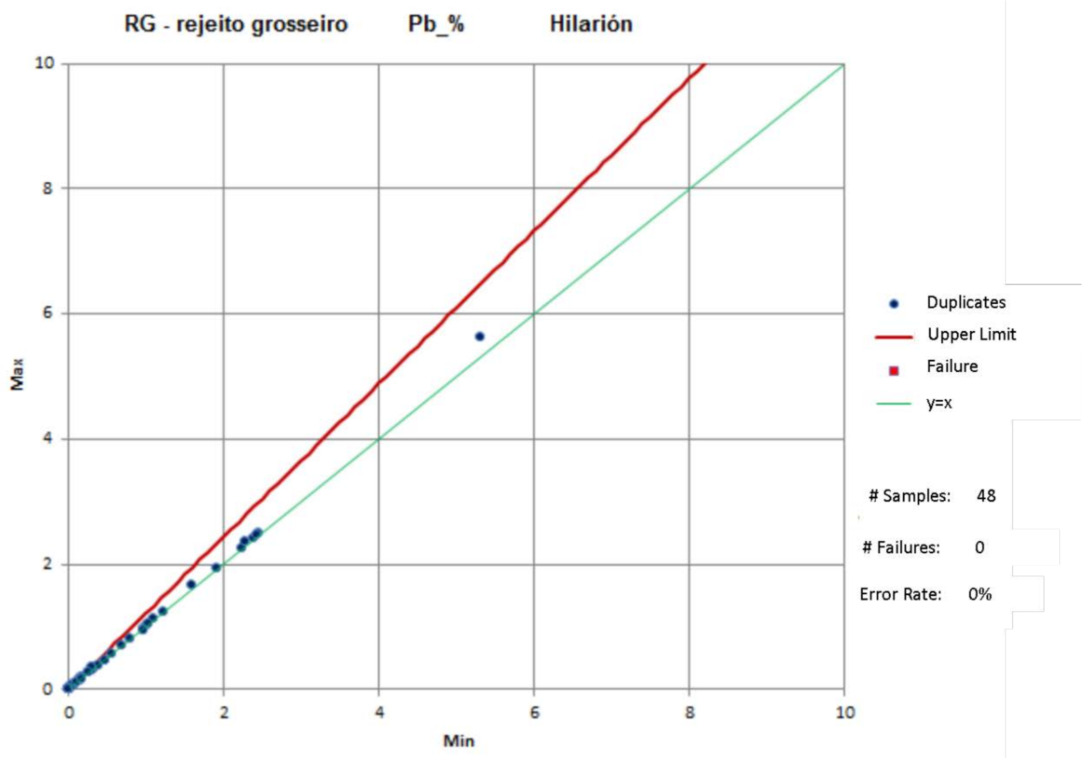


FIGURE 11-11 HILARIÓN DEPOSIT COARSE REJECT DUPLICATE PERFORMANCE – ZN (2007-2014)

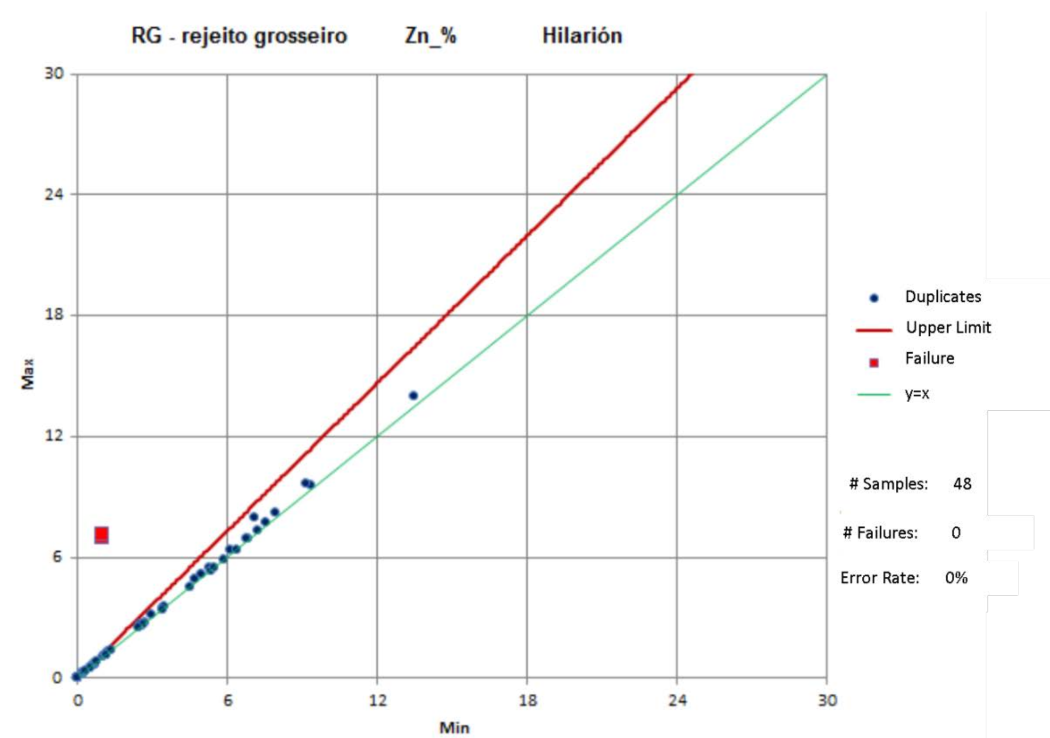


FIGURE 11-12 HILARIÓN DEPOSIT PULP DUPLICATE PERFORMANCE – PB (2007-2014)

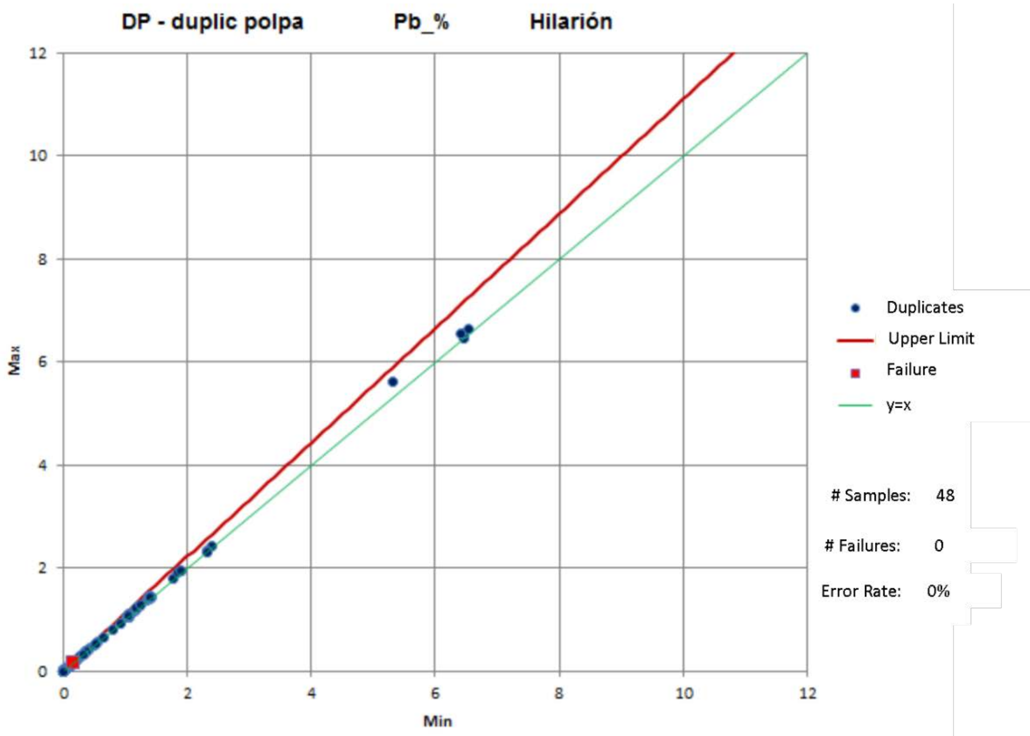
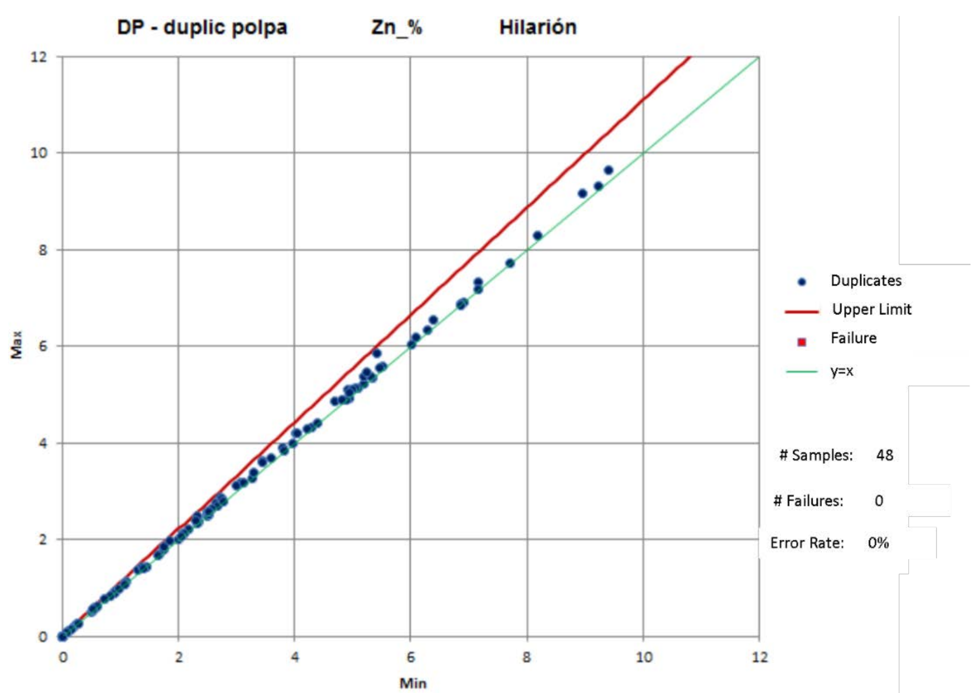


FIGURE 11-13 HILARIÓN DEPOSIT PULP DUPLICATE PERFORMANCE – ZN (2007-2014)



External Checks

Check assays consist of submitting pulps that were assayed at the primary laboratory to a secondary laboratory and re-analyzing them by using the same analytical procedures. This is done primarily to improve the assessment of bias in addition to the submission of CRMs and in-house standards submitted to the original laboratory. CRMS are also inserted with samples submitted to the secondary laboratory to evaluate if the secondary laboratory is potentially biased.

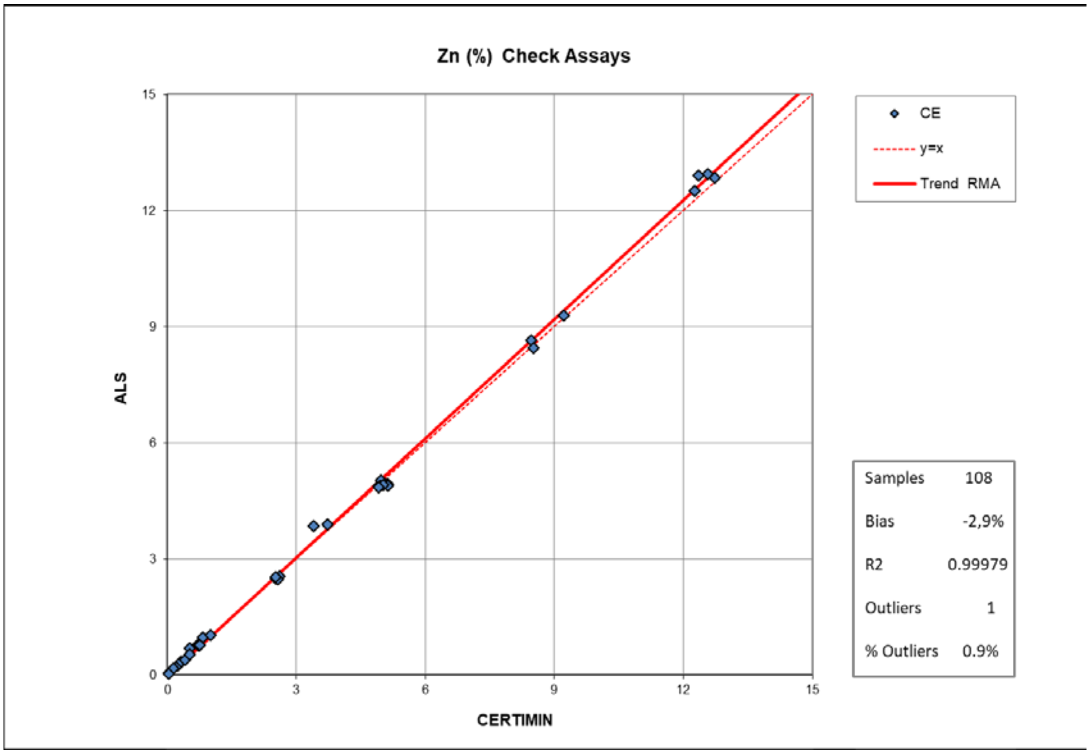
Between 2013 and 2014, 4,726 assay samples were analyzed at CERTIMIN. A total of 19 pulps and 90 coarse reject duplicates, resulting in an insertion rate of 2%, were sent to ALS Peru. No reference materials were inserted in the check assay batches.

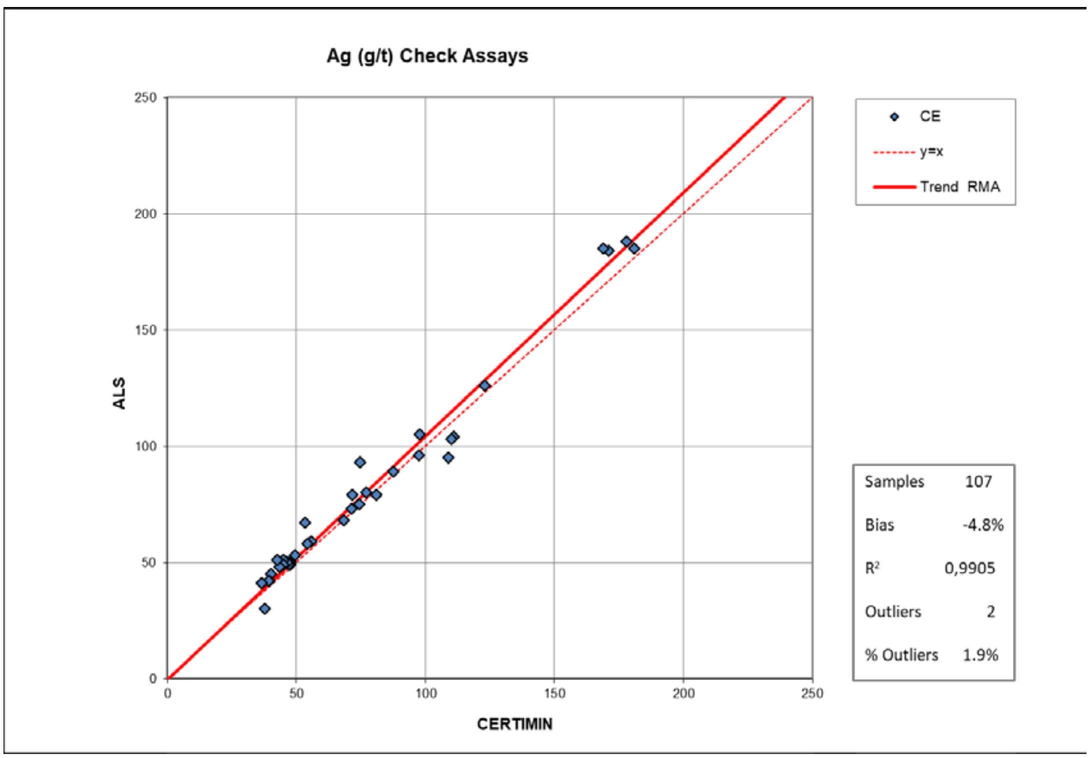
Overall, the check assay results are reasonable. The results for zinc, copper, lead, and copper gave a correlation coefficient of 1, which is very good, and the secondary laboratory averages for zinc are 2% higher, for lead are 2% lower, for silver 5% higher, and for copper are the same values as the primary laboratory. The check assays show that the primary laboratory has a low bias for silver (-5%). An example of zinc and silver assay performance for the check assays is shown in Figure 11-14.

RPA is of the opinion that the bias observed in the silver CRMs and in the check assays is not material and should not affect the quality of the Mineral Resource estimate, however, RPA recommends on-going monitoring of the silver low bias observed in the CRMs and in the check assays.

RPA is of the opinion than the external check assays confirm than the primary laboratory zinc, lead, silver, and copper are reliable and meet industry standards.

FIGURE 11-14 HILARIÓN DEPOSIT – ZN AND AG CHECK ASSAYS (2013-2014)





CURRENT WORK (2018 TO 2019)

From 2018 to 2019, Nexa sent 9,298 samples to ALS Peru, corresponding to 7,808 assay samples and 1,490 control samples (Table 11-4). The insertion rate is approximately 16%. ALS Peru was the primary laboratory and CERTIMIN was the secondary check or umpire laboratory. The 2018-2019 QA/QC program details for the ALS laboratory are summarized in Table 11-5.

TABLE 11-4 2018-2019 HILARIÓN DEPOSIT QA/QC SAMPLE INSERTION RATES
Nexa Resources S.A.– Hilarión Project

Control Sample	Type	No. Samples	Insertion Rate (%)
Blanks	Coarse	182	2
	Low Grade	315	3.5
In-house CRMs	Intermediate Grade	96	1
	High Grade	35	0.5
	Field	168	2
Duplicates	Reject	92	1
	Pulps	442	5
Check assays	Pulp	160	2
Total		**1,490**	**16**

TABLE 11-5 2018-2019 HILARIÓN DEPOSIT QA/QC PROGRAM DETAIL
Nexa Resources S.A.– Hilarión Project

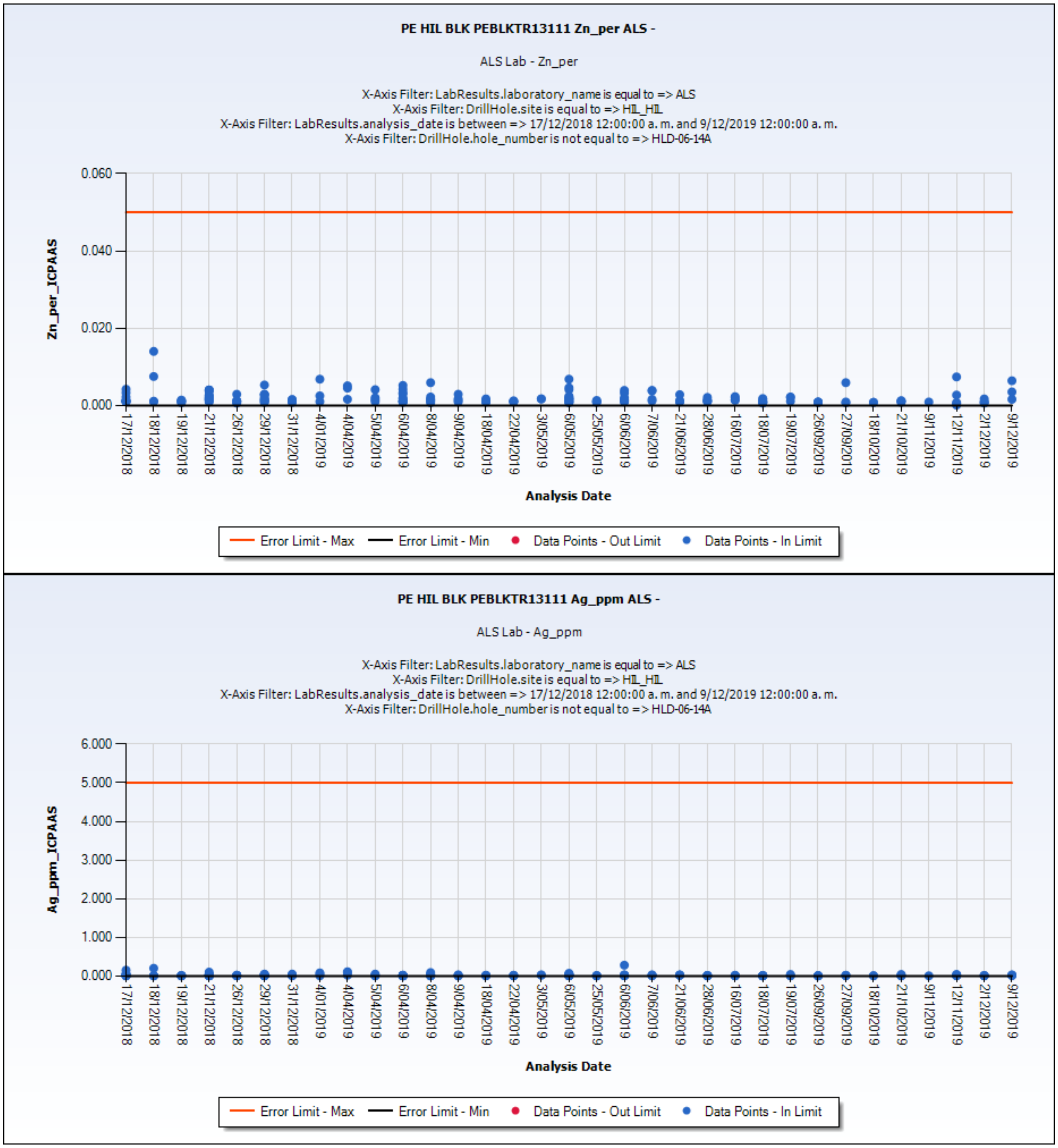
Laboratory	QA/QC Sample	Type	No. Samples	Failure Limit	Bias (%)			
					Ag	Cu	Pb	Zn
ALS	Blanks	Coarse	182	5 DLP				
	Standards	Low	315	<10%	1%	1%	-1%	2%
		Medium	96	<10%	2%	5%	-1%	0%
		High	35	<10%	-2%	3%	-3%	1%
	Duplicates	Field	168	<30%	2%	2%	3%	7%
		Reject	92	<20%	1%	0%	0%	1%
		Pulp	442	<10%	1%	0%	0%	0%
	External checks	Pulp	160	<10%	-1%	-1%	-1%	-1%
Total			**1,490**					

Blanks

A field blank is inserted every 50 samples. Certified blanks have been purchased from Target Rocks. The blanks consist of barren coarse limestone. The QA/QC protocol accepts results returning up to five times the practical detection limit based on the pulp duplicate results.

Figure 11-15 illustrates the overall blank assays for Zn and Ag. In RPA's opinion, the results of the blank material for Zn, Cu, Ag, Pb are within expected limits.

FIGURE 11-15 HILARIÓN DEPOSIT BLANK ZN ASSAYS (2018-2019)



Certified Reference Material and Internal Standards

A total of three different types of CRMs were used at Hilarión for low, medium, and high grades. The standards used in 2018-2019 (PEPSSTD001, PEPSSTD002, and PEPSSTD003), underwent round robin testing at six different laboratories by ALS Lima, SGS Lima, Certimin Lima, Inspectorate Lima, Bureau Veritas Vancouver, and ALS Vancouver. They were certified by Smee & Associates Consulting LTD and the sample preparation was performed by Target Rock laboratory. Base metals were analyzed using aqua regia digestion and AAS finish.

A total of 446 CRMs were sent to ALS, resulting in an insertion rate of 5.0%. A CRM is inserted every 20 samples. Table 11-6 lists the certified values of the CRMs for Zn, Pb, and Ag; and a summary of the assay performance for the CRMs.

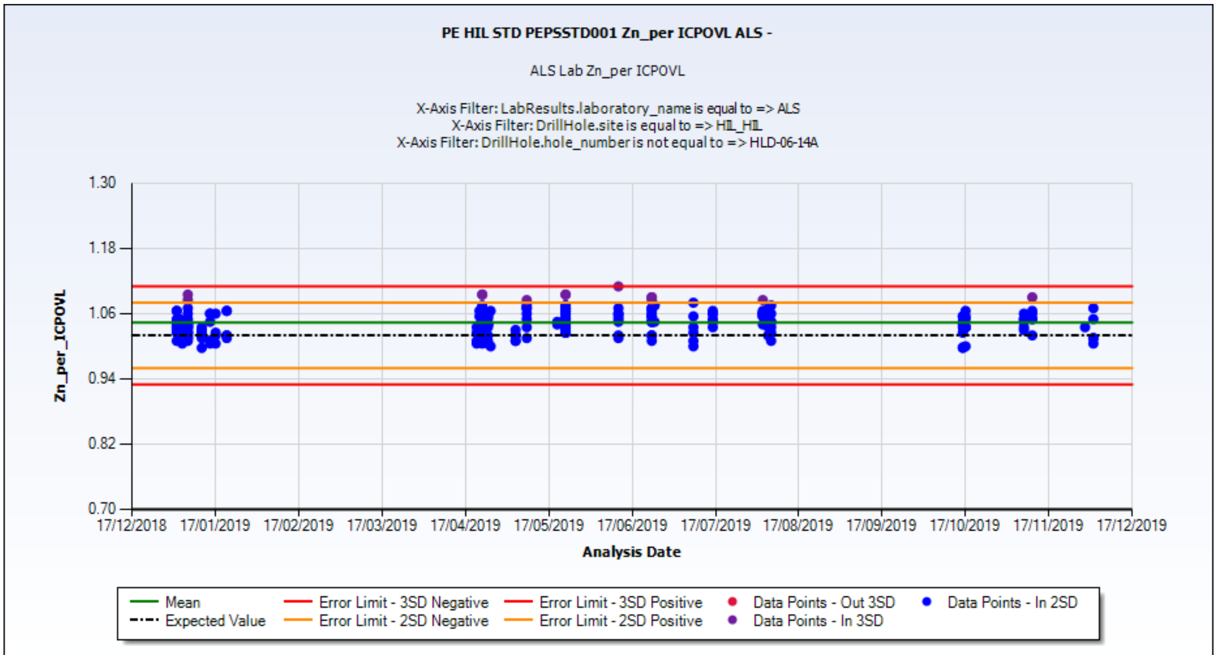
RPA reviewed the results returned from the CRMs. The conventional approach to setting reference standard acceptance limits is to use the mean assay ±2 standard deviations as a warning limit and ±3 standard deviations as a failure limit. The graphs in Figures 11-16 and 11-17 illustrate the zinc and silver assay results compared to acceptable limits of ±3 standard deviations. Results for CRMs are generally within acceptable limits with a small percentage of failures. The control charts show small negative zinc bias (-4%) for CRM PEPSSTD001, and a small positive copper bias for PEPSSTD002 (4.5%). These biases should continue to be monitored on an on-going basis.

TABLE 11-6 2018-2019 HILARIÓN DEPOSIT QA/QC PROGRAM DETAIL

Nexa Resources S.A.– Hilarión Project

CRM	Period	Element	Certified Value	SD	Count	Mean	Bias
PEPSSTD001	2018 to 2019	Zn%	1.02	0.06	315	1.036	-4.0
		Pb%	0.406	0.0129	315	0.403	-0.6
		Cu%	0.0708	0.0014	315	0.072	1.1
		Ag (g/t)	13.8	0.6	315	14	1.4
PEPSSTD002	2018 to 2019	Zn%	3.14	0.12	96	3.13	-0.4
		Pb%	1.48	0.09	96	1.46	-1.2
		Cu%	0.0698	0.0032	96	0.073	4.5
		Ag (g/t)	49.1	2.7	96	49.1	1.9
PEPSSTD003	2018 to 2019	Zn%	7.34	0.18	35	7.42	1.1
		Pb%	5.79	0.14	35	5.61	-3.1
		Cu%	0.183	0.012	35	0.188	2.8
		Ag (g/t)	243	7.1	35	238.2	-2.0

FIGURE 11-16 HILARIÓN DEPOSIT CRM ZN PERFORMANCE FOR PEPSSDT001 AND PEPSSDT002 (2018-2019)



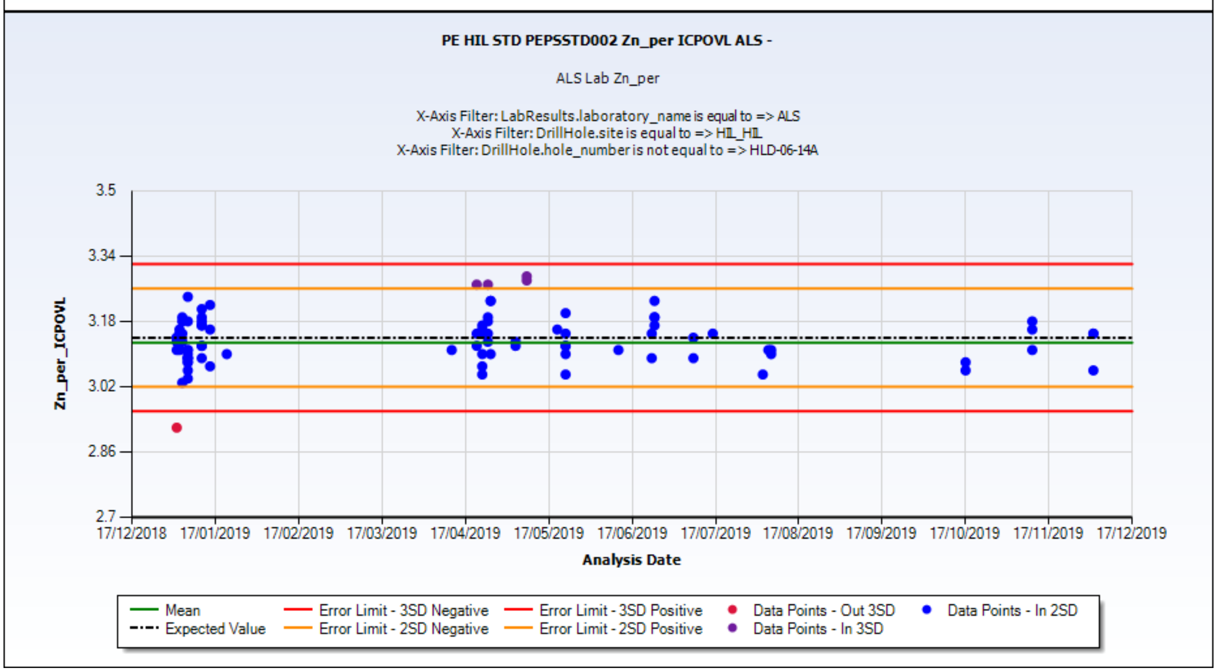
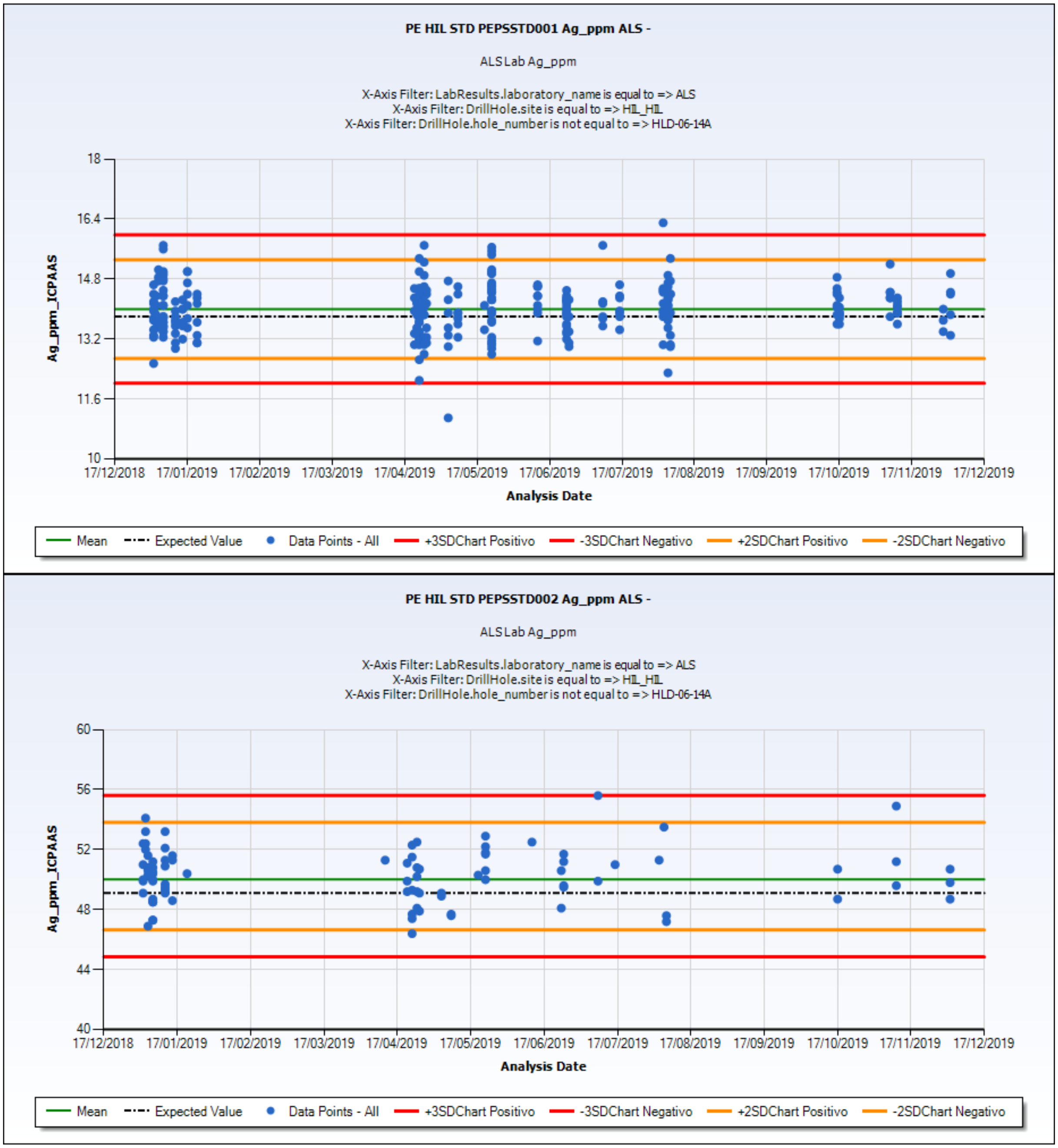


FIGURE 11-17 HILARIÓN DEPOSIT CRM AG PERFORMANCE FOR PEPSSDT001 AND PEPSSDT002 (2018-2019)



In RPA's opinion, the CRMs cover a reasonable range of grades with respect to the overall grade population of the deposit and the bias observed in the CRMs is not material.

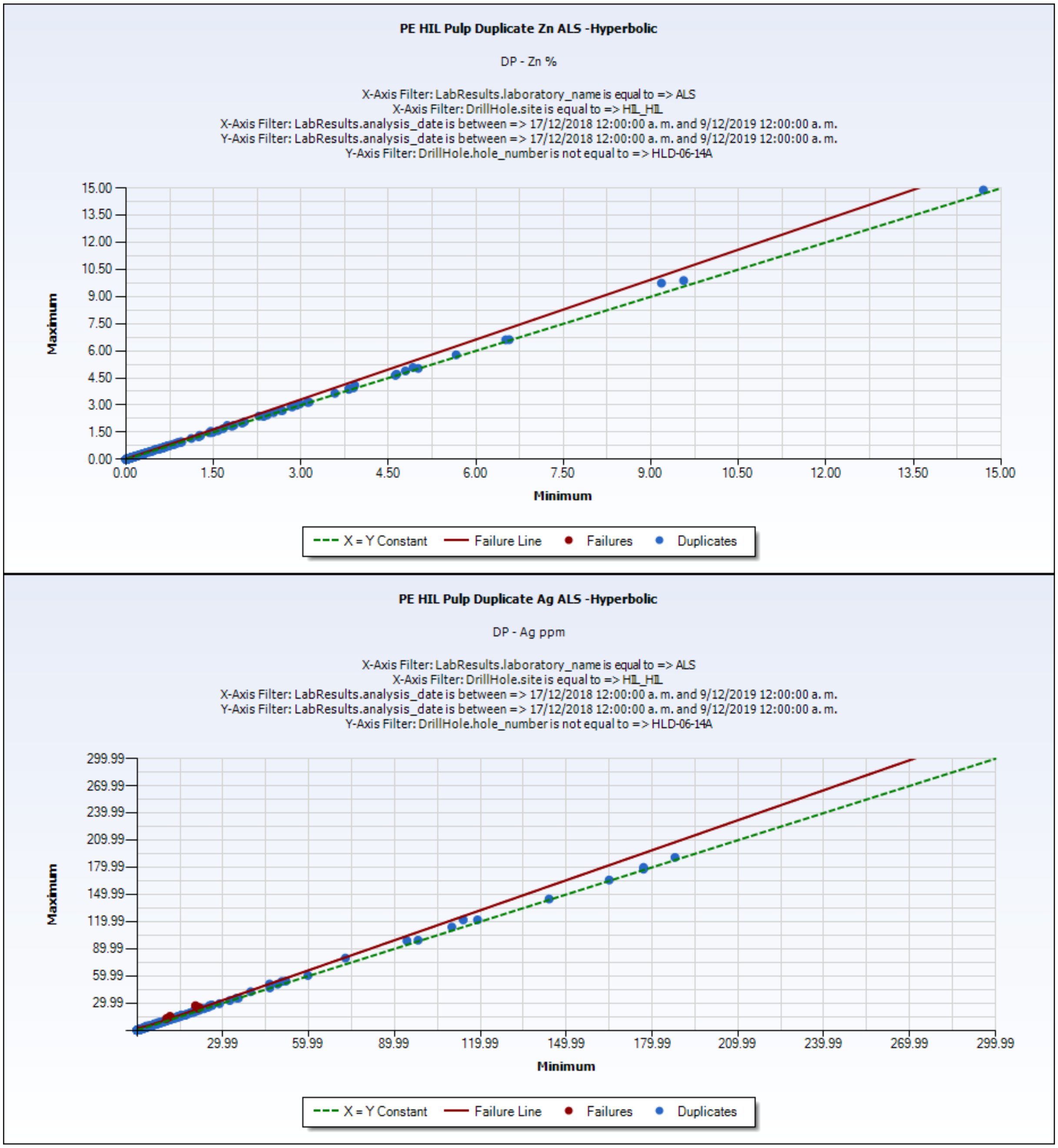
Duplicate Samples

A total of 702 duplicates were inserted into the sample stream to test the precision of the sampling method, sample preparation, and laboratory measurements. The following three types of duplicates are inserted as part of Hilarión QA/QC procedure:

- Field duplicates (2%).
- Crushed (Reject) duplicates (1%).
- Pulp duplicates (5%).

RPA found that the duplicate results for zinc, lead, copper, and silver compare very well. The duplicates at Hilarión for zinc, lead, copper, and silver fall inside the 10% relative hard value threshold. Pulp duplicate performance is shown in Figure 11-18.

FIGURE 11-18 HILARIÓN DEPOSIT PULP DUPLICATE PERFORMANCE FOR ZN AND AG (2018-2019)

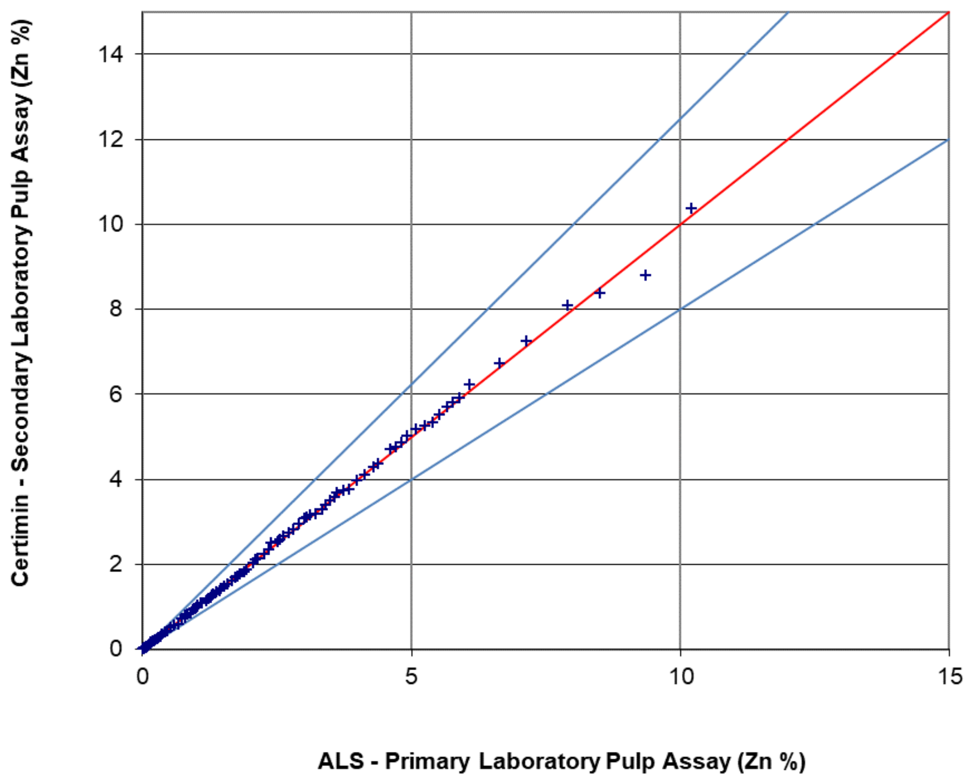


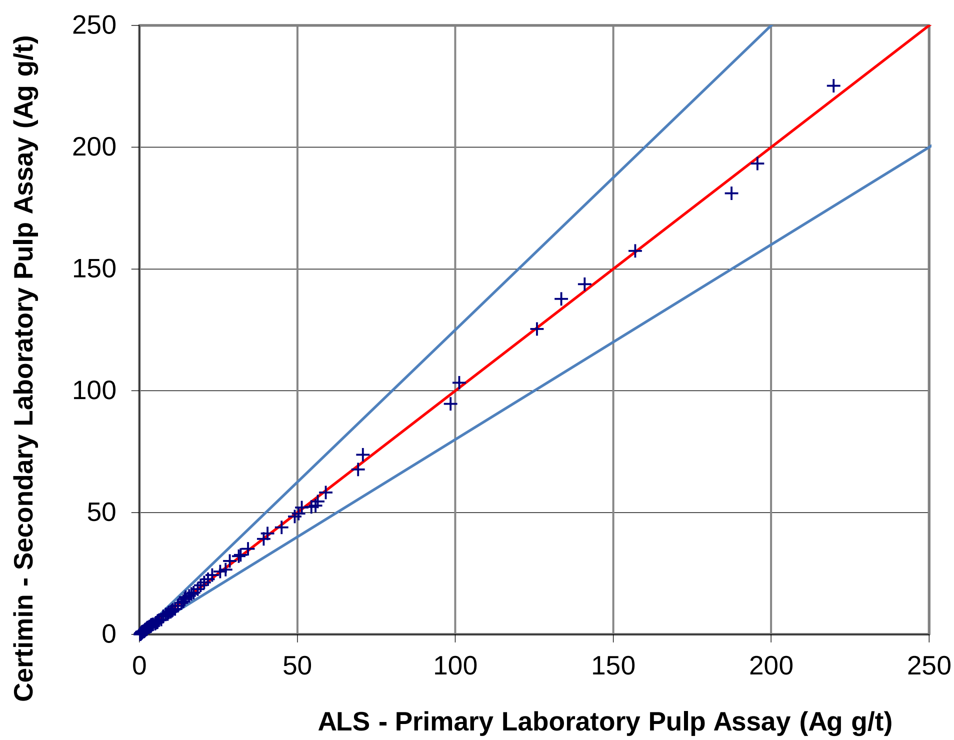
External Checks

Between 2018 and 2019, a total of 160 pulps, resulting in an insertion rate of 2%, were sent to Certimin. Reference materials and blanks were inserted in the check assay batches.

Overall, the check assay results are reasonable. The results for zinc, copper, lead, and copper gave a correlation coefficient of 1, which is very good, and the secondary laboratory averages for copper are 1% lower, and for zinc and lead are the same values than the primary laboratory. The check assays show that the primary laboratory has a low bias for silver (-4%). An example of zinc and silver assay performance for the check assays is shown in Figure 11-19.

FIGURE 11-19 HILARIÓN DEPOSIT – ZN AND AG CHECK ASSAYS (2018-2019)





EL PADRINO

A QA/QC program for El Padrino was in place throughout the Nexa Peru drilling campaigns, consisting of the submission of blanks, field duplicates, coarse reject duplicates, and pulp duplicates. While the drilling was ongoing from 2008 to 2014, the QA/QC programs can be summarized as follows:

- In 2008, standards, blanks, and field duplicates were submitted.
- In 2009, no QA/QC samples were submitted.
- From 2010 to 2012, only blanks and duplicates were submitted (the type of duplicates inserted is uncertain).
- In 2013, standards, blanks, and field duplicates were submitted.
- In 2014, standards, blanks, field duplicates, coarse reject duplicates, and pulp duplicates were submitted.

Assay acceptance criteria followed during the QA/QC program for El Padrino included the following:

- **Blanks:** assay value should not exceed five times the practical detection limit.
- **Duplicates:**
    - Field sample duplicate – relative error <30%
    - Coarse reject duplicate – relative error <20%
    - Pulp duplicate – relative error <10%
- **CRMs:**
    - Good – absolute values <5%
    - Acceptable – absolute values between 5% and 10%
    - Unacceptable – absolute value >10%

BLANKS

The contamination during sample processing is controlled by inserting blank samples in the sample stream. RPA set a threshold of 0.1% for Zn, Pb, and Cu; and 2 g/t for Ag for the assessment of blank performance.

A total of 509 blanks were used, resulting in an insertion rate of approximately 5%, which is reasonable. RPA identified one sample that was possibly mis-labelled but did not remove the sample from the analysis. Figures 11-20 and 11-21 show the overall blank assays for Zn and Ag.

The performance of the blank material is within expected limits.

FIGURE 11-20 EL PADRINO DEPOSIT BLANK ZN ASSAYS

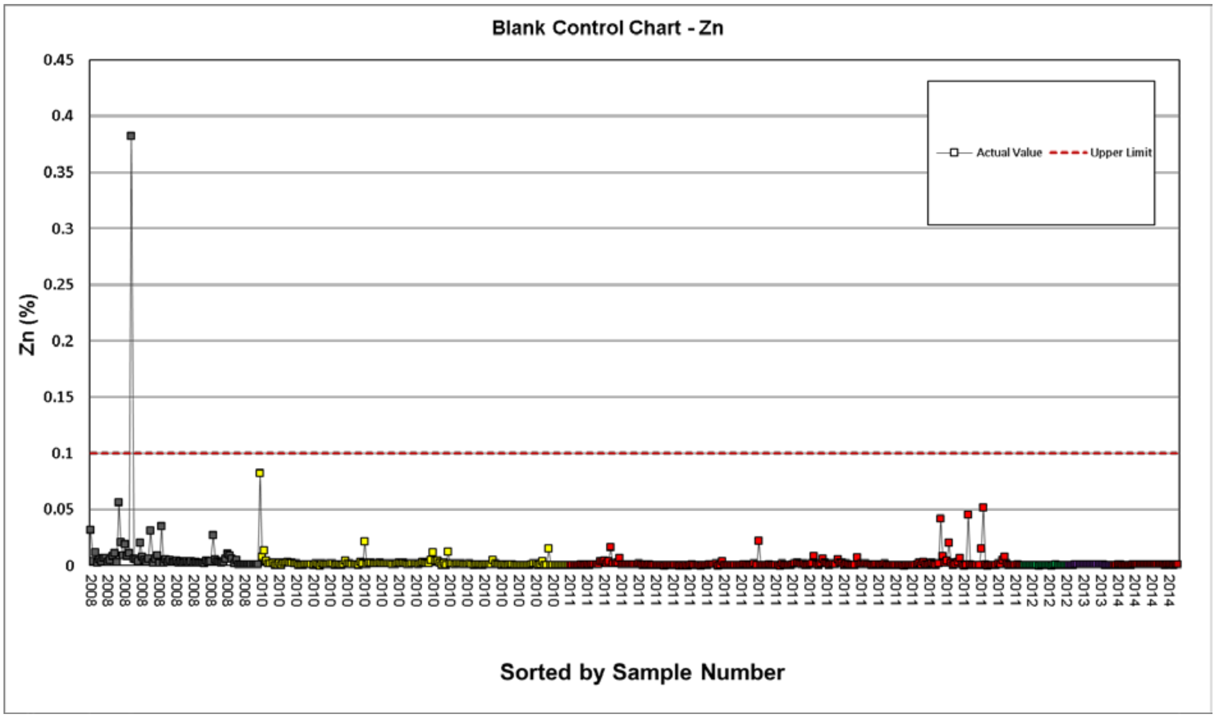
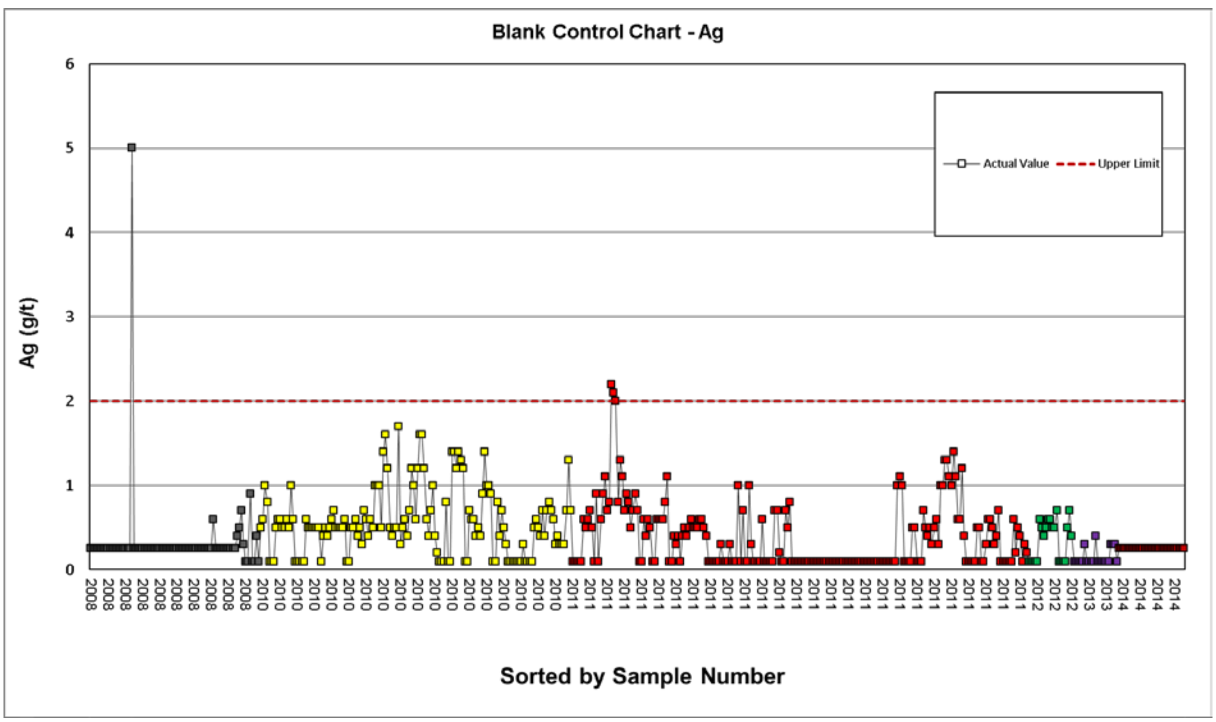


FIGURE 11-21 EL PADRINO DEPOSIT BLANK AG ASSAYS



CERTIFIED REFERENCE MATERIAL

A total of six different types of CRMs were used at El Padrino for low, medium, and high grades. The in-house standards used in 2008 (STD-1, STD-2, and STD-3) are not fully certified as they did not undergo round robin testing. Their expected values were determined by testing at CERTIMIN only. In 2010, the standards STD1000047, STD1000048, and STD1000049 underwent round robin testing at six different laboratories by SGS, on behalf of Nexa Peru.

A total of 128 CRMs were submitted, resulting in an insertion rate of 1%, which is low compared to RPA's recommended 5%. RPA did not identify any CRM mis-labelling. Table 11-7 lists the certified values of the CRMs for Zn, Pb, Ag, and Cu and a summary of the results.

TABLE 11-7 EL PADRINO DEPOSIT CRM CERTIFIED VALUES AND ASSAY PERFORMANCE

Nexa Resources S.A.– Hilarión Project

CRM	Period	Element	Certified Value	SD	Count	Mean	Bias
STD-1	2008	Zn%	5.69	0.11	9	5.82	2%
		Pb%	1.43	0.0297	9	1.46	2%
		Ag (g/t)	38.44	1.102	9	37.96	-1%
		Cu %	-	-	9	0.03	-
STD-2	2008	Zn%	11.36	0.192	8	11.35	0%
		Pb%	1.77	0.0319	8	1.78	1%
		Ag (g/t)	86.89	2.036	8	84.85	-2%
		Cu %	-	-	8	0.06	-
STD-3	2008	Zn%	2.57	0.0445	8	2.59	1%
		Pb%	0.99	0.01216	8	0.87	-13%
		Ag (g/t)	28.43	0.93	8	28.03	-1%
		Cu %	-	-	8	0.02	-
ST1000047	2013-2014	Zn%	4.94	0.04	38	5.00	1%
		Pb%	1.06	0.06	38	1.04	-2%
		Ag (g/t)	51.20	1.3	38	47.60	-7%
		Cu %	0.07	0.0014	38	0.07	-3%
ST1000048	2013-2014	Zn%	12.44	0.19	34	12.46	0%
		Pb%	6.50	0.12	34	6.55	1%
		Ag (g/t)	183.00	3	34	176.68	-3%
		Cu %	0.07	0.0013	34	0.07	-2%
ST1000049	2013-2014	Zn%	2.47	0.04	31	2.54	3%
		Pb%	1.42	0.04	31	1.42	0%
		Ag (g/t)	41.90	0.9	31	38.55	-8%
		Cu %	0.02	0.005	31	0.02	-4%

The standard performance is summarized as follows:

- The 2008 Zn standards show a slight positive bias and only one standard above three standard deviations over all three standards. An example is given in Figure 11-22.
- All the 2013 to 2014 standards show a slight positive bias for Zn but reasonable precision. The 2013 results are slightly higher than the 2014 results. Only two results are above three standard deviations, while there are five occurrences of consecutive values above two standard deviations, due in part to the slight positive bias throughout and in partly to the slightly higher results observed in 2013 (Figure 11-23). This time-based trend is only observed for Zn.
- In general, the standards yield reasonable results for Pb with the exception of STD-3, which shows a 13% negative bias. All eight results are below three standard deviations from the certified mean.
- The Ag values show a consistent low negative bias. ST1000049 has the largest negative bias of 8% resulting in 29 out of 31 samples below three standard deviations from the certified mean.
- The 2013 to 2014 Cu results are reasonable.

In general, the CRM results are reasonable. There is a small opportunity to increase Pb and Ag resource grades by on-going monitoring of the CRM performance. In any case, RPA recommends on-going data validation during future drilling programs, with data validation checks being performed and documented prior to entry of data into the master database.

FIGURE 11-22 EL PADRINO DEPOSIT ZN CONTROL CHART STD-1

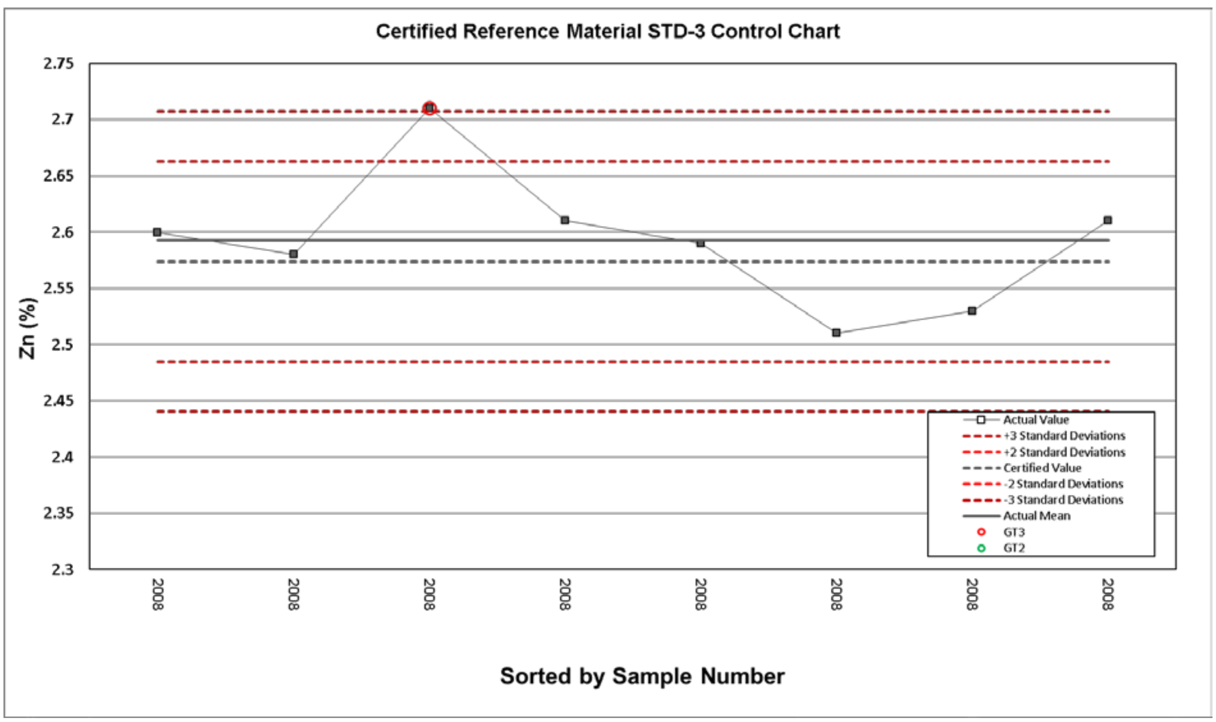
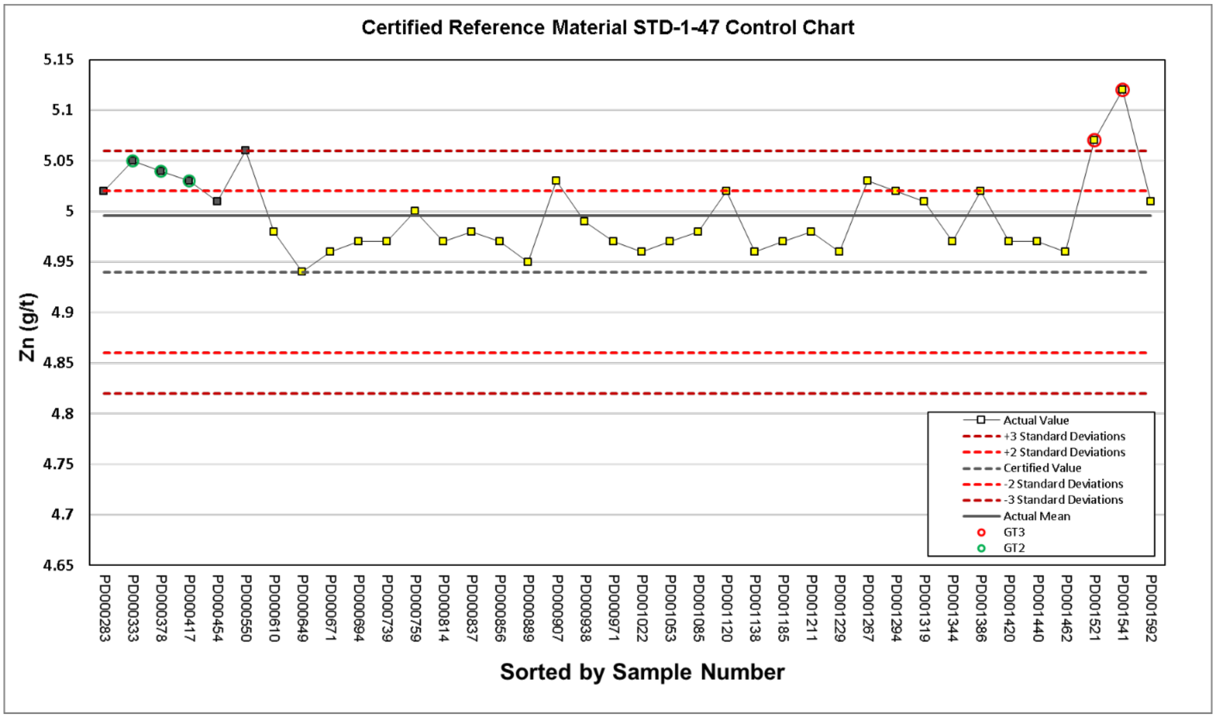


FIGURE 11-23 EL PADRINO DEPOSIT ZN CONTROL CHART ST1000047



DUPLICATE SAMPLES

A total of 471 duplicates exist in the database provided to RPA, although there is no identifier to discern between field, coarse, and pulp duplicates. RPA recommends amending the database options to include a separate identifier for the different types of duplicates.

According to internal QA/QC reports (Milpo 2014b and Milpo 2014c), a total of five field duplicates were submitted in 2013; and 27 field duplicates, 20 reject duplicates, and 20 pulp duplicates in 2014. The insertion rates for 2013 and 2014 were 2% and 6% respectively, averaging out to an overall 5% insertion rate. RPA is of the opinion that the insertion rate is reasonable.

RPA reviewed the duplicates in the reports provided and is of the opinion that the results are reasonable. RPA recommends performing external laboratory assay checks. The external check may confirm the low biases observed as compared to the CRMs submitted.

The Zn duplicate scatterplots are shown in Figures 11-24 to 11-26.

FIGURE 11-24 EL PADRINO DEPOSIT FIELD DUPLICATE PERFORMANCE – ZN (2014)

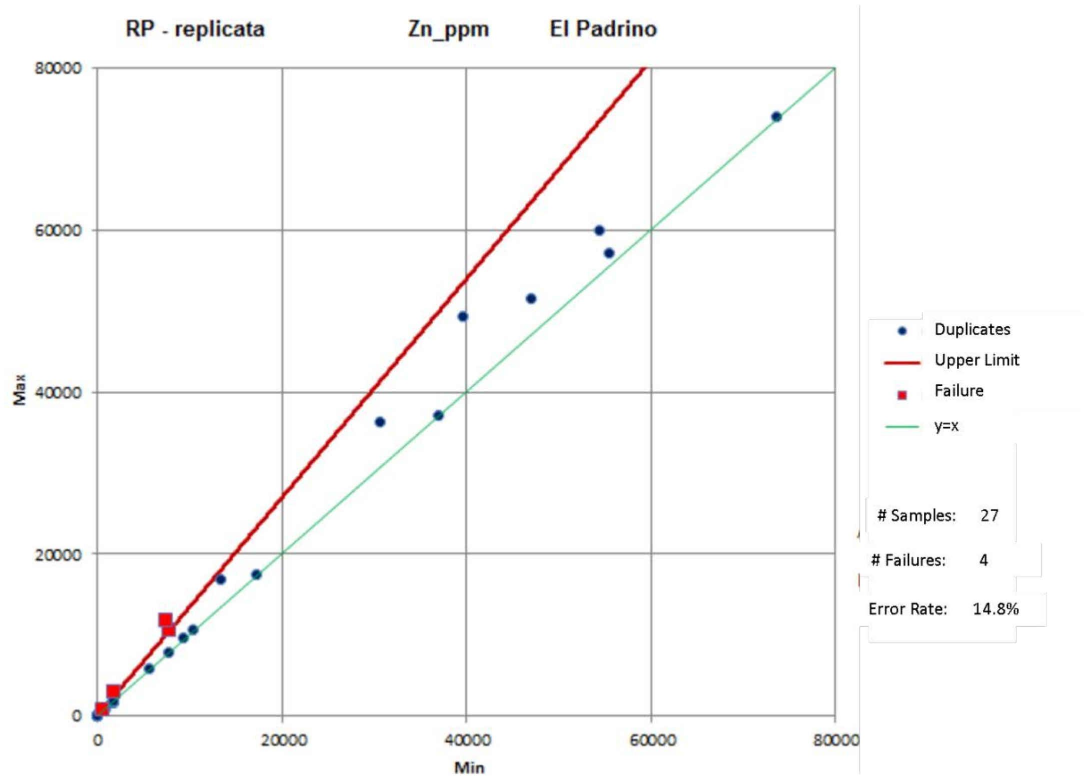


FIGURE 11-25 EL PADRINO DEPOSIT REJECT DUPLICATE PERFORMANCE – ZN (2014)

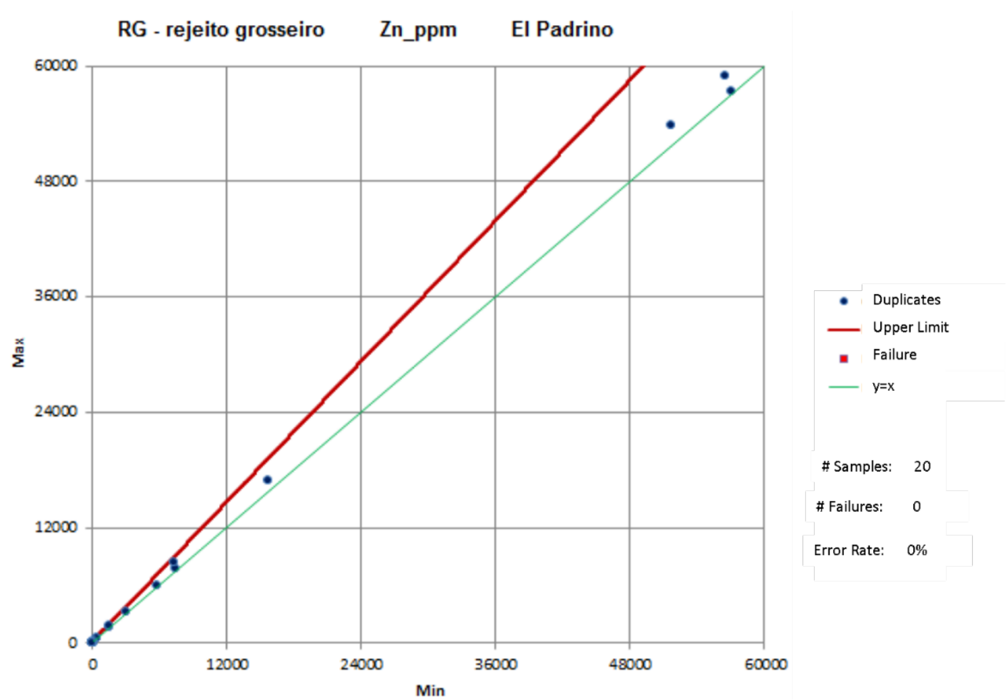
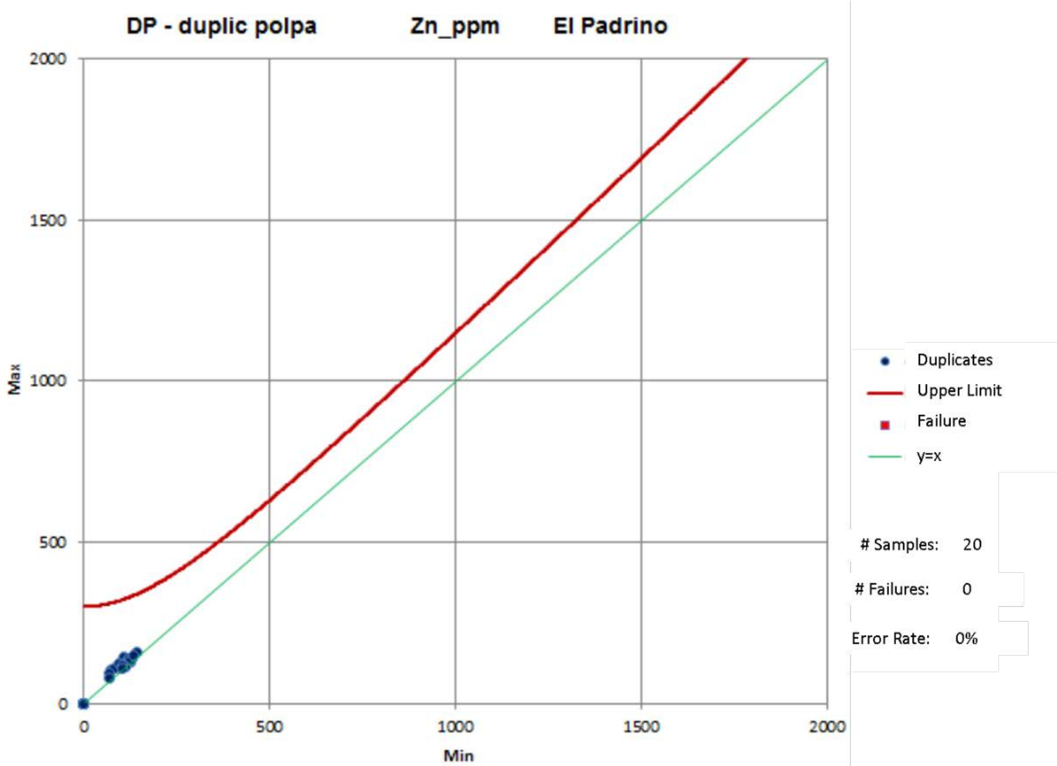


FIGURE 11-26 EL PADRINO DEPOSIT PULP DUPLICATE PERFORMANCE – ZN (2014)



In RPA's opinion, the QA/QC program as designed and implemented by Nexa is adequate and the assay results within the database are suitable for use in a Mineral Resource estimate. Grades of selected CRM materials adequately cover the distribution of Zn grades in the assay populations.

RPA recommends ongoing monitoring of QA/QC results and sending pulp duplicates to a secondary laboratory including blanks and CRMs. RPA also recommends adding a separate identifier for the different types of duplicates to the database.

12 DATA VERIFICATION

Rosmery J. Cárdenas Barzola, Principal Geologist with RPA, and an independent QP, visited Nexa's offices in Lima on June 12 and 13, 2017 and travelled to the Hilarión property on June 15, 2017. During the site visit, Ms. Cárdenas examined exposures of mineralization, reviewed plans and sections, visited the core shack, and reviewed core logging and sampling procedures. As part of the data verification process, she also checked the database against copies of assay certificates, checked a selection of drill hole collars and drill hole core photos, and reviewed QA/QC data collected by Nexa.

RPA found a few discrepancies in drill hole collar coordinates with respect to the topography. RPA recommends that Nexa review drill holes with collar coordinates that do not correspond to the topographic surface.

CERTIFICATE CHECKS

RPA conducted database checks against original assay certificates for the Hilarión and El Padrino projects.

RPA was provided with 541 assay certificates for Hilarión assayed by CERTIMIN laboratory for samples submitted for assaying from 2006 to 2012. The assay certificates were assembled and compared with the resource assay database. Approximately 15% of the Hilarión samples in the database were matched with assay certificate information for Zn, Pb, and Ag.

For El Padrino, 122 assay certificates were provided, spanning from 2008 to 2014. Approximately 95% of the El Padrino samples in the database were matched with assay certificate information for Zn, Ag, and Cu. RPA encountered some issues with inconsistent sample naming conventions. RPA recommends that a more consistent sample naming convention be used in the future, in order to facilitate database auditing.

The database values overall correspond with the assay certificate data, although a small number of different values were observed. This is most likely due to not accounting for re-assayed batches, which would produce similar values, yet not identical. RPA found minor differences in the silver grades related to unit conversion and decimal rounding problems that have a negligible impact on the resource silver grade estimates. No major issues were identified.

DATABASE AND GEOLOGICAL INTERPRETATION CHECKS

RPA inspected the drill holes in section and plan view to review geological interpretation related to drill hole and channel database and found good correlation. Some digital data included in the Hilarión mineralized zones were also checked against original logs for discrepancies in lithology records.

RPA queried the database for unique headers, unique samples, duplicate holes, overlapping intervals, blank and zero grade assays, and long interval samples. RPA did not identify any significant discrepancies. It is RPA's opinion that the assay database is adequate for the purposes of Mineral Resource estimation.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

HILARIÓN

RPA was provided seven metallurgical reports to review for Hilarión starting from 2006:

1. Chapi, 2006
2. Chapi, 2008
3. Plenge, 2010
4. Plenge, 2011
5. SGS, 2013
6. Certimin, 2013
7. Certimin, 2015

The information from these reports has been summarized in the sections below.

CHAPI 2006

A composite sample composed of 100 kg of assay rejects was used in tests to determine grinding and flotation parameters for use in the design of a 3,500 tpd processing plant. Test work included physical and chemical characterization, mineralogy, liberation, grind calibration, in addition to batch and locked cycle flotation tests (LCTs).

Mineralogy consisted of carbonates, followed by sulphides, quartz, magnetite, limonite, and sericite, while ore minerals consisted of galena and sphalerite (marmatite) with minor quantities of chalcopyrite. Sulphide gangue minerals present were predominantly pyrite and pyrrhotite. Approximately 19.0% of the lead was found to occur as oxide minerals, possibly limiting the potential overall recovery of lead to concentrate. A target grind size of 80% passing (P_{80}) 120 µm was set for flotation feed, and grind calibrations performed to determine grind time required to achieve this. A liberation study at this grind size determined that the majority of sphalerite was liberated (88%), while galena was less liberated (62%). Pyrite and other gangue minerals were well liberated (> 98%). The Bond ball mill work index (BWi) was determined to be 15.7 kWh/t.

Batch rougher flotation tests were conducted to evaluate different collectors with the objective of maximizing lead and silver recovery. Xanthate collectors were compared to dithiophosphate collectors. The tests demonstrated that the use of dithiophosphates rather than xanthates resulted in better recovery and selectivity of lead and silver. Batch cleaner tests on the lead rougher concentrate were conducted to evaluate zinc depressant schemes. The use of a combination of $ZnSO_4$ and NaCN was found to be effective for the rejection of zinc from the lead rougher concentrate. Batch zinc rougher flotation tests were conducted to evaluate zinc flotation schemes, concluding that $CuSO_4$ and sodium isopropyl xanthate (SIPX) at a pH of 10.5 to 11.0 produced the best results of the schemes tested. Flotation kinetic tests were conducted to determine the optimum flotation times for lead and zinc rougher, scavenger, and cleaner circuits.

Five LCTs were conducted during the course of batch flotation test work using conditions developed in batch flotation test work prior to each LCT. The culmination of the flotation test work led to the results summarized in Table 13-1 below. Penalty elements were below penalizable levels in the lead and zinc concentrates.

TABLE 13-1 CHAPI 2006 LOCKED CYCLE TEST RESULTS
Nexa Resources S.A.– Hilarión Project

Test	Concentrate	Grade					Recovery				
		(% Pb)	(oz/t Ag)	(% Zn)	(% Cu)	(% Fe)	(% Pb)	(% Ag)	(% Zn)	(% Cu)	(% Fe)
25	Lead	58.80	65.46	2.98	0.18	5.11	83.47	83.00	1.36	8.48	0.89
34		58.97	65.42	3.33	0.17	5.58	83.28	85.52	1.51	7.73	0,97
36		56.77	60.07	3.66	0.19	6.25	84.93	80.25	1.76	9.43	1.15
40		57.06	60.63	3.82	0.18	7.35	87.02	82.57	1.87	9.13	1.38
41		52.17	55.11	3.88	0.17	8.53	84.80	80.00	2.03	9.05	1.71
25	Zinc	0.50	1.56	45.84	0.25	12.45	3.13	8.74	92.44	51.91	9.64
34		0.31	1.57	50.78	0.31	10.73	1.69	7.64	88.72	54.33	7.20
36		0.35	1.32	49.61	0.24	10.47	2.06	6.87	92.97	46.78	7.54
40		0.19	1.05	51.68	0.27	10.13	1.07	5.16	91.44	49.09	6.88
41		0.27	0.96	49.47	0.31	12.41	1.54	4.89	90.55	57.85	8.72

Source: Chapi 2006

CHAPI 2008

A composite sample composed of 31 individual samples was used for flotation test work. Sub-samples of four of the individual samples were used for abrasion index (Ai) tests. An additional ten samples were subjected to impact work index test work. The results from the test work were used as the basis for the design of a 10,000 tpd processing plant. Test work included physical and chemical characterization, mineralogy, liberation, grind calibration, in addition to batch and LCTs.

Mineralogical analysis demonstrated that the predominant minerals were silicates and carbonates, with ore minerals including sphalerite (marmatite), galena, and minor amounts of chalcopyrite. The most abundant sulphide mineral was pyrrhotite, with only small amounts of pyrite present. Approximately 82.0% of the lead was present as sulphide mineral and therefore potentially floatable. At a P_{80} of approximately 140 µm, the majority of sphalerite and galena were liberated, as were pyrrhotite and pyrite. The Ai was measured at 0.1 g and the BWi was measured at 15.7 kWh/t.

Flotation test work was based on the Chapi 2006 test work and included batch and kinetic tests of the various circuits and LCTs. Certain flotation test products were subjected to size by size analysis. Test work demonstrated that in order to achieve satisfactory zinc concentrate grades, regrinding of the zinc rougher scavenger concentrate was necessary, as well as the use of additional reagents to assist with the depression of pyrrhotite, including Portland cement, dextrin, quebracho, and activated carbon. Batch test work led to the implementation of LCT conditions producing the results summarized in Table 13-2. Penalty elements were below penalizable levels in the lead and zinc concentrates.

TABLE 13-2 CHAPI 2008 LOCKED CYCLE TEST RESULTS
Nexa Resources S.A.– Hilarión Project

	Concentrate Grades			Tails		Recovery	
Cycle	Lead (% Pb)	Zinc (% Zn)	Iron (% Fe)	Final (% Zn)	Cl. Sc. (% Zn)	Lead (% Pb)	Zinc (% Zn)
1	71.4	53.0	11.2	0.01	3.9		
2	61.8	51.2	12.4	0.07	5.5		
3	61.0	52.6	11.8	0.82	9.8		
4	69.2	51.2	12.7	0.25	8.4		
5	70.6	50.9	12.8	0.21	9.2	89.1	83.2

Source: Chapi, 2008

PLENGE 2011

A composite composed of 11 samples was used in comminution, flotation, settling, and filtration test work, as well as for physical characterization and mineral liberation analysis.

The Ai was measured at 0.12 g, the Bond crushing work index (CWi) at 5.0 kWh/t, and the BWi at 14.8 kWh/t. Open circuit test work resulted in the establishment of flotation conditions that were applied in an LCT, the results of which are summarized in Table 13-3.

TABLE 13-3 PLENGE 2011 LOCKED CYCLE TEST RESULTS
Nexa Resources S.A.– Hilarión Project

Stream	Weight (%)	Grade					Distribution				
		(oz/t Ag)	(% Cu)	(% Pb)	(% Zn)	(% Fe)	(%Ag)	(% Cu)	(% Pb)	(% Zn)	(% Fe)
Lead concentrate	0.9	106.1	1.33	65.2	3.0	7.3	79.0	15.2	92.0	0.6	0.6
Zinc concentrate	12.5	1.3	0.42	0.17	30.1	32.6	13.5	67.4	3.4	78.3	36.0
Tails	86.6	0.1	0.02	0.03	1.2	8.3	7.5	17.4	4.7	21.1	63.4
Head (calculated)	100	1.2	0.08	0.62	4.8	11.3	100	100	100	100	100

Source: Plenge 2011

SGS 2013

Four composite samples supplied to SGS by Milpo were used in mineralogical, comminution, and flotation test work. The samples were reported to represent the mine plan or reserves as noted in Table 13-4. The make-up of the samples was not reported. Head assays for the composites are shown in Table 13-5.

TABLE 13-4 SGS 2013 COMPOSITE REPRESENTATIVITY
Nexa Resources S.A.– Hilarión Project

Sample	Representative of
M-1	Ore with pyrrhotite, first three years of project production
M-2	Ore without pyrrhotite, first three years of project production
M-3	Reserves with Pyrrhotite
M-4	Reserves without Pyrrhotite

TABLE 13-5 SGS 2013 COMPOSITE SAMPLE ASSAYS
Nexa Resources S.A.– Hilarión Project

Sample	Grade				
	(oz/t Ag)	(% Cu)	(% Pb)	(% Zn)	(% Fe)
M-1	22.7	0.06	0.28	3.73	11.7
M-2	23.4	0.05	0.38	3.87	11.0
M-3	33.2	0.05	0.80	3.27	12.3
M-4	26.1	0.03	0.65	2.77	8.6

SGS completed a mineralogical study using the particle mineral analysis (PMA) function of quantitative evaluation of minerals by scanning electron microscopy (QEMSCAN). The results of the scans are shown in Table 13-6. Analysis demonstrated that major constituents of the samples included feldspar (17.0% to 22.0%), quartz (<9.0%), phyllosilicates (6.0% to 11.0%), calcite (14.0% to 18.0%), and pyrrhotite (9.0% to 16.0%). The pyrite content varied between 0.3% and 0.4%.

TABLE 13-6 SGS QEMSCAN PMA ANALYSES
Nexa Resources S.A.– Hilarión Project

Minerals	M-1 (%)	M-2 (%)	M-3 (%)	M-4 (%)
Other	0.10	0.12	0.26	0.14
Fluorite	0.16	0.17	0.25	0.04
Carbonates	14.15	14.07	14.24	18.19
Fe Ti Oxides Oxyhydroxides	0.81	0.87	0.84	1.01
Other Silicates	27.44	25.19	20.74	20.23
Phyllosilicates	6.80	8.87	9.75	10.29
Plagioclase/Albite	4.27	4.35	3.19	3.88
K-Feldspar	17.38	17.01	20.33	21.94
Quartz	6.83	7.42	7.51	8.24
Other Sulphides	0.02	0.01	0.04	0.07
Pyrite-Pyrrhotite	15.65	15.04	16.86	10.92
Galena	0.30	0.55	1.06	0.68
Sphalerite	4.76	5.15	3.86	3.24
Molybdenite	0.11	0.09	0.13	0.12
Copper Sulphides	0.21	0.17	0.14	0.11

The BWi was determined for the samples and is shown in Table 13-7.

TABLE 13-7 SGS 2013 COMPOSITE WORK INDEX
Nexa Resources – Hilarión Project

Sample Code	BWi (kWh/t)
M-1	12.4
M-2	13.2
M-3	13.3
M-4	13.4

The flotation test work aimed to define the optimum conditions for each stage of flotation using open circuit rougher, cleaner, and kinetic flotation tests. Conditions determined in the open circuit tests were applied in LCTs using each of the four composites and are summarized in Table 13-8. Results of the LCTs are summarized in Table 13-9.

TABLE 13-8 SGS 2013 LOCKED CYCLE TEST CONDITIONS
Nexa Resources – Hilarión Project

Sample	Reagents (g/t)													H_2O_2	Regrind	pH	pH	Grind	Regrind
	Lime (kg/t)	$ZnSO_4$	NaCN	Na_2S	$Na_2S_2O_5$	$ZnSO_4$/NaCN Complex (3/1)	A-3418	H_2O_2	MIBC[1]	Z-11	S-7261	A-211	$CuSO_4$	Time min	Time min	Pb	Zn	P_{80} µm	P_{80} µm
M-1	1.9	50	95	80	100	200	6.8	300	55	22	54	14	350	20	5	Nat	11.50 - 11.82	93	25
M-2	1.9	50	95	80	100	200	6.8	300	59	22	54	21	275	20	5	Nat	11.50 - 11.82	93	25
M-3	1.78	50	20	80	100	190	13.6	-	33	20	54	8	180	20	3	Nat	11.50 - 11.80	93	25
M-4	1.9	50	30	80	100	200	6.8	200	51	12	54	14	380	20	5	Nat	11.50 - 11.82	117	25

Note:
1. Methyl isobutyl carbinol (MIBC)

TABLE 13-9 SGS 2013 LOCKED CYCLE TEST RESULTS
Nexa Resources – Hilarión Project

Sample	Concentrate	Weight (%)	Concentrate Grade					Recovery				
			Pb (%)	Zn (%)	Fe (%)	Cu (%)	Ag (g/t)	Pb (%)	Zn (%)	Fe (%)	Cu (%)	Ag (%)
M-1	Pb	0.56	49.12	2.78	14.9	0.3	3,117	87.22	0.41	0.73	2.51	67.22
	Zn	5.07	0.1	49.58	12.81	0.79	45.4	1.72	68.61	5.9	61.66	9.23
M-2	Pb	0.74	48.77	3.02	14.39	0.31	2,351	84.03	0.5	0.82	3.14	64
	Zn	7.02	0.08	47.34	13.81	0.58	36.5	1.34	72.85	7.27	54.81	9.22
M-3	Pb	1.09	58.16	2.25	9	0.15	2,058	80.79	0.76	0.8	2.75	65.38
	Zn	8.11	0.19	34.75	26.76	0.49	36.6	2.06	92.77	18.76	71.07	9.16
M-4	Pb	1.04	62.51	1.81	7.62	0.06	2,113	82.75	0.6	0.86	1.25	63.91
	Zn	4.38	0.17	47.26	15.08	0.56	55.1	1.03	73.38	7.97	59.28	7.84

CERTIMIN 2013

Four composite samples supplied to Certimin by Milpo were used for comminution and flotation test work. The samples, as with the SGS 2013 test work, were reported to represent the mine plan or reserves as noted in Table 13-4. The composition of the samples and if or how they relate to the samples used by SGS in its 2013 test work was not provided. Head assays (Table 13-10) are similar to those of the SGS composites.

TABLE 13-10 CERTIMIN 2013 COMPOSITE SAMPLE ASSAYS
Nexa Resources – Hilarión Project

Sample	Grade				
	(oz/t Ag)	(% Cu)	(% Pb)	(% Zn)	(% Fe)
M-1	23.0	0.06	0.31	3.60	12.1
M-2	21.2	0.06	0.38	3.71	11.0
M-3	39.2	0.06	0.78	3.00	12.5
M-4	31.8	0.04	0.68	2.73	8.9

A detailed mineralogical analysis was completed on each of the four composite samples using x-ray diffraction (XRD), petrographic studies and photomicrographs, mineralogical analysis by optical and electron microscopy, and QEMSCAN.

Sulphides were present as pyrite, pyrrhotite, sphalerite, chalcopyrite, galena, and arsenopyrite. In general, liberation of pyrite, chalcopyrite, sphalerite, and galena was good in the size range 44 µm to 74 µm. All of the samples contained significant quantities of pyrrhotite.

BWi and Ai tests were completed on each of the four samples. The results are shown in Table 13-11.

TABLE 13-11 CERTIMIN 2013 COMPOSITE WORK INDEX
Nexa Resources – Hilarión Project

Sample Code	BWi (kWh/t)	Ai (g)
M-1	13.5	0.228
M-2	13.8	0.356
M-3	14.6	0.170
M-4	14.5	0.134

The data indicates that the samples were moderately hard and more abrasive than the previous samples that were tested.

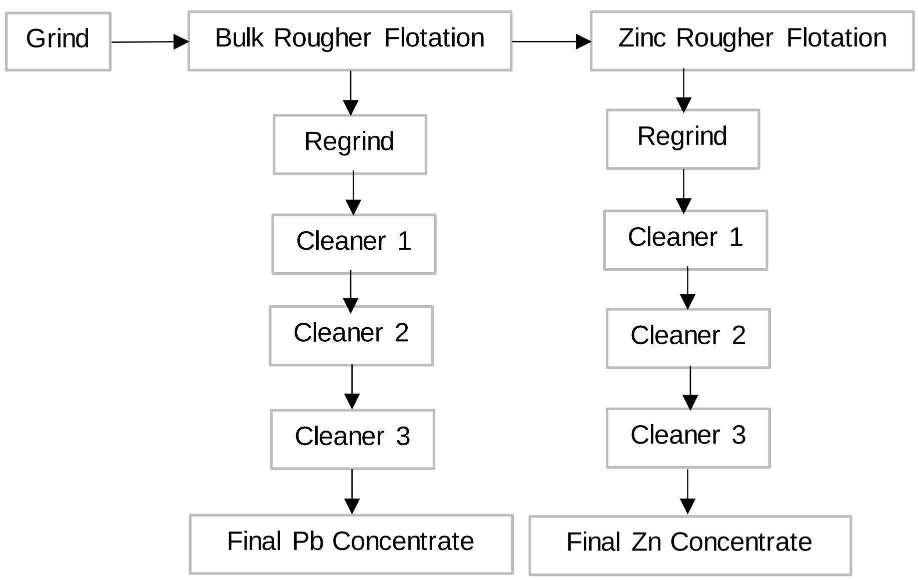
Certimin completed four exploratory flotation tests on each of the four samples followed by 15 open circuit tests on samples M1, M2, and M4 and 16 open circuit flotation tests on sample M3 to evaluate grind size, reagents, and pH.

After the test conditions were optimized, kinetics tests were completed on each of the four samples. The kinetics tests indicated the following:

- 5 minutes for lead flotation and 6 minutes for zinc flotation for M1 and M2
- 7 minutes for lead flotation and 3 minutes for zinc flotation for M3
- 4 minutes for lead flotation and 20 minutes for zinc flotation for M4

Batch flotation tests were conducted using three stages of bulk (i.e., lead) flotation with and without regrinding using three flotation schemes. Figure 13-1 shows a block flow diagram of the open cycle batch flotation tests.

FIGURE 13-1 BLOCK FLOW DIAGRAM FOR CERTIMIN 2013 FLOTATION TESTS



LCTs were completed for each sample using conditions derived from the open cycle tests. Table 13-12 provides the flotation performance projected by Certimin based on the weighted average of the LCT results for each of the samples.

TABLE 13-12 CERTIMIN 2013 PROJECTED LOM FLOTATION PERFORMANCE
Nexa Resources S.A.– Hilarión Project

Products	Weight (%)	Concentrate Grade Pb (%)	Concentrate Grade Ag (g/t)	Concentrate Grade Zn (%)	Concentrate Grade Fe (%)	Recovery Pb (%)	Recovery Ag (%)	Recovery Zn (%)	Recovery Fe (%)
Lead Concentrate	0.91	54.87	2,164	2.56	9.46	89.99	74.64	0.79	0.83
Zinc Concentrate	5.49	0.11	38.37	47.39	13.94	1.08	7.97	87.96	7.37
Tailings	93.59	0.05	4.91	0.36	10.20	8.93	17.38	11.25	91.80

The Certimin test data showed that a primary grind P_{80} of approximately 100 µm and regrind P_{80} of approximately 42 µm were effective for all samples. Recovery of lead and silver decreased as the concentrate grade increased since the lead grade was inversely related to the iron grade of the concentrate. A pH of 9.0 was optimum in the lead flotation circuit. Sodium sulphide and $ZnSO_4$were added to the primary grinding circuit. In the lead flotation circuit, a complex of $ZnSO_4$ and NaCN was used as a depressant, sodium sulphide sodium metabisulphite (SMBS) was added to the conditioner, while MIBC, Z-11, and an aqueous solution of sodium diisobutyldithiophosphinate (AP-3418A) were used as the other flotation reagents. For zinc flotation, Certimin determined that three stages of conditioning were most effective. Lime was added in the first stage of conditioning, S-7261 was added to the second stage, and copper sulphate, A-211, and xanthate was added to the third stage.

Certimin also conducted thickening and filtration tests and completed acid base accounting (ABA) tests.

CERTIMIN 2015

In 2015 Certimin completed bench scale and pilot plant tests using two samples designated M1 (1 to 5 Years) and M2 (6 to 10 Years). The samples weighed approximately 1.3 t each.

The head assays for the samples are provided in Table 13-13.

TABLE 13-13 CERTIMIN 2015 CHEMICAL ANALYSES
Nexa Resources S.A.– Hilarión Project

Elements	M1	M2
Pb, %	1.50	0.60
Zn, %	3.64	3.40
Cu, %	0.04	0.05
Fe, %	5.00	11.72
Au, g/t	0.05	0.04
Ag, g/t	49.10	32.10
CuOx, %	<0.005	<0.005
PbOx, %	0.45	0.17
ZnOx, %	0.12	0.12

The samples were characterized using optical microscopy and scanning electron microscopy. The results were consistent with the earlier mineralogy test work completed. Galena was the main lead mineral, and the major zinc minerals were sphalerite and marmatite. Both samples contained pyrite and pyrrhotite, however, M2 contained more pyrrhotite than M1.

BWi, CWi, SAG power index (SPI), Ai and drop weight index (DWi) tests were completed on each of the samples. The results are shown in Table 13-14.

TABLE 13-14 GRINDABILITY PROPERTIES OF CERTIMIN 2015 SAMPLES
Nexa Resources S.A.– Hilarión Project

Sample	BWi (kWh/t)	CWi (kWh/t)	SPI (min)	Ai (g)	DWi (kWh/m^3)
M1	13.92	21.43	67.06	0.205	6.59
M2	12.61	24.36	58.62	0.279	6.62

Certimin completed the 2015 testing with the objective of confirming the results from the earlier rounds of testing. For these tests, Certimin used activated carbon and sodium sulphide to improve flotation performance. Two batch tests were completed using M1 and three batch tests were completed using M3 prior to carrying out LCTs using each sample. After the optimum flotation conditions were verified, pilot plant tests were conducted. The results of the LCTs and pilot plant tests are summarized in Table 13-15.

TABLE 13-15 CERTIMIN 2015 FLOTATION TEST RESULTS
Nexa Resources S.A.– Hilarión Project

Products	Weight (%)	Concentrate Grade				Recovery			
		Pb (%)	Ag (g/t)	Zn (%)	Fe (%)	Pb (%)	Ag (%)	Zn (%)	Fe (%)
M1 LCT									
Bulk Concentrate	2.39	56.24	1,675	3.39	10.11	91.06	81.72	2.24	2.20
Zinc Concentrate	6.77	0.25	52.78	48.99	11.72	1.16	7.28	91.52	7.19
Tailings	90.84	0.13	5.94	0.25	11.04	7.78	11.00	6.24	90.61
M2 LCT									
Bulk Concentrate	0.97	53.65	2,550	2.04	14.06	88.23	77.94	0.53	1.37
Zinc Concentrate	7.07	0.11	31.02	47.67	13.17	1.30	6.90	90.29	10.25
Tailings	91.96	0.07	5.24	0.37	10.15	10.47	15.16	9.18	88.37
M1 Pilot Plant									
Bulk Concentrate	2.16	61.31	1,873	3.11	6.51	88.01	80.05	1.85	1.31
Zinc Concentrate	7.03	0.27	49.40	48.61	10.58	1.27	6.88	94.29	8.95
Tailings	90.82	0.18	7.26	0.15	11.03	10.71	13.07	3.86	89.74
M2 Confirmation Pilot Plant									
Bulk Concentrate	0.95	55.71	2,658	5.29	8.92	86.94	78.82	1.48	0.73
Zinc Concentrate	6.23	0.19	35.10	49.56	11.93	1.98	6.85	91.14	6.40
Tailings	92.82	0.07	4.93	0.27	11.62	11.08	14.32	7.38	92.87

The conditions utilized in these tests are summarized in Table 13-16. Primary grinds used for the pilot plant tests were P_{80} approximately 97 µm to 98 µm.

TABLE 13-16 CERTIMIN 2015 FLOTATION TEST CONDITIONS
Nexa Resources S.A.– Hilarión Project

Circuit	Regrind P_{80} µm	pH	Activated Carbon (g/t)	Lime (g/t)	$ZnSO_4$ (g/t)	$CuSO_4$ (g/t)	($ZnSO_4$: NaCN; 3:1) (g/t)	SMBS (g/t)	Na_2S (g/t)	A-3418 (g/t)	A-211 (g/t)	Z-11 (g/t)	S-7261 (g/t)	MIN 160 (g/t)
Bulk (Pb-Ag)	35	natural (7.8)	20		50		190	100	13.6	10		10		50
Zinc	40	11.8 to 12.0		3,190		200					19	24	64	36

Test work using the flotation tailings indicated that there was a high potential for acid generation.

EL PADRINO

Two phases of test work were conducted on samples from El Padrino in 2018 and 2019 at the Certimin laboratory in Peru:

1. Certimin 2018
2. Certimin 2019

CERTIMIN 2018

A total of 130 drill hole intervals were selected for metallurgical testing, making up 18 composites consisting of five metre interval groupings. Four of the 18 composites were used in comminution test work, and the remaining 14 composites were used to produce three composites for use in flotation test work. Each of the three flotation composites was composed of material from within different lithological zones. Flotation test work was aimed at evaluating different flotation conditions and reagents, culminating in three open cycle cleaner tests, one for each composite. Mineralogical characterization of the three flotation composites and of the flotation cleaner products was also carried out.

Comminution test work results are summarized in Table 13-17.

TABLE 13-17 GRINDABILITY PROPERTIES OF CERTIMIN 2018 EL PADRINO SAMPLES
Nexa Resources S.A.– Hilarión Project

Sample	BWi (kWh/t)	Ai (g)
EPAS-03	15.8	0.40
EPAS-04	10.1	0.12
EPAS-15	14.4	0.21
EPAS-18	13.1	0.33

The head assays for the flotation composites are presented in Table 13-18.

TABLE 13-18 CERTIMIN 2018 EL PADRINO CHEMICAL ANALYSES
Nexa Resources S.A.– Hilarión Project

Element		Flotation Composite		
	Unit	EPAC-01	EPAC-02	EPAC-03
Pb	%	0.02	0.23	0.31
Zn	%	6.99	3.67	4.44
Cu	%	0.96	0.04	0.15
Fe	%	12.7	4.39	11.1
Ag	g/t	14.6	44.4	47.9
S (t)	%	19.5	3.17	4.76
As	ppm	28.0	52.0	301

Mineralogical analysis of the flotation composites demonstrated that the majority of gangue minerals present consisted of silicates (predominantly garnet, and some talc in EPAC-01), and carbonates. Sulphides consisted predominantly of sphalerite and pyrite, with small amounts of chalcopyrite and galena, while EPAC-01 also contained significant gypsum / anhydrite. Sphalerite was shown to be > 80.0% liberated at the grind P_{80} of 106 µm. Some galena was associated with sphalerite.

Initial flotation test work indicated that a primary grind P_{80} of approximately 100 µm was optimal, followed by bulk flotation and cleaning to produce a lead-silver concentrate, and then zinc flotation to produce a zinc concentrate. Rougher concentrate results for the open cycle cleaner tests are shown in Table 13-19 (cleaner concentrates were not reported).

TABLE 13-19 CERTIMIN 2018 EL PADRINO FLOTATION TEST RESULTS
Nexa Resources S.A.– Hilarión Project

Products	Concentrate Grade Cu (%)	Pb (%)	Zn (%)	Fe (%)	S (%)	Recovery Cu (%)	Pb (%)	Zn (%)	Fe (%)	S (%)
EPAC-01										
Bulk Rougher Con	7.56	0.12	11.4	11.5	18.8	89.0	68.8	17.9	10.5	11.1
Zinc Rougher Con	0.67	0.01	50.3	4.06	29.2	8.00	4.54	80.0	3.73	17.5
EPAC-02										
Bulk Rougher Con	0.53	6.07	13.5	6.47	12.3	36.5	80.3	10.1	3.98	10.7
Zinc Rougher Con	0.24	0.22	38.4	6.66	23.5	50.4	8.85	87.9	12.4	62.3
EPAC-03										
Bulk Rougher Con	3.41	9.21	10.2	13.4	15.1	62.8	79.7	5.89	3.14	8.37
Zinc Rougher Con	0.43	0.21	37.3	11.4	25.3	33.5	7.84	91.2	11.3	59.0

Source: Transmin, 2018

Mineralogical characterization of the flotation products by PMA indicated that talc deportment for EPAC-01 was mainly to the bulk concentrate, although talc was also present in the bulk and zinc concentrates. Sphalerite in the zinc concentrates was mostly liberated, while in the bulk concentrates it was associated with either chalcopyrite (EPAC-01) or galena (EPAC-02 and EPAC-03).

CERTIMIN 2019

Phase two of the test work for El Padrino, completed in 2019, followed on from the work completed by Certimin in 2018 using the same three flotation composites produced for the Phase 1 work, as well as ten individual samples selected for mineralogical characterization.

Mineralogical characterization of the ten individual samples showed that they consisted predominantly of silicates and sulphides, with the main silicates being quartz, garnet, and andradite. There was a significant presence of talc in samples from different mineralogical areas. The main sulphides were pyrite, sphalerite, and in certain samples, pyrrhotite. Chalcopyrite liberation varied widely by zone, while sphalerite was generally well liberated.

Flotation test work evaluated a pre-float step to remove talc, which resulted in significant losses of Cu, and was therefore discontinued. Regrinding of the rougher (bulk and Zn) concentrates to different sizes was evaluated with the aim of improving concentrate quality producing varying results for the different composites. Evaluation of guar gum to depress talc was promising for EPAC-01. Open cycle cleaner tests were conducted for each composite; the results of which are presented in Table 13-20.

TABLE 13-20 CERTIMIN 2019 EL PADRINO FLOTATION TEST RESULTS
Nexa Resources S.A.– Hilarión Project

Products	Concentrate Grade						Recovery					
	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	Fe (%)	S (%)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	Fe (%)	S (%)
EPAC-01												
Bulk Cleaner Con	185	21.3	0.30	11.1	24.9	35.0	35.5	66.1	41.9	4.56	5.82	5.20
Zinc Cleaner Con	20.4	1.00	0.008	60.3	2.60	34.5	9.83	7.83	2.80	62.4	1.53	12.9
EPAC-02												
Bulk Cleaner Con	8,143	0.72	48.1	16.4	5.45	20.0	21.6	1.64	24.6	0.45	0.13	0.61
Zinc Cleaner Con	126	0.44	0.48	56.4	5.93	33.9	13.1	39.7	9.72	60.4	5.42	40.2
EPAC-03												
Bulk Cleaner Con	3,351	6.11	23.3	9.51	14.7	21.0	29.0	16.9	33.6	0.81	0.49	1.68
Zinc Cleaner Con	76.6	0.57	0.35	32.9	16.8	30.7	21.0	50.1	16.1	88.4	17.7	77.9

Source: Transmin, 2019

SUMMARY

HILARIÓN

RPA has reviewed information about the locations from which the Hilarión 2015 pilot plant composite samples were sourced and considers them sufficiently representative to provide indicative product quality and metallurgical response to the optimized pilot plant flow sheet.

Metallurgical test work for Hilarión has progressed through several stages and numerous tests using composite and bulk samples. Recovery of lead and zinc is complicated by the presence of non-sulphide lead minerals and high quantities of pyrrhotite. Flotation conditions have been optimized such that lead and zinc recoveries up to approximately 90.0% to concentrates have been achieved, with lead grades of approximately 55.0% in bulk lead-silver concentrates, and zinc grades of approximately 50.0% in zinc concentrates. The test work also showed that flotation performance was highly dependent upon the amount of pyrrhotite contained in the samples, as the amount of pyrrhotite in the samples increased, the grade of the zinc concentrate decreased.

Test data demonstrated that the quantities of arsenic, antimony, and other deleterious elements that may impact the economics should not be a concern as very low concentrations of these elements were contained in the samples.

RPA recommends that the acid generation potential of the flotation tailings warrants further testing and mitigation.

EL PADRINO

Samples from El Padrino used for metallurgical test work were selected to be representative of lithology, and grades of Cu, Pb and Zn. In RPA's opinion, the samples were sufficiently representative to provide indicative metallurgical response to testing. Metallurgical test work for El Padrino is in its early stages, however the test work has indicated that it is a complex deposit with varying metallurgical response depending on lithological zones from which samples were sourced. Blending of the plant feed will make it difficult to maintain product quality and recovery. The test work did enable the identification of a preliminary reagent scheme and flotation conditions, which will require further definition and optimization in subsequent test work. Further test work is necessary to determine whether or not El Padrino material can be effectively processed to produce saleable products.

14 MINERAL RESOURCE ESTIMATE

SUMMARY

The Mineral Resource estimates prepared by Nexa for the Hilarión and El Padrino deposits, dated December 31, 2019, are summarized in Table 14-1. The Hilarión Mineral Resource estimate is based on underground channel and drill hole data available as of April 30, 2014. The El Padrino Mineral Resource estimate is based on drill hole data available as of December 5, 2014. RPA has reviewed and accepted the Nexa resource estimates. There are no Mineral Reserves estimated for the Hilarión and El Padrino deposits.

The Mineral Resource estimates for the Hilarión and El Padrino deposits are based on a potential underground scenario. NSR cut-off values for the Mineral Resources of each deposit were established using a zinc price of US$1.34/lb Zn, a lead price of US$1.04/lb Pb, a copper price of US$3.41/lb Cu, and a silver price of US$19.61/oz Ag.

The Mineral Resource estimate was reported using all the material within resource shapes generated in Deswik Stope Optimizer software, satisfying minimum mining size, continuity criteria, and using a net smelter return (NSR) cut-off value of US$35/t for Sub-level Stoping (SLS) resource shapes for the Hilarión deposit, and an NSR cut-off value of US$45/t for SLS resource shapes and US$50/t for Room and Pillar (R&P) resource shapes for the El Padrino deposit.

No value has been assigned to the low grade copper mineralization present at Hilarión. Copper has been estimated in the Hilarión block model but has not been included in the Hilarión Mineral Resource estimate in Table 14-1.

RPA reviewed and revised as required the Mineral Resource assumptions, input parameters, geological interpretation, and block modelling procedures and is of the opinion that the Mineral Resource estimate is appropriate for the style of mineralization and that the block model is reasonable and acceptable to support the 2019 Mineral Resource estimate.

Exploration drifting has extracted 11,708 tonnes from the Hilarión deposit resource, based on the NSR cut-off value of US$35/t. This drifting has not been excluded from the stated Mineral

Resources. RPA does not consider this drifting to be material as it represents a very small percentage (<0.02%) of the Measured and Indicated Mineral Resources.

Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves (CIM (2014) definitions) were used for Mineral Resource classification.

TABLE 14-1 HILARIÓN PROJECT MINERAL RESOURCE ESTIMATE – DECEMBER 31, 2019

Nexa Resources S.A.– Hilarión Project

			Grade				Contained Metal			
Deposit	**Classification**	**Tonnes (Mt)**	**Zinc (%)**	**Lead (%)**	**Silver (g/t)**	**Copper (%)**	**Zinc (000 t)**	**Lead (000 t)**	**Silver (000 oz)**	**Copper (000 t)**
Hilarión	Measured	24.73	3.43	0.72	32.8	-	847.2	177.3	26,107	-
	Indicated	33.27	3.59	0.59	25.5	-	1,195.8	195.2	27,287	-
	M + I	**58.00**	**3.52**	**0.64**	**28.6**	-	**2,043.0**	**372.5**	**53,394**	-
	Inferred	21.54	3.28	0.78	28.5	-	706.1	167.6	19,763	-
El Padrino	Measured	-	-	-	-	-	-	-	-	-
	Indicated	0.95	4.31	0.26	33.9	0.16	41.1	2.4	1,038	1.6
	M + I	**0.95**	**4.31**	**0.26**	**33.9**	**0.16**	**41.1**	**2.4**	**1,038**	**1.6**
	Inferred	3.80	4.87	0.18	27.7	0.48	185.1	6.7	3,380	18.3
Total	**Measured**	**24.73**	**3.43**	**0.72**	**32.8**	-	**847.2**	**177.3**	**26,107**	-
	Indicated	**34.23**	**3.61**	**0.58**	**25.7**	-	**1,237.0**	**197.7**	**28,326**	-
	M + I	**58.96**	**3.53**	**0.64**	**28.7**	-	**2,084.1**	**374.9**	**54,433**	-
	Inferred	**25.34**	**3.52**	**0.69**	**28.4**	-	**891.2**	**174.3**	**23,144**	-

Notes:

1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated at an NSR cut off value of US$35/t for SLS resource shapes for Hilarión Deposit and an NSR cut-off value of US$45.00/t for SLS resource shapes and US$50.00/t for R&P resource shapes for El Padrino Deposit.
3. Mineral Resources are estimated using an average long-term metal prices of Zn: US$2,956.65/t (US$1.34/lb); Pb: US$2,303.14/t (US$1.04/lb); Cu: US$7,523.30/t (US$3.41/lb); and Ag: US$19.61/oz.
4. A minimum mining width of three metres was used for Hilarión and El Padrino.
5. Bulk density varies depending on mineralization domain.
6. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
7. Numbers may not add due to rounding.

RPA is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate.

HILARIÓN

SUMMARY

The Mineral Resource estimates are supported by 66 mineralization wireframes. The geological model and mineralization wireframes were generated in 2014 by Nexa geologists using Leapfrog Mining software.

Visual examination of the assay tables revealed the presence of unsampled intervals within and abutting the boundaries of the interpreted mineralization wireframes. Unsampled (null) values within wireframes were replaced with zeros in the database prior to grade composite creation.

A percent block model measuring 6.0 m by 3.0 m by 6.0 m for the mineralization wireframes was generated using MineSight. Blocks were interpolated for zinc, lead, silver, and copper using ordinary kriging (OK). A two-pass search strategy with a yield restriction for outlier values was applied when estimating the grades for the blocks contained within the mineralized wireframes.

Block model validation exercises included visual comparisons of the estimated block grades to the composite grades, the comparison of the average grade of the nearest neighbour (NN) estimate to the OK block average grades, and creation of swath plots.

In 2019, the MineSight resource model was converted by Nexa into a sub-blocked Datamine block model for resource reporting. RPA used the Datamine block model for the PEA work. A sub-blocked block model measuring 6 m by 6 m by 6 m, sub-celled to a minimum of 1 m by 1 m by 1 m for the mineralization wireframes

RESOURCE DATABASE

Nexa maintains the entire resource database in Microsoft Excel. The database comprises 597 drill holes and 211 underground channels for a total of 244,502.2 m. During 2018 and 2019, 11 drill holes totalling 13,027.25 m were completed at Hilarión North and six drill holes totalling 3,280.2 m, at Hilarión in proximity of Cuerpo 33, confirming and extending the mineralization in this zone. The 2018–2019 drilling was not included in the resource database for Hilarión as the Mineral Resources were not updated with this data. RPA recommends updating the Mineral Resources with the 2018-2019 drilling, however, in RPA's opinion, the new data would not make a significant change to the Mineral Resources.

RPA received data from Nexa in Microsoft Excel format. A MineSight database was also provided and extracted in CSV format. Data were amalgamated, parsed as required and imported by RPA into Vulcan software and Seequent's Leapfrog Geo software version for review.

The drill hole and channel database comprise drill hole collar coordinate data, drill hole collar azimuth and dip data, lithology, density data, and assay data. The channel sample data was converted into drill hole data for use in interpretation and Mineral Resource estimation.

For Mineral Resource estimation, the drill hole data was limited to assays located within the mineralization wireframes. This includes 13,545 zinc, lead, and silver assays from 555 drill holes and 122 underground channels for a total of 21,261 m of sampling; this data is summarized in Table 14-2. The effective date of the Hilarión Mineral Resource database is April 30, 2014.

TABLE 14-2 SUMMARY OF HILARIÓN DEPOSIT MINERAL RESOURCE DATABASE
Nexa Resources S.A. – Hilarión Project

Sampling Type	No. of Holes	Total Length (m)	No. of Samples
Drill holes	555	20,718.36	13,236
UG Channels	122	542.82	309

For grade estimation, unsampled intervals within mineralization wireframes were replaced with zero grades to prevent overestimation. Detection limit text values (e.g., "<0.05") were replaced with numerical values that were half of the absolute value of the detection limit.

RPA conducted a number of checks on the Mineral Resource database as discussed in Section 12 ("Data Verification"). Some drill hole collars were found to differ by more than five metres when compared to the topography. RPA recommends that these discrepancies be investigated. No other issues were identified. RPA is of the opinion that the database is appropriate to support Mineral Resource estimation.

TOPOGRAPHY

An aerial photogrammetry survey was completed over the Project in 2005 with five metre contour intervals. The resulting topography was used for the geological and mineralization models.

In 2012, a new topography was generated in the Hilarión II area using the Lidar system and a photogrammetry survey.

RPA reviewed the collar elevation with both topographic surfaces and noticed that the 2012 topography shows a closer correlation with the collar survey. RPA recommends using the most recent merged topography in the future, in addition to updating the geological and mineralization model with the updated topography.

GEOLOGIC MODELLING

Geological models were constructed by Nexa geologists to provide geologic control for grade estimation and to provide parameters for mine planning. Geological models for lithological domains were built using Leapfrog. Interpretations were made by geology personnel on a set of 41 cross sections oriented at N45°E and 39 benches, both at 40 m spacings. Diamond drill holes and underground channels were plotted in Leapfrog and used to create 3D geological wireframes. The geological wireframes were inspected by the Project geologist. The geological modelling work for the current Mineral Resource model was completed in 2014.

Mineralization is hosted in limestone of the Pariatambo Formation. There are a number of subparallel dikes, and two stocks located at the center and south of the deposit with dimensions 260 m by 200 m by 200 m and 260 m by 500 m by 500 m, respectively, which cut rocks of the Pariatambo Formation. These intrusive units controlled the extent of mineralization.

The intrusive units in contact with the limestone rocks have generated a halo of metamorphism, developing skarn, hornfels, and marble.

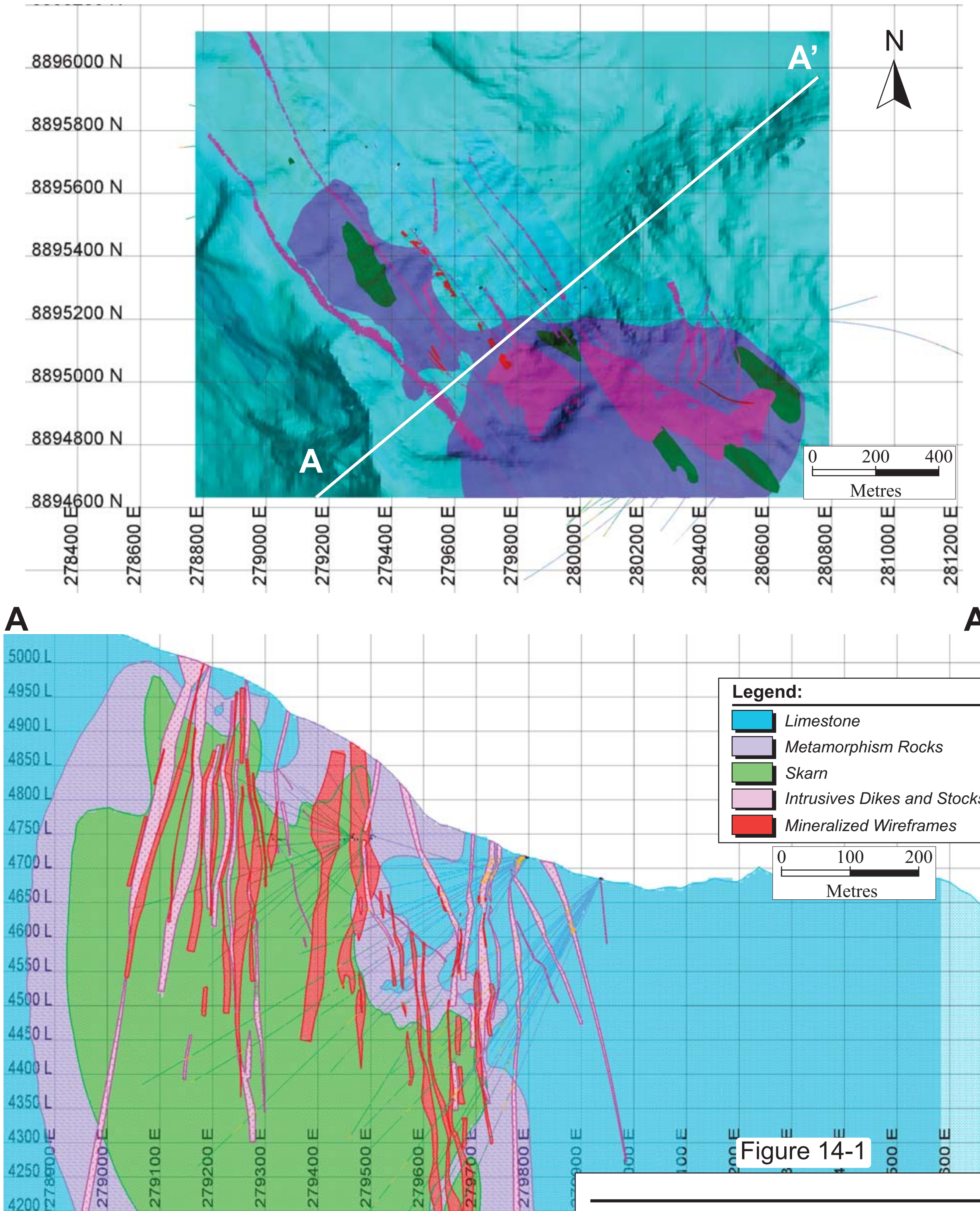
Wireframes were built for the main lithology domain zones and are listed in Tables 14-3. These wireframes were used to assign lithology codes to the block model.

TABLE 14-3 HILARIÓN DEPOSIT LITHOLOGY CODES

Nexa Resources S.A.– Hilarión Project

Litho Code	Lithology Group
1	Limestone
2	Metamorphic rocks
3	Skarn
4	Intrusive dikes and stocks
5	Mineralization wireframes

RPA reviewed the geological model with the block model lithology codes (Litom) and noticed some inconsistencies. These inconsistencies do not affect the estimation as grade was not interpolated using the Litom codes but do affect waste rock densities. RPA amended the lithology codes in the block model (Lito_rpa) in the block model (Figure 14-1).



Looking North-West

Figure 14-1

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Hilarión Deposit Geological Model

February 2020

Source: RPA, 2017.

MINERALIZATION MODELLING

The Hilarión Mineral Resources consist of two distinct styles of mineralization: Pb-Zn-Ag as massive, semi-massive sulphide and disseminated zones, and Cu-Ag as disseminated zones in the Cuerpo 33 Mineralization Domain. A total of 66 mineralization wireframes were constructed using Leapfrog and minimum mining thickness was not considered. Wireframes were modelled at a cut-off grade of 1.0% Zn, with input from the geologic solids guiding the mineralization interpretation. Mineralization wireframes were only generated where a minimum of three intercepts were available to guide interpretation. Figure 14-2 presents a 3D perspective view of the wireframes and Figure 14-3 depicts examples of section and plan views, respectively.

Mineralization at Hilarión strikes at approximately 323° azimuth, and ranges from approximately 100 m to over 1,500 m in strike length. Most of the mineralization wireframes dip from 80° to 90° to the northeast. The main mineralized zone comes close to outcropping at surface. Individual wireframe thicknesses range from less than one metre to a maximum of fifty metres, but more typically are from three metres to seven metres in thickness.

Mineralization wireframes were clipped to the 2005 topography and were clipped by late intrusive wireframes solids. Wireframes were not snapped to the drill holes, however, only samples within mineralization wireframes were used in estimation. RPA noted some significant zinc and copper grades outside the wireframes locally and recommends that Nexa update the mineralization solids with the aim of capturing some of this material. RPA also observed several instances where unsampled intervals within wireframes had not been assigned zero grades. This minor issue relates to a small number of unsampled intervals with centroids lying outside of mineralization zones. RPA suggests that this issue be corrected in future estimates by assigning zero grade to all unsampled intervals in the database. Nevertheless, less than 1.0% of intervals in the current resource are affected, and RPA considers the impact to be negligible.

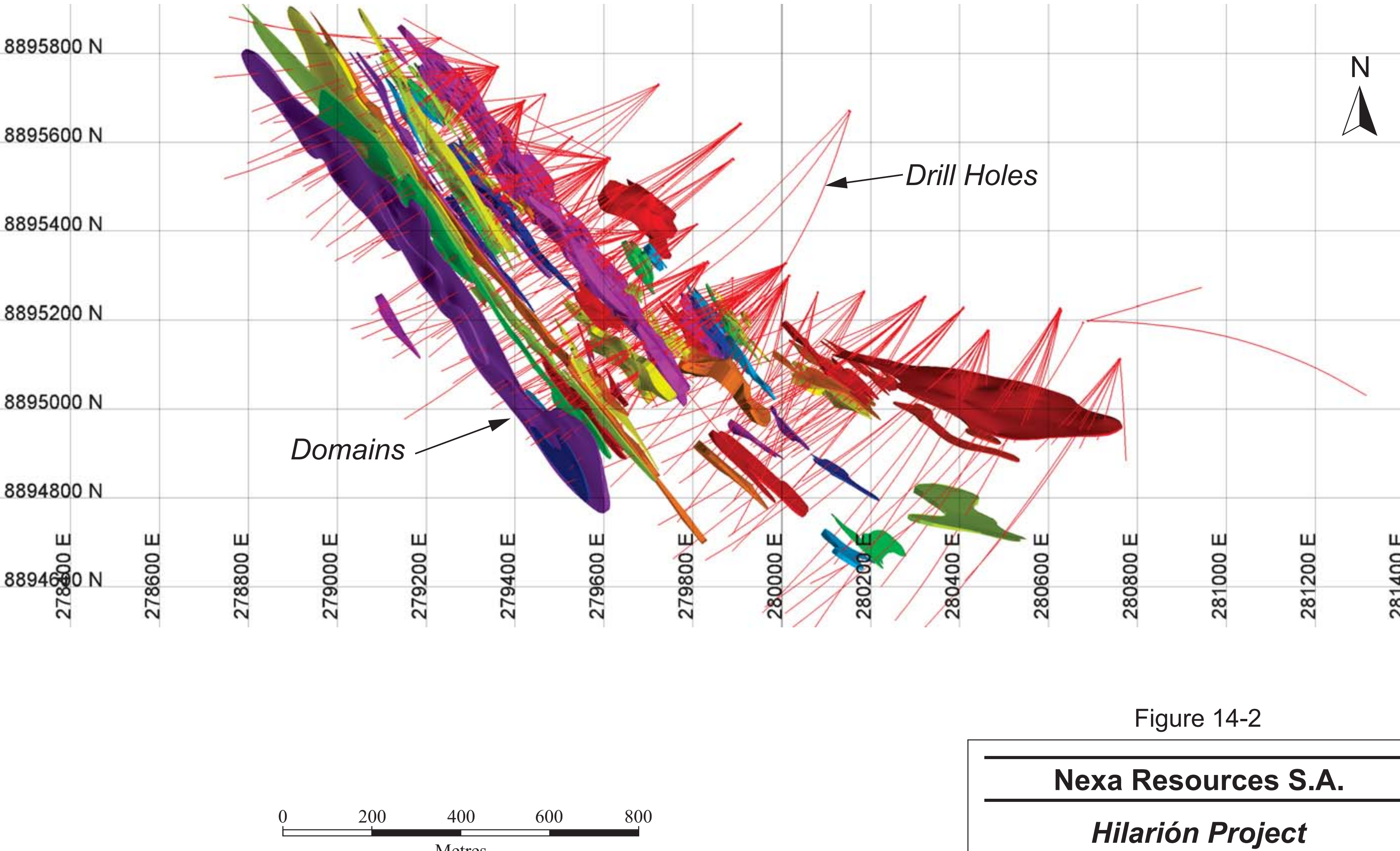


Figure 14-2

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Hilarión Deposit Mineralization Model

February 2020

Source: RPA, 2017.

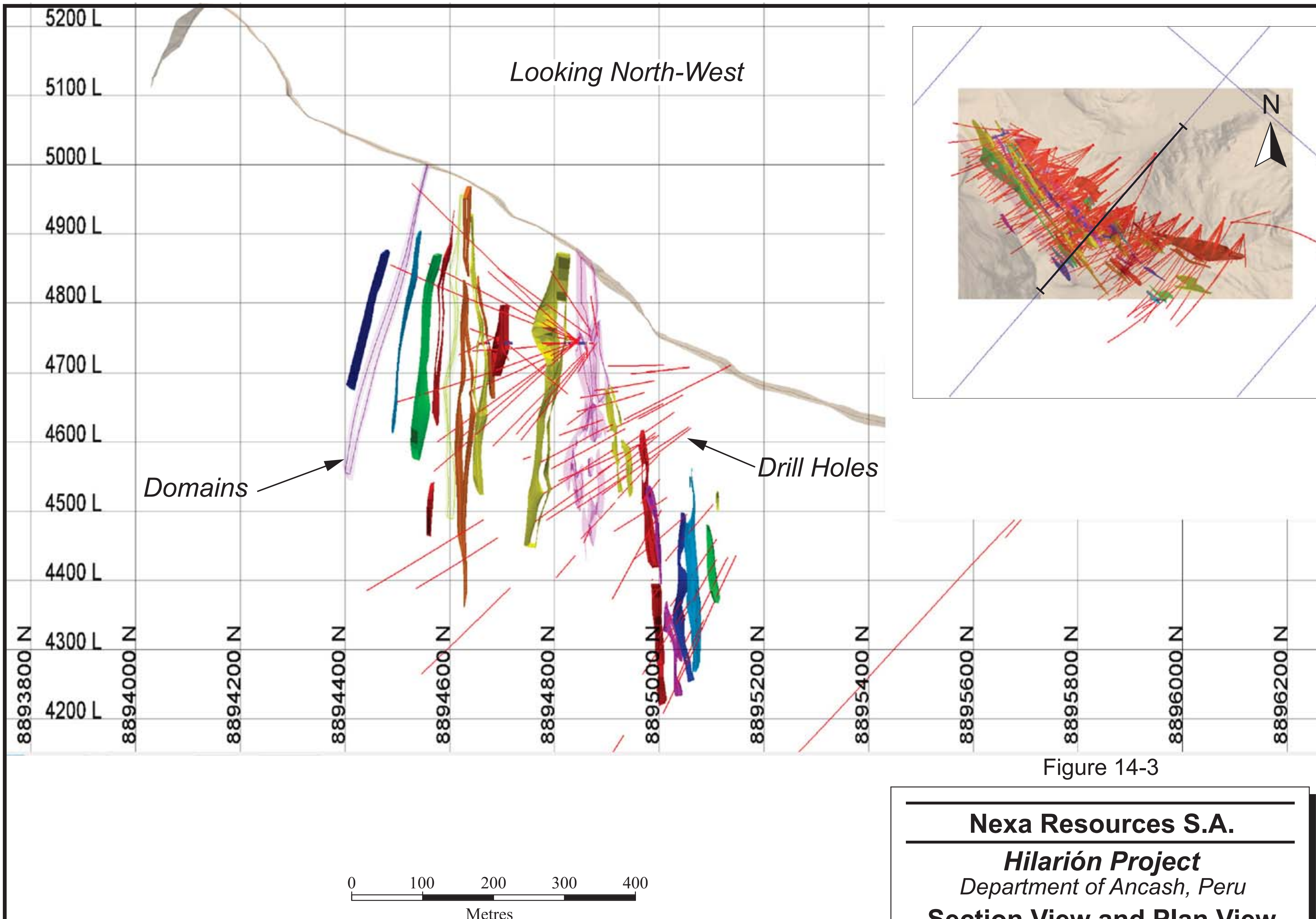


Figure 14-3

Nexa Resources S.A.

Hilarión Project
Department of Ancash, Peru

Section View and Plan View of Hilarión Deposit Mineralization Model

February 2020

Source: RPA, 2017.

Mineralization is open along strike to the north and south of the deposit, and some of the mineralization wireframes in the western area of the deposit are open at depth.

In regard to the wireframes used to support the Mineral Resource estimate, RPA offers the following conclusions and recommendations:

- Overall, the mineralization wireframes are adequate for the style of mineralization.
- The wireframes are suitable to support Mineral Resource and Mineral Reserve estimation.
- Use an NSR cut-off value for modelling to capture all the contributing metals and snap the wireframes to the drill holes. There is an opportunity to increase the mineralization wireframe volumes by approximately 5% to 10%.
- RPA observed a Cu-Ag mineralization zone in the proximity of Cuerpo 33 that has not yet been modelled. RPA recommends modelling this domain so that it can be incorporated in future estimates.
- Assign zero grade to all unsampled material in the database and ensure that all unsampled material within mineralization wireframes is being properly captured during compositing.
- Perform more drilling along strike and at depth where the mineralization is still open.

DENSITY

The Hilarión deposit has 35,357 density determinations that were used for resource estimate. In 2018 and 2019, an additional 7,983 density samples were taken at the Hilarión North and Hilarión Cuerpo 33 areas. RPA recommends updating the density values in the block model. In RPA's opinion, this will have a negligible impact on the current resource estimate as most of the new data is from Hilarión North where no resources have been estimated. A summary of the density measurements taken is presented in Table 14-4. The average of all measurements is 3.03 t/m^3 and the average density of measurements within the mineralization wireframes is 3.15 t/m^3. Higher values occur in zones with massive and semi-massive mineralization (3.35 t/m^3 average density). Nexa has assigned an average density value for the wallrocks as is presented in Table 14-4.

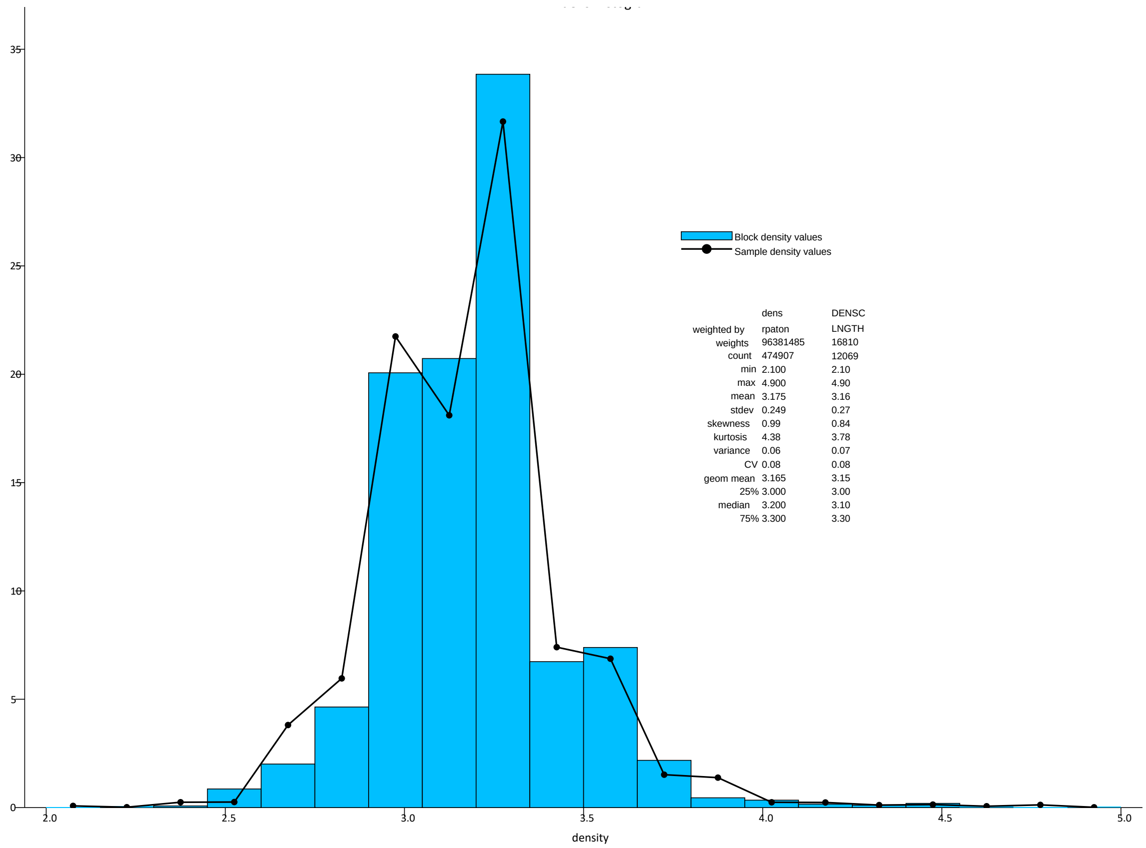
TABLE 14-4 ASSIGNED DENSITY DATA FOR THE HILARIÓN DEPOSIT
Nexa Resources S.A.– Hilarión Project

Lithology Code	Lithology Description	Count	Min (t/m3)	Max (t/m^3)	Average (t/m^3)
1	Limestone	2,471	1.9	4.5	2.88
2	Metamorphic rocks	5,786	2.0	5.0	2.95
3	Skarn	13,432	2.0	5.0	3.05
4	Intrusive dikes and stocks	3,477	2.1	3.5	2.82
5	Mineralization wireframes	10,191	2.0	4.9	3.15
All		35,357	1.9	5.0	3.03

For the mineralization wireframes, Nexa has interpolated the density values using an inverse distance squared (ID^2) method. The search ellipsoids for density are generally sub-vertical pancake shapes with the same orientation as the mineralization and the zinc estimate. The average density value for the mineralization blocks is 3.18 t/m^3.

RPA generated histograms (Figure 14-4) and swath plots to review the interpolated density values and found good overall correlation between block density values and supporting composite density values.

FIGURE 14-4 HISTOGRAM OF DENSITY VALUES WITHIN THE HILARIÓN DEPOSIT MINERALIZATION WIREFRAMES



EXPLORATORY DATA ANALYSIS

Nexa performed exploratory data analysis (EDA) on assay values flagged by mineralization domains. Assay intervals were merged with lithology code intervals. Unsampled intervals were substituted with zeroes. Table 14-5 shows the univariate statistical analysis by mineralization domain.

TABLE 14-5 DESCRIPTIVE STATISTICS OF ZINC, SILVER, AND LEAD ASSAY VALUES FOR THE HILARIÓN DEPOSIT

Nexa Resources S.A.– Hilarión Project

		Zn (%)					Ag (oz/ton)					Pb (%)				
Min Domain	Count	Min	Max	Mean	SD	CV	Min	Max	Mean	SD	CV	Min	Max	Mean	SD	CV
1	27	0.20	9.59	2.93	1.87	0.64	0.02	4.89	0.41	0.89	2.19	0.00	6.03	0.35	1.10	3.13
2	210	0.00	18.53	3.69	3.24	0.88	0.00	26.04	1.03	2.16	2.09	0.00	6.45	0.58	0.99	1.71
3	11	1.10	7.20	3.26	2.09	0.64	0.13	2.03	0.77	0.67	0.86	0.06	4.70	1.26	1.51	1.21
4	21	1.21	10.24	3.54	2.24	0.63	0.04	2.83	0.50	0.70	1.38	0.00	4.07	0.30	0.98	3.29

Min Domain	Count	Zn (%) Min	Zn (%) Max	Zn (%) Mean	Zn (%) SD	Zn (%) CV	Ag (oz/ton) Min	Ag (oz/ton) Max	Ag (oz/ton) Mean	Ag (oz/ton) SD	Ag (oz/ton) CV	Pb (%) Min	Pb (%) Max	Pb (%) Mean	Pb (%) SD	Pb (%) CV
5	292	0.00	19.19	3.77	3.50	0.93	0.00	6.53	0.70	0.87	1.25	0.00	4.77	0.50	0.84	1.67
6	342	0.00	20.92	3.71	3.65	0.98	0.00	7.14	0.63	0.84	1.35	0.00	5.39	0.48	0.75	1.57
7	96	0.00	20.08	2.29	1.86	0.81	0.00	6.53	0.93	0.97	1.04	0.00	4.47	0.81	0.98	1.20
8	17	0.59	7.68	2.03	1.38	0.68	0.04	0.82	0.28	0.21	0.76	0.01	0.34	0.11	0.10	0.94
9	492	0.00	28.57	3.46	3.75	1.09	0.00	5.75	0.83	0.90	1.08	0.00	5.65	0.62	0.83	1.34
10	94	0.00	20.94	3.30	3.43	1.04	0.00	3.60	0.50	0.63	1.25	0.00	3.62	0.45	0.74	1.66
11	102	0.00	18.28	3.37	2.76	0.82	0.00	6.53	0.75	1.03	1.38	0.00	6.59	0.57	1.06	1.85
12	76	0.39	15.90	2.49	2.32	0.93	0.11	9.20	1.20	1.37	1.15	0.01	5.14	0.52	0.70	1.34
13	113	0.00	21.51	3.44	3.40	0.99	0.00	8.75	0.47	0.97	2.08	0.00	4.45	0.20	0.59	2.90
14	50	0.34	13.84	2.37	2.02	0.85	0.13	3.60	1.19	0.95	0.80	0.05	2.18	0.45	0.46	1.00
15	125	0.00	15.25	3.69	2.90	0.79	0.00	6.56	0.59	0.99	1.69	0.00	4.04	0.27	0.62	2.30
16	275	0.00	21.32	3.81	3.02	0.79	0.00	4.79	0.62	0.68	1.11	0.00	3.97	0.28	0.45	1.64
17	387	0.00	16.47	3.25	2.59	0.80	0.00	38.61	1.01	2.22	2.21	0.00	5.58	0.55	0.89	1.62
18	162	0.00	31.74	4.99	5.33	1.07	0.00	10.80	0.98	1.54	1.57	0.00	9.00	0.58	1.08	1.86
19	24	0.00	18.59	4.34	4.00	0.92	0.00	6.85	0.99	0.95	0.95	0.00	9.42	1.08	1.40	1.30
20	17	0.75	32.47	7.88	9.23	1.17	0.21	3.54	1.48	1.10	0.75	0.04	4.93	1.66	1.55	0.94
21	36	0.09	7.23	2.89	1.64	0.57	0.02	2.14	0.65	0.57	0.88	0.01	4.38	0.65	0.99	1.53
22	25	0.37	20.61	3.18	3.25	1.02	0.05	2.01	0.59	0.58	0.98	0.01	1.23	0.16	0.28	1.71
23	393	0.00	29.30	3.78	3.24	0.86	0.00	12.41	0.76	0.86	1.13	0.00	5.88	0.49	0.83	1.69
24	42	0.47	13.44	2.72	2.34	0.86	0.22	7.68	1.12	1.16	1.03	0.11	5.24	1.01	1.05	1.04
25	29	1.04	5.63	2.50	1.19	0.48	0.11	3.60	1.31	0.95	0.72	0.05	3.90	1.26	1.10	0.87
26	101	0.39	19.01	3.03	2.69	0.89	0.04	11.90	1.86	1.98	1.06	0.02	5.90	1.40	1.46	1.04
27	850	0.00	28.28	3.74	3.59	0.96	0.00	6.14	0.86	0.93	1.08	0.00	7.43	0.62	0.90	1.44
28	80	0.00	10.82	2.66	2.01	0.76	0.00	3.07	1.00	0.69	0.69	0.00	3.15	0.70	0.73	1.05
29	26	0.05	10.56	3.42	2.28	0.67	0.02	4.41	1.78	1.01	0.57	0.03	4.37	2.17	1.06	0.49
30	108	0.00	18.15	3.12	3.59	1.15	0.00	3.50	0.85	0.78	0.92	0.00	3.33	0.55	0.77	1.39
31	6,053	0.00	33.95	3.39	3.07	0.91	0.00	20.03	1.40	1.62	1.16	0.00	22.48	1.05	1.64	1.57
32	21	0.04	4.31	1.70	1.14	0.67	0.11	1.76	0.72	0.50	0.70	0.09	2.13	0.65	0.63	0.96
33	841	0.00	33.76	7.59	7.17	0.94	0.00	30.32	0.99	1.79	1.80	0.00	4.54	0.10	0.33	3.25
34	72	0.00	10.19	2.63	2.12	0.81	0.00	3.16	0.93	0.85	0.91	0.00	4.88	0.78	1.11	1.43
35	148	0.00	11.40	3.25	2.46	0.76	0.00	5.88	1.06	1.12	1.06	0.00	14.63	0.83	1.51	1.82
36	34	0.00	19.54	3.37	3.77	1.12	0.00	3.63	1.24	0.98	0.79	0.00	7.69	1.67	1.90	1.13
37	46	0.24	19.66	3.44	4.06	1.18	0.06	5.50	1.06	1.25	1.18	0.03	4.48	0.78	1.02	1.31
38	43	0.00	9.46	2.67	2.37	0.89	0.00	5.37	1.24	1.25	1.01	0.00	11.32	2.12	2.25	1.06
39	472	0.00	25.45	3.35	3.22	0.96	0.00	4.57	0.56	0.60	1.06	0.00	5.78	0.23	0.54	2.42
40	229	0.00	25.94	4.37	4.40	1.01	0.00	6.14	0.64	0.93	1.45	0.00	12.66	0.79	1.74	2.19
41	275	0.00	33.69	4.47	4.29	0.96	0.00	12.67	0.55	1.12	2.02	0.00	11.59	0.45	1.53	3.41
42	16	0.51	16.54	5.31	4.05	0.76	0.06	1.71	0.70	0.55	0.79	0.00	1.63	0.24	0.44	1.85
43	200	0.10	26.89	5.08	4.88	0.96	0.01	3.47	0.54	0.60	1.11	0.00	3.23	0.16	0.38	2.42
44	344	0.00	31.33	5.59	5.86	1.05	0.00	6.75	0.83	0.98	1.18	0.00	4.80	0.26	0.57	2.18
45	221	0.00	19.76	4.53	3.77	0.83	0.00	5.37	0.67	0.82	1.21	0.00	4.18	0.11	0.32	3.01
46	72	0.00	10.49	3.02	2.29	0.76	0.00	8.36	1.37	1.37	1.00	0.00	16.25	1.62	2.47	1.52
47	102	0.00	28.37	5.05	4.77	0.94	0.00	11.77	1.81	1.90	1.05	0.00	22.06	1.48	2.71	1.84

Min Domain	Count	Zn (%) Min	Max	Mean	SD	CV	Ag (oz/ton) Min	Max	Mean	SD	CV	Pb (%) Min	Max	Mean	SD	CV
48	51	0.07	12.84	3.78	3.43	0.91	0.03	6.95	1.93	1.68	0.87	0.04	11.97	3.69	3.03	0.82
49	31	0.45	18.92	4.40	4.01	0.91	0.01	4.24	0.42	0.82	1.94	0.00	3.83	0.19	0.66	3.47
50	55	0.66	28.64	3.55	3.34	0.94	0.03	1.54	0.32	0.32	1.01	0.00	0.31	0.05	0.07	1.59
51	49	0.02	12.70	2.98	3.26	1.09	0.03	3.63	0.89	0.86	0.97	0.01	6.20	0.85	1.13	1.32
52	28	0.25	19.46	5.24	2.63	0.50	0.04	4.37	0.95	0.66	0.70	0.01	0.72	0.15	0.17	1.16
53	26	0.16	23.38	5.59	5.67	1.01	0.04	2.91	0.44	0.71	1.63	0.00	1.75	0.15	0.31	2.03
54	25	0.09	15.76	3.62	3.83	1.06	0.01	3.14	0.48	0.78	1.62	0.00	2.18	0.19	0.46	2.39
55	7	1.04	12.14	4.91	3.57	0.73	0.03	14.73	1.89	3.43	1.82	0.00	15.40	1.32	3.41	2.59
56	33	0.07	27.15	6.31	6.52	1.03	0.05	20.19	1.65	3.64	2.20	0.00	10.57	0.32	1.31	4.11
57	62	0.00	33.13	5.72	6.92	1.21	0.00	2.18	0.52	0.52	1.02	0.00	1.34	0.21	0.29	1.37
58	95	0.04	19.55	4.12	3.97	0.96	0.02	9.29	1.00	1.14	1.14	0.00	11.11	0.58	1.07	1.84
59	109	0.00	24.25	3.03	4.30	1.42	0.00	6.30	0.85	1.18	1.38	0.00	8.51	0.95	1.38	1.46
60	70	0.00	16.77	3.34	3.69	1.11	0.00	9.45	0.88	1.10	1.25	0.00	28.59	1.46	2.30	1.58
61	21	1.17	14.98	5.17	3.37	0.65	0.29	12.22	2.16	2.43	1.12	0.42	8.77	2.51	1.67	0.67
62	23	0.50	9.52	3.43	2.46	0.72	0.13	13.21	1.62	2.72	1.68	0.20	20.34	2.67	4.19	1.57
63	20	0.64	27.92	7.36	6.53	0.89	0.12	34.56	4.34	6.14	1.41	0.54	21.71	3.60	3.82	1.06
64	37	0.12	14.55	5.38	3.39	0.63	0.16	15.08	4.14	3.79	0.92	0.08	9.88	4.08	2.87	0.70
65	155	0.00	26.76	3.97	3.45	0.87	0.00	12.09	2.36	2.27	0.96	0.00	11.23	2.36	2.06	0.87
66	58	0.00	22.70	5.53	4.62	0.84	0.00	9.53	2.32	1.78	0.77	0.00	10.80	2.46	2.21	0.90

Note: SD – standard deviation; CV – coefficient of variation

GRADE CAPPING AND OUTLIER RESTRICTION

Where the assay distribution is skewed positively, or approaches log normal, erratic high grade assay values can have a disproportionate effect on the average grade of a deposit. One method of treating these outliers in order to reduce their influence on the average grade is to cap them at a specific grade level. In the absence of production data to calibrate capping levels, inspection of assay distributions can be used to estimate preliminary capping levels.

Instead of capping raw assays, Nexa applied high yield restriction (HYR) during grade estimation to limit the influence of a small number of high grade composites located in the upper tail of the metal distributions. The HYR strategy used by Nexa is presented in Table 14-6.

TABLE 14-6 HILARIÓN DEPOSIT HIGH YIELD RESTRICTIONS
Nexa Resources S.A.– Hilarión Project

Mineralization Domain	Zn %	Distance Restriction (m)	Pb %	Distance Restriction (m)	Ag oz/ton	Distance Restriction (m)	Cu %	Distance Restriction (m)
1								
2	12.15	12	2.84	12	2.91	12		
3								
4								
5	12.34	12					0.08	12
6	11.13	12	2.56	12	1.99	12	0.1	12
7								
8								
9	13.53	12	2.74	12	2.34	12		
10	9.05	12						
11								
12	6.11	12						
13	13.12	12						
14								
15	9.91	12						
16	10.59	12	1.18	12	2.16	12		
17	8.18	12	2.37	12	3.77	12	0.11	12
18	19.05	12						
19								
20								
21								
22								
23	10.86	12	2.75	12	2.41	12	0.08	12
24								
25								
26	6.3	12	3.98	12				
27	13.58	12	3.41	12	3.27	12	0.08	12
28	6.18	12	2.42	12				
29								
30	10.94	12						
31	18.75	12	10.29	12	9.06	12	0.4	12
32								
33	20.8	12	0.85	12	3.86	12	1.26	12
34								
35							0.12	12
36								
37								
38								
39	9.48	12	1.32	12	1.83	12	0.13	12
40							0.32	12

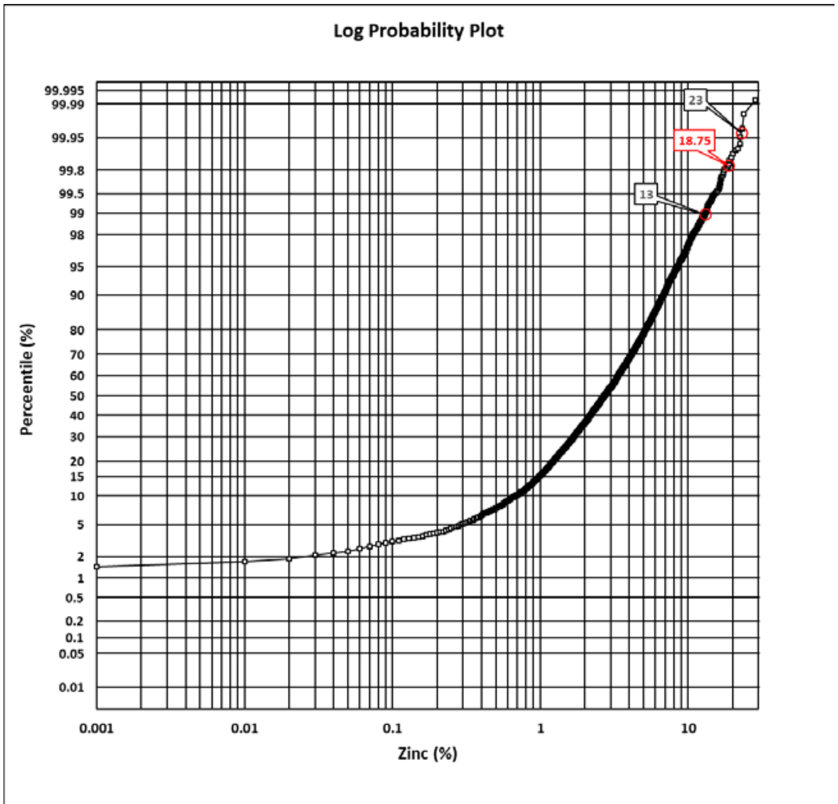
Mineralization Domain	Zn %	Distance Restriction (m)	Pb %	Distance Restriction (m)	Ag oz/ton	Distance Restriction (m)	Cu %	Distance Restriction (m)
41	13.61	12	2.74	12	1.36	12	0.28	12
42								
43			1.35	12			0.27	12
44	16.57	12	1.9	12	2.96	12	0.26	12
45	11.71	12	0.42	12				
46			5.4	12				
47			6.73	12				
48								
49								
50								
51								
52								
53								
54								
55								
56								
57								
58								
59								
60			6.59	12				
61								
62								
63								
64								
65								
66								

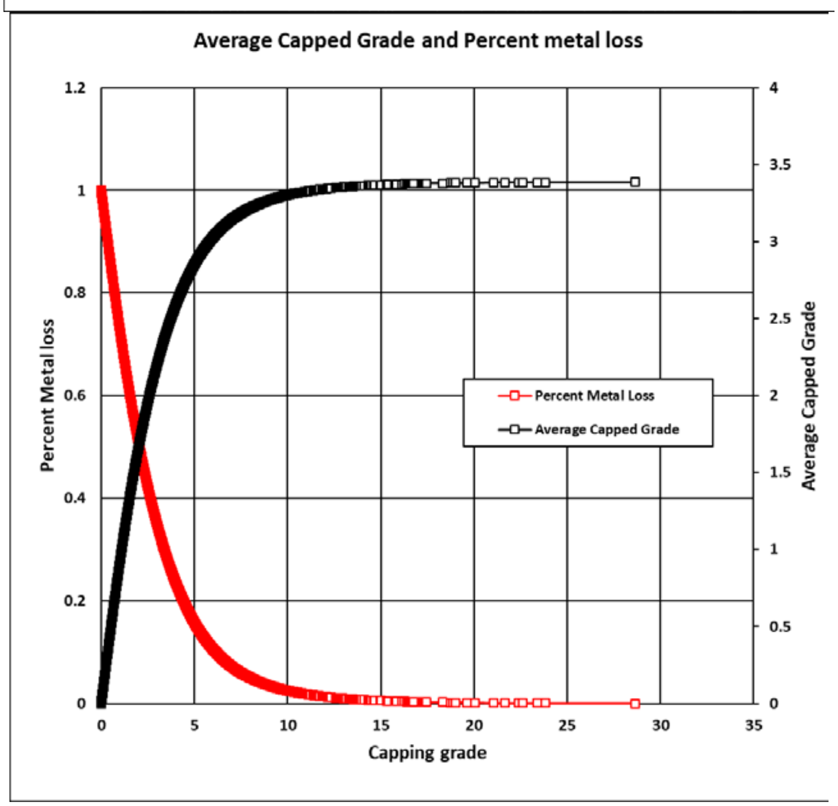
Nexa staff visually checked that the anomalous values were not forming high-grade clusters and did not cover more than 5.0% of the total population per mineralization domain.

RPA performed an independent capping analysis on zinc for two of the largest mineralization domains (31 and 33), as well as a visual validation of the block model in section and plan view. Log probability plots were inspected for each individual wireframe and RPA applied a capping grade using a combination of histograms, probability plots, decile analyses, and grade cutting curves. RPA found that the zinc coefficient of variation is very low, in general less than one, the zinc grade distributions were relatively continuous, and levels applied at inflection points did not reduce metal content significantly, confirming that the zinc values are not sensitive to capping. Figure 14-5 shows a probability plot and cutting curve for domain 31. RPA notes that Nexa's HYR for zinc reduced the grade by approximately 1.0% to 2.0% more than without capping applied.

RPA also reviewed the capping levels for silver and lead for Domain 2 and observed that these two metals express sensitivity to capping. For silver, the loss of metal using Nexa capping levels is approximately 20% and 5% for lead. The grade cutting curves demonstrate that the Mineral Resource silver and lead assays are sensitive to capping levels. RPA reviewed the capping levels utilized by Nexa and is of the opinion that, in general, the capping grades are reasonable.

FIGURE 14-5 ZINC PROBABILITY PLOT AND CUTTING CURVE FOR DOMAIN 31, HILARIÓN DEPOSIT





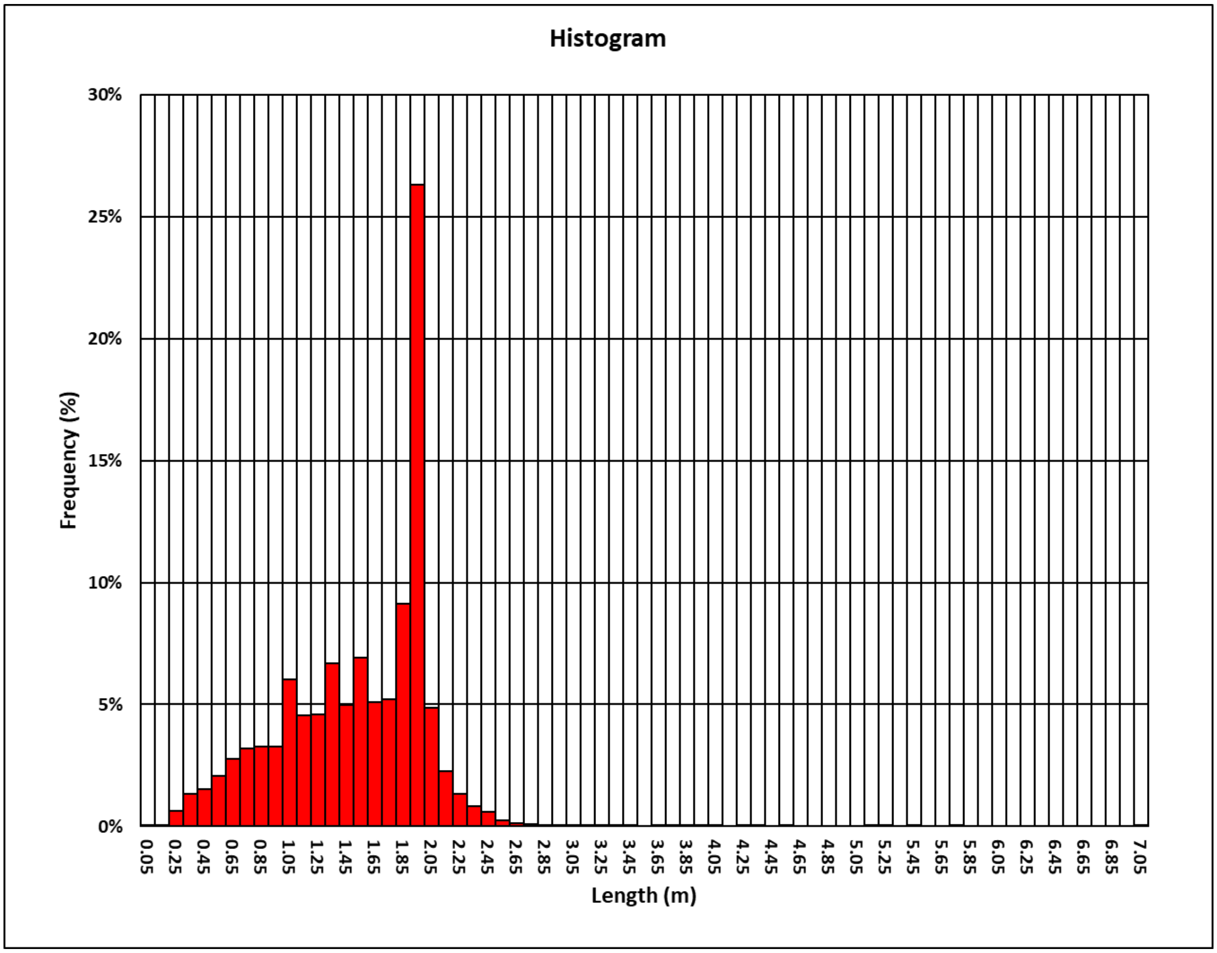
RPA offers the following conclusions and recommendations:

- In general, the HYR levels are reasonable, and suitable for the estimation of Mineral Resources.
- Investigate if capping levels should be applied for silver and lead in addition to the HYR search.
- Visual inspection of the spatial influence of isolated high grade samples in the block model indicates that block grade smearing was well controlled with the exception of the extremities where high grades overpower some low grade areas, however, this occurs mostly in the Inferred blocks.
- Perform capping analysis to validate HYR levels, reporting the metal loss as a result of capping high grades, and assessing the amount of metal in the upper decile and percentiles of the distribution to gain a better understanding of the amount of risk associated with extreme values in each capping domain. In general, there is 20% to 50% of the total metal within the upper decile and 10% to 20% of the total metal within the upper percentile of the silver and lead distributions.

COMPOSITING

Nexa staff composited the assays to 1.5 m with a 0.75 m tolerance within the mineralization solids, beginning at the collars. Small intervals were merged with the previous interval. Sample lengths range from 0.05 m to 7.5 m within the wireframe models with 26% taken at 2.0 m. The majority of samples (91%) were taken from 0.65 m to 2.1 m (Figure 14-6). Composite length corresponds to half the block size height for the deposit. Unsampled core intervals were set to zero grade prior to compositing.

FIGURE 14-6 HISTOGRAMS FOR ASSAY LENGTHS, HILARIÓN DEPOSIT



RPA noticed that there are 7.0% of the total composites with lengths less than 0.75 m. RPA generated statistics to compare the distribution of the orphan composites. The mean is slightly lower in comparison with the composites with lengths over 0.75 m, however, the distribution is very similar. RPA believes it is acceptable to include all of the composites in the estimation.

RPA reviewed the composites and offers the following conclusions and recommendations:

- The composite length is reasonable given the three metre block height.
- RPA recommends investigating density-weighted compositing and using 2 m length composites in the future.

VARIOGRAPHY

Experimental variograms were generated and modelled in MineSight by Nexa on the Hilarión Deposit using Zn, Ag, Pb, and Cu composite data. Only some mineralization domains could be modelled. Nexa used the modelled variograms for the surrounding domains grouped as is presented in Table 14-7:

TABLE 14-7 HILARIÓN DEPOSIT VARIOGRAM DOMAINS
Nexa Resources S.A.– Hilarión Project

Element	Modeled Variogram Domain	Group Domain
Zn	9	1,2,3,4,5,6,7,8
	17	10,11,12,13,14,15,16
	31	18, 19,20,21,22,23,24,25,26,27,28,29,30,32,66
	33	34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56, 57,58,59,60,61,62,63,64,65
Pb	9	1,2,3,4,5,6,7,8,10,11,12,13,14,15,16,17,18
	27	19,20,21,22,23,24,25,26,28,66
	31	29,30,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52, 53,54,55,56,57,58,59,60,61,62,63,64,65
Cu	31	1,2,3,4…...65,66
Ag	9	1,2,3,4,5,6,7,8,10,11,12,13
	17	14,15,16,17,18,19,20,21,22,23,66
	31	24,25,26,27,28,29,30
	33	32,34,35,36,37,38
	41	40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62, 63,64,65

Variograms were standardized and modelled using two spherical or exponential structures in three directions. The variograms were used for OK interpolation and as a guide for selecting search ellipse ranges.

Tables 14-8 to 14-10 show the variogram parameters by domain for zinc, lead, silver, and copper. Ellipsoid values use MineSight conventions (Az N, Dip N, Dip E) with rotation (Z-Left, X-Right, Y-Left). Axes in MineSight is: Y is Major, X is Semi, and Z is Minor. Figure 14-7 shows experimental and modelled variograms and their respective adjustments to the theoretical models.

TABLE 14-8 HILARIÓN DEPOSIT ZN VARIOGRAM PARAMETERS

Nexa Resources S.A.– Hilarión Project

Min Domain	Nugget	Model Type (Str 1)	Sill Differential (Str 1)	Ranges (Str 1)			Model Type (Str 2)	Sill Differential (Str 2)	Ranges (Str 2)			Minesight Rotation		
				Major	Minor	Vertical			Major	Minor	Vertical	AzN	DipN	DipE
9	0.11	exp	0.34	7	7	3.5	exp	0.57	67	67	5.8	232	-86	0
17	0.19	exp	0.53	13	13	4	exp	0.28	72	72	2	236	-85	0
31	0.25	exp	0.58	23	8	10	exp	0.17	120	80	70	232	-90	0
33	0.09	exp	0.63	24	18	18	exp	0.28	80	60	45	32	-76	0

TABLE 14-9 HILARIÓN DEPOSIT AG VARIOGRAM PARAMETERS

Nexa Resources S.A.– Hilarión Project

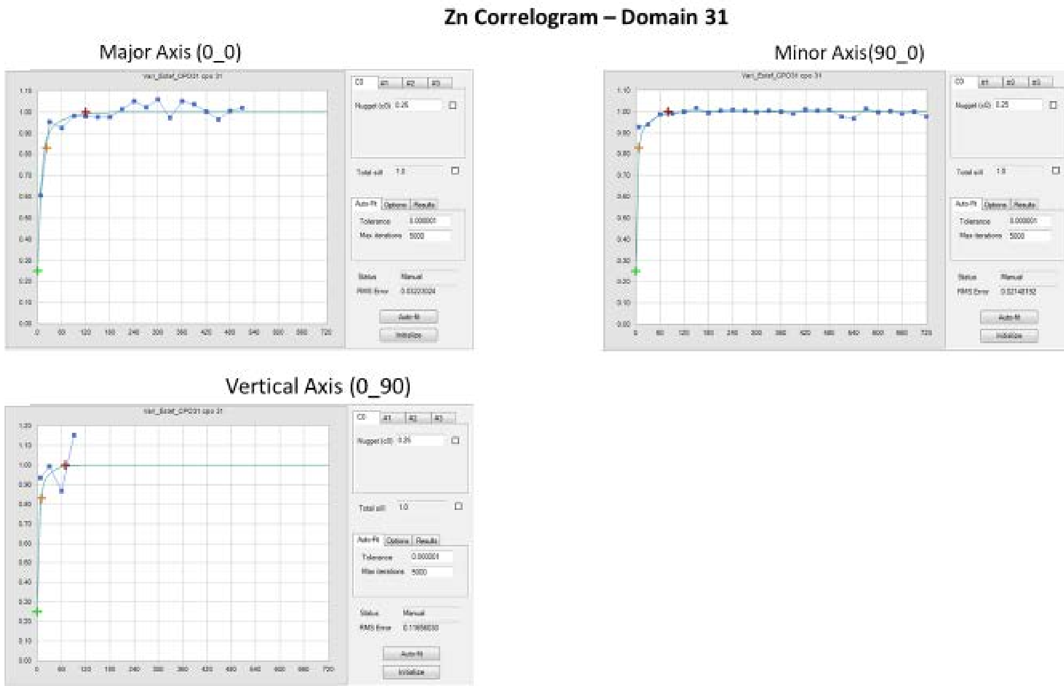
Min Domain	Nugget	Model Type (Str 1)	Sill Differential (Str 1)	Ranges (Str 1)			Model Type (Str 2)	Sill Differential (Str 2)	Ranges (Str 2)			Minesight Rotation		
				Major	Minor	Vertical			Major	Minor	Vertical	AzN	DipN	DipE
9	0.24	exp	0.13	18	18	3.5	exp	0.638	90	90	4	232	-86	0
17	0.58	sph	0.27	39	25	25	sph	0.17	56	31	31	236	-85	0
31	0.16	exp	0.44	370	220	70	exp	0.4	30	22	5	232	-90	0
33	0.05	exp	0.47	25	25	12	exp	0.57	155	55	30	32	-76	0
41	0.36	exp	0.51	13	13	4	exp	0.133	100	100	5	52	-82	0

TABLE 14-10 HILARIÓN DEPOSIT PB VARIOGRAM PARAMETERS

Nexa Resources S.A.– Hilarión Project

Min Domain	Nugget	Model Type (Str 1)	Sill Differential (Str 1)	Ranges (Str 1)			Model Type (Str 2)	Sill Differential (Str 2)	Ranges (Str 2)			Minesight Rotation		
				Major	Minor	Vertical			Major	Minor	Vertical	AzN	DipN	DipE
9	0.08314	sph	0.4138	35	35	3.5	sph	0.4546	100	100	5.8	232	-86	0
27	0.1193	sph	0.2958	22.36	5	15.72	sph	0.5799	153.57	45	40	228	-86	0
31	0.1248	sph	0.5224	38	28	3	sph	0.315	198	118	20	232	-90	0

FIGURE 14-7 VARIOGRAM EXAMPLE DOMAIN 31 ZN, HILARIÓN DEPOSIT



BLOCK MODEL

The block model consists of 3.0 m by 6.0 m by 6.0 m blocks. The model is rotated at 323° to parallel the main strike direction of the mineralization. The extents and dimensions of the block model are summarized in Table 14-11.

TABLE 14-11 HILARIÓN DEPOSIT BLOCK MODEL SETUP
Nexa Resources S.A.– Hilarión Project

Description	Easting (X)	Northing (Y)	Elevation (Z)
Minimum (m)	279,855.94	8,893,991.00	3,702
Maximum (m)	279,653.17	8,896,617.95	5,100
Extents (m)	1,419	2,220	1,398
	Column	**Row**	**Level**
Block size (m)	3	6	6
Number of blocks	473	370	233

Block modelling and estimates were completed in MineSight. The MineSight resource model was converted by Nexa into a sub-blocked Datamine block model for resource reporting. RPA used the Datamine block model for the PEA work. A sub-blocked block model measuring 6 m by 6 m by 6 m, sub-celled to a minimum of 1 m by 1 m by 1 m for the mineralization wireframes. Data were amalgamated and parsed as required and imported by RPA into Maptek's Vulcan software for review.

The bulk density was also interpolated within the mineralization wireframes. A partial percentage attribute was created for the mineralization wireframes. A description of the block model attributes is given in Table 14-12.

TABLE 14-12 HILARIÓN DEPOSIT BLOCK MODEL FIELD DESCRIPTIONS
Nexa Resources S.A.– Hilarión Project

Block Variables	Description
TOPO	Percentage of topo below surface
AGOK	Interpolated Ag oz by OK using yield restriction
PBOK	Interpolated Pb % by OK using yield restriction
ZNOK	Interpolated Zn % by OK using yield restriction
CUOK	Interpolated Cu % by OK using yield restriction
AGOKU	Interpolated Ag oz by OK without yield restriction
PBOKU	Interpolated Pb % by OK without yield restriction
ZNOKU	Interpolated Zn % by OK without yield restriction
CUOKU	Interpolated Cu % by OK without yield restriction
CPO	Mineralization Domain
%CPO	% of Mineralization Domain in block
LITOF	Lithology codes
DENS	Interpolated Density for Mineralization Domain
DENSW	Assigned Density for Wall Rock
CATGE	Clean-up Classification - Final Classification
CATEG	Classification based on distance

GRADE INTERPOLATION STRATEGY

Grades were interpolated into blocks for Zn, Pb, Ag, and Cu on a parent cell basis using OK. Only blocks occurring wholly or partially within the mineralization wireframes were interpolated. Separate composite files were used for each mineralization domain. Grades for blocks contained within the wireframes were estimated in two passes with parameters based on the variogram models. The dimension of the second pass was based on the variogram range, and represented a flattened ellipse shape, in general isotropic with respect to the major and semi-major axes, and a relatively short vertical minor axis to represent the geometries of mineralized domains. The search ellipsoids were oriented parallel to the overall domain orientations and used hard boundaries. The first pass employed larger search ellipse dimensions to ensure all blocks were estimated. Residual composites were included in the grade estimation.

For validation purposes, ID^2 and NN interpolations were also generated.
Density values within the mineralization solids were interpolated using ID^2 weighting based on the Zn search parameters. A summary of the Zn search ellipse parameters is presented in Table 14-13.

TABLE 14-13 HILARIÓN DEPOSIT ZN SEARCH STRATEGY
Nexa Resources S.A.– Hilarión Project

Mineralization Domain (CPO)	Pass	Estimation Type	MineSight Rotation			MineSight Ranges			Composites		Max Comp per Hole
			AzN	DipN	DipE	Major	Minor	Vertical	Min	Max	
1	2	OK	238	-86	0	670	670	134	1	14	2
	1	OK	238	-86	0	67	67	13.4	1	14	2
2	2	OK	235	-75	0	670	670	134	1	14	2
	1	OK	235	-75	0	67	67	13.4	1	14	2
3	2	OK	233	-76	0	670	670	134	1	14	2
	1	OK	233	-76	0	67	67	13.4	1	14	2
4	2	OK	227	-85	0	670	670	134	1	14	2
	1	OK	227	-85	0	67	67	13.4	1	14	2
5	2	OK	226	-73	0	670	670	134	1	14	2
	1	OK	226	-73	0	67	67	13.4	1	14	2
5	2	OK	233	-86	0	670	670	134	1	14	2
	1	OK	233	-81	0	67	67	13.4	1	14	2
6	2	OK	231	-84	0	670	670	134	1	14	2
	1	OK	231	-84	0	67	67	13.4	1	14	2
7	2	OK	236	-80	0	670	670	134	1	14	2
	1	OK	236	-80	0	67	67	13.4	1	14	2
8	2	OK	230	-84	0	670	670	134	1	14	2
	1	OK	230	-84	0	67	67	13.4	1	14	2
9	2	OK	232	-86	0	670	670	134	1	14	2
	1	OK	232	-86	0	67	67	13.4	1	14	2
10	2	OK	235	-85	0	720	720	144	1	14	2
	1	OK	235	-85	0	72	72	14.4	1	14	2
11	2	OK	231	-85	0	720	720	144	1	14	2
	1	OK	231	-85	0	72	72	14.4	1	14	2
12	2	OK	237	-87	0	720	720	144	1	14	2
	1	OK	237	-87	0	72	72	14.4	1	14	2
13	2	OK	233	-84	0	720	720	144	1	14	2
	1	OK	233	-84	0	72	72	14.4	1	14	2
14	2	OK	243	-88	0	720	720	144	1	14	2
	1	OK	243	-88	0	72	72	14.4	1	14	2
15	2	OK	55	-86	0	720	720	144	1	14	2
	1	OK	55	-86	0	72	72	14.4	1	14	2
16	2	OK	325	-90	0	720	720	144	1	14	2
	1	OK	325	-90	0	72	72	14.4	1	14	2
17	2	OK	236	-85	0	720	720	144	1	14	2
	1	OK	236	-85	0	72	72	14.4	1	14	2
18	2	OK	53	-88	0	800	800	160	1	14	2
	1	OK	53	-88	0	80	80	16	1	14	2
19	2	OK	52	-85	0	800	800	160	1	14	2
	1	OK	52	-85	0	80	80	16	1	14	2

Mineralization Domain (CPO)	Pass	Estimation Type	MineSight Rotation			MineSight Ranges			Composites		Max Comp per Hole
			AzN	DipN	DipE	Major	Minor	Vertical	Min	Max	
20	2	OK	70	-84	0	800	800	160	1	14	2
	1	OK	70	-84	0	80	80	16	1	14	2
21	2	OK	225	-86	0	800	800	160	1	14	2
	1	OK	225	-86	0	80	80	16	1	14	2
22	2	OK	228	-84	0	800	800	160	1	14	2
	1	OK	228	-84	0	80	80	16	1	14	2
23	2	OK	230	-90	0	800	800	160	1	14	2
	1	OK	230	-90	0	80	80	16	1	14	2
24	2	OK	46	-83	0	800	800	160	1	14	2
	1	OK	46	-83	0	80	80	16	1	14	2
25	2	OK	51	-84	0	800	800	160	1	14	2
	1	OK	51	-84	0	80	80	16	1	14	2
26	2	OK	52	-88	0	800	800	160	1	14	2
	1	OK	52	-88	0	80	80	16	1	14	2
27	2	OK	228	-86	0	800	800	160	1	14	2
	1	OK	228	-86	0	80	80	16	1	14	2
28	2	OK	226	-86	0	800	800	160	1	14	2
	1	OK	226	-86	0	80	80	16	1	14	2
29	2	OK	232	-90	0	800	800	160	1	14	2
	1	OK	232	-90	0	80	80	16	1	14	2
30	2	OK	45	-76	0	800	800	160	1	14	2
	1	OK	45	-76	0	80	80	16	1	14	2
31	2	OK	232	-90	0	800	800	160	1	14	2
	1	OK	232	-90	0	80	80	16	1	14	2
32	2	OK	59	-79	0	800	800	160	1	14	2
	1	OK	59	-79	0	80	80	16	1	14	2
33	2	OK	32	-76	0	600	600	120	1	14	2
	1	OK	32	-76	0	60	60	12	1	14	2
34	2	OK	54	-84	0	600	600	120	1	14	2
	1	OK	54	-84	0	60	60	12	1	14	2
35	2	OK	237	-85	0	600	600	120	1	14	2
	1	OK	237	-85	0	60	60	12	1	14	2
36	2	OK	40	-84	0	600	600	120	1	14	2
	1	OK	40	-84	0	60	60	12	1	14	2
37	2	OK	51	-81	0	600	600	120	1	14	2
	1	OK	51	-81	0	60	60	12	1	14	2
38	2	OK	50	-80	0	600	600	120	1	14	2
	1	OK	50	-80	0	60	60	12	1	14	2
39	2	OK	35	-90	0	600	600	120	1	14	2
	1	OK	35	-90	0	60	60	12	1	14	2
40	2	OK	52	-85	0	600	600	120	1	14	2
	1	OK	52	-85	0	60	60	12	1	14	2
41	2	OK	52	-82	0	600	600	120	1	14	2
	1	OK	52	-82	0	60	60	12	1	14	2
42	2	OK	247	-85	0	600	600	120	1	14	2
	1	OK	247	-85	0	60	60	12	1	14	2
43	2	OK	239	-90	0	600	600	120	1	14	2
	1	OK	239	-90	0	60	60	12	1	14	2
44	2	OK	233	-90	0	600	600	120	1	14	2
	1	OK	233	-90	0	60	60	12	1	14	2
45	2	OK	59	-85	0	600	600	120	1	14	2
	1	OK	59	-85	0	60	60	12	1	14	2
46	2	OK	237	-88	0	600	600	120	1	14	2
	1	OK	237	-88	0	60	60	12	1	14	2
47	2	OK	51	-90	0	600	600	120	1	14	2
	1	OK	51	-90	0	60	60	12	1	14	2
48	2	OK	244	-89	0	600	600	120	1	14	2
	1	OK	244	-89	0	60	60	12	1	14	2
49	2	OK	222	-86	0	600	600	120	1	14	2
	1	OK	222	-86	0	60	60	12	1	14	2

Mineralization Domain (CPO)	Pass	Estimation Type	MineSight Rotation			MineSight Ranges			Composites		Max Comp per Hole
			AzN	DipN	DipE	Major	Minor	Vertical	Min	Max	
50	2	OK	46	-84	0	600	600	120	1	14	2
	1	OK	46	-84	0	60	60	12	1	14	2
51	2	OK	213	-87	0	600	600	120	1	14	2
	1	OK	213	-87	0	60	60	12	1	14	2
52	2	OK	226	-80	0	600	600	120	1	14	2
	1	OK	226	-80	0	60	60	12	1	14	2
53	2	OK	31	-84	0	600	600	120	1	14	2
	1	OK	31	-84	0	60	60	12	1	14	2
54	2	OK	37	-81	0	600	600	120	1	14	2
	1	OK	37	-81	0	60	60	12	1	14	2
55	2	OK	45	-83	0	600	600	120	1	14	2
	1	OK	45	-83	0	60	60	12	1	14	2
56	2	OK	14	-82	0	600	600	120	1	14	2
	1	OK	14	-82	0	60	60	12	1	14	2
57	2	OK	209	-90	0	600	600	120	1	14	2
	1	OK	209	-90	0	60	60	12	1	14	2
58	2	OK	34	-88	0	600	600	120	1	14	2
	1	OK	34	-88	0	60	60	12	1	14	2
59	2	OK	37	-85	0	600	600	120	1	14	2
	1	OK	37	-85	0	60	60	12	1	14	2
60	2	OK	45	-88	0	600	600	120	1	14	2
	1	OK	45	-88	0	60	60	12	1	14	2
61	2	OK	37	-83	0	600	600	120	1	14	2
	1	OK	37	-83	0	60	60	12	1	14	2
62	2	OK	37	-86	0	600	600	120	1	14	2
	1	OK	37	-86	0	60	60	12	1	14	2
63	2	OK	25	81	0	600	600	120	1	14	2
	1	OK	25	81	0	60	60	12	1	14	2
64	2	OK	19	-77	0	600	600	120	1	14	2
	1	OK	19	-77	0	60	60	12	1	14	2
65	2	OK	11	-75	0	600	600	120	1	14	2
	1	OK	11	-75	0	60	60	12	1	14	2
66	2	OK	52	-85	0	800	800	160	1	14	2
	1	OK	52	-85	0	80	80	16	1	14	2

BLOCK MODEL VALIDATION

Nexa and RPA carried out a number of block model validation procedures including:

- Visual comparisons of block and composite grades on cross section, longitudinal section, and in plan.
- Statistical comparisons.
- Swath plots of OK, NN, ID^2 and composite grades by elevation and northing.

The visual inspection of composite and block grades revealed that the spatial grade correlation is good for zinc and reasonable for lead and silver (Figure 14-8).

Swath plots (Figure 14-9) show acceptable agreement of composite, NN, and OK for zinc, silver, and lead block grades.

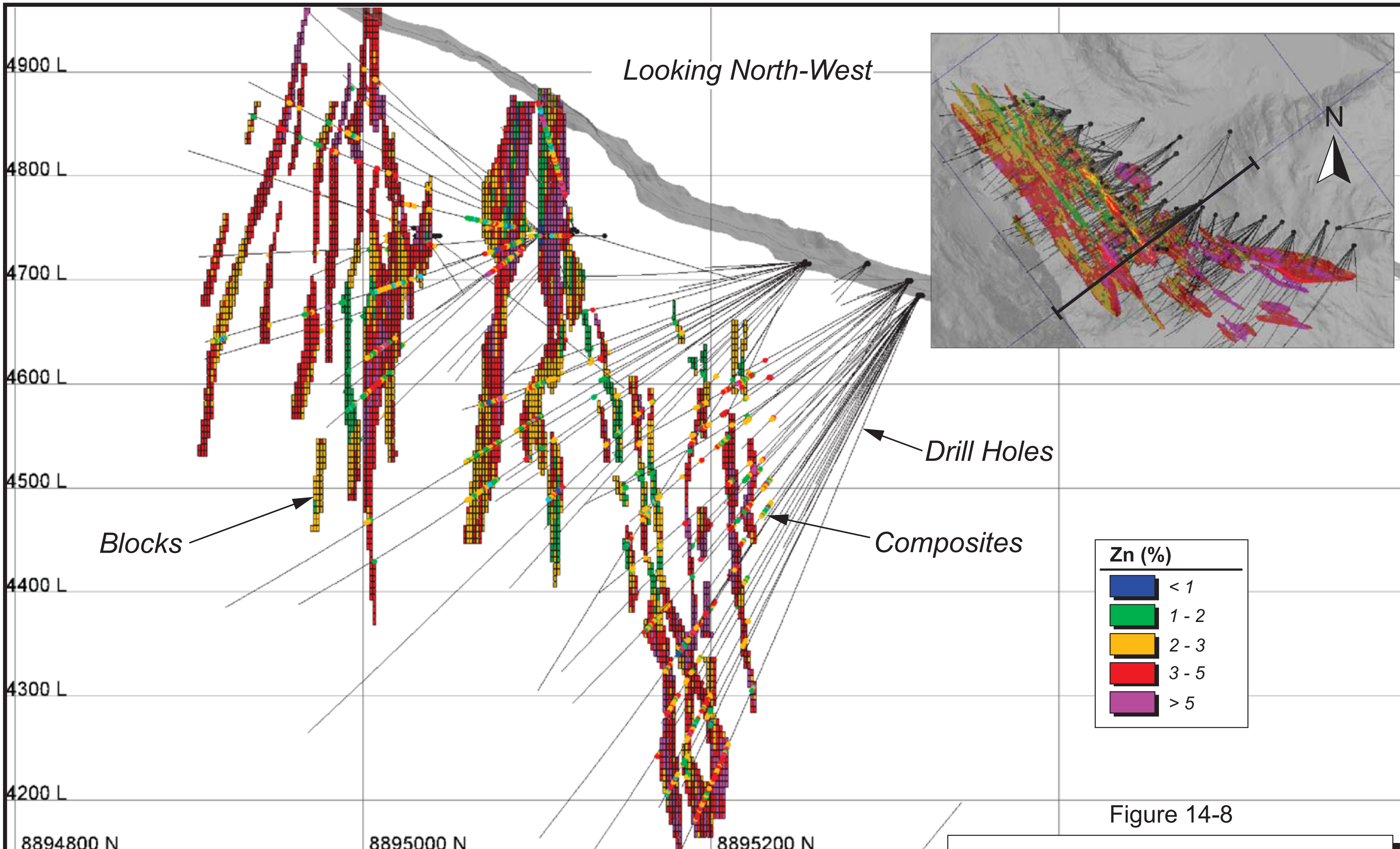


Figure 14-8

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Composite Zinc Values vs. Block Zinc Values, Hilarión Deposit

February 2020

Source: RPA, 2020.

www.rpacan.com

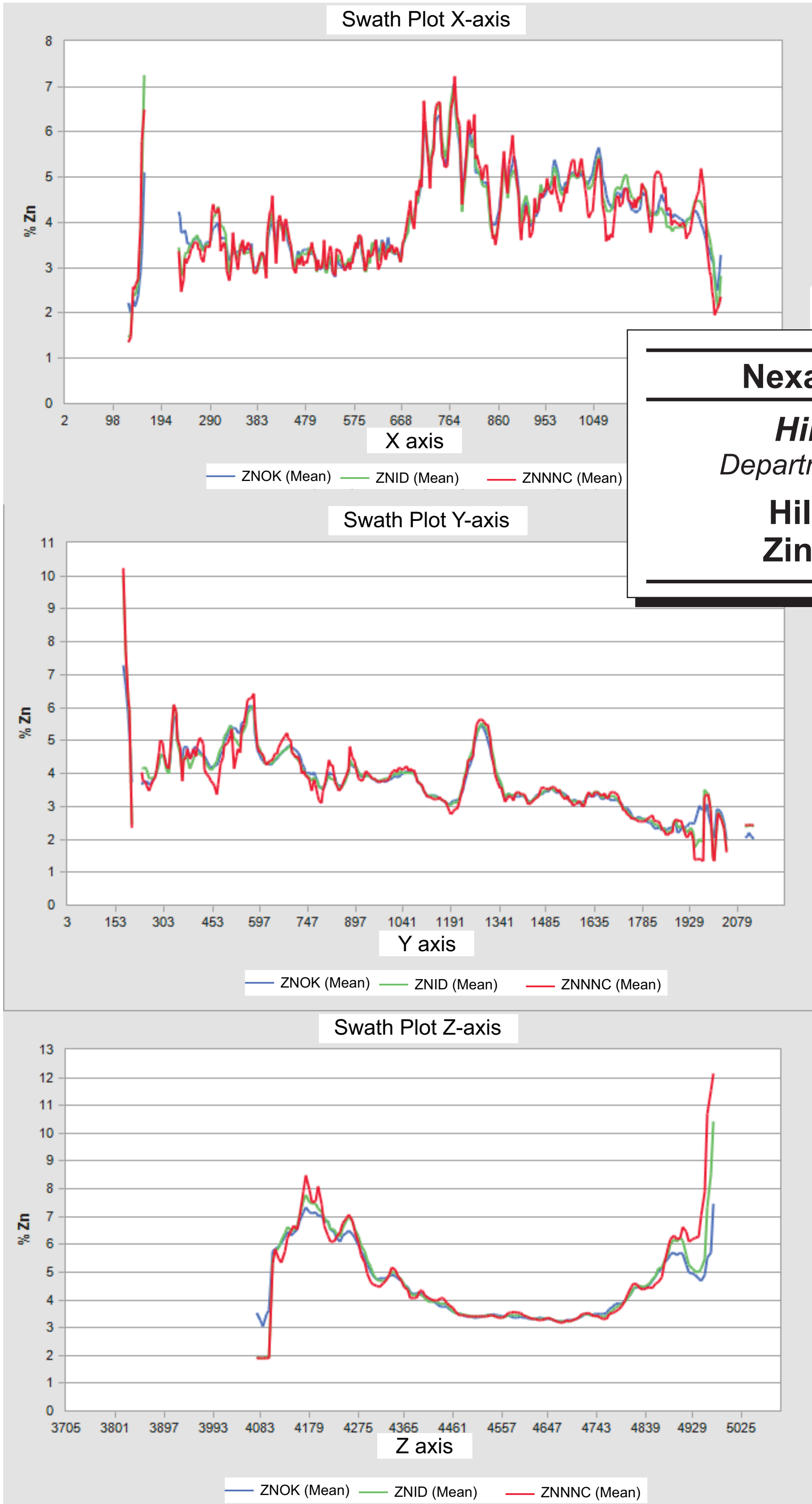


Figure 14-9

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Hilarión Deposit
Zinc Swath Plots

February 2020

Source: RPA, 2017.

On the basis of its review and validation procedures, RPA is of the opinion that the block model is valid and acceptable for supporting the Hilarión Mineral Resource estimate.

CLASSIFICATION

Definitions for Mineral Resource categories used in this report are consistent with those defined by CIM (2014) and adopted by NI 43-101. In the CIM classification, a Mineral Resource is defined 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”. Mineral Resources are classified into Measured, Indicated, and Inferred categories. A Mineral Reserve is defined as the “economically mineable part of a Measured and/or Indicated Mineral Resource” demonstrated by studies at Pre-Feasibility or Feasibility level as appropriate. Mineral Reserves are classified into Proven and Probable categories.

Blocks were classified as Measured, Indicated, and Inferred based on the number of holes and distances determined by variogram ranges. Flagging of the blocks by drill hole distances was done by using a search pass with dimensions and parameters as described in Table 14-14.

TABLE 14-14 HILARIÓN DEPOSIT SEARCH ELLIPSE RANGES FOR CLASSIFICATION CRITERIA
Nexa Resources S.A.– Hilarión Project

Parameters	Pass 1	Pass 2	Pass 3	Pass 4	Pass 5	Pass 6
Major Search Radius	60	48	31	11	30	24
Minor Search Radius	60	48	31	11	30	24
Vertical Search Radius	30	25	16	6	16	15
Min. N of holes	4	3	2	1	4	3
Classification	Indicated	Indicated	Indicated	Indicated	Measured	Measured

The first pass involved a numerical classification as described of blocks followed by a post processing of the classification to remove isolated blocks classified as Measured or Indicated. All blocks completely or partially contained within a wireframe model were assigned a minimum classification of Inferred.

A cross section showing the final classification is provided in Figure 14-10.

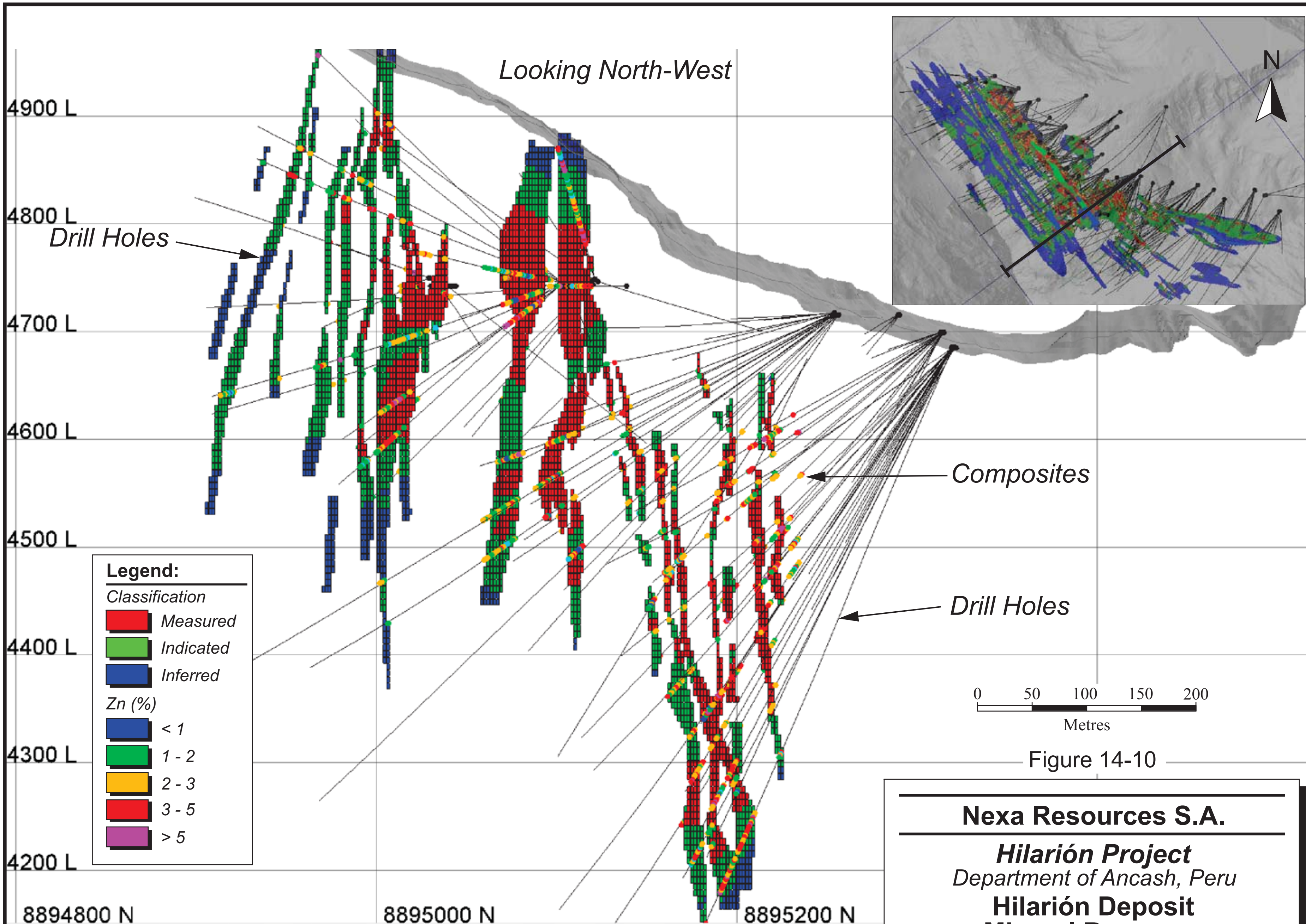


Figure 14-10

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Hilarión Deposit
Mineral Resource
Classification Assignment

February 2020

Source: RPA, 2020.

In regard to the classification, RPA notes the following:

- The overall classification is reasonable for the level of study.
- The average drill hole spacing for Measured and Indicated categories is slightly wider than the distances given in Table 14-14 due to the methodology used to flag blocks by distance.
- There were some isolated Indicated blocks that do not demonstrate continuity and should be downgraded to Inferred, however, this volume represents less than 2.0% of the total Indicated blocks.

With respect to classification RPA recommends the following:

- Perform a visual review of the classification of all blocks with a minimum distance to the closest drill hole.
- Confirm/adjust the classification results with the grade contoured longitudinal sections.
- Indicated blocks should be interpolated by a minimum of two drill holes.

NET SMELTER RETURN AND CUT-OFF VALUE

An NSR value was assigned to blocks for the purposes of validation of the geological interpretation and resource reporting. NSR values represent the estimated dollar value per tonne of mineralized material after allowance for metallurgical recovery and consideration of smelter terms, including revenue from payable metals, treatment charges, refining charges, price participation, penalties, smelter losses, transportation, and sales charges.

Input parameters used to develop the NSR calculation have been derived from metallurgical test work at Hilarión, and smelter terms and commodity prices provided by Nexa. These assumptions are dependent on the processing scenario and will be sensitive to changes in inputs from further metallurgical test work. The key assumptions used are presented in Table 14-15. No value has been assigned to the low grade copper mineralization present. Copper has been estimated in the block model but has not been included in the Mineral Resource estimate.

TABLE 14-15 HILARIÓN DEPOSIT NSR INPUTS
Nexa Resources S.A.– Hilarión Project

Category	Input
Metal Prices	US$1.34 / lb Zn US$1.04 / lb Pb US$19.61 / oz Ag
Metal Recovery	Zn to Zn Conc: 90.00% Pb to Pb Conc: 86.00% Ag to Pb Conc: 72.00%
Concentrate Grade	Zn Conc: 48.00% Pb Conc: 55.00%
Payable Metal	Zn in Zn Conc: Maximum 85%, Minimum 8% Deduction Pb in Pb Conc: Maximum 95%, Minimum 3% Deduction Ag in Pb Conc: Maximum 95%, Minimum 50 g/t Deduction
Transportation	Pb Conc and Zn Conc: US$118.00 / wmt
Treatment	Zn Conc: US$209.00 / dmt Pb conc: US$200.00 / dmt
Refining	Ag in Pb Conc: US$1.00/oz payable Ag

Based on these inputs, the resulting NSR factors used for Mineral Resource reporting are as follows:

- Zn: US$15.64 / % Zn
- Pb: US$13.41 / % Pb
- Ag: US$0.41 / oz Ag

NSR factors have been applied to the block model uniformly, irrespective of mineral domain.

To report Mineral Resources, an NSR cut-off grade value was estimated. The Project was envisaged as a 10,000 tonne per day (tpd) mine, using sub-level stoping mining methods, and with material being processed at an onsite processing facility producing two concentrates. RPA used an NSR cut-off of US$35/t to report the Hilarión Mineral Resource.

RPA is of the opinion that the operating costs are adequate for this size and type of operation.

MINERAL RESOURCE STATEMENT

In 2019, the MineSight resource model was converted by Nexa into a sub-blocked Datamine block model for resource reporting. The Mineral Resources for the Hilarión deposit as of December 31, 2019 are summarized in Table 14-16. The Mineral Resources are reported using all of the material located in Mineable Stope Optimizer (MSO) resource shapes that are based on an NSR cut-off value of US$35/t for SLS mining with a stope minimum width of 3.0 m (Figures 14-11 to 14-12). This is in compliance with the CIM (2014) resource definition requirement of "reasonable prospects for eventual economic extraction".

TABLE 14-16 HILARIÓN DEPOSIT MINERAL RESOURCES – DECEMBER 31, 2019
Nexa Resources S.A.– Hilarión Project

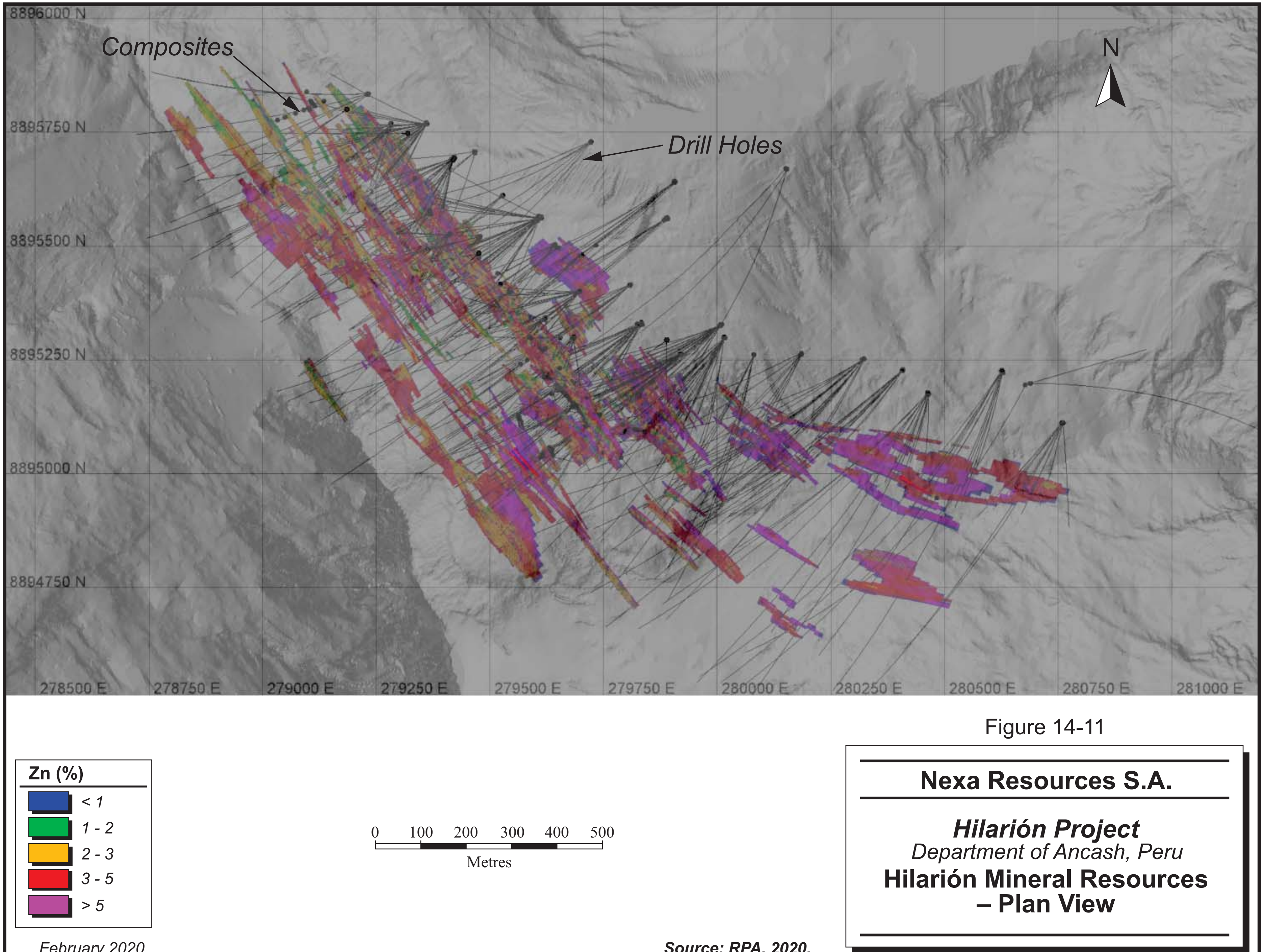
Category	Tonnes (Mt)	Grade			Contained Metal		
		Zinc (%)	Lead (%)	Silver (g/t)	Zinc (000 t)	Lead (000 t)	Silver (000 oz)
Measured	24.73	3.43	0.72	32.8	847.17	177.28	26,107
Indicated	33.27	3.59	0.59	25.5	1,195.83	195.21	27,287
Total M + I	**58.00**	**3.52**	**0.64**	**28.6**	**2,043.00**	**372.49**	**53,394**
Inferred	21.54	3.28	0.78	28.5	706.11	167.59	19,763

Notes:
1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated at an NSR cut off value of US$35/t.
3. Mineral Resources are estimated at average long-term metal prices of Zn: US$2,956.65/t (US$1.34/lb); Pb: US$2,303.14/t (US$1.04/lb); and Ag: US$19.61/oz.
4. A minimum mining width of three metres was used.
5. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
6. Numbers may not add due to rounding.

Exploration drifting has extracted 11,708 tonnes from the Hilarión deposit resource, based on the NSR cut-off value of US$35/t. This drifting has not been excluded from the stated Mineral Resources. RPA considers that this drifting is not material as it represents a very small percentage (<0.02%) of the Measured and Indicated Resources.

In RPA's opinion, the assumptions, parameters, and methodology used for the Hilarión Mineral Resource estimates are appropriate for the style of mineralization and potential mining methods.

There are no known environmental, permitting, legal, title, taxation, socio-economic, political, or other relevant factors that could significantly affect the Mineral Resources at Hilarión.



February 2020

Source: RPA, 2020.

Figure 14-11

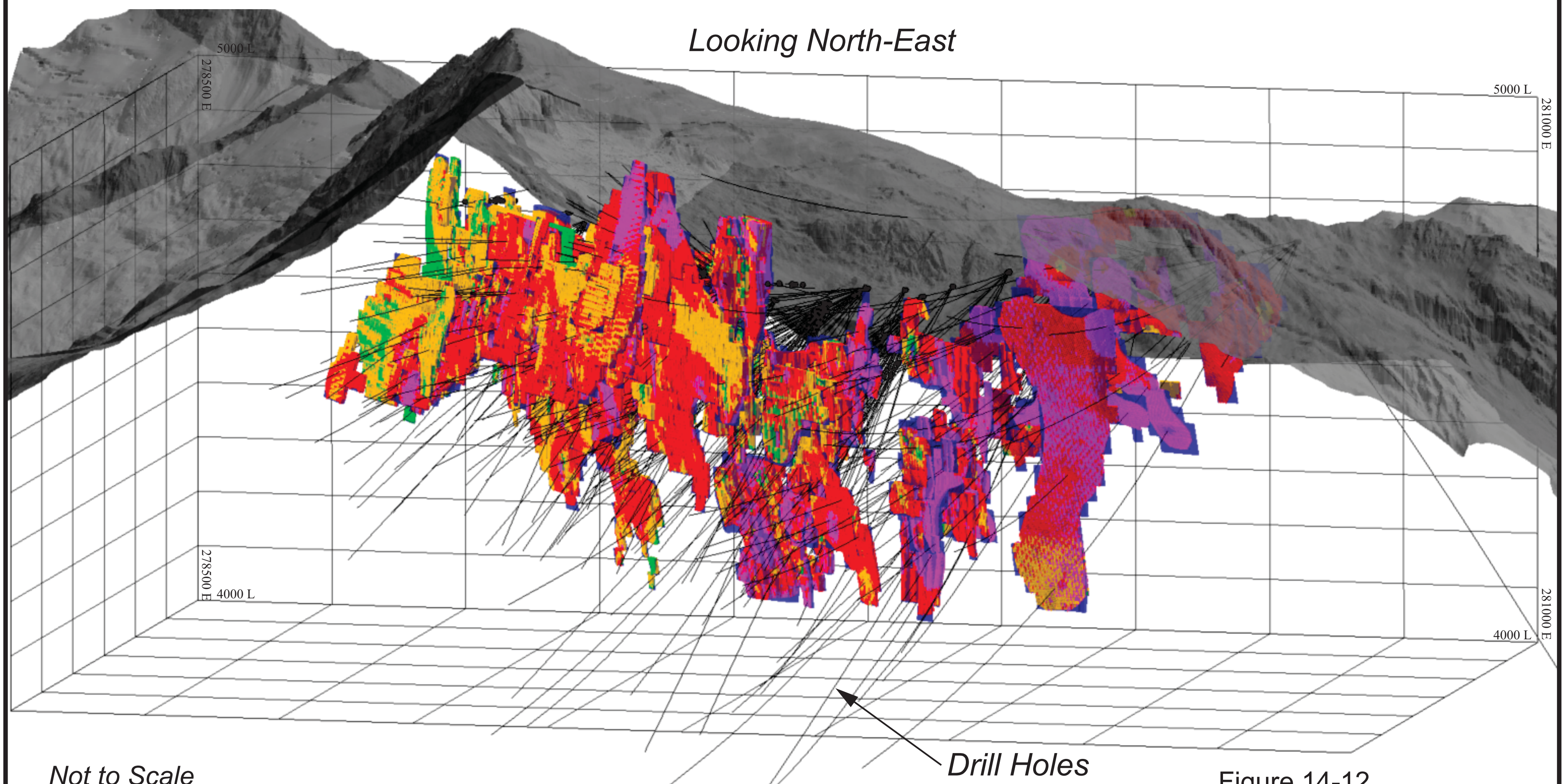
Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Hilarión Mineral Resources – Plan View

www.rpacan.com



Not to Scale

Zn (%)	
	< 1
	1 - 2
	2 - 3
	3 - 5
	> 5

Figure 14-12

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Hilarión Mineral Resources – Longitudinal Section

February 2020

Source: RPA, 2020.

COMPARISON TO PREVIOUS MINERAL RESOURCE ESTIMATES

A comparison of the current Nexa estimate, to the previous 2017 Mineral Resource estimate is presented in Table 14-17. The reasons for the changes are primarily due to the following:

- Higher NSR cut-off values
- New resource shape reporting methodology that includes all of the material in each resource shape
- A minimum thickness of three metres

Since the previous Mineral Resource estimate, Nexa has performed drilling programs to extend existing mineralization along strike in the northwestern portion of the Hilarión deposit delineating mineralization in newly discovered zones, and to extend and confirm mineralization in the Cuerpo 33 domain. Incorporating the 2018 to 2019 drilling will result in a minor increase in the resources. Waste included in the resource shapes is contributing to approximately 11% of the total resource tonnes.

TABLE 14-17 HILARIÓN COMPARISON OF 2019 VERSUS 2017 MINERAL RESOURCES

Nexa Resources S.A. - Hilarión Project

Category	Hilarión Mineral Resource Estimate - December 31, 2019							Hilarión Mineral Resource Estimate - July 31, 2017						
	Tonnes	Grade			Contained Metal			Tonnes	Grade			Contained Metal		
	(Mt)	Zinc (%)	Lead (%)	Silver (g/t)	Zinc (000 t)	Lead (000 t)	Silver (000 oz)	(Mt)	Zinc (%)	Lead (%)	Silver (g/t)	Zinc (000 t)	Lead (000 t)	Silver (000 oz)
Measured	24.73	3.43	0.72	32.8	847.2	177.3	26,107	27.40	3.71	0.79	35.6	1,016.0	218.0	31,300
Indicated	33.27	3.59	0.59	25.5	1,195.8	195.2	27,287	40.50	3.83	0.66	28.2	1,547.0	268.0	36,700
Total M&I	**58.00**	**3.52**	**0.64**	**28.6**	**2,043.0**	**372.5**	**53,394**	**67.90**	**3.78**	**0.72**	**31.2**	**2,563.0**	**485.0**	**68,100**
Inferred	21.54	3.28	0.78	28.5	706.1	167.6	19,763	26.80	3.53	0.82	30.5	946.0	221.0	26,200

EL PADRINO

SUMMARY

The Mineral Resources were estimated by RPA. Grade interpolation was constrained by 29 mineralization wireframes; these were modelled so as to be consistent with the 3D geologic model for the deposit. The geological model, mineralization wireframes, and block model were created by RPA using Leapfrog and Datamine Studio 3 software.

Zinc, lead, copper, and silver assays were capped at various levels prior to compositing to 1.5 m. Zeroes were inserted for unsampled intervals. A high grade distance restriction was applied to some zones, based on visual inspection of unrestricted estimates.

Variograms were modelled where possible and used both to support search and classification criteria and as input during validation.

Densities were assigned to blocks based on regression against zinc values for all zones except for two copper rich zones which were assigned a fixed density.

A block model measuring 3.0 m by 3.0 m by 3.0 m, sub-celled to a minimum of 1.0 m by 1.0 m by 1.0 m for the mineralization wireframes, was generated using Datamine Studio 3. Blocks were interpolated with zinc, lead, silver, and copper grades using ID^2. A three pass search strategy was used for the blocks contained within the mineralized wireframes with a HYR for outlier values. Dynamic anisotropy was used to orient the search ellipses and unique plunges were assigned to each zone.

An NSR value was assigned to blocks assuming long term metal prices and Cu, Pb, and Zn concentrates. The Mineral Resource estimate was reported using all the material within resource shapes generated in Deswik Stope Optimizer software, satisfying minimum mining size, continuity criteria, and using an NSR cut-off value of US$45/t for SLS resource shapes and US$50/t for R&P resource shapes. Blocks were classified as Indicated and Inferred using a distance based criteria.

Block model validation included visual comparisons of the estimated block grades to the composite grades, the comparison of the average grade of the nearest neighbor estimate to the ID^2 block average grades and a Global Change of Support (GCOS) check.

RESOURCE DATABASE

The resource database contains drilling information and analytical results up to January 13, 2014. A small amount of data that was received after this date was not used in the Mineral Resource estimate. The database comprises 87 drill holes for a total of 38,291 m of drilling. Drill holes were completed from 2008 to 2014. A summary of the Mineral Resource database is provided in Table 14-18.

TABLE 14-18 SUMMARY OF EL PADRINO DEPOSIT MINERAL RESOURCE DATABASE
Nexa Resources S.A.– Hilarión Project

Year	Number of Drill Holes	Metreage Drilled
2008	26	9,990.61
2009	6	1,793.45
2010	8	6,644.85
2011	18	8,610.50
2012	3	1,432.30
2013	16	6,541.00
2014	10	3,278.15
Grand Total	**87**	**38,290.86**

Nexa maintains the resource database in GeoExplo software. RPA received data from Nexa in plain text (.csv) format. Data were amalgamated and parsed as required and imported by RPA into Datamine Studio 3 and Leapfrog for review and modelling.

Section 12, Data Verification, describes the resource database verification steps carried out by RPA and Nexa. RPA is of the opinion that the drill hole database is valid and suitable to estimate Mineral Resources for the Project.

TOPOGRAPHY

A topographic survey was received from Nexa based on survey pickup points. RPA used the topographic survey to clip the geological model.

GEOLOGY MODELLING

The first phase of modelling at El Padrino involved creating a volumetric lithology model for the deposit area (Figure 14-13).

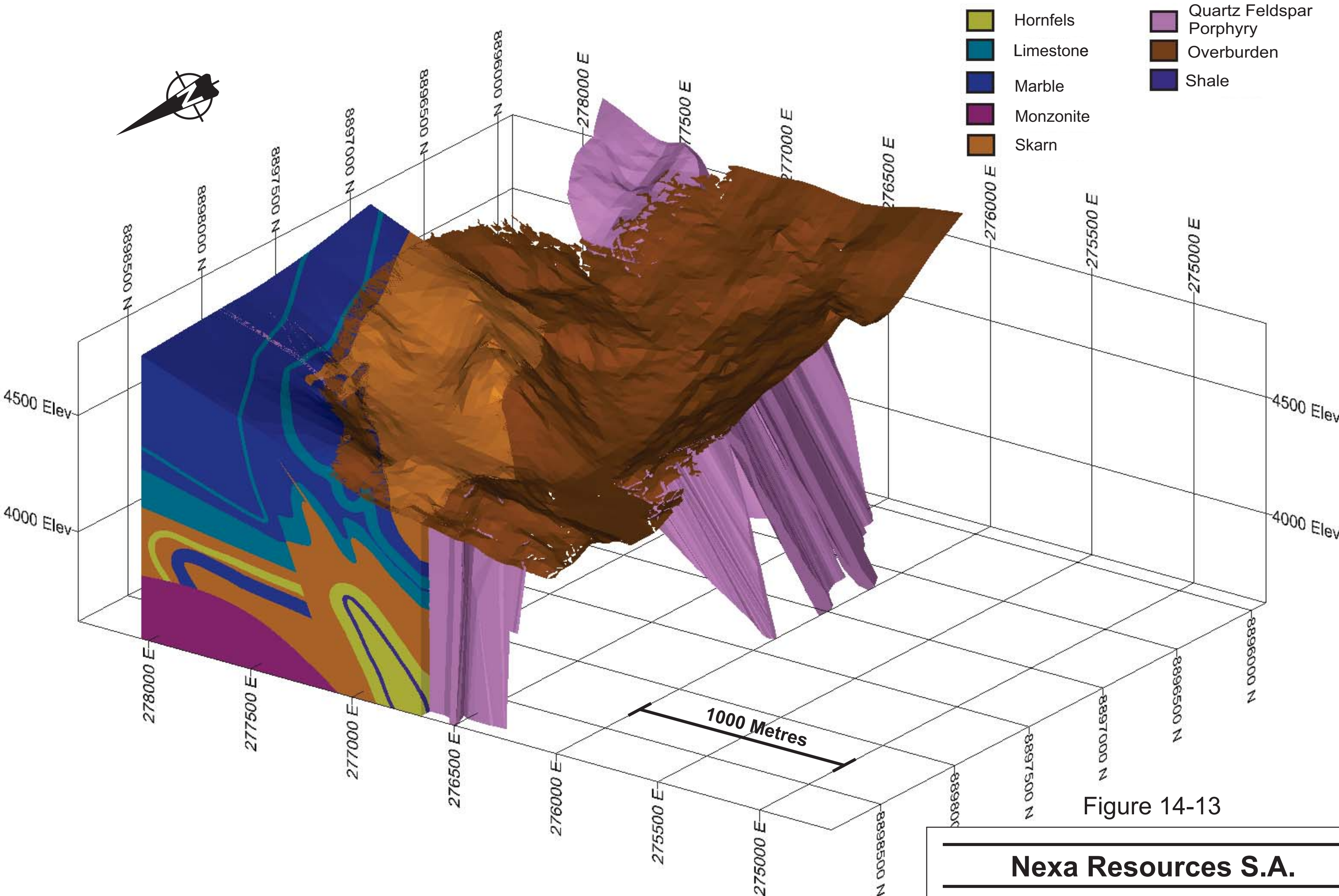


Figure 14-13

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

3D Isometric View of El Padrino Lithology Wireframes

February 2020

Source: RPA, 2017.

The major inputs for geologic modelling were:

- The existing drill hole database. Primarily lithology data was used, however, multi-element assays and alteration/structural data were also available and were used where appropriate.
- Plan and sectional geologic interpretations across the deposit.
- A surficial geology map covering the El Padrino deposit area.
- Satellite imagery covering the El Padrino deposit area; some units (e.g., the porphyry dikes) are clearly visible in the satellite image.
- Core photographs for most of the El Padrino drilling. Photographs were not available for the PAD-14-series drill holes.

Mapping by Nexa shows the El Padrino deposit area to consist of a sequence of layered, folded calcareous and siliciclastic sediments in a belt striking approximately north-northwest. The sedimentary stratigraphy in the deposit area was modelled to conform as closely as possible to existing mapping and the distribution of lithologies logged within drill holes. Stratigraphy hosting the deposit takes the form of a tight anticline cored by a band of skarn alteration, and apparently capped by a thick, impermeable, relatively unaltered limestone from 40 m to 120 m in thickness. Stratigraphy above the limestone consists of interbedded marble, skarn, calc-silicate, limestone, and hornfels layers. Alteration was presumed to be approximately parallel to lithology, given the juxtaposition of highly altered (i.e., skarn) and weakly altered or unaltered limestone lithologies.

The entire stratigraphic column is cut by a late set of porphyry dikes. Based on surface mapping, these have been modelled into an east-west to north-northwest striking, anastomosing set directly crosscutting mineralization, and a more continuous north-northwest striking set somewhat to the west of the deposit. A number of other bodies were also modelled based on lithology and grade information, including the El Padrino Stock to the south of the deposit; a broad Cu-Mo rich skarn-replacement zone west of the deposit; and a deep, shallow-dipping monzonite body intercepted at depth. The major Yanashallash Fault was also modelled, however, since it runs to the west of the El Padrino deposit, it had little effect on the model.

MINERALIZATION MODELLING

Subsequent to modelling of lithology, it was possible to begin grade modelling at El Padrino. A total of 29 separate mineralization zones were built, encompassing three separate, but closely-related, mineralization styles:

- Bedding-parallel mantos, forming at lithologic contacts and in favourable horizons, associated with skarn alteration; this is the predominant mineralization style at El Padrino. Zone 101 appears to be a special case of manto-style mineralization, wherein especially strong and continuous alteration and grade is developed within a favourable horizon folded into an anticlinal hinge and capped by a thick, impermeable limestone bed.
- Flat-lying copper-rich exoskarn developed along the upper contact of the shallow-dipping monzonite.
- Structurally controlled zones of faulting and veins/veinlets. One of these is developed directly within the Yanashallash Fault, while others parallel and are spatially related to the modelled porphyry bodies.
- A fourth style of mineralization consists of copper and molybdenum within a broad, low-grade, pervasively skarn-altered zone to the west of the main El Padrino deposit. This zone was modelled during the geologic modelling portion of the resource, however, no attempt was made to characterize grade or tonnages within this body, and Cu-Mo style mineralization does not form any part of the current resource.

Mineralization wireframes were modelled based primarily on grade, with lithology acting as a guide when extending wireframes along strike. Geochemical ratios (i.e., Cu/Zn) were also sometimes useful for discriminating between different mineralization styles. Wireframes were constructed using a two metre minimum width, and an NSR cut-off value greater than $20/t. Wireframes were generally extended halfway towards barren drill holes, or else 100 m beyond the last intercept where not constrained by drilling. Mineralization was sometimes pushed through unsampled or low-grade intercepts when sufficient evidence for continuity existed in other drill holes. Unsampled intervals were assigned zero grade.

Mineralization was modelled from surface (maximum elevation 4,575 m) down to a maximum depth of 850 m below surface (3,700 m elevation), however, the bulk of mineralized wireframes are less than 450 m below surface. Mineralized zones vary greatly in thickness, from a minimum of two metres up to 25 m maximum thickness; typically, most zones are from two to fifteen metres. The most continuous zones have been traced for a strike length of 700 m or more. All mineral envelopes were clipped to topography, a modelled overburden surface, and to cross-cutting quartz-feldspar porphyry dikes.

El Padrino mineralization wireframes are shown in Figure 14-14. Figure 14-15 shows a typical vertical section through the model wireframes with mineralization wireframes overlaying the lithology wireframes.

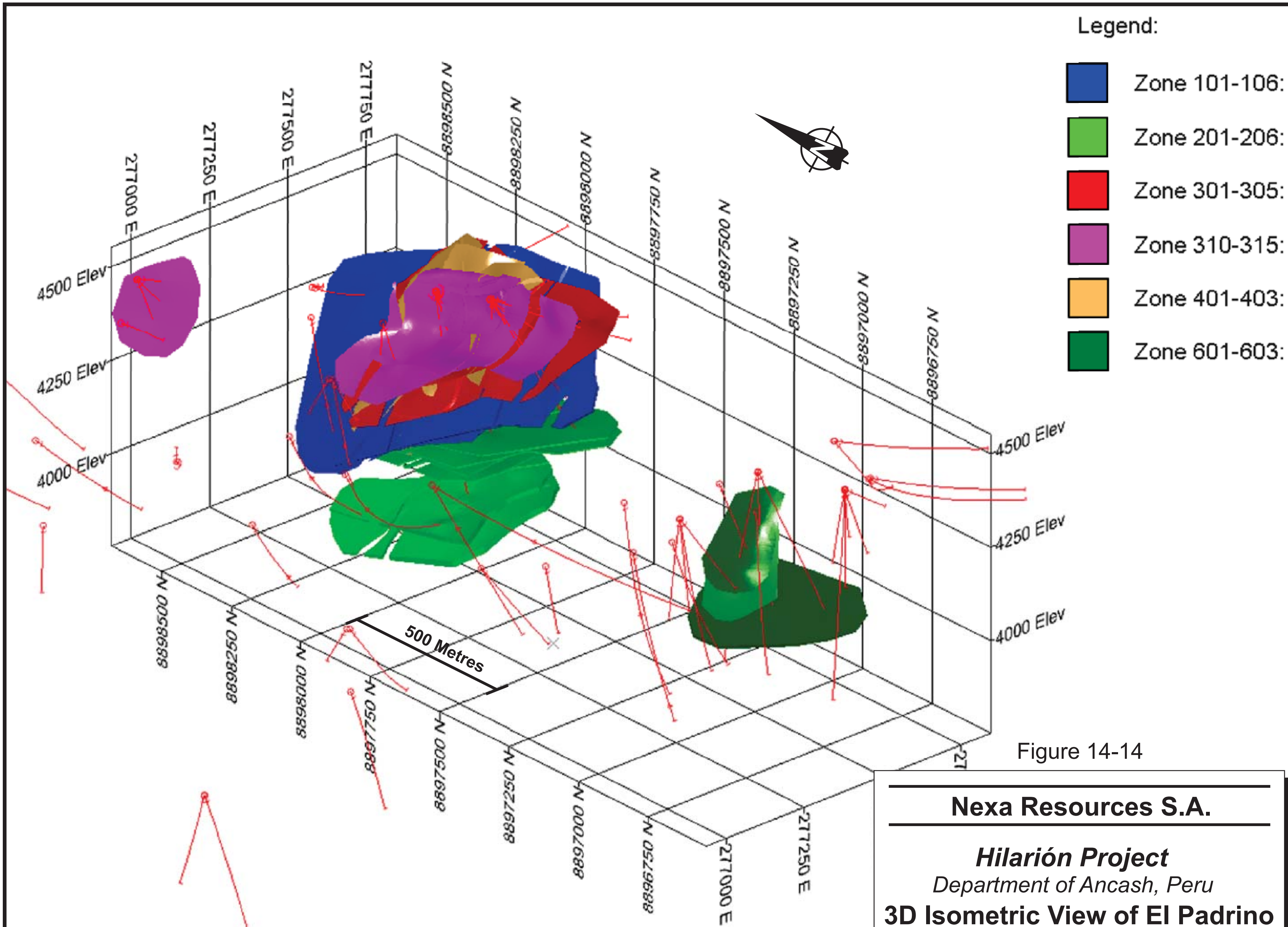


Figure 14-14

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

3D Isometric View of El Padrino Mineralization Wireframes

February 2020

Source: RPA, 2017.

RPA

www.rpacan.com

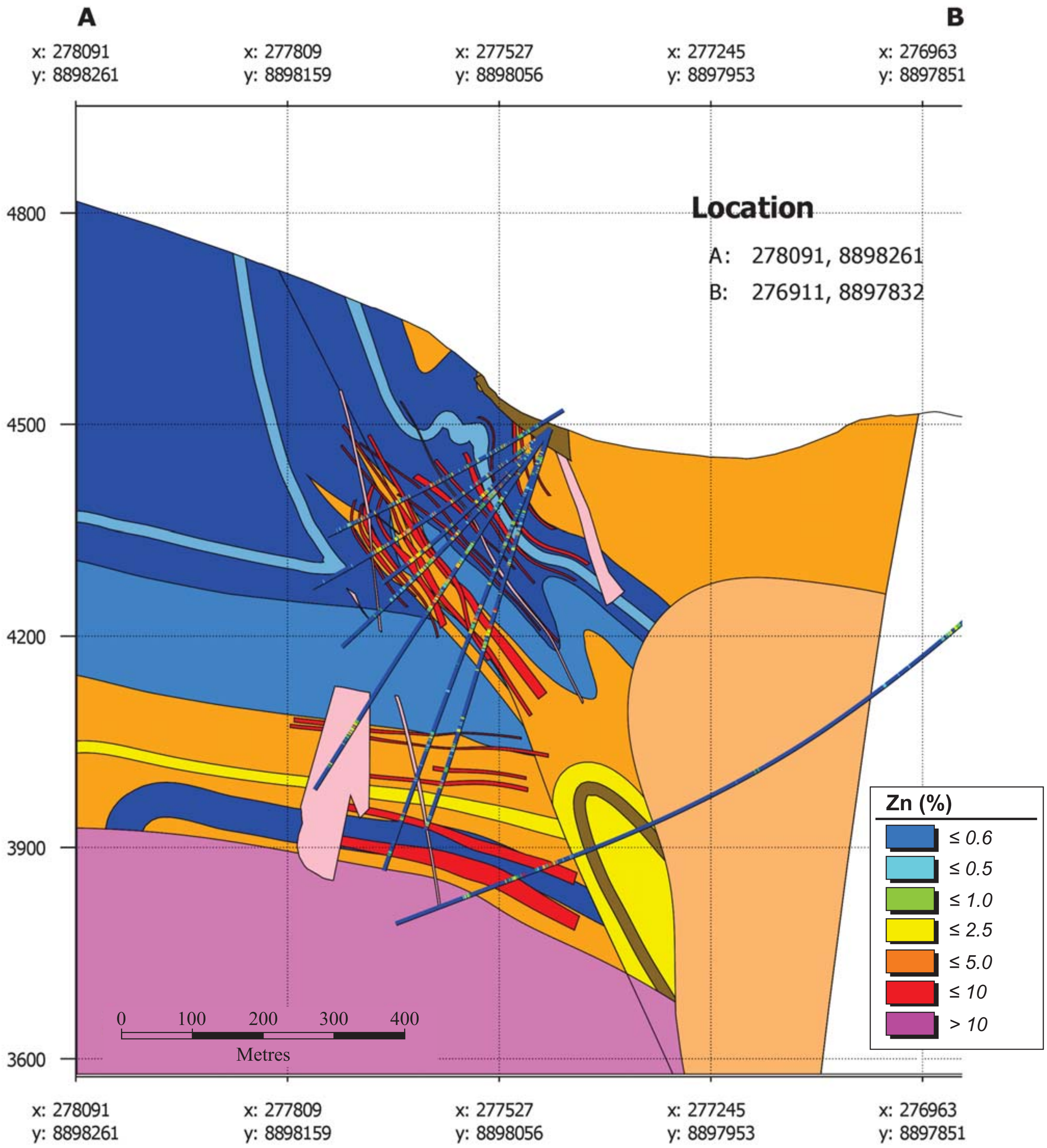


Figure 14-15

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Typical Vertical Section Through the El Padrino Deposit

NOTE: Mineralization Wireframes in Red.

February 2020

Source: RPA, 2017.

DENSITY

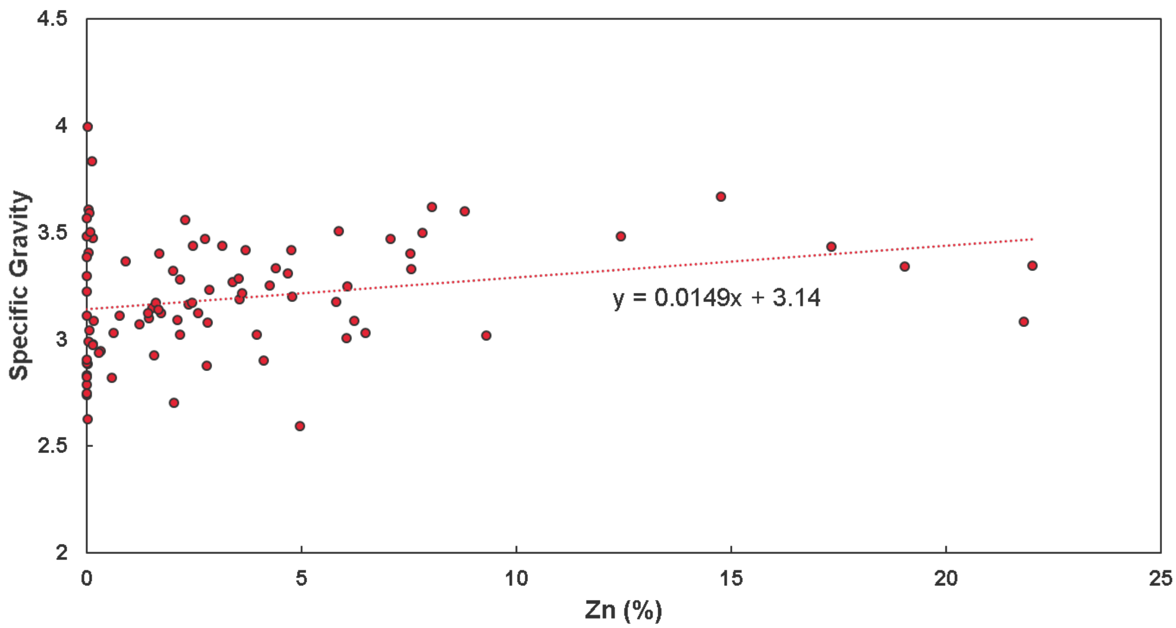
A total of 114 density measurements were provided and used for analysis. For all domains except for Zones 201 and 202, blocks were assigned density based on a linear regression formula of Zn versus specific gravity (Figure 14-16). The formula used for blocks was as follows:

$$Density = Zn \times 0.0149 + 3.14$$

Zones 201 and 202 do no exhibit the same Zn to density relationship due to higher Cu grades and large areas of massive pyrite (Figure 14-17). For these two zones, a fixed density of 3.31 t/m^3 was assigned.

RPA is of the opinion that the density assignment is adequate for the current level of study.

FIGURE 14-16 ZN VS. SPECIFIC GRAVITY SCATTER PLOT FOR EL PADRINO



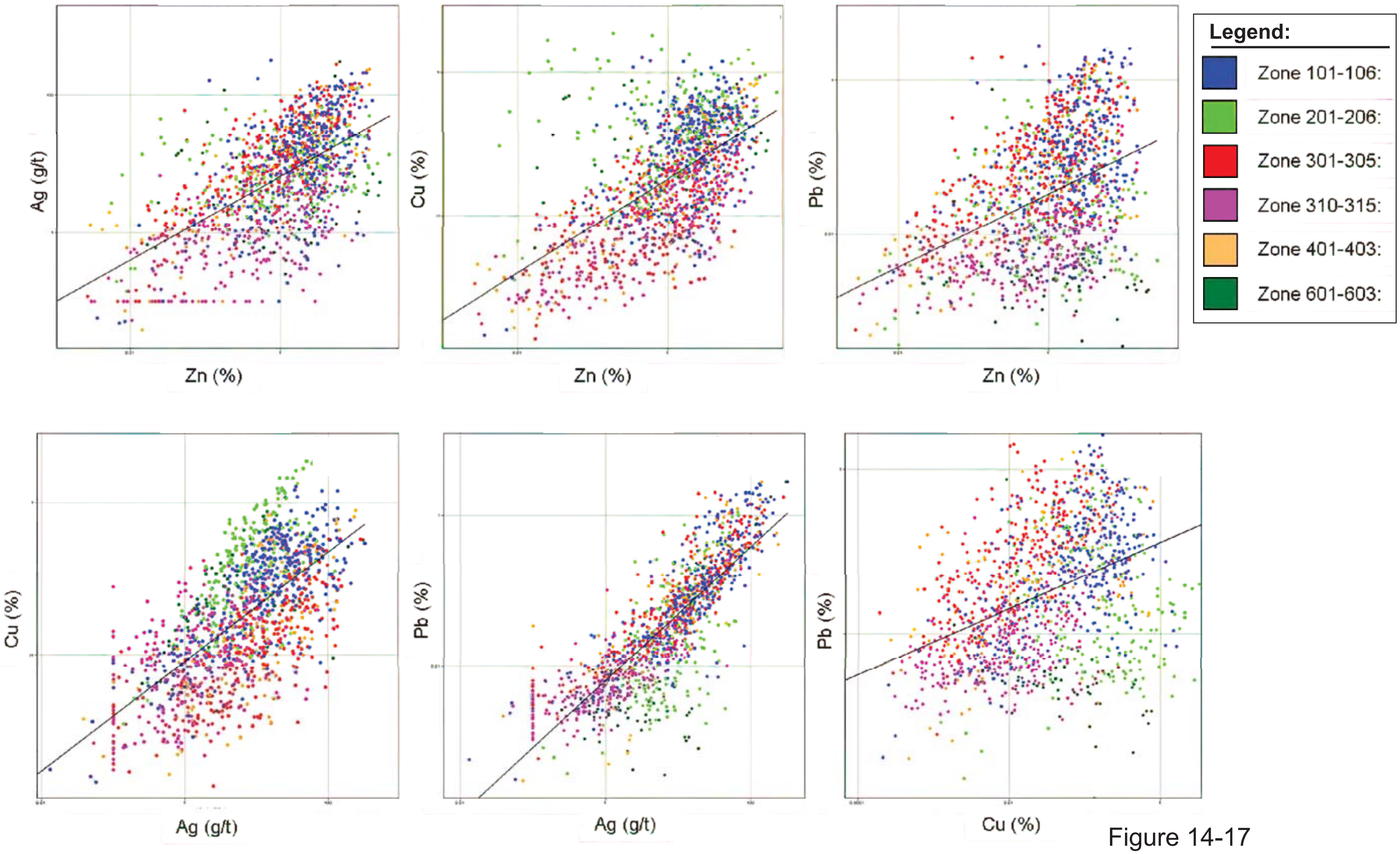


Figure 14-17

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Zn, Ag, Cu, and Pb Scatterplots for El Padrino Coloured Wireframe Zone

February 2020

Source: RPA, 2017.

RPA

www.rpacan.com

GRADE CAPPING AND OUTLIER RESTRICTION

RPA applied high grade capping to Zn, Pb, Cu, and Ag assays in order to limit the influence of a small amount of extreme values located in the upper tail of the metal distributions. Log probability plots, histograms, and decile analyses were used to inform the capping levels. Mineralization zones were grouped for capping according to similar characteristics such as mean and standard deviation. In addition to the initial cap, a second cap was applied based on a distance restriction to avoid the over-extrapolation of high grades in areas of sparse drilling. The grade thresholds chosen generally corresponded to the capping groups but were only applied where over-extrapolation of high grades was observed. The restriction distances applied were 35 m by 17.5 m by 10 m and 30 m by 30 m by 8 m (for Zone 601 only), oriented according to the dynamic anisotropy angles used for the search ellipsoids.

Table 14-19 describes the capping groups, capping grades, and distance restriction thresholds applied. Capped versus uncapped statistics are provided in Tables 14-20 to 14-23.

TABLE 14-19 EL PADRINO DEPOSIT CAPPING GROUP DESCRIPTIONS

Nexa Resources S.A.– Hilarión Project

Capping Group	Zone	Initial Cap				Restriction Threshold (35m by 17.5m by 10m)			
		Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)
1	101	320	2.1	2.75	-	200	1.4	2.75	12
1	102	320	2.1	2.75	-	-	-	-	-
1	103	320	2.1	2.75	-	-	-	-	-
1	104	320	2.1	2.75	-	-	-	-	-
1	105	320	2.1	2.75	-	-	-	-	-
2	106	200	0.45	2	15	100	0.45	1	10
4	201	-	-	-	15	-	3.5	-	15
1	202	320	2.1	2.75	-	200	1.4	2.75	12
1	203	320	2.1	2.75	-	200	1.4	2.75	12
1	204	320	2.1	2.75	8	200	1.4	2.75	8
1	205	320	2.1	2.75	-	-	-	-	-
1	206	320	2.1	2.75	-	-	-	-	-
1	301	320	2.1	2.75	-	-	-	-	-
2	302	200	0.45	2	15	-	-	-	-
2	303	200	0.45	2	15	-	-	-	-
2	304	200	0.45	2	15	-	-	-	-
2	305	200	0.45	2	15	-	-	-	-
3	310	90	0.36	0.4	15	90	0.21	0.2	9
3	311	90	0.36	0.4	15	-	-	-	-
3	312	90	0.36	0.4	15	-	-	-	-
3	313	90	0.36	0.4	15	-	-	-	-
3	314	90	0.36	0.4	15	-	-	-	-
3	315	90	0.36	0.4	15	-	-	-	-
5	401	200	0.6	0.6	10	-	-	-	-
1	402	320	2.1	2.75	15	200	1.4	2.75	12
1	403	320	2.1	2.75	15	200	1.4	2.75	12
1	601	320	2.1	2.75	-	200	1.4	2.75	12
1	602	320	2.1	2.75	-	200	1.4	2.75	12
1	603	320	2.1	2.75	-	-	-	-	-

TABLE 14-20 EL PADRINO DEPOSIT CAPPED VERSUS UNCAPPED STATISTICS - AG
Nexa Resources S.A.– Hilarión Project

Zone	Grade	Count	Uncapped						Capped					
			Minimum	Maximum	Mean	SD	Variance	CV	Maximum	Mean	SD	Variance	CV	Metal Loss (%)
101	Ag (g/t)	256	0	235	21.36	36.74	1,350.12	1.72	235	21.36	36.74	1,350.12	1.72	0%
102	Ag (g/t)	134	0.3	227	31.67	41.73	1,741.13	1.32	227	31.67	41.73	1,741.13	1.32	0%
103	Ag (g/t)	47	0.1	188	29.91	36.44	1,327.85	1.22	188	29.91	36.44	1,327.85	1.22	0%
104	Ag (g/t)	30	0	563	72.73	125.04	15,633.89	1.72	320	61.93	85.13	7,247.95	1.37	15%
105	Ag (g/t)	17	1.2	72.5	32.85	23.06	531.8	0.7	72.5	32.85	23.06	531.8	0.7	0%
106	Ag (g/t)	11	0.9	213	26.41	53.41	2,852.65	2.02	200	25.67	50.56	2,555.83	1.97	3%
201	Ag (g/t)	58	0.1	63.5	14.75	15.9	252.65	1.08	63.5	14.75	15.9	252.65	1.08	0%
202	Ag (g/t)	56	0.1	49.8	9.81	10.22	104.39	1.04	49.8	9.81	10.22	104.39	1.04	0%
203	Ag (g/t)	22	1.4	29.9	9.15	8.6	73.91	0.94	29.9	9.15	8.6	73.91	0.94	0%
204	Ag (g/t)	14	1.6	53.1	8.32	12.49	155.88	1.5	53.1	8.32	12.49	155.88	1.5	0%
205	Ag (g/t)	22	0.3	74.3	14.36	19.7	388.1	1.37	74.3	14.36	19.7	388.1	1.37	0%
206	Ag (g/t)	25	0.3	123	24.07	37.04	1,372.06	1.54	123	24.07	37.04	1,372.06	1.54	0%
301	Ag (g/t)	53	0	279	32.23	54.01	2,916.95	1.68	279	32.23	54.01	2,916.95	1.68	0%
302	Ag (g/t)	72	0	336	21.6	44.1	1,945.25	2.04	200	20.37	36.37	1,322.93	1.79	6%
303	Ag (g/t)	83	0	537	28.02	62.38	3,891.43	2.23	200	24.84	43.15	1,861.78	1.74	11%
304	Ag (g/t)	88	0	298	23.92	51.11	2,611.94	2.14	200	21.62	39.72	1,577.77	1.84	10%
305	Ag (g/t)	92	0	270	18.58	39.33	1,546.82	2.12	200	17.86	35.02	1,226.53	1.96	4%
310	Ag (g/t)	139	0	363	9.13	29.94	896.33	3.28	90	7.66	16.43	270.06	2.14	16%
311	Ag (g/t)	31	0	71.8	7.63	12.65	160.11	1.66	71.8	7.63	12.65	160.11	1.66	0%
312	Ag (g/t)	51	0	21.3	1.76	3.22	10.37	1.83	21.3	1.76	3.22	10.37	1.83	0%
313	Ag (g/t)	79	0	133	2.32	12.15	147.53	5.24	90	2	8.72	75.95	4.36	14%
314	Ag (g/t)	72	0	73.9	3.43	9.37	87.78	2.73	73.9	3.43	9.37	87.78	2.73	0%
315	Ag (g/t)	86	0	24.5	1.05	2.23	4.98	2.13	24.5	1.05	2.23	4.98	2.13	0%
401	Ag (g/t)	110	0	560	14.11	49.35	2,435.68	3.5	200	11.94	30.18	910.84	2.53	15%
402	Ag (g/t)	46	1	253	44.24	65.34	4,268.86	1.48	253	44.24	65.34	4,268.86	1.48	0%
403	Ag (g/t)	17	1.2	147	22.52	34.62	1,198.46	1.54	147	22.52	34.62	1,198.46	1.54	0%
601	Ag (g/t)	14	0	447	64.22	130.26	16,966.47	2.03	320	59.1	115.15	13,258.60	1.95	8%
602	Ag (g/t)	19	0	15.5	3.66	4.98	24.85	1.36	15.5	3.66	4.98	24.85	1.36	0%
603	Ag (g/t)	30	0	19	3.59	5.06	25.59	1.41	19	3.59	5.06	25.59	1.41	0%

Note: SD – standard deviation; CV – coefficient of variation

TABLE 14-21 EL PADRINO DEPOSIT CAPPED VERSUS UNCAPPED STATISTICS - CU

Nexa Resources S.A.– Hilarión Project

Zone	Grade	Count	Uncapped						Capped					
			Minimum	Maximum	Mean	SD	Variance	CV	Maximum	Mean	SD	Variance	CV	Metal Loss (%)
101	Cu (%)	256	0	6	0.15	0.39	0.15	2.5	2.1	0.14	0.26	0.07	1.82	7%
102	Cu (%)	134	0	1.39	0.18	0.23	0.05	1.25	1.39	0.18	0.23	0.05	1.25	0%
103	Cu (%)	47	0	2.13	0.27	0.33	0.11	1.21	2.1	0.27	0.33	0.11	1.2	0%
104	Cu (%)	30	0	0.98	0.21	0.25	0.06	1.2	0.98	0.21	0.25	0.06	1.2	0%
105	Cu (%)	17	0	0.85	0.16	0.16	0.03	0.98	0.85	0.16	0.16	0.03	0.98	0%
106	Cu (%)	11	0	1.24	0.16	0.32	0.1	2.01	0.45	0.1	0.15	0.02	1.43	34%
201	Cu (%)	58	0.01	5.91	0.9	1.24	1.53	1.38	3.5	0.81	0.96	0.91	1.17	9%
202	Cu (%)	56	0	5	0.43	0.93	0.87	2.17	2.1	0.34	0.56	0.31	1.66	21%
203	Cu (%)	22	0	0.72	0.16	0.2	0.04	1.23	0.72	0.16	0.2	0.04	1.23	0%
204	Cu (%)	14	0.01	0.88	0.14	0.22	0.05	1.57	0.88	0.14	0.22	0.05	1.57	0%
205	Cu (%)	22	0	0.84	0.11	0.18	0.03	1.64	0.84	0.11	0.18	0.03	1.64	0%
206	Cu (%)	25	0	0.58	0.15	0.14	0.02	0.9	0.58	0.15	0.14	0.02	0.9	0%
301	Cu (%)	53	0	0.58	0.04	0.1	0.01	2.18	0.58	0.04	0.1	0.01	2.18	0%
302	Cu (%)	72	0	0.51	0.04	0.09	0.01	2.1	0.45	0.04	0.09	0.01	2.03	2%
303	Cu (%)	83	0	0.27	0.04	0.06	0	1.75	0.27	0.04	0.06	0	1.75	0%
304	Cu (%)	88	0	0.45	0.03	0.06	0	2.27	0.45	0.03	0.06	0	2.27	0%
305	Cu (%)	92	0	0.37	0.03	0.06	0	2.18	0.37	0.03	0.06	0	2.18	0%
310	Cu (%)	139	0	0.84	0.03	0.07	0.01	2.65	0.36	0.02	0.05	0	1.97	9%
311	Cu (%)	31	0	0.11	0.02	0.03	0	1.16	0.11	0.02	0.03	0	1.16	0%
312	Cu (%)	51	0	0.12	0.01	0.02	0	2.24	0.12	0.01	0.02	0	2.24	0%
313	Cu (%)	79	0	1.39	0.02	0.12	0.02	5.56	0.36	0.01	0.05	0	3.17	34%
314	Cu (%)	72	0	1.14	0.02	0.12	0.01	4.92	0.36	0.02	0.04	0	2.76	33%
315	Cu (%)	86	0	0.36	0.02	0.05	0	2.25	0.36	0.02	0.05	0	2.25	0%
401	Cu (%)	110	0	4.59	0.1	0.51	0.26	5.26	0.6	0.05	0.11	0.01	2.39	52%
402	Cu (%)	46	0	0.97	0.13	0.19	0.04	1.54	0.97	0.13	0.19	0.04	1.54	0%
403	Cu (%)	17	0	0.73	0.22	0.31	0.09	1.39	0.73	0.22	0.31	0.09	1.39	0%
601	Cu (%)	14	0	0.4	0.07	0.13	0.02	1.88	0.4	0.07	0.13	0.02	1.88	0%
602	Cu (%)	19	0	0.47	0.1	0.15	0.02	1.54	0.47	0.1	0.15	0.02	1.54	0%
603	Cu (%)	30	0	0.8	0.15	0.23	0.05	1.55	0.8	0.15	0.23	0.05	1.55	0%

Note: SD – standard deviation; CV – coefficient of variation

TABLE 14-22 EL PADRINO DEPOSIT CAPPED VERSUS UNCAPPED STATISTICS - PB

Nexa Resources S.A.– Hilarión Project

Zone	Grade	Count	Uncapped						Capped					
			Minimum	Maximum	Mean	SD	Variance	CV	Maximum	Mean	SD	Variance	CV	Metal Loss (%)
101	Pb (%)	256	0	5.34	0.19	0.53	0.28	2.85	2.75	0.17	0.42	0.18	2.45	7%
102	Pb (%)	134	0	3.88	0.23	0.45	0.2	1.92	2.75	0.23	0.42	0.17	1.81	2%
103	Pb (%)	47	0.01	3.26	0.41	0.72	0.52	1.74	2.75	0.41	0.69	0.48	1.7	2%
104	Pb (%)	30	0	2.76	0.56	0.78	0.61	1.39	2.75	0.56	0.78	0.61	1.39	0%
105	Pb (%)	17	0.01	1.49	0.52	0.55	0.3	1.05	1.49	0.52	0.55	0.3	1.05	0%
106	Pb (%)	11	0.01	4.38	0.38	1.06	1.11	2.78	2	0.24	0.5	0.25	2.04	36%
201	Pb (%)	58	0	0.13	0.02	0.02	0	1.3	0.13	0.02	0.02	0	1.3	0%
202	Pb (%)	56	0	0.63	0.06	0.12	0.01	1.82	0.63	0.06	0.12	0.01	1.82	0%
203	Pb (%)	22	0	0.75	0.08	0.17	0.03	2.08	0.75	0.08	0.17	0.03	2.08	0%
204	Pb (%)	14	0	0.62	0.07	0.15	0.02	2.02	0.62	0.07	0.15	0.02	2.02	0%
205	Pb (%)	22	0	1.19	0.18	0.27	0.07	1.46	1.19	0.18	0.27	0.07	1.46	0%
206	Pb (%)	25	0	1.93	0.32	0.54	0.3	1.72	1.93	0.32	0.54	0.3	1.72	0%
301	Pb (%)	53	0	1.73	0.23	0.39	0.15	1.69	1.73	0.23	0.39	0.15	1.69	0%
302	Pb (%)	72	0	2.87	0.16	0.36	0.13	2.23	2	0.16	0.31	0.1	2	5%
303	Pb (%)	83	0	4.53	0.2	0.45	0.21	2.31	2	0.18	0.3	0.09	1.7	9%
304	Pb (%)	88	0	11.61	0.43	1.3	1.7	3.04	2	0.28	0.54	0.29	1.94	35%
305	Pb (%)	92	0	1.18	0.11	0.23	0.05	2.09	1.18	0.11	0.23	0.05	2.09	0%
310	Pb (%)	139	0	6.42	0.05	0.38	0.14	6.91	0.4	0.03	0.06	0	2.13	50%
311	Pb (%)	31	0	0.38	0.02	0.07	0	2.92	0.38	0.02	0.07	0	2.92	0%
312	Pb (%)	51	0	0.15	0.01	0.02	0	2.37	0.15	0.01	0.02	0	2.37	0%
313	Pb (%)	79	0	1.37	0.02	0.12	0.01	7.41	0.4	0.01	0.04	0	4.19	45%
314	Pb (%)	72	0	0.8	0.02	0.08	0.01	4.72	0.4	0.01	0.05	0	3.37	23%
315	Pb (%)	86	0	0.15	0.01	0.02	0	2.72	0.15	0.01	0.02	0	2.72	0%
401	Pb (%)	110	0	6.96	0.12	0.7	0.48	5.82	0.6	0.05	0.11	0.01	2.08	55%
402	Pb (%)	46	0	8.17	0.75	1.63	2.67	2.18	2.75	0.53	0.77	0.6	1.45	29%
403	Pb (%)	17	0	0.7	0.08	0.17	0.03	2.04	0.7	0.08	0.17	0.03	2.04	0%
601	Pb (%)	14	0	6.48	0.83	1.84	3.39	2.22	2.75	0.52	1	1	1.93	37%
602	Pb (%)	19	0	0.01	0	0	0	0.97	0.01	0	0	0	0.97	0%
603	Pb (%)	30	0	0.01	0	0	0	0.73	0.01	0	0	0	0.73	0%

Note: SD – standard deviation; CV – coefficient of variation

TABLE 14-23 EL PADRINO DEPOSIT CAPPED VERSUS UNCAPPED STATISTICS - ZN

Nexa Resources S.A.– Hilarión Project

Zone	Grade	Count	Uncapped						Capped					
			Minimum	Maximum	Mean	SD	Variance	CV	Maximum	Mean	SD	Variance	CV	Metal Loss (%)
101	Zn (%)	256	0	29.38	3.15	3.9	15.2	1.24	29.38	3.15	3.9	15.2	1.24	0%
102	Zn (%)	134	0.03	20.33	3.41	3.67	13.45	1.08	20.33	3.41	3.67	13.45	1.08	0%
103	Zn (%)	47	0.01	16.92	2.44	3.22	10.35	1.32	16.92	2.44	3.22	10.35	1.32	0%
104	Zn (%)	30	0	16.3	2.34	3.75	14.08	1.6	16.3	2.34	3.75	14.08	1.6	0%
105	Zn (%)	17	0.06	6.06	2.01	1.57	2.46	0.78	6.06	2.01	1.57	2.46	0.78	0%
106	Zn (%)	11	0.05	18.58	2.42	4.88	23.79	2.02	15	2.22	4.15	17.23	1.87	8%
201	Zn (%)	58	0.01	29.68	2.56	4.65	21.65	1.82	15	2.36	3.88	15.07	1.64	8%
202	Zn (%)	56	0	35.49	4	7.21	52.03	1.8	35.49	4	7.21	52.03	1.8	0%
203	Zn (%)	22	0.06	14.1	2.6	3.69	13.63	1.42	14.1	2.6	3.69	13.63	1.42	0%
204	Zn (%)	14	0.13	21.07	2.2	3.98	15.82	1.81	8	1.75	1.87	3.48	1.07	21%
205	Zn (%)	22	0.07	13.31	2.38	2.8	7.86	1.18	13.31	2.38	2.8	7.86	1.18	0%
206	Zn (%)	25	0.01	10.45	2.07	2.65	7.04	1.28	10.45	2.07	2.65	7.04	1.28	0%
301	Zn (%)	53	0	9.41	1.62	2.1	4.41	1.29	9.41	1.62	2.1	4.41	1.29	0%
302	Zn (%)	72	0	19.61	1.3	2.87	8.25	2.21	15	1.26	2.62	6.88	2.08	3%
303	Zn (%)	83	0	11.93	1.39	2.2	4.85	1.59	11.93	1.39	2.2	4.85	1.59	0%
304	Zn (%)	88	0	8.14	0.99	1.51	2.27	1.52	8.14	0.99	1.51	2.27	1.52	0%
305	Zn (%)	92	0	16.01	2.27	3.94	15.49	1.74	15	2.25	3.87	14.97	1.72	1%
310	Zn (%)	139	0	34.63	1.83	3.76	14.11	2.06	15	1.71	3.1	9.61	1.81	6%
311	Zn (%)	31	0	22.01	1.32	3.17	10.05	2.4	15	1.21	2.47	6.09	2.04	8%
312	Zn (%)	51	0	12.69	0.82	1.92	3.69	2.34	12.69	0.82	1.92	3.69	2.34	0%
313	Zn (%)	79	0	12.22	0.97	2.01	4.05	2.08	12.22	0.97	2.01	4.05	2.08	0%
314	Zn (%)	72	0	17.57	1.61	3.04	9.23	1.89	15	1.59	2.91	8.48	1.84	2%
315	Zn (%)	86	0	17.04	0.96	1.97	3.88	2.06	15	0.95	1.91	3.66	2.02	1%
401	Zn (%)	110	0	17.22	1.44	2.85	8.11	1.98	10	1.35	2.5	6.24	1.84	6%
402	Zn (%)	46	0.02	19.91	3.22	5.05	25.52	1.57	15	2.95	4.2	17.63	1.42	8%
403	Zn (%)	17	0.04	19.05	4.89	6.99	48.81	1.43	15	4.29	5.74	32.89	1.34	12%
601	Zn (%)	14	0	8.28	1.34	2.7	7.32	2.02	8.28	1.34	2.7	7.32	2.02	0%
602	Zn (%)	19	0	28.88	4.86	8.11	65.84	1.67	28.88	4.86	8.11	65.84	1.67	0%
603	Zn (%)	30	0	13.34	2.01	3.11	9.69	1.55	13.34	2.01	3.11	9.69	1.55	0%

Note: SD – standard deviation; CV – coefficient of variation

COMPOSITING

RPA composited the capped assays within zones to 1.5 m, which is close to the average sampling length within the wireframes and is half of the block size (Figure 14-18). Residual composites with lengths less than 0.5 m were discarded. Composites were weighted by length and unsampled core intervals were substituted with zeroes.

The univariate statistics for the composites are provided in Tables 14-24 to 14-27.

RPA notes that the sample lengths are highly variable, which results in some smoothing regardless of the composite length chosen. RPA recommends that samples between litho-structural contacts be taken to a default sampling length, for example 1.5 m, and that shorter lengths are taken only when important contacts or small scale geological features are encountered.

FIGURE 14-18 HISTOGRAMS FOR EL PADRINO ASSAY (LEFT) AND COMPOSITE (RIGHT) LENGTHS

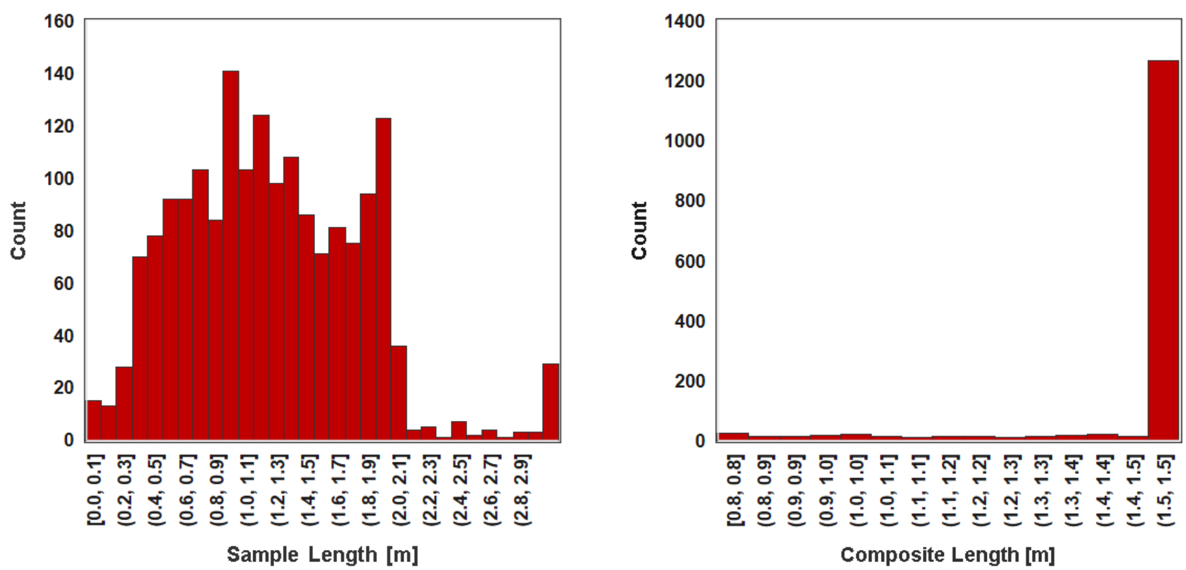


TABLE 14-24 EL PADRINO DEPOSIT CAPPED COMPOSITE STATISTICS - AG
Nexa Resources S.A.– Hilarión Project

Zone	Grade	Count	Minimum	Maximum	Mean	SD	Variance	CV
101	Ag (g/t)	213	0	208.67	21.2	32.58	1061.24	1.54
102	Ag (g/t)	107	0.52	210.11	31.78	37.57	1411.5	1.18
103	Ag (g/t)	37	0.7	133	30.4	32.7	1069.39	1.08
104	Ag (g/t)	26	0.05	320	62.32	71.73	5144.85	1.15
105	Ag (g/t)	13	9.1	55.16	32.78	15.49	239.85	0.47
106	Ag (g/t)	8	0.9	43.67	15.92	15.8	249.63	0.99
201	Ag (g/t)	53	1.45	61.37	14.61	14.33	205.33	0.98
202	Ag (g/t)	50	0.14	36.77	9.84	8.68	75.31	0.88
203	Ag (g/t)	23	2.23	29.9	9.16	7.87	61.88	0.86
204	Ag (g/t)	13	1.73	37.22	8.28	10.32	106.59	1.25
205	Ag (g/t)	22	0.7	53.26	14.56	18.08	327.05	1.24
206	Ag (g/t)	20	0.91	123	25.23	30.3	918.2	1.2
301	Ag (g/t)	41	1.53	279	29.62	46.42	2154.38	1.57
302	Ag (g/t)	54	0	145.13	20.65	31.83	1013.01	1.54
303	Ag (g/t)	66	0	126	24.85	31.16	970.92	1.25
304	Ag (g/t)	66	0	154.66	22.13	31.11	968.12	1.41
305	Ag (g/t)	69	0	135.46	17.79	30.3	918.18	1.7
310	Ag (g/t)	99	0	72.34	7.54	13.39	179.25	1.78
311	Ag (g/t)	25	0	56.49	7.72	11.16	124.65	1.45
312	Ag (g/t)	40	0	12.2	1.76	2.55	6.52	1.45
313	Ag (g/t)	63	0	14.55	1.39	2.66	7.05	1.9
314	Ag (g/t)	65	0	46.84	3.49	7.27	52.87	2.08
315	Ag (g/t)	85	0	8.4	1.05	1.71	2.93	1.63
401	Ag (g/t)	109	0	128	11.81	23.91	571.91	2.03
402	Ag (g/t)	38	1	237	44.04	58.56	3428.79	1.33
403	Ag (g/t)	15	1.7	127.63	22.96	31.79	1010.78	1.38
601	Ag (g/t)	13	0	304.4	57.91	94.24	8881.96	1.63
602	Ag (g/t)	23	0	15.5	3.65	4.74	22.44	1.3
603	Ag (g/t)	30	0	19	3.48	4.75	22.6	1.37

Note: SD – standard deviation; CV – coefficient of variation

TABLE 14-25 EL PADRINO DEPOSIT CAPPED COMPOSITE STATISTICS - CU

Nexa Resources S.A.– Hilarión Project

Zone	Grade	Count	Minimum	Maximum	Mean	SD	Variance	CV
101	Cu (%)	213	0	1.63	0.14	0.23	0.05	1.62
102	Cu (%)	107	0	1.18	0.18	0.21	0.04	1.14
103	Cu (%)	37	0	1.43	0.28	0.28	0.08	1
104	Cu (%)	26	0	0.8	0.2	0.2	0.04	1
105	Cu (%)	13	0.05	0.33	0.16	0.11	0.01	0.66
106	Cu (%)	8	0	0.22	0.08	0.09	0.01	1.06
201	Cu (%)	53	0.02	3.5	0.8	0.88	0.77	1.09
202	Cu (%)	50	0	2.1	0.34	0.52	0.27	1.52
203	Cu (%)	23	0.01	0.57	0.16	0.17	0.03	1.07
204	Cu (%)	13	0.01	0.52	0.14	0.18	0.03	1.26
205	Cu (%)	22	0.01	0.55	0.11	0.13	0.02	1.2
206	Cu (%)	20	0.02	0.4	0.16	0.11	0.01	0.73
301	Cu (%)	41	0	0.33	0.04	0.07	0.01	1.84
302	Cu (%)	54	0	0.39	0.04	0.08	0.01	1.87
303	Cu (%)	66	0	0.27	0.04	0.06	0	1.6
304	Cu (%)	66	0	0.21	0.03	0.04	0	1.63
305	Cu (%)	69	0	0.25	0.03	0.04	0	1.65
310	Cu (%)	99	0	0.27	0.02	0.04	0	1.57
311	Cu (%)	25	0	0.08	0.02	0.02	0	1.02
312	Cu (%)	40	0	0.09	0.01	0.02	0	1.56
313	Cu (%)	63	0	0.24	0.01	0.03	0	2.52
314	Cu (%)	65	0	0.23	0.02	0.03	0	2.13
315	Cu (%)	85	0	0.28	0.02	0.05	0	1.94
401	Cu (%)	109	0	0.6	0.05	0.1	0.01	2.11
402	Cu (%)	38	0	0.79	0.12	0.18	0.03	1.46
403	Cu (%)	15	0	0.7	0.22	0.29	0.09	1.36
601	Cu (%)	13	0	0.32	0.06	0.11	0.01	1.73
602	Cu (%)	23	0	0.47	0.1	0.15	0.02	1.48
603	Cu (%)	30	0	0.76	0.15	0.23	0.05	1.51

Note: SD – standard deviation; CV – coefficient of variation

TABLE 14-26 EL PADRINO DEPOSIT CAPPED COMPOSITE STATISTICS - PB
Nexa Resources S.A.– Hilarión Project

Zone	Grade	Count	Minimum	Maximum	Mean	SD	Variance	CV
101	Pb (%)	213	0	2.59	0.17	0.38	0.15	2.21
102	Pb (%)	107	0	2.44	0.23	0.37	0.13	1.59
103	Pb (%)	37	0.01	2.26	0.41	0.61	0.37	1.48
104	Pb (%)	26	0	2.75	0.56	0.69	0.48	1.24
105	Pb (%)	13	0.07	1.18	0.52	0.44	0.19	0.84
106	Pb (%)	8	0.01	0.49	0.15	0.19	0.04	1.27
201	Pb (%)	53	0	0.1	0.02	0.02	0	1.15
202	Pb (%)	50	0	0.45	0.06	0.1	0.01	1.58
203	Pb (%)	23	0	0.75	0.08	0.16	0.02	1.87
204	Pb (%)	13	0.01	0.44	0.07	0.12	0.02	1.7
205	Pb (%)	22	0	0.59	0.18	0.22	0.05	1.22
206	Pb (%)	20	0	1.11	0.33	0.4	0.16	1.2
301	Pb (%)	41	0.01	1.73	0.21	0.32	0.1	1.5
302	Pb (%)	54	0	1.08	0.16	0.25	0.06	1.61
303	Pb (%)	66	0	0.98	0.18	0.24	0.06	1.37
304	Pb (%)	66	0	2	0.28	0.47	0.22	1.66
305	Pb (%)	69	0	0.91	0.11	0.2	0.04	1.83
310	Pb (%)	99	0	0.26	0.03	0.05	0	1.76
311	Pb (%)	25	0	0.3	0.02	0.06	0	2.55
312	Pb (%)	40	0	0.06	0.01	0.01	0	1.54
313	Pb (%)	63	0	0.06	0.01	0.01	0	1.44
314	Pb (%)	65	0	0.25	0.01	0.04	0	2.59
315	Pb (%)	85	0	0.13	0.01	0.02	0	2.53
401	Pb (%)	109	0	0.5	0.05	0.09	0.01	1.77
402	Pb (%)	38	0	2.75	0.53	0.64	0.42	1.22
403	Pb (%)	15	0.01	0.61	0.08	0.15	0.02	1.87
601	Pb (%)	13	0	2.75	0.51	0.85	0.72	1.68
602	Pb (%)	23	0	0.01	0	0	0	0.9
603	Pb (%)	30	0	0	0	0	0	0.62

Note: SD – standard deviation; CV – coefficient of variation

TABLE 14-27 EL PADRINO DEPOSIT CAPPED COMPOSITE STATISTICS - ZN

Nexa Resources S.A.– Hilarión Project

Zone	Grade	Count	Minimum	Maximum	Mean	SD	Variance	CV
101	Zn (%)	213	0	15.26	3.1	3.17	10.03	1.02
102	Zn (%)	107	0.11	16.41	3.42	3.15	9.94	0.92
103	Zn (%)	37	0.05	11.14	2.48	2.51	6.3	1.01
104	Zn (%)	26	0.01	13.6	2.31	3.06	9.35	1.32
105	Zn (%)	13	0.66	4.09	2	0.76	0.58	0.38
106	Zn (%)	8	0.28	7.04	1.76	2.33	5.44	1.33
201	Zn (%)	53	0.01	15	2.39	3.48	12.13	1.46
202	Zn (%)	50	0.01	28.05	4.02	5.67	32.18	1.41
203	Zn (%)	23	0.06	14.1	2.62	3.53	12.47	1.35
204	Zn (%)	13	0.43	5.27	1.66	1.52	2.32	0.92
205	Zn (%)	22	0.15	8.18	2.4	2.16	4.64	0.9
206	Zn (%)	20	0.01	10.45	2.14	2.34	5.47	1.09
301	Zn (%)	41	0.02	7.59	1.47	1.55	2.42	1.05
302	Zn (%)	54	0	11.18	1.32	2.26	5.1	1.72
303	Zn (%)	66	0	8.27	1.39	1.86	3.46	1.34
304	Zn (%)	66	0	5.87	1.01	1.08	1.17	1.07
305	Zn (%)	69	0	14.9	2.21	3.16	10.01	1.43
310	Zn (%)	99	0	15	1.71	2.47	6.09	1.45
311	Zn (%)	25	0	7.74	1.27	1.87	3.48	1.47
312	Zn (%)	40	0	4.41	0.81	1.15	1.32	1.42
313	Zn (%)	63	0	4.73	0.89	1.19	1.41	1.33
314	Zn (%)	65	0	9.75	1.59	2.48	6.16	1.56
315	Zn (%)	85	0	7.2	0.95	1.4	1.96	1.48
401	Zn (%)	109	0	10	1.33	2.07	4.3	1.56
402	Zn (%)	38	0.05	15	2.95	3.92	15.35	1.33
403	Zn (%)	15	0.14	15	4.23	5.29	28.03	1.25
601	Zn (%)	13	0	6.04	1.16	2.09	4.39	1.81
602	Zn (%)	23	0	21.33	4.8	7.42	55.03	1.55
603	Zn (%)	30	0	9.62	1.86	2.21	4.88	1.19

Note: SD – standard deviation; CV – coefficient of variation

VARIOGRAPHY

RPA generated variograms to aid in the selection of search parameters and classification criteria, as well as for validation. Example variograms are shown in Figure 14-19.

Directional experimental correlograms were fit with two spherical structures for Ag, Cu, Pb, and Zn for the grouped zones 101 to 106. For all other zones, the limited data did not support stable variography. Ag exhibits the lowest relative nugget effect of 0.27, while Zn has the highest relative nugget effect at 0.4. In contrast, Zn has the longest range in the major direction at 100% of the sill. For all the variables, 95% of the variance is accounted for within approximately 100 m while 80% to 90% of the variance is accounted for within 60 m (Figure 14-20).

Variogram parameters for grouped zones 101 to 106 are provided in Table 14-28.

TABLE 14-28 EL PADRINO DEPOSIT ZONES 101-106 VARIOGRAM MODELS
Nexa Resources S.A.– Hilarión Project

	Ag	Cu	Pb	Zn
Z Rotation	70	70	70	70
X Rotation	135	135	135	135
Z Rotation	-20	-20	-20	-20
Nugget Effect	0.27	0.35	0.35	0.4
Structure 1				
Gamma	0.46	0.3	0.45	0.4
Major Range	54	37	90	46
Semi-Major Range	38	38	90	10
Minor Range	17	12	30	8
Structure 2				
Gamma	0.27	0.35	0.2	0.2
Major Range	152	220	170	311
Semi-Major Range	100	100	114	50
Minor Range	20	20	30	35

FIGURE 14-19 EL PADRINO ZONE 101-106 GROUPED DIRECTIONAL AND DOWNHOLE CORRELOGRAMS

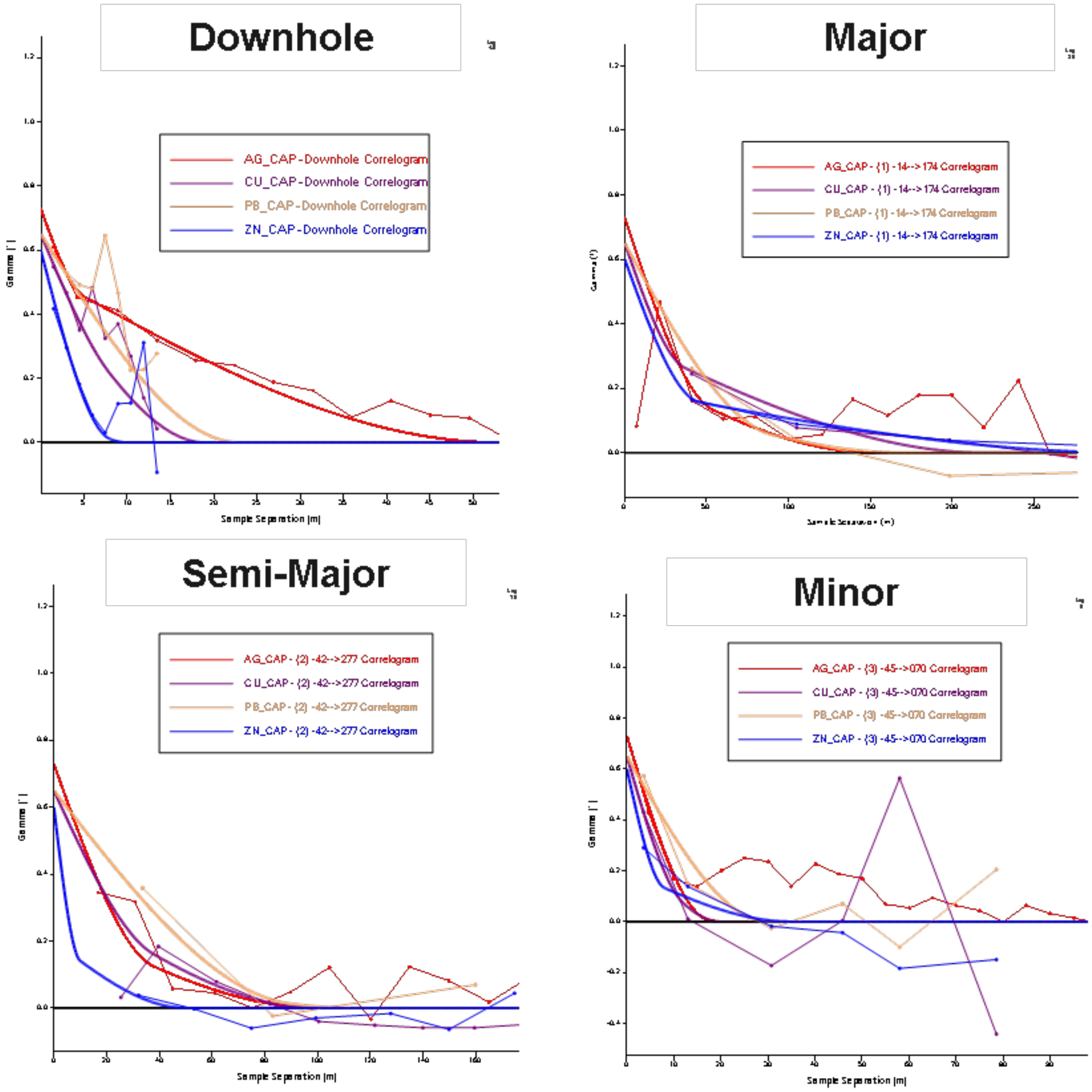
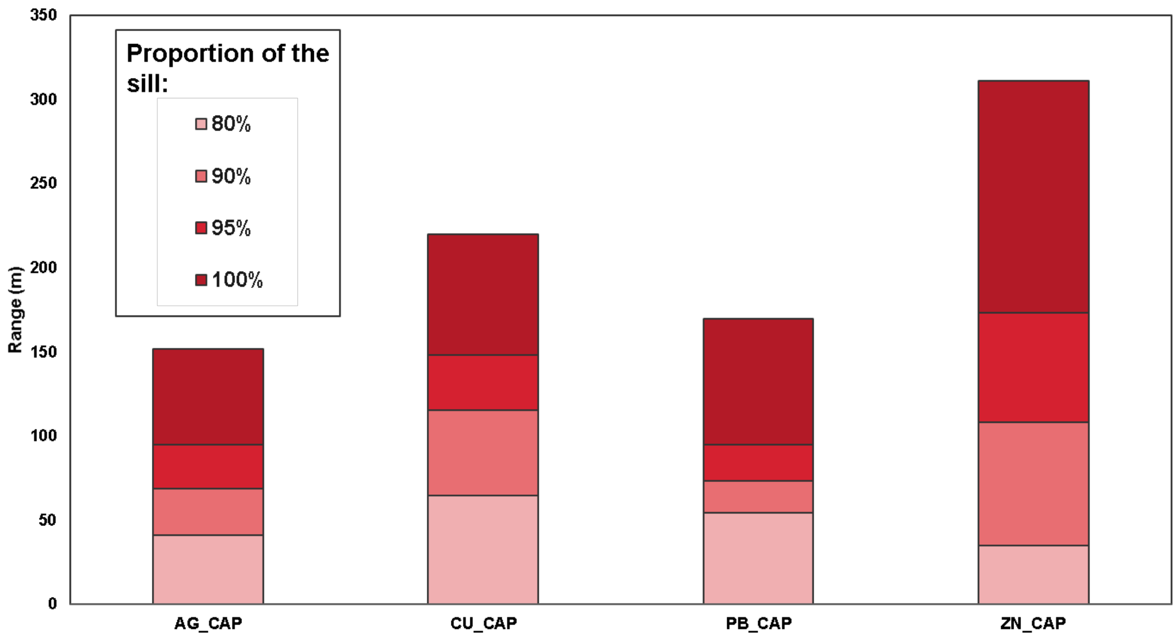


FIGURE 14-20 RANGES AT 80%, 90%, 95% AND 100% OF THE VARIOGRAM SILLS FOR EL PADRINO ZONES 101-106



BLOCK MODEL

El Padrino wireframes were filled with blocks in Datamine Studio 3. The final block model covers the entire extent of the deposit. The block model was sub-celled at wireframe boundaries with parent cells measuring 3.0 m by 3.0 m by 3.0 m and a minimum sub-cell size of 1.0 m by 1.0 m by 1.0 m. The block model parameters are given in Table 14-29.

The block size is appropriate for the proposed mining method and is suitable to support the estimation of Mineral Resources and Mineral Reserves. Comparisons between wireframe and block model volumes show close agreement.

TABLE 14-29 EL PADRINO DEPOSIT BLOCK MODEL PARAMETERS
Nexa Resources S.A.– Hilarión Project

Parameter	X	Y	Z
Origin (m)	276,940.90614	8,896,539.4925	3,692.116885
Block Size (m)	3	3	3
Number of Blocks	334	715	312

GRADE INTERPOLATION STRATEGY

Zn, Pb, Cu, and Ag grades were interpolated into blocks on a parent cell basis using ID^2 and a three pass search strategy. ID^3 and Nearest Neighbour (NN) were used for validation purposes. Search ellipsoids were oriented based on dynamic anisotropy angles extracted for the mineralization wireframes; and individual plunges were assigned to each wireframe based on grade contouring in longitudinal section, with geologic controls also taken into consideration. The plunge angle for dynamic anisotropy is achieved by either a positive or negative rotation around the Z-axis after dip and dip direction rotations given by a ZX rotation have been applied. Search ranges were chosen based on variography, trend analysis, and drill holes spacing. The minimum and maximum samples per block estimate and maximum samples per hole were adjusted based on a validation feedback loop.

The search parameters are given in Table 14-30 while the plunges assigned to each domain are provided in Table 14-31.

TABLE 14-30 EL PADRINO DEPOSIT SEARCH STRATEGY
Nexa Resources S.A.– Hilarión Project

Zones	Zones 101-106 and 301-315	Zones 201-206, 401 and 601 to 603	Zones 402-403
Pass 1			
Major Range	40	35	50
Semi-Major Range	30	35	25
Minor Range	8	8	10
Min Samples	4	4	4
Max Samples	12	12	12
Pass 2			
Expansion Factor	2	2	2
Min Samples	4	4	4
Max Samples	12	12	12
Pass 3			
Expansion Factor	6	6	6
Min Samples	2	2	2
Max Samples	4	4	4
Max per Hole	3	3	3

TABLE 14-31 EL PADRINO DEPOSIT SEARCH PLUNGES
Nexa Resources S.A.– Hilarión Project

Zone	Plunge	Zone	Plunge
101	25	304	15
102	25	305	75
103	25	310	75
104	25	311	15
105	25	312	15
106	25	313	15
201	0	314	15
202	0	315	15
203	0	401	125
204	0	402	125
205	0	403	125
206	0	601	0
301	15	602	0
302	75	603	0
303	15		

BLOCK MODEL VALIDATION

The El Padrino block model was validated using the following industry standard techniques:

- Visual inspection on vertical and longitudinal sections comparing composite grades versus block grades (Figures 14-21 to 14-24)
- Comparison between ID^2, NN, and composite means (Figures 14-25 to 14-28)
- GCOS check (Figure 14-29)

RPA inspected vertical and longitudinal sections and noted that the dynamic anisotropy was being executed as intended. A good agreement between the underlying composite data and block grades is observed. The plunge of the mineralization appears to be reasonably represented and the usage of the distance restriction methodology is resulting in appropriate extrapolation of high grades.

In general, there is a good agreement between the ID^2, NN, and composite means. Areas of disagreement such as Zn in Zone 101 are explained by the clustered configuration of the drill hole intercepts.

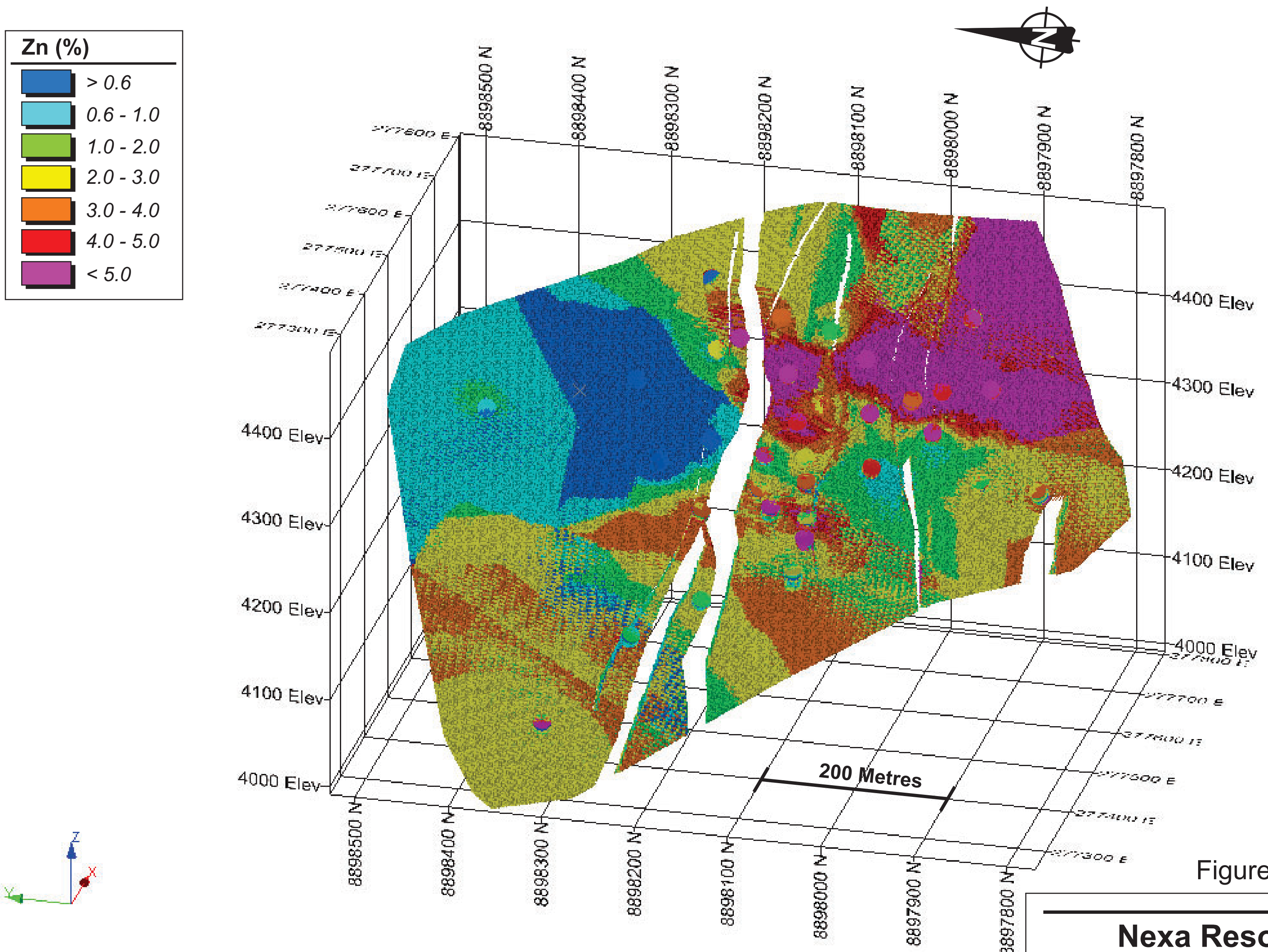


Figure 14-21

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Longitudinal Section Showing Zn Composite vs. Block Grades El Padrino Zone 101

February 2020

Source: RPA, 2017.

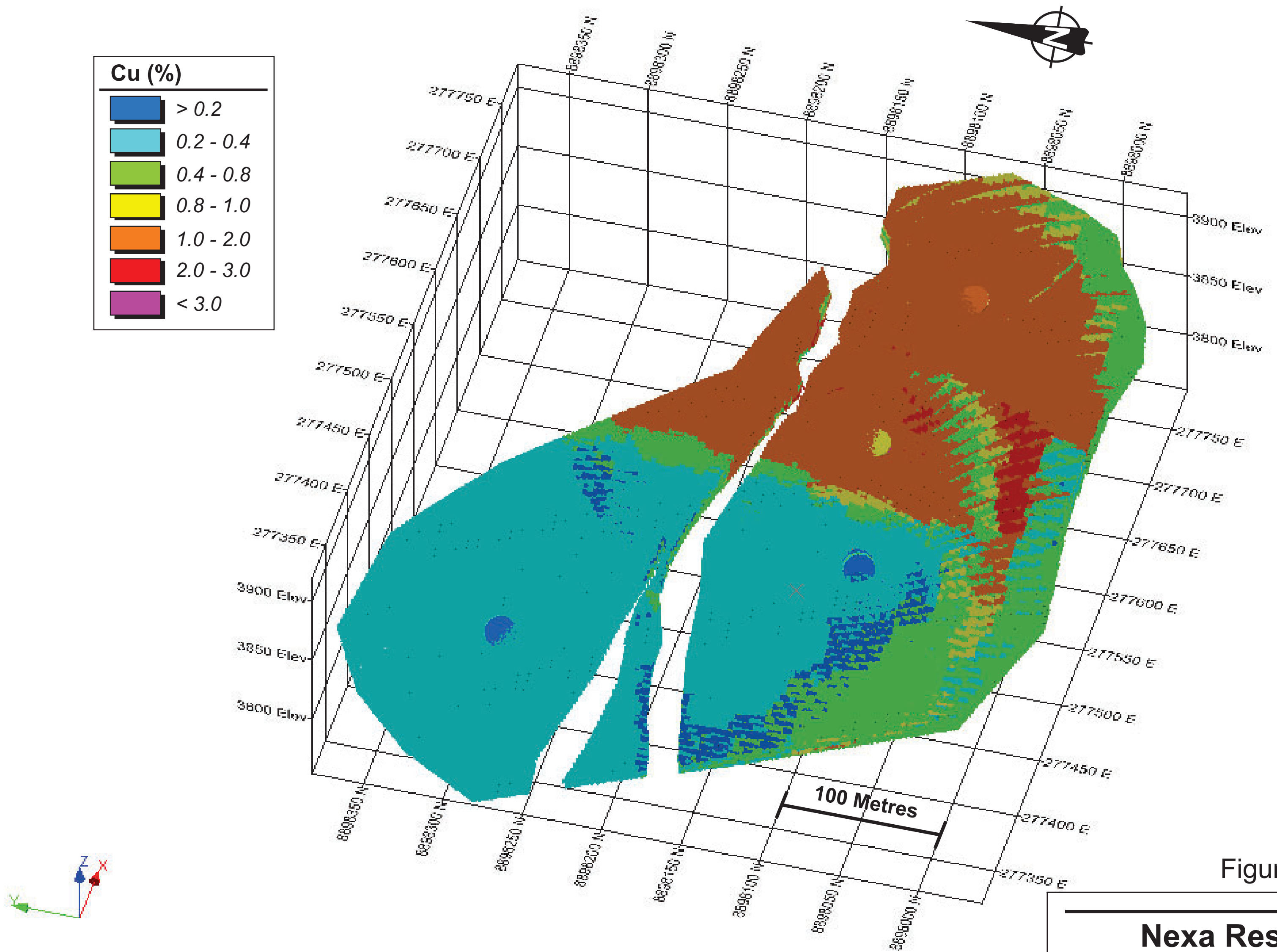


Figure 14-22

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Longitudinal Section Showing Cu Composite vs. Block Grades El Padrino Zone 201

February 2020

Source: RPA, 2017.

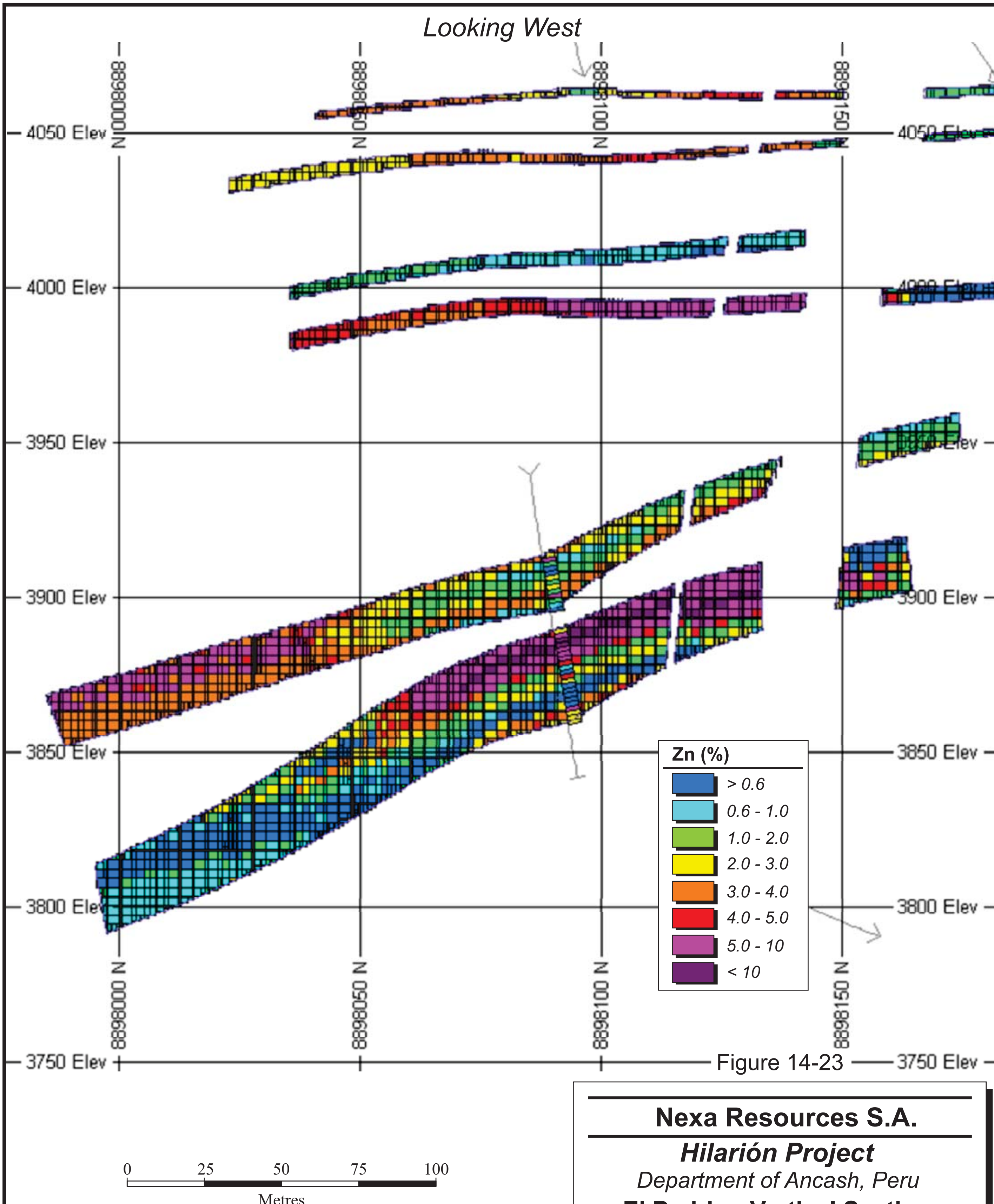


Figure 14-23

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

El Padrino Vertical Section showing Zn Composite vs Block Grades

February 2020

Source: RPA, 2017.

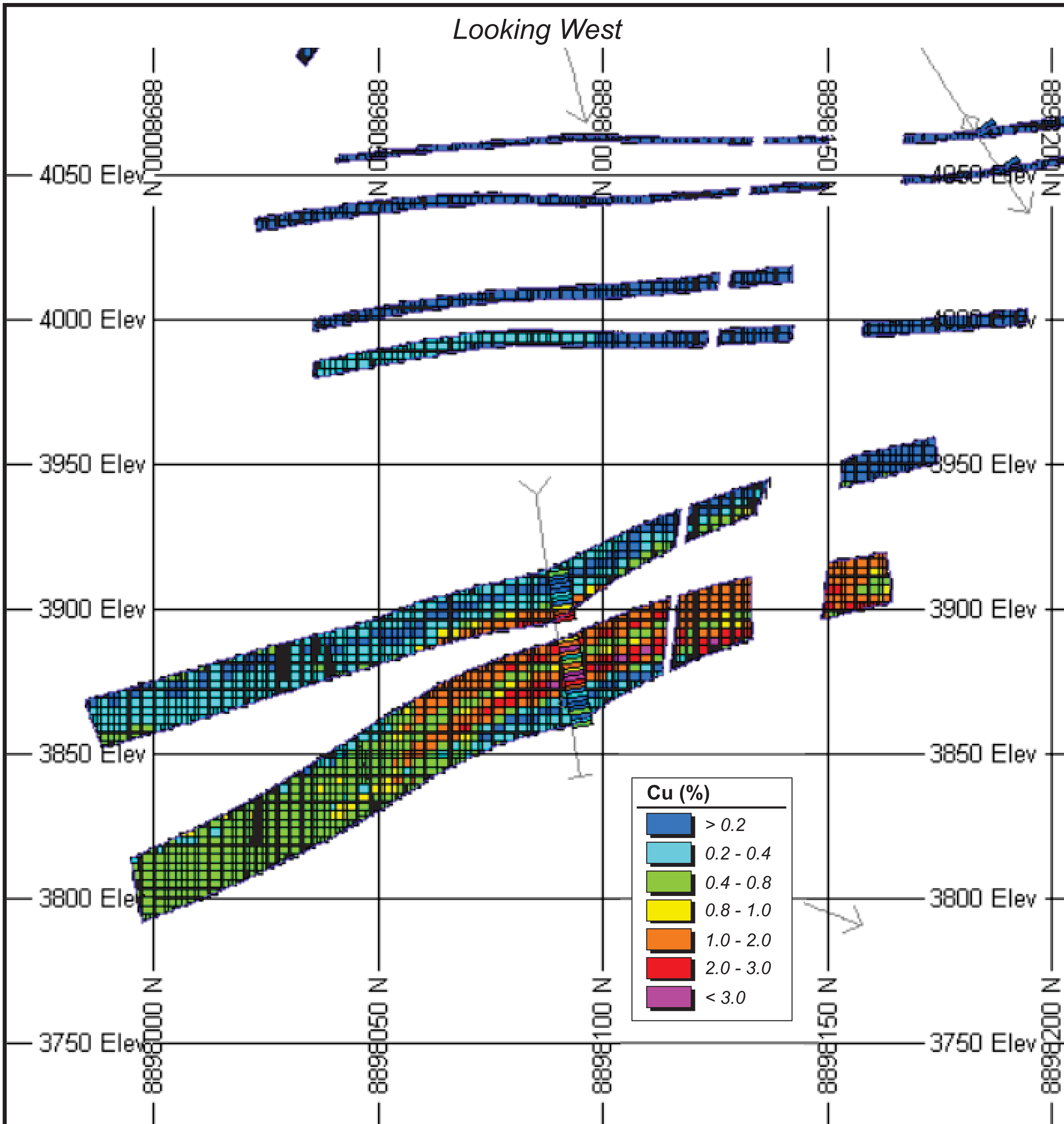


Figure 14-24

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

El Padrino Vertical Section showing Cu Composite vs Block Grades

February 2020

Source: RPA, 2017.

FIGURE 14-25 COMPARISON BETWEEN EL PADRINO BLOCK AND COMPOSITE MEANS - AG

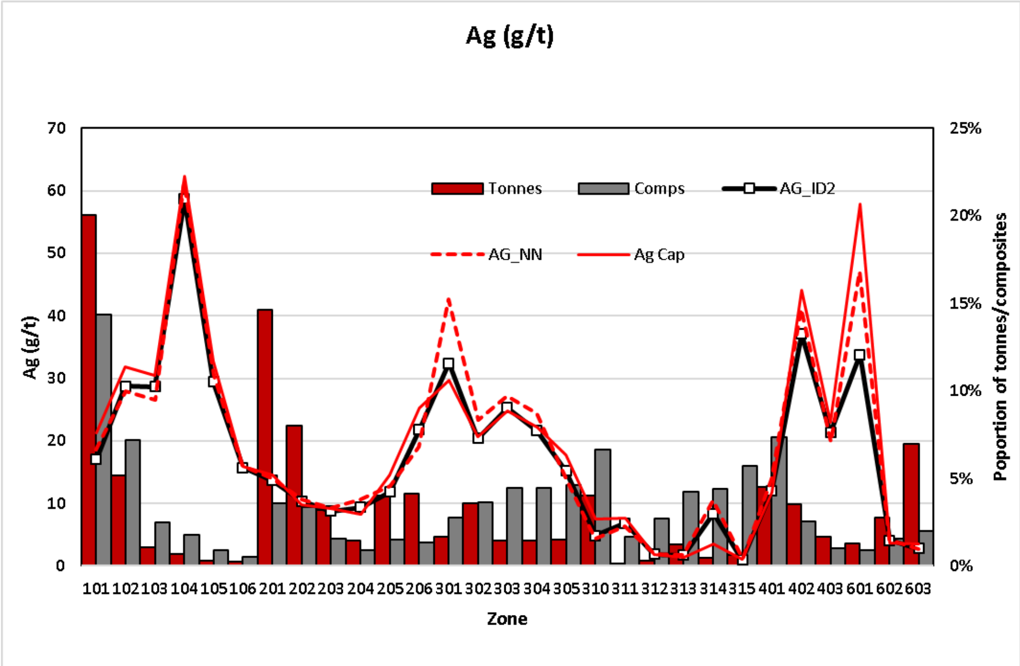


FIGURE 14-26 COMPARISON BETWEEN EL PADRINO BLOCK AND COMPOSITE MEANS – CU

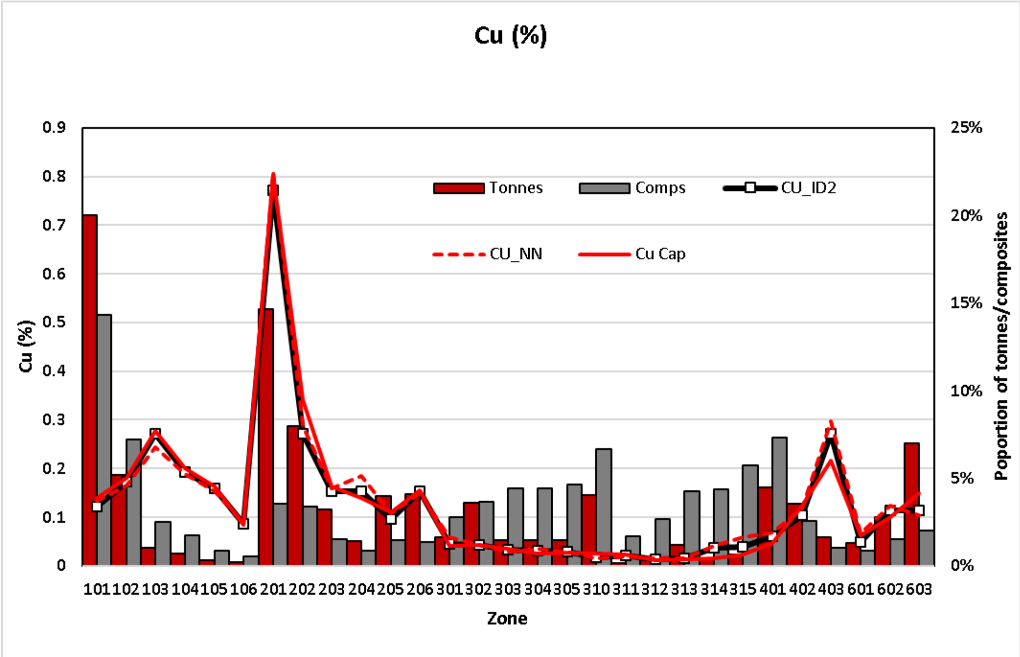


FIGURE 14-27 COMPARISON BETWEEN EL PADRINO BLOCK AND COMPOSITE MEANS – PB

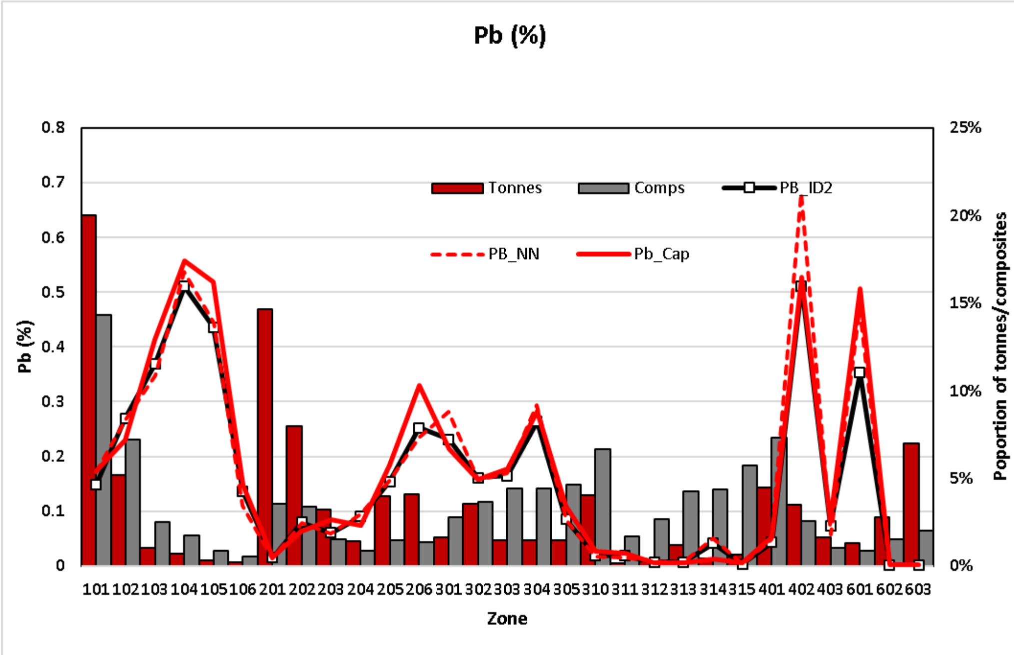


FIGURE 14-28 COMPARISON BETWEEN EL PADRINO BLOCK AND COMPOSITE MEANS – ZN

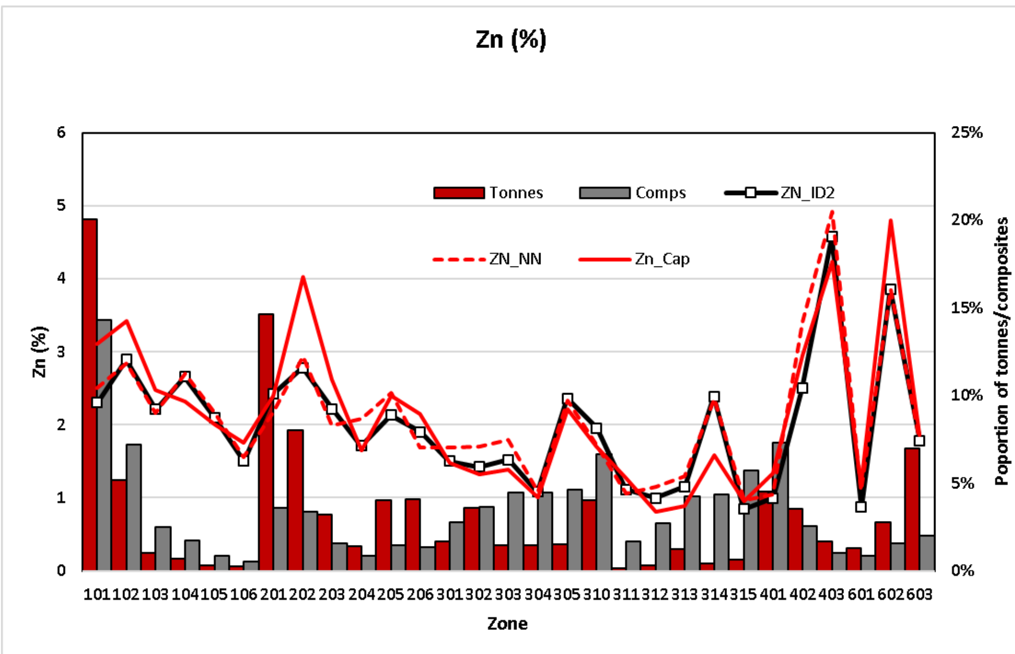
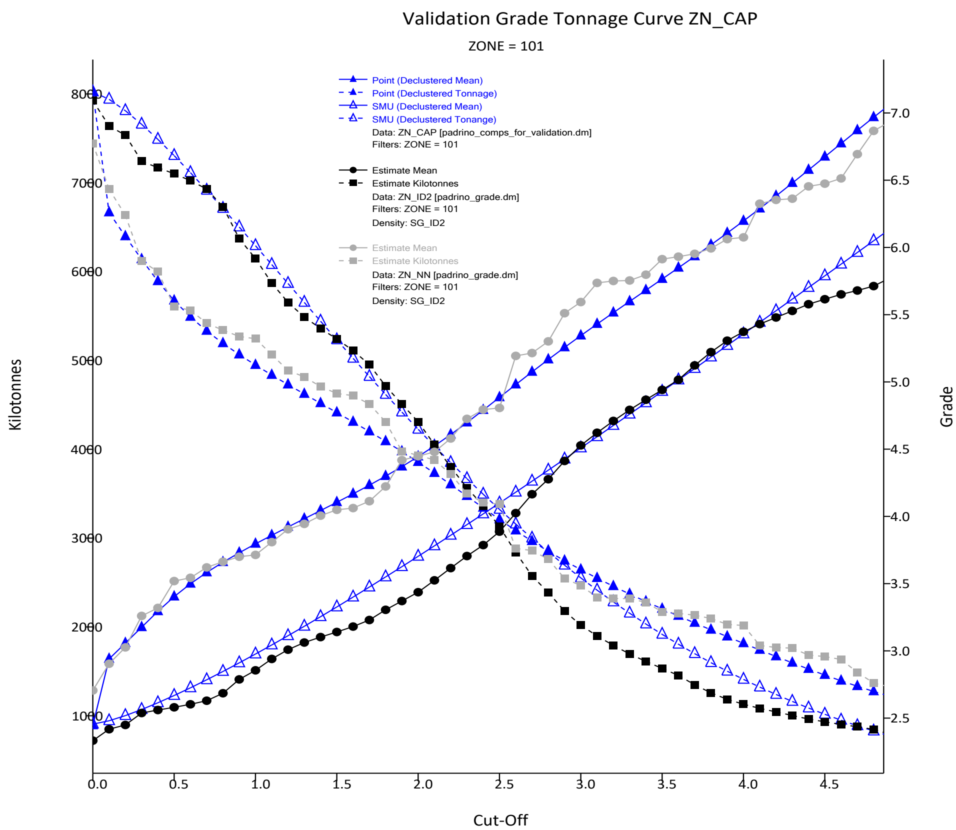


FIGURE 14-29 GLOBAL CHANGE OF SUPPORT CHECK – ZN, EL PADRINO ZONE 101



CLASSIFICATION

Definitions for resource categories used in this report are consistent with those defined by CIM (2014) and adopted by NI 43-101. In the CIM classification, a Mineral Resource is defined 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". Mineral Resources are classified into Measured, Indicated, and Inferred categories. A Mineral Reserve is defined as the "economically mineable part of a Measured and/or Indicated Mineral Resource" demonstrated by studies at Pre-Feasibility or Feasibility level as appropriate. Mineral Reserves are classified into Proven and Probable categories.

For El Padrino, a distance based approach supported by variography was adopted for assigning Indicated and Inferred categories to blocks. Numerical flagging of blocks was followed by a manual override to ensure that classified blocks meet the criteria for eventual economic extraction.

RPA's final classification criteria are as follows:

- Blocks with reasonable continuity above the cut-off value and within 100 m of the nearest drill hole were classified as Inferred.
- Blocks with reasonable continuity above the cut-off value, densities assigned using regression, and located in areas where drill holes are spaced no more than 60 m apart were classified as Indicated.
- No criteria for Measured Mineral Resources have been defined by RPA at this stage.

The final classification assignment for blocks above the NSR cut-off value is shown in Figure 14-30.

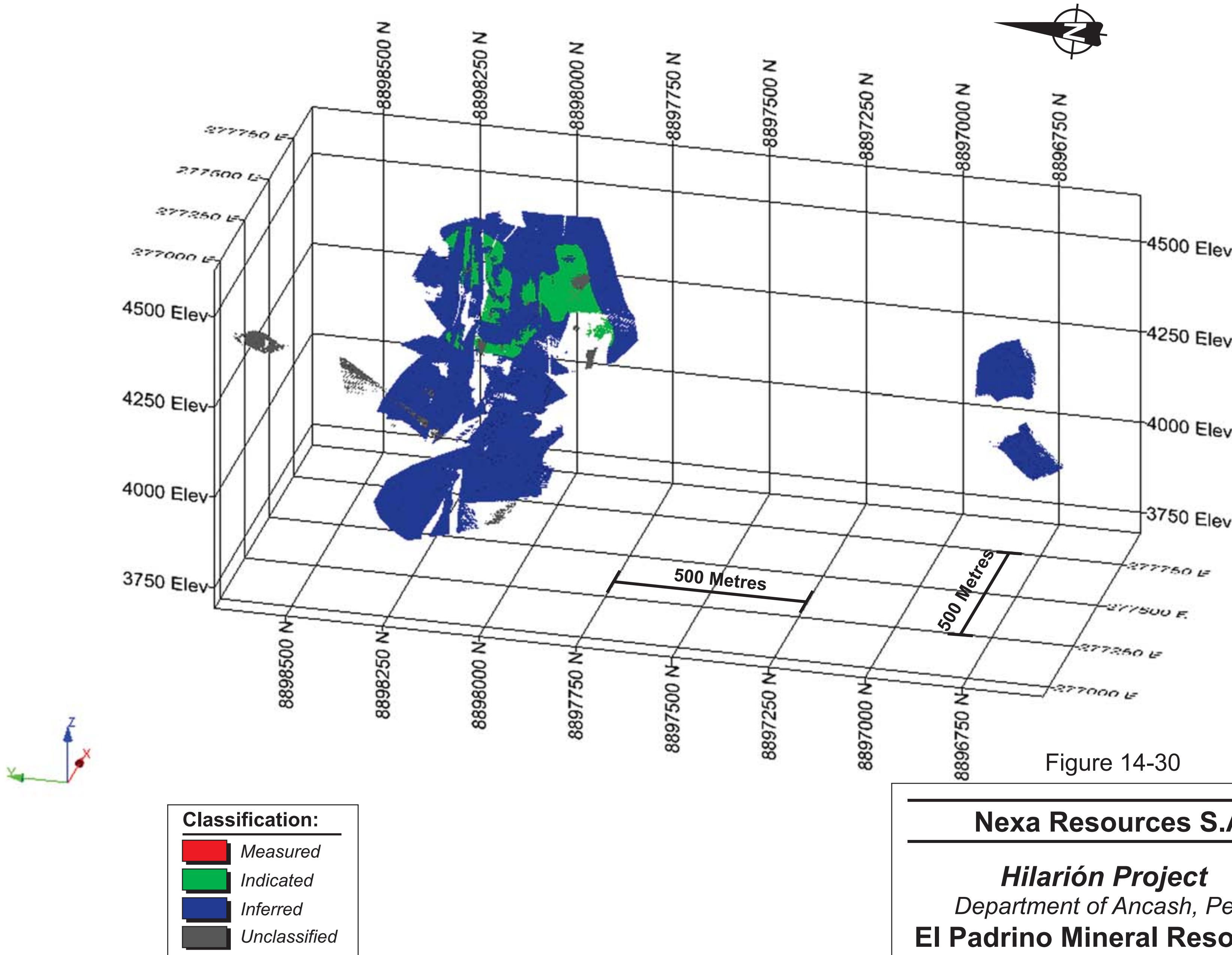


Figure 14-30

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

El Padrino Mineral Resource Classification Assignment

Source: RPA, 2017.

NET SMELTER RETURN AND CUT-OFF VALUE

An NSR value was assigned to blocks for the purposes of validation of the geological interpretation and resource reporting. NSR values represent the estimated dollar value per tonne of mineralized material after allowance for metallurgical recovery and consideration of smelter terms, including revenue from payable metals, treatment charges, refining charges, price participation, penalties, smelter losses, transportation, and sales charges.

Input parameters used to develop the NSR calculation have been derived from preliminary metallurgical test work on the El Padrino Zone, and smelter terms and commodity prices provided by Nexa. These assumptions are dependent on the processing scenario and will be sensitive to changes in inputs from further metallurgical test work. Metal prices used for mineral resources are based on consensus, long-term forecasts from banks, financial institutions, and other sources. The key assumptions used are presented in Table 14-32. It was assumed that the concentrates would be marketed internationally.

TABLE 14-32 EL PADRINO DEPOSIT NSR INPUTS
Nexa Resources S.A.– Hilarión Project

Category	Input
Metal Prices	US$1.34 / lb Zn US$1.04 / lb Pb US$3.41 / lb Cu US$19.61 / oz Ag
Exchange Rate	US$1.00 equals CAD$1.20
Metal Recovery	Zn to Zn Conc: 70.00% Pb to Pb Conc: 35.00% Ag to Pb Conc: 30.00% Cu to Cu Conc: 30%
Concentrate Grade	Zn Conc: 50.00% Pb Conc: 20.00% Cu Conc: 10.00%
Payable Metal	Zn in Zn Conc: Maximum 85%, Minimum 8% Deduction Pb in Pb Conc: Maximum 95%, Minimum 3% Deduction Ag in Pb Conc: Maximum 95%, Minimum 50 g/t Deduction Cu in Cu Conc: Maximum 96.6%, Minimum 1.1% Deduction
Transportation	Zn Conc, Pb Conc, and Cu Conc: US$118.00 / wmt
Treatment	Zn Conc: US$209 / dmt Pb conc: US$200 / dmt Cu conc: US$156.40 / dmt
Refining	Ag in Pb Conc: US$1.00/oz payable Ag Cu: US$0.08/lb payable Cu

Based on these inputs, the resulting NSR factors used for Mineral Resource reporting are as shown in Table 14-33.

TABLE 14-33 EL PADRINO DEPOSIT NSR FACTORS
Nexa Resources S.A.– Hilarión Project

Metal	Units	Factor
Ag	US$ per g Ag	0.17
Cu	US$ per % Cu	10.64
Pb	US$ per % Pb	1.05
Zn	US$ per % Zn	12.70

NSR factors have been applied to the block model uniformly, irrespective of mineral domain.

To report Mineral Resources, an NSR cut-off value was estimated. The Project was envisaged as a 2,000 tpd mine, using the sub-level stoping, and room and pillar mining methods, and with material being processed at a nearby off-site processing facility producing three concentrates. To estimate the NSR cut-off value, RPA, with input from Nexa, has estimated the operating costs at US$45.00/t and US$50.00/t for sub-level stoping and room and pillar, respectively.

MINERAL RESOURCE STATEMENT

A summary of the estimated Mineral Resources as of December 31, 2019 for El Padrino is detailed in Table 14-34. An NSR cut-off value of $45/t was applied to the SLS shapes and $50/t, to R&P resource shapes to satisfy the CIM (2014) requirement of “reasonable prospects for eventual economic extraction”.

TABLE 14-34 EL PADRINO DEPOSIT MINERAL RESOURCES – DECEMBER 31, 2019
Nexa Resources S.A.– Hilarión Project

Category	Tonnes (Mt)	Grade				Contained Metal			
		Zinc (%)	Lead (%)	Silver (g/t)	Copper (%)	Zinc (000 t)	Lead (000 t)	Silver (000 oz)	Copper (000 t)
Indicated	0.95	4.31	0.26	33.9	0.16	41.1	2.4	1,038	1.6
Inferred	3.80	4.87	0.18	27.7	0.48	185.1	6.7	3,380	18.3

Notes:
1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated at an NSR cut-off value of US$45.00/t for SLS resource shapes and US$50.00/t for R&P resource shapes.
3. Mineral Resources are estimated at average long-term metal prices of Zn: US$2,956.65/t (US$1.34/lb); Pb: US$2,303.14/t (US$1.04/lb); Cu: US$7,523.30/t (US$3.41/lb); and Ag: US$19.61/oz.
4. A minimum mining width of three metres was used.
5. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
6. Numbers may not add due to rounding.

In RPA’s opinion, the assumptions, parameters, and methodology used for the El Padrino Mineral Resource estimate are appropriate for the style of mineralization and potential mining methods.

There are no known environmental, permitting, legal, title, taxation, socio-economic, political, or other relevant factors that could significantly affect the Mineral Resources at El Padrino.

COMPARISON TO PREVIOUS MINERAL RESOURCE ESTIMATES

A comparison of the current Nexa estimate to the previous 2017 Mineral Resource estimate is presented in Table 14-35. The reasons for the changes are primarily due to the following:

- Higher NSR cut-off values
- Lower copper recoveries
- New resource shape reporting methodology that includes all of the material in each resource shape
- New SLS mining method that includes more waste in the resource shape and R&P mining method
- A minimum thickness of three metres

Recoveries has decreased to 30% for copper resulting in a lower value of the metal. Waste included in the resource shapes is contributing to approximately 9% of the total resource tonnes.

TABLE 14-35 EL PADRINO COMPARISON OF 2019 VERSUS 2017 MINERAL RESOURCES
Nexa Resources S.A. - Hilarión Project

	El Padrino Mineral Resource Estimate - December 31, 2019									El Padrino Mineral Resource Estimate - July 31, 2017								
	Tonnes	Grade				Contained Metal				Tonnes	Grade				Contained Metal			
Category	(Mt)	Zinc (%)	Lead (%)	Silver (g/t)	Copper (%)	Zinc (000 t)	Lead (000 t)	Silver (000 oz)	Copper (000 t)	(Mt)	Zinc (%)	Lead (%)	Silver (g/t)	Copper (%)	Zinc (000 t)	Lead (000 t)	Silver (000 oz)	Copper (000 t)
Measured	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indicated	0.95	4.31	0.26	33.9	0.16	41.1	2.5	1,038	1.6	1.50	4.39	0.27	36.3	0.21	68.0	4.0	1,800	3.0
Total M&I	**0.95**	**4.31**	**0.26**	**33.9**	**0.16**	**41.1**	**2.5**	**1,038**	**1.6**	**1.50**	**4.39**	**0.27**	**36.3**	**0.21**	**68.0**	**4.0**	**1,800**	**3.0**
Inferred	3.80	4.87	0.18	27.7	0.48	185.1	6.7	3,380	18.3	10.70	4.23	0.22	28.3	0.44	451.0	23.0	9,700	47.0

15 MINERAL RESERVE ESTIMATE

Mineral Reserves have not yet been estimated for the Project.

16 MINING METHODS

INTRODUCTION

The Project contemplates the underground exploitation of the polymetallic Mineral Resources of the Hilarión and El Padrino deposits. The two deposits are approximately three kilometres apart and Nexa considers that these would likely be developed and exploited initially as two separate mines, joining up underground later in the mine life. The proposed mine plan includes commencing with the much larger Hilarión deposit followed later with the El Padrino deposit. Current diamond drilling is being undertaken in the portion just north of the Hilarión deposit (the Gap) in order to evaluate the potential that exists in the gap between the two deposits. The current diamond drill program has returned positive results, however, it is still ongoing with the final results yet to be determined.

The Hilarión deposit is steeply dipping, ranging in thickness from approximately 0.50 m to 50 m, while the El Padrino deposit is partially steeply dipping and partially relatively shallow dipping with a maximum thickness of four metres. The Hilarión deposit can therefore be mined by bulk methods, while the El Padrino will be a combination of bulk and more selective mining methods such as Room and Pillar stoping in the shallow dipping portion of the resources.

A number of mining related studies have been carried out for Hilarión by Nexa, including the TWP Sudamérica (TWP) Trade-Off Study (TOS) for project infrastructure location including plant, tailings, ore transport, and crushing (June 2013) and Feasibility Study (FS) (December, 2013); Golder Associates Ltd. (Golder) Feasibility Study on Tailings and Paste Backfill (2013); and DCR-Ingenieros S.R. Ltda.'s (DCR-Ingenieros) Geotechnical Study and Hydrogeological Study. RPA has reviewed and provided feedback on the various designs for the development and mining approaches proposed by Nexa. This report is considered a PEA level study and therefore estimates will be in the order of ± 30% to 35% accuracy.

This PEA report considers only the mining of the Hilarión deposit, and the El Padrino deposit would be considered in future studies.

GEOMECHANICS

For characterization of the rock mass, seven diamond drill holes were completed for a total length of 3,178 m and five holes were geotechnically logged for a total of approximately 2,236 m. The rock mass parameters were carried out by DCR-Ingenieros and included the following:

- Type of rock
- Type of discontinuities
- Orientation, spacing, persistence, aperture, roughness,
- Type of backfill and strength
- Weathering, and presence of ground water
- Resistance of the rock
- RQD

During geomechanical mapping of underground rock exposures, principal discontinuities were registered, and 25 diamond drill holes underwent geotechnical logging for a total of approximately 9,970 m of drill core.

Plans and cross sections of the Hilarión deposit lithology were also prepared. The lithologies were made up of limestones, hornfels, marble, and endoskarn with the presence of diorite dikes and quartz dikes.

Faults, strata, and discontinuities are for the most part minor and the areas of influence are not considered significant.

GROUND CONDITIONS

The ground conditions at Hilarión are considered for the most part to be quite good which will require average ground control standards consisting of bolts and wire mesh screen with the intermittent use of shotcrete as required. No major deterrents with regard to the overall ground stability are anticipated.

IN-SITU STRESS

The maximum depth of the mining operations with respect to the surface will be approximately 450 m and the vertical component of stress has been evaluated at approximately 12 MPa, while the horizontal stress, using a factor k= 0.65 to 1.0, would approximate 8 MPa to 12 MPa.

The numerical model indicated that the major principal stress is aligned parallel with the hillside while the minor principal stress is aligned perpendicular to the hillside.

ROCK MASS CLASSIFICATION

The rock mass classification for the Hilarión deposit was assessed using the geomechanical classifications of Bieniawski (Rock Mass Rating (RMR) - 1989), Barton el al. (Q System – 1974) and Marinos and Hoek (Geological Strength Index (GSI) – 2002). The intact resistance of the rock mass was obtained by various methods such as uniaxial testing, triaxial testing, and tension testing and based on the physical properties of the intact rock including porosity, absorption, and density. The rock mass classification criteria are shown in Table 16-1.

TABLE 16-1 ROCK MASS CLASSIFICATION CRITERIA
Nexa Resources S.A.– Hilarión Project

Rock Type	RMR Range	Range Q	Quality (RMR)
I	>60	>5.92	Good
IIIA	51-60	2.18-5.92	Regular A
IIIB	41-50	0.72-1.95	Regular B
IVA	31-40	0.24-0.64	Poor A
IVB	21-30	0.08-0.21	Poor B
V	<21	<0.08	Very Poor

The rock mass quality by rock type is shown in Table 16-2.

TABLE 16-2 ROCK MASS QUALITY BY ROCK TYPE
Nexa Resources S.A.– Hilarión Project

Rock Type	Abbreviation	Range RMR	Rock Mass Quality
Limestone	CLZA	55-67	IIIA y II
Diorite	DIOR	62-68	II
Hornfels	HRN	62-68	II
Mineralized Zone	ZM	60-68	IIIA y II
Endoskarn	ENSK	63-68	II
Quartz Porphyry	PQZ	63-70	II
Stock Work	STOCK	63-70	II

ROCK PROPERTIES

The properties of the Hilarión typical rock types and structural domains are shown in Table 16-3.

TABLE 16-3 ROCK MASS PROPERTIES
Nexa Resources S.A.– Hilarión Project

Lithology	GSI	σ_c (MPa)	mi	SG (t/m³)	MR	mb	s	E (MPa)	ν
CLZA	60	90	11	2.7	500	1.84	0.0059	14,109	0.26
DIOR	64	120	20	2.7	325	4.58	0.0145	16,563	0.25
HRN	64	100	20	2.7	500	4.01	0.0099	19,187	0.25
ZM	63	120	15	3.2	400	2.88	0.0087	17,558	0.25
ENSK	66	120	15	3.0	400	3.29	0.0128	20,106	0.25
PQZ	67	160	20	2.7	375	4.58	0.0145	26,290	0.25
STOCK	67	120	20	2.7	375	4.58	0.0145	19,718	0.25

Notes:

1. GSI Geological Strength Index
2. σ_c (MPa) Compressive stress
3. mi Material constant (intact rock)
4. mb Reduced value (for rock mass)
5. SG (t/m³) Specific gravity
6. MR Modulus Ratio
7. s Constant (based on rock characteristics)
8. E (MPa) Elastic modulus
9. ν Poisson's ratio

MINE DESIGN

The proposed mine design for Hilarión includes the principal mode of access, which, given the topography, access, depth, production rate, etc., will be by ramp decline driven by mine contractors using twin-boom jumbo type development drills, load-haul-dump (LHD) loaders or scooptrams, and mine haul trucks to remove both waste and mineralized blasted material.

The dip of the Hilarión deposit vein system will permit utilizing bulk mining methods and allow reaching a high production capacity. Use of highly productive mine equipment will allow for drilling, loading, blasting, mucking, and hauling both waste and mineralized material in an efficient manner.

The proposed mine infrastructure consists of the mine backfill system, the mine ventilation system, the mine dewatering system, along with the mine ore handling system and communications system.

An adequate mine tailing facility will be strategically located to provide efficient deposition of the tailings and recycling of any water to reduce the final discharge to the environment.

NSR FACTORS

The NSR factors used for the Hilarión deposit to determine the resources within the PEA LOM plan are shown in Table 16-4. These criteria were used in the Hilarión LOM cash flow presented in this report.

TABLE 16-4 HILARIÓN DEPOSIT NSR INPUTS
Nexa Resources S.A.– Hilarión Project

Category	Input
Metal Prices	US$1.17 / lb Zn US$0.91 / lb Pb US$17.05 / oz Ag
Metal Recovery	Zn to Zn Conc: 90.00% Pb to Pb Conc: 86.00% Ag to Pb Conc: 72.00%
Concentrate Grade	Zn Conc: 48.00% Pb Conc: 55.00%
Payable Metal	Zn in Zn Conc: Maximum 85%, Minimum 8% Deduction Pb in Pb Conc: Maximum 95%, Minimum 3% Deduction Ag in Pb Conc: Maximum 95%, Minimum 50 g/t Deduction
Transportation	Pb Conc and Zn Conc: US$118.00 / wmt
Treatment	Zn Conc: US$290.65 / dmt Pb conc: US$124.00 / dmt
Refining	Ag in Pb Conc: US$1.00/oz payable Ag

NSR factors are as follows:

Zn: US$11.26 / % Zn

Pb: US$12.17 / % Pb

Ag: US$0.35 / oz Ag

COG used for stopes and ore development – an initial NSR of US$40.00 / t.

DESIGN CRITERIA

The proposed design parameters and criteria are listed in Table 16-5. Initial access to the mine will be via two mine ramps driven from the 4740 m elevation to access the first mineralized area. The proposed design includes a total of seven ramps to permit access to various veins along the strike of the mineralization. A plan of the 4290 m level is shown in Figure 16-1, indicating the position of the cross cuts in relation to the strike length of the deposit as well as the distribution of the veins on that level. Sub-levels will be driven at 30 m vertical intervals between the main levels. A stoping block will consist of three 30 m high stopes for a total of 90 m. Sill pillars will be left beneath the access drift of the stope at 90 m vertical intervals. For sub-level longhole stopes, loose rock fill (LRF) from the mine waste development and waste make up rock generated from a surface borrow pit will be used as backfill.

Ore passes will be driven on each level in order to maintain a reasonable LHD tramming distance (approximately 200 m) from the stope to the ore pass. These ore passes will serve the 90 m height of the main level and will be repeated as required from level to level. The muck will be trammed to the ore passes with the scooptrams and where required loaded into mine trucks of 20 m^3 capacity and hauled to the ore pass or transfer point. The production muck will be delivered to the main gyratory crusher for initial crushing and from there, into a surge bin or silo. It will then be loaded, via a feeder, onto the main conveyor located at the 4280 m level. The conveyor will transport the muck to the process plant and, as it will have an average gradient of -2%, it will be regenerative, saving on power costs.

Ventilation will be provided via ventilation raises and air downcast to service the active stoping areas and haulage routes throughout the mine complex. Soft starters will be utilized to ensure that power demand is optimized as much as possible given the remote location of the operations.

Certified safety refuge stations and facilities will be provided at the required strategic locations to ensure rapid access and response in the case of an emergency underground.

The paste backfill system will be designed and installed in such a way as to impart a minimum of congestion as possible in the working places of the mine. The paste fill plant will be located underground to enable proper control in the preparation and monitoring of the backfill and dedicated backfill crews will be assigned to the installation, operation, and maintenance of the backfill system as this will be a critical part of the mining cycle.

Compressed air will be supplied by two 750 cfm skid mounted screw compressors capable of providing up to 150 psig air for the machines and these will be in strategic underground locations to ensure adequate supply for the mining equipment. The equipment or compressed air requirements will include small airleg (stopper) type drills, jumbo drills, blowpipes, ventilation doors, air powered pumps, shotcrete machines, explosives loaders (ANFO), raise bore units, underground shops, and production drills which will have onboard compressors. Air requirements are estimated at between 1,500 cfm and 2,000 cfm, with two compressors operating and one on standby. Compressed air will be distributed via six inch schedule 40 pipes in the main lines and four inch schedule 40 pipes closer to the working areas in the mine.

Mine communications will be by Leaky Feeder system to ensure that adequate contact can be maintained for all operating, maintenance, and safety/security requirements. The Transverse Longhole Stopes (TLS) and Sub-level Longhole Stopes (SLS) are the designated stoping methods that will be utilized for the Project. The average dimensions of these stopes are shown in Table 16-5, however, they will vary to conform with existing mineralized contacts.

TABLE 16-5 DESIGN PARAMETERS
Nexa Resources S.A.– Hilarión Project

Parameter	Unit	Value
Basic Mining Unit TLS		
Length	m	16
Height	m	30
Width	m	20
TF	m^3	3.13
Basic Mining Unit SLS		
Length	m	40
Height	m	30
Width	m	6
TF	m^3	3.13
Infrastructure Dev.		
Conveyor Tunnel	m^2	5.5x6
Ramp (Extraction)	m^2	5x4
Ramp (Service)	m^2	5x5
Truck Loading Station	m^2	5x5
Ramps Access	m^2	5x5
Ventilation Raises	Ø	4.0
Ore Pass	Ø	3.0
Service Raises	m^2	3x3
Development X-Cuts	m^2	5x4.5
Development Levels	m^2	5x4.5
Mine Manpower		
Shift Rotation	days	14x7
Shifts per day	no.	2

Parameter	Unit	Value
Days per year	days	360
Hours per shift	h/shift	10.5
Downtime	%	0.75
Effective Work Hours	h/shift	7.88
Distances (avg.)		
Tram stope to ore pass	m	150
Tram face to loading point	m	200
Tram waste fill	m	200
Haul ore in-mine	m	1,600
Haul waste in-mine	m	3,000
Haul waste on surface	m	7,000
Equipment Speeds		
LHD empty	km/h	15
LHD loaded	km/h	10
Truck empty in-mine	km/h	30
Truck loaded in-mine	km/h	25
Mixer empty/loaded	km/h	15/10

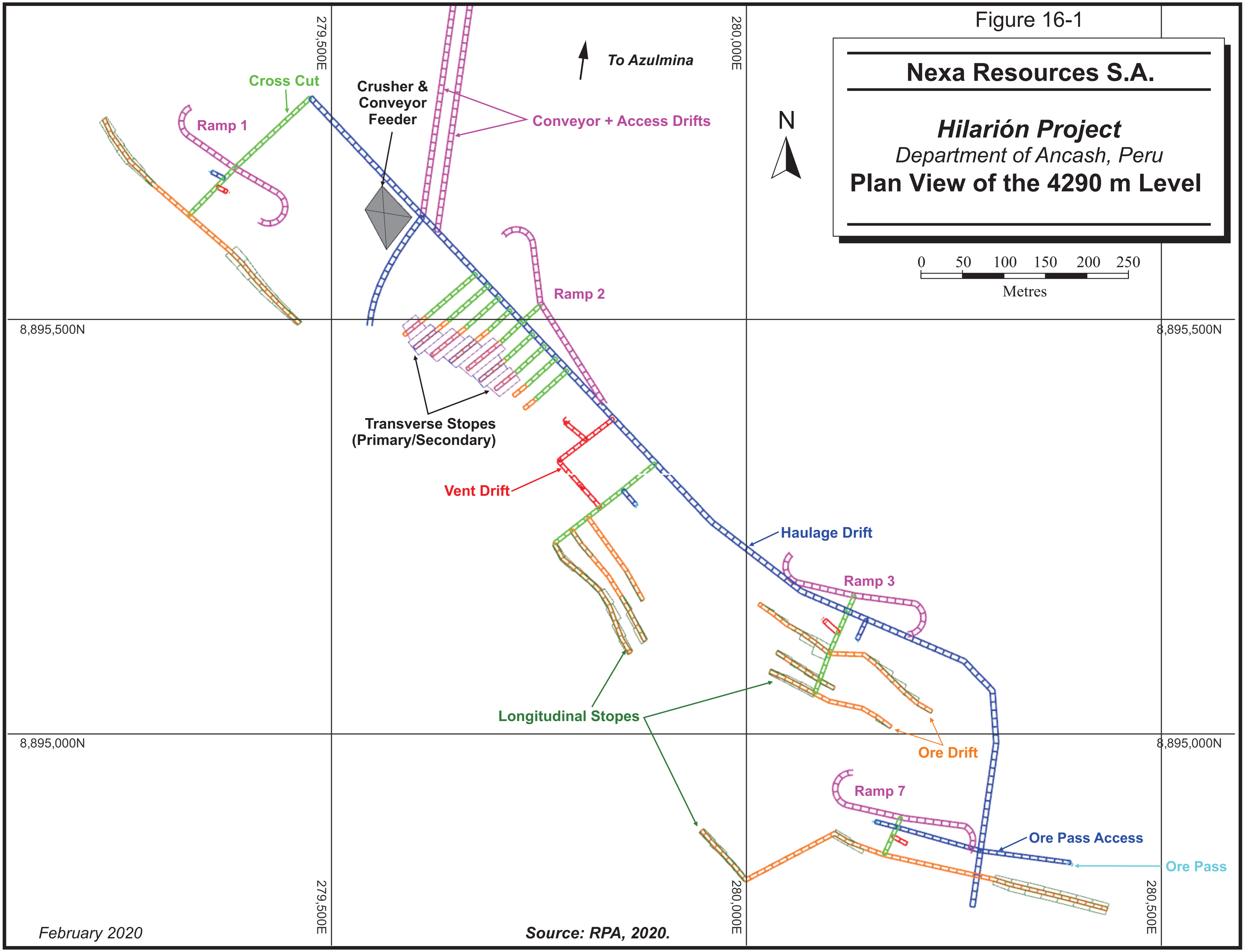


Figure 16-1

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Plan View of the 4290 m Level

EMPIRICAL STABILITY ANALYSIS

The results of Nexa's work on the geotechnical parameters provides the data required to prepare a stability graph, based on the stability number and the hydraulic radius factor for each of the stope designs. The stope designs were evaluated at various widths and heights to establish a range of support requirements necessary to maintain stable stope openings. Figure 16-2 is an example using the stability chart (Potvin, 1988 and Nickson, 1992) indicating stable, transition, and unstable zones. The stability graph plots the stability number or N' against the hydraulic radius or Hr. The stability number is developed from the Rock Tunneling Quality Index (Q) which is further developed into the Modified Rock Quality Index Q' and expressed as follows:

$$Q' = RQD/J_n \times J_r/J_a$$

The values of the items are shown in Table 16-6.

TABLE 16-6 FACTORS FOR Q'
Nexa Resources S.A.– Hilarión Project

Item	Value	Range
RQD	80.0	0-100
Jn	6.0	0.5-20
Jr	3.0	0.5-4
Ja	2.0	0.75-20
Q'	20	

Using the Q' factor, the Stability Number N' can be developed using the following relation:

- N'= Q' x A x B x C
- Where
  - A= a measure of the intact rock strength to induced stress.
  - B= a relative orientation of dominant jointing with respect to the excavation surface.
  - C= a measure of the influence of gravity on the stability of the face considered.

The selected values and range of values considered are shown in Table 16-7 that follows. These values then make up the N' which is plotted on the stability graph.

TABLE 16-7 STABILITY FACTOR INPUTS
Nexa Resources S.A.– Hilarión Project

Item	Value	Range
Q’	20	
A	0.8	0-1
B	0.8	0-1
C	7.5	0-10
N’=	96	

Adjusting the RMR values by varying the RQD values permits the calculation of a range of N’ values. The variation of stope heights from 30 m to 60 m was used to establish a range of Hr values that could then be plotted on the stability graph. The graph indicates that over the range of values anticipated for the Hilarión stopes, the openings remain in the stable zone. The stope dimensions will provide for good control of drilling, blasting, and mucking operations while additional optimization can also be carried out. The stability graph shown has been evaluated using the TLS stope dimensions. The SLLH stope dimensions would fall within the same area on the stability graph. Stope stability, at the dimensions selected, is not anticipated to present any major difficulties for stoping operations. The Hr is expected to fall between 6 and 7.5 and with the adjusted RMR values, the stability falls within the “stable” zone of the graph indicating safe mining conditions can be obtained.

The amount of dilution for the given stope designs is shown in Figure 16-3 which is a plot of the range of Adjusted RMR against the Hr value for the Hilarión rock mass. The graph used as a reference was the result of 102 observations and is considered reasonably accurate for the level of study. Therefore, RPA considers an external dilution factor or Equivalent Length of Slough (ELOS) of 0.35 m on either side of the stope boundaries to be reasonable.

FIGURE 16-2 STABILITY GRAPH

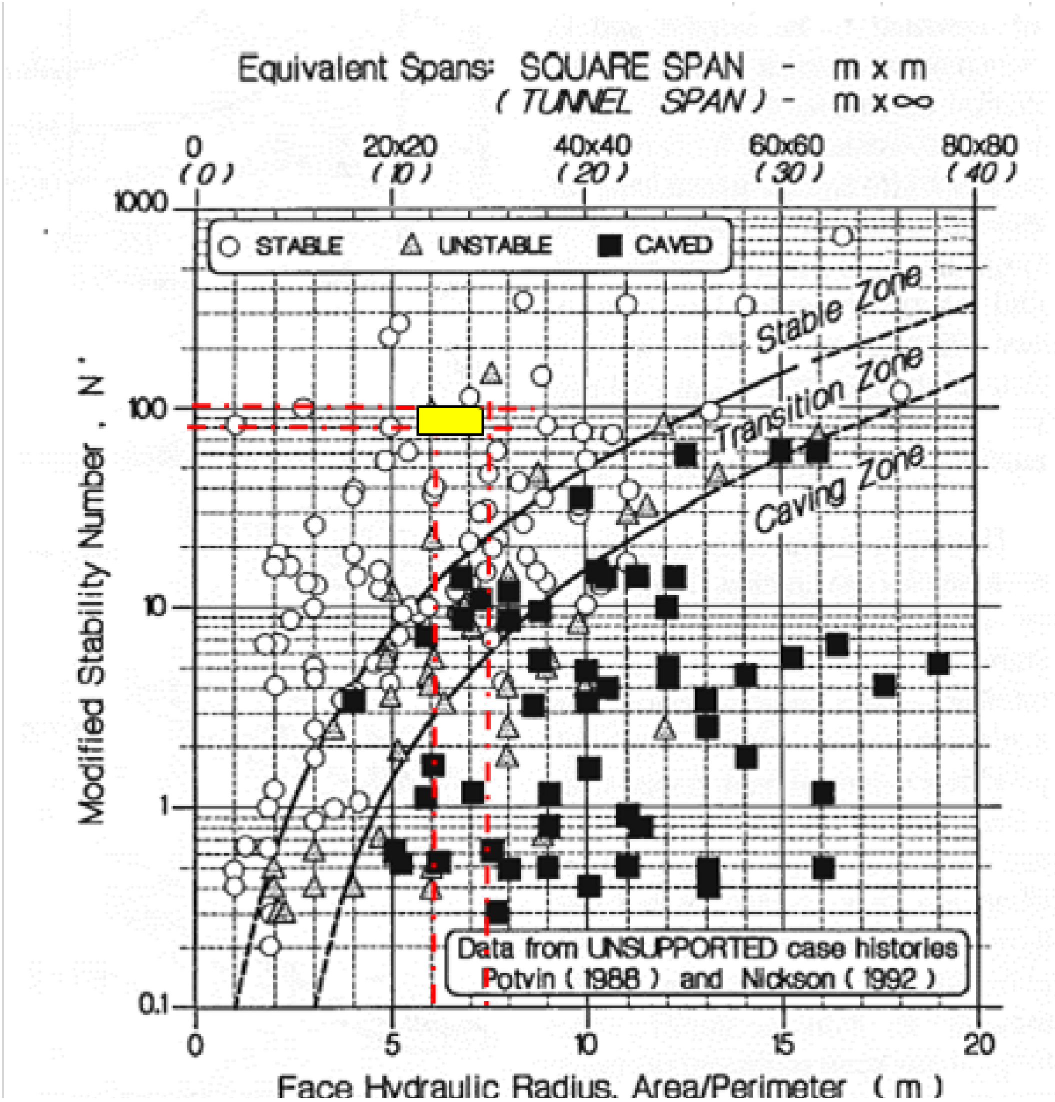
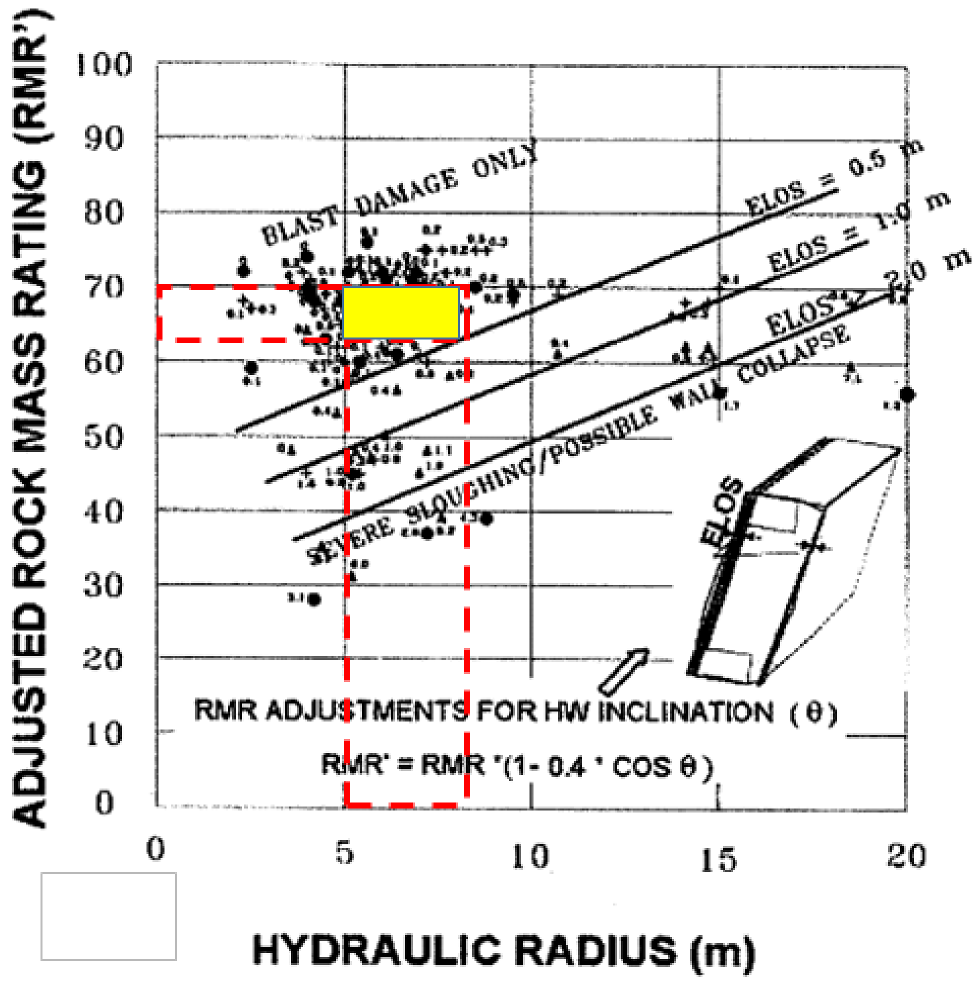


FIGURE 16-3 ADJUSTED RMR VS. HYDRAULIC RADIUS (HR)



NUMERICAL MODELLING

In the Hilarión FS carried out by TWP, a stress analysis was completed using Phase 2 software for the Bench and Fill (BF) stoping method proposed for approximately 10% of the deposit. The BF stoping method considered 4 m high drifts (undercut and overcut) and an effective stope height of 20 m. The analysis indicated that if pillars between the BF stopes were less than 8 m, cemented backfill should be utilized and if more than 8 m, LRF could be used to maintain stability. The analysis also indicated that the main ramp openings should be located at least 25 m from the stope openings in order to avoid any potential stability issues. The stope dimensions are currently set at 30 m heights and the stability charts confirm the stability at the dimensions utilized. RPA is in agreement with the dimensions discussed above, however, ongoing rock mechanics monitoring should be implemented to adjust to conditions as operating experience is gained at Hilarión. The ongoing work should include ground movement monitors such as extensometers at strategic locations in the mine and 3D stress analysis to evaluate stresses, if this is considered necessary, to aid in the mine design for stope dimensions.

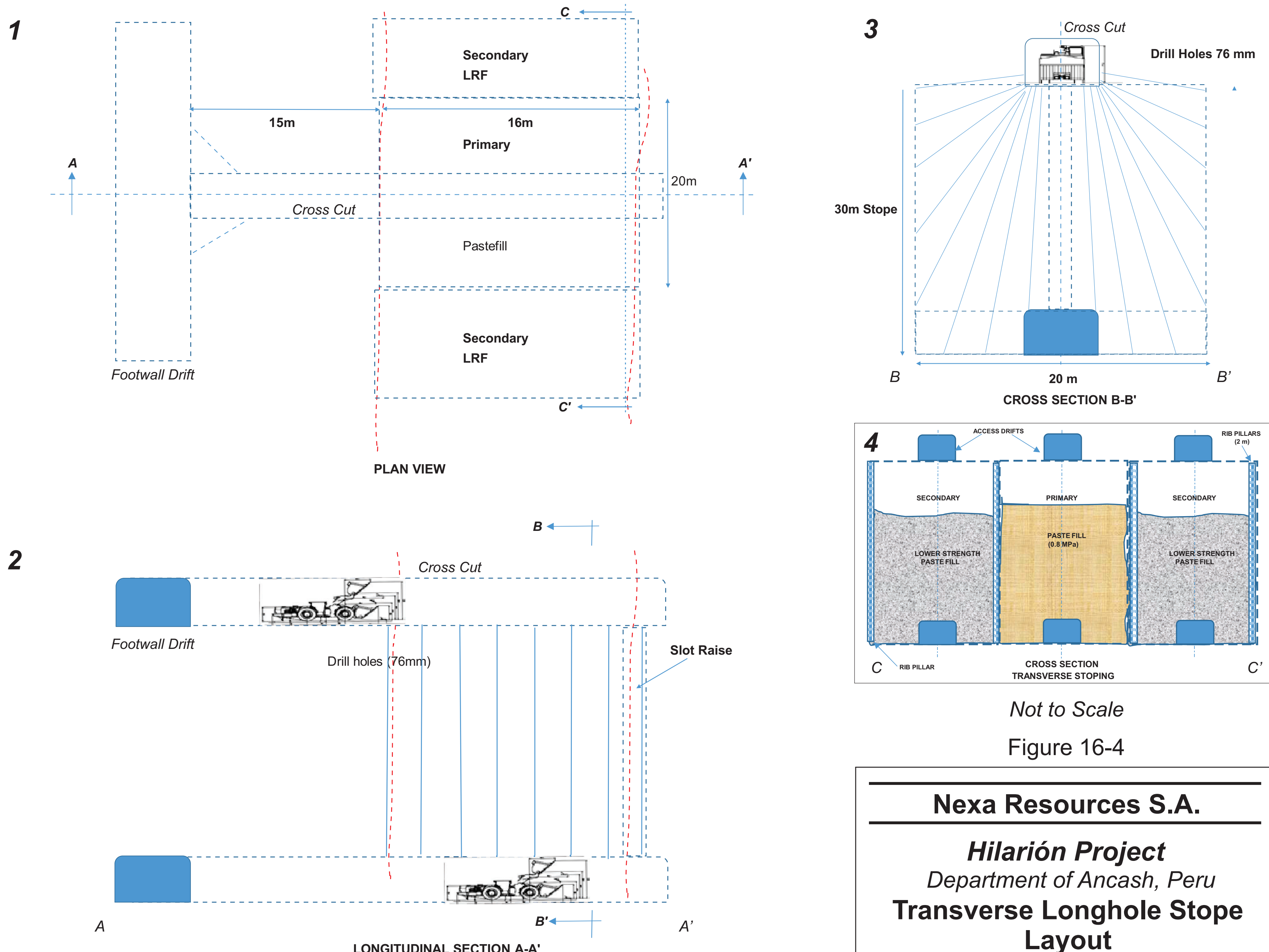
MINING METHOD

The Hilarión deposit will require the use of two bulk mining methods to provide the most efficient and cost-effective results for the LOM period. The deposit is sub-vertical thereby allowing for good operating parameters and use of gravity to enable good muck flow. The main zone of the deposit indicates an average width of approximately 16 m while there are numerous veins that on average are approximately 6.5 m.

STOPING METHOD

The stoping methods proposed to be applied for the Hilarión resources will include two bulk mining methods. The main zone makes up approximately 35% of the Mineral Resources and averages 16 m in width and over one kilometre in strike length. The main zone is proposed to be mined using the TLS method with primary and secondary stopes spaced equally at 20 m spacings along strike. The stope heights are planned at 30 m, however, in RPA's opinion, this could be increased on further analysis in follow-up studies. The TLS method is shown in Figure 16-4. Production drill holes will be 75 mm in diameter, drilled in a fan pattern and loaded with ammonium nitrate fuel oil (ANFO) blasting agent or an emulsion product and timed with non-electric detonators. The primary stopes will be backfilled with paste fill consisting of tailings and a cement portion while the secondary stopes can be backfilled using paste fill of a lower strength as the fill will be contained within rib pillars on each side of the secondary stopes. Blasting of all stopes will take place at the end of each shift with allowance to clear all the blasting fumes prior to re-entry to the workplaces underground. RPA recommends that in future studies, a trade-off study on the TLS method of stoping be assessed using rib pillars and sill pillars for support, thereby reducing the amount of paste fill required and the impact on operating costs and mine productivity versus loss of resource in the pillars.

The other veins of the Hilarión deposit are narrower and average approximately 6 m in width and will be mined using the SLS with LRF. Stopes will be accessed from the ramps and drifts driven on the mineralized structure. Stope heights will be 30 m and a stoping block consisting of three stopes high. A horizontal sill pillar will be left at 90 m vertical intervals. Mining will take place from the end of the stope back towards the access point. Then LRF will be placed to backfill the stope to create a mucking floor for the next lift. Figure 16-5 illustrates the approach. Production drilling will utilize 63 mm to 76 mm diameter holes with a two metre burden and 2.5 m spacing. Production drilling will be essentially vertical and drill hole breakthroughs will be able to be located to permit confirmation of drilling precision. Loading will use the same products as the TLS stopes.



Not to Scale

Figure 16-4

Nexa Resources S.A.

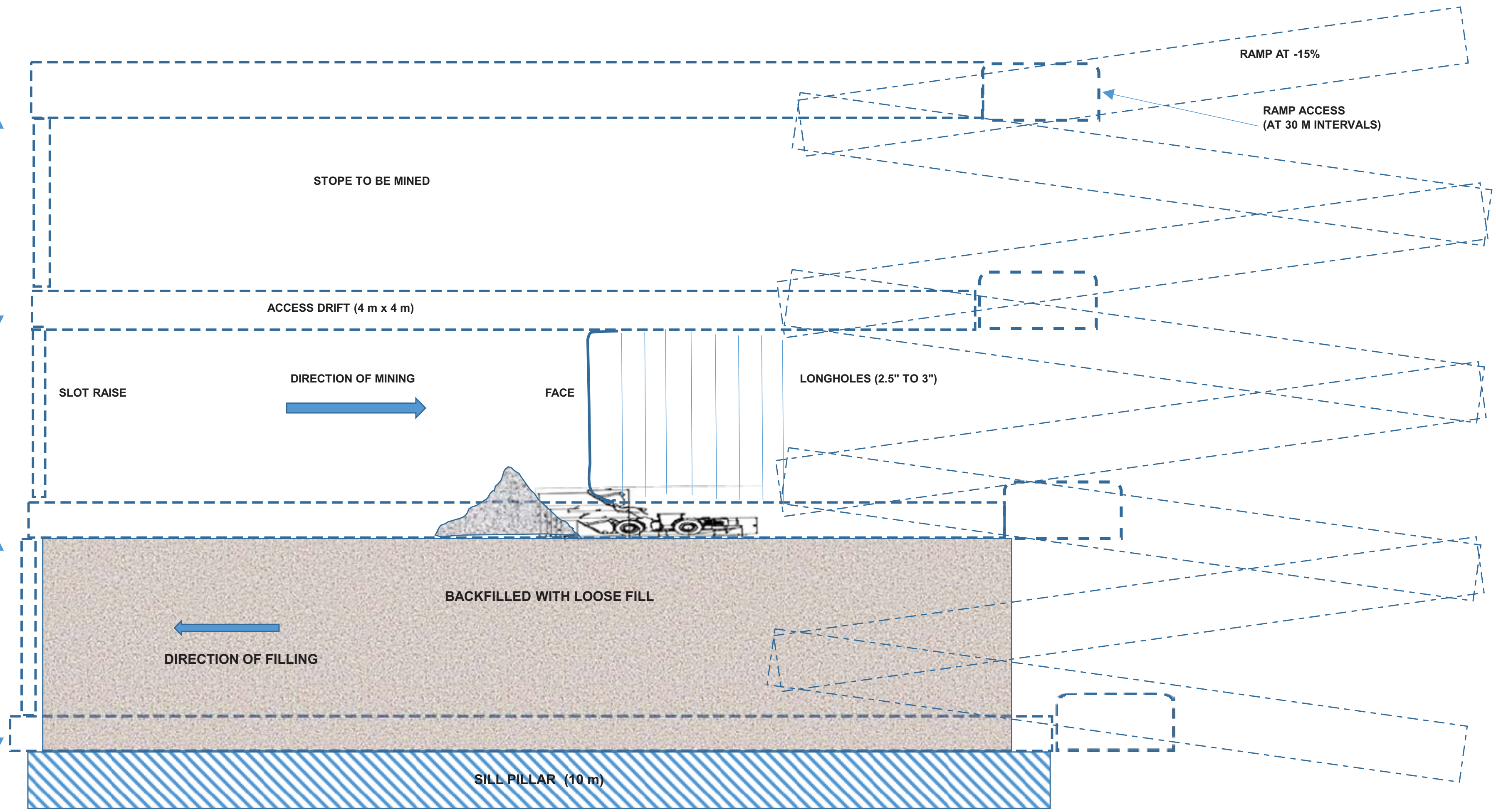
Hilarión Project

Department of Ancash, Peru

Transverse Longhole Stope Layout

February 2020

Source: RPA, 2019.



LONGITUDINAL SECTION OF TYPICAL SLLH STOPE

Not to Scale

Figure 16-5

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Illustrative Sublevel Longhole Stope Layout

February 2020

Source: RPA, 2019.

www.rpacan.com

PRODUCTIVITY ASSUMPTIONS

The productivity assumptions are listed in Table 16-8. The trucking performance will vary depending on distance of haul from the various areas in the mine and various depths as well. It is planned to use trucks for hauling of waste and ore from the mine to underground sites or to surface. RPA considers the development rates to be conservative in particular in multi-face conditions.

TABLE 16-8 PRODUCTIVITY ASSUMPTIONS
Nexa Resources S.A.– Hilarión Project

Area	Grade	Dimensions	Advance Rate (m) Single Face	
Development			**Per Day**	**Per Mo.**
Ramps (±1%)	±1%	5x5	5	100
Ramps (±15%)	±15%	5x5	4	80
X-Cuts	2%	5x5	5	60
Ore Drifts	2%	4x5	5	60
Ventilation Raises	90º	4m	30	100
Services Raises	50º to 75º	3x3	5	100
Stoping				
Production drilling	NA	62-76 mm	75	m/shift
Loading holes	NA	62-76 mm	480	t/m shift
Mucking	1%-5%	200 m	126	tph
Backfilling	LRF	200 m	60	m^3/h
Backfilling	Paste	Surface	145	m^3/h
Hauling	0%-15%	Contract	Various	t/shift

The mine haulage will be carried out using contractor operated trucks equivalent to 50 tonne Volvo FMX 10x4 type. The trucks will haul waste and ore from the various ramps as shown in Figure 16-6.

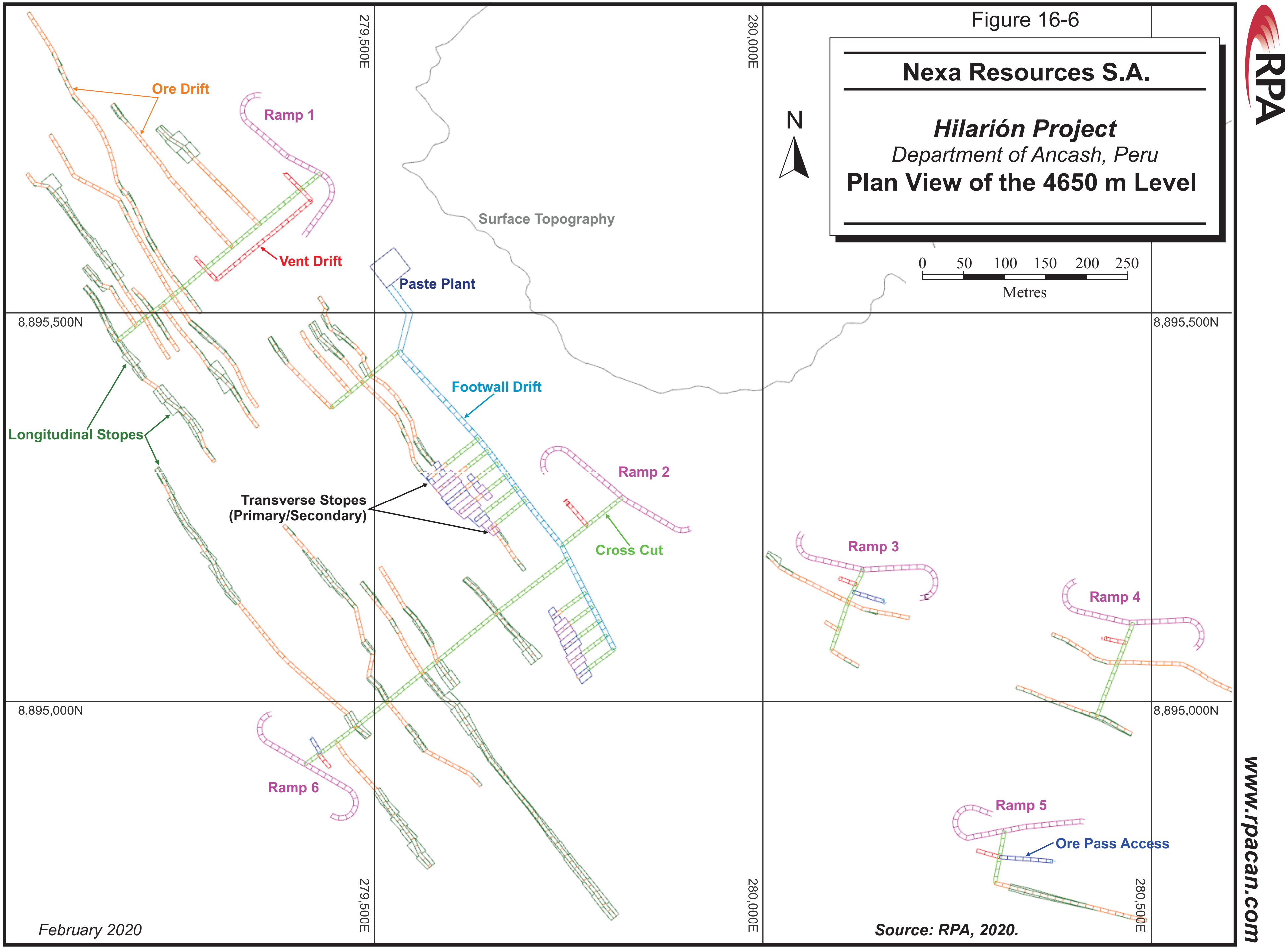
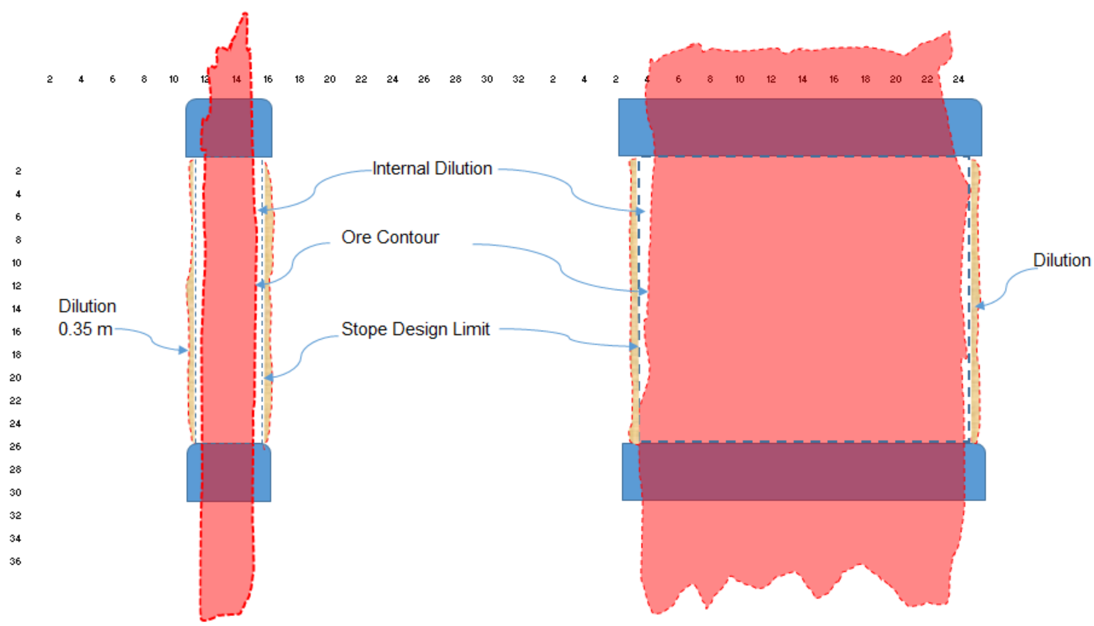


Figure 16-6
Nexa Resources S.A.
Hilarión Project
Department of Ancash, Peru
Plan View of the 4650 m Level
N
0 50 100 150 200 250
Metres
RPA
www.rpacan.com
279,500E
280,000E
280,500E
8,895,500N
8,895,000N
Ore Drift
Ramp 1
Vent Drift
Paste Plant
Surface Topography
Footwall Drift
Longitudinal Stopes
Transverse Stopes
(Primary/Secondary)
Ramp 2
Cross Cut
Ramp 3
Ramp 4
Ramp 5
Ore Pass Access
Ramp 6
February 2020
Source: RPA, 2020.

DILUTION AND EXTRACTION

The dilution is made up of both internal and external dilution. Internal dilution is all dilution that is within the limits of the stope design as shown in Figure 16-7. The external dilution was estimated to be on average 0.35 m on both walls of the stopes as shown. The estimate of the external dilution is also shown in Figure 16-3 earlier in this section where the ELOS approximation is indicated based on the estimated RMR values for the rock mass.

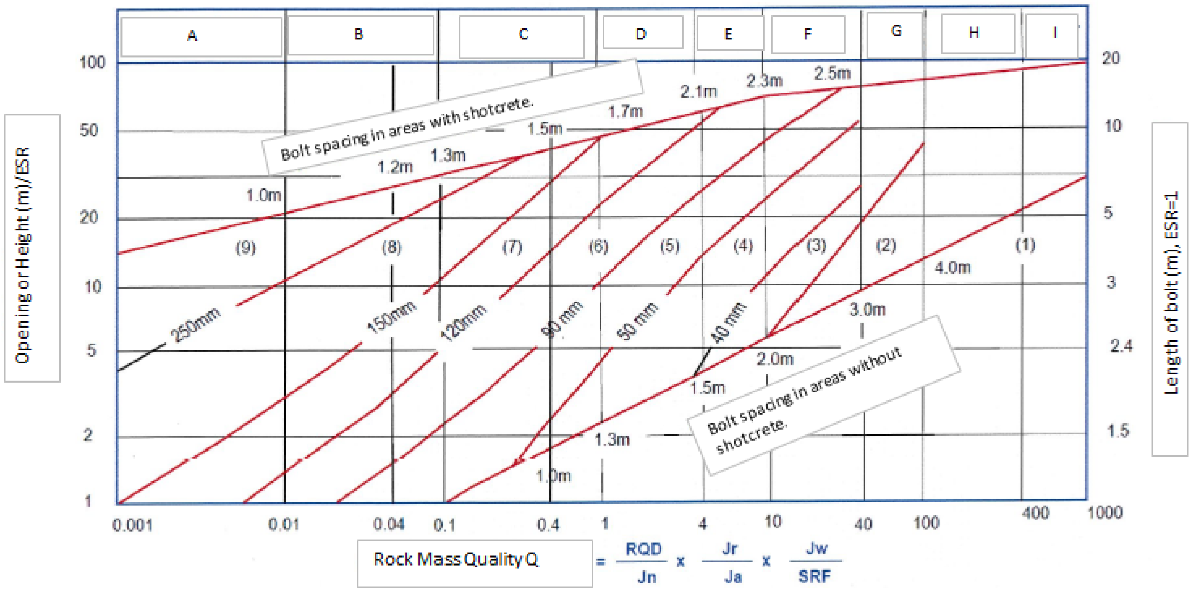
FIGURE 16-7 DILUTION LIMITS FOR LONGHOLE STOPES



GROUND SUPPORT

The ground support proposed for the various ground conditions is shown in Figure 16-8. For the majority of the Hilarión rock mass openings of nine metres or less require only sporadic support based on local conditions with support typically two to three metre length rebars either using cement or resin type grout. Figure 16-8 shows the level of support for different ground conditions, however, most will be centered on the Good to Very Good range.

FIGURE 16-8 GUIDE FOR PERMANENT EXCAVATION SUPPORT



A	Exceptionally Bad	C	Very Bad	E	Regular	G	Very Good
B	Extremely Bad	D	Bad	F	Good	H	Extremely Good
I	Exceptionally Good						

1	No support.	4	Systematic bolting with shotcrete (40-100mm)	8	Bolts & reinforced shotcrete >150mm with steel arches
2	Sporadic bolting.	5	Bolts & reinforced fibre shotcrete (50-90mm)	9	Armored concrete
3	Systematic bolting.	6	Bolts & reinforced fibre shotcrete (90-120 mm)		

Source: Grimstad & Barton, 1993

PRE-PRODUCTION DEVELOPMENT

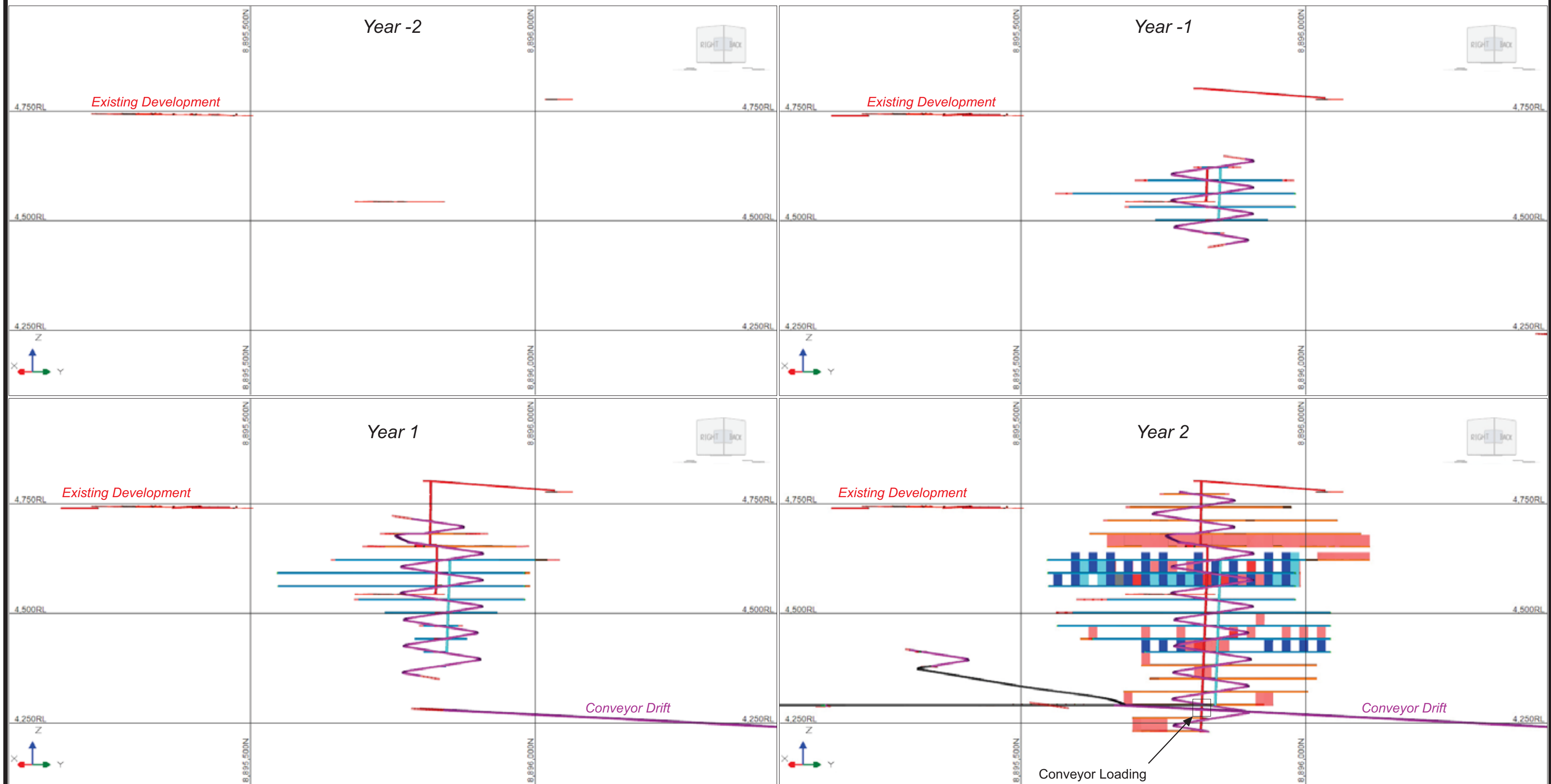
The pre-production development is listed in Table 16-9. As noted in the table, the conveyor drives will be the most important development connecting the underground mine with the process plant, hence need to be started as early as possible and advanced according to schedule. The conveyor drives will consist of parallel drifts driven at 5.5 m high by 6.0 m wide with connections approximately every 500 m. One drive will serve for the conveyor gallery while the second will serve for maintenance access, ventilation, and egress independent of the conveyor way, in case of emergency. The extra allowance shown is 10% of the waste development to account for re-muck bays, substations, sumps, and miscellaneous openings.

TABLE 16-9 PRE-PRODUCTION DEVELOPMENT
Nexa Resources S.A.– Hilarión Project

Description	Units	Total	Yr. -1	Yr. -2	Yr. 1
Ore Drifts	m	12,426	2,421	4,142	5,863
Ore Access Drives	m	165	82	49	34
Conveyor Drifts	m	5,362	2,465	2,438	459
Footwall Drift x-cut	m	4,377	2,468	1,432	477
Footwall Drift	m	2,809	1,704	785	320
Footwall Drift x-cut	m	2,646	969	1,465	212
Ore Drive - SLS	m	4,587	279	1,969	2,340
Ramp	m	4,503	1,472	1,209	1,821
Vent drift	m	1,250	789	272	189
X-cuts	m	1,530	193	600	738
Extra Allowance	m	1,263	635	399	229
Total Horizontal Development	m	40,917	13,476	14,759	12,682
Vertical Development Total	m	504	188	258	58
Vent Raise	m	246	74	172	-
Ore Pass	m	258	114	86	58

Figure 16-9 shows the proposed pre-production development sequence required to reach full production by year two. Processing in year one will average approximately one million tonnes allowing for a ramp up period using the tonnes mined in the first three years of development and preparation. Use will be made of the existing or “as-built” development on the 4770 m and 4530 m levels. The conveyor loading point will be located at the 4270 m level with the bulk of the resource located above this point. Where possible, ore pass raises will be developed whereby muck on the levels can be transferred via the ore pass to the crusher station and then to the conveyor loading system. An allowance for four rock breakers and grizzlies, strategically located on the underground levels, has been included in the sustaining capital costs as the mine is developed. Ore from the ore passes will be hauled with scooptrams and dumped into the crusher and ore trucked will be dumped directly into the crusher. A short raise located beneath the gyratory crusher and feeder will provide smooth loading of the main conveyor. The crusher will be located on the 4290 m level and muck will arrive at the crusher via the ore pass system from levels located above or dumped from trucks hauling from other levels primarily located below the crusher level.

Looking South-West



Legend:

- Longitudinal Stopes
- Transverse Primary Stopes
- Transverse Secondary Stopes

0 100 200 300 400 500
Metres

Figure 16-9

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Pre-Production Development Sequence

February 2020

Source: RPA, 2020.

ACCESS

All access to the underground will be via portals at various elevations to permit early preparation of the required facilities to permit material supply and handling of waste and mineralized rock to the various locations. The main conveyor drifts will be driven at the onset of development to prepare the muck handling system via the conveyors that will transport the muck to the process plant approximately three kilometres away. Access to the underground crusher room will be completed as soon as possible so that the gyratory crusher and associated excavations, including the ore silo (raise) and feeder system rockwork, can be excavated and construction work completed. The crusher will be set up such that haul trucks can dump directly into the crusher and ore pass raises will be driven to the upper levels so that muck from the upper levels can feed directly to the crusher.

LATERAL

Lateral development will include various ramps driven at 5 m high by 5 m wide to provide the clearance for the equipment that will be required for either services or material handling and transport. Ramps will be driven at a gradient of flat to ±15% to access the various mining elevations of the sub-levels that will be located at 30 m vertical intervals. The main conveyor drifts are driven at 5.5 m high by 6.0 m wide and at a grade of approximately +2%. Therefore, conveying of the muck will be on a negative grade providing for power regeneration to the system and improved operating costs.

VERTICAL

Vertical workings will consist for the most part of services raises which will be driven using conventional methods at 3 m by 3 m and various dips up to 90°. The main ventilation raises will be driven by experienced contractors using raise bore machines that can excavate 3 m and 4 m diameter raises, providing the required surface area to deliver the necessary air volume to provide adequate ventilation to the underground workings for both men and equipment. The raises will be used to provide for ventilation and will operate as exhaust raises, ensuring good air flow throughout the workings when breakthroughs are completed. Auxiliary ventilation will be used for confined headings being developed.

ORE AND WASTE HANDLING

All ore and waste material will be mucked using LHD units of various sizes and transported to nearby ore passes and then via trucks either to other underground locations or to surface stockpile areas or crushing facilities. The LHD and truck sizes selected for use underground, as well as service equipment, are listed in Table 16-11 under Mine Equipment.

BACKFILL

Backfill used to fill the mined openings created by stoping will consist of both consolidated backfill in the form of paste fill and unconsolidated backfill from mine development waste rock and waste rock from a borrow pit on surface that can be dumped into open stopes. The paste fill plant will be installed underground to make the system more cost effective. The tailings portion used for the paste fill will be pumped to the underground paste plant thickener and water will be recycled or treated as required. All sources of water will be recycled in efforts to reduce as much as possible any effluent. The paste fill will be used primarily in the transverse primary and secondary stopes, with a higher cement content in the primary stopes to achieve the required fill strength of 0.80 MPa estimated at 28 days. This would take approximately 4% cement content, however, the amount of cement will vary as the required strength varies. RPA recommends that additional test work be carried out to optimize the paste fill recipe as operating experience is gained by the mine operators.

PRODUCTIVITY ASSUMPTIONS

The paste fill portion of the backfilling system is proposed to use approximately 50% of the tailings, while the other half is deposited in a tailings facility on surface. The paste fill plant was designed by Golder with a design capacity of 6,500 tpd of solids. The plant can produce 161 m^3/h of paste at a solids density of 75.7%.

BACKFILL DESIGN

The paste fill plant will be fed by thickened solids at 70% solids where this feed is filtered to a solid of 83% to prepare a controlled dosage of cement (1.72% average cement content as 24% of the stopes are primary stopes which require structural backfill and 76% of the stopes are secondary which require a lower strength backfill. The paste fill is delivered via a system of pumps within the mine. Approximately 59% of the water is recovered and recycled from the thickened tailings equivalent to approximately 79 m^3/h which is sent to the overflow tank by gravity via a dedicated line. The portion of tailings required for the paste fill will be pumped through a six-inch diameter pipe via the conveyor access and up to the backfill plant located on the 4650 m level. The tailings will then be mixed to create the paste fill of the required strength. The thickened paste fill can then be distributed by pumps to the various stope locations. Positioning the plant at the 4650 m level will reduce the amount of power required to pump the paste fill as most of the levels are located below this level. The paste plant will have a maximum power demand of approximately 2 MW based on the preliminary design.

LIFE OF MINE PLAN

The LOM plan is shown in Table 16-10.

The LOM indicates an average overall production rate of 7,800 tpd over the full 16 years of the LOM with a production rate in excess of 10,000 tpd for a ten-year period from year two to year eleven of the LOM. Over the ten-year period at the higher production rate the backfill is split almost 50/50 between the paste fill and loose rock fill. Make-up rock fill will be required as waste rock from mine development will account for approximately 50% of that required. Additional operating costs were included to allow for waste rock from a surface source nearby.

Production ore will be made up of 37% from transverse primary and secondary stopes, 54% from sub-level longhole stopes and 8% from development headings in ore.

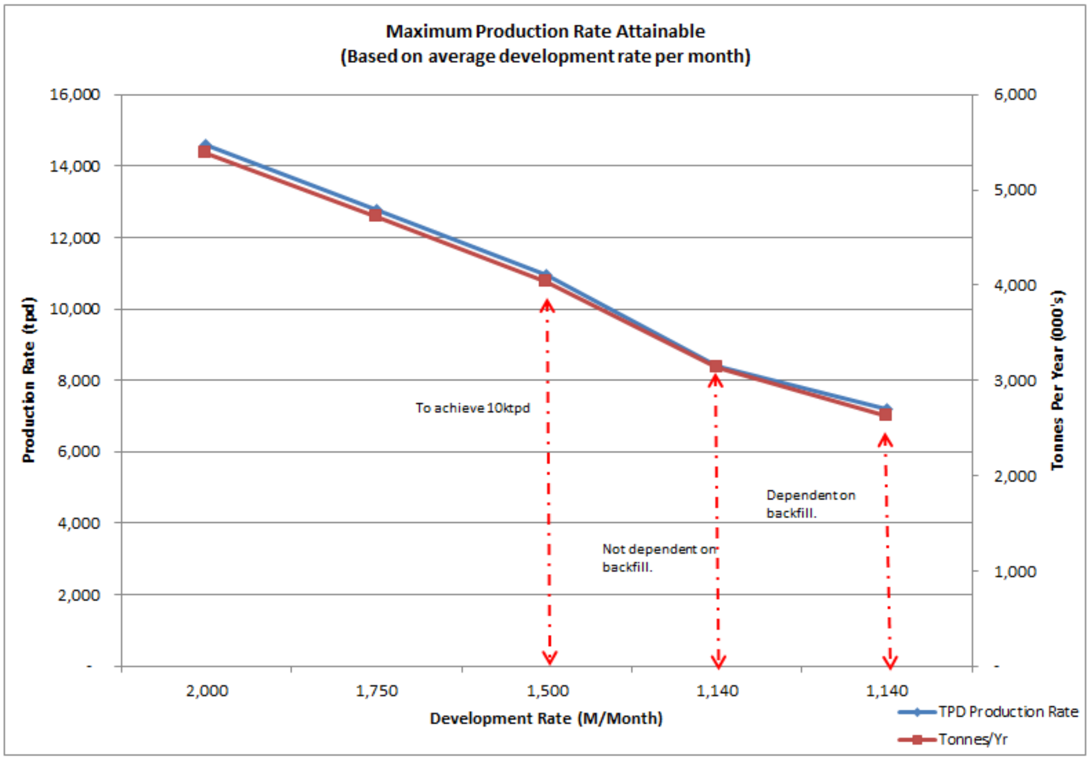
PRODUCTION RATE ASSUMPTIONS

The production rate assumptions were based on analysis including conceptual guidelines, modelling maximum production, workplace requirements, and comparison to similar operations. In RPA's opinion, a production rate of 10,000 tpd can be achieved for approximately 80% of the LOM, however, to achieve this production rate, the development intensity must average 35 m/d. The production rate sensitivity to both development intensity and the impact of backfilling can be illustrated in Figure 16-10. RPA recommends that a development intensity of 35 m/d be used in the planning process to reach the desired production rate. The use of the transverse stopes reduces the required development as typically an average of approximately 50 m/d, as shown in Figure 16-10 would be required to meet the high production rate achieved.

TABLE 16-10 LIFE OF MINE PLAN
Nexa Resources S.A. - Hilarión Project

Description	Units	Total	Yr.-2	Yr.-1	Yr.1	Yr.2	Yr.3	Yr.4	Yr.5	Yr.6	Yr.7	Yr.8	Yr.9	Yr.10	Yr.11	Yr.12	Yr.13	Yr.14	Yr.15	Yr.16
Underground Mining																				
Operating Days	days	5,760	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360
Tonnes milled per day	tpd	7,759			3,058	10,390	10,337	10,142	10,340	10,379	10,319	10,288	10,257	10,311	10,394	7,072	5,870	1,561	2,223	1,201
Production Tonnes	000 t	44,691	160	274	667	3,740	3,721	3,651	3,722	3,736	3,715	3,704	3,692	3,712	3,742	2,546	2,113	562	800	432
Ag Grade	g/t	30.43	50.19	33.10	31.72	40.53	32.14	32.68	24.24	24.24	24.35	26.11	25.87	26.29	32.80	35.25	37.70	41.64	47.50	38.30
Cu Grade	%	0.06	0.04	0.03	0.03	0.04	0.05	0.05	0.10	0.10	0.07	0.05	0.03	0.02	0.03	0.05	0.08	0.16	0.14	0.07
Pb Grade	%	0.72	1.04	0.74	0.66	0.82	0.64	0.69	0.42	0.39	0.45	0.64	0.70	0.67	1.02	1.11	1.12	1.08	1.46	1.31
Zn Grade	%	3.54	3.32	3.41	3.04	2.91	3.01	3.15	3.82	4.14	3.96	3.84	3.53	3.61	3.42	3.49	3.72	4.15	3.48	3.45
Waste	000 t	7,459	719	690	443	639	558	407	561	606	496	392	390	397	355	369	268	127	42	-
Total Moved	000 t	52,150	878	964	1,110	4,379	4,279	4,058	4,283	4,342	4,211	4,095	4,083	4,109	4,097	2,915	2,382	689	842	432
Processing																				
Tonnes processed	000 t	44,691			1,101	3,740	3,721	3,651	3,722	3,736	3,715	3,704	3,692	3,712	3,742	2,546	2,113	562	800	432
Ag Grade	g/t	30.43			34.75	40.53	32.14	32.68	24.24	24.24	24.35	26.11	25.87	26.29	32.80	35.25	37.70	41.64	47.50	38.30
Cu Grade	%	0.06%			0.03%	0.04%	0.05%	0.05%	0.10%	0.10%	0.07%	0.05%	0.03%	0.02%	0.03%	0.05%	0.08%	0.16%	0.14%	0.07%
Pb Grade	%	0.72%			0.74%	0.82%	0.64%	0.69%	0.42%	0.39%	0.45%	0.64%	0.70%	0.67%	1.02%	1.11%	1.12%	1.08%	1.46%	1.31%
Zn Grade	%	3.54%			3.17%	2.91%	3.01%	3.15%	3.82%	4.14%	3.96%	3.84%	3.53%	3.61%	3.42%	3.49%	3.72%	4.15%	3.48%	3.45%
Contained Ag	000 oz	43,724			1,230	4,874	3,845	3,836	2,901	2,911	2,908	3,109	3,071	3,138	3,947	2,885	2,562	752	1,222	533
Contained Cu	t	25,027			308	1,317	1,825	1,742	3,673	3,717	2,521	1,729	944	823	1,164	1,344	1,623	925	1,089	284
Contained Pb	t	322,679			8,109	30,541	23,896	25,170	15,484	14,511	16,902	23,696	25,906	24,955	38,308	28,192	23,602	6,051	11,707	5,650
Contained Zn	t	1,583,257			34,913	108,784	112,085	114,985	142,355	154,636	147,129	142,343	130,443	134,101	127,800	88,849	78,679	23,352	27,882	14,923

FIGURE 16-10 PRODUCTION RATE VS. DEVELOPMENT INTENSITY



MINE EQUIPMENT

The mine equipment will consist for the most part of diesel mobile equipment in order to complete ground support, mine services (pipe, electrical, communications), waste and ore handling, secondary breakage, and mine maintenance services. Nexa will provide its own production equipment, while mine development will be carried out by a mining contractor who will provide their equipment for the development. A list of the mine equipment is provided in Table 16-11.

TABLE 16-11 MINE EQUIPMENT
Nexa Resources S.A. - Hilarión Project

Description	Model	Carrier KW	Carrier HP	Electric System KW/HP	No. Units	Total HP
Production						
LH Drill for Orebody	Simba M4C	12	162	118/159	5	486
LH Drill for Veins	Raptor 55	72	97	75/100	2	194
ANFO Loader	Getman A64 Exc 2-500	129	173	NA	2	346
Scoop 9.4 yd³	R2900G	303	409	NA	6	2454
Scoop 6.0 yd³	R1600H	207	279	NA	2	558
Scoop 4.0 yd³	R1300G	122	165	NA	2	330
Tipper Trucks 20m³	Mercedes	338	450	NA	5	2250
Scaler	Getman S330	129	173	NA	2	346
Service						
Scissor Lift	Getman A64 SL	127	173	NA	1	173
Lube Truck	Getman A64 Lube-S	129	173	NA	2	346
Crane Truck	Getman A64 Crane	129	173	NA	1	173
Shotcrete	Getman	127	170	NA	1	170
Mobile Rockbreaker	MacLean RB3	110	147	NA	3	441
Ser. Vehicles (4x4)	InfoMine	63	85	NA	5	425
Personnel Carrier	Getman A64	129	173	NA	3	519
Compressor	(500 CFM/125PSI)	NA	NA	75/100	2	
Grader	Sandvik	97	130	NA	1	130
Front end loader	3.8m³	158	211	NA	1	211
Total						**9,552**
Contractor						
Jumbo 1 Boom	Sandvik	62	83	70	2	166
Jumbo 2 Boom	Sandvik	62	83	135	2	166
Scaler	Getman	127	170	NA	2	340
Bolter	Getman	129	173	40	3	519
Haul Trucks (20m³)	Mercedes	338	450	NA	2	900
Shotcrete Unit	Getman	127	170	NA	2	340
Transmixer	Normet MX 500	120	160	NA	5	800
Scooptram 9yd³	R2900G	303	409	NA	3	1227
Personnel Carrier	Getman A64	129	173	NA	3	519
Scissor Lift	Getaman A64 SL	129	173	NA	2	346
Service Vehicle (4x4)	InfoMine	63	85	NA	2	170
Compressor (750cfm)	InfoMine	NA	NA	275	2	NA
Gensets (350Kw)	Caterpillar	NA	NA	545	4	NA
Total						**5,493**

MINE INFRASTRUCTURE AND SERVICES

The Hilarión mine site will be located approximately 12 km from the town of Huallanca, however, due to limited infrastructure offered by this small town, a camp facility will be required at the mine site. A processing plant located on surface and other facilities such as electrical substation to provide the necessary energy requirements and ancillary facilities such as warehousing, office space, maintenance facilities, core logging and storage facilities and first aid and emergency facilities. The mine site will be located just upstream of the Azulmina tailings facility (TSF) considered for the Project. The available capacity of the planned TSF is estimated at approximately 67 million cubic metres well within the requirements of the currently available Mineral Resources. The mine employees for both the underground operation and the process plant will follow a 14 days on / 7 days off schedule rotation, with three crews including two on site and one at rest at any given time. Staff for the most part will be on 5/2 days schedule. For concentrate shipments to port and transportation of goods and services coming in and out of the mine, a new road approximately 6 km long to connect an existing road to near the Minera Santa Luisa access road will be required as large vehicles are not able to pass via the small roads of Huallanca. This will also avoid the nuisance of noise and potential dust for the small town.

VENTILATION

The ventilation system design will incorporate an exhaust system with fans located at strategic raise and portal access points as shown in Figure 16-11. Special precautions will be taken to keep the levels of dust as low as possible in respect of the nearby glaciers that have been adversely affected by climate change over recent times.

MINE AIR VOLUME

The mine air volume required was based on the following three criteria to meet the regulations in Peru:

- $Q_{Personnel}$, is 3.0 m^3/min for each person working in the mine plus 100% of this volume for workers operating at more than 4,000 m altitude, according to DS 055 2010 EM. DS refers to "supreme decree".
- $Q_{Explosives}$, is according to the formula proposed by Voronin, the volume required to dilute the blasting gases is 2.5 m^3/min per kilogram of explosives detonated, the ratio obtained from the formula mentioned.
- Q_{HP}, is the volume necessary to ventilate the mine for diesel equipment and is equal to 3 m^3/min per horsepower developed at the machine, according to DS 055 2010 EM.
- For the calculation, the following must be taken into consideration;

- Calculate the sum of Q_{HP} + Q_{Per} and compare to the $Q_{Exp.}$ taking the maximum of the two.
- Increase the volume by 10% to account for leaks in the network and secondary blasting.

- The three amounts are not accumulated as the DS 055 2010 EM considers that no major blasting operations are carried out while employees and equipment are operating in the mine.

The estimated volume required for the proposed Hilarión mine is shown in Table 16-12. While the combined equipment horsepower from both the company and contractor equipment is higher than that used in the table, the table value was considered an average of all the equipment operating at various areas of the proposed mine which will be spread out. Additional fans can be added as required. The maximum power demand for the underground during the production phase is estimated at approximately 4 MM to 5 MW.

TABLE 16-12 VENTILATION REQUIREMENTS
Nexa Resources S.A. - Hilarión Project

Description	Number/Quantity	Units (m^3/min.)	Q (m^3/min.)	Q (CFM)
Personnel (Q_1)	300	6	1,800	63,000
Equipment (Q_2)	9,000	3	27,000	945,000
Sub-Total			28,800	**1,008,000**
Explosives (Q_3)	2,500	2.5	6,250	218,750
Sub-Total			**Q_{1+2}**	**1,008,000**
Contingency 10%				100,800
Total				**1,108,800**

VENTILATION INSTALLATION

The ventilation fans and accessories will be installed with utmost care with respect to noise reduction, vibration, and overall efficiency for the operations. The conveyor tunnel system for muck transport to the mill will be kept independent from the rest of the mine ventilation system, to help control dust and to address issues to maintain an efficient operation and employee safety. The ventilation arrangement is shown in Figure 16-11 indicating the exhaust points in the mine.

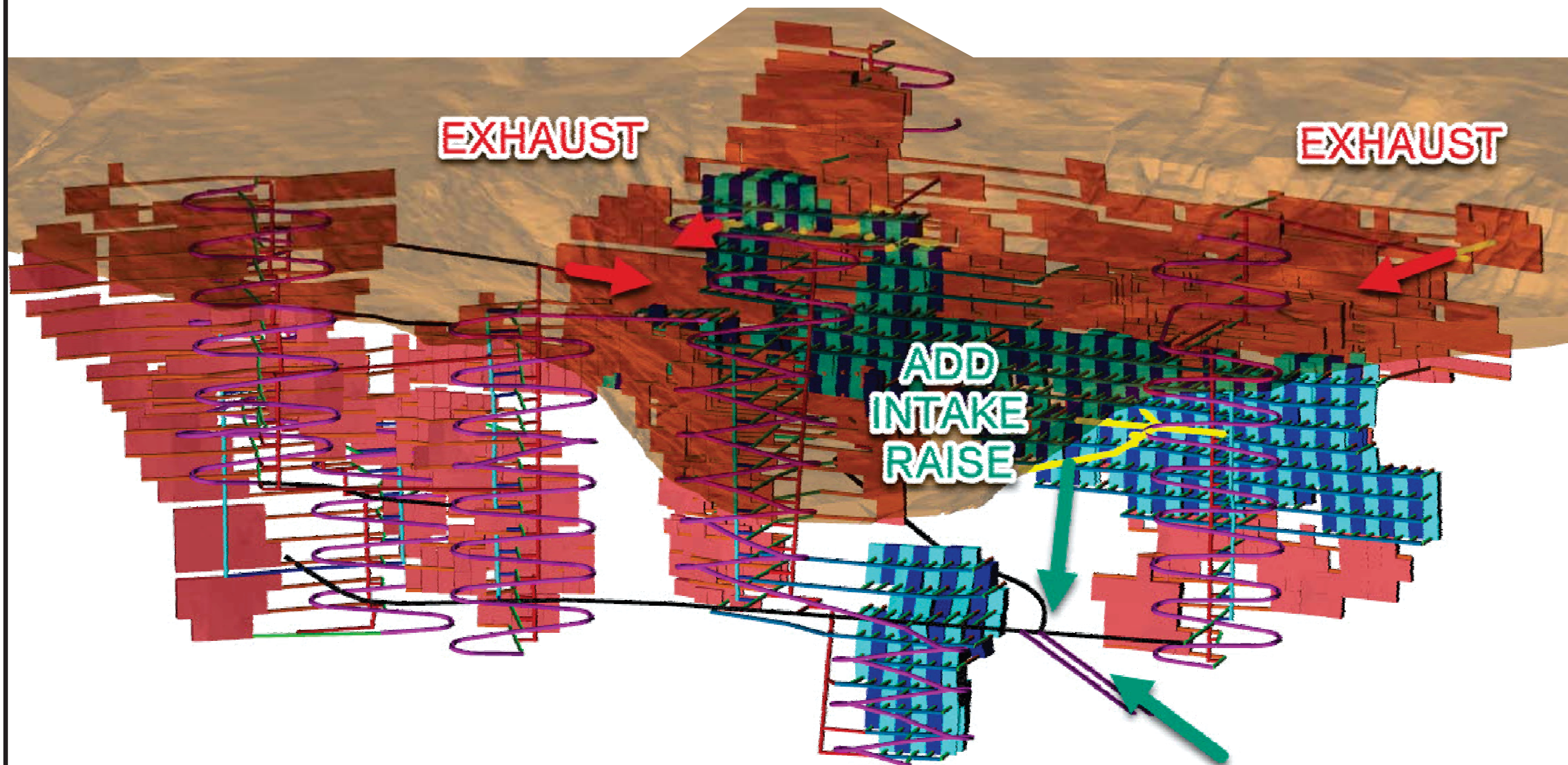
MINE AIR HEATING

No mine air heating was considered for the underground mine in at this preliminary phase as temperatures in the area are consistently above the freezing point that would impact compressed air and water lines and personnel underground.

DEWATERING

The dewatering system for the proposed Hilarión mine will be kept as simple as possible. For the most part, gravity will work in favour of mine drainage given the elevation differences and location of exit points in the mine. It is also planned to limit the mine effluent to a minimum and recycle as much as possible to avoid discharging effluent. Two water treatment plants (WTP) were considered in the initial study in order to supply the concentrator demand estimated at 50 L/s and to treat drainage from the mine workings anticipated at two 100 L/s flow rates from the mine. The treatment plants will remove metals from the water and provide water that meets discharge regulations or can be reused as process water in the plant and in the mine. For the current study, only one WTP will be required and located at the plant site.

Looking South-East



Not to Scale

Figure 16-11

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Ventilation Schematic

February 2020

Source: RPA, 2019.

RPA

www.rpacan.com

ROADS AND RAMPS

The access roads to the mine site are shown in Figure 18-2. Huallanca is located approximately 12 km form the site and the main access for material and concentrate transportation will be the newly extended road that exists near the Minera Santa Luisa operating mine. This will avoid a section of highway between the Minera Santa Luisa and Huallanca that experiences rock falls onto the highway each year requiring cleanup operations that effectively close off the road to traffic and cause unwanted delays.

MAINTENANCE FACILITIES

A smaller maintenance facility will be located on surface to service surface equipment such as small vehicles, front end loaders and such. Shop facilities will be provided for small maintenance of surface equipment.

UNDERGROUND

A maintenance facility will be provided for the underground mine given the distances involved in moving equipment to the surface site. The underground facility will be capable of carrying out both minor and major maintenance operations on all of the mine equipment.

SURFACE

The camp and kitchen facilities will be located near the main process plant location upstream of the Azulmina TSF. Other ancillary facilities including the maintenance facility, warehouse, cold storage, backup generator unit, first aid building, etc., are located, in proximity to the plant.

POWER

Allowance for a 5 km power line at 220 kV which will feed, off of the main powerline designated L 2253 between the Conococha and Vizcarra substations passes nearby the surface plant location selected. A substation would be installed and a 220 kV line extended to the mine site substation, where the voltage would be reduced from 220 kV to 22.9 kV off the secondary of the main transformer for in mine surface and underground distribution.

ELECTRICAL DISTRIBUTION

The electrical load will be delivered to the underground operations at 22.9 kV and then reduced to the required 480 V from the transformer secondary located in the underground substations.

ELECTRICAL LOAD

The electrical load for the proposed mine is shown in Table 16-13.

TABLE 16-13 ELECTRICAL LOAD
Nexa Resources S.A. - Hilarión Project

Area	kWh/Day	kWh/Mo.	kWh/Yr.
Mine	107,558	3,137,108	37,645,292
Process	369,993	10,791,463	129,497,550
Assay Lab	1,339	39,048	468,579
Tailings	76,963	2,244,760	26,937,120
Backfill	77,297	2,254,484	27,053,806
Services and Surface	2,648	77,226	926,718
Total	635,797	18,544,089	222,529,065

The consumption is estimated at approximately 26.5 MW.

FUEL STORAGE AND DISTRIBUTION

Fuel storage will be provided both on surface and underground to ensure adequate distribution of the fuel to the required areas of the mine.

COMMUNICATIONS

The underground communications will be via leaky feeder system to ensure constant contact for efficient operating and for emergency requirements.

WATER SUPPLY

Water supply will be made up of recycled water collected and treated water. The water estimated for the plant is approximately 300 L/s with 85% recovered from the supernatant of the thickeners of the lead and zinc concentrate and tailings thickener and the filtration water of the concentrates. The remaining 15% (50 L/s) will be supplied as fresh water from the treatment plant located near the mouth of the service tunnel 4350. Water for the mine operation will come from two 50 m^3 tanks located on levels in the mine provide by captured water in sumps in the mine.

STATIONARY EQUIPMENT

Stationary equipment underground will include the compressors, drill press, and other equipment required in the maintenance shop.

REFUGE STATIONS

Refuge stations will be located at strategic places on the levels underground and have communication, compressed air and oxygen apparatus, and other essential equipment available in the case of emergency.

MINE RESCUE EQUIPMENT AND SUPPLIES

The proposed mine will contain the required amount of BG 4 oxygen apparatus for any mine rescue missions that are required during the operations. The main mine rescue station will be located on surface to allow for adequate co-ordination by the director of rescue operations should an emergency occur. Regular training sessions will be carried out and the required number of trained mine rescue personnel will be on site during the mine operations. Various locations underground will be equipped with additional equipment such as self-rescue units, stretchers, and the like.

EXPLOSIVES AND CAP MAGAZINES

Explosives and accessories will be stored in regulation magazines located in strategic locations to ensure adequate and safe distribution to the various workplaces throughout the mine operations.

COMPRESSED AIR

A compressed air distribution line will be installed underground consisting of six-inch (150 mm) diameter schedule 40 pipe on the main lines and four-inch (100 mm) diameter lines in the development headings to provide the required air to the working faces. Mobile compressors with a 750 cfm capacity will be used in the mine to provide for development and production drilling requirements. The mining contractor carrying out the mine development will provide their own mobile compressors as well as their equipment including jumbo drills, scooptrams, bolters, shotcrete unit, scaler, service vehicles, and miscellaneous gear. The contractor will also have mobile 350 kW gensets to provide the required power for the jumbo drills and other equipment. The contractor will also supply two 20 m^3 capacity trucks to transport waste material away for development faces and to designated dump locations.

17 RECOVERY METHODS

The processing plant conceptual design is based on Hilarión pilot plant test work conducted at Certimin in 2015, in addition to earlier bench scale test work, typical processing methods for polymetallic deposits of this sort, and design criteria provided by RPA and Nexa. The processing of ore from the El Padrino deposit was not considered in the design of the processing plant due to the complex nature of the mineralization and the early stage of test work on El Padrino material.

The plant will process approximately 3.65 Mtpa through conventional comminution and flotation circuits to produce saleable bulk (lead-silver) and zinc concentrates. The potential to produce a copper concentrate if processing ore from El Padrino will be evaluated in future test work. In addition, future test work will be aimed at optimizing the process flow sheet and reagent scheme to maximize the recovery of valuable metals while minimizing costs of consumables and reagents.

PROCESS DESCRIPTION

A preliminary block flow diagram for the processing plant is presented in Figure 17-1. The processing plant will consist of the following unit operations:

- Crushing and grinding
- Flotation
- Concentrate thickening and filtration
- Tailings thickening and disposal

Mineralized material from the mine or run of mine (ROM) stockpiles will be delivered to the primary crusher dump hopper by trucks or front-end loaders (FELs). A stationary grizzly over the dump hopper will ensure that the feed passing through to the primary crusher will not exceed 600 mm in size. The multi-stage crushing circuit will produce a product suitable for feed to the grinding circuit, which, in closed circuit with cyclones, will produce a product with a P_{80} of 100 µm. Cyclone overflow will be thickened in a flotation feed thickener to enable control of flotation feed density. The underflow from the cyclones will be returned to the grinding circuit. A crushed ore stockpile will provide feed for the grinding circuit when the crushing circuit is not operating.

Underflow from the flotation feed thickener will be diluted to the desired density with process water and then be conditioned with flotation reagents prior to flotation. Initial flotation will recover the majority of lead and silver into a rougher concentrate. The rougher concentrate will be reground to improve liberation of lead and zinc minerals. Subsequent processing of the rougher concentrate in the bulk cleaner circuit will reject additional gangue and zinc minerals resulting in the improvement of the lead grade to produce a saleable lead-silver concentrate. The bulk rougher tails, consisting mainly of zinc minerals and non-sulphide gangue will be processed in a zinc rougher circuit to recover zinc. The zinc rougher concentrate will report to the zinc cleaner circuit after regrinding to improve zinc mineral liberation. Processing of the zinc rougher concentrate in the zinc cleaner circuit will reject gangue minerals and result in a saleable zinc concentrate.

Concentrates will be thickened, filtered, and stored prior to shipping in bulk, containers, or bags. Tails from the zinc circuit will report to the flotation tails thickener and will be thickened prior to being pumped to the conventional tailings storage facility (TSF). Water recovered from the concentrate and tailings dewatering steps, as well as from the TSF, will be recycled back into the process.

WATER

The bulk of the process water will be recovered from the tailings and concentrate thickeners, and tailings (paste-backfill) and concentrate filters and recycled within the processing plant. Make-up water for the plant will be supplied from the mine via a water treatment plant and treated water storage pond.

CONSUMABLES AND REAGENTS

Major consumables will consist of wear parts for the crushing circuit, and liners and grinding balls for the mills. Anticipated reagent requirements are based on the 2015 Certimin pilot test work, and include zinc sulphate, copper sulphate, sodium cyanide, sodium metabisulphite (SMBS), sodium sulphide, sodium isopropyl xanthate (SIPX), industrial lime, as well as specialty collectors, frothers, and depressants.

ENERGY

Electrical power will be supplied from the national grid, and electrical demand for the project has been estimated in previous studies at approximately 22 MW.

DESIGN CRITERIA

The processing plant will process an average of 10,000 tpd of ore to produce bulk lead-silver concentrate, and zinc concentrate.

TABLE 17-1 KEY PROCESS DESIGN CRITERIA
Nexa Resources S.A.– Hilarión Project

Description	Units	Value
Operating Schedule		
Operating Days Per Year, Processing Plant	days	365
Average Production Rates		
Annual Throughput, Processing Plant	tpa	3,650,000
Daily Throughput, Processing Plant	tpd	10,000
LOM Feed Grade		
Ag	g/t	30.4
Cu	%	0.06
Pb	%	0.72
Zn	%	3.54
Crushing Work Index	kWh/t	21.4
Bond Ball Mill Work Index	kWh/t	13.9
Crushing Availability	%	75
Nominal Crushing Throughput	dry tph	555
Feed P_{100}	mm	600
Grinding and Flotation Availability	%	92
Nominal Grinding Throughput (Fresh Feed)	tph	453
Feed Particle Size (F_{80})	µm	2,000
Product Particle Size (P_{80})	µm	100
Bulk Rougher Flotation Feed % Solids	%	33
Bulk Rougher Concentrate Regrind (P_{80})	µm	35
Zinc Rougher Concentrate Regrind (P_{80})	µm	40

RECOVERY

Estimates for recovery of metals to concentrate, as well as concentrate grades were based on LCTs and pilot tests conducted at Certimin in 2015. Lead and silver recovery to the bulk lead-silver concentrate were estimated at approximately 86% and 80%, respectively, with a lead grade of approximately 55%. Zinc recovery to the zinc concentrate was estimated to be approximately 90%, with a zinc grade of approximately 50%. There is potential for recoveries to change significantly as test work continues in efforts to optimize process efficiency and economics.

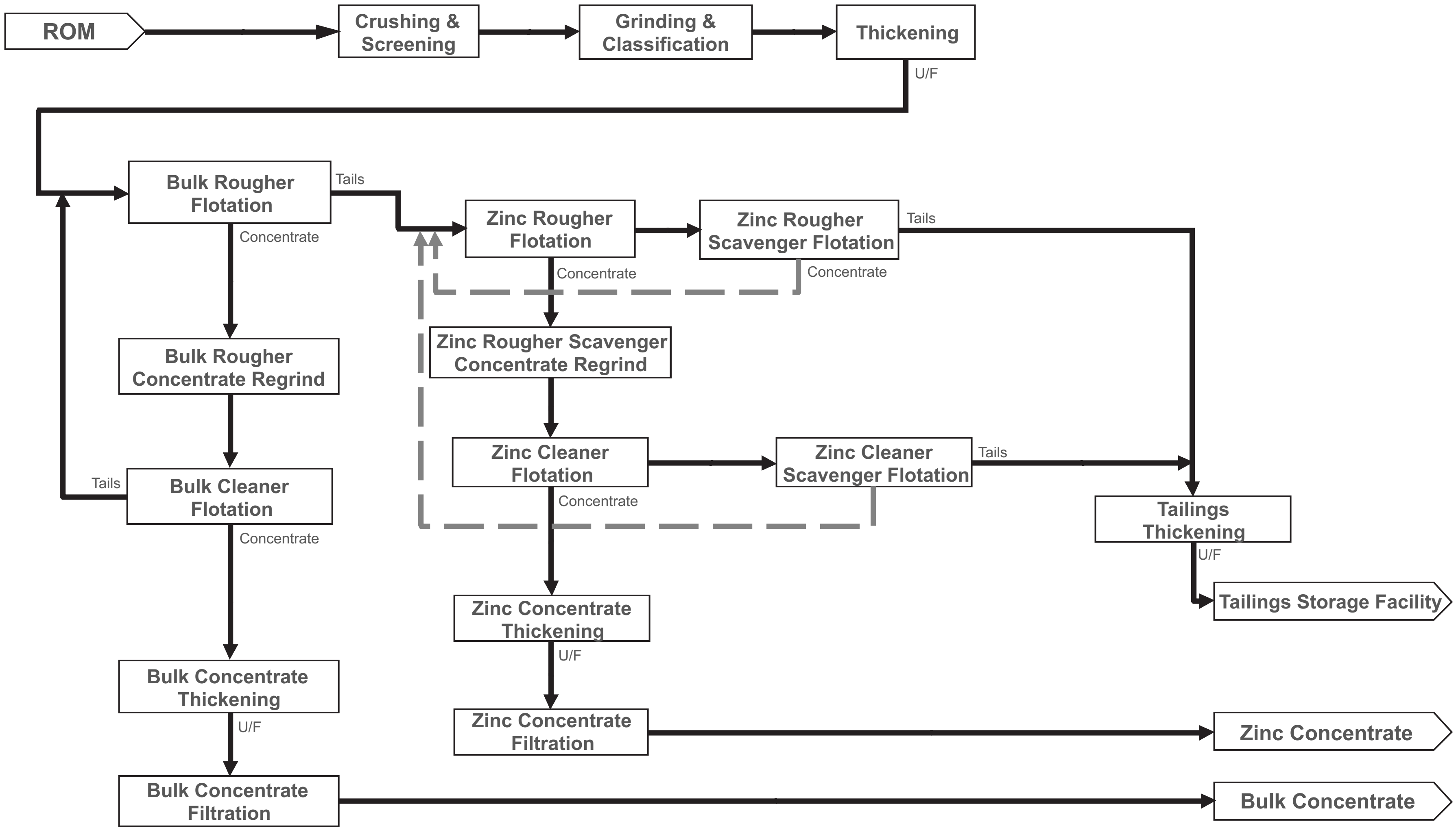


Figure 17-1

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Preliminary Block Flow Diagram

February 2020

Source: RPA, 2020.

RPA

www.rpacan.com

18 PROJECT INFRASTRUCTURE

The Project surface infrastructure is shown in Figure 18-1. The surface and underground operations could share some of the mine infrastructure, as discussed in Section 16. An isometric view showing the mine infrastructure and access roads is illustrated in Figure 18-2.

For the currently selected mine site, process plant, ancillary facilities and the tailings facility, there will be a requirement to remove several existing buildings and infrastructure owned by local residence of the area. The required negotiations, permits, and costs for this have not been addressed in this report however will require immediate attention prior to further studies.

There will be a requirement for a new road of approximately 6 km in length to enable bypassing the town of Huallanca with transportation of materials to the site and concentrate shipments to port facilities once production commences.

The site will consist of a process plant, mine offices/dry/warehouse/maintenance facilities, compressor building, and miscellaneous ancillary facilities such as fuel storage, cold storage, and overburden/waste/ore stockpile areas primarily for temporary usage during the mine life. The mine portals for the twin conveyor tunnels will be located in close proximity to the plant as indicated to provide efficient transfer of muck to the process plant. The structures on site will occupy an area of approximately 4,500 m^2. The total surface area covered by the Azulmina tailings facility (4A and 4B) is approximately 32 km^2 with an ultimate dam height of approximately 100 m. The storage capacity of each of 4A and 4B is approximately 60 Mm^3 and therefore offers the largest storage capacity of the four tailings alternatives shown in Figure 18-3.

PLANT SITE OPTIONS

In past studies, Nexa has carried out evaluations of the best option for the process plant location as well as various options for the tailings storage facility or TSF. RPA examined two options for the plant locations as shown in Figure 18-3. The results of the analysis are summarized in Table 18-1. The comparison of plant locations was completed at a high level and was not exhaustive and in RPA's opinion would require further examination at the next level of study, in particular with reference to continued exploration and additional resource that may exist between the two properties.

TABLE 18-1 PROCESS PLANT LOCATION OPTIONS
Nexa Resources S.A. - Hilarión Project

Item	Plant 1 Azulmina	Plant 2 Pachapaqui	Remarks/Comments
IRR after tax (%)	15.5	13.7	
NPV (at 10%) after-tax (US$M)	149	93	
Conc. Transport (km)	60	0	Additional cost of $0.06/t processed (see below)
Road Access (km)	10	4	Some extra cost for road maintenance but small
Consumables Transport (km)	60	0	Additional cost of $0.06/ t processed (see below)
Preproduction Development (m)	40,917	47,315	extra cost in capital costs
Conveyor drift - distance (km)	3	6	extra cost in capital costs
Schedule impact	0	2	years preproduction added
Preproduction Capital Costs (US$M)	585.1	603.5	extra ~$18.4M capital for Plant 2
Sustaining Capital Cost (US$M)	120.8	120.8	
Tailings Location	**TSF Plant 1 Azulmina 4A**	**TSF Plant 2 Quenhua Ragra**	
Tailings Volume (Mm^3)	60	54.6	Larger volume for Plant 1 (Positive)
Tailings Elevation (MASL)	4235	4500	Lower elevation for Plant 1 (Positive)
Tailings Surface Area (km^2)	8.2	4.7	Larger surface area to reclaim for Plant 1 (negative)
Dam Height (m)	135	150	Lower dam height at Plant 1 (Positive)
Tailings Line (km)	0.5	3.5	Shorter tailings discharge line at Plant 1 (Positive)
Environmental & Social	Less	More	Plant 2 closer to town of Pachapaqui

The mine site will be located approximately 12 km from the town of Huallanca should some staff desire to live at this location. The mine and plant employees will operate on a 14 day on and 7 day off rotation requiring a camp facility to respond to the room and board demands. The camp size required will be for approximately 500 men with extra capacity of approximately 200 to 250 men during the construction period of the project.

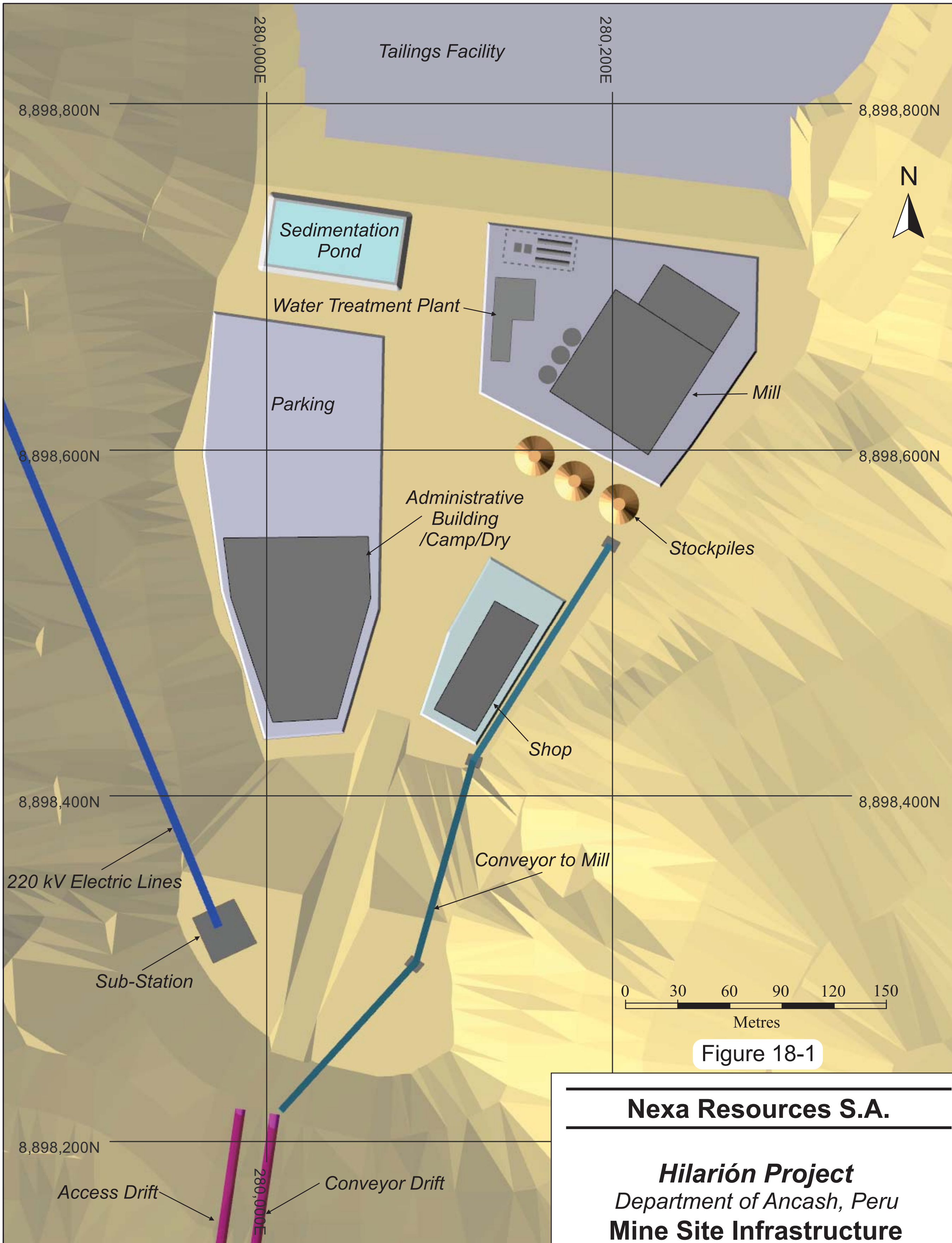


Figure 18-1

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Mine Site Infrastructure

February 2020

Source: RPA, 2020.

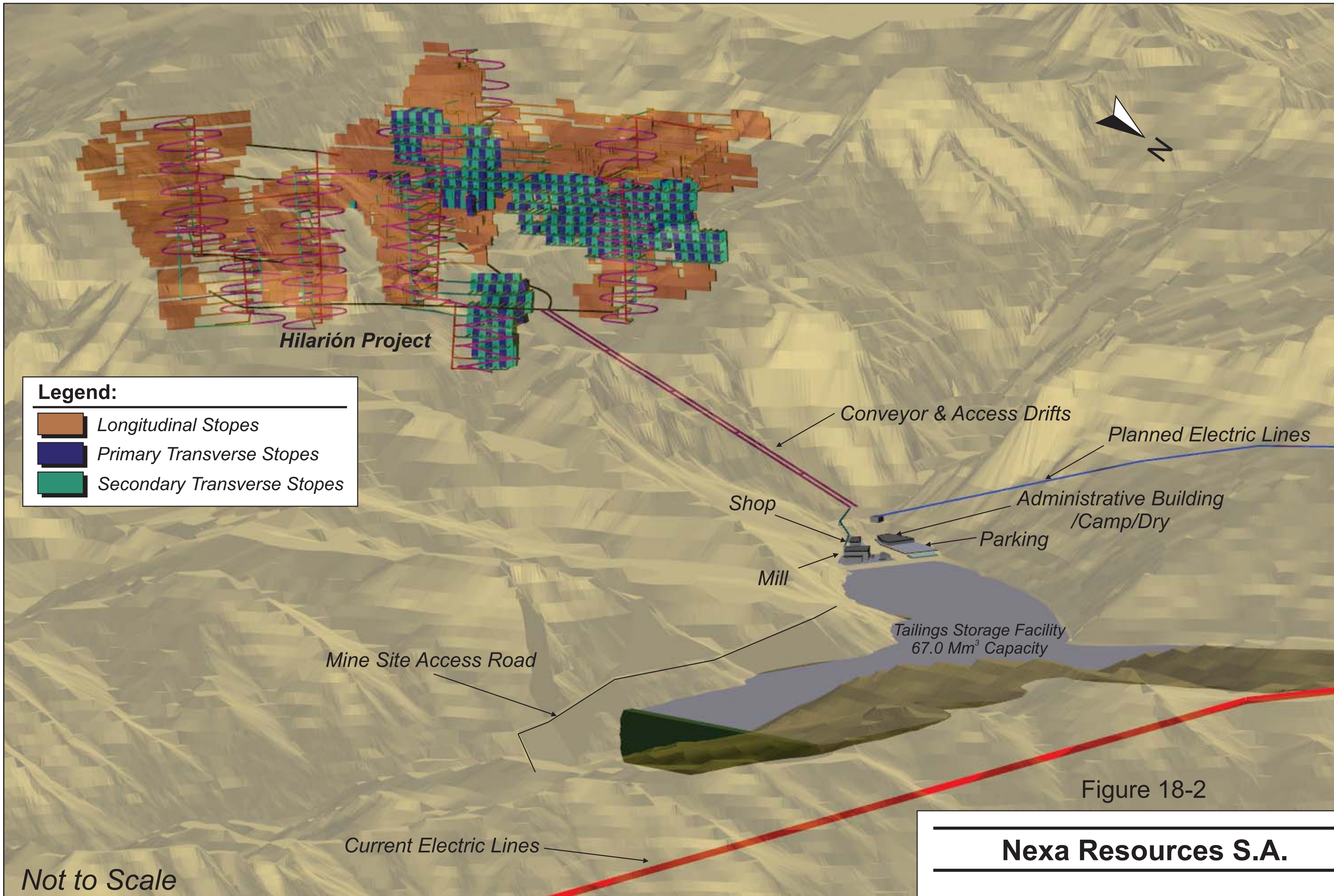


Figure 18-2

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Mine Site - Isometric View

February 2020

Source: RPA, 2020.

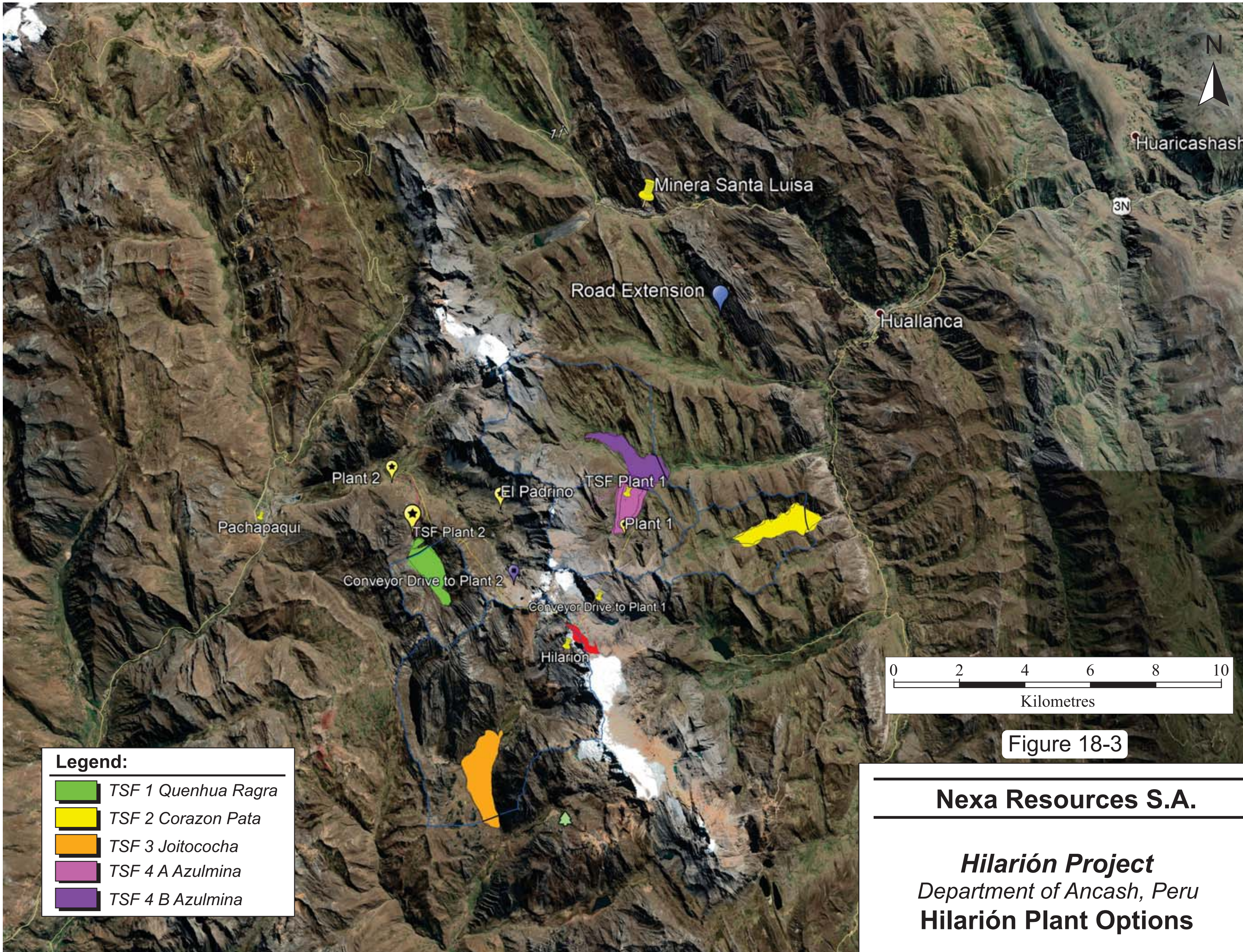


Figure 18-3

Nexa Resources S.A.

Hilarión Project

Department of Ancash, Peru

Hilarión Plant Options

February 2020

Source: Google Earth, 2020.

19 MARKET STUDIES AND CONTRACTS

MARKETS

The principal commodities at the Project will be freely traded, at prices that are widely known, so that prospects for sale of any production are virtually assured. RPA used metal prices of US$1,305 per ounce for gold, US$17.00 per ounce for silver, US$2.97 per pound for copper, US$0.91 for lead, and US$1.17 per pound for zinc for the Base Case.

CONTRACTS

The Project will potentially have various contracts in place for items such as those listed below:

- Mining
- Smelting and Refining
- Transportation and Handling
- Sales, Hedging, Forward Sales

For the study, zinc concentrate production was assumed to be integrated with the Nexa facility at Cajamarquilla – zinc revenue is based on current smelter recoveries and costs, which provide a net benefit to the Project compared to standard industry terms. Lead concentrate was assumed to be sold to a third-party, and standard industry terms for transportation, treatment, and refining costs, and payability factors were applied.

20 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

ENVIRONMENTAL AND SOCIAL SETTING

The information presented in this section is based on documentation provided by Nexa and meetings with mine site personnel in Lima facilitated by Nexa. Meetings were held with Patsy Quinte (Environmental Affairs Engineer for Hilarión) and Santiago Mendoza (Community Relations Manager for Hilarión). No site visit was conducted in support of the preparation of Section 20 of this Technical Report.

The Project is located in the Ancash region of the Peruvian Andes in the part of the Andes referred as the "Cordillera Huallanca". The area is characterized by steep slopes at higher elevations and more gentle slopes towards the valley bottoms. Elevations at the Project site are between 3,800 MASL and 5,200 MASL. The low-lying areas are located in the Chiuruco Valley, which is part of the Chiuruco Community.

The Chaupijanca glacier is located 24 km from the town of Huallanca, at an approximate altitude of 4,643 MASL to 5,069 MASL, above the Aguascocha lagoons. It belongs politically to the District of Huallanca, Province of Bolognesi, Department of Ancash. The Chiuruco Creek is located approximately 14 km from the town of Huallanca.

The Project is located within the Aguascocha Sub Cuenca Chiuruco watershed in proximity to two lakes: the upper Aguascocha lagoon and the lower Aguascocha lagoon. These water bodies are an important water reserve in the Project area.

The climate is typical for the Andes Mountains; very cold, pronounced, and dry winters that typically last from December to April. During the rainy season, the Chiuruco Valley provides sufficient water to support local populations, farming and mining activities.

Mountain glaciers are present in the Project area. Comparison of aerial photos spanning approximately 55 years show evidence of glacier retreat and significant reduction of surface footprint, likely due to global warming and El Niño Southern Oscillation phenomenon (Ecotec, 2018). The existing glaciers are considered to be a sensitive component of the environment in the Project area. Monitoring of the glaciers was initiated by Milpo in 2008 and has been continued by Nexa.

The current Mineral Resources are contained within two deposits, Hilarión and El Padrino, located approximately three kilometres apart. The Project contemplates development of an underground mine that could use either its own processing plant or one of the plants existing in the area. Field activities conducted to date have been limited to exploration. Mining of the Hilarión deposit will involve the construction of facilities and infrastructure that would likely be located for the most part in the District of Huallanca. Mining of the El Padrino deposit will involve the construction of facilities and infrastructure that would likely be located for the most part in the District of Aquia. The local communities potentially impacted by the Project activities are Huallanca, Chiuruco (located in the District of Huallanca), Aquia, and annexes of Aquia. Local farming activities are limited to livestock farming of cattle, sheep, and horses. Fish farming is also a local economic activity.

Extensive baseline data have been collected during the development of the environmental impact studies for the Project and baseline characterizations have been completed for the following disciplines:

- Climate and meteorology
- Geology and geomorphology
- Hydrology and hydrogeology
- Geochemistry
- Surface water and groundwater quality
- Glaciers
- Air quality
- Ambient noise and vibrations
- Soils and land use
- Aquatic biology (flora and fauna)
- Terrestrial biology (flora and fauna)
- Social

The geochemistry evaluation was carried out in 2017 using 105 samples, which are considered to be representative of 90% of the materials from El Padrino and Hilarión deposits. The results indicate that 75% of the geo-environmental units characterized are non-acid generating whereas the remaining 25% present low potential for acid generation.

ENVIRONMENTAL STUDIES

Separate environmental studies have been conducted for the development of Hilarión and El Padrino deposits. All the environmental studies completed for Hilarión up to 2019 have been developed for exploration activities. All the environmental studies completed for El Padrino up to 2017 were developed for exploration activities. The only environmental study for extraction activities is the Environmental Impact Assessment (EIA) completed for El Padrino Mining Project (SRK, 2018), which was submitted to the Peruvian authorities in 2018. This study is currently under review and pending approval by the regulator.

RPA has been provided with and reviewed the following reports:

- Modification to the semi-detailed EIA for the Hilarión Exploration Project (SVS Ingenieros, 2013a)
- First supporting technical report (*Informe Técnico Sustentatorio,* or ITS for its acronym in Spanish) for the fourth modification to the semi-detailed EIA for the Hilarión Exploration Project (Ecotec, 2018)
- Evaluation of the first ITS by the Peruvian Ministry of Energy and Mines (report No. 367-2018-MEM-DGAAM/DNAM/DGAM/A dated August 10, 2018)
- Third modification to the semi-detailed EIA for the El Padrino Exploration Project (Amec, 2017)
- Detailed EIA for the El Padrino Mining Project (SRK, 2018)

No information is available at this time on water management and tailings disposal for operation, although various alternatives for location of the tailings disposal facility have been identified by Nexa. The Azulmina TSF is currently the preferred location (see Mine Infrastructure and Services).

The existing glaciers are considered to be a sensitive component of the environment in the Project area. The main risks to existing glaciers posed by mining activities would be associated with the generation of particulate matter and vibrations. In the case of particulate matter, it is considered that the deposit of dust and other particles on the snow surface could potentially be an important factor in the loss of glacier mass due to reduction of snow albedo, absorption of solar radiation, and increase of melt and sublimation rates. According to the environmental impact assessment work carried out for the Project, vibrations that could be generated from surface activities (transit of vehicles and operation of machinery and equipment) do not represent a risk to the glacier due to the distance from the exploration activities. The Environmental Management Plan considers measures to mitigate the possible impacts of the Project activities on glaciers. These measures refer to the control of generation of particulate material, and noise and vibrations. They also refer to the location of Project facilities and infrastructure. A distance greater than 100 m between the maximum glacier footprint during the winter and the exploration platforms and sedimentation ponds must be observed.

The key Hilarión Exploration Project effects and associated management strategies, as described in the 2018 ITS (Ecotec, 2018), are shown in Table 20-1. An Environmental Management Plan and an Environmental Monitoring Program were prepared as part of the 2018 ITS. The monitoring program includes surface water quality and sediment quality, mining effluent discharges, groundwater quality, air quality, noise, and flora and fauna (terrestrial and aquatic).

TABLE 20-1 SUMMARY OF KEY ENVIRONMENTAL EFFECTS AND MANAGEMENT STRATEGIES
Nexa Resources S.A. – Hilarión Exploration Project

Environmental Component	Potential Impact	Management Strategies
Soils	Changes to soil uses Changes to soil quality	Appropriate storage of oils and lubricants using hermetic containers Appropriate collection using hermetic containers and disposal of residues from cleaning and maintenance of drilling machines and vehicles Appropriate disposal of liquid waste using hermetic containers Removal and adequate disposal of soils contaminated with oil and lubricants
Surface water	Changes to surface water flows Changes to surface water quality	Implementation of water management controls for the drilling platforms and appropriate final disposal of waste materials Minimizing activities in or near water bodies Location of designated areas for temporary storage of waste away from water bodies Appropriate storage, transportation, and handling of hazardous waste according to applicable normativity No discharge of oily materials to water bodies Continuing implementing measures approved by the authorities for construction, rehabilitation, and maintenance of access roads Quarterly monitoring evaluating results based on Peruvian environmental quality standards (ECA for its acronym in Spanish) according to D.S. No. 003-2008-MINAM. Sediment quality monitoring results are evaluated based on the CCME Canadian Environmental Quality Guidelines. Effluent monitoring results are compared against the Maximum Permissible Limits for Discharge of Liquid Effluents from Mining and Metallurgic Activities established in D.S No. 010-2010-MINAM.

Environmental Component	Potential Impact	Management Strategies
Groundwater	Changes to groundwater quality	Lining of components for impermeabilization and prevention of water infiltration Following the Contingency Plan for accidental spills in areas with visible phreatic level Regular maintenance of stormwater management infrastructure Following appropriate procedures for closure of boreholes with presence or absence of water Quarterly monitoring evaluating results based on the CCME Canadian Environmental Quality Guidelines
Air quality	Changes from dust generation and gas emissions	Regular preventive maintenance of vehicles and motorized equipment Regular irrigation of access roads with tanker trucks Speed limit for vehicles circulating within the Project site Quarterly monitoring evaluating results based on Peruvian ECA according to D.S. No. 003-2008-MINAM (recently updated in D.S. No. 003-2017-MINAM)
Noise and vibration	Disturbances resulting from changes to ambient noise levels and generation of vibrations	Prioritization of daily activities Regular maintenance of vehicles and equipment Controlling use of vehicle horns Vehicle circulation though established routes Quarterly monitoring
Terrestrial and aquatic flora	Changes to population and habitat of local species	Protect endemic and endangered species Collection of flora specimens is prohibited Logging, burning, clearing and recollection of vegetation outside of drilling platforms and access roads is prohibited Relocation of flora species Avoid introduction of non-native species Clearing of strictly required areas to avoid unnecessary removal of vegetation Appropriate removal and storage of topsoil Re-vegetation and rehabilitation of disturbed areas Temporary restriction to re-vegetated areas Bi-annual monitoring (dry and wet season)
Terrestrial and aquatic fauna	Changes to population and habitat of local species	Disturbing, stalking and chasing wild fauna is prohibited Hunting activities are prohibited Disposal of liquid and solid waste in water bodies is prohibited Minimizing areas for transport of materials to prevent displacement of fauna Noise control Appropriate controls to prevent contamination of soils and water Appropriate disposal of waste materials Dust control Personnel training Speed limit for vehicles circulating within the Project area Rehabilitation of disturbed areas and restitution of habitats Bi-annual monitoring (dry and wet season)

The key El Padrino Mining Project effects and associated management strategies, as described in the 2018 EIA (SRK, 2018), are shown in Table 20-2. An Environmental Management Plan and an Environmental Surveillance Plan (monitoring program) were prepared as part of the 2018 EIA. The monitoring program includes effluent discharges, surface water quality and sediment quality, groundwater quality, surface flow, air quality (particulate matter and gas emissions), non-ionizing radiation, noise, vibrations, soil quality, terrestrial and aquatic flora, terrestrial and aquatic fauna.

TABLE 20-2 SUMMARY OF KEY ENVIRONMENTAL EFFECTS AND MANAGEMENT STRATEGIES
Nexa Resources S.A. – El Padrino Exploration Project

Environmental Component	Potential Impact	Management Strategies
Soils	Changes to soil uses Changes to soil quality	Terrain contouring and profiling Maintenance of systems and structures for erosion control Storage of topsoil protecting the surface with a cover Compliance with the Residues Management Plan Management and control of accidental spills Regular inspections for control and follow-up Bi-annual monitoring of total metals, free cyanide and hydrocarbons checking compliance against D.S. No. 011-2017-MINAM (ECA for soil)
Surface water	Changes to surface water flows Changes to surface water quality	Interception and diversion of non-contact water to minimize the volume of contact water generated by the Project Collection of contact water and conveyance to sedimentation ponds for recirculation to extraction process and sediment control before releasing excess water to the environment Maintenance of vehicles and equipment to be carried out in the workshop area Prevention, management, and control of accidental spills Maintenance of water management infrastructure (channels, berms, sedimentation ponds, drains, etc.) Maintenance of the water treatment plants for sanitary water and potable water Appropriate management of sludge, domestic effluents, and industrial effluents Quarterly monitoring of field parameters, physicochemical parameters, total metals, and microbiology parameters checking compliance against D.S. No. 004-2017-MINAM (ECA for surface water), categories 3 and 4 Quarterly monitoring of mining effluents for field parameters, total suspended solids, oils and grease, total cyanide, total metals, and dissolved iron checking compliance against D.S. No. 010-2010-MINAM (maximum permissible limits) Bi-annual monitoring of sediment quality checking results against guidelines from Canada
Groundwater	Changes to phreatic level	Implementation of seepage collection systems for waste management facilities Quarterly monitoring of groundwater levels

Environmental Component	Potential Impact	Management Strategies
	Changes to groundwater quality	Quarterly monitoring of field parameters, total metals, and dissolved metals checking results against groundwater quality standards from Canada, Dominican Republic, and Brazil
Air quality	Changes from dust generation and gas emissions	Regular preventive maintenance of vehicles and motorized equipment Regular irrigation of access roads with tanker trucks Speed limit for vehicles circulating within the Project site Optimization of vehicle circulation to minimize trip frequency Turning engine off to avoid unnecessary idling Loading of vehicles respecting weight limits Transportation of materials in trucks with covered open-box beds Quarterly monitoring of particulate matter (PM_{10} and $PM_{2.5}$), lead and gases checking compliance against D.S. No. 003-2017-MINAM (ECA for air) and R.M. No. 315-96-EM/VMM (maximum permissible limits) Bi-annual monitoring of non-ionizing radiation checking compliance against D.S. No. 010-2005-PCM (ECA for non-ionizing radiation)
Noise and vibration	Disturbances resulting from changes to ambient noise levels and generation of vibrations	Appropriate planning and scheduling of blasting activities Appropriate management of explosives Regular maintenance of vehicles and equipment Controlling use of vehicle horns Controlling number of circulating vehicles Vehicle circulation though established routes Quaternary noise monitoring checking compliance against D.S. No. 085-2003-PCM (ECA for noise) Bi-annual vibration monitoring checking results against norms from Spain and Germany
Aquatic flora and fauna	Changes in abundance and diversity of aquatic species	Surface water mitigation measures to prevent contamination of water bodies (see above) Fishing and capture of specimens are prohibited Use and commercialization of specimens are prohibited Avoid introduction of non-native species Personnel training Bi-annual monitoring (dry and wet season)
Terrestrial flora and fauna	Changes to vegetation cover and diversity of terrestrial flora and fauna Changes to sensitive species of wild flora and fauna	Clearing of strictly required areas to avoid unnecessary removal of vegetation Appropriate removal and storage of topsoil Logging, burning, clearing and recollection of vegetation species is prohibited Re-vegetation and restoration Temporary access restriction to re-vegetated areas Avoid introduction of non-native species Disturbing, stalking, and chasing wild fauna is prohibited Hunting activities and capture of specimens are prohibited Minimizing areas for transport of materials to prevent displacement of fauna Speed limit for vehicles circulating within the Project area Noise control Protection of 'bofedales' (wetlands)

Environmental Component	Potential Impact	Management Strategies
		Appropriate controls to prevent contamination of soils and water Implementation of a soil remediation plan for accidental spills of hazardous substances Appropriate disposal of waste materials Activities of rescue and relocation Re-population of fauna Tracking performance indicators Personnel training Bi-annual monitoring (dry and wet season)

PROJECT PERMITTING

Peruvian projects pursuant of government environmental approval are classified in three categories:

- Category I – projects with minor potential adverse impacts do not require an EIA; instead, a Declaration of Environmental Impact (DIA for its acronym in Spanish) is prepared by the proponent, which should include environmental and social management plans, mine closure plan, and requirements for project licences.
- Category II – projects with moderate potential adverse impacts that can be mitigated with relatively simple mitigation measures require a "semi-detailed" EIA (EIA-sd).
- Category III – projects with significant potential adverse impacts (quantitative or qualitative) require a "detailed" EIA (EIA-d).

The ITS introduced in D.S. No. 054-2013-PCM is a complementary Environmental Management Instrument that can be used to modify an approved EIA-d for a project change that involves technological improvements in operations or non-significant adverse environmental impacts.

The Environmental Management Instruments previously approved for the Hilarión Exploration Project by the Peruvian Ministry of Energy and Mines are as follows:

- EIA-sd approved through directorial resolution (*Resolución Directoral,* or R.D.) No. 226-2010-MEM/AAM dated July 9, 2010, supported with report No. 656-2010-MEM-AAM/MES/YBC/CMC/RBG/ACHM
- First modification to the EIA-sd approved through R.D. No. 100-2011-MEM/AAM dated April 7, 2011, supported with report No. 354-2011-MEM-AAM/EAF/YBC/RBG/ACHM
- Second modification to the EIA-sd approved through R.D. No. 040-2012-MEM/AAM dated February 15, 2012, supported with report No. 149-2012-MEM-AAM/YBC/RBG/PRR/GCM/ACHM

- Third modification to the EIA-sd approved through R.D. No. 338-2012-MEM/AAM dated October 17, 2012, supported with report No. 1169-2012-MEM-AAM/ABR/MPC/RPP/GPV
- First ITS approved through R.D. No. 349-2013-MEM-AAM dated September 17, 2013, supported with report No. 1300-2013-MEM-AAM/JCV/RPP/LRM
- Second ITS approved through R.D. No. 054-2014-MEM-DGAAM dated January 31, 2014, supported with report No. 118-2014-MEM-DGAAM/DNAM/DGAM/B
- Fourth modification to the EIA-sd approved through R.D. No. 157-2014-MEM-DGAAM dated March 27, 2014, supported with report No. 346-2014-MEM-DGAAM/DGAM/B
- First ITS to the Fourth modification to the EIA-sd approved through R.D. No. 154-2018-MEM-DGAAM dated August 13, 2018, supported with report No. 367-2018-MEM-DGAAM/DNAM/DGAM/A

The fifth modification to the EIA-sd for the Hilarión Exploration Project was submitted to the Peruvian authorities for evaluation in May 2019 to obtain approval for new exploration platforms, access roads to the new platforms, auxiliary components, and a revised drilling schedule. This study is currently under review and pending approval by the regulator.

Authorization to take surface water for the Hilarión Exploration Project activities was granted by the National Water Authority through R.D. No. 1413-2019-ANA-AAA.M dated November 22, 2019. The authorization is for a maximum volume of 8,199.36 m^3 for a period of two years (4,099.68 m^3/year).

The Environmental Management Instruments previously approved for the El Padrino Exploration Project by the Peruvian Ministry of Energy and Mines are as follows:

- EIA-sd approved through R.D. No. 201-2010-MEM/AAM dated June 9, 2010
- First modification to the EIA-sd approved through R.D. No. 224-2011-MEM/AAM dated July 25, 2011
- First ITS approved through R.D. No. 348-2013-MEM-AAM dated September 17, 2013
- Second modification to the EIA-sd approved through R.D. No. 537-2014-MEM-DGAAM dated October 24, 2014
- Second ITS approved through R.D. No. 024-2016-MEM-DGAAM dated January 22, 2016
- Third modification to the EIA-sd approved through R.D. No. 240-2017-MEM-DGAAM dated August 31, 2017

The EIA-d for the El Padrino Mining Project was submitted to the National Environmental Certification Service for Sustainable Investments (SENACE for its acronym in Spanish) for evaluation in October 2018 to obtain approval for underground mining, construction of three tunnels that will provide access of personnel and equipment to the extraction zone, two waste rock dumps, one temporary ore stockpile, sedimentation ponds, and auxiliary components (offices, power stations, water tanks, warehouse, workshop, etc.).

Authorization to take surface water for the Hilarión Exploration Project activities was granted by the National Water Authority through the following directorial resolutions:

- R.D. No. 172-2010-ANA-ALA-BARRACA dated August 20, 2010
- R.D. No. 138-2013-ANA-AAA-CF dated June 6, 2013
- R.D. No. 518-2014-ANA-AAA-CF dated March 27, 2014
- R.D. No. 1091-2014-ANA-AAA-CF dated August 18, 2014
- R.D. No. 349-2015-ANA-AAA-CF dated March 27, 2015

The most recent certificate of non-existence of archeological remains (CIRA Certificate) No. 196-2016-ANC was issued by the Peruvian Ministry of Culture on September 16, 2016.

SOCIAL OR COMMUNITY REQUIREMENTS

GENERAL CONTEXT

The Project area is accessible by road and is located in close proximity to three rural districts: Aquia, Huallanca, and Huasta. The local communities potentially impacted by the Project activities are Huallanca, Chiuruco (located in the District of Huallanca), Aquia, and annexes of Aquia. The focus of this social review is on the impacts to the communities of Huallanca and Chiuruco given that, based on the most recent evaluation of alternatives, Project facilities required for operation will likely be located within the District of Huallanca.

This section presents the results of the social review based on a review of Nexa's policies, programs, social risk management systems, and/or social performance against relevant International Finance Corporation (IFC) Performance Standards (PS) (2012 Edition). This social review does not represent a detailed audit of Nexa's compliance with IFC PSs. Nexa's social performance is benchmarked against the following IFC PSs:

- **PS1: Social and Environmental Assessment and Management Systems** requires that companies identify, assess, and mitigate the social and environmental impacts and risks they generate throughout the lifecycle of their projects and operations. From a social perspective, the requirement includes: a comprehensive social assessment; identification of critical social impacts and risks; community consultation and engagement; information disclosure; mitigation plans to address impacts and risks; and development of an organizational structure with qualified staff and budgets to manage the overall social management system.

- **PS2: Labour and Working Conditions** incorporates the International Labour Organization conventions that seek to protect basic worker rights and promote effective worker/management relations.
- **PS4: Community Health and Safety** declares the project's duty to avoid or minimize risks and impacts to community health and safety and addresses priorities and measures to avoid and mitigate project related impacts and risks that might generate community exposure to risks of accidents and diseases.
- **PS5: Land Acquisition and Involuntary Resettlement** considers the need for land acquisition or involuntary resettlement of any individual, family or group; including the potential for economic displacement.
- **PS7: Indigenous Peoples** considers the presence of Indigenous groups, communities, or lands in the area that may be directly or indirectly affected by projects or operations.
- **PS8: Cultural Heritage**. This standard is based on the Convention on the Protection of the World Cultural and Natural Heritage. The objectives are to preserve and protect irreplaceable cultural heritage during a project's operations, whether or not it is legally protected or previously disturbed and promote the equitable sharing of benefits from the use of cultural heritage in business activities.

It is noted that **PS3 Resource Efficiency and Pollution Prevention** and **PS6 Biodiversity Conservation** correspond to environmental performance standards. Environmental management and performance are discussed under Environmental Studies.

PS1: SOCIAL AND ENVIRONMENTAL ASSESSMENT AND MANAGEMENT SYSTEMS

At a corporate level, Nexa has adopted the guidelines of the International Integrated Reporting Council (IIRC) and the standards for the Global Reporting Index (GRI). The IIRC guidelines promote a cohesive and integrated approach to reporting on organizational activities. The GRI standards provide best practices for public reporting on economic, environmental, and social impacts in order to help Nexa and its shareholders and stakeholders understand their corporate contribution to sustainable development. These standards were reported on in the most recent (2018) Nexa Resources Annual Report. With respect to social issues, the 2018 Annual Report provided details of corporate activities aligning with the following GRI Standards:

1. Employment
2. Occupational Health and Safety
3. Non-discrimination

4. Training and education
5. Diversity and equal opportunities
6. Freedom of association and collective bargaining
7. Child labour
8. Forced or compulsory labour
9. Human rights assessment
10. Local communities
11. Social assessment of suppliers
12. Socio-economic compliance

Nexa's 2018 Annual Report also includes reporting on corporate progress towards several sustainable development goals. With respect to social environment issues, these include:

1. Gender equality
2. Decent work and economic growth
3. Good health and well-being
4. Peace, justice, and strong institutions
5. Quality education
6. Reduced Inequalities
7. Sustainable cities and communities
8. Responsible consumption and production
9. Life below water

Nexa has a corporate compliance policy (PC-RCC-CCI-005-EN) meant to guide Nexa representatives and third parties. The compliance policy includes the following policies and procedures:

1. Code of Conduct
2. Anti-Corruption Policy
3. Money Laundering and Financing Terrorism Prevention Policy
4. Antitrust/Competition Policy
5. Insider Trading Policy
6. Disclosure Policy
7. Compliance Program Manual
8. Money Laundering and Financing Terrorism Prevention Manual
9. Gifts and Hospitality Procedure
10. Relationships with Government Representatives Procedure

11. Travel and Entertainment Procedure
12. Integrity Due Diligence Procedure
13. Conflict of Interests Procedure

In order to understand the potential effects of the Project on the areas of direct social influence, Nexa is relying on several studies from 2013 to 2018 including a detailed EIA (SRK, 2018). This assessment includes a description of the social environment for both the direct and indirect areas of social influence, a citizen participation plan, a characterization of social impacts of the Project, and an environmental management strategy.

It is important to note that while these documents focus on the District of Aquia, this review has a primary focus on the Huallanca area. As these communities are in very close proximity to one another, for the purposes of this review, the currently available documentation is being used as a proxy for more detailed information about the District of Huallanca. It is assumed that the types of potential impacts and proposed mitigation measures are similar for both areas.

The description of the **Social Baseline** includes:

- Sociodemographic characteristics
- Fertility and migration
- Drinking water sources
- Health services
- Education
- Housing and infrastructure
- Organizations and social institutions
- Economy and employment
- Livestock and agriculture
- Mining
- Unmet basic needs

The baseline environment characterization was accomplished through a variety of methods including both primary and secondary data collection. Primary data collection included field investigations such as surveys and interviews. Secondary data collection included reviews of legal documentation, information related to the areas of influence and inhabited areas, and studies relevant to the Project areas.

The **Citizen Participation Plan** describes the various ways in which members of the public and stakeholder groups could become engaged in the Project at various stages of the EIA. These have included:

- Participatory workshops
- Via the Permanent Information Office (PIO)
- Via receipt of information materials

In addition to these methods, as Project implementation continues, Nexa is committed to the implementation of the following citizen participation activities:

- Public advertisements of Project activities including posters in public spaces and via local broadcasters
- Presentations to stakeholder groups and representatives in various municipalities
- Public meetings
- Guided facility tours
- Participatory environmental monitoring

The **Characterization of Environmental and Social Impacts** determined that the Project would affect the following social factors:

- Health
- Education
- Local employment
- Commercial activity
- Land use

The assessment identified a number of potentially negative impacts. The only severe or significantly high impact was on rural land holders (expected to be less than five), who would need to be relocated or would lose access to that land. In this case, Nexa would need to implement a Social Compensation Plan (see section PS5).

Moderate negative impacts were predicted on health and on people's perception of their health due to increased dust, emissions, noise, and effluents resulting from the Project activities. Water discharge into local streams and increased vehicular traffic may also affect people's perceptions of their health.

Job expectations and opportunities are also expected to increase. This was found to be a moderate negative impact, as job expectations may exceed actual job opportunities created.

Several positive impacts were found for the social environment, including the improvement in local trade and economic opportunities through the acquisition of goods and services, improved education, and increased local employment.

In order to mitigate any negative impacts to the socio-economic environment as well as enhance any positive benefits that may result from the Project activities, Nexa has adopted the **Social Management Plan.** The types of programs included in the Social Management Plan include:

- Communications Relations Program
- Social Impact Mitigation Program
- Social Contingencies Program
- Compensation Program
- Local Employment Program
- Health and Nutrition Program
- Education Program
- Cultural Development Project
- Local Products, Goods, and Services Acquisition Program
- A Livestock Project

Together, these plans covering all stages of the Project include expenditures of approximately $2,697,000 Soles (approximately US$80,000). It is assumed that this figure is for the impacts to the communities in the District of Aquia, and should the Project proceed in Huallanca, a similar commitment would need to be made.

The key to successful identification and management of critical social risks is through the development and maintenance of constructive relationships with stakeholders. At the core of building and maintaining relationships is ensuring that Nexa maintains a database of relevant stakeholders, a matrix/listing of interactions with each stakeholder, as well as a social risk register. Nexa maintains such a tool for Huallanca, which allows Nexa to track and prioritize social issues.

In order to manage communications with the public, Nexa has already developed relationships with the local community including a local office and physical presence. The offices allow visitors to come in and speak with Project staff and learn more about the Project. Nexa also conducts targeted briefings and information sessions with various community stakeholder groups. The Social Management Plan includes details on how the Project and related impacts will be communicated to the public, how relationships will be fostered, and a contingency plan to mitigate potential social risks.

PS2: LABOUR AND WORKING CONDITIONS

Corporately, Nexa reports that 100% of its workers in Brazil are covered by collective bargaining units but does not report on the status in Peru. At a corporation level, Nexa has committed to the freedom of association and collective bargaining. Some of the Sustainable Development Targets identified by Nexa include (but are not limited to):

- By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value; and
- Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, migrant women, and persons in precarious employment.

At the time of writing this report, there was no available information on the number of proposed unionized employees and their collective bargaining units for Hilarión. However, it is assumed that should the Project proceed, on-site operations will align with corporate Nexa objectives.

Since the Project is not yet under construction, information was also not available on the number of type of skilled versus unskilled workers. However, Nexa has established local employment with targets of 100 jobs during construction, 200 jobs during operations, and 35 jobs at the closure stage of the Project. These jobs will be both directly with Nexa and through contractors.

Nexa has adopted occupational health and safety (OHS) policies to ensure the protection and promotion of the safety, human health, and welfare of employees. Corporately, Nexa reports on its health and safety performance and highlights safety as its “greatest asset”. Several corporate initiatives are aimed at promoting safety, ensuring that workers and contractors are trained, and ensuring that processes are in place to address any incidents that arise. In Peru, Nexa has advanced its *Peru Safety Plan*, which was reported to be 80% complete in the 2018. The *Peru Safety Plan* includes eight pillars:

1. Leadership training and awareness
2. Strengthening the occupational health and safety team
3. Implementation of the Outsourcing Management program
4. Improvement of wellness and work regime conditions in the units
5. Standardization of processes and procedures and improvements in Peru's mining units contingency plans
6. Team training and awareness
7. Synergy with Digital Mining actions measures
8. Industrial Automation Master Plan

For Hilarión, since the Project is not yet under construction, no site-specific OHS plans were available for review, however, it is assumed that should the Project proceed, site-specific plans will align with corporate and Peruvian guidelines and standards.

Corporately, Nexa has stated its commitment to internationally recognized human rights and prohibits any violation of human rights in its operations and suppliers. Nexa strives to protect human rights to ensure safety and equitable treatment of vulnerable populations. Suppliers are asked to provide information regarding both social responsibility and human rights preservation.

Nexa has committed resources to train and develop the local workforce in preparation for the Project. These initiatives include local job training for youth and others regarding heavy machinery, surveying, computing, and gastronomy.

Nexa has also made commitments to aid in the development of the local economy through strengthening agricultural operations and preferred acquisition of local goods and services.

PS4: COMMUNITY HEALTH AND SAFETY

Corporately, Nexa has made several commitments to improve community health and safety, as well as the overall well-being of community members. At Hilarión, Nexa has committed to social and community-based programs including investments of education through training, provision of school supplies and infrastructure improvements, investments in local cultural festivals, and health improvements including health care campaigns and disease prevention communication.

The 2017 NI 43-101 Technical Report suggested that further human health risk assessments be conducted to determine if potential air and water impacts (all predicted to be within regulatory standards) will affect the local population, wildlife, or feedstock. At the time of writing this report, no information was available to determine if this has yet been completed.

PS5: LAND ACQUISITION AND INVOLUNTARY RESETTLEMENT

The proposed project at Hilarión may involve resettlement of land custodians (expected to be less than five) who use the area for agricultural purposes. At the time of writing this report, there was no evidence to suggest that any permanent residents would need to be relocated. To support this relocation, Nexa has committed to:

- Determine the use of the agricultural or livestock farm that will be affected;
- Determine the extent of the property that will be affected;
- Meet with those involved to discuss issues;
- Provide support for affected land custodians;
- Coordinate with land custodians to transfer items and livestock if required;
- Provide support to rebuild new property through construction;
- Provide support in agricultural training if required; and
- Negotiate investments or divestments as appropriate.

These measures are largely in alignment with IFC standards for forced relocation.

Since the 2018 EIA report for El Padrino Mining Project provides details for the District of Aquia only, the need for forced relocation is not yet known.

PS7: INDIGENOUS PEOPLES

Based on available information, there are no Indigenous Peoples residing in or using the Project area lands. Therefore, this standard is not relevant to this review.

PS8: CULTURAL HERITAGE

Nexa has a CIRA Certificate issued by the Peruvian Ministry of Culture (2019) for the Project. This certificate states that where exploration activities occur, there are no traces of archaeological or historical remains. At the time of writing this report, there was no available information on any Chance Find Procedures that might be required upon commencement of Project construction.

Since the 2018 EIA report for El Padrino Mining Project provides details for the District of Aquia only, the presence of cultural heritage features in the District of Huallanca is not known.

MINE CLOSURE REQUIREMENTS

Conceptual Mine Closure Plans have been developed for all components of the Hilarión Exploration Project and the El Padrino Mining Project, in compliance with applicable Peruvian legislation. The plans address temporary, progressive, and final closure actions, and post closure inspection and monitoring. Two years before final closure, a detailed version of the Mine Closure Plan will have to be prepared and submitted to the Peruvian Ministry of Energy and Mines for review and approval.

The plan for the Hilarión Exploration Project was developed as part of the EIA-sd and the ITS for the fourth modification to the EIA-sd for the Hilarión Exploration Project (Ecotec, 2018). The plan for the El Padrino Mining Project was developed as part of the EIA-d (SRK, 2018).

The general objectives of the Hilarión Mine Closure Plan are as follows:

- Reduce or prevent environmental degradation and minimize adverse effects on biota;
- Promote, if possible, a use and condition of the rehabilitated ground that is compatible with the environment conditions of the Project area; and
- Promote the regeneration and restoration of the original habitat, as close as possible to original conditions prior to the Project.

The main facilities and infrastructure of the Hilarión Exploration Project subject to closure activities are as follows:

- Drilling platforms
- Boreholes
- Access roads
- Sedimentation ponds
- Topsoil stockpile
- Fuel storage facility

- Waste dump

The closure objectives of the El Padrino Mine Closure Plan are as follows:

- Health and safety – Securing public health and safety during execution of closure and post-closure activities, recovering the original environmental quality of the surroundings and developing feasible rehabilitation works from a biological, technical, and financial perspective.
- Physical stability – Long term closure design and measures adopting proper factors of safety for events with long recurrence periods.
- Geochemical stability – Long term closure design and measures to prevent acid rock drainage that could impact natural waterbodies.
- Land use – Proper uses following completion of rehabilitation activities in order to preserve the habitats for flora and fauna in the mine area of influence.
- Water bodies use – Maintain equilibrium in the micro-basins located in the mine area, preserving water quantity and quality, and implementing adequate water management.
- Social objectives – Minimize socio-economic impacts as much as possible by executing social programs that preserve the way of life of local communities.

The main facilities and infrastructure of the El Padrino Mining Project subject to closure activities are as follows:

- Extraction tunnel
- Ventilation shafts
- Sedimentation ponds
- Water management infrastructure (channels, pipelines, and water tanks)
- Waste rock dumps
- Industrial and domestic waste disposal facility
- Temporary ore stockpile
- Topsoil stockpile
- Auxiliary components (offices, warehouse, workshop, gas station, sanitary wastewater treatment plant, etc.)
- Access roads

The main closure activities for Hilarión and El Padrino projects are as follows:

- Dismantling
- Demolition, recovery, and disposal
- Measures to achieve physical stability
- Measures to achieve geochemical stability

- Measures to achieve hydrological stability
- Establishment of the land contouring
- Re-vegetation
- Social programs
- Post-closure maintenance and/or monitoring

The post-closure monitoring program will be initiated immediately after completion of the closure measures applicable to each Project facility and will remain active for at least five years, to evaluate the results and adequacy of implemented measures. The monitoring program involves physical stability, geochemical stability, water and sediment, and social component. The monitoring program developed during the operational phase will continue during the closure phase and will be updated as the Project approaches the closure phase, incorporating and/or eliminating elements, according to environmental and safety requirements. The monitoring activities will target compliance with national legal norms based on the Peruvian environmental quality standards and Maximum Permissible Limits for regulated parameters through the current mining and environmental legislation.

An updated cost estimate for mine closure accounting for closure activities and post-closure monitoring was included in the fifth modification to the EIA-sd for the Hilarión Exploration Project, which was submitted to the Peruvian authorities for evaluation in May 2019. The closure cost estimate was not included within the information available for review. The Mine Closure Plan from 2013 (SVS Ingenieros, 2013b) presents a cost estimate of US$570,804 (US$315,767 for final closure and US$255,037 for the five-year post-closure period).

A closure cost estimate was developed and included in the EIA-d for the El Padrino Mining Project. The total value estimated in 2018 is US$1,558,242 and corresponds to the period of two years anticipated for mine closure. No cost estimate has been developed to account for the five years of post-closure monitoring.

21 CAPITAL AND OPERATING COSTS

The Hilarión capital and operating costs were developed from the estimates of the required infrastructure, equipment, and manpower levels necessary to carry out the various phases of the Project. References for these cost areas included, RPA in-house data base information, equipment prices from suppliers, development costs from mine contractors in-country, and factored from past studies carried out for the Project.

CAPITAL COST

The capital cost for the Project is comprised of the pre-production capital and the sustaining capital required during the life of the mine. The pre-production period for Hilarión includes two years for mine and plant preparation and one year considered for ramp up to full production nameplate at the beginning of Year 2.

The preproduction capital is outlined in Table 21-1.

TABLE 21-1 PRE-PRODUCTION CAPITAL COSTS
Nexa Resources S.A. - Hilarión Project

Description	Preproduction Capital Cost (US$ 000)
Mine	
UG Equip.	6,410
Sur. Equip.	1,791
Preprod. Dev.	80,789
Main Vent.	1,520
Mine Pumping	151
Mine Services	1,973
Backfill Plant & Dist.	10,089
Sub-Total	**102,723**
Plant	
Crush/Grind/Float/Reagents	124,933
Elec. Substation & Dist.	17,134
Tailings/Dumps/WTP	78,128
Process Services	1,108
Sub-Total	**221,304**

Description	Preproduction Capital Cost (US$ 000)
Surface Infrastructure	
Mine Site Buildings	21,103
Roads	6,300
Power	8,864
Admin.	845
Sub-Total	**37,112**
Total Direct Costs	**361,140**
Indirect Costs	
EPCM (25%)	83,062
Other	5,814
Owners Cost	18,069
Sub-Total	**106,945**
Direct + Indirect Costs	**468,085**
Contingency (25%)	117,021
Total Preproduction Capital	**585,106**

The preproduction capital costs distribution includes $46 million in Year 1, $283 million in Year 2 and $256 million in Year 3 for a total of $585 million. Direct costs at $361 million make up approximately 62% of the cost while indirect costs of $107 million make up approximately 18% of the cost. Contingency was estimated at 25% of the combined direct and indirect costs, which RPA considers to be reasonable at the PEA level of study. The indirect costs include the engineering, procurement, construction and management, freight, insurance, and first fills.

The sustaining capital cost is presented in Table 21-2. The major costs are for mine equipment at 20% of the total and tailings at 76% of the total.

RPA notes that the waste development costs are accounted for in the operating costs in this analysis instead of being capitalized under sustaining development. The tailings facility cost accounts for dam raises in Year 4 and Year 8 as indicated. The total mine life extends out to Year 16, however, RPA is of the opinion that the potential for extending the mine life, based on current diamond drilling programs, is quite favourable.

TABLE 21-2 SUSTAINING CAPITAL COST
Nexa Resources S.A. - Hilarión Project

Description	Total US$(000)	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6	Yr. 7	Yr. 8
UG Equipment	24,235	9,515	7,329	2,172	1,604	904	904	904	904
Surface Equipment	575	235	235	105	-	-	-	-	-
Mine Ventilation	870	690	90	90	-	-	-	-	-
Mine Pumping & Serv.	1,925	771	368	397	50	189	50	50	50
Backfill Equipment	396	396	-	-	-	-	-	-	-
Tailings facility	92,991	-	-	-	46,496	-	-	-	46,496
Total	120,991	11,606	8,022	2,764	48,150	1,093	954	954	47,450

OPERATING COSTS

The Hilarión operating costs were developed based on current wage rates in the Peru in addition to the cost for consumables and equipment maintenance. Estimated performance rates of the various activities such as development, production drilling, loading, blasting, and mucking also formed the basis of the costs identified. Mine development and haulage costs were based on current contractor rates for such activities. The operating costs include direct labour, consumables, equipment operating and maintenance costs, and supervision costs.

The average operating costs estimated for Hilarión are presented in Table 21-3.

TABLE 21-3 OPERATING COSTS
Nexa Resources S.A. - Hilarión Project

Description	US$ 000/year	US$/t processed
Mine	65,509	18.20
Processing	47,714	13.25
G&A	10,803	3.00
Total	**124,026**	**34.45**

Mining costs are based on the use of bulk stoping methods with 30.0 m high stopes to provide the planned production rate. Ore haulage is not included in the first four years of mining as the ore can be moved to the ore passes and fed directly to the crusher station. Muck from the stopes will be moved quickly to nearby ore passes and fed to the underground crusher station which in turn will provide crushed muck to the feeder and subsequently the conveyor system to convey the material to the plant over a distance of approximately three kilometres. While the conveyor could be used to move waste rock, the requirement will be limited as there will be a shortfall of waste rock that will be required for backfilling of the stopes.

22 ECONOMIC ANALYSIS

The economic analysis contained in this report is based, in part, on Inferred Mineral Resources, and is preliminary in nature. Inferred Mineral Resources are considered too geologically speculative to have mining and economic considerations applied to them and to be categorized as Mineral Reserves. There is no certainty that economic forecasts on which this PEA is based will be realized.

An after-tax Cash Flow Projection has been generated from the LOM production schedule and capital and operating cost estimates and is summarized in Table 22-1. A summary of the key criteria is provided below.

ECONOMIC CRITERIA

PHYSICALS

- Pre-production period of approximately 24 months.
- Mine life of 16 years.
- The LOM plan is shown in Table 16-9.
- Total processing of 44.7 million tonnes grading 3.54% Zn, 0.72% Pb, 0.06% Cu, 30.43 g/t Ag.
- Mill recovery averaging 90% for zinc, 86% for lead, 80% for silver, with no copper recovered.

REVENUE

- Zinc concentrate averages 84% payable, with lead concentrate averaging 95% payable for silver, and 94.5% payable for lead, net of minimum deductions.
- Metal prices used are US$17/oz for silver, US$0.91/lb for lead, and US$1.17/lb for zinc with all costs in US dollars.
- Revenue is recognized at the time of production.
- Since the revenue is based on the integration of Nexa's Cajamarquilla smelter, standard third-party smelter terms were not used. This provides an upside on recovery payability, and smelter costs, for zinc concentrate.

COSTS

- Pre-production capital expenditure is US$585 million.

- Total LOM capital expenditures are US$750 million.
- Average operating cost over the LOM is US$34.45/t processed.

TAXES

- The mining taxes were based on a rate of 8%, with income taxes based on a rate of 29.5%.

TABLE 22-1 LOM CASH FLOW SUMMARY
Nexa Resources S.A. - Hilarión Project

	INPUTS	UNITS	TOTAL	Year -2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
MINING																					
Underground																					
Operating Days	360	days	5,760			360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360
Tonnes milled per day		tpd	7,759			3,058	10,390	10,337	10,142	10,340	10,379	10,319	10,288	10,257	10,311	10,394	7,072	5,870	1,561	2,223	1,201
Production Tonnes		000 t	44,691	160	274	667	3,740	3,721	3,651	3,722	3,736	3,715	3,704	3,692	3,712	3,742	2,546	2,113	562	800	432
Ag Grade		g/t	30.43	50.19	33.10	31.72	40.53	32.14	32.68	24.24	24.24	24.35	26.11	25.87	26.29	32.80	35.25	37.70	41.64	47.50	38.30
Cu Grade		%	0.06%	0.04	0.03	0.03	0.04	0.05	0.05	0.10	0.10	0.07	0.05	0.03	0.02	0.03	0.05	0.08	0.16	0.14	0.07
Pb Grade		%	0.72%	1.04	0.74	0.66	0.82	0.64	0.69	0.42	0.39	0.45	0.64	0.70	0.67	1.02	1.11	1.12	1.08	1.46	1.31
Zn Grade		%	3.54%	3.32	3.41	3.04	2.91	3.01	3.15	3.82	4.14	3.96	3.84	3.53	3.61	3.42	3.49	3.72	4.15	3.48	3.45
Waste		000 t	7,459	719	690	443	639	558	407	561	606	496	392	390	397	355	369	268	127	42	-
Total Moved		000 t	52,150	878	964	1,110	4,379	4,279	4,058	4,283	4,342	4,211	4,095	4,083	4,109	4,097	2,915	2,382	689	842	432
PROCESSING																					
Mill Feed		000 t	44,691			1,101	3,740	3,721	3,651	3,722	3,736	3,715	3,704	3,692	3,712	3,742	2,546	2,113	562	800	432
Ag Grade		g/t	30.43			34.75	40.53	32.14	32.68	24.24	24.24	24.35	26.11	25.87	26.29	32.80	35.25	37.70	41.64	47.50	38.30
Cu Grade		%	0.06%			0.03%	0.04%	0.05%	0.05%	0.10%	0.10%	0.07%	0.05%	0.03%	0.02%	0.03%	0.05%	0.08%	0.16%	0.14%	0.07%
Pb Grade		%	0.72%			0.74%	0.82%	0.64%	0.69%	0.42%	0.39%	0.45%	0.64%	0.70%	0.67%	1.02%	1.11%	1.12%	1.08%	1.46%	1.31%
Zn Grade		%	3.54%			3.17%	2.91%	3.01%	3.15%	3.82%	4.14%	3.96%	3.84%	3.53%	3.61%	3.42%	3.49%	3.72%	4.15%	3.48%	3.45%
Contained Ag		oz	43,724,227		-	1,230,003	4,873,775	3,844,949	3,836,350	2,900,906	2,911,487	2,908,160	3,109,272	3,071,447	3,137,533	3,946,565	2,885,019	2,561,537	752,466	1,222,252	532,506
Contained Cu		t	25,027		-	308	1,317	1,825	1,742	3,673	3,717	2,521	1,729	944	823	1,164	1,344	1,623	925	1,089	284
Contained Pb		t	322,679		-	8,109	30,541	23,896	25,170	15,484	14,511	16,902	23,696	25,906	24,955	38,308	28,192	23,602	6,051	11,707	5,650
Contained Zn		t	1,583,257		-	34,913	108,784	112,085	114,985	142,355	154,636	147,129	142,343	130,443	134,101	127,800	88,849	78,679	23,352	27,882	14,923
Recovery Grade																					
Cu Concentrate	Recovery #1	%																			
Ag	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Cu	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pb	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Zn	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pb Concentrate	Recovery #2	%																			
Ag	80.00%		80.00%		80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%	80.00%
Cu	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pb	86.00%		86.00%		86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%	86.00%
Zn	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Zn Concentrate	Recovery #3	%																			
Ag	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Cu	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pb	0.00%		0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Zn	90.00%		90.00%		90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%
Net Recovery		%																			
Ag			80.00%		80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
Cu			0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pb			86.00%		86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%	86%
Zn			90.00%		90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Total Average Recovery			80.36%			80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
Recovered Amount																					
Cu Concentrate	**Recovery #1**																				
Ag		**oz**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cu		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pb		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zn		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pb Concentrate	**Recovery #2**																				
Ag		**oz**	**34,979,381**		**-**	**984,002**	**3,899,020**	**3,075,959**	**3,069,080**	**2,320,725**	**2,329,190**	**2,326,528**	**2,487,417**	**2,457,158**	**2,510,027**	**3,157,252**	**2,308,015**	**2,049,229**	**601,973**	**977,802**	**426,005**
Cu		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pb		**t**	**277,504**		**-**	**6,974**	**26,265**	**20,550**	**21,646**	**13,316**	**12,479**	**14,535**	**20,379**	**22,279**	**21,461**	**32,945**	**24,245**	**20,298**	**5,204**	**10,068**	**4,859**
Zn		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zn Concentrate	**Recovery #3**																				
Ag		**oz**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cu		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pb		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zn		**t**	**1,424,931**		**-**	**31,421**	**97,906**	**100,876**	**103,486**	**128,119**	**139,173**	**132,416**	**128,109**	**117,399**	**120,691**	**115,020**	**79,964**	**70,811**	**21,016**	**25,094**	**13,431**
Grades in Concentrate																					
Cu Concentrate		dmt	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag grade in concentrate	0.00	g/t	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cu grade in concentrate	0.00%	%	0.00%		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pb grade in concentrate	0.00%	%	0.00%																		
Zn grade in concentrate	0.00%	%	0.00%																		
Concentrate Moisture	0.00%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Cu Concentrate		wmt	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pb Concentrate		dmt	504,553		-	12,680	47,754	37,364	39,356	24,211	22,689	26,428	37,052	40,507	39,020	59,899	44,083	36,906	9,462	18,305	8,835
Ag grade in concentrate		g/t	3,921			4,389	4,617	4,656	4,410	5,421	5,806	4,978	3,797	3,430	3,638	2,981	2,961	3,140	3,598	3,021	2,727
Cu grade in concentrate	0.00%	%	0.00%			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pb grade in concentrate	55%	%	55.00%		55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%
Zn grade in concentrate	0.00%	%	0.00%			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Concentrate Moisture	10.00%				10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Pb Concentrate		wmt	560,614		-	14,089	53,060	41,516	43,729	26,902	25,210	29,364	41,169	45,008	43,356	66,555	48,981	41,006	10,513	20,339	9,817
Zn Concentrate		dmt	2,849,863		-	62,843	195,812	201,753	206,972	256,238	278,345	264,832	256,218	234,798	241,381	230,040	159,928	141,622	42,033	50,187	26,861
Ag grade in concentrate	0.00	g/t	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cu grade in concentrate	0.00%	%	0.00%			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pb grade in concentrate	0.00%	%	0.00%			0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Zn grade in concentrate	50%	%	50.00%		50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Concentrate Moisture	10.00%				10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Zn Concentrate		wmt	3,166,514		-	69,825	217,568	224,170	229,969	284,709	309,273	294,258	284,686	260,886	268,201	255,600	177,697	157,358	46,703	55,764	29,846
Total Tonnes Concentrate		wmt	3,727,128		-	83,914	270,629	265,686	273,698	311,611	334,483	323,622	325,855	305,894	311,557	322,154	226,678	198,364	57,216	76,103	39,663
Total Recovered																					
Ag		**oz**	**34,979,381**		**-**	**984,002**	**3,899,020**	**3,075,959**	**3,069,080**	**2,320,725**	**2,329,190**	**2,326,528**	**2,487,417**	**2,457,158**	**2,510,027**	**3,157,252**	**2,308,015**	**2,049,229**	**601,973**	**977,802**	**426,005**
Cu		**t**	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pb		**t**	**277,504**		**-**	**6,974**	**26,265**	**20,550**	**21,646**	**13,316**	**12,479**	**14,535**	**20,379**	**22,279**	**21,461**	**32,945**	**24,245**	**20,298**	**5,204**	**10,068**	**4,859**
Zn		**t**	**1,424,931**		**-**	**31,421**	**97,906**	**100,876**	**103,486**	**128,119**	**139,173**	**132,416**	**128,109**	**117,399**	**120,691**	**115,020**	**79,964**	**70,811**	**21,016**	**25,094**	**13,431**
REVENUE																					
Metal Prices																					
Au		US$/oz Au	$1,297.32		$1,300	$1,271	$1,222	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305	$1,305
Ag		US$/oz Ag	$16.96		$16.62	$16.53	$16.16	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05	$17.05
Cu		US$/lb Cu	$2.95		$2.83	$2.84	$2.85	$2.87	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97	$2.97
Pb		US$/lb Pb	$0.91		$0.92	$0.91	$0.89	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91	$0.91
Zn		US$/lb Zn	$1.21		$1.15	$1.14	$1.17	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21	$1.21

	INPUTS	UNITS	TOTAL	Year -2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
Concentrate Payable %																					
Cu Concentrate Payable %																					
Payable Ag		%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Payable Cu		%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pb Concentrate Payable %																					
Payable Ag		%				95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%
Payable Pb		%				94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%	94.5%
Zn Concentrate Payable %																					
Payable Ag		%				0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Payable Zn		%				97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%	97.5%
Concentrate Payable																					
Cu Concentrate Payable																					
Payable Ag		oz	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Payable Cu		t	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pb Concentrate Payable																					
Payable Ag		oz	33,230,412			934,802	3,704,069	2,922,161	2,915,626	2,204,688	2,212,730	2,210,201	2,363,046	2,334,300	2,384,525	2,999,389	2,192,614	1,946,768	571,874	928,912	404,705
Payable Pb		t	262,367			6,594	24,832	19,429	20,465	12,590	11,798	13,743	19,267	21,064	20,291	31,148	22,923	19,191	4,920	9,519	4,594
Zn Concentrate Payable																					
Payable Ag		oz	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Payable Zn		t	1,389,308			30,636	95,458	98,355	100,899	124,916	135,693	129,106	124,906	114,464	117,673	112,144	77,965	69,041	20,491	24,466	13,095
Gross Revenue (less losses)																					
Ag Gross Revenue		US$ 000	$562,815			$15,452	$59,858	$49,825	$49,713	$37,591	$37,729	$37,685	$40,292	$39,801	$40,658	$51,142	$37,386	$33,194	$9,751	$15,839	$6,900
Cu Gross Revenue		US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pb Gross Revenue		US$ 000	$524,596			$13,187	$48,895	$38,912	$40,986	$25,214	$23,629	$27,523	$38,587	$42,185	$40,637	$62,380	$45,909	$38,434	$9,854	$19,064	$9,201
Zn Gross Revenue		US$ 000	$3,704,302			$77,268	$246,584	$261,934	$270,123	$334,421	$363,273	$345,636	$334,394	$306,438	$315,030	$300,228	$208,724	$184,833	$54,858	$65,500	$35,057
Total Gross Revenue		**US$ 000**	**$4,791,713**			**$105,908**	**$355,336**	**$350,671**	**$360,823**	**$397,227**	**$424,630**	**$410,844**	**$413,272**	**$388,425**	**$396,325**	**$413,750**	**$292,018**	**$256,461**	**$74,462**	**$100,403**	**$51,159**
Total Charges																					
Transport																					
Cu Concentrate	US$00.00 / wmt conc	US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pb Concentrate	US$131.00 / wmt conc	US$ 000	$73,440			$1,846	$6,951	$5,439	$5,729	$3,524	$3,303	$3,847	$5,393	$5,896	$5,680	$8,719	$6,416	$5,372	$1,377	$2,664	$1,286
Zn Concentrate	US$55.50 / wmt conc	US$ 000	$175,742			$3,875	$12,075	$12,441	$12,763	$15,801	$17,165	$16,331	$15,800	$14,479	$14,885	$14,186	$9,862	$8,733	$2,592	$3,095	$1,656
Treatment																					
Cu Concentrate		US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pb Concentrate		US$ 000	$62,565			$1,572	$5,922	$4,633	$4,880	$3,002	$2,813	$3,277	$4,594	$5,023	$4,839	$7,428	$5,466	$4,576	$1,173	$2,270	$1,096
Zn Concentrate		US$ 000	$690,298			$15,222	$47,430	$48,869	$50,133	$62,066	$67,421	$64,148	$62,061	$56,873	$58,468	$55,720	$38,738	$34,304	$10,181	$12,156	$6,506
Refining cost																					
Ag (==>Cu)	US$0.00 / oz	US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ag (==>Pb)	US$1.5 / oz	US$ 000	$49,846			$1,402	$5,556	$4,383	$4,373	$3,307	$3,319	$3,315	$3,545	$3,501	$3,577	$4,499	$3,289	$2,920	$858	$1,393	$607
Cu	US$0.00 / lb	US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pb	US$0.00 / lb	US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Market Participation																					
Cu		US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pb		US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Zn		US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Smelter Penalties																					
Cu Concentrate	US$0.00 / dmt	US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Pb Concentrate	US$0.00 / dmt	US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Zn Concentrate	US$0.00 / dmt	US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Charges		US$ 000	$1,051,890			$23,917	$77,933	$75,765	$77,879	$87,701	$94,021	$90,918	$91,394	$85,773	$87,448	$90,552	$63,772	$55,906	$16,182	$21,579	$11,151
Net Smelter Return		**US$ 000**	**$3,739,824**			**$81,990**	**$277,403**	**$274,905**	**$282,944**	**$309,526**	**$330,609**	**$319,926**	**$321,879**	**$302,652**	**$308,877**	**$323,199**	**$228,246**	**$200,556**	**$58,281**	**$78,824**	**$40,007**
Royalty NSR		US$ 000	$0			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Net Revenue		**US$ 000**	**$3,739,824**			**$81,990**	**$277,403**	**$274,905**	**$282,944**	**$309,526**	**$330,609**	**$319,926**	**$321,879**	**$302,652**	**$308,877**	**$323,199**	**$228,246**	**$200,556**	**$58,281**	**$78,824**	**$40,007**
Unit NSR		**US$/t milled**	**$83.68**			**$74.47**	**$74.17**	**$74**	**$77**	**$83**	**$88**	**$86**	**$87**	**$82**	**$83**	**$86**	**$90**	**$95**	**$104**	**$98**	**$93**
CUT-OFF GRADE																					
Net Revenue by Metal																					
Ag		%	14%			17%	20%	17%	16%	11%	10%	11%	11%	12%	12%	14%	15%	15%	15%	18%	16%
Cu		%	0%			0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pb		%	10%			12%	13%	10%	11%	6%	5%	6%	9%	10%	10%	14%	15%	14%	13%	18%	17%
Zn		%	76%			71%	67%	73%	73%	83%	84%	83%	80%	78%	78%	71%	70%	71%	72%	64%	67%
						100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Revenue per Metal Unit (NSR Factor)																					
Ag		$/g Ag	$0.38			$0.66	$0.36	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38	$0.38
Cu		$/% Cu	$0.00			$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Pb		$/% Pb	$12.04			$0.22	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12	$0.12
Zn		$/% Zn	$17.93			$0.29	$0.17	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18	$0.18
OPERATING COST																					
Mining (Underground)		US$/t milled	$18.20			$13	$19	$18	$17	$19	$19	$19	$19	$18	$18	$17	$19	$18	$21	$16	$13
Processing	$13.25/t milled	US$/t milled	$13			$13	$13	$13	$13	$13	$13	$13	$13	$13	$13	$13	$13	$13	$13	$13	$13
G&A	$3.00/t milled	US$/t milled	$3			$3	$3	$3	$3	$3	$3	$3	$3	$3	$3	$3	$3	$3	$3	$3	$3
Total Operating Cost		**US$/t milled**	**$34**			**$29**	**$35**	**$34**	**$34**	**$35**	**$35**	**$35**	**$35**	**$35**	**$34**	**$33**	**$35**	**$34**	**$38**	**$32**	**$30**
Mining (Underground)		US$ 000	$813,243			$13,988	$70,224	$67,360	$63,686	$71,590	$71,881	$69,968	$69,026	$67,852	$66,115	$63,987	$48,486	$38,365	$11,960	$12,994	$5,761
Mining - Transverse stopes		US$ 000	$233,519			$0	$28,870	$36,503	$27,533	$20,739	$25,232	$27,799	$22,566	$18,431	$21,160	$4,687	$0	$0	$0	$0	$0
Mining - Longitudinal stopes		US$ 000	$319,447			$3,436	$16,369	$10,752	$15,454	$27,033	$24,007	$20,294	$23,343	$26,918	$27,768	$43,390	$30,973	$26,723	$6,873	$10,353	$5,761
Mining - Ore Development		US$ 000	$92,264			$10,553	$6,105	$2,716	$8,714	$7,454	$5,701	$7,918	$11,072	$11,321	$4,903	$4,664	$6,207	$2,991	$1,294	$651	$0
Mining-Waste Development		US$ 000	$168,013			$0	$18,880	$17,389	$11,985	$16,364	$16,942	$13,956	$12,044	$11,182	$12,284	$11,246	$11,307	$8,651	$3,793	$1,990	
Processing		US$ 000	$592,330			$14,593	$49,573	$49,321	$48,393	$49,334	$49,521	$49,234	$49,088	$48,938	$49,198	$49,596	$33,744	$28,008	$7,450	$10,607	$5,732
G&A		US$ 000	$134,114			$3,304	$11,224	$11,167	$10,957	$11,170	$11,213	$11,147	$11,114	$11,080	$11,139	$11,229	$7,640	$6,341	$1,687	$2,402	$1,298
Total Operating Cost		**US$ 000**	**$1,539,687**			**$31,885**	**$131,020**	**$127,848**	**$123,036**	**$132,094**	**$132,615**	**$130,349**	**$129,228**	**$127,871**	**$126,453**	**$124,813**	**$89,871**	**$72,714**	**$21,097**	**$26,003**	**$12,791**
Unit Operating Cost		US$/t milled	$58			$51	$56	$55	$55	$59	$61	$60	$60	$58	$58	$58	$60	$61	$66	$59	$55
Operating Cashflow		US$ 000	$2,200,137			$50,105	$146,382	$147,058	$159,908	$177,432	$197,995	$189,577	$192,651	$174,781	$182,424	$198,386	$138,375	$127,842	$37,184	$52,821	$27,216
CAPITAL COST																					
Direct Cost																					
Mining		US$ 000	$102,723	$24,722	$34,740	$43,261	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Processing		US$ 000	$221,304	$0	$132,118	$89,187	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Infrastructure		US$ 000	$37,112	$3,663	$8,513	$24,936	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Direct Cost		**US$ 000**	**$361,140**	**$28,385**	**$175,371**	**$157,384**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Other Costs																					
EPCM / Owners / Indirect Cost	30%	US$ 000	$106,945	$8,288	$51,205	$47,453	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal Costs		**US$ 000**	**$468,085**	**$36,673**	**$226,576**	**$204,836**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Contingency	25%	US$ 000	$117,021	$9,168	$56,644	$51,209	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Initial Capital Cost		**US$ 000**	**$585,106**	**$45,841**	**$283,220**	**$256,045**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Sustaining		US$ 000	$120,991			$11,606	$8,022	$2,764	$48,150	$1,093	$954	$954	$47,450	$0	$0	$0	$0	$0	$0	$0	
Equipment Replacement		US$ 000	$0																		
Reclamation and closure		US$ 000	$44,000			$0	$0	$0	$0	$0	$0	$0	$0	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$15,000	$20,000
Total Capital Cost		**US$ 000**	**$750,097**	**$45,841**	**$283,220**	**$267,652**	**$8,022**	**$2,764**	**$48,150**	**$1,093**	**$954**	**$954**	**$47,450**	**$1,500**	**$1,500**	**$1,500**	**$1,500**	**$1,500**	**$1,500**	**$15,000**	**$20,000**
PRE-TAX CASH FLOW																					
Net Pre-Tax Cashflow		US$ 000	$1,450,040	-$45,841	-$283,220	-$217,547	$138,361	$144,294	$111,759	$176,339	$197,041	$188,623	$145,201	$173,281	$180,924	$196,886	$136,875	$126,342	$35,684	$37,821	$7,216
Cumulative Pre-Tax Cashflow		US$ 000		-$45,841	-$329,060	-$546,607	-$408,247	-$263,953	-$152,194	$24,145	$221,186	$409,809	$555,010	$728,292	$909,215	$1,106,101	$1,242,977	$1,369,319	$1,405,003	$1,442,824	$1,450,040
Mining Taxes		US$ 000	$180,471	$0	$0	$820	$9,042	$10,225	$11,157	$13,565	$15,720	$14,827	$14,783	$12,276	$13,707	$22,452	$15,468	$14,252	$3,978	$6,009	$2,191
Income Tax		US$ 000	$422,200	$0	$0	$0	$21,291	$24,185	$26,442	$31,370	$37,212	$34,781	$34,265	$29,210	$31,346	$53,735	$36,730	$33,786	$9,175	$13,714	$4,957
After-Tax Cashflow		US$ 000	$847,368	-$45,841	-$283,220	-$218,367	$108,028	$109,884	$74,160	$131,404	$144,109	$139,015	$96,153	$131,796	$135,871	$120,699	$84,678	$78,304	$22,531	$18,098	$68
Cumulative After-Tax Cashflow		US$ 000		-$45,841	-$329,060	-$547,427	-$439,399	-$329,515	-$255,355	-$123,951	$20,158	$159,172	$255,325	$387,121	$522,992	$643,691	$728,368	$806,672	$829,203	$847,301	$847,368
PROJECT ECONOMICS																					
Pre-Tax IRR		%	22.4%																		
Pre-tax NPV at 8% discounting	8.0%	US$ 000	$510,768																		
Pre-tax NPV at 10% discounting	10.0%	US$ 000	$384,632																		
Pre-tax NPV at 12% discounting	12.0%	US$ 000	$283,722																		
After-Tax IRR		%	15.5%																		
After-Tax NPV at 8% discounting	8.0%	US$ 000	$230,786																		
After-Tax NPV at 10% discounting	10.0%	US$ 000	$148,748																		
After-tax NPV at 12% discounting	12.0%	US$ 000	$83,546																		

CASH FLOW ANALYSIS

Considering the Project on a stand-alone basis, the undiscounted pre-tax cash flow totals $1,450 million over the mine life, and simple payback occurs five years from the start of production. The after-tax cash flow totals $847 million.

Net Present Value (NPV) at a range of discount rates is:

- Pre-tax 8% = $511 million
  10% = $385 million
  12% = $284 million
- After-tax 8% = $231 million
  10% = $149 million
  12% = $84 million

The pre-tax Internal Rate of Return (IRR) is 22.4%, with an after-tax IRR of 15.5%.

SENSITIVITY ANALYSIS

Project risks can be identified in both economic and non-economic terms. Key economic risks were examined by running cash flow sensitivities:

- Metal prices
- Exchange rate
- Head Grades
- Recovery
- Operating costs
- Capital costs

Pre-tax NPV sensitivity over the base case has been calculated for -20% to +20% variations. The operating and capital costs are estimated at -15% to +35% and zinc recovery is estimated at -3%, -5%, +2% and +5%.

The sensitivities are shown in Figure 22-1 and Table 22-2.

FIGURE 22-1 PRE-TAX SENSITIVITY GRAPH

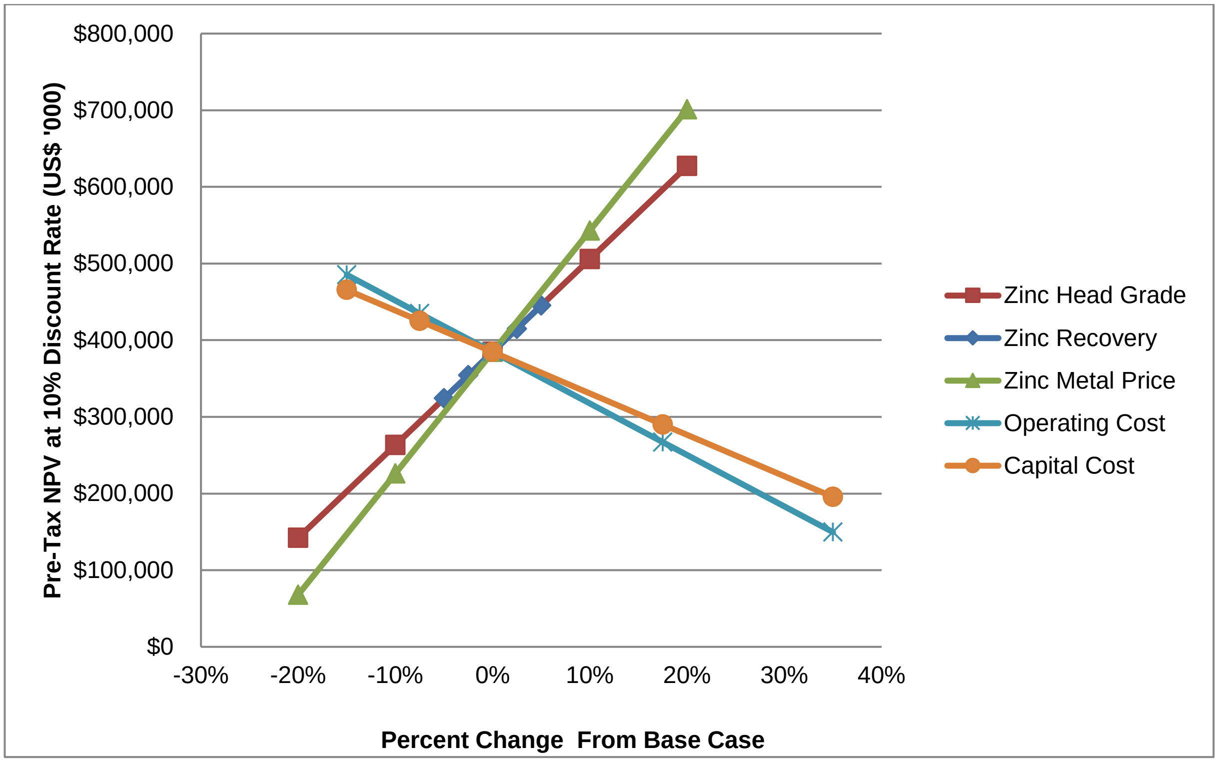


TABLE 22-2 PRE-TAX SENSITIVITY ANALYSES
Nexa Resources S.A. – Hilarión Project

NPV@10% US$ (000)	-20%	-10%	Base Case	10%	20%
Head Grade	142,189	263,410	384,632	505,853	627,074
Recovery	324,021	354,326	384,632	414,937	445,242
Metal Prices	80,605	232,618	384,632	536,645	688,659
Operating Cost	485,343	434,987	384,632	267,136	149,640
Capital Cost	465,630	425,131	384,632	290,133	195,635
Parameters					
Head Grade (%Zn)	2.83%	3.19%	3.54%	3.90%	4.25%
Recovery (%)	86%	88%	90%	92%	95%
Metal Prices (US$/lb Zn)	0.93	1.04	1.16	1.28	1.39
Operating Cost (US$000)	1,308,734	1,424,210	1,539,687	1,809,132	2,078,577
Capital Cost (US$000)	637,582	693,840	750,097	881,364	1,012,631

23 ADJACENT PROPERTIES

The Project is contiguous with claims held by various companies and individuals. None of the adjoining properties host mineralized zones comparable to the Project. RPA has not relied upon any information from the adjoining properties in the writing of this report.

24 OTHER RELEVANT DATA AND INFORMATION

No additional information or explanation is necessary to make this Technical Report understandable and not misleading.

25 INTERPRETATION AND CONCLUSIONS

In RPA's opinion, considering the large base of Mineral Resources, good prospects to increase resources, and synergies with the Cajamarquilla smelter, further work to advance the Project is merited, especially in an environment of higher metal prices.

GEOLOGY AND MINERAL RESOURCES

HILARIÓN DEPOSIT

- The Mineral Resource model was prepared by Nexa in 2017. The resource block model and resource estimate have been audited and accepted by RPA.
- Incorporating the 2018-2019 drilling will result in a minor increase in the resources.
- Measured and Indicated Mineral Resources are estimated to total 58.0 Mt at 3.52% Zn, 0.64% Pb, and 28.6 g/t Ag. In addition, Inferred Mineral Resources are estimated to total 21.5 Mt at 3.28% Zn, 0.78% Pb, and 28.5 g/t Ag.
- The deposit contains significant zinc, silver and lead mineralization hosted in the Pariatambo limestone formation. There are a number of sub-parallel dikes and two intrusive stocks that cut the limestone rocks to produce the skarn mineralization.
- Hilarión has features of both skarn and CRD mineralization.
- A large Project database containing geological and geochemical information has been compiled forming the foundation upon which future exploration programs can be designed.
- Sampling and assaying are adequately completed and have been generally carried out using industry standard QA/QC practices. The database is suitable to support a Mineral Resource estimate.
- The 2010-2014 standards have a low bias across the board for silver (-8% to -12%). The 2010 standards show a low bias as well, but of a lower magnitude. This imparts a conservative bias to the silver assays.
- The assumptions, parameters, and methodology used for the Hilarión Mineral Resource estimates are appropriate for the style of mineralization and mining methods.
- A number of polymetallic prospects located near the deposits have been outlined and warrant additional exploration.
- The 2018-2019 exploration program has been successful in delineating mineralization at Hilarión North, which has good exploration potential.
- There is good potential to increase the estimated resources using all elements of interest for wireframing, not just zinc. This approach would be particularly beneficial in Domain 33 which includes copper mineralization, which is currently not included in the mineralization wireframes. A small number of drill holes from the 2018-2019 drilling intersected good zinc and copper mineralization so there is good potential to increase the Domain 33 resources with more drilling in the future.

EL PADRINO DEPOSIT

- The Mineral Resource estimate was prepared by RPA.
- Indicated Mineral Resources are estimated to total 1.0 Mt at 4.31% Zn, 0.26% Pb, 33.9 g/t Ag, and 0.16% Cu. In addition, Inferred Mineral Resources are estimated to total 3.8 Mt at 4.87% Zn, 0.18% Pb, 27.7 g/t Ag, and 0.48% Cu.
- The geology and mineralization of the El Padrino deposit is similar to that of the Hilarión deposit.
- Protocols for drilling, sampling, analysis, security, historical data verification, and database management meet industry standard practices. The drill hole database was verified by RPA and is suitable for Mineral Resource estimation work.
- Significant exploration potential exists at El Padrino. Areas of interest include the immediate extension of the known zones, the monzonite contact at depth, a 500 m long zone located directly to the south, the area north of the El Padrino stock, and others.

MINING

- The Hilarión Project contemplates the exploitation of the Mineral Resources of the Hilarión deposit at a planned rate of 10,000 tpd over a sixteen-year period.
- A pre-production period of three years including the ramp up period in year three will allow for the start of full production beginning in year four.
- Proposed mining methods include SLS with backfill and TLS, which are suitable for the ground conditions and geological setting of the Hilarión deposit.
- The stability analysis information and calculations completed by Nexa in past studies and data evaluated by RPA permitted confidence in the mining methods selected.
- The productivity assumptions utilized for the study were assessed using various methods to confirm the mining rate used.
- The ground support design for the Hilarión rock mass is based on relatively detailed analysis using rock mass strength information from testing and determination of RMR values allowing for selection of support requirements.
- The level of dilution and extraction factors utilized were assessed based on the stope dimensions, rock mass quality, and stoping techniques to be employed, as well as the equipment limitations in confined spaces confirming extraction losses.
- The pre-production development has been scheduled to support the planned production rate at Hilarión with a ramp-up time to allow reaching maximum production levels desired.
- The backfill design using both paste fill and waste rock fill will provide the support requirements necessary for mining the Hilarión deposit, based on work by Golder and RPA's assessment.
- The production rate assumptions and LOM plan are based on achievable performance rates and schedules as well as employee productivity based on reliable estimates from first principals and also benchmarking.
- The mine equipment selection for the Hilarión project, was based on the mode of access, production level desired and mine layout to optimize equipment sizes, haul

distances, and mine infrastructure requirements such as ventilation, dewatering and underground services.

- The mine infrastructure for the production at Hilarión, including ventilation, dewatering, power distribution, and surface facilities including the Azulmina TSF appears to be reasonable at the PEA level of study.
- RPA carried out a comparison of two plant locations, the “Plant 1” location near the Azulmina TSF, near the town Huallanca, and an alternate “Plant 2” location near the Quenhua Ragra TSF, near the town of Pachapaqui. The result of the comparison showed a higher NPV and IRR at the Plant 1 location, which was selected as RPA’s base case.
- The El Padrino deposit would not add significant advantage to the PEA at this time given the smaller resource available and anticipated higher production cost due to the requirement for more selective mining methods.
- A LOM plan based on the current Mineral Resources was prepared indicating positive economics based on the estimated preproduction capital cost of $585 million, and additional $165 million in sustaining capital, which includes $44 million in mine closure cost. Additional mining options using pillars and reducing the dependence on cemented tailings would potentially improve the economics and should be assessed.

METALLURGY AND MINERAL PROCESSING

- RPA has reviewed information about the locations from which the Hilarión 2015 pilot plant composite samples were sourced and considers them sufficiently representative to provide indicative product quality and metallurgical response to the optimized pilot plant flow sheet.
- Metallurgical test work has been conducted by several laboratories using samples from Hilarión since 2006, culminating in flotation pilot test work by Certimin in 2015.
- To date, two phases of preliminary test work have been conducted using samples from El Padrino in 2018 and 2019.
- The Hilarión test work results indicate that recoveries of approximately 86% lead and 90% zinc with lead concentrate grades of approximately 55% and zinc concentrate grades of approximately 50% can be achieved with the optimized flowsheet conditions that have been developed. Recovery of silver to the lead concentrate of approximately 79% to 80% was achieved in pilot test work.
- Flotation is complicated by the presence of non-sulphide lead minerals and high concentrations of pyrrhotite.
- The quality of the zinc concentrate is directly related to the quantity of pyrrhotite in the samples. High quantities of pyrrhotite result in zinc concentrate that contains high concentrations of iron which correspondingly reduces the zinc grade of the concentrate.
- The concentrates contain low concentrations of arsenic, antimony, and other deleterious materials, and therefore RPA is of the opinion that these materials will not impact the economics of the project.
- Samples from El Padrino used for metallurgical test work were selected to be representative of lithology, and grades of Cu, Pb, and Zn. In RPA’s opinion, the

samples were sufficiently representative to provide indicative metallurgical response to testing.

- El Padrino test work results have shown that it is a complex deposit with varying metallurgical response depending on lithological zones from which samples were sourced.
- Blending of the plant feed will make it difficult to maintain product quality and recovery.
- The El Padrino test work did enable the identification of a preliminary reagent scheme and flotation conditions, which will require further definition and optimization in subsequent test work.
- Further test work is necessary to determine whether or not El Padrino material can be effectively processed to produce saleable products.

ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

- No known environmental issues were identified from the documentation review. The Project complies with applicable Peruvian permitting requirements. The approved permits address the authority's requirements for mining exploration activities.
- Usual components of the environment that could potentially be affected by the Project such as water resources, air quality, and flora and fauna have been evaluated through various environmental studies according to the Peruvian environmental legislation. The existing glaciers are considered to be a sensitive component of the environment in the Project area. Monitoring of the glaciers has been conducted since 2008. Based on the monitoring results, no adverse effects from the Project exploration activities to the glaciers have been identified.
- There is an Environmental Management Plan in place for the exploration phase, which includes a complete monitoring program for surface water quality and sediment quality, mining effluent discharges, groundwater quality, air quality, noise, and flora and fauna (terrestrial and aquatic). Nexa reports the results of the monitoring program to the authorities according to the frequency stated in the approved resolutions and no compliance issues have been raised by the authorities.
- A conceptual Mine Closure Plan has been developed for all the mine components within the context of Peruvian legislation as part of the environmental impact assessment studies.
- The social due diligence review indicates that at present, Nexa's plans and current programs at the proposed Hilarión site in Peru are a positive contribution to sustainability and community well-being. Nexa has established and continues to implement its various Corporate policies, procedures, and practices in a manner broadly consistent with relevant IFC Performance Standards.

26 RECOMMENDATIONS

RPA has the following recommendations by area.

GEOLOGY AND MINERAL RESOURCES

HILARIÓN DEPOSIT

- Update the Mineral Resource block model with the 2018-2019 drilling data.
- Increase the number of density samples collected in the mineralized domains to obtain more representative range of values for the deposit. Investigate the relationship between grade and density and consider a function that could be used to estimate local density and update the density values in the block model with the 2018-2019 density measurements.
- Drilling at Hilarión should focus on delineating and expanding the resource and exploring the downdip extension of the mineralization. The key mineralized contact should be explored towards the northwest, southeast and at depth.
- Evaluate the potential of including the mineralization intercepts that were not used in the current 2017 models and carry out additional drilling to improve the understanding of the continuity of mineralization.
- Use all the contributing metals for modelling and consider modelling by element if both spatial and statistical correlations are not reasonable.
- Perform additional modelling work including lithology, stratigraphy, and structural interpretations to improve the understanding of the controls on mineralization and grade distributions. The goal of this work is to improve future estimates and to define new exploration targets. Post-mineralization dikes are important features to model to permit the assignment of internal waste into the resource block models.
- Revisit variography and conduct trend analysis by mineralization domain for zinc, lead, silver, and copper.
- Document data validation checks of all core and channel sample data prior to entry into the master database.

EL PADRINO DEPOSIT

- Continue exploration outside the areas of known mineralization.
- Amend the QA/QC database to include a flag for the different types of duplicate control samples.

MINING

- With the positive economics shown in this PEA, mine engineering and planning should be advanced to the next level of detail to support detailed cost estimates for the Project as part of a PFS for the Property.

- Additional diamond drilling north of the Hilarión deposit, or the "Gap" area, should continue to increase Mineral Resources and extend the mine life.
- Test work should be carried out to confirm parameters for the paste fill.
- In future studies, a trade-off study on the TLS method of stoping should be assessed using rib pillars and sill pillars for support, thereby reducing the amount of paste fill required and the impact on operating costs and mine productivity versus the loss of resources in the pillars.
- RPA assessed two plant site options at a preliminary level only and this should be examined in further detail in future studies.

METALLURGY AND MINERAL PROCESSING

- Appropriate and representative variability samples of material should be collected from Hilarión and El Padrino and a systematic test program should be undertaken to advance the testing using the optimized test conditions that have been developed during past test work programs. The sample locations and sample types should be carefully documented and included in the metallurgical reports so that the information is easily available and accessible for future reporting. The test program should be designed to confirm how appropriate the current conceptual flowsheet is for all material types that will be processed over the life of the mine.
- Since the flotation results are highly dependent upon the quantity of pyrrhotite contained in the metallurgical samples, RPA also recommends that a geometallurgical program be implemented to ensure that there is a good understanding of the mineralization types that will be encountered during mining and processing and how the metallurgical results will vary depending on the ore types and grades.
- The acid generation potential of the Hilarión flotation tailings warrants further testing and mitigation.

ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

- Continue to implement the Environmental Management Plan, which monitors and manages potential environmental impacts resulting from the exploration activities to inform future permit applications and the detailed Mine Closure Plan still to be developed.
- Due to the lack of documentation on the impacts to the District of Huallanca, additional site-specific studies and documentation should be collected and reviewed to confirm the findings of this review.
- Nexa should have formal agreements in place with any persons potentially affected by involuntary resettlement as soon as possible. As the mitigation measures in the Social Management Plan are executed with respect to any resettlements, it is recommended that Nexa also refer to relevant IFC standards and update the socio-economic baseline information and its practices and procedures accordingly.
- Nexa should implement its Social Management Plan, providing social benefits to all the nearby communities including those inside and outside of Huallanca, due to the close proximity of these settlement areas to each other and the Project site.

- Further human health risk assessments should be conducted to determine if potential air and water impacts (all predicted to be within regulatory standards) will affect the local population, wildlife, or feedstock.
- Site specific policies on worker's rights and an OHS program should be developed and implemented prior to construction and operations.
- A "Chance Find" procedures should be developed and implemented prior to any further ground disturbing activities at the Project site.

PROPOSED PROGRAM AND BUDGET

The Property hosts two multi-element deposits, each encompassing various styles of mineralization. Each deposit, plus the Property overall, merits considerable exploration and development work. The primary objective of Nexa's proposed 2020 program, consisting of 6,000 m of drilling, is the expansion of the Hilarión North potential, and testing the Eureka and Mia targets. In addition, a geological mapping is planned at El Padrino South. This plan is aligned with the main objective to investigate the area between the Hilarión and El Padrino deposits. RPA concurs with Nexa's planned work program and budget of $5.3 million for 2020.

27 REFERENCES

Amec Foster Wheeler, 2017, Tercera Modificación del EIAsd del Proyecto de Exploración El Padrino, report prepared for Compañía Minera Milpo S.A.A. (March 2017).

Anglo Peruana Terra S.A., 2019, Informe Anual de Cartografiado Geológico, Proyecto Hilarión-Azulmina.

Atherton, M.P., and Petford, N., 1996: Plutonism and the growth of Andean crust at 9 S from 100 to 3 Ma. Journal of South American Earth Sciences, Vol. 9(1), pp 1-9.

Atherton, M.P., Pitcher, W.S., Warden, V.,1983: The Mesozoic marginal basin of Central Peru. Nature, Vol. 305, pp. 303-305.

Benavides-Caceres, V.,1999: Orogenic Evolution of the Peruvian Andes, in Geology and Ore Deposits of the Central Andes, Soc. Econ. Geo. Special Pub. No. 7, Skinner, B.J. (Ed), pp 61-107.

CERTIMIN S.A., 2013, Informe Metalúrgico Final Metalúrgico Pruebas Metalúrgicas Minerales de Ag, Cu, Pb y Zn, prepared for Compañia Minera Milpo S.A.C., April 2013.

CERTIMIN S.A., 2015, Informe Metalúrgico Pruebas Metalúrgicas a Nivel Laboratoria y Planta Piloto para Minerales Polimetálicos, prepared for Compañia Minera Milpo S.A.C., May 2015.

Chapi, Laboratorio Metalúrgico S.A.C., 2006, Proyecto Hilarión, prepared for Compañia Minera Milpo S.A.C., November 2006.

Chapi, Laboratorio Metalúrgico S.A.C., 2008, Proyecto Hilarión Fase II, prepared for Compañia Minera Milpo S.A.C., April 2008.

Clark, A.H., Farrar, E., Kontak, D.J., Langridge, R.J., Arena, F., Francem L.J., McBride, S.L., Woodman, P.L., Wasteneys, H.A., Sandeman, H.A. and Archibald, D.A., 1990: Geologic and Geochronological Constraints on the Metallogenic Evolution of the Andes of Southern Peru. Econ. Geo., Vol. 85, pp. 1520-1583.

Cobbing, E.F., 1981: The geology of the Western Cordillera of northern Peru (Vol. 5). HM Stationery Office.

Dawson, K.M., Sangster, D.F., Gross, G.A., Kirkham, R.V., and Sinclair, W.D., 1984: Skarn Deposits – Tungsten, Zinc-Lead-Silver, Iron, Copper; in Canadian Mineral Deposit Types: A Geological Synopsis. Geological Survey of Canada, Economic Geology Report 36, pp 55-58.

Einaudi, M.T., Meinert, L.D., and Newberry, R.F., 1991: Skarn Deposits in Economic Geology Seventy-Fifth Anniversary Volume, Economic Geology Publishing Co., pp 317-391.

Engler, A., 2009: The Geology of South America. GEOLOGY Vol. IV, pp. 374-405.

Geomecánica S.A.C., 2005, Levantamiento Topográfico del Proyecto Hilarión.

Golder Associates, Memorando Técnico, Estudio Conceptual de la Planta de Relleno en Pasta y Bombeo a Interior Mina (Versión 4), 04 de Julio de 2013

Horizons South America S.A.C., 2010, Proyecto Hilarión, Informe Técnico de campo

Horizons South America S.A.C., 2012, Proyecto Hilarión II, Informe Técnico de campo.

Jacay, J., Alejandro, V., Pino, A., and Sempere, T., 2008: Mesozoic backarc basins in western Peru: A brief summary. 7th International Symposium on Andean Geodynamics. Institut de Recherche pour l`Environnement, Nice, France.

Landis, G.P., and Rue, R.O., 1974: Geologic, fluid inclusion, and stable isotope studies of the Pasto Buena tungsten-base metal ore deposit, Northern Peru. Economic Geology, Vol. 69(7), pp 1025-1059.

Lara Consulting, Lima, 30 de Mayo, 2019 “Evaluación de Alto Nivel para Ubicar Posibles Relaveras para el Proyecto Hilarión – El Padrino.

Mégard, F., 1984: The Andean orogenic period and its major structures in central and northern Peru. Journal of Geological Society, Vol. 141(5), pp 893-900.

Mejia, J., and Hinostroza, J., 2017, Informe de Recursos Minerales – Proyecto Hilarión, prepared for Votorantim Metais., May 2017.

Meinert, L.D., 1993: Skarns and skarn deposits; in Ore Deposit Models, Volume II, Geological Association of Canada Reprint Series 6, pp 117-134.

Milpo S.A.C., 2006, Informe de Exploración – Proyecto Hilarión, prepared for Compañia Minera Milpo S.A.C., May 2006.

Milpo S.A.C., 2014a, Informe Anual de Exploración, Prospecto El Padrino (Informe No. 01), prepared for Compañía Minera Milpo, S.A., December 2014.

Milpo S.A.C., 2014b, Informe Anual de Aseguramiento y Control de Calidad de muestras diamantinas del Proyecto El Padrino, prepared for Compañía Minera Milpo, S.A., December 2014.

Milpo S.A.C., 2014c, PE_PMST_IT_control-calidad-El-Padrino-2013_20140522., prepared for Compañía Minera Milpo, S.A., May 2014.

Milpo, S.A.C., 2014, Quality Assurance (QA)/Quality Control (QC) annual reports for 2007-2014.

Nexa Resources S.A., 2020, An internal legal opinion by Magaly Bardales Rojas, Legal Corporate Manager and Institutional Affairs, Nexa, a letter to RPA expressing an opinion on the Section 4 content of the Technical Report (January 7, 2020).

Nexa, Marzo 2019 Proyecto Hilarión, Análisis De Ruta Al Proyecto Hilarión, Elaborado por: Evelyn Serrano Moromisato, Aprobado por: Aleandre Abe

Pardo-Casas, F., and Molnar, P., 1987: Relative motion of the Nazca (Farailon) and South American plates since Late Cretaceous time. Tectonics, Vol. 6(3), pp 233-248.

Petersen, U., 1999: Magmatic and metallogenic evolution of the Central Andes In Geology and Ore Deposits of the Central Andes, B.J. Skinner, Ed., Society of Economic Geologists, Special Publication Number 7, pp. 109-154.

Petford, N., and Atherton, M., 1996: Na-rich partial melts from newly underplated basaltic crust; the Cordillera Blanca Batholith, Peru. Journal of Petrology, Vol. 37(6), pp 1491-1521.

Petford, N., and Atherton, M., 1992: Granitoid emplacement and deformation along a major crustal lineament: the Cordillera Blanca, Peru. Tectonophysics, Vol. 205(1-3), pp 171-185.

Plenge Laboratorio, 2011, Investigación Metalúrgica No. 8383, prepared for TWP Sudamérica S.A. Proyecto Hilarión, November 10, 2011.

Plenge Laboratorio, 2010, Investigación Metalúrgica No. 7877 Flotación, prepared for Compañia Minera Milpo S.A.C., 2010.

Rogers, M.C., Thurston, P.C., Fyon, J.A., Kelly, R.I., and Breaks, F.W., 1995: Descriptive Mineral Deposits of Metallic and Industrial Deposit Types and Related Mineral Assessment Criteria. Ontario Geological Survey, Open File Report 5916, pp. 107-115.

RPA, 2017, Technical Report on the Hilarión Project, Ancash Region, Peru, report prepared for Votorantim Metais Holding S.A. (August 4, 2017).

SGS Minerals Services, 2013, Informe de Pruebas Metalurgicas Hilarión, prepared for Compañia Minera Milpo S.A.C., August 2013.

SRK Consulting, 2018, Estudio de Impacto Ambiental Detallado del Proyecto Minero El Padrino, report prepared for Nexa Resources (November 2018).

Stewart, J.W., Evernden, J.F., and Snelling, N.J., 1974: Age determinations from Andean Peru: a reconnaissance survey. Geological Society of America Bulletin, Vol. 85(7), pp. 1107-1116.

SVS Ingenieros S.A., 2013a, Modificación del EIAsd del Proyecto de Exploración Hilarión, report prepared for Compañía Minera Milpo S.A.A. (May 2013).

SVS Ingenieros S.A., 2013b, Plan de Cierre de Minas del Proyecto de Exploración Hilarión, report prepared for Compañía Minera Milpo S.A.A. (December 2013).

Transmin Metallurgical Consultants, 2018, Estudio Metalurgico Fase 1 para Proyecto El Padrino, prepared for Nexa Resources S.A., November 2018.

Transmin Metallurgical Consultants, 2019, Estudio Metalurgico Fase 2 para Proyecto El Padrino, prepared for Nexa Resources S.A., March 2019.

TWP Sudamérica S.A., 2013: Estudio de factibilidad para el Proyecto Hilarión – Informe Final. Document No. IT-09-02-0000-00-001.

TWP Sudamérica S.A., 2013: Marco Geológico, Estudio de factibilidad para el Proyecto Hilarión. IT-09-02-1000-03-001.

TWP Sudamérica S.A., 2013: Estudio Geológico, Estudio de impacto ambiental del Proyecto Hilarión. IT-09-02-1000-EIA.

Wilson, J.J., Reyes, L., Garayar, J., 1967: Geologia de los quadrángulos de Mollebamba, Tayabamba, Pomabamba y Huari, Lima, Peru. Servicio de Geologia y Minera del Peru, Boletin 16, 95p.

28 DATE AND SIGNATURE PAGE

This report titled "Technical Report on the Hilarión Project, Department of Ancash, Peru" and effective as of February 14, 2020 was prepared and signed by the following authors:

(Signed & Sealed) ***Jason J. Cox***

Dated at Toronto, ON
February 14, 2020

Jason J. Cox, P.Eng.
Principal Mining Engineer

(Signed & Sealed) ***Normand L. Lecuyer***

Dated at Toronto, ON
February 14, 2020

Normand L. Lecuyer, P.Eng.
Principal Mining Engineer

(Signed & Sealed) ***Rosmery J. Cárdenas Barzola***

Dated at Toronto, ON
February 14, 2020

Rosmery J. Cárdenas Barzola, P.Eng.
Principal Geologist

(Signed & Sealed) ***Brenna J.Y. Scholey***

Dated at Toronto, ON
February 14, 2020

Brenna J.Y. Scholey, P.Eng.
Principal Metallurgist

(Signed & Sealed) ***Luis Vasquez***

Dated at Toronto, ON
February 14, 2020

Luis Vasquez, M.Sc., P.Eng.
Senior Environmental Consultant and
Hydrotechnical Engineer
SLR Consulting (Canada) Ltd.

29 CERTIFICATE OF QUALIFIED PERSON

JASON J. COX

I, Jason J. Cox, P.Eng., as an author of this report entitled "Technical Report on the Hilarión Project, Department of Ancash, Peru" prepared for Nexa Resources S.A. and dated February 14, 2020, do hereby certify that:

1. I am Principal Mining Engineer with Roscoe Postle Associates Inc. of Suite 501, 55 University Ave., Toronto, ON M5J 2H7.

2. I am a graduate of the Queen's University, Kingston, Ontario, Canada, in 1996 with a Bachelor of Science degree in Mining Engineering.

3. I am registered as a Professional Engineer in the Province of Ontario (Reg. #90487158). I have worked as a mining engineer for more than 21 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Review and reporting as a consultant on many mining operations and projects around the world for due diligence and regulatory requirements
   - Engineering study work (PEA, PFS, and FS) on many mining projects around the world, including commodities such as precious metals, base metals, bulk commodities, industrial minerals, and rare earths
   - Operational experience as Planning Engineer and Senior Mine Engineer at three North American mines
   - Contract Co-ordinator for underground construction at an American mine

4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

5. I visited the Hilarión Project from June 17 to 20, 2019.

6. I am responsible for Sections 15, 18, 19, 21, 22, and 24 and related disclosure in Sections 1, 2, 3, 25, 26, and 27 of the Technical Report.

7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.

8. I have had no prior involvement with the property that is the subject of the Technical Report.

9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

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

Dated this 14th day of February, 2020

(Signed & Sealed) ***Jason J. Cox***

Jason J. Cox, P.Eng.

NORMAND L. LECUYER

I, Normand L. Lecuyer, P.Eng., as an author of this report entitled “Technical Report on the Hilarión Project, Department of Ancash, Peru” prepared for Nexa Resources S.A. and dated February 14, 2020, do hereby certify that:

1. I am Principal Mining Engineer with Roscoe Postle Associates Inc. of Suite 501, 55 University Ave Toronto, ON, M5J 2H7.

2. I am a graduate of Queen’s University, Kingston, Canada, in 1976 with a B.Sc. (Hons.) degree in Mining Engineering.

3. I am registered as a Professional Engineer in the provinces of Ontario (Reg. # 26055251), Québec (Reg. # 34914) and Newfoundland and Labrador (Reg. #06161). I have worked as a mining engineer for a total of 43 years since my graduation. My relevant experience for the purpose of the Technical Report is:
    - Review and report as a consultant on numerous exploration and mining projects around the world for due diligence and regulatory requirements.
    - Vice-President Operations for a number of mining companies.
    - Mine Manager at an underground gold mine in Northern Ontario, Canada.
    - Manager of Mining/Technical Services at a number of base-metal mines in Canada and North Africa.
    - Vice-President Engineering at two gold operations in the Abitibi area of Quebec, Canada.

4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

5. I visited the Hilarión Project from June 17 to 20, 2019.

6. I am responsible for Section 16 and related disclosure in Sections 1, 2, 3, 25, 26, and 27 of the Technical Report.

7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.

8. I have prepared a previous Technical Report dated August 4, 2017, on the property that is the subject of the Technical Report.

9. I have read NI 43-101, and those sections of the Technical Report for which I am responsible, have been prepared in compliance with NI 43-101 and Form 43-101F1.

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

Dated this 14th day of February, 2020

(Signed & Sealed) ***Normand L. Lecuyer***

Normand L. Lecuyer, P.Eng.

ROSMERY J. CÁRDENAS BARZOLA

I, Rosmery J. Cárdenas Barzola, P.Eng., as an author of this report entitled "Technical Report on the Hilarión Project, Department of Ancash, Peru" prepared for Nexa Resources S.A. and dated February 14, 2020, do hereby certify that:

1. I am Principal Geologist with Roscoe Postle Associates Inc. of Suite 501, 55 University Ave Toronto, ON, M5J 2H7.

2. I am a graduate of Universidad Nacional de Ingenieria, Lima, Peru, in 2002 with a B.Sc. degree in Geological Engineering.

3. I am registered as a Professional Engineer in the province of Ontario (Reg. # 100178079). I have worked as a geologist for a total of 15 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Resource estimation, geological modelling, and QA/QC experience.
   - Review and report as a consultant on numerous exploration, development, and production mining projects around the world for due diligence and regulatory requirements.
   - Evaluation Geologist and Resource Modelling Geologist with Barrick Gold Corporation at Pueblo Viejo Project (Dominican Republic) and Lagunas Norte Mine (Peru).

4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

5. I visited the Hilarión Project on June 15, 2017 and Nexa's offices in Lima on June 12 and 13, 2017.

6. I am responsible for Sections 4 to 12, 14, and 23 and related disclosure in Sections 1, 2, 3, 25, 26, and of the Technical Report.

7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.

8. I have prepared a previous Technical Report dated August 4, 2017, on the property that is the subject of the Technical Report.

9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

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

Dated this 14th day of February, 2020

(Signed & Sealed) ***Rosmery J. Cárdenas Barzola***

Rosmery J. Cárdenas Barzola, P.Eng.

BRENNA J.Y. SCHOLEY

I, Brenna J.Y. Scholey, P.Eng., as an author of this report entitled "Technical Report on the Hilarión Project, Department of Ancash, Peru" prepared for Nexa Resources S.A. and dated February 14, 2020, do hereby certify that:

1. I am Principal Metallurgist with Roscoe Postle Associates Inc. of Suite 501, 55 University Ave., Toronto, ON M5J 2H7.

2. I am a graduate of The University of British Columbia in 1988 with a B.A.Sc. degree in Metals and Materials Engineering.

3. I am registered as a Professional Engineer in the Province of Ontario (Reg. #90503137) and British Columbia (Reg. #122080). I have worked as a metallurgist for a total of 31 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Reviews and reports as a metallurgical consultant on numerous mining operations and projects for due diligence and regulatory requirements.
   - Senior Metallurgist/Project Manager on numerous base metals and precious metals studies for an international mining company.
   - Management and operational experience at several Canadian and U.S. milling, smelting and refining operations treating various metals, including copper, nickel, and precious metals.

4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

5. I did not visit the Hilarión Project.

6. I am responsible for Sections 13 and 17 and related disclosure in Sections 1, 2, 3, 25, 26, and 27 of the Technical Report.

7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.

8. I have had no prior involvement with the property that is the subject of the Technical Report.

9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

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

Dated this 14th day of February, 2020

(Signed & Sealed) ***Brenna J.Y. Scholey***

Brenna J.Y. Scholey, P.Eng.

LUIS VASQUEZ

I, Luis Vasquez, M.Sc., P.Eng., as an author of this report entitled "Technical Report on the Hilarión Project, Department of Ancash, Peru" prepared for Nexa Resources S.A. and dated February 14, 2020, do hereby certify that:

1. I am a Senior Environmental Consultant and Hydrotechnical Engineer with SLR Consulting (Canada) Ltd. at 36 King St. East 4th Floor in Toronto, ON, M5C-1E5.

2. I am a graduate of Universidad de Los Andes, Bogotá, Colombia, in 1998 with a B.Sc. degree in Civil Engineering.

3. I am registered as a Professional Engineer in the Province of Ontario (Reg. #100210789). I have worked as a as a civil engineer on mining related projects for a total of 15 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Preparation of numerous environmental impact assessments for mining projects located in Canada, and Perú for regulatory approval.
   - Preparation of multiple mine closure plans for mining projects in Canada and Perú.
   - Preparation of several scoping, prefeasibility, feasibility and detailed design level studies for projects located in North America, South America, the Caribbean and Asia with a focus on planning, design and safe operation of water management systems and waste disposal facilities.

4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

5. I did not visit the Hilarión Project.

6. I am responsible for Section 20 and related disclosure in Sections 1, 2, 3, 25, 26, and 27 of the Technical Report.

7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.

8. I have had no prior involvement with the property that is the subject of the Technical Report.

9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

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

Dated this 14th day of February, 2020

(Signed & Sealed) ***Luis Vasquez***

Luis Vasquez, M.Sc., P.Eng.