U.S. SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 6-K

**REPORT OF FOREIGN PRIVATE ISSUER
PURSUANT TO RULE 13a-16 OR 15d-16 UNDER THE
SECURITIES EXCHANGE ACT OF 1934**

For the Month of April, 2019

Nexa Resources S.A.

(Exact Name as Specified in its Charter)

N/A
(Translation of Registrant's Name)

**37A, Avenue J.F. Kennedy
L-1855, Luxembourg
Grand Duchy of Luxembourg**
(Address of principal executive offices)

Indicate by check mark whether the registrant files or will file annual reports under cover Form 20-F or Form 40-F.

Form 20-F ☒ Form 40-F ☐

Indicate by check mark if the registrant is submitting the Form 6-K in paper as permitted by Regulation S-T Rule 101(b)(1): ☐

Indicate by check mark if the registrant is submitting the Form 6-K in paper as permitted by Regulation S-T Rule 101(b)(7): ☐

Indicate by check mark whether by furnishing the information contained in this Form, the registrant is also thereby furnishing the information to the Commission pursuant to Rule 12g3-2(b) under the Securities Exchange Act of 1934.

Yes ☐ No ☒

If "Yes" is marked, indicate below the file number assigned to the registrant in connection with Rule 12g3-2(b): Not applicable.

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

Date: April 3, 2019

NEXA RESOURCES S.A.

By: /s/ Rodrigo Menck
Name: Rodrigo Menck
Title: Senior Vice President Finance and Group Chief Financial Officer

EXHIBIT INDEX

Exhibit	Description of Exhibit
99.1	Nexa Resources S.A. — Atacocha Mine - Technical Report
99.2	Consent of qualified person - Avakash Patel
99.3	QP Certificate RPA — Atacocha — Avakash Patel
99.4	Consent of qualified person — Rosmery Cárdenas
99.5	QP Certificate RPA — Atacocha — Rosmery Cárdenas
99.6	Consent of qualified person — Luis Vasquez
99.7	QP Certificate RPA — Atacocha — Luis Vasquez
99.8	Consent of qualified person - Scott Ladd
99.9	QP Certificate RPA — Atacocha — Scott Ladd

Exhibit 99.1

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NEXA RESOURCES S.A.

TECHNICAL REPORT ON THE ATACOCHA MINE, PASCO PROVINCE, CENTRAL PERU

NI 43-101 Report

Qualified Persons:
Scott Ladd, P.Eng.
Rosmery Cardenas, P.Eng.
Avakash Patel, P.Eng.
Luis Vasquez, M.Sc., P.Eng.

March 22, 2019

Report Control Form

Document Title	Technical Report on the Atacocha Mine, Pasco Province, Central Peru		
Client Name & Address	Nexa Resources S.A. Rua Guaicui, 20-14°Andar Belo Horizonte/MG 30380-380		
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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 Atacocha Mine (the Mine or the Project), located in Pasco Province, central Peru. The purpose of this report is to support the public disclosure of updated Mineral Reserve and Mineral Resource estimates. This Technical Report conforms to National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101). RPA visited the Mine on September 5 to 7, 2018.

Nexa is publicly traded 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 is a producer with 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 two underground mines, Vazante (Zn and Pb) and Morro Agudo (Zn and Pb), and two development projects, Aripuanã and Caçapava do Sul. 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-Au), 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. It also operates one zinc smelter in Peru (Cajamarquilla).

The Mine is owned by Nexa Resources Atacocha S.A.A. (Atacocha), which is controlled 91% by Nexa Resources El Porvenir S.A.C., a 99.99% subsidiary of Nexa Resources Peru S.A.A. (Nexa Perú). Nexa Perú is an indirect subsidiary of Votorantim S.A., which through Nexa Resources Cajamarquilla S.A. (Parent Company) and Nexa (located in Luxembourg), controls 80.06% of Nexa Perú's common shares.

The Mine commenced production in 1938. The operation is currently mining ore from the Atacocha underground mine (1,200 tonnes per day (tpd)) and the San Gerardo open pit mine (3,300 tpd) . Both mining operations currently feed the 4,500 tpd Atacocha processing plant.

In 2018, the Mine produced approximately 17,324 tonnes of zinc, 125 tonnes of copper, 15,595 tonnes of lead, 1.68 million ounces of silver, and 15,431 ounces of gold.

CONCLUSIONS

Increased accuracy in the Atacocha underground and San Gerardo open pit Mineral Resource models and Mineral Reserve estimates has resulted in deferring the Cerro Pasco Complex Integration plans and associated benefits. While the realization of these benefits is considered an achievable component of the integration plan, they have not been considered in this assessment of the Atacocha operation. RPA has the following conclusions:

GEOLOGY AND MINERAL RESOURCES

- The Mineral Resource estimate was prepared by Nexa. The resource estimate has been audited and accepted by RPA.
- Exclusive of Mineral Reserves, the end of year (EOY) Measured and Indicated Mineral Resources include:
  - Atacocha underground: 2.22 Mt at 3.50% Zn, 1.14% Pb, 0.29% Cu, and 63.9 g/t Ag containing 77,000 t of zinc, 25,200 t of lead, 6,400 t of copper, and 4.6 million ounces (Moz) of silver.
  - San Gerardo open pit: 3.74 Mt at 1.26% Zn, 0.88% Pb, 0.05% Cu, 29.6 g/t Ag, and 0.23 g/t Au containing 47,300 t zinc, 32,800 t lead, 1,900 t copper, 3.6 Moz silver, and 28,000 oz gold.
- In addition, EOY2018 Inferred Mineral Resources total 4.95 Mt at 3.46% Zn, 1.52% Pb, 0.35% Cu, and 102.7 g/t Ag for Atacocha underground and 0.80 Mt at 1.08% Zn, 0.93% Pb, 0.03% Cu, 31.4 g/t Ag, and 0.50 g/t Au for San Gerardo open pit.
- Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves dated May 10, 2014 (CIM (2014) definitions) were followed for Mineral Resources.
- The San Gerardo resource decreased significantly mostly because of changes to the geological interpretation.
- The deposit contains significant zinc, lead, copper, silver, and gold mineralization hosted in the Chambara Formation (part of Pucara Group) around the Santa Bárbara and the San Gerardo stocks (Oligocene porphyries) that cut the limestone rocks to produce the skarn mineralization.
- Atacocha has features of skarn, replacement, hydrothermal vein/breccia-style, and porphyry mineralization.
- A large Project database containing geological and geochemical information has been compiled forming the foundation upon which future exploration programs can be designed.

- Nexa has defined a number of good exploration targets.
- 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 assumptions, parameters, and methodology used for the Atacocha 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 Mineral Resource estimates are completed to industry standards using reasonable and appropriate parameters and are acceptable for conversion to Mineral Reserves.

MINERAL RESERVES AND MINING

- The Atacocha and San Gerardo Mineral Reserve estimates were completed by Nexa and were reviewed and adopted by RPA.
- The EOY2018 Proven and Probable Mineral Reserves for the Atacocha underground and San Gerardo open pit total 9.8 Mt at grades of 2.15% Zn, 1.29% Pb, 0.12% Cu, 51.2 g/t Ag, and 0.13 g/t Au, which results in a six year mine life for the Atacocha operation.
- The Atacocha Mineral Reserve estimate tonnage is reduced by 51% compared to the previous estimate dated December 31, 2017, which is primarily due to changes in the Mineral Resource model.
- Applications for the updated San Gerardo environmental and operational licences that are required to execute the open pit mine plan have been submitted and are under consideration for approval.
- A pre-feasibility level geotechnical study analyzing the San Gerardo slope design and stability has been completed in February 2019, and generally supports the previous open pit design parameters.
- Underground mining operations at Atacocha are well established and carried out by an experienced workforce. The underground mining methods include cut and fill (CAF) and sub-level open stoping (SLS). These are appropriate mining methods for the deposit. The San Gerardo open pit has been in operation since 2016 utilizing a contractor workforce.
- Mine planning for the Atacocha mine follows industry standards. The Mineral Reserve estimates have been prepared using acceptable estimation methodologies and the classification of Proven and Probable Mineral Reserves conforms to CIM (2014) definitions.
- The life of mine (LOM) plan sustaining capital costs, inclusive of capital development, tailings dam expansion and replacement mining equipment, are estimated to total US$96.9 million and are considered reasonable.

- Efforts to reconcile the resource models for surface and underground mine production as a combined feed to the process plant have been largely unsuccessful due to inaccuracies in the previous resource model and the complexities associated with reconciling multiple feeds.

PROCESSING

- Ore head grades at the Atacocha concentrator have changed since the introduction of San Gerardo open pit ore in early 2016. Head grades of zinc and copper have decreased, while the head grade of gold has increased, but has also become more variable. Lead head grade has remained relatively steady.

- Recoveries are related to the head grades. Zinc recovery has dropped from 88% in 2015 to 78% in 2018, and gold recovery has almost doubled from 36% in 2015 to 64% in 2018. Additionally, copper recovery dropped from 26% to approximately 8% over the same time period.

ENVIRONMENTAL CONSIDERATIONS

- No known environmental issues were identified from the documentation review. Atacocha complies with applicable Peruvian permitting requirements. The approved permits address the authority's requirements for operation of the open pit and underground mine, tailings storage facilities, waste rock dumps, process plant, water usage, and effluents discharge.

- There is a comprehensive Environmental Management Plan in place, which includes a complete monitoring program for effluent discharges, gas emissions, air quality, non-ionizing radiation, noise, surface water quality, groundwater quality, springs water quality, vibrations, soil quality, terrestrial biology (vegetation and wildlife), and aquatic biology. Atacocha 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 Mine Closure Plan has been developed for all the mine components within the context of Peruvian legislation and is periodically updated.

- Atacocha has developed an appropriate set of policies, protocols, and operational procedures and practices that aim to address various aspects of Nexa's Social Responsibility with regard to its mining operations.

RECOMMENDATIONS

RPA has the following recommendations:

GEOLOGY AND MINERAL RESOURCES

- Improve reconciliation processes so that production data can be used to calibrate future resource and reserve models.

- Divide mineralization domains where groups of wireframes have been merged to avoid sharing of samples.

- Incorporate some high grade domains by element to prevent smearing of high grades into low grades and vice versa.
- Consider modelling by element if both spatial and statistical correlations are not reasonable.
- Incorporate, in future models, a structural model to help properly define mineralization wireframe geometry and continuity in the structurally controlled zones.
- Investigate if capping levels should be applied based on high grade and low grade domains for lead, copper, and silver.
- Increase the number of density samples in areas that currently have insufficient density tests available.
- Implement QA/QC procedures that will reduce certified reference material (CRM) failure rates and improve the field duplicate precision. Additionally, incorporate CRMs in the external checks.
- Complete the 2019 exploration program, consisting of a 76,000 m drill program to explore new targets and continue with advanced exploration. The 2019 exploration program budget is approximately US$10.9 million.

MINERAL RESERVES AND MINING

- Evaluate and implement procedural changes that will improve reconciliation of production results to the Mineral Resource and Mineral Reserve estimates. Adjust estimation parameters based on reconciliation findings.
- Carry out San Gerardo mine geotechnical drilling, testing, and analysis to update slope stability analysis to the operating mine level.
- Use stope reconciliation results and stope performance analysis to evaluate SLS stope designs. Optimize SLS geotechnical and stope design parameters and evaluate the potential to increase SLS stoping production quantities, and subsequently increase productivity, reduce overall mine operating costs, and reduce dilution associated with mining narrow zones.
- Carry out geotechnical analysis of Atacocha underground ground support standards.
- Continue to evaluate the benefits of integrating Atacocha with El Porvenir through strategic planning and modelling processes, including improved materials handling solutions, increased workforce efficiency and utilization, and optimized feeds for process facilities.

PROCESSING

- Additional test work may be beneficial in evaluating whether or not the Atacocha concentrator flotation operation can be optimized to further improve the recovery of gold resulting from the introduction of San Gerardo ore.

- Investigate the applicability of gravity gold recovery from San Gerardo ore and evaluate the economics of retrofitting a gravity circuit to the concentrator.

ENVIRONMENTAL CONSIDERATIONS

- Review Atacocha's commitments in the most recent agreement renewals and ensure that their fulfilment is independently verified.

ECONOMIC ANALYSIS

Under NI 43-101, this section is not required as Atacocha is currently in operation and there is no material expansion of current production. RPA has performed an economic analysis of the Atacocha Mine using the LOM weighted average metal prices, at the forecasted production rates, metal recoveries, and capital and operating costs estimated in this report and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves.

TECHNICAL SUMMARY

PROPERTY DESCRIPTION AND LOCATION

The Project is located in north central Pasco Province, central Peru, approximately 180 km northeast of the capital city of Lima. Access by road from Lima is via the Central Highway (Carretera Central), through the city of Huánuco, to the town of Chicrín (at km 324). An approximately 4.5 km long unpaved road provides access to the Mine from the town of Chicrín. The Project is centred at approximately 367,000mE and 8,831,000mN.

LAND TENURE

The Project consists of 147 contiguous mining concessions covering an aggregate area of approximately 2,872.5 ha. As of December 31, 2018, 139 of the Project concessions were held in the name of Nexa Resources Atacocha S.A.A., seven concessions were held in the name of Nexa Resources Peru S.A.A. and one was held in the name of Nexa Resources El Porvenir S.A.C.

EXISTING INFRASTRUCTURE

The Atacocha operation is comprised of the following main facilities:

- 900 tpd to 1,700 Underground mine

- 2,800 tpd to 3,600 tpd San Gerardo open pit (including Satellite East and Satellite West open pits)
- Atacocha waste dump
- Atacocha Tailings Storage Facility (TSF)
- Temporary ore stockpile
- Topsoil stockpile
- 4,500 tpd Atacocha processing plant
- Sediment pond
- Ancillary buildings (administration, storage, vehicle maintenance, etc.)
- San Felipe and Chicrín camps
- Closed waste dumps (3600, 3900, 4000)
- Inactive tailings storage facilities in closure (Chicrín Antiguo, Chicrín Actual, Cajamarquilla, Titlacayán, Malauchaca)

HISTORY

In 1936, Compañia Minera Atacocha S.A.A. was formed to explore, develop, and exploit Cu-Pb-Zn deposits in the area. Early work focused on developing the San Ramon tunnel to exploit veins on the 4000 Level. In 1952, the construction of the 3600 Level with a length of 2,700 m was completed, which allowed a new main level of access and transportation to underground work, while facilitating the extraction and transportation of the mineral to the new concentrate plant located in Chicrín.

Compañia Minera Milpo S.A.A. conducted exploration and development work in Atacocha from 1949 onwards. Most of the exploration was conducted simultaneously with underground development, which involves diamond drilling, and channel sampling following underground drifting. Prior to 1997, minor and sporadic drilling was completed; and no channel sampling was documented before year 2001. Nexa is currently developing an underground connection (and integration) of the El Porvenir and Atacocha mines; which will involve systematic exploration through this zone.

GEOLOGY AND MINERALIZATION

The Atacocha property is situated in the Pasco region of the Western Cordillera of the Andes mountain range in central Perú, within the Eocene-Miocene Polymetallic and Miocene Au-Ag Epithermal Belts.

At Atacocha, the stratigraphic units of primary interest are the Chambará, Aramachay, and Condorsinga formations, as well as other undifferentiated limestone units of the Pucará Group, the Goyllarisquizga Formation, and stratigraphically overlying basalt layers. The deposit is structurally controlled, with the Milpo-Atacocha Fault being a major structural feature in the region dividing the property into two structural domains: the western San Gerardo Sector and the eastern Santa Bárbara Sector.

Mineralization is characterized as a skarn, intermediate sulphidation epithermal vein/breccia-style, or porphyry mineralization. Skarn related alteration includes scilica- wollastonite, garnet, silica, and pyrite-argillic alteration. Silica-sericite-argillic alteration is associated with hydrothermal mineralization. Phyllic alteration made of sericite, quartz, pyrite and intense A- and B-types quartz veinlets stockwork is generally associated with porphyry mineralization.

EXPLORATION STATUS

Nexa has been conducting exploration and development work at Atacocha since 1949. Most exploration is generally conducted simultaneously with underground development, which involves diamond core drilling, and channel sampling following underground drifting. Prior to 1997, minor and sporadic drilling was completed; and no channel sampling is documented before 2001. Systematic underground geological mapping is completed at scale of either 1:500 or 1:250, following underground development on all levels and sub-levels. A total of 29 underground levels have been developed at Atacocha, with additional development on sub-levels. Geological mapping is completed by the mine/ production geologists drawn on paper in the field, and subsequently digitized with the help of a modelling assistant. The geological level plan maps are updated and incorporated in a 3D geological model daily to aid future exploration and mine development planning.

During 2018, Nexa carried out exploration drilling in the Cristina Northeast, San Gerardo, and Integration Zone. The results confirmed the continuity of the mineralization at Cristina Northeast and San Gerardo, and the new discovery at the Integration Zone. The 2018 exploration program was successful in delineating and confirming new areas with good exploration potential.

MINERAL RESOURCES

The Mineral Resource estimate for the Atacocha mine, dated December 31, 2018, using all data available as of August 31, 2018 was completed by Nexa personnel and reviewed by RPA.

A summary of the Atacocha underground and San Gerardo open pit Mineral Resources, exclusive of Mineral Reserves, for the Atacocha deposit, is shown in Tables 1-1 and 1-2, respectively. CIM (2014) definitions were followed for the Mineral Resources and Mineral Reserves at the Mine.

TABLE 1-1 ATACOCHA UNDERGROUND MINERAL RESOURCES - DECEMBER 31, 2018

Nexa Resources S.A.- Atacocha Mine

Category	Tonnage (Mt)	Grade Zinc (%)	Grade Lead (%)	Grade Copper (%)	Grade Silver (g/t)	Contained Metal Zinc (000 t)	Contained Metal Lead (000 t)	Contained Metal Copper (000 t)	Contained Metal Silver (000 oz)
Measured	0.69	3.25	1.28	0.26	64.1	22.4	8.8	1.8	1,421
Indicated	1.53	3.61	1.07	0.30	63.8	55.2	16.4	4.6	3,140
Total M&I	**2.22**	**3.50**	**1.14**	**0.29**	**63.9**	**77.7**	**25.2**	**6.4**	**4,561**
Inferred	4.95	3.46	1.52	0.35	102.7	171.3	75.2	17.3	16,347

Notes:

1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated at NSR cut-off values of US$71.13/t for CAF resource stopes and US$61.98/t for SLS resource stopes.
3. Mineral Resources are estimated using an average long-term metal prices of Zn: US$3,034/t (US$1.38/lb); Pb: US$2,530/t (US$1.15/lb); Cu: US$7,351/t (US$3.33/lb); and Ag: US$21.58/oz and a PEN/US$ exchange rate of $3.30.
4. A minimum mining width of 4.0 m was used for CAF resource stopes and 3.0 m was used for SLS resource stopes.
5. Bulk density varies depending on mineralization domain.
6. Mineral Resources are exclusive of Mineral Reserves.
7. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
8. Numbers may not add due to rounding.

TABLE 1-2 SAN GERARDO MINERAL RESOURCES - DECEMBER 31, 2018

Nexa Resources S.A.- Atacocha Mine

Category	Tonnage (Mt)	Grade Zinc (%)	Grade Lead (%)	Grade Copper (%)	Grade Silver (g/t)	Grade Gold (g/t)	Contained Metal Zinc (000 t)	Contained Metal Lead (000 t)	Contained Metal Copper (000 t)	Contained Metal Silver (000 oz)	Contained Metal Gold (000 oz)
Measured	1.47	1.47	0.88	0.05	30.1	0.22	21.6	12.9	0.7	1,423	10
Indicated	2.27	1.13	0.87	0.05	29.3	0.23	25.7	19.7	1.1	2,141	17
Total M&I	**3.74**	**1.26**	**0.88**	**0.05**	**29.6**	**0.23**	**47.3**	**32.8**	**1.9**	**3,564**	**28**
Inferred	0.80	1.08	0.93	0.03	31.4	0.50	8.6	7.4	0.2	807	13

Notes:

1. CIM (2014) definitions were followed for Mineral Resources.

2. Mineral Resources are estimated at an NSR cut-offs of US$17.97/t.
3. Mineral Resources are estimated using an average long-term metal prices of Zn: US$3,034/t (US$1.38/lb); Pb: US$2,530/t (US$1.15/lb); Cu: US$7,351/t (US$3.33/lb), and Ag: US$21.58/oz and a PEN/US$ exchange rate of $3.30.
4. A minimum mining width (block size) of 4 m was used.
5. Bulk density varies depending on mineralization domain.
6. Mineral Resources are exclusive of Mineral Reserves.
7. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
8. Numbers may not add due to rounding.

The database, as of August 31, 2018, comprises 4,384 drill holes and 69,106 underground channels for a total of 996,097 m. For Mineral Resource estimation, the drill hole data were limited to those assays located inside the mineralization wireframes. This includes 2,375 drill holes and 42,230 underground channels for a total of 178,696 m of sampling for Atacocha underground, and 718 drill holes and 1,486 underground channels for a total of 29,996 m of sampling for San Gerardo.

The Atacocha underground Mineral Resource estimates are supported by 77 mineralization wireframes. Unsampled intervals within wireframes were assigned with detection limit values in the database prior to grade composite creation. High zinc, lead, copper, and silver two metre composite grades were capped. A sub-blocked model with a minimum sub-cell size of 0.5 m by 0.5 m by 0.5 m with parent blocks measuring 4 m by 4 m by 4 m for the mineralization wireframes was generated. Blocks were interpolated for zinc, lead, copper, and silver using ordinary kriging (OK) or inverse distance cubed (ID^3), and a three-pass search strategy. Bulk density values were estimated to vary from 3.14 g/cm^3 to 3.88 g/cm^3 in the mineralized domains, and the average density used for the wall rock zones was 2.80 g/cm^3.

Mineral Resources at Atacocha underground are reported within resource stopes generated in Deswik Stope Optimizer software, satisfying minimum mining size, Net Smelter Return (NSR) cut-off values of US$71.13/t for CAF resource stopes and US$61.99/t for SLS resource stopes, and continuity criteria.

The San Gerardo Mineral Resource estimates are based on 40 mineralization wireframes. Unsampled intervals within wireframes were assigned with detection limit values in the database prior to grade composite creation. High zinc, lead, copper, silver, and gold two metre composite grades were capped. A sub-blocked model with a minimum sub-cell size of 0.5 m by 0.5 m by 0.5 m with parent blocks measuring 4 m by 4 m by 6 m for the mineralization wireframes was generated. Blocks were interpolated for zinc, lead, copper, silver, and gold using OK and ID^3. A three-pass search strategy was developed by Nexa to estimate the grades for the blocks contained within the mineralized wireframes. Bulk density values vary from 2.63 g/cm³ to 2.99 g/cm³ in the mineralized domains, and average 2.62 g/cm³ for the wall rock zones. The 0.5 m by 0.5 m by 0.5 m were re-blocked into the final resource model, which has 4 m by 4 m by 6 m blocks. The re-blocked grades were assigned based on tonnage weighting the original block grades and the geology and other codes were assigned based on majority rules.

Mineral Resources at San Gerardo are reported within a preliminary pit shell generated in NPV Scheduler software package from Datamine, at a reporting NSR cut-off value of US$17.97/t.

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 or ID^3 average grades, and creation of swath plots. Blocks were classified as Measured, Indicated, and Inferred based on the number of holes and distances determined by variogram ranges, and conform to CIM (2014) definitions.

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.

MINERAL RESERVES

The updated Mineral Reserve estimate effective December 31, 2018 is summarized in Tables 1-3 and 1-4 for the Atacocha underground mine and San Gerardo open pit, respectively.

TABLE 1-3 ATACOCHA MINERAL RESERVES - DECEMBER 31, 2018
Nexa Resources S.A. – Atacocha Mine

Category	Tonnage	Grade				Contained Metal			
	(000 t)	Zinc (%)	Lead (%)	Copper (%)	Silver (g/t)	Zinc (000 t)	Lead (000 t)	Copper (000 t)	Silver (000 oz)
Proven	1,634	3.49	2.14	0.20	94.8	57.0	35.0	3.3	4,980
Probable	2,160	4.52	1.38	0.30	69.4	97.6	29.9	6.5	4,821
Total	**3,794**	**4.08**	**1.71**	**0.26**	**80.3**	**154.6**	**64.9**	**9.7**	**9,801**

Notes:
1. CIM (2014) definitions were followed for Mineral Reserves.
2. Mineral Reserves are estimated at NSR cut-offs of US$ 71.13/t processed and US$61.99/t processed for CAF and SLS respectively.
3. Mineral Reserves are estimated using average long-term metal prices of Zn: US$2,638.50/t (US$1.20/lb); Pb: US$2,199.60/t (US$1.00/lb); Cu: US$6,391.80 /t (US$2.90/lb); Ag: US$18.76/oz and Au: US$1,352/oz and a PEN/US$ exchange rate of $3.30.
4. A minimum mining width of 4.0 m was used for both CAF and SLS.
5. Bulk density is 3.40 t/m^3.
6. Numbers may not add due to rounding.

TABLE 1-4 SAN GERARDO MINERAL RESERVES – DECEMBER 31, 2018
Nexa Resources S.A. – Atacocha Mine

Category	Tonnage	Grade					Contained Metal				
	(000 t)	Zinc (%)	Lead (%)	Copper (%)	Silver (g/t)	Gold (g/t)	Zinc (000 t)	Lead (000 t)	Copper (000 t)	Silver (000 oz)	Gold (000 oz)
Proven	3,100	0.96	0.99	0.03	33.0	0.22	29.7	30.8	0.9	3,288	22.2
Probable	2,934	0.92	1.06	0.03	32.7	0.21	27.0	31.0	0.8	3,080	19.9
Total	**6,034**	**0.94**	**1.02**	**0.03**	**32.8**	**0.22**	**56.7**	**61.7**	**1.7**	**6,368**	**42.1**

Notes:
1. CIM (2014) definitions were followed for Mineral Reserves.
2. Mineral Reserves are estimated at an NSR cut-off of US$17.97/t processed.
3. Mineral Reserves are estimated using average long-term metal prices of Zn: US$2,638.50/t (US$1.20/lb); Pb: US$2,199.60/t (US$1.00/lb); Cu: US$6,391.80 /t (US$2.90/lb); Ag: US$18.76/oz and Au: US$1,352/oz and a PEN/US$ exchange rate of $3.30.
4. Bulk density is 2.75 t/m^3.
5. 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 Reserve estimate.

The dilution that has been applied is related to the selected mining method. For the CAF method, it varies from 8.8% to 25% depending on the stope width. For the SLS method, the dilution is 20% for all stope widths. Extraction is related to the mining method and is applied on a percentage basis. It is 98% for CAF, 85% for SLS, and 100% for development.

MINING METHOD

The Atacocha mine consists of the Atacocha underground mine and the San Gerardo open pit. The Atacocha underground is ramp accessed to a planned depth of 1,600 m, utilizing CAF and SLS mining methods. The mine uses a combination of unconsolidated waste rockfill and hydraulic backfill for CAF and unconsolidated waste rockfill for SLS. The Atacocha underground ore production averages 900 tpd in 2019, increasing over the LOM to an average production rate of 1,700 tpd. San Gerardo average ore and waste production rates for 2019 are 3,600 tpd and 17,800 tpd, respectively, with average LOM production rates of 2,800 tpd and 16,900 tpd for ore and waste respectively. Waste is hauled to the San Gerardo waste dump, which is adjacent to the Atacocha TSF dam.

MINERAL PROCESSING

The Atacocha concentrator processes ore from the Atacocha underground mine and the San Gerardo open pit mine. While production from the open pit ramped up from 2016 to 2017, ore from the underground mine has decreased, and in 2018 open pit ore made up approximately 70% of the Atacocha concentrator feed. The average daily processing rate is approximately 4,200 t.

The Atacocha concentrator utilizes a conventional crushing, grinding, and sequential flotation scheme to produce lead, copper, and zinc concentrates. A flash-flotation step is included in the grinding circuit that recovers lead at a grade sufficiently high to report directly to the final lead concentrate. Lower copper head grades in recent years has resulted in only small quantities of copper concentrate being produced intermittently when copper head grades warrant its production. The majority of gold and silver report to the lead concentrate.

The zinc concentrate is transported to the Cajamarquilla zinc refinery near Lima, while the copper and lead concentrates are sold to concentrate traders.

PROJECT INFRASTRUCTURE

Site operations comprise an underground mine, open pit mine, and a process plant facility. Supporting onsite infrastructure include maintenance facilities; maintenance buildings for underground and surface equipment, laboratory, and tailings pumping station. Facilities and structures supporting operations include warehouses and laydown areas, offices, dry facilities, hydroelectric generating station, power lines and substation, fuel storage tanks, and accommodations camp. The site has well developed systems in place for water supply and distribution, including fresh water and fire suppression water, sewage collection and disposal, and communications. A network of site roads that are approximately six metres wide and total 15 km in length are used by authorized mine personnel and equipment, including ore and waste haul trucks, concentrate haul trucks, support and light duty vehicles to provide access to onsite infrastructure.

Power supply for the Project comes from three sources, Electroandes, a power supplier located in Paragsha, via a 30 km long 50 kV transmission line, Chaprin Hydro, a hydroelectric generating station with a total capacity of 5.26 MW via a 15 km long 50 kV transmission line, and the Marcopampa hydroelectric generating station with a total capacity of 1.1 MW via a five kilometre long 50 kV transmission line.

Waste rock from the San Gerardo Mine is disposed of in the Atacocha Waste Dump, which is adjacent to and downstream of the Atacocha TSF. Atacocha processing plant currently pumps tailings to the El Porvenir TSF, and both the Atacocha and El Porvenir TSFs have capacity for expansion to accommodate tailings production over the LOM.

MARKET STUDIES

The principal commodities produced at Atacocha are zinc, lead, and copper concentrates, with silver and gold contained in concentrate. These products are freely traded at prices that are widely known.

ENVIRONMENTAL, PERMITTING AND SOCIAL CONSIDERATIONS

Various Environmental Impact Assessments (EIA) and modifications have been submitted and approved between 2005 and 2018. The most recent modifications involve the implementation of a new power transmission line from El Porvenir mine site to the Atacocha mine site, and the expansion of the Atacocha processing plant capacity.

The Atacocha mine operation is managed according to the environmental and closure considerations presented in four types of documents, which must be approved by directorial resolutions from the Peruvian government:

- Environmental Adjustment and Management Plan

- Environmental Impact Assessment
- Technical support reports
- Mine Closure Plan

A new modification of the Mine Closure Plan including the San Gerardo open pit is being prepared, with completion targeted for the first quarter of 2019.

Atacocha complies with applicable Peruvian permitting requirements. The approved permits address the authority's requirements for operation of the open pit and underground mine, tailings storage facilities, waste rock dumps, process plant, water usage and effluents discharge.

Atacocha has developed policies, protocols, and operational procedures and practices that aim to address various aspects of the company's social responsibility with regard to its mining operations. These policies, protocols and procedures have been designed to meet host country requirements and comply with International Finance Corporation (IFC) standard PS-1 (Environmental and Social Assessment and Management System (ESMS)) requirements. These policies and procedures are updated periodically in response to changing local conditions throughout the mine life. The current set of policies and procedures were last updated in 2012.

CAPITAL AND OPERATING COST ESTIMATES

A summary of the capital costs for the Project is given in Table 1-5.

TABLE 1-5 LOM CAPITAL COSTS
Nexa Resources S.A. – Atacocha Mine

Item	Total (US$000)
Sustaining Capital Cost	**97,451**
Environmental	346
Heavy Mobile Equipment	16,456
Mining Facilities	3,763
Metallurgical Plant	7,435
Safety	5,731
Tailing Dam	18,755
Waste Deposit	14,500
Others	2,104
Capital Development	28,362

Sustaining capital development consists of 14,200 m of primary development or an average of 2,400 m per year over six years with requirements decreasing progressively over the LOM.

Mine closure costs are currently estimated at approximately US$15.3 million.

The unit operating costs for the Atacocha underground mine are listed in Table 1-6. Lateral capital and operating development are estimated at $1,995/m and raise development is estimated at $500/m.

TABLE 1-6 ATACOCHA LOM OPERATING COSTS
Nexa Resources S.A. – Atacocha Mine

Item	Units	CAF	SLS
Mining	US$/t Processed	52.50	46.36
Processing	US$/t Processed	9.82	9.82
General and Administrative	US$/t Processed	8.82	8.82
Total	**US$/t Processed**	**71.13**	**61.99**

The unit operating costs for San Gerardo open pit mine are listed in Table 1-7.

TABLE 1-7 SAN GERARDO LOM OPERATING COSTS
Nexa Resources S.A. – Atacocha Mine

Item	Units	Unit Cost
Ore Mining	US$/t Processed	4.48
Waste Mining	US$/t Processed	2.26
Processing	US$/t Processed	9.82
General and Administrative	US$/t Processed	5.93

Unit operating cost estimates are based on analysis of budgeted fixed and variable costs, which compare well to historical actuals.

2 INTRODUCTION

Roscoe Postle Associates Inc. (RPA) was retained by Nexa Resources S.A. (Nexa) to prepare an independent Technical Report on the Atacocha mine (the Mine or the Project), located in Pasco Province, central Peru. The purpose of this report is to support the public disclosure of updated Mineral Reserve and Mineral Resource estimates. This Technical Report conforms to National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101).

Nexa is publicly traded 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 is one of the largest producers of zinc in the world. It 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 two underground mines, Vazante (Zn and Pb) and Morro Agudo (Zn and Pb), and two development projects, Aripuanã and Caçapava do Sul. 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-Au), 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. It also operates one zinc smelter in Peru (Cajamarquilla).

The Mine is owned by Nexa Resources Atacocha S.A.A. (Atacocha), which is controlled 91% by Nexa Resources El Porvenir S.A.C., a 99.99% subsidiary of Nexa Resources Peru S.A.A. (Nexa Perú). Nexa Perú is an indirect subsidiary of Votorantim S.A., which through Nexa Resources Cajamarquilla S.A. (Parent Company) and Nexa (located in Luxembourg), controls 80.06% of Nexa Perú's common shares.

The Mine commenced production in 1938. In 2018, the Mine produced approximately 17,324 tonnes of zinc, 125 tonnes of copper, 15,595 tonnes of lead, 1.68 million ounces of silver, and 15,431 ounces of gold. The operation is currently mining ore from the Atacocha underground mine and the San Gerardo open pit mine. Both mining operations currently feed the Atacocha processing plant.

SOURCES OF INFORMATION

A site visit was carried out to the Project by Scott Ladd, P. Eng., Principal Mining Engineer with RPA, Rosmery Cardenas, P. Eng., Principal Geologist with RPA and Lance Engelbrecht, B.Sc., Principal Metallurgist with RPA, from September 5 to 7, 2018.

During the preparation of this report and the site visit, discussions were held with personnel from Nexa:

- Marcelo Del Guidice Rocha Santos, Resource and Reserve Committee
- Jonas Mota e Silva, Corporate Manager of Geology and Exploration
- Pedro Dueñas, Geology Superintendent at Pasco Complex
- Jose Antonio Lopes, Corporate Resource Manager
- Joel Mejia, Corporate Resource Chief
- Jerry Huaman, Senior Resource Geologist at Pasco Complex
- Nydia Mendizabal, Database Administrator at Pasco Complex
- Maria Campos, Corporate Database Administrator
- Alexander Tola, Mine Geologist Chief
- Mervin Tapia, Brownfield Exploration Manager at Pasco Complex
- Hector Aspajo, Corporate Brownfield Exploration Manager
- Thiago Nantes Teixeira, Mineral Resources and Mineral Reserves Committee
- Priscila Artioli, Mineral Resources and Mineral Reserves Committee
- Fernando Madeira Perisse, Long Term Planning Coordinator
- Cesar Matias, Metallurgical Engineering Manager
- Huender Cleiton, Operations Supervisor (Process)

The Qualified Persons (QP) for this report are Scott Ladd, P.Eng., Rosmery Cardenas, P.Eng., and Avakash Patel, P.Eng., RPA Principal Metallurgist. Mr. Ladd prepared Sections 15 and 16 and 18, 19, 21, and 22, and contributed to Sections 1 to 3 and 25 to 27. Ms. Cardenas prepared Sections 4 to 14 and contributed to Sections 1 to 3 and 25 to 27. Sections 13 and 17 were prepared by Lance Engelbrecht, B.Sc., under the supervision of Avakash Patel, P.Eng., who takes responsibility for these sections and relevant information in Sections 1 to 3 and 25 to 27. Mr. Luiz Vasquez, M.Sc., P.Eng., RPA Associate Environmental Specialist, prepared Section 20 and contributed to Sections 1, 18, 25 to 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.

µ	micron	kVA	kilovolt-amperes
µg	microgram	kW	kilowatt
a	annum	kWh	kilowatt-hour
A	ampere	L	litre
bbl	barrels	lb	pound
Btu	British thermal units	L/s	litres per second
°C	degree Celsius	m	metre
C$	Canadian dollars	M	mega (million); molar
cal	calorie	m^2	square metre
cfm	cubic feet per minute	m^3	cubic metre
cm	centimetre	MASL	metres above sea level
cm^2	square centimetre	m^3/h	cubic metres per hour
d	day	mi	mile
dia	diameter	min	minute
dmt	dry metric tonne	µm	micrometre
dwt	dead-weight ton	mm	millimetre
°F	degree Fahrenheit	mph	miles per hour
ft	foot	MVA	megavolt-amperes
ft^2	square foot	MW	megawatt
ft^3	cubic foot	MWh	megawatt-hour
ft/s	foot per second	oz	Troy ounce (31.1035g)
g	gram	oz/st, opt	ounce per short ton
G	giga (billion)	ppb	part per billion
Gal	Imperial gallon	ppm	part per million
g/L	gram per litre	psia	pound per square inch absolute
Gpm	Imperial gallons per minute	psig	pound per square inch gauge
g/t	gram per tonne	RL	relative elevation
gr/ft^3	grain per cubic foot	s	second
gr/m^3	grain per cubic metre	st	short ton
ha	hectare	stpa	short ton per year
hp	horsepower	stpd	short ton per day
hr	hour	t	metric tonne
Hz	hertz	tpa	metric tonne per year
in.	inch	tpd	metric tonne per day
in^2	square inch	US$	United States dollar
J	joule	USg	United States gallon
k	kilo (thousand)	USgpm	US gallon per minute
kcal	kilocalorie	V	volt
kg	kilogram	W	watt
km	kilometre	wmt	wet metric tonne
km^2	square kilometre	wt%	weight percent
km/h	kilometre per hour	yd^3	cubic yard
kPa	kilopascal	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, and
- 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. Nexa has relied on a legal review and opinion by Osterling Abogados of Lima, Peru dated July 24, 2017 entitled Legal Opinion – Atacocha Mine and this opinion is relied on in Sections 1 and 4 of this report. Nexa has provided RPA with letters dated February 19, 2019 and March 1, 2019 updating the legal review and opinion. RPA has not researched property title or mineral rights for the Atacocha mine and expresses no opinion as to the ownership status of the property.

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 districts of San Fransisco de Asis de Yarusyacán and Yanacancha, in the north central portion of Pasco Province, central Peru (Figure 4-1). The Project consists of 147 mineral concessions and covers an area of approximately 2,872.5 ha. The mineral concessions make up an irregularly-shaped, contiguous block extending for a distance of approximately 7.0 km in an east-west direction and approximately 6.5 km in a north-south direction, centred at approximately 367,000mE and 8,831,000mN.

LAND TENURE

The Project consists of 147 mineral concessions and covers an area of approximately 2,872.5 ha. The relevant tenure information, including the concession name and code number, registration date and number, available area, title holder, and concession status of each of the mineral concessions can be found in Table 30-1, Appendix 1. This information is based on the legal review and opinion by Osterling Abogados of Lima, Peru dated July 24, 2017 entitled Legal Opinion – Atacocha Mine (Huertas del Pino et al., 2017), and letters from Nexa's legal counsel dated February 19, 2019 and March 1, 2019, updating the legal review and opinion (Nexa 2019a).

As of December 31, 2018, 139 of the Project concessions are held in the name of Nexa Resources Atacocha S.A.A., seven concessions are held in the name of Nexa Resources Peru S.A.A., and one is held in the name of Nexa Resources El Porvenir S.A.C. (Table 30-1 and Figure 4-2).

The titles of all mineral concessions listed in Appendix 1 have been granted and duly recorded in the Public Registry. The UTM coordinates of these mineral concessions, which determine their location within the official grid, have been recorded in the Mining Cadaster.

All annual fees applicable to the mineral concessions comprising the Project up to year 2018 have been paid in full when due. Annual fees payable in 2019 to keep all mineral concessions in good standing total $83,243.34.

Figure 4-1

Nexa Resources

Atacocha Mine

Province of Pasco, Central Peru

Location Map

March 2019

Callao has the status of a Department

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Source: Map No. 3838 Rev. 3, United Nations, 2004.

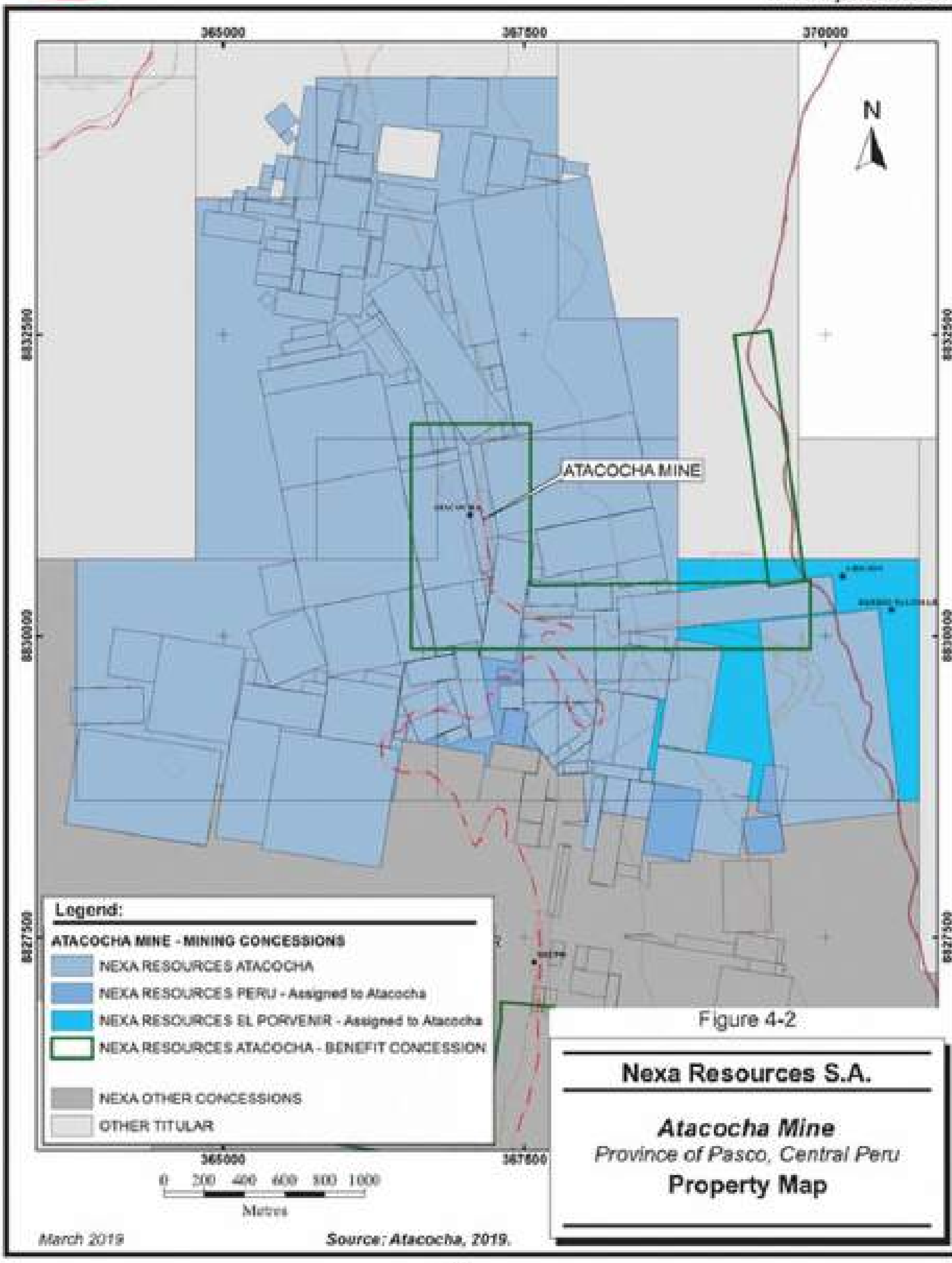


Figure 4-2

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Property Map

Certain mineral concessions are subject to a penalty if the minimum required levels of production or exploration expenditures have not been met. All penalties applicable to the mineral concessions comprising the Project up to year 2018, have been paid in full when due. Penalties due in 2019 total $1,143.03.

UNDERLYING AGREEMENTS

The Atacocha mine is owned by Nexa Resources Atacocha S.A.A. (Atacocha), which is controlled 91% by Nexa Resources El Porvenir S.A.C., a 99.99% subsidiary of Nexa Resources Peru S.A.A. (Nexa Perú). Nexa Perú is an indirect subsidiary of Votorantim S.A., which through Nexa Resources Cajamarquilla S.A. (Parent Company) and Nexa Resources S.A.(Nexa) (Located in Luxembourg), controls 80.06% of Nexa Perú common shares.

MINERAL RIGHTS

According to Peruvian law:

- Mineral concessions grant their holder the right to explore, develop, and mine minerals located within their internal boundaries. They allow the aforementioned rights for either metallic or non-metallic minerals.
- A mineral claim is an application to obtain a mineral concession. Exploration, development and exploitation works may be initiated once title to concession has been granted, except in those areas of overlap with pre-existing claims or concessions applied for before December 15, 1991. Upon completion of 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 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 competent 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.
- Mineral rights holders must comply with the payment of the Annual Fee equal to $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 or spend the equivalent amount in exploration or investments before a statutory deadline. When such deadline is not met within term a Penalty must be paid.

- Mineral concessions titled on or before October 10, 2008 must meet the Minimum Annual Production Target of US$100.00 per hectare per year for metallic concessions, within a statutory term of six years since the concession is titled. The applicable penalty is US$ 6.00 per hectare per year as of the seventh year until the eleventh year. As of the twelfth year, the applicable penalty is US$20.00 per hectare per year.

- According the Peruvian General Mining Law, the mining concessions must pay a penalty if either the minimum annual production or the minimum annual investment are not reached. The minimum annual production is equal to 1 UIT (Tax Unit) per granted hectare, the minimum annual investment is the penalty to be paid multiplied by a factor of 10.

- The penalty is calculated based on the granted hectares multiplied by a percentage of the UIT (it depends of the years from titling). It should be noted that for concessions titled before October 2008, the count starts in 2008.

- The following details the formula for calculating the penalty:

Penalty (year 11 to 15)	=	Ha (granted)	X	2%	UIT (PEN)
Penalty (year 16 to 20)	=	Ha (granted)	X	5%	UIT (PEN)
Penalty (year 21 to 30)	=	Ha (granted)	X	10%	UIT (PEN)

  (i) The concession holder can be exonerated from paying the penalty if it can demonstrate that during the previous year it has invested more than the minimum annual investment or that during the previous year the sales are bigger than the minimum annual production.

  (ii) A concession expires if it does not reach the minimum production in the year 30, but a time frame of up to five additional years can apply for a non-compliance 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.

PERMITTING

Permits and authorizations for the operations are listed in Table 31-1, Appendix 2.

RPA is not aware of any environmental liabilities on the property. Nexa 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.

SURFACE RIGHTS AND EASEMENTS

According to the General Mining Law and related legislation, surface rights are independent of mineral rights.

The law requires that the holder of a Mining Concession reaches either an agreement with the landowner before starting relevant mining activities (i.e., exploration, exploitation, etc.) or the completion of the administrative easement procedure, in accordance with the applicable regulation.

Surface property is a right *in rem* that is acquired through:

(i) the transfer of ownership by agreement of the parties (derivative title), or
(ii) by acquisitive prescription of domain (original title).

Temporary rights to use and/or enjoy derived powers from a surface property right may be obtained through usufruct and easement rights.

As indicated by Nexa, the Project is located within the following surface rights:

(i) a property of 1,103 Ha and 722 m² for the Mine site, for the Marcopampa hydroelectric power station and Marcopampa power transmission line;

(ii) a property of 14.9936 Ha for the Chaprin hydroelectric power station;

(iii) a right of way of 15 km for the power transmission line between the Chaprin hydroelectric power station and the Mine site;

(iv) a right of way of 8,315 m² for the water pipeline that feeds the Chaprin and Marcopampa hydroelectric power stations.

ENVIRONMENTAL CONSIDERATION

Environmentally, the Project is not located within a protected natural area nor its buffer zones. Atacocha has developed a number of environmental plans and studies which form the basis for its operations. Atacocha operates an Environmental and Social Management Systems for

Atacocha to manage its environmental and social risks and impacts in a structured and ongoing way. These systems along with permitting information are discussed in Section 20.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

ACCESSIBILITY

Access by road to the Project from the capital city of Lima is via the Central Highway (Carretera Central), through the city of Huánuco, to the town of Chicrin (at km 324). An approximately 4.5 km long unpaved road provides access to the Mine from the town of Chicrin.

The area is serviced by daily flights from Lima to Huánuco and Jauja. The airport at Huánuco is located approximately 100 km north of the Project, a two hours drive along paved roads. The airport at the city of Jauja is located approximately 200 km south of the Project, a three hours drive along paved roads.

CLIMATE

The Project area has an Alpine Tundra climate characterized by humid, damp, and cloudy summers with frequent rainfall from December to April and dry, sunny winters from June to August with cool to cold temperatures throughout the year. The average annual temperature is 5.5°C and the average annual rainfall is 999 mm. Snowfall may occur during any season.

LOCAL RESOURCES

Various services including temporary and permanent accommodations and medical services are available at the city of Cerro de Pasco (population 70,000), located approximately 16 km south of the Project. A greater range of general services are available at Huánuco (population 175,000), located approximately 80 km to the north and at the capital city of Lima, located approximately 200 km to the southwest.

INFRASTRUCTURE

The Atacocha operation is comprised of the following main facilities:

- 900 tpd to 1,700 Underground mine
- 2,800 tpd to 3,600 tpd San Gerardo open pit (including Satellite East and Satellite West open pits)
- Atacocha waste dump

- Atacocha tailings storage facility
- Temporary ore stockpile
- Topsoil stockpile
- 4,500 tpd Atacocha processing plant
- Sediment pond
- Ancillary buildings (administration, storage, vehicle maintenance, etc.)
- San Felipe and Chicrin camps
- Closed waste dumps (3600, 3900, 4000)
- Inactive tailings storage facilities in closure (Chicrín Antiguo, Chicrín Actual, Cajamarquilla, Titlacayán, Malauchaca)

PHYSIOGRAPHY

The Mine is located in a glacial valley with rugged mountains in the central highland of Perú, in the Western Cordillera. There are three geomorphological zones in the Atacocha area: the Puna surface, the Cordilleran Zone, and the Periglacial Valleys Zone. The elevation at the Mine is 4,340 MASL and the processing plant is located in the Huallaga river valley, surrounded by rugged hills/mountains, at an elevation of approximately 3,600 MASL. Topographical relief comprises deep, long, narrow valleys with steep slopes. Some rivers cross through the area, and have moderate slopes and some scattered peaks. The main valley has a general inclination from south to north.

6 HISTORY

OWNERSHIP HISTORY

From its discovery until 1925, the Project was controlled by the Pucayacu Mining Company (Pucayacu) until Pucayacu was liquidated and the Project was declared abandoned.

In 1928, the Casa Gallo Hermanos enterprise acquired the Project.

In 1936, Nexa Resources Atacocha S.A.A. was established and began exploiting the Mine. Atacocha was controlled 91% by Nexa Resources El Porvenir S.A.C. Nexa Resources El Porvenir S.A.C. was 99.99% controlled by Nexa Resources Peru S.A., an indirect subsidiary of Votorantim S.A. and Nexa Resources S.A.

In September 2017, VMH was re-named Nexa and began trading publicly on the NYSE and TSX.

EXPLORATION AND DEVELOPMENT HISTORY

On February 8, 1936, Atacocha was established to explore, develop, and exploit the mining sites, to produce lead, zinc, and copper concentrates. In the first year of operations, the activities focused on levelling and widening of the San Ramon tunnel at the 4000 Level to prepare it to be used as a mine extraction level. The exploitation work developed in veins from the 4000 Level allowed to verify that these veins represented the limits of a unique mineralized body. In the next two years (1938), the "Marcopampa" hydroelectric central and Concentrate Plant No. 1 in Chicrín were completed.

In 1952, the construction of the 3600 Level with a length of 2,700 m was completed, which allowed a new main level of access and transportation to underground work, while facilitating the extraction and transportation of the mineral to new Concentrate Plant No. 2 (now the Atacocha process plant) also located in Chicrín.

In 1953, the Chaprin Hydroelectric Plant began operating. Also, from the development of the exploration and exploitation works, in addition to the work undertaken from peak 533 that joined the 3600 Level with 3900 Level, another important mineralized body was discovered below, proving that it was the most extensive mineralization discovered in Atacocha.

Milpo conducted exploration and development work at Atacocha from 1949 onwards. Most of the exploration was generally conducted simultaneously with underground development, which involves diamond core drilling, and channel sampling following underground drifting. Prior to 1997, minor and sporadic drilling was completed; and no channel sampling is documented before year 2001. Nexa is currently developing an underground connection (and integration) of the El Porvenir and Atacocha mines, which will involve systematic exploration through this zone.

HISTORICAL RESOURCE ESTIMATES

Previous resource estimates are discussed in detail in SRK (2017). All previous estimates are superseded by the current Mineral Resource estimate reported in Section 14.

PAST PRODUCTION

Table 6-1 shows the historical production from Atacocha to the end of 2018.

TABLE 6-1 PAST PRODUCTION
Nexa Resources S.A. – Atacocha Mine

Year	Tonnes	Au (oz/t)	Ag (oz/t)	Pb (%)	Zn (%)	Cu (%)
2009	1,424,905	0.01	1.20	0.72	4.70	0.26
2010	1,537,390	0.02	1.24	0.72	4.26	0.24
2011	1,540,647	0.01	1.39	0.73	3.37	0.27
2012	1,455,482	0.01	1.27	0.76	3.43	0.23
2013	1,480,429	0.01	1.40	0.79	3.34	0.24
2014	1,540,713	0.01	1.48	0.89	2.74	0.20
2015	1,431,315	0.01	1.54	1.10	2.40	0.16
2016	1,487,390	0.02	1.71	1.32	1.80	0.11
2017	1,506,830	0.02	1.43	1.22	1.43	0.09
2018	1,551,470	0.02	1.42	1.18	1.43	0.10

7 GEOLOGICAL SETTING AND MINERALIZATION

REGIONAL GEOLOGY

The South American Platform is mainly 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 sea board 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 (Peterson, 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.

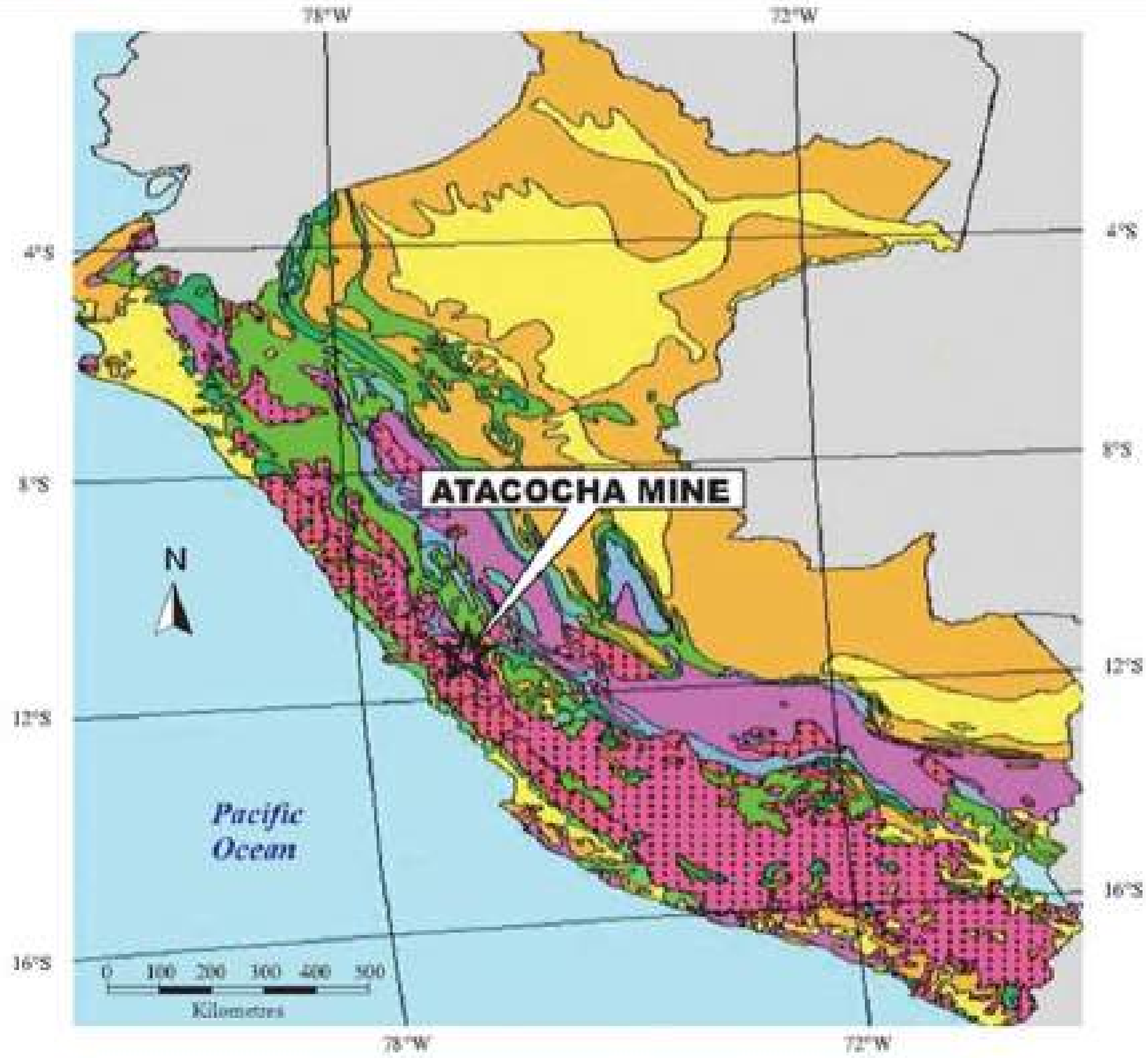
The geology of Peru, from the Peru-Chile Trench in the Pacific to the Brazilian Shield, is defined as three major parallel regions, from west to east: the Andean Forearc, the High Andes, and the Andean Foreland. All three of these regions formed during Meso-Cenozoic evolution of the Central Andes. The 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 almost 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.



Sedimentary Rocks

- Quaternary
- Tertiary
- Cretaceous
- Cretaceous Jurassic
- Jurassic
- Jurassic Triassic
- Permian Carboniferous
- Precambrian Devonian

Igneous Metamorphic Rocks

- Cretaceous - Volcanics Tertiary
- Mesozoic - Cenozoic Intrusives
- Precambrian Indifferentiated

Figure 7-1

Nexa Resources S.A.

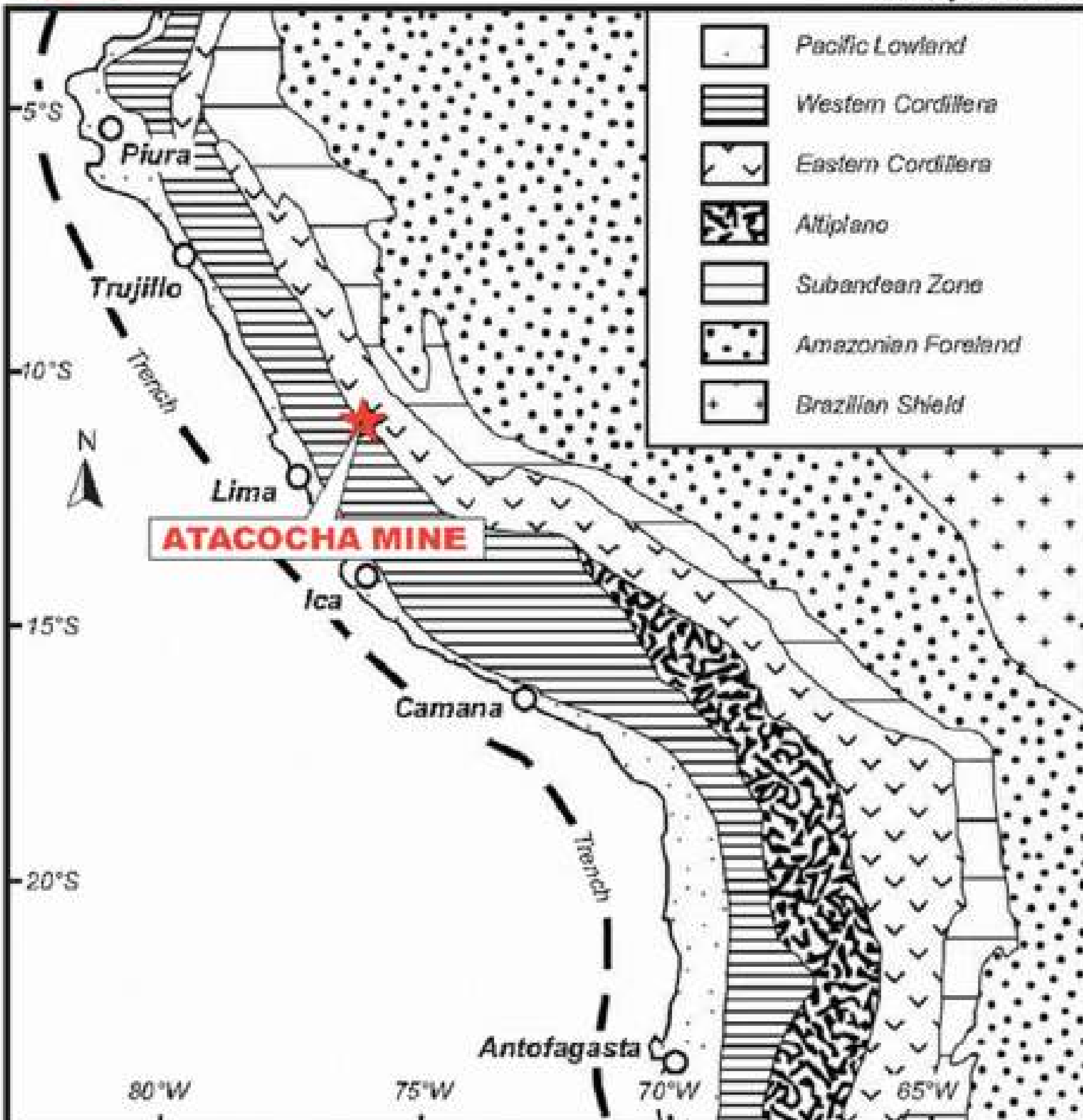
Atacocha Mine

Province of Pasco, Central Peru

Regional Geology

March 2019

Source: RPA, 2017.



0 125 250 375 500
Kilometres

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

March 2019

Figure 7-2

Nexa Resources S.A.

Atacocha Mine
Province of Pasco, Central Peru
Morphostructural Map

LOCAL GEOLOGY

The following section was compiled from Johnson (1955), Mégard (1968), Zevallos (1975) and Cobbing et al. (1996) and is abridged from SRK (2017). Figure 7-3 illustrates the Local Geology.

The Atacocha property is situated in the Pasco region of the Western Cordillera of the Andes mountain range in central Perú, within the Eocene-Miocene Polymetallic and Miocene Au-Ag Epithermal Belts.

STRATIGRAPHY

The oldest rocks in the region are part of the Excelsior Formation (Devonian), comprising metamorphosed siliciclastic sediments or phyllite and quartzite.

The Mitu Group (Upper Permian to Middle Triassic), comprises clastic sediments and mafic to andesitic volcanics, including red sandstone, shale, and minor conglomerate. There is a polymictic conglomerate unit, which is approximately 45 m thick, at the base of the Mitu Group. Conglomerate clasts are subangular, comprising shale, phyllite, quartzite, and minor limestone. The conglomerate matrix is a well cemented, fine grained, reddish sandy material. Thin, grey to reddish siltstone layers are also present, and exhibit laminar stratification. The middle part of the Mitu Group comprises sequences of fine grained, reddish sandstone, with cross-stratification and interbedded with polymictic conglomerate layers. The Mitu Group was deposited during the Late Hercynian Tectonic Phase (based on the fossil record, and radiometric age dating). An angular unconformity exists between the underlying Excelsior Formation and overlying Mitu Group. The sediment package has accumulated with increasing thickness to the east, locally up to approximately 2,000 m, thinning to possibly as little as 100 m thickness in some areas.

The Pucará Group (Norian-Toarcian) was deposited in the Pucará Basin, a north-northwest trending trough associated with a transtensional shear zone accommodating rifting and sinistral movement, on the Mitu Group with an erosional and angular unconformity. The Pucará Group is dominated by carbonate platform sequences which were primarily deposited in a shallow-water environment during the first marine progression of the Andean Orogenic Cycle from the Upper Triassic to Lower Jurassic. The Pucará Group comprises interbedded grey to black limestone, dolostone, and shale with varying thicknesses of up to 60 cm, and is sub-divided into three formations: the Chambará, Aramachay, and Condorsinga formations (Mégard, 1968).

The Chambará Formation (Norian to Rhaetian) overall comprises massive, grey to pale limestone beds with some layers containing chert nodules, horizons of grey to beige calcareous siltstone with variable oxides, and red shale. Thicknesses vary from approximately 600 m to over 3,000 m. This formation may be further sub-divided.

The Aramachay Formation (Hettangian to Sinemurian) is characterized by dark grey bituminous calcareous shales, and limestone beds over 15 cm thick. This formation was deposited in a deeper-water environment.

The Condorsinga Formation (Sinemurian to Toarcian) comprises beige to grey, thin to massive, interbedded limestone and dolostone. Thicknesses vary from approximately 500 m to over 1,500 m.

The Goyllarisquizga Group (Hauterivian to Aptian), consisting of siliciclastic sediments from 150 m to 600 m thick, was deposited during the Lower Cretaceous (Hauterivian to Aptian age) with an erosional and angular unconformity over the Pucará Group. Variable and discontinuous units of conglomerate, chert, and/or shale with carbonaceous fragments occur at the base of this group, which correlates with the Chimú Formation. An approximately 40 m thick sequence comprising bitumen-bearing siltstone, with carbonaceous layers and laminar stratification, is located above the Chimú Formation. Continuing up in the stratigraphic sequence is a section approximately 25 m thick comprising medium grain, reddish sandstone with thin micro-conglomerate layers, alternating with white sandstone higher up in the sequence. These sequences correlate with the Santa and Carhuaz formations. The majority of the Goyllarisquizga Group comprises cross-bedded grey to white, medium to coarse grained, quartz-rich sandstone approximately 90 m thick or more, which correlates with the Farrat Formation.

Over one metre thick limestone units are present locally in the upper parts of this formation. Thin terrestrial red beds and basalt layers one metre to two metres thick may be interbedded near the upper contact.

A discontinuous, predominantly basaltic flow conformably overlies the Goyllarisquizga Group. Thin, red beds of sandstone and shale occur within the basalt unit.

The equivalent Machay and Chicrin formations (Albian) comprise up to approximately 250 m of unfossilized, massive to thinly interbedded grey calcareous sandstone, grey to brown marly limestone, grey calcareous conglomerate with clasts of fine to muddy sandstone, and fine grain red sandstone. The Chicrin Formation is approximately 100 m thick in the Atacocha area. These rocks were deposited onto the basalt flows during the middle Cretaceous.

Another unit of predominantly basalt flows with thin beds of red sandstone and shale was disconformably deposited on top of the Machay/Chicrin Formation.

The Pocobamba (Upper Eocene) Formation comprises breccias with sub-angular to sub-rounded limestone clasts derived from the Pucará Formation; sub-divided into the Cacuán and Shuco members. The Pocobamba Formation was deposited as detritus in a continental setting.

Figure 7-4 illustrates the generalized stratigraphic column in the Project area.

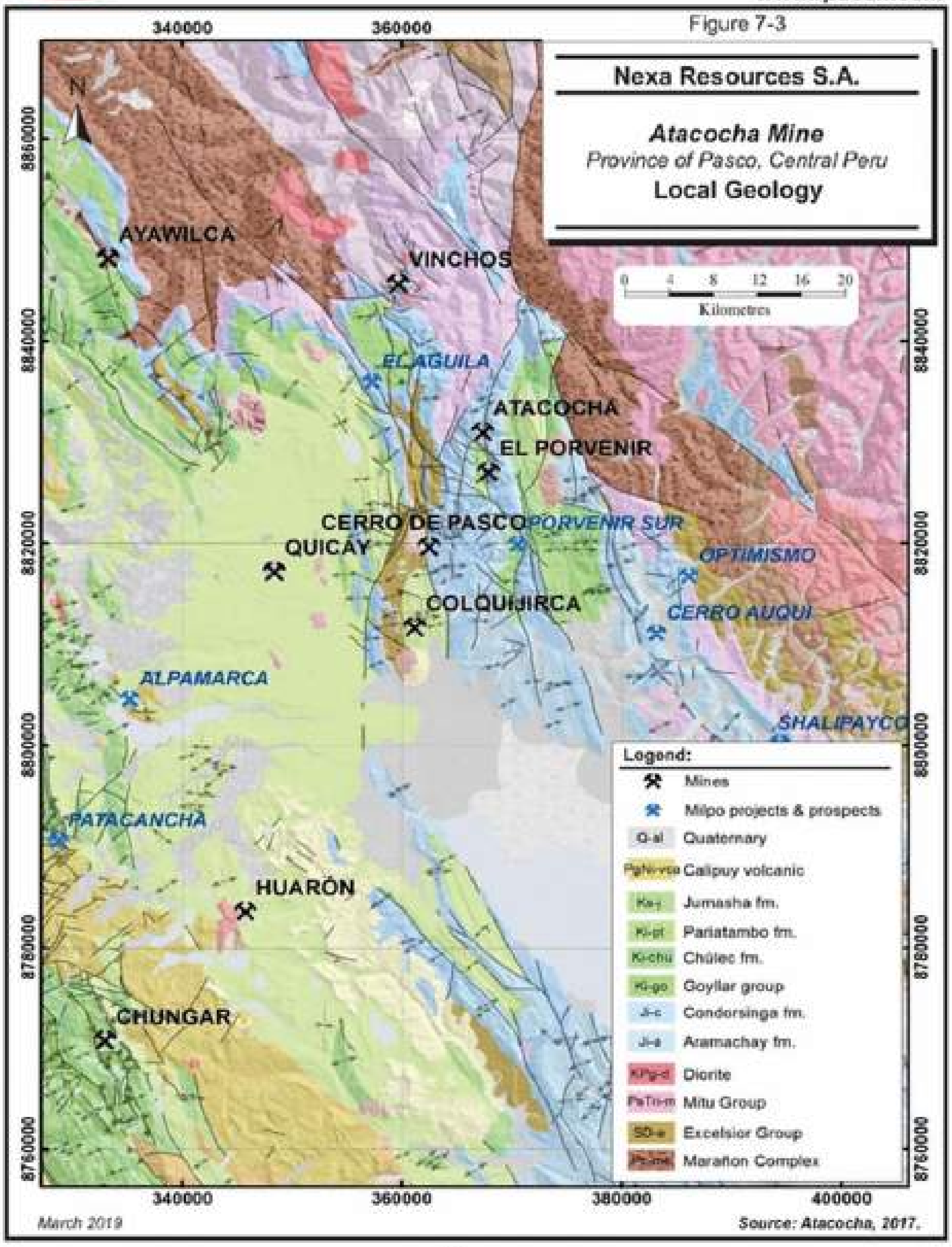
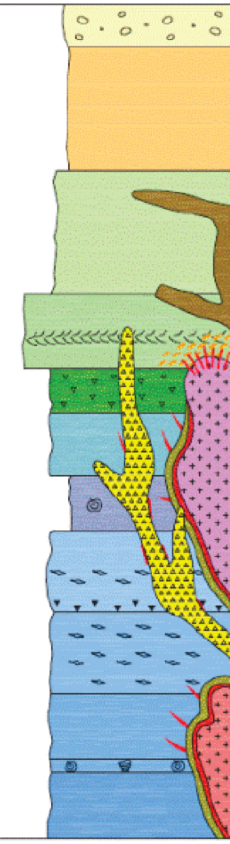


Figure 7-3
Nexa Resources S.A.
Atacocha Mine
Province of Pasco, Central Peru
Local Geology
Kilometres
AYAWILCA
VINCHOS
EL AGUILA
ATACOCHA
EL PORVENIR
CERRO DE PASCO
PORVENIR SUR
QUICAY
OPTIMISMO
COLQUIJIRCA
CERRO AUQUI
ALPAMARCA
SHALIPAYCO
PATACANCHA
HUARÓN
CHUNGAR
Legend:
Mines
Milpo projects & prospects
Q-al Quaternary
Calipuy volcanic
Jumasha fm.
Pariatambo fm.
Chúlec fm.
Goyllar group
Condorsinga fm.
Aramachay fm.
Diorite
Mitu Group
Excelsior Group
Marañon Complex
March 2019
Source: Atacocha, 2017.

ERA	SYSTEM	STRATIGRAPHIC UNIT (FORMATION)		LITHOLOGY	MINERALIZATION (INTRUSIVE)
CENOZOIC	QUATERNARY	Calcareous conglomerate		Fragment of limestone with reddish clay calcareous matrix.	
	EOCENE - PALEOCENE	Pocobamba		Calcareous breccia with some sandstone lenses.	
MESOZOIC	CRETACEOUS	Chulec		Limestones, dolomitized marly limestones	Basalt with alveolar texture
		Goyllarisquizga		Quartz limestones, orthocuartites with crossbedding	Au – Ag – Pb in veins (Sheer zone) Quartz, sericite, clay.
	JURASSIC	Sedimentary breccia		Calcareous breccia with reddish calcareous detritic matrix, with clasts of sandstones, limestones and chert.	Atacocha intrusive – San Gerardo Quartzodiorite (bt,hb)
		Pucará Gr. – Condorsinga	F	Light gray micritic limestones with cherts and abundant pseudomorphs fossils.	Skarn Zn – Pb – Ag in veins, replacement bodies.
		Pucará Gr. – Aramachay	E	Marls and black limestones (bt), with fossils (ammonites).	
	TRIASSIC	Pucará Gr. – Chambará	D	Dolomites and gray limestones, mudstone a grainstone.	
			C	Limestones and dark gray dolomites chert.	Breccia, siliceous heterolytic Zn – Pb – Ag in veins, bodies.
			B	Dolomites and micritic black limestones in thin layers (bt). Fossiliferous level.	Santa Bárbara intrusive and Quartzodiorite Milpo (bt,hb) Skarn Zn – Pb – Ag.
			A	Limestones and micritic dolomites.	

COLUMN



NTS

Figure 7-4

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Generalized Regional Stratigraphic Column

Source: Atacocha, 2017.

INTRUSIVE ROCKS

Two generations of magmatism are recognized in the region, belonging to either the Milpo-Atacocha-Vinchos (29-26 Ma) or Cerro de Pasco-Colquijirca (16-10 Ma) belts (Cobeñas, 2008, and references therein). Both magmatic belts are oriented north-northeast – south-southwest, approximately parallel the Andean trend.

The Milpo-Atacocha-Vinchos intrusive rocks are characterized as small hypabyssal stocks (<1 km^2), dikes, and sills of granodiorite (dacite) to diorite and tonalite composition, and occur within High-K Calc-Alkaline Series and Shoshonitic Series. These intrusive rocks generally exhibit a porphyritic texture with plagioclase as the dominant mineral forming the matrix, and variable phenocrysts of quartz, hornblende, biotite, and pyroxenes. The groundmass comprises fine-grain quartz and feldspar-plagioclase.

Magmatic emplacement occurred during the Oligocene based on two K-Ar age dates of porphyritic granodioritic samples with partially carbonate and sericite altered plagioclase (29.3±2.5 Ma and 25.9±1.5 Ma) (Soler and Bonhomme, 1988). More recently, 12 intrusive rocks samples from the El Porvenir and Atacocha areas were analyzed by U-Pb geochronology at the University of Tasmania, and provided age dates of intrusive crystallization from 28.58 ± 0.38 to 30.11 ± 0.23 Ma.

These intrusive bodies may exhibit an elongate geometry, trending northwest–southeast, parallel to the regional fold axis, and are mostly spatially associated with the Milpo-Atacocha Fault, suggesting that there is an apparent structural control on magmatic emplacement.

Metamorphic contact aureoles are variably formed around these intrusive bodies. The most intense contact aureole is recognized in the Atacocha area, where Pucará Group rocks are completely silicified with pyrite impregnations for up to 200 m.

The Cerro de Pasco-Colquijirca intrusive rocks are characterized as volcanic to subvolcanic dacite, trachyte, trachy-dacite, quartz monzonite, and quartz latite. Texture varies from porphyritic to aphanitic. Composition is dominated by quartz and plagioclase, with lesser amphiboles, biotite, and K-feldspar. Age dating from the Cerro de Pasco, Marcapunta, and Yanamate complexes reveals ages ranging from 16 Ma to 10 Ma.

STRUCTURE

Regional tectonics during the Mesozoic and Cenozoic are collectively referred to as the Andean Cycle which comprises multiple sedimentation and deformational events. The Andean Cycle is sub-divided into at least seven deformational phases (Ellison et al., 1989):

- Peruana (Upper Cretaceous);
- Incaica (Paleogene/Eocene);
- Quechua 1 (early Oligocene);
- Quechua 2 (late Oligocene to early Miocene);
- Quechua 3 (middle Miocene);
- Quechua 4 (late Miocene); and
- Quechua 5 (late Miocene).

Three episodes of regional folding are recognized occurring during the Paleogene and possibly earlier, and are separated by periods of tension. Throughout the region, during the second Andean deformation phase (Incaico), from the Eocene to Oligocene, the tectonics are characterized by northeast–southwest to east–west oriented compression. Much of the folding of the Mesozoic rocks occurred during this deformational phase. The stratigraphic rocks are folded conformably generally forming a series of anticlines and synclines, parallel to the principal Andean trend, with a north/northwest–south/southeast oriented fold axis, plunging to the south. Most folds described throughout the region have gently to moderately dipping (<60°) limbs.

The Milpo-Atacocha Fault is a major structural feature in the region, which can be traced for nearly 15 km from Yarusyacán in the north to Carmen Chico in the south. The Milpo-Atacocha Fault strikes north-south, dipping steeply to the east, with as much as 2,000 m of reverse displacement (east-block up), and probable sinistral movement. Mégard (1968) considers that the Milpo-Atacocha Fault may be part of a fault system active since at least the Triassic, and during the Upper Cretaceous (i.e., pre- and post-folding displacement).

A series of fractures are reportedly formed in response to the northeast-southwest tectonic compression:

1. north-northeast trending dextral faults;
2. southwest trending sinistral faults;
3. northeast trending tensional joints;
4. northwest trending tensional joints.

Figure 7-5 illustrates the regional geological setting with major structures.

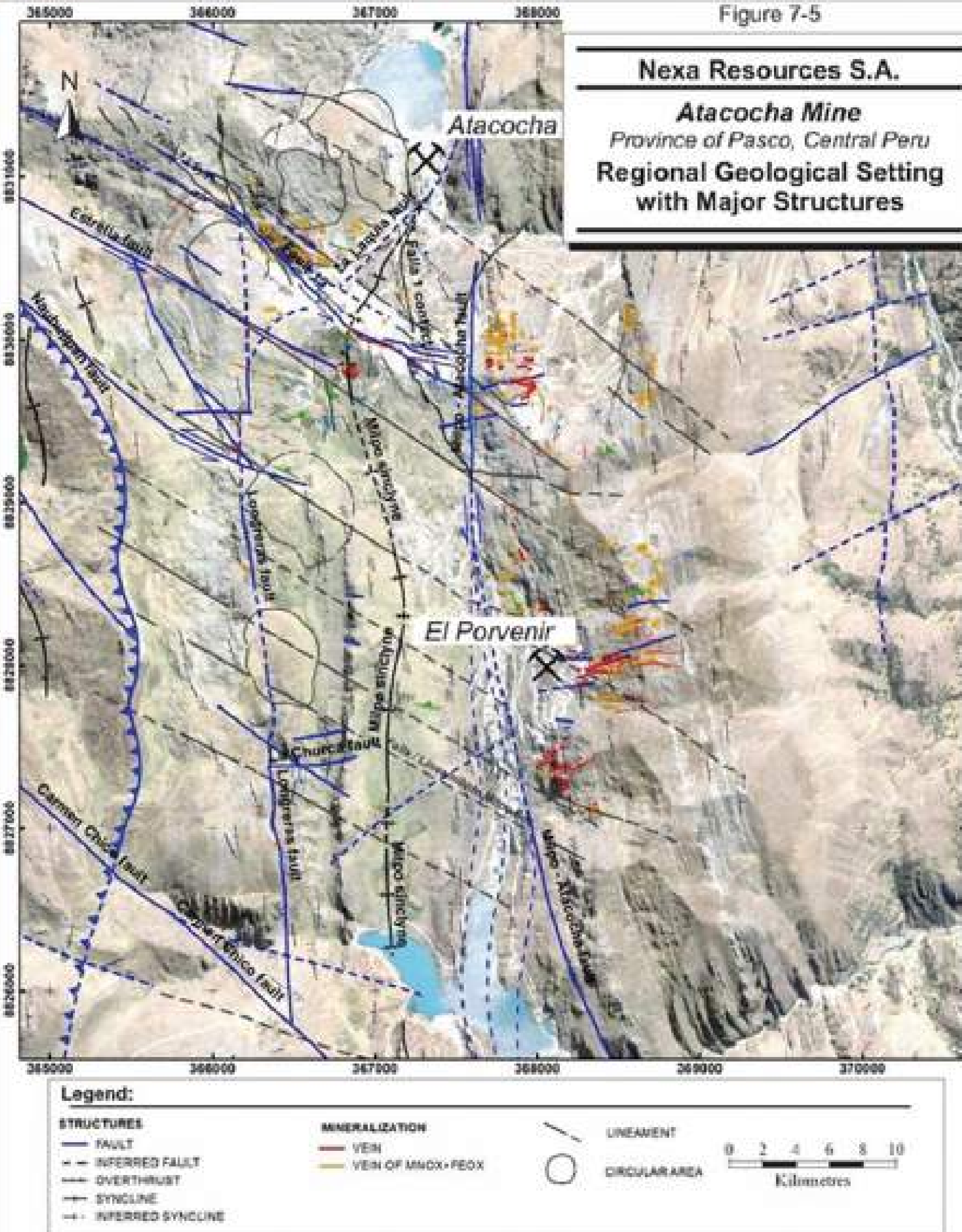
Figure 7-5

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Regional Geological Setting with Major Structures



March 2019

Source: Atacocha, 2017.

PROPERTY GEOLOGY

The geology of Atacocha was compiled by various reports including Cobeñas (2008). Figure 7-6 illustrates the property geology of the larger El Porvenir to Atacocha area. Figure 7-7 depicts two representative geological cross sections through the Atacocha area.

Within the Project area, the stratigraphic units of primary interest are the Pucará and Goyllarisquizga Groups. The Pucará Group is sub-divided into six units: A, B, C, D, which correspond to the Chambará Formation, and E and F, corresponding to the Aramachay and Condorsinga formations, respectively.

- **Unit A** is located to the east of the Atacocha Fault. It consists of a grey to dark grey limestone, micritic to sparitic, with thin dolomite layers, calcarenites and fine, greenish volcanic siltstones at the base of the Chambará Formation. Yellowish grey limonites to compact dolomicrites are observed as well.
- **Unit B** is located to the east of, and stratigraphically above, Unit A. Dark grey to black coloured limestones, dolomicrites, and micrites are observed in thin layers to tabular strata with lenticular bituminous horizons. It can be seen in many parts of the mine due to its obliteration of marble and silicification. The more competent rocks are located at the intermediate zone in the Chambará Formation.
- **Unit C** is located to the east of the mine area. Monotonous grey micritic to sparitic chertic limestones in metric strata are observed. The unit also contains dolomitic horizons. Its lithologic sequences are hard and it represents the intermediate zone of the Chambará Formation.
- **Unit D** is widely distributed within the Atacocha and Santa Bárbara sections. The limestones are beige varying from mudstone to grainstone with light beige dolomitic intercalations. Cherts and bituminous horizons are also observed. Unit D corresponds to the upper zone of the Chambará Formation.
- **Unit E** is the lithological guide of the Atacocha mineralization. It consists of black micritic limestones and black lutite. In many places this package is obliterated by marble, silica, silica-sericite-clay, etc. In many places of the mine, the rock is altered becoming recrystallized and discoloured, adopting clearer tones without converting to marble (loss of calcium). These rocks correspond to the Aramachay Formation of the Pucará Group.
- **Unit F**: is grey to light grey limestones, mudstone to packstone, with fossil horizons and dolomitic levels.

The Goyllarisquizga Group outcrops in the area of the deposit comprising quartz-rich sandstone, corresponding to the Goyllarisquizga Formation. Sandstones may vary from quartz arenite to arkose. The matrix is argillaceous to siliceous. Above the 4,000 Level, the lithology and stratification are well defined and easy to recognize. Below the 4000 Level, strong alteration has obliterated the original rock intensity forming siliceous breccias and massive silica where it is still possible to recognize quartz grains and in few places the stratification.

Localized basalt units are observed in some drill holes to the southwest of the mine, below the Cherchere and San Gerardo zones. The units consist of grey to greenish basalt with green vacuoles of zeolites with traces of flows with olivine phenocrystals, limonite, and magnetite.

Intrusive rocks within the property are variably porphyritic dacite to quartz diorite with hornblende and biotite phenocrysts. Dacitic dikes are sub-divided into two units: porphyritic with feldspar phenocrysts and minor quartz restricted to the groundmass; and porphyritic with abundant quartz phenocrysts, with minor biotite and hornblende. The quartz diorite comprises feldspar phenocrysts up to 6 mm long, with variable quartz 'eyes', and aggregates of biotite and hornblende. The groundmass is microcrystalline quartz and plagioclase. These intrusive rocks generally form dikes trending north-south, and are observed in three areas: Santa Bárbara/central, south along/parallel to the Atacocha Fault, and the southern Section 3. These intrusive rocks in the Atacocha area are part of the Milpo-Atacocha-Vinchos Belt (28 to 30 Ma). The Santa Bárbara and San Gerardo stocks are the two principal intrusive units within the property.

The north-south trending Milpo-Atacocha Fault passes through the property, dividing the property into two structural domains: the western San Gerardo Sector and the eastern Santa Bárbara Sector.

The Santa Bárbara Sector, east of the Milpo-Atacocha Fault, comprises Pucará Group sediments, approximately north striking, and steeply east dipping (approximately 80°). The Chambará Formation occurs immediately adjacent to the fault, followed by younger sediments (higher in stratigraphic column) continuing further to the east. The Santa Bárbara intrusive stock forms a series of dikes, also occurs east of the Milpo-Atacocha Fault emplaced within the Pucará Group sediments. The Santa Bárbara intrusive exhibits three different parts/zones based on orientation: the southern part trends north to northeast, the central part trends north-south, and the northern part trends northeast. Multiple siliceous breccias have been mapped in the Santa Bárbara Sector; one in particular is relatively large occurring west of the Santa Bárbara stock and adjacent to, and possibly cross-cut or influenced by, the Milpo-Atacocha Fault.

The San Gerardo Sector, west of the Milpo-Atacocha Fault, comprises folded Goyllarisquizga Group sediments with undifferentiated limestones of the Pucará Group below forming an asymmetrical synclinal fold. The fold axis trends approximately north-south, and plunges shallowly to the south. The eastern limb of the syncline dips 40° to 70° to the southwest; the western limb dips 75° to 85° to the northeast. The northwest-trending San Gerardo intrusive stock, which forms a series of dikes, also occurs west of the Milpo-Atacocha Fault, intruding the folded Mesozoic sediments, and appears to exhibit some relationship with Fault ("Falla") 13 (see below).

Three main structural systems are recognized as controlling the economic mineralization:

1. north-south dextral faults
2. northwest tensional faults and joints
3. east-west tensional polymetallic veins

Major north-south trending structures in the area are the Milpo-Atacocha and Longreras faults. A series of northwest-southeast trending faults are mapped in the San Gerardo Sector, and appear to control some structural mineralization and/or intrusive emplacement, particularly on Fault 13. A number of siliceous breccias (see Mineralization below) are mapped in the San Gerardo Sector. Fault 1 is sub-parallel and approximates the synclinal fold axis, but may dip to the east, and merges with/splays from the Milpo-Atacocha Fault at depth. The zone around Fault 1 and syncline fold axis exhibits intense faulting and fracturing, which appears to have been a zone of concentrated hydrothermal activity based on the spatial association of siliceous and polymictic breccias, and associated mineralization. Also, in the San Gerardo Sector, the Longreras Fault trends north-south, located nearly one kilometre west of the Milpo-Atacocha Fault. The Longreras Fault is inferred to accommodate some dextral displacement; however, also based on the cross sections, significant vertical displacement (i.e., east-block down) appears to have also occurred.

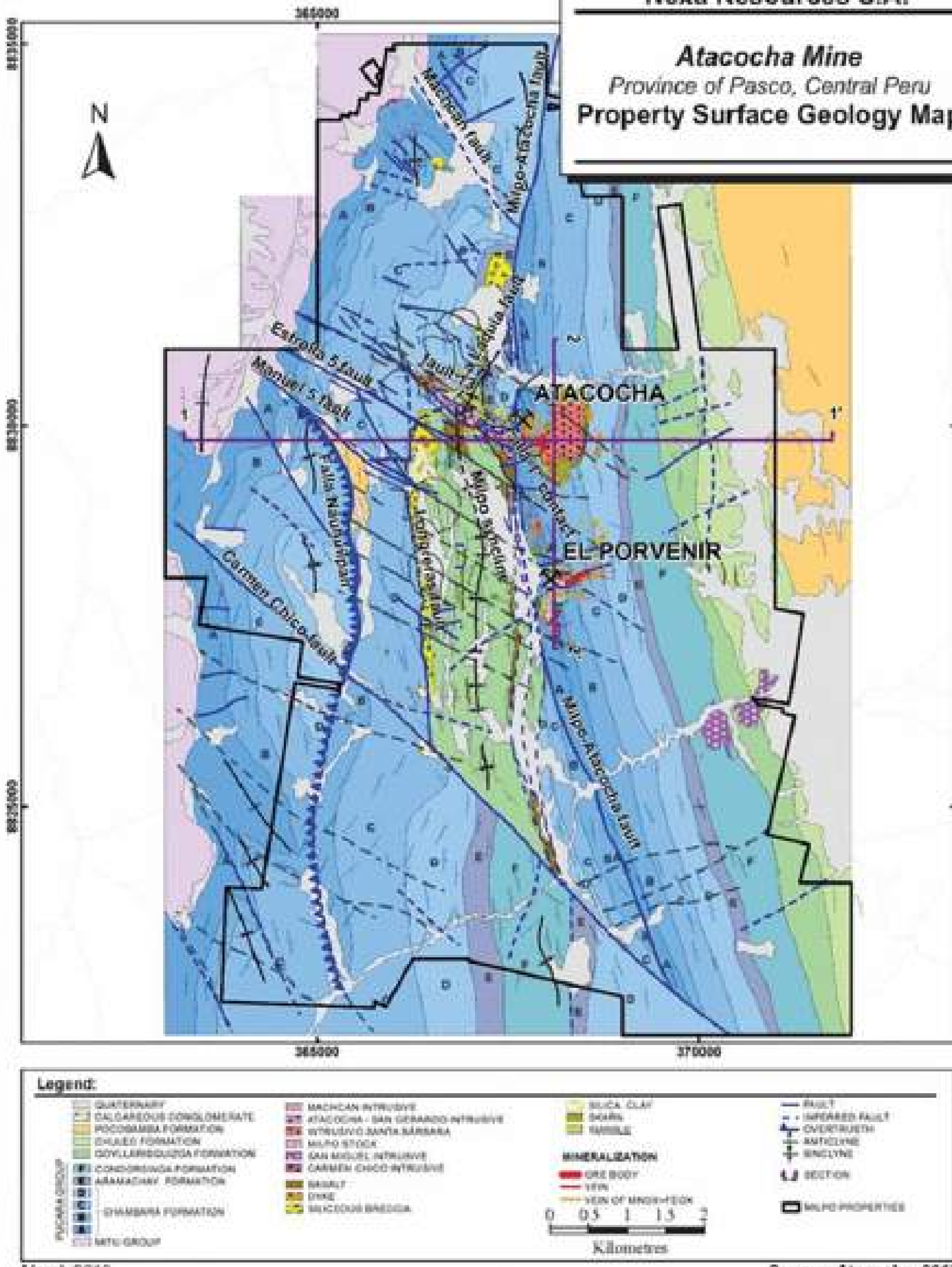
Figure 7-6

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Property Surface Geology Map



March 2019

Source: Atacocha, 2017.

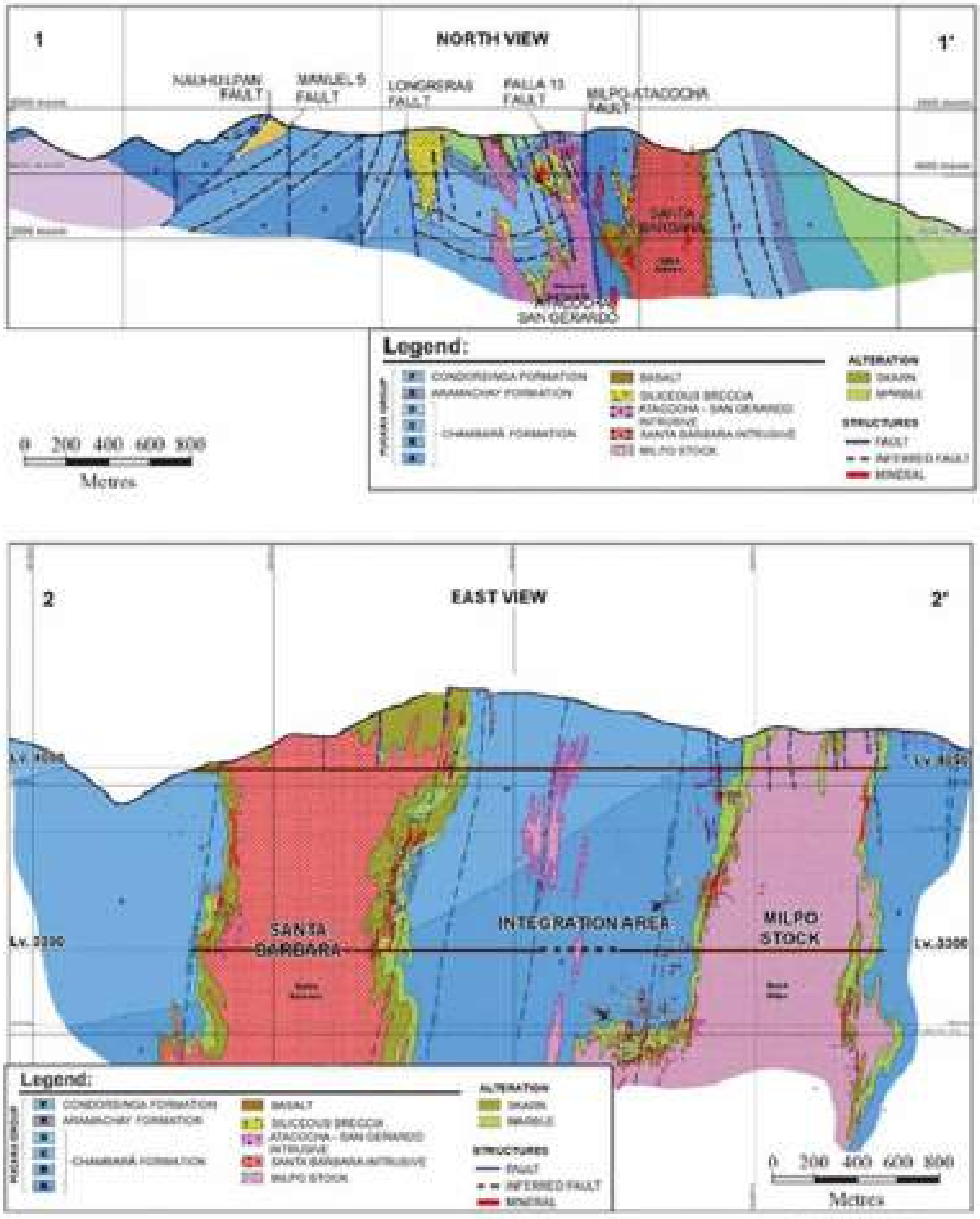


Figure 7-7

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Representative Cross Sections through Atacocha Area

Source: Atacocha, 2017.

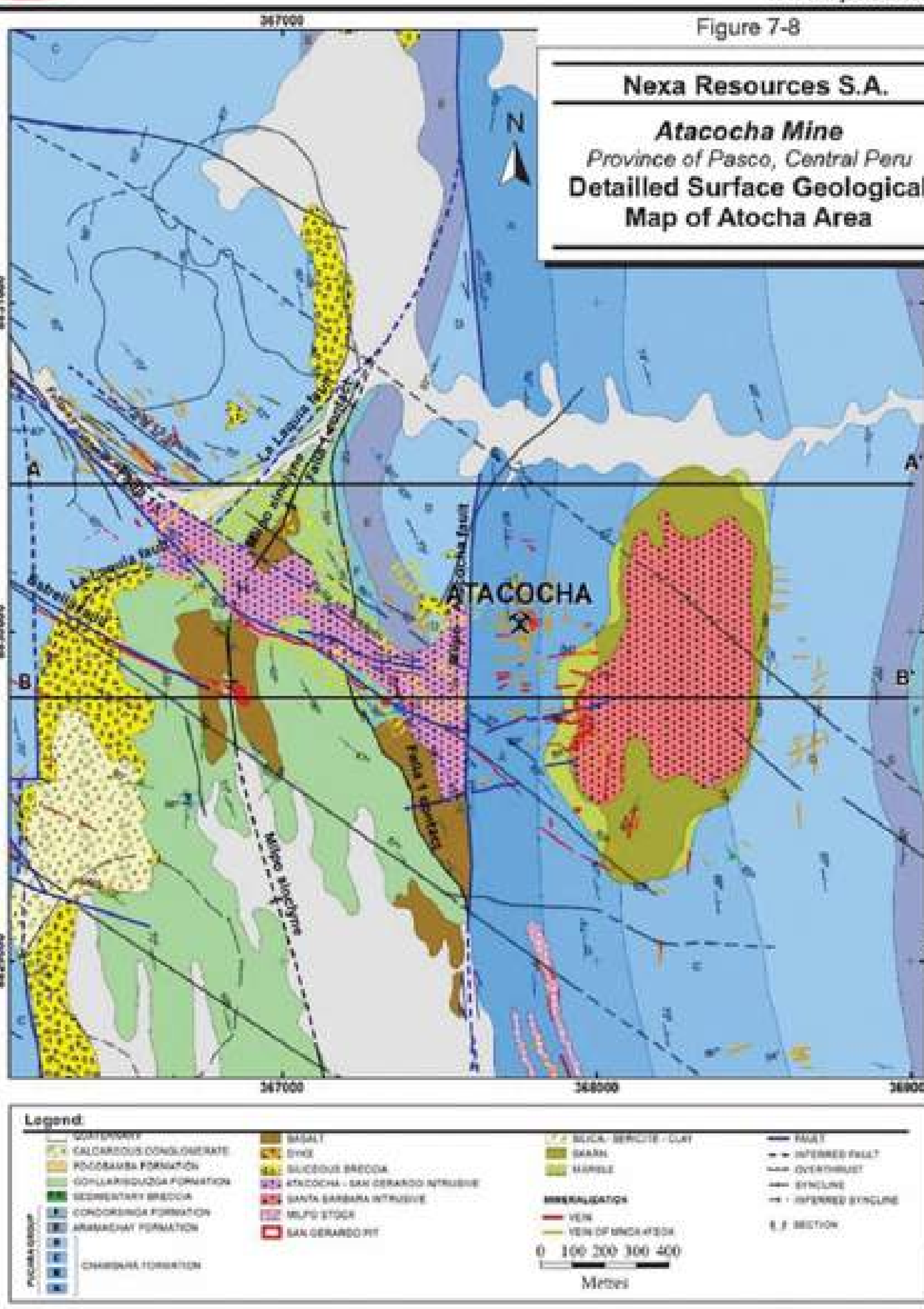
Figure 7-8

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Detailled Surface Geological Map of Atocha Area



Source: Atacocha, 2017.

ALTERATION

Skarn-related alteration has been characterized according to dominant key mineral assemblages: silica-wollastonite, garnet, silica, and pyrite-argillic.

Garnet-skarn is dominated by >50% garnet (by volume), generally brown to greenish and medium to fine grained, or light brown to yellowish (andradite) and light green (grosularia). Minor pyroxene, where present, is light green, very fine grained, and associated with minor sulphides. Magnetite is spatially associated with green garnet areas, as well as pyrite and lesser pyrrhotite.

Silica-skarn is defined where silica content exceeds 50%. Silica may occur in veinlets or as disseminations. Silica-wollastonite alteration appears to form a sub-division of the silica-dominant group, and forms light grey to milky white zones with brecciated to massive/patchy textures. Wollastonite may form radiating fibrous crystals. Locally, a silica-skarn-chlorite assemblage may be present, exhibiting strong structural controls. White to grey silica developed early, followed by green skarn with variably associated chlorite and hematite.

Pyrite-argillic skarn comprises 30% to 80% massive pyrite, with 10% to 30% undistinguished whitish clays, and up to 20% greenish garnet. Locally, pyrite appears to be pseudomorphic replacing garnet.

An alteration assemblage comprising silica-sericite-argillic (halloysite, montmorillonite, and kaolinite) is associated with hydrothermal mineralization. Locally this alteration assemblage is strong, and possibly replaces original rocks completely in areas below the 4000 Level.

West of the Milpo-Atacocha Fault below the 4000 Level, strong siliceous alteration has variably obliterated the original rock; within the Goyllarisquizga Group it is possible to recognize quartz grains and stratification in a few places. Locally siliceous-cemented breccias with silica-sericite-clays matrix (halloysite, montmorillonite, and kaolinite) and massive silica hydrothermal breccias have formed.

Marbleization of limestone and dolomite units appears to be spatially associated with intrusive units, and skarn-related alteration.

Phyllic alteration made of sericite, quartz, pyrite and intense A- and B-types quartz veinlets stockwork is generally associated with porphyry mineralization.

MINERALIZATION

At Atacocha, mineralization is characterized as a skarn, intermediate sulphidation epithermal vein/breccia-style, or porphyry mineralization.

Skarn/metasomatic-related mineralization spatially associated with the Santa Barbara stock or San Gerardo stock is paragenetically earlier, followed by the hydrothermal mineralization. Skarn-related mineralization is commonly associated with the garnet and silica-skarn-chlorite assemblages, comprising pyrite, chalcopyrite, sphalerite, galena, and lesser pyrrhotite, pyrite, bournonite, covelite, orpiment, and realgar occurring within the Pucará Group sediments around the Santa Bárbara stock.

Skarn-related mineralization is characterized by pyrite, chalcopyrite, sphalerite, galena, with lesser bismuthinite and a variety of sulphosalts (Bi-bearing) and pyrrhotite, bornite, and covellite at lower elevation. Molybdenite may occur proximal to the skarn-related mineralization. Elevated Bi and Au are reported to be associated with skarn-related mineralization. Veins and veinlets with pyrite, chalcopyrite, sphalerite, galena, with quartz and carbonate occur within marble units, and are spatially associated with skarn bodies.

The intermediate sulphidation epithermal mineralization occurs in the upper part of the system (i.e., at higher elevations) as veins and breccias, characterized by galena, Ag-bearing sulphosalts, sphalerite, and free gold. Gangue mineralogy comprises quartz (silica), pyrite, specularite/hematite, adularia, rhodochrosite, rhodonite, and alabandite. The silica-sericite-halloysite alteration assemblage is generally associated with this epithermal system. These veins and breccias are mostly between the San Gerardo stock and Fault 1, and appear to be at least partly controlled by the northwest-trending Fault 13. Breccias have been grouped into either Ag-Pb-Zn hydrothermal breccias or siliceous breccias based on their mineralogical assemblages and textural characteristics.

Siliceous breccias are further sub-divided into three groups: silica, granular ("terrosa"), and massive. Collectively the siliceous breccias may form large, relatively continuous bodies based on various interpretations; some appear to be spatially associated with the San Gerardo and

Santa Bárbara intrusives and structurally controlled by the Milpo-Atacocha, Longreras, 13, 1, and Laquia faults. Veinlets of pyrite, galena, sphalerite, and possibly other fine undistinguished sulphides may occur within the variable silica-sericite-clay matrix.

The silica breccia comprises clasts of milky white to grey opaline silica, sub-rounded to sub-angular, from millimetre to centimetre size; as well as less common sandstone and limestone clasts. The silica-breccia clasts are cemented by a white granular silica, with occasional cross-cutting thin white silica veinlets.

The massive (siliceous) breccia forms zones of pervasive alteration comprising predominantly fine grained and massive white silica.

The granular- (siliceous) breccia comprises loose white to grey silica grains, within a poorly cemented clay (undifferentiated) matrix.

The Ag-Pb-Zn breccias are sub-divided into calcareous, polymictic- monomictic, and karst/collapse. Breccia clasts include limestone, marble, silica (massive), and skarn; the composition of the clasts indicates that brecciation occurred later than skarn development. Massive silica alteration may cross-cut skarns.

The calcareous breccia comprises sub-angular to sub-rounded clasts of limestone and marble; cemented by a grey to dark grey calcareous matrix, with occasional bituminous material and rare pyrite. Pyrite, sphalerite, galena, and other sulphides/sulphosalts including orpiment, realgar, tetrahedrite, alabandite, stannite, as well as quartz, calcite, rhodochrosite, and rhodonite occur within the matrix. Minor mineralization may occur within marble where the calcareous breccias cross-cut these units. Geochemical/mineralogical zonation is apparent whereby galena (Pb) and Mn-bearing minerals are more abundant distally relative to sphalerite (Zn). Bismuth- and Sn-bearing minerals are more elevated proximally.

The polymictic to monomictic breccias are overall grey, and comprise sub-angular clasts of black limestone, mudstone, white silica with silica-pyrite veinlets, and marble with silica-wollastonite and calcite. Monomictic breccias comprise sub-angular clasts of limestone or predominantly intrusive rocks. Both polymictic and monomictic breccias clasts vary in size, and are cemented with a black amorphous material with disseminated pyrite. Pyrite, chalcopyrite, sphalerite, galena, and possibly other sulphides occur within the matrix forming veins/veinlets, pockets, or disseminations.

Karst/collapse breccias contain clasts of limestone, marble, silica, skarn, and intrusive rocks, are sub-angular to sub-rounded, within a matrix of sub-horizontal laminated limestone and silica-sericite-clay material.

The Cu-Au±Mo porphyry mineralization is found in the Santa Bárbara Stock. It consists of porphyry quartz monzodiorite with potentially economic grades (i.e., 0.3% Cu, 0.3 g/t Au) of Cu-Au±Mo. The San Gerardo Stock is made of the same quartz monzodiorite, but with weaker alteration and much lower grades of all metals of interest. In the Milpo Stock, the porphyry potential was poorly investigated, however, A- and B-type stockwork veinlets with low Cu grades were recorded in the past and the stock warrants future investigation.

8 DEPOSIT TYPES

The following is taken from SRK (2017).

Three types of mineral deposits are recognized at Atacocha, described as:

- Skarn (Exo and Endo Skarn);
- Intermediate sulphidation epithermal veins and breccias, and
- Porphyry.

The description of the skarn deposit is largely derived from Einaudi and Burt (1982), Hammarstrom et al. (1991). The hydrothermal vein deposit description is largely derived from Baumgartner, Fontboté and Vennemann (2008). The porphyry description is taken mainly from Kirkham (1972).

SKARN AND REPLACEMENT DEPOSITS

Skarn deposits are generally considered as replacement-style mineralization within or associated with carbonate-dominant rocks. Skarns are classified as either endoskarn, or exoskarn, referring to the location of skarn-related mineralization either within an associated intrusive unit, or within carbonate lithology, respectively. Additionally, skarns can be divided into two broad groups: magnesian or calcic skarns, based on either a dolomite-dominated or limestone-dominated host lithology, respectively.

Skarn development commonly includes metamorphic and metasomatic processes associated with carbonate and intrusive rocks, and an associated hydrothermal system. Mineralization occurs via a physio-chemical reaction between circulating hydrothermal fluids and the host lithology, and results in irregular shaped bodies. The hydrothermal system is generally believed to be related to and expelled from a cooling igneous body, which then under goes a chemical reaction and cools as the fluid interacts with the usually carbonate-dominant host lithology. The lithochemistry of the host rocks (i.e. Ca- or Mg-rich carbonate, or calc-silicate assemblage) strongly controls or influences mineralization. Replacement mineralogy commonly comprises Ca- and Mg-bearing silicates, however Fe-, Al-, and Mn-bearing minerals may also be important. Mineral and metal zonation is common. Three generalized dynamic processes responsible for the formation of all skarns are described as:

(i) Isochemical contact metamorphism during pluton emplacement;

(ii) Prograde metasomatic (infiltration) skarn formation as the pluton cools and an ore fluid develops; and,

(iii) Retrograde alteration of earlier-formed mineral assemblages.

The style of mineralization at Atacocha appears to be best represented by the base- and precious metal skarn category of the calcic skarn group, and can be further classified as a Zn-Pb skarn deposit based on the importance of contained metals. In terms of a conceptual model, Zn + Pb combined may average 10% to 15%, commonly with significant Ag (from 30 g/t to 300 g/t) as well as Cu, Au, and W. Copper mineralization commonly occurs proximal to the associated intrusive unit, whereas Zn and Pb mineralization typically occurs more distally to the associated intrusive. Mineralization commonly occurs as sulphides, including sphalerite, galena, chalcopyrite, and a variety of Ag-bearing sulphosalts. Gangue mineralogy may be dominated by Mn-bearing pyroxenes, and garnet. Mineral textures vary from commonly coarse-grained, associated with Ca-rich host lithology and in close proximity to the related intrusion, to fine-grained, more distal and associated with calc-silicate rocks.

The tectonic setting of Zn-Pb skarns are commonly reported at continental margins, and formed during syn- to late orogenic processes. Plutons are commonly absent but, if present, occur as stocks and dikes and may vary in composition from granite to granodiorite to syenite to diorite. Replacement mineralogy within carbonates is usually Fe, Mn, and S-rich, and low in Al; and alteration within associated intrusions may comprise locally intense epidote, pyroxene, and garnet.

HYDROTHERMAL VEIN AND BRECCIA DEPOSITS

The hydrothermal veins and breccias at Atacocha fall into a class of epithermal polymetallic base metal deposits (also referred to as Cordilleran base metal veins), which form in the upper/higher parts of, or distally to, a magmatic-hydrothermal system (i.e., porphyry environment).

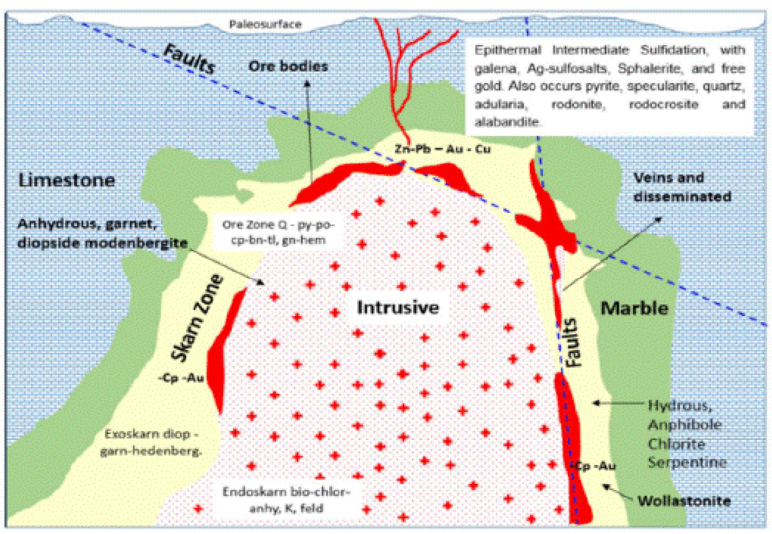
The Cordilleran base metal deposits have the following features:

- Close temporal and spatial association with calc-alkaline intrusions;
- Mineralization occurred under epithermal conditions (i.e., near Earth's surface);

- Sulphide-rich mineralogy, including a Cu-Zn-Pb-(Ag-Au-Bi) metal suite, and high Ag/Au ratio;
- Well-developed ore and alteration mineral zonation, with Zn-Pb ores formed more distally (Pb-Ag-Au assemblage in the upper zone and Cu-Au association in the deeper zones);
- Early pyrite-quartz associated with low-sulphidation mineralogy
- Mineralization textures may be open-spacing filling in silicate host rocks, or as replacement in carbonate rocks; and
- Mineralization occurred late in the temporal evolution of the magmatic-hydrothermal system.

Figure 8-1 is a schematic diagram showing the spatial relationship of skarn, replacement, and hydrothermal vein mineralization with intrusive rocks.

FIGURE 8-1 SCHEMATIC DIAGRAM OF SKARN, REPLACEMENT AND HYDROTHERMAL VEIN MINERALIZATION



PORPHYRY DEPOSITS

Porphyry deposits are large, low to medium grade deposits in which primary (hypogene) ore minerals are dominantly structurally controlled and which are spatially and genetically related to felsic to intermediate porphyritic intrusions (Kirkham, 1972). The large size and structural control (e.g., veins, vein sets, stockworks, fractures, "crackle zones" and breccia pipes) serve to distinguish porphyry deposits from a variety of deposits that may be peripherally associated, including skarns, high temperature mantos, breccia pipes, peripheral mesothermal veins and epithermal precious metal deposits (Sinclair, 2007).

Porphyry deposits range in age from Archean to Recent, although are predominantly associated with Mesozoic to Cenozoic orogenic belts. They occur throughout the world in a series of extensive, relatively narrow, linear metallogenic provinces. Porphyry deposits occur in close association with porphyritic epizonal and mesozonal intrusions, typically in the root zones of andesitic stratovolcanoes. A close temporal relationship exists between magmatic activity and hydrothermal mineralization in porphyry deposits (Kirkham, 1971). Magma composition and petrogenesis of related intrusions exert a fundamental control on the metal content of porphyry deposits. Intrusive rocks associated with porphyry Cu, porphyry Cu-Mo, porphyry Cu-Au and porphyry Au tend to be low-silica, relatively primitive dioritic to granodioritic plutons whereas porphyry deposits of Mo, W-Mo, W, and Sn are typically associated with high-silica, strongly differentiated granitic plutons.

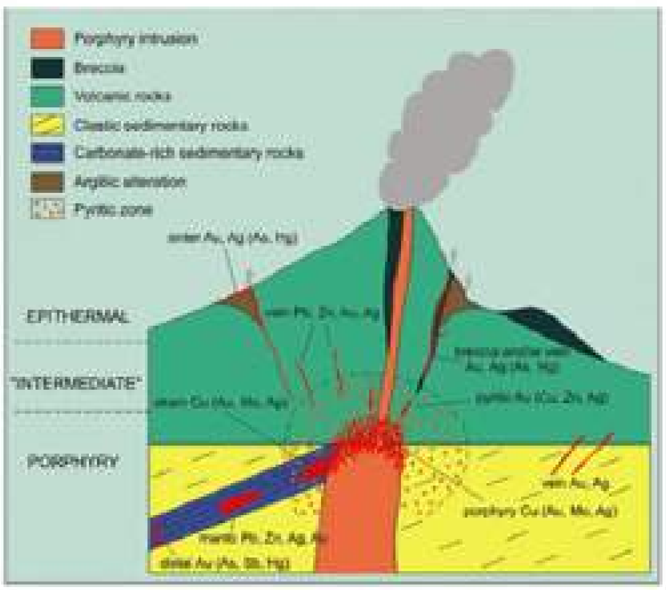
The overall form of individual porphyry deposits is highly varied and includes irregular, oval, solid, or "hollow" cylindrical and inverted cup shapes. Deposits may occur separately or overlap and, in some cases, are stacked. Individual deposits measure hundreds to thousands of metres in three dimensions. Deposits are characteristically zoned, with barren cores and crudely concentric metal zones that are surrounded by barren pyretic halos with or without peripheral veins, skarns, replacement manto zones and epithermal precious metal deposits. The copper-iron sulphides reside primarily in veins and hydrothermal breccias, with lesser amounts occurring as disseminations in the altered wall rocks. Complex, irregular mineralization and alteration patterns are due, in part, to the superposition and spatial separation of mineral and alteration zones of different ages.

The mineralogy of porphyry deposits is highly varied, although pyrite is typically the dominant sulphide mineral in Cu, Cu-Mo, Cu-Au, Au, and Ag deposits. The principal ore and associated minerals in porphyry Cu-Au deposits are chalcopyrite, bornite, chalcocite, tennantite, enargite, other Cu minerals, native Au, electrum, and tellurides. Associated minerals include pyrite, arsenopyrite, magnetite, quartz, biotite, K-feldspar, anhydrite, epidote, chlorite, scapolite, albite, calcite, fluorite, and garnet.

Hydrothermal alteration is extensive and typically zoned, both on a deposit scale and around individual veins and fractures. In many porphyry deposits, alteration zones on a deposit scale consist of an inner potassic zone and an outer zone of propyllitic alteration. Zones of phyllic alteration and argillic alteration may be part of the zonal pattern between the potassic and propyllitic zones, or can be irregular or tabular, younger zones superimposed on older alteration and sulphide assemblages.

Figure 8-2 is a schematic diagram through a typical porphyry system showing mineral zonation and possible relationship to other deposit types like skarn, manto, "mesothermal" or "intermediate" precious-metal and base-metal vein and replacement, and epithermal precious-metal (Kirkham and Sinclair, 1995).

FIGURE 8-2 SCHEMATIC DIAGRAM THROUGH TYPICAL PORPHYRY SYSTEM



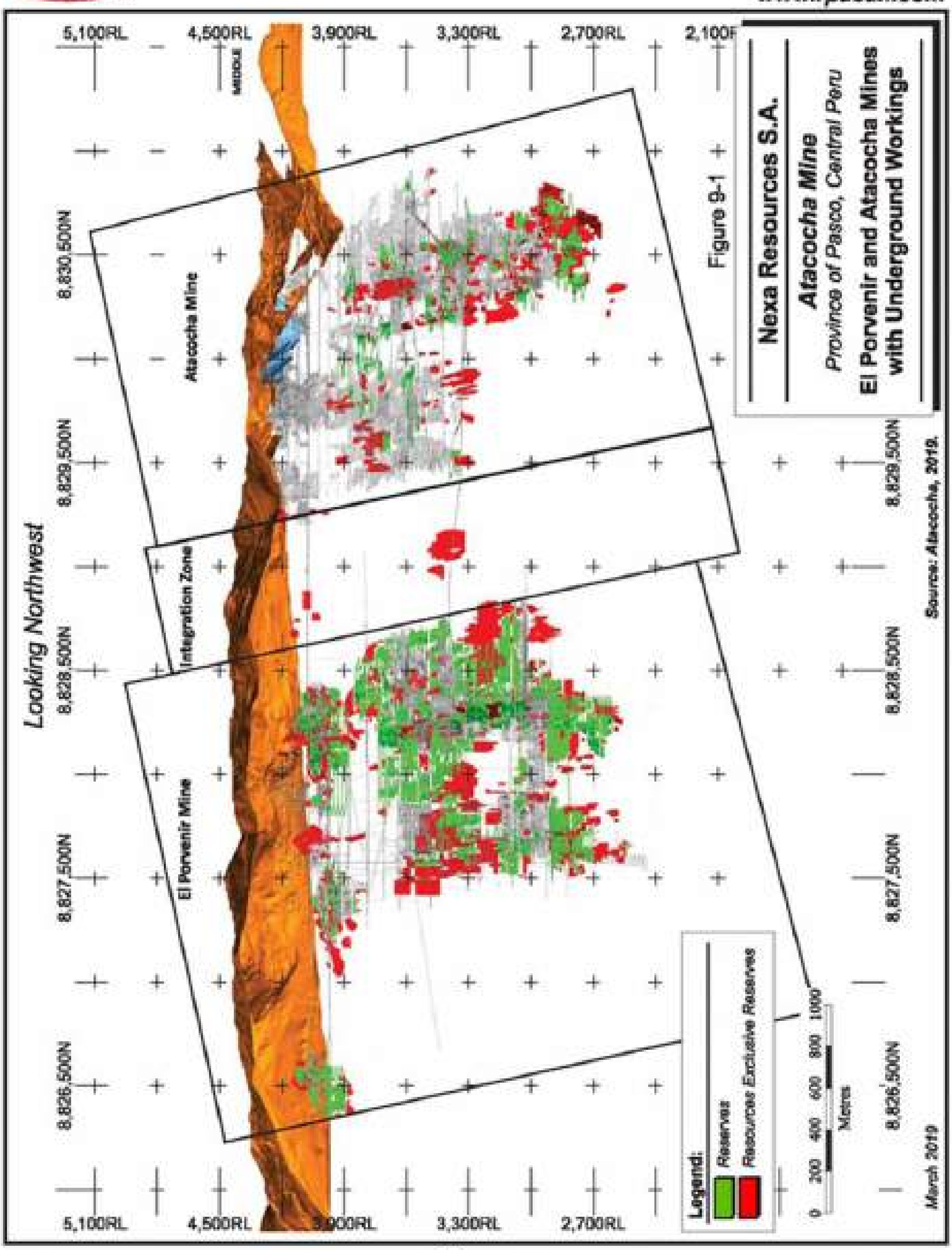
During the 2018 drilling campaign, an andesitic porphyry was intersected. This andesitic porphyry is associated with the Santa Barbara diorite intrusive and consists of quartz veins and phyllic alteration.

9 EXPLORATION

Nexa has been conducting exploration and development work at Atacocha since 1949. Most of this work is generally conducted simultaneously with underground development, which involves diamond core drilling, and channel sampling following underground drifting. Drilling and channel sampling are discussed in more detail in Sections 10 and 11. Prior to 1997, minor and sporadic exploration drilling was completed; and no channel sampling is documented before 2001. Nexa has recently developed an underground connection (and integration) of the El Porvenir and Atacocha mines at the 3370 Level. At least four more of these connections are planned and allow ample opportunities to conduct underground exploration drilling to test this zone which lies between the two mines. Figure 9-1 shows the El Porvenir and Atacocha mines with current and planned underground workings in relation to resource classifications and relevant infrastructure.

Systematic underground geological mapping is completed at a scale of either 1:500 or 1:250, following underground development on all levels and sub-levels. A total of 29 underground levels have been developed at Atacocha, with additional development on sub-levels. Geological mapping is completed by the mine/production geologists drawn on paper in the field, and subsequently digitized with the help of a modelling assistant. The geological level plan maps are updated and incorporated in a 3D geological model daily to aid future exploration and mine development planning.

In 2018, Atacocha completed 81,723 m of diamond drilling, of which 44,140 m were exploration and 37,583 m were infill drilling for resource and reserve reclassification. The exploration drilling programs successfully defined new Inferred Mineral Resources close to the operational level (3,300 m) of the Atacocha mine at Cristina Northeast, San Gerardo, and within the Integration zones. The Integration zones are an important strategic target particularly in light of the El Porvenir and Atacocha mine lives.


Looking Northwest
Atacocha Mine
Integration Zone
El Porvenir Mine
MIDDLE
5,100RL
4,500RL
3,900RL
3,300RL
2,700RL
2,100RL
8,826,500N
8,827,500N
8,828,500N
8,829,500N
8,830,500N
Legend:
Reserves
Resource Exclusive Reserves
0 200 400 600 800 1000
Metres
March 2019
Figure 9-1
Nexa Resources S.A.
Atacocha Mine
Province of Pasco, Central Peru
El Porvenir and Atacocha Mines with Underground Workings
Source: Atacocha, 2019.

As part of a continuous improvement program at Atacocha, the exploration team carried out the following work during 2018:

- Drill core density measurements (displaced volume and Jolly methods) were taken at the core shack prior to being shipped to the laboratory in Lima for chemical analyses.
- Geotechnical logging was improved to calculate a more consistent value for rock mass rating.
- Spectral logging was performed on 2,826.60 m of core which focused on better definitions of the alteration halos and mineral assemblages.
- A formal handover between the Exploration and Mine geologists was established to better streamline the process of upgrading Inferred Mineral Resources into Measured and Indicated Mineral Resources.

Short-term opportunities for discovering new and significant resources rely on developing exploration platforms and drilling exploration holes at the following locations:

- The upper levels (above 3,300 MASL) of the Integration Zone between El Porvenir and Atacocha
- The eastern side of the Santa Barbara stock, 3,300 MASL and below
- The upper levels (above 3,300 MASL) of San Gerardo

Long-term exploration opportunities are recognized in the following areas:

- Machán
- Longrera
- Falla Manuel 5 / Pique Estrella
- Deeper parts of both the Santa Barbara skarns and the Integration Zone between Atacocha and El Porvenir

The location of the short-term exploration targets is shown in Figure 9-2.

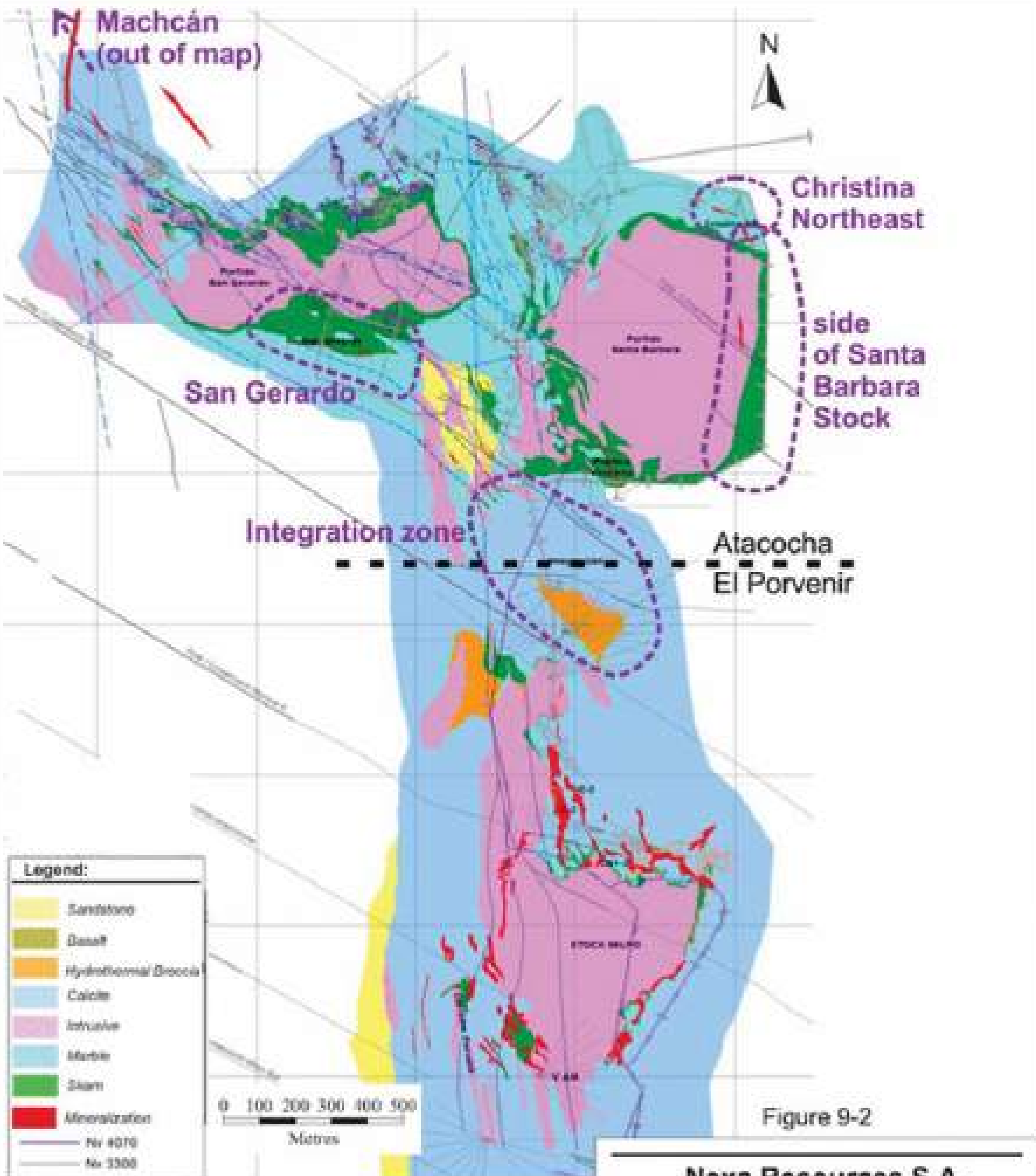


Figure 9-2

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Exploration Targets at Atacocha, San Gerardo and El Porvenir

March 2019

Source: Atacocha, 2019.

The Machán target is of particular exploration interest. This target is in the early concept phase, but was tested by 3,879 m of core drilling during 2001 through 2013. The early results intersected a narrow polymetallic vein system with potential for a completely new skarn system, separate from Atacocha and El Porvenir. Nexa has modelled the vein system based on the drilling intercepts, but the mineralization remains open both laterally and at depth.

Exploration work planned for 2019 includes 38,600 m of diamond core drilling focused on defining new Inferred Mineral Resources at nine different targets. The main focus of these targets will be the Integration Zone between the Atacocha and El Porvenir deposits. This area has the best potential for increasing the current resources of the Project. It was recently discovered, in 2018, and much drilling is required to define the mineralization, which is still open from the surface to depth.

In addition to the exploration program, the mining geology team expects to drill an additional 36,000 m aiming to upgrade Inferred Mineral Resources to Indicated and ultimately convert them into Probable Mineral Reserves.

10 DRILLING

DRILLING SUMMARY

A total of 4,384 drill-holes for 734,103 m are included in the Atacocha drilling database. Only 35 holes were drilled by reverse circulation (RC) and all other drill holes were diamond drill holes (DDH). The majority (3,733) of the drill holes were collared underground, with a total of only 651 holes completed from the surface, including the 35 RC drill holes. Since 2005, drilling has been completed by various contractors.

Table 10-1 lists all the drilling at Atacocha, both from surface and underground.

TABLE 10-1 DRILLING SUMMARY AT ATACOCHA
Nexa Resources S.A. – Atacocha Mine

Year	Surface Holes			Underground Holes			Total		
	Number	Metres	Type	Number	Metres	Type	Number	Metres	Type
1968							4	350.00	DDH
1969							3	346.20	DDH
1970							1	31.08	DDH
1986							1	31.09	DDH
1991							2	135.02	DDH
1992							1	73.16	DDH
1997							4	231.67	DDH
1998							17	2,247.12	DDH
1999							41	3,460.20	DDH
2000							48	4,997.95	DDH
2001							94	8,756.05	DDH
2002							89	10,346.50	DDH
2003							179	20,541.40	DDH
2004							332	43,203.60	DDH
2005							156	31,253.40	DDH
2006							129	19,444.60	DDH
2007							225	29,896.55	DDH
2008	2	674.55	DDH	343	51,512.60	DDH	345	52,187.15	DDH
2009							120	26,458.65	DDH
2010							143	35,054.30	DDH
2011							188	39,964.80	DDH
2012	1	100.80	DDH	273	62,153.00	DDH	274	62,253.80	DDH
2013	46	7,348.10	DDH	141	40,936.20	DDH	187	48,284.30	DDH

Year	Surface Holes			Underground Holes			Total		
	Number	Metres	Type	Number	Metres	Type	Number	Metres	Type
2014	67	11,027.00	DDH	192	39,853.65	DDH	259	50,880.65	DDH
2015	120	17,379.60	DDH	159	27,468.90	DDH	279	44,848.50	DDH
2016	238	35,594.00	DDH	260	36,616.95	DDH	498	72,210.95	DDH
2017	32	6,881.20	DDH	232	37,488.25	DDH	264	44,369.45	DDH
2017	35	8,687.00	RC				35	8,687.00	RC
2018	110	21,347.40	DDH	356	52,210.00	DDH	466	73,557.40	DDH
Totals	**651**	**109,039.65**		**1,956**	**348,239.55**		**4,384**	**734,102.54**	

Figure 10-1 illustrates the locations of the holes drilled on the Project. Figure 10-2 is a plan view illustrating selected drill holes and the related geological interpretation at the Atacocha deposit.

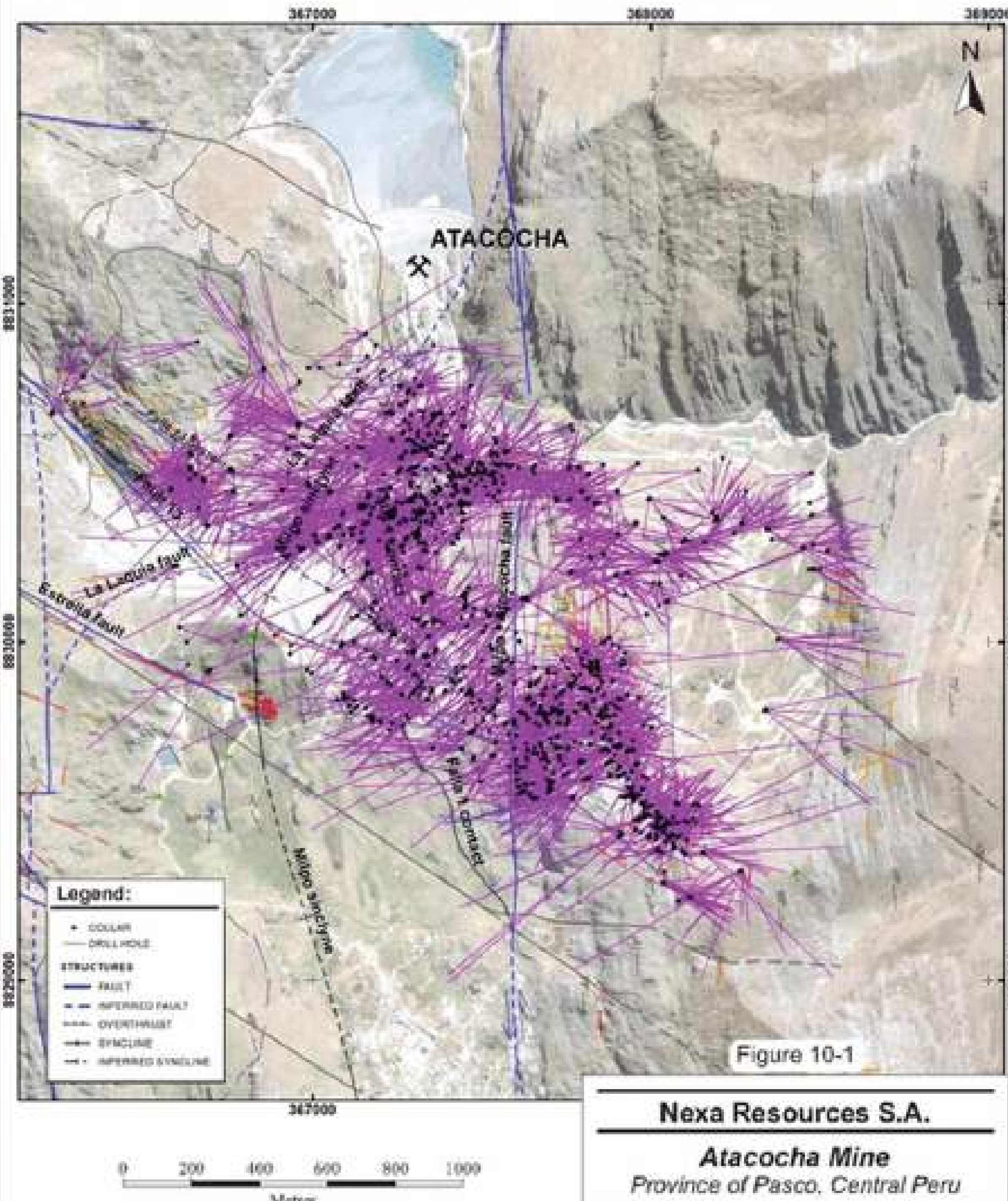


Figure 10-1

Nexa Resources S.A.

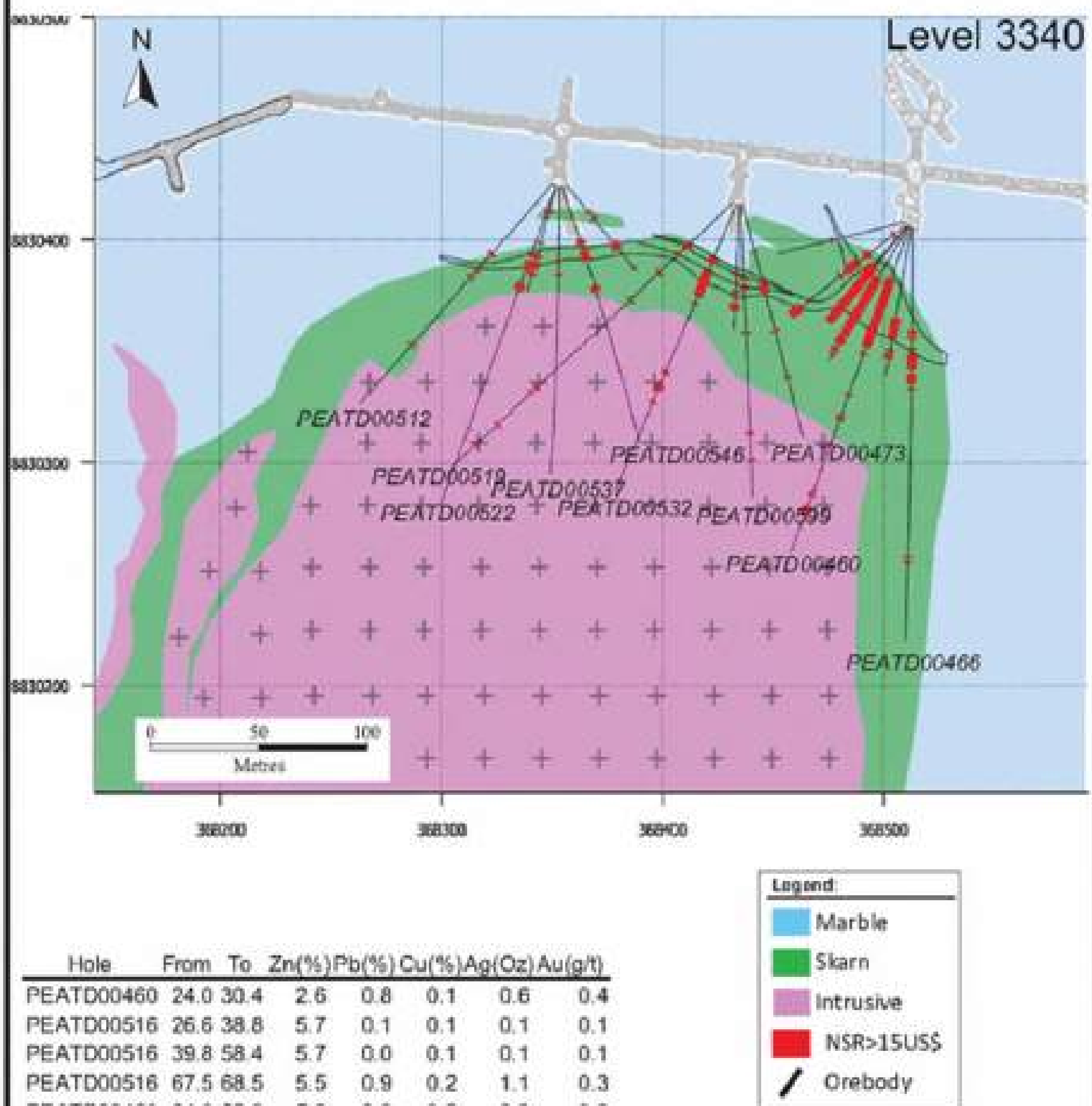
Atacocha Mine

Province of Pasco, Central Peru

Plan of Drill Holes with Collars and Traces Projected to Surface

March 2019

Source: Atacocha, 2017.



Hole	From	To	Zn(%)	Pb(%)	Cu(%)	Ag(Oz)	Au(g/t)
PEATD00460	24.0	30.4	2.6	0.8	0.1	0.6	0.4
PEATD00516	26.6	38.8	5.7	0.1	0.1	0.1	0.1
PEATD00516	39.8	58.4	5.7	0.0	0.1	0.1	0.1
PEATD00516	67.5	68.5	5.5	0.9	0.2	1.1	0.3
PEATD00460	24.0	62.0	5.2	0.3	0.2	0.3	0.3
PEATD00466	59.0	61.0	1.6	0.0	1.1	0.3	0.8
PEATD00466	61.0	63.7	2.3	0.7	2.1	0.8	1.7
PEATD00497	42.9	44.1	11.0	0.0	0.0	0.0	0.1
PEATD00635	37.5	38.0	5.2	2.3	0.1	1.8	0.5
PEATD00636	68.3	84.0	4.4	2.0	0.2	1.8	0.7

Figure 10-2

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Plan Illustrating Drilling Pattern, Interpreted Geology and Mineralized Zones

March 2019

Source: Atacocha, 2019.

Drilling procedures are coordinated and supervised by company geologists (mine/production or exploration), and overseen by the Superintendent of Geology and Exploration. Drilling procedures are as follows:

- Initially, drill hole collar coordinates and orientation are communicated to a mine surveyor to accurately position the drill hole and are then certified by the surveyor and validated by the responsible geologist. The coordinates and collar orientation data are entered into a master CSV file, subsequently imported into the database (Fusion) and geological/mine/modelling software program. Drill hole (and channel sample) identification is generated in a systematic and specific format, including codes to reference: country, mining unit, year, and sequential number. All related drill hole data generated is similarly referenced to the corresponding drill hole collar. Basic drill hole information (i.e., collar and survey) should be entered into the database, and archived within four days of completing the drill hole.

- Daily drilling logs completed and provided by the various contracted drilling companies are archived in pdf format.

- Drill hole survey data is collected by various drilling contractors. The survey is generally carried out after the completion of the drill hole. Various survey equipment (i.e., Gyro, Reflex, Flexit, etc.) may be used depending on the drilling contractor and equipment availability; Gyro survey deviation information is archived in pdf format. Survey data are collected between approximately 5 m and 10 m downhole, depending on the drilling objective (infill and brownfield). Original survey data is marked on paper, and provided to the supervising geologist, signed by the driller in charge. Survey data is validated by the responsible geologist and entered into a master CSV file, subsequently imported into the database, and geological/mine/modelling software program.

- Following the completion of a drill hole, the logging and core sampling procedures are carried out by a team of logging geologists. Core logging is completed using a set of geological, lithological, mineralogical, and alteration terms. Core logs are archived in Excel format. A complete series of core photos are taken for each drill hole and stored in jpeg or pdf format. Core sampling for geochemical analysis are essentially completed at the same time as core logging; see Section 11 for detailed description of drill core sampling procedures. Logging is completed within 48 hours after a drill hole is completed.

- The company personnel responsible for managing the database incorporates the core logging and core sampling information, as well as the subsequent assay results, once the analytical work is completed. Sample and assay data are initially combined in a master CSV file, subsequently imported into the database, and geological/mine/modelling software program.

Drilling information is stored in a structured directory (Figure 10-3), and backed up on a central server (Brazil). Data available in the drill hole database includes: drill hole location (Collar), down-hole survey (Survey), sampling and geochemical analysis (Assay), recovery (Geotech), density (Density), and geological characteristics (Lithology, Alteration, Mineralization). Drill core diameter varies, including: BQ (36.4 mm), NQ (47.6 mm), HQ (63.5 mm), and TT-46 (35.3 mm).

FIGURE 10-3 DRILLING INFORMATION ORGANIZATION

- PERU
  - Units
    - AT
      - Drill - holes
        - Data base
        - Density
        - Desviations reading (Survey)
        - Photographs
        - Drilling program
        - Sampling
      - Geochemistry
        - Results
      - Administration
        - QAQC

DRILLING PATTERN AND DENSITY

Exploration drilling is generally completed over a 50 m by 50 m grid, whereas infill drilling is designed to cover a 15 m by 15 m grid. The overall distribution of drill holes and channel samples has been concentrated around the Santa Bárbara, San Gerardo stock, and Integration zones.

DRILL CORE SAMPLING

Drill core sampling is carried out under the supervision of the Sampling Geologist Supervisor and completed after the geotechnical and geological logging, and photographing the whole core.

The length of the samples varies between 0.30 m and 2.00 m depending on the structure and lithology. Once the sample length and cut-line have been defined by the supervising geologist, the core is cut longitudinally into two equal parts using an electric diamond drill core saw. If the core is very fractured, the sampler separates and removes 50% of the fragmented material for the sample. The fragments are deposited in a pre-coded polyethylene bag and transported to the laboratory.

CHANNEL SAMPLING

Channel samples are treated as drill holes in the database, with a location, survey (direction: azimuth and inclination), and associated sampling/assay data. Table 10-2 lists the amount of channel sampling completed since 2001 by year. Figure 10-4 illustrates the distribution of the channel sampling.

Channel chip samples are generally collected from the face of newly exposed underground workings. The entire process is carried out under the inspection of the sampling supervisor geologist.

Channel samples are collected between the hanging wall and footwall contacts of mineralized zones. A channel sample area is marked, oriented perpendicular to the strike of the mineralized structure. In general, the spacing between each channel sample is 2.0 m. The width of each channel sample is approximately 0.2 m to 0.3 m wide, and 2.0 cm deep. The sample area is first washed down to provide a clear view of the vein. The channel is sampled by taking a succession of chips in sequence from the hanging wall to the footwall. If the width of the vein, or length of the channel sample, is longer than 1.5 m, sample lengths shorter than 1.5 m are collected. If the width of the vein is smaller than 0.2 m, the width of the sample is increased to 0.4 m to obtain a sufficient sample size.

Sample collection is normally performed by two samplers, one using the hammer and chisel, and the other holding the receptacle cradle to collect the rock fragments. The cradle consists of a sack, with the mouth kept open by a wire ring. The collected sample material is then placed on a mat measuring 1.0 m by 1.2 m; the larger sample fragments are then broken down to smaller fragments, less than approximately 2.0 cm, using a four- or six-pound hammer. Subsequently, the sample material is mixed, and approximately one quarter of the mixed material is separated to obtain a representative sample (cone-and-quarter method), with a target weight of between 2.5 and 3.0 kg. The final sample is placed in a bag with a coded ticket, and shipped to the Inspectorate Mina laboratory. Channel sampling was discontinued in 2016.

TABLE 10-2 SUMMARY OF CHANNEL SAMPLING BY YEAR
Nexa Resources S.A. – Atacocha Mine

Year	Quantity	Metres
2001	2,406	5,737.24
2002	8,523	23,044.88
2003	8,358	23,094.19
2004	6,316	23,035.27
2005	7,105	28,203.90
2006	9,505	36,975.60
2007	7,360	27,625.23
2008	6,141	22,777.25
2009	3,446	16,523.95
2010	2,357	12,879.30
2011	1,824	9,549.45
2012	1,949	10,376.30
2013	1,463	8,531.15
2014	1,290	7,652.65
2015	951	5,339.45
2016	112	648.60
Total	**69,106**	**261,994.40**

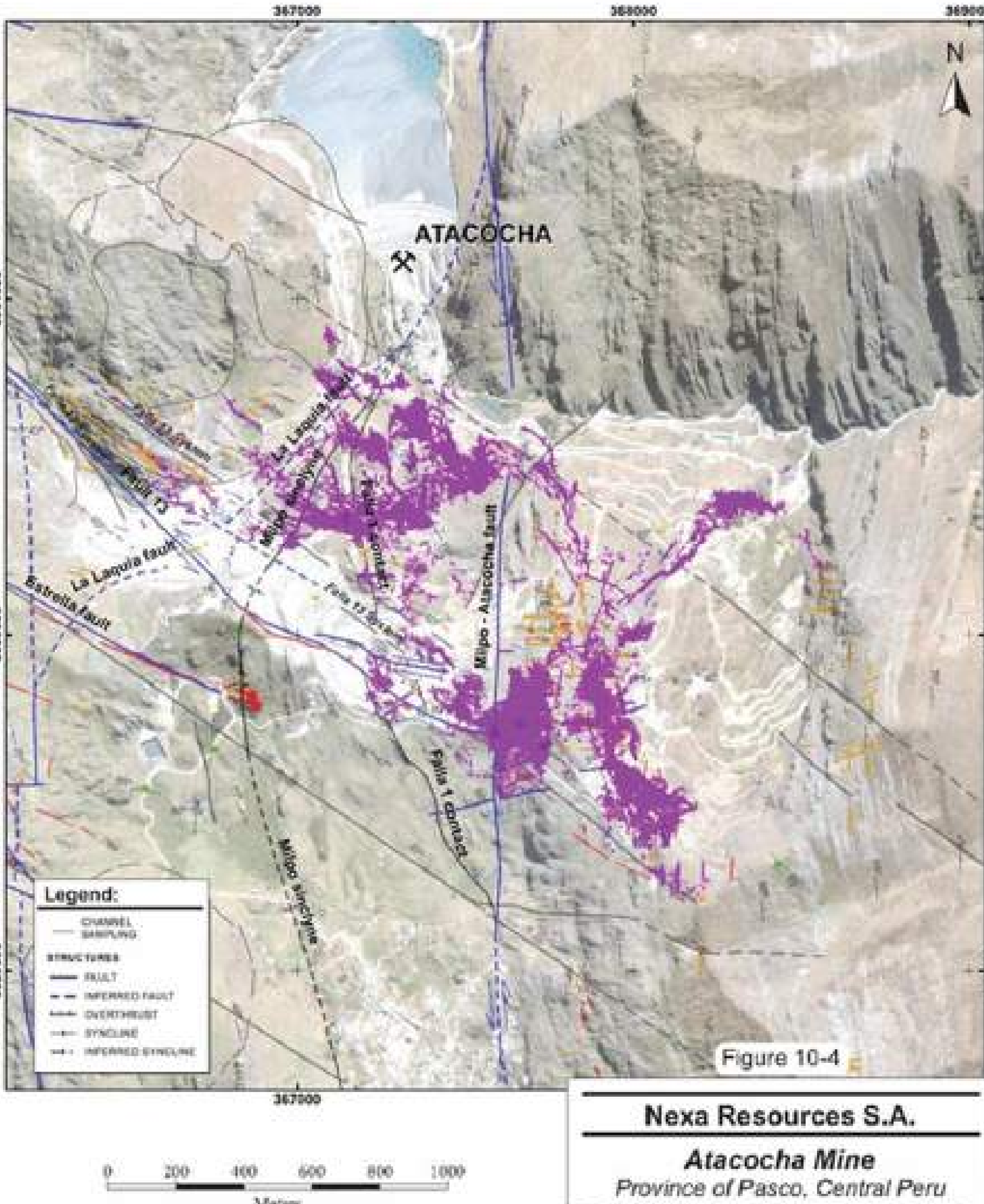


Figure 10-4

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Distribution of Channel Samples Projected to Surface

March 2019

Source: Atacocha, 2017.

DRILLING AND CHANNEL SAMPLING RESULTS

The analysis and interpretation of drilling and channel sampling data is continually incorporated into the Atacocha 3D geological model.

The database is used by two dedicated 3D modelling geologists who work together and with the mine/production and exploration geologists to continually construct and update the 3D geological model. The 3D geological models are constructed in Datamine Studio RM and Leapfrog, primarily using geochemical assay results, particularly Zn, Pb, Cu, Ag, and Au, as well as underground geological level plan maps and interpreted cross- and transverse-sections.

In RPA's opinion, the drilling, core handling, logging, and sampling procedures employed at the Atacocha Deposit meet industry standards.

In RPA's opinion, there are no drilling, sampling, or recovery factors that could materially affect the accuracy and reliability of the results.

11 SAMPLE PREPARATION, ANALYSES AND SECURITY

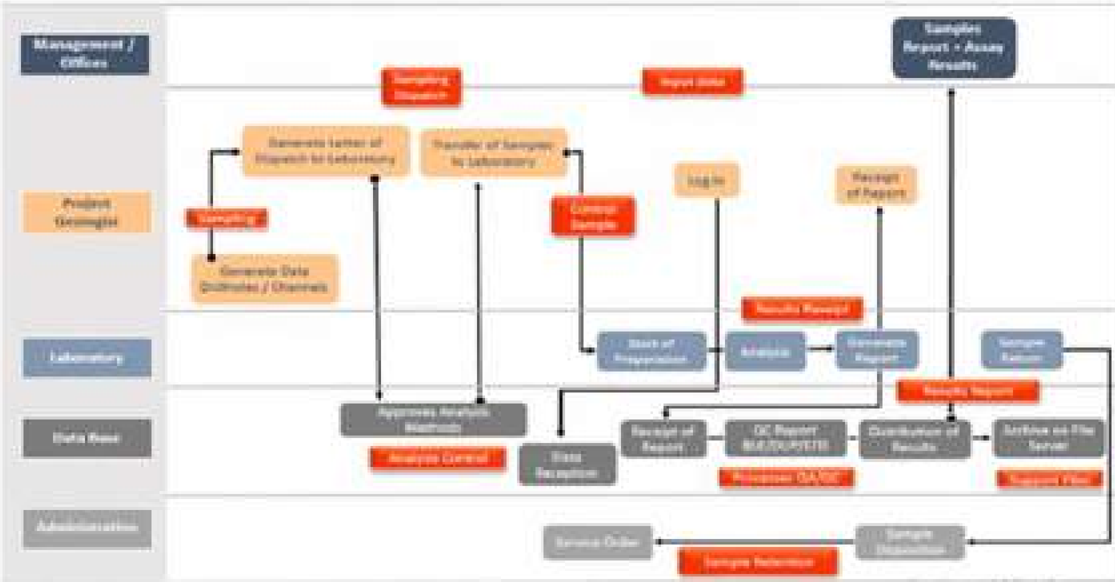
The core and channels samples are sent to several independent laboratories including Inspectorate (at the mine site and Lima), SGS (Lima), ALS (Lima) and Certimin (Lima). Testing protocols among these laboratories differ in their detection limit and methods applied. The Atacocha mine has a contract with Inspectorate, which began its operations mid-2011, and with ALS in mid-2017. Inspectorate is an independent and commercial laboratory, and is part of the Bureau Veritas, which is a global leader in testing, inspection, and certification. A schematic flow chart showing the control and transfer of samples and related data is shown in Figure 11-1.

SAMPLE PREPARATION AND ANALYSES

Sampling was completed by Nexa mine geologists. The samples were collected from drill holes and channels. Samples were bagged and sent to Atacocha Inspectorate, SGS, Certimin, and ALS Lima for preparation and analysis. The weight of the samples was not recorded.

Prepared samples were assayed principally for a suite of seven elements: Zn, Pb, Cu, Ag, Au, Bi, and Mn. Samples are initially coded and dried at 105°C for three hours. Following drying, the samples are crushed to a minimum of 85% passing a #10 mesh. The crushed samples are then reduced in size by passing the entire sample through a riffle splitter until 150 g to 200 g is obtained. The split samples are then pulverized to a minimum of 95% passing a #140 mesh. The pulverized samples are subsequently analyzed using an aqua regia digestion and atomic absorption spectroscopy (AAS).

FIGURE 11-1 SCHEMATIC FLOW CHART FOR SAMPLE AND DATA CONTROLS



Source: Nexa Atacocha

DENSITY MEASUREMENTS

A total of 3,251 density samples were taken from 2013 to 2018 at the Atacocha deposit, and were tested by various laboratories. Nexa used ALS Peru S.A. and Certimin as independent laboratories for density determinations. A summary of the density measurements taken is presented in Table 11-1.

A total of 2,154 samples were selected from Atacocha underground and 1,006 samples were selected from the San Gerardo open pit. Sample spacings ranged from approximately 20 m to 50 m. The samples were taken from a variety of lithological and mineralogical types. Photographs and brief descriptions were taken before sending the samples to the laboratory for density determinations. Density data is recorded into the main database.

A total of 1,157 samples were collected from mineralized zones and a total of 2,002 samples were collected from waste rocks. For the mineralized zones, an average density value was applied. In the absence of sufficient data, Nexa has assigned an average density value of surrounding mineralized zones or the global average density value of all the mineralized zones.

TABLE 11-1 DENSITY MEASUREMENTS
Nexa Resources S.A. – Atacocha Mine

Sample Type	Laboratory	Year	No. of Density Measurements
Drill core	ALS Peru S.A.	2016	263
		2017	126
		2018	714
	Atacocha Mine	2013	2
		2014	111
		2015	16
	Certimin	2017	141
	Shalipayco Project	2013	50
Channel /Rock	ALS Peru S.A.	2016	720
		2017	60
		2018	97
	Certimin S.A.	2017	92
	Shalipayco Project	2013	859
Total			**3,251**

ALS Peru S.A. and Certimin laboratories use the water immersion method to determine the density of the provided samples. This method consists of coating the sample in paraffin wax, weighing the sample in air, then suspending the sample in water and weighing the sample again.

At Atacocha, a trained technician weighs the sample in air, then suspends the sample in water and measures the volume of displaced water.

DATABASE MANAGEMENT

Database management is performed by a dedicated on-site geologist under the supervision of the Resource Geologist. Data are stored centrally on a Microsoft Cloud server in Fusion, a Datamine database product. Previously, digital logging sheets prepared by the geologist were uploaded to the database management system SIOM (Sistema Integrado de Operación Minera),which has now been superseded by Fusion. Original drill logs, structural logs, geotechnical logs, and details related to the hole are stored on site in a folder, specific to each drill hole. Folders are clearly labelled and stored in a cabinet in the office.

Assay certificates are mailed to the site by ALS Peru S.A and Inspectorate and emailed to Nexa's mine and corporate Database Administrators. Certificates are reviewed by the mine Database Administrator prior to uploading information to Fusion.

Access to the Atacocha database is by registered Fusion users from Nexa. Nexa maintains several user profiles with different access permissions and privileges defined by the Database Administrator. The data are updated automatically daily and weekly. Monthly back-ups are run following Nexa protocols.

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 a contractor supervised by the company personnel. 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 AND QUALITY CONTROL PROGRAMS

The Atacocha mine has historical data and information up through 2018 and has implemented a quality assurance/quality control (QA/QC) program. These processes comply with current industry best practices which involve appropriate procedures and routine insertion of certified reference materials (CRM), standards, blanks, and duplicates to monitor the sampling, sample preparation, and analytical processes. Analysis of QA/QC data is performed to assess the reliability of all sample assay data and the confidence in the data used for resource estimation.

Quality control samples have been inserted into the sample stream since 2014 and channel samples since 2012. The Atacocha mine routinely sends in-house CRMs, blanks, field, reject (preparation), and pulp (laboratory) duplicates. During 2018, Nexa incorporated systematic external checks into the QA/QC program. Check assay programs were also carried out prior to 2018. Pulps were sent to external laboratories for analysis. Currently, the mine laboratory (Inspectorate) and ALS analyze samples from infill drilling and brownfield exploration drilling, respectively.

During 2006 to 2007 drilling campaign, samples were sent to SGS for analysis. From 2007 to present, underground infill drilling samples are sent to Inspectorate laboratory. If the mine laboratory is running out of capacity, samples are delivered to Certimin laboratory.

The approximate insertion rates for exploration samples are summarized in Table 11-2. The actual insertion rates vary slightly by year and sample type.

TABLE 11-2 QC INSERTION RATES
Nexa Resources S.A. – Atacocha Mine

Year	Control	Type	Drill Hole No. Samples	Drill Hole Insertion Rate (%)	Channel No. Samples	Channel Insertion Rate (%)
2012 - 2017	Blanks	Pulp	1,917	3	835	3
		Coarse	1,930	3	455	1
	In-house CRMs	Low grade	1,642	3	358	1
		Intermediate grade	1,832	3	139	0
		High grade	1,559	3	719	2
	Duplicates	Field	1,715	3	696	2
		Reject	2,043	3	770	2
		Pulps	1,473	2	955	3
		All control samples	**14,111**	**23**	**4,927**	**15**
2018	Blanks	Pulp	1,374	2		
		Coarse	1,304	2		
	In-house CRMs	Low grade	1,081	2		
		Intermediate grade	1,107	2		
		High grade	1,103	2		
	Duplicates	Field	1,605	2		
		Reject	1,621	3		
		Pulps	2,277	3		
		All control samples	**11,472**	**17**		

CERTIFIED REFERENCE MATERIAL

Results from the regular submission of CRMs, prepared in-house and certified by accredited laboratories, are analyzed to identify problems with specific sample batches and long-term biases associated with the assay laboratories. CRMs were inserted into the sample stream by technicians trained in quality control procedures. CRMs inserted with drill core samples since the 2014 are detailed in Table 11-3 and with channel samples since 2012 in Table 11-4. Nine CRMs using in-house material were certified by Target Rocks Peru S.A.C. (MAT 04 to MAT-12) and eight standards ("STD" pre-fixes) were certified by Actlabs Skyline Perú S.A.C.

TABLE 11-3 CRMs USED WITH DRILLING SAMPLES SINCE 2014
Nexa Resources S.A. – Atacocha Mine

Standard	No. Submitted	Laboratory	Year
MAT-04	165	Inspectorate	2012-2013-2014-2015-2016
MAT-05	69	Inspectorate	2012-2013-2014-2016
MAT-06	66	Inspectorate	2012-2013-2014-2015
MAT-07	519	ALS- Inspectorate	2014-2016-2017
MAT-08	543	ALS- Inspectorate	2016- 2017
MAT-09	758	ALS- Inspectorate	2016- 2017
MAT-10	1,044	ALS-Inspectorate-Certimin	2017-2018
MAT-11	1,074	ALS-Inspectorate-Certimin	2017-2018
MAT-12	1,076	ALS-Inspectorate-Certimin	2017-2018
STD1_ ACTLABS2015	116	ALS- Inspectorate	2015-2016
STD12_ ACTLABS2015	914	Inspectorate	2013-2014-2015-2016
STD13_ ACTLABS2015	988	ALS- Inspectorate	2013-2014-2015-2016
STD14_ ACTLABS2015	926	Inspectorate	2013-2014-2015-2016
STD2_ ACTLABS2014	351	ALS-Inspectorate	2013-2014-2015-2016
STD2_ ACTLABS2015	18	ALS-Inspectorate	2016
STD3_ ACTLABS2014	158	ALS-Inspectorate	2013-2014-2015-2016
STD3_ ACTLABS2015	78	ALS-Inspectorate	2016
Total	**8,863**		

TABLE 11-4 CRMs USED WITH CHANNEL SAMPLES SINCE 2012
Nexa Resources S.A. – Atacocha Mine

Standard	No. Submitted	Laboratory	Year
MAT-04	78	Inspectorate	2014-2015
MAT-05	42	Inspectorate	2014
MAT-06	48	Inspectorate	2014
STD3_NOCERTIF	223	Inspectorate	2012-2013-2014
STD12_ACTLABS2015	57	Inspectorate	2013-2015
STD13_ACTLABS2015	52	Inspectorate	2013-2015
STD14_ACTLABS2015	64	Inspectorate	2013-2015
STD2_ACTLABS2014	45	Inspectorate	2014-2015
STD3_ACTLABS2014	51	Inspectorate	2014-2015
STD3_NOCERTIF	276	Inspectorate	2012-2013
Total	**936**		

PREVIOUS WORK (2012-2017)

The CRM expected values are listed in Table 11-5.

TABLE 11-5 CRMs USED AT ATACOCHA FROM 2012 TO 2017
Nexa Resources S.A. – Atacocha Mine

Laboratory	Method	Standard	Au (ppm)		Ag (oz)		Pb (%)		Zn (%)		Cu (%)	
			Best Value	Std Dev	Best Value	Std Dev	Best Value	Std Dev	Best Value	Std Dev	Best Value	Std Dev
TARGET ROCKS	Four Acid Digestion	MAT-04			0.94	0.03	0.7	0.02	0.279	0	0.162	0
		MAT-05			4.12	0.12	2.37	0.03	2.5	0.06	0.576	0.01
		MAT-06			15.08	0.21	7.75	0.1	7.98	0.12	2.53	0.06
		MAT-07	0.346	0.04	0.31	0.02	0.22	0.01	0.188	0	0.009	0
		MAT-08	0.337	0.04	3.57	0.12	1.2	0.03	2.73	0.04	0.29	0.01
		MAT-09	0.828	0.02	11.25	0.4	11.01	0.25	15.44	0.33	0.501	0.01
ACTLABS SKYLINE PERU	Multi-Acid Digestion + AAS	STD1_ ACTLABS2015			0.461	0.05	0.39	0.01	0.78	0.01	0.153	0
		STD12_ ACTLABS2015			0.455	0.03	0.278	0.01	0.57	0.01	0.145	0
		STD13_ ACTLABS2015			1.6	0.06	1.12	0.01	3.29	0.04	0.23	0.01
		STD14_ ACTLABS2015			5.66	0.33	3.66	0.07	7.3	0.05	0.561	0.01
		STD2_ ACTLABS2014			0.93	0.03	0.46	0.01	3.07	0.04	0.36	0.01
		STD2_ ACTLABS2015			1.44	0.09	1.26	0.02	4	0.04	0.196	0
		STD3_ ACTLABS2014			3.72	0.09	3.62	0.05	7.34	0.16	0.21	0.01
		STD3_ ACTLABS2015			3.13	0.16	3.04	0.04	6.72	0.14	0.267	0.01
No information		STD3_ SNCERT-OLD	Without certificate									
		STD1										
		STD3										

Nexa sent 2,587 CRMs to the Atacocha Inspectorate laboratory with 31,617 drill core samples (a submission rate of 1 in 12 samples) in 2014 to 2017 and 27,307 channel samples with 1,613 CRMs (a submission rate of 1 in 17 samples) from 2012 to 2015.

Nexa sent a total of 1,157 CRMs to the Lima Inspectorate laboratory, with 14,190 drill hole samples (a submission rate of 1 in 12 samples) submitted from November 2015 to August 2016, and a total of 1,289 CRMs to ALS, with 21,648 drill hole samples (a submission rate of 1 in 17 samples) submitted from August 2016 to April 2017

Overall, most of the CRMs results for zinc, lead, copper, silver, and gold are within acceptable limits. RPA noticed some CRM numbering mix-ups during 2016, and some narrow failure limits for low grade CRMs that unfairly influenced the overall CRM failure statistics.

CURRENT WORK (2018)

During 2018, Atacocha sent 66,083 drill core samples, and 3,291 CRMs resulting in an insertion rate of 5.0% .

Tables 11-6 to 11-8 lists the certified values of the CRMs for Zn, Pb, Cu, Ag and Au; and the summary of the assay performance for the CRMs.

TABLE 11-6 ATACOCHA CRM VALUES AND ASSAY PERFORMANCE AT CERTIMIN LABORATORY
Nexa Resources S.A. – Atacocha Mine

Laboratory	Type Standard	Element	No. Samples	Best Value	Mean	Bias	Failure Rates
CERTIMIN	Low grade MAT10	Au(g/t)	9	0.25	0.25	-0.50%	0%
		Ag(oz/t)	9	0.28	0.28	0.10%	0%
		Cu (%)	9	0.25	0.26	3.60%	0%
		Pb (%)	9	0.11	0.12	5.40%	0%
		Zn (%)	9	0.30	0.29	-2.50%	0%
	Medium grade MAT11	Au(g/t)	27	0.93	0.95	2.30%	0%
		Ag(oz/t)	27	1.76	1.69	-3.90%	0%
		Cu (%)	27	0.17	0.17	2.10%	0%
		Pb (%)	27	1.37	1.36	-1.00%	0%
		Zn (%)	27	2.19	2.13	-2.80%	7%
	High grade MAT12	Au(g/t)	26	8.98	9.45	5.20%	0%
		Ag(oz/t)	26	8.62	8.69	0.90%	0%
		Cu (%)	26	0.18	0.18	1.30%	0%
		Pb (%)	26	6.83	6.79	-0.60%	0%
		Zn (%)	26	6.95	6.85	-1.40%	0%

TABLE 11-7 ATACOCHA CRM VALUES AND ASSAY PERFORMANCE AT ALS LABORATORY
Nexa Resources S.A. – Atacocha Mine

Laboratory	Type Standard	Element	No. Samples	Best Value	Mean	Bias	Failure Rates
ALS	Low grade MAT10	Au (g/t)	794	0.25	0.25	0.70%	2%
		Ag (oz/t)	794	0.28	0.27	6.40%	1%
		Cu (%)	794	0.25	0.26	5.00%	1%
		Pb (%)	794	0.11	0.11	1.90%	0%
		Zn (%)	794	0.30	0.29	-3.20%	0%
	Medium grade MAT11	Au (g/t)	777	0.93	0.94	0.50%	1%
		Ag (oz/t)	777	1.76	1.66	4.10%	1%
		Cu (%)	777	0.17	0.18	2.80%	1%
		Pb (%)	777	1.37	1.34	-2.40%	1%
		Zn (%)	777	2.19	2.13	-2.80%	1%
	High grade MAT12	Au (g/t)	768	8.98	9.04	0.60%	2%
		Ag (oz/t)	768	8.62	7.95	1.70%	1%
		Cu (%)	768	0.18	0.18	3.10%	1%
		Pb (%)	768	6.83	6.67	-2.30%	1%
		Zn (%)	768	6.95	6.91	-0.50%	1%

TABLE 11-8 ATACOCHA CRM VALUES AND ASSAY PERFORMANCE AT INSPECTORATE LABORATORY
Nexa Resources S.A. – Atacocha Mine

Laboratory	Type Standard	Element	No. Samples	Best Value	Mean	Bias	Failure Rates
INSPECTORATE	Low grade MAT10	Au(g/t)	278	0.25	0.24	-1.20%	5%
		Ag(oz/t)	278	0.28	0.29	5.00%	3%
		Cu (%)	278	0.25	0.27	6.10%	3%
		Pb (%)	278	0.11	0.12	3.00%	3%
		Zn (%)	278	0.30	0.3	-1.20%	3%
	Medium grade MAT11	Au(g/t)	303	0.93	0.95	2.30%	0%
		Ag(oz/t)	303	1.76	1.82	3.60%	0%
		Cu (%)	303	0.17	0.18	3.10%	1%
		Pb (%)	303	1.37	1.38	0.70%	1%
		Zn (%)	303	2.19	2.24	2.50%	1%
	High grade MAT12	Au(g/t)	309	8.98	8.94	-0.40%	2%
		Ag(oz/t)	309	8.62	8.86	2.80%	0%
		Cu (%)	309	0.18	0.18	1.00%	0%
		Pb (%)	309	6.83	6.75	-1.20%	1%
		Zn (%)	309	6.95	6.92	-0.50%	0%

In RPA's opinion, the CRMs cover a reasonable range of grades with respect to the overall resource grades. RPA recommends that Nexa make new high grade zinc and lead CRMs. RPA also recommends implementing procedures that will reduce the CRM failure rates.

BLANKS

The regular submission of blank material is used to assess contamination during sample preparation and to identify sample numbering errors. Field blank samples are composed of barren material that have grades that are less than the detection limits.

PREVIOUS WORK (2012-2017)

A total of 1,752 blanks with 25,925 drill hole samples and a total of 290 blanks with 18,993 channel samples from January 2014 to February 2017 (a submission rate of 1 in 15 samples) were sent to Atacocha Inspectorate.

A total of 1,824 blanks with 30,370 drill hole samples from 2014 to 2017 (a submission rate of 1 in 17 samples) were sent to Lima Inspectorate.

A total of 1,315 blanks with 22,089 drill hole samples from August 2016 to April 2017 (a submission rate of 1 in 17 samples) were sent to ALS.

The results in all the laboratories show a pass rate greater than 98% indicating negligible contamination.

CURRENT WORK (2018)

In the 2018 evaluation, 1,304 coarse blanks (2.1%) and 1,374 fine blanks (2.0%) were inserted with core samples and showed no significant contamination during the preparation and analysis. Tables 11-9 and 11-10 show the results of the coarse and fine blanks, respectively.

TABLE 11-9 COARSE BLANK RESULTS FOR 2018
Nexa Resources S.A. – Atacocha Mine

Element	CERTIMIN			ALS			INSPECTORATE		
	Total	Failure	Failure Rate%	Total	Failure	Failure Rate %	Total	Failure	Failure Rate %
Au(g/t)	56	0	0.00%	790	2	0.30%	458	0	0.00%
Ag(oz/t)	56	0	0.00%	790	1	0.10%	458	0	0.00%
Cu (%)	56	0	0.00%	790	2	0.30%	458	0	0.00%
Pb (%)	56	0	0.00%	790	7	0.90%	458	0	0.00%
Zn (%)	56	0	0.00%	790	20	2.50%	458	0	0.00%

TABLE 11-10 FINE BLANK RESULTS FOR 2018
Nexa Resources S.A. – Atacocha Mine

Element	CERTIMIN			ALS			INSPECTORATE		
	Total	Failure	Failure Rate%	Total	Failure	Failure Rate %	Total	Failure	Failur e Rate %
Au(g/t)	64	0	0.00%	839	0	0.00%	471	0	0.00%
Ag(oz/t)	64	0	0.00%	839	0	0.00%	471	0	0.00%
Cu (%)	64	0	0.00%	839	1	0.10%	471	0	0.00%
Pb (%)	64	0	0.00%	839	0	0.00%	471	0	0.00%
Zn (%)	64	0	0.00%	839	1	0.10%	471	0	0.00%

In RPA's opinion, the results of the blanks are within acceptable limits at all three laboratories.

DUPLICATES

Duplicates help assess the natural local-scale grade variance or nugget effect and are also useful for detecting sample numbering mix-ups. The field (core) duplicates help monitor the grade variability as a function of both sample homogeneity and laboratory error.

The precision of sampling and analytical results can be quantified by re-analyzing the same sample using the same methodology. The variance between the measured results will measure their precision. Precision is affected by mineralogical factors such as grain size and distribution and inconsistencies in the sample preparation and analysis processes. There are several different duplicate sample types, which can be used to determine the precision of the entire sampling process, sample preparation, and analytical process. Blind duplicate samples are submitted to the laboratory. A description of the different types of duplicates used by Atacocha is provided in Table 11-11.

TABLE 11-11 DUPLICATE TYPES AND DESCRIPTIONS
Nexa Resources S.A. – Atacocha Mine

Duplicate	Description
Field	The sample generated by another sampling operation at the same collection point includes a duplicate sample taken from a quarter of the drill core sample. Since mid-2016, a duplicate sample was taken from the second half of the drill core sample.
Reject	The second sample obtained from splitting the coarse crushed rock during sample preparation and submitted blind to the same laboratory that assayed the original sample.
Pulp	The second sample obtained from splitting the pulverized material during sample preparation and submitted blind at a later date to the same laboratory that assayed the original pulp.

Numerous plots and graphs are used monthly to monitor precision and bias levels. A brief description of the plots employed in the analysis of Atacocha duplicate data is provided below:

- Scatter plot: assesses the scattering degree of the duplicate result plotted against the original value, which allows for bias characterization and regression calculations.
- Ranked half absolute relative difference (HARD) of samples plotted against their rank % value.

HARD:

1) Acceptable HARD value for field duplicates is < 30%
2) Acceptable HARD value for coarse duplicate is < 20%
3) Acceptable HARD value for pulp is < 10 %

Duplicates were submitted with channel samples and drill core samples. If both the original and duplicate results returned a value less than two times the detection limit, the results were disregarded for the HARD analysis due to distortion in the precision levels at very low grades.

PREVIOUS WORK (2012-2017)

Atacocha sent duplicate samples to Atacocha Inspectorate, Lima Inspectorate, and ALS. RPA reviewed the duplicate results for zinc, lead, copper, silver, and gold and found that they generally compare well. Some of the pulp duplicates at the Atacocha Inspectorate for zinc, lead, and copper fall outside the 10% relative hard value threshold.

CURRENT WORK (2018)

Duplicate control charts were prepared for Zn, Au, Ag, Cu, and Pb in both laboratories. Overall, the duplicate results show relatively good assay precision, with the exception of zinc field duplicates due to the variability that is inherent in the samples. Table 11-12 shows the results of the duplicate samples analyzed.

RPA recommends continuing to select duplicates that are representative of the mineralization Zn, Pb, Cu, Ag, and Au grade ranges, and completing ongoing studies to investigate the component of variability that is inherent in the sample, versus the component due to assay precision.

TABLE 11-12 ERROR RATES OF DUPLICATES
Nexa Resources S.A. – Atacocha Mine

		Field Duplicates			Coarse Duplicates			Pulp Duplicates		
Laboratory	Element	Sample	Failure	Failure Rate%	Sample	Failure	Failure Rate %	Sample	Failure	Failure Rate %
CERTIMIN	Au(g/t)	42	3	7%	51	0	0%	76	1	1%
	Ag(oz/t)	42	2	5%	51	0	0%	76	5	7%
	Cu (%)	42	2	5%	51	0	0%	76	0	0%
	Pb (%)	42	5	12%	51	6	12%	76	0	0%
	Zn (%)	42	8	19%	51	0	0%	76	0	0%
ALS	Au(g/t)	1092	33	3%	1,092	3	0%	1,519	34	2%
	Ag(oz/t)	1092	38	4%	1,092	6	1%	1,519	4	0%
	Cu (%)	1092	39	4%	1,092	4	0%	1,519	3	0%
	Pb (%)	1092	123	11%	1,092	123	11%	1,519	2	0%
	Zn (%)	1092	150	14%	1,092	18	2%	1,519	1	0%

Laboratory	Element	Field Duplicates Sample	Field Duplicates Failure	Field Duplicates Failure Rate%	Coarse Duplicates Sample	Coarse Duplicates Failure	Coarse Duplicates Failure Rate %	Pulp Duplicates Sample	Pulp Duplicates Failure	Pulp Duplicates Failure Rate %
INSPECTORATE ATACOCHA	Au(g/t)	471	6	1%	478	0	0%	682	5	1%
	Ag(oz/t)	471	11	2%	478	0	0%	682	0	0%
	Cu (%)	471	20	4%	478	1	0%	682	3	0%
	Pb (%)	471	30	6%	478	30	6%	682	3	0%
	Zn (%)	471	65	14%	478	1	0%	682	1	0%

EXTERNAL CHECK SAMPLES

Nexa sent 261 pulp samples analyzed at Inspectorate to ALS and 495 sample pulps analyzed at ALS to Certimin for referee check assays. Approximately a two percent insertion rate is used for external check samples. Statistics for the check assay results are shown in Tables 11-13 and 11-14.

TABLE 11-13 CHECK ASSAYS AT ALS LABORATORY
Nexa Resources S.A. – Atacocha Mine

	Zn %		Pb %		Cu %		Ag g/t		Au g/t	
	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary
Number of Samples (N):	330	330	286	286	276	276	226	226	226	226
Mean:	3.71	3.78	1.33	1.38	0.36	0.37	84.23	93.32	0.28	0.27
Maximum Value:	29	30	28	28	7	7	3393	3550	9	7
Minimum Value:	0	0	0	0	0	0	1	0	0	0
Median:	1	1	0	0	0	0	11	10	0	0
Variance:	37	38	12	13	0	0	83400	112631	1	0
Std. Dev:	6	6	3	4	1	1	289	336	1	1
Coefficient of Variation:	2	2	3	3	2	2	3	4	3	2
Correlation Coefficient	0.999		0.995		0.996		0.960		0.991	
% Diff Between Means	-2.0%		-4.0%		-3.9%		-10.8%		3.5%	

TABLE 11-14 CHECK ASSAYS AT CERTIMIN LABORATORY
Nexa Resources S.A. – Atacocha Mine

	Zn %		Pb %		Cu %		Ag g/t		Au g/t	
	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary	Primary	Secondary
Number of Samples (N):	404	404	332	332	333	333	434	434	431	431
Mean:	4.04	4.02	2.51	2.49	0.24	0.23	71.89	71.50	0.83	0.86
Maximum Value:	34	35	39	38	3	3	1711	1740	88	88
Minimum Value:	0	0	0	0	0	0	0	0	0	0
Median:	1	1	1	1	0	0	12	11	0	0
Variance:	39	38	28	27	0	0	34229	35583	26	28
Std. Dev:	6	6	5	5	0	0	185	189	5	5
Coefficient of Variation:	2	2	2	2	2	2	3	3	6	6
Correlation Coefficient	0.999		0.998		0.999		0.999		0.989	
% Diff Between Means	0.6%		0.7%		1.4%		0.6%		-3.7%	

The results for zinc gave a correlation coefficient of 0.99, which is very good. There were some samples removed as they were at detection limit value. The check assay results compared well, showing very high overall correlation coefficients, except for the ALS silver value, which was less at 0.96%. For silver, a potential negative bias of approximately 10% at Inspectorate in comparison to ALS should be investigated.

RPA is of the opinion that the mine laboratory zinc, lead, copper, silver, and gold assays are reliable and meet industry standards.

QA/QC RECOMMENDATIONS

RPA's QA/QC recommendations are as follows:

- Revaluate the 2012 to 2017 QA/QC failure rates after removing CRM numbering mix-ups and adjusting the failure limits for certain CRMs.
- Include CRMs with check assays.
- Investigate the potential 10% negative silver bias at Inspectorate.
- Select duplicates and check assays in mineralized zones.

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.

12 DATA VERIFICATION

Rosmery Cardenas, Principal Geologist with RPA and an independent QP, visited the Atacocha Mine from September 5 to 7, 2018. During the site visit, Ms. Cardenas reviewed plans and sections, visited the core shack, examined some drill cores and mineralization exposures at the underground mine, and held discussions with Nexa personnel.

RPA performed checks on the Atacocha Mineral Resource database by comparing 2017 assay certificates to the assay values in the database. The database values correspond well with the assay certificate data.

As part of the data verification process, 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. RPA queried the database for unique headers, unique samples, duplicate holes, overlapping intervals, blank and zero grade assays, and long interval sample, and reviewed QA/QC data collected by Nexa. RPA did not identify any significant discrepancies.

During the last quarter of 2017, Nexa transferred the database from SIOM database management system and Excel files to Fusion software, and prepared an exhaustive number of checks to confirm the accuracy of the data migration. Nexa has implemented a series of routine verifications to ensure the collection of reliable data. Core logging, surveying, and sampling were monitored by exploration and mine geologists and verified routinely for consistency. The Atacocha resource database is regularly maintained and validated by the database administrator using Fusion software validation routines and by regularly checking the drill hole data on-screen visually. Nexa prepared "The Informe de Validación de Base de Datos Atacocha" report containing additional detail regarding the data validation (Nexa, 2019c). During this validation, Nexa found 76 channel and one drill hole creating inconsistencies with surrounding data. As a result, these holes and channel were removed from the resource database.

In 2017, Amec Foster Wheeler (Amec) audited the Atacocha database. Amec reviewed and validated the information from 2011 to 2017 compiled by Atacocha. Amec used signed assay certificates to verify the assays in the database; some inconsistencies were observed in Zn and Cu assays. Other checks included collar locations, downhole survey measurements, and lithology codes. Some inconsistencies were observed. In addition, a comparison between drill hole assay and channel assay was performed. The test compared results of nearby holes by searching for channel samples near drill holes within a four-metre distance. Amec constructed QQ plots and found that both grade distributions were very similar, with no bias observed (Amec, 2017).

As part of SRK's 2017 NI 43-101 Technical Report, SRK performed assay data verification by comparing assay certificates with values in the database. SRK found that a significant number of historical samples did not have assay certificates and downgraded some areas to Inferred as a result. Nexa has found more assay certificates since 2017 and completed a statistical and visual study that concluded that there were no significant issues with the historical data. RPA reviewed Nexa's comparison work and concurred with the inclusion of historical data in the resource estimate with no classification downgrade.

RPA found that the database is well maintained, and generally exceeds industry standards. RPA is of the opinion that database and database verification procedures for the Project comply with industry standards and are adequate for the purposes of Mineral Resource estimation.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

TEST WORK

Nexa is in the process of developing geometallurgical models for the Atacocha underground and San Gerardo open pit mines. In 2017, fifteen samples from Atacocha (nine from the open pit and six from the underground mine) were submitted for metallurgical testing. The samples were intended to be representative of the planned 2018 concentrator feed.

Test work included mineralogy, hardness testing (Bond ball mill work index and abrasion index), and flotation testing (variability tests, locked cycle tests, and grind size evaluation).

The geometallurgical sample selection and test work were planned with the assistance of Transmin Metallurgical Consultants (Transmin), and results and interpretation are reported by Transmin in the following report:

- Estudio Geometalurgico Preliminar para Unidad Minera Atacocha, 13 June 2018

Initially, 30 samples of drill core were selected to represent ore to be processed by the concentrator in 2018 (six from the underground and 24 from the open pit), however, ultimately only 15 of these samples were selected for test work (five from the underground ore and 10 from the open pit ore). Priority was given to selecting samples from holes drilled in 2016 and 2017, so as to use the freshest possible material for metallurgical test work. Samples of the underground orebodies were selected to represent key parameters, including orebody, lithology, and grades of Pb, Cu, Zn, Ag, and Mn. Samples from the open pit were selected based on grades of Pb, Cu, Zn, Ag, and Mn; lithology and domain were not available for use in the sample selection for the open pit. Sample selection was also limited to areas in the block model with values of NSR ≥ $47.79/t (underground) or NSR ≥ $22.00/t (open pit) (Transmin, 2018). A summary of the samples selected for metallurgical test work is presented in Table 13-1.

TABLE 13-1 ATACOCHA SAMPLES SELECTED FOR METALLURGICAL TEST WORK
Nexa Resources S.A. – Atacocha Mine

Sample	Orebody	Lithology	Location	Program
AAS-07	Orebody 10	intrusive	Open Pit	Comminution
AAS-07-01	Orebody 10	intrusive	Open Pit	Flotation / comminution
AAS-09-01	Orebody 10	intrusive	Open Pit	Flotation / comminution
AAS-10-01	Orebody 10	intrusive	Open Pit	Flotation / comminution
AAS-24-01	Vein L	intrusive	Open Pit	-
AAS-27	Vein LA27	intrusive	Open Pit	Flotation / comminution
AAS-28	Vein LA27	intrusive	Open Pit	Flotation / comminution
AAS-29	Vein LA27	limestone	Open Pit	Flotation / comminution
AAS-30	Vein LA27	intrusive	Open Pit	Flotation / comminution
AAS-30-01	Orebody 10	intrusive	Open Pit	Flotation / comminution
AAS-05	Anita Orebody	skarn	Underground	Flotation / comminution
AAS-31	Orebody 23	marble	Underground	Flotation
AAS-33	Orebody 23	mineralization	Underground	Flotation
AAS-34	Orebody 18	mineralization	Underground	Flotation
AAS-36	Anita Orebody	mineralization	Underground	Flotation

Source: Transmin, 2018

Sample AAS-24-01 was not submitted for test work as it was found to have very low grades of Pb, Cu, Zn, and Ag. Chemical analysis of the samples is shown in Table 13-2.

TABLE 13-2 ANALYSIS OF SAMPLES SELECTED FOR METALLURGICAL TEST WORK
Nexa Resources S.A. – Atacocha Mine

Sample	Orebody	Lithology	Zone	Au g/t	Ag g/t	As %	Bi ppm	Cu %	Fe %	Mn %	Pb %	Zn %
AAS-07	Orebody 10	intrusive	OP	0.18	6.00	0.064	<5	0.0056	4.36	0.24	0.19	0.40
AAS-07-01	Orebody 10	intrusive	OP	0.26	8.10	0.071	<5	0.0055	4.73	0.15	0.14	0.11
AAS-09-01	Orebody 10	intrusive	OP	1.99	38.2	0.12	10.0	0.041	4.12	0.23	0.94	1.64
AAS-10-01	Orebody 10	intrusive	OP	0.65	60.2	0.17	28.0	0.061	4.89	0.16	1.54	1.29
AAS-24-01	Vein L	intrusive	OP	<0.005	1.00	0.0005	<5	0.00093	0.44	0.017	0.0013	0.0044
AAS-27	Vein LA27	intrusive	OP	0.14	39.3	0.065	16.0	0.035	4.24	0.48	1.81	1.18
AAS-28	Vein LA27	intrusive	OP	0.64	61.3	0.20	<5	0.029	4.88	0.22	3.11	1.21
AAS-29	Vein LA27	limestone	OP	0.046	30.2	0.039	<5	0.0074	1.75	0.56	1.52	1.90
AAS-30	Vein LA27	intrusive	OP	0.15	41.0	0.058	13.0	0.032	4.36	0.48	1.89	1.21
AAS-30-01	Orebody 10	intrusive	OP	0.44	80.0	0.13	<5	0.047	5.39	0.22	3.96	1.70
AAS-05	Anita Orebody	skarn	UG	0.098	16.6	0.022	<5	0.18	17.2	0.17	0.35	0.94
AAS-31	Orebody 23	marble	UG	0.34	173	0.081	1,126	0.47	6.70	0.31	1.58	8.37
AAS-33	Orebody 23	mineralization	UG	0.60	89.6	0.59	1,492	0.36	19.0	1.31	0.51	6.72
AAS-34	Orebody 18	mineralization	UG	0.17	63.6	0.14	488	0.46	18.1	1.41	0.39	8.26

Sample	Orebody	Lithology	Zone	Au g/t	Ag g/t	As %	Bi ppm	Cu %	Fe %	Mn %	Pb %	Zn %
AAS-36	SB Orebody	mineralization	UG	0.22	6.40	0.0059	7.00	0.47	16.0	0.19	0.0039	10.1

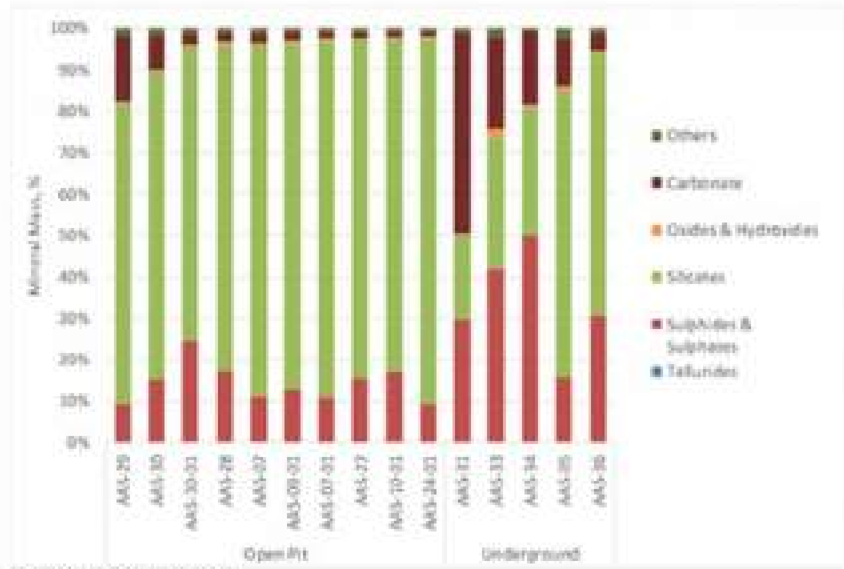
Source: Transmin, 2018

Mineralogical analysis of the samples is presented in Figures 13-1 and 13-2. In the open pit samples, silicates make up the majority of the samples, ranging from 71% to 88%, whereas the underground samples typically contain lower amounts of silicates – the samples ranged from 20% to 70% silicates. A major component of the underground samples is carbonates, whereas carbonates are a minor component of the open pit samples. Open pit samples are notable for the presence of sphalerite containing Mn, arsenic-containing Pb sulphides, and the lack of chalcopyrite. The mineralogical characterization is summarized in Table 13-3.

TABLE 13-3 MINERALOGICAL CHARACTERIZATION SUMMARY
Nexa Resources S.A. – Atacocha Mine

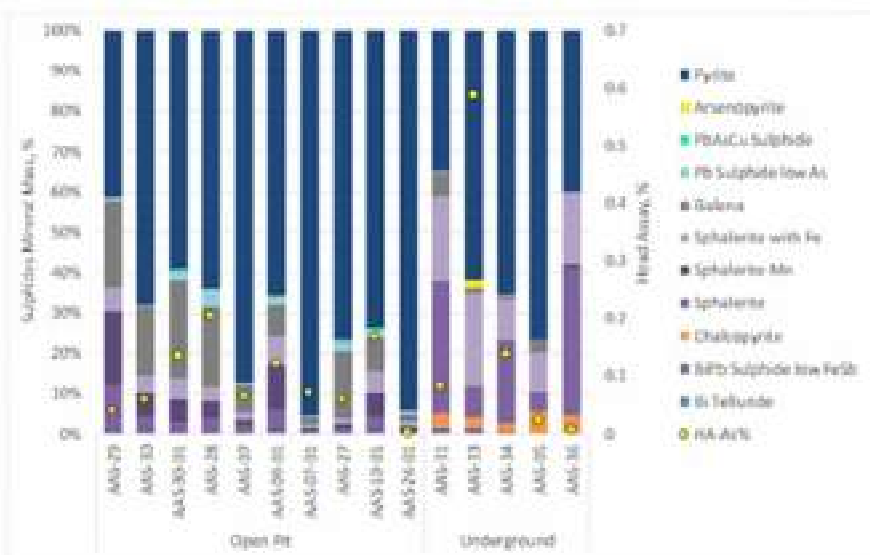
Zone	Sample	Orebody	Tellurides %	Sulphides & Sulphates %	Silicates %	Oxides & Hydroxides %	Carbonate %	Others %
OP	AAS-29	Vein LA27	0.04	9.5	72.3	0.22	16.1	1.75
	AAS-30	Vein LA27	0.020	15.1	74.5	0.35	8.3	1.71
	AAS-30-01	Orebody 10	0.04	24.6	71.1	0.36	2.7	1.08
	AAS-28	Vein LA27	0.04	17.5	78.4	0.40	2.50	0.95
	AAS-07	Orebody 10	0.015	11.1	84.7	0.32	2.30	1.19
	AAS-09-01	Orebody 10	0.03	13.0	83.3	0.36	2.1	1.01
	AAS-07-01	Orebody 10	0.00	10.7	85.6	0.312	1.6	1.05
	AAS-27	Vein LA27	0.03	15.2	81.8	0.36	1.4	1.01
	AAS-10-01	Orebody 10	0.07	17.1	80.1	0.46	1.18	0.96
	AAS-24-01	Vein L	0.000	9.5	88.0	0.50	1.0	1.00
UG	AAS-31	Orebody 23	0.149	29.3	20.5	0.25	48.61	0.85
	AAS-33	Orebody 23	0.109	41.82	31.7	2.15	21.9	2.19
	AAS-34	Orebody 18	0.12	49.7	31.1	0.44	18.0	0.61
	AAS-05	Anita Orebody	0.03	15.6	69.6	0.66	11.66	2.42
	AAS-36	SB Orebody	0.08	30.5	63.7	0.19	4.2	1.31

FIGURE 13-1 BULK MINERALOGICAL ANALYSIS



Source: Transmin, 2018

FIGURE 13-2 SULPHIDE MINERAL BREAKDOWN



Source: Transmin, 2018

Comminution test results are shown in Table 13-4. The open pit ore is moderate to hard in terms of grindability, with low abrasiveness. Only one sample of underground ore was tested, and therefore no conclusions can be drawn about the general comminution characteristics of the underground ore.

TABLE 13-4 COMMINUTION TEST WORK RESULTS
Nexa Resources S.A. – Atacocha Mine

Sample	Orebody	Litho	Zone	Ai g	BWi kWh/t
AAS-05	Anita Orebody	Skarn	UG	0.24	8.10
AAS-07	Orebody 10	Intrusive	OP	0.24	18.1
AAS-07-01	Orebody 10	Intrusive	OP	0.12	15.0
AAS-09-01	Orebody 10	Intrusive	OP	0.36	16.1
AAS-10-01	Orebody 10	Intrusive	OP	0.13	13.1
AAS-27	Vein LA27	Intrusive	OP	0.10	12.9
AAS-30	Vein LA27	Intrusive	OP	0.093	12.2
AAS-28	Vein LA27	Intrusive	OP	0.22	14.1
AAS-30-01	Orebody 10	Intrusive	OP	0.098	12.0

Source: Transmin, 2018

Five composite samples were produced for use in grind optimization and locked cycle flotation tests. Compositions of the composites are provided in Table 13-5.

TABLE 13-5 ANALYSIS OF COMPOSITE SAMPLES
Nexa Resources S.A. – Atacocha Mine

Composite	Zone	Au g/t	Ag g/t	Cu %	Fe %	Mn %	Pb %	Zn %
AAC-01	UG	0.54	342	1.05	19.3	0.48	10.1	16.8
AAC-02	UG + OP	0.87	355	0.36	13.8	2.62	9.48	12.4
AAC-03	OP	0.83	228	0.22	4.62	0.98	8.57	12.6
AAC-04	Plant Oct 17	0.49	39	0.13	9.25	0.88	0.95	1.49
AAC-05	OP + UG	0.48	36.4	0.07	6.8	0.31	1.43	1.29

Source: Transmin, 2018

Bulk rougher flotation was completed at three grind sizes on AAC-01, AAC-02, and AAC-03 at P_{80} of 100 µm, 150 µm, and 200 µm. The tests indicated little sensitivity in terms of recovery to grind size in the range tested.

AAC-05 was used in locked cycle flotation testing, with six cycles completed. The primary grind size used was 48% passing 74 µm. Pb and Zn concentrates were produced with grades of 61.1% Pb and 53.3% Zn respectively. Final Pb and Zn recoveries to the Pb and Zn concentrates were 84.1% and 85.9% respectively. Penalty elements As and Mn exceeded their respective limits: As in the Pb concentrate exceeded 8,000 ppm at 8,114 ppm, and Mn in the Zn concentrate exceeded the limit (0.5%) at 0.68%.

Rougher flotation variability tests were completed on 13 of the 15 variability samples, consisting of bulk and Zn rougher flotation. Flotation conditions were varied based on Pb and Zn grades of the samples, resulting in four different flotation schemes being used during the variability tests. Results of the tests are shown in Tables 13-6 and 13-7.

TABLE 13-6 VARIABILITY TEST WORK BULK ROUGHER CONCENTRATE
Nexa Resources S.A. – Atacocha Mine

Sample	Zone	Weight %	Bulk Rougher Concentrate Grade						Recovery (%)					
			Ag g/t	Cu %	Pb %	Zn %	As %	Mn %	Ag	Cu	Pb	Zn	As	Mn
AAS-07-01	OP	2.09	190	0.18	3.70	1.06	0.59	0.061	53.1	30.4	58.1	20.7	17.3	0.86
AAS-09-01	OP	4.98	654	0.76	16.7	5.38	1.18	0.12	88.5	82.3	91.8	17.2	49.0	2.62
AAS-27	OP	5.58	867	0.71	28.3	2.05	0.76	0.054	87.8	79.6	90.5	31.1	63.3	0.63
AAS-29	OP	2.90	904	0.19	46.7	5.72	0.23	0.37	84.4	39.1	88.9	9.11	17.0	1.93
AAS-10-01	OP	8.49	611	0.70	15.5	7.21	1.14	0.11	91.1	85.3	91.7	50.3	57.5	5.66
AAS-28	OP	7.66	684	0.33	34.4	9.19	1.40	0.16	88.5	75.1	89.4	58.4	52.6	5.61
AAS-30	OP	4.75	827	0.68	35.4	11.9	0.24	0.29	91.0	79.5	93.8	50.1	19.4	2.85
AAS-30-01	OP	11.8	647	0.39	29.6	7.99	0.65	0.085	91.5	84.8	94.0	55.9	56.9	4.51
AAS-05	UG	1.05	801	11.4	29.0	2.87	0.10	0.061	51.8	65.4	82.2	3.20	4.70	0.38
AAS-31	UG	5.47	2,815	5.00	25.2	22.7	0.27	0.20	83.3	57.0	91.6	15.0	18.0	3.57
AAS-33	UG	3.36	2,131	5.92	12.2	12.6	0.73	0.68	78.1	54.4	82.6	6.59	4.21	1.74
AAS-34	UG	1.60	2,512	3.61	18.0	4.47	0.58	0.67	64.1	13.3	77.5	0.90	6.73	0.76
AAS-36	UG	0.22	77.2	0.46	0.54	3.71	0.0076	0.19	2.16	0.20	23.1	0.080	0.28	0.22

Source: Transmin, 2018

TABLE 13-7 VARIABILITY TEST WORK ZINC ROUGHER CONCENTRATE
Nexa Resources S.A. – Atacocha Mine

Sample	Zone	Weight, %	Zinc Rougher Concentrate Grade						Recovery (%)					
			Ag g/t	Cu %	Pb %	Zn %	S %	Fe %	Ag	Cu	Pb	Zn	S	Fe
AAS-07-01	OP	9.94	21.1	0.024	0.23	0.70	0.41	0.079	28.0	19.4	17.4	65.4	57.2	5.35
AAS-09-01	OP	9.65	30.5	0.031	0.40	13.1	0.41	0.24	7.99	6.60	4.21	81.4	33.3	10.1
AAS-27	OP	10.4	47.3	0.049	1.01	2.23	0.23	0.10	8.95	10.3	6.05	63.4	35.5	2.17
AAS-29	OP	6.78	32.7	0.036	0.68	22.9	0.21	0.70	7.14	17.0	3.03	85.1	36.4	8.43
AAS-10-01	OP	8.91	41.7	0.050	0.79	6.56	0.46	0.14	6.53	6.37	4.92	48.1	24.6	7.64
AAS-28	OP	11.4	44.9	0.030	1.89	4.18	0.58	0.14	8.67	10.4	7.35	30.7	32.3	7.44
AAS-30	OP	12.7	20.0	0.020	0.47	4.28	0.32	0.24	5.90	6.33	3.33	48.2	71.6	6.26

Sample	Zone	Weight, %	Zinc Rougher Concentrate Grade						Recovery (%)					
			Ag g/t	Cu %	Pb %	Zn %	S %	Fe %	Ag	Cu	Pb	Zn	S	Fe
AAS-30-01	OP	12.2	37.5	0.030	1.26	5.89	0.30	0.18	5.53	6.79	4.16	42.8	27.3	10.2
AAS-05	UG	11.8	51.8	0.30	0.25	7.26	0.071	0.10	37.9	19.7	7.93	91.5	37.6	7.02
AAS-31	UG	14.6	103	1.03	0.35	41.6	0.058	0.28	8.15	31.3	3.37	73.4	10.4	12.9
AAS-33	UG	26.1	32.5	0.33	0.13	21.7	0.90	0.38	9.24	23.7	6.91	87.9	40.2	7.52
AAS-34	UG	14.2	60.9	2.07	0.12	50.8	0.058	0.46	13.8	67.6	4.77	90.7	5.92	4.63
AAS-36	UG	16.3	31.9	2.41	0.0062	52.6	0.001	0.20	74.1	86.8	29.4	93.9	0.52	16.9

Source: Transmin, 2018

The effect of the four different flotation schemes on the above results is unknown, and therefore, while some general conclusions can be drawn, comparison of individual results should be treated with care.

Lead recovery to the bulk concentrate averaged 91% for open pit ore and 83% for underground ore (excluding the low lead content samples). Zn recovery to the Zn rougher concentrate averaged 59% for open pit ore and 87% for the underground ore.

With the open pit samples, average Zn recovery to the bulk concentrate was significantly higher than for the underground samples (37% versus 5% respectively), even though the Zn head grades of the underground samples were far higher than those of the open pit samples. This would put more pressure on the bulk cleaning circuit to separate Zn from Pb and Cu.

Test work results from the samples were used to derive recovery-versus-head-grade relationships for Pb, Zn, Cu, Mn, and As. Significantly more samples would be required to derive recovery relationships that could be used for long term planning.

ATACOCHA CONCENTRATOR RECOVERIES

Head grades of ore being treated in the Atacocha concentrator have changed since the introduction of open pit ore in early 2016; these are shown in Figures 13-3 and 13-4. Head grades of Zn and Cu have decreased (to 1.4% and 0.1% respectively), while the head grade of Au has increased, but has also become more variable. Pb head grade has remained relatively steady.

FIGURE 13-3 ATACOCHA ZINC, LEAD AND COPPER HEAD GRADES

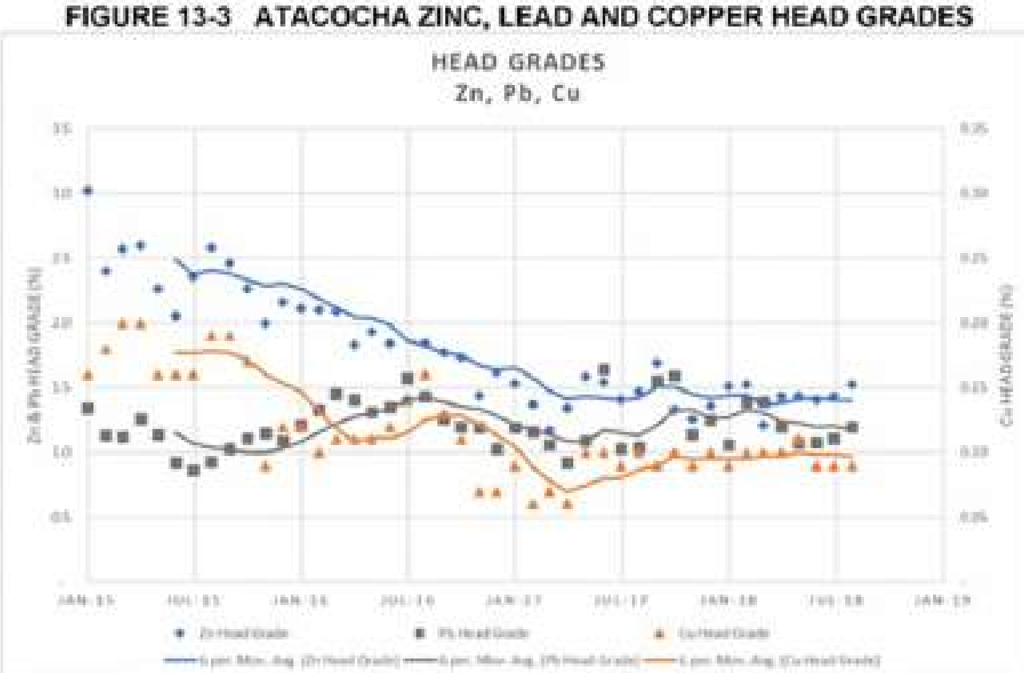
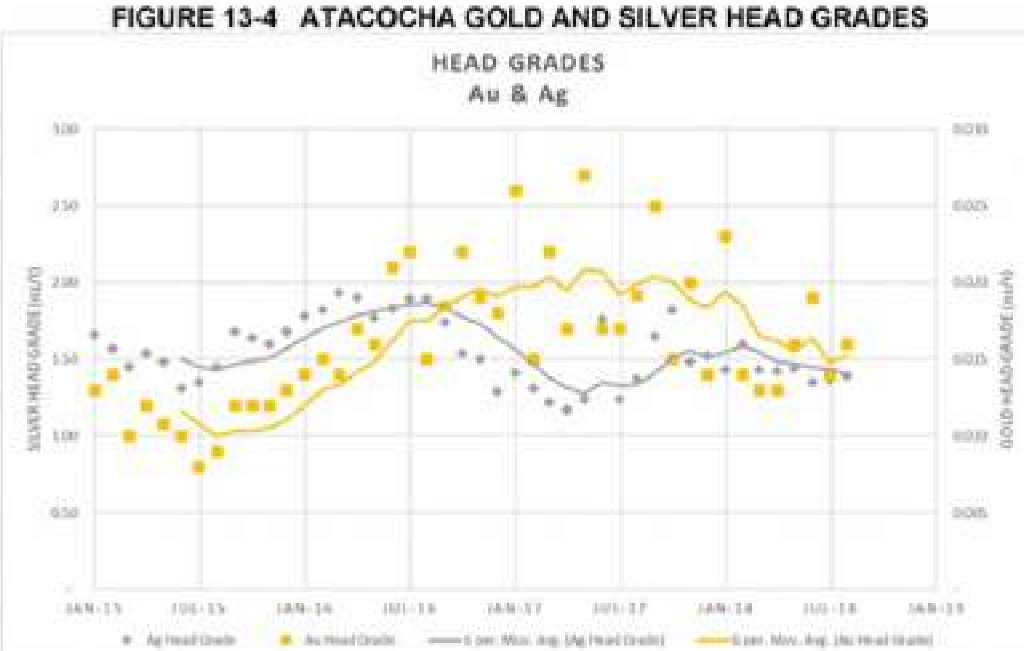
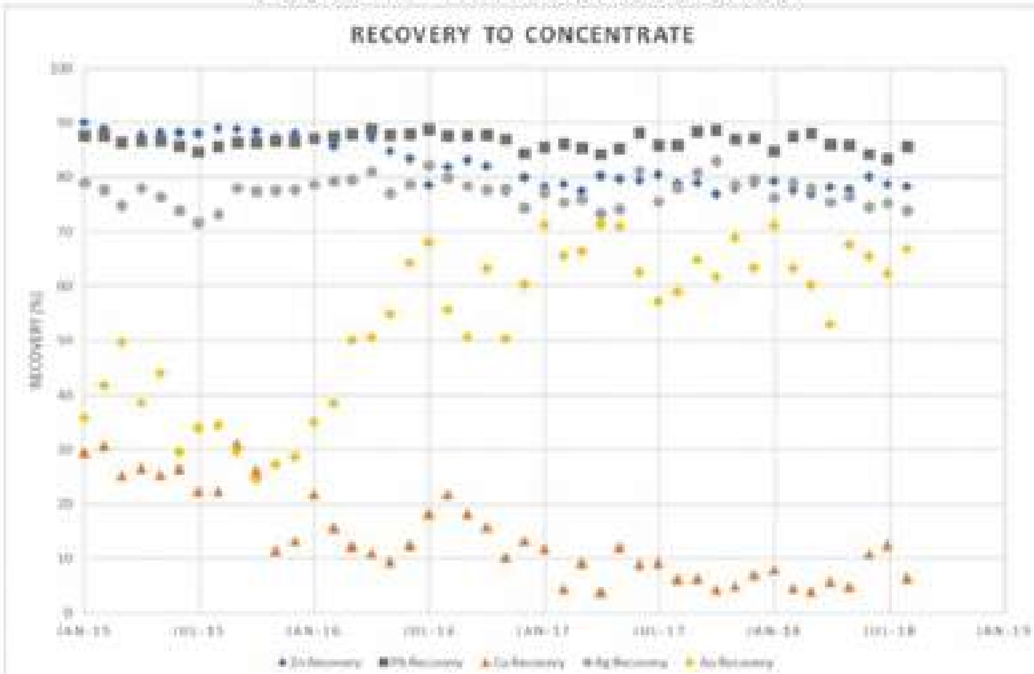


FIGURE 13-4 ATACOCHA GOLD AND SILVER HEAD GRADES



Recoveries have followed the head grades, as shown in Figure 13-5. This figure shows Zn, Pb and Cu recoveries to their respective concentrates, and total Ag and Au recoveries to both the Pb and Cu concentrates. Most notably, Zn recovery has dropped from 88% in 2015 to 78% in 2018, and Au recovery has almost doubled from 36% in 2015 to 64% in 2018. Additionally, Cu recovery dropped from 26% to 8% over the same time period. Figure 13-5 shows clearly how these changes in recoveries coincide with the introduction of San Gerardo open pit ore to the concentrator feed in early 2016, and the increasing proportion of the feed that it made up over the following year.

FIGURE 13-5 ATACOCHA RECOVERIES



As a result of the changes in recoveries brought about by the introduction of San Gerardo ore, new recovery curves for Pb and Zn have been derived to predict future recoveries from the Atacocha concentrator, while copper recoveries have been assumed to average approximately 5.5%. The recovery curves are shown in Table 13-8 and illustrated in Figures 13-6 to 13-8, plotted against monthly recoveries achieved in 2017 and 2018 over the range of head grades realized at the concentrator.

TABLE 13-8 RECOVERY CURVES FOR THE ATACOCHA CONCENTRATOR
Nexa Resources S.A. – Atacocha Mine

	Recovery Curve	Recovery Cap (%)
Zn Recovery	Recovery = $-7.456\,(Grade_{Zn})^2 + 27.45\,(Grade_{Zn}) + 54.21$	79.5
Pb Recovery	Recovery = $-7.47\,(Grade_{Pb}) + 77.08$	69.0
Cu Recovery	5.52	5.52

FIGURE 13-6 MONTHLY ZINC RECOVERY IN 2017 AND 2018, AND THE 2019 NSR RECOVERY CURVE

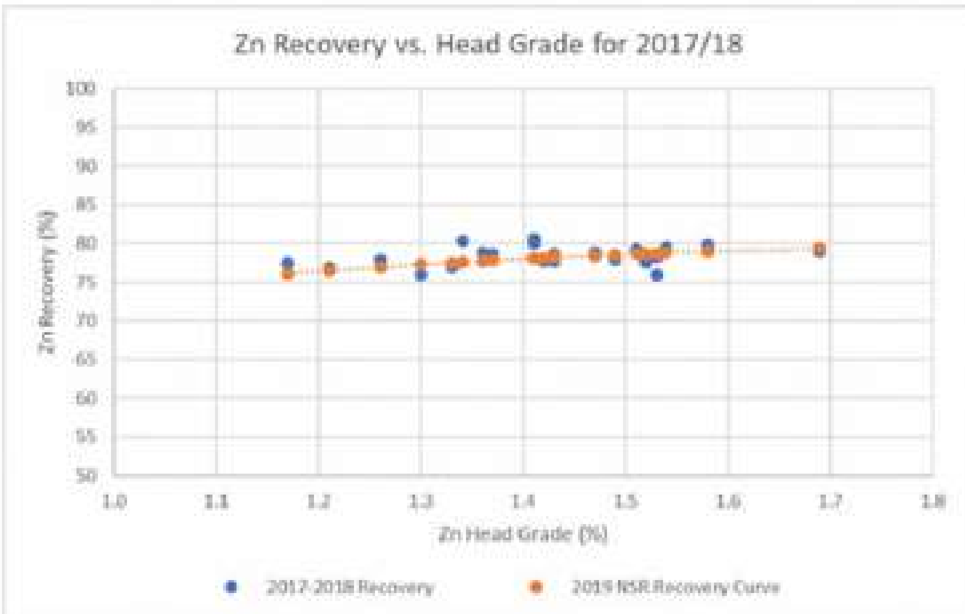


FIGURE 13-7 MONTHLY LEAD RECOVERY IN 2017 & 2018, AND THE 2019 NSR RECOVERY CURVE

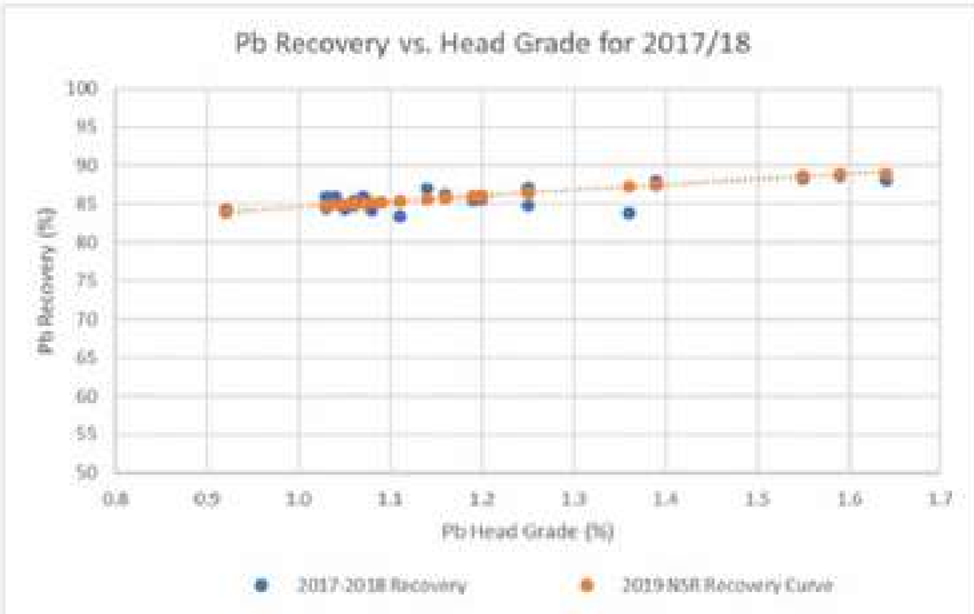
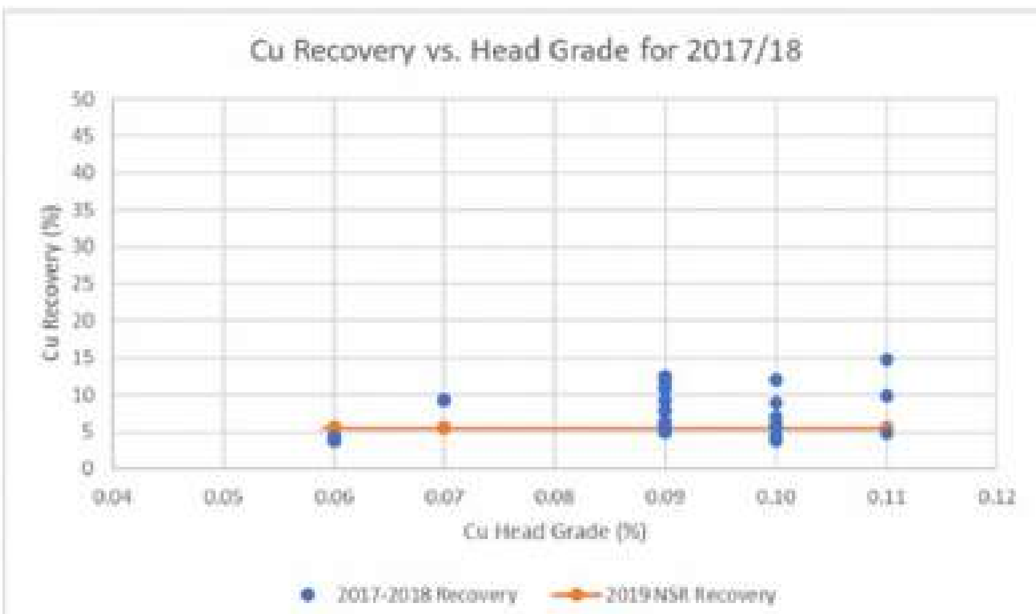


FIGURE 13-8 MONTHLY COPPER RECOVERY IN 2017 & 2018, AND THE 2019 NSR RECOVERY



14 MINERAL RESOURCE ESTIMATE

SUMMARY

The Mineral Resource estimate for the Atacocha mine, dated December 31, 2018, using all data available as of August 31, 2018 was completed by Atacocha staff and reviewed by RPA.

A summary of the Atacocha underground and open pit (San Gerardo) Mineral Resources, exclusive of Mineral Reserves, for the Atacocha deposit, is shown in Tables 14-1 and 14-2, respectively. NSR cut-off values for the Mineral Resources were established using a zinc price of US$3,034 per tonne, a lead price of US$2,530 per tonne, a copper price of US$7,351 per tonne, a silver price of US$21.58 per ounce, and a gold price of US$1,555 per ounce.

Mineral Resources at Atacocha underground are reported within resource stopes generated in Deswik Stope Optimizer software, satisfying minimum mining size, NSR cut-off values of US$71.13/t for Cut and Fill (CAF) resource stopes and US$61.99/t for Sublevel Stoping (SLS) resource stopes, and continuity criteria. Mineral Resources at the San Gerardo open pit are reported within a preliminary pit shell generated in NPV Scheduler software package from Datamine, at a reporting NSR cut-off value of US$17.97/t.

RPA's review of, and conclusions regarding, the resource model applies not just to the Mineral Resources listed in Tables 14-1 and 14-2, but also to the Mineral Resources that were converted to Mineral Reserves.

RPA reviewed the Mineral Resource assumptions, input parameters, geological interpretation, and block modelling and reporting 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 2018 year-end Mineral Resource estimate. The Qualified Person for this Mineral Resource estimate is Rosmery Cardenas, P.Eng.

The Mineral Resource estimates are prepared in accordance with Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves dated May 10, 2014 (CIM (2014) definitions).

TABLE 14-1 ATACOCHA UNDERGROUND MINERAL RESOURCES - DECEMBER 31, 2018
Nexa Resources S.A.- Atacocha Mine

Category	Tonnage	Grade				Contained Metal			
	(Mt)	Zinc (%)	Lead (%)	Copper (%)	Silver (g/t)	Zinc (000 t)	Lead (000 t)	Copper (000 t)	Silver (000 oz)
Measured	0.69	3.25	1.28	0.26	64.1	22.4	8.8	1.8	1,421
Indicated	1.53	3.61	1.07	0.30	63.8	55.2	16.4	4.6	3,140
Total M&I	**2.22**	**3.50**	**1.14**	**0.29**	**63.9**	**77.7**	**25.2**	**6.4**	**4,561**
Inferred	4.95	3.46	1.52	0.35	102.7	171.3	75.2	17.3	16,347

Notes:
1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated at NSR cut-off values of US$71.13/t for CAF resource stopes and US$61.99/t for SLS resource stopes.
3. Mineral Resources are estimated using an average long-term metal prices of Zn: US$3,034/t; Pb: US$2,530/t; Cu: US$7,351/t; and Ag: US$21.58/oz and a PEN/US$ exchange rate of $3.30.
4. A minimum mining width of 4.0 m was used for CAF resource stopes and 3.0 m was used for SLS resource stopes.
5. Bulk density varies depending on mineralization domain.
6. Mineral Resources are exclusive of Mineral Reserves.
7. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
8. Numbers may not add due to rounding.

TABLE 14-2 SAN GERARDO OPEN PIT MINERAL RESOURCES - DECEMBER 31, 2018
Nexa Resources S.A.- Atacocha Mine

Category	Tonnage	Grade					Contained Metal				
	(Mt)	Zinc (%)	Lead (%)	Copper (%)	Silver (g/t)	Gold (g/t)	Zinc (000 t)	Lead (000 t)	Copper (000 t)	Silver (000 oz)	Gold (000 oz)
Measured	1.47	1.47	0.88	0.05	30.1	0.22	21.6	12.9	0.7	1,423	10
Indicated	2.27	1.13	0.87	0.05	29.3	0.23	25.7	19.7	1.1	2,141	17
Total M&I	**3.74**	**1.26**	**0.88**	**0.05**	**29.6**	**0.23**	**47.3**	**32.8**	**1.9**	**3,564**	**28**
Inferred	0.80	1.08	0.93	0.03	31.4	0.50	8.6	7.4	0.2	807	13

Notes:
1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated at an NSR cut-offs of US$17.97/t.
3. Mineral Resources are estimated using an average long-term metal prices of Zn: US$3,034/t; Pb: US$2,530/t; Cu: US$7,351/t; Ag: US$21.58/oz; and Au: US$1,555/oz and a PEN/US$ exchange rate of $3.30.
4. A minimum mining width (block size) of 4 m was used.
5. Bulk density varies depending on mineralization domain.
6. Mineral Resources are exclusive of Mineral Reserves.
7. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
8. 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.

MINERAL RESOURCE ESTIMATION METHODOLOGY

The evaluation of Mineral Resources involved the following procedures:

- Database compilation and verification;
- Construction of wireframe models for the boundaries of the skarn, replacement, and structurally controlled mineralization;
- Definition of resource domains;
- Detection limit value assignment to drill hole intervals that were not sampled (Table 14-3);
- Data conditioning (compositing and capping) for geostatistical analysis and variography;
- Selection of estimation strategy and estimation parameters;
- Block modelling and grade interpolation;
- Resource classification and validation;
- Assessment of "reasonable prospects for eventual economic extraction" and selection of appropriate cut-off grades;
- Preparation of the Mineral Resource Statement.

TABLE 14-3 DETECTION LIMIT VALUES ASSIGNED TO UNSAMPLED INTERVALS
Nexa Resources S.A – Atacocha Mine

Element	Datamine ID	Detection Value
Zn (%)	ZN	0.00002
Pb (%)	PB	0.00002
Ag (g/t)	AG	0.00019
Cu (%)	CU	0.00001
Au (g/t)	AU	0.005

RESOURCE DATABASE AND VALIDATION

Nexa maintains the entire database in Studio RM-FUSION. The database comprises 4,384 drill holes and 69,106 underground channels for a total of 996,097 m.

RPA received data from Nexa in Microsoft Excel format. A Datamine database was also provided and extracted in CSV format. Data were amalgamated, parsed as required, and imported by RPA into Vulcan Version 10.1.5 (Vulcan) software and Sequent Limited's Leapfrog software version 4.2 (Leapfrog) for review.

The drill hole and channel database comprises 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 were limited to those assays located inside the mineralization wireframes. This includes 2,375 drill holes and 42,230 underground channels for a total of 178,696 m of sampling for Atacocha underground, and 718 drill holes and 1,486 underground channels for a total of 29,996 m of sampling for San Gerardo; and this data is summarized in Table 14-4. For gold estimates in San Gerardo, only drill hole data was used as no gold assaying was performed in the historical channel samples. No gold estimates were performed for the Atacocha underground. The effective date of the Atacocha Mineral Resource database is August 31, 2018.

TABLE 14-4 ATACOCHA DEPOSIT MINERAL RESOURCE DATABASE
Nexa Resources S.A.- Atacocha Mine

	Sample Type	N° Drill Holes/Channels	Metres	No. Samples	Comments
Atacocha Underground	Drill holes	2,375	31,802	33,554	
	Channels	42,230	146,895	88,790	
	Sub-total	**44,605**	**178,696**	**122,344**	
San Gerardo Open Pit	Drill holes	718	22,740	20,364	
	Channels	1,486	7,256	5,660	
	Sub-total	**2,204**	**29,996**	**26,024**	
Totals	Drill holes	3,093	54,542	53,918	Data from 2008 to 2018
	Channels	43,716	154,151	94,450	Data from 2008 to 2018
	Total	**46,809**	**208,692**	**148,368**	

RPA conducted a number of checks on the Mineral Resource database as discussed in Section 12, Data Verification. RPA is of the opinion that the database is of high quality and generally exceeds industry standards, and is appropriate to support Mineral Resource estimation.

ATACOCHA UNDERGROUND MODEL

SUMMARY

The Atacocha underground Mineral Resource estimates were performed for 77 mineralization wireframes. The geological model and mineralization wireframes were generated in 2018 by the Atacocha geologists using Leapfrog.

Visual examination of the assay tables revealed the presence of unsampled intervals within and abutting the boundaries of the interpreted mineralization wireframes. Unsampled intervals within wireframes were assigned with detection limit values in the database prior to grade composite creation. High zinc, lead, copper, and silver two metre composite grades were capped. Supervisor software version 8.6 was used for geostatistical analysis and variography.

A sub-blocked model with a minimum sub-cell size of 0.5 m by 0.5 m by 0.5 m with parent blocks measuring 4 m by 4 m by 4 m for the mineralization wireframes was generated using Datamine Studio RM version 1.4.126. Blocks were interpolated for zinc, lead, copper, and silver using ordinary kriging (OK) and inverse distance cubed (ID^3). A three-pass search strategy when estimating the grades for the blocks contained within the mineralized wireframes. Bulk density values were estimated to vary from 3.14 g/cm^3 to 3.88 g/cm^3 in the mineralized domains, and the average density used for the wall rock zones was 2.80 g/cm^3.

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 and ID^3 average grades, and creation of swath plots.

Blocks were classified as Measured, Indicated, and Inferred based on the number of holes and distances determined by variogram ranges.

GEOLOGICAL INTERPRETATION AND MINERALIZATION DOMAINS

The Atacocha underground Mineral Resource estimate is based on assay and geological interpretation for each individual mineralized domain. Geological models were built by Atacocha geologists using the drilling and channel sampling assay results, as well as the structural and lithological controls observed in underground workings and drill core logging data. Geological model for lithological domains and the mineralization model were built using Leapfrog software with some adjustments performed in Datamine software.

Eight lithological domains were modelled for Atacocha underground. They are identified as skarn, intrusive, siliceous breccia, massive silica, marble, sandstone, limestone, and basalt. Three other domains were modelled which contain potential economic mineralization: skarn, siliceous/massive breccia, and limestone replacement.

Figure 14-1 shows an oblique 3D view of the lithology domains. Figure 14-2 shows a plan view of the Atacocha underground lithological model at an elevation of 3,300 MASL.

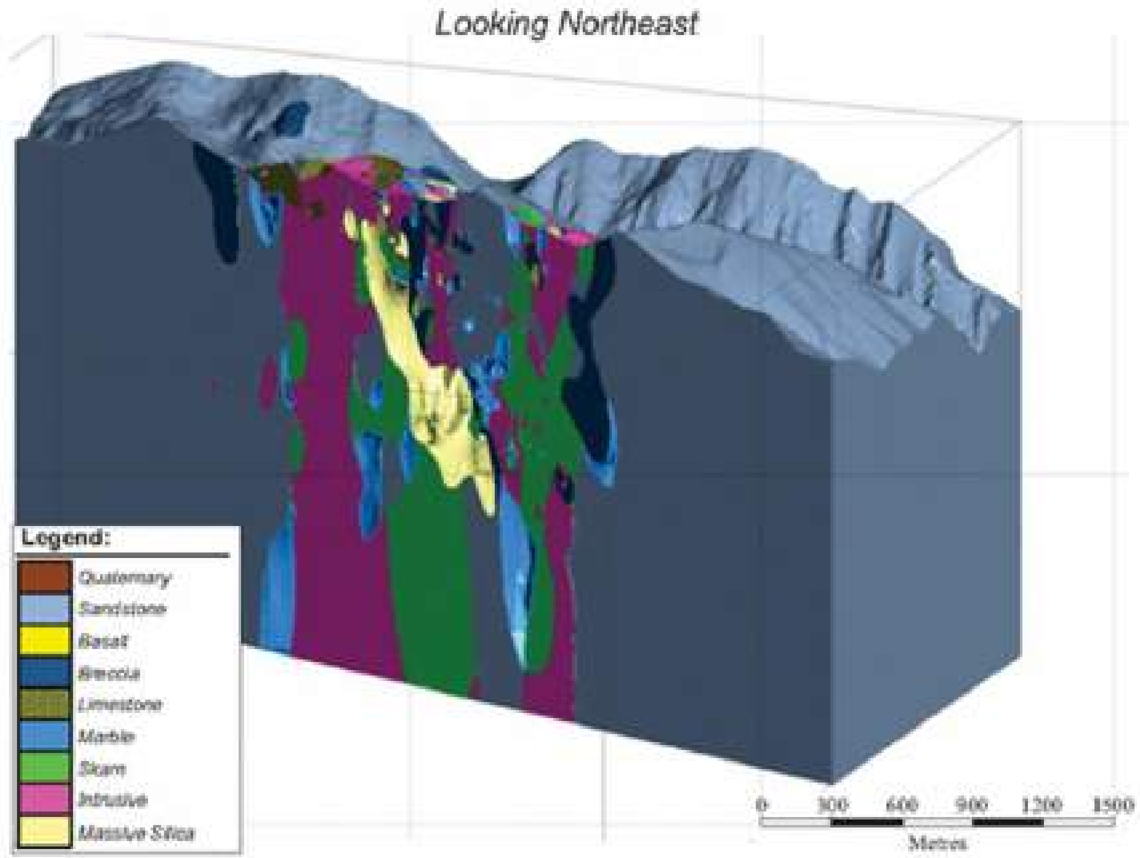


Figure 14-1

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Oblique 3D View of Lithology Domains at Nexa Atacocha Underground

March 2019

Source: Atacocha, 2019.

RPA

www.rpacan.com

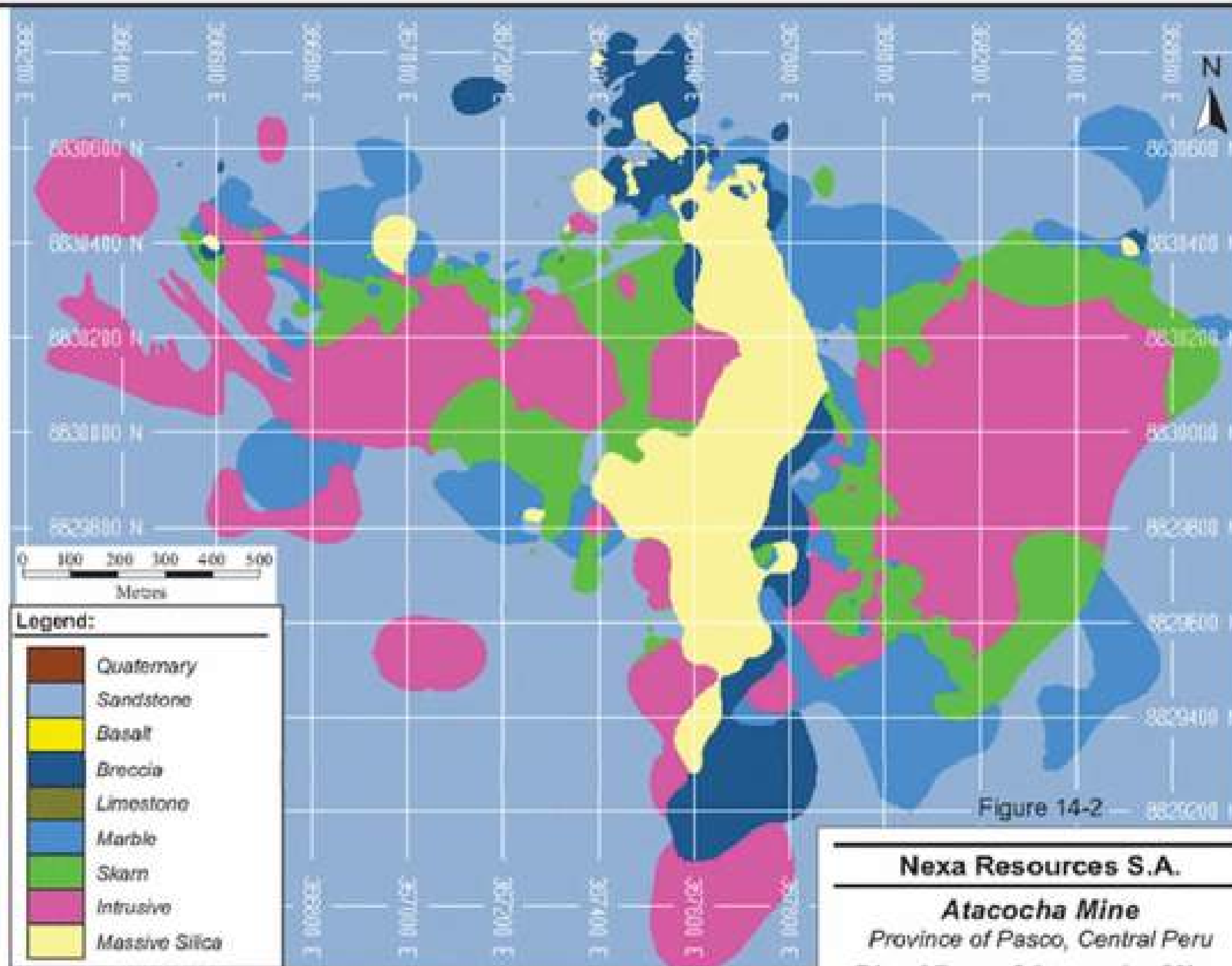


Figure 14-2

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Plan View of Atacocha Mine Lithological Model, 3,300 MASL

March 2019

Source: Atacocha, 2019.

The mineralization wireframes were originally built based on information from mineralized zones and mapping within the open pit and were extrapolated down into the underground zones. No minimum mining thickness was used. Once these solids were created, explicit modelling techniques were used to adjust the boundaries of the initial mineralization wireframes. The final mineralization wireframes were verified with drilling information on level plan views every 20 m. A total of 77 mineralization wireframes were modelled using a $15/t NSR cut-off value to determine whether any given sample intersection would be considered for inclusion into a mineralized domain. Nexa calculated an NSR value for all assay intervals that takes into account all four economic metals (Zn, Pb, Cu, and Ag).

During the modelling process, three styles of mineralization were identified at the Atacocha deposit:

- **Skarn:** mineralized zones of irregular to structurally controlled geometry, primarily contained within the Pucará Group, comprising garnet with associated metallic mineralization of galena, sphalerite, chalcopyrite, and silver-bearing sulphosalts (i.e., tetrahedrite)
- **Replacement:** lenses to irregular geometry contacts within the Pucará Group, comprising metallic mineralization of galena, sphalerite, chalcopyrite, and silver-bearing sulphosalts (i.e., tetrahedrite)
- **Structurally controlled zones (i.e., veins):** mineralization comprising galena, sphalerite, and silver-bearing sulphosalts (i.e., tetrahedrite) with quartz, rhodochrosite, and pyrite that forms structurally controlled shoots with lengths of up to 150 m and vertical extents of up to 350 m

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

- Overall, RPA is of the opinion that the mineralization wireframes are appropriate for the style of mineralization, and acceptable to support Mineral Resource and Mineral Reserve estimation.
- RPA noticed that some mineralization zones are controlled by faults. RPA recommends that Nexa incorporate, in future models, a structural model to help properly define mineralization wireframe geometry and continuity in the structurally controlled zones.
- RPA observed that Zn, Pb, Cu, and Ag do not always correlate spatially and statistically. Nexa developed search parameters to handle potential smearing of grades as the mineralization wireframes used an NSR cut-off value, however, RPA recommends, in future estimates, considering modelling by element if both spatial and statistical correlations are not reasonable.

- RPA recommends dividing mineralization domains where groups of wireframes have been merged to avoid sharing samples.
- RPA recommends incorporating some high grade domains by element to prevent smearing of high grades into low grades and vice versa.
- RPA recommends performing more drilling along strike and at depth where the mineralization is still open.

Table 14-5 lists the mineralization domains that were used for the underground Mineral Resource estimate.

TABLE 14-5 UNDERGROUND MINERALIZATION DOMAINS
Nexa Resources S.A.- Atacocha Mine

Zone	Mineralization Domain	OB[1]	COD_OB[2]	Volume (m^3)
Atacocha	OB Integration	INTAP	5000	25,013,284
Atacocha	OB 13B Skarn	13BSKN1	3600	23,551,014
Atacocha	OB 9	91A	810	15,829,109
Atacocha	OB 9	91N	3605	420,838
Atacocha	OB 13C	13C1	3610	3,197,619
Atacocha	OB 9	91S	805	7,963,593
Atacocha	OB 13	131D	440	15,090,061
Atacocha	OB 13	131F	460	121,743
Atacocha	OB 13B	13B1	500	24,241,021
Atacocha	OB 13B	13B1A	510	471,218
Atacocha	OB 13	13CA	430	5,192,536
Atacocha	OB 13 Ramal 4	13R41	300	78,464,322
Atacocha	OB 13 Ramal 4	13R41A	310	24,969,228
Atacocha	OB 13 Ramal 8	13R8	4300	2,402,030
Atacocha	OB 13	131AA	410	138,593
Atacocha	OB 13	131AB	415	1,765,787
Atacocha	OB 13	131B	420	1,931,687
Atacocha	OB 13	13B	401	12,632,908
Atacocha	OB 13	13CB	435	697,110
Atacocha	OB 13 Ramal 6	13R61	210	3,364,963
Atacocha	OB 13 Ramal 6	13R61B	200	486,543
Atacocha	OB 13 Ramal 7	13R71	100	3,537,939
Atacocha	OB 25	251E	4005	81,571
Atacocha	OB 13 Ramal 7	13R71B	110	17,850
Atacocha	OB 13 Ramal 7	13R72B	120	97,439
Atacocha	OB 25	251N	4000	54,531,525
Atacocha	OB 13 Ramal 8 Ingrid	ING	4305	21,258,574
Atacocha	Veta 27	V27	600	17,674,556
Atacocha	OB 13	131E	450	1,871,243
Atacocha	OB 13	13CC	436	1,207,569

Zone	Mineralization Domain	OB[1]	COD_OB[2]	Volume (m³)
Atacocha	OB 13	13H	445	176,149
Atacocha	OB 13	13G	470	12,491,265
San Gerardo	OB 17	173	1800	70,332,410
San Gerardo	Veta T	VT3	3750	4,891,665
San Gerardo	Veta San Gerardo	SGC	3850	6,604,435
San Gerardo	Veta San Gerardo	SGN	3851	865,471
San Gerardo	Veta San Gerardo	SGS	3852	928,116
San Gerardo	OB 10	10	3200	117,071
San Gerardo	OB 10	103	3201	3,491,054
San Gerardo	OB 10	103A	3215	895
San Gerardo	OB Crow	CR3	3700	2,213,602
San Gerardo	Veta San Gerardo	SGSU	3853	612,747
San Gerardo	Veta Cherchere	VCH3	1600	1,360,027
San Gerardo	OB 15	152	3800	1,845,991
San Gerardo	OB 17	173B	1820	1,321,652
San Gerardo	OB 18	18C	1200	13,854,495
San Gerardo	OB 18	18E	1201	3,377,141
San Gerardo	OB 18	18W	1210	2,455,771
San Gerardo	OB 23	23C	1300	25,610,238
San Gerardo	OB 23	23E	1301	1,110,029
San Gerardo	Veta P	VP1	3670	1,626,215
San Gerardo	Veta Prima	VPR1	3650	51,070
San Gerardo	Veta Ramal P	VRP1	3660	5,341,105
San Gerardo	Veta Intermedio	VINT3	3400	385,100
San Gerardo	Veta Intermedio	VINT3A	3410	91,363
San Gerardo	OB 15	15	3810	298,096
San Gerardo	OB 17	173A	1810	2,025,587
Santa Barbara	OB Miguel	M2	3870	9,608,534
Santa Barbara	OB Violeta	V2	3890	761,129
Santa Barbara	OB Pradera Vasconia	PRVSC	2400	,6342,995
Santa Barbara	OB Pradera Vasconia	PRVSN	2401	2,093,342
Santa Barbara	OB Pradera Vasconia	PRVSSU	2402	75,571,256
Santa Barbara	OB Don Felipe	DF2	2300	757,114
Santa Barbara	OB Don Felipe	DF2A	2310	6,921,428
Santa Barbara	OB Don Felipe	DF2B	2320	256,964
Santa Barbara	OB Santa Barbara	SB2	2200	40,448,764
Santa Barbara	OB Santa Barbara	SB2A	2210	4,686,334
Santa Barbara	OB Cristina NE	CNEC	3100	3,904,167
Santa Barbara	OB Cristina NE	CNEI	3101	3,248,196
Santa Barbara	OB Silvana	S2	3900	683,993
Santa Barbara	OB San Pedro	SP2	3950	11,595,731
Santa Barbara	OB Anita	ANC	2700	1,594,927
Santa Barbara	OB Anita	ANE	2702	33,603,202
Santa Barbara	OB Cristina	C2	3880	833,894
Santa Barbara	OB Don Felipe	DF2C	2330	149,615

Zone	Mineralization Domain	OB[1]	COD_OB[2]	Volume (m^3)
Santa Barbara	OB Anita	ANS	2701	250,913
Santa Barbara	OB Cristina NE	CNESU	3110	669,408

Note: [1] OB: Mineralization domain code, [2] COB_OB: Mineralization domain numerical code

The current Mineral Resource estimation included a full review of the continuity of the mineralized domains both in 3D, section, and plan views. The new wireframes were constructed using the geologists' interpretation of the mineralization observed in the underground openings, and the extension of the solids were extrapolated 40 m from the last mineralized drill hole intercept. Reinterpretation of the mineralization continuity has resulted in new modelled geometry in some of the mineralized domains. Figure 14-3 illustrates the distribution of all of the mineralization domains.

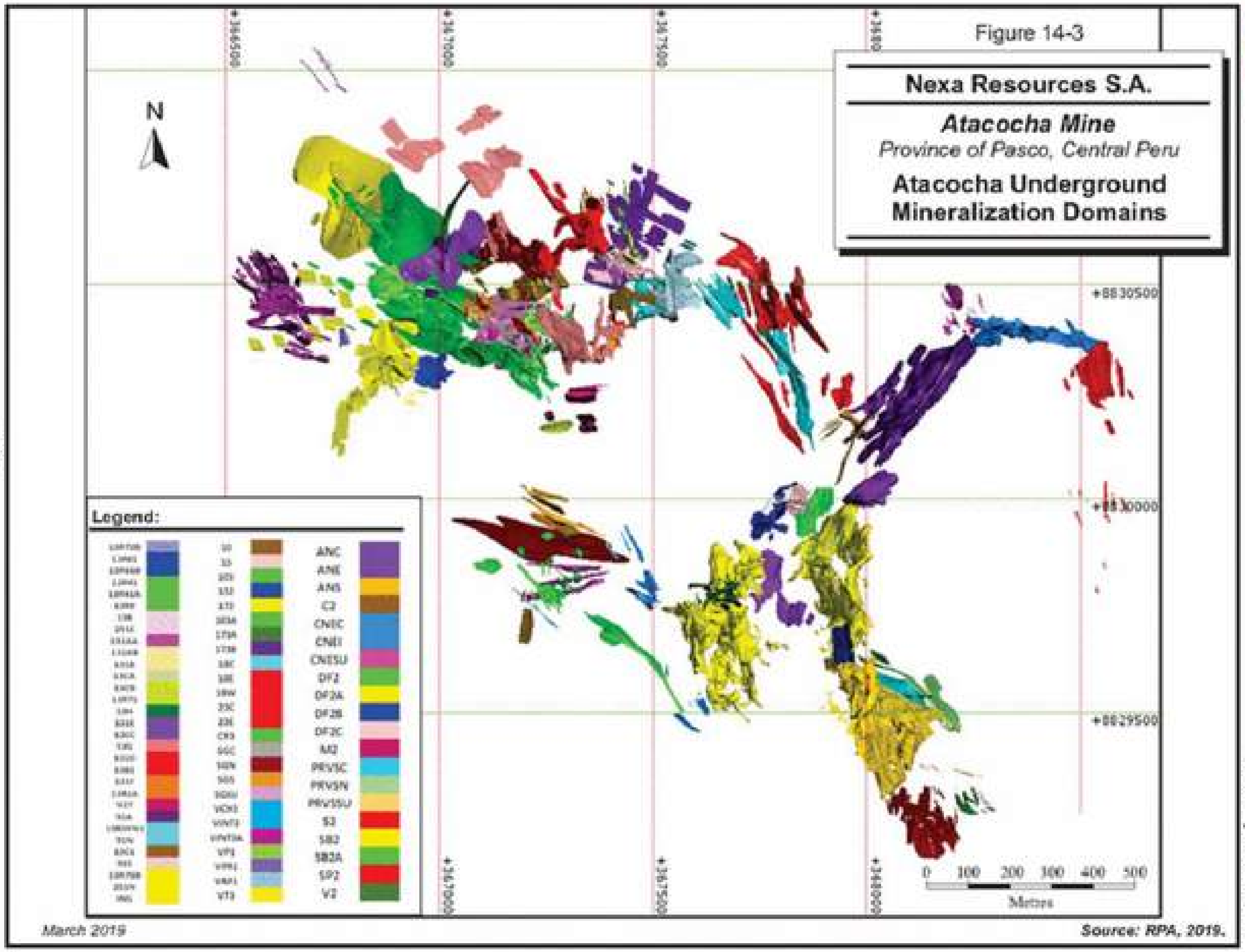


Figure 14-3
Nexa Resources S.A.
Atacocha Mine
Province of Pasco, Central Peru
Atacocha Underground Mineralization Domains
RPA
N
+366500
+367000
+367500
+8830500
+8830000
+8829500
+367000
+367500
+368000
Legend:
ANC
ANE
ANS
C2
CNEC
CNEI
CNESU
DF2
DF2A
DF2B
DF2C
M2
PRVSC
PRVSN
PRVSSU
S3
SB2
SB2A
SP2
V2
0 100 200 300 400 500
Metres
March 2019
Source: RPA, 2019.

ESTIMATION DOMAINS

Atacocha defined 49 estimation domains (Table 14-6), which include the 77 mineralization domains.

The estimation domains were created using a number of geological parameters, which include: geological zones (Atacocha, San Gerardo, and Santa Barbara), type of structures (mineralized body or vein), type of emplacements (exoskarn, distal skarn, and endoskarn), type of lithological controls (contact, fault, brecciation, intrusive, contact fault), the anisotropy and orientation of the mineralization domains, and an NSR cut-off of US$15.0/t.

The nomenclature that is used in the estimation process considers "OB" as the name of each mineralization domain, "COD_OB" as the numerical code for each mineralization domain, and "COD_Estim" as the numerical code for each estimation domain.

Figures 14-4 to 14-7 show the geological models for Atacocha underground.

TABLE 14-6 ATACOCHA UNDERGROUND ESTIMATION DOMAINS
Nexa Resources S.A.- Atacocha Mine

COD_ESTIM	Mineralization Domain	COD_OB	Geological Zone	Structure Type	Emplacement	Lithological Control Type
120	13R72B	120	Atacocha	Mineralized body	Exoskarn	Contact
210	13R61	210	Atacocha	Mineralized body	Exoskarn	Contact
	13R61B	200	Atacocha	Mineralized body	Exoskarn	Contact
300	13R41	300	Atacocha	Mineralized body	Exoskarn	Contact
	13R41A	310	Atacocha	Mineralized body	Exoskarn	Contact
	13R8	4300	Atacocha	Mineralized body	Distal Skarn	Fault
401	13B	401	Atacocha	Mineralized body	Exoskarn	Contact
	251E	4005	Atacocha	Vein	Distal Skarn	Fault
410	131AA	410	Atacocha	Mineralized body	Exoskarn	Contact
415	131AB	415	Atacocha	Mineralized body	Exoskarn	Contact
	131B	420	Atacocha	Mineralized body	Exoskarn	Contact
430	13CA	430	Atacocha	Mineralized body	Exoskarn	Contact
435	13CB	435	Atacocha	Mineralized body	Exoskarn	Contact
	13R71	100	Atacocha	Mineralized body	Exoskarn	Contact
445	13H	445	Atacocha	Mineralized body	Exoskarn	Contact
450	131E	450	Atacocha	Mineralized body	Exoskarn	Contact
	13CC	436	Atacocha	Mineralized body	Exoskarn	Contact
470	13G	470	Atacocha	Mineralized body	Exoskarn	Contact
500	131D	440	Atacocha	Mineralized body	Exoskarn	Contact
	13B1	500	Atacocha	Mineralized body	Exoskarn	Contact

COD_ESTIM	Mineralization Domain	COD_OB	Geological Zone	Structure Type	Emplacement	Lithological Control Type
510	131F	460	Atacocha	Mineralized body	Exoskarn	Contact
	13B1A	510	Atacocha	Mineralized body	Exoskarn	Contact
600	V27	600	Atacocha	Vein	Distal Skarn	Fault
810	91A	810	Atacocha	Mineralized body	Exoskarn	Contact
1200	18C	1200	San Gerardo	Mineralized body	Exoskarn	Contact Fault
	ANS	2701	Santa Barbara	Mineralized body	Endoskarn	Intrusive
1300	18E	1201	San Gerardo	Mineralized body	Exoskarn	Contact Fault
	18W	1210	San Gerardo	Mineralized body	Exoskarn	Contact
	23C	1300	San Gerardo	Mineralized body	Exoskarn	Contact Fault
	23E	1301	San Gerardo	Mineralized body	Exoskarn	Contact Fault
1800	173	1800	San Gerardo	Mineralized body	Exoskarn	Fault
	VT3	3750	San Gerardo	Mineralized body	Exoskarn	Contact
1810	173A	1810	San Gerardo	Mineralized body	Exoskarn	Fault
1820	173B	1820	San Gerardo	Mineralized body	Exoskarn	Fault
2200	DF2A	2310	Santa Barbara	Mineralized body	Exoskarn	Contact
	SB2	2200	Santa Barbara	Mineralized body	Exoskarn	Contact Fault
2210	DF2	2300	Santa Barbara	Mineralized body	Exoskarn	Contact
	SB2A	2210	Santa Barbara	Mineralized body	Exoskarn	Contact Fault
2320	DF2B	2320	Santa Barbara	Mineralized body	Exoskarn	Contact
2330	DF2C	2330	Santa Barbara	Mineralized body	Exoskarn	Contact
2400	PRVSC	2400	Santa Barbara	Mineralized body	Exoskarn	Contact
2401	PRVSN	2401	Santa Barbara	Mineralized body	Exoskarn	Contact
2402	PRVSSU	2402	Santa Barbara	Mineralized body	Exoskarn	Contact
2702	ANC	2700	Santa Barbara	Mineralized body	Exoskarn	Contact Fault
	ANE	2702	Santa Barbara	Mineralized body	Endoskarn	Fault
3100	CNEC	3100	Santa Barbara	Mineralized body	Exoskarn	Contact
	CNEI	3101	Santa Barbara	Mineralized body	Exoskarn	Contact
3110	CNESU	3110	Santa Barbara	Mineralized body	Exoskarn	Contact
3200	10	3200	San Gerardo	Mineralized body	Exoskarn	Brecciation
3201	103	3201	San Gerardo	Mineralized body	Exoskarn	Brecciation
	103A	3215	San Gerardo	Mineralized body	Exoskarn	Brecciation
	CR3	3700	San Gerardo	Mineralized body	Exoskarn	Fault
3400	VINT3	3400	San Gerardo	Vein	Distal Skarn	Fault
3410	VINT3A	3410	San Gerardo	Vein	Distal Skarn	Fault
3600	13BSKN1	3600	Atacocha	Mineralized body	Exoskarn	Contact
	91N	3605	Atacocha	Mineralized body	Exoskarn	Contact
3610	13C1	3610	Atacocha	Mineralized body	Exoskarn	Contact
	VP1	3670	San Gerardo	Vein	Distal Skarn	Fault
3650	VPR1	3650	San Gerardo	Vein	Distal Skarn	Fault
3660	91S	805	Atacocha	Mineralized body	Exoskarn	Contact
	VRP1	3660	San Gerardo	Vein	Distal Skarn	Fault
3800	152	3800	San Gerardo	Vein	Distal Skarn	Fault
	C2	3880	Santa Barbara	Mineralized body	Exoskarn	Contact
3810	15	3810	San Gerardo	Vein	Distal Skarn	Fault

COD_ESTIM	Mineralization Domain	COD_OB	Geological Zone	Structure Type	Emplacement	Lithological Control Type
3850	SGC	3850	San Gerardo	Mineralized body	Exoskarn	Contact
3851	SGN	3851	San Gerardo	Mineralized body	Exoskarn	Contact
3852	SGS	3852	San Gerardo	Mineralized body	Exoskarn	Contact
3853	SGSU	3853	San Gerardo	Mineralized body	Exoskarn	Contact
	VCH3	1600	San Gerardo	Vein	Distal Skarn	Fault
3870	M2	3870	Santa Barbara	Vein	Distal Skarn	Fault
3890	V2	3890	Santa Barbara	Vein	Distal Skarn	Fault
3950	S2	3900	Santa Barbara	Vein	Distal Skarn	Fault
	SP2	3950	Santa Barbara	Vein	Distal Skarn	Fault
4000	13R71B	110	Atacocha	Mineralized body	Exoskarn	Contact
	251N	4000	Atacocha	Vein	Distal Skarn	Fault
	ING	4305	Atacocha	Mineralized body	Exoskarn	Contact
5000	INTAP	5000	Atacocha	Mineralized body	Distal Skarn	Brecciation

EXPLORATORY DATA ANALYSIS – RAW ASSAYS

The first step in developing a block model estimate after completing 3D solid models is to assess the assay data contained inside the solid models and to determine whether any additional domaining is required prior to compositing. Typically, raw assay data are extracted from each domain and are then assessed using histograms and cumulative probability plots. Tables 14-7 to 14-10 show descriptive statistics for uncapped Zn, Pb, Cu, and Ag assays, respectively, within the various mineralized and estimation domains.

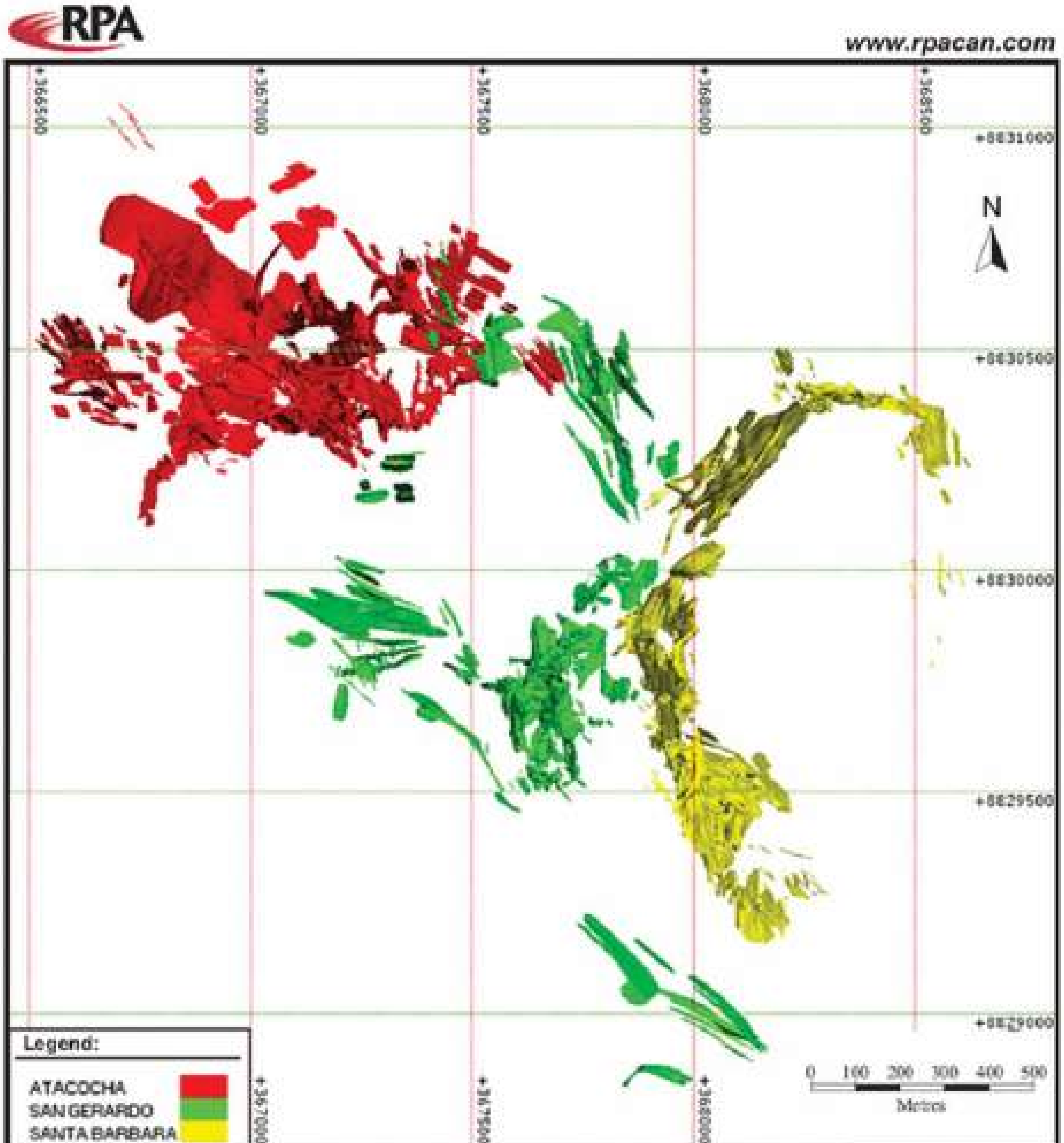


Figure 14-4

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Atacocha Underground Geological Zones

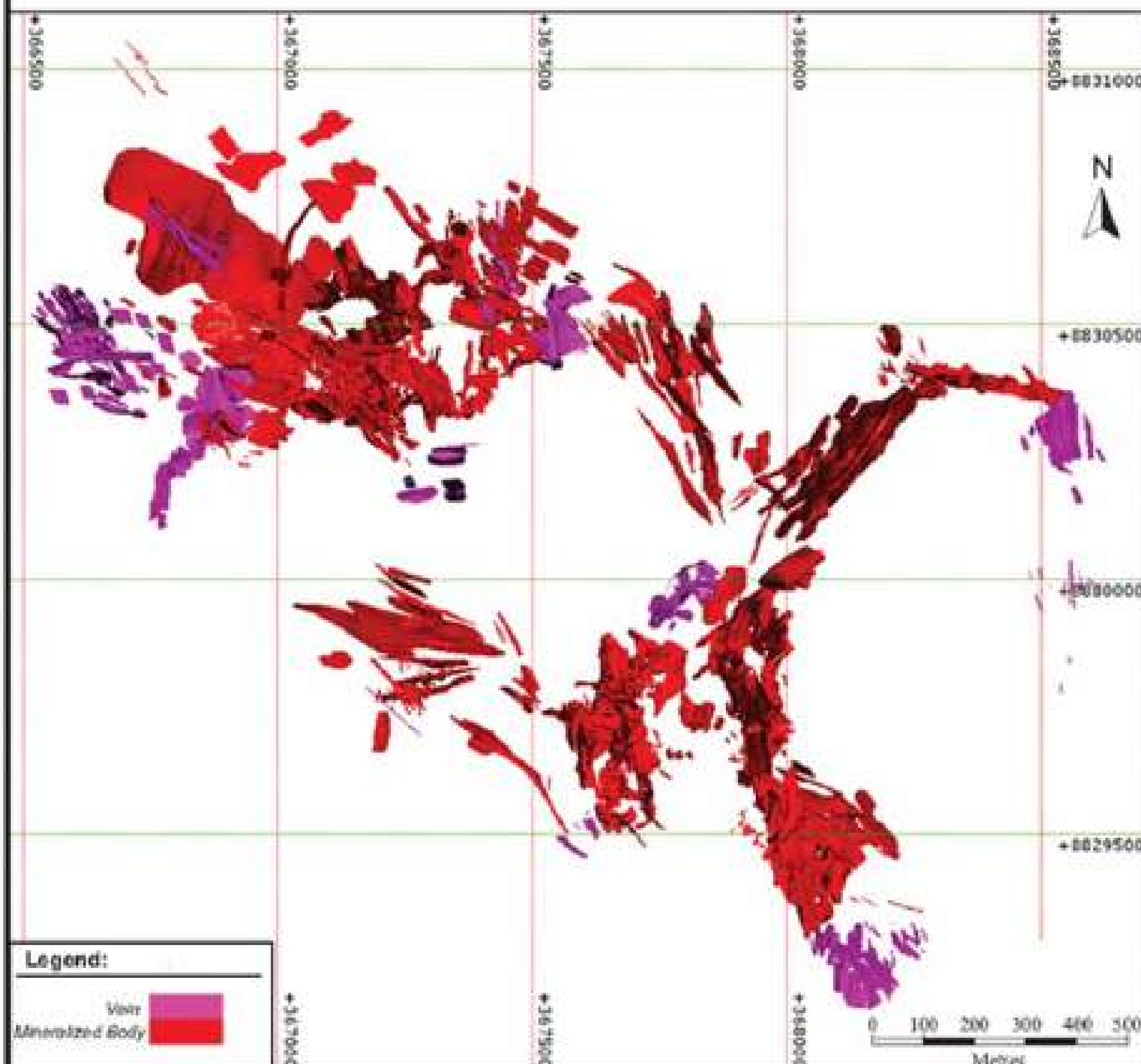


Figure 14-5

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Atacocha Underground Structure Type Model

March 2019

Source: Atacocha, 2019.

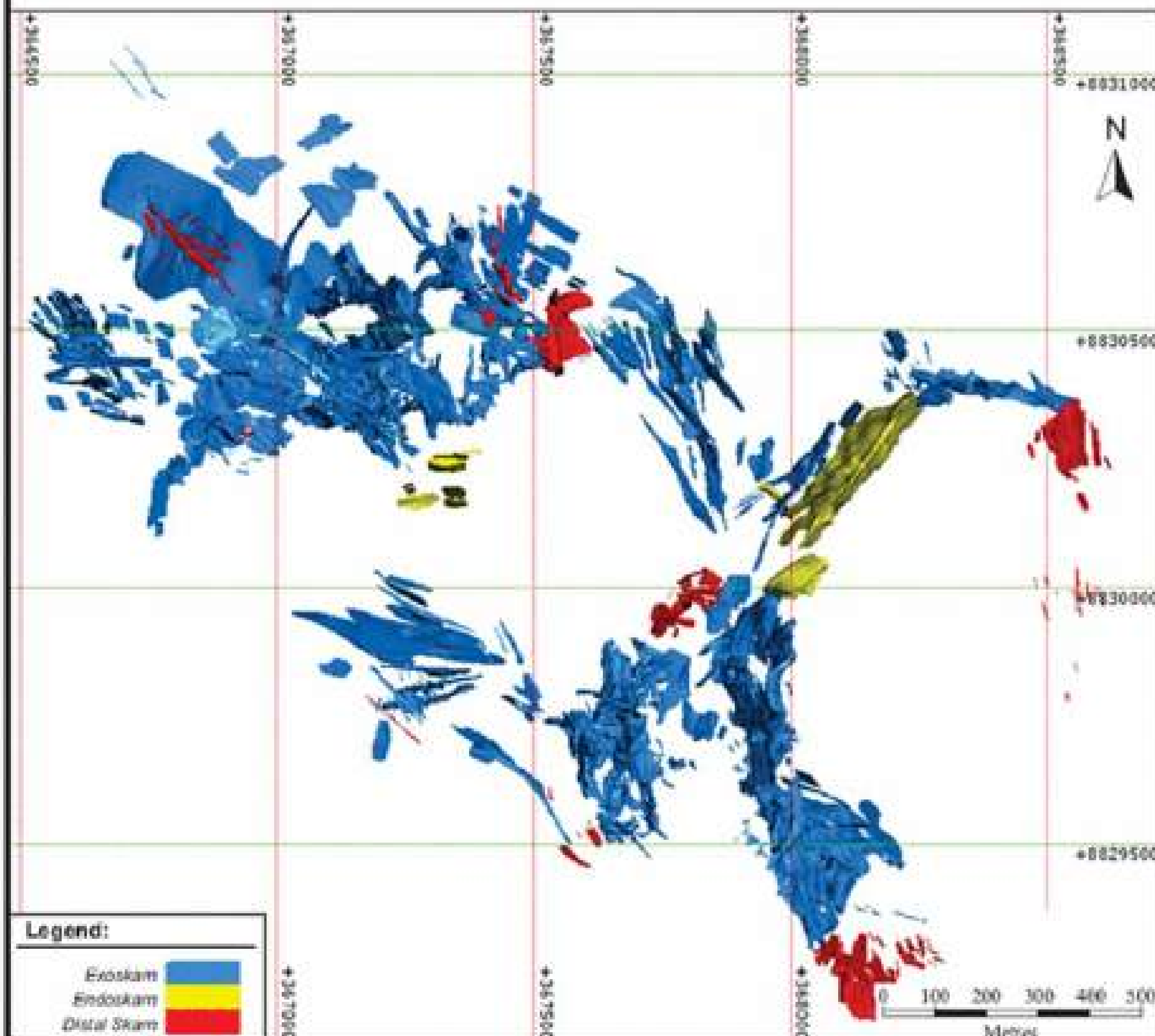


Figure 14-6

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Distribution of Atacocha Underground Emplacement Types

March 2019

Source: Atacocha, 2019.

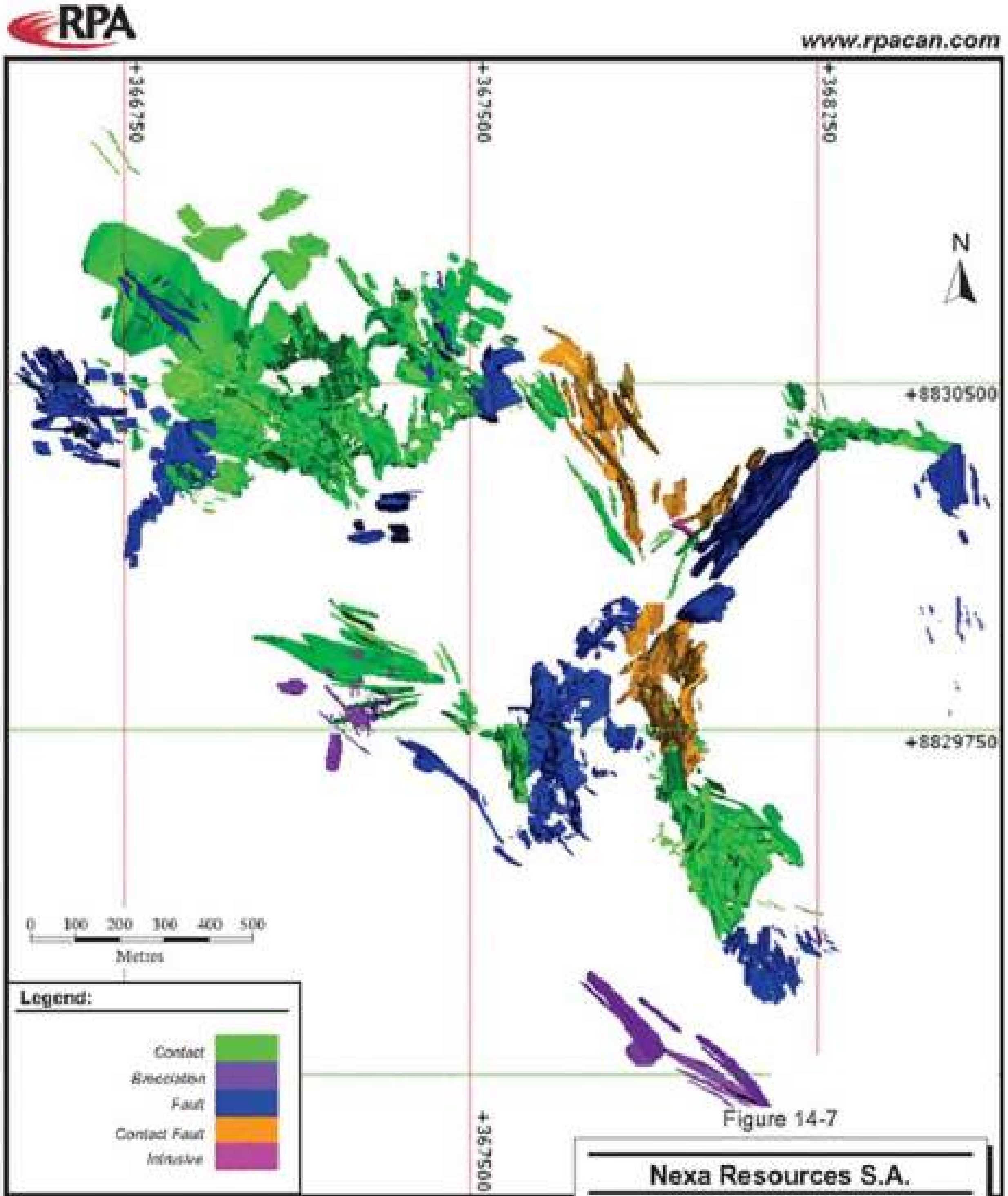


Figure 14-7

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Atacocha Underground Lithological Control Type Model

March 2019

Source: Atacocha, 2019.

TABLE 14-7 ESTIMATION DOMAIN RAW ASSAY STATISTICS FOR ZINC (ZN %)
Nexa Resources S.A.- Atacocha Mine

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dev	C.V.
120	13R72B	120	6	0.72	13.75	9.17	4.21	0.46
210	13R61B	200	107	0.02	31.52	6.45	7.52	1.17
210	13R61	210	910	0.00	46.22	5.03	7.77	1.55
300	13R41	300	5,433	0.00	51.91	8.80	9.77	1.11
300	13R41A	310	3,122	0.00	51.84	7.12	9.04	1.27
300	13R8	4300	829	0.00	50.23	6.28	10.05	1.60
401	13B	401	1,219	0.00	31.70	2.55	3.72	1.46
401	251E	4005	75	0.02	22.63	2.82	4.90	1.73
410	131AA	410	240	0.02	22.22	3.36	4.00	1.19
415	131AB	415	708	0.00	40.92	5.72	7.39	1.29
415	131B	420	359	0.00	37.51	5.25	5.98	1.14
430	13CA	430	1,659	0.00	40.64	5.54	7.33	1.32
435	13R71	100	396	0.00	47.47	3.94	5.94	1.51
435	13CB	435	677	0.00	35.44	3.96	5.13	1.30
445	13H	445	14	0.05	6.25	3.13	2.44	0.78
450	13CC	436	166	0.00	52.49	11.23	15.84	1.41
450	131E	450	646	0.00	49.11	14.11	13.55	0.96
470	13G	470	3,734	0.00	50.41	6.52	6.64	1.02
500	131D	440	5,128	0.00	52.78	9.65	10.68	1.11
500	13B1	500	7,606	0.00	49.58	8.88	10.24	1.15
510	131F	460	105	0.00	27.30	1.78	3.67	2.06
510	13B1A	510	129	0.00	49.93	2.78	7.30	2.63
600	V27	600	2,550	0.00	34.18	2.33	4.55	1.96
810	91A	810	941	0.00	40.22	3.04	5.31	1.75
1200	18C	1200	1,056	0.00	38.68	3.49	4.77	1.37
1200	ANS	2701	342	0.00	27.70	3.25	4.86	1.49
1300	18E	1201	550	0.00	34.15	2.67	4.17	1.56
1300	18W	1210	644	0.00	23.05	1.70	2.40	1.41
1300	23C	1300	2,165	0.00	39.08	2.49	4.50	1.81
1300	23E	1301	158	0.00	33.24	1.90	3.38	1.78
1800	173	1800	20,295	0.00	42.77	4.50	5.69	1.26
1800	VT3	3750	5,007	0.00	59.11	5.55	7.10	1.28
1810	173A	1810	1,348	0.00	34.67	4.58	5.52	1.21
1820	173B	1820	648	0.00	34.77	7.07	8.08	1.14
2200	SB2	2200	4,023	0.00	44.55	5.19	5.44	1.05
2200	DF2A	2310	1,739	0.00	31.88	4.57	5.26	1.15
2210	SB2A	2210	1,611	0.00	30.95	3.13	4.08	1.30
2210	DF2	2300	273	0.00	21.65	4.41	5.19	1.18
2320	DF2B	2320	9	0.00	3.04	0.43	0.61	1.41
2330	DF2C	2330	22	0.00	8.13	2.88	2.12	0.74
2400	PRVSC	2400	791	0.00	44.03	4.17	5.86	1.41

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dev	C.V.
2401	PRVSN	2401	117	0.00	23.80	1.52	2.35	1.54
2402	PRVSSU	2402	18,383	0.00	51.25	6.02	5.93	0.99
2702	ANC	2700	622	0.00	40.91	3.47	5.00	1.44
2702	ANE	2702	3,353	0.00	40.05	3.61	4.20	1.16
3100	CNEC	3100	4,563	0.00	34.32	4.03	3.49	0.87
3100	CNEI	3101	1,585	0.00	30.90	3.36	2.95	0.88
3110	CNESU	3110	195	0.00	22.77	2.58	2.62	1.02
3200	10	3200	18	0.01	6.16	0.69	1.08	1.56
3201	103	3201	863	0.00	24.06	1.89	2.37	1.25
3201	103A	3215	3	0.00	0.31	0.19	0.15	0.82
3201	CR3	3700	84	0.02	11.49	1.15	1.63	1.43
3400	VINT3	3400	31	0.00	15.00	3.51	4.20	1.20
3410	VINT3A	3410	40	0.12	7.80	2.20	2.44	1.11
3600	13BSKN1	3600	3,675	0.00	47.09	4.37	7.37	1.69
3600	91N	3605	73	0.00	23.61	4.06	5.06	1.25
3610	13C1	3610	1,016	0.00	37.97	4.71	6.08	1.29
3610	VP1	3670	541	0.00	33.74	4.74	6.17	1.30
3650	VPR1	3650	39	0.03	11.89	0.89	1.89	2.12
3660	91S	805	2,287	0.00	48.65	7.76	9.57	1.23
3660	VRP1	3660	3,190	0.00	39.74	6.82	7.53	1.10
3800	152	3800	437	0.00	30.59	2.08	3.22	1.54
3800	C2	3880	101	0.00	18.91	2.33	2.78	1.19
3810	15	3810	254	0.00	35.12	1.98	3.75	1.90
3850	SGC	3850	132	0.00	25.30	2.40	4.00	1.67
3851	SGN	3851	101	0.01	4.66	0.67	0.80	1.19
3852	SGS	3852	46	0.01	22.60	1.50	3.34	2.22
3853	VCH3	1600	55	0.12	28.92	3.82	5.71	1.50
3853	SGSU	3853	1,002	0.00	40.14	3.78	5.77	1.53
3870	M2	3870	748	0.00	37.55	4.57	5.02	1.10
3890	V2	3890	76	0.02	22.05	2.21	4.14	1.88
3950	S2	3900	65	0.00	18.23	2.73	3.39	1.24
3950	SP2	3950	311	0.00	37.30	3.27	4.30	1.31
4000	13R71B	110	97	0.00	30.65	3.66	6.43	1.76
4000	251N	4000	440	0.00	37.53	4.17	6.27	1.51
4000	ING	4305	223	0.05	37.75	4.44	6.39	1.44
5000	INTAP	5000	138	0.02	31.67	2.32	3.22	1.39

TABLE 14-8 ESTIMATION DOMAIN STATISTICS FOR LEAD (PB %)
Nexa Resources S.A.- Atacocha Mine

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	C.V.
120	13R72B	120	6	0.01	0.30	0.10	0.11	1.11
210	13R61B	200	107	0.01	0.80	0.06	0.12	2.02
210	13R61	210	910	0.00	11.55	0.13	0.52	3.91
300	13R41	300	5,433	0.00	41.08	0.42	1.57	3.75

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	C.V.
300	13R41A	310	3,122	0.00	21.57	0.30	1.18	3.89
300	13R8	4300	829	0.00	29.57	2.53	4.22	1.67
401	13B	401	1,219	0.00	10.51	0.38	0.96	2.51
401	251E	4005	75	0.01	1.28	0.09	0.20	2.14
410	131AA	410	240	0.02	17.52	1.00	1.98	1.98
415	131AB	415	706	0.00	29.08	3.00	4.54	1.51
415	131B	420	359	0.00	6.78	0.34	0.79	2.36
430	13CA	430	1,659	0.00	26.45	1.05	2.58	2.45
435	13R71	100	396	0.00	24.52	0.55	1.80	3.25
435	13CB	435	677	0.00	23.32	1.04	2.02	1.94
445	13H	445	14	0.14	22.13	4.76	5.70	1.20
450	13CC	436	166	0.00	20.98	0.97	2.70	2.80
450	131E	450	646	0.00	14.26	0.68	1.44	2.11
470	13G	470	3,734	0.00	43.77	1.89	3.78	1.99
500	131D	440	5,128	0.00	34.21	1.39	2.87	2.06
500	13B1	500	7,606	0.00	68.46	4.77	6.19	1.30
510	131F	460	105	0.00	3.64	0.17	0.37	2.17
510	13B1A	510	129	0.00	16.41	1.28	2.15	1.68
600	V27	600	2,550	0.00	47.98	3.02	5.71	1.89
810	91A	810	941	0.00	19.65	1.68	2.74	1.63
1200	18C	1200	1,056	0.00	34.43	1.45	3.62	2.50
1200	ANS	2701	342	0.00	23.68	1.92	3.87	2.02
1300	18E	1201	550	0.00	15.37	1.37	2.30	1.68
1300	18W	1210	644	0.00	30.20	1.46	3.22	2.21
1300	23C	1300	2,165	0.00	33.95	1.40	3.35	2.39
1300	23E	1301	158	0.00	9.48	0.92	1.54	1.68
1800	173	1800	20,295	0.00	63.17	4.12	5.00	1.21
1800	VT3	3750	5,007	0.00	38.00	4.90	6.16	1.26
1810	173A	1810	1,348	0.00	23.45	2.27	3.16	1.39
1820	173B	1820	648	0.00	33.56	5.84	7.10	1.22
2200	SB2	2200	4,023	0.00	33.38	1.65	3.92	2.37
2200	DF2A	2310	1,739	0.00	15.51	0.26	0.96	3.65
2210	SB2A	2210	1,611	0.00	26.74	0.94	2.82	3.00
2210	DF2	2300	273	0.00	11.59	0.17	0.88	5.25
2320	DF2B	2320	9	0.00	5.78	0.65	1.10	1.68
2330	DF2C	2330	22	0.00	0.65	0.17	0.26	1.54
2400	PRVSC	2400	791	0.00	19.40	0.22	1.03	4.59
2401	PRVSN	2401	117	0.00	8.29	0.45	1.20	2.69
2402	PRVSSU	2402	18,383	0.00	25.84	0.13	0.66	4.93
2702	ANC	2700	622	0.00	18.61	0.41	1.35	3.32
2702	ANE	2702	3,353	0.00	25.82	0.45	1.55	3.44
3100	CNEC	3100	4,563	0.00	13.55	0.27	0.81	3.07
3100	CNEI	3101	1,585	0.00	10.50	0.16	0.57	3.57
3110	CNESU	3110	195	0.00	6.74	0.15	0.46	2.99
3200	10	3200	18	0.02	6.92	0.88	1.46	1.66

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	C.V.
3201	103	3201	863	0.00	30.90	2.26	3.88	1.71
3201	103A	3215	3	0.00	0.96	0.58	0.47	0.82
3201	CR3	3700	84	0.01	9.10	1.31	1.60	1.22
3400	VINT3	3400	31	0.00	7.57	0.36	0.86	2.38
3410	VINT3A	3410	40	0.01	1.34	0.39	0.46	1.16
3600	13BSKN1	3600	3,675	0.00	35.54	1.58	3.91	2.48
3600	91N	3605	73	0.00	1.68	0.51	0.42	0.83
3610	13C1	3610	1,016	0.00	18.02	1.32	2.81	2.13
3610	VP1	3670	541	0.00	25.75	2.73	3.79	1.39
3650	VPR1	3650	39	0.02	10.10	1.48	1.98	1.33
3660	91S	805	2,287	0.00	32.01	3.99	5.43	1.36
3660	VRP1	3660	3,190	0.00	41.93	4.13	5.27	1.27
3800	152	3800	437	0.00	25.54	1.61	3.24	2.01
3800	C2	3880	101	0.00	6.89	0.62	1.11	1.80
3810	15	3810	254	0.00	17.26	0.57	1.61	2.80
3850	SGC	3850	132	0.00	8.51	0.47	1.04	2.21
3851	SGN	3851	101	0.00	3.97	0.49	0.55	1.12
3852	SGS	3852	46	0.00	1.32	0.24	0.33	1.34
3853	VCH3	1600	55	0.09	14.89	3.09	3.44	1.11
3853	SGSU	3853	1,002	0.00	38.29	2.88	4.36	1.52
3870	M2	3870	748	0.00	17.29	0.28	1.31	4.71
3890	V2	3890	76	0.02	24.89	1.93	4.79	2.49
3950	S2	3900	65	0.00	4.25	0.36	0.79	2.18
3950	SP2	3950	311	0.00	20.01	0.33	1.43	4.37
4000	13R71B	110	97	0.00	4.95	0.15	0.53	3.48
4000	251N	4000	440	0.00	18.23	0.49	2.00	4.05
4000	ING	4305	223	0.01	17.62	1.74	3.12	1.80
5000	INTAP	5000	138	0.00	11.29	0.70	1.19	1.69

TABLE 14-9 ESTIMATION DOMAIN STATISTICS FOR COPPER (CU %)
Nexa Resources S.A.- Atacocha Mine

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	C.V.
120	13R72B	120	6	0.02	0.28	0.15	0.08	0.53
210	13R61B	200	107	0.01	10.52	0.21	0.49	2.40
210	13R61	210	910	0.00	14.58	0.31	0.72	2.29
300	13R41	300	5,433	0.00	11.18	0.30	0.54	1.81
300	13R41A	310	3,122	0.00	15.86	0.27	0.54	1.97
300	13R8	4300	829	0.00	3.08	0.08	0.23	2.98
401	13B	401	1,219	0.00	18.81	0.78	1.05	1.33
401	251E	4005	75	0.01	1.95	0.26	0.26	1.00
410	131AA	410	240	0.01	13.12	0.55	0.95	1.75
415	131AB	415	708	0.00	12.20	0.51	1.16	2.25
415	131B	420	359	0.00	8.41	0.69	1.10	1.59
430	13CA	430	1,659	0.00	8.36	0.61	0.84	1.37

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	C.V.
435	13R71	100	396	0.00	7.45	0.39	0.68	1.72
435	13CB	435	677	0.00	7.54	0.60	0.82	1.37
445	13H	445	14	0.01	0.60	0.19	0.19	1.03
450	13CC	436	166	0.00	2.06	0.24	0.40	1.71
450	131E	450	646	0.00	6.75	0.35	0.52	1.51
470	13G	470	3,734	0.00	40.00	0.57	1.37	2.40
500	131D	440	5,128	0.00	16.63	0.53	1.00	1.87
500	13B1	500	7,606	0.00	8.23	0.24	0.33	1.36
510	131F	460	105	0.00	13.62	1.34	2.25	1.68
510	13B1A	510	129	0.00	3.12	0.08	0.22	2.71
600	V27	600	2,550	0.00	2.78	0.04	0.10	2.25
810	91A	810	941	0.00	8.60	0.24	0.62	2.60
1200	18C	1200	1,056	0.00	23.30	0.39	0.98	2.49
1200	ANS	2701	342	0.00	3.37	0.31	0.36	1.14
1300	18E	1201	550	0.00	5.07	0.30	0.52	1.71
1300	18W	1210	644	0.00	2.45	0.12	0.20	1.68
1300	23C	1300	2,165	0.00	9.04	0.24	0.49	2.07
1300	23E	1301	158	0.00	2.29	0.18	0.36	1.96
1800	173	1800	20,295	0.00	18.22	0.26	0.39	1.46
1800	VT3	3750	5,007	0.00	5.61	0.25	0.36	1.46
1810	173A	1810	1,348	0.00	1.49	0.04	0.08	2.10
1820	173B	1820	648	0.00	3.94	0.31	0.34	1.10
2200	SB2	2200	4,023	0.00	7.14	0.36	0.40	1.10
2200	DF2A	2310	1,739	0.00	11.07	0.43	0.62	1.46
2210	SB2A	2210	1,611	0.00	7.36	0.31	0.38	1.23
2210	DF2	2300	273	0.00	1.72	0.23	0.26	1.12
2320	DF2B	2320	9	0.00	0.48	0.22	0.17	0.76
2330	DF2C	2330	22	0.00	0.53	0.19	0.15	0.79
2400	PRVSC	2400	791	0.00	4.49	0.32	0.47	1.45
2401	PRVSN	2401	117	0.00	3.55	0.38	0.47	1.24
2402	PRVSSU	2402	18,383	0.00	13.73	0.34	0.60	1.74
2702	ANC	2700	622	0.00	4.96	0.31	0.37	1.22
2702	ANE	2702	3,353	0.00	22.09	0.34	0.58	1.68
3100	CNEC	3100	4,563	0.00	2.76	0.18	0.19	1.04
3100	CNEI	3101	1,585	0.00	4.52	0.24	0.33	1.36
3110	CNESU	3110	195	0.00	2.02	0.22	0.25	1.17
3200	10	3200	18	0.01	0.20	0.04	0.05	1.37
3201	103	3201	863	0.00	4.98	0.12	0.37	3.00
3201	103A	3215	3	0.00	0.14	0.08	0.07	0.82
3201	CR3	3700	84	0.01	2.98	0.13	0.37	2.84
3400	VINT3	3400	31	0.00	1.97	0.50	0.53	1.07
3410	VINT3A	3410	40	0.08	0.72	0.28	0.19	0.70
3600	13BSKN1	3600	3,675	0.00	22.37	0.97	1.47	1.52
3600	91N	3605	73	0.00	3.10	0.21	0.56	2.63
3610	13C1	3610	1,016	0.00	14.50	0.92	1.21	1.31

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	C.V.
3610	VP1	3670	541	0.00	2.58	0.18	0.23	1.30
3650	VPR1	3650	39	0.01	0.68	0.14	0.17	1.16
3660	91S	805	2,287	0.00	8.61	0.37	0.62	1.69
3660	VRP1	3660	3,190	0.00	14.55	0.48	0.98	2.04
3800	152	3800	437	0.00	1.83	0.28	0.24	0.85
3800	C2	3880	101	0.00	2.68	0.26	0.36	1.35
3810	15	3810	254	0.00	3.46	0.23	0.32	1.40
3850	SGC	3850	132	0.00	17.80	0.46	1.28	2.77
3851	SGN	3851	101	0.01	1.04	0.20	0.18	0.90
3852	SGS	3852	46	0.00	3.04	0.51	0.76	1.49
3853	VCH3	1600	55	0.01	1.08	0.15	0.21	1.39
3853	SGSU	3853	1,002	0.00	6.44	0.30	0.44	1.47
3870	M2	3870	748	0.00	29.72	0.50	0.91	1.83
3890	V2	3890	76	0.01	6.93	0.61	0.90	1.47
3950	S2	3900	65	0.00	2.90	0.26	0.43	1.65
3950	SP2	3950	311	0.00	5.31	0.21	0.56	2.67
4000	13R71B	110	97	0.00	1.89	0.36	0.35	0.97
4000	251N	4000	440	0.00	11.34	0.70	1.23	1.74
4000	ING	4305	223	0.01	5.65	0.24	0.58	2.47
5000	INTAP	5000	138	0.00	1.65	0.17	0.23	1.32

TABLE 14-10 ESTIMATION DOMAIN STATISTICS FOR SILVER (AG G/T)

Nexa Resources S.A.- Atacocha Mine

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	C.V.
120	13R72B	120	6	2.02	10.26	7.99	2.32	0.29
210	13R61B	200	107	2.02	236.39	13.74	17.17	1.25
210	13R61	210	910	0.00	402.48	17.77	31.70	1.78
300	13R41	300	5,433	0.00	1701.67	37.74	89.90	2.38
300	13R41A	310	3,122	0.00	2460.29	35.53	84.67	2.38
300	13R8	4300	829	0.00	1658.75	85.04	155.30	1.83
401	13B	401	1,219	0.00	1584.72	60.45	98.68	1.63
401	251E	4005	75	2.02	69.05	13.75	15.65	1.14
410	131AA	410	240	2.02	1875.54	73.43	88.37	1.20
415	131AB	415	708	0.00	1419.87	111.11	156.86	1.41
415	131B	420	359	0.00	383.19	61.48	59.06	0.96
430	13CA	430	1,659	0.00	1652.84	124.15	154.17	1.24
435	13R71	100	396	0.00	659.08	37.54	66.68	1.78
435	13CB	435	677	0.00	1055.96	87.03	113.98	1.31
445	13H	445	14	6.53	314.46	92.19	80.11	0.87
450	13CC	436	166	0.00	699.52	43.56	63.77	1.46
450	131E	450	646	0.00	1092.04	98.50	93.28	0.95
470	13G	470	3,734	0.00	2343.34	173.09	190.22	1.10
500	131D	440	5,128	0.00	2614.87	171.75	214.02	1.25
500	13B1	500	7,606	0.00	2901.64	146.13	160.64	1.10

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	C.V.
510	131F	460	105	0.00	491.12	94.19	96.41	1.02
510	13B1A	510	129	0.00	414.30	28.41	42.82	1.51
600	V27	600	2,550	0.00	2611.14	115.15	217.73	1.89
810	91A	810	941	0.00	2075.54	53.19	111.75	2.10
1200	18C	1200	1,056	0.00	1317.23	78.86	147.49	1.87
1200	ANS	2701	342	0.00	1831.71	104.80	226.28	2.16
1300	18E	1201	550	0.00	1160.16	87.99	153.42	1.74
1300	18W	1210	644	0.00	3069.29	114.42	275.85	2.41
1300	23C	1300	2,165	0.00	1592.81	92.30	165.13	1.79
1300	23E	1301	158	0.00	843.53	86.43	123.63	1.43
1800	173	1800	20,295	0.00	3550.15	176.61	225.70	1.28
1800	VT3	3750	5,007	0.00	1563.26	148.84	193.10	1.30
1810	173A	1810	1,348	0.00	1582.23	81.28	96.74	1.19
1820	173B	1820	648	0.00	1423.61	141.91	168.76	1.19
2200	SB2	2200	4,023	0.00	1582.86	63.36	125.95	1.99
2200	DF2A	2310	1,739	0.00	856.90	13.24	28.69	2.17
2210	SB2A	2210	1,611	0.00	1264.98	40.54	86.93	2.14
2210	DF2	2300	273	0.00	238.25	8.57	19.50	2.27
2320	DF2B	2320	9	0.00	63.45	14.06	15.30	1.09
2330	DF2C	2330	22	0.00	20.53	7.64	8.00	1.05
2400	PRVSC	2400	791	0.00	471.43	11.07	27.64	2.50
2401	PRVSN	2401	117	0.00	270.29	23.64	47.82	2.02
2402	PRVSSU	2402	18,383	0.00	744.00	10.39	21.95	2.11
2702	ANC	2700	622	0.00	538.81	24.43	55.83	2.28
2702	ANE	2702	3,353	0.00	1881.14	17.22	49.86	2.89
3100	CNEC	3100	4,563	0.00	730.00	14.58	28.81	1.98
3100	CNEI	3101	1,585	0.00	628.76	9.73	25.53	2.63
3110	CNESU	3110	195	0.00	117.88	17.81	21.24	1.19
3200	10	3200	18	4.04	171.07	47.81	41.60	0.87
3201	103	3201	863	0.00	2162.31	84.76	220.42	2.60
3201	103A	3215	3	0.00	68.74	41.24	33.67	0.82
3201	CR3	3700	84	2.02	916.00	63.44	129.48	2.04
3400	VINT3	3400	31	0.00	86.16	16.80	16.60	0.99
3410	VINT3A	3410	40	2.02	226.12	54.92	66.18	1.21
3600	13BSKN1	3600	3,675	0.00	1541.18	99.59	142.08	1.43
3600	91N	3605	73	0.00	223.95	33.58	42.55	1.27
3610	13C1	3610	1,016	0.00	1333.10	132.86	156.28	1.18
3610	VP1	3670	541	0.00	985.98	124.59	141.33	1.13
3650	VPR1	3650	39	2.02	1240.10	179.69	246.64	1.37
3660	91S	805	2,287	0.00	1223.61	167.50	192.19	1.15
3660	VRP1	3660	3,190	0.00	2216.12	191.58	197.38	1.03
3800	152	3800	437	0.00	757.99	70.81	114.31	1.61
3800	C2	3880	101	0.00	1064.05	27.33	66.68	2.44
3810	15	3810	254	0.00	1306.97	24.47	64.88	2.65
3850	SGC	3850	132	0.00	846.01	77.70	132.15	1.70
3851	SGN	3851	101	1.20	829.71	51.31	99.25	1.93
3852	SGS	3852	46	3.50	186.86	67.64	55.19	0.82

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	C.V.
3853	VCH3	1600	55	11.41	432.96	97.70	97.30	1.00
3853	SGSU	3853	1,002	0.00	2578.48	133.51	207.75	1.56
3870	M2	3870	748	0.00	496.10	17.14	39.79	2.32
3890	V2	3890	76	4.04	559.24	46.28	67.38	1.46
3950	S2	3900	65	0.00	122.86	20.56	32.54	1.58
3950	SP2	3950	311	0.00	427.36	12.94	35.72	2.76
4000	13R71B	110	97	0.00	215.55	25.28	35.45	1.40
4000	251N	4000	440	0.00	814.29	42.86	66.75	1.56
4000	ING	4305	223	2.02	718.18	55.80	92.54	1.66
5000	INTAP	5000	138	1.31	3634.28	93.69	326.05	3.48

DENSITY

A total of 737 density measurements were taken within the underground mineralization zones and 1,397 density measurements for the wall rock. Table 14-11 shows the statistics of all of the density data. The mineralized zones with the highest average density values are 103, 10, 103A, CR3, SGSU, and VCH3. All of these domains have average values greater than 3.53 g/cm^3. Atacocha assigned the mean density value to their respective mineralization domains. In areas without or little density data, Nexa assigned either the average density for the deposit (3.53 g/cm^3) or a density value from a nearby mineralized zone with similar mineralization.

TABLE 14-11 ATACOCHA UNDERGROUND DENSITY DATA STATISTICS
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	No. Samples	Mean (g/cm^3)	Minimum	Maximum	CV
Average Density		3.530			
UG Wall Rock	1,391	2.800	2.450	4.610	0.167
13R71_100	14	3.513	3.310	3.700	0.041
13R41_300	64	3.408	2.760	3.930	0.106
13R41A_310	3*	3.408	3.470	3.750	0.032
13B_401	15	3.217	2.970	3.420	0.052
131AB_415	1*	3.624	4.240	4.240	
131B_420	1*	3.624	3.780	3.780	
13CA_430	11	3.444	3.180	3.710	0.060
13CB_435	22	3.683	3.470	3.910	0.050
131D_440	39	3.624	3.310	3.810	0.054
131E_450	22	3.683	3.510	3.890	0.044
13B1_500	1*	3.624	3.670	3.670	
V27_600	21	3.709	2.460	5.420	0.287
91A_810	11	3.137	2.850	3.450	0.073
18C_1200	94	3.715	3.060	4.280	0.105
18E_1201	11	3.474	3.380	3.550	0.021

Mineralization Domain	No. Samples	Mean (g/cm^3)	Minimum	Maximum	CV
23C_1300	86	3.387	2.620	4.560	0.206
23E_1301	1*	3.387	4.260	4.260	
173_1800	75	3.306	2.320	5.490	0.236
173B_1820	1*	3.306	2.910	2.910	
SB2_2200	24	3.730	3.600	3.910	0.032
DF2A_2310	28	3.795	3.570	3.950	0.042
PRVSC_2400	6*	3.530	3.570	4.030	0.050
ANC_2700	24	3.375	2.950	3.790	0.103
ANS_2701	13	3.764	3.290	4.070	0.094
ANE_2702	40	3.467	3.270	3.630	0.037
CNEI_3101	82	3.749	3.320	4.100	0.074
103_3201	10	3.876	3.260	4.280	0.125
15_3810	11	3.253	2.750	3.610	0.105
SGC_3850	11	3.358	2.690	3.760	0.129
SGN_3851	2*	3.250	3.250	3.250	
SGS_3852	2*	3.455	3.160	3.750	0.085
251N_4000	1*	3.513	4.150	4.150	
13R8_4300	9	3.629	3.120	4.060	0.114
ING_4305	5*	3.530	3.080	4.650	0.139
INTAP_5000	2*	3.530	2.710	3.530	0.131
M2_3870	**	3.530	-	-	-
V2_3890	**	3.530	-	-	-
PRVSN_2401	**	3.530	-	-	-
PRVSSU_2402	**	3.530	-	-	-
VT3_3750	**	3.306	-	-	-
DF2_2300	**	3.795	-	-	-
DF2B_2320	**	3.795	-	-	-
SB2A_2210	**	3.730	-	-	-
10_3200	**	3.876	-	-	-
103A_3215	**	3.876	-	-	-
CR3_3700	**	3.876	-	-	-
SGSU_3853	**	3.876	-	-	-
VCH3_1600	**	3.876	-	-	-
CNEC_3100	**	3.749	-	-	-
S2_3900	***	3.530	-	-	-
SP2_3950	***	3.530	-	-	-
152_3800	**	3.253	-	-	-
C2_3880	**	3.375	-	-	-
DF2C_2330	**	3.795	-	-	-
18W_1210	**	3.715	-	-	-
13BSKN1_3600	**	3.624	-	-	-
91N_3605	**	3.137	-	-	-
13C1_3610	**	3.624	-	-	-
91S_805	**	3.137	-	-	-

Mineralization Domain	No. Samples	Mean (g/cm^3)	Minimum	Maximum	CV
VP1_3670	***	3.530	-	-	-
VPR1_3650	***	3.530	-	-	-
VRP1_3660	**	3.387	-	-	-
131F_460	**	3.624	-	-	-
13B1A_510	***	3.530	-	-	-
131AA_410	**	3.217	-	-	-
13R61_210	**	3.408	-	-	-
13R61B_200	**	3.408	-	-	-
13R71B_110	***	3.530	-	-	-
251E_4005	**	3.408	-	-	-
13R72B_120	**	3.513	-	-	-
13CC_436	**	3.624	-	-	-
13H_445	**	3.624	-	-	-
VINT3_3400	***	3.530	-	-	-
VINT3A_3410	***	3.530	-	-	-
173A_1810	**	3.306	-	-	-
CNESU_3110	**	3.749	-	-	-
13G_470	***	3.530	-	-	-

Notes:
(*) Density measurements are insufficient for density calculations
(**) Domains using density values from surrounding domains
(***) Domains without sufficient density values. An average density value was assigned
CV – coefficient of variation

RPA generated histograms and box plots based on mineralized zones to review the assigned density values, and is of the opinion that the density values are reasonable and acceptable for estimating tonnage factors. RPA recommends generating more density data in areas that currently have insufficient density tests available.

COMPOSITING

The average length of samples within the mineralized domains is 1.46 m. Assay data was composited to two-metre lengths that correspond to half the parent block size height for the deposit. The composite length was selected based on four composite length levels (1 m, 2 m, 3 m and 4 m) related to the block size. Figure 14-8 illustrates a comparison of the mean relative error between length-weighted composite mean versus composite mean by mineralization domain at different composite levels. Based on this analysis, the two-metre composite results in the best correlation between assay data and composites.

Atacocha generated statistics to compare the distribution of the raw assays and the composites (Table 14-12). An approximately less than two percent increase in means after compositing was observed.

FIGURE 14-8 COMPOSITE LENGTH COMPARISON

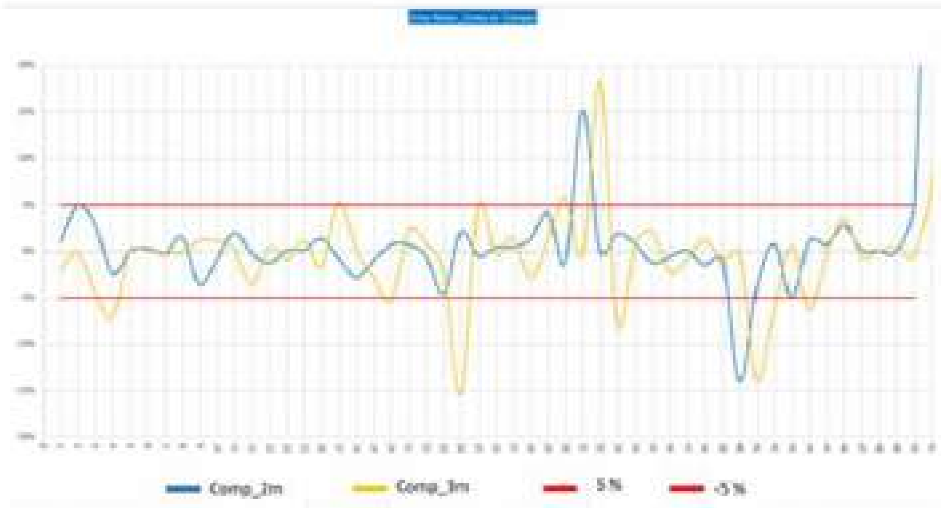


TABLE 14-12 UNDERGROUND RAW ASSAYS VERSUS COMPOSITE MEAN GRADES
Nexa Resources S.A.- Atacocha Mine.

Element	Raw Assay Mean	Raw Assay (including Detection Value for unsampled data) Mean	Composites Mean
Zn (%)	5.759	5.596	5.618
Pb (%)	2.284	2.220	2.272
Cu (%)	0.356	0.346	0.347
Ag (g/t)	105.537	102.565	104.751

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

- The composite length is appropriate given the dominant sampling length and the 4 m parent block height, and is suitable to support Mineral Resource and Mineral Reserve estimation.
- RPA recommends investigating density-weighted compositing.

CAPPING HIGH GRADE VALUES

Where the assay distribution is skewed positively or approaches log-normal, erratic high grade 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 cut or cap them at a specific grade level.

Atacocha evaluated the composite grades using log-probability plots to asses the influence of higher grades for each element within the mineralization domains. Figure 14-9 is an example of a log-probability plot for the OB 1200 domain. The criteria, applied by Atacocha, for restricting outliers was to identify a pronounced break in the probability curve that occurs above the 95th percentile.

Nexa applied a second capping level for the third interpolation pass in channel composites to restrict the high grade influence.

Table 14-13 lists the capping levels for drill hole ("CAPD") and channel ("CAPC") composites determined for each mineralization domain, and Table 14-14 shows the second capping levels applied to the channel samples used for the third interpolation pass.

FIGURE 14-9 1200 MINERALIZATION DOMAIN ZINC% PROBABILITY PLOT

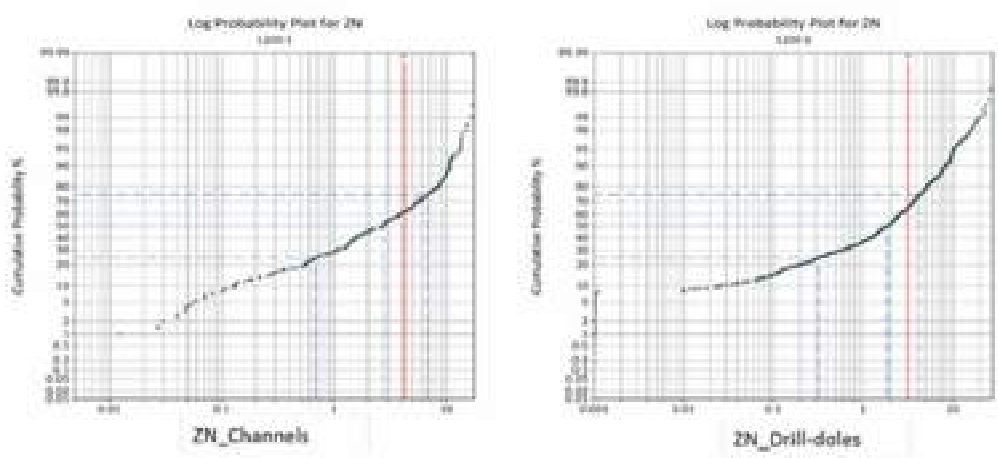


TABLE 14-13 CAPPING LEVELS BY MINERALIZATION DOMAINS
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	ZN CAPD (%)	ZN CAPC (%)	PB CAPD (%)	PB CAPC (%)	CU CAPD (%)	CU CAPC (%)	AG CAPD (g/t)	AG CAPC (g/t)
INTAP_5000	5.00	-	3.20	-	0.63	-	350.00	-
13R71B_4000	26.00	-	9.80	0.60	4.00	-	230.00	-
251N_4000	26.00	-	9.80	0.60	4.00	-	230.00	-
ING_4000	26.00	-	9.80	0.60	4.00	-	230.00	-
S2_3950	9.40	10.50	2.50	2.20	1.50	0.30	95.80	-
SP2_3950	9.40	10.50	2.50	2.20	1.50	0.30	95.80	-
V2_3890	8.00	-	8.60	-	-	-	137.00	-
M2_3870	12.00	14.50	1.85	1.85	1.70	1.80	100.00	105.00
SGSU_3853	10.50	20.00	10.00	15.00	1.00	1.70	412.00	613.00
VCH3_3853	10.50	20.00	10.00	15.00	1.00	1.70	412.00	613.00
SGS_3852	-	-	1.00	-	-	-	156.00	-
SGN_3851	2.00	-	-	-	0.60	-	127.00	-
SGC_3850	11.00	-	3.80	-	1.30	-	405.00	-
15_3810	12.00	-	4.00	-	-	-	270.00	-
152_3800	7.00	7.30	5.00	9.00	0.70	0.70	-	357.00
C2_3800	7.00	7.30	5.00	9.00	0.70	0.70	-	357.00
91S_3660	22.00	30.00	8.50	27.70	1.70	2.80	356.00	1070.00
VRP1_3660	22.00	30.00	8.50	27.70	1.70	2.80	356.00	1070.00
VPR1_3650	-	-	-	-	-	-	-	-
13C1_3610	6.50	28.00	4.30	-	3.20	4.40	395.00	640.00
VP1_3610	6.50	28.00	4.30	-	3.20	4.40	395.00	640.00
13BSKN1_3600	21.80	36.20	13.00	13.30	4.10	11.65	370.00	627.00
91N_3600	21.80	36.20	13.00	13.30	4.10	11.65	370.00	627.00
VINT3A_3410	-	-	-	-	-	-	-	-
VINT3_3400	-	-	-	-	-	-	-	-
103_3201	5.70	4.80	7.80	15.70	1.00	0.90	400.00	690.00
103A_3201	5.70	4.80	7.80	15.70	1.00	0.90	400.00	690.00
CR3_3201	5.70	4.80	7.80	15.70	1.00	0.90	400.00	690.00
10_3200	-	-	-	-	-	-	-	-
CNESU_3110	7.30	-	0.70	-	0.70	0.40	80.00	-
CNEC_3100	13.50	19.70	3.50	6.00	1.40	1.40	180.00	157.00
CNEI_3100	13.50	19.70	3.50	6.00	1.40	1.40	180.00	157.00
ANC_2702	15.00	25.00	5.00	9.00	2.00	2.00	150.00	250.00
ANE_2702	15.00	25.00	5.00	9.00	2.00	2.00	150.00	250.00
PRVSSU_2402	20.00	30.00	1.00	7.00	3.00	6.00	80.00	250.00
PRVSN_2401	-	-	-	-	-	-	-	-
PRVSC_2400	16.00	16.00	6.00	1.00	1.50	1.00	80.00	50.00
DF2C_2330	-	-	-	-	-	-	-	-
DF2B_2320	-	-	-	-	-	-	-	-
DF2_2210	10.00	20.00	7.50	12.00	0.60	2.00	100.00	400.00
SB2A_2210	10.00	20.00	7.50	12.00	0.60	2.00	100.00	400.00

Mineralization Domain	ZN CAPD (%)	ZN CAPC (%)	PB CAPD (%)	PB CAPC (%)	CU CAPD (%)	CU CAPC (%)	AG CAPD (g/t)	AG CAPC (g/t)
DF2A_2200	15.00	30.00	8.00	25.00	2.50	3.50	150.00	850.00
SB2_2200	15.00	30.00	8.00	25.00	2.50	3.50	150.00	850.00
173B_1820	8.00	26.00	3.00	25.00	0.60	1.00	200.00	550.00
173A_1810	5.00	20.00	4.00	10.00	-	0.30	150.00	400.00
173_1800	25.00	35.00	25.00	30.00	2.00	3.00	1200.00	2000.00
VT3_1800	25.00	35.00	25.00	30.00	2.00	3.00	1200.00	2000.00
18E_1300	17.00	15.00	12.00	13.00	2.00	2.00	600.00	900.00
18W_1300	17.00	15.00	12.00	13.00	2.00	2.00	600.00	900.00
23C_1300	17.00	15.00	12.00	13.00	2.00	2.00	600.00	900.00
23E_1300	17.00	15.00	12.00	13.00	2.00	2.00	600.00	900.00
18C_1200	18.00	12.00	10.00	12.00	2.00	0.70	600.00	470.00
ANS_1200	18.00	12.00	10.00	12.00	2.00	0.70	600.00	470.00
91A_810	10.00	9.00	6.50	5.00	0.80	1.00	200.00	100.00
V27_600	20.00	15.00	20.00	18.00	0.35	0.20	800.00	800.00
131F_510	8.00	8.00	3.00	3.00	3.00	3.00	200.00	200.00
13B1A_510	8.00	8.00	3.00	3.00	3.00	3.00	200.00	200.00
131D_500	35.00	40.00	7.80	16.00	2.00	6.00	600.00	1200.00
13B1_500	35.00	40.00	16.70	28.50	2.00	6.00	600.00	1200.00
13G_470	10.00	30.00	4.50	20.00	1.00	10.00	400.00	1400.00
131E_450	40.00	40.00	5.00	6.00	1.00	2.50	200.00	300.00
13CC_450	40.00	40.00	5.00	6.00	1.00	2.50	200.00	300.00
13H_445	-	-	-	-	-	-	-	-
13CB_435	18.00	18.00	5.00	7.50	3.00	3.00	300.00	300.00
13R71_435	18.00	18.00	5.00	7.50	3.00	3.00	300.00	300.00
13CA_430	14.00	30.00	2.50	10.00	2.00	4.00	250.00	800.00
131AB_415	25.00	20.00	8.00	15.00	4.00	2.00	400.00	450.00
131B_415	25.00	20.00	8.00	15.00	4.00	2.00	400.00	450.00
131AA_410	-	12.00	-	7.00	-	2.00	-	250.00
13B_401	12.00	14.00	3.00	3.00	3.00	4.00	200.00	300.00
251E_401	12.00	14.00	3.00	3.00	3.00	4.00	200.00	300.00
13R41_300	30.00	40.00	5.20	7.00	2.00	3.00	400.00	600.00
13R41A_300	30.00	40.00	3.00	5.60	2.00	3.00	400.00	600.00
13R8_300	30.00	40.00	7.00	14.00	2.00	3.00	400.00	600.00
13R61_210	15.00	30.00	1.00	1.00	1.00	1.00	70.00	90.00
13R61B_210	15.00	30.00	1.00	1.00	1.00	1.00	70.00	90.00
13R72B_120	-	-	-	-	-	-	-	-

Note:
CAPC: Capping levels for Channels, CAPD: Capping levels for drill holes

TABLE 14-14 SECOND CAPPING LEVELS APPLIED TO CHANNEL SAMPLES FOR THE THIRD INTERPOLATION PASS
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	ZN_CAPC3	PB_CAPC3	CU_CAPC3	Ag_CAPC3
INTAP_5000	-	-	-	-
13R71B_4000	8.00	0.60	0.72	70.00
251N_4000	8.00	0.60	0.72	70.00
ING_4000	8.00	0.60	0.72	70.00
S2_3950	7.00	1.00	0.30	-
SP2_3950	7.00	1.00	0.30	-
V2_3890	-	-	-	-
M2_3870	11.00	1.50	1.80	105.00
SGSU_3853	13.00	9.00	0.90	350.00
VCH3_3853	13.00	9.00	0.90	350.00
SGS_3852	-	-	-	-
SGN_3851	-	-	-	-
SGC_3850	-	-	-	-
15_3810	-	-	-	-
152_3800	7.30	9.00	0.70	357.00
C2_3800	7.30	9.00	0.70	357.00
91S_3660	20.00	11.00	1.00	400.00
VRP1_3660	20.00	11.00	1.00	400.00
VPR1_3650	-	-	-	-
13C1_3610	15.00	10.00	2.00	400.00
VP1_3610	15.00	10.00	2.00	400.00
13BSKN1_3600	20.00	10.00	3.10	350.00
91N_3600	20.00	10.00	3.10	350.00
VINT3A_3410	-	-	-	-
VINT3_3400	-	-	-	-
103_3201	4.80	7.00	0.30	300.00
103A_3201	4.80	7.00	0.30	300.00
CR3_3201	4.80	7.00	0.30	300.00
10_3200	-	-	-	-
CNESU_3110	2.80	0.40	0.40	30.00
CNEC_3100	10.00	1.50	0.50	50.00
CNEI_3100	10.00	1.50	0.50	50.00
ANC_2702	12.00	3.00	0.90	100.00
ANE_2702	12.00	3.00	0.90	100.00
PRVSSU_2402	18.00	0.60	1.30	40.00
PRVSN_2401	-	-	-	-
PRVSC_2400	15.00	1.00	1.00	50.00
DF2C_2330	-	-	-	-
DF2B_2320	-	-	-	-
DF2_2210	10.00	4.00	0.90	130.00

Mineralization Domain	ZN_CAPC3	PB_CAPC3	CU_CAPC3	Ag_CAPC3
SB2A_2210	10.00	4.00	0.90	130.00
DF2A_2200	17.00	8.00	1.00	250.00
SB2_2200	17.00	8.00	1.00	250.00
173B_1820	20.00	18.00	0.60	350.00
173A_1810	11.00	6.00	0.10	200.00
173_1800	20.00	18.00	0.90	600.00
VT3_1800	20.00	18.00	0.90	600.00
18E_1300	9.00	8.00	0.80	350.00
18W_1300	9.00	8.00	0.80	350.00
23C_1300	9.00	8.00	0.80	350.00
23E_1300	9.00	8.00	0.80	350.00
18C_1200	12.00	10.00	0.70	350.00
ANS_1200	12.00	10.00	0.70	350.00
91A_810	9.00	5.00	1.00	100.00
V27_600	10.00	10.00	0.20	350.00
131F_510	-	-	-	-
13B1A_510	-	-	-	-
131D_500	25.00	11.00	0.80	400.00
13B1_500	25.00	11.00	0.80	400.00
13G_470	20.00	10.00	2.00	500.00
131E_450	32.00	1.50	0.80	200.00
13CC_450	32.00	1.50	0.80	200.00
13H_445	-	-	-	-
13CB_435	11.00	2.80	1.20	200.00
13R71_435	11.00	2.80	1.20	200.00
13CA_430	17.00	3.00	1.50	300.00
131AB_415	12.00	11.00	1.00	300.00
131B_415	12.00	11.00	1.00	300.00
131AA_410	8.00	2.60	1.10	150.00
13B_401	8.50	1.80	2.10	200.00
251E_401	8.50	1.80	2.10	200.00
13R41_300	20.00	3.00	1.00	200.00
13R41A_300	20.00	3.00	1.00	200.00
13R8_300	20.00	3.00	1.00	200.00
13R61_210	20.00	0.50	0.50	70.00
13R61B_210	20.00	0.50	0.50	70.00
13R72B_120	-	-	-	-

Note: CAPC: Capping levels for Channels

RPA performed an independent capping analysis on some elements for some domains, as well as a visual validation of the block model in section and plan view. Log probability plots were inspected for each of these domains and RPA applied a capping grade using a combination of histograms, probability plots, and decile analyses. RPA found that most of the coefficients of variation (CV) after applying capping are low, with exception of a few domains with CV values more than 1.5. RPA considers that the capping levels selected are appropriate.

RPA offers the following conclusions and recommendations:

- In general, the capping levels are reasonable, and suitable for the estimation of Mineral Resources.
- Investigate if capping levels should be applied based on high grade and low grade domains for lead, copper, and silver.
- Report the metal loss as a result of capping high grades, and assess 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. For the major domain contributor to the Inferred Mineral Resource (5000 Mineralization domain), there is still 49% of the total metal within the upper decile of the silver distribution.
- Adjust capping values with production data when an accurate reconciliation process is established.

VARIOGRAPHY

Atacocha generated downhole and directional variograms using the two-metre composite values generated for each domain and each element. The variograms were used to support the characterization and quantification of the variance of mineralization within the spatial continuity of the mineralization domains being analyzed. Variograms were standardized and modelled using two spherical structures in three directions. The variograms were used for OK interpolation and as a guide for selecting search ellipse ranges.

Figure 14-10 illustrates an example of the zinc variograms for the 2402 Domain. The results for all modelled variograms for Zn, Pb, Cu, and Ag are listed in Tables 14-15 to 14-18, respectively.

FIGURE 14-10 ZINC NORMAL SCORE EXPERIMENTAL AND MODELLED VARIOGRAMS FOR DOMAIN 2402

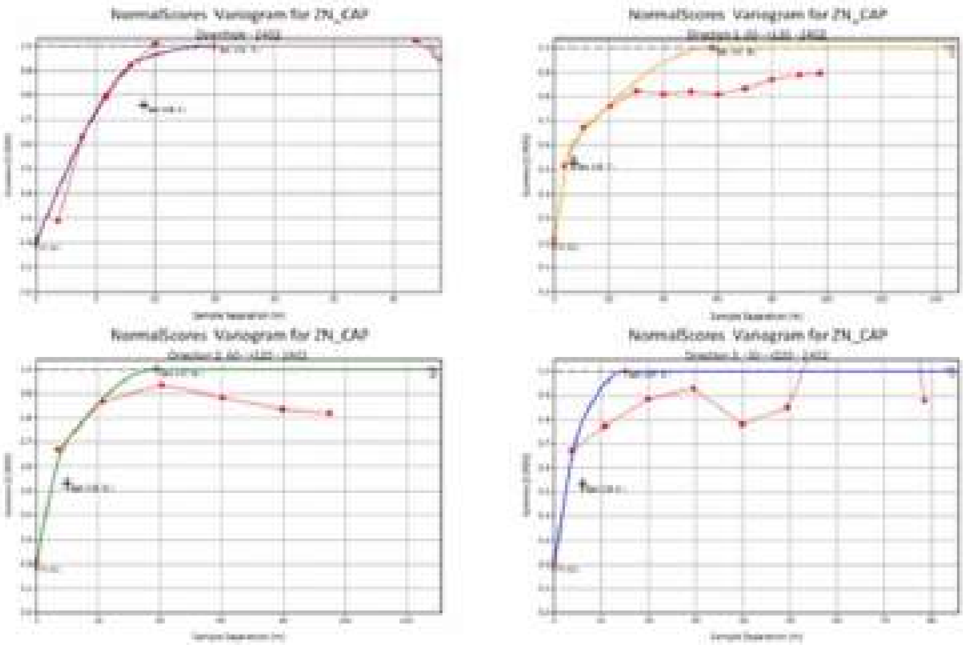


TABLE 14-15 ZINC VARIOGRAM PARAMETERS
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
10_3200	0.32	69.358	-54.469	53.948	3	2	1	0.42	13	7	3	0.27	36	20	10
13B_401	0.24	89.425	58.525	163.26	3	2	1	0.44	11	9	4	0.32	38	27	11
13B1_500	0.23	16.052	54.469	149.358	3	2	1	0.29	11	11	8	0.48	50	39	16
13B1A_510	0.06	-100	45	-90	3	2	1	0.53	9	7	4	0.41	41	25	12
13BSK1_1	0.11	70.642	54.469	53.948	3	2	1	0.6	8	7	4	0.3	37	26	16
13C1_3610	0.05	-113.616	19.683	-79.372	3	2	1	0.44	15	6	10	0.51	69	28	18
13CA_430	0.14	100	80	90	3	2	1	0.55	14	9	5	0.3	38	21	11
13CB_435	0.02	36.74	58.525	70.575	3	2	1	0.34	11	4	3	0.63	42	19	11
13CC_450	0.2	46.052	54.469	149.358	3	2	1	0.44	24	8	4	0.36	31	23	10
13G_470	0.26	33.898	-25.059	56.31	3	2	1	0.28	21	10	6	0.47	62	39	21
13H_445	0.26	46.052	54.469	149.358	3	2	1	0.47	25	9	4	0.27	34	23	10
13R8_300	0.16	56.74	58.525	-109.425	3	2	1	0.34	19	20	6	0.5	71	44	24
13R41_300	0.16	56.74	58.525	-109.425	3	2	1	0.34	19	20	6	0.5	71	44	24
13R41A_300	0.16	56.74	58.525	-109.425	3	2	1	0.34	19	20	6	0.5	71	44	24
13r61_210	0.04	-95.439	-75.894	135.439	3	2	1	0.48	23	7	4	0.48	53	27	10
13r61b_210	0.04	-95.439	-75.894	135.439	3	2	1	0.48	23	7	4	0.48	53	27	10
13R71_435	0.02	36.74	58.525	70.575	3	2	1	0.34	11	4	3	0.63	42	19	11
13R71B_4000	0.17	-102.76	33.826	-52.995	3	2	1	0.34	28	26	6	0.49	50	33	10
13R72B_120	0.05	-95.439	-75.894	135.439	3	2	1	0.47	23	7	4	0.47	53	27	10
15_3810	0.1	174.494	67.731	-62.727	3	2	1	0.48	14	8	3	0.42	22	16	7
18C_1200	0.12	92.176	-46.042	-60.48	3	2	1	0.6	19	12	14	0.28	40	27	16
18E_1300	0.23	-120	-30	90	3	2	1	0.49	13	8	11	0.28	36	22	12
18W_1300	0.23	-120	-30	90	3	2	1	0.49	13	8	11	0.28	36	22	12
23C_1300	0.23	-120	-30	90	3	2	1	0.49	13	8	11	0.28	36	22	12
23E_1300	0.23	-120	-30	90	3	2	1	0.49	13	8	11	0.28	36	22	12
91A_810	0.2	-10.893	-48.59	40.893	3	2	1	0.27	24	18	4	0.53	48	22	11
91N_3600	0.11	70.642	54.469	53.948	3	2	1	0.6	8	7	4	0.3	37	26	16
91S_3660	0.08	-110	50	-90	3	2	1	0.4	7	6	6	0.51	52	37	32
103_3201	0.15	9.358	-54.469	53.948	3	2	1	0.11	32	7	3	0.75	33	20	10
103A_3201	0.15	9.358	-54.469	53.948	3	2	1	0.11	32	7	3	0.75	33	20	10
131AA_410	0.05	94.494	67.731	-62.727	3	2	1	0.42	22	6	5	0.53	40	24	10
131AB_415	0.21	5.439	75.894	135.439	3	2	1	0.48	13	5	5	0.31	28	17	16
131B_415	0.21	5.439	75.894	135.439	3	2	1	0.48	13	5	5	0.31	28	17	16
131D_500	0.23	16.052	54.469	149.358	3	2	1	0.29	11	11	8	0.48	50	39	16
131E_450	0.2	46.052	54.469	149.358	3	2	1	0.44	24	8	4	0.36	31	23	10
131F_510	0.06	-100	45	-90	3	2	1	0.53	9	7	4	0.41	41	25	12
152_3800	0.1	-50	70	-90	3	2	1	0.39	6	7	4	0.51	37	22	10
173_1800	0.18	26.781	62.009	136.781	3	2	1	0.38	11	9	11	0.44	64	31	15
173A_1810	0.31	0	0	-120	3	2	1	0.08	12	25	9	0.61	39	26	14
173B_1820	0.06	126.565	37.761	50.768	3	2	1	0.47	7	8	6	0.47	26	17	9

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
251E_401	0.24	89.425	58.525	163.26	3	2	1	0.44	11	9	4	0.32	38	27	11
251N_4000	0.17	-102.76	33.826	-52.995	3	2	1	0.34	28	26	6	0.49	50	33	10
ANC_2702	0.26	-30.938	23.399	-111.88	3	2	1	0.54	12	5	6	0.2	33	15	7
ANE_2702	0.26	-30.938	23.399	-111.88	3	2	1	0.54	12	5	6	0.2	33	15	7
ANS_1200	0.12	92.176	-46.042	-60.48	3	2	1	0.6	19	12	14	0.28	40	27	16
C2_3800	0.1	-50	70	-90	3	2	1	0.39	6	7	4	0.51	37	22	10
CNEC_3100	0.11	25.725	29.499	-101.508	3	2	1	0.63	6	11	8	0.26	27	18	9
CNEI_3100	0.11	25.725	29.499	-101.508	3	2	1	0.63	6	11	6	0.26	27	18	9
CNESU_3110	0.14	50	-50	-90	3	2	1	0.36	22	8	3	0.49	30	17	9
CR3_3201	0.15	9.358	-54.469	53.948	3	2	1	0.11	32	7	3	0.75	33	20	10
DF2_2210	0.19	70.149	-44.136	-104.002	3	2	1	0.41	12	6	5	0.39	29	16	8
DF2A_2200	0.09	160	70	180	3	2	1	0.49	4	9	8	0.42	33	20	11
DF2B_2320	0.12	160	70	180	3	2	1	0.32	7	7	8	0.55	33	21	11
DF2C_2330	0.19	70.149	-44.136	-104.002	3	2	1	0.43	12	5	6	0.38	31	19	9
ING_4000	0.17	-102.76	33.826	-52.995	3	2	1	0.34	28	26	6	0.49	50	33	10
INTAP_5000	0.09	-173.219	62.009	-43.219	3	2	1	0.3	12	7	14	0.61	33	22	17
M2_3870	0.31	96.74	58.525	70.575	3	2	1	0.04	9	11	10	0.65	21	17	11
PRVSC_2400	0.12	-130	80	-90	3	2	1	0.38	20	6	5	0.5	40	23	12
PRVSN_2401	0.1	-140	-60	90	3	2	1	0.44	10	4	2	0.46	31	18	8
PRVSSU_2402	0.22	40	0	-120	3	2	1	0.35	8	11	6	0.43	57	37	15
S2_3950	0.39	-37.273	-67.731	-25.506	3	2	1	0.04	26	4	1	0.57	43	20	12
SB2_2200	0.09	160	70	180	3	2	1	0.49	4	9	8	0.42	33	20	11
SB2A_2210	0.19	70.149	-44.136	-104.002	3	2	1	0.41	12	6	5	0.39	29	16	8
SGC_3850	0.1	82.727	67.731	-154.494	3	2	1	0.27	21	15	14	0.62	44	31	15
SGN_3851	0.42	82.727	67.731	-154.494	3	2	1	0.19	14	15	4	0.39	40	23	11
SGS_3852	0.11	-90	90	170	3	2	1	0.46	21	15	11	0.43	39	26	15
SGSU_3853	0.22	71.692	48.974	74.66	3	2	1	0.41	14	5	16	0.37	29	20	17
SP2_3950	0.39	-37.273	-67.731	-25.506	3	2	1	0.04	26	4	1	0.57	43	20	12
V2_3890	0.35	96.74	58.525	70.575	3	2	1	0.08	9	11	10	0.57	21	17	11
V27_600	0.15	-130	50	-90	3	2	1	0.53	5	4	4	0.32	21	14	8
VCH3_3853	0.22	71.692	48.974	74.66	3	2	1	0.41	14	5	16	0.37	29	20	17
VINT3_3400	0.18	3.451	-9.391	-69.716	3	2	1	0.45	10	8	5	0.37	29	19	10
VINT3A_3410	0.16	6.013	37.159	-115.414	3	2	1	0.36	6	5	3	0.48	16	10	6
VP1_3610	0.05	-113.616	19.683	-79.372	3	2	1	0.44	15	6	10	0.51	69	28	18
VPR1_3650	0.1	-110	50	-90	3	2	1	0.51	7	8	7	0.39	52	37	27
VRP1_3660	0.08	-110	50	-90	3	2	1	0.4	7	6	6	0.51	52	37	32
VT3_1800	0.18	26.781	62.009	136.781	3	2	1	0.36	11	9	11	0.44	64	31	15

TABLE 14-16 LEAD VARIOGRAM PARAMETERS
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
10_3200	0.28	69.358	-54.469	53.948	3	2	1	0.37	8	8	4	0.34	29	18	10
13B_401	0.14	10.79	41.561	-131.93	3	2	1	0.61	17	11	3	0.25	33	22	8
13B1_500	0.09	-20	70	180	3	2	1	1	10	17	11	1	47	34	20
13B1A_510	0.05	80	70	90	3	2	1	0.46	12	9	6	0.48	40	30	14
13BSK1_1	0.14	157.273	67.731	-25.506	3	2	1	0.44	8	6	5	0.42	44	28	20
13C1_3610	0.27	-104.275	-29.499	-78.492	3	2	1	0.28	28	6	10	0.45	74	30	16
13CA_430	0.08	110	70	90	3	2	1	0.65	4	11	6	0.27	27	17	11
13CB_435	0.02	64.561	75.894	44.561	3	2	1	0.49	46	14	8	0.48	54	29	15
13CC_450	0.26	-39.107	48.59	-139.107	3	2	1	0.25	24	19	4	0.49	49	31	13
13G_470	0.22	39.686	-17.229	58.433	3	2	1	0.23	10	7	6	0.55	87	40	18
13H_445	0.23	-39.107	48.59	-139.107	3	2	1	0.48	25	9	4	0.29	34	23	10
13R8_300	0.14	94.561	75.894	44.561	3	2	1	0.38	14	15	7	0.48	28	16	9
13R41_300	0.11	-156.74	58.525	109.425	3	2	1	0.51	8	11	8	0.39	51	32	16
13R41A_300	0.15	61.692	-48.974	105.34	3	2	1	0.5	6	9	11	0.35	55	35	22
13r61_210	0.06	34.275	-29.499	-101.508	3	2	1	0.74	30	9	3	0.21	44	26	11
13r61b_210	0.06	34.275	-29.499	-101.508	3	2	1	0.74	30	9	3	0.21	44	26	11
13R71_435	0.02	64.561	75.894	44.561	3	2	1	0.49	46	14	8	0.48	54	29	15
13R71B_4000	0.1	-96.102	25.659	-56.31	3	2	1	0.6	10	9	5	0.3	27	16	8
13R72B_120	0.06	34.275	-29.499	-101.508	3	2	1	0.65	24	9	3	0.28	37	26	11
15_3810	0.07	155.439	75.894	-44.561	3	2	1	0.46	17	10	3	0.47	18	11	6
18C_1200	0.1	40	-50	-90	3	2	1	0.72	8	6	4	0.18	25	15	8
18E_1300	0.26	-120	-60	90	3	2	1	0.45	17	6	4	0.3	60	28	12
18W_1300	0.26	-120	-60	90	3	2	1	0.45	17	6	4	0.3	60	28	12
23C_1300	0.26	-120	-60	90	3	2	1	0.45	17	6	4	0.3	60	28	12
23E_1300	0.26	-120	-60	90	3	2	1	0.45	17	6	4	0.3	60	28	12
91A_810	0.17	-10.893	-48.59	40.893	3	2	1	0.33	29	17	2	0.5	40	26	12
91N_3600	0.14	157.273	67.731	-25.506	3	2	1	0.44	8	6	5	0.42	44	28	20
91S_3660	0.16	70	70	90	3	2	1	0.38	7	10	10	0.47	64	50	29
103_3201	0.27	9.358	-54.469	53.948	3	2	1	0.33	9	10	4	0.4	39	18	10
103A_3201	0.27	9.358	-54.469	53.948	3	2	1	0.33	9	10	4	0.4	39	18	10
131AA_410	0.08	-54.275	29.499	78.492	3	2	1	0.42	18	6	5	0.51	34	19	13
131AB_415	0.15	33.26	58.525	109.425	3	2	1	0.43	36	8	3	0.42	41	27	12
131B_415	0.15	33.26	58.525	109.425	3	2	1	0.43	36	8	3	0.42	41	27	12
131D_500	0.05	17.273	67.731	154.494	3	2	1	0.52	7	5	8	0.44	43	31	18
131E_450	0.26	-39.107	48.59	-139.107	3	2	1	0.25	24	19	4	0.49	49	31	13
131F_510	0.05	80	70	90	3	2	1	0.46	12	9	6	0.48	40	30	14
152_3800	0.15	130	70	90	3	2	1	0.39	23	19	4	0.46	26	20	10
173_1800	0.13	46.781	62.009	136.781	3	2	1	0.44	6	8	7	0.43	46	28	16
173A_1810	0.17	0	0	-120	3	2	1	0.4	10	5	2	0.43	34	23	12

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
173B_1820	0.06	140.893	48.59	40.893	3	2	1	0.57	13	8	13	0.36	27	17	14
251E_401	0.14	10.79	41.561	-131.93	3	2	1	0.61	17	11	3	0.25	33	22	8
251N_4000	0.1	-96.102	25.659	-56.31	3	2	1	0.6	10	9	5	0.3	27	16	8
ANC_2702	0.24	-66.033	-50.332	-122.398	3	2	1	0.56	8	6	5	0.2	34	14	9
ANE_2702	0.24	-66.033	-50.332	-122.398	3	2	1	0.56	8	6	5	0.2	34	14	9
ANS_1200	0.1	40	-50	-90	3	2	1	0.72	8	6	4	0.18	25	15	8
C2_3800	0.15	130	70	90	3	2	1	0.39	23	19	4	0.46	28	20	10
CHEC_3100	0.44	25.725	29.499	-101.508	3	2	1	0.25	10	24	9	0.31	55	42	20
CNEI_3100	0.44	25.725	29.499	-101.508	3	2	1	0.25	10	24	9	0.31	55	42	20
CNESU_3110	0.11	50	-50	-90	3	2	1	0.68	12	7	3	0.21	37	17	8
CR3_3201	0.27	9.358	-54.469	53.948	3	2	1	0.33	9	10	4	0.4	39	18	10
DF2_2210	0.13	-88.308	-48.974	105.34	3	2	1	0.4	12	6	7	0.47	46	22	14
DF2A_2200	0.17	70	0	-110	3	2	1	0.57	14	13	4	0.26	42	29	13
DF2B_2320	0.13	70	0	-110	3	2	1	0.39	19	15	4	0.48	35	24	10
DF2C_2330	0.14	-88.308	-48.974	105.34	3	2	1	0.36	14	6	7	0.49	40	22	14
ING_4000	0.1	-96.102	25.659	-56.31	3	2	1	0.6	10	9	5	0.3	27	16	8
INTAP_5000	0.12	-173.219	62.009	-43.219	3	2	1	0.53	12	7	6	0.35	33	21	10
M2_3870	0.29	170	80	0	3	2	1	0.28	19	15	14	0.43	26	20	15
PRVSC_2400	0.2	-130	80	-90	3	2	1	0.43	17	13	3	0.37	36	26	14
PRVSN_2401	0.12	-140	-60	90	3	2	1	0.5	10	4	2	0.38	31	18	8
PRVSSU_2402	0.22	-128.63	-28.024	112.796	3	2	1	0.55	14	13	7	0.23	56	36	16
S2_3950	0.27	91.17	28.024	67.204	3	2	1	0.57	26	14	1	0.17	46	24	12
SB2_2200	0.17	70	0	-110	3	2	1	0.57	14	13	4	0.26	42	29	13
SB2A_2210	0.13	-88.308	-48.974	105.34	3	2	1	0.4	12	6	7	0.47	46	22	14
SGC_3850	0.1	-152.904	-18.747	111.173	3	2	1	0.39	12	10	1	0.52	30	22	11
SGN_3851	0.47	-152.904	-18.747	111.173	3	2	1	0.21	13	14	7	0.32	34	22	11
SGS_3852	0.07	-10	-20	90	3	2	1	0.32	12	10	1	0.62	30	22	11
SGSU_3853	0.2	71.692	48.974	74.66	3	2	1	0.4	14	8	8	0.4	40	21	15
SP2_3950	0.27	91.17	28.024	67.204	3	2	1	0.57	26	14	1	0.17	46	24	12
V2_3890	0.25	170	80	0	3	2	1	0.19	19	15	14	0.56	26	20	15
V27_600	0.2	-130	50	-90	3	2	1	0.45	11	6	4	0.35	26	17	8
VCH3_3853	0.2	71.692	48.974	74.66	3	2	1	0.4	14	8	8	0.4	40	21	15
VINT3_3400	0.23	3.451	-9.391	-69.716	3	2	1	0.5	10	8	5	0.28	29	19	10
VINT3A_3410	0.16	-2.904	18.747	-111.173	3	2	1	0.38	6	5	3	0.47	16	10	6
VP1_3610	0.27	-104.275	-29.499	-78.492	3	2	1	0.28	28	6	10	0.45	74	30	16
VPR1_3650	0.22	70	70	90	3	2	1	0.37	7	10	10	0.41	68	50	27
VRP1_3660	0.16	70	70	90	3	2	1	0.38	7	10	10	0.47	64	50	29
VT3_1800	0.13	46.781	62.009	136.781	3	2	1	0.44	6	8	7	0.43	46	28	16

TABLE 14-17 COPPER VARIOGRAM PARAMETERS
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
10_3200	0.28	100	0	70	3	2	1	0.38	8	8	3	0.34	36	20	6
13B_401	0.24	119.107	48.59	139.107	3	2	1	0.21	15	16	3	0.55	42	27	8
13B1_500	0.36	-39.425	58.525	-163.26	3	2	1	0.31	10	12	3	0.33	54	39	15
13B1A_510	0.06	80	70	90	3	2	1	0.48	27	11	6	0.46	55	33	15
13BSK1_1	0.17	130	70	0	3	2	1	0.39	10	6	5	0.44	34	22	16
13C1_3610	0.08	86.74	58.525	70.575	3	2	1	0.34	7	6	9	0.58	55	29	18
13CA_430	0.15	100	-60	90	3	2	1	0.6	15	9	4	0.25	25	15	8
13CB_435	0.18	155.439	75.894	-44.561	3	2	1	0.27	11	15	13	0.55	46	30	16
13CC_450	0.16	-39.107	48.59	-139.107	3	2	1	0.55	18	11	3	0.29	40	28	13
13G_470	0.15	-135.038	8.649	-59.619	3	2	1	0.63	6	5	6	0.22	44	27	11
13H_445	0.16	-39.107	48.59	-139.107	3	2	1	0.51	18	11	3	0.33	40	28	13
13R8_300	0.08	65.506	67.731	-117.273	3	2	1	0.56	14	15	5	0.36	64	42	20
13R41_300	0.08	65.506	67.731	-117.273	3	2	1	0.56	14	15	5	0.36	64	42	20
13R41A_300	0.08	65.506	67.731	-117.273	3	2	1	0.56	14	15	5	0.36	64	42	20
13r61_210	0.04	19.575	-63.194	-112.647	3	2	1	0.32	25	12	3	0.65	39	23	10
13r61b_210	0.04	19.575	-63.194	-112.647	3	2	1	0.32	25	12	3	0.65	39	23	10
13R71_435	0.18	155.439	75.894	-44.561	3	2	1	0.27	11	15	13	0.55	46	30	16
13R71B_4000	0.22	130.79	41.561	48.07	3	2	1	0.69	32	24	5	0.09	52	25	11
13R72B_120	0.04	19.575	-63.194	-112.647	3	2	1	0.46	20	12	3	0.5	39	23	10
15_3810	0.16	155.439	75.894	-44.561	3	2	1	0.23	8	8	4	0.61	23	14	8
18C_1200	0.13	70	-60	-90	3	2	1	0.36	13	8	5	0.52	19	14	8
18E_1300	0.14	-120	-70	90	3	2	1	0.39	15	19	11	0.47	52	31	16
18W_1300	0.14	-120	-70	90	3	2	1	0.39	15	19	11	0.47	52	31	16
23C_1300	0.14	-120	-70	90	3	2	1	0.39	15	19	11	0.47	52	31	16
23E_1300	0.14	-120	-70	90	3	2	1	0.39	15	19	11	0.47	52	31	16
91A_810	0.31	-10.893	-48.59	40.893	3	2	1	0.43	23	19	6	0.25	37	22	11
91N_3600	0.17	130	70	0	3	2	1	0.39	10	6	5	0.44	34	22	16
91S_3660	0.16	70	50	90	3	2	1	0.46	10	7	6	0.39	45	25	13
103_3201	0.31	40	0	70	3	2	1	0.42	13	8	5	0.27	29	20	20
103A_3201	0.31	40	0	70	3	2	1	0.42	13	8	5	0.27	29	20	20
131AA_410	0.04	94.494	67.731	-62.727	3	2	1	0.5	9	17	3	0.45	31	22	10
131AB_415	0.14	23.26	58.525	109.425	3	2	1	0.6	17	6	3	0.26	29	17	8
131B_415	0.14	23.26	58.525	109.425	3	2	1	0.6	17	6	3	0.26	29	17	8
131D_500	0.36	-39.425	58.525	-163.26	3	2	1	0.31	10	12	3	0.33	54	39	15
131E_450	0.16	-39.107	48.59	-139.107	3	2	1	0.55	18	11	3	0.29	40	28	13
131F_510	0.06	80	70	90	3	2	1	0.48	27	11	6	0.46	55	33	15
152_3800	0.26	-90	90	-50	3	2	1	0.07	21	19	4	0.67	42	28	16
173_1800	0.1	-47.273	67.731	-154.494	3	2	1	0.46	8	9	6	0.44	38	26	14
173A_1810	0.28	0	0	-120	3	2	1	0.53	29	23	3	0.2	40	26	13

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
173B_1820	0.06	-120.893	48.59	-40.893	3	2	1	0.42	14	4	6	0.52	38	26	10
251E_401	0.24	119.107	48.59	139.107	3	2	1	0.21	15	16	3	0.55	42	27	8
251N_4000	0.22	130.79	41.561	48.07	3	2	1	0.69	32	24	5	0.09	52	25	11
ANC_2702	0.13	-66.033	-50.332	-122.398	3	2	1	0.44	18	10	5	0.44	46	30	11
ANE_2702	0.13	-66.033	-50.332	-122.398	3	2	1	0.44	18	10	5	0.44	46	30	11
ANS_1200	0.13	70	-60	-90	3	2	1	0.36	13	8	5	0.52	19	14	8
C2_3800	0.26	-90	90	-50	3	2	1	0.07	21	19	4	0.67	42	28	16
CNEC_3100	0.13	25.725	29.499	-101.508	3	2	1	0.51	16	8	8	0.36	43	27	19
CNEI_3100	0.13	25.725	29.499	-101.508	3	2	1	0.51	16	8	8	0.36	43	27	19
CNESU_3110	0.18	50	-50	-90	3	2	1	0.23	8	6	3	0.59	26	15	8
CR3_3201	0.31	40	0	70	3	2	1	0.42	13	8	5	0.27	29	20	20
DF2_2210	0.12	-90.149	-44.136	104.002	3	2	1	0.51	14	5	7	0.37	41	26	13
DF2A_2200	0.13	70	0	-110	3	2	1	0.35	6	7	8	0.51	45	30	15
DF2B_2320	0.12	70	0	-110	3	2	1	0.4	6	14	8	0.48	35	23	12
DF2C_2330	0.11	-90.149	-44.136	104.002	3	2	1	0.47	14	5	7	0.42	38	26	13
ING_4000	0.22	130.79	41.561	48.07	3	2	1	0.69	32	24	5	0.09	52	25	11
INTAP_5000	0.11	140	70	0	3	2	1	0.4	12	13	8	0.49	33	14	13
M2_3870	0.2	170	80	0	3	2	1	0.2	43	15	14	0.6	48	31	16
PRVSC_2400	0.07	-130	70	-90	3	2	1	0.62	24	10	5	0.31	35	20	9
PRVSN_2401	0.12	40	-80	-90	3	2	1	0.48	10	4	2	0.4	31	18	8
PRVSSU_2402	0.14	23.987	-37.159	-115.414	3	2	1	0.46	14	12	8	0.4	52	29	13
S2_3950	0.23	-105.725	29.499	-78.492	3	2	1	0.36	26	20	1	0.4	30	24	12
SB2_2200	0.13	70	0	-110	3	2	1	0.35	6	7	8	0.51	45	30	15
SB2A_2210	0.12	-90.149	-44.136	104.002	3	2	1	0.51	14	5	7	0.37	41	26	13
SGC_3850	0.16	-149.686	-17.229	121.567	3	2	1	0.51	14	13	6	0.34	31	20	12
SGN_3851	0.17	-137.24	-33.826	127.005	3	2	1	0.34	14	11	7	0.49	29	18	10
SGS_3852	0.08	170	20	-90	3	2	1	0.64	14	13	6	0.28	31	20	12
SGSU_3853	0.35	71.692	48.974	74.66	3	2	1	0.31	10	5	5	0.34	31	22	19
SP2_3950	0.23	-105.725	29.499	-78.492	3	2	1	0.36	26	20	1	0.4	30	24	12
V2_3890	0.24	170	80	0	3	2	1	0.28	43	15	14	0.48	48	31	16
V27_600	0.15	-130	50	-90	3	2	1	0.63	6	5	4	0.22	27	13	8
VCH3_3853	0.35	71.692	48.974	74.66	3	2	1	0.31	10	5	5	0.34	31	22	19
VINT3_3400	0.19	9.062	-23.399	-68.12	3	2	1	0.45	10	8	5	0.35	29	19	10
VINT3A_3410	0.15	-100	-70	-180	3	2	1	0.36	6	5	3	0.5	16	10	6
VP1_3610	0.08	86.74	58.525	70.575	3	2	1	0.34	7	6	9	0.58	55	29	18
VPR1_3650	0.13	70	50	90	3	2	1	0.41	10	7	6	0.46	45	25	13
VRP1_3660	0.16	70	50	90	3	2	1	0.40	10	7	6	0.39	45	25	13
VT3_1600	0.1	-47.273	67.731	-154.494	3	2	1	0.46	8	9	6	0.44	38	26	14

TABLE 14-18 SILVER VARIOGRAM PARAMETERS

Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
10_3200	0.25	69.358	-54.469	53.948	3	2	1	0.41	7	7	3	0.34	26	16	9
13B_401	0.25	-50.79	-41.561	48.07	3	2	1	0.44	11	12	2	0.31	30	21	11
13B1_500	0.11	16.052	54.469	149.358	3	2	1	0.46	6	8	8	0.43	53	34	14
13B1A_510	0.05	80	70	90	3	2	1	0.46	45	11	9	0.48	60	34	16
13BSK1_1	0.23	157.273	67.731	-25.506	3	2	1	0.34	5	6	5	0.42	39	25	16
13C1_3610	0.09	-104.275	-29.499	-78.492	3	2	1	0.41	10	6	10	0.5	60	30	18
13CA_430	0.07	100	-70	90	3	2	1	0.52	12	6	5	0.42	41	26	14
13CB_435	0.06	64.561	75.894	44.561	3	2	1	0.16	11	14	8	0.77	48	29	15
13CC_450	0.2	-39.107	48.59	-139.107	3	2	1	0.44	19	6	4	0.36	41	27	9
13G_470	0.2	-135.038	8.649	-59.619	3	2	1	0.44	10	6	6	0.36	44	26	14
13H_445	0.23	-39.107	48.59	-139.107	3	2	1	0.44	19	6	4	0.33	41	27	9
13R8_300	0.09	-156.74	58.525	109.425	3	2	1	0.6	16	12	7	0.31	57	32	16
13R41_300	0.09	-156.74	58.525	109.425	3	2	1	0.6	16	12	7	0.31	57	32	16
13R41A_300	0.09	-156.74	58.525	109.425	3	2	1	0.6	16	12	7	0.31	57	32	16
13r61_210	0.04	34.275	-29.499	-101.508	3	2	1	0.64	4	6	4	0.32	29	17	8
13r61b_210	0.04	34.275	-29.499	-101.508	3	2	1	0.64	4	6	4	0.32	29	17	8
13R71_435	0.06	64.561	75.894	44.561	3	2	1	0.16	11	14	8	0.77	48	29	15
13R71B_4000	0.21	-96.102	25.659	-56.31	3	2	1	0.46	10	14	5	0.33	28	21	8
13R72B_120	0.04	34.275	-29.499	-101.508	3	2	1	0.52	21	5	3	0.44	43	24	11
15_3810	0.06	155.439	75.894	-44.561	3	2	1	0.38	10	14	5	0.56	22	18	8
18C_1200	0.14	121.924	-65.186	-35.417	3	2	1	0.53	6	5	6	0.33	23	15	8
18E_1300	0.25	-120	-60	90	3	2	1	0.33	10	6	6	0.42	52	24	12
18W_1300	0.25	-120	-60	90	3	2	1	0.33	10	6	6	0.42	52	24	12
23C_1300	0.25	-120	-60	90	3	2	1	0.33	10	6	6	0.42	52	24	12
23E_1300	0.25	-120	-60	90	3	2	1	0.33	10	6	6	0.42	52	24	12
91A_810	0.29	-10.893	-48.59	40.893	3	2	1	0.32	22	6	4	0.4	30	18	10
91N_3600	0.23	157.273	67.731	-25.506	3	2	1	0.34	5	6	5	0.42	39	25	16
91S_3660	0.1	-110	50	-90	3	2	1	0.55	10	5	10	0.35	67	57	27
103_3201	0.3	9.358	-54.469	53.948	3	2	1	0.46	7	7	3	0.24	24	16	9
103A_3201	0.3	9.358	-54.469	53.948	3	2	1	0.46	7	7	3	0.24	24	16	9
131AA_410	0.04	114.275	29.499	-78.492	3	2	1	0.42	24	15	4	0.54	50	28	11
131AB_415	0.21	24.494	67.731	117.273	3	2	1	0.46	23	8	4	0.33	43	23	9
131B_415	0.21	24.494	67.731	117.273	3	2	1	0.46	23	8	4	0.33	43	23	9
131D_500	0.11	16.052	54.469	149.358	3	2	1	0.46	6	8	8	0.43	53	34	14
131E_450	0.2	-39.107	48.59	-139.107	3	2	1	0.44	19	6	4	0.36	41	27	9
131F_510	0.05	80	70	90	3	2	1	0.46	45	11	9	0.48	60	34	16
152_3800	0.21	130	70	90	3	2	1	0.33	5	9	4	0.46	24	17	11
173_1800	0.09	26.781	62.009	136.781	3	2	1	0.4	6	9	11	0.5	38	28	15
173A_1810	0.21	0	0	-120	3	2	1	0.47	12	25	4	0.33	44	26	14

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
173B_1820	0.06	140.893	48.59	40.893	3	2	1	0.39	19	11	6	0.55	36	20	11
251E_401	0.25	-50.79	-41.561	48.07	3	2	1	0.44	11	12	2	0.31	30	21	11
251N_4000	0.21	-96.102	25.659	-56.31	3	2	1	0.46	10	14	5	0.33	28	21	8
ANC_2702	0.12	-66.033	-50.332	-122.398	3	2	1	0.63	8	6	6	0.25	18	11	7
ANE_2702	0.12	-66.033	-50.332	-122.398	3	2	1	0.63	8	6	6	0.25	18	11	7
ANS_1200	0.14	121.924	-65.186	-35.417	3	2	1	0.53	6	5	6	0.33	23	15	8
C2_3800	0.21	130	70	90	3	2	1	0.33	5	9	4	0.46	24	17	11
CNEC_3100	0.25	25.725	29.499	-101.508	3	2	1	0.34	24	18	7	0.41	43	31	18
CNEI_3100	0.25	25.725	29.499	-101.508	3	2	1	0.34	24	18	7	0.41	43	31	18
CNESU_3110	0.05	50	-50	-90	3	2	1	0.63	23	8	3	0.32	44	19	9
CR3_3201	0.3	9.358	-54.469	53.948	3	2	1	0.46	7	7	3	0.24	24	16	9
DF2_2210	0.08	-90.149	-44.136	104.002	3	2	1	0.59	14	9	7	0.33	53	29	12
DF2A_2200	0.19	80	0	-100	3	2	1	0.46	12	16	6	0.35	53	33	10
DF2B_2320	0.17	80	0	-100	3	2	1	0.57	22	19	6	0.26	51	30	10
DF2C_2330	0.09	-90.149	-44.136	104.002	3	2	1	0.41	13	9	7	0.51	47	29	12
ING_4000	0.21	-96.102	25.659	-56.31	3	2	1	0.46	10	14	5	0.33	28	21	8
INTAP_5000	0.14	66.013	37.159	64.586	3	2	1	0.4	12	7	15	0.46	33	21	20
M2_3870	0.24	-144.561	75.894	-44.561	3	2	1	0.2	40	15	14	0.57	63	33	15
PRVSC_2400	0.09	-130	80	-90	3	2	1	0.31	8	4	6	0.59	37	20	9
PRVSN_2401	0.13	-140	-60	90	3	2	1	0.52	10	4	2	0.35	31	18	8
PRVSSU_2402	0.18	56.013	37.159	-115.414	3	2	1	0.54	14	14	6	0.27	53	34	18
S2_3950	0.18	88.29	39.273	77.038	3	2	1	0.44	26	17	1	0.38	39	26	13
SB2_2200	0.19	80	0	-100	3	2	1	0.46	12	16	6	0.35	53	33	10
SB2A_2210	0.08	-90.149	-44.136	104.002	3	2	1	0.59	14	9	7	0.33	53	29	12
SGC_3850	0.09	-152.904	-18.747	111.173	3	2	1	0.34	12	10	1	0.57	30	22	11
SGN_3851	0.08	-152.904	-18.747	111.173	3	2	1	0.48	10	7	6	0.44	18	12	10
SGS_3852	0.07	-10	-20	90	3	2	1	0.37	17	11	6	0.55	23	19	9
SGSU_3853	0.42	76.74	58.525	70.575	3	2	1	0.39	15	9	8	0.19	51	29	20
SP2_3950	0.18	88.29	39.273	77.038	3	2	1	0.44	26	17	1	0.38	39	26	13
V2_3890	0.22	-144.561	75.894	-44.561	3	2	1	0.01	42	15	14	0.77	43	31	15
V27_600	0.2	-130	50	-90	3	2	1	0.35	5	6	4	0.45	21	14	8
VCH3_3853	0.42	76.74	58.525	70.575	3	2	1	0.39	15	9	8	0.19	51	29	20
VINT3_3400	0.2	3.451	-9.391	-69.716	3	2	1	0.44	10	8	5	0.36	29	19	10
VINT3A_3410	0.15	-146.781	-62.009	136.781	3	2	1	0.21	6	5	3	0.64	20	10	6
VP1_3610	0.09	-104.275	-29.499	-78.492	3	2	1	0.41	10	6	10	0.5	60	30	18
VPR1_3650	0.12	-110	50	-90	3	2	1	0.55	10	5	10	0.33	67	57	27
VRP1_3660	0.1	-110	50	-90	3	2	1	0.55	10	5	10	0.35	67	57	27
VT3_1800	0.09	26.781	62.009	136.781	3	2	1	0.4	6	9	11	0.5	38	28	15

BLOCK MODEL AND GRADE ESTIMATION

The block model was built and grade estimates were performed using Datamine Studio RM (version 14.1.156-3) software. The Atacocha underground block model was sub-celled at mineralization wireframes boundaries with parent cells measuring 4 m by 4 m by 4 m and a minimum sub-cell size of 0.5 m by 0.5 m by 0.5 m. The block model parameters are given in Table 14-19. The block size selected by Atacocha corresponds to the cut and fill mining method and the average thickness of the mineralization domains are approximately five metre.

TABLE 14-19 ATACOCHA UNDERGROUND BLOCK MODEL PARAMETERS
Nexa Resources S.A.- Atacocha Mine

Parameter	East (m)	North (m)	Elevation (m)
Minimum Coordinate	366,300	8,826,200	2,400
Maximum Coordinate	368,700	8,831,156	4,704
Block Size (m)	4	4	4

Atacocha defined the direction and the search parameters based on the trend analysis performed in the variography study and the orientation and geometry of the mineralized wireframes.

The grade interpolation strategy incorporated three estimation passes using OK or ID^3 estimation methods for Zn, Pb, Cu, and Ag composites. The estimation parameters are given in Tables 14-20 to 14-23.

A comparison of ID^3 and OK against NN results was performed to determine the most effective parameters for the estimation. NN interpolation was used only for validation purpose.

TABLE 14-20 ZINC ESTIMATION PARAMETERS – ATACOCHA UNDERGROUND
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Method	Rotation System S-AXIS			Search Ellipse S-DIST			Pass 1 SVOLFAC	# Comp		Pass 2 SVOLFAC	# Comp		Pass 3 SVOLFAC	# Comp	
		1	2	3	1	2	3		Min	Max		Min	Max		Min	Max
10_3200	ID^3	3	2	1	12	8	4	1	2	4	1.20	2	3	30	1	2
13B_401	ID^3	3	2	1	19	13.5	6.5	1	9	18	2.00	6	9	30	1	6
13B1_500	OK	3	2	1	16.7	13	5.3	1	9	18	3.00	6	12	30	1	2
13B1A_510	ID^3	3	2	1	40	25	12	1	6	12	1.50	4	5	10	1	1
13BSKN1_1	OK	3	2	1	18.5	14	6	1	9	18	2.00	6	12	10	1	3
13C1_3610	OK	3	2	1	18	10	5	1	5	8	1.50	4	8	10	1	2

Mineralization Domain	Method	Rotation System S-AXIS			Search Ellipse S-DIST			Pass 1 SVOLFAC	# Comp		Pass 2 SVOLFAC	# Comp		Pass 3 SVOLFAC	# Comp	
		1	2	3	1	2	3		Min	Max		Min	Max		Min	Max
13CA_430	OK	3	2	1	16	10.5	5.5	1	9	18	2.00	4	12	10	1	2
13CB_435	OK	3	2	1	12.6	6	3.6	1	9	18	1.50	6	12	10	1	3
13CC_450	OK	3	2	1	17	11.5	5	1	4	12	1.50	2	6	10	1	2
13G_470	OK	3	2	1	31	19.5	10.5	1	9	18	1.50	9	18	30	1	2
13H_445	ID^3	3	2	1	17	11.5	5	1	1	4	2.00	1	4	10	1	2
13R8_300	OK	3	2	1	22	14.6	6.6	1	6	12	1.50	4	9	30	1	2
13R41_300	ID^3	3	2	1	33	22	10	1	8	15	2.00	6	9	30	1	4
13R41A_300	OK	3	2	1	33	22	10	1	9	18	2.00	6	9	10	1	6
13r61_210	ID^3	3	2	1	21.5	13.5	5	1	9	18	1.50	6	12	10	1	6
13r61b_210	ID^3	3	2	1	26.5	13.5	5	1	4	16	2.50	4	8	10	1	6
13R71_435	ID^3	3	2	1	19	9.5	6.5	1	6	18	1.50	4	12	10	1	3
13R71B_4000	ID^3	3	2	1	15	8	4	1	5	8	1.50	6	9	10	1	3
13R72B_120	ID^3	3	2	1	45	30	15	1	9	18	1.50	6	9	10	1	6
15_3810	ID^3	3	2	1	24	16	7	1	8	16	1.50	6	9	10	1	5
18C_1200	OK	3	2	1	40	27	16	1	9	18	1.50	6	9	30	1	2
18E_1300	OK	3	2	1	32	12	10	1	6	12	1.50	4	10	10	1	5
18W_1300	OK	3	2	1	18	11	6	1	9	18	1.50	6	9	10	1	2
23C_1300	OK	3	2	1	18	11	6	1	9	18	1.50	6	9	10	1	3
23E_1300	OK	3	2	1	18	11	6	1	4	8	2.00	4	8	10	1	2
91A_810	OK	3	2	1	27	15	10	1	6	12	1.50	4	10	10	1	4
91N_3600	ID^3	3	2	1	37	28	16	1	4	6	1.50	2	4	10	1	6
91S_3660	ID^3	3	2	1	27	18	9	1	7	12	2.30	5	8	10	1	6
103_3201	OK	3	2	1	24	12	8	1	6	10	1.80	4	9	10	1	4
103A_3201	ID^3	3	2	1	8	5	3	1	2	4	1.50	1	2	10	1	3
131AA_410	OK	3	2	1	20	12	5	1	6	12	1.50	2	4	10	1	2
131AB_415	ID^3	3	2	1	14	8.5	5	1	6	18	2.00	4	12	10	1	6
131B_415	ID^3	3	2	1	14	8.5	5	1	6	18	2.00	4	12	10	1	6
131D_500	OK	3	2	1	25	19.5	8	1	9	18	2.00	6	12	10	1	2
131E_450	OK	3	2	1	17	11.5	5	1	6	10	1.50	4	7	10	1	2
131F_510	ID^3	3	2	1	13.7	8.3	4	1	4	8	2.00	4	8	10	1	2
152_3800	ID^3	3	2	1	33	20	10	1	7	14	1.30	6	9	10	1	6
173_1800	OK	3	2	1	20.7	10.3	5	1	9	18	2.00	6	9	10	1	6
173A_1810	OK	3	2	1	12.3	14.3	4.7	1	9	18	2.00	6	9	30	1	3
173B_1820	OK	3	2	1	13	8.5	4.5	1	9	18	2.00	6	9	10	1	2
251E_401	ID^3	3	2	1	10	7	5.5	1	4	8	1.50	4	8	10	1	2
251N_4000	ID^3	3	2	1	45	30	15	1	9	18	1.50	6	9	10	1	6
ANC_2702	OK	3	2	1	16.5	7.5	3.5	1	6	18	2.00	4	9	10	1	3
ANE_2702	OK	3	2	1	16.5	7.5	3.5	1	9	18	2.50	6	9	50	1	3
ANS_1200	ID^3	3	2	1	20	13.5	8	1	8	16	1.50	4	12	10	1	2
C2_3800	ID^3	3	2	1	27	18	8	1	4	8	1.50	6	9	10	1	3
CNEC_3100	OK	3	2	1	10.3	13.3	5	1	9	18	3.00	6	9	10	1	3
CNEI_3100	OK	3	2	1	10.3	13.3	5	1	9	18	3.00	6	9	30	1	3

Mineralization Domain	Method	Rotation System S-AXIS			Search Ellipse S-DIST			Pass 1 SVOLFAC	# Comp		Pass 2 SVOLFAC	# Comp		Pass 3 SVOLFAC	# Comp	
		1	2	3	1	2	3		Min	Max		Min	Max		Min	Max
CNESU_3110	ID^3	3	2	1	15	8.5	4.5	1	4	7	1.80	6	12	10	1	3
CR3_3201	ID^3	3	2	1	18	12	6	1	3	5	1.80	2	4	30	1	4
DF2_2210	OK	3	2	1	15.5	9.5	4.5	1	9	18	2.00	6	9	10	1	3
DF2A_2200	OK	3	2	1	16.5	10.5	5.5	1	8	18	2.00	6	9	10	1	3
DF2B_2320	ID^3	3	2	1	11	7	3.7	1	1	2	2.00	1	2	30	1	2
DF2C_2330	ID^3	3	2	1	10.3	6.3	3	1	2	4	2.00	1	2	10	1	2
ING_4000	ID^3	3	2	1	50	32	15	1	6	12	1.30	5	8	10	1	4
INTAP_5000	ID^3	3	2	1	43	28	10	1	6	12	1.50	5	6	10	1	5
M2_3870	OK	3	2	1	30	20	10	1	7	12	1.80	6	9	10	1	5
PRVSC_2400	OK	3	2	1	20	11.5	6	1	9	18	2.00	6	9	30	1	2
PRVSN_2401	ID^3	3	2	1	27	18	8	1	4	8	1.50	4	8	10	1	3
PRVSSU_2402	OK	3	2	1	10.7	16.3	5	1	9	18	3.00	6	9	30	1	4
S2_3950	ID^3	3	2	1	45	30	15	1	5	10	1.50	6	9	10	1	6
SB2_2200	OK	3	2	1	16.5	10.5	5.5	1	6	18	2.00	6	9	10	1	6
SB2A_2210	OK	3	2	1	15.5	9.5	4.5	1	9	18	2.00	6	12	10	1	3
SGC_3850	ID^3	3	2	1	44	26	15	1	4	8	1.50	6	9	10	1	3
SGN_3851	ID^3	3	2	1	40	23	11	1	5	10	1.80	6	9	10	1	6
SGS_3852	ID^3	3	2	1	50	30	15	1	4	10	1.80	6	9	10	1	6
SGSU_3853	OK	3	2	1	12	8	4	1	5	12	1.40	5	12	10	1	2
SP2_3950	ID^3	3	2	1	36	24	8	1	9	10	1.50	6	9	10	1	6
V2_3890	ID^3	3	2	1	21	17	11	1	2	4	1.50	2	4	10	1	2
V27_600	OK	3	2	1	30	20	10	1	7	14	1.60	5	8	10	1	4
VCH3_3853	ID^3	3	2	1	36	24	5	1	5	10	1.60	6	9	10	1	6
VINT3_3400	ID^3	3	2	1	12	10	4	1	2	4	1.50	2	4	30	1	2
VINT3A_3410	ID^3	3	2	1	12	8	4	1	2	4	2.00	2	4	30	1	2
VP1_3610	OK	3	2	1	15	10	5	1	6	12	1.20	4	6	10	1	1
VPR1_3650	ID^3	3	2	1	18	12	6	1	4	7	1.50	4	7	10	1	3
VRP1_3660	ID^3	3	2	1	18	18	6	1	7	10	1.30	6	10	10	1	4
VT3_1800	OK	3	2	1	20.7	10.3	5	1	9	18	2.00	6	9	10	1	2

TABLE 14-21 LEAD ESTIMATION PARAMETERS – ATACOCHA UNDERGROUND
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Method	Rotation System S-AXIS			Search Ellipse S-DIST			Pass 1 SVOLFAC	# comp		Pass 2 SVOLFAC	# comp		Pass 3 SVOLFAC	# comp	
		1	2	3	1	2	3		Min	Max		Min	Max		Min	Max
10_3200	ID^3	3	2	1	12	7	3	1	2	4	1.20	2	3	30	1	2
13B_401	ID^3	3	2	1	16.5	11	4	1	6	18	2.00	6	8	30	1	6
13B1_500	OK	3	2	1	20.3	11.3	5.3	1	9	18	3.00	6	12	30	1	2
13B1A_510	ID^3	3	2	1	20	15	7	1	4	12	2.00	4	5	10	1	1
13BSKN1_1	OK	3	2	1	22	14	10	1	9	18	2.00	6	12	10	1	3

Mineralization Domain	Method	Rotation System S-AXIS			Search Ellipse S-DIST			Pass 1 SVOLFAC	# comp		Pass 2 SVOLFAC	# comp		Pass 3 SVOLFAC	# comp	
		1	2	3	1	2	3		Min	Max		Min	Max		Min	Max
13C1_3810	OK	3	2	1	13	7	4	1	5	7	1.50	5	7	10	2	4
13CA_430	OK	3	2	1	12.5	8.5	4	1	9	18	2.00	4	12	10	1	2
13CB_435	ID^3	3	2	1	16	10	5	1	9	18	1.50	6	12	10	1	3
13CC_450	OK	3	2	1	17	11.5	5	1	4	12	1.50	2	6	10	1	2
13G_470	OK	3	2	1	36.5	20	9	1	9	18	1.50	9	18	30	1	2
13H_445	ID^3	3	2	1	17	11.5	5	1	1	4	2.00	1	4	10	1	2
13R8_300	ID^3	3	2	1	17	10.3	5.3	1	9	18	2.00	4	12	30	1	2
13R41_300	ID^3	3	2	1	25.5	16	8	1	8	15	2.00	6	9	30	1	4
13R41A_300	ID^3	3	2	1	25.5	16	8	1	9	18	2.00	6	9	10	1	6
13r61_210	ID^3	3	2	1	18.5	13.5	5.5	1	9	18	1.50	6	12	10	1	6
13r61b_210	ID^3	3	2	1	18.5	13	6.5	1	4	12	2.50	4	8	10	1	6
13R71_435	ID^3	3	2	1	25.5	14.5	7.5	1	6	12	1.50	4	8	10	1	3
13R71B_4000	ID^3	3	2	1	15	10	5	1	5	7	1.50	6	9	10	1	4
13R72B_120	ID^3	3	2	1	45	30	15	1	9	18	1.50	6	9	10	1	6
15_3810	ID^3	3	2	1	22	16	7	1	6	12	1.70	4	9	10	1	4
18C_1200	OK	3	2	1	12.5	7.5	4	1	4	8	2.00	4	8	30	1	2
18E_1300	ID^3	3	2	1	34	14	10	1	6	12	2.00	3	6	10	1	4
18W_1300	OK	3	2	1	26	12	6	1	9	18	1.50	6	9	10	1	2
23C_1300	OK	3	2	1	26	12	6	1	9	18	1.50	6	9	10	1	3
23E_1300	OK	3	2	1	26	12	6	1	4	8	2.00	4	8	10	1	1
91A_810	ID^3	3	2	1	35	18	10	1	7	13	1.50	5	12	10	1	4
91N_3600	ID^3	3	2	1	44	28	20	1	4	6	1.50	2	4	10	1	6
91S_3660	ID^3	3	2	1	27	18	9	1	7	12	2.30	5	8	10	1	6
103_3201	OK	3	2	1	24	12	8	1	6	10	1.80	4	9	10	1	4
103A_3201	ID^3	3	2	1	8	5	3	1	2	4	1.50	1	2	10	1	3
131AA_410	OK	3	2	1	17	9.5	6.5	1	6	12	1.50	2	4	10	1	2
131AB_415	OK	3	2	1	21.5	13.5	6	1	6	18	2.00	4	12	10	1	6
131B_415	ID^3	3	2	1	21.5	13.5	6	1	4	8	2.00	4	8	10	1	4
131D_500	OK	3	2	1	30.5	17	8	1	9	18	2.00	6	12	10	1	2
131E_450	OK	3	2	1	17	11.5	5	1	6	18	1.50	4	12	10	1	2
131F_510	ID^3	3	2	1	13.3	10	4.7	1	4	8	2.00	4	8	10	1	2
152_3800	ID^3	3	2	1	24	16	7	1	7	14	1.60	5	9	10	1	6
173_1800	OK	3	2	1	13	8.3	5.3	1	9	18	2.00	6	9	10	1	6
173A_1810	OK	3	2	1	10	13.3	6.3	1	9	18	2.00	6	9	30	1	6
173B_1820	OK	3	2	1	20	13	7	1	9	18	2.00	6	9	10	1	2
251E_401	ID^3	3	2	1	16.5	11	4	1	4	8	1.50	1	4	10	1	4
251N_4000	ID^3	3	2	1	45	30	15	1	9	18	1.50	6	9	10	1	6
ANC_2702	ID^3	3	2	1	15	10	5	1	6	18	2.00	4	9	10	1	3
ANE_2702	ID^3	3	2	1	15	10	5	1	6	12	2.50	4	8	30	1	2
ANS_1200	ID^3	3	2	1	25	15	8	1	8	16	1.50	4	12	10	1	2
C2_3800	ID^3	3	2	1	30	20	10	1	4	8	1.50	6	9	10	1	3
CNEC_3100	OK	3	2	1	20	19	6.7	1	9	18	1.50	4	8	10	1	2

Mineralization Domain	Method	Rotation System S-AXIS 1	2	3	Search Ellipse S-DIST 1	2	3	Pass 1 SVOLFAC	# comp Min	Max	Pass 2 SVOLFAC	# comp Min	Max	Pass 3 SVOLFAC	# comp Min	Max
CNEI_3100	OK	3	2	1	20	19	6.7	1	9	18	2.50	4	6	30	1	2
CNESU_3110	ID^3	3	2	1	18.5	8.5	4	1	4	7	1.80	6	12	10	1	3
CR3_3201	ID^3	3	2	1	18	12	6	1	3	5	1.80	2	4	30	1	4
DF2_2210	ID^3	3	2	1	20	11	7	1	4	8	1.50	4	8	10	1	3
DF2A_2200	ID^3	3	2	1	17.5	20	5	1	8	18	2.00	4	8	10	1	2
DF2B_2320	ID^3	3	2	1	11.7	13.3	3.3	1	1	2	2.00	1	2	30	1	2
DF2C_2330	ID^3	3	2	1	13.3	7.3	4.7	1	2	4	2.00	1	2	10	1	2
ING_4000	ID^3	3	2	1	60	38	20	1	6	12	1.30	5	8	10	1	3
INTAP_5000	ID^3	3	2	1	43	28	10	1	6	12	1.50	5	6	10	1	5
M2_3870	OK	3	2	1	26	20	15	1	6	18	2.00	6	12	10	1	1
PRVSC_2400	OK	3	2	1	15	9.5	4.5	1	6	12	2.00	6	9	30	1	6
PRVSN_2401	ID^3	3	2	1	27	18	8	1	4	6	1.50	4	8	10	1	3
PRVSSU_2402	ID^3	3	2	1	17.3	9.7	4.3	1	9	18	3.00	6	9	30	1	4
S2_3950	ID^3	3	2	1	45	30	15	1	8	10	1.50	6	9	10	1	6
SB2_2200	OK	3	2	1	17.5	20	5	1	6	18	2.00	6	9	10	1	6
SB2A_2210	OK	3	2	1	20	11	7	1	9	18	2.00	6	12	10	1	3
SGC_3850	ID^3	3	2	1	44	26	11	1	4	8	1.50	6	9	10	1	2
SGN_3851	ID^3	3	2	1	36	24	12	1	5	10	1.80	6	9	10	1	6
SGS_3852	ID^3	3	2	1	50	30	15	1	4	10	1.80	6	9	10	1	6
SGSU_3853	OK	3	2	1	12	8	4	1	5	12	1.40	7	12	10	1	2
SP2_3950	ID^3	3	2	1	45	30	15	1	4	7	1.30	6	9	10	1	6
V2_3890	ID^3	3	2	1	26	20	15	1	4	16	2.00	1	2	10	1	2
V27_600	OK	3	2	1	30	20	10	1	7	14	1.60	5	8	10	1	4
VCH3_3853	ID^3	3	2	1	36	24	5	1	5	10	1.60	6	9	10	1	6
VINT3_3400	ID^3	3	2	1	12	10	4	1	2	4	1.50	2	4	30	1	2
VINT3A_3410	ID^3	3	2	1	12	8	4	1	2	4	2.00	2	4	30	1	2
VP1_3610	OK	3	2	1	15	10	5	1	6	12	1.20	4	6	10	1	1
VPR1_3650	ID^3	3	2	1	18	12	6	1	4	7	1.50	4	7	10	1	3
VRP1_3660	OK	3	2	1	18	18	6	1	7	10	1.30	6	10	10	1	4
VT3_1800	OK	3	2	1	13	8.3	5.3	1	9	18	2.00	6	9	10	1	2

TABLE 14-22 COPPER ESTIMATION PARAMETERS - – ATACOCHA UNDERGROUND

Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Method	Rotation System S-AXIS 1	2	3	Search Ellipse S-DIST 1	2	3	Pass 1 SVOLFAC	# Comp Min	Max	Pass 2 SVOLFAC	# Comp Min	Max	Pass 3 SVOLFAC	# Comp Min	Max
10_3200	ID^3	3	2	1	9	6	3	1	2	4	1.20	2	3	30	1	2
13B_401	OK	3	2	1	19	12.5	4	1	9	18	2.00	6	9	30	1	6
13B1_500	OK	3	2	1	18	11.7	5	1	9	18	3.00	6	12	30	1	2
13B1A_510	ID^3	3	2	1	55	35	17	1	2	8	1.50	2	5	10	1	1

Mineralization Domain	Method	Rotation System S-AXIS			Search Ellipse S-DIST			Pass 1 SVOLFAC	# Comp		Pass 2 SVOLFAC	# Comp		Pass 3 SVOLFAC	# Comp	
		1	2	3	1	2	3		Min	Max		Min	Max		Min	Max
13BSKN1_1	OK	3	2	1	17	11	8	1	9	18	2.00	6	12	10	1	3
13C1_3610	OK	3	2	1	24	12	6	1	7	14	1.30	4	8	10	1	3
13CA_430	OK	3	2	1	12.5	7.5	4	1	9	18	2.00	4	12	10	1	2
13CB_435	OK	3	2	1	16	10	5	1	9	18	1.50	6	12	10	1	3
13CC_450	ID^3	3	2	1	20	14	6.5	1	4	12	1.50	2	6	10	1	2
13G_470	OK	3	2	1	22	13.5	5.5	1	9	18	1.50	6	12	30	1	2
13H_445	ID^3	3	2	1	20	14	6.5	1	1	4	2.00	1	4	10	1	2
13R8_300	ID^3	3	2	1	17	10.3	5.3	1	9	18	2.00	4	12	30	1	2
13R41_300	OK	3	2	1	25.5	16	10	1	8	15	2.00	6	9	30	1	4
13R41A_300	OK	3	2	1	25.5	16	10	1	9	18	2.00	6	9	10	1	6
13r61_210	ID^3	3	2	1	19.5	11.5	5	1	9	18	1.50	6	12	10	1	6
13r61b_210	ID^3	3	2	1	19.5	11.5	5	1	4	12	2.50	6	16	10	1	6
13R71_435	ID^3	3	2	1	21.5	15	8	1	6	18	1.50	4	12	10	1	3
13R71B_4000	ID^3	3	2	1	18	10	5	1	5	8	1.50	6	9	10	1	4
13R72B_120	ID^3	3	2	1	45	30	15	1	9	18	1.50	6	9	10	1	6
15_3810	ID^3	3	2	1	22	13	8	1	5	10	1.70	4	9	10	1	5
18C_1200	OK	3	2	1	27	14	8	1	9	18	1.50	6	9	30	1	2
18E_1300	OK	3	2	1	25	12	10	1	7	12	1.50	5	7	10	1	4
18W_1300	OK	3	2	1	26	15.5	8	1	9	18	1.50	6	9	10	1	2
23C_1300	OK	3	2	1	26	15.5	8	1	9	18	1.50	6	9	10	1	3
23E_1300	OK	3	2	1	26	15.5	8	1	4	8	2.00	4	8	10	1	1
91A_610	ID^3	3	2	1	35	20	10	1	7	12	1.50	5	7	10	1	5
91N_3600	ID^3	3	2	1	34	22	16	1	4	6	1.50	2	4	10	1	6
91S_3660	OK	3	2	1	27	18	9	1	7	12	2.30	5	8	10	1	6
103_3201	ID^3	3	2	1	24	12	8	1	6	10	1.80	4	9	10	1	4
103A_3201	ID^3	3	2	1	8	5	3	1	2	4	1.50	1	2	10	1	3
131AA_410	OK	3	2	1	15.5	11	5	1	6	12	1.50	2	4	10	1	2
131AB_415	ID^3	3	2	1	14.5	8.5	4	1	6	18	2.00	4	12	10	1	6
131B_415	ID^3	3	2	1	14.5	8.5	4	1	6	18	2.00	4	12	10	1	6
131D_500	OK	3	2	1	27	17.5	7.5	1	9	18	2.00	6	12	10	1	2
131E_450	ID^3	3	2	1	20	14	6.5	1	6	10	1.50	4	7	10	1	2
131F_510	ID^3	3	2	1	18.3	11	5	1	4	8	2.00	4	8	10	1	2
152_3800	ID^3	3	2	1	33	20	10	1	7	14	1.30	6	9	10	1	6
173_1800	OK	3	2	1	12.7	6.7	4.7	1	9	18	2.00	6	9	10	1	6
173A_1810	OK	3	2	1	8.7	13.7	3.7	1	9	18	2.00	6	9	30	1	3
173B_1820	ID^3	3	2	1	19	11	5	1	9	18	2.00	6	9	10	1	2
251E_401	ID^3	3	2	1	19	12.5	4	1	4	8	1.50	1	4	10	1	2
251N_4000	ID^3	3	2	1	45	30	15	1	9	18	1.50	6	9	10	1	6
ANC_2702	OK	3	2	1	26	15	5	1	6	18	2.00	4	9	10	1	3
ANE_2702	OK	3	2	1	26	15	5	1	9	18	2.50	6	9	30	1	2
ANS_1200	ID^3	3	2	1	13.5	7	4	1	6	12	2.00	4	8	10	1	3
C2_3800	ID^3	3	2	1	33	22	11	1	4	8	1.50	6	9	10	1	3

Mineralization Domain	Method	Rotation System S-AXIS			Search Ellipse S-DIST			Pass 1 SVOLFAC	# Comp		Pass 2 SVOLFAC	# Comp		Pass 3 SVOLFAC	# Comp	
		1	2	3	1	2	3		Min	Max		Min	Max		Min	Max
CNEC_3100	OK	3	2	1	13.3	16.7	6.7	1	9	18	3.00	6	9	10	1	3
CNEI_3100	OK	3	2	1	13.3	16.7	6.7	1	9	18	3.00	6	9	30	1	3
CNESU_3110	ID^3	3	2	1	13	7.5	4	1	4	7	1.80	6	12	10	1	3
CR3_3201	ID^3	3	2	1	18	12	6	1	3	5	1.80	2	4	30	1	4
DF2_2210	OK	3	2	1	19	13	6.5	1	9	18	2.00	6	9	10	1	3
DF2A_2200	OK	3	2	1	17.5	29	6	1	8	18	2.00	6	9	10	1	3
DF2B_2320	ID^3	3	2	1	11.7	19.3	4	1	1	2	2.00	1	2	30	1	2
DF2C_2330	ID^3	3	2	1	12.7	8.7	4.3	1	2	4	2.00	1	2	10	1	2
ING_4000	ID^3	3	2	1	50	32	15	1	6	12	1.20	5	8	10	1	4
INTAP_5000	ID^3	3	2	1	43	28	10	1	6	12	1.50	5	6	10	1	5
M2_3870	OK	3	2	1	30	20	10	1	7	12	1.80	6	9	10	1	3
PRVSC_2400	ID^3	3	2	1	17.5	10	4.5	1	9	18	2.00	6	9	30	1	6
PRVSN_2401	ID^3	3	2	1	33	20	10	1	4	8	1.50	4	8	10	1	3
PRVSSU_2402	ID^3	3	2	1	17.3	9.7	4.3	1	9	18	3.00	6	9	30	1	7
S2_3950	ID^3	3	2	1	45	30	15	1	5	10	1.50	6	9	10	1	6
SB2_2200	ID^3	3	2	1	17.5	29	6	1	6	18	2.00	6	9	10	1	6
SB2A_2210	OK	3	2	1	19	13	6.5	1	9	18	2.00	6	12	10	1	3
SGC_3850	ID^3	3	2	1	44	26	12	1	4	8	1.50	6	9	10	1	3
SGN_3851	ID^3	3	2	1	36	24	12	1	5	10	1.80	6	9	10	1	6
SGS_3852	ID^3	3	2	1	50	30	15	1	4	10	1.80	6	9	10	1	6
SGSU_3853	ID^3	3	2	1	12	8	4	1	5	12	1.40	5	12	10	1	2
SP2_3950	ID^3	3	2	1	36	24	8	1	9	18	1.50	6	9	10	1	6
V2_3690	ID^3	3	2	1	45	30	15	1	5	10	1.80	6	9	10	1	6
V27_600	ID^3	3	2	1	30	20	10	1	7	14	1.60	5	8	10	1	4
VCH3_3853	ID^3	3	2	1	36	24	5	1	5	10	1.60	6	9	10	1	6
VINT3_3400	ID^3	3	2	1	12	10	4	1	2	4	1.50	2	4	30	1	2
VINT3A_3410	ID^3	3	2	1	12	8	4	1	2	4	2.00	2	4	30	1	2
VP1_3610	OK	3	2	1	15	10	5	1	6	12	1.20	4	6	10	1	1
VPR1_3650	ID^3	3	2	1	18	12	6	1	4	7	1.50	4	7	10	1	3
VRP1_3660	OK	3	2	1	18	18	6	1	7	10	1.30	6	10	10	1	4
VT3_1800	OK	3	2	1	12.7	8.7	4.7	1	9	18	2.00	6	9	10	1	2

TABLE 14-23 SILVER ESTIMATION PARAMETERS – ATACOCHA UNDERGROUND

Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Method	Rotation System S-AXIS			Search Ellipse S-DIST			Pass 1 SVOLFAC	# Comp		Pass 2 SVOLFAC	# Comp		Pass 3 SVOLFAC	# Comp	
		1	2	3	1	2	3		Min	Max		Min	Max		Min	Max
10_3200	ID^3	3	2	1	15	10	5	1	2	4	1.20	2	3	30	1	2
13B_401	ID^3	3	2	1	15	10.5	5.5	1	9	18	2.00	6	9	30	1	6
13B1_500	OK	3	2	1	17.7	10	4.7	1	9	18	3.00	6	12	30	1	2

Mineralization Domain	Method	Rotation System S-AXIS			Search Ellipse S-DIST			Pass 1 SVOLFAC	# Comp		Pass 2 SVOLFAC	# Comp		Pass 3 SVOLFAC	# Comp	
		1	2	3	1	2	3		Min	Max		Min	Max		Min	Max
13B1A_510	ID^3	3	2	1	35	20	10	1	4	12	2.00	2	5	10	1	1
13BSKN1_1	OK	3	2	1	16.5	11.5	8	1	9	18	2.00	6	12	10	1	3
13C1_3610	OK	3	2	1	18	12	6	1	6	12	1.30	4	8	10	1	3
13CA_430	OK	3	2	1	19	13	7	1	9	18	2.00	4	12	10	1	2
13CB_435	ID^3	3	2	1	16	10	5	1	9	18	1.50	6	12	10	1	3
13CC_450	ID^3	3	2	1	20.5	13.5	4.5	1	4	12	1.50	2	6	10	1	2
13G_470	OK	3	2	1	19	13	7	1	9	18	1.50	6	12	30	1	2
13H_445	ID^3	3	2	1	20.5	13.5	5	1	1	4	2.00	1	4	10	1	2
13R8_300	OK	3	2	1	19	10.6	5.3	1	6	12	1.50	4	9	30	1	2
13R41_300	OK	3	2	1	23.5	16	8	1	8	15	2.00	6	9	30	1	4
13R41A_300	OK	3	2	1	27.5	16	8	1	9	18	2.00	6	9	10	1	6
13r61_210	OK	3	2	1	21.5	12	5.5	1	9	18	1.50	6	12	10	1	6
13r61b_210	OK	3	2	1	21.5	12	6.5	1	4	12	2.50	4	8	10	1	6
13R71_435	ID^3	3	2	1	24	14.5	7.5	1	6	18	1.50	4	12	10	1	3
13R71B_4000	ID^3	3	2	1	18	10	5	1	5	8	1.50	6	9	10	1	4
13R72B_120	ID^3	3	2	1	45	30	15	1	9	18	1.50	6	9	10	1	6
15_3810	ID^3	3	2	1	22	13	8	1	6	10	1.70	4	9	10	1	5
18C_1200	ID^3	3	2	1	33	20	11	1	9	18	1.50	6	9	30	1	2
18E_1300	OK	3	2	1	34	14	10	1	6	12	2.00	3	6	10	1	4
18W_1300	OK	3	2	1	26	12	6	1	9	18	1.50	6	9	10	1	2
23C_1300	OK	3	2	1	26	12	6	1	9	18	1.50	6	9	10	1	3
23E_1300	OK	3	2	1	26	12	6	1	4	8	2.00	4	8	10	1	2
91A_810	ID^3	3	2	1	35	20	10	1	6	12	1.50	4	8	10	1	4
91N_3600	ID^3	3	2	1	33	23	16	1	4	6	1.50	2	4	10	1	6
91S_3660	OK	3	2	1	27	18	9	1	7	12	2.30	5	8	10	1	6
103_3201	ID^3	3	2	1	24	12	8	1	6	10	1.80	4	9	10	1	4
103A_3201	ID^3	3	2	1	8	5	3	1	2	4	1.50	1	2	10	1	3
131AA_410	OK	3	2	1	25	14	5.5	1	6	12	1.50	2	4	10	1	2
131AB_415	ID^3	3	2	1	21.5	11.5	4.5	1	6	18	2.00	4	12	10	1	6
131B_415	ID^3	3	2	1	21.5	11.5	4.5	1	6	18	2.00	4	12	10	1	6
131D_500	OK	3	2	1	26.5	15	7.5	1	9	18	2.00	6	12	10	1	2
131E_450	ID^3	3	2	1	20.5	13.5	4.5	1	6	18	1.50	4	12	10	1	2
131F_510	ID^3	3	2	1	20	11.3	5.3	1	4	8	2.00	4	8	10	1	2
152_3800	ID^3	3	2	1	33	20	10	1	9	18	1.30	5	9	10	1	6
173_1800	OK	3	2	1	12.7	9.3	5	1	9	18	2.00	6	9	10	1	6
173A_1810	OK	3	2	1	13.7	10.3	4.7	1	9	18	2.00	6	9	30	1	6
173B_1820	OK	3	2	1	18	10	5.5	1	9	18	2.00	6	9	10	1	2
251E_401	ID^3	3	2	1	15	10.5	5.5	1	4	8	1.50	1	4	10	1	2
251N_4000	ID^3	3	2	1	45	30	15	1	9	18	1.50	6	9	10	1	6
ANC_2702	ID^3	3	2	1	13.5	9	4.5	1	6	18	2.00	4	9	10	1	3
ANE_2702	ID^3	3	2	1	13.5	9	4.5	1	9	18	2.50	6	9	30	1	2
ANS_1200	ID^3	3	2	1	16.5	10	5.5	1	8	16	1.50	4	12	10	1	2

Mineralization Domain	Method	Rotation System S-AXIS			Search Ellipse S-DIST			Pass 1 SVOLFAC	# Comp		Pass 2 SVOLFAC	# Comp		Pass 3 SVOLFAC	# Comp	
		1	2	3	1	2	3		Min	Max		Min	Max		Min	Max
C2_3800	ID^3	3	2	1	30	20	10	1	4	8	1.50	6	9	10	1	3
CNEC_3100	OK	3	2	1	13.3	16.7	6.7	1	9	18	1.50	4	8	10	1	2
CNEI_3100	OK	3	2	1	13.3	16.7	6.7	1	9	18	1.50	4	8	30	1	2
CNESU_3110	ID^3	3	2	1	22	9.5	4.5	1	4	7	1.80	6	12	10	1	3
CR3_3201	ID^3	3	2	1	18	12	6	1	3	5	1.80	2	4	30	1	4
DF2_2210	OK	3	2	1	23.5	14.5	6	1	6	12	1.50	4	8	10	1	2
DF2A_2200	OK	3	2	1	25.5	15	5	1	8	18	2.00	6	9	10	1	2
DF2B_2320	ID^3	3	2	1	17	10	3.3	1	1	2	2.00	1	2	30	1	2
DF2C_2330	ID^3	3	2	1	15.7	9.7	4	1	2	4	2.00	1	2	10	1	2
ING_4000	ID^3	3	2	1	60	38	20	1	6	10	1.20	5	8	10	1	3
INTAP_5000	ID^3	3	2	1	43	28	10	1	6	12	1.50	5	6	10	1	5
M2_3870	OK	3	2	1	43	31	15	1	6	18	1.25	4	8	10	1	1
PRVSC_2400	OK	3	2	1	16	10	4.5	1	9	18	2.00	6	9	30	1	6
PRVSN_2401	ID^3	3	2	1	30	18	8	1	4	8	1.50	4	8	10	1	3
PRVSSU_2402	OK	3	2	1	16.7	11.3	6	1	9	18	3.00	6	9	30	1	4
S2_3950	ID^3	3	2	1	45	30	15	1	5	10	1.50	6	9	10	1	6
SB2_2200	OK	3	2	1	25.5	15	5	1	6	18	2.00	6	9	10	1	6
SB2A_2210	OK	3	2	1	23.5	14.5	6	1	9	18	2.00	6	12	10	1	3
SGC_3850	ID^3	3	2	1	44	26	11	1	4	8	1.50	6	9	10	1	3
SGN_3851	ID^3	3	2	1	36	24	12	1	5	10	1.80	6	9	10	1	6
SGS_3852	ID^3	3	2	1	50	30	15	1	4	10	1.80	6	9	10	1	6
SGSU_3853	ID^3	3	2	1	12	8	4	1	5	12	1.30	5	12	10	1	2
SP2_3950	ID^3	3	2	1	45	30	15	1	4	7	1.30	6	9	10	1	6
V2_3890	ID^3	3	2	1	45	30	15	1	5	10	1.80	6	9	10	1	6
V27_600	OK	3	2	1	30	20	10	1	7	14	1.60	5	8	10	1	4
VCH3_3853	ID^3	3	2	1	36	24	5	1	5	10	1.60	6	9	10	1	6
VINT3_3400	ID^3	3	2	1	12	10	4	1	2	4	1.50	2	4	30	1	2
VINT3A_3410	ID^3	3	2	1	12	8	4	1	2	4	2.00	2	4	30	1	2
VP1_3610	OK	3	2	1	15	10	5	1	6	12	1.20	4	6	10	1	1
VPR1_3650	ID^3	3	2	1	18	12	6	1	4	7	1.50	4	7	10	1	3
VRP1_3660	OK	3	2	1	18	12	6	1	7	10	1.30	6	10	10	1	4
VT3_1800	OK	3	2	1	12.7	9.3	5	1	9	18	2.00	6	9	10	1	2

MODEL VALIDATION AND SENSITIVITY

Atacocha has validated the resource block model using four separate industry standard validation procedures. Some examples of the validation results are included below:

- Visual inspection of composite grades against the block grades on sections and plans.
- Global statistical comparison of the OK and the ID^3 grades versus the NN grades.
- Swath plot comparisons of the estimation methods to investigate local bias.

- Impact of outlier capping analysis.

VISUAL VALIDATION

A visual comparison on vertical sections, 20 m apart, found good overall correlations between the blocks and composite grades. Figures 14-11 to 14-14 illustrate the visual correlation between the blocks and composite grades in the CNE mineralization domain on cross sections looking north at the 3,300 m level elevation for Zn, Pb, Cu and Ag, respectively. There is a better correlation in the blocks closest to the composites as opposed to the blocks located further away, which show a reasonable degree of smoothing.

Atacocha and RPA visually compared the composite and block grades on plans and sections and found that they correlate well spatially.

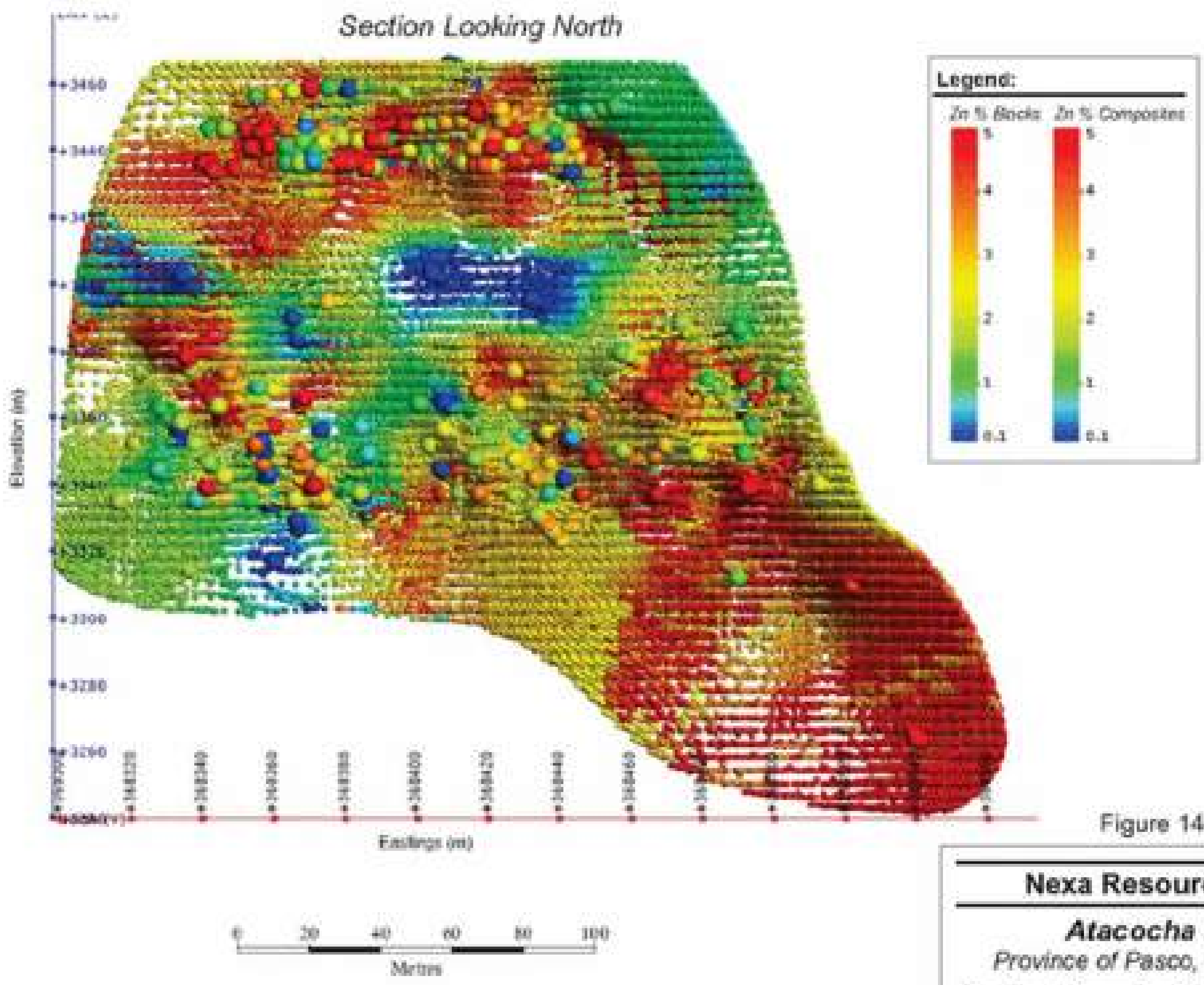


Figure 14-11

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Section Showing Zinc Blocks and Composites – CNE Domain

March 2019

Source: Atacocha, 2019.

www.rpacan.com

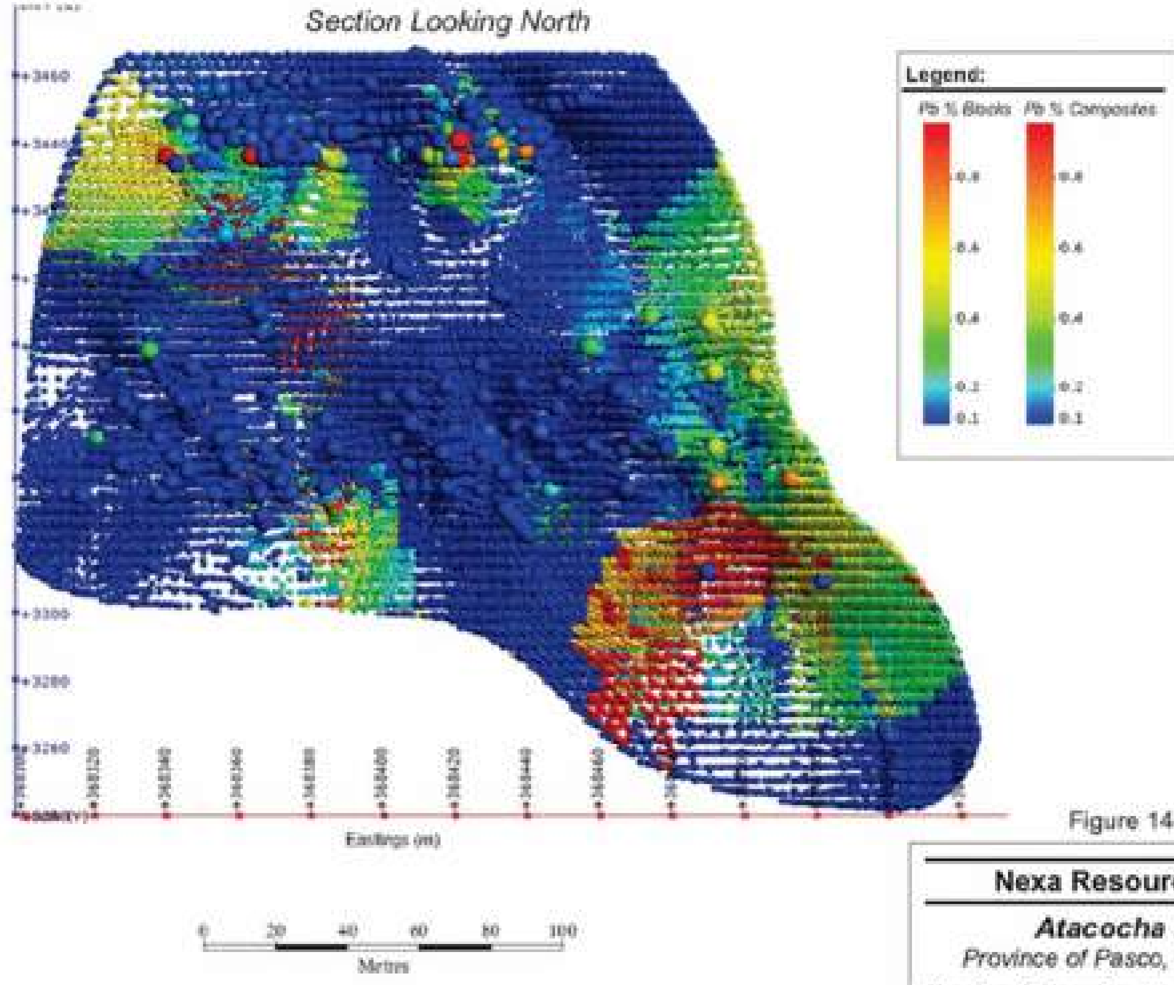


Figure 14-12

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Section Showing Lead Blocks and Composites – CNE Domain

March 2019

Source: Atacocha, 2019.

RPA

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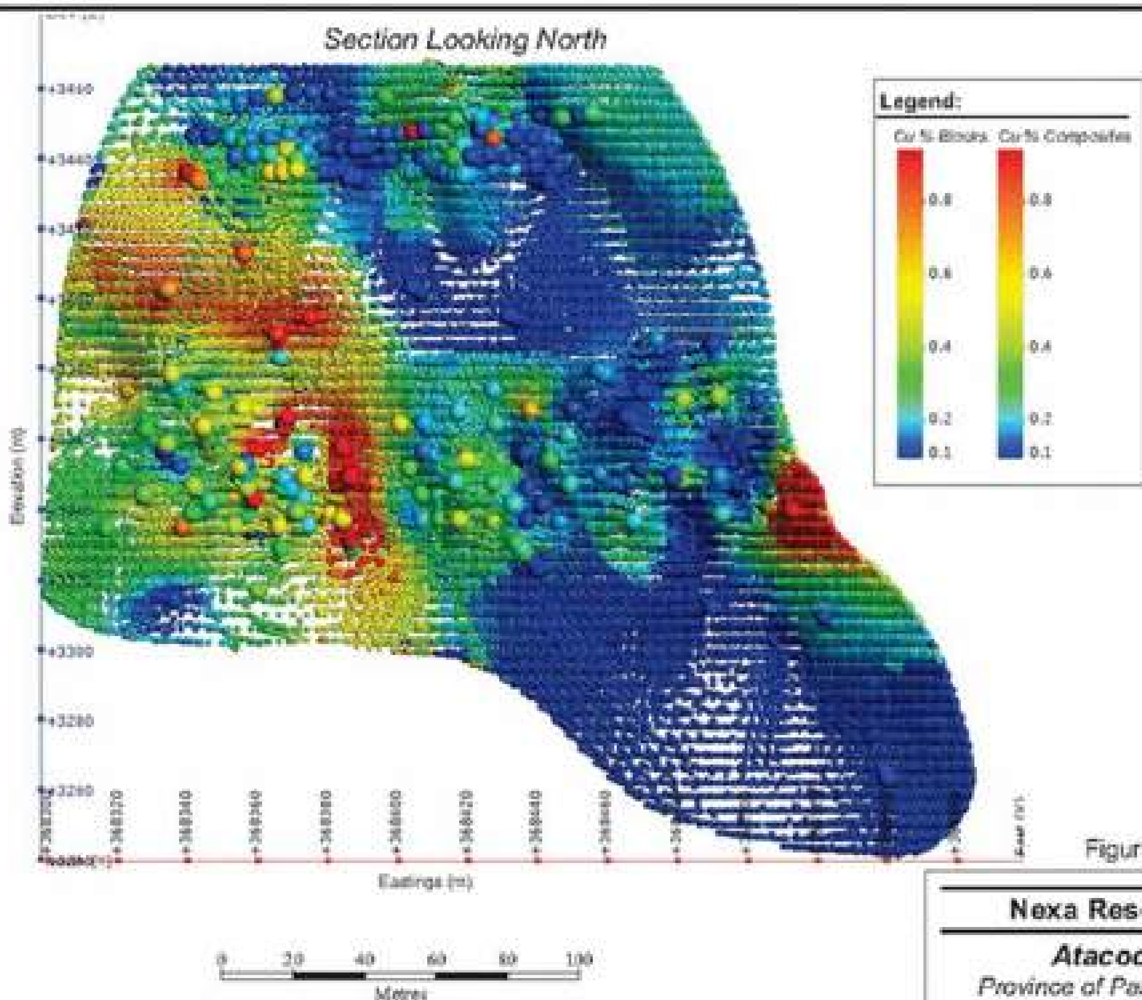


Figure 14-13

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Section Showing Copper Blocks and Composites – CNE Domain

March 2019

Source: *Atacocha, 2019.*

RPA

www.rpacan.com

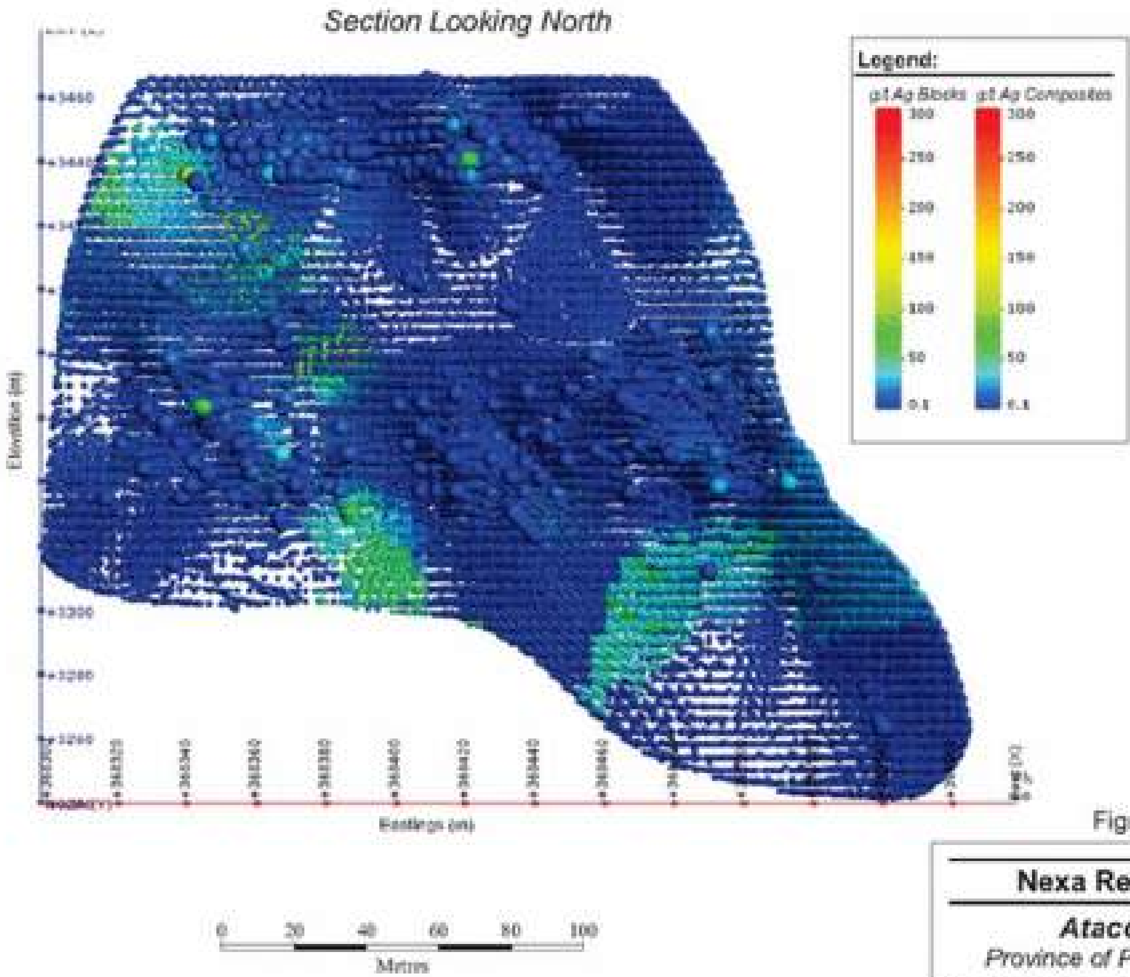


Figure 14-14

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Section Showing Silver Blocks and Composites – CNE Domain

March 2019

Source: Atacocha, 2019.

www.rpacan.com

GLOBAL STATISTICAL COMPARISON

The OK or ID³ block means for each mineralization domain were compared with the NN estimations. These comparisons produced percentage errors between the estimates which were within ±5% in most of the domains. Overall, the comparisons show that the methods used to estimate grades were appropriate. Tables 14-24 to 14-27 show an example of this comparison for the 18C_1200 domain.

TABLE 14-24 COMPARISON OF ID³, OK, AND NN ZINC GRADES - DOMAIN 18C_1200
Nexa Resources S.A.- Atacocha Mine

Domain	Method	Class	Number of Blocks	NN Mean (%)	NN CV	ID³ or OK Mean (%)	ID³ or OK CV	Difference of Relative Means (%)
18C_1200	OK	1	75,319	3.266	0.977	3.391	0.620	-4%
		2	31,191	2.793	1.055	2.691	0.721	4%
		3	44,977	3.191	0.758	3.199	0.729	0%
		4	151,487	3.128	0.931	3.161	0.683	-1%

TABLE 14-25 COMPARISON OF ID³, OK, AND NN LEAD GRADES - DOMAIN 18C_1200
Nexa Resources S.A.- Atacocha Mine

Domain	Method	Class	Number of Blocks	NN Mean (%)	NN CV	ID³ or OK Mean (%)	ID³ or OK CV	Difference of Relative Means (%)
18C_1200	OK	1	14,462	1.500	2.002	1.536	1.607	-2%
		2	51,131	0.800	2.419	0.814	1.693	-2%
		3	85,766	1.385	1.262	1.332	1.227	4%
		4	151,359	1.198	1.588	1.200	1.401	0%

TABLE 14-26 COMPARISON OF ID³, OK, AND NN COPPER GRADES - DOMAIN 18C_1200
Nexa Resources S.A.- Atacocha Mine

Domain	Method	Class	Number of Blocks	NN Mean (%)	NN CV	ID³ or OK Mean (%)	ID³ or OK CV	Difference of Relative Means (%)
18C_1200	OK	1	30,693	0.305	0.997	0.301	0.712	1%
		2	48,561	0.461	0.984	0.461	0.773	0%
		3	72,233	0.690	0.888	0.693	0.868	0%
		4	151,487	0.554	0.986	0.555	0.920	0%

TABLE 14-27 COMPARISON OF ID³, OK, AND NN SILVER GRADES - DOMAIN 18C_1200
Nexa Resources S.A.- Atacocha Mine

Domain	Method	Class	Number of Blocks	NN		ID³ or OK		Difference of Relative Means (%)
				Mean (%)	CV	Mean (%)	CV	
18C_1200	IDW3	1	58,167	62.800	1.625	64.358	1.105	-2%
		2	35,229	60.399	1.138	58.582	0.845	3%
		3	58,091	124.990	0.887	119.826	0.857	4%
		4	151,487	87.152	1.174	86.173	1.007	1%

In RPA's opinion, the statistical tables that compare the declustered composite mean (NN) and block gold grades show that the two populations have similar distributions with not much grade smoothing evident.

LOCAL VALIDATION

Swath plots were generated to assess for local bias and to compare the differences between the OK and ID³ block grade estimates and the NN estimated grades for each domain and element. The plots in Figures 14-15 to 14-18 show the combined Measured and Indicated blocks in the east, north, and vertical directions. RPA considers that the results show acceptable agreement of composite (NN) and block grades.

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 resource and reserve estimates.

FIGURE 14-15 ATACOCHA UNDERGROUND ZINC PROBABILITY AND SWATH PLOTS

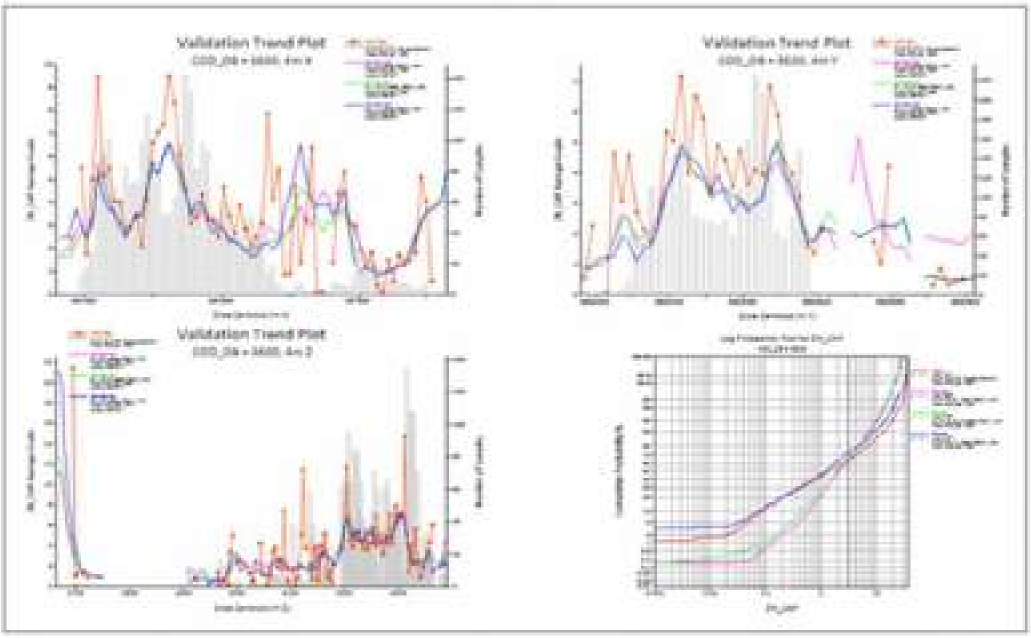


FIGURE 14-16 ATACOCHA UNDERGROUND LEAD PROBABILITY AND SWATH PLOTS

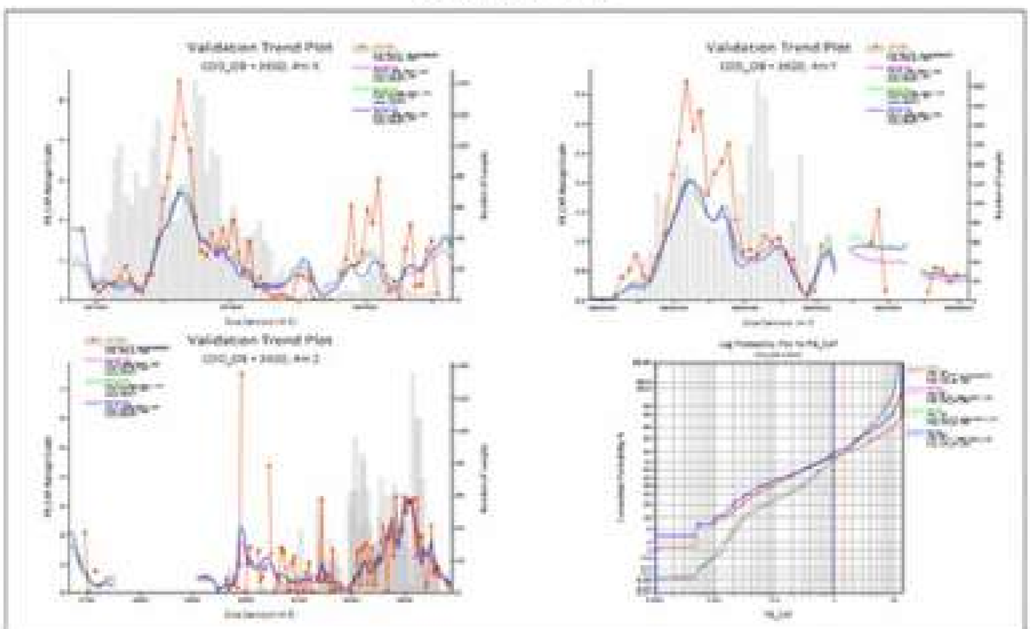


FIGURE 14-17 ATACOCHA UNDERGROUND COPPER PROBABILITY AND SWATH PLOTS

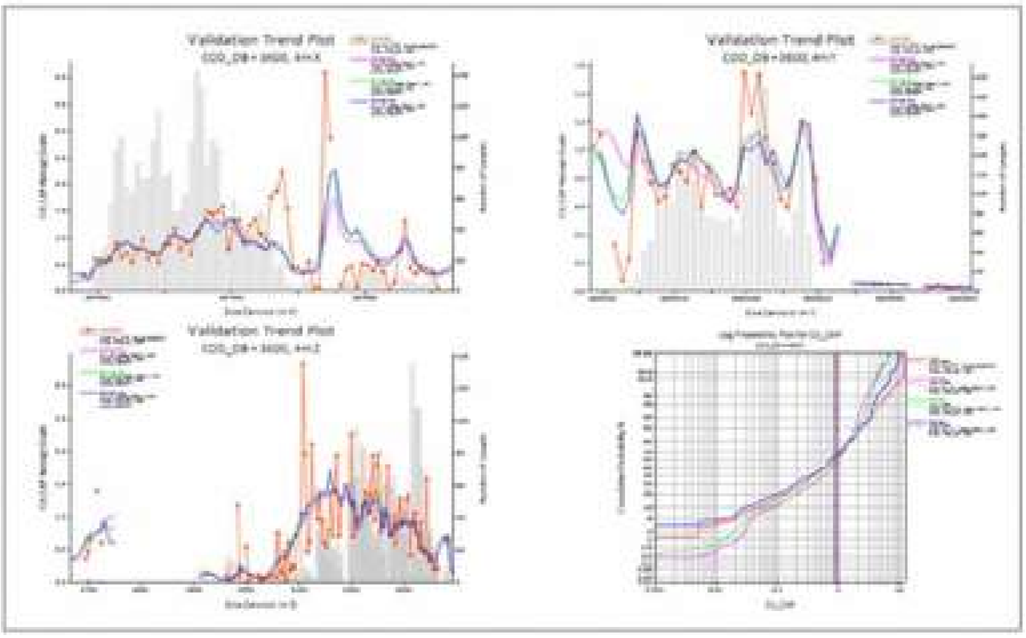
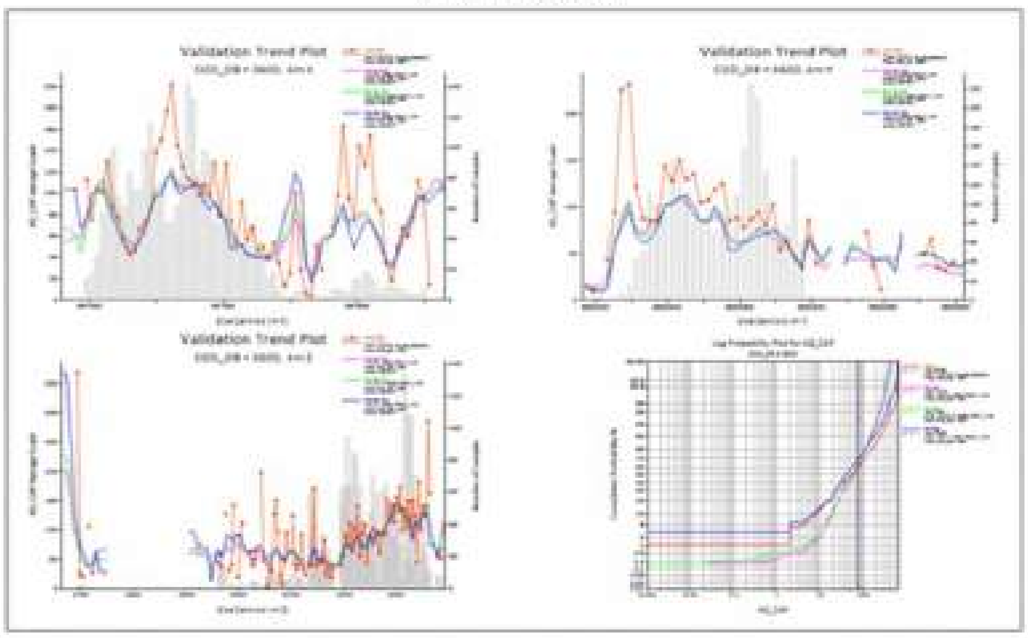


FIGURE 14-18 ATACOCHA UNDERGROUND SILVER PROBABILITY AND SWATH PLOTS



MINERAL RESOURCE CLASSIFICATION

Definitions for resource categories used in this report are consistent with CIM (2014) definitions incorporated by reference into 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. The location, quantity, grade or quality, continuity, and other geological characteristics of a Mineral Resource are known, estimated, or interpreted from specific geological evidence and knowledge, including sampling." 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. Two classification groups were defined based on geology and grade continuity. Separate classification interpolation passes were run to flag the resource categories for each group:

MINOR CONTINUITY ZONES

- **Measured Mineral Resource:** Composites from a minimum of three holes within a 24 m by 24 m by 12 m radii search.
- **Indicated Mineral Resource:** Composites from a minimum of three holes within a 45 m by 45 m by 23 m radii search.
- **Inferred Mineral Resource:** Composites from a minimum of three holes within a 90 m by 90 m by 45 m radii search.

MAJOR CONTINUITY ZONES

- **Measured Mineral Resource:** Composites from a minimum of three holes within a 26 m by 26 m by 13 m radii search.
- **Indicated Mineral Resource:** Composites from a minimum of three holes within a 51 m by 51 m by 26 m radii search.
- **Inferred Mineral Resource:** Composites from a minimum of three holes within a 102 m by 102 m by 51 m radii search.

A post-processing, resource clean-up script was applied to the classification model to avoid the "spotted dog" effect and to demonstrate continuity between samples. Figure 14-19 illustrates the final classification for Atacocha underground.

RPA checked the Atacocha classification results visually and statistically by building a closest distance to block centroids model. Overall, RPA is of the opinion that the resource classification criteria developed by Atacocha are reasonable and acceptable, however, RPA notes that there are not significant differences in the search radii applied to the two classification groups. RPA recommends reviewing the search radii criteria developed for the Minor Continuity Zone group.

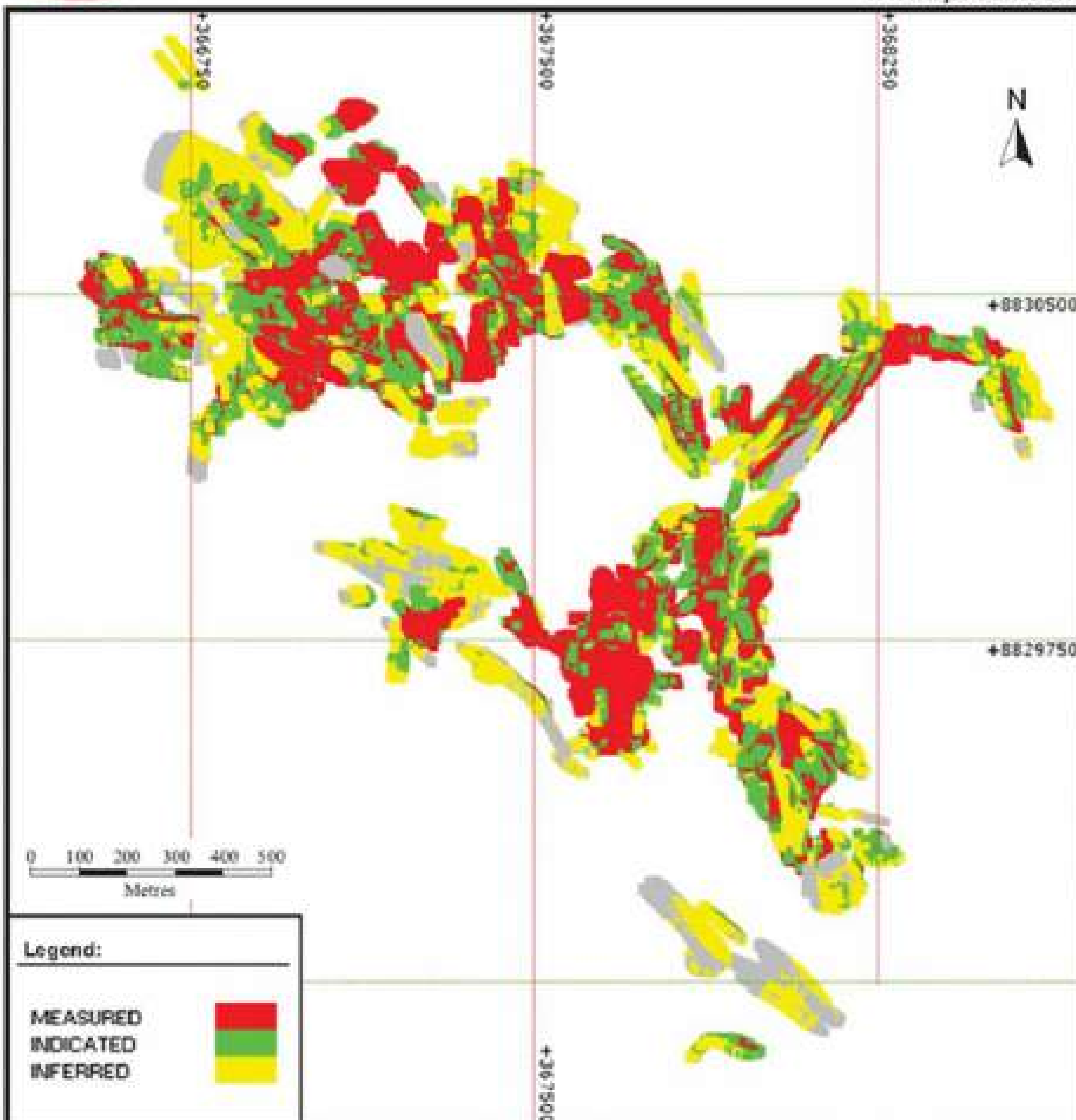


Figure 14-19

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Atacocha Underground Resource Classification

March 2019

Source: Atacocha, 2019.

NET SMELTER RETURN AND CUT-OFF VALUE

NSR calculations are based on historical performance of the concentrator and current smelter contracts. 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. The calculations do not include the impact of royalties, severance taxes, or any streaming agreements.

Input parameters used to develop the NSR calculation have been derived from metallurgical test work on the Atacocha property, and smelter terms and commodity prices provided by Nexa, and are based on consensus, long term forecasts from banks, financial institutions, and other sources. 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 14-28.

Net smelter return is expressed in US$/t and is calculated from mineralization grades to make an adequate comparison with production cost in order to determine whether the mined material is categorized as potentially economic mineralization or waste. The recovery calculations are polynomials and are bounded by maximum and minimum grades.

TABLE 14-28 NSR DATA
Nexa Resources – Atacocha Mine

Category	Input
Metal Prices	US$3,034/t Zn US$2,530/t Pb US$7,351/t Cu US$21.58/oz Ag US$1,555/oz Au
Concentrate Grade	Zn Conc: 50.14% Pb Conc: 58.96% Cu Conc. 19.57%

Typical industry smelting and refining charges were applied to the various concentrates. It was assumed that the concentrates would be process internally by Nexa and marketed internationally.

NSR factors have been applied to the block model uniformly, irrespective of mineralization domain. To report Mineral Resources, an NSR cut-off value was estimated. To estimate the NSR cut-off grade value, the following operating costs, provided by Nexa, were used:

- Mining US$/t proc
  - CAF: $52.50
  - SLS: $46.36
- Process + Tailings US$/t proc $9.82
- G&A US$/t proc $8.82
- Total US$/t proc
  - CAF: $71.13
  - SLS: $61.99

This formed the basis for US$71.13/t CAF mining and US$61.99/t SLS mining NSR cut-off values. In RPA's opinion, the operating costs are adequate for this size and type of operation.

MINERAL RESOURCE REPORTING

The Mineral Resources for the Atacocha underground operation as of December 31, 2018 are summarized in Table 14-1. The Mineral Resources are exclusive of Mineral Reserves and 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$61.99/t for SLS mining with a stope size of 20 m high, a minimum width of 3.0 m and maximum width of 12 m, and an NSR cut-off value of US$71.13/t for CAF stope mining with a stope size of 4 m high, a minimum width of 4.0 m, and a maximum width of 12 m. This is in compliance with the CIM (2014) resource definition requirement of "reasonable prospects for eventual economic extraction".

For the Atacocha underground, wireframe models of the completed underground excavations as of December 31, 2018 were prepared to remove the portions of the mineralized zones that have been mined out before the resource and reserve stopes were generated. The sub-blocking functions of the Deswik software package were employed to maximize the accuracy of the mined-out contacts. For more recent underground excavations, solid models of the mine development and drifts were constructed digitally from data collected using a total station surveying unit.

RPA observed some internal overlaps creating invalid mined-out solids that could not be used to flag the block model. The mined-out solids, however, do not overlap with the resource and reserve stopes. RPA recommends merging and cleaning up the mined-out solids in the future to enable flagging of the mined-out volumes directly to the block model.

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

COMPARISON TO PREVIOUS MINERAL RESOURCE ESTIMATES

A comparison of the current Nexa estimate, exclusive of Mineral Reserves, to the previous 2017 Mineral Resource estimate is presented in Table 14-29. The reasons for the changes are primarily due to the following:

- Higher NSR cut-off values
- Depletion of material through mining
- The addition of new mineralization domains (intap, sgc, sgs, cnei, and anc) through exploration diamond drilling
- New resource stope reporting methodology that includes all of the material in each resource stope
- New SLS mining method that includes more waste in the resource stopes
- Slightly higher density values
- New classification criteria

Since the previous Mineral Resource estimate, Nexa has undertaken surface and underground drilling programs to infill and extend existing mineralization along strike and at depth, in addition to delineating mineralization in newly discovered zones. This additional data has increased the number of mineralized zones, with resultant increases in Mineral Resource tonnages, and metal content of the Inferred Mineral Resources. Recovery of missing assay certificates and re-evaluation of historical assays has increased the Measured and Indicated tonnage and metal content. Waste included in the resource stopes is contributing to approximately 18% of the total resource tonnes.

TABLE 14-29 ATACOCHA UNDERGROUND COMPARISON OF 2018 VERSUS 2017 MINERAL RESOURCES
Nexa Resources S.A.- Atacocha Mine

Class	31-Dec-18 Tonnes	Grade				Contained Metal Content				31-Dec-17 Tonnes	Grade				Contained Metal Content			
		Zinc	Lead	Copper	Silver	Zinc	Lead	Copper	Silver		Zinc	Lead	Copper	Silver	Zinc	Lead	Copper	Silver
	(Mt)	(%)	(%)	(%)	(g/t)	(000 t)	(000 t)	(000 t)	(000 oz)	(Mt)	(%)	(%)	(%)	(g/t)	(000 t)	(000 t)	(000 t)	(000 oz)
Measured	0.69	3.25	1.28	0.26	64.1	22.4	8.8	1.8	1,421	0.23	3.85	1.36	0.33	75.46	8.9	3.1	0.8	558
Indicated	1.53	3.61	1.07	0.30	63.8	55.2	16.4	4.6	3,140	0.84	3.60	1.13	0.32	59.66	30.2	9.5	2.7	1,611
Total Measured + Indicated	**2.22**	**3.50**	**1.14**	**0.29**	**63.9**	**77.7**	**25.2**	**6.4**	**4,561**	**1.07**	**3.65**	**1.18**	**0.32**	**63.06**	**39.1**	**12.6**	**3.4**	**2,169**
Inferred	4.95	3.46	1.52	0.35	102.7	171.3	75.2	17.3	16,347	3.34	4.36	1.65	0.35	77.84	145.6	55.1	11.7	8,359

SAN GERARDO OPEN PIT MODEL

SUMMARY

The Mineral Resource estimates are based on 40 mineralization wireframes. The geological model and mineralization wireframes were generated in 2018 by the Atacocha geologists using Leapfrog version 4.2.

Visual examination of the assay tables revealed the presence of unsampled intervals within and abutting the boundaries of the interpreted mineralization wireframes. Unsampled intervals within wireframes were assigned with detection limit values in the database prior to grade composite creation. High zinc, lead, copper, silver, and gold two metre composite grades were capped. Supervisor Software version 8.6 was used for geostatistical analysis and variography.

A sub-blocked model with a minimum sub-cell size of 0.5 m by 0.5 m by 0.5 m with parent blocks measuring 4 m by 4 m by 6 m for the mineralization wireframes was generated using Datamine Studio RM version 1.4.126. Blocks were interpolated for zinc, lead, copper, silver, and gold using OK and ID^3. A three-pass search strategy was developed by Nexa to estimate the grades for the blocks contained within the mineralized wireframes. Bulk density values vary from 2.63 g/cm^3 to 2.99 g/cm^3 in the mineralized domains, and average 2.62 g/cm^3 for the wall rock zones.

The 0.5 m by 0.5 m by 0.5 m were re-blocked into the final resource model, which has 4 m by 4 m by 6 m blocks. The re-blocked grades were assigned based on tonnage weighting the original block grades and the geology and other codes were assigned based on majority rules.

Block model validation exercises included visual comparisons of the estimated block grades to the composite grades, the comparison of the average grade of the NN estimate to the OK and ID^3 average grades, and creation of swath plots.

Blocks were classified as Measured, Indicated, and Inferred based on the number of holes and distances determined by variogram ranges.

Table 14-30 lists the holes by drilling type and year used for the San Gerardo resource estimation. The 2016 drilling program was the largest campaign of drilling.

TABLE 14-30 SAN GERARDO DRILL HOLE DATA
Nexa Resources S.A.- Atacocha Mine

Year	Holes	Metres Drilled	Type
2008	2	674.55	DDH
2012	1	100.8	DDH
2013	46	7,348.1	DDH
2014	67	1,1027	DDH
2015	120	17,379.6	DDH
2016	238	35,594	DDH
2017	32	6,881.2	DDH
2017	35	8,687	RC
2018	110	21,347.4	DDH
Total	**651**	**109,039.65**	

GEOLOGICAL INTERPRETATION AND MINERALIZATION DOMAINS

The San Gerardo Mineral Resource estimate is based on assay and geological interpretation for each individual mineralized domain. The mineralized solids were constructed in 2D and 3D using Leapfrog Geo and Datamine Software. Geological models were built by Atacocha geologists using the drilling and channel sampling assay results, as well as the structural and lithological controls observed in the open pit mineralization exposures and drill core logging data. Figure 14-20 shows an oblique 3D view of the lithology domains for the San Gerardo open pit.

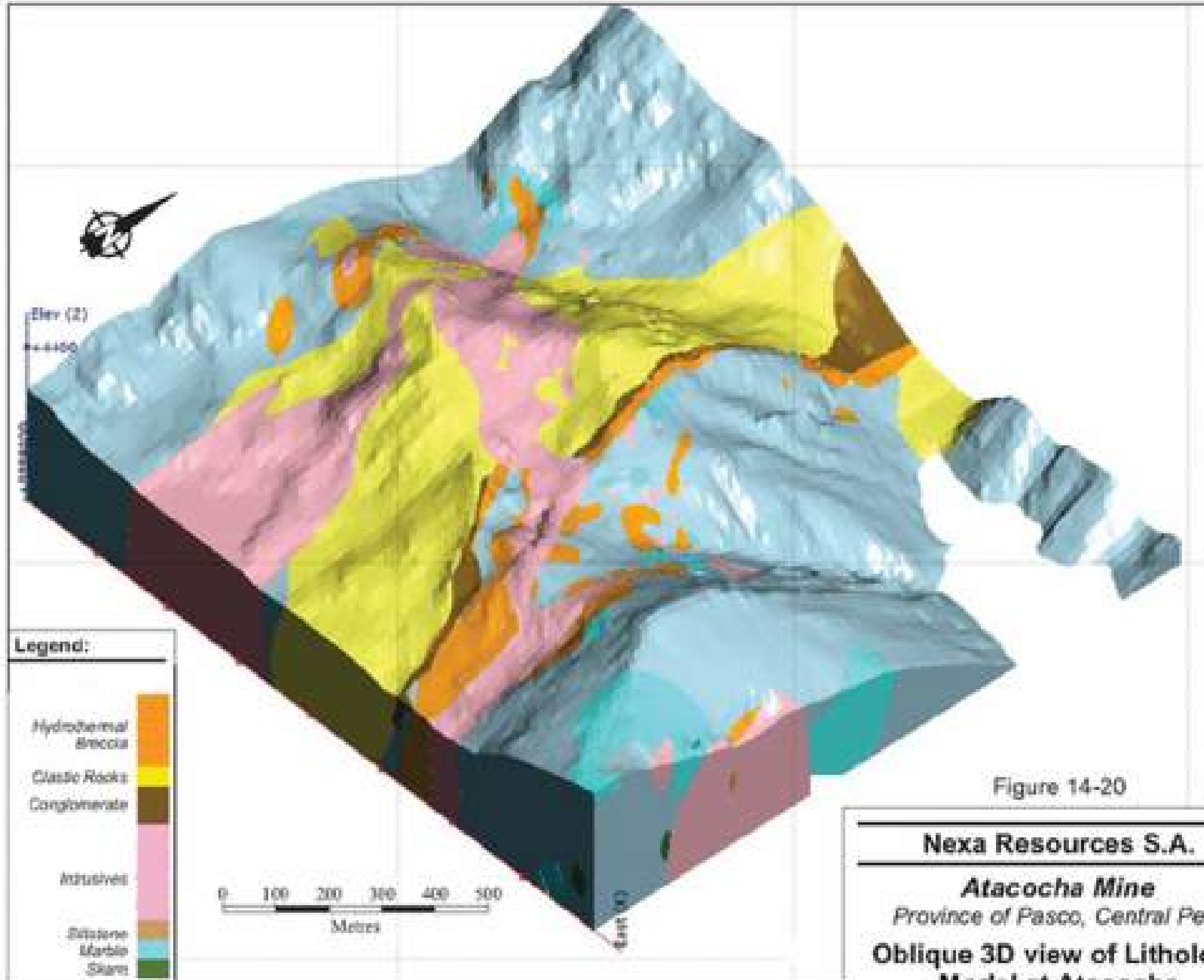


Figure 14-20

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Oblique 3D view of Lithology Model at Atacocha

March 2019

Source: Atacocha, 2019.

The San Gerardo open pit structural model was built based on the following approach:

- The main levels, openings, and pits provide information about the shape of the mineralized structure that is extrapolated to the adjacent levels of the pit.
- The resulting solids are modified with the information from drill holes between each level.
- Finally, the interpretation was verified and modified using plan views every 20 m.

During the modelling process, three styles of mineralization were identified in the Atacocha deposit:

- **Skarn:** forms mineralized zones of irregular to structural controlled geometry, primarily contained within the Pucará Group, comprising garnet with associated metallic mineralization of galena, sphalerite, chalcopyrite, and silver-bearing sulphosalts (i.e., tetrahedrite)
- **Replacement:** lenses to irregular geometry contacts within the Pucará Group, comprising metallic mineralization of galena, sphalerite, chalcopyrite, and silver-bearing sulphosalts (i.e., tetrahedrite)
- **Structurally controlled zones (i.e., veins):** mineralization comprising galena, sphalerite, and silver-bearing sulphosalts (i.e., tetrahedrite) with quartz, rhodochrosite, and pyrite forms structurally controlled shoots, with dimensions up to 150 m long, with a vertical extent of up to 350 m.

Eight lithological domains are modelled. They are identified as skarn, intrusive, siliceous breccia, massive silica, marble, sandstone, limestone, and basalt. Three other domains have been modelled, which contain potential economic mineralization: skarn, siliceous/massive breccia, and limestone replacement.

Figure 14-21 shows a plan view of the main lithological domains.

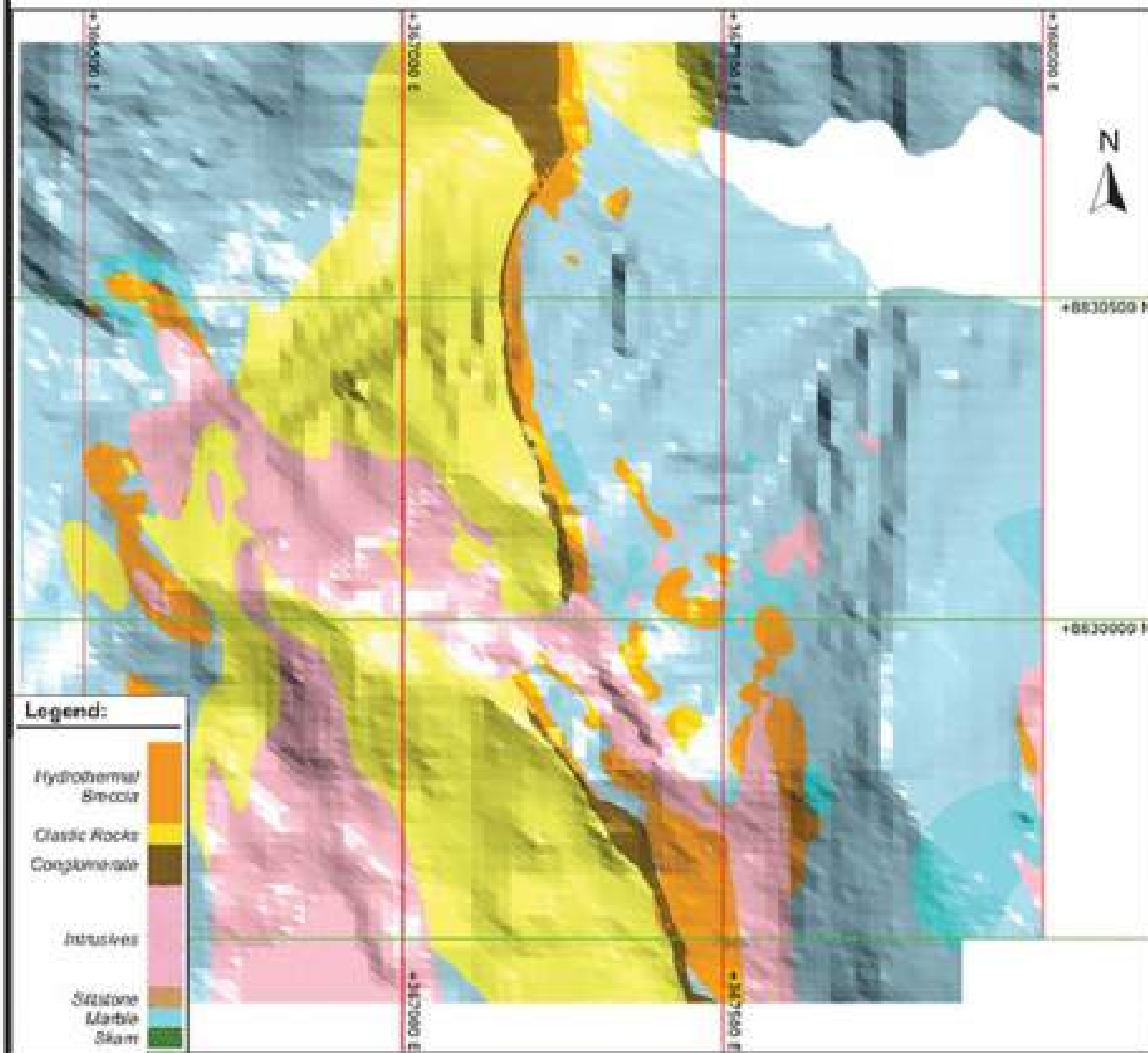


Figure 14-21

Nexa Resources S.A.

Atacocha Mine
Province of Pasco, Central Peru

Plan View of Main Lithological Dolmains

March 2019

Source: Atacocha, 2019.

Table 14-31 lists the 40 mineralization domains that were used for the San Gerardo Mineral Resources estimate.

TABLE 14-31 OPEN PIT MINERALIZATION DOMAINS
Nexa Resources S.A.- Atacocha Mine

Zone	Mineralization Domain	OB[1]	COD_OB[2]	Volume (m^3)
Tajo San Gerardo	Cuerpo uno	cpo1	1	537,120
Tajo San Gerardo	Cuerpo dos	cpo2	2	664,890
Tajo San Gerardo	Cuerpo tres	cpo3	3	60,020
Tajo San Gerardo	Cuerpo cuatro	cpo4	4	1,346,900
Tajo San Gerardo	Cuerpo cinco	cpo5	5	171,500
Tajo San Gerardo	Cuerpo seis	cpo6	6	298,090
Tajo San Gerardo	Cuerpo siete	cpo7	7	364,500
Tajo San Gerardo	Cuerpo ocho	cpo8	8	309,560
Tajo San Gerardo	Cuerp nueve	cpo9	9	196,960
Tajo San Gerardo	Cuerpo diez	cpo10	10	83,765
Tajo San Gerardo	Cuerpo once	cpo11	11	309,140
Tajo San Gerardo	Cuerpo doce	cpo12	12	419,880
Tajo San Gerardo	Cuerpo trece	cpo13	13	11,173
Tajo San Gerardo	Cuerpo catorce	cpo14	14	22,509
Tajo San Gerardo	Cuerpo quince	cpo15	15	145,790
Tajo San Gerardo	Cuerpo dieciseis	cpo16	16	149,760
Tajo San Gerardo	Curpo diecisiete	cpo17	17	158,100
Tajo San Gerardo	Cuerpo dieciocho	cpo18	18	453,440
Tajo San Gerardo	Cuerpo diecinueve	cpo19	19	290,230
Tajo San Gerardo	Ore body 10	10	20	1,362,400
Tajo San Gerardo	Ore body 10	10e	21	633,410
Tajo San Gerardo	Asunción norte	asn	22	826,750
Tajo San Gerardo	Asunción sur	ass	23	990,300
Tajo San Gerardo	Veta cherchere	chec	24	125,120
Tajo San Gerardo	Veta cherchere	chee	25	315,670
Tajo San Gerardo	Veta cherchere	chen	26	260,670
Tajo San Gerardo	Veta cherchere	chew	27	147,400
Tajo San Gerardo	Veta lizzy	liz	28	709,690
Tajo San Gerardo	Veta lizzy	lizs	29	252,300
Tajo San Gerardo	n	n1	30	348,870
Tajo San Gerardo	n	n5	31	368,850
Tajo San Gerardo	n	n10	32	32,300
Tajo San Gerardo	Veta j	vj	33	327,290
Tajo San Gerardo	Veta k	vk	34	271,370
Tajo San Gerardo	Veta l	vl	35	218,590
Tajo San Gerardo	Veta m	vm	36	266,570
Tajo San Gerardo	Veta n	vn	37	99,101
Tajo San Gerardo	Veta o	vo	38	309,890

Zone	Mineralization Domain	OB[1]	COD_OB[2]	Volume (m^3)
Tajo San Gerardo	Veta p	vp	39	96,654
Tajo San Gerardo	Veta q	vq	40	54,369

Note: OB[1]: Mineralization domain code, COB_OB[2]: Mineralization domain numerical code

The current Mineral Resource estimation included a full review of the continuity of the mineralized domains both in 3D, section, and plan views. Mineralized wireframes were constructed using the interpretations on cross sections and plans generated by the mine geologists. The strike of some mineralized domains was modified based on the observations and interpretations from these sections. Mineralized wireframes were extrapolated 40 m from the last mineralized drill hole intercept. Reinterpretation of the mineralization continuity has resulted in new modelled geometry in some the mineralized domains. Figure 14-22 illustrates the distribution of all of the mineralization domains.

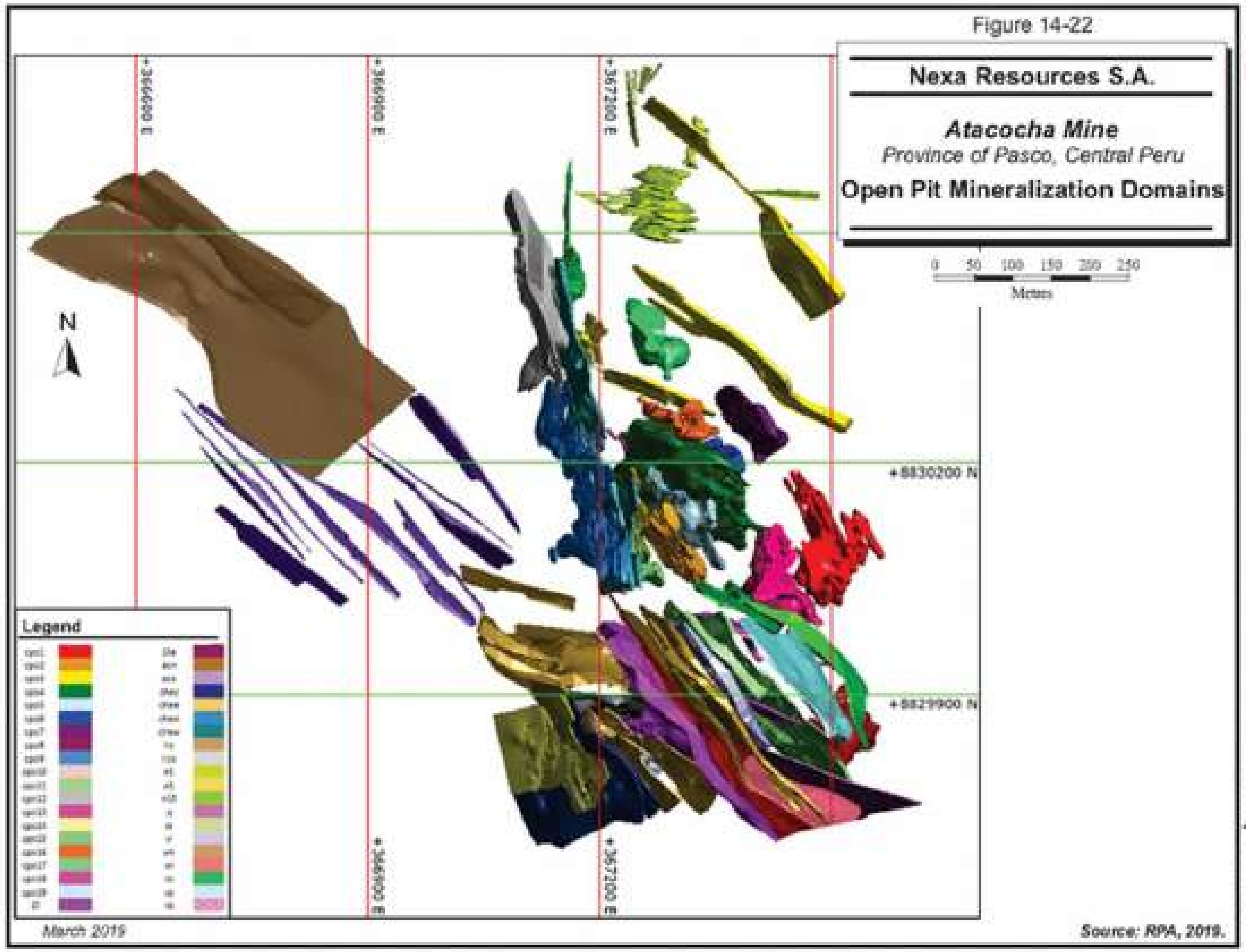


Figure 14-22
Nexa Resources S.A.
Atacocha Mine
Province of Pasco, Central Peru
Open Pit Mineralization Domains
0 50 100 150 200 250
Metres
N
+366600 E
+366900 E
+367200 E
+8830200 N
+8829900 N
Legend
March 2019
Source: RPA, 2019.

ESTIMATION DOMAINS

Atacocha defined 36 estimation domains (Table 14-32), which include the 40 mineralization domains. The estimation domains were used for each element Zn, Pb, Cu, Ag, and Au.

The estimation domains were created using a number of geological parameters including: the geographic zones (center, north, south, east, and west), structural type (mineralized body, vein, and lenses), type of emplacements (hydrothermal gap, structural, and replacement), lithological control (fault or brecciation), the anisotropy and orientation of the mineralization domains, and an NSR cut-off value of US$5.0/t.

The nomenclature that is used in all the estimation process considers "OB" as the name of each mineralization domain, "COD_OB" as the numerical code for each mineralization domain and "COD_Estim" as the numerical code for each estimation domain.

Figures 14-23 to 14-26 show the geological models at San Gerardo.

TABLE 14-32 OPEN PIT ESTIMATION DOMAINS
Nexa Resources S.A.- Atacocha Mine

COD_ESTIM	Mineralization Domain	COD_OB	Geographic Zone	Structure Type	Emplacement	Lithological Control Type
1	cpo1	1	East Zone	Mineralized Body	Hydrothermal gap	Brecciation
3	cpo3	3	North Zone	Mineralized Body	Hydrothermal gap	Brecciation
	cpo13	13	North Zone	Mineralized Body	Hydrothermal gap	Brecciation
4	cpo2	2	North Zone	Mineralized Body	Hydrothermal gap	Brecciation
	cpo4	4	North Zone	Mineralized Body	Hydrothermal gap	Brecciation
5	cpo5	5	North Zone	Mineralized Body	Hydrothermal gap	Brecciation
6	cpo6	6	North Zone	Mineralized Body	Hydrothermal gap	Brecciation
7	cpo7	7	North Zone	Mineralized Body	Hydrothermal gap	Brecciation
8	cpo8	8	South Zone	Mineralized Body	Hydrothermal gap	Brecciation
9	cpo9	9	North Zone	Mineralized Body	Hydrothermal gap	Brecciation
10	cpo10	10	North Zone	Mineralized Body	Hydrothermal gap	Brecciation
11	cpo11	11	North Zone	Mineralized Body	Hydrothermal gap	Brecciation
12	cpo12	12	North Zone	Mineralized Body	Hydrothermal gap	Brecciation
14	cpo14	14	North Zone	Mineralized Body	Hydrothermal gap	Brecciation
15	cpo15	15	North Zone	Mineralized Body	Hydrothermal gap	Brecciation
16	cpo16	16	North Zone	Mineralized Body	Hydrothermal gap	Brecciation
17	cpo17	17	North Zone	Mineralized Body	Hydrothermal gap	Brecciation
18	cpo18	18	East Zone	Mineralized Body	Hydrothermal gap	Brecciation
19	cpo19	19	South Zone	Mineralized Body	Hydrothermal gap	Brecciation
20	10	20	Center Zone	Mineralized Body	Hydrothermal gap	Brecciation
	10e	21	Center Zone	Mineralized Body	Hydrothermal gap	Brecciation

COD_ESTIM	Mineralization Domain	COD_OB	Geographic Zone	Structure Type	Emplacement	Lithological Control Type
22	asn	22	North Zone	Vein	Structural	Fault
23	ass	23	North Zone	Vein	Structural	Fault
24	chec	24	Center Zone	Lenses	Replacement	Fault
25	chee	25	East Zone	Lenses	Replacement	Fault
26	chen	26	North Zone	Lenses	Replacement	Fault
27	chew	27	West Zone	Lenses	Replacement	Fault
28	liz	28	West Zone	Vein	Hydrothermal gap	Brecciation
29	lizs	29	West Zone	Vein	Hydrothermal gap	Brecciation
30	n1	30	North Zone	Vein	Hydrothermal gap	Fault
31	n5	31	North Zone	Vein	Structural	Fault
32	n10	32	North Zone	Vein	Replacement	Fault
33	vj	33	Center Zone	Vein	Structural	Fault
34	vk	34	Center Zone	Vein	Structural	Fault
35	vl	35	Center Zone	Vein	Structural	Fault
36	vm	36	Center Zone	Vein	Structural	Fault
37	vn	37	Center Zone	Vein	Structural	Fault
38	vo	38	Center Zone	Vein	Structural	Fault
	vp	39	Center Zone	Vein	Structural	Fault
40	vq	40	Center Zone	Vein	Structural	Fault

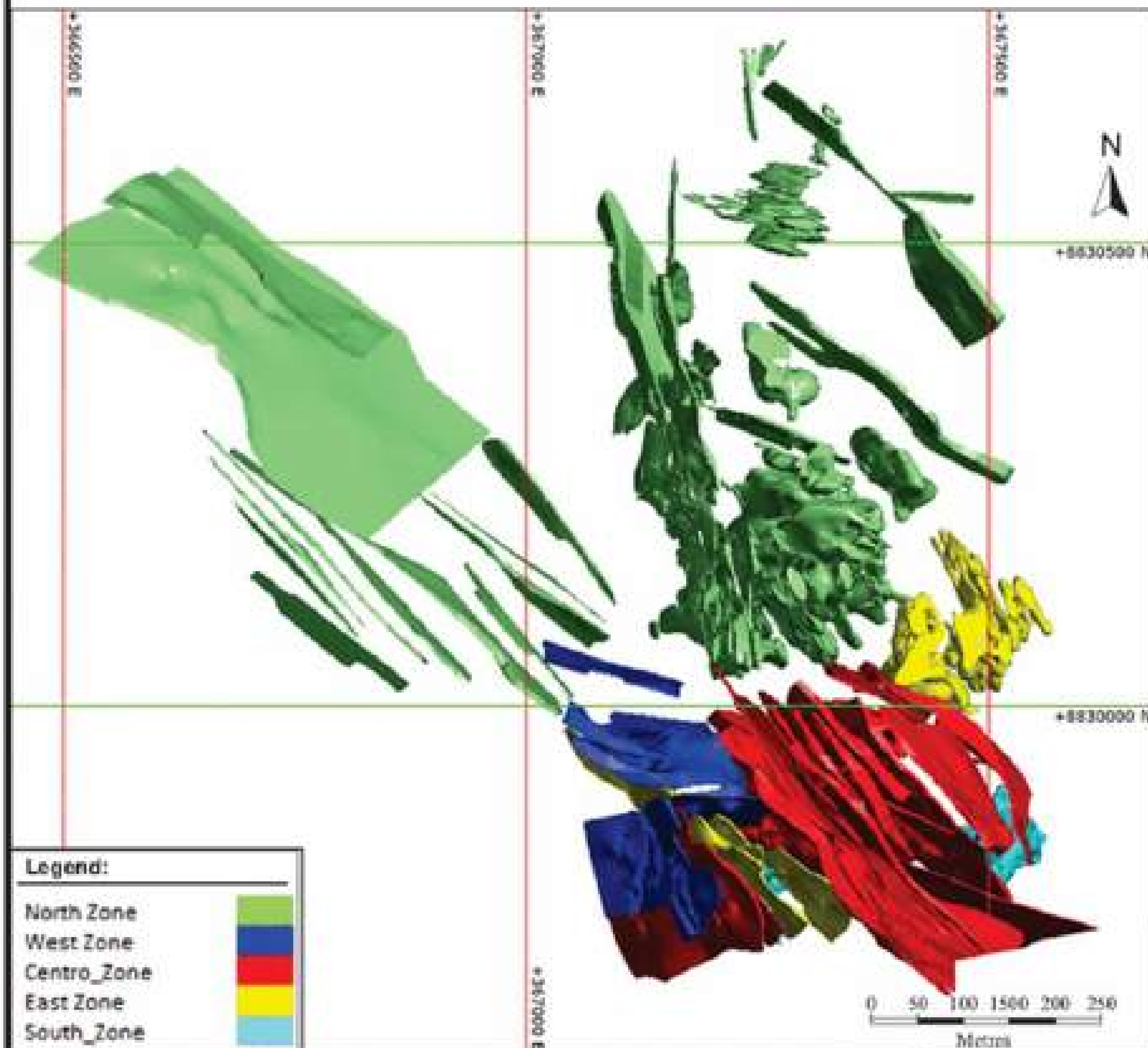


Figure 14-23

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Open Pit Geographic Zones

March 2019

Source: Atacocha, 2019.

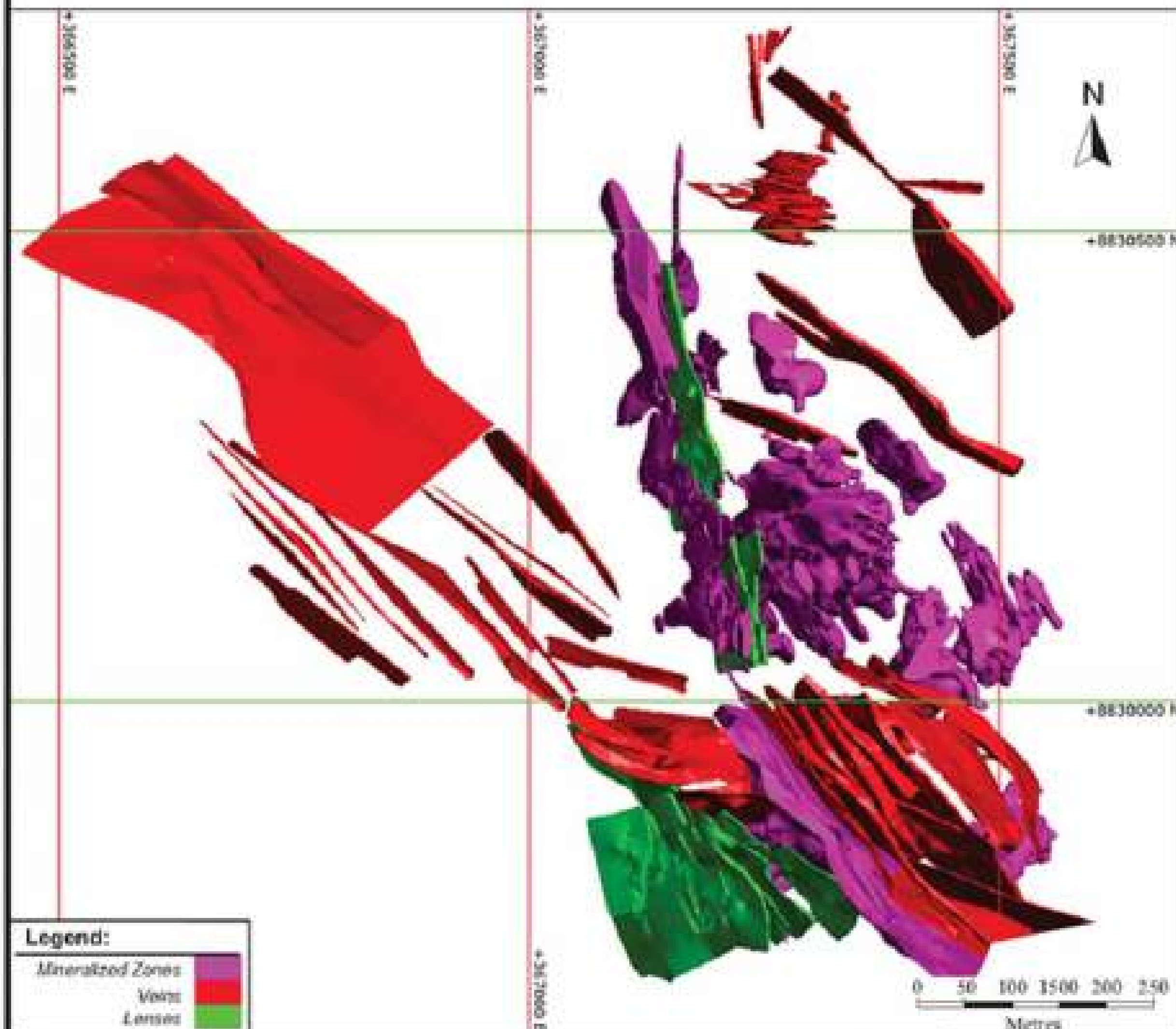


Figure 14-24

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Open Pit Structure Type Model

March 2019

Source: Atacocha, 2019.

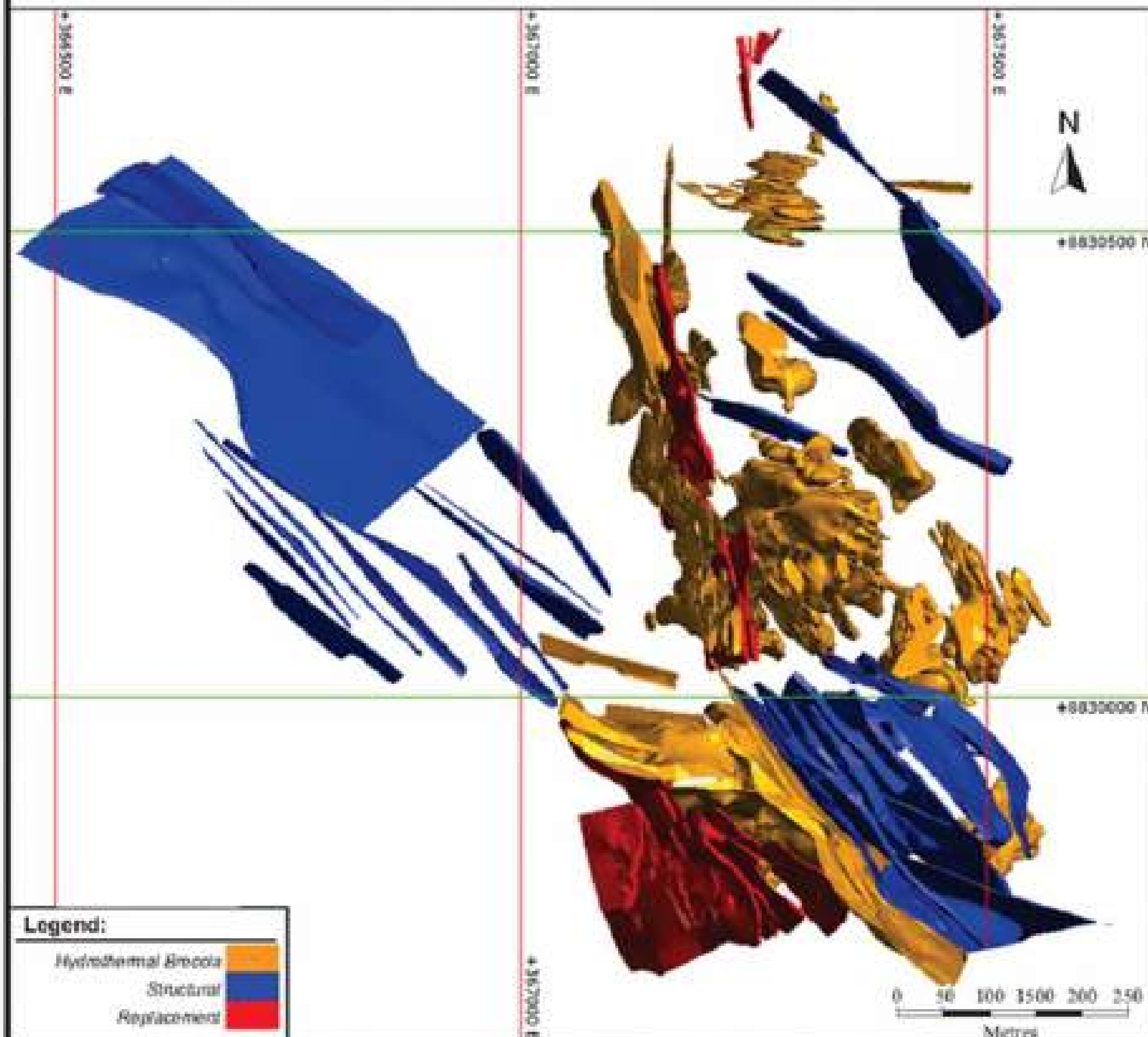


Figure 14-25

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Open Pit Emplacement Types

March 2019

Source: Atacocha, 2019.

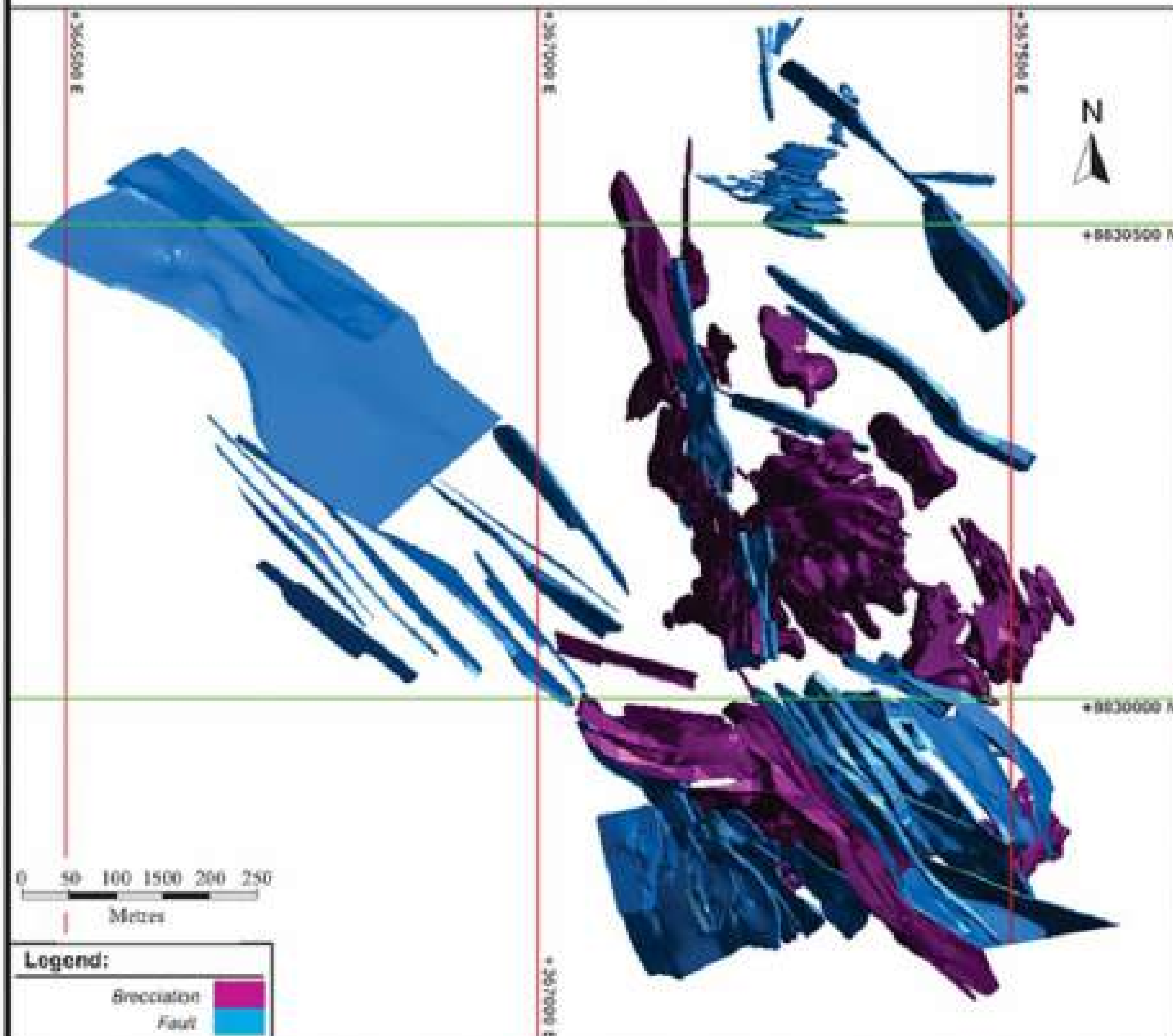


Figure 14-26

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Open Pit Lithological Control Types

March 2019

Source: Atacocha, 2019.

EXPLORATORY DATA ANALYSIS – RAW ASSAYS

The first step in developing a block model estimate after completing 3D solid models is to assess the assay data contained inside the solid models and to determine whether any additional domaining is required prior to compositing. Typically, raw assay data are extracted from each domain and are then assessed using histograms and cumulative probability plots. Tables 14-33 to 14-37 show descriptive statistics for uncapped Zn, Pb, Cu, Ag, and Au assays, respectively, within the various mineralized and estimation domains.

TABLE 14-33 ESTIMATION DOMAIN STATISTICS FOR ZINC (ZN %) – OPEN PIT
Nexa Resources S.A.- Atacocha Mine

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	CV
1	cpo1	1	1,439	0.00	33.38	1.30	2.80	2.16
4	cpo2	2	1,290	0.00	35.88	1.30	1.86	1.43
3	cpo3	3	165	0.00	20.24	1.04	1.80	1.73
4	cpo2	4	2,215	0.00	47.41	1.45	3.04	2.09
5	cpo5	5	318	0.00	11.35	0.55	1.00	1.80
6	cpo6	6	838	0.01	34.38	3.63	5.01	1.38
7	cpo7	7	331	0.00	26.29	3.52	4.14	1.18
8	cpo8	8	1,292	0.00	23.92	1.80	2.25	1.25
9	cpo9	9	620	0.00	41.02	0.65	1.62	2.49
10	cpo10	10	432	0.01	15.46	0.95	1.52	1.60
11	cpo11	11	466	0.00	25.04	0.86	2.05	2.39
12	cpo12	12	296	0.00	22.60	0.71	2.12	2.99
3	cpo3	13	49	0.04	10.92	1.20	1.65	1.38
14	cpo14	14	72	0.00	7.52	0.71	1.06	1.50
15	cpo15	15	133	0.00	17.35	1.39	2.42	1.74
16	cpo16	16	483	0.01	12.75	0.58	1.17	2.02
17	cpo17	17	497	0.00	25.46	0.79	1.43	1.80
18	cpo18	18	847	0.00	11.29	0.70	1.03	1.48
19	cpo19	19	624	0.00	19.53	1.17	1.65	1.42
20	10	20	3,240	0.00	36.11	1.11	2.07	1.87
20	10	21	995	0.00	20.33	0.96	1.53	1.60
22	asn	22	337	0.00	25.80	3.07	4.57	1.49
23	ass	23	397	0.00	27.90	0.84	2.06	2.46
24	chec	24	214	0.00	6.00	0.49	0.91	1.86
25	chee	25	516	0.00	23.54	1.09	2.79	2.55
26	chen	26	479	0.00	27.27	0.68	1.64	2.41
27	chew	27	628	0.00	16.22	0.63	1.15	1.81
28	liz	28	1,335	0.00	30.95	0.66	1.72	2.61
29	lizs	29	618	0.00	37.49	1.28	2.64	2.07
30	n1	30	517	0.00	38.61	1.10	3.52	3.20

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	CV
31	n5	31	290	0.00	16.48	1.07	1.93	1.81
32	n10	32	75	0.00	7.36	0.77	1.21	1.58
33	vj	33	1,101	0.00	28.06	1.66	2.55	1.53
34	vk	34	505	0.00	13.43	0.84	1.41	1.68
35	vl	35	371	0.00	12.37	0.75	1.31	1.74
36	vm	36	684	0.00	18.39	0.52	0.87	1.67
37	vn	37	270	0.00	11.16	1.25	1.60	1.28
38	vo	38	589	0.00	15.05	0.86	1.73	2.01
38	vo	39	188	0.00	13.04	0.81	1.69	2.07
40	vq	40	268	0.01	33.57	2.54	4.26	1.68

TABLE 14-34 ESTIMATION DOMAIN STATISTICS FOR LEAD (PB %) - OPEN PIT
Nexa Resources S.A.- Atacocha Mine

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	CV
1	cpo1	1	1,439	0.00	30.55	0.87	1.87	2.14
4	cpo2	2	1,290	0.00	25.38	1.13	2.57	2.27
3	cpo3	3	165	0.00	20.22	1.11	2.00	1.80
4	cpo2	4	2,215	0.00	28.71	1.30	2.36	1.81
5	cpo5	5	318	0.00	16.00	0.60	1.36	2.26
6	cpo6	6	838	0.01	11.09	0.23	0.83	3.70
7	cpo7	7	331	0.00	18.86	0.32	1.50	4.75
8	cpo8	8	1,292	0.00	47.22	1.43	2.40	1.68
9	cpo9	9	620	0.00	69.59	0.92	3.40	3.71
10	cpo10	10	432	0.02	23.39	1.77	3.05	1.73
11	cpo11	11	466	0.00	33.05	1.40	3.00	2.15
12	cpo12	12	296	0.01	23.08	0.75	2.21	2.93
3	cpo3	13	49	0.01	12.47	1.16	2.33	2.01
14	cpo14	14	72	0.00	4.34	0.67	1.13	1.69
15	cpo15	15	133	0.00	17.95	1.21	2.09	1.72
16	cpo16	16	483	0.01	10.45	0.63	0.97	1.54
17	cpo17	17	497	0.00	23.14	1.06	1.78	1.67
18	cpo18	18	847	0.00	28.12	0.89	1.61	1.81
19	cpo19	19	624	0.00	23.74	1.08	2.05	1.91
20	10	20	3,240	0.00	25.38	1.04	1.89	1.81
20	10	21	995	0.00	31.82	1.33	2.73	2.05
22	asn	22	337	0.00	36.13	3.48	6.01	1.73
23	ass	23	397	0.00	17.75	0.69	1.62	2.34
24	chec	24	214	0.00	8.75	0.62	1.39	2.24
25	chee	25	516	0.00	14.24	0.75	1.67	2.23
26	chen	26	479	0.00	16.30	0.64	1.44	2.24
27	chew	27	628	0.00	19.81	0.70	1.64	2.35
28	liz	28	1,335	0.00	62.27	1.36	3.99	2.94
29	lizs	29	618	0.00	39.65	1.89	4.27	2.26

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	CV
30	n1	30	517	0.00	45.00	1.40	3.67	2.61
31	n5	31	290	0.00	33.90	1.41	2.77	1.97
32	n10	32	75	0.00	5.00	0.41	0.70	1.70
33	vj	33	1,101	0.00	18.62	1.27	2.13	1.67
34	vk	34	505	0.00	33.31	1.00	2.35	2.34
35	vl	35	371	0.00	32.86	1.15	2.83	2.46
36	vm	36	684	0.00	30.05	0.62	1.24	2.00
37	vn	37	270	0.00	22.09	1.53	2.47	1.61
38	vo	38	589	0.00	29.19	1.15	2.44	2.11
38	vo	39	188	0.00	10.64	0.74	1.33	1.80
40	vq	40	268	0.01	24.33	1.36	2.38	1.75

TABLE 14-35 ESTIMATION DOMAIN STATISTICS FOR COPPER (CU %) – OPEN PIT
Nexa Resources S.A.- Atacocha Mine

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	CV
1	cpo1	1	1,439	0.00	3.07	0.05	0.13	2.87
4	cpo2	2	1,290	0.00	1.71	0.07	0.12	1.74
3	cpo3	3	165	0.00	0.17	0.02	0.03	1.54
4	cpo2	4	2,215	0.00	1.85	0.04	0.10	2.49
5	cpo5	5	318	0.00	0.29	0.01	0.02	1.77
6	cpo6	6	838	0.00	2.74	0.09	0.16	1.80
7	cpo7	7	331	0.00	1.52	0.10	0.15	1.56
8	cpo8	8	1,292	0.00	3.23	0.07	0.17	2.28
9	cpo9	9	620	0.00	1.44	0.03	0.09	3.42
10	cpo10	10	432	0.00	3.29	0.10	0.21	2.04
11	cpo11	11	466	0.00	2.07	0.10	0.21	2.14
12	cpo12	12	296	0.00	0.72	0.02	0.05	2.51
3	cpo3	13	49	0.00	0.10	0.01	0.02	1.35
14	cpo14	14	72	0.00	0.50	0.03	0.10	3.02
15	cpo15	15	133	0.00	0.36	0.02	0.04	2.32
16	cpo16	16	483	0.00	0.27	0.01	0.02	1.74
17	cpo17	17	497	0.00	1.30	0.02	0.05	3.08
18	cpo18	18	847	0.00	0.90	0.03	0.05	1.78
19	cpo19	19	624	0.00	2.23	0.05	0.14	2.97
20	10	20	3,240	0.00	1.46	0.04	0.08	2.01
20	10	21	995	0.00	10.21	0.08	0.36	4.55
22	asn	22	337	0.00	8.75	0.11	0.60	5.58
23	ass	23	397	0.00	0.30	0.03	0.03	1.22
24	chec	24	214	0.00	0.91	0.04	0.12	2.77
25	chee	25	516	0.00	3.09	0.04	0.18	4.65
26	chen	26	479	0.00	0.98	0.01	0.06	4.06
27	chew	27	628	0.00	1.57	0.03	0.10	3.60
28	liz	28	1,335	0.00	1.57	0.03	0.10	3.01

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	CV
29	lzs	29	618	0.00	6.71	0.07	0.37	5.22
30	n1	30	517	0.00	1.59	0.03	0.08	2.68
31	n5	31	290	0.00	2.04	0.02	0.14	5.83
32	n10	32	75	0.00	0.07	0.01	0.01	1.69
33	vj	33	1,101	0.00	3.67	0.06	0.15	2.69
34	vk	34	505	0.00	1.02	0.03	0.07	2.74
35	vl	35	371	0.00	1.08	0.02	0.08	3.42
36	vm	36	684	0.00	2.00	0.02	0.06	3.41
37	vn	37	270	0.00	0.32	0.03	0.05	1.77
38	vo	38	589	0.00	3.75	0.04	0.17	4.15
38	vo	39	188	0.00	0.85	0.03	0.10	3.07
40	vq	40	268	0.00	0.86	0.03	0.06	1.88

TABLE 14-36 ESTIMATION DOMAIN STATISTICS FOR SILVER (AG G/T) – OPEN PIT

Nexa Resources S.A.- Atacocha Mine

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	CV
1	cpo1	1	1,439	0.00	1,816.13	37.19	87.87	2.36
4	cpo2	2	1,290	0.00	1,028.28	34.26	73.08	2.13
3	cpo3	3	165	0.00	762.97	33.70	66.82	1.98
4	cpo2	4	2,215	0.00	4,475.79	38.74	102.97	2.66
5	cpo5	5	318	0.00	406.21	23.51	38.92	1.66
6	cpo6	6	838	1.27	236.08	12.66	23.95	1.89
7	cpo7	7	331	0.00	442.60	12.01	38.54	3.21
8	cpo8	8	1,292	0.00	1,364.82	59.18	109.56	1.85
9	cpo9	9	620	0.62	1,563.43	31.87	98.34	3.09
10	cpo10	10	432	2.02	1,045.39	77.24	93.75	1.21
11	cpo11	11	466	0.00	723.16	61.65	90.33	1.47
12	cpo12	12	296	0.10	514.29	24.82	54.69	2.20
3	cpo3	13	49	3.30	260.65	30.72	46.00	1.50
14	cpo14	14	72	0.47	390.35	33.60	80.03	2.38
15	cpo15	15	133	0.00	276.00	25.62	43.46	1.70
16	cpo16	16	483	0.41	545.55	23.83	35.08	1.47
17	cpo17	17	497	0.10	472.77	26.96	37.23	1.38
18	cpo18	18	847	0.00	689.14	28.82	49.66	1.72
19	cpo19	19	624	0.00	1,398.41	36.80	100.50	2.73
20	10	20	3,240	0.00	983.49	34.28	56.90	1.66
20	10	21	995	0.00	1,344.91	51.55	109.39	2.12
22	asn	22	337	0.00	967.32	112.64	153.84	1.37
23	ass	23	397	0.21	360.00	20.04	33.30	1.66
24	chec	24	214	0.00	572.93	34.68	89.98	2.59
25	chee	25	516	0.00	621.76	34.60	56.91	1.64
26	chen	26	479	0.00	509.47	19.38	42.74	2.21
27	chew	27	628	0.00	1,084.58	29.99	83.79	2.79

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	CV
28	liz	28	1,335	0.00	1,674.92	44.20	112.69	2.55
29	lizs	29	618	0.00	1,240.10	66.08	131.64	1.99
30	n1	30	517	0.00	1,119.73	38.41	100.32	2.61
31	n5	31	290	0.00	796.87	40.84	70.18	1.72
32	n10	32	75	0.47	130.32	14.91	19.38	1.30
33	vj	33	1,101	0.00	1,258.14	43.65	69.48	1.59
34	vk	34	505	0.00	1,171.67	29.08	69.14	2.38
35	vl	35	371	0.00	774.17	30.74	75.55	2.46
36	vm	36	684	0.00	1,345.85	24.33	55.09	2.26
37	vn	37	270	0.00	613.67	37.46	56.00	1.49
38	vo	38	589	0.00	1,663.72	32.81	81.78	2.49
38	vo	39	188	0.00	888.00	28.01	68.61	2.45
40	vq	40	268	0.65	540.89	36.67	58.39	1.59

TABLE 14-37 ESTIMATION DOMAIN'S STATISTICS FOR GOLD (AU G/T)

Nexa Resources S.A.- Atacocha Mine

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	CV
1	cpo1	1	1,288	0.00	14.00	0.20	0.57	2.78
4	cpo2	2	383	0.01	24.67	1.63	2.13	1.31
3	cpo3	3	165	0.00	20.24	1.04	1.80	1.73
4	cpo2	4	686	0.02	34.66	2.26	3.78	1.68
5	cpo5	5	318	0.00	11.35	0.55	1.00	1.80
6	cpo6	6	437	0.05	34.38	4.90	5.85	1.19
7	cpo7	7	145	0.03	22.04	4.26	4.87	1.14
8	cpo8	8	935	0.01	23.92	1.95	2.18	1.12
9	cpo9	9	620	0.00	41.02	0.65	1.62	2.49
10	cpo10	10	32	0.02	3.01	0.39	0.66	1.68
11	cpo11	11	51	0.04	3.28	0.44	0.55	1.24
12	cpo12	12	296	0.00	22.60	0.71	2.12	2.99
3	cpo3	13	49	0.04	10.92	1.20	1.65	1.38
14	cpo14	14	72	0.00	7.52	0.71	1.06	1.50
15	cpo15	15	133	0.00	17.35	1.39	2.42	1.74
16	cpo16	16	42	0.05	8.35	2.18	2.09	0.96
17	cpo17	17	497	0.00	25.46	0.79	1.43	1.80
18	cpo18	18	847	0.00	11.29	0.70	1.03	1.48
19	cpo19	19	244	0.02	19.53	1.45	2.22	1.53
20	10	20	888	0.01	24.56	1.63	2.49	1.52
20	10	21	169	0.01	12.49	1.40	1.95	1.39
22	asn	22	119	0.01	25.80	6.52	5.70	0.87
23	ass	23	397	0.00	27.90	0.84	2.06	2.46
24	chec	24	214	0.00	6.00	0.49	0.91	1.86
25	chee	25	516	0.00	23.54	1.09	2.79	2.55
26	chen	26	479	0.00	27.27	0.68	1.64	2.41
27	chew	27	628	0.00	16.22	0.63	1.15	1.81

C_ESTIM	OB	COD_OB	# Samples	Minimum	Maximum	Mean	Std. Dv	CV
28	liz	28	10	0.13	7.31	1.92	2.14	1.12
29	lizs	29	13	0.08	20.04	3.32	4.87	1.46
30	n1	30	517	0.00	38.61	1.10	3.52	3.20
31	n5	31	290	0.00	16.48	1.07	1.93	1.81
32	n10	32	75	0.00	7.36	0.77	1.21	1.58
33	vj	33	856	0.02	22.38	1.88	2.56	1.36
34	vk	34	56	0.03	6.27	1.10	1.31	1.20
35	vl	35	37	0.06	4.74	1.25	1.06	0.85
36	vm	36	684	0.00	18.39	0.52	0.87	1.67
37	vn	37	118	0.04	10.00	1.58	1.83	1.15
38	vo	38	38	0.01	5.63	0.72	1.00	1.39
38	vo	39	188	0.00	13.04	0.81	1.69	2.07
40	vq	40	250	0.02	33.57	2.65	4.36	1.65

DENSITY

A total of 363 density measurements were taken within the open pit mineralization zones Density samples were collected from most of the mineralization domains. Table 14-38 shows the statistics of all of the density data. The mineralized zones with the highest average density values are CPO2, CPO10, LIZ, CPO11, and CPO1. All of these domains have an average value greater than 2.77 g/cm³. Mean density values were assigned to domains with sufficient measurements, the overall mean value of 2.77 g/cm³ or a density value from a similar nearby domain was assigned to domains with few to no density tests.

TABLE 14-38 SAN GERARDO DENSITY DATA STATISTICS
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	N° Samples	Mean (g/cm³)	Minimum (g/cm³)	Maximum (g/cm³)	CV
Average Global Density		2.77	-	-	-
cpo1_1	33	2.71	2.51	2.83	0.04
cpo2_2	56	2.99	2.83	3	0.03
cpo4_4	10	2.72	2.67	2.82	0.02
cpo5_5	3	2.72	2.68	3.03	0.05
cpo9_9	1	2.73	4.92	4.92	
cpo10_10	2	2.99	1.41	3.36	0.41
cpo15_15	3	2.73	2.73	3.03	0.04
cpo17_17	11	2.73	2.69	2.78	0.01
cpo18_18	13	2.63	2.6	2.68	0.01
10_20	100	2.67	2.54	2.78	0.03
10e_21	24	2.78	2.67	2.75	0.01
asn_22	3	2.77	2.65	2.73	0.01
chee_25	10	2.73	2.68	2.77	0.01

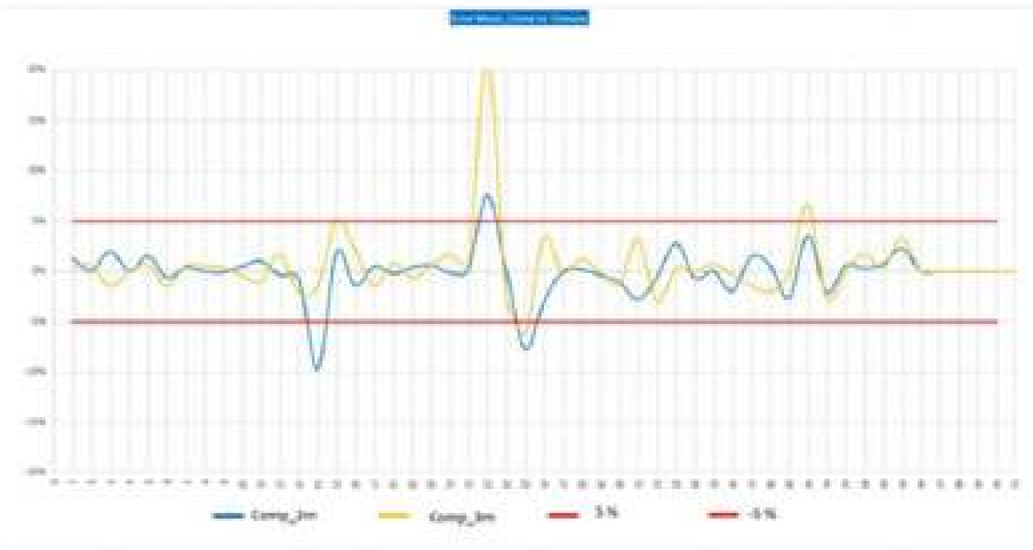
Mineralization Domain	N° Samples	Mean (g/cm³)	Minimum (g/cm³)	Maximum (g/cm³)	CV
chen_26	2	2.73	2.57	3.33	0.13
chew_27	4	2.77	2.55	2.84	0.04
lz_28	27	2.91	2.78	2.85	0.01
lzs_29	5	2.77	2.67	2.71	0.01
n1_30	16	2.65	2.57	2.67	0.01
n5_31	3	2.65	2.63	3.87	0.18
vj_33	4	2.67	2.73	3.23	0.07
vk_34	15	2.67	2.62	2.7	0.01
vl_35	7	2.68	2.58	2.73	0.02
vm_36	12	2.73	2.71	2.74	0.01
vn_37	20	2.76	2.72	2.79	0.01
vo_38	9	2.65	2.62	2.66	0.01
vp_39	2	2.65	2.66	3.01	0.06
cpo3_3		2.73	-	-	-
cpo6_6		2.72	-	-	-
cpo7_7		2.71	-	-	-
cpo8_8		2.65	-	-	-
cpo11_11		2.99	-	-	-
cpo12_12		2.73	-	-	-
cpo13_13		2.73	-	-	-
cpo14_14		2.73	-	-	-
cpo16_16		2.72	-	-	-
cpo19_19		2.99	-	-	-
620ass_23		2.91	-	-	-
chec_24		2.73	-	-	-
n10_32		2.65	-	-	-
vq_40		2.76	-	-	-

RPA generated histograms and box plots based on mineralized zones to review the assigned density values, and is of the opinion that the density values are reasonable and acceptable.

COMPOSITING

The average length of samples within the mineralized domains is 1.15 m. Assay data was composited to two-metre length samples that correspond to one third of the parent block heights. The composite length was selected based on four composite length levels (1 m, 2 m, 3 m, and 4 m) related to the block size. Figure 14-27 illustrates a comparison of the mean relative error between length-weighted composite mean versus composite mean by mineralization domain at different composite levels. Based on this analysis, the two-metre composites result in the best correlation between assay data and composites.

FIGURE 14-27 COMPOSITE LENGTH COMPARISONS – SAN GERARDO



Atacocha generated statistics to compare the distribution of the raw assays and the composites (Table 14-39). Approximately, less than two percent increase in means after compositing were observed.

TABLE 14-39 OPEN PIT RAW ASSAYS VERSUS COMPOSITE MEAN GRADES
Nexa Resources S.A.- Atacocha Mine

Element	Raw Assay Mean	Raw Assay (including Detection Value for Unsampled Data) Mean	Composites Mean
Zn (%)	0.51	0.36	0.37
Pb (%)	0.43	0.31	0.32
Cu (%)	0.02	0.02	0.02
Ag (g/t)	15.43	11.06	11.31
Au (g/t)	0.16	0.08	0.08

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

- The composite length is appropriate given the dominant sampling length and the six metre parent block height, and is suitable to support open pit Mineral Resource and Mineral Reserve estimation.
- RPA recommends investigating density-weighted compositing.

CAPPING HIGH GRADE VALUES

Where the assay distribution is skewed positively or approaches log-normal, erratic high grade 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 cut or cap them at a specific grade level.

Atacocha evaluated the composite grades using log-probability plots to asses the influence of higher grades for each element in each mineralization domain. Figure 14-28 is an example of a log-probability plot for the OB_20 Domain. The criteria, applied by Atacocha, for restricting outliers was to identify a pronounced break in the probability curve that occurs above the 95th percentile.

Table 14-40 lists the capping levels for drill hole and channel composites estimated for each mineralization domain.

FIGURE 14-28 OB_20 MINERALIZATION DOMAIN ZINC% PROBABILITY PLOT

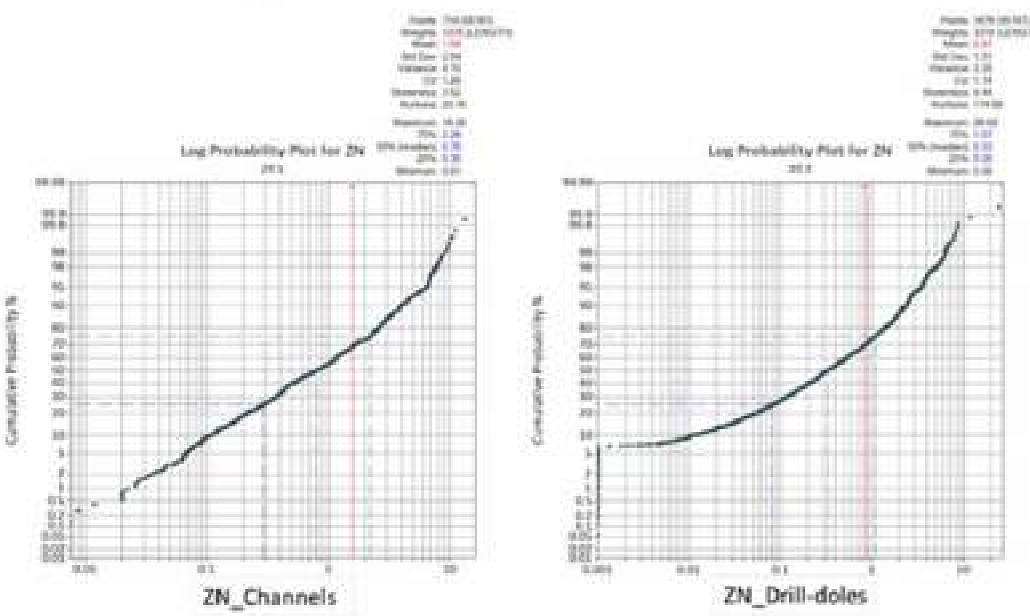


TABLE 14-40 CAPPING LEVELS BY MINERALIZATION DOMAINS – SAN GERARDO
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	ZN CAPD (%)	ZN CAPC (%)	PB CAPD (%)	PB CAPC (%)	CU CAPD (%)	CU CAPC (%)	AG CAPD (g/t)	AG CAPC (g/t)
cpo1_1	5.7	17.2	4.8	-	0.3	0.2	220	261
cpo2_2	10	9.6	5.7	11.1	0.3	0.45	150	250
cpo3_3	3.7	-	4.6	-	0.09	-	122	-9
cpo4_4	10	9.6	5.7	11.1	0.3	0.45	150	250
cpo5_5	2.5	-	2.3	-	0.06	-	80	-9
cpo6_6	9.2	19.4	1.5	1.1	0.3	0.4	47	78
cpo7_7	7.8	13.2	1.6	-	0.4	0.17	28	-9
cpo8_8	7	7.2	3.6	7	0.16	0.6	83	281
cpo9_9	3.4	-	3.6	-	0.19	-	140	-9
cpo10_10	4.5	-	8	-	0.35	-	258	-9
cpo11_11	4.3	-	9	-	0.5	-	212	300
cpo12_12	6.4	-	3.8	-	0.13	-	98	-9
cpo13_13	3.7	-	4.6	-	0.09	-	122	-9
cpo14_14	-	-	-	-	-	-	-9	-9
cpo15_15	5.9	-	5.4	-	0.08	-	94	-9
cpo16_16	2	-	2.5	-	0.05	-	83	-9
cpo17_17	3.7	-	4.1	-	0.08	-	96	-9
cpo18_18	4	-	4.3	-	0.15	-	145	-9
cpo19_19	2.5	5.2	2	6.8	0.35	0.18	87	275
10_20	7.1	8.6	7.8	8	0.45	0.46	260	210
10e_21	7.1	8.6	7.8	8	0.45	0.46	260	210
asn_22	3	20	2.3	27.5	0.12	0.145	160	650
ass_23	5.2	-	3.4	-	0.1	-	85	-9
chec_24	2.9	-	4	-	0.35	-	170	-9
chee_25	10.36	-	4.5	-	0.2	-	165	-9
chen_26	3.8	-	2.5	-	0.07	-	74	-9
chew_27	4.1	-	2.5	-	0.13	-	130	-9
lz_28	5.1	-	12	-	0.2	-	362	-9
lzs_29	5.7	-	8.6	-	0.4	-	270	-9
n1_30	9.5	-	5	-	0.17	-	210	-9
n5_31	4.9	-	5.5	-	0.06	-	130	-9
n10_32	-	-	-	-	-	-	-9	-9
vj_33	2.8	9.8	4.9	7	0.08	0.28	77	180
vk_34	3.2	-	5.5	-	0.09	-	120	-9
vl_35	2.9	-	6.5	-	0.09	-	175	-9
vm_36	2.2	-	3	-	0.1	-	105	-9
vn_37	3.3	4.2	3.6	-	0.1	-	85	-9
vo_38	5.1	-	5.1	-	0.26	-	135	200
vp_39	5.1	-	5.1	-	0.26	-	135	200
vq_40	-	9.15	-	4.8	-	0.11	-9	120

Note:
CAPC: Capping levels for Channels, CAPD: Capping levels for drill holes

RPA performed an independent capping analysis on some elements for some domains, as well as a visual validation of the block model in section and plan views. Log probability plots were inspected for some of these domains and RPA estimated a capping grade using a combination of histograms, probability plots, and decile analyses. RPA found that most of the CV values after applying capping are low, with the exception of a few domains with CV values exceeding 1.5. RPA considers that the capping levels selected are appropriate.

RPA offers the following conclusions and recommendations:

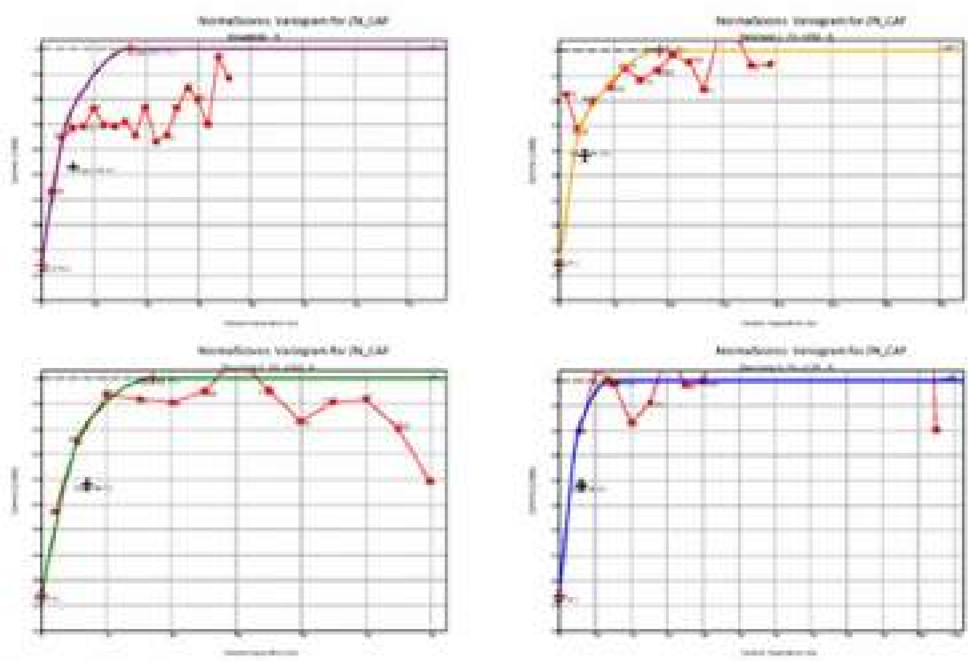
- In general, the capping levels are reasonable and suitable for the estimation of Mineral Resources.
- Investigate if capping levels should be applied based on high grade and low grade domains for lead, copper, silver, and gold.
- Report the metal loss as a result of capping high grades, and assess 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.
- Adjust capping values with production data when an accurate reconciliation process is established.

VARIOGRAPHY

Atacocha generated downhole and directional variograms using the two-metre composite values generated for each domain and each element. The variograms were used to support the characterization and quantification of the variance of mineralization within the spatial continuity of the mineralization domains being analyzed. Variograms were standardized and modelled using two spherical structures in three directions. The variograms were used for OK interpolation and as a guide for selecting search ellipse ranges.

Figure 14-29 shows an example of the zinc variograms for the CPO8 Domain. The results for all modelled variograms for Zn, Pb, Cu, Ag, and Au are listed in Tables 14-41 to 14-45, respectively.

FIGURE 14-29 ZINC NORMAL SCORE EXPERIMENTAL AND MODELLED VARIOGRAMS FOR DOMAIN CPO8



Source: Nexa Atacocha

TABLE 14-41 ZINC VARIOGRAM PARAMETERS – OPEN PIT
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
10_20	0.23	-160.417	65.186	128.076	3	2	1	0.39	9	4	14	0.37	26	22	15
10e_20	0.23	-160.417	65.186	128.076	3	2	1	0.39	9	4	14	0.37	26	22	15
asn_22	0.11	120	50	-180	3	2	1	0.3	12	4	5	0.59	68	25	15
ass_23	0.1	-145	70	90	3	2	1	0.47	33	51	12	0.43	110	97	39
chec_24	0.16	25.162	35.396	-45.281	3	2	1	0.52	27	20	7	0.33	59	36	15
chee_24	0.17	-12.624	61.095	-29.032	3	2	1	0.59	12	13	5	0.25	54	24	10
chen_26	0.15	-64.583	65.186	51.924	3	2	1	0.48	16	8	5	0.37	43	25	10
chew_27	0.26	24.232	37.761	-26.565	3	2	1	0.53	13	5	2	0.2	17	10	5
cpo1_1	0.29	-113.515	31.321	60.349	3	2	1	0.38	9	9	3	0.33	40	28	16
cpo2_4	0.31	-16.204	51.71	-46.997	3	2	1	0.35	12	6	16	0.34	69	34	23
cpo3_3	0.32	-44.266	72.036	-147.054	3	2	1	0.33	8	10	5	0.35	20	15	10
cpo4_4	0.31	-16.204	51.71	-46.997	3	2	1	0.35	12	6	16	0.34	69	34	23
cpo5_5	0.28	-16.204	51.71	-46.997	3	2	1	0.38	16	10	16	0.34	69	34	21
cpo6_6	0.25	-28.018	74.207	-71.323	3	2	1	0.51	30	6	11	0.25	52	17	5

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
cpo7_7	0.2	-45	85	0	3	2	1	0.2	36	21	12	0.6	107	27	16
cpo8_8	0.17	-100	70	0	3	2	1	0.47	23	7	6	0.37	92	17	14
cpo9_9	0.19	-58.796	51.71	46.997	3	2	1	0.39	6	14	2	0.43	23	18	8
cpo10_10	0.18	60.575	58.525	-163.26	3	2	1	0.36	38	8	5	0.46	66	24	15
cpo11_11	0.24	-120	45	90	3	2	1	0.42	25	8	5	0.34	37	24	10
cpo12_12	0.26	-70.854	56.774	61.813	3	2	1	0.43	23	44	5	0.31	57	54	10
cpo13_13	0.32	-44.266	72.036	-147.054	3	2	1	0.33	8	10	5	0.35	20	15	10
cpo14_14	0.05	-90	90	70	3	2	1	0.37	15	10	5	0.58	30	20	10
cpo15_15	0.13	-111.74	58.525	109.425	3	2	1	0.41	30	20	5	0.46	45	30	10
cpo16_16	0.16	-161.534	69.409	75.651	3	2	1	0.4	26	15	12	0.43	145	79	15
cpo17_17	0.39	-45	80	0	3	2	1	0.13	7	7	5	0.48	25	18	10
cpo18_18	0.22	96.997	51.71	-143.796	3	2	1	0.44	32	8	9	0.34	41	18	15
cpo19_19	0.2	-99.981	44.782	97.053	3	2	1	0.43	18	19	3	0.37	58	20	11
liz_28	0.26	31.74	58.525	-109.425	3	2	1	0.37	38	33	10	0.37	116	69	14
lizs_29	0.15	-16.692	48.974	-74.66	3	2	1	0.38	31	11	5	0.47	49	25	11
n1_30	0.36	49.007	68.909	-135.993	3	2	1	0.39	15	8	5	0.25	65	23	10
n5_31	0.08	29.07	49.741	-82.249	3	2	1	0.45	17	10	5	0.47	28	20	10
n10_32	0.14	-90	90	90	3	2	1	0.55	20	10	5	0.31	30	20	10
vj_33	0.15	-80	75	0	3	2	1	0.33	7	7	4	0.52	32	29	10
vk_34	0.19	-108.967	50.332	57.602	3	2	1	0.46	19	11	5	0.35	30	26	10
vl_35	0.16	24.494	67.731	-62.727	3	2	1	0.43	20	15	5	0.4	30	20	10
vm_36	0.31	32.656	47.726	-67.371	3	2	1	0.37	45	19	5	0.32	61	39	10
vn_37	0.16	115	75	180	3	2	1	0.27	10	6	5	0.55	52	18	10
vo_38	0.16	40	75	-90	3	2	1	0.53	21	12	5	0.29	41	35	10
vp_38	0.16	40	75	-90	3	2	1	0.53	21	12	5	0.29	41	35	10
vq_40	0.07	-116.416	59.624	80.075	3	2	1	0.47	18	8	5	0.46	24	15	10

TABLE 14-42 LEAD VARIOGRAM PARAMETERS – OPEN PIT
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
10_20	0.18	-160.417	65.186	128.076	3	2	1	0.42	11	11	11	0.41	35	36	13
10e_20	0.18	-160.417	65.186	128.076	3	2	1	0.42	11	11	11	0.41	35	36	13
asn_22	0.09	120	50	-180	3	2	1	0.54	35	12.5	5	0.37	58	25	16
ass_23	0.19	-145	70	90	3	2	1	0.38	43	24	10	0.44	125	64	20
chec_24	0.18	25.162	35.396	-45.281	3	2	1	0.44	27	20	7	0.38	56	36	15
chee_24	0.16	-12.624	61.095	-29.032	3	2	1	0.57	26	13	5	0.28	54	24	10
chen_26	0.15	-64.583	65.186	51.924	3	2	1	0.38	22	14	5	0.47	66	35	10
chew_27	0.13	24.232	37.761	-26.565	3	2	1	0.63	13	5	2	0.23	17	10	5
cpo1_1	0.19	-113.515	31.321	60.349	3	2	1	0.35	9	16	7	0.46	25	21	19

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
cpo2_4	0.19	14.21	41.561	-48.07	3	2	1	0.49	50	21	26	0.32	82	57	36
cpo3_3	0.27	-44.266	72.036	-147.054	3	2	1	0.41	8	10	5	0.33	20	15	10
cpo4_4	0.19	14.21	41.561	-48.07	3	2	1	0.49	50	21	26	0.32	82	57	36
cpo5_5	0.2	14.21	41.561	-48.07	3	2	1	0.45	50	21	26	0.35	82	57	36
cpo6_6	0.27	-54.561	75.894	-44.561	3	2	1	0.47	55	17	17	0.27	76	22	22
cpo7_7	0.47	-45	85	0	3	2	1	0.4	26	18	6	0.14	44	21	13
cpo8_8	0.17	-34.007	68.909	-44.007	3	2	1	0.37	13	8	6	0.46	75	34	18
cpo9_9	0.27	-24.425	58.525	16.74	3	2	1	0.52	8	8	2	0.21	12	31	8
cpo10_10	0.17	60.575	58.525	-163.26	3	2	1	0.47	13	8	5	0.36	54	22	14
cpo11_11	0.3	-120	45	90	3	2	1	0.36	6	8	5	0.35	24	20	10
cpo12_12	0.37	-83.308	48.974	74.66	3	2	1	0.35	40	25	5	0.28	44	47	10
cpo13_13	0.27	-44.266	72.036	-147.054	3	2	1	0.41	8	10	5	0.33	20	15	10
cpo14_14	0.05	-90	90	70	3	2	1	0.43	15	10	5	0.52	30	20	10
cpo15_15	0.12	-111.74	58.525	109.425	3	2	1	0.4	30	20	5	0.47	45	30	10
cpo16_16	0.26	-161.534	69.409	75.651	3	2	1	0.32	31	22	9	0.42	44	33	12
cpo17_17	0.31	-45	80	0	3	2	1	0.47	6	10	5	0.22	16	15	10
cpo18_18	0.29	-108.308	48.974	74.66	3	2	1	0.3	13	15	6	0.41	40	31	10
cpo19_19	0.29	-94.851	44.136	104.002	3	2	1	0.32	55	28	11	0.39	90	39	19
liz_28	0.31	31.74	58.525	-109.425	3	2	1	0.39	41	26	5	0.3	88	49	10
lizs_29	0.16	-16.692	48.974	-74.66	3	2	1	0.43	30	7	5	0.41	44	20	10
n1_30	0.26	49.007	68.909	-135.993	3	2	1	0.38	22	8	5	0.36	30	20	10
n5_31	0.08	29.07	49.741	-82.249	3	2	1	0.44	17	10	5	0.47	28	20	10
n10_32	0.14	-90	90	90	3	2	1	0.55	20	10	5	0.31	30	20	10
vj_33	0.14	-80	75	0	3	2	1	0.46	8	10	4	0.39	67	38	10
vk_34	0.21	-108.967	50.332	57.602	3	2	1	0.48	19	11	5	0.31	30	26	10
vl_35	0.19	24.494	67.731	-62.727	3	2	1	0.48	20	15	5	0.33	30	20	10
vm_36	0.33	32.858	47.726	-67.371	3	2	1	0.39	43	19	5	0.29	46	39	10
vn_37	0.19	115	75	180	3	2	1	0.37	9	6	5	0.43	53	22	10
vo_38	0.17	40	75	-90	3	2	1	0.46	5	15	5	0.37	34	29	10
vp_38	0.17	40	75	-90	3	2	1	0.46	5	15	5	0.37	34	29	10
vq_40	0.07	-116.416	59.624	80.075	3	2	1	0.47	18	8	5	0.46	21	15	10

TABLE 14-43 COPPER VARIOGRAM PARAMETERS – OPEN PIT
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
10_20	0.2	-160.417	65.186	128.076	3	2	1	0.5	5	10	7	0.3	25	18	10
10e_20	0.2	-160.417	65.186	128.076	3	2	1	0.5	5	10	7	0.3	25	18	10
asn_22	0.32	120	50	-180	3	2	1	0.59	25	8	5	0.08	46	14	13
ass_23	0.27	-145	70	90	3	2	1	0.3	19	51	12	0.43	103	86	56

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
chec_24	0.2	25.162	35.396	-45.281	3	2	1	0.51	18	18	7	0.29	32	25	16
chee_24	0.15	-12.624	61.095	-29.032	3	2	1	0.57	33	8	5	0.28	50	22	10
chen_26	0.17	-64.583	65.186	51.924	3	2	1	0.41	22	20	5	0.42	65	38	10
chew_27	0.27	24.232	37.761	-26.565	3	2	1	0.29	7	5	2	0.43	22	10	5
cpo1_1	0.42	-119.728	33.644	71.887	3	2	1	0.32	9	19	6	0.27	20	20	16
cpo2_4	0.19	-16.204	51.71	-46.997	3	2	1	0.37	12	14	5	0.44	80	45	35
cpo3_3	0.21	-44.266	72.036	-147.054	3	2	1	0.48	20	15	5	0.31	30	20	10
cpo4_4	0.19	-16.204	51.71	-46.997	3	2	1	0.37	12	14	5	0.44	80	45	35
cpo5_5	0.21	14.21	41.561	-48.07	3	2	1	0.46	50	21	26	0.32	82	57	36
cpo6_6	0.39	-54.561	75.894	-44.561	3	2	1	0.2	21	14	8	0.41	88	24	15
cpo7_7	0.13	-55	85	0	3	2	1	0.54	39	19	9	0.33	49	27	18
cpo8_8	0.32	-25.417	65.186	-51.924	3	2	1	0.44	11	23	9	0.23	61	52	39
cpo9_9	0.32	-24.425	58.525	16.74	3	2	1	0.43	10	18	2	0.25	17	31	8
cpo10_10	0.16	60.575	58.525	-163.26	3	2	1	0.35	19	10	5	0.49	20	15	10
cpo11_11	0.21	80	60	-90	3	2	1	0.46	38	31	5	0.33	90	35	10
cpo12_12	0.3	-83.308	48.974	74.66	3	2	1	0.38	14	12	5	0.31	25	22	10
cpo13_13	0.21	-44.266	72.036	-147.054	3	2	1	0.48	20	15	5	0.31	30	20	10
cpo14_14	0.1	-90	90	70	3	2	1	0.59	15	10	5	0.31	30	20	10
cpo15_15	0.13	-111.74	58.525	109.425	3	2	1	0.42	30	20	5	0.45	45	30	10
cpo16_16	0.27	-161.534	69.409	75.651	3	2	1	0.46	27	13	9	0.27	87	61	12
cpo17_17	0.39	-45	80	0	3	2	1	0.36	16	13	4	0.25	27	15	8
cpo18_18	0.26	-75.439	75.894	44.561	3	2	1	0.49	10	5	5	0.25	23	14	10
cpo19_19	0.25	-99.981	44.762	97.053	3	2	1	0.47	42	8	8	0.28	47	23	14
liz_28	0.29	31.74	58.525	-109.425	3	2	1	0.44	68	11	8	0.27	92	43	30
lizs_29	0.19	-16.692	48.974	-74.66	3	2	1	0.42	45	11	5	0.39	65	25	10
n1_30	0.5	49.007	68.909	-135.993	3	2	1	0.21	36	8	5	0.3	44	23	10
n5_31	0.08	29.07	49.741	-82.249	3	2	1	0.45	17	10	5	0.47	28	20	10
n10_32	0.12	-90	90	90	3	2	1	0.55	20	10	5	0.32	30	20	10
vj_33	0.16	-80	75	0	3	2	1	0.34	7	8	4	0.5	37	22	10
vk_34	0.22	-108.987	50.332	57.602	3	2	1	0.49	19	11	5	0.29	30	26	10
vl_35	0.22	24.494	67.731	-62.727	3	2	1	0.53	20	15	5	0.25	30	20	10
vm_36	0.38	32.858	47.726	-67.371	3	2	1	0.39	33	19	5	0.23	55	31	10
vn_37	0.22	115	75	180	3	2	1	0.38	20	12	5	0.4	32	23	10
vo_38	0.27	40	75	-90	3	2	1	0.5	11	11	5	0.23	44	23	10
vp_38	0.27	40	75	-90	3	2	1	0.5	11	11	5	0.23	44	23	10
vq_40	0.08	-116.416	59.624	80.075	3	2	1	0.48	18	8	5	0.43	24	15	10

TABLE 14-44 SILVER VARIOGRAM PARAMETERS – OPEN PIT
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
10_20	0.17	-160.417	65.186	128.076	3	2	1	0.39	6	15	5	0.44	30	20	10
10e_20	0.17	-160.417	65.186	128.076	3	2	1	0.39	6	15	5	0.44	30	20	10
asn_22	0.1	120	50	-180	3	2	1	0.49	34	10	5	0.4	50	25	15
ass_23	0.1	-145	70	90	3	2	1	0.52	16	14	10	0.38	41	30	20
chec_24	0.25	25.162	35.396	-45.281	3	2	1	0.41	20	10	7	0.34	54	30	15
chee_24	0.16	-12.624	61.095	-29.032	3	2	1	0.41	21	8	5	0.43	46	30	10
chen_26	0.15	-64.583	65.186	51.924	3	2	1	0.35	22	24	5	0.5	68	28	10
chew_27	0.26	24.232	37.761	-26.565	3	2	1	0.53	13	5	2	0.21	17	10	5
cpo1_1	0.2	-68.076	65.186	35.417	3	2	1	0.43	7	18	6	0.37	19	19	12
cpo2_4	0.28	8.796	51.71	-46.997	3	2	1	0.38	44	14	8	0.35	66	46	22
cpo3_3	0.26	-44.266	72.036	-147.054	3	2	1	0.41	20	15	5	0.33	30	20	10
cpo4_4	0.28	8.796	51.71	-46.997	3	2	1	0.38	44	14	8	0.35	66	46	22
cpo5_5	0.18	14.21	41.561	-48.07	3	2	1	0.44	50	21	26	0.38	82	57	36
cpo6_6	0.18	16.302	78.831	-116.74	3	2	1	0.5	23	14	6	0.32	32	18	13
cpo7_7	0.16	-45	85	0	3	2	1	0.37	45	15	6	0.48	47	22	13
cpo8_8	0.18	-34.007	68.909	-44.007	3	2	1	0.35	23	28	5	0.47	72	34	23
cpo9_9	0.45	-24.425	58.525	16.74	3	2	1	0.19	28	28	2	0.36	67	44	8
cpo10_10	0.29	60.575	58.525	-163.26	3	2	1	0.32	13	8	3	0.39	41	12	8
cpo11_11	0.23	80	60	-90	3	2	1	0.37	46	12	5	0.39	65	18	10
cpo12_12	0.37	71.072	53.775	-72.912	3	2	1	0.33	11	12	5	0.29	65	30	10
cpo13_13	0.26	-44.266	72.036	-147.054	3	2	1	0.41	20	15	5	0.33	30	20	10
cpo14_14	0.09	-90	90	70	3	2	1	0.55	15	10	5	0.36	30	20	10
cpo15_15	0.12	-111.74	58.525	109.425	3	2	1	0.38	30	20	5	0.5	45	30	10
cpo16_16	0.2	-161.534	69.409	75.651	3	2	1	0.39	24	16	13	0.41	37	23	15
cpo17_17	0.34	-45	80	0	3	2	1	0.41	5	11	7	0.25	16	14	10
cpo18_18	0.21	-108.308	48.974	74.66	3	2	1	0.33	25	13	4	0.46	56	31	10
cpo19_19	0.16	-110.93	49.741	97.751	3	2	1	0.47	79	24	8	0.35	121	37	14
liz_28	0.29	31.74	58.525	-109.425	3	2	1	0.47	36	10	16	0.23	108	38	28
lizs_29	0.16	-16.692	48.974	-74.66	3	2	1	0.45	40	11	5	0.39	59	29	10
n1_30	0.34	49.007	68.909	-135.993	3	2	1	0.42	10	8	5	0.24	30	20	10
n5_31	0.08	29.07	49.741	-82.249	3	2	1	0.42	17	10	5	0.5	28	20	10
n10_32	0.12	-90	90	90	3	2	1	0.52	20	10	5	0.36	30	20	10
vj_33	0.14	-80	75	0	3	2	1	0.34	7	5	4	0.52	32	23	10
vk_34	0.19	-108.967	50.332	57.602	3	2	1	0.46	19	11	5	0.34	30	26	10
vl_35	0.2	24.494	67.731	-62.727	3	2	1	0.47	20	15	5	0.34	30	20	10
vm_36	0.34	32.858	47.726	-67.371	3	2	1	0.4	32	19	5	0.26	46	39	10
vn_37	0.18	115	75	180	3	2	1	0.31	23	6	5	0.51	40	17	10
vo_38	0.22	40	75	-90	3	2	1	0.46	70	12	5	0.32	91	31	10
vp_38	0.22	40	75	-90	3	2	1	0.46	70	12	5	0.32	91	31	10

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE 1	2	3	Rotation System V-AXIS 1	2	3	Search Ellipse Structure 1 Sill	Major	Minor	Vertical	Search Ellipse Structure 2 Sill	Major	Minor	Vertical
vq_40	0.07	-116.416	59.624	80.075	3	2	1	0.45	18	8	5	0.48	24	15	10

TABLE 14-45 GOLD VARIOGRAM PARAMETERS – OPEN PIT
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE 1	2	3	Rotation System V-AXIS 1	2	3	Search Ellipse Structure 1 Sill	Major	Minor	Vertical	Search Ellipse Structure 2 Sill	Major	Minor	Vertical
10_20	0.2	-160.417	65.186	128.076	3	2	1	0.46	15	19	5	0.34	44	23	14
10e_20	0.2	-160.417	65.186	128.076	3	2	1	0.46	15	19	5	0.34	44	23	14
asn_22	0.15	120	50	-180	3	2	1	0.22	44	12.5	5	0.63	50	25	15
ass_23	0.09	-145	70	90	3	2	1	0.41	53	51	10	0.5	100	60	20
chec_24	0.26	25.162	35.396	-45.281	3	2	1	0.42	20	10	7	0.32	52	30	15
chee_24	0.19	-12.624	61.095	-29.032	3	2	1	0.43	19	11	5	0.37	53	23	10
chen_26	0.16	-64.583	65.186	51.924	3	2	1	0.37	31	24	5	0.46	68	28	10
chew_27	0.27	24.232	37.761	-26.565	3	2	1	0.53	9	5	2	0.21	17	10	5
cpo1_1	0.14	-49.425	58.525	16.74	3	2	1	0.38	23	9	8	0.48	31	22	18
cpo2_4	0.22	8.796	51.71	-46.997	3	2	1	0.5	19	30	3	0.27	40	35	8
cpo3_3	0.26	-44.266	72.036	-147.054	3	2	1	0.42	20	10	10	0.32	30	20	15
cpo4_4	0.22	8.796	51.71	-46.997	3	2	1	0.5	19	30	3	0.27	40	35	8
cpo5_5	0.19	14.21	41.561	-46.07	3	2	1	0.45	50	21	26	0.36	82	57	36
cpo6_6	0.16	16.302	78.831	-116.74	3	2	1	0.42	23	14	6	0.42	32	18	13
cpo7_7	0.26	-45	85	0	3	2	1	0.4	9	6	6	0.34	27	18	13
cpo8_8	0.13	-34.007	68.909	-44.007	3	2	1	0.48	11	27	5	0.39	33	44	27
cpo9_9	0.32	-24.425	58.525	16.74	3	2	1	0.32	12	7	2	0.36	32	23	8
cpo10_10	0.28	60.575	58.525	-163.26	3	2	1	0.33	15	5	5	0.39	42	16	14
cpo11_11	0.26	80	60	-90	3	2	1	0.24	9	12	5	0.5	36	24	10
cpo12_12	0.21	71.072	53.775	-72.912	3	2	1	0.32	23	47	5	0.47	132	58	10
cpo13_13	0.26	-44.266	72.036	-147.054	3	2	1	0.42	20	10	10	0.32	30	20	15
cpo14_14	0.06	-90	90	70	3	2	1	0.42	15	10	5	0.52	30	20	10
cpo15_15	0.1	-111.74	58.525	109.425	3	2	1	0.32	30	20	5	0.57	45	30	10
cpo16_16	0.16	-161.534	69.409	75.651	3	2	1	0.43	13	18	14	0.39	46	23	15
cpo17_17	0.33	-45	80	0	3	2	1	0.3	7	20	5	0.37	30	26	15
cpo18_18	0.22	-108.308	48.974	74.66	3	2	1	0.47	17	13	4	0.31	62	31	10
cpo19_19	0.17	-110.93	49.741	97.751	3	2	1	0.41	79	24	8	0.42	121	37	14
liz_28	0.45	31.74	58.525	-109.425	3	2	1	0.22	34	8	5	0.33	75	31	10
lizs_29	0.17	-16.692	48.974	-74.66	3	2	1	0.5	11	11	5	0.34	32	25	10
n1_30	0.31	49.007	68.909	-135.993	3	2	1	0.41	23	8	5	0.28	40	20	10
n5_31	0.09	29.07	49.741	-82.249	3	2	1	0.46	15	10	5	0.45	30	20	10
n10_32	0.13	-90	90	90	3	2	1	0.52	20	10	5	0.35	30	20	10
vj_33	0.16	-80	75	0	3	2	1	0.35	7	8	4	0.47	32	26	10
vk_34	0.23	-108.967	50.332	57.602	3	2	1	0.46	19	11	5	0.31	30	26	10

Mineralization Domain	Nugget	Datamine Rotation V-ANGLE			Rotation System V-AXIS			Search Ellipse Structure 1				Search Ellipse Structure 2			
		1	2	3	1	2	3	Sill	Major	Minor	Vertical	Sill	Major	Minor	Vertical
vl_35	0.2	24.494	67.731	-62.727	3	2	1	0.46	20	15	5	0.34	30	20	10
vm_36	0.37	32.858	47.726	-67.371	3	2	1	0.37	58	27	5	0.26	68	50	10
vn_37	0.22	115	75	180	3	2	1	0.33	23	6	5	0.45	40	17	10
vo_38	0.24	40	75	-90	3	2	1	0.53	12	22	5	0.22	32	27	10
vp_38	0.24	40	75	-90	3	2	1	0.53	12	22	5	0.22	32	27	10
vq_40	0.14	-116.416	59.624	80.075	3	2	1	0.71	18	8	5	0.14	24	15	10

BLOCK MODEL AND GRADE ESTIMATION

The block model was built and grade estimates were performed using Datamine Studio RM (version 14.1.156-3) software. The San Gerardo block model was sub-celled at mineralization wireframes boundaries with parent cells measuring 4 m by 4 m by 6 m high and a minimum sub-cell size of 0.5 m by 0.5 m by 0.5 m. The block model parameters are given in Table 14-46. The block size was selected according to the geometry of the mineralization and in relation to the bench size.

TABLE 14-46 SAN GERARDO BLOCK MODEL PARAMETERS
Nexa Resources S.A.- Atacocha Mine

Parameter	East (m)	North (m)	Elevation (m)
Minimum Coordinate	366,300	8,826,200	2,398
Maximum Coordinate	368,700	8,831,156	5,854
Block size (m)	4	4	6

Atacocha defined the direction and the search parameters based on the trend analysis performed in the variography study and the orientation and geometry of the mineralized wireframes.

The grade interpolation strategy incorporated three estimation runs using OK and ID^3 estimation methods for Zn, Pb, Cu, Ag, and Au composites. The estimation parameters are given in Tables 14-47 to 14-51.

A comparison of ID^3 and OK against NN results was performed to determine the most effective parameters for the estimation. NN interpolation was used only for validation purpose.

TABLE 14-47 ZINC ESTIMATION PARAMETERS – OPEN PIT
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Method	Rotation System S-AXIS			Search Ellipse S-DIST			Pass 1 SVOLFAC	# Comp		Pass 2 SVOLFAC	# Comp		Pass 3 SVOLFAC	# Comp	
		1	2	3	1	2	3		Min	Max		Min	Max		Min	Max
10_20	OK	3	2	1	24	12	10	1	9	14	2	6	9	10	1	5
10e_20	OK	3	2	1	18	12	8	1	8	12	2	6	8	20	2	6
asn_22	OK	3	2	1	20	10	8	1	6	7	2	4	5	30	1	3
ass_23	OK	3	2	1	45	24	12	1	7	12	1.8	5	6	30	1	5
chec_24	OK	3	2	1	32	18	8	1	7	12	1.7	5	7	10	1	4
chee_25	OK	3	2	1	24	12	10	1	9	12	1.7	6	9	10	1	5
chen_26	OK	3	2	1	32	16	10	1	7	12	1.5	5	6	10	1	4
chew_27	ID^3	3	2	1	24	12	10	1	8	14	1.5	6	7	10	1	5
cpo1_1	OK	3	2	1	32	12	10	1	7	13	2	5	7	10	1	5
cpo2_4	OK	3	2	1	28	12	10	1	7	12	2	5	6	10	1	3
cpo3_3	ID^3	3	2	1	21	12	8	1	7	12	2	5	7	10	1	4
cpo4_4	OK	3	2	1	36	16	10	1	7	12	2	5	6	10	1	4
cpo5_5	ID^3	3	2	1	28	14	10	1	7	12	2	5	6	10	1	5
cpo6_6	OK	3	2	1	26	10	8	1	7	12	2	5	7	10	1	3
cpo7_7	OK	3	2	1	20	10	8	1	8	12	2	5	7	10	1	4
cpo8_8	ID^3	3	2	1	20	10	6	1	7	9	2	5	8	10	1	3
cpo9_9	ID^3	3	2	1	26	10	8	1	7	12	2	6	7	10	1	5
cpo10_10	OK	3	2	1	30	15	10	1	7	12	2	5	7	10	1	3
cpo11_11	OK	3	2	1	28	22	10	1	6	10	2	5	8	10	1	4
cpo12_12	OK	3	2	1	30	20	12	1	7	12	2	5	8	30	1	4
cpo13_3	ID^3	3	2	1	30	20	10	1	9	15	2	6	9	10	1	3
cpo14_14	ID^3	3	2	1	30	22	10	1	8	12	2	5	7	10	1	5
cpo15_15	ID^3	3	2	1	25	12	10	1	8	12	2	6	9	10	1	5
cpo16_16	OK	3	2	1	22	12	10	1	8	12	1.7	6	8	10	1	5
cpo17_17	ID^3	3	2	1	16	10	8	1	8	10	2.2	6	8	10	1	5
cpo18_18	OK	3	2	1	24	12	8	1	8	12	2	5	7	10	1	4
cpo19_19	OK	3	2	1	24	12	8	1	7	12	2	6	7	10	1	5
liz_28	OK	3	2	1	23	15	8	1	6	12	2	6	9	10	1	3
lizs_29	ID^3	3	2	1	26	10	7	1	6	8	2	6	9	30	1	4
n1_30	ID^3	3	2	1	30	16	10	1	6	10	2	6	7	10	1	3
n5_31	ID^3	3	2	1	25	15	9	1	7	9	2	5	8	10	1	4
n10_32	ID^3	3	2	1	20	12	6	1	7	10	2	5	7	15	1	3
vj_33	ID^3	3	2	1	26	18	13	1	7	9	1.8	5	8	30	1	3
vk_34	OK	3	2	1	28	16	10	1	9	14	2	6	9	10	1	6
vl_35	ID^3	3	2	1	25	12	10	1	7	12	2	5	7	10	1	5
vm_36	OK	3	2	1	25	15	10	1	7	12	2	5	7	10	1	5
vn_37	ID^3	3	2	1	20	12	10	1	7	12	1.7	5	6	8	1	3
vo_38	ID^3	3	2	1	18	12	10	1	8	12	2	5	7	10	1	5
vp_38	ID^3	3	2	1	25	12	10	1	5	8	1.9	4	6	10	1	3
vq_40	ID^3	3	2	1	16	10	8	1	7	12	2	3	5	7	1	3

TABLE 14-48 LEAD ESTIMATION PARAMETERS – OPEN PIT
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Method	Rotation System S-AXIS			Search Ellipse S-DIST			Pass 1 SVOLFAC	# Comp		Pass 2 SVOLFAC	# Comp		Pass 3 SVOLFAC	# Comp	
		1	2	3	1	2	3		Min	Max		Min	Max		Min	Max
10_20	OK	3	2	1	24	12	10	1	9	14	2	6	9	10	1	5
10e_20	OK	3	2	1	18	12	8	1	8	12	2	6	8	20	2	6
asn_22	OK	3	2	1	20	10	8	1	6	7	2	4	5	30	1	3
ass_23	OK	3	2	1	45	24	12	1	7	12	1.8	5	6	30	1	5
chec_24	OK	3	2	1	32	16	8	1	7	12	1.7	5	7	10	1	5
chee_25	OK	3	2	1	24	12	10	1	9	12	1.7	6	9	10	1	5
chen_26	OK	3	2	1	32	16	10	1	7	12	1.5	5	6	10	1	4
chew_27	ID^3	3	2	1	24	12	10	1	8	14	1.5	6	7	10	1	5
cpo1_1	OK	3	2	1	32	12	10	1	6	13	2	5	6	10	1	5
cpo2_4	OK	3	2	1	28	12	10	1	7	12	2	5	6	10	1	3
cpo3_3	ID^3	3	2	1	22	12	6	1	7	12	1.5	5	7	10	1	4
cpo4_4	OK	3	2	1	36	16	10	1	7	12	2	5	6	10	1	5
cpo5_5	ID^3	3	2	1	26	14	10	1	7	12	2	5	6	10	1	5
cpo6_6	ID^3	3	2	1	26	10	8	1	7	12	2	5	7	10	1	3
cpo7_7	OK	3	2	1	24	15	8	1	7	14	1.5	5	7	10	1	3
cpo8_8	OK	3	2	1	20	10	6	1	7	9	2	4	6	10	1	3
cpo9_9	ID^3	3	2	1	24	10	8	1	8	12	2	6	7	10	1	5
cpo10_10	ID^3	3	2	1	30	15	10	1	7	12	2	5	7	10	1	3
cpo11_11	ID^3	3	2	1	28	22	10	1	7	15	2	5	7	10	1	4
cpo12_12	ID^3	3	2	1	30	20	10	1	7	12	2	6	9	10	1	5
cpo13_3	ID^3	3	2	1	30	20	10	1	8	12	2	5	8	10	1	3
cpo14_14	ID^3	3	2	1	30	25	15	1	8	12	2	5	7	10	1	4
cpo15_15	ID^3	3	2	1	25	12	10	1	8	12	2	6	9	10	1	5
cpo16_16	OK	3	2	1	22	12	10	1	8	12	1.7	6	8	10	1	5
cpo17_17	ID^3	3	2	1	16	10	8	1	8	10	2.2	6	8	10	1	5
cpo18_18	ID^3	3	2	1	24	12	8	1	7	12	2	5	6	10	1	3
cpo19_19	ID^3	3	2	1	24	12	8	1	7	12	2	6	7	10	1	5
liz_28	OK	3	2	1	28	15	8	1	6	12	2	5	8	10	1	3
lizs_29	OK	3	2	1	24	10	7	1	8	12	2	6	9	30	1	4
n1_30	OK	3	2	1	26	16	10	1	9	12	2	6	8	10	1	3
n5_31	OK	3	2	1	25	15	10	1	5	9	2.3	5	8	10	1	5
n10_32	ID^3	3	2	1	20	12	6	1	7	10	2	5	7	15	2	3
vj_33	ID^3	3	2	1	28	14	6	1	7	9	1.8	5	8	30	1	3
vk_34	ID^3	3	2	1	28	16	10	1	9	14	2	6	9	10	1	4
vl_35	ID^3	3	2	1	25	12	10	1	7	12	2	5	7	10	1	5
vm_36	ID^3	3	2	1	25	15	10	1	7	12	2	5	7	10	1	5
vn_37	ID^3	3	2	1	22	12	10	1	7	12	1.7	5	6	8	1	3
vo_38	ID^3	3	2	1	16	12	10	1	6	12	2	4	6	10	1	4
vp_39	ID^3	3	2	1	25	12	10	1	5	12	1.9	4	6	10	1	5

Mineralization Domain	Method	Rotation System S-AXIS 1	2	3	Search Ellipse S-DIST 1	2	3	Pass 1 SVOLFAC	# Comp Min	Max	Pass 2 SVOLFAC	# Comp Min	Max	Pass 3 SVOLFAC	# Comp Min	Max
vq_40	ID^3	3	2	1	16	10	8	1	7	12	2	3	5	7	1	3

TABLE 14-49 COPPER ESTIMATION PARAMETERS – OPEN PIT
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Method	Rotation System S-AXIS 1	2	3	Search Ellipse S-DIST 1	2	3	Pass 1 SVOLFAC	# Comp Min	Max	Pass 2 SVOLFAC	# Comp Min	Max	Pass 3 SVOLFAC	# Comp Min	Max
10_20	OK	3	2	1	24	12	10	1	9	14	2	6	9	10	1	5
10e_20	OK	3	2	1	18	12	8	1	8	12	2	6	8	20	2	6
asn_22	OK	3	2	1	20	10	8	1	6	7	2	4	5	30	1	3
ass_23	OK	3	2	1	45	24	12	1	7	12	1.8	5	6	30	1	5
chec_24	OK	3	2	1	32	18	8	1	7	12	1.7	5	7	10	1	4
chee_25	OK	3	2	1	24	12	10	1	9	12	1.7	6	9	10	1	5
chen_26	ID^3	3	2	1	32	16	10	1	7	12	1.5	5	6	10	1	4
chew_27	ID^3	3	2	1	24	12	10	1	8	14	1.5	6	7	10	1	5
cpo1_1	OK	3	2	1	30	20	10	1	7	13	2	5	7	10	1	3
cpo2_4	OK	3	2	1	28	10	10	1	7	12	2	5	6	10	1	3
cpo3_3	ID^3	3	2	1	22	10	6	1	7	12	2	5	7	10	1	5
cpo4_4	OK	3	2	1	36	16	10	1	7	12	2	5	6	10	1	4
cpo5_5	ID^3	3	2	1	26	12	10	1	7	12	2	5	6	10	1	5
cpo6_6	ID^3	3	2	1	26	10	8	1	7	12	2	6	7	10	1	3
cpo7_7	OK	3	2	1	20	10	8	1	7	12	2	5	7	10	1	4
cpo8_8	OK	3	2	1	20	10	8	1	7	12	2	5	8	10	1	3
cpo9_9	ID^3	3	2	1	22	10	8	1	7	12	2	5	9	10	1	5
cpo10_10	ID^3	3	2	1	20	14	10	1	7	12	2.2	5	7	10	1	3
cpo11_11	OK	3	2	1	28	22	10	1	6	10	2	4	6	10	1	4
cpo12_12	ID^3	3	2	1	30	25	10	1	7	12	2	5	8	10	1	4
cpo13_3	ID^3	3	2	1	35	25	15	1	7	15	2	5	7	10	1	3
cpo14_14	ID^3	3	2	1	30	20	10	1	7	12	2	5	7	10	1	5
cpo15_15	ID^3	3	2	1	25	12	10	1	8	12	2	6	9	10	1	5
cpo16_16	OK	3	2	1	20	12	10	1	8	12	1.7	6	8	10	1	5
cpo17_17	ID^3	3	2	1	16	10	8	1	8	10	2.2	6	8	10	1	5
cpo18_18	OK	3	2	1	24	12	8	1	8	12	2	5	7	10	1	4
cpo19_19	ID^3	3	2	1	24	12	8	1	7	12	2	6	7	10	1	5
liz_28	ID^3	3	2	1	28	15	8	1	6	12	2	5	8	10	1	3
lizs_29	ID^3	3	2	1	25	10	6	1	6	9	2	6	9	30	1	3
n1_30	ID^3	3	2	1	24	15	10	1	7	10	2	6	8	10	1	5
n5_31	ID^3	3	2	1	28	23	10	1	5	9	2	5	8	10	1	5
n10_32	ID^3	3	2	1	20	12	6	1	7	10	2	5	7	15	2	3
vj_33	ID^3	3	2	1	26	14	6	1	7	9	1.8	5	8	30	1	3

Mineralization Domain	Method	Rotation System S-AXIS 1	2	3	Search Ellipse S-DIST 1	2	3	Pass 1 SVOLFAC	# Comp Min	# Comp Max	Pass 2 SVOLFAC	# Comp Min	# Comp Max	Pass 3 SVOLFAC	# Comp Min	# Comp Max
vk_34	ID^3	3	2	1	28	16	10	1	9	14	2	6	9	10	1	4
vl_35	ID^3	3	2	1	25	12	10	1	7	12	2	5	7	10	1	5
vm_36	OK	3	2	1	28	15	10	1	7	12	2	5	7	10	1	5
vn_37	ID^3	3	2	1	22	12	10	1	7	12	1.7	5	6	8	1	3
vo_38	OK	3	2	1	21	15	10	1	6	12	2	4	6	10	1	4
vp_38	ID^3	3	2	1	25	12	10	1	5	8	1.9	4	6	10	1	3
vq_40	ID^3	3	2	1	16	10	8	1	7	12	2	3	5	7	1	3

TABLE 14-50 SILVER ESTIMATION PARAMETERS – OPEN PIT
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Method	Rotation System S-AXIS 1	2	3	Search Ellipse S-DIST 1	2	3	Pass 1 SVOLFAC	# Comp Min	# Comp Max	Pass 2 SVOLFAC	# Comp Min	# Comp Max	Pass 3 SVOLFAC	# Comp Min	# Comp Max
10_20	OK	3	2	1	24	12	10	1	9	14	2	6	9	10	1	6
10e_20	OK	3	2	1	18	12	8	1	8	12	2	6	8	20	2	6
asn_22	OK	3	2	1	20	10	8	1	6	7	2	4	5	30	1	3
ass_23	OK	3	2	1	45	24	12	1	7	12	1.8	5	6	30	1	5
chec_24	ID^3	3	2	1	32	18	8	1	7	12	1.7	5	7	10	1	4
chee_25	OK	3	2	1	24	12	10	1	9	12	1.7	6	9	10	1	5
chen_26	OK	3	2	1	32	16	10	1	7	12	1.5	5	6	10	1	4
chew_27	ID^3	3	2	1	24	12	10	1	8	14	1.5	6	7	10	1	5
cpo1_1	OK	3	2	1	30	12	10	1	7	13	2	5	7	10	1	5
cpo2_4	OK	3	2	1	28	12	10	1	7	12	2	5	6	10	1	3
cpo3_3	ID^3	3	2	1	21	12	8	1	7	12	2	5	7	10	1	4
cpo4_4	OK	3	2	1	36	16	10	1	7	12	2	5	6	10	1	5
cpo5_5	ID^3	3	2	1	28	14	10	1	7	12	2	5	6	10	1	5
cpo6_6	ID^3	3	2	1	26	10	8	1	7	12	2	6	7	10	1	3
cpo7_7	ID^3	3	2	1	20	10	10	1	8	12	2.2	5	7	10	1	3
cpo8_8	OK	3	2	1	20	10	8	1	7	12	2	5	8	10	1	3
cpo9_9	OK	3	2	1	26	10	8	1	7	12	2	6	7	10	1	5
cpo10_10	ID^3	3	2	1	30	15	10	1	7	12	2.2	5	7	10	1	3
cpo11_11	OK	3	2	1	28	22	10	1	9	12	2	4	6	10	1	4
cpo12_12	ID^3	3	2	1	35	20	10	1	7	15	2	5	9	10	1	3
cpo13_3	ID^3	3	2	1	30	20	10	1	9	15	2	5	8	10	1	3
cpo14_14	ID^3	3	2	1	35	20	10	1	7	12	2	5	7	10	1	4
cpo15_15	ID^3	3	2	1	25	12	10	1	8	12	2	6	9	10	1	5
cpo16_16	OK	3	2	1	22	12	10	1	8	12	1.7	6	8	10	1	5
cpo17_17	ID^3	3	2	1	16	10	8	1	8	10	2.2	6	8	10	1	5
cpo18_18	ID^3	3	2	1	24	12	8	1	7	12	2	5	6	10	1	3
cpo19_19	OK	3	2	1	24	12	8	1	7	12	2	6	7	10	1	5

Mineralization Domain	Method	Rotation System S-AXIS			Search Ellipse S-DIST			Pass 1 SVOLFAC	# Comp		Pass 2 SVOLFAC	# Comp		Pass 3 SVOLFAC	# Comp	
		1	2	3	1	2	3		Min	Max		Min	Max		Min	Max
liz_28	ID^3	3	2	1	26	15	8	1	6	12	2	5	8	10	1	3
lizs_29	OK	3	2	1	24	10	7	1	8	12	2	6	9	30	1	3
n1_30	OK	3	2	1	28	16	10	1	8	12	2	6	8	10	1	5
n5_31	ID^3	3	2	1	25	18	9	1	5	9	2.3	5	8	10	1	5
n10_32	ID^3	3	2	1	20	12	6	1	7	10	2	5	7	15	1	3
vj_33	ID^3	3	2	1	28	14	6	1	7	9	1.8	5	8	30	1	3
vk_34	OK	3	2	1	28	16	10	1	9	18	2	6	9	10	1	6
vl_35	OK	3	2	1	25	12	10	1	7	12	2	5	7	10	1	5
vm_36	OK	3	2	1	28	15	10	1	7	12	2	5	7	10	1	5
vn_37	ID^3	3	2	1	22	12	10	1	7	12	1.7	5	6	8	1	3
vo_38	ID^3	3	2	1	18	12	10	1	7	12	2	5	7	10	1	5
vp_38	ID^3	3	2	1	25	12	10	1	5	8	1.9	4	6	10	1	3
vq_40	ID^3	3	2	1	16	10	8	1	7	12	2	3	5	7	1	3

TABLE 14-51 GOLD ESTIMATION PARAMETERS – OPEN PIT
Nexa Resources S.A.- Atacocha Mine

Mineralization Domain	Method	Rotation System S-AXIS			Search Ellipse S-DIST			Pass 1 SVOLFAC	# Comp		Pass 2 SVOLFAC	# Comp		Pass 3 SVOLFAC	# Comp	
		1	2	3	1	2	3		Min	Max		Min	Max		Min	Max
10_20	ID^3	3	2	1	24	12	10	1	8	14	2	6	9	10	1	4
10e_20	OK	3	2	1	18	12	8	1	8	12	2	6	8	20	2	6
asn_22	ID^3	3	2	1	20	10	8	1	6	7	2	4	5	30	1	3
ass_23	OK	3	2	1	45	24	12	1	7	12	1.8	5	6	30	1	5
chec_24	ID^3	3	2	1	32	18	8	1	7	12	1.7	5	7	10	1	4
chee_25	ID^3	3	2	1	24	12	10	1	9	12	1.7	6	9	10	1	5
chen_26	OK	3	2	1	32	16	10	1	7	12	1.5	5	6	10	1	4
chew_27	ID^3	3	2	1	24	12	10	1	8	14	1.5	6	7	10	1	5
cpo1_1	ID^3	3	2	1	28	20	10	1	7	13	2	5	7	10	1	6
cpo2_4	ID^3	3	2	1	30	12	10	1	12	15	2	7	9	10	1	5
cpo3_3	ID^3	3	2	1	21	12	8	1	7	12	2	5	7	10	1	3
cpo4_4	ID^3	3	2	1	30	16	10	1	7	12	2	5	6	10	1	5
cpo5_5	ID^3	3	2	1	28	14	10	1	7	12	2	5	6	10	1	5
cpo6_6	ID^3	3	2	1	20	8	6	1	7	12	2	5	7	10	1	3
cpo7_7	OK	3	2	1	24	15	10	1	8	12	2.2	5	7	10	1	3
cpo8_8	ID^3	3	2	1	35	20	15	1	4	5	2	3	4	20	1	2
cpo9_9	OK	3	2	1	24	10	8	1	7	12	2	5	7	10	1	4
cpo10_10	ID^3	3	2	1	30	15	10	1	7	12	2	5	7	10	1	3
cpo11_11	ID^3	3	2	1	35	18	10	1	7	12	2.3	5	7	10	1	4
cpo12_12	ID^3	3	2	1	35	20	15	1	9	18	2	6	9	10	1	6
cpo13_3	ID^3	3	2	1	35	20	15	1	9	18	2	6	9	10	1	3
cpo14_14	ID^3	3	2	1	30	20	10	1	7	12	2	5	7	10	1	4

Mineralization Domain	Method	Rotation System S-AXIS 1	2	3	Search Ellipse S-DIST 1	2	3	Pass 1 SVOLFAC	# Comp Min	# Comp Max	Pass 2 SVOLFAC	# Comp Min	# Comp Max	Pass 3 SVOLFAC	# Comp Min	# Comp Max
cpo15_15	ID^3	3	2	1	25	12	10	1	8	12	2	6	9	10	1	5
cpo16_16	ID^3	3	2	1	22	12	10	1	8	12	1.7	6	8	10	1	5
cpo17_17	ID^3	3	2	1	16	10	8	1	8	10	2.2	6	8	10	1	5
cpo18_18	ID^3	3	2	1	24	12	8	1	6	12	2	5	7	10	1	3
cpo19_19	ID^3	3	2	1	36	14	10	1	7	10	1.5	5	6	10	1	4
liz_28	OK	3	2	1	23	15	8	1	6	12	2	6	9	10	1	3
lizs_29	OK	3	2	1	24	14	8	1	8	12	2	6	9	30	1	4
n1_30	OK	3	2	1	26	16	10	1	9	12	2	6	8	10	1	5
n5_31	ID^3	3	2	1	25	15	9	1	7	9	2	5	8	10	1	5
n10_32	ID^3	3	2	1	20	12	6	1	7	10	2	5	7	15	2	3
vj_33	ID^3	3	2	1	28	14	6	1	7	9	1.8	5	8	30	1	3
vk_34	ID^3	3	2	1	32	16	10	1	9	16	2	6	8	10	1	4
vl_35	ID^3	3	2	1	25	12	10	1	7	12	2	5	7	10	1	5
vm_36	ID^3	3	2	1	25	15	10	1	7	12	2	5	7	10	1	5
vn_37	ID^3	3	2	1	20	12	10	1	7	12	1.7	5	6	8	1	3
vo_38	ID^3	3	2	1	21	12	10	1	8	12	2	5	7	10	1	5
vp_38	ID^3	3	2	1	25	12	10	1	5	8	1.9	4	6	10	1	3
vq_40	ID^3	3	2	1	16	10	8	1	7	12	2	3	5	7	1	3

The 0.5 m by 0.5 m by 0.5 m were re-blocked into the final resource model, which has 4 m by 4 m by 6 m blocks. The re-blocked grades were assigned based on tonnage weighting the original block grades and the geology and other codes were assigned based on majority rules.

MODEL VALIDATION AND SENSITIVITY

Atacocha has validated the resource block model using four separate industry standard validation procedures. Some examples of the validation results are included below.

- Visual inspection of composite grades against the block grades on sections and plans.
- Global statistical comparison of the OK and the ID^3 grades versus the NN grades
- Swath plot comparisons of the estimation methods to investigate local bias.
- Impact of outlier capping analysis.

VISUAL VALIDATION

A visual comparison on vertical sections, 20 m apart, found good overall correlations between the blocks and composite grades. Figures 14-30 to 14-33 illustrate the visual correlation between the blocks and composites grades in the OB_10 Domain for Zn, Pb, Ag, and Au, respectively. With the assigned interpolation radius, there is greater correlation in the blocks closest to the composites as opposed to the blocks located farther away, which show a suitable degree of smoothing.

Atacocha and RPA visually compared the composite and block grades on plans and sections and found that they correlate well spatially.

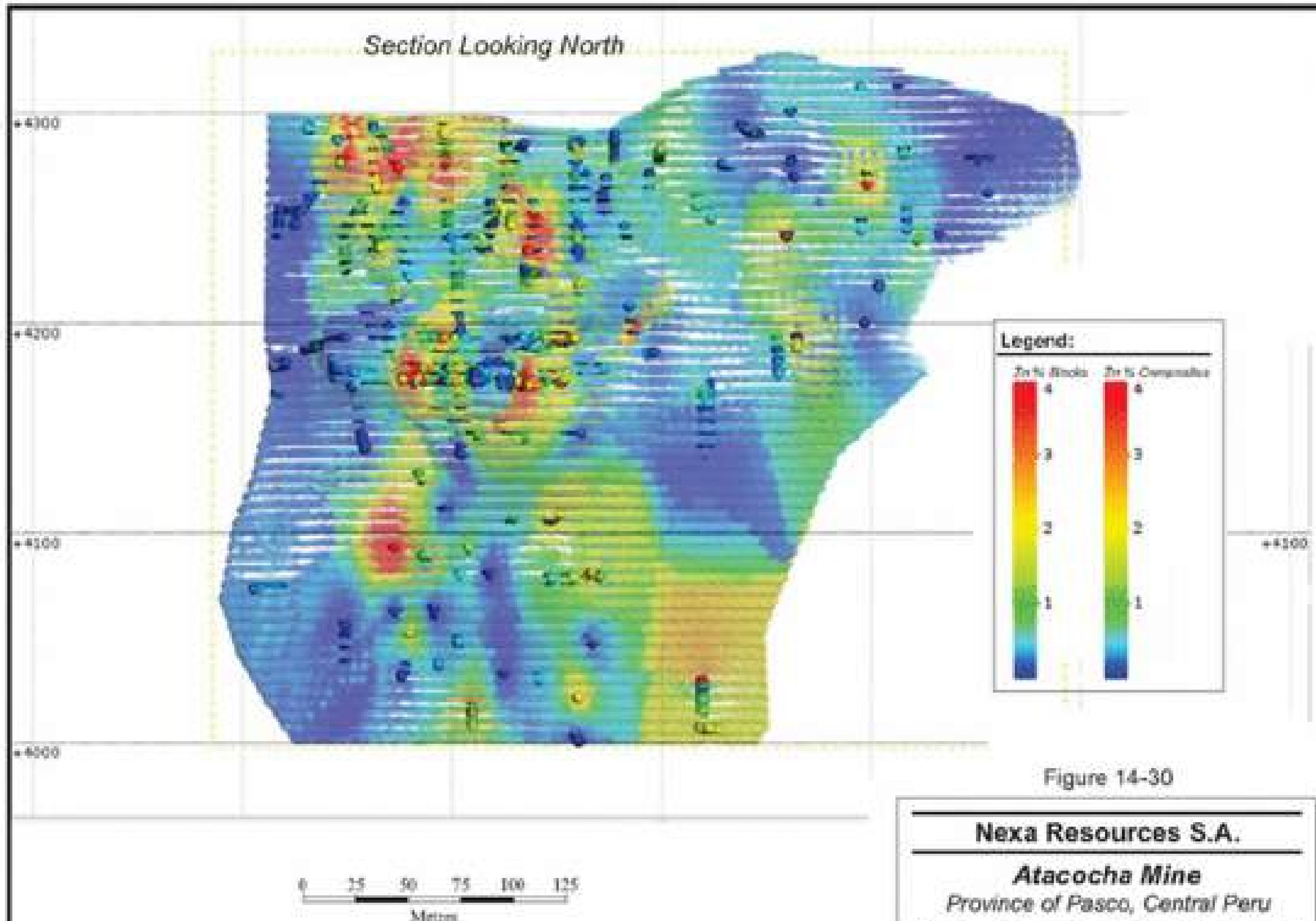


Figure 14-30

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Section Showing Zinc Blocks and Composites - OB_10 Domain

March 2019

Source: Atacocha, 2019.

RPA

www.rpacan.com

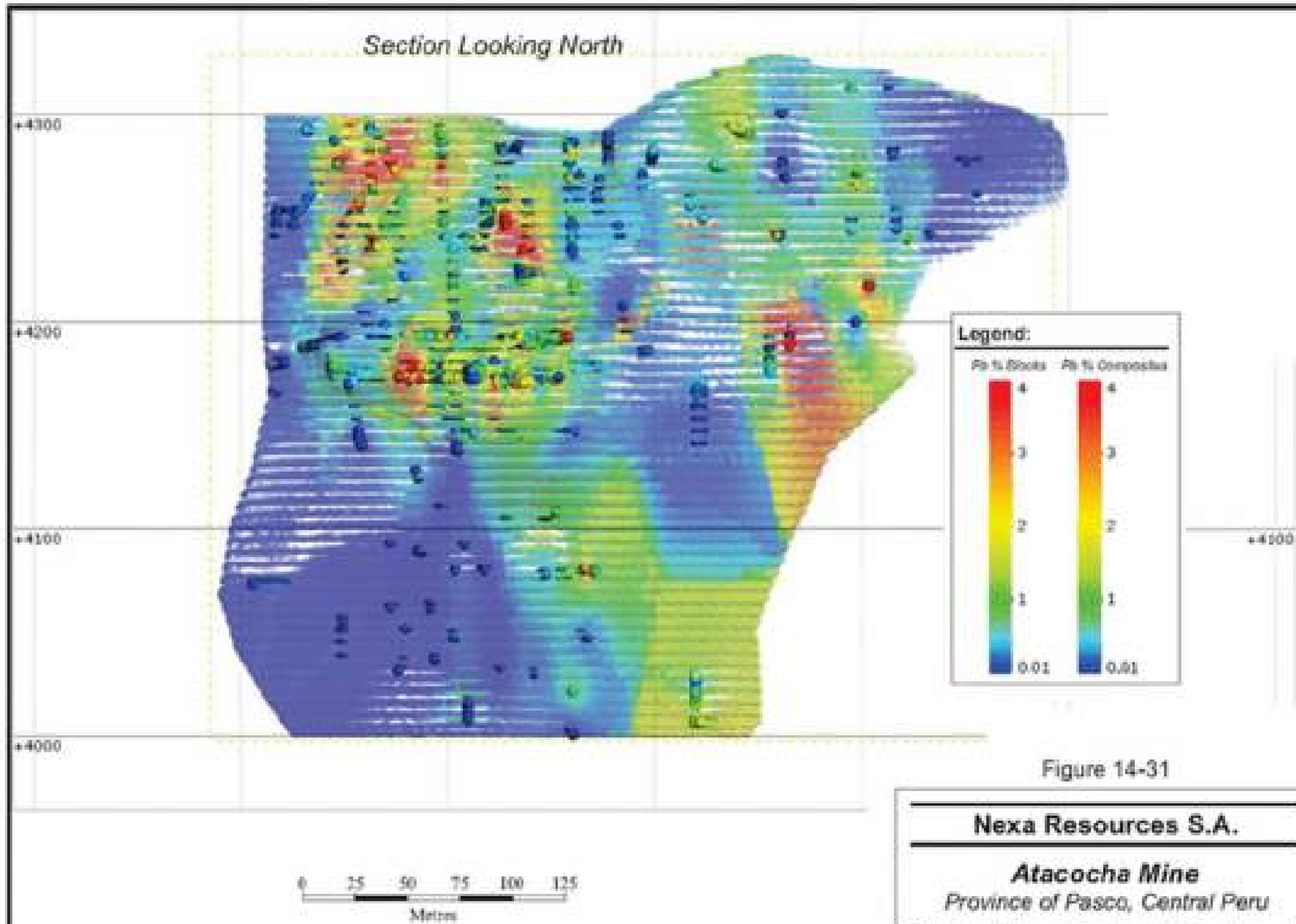


Figure 14-31

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Section Showing Lead Blocks and Composites - OB_10 Domain

March 2019

Source: Atacocha, 2019.

www.rpacan.com

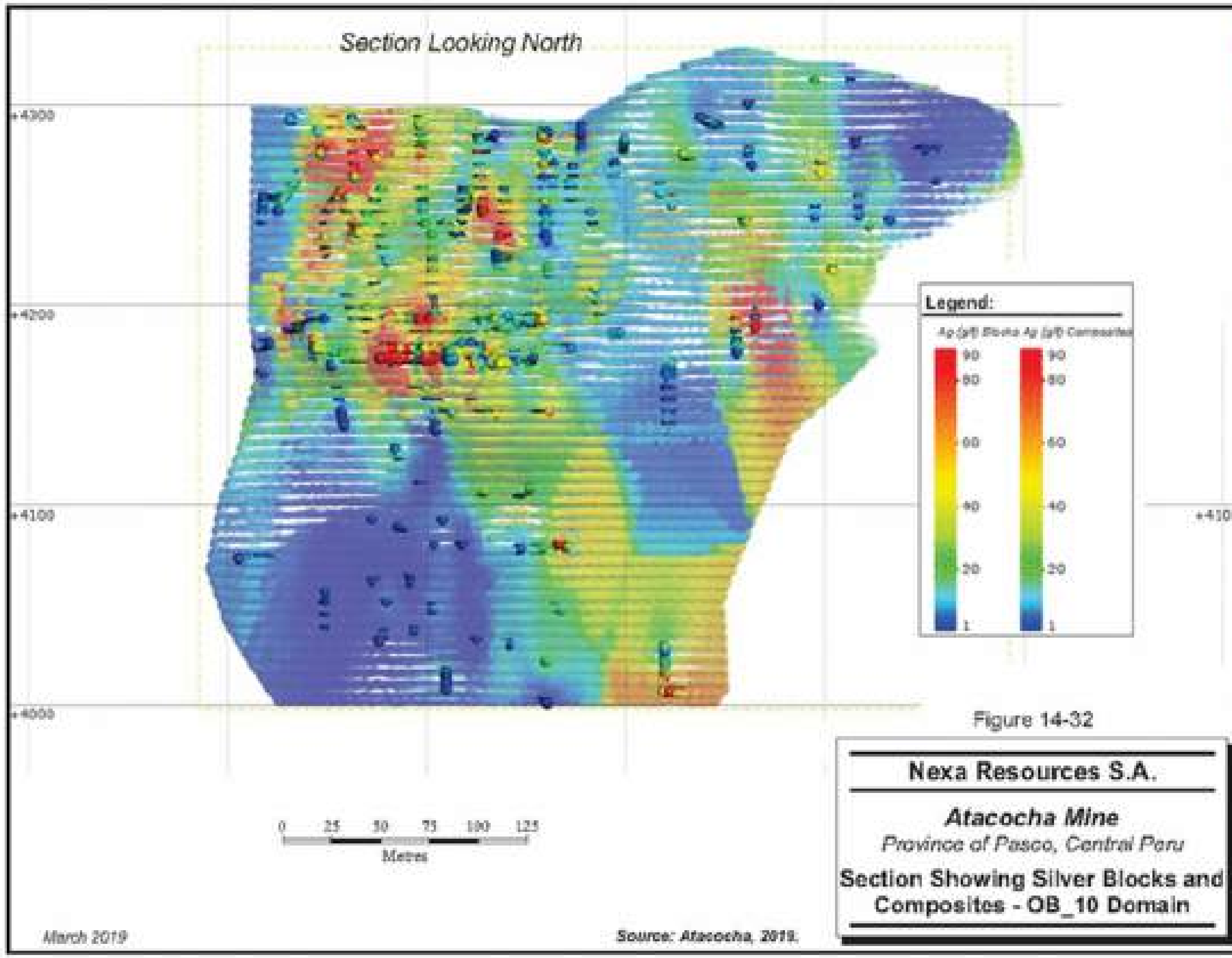


Figure 14-32

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Section Showing Silver Blocks and Composites - OB_10 Domain

www.rpacan.com

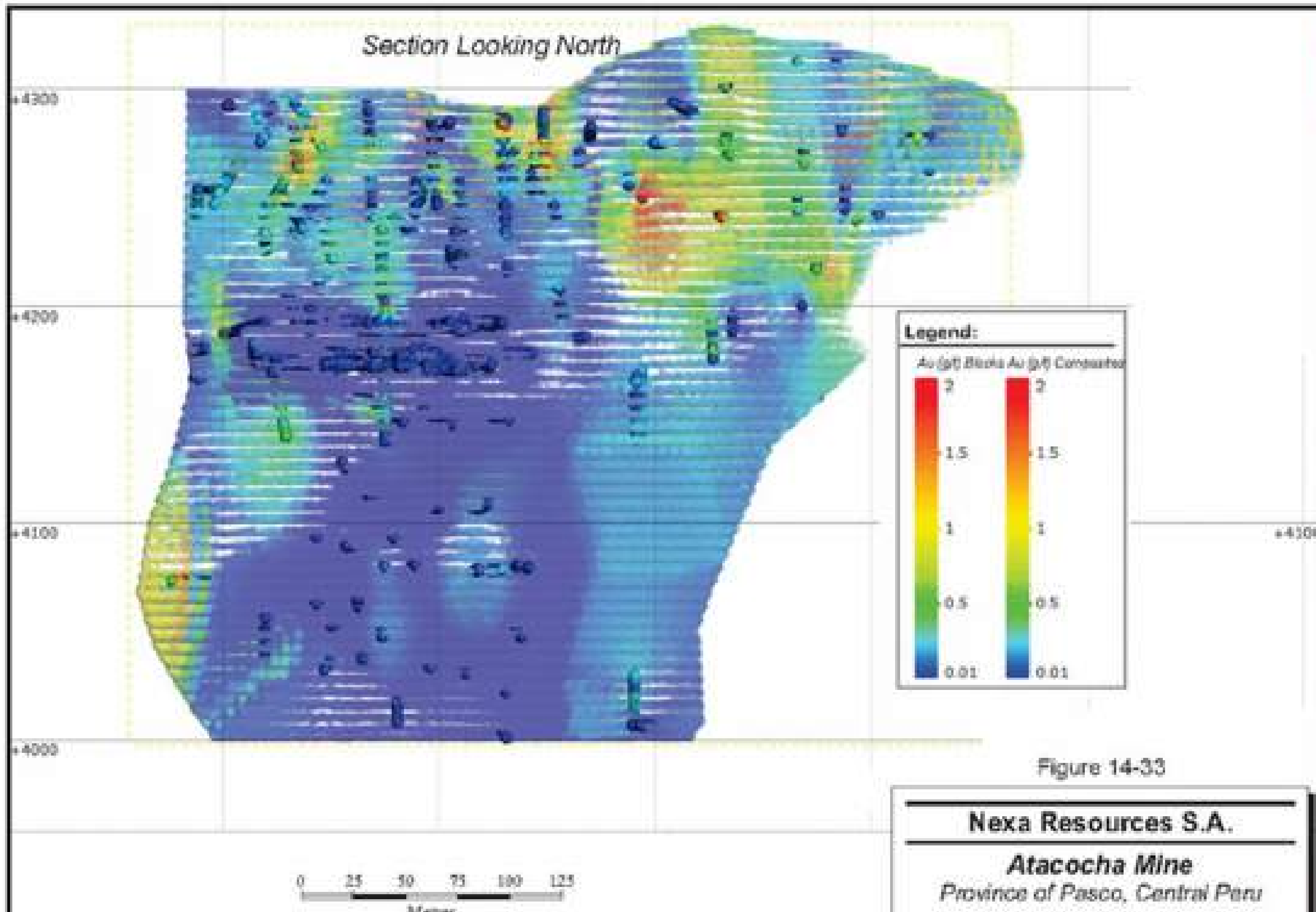


Figure 14-33

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Section Showing Gold Blocks and Composites - OB_10 Domain

March 2019

Source: Atacocha, 2019.

www.rpacan.com

GLOBAL STATISTICAL COMPARISON

The means of OK or ID³ were compared with NN estimations for each mineralization domain. These comparisons produced percentage errors between the estimates which were within ±5% in most of the domains. Overall, the comparisons show that the methods used to estimate grades were appropriate. Tables 14-52 to 14-56 show an example of this comparison for the 10_20 domain.

TABLE 14-52 COMPARISON OF ID³, OK, AND NN ZINC GRADES - DOMAIN 10_20
Nexa Resources S.A.- Atacocha Mine

Domain	Method	Class	# of Blocks	NN Mean (%)	NN CV	ID³ or OK Mean (%)	ID³ or OK CV	Relative Difference in Means (%)
10_20	OK	1	14,910	1.23	1.27	1.28	0.76	-3.89%
		2	123,900	0.75	1.46	0.74	0.91	0.81%
		3	75,256	0.56	1.56	0.59	0.94	-3.67%
		4	214,066	0.78	1.48	0.79	0.94	-1.16%

TABLE 14-53 COMPARISON OF ID³, OK, AND NN LEAD GRADES - DOMAIN 10_20
Nexa Resources S.A.- Atacocha Mine

Domain	Method	Class	# of Blocks	NN Mean (%)	NN CV	ID³ or OK Mean (%)	ID³ or OK CV	Relative Difference in Means (%)
10_20	OK	1	14,910	1.15	1.12	1.17	0.64	-2.22%
		2	123,900	0.73	1.55	0.73	1.04	-0.24%
		3	75,256	0.48	2.02	0.49	1.39	-2.88%
		4	214,066	0.73	1.55	0.74	1.04	-1.14%

TABLE 14-54 COMPARISON OF ID³, OK, AND NN COPPER GRADES - DOMAIN 10_20
Nexa Resources S.A.- Atacocha Mine

Domain	Method	Class	# of Blocks	NN Mean (%)	NN CV	ID³ or OK Mean (%)	ID³ or OK CV	Relative Difference in Means (%)
10_20	OK	1	14,910	0.05	1.15	0.05	0.63	-5.70%
		2	123,900	0.03	1.64	0.03	0.91	5.78%
		3	75,256	0.03	1.25	0.03	0.93	3.39%
		4	214,066	0.03	1.47	0.03	0.88	5.36%

TABLE 14-55 COMPARISON OF ID³, OK, AND NN SILVER GRADES - DOMAIN 10_20
Nexa Resources S.A.- Atacocha Mine

Domain	Method	Class	# of Blocks	NN		ID³ or OK		Relative Difference in Means (%)
				Mean (g/t)	CV	Mean (g/t)	CV	
10_20	OK	1	14910	41.09	0.97	42.25	0.58	-2.78%
		2	123900	24.00	1.34	22.99	0.86	4.28%
		3	75256	15.16	1.65	15.07	1.04	0.66%
		4	214066	24.52	1.34	24.07	0.89	1.85%

TABLE 14-56 COMPARISON OF ID³, OK, AND NN GOLD GRADES - DOMAIN 10_20
Nexa Resources S.A.- Atacocha Mine

Domain	Method	Class	# of Blocks	NN		ID³ or OK		Relative Difference in Means (%)
				Mean (g/t)	CV	Mean (g/t)	CV	
10_20	ID³	1	5161	0.65	1.52	0.65	1.11	0.49%
		2	130282	0.26	1.98	0.26	1.54	1.52%
		3	78623	0.25	1.58	0.24	1.33	5.33%
		4	214066	0.27	1.90	0.27	1.50	2.34%

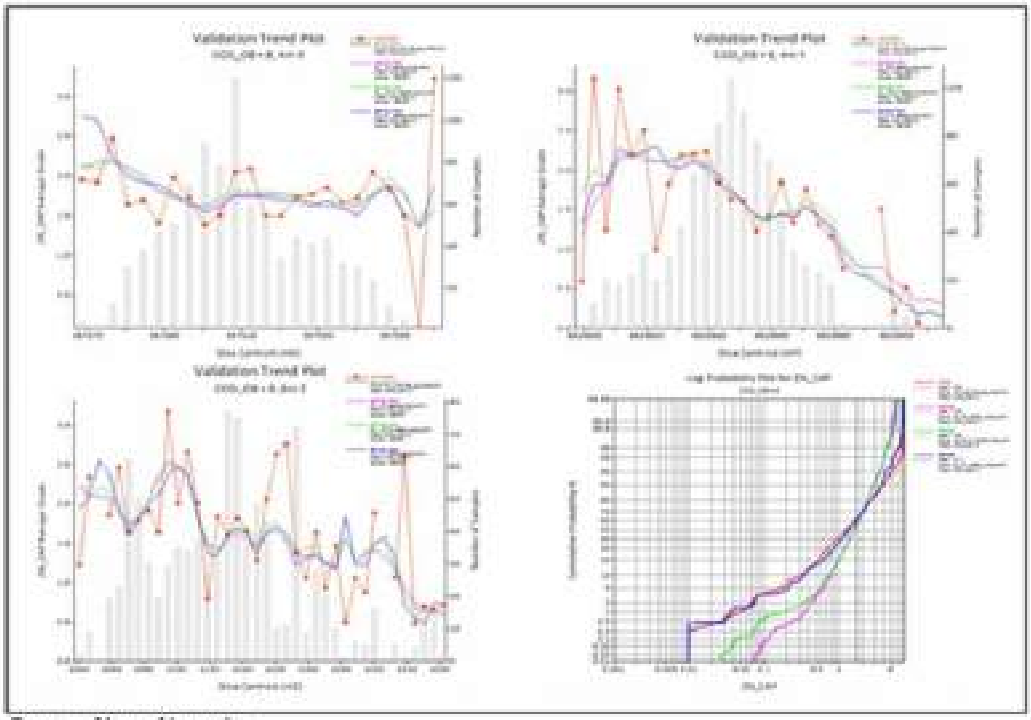
In RPA's opinion, the statistical tables that compare the declustered composite mean (NN) and block gold grades show that the two populations have similar distributions with not much grade smoothing evident.

LOCAL VALIDATION

Swath plots were generated to assess for local bias and to compare the differences between the OK and ID³ block grade estimates and the NN block grades for each domain and element. The plots given in Figures 14-34 to 14-38 are based on combined Measured and Indicated blocks, in the east, north and vertical directions. RPA considers that the results show acceptable agreement of composite (NN) and block grades.

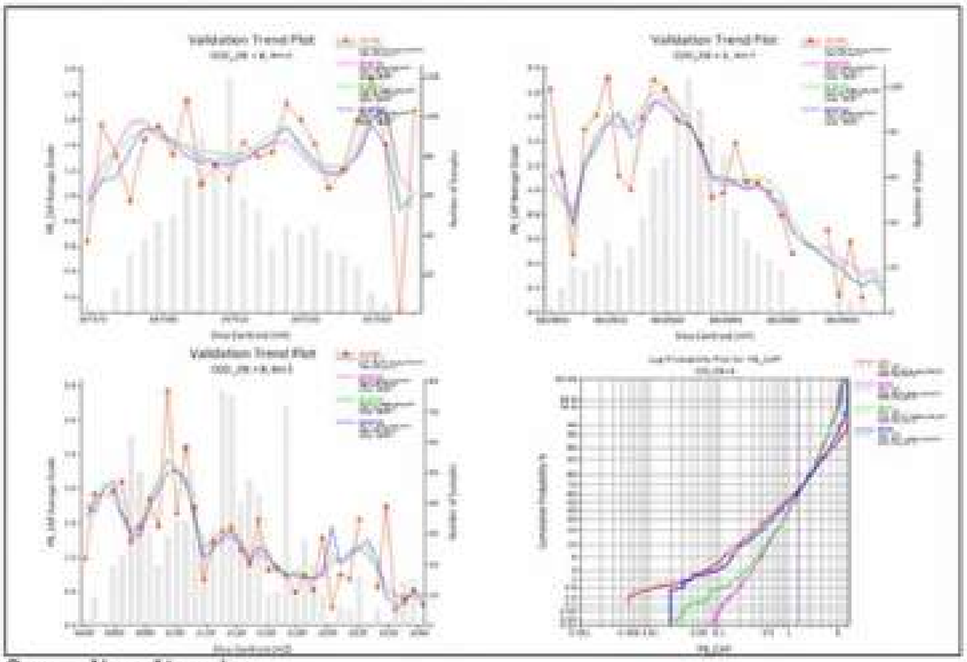
On the basis of its review and validation procedures, RPA is of the opinion that the block model is valid and acceptable for supporting the resource and reserve estimates.

FIGURE 14-34 OPEN PIT ZINC PROBABILITY AND SWATH PLOTS – COD_08 DOMAIN



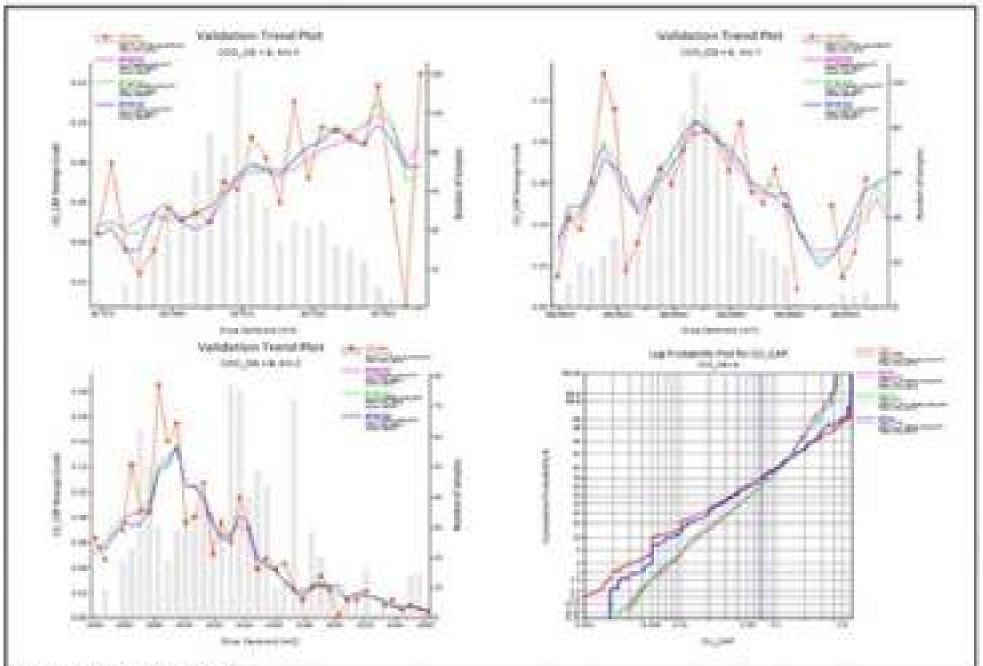
Source: Nexa Atacocha

FIGURE 14-35 OPEN PIT LEAD PROBABILITY AND SWATH PLOTS – COD_08 DOMAIN



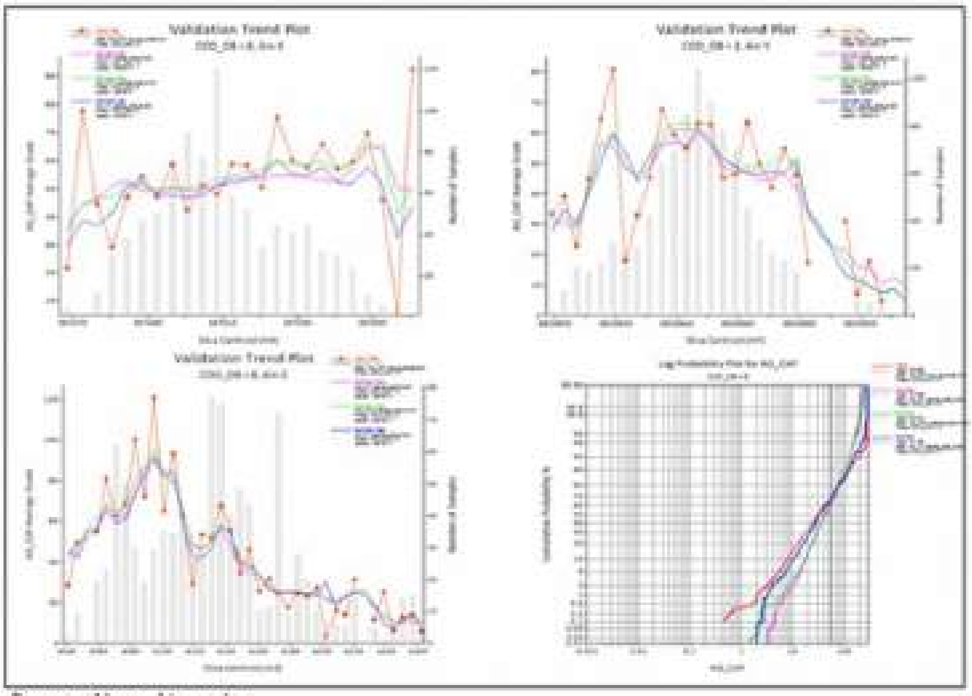
Source: Nexa Atacocha

FIGURE 14-36 OPEN PIT COPPER PROBABILITY AND SWATH PLOTS – COD_08 DOMAIN



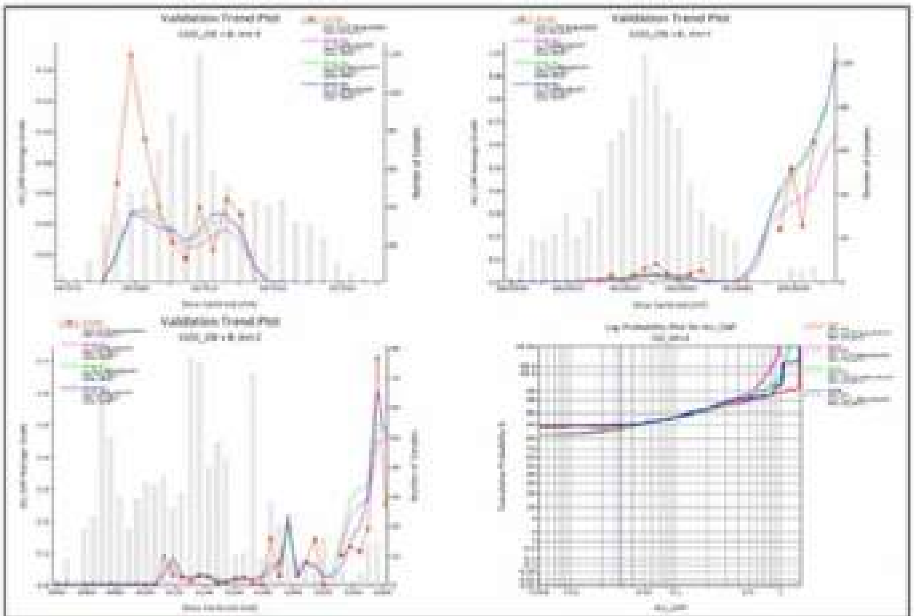
Source: Nexa Atacocha

FIGURE 14-37 OPEN PIT SILVER PROBABILITY AND SWATH PLOTS – COD_08 DOMAIN



Source: Nexa Atacocha

FIGURE 14-38 OPEN PIT GOLD PROBABILITY AND SWATH PLOTS – COD_08 DOMAIN



Source: Nexa Atacocha

MINERAL RESOURCE CLASSIFICATION

Definitions for resource categories used in this report are consistent with CIM definitions (2014) incorporated by reference into 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. The location, quantity, grade or quality, continuity, and other geological characteristics of a Mineral Resource are known, estimated, or interpreted from specific geological evidence and knowledge, including sampling." 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 number of holes and distances determined by variogram ranges. Two classification groups were defined based on geology and grade continuity. Separate classification interpolation passes were run to flag the resource categories for each group:

MINOR CONTINUITY ZONES

- **Measured Resource:** Composites from a minimum of three holes within a 25 m by 25 m by 12 m radii search.
- **Indicated Resource:** Composites from a minimum of three holes within a 41 m by 41 m by 21 m radii search.
- **Inferred Resource:** Composites from a minimum of three holes within an 83 m by 83 m by 41 m radii search.

MAJOR CONTINUITY ZONES

- **Measured Resource:** Composites from a minimum of three holes within a 31 m by 31 m by 15 m radii search.
- **Indicated Resource:** Composites from a minimum of three holes within a 50 m by 50 m by 25 m radii search.
- **Inferred Resource:** Composites from a minimum of three holes within a 101 m by 101 m by 50 m radii search.

A post-processing, resource clean-up script was applied to the classification model to avoid the "spotted dog" effect and to demonstrate continuity between samples. Figure 14-39 illustrates the final classification for San Gerardo.

RPA checked the Atacocha classification results visually and statistically by building a closest distance to block centroids model. Overall, RPA is of the opinion that the resource classification criteria developed by Atacocha are reasonable and acceptable, however, RPA notes that there are not significant differences in the search radii applied to the two classification groups. RPA recommends reviewing the search radii criteria developed for the Minor Continuity Zone group and investigating if the open pit and underground models can be classified using the same criteria in the future.

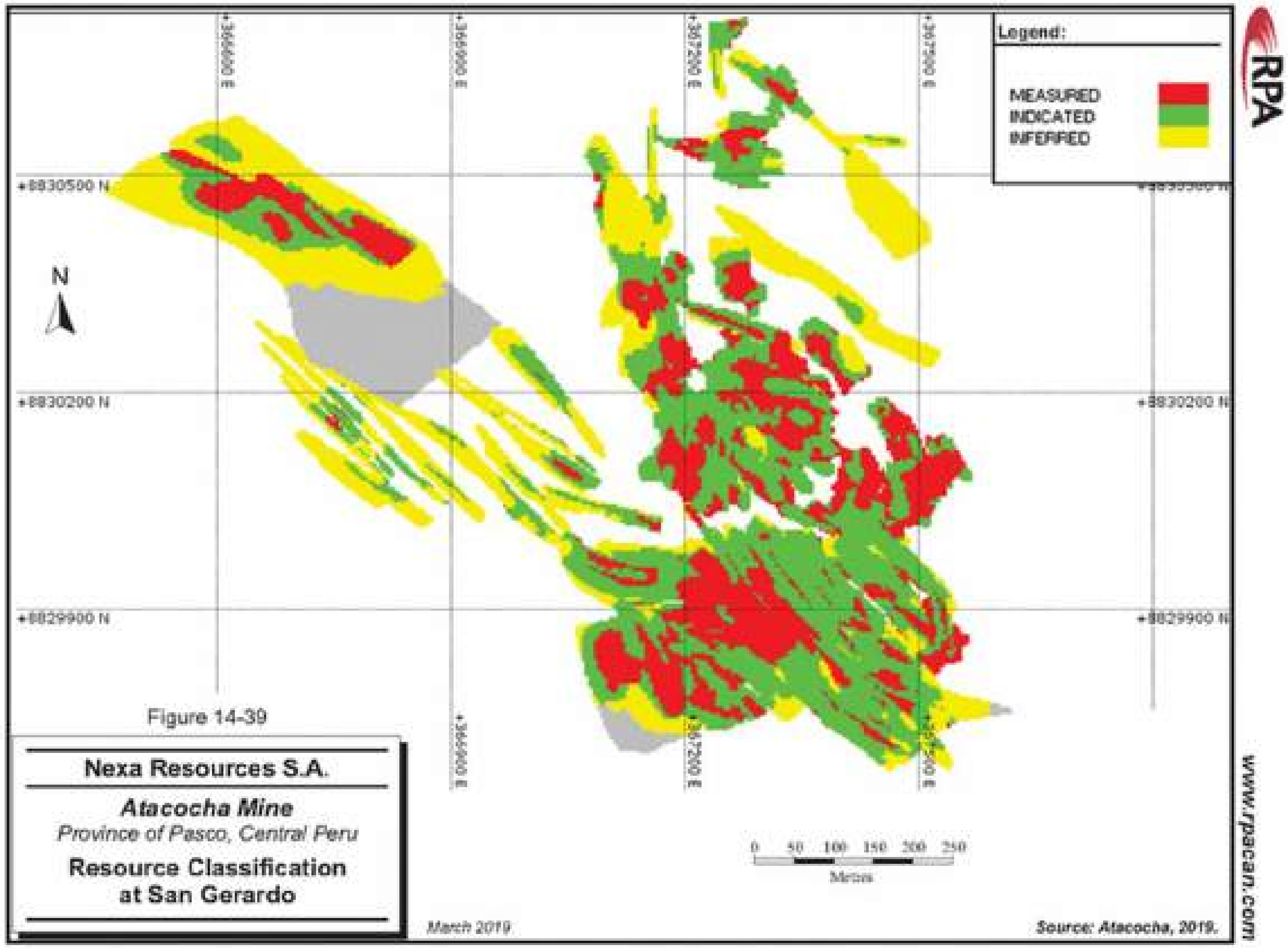


Figure 14-39

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Resource Classification at San Gerardo

NET SMELTER RETURN AND CUT-OFF VALUE

Net Smelter Return (NSR) calculations are based on historical performance of the concentrator and current smelter contracts. 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. The calculations do not include the impact of royalties, severance taxes or any streaming agreements.

Input parameters used to develop the NSR calculation have been derived from metallurgical test work on the Atacocha property, and smelter terms and commodity prices provided by Nexa, and are based on consensus, long term forecasts from banks, financial institutions, and other sources. 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 14-57.

Net smelter return is expressed in US$/t and is calculated from mineralization grades to make an adequate comparison with production cost in order to determine whether the mined material is categorized as potentially economic mineralization or waste. The recovery calculations are polynomials and are bounded by maximum and minimum grades.

TABLE 14-57 NSR DATA
Nexa Resources – Atacocha Mine

Category	Input
Metal Prices	US$3,034/t Zn US$2,530/t Pb US$7,351/t Cu US$21.58/oz Ag US$1,555/oz Au
Concentrate Grade	Zn Conc: 50.14% Pb Conc: 58.96% Cu Conc. 19.57%

Typical industry smelting and refining charges were applied to the various concentrates. It was assumed that the concentrates would be processed internally and marketed internationally.

NSR factors have been applied to the block model uniformly, irrespective of mineralization domain. To report Mineral Resources, an NSR cut-off value was estimated. To estimate the NSR cut-off grade value, the following operating costs, provided by Nexa, were used:

- Mining US$/t proc
  - Ore (in-pit): $2.26
  - Ore (ex-pit): $2.22
  - Waste: $2.26
- Process + Tailings US$/t proc $9.82
- G&A US$/t proc $5.93

The ex-pit ore, process, tailings, and G&A costs formed the basis for US$17.97/t open pit mining NSR cut-off values. In RPA's opinion, the operating costs are adequate for this size and type of operation.

MINERAL RESOURCE REPORTING

The Mineral Resources for the San Gerardo operation as of December 31, 2018 are summarized in Table 14-2 in this section. The Mineral Resources are exclusive of Mineral Reserves and are reported within a preliminary pit shell generated in NPV Scheduler software package from Datamine, at a reporting NSR cut-off value of US$17.97/t. This is in compliance with the CIM (2014) resource definition requirement of "reasonable prospects for eventual economic extraction".

A topographic surface of the San Gerardo Mine area that is current as of December 31, 2018 was used to deplete the block model. For historical underground excavations within the San Gerardo resource and reserve pits, a mined-out code was applied if more than five percent of the excavation wireframes was within a block to preserve mined-out solid continuity. In these mined-out zones, grades have been sterilized and a density value of 1.88 cm g/cm^3 has been applied.

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

COMPARISON TO PREVIOUS MINERAL RESOURCE ESTIMATES

A comparison of the current Nexa resource estimate, exclusive of Mineral Reserves, to the previous 2017 Mineral Resource estimate is presented in Table 14-58. The reasons for the changes are mostly due to the new geological interpretation approach representing more accurately the geology observed in the pit, and to a lesser extent, slightly lower density values, a lower NSR cut-off value, and the depletion of material through mining.

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TABLE 14-58 SAN GERARDO COMPARISON OF 2018 VERSUS 2017 MINERAL RESOURCES
Nexa Resources S.A.- Atacocha Mine

Class	31/12/2018 Tonnes	Grade					Contained Metal Content					31/12/2017 Tonnes	Grade					Contained Metal Content				
		Zinc	Lead	Copper	Silver	Gold	Zinc	Lead	Copper	Silver	Gold		Zinc	Lead	Copper	Silver	Gold	Zinc	Lead	Copper	Silver	Gold
	(Mt)	(%)	(%)	(%)	(g/t)	(g/t)	(000 t)	(000 t)	(000 t)	(000 oz)	(000 oz)	(Mt)	(%)	(%)	(%)	(g/t)	(g/t)	(000 t)	(000 t)	(000 t)	(000 oz)	(000 oz)
Measured	1.47	1.47	0.88	0.05	30.1	0.22	21.6	12.9	0.7	1,423	10	2.17	1.21	0.88	0.05	29.6	0.27	26.3	19.0	1.1	2,067	19
Indicated	2.27	1.13	0.87	0.05	29.3	0.23	25.7	19.7	1.1	2,138	17	6.84	1.20	0.84	0.06	32.1	0.10	82.1	57.5	4.1	7,059	22
Total Measured + Indicated	**3.74**	**1.26**	**0.88**	**0.05**	**29.6**	**0.23**	**47.3**	**32.8**	**1.9**	**3,564**	**28**	**9.01**	**1.20**	**0.84**	**0.06**	**31.5**	**0.14**	**108.2**	**75.5**	**5.2**	**9,117**	**41**
Inferred	0.80	1.08	0.93	0.03	31.4	0.50	8.6	7.4	0.2	807	13	1.64	1.16	1.11	0.04	37.4	0.07	19.0	18.2	0.7	1,970	4

15 MINERAL RESERVE ESTIMATE

SUMMARY

Atacocha mining units include the Atacocha underground mine (Atacocha) and the San Gerardo open pit mine (San Gerardo). Production from Atacocha and San Gerardo is combined to feed the Atacocha processing plant with a nominal capacity of 4,500 tpd. For the remaining life of mine (LOM), Atacocha production rates range from 900 tpd to 2,400 tpd and San Gerardo production rates range from 2,100 tpd to 3,600 tpd.

The Atacocha underground mine has been in operation since 1938. Mining is planned to a depth of approximately 1,600 m inclusive of the Upper, Middle, Lower, and Deep zones, with most of the mineralization extracted from the Upper and Middle zones. Current operations are centred on the 3300 Level and access to the Deep zone is currently being rehabilitated, with development of the Deep zone to start in the second half of 2019. Mining methods include Cut and Fill (CAF), which has been used for the entire production history, and the newly adopted Sublevel Stoping (SLS).

The San Gerardo open pit mine has been in operation since 2016, with the LOM production plan consisting of the currently permitted area of approximately 8.8 ha, which supports mine operations to August 2019, and the 24.2 ha area to be permitted in 2019, which represents production to the end of the LOM. Open pit mining uses conventional surface mining on six metre benches, with ore haulage to an ore pass east of San Gerardo that reports to the 3600 Level of Atacocha, where it is trammed by locomotive and rail car to the Atacocha plant. A new ore pass is planned to be constructed in 2019 as a replacement for the current one. Waste is hauled to the San Gerardo waste dump, which is adjacent to the Atacocha Tailings Storage Facility (TSF) dam.

For this report, RPA has reviewed the Mineral Reserve estimates of the Atacocha and San Gerardo mines, as estimated by Nexa as of December 31, 2018. RPA visited the site, met with management and technical teams, and carried out a number of checks to verify the various procedures and numerical calculations used in the Atacocha Mineral Reserve estimate.

The Mineral Reserves, as at December 31, 2018 for Atacocha underground and San Gerardo, are shown in Tables 15-1 and 15-2 respectively.

TABLE 15-1 ATACOCHA UNDERGROUND MINERAL RESERVES - DECEMBER 31, 2018
Nexa Resources S.A. – Atacocha Mine

Category	Tonnage (000 t)	Grade Zinc (%)	Grade Lead (%)	Grade Copper (%)	Grade Silver (g/t)	Contained Metal Zinc (000 t)	Contained Metal Lead (000 t)	Contained Metal Copper (000 t)	Contained Metal Silver (000 oz)
Proven	1,634	3.49	2.14	0.20	94.8	57.0	35.0	3.3	4,980
Probable	2,160	4.52	1.38	0.30	69.4	97.6	29.9	6.5	4,821
Total	**3,794**	**4.08**	**1.71**	**0.26**	**80.3**	**154.6**	**64.9**	**9.7**	**9,801**

Notes:
1. CIM (2014) definitions were followed for Mineral Reserves.
2. Mineral Reserves are estimated at NSR cut-offs of US$ 71.13/t processed and US$61.99/t processed for CAF and SLS respectively.
3. Mineral Reserves are estimated using average long-term metal prices of Zn: US$2,638.50/t (US$1.20/lb); Pb: US$2,199.60/t (US$1.00/lb); Cu: US$6,391.80 /t (US$2.90/lb); Ag: US$18.76/oz and Au: US$1,352/oz and a PEN/US$ exchange rate of $3.30.
4. A minimum mining width of 4.0 m was used for both CAF and SLS.
5. Bulk density is 3.40 t/m³.
6. Numbers may not add due to rounding.

TABLE 15-2 SAN GERARDO OPEN PIT MINERAL RESERVES – DECEMBER 31, 2018
Nexa Resources S.A. – Atacocha Mine

Category	Tonnage (000 t)	Grade Zinc (%)	Grade Lead (%)	Grade Copper (%)	Grade Silver (g/t)	Grade Gold (g/t)	Contained Metal Zinc (000 t)	Contained Metal Lead (000 t)	Contained Metal Copper (000 t)	Contained Metal Silver (000 oz)	Contained Metal Gold (000 oz)
Proven	3,100	0.96	0.99	0.03	33.0	0.22	29.7	30.8	0.9	3,288	22.2
Probable	2,934	0.92	1.06	0.03	32.7	0.21	27.0	31.0	0.8	3,080	19.9
Total	**6,034**	**0.94**	**1.02**	**0.03**	**32.8**	**0.22**	**56.7**	**61.7**	**1.7**	**6,368**	**42.1**

Notes:
1. CIM (2014) definitions were followed for Mineral Reserves.
2. Mineral Reserves are estimated at an NSR cut-off of US$17.97/t processed.
3. Mineral Reserves are estimated using average long-term metal prices of Zn: US$2,638.50/t (US$1.20/lb); Pb: US$2,199.60/t (US$1.00/lb); Cu: US$6,391.80 /t (US$2.90/lb); Ag: US$18.76/oz and Au: US$1,352/oz and a PEN/US$ exchange rate of $3.30.
4. Bulk density is 2.75 t/m³.
5. Numbers may not add due to rounding.

RPA is not aware of any mining, metallurgical, infrastructure, permitting, or other relevant factors that could materially affect the Mineral Reserve estimate.

ATACOCHA UNDERGROUND MINE

MODIFYING FACTORS

Given the considerable history of the CAF mining method applied at Atacocha, modifying factor estimates are primarily based on historical data, while SLS estimates are based on test mining that was completed in 2018. RPA considers the dilution and extraction estimates for CAF and SLS to be reasonable and consistent with the current operating performance and orebody properties.

DILUTION

The dilution that has been applied is related to the selected mining method. The two main mining methods are CAF and SLS. Sources of external dilution in the CAF mining method include overbreak and mucking of waste backfill that is mixed with the ore. The dilution for each method is summarized in Table 15-3.

TABLE 15-3 DILUTION
Nexa Resources S.A. – Atacocha Mine

Mining Method	Stope Width (m)	Percent Dilution (%)
CAF	4	25
	4-5	17
	5-6	12.6
	>6	8.8
SLS	All	20

EXTRACTION

Extraction is related to the mining method and is applied on a percentage basis. The amount of extraction for each method is shown in Table 15-4.

TABLE 15-4 EXTRACTION PERCENTAGE
Nexa Resources S.A. – Atacocha Mine

Item	Extraction (%)
Development	100
CAF	98
SLS	85

NET SMELTER RETURN

NSR calculations are based on historical performance of the concentrator and current smelter contracts. 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. The calculations do not include the impact of royalties, severance taxes, or any streaming agreements.

Input parameters used to develop the NSR calculation have been derived from metallurgical test work on the Atacocha property, and smelter terms and commodity prices provided by Nexa, and are based on consensus, long term forecasts from banks, financial institutions, and other sources. Metal recoveries are calculated based on grade-recovery relationships, which are discussed in Section 13. The key assumptions used are presented in Table 15-5.

NSR is expressed in US$/t and is calculated from mineralization grades to make an adequate comparison with production cost in order to determine whether the mined material is categorized as potentially economic mineralization or waste.

Typical industry smelting and refining charges were applied to the various concentrates. It was assumed that the concentrates would be process internally and marketed internationally.

TABLE 15-5 NSR DATA
Nexa Resources S.A. – Atacocha Mine

Category	Input
Metal Prices	US$2,639/t Zn US$2,200/t Pb US$6,392/t Cu US$18.76/oz Ag US$1,352/oz Au
Concentrate Grade	Zn Conc: 50.14% Pb Conc: 58.96% Cu Conc. 19.57%

ATACOCHA UNDERGROUND CUT-OFF VALUE

The break-even NSR cut-off values for the CAF and SLS mining methods are $71.13/tonne processed and $61.99/tonne processed, respectively, and are summarized in Table 15-6.

The cut-off value used for the Mineral Reserve is based on an NSR value. The NSR formula is:

$$NSR = \frac{Total\ Operating\ Cost + CAP\ Dev\ Costs}{Tonnes\ Processed}$$

TABLE 15-6 ATACOCHA OPERATING COST DATA
Nexa Resources S.A. – Atacocha Mine

	Units	Mining Method	
		CAF	SLS
Mining	US$/t proc	$52.50	$46.36
Process + Tailings	US$/t proc	$9.82	$9.82
G&A	US$/t proc	$8.82	$8.82
Total	**US$/t proc**	**$71.13**	**$61.99**

RPA received the Atacocha depleted block model, as-built development and stope shapes, planned development and stope shapes, and production schedule in Deswik format. RPA imported the block model and all wireframes into Deswik and completed the following checks:

- The block model was accurately depleted by as-built development and stope shapes.
- Planned development and stope shapes were consistent with design parameters.
- Development and stope designs were designed using only Measured and Indicated Mineral Resources.
- Application of dilution and extraction factors were consistent, as shown in Table 15-3 and 15-4.
- NSR cut-off values were applied, as shown in Table 15-5 and Table 15-6.
- The production schedule was consistent with historical performance.

SAN GERARDO

OPEN PIT OPTIMIZATION

Potential pits were evaluated using the NPV Scheduler software package from Datamine, which employs the Lerchs-Grossmann pit optimization algorithm. A pit shell was selected for design from a set of shells generated using only Measured and Indicated Mineral Resources. The parameters used to derive the selected pit shell are presented in Table 15-7.

Overall slope angles are based on the updated geotechnical assessment completed in February 2019 by SRK. Operating costs are based on budgeted operating data from 2019. Dilution and extraction parameters are estimated based on orebody geometry, equipment selection, and historical operating performance.

The NSR values were calculated for the San Gerardo resource model blocks, as noted above in Table 15-5.

TABLE 15-7 SAN GERARDO RESERVE PIT OPTIMIZATION PARAMETERS
Nexa Resources S.A. – Atacocha Mine

Parameter	Unit	Input
Overall Slope Angle	degrees	37/47
Mining Cost (Ore)	US$/t	4.48
Mining Cost (Waste)	US$/t	2.26
Process Cost	US$/t	9.82
General and Administrative Cost	US$/t	5.93
Mining Extraction	%	98
Mining Dilution	%	2
Block Size	M	4x4x6

Calculated block model NSR values were evaluated against the internal break-even value. Blocks classified as Measured or Indicated Mineral Resources with an NSR value above the internal break-even value, are included in the Mineral Reserve.

RPA received the San Gerardo depleted block model, historical underground mining as-built shapes, open pit design, and production schedule in Deswik format. RPA imported the block model and all wireframes into Surpac and confirmed that the block model was accurately depleted by historical underground mining as-built shapes. RPA also evaluated potential pits using the Whittle 4.7X software package, employing the Lerchs-Grossmann pit optimization algorithm, and produced optimization results consistent with those provided by Nexa. The open pit design was reviewed and observed to have design parameters consistent with the optimization parameters, and interrogation of the design yielded Mineral Reserve tonnes and grade consistent with those produced by Nexa.

16 MINING METHODS

The Atacocha mine consists of the Atacocha underground mine and the San Gerardo open pit. The Atacocha underground is ramp accessed to a planned depth of 1,600 m, utilizing CAF and SLS mining methods. The mine uses a combination of unconsolidated waste rockfill and hydraulic backfill for CAF and unconsolidated waste rockfill for SLS. The Atacocha underground ore production averages 900 tpd in 2019, increasing over the LOM to an average production rate of 1,700 tpd. San Gerardo average ore and waste production rates for 2019 are 3,600 tpd and 17,800 tpd respectively, with average LOM production rates of 2,800 tpd and 16,900 tpd for ore and waste respectively.

ATACOCHA UNDERGROUND MINE

MINE DESIGN

The Atacocha underground mine is planned to a depth of approximately 1,600 m inclusive of the Upper, Middle, Lower, and Deep zones, with most of the mineralization extracted from the Upper and Middle zones. Current operations are centred around the 3300 Level, and access to the Deep zone is currently being rehabilitated, with development of the Deep zone to start in the second half of 2019. The underground mine design is presented in Figure 16-1.

MINING METHOD

Atacocha is mined by CAF, which has been used for the entire production history and the newly adopted SLS (Table 16-1). The CAF and SLS mining methods are illustrated in Figures 16-2 and 16-3, respectively. CAF stopes consist of five cuts of four metres to generate 20 m sublevels that are accessed by ramps and rising cross-cuts that are approximately 55 m long. Production is by horizontal jumbo breasting, with backfill consisting of unconsolidated waste rock and hydraulic fill.

The SLS mining method has demonstrated increased productivities and reduced unit costs as compared to CAF. SLS stopes are located a minimum of 40 m from infrastructure, are 20 m high, 30 m long, and have a minimum mining width of four metres. Production is achieved by vertical blastholes, and backfilled using unconsolidated waste fill.

TABLE 16-1 ATACOCHA UNDERGROUND STOPE DESIGN PARAMETERS
Nexa Resources S.A. – Atacocha Mine

Parameter	Unit	Input
Cut and Fill		
Standard Stope Height	m	20
Cut Height	m	4
Minimum Mining Width	m	4
Maximum Mining Width	m	10
Sublevel Stoping		
Standard Stope Height	m	20
Minimum Mining Width	m	4
Maximum Mining Width	m	10

In RPA's opinion, the mining methods are appropriate and productivities and performance are reasonable.

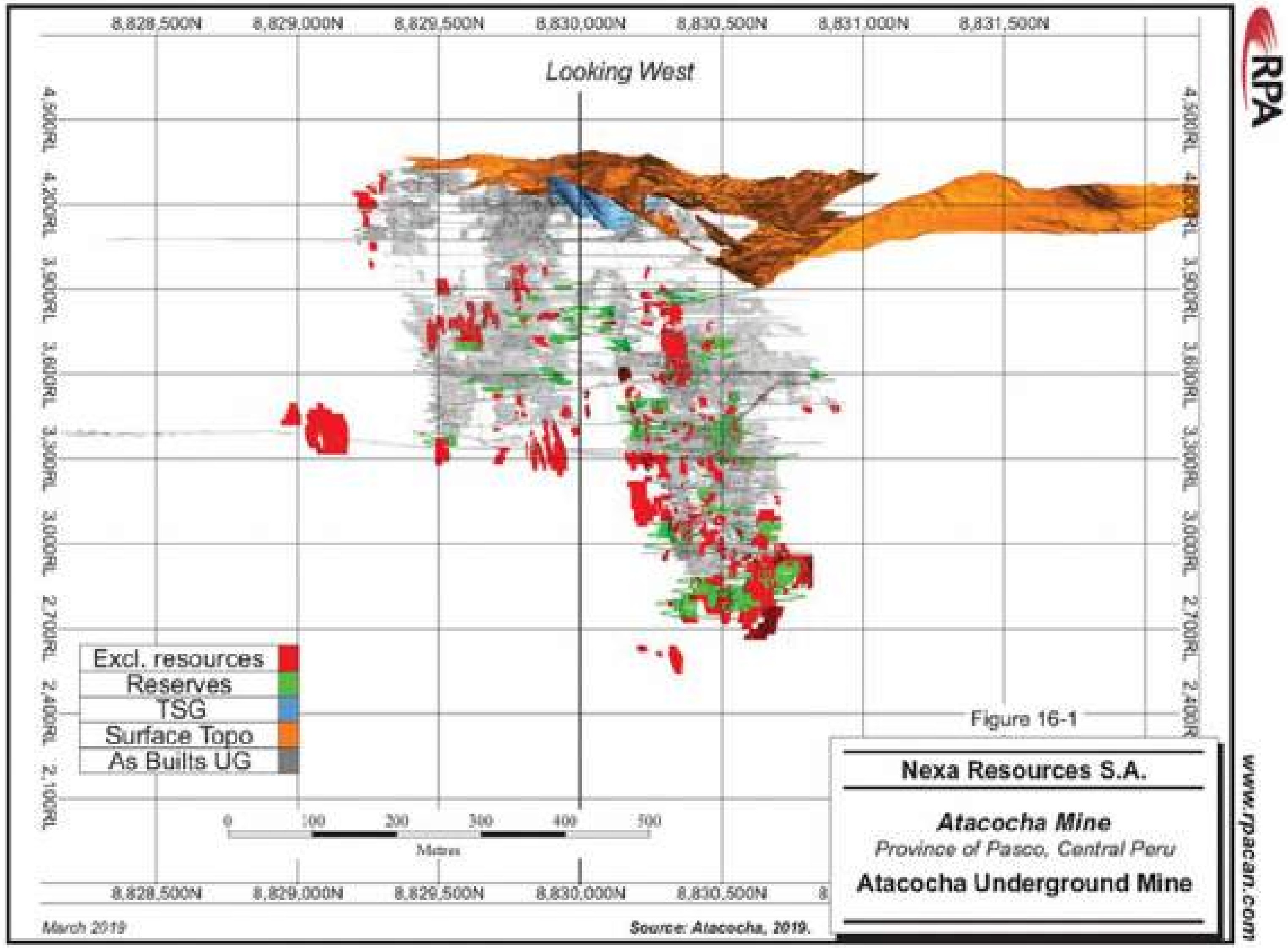

Figure 16-1

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Atacocha Underground Mine

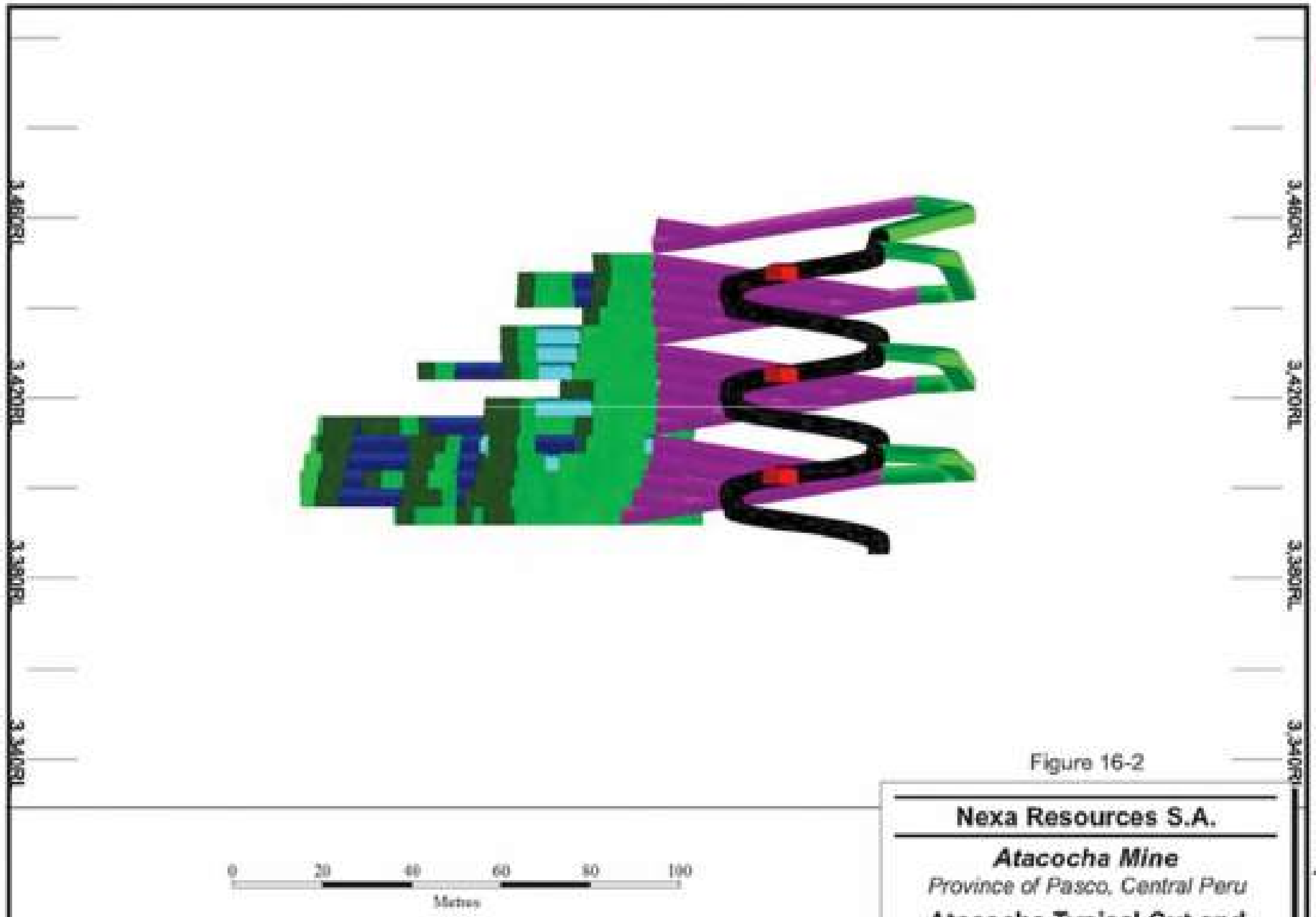

Figure 16-2

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Atacocha Typical Cut and Fill Design Schematic

March 2019

Source: Atacocha, 2019.

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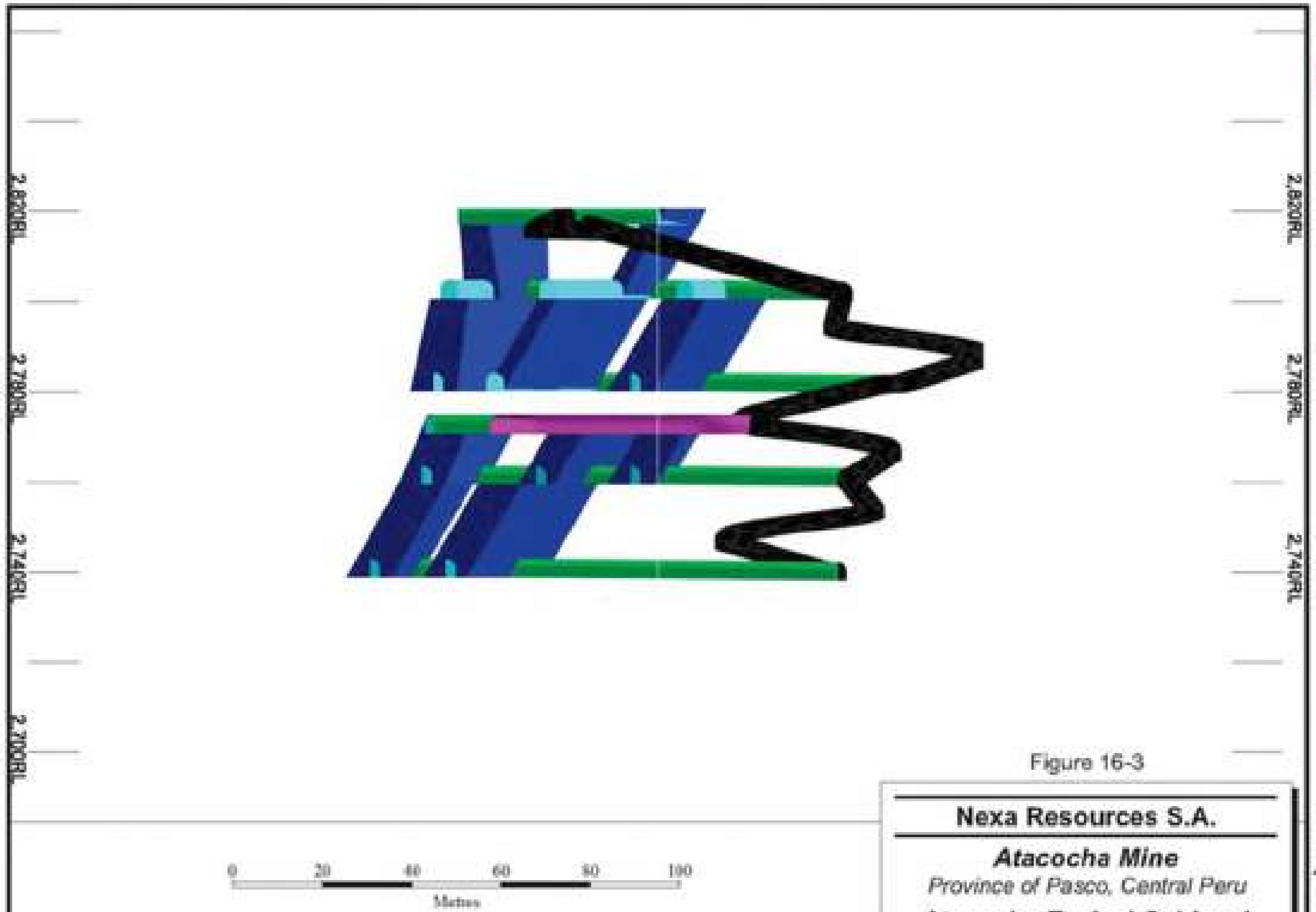

Figure 16-3

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Atacocha Typical Sublevel Stoping Design Schematic

March 2019

Source: Atacocha, 2019.

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GEOMECHANICS, GROUND SUPPORT

The host rock and mineralized zones have been classified as poor to fair quality rock mass with rock mass ratings (RMR) varying from 25 to 60. The host rock primarily consists of mildly altered limestones and breccias, while the mineralized zone is moderately altered and includes skarn, marble, calcareous breccias, heterolithic breccias, and siliceous breccias. Both zones have five main discontinuity systems with spacings ranging from 5 mm to 300 mm. Discontinuities are generally calcite filled or clean and wet. All rock types are considered medium strength, with stresses in the Upper and Middle zones empirically demonstrated to be low to moderate and insitu stress measurements in the Lower zone indicating moderate level stresses.

Ground support consists of split set bolts in temporary excavations and resin rebar in permanent excavations. Welded wire mesh is used in zones of lower quality rockmass and in close proximity to the footwall, while chainlink mesh is used in areas of improved rockmass quality. All shotcrete used contains 5 kg of synthetic fibre per cubic metre, with shotcrete thickness increasing as rockmass quality worsens. Table 16-2 summarizes the Atacocha recommended ground support standards as a function of RMR.

TABLE 16-2 ATACOCHA UNDERGROUND STOPE DESIGN PARAMETERS
Nexa Resources S.A. – Atacocha Mine

Excavation Type	RMR Range	Bolt Length and Type	Bolt Spacing (m)	Mesh Type	Shotcrete Thickness (mm)
Temporary Span of 4 m to 8 m	< 30	2.1m Split Set	1.0 x 1.0	Welded	100
	30 - 40	2.1m Split Set	1.0 x 1.0	Chainlink	75
	40 -50	2.1m Split Set	1.5 x 1.5	Chainlink	50
	50 -60	2.1m Split Set	1.2 x 1.2	Chainlink / Welded	50
	> 60	2.1m Split Set	1.5 x 1.5	Chainlink / Welded	50
Permanent Span of 4 m to 8 m	< 20	2.1m Resin Rebar	TO	BE	CONFIRMED
	20 - 30	2.1m Resin Rebar	1.0 x 1.0	Welded	100
	30 - 40	2.1m Resin Rebar	1.0 x 1.0	Chainlink	75
	40 -50	2.1m Resin Rebar	1.5 x 1.5	Chainlink	50
	50 -60	2.1m Resin Rebar	1.2 x 1.2	Chainlink / Welded	50
	> 60	2.1m Resin Rebar	1.5 x 1.5	Chainlink / Welded	50

MINE EQUIPMENT

Underground mine development, road maintenance, and haulage are by contractor and underground production and tramming by locomotive are by Nexa. The underground mining equipment used at Atacocha is presented in Table 16-3.

TABLE 16-3 ATACOCHA UNDERGROUND MINING EQUIPMENT
Nexa Resources S.A.– Atacocha Mine

Typical Manufacturer	Typical Model	Equipment Type	Quantity
BTI	ALB 4.5LP15ARN	Anfo Loader	3
Sandvik	DD320/DD321	Drilling Jumbo	5
BTI	HS18-BX10/SCALEBOSS 3DE	Scaler	4
Maclean	MEM - SSB/MEM - 946	Bolter	6
Caterpillar	CATR1600J9SD00134	10.2 t Scoop	5
Caterpillar	CATR1300CNJB00242	6.8 t Scoop	4
Caterpillar	950 H	Front End Loader	1
IMIM/Serminsa	8 T to 15 T	Locomotives	6
Volvo	FMX 440 8x4	24t Haul Truck	11

ATACOCHA MINE INFRASTRUCTURE

Mine infrastructure includes mine offices, dry, main shaft and ventilation shaft, mine access ramps 5400 and 990 which connect levels 3900 with 3300, main haulage drift (level 3600), backfill plant, and explosives storage area. The underground infrastructure will continue to grow as the mine is deepened to complete access to the reserves at depth. Underground electrical substations, dewatering sumps, and refuge stations will continue to be added, as required.

MATERIAL HANDLING

All ore is hauled by contractor to ore bins, where it is loaded to rail cars and delivered to the Atacocha processing plant. Waste material from waste development is consumed as unconsolidated backfill for stopes.

VENTILATION

The Atacocha Mine primary ventilation system is well established and delivers approximately 380 m^3/s (800,000 cfm) to the underground workings to meet the government regulations for the operating equipment, personnel, and underground installations. The ventilation circuit for the Mine is shown in Figure 16-4. Auxiliary ventilation is provided to work places that do not have flow through ventilation through the use of 30 hp to 100 hp auxiliary fans with 24 in. to

30 in. diameter flexible ventilation ducts that deliver 9.4 m^3/s to 28.3 m^3/s (20,000 cfm to 60,000 cfm).

DEWATERING

Mine and surface water from San Gerardo drains into the Atacocha underground mine, where it is collected in settling sumps and subsequently reports by gravity to the Don Paco tunnel at the 3,600 m elevation. The Atacocha underground is dewatered through a series of dewatering stations that pump mine water through a series of lifts to the Don Paco tunnel. Surface and underground water are combined and pumped out of the Atacocha underground mine via the Don Paco portal. The mine dewatering system has a design capacity in excess of 120 L/s.

The mine dewatering schematic is shown in Figure 16-5.

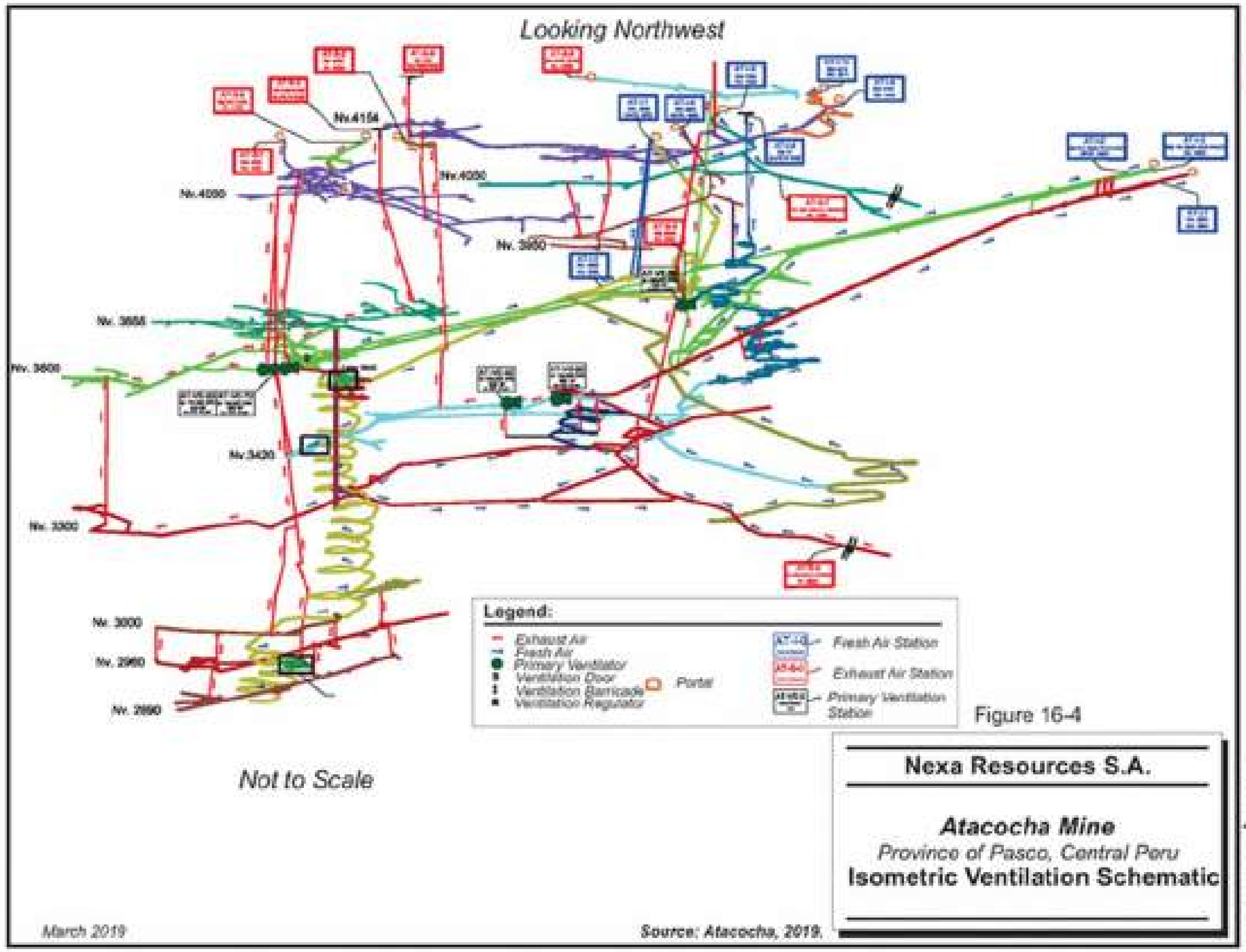

Figure 16-4

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Isometric Ventilation Schematic

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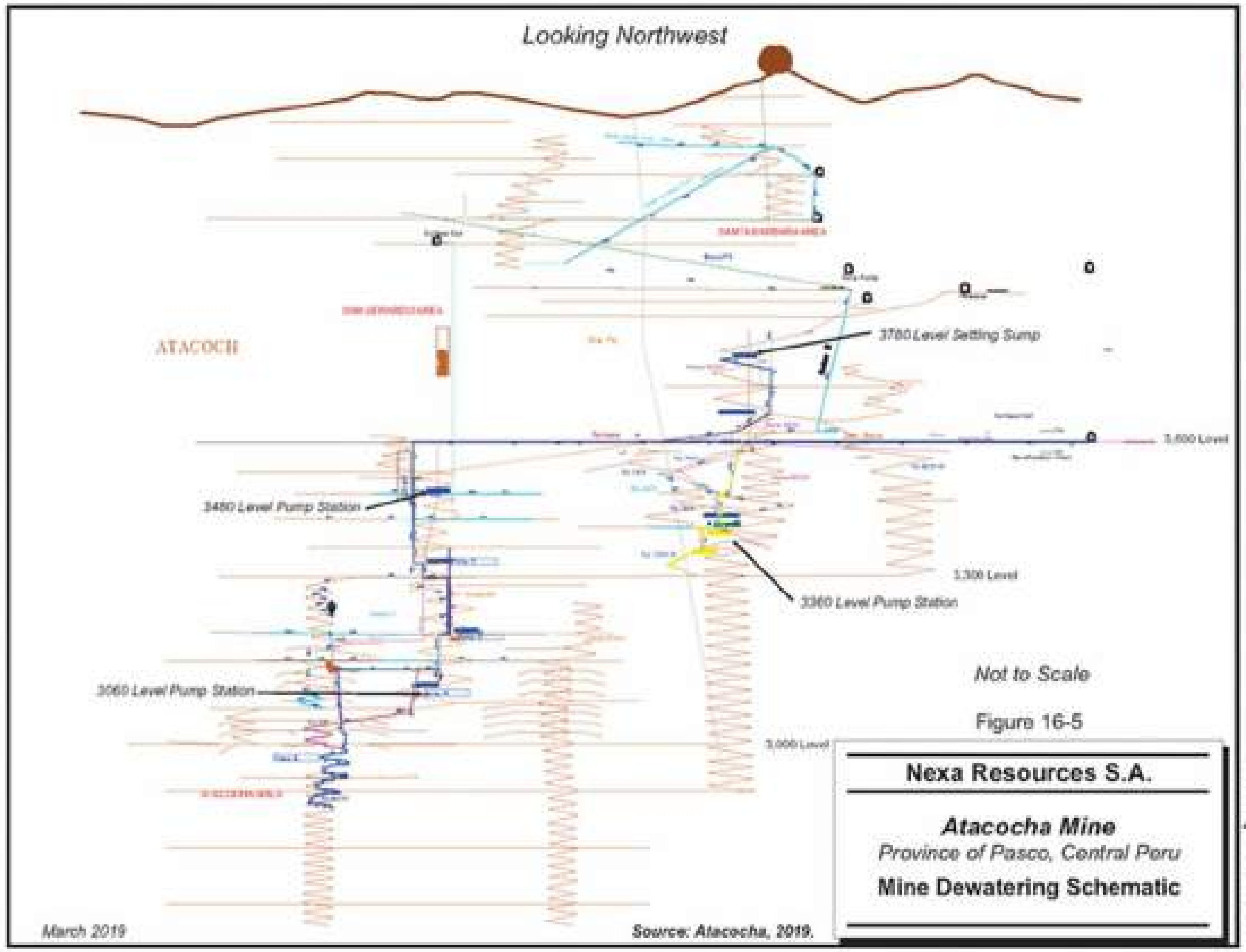

Figure 16-5

Nexa Resources S.A.

Atacocha Mine
Province of Pasco, Central Peru

Mine Dewatering Schematic

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SAN GERARDO

MINE DESIGN

A pit design was created based on the NPV Scheduler output shell using Deswik mine planning software and is consistent with the geotechnical design parameters that are summarized in Table 16-4. The final pit outline with topography is presented in Figure 16-6 and a longitudinal section through the final pit outline is presented in Figure 16-7. The San Gerardo pit is excavated on the east slope, with variable pit floor elevations and an ultimate pit bottom at 4,110 MASL. The pit is designed slightly wider than the NPV Scheduler shell to achieve reasonable mining widths to operate equipment.

TABLE 16-4 SAN GERARDO OPEN PIT DESIGN PARAMETERS
Nexa Resources S.A. – Atacocha Mine

Parameter	Unit	Input
Overall Slope Angle	°	37/47
Bench Face Angle	°	60/65
Berm Width	m	3
Bench Height	m	6
Benches per Berm	#	1
Double Ramp Width	m	12
Single Ramp Width	m	9
Ramp Slope	%	10

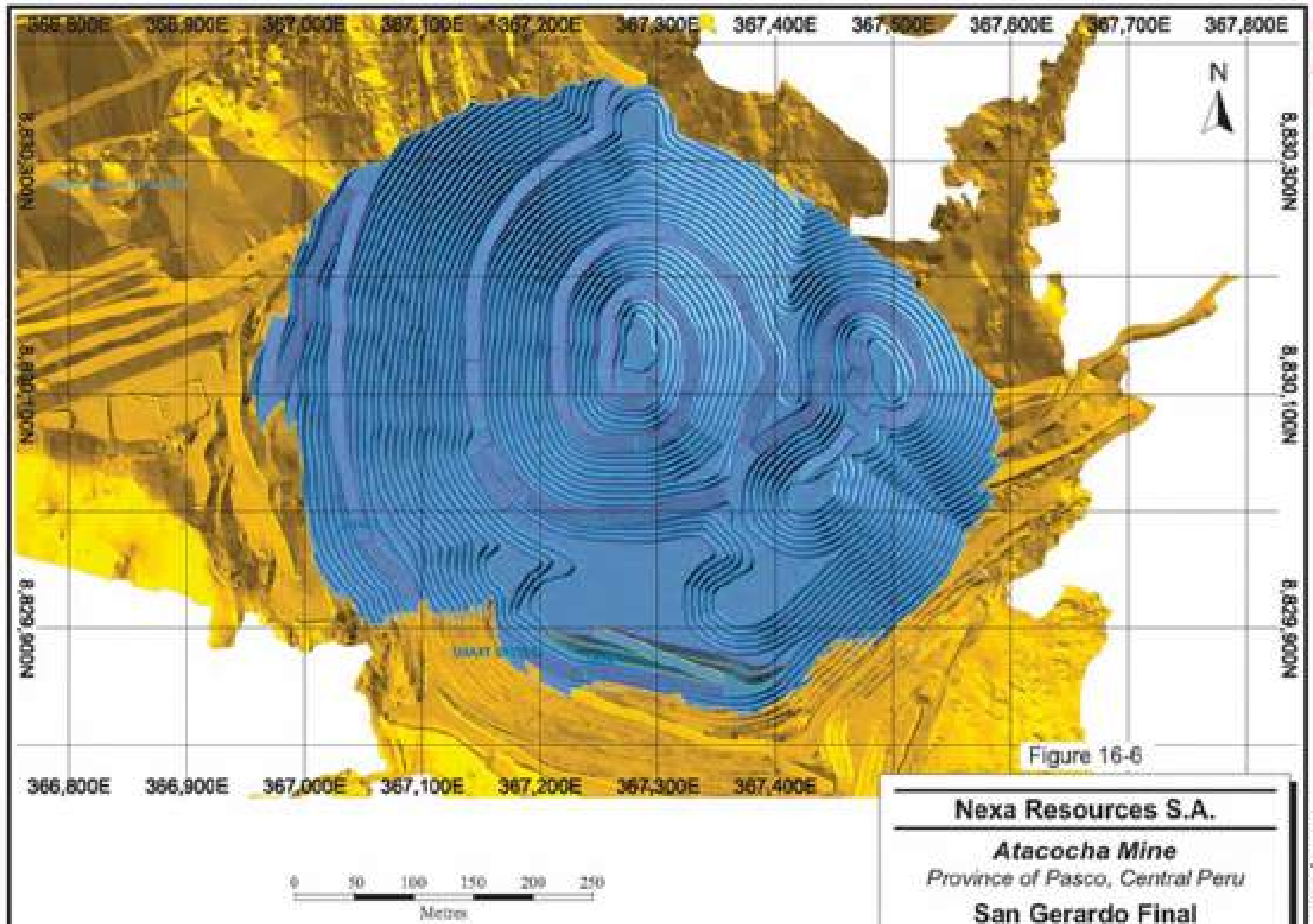

Figure 16-6

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

San Gerardo Final Mine Design Section

March 2019

Source: Atacocha, 2019.

RPA

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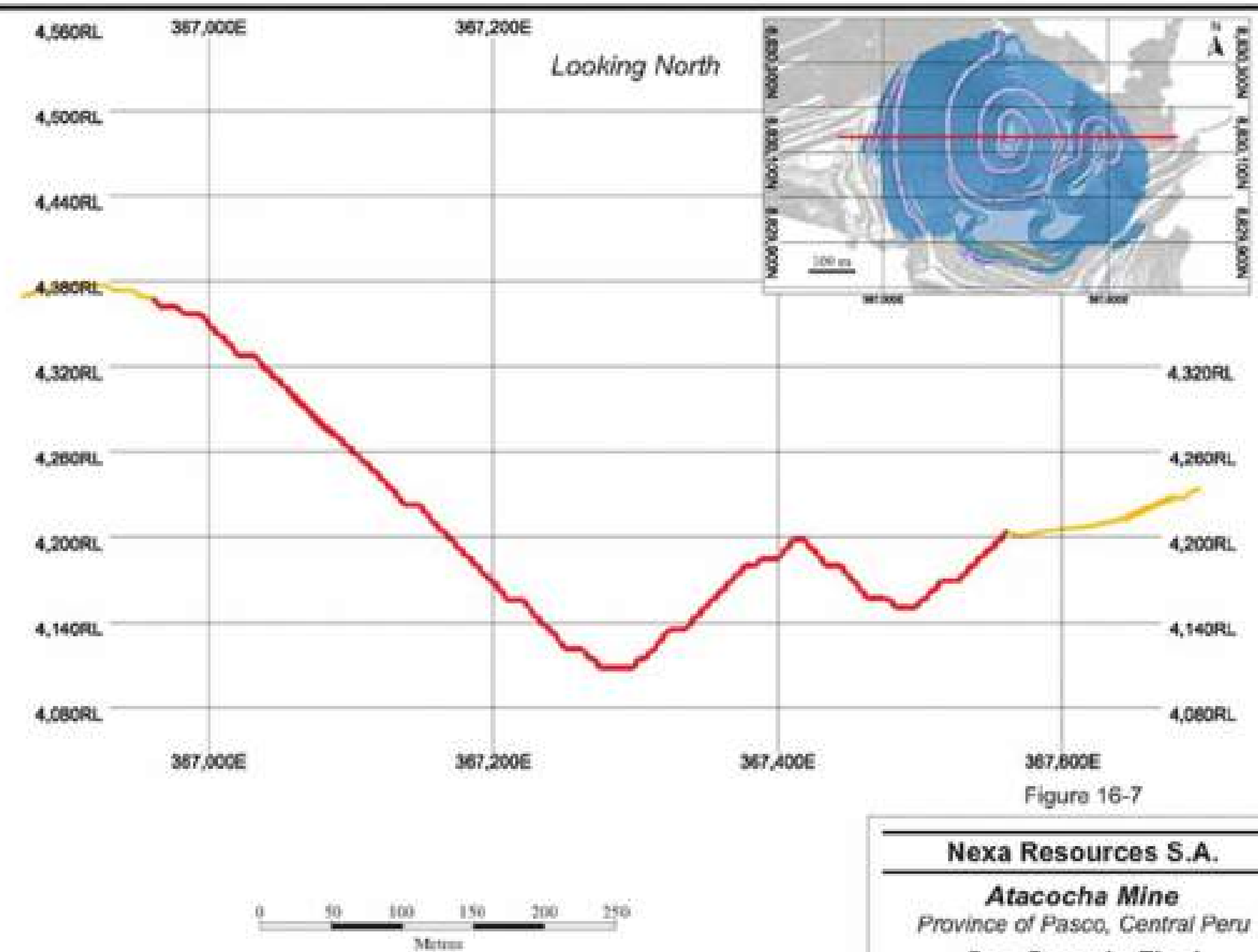


Figure 16-7

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

San Gerardo Final Mine Design Section

March 2019

Source: Atacocha, 2019.

MINING METHOD

At San Gerardo, surface mining is carried out by contractor (PEVOEX), including drilling, blasting, loading, hauling, and support. The mine is designed with a six metre bench height, utilizing 127 mm vertical drill holes on 4.0 m x 4.6 m drill pattern with 0.5 m of sub-drilling. Production drill holes are loaded with packaged emulsion.

Loading is with the CAT 336 and 374 excavators that allow for selectivity during the loading process and haulage of ore and waste is by 15 m^3 and 20 m^3 trucks respectively. Ramps are 12 m wide at a 10% gradient that allow bi-directional haul truck travel. Ore produced by San Gerardo is hauled to Ore Pass #2 to the east of the pit that reports to the 3600 Level of Atacocha, where it is trammed by locomotive and rail car to the Atacocha plant. A new ore pass will be excavated north of the pit in 2019, that will replace Ore Pass #2. Waste is hauled to the San Gerardo waste dump, which is adjacent to the Atacocha TSF dam. Average single direction haul distances for ore and waste are approximately 1.0 km and 4.7 km respectively.

GEOTECHNICAL CONSIDERATIONS

A pre-feasibility level geotechnical study was completed by SRK in February 2019. The objective was to design inter-ramp slope angles that are stable and in compliance with safety requirements. The analyses utilized data including diamond drill core inspections, mapping of exposed pit walls and the surrounding area, and laboratory testing of rock properties. Geotechnical domains were created and subsequently populated with rock mass quality (Bieniawski, 1989) using Leapfrog Geo. From this data, slope and bench design parameters were determined for each geotechnical domain, which are summarized in Table 16-5 with geotechnical domain sectors illustrated in Figure 16-8.

TABLE 16-5 SAN GERARDO OPEN PIT DESIGN PARAMETERS
Nexa Resources S.A. – Atacocha Mine

Geotechnical Domain Sector	Azimuth (°)	Overall Slope Design		Inter-Ramp Slope Design	
		Maximum Angle (°)	Maximum Height (m)	Maximum Angle (°)	Maximum Height (m)
SD-01	140	37	250	40	60
SD-02	225	43	165	48	60
SD-03	300	41	110	46	60
SD-04	118	46	80	46	60
SD-05	308	45	170	49	60
SD-06	000	44	150	46	60
SD-07	019	47	70	47	60
SD-08	104	39	270	44	60

MINE EQUIPMENT

Open pit mining production is carried out by contractors. The open pit mining equipment used at San Gerardo is presented in Table 16-6.

TABLE 16-6 SAN GERARDO OPEN PIT MINING EQUIPMENT
Nexa Resources S.A. – Atacocha Mine

Typical Manufacturer	Typical Model	Equipment Type	Quantity
Caterpillar	336D2L	Excavator	2
Caterpillar	374F	Excavator	1
Sandvik	DX 800	Pre-split Drill	1
Sandvik	DP 1500i	Production Drill	1
Caterpillar	966H	Front End Loader	1
Caterpillar	140K	Grader	1
Caterpillar	D6T	Dozer	1
Caterpillar	D8T	Dozer	1
Volvo	6X4	15m³ Haul Truck	2
Volvo	8X4	20m³ Haul Truck	8

PERSONNEL

The Atacocha manpower is made up of the mine employees and staff as well as a significant number of contract employees as presented in Tables 16-7.

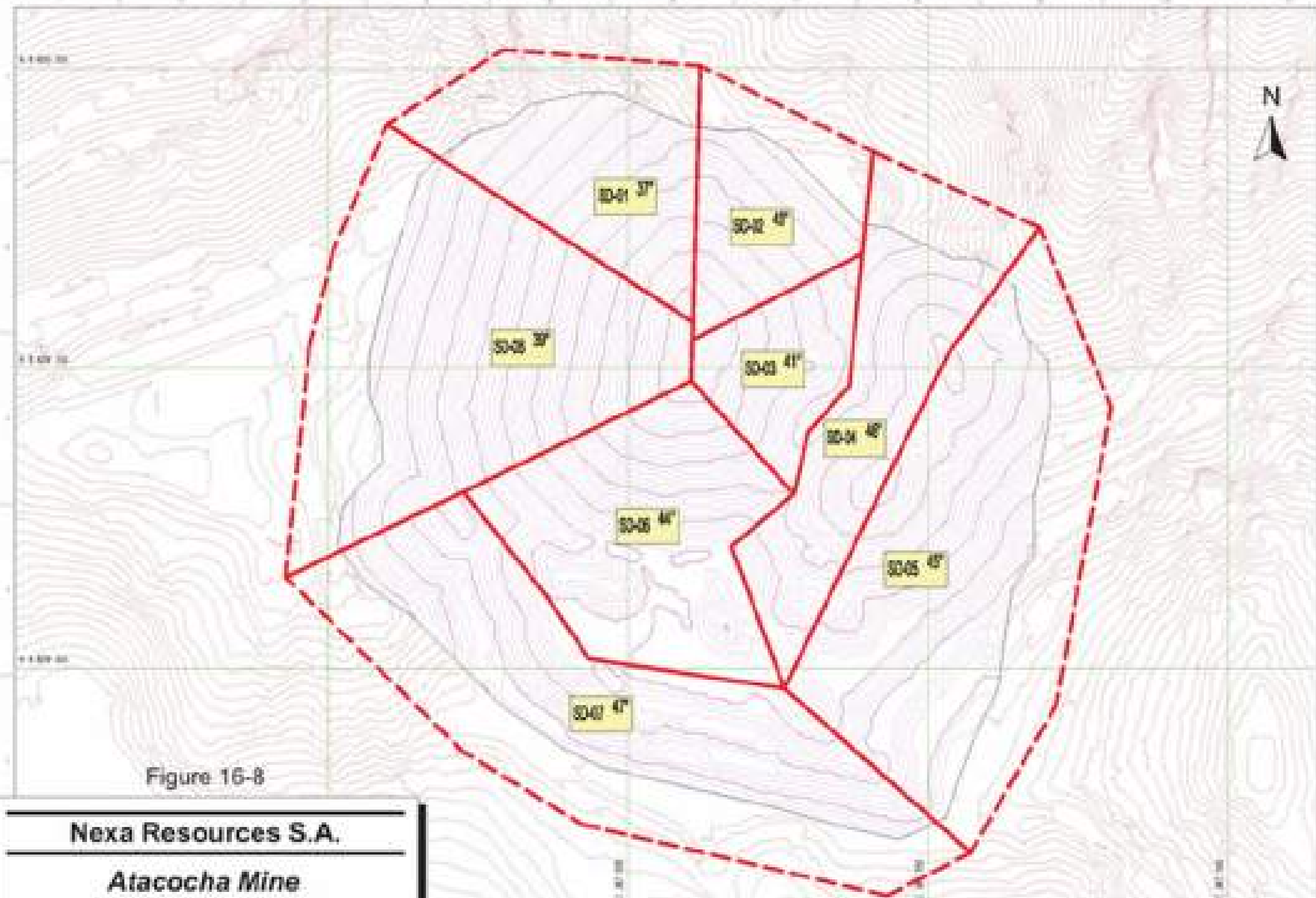


Figure 16-8

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

San Gerardo Mine Geotechnical Domain Sectors

March 2019

Source: Atacocha, 2019.

TABLE 16-7 SAN GERARDO OPEN PIT MINING EQUIPMENT
Nexa Resources S.A. – Atacocha Mine

Department	Employee	Contractor	Total
Mine	126	334	460
Geology	40	111	151
Maintenance	48	76	124
Administration	74	25	99
Planning	25	73	98
Plant	18	29	47
Environmental Affairs	3	17	20
Others	2	20	22
Security	8	0	8
Projects	3	0	3
Total	**347**	**685**	**1,032**

CONSOLIDATED LIFE OF MINE PLAN

Table 16-8 highlights the consolidated LOM plan for the Atacocha underground and the San Gerado open pit.

Atacocha underground ore production averages 900 tpd in 2019, increasing over the LOM plan with an LOM average production rate of 1,700 tpd. The Deep zone is currently being rehabilitated, with development of the Deep zone to start in the second half of 2019. Lateral capital and operating development have annual averages of 2,400 m and 3,500 m respectively, with total development consistent over the first five years of the LOM at an average of 6,400 m.

The current San Gerardo environmental and operational permits allow mining operations within an 8.8 ha area. The current LOM plan restricts mining operations to this area until August 2019. Following updated mining permit approval, the permit area increases to 24.2 ha. Average ore and waste production rates for 2019 are 3,600 tpd and 17,800 tpd, respectively, with average LOM production rates of 2,800 tpd and 16,900 tpd for ore and waste, respectively.

Consolidated mine production feeds the Atacocha plant at a nominal capacity of 4,500 tpd.

TABLE 16-8 CONSOLIDATED LIFE OF MINE PRODUCTION PLAN

Nexa Resources – Atacocha Mine

Atacocha	**UNITS**	**TOTAL**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
CAF ROM	000 t	2,872	320	506	332	567	560	545	42
Zn Grade	%	4.00%	4.62%	2.54%	3.69%	3.56%	4.52%	5.02%	5.36%
Pb Grade	%	1.74%	2.04%	1.99%	2.03%	2.00%	1.48%	1.21%	1.02%
Cu Grade	%	0.25%	0.24%	0.15%	0.18%	0.19%	0.33%	0.39%	0.25%
Ag Grade	oz/t	2.65	3.20	3.26	2.60	2.66	2.49	1.99	2.11
SLS ROM	000 t	922	0	19	208	153	200	304	37
Zn Grade	%	4.33%	4.62%	2.54%	3.69%	3.56%	4.52%	5.02%	5.36%
Pb Grade	%	1.60%	2.04%	1.99%	2.03%	2.00%	1.48%	1.21%	1.02%
Cu Grade	%	0.29%	0.24%	0.15%	0.18%	0.19%	0.33%	0.39%	0.25%
Ag Grade	oz/t	23.8	3.20	3.20	2.60	2.66	2.49	1.99	2.11
Total ROM	000 t	3,794	320	525	540	720	760	849	79
Zn Grade	%	4.08%	4.62%	2.54%	3.69%	3.56%	4.52%	5.02%	5.36%
Pb Grade	%	1.71%	2.04%	1.99%	2.03%	2.00%	1.48%	1.21%	1.02%
Cu Grade	%	0.26%	0.24%	0.15%	0.18%	0.19%	0.33%	0.39%	0.25%
Ag Grade	oz/t	2.58	3.20	3.26	2.60	2.66	2.49	1.99	2.11
Development									
Lat. Cap. Dev.	m	14,217	4,670	3,547	2,203	2,425	892	481	-
Vert. Cap. Dev.	m	830	254	351	166	59	-	-	-
Lat. Op. Dev.	m	20,783	660	2,953	4,263	4,575	6,058	2,155	118
San Gerardo	**UNITS**	**TOTAL**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Total ROM	000 t	6,034	1,317	1,098	1,082	902	863	772	-
Zn Grade	%	0.94%	0.85%	0.95%	0.73%	0.96%	1.03%	1.25%	-
Pb Grade	%	1.02%	0.95%	0.84%	0.77%	1.13%	1.17%	1.46%	-
Cu Grade	%	0.03%	0.03%	0.03%	0.02%	0.02%	0.03%	0.05%	-
Ag Grade	oz/t	1.06	1.02	1.04	0.88	1.10	1.06	1.32	-
Waste	000 t	36,369	6,494	9,719	9,400	6,511	3,511	735	-
Strip Ratio		6.0	4.9	8.9	8.7	7.2	4.1	1.0	
Atacocha Plant	**UNITS**	**TOTAL**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Total ROM	000 t	9,828	1,637	1,623	1,622	1,622	1,623	1,621	79
Underground	000 t	3,794	320	525	540	720	760	849	79
Open-pit	000 t	6,034	1,317	1,098	1,082	902	863	772	-
Zn Grade	%	2.15%	1.59%	1.46%	1.71%	2.11%	2.66%	3.23%	5.36%
Pb Grade	%	1.29%	1.17%	1.22%	1.19%	1.52%	1.32%	1.33%	1.02%
Cu Grade	%	0.12%	0.07%	0.07%	0.07%	0.10%	0.17%	0.23%	0.25%
Ag Grade	oz/t	1.6	1.45	1.76	1.45	1.79	1.73	1.67	2.11

17 RECOVERY METHODS

INTRODUCTION

The Atacocha concentrator processes ore from the Atacocha underground mine and the San Gerardo open pit mine. While production from the open pit ramped up from 2016 to 2017, ore from the underground mine has decreased, and in 2018 open pit ore made up approximately 70% of the Atacocha concentrator feed. The average daily processing rate is approximately 4,200 t.

The Atacocha concentrator utilizes a conventional crushing, grinding, and sequential flotation scheme to produce lead, copper, and zinc concentrates. A flash-flotation step is included in the grinding circuit that recovers lead at a grade sufficiently high to report directly to the final lead concentrate. Lower copper head grades in recent years have resulted in only small quantities of copper concentrate being produced intermittently when copper head grades warrant its production. The majority of gold and silver report to the lead concentrate.

The zinc concentrate is transported to the Cajamarquilla zinc refinery in Peru, while the copper and lead concentrates are sold to concentrate traders.

PROCESS DESCRIPTION

A simplified process flow diagram is shown in Figure 17-1.

ROM ore is delivered to four coarse ore bins that feed ore to the primary jaw crusher located at the surface near the underground portal. The crusher feed grizzly undersize and the primary crusher product are combined and fed to secondary and tertiary crushing stages in open and closed circuit respectively. The crushed ore, with a top size of approximately 5 mm, is delivered to six storage bins prior to being fed to the six primary ball mills in parallel. Each of the mills is in closed circuit with cyclones for classification, and incorporates a single flash flotation cell for coarse lead mineral recovery. The cyclone overflow feeds the sequential flotation plant.

The flotation plant consists of three flotation separation circuits. The first produces a bulk copper-lead concentrate that is then separated in the second circuit to produce the copper and lead concentrates. The third circuit, processing the tailings from the copper and lead circuits, and including a regrinding stage, produces the zinc concentrate and the final tails. A Courier online analyzer provides real-time data to help with process control.

Each concentrate is thickened and filtered before being discharged to the concentrate storage areas ready for shipping. The concentrates are loaded into trucks by front end loader when being despatched to customers.

Flotation tailings classified by cyclones; the underflow is directed to the underground mine for back-fill. The cyclone overflow is thickened to approximately 55% solids in a 125 ft thickener, and then pumped to the tailings dam at the El Porvenir concentrator by positive displacement pumps. Excess water is discharged from the tailings dam through a drainage system, and in part due to dilution from rain water and streams, meets discharge requirements without further treatment.

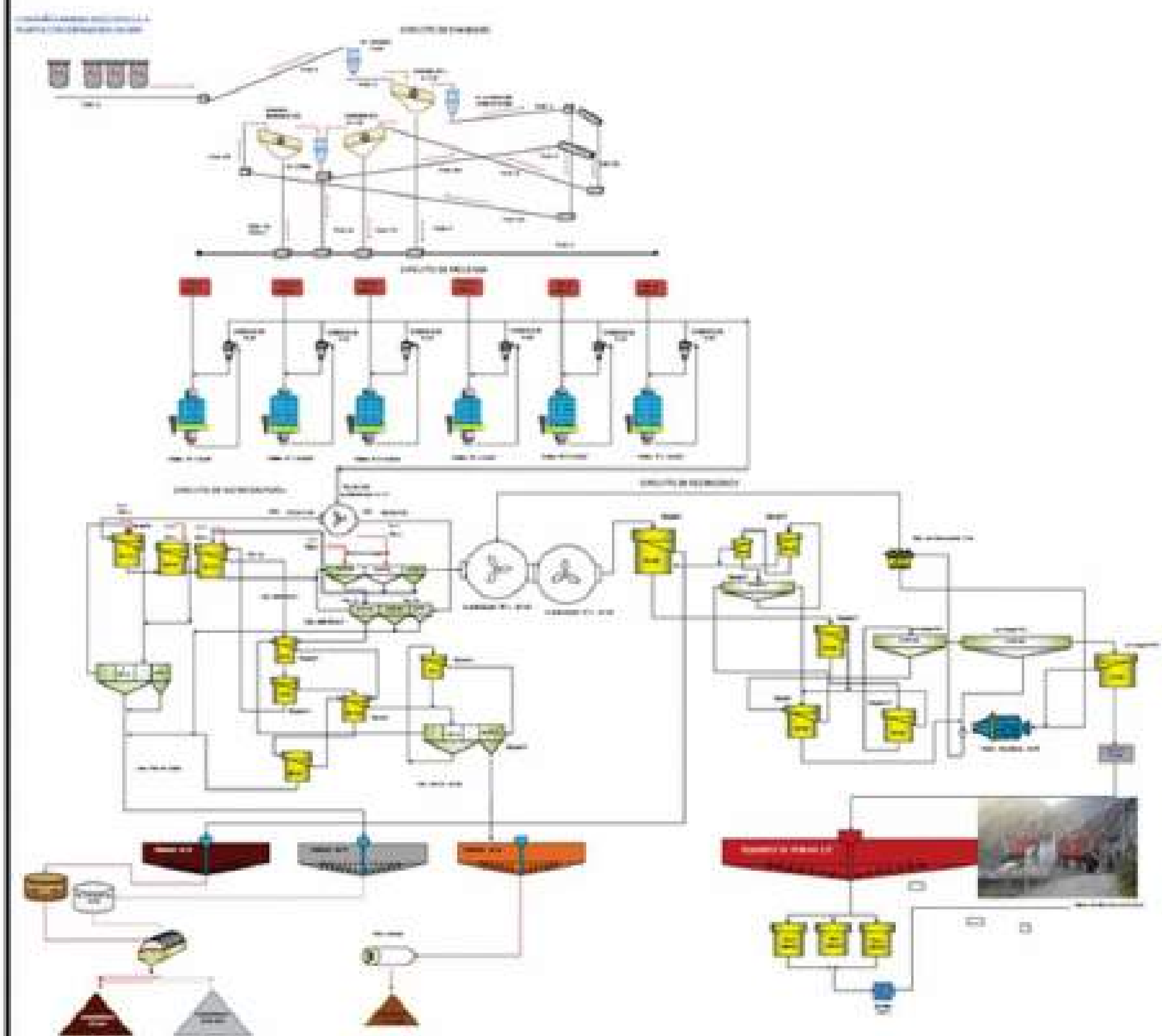


Figure 17-1

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Process Flowsheet

March 2019

Source: Atacocha, 2019.

18 PROJECT INFRASTRUCTURE

ONSITE INFRASTRUCTURE

Site operations comprise an underground mine, open pit mine, and a process plant facility. Supporting onsite infrastructure include maintenance facilities; maintenance buildings for underground and surface equipment, laboratory, and tailings pumping station. Facilities and structures supporting operations include warehouses and laydown areas, offices, dry facilities, hydroelectric generating station, power lines and substation, fuel storage tanks, and accommodations camp. A network of site roads that are approximately 6 m wide and total 15 km in length are used by authorized mine personnel and equipment, including ore and waste haul trucks, concentrate haul trucks, support and light duty vehicles to provide access to onsite infrastructure.

Figure 18-1 shows the general layout of the Atacocha infrastructure.

Figure 18-1

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Atacocha Infastructure

March 2019

Source: Atacocha, 2019.

POWER PLANT AND DISTRIBUTION

Power supply for the Project comes from three sources, Electroandes, a power supplier located in Paragsha via a 30 km long 50 kV transmission line, Chaprin Hydro, a hydroelectric generating station with a total capacity of 5.26 MW via a 15 km long 50 kV transmission line, and the Marcopampa hydroelectric generating station with a total capacity of 1.1 MW via a 5 km long 50 kV transmission line. A network of power lines distribute power to various locations within the property to support operating activities.

TAILINGS STORAGE FACILITY

The current plan considers that all tailings generated by Atacocha and El Porvenir process plants will be deposited in the El Porvenir TSF. A storage capacity of 30 Mm^3 is required to support the LOM estimate, with potential for expansion of the resource possible. The El Porvenir TSF arrangement is shown in Figure 18-2.

A feasibility study and the current operation permit support an increased height of the El Porvenir tailings dam to a crest elevation of 4,100 m, as designed by Ausenco (2016). Table 18-1 shows the tailings storage planning considerations, with the design ultimate crest height satisfying the required tailings storage volume for the LOM plan using an average deposited tailings dry density of 1.3 t/m^3.

TABLE 18-1 STORAGE CAPACITY OF EL PORVENIR TAILINGS STORAGE FACILITY
Nexa Resources S.A. – Atacocha Mine

Elevation (m)	Incremental Volume (M m^3)	Cumulative Volume (M m^3)
4056	0.53	0.53
4060	3.88	4.41
4065	3.87	8.28
4070	3.88	12.16
4075	3.87	16.03
4080	3.88	19.91
4085	3.87	23.78
4090	3.88	27.66
4095	3.87	31.53
4098	2.33	33.86

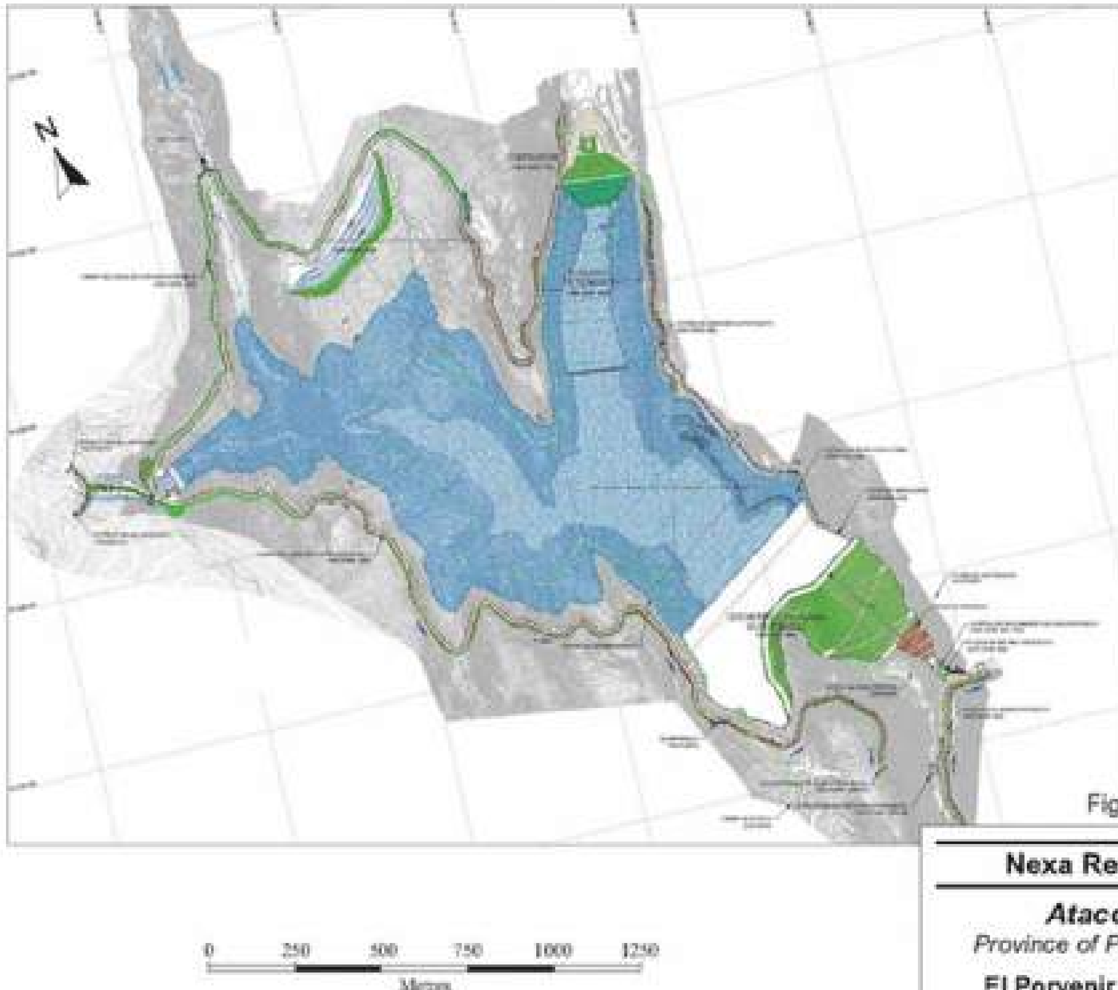


Figure 18-2

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

El Porvenir Tailings Storage Facility Arrangement

March 2019

Source: Atacocha, 2019.

A schematic cross section of the existing dam extracted from the Nexa monitoring report is shown in Figure 18-3. SRK (2017) reports that the dam was raised as a cycloned sand (tailings) dam to elevation 4,043 m, and rockfill above that level. The cyclone sand dam section is indicated by the pink colour on Figure 18-3. The overall downstream slope of the dam is reportedly 2H:1V.

The current dam crest is at elevation 4056 m and the downstream toe is inferred to be less than 3920 m from available plans, resulting in a dam height of 136 m. Figure 18-4 shows the main TSF dam in plan view. The emergency spillway is an overflow tunnel located in the right abutment reportedly designed to convey flows from Probable Maximum Precipitation (SRK, 2017). The tunnel discharges via a tunnel daylighting at elevation 4,035 m.

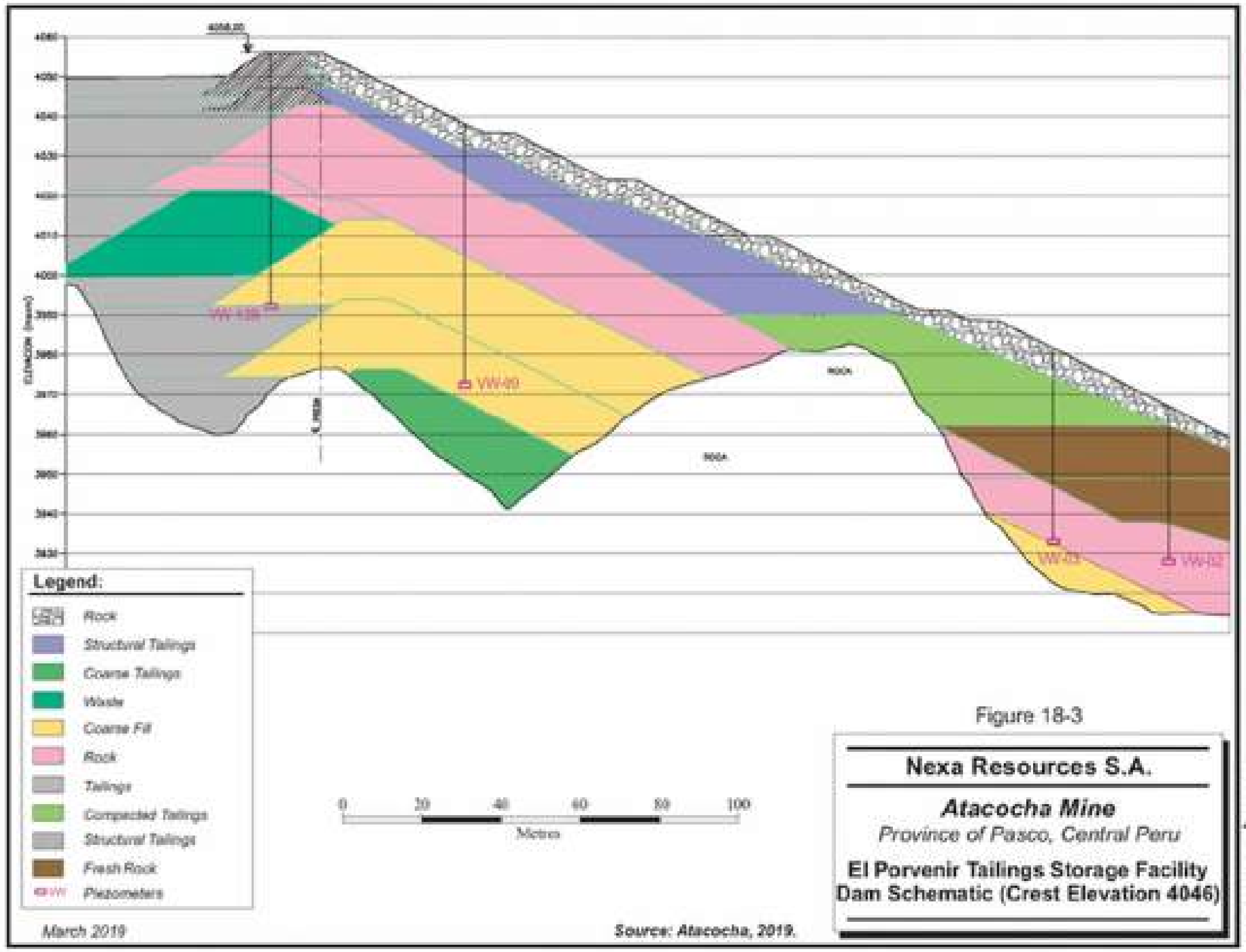


Figure 18-3

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

El Porvenir Tailings Storage Facility Dam Schematic (Crest Elevation 4046)

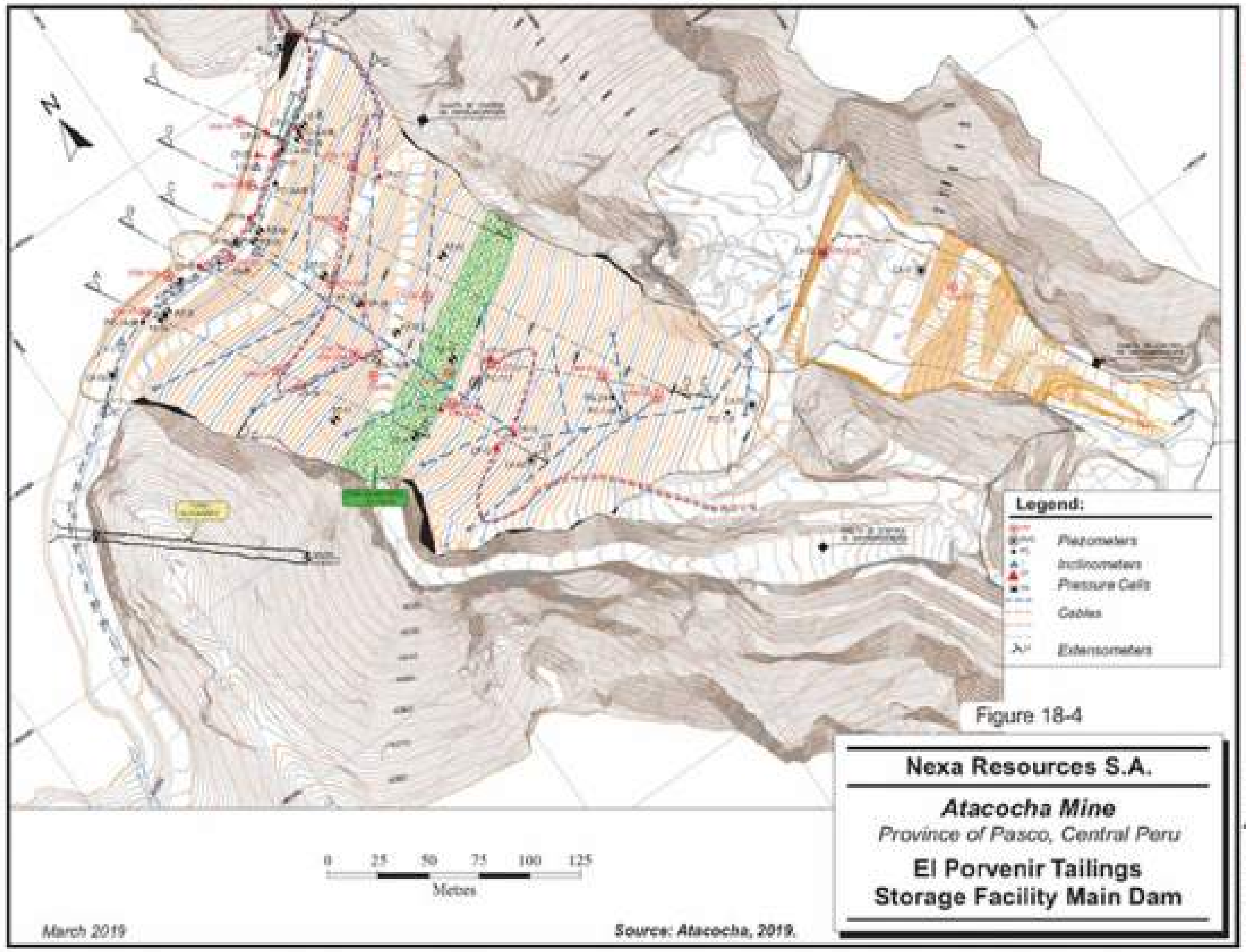


Figure 18-4

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

El Porvenir Tailings Storage Facility Main Dam

Table 18-2 summarizes the recent dam raising activities and the plans to raise the crest elevation to 4100 m for an ultimate dam height of 177 m.

Figure 18-5 shows the design section for raising the dam crest to 4100 m (Ausenco, 2016).

TABLE 18-2 RECENT EL PORVENIR TAILINGS DAM RAISES
Nexa Resources S.A. – Atacocha Mine

Construction Completion	Crest elevation (m)	Maximum Height (m)	Comments
Prior to Jan/2013	4043	123	• Cycloned sand dam
05/2015	4047	127	• Switch to rockfill • Grouting of the dam abutments • Geomembrane face lining (4 m raise only)
04/2017	4054	134	• Downstream sub-drain system added (in rockfill)
09/2017	4056	136	• Inlet channel / berms constructed for the spillway
Planned ultimate	4100	180	• Centreline rockfill section • Requires dams at the north side of TSF • Includes a significant drop structure for the spillway adjacent to dam

It is noted that the expansion of the TSF to contain the life-of-mine tailings requires a rockfill embankment dam at the northeast corner of the TSF to prevent tailings from impacting the process plant area, as well as the northwest where the Tingovado Creek is diverted (Figure 18-5).

Non-contact runoff from around the TSF is currently conveyed downstream of the dams using perimeter diversion channels. The diversion on the western side of the TSF will be raised for the ultimate dam (Ausenco, 2016).

To RPA's knowledge the measures to address seepage through karst rocks have been implemented through recent TSF construction including a sandy gravel platform around the perimeter of the TSF (SRK, 2017), and bedrock foundation grouting of the dam abutments in 2015. On-going operations will require continuous tailings deposition planning and pond management to maintain the design beach widths to limit seepage through the permeable dam. Monthly and annual dam safety inspections are currently being conducted by Geoconsultoria Ltda, an external consultant, for both the Atacocha and El Porvenir dams.

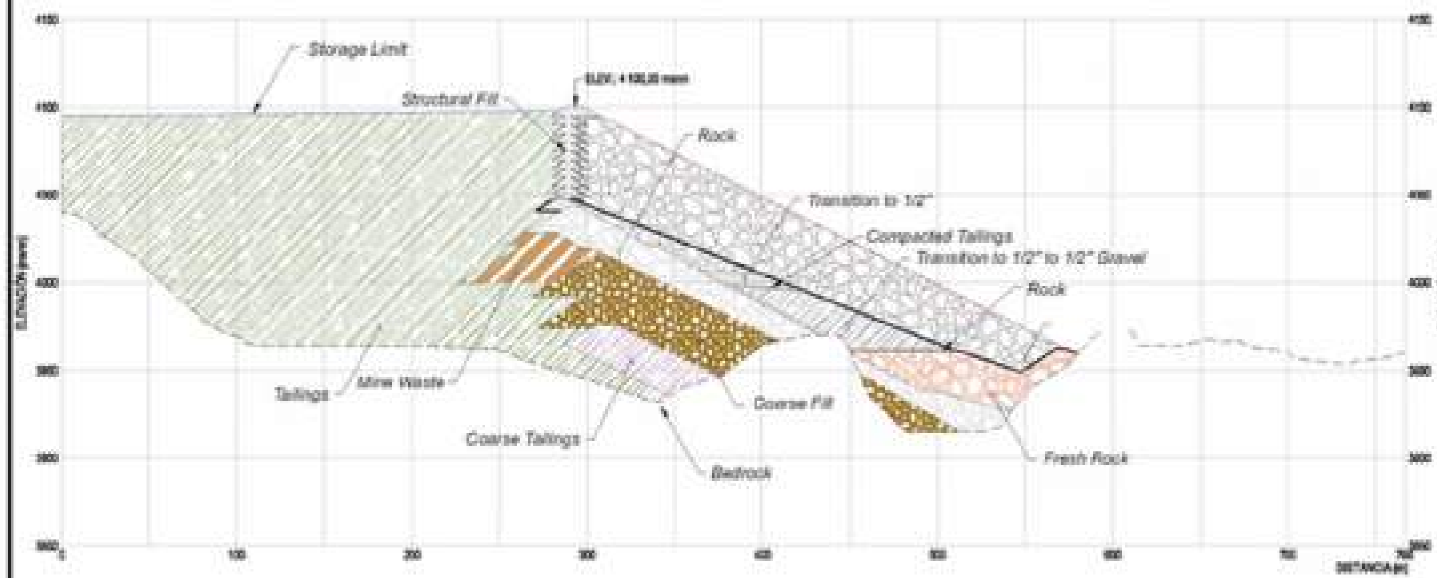


Figure 18-5

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Proposed Raising of El Porvenir Dam to Crest Elevation 4100

March 2019

Source: Atacocha, 2019.

www.rpacan.com

ATACOCHA WASTE ROCK DUMP

Mine rock disposal is planned downstream of the existing Atacocha TSF dam, which also serves to buttress the dam to enhance stability. The Atacocha TSF dam has been raised in at least five stages by the downstream method, with a 2H:1V overall downstream slope and a 1.5H:1V upstream slope. The upstream slope is lined with a geomembrane. The Atacocha TSF is shown on Figure 18-6 and a dam cross section on Figure 18-7.

It is also understood that the first of four stages of dam raising included geosynthetic clay liner (GCL) on both the upstream and downstream faces of the dam and around the perimeter of the TSF (SRK, 2017). The GCL was reportedly installed for the initial TSF development over concerns about potential acid generation in the tailings and it has been maintained because of permits conditions. The GCL lining on geogrid support layers around the TSF also serves to mitigate potential issues with karst terrain.

Dam safety monitoring reports indicate that the TSF pond was at the maximum operating level for 18 months from early 2017 until the dam was raised in late 2018.

Figure 18-8 shows the waste rock facility downstream of the TSF and lined pond for water collection and management.

Mine waste rock management planning includes encapsulation of potentially acid generating (PAG) waste rock within a non-acid generating (NAG) surround as shown on Figure 18-9, and the waste rock dump area is provided with a sub-drain seepage collection system (Ausenco, 2018).

Figure 18-10 shows the extent of bedrock foundation excavation and treatment downstream of the waste rock dump.

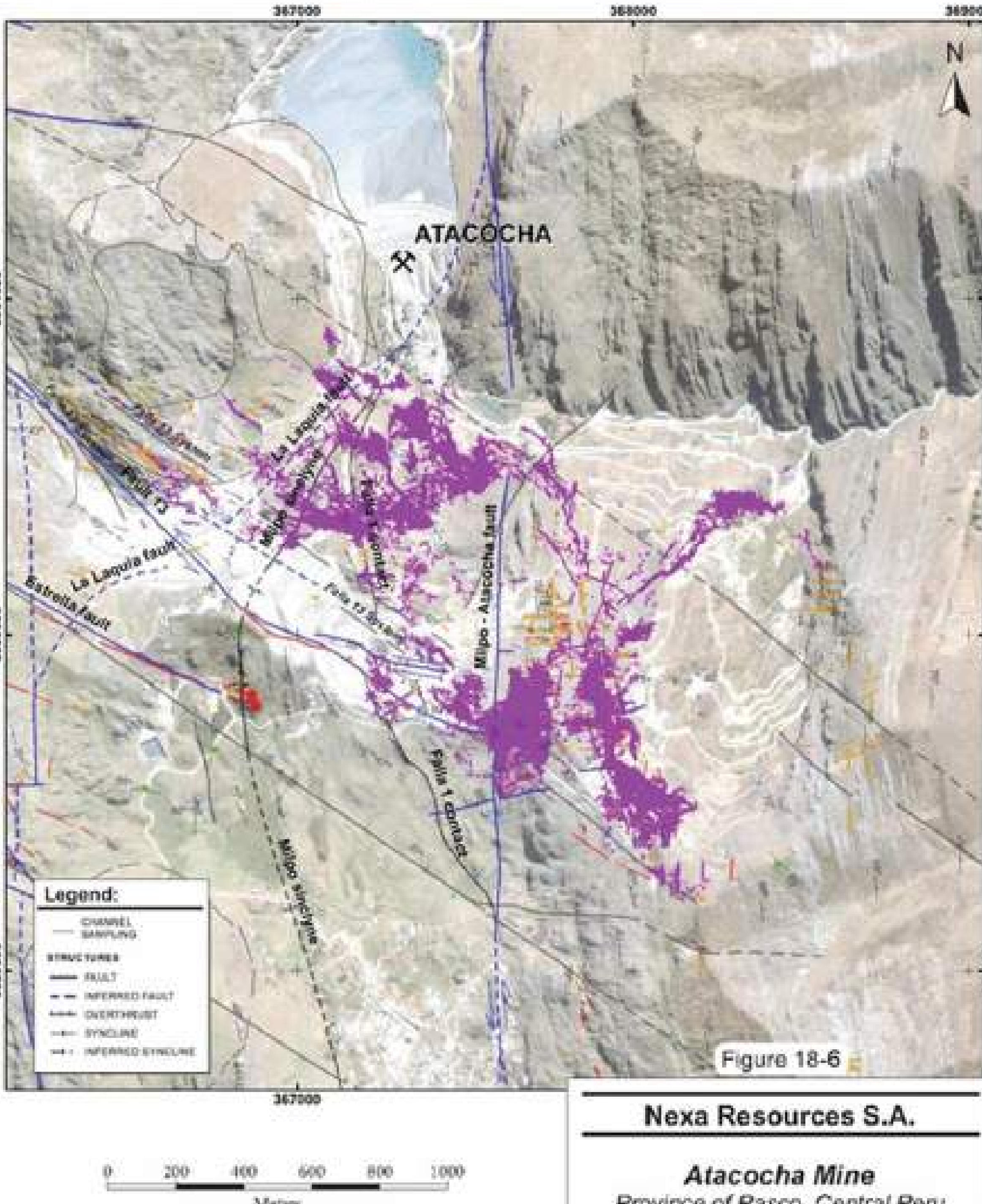


Figure 18-6

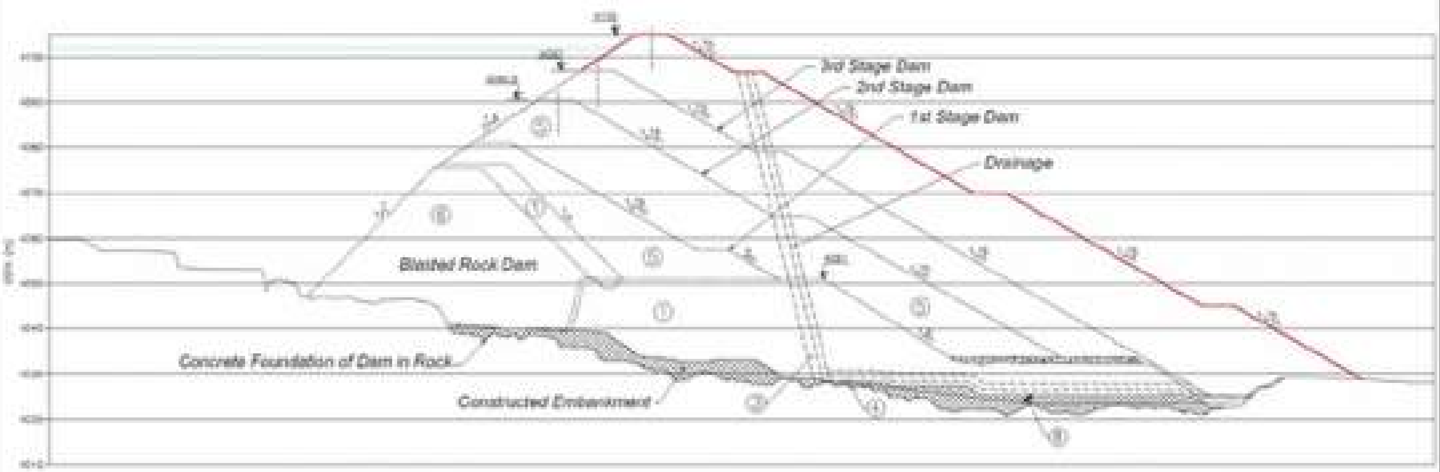
Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Atacocha Tailings Storage Facility

March 2019 *Source: Atacocha, 2017.*



Legend:

1. Silty Gravel
2. Gravelly Sand
3. Gravelly Sand
4. Gravelly Sand
5. Fine (Screened) Rock
6. Rock
7. Gravelly Sand
8. Gravelly Sand
9. Fine (Screened) Rock

0 10 20 30 40 50
Meters

Figure 18-7

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Atacocha Tailings Storage Facility Dam Cross Section

March 2019

Source: Atacocha, 2019.

RPA

www.rpacan.com

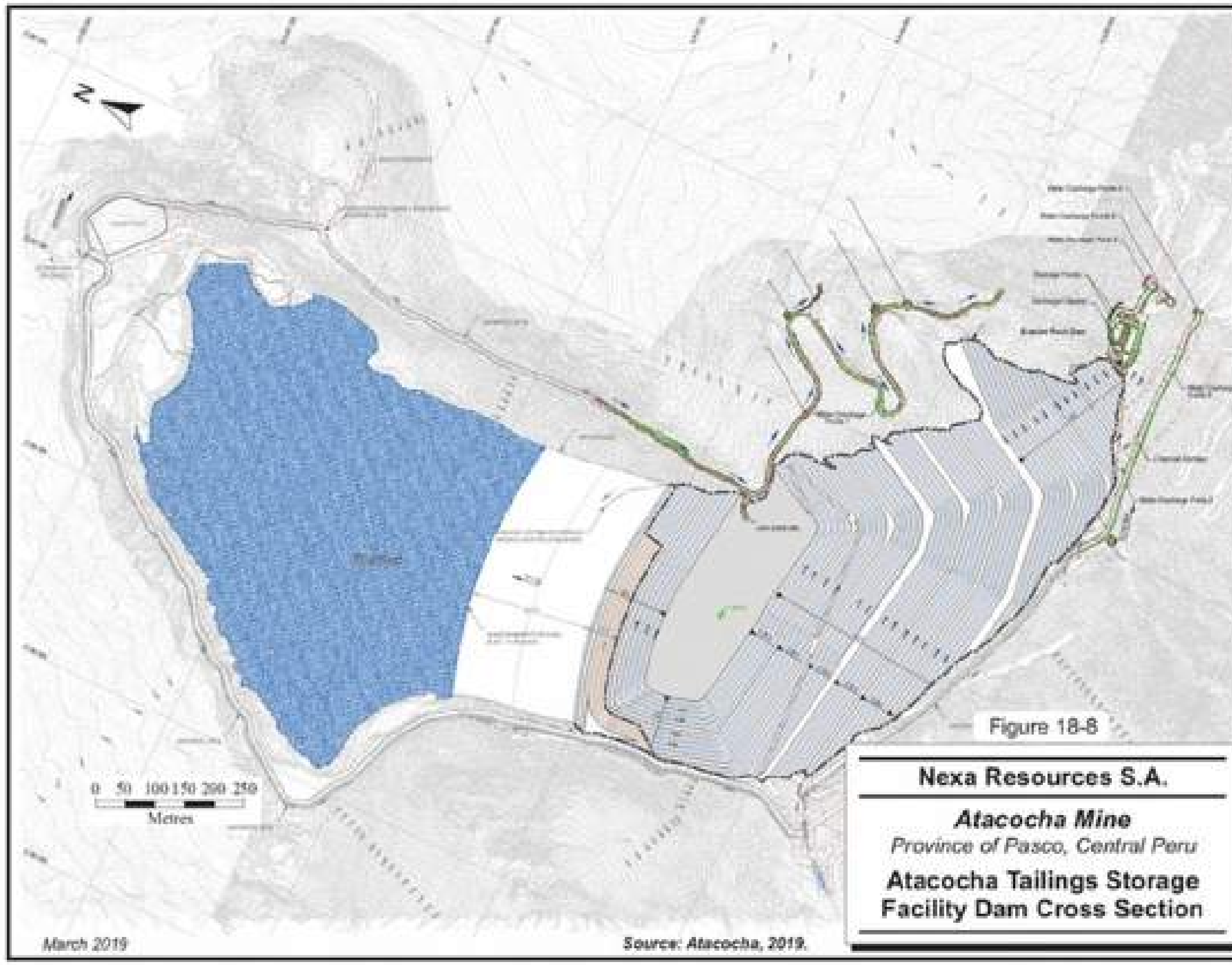


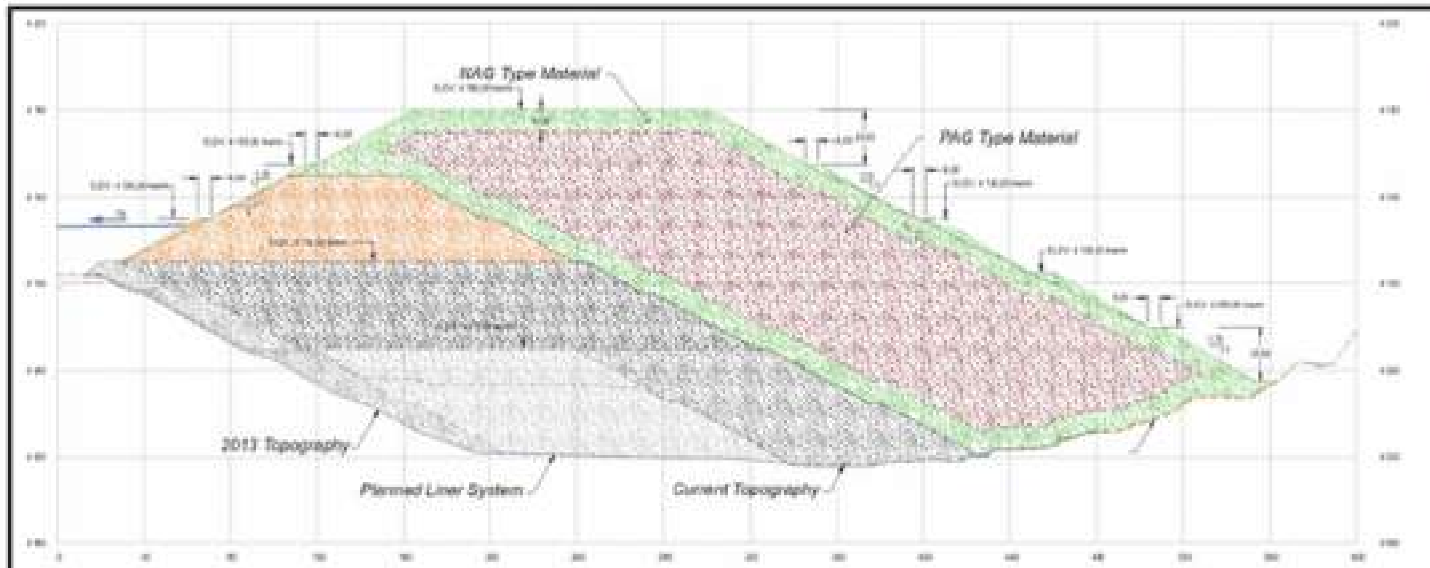
Figure 18-8

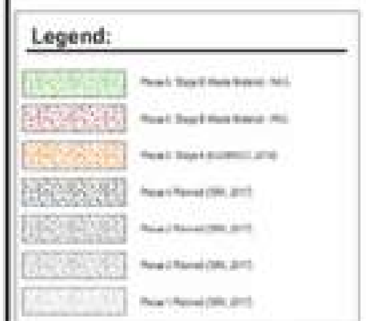
Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Atacocha Tailings Storage Facility Dam Cross Section





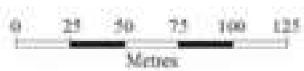


Figure 18-9

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Potentially Acid Generating Rock Encapsulation Concept

March 2019

Source: Atacocha, 2019.

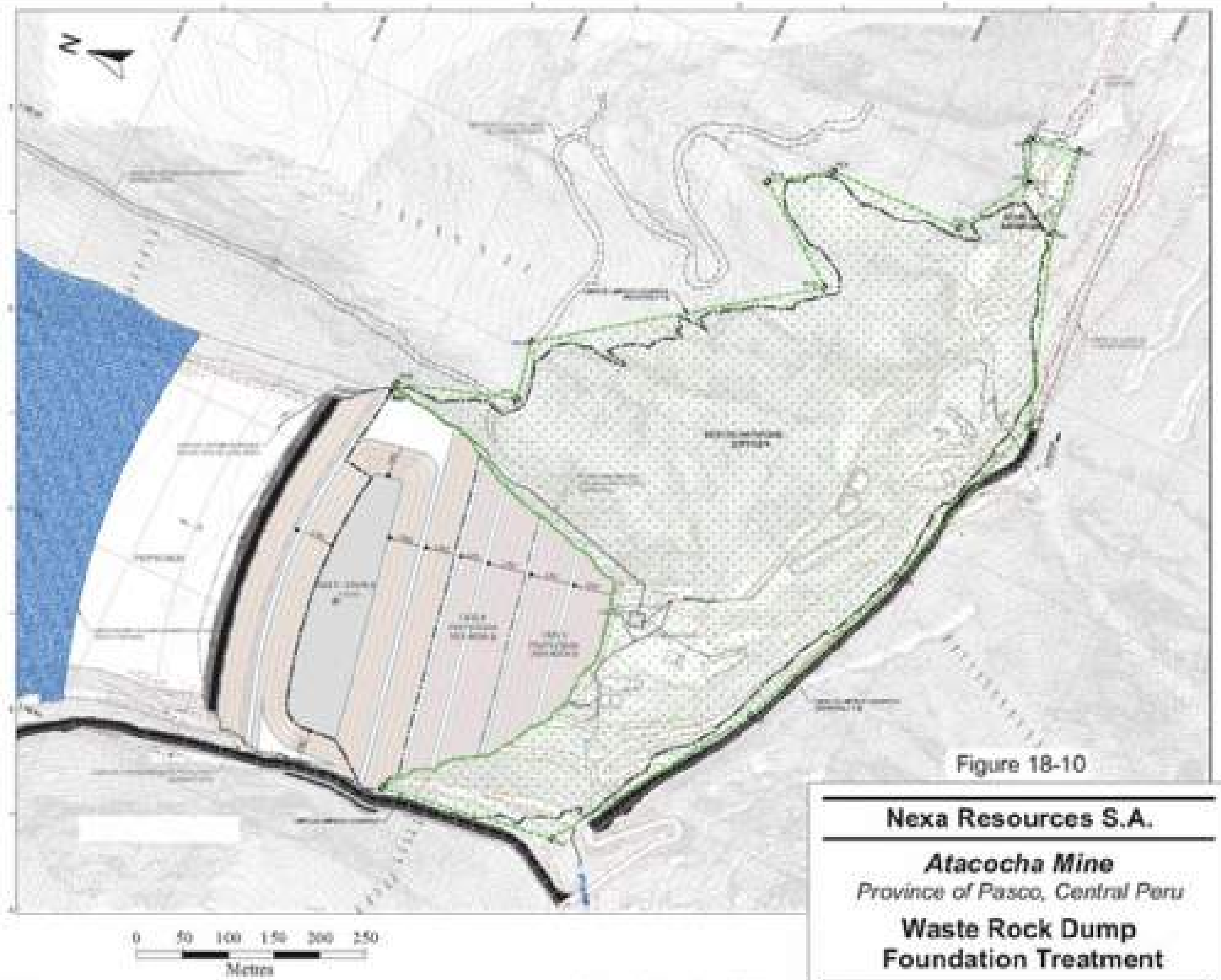


Figure 18-10

Nexa Resources S.A.

Atacocha Mine

Province of Pasco, Central Peru

Waste Rock Dump Foundation Treatment

March 2019

Source: Atacocha, 2019.

19 MARKET STUDIES AND CONTRACTS

The principal commodities produced at Atacocha are zinc, lead, and copper concentrates, with silver and gold contained in concentrate. These products are freely traded at prices that are widely known.

Metal prices for Mineral Resource and Mineral Reserve estimation and for economic analysis, are based on consensus forecasts by independent financial institutions.

For the economic analysis, RPA used LOM weighted average metal prices of:

- US$2,603/t Zinc
- US$2,178/t Lead
- US$6,437/t Copper
- $18.99/oz Silver
- $1,360/oz Gold

Zinc concentrate is sold to the Cajamarquilla smelter located east of Lima on an annual contract. Lead and copper concentrates are sold to commodity trading companies on annual contracts and delivered to Callao port. The concentrates are of clean quality with low levels of impurities. In RPA's opinion, the contract terms are typical of the industry.

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 for review, and teleconferences with mine site personnel facilitated by Nexa. No site visit was conducted in support of the preparation of Section 20 of this Technical Report.

MINE OPERATION OVERVIEW

The Atacocha property is located in the district of San Francisco de Asís de Yarusyacán, in the province of Pasco, Peru, approximately 15 km northeast of the town of Cerro de Pasco. The property is in the central Andes mountains region of Peru, at an approximate elevation of 4,200 MASL. It is located regionally within the Alto Huallaga Inter-basin, and locally in the headwaters of the Atacocha Creek sub-watershed, which contributes to the Huallaga River. Highest flows in the river typically occur in February, and lowest flows in June. The life of mine of Atacocha currently extends until 2025.

The Atacocha operation is comprised of the following main facilities:

- Underground mine
- San Gerardo open pit (including Satellite East and Satellite West open pits)
- In-pit waste dumps (North Zone and West Zone)
- Atacocha waste dump
- Atacocha tailings storage facility
- Temporary ore stockpile
- Topsoil stockpile
- Atacocha processing plant (referred to as Chicrín No. 2 in the Closure Plan)
- Sediment pond
- Ancillary buildings (administration, storage, vehicle maintenance, etc.)
- San Felipe and Chicrín camps
- Closed waste dumps (3600, 3900, 4000)
- Inactive tailings storage facilities in closure (Chicrín Antiguo, Chicrín Actual, Cajamarquilla, Titlacayán, Malauchaca)

With the integration of Atacocha and El Porvenir mine operations, tailings from Atacocha can be deposited in El Porvenir TSF, located approximately 4 km south of the Atacocha mine. This is the current tailings disposal practice. Disposal of tailings in the Atacocha TSF is currently permitted for dam crest elevation 4,105 m and is awaiting authorization for additional disposal with the dam crest raised up to elevation 4,110 m. Likewise, disposal of waste rock in the Atacocha waste dump will begin when the authorization is granted. The permitting application for those facilities has already been submitted.

The concentrator plant processes polymetallic ore (zinc, lead, copper, silver, gold) with a daily throughput of 4,500 tpd.

Non-contact water is diverted around the open pits, the Atacocha TSF, and the Atacocha waste dump through diversion channels that convey the water to the Lalaquia and Atacocha creeks.

Open pit and underground mine dewatering is used for process plant make-up water and dust control water for roads; it can alternatively be conveyed to the sediment pond for treatment and discharge to the environment if the water inflow exceeds water consumption requirements. The controlled outflow from the Atacocha TSF corresponds to the water pumped from the tailings decant pond back to the process plant (there is no discharge from the Atacocha tailings facility to the environment). Seepage from the Atacocha TSF is captured by the drainage system and seepage management pond located downstream of the tailings dam; rainfall infiltration through the future Atacocha waste dump will be captured with the underdrain system of the facility, collected in a sediment pond and pumped to the Atacocha tailings pond.

Contact water is collected and used in support of mining activities such as process plant make-up water, shotcrete plant, and road irrigation. According to mine site personnel, availability of water supply for operations is not a concern through the planned life of mine. External fresh water supply is required only for consumption of potable water and it is obtained from two sources: Lake Ñahualpun and Huallpahuaja Creek. Excess contact water collected on site is conveyed to the sediment pond for water quality control prior to its discharge to Huallaga River. This is the only point of water discharge from the mine facilities into the environment. The water management system includes a potable water treatment plant for water supply to the camps, and a waste water treatment plant for discharge of treated sewage water to the Huallaga River.

EXISTING CONDITIONS

Terrain. Topographical relief comprises deep, long, narrow valleys with steep slopes. Some rivers cross through the area and have moderate slopes and some scattered peaks. The main valley has a general inclination from south to north. The Atacocha processing plant is located near the Huallaga River valley (3,600 MASL) surrounded by rugged hills/mountains.

Climate. The climate is cold and dry throughout the year, which is typical of the Central Andes Mountain Region. The rainy season occurs from December to April. From June to August there are generally minimal rainfalls. Based on data from the Cerro de Pasco regional meteorological station operated by the government, the average temperature ranges from 4°C in July to 6°C in November; the maximum monthly precipitation is 163 mm in February and the minimum monthly precipitation is 18 mm in July.

Soils. There are two types of soils in the mine site area, mineral and organic, derived from residual and transported soils. Actual land use corresponds to five categories: private facilities (mining activity), natural pastures, arboreal vegetation, terrain with hydromorphic vegetation (areas located in wet environments), and lithic outcrops (rock outcrops in top and hillside of mountains).

Soils at the site have concentrations of arsenic, cadmium and lead that exceed the national environmental quality standards (D.S. 002-2013-MINAM), at some sampling points; these high values could be attributed to the local lithology (SRK, 2017).

Geochemistry. Geochemistry information provided for review included two reports from 2015 on laboratory analysis conducted with rock samples taken from the San Gerardo open pit (formerly named Glory Hole), and one report from 2018 on hydrogeochemical modelling based on five samples to characterize the waste rock to be deposited in the Atacocha waste dump.

From the 2015 reports, two samples presented low acid generating potential and one sample presented high acid generating potential. From the 2018 report, the most representative lithologies are non-acid generating and show low metal leaching potential. However, sandstones with high sulphide content have potential to be acid generating, and dacites showed inconclusive results.

The detailed design report for phase 5 of the Atacocha waste dump (Ausenco, 2018a), refers to results of static and kinetic testing from 2017 indicating that the waste rock is potentially acid generating.

According to the second modification of the Environmental Impact Assessment (EIA) of the expansion of the Atacocha processing plant (2018), geotechnical analysis from eight samples obtained from the San Gerardo open pit and in-pit waste dumps showed uncertain acid generation potential due to the variability of the analysis results. The 2018 EIA also states that there was no acid generation from samples analyzed during a complementary evaluation.

Air Quality. Air quality has been characterized using records from seven monitoring stations for the period 2012 to 2016. The monitoring results are compared against national environmental quality standards (R.M. N° 181-2016-MINAM). According to SRK (2017), particulate material less than 10 µm (PM10), less than 2.5 µm (PM2.5), and Ozone (O_3) rates as "Good" for the 2011-2016 in all cases, except for some measurements which qualify as "Moderate". The concentrations of the variables Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Sulfur Dioxide (SO_2) and Hydrogen Sulfide (SH_2)2 are all classified as "Good" quality. No values have been registered that indicate "Poor" quality, nor "Threshold of care".

Surface Water Quality. Surface water quality monitoring is conducted at eight sampling locations in three natural waterbodies (i.e., Atacocha Creek, Lalaquia Creek and Huallaga River). Three of these stations are located upstream of the mining activities (one on each waterbody) and the rest are located downstream. Surface water quality is compared with the national environmental quality standards for water (D.S. N° 015-2015-MINAM, D.S. N° 004-2017-MINAM) for irrigation of high and low stem crops (class 3-D1), animal beverage (class 3-D2) and conservation of the aquatic environment (class 4-E2). The environmental standards correspond to "Uses of Water" and do not seek to establish Maximum Permissible Limits for watercourses given that natural watercourses, even those exempt from any anthropogenic influence, do not necessarily meet the values established by the environmental standards (SRK, 2017).

Results from monitoring conducted in 2015 and 2016 showed concentrations of manganese and lead that exceed the national environmental quality standards for class 3 and 4; and concentrations of cadmium, thallium, zinc, and nickel for class 4. There were also exceedances in parameters such as pH, conductivity and total suspended solids. Monitoring results from 2018 showed exceedances for manganese, lead, cadmium, and zinc. The water quality analysis included in the 2018 EIA presented an individual discussion for each parameter explaining how the exceedances are associated with geological and morphological conditions inherent of the mine location. It is noted that exceedances are observed for short periods of time and are not simultaneously happening for all the monitored parameters.

Effluent Water Quality. It is noted that effluent water quality is monitored at two locations: discharge from the sediment pond to the Huallaga River, and treated sewage discharge. The water quality at the effluent discharge locations complies with the maximum permissible limits established by the current Peruvian Legislation (D.S. 010-2010-MINAM and D.S. 003-2010-MINAM). Monitoring results from 2018 showed no exceedances.

Groundwater Quality. Groundwater quality standards from Brazil and Dominican Republic are used by the Peruvian Ministry of Energy and Mines for evaluation of compliance in absence of similar standards for Perú.

Groundwater quality monitoring conducted between 2014 and 2016 upstream of the Atacocha TSF showed concentrations of fluoride and of several total metals (aluminum, manganese, nickel, zinc, arsenic and iron) exceeding the environmental quality standards of Brazil and Dominican Republic. The monitoring conducted downstream of the Atacocha TSF showed short term exceedances of iron and lead (SRK, 2017).

Groundwater quality monitoring was conducted in 2018 at two locations equipped with piezometers, downstream of the Atacocha TSF. The monitoring results showed exceedances of arsenic, iron, manganese, and turbidity in one of the two piezometers. The water quality analysis completed by Nexa in December 2018 proposes the installation of monitoring locations upstream of the tailings storage facility to understand the comparative influence of seepage on the water quality results.

Noise and Vibrations. Ambient noise has been characterized using records from seven monitoring stations for the period 2012 to 2016. Exceedances were registered in three stations when comparing the monitoring results against the national environmental quality standards for Residential Zone. The exceedances were attributed in the 2018 EIA to human activities and vehicular traffic. The ambient vibrations monitored at 18 locations meet the national environmental quality standards.

Aquatic Biology. According to SRK (2017), the only reported fish species, *Orestias agassizii*, is not registered in any national conservation category. Likewise, two species of macrophytes have been reported and none have been registered with any category of national (D.S. 004-2014-MINAGRI) or international conservation (CITES-2017, IUCN-2016.3).

Terrestrial Biology. According to SRK (2017), the fauna is represented by 10 species of mammals; 24, of birds; one specie of amphibian; and 51 taxa of insects. It is worth mentioning that some species such as camelid and sheep cattle belonging to residents of areas bordering the project have been introduced. None of the species reported are categorized as threatened by the national standard (D.S. 004-2014-MINAGRI) nor international lists (CITES-2016 and IUCN-2016.I). Nevertheless, consider that two species of rodents are endemic for Peru: *Akodon juninesis* and *Calomys sorellus*.

A total of 112 species of vascular flora have been registered. It is worth mentioning that some species corresponding to vegetation of rural areas have been introduced.

According to international criteria for endangered species only one specie has been recorded: *the Plantago*, of Minor Concern, according to IUCN-2016.1. As to the national standard, D.S. 043-2006-AG, four species were registered as Endangered: *Perezia pinnatifida*, *Ephedra rupestris*, *Buddleja coriaceae* and *Buddleja incana*. The first two especies are native and the *Buddlejas* have been introduced / naturalized and were reported only in ruderal areas as part of the grassland. Likewise, the national standard recognizes *Chuquiraga spinosa* as a species Near Threatened (NT), reported associated with rocky areas at high altitude that provide a favorable microclimate for its development.

There is no evidence of endemic species as to the Red Book of Endemic Species of Peru (Leon et al, 2006).

Metals in Plant and Animal Tissue. According to SRK (2017), concentration of metals in fish tissue (*Orestias agassizii*) exceed international standards for arsenic, lead, antimony and zinc, such as European legislation (European Commission, 2005), Brazilian legislation (Brazil, Laws, etc., 1965), and FAO (Nauen C. E., 1983) for the content of metals in fish for direct human consumption; these same elements are also highly concentrated in the macrophytes and in sediments (exceeding the Canadian standards); also, the concentration of arsenic, lead, and zinc in vegetal tissue in *Mimulus glabratus* and *Cardamine bonariensis* surpasses those referred by the Mercosur Technical Regulation, WHO and FAO (2006) as corresponds.

Sensitive Areas. The Atacocha mine does not overlap with any recognized protected or sensitive areas.

Social. The direct area of influence of the mine encompasses the following rural communities:

- Comunidad de San Francisco de Asís de Yarusyacán;
- Anexo de Machcan;
- Anexo San Ramón de Yanapampa;
- Comunidad de Titaclayan;
- Centro Poblado San Isidro de Yanapampa;
- Comunidad de Cajamarquilla; and
- Comunidad San Antonio de Malauchaca.

EL PORVENIR TAILINGS STORAGE FACILITY

The geotechnical performance monitoring reports provided for review indicate that the El Porvenir TSF is operating with a relatively high pond within approximately one metre of the maximum operating level, however, a January 2019 dam inspection did not identify any significant safety concerns.

The safety of operating an upstream raise tailings dam depends on the ability to maintain wide tailings beaches and a low phreatic level in the dam shell for stability. It is notable that the tailings facility pond level rose almost three metres between November 2018 and January 2019 and is near the maximum operating level set for dam safety.

No information was available regarding the interaction between the Atacocha and El Porvenir operations from a water balance perspective, which is significant since the El Porvenir milling operations draw reclaim water from the TSF. The impact of a temporary suspension of El Porvenir milling operations on the el Porvenir TSF water balance should be considered.

Crest settlements at the left side of the dam were reportedly noted in a 2008 report by Golder that was not available for review (SRK, 2017). No issues with regard to crest settlements were noted in recent dam safety monitoring reports. It is noted however that bedrock foundation grouting of the left and right abutments carried out in 2015 observed very significant grout takes in numerous grouthole stages indicating the filling of voids.

A series of seepage collection sub-drainage pipes were also installed on the downstream shell of the dam prior to raising the rockfill to crest elevation 4,056 m (Ausenco, 2016a).

Non-contact runoff from around the TSF is conveyed downstream of the dams (SRK, 2017).

ATACOCHA TAILINGS STORAGE FACILITY

The dam has been raised in at least five stages by the downstream method, with a 2H:1V overall downstream slope and a 1.5H:1V upstream slope. The upstream slope is lined with a geomembrane. The last raise of the dam crest to elevation 4,105 m results in a maximum dam height of 81 m.

Dam safety monitoring reports indicate that the TSF pond was at the maximum operating level for 18 months from early 2017 until the dam was raised in late 2018.

SRK (2017) describes the mine waste rock as uncertain with regard to acid generation potential, whereas Ausenco (2018) refers to geochemistry testing that shows the waste rock as acid generating. It is also understood that the first of four stages of dam raising included geosynthetic clay liner (GCL) on both the upstream and downstream faces of the dam, and around the perimeter of the TSF (SRK, 2017). Lining both faces of the dam is not conventional and seems to corroborate concerns that the mine rock is potentially acid generating. GCL lining on geogrid support layers around the TSF indicates that karst terrain likely controls TSF seepage and warranted serious concern.

Little information on the Atacocha TSF was provided for review. The dam is of significantly lower height than the El Porvenir TSF dam and has been constructed using the downstream method, which is inherently safer than upstream raising with tailings. Ongoing inspection of beach width and downstream water quality is required to ensure acceptable environmental performance.

ENVIRONMENTAL STUDIES

RPA has been provided with and reviewed the following documents and reports:

- Directorial resolution for the second modification of the EIA of the expansion of the Atacocha mineral processing plant to 5,000 tonnes per day (report No. 529-2018-SENACE-JEF/DEAR dated August 21, 2018)
- Environmental Management Plan (extracted from the EIA approved in 2018)
- List of approved permits for Atacocha (updated list provided on February 14, 2019)
- Hydrogeochemical modelling of the waste dump for the San Gerardo vein prepared by Amphos 21 Consulting Perú (report No. 370_17-ITE-002 Rev. B dated June 2018)
- Geochemical testing for the Glory Hole dump (Appendix 3-3.1 prepared by SRK Consulting)
- Atacocha water balance flow diagram schematic
- Slide presentation summarizing water quality monitoring findings prepared by Nexa
- Second modification of the Atacocha mine's closure plan (report No. 321-2016-MEM-DGAAM/DNAM/DGAM/PC dated March 30, 2016)
- Emergency response plan for the Atacocha tailings dam (document No. WBH31-17-VM-RTE-0002 dated 18/12/17)
- Overall corporate policy
- Procedure for development and management of community relations SGI-GRS-P-13 Rev. 04
- Procedure to promote local development SGI-GRS-04 Rev. 04
- Procedure to address requests and complaints SGI -GRS-P-7 Rev. 04
- Community relationships policy SGI-GRS-P-15 Rev. 04
- Community relations protocol SGI-GRS-P-1 Rev. 04
- Procedure to promote local employment SGI-GRS-P-5 Rev. 04
- Independent Technical Report pursuant to National Instrument 43-101 of the Canadian Securities Administrators for Atacocha Mine, Perú. Report prepared by SRK Consulting issued on August 15, 2017

Various Environmental Impact Assessments (EIA) and modifications have been submitted and approved between 2005 and 2018. The most recent modifications involve the implementation of a new power transmission line from El Porvenir mine site to the Atacocha mine site, and the expansion of the Atacocha processing plant capacity.

The Atacocha mine operation is managed according to the environmental and closure considerations presented in four type of documents, which must be approved by directorial resolutions from the Peruvian government (Table 20-1):

- Environmental Adjustment and Management Plan
- Environmental Impact Assessment
- Technical support reports
- Mine Closure Plan

A new modification of the Mine Closure Plan including the San Gerardo open pit is being prepared, with completion targeted for the first quarter of 2019.

TABLE 20-1 ENVIRONMENTAL AND SOCIAL MANAGEMENT OF THE ATACOCHA MINE OPERATION
Nexa Resources S.A. – Atacocha Mine

Document	Resolution No. and Approval Date
Environmental Adjustment and Management Plan Programa de Adecuación y Manejo Ambiental (PAMA) de la unidad de producción Atacocha	DR 89-97-EM-DGM, 06/03/1997
Environmental Adjustment and Management Plan	
Modificación en vías de regularización del Programa de Adecuación y Manejo Ambiental de la unidad de producción Atacocha	DR 313-2002-EM-DGAA, 22/10/2002
First modification of the PAMA	
Modificación en vías de regularización del Programa de Adecuación y Manejo Ambiental de la unidad de producción Atacocha, regularización de reajuste de cronograma	DR 154-2004-MEM-AAM, 20/04/2004
Second modification of the PAMA	
Environmental Impact Assessment Estudio de Impacto Ambiental del nuevo depósito del proyecto "depósito de relaves Vaso Cajamarquilla" Etapa 1	DR 234-2005-MEM-AAM, 08/06/2005
Environmental Impact Assessment (EIA) of the new Cajamarquilla tailings deposit	
Modificación del Estudio de Impacto Ambiental del proyecto "depósito de relaves Vaso Cajamarquilla"	DR 242-2007-MEM-AAM, 19/07/2007
Modification of the EIA of the new Cajamarquilla tailings deposit	
Estudio de Impacto Ambiental del nuevo depósito Vaso Atacocha" *EIA of the new Vaso Atacocha tailings deposit*	DR 361-2007-MEM-AAM, 30/10/2007
Modificación del Estudio de Impacto Ambiental del proyecto "Depósito de relaves Vaso Atacocha"	DR 380-2012-MEM-AAM, 19/11/2012
Modification of the EIA of the Vaso Atacocha tailings deposit	

Document	Resolution No. and Approval Date
Modificación del Estudio de Impacto Ambiental de la ampliación de capacidad de producción de la planta concentradora de la concesión de beneficio Chicrín N° 2 a 5,000 TMD	DR 284-2012-MEM-AAM, 05/09/2012
Modification of the EIA of the expansion of the mineral processing plant Chicrín No. 2 to 5.000 tonnes per day	
Estudio de Impacto Ambiental de la 2Líneas de transmisión 50 kV S.E. El Porvenir – S.E. Nuevo Chicrín"	DR 347-2013-MEM-AAM, 13/09/2013
EIA of the new transmission line from the substation El Porvenir to the substation Nuevo Chicrín	
Segunda modificación del Estudio de Impacto Ambiental de la ampliación de capacidad de producción de la planta concentradora de la concesión de beneficio Chicrín N° 2 a 5,000 TMD	DR 119-2018-SENACE-JEF/DEAR, 21/08/2018
Second modification of the EIA of the expansion of the mineral processing plant Chicrín No. 2 to 5.000 tonnes per day	
Technical Support Documents	
Informe Técnico Sustentatorio N°1: Modificación del método de explotación de la veta "San Gerardo"	DR 170-2014-MEM-DGAAM, 10/04/2014
Supporting Technical Report No. 1: Modification of the mining methods of San Gerardo vein	
Informe Técnico Sustentatorio N°2: Modificación de disposición de relaves aprobados – Deposito de Relaves Vaso Atacocha	DR 527-2014-MEM-DGAAM-V, 20/10/2014
Supporting Technical Report No. 2: modification of the approved tailings disposal – Vaso Atacocha tailings deposit	
Memoria Técnica Detallada de la Unidad Minera Atacocha	DR 243-2016-MEM-DGAAM, 11/08/2016
Atacocha Mine's detailed technical memorandum	
Mine Closure Plan	
Plan de Cierre de Minas de la unidad minera Atacocha	DR 198-2009-MEM-AAM, 08/07/2009
Closure Plan of the Atacocha Mine	
Modificación del Plan de Cierre de Minas de la U.M. Atacocha	DR 139-2012-MEM-AAM, 03/05/2012
Modification of the Atacocha Mine's closure plan	
Actualización del Plan de Cierre de Minas de la U.M. Atacocha	DR 387-2012-MEM-AAM, 22/11/2012
Update of the closure plan of the Atacocha Mine	
Segunda modificación del Plan de Cierre de Minas de la U.M. Atacocha	DR 98-2016-MEM-DGAAM, 04/04/2016
Second modification of the Atacocha Mine's closure plan	

The key project effects and associated management strategies, as described in the 2018 EIA, are shown in Table 20-2. No environmental compensation plans have been requested by the Peruvian government given that no significant negative impacts to the ecosystem were identified in the most recent Environmental Impact Assessment (2018). An Environmental Management Plan including a monitoring program was prepared as part of the Environmental

Impact Assessment. The monitoring program includes effluent discharges, gas emissions, air quality, non-ionizing radiation, noise, surface water quality, groundwater quality, springs water quality, vibrations, soil quality, terrestrial biology (vegetation and wildlife) and aquatic biology.

TABLE 20-2 SUMMARY OF KEY ENVIRONMENTAL EFFECTS AND MANAGEMENT STRATEGIES
Nexa Resources S.A. – Atacocha Mine

Environmental Component	Potential Impact	Management Strategies
Topography and landscape	Relief alteration Changes in landscape's visual quality	Pre-planning to minimize impact Management of construction activities to minimize impacts (delimitations of work areas, minimization of stripping and earth works, regular inspection) Controlled perforation and blasting Design and monitoring of slope stability Re-conformation of the landscape Revegetation
Soils	Changes to soil uses Changes to soil quality	Rehabilitation of temporary areas used during construction Inherent design measures to minimize soil disturbance Development of topsoil deposits Revegetation Appropriate slope design to prevent landslides Appropriate management of industrial and domestic waste Appropriate management of oils and fuels Appropriate management of hazardous waste Development of spills management plan Prohibition to circulate outside established roads
Surface water	Changes to surface water flows Changes to surface water quality	Environmental controls for construction activities Diversion of non-contact water Collection of contact water and maximization of water re-use in the mine operation Water quality treatment prior to discharging excess contact water to the Huallaga River Sewage treatment Implementation of oil and grease traps Sediment and erosion control measures Regular inspection and maintenance of water management facilities and associated infrastructure Monthly monitoring program for surface flows and water quality sampling (including effluent discharges) Additional geochemistry testing to verify acid generation and leaching potentials of waste rock
Groundwater	Changes to phreatic level Changes to groundwater quality	Reduction of deep infiltration through design features such as geomembrane liners and construction of underdrain systems Monthly monitoring program for water levels and water quality sampling
Air quality	Changes from particulate and gas emissions	Appropriate planning of work fronts to reduce truck circulation frequency and route distances Irrigation of access roads with tanker trucks Controlled perforation and blasting

Environmental Component	Potential Impact	Management Strategies
		Traffic speed and load control Covered hoppers Regular preventive maintenance of vehicles and motorized equipment Prohibition to circulate outside established roads Revegetation Quaternary air quality monitoring
Noise and vibration	Disturbances resulting from changes to ambient noise levels and generation of vibrations	Use of hearing protection devices Appropriate planning of vehicle circulation Appropriate planning and scheduling of blasting activities Regular vehicle maintenance Control measures to attenuate noise at the sources Quaternary noise and vibrations monitoring
Fish	Changes in abundance and diversity of aquatic species	Inherent design measures to minimize negative impacts to aquatic habitat Meeting water quality standards at points of effluent discharge to the environment Prohibition to dispose of solid or liquid waste in natural waterbodies Prohibition to capture fish in the mine concession area Personnel training Bi-annual monitoring (dry and wet season)
Vegetation	Changes to vegetation cover and diversity of terrestrial flora Changes to sensitive species of wild flora	Fencing of work areas Inherent design measures to minimize disturbance area Revegetation Environmental controls for protection of local sensitive ecosystems (bofedales) Prohibition to collect flora and cut trees Personnel training Rescue of relocation of species as required Bi-annual monitoring (dry and wet season)
Wildlife	Changes in abundance and diversity of terrestrial fauna Alterations to habitat of terrestrial fauna	Inspection prior to construction activities Appropriate fencing and signaling Traffic speed limits Prohibition to capture and or extract fauna Prohibition to hunt Personnel training Rescue of relocation of species as required Bi-annual monitoring (dry and wet season)

The environmental monitoring program established at Atacocha and the environmental audits performed annually (aiming to identify critical environmental risks in the operations) are the main tools of the Atacocha's Environmental Management System to track the implementation of high environmental standards and the continuous compliance with the environmental commitments. The environmental audit matrix includes the evaluation of legal requirement audit results, monitoring activities and environmental incidents.

PROJECT PERMITTING

Atacocha complies with applicable Peruvian permitting requirements. The approved permits address the authority's requirements for operation of the open pit and underground mine, tailings storage facilities, waste rock dumps, process plant, water usage and effluents discharge. A list of permits is shown in Appendix 1.

SOCIAL OR COMMUNITY REQUIREMENTS

The site is situated at KM324 of the Carretera Central Highway (Lima - Huánuco route), 16 km from the city of Cerro de Pasco. The communities located within the mine's area of direct influence are:

- Comunidad de San Francisco de Asis de Yarusyacán
- Anexo de Machcan
- Anexo San Ramón de Yanapampa
- Comunidad de Titaclayán
- Centro Poblado San Isidro de Yanapampa
- Comunidad de Cajamarquilla
- Comunidad San Antonio de Malauchaca.

RIGHTS AND COMMITMENTS

In 2004, Atacocha acquired rights to land from the community of Cajamarquilla via an Agreement for the construction of tailings facilities and auxiliary infrastructure. The Agreement included various commitments and obligations, including financial compensation for rights to the land. Subsequently (2006, 2008 and 2012), the original Agreement had been amended and ratified by the community, and compliance with the commitments and obligations assumed by Atacocha in the Original Agreement and its amendments have been confirmed. The duration of the Agreements is until the end of life of the deposit.

Similarly, Atacocha acquired and has subsequently renewed a right-of-way Agreement with the community of Ticlacayán for Atacocha's hydraulic infrastructure to route water from the Huallaga river to two hydroelectric facilities at Marcopampa and Charpin. The term of the most recent renewal is for 20 years, until 2033.

Atacocha's financial commitments under these agreements are summarized in Table 20-3.

TABLE 20-3 SUMMARY OF THE ATACOCHA'S COMMITMENTS ACQUIRED BY THE RIGHT OF LAND AND RIGHT OF WAY AGREEMENTS CELEBRATED WITH THE COMMUNITIES OF CAJAMARQUILLA AND TICLACAYÁN
Nexa Resources S.A. – Atacocha Mine

Agreements and amendments	Objectives	Community	Commitments acquired by Atacocha	Date/Term
Right of land celebrated with the community of Cajamarquilla (10/20/2004)	Right of land (13 hectares) for the construction of the Cajamarquilla's tailings deposit and auxiliary infrastructure	The community authorizes Right of land (13 hectares) for the construction and operation of the Cajamarquilla's tailings deposit and auxiliary infrastructure	Payment of 730,605.74 Soles, in works established in the Original Agreement and in its three (03) amendments.	Until the end of life of the deposit
First amendment (10/04/2006) Second amendment (06/03/2008) Third amendment (10/23/2012)	Each document records the progress in the fulfillment of the Commitments acquired by Atacocha. In the Third amendment, clause 5.1 the Community ratifies the fulfillment of all the commitments and obligations assumed by the Atacocha in the Original Agreement and its amendments.			
Renewal of the right of way celebrated with the community of Ticlacayan and its amendments (04/15/2013)	Renewal of the right of way celebrated with the community of Ticlacayan for Atacocha's hydraulic infrastructure to conduct water from the Huallaga river to the hydroelectric schemes Marcopampa and Charpin for the period of 4/15/2013 - 4/15/2033	The community recognizes the agreement for the right of way for Atacocha's hydraulic infrastructure to conduct water from the Huallaga River to the hydroelectric schemes Marcopampa and Charpin for the period 1951 – 2008, its renewal for the period 2009 ongoing, and the renewal for the period of 4/15/2013 - 4/15/2033	Payment of 1 600,000.00 Soles, at the signing of the contract. In addition: 120,000 Soles performing works in the 7 neighborhoods of the Community; 100,000 Soles for the electric power services; 680,000 Soles, for the development of projects in the Community (in two years); 1 000,000 Soles for work per concept of Taxes; Contracting of the communal enterprise in works realized by Atacocha; Hire people from the community in the different jobs that are generated	20 Years

Source: SRK (2017).

SOCIAL RESPONSIBILITY POLICY FRAMEWORK

Atacocha has developed policies, protocols and operational procedures and practices that aim to address various aspects of the company's social responsibility with regard to its mining operations. These policies, protocols and procedures have been designed to meet host country requirements and comply with International Finance Corporation (IFC) standard PS-1 ("Environmental and Social Assessment and Management System (ESMS)") requirements. These policies and procedures are updated periodically in response to changing local conditions throughout the mine life. The current set of policies and procedures were last updated in 2012.

As required by IFC PS-1, Atacocha's management system is based on an overarching Corporate policy defining the environmental and social objectives and principles that will guide the project to achieve sound environmental and social performance. Atacocha's policy aims to achieve the following:

1. Prevent, mitigate, minimize and control environmental impacts, occupational health and safety risks; training, motivating and listening to the opinion of its workers, to foster in them a culture regarding the environment, safety and health of the worker, as well as to its visitors and interested parties.

2. Ensure that all workers receive fair compensation according to the work they develop, as well as dignified working conditions, a conducive work environment and oriented to their working skills and personal development.

3. Develop activities in favor of the welfare of the populations that live in the environment of Atacocha's operations, respecting their culture and traditions.

4. Promote the continuous improvement of the effectiveness of the Management System, through compliance with environmental standards, quality, occupational safety and health, contained in legal requirements and other accepted by the organization.

5. Providing a product that satisfies the quality required by its customers, in a timely manner, optimizing production costs, innovating and being internationally competitive.

Also consistent with IFC PS-1, Atacocha's Community Relationships Policy (SGI-GRS-P-15) aims to achieve the following:

- Respect for communities' culture, resources and traditions;
- Treating local communities as strategic allies, seeking to develop activities that are of mutual benefit;
- Promoting local employment and job opportunities with preferential local suppliers;
- Developing local capacities to achieve competitiveness;
- Promoting the social role of the company as an active actor that contributes to the local development under the leadership of the state authority, be it local, regional or national;
- Orienting all social development initiatives in a manner that promotes self-management and sustainability, promoting the contribution of the beneficiaries themselves and co-financing to achieve shared development;

- Establishing the understanding among staff that social responsibility traverses the whole company;
- Encouraging communication about the company's activities in the locality of its operations; and
- Generating social and environmental assets from the mining activity.

It is noteworthy that the project does not involve adverse impacts to Indigenous Peoples and therefore, IFC PS-7 does not apply.

Atacocha's policies are further implemented by a variety of protocols and operating procedures as summarized in Table 20-4:

TABLE 20-4 SOCIAL RESPONSIBILITY PROTOCOLS AND PROCEDURES
Nexa Resources S.A. – Atacocha Mine

Protocol	Objectives	Operational Procedures
SGI-GRS-P-1. Community relations protocol	To ensure that Corporate management officials, collaborators and contractors conduct their activities with: • Respect for local communities uses, traditions and culture (including avoiding violence and harassment, maintaining sentimental relationships, discrimination, use of intoxicating and illegal substances); • Respect for natural resources, including archaeological remains; • Respect for the role of the Corporate Community Relations function; • Respect for the reputation of the Company; and • Acquisition of local products.	• SGI-GRS-P1-01. Form to declare the understanding and commitment with the community relations protocol
SGI-GRS-04. Protocol to promote local development (social investment of the mining company)	To manage the company's social investment in a strategic and participatory manner to encourage local development in a manner that contributes to overall sustainable development through alliances or agreements or other cooperative actions that are aligned with local development plans in areas such as: • Health and Nutrition • Local Management • Education • Economic Development • Water Management • Climate Change.	• SGI-GRS-P04-01. Flow diagram of the local development promotion process
SGI-GRS-P-5. Protocol to promote local employment	To ensure the company incorporates the local labourforce into its operations in a sustainable way, guaranteeing fair access to employment as well as the efficiency in the performance of the workers, through: • Promotion of local employment (e.g., medical examinations, general orientation and training) • Formation of a local labour committee • Review of labour commitments	• SGI-GRS-P5-01. Flow diagram for procedure to promote local employment • SGI-GRS-P5-02. Form to keep and inventory of the local workforce

Protocol	Objectives	Operational Procedures
	• Maintaining of an inventory of local labourforce • Identifying employment needs and gaps; • Recruitment, selection and induction of staff.	• SGI-GRS-P5-03. Form to apply for a job
SGI -GRS-P-7. Protocol to address requests and complaints	To ensure the company has an adequate and consistent mechanism to register, investigate, evaluate and resolve the requests and claims that the population in the area of influence might have in relation to the activities of the company. Complaints and claims are to be resolved in an objective, efficient and fair manner.	• SGI-GRS-P7-1. Form to register complaints • SGI-GRS-P7-2. Flow diagram for procedure to address requests and complaints • SGI-GRS-P7-3. Closure notice form for complaints that have been addressed
SGI-GRS-P-13. Protocol for development and management of community relations	To ensure the company maintains its high reputational capital by generating social value and creating bridges of communication through preventive dialogue with the different social actors in the area of influence of the mine site.	• SGI-GRS-P13-01. Flow diagram for development of community relations • SGI-GRS-P-13-02. Action plan form to support the development and management of community relations

A review of the second modification of the Environmental Impact Assessment of the expansion of the Atacocha processing plant (2018) indicates that Atacocha is in the process of implementing numerous programs aimed at fulfilling its Social Responsibility policy commitments. These programs have also been allocated a budget (Table 20-5) for their implementation during construction, operations and closure phases.

TABLE 20-5 PROPOSED SOCIAL RESPONSIBILITY PROGRAM BUDGETS
Nexa Resources S.A. – Atacocha Mine

Construction (Annually for 1 year)	Operations (Annually for 9 years)	Closure (Annually for 3 years)
478,541 Soles	2,587,167 Soles	105,000 Soles
~ $145,000 USD (2019)	~ $782,209 USD (2019)	~ $32,000 USD (2019)

Source: 2018 Environmental Impact Assessment (Table 6.5-17)

Table 20-6 identifies the Social Responsibility Program components, followed by a description of selected programs identified in Atacocha's overall Social Responsibility program.

TABLE 20-6 SOCIAL RESPONSIBILITY PROGRAM COMPONENTS AND OBJECTIVES
Nexa Resources S.A. – Atacocha Mine

Program	Objectives
Communication	• Inform the population within the direct social influence area and other stakeholders about the activities conducted by Atacocha • Inform the population about mine closure plans
Mitigation of Social Impacts	• Inform with simple communication and supporting technical studies that the nearby communities are not going to be negatively affected by the mining activity • Inform in a timely and transparent manner about realistic job opportunities during construction and operation
Social Contingencies	• Effective response to social circumstances that could result in social conflict
Local Employment	• Promote local employment to improve household income • Train the younger population on job activities related to the mining industry
Livestock Activities	• Genetical improvement of sheep • Improve salubrity in sheep farms
Health	• Implementation of medical campaigns to improve the health services for the communities
Education	• Provision of school supplies to children
Water Managements	• Promote efficient water use • Promote the creation of local administrative committees for sanitary services
Vulnerable Groups	• Donation of provisions to senior citizens who live in poverty
Support to Local Festivities	• Encourage and promote the traditions in the communities through economic support
Community Project	• Improvement of the road and pedestrian trail in Anexo Machcán
Acquisition of local products, goods and services	• Promote economic development of the community enterprise in Yarusyacán contracting laundry and cleaning services with Esermy
Strengthening of Local Capabilities	• Conduct an inventory of labour force to maximize local employment • Support training for members of local community enterprises • Support training for local teachers

Source: 2018 Environmental Impact Assessment (Table 6.5-17)

SOCIAL MANAGEMENT PLAN

In accordance with Title V of Supreme Decree No. 040-2014-EM, and based on the Corporate policies, protocols and operating procedures, Atacocha has developed a comprehensive Social Management Plan. The plan is consistent with the Community Relations guidelines of Peru's Ministry of Energy and Mines (MINEM) and takes into account the results of surveys and interviews of local authorities and leaders undertaken by Atacocha. The objectives of the Social Management Plan are:

- To maximize positive social impacts and prevent or minimize negative social impacts derived from the operational activities, thereby contributing to the welfare of society through dialogue and respect for people, society and environment.
- To develop and maintain constructive relationships between the mining company, the population and interest groups in the area of direct social influence.
- To channel and handle appropriately and timely doubts, complaints, concerns and queries related to Atacocha's activities.
- To contribute to the development of human and social capital in the area of direct social influence.

LOCAL EMPLOYMENT PLAN

Currently there are approximately 400 full-time employees at the site. Atacocha has developed specific targets for local employment during the operation and maintenance stage of the project.

Atacocha has set an employment target of 75 people from local communities, of which 52% would be from the local population. Atacocha has projected that of this local labour component, there will be 30 people hired from the communities within the direct influence area.

COMMUNICATION PROGRAM

Atacocha has a permanent information office dedicated to receiving, managing and addressing complaints, claims, questions and information requests from the communities. To be proactive, Atacocha has also developed a communications program that involves the following activities:

- Distribution of informative material (Quarterly).
- Social concern monitoring (Quarterly).
- A complaint management process aimed at preventing and managing possible social conflicts in the area.
- Meetings with local authorities (Quarterly).
- Guided tours (Quarterly).

DISCUSSION AND RECOMMENDATIONS

Available information indicates that Atacocha and its predecessors have fulfilled their commitments and obligations under their community Agreements up to October 2012. The financial and other commitments in the most recent Agreement renewal were not available for review. Notwithstanding, and given that renewals appear to have been sought and ratified periodically (i.e., every 2 – 4 years), it is likely that new Agreement renewals are pending. This has not been independently verified. Therefore, RPA recommends that Atacocha's commitments in the most recent Agreement renewals be reviewed and that their fulfilment be independently verified.

Atacocha has developed a robust set of policies, protocols, and operational procedures and practices that aim to address various aspects of the Company's Social Responsibility with regards to its mining operations. Available information suggests that the company continues to develop and implement various social management, local employment, and communication programs. These programs appear to be comprehensive in scope and address key community issues related to mining operations. However, no information was available as to the effectiveness of these programs in achieving their objectives. For example, no information was available with regard to the level of local employment achieved in relation to Atacocha's local employment commitments. Therefore, RPA recommends that Atacocha actual social performance be independently verified in the context of its commitments (e.g., local employment) and social program objectives.

MINE CLOSURE REQUIREMENTS

Atacocha has developed a Closure Plan at a feasibility level for all its components within the context of the Peruvian legislation. This closure plan is periodically updated over the life of the mine. The Closure Plan addresses 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 specific objectives of the Atacocha 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.
- Waterbodies 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.

Maximizing the number of mine components that can be subject to a walk-away closure scenario is one of the main closure criteria for Atacocha.

The minimum closure activities to be considered are:

- Demobilization of machinery and equipment
- Dismantling
- Demolition and salvage
- Physical stabilization
- Geochemical stabilization
- Water management
- Re-establishing the landscape contour
- Social programs
- Post-closure maintenance and monitoring

Where possible, the surface water drainage pattern would need to be re-established to a condition similar to the original hydrological system.

During site construction activities, topsoil is being stored separately to be used later for re-vegetation purposes.

Waste materials will be decontaminated (if required), recycled when cost-effective, and disposed at a licensed facility. Facilities containing petroleum products, chemicals, solid waste, hazardous waste, and/or contaminated soil or materials will be dismantled and managed according to regulatory requirements. All hazardous waste will need to be managed according to existing laws and regulations and will be transported off site.

The Mine Closure Plan concentrates on the decommissioning and closure of primary facilities and elements of infrastructure at Atacocha, which include:

- San Gerardo open pit;
- Underground mine and associated portal, ventilation shafts, support facilities and underground infrastructure;
- Waste rock dumps;
- Tailings storage facilities;
- Ore and topsoil stockpiles;
- The old (Chicrin No. 1, not active) and current (Atacocha, or Chicrin No. 2, active, including ore sorting, crushing, flotation circuit, thickener and filters, repulping pond) processing plants;
- Industrial water systems (intake, storage, distribution and waste water treatment);
- Quarries;
- Laydown areas and warehouses;
- Mechanical and maintenance shops;
- The fuel storage tank farm, secondary containments, and fueling station;
- Solid waste landfill;
- Hazardous waste storage facility area;
- The diesel power plant, power distribution substation, and power transmission lines;
- Mine access roads;
- Huallaga River derivation tunnel;
- Mine camp and administrative buildings; and
- Potable water and septic systems.

Notwithstanding that the El Porvenir Mine has a separate Mine Closure Plan, the El Porvenir Tailings Facility forms part to the current project description and the closure requirements should therefore be considered for evaluation of Atacocha.

A summary of the main proposed closure activities is presented in Table 20-7.

TABLE 20-7 SUMMARY OF MAIN CLOSURE ACTIVITIES
Nexa Resources S.A. – Atacocha Mine

Mine Component		Closure Activities
Mine	Open pits	• Slope stability analysis and slope contouring if required (physical stability) • Fencing • Removal of equipment • Dismantling and demolition of structures
	Underground mine	• Plugging or filling of mine openings • Dismantling and demolition of metallic and concrete structures • Construction of drainage channels • Placing of topsoil • Re-vegetation
Waste disposal facilities	Waste dumps Landfills	• Slope contouring (physical stability) • Cover installation and revegetation • Post-closure water monitoring • Implementation of dykes for surface water runoff control
	Tailings storage facilities (Atacocha & El Porvenir)	• Leveling and recontouring • Cover installation and re-vegetation • Construction of perimeter channels
Other infrastructure	Ore stockpile Shotcrete plant Process plant Shops Power transmission lines Hazardous waste storage areas Laydown areas Access roads	• Removal of low-grade ore • Dismantling, demolition, salvaging and disposal of structures • Removal of equipment • Removal of contaminated soils • Transportation to authorized disposal areas • Cleaning and purification of tanks and deposits • Recontouring of terrain, re-vegetation and habitat rehabilitation
Staff facilities	Mine camp Administrative buildings Potable water and septic systems	• Mobilization of equipment, machinery and personnel • De-energization • Dismantling and removal of structures and equipment to authorized disposal areas • Dismantling and demolition of concrete structures • Recontouring of terrain and re-vegetation
Borrow Areas	Quarries	• Cut and fill (physical stability) • Fencing • Construction of drainage channels • Re-vegetation

The old Atacocha TSFs are reportedly closed by covering with 0.5 m or clay, 0.3 m of topsoil and have been revegetated. Presumably the current TSF will require similar closure measures. The borrow source and cost estimate for closure reclamation should be reviewed.

It is noted that the design criteria for the El Porvenir and Atacocha TSFs closure planning are to Peruvian Standards, which are less stringent than Canadian dam safety guidelines. For example, the Atacocha and El Porvenir tailings dams have been designed to meet stability requirements for a 2500-year return earthquake with estimated peak ground acceleration of 0.4 times the acceleration due to gravity, which is significant. Post-seismic stability analyses for El Porvenir dam were carried out by Ausenco (2016) to demonstrate dam stability but no information was provided related to the risk of failure of the emergency spillway inlet control structure and the potential for liquefied tailings release through the spillway tunnel. The ultimate tailings level is some 50 m above the spillway tunnel invert.

The El Porvenir TSF emergency spillway has been designed to pass the Probable Maximum Flood resulting from 146 mm of precipitation in 6 hours, which is appropriate given the size of the dam. It is not clear that the post-closure flood routing assumed the perimeter watershed diversion channels would still be in service in the long-term. The risk of diversion channel blockage and potentially higher inflows to the TSF should be evaluated with additional freeboard added to the dam crest, if required, to ensure the dam is not overtopped.

A comprehensive dam safety review is recommended in order to finalize the detailed closure plan prior to moving into the closure stage.

Physical, chemical, biological and social stability conditions following closure will be verified through implementation of the post-closure maintenance and monitoring program. Monitoring will also support the evaluation and verification of compliance with closure activities, and the identification of deviations leading to the adoption of corrective measures. The monitoring activities will be carried out considering the Peruvian Environmental Quality Standards and Maximum Permissible Limits, as well as criteria set in the Mine Closure Plan for physical, chemical, biological and social stability.

Post-closure monitoring activities involve the following:

- Physical – Displacements and settlements on slopes; the monitoring frequency will be quarterly during the first two years and biannually the following three years.
- Geochemical – Surface water quality monitoring in order to evaluate the effectiveness of the measures established; the monitoring frequency will be biannually for five years.
- Hydrological – Technical inspections programmed to identify possible erosions, settlements, collapses and obstructions; the monitoring frequency will be biannually for five years.
- Biological – Verify the effectiveness of the designed coverage and rehabilitation systems, evaluate the success of the systems of re-vegetation and evaluate the need

of complementary sowing, fertilization and weed control; the monitoring frequency will be biannually for five years (dry and wet season).

- Social – Development of a set of actions that will allow to verify the efficiency and effectiveness of the social programs at mine closure in accordance with established objectives, and adoption of corrective measures as required.

A closure cost estimate was developed and included in the Mine Closure Plan. The total value estimated in 2016 for the remaining life of mine (2019 to 2026) is US$15.3 million, including local taxes. A detailed breakdown of the cost estimate is provided in the second modification of the Atacocha Mine Closure Plan (DR-98-2016-MEM-DGAAM, 04/04/2016).

CONCLUSIONS AND RISKS

No known environmental issues were identified from the documentation review. Atacocha complies with applicable Peruvian permitting requirements. The approved permits address the authority's requirements for operation of the open pit and underground mine, tailings storage facilities, waste rock dumps, process plant, water usage and effluents discharge.

The risks and recommendations identified are presented in Table 20-8. Opportunities identified are presented in Table 20-9.

TABLE 20-8 SUMMARY OF RISKS IDENTIFIED
Nexa Resources S.A. – Atacocha Mine

Risk	Issue	Recommendation
Uncertainty regarding the potential for acid generation	Due to the variability of the samples and the reduced numbers of samples tested, waste rock is considered to have an uncertain acid generation potential.	Geochemical evaluation should continue, including additional static and kinetic geochemical testing on waste rock and tailings samples, together with robust water quality monitoring to verify compliance with the national environmental standards and the appropriateness of the waste rock disposal and water management procedures that are in place.
Possible interruption of mine operations due to water management issues	Since the El Porvenir milling operations draw reclaim water from the El Porvenir TSF, a temporary suspension of El Porvenir milling operations could impact the el Porvenir TSF water balance and the Atacocha tailings disposal.	Development of an integrated water balance that reflects the interaction between the Atacocha and El Porvenir operations from a water balance perspective.
Not considering El Porvenir TSF as part of the Atacocha mine for closure planning of Atacocha	Implications of the El Porvenir TSF closure requirements on the Atacocha	Inclusion of El Porvenir TSF in the Atacocha Mine Closure Plan.

Risk	Issue	Recommendation
	operation, closure planning and closure cost estimate.	
El Porvenir TSF dam integrity	Safety of operating an upstream raise tailings dam requires wide beaches to ensure the water table remains low. Rapid increases of pond water level and potentially higher inflows to the TSF in the event of diversion channel blockage could results in a high pond level in the long-term.	Carry out a risk assessment and confirm that closure design basis considers potential diversion of channel blockage.
Failure of the El Porvenir TSF dam emergency spillway inlet	The ultimate spillway tunnel design includes a drop structure some 50 m high that is prone to cracking due to earthquake forces. In an extreme event, liquefied tailings could flow into the tunnel.	Carry out a risk assessment.
Existing Agreement regarding the Right of land celebrated with the community of Cajamarquilla and Agreement regarding right of way celebrated with the community of Ticlacayán may require amendment	In the event of non-compliance with commitments of the agreement, the communities may refuse to ratify the agreement	Atacocha's commitments in the most recent Agreement renewals should be reviewed and the fulfilment of obligations and commitments be independently verified.

TABLE 20-9 OPPORTUNITIES FOR OPTIMIZATION
Nexa Resources S.A. – Atacocha Mine

Opportunity	Action Required
Optimization of construction, tailings deposition and water management between the Atacocha and El Porvenir operations in order to prevent situations where potential problems with one of the tailings dams could impact continuity of the sister operation.	Integration of tailings deposition planning and water management planning between both operations.
A review of the Atacocha's social performance and the effectiveness of their Social Responsibility programs in achieving their objectives will allow Atacocha to adapt their social programs on an annual basis to be responsive to community issues and concerns. Annual reporting will make Atacocha more transparent with local communities and other stakeholders and help maintain their "social license" to operate.	Atacocha actual social performance should be independently verified in the context of its commitments (e.g., local employment) and social program objectives. The results should be communicated to local communities and other stakeholders .

21 CAPITAL AND OPERATING COSTS

CAPITAL COSTS

A summary of the capital costs for the Project is given in Table 21-1.

TABLE 21-1 LOM CAPITAL COSTS
Nexa Resources S.A. – Atacocha Mine

Item	Total (US$000)
Sustaining Capital Cost	**97,451**
Environmental	346
Heavy Mobile Equipment	16,456
Mining Facilities	3,763
Metallurgical Plant	7,435
Safety	5,731
Tailing Dam	18,755
Waste Deposit	14,500
Others	2,104
Capital Development	28,362

Sustaining capital development consists of 14,200 m of primary development or an average of 2,400 m per year over six years with requirements decreasing progressively over the LOM.

Mine closure costs are listed annually in Table 21-2 and cover rehabilitation, dismantling, tailings, and closure of mine accesses.

TABLE 21-2 LOM CLOSURE COSTS
Nexa Resources S.A. – Atacocha Mine

Year	Closure Cost (US$000)
2019	892
2020	5,979
2021	6,222
2022	444
2023	443
2024	443
2025	442
2026	443
LOM Total	**15,308**

The capital costs for Atacocha appear to be reasonable to RPA. Approximately $79 million will be spent over the next three years for sustaining capital, including mine development, tailings storage facility, waste rock disposal, and mobile mine equipment. An additional $19 million is spent on sustaining capital from 2022 to the end of the mine life.

OPERATING COSTS

The unit operating costs for the Atacocha underground mine are listed in Table 21-3. Lateral capital and operating development are estimated at $1,995/m and raise development is estimated at $500/m.

TABLE 21-3 ATACOCHA LOM OPERATING COSTS
Nexa Resources S.A. – Atacocha Mine

Item	Units	CAF	SLS
Mining	US$/t Processed	52.50	46.36
Processing	US$/t Processed	9.82	9.82
General and Administrative	US$/t Processed	8.82	8.82
Total	**US$/t Processed**	**71.13**	**61.99**

The unit operating costs for San Gerardo open pit mine are listed in Table 21-4.

TABLE 21-4 SAN GERARDO LOM OPERATING COSTS
Nexa Resources S.A. – Atacocha Mine

Item	Units	Unit Cost
Ore Mining	US$/t Processed	4.48
Waste Mining	US$/t Processed	2.26
Processing	US$/t Processed	9.82
General and Administrative	US$/t Processed	5.93

Unit operating cost estimates are based on analysis of budgeted fixed and variable costs, which compare well to historical actuals.

22 ECONOMIC ANALYSIS

Under NI 43-101, this section is not required as Atacocha is currently in operation and there is no material expansion of current production. RPA has performed an economic analysis of the Atacocha Mine using the LOM weighted average metal prices shown in Table 22-1, at the forecasted production rates, metal recoveries, and capital and operating costs estimated in this report and confirms that the outcome is a positive cash flow that supports the statement of Mineral Reserves.

TABLE 22-1 LOM WEIGHTED AVERAGE METAL PRICES
Nexa Resources S.A. – Atacocha Mine

Commodity	LOM Average Price	
Zinc	US$2,603/t	US$1.18/lb
Lead	US$2,178/t	US$0.99/lb
Copper	US$6,437/t	US$2.92/lb
Silver	$18.99/oz	
Gold	$1,360/oz	

23 ADJACENT PROPERTIES

Nexa Resources maintains ajoining mining concessions which encompass both El Porvenir and Atacocha mines.

Figure 23-1 outlines all the mining concessions in the vicinity of the Atacocha and El Porvenir mines.

In the North, Atacocha mine's concessions are surrounded by Paragsha S.A.C. Mining Company's concessions, the Vichaycocha Mining Company's concessions, and Exploradora de Vinchos Ltda.'s concessions. These companies are subsidiaries of the Volcan Group.

Within Atacocha mine's concessions, San Sebastian AMC S.C.R.L. maintains a claim in to the north. This can be seen in purple in Figure 23-1. San Sebastian AMC S.C.R.L. is a subsidiary of the Volcan Group.

Corporación Minera Centauro S.A.C.owns the concessions to the east of Nexa Resources' concessions. This is worth noting as Corporación Minera Centauro S.A.C. is a Peruvian capital company who focuses on the exploration, mining and processing of polymetallic minerals such as gold, silver, and copper.

Nexa also maintains a group of mining concessions located within the boundaries of some of Volcan Groups properties.

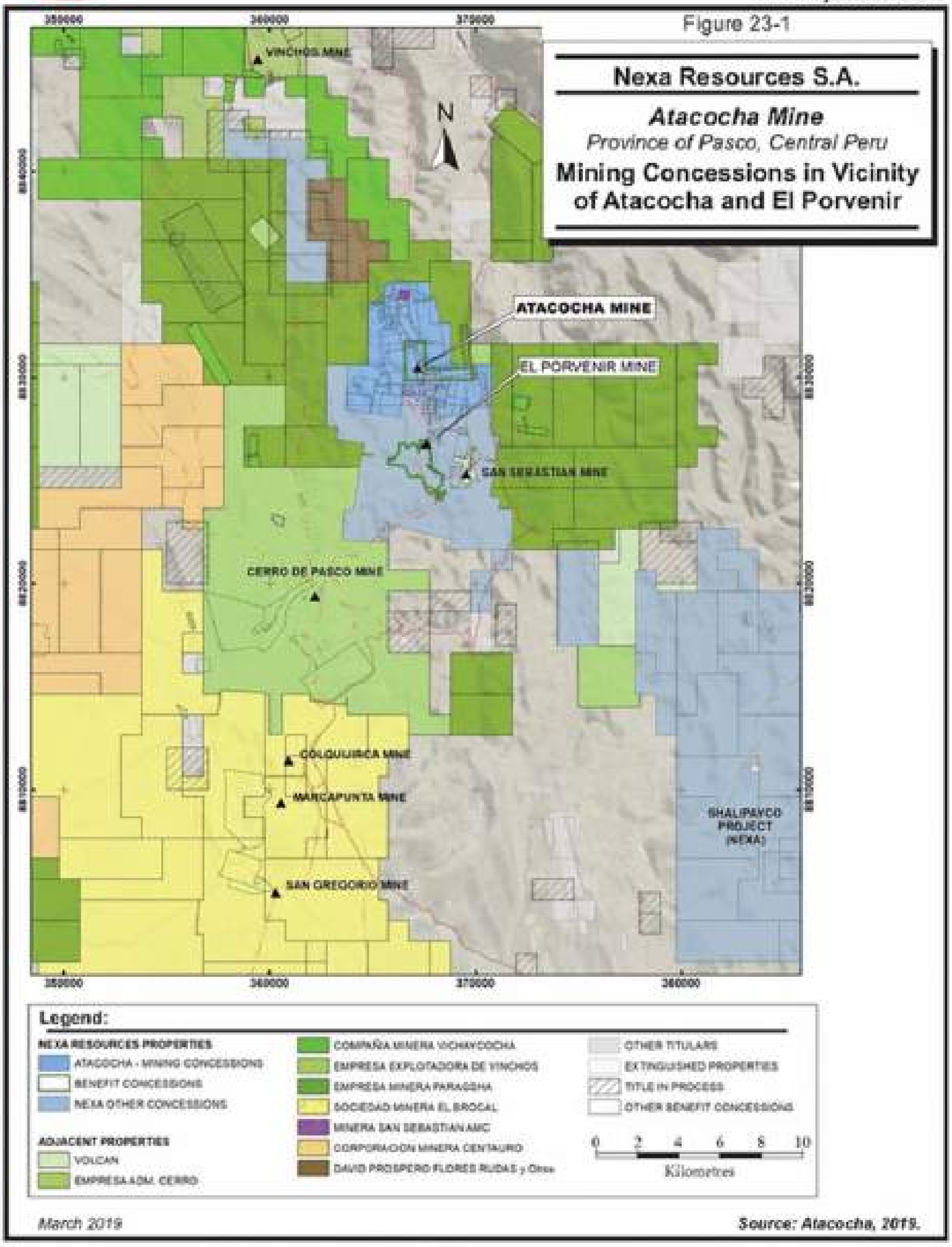


Figure 23-1
Nexa Resources S.A.
Atacocha Mine
Province of Pasco, Central Peru
Mining Concessions in Vicinity of Atacocha and El Porvenir
N
VINCHOS MINE
ATACOCHA MINE
EL PORVENIR MINE
SAN SEBASTIAN MINE
CERRO DE PASCO MINE
COLQUIJIRCA MINE
MARCAPUNTA MINE
SAN GREGORIO MINE
SHALIPAYCO PROJECT (NEXA)
350000
360000
370000
380000
Legend:
NEXA RESOURCES PROPERTIES
ATACOCHA - MINING CONCESSIONS
BENEFIT CONCESSIONS
NEXA OTHER CONCESSIONS
ADJACENT PROPERTIES
VOLCAN
EMPRESA ADM. CERRO
COMPAÑIA MINERA VICHAYCOCHA
EMPRESA EXPLOTADORA DE VINCHOS
EMPRESA MINERA PARAGSHA
SOCIEDAD MINERA EL BROCAL
MINERA SAN SEBASTIAN AMC
CORPORACION MINERA CENTAURO
DAVID PROSPERO FLORES RUDAS y Otros
OTHER TITULARS
EXTINGUISHED PROPERTIES
TITLE IN PROCESS
OTHER BENEFIT CONCESSIONS
0 2 4 6 8 10
Kilometres
March 2019
Source: Atacocha, 2019.

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

RPA has the following conclusions:

Plans for integration of Atacocha and El Porvenir mines has been impacted by the changes to the San Gerardo open pit mine Mineral Reserves.

GEOLOGY AND MINERAL RESOURCES

- The Mineral Resource estimate was prepared by Nexa. The resource estimate has been audited and accepted by RPA.
- Exclusive of Mineral Reserves, the EOY Measured and Indicated Mineral Resources include:
  - Atacocha underground: 2.22 Mt at 3.50% Zn, 1.14% Pb, 0.29% Cu, and 63.9 g/t Ag containing 77,000 t of zinc, 25,200 t of lead, 6,400 t of copper, and 4.6 million ounces (Moz) of silver.
  - San Gerardo open pit: 3.74 Mt at 1.26% Zn, 0.88% Pb, 0.05% Cu, 29.6 g/t Ag, and 0.23 g/t Au containing 47,300 t zinc, 32,800 t lead, 1,900 t copper, 3.6 Moz silver, and 28,000 oz gold.
- In addition, EOY2018 Inferred Mineral Resources total 4.95 Mt at 3.46% Zn, 1.52% Pb, 0.35% Cu, and 102.7 g/t Ag for Atacocha underground and 0.80 Mt at 1.08% Zn, 0.93% Pb, 0.03% Cu, 31.4 g/t Ag, and 0.50 g/t Au for San Gerardo open pit.
- CIM (2014) definitions were followed for Mineral Resources.
- The San Gerardo resource decreased significantly mostly because of changes to the geological interpretation.
- The deposit contains significant zinc, lead, copper, silver, and gold mineralization hosted in the Chambara Formation (part of Pucara Group) around the Santa Bárbara and the San Gerardo stocks (Oligocene porphyries) that cut the limestone rocks to produce the skarn mineralization.
- Atacocha has features of skarn, replacement, hydrothermal vein/breccia-style, and porphyry mineralization.
- A large Project database containing geological and geochemical information has been compiled forming the foundation upon which future exploration programs can be designed.

- Nexa has defined a number of good exploration targets.
- 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 assumptions, parameters, and methodology used for the Atacocha 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 Mineral Resource estimates are completed to industry standards using reasonable and appropriate parameters and are acceptable for conversion to Mineral Reserves.

MINERAL RESERVES AND MINING

- The Atacocha and San Gerardo Mineral Reserve estimates were completed by Nexa and were reviewed and adopted by RPA.
- The EOY2018 Proven and Probable Mineral Reserves for the Atacocha underground and San Gerardo open pit total 9.8 Mt at grades of 2.15% Zn, 1.29% Pb, 0.12% Cu, 51.2 g/t Ag, and 0.13 g/t Au, which results in a six year mine life for the Atacocha operation.
- The Atacocha Mineral Reserve estimate tonnage is reduced by 51% compared to the previous estimate dated December 31, 2017, which is primarily due to changes in the Mineral Resource model.
- Applications for the updated San Gerardo environmental and operational licences that are required to execute the open pit mine plan have been submitted and are under consideration for approval.
- A pre-feasibility level geotechnical study analyzing the San Gerardo slope design and stability has been completed in February 2019, and generally supports the previous open pit design parameters.
- Underground mining operations at Atacocha are well established and carried out by an experienced workforce. The underground mining methods include CAF and SLS. These are appropriate mining methods for the deposit. The San Gerardo open pit has been in operation since 2016 utilizing a contractor workforce.
- Mine planning for the Atacocha mine follows industry standards. The Mineral Reserve estimates have been prepared using acceptable estimation methodologies and the classification of Proven and Probable Mineral Reserves conforms to CIM (2014) definitions.
- The LOM plan sustaining capital costs, inclusive of capital development, tailings dam expansion and replacement mining equipment, are estimated to total US$96.9 million and are considered reasonable.

- Efforts to reconcile the resource models for surface and underground mine production as a combined feed to the process plant have been largely unsuccessful due to inaccuracies in the previous resource model and the complexities associated with reconciling multiple feeds.

PROCESSING

- Ore head grades at the Atacocha concentrator have changed since the introduction of San Gerardo open pit ore in early 2016. Head grades of zinc and copper have decreased, while the head grade of gold has increased, but has also become more variable. Lead head grade has remained relatively steady.
- Recoveries are related to the head grades. Zinc recovery has dropped from 88% in 2015 to 78% in 2018, and gold recovery has almost doubled from 36% in 2015 to 64% in 2018. Additionally, copper recovery dropped from 26% to approximately 8% over the same time period.

ENVIRONMENTAL CONSIDERATIONS

- No known environmental issues were identified from the documentation review. Atacocha complies with applicable Peruvian permitting requirements. The approved permits address the authority's requirements for operation of the open pit and underground mine, tailings storage facilities, waste rock dumps, process plant, water usage, and effluents discharge.
- There is a comprehensive Environmental Management Plan in place, which includes a complete monitoring program for effluent discharges, gas emissions, air quality, non-ionizing radiation, noise, surface water quality, groundwater quality, springs water quality, vibrations, soil quality, terrestrial biology (vegetation and wildlife), and aquatic biology. Atacocha 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 Mine Closure Plan has been developed for all the mine components within the context of Peruvian legislation and is periodically updated.
- Atacocha has developed an appropriate set of policies, protocols, and operational procedures and practices that aim to address various aspects of Nexa's Social Responsibility with regard to its mining operations.

26 RECOMMENDATIONS

RPA has the following recommendations:

GEOLOGY AND MINERAL RESOURCES

- Improve reconciliation processes so that production data can be used to calibrate future resource and reserve models.
- Divide mineralization domains where groups of wireframes have been merged to avoid sharing of samples.
- Incorporate some high grade domains by element to prevent smearing of high grades into low grades and vice versa.
- Consider modelling by element if both spatial and statistical correlations are not reasonable.
- Incorporate, in future models, a structural model to help properly define mineralization wireframe geometry and continuity in the structurally controlled zones.
- Investigate if capping levels should be applied based on high grade and low grade domains for lead, copper, and silver.
- Increase the number of density samples in areas that currently have insufficient density tests available.
- Implement QA/QC procedures that will reduce CRM failure rates and improve the field duplicate precision. Additionally, incorporate CRMs in the external checks.
- Complete the 2019 exploration program, consisting of a 76,000 m drill program to explore new targets and continue with advanced exploration. The 2019 exploration program budget is approximately US$10.9 million.

MINERAL RESERVES AND MINING

- Evaluate and implement procedural changes that will improve reconciliation of production results to the Mineral Resource and Mineral Reserve estimates. Adjust estimation parameters based on reconciliation findings.
- Carry out San Gerardo mine geotechnical drilling, testing, and analysis to update slope stability analysis to the operating mine level.
- Use stope reconciliation results and stope performance analysis to evaluate SLS stope designs. Optimize SLS geotechnical and stope design parameters and evaluate the potential to increase SLS stoping production quantities, and subsequently increase

productivity, reduce overall mine operating costs, and reduce dilution associated with mining narrow zones.

- Carry out geotechnical analysis of Atacocha underground ground support standards.

- Continue to evaluate the benefits of integrating Atacocha with El Porvenir through strategic planning and modelling processes, including improved materials handling solutions, increased workforce efficiency and utilization, and optimized feeds for process facilities.

PROCESSING

- Additional test work may be beneficial in evaluating whether or not the Atacocha concentrator flotation operation can be optimized to further improve the recovery of gold resulting from the introduction of San Gerardo ore.

- Investigate the applicability of gravity gold recovery from San Gerardo ore and evaluate the economics of retrofitting a gravity circuit to the concentrator.

ENVIRONMENTAL CONSIDERATIONS

- Review Atacocha's commitments in the most recent agreement renewals and ensure that their fulfilment is independently verified.

27 REFERENCES

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28 DATE AND SIGNATURE PAGE

This report titled "Technical Report on the Atacocha Mine, Pasco Province, Central Peru" and dated March 22, 2019 was prepared and signed by the following authors:

(Signed and Sealed) *Scott C. Ladd*

Dated at Toronto, ON
March 22, 2019

Scott C. Ladd, P. Eng.
Principal Mining Engineer

(Signed and Sealed) *Rosmery Cardenas*

Dated at Toronto, ON
March 22, 2019

Rosmery Cardenas, P. Eng.
Principal Geologist

(Signed and Sealed) *Avakash Patel*

Dated at Toronto, ON
March 22, 2019

Avakash Patel, P.Eng.
Principal Metallurgist

(Signed and Sealed) *Luiz Vasquez*

Dated at Toronto, ON
March 22, 2019

Luiz Vasquez, M.Sc., P.Eng.
Associate Environmental Specialist

29 CERTIFICATE OF QUALIFIED PERSON

SCOTT C. LADD

I, Scott C. Ladd, P.Eng., as an author of this report entitled "Technical Report on the Atacocha Mine, Pasco Province, Central Peru" prepared for Nexa Resources S.A. and dated March 22, 2019, 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 Laurentian University, Sudbury, Ontario in 1998 with a B.Eng. degree in Mining Engineering.

3. I am registered as a Professional Engineer in the Province of British Columbia (Reg. #167289). I have worked as a mining engineer for a total of 20 years since my graduation. My relevant experience for the purpose of the Technical Report is:
    - Principal Mining Consultant and Regional Manager responsible for Canadian operations with an Australian based mining consulting firm.
    - Preparation of scoping, prefeasibility, and feasibility level studies and reporting for due diligence and regulatory requirements.
    - Principal Mining Engineer with an international diamond corporation, responsible for technical and operational leadership, support, and guidance for all Canadian operating mines and projects.
    - Director, Operations Performance Management and Strategic Mine Planning with a major Canadian mining company.
    - Open Pit Mine Manager/Technical Services Superintendent at a coal mine in Alberta.

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 Atococha Mine on September 5 to 7, 2018.

6. I am responsible for Sections 15 and 16 and 18 to 22, and relevant disclosure in Sections 1 to 3 and 25 to 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 22nd day of March, 2019.

(Signed and Sealed) ***Scott C. Ladd***

Scott C. Ladd, P.Eng.

ROSMERY J. CÁRDENAS

I, Rosmery Julia Cárdenas Barzola, P.Eng., as an author of this report entitled "Technical Report on the Atacocha Mine, Pasco Province, Central Peru" prepared for Nexa Resources S.A. and dated March 22, 2019, 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 16 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Resource estimation, geological modelling, and QA/QC experience ranging from greenfield projects to operating mines, including open pit and underground.
   - 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).
   - Geologist at a polymetallic underground mine in Peru in charge of exploration and definition drilling.

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 Atococha Mine on September 5 to 7, 2018.

6. I am responsible for Sections 4 to 14 and relevant disclosure in Sections 1 to 3 and 25 to 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 22nd day of March, 2019.

(Signed and Sealed) ***Rosmery Cardenas***

Rosmery J. Cárdenas, P.Eng.

AVAKASH PATEL

I, Avakash Patel, P.Eng., as an author of this report entitled "Technical Report on the Atacocha Mine, Pasco Province, Central Peru" prepared for Nexa Resources S.A. and dated March 22, 2019, do hereby certify that:

1. I am Vice President, Metallurgy and 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 Regina, Saskatchewan in 1996 with a B.A.Sc. in Regional Environmental Systems Engineering (Civil/Chemical).

3. I am registered as a Professional Engineer in the Province of Ontario (Reg. #90513565) and in the Province of British Columbia (Reg. #31860). I have worked as a metallurgical engineer for a total of 22 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 positions at numerous base metal and precious metal operations, and consulting companies responsible for general management, project management, and process design.
   - Sr. Corporate Manager – Metallurgy and Mineral Processing with a major Canadian mining company and a junior Canadian mining company.
   - Manager of Engineering/Processing Engineering with two large international Engineering companies responsible for designing, planning, and execution for multiple complex mining projects.

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 Atacocha Mine.

6. I am responsible for Sections 13 and 17 and relevant disclosure in Sections 1 to 3 and 25 to 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 22nd day of March, 2019.

(Signed and Sealed) ***Avakash Patel***

Avakash Patel, P.Eng.

LUIS VASQUEZ

I, Luis Vasquez, M.Sc., P.Eng., as an author of this report entitled "Technical Report on the Atacocha Mine, Pasco Province, Central Peru" prepared for Nexa Resources S.A. and dated March 22, 2019, do hereby certify that:

1. I am a Senior 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 14 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 Atacocha mine site.

6. I am responsible for Section 20, portions of Section 18, and related disclosure in Sections 1, 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 22nd day of March, 2019

(Signed and Sealed) ***Luiz Vasquez***

Luis Vasquez, M.Sc., P.Eng.

30 APPENDIX 1

LAND TENURE

TABLE 30-1 ATACOCHA MINING CONCESSIONS AS OF DECEMBER 31, 2018
Nexa Resources S.A. - Atacocha Mine

NUMBER	CODE	CONCESSION	TITLE HOLDER	STATUS	DATE	REGISTRATION	AVAIBLE AREA (ha)
1	010000216L	ACUMULACION ATACOCHA 1	NEXA RESOURCES ATACOCHA S.A.A.	Acumulación D.M. Titulada	25/01/2016	P-11246469	43.94
2	04009516X01	AGUSTIN	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	07/06/1951	P-02013182	3.99
3	04007683X01	ALICIA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	27/07/1927	P-02003967	4.00
4	04012577X01	AMERICA DEL SUR	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	06/06/1979	P-20004303	19.97
5	04005440X01	ANGELICA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	06/11/1915	P-02005828	5.99
6	04008194X01	ANITA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	17/12/1935	P-02010141	11.98
7	04005504X01	ANTRIM	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	23/02/1916	P-02010284	2.00
8	04007294X01	ARDA TROYA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	05/05/1924	P-02010189	3.60
9	04010250X01	ATACOCHA Nº 3	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	09/12/1955	P-02014140	4.91
10	04010501X01	ATACOCHA Nº 4	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	19/06/1957	P-02014782	1.69
11	04010502X01	ATACOCHA Nº 5	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	19/06/1957	P-02013944	1.70
12	04008462X01	C.M.A. Nº 1	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	10/10/1939	P-02010140	4.00
13	04009575X01	C.M.A. Nº 12	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	20/10/1951	P-02013903	99.87
14	04009757X01	C.M.A. Nº 13	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	24/04/1952	P-02013942	24.97
15	04009758X01	C.M.A. Nº 14	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	24/04/1952	P-02013971	20.97
16	04009759X01	C.M.A. Nº 15	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	24/04/1952	P-02014165	99.87
17	04009760X01	C.M.A. Nº 16	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	24/04/1952	P-02014115	39.95
18	04009837X01	C.M.A. Nº 17	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	11/08/1952	P-02014066	1.00
19	04009838X01	C.M.A. Nº 18	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	11/08/1952	P-02013989	2.00
20	04009839X01	C.M.A. Nº 19	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	11/08/1952	P-02014005	2.00
21	04008508X01	C.M.A. Nº 2	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	27/04/1940	P-02009998	7.99
22	04009825X01	C.M.A. Nº 20	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	11/07/1952	P-02014839	55.92
23	04009826X01	C.M.A. Nº 21	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	11/07/1952	P-02014328	15.98
24	04009908X01	C.M.A. Nº 24	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	29/01/1953	P-02014002	35.95
25	04009909X01	C.M.A. Nº 25	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	29/01/1953	P-02014110	3.00
26	04009912X01	C.M.A. Nº 26	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	11/02/1953	P-02013931	1.00
27	04010002X01	C.M.A. Nº 28	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	22/05/1954	P-02013246	79.90
28	04010003X01	C.M.A. Nº 29	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	22/05/1954	P-02013174	17.98
29	04008168X01	C.M.A. Nº 3	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	16/12/1947	P-02010179	35.95
30	04010004X01	C.M.A. Nº 30	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	22/05/1954	P-02014189	199.74
31	04010004X02	C.M.A. Nº 31	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	22/05/1954	P-02014004	103.85

NUMBER	CODE	CONCESSION	TITLE HOLDER	STATUS	DATE	REGISTRATION	AVAIBLE AREA (ha)
32	04010063X01	C.M.A. Nº 32	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	04/11/1954	P-02014026	169.78
33	04009169X01	C.M.A. Nº 4	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	16/12/1947	P-02010150	29.98
34	04010218X01	C.M.A. Nº 40	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/11/1955	P-02014023	2.00
35	04010076X01	C.M.A. Nº 46	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	20/11/1954	P-02014003	95.88
36	04010116X01	C.M.A. Nº 48	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	14/02/1955	P-02011771	3.00
37	04010358X01	C.M.A. Nº 49	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	13/08/1956	P-02013916	39.94
38	04009170X01	C.M.A. Nº 5	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	16/11/1947	P-02010060	9.99
39	04010132X01	C.M.A. Nº 50	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	29/04/1955	P-02014008	7.99
40	04010133X01	C.M.A. Nº 51	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	29/04/1955	P-02014007	1.00
41	04010359X01	C.M.A. Nº 52	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	13/08/1956	P-02014091	3.00
42	04010360X01	C.M.A. Nº 53	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	13/08/1956	P-02014131	1.00
43	04009171X01	C.M.A. Nº 6	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	16/12/1947	P-01010147	7.99
44	04010219X01	C.M.A. Nº 61	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/11/1955	P-02014268	17.98
45	04010220X01	C.M.A. Nº 62	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/11/1955	P-02014167	3.00
46	04010222X01	C.M.A. Nº 64	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/11/1955	P-02014332	9.99
47	04010229X01	C.M.A. Nº 65	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/11/1955	P-02014341	9.99
48	04010224X01	C.M.A. Nº 66	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/11/1955	P-02014157	11.98
49	04010225X01	C.M.A. Nº 67	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/11/1955	P-02014521	5.99
50	04010226X01	C.M.A. Nº 68	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/11/1955	P-02014118	3.00
51	04010227X01	C.M.A. Nº 69	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/11/1955	P-02014147	15.98
52	04009315X01	C.M.A. Nº 7	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	09/06/1949	P-02011772	53.93
53	04010228X01	C.M.A. Nº 70	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/11/1955	P-02013990	2.00
54	04010229X02	C.M.A. Nº 71	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/11/1955	P-02014344	2.00
55	04010230X01	C.M.A. Nº 72	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/11/1955	P-02014265	2.00
56	04010231X01	C.M.A. Nº 73	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/11/1955	P-02014178	2.00
57	04010232X01	C.M.A. Nº 74	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/11/1955	P-02014179	1.00
58	04010233X01	C.M.A. Nº 75	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/11/1955	P-02014190	9.99
59	04010235X01	C.M.A. Nº 77	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	25/11/1955	P-02014116	3.99
60	04010236X01	C.M.A. Nº 78	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	25/11/1955	P-02014169	1.00
61	04010311X01	C.M.A. Nº 79	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	23/05/1956	P-02010274	3.99
62	04009317X01	C.M.A. Nº 8	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/06/1949	P-02011770	15.98
63	04010312X01	C.M.A. Nº 80	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	23/05/1956	P-02014342	2.00
64	04010313X01	C.M.A. Nº 81	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	23/05/1956	P-02013168	1.00

NUMBER	CODE	CONCESSION	TITLE HOLDER	STATUS	DATE	REGISTRATION	AVAIBLE AREA (ha)
65	04010314X01	C.M.A. Nº 82	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	23/05/1956	P-02014122	3.99
66	04010316X01	C.M.A. Nº 83	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	25/05/1956	P-02014121	2.00
67	04010317X01	C.M.A. Nº 84	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	25/05/1950	P-02013237	1.00
68	04010318X01	C.M.A. Nº 85	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	25/05/1956	P-02014335	4.99
69	04010320X01	C.M.A. Nº 86	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	18/06/1956	P-02013238	17.98
70	04001032X01	C.M.A. Nº 87	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	18/06/1956	P-02013235	6.01
71	04010322X01	C.M.A. Nº 88	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	18/06/1956	P-02014132	3.99
72	04010323X01	C.M.A. Nº 89	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	18/06/1956	P-02014024	3.00
73	04009316X01	C.M.A. Nº 9	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/06/1949	P-02009985	5.99
74	04010344X01	C.M.A. Nº 90	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	07/07/1956	P-02014030	35.95
75	04010345X01	C.M.A. Nº 91	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	07/07/1956	P-02014031	4.00
76	04010346X01	C.M.A. Nº 92	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	07/07/1956	P-02014119	2.00
77	04010347X01	C.M.A. Nº 93	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	07/07/1956	P-02014017	0.62
78	04010906X01	C.M.A. Nº 94	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	01/12/1960	P-20000405	11.98
79	04012507X01	C.M.A. Nº 97	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	07/12/1978	P-20000333	2.00
80	04006218X01	CANTABRIA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/09/1915	P-02010552	5.99
81	04008335X01	CARLOS CHINO	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	05/06/1937	P-02003965	5.99
82	04007322X01	CARMEN	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	23/12/1924	P-02003971	2.00
83	04009644X01	CARMEN ROSA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	22/12/1951	P-02007797	3.99
84	04010284X01	CARMEN ROSA Nº 2	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	12/03/1956	P-02013169	2.00
85	04009210X01	CARMENCITA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	02/06/1948	P-02007000	2.00
86	04005459X01	CAVEL	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	17/12/1915	P-02006247	3.42
87	04009528X01	CHAMACO	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	21/06/1951	P-02007804	59.92
88	04010332X01	CIPRIANO CUATRO	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	28/06/1956	P-02013236	0.50
89	04010331X01	CIPRIANO DOS	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	28/06/1956	P-02013175	1.46
90	04008683X01	CIPRIANO PRIMERO	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	23/02/1942	P-02003974	3.99
91	04010330X01	CIPRIANO UNO	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	28/06/1956	P-02013173	0.80
92	04003312X01	COLQUIMARCA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	06/09/1907	P-02010327	0.90
93	04005371X01	CRISTINA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	27/05/1915	P-02005618	41.94
94	04010670X01	DEMASIA ATACOCHA Nº 6	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	11/05/1959	P-02013832	0.26
95	04010671X01	DEMASIA ATACOCHA Nº 7	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	11/05/1959	P-20001140	2.01
96	04010672X01	DEMASIA ATACOCHA Nº 8	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	11/05/1959	P-02013904	1.51
97	04005461X01	DEWAR	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	07/12/1915	P-02010504	3.94

NUMBER	CODE	CONCESSION	TITLE HOLDER	STATUS	DATE	REGISTRATION	AVAIBLE AREA (ha)
98	04007291X01	DORA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	05/03/1924	P-02010236	19.97
99	04006984X01	EL PORVENIR	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	01/09/1921	P-02003970	9.99
100	04000425X01	ESTRELLA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	16/10/1901	P-02010178	7.99
101	04007292X01	FRANK	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	05/05/1924	P-02010145	2.00
102	04009460X01	JUAN ANTONIO	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	03/01/1951	P-02013167	6.00
103	04008684X01	JUAN MANUEL	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	23/02/1942	P-02003976	3.99
104	04005502X01	KILKENNY	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	15/02/1916	P-02010146	49.93
105	04005548X01	LA PRADERA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	01/03/1916	P-02004216	11.98
106	04007289X01	LIBERTAD	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	05/03/1924	P-02010200	7.99
107	04007283X01	LIZANDRO	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	14/04/1924	P-02003964	7.99
108	04005382X01	MANUEL NUMERO UNO	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	19/06/1915	P-02006191	17.98
109	04005432X01	MANUEL SEGUNDO	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	16/10/1915	P-02006197	5.79
110	04009209X01	MARIA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	02/06/1948	P-02007001	5.99
111	04009461X01	MARIA CECILIA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	03/01/1951	P-02015793	9.99
112	04009517X01	MARUJA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	07/06/1951	P-02007796	2.92
113	04004256X01	MIGUEL	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	30/05/1911	P-02006190	2.00
114	04008270X01	MILAGROS	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	30/11/1936	P-02007004	7.93
115	04005578X01	MULL	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	08/04/1916	P-02010177	4.45
116	04005577X01	NELL	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	08/04/1916	P-02010168	11.98
117	04008183X01	OLVIDADA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	08/11/1935	P-02010289	0.33
118	04008219X01	PACO	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	07/05/1936	P-02010296	2.00
119	04007281X01	PALMIRA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	01/05/1924	P-02003972	15.98
120	04007293X01	PHOENIX	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	05/05/1924	P-02009999	2.41
121	010125494	PORVENIR 62	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	10/03/1994	P-11030784	358.96
122	010125594	PORVENIR 63	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	10/03/1994	P-11030789	184.52
123	010373394A	PORVENIR 66A	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	21/06/1994	P-11030775	0.32
124	010683595	PORVENIR 69	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	06/03/1995	P-11031070	0.53
125	04009527X01	PRECAUCION N° 3	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	21/06/1951	P-02007793	1.00
126	04007684X01	PRECAUCION NUMERO UNO	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	27/07/1927	P-02003966	2.00
127	04005802X01	PURISIMA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	09/04/1917	P-02003977	15.98
128	04009078X01	RICARDO	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	13/11/1946	P-02003973	7.99
129	04010305X01	ROBERTO	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	16/05/1956	P-02015851	0.08
130	04007283X02	SANTA CESILIA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	01/03/1924	P-02003975	3.99

NUMBER	CODE	CONCESSION	TITLE HOLDER	STATUS	DATE	REGISTRATION	AVAIBLE AREA (ha)
131	04005401X01	SEGUNDA DOCENA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	26/07/1915	P-02009700	3.99
132	04005373X01	SIDNEY	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	27/05/1915	P-02010170	5.99
133	04005368X01	SOCAVON CHERCHERE	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	27/05/1915	P-02010174	7.99
134	04009244X01	SOL DE PLATA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	25/10/1948	P-02010167	17.98
135	04005402X01	TERCERA DOCENA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	26/07/1915	P-02010169	5.99
136	04005350X01	TIGER	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	03/05/1915	P-02005063	29.96
137	04007290X01	TRES MOSQUETEROS	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	05/05/1924	P-02010188	15.98
138	04008217X01	VASCONIA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	07/12/1907	P-20000406	2.00
139	04004780X01	VIOLETA SEGUNDA	NEXA RESOURCES ATACOCHA S.A.A.	Mining Concession	27/01/1913	P-02007634	11.98
140	04005427X01	AZTEC	NEXA RESOURCES PERU S.A.A.	Mining Concession	11/10/1915	P-02004921	2.00
141	04005428X01	CROW	NEXA RESOURCES PERU S.A.A.	Mining Concession	11/10/1915	P-02006258	15.58
142	04005460X01	CURIE	NEXA RESOURCES PERU S.A.A.	Mining Concession	07/12/1915	P-02007248	1.14
143	04005366X01	LA FLOR DE ATACOCHA	NEXA RESOURCES PERU S.A.A.	Mining Concession	27/05/1915	P-02004495	5.99
144	04012661X01	PORVENIR 29	NEXA RESOURCES PERU S.A.A.	Mining Concession	22/10/1979	P-20000337	9.53
145	04012666X01	PORVENIR 34	NEXA RESOURCES PERU S.A.A.	Mining Concession	22/10/1979	P-20000357	7.99
146	04009221X01	PORVENIR CUATRO	NEXA RESOURCES PERU S.A.A.	Mining Concession	16/08/1948	P-02006696	23.97
147	010125694A	PORVENIR 64A	NEXA RESOURCES EL PORVENIR S.A.C.	Mining Concession	10/03/1994	P-11199132	157.43
							2,872.51

Source: Nexa, 2019

31 APPENDIX 2

LIST OF PERMITTING DOCUMENTATION FOR THE ATACOCHA OPERATION

TABLE 31-1 PERMITS AND AUTHORIZATIONS
Nexa Resources S.A. – Atacocha Mine

	Governmental Consent	Resolution	Approval Date
Environmental certification			
1	Atacocha´s Adaptation and Environmental Management Program (PAMA)	DR 89-97-EM-DGM	06/03/1997
2	First Amendment to Atacocha´s PAMA	DR 313-2002-EM-DGAA	22/10/2002
3	Second Amendment to Atacocha´s PAMA	DR 154-2004-MEM-AAM	20/04/2004
4	EIA for the Tailing Deposit denominated "Depósito de Relaves Vaso Cajamarquilla"	DR 234-2005-MEM-AAM	08/06/2005
5	Amendment to the EIA for the Tailing Deposit denominated "Depósito de Relaves Vaso Cajamarquilla".	DR 242-2007-MEM-AAM	19/07/2007
6	EIA for the Tailing Deposit denominated "Depósito de Relaves Vaso Atacocha".	DR 361-2007-MEM-AAM	30/10/2007
7	Amendment to the EIA for the Tailing Deposit denominated "Depósito de Relaves Vaso Atacocha"	DR 380-2012-MEM-AAM	19/11/2012
8	Amendment to the EIA for the expansion of the capacity of the beneficiation plant of the beneficiation concession "Chicrin No. 2" up to 5,000 tpd.	DR 284-2012-MEM-AAM	05/09/2012
9	EIA for the 50 kV power transmission line SE El Porvenir - SE Chicrin	DR 347-2013-MEM-AAM	13/09/2013
10	Technical Report (ITS) for the exploitation of San Gerardo.	DR 170-2014-MEM-DGAAM	10/04/2014
11	Technical Report (ITS) for the Tailings integration project.	DR 527-2014-MEMDGAAM-V	20/10/2014
12	Detailed Technical Report (MTD)	DR 243-2016-MEMDGAAM	11/08/2016
13	Second Amendment to the EIA for the expansion of the capacity of the beneficiation plant of the beneficiation concession "Chicrin No. 2" up to 5,000 tpd.	DR 119-2018-SENACE-JEF/DEAR	21/08/2018
Mine closure plan			
1	Mine Closure Plan	DR 198-2009-MEM-AAM	8/07/2009
2	First Amendment to the Mine Closure Plan	DR139-2012-MEM-AAM	03/05/2012
3	First Mine Closure Plan Update.	DR 387-2012-MEM-AAM	22/11/2012
4	Second Amendment to the Mine Closure Plan.	DR 98-MEM-DGAAM	04/04/2016
Beneficiation plant and tailings disposal facilities			
1	Beneficiation Concession Title	R 192-74-DGM-DC	02/10/1974
2	Authorization to operate the facilities to expand the production capacity of the beneficiation plant up to 3,500 tpd.	Resolution s/n	28/11/2000
3	Authorization to operate the tailings deposit denominates "Vaso Atacocha" at 4,089 MASL	R 892-2008-MEM-DGM	21/02/2008
4	Authorization to construct the facilities to extend the Capacity of the tailings deposit denominated "Vaso Atacocha" at 4,081 MASL	R 689-2008-MEM-DGM-V	18/11/2008
5	Authorization to construct the facilities extend the capacity of the tailings deposit denominated "Vaso Atacocha" at 4,093 MASL	R 996-2009-MEM-DGM-V	23/12/2009
6	Authorization to construct the facilities to expand the production capacity of the beneficiation plant up to 4,380 tpd.	R 411-2010-MEM-DGM-V	8/11/2010
7	Authorization to operate the facilities to expand the production capacity of the beneficiation plant up to 4,380 tpd.	R 191-2011-MEM-DGM-V	14/06/2011
7	Authorization to construct the facilities to modify the beneficiation concession without changing the production capacity.	R 326-2011-MEM-DGM-V	25/08/2011
8	Authorization to construct the facilities to expand the tailings deposit denominated "Vaso Atacocha" at 4,105 MASL	R 92-2012-MEM-DGM-V	15/03/2012
9	Authorization to operate new infrastructure related to the beneficiation concession without expanding the authorized production capacity	R 137-2013-MEM-DGM-V	25/03/2013

	Governmental Consent	Resolution	Approval Date
10	Authorization to operate new infrastructure related to the beneficiation concession without expanding the authorized production capacity	R 207-2013-MEM-DGM-V	10/05/2013
11	Authorization to operate the tailings deposit denominated "Vaso Atacocha" al 4.105 MASL	R 236-2013-MEM-DGM-V	31/05/2013
12	Authorization to construct the facilities to expand the tailings deposit denominated "Vaso Atacocha" at 4,128 MASL	R 375-2013-MEM-DGM-V	19/09/2013
13	Precisions to the R 375-2013-MEM-DGM-V	R 417-2013-MEM-DGM-V	4/11/2013
14	Authorization to construct the facilities to transport the tailing generated in the beneficiation concession denominated "Chicrin No. 2" to the beneficiation concession denominated owned by the mine "El Porvenir".	R 594-2014-MEM-DGM-V	31/12/2014
15	Authorization to operate the facilities to transport the tailing generated in the beneficiation concession denominated "Chicrin No. 2" to the beneficiation concession denominated owned by the mine "El Porvenir".	R 287-2015-MEM-DGM-V	3/07/2015
16	Authorization to construct the facilities to expand the production capacity of the beneficiation plant up to 5,000 tpd	R 120-2016-MEM-DGM-V	4/04/2016
17	Authorization to operate the beneficiation plant with a processing capacity of 4,600 tpd	R 754-2016-MEM-DGM-V	22/11/2016
18	Authorization to construct the facilities to expand the tailing facilities denominated "Vaso Atacocha" at 4,110 MASL	R 210-2006-MEM-DGM-V	4/05/2016
19	Authorization to exploit Glory Hole as open pit	R 1158-2017-MEM-DGM/V	18/12/2017
20	Authorization to modify construction of Vaso Atacocha	R 64-2018-MEM-DGM	01/02/2018
Water Supply			
1	Water license for mining purposes	AR 20-99-CTARP-INRENAATDRP	12/03/1999
2	Water license for mining purposes	AR 134-2011-ANA-ALAPASCO	26/05/2011
3	Water license for human consumption purposes	AR 21-99-CTARP-DRAINRENA-ATDRP	12/03/1999
4	Water license for human consumption purposes	AR 12-2006-AG-DRAP/ ATDRP	3/04/2006
5	Water license for energy purposes	AR 19-99-CTARP-INRENAATDRP	12/03/1999
Effluent Discharge to the Environment			
1	Authorization to discharge treated domestic waste waters from Campamentos Chicrí Bajo y Chicrín Artesanos	R 303-2016-ANA-DGCRH	30/12/2016
2	Authorization to discharge treated industrial waste waters from pond E09	R 69-2015-ANA-DGCRH	6/03/2015
3	Authorization to discharge treated industrial waste waters from Tailings Dam Atacocha	R 68-2015-ANA-DGCRH	6/03/2015
Power Supply			
1	Authorization to generate electricity for 5.40 MW in the Hydroelectric plant denominated "Chaprin".	R 313-94-EM-DGE	5/07/1994
2	Authorization to generate electricity for 1,20 MW in the Hydroelectric plant denominated "Marcopampa"	R 14-95-EM-DGE	20/01/1995
3	Power Transmission Concession	R 16-96-EM	02/04/1996
4	Authorization to increase power capacity of Electric Substation "Nueva Chicrin"	SR 152-2008-MEM-DGM/V	05/02/2008
	Use of Explosive		
1	Certificate of Mining Operation	131-2019-C	19/12/2018
2	Authorization to use acquire and use explosives.	R 688-2019-SUCAMEC/GEPP	01/03/2019
3	Authorization to operate an underground magazine	R 1104-2015-SUCAMEC/GEPP	02/06/2015

	Governmental Consent	Resolution	Approval Date
4	Authorization to operate an underground magazine	R 428-2018-SUCAMEC/GEPP	02/02/2018
5	Authorization to operate an underground magazine	R 429-2018-SUCAMEC/GEPP	02/02/2018
6	Authorization to operate a silo magazine	R 119-2018-SUCAMEC/GEPP	10/01/2018

Source: Nexa, 2019

Exhibit 99.2

RPA

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CONSENT OF QUALIFIED PERSON

April 3, 2019

I, Avakash Patel, P.Eng., do hereby consent to the public filing of the report titled "Technical Report on the Atacocha Mine, Pasco Province, Central Peru" (the Technical Report), prepared for Nexa Resources S.A. and dated March 22, 2019, and to the use of extracts from, or the summary of, the Technical Report in the press release of Nexa Resources S.A. dated March 28, 2019 (the Press Release).

I also certify that I have read the Press Release and that it fairly and accurately represents the information in the Technical Report that supports the Press Release.

Signed *Avakash Patel*

Avakash Patel, P.Eng.

AVAKASH PATEL

I, Avakash Patel, P.Eng., as an author of this report entitled "Technical Report on the Atacocha Mine, Pasco Province, Central Peru" prepared for Nexa Resources S.A. and dated March 22, 2019, do hereby certify that:

1. I am Vice President, Metallurgy and 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 Regina, Saskatchewan in 1996 with a B.A.Sc. in Regional Environmental Systems Engineering (Civil/Chemical).

3. I am registered as a Professional Engineer in the Province of Ontario (Reg. #90513565) and in the Province of British Columbia (Reg. #31860). I have worked as a metallurgical engineer for a total of 22 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 positions at numerous base metal and precious metal operations, and consulting companies responsible for general management, project management, and process design.
   - Sr. Corporate Manager – Metallurgy and Mineral Processing with a major Canadian mining company and a junior Canadian mining company.
   - Manager of Engineering/Processing Engineering with two large international Engineering companies responsible for designing, planning, and execution for multiple complex mining projects.

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 Atacocha Mine.

6. I am responsible for Sections 13 and 17 and relevant disclosure in Sections 1 to 3 and 25 to 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 22nd day of March, 2019.

(Signed and Sealed) ***Avakash Patel***

Avakash Patel, P.Eng.

Exhibit 99.4

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CONSENT OF QUALIFIED PERSON

April 3, 2019

I, Rosmery Julia Cardenas Barzola, P.Eng., do hereby consent to the public filing of the report titled "Technical Report on the Atacocha Mine, Pasco Province, Central Peru" (the Technical Report), prepared for Nexa Resources S.A. and dated March 22, 2019, and to the use of extracts from, or the summary of, the Technical Report in the press release of Nexa Resources S.A. dated March 28, 2019 (the Press Release).

I also certify that I have read the Press Release and that it fairly and accurately represents the information in the Technical Report that supports the Press Release.

Signed *Rosmery Julia Cardenas Barzola*

Rosmery Julia Cardenas Barzola, P.Eng.

ROSMERY J. CÁRDENAS

I, Rosmery Julia Cárdenas Barzola, P.Eng., as an author of this report entitled "Technical Report on the Atacocha Mine, Pasco Province, Central Peru" prepared for Nexa Resources S.A. and dated March 22, 2019, 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 16 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Resource estimation, geological modelling, and QA/QC experience ranging from greenfield projects to operating mines, including open pit and underground.
   - 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).
   - Geologist at a polymetallic underground mine in Peru in charge of exploration and definition drilling.

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 Atacocha Mine on September 5 to 7, 2018.

6. I am responsible for Sections 4 to 14 and relevant disclosure in Sections 1 to 3 and 25 to 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 22nd day of March, 2019.

(Signed and Sealed) ***Rosmery Cardenas***

Rosmery J. Cárdenas, P.Eng.

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CONSENT OF QUALIFIED PERSON

April 3, 2019

I, Luiz Vasquez, P.Eng., do hereby consent to the public filing of the report titled "Technical Report on the Atacocha Mine, Pasco Province, Central Peru" (the Technical Report), prepared for Nexa Resources S.A. and dated March 22, 2019, and to the use of extracts from, or the summary of, the Technical Report in the press release of Nexa Resources S.A. dated March 28, 2019 (the Press Release).

I also certify that I have read the Press Release and that it fairly and accurately represents the information in the Technical Report that supports the Press Release.

Signed ***Luiz Vasquez***

Luiz Vasquez, P.Eng.

LUIS VASQUEZ

I, Luis Vasquez, M.Sc., P.Eng., as an author of this report entitled "Technical Report on the Atacocha Mine, Pasco Province, Central Peru" prepared for Nexa Resources S.A. and dated March 22, 2019, do hereby certify that:

1. I am a Senior 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 14 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 Atacocha mine site.

6. I am responsible for Section 20, portions of Section 18, and related disclosure in Sections 1, 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 22nd day of March, 2019

(Signed and Sealed) ***Luiz Vasquez***

Luis Vasquez, M.Sc., P.Eng.

CONSENT OF QUALIFIED PERSON

April 3, 2019

I, Scott C. Ladd, P.Eng., do hereby consent to the public filing of the report titled "Technical Report on the Atacocha Mine, Pasco Province, Central Peru" (the Technical Report), prepared for Nexa Resources S.A. and dated March 22, 2019, and to the use of extracts from, or the summary of, the Technical Report in the press release of Nexa Resources S.A. dated March 28, 2019 (the Press Release).

I also certify that I have read the Press Release and that it fairly and accurately represents the information in the Technical Report that supports the Press Release.

Signed *Scott C. Ladd*

Scott C. Ladd, P.Eng.

29 CERTIFICATE OF QUALIFIED PERSON

SCOTT C. LADD

I, Scott C. Ladd, P.Eng., as an author of this report entitled "Technical Report on the Atacocha Mine, Pasco Province, Central Peru" prepared for Nexa Resources S.A. and dated March 22, 2019, 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 Laurentian University, Sudbury, Ontario in 1998 with a B.Eng. degree in Mining Engineering.

3. I am registered as a Professional Engineer in the Province of British Columbia (Reg. #167289). I have worked as a mining engineer for a total of 20 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Principal Mining Consultant and Regional Manager responsible for Canadian operations with an Australian based mining consulting firm.
   - Preparation of scoping, prefeasibility, and feasibility level studies and reporting for due diligence and regulatory requirements.
   - Principal Mining Engineer with an international diamond corporation, responsible for technical and operational leadership, support, and guidance for all Canadian operating mines and projects.
   - Director, Operations Performance Management and Strategic Mine Planning with a major Canadian mining company.
   - Open Pit Mine Manager/Technical Services Superintendent at a coal mine in Alberta.

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 Atococha Mine on September 5 to 7, 2018.

6. I am responsible for Sections 15 and 16 and 18 to 22, and relevant disclosure in Sections 1 to 3 and 25 to 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 22nd day of March, 2019.

(Signed and Sealed) ***Scott C. Ladd***

Scott C. Ladd, P.Eng.