

# Technical Report for the Candelaria Copper Mining Complex, Atacama Region, Region III, Chile

Report Prepared for  
**Lundin Mining Corporation**

**lundin mining**



Report Prepared by

 **srk** consulting

SRK Consulting (Canada) Inc.

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Cover: Candelaria Open Pit, showing Candelaria process plant and tailings facility, looking north.

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## Executive Summary

The Candelaria Copper Mining Complex comprises two adjacent copper mining operations that produce copper concentrates from open pit and underground mines located near Copiapó in the Atacama Region, Region III of Chile. Compañía Contractual Minera Candelaria (Minera Candelaria) is an open pit and underground mine providing copper ore to an on-site concentrator with a capacity of 75,000 tonnes per day, and Compañía Contractual Minera Ojos del Salado (Minera Ojos del Salado) comprises two underground mines: Santos and Alcaparrosa. The Santos mine provides copper ore to an on-site concentrator with a capacity of 3,800 tonnes per day and provides an average of 1,400 tonnes per day to the Minera Candelaria concentrator, while all the ore from the Alcaparrosa mine is treated at the Minera Candelaria processing plant. In 2018, the operations are forecast to collectively produce contained metals in concentrates (100 percent basis) containing 135 kilotonnes of copper, 78,000 ounces of gold, and 1.2 million ounces of silver. The Candelaria Copper Mining Complex is indirectly owned by Lundin Mining Corporation (Lundin; 80 percent) and Sumitomo Metal Mining Co., Ltd. and Sumitomo Corporation (collectively, Sumitomo; 20 percent).

Lundin is a diversified base metals mining company with operations Chile, the USA, Portugal, and Sweden producing copper, nickel, zinc, and lead. Lundin is a Canadian public company with a head office in Toronto, Canada. Its common shares are listed on the Toronto Stock Exchange (symbol LUN) and the NASDAQ Stockholm (symbol LUMI).

In September 2018, Lundin retained the services of SRK Consulting (Canada) Inc. (SRK) to visit the Candelaria Copper Mining Complex and compile a technical report pursuant to National Instrument 43-101 *Standards of Disclosure for Mineral Projects* and Form 43-101F1. This report updates the November 30, 2017 Technical Report entitled “Technical Report for the Candelaria Copper Mining Complex, Atacama Region, Region III, Chile”. It summarizes the technical information that is relevant to support the disclosure of new Mineral Resources and Mineral Reserves estimates (as of June 30, 2018) prepared using revised economic parameters and the positive results of recent exploration programs.

On September 6, 2018, Lundin announced updated Mineral Resource and Mineral Reserve Statements for the Candelaria Copper Mining Complex (as of June 30, 2018). Relative to the previous year, the Mineral Resources and the Mineral Reserves have increased significantly. Open pit Mineral Reserves are declared for the new Española deposit, a recent exploration discovery located south of the Candelaria pit. Mineral Reserves at the underground mines have also increased; allowing to extend the Life of Mine of the Complex by 5 years to 2040. During the first quarter 2018, the Los Diques tailings management facility, a key component of the Candelaria 2030 project, was commissioned, and can now receive tailings produced by the Candelaria Plant. In addition, the operational permits for Ojos del Salado were extended to 2022. The new production schedule presented in this technical report will serve as the basis for preparing a new Environmental Impact Assessment to modify and obtain the operational permits necessary for its implementation and other mine optimizations currently being studied.

This report also summarizes changes to the open pit phase design and new underground production schedules, based on these updated Mineral Reserves, as well as operational improvement initiatives designed to reduce operational costs and improve efficiencies.

## Property Description and Ownership

The Candelaria Copper Mining Complex is located in Chile’s Atacama Region, Region III, approximately 20 kilometres south of the city of Copiapó and adjacent to the community of Tierra Amarilla all of which are approximately 650 kilometres north of Santiago (Figure i and Figure ii). The properties are easily accessed using the public road system. Copiapó is a modern city with all the regular services and a population of approximately 160,000. Personnel employed by the Candelaria Copper Mining Complex come primarily from the Atacama region. The Candelaria and Ojos del Salado mines receive electrical power through long-term contracts with AES Gener S.A., a nation-wide energy company. The primary water supply comes from a desalination plant, which was commissioned in 2013 and is located at the Punta Padrones port facility at the

nearby sea port of Caldera. Both the desalination plant and the Punta Padrones port are owned by Minera Candelaria. Local treated sewage water purchased from Aguas Chañar is also used by the mines. The copper concentrate is trucked from site to local smelters or shipped from Punta Padrones to world markets.

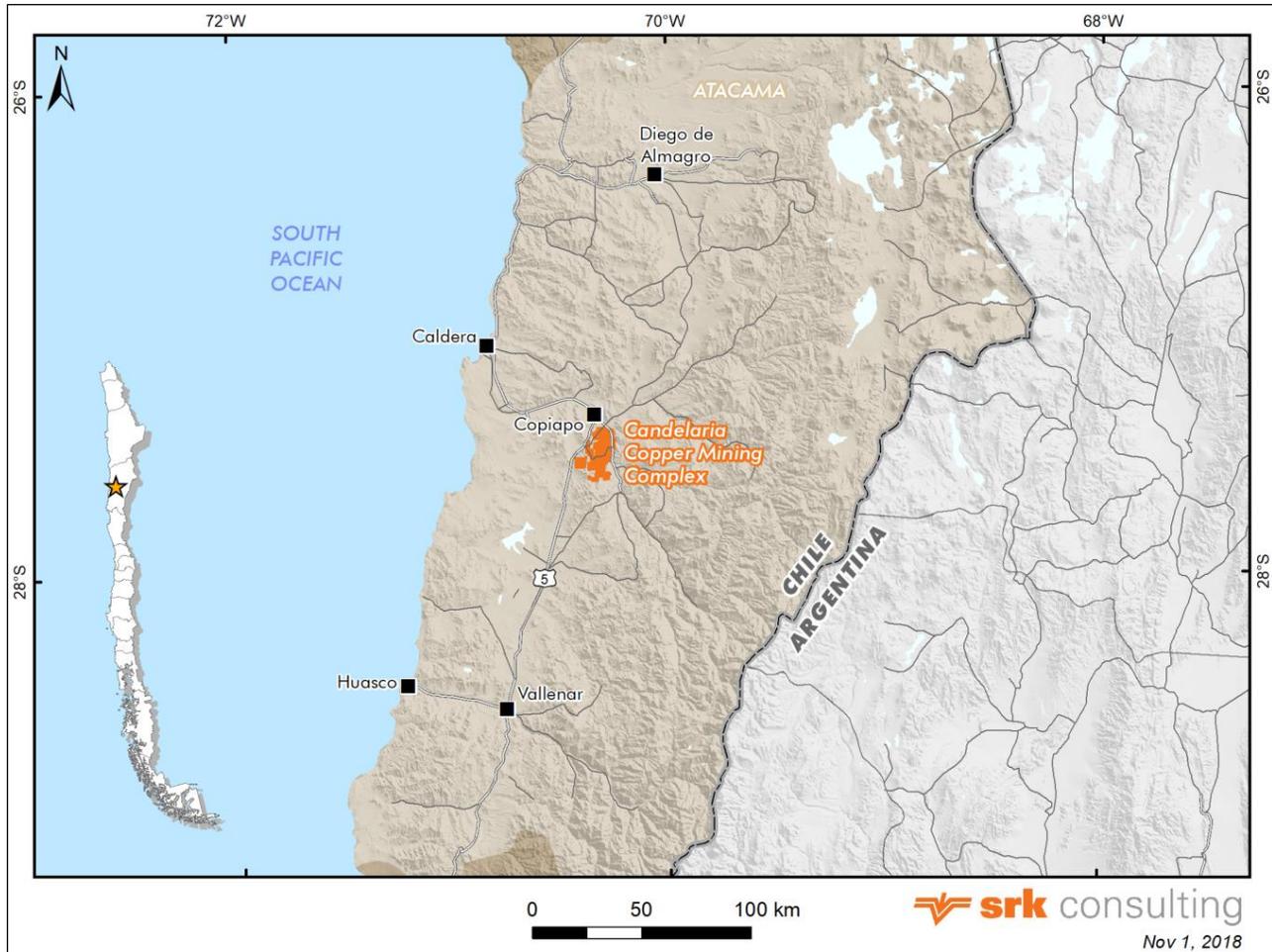


Figure i: Location of the Mines Comprising the Candelaria Copper Mining Complex

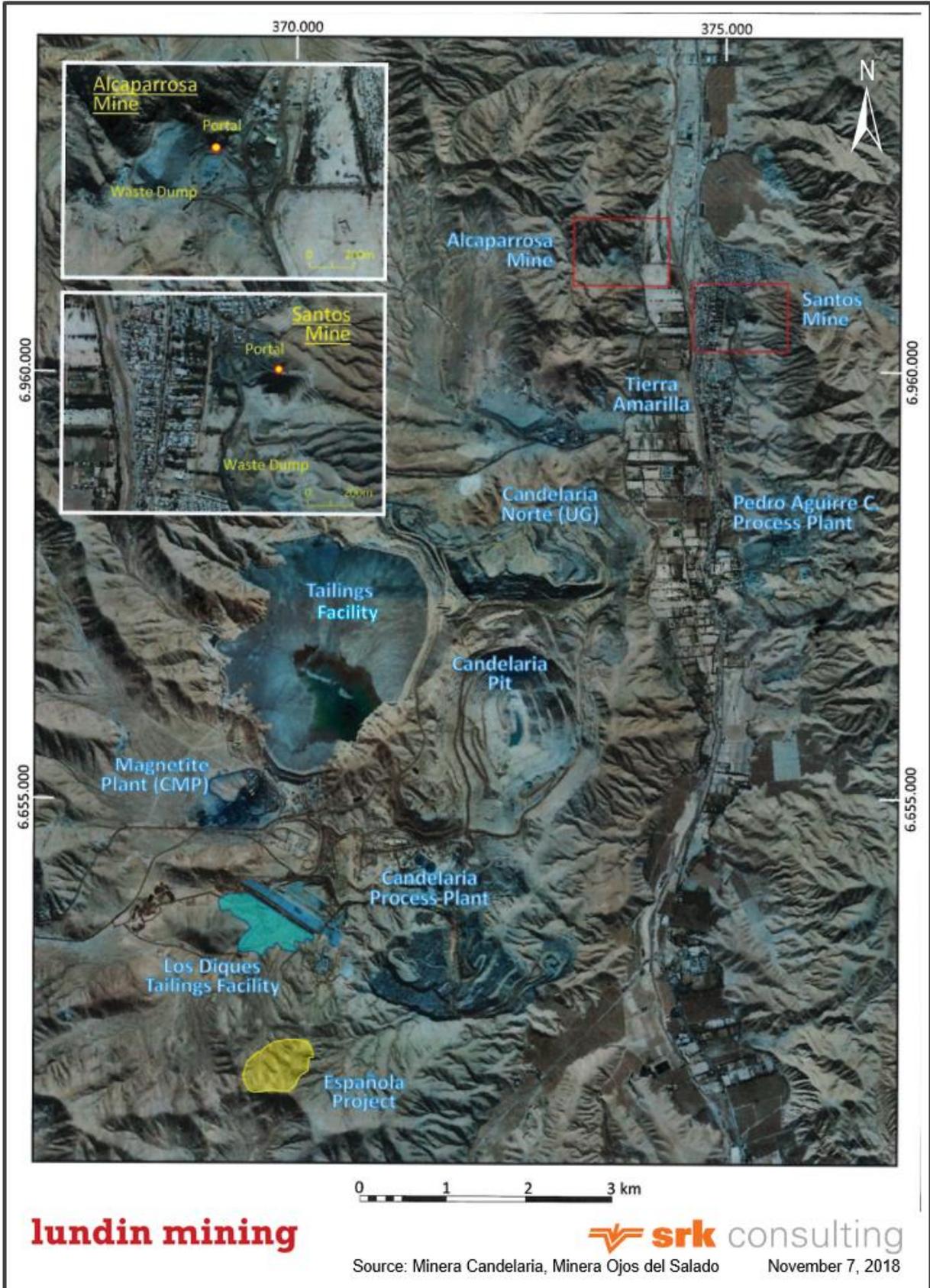


Figure ii: The Local Infrastructure of the Candelaria Copper Mining Complex

Copiapó has a desert climate with mild temperatures year-round. Winters are mild with warm temperatures. Annual precipitation averages approximately 17 millimetres, the majority of which falls in the winter months. The elevation of the mining operations does not exceed 800 metres above sea level. The climate and relatively low elevation allows for year-round mining and exploration activities.

The Minera Candelaria property comprises 253 mining exploitation concessions (approximately 5,891 hectares) and 80 mining exploration concessions (approximately 6,680 hectares). The Minera Ojos del Salado property comprises 205 mining exploitation concessions (approximately 9,287 hectares) and 59 mining exploration concessions (approximately 10,748 hectares). The tenements are free of mortgages, encumbrances, prohibitions, injunctions, and litigation. The tenements containing the active and future mining activities are not affected by royalties. The Candelaria Copper Mining Complex holds certain underground water use rights and certain surface water use rights.

## History

The Candelaria sulphide deposit was discovered by Phelps Dodge Corporation (Phelps Dodge) in 1987. A feasibility study was completed in 1990, and, following approval by the Chilean government, construction started in October of 1992. Sumitomo acquired a 20 percent stake in the property in 1992. Production commenced in early 1995.

In 2007, property ownership changed when Freeport-McMoRan Inc. (Freeport) acquired Phelps Dodge.

During 2011, a pipeline was completed to bring water purchased from a nearby sewage treatment facility to the Candelaria mine. A desalination plant at the port of Caldera was built and commissioned in 2013 at a capacity of 500 litres per second.

The Santos underground mine has been in production since 1929, with processing taking place at what is now called the Pedro Aguirre Cerda (PAC) plant. Phelps Dodge became sole owner of Minera Ojos del Salado and the Santos mine and PAC plant in 1985. The PAC plant has been expanded several times to its current capacity of 3,800 tonnes per day. Sumitomo acquired its 20 percent interest in Minera Ojos del Salado in 2005.

In early 1996, production from the Alcaparrosa underground mine commenced. Due to low copper prices the PAC plant was shutdown from 1998 to 2004.

In November 2014, Lundin acquired Freeport's interest in the Candelaria Copper Mining Complex.

The Candelaria Copper Mining Complex has been a significant producer of copper since the mid-1990s. Over the last four years, annual contained copper and gold metal in concentrates has averaged approximately 174 kilotonnes and 100,000 ounces, respectively.

During 2015, the Candelaria 2030 project received environmental approval. Key permits were received during 2016 for the construction of the new Los Diques tailings storage facility and major civil works began in August 2016 and construction continued through 2017.

During 2017 permits were granted to allow the Candelaria Underground operations to expand production from 6,000 to 14,000 tonnes per day.

In 2018, the new Los Diques tailings management facility was commissioned and received its first tailings. In addition, initial Mineral Resources and Mineral Reserves were declared for the recent Española surface discovery.

## Geology, Mineralization, and Deposit Types

The Candelaria sulphide deposit is located at the boundary between the Coastal Cordillera and the Copiapó Precordillera. The Coastal Cordillera of Chañaral and Copiapó is composed of Permian to Lower Cretaceous intrusions within a basement of metasedimentary rocks of Devonian to Carboniferous age. Volcanic,

volcaniclastic, and marine carbonate rocks represent intra- and back-arc sequences that were deposited during Early to Mid-Cretaceous.

The Candelaria, Santos, and Alcaparrosa mines are located in the district of Punta del Cobre. The polymetallic sulphide deposits are hosted in volcanic rocks of the Punta del Cobre Formation. Polymetallic sulphide deposits in the Punta del Cobre district are located to the east of the main branches of the Atacama fault zone, a subduction-linked, strike-slip fault system stretching over 1,000 kilometres along the Chilean coast and active at least since the Jurassic. The dominant structural elements of the Punta del Cobre area are the northeast-trending Tierra Amarilla Anticlinorium, a southeast-verging fold-and-thrust system and a series of north-northwest- to northwest-trending high-angle faults.

The copper-gold sulphide mineralization found at the Candelaria Copper Mining Complex is generally referred to as iron oxide copper gold (IOCG) mineralization. The sulphide mineralization occurs in breccias, stockwork veinlets, disseminations in andesite, and as an internal tuff unit. There are also some localized controls to mineralization in the form of faults, breccias, veins, and foliation. Candelaria has become an exploration model for Andean-type IOCG deposits that display close relationships to the plutonic complexes and broadly coeval fault systems. Depending on lithology and the structural setting, the polymetallic sulphide mineralization can occur as veins, hydrothermal breccias, replacement mantos, and calcic skarns. The Candelaria IOCG system lies within the thermal aureole of the Lower Cretaceous magmatic arc plutonic suite in the Candelaria-Punta del Cobre district.

## Exploration Status

Ongoing exploration is conducted by the Candelaria Copper Mining Complex with the primary purpose of supporting mining and increasing the estimated Mineral Resources and Mineral Reserves available for mining. Exploration is focused on the known mantos, veins, and breccia masses in proximity to existing open pit and underground infrastructure. Historically, this strategy has proven very effective in defining new Mineral Resources available for underground mining. Much of the exploration is conducted from underground, requiring significant underground development to provide adequate drilling stations. Regional exploration is also undertaken on the large properties surrounding the mines to identify targets and define new Mineral Resource areas.

From 2010 to the end of June 2018, Minera Candelaria and Minera Ojos del Salado have together invested more than US\$229 million in exploration to expand the Mineral Resources primarily below the Candelaria Open Pit, to the north and south of the pit, and at the three underground mines (Candelaria Underground, Santos and Alcaparrosa). During this period, 3,198 core boreholes (888,435 metres) were drilled requiring 15,061 metres of underground development to provide access for drilling.

Brownfield exploration drilling began late in 2017 with surface drilling commencing in the south district of the Candelaria land concession in an area called Española. In total, 79 drill platforms and roads were developed during the 2017 and 2018 drilling campaign, and 92 exploration and infill core holes totalling 31,370 metres were drilled at Española.

The recent aggressive exploration program has resulted in significant new discoveries with a positive impact particularly on the life of the three underground mines. In 2015, a new exploration and resource development tool, Mineral Inventory Range Analysis (“MIRA”) was initiated with the purpose to understand the potential mineral inventory remaining in the mines as well as within the Candelaria land holdings.

Building on this exploration success, future exploration for the period 2019 to 2023 will focus on maintaining operational fronts in the mines, targeting the lateral extensions of the areas investigated since 2010 and exploring district targets to the north and south of mining infrastructure within the Minera Candelaria and Minera Ojos del Salado land holdings. The planned exploration program includes approximately 2,830 metres of underground development, 261,000 metres of core drilling, and continued geophysical campaigns at a total estimated combined cost of US\$72.5 million. Step out drilling will continue within the mines; however, exploration drilling will be focused in the district.

The exploration potential of the Candelaria Copper Mining Complex remains excellent. SRK is of the opinion that continued exploration programs and the MIRA exploration and Mineral Resource development initiative will continue to expand the underground Mineral Resource estimates.

## **Drilling, Sample Preparation, Analyses, and Security**

Mineral Resources are estimated from information obtained from surface and underground boreholes. From 1990 to June 30, 2018, 4,351 core and percussion boreholes (1,260,592 metres) were drilled in and around the Candelaria mine. Since 1990 to 2004, there were five exploration diamond drill holes drilled in Española totaling 2,861 metres. Since July 2017 and the end of June 2018 there were 92 new diamond drill holes drilled totaling 31,370 metres. In the Santos mine from 1988 until June 30, 2018, a total 1,504 core boreholes (304,946 metres) were drilled from underground and surface stations. The borehole data base for the Alcaparrosa mine contains 1,085 boreholes (263,634 metres) drilled from surface and underground locations since 1990 and until the June 30, 2018.

The drilling and sampling procedures are consistent with generally recognized industry best practices. SRK concludes that the samples are representative of the source materials and there is no evidence that the sampling process introduced a bias.

Analytical samples informing the Candelaria Mineral Resource estimates were prepared and assayed at the Candelaria mine laboratory that is accredited to ISO17025 for the analyses of copper, iron, zinc, and silver. Analytical samples informing the Ojos del Salado Mineral Resource estimates were prepared and assayed by Intertek (formerly Vigalab). Conventional preparation and assaying procedures were used. Copper is analyzed by multi acid digestion and atomic absorption spectroscopy. Gold is assayed using a fire assay procedure. Specific gravity is systematically measured on core samples.

The Candelaria Copper Mining Complex implements analytical quality control measures consistent with generally accepted industry best practices. The analytical quality control program includes the use of control samples inserted with all samples submitted and check assaying by umpire laboratories. The analytical quality control data are routinely monitored and audited.

In the opinion of SRK, the analytical results delivered by the primary laboratories used are sufficiently reliable to inform Mineral Resource estimates. The sampling preparation, security, and analytical procedures used are consistent with generally accepted industry best practices and are therefore adequate to support Mineral Resource estimation.

## **Mineral Processing and Metallurgical Testing**

The Candelaria Copper Mining Complex maintains regular metallurgical testing programs that are incorporated with historical testing results and mill performance into a statistical model to predict and improve processing performance in terms of mill throughput, metal recovery to concentrate, and final concentrate grade. Metallurgical tests are executed in several specialized in-house and commercial facilities. Testing includes rock hardness classification, mineralogy using QEMSCAN technology and bench scale flotation testing that is correlated with industrial scale performance in order to predict mill throughput and metallurgical performance.

The success of the recent exploration programmes has allowed the study of potential production expansion options. New metallurgical tests were initiated in late 2016 as part of a Feasibility Study to evaluate potential throughput increases at the Candelaria mill. Results and analysis from this testwork programme were evaluated and many process improvement initiatives have now commenced, focussing on debottlenecking and improving the performance of the existing mill facilities.

The Candelaria Mill Optimization Project (CMOP) includes upgrades in crushing, grinding, classification and flotation circuit capacity that are forecast to improve throughput by 4,000 tonnes per day and copper recovery by 1.7 percent. The anticipated improvement in copper recovery will substantially address the recovery reductions associated with previous expansions in plant throughput. However, head grade will remain in the

range 0.5 to 0.7 percent copper and limit the benefits of these initiatives compared with, historically higher copper grades.

## Mineral Resource and Mineral Reserve Estimates

The Mineral Resource estimates discussed herein are informed from core drilling information stored in a secured central database and were evaluated using a geostatistical block modelling approach. Six Mineral Resource models were prepared for the areas comprising the Candelaria Open Pit mine and Española open pit project and the three underground mines (Candelaria Underground North Sector, Candelaria Underground South Sector, Santos, and Alcaparrosa) using slightly different methodologies and assumptions. The block models comprising the Candelaria Underground, Santos and Alcaparrosa underground deposits have been integrated since 2017.

SRK reviewed and audited the Mineral Resource models prepared by Minera Candelaria and Minera Ojos del Salado personnel. In the opinion of SRK, the Mineral Resource estimation reported herein is a reasonable representation of the Mineral Resources found at the Candelaria Copper Mining Complex at the current level of sampling. The Mineral Resources have been estimated in conformity with generally accepted CIM *Estimation of Mineral Resource and Mineral Reserves Best Practices Guidelines* and are reported in accordance with Canadian Securities Administrators' National Instrument 43-101. The consolidated audited Mineral Resource Statement for the Candelaria Copper Mining Complex, as of June 30, 2018, is presented in Table i. Mineral Resources include Mineral Reserves.

Relative to 2017, the 2018 combined open pit Measured and Indicated Mineral Resources tonnages have increased materially, whereas copper grades have decreased primarily as a result of the introduction of the Española Project and the reduction of the reporting cut-off grades from 0.20 percent copper to 0.15 percent copper. Combined underground Measured and Indicated Mineral Resources tonnages have also increased significantly, whereas copper grades have decreased primarily due to the introduction of new discoveries and the reduction of the reporting cut-off grades from 0.60 percent copper to 0.55 percent copper. Contained metal for Mineral Resources amenable to both open pit and underground extraction has however increased significantly.

Open pit and underground Mineral Resource models (long-term models) for each deposit is compared to their respective grade control models (short term models) and to the production reports (as mined) on a monthly basis. Generally, the comparison between the long and short-term models is reasonable, but some significant differences do occur that should be analysed by CCMC staff. These reconciliations have been undertaken for copper, gold and silver.

**Table i: Consolidated Audited Mineral Resource Statement\*, Candelaria Copper Mining Complex, SRK Consulting (Canada) Inc., June 30, 2018 (100% Basis)**

Classification	Quantity	Grade			Contained Metal		
	Tonnes ('000)	Copper (%)	Gold (g/t)	Silver (g/t)	Copper ('000 t)	Gold ('000 oz)	Silver ('000 oz)
<b>Open Pit</b>							
Measured	468,239	0.47	0.11	1.46	2,220	1,647	22,014
Indicated	65,757	0.38	0.09	0.92	251	198	1,943
<b>Measured and Indicated</b>	<b>533,995</b>	<b>0.46</b>	<b>0.11</b>	<b>1.40</b>	<b>2,471</b>	<b>1,845</b>	<b>23,957</b>
Inferred	34,417	0.37	0.09	0.42	128	95	462
<b>Underground</b>							
Measured	222,957	1.05	0.24	3.27	2,330	1,714	23,431
Indicated	111,018	0.96	0.22	2.84	1,066	774	10,137
<b>Measured and Indicated</b>	<b>333,975</b>	<b>1.02</b>	<b>0.23</b>	<b>3.13</b>	<b>3,397</b>	<b>2,489</b>	<b>33,568</b>
Inferred	18,301	1.07	0.19	2.28	196	111	1,344
<b>WIP**</b>							
Measured	84,504	0.33	0.09	1.38	278	243	3,755
Indicated							
<b>Measured and Indicated</b>	<b>84,504</b>	<b>0.33</b>	<b>0.09</b>	<b>1.38</b>	<b>278</b>	<b>243</b>	<b>3,755</b>
Inferred							
<b>Total</b>							
Measured	775,699	0.62	0.14	1.97	4,829	3,605	49,201
Indicated	176,774	0.74	0.17	2.13	1,317	972	12,080
<b>Measured and Indicated</b>	<b>952,474</b>	<b>0.65</b>	<b>0.15</b>	<b>2.00</b>	<b>6,146</b>	<b>4,577</b>	<b>61,281</b>
Inferred	52,719	0.62	0.12	1.07	325	205	1,806

\* Reported within the boundaries of the Compañía Contractual Minera Candelaria and Compañía Contractual Ojos del Salado properties. Mineral Resources are not Mineral Reserves and have not demonstrated economic viability. All figures are rounded to reflect the relative accuracy of the estimates. Mineral Resources include Mineral Reserves. Open pit Mineral Resources are reported at a cut-off grade of 0.15 percent copper for the Candelaria Open Pit and 0.20 percent copper for La Española Project, within conceptual pit shells based on metal prices of US\$3.16 per pound of copper and US\$1,000 per ounce of gold and current topography. Underground Mineral Resources are reported at a cut-off grade of 0.55 percent copper.

\*\* Work-in-progress (WIP) stockpiles

Mineral Reserves are derived from Measured and Indicated Mineral Resources after applying economic parameters. The Mineral Reserves are derived and classified according to the following criteria:

- Proven Mineral Reserves are the economically mineable part of the Measured Mineral Resources where development work for mining and information on processing/metallurgy and other relevant factors demonstrate that economic extraction is achievable.
- Probable Mineral Reserves are those Measured and Indicated Mineral Resources where development work for mining and information on processing/metallurgy and other relevant factors demonstrate that economic extraction is achievable.

The consolidated audited Mineral Reserve Statement for the Candelaria Copper Mining Complex is presented in Table ii. Mineral Reserves are included in Mineral Resources.

**Table ii: Consolidated Audited Mineral Reserve Statement\*, Candelaria Copper Mining Complex, SRK Consulting (Canada) Inc., June 30, 2018 (100% Basis)**

Classification	Quantity (’000 t)	Grade			Contained Metal		
		Copper (%)	Gold (g/t)	Silver (g/t)	Copper (’000 t)	Gold (’000 oz)	Silver (’000 oz)
<b>Candelaria Open Pit and Española</b>							
Proven	376,316	0.49	0.11	1.52	1,842	1,365	18,443
Probable	39,152	0.39	0.10	1.12	154	126	1,409
<b>Total</b>	<b>415,468</b>	<b>0.48</b>	<b>0.11</b>	<b>1.49</b>	<b>1,996</b>	<b>1,491</b>	<b>19,852</b>
<b>WIP** (Candelaria and Ojos del Salado)</b>							
Proven	84,504	0.33	0.09	1.38	278	243	3,755
Probable							
<b>Total</b>	<b>84,504</b>	<b>0.33</b>	<b>0.09</b>	<b>1.38</b>	<b>278</b>	<b>243</b>	<b>3,755</b>
<b>Total District Underground</b>							
Proven	71,876	0.88	0.21	3.33	634	478	7,693
Probable	62,130	0.81	0.18	2.35	504	362	4,699
<b>Total</b>	<b>134,006</b>	<b>0.85</b>	<b>0.20</b>	<b>2.88</b>	<b>1,139</b>	<b>840</b>	<b>12,392</b>
<b>District Combined</b>							
Proven	532,696	0.52	0.12	1.75	2,755	2,087	29,891
Probable	101,282	0.65	0.15	1.88	659	488	6,108
<b>Total</b>	<b>633,978</b>	<b>0.54</b>	<b>0.13</b>	<b>1.77</b>	<b>3,413</b>	<b>2,575</b>	<b>35,999</b>

\* Mineral Reserves are included in Mineral Resources. Mineral Reserves have been prepared using metal prices of US\$2.75 per pound of copper, US\$1,000 per ounce of gold, and US\$15.00 per ounce of silver. All figures have been rounded to reflect the relative accuracy of the estimates. Minera Candelaria Mineral Reserves for open pit and underground are reported at cut-off grades of 0.17 and 0.57 percent copper, respectively. Underground Mineral Reserves for Alcaparrosa and Santos mines are reported at cut-off grades of 0.59 and 0.64 percent copper, respectively. Mineral Reserves for the Española open pit project are reported at cut-off grade of 0.21 percent copper.

\*\* Work-in-progress (WIP) stockpiles

## Mining Methods

The Candelaria Open Pit mine operates with an overall mining rate of approximately 310,000 tonnes per day over the next 10 years including an average of 45,000 tonnes per day of ore sent to the Candelaria processing plant together with substantial quantities of ore recovered from the WIP stockpiles. The average grade of the ore that will be mined from the open pit over the remaining life of mine (LOM) is estimated at 0.49 percent copper, while stockpiled work-in-progress material is estimated to have an average grade of 0.33 percent copper. The mine currently operates seven electric shovels, 43 haulage trucks, eight production drills, and a fleet of support equipment. A major open pit mine equipment re-capitalization programme will see much of the current fleet replaced over the next three years.

The Candelaria Underground mine is forecast to produce 9,000 tonnes per day of ore in 2018, ramping up to a steady state of 14,000 tonnes per day by 2021 as per the LOM plan. The average LOM grade is 0.85 percent copper. The Alcaparrosa mine currently produces 4,300 tonnes per day of ore and is expected to maintain that rate in the LOM plan. The LOM average grade is 0.79 percent copper. The Santos mine will continue to produce at its current rate of production of 5,200 tonnes per day of ore with an average LOM grade of 0.91 percent copper. The mining method in all three underground mines is sublevel open stoping.

The LOM plan for the Candelaria Copper Mining Complex is largely driven by supplying ore to the Candelaria processing plant from the Candelaria and Española open pit open pits although higher grade underground sources are of increasing importance. Surface WIP stockpiles are fed to the plant once the open pit Mineral Reserves have been depleted. The open pit and work-in-progress stockpile Proven and Probable Mineral Reserves are estimated at 499.9 million tonnes at an average grade of 0.45 percent copper, 0.11 gram of gold per tonne, and 1.47 grams per tonne silver.

The Candelaria open pit was designed to be mined in several phases of development. As of June 2018, five phases of development remain in the LOM plan (Phases 9 to 13). The overall strip ratio is expected to be 2.45:1 including ore that is initially delivered to stockpiles. The total in-pit waste is 939.6 million tonnes and the overall life of the open pit mine is 17 years. Candelaria has been planning a substantial mine equipment recapitalization program to replace the aged mining equipment fleet and a change in the loading methodology to increase capacity and efficiency while improving equipment availability and reliability. The program is under way and progress on schedule or ahead of schedule. The forecast total cost over the four years (2018-2021) of this mine equipment recapitalisation programme is US\$216.0 million of which US\$110.4 is expected to be spent in 2018.

For the Española project the total in-pit waste is 83.2 million tonnes and the overall life estimated in 7 years.

The three underground mines (Candelaria Underground, Santos, and Alcaparrosa) utilize a sublevel stoping mining method for ore extraction. This method is ideal for relatively large, vertical, as well as thick deposits with favourable and stable host rock. Stopes can typically be up to 180 metres high with sublevels at 20 to 60 metre intervals. The length of the stopes is generally 40 to 100 metres with widths varying between 20 to 30 metres. Stopes are drilled down from the sublevel drilling drifts as benches using 114 to 140 mm diameter down-the-hole holes. The holes are loaded and blasted in vertical slices towards an open face created by the slot blasting. The blasted ore gravitates to the bottom of the stope and is collected in draw points at the production level below. This lower level also consists of the haulage (transport) drift. The undercut levels, which feed the draw points, are 15 to 20 metres high and inclined at 50 to 60 degrees to allow the blasted ore to flow easily by gravity. An Epiroc Simba tophammer rig drills 64 mm up holes within the undercut, which are loaded and blasted with the downholes. Once the stope is mined, a remaining rib pillar, which can be another 20 to 30 metres wide, may be blasted into the stope to increase the extraction tonnage. Typically, a 20-metre structural pillar remains between each stope and no backfill is used at these operations. Mucked ore is dumped into 60 tonne underground trucks or 30 tonne highway type trucks (being replaced by the former trucks) and hauled up the ramp to a surface stockpile for subsequent re-handling and processing. The current mine lives of the Candelaria Underground, Alcaparrosa, and Santos mines are 19, 9 and 10 years, respectively.

For 2018, the Candelaria Copper Mining Complex is forecast to produce contained metals in concentrate (100 percent basis) of 135 kilotonnes of copper, 78 kilo ounces of gold and 1.2 million ounces of silver. Over the remaining LOM plan (to 2040), the average annual production is estimated to be 142 kilotonnes of copper, 82 kilo ounces of gold and 1.3 million ounces of silver. This is an improvement over the previously reported production schedule and increases the overall project economics. Over the 10-year period, 2019 to 2028, the average annual production is estimated to be 180 kilotonnes of copper, 102 kilo-ounces of gold and 1.6 million ounces of silver.

## Recovery Methods

The Candelaria processing plant receives ore from the Candelaria Open Pit and the Candelaria Underground North Sector and Ojos del Salado underground mines. It has a nameplate capacity of 75,000 tonnes per day. The PAC processing plant receives ore from the Santos underground mine and has a design capacity of 3,800 tonnes per day.

The historical processing performance of Candelaria from 2000 to mid-2018 averaged 25.8 million tonnes per year, equivalent to approximately 76,000 tonnes per day with a utilization of 93 percent. During this period, metallurgical recovery averaged 94 percent for copper, 75 percent for gold, and 83 percent for silver.

The Candelaria processing plant flowsheet is conventional, comprising two parallel process lines for grinding and flotation, reclaimed process water from a conventional tailings dam, final concentrate filtration, and shipping of bulk copper concentrates. Run of mine ore is trucked to a primary gyratory crusher. Grinding takes place in a multi-stage closed circuit using semi-autogenous grinding (SAG) mills, ball mills, and pebble crushing. A multi-stage flotation circuit using an arrangement of mechanical cells, regrind mills and column cells produces copper concentrate. Final flotation copper concentrate with gold and silver by-product metals is thickened, filtered, and stored on site. Final flotation tails are conventionally thickened and disposed of in a rockfill embankment tailings storage facility. Process water is reclaimed from the tailings dam for reuse in the processing plant.

The PAC processing plant has been in operation since 1929. The plant processes 3,800 tonnes per day of fresh feed from the Santos underground mine with an average historical head grade of 0.85 percent copper and a copper recovery of 94 percent. The historical gold and silver recoveries are 72 percent.

The PAC processing plant flowsheet comprises a closed-circuit crushing plant including a primary jaw crusher, a secondary cone crusher, and two tertiary cone crushers. The grinding circuit has three ball mills operating in parallel and in direct closed circuit with hydro-cyclone classification. The flotation plant uses conventional multi-stage, mechanical, flotation cells, regrind milling, and column cells for the final concentrate cleaning stage. The final concentrate is thickened and filtered. Final flotation tailings from the PAC plant are pumped to the main Candelaria tailings storage facility while a new line to Los Diques is planned to be installed in 2019.

Copper concentrates containing precious metals are trucked to the Punta Padrones port, near Caldera. In 2018, the typical Candelaria copper concentrate is forecast to average 30 percent copper, 6 g/t gold, and 92 g/t silver with a moisture content of 8.0 percent after filtration. The copper concentrate of the PAC plant is forecast to average 30 percent copper, 5 g/t gold, and 67 g/t silver.

Minera Candelaria has an agreement with a third-party company to process Candelaria's flotation tailings to produce a magnetite concentrate and this produces an additional source of by-product revenue.

In 2018, the initial construction phases of the new Los Diques tailings storage facility were completed and the facility received its first tailings during the first quarter as part of commissioning. The Los Diques tailings storage facility can now receive 100 percent of the flotation tailings from the Minera Candelaria processing plant. The Los Diques tailings storage facility is located to the southwest of the open pit and plant sites and will have an approximate designed capacity of 600 million tonnes. Flotation tailings from the PAC processing plant continue to be deposited in the Candelaria tailings storage facility while a pipeline to Los Diques will be installed in 2019. The Candelaria flotation tails are thickened and then pumped to the tailings storage facility at an average solids concentration of 50 percent. The PAC flotation tails are pumped unthickened at an average concentration of 35 percent solids.

## Project Infrastructure

The Minera Candelaria infrastructure includes:

- Candelaria Open Pit with a capacity of approximately 310,000 tonnes of rock per day over the next 10 years.
- Surface waste dumps located to the north and southwest of the Candelaria Open Pit.
- Candelaria processing plant with a nameplate capacity of 75,000 tonnes per day. A series of process improvements (on going) have been scheduled for 2018 and 2019.
- Candelaria Underground (North Sector) with a current production ore capacity of 9,000 tonnes per day ramping up to 14,000 tonnes per day in 2021 with the introduction of the South Sector.
- Candelaria tailings storage facility located northwest of the Candelaria Open Pit.
- The new Los Diques tailings storage facility located to the south-east of the open pit and mine facilities.
- Ancillary mine services and administrative buildings and road accesses.
- Off-site Punta Padrones port located at Caldera with a 45,000-wet metric tonne designed storage capacity and 1,000 wet metric tonnes per hour loading capacity.
- Desalination plant adjacent to the port facility commissioned in January 2013 with a capacity of 500 litres per second and the related pipeline to connect to the Bodega pump station (80 kilometres).
- Pipeline from the Bodega pump station to the Candelaria plant site (40 kilometres).

Minera Ojos del Salado infrastructure includes:

- Alcaparrosa underground mine with an ore capacity of 4,300 tonnes per day.
- Santos underground mine with an ore capacity of 5,200 tonnes per day.
- PAC processing plant with a capacity of 3,800 tonnes per day.

- Ancillary surface service buildings and road accesses.

## Market Studies

The quality of the copper concentrates produced by the Candelaria Copper Mining Complex is excellent. The concentrates are clean and have very low content of critical elements such as lead, arsenic, antimony, bismuth, and mercury. The range of the zinc content in the Candelaria copper concentrates is very wide (0.1 percent to 3.75 percent) and may, from time to time, result in modest penalties from some copper smelters.

Minera Candelaria concentrate is primarily sold through eight long-term contracts under a range of quantity options and destinations. One contract expires at the end of 2019, with the remainder continuing past 2019 on an evergreen basis. All contracts are referenced against annual copper smelter treatment terms. The concentrate is shipped from the Punta Padrones port facility to destinations in Europe, China, Japan and Korea.

Minera Ojos de Salado copper concentrate is currently sold under two long-term contracts: one for domestic delivery in Chile and one for delivery to Japan. The contracts run at least until the end of 2019 and both are referenced against annual copper smelter treatment terms.

## Environmental Studies, Permitting, and Social or Community Impact

The Candelaria Copper Mining Complex is located at approximately 450 metres above sea level in the southern margins of the Atacama Desert, south of the major regional center of Copiapó and a few kilometres from the community of Tierra Amarilla. The Punta Padrones facilities are located adjacent to the coastal community of Caldera, approximately 110 kilometres from the mine and mill. The arid climate and proximity to communities and agricultural areas and fishing zones constitute the major environmental and social constraints on project development and mine operation.

Chile has in place a comprehensive regulatory framework for mining and other industrial activities, dating from the mid-1990s and most recently updated in 2013. Although the Candelaria Copper Mining Complex was permitted and developed prior to the modern framework being in place, it holds numerous environmental approvals stemming from modifications to the original developments. In addition, the complex holds more than 1,000 permits for construction and operation of the mining and milling facilities, and related infrastructure.

The most recent environmental assessment process for Candelaria was initiated in September 2013 with the submittal of an Environmental Impact Study (*Estudio de Impacto Ambiental*, EIA). The “Candelaria 2030” EIA included, among other things, an extension of the operating life of the facilities and the Los Diques tailings storage facility. The Alcaparrosa mine received environmental approval in 1996 with subsequent amendments, most recently an EIA requesting the extension of the mine operation through 2022. The Environmental Management Systems for the Candelaria Copper Mining Complex have been certified under the international ISO 14001 Standard since 1999. During 2017, the Candelaria Copper Mining Complex implemented the updated standard ISO 14001/2015 for Minera Candelaria and Minera Ojos de Salado. An external audit was performed in January 2018 and the certification with the updated standard was granted for 3 years.

The Environmental Superintendent (*Superintendencia de Medio Ambiente*, SMA) is the arm of the Environment Ministry that is responsible for monitoring and enforcing compliance with environmental approval (RCA) conditions and applicable environmental legal requirements. In 2013 and 2014, prior to Lundin’s acquisition of its interest in the mine, the SMA conducted two inspections of the Candelaria mine and port facilities. In May 2015, the SMA issued Extent Resolution No. 1/ROL D-018-2015 detailing 16 charges against the Candelaria Copper Mining Complex for alleged non-compliance with its environmental approvals. Following approximately 18 months of information exchange, the SMA issued Extent Resolution No. 1111/2016 in December 2016, eliminating four of the 16 charges and levied a fine totaling 5,049 annual tax units (UTA), equivalent to approximately US\$4 million. Candelaria appealed the sanctioning resolution to the Environmental Court. In June 2018 Candelaria was notified of the rejection of the appeal in the Environmental Court and in July 2018, Candelaria paid the fine and appealed to the Supreme Court (Corte Suprema). It is

expected that the process may take up to a year or more to be resolved in the Supreme Court. Candelaria does not foresee any impact of this legal process on production

The Candelaria Copper Mining Complex is an active participant in civil society in the Atacama region of Chile, with social initiatives focussed principally on the communities nearest to the mine and port sites, namely Tierra Amarilla, Copiapó and Caldera. The Candelaria Copper Mining Complex operates liaison offices in both communities and has implemented a formal Stakeholder Engagement Plan and a grievance/suggestions mechanism. Community forums, called “Encuentros con Candelaria” and consisting of open meetings, have been conducted to share relevant information about the company’s strategic plan and initiatives on topics related to safety, environmental, operational and social performance.

The Candelaria Copper Mining Complex has in place agreements with the local government of Tierra Amarilla, Caldera and Copiapó. The Tierra Amarilla agreement makes available more than US\$16.5 million focused on socioeconomic development and protection of local culture, environment and heritage. In addition, at Caldera where most residents are either directly or indirectly linked to the fishing industry, Minera Candelaria established the Fishermen Development Fund to offer local fishermen resources to develop individual and collective projects in the four main areas of housing, health, education and economic development and to promote sustainability in the fishing sector including upskilling, retraining, practice.

In 2017, the Candelaria Copper Mining Complex initiated a process to develop a 5-year Strategic Development Plan aimed to position the Candelaria Copper Mining Complex as a catalyst for the development of the Atacama region, together with the generation of public-private partnerships. The key pillars of the process are economic development, education, wellness and social and environmental innovation. Implementation of the plan continues with the development of a local contracting program, and currently 95 percent of the workforce resides in the Atacama Region. Also, a program of local suppliers was put in place in partnership with CORFO (National Corporation for the Promotion of Production).

## Capital and Operating Costs

The average open pit mining cost over the next 5 years (2019 – 2023), excluding the impact of capitalized waste stripping, is estimated to be US\$2.12 per tonne of material moved, with annual fluctuations. Total mining costs include ore and waste stripping. Costs have decreased slightly over the previous forecast due to the renewal of the mine’s mobile equipment fleet and a decrease in labour and supplies costs. Energy (diesel) costs are slightly higher than those previously forecast.

The average underground mining cost over the next 5 years at Candelaria Underground is estimated to be US\$15.30 per tonne, with overall costs falling as development requirements decrease in the last year of operations. Contractor costs account for 60 percent of the total mining costs. The forecast average Ojos del Salado unit underground mining cost over the next 5 years is estimated at approximately US\$19.94 per tonne. The mine lives at Santos and Alcaparrosa have both been extended to 2028 and 2027, respectively.

The forecast average unit processing cost for Minera Candelaria over the next 5 years is estimated to be US\$6.30 per tonne, decreasing from US\$6.88 in 2019 to US\$5.52 in 2023 as newly-negotiated electricity rate takes effect.

The average processing cost for Minera Ojos del Salado over the next four years is estimated to be US\$7.96 per tonne. This is a combination of the costs for treating the Santos ore at the PAC plant and the Alcaparrosa ore at the Candelaria plant.

Minera Candelaria unit general and administrative cost (G&A) over the next 5 years is estimated to be US\$1.85 per tonne. For Minera Ojos del Salado, the average unit G&A cost over the next 5 years is expected to be US\$1.20 per tonne.

For 2018, the forecast combined Candelaria Copper Mining Complex C1 cash operating cost is estimated to be US\$1.70 per pound (net of by-product credits). From 2019 to 2023, the forecast C1 cash costs are estimated at between US\$1.29 and US\$1.53 per pound of copper net of by-product credits and the effect of the Franco-Nevada gold and silver streaming agreement. LOM C1 cash costs are forecast to average approximately

US\$1.41 per pound of copper net of by-product credits and the Franco-Nevada gold and silver streaming agreement. Fluctuations in the cash cost are largely driven by the changes in the copper head grade in the open pit, and hence copper metal production, over the LOM.

At Minera Candelaria, total capital expenditures over the period 2019 to 2023, excluding capitalized waste stripping, are forecast at US\$571.5 million and at Minera Ojos del Salado the forecast for the next 5 years is US\$96.0, totaling a combined cost of US\$667.4. In the Candelaria Open Pit mine, a major recapitalization of the open pit mine equipment fleet has been approved and will be on-going for the next few years. This includes new trucks, shovels and ancillary equipment at a forecast total cost of US\$216 million, of which US\$110.4 million expected to be spent in 2018 and the remainder over the next three years. Capital costs for the Candelaria Underground mine have increased over previous forecasts and represent the development and supporting mine infrastructure for the expanded production in the North Sector of the Candelaria Underground and the development of the South Sector of the mine. The forecast capital expenditure for Candelaria Underground South Sector over the next 5 years is US\$76 million, of which US\$ 32 million is expected to be spent in 2019. Candelaria mill capital costs are forecast at US\$76 million over the next 5 years including a number of significant process improvement initiatives under the CMOP project that will increase mill throughput by 4,000 tonnes per day and copper metal recovery by a forecast 1.7 percent. Tailings capital costs the early commencement of additional phases of the new Los Diques tailings storage facility reducing both operating and capital costs over the long term. G&A costs include a number of environmental and local community initiatives.

During the production phase of the Candelaria Open Pit mine, waste stripping costs which provide probable future economic benefits and improved access to the orebody are capitalized to mineral properties. Lundin capitalizes waste stripping costs when experienced strip ratios are above the average planned strip ratio for each open pit phase under development. Capitalized waste stripping from the Candelaria open pit and the Española open pit project is forecast to be US\$647.8 million for the period 2019 to 2023 and represents the changed phasing of the Candelaria open pit and the development of the Española project and the increased stripping ratio over the short term. This short-term increase results in an improved copper production profile over the LOM and overall improvement in Candelaria's economics.

## **Economic Analysis**

Lundin has opted to exclude reporting this section as producing issuers may exclude the information required under Economic Analysis (Item 22 of Form 43-101F1) for technical reports on properties currently in production unless the technical report includes a material expansion of current production.

## **Conclusions and Recommendations**

The Candelaria Copper Mining Complex is a world class long life copper mining operation with potential to further extend the operating life. In 2018, the operations are forecasted to collectively produce contained metals in concentrates (100 percent basis) containing 135 kilotonnes of copper, 78,000 ounces of gold, and 1.2 million ounces of silver. Based on the June 30, 2018 Mineral Reserves, the projects are expected to support operations until 2040.

Ongoing Mineral Resource expansion exploration, however, has the potential to extend the mine life beyond 2040 and further change the projected copper production profile by replacing low grade open pit and stockpile mill feed with higher grade ore extracted from the expanding underground mines and deferring depletion of the low-grade stockpiles. There are also opportunities to increase the throughput capacity of the Candelaria plant through improvement initiatives currently under implementation and modifications to the grinding circuits. Various ongoing onsite optimisation initiatives with certain disciplines (including MIRA, CMOP, Candelaria South development, mining equipment upgrades and various infrastructure upgrades) are progressing well, with each having the potential to have a positive and material impact on operational efficiencies and to the LOM.

The technical information about the Candelaria Copper Mining Complex is extensive and attests to the high overall quality of the exploration, mine planning, design work and operational reporting completed by site personnel, as is expected from a world class asset. SRK examined the exploration, geology and Mineral

Resource modelling, mine designs, Mineral Reserve estimates, processing, and environmental aspects of the Candelaria Copper Mining Complex. On the basis of the results from the audit, SRK concludes that the Mineral Resource and Mineral Reserve Statements for the Candelaria Copper Mining Complex as of June 30, 2018 are appropriately categorized and free of material errors. Financial information examined by SRK confirms that the Mineral Reserves are economic under the assumptions considered.

The operational permits for the Alcaparrosa mine have been secured to sustain mine operations through 2022 and deposition of tailings in the Candelaria tailings storage facility through 2030. Driven by exploration success, a new EIA will be prepared to modify and obtain the operational permits required to support the production schedule presented in this technical report. The new EIA is expected to be submitted by the end of 2019.

Since 2010, aggressive exploration has defined several new sulphide mineralization zones amenable to underground and surface mining. These significant discoveries together with ongoing mine optimization studies have a positive impact on the life and value of the Candelaria Copper Mining Complex by primarily replacing low-grade open pit and stockpile plant feed with higher-grade underground ore, thereby deferring processing low grade work-in-progress stockpiles to a later date.

SRK strongly recommends that Lundin continues its effective exploration strategy that has been very successful in increasing the Mineral Resources and the Mineral Reserves of the Candelaria Copper Mining Complex.

Together with recent surface brownfield discoveries, underground exploration continues to expand known sulphide bodies and yield new discoveries highlighting the exceptional exploration potential of the Candelaria Copper Mining Complex.

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# 1 Introduction and Terms of Reference

The Candelaria Copper Mining Complex comprises two adjacent copper operations producing copper concentrates from open pit and underground mines located near Copiapó in the Atacama Region, Region III of Chile: Compañía Contractual Minera Candelaria (Minera Candelaria) and Compañía Contractual Minera Ojos del Salado (Minera Ojos del Salado). Minera Candelaria is an open pit and underground mine providing copper ore to an on-site concentrator with a capacity of 75,000 tonnes per day. Minera Ojos del Salado comprises two underground mines, Santos and Alcaparrosa. The Santos mine provides copper ore to an on-site concentrator with a capacity of 3,800 tonnes per day and 1,400 tonnes per day to the Minera Candelaria mill, while all ore from the Alcaparrosa mine is treated at the Minera Candelaria mill. In 2018, the operations are forecasted to collectively produce contained metals in concentrates (100 percent basis) containing 135 kilotonnes of copper, 78,000 ounces of gold, and 1.2 million ounces of silver. The Candelaria Copper Mining Complex is indirectly owned by Lundin (80 percent) and Sumitomo Metals Mining Co., Ltd. and Sumitomo Corporation (collectively, Sumitomo; 20 percent).

Lundin is a diversified base metals mining company with operations and projects in Chile, the USA, Portugal, Sweden, and Spain and it produces copper, nickel, zinc, and lead. Lundin is a Canadian public company with offices in Toronto, Canada and its common shares are listed on the Toronto Stock Exchange (symbol LUN) and the NASDAQ Stockholm (symbol LUMI).

On September 6, 2018, Lundin announced updated Mineral Resource and Mineral Reserve Statements for the Candelaria Copper Mining Complex (as of June 30, 2018). Relative to the previous year, the Mineral Resources and the Mineral Reserves have increased significantly. These increases are due to various factors, including the addition of new discoveries, Mineral Resource modelling optimizations, operational efficiencies and the reduction of reporting cut-off grades. Open pit Mineral Reserves are declared for the new Española deposit, a recent exploration discovery located south of the Candelaria pit and the Mineral Reserves at the underground mines have continued to be expanded; allowing to extend the Life of Mine of the Complex by 5 years to 2040. During the first quarter 2018, the Los Diques tailing storage facility, a key component of the Candelaria 2030 project, was commissioned, and can now receive all tailings produced by the Candelaria Plant. Also, the operational permits for Ojos del Salado were extended to 2022. The new production schedule proposed in this technical report will serve as the basis for preparing a new Environmental Impact Assessment to modify and obtain the operational permits necessary to its implementation.

In September 2018, Lundin retained the services of SRK Consulting (Canada) Inc. (SRK) to visit the Candelaria Copper Mining Complex and to compile a new technical report pursuant to National Instrument 43-101 Standards of Disclosure for Mineral Projects and Form 43-101F1. This report updates the November 30, 2017 Technical Report entitled “Technical Report for the Candelaria Copper Mining Complex, Atacama Region, Region III, Chile”. It summarizes the technical information that is relevant to support the disclosure of new Mineral Resources and Mineral Reserves estimates (as of June 30, 2018) prepared using revised economic parameters and the positive results of recent exploration programs. The revised Mineral Resources and Mineral Reserves Statements presented herein were disclosed by Lundin on September 6, 2018. The report also summarizes changes to the open pit phase design and new underground production schedules, based in these updated Mineral Reserves. Various operational improvement initiatives are described in this document. Material from a newly discovered Española deposit, which is amenable to open pit extraction, has been incorporated into the reported Mineral Resources and Mineral Reserves.

This technical report is based on an inspection of the properties by a team of qualified persons conducted on October 30 and 31, 2018, a review of technical information made available by Lundin, and discussions with Lundin technical personnel. The qualified persons have reviewed such technical information and determined it to be adequate to support Mineral Resource and Mineral Reserve Statements pursuant to National Instrument 43-101.

## 1.1 Terms of Reference

The scope of work was defined in an engagement letter executed between Lundin and SRK on October 1, 2018. The scope involves mobilizing a team of qualified persons to visit the subject mineral assets to review the technical information relevant to supporting Mineral Resources and Mineral Reserves estimates prepared by Minera Candelaria and Minera Ojos del Salado personnel. The objective of this review is to provide an independent opinion about the Mineral Resources and Mineral Reserves of the Candelaria Copper Mining Complex as of **June 30, 2018**, and to compile a technical report pursuant to National Instrument 43-101 to support the disclosure of Mineral Resource and Mineral Reserve Statements for the complex. The responsibilities for each report section are listed in Table 1.

**Table 1: Responsibility for Technical Report Sections**

Section	Title	Responsible
-	Executive Summary	SRK / NMS
1	Introduction	SRK
2	Reliance on Other Experts	SRK
3	Property Description and Location	SRK / CCMC
4	Accessibility, Climate, Local Resources, Infrastructure and Physiography	SRK / CCMC
5	History	SRK
6	Geological Setting and Mineralization	SRK / CCMC
7	Deposit Types	SRK
8	Exploration	CCMC / SRK
9	Drilling	CCMC / SRK
10	Sample Preparation, Analysis, and Security	CCMC / SRK
11	Data Verification	SRK
12	Mineral Processing and Metallurgical Testing	LMC / SRK
13	Mineral Resource Estimates	SRK / CCMC
14	Mineral Reserve Estimates	SRK / NMS / CCMC
15	Mining Methods	SRK / NMS / CCMC
16	Recovery Methods	LMC / SRK
17	Project Infrastructure	SRK / NMS
18	Market Studies and Contracts	LMC / SRK
19	Environmental Studies, Permitting, and Social or Community Impact	SRK / LMC / CCMC
20	Capital Cost and Operating Costs	CCMC / SRK / NMS
21	Economic Analysis	CCMC / SRK
22	Adjacent Properties	SRK
23	Other Relevant Data and Information	SRK
24	Interpretation and Conclusions	SRK / NMS
25	Recommendations	SRK / NMS
26	References	SRK / NMS

\* CCMC = Candelaria Copper Mining Complex; NMS = John Nilsson; LMC = Lundin Mining Corporation

## 1.2 Qualification of SRK

The SRK Group comprises more than 1,300 professionals, offering expertise in a wide range of resource engineering disciplines. The independence of the SRK Group is ensured by the fact that it holds no equity in any project it investigates and that its ownership rests solely with its staff. These facts permit SRK to provide its clients with conflict-free and objective recommendations. SRK has a proven track record in undertaking independent assessments of Mineral Resources and Mineral Reserves, project evaluations and audits, technical reports and independent feasibility evaluations to bankable standards on behalf of exploration and mining companies, and financial institutions worldwide. Through its work with a large number of major international mining companies, the SRK Group has established a reputation for providing valuable consultancy services to the global mining industry.

The technical report was compiled by a group of independent qualified persons from SRK with the assistance of John Nilsson, PEng of Nilsson Mine Services Ltd. (NMS). In accordance with National Instrument 43-101 guidelines, two of the qualified persons visited the Candelaria Copper Mining Complex (CCMC) during October 2018 as shown in Table 2.

The review of the geology and Mineral Resources aspects was completed by Glen Cole, PGeo and Dr. David Machuca, PEng, whereas the review of the underground mining aspect was completed by Benny Zhang, PEng and Sean Kautzman, PEng all full-time employees of SRK.

The review of the open pit mining aspect was completed by John Nilsson, PEng, an independent consultant.

The review of the mineral processing and metallurgical testing and recovery methods aspects was completed by Dr. Adrian Dance, PEng, a full-time employee of SRK.

**Table 2: Qualified Persons**

Company	Qualified Person	Site Visit	Responsibility
SRK	Glen Cole, PGeo (APGO #1416)	June 16-18, 2014 December 14-16, 2016 November 8-9, 2017 October 30-31, 2018	Overall responsibility on behalf of SRK. Project Management (Executive Summary, Sections 1 to 11, 18, 21, 22, 23, 26, and parts of 24 and 25)
SRK	Adrian Dance, PEng (APEGBC#37151)	No Visit	Review of Processing and Recovery Methods (Sections 12, 16, and parts of 20)
SRK	Benny Zhang, PEng (PEO #100115459)	December 14-16, 2016 November 8-9, 2017	Underground Mining and Mineral Reserves (Parts of Sections 14, 15, 20, 24, and 25)
Independent	John Nilsson, PEng (APEGBC#20697)	June 10-12, 2014 June 16-18, 2014 July 6-10, 2015 December 14-16, 2016 October 9-13, 2017 October 30-31, 2018	Open Pit Mining and Mineral Reserves (Parts of Sections 14, 15, 17, 20, 24, 25, and 26)
SRK	Cameron C. Scott, PEng (APEGBC#11523)	No Visit	Environmental and Social and Permitting (Section 19)

The review of the environmental, social, and permitting aspects was completed by Maria Ines Vidal, MAusIMM an employee of SRK Consulting (Chile) S.A., under the supervision of Cameron C. Scott, PEng, a full-time employee of SRK.

Dr. Jean-François Couture, PGeo. (APGO#0197), an Associate Corporate Consultant with SRK, reviewed drafts of this technical report prior to their delivery to Lundin as per SRK internal quality management procedures. Dr. Couture has visited the project in 2015.

### 1.3 Basis of Technical Report

This technical report is based on information made available to SRK by Lundin, Minera Candelaria, and Minera Ojos del Salado in an electronic data room, and on information collected during the site visits. The authors have no reason to doubt the reliability of the information provided by Lundin. Other information was obtained from the public domain.

This report is based on the following sources of information:

- Information provided by Lundin, Minera Candelaria, and Minera Ojos del Salado.
- Site visit conducted by Sean Kautzman, Maria Ines Vidal and Glen Cole from SRK and by independent consultant John Nilsson during October 30 to 31, 2018.
- Discussions with Lundin, Minera Candelaria, and Minera Ojos del Salado personnel.
- Additional information from public domain sources.

The qualified persons have reviewed such technical information and have no reasons to doubt the reliability of the information provided by Lundin, Minera Candelaria, and Minera Ojos del Salado.

### 1.4 Declaration

SRK's opinion contained herein and effective **June 30, 2018** is based on information collected by SRK throughout the course of SRK's investigations. The information in turn reflects various technical and economic conditions at the time of writing the report. Given the nature of the mining business, these conditions can change significantly over relatively short periods of time. Consequently, actual results may be significantly more or less favourable.

This report may include technical information that requires subsequent calculations to derive subtotals, totals, and weighted averages. Such calculations inherently involve a degree of rounding and consequently introduce a margin of error. Where these occur, SRK does not consider them to be material.

SRK is not an insider, associate or an affiliate of Lundin, Minera Candelaria, or Minera Ojos del Salado. The results of the technical review by SRK are not dependent on any prior agreements concerning the conclusions to be reached, nor are there any undisclosed understandings concerning any future business dealings.

## 2 Reliance on Other Experts

SRK has not performed an independent verification of the land titles and tenures as summarized in Section 3 of this report. SRK did not verify the legality of any underlying agreements that may exist concerning the permits or other agreements between third parties. SRK has relied on information provided by Lundin, regarding the ownership status of the Candelaria Copper Mining Complex including the Minera Candelaria and Minera Ojos del Salado properties. The reliance applies solely to the legal status of the rights disclosed in Section 3.

### 3 Property Description and Location

The Candelaria Mining Complex is located in Chile’s Atacama Region, Region III, approximately 20 kilometres south of the city of Copiapó and adjacent to the community of Tierra Amarilla, all of which are approximately 650 kilometres north of Santiago. The properties are connected to the well-maintained Chilean road system (Figure 1). The properties are located at approximately 27 degrees 30 minutes latitude south and 70 degrees, 15 minutes longitude west.

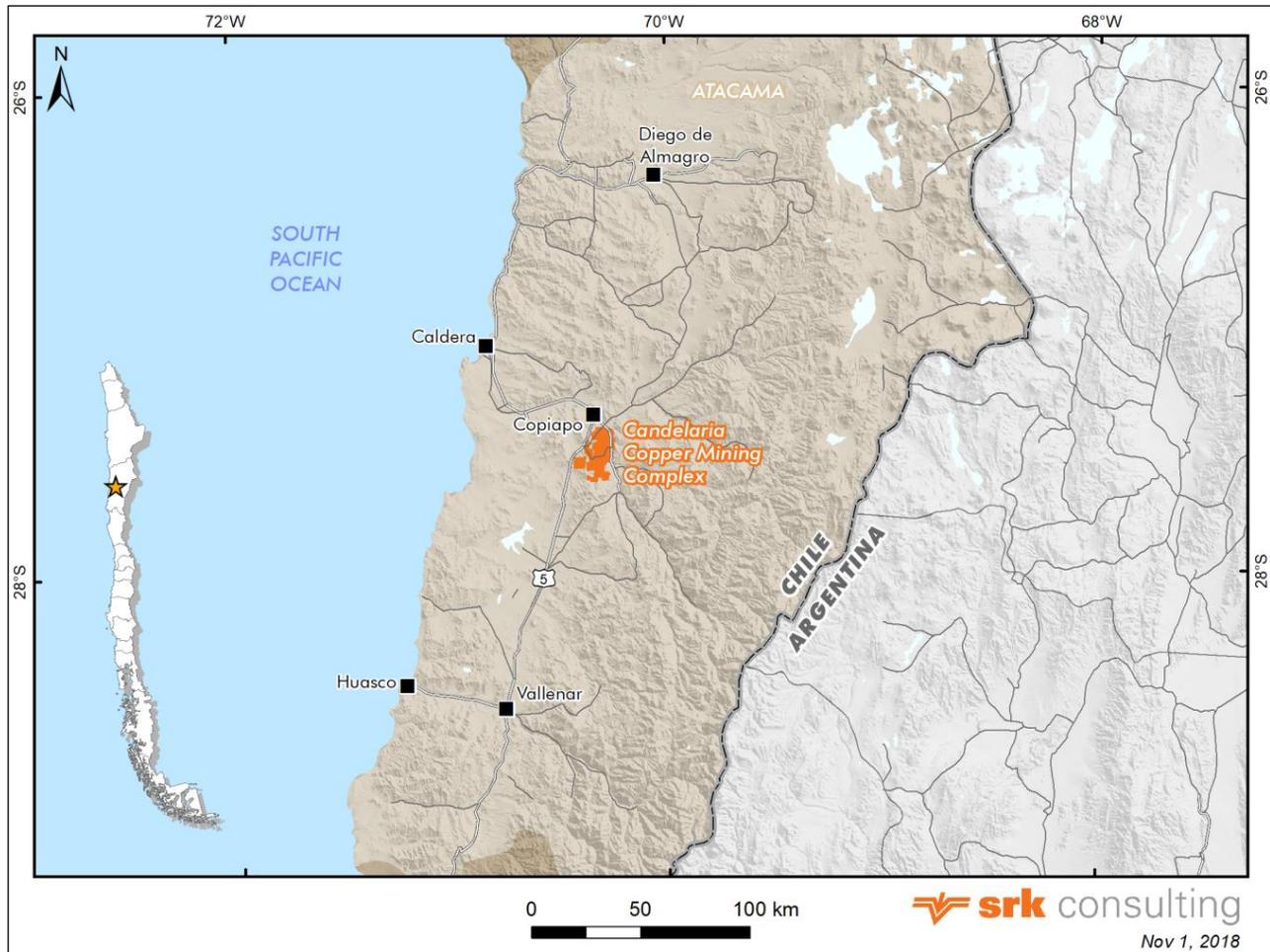


Figure 1: Location of the Mines of the Candelaria Copper Mining Complex

## 3.1 Mineral Tenure

### 3.1.1 Minera Candelaria

The Minera Candelaria property comprises 253 mining exploitation concessions (approximately 5,891 hectares) and 67 mining exploration concessions (approximately 6,680 hectares) (Figure 2 and Appendix A). The list contains concessions that have been granted or are in the process of being granted by the competent Court. The tenements are free of mortgages, encumbrances, prohibitions, injunctions, and litigation. The tenements are not affected by royalties except for those listed in Table 3. No mining is currently taking place on these tenements nor are they contemplated in the current life of mine plan.

Other than disclosed herein, there are no other known factors or risks that may affect access, title, or the right or ability to perform work on the property.

**Table 3: Royalty Characteristics for Candelaria Tenements**

Tenement Name	Tenement Type	Royalty Description
Santa Gemita II Uno al Veinte	Mining Exploitation Concession	US\$0.01 per pound of fine copper produced from minerals extracted from these mining concessions. Royalty payment obligation starts once Minera Candelaria has extracted from these concessions ore equivalent to an amount greater than 300 pounds of fine copper.
Santa Gemita III Uno al Veinte	Mining Exploitation Concession	
Santa Gemita IV Una al Cinco	Mining Exploitation Concession	
Santa Gemita V Una al Diez	Mining Exploitation Concession	
Brisa 41 a Brisa 45	Mining Exploitation Concession	
Farellon	Mining Exploitation Concession	US\$5M if mining concessions being mined or the Plant were to achieve a Mining Operational Margin equal to or superior than 30% on any of the years between 2017 and 2021, included.

### 3.1.2 Minera Ojos del Salado

The Minera Ojos del Salado property comprises 205 mining exploitation concessions (approximately 9,287 hectares) and 57 mining exploration concessions (approximately 10,748 hectares) (Figure 2). The concessions either have been granted or are in the process of being granted.

A complete list of tenements is provided in Appendix A. The list contains concessions that have been granted or are in the process of being granted by the competent Court. The tenements are free of mortgages, encumbrances, prohibitions, injunctions, and litigation.

There are no other known factors or risks that may affect access, title, or the right or ability to perform work on the property.

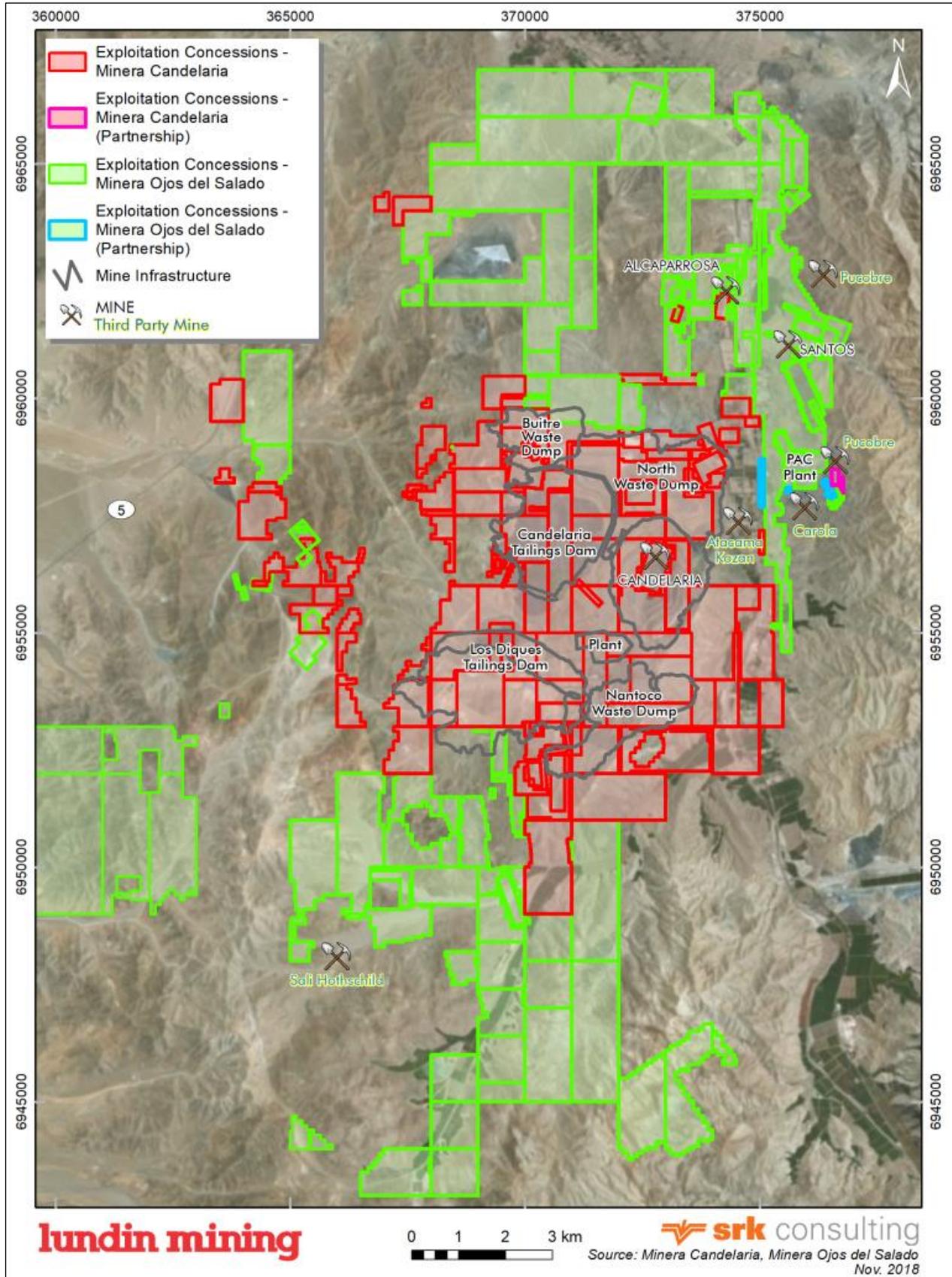


Figure 2: Candelaria and Ojos del Salado Land Tenure Map

## 3.2 Water Use Rights

Minera Candelaria is the owner of underground water use rights of consumptive and permanent use for approximately 1,196 litres per second. The underground water use rights are legally registered in the name of Minera Candelaria, free of mortgages, encumbrances, prohibitions, injunctions, and litigation.

Minera Candelaria is the property owner of superficial water use rights that are equivalent to approximately 62 litres per second. The superficial water use rights are legally registered in the name of Minera Candelaria, free of mortgages, encumbrances, prohibitions, injunctions and litigation.

Minera Ojos del Salado is the property owner of underground water use rights of consumptive and permanent use for a total of 50 litres per second. The underground water use rights are legally registered in the name of Minera Ojos del Salado, free of mortgages, encumbrances, prohibitions, injunctions, and litigation.

Minera Ojos del Salado is the property owner of superficial water use rights in the Las Rojas Channel that are equivalent to approximately 21 litres per second. The superficial water use rights are legally registered in the name of Minera Ojos del Salado, free of mortgages, encumbrances, prohibitions, injunctions, and litigation.

With the commissioning of a desalination plant located at the Punta Padrone port site in early 2013, the Candelaria Copper Mining Complex ceased extracting process water from underground water sources in November 2013. The underground water rights remain active and are used for potable and emergency purposes.

## 3.3 Mineral Rights in Chile

There are two types of mining concessions in Chile: exploration concessions and exploitation concessions.

In accordance with the Chilean Mining Code, the owner of a mining concession can explore, exploit and benefit from all minerals within the boundaries of the relevant concessions, except for hydrocarbon and lithium, without additional administrative concessions or operation agreements.

Every titleholder of a mining concession, whether exploitation or exploration, has the right to establish an occupation easement over the surface properties required for the comfortable exploration or exploitation of its concession. In the event that the surface property owner does not voluntarily agree to the granting of the easement, the titleholder of the mining concession may request such easement before the Courts of Justice, which shall grant the same upon determination of due compensation for losses.

All mining exploration and exploitation concession applications are submitted to the Chilean court and granted through a court procedure. Once the court procedure is completed, the court issues a final ruling decision. If the decision is supportive of the application, the ruling decision acts as the legal title of the concession, which is then registered in the national mining registrar. The application to court decision process typically takes 6 to 8 months for an exploration concession and 12 to 15 months for an exploitation concession.

The main characteristics of exploration and exploitation concessions are described in the following subsections.

### **3.3.1 Exploration Concessions**

The titleholder of an exploration concession has the right to carry out all types of mining exploration activities within the area of the concession. Exploration concessions can overlap or be granted over the same area of land, however, the rights granted by an exploration concession can only be exercised by the titleholder with the earliest dated exploration concession over a particular area.

For each exploration concession, the titleholder must pay an annual fee of approximately US\$1.60 per hectare to the Chilean Treasury. Exploration concessions have a duration of two years. At the end of this period, they may: (i) be renewed as an exploration concession for two additional years in which case at least 50 percent of the surface area must be renounced, or (ii) be converted, totally or partially, into exploitation concessions.

A titleholder with the earliest dated exploration concession has a preferential right to an exploitation concession in the area covered by the exploration concession, over any third parties with a later dated exploration concession for that area or without an exploration concession at all and must oppose any applications made by third parties for exploitation concessions within the area for the exploration concession to remain valid.

### **3.3.2 Exploitation Concessions**

The titleholder of an exploitation concession is granted the right to explore and exploit the minerals located within the area of the concession and to take ownership of the minerals that are extracted. Exploitation concessions can overlap or be granted over the same area of land, however, the rights granted by an exploitation concession can only be exercised by the titleholder with the earliest dated exploitation concession over a particular area.

Exploitation concessions are of indefinite duration and an annual fee is payable to the Chilean Treasury of approximately US\$8 per hectare.

Where a titleholder of an exploration concession has applied to convert the exploration concession into an exploitation concession, the application for the exploitation concession and the exploitation concession itself are back-dated to the date of the exploration concession.

A titleholder to an exploitation concession must apply to annul or cancel any exploitation concessions that overlap with the area covered by its exploitation concession within a certain time period in order for the exploitation concession to remain valid.

## 4 Accessibility, Climate, Local Resources, Infrastructure, and Physiography

The properties are located in the Atacama Region, Region III of northern Chile, at an elevation of approximately 650 metres above sea level and approximately 20 kilometres south of the city of Copiapó and 5 kilometres west of the town of Tierra Amarilla.

### 4.1 Accessibility

The properties are accessible by two maintained dirt roads, one coming through the Tierra Amarilla community and the other branching off of Route 5, the Pan-American Highway, a well-maintained multi-lane highway. Copiapó regional airport is serviced by regional flights from Santiago and other destinations on a daily basis. The regional airport is located approximately midway between Copiapó in the south and Caldera in the north. Copiapó itself is strategically located on the Pan-American Highway.

### 4.2 Local Resources and Infrastructure

Copiapó is a modern city with all regular services and a population of approximately 160,000. Numerous mining-related businesses are located in the city. Personnel employed by the Candelaria Copper Mining Complex come from the Copiapó region. The Candelaria and Ojos del Salado mines receive electrical power through long-term contracts with AES Gener S.A., a local energy company. The main line to the Candelaria mine is rated at 220 kilovolts at 745 amperes. Ojos del Salado is serviced by a 23-kilovolt line with 235 amperes. The current contract with AES Gener S.A. expires in 2022.

The mines' water supply comes from a desalination plant (Figure 3B) owned by Minera Candelaria via a pipeline that were both completed in 2013, as well as from a nearby wastewater treatment facility. The commissioning of the desalination plant has enabled the mines to cease drawing ground water from the Copiapó aquifer, the historic source of water, except in emergency situations and for potable water supply. Concentrate is being shipped from the company-owned Punta Padrones port facility at the port of Caldera (Figure 3B). The facility has a storage capacity of 45,000 wet metric tonnes and can handle ships with a capacity of up to 58,000 tonnes and a draft of 12.4 metres. The port has a total annual capacity of some 3.5 million wet metric tonnes, well in excess of current and planned production. The new tailings storage facility, Los Diques, to the southwest of the open pit and plant sites has been designed to replace the Candelaria tailings storage facility. The Los Diques facility has an approximate designed capacity of 600 million tonnes, to a final crest elevation of 873 metres above sea level, which is more than that is required by the current projected mine life. Key mine infrastructure is shown in Figure 4.

### 4.3 Climate

Copiapó has a desert climate with mild temperatures year-round. Winters are mild with warm temperatures; mid-winter maximums in July reach approximately 20 degrees Celsius. Winter night-time temperatures average approximately 7 degrees Celsius. Summers are warm with a January average of 22 degrees Celsius. Annual precipitation is approximately 17 millimetres, of which the majority falls in the winter months. Exploration and mining can occur year-round.

## 4.4 Physiography

The project area is mountainous with a relief varying between 200 and 1,000 metres above sea level (Figure 3A-D). Vegetation is minimal outside of inhabited valleys where irrigation is used to support vegetation that is capable of withstanding the desert environment. The mines are located in an active seismic zone.



**Figure 3: Infrastructure and Landscape in the Project Area**

- A: Mining activities within the Candelaria Open Pit
- B: Punta Padrones desalination plant
- C: Minera Candelaria process plant
- D: Española project, looking south across the Los Diques tailings storage facility

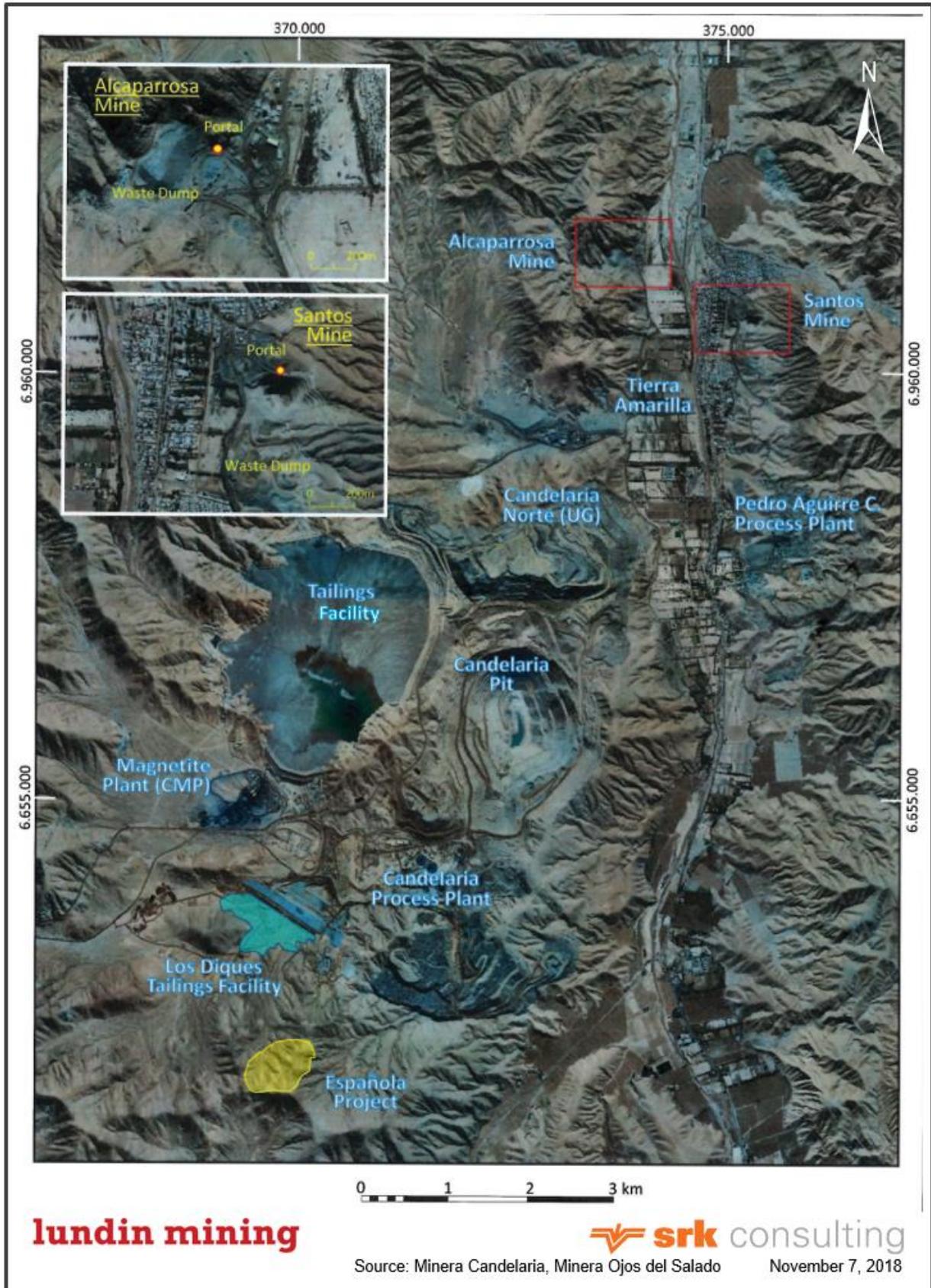


Figure 4: Candelaria Copper Mining Complex and Related Local Infrastructure

## 5 History

Information about the exploration history of the Minera Candelaria and Minera Ojos del Salado mines is scarce. Information presented in this section was extracted from public databases.

The Candelaria deposit was discovered by the Phelps Dodge Corporation (Phelps Dodge) in 1987. A feasibility study was completed in 1990, and construction started in October 1992. Production commenced in early 1995. In 1996, Phelps Dodge announced plans to expand the concentrator throughput with the installation of a second semi-autogenous grinding (SAG) mill. The expansion also included additional mining facilities and new and expanded concentrator facilities. This upgrade was completed in 1997. Sumitomo Corporation acquired a 20 percent stake in the property in 1992.

Mine site and district exploration programs have been active since the discovery of the Candelaria deposit. This work resulted in the discovery of the Alcaparrosa and Candelaria Underground (North Sector) deposits, both of which are now producing mines.

In 2007, property ownership changed when Freeport-McMoRan Inc. (Freeport) acquired Phelps Dodge. Operations at the Candelaria Copper Mining Complex continued uninterrupted.

During 2011, a pipeline was completed to bring water purchased from a nearby wastewater treatment facility to the Candelaria mine.

A desalination plant at the port of Caldera was commissioned in 2013 at a capacity of 500 litres per second.

The Santos mine has been in production since 1929. At that time, the operation was known as Planta Punta de Cobre and was owned by Caja de Crédito Minero (CACREMI). The plant started with an initial throughput capacity of 250 tonnes per day. It was later renamed the Pedro Aguirre Cerda (PAC) plant. In 1978, the PAC plant was acquired by private individuals from Empresa Nacional de Minería, legal successor to CACREMI. The Santos mine and Resguardo claims were also acquired, which together formed Minera Ojos del Salado. The processing capacity was increased to 650 tonnes per day. Phelps Dodge acquired 10 percent of Ojos del Salado in 1983 and became sole owner of the property in 1985. The PAC plant was expanded for a second time in 1988, increasing capacity to 1,700 tonnes per day. Subsequent upgrades have increased the plant capacity to the current 3,800 tonnes per day. Sumitomo acquired its 20 percent interest in Minera Ojos del Salado in 2005.

In 1995, construction of a second underground operation at the Alcaparrosa mine commenced, with production starting in early 1996.

In November 2014, Lundin acquired Freeport's 80 percent interest in the Candelaria Copper Mining Complex.

The Candelaria Copper Mining Complex has been a significant producer of copper since the mid-1990s. Table 4 shows the contained copper and gold metal in concentrates produced since 2014.

A summary of the development history of the Candelaria Copper Mining Complex is presented in Table 5.

**Table 4: Contained Payable Metal in Concentrate (100% Basis)**

Metal	Unit	2012	2013	2014	2015	2016	2017	2018 H1
Copper	kt Cu	147	191	157	175	161	177	64
Gold	koz Au	83	101	87	95	90	99	35

Source: Freeport (2012-2013) and Lundin (2014-2018 H1)

**Table 5: Summary Development History of the Candelaria Copper Mining Complex**

Date	Event or Milestone
1927	Minera Ojos del Salado is built under the name Planta Punta de Cobre, and owned by Caja de Crédito Minero (CACREMI). Production started in 1929 with an initial throughput capacity of 250 tonnes per day. It was later renamed the PAC plant.
1978	PAC plant was acquired by private individuals from Empresa Nacional de Minería, legal continuer of CACREMI. The Santos mine and Resguardo claims were also acquired, which together formed Minera Ojos del Salado. The creation of the new mining company generated an expansion, increasing its processing capacity to 650 tonnes per day.
1983	North American company Phelps Dodge acquired 10 percent of the shares of Minera Ojos del Salado.
1985	Phelps Dodge acquired total control of Minera Ojos del Salado.
1987	Phelps Dodge discovered the Candelaria deposit.
1988	Phelps Dodge tunneled 396 metres into the Candelaria sulphide deposit.
1988	The PAC plant was expanded for the second time to 1,700 tonnes per day.
1989	Candelaria feasibility study started. By August, Phelps Dodge had spent US\$8 million on the project.
1990	Candelaria feasibility work was completed.
1991	The Chilean government approved a request by Minera Candelaria to invest US\$1.5 billion in the project over a 12-year period.
1992	Sumitomo acquired a 20 percent interest in Minera Candelaria for US\$40 million, plus Sumitomo's share of the total equity capital required to finance construction and development.
1993	Minera Candelaria began stripping Phase 1 of the open pit at 35 kilotonnes per day.
1994	The Candelaria processing plant start-up, three months ahead of schedule.
1995	Minera Candelaria first shipment loaded at port facility.
1997	The Export-Import Bank (Exim) of Japan agreed to provide a US\$150 million loan to assist in financing the expansion at Minera Candelaria. Phelps Dodge completed the expansion project eight months ahead of schedule and at a cost of US\$320 million, 10 percent below budget. The expansion included additional mining facilities, the construction of a second SAG mill, and new and expanded concentrator facilities to 70 kilotonnes per day.
1997	Minera Candelaria mill expansion completed to 70 kilotonnes per day.
1998	The PAC processing plant operations were stopped due to a low copper price.
2004	The PAC processing plant operations were resumed due to the improved copper price outlook.
2005	Sumitomo acquired 20 percent interest in Minera Ojos del Salado. The Candelaria Underground (North Sector) started production.
2007	Freeport acquired Phelps Dodge gaining ownership of both Minera Candelaria and Minera Ojos del Salado.
2011	Construction of the desalination plant commenced at Punta Padrones.
2013	Completion and full operation of desalination plant.
2014	October 6, Lundin announced an agreement to acquire Freeport's 80 percent interest in Minera Candelaria and Minera Ojos del Salado. The transaction closed on November 3, 2014.
2015	The Candelaria 2030 project (including the new Los Diques tailings storage facility) receives environmental approval following two years of review by Chilean regulators.
2016	Construction initiated on the Los Diques tailings storage facility after receipt of major construction permits.
2017	Permits granted to allow the Candelaria Underground operations to expand production from 6,000 to 14,000 tonnes per day.
2018	Commissioning of the Los Diques tailings storage facility. First declaration of Mineral Resources and Mineral Reserves for the new open pit Española project.

## 6 Geological Setting and Mineralization

### 6.1 Regional Geology

The Candelaria deposit is located in the Atacama Region, Region III in northern Chile, at the boundary between the Coastal Cordillera and the Copiapó Precordillera. The Coastal Cordillera of Chañaral and Copiapó is composed of Permian to Lower Cretaceous intrusions within a basement of metasedimentary rocks of Devonian to Carboniferous age (Dallmeyer et al., 1996). Volcanic, volcanoclastic, and marine carbonate rocks represent intra- and back-arc sequences that were deposited during Early to Mid-Cretaceous (Arévalo et al., 2006).

In the Copiapó Precordillera the oldest exposed rocks are Early Carboniferous in age and correlate with metasedimentary basement rocks in the Coastal Cordillera. They are overlain by Permian to Jurassic sedimentary and volcanic rocks. Permian granitic plutonic complexes in the Precordillera are associated with extensive crustal melting and rifting. Volcanic and sedimentary rocks of the Punta del Cobre Formation, the Bandurrias Formation, and marine carbonate rocks of the Chañarcillo Group are prominently exposed as a belt of calcareous, volcanic, and volcanoclastic rocks in the western Precordillera. They are overlain by the Cerrillos Formation of epiclastic to volcanoclastic rocks. At the base, the Cerrillos Formation contains fluvial sandstone and conglomerate, as well as freshwater limestone. Volcanic breccias and lava flows are more dominant higher in the sequence.

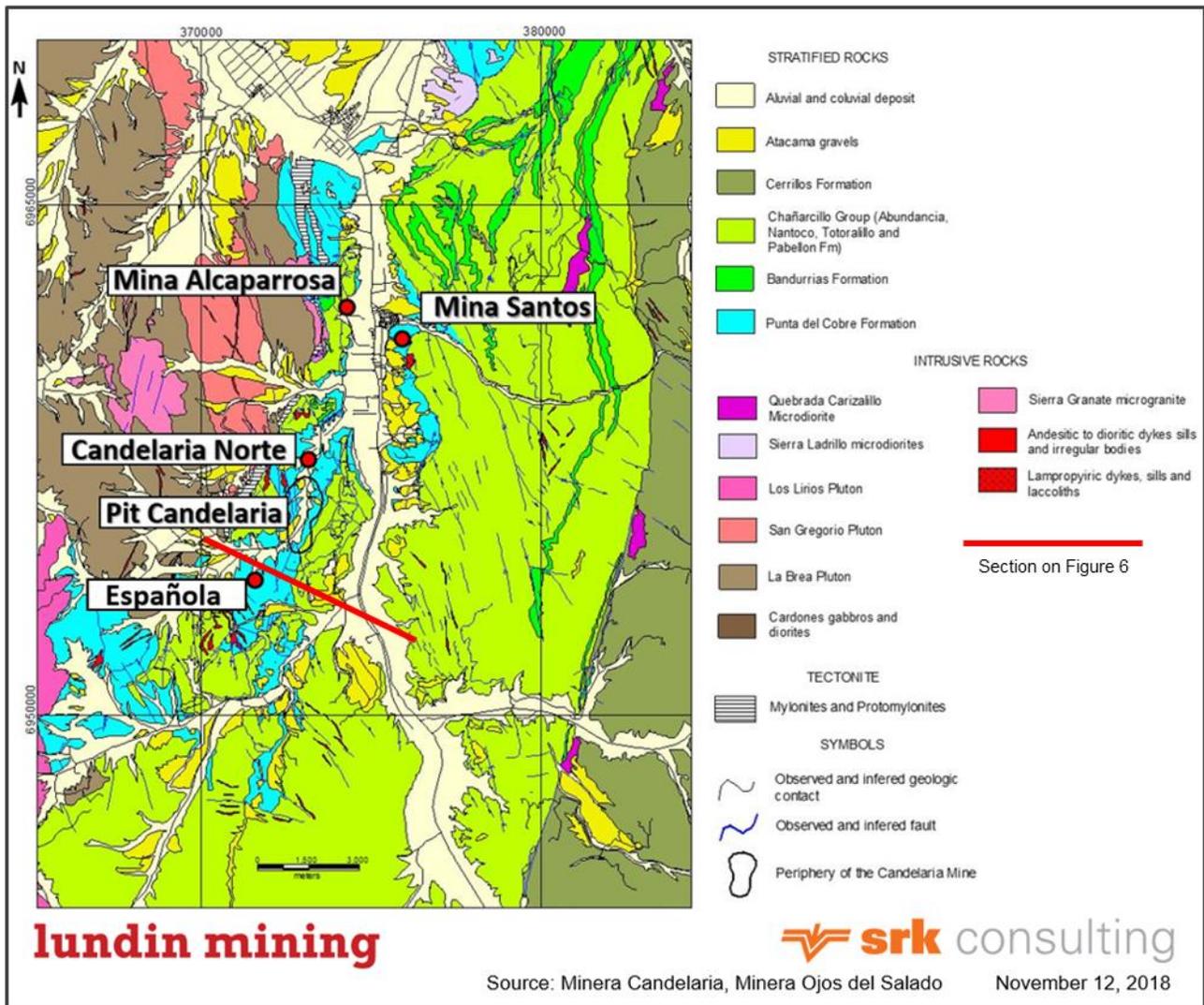
The Candelaria-Punta del Cobre polymetallic sulphide deposits are located to the east of the Atacama fault zone, which extends over 1,000 kilometres along the Chilean coast. The Atacama fault zone is a subduction-linked arc-parallel strike-slip fault system that has been active at least since the Jurassic (Marschik and Fontboté, 2001).

### 6.2 Local Geology

The Candelaria, Santos, and Alcaparrosa mines and Española project are located in the mining district of Punta del Cobre. The polymetallic sulphide deposits are hosted in the volcanic rocks of the Punta del Cobre Formation (Figure 5). The Punta del Cobre Formation is overlain by Cretaceous marine calcareous rocks of the Lower Cretaceous Chañarcillo Group. The Chañarcillo Group comprises, from the bottom up, the Abundancia, Nantoco, Totoralillo, and Pabellón Formations.

In the north and northwest, the rocks of the Chañarcillo Group are interlayered with continental volcano-sedimentary rocks of the Bandurrias Formation, also of Lower Cretaceous age. The rocks of the Chañarcillo Group were deposited in the back-arc facies of a volcanic arc, which is represented by the rocks of the Bandurrias and Punta del Cobre formations.

Intrusive rocks of the Coastal Batholith are located mainly to the west of the Punta del Cobre district (Figure 5) and are age dated at between 123 and 111 million years. The development of a contact aureole to this batholith affected, with decreasing intensity to the east, all the Lower Cretaceous rocks in the Punta del Cobre district. At the latitude of the Candelaria mine, the Coastal Batholith forms a tabular multi-phase plutonic complex formed, from oldest to youngest, by the La Brea diorite, the San Gregorio monzodiorite, the tonalitic to granodioritic Los Lirios pluton, and the Ojancos and El Granate microgranite (Figure 5). The largest area is covered by the La Brea pluton.



**Figure 5: Regional Geology Setting Around the Candelaria, Alcaparrosa, and Santos Mines**

The dominant structural elements in the Candelaria-Punta del Cobre area are a large northeast-trending antiform (Tierra Amarilla Anticlinorium), a southeast verging fold-and-thrust system and a dense set of north-northwest to northwest-trending high-angle sinistral transcurrent faults (Marschik and Fontbote, 2001). This fold is part of the Paipote Fold and Thrust System comprising a set of north-northeast-trending folds and thrust sheets (Arévalo et al., 2006). One of the folds in the Candelaria mine area is the northeast-trending Tierra Amarilla Anticline, which has affected all Lower Cretaceous sedimentary and volcanic rock.

Northeast-striking reverse faults parallel to the Tierra Amarilla Anticline are part of the Paipote fold and thrust belt. Mylonitic shear zones and cataclastic rocks locally form the contact between the intrusive rocks and Early Cretaceous host rocks. Ductile deformation is recorded in the Ojancos, Candelaria, and Florida shear zones. Both the Tierra Amarilla Anticline and the Ojancos-Florida Shear Zone are displaced by north-northwest-trending brittle faults (Figure 5). The Lar, San Gregorio, and Ojancos Faults show sinistral strike-slip displacement. The rocks located between the major north-northwest-striking faults also appear displaced by shorter faults of northwest- to north-northwest-strike orientation.

## 6.3 Property Geology

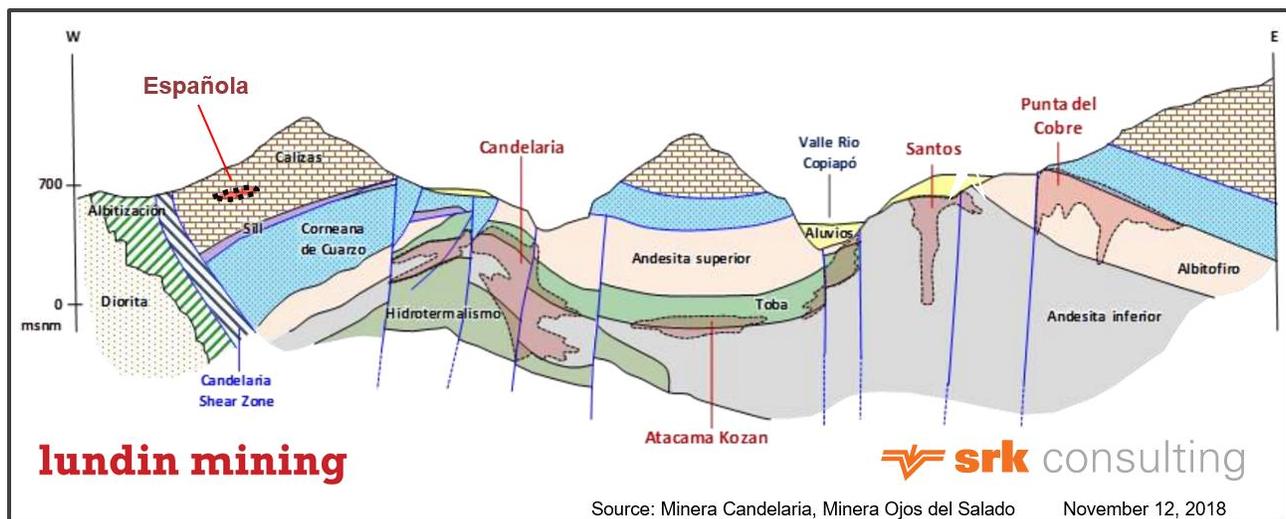
### 6.3.1 Geology of the Candelaria Mine

Calcareous, sedimentary, and volcanoclastic rock of the Abundancia and Punta del Cobre formations are exposed within the open pit of the Candelaria mine. Due to the closer proximity to the Coastal Batholith, rocks in the open pit of the Candelaria mine show stronger metasomatism and metamorphism than in other sulphide deposits of the Punta del Cobre district (Figure 6).

The lowermost unit in the Candelaria mine and Candelaria Underground is the Lower Andesite, a compact succession of porphyritic to massive andesite and volcanoclastic breccias with intense biotite-quartz-magnetite-albite alteration (Figure 7 and Figure 8). The Lower Andesite is overlain by a succession of stratified volcanoclastic rocks including tuffs, which are further sub-divided by alteration and mineralisation into pink garnet skarn and magnetite breccia. The Upper Andesite of the Punta de Cobre Formation consists of a homogenous succession of undifferentiated volcanoclastic and andesitic rock. The biotite-bearing andesite exhibits alteration varying from quartz-pyroxene hornfels to pyroxene-scapolite-garnet skarns.

The Abundancia Formation of the Chañarcillo Group in the Candelaria mine consists of fine-grained biotite-, silica-, or clinopyroxene-bearing calcareous metasandstone and mudstone. The stratified rocks are cut by dacite and lamprophyre dikes. The hydrothermally-altered dacite porphyry dikes and sills locally contain copper mineralization. The youngest rocks in the Candelaria mine are post-mineralization lamprophyre dikes.

At the Candelaria mine a low angle shear zone, located at the confluence of ductile to brittle high-angle faults, marks synplutonic brittle-to-ductile extensional deformation (Arévalo et al., 2006).



**Figure 6: Schematic Vertical Section Showing the Location of the Candelaria and Santos Mines (see Figure 5 for section location)**

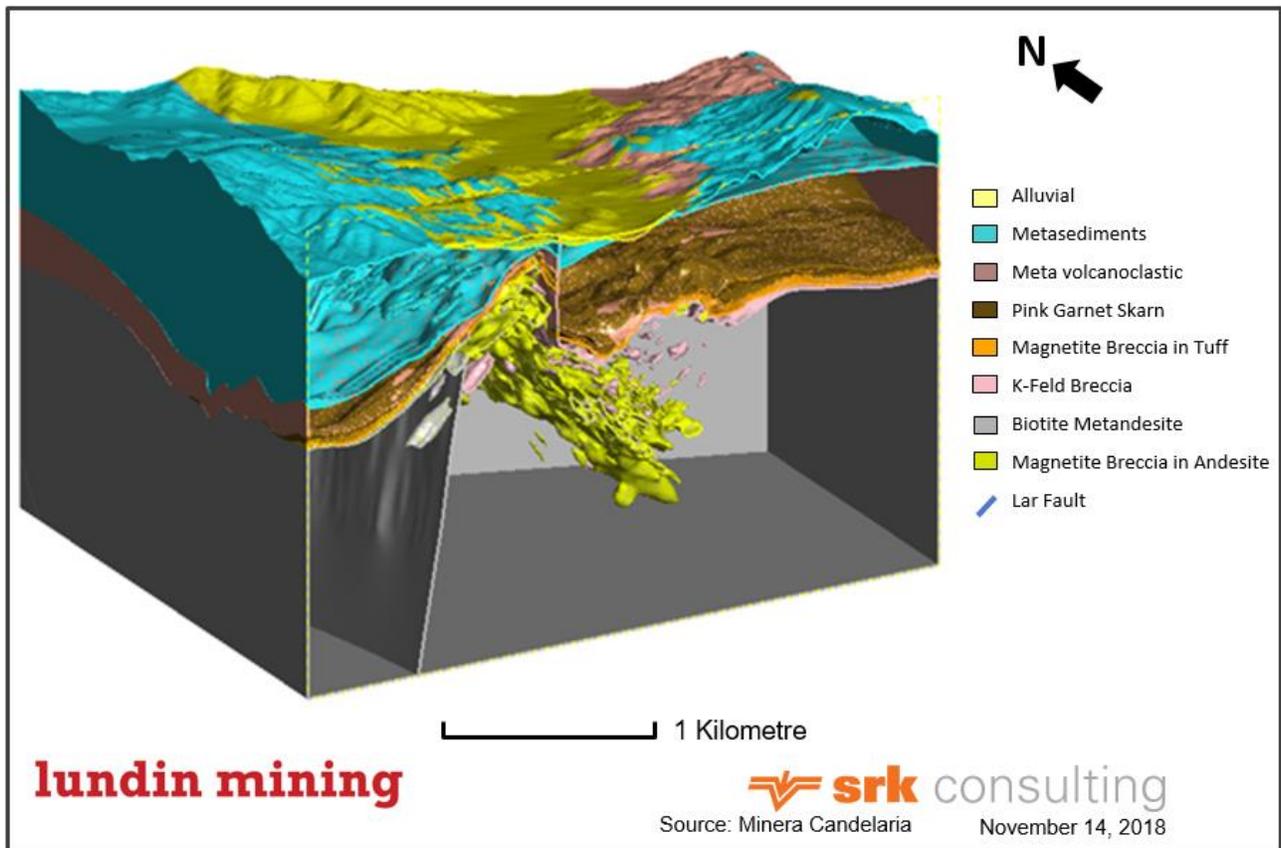


Figure 7: Local Geology Setting of the Candelaria Mine

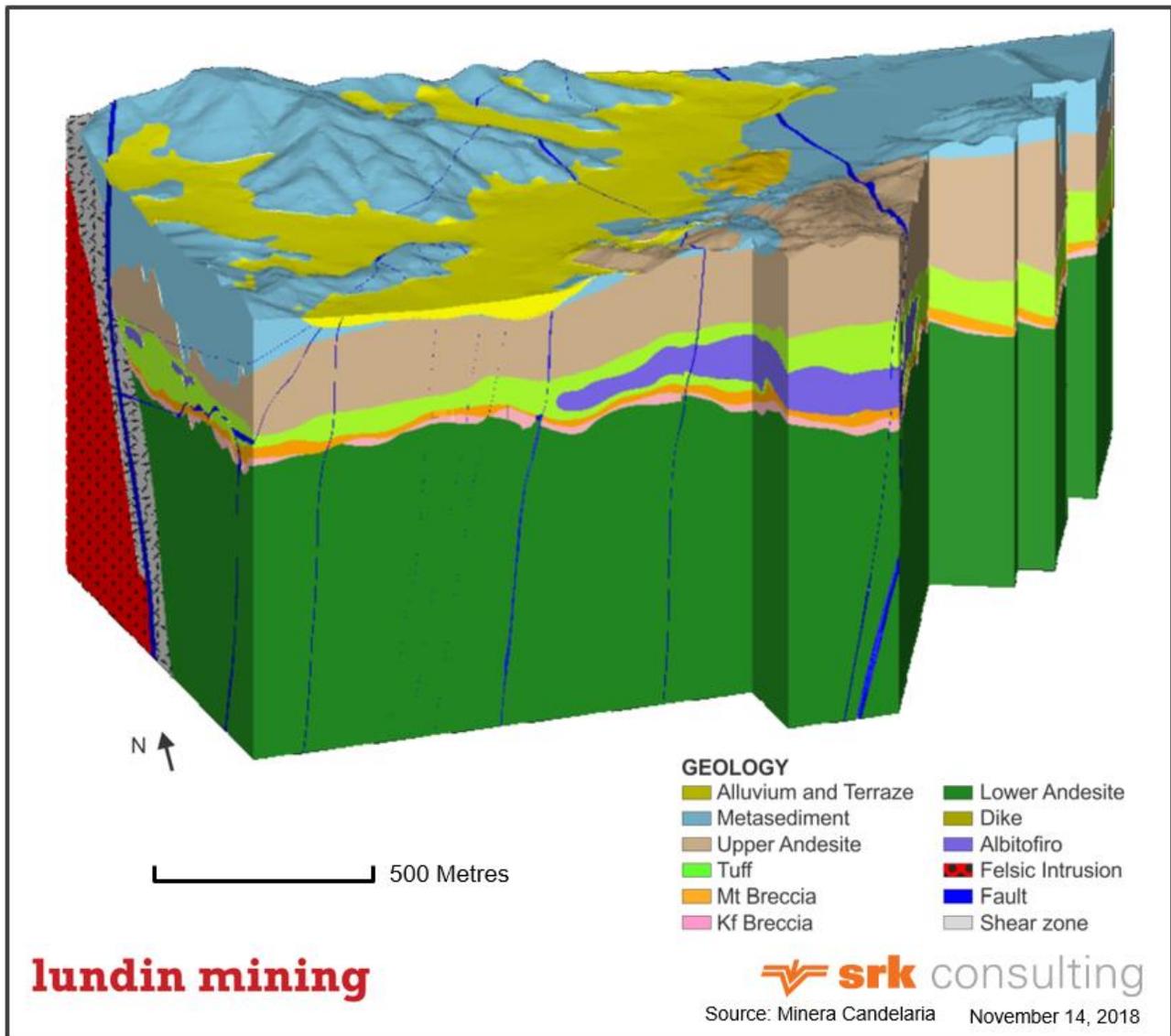


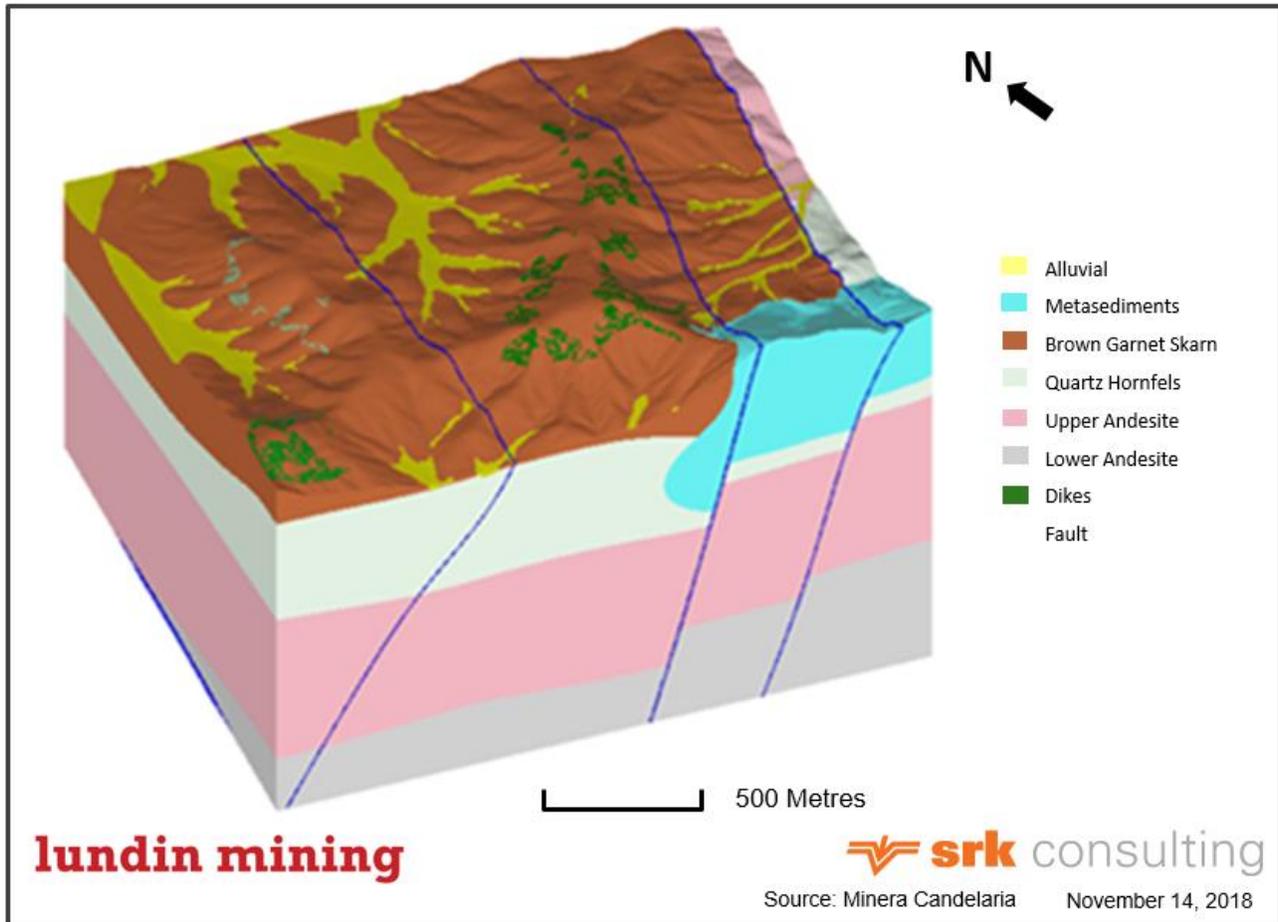
Figure 8: Geological Setting of Candelaria Underground (North Sector)

### 6.3.2 Geology of the Española Project

The Española project is located in the south portion of Candelaria-Punta del Cobre district, 2.5 kilometres southwest from the Candelaria open pit (Figure 4 and Figure 5). It occurs in the contact aureole between the Copiapó batholith and sedimentary and volcano-sedimentary rocks of the Chañarcillo Group and the Punta del Cobre Formation in a tectonically depressed block controlled by San Gregorio fault system (Figure 9). The copper mineralization (oxides, sulphides and mixed) is hosted mainly in brown garnet skarn levels and in quartz hornfels in the upper part of the stratigraphic sequence (Abundancia Formation) with mantos characteristics.

The main lithological types on surface are assigned to the Abundancia Formation and were affected by different metamorphic processes during emplacement of the Copiapó batholith. In the eastern

portion of the area, there is a fault contact with the volcanic and volcanoclastic rocks of the Punta del Cobre Formation.



**Figure 9: Geological Setting of the Española Project**

### 6.3.3 Geology of the Santos Mine

The rocks of the Santos mine are comprised mainly of the Punta del Cobre and Abundancia Formations. A typical section showing the geology of the Santos mine is shown in Figure 10.

The lowermost rocks of the Punta del Cobre Formation are porphyritic to aphanitic andesite of the Lower Andesite. The Lower Andesite is conformably overlain by dacitic domes hydrothermally altered to an albitic-pyritic assemblage that is overlain by a succession of volcanoclastic breccias with interbedded layers of siltstone and sandstone. The basal portion of this unit (locally termed albitoforo) hosts manto-type copper mineralization. Conformably overlying the breccias are fine grained clastic rocks and Upper Andesite basaltic andesite flows. Intercalations of lenticular limestone, polymict breccias, volcanic tuffs, sandstone and iron-rich chert also occur within the Upper Andesite. The overlying Abundancia Formation comprises well stratified marine sedimentary rock, mainly calcareous sandstone. The rocks of the Abundancia Formation do not contain significant mineralization.

Intrusive rocks in the Santos mine are represented by a hornblende diorite, which intrudes the Punta del Cobre Formation and the lower Abundancia Formation. Dikes cut various stratigraphic levels of

the Punta del Cobre Formation and some layers of the Abundancia Formation. Andesitic dikes trend northwest and are up to 4 metres thick. Dacitic dikes occur in variable orientations ranging from northwest to northeast trends and are up to 5 metres thick. Dikes post-date the mineralization.

The Santos mine is located in the eastern limb of the north-northeast-trending Tierra Amarilla anticline. The stratigraphic contacts in the eastern limb of the fold dip approximately 25 degrees.

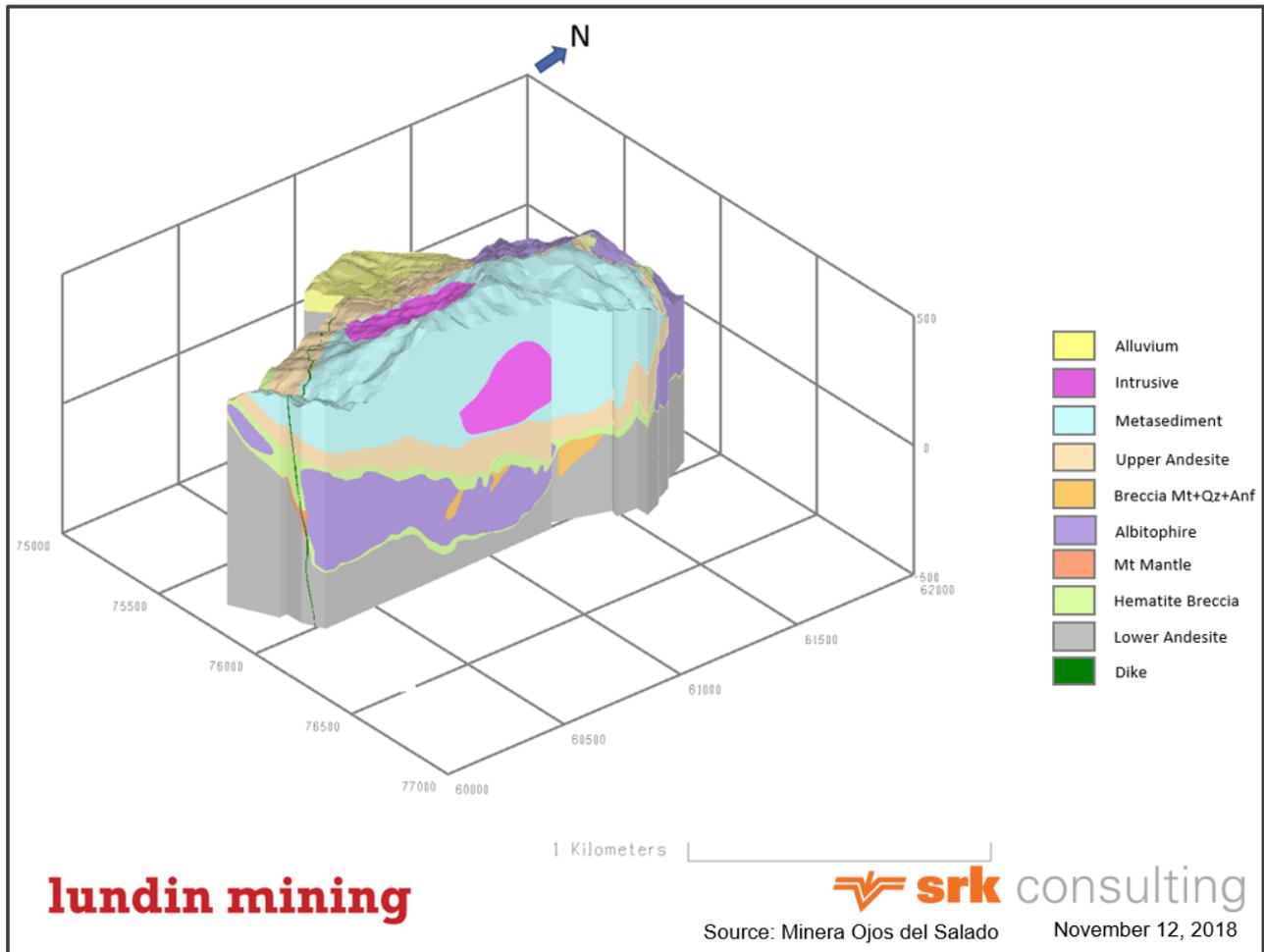


Figure 10: Geological Setting of the Santos Mine

### 6.3.4 Geology of the Alcaparrosa Mine

The Alcaparrosa mine is located in the northern part of the Punta del Cobre mining district (Figure 5), in the west flank of Copiapó valley. A typical section of the mine stratigraphy is shown in Figure 11. Punta del Cobre Formation is subdivided into a Lower Andesite unit, which is succeeded by volcanoclastic breccias, albitophyre and pyroxene- scapolite hornfels interbedded with garnetites. The Lower Andesite consist of aphanitic, porphyritic, blastoporphyrific and brecciated dark grey andesites. The albitophyre is a light grey pophyritic dacite with phenocrysts of plagioclase and occasionally “quartz eyes” in an aphanitic silica groundmass. The volcanoclastic breccia contains porphyritic rock clasts altered to potassic feldspar in a matrix with high contents of magnetite. Hornfels and garnetites are concordant located over the albitophyre and correspond to the

metamorphosed equivalents of the upper part of Punta de Cobre Formation and Abundancia Formation. In the southern central part of the mine a granodiorite stock cuts the whole sequence.

The metasedimentary unit overlying the Punta del Cobre Formation likely corresponds to the Abundancia Formation. The metasedimentary unit is divided into the following two sub-units: a quartz hornfels, and a pyroxene-scapolite-garnet skarn with metasomatic banding.

Intrusive rocks are andesitic, granitic, dioritic and monzodioritic dikes, and a diorite stock. The diorite stock is a post-mineral intrusion with equigranular texture composed of plagioclase and hornblende phenocrysts. The diorite stock is cut by dikes. Andesite dikes are porphyritic in texture and do not contain any mineralization. Granitic dikes have aplitic to porphyritic texture and show disseminated traces of pyrite and magnetite, although they do not contain any copper mineralization. Dioritic dikes are fine-grained equi-granular and barren. Monzodioritic dikes contain xenoliths of magnetite and chalcopyrite veinlets.

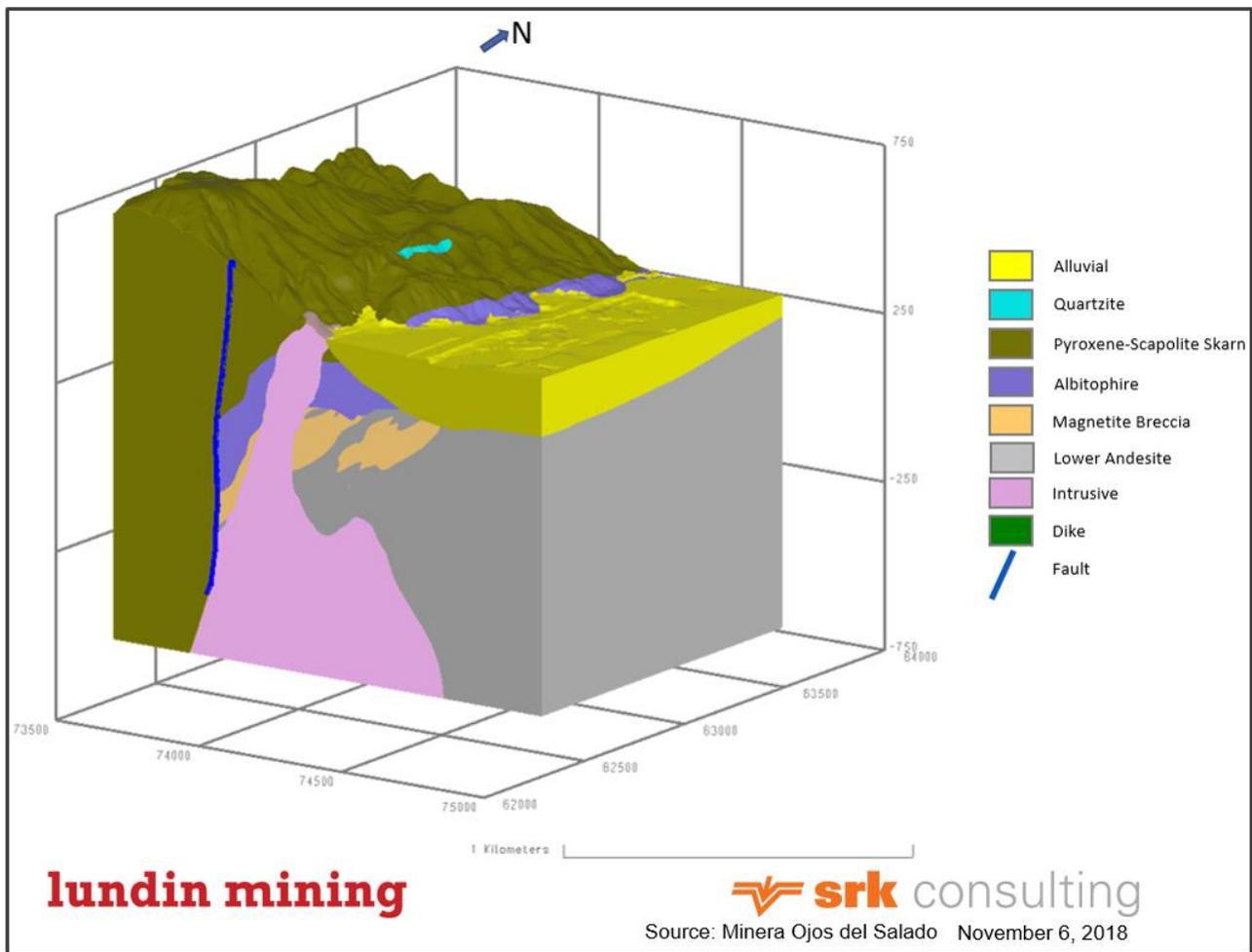


Figure 11: Geological Setting of the Alcaparrosa Mine

## 6.4 Mineralization

### 6.4.1 Mineralization at the Candelaria Mine

The main mineralized body at the Candelaria mine is hosted in rocks of the Punta del Cobre Formation. Specifically, the host rocks are massive andesite and andesite breccias of the Lower Andesite, and volcanic tuffs and volcanoclastic rocks comprising the base of the Upper Andesite. In the metasedimentary rock unit, the mineralization is confined to a few isolated layers (mantos).

The mineralized body is up to 400 metres thick in its central part and thins towards the edges. In east-west sections, the mineralization has a lenticular, downward concave shape with a steep eastern limb and a shallowly dipping western limb. The shape of the mineralized body in north-south section is irregular. In plan view, the extent of the mineralization is approximately 1,400 metres by 2,400 metres. The mineralized body was folded after its formation. The north-northeast-trending fold axis corresponds to the Tierra Amarilla Anticline.

The mineralization assemblage in the Candelaria mine consists of chalcopyrite, magnetite, pyrite, pyrrhotite, and sphalerite. Biotite, calc-silicate minerals, and potassium feldspar constitute the gangue minerals. Pervasive potassic alteration is associated with the mineralization.

Dominant copper mineralization styles are mantos, veins, breccia bodies, and veinlets along foliation planes. Gold occurs within chalcopyrite grains and along fractures surface in pyrite. Chalcopyrite and pyrite also occur in secondary northwest and north-northwest-striking faults.

### 6.4.2 Mineralization at the Española Project

In the Española project area, the primary dominant copper sulphide is chalcopyrite found as clusters and in disseminated form commonly associated with brown garnet porphyroblasts. Gangue minerals are pyrite and iron oxides (magnetite-hematite). Near the surface and down to a depth of approximately 70, the mineralization is oxidized, characterized by the presence of chrysocolla, malachite, native copper, diogenite and bornite.

The mineralized bodies are arranged as mantos and are hosted mainly in the brown garnet skarn and in less proportion in silica hornfels. Locally in the south part of the project veins and veinlets of metric thicknesses are observed that were interpreted in parallel to the Española vein-fault.

### 6.4.3 Mineralization at the Santos Mine

Chalcopyrite is the only primary copper sulphide present in the Santos mine. In addition to copper mineralization, there are economic values of gold. Most frequent gangue minerals are pyrite, magnetite, actinolite, potassic feldspar, chlorite, biotite and hematite.

In the Santos mine, three styles of mineralized bodies are observed: veins, mantos, and breccia bodies. An important vein in the Santos mine is the Isabel Vein, which is oriented northwest-striking, and extends over 1 kilometre in length and between 4 and 30 metres in width. Manto-type mineralization occurs as tabular bodies located at two sedimentary horizons located in the floor and roof of the albitophyre. The manto mineralization is characterized by variable iron contents with magnetite common in the north and deeper areas, and specular hematite in the south. Mineralization occurs within breccia bodies is typically contained with the albitoforo and lower andesite and is formed by steeply west-dipping and north-northwest- to northwest-striking bodies.

#### **6.4.4 Mineralization at the Alcaparrosa Mine**

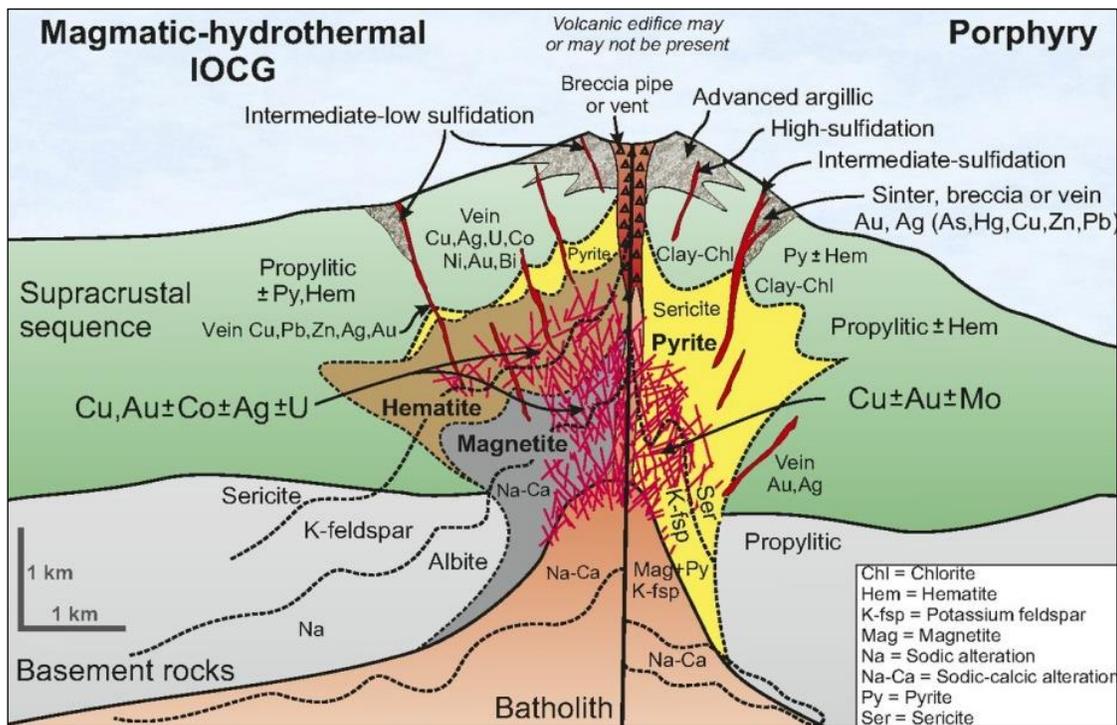
Mineralization at the Alcaparrosa mine principally occurs as mantos that trend to the northeast and dip to the west. Ore mineralogy consists of chalcopyrite, pyrite, and magnetite, with trace pyrrhotite, molybdenite, and arsenopyrite. Mineralization at the Alcaparrosa mine also occurs as veinlets defining dense stockwork, breccias (hydrothermal potassium feldspar and magnetite) as well as fine dissemination in biotite meta-andesites. High-grade bodies are also found in massive veins striking north-northwest, north, and east.

## 7 Deposit Types

The copper-gold sulphide mineralization present at the Candelaria Copper Mining Complex is generally referred to as iron oxide copper gold (“IOCG”). Depending on lithology and the structural setting, the polymetallic sulphide mineralization can occur as veins, hydrothermal breccias, replacement mantos, and calcic skarns (Sillitoe, 2003).

The Candelaria IOCG deposit lies within the metamorphic aureole of the Lower Cretaceous magmatic arc plutonic complex that is located within the Candelaria-Punta del Cobre district, Atacama Region, northern Chile. IOCG deposits are primarily defined by their elevated magnetite and/or hematite with elevated copper and gold contents (Sillitoe, 2003). The IOCG belt located in the Coastal Cordillera of northern Chile and southern Peru is part of a volcano-plutonic arc of Jurassic to Early Cretaceous age. The arc is characterized by voluminous tholeiitic to calc-alkaline plutonic complexes of gabbro to granodiorite composition and primitive, mantle-derived parentage. Major arc-parallel fault systems developed in response to extension and transtension induced by subduction roll-back at the retreating convergent margin.

Most of the sulphide mineralization at Candelaria and Ojos del Salado occurs in breccias, stockwork veinlets, and disseminations in andesite, especially where the rocks are strongly foliated. Higher-grade copper mineralization is controlled by stratigraphy in mantos and by faults, trending predominantly northwest. The host rocks are thermally metamorphosed (hornfels and skarn) in the aureole of the Copiapó Batholith, within 1 kilometre from the intrusion. The top of the mineralization system consists of magnetite-amphibole skarn within calcareous meta-tuff mineralized with pyrrhotite, pyrite and chalcopyrite (Figure 12).



**Figure 12: Schematic Section Through IOCG and Magmatic Systems**

Source: Richards and Mumin (2013)

## 8 Exploration

### 8.1 General Overview

Candelaria and Ojos del Salado (Santos and Alcaparrosa) are active mine operations that comprise the Candelaria Copper Mining Complex. Exploration work completed prior to commencement of mining is not relevant to this technical report.

Ongoing exploration is conducted by Minera Candelaria and Minera Ojos del Salado with the primary purpose of supporting mine operations and increasing Mineral Resource estimates. The exploration strategy is focused on tracing known mantos and vein targets as extensions from current orebodies utilizing host rock and alteration features down dip and along strike from existing underground infrastructure. Historically, this strategy has proven very effective in defining new Mineral Resources available for underground mining. Exploration work is completed by mine personnel.

Much of the exploration is conducted from underground, requiring significant underground development to provide adequate drilling stations. Regional exploration is also undertaken on the large properties surrounding the mines to identify new targets and define new Mineral Resource areas for more detailed Mineral Resource exploration.

From 2010 to the end of June 2018, Minera Candelaria and Minera Ojos del Salado have together invested more than US\$229 million in exploration to expand the Mineral Resources primarily below the Candelaria Open Pit, to the north and south of the pit, and at the three underground mines (Candelaria Underground, Santos and Alcaparrosa). During this period, 3,198 core boreholes (888,435 metres) were drilled requiring 15,061 metres of underground development to provide access for drilling. Since Lundin purchased the Candelaria Copper Mining Complex in late 2014 to the end of June 2018, there has been an investment in exploration of US\$100 million. During this period 1,526 core boreholes (453,736 metres) were drilled requiring 3,210 metres of underground development.

At Minera Candelaria, the Measured and Indicated Mineral Resources increased significantly during the June 2018 reporting period. Increases are attributed to discovery of new mineralization, model integration, and changes in reporting cut-off grades. Increases related to discoveries include: the Española project, which was discovered 2.5 kilometres to the south of the current Candelaria Pit, the Wedge Gap, found underground to the south of Candelaria Norte; and in Candelaria Norte, in the sector called Lila 6 & 7. Other increases are attributed to the extensive drilling program that occurred during the year. Mineral Resource growth occurred in Candelaria Norte in the Lila 5 sector, where a new model was prepared (Figure 12 and Figure 13); to the south of the Candelaria pit, exploration drilling occurred from the surface above the Mariana sector further establishing the continuity of mineralization beneath the western and southern portions of the open pit; exploration drilling also occurred underground, below the southeast flank of the pit expanding the Mineral Resource for Phase 13 of the open pit, additional surface drilling was also completed in the bottom of Phase 9 pit to explore the potential for mineralization at depth; and in Santos to the north in Melendez Norte, and South Malaquita. Finally, additional underground Mineral Resource resulted from the consolidation of several models in Alcaparrosa and Santos mines, and also as a result of lowering the reporting cut-off grade from 0.60 to 0.55 percent copper.

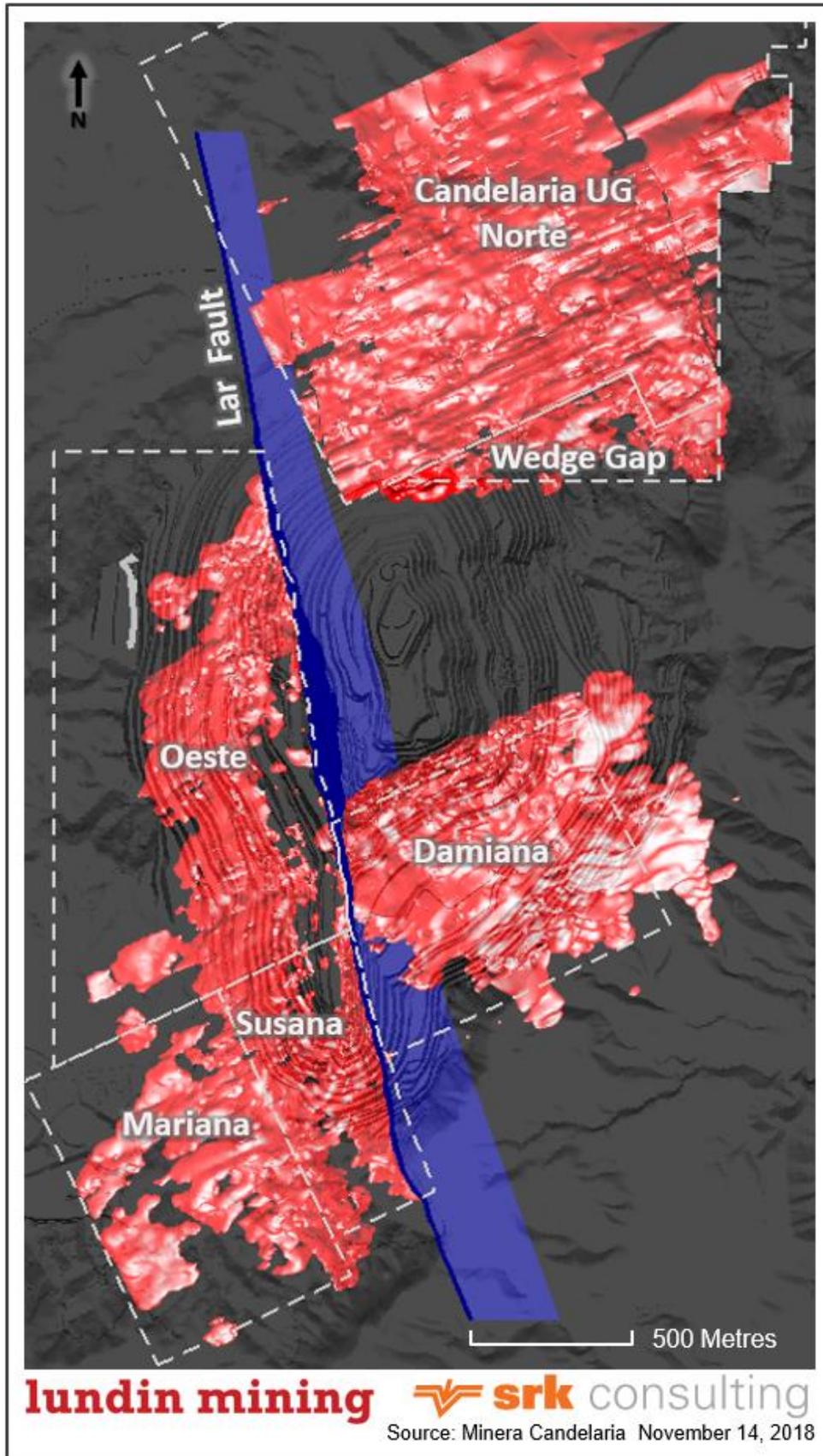
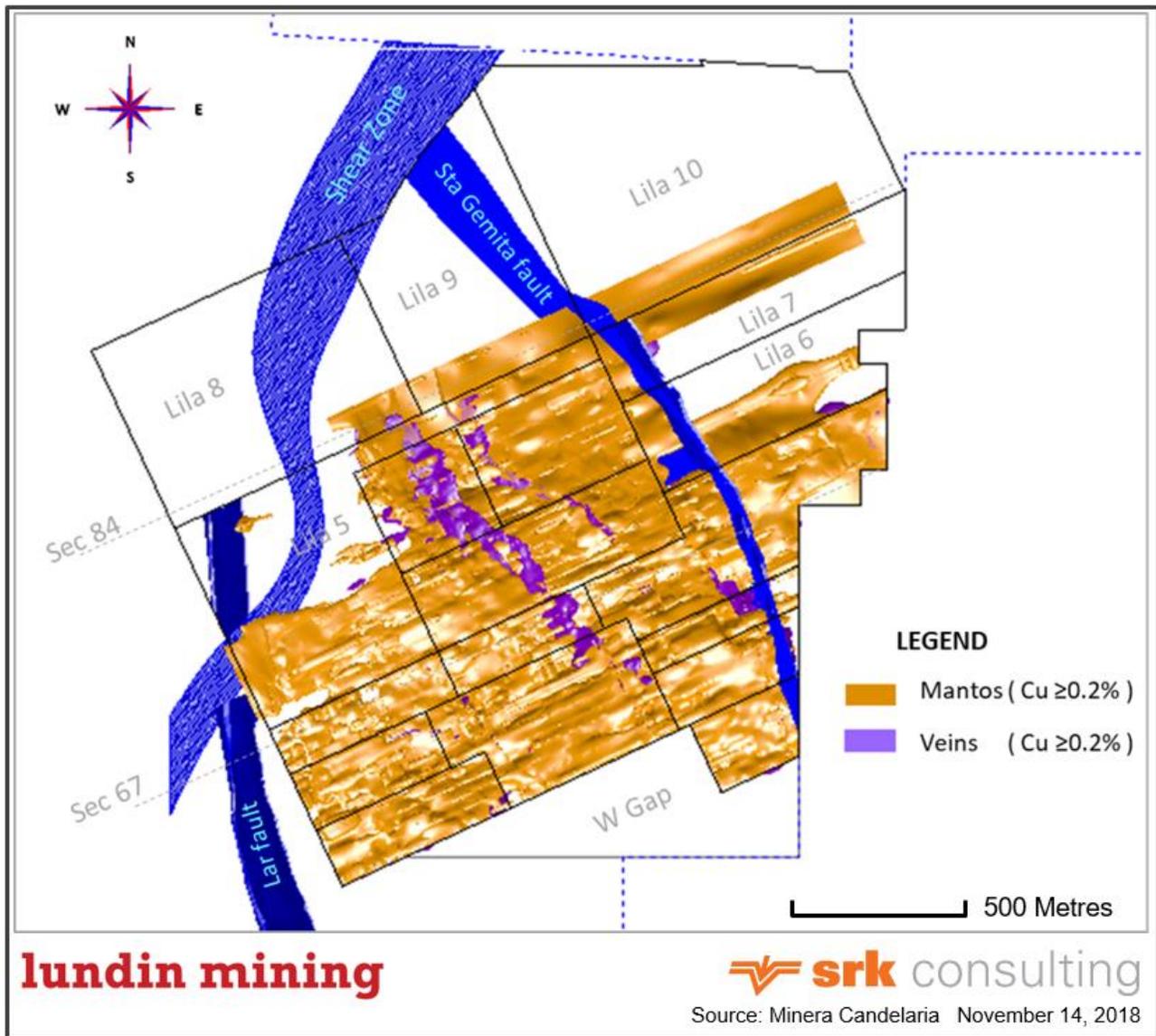


Figure 13: Plan Showing Exploration Areas at the Candelaria Underground (South Sector)



**Figure 14: Plan Showing Exploration Areas at the Candelaria Underground (North Sector)**

At Minera Ojos del Salado, new Mineral Resource and Mineral Reserve estimates were prepared in the first half of 2018, extending the life of the Santos mine to 2028. The Measured and Indicated Mineral Resources increased by more than 70 percent over the year in Santos due to drilling, the consolidation of two independent block models into one (Santos; Figure 15) and lowering the underground cut-off grade from 0.60 to 0.55 percent copper. At the Alcaparrosa mine, Mineral Resources increased by 46 percent due to drilling, the integration of seven block models into one (Alcaparrosa; Figure 16) and lowering the underground cut-off grade from 0.60 to 0.55 percent copper. Mineralization remains open to the southwest and further potential exists in the east central and west central zones outside of the current model. Wide spaced extension and infill drilling is ongoing and will improve the confidence in the continuity of the sulphide mineralization in both the Alcaparrosa and Santos mines.

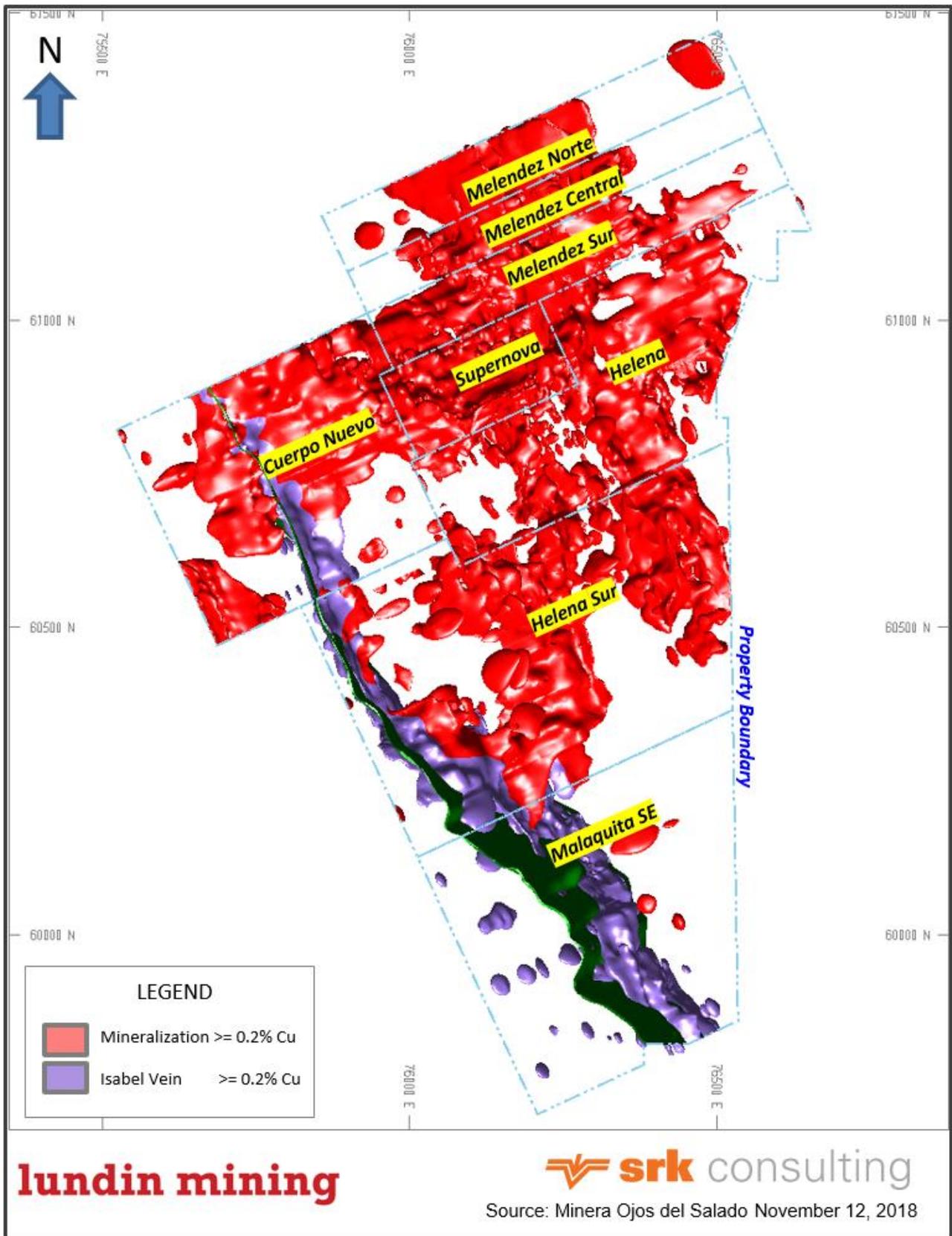


Figure 15: Plan Showing Exploration Areas at the Santos Mine

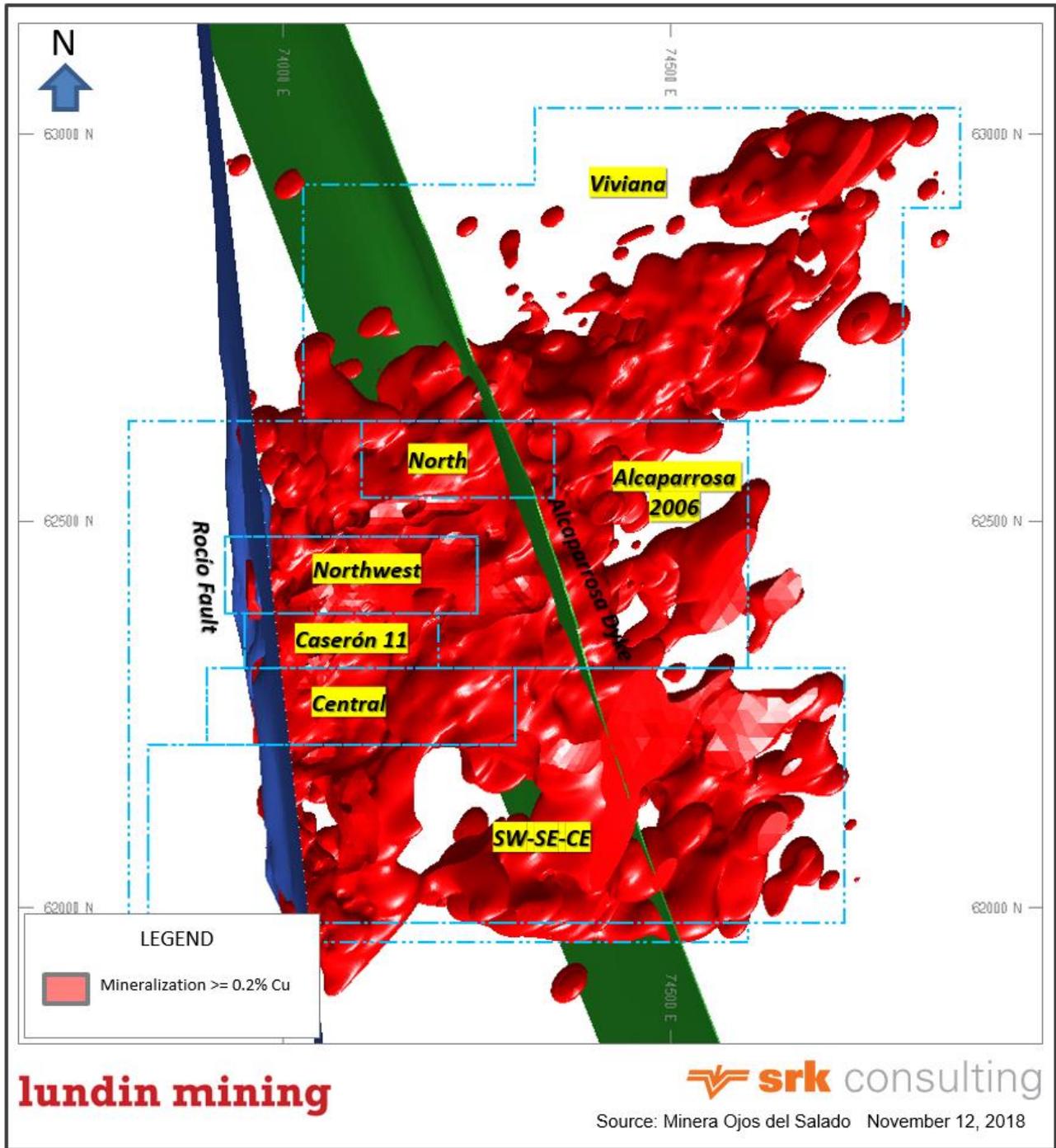


Figure 16: Exploration Areas at the Alcaparrosa Mine

In the Santos mine to the north of the Melendez sector, sulphide mineralization was confirmed to continue to the north. To the south in the Malachita sector, sulphide mineralization was confirmed in deeper horizons. In addition, during the year a NS&SAMT (Natural Source and Controlled Source Audio Magneto-Telluric) geophysical survey was performed to the southern extents of Santos, the survey was performed to map structures which could be controlling the location/formation of vein type mineralization known to be adjacent to the area. Drilling has since commenced over the area with positive results within the low resistivity zones.

Brownfield exploration drilling began late in 2017 with surface drilling commencing in the south district of the Candelaria land concession in an area called Española. The Española project is an area approximately 2.5 kilometres south of the Candelaria Open Pit. Geophysical surveys performed in 2016 showed a gravimetric, apparent chargeability and conductivity anomaly coincident with a historic magnetic anomaly (Figure 17). Further investigation of the area found three shallow historical boreholes intersected low grade mineralization, 0.20 percent to 0.49 percent copper from 24 to 165 metres in length. A drilling campaign was developed in September 2017 to test the extent of the mineralization. When more mineralization was encountered, further drilling continued with the objective to delimit the mineralized body. In total, 79 drill platforms and roads were developed during the 2017 and 2018 drilling campaign, and 92 exploration and infill core boreholes totaling 31,370 metres were drilled. A new Mineral Resource model was constructed with this data to support Mineral Resource estimation.

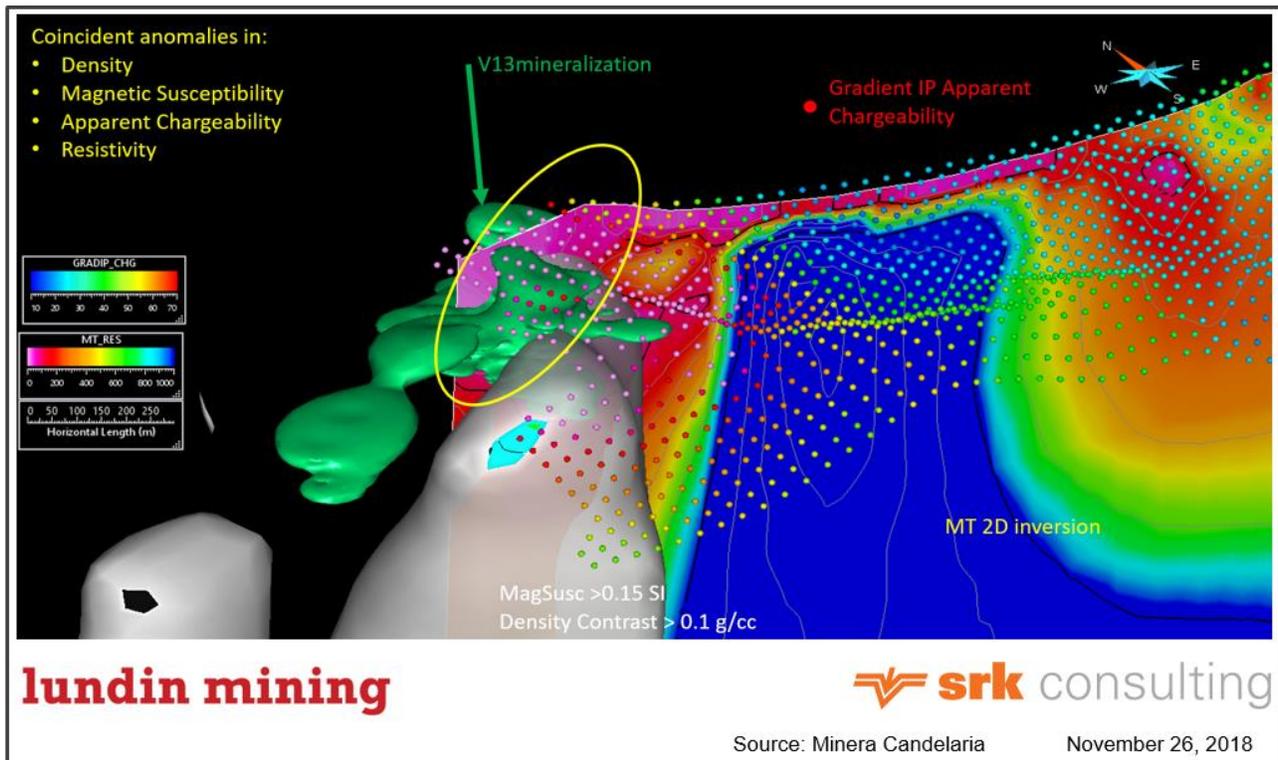


Figure 17: State of Data Before Discovery of Española

Building on this success, an exploration program is planned for the period 2019 to 2023, maintaining operational fronts in the mines, targeting the lateral extensions of the areas investigated since 2010 and exploring district targets to the north and south of mining infrastructure within the Minera Candelaria and Minera Ojos del Salado land holdings. The planned exploration program (Table 6) includes approximately 2,830 metres of underground development, 261,000 metres of core drilling, and continued geophysical campaigns at a total estimated combined cost of US\$72.5 million. The 5-year exploration budget has been reduced compared to the previous years due to the significant increase in Mineral Resources within each of the mines, extending the life of the Candelaria Mining Complex substantially for mine operations; therefore, decreasing pressure to sustain annual exploration drilling. Step out drilling will continue within the mines; however, drilling will focus in regional exploration within the district.

**Table 6: Summary of Exploration Program (2019 to 2023)**

		2019	2020	2021	2022	2023	Total
Santos	Definition		6,000	3,000			9,000
	Exploration			3,000			3,000
Alcaparrosa	Definition	3,000	4,000	4,000	4,000	4,000	19,000
	Exploration	4,000	3,000	4,000	4,000	4,000	19,000
Candelaria	Definition	22,000	5,000	14,000	10,000	10,000	61,000
	Exploration	3,000	19,000	11,000	10,000	10,000	53,000
Española	Definition	4,000	4,000				8,000
	Exploration			4,000	4,000	4,000	12,000
District	Definition			10,000	16,000	16,000	42,000
	Exploration	8,000	12,000	3,000	5,000	7,000	35,000
	<b>Total (metres/year)</b>	<b>44,000</b>	<b>53,000</b>	<b>56,000</b>	<b>53,000</b>	<b>55,000</b>	<b>261,000</b>
	<b>Drifting (metres)</b>	<b>940</b>	<b>600</b>	<b>400</b>	<b>480</b>	<b>410</b>	<b>2,830</b>
	<b>US\$ ('000s)</b>	<b>14,684</b>	<b>14,750</b>	<b>14,433</b>	<b>14,310</b>	<b>14,339</b>	<b>72,516</b>

The objective of this exploration program is three-fold: to define and upgrade the classification of additional higher-grade Mineral Resources in the underground mines to replace the processing of lower grade feed from the open pit or surface stockpiles and improve the life of mine copper production; to understand the Mineral Resource potential remaining in the underground mines; and, to explore the Candelaria District to supplement the depletion of Mineral Resources in the mines.

The aggressive exploration program initiated in 2010 has resulted in significant new discoveries, with a positive impact on the life of the three underground mines. In 2015, a new exploration and Mineral Resource development tool, Mineral Inventory Range Analysis (“MIRA”) was initiated with the purpose to understand the potential mineral inventory remaining in the mines as well as identify the potential mineral inventory within the Candelaria land holdings. Since 2015, mineral inventories have increased across the Candelaria district as a result of the aggressive exploration programs (drilling and geophysical surveys), block model integrations, and new discoveries in Santos, Alcaparrosa and Candelaria mines, and the new district discovery of Española. Confidence has grown with the positive results received by utilizing the MIRA tool in the exploration programs. It is expected that the Mineral Resources will continue to grow within the current mines and district.

At Candelaria, 97,148 metres of underground core were drilled and 1,355 metres of underground development were completed since July 2017. This includes exploring the southern extensions of Mariana, Damiana, and Santa Gemita (17,107 metres of core drilling), definition of the northern extensions of mineralization in Candelaria Underground (North Sector and Wedge Gap, 58,956 metres), and to explore open pit potential from both the surface and underground (21,084 metres).

At the Alcaparrosa mine, the 2018 exploration program included 348 metres of underground development, and a total of 16,521 metres of core drilling in the in the West Central area (Figure 16).

At the Santos mine, the 2018 exploration program included 122 metres of underground development, and a total of 16,534 metres of underground core drilling divided between the Helena, Melendez North, Malaquita Deep sectors, and on the surface in Isabel Oeste, and Santos Sur (Figure 15).

In the district, additional core drilling was conducted at Pirata Rincon (789 metres), Cora Kaiser (1,052 metres), and Ojancos Sur (1,564 metres; Figure 18).

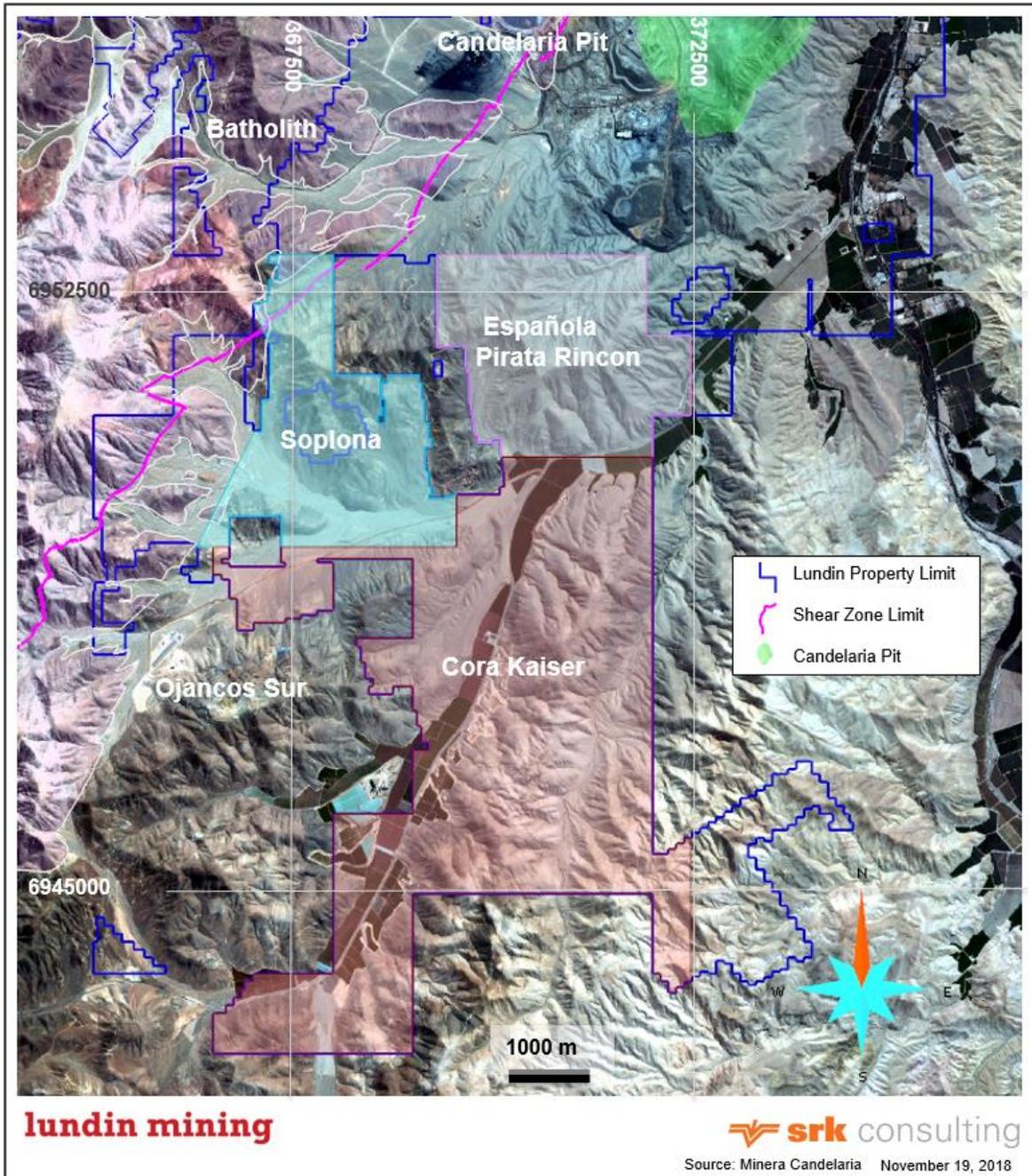


Figure 18: Plan Showing the South District Surface Drilling

In addition to the underground exploration programmes, various geophysical surveys were conducted to guide drilling programs within the Candelaria District, a 3D DCIP Survey was conducted in the south district over the Española area. A CSAMT survey was performed over the south surface of Santos, with the objective of defining structures which could be controlling the location/formation of vein type mineralization known to be adjacent to Santos. An airborne magnetic/radiometric survey was flown over the entire district.

Magnetic susceptibility and conductivity measurements and down-hole physical property logging continued during 2018 and were used to assist interpreting geophysical data and map magnetic susceptibility of lithological units and improve geological modelling.

## 8.2 Exploration Performance 2014 to 2018

Since acquiring the Candelaria Copper Mining Complex in late 2014 Lundin has invested over US\$100 million in exploration (to the end of June 2018). These investments have allowed to increase significantly the Mineral Resources at all mines and to extend the life of the operations by 10 years to 2040.

The current forward-looking exploration strategy is to:

- Continue the development of the underground headings within the existing mine infrastructure ahead of operations.
- Test the extensions of mantos and veins, as well as exploring for deep seated mineralization.
- Test high potential MIRA targets both within the mining infrastructure as well as in the district; explore outside the boundaries of sulfide mineralization and review oxide potential.
- Apply additional tools including new geophysical applications; statistical analysis to geochemical sample results.
- Develop a 3D targeting modelling tool that integrates, geophysical survey data, geochemistry, structural components, field mapping, and drill hole information to assist in optimal drill hole targeting throughout the district

## 8.3 SRK Comments

The considerable investment in exploration at Minera Candelaria and Minera Ojos del Salado since 2014 (US\$100 million) has continued to demonstrate the excellent potential for extending the sulphide zones in the three underground mines and the generation of new discoveries amenable for underground mining in other areas of the properties.

Step-out and infill drilling programs have resulted in the discovery of new mineralization extensions throughout the property particularly at Candelaria Underground (North and South Sectors), Alcaparrosa and Santos.

Since 2014, exploration success combined with operational efficiencies (cut-off grade reductions), Mineral Resource estimation innovations (Mineral Resource model consolidations) has significantly increased reported Mineral Resources and Mineral Reserves of mineralization amenable to underground extraction. Recent exploration in the district also highlights the potential of increasing Mineral Resources and Mineral Reserves amenable to open pit extraction, as witnessed by the Española project.

A new 5-year exploration program (2019 to 2023) has been developed, which will target lateral extensions of the areas investigated since 2010 and exploring district targets to the north and south of mining infrastructure within Minera Candelaria land holdings. This aggressive exploration program should continue to define and upgrade underground and open pit Mineral Resource estimates on the property.

The exploration potential of the Candelaria Copper Mining Complex is excellent. SRK is also of the opinion that the MIRA exploration and Mineral Resource development strategy will continue to complement the exploration program in the future, which should result in a continuous growth in Mineral Resources within the current mines and elsewhere in the district.

SRK strongly supports the development of the 3D targeting modelling tool that integrates, geophysical survey data, geochemistry, structural components, field mapping, and borehole information to assist in optimal drill hole targeting throughout the district.

## 9 Drilling

### 9.1 Drilling at Candelaria

From 1990 to June 30, 2018, 4,351 core and percussion boreholes (1,260,592 metres) were drilled in and around the Candelaria mine. Approximately 96 percent of all drilling comprised core boreholes. Approximately 80 percent of all core boreholes were drilled using NQ equipment, the rest using HQ equipment. Initially, drilling was completed by Geotech Boyles Bros. S.A. Later, drilling services were provided by Connors Drilling, LLC and finally from 2012, Boart Longyear was contracted to complete all drilling.

Until 2011, boreholes were surveyed by mine personnel. No information exists on instruments or methodologies used for these surveys. Since 2011, SG Drill Servicios Geol (SG Drill) based in Copiapó, has been contracted to complete down-hole surveys. SG Drill uses a Reflex tool with readings at 3-metre intervals. Most of the boreholes were drilled with an azimuth of 065 or 245 degrees with inclinations between -90 and +90 degrees. Table 7 summarizes the drilling information for Candelaria. The collars of the boreholes drilled within the Candelaria Copper Mining Complex is shown in Figure 19.

**Table 7: Summary of Drilling Activities at Candelaria Mine (Open Pit and Underground)**

Year	RC		Surface		Geotechnics		Underground		Total	
	Number	Metres	Number	Metres	Number	Metres	Number	Metres	Number	Metres
1990	-	-	325	125,369	-	-	-	-	325	125,369
1991	-	-	-	-	-	-	-	-	0	0
1992	-	-	-	-	-	-	-	-	0	0
1993	23	4,041	-	-	-	-	-	-	23	4,041
1994	-	-	88	21,482	5	1,236	-	-	93	22,718
1995	-	-	71	32,417	-	-	-	-	71	32,417
1996	-	-	70	32,848	-	-	-	-	70	32,848
1997	-	-	38	12,174	4	1,459	-	-	42	13,632
1998	-	-	37	14,661	-	-	-	-	37	14,661
1999	-	-	60	16,736	-	-	-	-	60	16,736
2000	-	-	69	20,788	2	1,016	-	-	71	21,804
2001	-	-	126	51,026	-	-	-	-	126	51,026
2002	-	-	83	26,455	-	-	2	461	85	26,917
2003	47	3,627	88	30,441	-	-	89	11,984	224	46,052
2004	-	-	78	34,291	4	1,361	248	34,443	330	70,094
2005	-	-	112	53,130	1	71	30	6,398	143	59,599
2006	109	3,482	156	11,742	2	547	7	1,051	274	16,821
2007	-	-	131	38,568	-	-	79	14,294	210	52,862
2008	-	-	63	22,516	1	225	95	17,627	159	40,368
2009	-	-	53	13,773	-	-	23	4,541	76	18,315
2010	-	-	29	9,696	5	2,246	161	26,219	195	38,161
2011	-	-	69	36,433	4	200	95	17,424	168	54,057
2012	-	-	90	47,725	4	1,205	136	30,430	230	79,361
2013	-	-	45	24,483	2	859	208	47,115	255	72,457
2014	-	-	37	13,873	10	4,305	118	29,242	165	47,419
2015	-	-	59	31,393	-	-	248	66,694	307	98,086
2016	-	-	27	14,617	-	-	153	42,447	180	57,064
2017	-	-	63	39,635	-	-	216	66,576	279	106,210
2018*	-	-	29	9,851	-	-	124	31,646	153	41,497
<b>Total</b>	<b>179</b>	<b>11,150</b>	<b>2,096</b>	<b>786,120</b>	<b>44</b>	<b>14,730</b>	<b>2,032</b>	<b>448,592</b>	<b>4,351</b>	<b>1,260,592</b>

\* First and second quarter of 2018

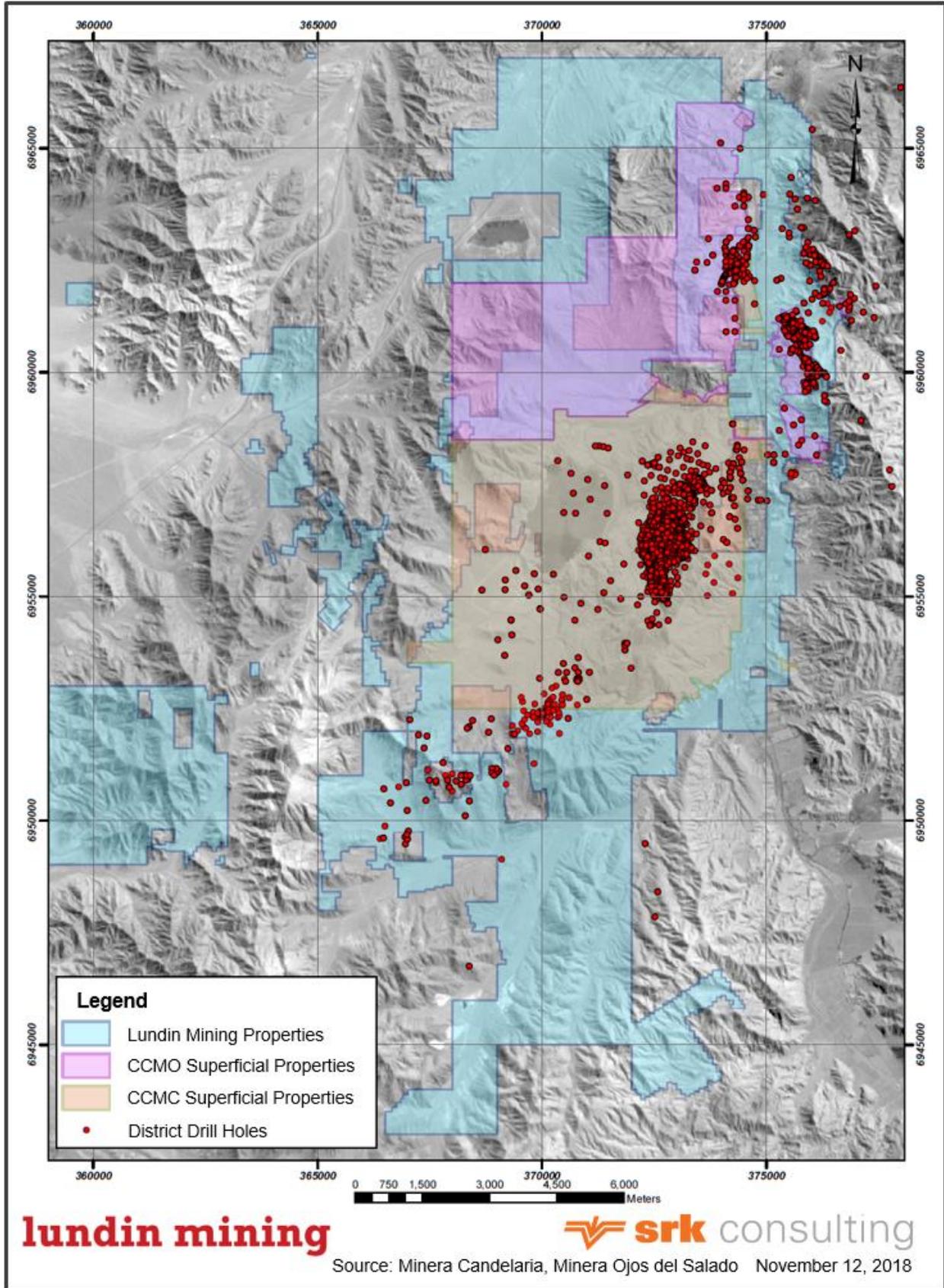


Figure 19: Location of Collars of Boreholes Drilled on the Candelaria Copper Mining Complex

Core recovery is routinely measured and typically exceeds 90 percent. Borehole spacing in the Mineral Resource areas is approximately 35 metres and wider along the edges of the Mineral Resource areas and beyond.

## 9.2 Drilling at Española

Since 1990 to 2004, there were five exploration diamond drill holes drilled in Española totaling 2,861 metres. Since July 2017 and the end of June 2018 there were 92 new diamond drill holes drilled totaling 31,370 metres. To date, Española has now 97 drill holes with 34,231 metres in total.

Most of drill holes had azimuth 0° to 358° and slopes between -54° and -90°. SG Drill surveyed deviations using Reflex with readings every 3 interval metres. Table 8 summarizes drilling information at the Española project.

**Table 8: Summary of Drilling Activities at the Española Project**

Year	Dust		Surface		Geotechnics		Underground		Total	
	Number	Metres	Number	Metres	Number	Metres	Number	Metres	Number	Metres
1990	-	-	1	456	-	-	-	-	1	456
1991	-	-	-	-	-	-	-	-	-	-
1992	-	-	-	-	-	-	-	-	-	-
1993	-	-	-	-	-	-	-	-	-	-
1994	-	-	-	-	-	-	-	-	-	-
1995	-	-	-	-	-	-	-	-	-	-
1996	-	-	-	-	-	-	-	-	-	-
1997	-	-	3	1,390	-	-	-	-	3	1,390
1998	-	-	-	-	-	-	-	-	-	-
1999	-	-	-	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-	-	-	-
2001	-	-	-	-	-	-	-	-	-	-
2002	-	-	-	-	-	-	-	-	-	-
2003	-	-	-	-	-	-	-	-	-	-
2004	-	-	1	1,015	-	-	-	-	1	1,015
2005	-	-	-	-	-	-	-	-	-	-
2006	-	-	-	-	-	-	-	-	-	-
2007	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	-	-	-	-
2012	-	-	-	-	-	-	-	-	-	-
2013	-	-	-	-	-	-	-	-	-	-
2014	-	-	-	-	-	-	-	-	-	-
2015	-	-	-	-	-	-	-	-	-	-
2016	-	-	-	-	-	-	-	-	-	-
2017	-	-	15	8,676	-	-	-	-	15	8,676
2018*	-	-	77	22,694	-	-	-	-	77	22,694
<b>Total</b>	-	-	<b>97</b>	<b>34,231</b>	-	-	-	-	<b>97</b>	<b>34,231</b>

\* First, second quarter and until end of August of 2018

## 9.3 Drilling at Ojos del Salado

### 9.3.1 Santos Mine

In the Santos mine, a total 1,504 core boreholes (304,946 metres) were drilled from underground and surface stations from 1988 until June 30, 2018. Since July 2017 drilling has occurred underground in sectors Meléndez Norte, Helena, and Malaquita, and from the surface drilling occurred over Isabel Oeste and South Santos. The majority of the boreholes were drilled with an azimuth of 65 or 245 degrees with inclinations between -82 and +90 degrees. Borehole lengths vary between 40 and 728 metres. Down-hole deviations are monitored at regular intervals using Reflex tools. Table 9 shows a summary of the drilling activities completed for Santos mine.

All boreholes are collared with HQ-sized equipment; boreholes size was reduced in long boreholes or in fracture zones. All drilling in the Santos mine was originally completed by the Connors Drilling Group. More recent drilling was completed by Boart-Longyear.

**Table 9: Summary of Drilling Activities Completed at the Santos Mine**

Year	Dust		Surface		Geotechnics		Underground		Total	
	Number	Metres	Number	Metres	Number	Metres	Number	Metres	Number	Metres
1988	-	-	96	15,464	-	-	32	4,944	128	20,108
1989	-	-	17	3,651	-	-	49	5,773	66	9,424
1990	-	-	9	1,455	-	-	24	2,617	33	4,072
1991	-	-	-	-	-	-	17	3,327	17	3,327
1992	-	-	23	11,019	-	-	28	4,637	51	15,656
1993	-	-	32	12,766	-	-	26	2,978	58	15,744
1994	-	-	-	-	-	-	129	14,463	129	14,463
1995	-	-	-	-	-	-	18	1,520	18	1,520
1996	-	-	-	-	-	-	10	2,099	10	2,099
1997	-	-	-	-	-	-	22	5,398	22	5,398
1998	-	-	-	-	-	-	3	654	3	654
1999	-	-	-	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-	-	-	-
2001	-	-	-	-	-	-	-	-	-	-
2002	-	-	-	-	-	-	-	-	-	-
2003	-	-	-	-	-	-	-	-	-	-
2004	-	-	-	-	-	-	30	5,549	30	5,549
2005	-	-	-	-	-	-	52	11,764	52	11,764
2006	-	-	21	7,972	-	-	74	15,318	95	23,291
2007	-	-	6	1,261	-	-	90	16,156	96	17,417
2008	-	-	-	-	-	-	109	22,128	109	22,128
2009	-	-	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	92	15,818	92	15,818
2012	-	-	-	-	-	-	77	18,845	77	18,845
2013	-	-	-	-	-	-	85	21,923	85	21,923
2014	-	-	-	-	-	-	35	7,121	35	7,121
2015	-	-	-	-	-	-	91	15,949	91	15,949
2016	-	-	-	-	-	-	69	17,791	69	17,791
2017	-	-	-	-	-	-	92	22,432	92	22,432
2018*	-	-	8	2,510	-	-	38	9,643	46	12,154
<b>Total</b>	-	-	<b>212</b>	<b>56,098</b>	-	-	<b>1,292</b>	<b>248,847</b>	<b>1,504</b>	<b>304,946</b>

\* First and second quarter of 2018

### 9.3.2 Alcaparrosa Mine

The borehole data base for the Alcaparrosa mine contains 1,085 boreholes (263,634 metres) drilled from surface and underground locations since 1990 and until the June 30, 2018. Since July 2017 drilling has occurred in the west central sector of Alcaparrosa. Most of the boreholes were drilled with an azimuth of 65 and 245 degrees with inclinations between -82 degrees and +90 degrees. Borehole lengths vary between 70 and 600 metres. Down-hole deviations are monitored at regular intervals using Reflex tools. Table 10 shows a summary of the drilling activities completed for the Alcaparrosa mine.

**Table 10: Summary of Drilling Activities Completed at the Alcaparrosa Mine**

Year	Dust		Surface		Geotechnics		Underground		Total	
	Number	Metres	Number	Metres	Number	Metres	Number	Metres	Number	Metres
1990	-	-	31	15,381	-	-	-	-	31	15,381
1991	-	-	15	7,854	-	-	-	-	15	7,854
1992	-	-	19	7,706	-	-	-	-	19	7,706
1993	-	-	34	11,392	-	-	45	14,129	79	25,521
1994	-	-	14	3,817	-	-	28	6,653	42	10,470
1995	-	-	-	-	-	-	-	-	-	-
1996	-	-	-	-	-	-	2	247	2	247
1997	-	-	-	-	-	-	50	7,025	50	7,025
1998	-	-	-	-	-	-	-	-	-	-
1999	-	-	-	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-	-	-	-
2001	-	-	-	-	-	-	-	-	-	-
2002	-	-	-	-	-	-	-	-	-	-
2003	-	-	14	6,004	-	-	4	1,672	18	7,677
2004	-	-	8	5,552	-	-	27	6,071	35	11,623
2005	-	-	7	6,753	-	-	20	6,959	27	13,712
2006	-	-	3	1,378	-	-	-	-	3	1,378
2007	-	-	-	-	-	-	66	7,783	66	7,783
2008	-	-	-	-	-	-	26	4,278	26	4,278
2009	-	-	-	-	-	-	85	12,261	85	12,261
2010	-	-	-	-	-	-	81	16,449	81	16,449
2011	-	-	10	5,932	-	-	95	13,914	105	19,846
2012	-	-	9	4,277	-	-	35	9,049	44	13,326
2013	-	-	-	-	-	-	112	22,755	112	22,755
2014	-	-	-	-	-	-	28	7,161	28	7,161
2015	-	-	-	-	-	-	81	22,130	81	22,130
2016	-	-	5	2,397	-	-	19	3,200	24	5,597
2017	-	-	-	-	-	-	59	12,659	59	12,659
2018*	-	-	-	-	-	-	53	10,798	53	10,798
<b>Total</b>	-	-	<b>169</b>	<b>78,443</b>	-	-	<b>916</b>	<b>185,192</b>	<b>1,085</b>	<b>263,634</b>

\* First and second quarter of 2018

## 9.4 Sampling Method and Approach

Logging and sampling procedures at Minera Candelaria and Minera Ojos del Salado operations follow similar approaches using documented protocols. Geology logging records information about rock type, mineralogy, textures, structures, mineralization, and alteration. Geotechnical logging records information about core recovery, rock quality designation (RQD), hardness, and the number and nature of fractures. In addition, point load tests were performed at selected intervals. Until

January 2012, geotechnical logging was performed by mine personnel, after this date that work was contracted. Core photographs were initially taken of uncut core of selected drill holes. During 2017, core photography was implemented for all drill holes, and the subsequent information is loaded and stored into the Acquire database.

Before 2007, samples were taken at 1-metre intervals. After 2007 onward, sample intervals for the open pit were increased to 2 metres. Analytical samples were taken from core cut lengthwise using a diamond saw. Half of the core is retained in core boxes for reference. For the Candelaria Open Pit, core was sampled from two bench heights above known mineralization to the bottom of the borehole. For the underground mines, core is sampled on the basis of visible sulphides. The top parts of boreholes were not sampled. Sampling is carried out by a contractor under the supervision of mine personnel. At Candelaria, in late 2016, in the underground mines, core sample length was increased from 1 to 2 metres in length.

Before 2014, primary information such as collar coordinates, survey data, as well as geological and geotechnical logging data was entered into Microsoft® Excel sheets and later aggregated into a final database by authorized personnel from the geology team. Since 2015 logging information is captured digitally and transferred to the main project Acquire database automatically.

## 9.5 SRK Comments

SRK has witnessed drilling and sampling activities on the operations on numerous occasions and believes that the drilling and sampling procedures adopted by the Candelaria Copper Mining Complex are consistent with generally recognized industry best practices. The resultant drilling pattern is sufficiently dense to interpret the geometry and the boundaries of the copper and gold mineralization with confidence. Core samples were collected by competent personnel using procedures meeting generally accepted industry best practices. The process is undertaken or supervised by suitably qualified geologists. SRK concludes that the samples are representative of the source materials and there is no evidence that the sampling process introduced a bias.

## 10 Sample Preparation, Analyses, and Security

### 10.1 Historical Samples

The borehole sampling preparation, analyses, and security procedures utilized by ENAMI and its predecessors between 1929 and 1985 are unknown.

### 10.2 Core Samples (1985 to Present)

#### 10.2.1 Minera Candelaria

Analytical samples informing the Candelaria Open Pit Mineral Resources were prepared and assayed at the Candelaria mine site. In 2014, the laboratory was certified to International Standards Organization (ISO)17025 by the National Institute of Standardization (INN) of Chile for the analyses of copper, iron, zinc, and silver. Compliance to the ISO standard is being verified yearly by the INN. The laboratory is not independent from Minera Candelaria. It is managed by the Candelaria Processing Department.

Analytical samples informing the Ojos del Salado Mineral Resources were prepared and assayed by Intertek (formerly Vigalab) in Paipote, Chile. Intertek is a global group operating 13 laboratories in Chile with a management system accredited to ISO9001. Intertek's laboratories are independent from Minera Ojos del Salado.

Minera Candelaria uses Intertek in Paipote as an umpire laboratory.

The sample analyses used for the Mineral Resource reporting for the Española project were prepared by Geolaquim Ltda. (Geolaquim) (80 percent) and Intertek I (20 percent). Geolaquim is certified under regulation ISO 17025 by the INN for concentrated minerals and others (soluble copper, total copper, iron and gold).

Prior to 2006, Minera Ojos del Salado used Geolab as an umpire laboratory. As far as SRK was able to determine, Geolab is independent from Minera Ojos del Salado. After 2006, Minera Ojos del Salado used ALS Limited (ALS) laboratory in Coquimbo as an umpire laboratory. The management system of the ALS Minerals Group laboratories is accredited to ISO-9001:2000 by QMI Management Systems. ALS is independent from Minera Ojos del Salado. Since 2016, the Candelaria laboratory has been used as an umpire laboratory.

The sample preparation and analytical methodologies used for assaying Candelaria, Española, and Ojos del Salado samples are similar.

Upon reception, sample details are recorded and insertion points for quality control samples in the sample stream are determined. Sample preparation includes drying at 105 degrees Celsius in a forced air furnace, primary crushing to 100 percent passing 5 millimetres, secondary crushing cycle to 90 percent passing 1.68 millimetres (12 mesh). Grinding tests are conducted on every 40th sample.

From the crushed material two 1-kilogram samples (Sample A and B) are prepared using a rotary splitter. Coarse rejects are retained and kept in storage. Both samples A and B are pulverized separately to 95 percent passing 0.106 millimetres (140 mesh). Sample A is subdivided into four

subsamples: one subsample with approximately 200 grams, and three subsamples weighing approximately 100 grams each (A1, A2, and A3) and are used for quality control. Sample B is subdivided into two subsamples: one weighing approximately 200 grams and the other (B1) approximately 100 grams. The two heavier subsamples are kept for future reference or as backup should more sample material be required.

Copper, silver, zinc, and iron are analyzed by multi acid digestion and atomic absorption spectroscopy (AAS). Copper assays greater than 6 percent are re-analyzed systematically. Gold is also assayed in 30-gram aliquots by fire assay with AAS finish. Minera Ojos del Salado began assaying for zinc in January 2015.

Assay data are loaded directly from digital assay result files into the final database in order to minimize entry errors.

### 10.3 Specific Gravity Data

Specific gravity (SG) is measured systematically over the full sample intervals. For each sample interval, all core fragments larger than 5 centimetres in length are collected and used to measure specific gravity using a water displacement method without paraffin coating. Measurements are duplicated every 20 measurements and the scale is checked frequently using a 2-kilogram weight.

### 10.4 Quality Assurance and Quality Control Programs

Quality assurance and quality control programs are typically set in place to ensure the reliability and trustworthiness of the exploration data. They include written field procedures and independent verifications of aspects such as drilling, surveying, sampling and assaying, data management, and database integrity. Appropriate documentation of quality control measures and regular analysis of quality control data are important as a safeguard for the project data and form the basis for the quality assurance program implemented during exploration.

Analytical control measures typically involve internal and external laboratory control measures implemented to monitor the precision and accuracy of the sampling, preparation, and assaying. They are also important to prevent sample mix-up and monitor the voluntary or inadvertent contamination of samples. Assaying protocols typically involve regular duplicate and replicate assays and insertion of quality control samples. Check assaying is typically performed as an additional reliability test of assaying results. This typically involves re-assaying a set number of rejects and pulps at a second umpire laboratory.

#### 10.4.1 Historical Analytical Quality Control at Alcaparrosa

No information exists about the analytical quality control procedures at Alcaparrosa between 1929 and 1985.

#### 10.4.2 Analytical Quality Control (1985 to Present)

##### **Minera Candelaria and Española**

The analytical quality control program implemented at Candelaria includes the use of control samples (coarse and pulp duplicate samples and reference material samples) inserted within all samples submitted for assaying. Pulp duplicate samples are inserted at a rate of one every 20 samples. Preparation duplicate samples from the B samples (see Section 10.2) are inserted at a rate of one every 40 samples. Pulp sample duplicates A (A1, A2, A3) are inserted in a range of one

every 20 samples (A2) in the same laboratory. A duplicate every 20 metres (A3) is sent to an umpire laboratory. Duplicates for sample preparation B (B1) are inserted in a range of one every 40 samples.

Prior to 2016, six different reference materials were created from Candelaria samples and certified for copper and gold by round robin testing under the supervision of ALS Minerals in Copiapó. Copper grades of the reference material range from 0.50 to 3.69 percent copper. Reference material samples were inserted at a rate of one every 20 samples.

Since 2015 reference materials have been prepared by INTEM laboratory. New reference materials were created for copper and gold of low grade, medium grade, high grade and blanks. Ten laboratories are used in the round robin process to define the recommended grade and variance of the reference materials.

After sample preparation, pulps are relabeled. A duplicate and approximately 5 percent of the samples are sent to the umpire laboratory.

Analytical quality control procedures were improved during 2016. Four reference material were prepared (IN-PT-5301 procedure) at the INTEM laboratory in Antofagasta, Chile following the ISO-34 guide (General Requirements for the Competence of Reference Material Producers). The four reference material samples are:

- IN-BMF-233: Blank 2016, (0.004 percent copper, 1.0 parts per million (ppm) silver, 0.01 ppm gold)
- IN-C080-230: Low grade 2016 (0.293 percent copper, 2.2 ppm silver, 0.079 ppm gold)
- IN-C080-231: Medium grade 2016 (0.658 percent copper, 2.8 ppm silver, 0.138 ppm gold)
- IN-C080-232: High grade 2016, (1.373 percent copper, 3.1 ppm silver, 0.275 ppm gold)

During 2018 new reference material samples were prepared by INTEM laboratory according to procedure IN-PT-5301.

- IN-BMF-333: Blank 2018, (0.004 percent copper, < 1.0 ppm silver, < 10 ppb gold)
- IN-C080-316: Low Grade 2018, (0.208 percent copper, 0.9 ppm silver, 0.041 ppm gold)
- IN-C080-317: Average Grade 2018, (0.572 percent copper, 2.5 ppm silver, 0.155 ppm gold)
- IN-C080-318: High Grade 2018, (1.465 percent copper, 8.0 ppm silver, 0.346 ppm gold)

Since 2016, exploration data are managed through an Acquire database, which include quality control management features for sample coordinates from borehole surveys and data management tools. Sample numbering and labelling is controlled through Acquire, including insertion of quality control samples and consignment notes to the primary laboratories. Analytical results are received electronically and managed through Acquire with quality control filters. Samples outside defined limits are rejected by Acquire and flagged for further investigation. The Acquire system includes features for reporting analytical results and preparing bias charts and time series plots.

## **Minera Ojos del Salado**

Prior to 2006, the analytical quality control program at Ojos del Salado consisted of the use of control samples (pulp duplicate samples) and the use of check assaying at an umpire laboratory. No field duplicates, standard reference material, or blank material were submitted prior to 2006.

Analysis of quality control data during this time by AMEC (2013b) highlighted the poor performance of the pulp duplicate samples, especially for copper. Because the duplicate samples

performed better for gold, AMEC (2013b) concluded that the overall performance of the quality control data was satisfactory.

Starting in 2006, Minera Ojos del Salado changed the analytical quality control procedures to replicate those in use at Candelaria.

Since 2016, Ojos del Salado samples are now also managed through the Acquire system similarly to Minera Candelaria.

## 10.5 Sample Security

Information about the sample security in the historical exploration period prior to Minera Candelaria and Minera Ojos del Salado's involvement is unavailable.

All drilling assay samples are collected by a contractor under the direct supervision of a mine geologist. Samples from Candelaria are processed and analyzed entirely at the mine site. Samples from Ojos del Salado are shipped directly from the property to the Intertek laboratory in Paipote.

Assay samples are collected by appropriately qualified staff at the laboratories. Sample security involved maintaining the chain of custody of samples to prevent inadvertent contamination or mixing of samples and rendering active tampering as difficult as possible.

During the site visit, SRK found no evidence of active tampering or inadvertent contamination of assay samples collected either on the Candelaria or Ojos del Salado properties.

## 10.6 SRK Comments

SRK reviewed the field procedures and analytical quality control measures used at the Candelaria Copper Mining Complex operations. In the opinion of SRK, company personnel used care in the collection and management of the field and assaying exploration and production data. Based on historical reports and data available, SRK has no reason to doubt the reliability of exploration and production information provided by the Candelaria Copper Mining Complex.

The introduction of the Acquire-based database / analytical data management system in 2016 has further enhanced the integrity exploration data and analytical quality control procedures at Minera Candelaria and Minera Ojos del Salado. The reports and analytical results examined by SRK suggest that the analytical results delivered by the primary laboratories used by the Candelaria Copper Mining Complex are free of apparent bias.

In the opinion of SRK, the sampling preparation, security, and analytical procedures used by the Candelaria Copper Mining Complex are consistent with generally accepted industry best practices and are therefore adequate to support Mineral Resource estimation.

## 11 Data Verification

### 11.1 Verifications by the Candelaria Copper Mining Complex

The exploration and production work completed by the Candelaria Copper Mining Complex was conducted using documented procedures and involved extensive verification and validation of exploration and production data prior to them being considered for geological modelling and Mineral Resource estimation. During drilling, experienced mine geologists implemented industry standard measures designed to ensure the reliability and trustworthiness of the exploration data.

Candelaria Copper Mining Complex technical staff monitor analytical quality control data on a real-time basis. Exploration data are managed through an Acquire database, which includes extensive quality control features and tools to facilitate ongoing monitoring and reporting. Quality control failures are investigated, and appropriate actions are taken when necessary, including requesting re-assaying of certain batches of samples.

### 11.2 Verifications by SRK

#### 11.2.1 Site Visit

Technical consultants from SRK have visited the Candelaria and Ojos del Salado properties on numerous occasions. In accordance with National Instrument 43-101 guidelines, a team of professionals under the supervision of SRK visited the Candelaria and Ojos del Salado properties from June 10 to 12 and from June 14 to 16, 2014, accompanied by representatives of Lundin. The team included Glen Cole, PGeo, Gary Poxleitner, PEng, and Maria Ines Vidal, MAusIMM, from SRK, and Daniel Sepulveda, and John Nilsson, PEng, both independent consultants.

SRK conducted another site visit from July 6 to July 10, 2015. The team included Jean-Francois Couture, PGeo, Gary Poxleitner, PEng, and Maria Ines Vidal, MAusIMM, from SRK, and John Nilsson, PEng, an independent consultant. Jean-Francois Couture, Gary Poxleitner, and John Nilsson are qualified persons pursuant to National Instrument 43-101.

SRK returned to the Candelaria Copper Mining Complex from December 14 to 16, 2016. The team included Glen Cole, PGeo, Benny Zhang, PEng, Maria Ines Vidal, MAusIMM, from SRK and John Nilsson, PEng, an independent consultant.

On November 8 and 9, 2017 Glen Cole, PGeo, Benny Zhang, PEng, Maria Ines Vidal, MAusIMM, from SRK visited the Candelaria Copper Mining Complex. John Nilsson, PEng, an independent consultant, also visited the mine complex from October 9 to 13, 2017.

The most recent site visit by SRK technical consultants was on October 30 and 31, 2018. Glen Cole, PGeo, Sean Kautzman, PEng, Maria Ines Vidal, MAusIMM, from SRK visited the Candelaria Copper Mining Complex. John Nilsson, PEng, an independent consultant, also visited the mine complex at this time.

The site visits took place during active drilling and production activities. Aspects that could materially impact the integrity of the data informing the Mineral Resources (core logging, sampling, analytical results, and database management) were reviewed with Minera Candelaria and Minera

Ojos del Salado staff. SRK also interviewed mine staff to ascertain exploration and production procedures and protocols.

SRK has examined core from several boreholes and found that the logging information accurately reflects actual core. The lithology contacts checked by SRK match the information reported in the core logs.

On October 31, 2018, SRK toured the Candelaria Norte underground mine, one of the three underground operations. Areas of the mine observed included mine development, sub-level stoping activities, and the current raise boring project. An inspection of the new Española open pit project was also undertaken. SRK also met with technical discipline heads to discuss aspects of the latest Mineral Resource and Mineral Reserve estimates.

### **11.2.2 Review of Exploration Data and Mineral Resource Models**

SRK reviewed the borehole databases, Mineral Resource models, documented Mineral Resource estimation procedures and digital mine infrastructure wireframes. For the preparation of this technical report, SRK was able to reproduce block model estimates for a representative sample of the block models to a satisfactory degree.

SRK also completed statistical comparison of the global block models grade against the informing drilling data and visually compared on plans and sections the block models against the informing composites to confirm that the various models are generally an adequate representation of the distribution of the copper, gold, and silver mineralization.

The Candelaria Open Pit Mineral Resource model is routinely compared against the production model derived from blasthole samples and the Mineral Resource estimation parameters are periodically adjusted accordingly. On average, the Mineral Resource model under evaluates the metal content of a bench by a few percent relative to the blasthole model.

After comparing the open pit and underground Mineral Resource models against the informing composites and the statistics of the production model (long and short-term models), SRK concludes that the Candelaria Copper Mining Complex estimation approach produces a reasonable and reliable model adequate to support open pit mining and which adequately reconciles to monthly production data.

## 12 Mineral Processing and Metallurgical Testing

The Candelaria Copper Mining Complex is a mature mining operation. Mineral processing and metallurgical testwork completed prior to the commissioning of the Candelaria and Pedro Aguirre Cerda (PAC) processing plants are not relevant to this technical report. Both processing plants have been in operation for many years and produce copper concentrates that are sold to customers worldwide (see Section 18). A summary of the performance of the processing plants is provided in section 16 of this technical report. Metal recovery assumptions are derived by ore type from historical performance of the processing plants. Other than those stated in Sections 16 and 18, there are no other processing factors or deleterious elements that could have a significant impact on economic extraction.

As part of the ongoing operations, both processing plants undertake ongoing testing programs. This section describes the testing programs undertaken and updated during normal operations.

### 12.1 Mineralogy

The sulphide mineralization at Candelaria and Ojos del Salado is classified as an IOCG deposit where minerals of interest occur in breccia, stockwork and veinlets disseminated in andesite rock. Copper and magnetite minerals coexist or appear independent from each other in the host rock.

Largely dominant minerals are potassium feldspar, biotite, quartz and plagioclase. The sulphide mineralization is dominated by pyrite while copper is present as chalcopyrite representing approximately four percent of the mineralization (see Figure 20 for a QEMSCAN summary of overall composition).

Chalcopyrite is present across all size fractions with the majority in the 38- to 150-micrometre range. Similarly, the dominant mineralogy species (including iron oxides) maintain their presence across all particle sizes. Gold and silver are associated with sulphide minerals, primarily chalcopyrite and pyrite. Varying gold content in the pyrite is associated with gold losses to flotation tailings.

### 12.2 Metallurgical Testing

Minera Candelaria maintains regular metallurgical testing programs that are incorporated into statistical models to predict historical metallurgical performance and improve its processing performance in terms of mill throughput, metal recovery to concentrate and final concentrate grade.

Metallurgical tests are executed in several specialized facilities such as Universidad de Atacama and at commercial third-party laboratories in Chile, including SGS Mineral Services, Aminpro and Starkey & Associates.

Regular testing by Geological Unit (Unidad Geológica, UG) includes rock hardness classification (see Table 11) for extra-hard (UG 77), hard (UG 57 and 59), moderate (UG 40 and 68), soft (UG5-61) and extra-soft (UG 67) units. In addition, bench scale flotation testing is correlated with industrial scale results to predict mill throughput and metallurgical performance.

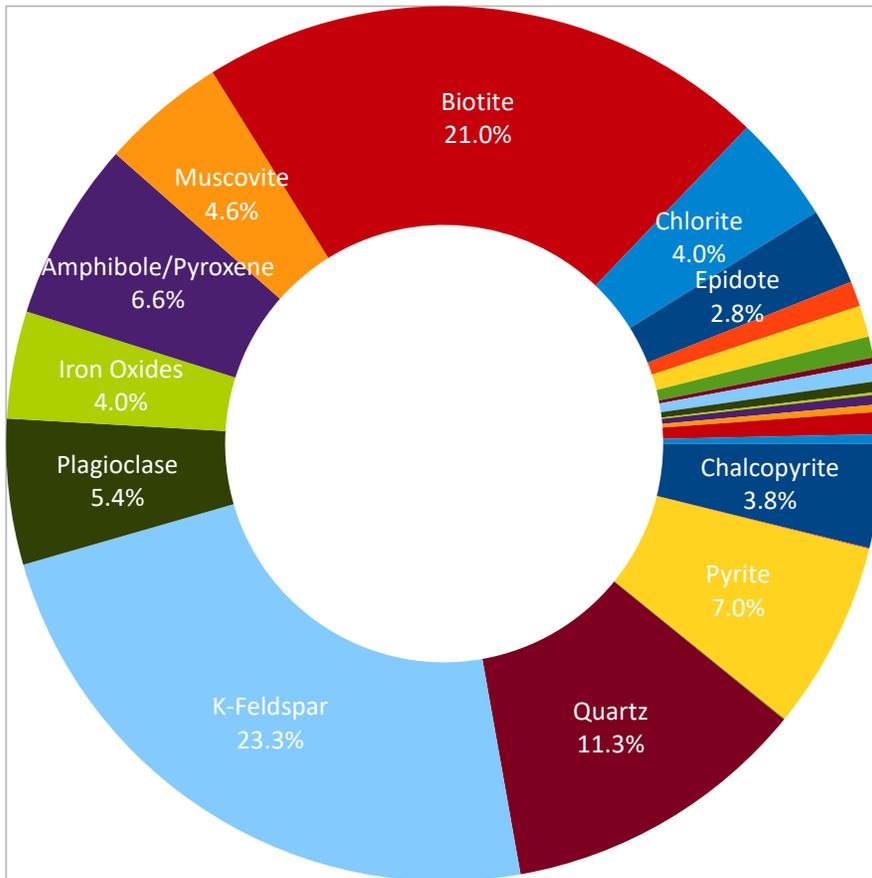


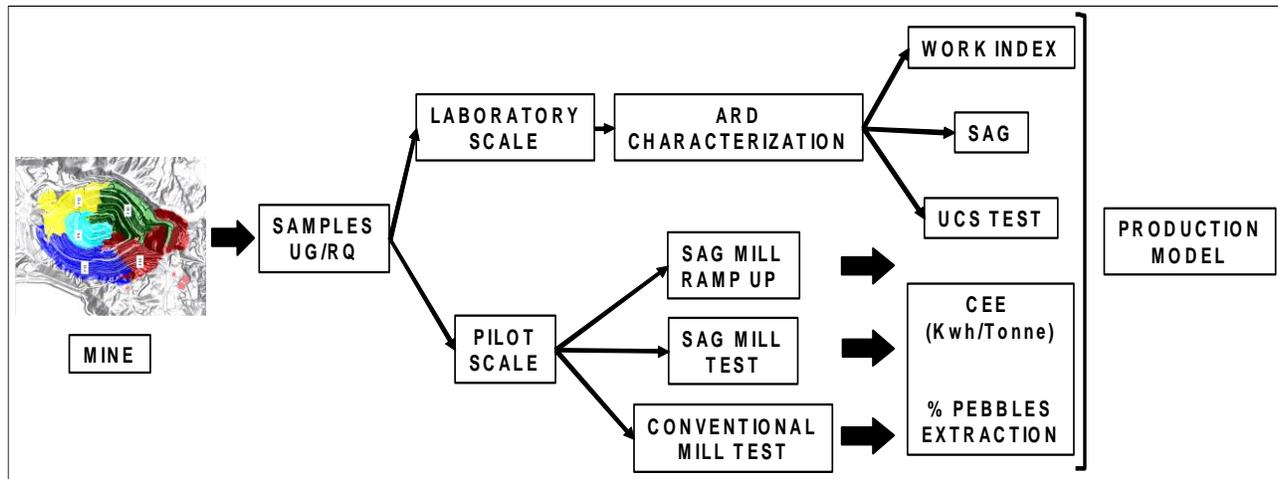
Figure 20: Typical Mill Feed Mineralogy (QEMSCAN Analysis)

Table 11: Rock Hardness Classification, Unconfined Compressive Strength (UCS)

Hardness Category	UCS (MPa)
Extra Hard	180 to 240
Hard	140 to 180
Intermediate	100 to 140
Soft	20 to 100

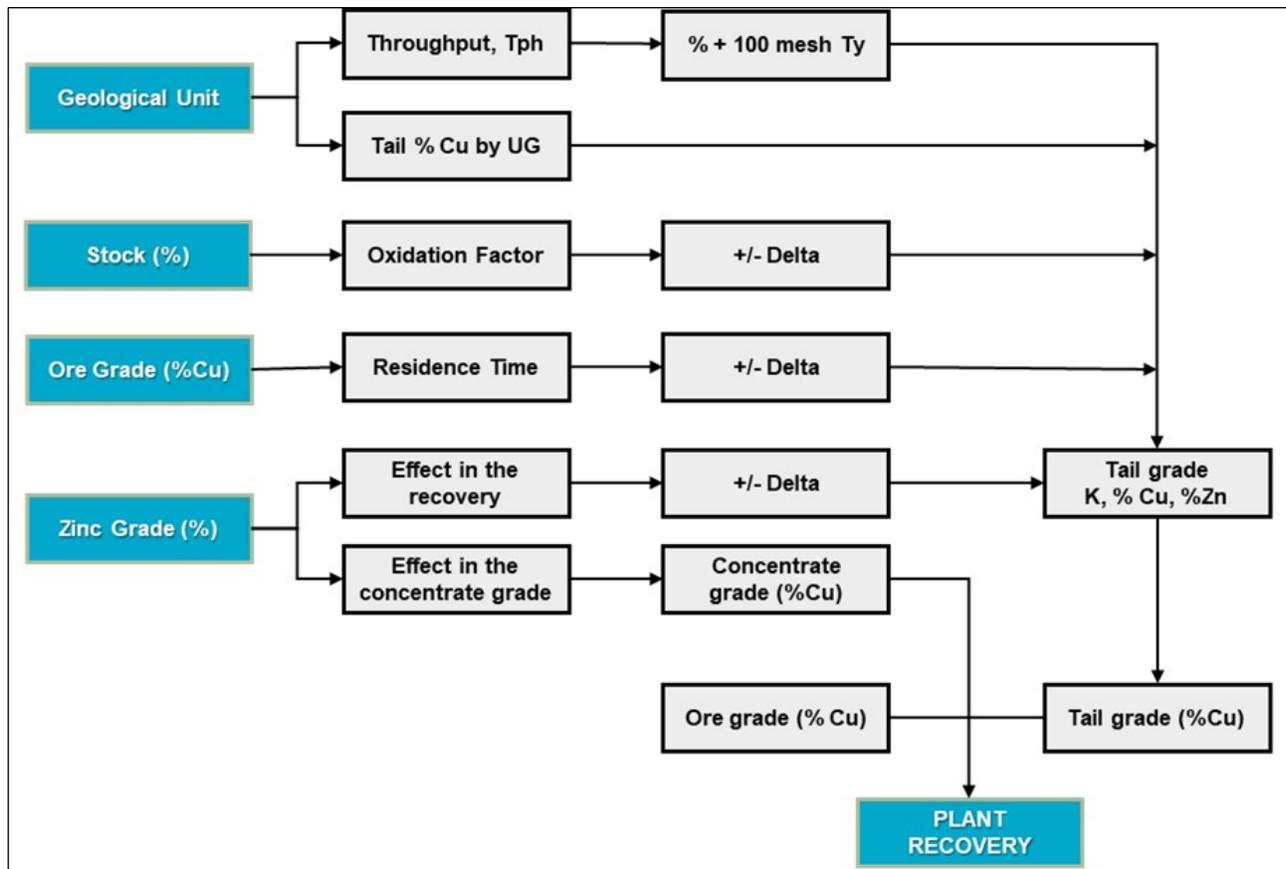
Figure 21 shows the structure of the throughput forecasting model that is updated and maintained by Candelaria personnel. Relationships between UG, specific grinding energy (kWh/t), Rock Quality (RQ) Designation, weight fraction of -25 millimetres after blasting and pebble production rate are used to predict grinding circuit power requirements and plant capacity, based on mill availabilities.

In addition, copper recovery to final concentrate is modelled by UG, including factors for grind size (and its effect on tailings grade), zinc head grade and level of stockpile oxidation. As depicted in Figure 22, copper head grade is also incorporated. At present, any effect of secondary copper minerals (e.g., acid soluble copper) is not included in the copper recovery model. Precious metal recovery is not related to UG and is relatively constant for both gold and silver depending on the open pit or underground source



**Figure 21: Structure of Throughput Forecasting Model (schematic)**

Source: Minera Candelaria



**Figure 22: Structure of Copper Recovery Forecasting Model (schematic)**

Source: Minera Candelaria

Recent exploration programmes have discovered additional Mineral Resources and Reserves and resulted in extended mine lives. New metallurgical tests were initiated in late 2016 as part of a feasibility study to evaluate a potential throughput increase of the Candelaria mill. The material tested was a blend of ore considered representative of future feedstock. Testwork included semi-autogenous grinding (SAG) and ball mill pilot testing (SGS Minerals S.A. 2017), specific SAGDesign<sup>®</sup> tests (Starkey & Associates 2016), bench scale flotation kinetic modelling and automated scanning electron microscopy (QEMSCAN). Results and analysis from this testwork programme were evaluated using the Ausenco Ausgrind methodology to improve confidence in the estimated throughput for the life of mine plan.

Internal testwork is undertaken with SPI, Bond ball mill (BWi) and rod mill work index (RWi) testing along with laboratory flotation tests for routine characterization and ongoing adjustment/development of geometallurgical models. The SPI is being superseded by the SMC test procedure as a reference of SAG mill-related ore hardness as the SPI methodology was found to be not sensitive enough to characterize hard and extra-hard ore types (UGs 57, 59 and 77). Table 12 summarizes the metallurgical testwork undertaken to date in 2017 and 2018.

In parallel with the mill expansion study, a number of process initiatives have commenced focusing on debottlenecking and improving the existing facilities. As a part of these initiatives, further variability testwork programs were initiated. The Mine-to-Mill study is evaluating potential improvements in primary crusher feed size from blasting (both underground and the open pit) and the effect on overall comminution specific energy. This is combined with a geometallurgical initiative to characterize different geological zones, adding to the existing database and incorporating more underground sections.

**Table 12: Metallurgical Testwork 2017-2018**

<b>Testwork</b>	<b># Samples</b>	<b>Investigation</b>
<b>Comminution</b>		
Bond BWi & RWi	112	Phase 9, Candelaria Underground (North Sector); operational control
SMC	143	Mine-to-Mill project
Point Load Index	143	Mine-to-Mill project
SPI	136	Phase 9, Candelaria Underground (North Sector); operational control; Mine-to-Mill project
Bond BWi	143	Mine-to-Mill project
Bond Ai	21	Phase 9, Candelaria Underground (North Sector)
<b>Flotation</b>		
Rougher	30	Mine-to-Mill project
Rougher	154	Operational optimization

As discussed in Section 16.3, the Candelaria Mill Optimization Project (CMOP) includes upgrades in grinding, classification and flotation circuit capacity. The anticipated improvement in copper recovery will substantially address the shortfall associated with previous expansions in plant throughput. However, head grade will remain at 0.5 to 0.7 percent copper and limit the benefits of these initiatives compared with, historically higher copper grades.

## 13 Mineral Resource Estimates

### 13.1 Introduction

The Mineral Resources for Minera Candelaria comprise, primarily, the Candelaria iron oxide copper gold (IOCG) deposit. The central area of this deposit is mined by open pit methods and its northeast, south and west flanks are currently mined or planned to be mined by underground methods. The northeast flank of the Candelaria Pit, called Candelaria Underground North Sector, is currently mined by underground methods. In 2018 a new sector, the Wedge Gap, was included. It is located between the Candelaria Underground North Sector and the ultimate limits of the Candelaria Open Pit and will be eventually mined by underground mining methods. The Damiana, Susana, Mariana and West areas located, clockwise in that order, from the south to the west flanks of the Candelaria Open Pit are jointly known as the Candelaria Underground South Sector and will be also eventually mined by underground methods. In 2018, Mineral Resources were delineated for the first time at the Española project, which is a satellite deposit located four kilometres southwest of the Candelaria Open Pit. This area will be eventually mined by open pit methods.

The Mineral Resources for Minera Ojos del Salado comprise two deposits, Alcaparrosa and Santos, currently mined by underground mining methods.

Since 2016, the Mineral Resource models are generated by the Resource Definition Department of the Candelaria Copper Mining Complex. The Mineral Resource models for the Candelaria Underground South and North Sectors are separated from the Mineral Resource model for the Candelaria Open Pit. These three Mineral Resources models were updated in 2018 with new drilling information, and a new separate Mineral Resources model was created for the Española project.

The integrated Mineral Resource model for the Santos deposit has been expanded in 2018 to include the areas of Veta Isabel (Malaquita SE) and Cuerpo Nuevo. In 2018, the new integrated Mineral Resource model for the Alcaparrosa deposit comprises the seven areas modelled and reported separately until 2017. These two Mineral Resource models for Minera Ojos del Salado were updated with recent drilling information in 2018.

SRK reviewed and audited the Mineral Resource models generated by the personnel of the Resource Definition Department of the Candelaria Complex. This section outlines the Mineral Resource estimation methodology and summarizes the key assumptions considered for the preparation of the open pit and underground mines Mineral Resource models during the second quarter of 2018. Table 13 presents a list of the block models constructed in 2018 and their 2017 equivalents.

In the opinion of SRK, the Mineral Resource evaluation reported herein is a reasonable representation of the Mineral Resources found at the Candelaria Copper Mining Complex at the current level of sampling as of June 30, 2018. The Mineral Resources were estimated in conformity with generally accepted CIM *Estimation of Mineral Resource and Mineral Reserves Best Practices Guidelines* and are reported in accordance with Canadian Securities Administrators' National Instrument 43-101. Mineral Resources are not Mineral Reserves and have not demonstrated economic viability. There is no certainty that all or any part of the Mineral Resources will be converted into Mineral Reserves.

## 13.2 Mineral Resource Estimation and Classification Procedures

In 2018 the methodology used in building the Candelaria Open Pit model is very similar to the used for the Candelaria Underground models (North Sector, South Sector and Wedge Gap). Thus, the estimation methodology for Candelaria Open Pit is discussed along the methodology for Candelaria Underground and separately from the methodologies used for the Española project and the Minera Ojos del Salado (Alcaparrosa and Santos) deposits. Table 13, below, is a comparative list of the models built in 2017 and 2018.

**Table 13: Comparison between 2017 and 2018 Block Models**

<b>Mineral Resource Models 2017</b>	<b>Mineral Resource Models 2018</b>	<b>Latest Informing Data</b>	<b>Model Completion Date</b>
<b>Minera Candelaria</b>			
Candelaria Open Pit	Candelaria Open Pit	25/01/2018	31/03/2018
Candelaria Underground South Sector	Candelaria Underground South Sector	31/12/2017	31/03/2018
Candelaria Underground North Sector	Candelaria Underground North Sector	31/12/2017	28/02/2018
-	Candelaria Underground Wedge Gap Sector	30/06/2018	31/07/2018
-	Española Project	10/08/2018	31/08/2018
<b>Minera Ojos del Salado</b>			
Separated Alcaparrosa Underground Models:			
Alcaparrosa			
Caserón 11			
Sector North			
Sector Northeast	Integrated Alcaparrosa Underground Model	31/12/2017	31/03/2018
Sector Central			
Sector SW-SE-CE			
Sector Viviana			
Integrated Santos Model	Integrated Santos Model including the Veta Isabel and Cuerpo Nuevo areas	31/12/2017	31/03/2018

### 13.2.1 Minera Candelaria Open Pit and Underground Sectors

The Candelaria Underground South Sector Mineral Resource model includes four areas: Damiana, Susana, Mariana and West. The Mineral Resource model for Candelaria Underground North Sector comprises 18 areas (Candelaria Norte, Norte, Lila 1, Lila 2, Lila 3, Lila 4, Lila 5, Lila 6, Lila 7, Lila 8, Lila 9, Lila 10, West North, West Central, West South, Elisa, Elisa North and Elisa North 2). The Mineral Resource model for Wedge Gap Sector comprises a relatively small volume located between the pit cone that limits the Candelaria Open Pit Mineral Resources and the southern boundary of the Candelaria Underground North Sector model.

The global database available for the 2018 Mineral Resource estimation of the Candelaria Open Pit and Underground (North, South and Wedge Gap sectors) include 2,096 (786,120 metres) surface and 2,032 (448,592 metres) underground core boreholes. Percussion drilling and geotechnical holes were not considered for the Mineral Resource estimation. All exploration data are securely managed within the Candelaria Copper Mining Complex Acquire database. Table 14 summarizes the data effectively used for building the different Mineral Resource models of Candelaria Open Pit and Underground Sectors.

At the cut-off date January 25, 2018, the data informing the Mineral Resources of the Candelaria Open Pit and Underground South Sector comprised 3,601 core and percussion boreholes (1,064,042 metres) including 104 new boreholes (52,826 metres) drilled as part of the 2017 drilling

campaign. The number of samples effectively used is different for both sectors because the different domains considered in the Open Pit and Underground South Sectors. The data used for the Mineral Resource estimation of Candelaria Underground North and Wedge Gap sectors is a subset of the total Candelaria district drilling database comprising 2,018 core boreholes (499,531 metres).

The Candelaria Open Pit block model consists of 10- by 10- by 16-metre cells encompassing all the Candelaria area, including Candelaria Underground South Sector and a portion of Candelaria Underground North Sector. The three block models built for Candelaria Underground South, Candelaria Underground North and Wedge Gap sectors, respectively, consist of 5- by 5- by 4-metre cells.

Coded drilling data were used to generate 35-metre spaced transversal (southwest-northeast) sections for the geology and grade boundaries. 35-metre spaced longitudinal (southeast-northwest) sections and 16-metre spaced plans were built for the grade boundaries only. The lithological sections and plans were modelled within MineSight software as polyline files and were used together with the coded drilling data to build the lithological solids through implicit modelling in MineSight and Leapfrog software. The resulting solids were used to code the blocks within the different lithological units. The modelled surface of the Lar fault was used to divide the Open Pit block model in the East and West sectors. The grade boundaries in sections and plans were used to code all block models as three categories (less than 0.2 percent, above 0.2 percent, and above 1.5 percent copper) called ‘ore types’. The combination of the lithological units and three ore types generates the ‘geological units’ or domains coded in the block models.

The individual samples were composited to a 16-metre length, which corresponds to the open pit bench height, for the Open Pit Mineral Resource model, and to a 4-metre length for the Underground Mineral Resource models. The composite copper, gold, silver and zinc grades, and magnetite contents were obtained as averages weighted by the specific gravity and the length of individual samples. The composites were also coded by the geological and ore type codes.

The assessment and modelling of spatial continuity of copper, gold, silver and zinc composites, magnetite content, and specific gravity was performed using the Snowden Supervisor software within geological units and for the East and West sectors separately. All these variables were normal score transformed to analyze their corresponding anisotropy directions through variogram maps and to generate experimental variograms along such directions. The anisotropy directions were verified against the observed grade continuity in blast hole data within the different geological units. The variogram models fitted on the experimental normal scores variograms were back-transformed for their use in the estimation of the variables.

The nearest neighbour kriging algorithm (NNK) was used for the estimation of all variables in all Candelaria Mineral Resource models, except for specific gravity where ordinary kriging (OK) was used in the Candelaria Open Pit and Candelaria Underground South Sector Mineral Resource models. Estimation was performed in two passes. For all metals in all geological units, the first pass used a 100- by 100- by 50-metre search box oriented according to the copper variogram model. The dimensions and orientation of the second pass search ellipsoid for in each geological unit was dictated by the second structure of their corresponding copper variogram. For both passes, the minimum and maximum number of composites, and maximum number of composites per borehole were 2, 16 and 3, respectively. This configuration of informing data applied for all Candelaria models, metals and domains, except for the waste rock mineral type (outside the 0.2 percent copper grade shell) in Candelaria Underground North and Wedge Gap sectors, where a minimum of one composite was used. Differently from the metals, the estimation of specific gravity was performed using a spherical search with a minimum of two composites and a maximum of 12, with a maximum of 3 composites per borehole for each lithological type.

Under the nearest neighbour kriging estimation algorithm, an outlier search restriction to a distance equivalent to one and a half the lateral cell size (15 metres for the open pit models, 7.5 metres for the underground models) was applied to the copper, gold, silver and zinc, and magnetite content exceeding the 97.8 percentile of their corresponding populations within each lithological unit. No outlier restriction was applied for the estimation of the specific gravity in any sector.

The Lar fault surface was used as a hard boundary for the estimation of all variables in the Candelaria Open Pit Mineral Resource model. In all models, Open Pit and Underground, the estimation of copper, gold and silver were constrained by the ore type and the lithological codes. The estimation of zinc, magnetite content and specific gravity was constrained only by the lithological units. The 0.2 percent and the 1.5 percent copper grade shells defining the three main ore types were used as soft and hard boundaries, respectively. The boundaries between lithological units were considered as hard. Table 14 summarizes the data and estimation strategy used to build the four different Candelaria Open Pit and Underground Mineral Resource models.

The Mineral Resource models were validated against short-term models built using blasthole data.

**Table 14: Interpolation Data and Parameters for Candelaria Open Pit and Underground Sectors**

Parameter	Candelaria Open Pit	Candelaria South Susana, Damiana, Mariana, Candelaria West	Candelaria North  Integrated Model	Wedge Gap
<b>Last model date</b>	<b>31/03/2018</b>	<b>31/03/2018</b>	<b>28/02/2018</b>	<b>31/07/2018</b>
<b>Drilling</b>				
Type	Core drilling	Core drilling	Core drilling	Core drilling
Number <sup>(1)</sup>	3,601	3,601	1,864	217
Metres	1,064,042	1,064,042	439,611	59,920
<b>Data</b>				
Samples <sup>(2)</sup>	739,614	466,562	336,606	43,954
Compositing	16 m	4 m	4 m	4 m
No. Composites	53,256	81,504	91,530	13,153
Outlier treatment	Restricted search at 1 ½ the block size for high grades above the 97.8 percentile			
Wireframes	14 Lithological units 2 grade shells (0.2% and 1.5% Cu)	12 Lithological units	12 Lithological units	10 Lithological units
<b>Interpolation</b>	Estimation domains for Cu, Au and Ag built combining lithology and grade shells. Lithology units and the 0.2% Cu grade shell are used as hard boundaries. The 1.5% Cu grade shell is used as a soft boundary. SG, Magnetite and Zn estimated using only lithological domains.			
Domaining	Estimation domains for Cu, Au and Ag built combining lithology and grade shells. Lithology units and the 0.2% Cu grade shell are used as hard boundaries. The 1.5% Cu grade shell is used as a soft boundary. SG, Magnetite and Zn estimated using only lithological domains.			
Variables	Cu, Au, Ag, Zn, Magnetite, SG			
Block model extent (m)	2,600 X 4,600 Y 1,168 Z	2,350 X 2,850 Y 1,220 Z	2,300 X 2,700 Y 1,700 Z	1,300 X 600 Y 1,700 Z
Block size (m)	10 x 10 x 16	5 x 5 x 4	5 x 5 x 4	5 x 5 x 4
<b>Method</b>				
Cu, Au, Ag	NNK	NNK	NNK	NNK
SG	OK	OK	NNK	NNK
Zn	NNK	NNK	NNK	NNK
Magnetite	NNK	NNK	NNK	NNK
Classification	Measured, Indicated, Inferred	Measured, Indicated, Inferred	Measured, Indicated, Inferred	Measured, Indicated, Inferred

<sup>(1)</sup> Includes only the boreholes effectively used in the model

<sup>(2)</sup> Includes only samples with copper values and domain assignment

Estimation method: ID = Inverse distance OK = Ordinary Kriging NNK = Nearest Neighbour Kriging

The Mineral Resource classification criteria for all the four Candelaria Open pit and underground models are very similar to those used in 2017. They include the distance to the informing composites and the minimum number of boreholes used for their estimation. In the case of the Candelaria Open Pit and Candelaria Underground South Sector models, the distance criterion is the distance to the nearest informing composite, whereas for the Candelaria Underground North and Wedge Gap sectors, it is the average distance of all informing composites. Table 15 summarizes the classification criteria for all Candelaria models. Based on these criteria, the final limits between the different categories were smoothed manually to ensure the continuity of the Mineral Resources.

Open pit mine Mineral Resources include those classified blocks above a cut-off grade of 0.15 percent copper, below the mine topography at the end of June 2017 and within a conceptual Lerchs- Grossman pit shell based on metal prices of US\$3.16 per pound of copper and US\$1,000 per ounce of gold. The underground Mineral Resources include only the classified blocks with estimated grades above a cut-off of 0.55 percent copper.

**Table 15: Classification Parameters for Candelaria Open Pit and Underground Mineral Resources**

<b>Classification</b>	<b>Number of Informing Boreholes</b>	<b>Distance<sup>1,2</sup> to Informing Composites (m)</b>
Measured	3 or more	Less than 35
Indicated	3 or more	35 to 70
	2	Less than 70
Inferred	1	Less than 100
	2 or more	More than 70

<sup>1</sup> Distance to the nearest informing composites for Candelaria Open Pit and Candelaria Underground South Sector

<sup>2</sup> Average distance to informing composites for Candelaria Underground North and Wedge Gap Sectors

### 13.2.2 Española Project

At the data cut-off date August 10, 2018, the data informing the Mineral Resources of this new project comprised 97 core boreholes (34,231 metres) which included 21,428 samples (Table 16). The ratio between soluble and total copper was used to define three mineral types as sulfide (0 to 0.20), mixed (0.20 to 0.60) and oxide (0.60 to 1.00). The 0.20 and 0.60 thresholds for the soluble copper ratio were used to build solids for the three mineral types through implicit modelling in Leapfrog software. A grade shell at 0.2 percent total copper was also built using implicit modelling, as well as solids for 9 lithological units.

The raw samples were composited to 8-metre length with the composite grades calculated as averages weighted by the length and specific density of the raw samples. The variogram models were fitted on the experimental covariances of total and soluble copper, gold, silver, magnetite and zinc and specific gravity per lithological units.

The block model for the Española project consists of 10- by 10- by 8-metre cells coded by lithological units, mineral types and their position inside or outside the grade shell. The Nearest Neighbour Kriging (NNK) algorithm was used for the estimation of all variables using two estimation passes informed by a minimum of three composites, a maximum of 14 and a restriction of at most three composites per borehole. The first pass search consisted of a 150- by 150- by 50-metres box, whereas the dimensions and orientation of second pass search ellipsoid was dictated by the

ranges and orientation of the second variogram model structure for each variable and lithological unit. As part of the NNK algorithm, the influence of high grades exceeding the 97.8 percentile of the population in each lithological unit was restricted to a distance equivalent to one and a half the dimension of the individual blocks, this is 15 metres. The 0.2 percent copper grade shell encompassing the “Mantos” domain was used as a hard boundary. The limits between the oxides, mixed and sulphide mineral types were also used as hard boundaries, but the lithologic units contacts were considered as soft.

**Table 16: Interpolation Data and Parameters for the Española Project**

<b>Parameter</b>	<b>Española Project</b>
<b>Last Model Date</b>	<b>31/08/2018</b>
<b>Drilling</b>	
Type	Core drilling
Number <sup>(1)</sup>	97
Metres	34,231
<b>Data</b>	
Samples <sup>(2)</sup>	21,428
Compositing	8 m
No. Composites	3,733
Outlier treatment	Restricted search at 1 ½ the block size for high grades above the 97.8 percentile
Wireframes	9 Lithological units, 3 mineral types (Oxides, Mixed, and Sulphides) 1 grade shells (0.2% Cu)
<b>Interpolation</b>	
Domaining	Mineral types and the 0.2% Cu grade shell are used as hard boundaries. Lithologic units are considered soft boundaries
Variables	Cu, CuS Au, Ag, Zn, Magnetite, SG
Block model extent (m)	3,600 X 2,600 Y 1,312 Z
Block size (m)	10 x 10 x 16
<b>Method</b>	
Cu, CuS, Au, Ag	NNK
SG	NNK
Zn	NNK
Magnetite	NNK
Classification	Measured, Indicated, Inferred

<sup>(1)</sup> Includes only the boreholes effectively used in the model

<sup>(2)</sup> Includes only samples with copper values and domain assignation

Estimation method: ID = Inverse distance OK = Ordinary Kriging

NNK = Nearest Neighbour Kriging

The classification criteria for the Española project is also based on the number of informing boreholes and the ‘mid distance’ to the composites. For each block, the ‘mid distance’ is calculated as the middle point between the distance to the nearest informing composite and the average distance to all informing composites. The ‘mid-distance’ thresholds for Measured and Indicated blocks are related to the variogram ranges of first and second structures, respectively, fitted for copper grades in the Mantos domain. The Mineral Resource Classification criteria for the Española project are summarized in Table 17. The Mineral Resource for the Española project include all blocks with estimated grades above 0.20 percent Copper within a conceptual Lerchs- Grossman pit shell based on metal prices of US\$3.16 per pound of copper and US\$1,000 per ounce of gold.

**Table 17: Classification Parameters for the Española Project**

<b>Classification</b>	<b>Number of Informing Boreholes</b>	<b>Mid Distance to Informing Composites (m)</b>
Measured	3 or more	Less than 62
Indicated	3 or more	62 to 88
	2	Less than 88
Inferred	1	Less than 100
	2 or more	More than 88

### 13.2.3 Minera Ojos del Salado Underground

Minera Ojos del Salado comprises the Santos and Alcaparrosa underground mines. As of 2018, the seven sectors of the Alcaparrosa Mine are integrated in a single Mineral Resource model. The seven Alcaparrosa sectors that were modelled separately until 2017 are Alcaparrosa, Caserón 11, North, Northeast, Central, Southwest-Southeast-Central East and Viviana. In 2017, six sectors of the Santos mine, including Melendez North, Melendez Central, Melendez South, Supernova, Helena, and Helena Sur, were integrated into a single Mineral Resource model. In 2018, the integrated Santos model has been expanded to include the areas of Cuerpo Nuevo and Veta Isabel (also known as Malaquita SE).

At the data cut-off date (December 31, 2017), the Alcaparrosa integrated database comprised 1,019 core boreholes (247,927 metres), including 54 infill boreholes drilled in the Viviana, Alcaparrosa, Norte and Southwest-Southeast-Central East during 2017. For the integrated 2018 Santos Mineral Resource model, the informing database comprises 1,263 boreholes (261,010 metres), including 60 infill boreholes drilled within the Helena Sur area during 2017 and 32 exploration holes drilled, also in 2017, in the north flank of the Melendez Norte area. Table 18 presents a summary and estimation strategy used to build the Mineral Resource models for Santos and Alcaparrosa mines.

The methodology used to build the Mineral Resource models for the Santos and Alcaparrosa mines is very similar to what was outlined for the Minera Candelaria Underground sectors. The compositing length (4 metres) and the block size (5- by 5- by 4-metres) are the same as those used for the Candelaria Underground North and South sectors. The main differences include:

- For Santos mine, drilling information was used to interpret geological and grade sections that were subsequently used to build fault surfaces, 9 lithological models, and the 0.2 and 1.5 percent copper grade shells using implicit modelling within MineSight software. For the Alcaparrosa mine, the drilling information was used directly to build the fault surfaces, 8 lithological models, and the 0.2 and 1.5 percent grade shell by implicit modelling within Leapfrog software. The Santos and Alcaparrosa block models were coded according to the resulting solids.
- The search for outliers, defined as grades exceeding the 97.8 percentile, was restricted to 7.5 metres.
- In both the Alcaparrosa and Santos, copper, gold, silver and zinc and magnetite content were estimated using the nearest neighbour kriging algorithm, whereas specific gravity was estimated using ordinary kriging.
- Between the 0.2 percent and 1.5 percent grade shells (medium grade domain), the lithological units work as hard boundaries. However, the lithological solids are treated as soft boundaries outside the 0.2 percent and within the 1.5 percent grade shells.

- The 0.2 percent copper grade shell is considered a soft boundary in the Santos model, but hard in the Alcaparrosa model.
- The estimation of zinc, magnetite content and specific gravity considers only lithological domains and treats their contacts as hard boundaries.
- Similar to the Candelaria models, estimation is performed in two passes. The first pass uses a 100- by 100- by 50-metre box search and the second pass uses a search ellipsoid of size and orientation corresponding to the second structure of the copper variogram model. A minimum of two and a maximum of twelve composites are used to inform the estimation of each block within the search volumes. A maximum of three informing composites per borehole are permitted.

**Table 18: Underground Interpolation Data and Parameters for Santos and Alcaparrosa Mines**

Parameter	Santos Integrated Model	Alcaparrosa Integrated Model
<b>Model Completion Date</b>	<b>31/03/2018</b>	<b>31/03/2018</b>
<b>Drilling</b>		
Type	Core drilling	Core drilling
Number (1)	1,263	3,601
Metres	261,010	1,064,042
<b>Data</b>		
Samples (2)	137,235	193,967
Compositing	4 m	4 m
No. Composites	39,150	53,154
Outlier treatment	Restricted search at 1 ½ the block size for high grades above the 97.8 percentile	
Wireframes	10 Lithological units 2 grade shells (0.2 and 1.5% Cu)	8 Lithological units
<b>Interpolation</b>	Estimation domains for Cu, Au and Ag grades built combining lithology and mineralization. Lithology units and the 0.2% Cu grade shell are used as hard boundaries. The 1.5% Cu grade shell is used as a soft boundary. SG, Magnetite and Zn estimated using only lithological domains.	
Domaining	SG, Magnetite and Zn estimated using only lithological domains.	
Variables	Cu, Au, Ag, Zn, Magnetite, SG	
Block model extent (m)	2,500 X 2,300 Y 1,400 Z	1,700 X 2,700 Y 1,500 Z
Block size (m)	5 x 5 x 4	5 x 5 x 4
<b>Method</b>		
Cu, Au, Ag	NNK	NNK
SG	OK	OK
Zn	NNK	NNK
Magnetite	NNK	NNK
Classification	Measured, Indicated, Inferred	Measured, Indicated, Inferred

(1) Includes only the boreholes effectively used in the model

(2) Includes only samples with copper values and domain assignation

Estimation method: ID = Inverse distance OK = Ordinary Kriging NNK = Nearest Neighbour Kriging

As for the Candelaria Underground North Sector Mineral Resources, the block models for the Ojos del Salado underground mines were classified based on the average distance of the informing composites to the centres of the blocks and the minimum number of boreholes used to estimate a block (Table 19).

**Table 19: Classification Parameters for Minera Ojos del Salado Underground Mineral Resources, (Alcaparrosa and Santos Mines)**

<b>Classification</b>	<b>Number of Informing Boreholes</b>	<b>Average Distance to Informing Composites (m)</b>
Measured	3 or more	Less than 25
Indicated	3 or more	25 to 50
	2	Less than 50
Inferred	1	Less than 100
	2 or more	More than 50

### 13.3 SRK Comments

Since acquiring the Candelaria Copper Mining Complex in November 2014, the aggressive exploration programs undertaken by Lundin have significantly expanded the Mineral Resource estimates of Minera Candelaria and Minera Ojos del Salado. During 2018, this led to increase of about 13 percent of the global Measured and Indicated Mineral Resources. Other factors driving this increase are the addition of the new Española project and the Wedge Gap sector, as well as the lowering of the reporting cut-off grades. Between 2017 and 2018, the Candelaria Open Pit cut-off grade was reduced from 0.20 to 0.15 percent copper, and for the Candelaria and Ojos del Salado underground Mineral Resources, the cut-off grade was lowered from 0.60 to 0.55 percent copper.

All of the four models for the underground deposits have now been completely integrated and expanded to extend over future areas of exploration. Since 2017, all new or updated Mineral Resource models for Minera Candelaria and Minera Ojos del Salado have been built by the Resource Definition Department of the Candelaria Copper Mining Complex. This centralization has resulted in a more consistent Mineral Resource estimation methodology applied to the different deposits. The integration of the models and the standardization of the estimation methodology across all mines and for most variables represents an important milestone that will undoubtedly prove helpful for future exploration for the extensions of the sulphide mineralization. The success of the exploration programs has had a positive impact on the life of the operations, particularly at the underground mines.

SRK is of the opinion that the exploration program proposed for the period 2019 to 2023 has the potential to expand further the Mineral Resources of the Candelaria Copper Mining Complex amenable to both underground and open pit extraction, with a likely positive impact on the life of mine.

### 13.4 Mineral Resource Statement

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

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

The “reasonable prospects for eventual economic extraction” requirement generally implies that the quantity and grade estimates meet certain economic thresholds and that the Mineral Resources are reported at an appropriate cut-off grade that takes into account extraction scenarios and processing recoveries. Mineral Resources are not Mineral Reserves and have not demonstrated economic viability. There is no certainty that all or any part of the Mineral Resource estimate will be converted into Mineral Reserves.

The audited Mineral Resource Statement for Minera Candelaria is presented in Table 20. Open pit Mineral Resources are reported within a conceptual Lerchs-Grossman pit shell based on metal prices of US\$3.16 per pound of copper and US\$1,000 per ounce of gold and at a cut-off grade of 0.15 percent copper for the Candelaria Open pit and 0.20 percent copper for the Española project. Underground Mineral Resources from Candelaria Underground (North Sector) and Candelaria Underground (South Sector) are reported at a cut-off grade of 0.55 percent copper. Table 20 also includes a contribution from various operational work-in-progress (WIP) stockpiles. The Mineral Resources include Mineral Reserves.

**Table 20: Audited Mineral Resource Statement\*, Compañía Contractual Minera Candelaria, SRK Consulting (Canada) Inc., June 30, 2018\* (100% Basis)**

Classification	Quantity	Grade			Contained Metal		
	Tonnes ('000)	Copper (%)	Gold (g/t)	Silver (g/t)	Copper ('000 t)	Gold ('000 oz)	Silver ('000 oz)
<b>Candelaria Open Pit</b>							
Measured	444,914	0.48	0.11	1.52	2,121	1,578	21,710
Indicated	37,725	0.37	0.10	1.33	138	119	1,611
<b>Measured and Indicated</b>	<b>482,639</b>	<b>0.47</b>	<b>0.11</b>	<b>1.50</b>	<b>2,259</b>	<b>1,697</b>	<b>23,320</b>
Inferred	6,617	0	0.06	0.84	16.22	12	180
<b>Española Project</b>							
Measured	23,325	0.42	0.09	0.41	99	69	305
Indicated	28,031	0.40	0.09	0.37	113	79	332
<b>Measured and Indicated</b>	<b>51,356</b>	<b>0.41</b>	<b>0.09</b>	<b>0.39</b>	<b>211</b>	<b>149</b>	<b>637</b>
Inferred	27,801	0.40	0.09	0.32	112	82	282
<b>Candelaria WIP**</b>							
Measured	84,460	0.33	0.09	1.38	278	243	3,751
Indicated							
<b>Measured and Indicated</b>	<b>84,460</b>	<b>0.33</b>	<b>0.09</b>	<b>1.38</b>	<b>278</b>	<b>243</b>	<b>3,751</b>
Inferred							
<b>Candelaria Underground</b>							
Measured	154,245	1.04	0.24	3.97	1,606	1,193	19,698
Indicated	71,967	0.95	0.22	3.49	685	508	8,083
<b>Measured and Indicated</b>	<b>226,211</b>	<b>1.01</b>	<b>0.23</b>	<b>3.82</b>	<b>2,291</b>	<b>1,701</b>	<b>27,780</b>
Inferred	16,373	1.08	0.19	2.38	176	100	1,255
<b>Combined</b>							
Measured	706,943	0.58	0.14	2.00	4,104	3,083	45,463
Indicated	137,723	0.68	0.16	2.26	936	706	10,026
<b>Measured and Indicated</b>	<b>844,666</b>	<b>0.60</b>	<b>0.14</b>	<b>2.04</b>	<b>5,040</b>	<b>3,789</b>	<b>55,489</b>
Inferred	50,790	<b>0.60</b>	<b>0.12</b>	<b>1.05</b>	304	195	1,717

\* Reported within the boundaries of the Compañía Contractual Minera Candelaria property. Mineral Resources are not Mineral Reserves and have not demonstrated economic viability. All figures are rounded to reflect the relative accuracy of the estimates. Mineral Resources include Mineral Reserves. Open pit Mineral Resources are reported at a cut-off grade of 0.15 percent copper for the Candelaria Open Pit and 0.20 percent copper for the Española Project, within conceptual pit shells based on metal prices of US\$3.16 per pound of copper and US\$1,000 per ounce of gold and current topography. Underground Mineral Resources are reported at a cut-off grade of 0.55 percent copper.

\*\* Work-in-progress (WIP) stockpiles

The audited Mineral Resource Statement for Minera Ojos del Salado is presented in Table 21. The Mineral Resources for the underground Santos and Alcaparrosa mines are reported at a cut-off grade of 0.55 percent copper.

**Table 21: Audited Mineral Resource Statement\*, Compañía Contractual Minera Ojos del Salado, SRK Consulting (Canada) Inc., June 30, 2018 (100% Basis)**

Classification	Quantity	Grade			Contained Metal		
	Tonnes ('000)	Copper (%)	Gold (g/t)	Silver (g/t)	Copper ('000 t)	Gold ('000 oz)	Silver ('000 oz)
<b>Santos Mine</b>							
Measured	36,311	1.12	0.26	2.33	406	303	2,717
Indicated	16,329	1.02	0.24	2.14	167	127	1,122
<b>Measured and Indicated</b>	<b>52,640</b>	<b>1.09</b>	<b>0.25</b>	<b>2.27</b>	<b>573</b>	<b>430</b>	<b>3,840</b>
Inferred	423	0.90	0.17	1.14	4	2	15
<b>Alcaparrosa Mine</b>							
Measured	32,401	0.98	0.21	0.98	319	218	1,017
Indicated	22,722	0.94	0.19	1.28	214	139	932
<b>Measured and Indicated</b>	<b>55,123</b>	<b>0.97</b>	<b>0.20</b>	<b>1.10</b>	<b>533</b>	<b>357</b>	<b>1,948</b>
Inferred	1,506	1.10	0.17	1.53	17	8	74
<b>Ojos del Salado WIP**</b>							
Measured	44	1.20	0.22	2.95	1	0	4
Indicated							
<b>Measured and Indicated</b>	<b>44</b>	<b>1.20</b>	<b>0.22</b>	<b>2.95</b>	<b>1</b>	<b>0</b>	<b>4</b>
Inferred							
<b>Combined</b>							
Measured	68,756	1.05	0.24	1.69	725	522	3,738
Indicated	39,051	0.98	0.21	1.64	381	266	2,054
<b>Measured and Indicated</b>	<b>107,807</b>	<b>1.03</b>	<b>0.23</b>	<b>1.67</b>	<b>1,106</b>	<b>788</b>	<b>5,792</b>
Inferred	1,929	1.06	0.17	1.44	20	11	89

\* Reported within the boundaries of the Compañía Contractual Minera Ojos del Salado property. Mineral Resources are not Mineral Reserves and have not demonstrated economic viability. Mineral Resources include Mineral Reserves. All figures are rounded to reflect the relative accuracy of the estimates. Reported at a cut-off grade of 0.55 percent copper, based on metal price of US\$3.16 per pound of copper and US\$1,000 per ounce of gold.

\*\* Work-in-progress (WIP) stockpiles

The audited combined Mineral Resource Statement for the Candelaria Copper Mining Complex is presented in Table 22.

**Table 22: Consolidated Audited Mineral Resource Statement\*, Candelaria Copper Mining Complex, SRK Consulting (Canada) Inc., June 30, 2018 (100% Basis)**

Classification	Quantity	Grade			Contained Metal		
	Tonnes ('000)	Copper (%)	Gold (g/t)	Silver (g/t)	Copper ('000 t)	Gold ('000 oz)	Silver ('000 oz)
<b>Open Pit</b>							
Measured	468,239	0.47	0.11	1.46	2,220	1,647	22,014
Indicated	65,757	0.38	0.09	0.92	251	198	1,943
<b>Measured and Indicated</b>	<b>533,995</b>	<b>0.46</b>	<b>0.11</b>	<b>1.40</b>	<b>2,471</b>	<b>1,845</b>	<b>23,957</b>
Inferred	34,417	0.37	0.09	0.42	128	95	462
<b>Underground</b>							
Measured	222,957	1.05	0.24	3.27	2,330	1,714	23,431
Indicated	111,018	0.96	0.22	2.84	1,066	774	10,137
<b>Measured and Indicated</b>	<b>333,975</b>	<b>1.02</b>	<b>0.23</b>	<b>3.13</b>	<b>3,397</b>	<b>2,489</b>	<b>33,568</b>
Inferred	18,301	1.07	0.19	2.28	196	111	1,344
<b>WIP**</b>							
Measured	84,504	0.33	0.09	1.38	278	243	3,755
Indicated							
<b>Measured and Indicated</b>	<b>84,504</b>	<b>0.33</b>	<b>0.09</b>	<b>1.38</b>	<b>278</b>	<b>243</b>	<b>3,755</b>
Inferred							
<b>Total</b>							
Measured	775,699	0.62	0.14	1.97	4,829	3,605	49,201
Indicated	176,774	0.74	0.17	2.13	1,317	972	12,080
<b>Measured and Indicated</b>	<b>952,474</b>	<b>0.65</b>	<b>0.15</b>	<b>2.00</b>	<b>6,146</b>	<b>4,577</b>	<b>61,281</b>
Inferred	52,719	0.62	0.12	1.07	325	205	1,806

\* Reported within the boundaries of the Compañía Contractual Minera Candelaria and Compañía Contractual Ojos del Salado properties. Mineral Resources are not Mineral Reserves and have not demonstrated economic viability. All figures are rounded to reflect the relative accuracy of the estimates. Mineral Resources include Mineral Reserves. Open pit Mineral Resources are reported at a cut-off grade of 0.15 percent copper for the Candelaria Open Pit and 0.20 percent copper for the Española project, within conceptual pit shells based on metal prices of US\$3.16 per pound of copper and US\$1,000 per ounce of gold and current topography. Underground Mineral Resources are reported at a cut-off grade of 0.55 percent copper.

\*\* Work-in-progress (WIP) stockpiles

Table 23 tabulates the Mineral Resources contained in underground pillars which may later be partially converted into Mineral Reserves. This material is included in the respective Mineral Resource Statements for the respective operations. In 2018, the Mineral Resources within pillars were estimated from the Mineral Resource model blocks enclosed within a 15-metre envelope around exploited stopes.

**Table 23: Minera Resources in Underground Pillars, Candelaria Copper Mining Complex, June 2018**

Classification	Quantity Tonnes (‘000)	Grade			Contained Metal		
		Copper (%)	Gold (g/t)	Silver (g/t)	Copper (‘000 t)	Gold (‘000 oz)	Silver (‘000 oz)
<b>Pillars Candelaria Underground</b>							
Measured	23,253	1.16	0.28	4.53	269	207	3,388
Indicated	189	1.04	0.27	3.11	2	2	19
<b>Measured and Indicated</b>	<b>23,441</b>	<b>1.15</b>	<b>0.28</b>	<b>4.52</b>	<b>271</b>	<b>208</b>	<b>3,407</b>
Inferred					0	0	0
<b>Pillars Santos Underground</b>							
Measured	18,032	1.20	0.27	2.43	216	157	1,408
Indicated	1,670	1.02	0.22	2.07	17	12	111
<b>Measured and Indicated</b>	<b>19,702</b>	<b>1.18</b>	<b>0.27</b>	<b>2.40</b>	<b>233</b>	<b>169</b>	<b>1,519</b>
Inferred	30	0.78	0.16	1.40	0	0	1
<b>Pillars Alcaparrosa Underground</b>							
Measured	13,809	1.02	0.23	0.75	141	143	473
Indicated	1,589	1.00	0.22	0.62	16	16	45
<b>Measured and Indicated</b>	<b>15,398</b>	<b>1.02</b>	<b>0.23</b>	<b>0.74</b>	<b>157</b>	<b>159</b>	<b>518</b>
Inferred	1	1.12	0.35	0.55	0	0	0
<b>Combined</b>							
Measured	55,093	1.14	0.26	2.90	625	507	5,269
Indicated	3,448	1.01	0.22	1.46	35	29	175
<b>Measured and Indicated</b>	<b>58,541</b>	<b>1.13</b>	<b>0.26</b>	<b>2.81</b>	<b>660</b>	<b>536</b>	<b>5,444</b>
Inferred	31	0.79	0.17	1.39	0	0	1

\* Reported within the property of the Compañía Contractual Minera Ojos del Salado and Compañía Contractual Minera Candelaria. The figures presented in this table are included into the Audited Mineral Resource Statement and correspond to Mineral Resources located within pillars that could eventually be converted into Mineral Reserves. All figures rounded to reflect the relative accuracy of the estimates. Reported at a cut-off grade of 0.55 percent copper.

## 13.5 Reconciliation

The Candelaria Open Pit Mineral Resource model (locally termed the long-term model) is compared to grade control models (short term models) and to the production reports (as mined) monthly. Grade control models are generated from closely spaced blast hole data, whereas Mineral Resource models are derived from exploration core drilling data. The tonnages in mine production reports are estimated from the number and capacity of trucks operating in the different mines and the grades are taken from the grade control model.

A monthly reconciliation between the Mineral Resource model (Long Term), the grade control model (Short Term) and As Mined for the Candelaria Open Pit for the period of July 2017 to June 2018 is presented in Table 24. Overall, the short-term model reports less tonnages and lower grades for this period. This may suggest differences in the areas reported by the two models and lower grades in the production data when compared to the informing borehole data used to estimate the common volumes between both models. The overall increase in tonnage and decrease in grades in the production reports in relation to the short-term model may be due to dilution.

**Table 24: Monthly Reconciliation between Long Term and Short-Term Models and the Production for the Candelaria Open Pit, Compañía Contractual Minera Candelaria (July 2017 to June 2018)**

Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity ('000 t)	Grade Cu (%)	Metal Cu ('000 t)	Quantity ('000 t)	Grade Cu (%)	Metal Cu ('000 t)	Quantity ('000 t)	Grade Cu (%)	Metal Cu ('000 t)
Jul 2017	964	0.91	8.8	953	0.86	8.2	896	0.81	7.3
Aug 2017	1,758	0.72	12.7	1,515	0.73	11.1	1,632	0.74	12.1
Sept 2017	1,797	0.96	17.3	1,676	0.93	15.6	1,677	0.88	14.7
Oct 2017	1,593	0.81	12.9	1,438	0.69	9.9	1,634	0.67	11.0
Nov 2017	1,421	0.66	9.4	1,338	0.65	8.7	1,441	0.61	8.8
Dec 2017	1,796	0.67	12.0	1,641	0.60	9.9	1,813	0.62	11.2
Jan 2018	1,073	0.51	5.5	842	0.53	4.5	873	0.55	4.8
Feb 2018	817	0.58	4.7	710	0.58	4.1	700	0.56	3.9
Mar 2018	944	0.71	6.7	784	0.59	4.7	818	0.56	4.6
Apr 2018	666	0.50	3.3	521	0.53	2.8	474	0.47	2.2
May 2018	309	0.67	2.1	269	0.68	1.8	335	0.57	1.9
Jun 2018	132	1.01	1.3	109	0.86	0.9	178	0.74	1.3
<b>Total</b>	<b>13,271</b>	<b>0.73</b>	<b>96.8</b>	<b>11,796</b>	<b>0.70</b>	<b>82.1</b>	<b>12,471</b>	<b>0.67</b>	<b>83.9</b>
<b>Overall relative difference*</b>				<b>-11.1%</b>	<b>-4.6%</b>	<b>-15.2%</b>	<b>-6.0%</b>	<b>-7.8%</b>	<b>-13.3%</b>

\* Long term vs short term and mine extraction

Monthly reconciliation is also undertaken between underground Mineral Resource models (Long Term) and Short-Term models, estimated from down-the-hole boreholes sampling, which is used for production grade control. Examples of this are shown in Table 25, Table 26 and Table 27, which present the monthly reconciliation between the Mineral Resources, the grade control models for the Candelaria Underground (North Sector), Santos and Alcaparrosa underground mines for the period of July 2017 to June 2018. Over that period the long and short-term models for the Candelaria Underground North Sector and Alcaparrosa mine are in close agreement, overall. The Santos long-term model, however, may be slightly optimistic when compared to the short-term model in terms of copper grades. The larger tonnages and lower grades generally reported for the three underground mines in relation to the long-term model may be attributable, in large part, to external dilution during mining. Similar tables for the reconciliation of gold and silver over the period of July 2017 to June 2018 are presented in Appendix B.

**Table 25: Monthly Reconciliation between Long and Short-Term Models for the Candelaria Underground (North Sector), Minera Candelaria (July 2017 to June 2018)**

Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity ('000 t)	Grade Cu (%)	Metal Cu ('000 t)	Quantity ('000 t)	Grade Cu (%)	Metal Cu ('000 t)	Quantity ('000 t)	Grade Cu (%)	Metal Cu ('000 t)
Jul 2017	192	0.96	1.8	192	0.92	1.8	228	0.86	2.0
Aug 2017	183	0.98	1.8	183	1.07	2.0	227	0.97	2.2
Sept 2017	180	1.07	1.9	180	1.00	1.8	233	0.90	2.1
Oct 2017	188	0.83	1.6	188	0.95	1.8	231	0.91	2.1
Nov 2017	194	1.05	2.0	194	1.19	2.3	232	1.09	2.5
Dec 2017	159	1.20	1.9	159	1.21	1.9	222	1.02	2.3
Jan 2018	150	0.74	1.1	150	1.30	2.0	205	1.11	2.3
Feb 2018	184	1.06	2.0	184	1.08	2.0	220	1.00	2.2
Mar 2018	228	0.89	2.0	228	0.87	2.0	267	0.84	2.2
Apr 2018	229	1.01	2.3	229	0.90	2.1	262	0.85	2.2
May 2018	248	1.24	3.1	248	1.11	2.8	275	1.04	2.9
Jun 2018	239	1.19	2.8	239	0.99	2.4	279	0.92	2.6
<b>Total</b>	<b>2,373</b>	<b>1.03</b>	<b>24.4</b>	<b>2,373</b>	<b>1.04</b>	<b>24.7</b>	<b>2,883</b>	<b>0.96</b>	<b>27.6</b>
<b>Overall relative difference*</b>				<b>0.0%</b>	<b>1.1%</b>	<b>1.1%</b>	<b>21.5%</b>	<b>-8.0%</b>	<b>11.8%</b>

\* Long term vs short term and mine extraction

**Table 26: Monthly Reconciliation between Long and Short -Term Models for the Santos Mine, Minera Ojos del Salado (July 2017 to June 2018)**

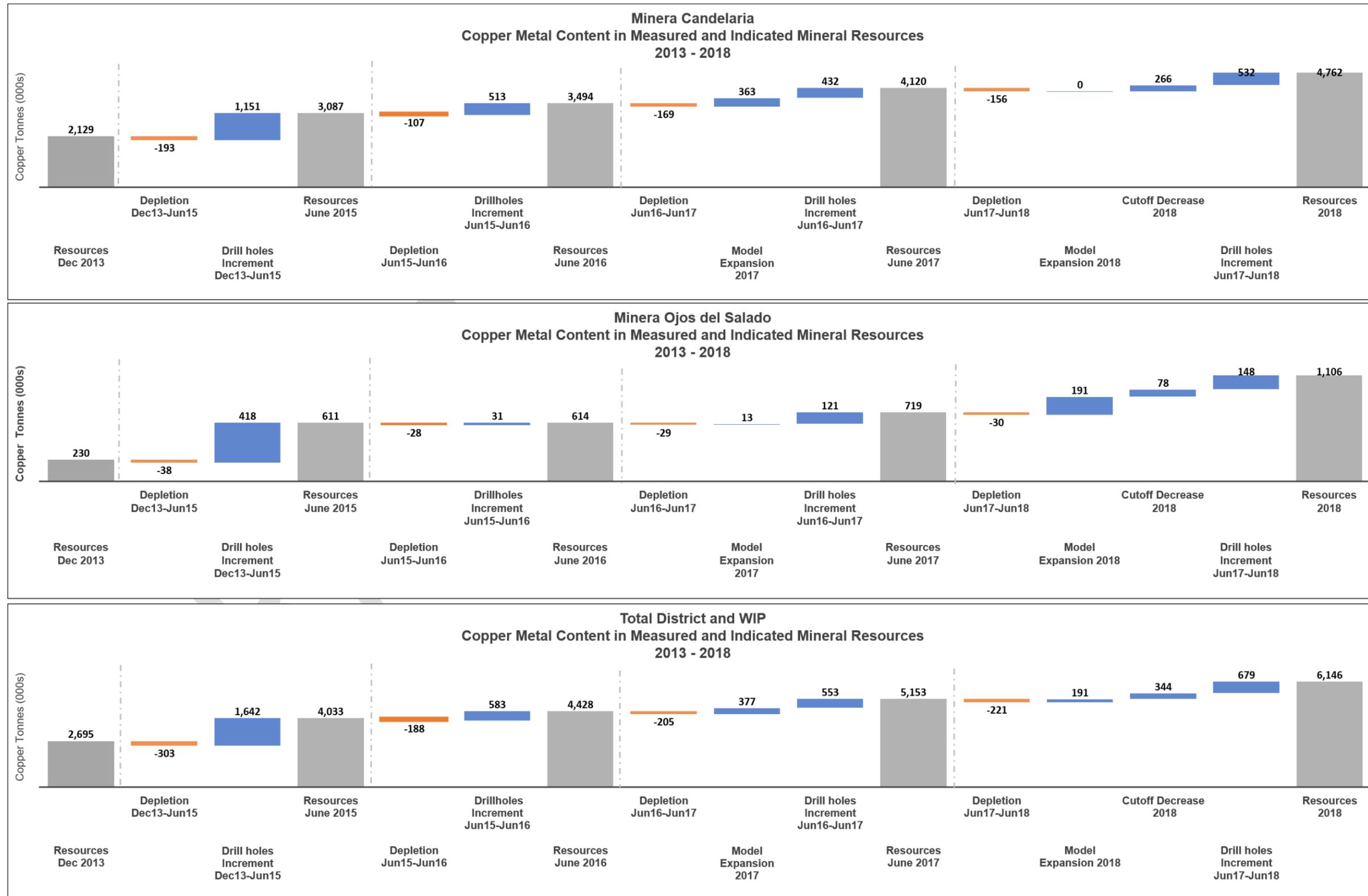
Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity ('000 t)	Grade Cu (%)	Metal Cu ('000 t)	Quantity ('000 t)	Grade Cu (%)	Metal Cu ('000 t)	Quantity ('000 t)	Grade Cu (%)	Metal Cu ('000 t)
Jul 2017	151	1.17	1.8	151	1.04	1.6	157	1.02	1.6
Aug 2017	143	1.22	1.7	143	1.21	1.7	158	1.17	1.8
Sept 2017	148	1.31	1.9	148	1.26	1.9	160	1.22	1.9
Oct 2017	133	1.47	2.0	133	1.55	2.1	152	1.44	2.2
Nov 2017	118	1.18	1.4	118	1.09	1.3	139	1.00	1.4
Dec 2017	130	1.27	1.7	130	1.26	1.6	145	1.17	1.7
Jan 2018	136	1.27	1.7	136	1.07	1.5	147	1.02	1.5
Feb 2018	114	1.21	1.4	114	1.11	1.3	131	1.07	1.4
Mar 2018	138	1.05	1.5	138	0.86	1.2	151	0.85	1.3
Apr 2018	161	1.12	1.8	161	0.82	1.3	172	0.81	1.4
May 2018	168	0.99	1.7	171	0.93	1.6	180	0.92	1.7
Jun 2018	153	1.19	1.8	153	1.09	1.7	159	1.13	1.8
<b>Total</b>	<b>1,694</b>	<b>1.20</b>	<b>20.3</b>	<b>1,697</b>	<b>1.10</b>	<b>18.7</b>	<b>1,851</b>	<b>1.06</b>	<b>19.7</b>
<b>Overall relative difference*</b>				<b>0.2%</b>	<b>-8.2%</b>	<b>-8.1%</b>	<b>9.2%</b>	<b>-11.1%</b>	<b>-2.9%</b>

\* Long term vs short term and mine extraction

**Table 27: Monthly Reconciliation between Long and Short-Term Models for the Alcaparrosa Mine, Minera Ojos del Salado (July 2017 to June 2018)**

Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity ('000 t)	Grade Cu (%)	Metal Cu ('000 t)	Quantity ('000 t)	Grade Cu (%)	Metal Cu ('000 t)	Quantity ('000 t)	Grade Cu (%)	Metal Cu ('000 t)
Jul 2017	125	0.80	1.0	125	0.86	1.1	130	0.84	1.1
Aug 2017	127	0.86	1.1	127	0.82	1.0	132	0.80	1.1
Sept 2017	138	0.81	1.1	138	0.78	1.1	138	0.77	1.1
Oct 2017	143	0.77	1.1	143	0.81	1.2	137	0.78	1.1
Nov 2017	118	0.74	0.9	118	0.75	0.9	128	0.72	0.9
Dec 2017	118	0.74	0.9	118	0.69	0.8	125	0.67	0.8
Jan 2018	122	0.68	0.8	122	0.70	0.9	131	0.69	0.9
Feb 2018	109	0.67	0.7	109	0.67	0.7	106	0.68	0.7
Mar 2018	129	0.79	1.0	129	0.73	0.9	134	0.66	0.9
Apr 2018	131	0.71	0.9	131	0.67	0.9	143	0.65	0.9
May 2018	121	0.65	0.8	121	0.71	0.9	134	0.75	1.0
Jun 2018	130	0.75	1.0	130	0.75	1.0	143	0.74	1.1
<b>Total</b>	<b>1,513</b>	<b>0.75</b>	<b>11.3</b>	<b>1,513</b>	<b>0.75</b>	<b>11.3</b>	<b>1,581</b>	<b>0.73</b>	<b>11.5</b>
<b>Overall relative difference*</b>				<b>0.0%</b>	<b>-0.3%</b>	<b>-0.3%</b>	<b>4.5%</b>	<b>-2.6%</b>	<b>1.8%</b>

The waterfall charts in Figure 23 summarizes the sources of the changes observed from December 2013 to June 2018 in the combined Measured and Indicated Mineral Resources for Minera Candelaria, Minera Ojos del Salado, and the entire district plus the stock piles (WIP). Measured and Indicated Mineral Resources have been steadily increasing since 2014 primarily due to the sustained exploration and infill drilling. The 2017 to 2018 period has experienced the largest increment in Measured and Indicated Mineral Resources over the last three years. In this last period, the exploration efforts have resulted in the addition of the Española project to Minera Candelaria Mineral Resources and the expansion of the Santos and Alcaparrosa Mineral Resource models for Minera Ojos del Salado. The lowering of the underground and open pit cut-off grades for both companies in 2018 have resulted in gains that largely exceed the losses of Measured and Indicated Mineral Resources by depletion.



**Figure 23: Waterfall Charts Showing Variation in Measured and Indicated Mineral Resources Between 2013 and 2018**

Measured and Indicated Mineral Resources (expressed as copper metal content) in the Candelaria Open Pit, the Española project, and the underground mines at Candelaria Underground (North and South Sectors), Alcaparrosa and Santos mine.

## 14 Mineral Reserve Estimates

### 14.1 Commercial Orientation

Mineral Reserves of the Candelaria Copper Mining Complex were estimated by the Candelaria Copper Mining Complex Technical Services Open Pit and Underground Departments. The Mineral Reserves are based on the June 2018 Measured and Indicated Mineral Resources.

The mining costs correspond to the average of the last three years of the operating costs of the mine and processing plant. Diesel and energy costs were provided by the company’s supplies department adding also sustainability capital and general administration expenses.

The Mineral Reserve estimate is based on the June 2018 life of mine (LOM) production plan. The optimized pit design will be mined in Phases 9 through 13. The plan includes the new sectors for the underground mines.

The exchange rate and metal price assumptions for copper and co-products silver and gold are shown in Table 28.

**Table 28: Lundin Metal Price Assumptions for Mineral Reserves 2018**

<b>Metal Prices</b>	<b>Unit</b>	<b>Jun-18</b>
Copper	US\$/lb	2.75
Silver	US\$/oz	15.00
Gold	\$/oz	1,000.00
<b>Exchange Rates</b>	<b>Unit</b>	
Chilean Peso	Peso/US\$	550

### 14.2 Minera Candelaria

#### 14.2.1 Candelaria Open Pit Mineral Reserves

The Candelaria Open Pit Mineral Reserve estimates were prepared by the Technical Services Open Pit Department and are based on the Measured and Indicated Mineral Resources. The Mineral Reserve estimates are based on a mine plan and open pit designs developed using modifying parameters including metal prices, metal recovery based on performance of the processing plant, operating cost estimates, and sustaining capital cost estimates based on the production schedule and equipment requirements.

The Mineral Reserve estimation process involved the following tasks:

- Selection of optimization parameters
- Pit optimization to define optimum pit limit using a Lerchs-Grossman algorithm
- Selection of mining cut-off grade
- Preparation of a pit design, including pit phases
- Preparation of a LOM production schedule
- Tabulation of Mineral Reserve Statement

Table 29 summarizes the optimization parameters used in 2018 for the disclosure of Mineral Reserves.

**Table 29: Summary of Pit Optimization Parameters for 2018**

<b>Basic Design Parameters</b>	<b>Units</b>	<b>Parameter Value</b>
Copper	US\$/lb-Cu	2.75
Gold	US\$/oz-Au	1,000
Silver	US\$/oz-Ag	15.00
<b>Discount Rate</b>	<b>%</b>	<b>10.0%</b>
Average vertical advance rate	bench/yr/PB	8
Long term power cost assumption	US\$/kWh	0.08
Long term diesel cost assumption (delivered)	US\$/US Gal.	1.95
<b>Mining Rate</b>	<b>KTPD</b>	<b>211</b>
Mining costs (no haulage)	US\$/dmt-Mined	1.42
Stockpile re-handling costs (no haulage)	US\$/dmt-Mined	0.839
Haulage increment/dmt/bench	US\$/dmt-Mined	0.023
Fixed mill ore haulage cost	US\$/dmt-Mined	0.026
Fixed waste haulage cost	US\$/dmt-Mined	0.41
Mine equipment capital annuity	US\$/dmt-Mined	0.190
<b>Milling Rate</b>	<b>KTPD</b>	<b>78</b>
Crushing cost	US\$/dmt-Milled	0.21
Milling cost	US\$/dmt-Milled	5.71
Mill sustaining capital allowance	US\$/dmt-Milled	0.74
G&A assigned to mill	US\$/dmt-Milled	1.82
<b>Total Cost</b>	<b>US\$/dmt-Milled</b>	<b>8.48</b>
<b>Downstream Costs</b>		
Concentrate moisture	%	9.5
Concentrate copper grade	%-Cu	30.09
Freight cost	US\$/wmt	39.00
Freight cost (concentrate)	US\$/dmt-Concentrate	42.65
Smelting	US\$/dmt- Concentrate	100.00
Refining	US\$/lb-Cu	0.100
Transportation loss allowance	%-loss	0.20
Net smelter payment incl. trans loss	%-payable	96.41
By-product credits gold, silver, iron	US\$/lb-Cu	(0.345)
<b>Costs /lb W/ By-product Credits w/o Credits</b>	<b>US\$/lb-Cu</b>	<b>(0.024)</b>
<b>Royalty</b>	<b>US\$/lb-Cu</b>	<b>n/a</b>
<b>By Product Credits</b>		
Gold content in copper concentrate	g/dmt	5.5
Gold payable term	%	96.0
Gold refining cost	US\$/oz	5.00
Silver content in copper concentrate	g/dmt	88.0
Silver payable term	%	90.0
Silver refining cost	US\$/oz	0.35
Payable gold	US\$/lb-Cu	0.263
Payable silver	US\$/lb-Cu	0.058
Other credits	US\$/lb-Cu	0.025
<b>By-Product Credits</b>	<b>US\$/lb-Cu</b>	<b>0.345</b>
<b>Downstream Costs</b>	<b>US\$/lb-Cu</b>	
Concentrate freight	US\$/lb-Cu	0.066
Smelting	US\$/lb-Cu	0.155
Refining	US\$/lb-Cu	0.100
Freight to market & sales costs	US\$/lb-Cu	0.003
<b>Total Before By-Product Credits</b>	<b>US\$/lb-Cu</b>	<b>0.321</b>

For the June 30, 2018 Mineral Reserves, site operating costs used for the pit optimization were based on actual average operating costs for the previous three years, 2015 through 2017, and long-term forecasts for fuel at US\$1.95 per gallon, power at US\$0.08 per kilowatt hour, in accordance with the Forecast LOM average, tires at US\$32,800 each and an exchange rate of 550 pesos per US dollar.

Base mining costs excluding haulage are estimated at US\$1.42 per tonne mined for an overall mining rate of 211,000 tonnes per day. Stockpile re-handle costs excluding haulage are estimated at US\$0.84 per tonne. The haulage increment per 16-metre bench is estimated at US\$0.023 per tonne per bench to depth. The fixed milling ore and waste haulage costs are estimated at US\$0.026 and US\$0.410 per tonne, respectively. An equipment annuity of US\$0.19 per tonne mined was applied to account for equipment replacement. Discounting was applied to all block values in the model for the purposes of pit optimization. The discount rate applied was 10.0 percent and the sinking rate assumed was eight benches per year resulting in an effective discount factor of 1.25 percent per bench.

Processing cost estimates include US\$0.21 per tonne for crushing and US\$5.71 per tonne for milling. A mill sustaining capital allowance of US\$0.74 per tonne was included. The general and administration costs of US\$1.82 per tonne were assigned to the ore milled. The total processing costs are estimated at US\$8.48 per tonne milled.

Copper recovery estimates are based on a model developed by the metallurgical group at the Candelaria Copper Mining Complex. This model takes input data for geology, mineralogy, process throughput, grind size, oxidation and zinc to concentrate as part of the process that provides estimates of final tailings and concentrate grades and resultant overall copper recovery. The Candelaria plant average LOM copper recovery is estimated to be 93.4 percent. Gold and silver recoveries were assigned for a series of grade ranges. The average LOM gold and silver recoveries are estimated to be 71.6 and 82.1 percent, respectively.

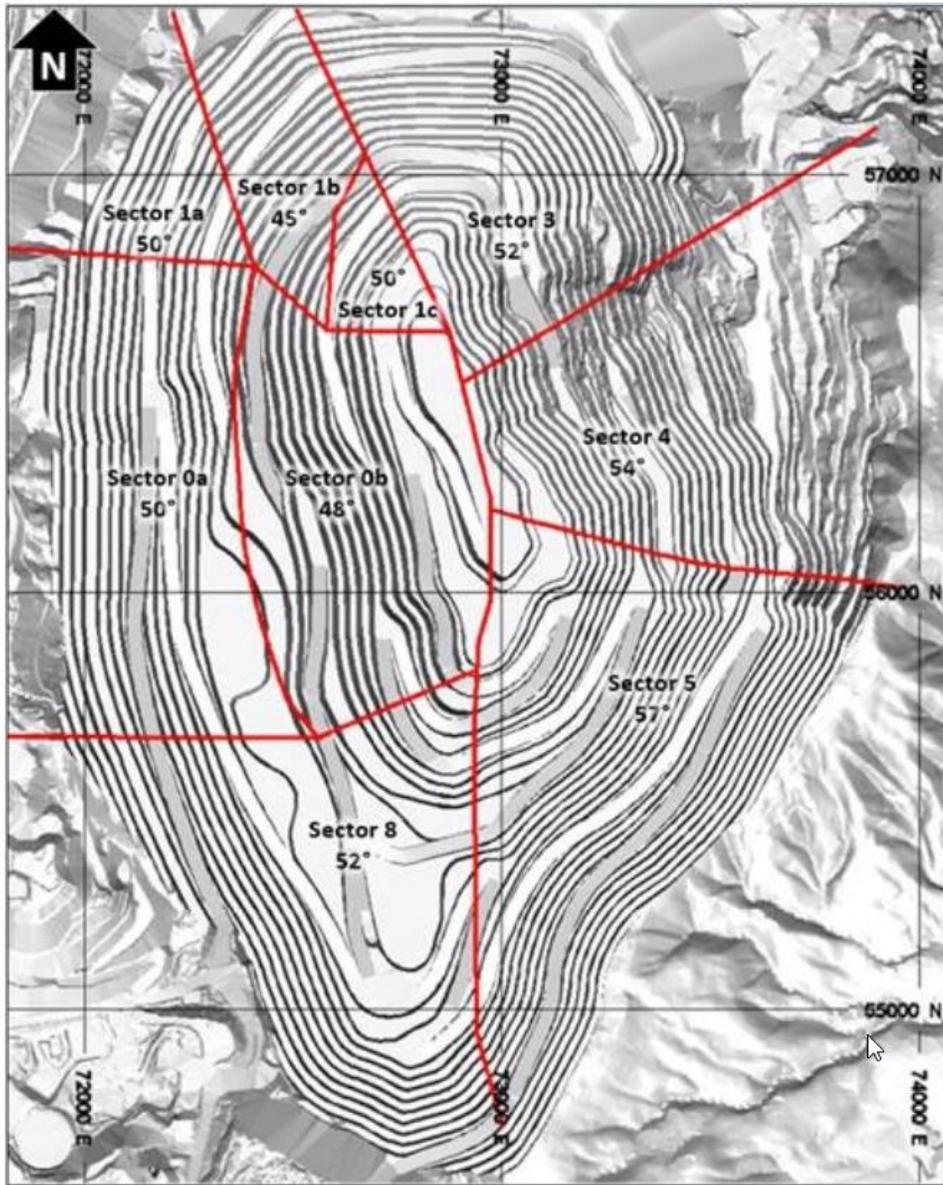
The copper concentrate is assumed to have a copper grade of 30.24 percent with a moisture content of 9.5 percent. For the pit optimization, the concentrate was assumed to be “clean” with no applicable smelter penalties. Transportation costs for the concentrate are estimated at US\$39.00 per wet metric tonne or US\$42.65 per dry metric tonne. Smelting and refining charges are estimated to be US\$100.00 per dry metric tonne and US\$0.10 per payable pound of copper, respectively. Based on a 30.30 percent concentrate grade, the copper pay factor is estimated at 96.5 percent. A transportation loss allowance of 0.20 percent was applied.

The payable gold in concentrate was assigned at 96.0 percent with a refining charge of US\$5.00 per ounce. The payable silver in concentrate was assigned at 90.0 percent with a silver refining charge of US\$0.35 per ounce.

The pit optimization was undertaken using the Mineral Resource block model expanded in all directions to cover the maximum extent of the ultimate pit. A mining block model was populated in MineSight and Datamine NPV Scheduler. Additional block model items were added for slope coding, concentrate grades, metallurgical recovery, rock hardness, mining restriction near the tailings impoundment and the property boundary on the east side of the open pit. No additional mining dilution or losses were applied to the Mineral Resource model for the purpose of mine planning. A 100-metre offset pit limit restriction was applied at the toe of the existing tailings storage facility. A boundary restriction was applied on the east side of the open pit.

Open pit wall slope recommendations were provided by Call Nicolas International Company (CNI), based on comprehensive geo-mechanical studies to support the current operating pits. Inter-ramp slopes angles range from 45 to 57 degrees. Nine slope sectors were defined with different inter-ramp

slopes, bench face angles, berm intervals, and berm widths (Figure 24). A hard rock surface was used to control the slope angle in overburden and fill areas in the upper part of the deposit.



SECTR	Name	ISA degrees	BFA degrees	Berm Interval meters	Berm Width meters	NPVS Input
1	Sector 0a	50.0	72	32	16.50	44.6
2	Sector 0b Lar Fault	48.0	65	32	13.90	41.5
3	Sector 1a	50.0	72	32	16.50	44.6
4	Sector 1b	45.0	65	32	17.10	41.1
5	Sector 1c	50.0	72	32	16.50	45.8
6	Sector 3	52.0	72	32	14.50	45.2
7	Sector 4	54.0	72	32	12.85	47.2
8	Sector 5	57.0	78	32	14.00	50.2
9	Sector 8	52.0	75	32	16.40	47.8

**Figure 24: Candelaria Open Pit Sectors Geotechnical Design Recommendations**

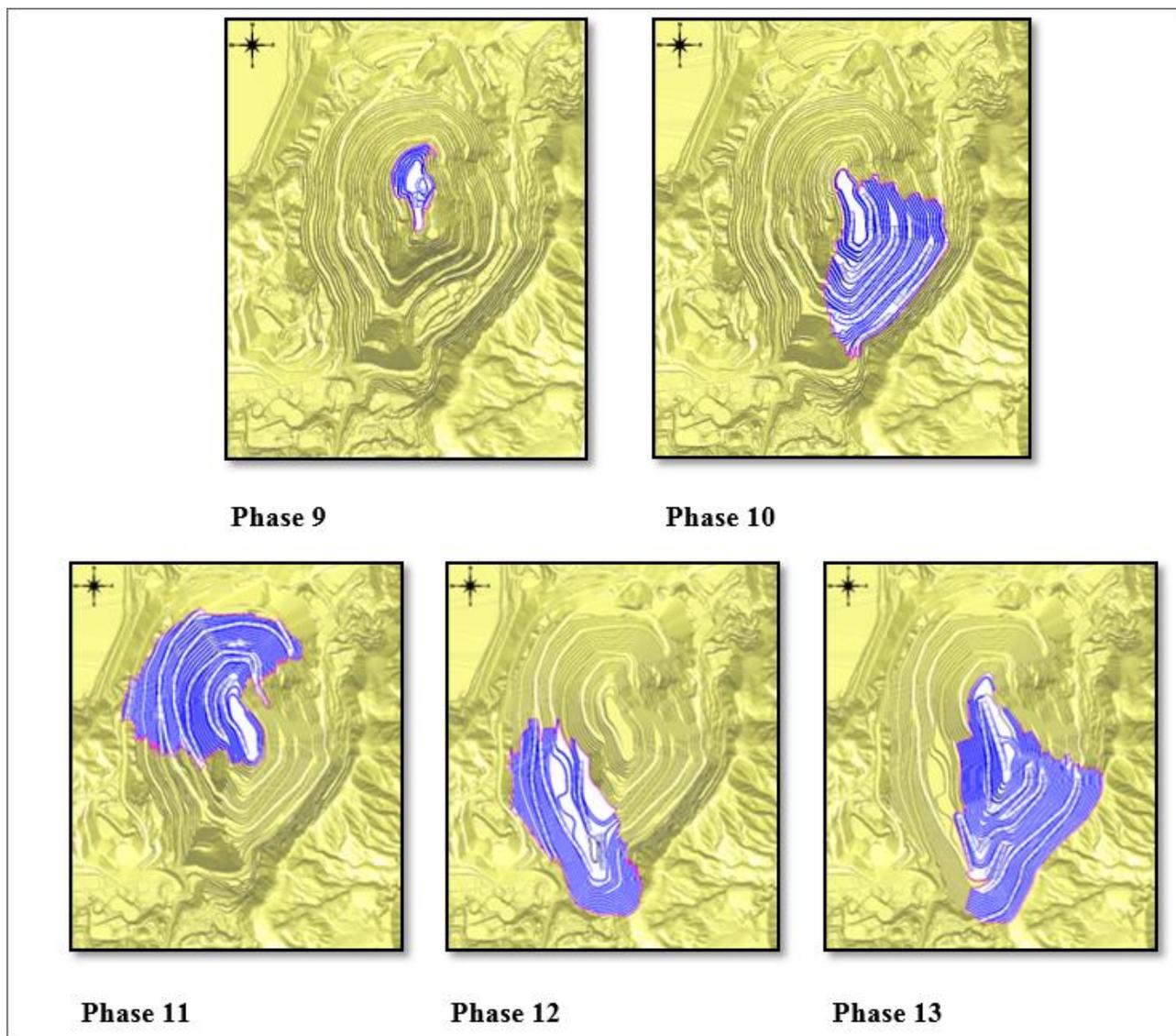
ISA: Inter-ramp slope angle, BFA: bench face angle

Source: Call Nicolas International Company

The unsmoothed US\$2.75 per pound of copper Lerchs-Grossman pit was used as a guide to develop the ultimate pit design. Design parameters include:

- Sixteen-metre bench with double bench between catchment berms.
- Planned mining widths in the design phases exceeding 100 metres but pinching down to 40 to 60 metres locally where ramps and phase interfaces come together.
- Haulage allowances of 33 metres; in practise, the ramp width provides adequate room for berms and two-way traffic with the 240-ton class trucks used at Candelaria.
- Mining Phases 9 through 13.

The final pit design was used to report the Candelaria Open Pit Mineral Reserves, using a topographic profile as of June 30, 2018. The final pit design mining phases are shown in Figure 25. For the open pit LOM plan that supports the open pit Mineral Reserves direct mill feed is scheduled at a variable cut-off grade averaging approximately 0.31 percent copper. The material below that cut-off grade but above a grade of 0.17 percent copper is stockpiled.



**Figure 25: Candelaria Mining Phases**

The new 2018 overall design has shown an increase in Mineral Reserves of 21.5 percent relative to 2017. The change is primarily due to a reduced cut-off grade of 0.17 percent total copper, which has resulted in an increase in the overall pit size and material above cut-off.

The open pit mine design has been expanded beyond current environmental permit boundaries. New EIA documentation for a permit change application is in progress. Site personnel consider permit application approval to be a reasonable expectation.

## 14.2.2 Española Open Pit Mineral Reserves

The Española project is a new addition to the Mineral Reserves in the Candelaria District. The deposit will be exploited using open pit mining methods similar to those currently applied at the Candelaria open pit.

The Española project is considered to contain medium to low grade ore. Its most important contribution to the mining plan will be associated with the replacement of ore from low-grade stockpiles previously scheduled for processing.

The operating cost estimates used for Española have been adapted from the Candelaria open pit. The main differences can be found in mine base costs for a lower mining rate and the transportation costs, since these depend entirely on the distance from the pit to the dumps, stockpiles and crusher.

Mineral Reserves for the Española open pit are based on Measured and Indicated Mineral Resources within a pit design defined by the economic limits of mining.

Given certain geological similarities with the current Candelaria Open Pit, logarithmic regressions have been generated, which have been used to estimate the metallurgical copper recoveries. Gold and silver recoveries are estimated using the same criteria as the copper recovery, supported by a regression and reduced as copper solubility increases.

Metallurgical recovery for copper, gold and silver were estimated using a similar methodology to Candelaria. In the weathered zone an adjustment was made to each recovery based upon the solubility ratio (copper sulphide: total copper).

The mining base operating cost, excluding transportation, was estimated to be US\$1.57 per tonne mined. The ore extraction rate will be variable. For the purposes of pit optimization, a mining rate of 45 kilotonnes per day was assumed at Española.

Primary loading units in ore and waste will be Caterpillar 6040 and 6020 backhoes. Stockpile re-handling, excluding transportation, costs been estimated at US\$0.94 per tonne.

The incremental cost per bench (every 16 metres) has been estimated at US\$0.02 per tonne per bench.

Fixed transportation costs for ore hauled directly to the plant and to the dump are estimated at US\$0.76 per tonne and US\$0.50 per tonne, respectively, and are in line with the latest pit cost estimate. CAT 793-F trucks will be the primary haulage units.

The sustaining capital for equipment amortization has been included at US\$0.19 per tonne mined and is directly related to equipment replacement and major repairs. This cost has been developed for the Candelaria open pit.

The plant operating cost has been estimated at US\$8.48 per tonne and reflects the latest adjustments to the Candelaria cost of power. The plant operating cost includes crushing, grinding, general and administrative expenses, plant sustaining capital and an allowance for the Los Diques tailings storage facility sustaining capital.

The 10 percent discount rate applied in pit optimization was the same as for the Candelaria pit. The sinking rate applied was 6 benches per year with a corresponding bench discount factor of 1.67 percent.

The cut-off grade applied for Mineral Reserve reporting at Española is 0.21 percent total copper. The soluble copper ratio was considered for both pit optimization and Mineral Reserve reporting for scheduling. Mineral Resources with greater than 10 percent soluble copper were not considered for pit limit definition. Mineral Resources with greater than 20 percent soluble copper were not reported for Mineral Reserves and production scheduling.

A geomechanical pre-feasibility analysis of the Española project design was undertaken by mine site engineers. This review considered the design angles, i.e.: bench face angle (BFA), inter-ramp angle (ISA) and containment berm width (CB). Identification of potential planar failures and/or wedges as well as reviewing the geotechnical parameters of the lithology present in the Española deposit was completed.

The current Española project design parameters are summarized below:

- Bench face angle BFA: 70 degrees
- Inter-ramp ISA gap angle: 48 degrees
- Width of BW berm: 8.6 metres
- Bench Height: 16 metres
- Ramp width: 35 metres

The design of the Española open pit is emplaced mainly in metasedimentary rock (UG30) and dacitic sill (UG70) rocks, which show a high uniaxial compressive strength (UCS between 169 and 224 megapascals). The pit optimization overall wall slope was assumed to be 45 degrees.

The Mineral Reserve estimates are based on the mine design developed using an optimized pit limit defined by applying the modifying factors described above. The positive economics of the Mineral Reserves are supported by the financial analysis of the LOM Plan.

Environmental permit applications will be prepared for the extraction of these Mineral Reserves. Based on information provided by Candelaria management regarding the anticipated timeframe for the permitting process, the QP expects that the environmental permits will be approved by 2022, with the sectorial permits the following year. Extraction of the Española material is currently only scheduled to commence in 2025.

### **14.2.3 Mineral Reserves of the Candelaria Underground Mine**

The Candelaria Underground mine Mineral Reserve estimates were prepared by the Candelaria Copper Mining Complex Underground Technical Service Department. The Mineral Reserves are based on the 2018 estimated Measured and Indicated Mineral Resources defined for the underground mine.

The Candelaria Underground Mine includes mining fronts added to both the Candelaria Underground North and South Sectors since the publication of the 2017 Technical Report. The newly-added areas include Wedge Gap East and West in the Candelaria Underground (North Sector), and Damiana in the Candelaria Underground (South Sector). Additional Mineral Reserves have also been added to the Wendy North and Elisa North 2 areas within the Candelaria Underground (North sector). The Mineral Reserve estimates for the Candelaria Underground Mine are based on the 2018 LOM plans and the stopes were designed and developed using modifying parameters summarized in Table 30.

**Table 30: Summary of Mineability Factors Applied for Mineral Reserve Estimation – Candelaria Underground, Santos & Alcaparrosa Mines**

Parameter	Units	Candelaria UG	
		June 2017	June 2018
<b>Mining ore recovery by stope setting</b>			
Vertical	%	95	95
Inclined	%	95	95
Rib	%	95	95
Pillar	%	95	95
Structural pillar	%	95	95
<b>Mining ore dilution by stope setting</b>			
Vertical	%	18	18
Inclined	%	30	30
Rib	%	50	50
Pillar	%	40	40
Structural pillar	%	50	50
<b>Dilution material*</b>			
Copper	%	0.30	0.30
Gold	g/t	0.07	0.07
Silver	g/t	1.00	1.00
Magnetite	%	5.00	5.00

\* Default dilution material grades. Some in-production stope dilution grades applied are based on detailed dilution solid analysis performed by geologists and geotechnical engineers

It should be noted that mineability factors applied in 2018 were verified based on back-analysis from historical mined-out stope cavity monitoring system data. The mineability factors used in 2018 are consistent with those employed in 2017. When compared to 2017 figures, the Mineral Reserve tonnage has increased by 53.8 percent, while metal grades decreased by 4.5 percent and contained metals increased by approximately 46.8 percent. These increases reflect the success of the exploration program.

The conversion of Mineral Resources to Mineral Reserves at Minera Candelaria is initiated at the formal transfer of the Mineral Resource block models to the underground mine planning group.

The metal grades of the Inferred Mineral Resources in the Mineral Resource block model were re-coded to zero. For the Candelaria North sector, preliminary stope layouts were generated by first utilizing Datamine MSO (Mineable Shape Optimizer) software with predefined stope design parameters. These preliminary stope designs were reviewed and refined to achieve optimal stope geometries. The specific geotechnical recommendations were also considered for each case including, where necessary, for pillars left between the underground mine and the open pit. The final stope designs, grades and tonnes were internally audited before reporting.

For the Candelaria South and Candelaria North Wedge Gap areas, preliminary stope layouts were generated by utilizing the Deswik software with predefined stope parameters. These initial designs were reviewed to ensure mineability, after which drifting layouts were developed to access the stopes. The mining sequence was scheduled using the Deswik software and reviewed to ensure minimal interaction with the open pit mining sequence. All designs were reviewed and confirmed to be outside of the ultimate pit design.

Stope in-situ data were reported using an Excel spreadsheet, and mining dilution and recovery factors were applied to the final calculations of tonnage and grade.

The cut-off grade calculated for the Candelaria Underground Mine, which corresponds to 0.57 percent copper, was based on costs and commercial orientations.

Dilution and recovery parameters vary depending on certain attributes for an individual stope, including geotechnical condition, geometry, and location in the mining sequence.

All economical stopes and related development are included in this report.

### **14.3 Mineral Reserves of the Minera Ojos del Salado**

Minera Ojos del Salado consists of the Santos and Alcaparrosa underground mines. The Mineral Reserves for the Santos and Alcaparrosa mines were prepared by the Underground Technical Services Department and were based on the 2018 estimations of Measured and Indicated Mineral Resources, defined by the Resource Definition Department.

The Mineral Reserve estimates for the Santos and Alcaparrosa underground mines are based on their 2018 LOM plans and the stopes were designed using modifying parameters tabulated in Table 30.

The conversion of Mineral Resources to Mineral Reserves at the Santos and Alcaparrosa mines followed the same process applied for the Candelaria Underground Mine.

The cut-off grades calculated for the Santos and Alcaparrosa mines, which correspond to 0.64 and 0.59 percent copper respectively, were based on cost estimation and commercial orientations.

### **14.4 Mineral Reserve Statement**

Mineral Reserves are derived from Measured or Indicated Mineral Resources after applying economic parameters. Mineral Reserves are classified using the following criteria:

- Proven Mineral Reserves are the Measured Mineral Resources where development work for mining and information on processing/metallurgy and other relevant factors demonstrate that economic extraction is achievable.
- Probable Mineral Reserves are those Measured and Indicated Mineral Resources where development work for mining and information on processing/metallurgy and other relevant factors demonstrate that economic extraction is achievable.

The audited Mineral Reserve Statements for Minera Candelaria and Minera Ojos del Salado are tabulated in Table 31 and Table 32, respectively. The consolidated Mineral Reserve Statement for the Candelaria Copper Mining Complex is presented in Table 33.

**Table 31: Audited Mineral Reserve Statement\*, Compañía Contractual Minera Candelaria, SRK Consulting (Canada) Inc., June 30, 2018 (100% Basis)**

Classification	Quantity ('000 t)	Grade			Contained Metal		
		Copper (%)	Gold (g/t)	Silver (g/t)	Copper ('000 t)	Gold ('000 oz)	Silver ('000 oz)
<b>Candelaria Open Pit</b>							
Proven	357,302	0.49	0.11	1.58	1,760	1,309	18,188
Probable	26,448	0.38	0.1	1.47	101	89	1,250
<b>Total</b>	<b>383,749</b>	<b>0.49</b>	<b>0.11</b>	<b>1.58</b>	<b>1,861</b>	<b>1,397</b>	<b>19,437</b>
<b>Española Project**</b>							
Proven	19,014	0.43	0.09	0.42	82	57	255
Probable	12,704	0.42	0.09	0.39	53	37	159
<b>Total</b>	<b>31,719</b>	<b>0.42</b>	<b>0.09</b>	<b>0.41</b>	<b>135</b>	<b>94</b>	<b>414</b>
<b>Candelaria WIP</b>							
Proven	84,460	0.33	0.09	1.38	278	243	3,751
Probable							
<b>Total</b>	<b>84,460</b>	<b>0.33</b>	<b>0.09</b>	<b>1.38</b>	<b>278</b>	<b>243</b>	<b>3,751</b>
<b>Candelaria Underground</b>							
Proven	54,725	0.88	0.21	3.77	483	367	6,627
Probable	46,289	0.81	0.18	2.55	374	264	3,801
<b>Total</b>	<b>101,015</b>	<b>0.85</b>	<b>0.19</b>	<b>3.21</b>	<b>856</b>	<b>631</b>	<b>10,428</b>
<b>Minera Candelaria Total</b>							
Proven	515,501	0.50	0.12	1.74	2,602	1,975	28,821
Probable	85,441	0.62	0.14	1.9	528	390	5,210
<b>Total</b>	<b>600,943</b>	<b>0.52</b>	<b>0.12</b>	<b>1.76</b>	<b>3,130</b>	<b>2,365</b>	<b>34,031</b>

\* Mineral Reserves included in Mineral Resources. Mineral Reserves have been prepared using metal prices of US\$2.75 per pound of copper, US\$1,000 per ounce of gold, and US\$15.00 per ounce of silver. All figures have been rounded to reflect the relative accuracy of the estimates. Mineral Reserves for the Candelaria Open Pit are reported at cut-off grades of 0.17 percent copper. Underground Mineral Reserves for Candelaria North and Candelaria South are reported at cut-off grades of 0.57 percent copper.

\*\* For the Española project Mineral Reserves have been prepared using metal prices of US\$2.75 per pound of copper, US\$1,000 per ounce of gold, and US\$15.00 per ounce of silver. All figures have been rounded to reflect the relative accuracy of the estimates. Mineral Reserves for the Española Open Pit are reported at cut-off grades of 0.21 percent copper.

**Table 32: Audited Mineral Reserve Statement\*, Compañía Contractual Minera Ojos del Salado, SRK Consulting (Canada) Inc., June 30, 2018 (100% Basis)**

Classification	Quantity ('000 oz)	Grade			Contained Metal		
		Copper (%)	Gold (g/t)	Silver (g/t)	Copper ('000 t)	Gold ('000 oz)	Silver ('000 oz)
<b>Santos Underground</b>							
Proven	10,742	0.93	0.22	2.27	100	77	784
Probable	7,779	0.89	0.22	2.19	69	55	547
<b>Total</b>	<b>18,521</b>	<b>0.91</b>	<b>0.22</b>	<b>2.23</b>	<b>169</b>	<b>132</b>	<b>1,331</b>
<b>Alcaparrosa Underground</b>							
Proven	6,408	0.81	0.17	1.37	52	34	282
Probable	8,062	0.77	0.17	1.35	62	43	351
<b>Total</b>	<b>14,470</b>	<b>0.79</b>	<b>0.17</b>	<b>1.36</b>	<b>114</b>	<b>77</b>	<b>633</b>
<b>WIP</b>							
Proven	44	1.2	0.22	2.95	1	0	4
Probable							
<b>Total</b>	<b>44</b>	<b>1.2</b>	<b>0.22</b>	<b>2.95</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Combined Mining</b>							
Proven	17,194	0.89	0.2	1.94	152	111	1,071
Probable	15,841	0.83	0.19	1.76	131	98	898
<b>Total</b>	<b>33,035</b>	<b>0.86</b>	<b>0.2</b>	<b>1.85</b>	<b>283</b>	<b>210</b>	<b>1,968</b>

\* Mineral Reserves included in Mineral Resources. Mineral Reserves have been prepared using metal prices of US\$2.75 per pound of copper, US\$1,000 per ounce of gold, and US\$15.00 per ounce of silver. All figures have been rounded to reflect the relative accuracy of the estimates. Underground Mineral Reserves for Santos and Alcaparrosa are reported cut-off grades of 0.64 percent copper and 0.59 percent copper, respectively.

**Table 33: Consolidated Audited Mineral Reserve Statement\*, Candelaria Copper Mining Complex, SRK Consulting (Canada) Inc., June 30, 2018 (100% Basis)**

Classification	Quantity ('000 t)	Grade			Contained Metal		
		Copper (%)	Gold (g/t)	Silver (g/t)	Copper ('000 t)	Gold ('000 oz)	Silver ('000 oz)
<b>Candelaria Open Pit + Española</b>							
Proven	376,316	0.49	0.11	1.52	1,842	1,365	18,443
Probable	39,152	0.39	0.1	1.12	154	126	1,409
<b>Total</b>	<b>415,468</b>	<b>0.48</b>	<b>0.11</b>	<b>1.49</b>	<b>1,996</b>	<b>1,491</b>	<b>19,852</b>
<b>Total District Underground</b>							
Proven	71,876	0.88	0.21	3.33	634	478	7,693
Probable	62,130	0.81	0.18	2.35	504	362	4,699
<b>Total</b>	<b>134,006</b>	<b>0.85</b>	<b>0.2</b>	<b>2.88</b>	<b>1,139</b>	<b>840</b>	<b>12,392</b>
<b>WIP Candelaria &amp; Ojos del Salado</b>							
Proven	84,504	0.33	0.09	1.38	278	243	3,755
Probable							
<b>Total</b>	<b>84,504</b>	<b>0.33</b>	<b>0.09</b>	<b>1.38</b>	<b>278</b>	<b>243</b>	<b>3,755</b>
<b>District Total</b>							
Proven	532,696	0.52	0.12	1.75	2,755	2,087	29,891
Probable	101,282	0.65	0.15	1.88	659	488	6,108
<b>Total</b>	<b>633,978</b>	<b>0.54</b>	<b>0.13</b>	<b>1.77</b>	<b>3,413</b>	<b>2,575</b>	<b>35,999</b>

\* Mineral Reserves included in Mineral Resources. Mineral Reserves have been prepared using metal prices of US\$2.75 per pound of copper, US\$1,000 per ounce of gold, and US\$15.00 per ounce of silver. All figures have been rounded to reflect the relative accuracy of the estimates. Mineral Reserves for the Candelaria Open Pit are reported at cut-off grades of 0.17 percent copper. Underground Mineral Reserves for Candelaria North and Candelaria South are reported at cut-off grades of 0.57 percent copper. Underground Mineral Reserves for Santos and Alcaparrosa are reported cut-off grades of 0.64 percent copper and 0.59 percent copper, respectively

\*\* For the Española project Mineral Reserves have been prepared using metal prices of US\$2.75 per pound of copper, US\$1,000 per ounce of gold, and US\$15.00 per ounce of silver. All figures have been rounded to reflect the relative accuracy of the estimates. Mineral Reserves for the Española Open Pit are reported at cut-off grades of 0.21 percent copper.

A comparison of Mineral Reserves reported in 2017 and in 2018 and disclosed in this Technical Report indicate that:

- The Candelaria Open Pit Mineral Reserves have increased by 176 kilotonnes of contained copper, considering the extraction from July 2017 through June 2018.
- The Candelaria WIP show a decrease of 35 kilotonnes of copper due to the depletion of the North Stockpile in 2018.
- Candelaria Underground Mineral Reserves have increased by 272 kilotonnes of contained copper, primarily due to exploration success in the new mining areas in the North and South sectors as well as the Wedge Gap.
- Ojos del Salado Mineral Reserves have increased by 80 kilotonnes of contained copper; (44 kilotonnes at Santos and 36 kilotonnes at Alcaparrosa), again due to exploration success.
- Finally, Española contributes 135 kilotonnes of contained copper to the Candelaria Mineral Reserves. It is expected that the Mineral Reserves will increase by converting Inferred Mineral Resources into the Measured or Indicated category with further infill drilling.

## 15 Mining Methods

### 15.1 Introduction

Minera Candelaria consists of the Candelaria Open Pit and the Candelaria Underground mines. Minera Ojos del Salado consists of the Santos and Alcaparrosa underground mines. The Candelaria and the Minera Ojos del Salado operations are located close to each other, resulting in shared surface infrastructure such as the concentrator and tailings dam, as well as a common management structure. The ore from the Candelaria Open Pit, Candelaria Underground, and Alcaparrosa Mine is processed at the Candelaria processing plant. Ore from the Santos mine is shipped to the Pedro Aguirre Cerda (PAC) processing plant located on the Minera Ojos del Salado property. Any ore above the capacity of the PAC plant is sent to the Candelaria plant for processing. Ore from the Española open pit will be transported to the Candelaria processing plant.

This section describes the open pit and underground mining methods used at the Candelaria Copper Mining Complex.

The open pits will operate with an overall mining rate of approximately 310,000 tonnes per day for the next ten years. As the final Candelaria Phase 13 waste stripping is completed the overall mining rate will decline. A stockpile strategy has been developed to maximize the grade of material going to the processing facility. Direct milling ore will average 0.59 percent copper from Candelaria and 0.43 percent copper from Española. Lower grade stockpile ore will be recovered to meet plan capacity as required. The mine operates seven electric shovels, forty-three haulage trucks, eight production drills, and a fleet of support equipment.

The Candelaria Underground mine is forecast to produce 9,000 tonnes per day of ore in 2018, ramping up to a steady state of 14,000 tonnes of ore per day by 2021 as per the LOM plan. The average LOM grade is 0.85 percent copper. The Alcaparrosa mine currently produces 4,300 tonnes per day of ore and is expected to maintain a steady state production rate. The LOM average grade is 0.79 percent copper. The Santos mine will continue to produce at its current rate of production of 5,200 tonnes per day of ore with an average LOM grade of 0.91 percent copper. The mining method employed in all three underground mines is sublevel open stoping.

### 15.2 Open Pit Mine Design and Consolidated Production Schedule

A LOM plan for Minera Candelaria is based on the Mineral Reserves reported in Section 14. The plan is largely driven by supplying ore to the Candelaria processing plant from the open pit mine and surface stockpiles once the open pit Mineral Reserves have been depleted. The current combined open pit Candelaria, open pit Española and work-in-progress stockpile Mineral Reserves are estimated at 499.9 million tonnes at an average grade of 0.45 percent copper, 0.11 g/t gold, and 1.47 g/t silver. The open pit and work-in-progress stockpile Mineral Reserves are reported at a cut-off grade of 0.17 percent for Candelaria and 0.21 percent for Española.

The Candelaria open pit was designed to be mined in several phases of development. As of June 2018, five phases of development remain in the LOM plan (Phases 9 to 13). The overall strip ratio is expected to be 2.45:1 including ore that is initially delivered to stockpiles. The total in-pit waste is 939.6 million tonnes and the overall life of the open pit mine is 17 years. The final pit

design and an outline of the overall Mineral Reserves are shown in Figure 26. The Española total in-pit waste is 83.2 million tonnes and the overall life estimated in 7 years.

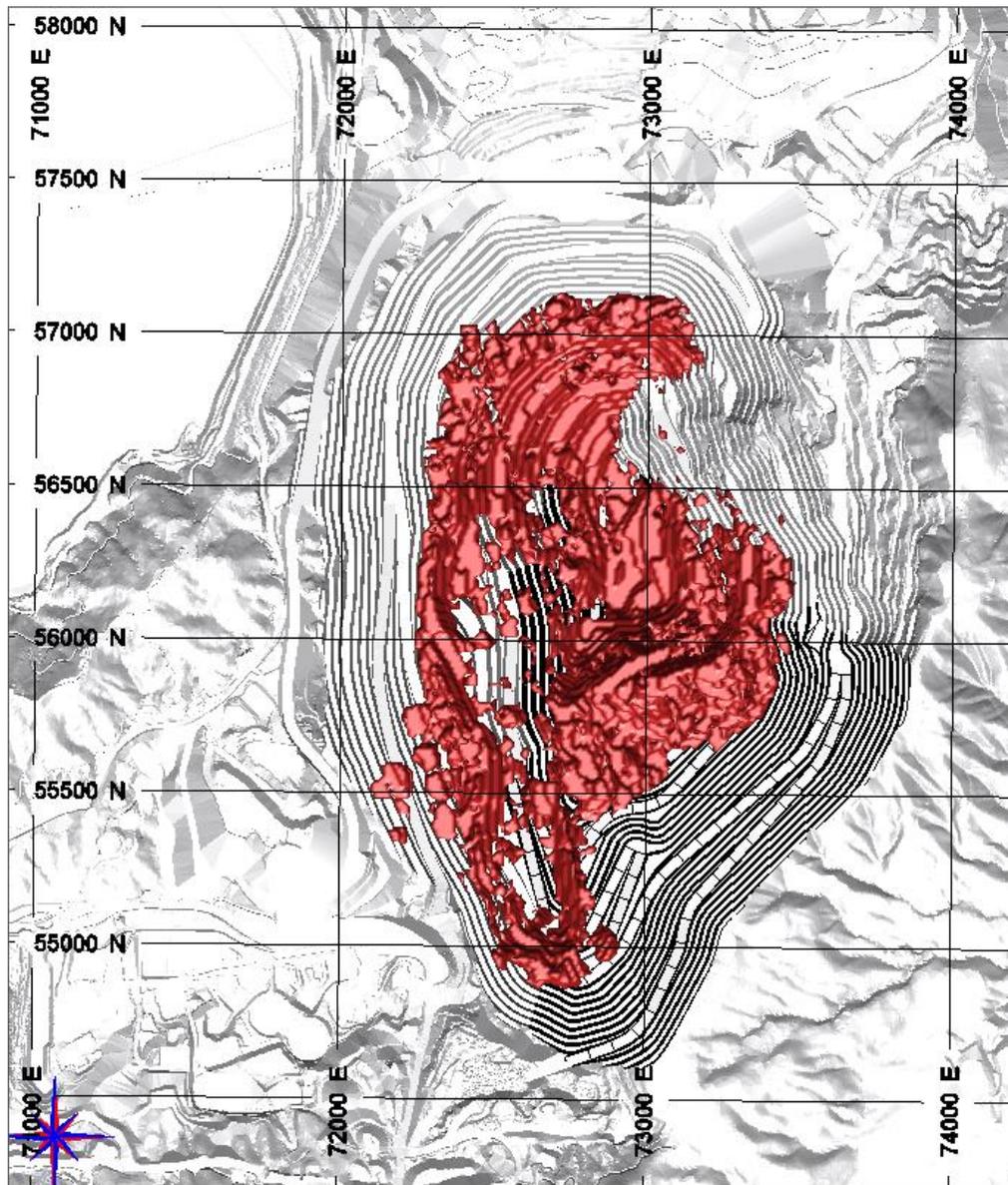
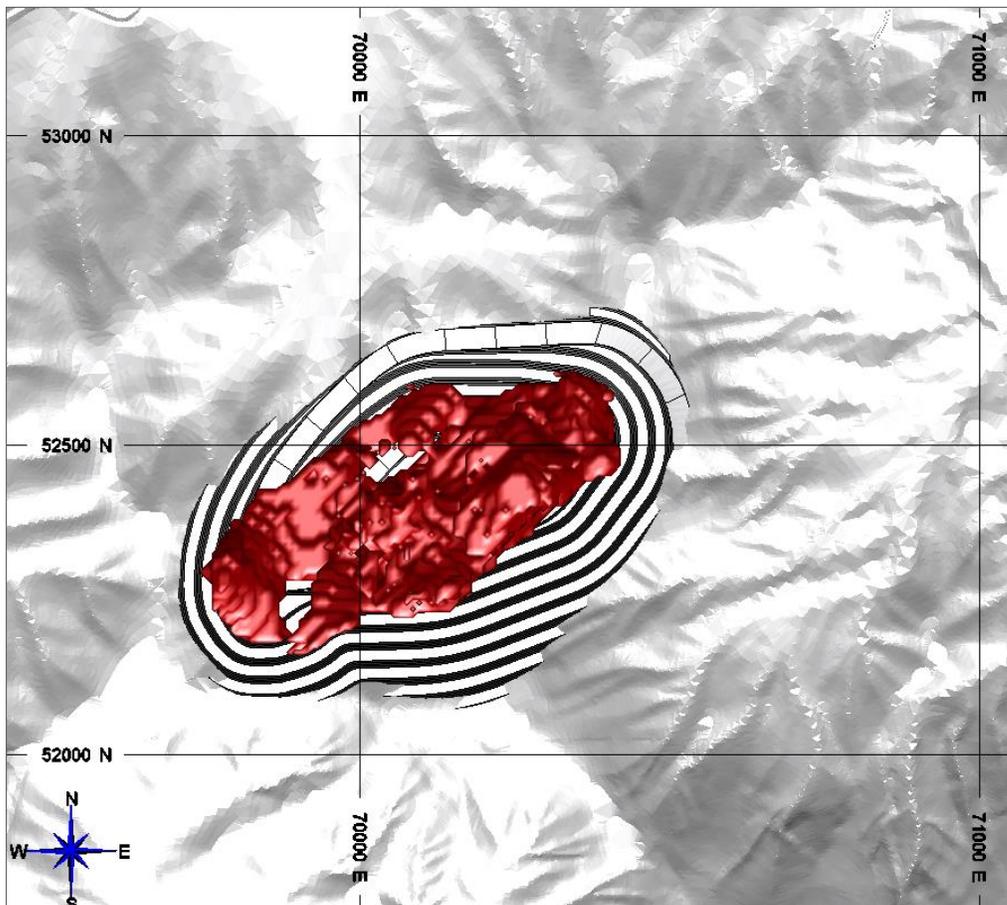


Figure 26: Summary of Candelaria Open Pit Mine Development

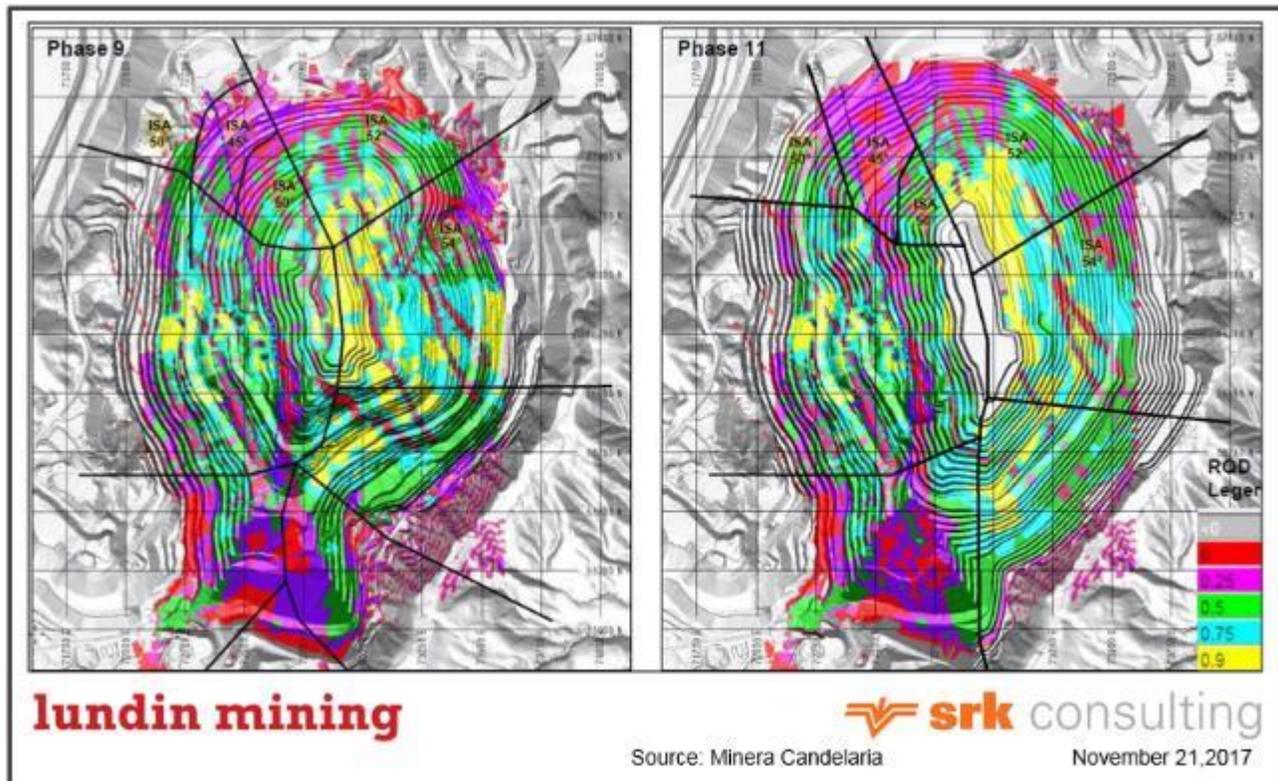


**Figure 27: Summary of Candelaria and Española Open Pit Mine Development**

The open pit design is based upon the following key considerations:

- Phase development to smooth ore and waste scheduling with stockpile material available to supplement direct mill feed from the mine.
- Overall and inter-ramp slope recommendations provided by Call Nicolas International Company (CNI) including use of pre-split drilling and blasting.
- Operating constraints of the equipment available for mining.
- Minimum mining width defined by double side loading of trucks with allowance for an access ramp.
- Bench height achievable and within the safe operating reach of the primary loading units.
- Minimum haulage road operating width and maximum effective grade within the operating limitations of the primary haulage units.

The primary components for the open pit slope design include bench geometry, inter-ramp, and overall slope angles (Figure 28). The current pit dimensions are 2,200 metres by 1,400 metres with a depth of 700 metres. Current inter-ramp slope angles range from 45 to 52 degrees in the west wall and from 52 to 57 degrees in the east wall. Bench face angles range from 65 to 72 degrees.



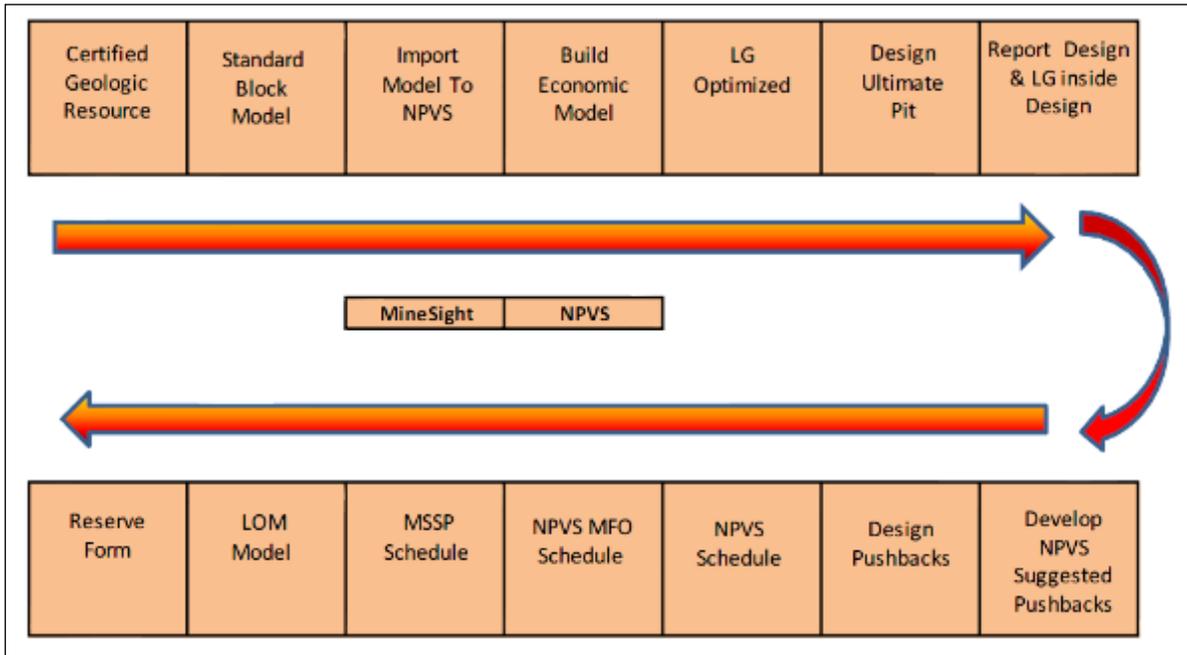
**Figure 28: Slope Sectors Rock Quality Designation for Phase 9 (Left) and Phase 11 (right)**

The rock at Candelaria has a typical uniaxial compressive strength of over 140 megapascals and is considered “hard rock”. In the east, any wall instabilities are structurally controlled with north and northwest being the most critical directions. The failure mechanism in this wall is mainly planar failure. In the west and north walls the stability is controlled by rock mass conditions. The failure mechanisms in these walls are wedge and circular type failures. The intersection between the Lar fault and the Mistral Mirador fault generates a zone of rock weakness. Open wall slope recommendations have been provided by CNI (see Section 14).

Slope monitoring is carried out in the mine on a continuous basis using robotized monitoring systems, including two robotic prism monitoring stations, five SlideMinder extensometers, three Ground Probe SS radar units, nine vibrating wire piezometers, and two web cameras.

The Candelaria Open Pit is relatively dry owing to its location in an arid region. The northeast wall appears to be receiving some seepage from the toe of the tailings dam. Horizontal drain holes have been drilled up to 200 metres into the wall to reduce pore pressures in the area of the Lar fault.

The pit designs include allowances for 32- to 35-metre wide roads including ditches and berms. Haul roads within the pit limits have a maximum gradient of 10 percent with the exception of the Phase 9 pit bottom where grades will be increased to 14 percent utilizing an articulated truck fleet. The final pit design is shown in Figure 26. The flowsheet for the design and scheduling of the Minera Candelaria LOM plan is shown in Figure 29.



**Figure 29: Candelaria Life of Mine Plan Development Process**

Source: Minera Candelaria

The LOM plan was developed using MineSight and Datamine NPVS software packages. The Mineral Resource model and standard mining block model were developed in MineSight. This standard mining model was then imported to NPVS to calculate economic value items and to develop Lerchs-Grossman pit limits. A final pit design was developed in MineSight. NPVS was used to develop potential pushback limits. Detailed phase designs were then completed in MineSight and schedule optimization was undertaken in NPVS. Once a cut-off grade was estimated and a stockpile strategy was completed, MineSight Schedule Optimizer was used to create the final detailed schedule.

The mine production schedule for Minera Candelaria and Minera Ojos del Salado for the period 2H-2018 to 2040 is shown in Table 34, displaying the material sent to the Candelaria and PAC plants, and the forecast processing plant recoveries together with the concentrate and contained copper, gold, and silver metal. Low grade material from the open pit is initially transferred to WIP stockpiles and later withdrawn as WIP re-handle feed for the plant. The current mine production forecast is shown graphically in Figure 30. Examples of annual development plans are shown in Figure 31 to Figure 34. Española is expected to begin ore delivery to the Candelaria processing plant during the second half of 2025.

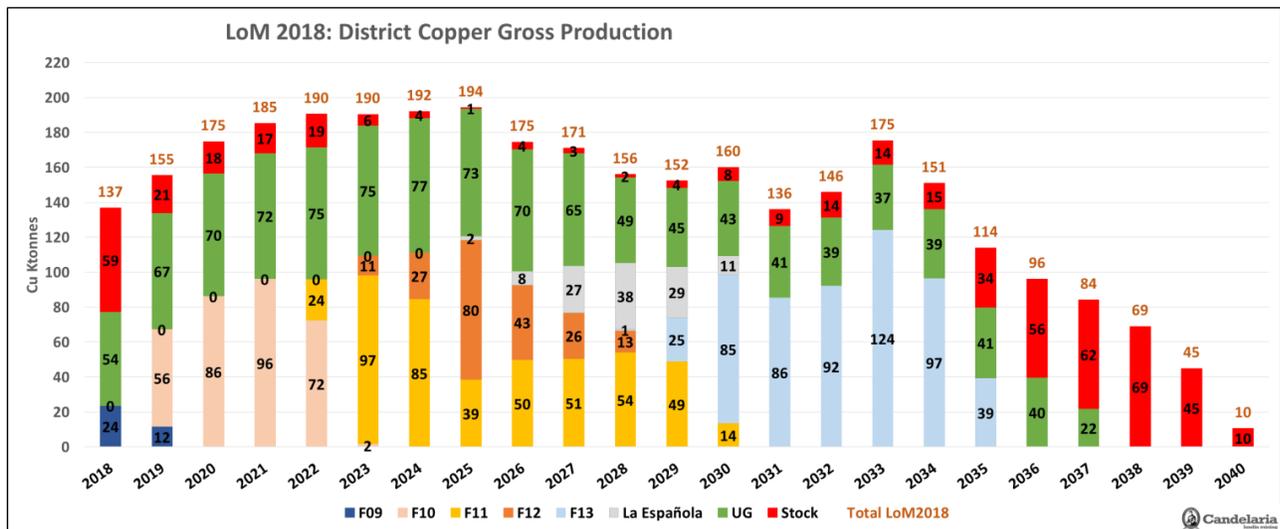
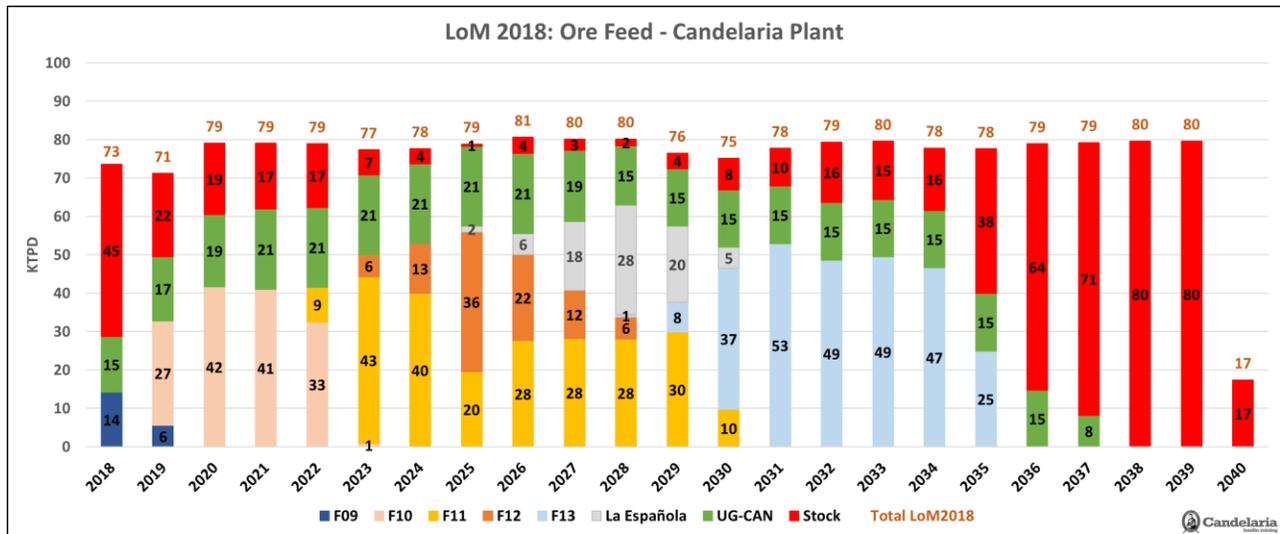
For the second half of 2018, the Candelaria Copper Mining Complex is forecast to produce concentrates containing 70 kilotonnes of copper, 41 kilo-ounces of gold and 0.66 million ounces of silver. Over the remaining LOM plan (2019 to 2040), the average annual production is estimated to be 142 kilotonnes of copper, 82 kilo-ounces of gold and 1.3 million ounces of silver. Over the 10-year period, 2019 to 2028, the average annual production is estimated to be 180 kilotonnes of copper, 102 kilo-ounces of gold and 1.6 million ounces of silver.

**Table 34: Candelaria Copper Mining Complex Mine Consolidated Production Schedule (100% Basis)**

Mine Production Plan	Unit	2H2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total	
<b>Open pit Ore fed to mill</b>	<b>Tonnes (kt)</b>	<b>2,699</b>	<b>11,986</b>	<b>15,253</b>	<b>14,996</b>	<b>15,168</b>	<b>18,268</b>	<b>19,377</b>	<b>20,434</b>	<b>18,256</b>	<b>14,863</b>	<b>12,618</b>	<b>13,737</b>	<b>16,987</b>	<b>19,312</b>	<b>17,789</b>	<b>18,063</b>	<b>17,006</b>	<b>9,103</b>						<b>275,916</b>	
	Cu (%)	0.50	0.61	0.59	0.68	0.67	0.63	0.60	0.60	0.52	0.53	0.55	0.56	0.61	0.47	0.54	0.72	0.61	0.47						0.59	
	Au (g/t)	0.14	0.14	0.14	0.15	0.15	0.16	0.14	0.14	0.11	0.12	0.13	0.12	0.15	0.12	0.12	0.15	0.13	0.11						0.13	
	Ag (g/t)	1.93	1.64	1.43	2.30	2.49	2.08	2.34	1.81	1.75	1.70	1.95	1.64	1.75	1.15	1.18	2.20	2.18	1.12						1.83	
<b>Española</b>	<b>Tonnes (kt)</b>								<b>551</b>	<b>2,040</b>	<b>6,549</b>	<b>10,417</b>	<b>7,229</b>	<b>1,975</b>											<b>28,761</b>	
	Cu (%)								0.417	0.424	0.448	0.401	0.440	0.445											0.43	
	Au (g/t)								0.11	0.10	0.10	0.09	0.09	0.11											0.09	
	Ag (g/t)								0.43	0.41	0.43	0.40	0.41	0.44											0.41	
<b>Open pit + Española Low grade to WIP</b>	<b>Tonnes (kt)</b>	<b>488</b>	<b>4,825</b>	<b>10,675</b>	<b>8,593</b>	<b>3,394</b>	<b>8,971</b>	<b>8,642</b>	<b>14,172</b>	<b>12,048</b>	<b>4,190</b>	<b>3,298</b>	<b>4,304</b>	<b>6,763</b>	<b>8,124</b>	<b>5,968</b>	<b>3,016</b>	<b>2,272</b>	<b>1,049</b>						<b>110,791</b>	
	Cu (%)	0.49	0.22	0.23	0.23	0.22	0.23	0.22	0.25	0.22	0.22	0.22	0.21	0.23	0.20	0.20	0.20	0.19	0.17						0.22	
	Au (g/t)	0.04	0.07	0.06	0.06	0.06	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.06	0.06	0.05						0.06	
	Ag (g/t)	0.48	0.87	0.61	0.72	1.04	1.12	1.17	1.12	1.13	0.98	0.88	0.92	0.75	0.70	0.57	1.23	0.99	0.63						0.92	
<b>WIP Rehandle</b>	<b>Tonnes (kt)</b>	<b>8,173</b>	<b>7,888</b>	<b>6,807</b>	<b>6,247</b>	<b>6,042</b>	<b>2,373</b>	<b>1,429</b>	<b>211</b>	<b>1,527</b>	<b>1,050</b>	<b>652</b>	<b>1,480</b>	<b>2,991</b>	<b>3,582</b>	<b>5,766</b>	<b>5,502</b>	<b>5,925</b>	<b>13,739</b>	<b>23,484</b>	<b>25,896</b>	<b>29,065</b>	<b>29,065</b>	<b>6,357</b>	<b>195,251</b>	
	Cu (%)	0.38	0.30	0.30	0.30	0.35	0.30	0.30	0.29	0.29	0.29	0.28	0.28	0.28	0.29	0.28	0.28	0.27	0.27	0.27	0.27	0.27	0.19	0.19	0.27	
	Au (g/t)	0.08	0.09	0.08	0.08	0.06	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.07	
	Ag (g/t)	1.20	1.33	1.28	1.24	0.94	1.34	1.19	1.20	1.05	1.19	1.19	1.19	1.18	0.54	1.15	1.14	1.14	1.14	1.14	1.14	1.14	1.13	1.01	1.01	1.12
<b>From Candelaria UG</b>	<b>Tonnes (kt)</b>	<b>1,686</b>	<b>3,987</b>	<b>4,757</b>	<b>5,475</b>	<b>5,475</b>	<b>5,475</b>	<b>5,490</b>	<b>5,475</b>	<b>5,475</b>	<b>5,475</b>	<b>5,490</b>	<b>5,475</b>	<b>5,475</b>	<b>5,475</b>	<b>5,490</b>	<b>5,475</b>	<b>5,475</b>	<b>5,475</b>	<b>5,403</b>	<b>3,013</b>				<b>101,015</b>	
	Cu (%)	0.91	0.97	0.95	0.86	0.91	0.90	0.94	0.88	0.89	0.86	0.85	0.88	0.83	0.80	0.76	0.73	0.77	0.79	0.78	0.77				0.85	
	Au (g/t)	0.27	0.26	0.22	0.21	0.22	0.20	0.22	0.20	0.19	0.19	0.18	0.18	0.19	0.17	0.17	0.16	0.16	0.18	0.18	0.20				0.19	
	Ag (g/t)	4.25	4.30	4.04	3.35	3.48	3.46	3.59	3.10	3.37	2.90	2.83	3.22	2.69	3.19	3.27	3.39	3.56	2.86	2.09	1.74				3.21	
<b>From Santos</b>	<b>Tonnes (kt)</b>	<b>296</b>	<b>511</b>	<b>512</b>	<b>511</b>	<b>511</b>	<b>511</b>	<b>512</b>	<b>511</b>	<b>511</b>	<b>511</b>	<b>169</b>													<b>5,068</b>	
	Cu (%)	1.00	1.07	0.92	0.93	0.94	0.88	0.92	0.87	0.76	0.82	0.93													0.91	
	Au (g/t)	0.23	0.25	0.23	0.24	0.23	0.21	0.23	0.22	0.19	0.20	0.22													0.22	
	Ag (g/t)	2.65	2.60	2.21	2.27	2.53	2.31	2.34	1.97	1.72	2.03	2.05													2.24	
<b>From Alcaparrosa</b>	<b>Tonnes (kt)</b>	<b>806</b>	<b>1,606</b>	<b>1,610</b>	<b>1,611</b>	<b>1,606</b>	<b>1,606</b>	<b>1,610</b>	<b>1,606</b>	<b>1,606</b>	<b>809</b>														<b>14,476</b>	
	Cu (%)	0.86	0.77	0.78	0.76	0.78	0.84	0.828	0.817	0.705	0.752														0.79	
	Au (g/t)	0.18	0.17	0.15	0.16	0.16	0.18	0.19	0.18	0.15	0.15														0.17	
	Ag (g/t)	1.13	1.20	1.15	1.49	1.44	1.64	1.39	1.34	1.47	1.16														1.36	
<b>Total Ore to Candelaria Plant</b>	<b>Tonnes (kt)</b>	<b>13,659</b>	<b>25,978</b>	<b>28,940</b>	<b>28,840</b>	<b>28,801</b>	<b>28,233</b>	<b>28,419</b>	<b>28,788</b>	<b>29,415</b>	<b>29,257</b>	<b>29,347</b>	<b>27,921</b>	<b>27,428</b>	<b>28,369</b>	<b>29,045</b>	<b>29,040</b>	<b>28,406</b>	<b>28,317</b>	<b>28,887</b>	<b>28,908</b>	<b>29,065</b>	<b>29,065</b>	<b>6,357</b>	<b>620,487</b>	
	<b>Cu (%)</b>	<b>0.511</b>	<b>0.59</b>	<b>0.60</b>	<b>0.64</b>	<b>0.66</b>	<b>0.67</b>	<b>0.67</b>	<b>0.67</b>	<b>0.59</b>	<b>0.58</b>	<b>0.55</b>	<b>0.58</b>	<b>0.61</b>	<b>0.51</b>	<b>0.53</b>	<b>0.64</b>	<b>0.57</b>	<b>0.44</b>	<b>0.37</b>	<b>0.33</b>	<b>0.27</b>	<b>0.19</b>	<b>0.19</b>	<b>0.53</b>	
	<b>Au (g/t)</b>	<b>0.122</b>	<b>0.147</b>	<b>0.141</b>	<b>0.150</b>	<b>0.147</b>	<b>0.162</b>	<b>0.155</b>	<b>0.151</b>	<b>0.128</b>	<b>0.128</b>	<b>0.123</b>	<b>0.124</b>	<b>0.143</b>	<b>0.126</b>	<b>0.117</b>	<b>0.138</b>	<b>0.127</b>	<b>0.105</b>	<b>0.094</b>	<b>0.087</b>	<b>0.073</b>	<b>0.06</b>	<b>0.06</b>	<b>0.12</b>	
	<b>Ag (g/t)</b>	<b>1.75</b>	<b>1.95</b>	<b>1.82</b>	<b>2.23</b>	<b>2.30</b>	<b>2.27</b>	<b>2.47</b>	<b>2.00</b>	<b>1.91</b>	<b>1.61</b>	<b>1.55</b>	<b>1.61</b>	<b>1.78</b>	<b>1.47</b>	<b>1.57</b>	<b>2.22</b>	<b>2.23</b>	<b>1.47</b>	<b>1.32</b>	<b>1.20</b>	<b>1.13</b>	<b>1.01</b>	<b>1.01</b>	<b>1.76</b>	
Open pit Waste Candelaria	Tonnes (kt)	44,791	92,360	83,089	81,768	89,490	84,083	75,269	62,468	61,156	65,563	51,964	42,458	37,128	23,865	19,674	11,069	6,659	6,716						939,569	
Strip Ratio Candelaria		14.1	5.5	3.2	3.5	4.8	3.1	2.7	1.8	2.0	3.5	3.4	2.4	1.7	0.9	0.8	0.5	0.3	0.7						2.43	
Open Pit Waste Española	Tonnes (kt)							9,914	16,815	19,640	14,960	10,879	6,438	4,539											83,186	
Strip Ratio Española									19.6	8.8	2.2	1.0	0.9	1.2											2.62	
<b>Total Ore from Santos Mine to PAC plant</b>	<b>Tonnes (kt)</b>	<b>651</b>	<b>1,371</b>	<b>1,355</b>	<b>1,391</b>	<b>1,401</b>	<b>1,397</b>	<b>1,354</b>	<b>1,379</b>	<b>1,374</b>	<b>1,389</b>	<b>429</b>													<b>13,491</b>	
	<b>Cu (%)</b>	<b>1.13</b>	<b>1.07</b>	<b>0.93</b>	<b>0.93</b>	<b>0.94</b>	<b>0.88</b>	<b>0.92</b>	<b>0.87</b>	<b>0.76</b>	<b>0.82</b>	<b>0.93</b>													<b>0.91</b>	
	<b>Au (g/t)</b>	<b>0.21</b>	<b>0.25</b>	<b>0.24</b>	<b>0.24</b>	<b>0.23</b>	<b>0.21</b>	<b>0.23</b>	<b>0.22</b>	<b>0.19</b>	<b>0.20</b>	<b>0.22</b>													<b>0.22</b>	
	<b>Ag (g/t)</b>	<b>2.61</b>	<b>2.60</b>	<b>2.22</b>	<b>2.28</b>	<b>2.53</b>	<b>2.31</b>	<b>2.34</b>	<b>1.97</b>	<b>1.72</b>	<b>2.03</b>	<b>2.05</b>													<b>2.24</b>	

**Table 34: Candelaria Copper Mining Complex Mine Consolidated Production Schedule (100% Basis) (continued 2/2)**

Plant Production Plan	Unit	2H2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	Total	
Candelaria Plant Recoveries	% Cu	90.9%	92.6%	94.3%	94.1%	93.6%	94.4%	94.5%	95.3%	95.4%	94.9%	94.1%	94.3%	96.3%	94.2%	94.9%	94.8%	93.6%	92.0%	90.2%	89.3%	87.8%	83.0%	88.7%		
	% Au	69.1%	72.4%	71.7%	74.3%	74.3%	73.6%	72.9%	73.0%	71.1%	71.1%	71.1%	71.1%	73.0%	71.1%	71.1%	73.0%	71.1%	71.1%	70.8%	70.8%	70.8%	68.8%	68.6%		
	% Ag	80.1%	82.1%	82.2%	83.5%	85.1%	83.7%	83.4%	82.8%	82.8%	82.8%	81.3%	82.8%	82.8%	81.3%	81.3%	83.6%	83.6%	81.3%	81.0%	81.0%	81.0%	67.1%	66.9%		
Candelaria Plant Concentrate	Tonnes (kt)	209	466	535	570	585	588	594	603	547	530	503	503	526	446	479	597	518	376	316	277	227	147	34	10,176	
	Cu (%)	30.33	30.41	30.50	30.35	30.46	30.44	30.35	30.32	30.16	30.22	30.23	30.29	30.42	30.45	30.41	29.36	29.14	30.33	30.44	30.42	30.42	30.43	30.43	30.24	
	Au (g/t)	5.52	5.94	5.49	5.65	5.36	5.71	5.39	5.26	4.89	5.01	5.08	4.90	5.45	5.68	5.05	4.89	4.96	5.64	6.1	6.4	6.6	7.6	7.1	5.43	
	Ag (g/t)	91.6	89.2	81.0	94.0	96.1	91.1	98.6	79.1	85.0	73.7	73.4	73.9	77.0	75.8	77.2	90.2	102.2	89.9	97.5	101.6	116.9	133.5	124.7	87.91	
Candelaria Contained Metal	Cu (kt)	63	142	163	173	178	179	180	183	165	160	152	152	160	136	146	175	151	114	96	84	69	45	10	3,078	
	Au (koz)	37	89	94	104	101	108	103	102	86	85	82	79	92	81	78	94	83	68	62	57	48	36	8	1,778	
	Ag (koz)	616.0	1,335.5	1,393.1	1,723.7	1,808.2	1,722.1	1,884.4	1,534.7	1,494.0	1,257.1	1,187.5	1,193.6	1,301.4	1,087.8	1,189.2	1,731.6	1,700.7	1,085.5	989.6	903.7	852.4	633.1	138.1	28,763	
PAC Plant Recoveries	% Cu	92.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%	93.5%		
	% Au	84.8%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%	74.1%		
	% Ag	85.5%	82.6%	82.2%	82.0%	82.6%	81.1%	82.2%	81.4%	81.4%	81.4%	81.4%	81.4%	81.4%	81.4%	81.4%	81.4%	81.4%	81.4%	81.4%	81.4%	81.4%	81.4%	81.4%		
PAC Plant Concentrate	Tonnes (kt)	23	46	39	40	41	38	39	38	32	36	12													384	
	Cu (%)	29.47	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00													29.97	
	Au (g/t)	4.92	5.44	6.03	6.16	5.80	5.58	5.83	6.07	6.06	5.72	5.73													5.79	
	Ag (g/t)	62.6	64.4	63.1	64.4	71.4	68.3	67.1	59.1	59.6	64.5	57.8													64.44	
PAC Contained Metal	Cu (kt)	6.8	14	12	12	12	11	12	11	10	11	4													115	
	Au (koz)	3.7	8	8	8	8	7	7	7	6	7	2													71	
	Ag (koz)	46.69	94.6	79.3	83.5	94.2	84.0	83.6	71.2	62.0	73.9	23.0													796.1	
<b>Total Concentrate Production</b>	<b>Tonnes (kt)</b>	<b>232</b>	<b>512</b>	<b>574</b>	<b>611</b>	<b>626</b>	<b>626</b>	<b>633</b>	<b>641</b>	<b>579</b>	<b>566</b>	<b>516</b>	<b>503</b>	<b>526</b>	<b>446</b>	<b>479</b>	<b>597</b>	<b>518</b>	<b>376</b>	<b>316</b>	<b>277</b>	<b>227</b>	<b>147</b>	<b>34</b>	<b>10,560</b>	
	<b>Cu (%)</b>	<b>30.2</b>	<b>30.4</b>	<b>30.5</b>	<b>30.3</b>	<b>30.4</b>	<b>30.4</b>	<b>30.3</b>	<b>30.3</b>	<b>30.2</b>	<b>30.2</b>	<b>30.2</b>	<b>30.3</b>	<b>30.4</b>	<b>30.5</b>	<b>30.4</b>	<b>29.4</b>	<b>29.1</b>	<b>30.3</b>	<b>30.4</b>	<b>30.4</b>	<b>30.4</b>	<b>30.4</b>	<b>30.4</b>	<b>30.4</b>	
	<b>Au (g/t)</b>	<b>5.5</b>	<b>5.9</b>	<b>5.5</b>	<b>5.7</b>	<b>5.4</b>	<b>5.7</b>	<b>5.4</b>	<b>5.3</b>	<b>5.0</b>	<b>5.1</b>	<b>5.1</b>	<b>4.9</b>	<b>5.5</b>	<b>5.7</b>	<b>5.0</b>	<b>4.9</b>	<b>5.0</b>	<b>5.6</b>	<b>6.1</b>	<b>6.4</b>	<b>6.6</b>	<b>7.6</b>	<b>7.1</b>		
	<b>Ag (g/t)</b>	<b>89</b>	<b>87</b>	<b>80</b>	<b>92</b>	<b>95</b>	<b>90</b>	<b>97</b>	<b>78</b>	<b>84</b>	<b>73</b>	<b>73</b>	<b>74</b>	<b>77</b>	<b>76</b>	<b>77</b>	<b>90</b>	<b>102</b>	<b>90</b>	<b>98</b>	<b>102</b>	<b>117</b>	<b>134</b>	<b>125</b>		
<b>Total Contained Metal</b>	<b>Cu (kt)</b>	<b>70</b>	<b>155</b>	<b>175</b>	<b>185</b>	<b>190</b>	<b>190</b>	<b>192</b>	<b>194</b>	<b>175</b>	<b>171</b>	<b>156</b>	<b>152</b>	<b>160</b>	<b>136</b>	<b>146</b>	<b>175</b>	<b>151</b>	<b>114</b>	<b>96</b>	<b>84</b>	<b>69</b>	<b>45</b>	<b>10</b>	<b>3,193</b>	
	<b>Au (koz)</b>	<b>41</b>	<b>97</b>	<b>102</b>	<b>112</b>	<b>109</b>	<b>115</b>	<b>110</b>	<b>109</b>	<b>92</b>	<b>92</b>	<b>85</b>	<b>79</b>	<b>92</b>	<b>81</b>	<b>78</b>	<b>94</b>	<b>83</b>	<b>68</b>	<b>62</b>	<b>57</b>	<b>48</b>	<b>36</b>	<b>8</b>	<b>1,849</b>	
	<b>Ag (koz)</b>	<b>663</b>	<b>1430</b>	<b>1472</b>	<b>1807</b>	<b>1902</b>	<b>1806</b>	<b>1968</b>	<b>1606</b>	<b>1556</b>	<b>1331</b>	<b>1210</b>	<b>1194</b>	<b>1301</b>	<b>1088</b>	<b>1189</b>	<b>1732</b>	<b>1701</b>	<b>1085</b>	<b>990</b>	<b>904</b>	<b>852</b>	<b>633</b>	<b>138</b>	<b>29,559</b>	



**Figure 30: Candelaria Copper Mining Complex Consolidated Mine Production Schedule**

Top: Total ore to Candelaria plant (kilotonnes per day)

Bottom: Contained copper production (kilotonnes)

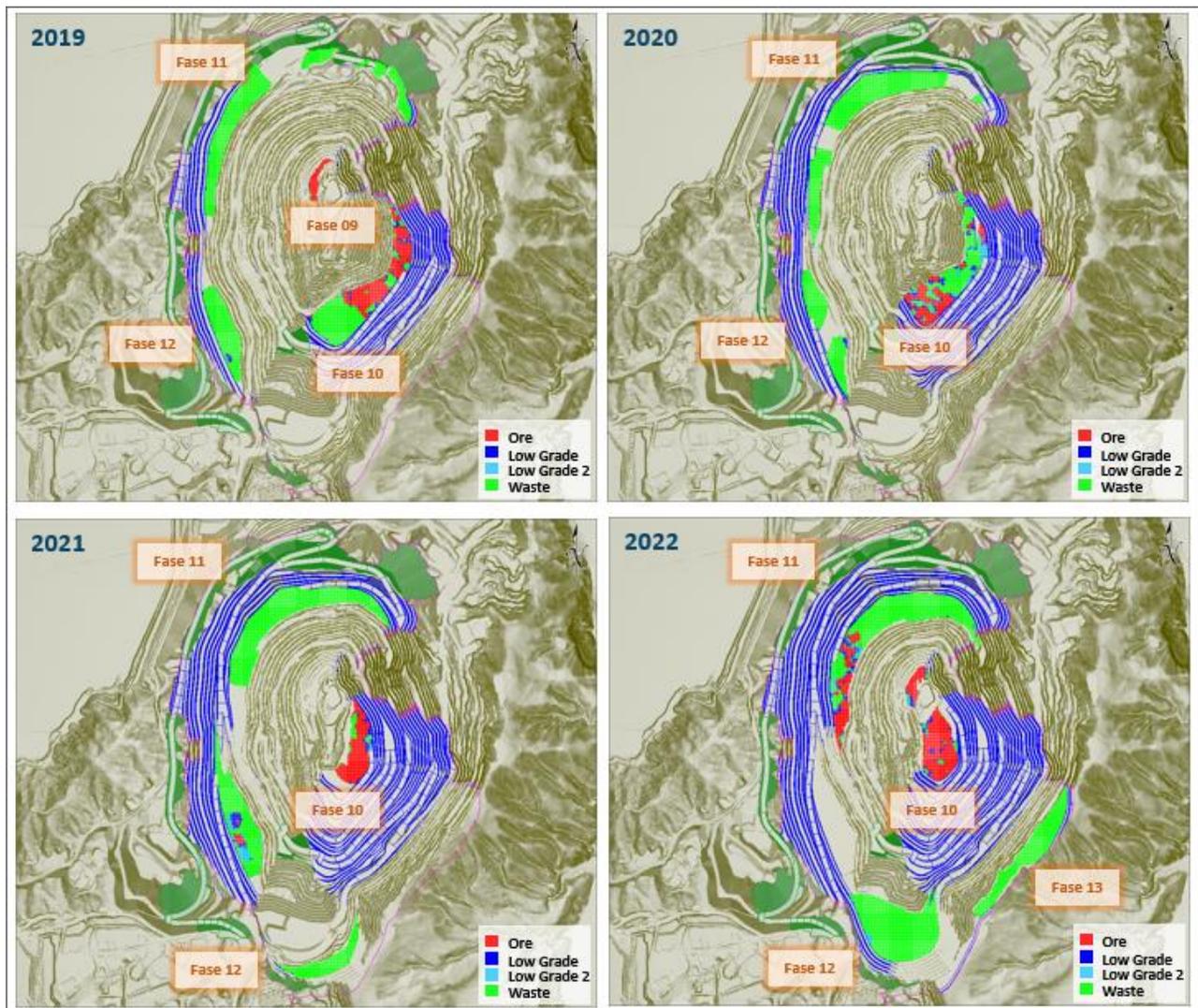


Figure 31: Annual Development Plan for 2019 to 2022

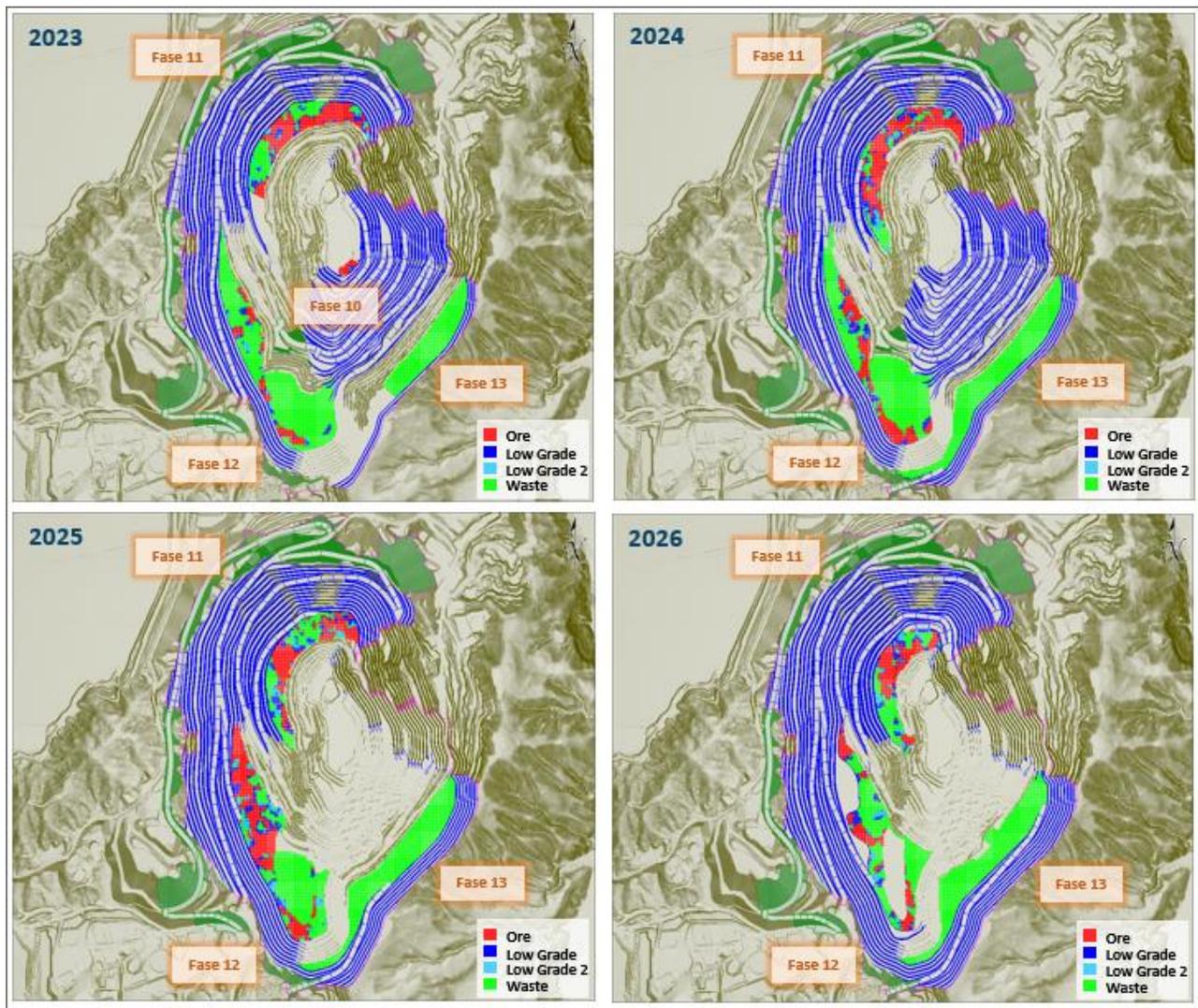


Figure 32: Annual Development Plan for 2023, 2024, 2025 and 2026

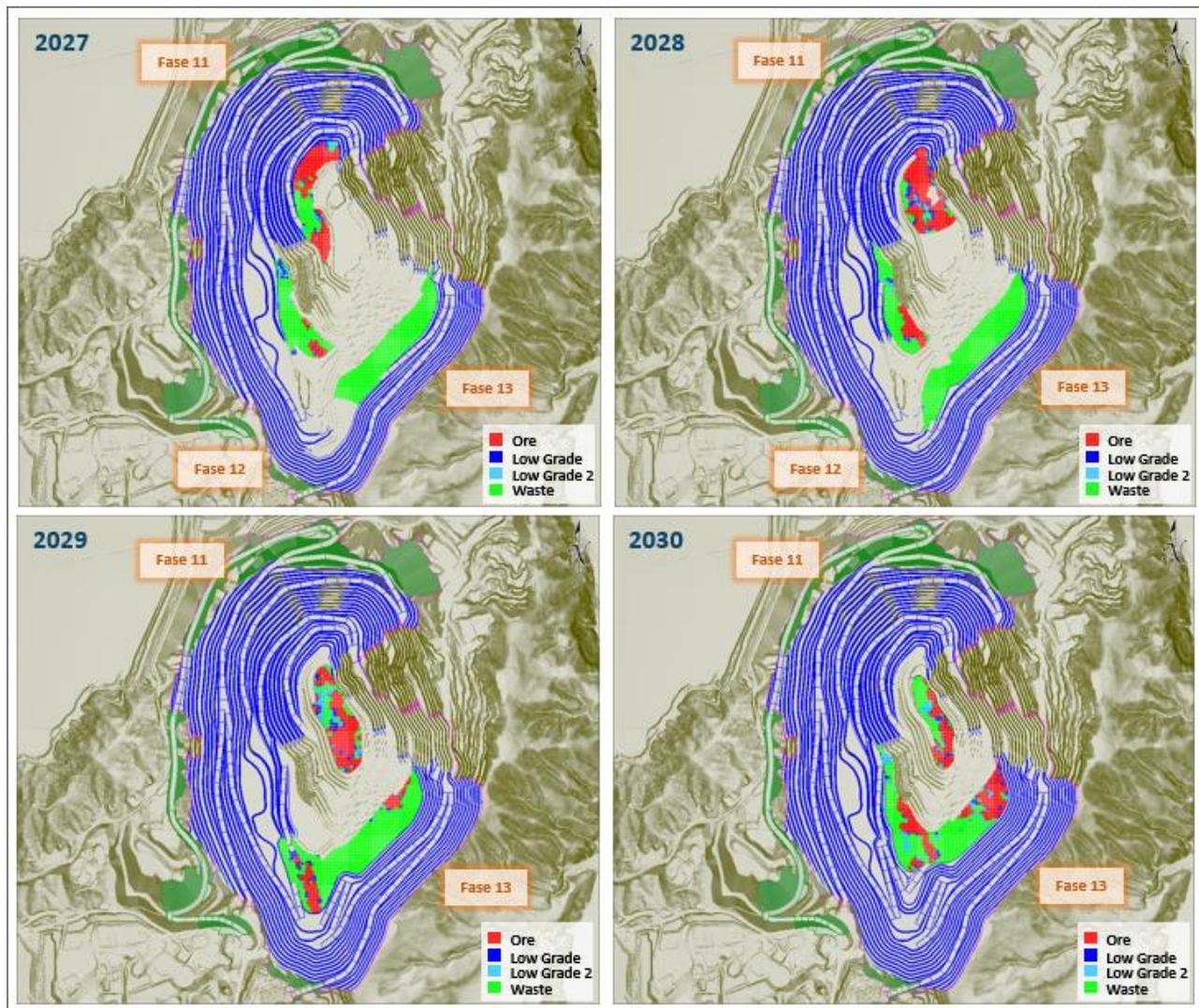


Figure 33: Annual Development Plan for 2027, 2028, 2029 and 2030

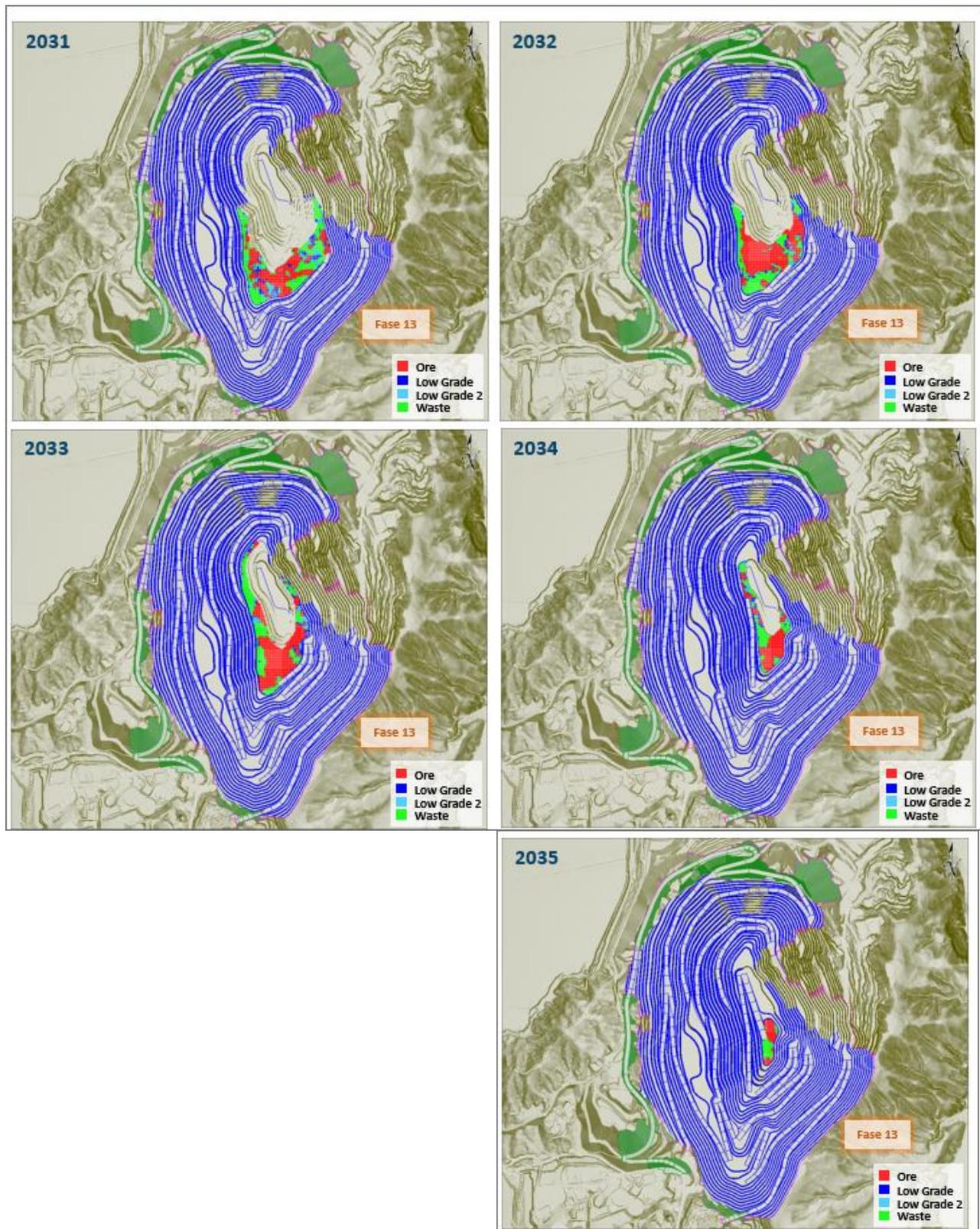
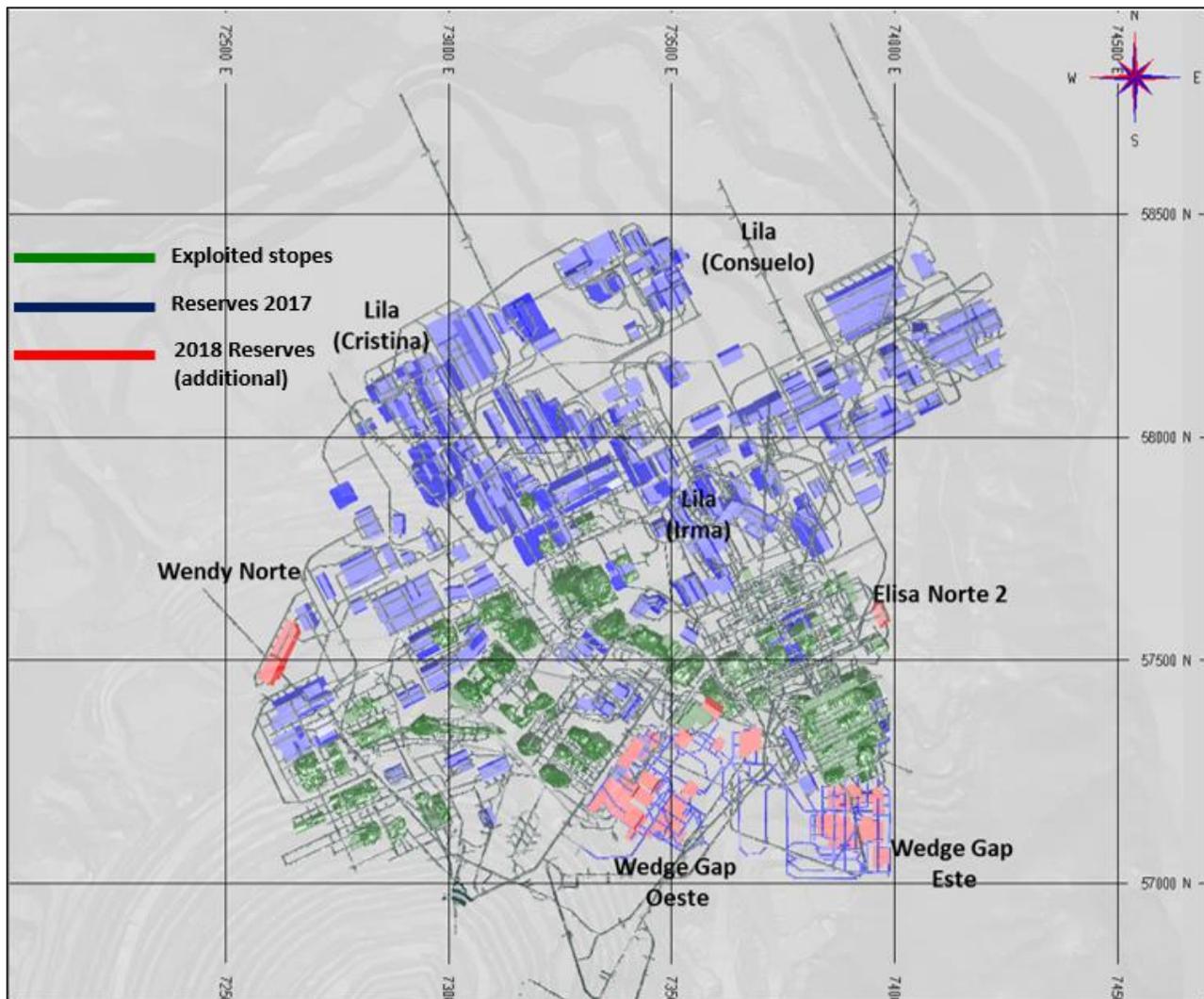


Figure 34: Annual Development Plan for 2031, 2032, 2033, 2034 and 2035

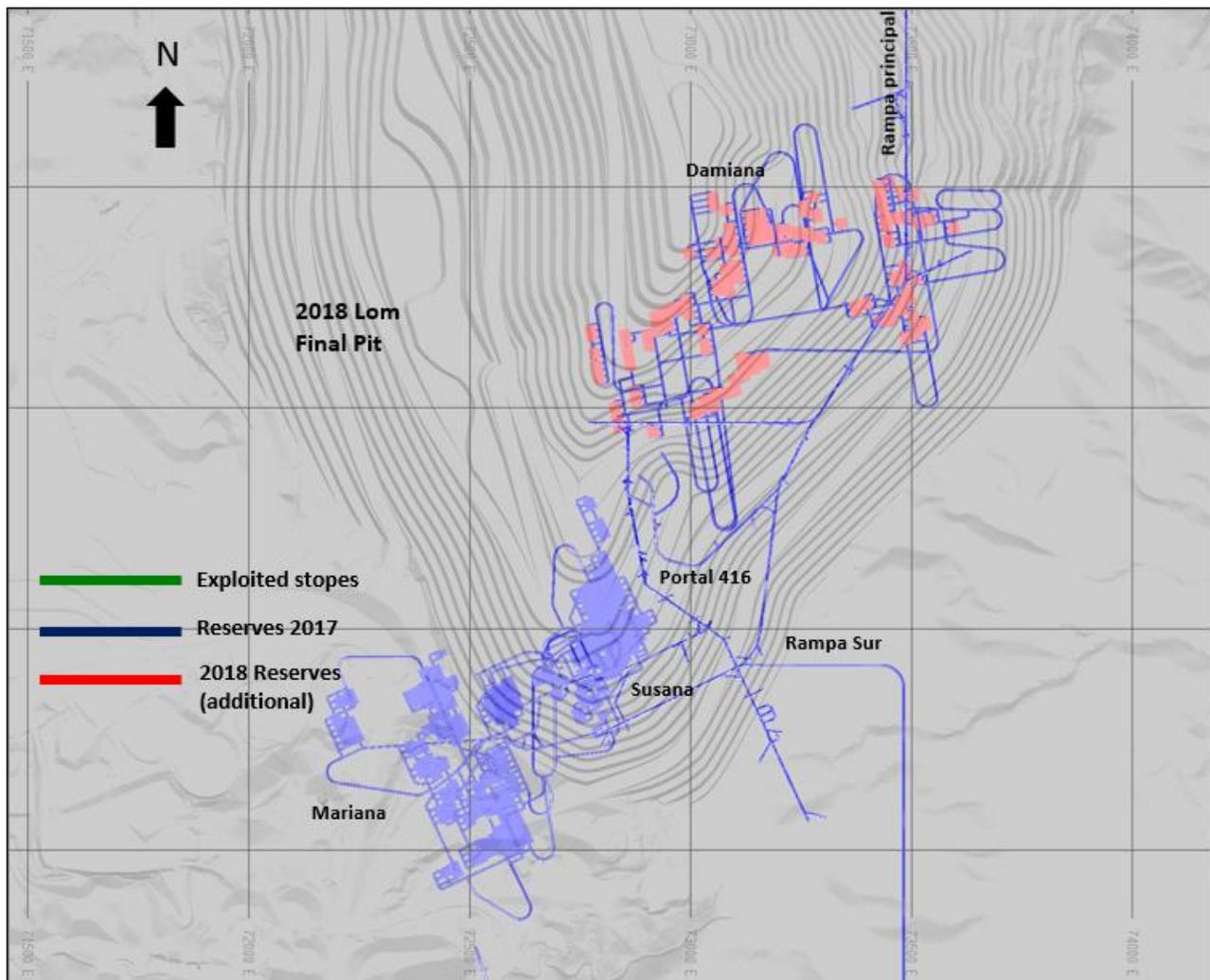
### 15.3 Underground Mine Design and Production Schedule

Each of the three underground mines and its associated facilities is accessed by a surface portal and ramp. Figure 35, Figure 36, Figure 37, and Figure 38 show the basic layout of Candelaria Underground (North Sector), Candelaria Underground (South Sector), Santos mine, and Alcaparrosa mine, respectively.

The underground mine Technical Services Group employs geological, geotechnical, planning and surveying personnel. The mines follow detailed production and development plans and schedules, with the mining activities conducted under the guidance and oversight of the mine’s General Manager. The operational activities at the mines are performed by contractors with oversight by Minera Candelaria and Minera Ojos del Salado management. The contractors employ and manage the mines’ labour force and they own and maintain the mining equipment.

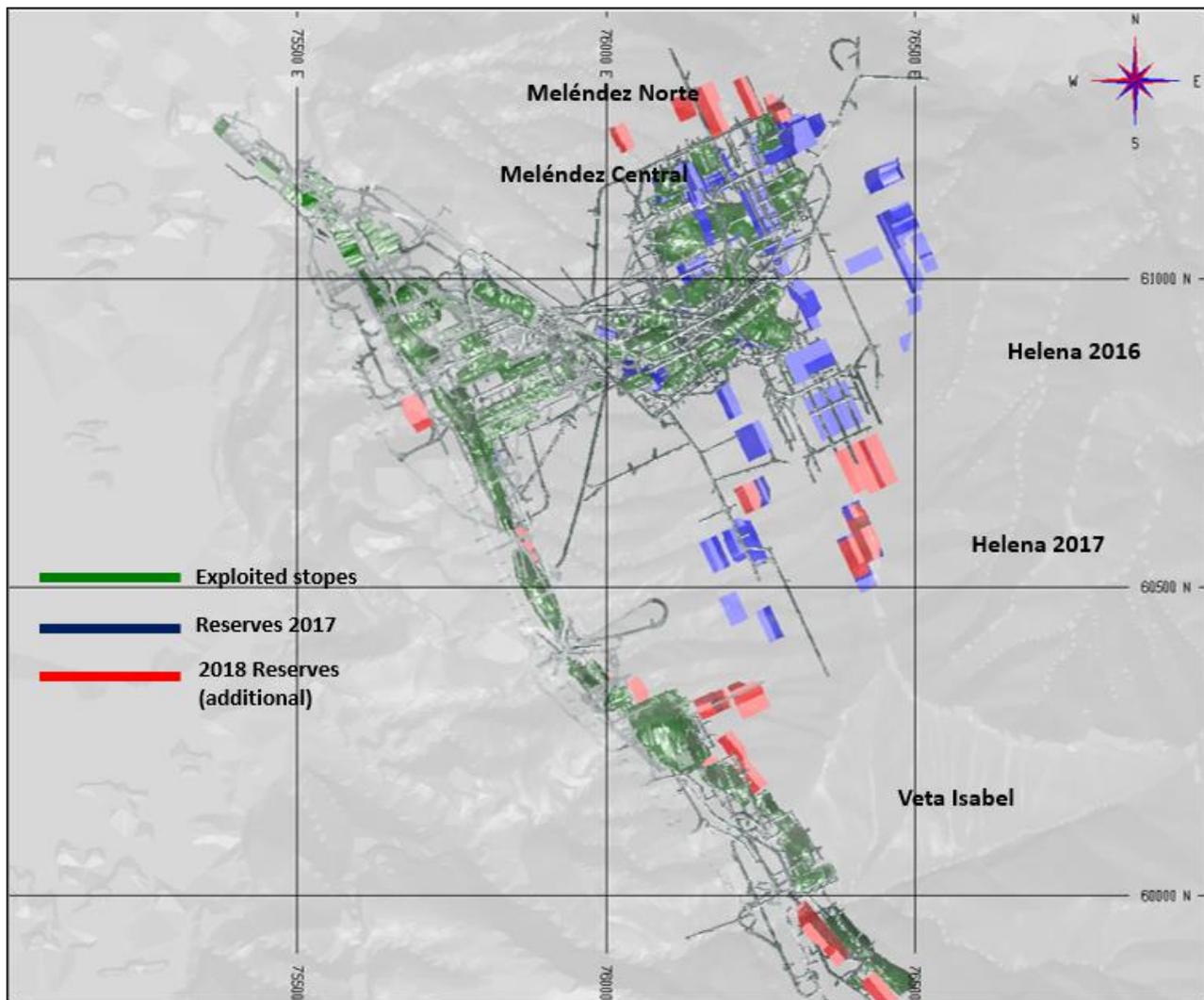


**Figure 35: Layout of the Candelaria Underground Mine (North Sector)**  
 Source: Minera Candelaria



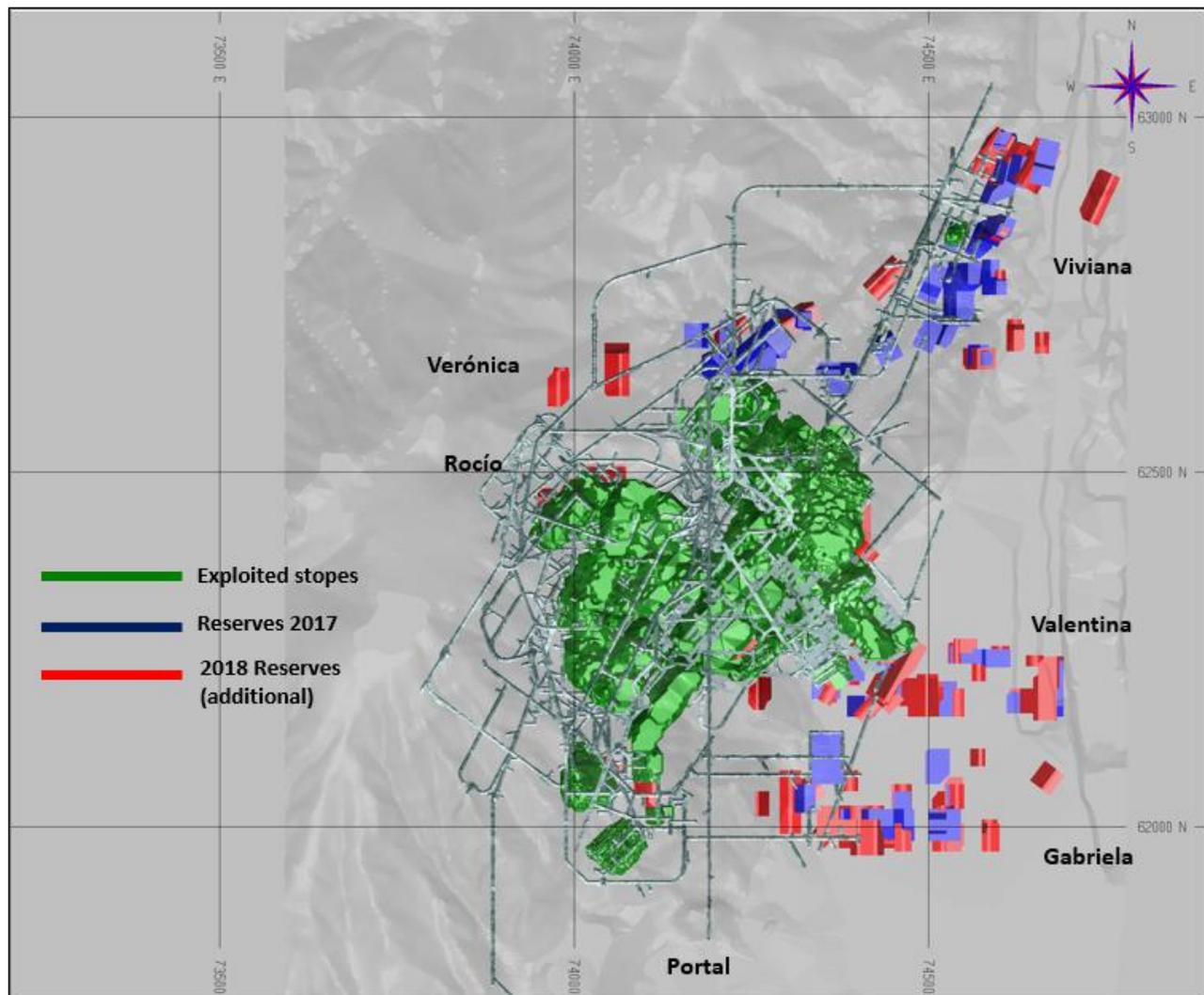
**Figure 36: Layout of the Candelaria Underground Mine (South Sector)**

Source: Minera Candelaria



**Figure 37: Layout of the Santos Underground Mine**

Source: Minera Ojos del Salado



**Figure 38: Layout of the Alcaparrosa Mine**

Source: Minera Ojos del Salado

The underground mines are relatively dry owing to their location in an arid region. Geotechnical rock mass characterization was completed from core logging, detailed mapping of geological structures, testing of intact material properties and measuring in-situ stresses. Empirical open stope design methodologies were used to determine roof and wall stability and the size of pillars. Numerical analysis simulation tools for mine sequencing analysis were also applied. External consultants undertook global stability analysis of the planned open stoping operations for all three underground mines in 2013 and 2014, and produced the following reports:

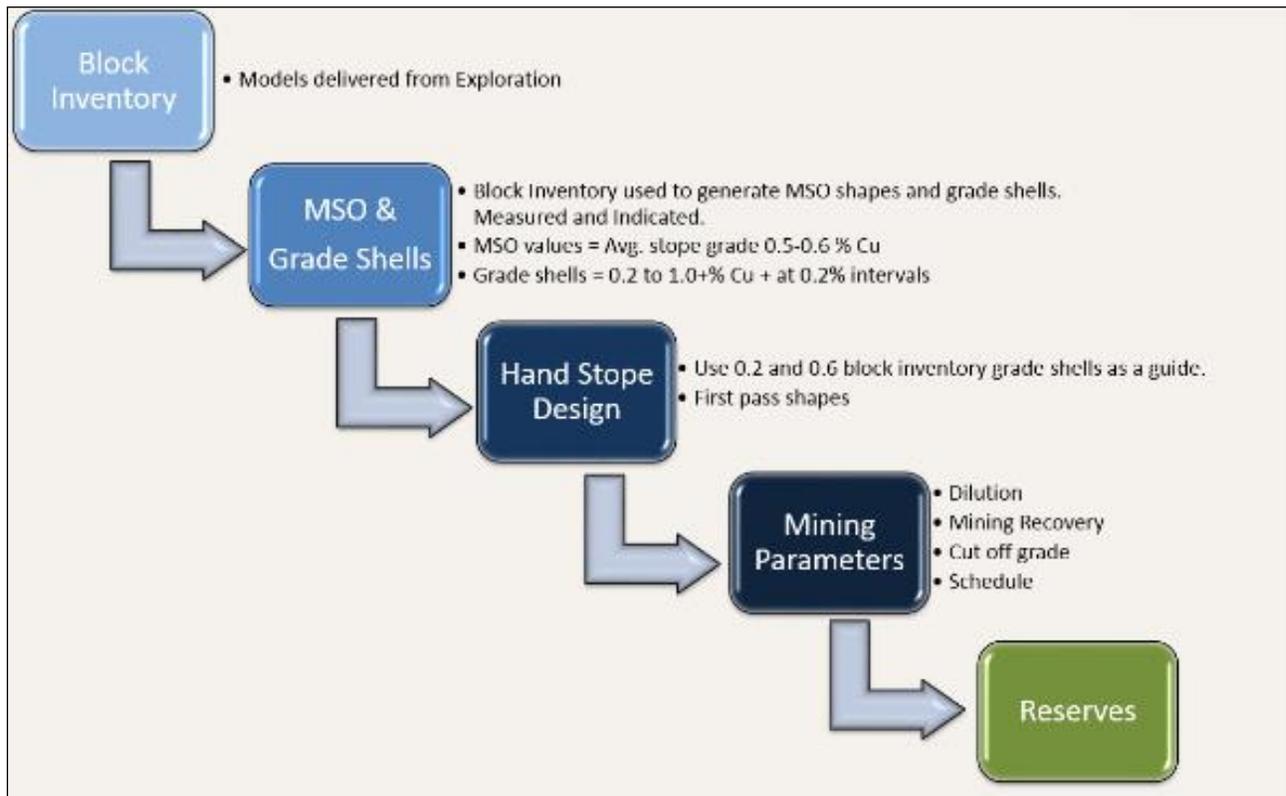
- Análisis de Estabilidad Global Complejo Super Nova – Mina Santos, prepared by E-Mining Technology S.A. for Minera Candelaria.
- Análisis de Estabilidad Global – Mina Alcaparrosa, prepared by E-Mining Technology S.A. for Minera Candelaria.
- Analisis Nueva Secuencia De Explotacion Sector Mantos Elisa – Mina Candelaria Norte, prepared by E-Mining Technology S.A. for Minera Candelaria.

In 2018, development began on a hydrogeological model to estimate possible interactions between the Copiapó River Valley and the Alcaparrosa Mine. A core borehole with accompanying permeability testing was drilled in 2018, with an external consultant interpreting the results and developing a hydrogeological model.

SRK is of the opinion that the stopes that support the proposed LOM plan for the Candelaria, Alcaparrosa and Santos underground mines can be mined as expected.

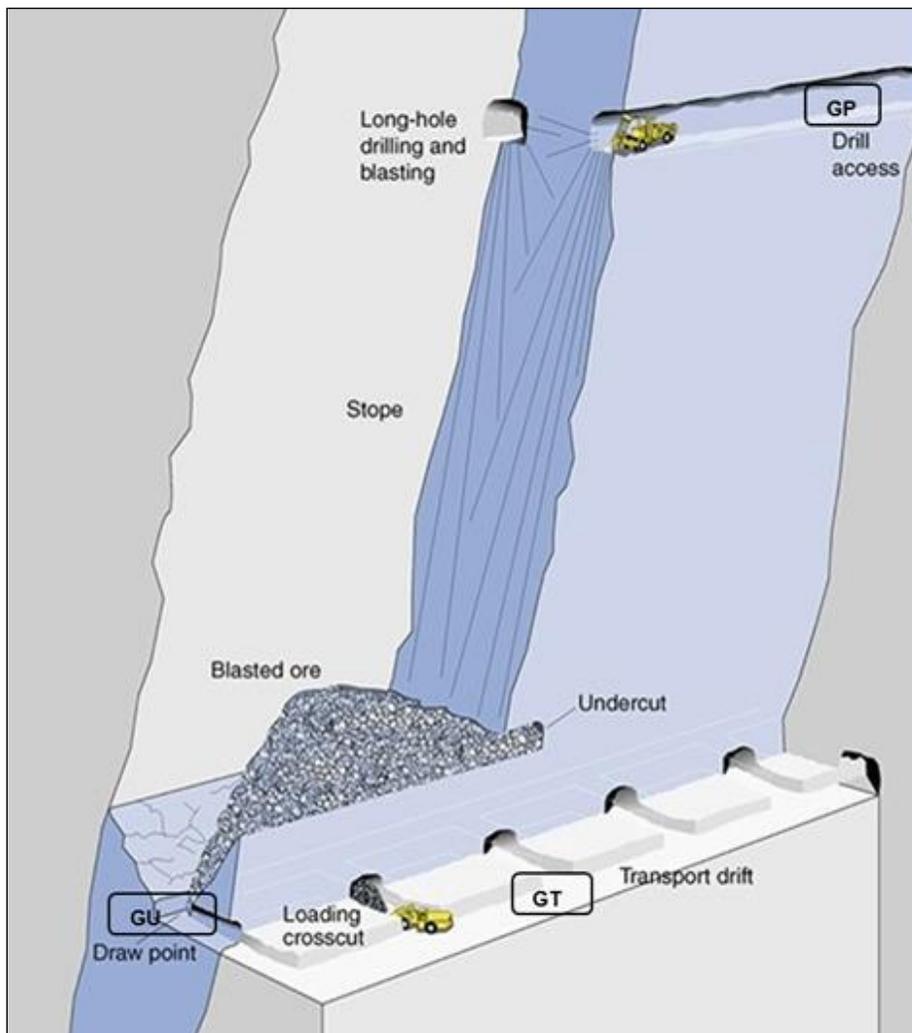
The flowsheet for the design and scheduling of the underground Mineral Reserves in the mine plan is shown in Figure 39. The three underground mines utilize a sublevel open stoping mining method for ore extraction. This method is ideal for relatively large, vertical, thick deposits with favourable (stable) host rock (Figure 40).

Stope excavations can typically be up to 180 metres high with sublevels at 20 to 60 metre intervals. The length of the stopes ranges from 40 to 100 metres, with widths varying between 20 to 30 metres. A Redbore RB50 or down-the-hole (DTH) drill is used to create a slot at one end of the stope, which will provide the relief necessary when blasting commences. Stope blastholes are drilled downwards from the sublevel drilling drifts as benches, using 114- to 140-millimetre diameter holes. The holes are loaded and blasted in vertical slices towards the open face created by the slot blasting. The blasted ore gravitates to the bottom of the stope and is collected in draw points at the production level below. This lower level also consists of the haulage (transport) drift.



**Figure 39: Candelaria Life of Mine Plan Development Process**

Source: Minera Candelaria



**Figure 40: Depiction of the Sublevel Open Stopping mining method**

The undercut levels, which feed the draw points, are 15 to 20 metres high and inclined at 50 to 60 degrees to allow the blasted ore to flow easily by gravity. An Epiroc Simba tophammer rig drills 64-millimetre up holes within the undercut, which are loaded and blasted with the downholes. Once the stope is mined, a remaining rib pillar, which can be another 20 to 30 metres wide, may be blasted into the stope to increase the extraction tonnage. Typically, a 20-metre structural pillar remains between each stope and no backfill is used at these operations.

A scoping study to determine the economic viability of adding cemented paste tailings backfill to the underground workings, in anticipation of providing greater extraction tonnages, is currently underway. The results of this study should be known in early 2019.

Ore is mucked from the draw points using surface-type front-end loaders and load-haul-dump (LHD) vehicles. The mucked ore is dumped into 30-tonne, highway-type trucks and hauled up the ramp to a surface stockpile for subsequent re-handling and processing. At Candelaria Underground, the highway-style trucks are being phased out and replaced with 60-tonne low-profile articulated trucks operated on an owner basis.

Some mineralized material may not be recoverable at stope completion, while other mineralized material is left as support pillars, lowering the overall mining recovery. The overall mining recovery varies depending on the type of stope and its geometry. The amount of dilution also varies depending on the stope setting. Dilution typically contains mineralized material with low metal grades. Typical mining recovery and dilution factors are summarized in Table 35.

**Table 35: Summary of Stope Setting**

<b>Stope Type</b>	<b>Dilution (%)</b>	<b>Recovery (%)</b>
Vertical	18	95
Inclined	30	95
Rib	50	95
Pillar	40	95
Structural pillar	50	95

## 15.4 Underground Mine Plan

The current scheduled annual production for the Candelaria Underground (North and South Sectors), Santos, and Alcaparrosa mines is summarized in Table 36.

The Candelaria Underground mine is planned to ramp up from 11,000 ore tonnes per day in 2019 to a steady state of 14,000 ore tonnes per day by 2021. Two new mining areas were introduced into the LOM plan in 2018 to support this ramp up, Wedge Gap Oeste and Wedge Gap Este, and Mineral Reserves were added to Wendy Norte and Elisa Norte 2. The increase in the LOM is further enhanced by an earlier start of production from the Susana, Mariana and Damiana areas in Candelaria South. The forecast pre-production capital expenditure for development of the Candelaria South sector is US\$46 million, of which US\$17 million is expected to be spent in 2019.

The schedule and ramp-up periods are summarized below:

- 2018 Candelaria Underground (North Sector) continues to ramp up from 2017 production rate of 7,000 tonnes per day, with an increase to 8,800 tonnes per day (annual average) versus the previous estimation of 8,000 tonnes per day.
- 2019 Candelaria Underground (North Sector) ramps up tonnage from 8,800 to 10,500 tonnes per day (annual average).
- 2019 Candelaria Underground (South Sector) initiates production at a rate of 2,000 tonnes per day in Q4 2019 through the end of 2020.
- From 2021 onward, Candelaria Underground will produce 14,000 tonnes per day through to 2035, with a ramp down occurring in 2037.

**Table 36: Underground Mineral Reserve Schedule**

Mine Production Plan	Unit	2H2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	Total
From Candelaria UG	Tonnes (kt)	1,686	3,987	4,757	5,475	5,475	5,475	5,490	5,475	5,475	5,475	5,490	5,475	5,475	5,475	5,490	5,475	5,475	5,475	5,403	3,013	<b>101,015</b>
	Cu (%)	0.91	0.97	0.95	0.86	0.91	0.90	0.94	0.88	0.89	0.86	0.85	0.88	0.83	0.80	0.76	0.73	0.77	0.79	0.78	0.77	<b>0.85</b>
	Au (g/t)	0.27	0.26	0.22	0.21	0.22	0.20	0.22	0.20	0.19	0.19	0.18	0.18	0.19	0.17	0.17	0.16	0.16	0.18	0.18	0.20	<b>0.19</b>
	Ag (g/t)	4.25	4.30	4.04	3.35	3.48	3.46	3.59	3.10	3.37	2.90	2.83	3.22	2.69	3.19	3.27	3.39	3.56	2.86	2.09	1.74	<b>3.21</b>
From Santos*	Tonnes (kt)	296	511	512	511	511	511	512	511	511	511	169										<b>5,068</b>
	Cu (%)	1.00	1.07	0.92	0.93	0.94	0.88	0.92	0.87	0.76	0.82	0.93										<b>0.91</b>
	Au (g/t)	0.23	0.25	0.23	0.24	0.23	0.21	0.23	0.22	0.19	0.20	0.22										<b>0.22</b>
	Ag (g/t)	2.65	2.60	2.21	2.27	2.53	2.31	2.34	1.97	1.72	2.03	2.05										<b>2.24</b>
From Alcaparrosa**	Tonnes (kt)	806	1,606	1,610	1,611	1,606	1,606	1,610	1,606	1,606	809											<b>14,476</b>
	Cu (%)	0.86	0.77	0.78	0.76	0.78	0.84	0.828	0.817	0.705	0.752											<b>0.79</b>
	Au (g/t)	0.18	0.17	0.15	0.16	0.16	0.18	0.19	0.18	0.15	0.15											<b>0.17</b>
	Ag (g/t)	1.13	1.20	1.15	1.49	1.44	1.64	1.39	1.34	1.47	1.16											<b>1.36</b>
<b>Total Ore from UG</b>	<b>Tonnes (kt)</b>	<b>2,788</b>	<b>6,104</b>	<b>6,880</b>	<b>7,597</b>	<b>7,592</b>	<b>7,592</b>	<b>7,613</b>	<b>7,592</b>	<b>7,592</b>	<b>6,795</b>	<b>5,659</b>	<b>5,475</b>	<b>5,475</b>	<b>5,475</b>	<b>5,490</b>	<b>5,475</b>	<b>5,475</b>	<b>5,475</b>	<b>5,403</b>	<b>3,013</b>	<b>120,559</b>
	<b>Cu (%)</b>	<b>0.904</b>	<b>0.92</b>	<b>0.91</b>	<b>0.84</b>	<b>0.89</b>	<b>0.88</b>	<b>0.91</b>	<b>0.87</b>	<b>0.84</b>	<b>0.84</b>	<b>0.85</b>	<b>0.88</b>	<b>0.83</b>	<b>0.80</b>	<b>0.76</b>	<b>0.73</b>	<b>0.77</b>	<b>0.79</b>	<b>0.78</b>	<b>0.77</b>	<b>0.84</b>
	<b>Au (g/t)</b>	<b>0.237</b>	<b>0.237</b>	<b>0.205</b>	<b>0.204</b>	<b>0.208</b>	<b>0.197</b>	<b>0.210</b>	<b>0.199</b>	<b>0.186</b>	<b>0.188</b>	<b>0.186</b>	<b>0.185</b>	<b>0.185</b>	<b>0.174</b>	<b>0.166</b>	<b>0.156</b>	<b>0.163</b>	<b>0.177</b>	<b>0.185</b>	<b>0.199</b>	<b>0.19</b>
	<b>Ag (g/t)</b>	<b>3.18</b>	<b>3.34</b>	<b>3.23</b>	<b>2.88</b>	<b>2.98</b>	<b>3.00</b>	<b>3.04</b>	<b>2.65</b>	<b>2.86</b>	<b>2.63</b>	<b>2.80</b>	<b>3.22</b>	<b>2.69</b>	<b>3.19</b>	<b>3.27</b>	<b>3.39</b>	<b>3.56</b>	<b>2.86</b>	<b>2.09</b>	<b>1.74</b>	<b>2.95</b>

\* Include 38 kilotonnes of WIP stockpiles

\*\* Include 6 kilotonnes of WIP stockpiles

To meet these targets, the following development rates are planned for the Candelaria Underground mine:

- North Sector:
  - 2018 H2 to 2029: 750 metres per month
  - 2030: 350 metres per month
  
- South Sector:
  - 2018: 200 metres per month
  - 2019 to 2022: 400 metres per month
  - 2023: 300 metres per month
  - 2026 to 2029: No development
  - 2030 to 2032: 400 metres per month
  - 2033: 150 metres per month

The Santos mine will maintain its current production rate of approximately 5,200 tonnes per day until 2027, when it decreases to 1,600 tonnes per day for the last year of the mine’s life. This will be achieved by developing 400 metres per month until the fourth quarter of 2022 when the development rate will be reduced gradually. The development rate varies from 300 to 50 metres per month from 2023 to 2028.

The Alcaparrosa mine will maintain its current production rate of 4,300 tonnes per day until mid-2027. This is supported by developing 400 metres per month from 2018 through 2025, when development rate will be reduced to 150 metres per month until the mine ceases production.

## 15.5 Waste Dumps

The capacity of each of the waste dumps is summarized in Table 37. The waste dump surface area will be increased by approximately 28 hectares with an expanded capacity of approximately 110 million tonnes only in the Nantoco dump. The dumps will be constructed in 20-metre lifts and 30-metre wide access ramps.

The waste dump remaining capacity at Nantoco as of May 28, 2018 was 231 million tonnes. The North and Buitre dumps had 219 and 293 million-tonne capacities, respectively. The total waste requirement at the Los Diques tailings storage facility was 188 million tonnes. Most of the waste is placed at Los Diques. The LOM plan shows a total waste production of 1,022 million tonnes, 939 million tonnes from the Candelaria Open Pit and 83 million tonnes from Española, indicating that the dump designs available now are not enough for the current LOM plan. However, for this purpose, new EIA documentation is being prepared, adding more lifts in the Nantoco and Buitre waste dumps, for which there is a reasonable approval expectation.

**Table 37: Waste Dump Capacity**

Waste Rock Dump	Currently	Additional	Total	Currently	Projected	Final
	Approved	Project		Approved		Projected
	(Mt)	(Mt)	(Mt)	Elevation (m.a.s.l.)	Elevation (m.a.s.l.)	Surface Area (hectare)
North	2,270	0	2,270	880	880	730
Nantoco	455	110	565	940	1080	357

Source: Minera Candelaria

## 15.6 Mine Equipment

### 15.6.1 Open Pit Mine Equipment

The Candelaria Open Pit is a conventional truck and shovel operation. The unit operations are drilling, blasting, grade control, loading and hauling. The primary loading units are electric cable shovels; however, the sustaining capital plan does allow for a gradual implementation of hydraulic loading units. The primary drills are rotary diesel-powered units. Support equipment provides development access, road maintenance and equipment servicing capability. The open pit mine operates 24 hours per day, 365 days per year. Shift employees work 12-hour shifts. The overall mining rate is currently being increased to approximately 310,000 tonnes per day. Total primary crusher throughput is variable based upon hardness averaging 78,000 tonnes per day combined open pit and underground ore.

The primary production blasthole drills are rotary machines capable of single pass drilling on a 16-metre bench. The current drill fleet consists one Atlas Copco Pit Viper PV-275, and five PV-351 diesel units. Drill mechanical availability for the fleet averages 85 percent and utilization averages 60 percent. Drill penetration rates are variable ranging from 14 metres per hour in hard rock to 29 metres per hour in weak rock. The fleet will be expanded to a total of 10 drills over the next year including 7 Pit Vipers and 3 Roc drills for wall control blasting.

The rock at the Candelaria Open Pit is hard and fine fragmentation is required in most areas of the pit to maximize throughput to the concentrator. As a result, drill patterns are relatively tight resulting in powder factors ranging from 0.50 to 0.75 kilogram per tonne.

The wall control blasting includes line holes drilled for presplitting. There are three Atlas Copco Roc L8 drills dedicated to line hole drilling. The line holes are normally drilled on 2-metre centres at the recommended bench face angle on a double bench.

Blasting is carried out with heavy ammonium nitrate / fuel oil. Blasthole cuttings are sampled and assayed for copper only for grade control.

The primary loading fleet currently consists of three P&H 4100 (43 cubic metres), three P&H 2800 (28 cubic metres) electric cable shovels and one P&H 2100 (13 cubic metres) electric cable shovel. A PC2000 (12 cubic metres) hydraulic excavator is also being used in narrow operating areas. Additional hydraulic shovels (31 cubic metre) will be added in 2019 and 2020. Rental units are planned in the short term until new machines can be delivered. Support units include one Cat 994 (16 cubic metres) and one Cat 992 (9 cubic metres) wheel loader. The P&H 4100 and P&H 2800 shovels mine stockpiles, ore, and waste. The P&H 2100 re-handles ore from the Candelaria Underground North Sector to large haulage trucks for transportation to the primary crusher. The shovel fleet has an average availability of 84 percent and utilization of 82 percent. Minera Candelaria implemented a rebuild program on shovels, completing major rebuilds on five shovels between 2009 and 2011.

Under a major mine equipment re-capitalization programme, new hydraulic excavators/shovels will replace the cable shovels. The P&H4100's will be phased out in 2019, 2020 and 2023 and the P&H2800's will be phased out in 2018, 2025 and 2026 to be replaced by a fleet of Caterpillar 6060 and 6020 hydraulic excavators.

The Minera Candelaria haulage fleet currently consists of 46 Cat 793 mechanical drive trucks. These trucks use light boxes and typically carry loads of between 232 and 237 tonnes. Road conditions in

the mine are very good and tire life is 90,000 kilometres. A truck rebuild program is also in place at the Candelaria Open Pit, and trucks are overhauled at 100,000 hours with an extended life expectancy of 75,000 hours. The truck fleet availability is 85 percent and utilization is 92 percent. Loading times for the trucks range from 10.0 minutes with a PC2000 to 1.6 minutes with a P&H 4100. The truck fleet requirement in the LOM plan is expected to peak at 53 units. Rebuilds are planned for 14 Cat 793C trucks; four in 2021, 2022 and 2023 and two in 2024, while the remainder of the fleet will be phased out and replaced with newer technology Cat 793F trucks; however, the Cat 793F trucks will also be rebuilt. The LOM plan considers 6 trucks rebuild by year between 2029 to 2035. A total of 38 new trucks will be purchased over the next four years under the mine equipment re-capitalization programme.

The open pit mine has an extensive fleet of support equipment. The track dozer fleet includes six Cat D10 and two Cat D11 models, which are used on dumps, stockpiles, and in the pit for bench maintenance. Under the re-capitalization programme this dozer fleet will be upgraded with newer models. There are five Cat 824-wheel dozers for road and bench maintenance. In the future, Cat 834-wheel dozers will be introduced. The grader fleet includes three Cat 16M and one Cat 24M models. Replacements for graders are also planned.

The mine support equipment fleet includes five Cat 773 and one Cat 777 water trucks for watering roads and working faces prior to loading to control dust. Replacement Cat 777G water trucks are planned. The excavator fleet includes two Cat 385 models that are used for wall scaling and ditching as required.

A dispatch system is used in the mine. High precision GPS locators are used on the shovels and the drills. Lower precision systems are used on the trucks and the auxiliary equipment.

The open pit mine major equipment additions and replacements under the four year mine recapitalization programme are summarized in Table 38.

**Table 38: Open Pit Mine Equipment Additions and Replacements to 2018 - 2021**

Unit Cost US\$M	Equipment	2018		2019		2020		2021		Total 2018 - 2021	
		Units	US\$M	Units	US\$M	Units	US\$M	Units	US\$M	Units	US\$M
3.8	Haulage trucks Cat 793F	15	57.6	21	79.8	2	7.58			38	144.9
2.6-3.1	Hydraulic excavator Cat 6020		3.1			1	2.6			1	5.7
5.5	Front end loader Cat 994K	1	5.5			1	5.5			2	11.0
0.87	Wheel dozer Cat 834H	5	4.4							5	4.4
10.2	Hydraulic excavator Cat 6060	2	20.4							2	20.4
0.85	Rock Drilling	1	0.85							1	0.9
1.39	Dozer D10T	3	4.2							3	4.2
2.25	Dozer D11T	2	4.5							2	4.5
1.87	Water truck Cat 777	3	5.6	1	1.9	2	1.9			6	9.4
0.95	Motor grader Cat 16			1	0.95				2.1	1	3.1
2.14	Motor grader Cat 24	2	4.3					1	2.14	2	6.4
1.15	Excavator Cat 390			1	1.15					1	1.2
	<b>Total</b>		<b>110.4</b>		<b>83.8</b>		<b>17.6</b>		<b>4.2</b>		<b>216.0</b>

## 15.6.2 Underground Mine Equipment

All three underground mines utilize conventional surface and underground equipment designed for hard-rock mining environments. LHDs and front-end loaders are used for mucking ore from the stope draw points and development headings. Several of the LHDs have remote-control capability, which allows the unit to travel past the brow and increase ore recovery, whereas the front-end

loaders do not. Blasted ore is mucked into 30-tonne, highway-type trucks (being replaced by 60-tonne underground haul trucks) or 60-tonne underground haul trucks, which transport the muck to a surface stockpile. For production ore, typically three to four trucks are assigned to one loader depending on the haul distance. For stope drilling, down-the-hole drills with 114- to 140-millimetre diameter bits are used in the sublevels. Atlas Copco Simba tophammer drills are utilized for draw point drilling. Twin-boom jumbos drill off the development headings and drill holes for installing the bolts used for ground support. Aerial-lifts are used for the installation of services and bolts.

The overall mining rate is currently 9,000 tonnes per day for the Candelaria Underground mine, with an increase to 11,000 tonnes per day in 2019 commensurate with the initiation of production in the South Sector. The mine will reach (and maintain) a peak of 14,000 tonnes per day by 2021, with a ramp down to 8,200 tonnes per day in 2037 after the South Sector is depleted. Ore production remains consistent at 5,200 tonnes per day for the Santos mine and 4,300 tonnes per day for the Alcaparrosa mine.

The primary mining equipment currently used at the Candelaria Underground, Alcaparrosa and Santos mines is summarized in Table 39. The underground mining equipment is owned and operated by contractors. Additional mobile equipment necessary to support the planned mine expansion will be purchased between 2018 and 2020, as seen in Table 40. At the Candelaria Underground mine owner-operated loading and hauling is being introduced using large LHDs and the 60-tonne underground haul trucks.

**Table 39: Current Contractor Equipment**

<b>Equipment</b>	<b>Candelaria Underground</b>	<b>Alcaparrosa and Santos</b>
LHDs	2	4
Front-end Loaders	2	4
Jumbos	6	4
DTH Drills	5	5
Trucks (30 tonnes)	5	16
Tophammer Drills	2	1
Aerial Lifts	7	4

**Table 40: Additional Underground Mining Equipment**

<b>Equipment</b>	<b>Candelaria UG</b>		
	<b>2018</b>	<b>2019</b>	<b>2020</b>
LHDs	4	2	-
Trucks (60 tonnes)	10	4	-
Tophammer Drills	-	2	1

## 15.7 Mining Opportunities

Continued exploration programmes and open pit re-optimizations have been successful in increasing the Mineral Resources and Mineral Reserves at the Candelaria Copper Mining Complex, resulting in a significant increase in the complex’s operating life, particularly in the three underground mines. In anticipation of further positive exploration results continuing to enlarge the Mineral Resources and Mineral Reserves, the Candelaria Copper Mining Complex continues examining potential mine expansion options.

These studies have focused on opportunities to expand production from the higher-grade underground mines, particularly at Candelaria Underground, where Mineral Resources and Mineral Reserves are the largest, exploration potential is the greatest and permitting is in place for production of 14,000 tonnes per day. This has culminated in a plan to commence production from the Candelaria Underground South Sector, with access and infrastructure development having started in late 2017. The purchase of a fleet of state-of-the-art and purpose-built 60-tonne capacity haulage trucks will replace the contractor-owned 30-tonne fleet. These and other initiatives will see production from the Candelaria Underground mine reach to 14,000 tonnes per day by 2021.

Studies are continuing on the Candelaria Underground (both North and South sectors) with a view to increase production levels further. These studies are scrutinizing the development requirements, mining methods and engineering designs with the aim of increased production. Enhancements to the materials handling systems, including the possible installation of underground crushing and conveying systems, are also under review. Results of these conceptual mine expansion studies, with outputs of up to 26,000 tonnes per day being considered coupled with their impacts on mine infrastructure and permitting, are expected in 2019.

The exploration and mine planning effort, undertaken over the past year, at Española has resulted in the discovery and conversion of 31 million tonnes of Mineral Resources to Mineral Reserves. Significant additional quantities of Mineral Reserves are possible at Española with additional infill drilling to the south.

## 16 Recovery Methods

The Candelaria Copper Mining Complex operates two processing plants: Candelaria and Pedro Aguirre Cerda (PAC). The Candelaria processing plant receives ore from the Candelaria Open Pit, Candelaria Underground North Sector and Alcaparrosa underground mines. The PAC processing plant receives ore from the Santos mine.

### 16.1 Minera Candelaria Plant

Minera Candelaria is a mature operation that started producing in 1995. Its processing plant has a nominal capacity of 75,000 tonnes per day of fresh feed and produces a copper concentrate with gold and silver credits. Additionally, Minera Candelaria has an agreement with Compañía Minera del Pacifico S.A. (CMP) to process Candelaria’s flotation tails to recover a magnetite concentrate as an additional by-product credit.

The historical processing performance of Minera Candelaria from 2000 to mid-2018 (see Figure 41) averaged 25.8 million tonnes per year, equivalent to 76,000 tonnes per day at a plant utilization of 93 percent.

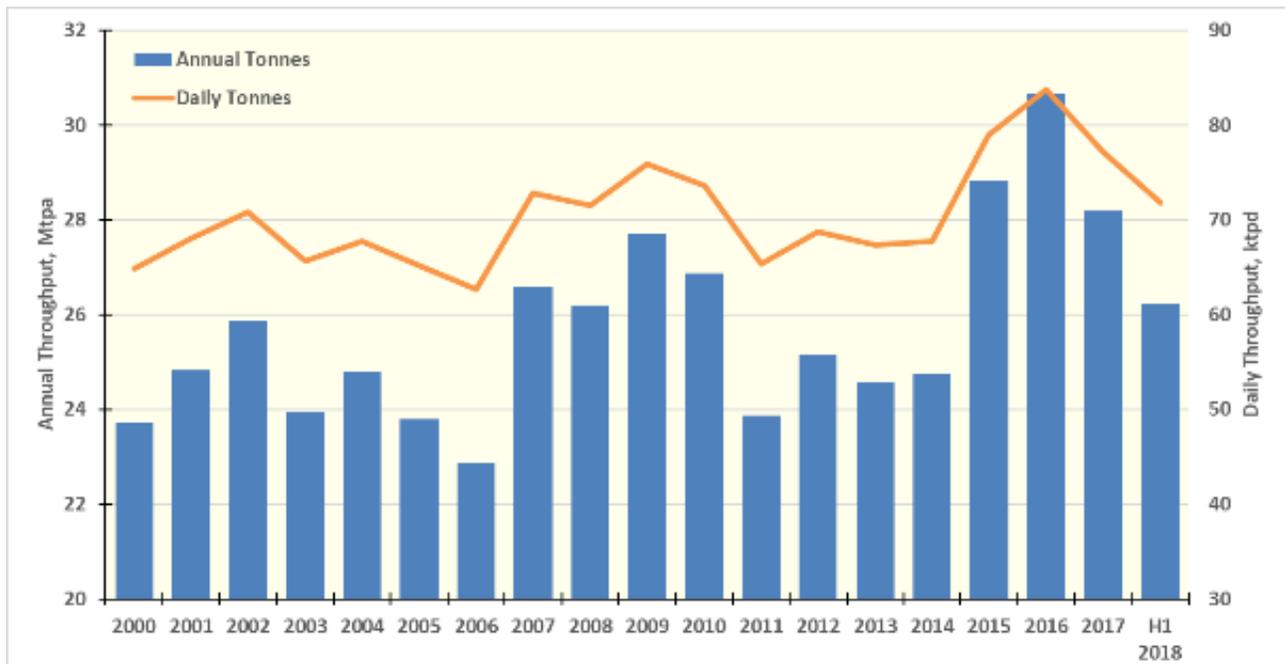
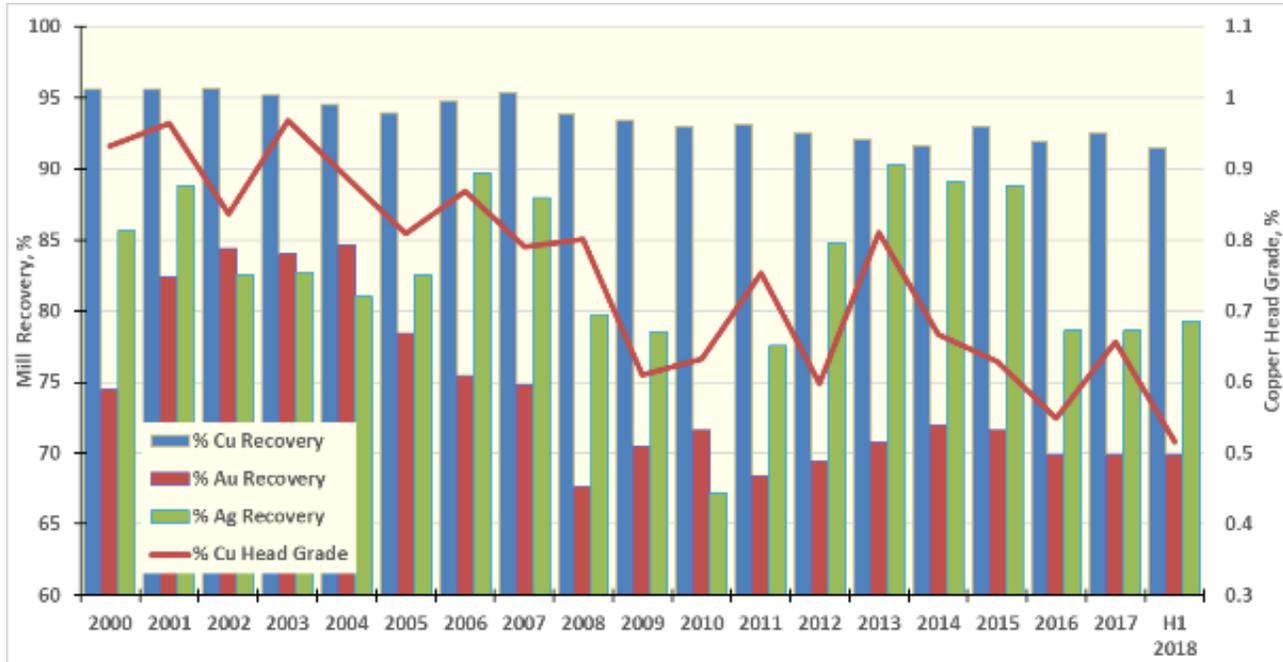


Figure 41: Minera Candelaria Historical Processing Capacity

Between 2000 and mid-2018, metallurgical recovery averaged 94 percent for copper, 75 percent for gold and 83 percent for silver (see Figure 42). Over this same period, copper head grade has fallen from 1.0 percent to below 0.6 percent. Candelaria copper concentrate averages 30 percent copper, 6 g/t gold and 92 g/t silver with a moisture content of 8 percent after filtration.



**Figure 42: Minera Candelaria Historical Metallurgical Performance**

### 16.1.1 Processing Flowsheet

Minera Candelaria operates a conventional process plant flowsheet that incorporates crushing, two parallel lines of grinding and flotation with final concentrate filtration and shipping of bulk copper concentrates. Process water is reclaimed from the tailings storage facility after thickening.

Run-of-mine ore is trucked to a primary gyratory crusher. The crushed product is transported using an overland conveyor belt to a coarse ore stockpile with a combined live and dead capacity of 500,000 tonnes. Semi-autogenous grinding (SAG) mills are followed by pebble crushing, with separate grinding of a portion of the crushed pebbles and the remainder brought back to the SAG mills. This circuit is followed by closed-circuit ball milling with hydrocyclones to classify the flotation feed size.

A multi-stage flotation circuit using an arrangement of mechanical cells, regrind mill and column cells produces a final copper concentrate with gold and silver by-products. Final concentrate is thickened, filtered and stored on site before being trucked to Minera Candelaria’s shipping port at Punta Padrones, near Caldera. Final flotation tails are thickened and disposed of in a rockfill embankment tailings storage facility.

Figure 43 shows the complete Minera Candelaria process flowsheet while Table 41 lists major equipment.

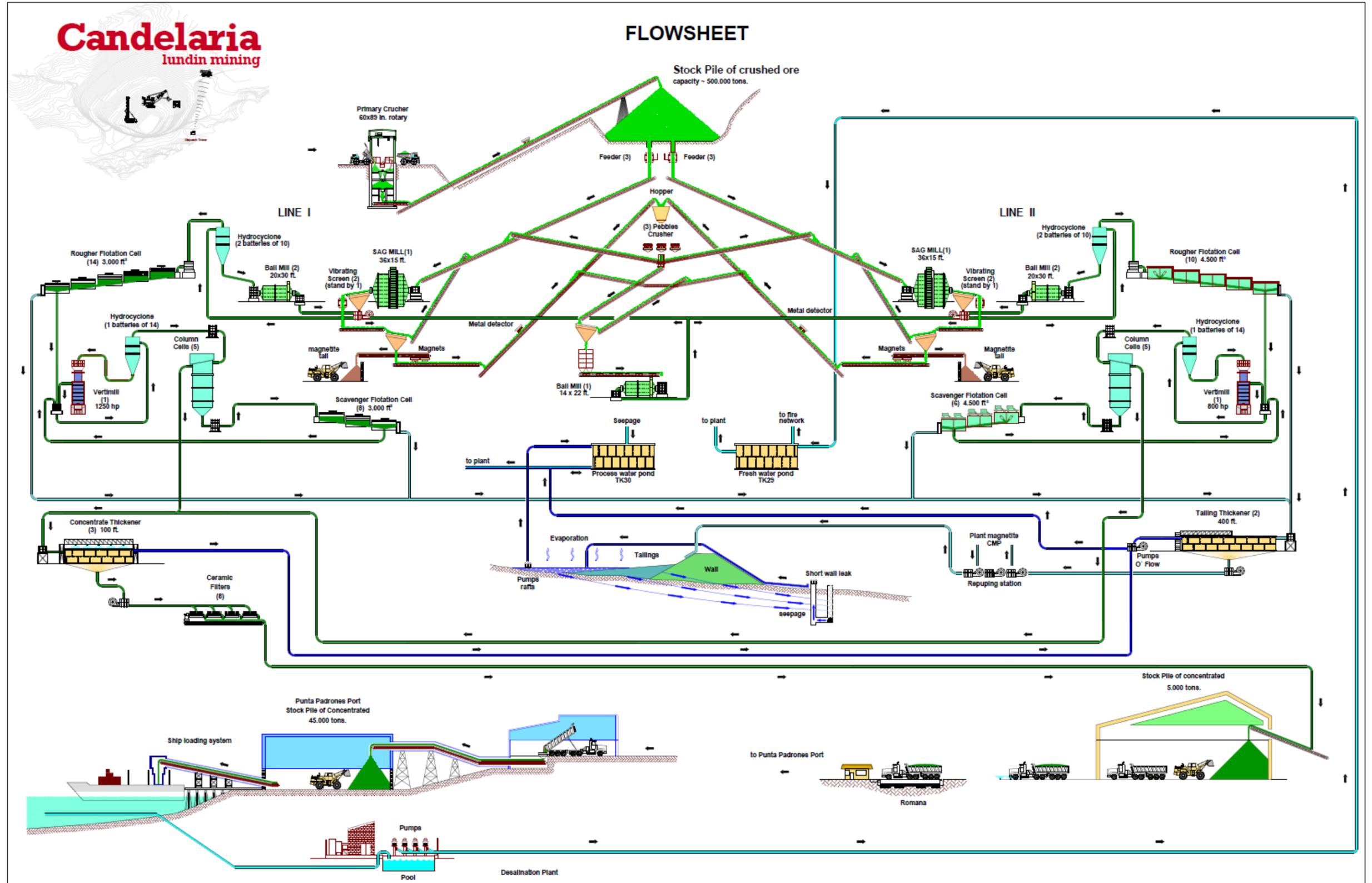


Figure 43: Minera Candelaria Flowsheet  
 Source: Minera Candelaria

**Table 41: Minera Candelaria Major Processing Equipment**

Area	Unit Process	Equipment
Crushing	Primary crusher	Gyratory 60 in x 89 in
	Coarse ore stockpile	500,000 tonnes total
Pebble crushing		3 x pebble crushers 1 x regrind mill 14 ft. x 22 ft.
Mill processing line 1	Grinding	SAG mill 36 ft. x 15 ft.
		2 x ball mills 20 ft. x 30 ft.
	Flotation	2 x clusters x 10 hydrocyclones
		14 x rougher cells 3000 ft <sup>3</sup> 1 x vertical regrind mill 1250 HP 4 x column cells 3 x flotation cells 3000 ft <sup>3</sup>
Mill processing line 2	Grinding	SAG mill 36 ft. x 15 ft.
		2 x ball mill 20 ft. x 30 ft.
	Flotation	2 x clusters x 10 hydrocyclones
		10 x rougher cells 4500 ft <sup>3</sup> 1 x vertical regrind mill 800 HP 4 x column cells 6 x flotation cells 4500 ft <sup>3</sup>
Final tails	Tailings thickener	2 x 400 ft. diameter
Final concentrate	Concentrate thickener	3 x 100 ft. diameter
	Filtration	8 x ceramic filters
	Storage	5,000 tonnes total
Port	Concentrate storage	45,000 tonnes total
Water supply	Ocean water	500 l/s desalination plant at Punta Padrones and pipeline to mine site water tank
	Treated water	Treated municipal waste water from Aguas Chañar and pipeline to process water tank

### 16.1.2 Reagents

Minera Candelaria applies a suite of flotation reagents to maximize recovery of copper and by-product credit metals and for the dewatering of its flotation concentrate and tailings. Table 42 lists reagents used and range of consumption levels.

**Table 42: List of Processing Plant Reagents and Consumptions**

Reagent	Commercial Name	Manufacturer	Consumption (g/t)	
			Minimum	Maximum
Primary collector	AP3894	Solvay	6	8
Secondary collector	Hostafлот-Lib K	Sansil-Clariant	3	4
Frother	Nalflote 9837	Nalco	3	5
Lime	Lime	Inacal	350	545
Flocculant concentrate	Optimer 9876	Nalco	2	5
Flocculant tailings	SNF 228	SNF	5	10

### 16.1.3 Magnetite Recovery

Since 2008, tailings from the Minera Candelaria processing plant have been treated under an agreement with Compañía Minera del Pacifico S.A. (CMP) to produce a magnetite concentrate. The CMP magnetite extraction plant is located to the west of the Candelaria plant site area and to the south of the tailings storage facility. The magnetite concentrate from the plant is transferred via

pipeline to CMP's port near Caldera and the remaining non-magnetic material is deposited in the Candelaria tailings storage facility.

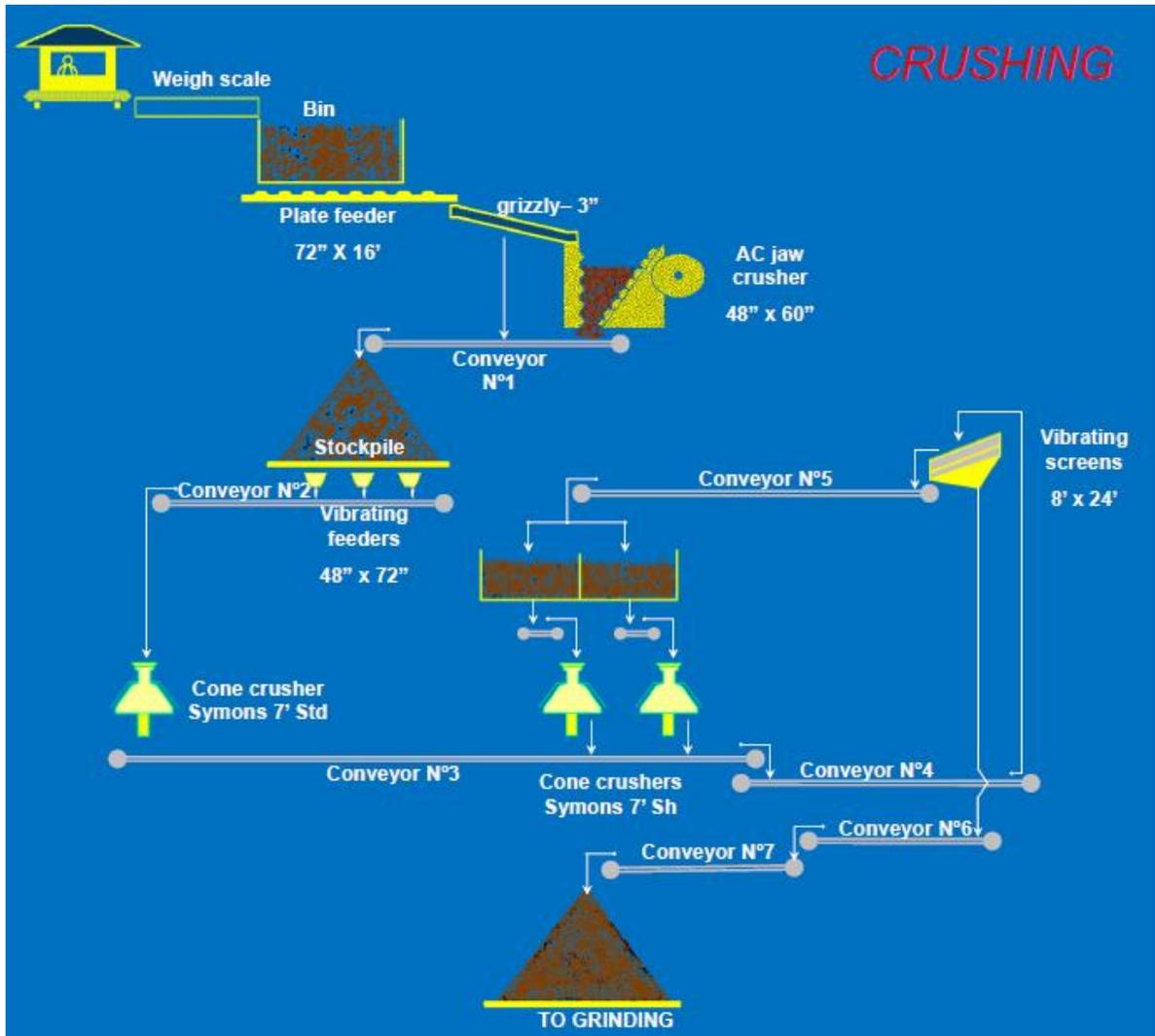
The magnetite concentrate provides an additional source of by-product revenue to Minera Candelaria, linked to global iron ore prices. The contractual agreement includes payment for rental of the CMP plant site area from Minera Candelaria. To reach an approved iron concentrate production rate of up to 3 million tonnes per year, CMP can process material other than Candelaria tailings but must pay a per tonne fee for the disposal of third-party tails into the Los Diques facility, as part of the agreement. The Candelaria mine production plan includes 0.9 to 3.4 million tonnes of annual magnetite content until 2035, with a magnetic iron content of 4.8 to 18.3 percent.

## 16.2 Minera Ojos del Salado PAC Plant

The PAC concentrator of Minera Ojos del Salado has been in operation since 1929. The concentrator processes 3,800 tonnes per day of fresh feed from the Santos underground mine with an historical average head grade of 0.85 percent copper with a copper recovery of 94 percent. Copper concentrate produced has averaged 30 percent copper, 5 g/t gold, and 67 g/t silver since 2004. Gold and silver recoveries are slightly lower than Candelaria, at 72 percent each.

The current mine plan shows the PAC plant continuing to operate at this capacity until 2028, when it will halt production. The concentrator flowsheet comprises a closed-circuit crushing plant (see Figure 44) including a primary jaw crusher (48 by 60 inches), a secondary cone crusher (Symons 7-foot standard) and two tertiary cone crushers (Symons 7-foot short head).

The grinding plant (see Figure 45) has three ball mills (one 9 by 9 feet and two 10.5 by 13 feet) operating in parallel and in closed-circuit with hydrocyclones. The flotation plant (see Figure 46) uses multi-stage, mechanical (self-aspirated and forced-air) flotation cells varying in size from 100 to 1500 cubic feet. After rougher flotation, regrind milling and column cells are used to generate a final concentrate which is thickened and filtered using a 30-square-metre ceramic disc filter. Final flotation tailings from the PAC plant are pumped to the main Minera Candelaria tailings storage facility but not processed through the magnetite recovery plant.



**Figure 44: PAC Crushing Plant Flowsheet**  
Source: Minera Ojos del Salado

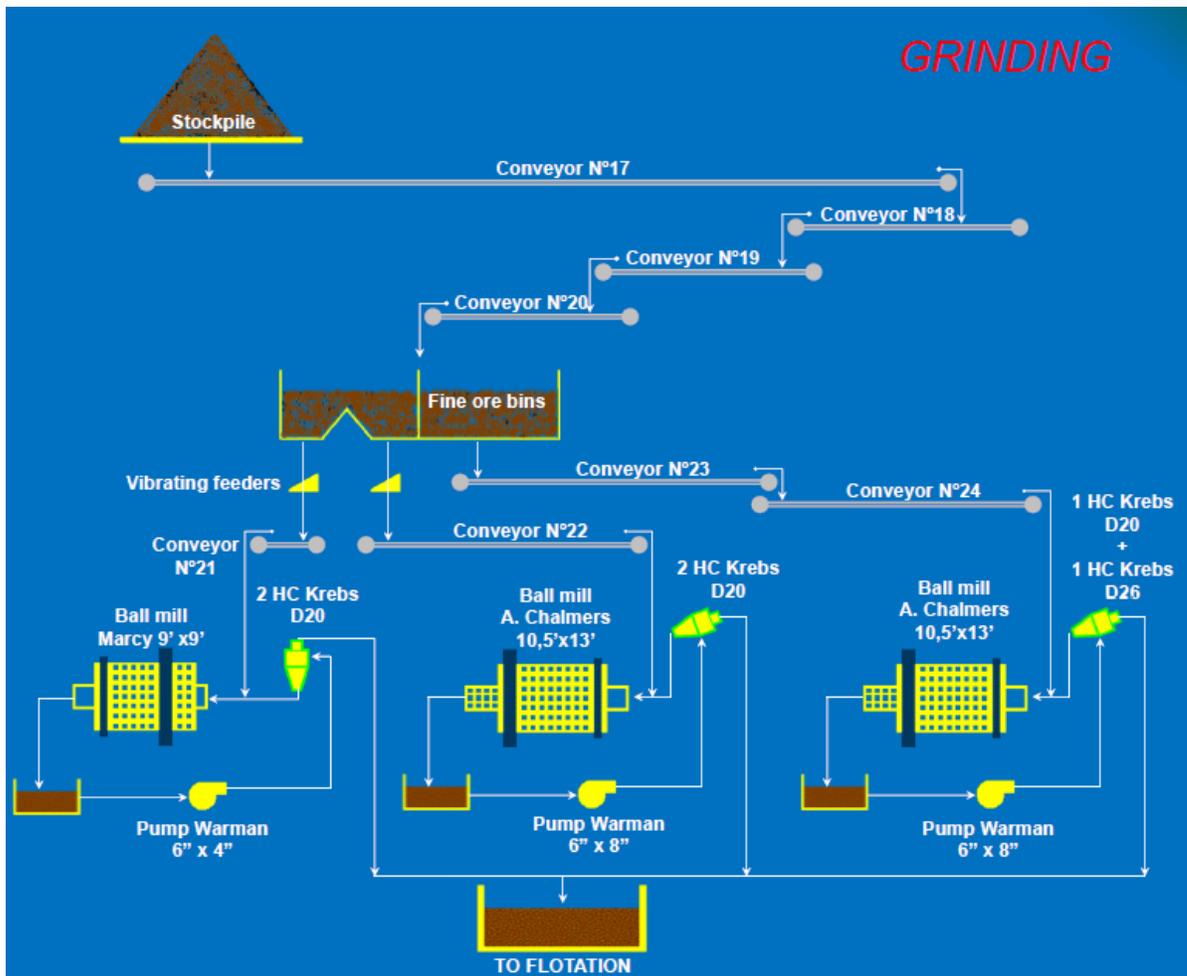


Figure 45: PAC Grinding Plant Flowsheet

Source: Minera Ojos del Salado

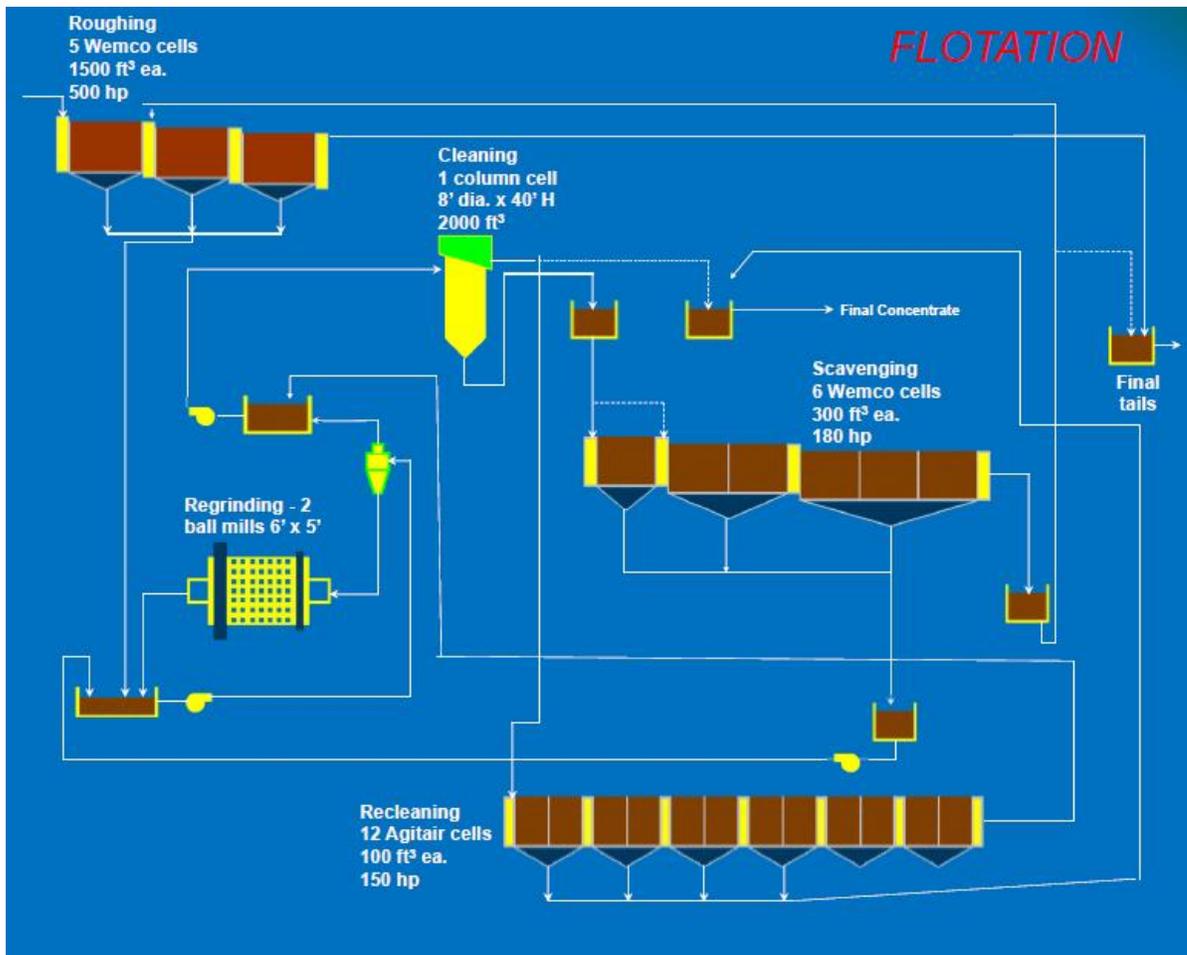


Figure 46: PAC Flotation Plant Flowsheet

Source: Minera Ojos del Salado

### 16.3 Process Improvement Initiatives

The success of the recent exploration programmes in discovering additional Mineral Resources and Reserves have resulted in an increased mine life for the Candelaria Copper Mining Complex. A feasibility study has been undertaken to evaluate potential expansion of the main Minera Candelaria processing plant to add 15 to 20 percent throughput capacity. The study identified that pre-crushing the SAG mill feed is a key element and would allow an increase in grinding circuit throughput without impacting the flotation feed and recoveries. At this time, pre-crushing of the SAG mill feed has not been considered in the plant expansion plans.

The milling circuit currently operates at maximum power draw so plant throughput is determined by ore hardness and size. The study also identified the need to optimize the secondary milling circuit to balance power requirements for the entire comminution circuit.

The plant expansion as outlined in the feasibility study has not been advanced at this stage, pending further reviews and optimization of the mine plans. However, some of the process improvement initiatives highlighted by the study are being implemented on their individual merits and will each contribute to improved metallurgical performance. These process improvement initiatives have been approved under the Candelaria Mill Optimisation Project (CMOP) and are listed in Table 43.

The combined impact of these initiatives is estimated to be an additional 4,000 tonnes per day of throughput (or a 5 percent increase) and an additional 1.7 percent copper recovery. As shown in Table 43, the total cost of these initiatives is US\$73.9 million and will be completed by late 2019. The CMOP project commenced in 2018 and the forecast 2019 expenditure is approximately US\$50 million.

Another scoping study considers the installation of primary crushers underground with secondary crushing at surface to deal with Candelaria Norte and Candelaria Sur ore production. This is expected to decrease the underground mining costs and increase the plant throughput capability while increasing the daily underground production from 14 to 26 kilotonnes per day.

During 2018 the Triple Point Technology Algosys Metallurgical Accountant<sup>®</sup> system was implemented at Candelaria and the PAC process plants. This system is designed to improve metal accounting practices in line with global best practices.

**Table 43: CMOP Improvement Initiatives**

Initiative	Benefit	Estimated Cost, \$M	Forecast Completion
Primary Crusher Motor Upgrade	Increasing the rating of the crusher motor will allow the crusher to restart under load which will increase utilisation. New electrical room included in scope. Minor delay due to change on motor spec.	2.8	Jun 2019
Ball Mill Repowering	Additional power available to the secondary ball mills which can be utilised by increasing the speed of the mills and ball load, will assist in reducing the product grind size and will contribute to improved copper recoveries.	32.7	Oct 2019
Cyclones and Feed Pump Upgrade	Upgrading the cyclones, cyclone feed pumps/motors and feed pipes will allow more optimal cyclone feed densities and improved classification.	19.9	Sep 2019
Flotation Upgrade	The rougher flotation cells have been identified as having performance limitations. Modifications are planned to overcome these legacy limitations and will lead to recovery improvements. Minor delay expected due to execution strategy linked to implementation of permanent flotation cell by-pass system by the operation.	5.1	Jun 2019
Pebble Circuit Upgrade	The current pebble crusher circuit does not treat all of the pebbles generated by the SAG mills. Redesigning the feed distribution to the pebble bins, improving the operation of the pebble crushers and curtailing the recycle stream back to the SAG mills feed while presenting all of the crushed pebble stream to the pebble circuit ball mill are planned. It is estimated that an additional 4ktpd of primary SAG mill feed can be achieved with these modifications in place.	11.2	Jul 2019
Water Upgrades	De-bottlenecking the desalination plant to achieve nameplate capacity. Minor delay due to water management strategy requiring full desalination plant availability during Chilean summer.	2.2	Apr 2019
<b>Total</b>		<b>73.9</b>	

## 16.4 Forecast Future Performance

Figure 47 shows the forecast LOM plant feed tonnes by source and the average copper head grade. The expected outcomes from the process improvement initiatives are included in this forecast. With increased Mineral Reserves, the option of operating the Candelaria concentrator at a higher throughput will continue to be reviewed. Copper head grades will remain at 0.5 to 0.7 percent until 2035 before falling to 0.2 percent at the end of mine life, when reclaimed stockpiles will be the only mill feed source.

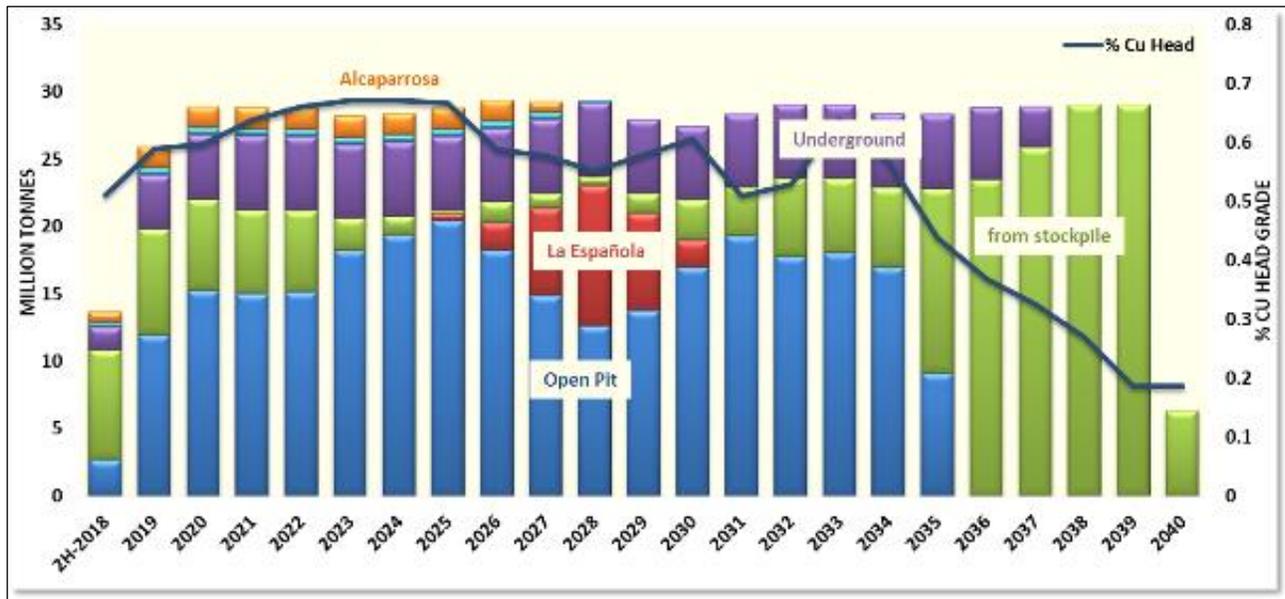


Figure 47: Candelaria Life of Mine Forecasted Plant Feed by Source

Figure 48 shows the forecasted copper recovery and final concentrate copper and gold grades. The effect of lower copper head grade is evident after 2035, with recoveries dropping below 90 percent.

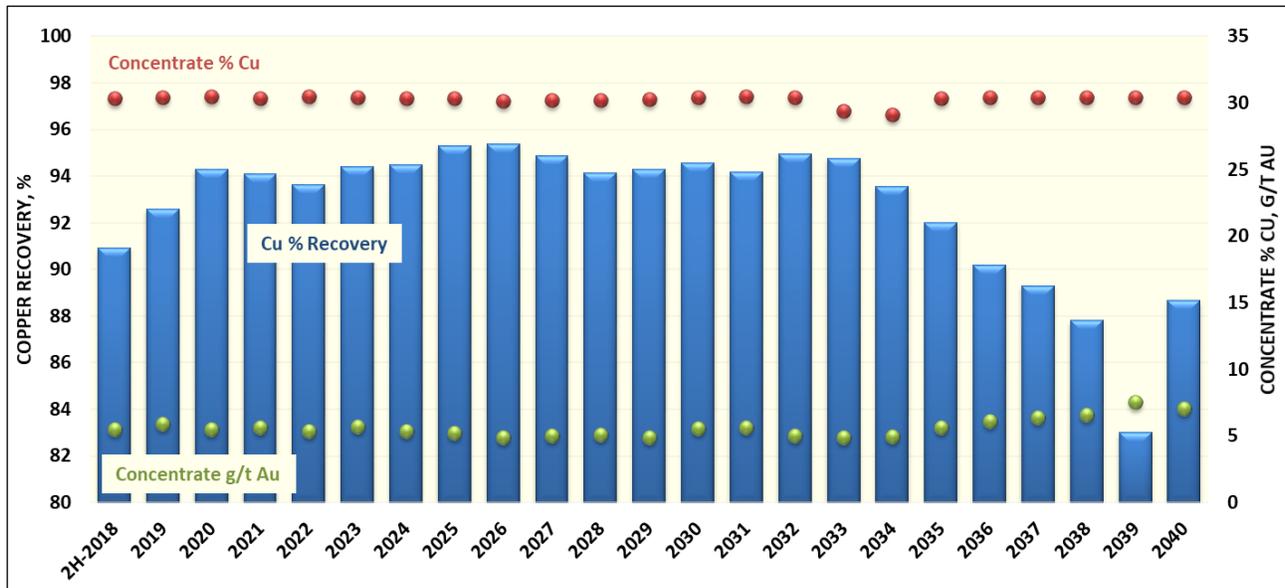


Figure 48: Candelaria Life of Mine Forecasted Copper Recovery & Concentrate Grades

A plot of copper recovery against head grade is shown in Figure 49. Annual results for 2000 to 2018 show 92 to 96 percent recovery, while the Candelaria forecasting model discussed in Section 12.2 was used to estimate future recoveries at lower head grades. Figure 49 provides a comparison between the set of LOM forecasted results as of 2017 versus 2018, with the latter including the expected 1.7 percent copper recovery increase from the CMOP initiatives currently underway. The increased recovery is primarily due to an expected reduction in flotation feed 80 percent passing

(P<sub>80</sub>) size, from the current 145 to 150 micrometres to 130 to 135 micrometres. This reduction was found to have a greater effect on the harder ore domains (UG 57-59 and UG 40-68).

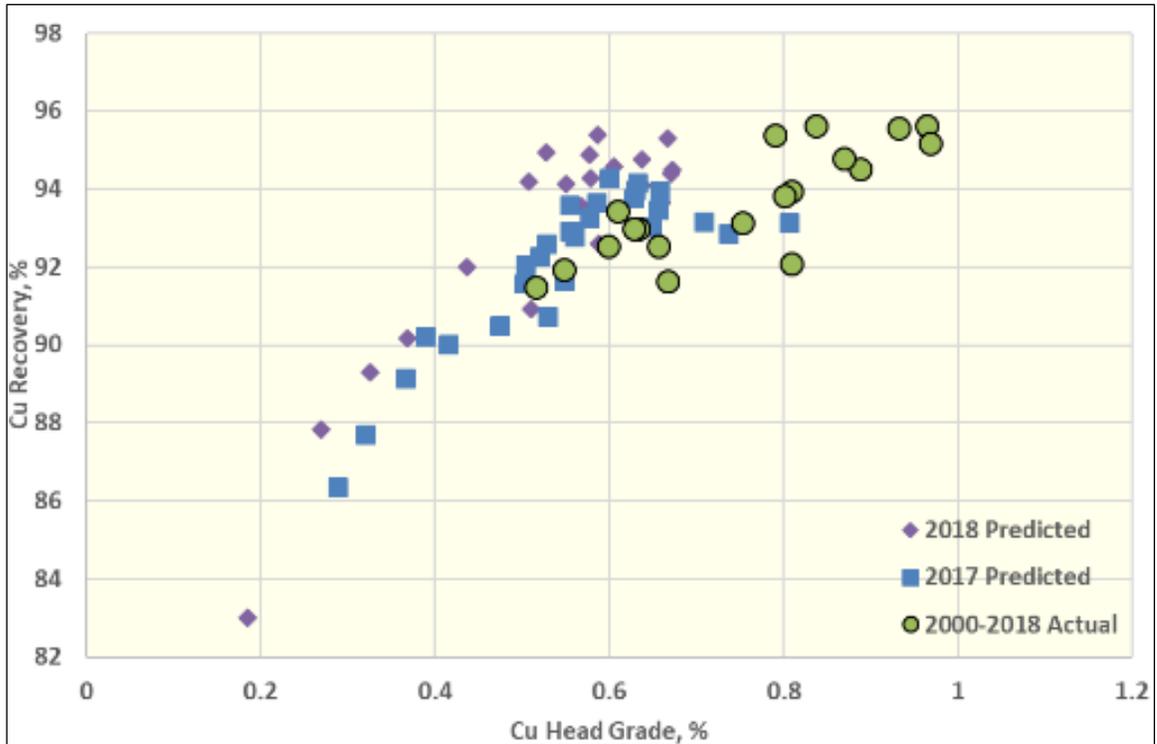


Figure 49: Candelaria Copper Recovery vs. Head Grade – Forecasts & Actual

The PAC processing plant is planned to operate until 2028 as shown in Figure 50. Head grades will continue at around 1 percent copper with 0.2 g/t gold over this period.

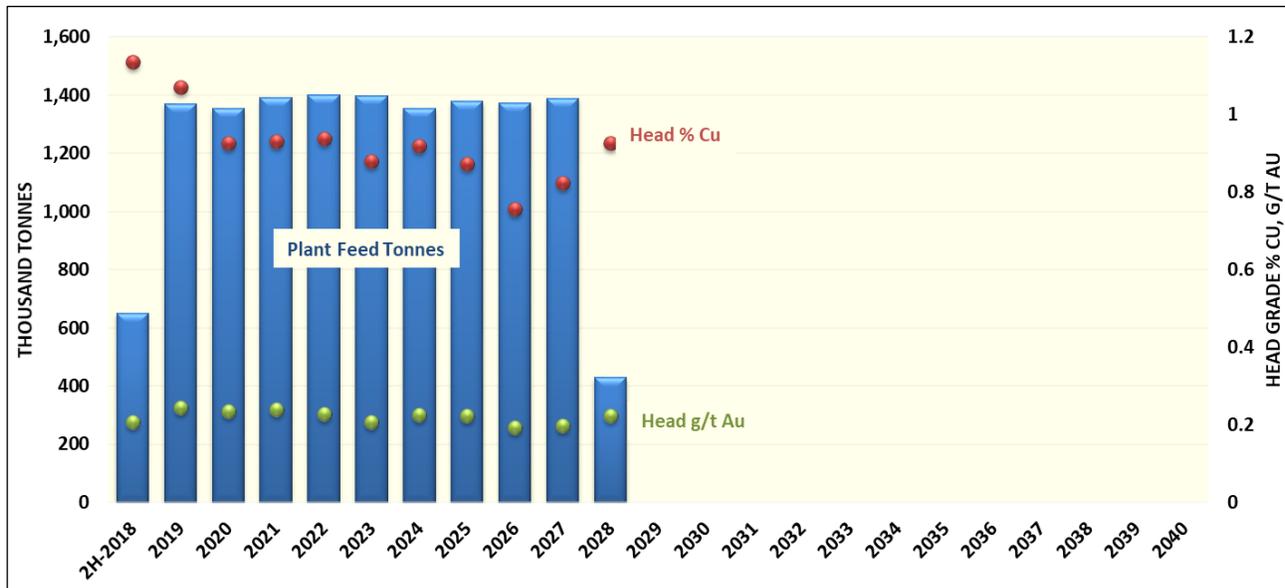


Figure 50: Minera Ojos del Salado PAC Life of Mine Forecasted Plant Feed

## 17 Project Infrastructure

This section provides a summary of the major infrastructure of the Candelaria Copper Mining Complex. This section is compiled from information collected during the site visit when all major infrastructure was visited by SRK. The major infrastructure is shown in Figure 4.

### 17.1 Candelaria Copper Mining Complex

The Minera Candelaria infrastructure includes:

- The Candelaria Open Pit with a capacity of approximately 310,000 tonnes of rock per day over the next 10 years.
- Surface waste dumps located to the north and southwest of the Candelaria Open Pit.
- The Candelaria processing plant with a nominal capacity of 75,000 tonnes per day.
- The Candelaria Underground mine with a current ore capacity of 9,000 tonnes per day (which will be ramped up to 14,000 tonnes per day later in 2021 with the start of production from the Candelaria Underground South Sector) and access from a portal located within the Candelaria Open Pit.
- The new Los Diques tailings storage facility located to the south-east of the open pit and mine facilities, was commissioned and put into operation in 2018.
- Ancillary mine services and administrative buildings and road accesses.
- The off-site Punta Padrones port located at Caldera with a 45,000-wet metric tonne designed storage capacity and 1,000 wet metric tonnes per hour loading capacity.
- A desalination plant adjacent to the port facility and commissioned in January 2013 with a capacity of 500 litres per second and related pipeline to connect to the Bodega pump station (80 kilometres).
- A pipeline from the Bodega pump station to the Candelaria plant site (40 kilometres).

The Minera Ojos del Salado infrastructure includes:

- The Alcaparrosa underground mine with an ore capacity of 4,400 tonnes per day and access by a portal.
- The Santos underground mine with an ore capacity of 5,200 tonnes per day and access by a separate portal.
- The PAC processing plant with a capacity of 3,800 tonnes per day.
- Ancillary surface service buildings and road accesses.

### 17.2 Power Supply

Power supply for the Candelaria Copper Mining Complex, as well as the port and desalination facilities, is supplied under a contract with GENER (AES Gener S.A.) since July 2012. Contract term extension negotiations, until 2035, have been completed and an extension agreement was reached with a significant price reduction. Power maximum capacity of 139 megawatts and the option to increase to 160 megawatts. Starting in 2023 at least 80 percent of the supply shall be from green sources (renewable energy). Typical combined maximum demands for the mines, port, and desalination plant are approximately 110 megawatts. Under the newly signed power contract, unit power cost is forecast to fall to approximately US\$0.07 per kilowatt hour from 2023.

In 2016, Minera Candelaria and Minera Ojos del Salado consumed 807 and 66 gigawatt hours, respectively, for a combined total of 872 gigawatt hours per year. Reported power costs in 2016 and 2017 year to date were US\$0.094 and US\$0.108 per kilowatt hour respectively.

### 17.3 Punta Padrones Port Facilities

Minera Candelaria infrastructure includes the Punta Padrones port facilities located at Caldera on the Pacific Ocean seaboard (Figure 1 and Figure 3). It has been in operation since 1995. The facility comprises a covered concentrate warehouse with a capacity of 45,000 wet metric tonnes and a telescopic ship loader that has a capacity of 1,000 wet metric tonnes per hour. The facility is equipped with dust collection systems and all concentrate truck discharge and warehouse loader activities take place inside covered buildings. The telescopic ship loader is PLC controlled and conveyor discharge to the ship hold is via an “elephant’s trunk.”

The port is able to accommodate ships of up to 58,000 metric tonnes with drafts of up to 12.4 metres. Typically, three vessels are loaded per month. The total capacity of the port is approximately 3.5 million wet metric tonnes per annum. The maximum annual concentrate production over the remaining LOM is approximately 600,000 wet metric tonnes per annum. Overall utilization of the port is therefore low and the excess capacity is potentially available for cost savings and sharing with other concentrate exporters.

### 17.4 Fresh Water Supply

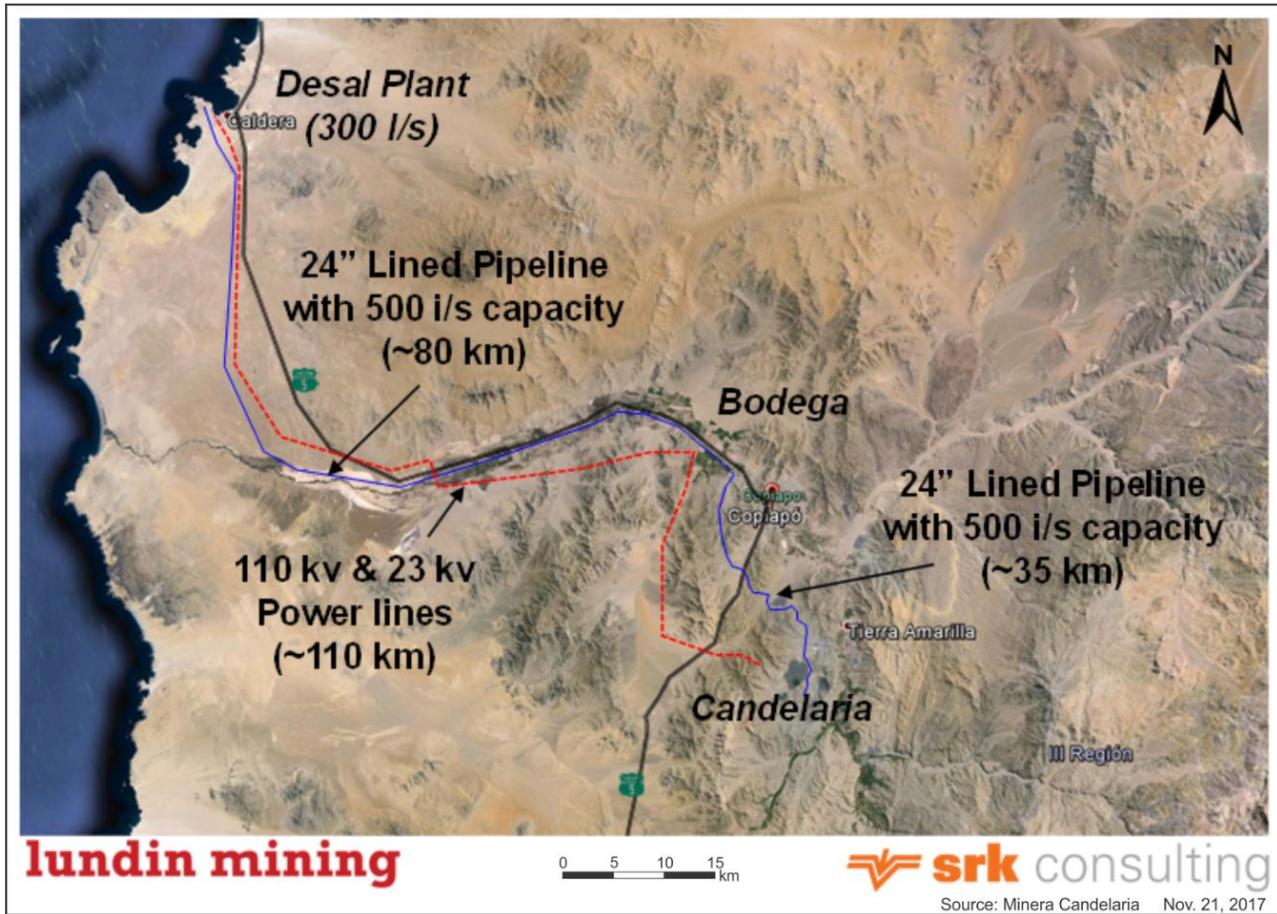
Historically, the Candelaria Copper Mining Complex sourced fresh water from deep wells in the nearby Copiapó aquifer for which the mines held and continue to hold water rights. During the 2000s, water levels in many of these wells dropped significantly and some went dry.

Following an extensive examination of alternative water supplies, including more distant ground water wells, Minera Candelaria opted to construct a desalination plant at the Punta Padrones port site and pump the water 110 kilometres to the mine site via a dedicated pipeline and booster pump station (Figure 51). The desalination plant was originally designed at 300 litres per second and was later expanded to 500 litres per second.

The desalination plant itself consists of three, nominal 150 litres per second lines comprising pre-filtration, ultra-filtration, micro-filtration ahead of conventional reverse osmosis. The reverse osmosis plant includes 468 pressure vessels with 3,276 membranes operating at a pressure exceeding 1,000 pounds per square inch. The desalination plant was commissioned in early 2013 and reached nameplate capacity later that year. In November 2013, extraction from groundwater sources in the Copiapó aquifer was stopped, except for water for potable supply and emergencies.

In addition to the desalination plant, the mines also source water from Aguas Chañar, a private company that treats the sewage from Copiapó and Tierra Amarilla. One of the conditions of approval of the Candelaria 2030 EIA is the gradual phase-out of the use of water from the Aguas Chañar wastewater treatment plant. By July 2025, the operations will depend solely on water from the desalination plant.

The water requirements can be met by pumping additional desalinated seawater from the plant at Punta Padrones.



**Figure 51: Desalination Plant Location and Pipeline to Candelaria Site**

Source: Minera Candelaria

## 17.5 Las Cruces Pipeline Relocation

A 4,800-metre segment of the water pipeline from Bodega to Candelaria that traversed Pucobre land had to be relocated due to the planned construction of their new tailings storage facility. The project was completed on October 1, 2018.

## 17.6 Ojos Pipeline Relocation

To ensure operational continuity of the PAC plant, after the expiry of the current Candelaria tailings storage facility in 2019, a new tailings pipeline, with a new pump station, is required to the Los Diques tailings storage facility. A total of US\$7.1 million has been budgeted for this project and is planned to be complete by December 2019.

## 17.7 Tailings Storage Facilities

### 17.7.1 Candelaria Tailings Storage Facility

The Candelaria tailings storage facility, located to the northwest of the open pit (Figure 4), currently receives flotation tailings from the PAC processing plant. The Minera Ojos del Salado flotation tailings are pumped unthickened at an average solids concentration of 35 percent. The Candelaria flotation tailings are thickened and pumped to the new Los Diques tailings storage facility at an average solids concentration of 50 percent.

The Candelaria tailings storage facility currently has three embankment dams (Main, North and South), built with mine waste material with a final designed crest elevation of 800 metres above sea level. Construction of the final dam configuration was completed in 2015. A small containment dike (Decidida) is built from borrow material on the western edge of the facility. The dams have a filter system comprised of varying combinations of granular material, geotextile and/or HDPE liner on the upstream slope. The downstream slope of the dams is 1.6(H):1.0(V) and the upstream slope is 1.8(H):1.0(V), except for the Decidida dam where both slopes are 1.8(H):1.0(V). All dams are constructed using the downstream method.

At the end of June 2018, the remaining storage capacity is estimated to be about 16 million cubic metres. This includes the additional storage obtained by a reduction in the freeboard from 5.0 to 1.5 metres, the key permits for which were granted in April and May 2016.

The currently proposed closure plan for the Minera Candelaria tailings storage facilities includes a cover of granular material with channels to direct surface run-off towards a spillway located at the south-east end of the South dam.

### 17.7.2 Los Diques Tailings Storage Facility

A new tailings storage facility, known as Los Diques, to the southwest of the open pit and plant sites (see Figure 4), has been constructed to replace the Candelaria tailings storage facility. The Los Diques tailings storage facility will have an approximate designed capacity of 600 million tonnes, to a final crest elevation of 873 metres above sea level. The Los Diques tailings storage facility is a key part of the “Candelaria 2030 - Operational Continuity Project” environmental impact study that was submitted to the environmental authorities in September 2013 and approved with conditions in July 2015. Key sectorial permits for Los Diques including those from the Servicio Nacional de Geología y Minería (SERNAGEOMIN) and the General Directorate of Water (DGA) were granted in July and August 2016 respectively allowing the main dam construction activities to commence.

The new tailings storage facility is designed with three embankments, all of them built from mine waste material, with transition and filter zones built from engineered fill borrowed from inside the containment area. The main embankment has underdrains to facilitate water recovery. The design includes a geomembrane on the upstream slope and a grout curtain for the north and south embankments only. In addition, a cut-off wall and drain wall along with extraction wells collect seepage water for recirculation to the processing plant.

At the end of June 2018, the initial construction phases of Los Diques were completed (see Figure 52). Future phases of the Main dam planned to start in 2019 have been initiated ahead of schedule, taking advantage of synergies with the current project and the availability of mine waste from the open pit. This will lead to capital cost savings on future embankment raises. All power line

and road diversions are complete, placement of mine waste on the main embankment has reached the planned height of the starter dam, the cut-off wall and seepage collection system are complete and the tailings distribution lines are in place. Placement of first tailings material started during the first quarter of 2018 as part of commissioning. The commissioning phase is complete, and the Los Diques tailings storage facility can now receive 100 percent the flotation tailings from the Candelaria processing plant. Flotation tailings from the PAC processing plant continue to be deposited in the Candelaria tailings storage facility.



**Figure 52: Los Diques Tailings Storage Facility, November 2018**  
Looking south-southwest

The currently proposed Los Diques closure plan includes a cover and a spillway on the North dam that will direct surface run-off to a drainage canal located on the west boundary of the dam. Water that is collected in the drainage canal will be routed to the pit.

## 18 Market Studies and Contracts

The Candelaria Copper Mining Complex has been selling copper sulphide concentrates to customers worldwide according to established contracts for many years. Market studies are therefore not relevant to the purpose of this technical report. This section summarizes the key contracts.

The quality of the copper concentrates produced by the Candelaria Copper Mining Complex is excellent. The concentrates are clean and have very low content of critical elements such as lead, arsenic, antimony, bismuth, and mercury. The range of the zinc content in the Candelaria copper concentrates is very wide (0.1 percent to 3.75 percent) and may, from time to time, result in modest penalties from some copper smelters.

Copper concentrates from Minera Candelaria and Minera Ojos de Salado, have significant by-product credits of gold and silver. Technically, the copper concentrates have no limitations and can be treated at all copper smelters worldwide.

The Minera Candelaria concentrate is primarily sold through eight long-term contracts under a range of quantity options and destinations. One contract expires at the end of 2019, with the remainder continuing past 2019 on an evergreen basis. All contracts are referenced against annual copper smelter treatment terms. The concentrate is shipped from the Punta Padrones port facility to destinations in Europe, China, Japan and Korea. As necessary, and to adjust for production variability, a small portion of concentrate production is sold into the spot market at then-current market terms for destinations similar to the above.

The Minera Ojos de Salado copper concentrate is currently sold under two long-term contracts: one for domestic delivery in Chile and one for delivery to Japan. The contracts run at least until the end of 2019 and both are referenced against annual copper smelter treatment terms.

The sales contracts are a mix of “block” and “brick” contracts. Under a “block” contract, 100 percent of the terms are based on the current year’s annual terms, while under a “brick” contract, the terms for each year are being based on 50 percent at the prior year’s annual terms and 50 percent at the current year’s annual terms.

Minera Candelaria and Minera Ojos del Salado have entered into two Contracts of Affreightments (COA) with two different shipping companies. These COAs are valid through 2019. The existing COAs cover all present sales destinations.

In addition to copper concentrate sales, Minera Candelaria has an agreement with Minera del Pacifico to process Candelaria’s flotation tailings to produce a magnetite concentrate and this produces an additional source of by-product revenue.

## 19 Environmental Studies, Permitting, and Social or Community Impact

This section summarizes the environmental and social aspects of the Minera Candelaria and Minera Ojos del Salado operations and was compiled from information made available by Lundin and a site visit by SRK on October 30 and 31, 2018.

### 19.1 Environmental Studies and Regulatory Framework

Chile has in place a comprehensive regulatory framework governing both environmental approvals and associated construction and operating permits, generally referred to as Environmental Sectorial Permits (*Permisos Ambientales Sectoriales*, or PAS). The Environmental Impact Evaluation System (*Sistema de Evaluación de Impacto Ambiental*, or SEIA) came into being in 1994 with the promulgation of Law 19.300. The implementing regulations have been modified on more than one occasion since then as the system has evolved, most recently in 2013. The SEIA is administered by the Environmental Evaluation Service (*Servicio de Evaluación Ambiental*, or SEA), an arm of the Environment Ministry (*Ministerio del Medio Ambiente*, or MMA).

Mining and other activities (with the notable exception of agriculture) in Chile are subject to environmental review and can be approved via three mechanisms, as follows:

1. A *Pertinencia de Ingreso* (or *Pertinencia*) is a document prepared for small projects or minor modifications to existing projects, which demonstrates that the effects of the proposed action are below the threshold requiring formal environmental review. Once approved by the SEA the project or modification can proceed without undergoing environmental review (although sectorial permits, or modifications to existing permits, may be required).
2. An Environmental Impact Declaration (*Declaración de Impacto Ambiental*, or DIA) is required to be submitted by the proponent for projects or project modifications that are significant enough to warrant environmental review, but which are not expected to result in significant environmental impacts, as these are defined legally.
3. An Environmental Impact Study (*Estudio de Impacto Ambiental*, or EIA) is required to be submitted by the proponent for projects or project modifications where significant environmental impacts are expected to occur, and where specific measures for impact avoidance, mitigation or compensation will need to be agreed upon.

The SEA approves DIAs and EIAs following regulatory review and (in the case of EIAs) formal public consultation, by issuing an Environmental Qualification Resolution (*Resolución de Calificación Ambiental*, RCA). RCAs can run to several hundred pages in length for complex projects, and usually, contain numerous conditions of approval related to both environmental and social aspects of project development, that must be adhered to by the project proponent during all phases of the project life cycle.

Normally, once a proponent obtains an RCA it is necessary to obtain sectorial permits for construction and operation of the new or modified project. These are described further in Section 19.2.2.

## 19.2 Permitting and Compliance

### 19.2.1 Environmental Approvals

#### Minera Candelaria

The original Candelaria project was submitted to a voluntary environmental assessment process and was approved by resolution ORD No. 817 on June 9, 1992. The Candelaria mine officially started operations on March 9, 1995 and has undergone a series of modifications since the early 1990s, which have been permitted through Pertinencias, DIAs, and EIAs (Table 44 and Table 45).

The most recent major environmental permitting effort was the “Candelaria 2030” EIA which included, among other things, an extension to the mine life and the development of the Los Diques tailings storage facility. The SEA approved the EIA via RCA No. 133/ in July 2015. Construction of the initial phases of Los Diques tailings storage facility is now complete and the facility is operational.

Candelaria is now in the scoping phase of the next major environmental permitting exercise, which will include an extension to the mine life, a possible expansion of underground mining production and other mine optimization initiatives. It is expected that the EIA will be submitted in late 2019.

**Table 44: Minera Candelaria Environmental Approvals (RCAs\*)**

<b>Project</b>	<b>Legal Reference*</b>
EIA Candelaria project Phase I	N° 817/1992
EIA Port facilities Punta Padrones	N° 001/1994
EIA Candelaria project Phase II	N°1/1997
DIA Receipt and storage of tailings from Minera Ojos del Salado	N° 044/1997
DIA Auxiliary fuel tank Candelaria mine	N° 006/1998
DIA Mixing plan of diesel and used oil	N°104/1998
DIA Copper concentrate transport to new destinations	N° 26/2000
DIA Exploration ramp Candelaria Underground North Sector	N° 084/2001
DIA Candelaria Underground North Sector project	N° 094/2003
DIA Modification of the feeding system of the tailings dam	N° 116/2005
DIA Reception and processing mineral from Alcaparroza mine	N° 012/2005
DIA Exploration ramp Candelaria Underground South Sector	N° 04/2005
DIA Candelaria Underground North Sector expansion	N° 175/2007
DIA Optimization pebbles circuit	N° 106/2007
DIA Water pipeline Chamonate - Candelaria	N° 273/2008
EIA Candelaria desalination plant	N° 129/2011
DIA Growth of height La Candelaria tailings dam wall	N° 74/2012
EIA Candelaria 2030 - Project operational continuity	N° 133/2015

\* Environmental Approval Resolution (RCA)

**Table 45: Changes at Candelaria Approved Under Pertinencias**

<b>Project /Activity</b>	<b>Legal Reference</b>
Modification of concentrate route	Letter N° 1088/2011, SEA Atacama
Modification of the path of the power line between the mine and the desalinization plant	Letter N° 1424/2011, SEA Atacama
Extension of LOM expansion Candelaria Underground North Sector	Letter N° 911/2012, SEA Atacama
Operational optimization Candelaria Underground mine	Resolution N°062/2017, SEA Atacama
Adaptation of Candelaria pipelines in Las Cruces area	Resolution N°35/2018 SEA Atacama

### **Minera Ojos del Salado**

The Santos mine and PAC processing plant were developed prior to 1994 when the environmental regulatory regime was different from the present day. The Alcaparrosa mine received environmental approval in 1996 with subsequent amendments, most recently an EIA requesting the extension of the mine operation through 2022.

Tailings from the PAC plant are deposited in the Candelaria tailings storage facilities under an environmental approval granted in 1997 and extended through 2030. Environmental permits and Pertinencias related to Minera Ojos del Salado are listed in Table 46 and Table 47.

**Table 46: Summary of Minera Ojos del Salado Approvals (RCAs\*)**

<b>Project /Facility</b>	<b>Description</b>	<b>Approval Reference*</b>
EIA Alcaparrosa mine	2,500 tonnes per day process in Aguirre Cerda plant	N° 2/1996
DIA Tailings transport to Candelaria	Transport of tailings N° 8 to Candelaria	N° 048/1997
EIA Modification to Alcaparrosa mine	Process in Aguirre Cerda plant 725,000 tonnes per year between 1998 – 2006 913,000 – 1,450,000 tonnes per year between 2007 – 2008 570,000 tonnes per year in 2010	N° 6/1999
DIA Cerro Negro mine exploration	12 boreholes	N° 002/ 2000
DIA Modification II Alcaparrosa project	Transport of 4,000 tonnes per day to Candelaria plant (new road)	N° 003/2005
DIA Tortolitas mine exploration	10 boreholes	N°089/2005
DIA Slag removal/tunnel remediation of Edwards smelter	Environmental management and closure of two abandoned facilities (slag deposit and tunnel) from old Edwards smelter	N° 118/2005
DIA Environmental improvement of six tailings dams	Environmental remediation of six old abandoned tailings dams	N° 228/ 2007
DIA Mineral transportation between Santos mine and Alcaparrosa mine	Transportation of approximately 1,400 tonnes per day of ore from Santos to Alcaparrosa	N°204/2008
EIA Alcaparrosa Mine – Project operational continuity	Production of 4,300 tonnes per day of ore from Alcaparrosa and transportation to Candelaria. Transportation of 1,400 tonnes per day ore from Santos to Candelaria	N°158/2017

\* Environmental Approval Resolution (RCA)

**Table 47: Minera Ojos del Salado Changes Approved Under *Pertinencia***

<b>Project/Activity</b>	<b>Description</b>	<b>Legal Reference</b>
Tailings transport to Candelaria	Extension until 2017 to the tailings N° 8 transport to Candelaria tailings dam	Letter N° 552/2012
Alcaparrosa mine life extension	Extension of mine life for three years, to end of 2015	Letter N°001/2013
Alcaparrosa mine life extension	Extension of mine life for two years, to end of 2017	Resolution N°239/2015
Santos mine update of exploitation method	Incorporation of north and south extensions of the northeast area	Resolution N° 107/2016

## 19.2.2 Sectorial Permits

Environmental sectorial permits (*Permisos Ambientales Sectoriales*, or PAS) authorizing the construction and operation of new or modified facilities must be obtained following environmental approval. These permits are granted by as many as ten different public agencies including the General Water Directorate (*Dirección General de Aguas*, DGA), the National Geology and Mining Service (*Servicio Nacional de Geología y Minería*, SERNAGEOMIN) and the Health Ministry (*Ministerio de Salud*).

### Minera Candelaria

The Candelaria Copper Mining Complex has all required permits in place and, through its Environmental Management System keeps a detailed record of each permit and its compliance status. Since 1992, approximately 850 specific sectorial permits have been obtained.

During the Candelaria 2030 environmental permitting process 150 sectorial permits were identified, mostly related to the development of the Los Diques tailings storage facilities. The two most important construction permits for Los Diques were granted by the SERNAGEOMIN in July 2016 and by the DGA in August 2016. Construction of the embankment was completed on schedule and the operating permit was granted by the DGA in August 2018.

The Technical Permit from SERNAGEOMIN for the Port and Plant Operations was granted in December 2017. In addition, the Candelaria 2030 Closure Plan was approved in September 2018.

### Minera Ojos del Salado

The Minera Ojos del Salado operations are associated with approximately 150 specific sectorial permits. As with Minera Candelaria, detailed records of all permits and their compliance status are maintained.

## 19.2.3 Environmental Compliance

The environmental approvals and PAS associated with Candelaria and Ojos del Salado include a total of approximately 2,500 conditions of approval. Candelaria uses a software system called SIGEA to catalogue these conditions and to verify compliance with all of them. In addition, internal and external audits are conducted to verify compliance with applicable legal requirements, and the operations are subject to frequent regulatory inspections as well.

There is currently one open legal case related to the environmental permits. The details around this challenge are summarized in the following section.

## SMA Charges

The Environmental Superintendent (*Superintendencia de Medio Ambiente*, SMA) is the arm of the Environment Ministry that is responsible for monitoring and enforcing compliance with environmental approval (RCA) conditions and applicable environmental legal requirements. In 2013 and 2014, prior to Lundin's acquisition of its interest in the mine, the SMA conducted two inspections of the Candelaria mine and port facilities. In May 2015, the SMA issued Extent Resolution No. 1/ROL D-018-2015 detailing 16 charges against the Candelaria Copper Mining Complex for alleged non-compliance with its environmental approvals.

Following approximately 18 months of information exchange, the SMA issued Extent Resolution No. 1111/2016 in December 2016. With this resolution, the SMA eliminated four of the 16 charges, and levied a fine totaling 5,049 annual tax units (UTA), equivalent to approximately US\$4 million. From the total fine amount, approximately 90 percent was linked to a single charge related to the allegation that the Candelaria Copper Mining Complex did not reduce groundwater consumption sufficiently to reflect the increasing rate of recirculation from the tailings storage facility and the additional supply of treated domestic wastewater from Aguas Chañar and desalinated seawater.

Candelaria appealed the sanctioning resolution to the Environmental Court. In June 2018 Candelaria was notified of the rejection of the appeal in the Environmental Court and in July 2018, Candelaria paid the fine and appealed to the Supreme Court (Corte Suprema). It is expected that the process may take up to a year or more to be resolved in the Supreme Court. Candelaria does not foresee any impact of this legal process on production.

## 19.3 Environment Management

The Candelaria Copper Mining Complex is located near the town of Tierra Amarilla and near an agriculture area of the Copiapó valley. In this region mining activities coexist with communities and agricultural activities. The Copiapó River Basin has significant shortages of groundwater resources and aquifer levels have decreased over time due to water extraction for agricultural, industrial and domestic uses.

The Copiapó valley is located in the southern margins of the Atacama Desert and is characterized by an arid climate. The Tierra Amarilla area has an average annual temperature of 17 degrees Celsius, an average relative humidity of 60 percent and an annual average precipitation of 17 millimetres. In the coastal area, Caldera has an average annual temperature of 15 degrees Celsius, an average relative humidity of 82 percent and annual average precipitation of 6 millimetres. Rainfall is irregular from year to year and several years typically pass between significant precipitations events, which are often associated with the El Niño phenomenon.

The operations are located in the lower portion of the El Bronce and El Buitre sub-basins. Both sub-basins are oriented east-west and drain towards the Copiapó River.

### 19.3.1 Key Environmental Issues

The key environmental management aspects managed by the Candelaria Copper Mining Complex are related to the specific sensitivities of the region, as summarized in the following sections.

#### Water Supply

Taking into consideration the sensitivities of water resources in the Copiapó basin, the Candelaria Copper Mining Complex has developed and implemented a water resource optimization plan for its

operations. Since 2013, the operations have eliminated groundwater use for processing activities. The main sources of water are now derived from recirculation of water from the tailings storage facilities, treated domestic wastewater from the Aguas Chañar treatment plant in Copiapó and desalinated seawater pumped from the desalination plant located adjacent to the marine terminal at Caldera. Water from groundwater wells remains available in case of emergency and maintenance and for the supply of potable water.

One of the conditions of approval of the Candelaria 2030 EIA is the gradual phase-out of the use of water from the Aguas Chañar wastewater treatment plant. By July 2025, the operations will depend solely on water from the desalinization plant.

## **Water Quality**

Water quality management and control of potential water loss from the mining facilities are important issues addressed through the environmental management of the operations.

The existing Candelaria tailings storage facility and the new Los Diques tailings storage facility have been designed to minimize water losses and maximize water reuse in the processing plant.

For the Los Diques tailings storage facility, hydrogeological studies indicate that seepage flows will be low and will flow towards the current open pit mine, which will act as a sink. Preferential infiltration flows occur toward the pit, at depths greater than 500 metres below surface, deeper than the depth of the Copiapó aquifer in the area, which is located at depths between 40 and 120 metres.

Generally, both waste rock and tailings at Candelaria exhibit a low potential for acid rock drainage and the arid climate results in conditions whereby the amount of rainwater coming into contact with tailings and waste rock is minimal. Hence the long-term risk of acid rock drainage and associated impacts to surface and/or groundwater quality is considered very low. Despite this, the authorities raised concerns during the review of the proposed Candelaria 2030 EIA about potential seepage from the tailings storage facilities and any associated impacts on the Copiapó River basin. As a result, one of the approval conditions is that, if water is present in any of the wells of the Los Bronces drainage (P1 and PP2 monitoring wells), the Candelaria Copper Mining Complex must proceed immediately with the hydrogeological isolation of the Los Bronces sub-basin from the Copiapó area aquifer system, by a mechanism that will require approval from the environmental authorities.

## **Air Quality**

The Candelaria Copper Mining Complex operates close to populated areas where agriculture is a significant land use along with a number of other mining operations. Air quality, notably fugitive dust from mining, transportation, and other activities, is a relevant environmental issue. In their comments on the Candelaria 2030 project, the authorities pointed out that the area is technically saturated for respirable particulate matter (PM 10 and PM 2.5), although the area is not officially designated as such. In this context, the Candelaria Copper Mining Complex utilizes a series of measures to control dust emissions, including a road wetting plan, nebulizers on stockpiles, crusher dust collectors, and internal monitoring of emission control. The approval of the Candelaria 2030 project added a number of additional mitigation measures, which are being implemented in accordance with the RCA.

A new commitment included in the new Alcaparrosa RCA includes paving of some sections of the access road to the project.

## Environmental Monitoring Program

Since 1993 an environmental monitoring program has been in place to identify any changes in environmental conditions with respect to the baseline dataset. The results are periodically sent to the responsible government authorities. The monitoring program includes groundwater quality and levels, dust, noise and vibration, and marine parameters, among others. The approval of the Candelaria 2030 project (RCA N°133/2015) added additional monitoring requirements which are being implemented

A summary of the current monitoring program is provided in Table 48.

**Table 48: Environmental Monitoring Program**

Item	Parameter	Frequency	Area
Air Quality / Meteorology	PM 10 and PM 2.5 (particular matter less than 10 microns)	Every three days	Tierra Amarilla Caldera Nantoco
	Settleable dust (TDS) and Fe, Cu; As and SiO <sub>2</sub> composition	Monthly	Candelaria mine Punta Padrones Nantoco
	Wind velocity and direction	Continuous	Candelaria mine Caldera Punta Padrones
	Evaporation from tailings dam (l/s)	Continuous	Mine
Noise and Vibrations	NPS	Annual	Tierra Amarilla Caldera
	Vertical acceleration	Annual	Tierra Amarilla
Water	Phreatic levels	Monthly	Mine area/EI Bronce drainage Tierra Amarilla Paipote Aquifer 4 area
	Underground water quality	Biannual and annual, depending on parameter	Mine area/EI Bronce drainage Tierra Amarilla Paipote Aquifer 4 area
	Recirculated water quality	Biannual and annual	Mine
	Drinking water quality	Monthly	Port
	Freshwater consumption, water from the sewage plant, desalinated water, and recirculated water (m <sup>3</sup> )	Monthly	Mine
	Marine Area Desalination Plant	Oceanographic parameters in sea water column	Biannual
	Metals and granulometry in sediments		
	Seawater communities		
	Plankton communities		
	Fish fauna		
	Water quality in brine discharge	Depending on the production of desalinated water	
Marine Area Punta Padrones Port	Metals, temperature, salinity, dissolve oxygen in sea water column; metals and granulometry in sediments	Biannual	Punta Padrones
	Seawater communities		
Piedra Colgada Wetland	Physical, biological, hydro biological characteristics	Biannual	Piedra Colgada
Puerto Viejo	Physical, biological, hydro biological characteristics	Biannual	Copiapó River mouth

Coupled with the monitoring plan described above, the Candelaria Copper Mining Complex has developed and implemented a plan to comply with the commitments of the Candelaria 2030 approval resolution, including maintaining relevant records and reporting to the responsible government authorities in the required timelines.

### **Environmental Management System**

During 2017, the Candelaria Copper Mining Complex implemented the updated standard ISO 14001/2015 for Minera Candelaria and Minera Ojos de Salado. An external audit was performed in January 2018 and the certification with the updated standard was granted for 3 years.

During 2018, the Candelaria Copper Mining Complex has continued to implement LMC's Responsible Mining Management Standard (RMMS), updated in 2017 to provide an integrated Health, Safety, Environment and Communities (HSEC) management system.

### **19.3.2 Mine Closure Planning**

The Candelaria Copper Mining Complex has developed a closure plan for each of the Minera Candelaria and Minera Ojos del Salado operations in accordance with applicable legal requirements, specifically Law 20.551/2011 and Supreme Decree N°41/2012, in addition to the corporate standards of Lundin. The competent authority for approving Mine Closure Plans (MCPs) in Chile is SERNAGEOMIN. Under current law, mining projects with an extraction capacity of over 10,000 tonnes per month must provide a financial guarantee, the amount of which will be determined based on the periodic re-evaluation of the closure plan implementation and management costs.

SERNAGEOMIN most recently approved the MCP for Candelaria in September 2018. The updated MCP addresses the changes to the project documented in the 2030 EIA, including the Los Diques tailings storage facility. The approved closure cost estimate is:

- US\$153.3 million comprising direct closure costs of (US\$132.8 million, and post-closure costs of US\$20.4 million.
- Minera Candelaria is in process to provide the required guarantees (20 percent of the present value of the closure costs) for the updated closure plan.

SERNAGEOMIN most recently approved the Minera Ojos del Salado MCP in 2014. Estimated closure costs are US\$7.9M. Candelaria submitted an updated MCP in late 2017 which is currently in regulatory review.

The closure plan for San Esteban I and II, two legacy tailing facilities, was approved and the closure process initiated in 2018. San Esteban II tailings storage facility was relocated to the Candelaria tailings storage facility as part of the approved closure plan.:

## **19.4 Social and Community Issues**

The Candelaria Copper Mining Complex is located near the community of Tierra Amarilla. This proximity can result in potential impacts of noise, dust, visual intrusion, blasting, and vehicular traffic. The concentrate storage shed, marine terminal and desalination plant are located near the community of Caldera. Linear infrastructure and activities including power lines, water pipelines and concentrate transport are located in the vicinity of smaller towns, among which Indigenous communities (“Colla”) are located.

Minera Candelaria and Minera Ojos del Salado are subject to the requirements of the Chilean regulatory process and must also meet the corporate requirements set by Lundin related to stakeholder engagement, impact management, and social investment.

The company has processes in place to identify, map, and analyze their stakeholders from direct and indirect influence areas who may be affected by the operations, with special attention given to vulnerable groups such as women, children, and those considered vulnerable within a socioeconomic context.

Stakeholder engagement systems and practices include the following examples:

- Implementation of a Stakeholder Engagement Plan, which guides the Community Relations team’s annual activities and ensures a proactive approach to engagement, impact management and social investment.
- Implementation of a grievance/suggestions mechanism, which provides all stakeholders with an opportunity to express concerns, request information and make suggestions. Each concern, request and suggestion is documented and processed, actioned and responded to in a timely manner.
- Tierra Amarilla’s community office since 2014, is an engagement point with the community closest to the mine and milling operations, strategically located at the centre of town, this office receives an average of 800 visitors per month. Visitors have direct access to local staff, free and open computer and internet use, document printing facilities, technological skills training workshops and training class rooms. Stakeholders can also engage with Candelaria Human Resources staff regarding interest in employment opportunities. During 2018 the facade of the house was modified, being painted by local graffiti artists and members of the community, with motives of mining, local history and indigenous heritage.
- Caldera community office since September 2016, near to the port and desalination plant operations. Opportunities for direct interaction with local community relations staff, training and education programs, computer and internet access, employment opportunities, and specific programs for fisherman are offered at this location.
- During the first quarter of 2019, a new community office will be open in Copiapó, regional capital and city where about 98 percent of the Candelaria employees live.
- The company also organizes regular mine site visits by interested members of the community.
- Community forums, called “Encuentros con Candelaria”, consisting of open meetings have been conducted to share relevant information about the company’s strategic plan and initiatives on topics related to safety, environmental, operational and social performance.

Candelaria has also established voluntary agreements with multiple stakeholders:

- Collaboration Agreement with Tierra Amarilla Municipality, signed in 2015 focused on socioeconomic development and protection of local culture, environment and heritage. Total investment USD 16.5 million for 12 years. This agreement is ongoing and under permanent improvement.
- Collaboration Agreement Framework with Caldera Municipality, signed in May 2018, formalizing the relationship and focused on economic diversification, social and environmental innovation, education, health and culture. Valid until December 2023.
- Collaboration Agreement Framework with Copiapó Municipality, signed in October 2018, formalizing the relationship and focused on economic diversification, social and environmental innovation, education, health and culture. Valid until October 2020.

- Caldera – collaboration agreement with 17 fisherman union, working with since 2014, developing 13 initiatives of sustainable fishing practices, to promote sustainability in the fishing sector including upskilling, retraining, practise.

Complimentary to these stakeholder engagement systems and practices and agreements, social investment and shared value creation programs are being developed and implemented throughout the communities surrounding Candelaria.

Examples of community investment programs include:

- Sustainable Fishing in Caldera: With a three-year commitment, Candelaria through the Lundin Foundation will be supporting the Punta Frodden Seafood Processing Plant and the local fishermen in Caldera to enhance productivity, quality standards and sustainable practices.
- *Inventa Comunidad*: is a community-based innovation program to develop solutions to pressing environment and social issues, particularly in the communities of Tierra Amarilla, Copiapó and Caldera. Entrepreneurs with strong potential receive preliminary financing, training and technical assistance to develop their business idea.
- Indigenous Work Table: Given the recent appearance of some Indigenous communities in the Tierra Amarilla area, an Indigenous Work Table is under development. Estimated that there are currently 5 groups registered.

The Candelaria Copper Mining Complex has developed a local contracting program, and currently 95 percent of the workforce resides in the Atacama Region. Also, a program of local suppliers was put in place in partnership with CORFO (National Corporation for the Promotion of Production).

At the beginning of 2018, a group of fishermen based in Caldera presented a legal claim accusing Candelaria and another mining companies of impacting their fishing activity due to port operations in Caldera bay. This claim is under review through the normal legal process in a local court.

## 20 Capital and Operating Costs

### 20.1 Operating Costs

The forecast operating costs for the next 5 years at Minera Candelaria and Minera Ojos del Salado are shown in Table 49.

Total Minera Candelaria unit costs are expected to remain reasonably static over the next 5 years. Costs have decreased slightly compared to those published in the previous technical report as a result of the renewal of the open pit mine equipment fleet and lower unit labour costs. Energy (diesel) costs are slightly higher than those previously forecast; however, decreased labour and supplies costs more than offset that increase. As the mine life progresses, costs are expected to decrease due to reduced amounts of open pit waste stripping and underground mine development, as well as reductions in power costs resulting from a recently-negotiated contract.

Minera Ojos del Salado unit operating costs have also decreased with lower labour and contractor costs. Costs are forecast to decrease towards the end of the mine life as the underground mine development ceases.

**Table 49: Forecast Unit Operating Costs**

Unit Operating Cost	Unit	2019	2020	2021	2022	2023	Average 2024-28	Average 2029-33	Average 2034-40	Average LOM
<b>Candelaria</b>										
Mining cost - OP	US\$/t mat moved	2.04	2.05	2.17	2.10	2.26	2.49	2.83	1.78	2.34
Mining cost - UG	US\$/t mined	14.86	15.60	15.08	15.44	15.42	14.41	14.85	11.43	14.18
Processing cost	US\$/t milled	6.88	6.50	6.34	6.32	5.52	5.45	5.57	5.68	5.74
G&A cost	US\$/t milled	2.29	1.67	1.69	1.77	1.90	1.88	1.58	0.93	1.51
<b>Total Unit Cost</b>	<b>US\$/t milled</b>	<b>21.67</b>	<b>19.80</b>	<b>20.17</b>	<b>20.21</b>	<b>20.47</b>	<b>20.02</b>	<b>15.77</b>	<b>9.59</b>	<b>15.91</b>
<b>Ojos del Salado</b>										
Mining cost	US\$/t mined	18.46	19.56	20.19	20.31	21.16	19.28	0.00	0.00	19.65
Processing cost	US\$/t milled	8.04	8.09	8.04	7.99	7.66	8.09	0.00	0.00	8.02
G&A cost	US\$/t milled	1.28	1.23	1.19	1.16	1.15	1.32	0.00	0.00	1.26
<b>Total Unit Cost</b>	<b>US\$/t milled</b>	<b>27.78</b>	<b>28.87</b>	<b>29.42</b>	<b>29.49</b>	<b>29.97</b>	<b>28.69</b>	<b>0.00</b>	<b>0.00</b>	<b>28.92</b>

The following sections present a breakdown of the mining, processing, and general and administrative operating costs.

#### 20.1.1 Mining Operating Costs

Table 50 presents a breakdown of the forecast Candelaria Open Pit mining costs.

The average open pit mining cost over the next 5 years, including capitalized waste stripping, is forecast to be US\$2.12 per tonne of material moved. Costs have decreased slightly over the previous forecast through renewal of the mine equipment fleet and reduced unit labour costs. Annual fluctuations in the unit cost are also the result of changing haul depths and lengths associated with the latest open pit mine plans as well as variations in the quantities of ore and waste mined each year. The cost per tonne of material moved is forecast to increase beginning in 2023 as the amount of ore re-handled from stockpile decreases. Near the end of the mine's life, the reduction of the waste stripping operations and increased stockpile ore re-handle correlate to lower forecasted costs.

**Table 50: Forecast of Candelaria Open Pit Mining Costs**

Cost	Unit	2019	2020	2021	2022	2023	Average 2024-28	Average 2029-33	Average 2034-40	Average LOM
<b>Unit Cost</b>										
Labor	US\$/t mat moved	0.43	0.46	0.48	0.47	0.47	0.54	0.47	0.41	0.48
Contractors	US\$/t mat moved	0.52	0.34	0.36	0.35	0.37	0.39	0.50	0.46	0.42
Supplies	US\$/t mat moved	0.66	0.82	0.86	0.82	0.93	1.01	1.10	0.50	0.91
Energy	US\$/t mat moved	0.47	0.47	0.52	0.51	0.53	0.60	0.75	0.45	0.57
Other	US\$/t mat moved	-0.04	-0.04	-0.05	-0.04	-0.04	-0.04	-0.05	-0.04	-0.04
<b>Total Unit Cost</b>	US\$/t mat moved	<b>2.04</b>	<b>2.05</b>	<b>2.17</b>	<b>2.10</b>	<b>2.26</b>	<b>2.49</b>	<b>2.83</b>	<b>1.78</b>	<b>2.34</b>
<b>Total Cost</b>										
Labor	US\$M	50.6	53.7	53.6	53.5	53.5	58.1	26.9	10.3	34.7
Contractors	US\$M	60.8	39.4	39.8	39.5	42.2	42.0	28.6	11.5	29.8
Supplies	US\$M	77.2	95.0	95.6	93.6	105.9	108.9	67.3	12.7	65.3
Energy	US\$M	54.4	54.3	58.1	57.6	60.1	65.3	43.2	11.3	41.2
Other	US\$M	-4.2	-4.5	-5.1	-5.1	-5.1	-4.8	-2.9	-1.1	-3.2
<b>Total Cost</b>	US\$M	<b>238.9</b>	<b>237.8</b>	<b>242.0</b>	<b>239.1</b>	<b>256.6</b>	<b>269.6</b>	<b>163.1</b>	<b>44.7</b>	<b>167.8</b>
<b>Capitalized Waste Stripping</b>	<b>US\$M</b>	<b>127.3</b>	<b>126.6</b>	<b>142.3</b>	<b>159.0</b>	<b>92.6</b>	<b>113.4</b>	<b>17.8</b>	<b>0.0</b>	<b>59.3</b>
<b>Total Cost excl. Cap Waste</b>	<b>US\$M</b>	<b>111.6</b>	<b>111.3</b>	<b>99.7</b>	<b>80.1</b>	<b>164.0</b>	<b>156.2</b>	<b>145.2</b>	<b>44.7</b>	<b>108.5</b>
<b>Unit Cost excl. Waste Stripping</b>	<b>US\$/t mat moved</b>	<b>0.95</b>	<b>0.96</b>	<b>0.89</b>	<b>0.70</b>	<b>1.44</b>	<b>1.44</b>	<b>2.52</b>	<b>1.78</b>	<b>1.51</b>

\* The negative values under Other refer to the transportation of Alcaparrosa and Santos mines ores to the Candelaria plant, which is undertaken by Minera Candelaria, while the costs are allocated to Minera Ojos del Salado.

Table 50 also shows how removing the capitalized waste stripping costs affects the open pit operating cost. Lundin capitalizes waste stripping costs when actual strip ratios are above the average planned strip ratio for each open pit phase under development. Total capitalized waste stripping costs have decreased from previous forecasts largely as a result of lower mining costs during the next 5 years.

The forecast operating costs of the Candelaria Underground mine operations are presented in Table 51. The average forecast underground mining cost over the next 5 years at Candelaria is US\$15.30 per tonne. Costs are forecast to decrease towards the end of the mine life as the mine development requirements reduce.

The forecast costs of the Minera Ojos del Salado underground mine operations, Santos and Alcaparrosa, are shown in Table 52.

The forecast average Minera Ojos del Salado unit underground mining cost over the next 5 years is approximately US\$19.94 per tonne, decreasing to US\$19.28 over the following 5 years as a result of reduced mine development needs. The mine lives at Santos and Alcaparrosa have been extended from 2024 to 2028 and 2027, respectively.

**Table 51: Forecast of Operating Cost for Candelaria Underground Operations**

Cost	Unit	2019	2020	2021	2022	2023	Average 2024-28	Average 2029-33	Average 2034-37	Average LOM
<b>Unit Cost</b>										
Labor	US\$/t	1.93	1.92	1.76	1.76	1.76	1.76	1.76	1.83	1.79
Contractors	US\$/t	8.79	9.45	8.97	8.99	9.28	8.29	8.81	5.61	8.12
Supplies	US\$/t	2.12	2.18	2.30	2.64	2.50	2.48	2.40	2.14	2.36
Energy	US\$/t	1.16	1.16	1.16	1.16	1.00	1.01	1.02	1.01	1.04
Other	US\$/t	0.86	0.89	0.88	0.88	0.88	0.88	0.87	0.84	0.87
<b>Total Unit Cost</b>	<b>US\$/t</b>	<b>14.86</b>	<b>15.60</b>	<b>15.08</b>	<b>15.44</b>	<b>15.42</b>	<b>14.41</b>	<b>14.85</b>	<b>11.43</b>	<b>14.18</b>
<b>Total Cost</b>										
Labor	US\$M	7.7	9.1	9.7	9.6	9.6	9.6	9.6	8.9	9.4
Contractors	US\$M	35.0	44.9	49.1	49.2	50.8	45.4	48.3	27.2	42.4
Supplies	US\$M	8.5	10.4	12.6	14.5	13.7	13.6	13.1	10.4	12.3
Energy	US\$M	4.6	5.5	6.4	6.3	5.5	5.5	5.6	4.9	5.4
Other	US\$M	3.4	4.2	4.8	4.8	4.8	4.8	4.7	4.1	4.5
<b>Total Cost</b>	<b>US\$M</b>	<b>59.2</b>	<b>74.2</b>	<b>82.6</b>	<b>84.5</b>	<b>84.4</b>	<b>79.0</b>	<b>81.3</b>	<b>55.4</b>	<b>74.1</b>

**Table 52: Forecast of Operating Cost for Ojos del Salado Underground Operations**

Cost	Unit	2019	2020	2021	2022	2023	Average 2024-28	Average 2029-33	Average 2034-37	Average LOM
<b>Unit Cost</b>										
Labor	US\$/t	1.35	1.43	1.41	1.41	1.42	1.37	0.00	0.00	1.39
Contractors	US\$/t	14.66	15.62	16.37	16.52	17.62	15.84	0.00	0.00	16.02
Supplies	US\$/t	0.82	0.87	0.85	0.85	0.83	0.77	0.00	0.00	0.81
Energy	US\$/t	1.03	1.02	0.98	0.97	0.70	0.71	0.00	0.00	0.84
Other	US\$/t	0.60	0.62	0.59	0.59	0.59	0.59	0.00	0.00	0.59
<b>Total Unit Cost</b>	<b>US\$/t</b>	<b>18.46</b>	<b>19.56</b>	<b>20.19</b>	<b>20.34</b>	<b>21.16</b>	<b>19.28</b>	<b>0.00</b>	<b>0.00</b>	<b>19.65</b>
<b>Total Cost</b>										
Labor	US\$M	4.7	5.0	4.9	4.9	5.0	3.8			4.3
Contractors	US\$M	51.1	54.3	57.5	58.1	61.9	43.6			50.1
Supplies	US\$M	2.9	3.0	3.0	3.0	2.9	2.1			2.5
Energy	US\$M	3.6	3.6	3.4	3.4	2.5	2.0			2.6
Other	US\$M	2.1	2.2	2.1	2.1	2.1	1.6			1.9
<b>Total Cost</b>	<b>US\$M</b>	<b>64.4</b>	<b>68.0</b>	<b>70.9</b>	<b>71.6</b>	<b>74.4</b>	<b>53.1</b>	<b>0.0</b>	<b>0.0</b>	<b>61.5</b>

## 20.1.2 Processing Operating Costs

A breakdown of the forecast Minera Candelaria processing costs including primary crushing and conveying, grinding, flotation, filtering and dewatering, together with water supply are shown in Table 53.

The forecast average unit processing cost for Minera Candelaria over the next 5 years is US\$6.30 per tonne, decreasing from US\$6.88 per tonne in 2019 to US\$5.52 in 2023 as newly-negotiated electricity rates come into effect (the electricity price will drop from the current US\$0.11 to approximately US\$0.07 per kilowatt hour in 2023).

The forecast processing costs for the next 5 years for Minera Ojos del Salado are presented in Table 54.

**Table 53: Forecast of Minera Candelaria Processing Cost**

Processing Cost	Unit	2019	2020	2021	2022	2023	Average 2024-28	Average 2029-33	Average 2034-40	Average LOM
<b>Unit Cost</b>										
Labor	US\$/t	1.17	1.10	1.11	1.11	1.13	1.03	0.97	0.97	1.02
Contractors	US\$/t	1.01	0.91	0.90	0.91	0.90	0.84	0.74	0.70	0.79
Supplies	US\$/t	2.26	2.15	2.05	2.16	2.24	2.11	2.01	2.02	2.07
Energy	US\$/t	3.05	2.91	2.86	2.71	1.84	1.92	1.98	2.09	2.15
Other*	US\$/t	-0.60	-0.57	-0.57	-0.57	-0.59	-0.45	-0.13	-0.10	-0.30
<b>Total Unit Cost</b>	<b>US\$/t</b>	<b>6.88</b>	<b>6.50</b>	<b>6.34</b>	<b>6.32</b>	<b>5.52</b>	<b>5.45</b>	<b>5.57</b>	<b>5.68</b>	<b>5.74</b>
<b>Total Cost</b>										
Labor	US\$M	27.9	29.6	29.5	29.5	29.4	28.2	27.6	24.8	27.2
Contractors	US\$M	24.1	24.3	24.0	24.2	23.5	23.2	21.0	17.8	21.2
Supplies	US\$M	53.9	57.7	54.8	57.7	58.5	57.9	56.9	51.6	55.4
Energy	US\$M	72.8	78.0	76.3	72.4	48.0	52.8	56.1	53.4	57.6
Other*	US\$M	-14.4	-15.4	-15.3	-15.3	-15.3	-12.4	-3.7	-2.5	-7.9
<b>Total Cost</b>	<b>US\$M</b>	<b>164.3</b>	<b>174.2</b>	<b>169.4</b>	<b>168.6</b>	<b>144.1</b>	<b>149.8</b>	<b>157.9</b>	<b>145.1</b>	<b>153.4</b>

\* The negative values under Other refer to credits for the treatment of Alcaparrosa and part of Santos ores that is undertaken in the Candelaria plant, received from Minera Ojos del Salado.

**Table 54: Forecast of Minera Ojos del Salado Processing Cost**

Cost	Unit	2019	2020	2021	2022	2023	Average 2024-28	Average 2029-33	Average 2034-40	Average LOM
<b>Unit Cost</b>										
Labor	US\$/t	0.68	0.72	0.71	0.71	0.71	0.87	0.00	0.00	0.78
Contractors	US\$/t	1.91	1.94	1.97	1.97	1.97	2.18	0.00	0.00	2.05
Supplies	US\$/t	1.27	1.27	1.26	1.26	1.25	1.41	0.00	0.00	1.33
Energy	US\$/t	1.24	1.21	1.19	1.17	0.82	0.94	0.00	0.00	1.05
Other	US\$/t	2.94	2.94	2.91	2.88	2.90	2.68	0.00	0.00	2.81
<b>Total Unit Cost</b>	<b>US\$/t</b>	<b>8.04</b>	<b>8.09</b>	<b>8.04</b>	<b>7.99</b>	<b>7.66</b>	<b>8.09</b>	<b>0.00</b>	<b>0.00</b>	<b>8.02</b>
<b>Total Cost</b>										
Labor	US\$M	2.4	2.5	2.5	2.5	2.5	2.4	0.0	0.0	2.4
Contractors	US\$M	6.7	6.7	6.9	6.9	6.9	6.0	0.0	0.0	6.4
Supplies	US\$M	4.4	4.4	4.4	4.4	4.4	3.9	0.0	0.0	4.2
Energy	US\$M	4.3	4.2	4.2	4.1	2.9	2.6	0.0	0.0	3.3
Other	US\$M	10.2	10.2	10.2	10.1	10.2	7.4	0.0	0.0	8.8
<b>Total Cost</b>	<b>US\$M</b>	<b>28.0</b>	<b>28.1</b>	<b>28.2</b>	<b>28.1</b>	<b>26.9</b>	<b>22.3</b>	<b>0.0</b>	<b>0.0</b>	<b>25.1</b>

The average forecast processing cost for Minera Ojos del Salado over the next 5 years is US\$7.96 per tonne. This is a combination of costs for treating Santos ore at the PAC plant plus Alcaparrosa ore and a small amount of Santos ore at the Candelaria plant. The PAC plant is considerably smaller than the Candelaria plant, with higher operating costs that average US\$13.00 per tonne. Costs are forecast to decrease from 2023 because of lower energy costs noted above.

### 20.1.3 General and Administrative Costs

A breakdown of the forecast general and administration (G&A) costs for Minera Candelaria is shown in Table 55.

**Table 55: Forecast of Minera Candelaria General and Administration Cost**

Cost	Unit	2019	2020	2021	2022	2023	Average 2024-28	Average 2029-33	Average 2034-40	Average LOM
<b>Unit Cost</b>										
Labor	US\$/t	0.63	0.55	0.55	0.55	0.54	0.51	0.48	0.31	0.45
Contractors	US\$/t	1.40	0.96	0.94	0.98	1.11	1.11	0.85	0.37	0.81
Supplies	US\$/t	0.24	0.15	0.19	0.23	0.23	0.25	0.25	0.24	0.24
Energy	US\$/t	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Other*	US\$/t	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
<b>Total Unit Cost</b>	<b>US\$/t</b>	<b>2.29</b>	<b>1.67</b>	<b>1.69</b>	<b>1.77</b>	<b>1.90</b>	<b>1.88</b>	<b>1.58</b>	<b>0.93</b>	<b>1.51</b>
<b>Total Cost</b>										
Labor	US\$M	15.1	14.8	14.6	14.7	14.0	14.0	13.6	7.9	12.1
Contractors	US\$M	33.5	25.6	25.0	26.1	29.1	30.6	24.0	9.4	21.7
Supplies	US\$M	5.7	4.1	5.1	6.1	6.1	6.8	7.0	6.2	6.3
Energy	US\$M	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6
Other*	US\$M	-0.2	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
<b>Total Cost</b>	<b>US\$M</b>	<b>54.6</b>	<b>44.8</b>	<b>45.1</b>	<b>47.2</b>	<b>49.5</b>	<b>51.7</b>	<b>44.9</b>	<b>23.8</b>	<b>40.5</b>

\* The negative values under Other refer to the forecast of the laboratory cost, which is allocated to processing costs

The forecast average unit G&A cost for the Minera Candelaria mines over the next 5 years is US\$1.85 per tonne. Forecast G&A costs have decreased compared with previous cost estimates largely because of a decrease in labour and contractor costs. Total annual costs over the period range between US\$45 and US\$55 million.

The G&A forecast costs at the Minera Ojos del Salado mines are summarized in Table 56. The forecast average unit G&A cost for Minera Ojos del Salado over the next 5 years is estimated at US\$1.20 per tonne.

**Table 56: Forecast of Minera Ojos del Salado General and Administration Cost**

Cost	Unit	2019	2020	2021	2022	2023	Average 2024-28	Average 2029-33	Average 2034-40	Average LOM
<b>Unit Cost</b>										
Labor	US\$/t	0.33	0.34	0.33	0.33	0.32	0.49	0.00	0.00	0.40
Contractors	US\$/t	0.86	0.78	0.73	0.72	0.73	0.73	0.00	0.00	0.75
Supplies	US\$/t	0.10	0.10	0.12	0.10	0.10	0.10	0.00	0.00	0.11
Energy	US\$/t	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	US\$/t	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total Unit Cost</b>	<b>US\$/t</b>	<b>1.28</b>	<b>1.23</b>	<b>1.19</b>	<b>1.16</b>	<b>1.15</b>	<b>1.32</b>	<b>0.00</b>	<b>0.00</b>	<b>1.26</b>
<b>Total Cost</b>										
Labor	US\$M	1.2	1.2	1.2	1.2	1.1	1.3	0.0	0.0	1.3
Contractors	US\$M	3.0	2.7	2.6	2.5	2.5	2.0	0.0	0.0	2.3
Supplies	US\$M	0.3	0.4	0.4	0.4	0.4	0.3	0.0	0.0	0.3
Energy	US\$M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	US\$M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total Cost</b>	<b>US\$M</b>	<b>4.5</b>	<b>4.3</b>	<b>4.2</b>	<b>4.1</b>	<b>4.1</b>	<b>3.6</b>	<b>0.0</b>	<b>0.0</b>	<b>3.9</b>

## 20.1.4 C1 Cash Costs

The forecast average C1 cash cost for the combined Candelaria Copper Mining Complex over the next 5 years is US\$1.41 per pound of copper, net of the effect of the Franco-Nevada gold and silver streaming agreement. The expected average of the C1 cash cost over the life of mine is US\$1.41 per pound of copper. The forecast C1 cash cost for the following 5 years are shown below in Table 57.

Coincident with Lundin’s acquisition of the Candelaria Copper Mining Complex, the company entered into a definitive agreement with Franco-Nevada (Barbados) Corporation, a subsidiary of Franco-Nevada to sell to Franco-Nevada a gold and silver stream from the Candelaria Copper Mining Complex in exchange for an upfront deposit of US\$648 million payable at closing. Under the agreement, Franco-Nevada acquired 68 percent of the gold and silver production until 720 kilo-ounces of gold and 12 million ounces of silver have been delivered. Thereafter, Franco-Nevada will be entitled to receive 40 percent of the gold and silver production from the operation. In addition to the upfront deposit, for each ounce of gold and silver delivered, Franco-Nevada will make ongoing payments equal to the lesser of (1) the prevailing market prices and (2) US\$400 per ounce gold and US\$4.00 per ounce silver. The ongoing payments for gold and silver will be subject to a 1 percent inflationary adjustment, beginning three years after the closing of the acquisition. For 2019, gold and silver contract prices will be US\$408 per ounce and US\$4.08 per ounce, respectively. It should be noted that the agreement with Franco-Nevada is with a separate wholly-owned subsidiary of Lundin and it is not an encumbrance or obligation on either Minera Candelaria or Minera Ojos del Salado. The effect of the agreement is reflected in the C1 cash costs below to allow an assessment of the economic impact to Lundin.

**Table 57: C1 Copper Cash Costs\***

Company	Unit	2019	2020	2021	2022	2023	Average 2024-28	Average 2029-33	Average 2034-40	Average LOM
Minera Candelaria	US\$/lb Cu	1.50	1.38	1.27	1.19	1.37	1.39	1.37	1.41	1.37
Mineral Ojos del Salado	US\$/lb Cu	1.65	1.87	1.88	1.87	1.89	1.86	0.00	0.00	1.84
<b>Combined</b>	<b>US\$/lb Cu</b>	<b>1.53</b>	<b>1.46</b>	<b>1.36</b>	<b>1.29</b>	<b>1.44</b>	<b>1.44</b>	<b>1.37</b>	<b>1.41</b>	<b>1.41</b>

\* Net of the Franco-Nevada Stream Agreement. The C1 cash cost represents the cash cost incurred at each processing stage, from mining through to recoverable metal delivered to market, less net by-product credits.

## 20.2 Capital Costs

The forecast Minera Candelaria capital investment plan for the period from 2019 to 2040 is summarized in Table 58.

As shown, total capital expenditures excluding waste stripping over the period 2019 to 2023 are forecast at US\$572 million and from 2024 to 2040 at US\$419 million, for a total of US\$991 million over the life of mine.

In the Candelaria Open Pit, a major recapitalization of the open pit mine equipment fleet has been approved, as detailed in Section 15. The replacement program that commenced in 2018, includes new trucks, shovels and ancillary equipment at a forecast total cost of US\$216 million, of which approximately US\$110 was expected to be spent in 2018 and the remainder over the next three years

Mine equipment and infrastructure for the new Española Open Pit is included in the table, with a total forecast cost of US\$18 million over the next 5 years.

**Table 58: Forecast Capital Investment Plan for Minera Candelaria**

<b>Cost</b>	<b>Unit</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Total 2024-28</b>	<b>Total 2029-33</b>	<b>Total 2034-40</b>	<b>Total LOM</b>
Mine Open Pit	US\$M	90.5	28.1	13.5	14.0	37.9	55.2	79.0	30.0	348.2
Mine Underground	US\$M	63.3	37.6	28.4	37.4	24.3	97.0	8.0	0.0	296.1
Mill	US\$M	59.6	5.8	3.3	7.0	0.4	19.3	4.2	5.0	104.4
Tailings	US\$M	8.0	23.5	30.6	45.1	3.5	121.6	0.0	0.0	232.3
G&A	US\$M	1.2	8.5	0.0	0.0	0.0	0.0	0.0	0.0	9.7
<b>Total</b>	<b>US\$M</b>	<b>222.7</b>	<b>103.5</b>	<b>75.8</b>	<b>103.5</b>	<b>66.1</b>	<b>293.1</b>	<b>91.1</b>	<b>35.0</b>	<b>990.7</b>
<b>Capitalized Waste</b>	<b>US\$M</b>	<b>127.3</b>	<b>126.6</b>	<b>142.3</b>	<b>159.0</b>	<b>92.6</b>	<b>567.1</b>	<b>89.1</b>	<b>0.0</b>	<b>1,304.0</b>
<b>Total Cost</b>	<b>US\$M</b>	<b>350.0</b>	<b>230.1</b>	<b>218.1</b>	<b>262.5</b>	<b>158.6</b>	<b>860.2</b>	<b>180.3</b>	<b>35.0</b>	<b>2,294.7</b>

Capital costs for the Candelaria Underground mine have increased over previous forecasts and represent the development and supporting mine infrastructure for the expanded production in the North Sector of the Candelaria Underground and the development of the South Sector of the mine. The forecast capital expenditure for Candelaria Underground South Sector over the next 5 years is US\$76 million, of which US\$32 million is expected to be spent in 2019. Total forecast underground capital costs at Candelaria over the 5 years are US\$191 million.

Candelaria mill capital costs are forecast to be US\$76 million over the next five-year period. These costs include a series of process improvement initiatives, to be completed by late 2019, under the CMOP project discussed in Section 16. The cost for completing these improvements in 2019 is approximately US\$50 million, which includes major upgrades to the primary crusher, pebble circuit, ball mill, cyclone and flotation cell. An additional US\$26 million is estimated for smaller upgrade items over the next 5 years, such as DCS migration, courier replacement, mill monitoring systems, ball mill crown pinion replacement, transformers, building repairs and desalination plant membranes.

Tailings capital costs include the early commencement of additional phases of the new Los Diques tailings storage facility, reducing both operating and capital costs over the long term.

G&A capital costs include a number of environmental and local community initiatives, including a partial relocation of desalinated water pipeline.

Lundin capitalizes waste stripping costs when experienced strip ratios are above the average planned strip ratio for each open pit phase under development. During the production phase of the Candelaria Open Pit, waste stripping costs, which provide probable future economic benefits and improved access to the orebody are capitalized to mineral properties. Capitalized waste stripping from the open pit is forecast to be US\$648 million for the period 2019 to 2023 and US\$1,304 million over the life of mine.

The forecast capital expenditure estimate for Minera Ojos del Salado mines over the next 5 years totals US\$96 million, as can be seen in Table 59. This is an increase over previous forecasts and reflects the capitalization of mine access development in waste and the extension of Santos and Alcaparrosa mine lives to 2028 and 2027, respectively. A US\$6 million allowance has been made under G&A to extend the PAC plant tailings pipeline to the Los Diques tailings storage facility in 2019.

**Table 59: Forecast Capital Investment Plan for Minera Ojos del Salado**

<b>Cost</b>	<b>Unit</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Total 2024-28</b>	<b>Total 2029-33</b>	<b>Total 2034-40</b>	<b>Total LOM</b>
Mine Underground	US\$M	21.5	22.4	16.8	17.2	9.5	18.5	0.0	0.0	105.9
Mill	US\$M	0.0	0.0	0.0	0.0	0.0	0.9	0.5	0.0	1.4
Tailings	US\$M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
G&A	US\$M	6.1	2.5	0.0	0.0	0.0	0.0	0.0	0.0	8.6
<b>Total Cost</b>	<b>US\$M</b>	<b>27.6</b>	<b>24.9</b>	<b>16.8</b>	<b>17.2</b>	<b>9.5</b>	<b>19.4</b>	<b>0.5</b>	<b>0.0</b>	<b>115.9</b>

## 21 Economic Analysis

Lundin have opted to exclude reporting this section as producing issuers may exclude the information required under Economic Analysis (Item 22 of Form 43-101F1) for technical reports on properties currently in production unless the technical report includes a material expansion of current production.

## 22 Adjacent Properties

There are no adjacent properties that are relevant to the purpose of this technical report.

## **23 Other Relevant Data and Information**

There is no other relevant data available about the Candelaria Copper Mining Complex.

## 24 Interpretation and Conclusions

The Candelaria Copper Mining Complex is a world class copper, long-life, mining operation. In 2018, the complex is expected to produce contained metal in concentrate (100 percent basis) is 136 kilotonnes of copper and 78,000 ounces of gold. Based on the June 30, 2018 Mineral Reserves, the projects are expected to support operations until 2040.

Since Lundin purchased the Candelaria Copper Mining Complex in late 2014 to the end of June 2018, there has been an investment in exploration of over US\$100 million. During this period 1,526 core bore holes (453,736 metres) were drilled requiring 3,210 metres of underground development.

Aggressive ongoing Mineral Resource expansion exploration has the potential to extend the mine life beyond 2040 and further change the projected copper production profile by replacing low grade open pit and deferring stockpile mill feed with higher grade ore extracted from the expanding underground mines and deferring depletion of the low-grade stockpiles. There are also opportunities to increase the throughput capacity of the Candelaria plant through improvement initiatives currently under implementation and modifications to the grinding circuits. Various ongoing onsite optimisation initiatives with certain disciplines (including MIRA, CMOP, Candelaria South development, mining equipment upgrades and various infrastructure upgrades) are progressing well, with each having the potential to have a positive and material impact on operational efficiencies and to the life of mine.

A team of independent consultants returned to the Candelaria Copper Mining Complex during October 2018 to review changes to the assets since undertaking a similar review in the fourth quarter of 2017. The technical information about the Candelaria Copper Mining Complex is extensive and attests to the overall high quality of the exploration, mine planning, and design work completed by site personnel, as is expected from such a world class asset. Although continued exploration success has again contributed to material Mineral Resource and Mineral Reserve growth in 2018, operational efficiencies, a reduction in reporting cut-off grades, Mineral Resource model integrations and the incorporation material from the Española open pit project have also made significant contributions to this growth.

SRK examined the exploration, geology, Mineral Resource modelling, mine designs, Mineral Reserve estimates, processing, and environmental aspects of the Candelaria Copper Mining Complex. The purpose of the investigation was to confirm that the Mineral Resource and Mineral Reserve estimates prepared by mine personnel were prepared in compliance with generally recognized industry best practices and can be reported according to Canadian Institute of Mining, Metallurgy and Petroleum *Definition Standards for Mineral Resources and Mineral Reserves* (May 2014).

The Mineral Resources and Mineral Reserves are distributed in one open pit mine, one open pit project and three separate underground mines. SRK audited a representative sample of the various block models and mine designs. For those models, SRK was able to replicate the tabulations prepared by mine personnel within rounding errors. On the basis of the results from the 2018 audit combined with knowledge from previous audits, SRK concludes that the Mineral Resources and Mineral Reserves Statements for the Candelaria Copper Mining Complex as of June 30, 2018 are appropriately categorized and free of material errors. Financial information examined during the SRK investigations confirm that the Mineral Reserves are economic under the assumptions considered.

SRK draws the following conclusions:

- In addition to underground Mineral Resource expansion, surface exploration has also successfully delineated deposits amenable to open pit extraction in the Candelaria district.
- The Candelaria Copper Mining Complex is world class mining, long-life, operation.
- Mineral Resource modelling methodology revisions, including the consolidation of all previously separate Mineral Resource models has enhanced the estimation process while also contributing to Mineral Resource increases.
- The life of mine plan now forecasts depletion of Mineral Reserves in 2040, with the potential to further increase this in future
- Mineral Reserves are estimated using a copper price of US\$2.75 per pound, a gold price of US\$1,000 per ounce and a silver price of US\$15.00 per ounce.
- The new Los Diques tailings storage facility was commissioned during the first quarter of 2018 and can now receive 100 percent of the flotation tailings from the Candelaria processing plant. A tailings pipeline from the PAC plant will be installed to Los Diques in 2019.
- The mines have their own state of the art export port facility at Punta Padrones with significant excess capacity.
- Ongoing aggressive exploration has defined new Mineral Resources and Mineral Reserves in the underground mines, significantly extending their lives. Further exploration success has the potential to extend their lives further and potentially allow increasing their throughput. This will improve the copper production profile by replacing low-grade open pit and stockpile mill feed with higher-grade underground ore and will defer stockpile depletion.
- Mineral Resources and Mineral Reserves are declared for a recent surface discovery at Española. Step-out and infill drilling has the potential to expand this new discovery.
- The proposed five-year exploration program (US\$72.5 million from 2019 to 2023) will continue to add Mineral Resources and Mineral Reserves if implemented.
- Recent exploration in other parts of the Candelaria district has identified several other exploration targets, with good potential for identifying new IOCG sulphide deposits in this exceptional IOCG deposit district.
- Exploration has been successful in extending the life of the Candelaria Copper Mining Complex to at least 2040.
- Due to the extensions to the mine lives, engineering studies have been initiated to investigate potential options for production throughput expansions of the underground mines and the main Candelaria processing plant.
- The operational permits for the Alcaparrosa mine have been secured to sustain mine operations through 2022 and deposition of tailings deposition in the Candelaria tailings storage facility through 2030.
- A new EIA will be prepared to modify and obtain the operational permits required to support the production schedule presented in this technical report. The new EIA is expected to be submitted by the end of 2019.
- In June 2018 Candelaria was notified of the rejection of an appeal in the Environmental Court filed in June 2017 in connexion with an alleged non-compliance with its environmental approvals. In July 2018, Candelaria paid a fine (5,049 annual tax units, equivalent to approximately US\$4 million) and appealed to the Supreme Court (Corte Suprema). In March 2017, the SMA rejected a third-party claim related to the initial charges. The Candelaria Copper Mining Complex does not foresee any impact of this legal process on production.

Other than what has been disclosed in this technical report, SRK is not aware of any other significant risks and uncertainties that could reasonably be expected to affect the reliability or confidence in the Mineral Resource and Mineral Reserve estimates prepared for the Candelaria Copper Mining Complex.

## 25 Recommendations

The Candelaria Copper Mining Complex comprises several operating copper mines with a combined life of mine projected to 2040 with the depletion of the Mineral Reserve estimates disclosed herein. Since 2010, aggressive exploration has defined several new sulphide mineralization zones amenable to underground and surface mining. These significant discoveries together with ongoing mine optimization studies have a positive impact on the life and value of the Candelaria Copper Mining Complex by primarily replacing low-grade open pit and stockpile plant feed with higher-grade underground ore, thereby deferring processing low grade work-in-progress stockpiles to a later date.

The increase in underground Mineral Reserves have had a positive impact on the life of the underground mines. Lundin should continue with the optimization studies initiated in 2016 to investigate expansion options for the underground mines, re-optimization of the Candelaria open pit mine, and to increase the throughput of the main Candelaria process plant.

SRK recommends reviewing the factors impacting the conversion of Mineral Resources to Mineral Reserves with an objective to increase the conversion ratio.

SRK strongly recommends that Lundin continues its effective exploration strategy that has been very successful in increasing the Mineral Resources and the Mineral Reserves of the Candelaria Copper Mining Complex.

Finally, a new Environmental Impact Assessment should be prepared to support the production schedule presented in this technical report and obtain the operational permits required to develop the new areas of Mineral Reserves and ancillary facilities.

## 26 References

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SRK, 2017: Technical Report for the Candelaria Copper Mining Complex, Atacama Province, Region III, Chile. Technical Report prepared by SRK Consulting (Canada) Inc. for Lundin Mining Corporation and dated January 17, 2017.

Starkey & Associates, 2016. Candelaria Project SAGDesign Test Work Results For 3 Samples, S&A Project No. S205, dated November 11, 2016.

## **APPENDIX A**

### **List of Exploitation and Exploration Concessions**

**Schedule A – Minera Candelaria Mining Exploitation Concessions**

Nacional Rol	Name	Area (ha)	Registration Information				Status		
			Page	Number	Year Register	City			
1	03203-1863-7	AFUERINA 1/12	53	1404	278	10-Oct-1991	Property	COPIAPO	Granted
2	03203-1817-3	AGUILA 1/12	50	1727	V 299	9-Jul-1990	Property	COPIAPO	Granted
3	03203-1987-0	AGUILA 31/35	23	1005	182	17-Jul-1991	Property	COPIAPO	Granted
4	03203-1287-6	ALCE 1/3	9	78	37	10-Mar-1986	Property	COPIAPO	Granted
5	03203-1775-4	ANA 6	5	2676	536	18-Dec-1990	Property	COPIAPO	Granted
6	03203-1904-8	ANDALUCIA 1/10	50	27	V 5	Año 1991	Property	COPIAPO	Granted
7	03202-1986-8	ANDREA 10 1/20	100	285	62	30-Jul-2015	Property	CALDERA	Granted
8	03202-1987-6	ANDREA 11 1/20	100	291	63	30-Jul-2015	Property	CALDERA	Granted
9	03202-1988-4	ANDREA 12 1/20	100	297	64	30-Jul-2015	Property	CALDERA	Granted
10	03202-1989-2	ANDREA 13 1/20	100	303	65	30-Jul-2015	Property	CALDERA	Granted
11	03202-1990-6	ANDREA 14 1/40	146	453	87	28-Sep-2015	Property	CALDERA	Granted
12	03202-1991-4	ANDREA 15 1/40	200	309	66	30-Jul-2015	Property	CALDERA	Granted
13	03202-1992-2	ANDREA 16 1/40	200	315	67	30-Jul-2015	Property	CALDERA	Granted
14	03202-1993-0	ANDREA 17 1/60	300	322	68	30-Jul-2015	Property	CALDERA	Granted
15	03202-1994-9	ANDREA 18 1/60	300	329	69	30-Jul-2015	Property	CALDERA	Granted
16	03202-1983-3	ANDREA 7 1/20	100	267	59	30-Jul-2015	Property	CALDERA	Granted
17	03202-1984-1	ANDREA 8 1/20	100	273	60	30-Jul-2015	Property	CALDERA	Granted
18	03202-1985-K	ANDREA 9 1/20	100	279	61	30-Jul-2015	Property	CALDERA	Granted
19	03201-9704-K	ANDREA CINCO 1/40	200	3778	754	26-Sep-2013	Property	COPIAPO	Granted
20	03201-A368-6	ANDREA CUATRO 1/6	16	2728	517	24-Jun-2013	Property	COPIAPO	Granted
21	03201-A369-4	ANDREA CUATRO 11/20	48	4655	V 950	13-Nov-2013	Property	COPIAPO	Granted
22	03201-A370-8	ANDREA CUATRO 21/30	70	2734	V 518	24-Jun-2013	Property	COPIAPO	Granted
23	03201-A366-K	ANDREA DOS 1	2	4650	V 949	13-Nov-2013	Property	COPIAPO	Granted
24	03201-9705-8	ANDREA SEIS 21/40	100	3784	V 755	26-Sep-2013	Property	COPIAPO	Granted
25	03201-A364-3	ANDREA UNO 1/4	10	2740	519	24-Jun-2013	Property	COPIAPO	Granted
26	03201-A365-1	ANDREA UNO 11/20	30	4644	V 948	13-Nov-2013	Property	COPIAPO	Granted
27	03203-2009-7	ANGELICA 11/13	3	662	112	28-May-1991	Property	COPIAPO	Granted
28	03203-2717-2	ANTONIA 1/10	100	1772	318	27-Oct-1993	Property	COPIAPO	Granted
29	03203-2718-0	ANTONIA 11/20	100	1780	319	27-Oct-1993	Property	COPIAPO	Granted
30	03203-2719-9	ANTONIA 21/30	70	1788	320	27-Oct-1993	Property	COPIAPO	Granted
31	03203-2720-2	ANTONIA 31/40	100	1796	321	27-Oct-1993	Property	COPIAPO	Granted
32	03203-2721-0	ANTONIA 41/50	100	1804	322	27-Oct-1993	Property	COPIAPO	Granted
33	03203-2722-9	ANTONIA 51/70	100	1811	323	27-Oct-1993	Property	COPIAPO	Granted
34	03203-2723-7	ANTONIA 71/80	100	1818	V 324	27-Oct-1993	Property	COPIAPO	Granted
35	03203-2724-5	ANTONIA 81/90	100	1826	325	27-Oct-1993	Property	COPIAPO	Granted
36	03203-2108-5	ANTONIA I 1/24	120	204	V 37	8-Feb-1994	Property	COPIAPO	Granted
37	03203-0053-3	AURORA (R)	1	150	V 255	Año 1904	Property	COPIAPO	Granted
38	03202-0932-3	BAHIA IV 1/10	40	12	4	14-Sep-1999	Property	CALDERA	Granted
39	03202-0933-1	BAHIA V 1/30	150	21	6	7-Dec-1999	Property	CALDERA	Granted
40	03202-0934-k	BAHIA VI 1/9	39	26	7	7-Dec-1999	Property	CALDERA	Granted
41	03203-4953-2	BELLAVISTA 1/8	24	1467	V 366	21-Dec-2009	Property	COPIAPO	Granted
42	03203-4955-9	BELLAVISTA 11/14	16	56	V 14	13-Jan-2010	Property	COPIAPO	Granted
43	03203-4956-7	BELLAVISTA 15/18	20	63	15	13-Jan-2010	Property	COPIAPO	Granted
44	03203-4954-0	BELLAVISTA 9/10	6	1474	367	21-Dec-2009	Property	COPIAPO	Granted
45	03203-0230-7	BERTA DOS AL ESTE	3	316	119	19-Aug-1939	Property	COPIAPO	Granted
46	03203-0229-3	BERTA UNO AL NORTE	4	316	119	19-Aug-1939	Property	COPIAPO	Granted
47	03203-1622-7	BRISA 1/10	50	2232	V 383	3-Sep-1990	Property	COPIAPO	Granted
48	03203-1623-5	BRISA 21/40	60	13	V 3	11-Jan-1991	Property	COPIAPO	Granted
49	03203-1624-3	BRISA 41/45	25	21	4	Año 1991	Property	COPIAPO	Granted
50	03203-1370-8	BRONCE 1/10	100	142	31	9-Feb-1987	Property	COPIAPO	Granted
51	03203-1371-6	BRONCE 11/20	89	81	23	23-Jan-1987	Property	COPIAPO	Granted
52	03203-1372-4	BRONCE 21/30	100	134	30	9-Feb-1987	Property	COPIAPO	Granted
53	03203-1373-2	BRONCE 31/36	47	91	V 24	23-Jan-1987	Property	COPIAPO	Granted
54	03203-1704-5	BRONCE 37	1	935	V 226	26-Jul-1989	Property	COPIAPO	Granted
55	03203-1705-3	BRONCE 38	2	942	227	26-Jul-1989	Property	COPIAPO	Granted
56	03203-1374-0	BRONCE 41/50	100	102	25	23-Jan-1987	Property	COPIAPO	Granted
57	03203-1441-0	BRONCE 51/70	100	470	118	9-Sep-1987	Property	COPIAPO	Granted
58	03203-1479-8	BRONCE 71/89	86	418	V 166	19-Oct-1988	Property	COPIAPO	Granted
59	03203-1583-2	BRONCE 91/100	50	966	158	17-Apr-1990	Property	COPIAPO	Granted

**Schedule A – Continued**

Nacional Rol	Name	Area (ha)	Registration Information				Status		
			Page	Number	Year Register	City			
60	03203-1584-0	BRONCE 101/115	75	959	156	12-Apr-1990	Property	COPIAPO	Granted
61	03203-3940-5	BRONCE CINCO 16/30	50	475	V 136	22-May-2000	Property	COPIAPO	Granted
62	03203-3939-1	BRONCE CUATRO 1/30	123	465	135	22-May-2000	Property	COPIAPO	Granted
63	03203-3938-3	BRONCE TRES 1/30	150	2164	486	18-Oct-2011	Property	COPIAPO	Granted
64	03203-3945-6	BRONCE VEINTE 1/10	28	1407	323	18-Nov-1999	Property	COPIAPO	Granted
65	03203-1905-6	CALEDONIA 1/5	25	34	V 6	Año 1991	Property	COPIAPO	Granted
66	03203-4354-2	CARLA 10 11/15	23	67	V 33	8-Feb-2005	Property	COPIAPO	Granted
67	03203-2762-8	CAROLITA CINCO 1/10	28	540	85	11-Apr-1994	Property	COPIAPO	Granted
68	03203-2782-2	CAROLITA CUATRO 1/10	100	1787	V 316	26-Dec-1996	Property	COPIAPO	Granted
69	03203-2688-5	CAROLITA DOS 1/25	78	2069	V 372	28-Dec-1993	Property	COPIAPO	Granted
70	03203-2689-3	CAROLITA DOS 31	1	2079	373	28-Dec-1993	Property	COPIAPO	Granted
71	03203-2781-4	CAROLITA TRES 1/14	124	1776	V 315	26-Dec-1996	Property	COPIAPO	Granted
72	03203-2685-0	CAROLITA UNO 1/15	59	2046	369	28-Dec-1993	Property	COPIAPO	Granted
73	03203-2686-9	CAROLITA UNO 16/22	7	2054	370	28-Dec-1993	Property	COPIAPO	Granted
74	03203-2687-7	CAROLITA UNO 34/35	2	2062	371	28-Dec-1993	Property	COPIAPO	Granted
75	03203-3346-6	CAROLITA VEINTIDOS 1/5	24	1495	V 261	8-Oct-1996	Property	COPIAPO	Granted
76	03203-2330-4	CHIQUITA	3	1083	V 343	3-Jun-1992	Property	COPIAPO	Granted
77	03203-2331-2	CHIQUITA I	1	1076	V 342	3-Jun-1992	Property	COPIAPO	Granted
78	03203-1338-4	CIERVO 1/3	9	85	38	10-Mar-1986	Property	COPIAPO	Granted
79	03203-1808-4	CONDOR 1/3	6	1754	302	9-Jul-1990	Property	COPIAPO	Granted
80	03203-2095-K	CORA 1/20	140	1352	V 266	7-Oct-1991	Property	COPIAPO	Granted
81	03203-2154-9	CORA 21/40	200	1758	332	9-Dec-1991	Property	COPIAPO	Granted
82	03203-1749-5	COSTANERA 1/12	43	1648	V 281	Año 1990	Property	COPIAPO	Granted
83	03203-1645-6	CRUCES 1/20	100	952	155	12-Apr-1990	Property	COPIAPO	Granted
84	03203-1646-4	CRUCES 21/40	77	1768	V 304	9-Jul-1990	Property	COPIAPO	Granted
85	03203-1647-2	CRUCES 41/66	130	2217	V 381	30-Aug-1990	Property	COPIAPO	Granted
86	03203-4995-8	CRUCES DOS 1/26	68	610	V 138	22-Jun-2010	Property	COPIAPO	Granted
87	03203-1772-k	CRUCES I 16/20	14	1750	331	9-Dec-1991	Property	COPIAPO	Granted
88	03203-1773-8	CRUCES I 21/27	10	1646	316	13-Nov-1991	Property	COPIAPO	Granted
89	03203-0784-8	DECIDIDA 1/2	10	261	140	Año 1956	Property	COPIAPO	Granted
90	03203-0775-9	DELIRIO (SLM)	5	929	148	6-Apr-1990	Property	COPIAPO	Granted
91	03203-5820-5	DESPRECIADA 1/2	6	2921	V 612	20-Aug-2012	Property	COPIAPO	Granted
92	03203-0324-9	DESPRECIADA 1/6 (1)	5	180	V 82	14-Sep-1948	Property	COPIAPO	Granted
93	03203-0289-7	DICHOSA	5	272	V 99	13-Dec-1936	Property	COPIAPO	Granted
94	03203-7012-4	ELENA 1 1/8	22	4519	955	28-Dec-2015	Property	COPIAPO	Granted
95	03203-7013-2	ELENA 1 11/12	4	3837	779	11-Nov-2015	Property	COPIAPO	Granted
96	03203-1463-1	ESPERANZA 1/7	22	1652	V 317	13-Nov-1991	Property	COPIAPO	Granted
97	03203-1409-7	ESTEBAN 1/4	14	499	V 70	1-Feb-1990	Property	COPIAPO	Granted
98	03201-B587-0	ESTELA 1 1/40	200	4209	V 1038	11-Dec-2014	Property	COPIAPO	Granted
99	03201-B595-1	ESTELA 10 1/60	300	780	V 161	11-Feb-2015	Property	COPIAPO	Granted
100	03201-B596-K	ESTELA 11 1/30	145	4236	V 1042	11-Dec-2014	Property	COPIAPO	Granted
101	03201-B597-8	ESTELA 12 1/22	110	787	V 162	11-Feb-2015	Property	COPIAPO	Granted
102	03201-B598-6	ESTELA 12 31/43	39	793	V 163	11-Feb-2015	Property	COPIAPO	Granted
103	03201-B599-4	ESTELA 13 1/60	300	800	164	11-Feb-2015	Property	COPIAPO	Granted
104	03201-B600-1	ESTELA 14 1/40	200	807	165	11-Feb-2015	Property	COPIAPO	Granted
105	03201-B601-K	ESTELA 15 1/40	200	4243	V 1043	11-Dec-2014	Property	COPIAPO	Granted
106	03202-1941-8	ESTELA 16 1/40	200	436	84	27-Aug-2015	Property	CALDERA	Granted
107	03201-B588-9	ESTELA 3 1/50	240	4216	1039	11-Dec-2014	Property	COPIAPO	Granted
108	03201-B589-7	ESTELA 4 1/7	21	753	V 157	11-Feb-2015	Property	COPIAPO	Granted
109	03201-B289-8	ESTELA 5 1/60	214	1922	369	12-May-2015	Property	COPIAPO	Granted
110	03201-B590-0	ESTELA 6 31/50	100	759	V 158	11-Feb-2015	Property	COPIAPO	Granted
111	03201-B591-9	ESTELA 7 1/40	196	766	159	11-Feb-2015	Property	COPIAPO	Granted
112	03201-B592-7	ESTELA 8 1/44	212	4223	V 1040	11-Dec-2014	Property	COPIAPO	Granted
113	03201-B593-5	ESTELA 8 45/60	80	4230	V 1041	11-Dec-2014	Property	COPIAPO	Granted
114	03201-B594-3	ESTELA 9 1/60	300	773	V 160	11-Feb-2015	Property	COPIAPO	Granted
115	03201-C331-8	ESTELA A11 1/2	9	2056	V 573	18-Nov-2016	Property	COPIAPO	Granted
116	03201-C330-k	ESTELA A2 1/48	240	2049	V 572	18-Nov-2016	Property	COPIAPO	Granted
117	03203-0053-3	ESTRELLA (R )	2	147	253	Año 1904	Property	COPIAPO	Granted
118	03203-5824-8	FLORENCIA 14 1/9	35	2434	V 528	26-Jul-2012	Property	COPIAPO	Granted

**Schedule A – Continued**

Nacional Rol	Name	Area (ha)	Registration Information				Status		
			Page	Number	Year Register	City			
119	03203-5825-6	FLORENCIA 15 1/5	15	2442	V 529	26-Jul-2012	Property	COPIAPO	Granted
120	03203-6400-0	FLORENCIA 18 2	5	669	V 185	13-Mar-2014	Property	COPIAPO	Granted
121	03203-5826-4	FLORENCIA 22 1/15	51	2449	V 530	26-Jul-2012	Property	COPIAPO	Granted
122	03203-5822-1	FLORENCIA 4 1/5	12	2426	527	26-Jul-2012	Property	COPIAPO	Granted
123	03203-7023-k	FLORENCIA A18 21/24	11	163	V 45	26-Jan-2016	Property	COPIAPO	Granted
124	03203-7021-3	FLORENCIA A3 1/12	21	270	V 58	2-Feb-2016	Property	COPIAPO	Granted
125	03203-0322-2	FUNDENTE 1/5	18	130	95	8-Oct-1951	Property	COPIAPO	Granted
126	03203-5821-3	FUNDENTES 1/20	81	1905	V 429	21-Jun-2012	Property	COPIAPO	Granted
127	03203-7092-2	GEMA II 1/40	158	2062	V 574	18-Nov-2016	Property	COPIAPO	Granted
128	03203-7093-0	GEMA III 1/40	200	768	192	15-Apr-2016	Property	COPIAPO	Granted
129	03203-7094-9	GEMA IV 1/10	50	774	V 193	15-Apr-2016	Property	COPIAPO	Granted
130	03203-7095-7	GEMA V 1/20	100	340	76	12-Feb-2016	Property	COPIAPO	Granted
131	03203-1655-3	GRANATE 120/126	14	40	V 5	2-Jan-1990	Property	COPIAPO	Granted
132	03203-0814-3	INDEPENDENCIA (SLM)	2	835	149	6-Apr-1990	Property	COPIAPO	Granted
133	03203-0419-9	INDEPENDENCIA 1/20	50	264	V 109	13-Dec-1958	Property	COPIAPO	Granted
134	03203-1464-K	LA PIRITA 1/7	43	100	39	9-Apr-1988	Property	COPIAPO	Granted
135	03203-4748-3	LA PITA 1/15	51	1459	V 365	21-Dec-2009	Property	COPIAPO	Granted
136	03203-1676-6	LA POLLITA 1/13	39	623	160	10-May-1989	Property	COPIAPO	Granted
137	03203-4749-1	LA POLO 1/6	18	1480	368	21-Dec-2009	Property	COPIAPO	Granted
138	03203-0097-5	LA SIETE POR CIENTO 1/3	15	294	133	12-Dec-1955	Property	COPIAPO	Granted
139	03203-1204-3	LAR 1/10	50	220	V 111	22-Aug-1983	Property	COPIAPO	Granted
140	03203-2405-k	MACARENA 111/129	173	1357	V 261	13-Sep-1993	Property	COPIAPO	Granted
141	03203-2484-k	MACARENA 131/140	90	1437	V 271	20-Sep-1993	Property	COPIAPO	Granted
142	03203-2486-6	MACARENA 176/180	20	1049	V 203	18-Aug-1993	Property	COPIAPO	Granted
143	03203-2406-8	MACARENA 181/195	150	1366	V 262	13-Sep-1993	Property	COPIAPO	Granted
144	03203-2487-4	MACARENA 196/200	10	1375	V 263	13-Sep-1993	Property	COPIAPO	Granted
145	03203-2488-2	MACARENA 211/240	291	1057	204	18-Aug-1993	Property	COPIAPO	Granted
146	03203-2407-6	MACARENA 241/260	182	1384	264	13-Sep-1993	Property	COPIAPO	Granted
147	03203-2408-4	MACARENA 261/270	100	1393	V 265	13-Sep-1993	Property	COPIAPO	Granted
148	03203-2489-0	MACARENA 271/273	26	1403	266	13-Sep-1993	Property	COPIAPO	Granted
149	03203-2490-4	MACARENA 274/280	35	1412	V 267	13-Sep-1993	Property	COPIAPO	Granted
150	03203-2491-2	MACARENA 281	4	1421	268	13-Sep-1993	Property	COPIAPO	Granted
151	03203-2493-9	MACARENA 288/297	94	1066	V 205	18-Aug-1993	Property	COPIAPO	Granted
152	03203-2494-7	MACARENA 298/305	73	1075	206	18-Aug-1993	Property	COPIAPO	Granted
153	03203-2495-5	MACARENA 306/307	3	1083	207	18-Aug-1993	Property	COPIAPO	Granted
154	03203-2496-3	MACARENA 316/325	21	1090	V 208	18-Aug-1993	Property	COPIAPO	Granted
155	03203-2497-1	MACARENA 336	1	1100	209	18-Aug-1993	Property	COPIAPO	Granted
156	03203-2409-2	MACARENA 346/365	200	683	V 144	19-May-1993	Property	COPIAPO	Granted
157	03203-2498-k	MACARENA 366/385	200	1107	V 210	18-Aug-1993	Property	COPIAPO	Granted
158	03203-2499-8	MACARENA 386/405	200	1115	V 211	18-Aug-1993	Property	COPIAPO	Granted
159	03203-2500-5	MACARENA 406/425	78	454	106	21-Apr-1993	Property	COPIAPO	Granted
160	03203-2501-3	MACARENA 426/433	26	1123	V 212	18-Aug-1993	Property	COPIAPO	Granted
161	03203-2502-1	MACARENA 434/437	19	1132	V 213	18-Aug-1993	Property	COPIAPO	Granted
162	03203-2503-k	MACARENA 442/444	5	1140	214	18-Aug-1993	Property	COPIAPO	Granted
163	03203-2504-8	MACARENA 445/464	58	1148	215	18-Aug-1993	Property	COPIAPO	Granted
164	03203-1501-8	MANTO PEDREGAL 1/3	12	1049	251	22-Aug-1989	Property	COPIAPO	Granted
165	03203-7004-3	MARTITA 1 1/2	3	3115	646	10-Sep-2015	Property	COPIAPO	Granted
166	03203-6273-3	MARTITA 10 1/40	163	745	156	11-Feb-2015	Property	COPIAPO	Granted
167	03203-6495-7	MARTITA 6 1/17	68	662	184	13-Mar-2014	Property	COPIAPO	Granted
168	03203-7005-1	MARTITA 9 1	1	3121	V 647	10-Sep-2015	Property	COPIAPO	Granted
169	03203-0053-3	MERCEDES (R )	1	130	V 227	Año 1905	Property	COPIAPO	Granted
170	03203-1893-9	MILANO 41/44	18	484	V 77	23-Apr-1991	Property	COPIAPO	Granted
171	03203-1894-7	MILANO 51/54	15	1012	183	17-Jul-1991	Property	COPIAPO	Granted
172	03203-0853-4	NIC CARTER 1/2	7	134	V 95	8-Sep-1942	Property	COPIAPO	Granted
173	03203-1474-7	NIC CARTER II 1/20	78	1119	V 349	11-Jun-1992	Property	COPIAPO	Granted
174	03203-1502-6	OCHO POR CIENTO 1/5	18	1035	249	22-Aug-1989	Property	COPIAPO	Granted
175	03203-1438-0	OJANCO 1/20	86	205	73	22-Jun-1988	Property	COPIAPO	Granted
176	03203-1666-9	OJANCO 61/84	120	2430	V 429	19-Oct-1990	Property	COPIAPO	Granted
177	03203-1667-7	OJANCO 85/96	60	1300	V 216	10-May-1990	Property	COPIAPO	Granted

**Schedule A – Continued**

Nacional Rol	Name	Area (ha)	Registration Information				Status		
			Page	Number	Year Register	City			
178	03201-5472-3	OJANCO CINCO 3/5	8	540	176	9-Apr-1998	Property	COPIAPO	Granted
179	03201-5473-1	Ojanco Cinco 6/15 (14/15)	12	546	V 177	9-Apr-1998	Property	COPIAPO	Granted
180	03201-5465-0	OJANCO CUATRO 4/14	78	164	V 27	18-Jan-1999	Property	COPIAPO	Granted
181	03201-5987-3	OJANCO DOS 1	1	869	V 227	7-Dec-2000	Property	COPIAPO	Granted
182	03203-3616-3	OJANCO DOS 1/4	16	773	267	8-Jun-1998	Property	COPIAPO	Granted
183	03203-3618-k	OJANCO DOS 11/16	36	786	V 269	8-Jun-1998	Property	COPIAPO	Granted
184	03203-3617-1	OJANCO DOS 6/9	6	779	V 268	8-Jun-1998	Property	COPIAPO	Granted
185	03203-2264-2	OJANCO I 41/50	50	492	78	23-Apr-1991	Property	COPIAPO	Granted
186	03201-5988-1	OJANCO SEIS 1/18	61	236	V 69	11-Apr-2001	Property	COPIAPO	Granted
187	03201-5461-8	OJANCO TRES 11/20	49	1177	V 340	14-Jul-1998	Property	COPIAPO	Granted
188	03201-5463-4	OJANCO TRES 24/38	33	499	V 170	9-Apr-1998	Property	COPIAPO	Granted
189	03201-5460-k	OJANCO TRES 4/10	17	1033	V 316	8-Jul-1998	Property	COPIAPO	Granted
190	03201-5474-k	OJANCO VEINTIUNO 1/3	6	555	V 178	9-Apr-1998	Property	COPIAPO	Granted
191	03201-5476-6	OJANCO VEINTIUNO 12/16	15	561	V 179	9-Apr-1998	Property	COPIAPO	Granted
192	03201-5475-8	OJANCO VEINTIUNO 5/10	41	1062	V 320	8-Jul-1998	Property	COPIAPO	Granted
193	03203-5261-4	OLI CINCO 1/4	20	438	V 99	27-Feb-2012	Property	COPIAPO	Granted
194	03203-3612-0	PAME DOS 26/36	39	184	30	9-Feb-1999	Property	COPIAPO	Granted
195	03203-3613-9	PAME DOS 38/66	83	1296	V 364	17-Aug-1998	Property	COPIAPO	Granted
196	03203-3609-0	PAME UNO 24/28	7	1290	V 363	17-Aug-1998	Property	COPIAPO	Granted
197	03203-3607-4	PAME UNO 6/7	3	793	V 270	8-Jun-1998	Property	COPIAPO	Granted
198	03203-1497-6	PELIGROSA 1/20	88	713	178	5-Jun-1989	Property	COPIAPO	Granted
199	03203-1403-8	PELUSIN 1/10	50	35	12	4-Feb-1988	Property	COPIAPO	Granted
200	03203-1744-4	POLA 1/4	17	1029	V 176	30-Apr-1990	Property	COPIAPO	Granted
201	03203-1585-9	PROTECTORA 1/10	50	487	68	31-Jan-1990	Property	COPIAPO	Granted
202	03203-1586-7	PROTECTORA 21/40	100	1364	V 267	7-Oct-1991	Property	COPIAPO	Granted
203	03203-1587-5	PROTECTORA 41/52	54	1372	268	7-Oct-1991	Property	COPIAPO	Granted
204	03203-1588-3	PROTECTORA 55/68	67	1488	243	31-May-1990	Property	COPIAPO	Granted
205	03203-1625-1	PUDU 1/2	2	2225	382	3-Sep-1990	Property	COPIAPO	Granted
206	03202-0849-1	PUNTA PADRONES 1/33	132	55	9	24-Jun-1997	Property	CALDERA	Granted
207	03203-1099-7	RENO 1/6	24	81	V 79	25-Jun-1979	Property	COPIAPO	Granted
208	03203-1506-9	RESCATADA 1/8	36	181	61	9-Feb-1989	Property	COPIAPO	Granted
209	03203-1626-k	RINCON 1/2	5	403	57	31-Jan-1990	Property	COPIAPO	Granted
210	03203-0325-7	RINCONADA 1/5 (1/3)	12	464	136	26-Sep-1966	Property	COPIAPO	Granted
211	03203-1431-3	RORO 1/6	30	261	V 94	11-Aug-1988	Property	COPIAPO	Granted
212	03203-2327-4	ROSALIA I	1	1152	353	11-Jun-1992	Property	COPIAPO	Granted
213	03203-2328-2	ROSALIA II	1	1158	354	11-Jun-1992	Property	COPIAPO	Granted
214	03203-2329-0	ROSALIA III	1	1836	V 472	9-Oct-1992	Property	COPIAPO	Granted
215	03203-2903-5	ROSICLER CUATRO 1/40	188	1214	232	14-Sep-1994	Property	COPIAPO	Granted
216	03203-2904-3	ROSICLER DOS 1/31	140	1438	265	5-Oct-1994	Property	COPIAPO	Granted
217	03203-2906-k	ROSICLER TRES 1/20	200	1430	264	5-Oct-1994	Property	COPIAPO	Granted
218	03203-2037-2	ROSITA	1	927	V 171	17-Jul-1991	Property	COPIAPO	Granted
219	03203-0077-0	SAN GREGORIO	5	173	72	28-Jul-1939	Property	COPIAPO	Granted
220	03203-1496-8	SAN JOSE 1/5	25	748	191	30-Jun-1989	Property	COPIAPO	Granted
221	03203-1755-k	SAN JOSE Y SOFIA 1	10	2080	356	14-Aug-1990	Property	COPIAPO	Granted
222	03203-0053-3	SAN LUIS (R )	4	152	256	Año 1904	Property	COPIAPO	Granted
223	03203-1022-9	SAN PANCRACIO 1/3	13	102	V 49	11-Jul-1972	Property	COPIAPO	Granted
224	03203-1789-4	San Pedro I 11/20, 31/34 Y 46/48	79	1386	V 227	15-May-1990	Property	COPIAPO	Granted
225	03203-1790-8	SAN PEDRO II 1/48	48	1378	226	15-May-1990	Property	COPIAPO	Granted
226	03203-0053-3	SAN RAMON	1	54	V 19	Año 1968	Property	COPIAPO	Granted
227	03203-1788-6	SANTA GEMITA II 1/20	123	2543	450	23-Nov-1990	Property	COPIAPO	Granted
228	03203-1680-4	SANTA GEMITA III 1/20	190	927	225	26-Jul-1989	Property	COPIAPO	Granted
229	03203-1742-8	SANTA GEMITA IV 1/5	50	2691	538	19-Dec-1990	Property	COPIAPO	Granted
230	03203-1743-6	SANTA GEMITA V 1/10	100	2145	368	24-Aug-1990	Property	COPIAPO	Granted
231	03203-0112-2	SANTA ROSA 1/10	49	321	142	22-Jun-1959	Property	COPIAPO	Granted
232	03203-1698-7	SANTA SOFIA 1/60	60	664	V 166	12-May-1989	Property	COPIAPO	Granted
233	03203-1756-8	SANTA TERESA I 1/20	100	1842	V 473	13-Oct-1992	Property	COPIAPO	Granted
234	03203-1757-6	SANTA TERESA II 1/20	100	1849	474	13-Oct-1992	Property	COPIAPO	Granted
235	03203-1758-4	SANTA TERESA III 1/20	100	1856	V 475	13-Oct-1992	Property	COPIAPO	Granted
236	03203-1846-7	SUR 1/2	2	2331	400	12-Sep-1990	Property	COPIAPO	Granted

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Nacional Rol	Name	Area (ha)	Registration Information				Status
			Page	Number	Year Register	City	
237	03201-7174-1 Tolito Segunda 1/6 (R )	30	574	160	9-Jul-2007	Property COPIAPO	Granted
238	03203-1890-4 TORO 621/628	32	1222	228	6-Sep-1991	Property COPIAPO	Granted
239	03203-1480-1 VENADO 1/22	104	568	234	22-Dec-1988	Property COPIAPO	Granted
240	03203-1543-3 VENADO 25/39	65	1213	290	10-Oct-1989	Property COPIAPO	Granted
241	03203-1663-4 VENADO II 1/10	33	386	55	31-Jan-1990	Property COPIAPO	Granted
242	03203-1759-2 VENADO II 17/46	150	573	82	28-Feb-1990	Property COPIAPO	Granted
243	03203-2451-3 VENTARRON 1/20	88	577	V 130	5-May-1993	Property COPIAPO	Granted
244	03203-1478-k VIENTO 1/20	100	95	V 35	13-Jan-1989	Property COPIAPO	Granted
245	03203-1408-9 VIENTO 21/31	41	150	V 32	9-Feb-1987	Property COPIAPO	Granted
246	03203-1544-1 VIENTO 41/58	90	869	V 214	19-Jul-1989	Property COPIAPO	Granted
247	03203-1545-k VIENTO 59/84	130	502	132	20-Apr-1989	Property COPIAPO	Granted
248	03203-1546-8 VIENTO 85/102	90	508	V 133	20-Apr-1989	Property COPIAPO	Granted
249	03203-1508-5 VIENTO 103/122	100	102	36	13-Jan-1989	Property COPIAPO	Granted
250	03203-1664-2 VIENTO II 21/29	41	1745	V 301	9-Jul-1990	Property COPIAPO	Granted
251	03201-C772-0 JUANITA 2 1-5	20	1177	V 754	21-Mar-2017	Discovery COPIAPO	Granted
252	03201-C877-8 JUANITA 4 1-8	8	3368	V 2174	24-Jul-2017	Discovery COPIAPO	In Process
253	ESPERANZA II 1/20	100	2642	V 1601	28-May-2018	Discovery COPIAPO	In Process

**Schedule A – Minera Candelaria Exploration Concessions**

Nacional Rol	Name	Area (ha)	Registration Information						Status	Expiration Date	
			Page	Number	Year	Register	City				
1	03203-E542-6	MARTITA C15	300	660	v	433	20-Feb-2017	Discover	COPIAPO	Granted	17/Dec/2018
2	03201-L853-K	JUANITA 2A	100	4051		2629	4-Sep-2017	Discover	COPIAPO	Granted	19-Jul-2019
3	03203-E720-8	SUR 1 JUANITA 3	100	4049		2628	4-Sep-2017	Discover	COPIAPO	Granted	19-Jul-2019
4	03201-K221-8	(renewal)	100	7200	v	5042	28-Dec-2015	Discover	COPIAPO	Granted	8/Sep/2019
5	03201-M179-4	ESTELA C13	300	10		6	2-Jan-2018	Discover	COPIAPO	Granted	15-Nov-2019
6	03201-M147-6	ESTELA C1	200	1		1	2-Jan-2018	Discover	COPIAPO	Granted	16-Nov-2019
7	03201-M150-6	ESTELA C10	300	6	v	4	2-Jan-2018	Discover	COPIAPO	Granted	16-Nov-2019
8	03201-M151-4	ESTELA C15	200	8		5	2-Jan-2018	Discover	COPIAPO	Granted	16-Nov-2019
9	03201-M148-4	ESTELA C2	300	551		360	1-Feb-2018	Discover	COPIAPO	Granted	16-Nov-2019
10	03201-M146-8	ESTELA C5	300	3		2	2-Jan-2018	Discover	COPIAPO	Granted	16-Nov-2019
11	03201-M149-2	ESTELA C6	300	4	v	3	2-Jan-2018	Discover	COPIAPO	Granted	16-Nov-2019
12	03201-M143-3	ESTELA C8	300	554	v	362	1-Feb-2018	Discover	COPIAPO	Granted	14-Dec-2019
13	03201-M144-1	ESTELA C11	200	556	v	363	1-Feb-2018	Discover	COPIAPO	Granted	21-Dec-2019
14	03201-M145-K	ESTELA C12	300	558		364	1-Feb-2018	Discover	COPIAPO	Granted	21-Dec-2019
15	03201-M142-5	ESTELA C4	100	553		361	1-Feb-2018	Discover	COPIAPO	Granted	21-Dec-2019
16	03201-M225-1	ESTELA C14	200	1296	v	809	7-Mar-2018	Discover	COPIAPO	Granted	2-Feb-2020
17	03201-M222-7	ESTELA C3	300	1292		806	7-Mar-2018	Discover	COPIAPO	Granted	2-Feb-2020
18	03201-M223-5	ESTELA C7	200	1293	v	807	7-Mar-2018	Discover	COPIAPO	Granted	2-Feb-2020
19	03201-M224-3	ESTELA C9	300	1295		808	7-Mar-2018	Discover	COPIAPO	Granted	2-Feb-2020
20	03201-M226-K	JUANITA A4	100	1290		805	7-Mar-2018	Discover	COPIAPO	Granted	2-Feb-2020
21	03202-3046-2	ANDREA C13	100	373		213	17-May-2018	Discover	CALDERA	Granted	5-Feb-2020
22	03202-3047-0	ANDREA C14	200	375		214	17-May-2018	Discover	CALDERA	Granted	5-Feb-2020
23	03202-3048-9	ANDREA C15	200	377		215	17-May-2018	Discover	CALDERA	Granted	5-Feb-2020
24	03202-3049-7	ANDREA C16	200	379		216	17-May-2018	Discover	CALDERA	Granted	5-Feb-2020
25	03202-3050-0	ANDREA C17	300	381		217	17-May-2018	Discover	CALDERA	Granted	9-Feb-2020
26	03202-3038-1	ANDREA C18	300	384		218	17-May-2018	Discover	CALDERA	Granted	9-Feb-2020
27	03202-3039-k	ESTELA C16	200	387		219	17-May-2018	Discover	CALDERA	Granted	9-Feb-2020
28	03202-3043-8	ANDREA C10	100	367		210	17-May-2018	Discover	CALDERA	Granted	23-Feb-2020
29	03202-3044-6	ANDREA C11	100	369		211	17-May-2018	Discover	CALDERA	Granted	23-Feb-2020
30	03202-3045-4	ANDREA C12	100	371		212	17-May-2018	Discover	CALDERA	Granted	23-Feb-2020
31	03202-3042-k	ANDREA C7	100	361		207	17-May-2018	Discover	CALDERA	Granted	23-Feb-2020
32	03202-3040-3	ANDREA C8	100	363		208	17-May-2018	Discover	CALDERA	Granted	23-Feb-2020
33	03202-3041-1	ANDREA C9	100	365		209	17-May-2018	Discover	CALDERA	Granted	23-Feb-2020
34	03203-F181-7	MARTITA D10	300	2721	v	1651	1-Jun-2018	Discover	COPIAPO	Granted	17-Apr-2020
35	03203-F182-5	MARTITA D25	200	2723	v	1652	1-Jun-2018	Discover	COPIAPO	Granted	17-Apr-2020
36	03203-F187-6	MARTITA D11	300	3101		1872	3-Jul-2018	Discover	COPIAPO	Granted	14-May-2020
37	03203-F189-2	MARTITA D26	100	3104	v	1874	3-Jul-2018	Discover	COPIAPO	Granted	23-May-2020
38	03203-F194-9	Bellavista C1	100	3106	v	1875	3-Jul-2018	Discover	COPIAPO	Granted	28-May-2020
39	03203-F183-3	MARTITA D24	300	3102	v	1873	3-Jul-2018	Discover	COPIAPO	Granted	28-May-2020
40	03203-F188-4	MARTITA D23	300	27		22	3-Jan-2018	Discover	COPIAPO	Granted	15-Jun-2020
41	03203-F298-8	MARTITA D4	300	2636	v	1597	28-May-2018	Discover	COPIAPO	Granted	12/Sep/2020
42	03203-F300-3	MARTITA D8	100	2639	v	1599	28-May-2018	Discover	COPIAPO	Granted	24/Sep/2020
43	03203-F301-1	MARTITA D13	300	2641		1600	28-May-2018	Discover	COPIAPO	Granted	5/Oct/2020
44	03203-F297-K	MARTITA D3	300	2635		1596	28-May-2018	Discover	COPIAPO	In Process	
45	03203-F299-6	MARTITA D7	300	2638		1598	28-May-2018	Discover	COPIAPO	In Process	
46		CALDERA A1	200	519		301	8-Aug-2018	Discover	CALDERA	In Process	
47		CALDERA A2	200	520		302	8-Aug-2018	Discover	CALDERA	In Process	
48		CALDERA A3	100	521		303	8-Aug-2018	Discover	CALDERA	In Process	
49		CALDERA A4	100	522		304	8-Aug-2018	Discover	CALDERA	In Process	
50		LICHA B1	200	3537	v	2148	6-Aug-2018	Discover	COPIAPO	In Process	
51		LICHA B2	200	3539		2149	6-Aug-2018	Discover	COPIAPO	In Process	
52		LICHA B3	100	3540	v	2150	6-Aug-2018	Discover	COPIAPO	In Process	
53		MARTITA D1	300	3542		2151	6-Aug-2018	Discover	COPIAPO	In Process	
54		MARTITA D2	300	3543	v	2152	6-Aug-2018	Discover	COPIAPO	In Process	
55		MARTITA D5	300	3545		2153	6-Aug-2018	Discover	COPIAPO	In Process	
56		MARTITA D6	300	3546	v	2154	6-Aug-2018	Discover	COPIAPO	In Process	
57		MARTITA D9	300	3548		2155	6-Aug-2018	Discover	COPIAPO	In Process	
58		MARTITA D12	300	3549	v	2156	6-Aug-2018	Discover	COPIAPO	In Process	

**Schedule A – Continued**

Nacional Rol	Name	Area (ha)	Registration Information					Status	Expiration Date
			Page	Number	Year	Register	City		
59	MARTITA D14	300	3551	2157	6-Aug-2018	Discover	COPIAPO	In Process	
60	MARTITA D15	300	3552	v 2158	6-Aug-2018	Discover	COPIAPO	In Process	
61	MARTITA D16	200	3554	2159	6-Aug-2018	Discover	COPIAPO	In Process	
62	MARTITA D17	300	3555	v 2160	6-Aug-2018	Discover	COPIAPO	In Process	
63	MARTITA D18	100	3557	2161	6-Aug-2018	Discover	COPIAPO	In Process	
64	MARTITA D19	200	3558	v 2162	6-Aug-2018	Discover	COPIAPO	In Process	
65	MARTITA D20	200	3560	2163	6-Aug-2018	Discover	COPIAPO	In Process	
66	MARTITA D21	200	3561	v 2164	6-Aug-2018	Discover	COPIAPO	In Process	
67	MARTITA D22	100	3563	2165	6-Aug-2018	Discover	COPIAPO	In Process	

**Schedule B – Minera Ojos del Salado Mining Exploitation Concessions**

Nacional Rol	Name	Area (ha)	Registration Information						Status	
			Page	Number	Year	Register	City			
1	03203-1642-1	ALBA 127/156	132	1164	V	281	22-Sep-1989	Property	COPIAPO	Granted
2	03203-1643-k	ALBA 157/160	11	470		66	31-Jan-1990	Property	COPIAPO	Granted
3	03203-1644-8	ALBA 163/169	22	478	V	67	31-Jan-1990	Property	COPIAPO	Granted
4	03203-1637-5	ALBA 17/36	100	1064	V	181	30-Apr-1990	Property	COPIAPO	Granted
5	03203-1638-3	ALBA 37/56	100	1157	V	280	22-Sep-1989	Property	COPIAPO	Granted
6	03203-1639-1	ALBA 57/76	100	447		63	31-Jan-1990	Property	COPIAPO	Granted
7	03203-0748-1	ALCAPARROSA	5	163	V	207	24-07-1877	Property	COPIAPO	Granted
8	03203-0749-k	ALCAPARROSA II y IV	10	370		137	5-Sep-1939	Property	COPIAPO	Granted
9	03203-0932-8	ALTA SIERRA 1/11 (2)	8	86		33	31-Mar-1965	Property	COPIAPO	Granted
10	03201-0095-K	AURORA	5	4		2	15-Jan-1954	Property	COPIAPO	Granted
11	03203-2165-4	Blanca Torre de Carrizalillo 1/25	20	1906		482	20-Oct-1992	Property	COPIAPO	Granted
12	03201-5796-k	BONANZA CUARTA 1/60	300	347	V	78	22-Mar-1999	Property	COPIAPO	Granted
13	03201-5728-5	BONANZA DOS 1/10	40	177	V	29	9-Feb-1999	Property	COPIAPO	Granted
14	03201-5797-8	BONANZA SEXTA 1	1	354	V	79	22-Mar-1999	Property	COPIAPO	Granted
15	03201-5800-1	BONANZA SEXTA 11, 12, 33/60	150	370		82	22-Mar-1999	Property	COPIAPO	Granted
16	03201-5798-6	BONANZA SEXTA 6	1	359	V	80	22-Mar-1999	Property	COPIAPO	Granted
17	03201-5799-4	BONANZA SEXTA 7/10	13	364	V	81	22-Mar-1999	Property	COPIAPO	Granted
18	03201-5795-1	BONANZA TERCERA 1/60	300	340	V	77	22-Mar-1999	Property	COPIAPO	Granted
19	03201-5189-9	BONANZA UNO 1/40	200	288	V	44	27-Feb-1997	Property	COPIAPO	Granted
20	03203-5656-3	BRISA CUATRO 1/2	6	747	V	148	21-Feb-2013	Property	COPIAPO	Granted
21	03203-6329-2	BRISA SIETE 1/2	2	689	V	188	13-Mar-2014	Property	COPIAPO	Granted
22	03203-5655-5	BRISA TRES 1/2	2	2457	V	531	26-Jul-2012	Property	COPIAPO	Granted
23	03203-6486-8	BUITRE 2 1/48	217	682		187	13-Mar-2014	Property	COPIAPO	Granted
24	03201-0728-8	CARMEN	5	253		94	8-Nov-1935	Property	COPIAPO	Granted
25	03203-3245-1	CARO TRES 37	1	230	V	34	19-Feb-1996	Property	COPIAPO	Granted
26	03203-1876-9	CAROLITA 1/7	22	1296		243	26-Sep-1991	Property	COPIAPO	Granted
27	03203-3170-6	CAROLITA SEIS 1/10	30	1919		302	1-Dec-1995	Property	COPIAPO	Granted
28	03201-2431-K	CECILIA 1/106	506	173		71	24-Apr-1986	Property	COPIAPO	Granted
29	03203-1978-1	CHICA 1/3	4	997	V	181	17-Jul-1991	Property	COPIAPO	Granted
30	03203-1981-1	CHICA 14/20	31	1222		365	3-Jul-1992	Property	COPIAPO	Granted
31	03203-1982-k	CHICA 22/25	7	971	V	178	17-Jul-1991	Property	COPIAPO	Granted
32	03203-1983-8	CHICA 26/31	13	988	V	180	17-Jul-1991	Property	COPIAPO	Granted
33	03203-1984-6	CHICA 32/38	24	979		179	17-Jul-1991	Property	COPIAPO	Granted
34	03203-1985-4	CHICA 39	1	965	V	177	17-Jul-1991	Property	COPIAPO	Granted
35	03203-1979-k	CHICA 4/12	20	957	V	176	17-Jul-1991	Property	COPIAPO	Granted
36	03203-1970-6	CLAUDIA 1/17	17	153	V	25	18-Feb-1991	Property	COPIAPO	Granted
37	03203-2980-9	COALA DOS 11/24	51	42	V	6	5-Jan-1995	Property	COPIAPO	Granted
38	03203-2981-7	COALA TRES 13/20	32	51		7	5-Jan-1995	Property	COPIAPO	Granted
39	03201-5126-0	CONDOR 1/20	100	847		143	30-Jun-1997	Property	COPIAPO	Granted
40	03201-2201-5	COOPERATIVA AGUSTINA 1/10	50	438		136	18-Nov-1980	Property	COPIAPO	Granted
41	03203-6954-1	CORA A1 1/60	300	2819	v	592	27-Jul-2015	Property	COPIAPO	Granted
42	03203-6955-K	CORA A2 1/60	300	2827		593	27-Jul-2015	Property	COPIAPO	Granted
43	03203-6956-8	CORA A3 1/40	200	2848		595	27-Jul-2015	Property	COPIAPO	Granted
44	03203-6957-6	CORA A4 1/39	177	2834		594	27-Jul-2015	Property	COPIAPO	Granted
45	03203-6958-4	CORA A5 1/43	168	3843		780	11-Nov-2015	Property	COPIAPO	Granted
46	03203-6959-2	CORA A6 1/7	16	4277		912	14-Dec-2015	Property	COPIAPO	Granted
47	03203-1662-6	CORITA 1/8	40	1896	V	326	19-Jul-1990	Property	COPIAPO	Granted
48	03203-0276-5	COTOPAXI 1/5 (3)	15	483		124	16-Nov-1962	Property	COPIAPO	Granted
49	03201-5991-1	CRUCES NUEVE 1/20	100	829	V	207	29-Nov-2000	Property	COPIAPO	Granted
50	03203-4067-5	CRUCES OCHO 1/15	75	816	V	205	29-Nov-2000	Property	COPIAPO	Granted
51	03203-4068-3	CRUCES OCHO 41/60	85	823		206	29-Nov-2000	Property	COPIAPO	Granted
52	03201-5990-3	CRUCES SIETE 1/20 y 31/50	120	810		204	29-Nov-2000	Property	COPIAPO	Granted
53	03201-2203-1	CUTANA 1/10	47	138		44	2-Jul-1971	Property	COPIAPO	Granted
54	03203-6881-2	DANIELA DIEZ 1/3	12	813	V	166	11-Feb-2015	Property	COPIAPO	Granted
55	03201-0180-8	DESCUBRIDORA 1/2	10	123		62	9-Oct-1952	Property	COPIAPO	Granted
56	03203-0294-3	DESCUIDADA II (R )	2	8		3	8-Jan-1940	Property	COPIAPO	Granted
57	03203-0782-1	DESCUIDADA VI (R )	3	113		56	15-May-1952	Property	COPIAPO	Granted
58	03203-0296-K	DESEADA	5	71		34	Año 1942	Property	COPIAPO	Granted
59	03201-1509-4	DESPRECIADA 1/2	10	1		1	6-May-1947	Property	COPIAPO	Granted

**Schedule B - Continued**

Nacional Rol	Name	Area (ha)	Registration Information							Status
			Page	Number	Year	Register	City			
60	03203-2751-2	DICASO 1/40 (1/9)	45	131	V	61	16-Apr-1981	Property	COPIAPO	Granted
61	03201-0034-8	ESCAPADA	30	406	V	177	1-Nov-1938	Property	COPIAPO	Granted
62	03201-2118-3	GLADYS 1/73	358	111	V	57	9-Apr-1981	Property	COPIAPO	Granted
63	03203-1648-0	GRANATE 1/21	105	1279		213	11-May-1990	Property	COPIAPO	Granted
64	03203-1649-9	GRANATE 22/41	100	1293	V	215	11-May-1990	Property	COPIAPO	Granted
65	03203-1650-2	GRANATE 42/48	28	1761		303	9-Jul-1990	Property	COPIAPO	Granted
66	03203-1651-0	GRANATE 64/76	42	1249		210	11-May-1990	Property	COPIAPO	Granted
67	03203-1652-9	GRANATE 86/90	15	190	V	21	9-Jan-1990	Property	COPIAPO	Granted
68	03203-1653-7	GRANATE 92/104	65	425		60	31-Jan-1990	Property	COPIAPO	Granted
69	03203-1654-5	GRANATE 105/119	45	1695	V	294	5-Jul-1990	Property	COPIAPO	Granted
70	03203-1632-4	HERCULES 35/60	90	610		87	8-Mar-1990	Property	COPIAPO	Granted
71	03203 1633-2	HERCULES 63/90	112	1903	V	327	23-Jul-1990	Property	COPIAPO	Granted
72	03203 1634-0	HERCULES 91/101	40	1306	V	217	10-May-1990	Property	COPIAPO	Granted
73	03203-1885-8	HERCULES II 1/12	30	257	V	40	12-Feb-1992	Property	COPIAPO	Granted
74	03203-3224-9	JILGUERO DOS 1/10	20	36	V	5	3-Jan-1996	Property	COPIAPO	Granted
75	03203-3621-k	JILGUERO SEGUNDA 21/23	3	1395	V	321	18-Nov-1999	Property	COPIAPO	Granted
76	03203-3968-5	JILGUERO SEGUNDA 41/45	9	1401		322	18-Nov-1999	Property	COPIAPO	Granted
77	03203-0829-1	LA DICHOSA 1/2	10	304	V	137	12-Dec-1955	Property	COPIAPO	Granted
78	03203-2800-4	LADRILLOSDOS 27/39	14	2037		368	28-Dec-1993	Property	COPIAPO	Granted
79	03203-2810-1	LADRILLOSTRES 1/10	30	1206	V	231	14-Sep-1994	Property	COPIAPO	Granted
80	03203-2811-k	LADRILLOSTRES 51/52	5	1560	V	284	19-Oct-1994	Property	COPIAPO	Granted
81	03203-2799-7	LADRILLOSUNO 1/22	69	2025	V	367	28-Dec-1993	Property	COPIAPO	Granted
82	03201-2169-8	LAS ADRIANITAS 1/28	45	266	V	124	18-Jun-1970	Property	COPIAPO	Granted
83	03203-4107-8	LAS PINTADAS 1/37	172	1		1	4-Jan-2001	Property	COPIAPO	Granted
84	03203-4109-4	LAS PINTADAS 121/125	7	24	V	3	4-Jan-2001	Property	COPIAPO	Granted
85	03203-4110-8	LAS PINTADAS 131/135	18	32		4	4-Jan-2001	Property	COPIAPO	Granted
86	03203-4111-6	LAS PINTADAS 141	3	38	V	5	4-Jan-2001	Property	COPIAPO	Granted
87	03203-4108-6	LAS PINTADAS 61/120	251	11		2	4-Jan-2001	Property	COPIAPO	Granted
88	03203-0440-7	LASTENIA	2	58		95	16-07-1890	Property	COPIAPO	Granted
89	03203-0444-k	LAURA REBECA (SLM)	2	434		189	15-Dec-1938	Property	COPIAPO	Granted
90	03203-0445-8	LAURA SEGUNDA (SLM)	2	434		189	15-Dec-1938	Property	COPIAPO	Granted
91	03201-7107-5	LECHUZA 1/40	198	65		32	24-Mar-2008	Property	COPIAPO	Granted
92	03201-8842-3	LECHUZA SUR 1/15	53	2464	V	532	26-Jul-2012	Property	COPIAPO	Granted
93	03201-5125-2	LEON 1/20	100	855		144	30-Jun-1997	Property	COPIAPO	Granted
94	03203-4028-4	MACA DOS 61/62	2	485	V	141	8-Jun-2000	Property	COPIAPO	Granted
95	03203-2481-5	MACARENA 61/70	71	1023	V	200	18-Aug-1993	Property	COPIAPO	Granted
96	03203-2479-3	MACARENA 11/28	144	1014		199	18-Aug-1993	Property	COPIAPO	Granted
97	03203-2480-7	MACARENA 41/49	10	587		131	5-May-1993	Property	COPIAPO	Granted
98	03203-2506-4	MACARENA 469/478	31	1164		217	18-Aug-1993	Property	COPIAPO	Granted
99	03203-2508-0	MACARENA 495/497	6	1182	V	219	18-Aug-1993	Property	COPIAPO	Granted
100	03203-2483-1	MACARENA 101/110	55	1040	V	202	18-Aug-1993	Property	COPIAPO	Granted
101	03203 2505-6	MACARENA 467	4	1157		216	18-Aug-1993	Property	COPIAPO	Granted
102	03203 2507-2	MACARENA 485/494	16	1174		218	18-Aug-1993	Property	COPIAPO	Granted
103	03203-2482-3	MACARENA 81/87	65	1032	V	201	18-Aug-1993	Property	COPIAPO	Granted
104	03203-2517-k	MACARENA 969/978	32	1231		225	18-Aug-1993	Property	COPIAPO	Granted
105	03203-4014-4	MAK CUATRO 1/4	6	491		142	8-Jun-2000	Property	COPIAPO	Granted
106	03203-0564-0	MALAQUITA 1/156	589	183		56	8-Jul-1968	Property	COPIAPO	Granted
107	03203-1736-3	MALAQUITA 157	1	580		83	28-Feb-1990	Property	COPIAPO	Granted
108	03203-1976-5	MALAQUITA 159/161	6	835	V	132	8-May-1992	Property	COPIAPO	Granted
109	03201-2302-k	MAMIÑA 1/125	582	219	V	117	26-Jun-1981	Property	COPIAPO	Granted
110	03203-0843-7	MANTO MONSTRUO UNO	5	192		87	27-Oct-1948	Property	COPIAPO	Granted
111	03203-0700-7	MARCELA DEL CARMEN 1/5	25	235		155	7-Dec-1950	Property	COPIAPO	Granted
112	03201-7795-2	MARK 1/40	200	445		100	27-Feb-2012	Property	COPIAPO	Granted
113	03201-7797-9	MARK 101/160	300	452	V	101	27-Feb-2012	Property	COPIAPO	Granted
114	03201-7798-7	MARK 161/193	134	1370		308	16-Jun-2011	Property	COPIAPO	Granted
115	03201-7799-5	MARK 201/259	249	1379	V	309	16-Jun-2011	Property	COPIAPO	Granted
116	03201-7800-2	MARK 261/318	243	1389	V	310	16-Jun-2011	Property	COPIAPO	Granted
117	03201-7796-0	MARK 41/100	300	1362	V	307	16-Jun-2011	Property	COPIAPO	Granted
118	03201-9234-K	MARK I 1/40	200	1913	V	430	21-Jun-2012	Property	COPIAPO	Granted

**Schedule B - Continued**

Nacional Rol	Name	Area (ha)	Registration Information						Status
			Page	Number	Year	Register	City		
119 03201-9235-8	MARK II 1/60	300	3410	V	700	21-Sep-2012	Property	COPIAPO	Granted
120 03201-9236-6	MARK III 1/60	300	1919	V	431	21-Jun-2012	Property	COPIAPO	Granted
121 03201-9237-4	MARK IV 1/33	134	3417		701	21-Sep-2012	Property	COPIAPO	Granted
122 03201-9238-2	MARK V 1/59	249	3426		702	21-Sep-2012	Property	COPIAPO	Granted
123 03201-9239-0	MARK VI 1/54	238	56		11	10-Jan-2013	Property	COPIAPO	Granted
124 03201-9240-4	MARK VI 55/57	4	3435		703	21-Sep-2012	Property	COPIAPO	Granted
125 03201-9241-2	MARK VI 59/60	3	1926		432	21-Jun-2012	Property	COPIAPO	Granted
126 03203-3260-5	MARTA 1/30 (27/28)	8	192		49	16-Jun-1964	Property	COPIAPO	Granted
127 03203-1891-2	MILANO 1/10	35	477	V	76	23-Apr-1991	Property	COPIAPO	Granted
128 03203-1988-9	MONUNA 1/2	2	951	V	175	17-Jul-1991	Property	COPIAPO	Granted
129 03203-1989-7	MONUNA 3	2	945	V	174	17-Jul-1991	Property	COPIAPO	Granted
130 03203 1990-0	MONUNA 7	3	939	V	173	17-Jul-1991	Property	COPIAPO	Granted
131 03203 1991-9	MONUNA 8	1	933	V	172	17-Jul-1991	Property	COPIAPO	Granted
132 03203 0625-6	ÑA LU 1/6	30	158		59	3-Mar-1959	Property	COPIAPO	Granted
133 03201-5048-5	NATALIA 1/3 ( R )	6	799	V	144	Año 1996	Property	COPIAPO	Granted
134 03203-2065-8	NEGRA 1/30	300	608		97	6-Apr-1992	Property	COPIAPO	Granted
135 03203-1971-4	OLGA 1/10	47	146	V	24	18-Feb-1991	Property	COPIAPO	Granted
136 03203-3477-2	PANDA CUARTA 1/20	100	1558		266	26-Nov-1997	Property	COPIAPO	Granted
137 03203-3472-1	PANDA CUATRO 1	4	1546		264	26-Nov-1997	Property	COPIAPO	Granted
138 03203-3473-k	PANDA CUATRO 2/8	21	1551	V	265	26-Nov-1997	Property	COPIAPO	Granted
139 03203-3824-7	PANDA CUATRO 9/10	6	1028	V	196	5-Jul-1999	Property	COPIAPO	Granted
140 03203-3750-k	PANDA QUINTA 1/24	111	63	V	21	31-Jan-2000	Property	COPIAPO	Granted
141 03203-3474-8	PANDA SEGUNDA 1/15	75	1564	V	267	26-Nov-1997	Property	COPIAPO	Granted
142 03203-3475-6	PANDA TERCERA 1/10	50	1570	V	268	26-Nov-1997	Property	COPIAPO	Granted
143 03203-3476-4	PANDA TERCERA 11/30	100	1577	V	269	26-Nov-1997	Property	COPIAPO	Granted
144 03203-0663-9	PEDRO A. CERDA 1/10	40	487	V	125	1-Dec-1962	Property	COPIAPO	Granted
145 03203-5801-9	PINTA 1	3	2472		533	27-Jul-2012	Property	COPIAPO	Granted
146 03203-5802-7	PINTA 2/11	30	2478	V	534	27-Jul-2012	Property	COPIAPO	Granted
147 03203-1657-k	PINTADAS 21/39	71	498	V	79	23-Apr-1991	Property	COPIAPO	Granted
148 03203-1659-6	PINTADAS 66/72	27	60	V	7	2-Jan-1990	Property	COPIAPO	Granted
149 03203-1660-k	PINTADAS 79/96	81	1737		300	9-Jul-1990	Property	COPIAPO	Granted
150 03203 1658-8	PINTADAS 45/65	80	1267	V	212	10-May-1990	Property	COPIAPO	Granted
151 03203-2249-9	PINTADAS 73	1	616		98	6-Apr-1992	Property	COPIAPO	Granted
152 03203 1818-1	PINTADAS II 1/15	50	1257	V	211	10-May-1990	Property	COPIAPO	Granted
153 03203-3703-8	POR SI ACASO 1	2	1428		387	16-Sep-1998	Property	COPIAPO	Granted
154 03203-7239-9	PORFIA 1/5	20	587	v	169	4-Apr-2017	Property	COPIAPO	Granted
155 03201-9891-7	PUNTA NEGRA A 1/40	200	675	V	186	13-Mar-2014	Property	COPIAPO	Granted
156 03203-2912-4	QUILIMARI I 1/11	102	1274		194	27-Jul-1995	Property	COPIAPO	Granted
157 03203-0677-9	REBECA SEGUNDA (SLM)	1	434		189	15-Dec-1938	Property	COPIAPO	Granted
158 03203-0725-2	RELAVE 1/2	10	118		53	7-Apr-1953	Property	COPIAPO	Granted
159 03203-2111-5	RENACER 14/26	55	1135	V	351	11-Jun-1992	Property	COPIAPO	Granted
160 03203-2112-3	RENACER 28/32	20	1144		352	11-Jun-1992	Property	COPIAPO	Granted
161 03203-2113-1	RENACER 35/51	57	1575		286	19-Oct-1994	Property	COPIAPO	Granted
162 03203-2110-7	RENACER 4/13	30	582	V	152	7-Jul-2000	Property	COPIAPO	Granted
163 03203-2114-k	RENACER 55/58	20	1585		287	19-Oct-1994	Property	COPIAPO	Granted
164 03203-2115-8	RENACER 69/83	69	178		34	7-Feb-1994	Property	COPIAPO	Granted
165 03203-2116-6	RENACER 84/92	37	807	V	121	20-May-1994	Property	COPIAPO	Granted
166 03203-2118-2	RENACER 105/135	103	186	V	35	7-Feb-1994	Property	COPIAPO	Granted
167 03203-0678-7	RESGUARDO (SLM)	1	192		79	9-Jun-1939	Property	COPIAPO	Granted
168 03203-0588-8	RESGUARDO 1/4	4	418	V	65	31-Jul-1963	Property	COPIAPO	Granted
169 03203 1482-8	ROCIO 1/8	55	209	V	72	17-Feb-1989	Property	COPIAPO	Granted
170 03203-0980-8	SAN ESTEBAN	5	48	V	10	14-Jan-1958	Property	COPIAPO	Granted
171 03203-2750-4	SAN JOSE Y SOFIA 2	10	2080		356	14-Aug-1990	Property	COPIAPO	Granted
172 03203-2752-0	SAN PEDRO I 1/10,21/30,35/45	155	1386	V	227	15-May-1990	Property	COPIAPO	Granted
173 03203-2749-0	SAN PEDRO II 49/68	20	1378		226	15-May-1990	Property	COPIAPO	Granted
174 03203-0904-2	SANTA AURORA 1/8	32	121	V	49	3-May-1967	Property	COPIAPO	Granted
175 03203-0888-7	Santos Veta Y Stos. Manto	8	306		119	10-Aug-1937	Property	COPIAPO	Granted
176 03203-0054-1	SOFIA	1	85	V	90	05-07-1890	Property	COPIAPO	Granted

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Nacional Rol	Name	Area (ha)	Registration Information							Status
			Page	Number	Year	Register	City			
119 03201-9235-8	MARK II 1/60	300	3410	V	700	21-Sep-2012	Property	COPIAPO	Granted	
177 03203-3908-1	SOL SEGUNDA 10/12	3	376	V	83	22-Mar-1999	Property	COPIAPO	Granted	
178 03203-3909-k	SOL SEGUNDA 13/22	30	382	V	84	22-Mar-1999	Property	COPIAPO	Granted	
179 03201-4993-2	SUERTE CINCO 1-60 ( 1, 2, 3, 7, 8, 13, ...)	80	221		33	19-Feb-1996	Property	COPIAPO	Granted	
180 03203-2759-8	TAURO TRES 1 (SLM)	10	1225	V	234	16-Sep-1994	Property	COPIAPO	Granted	
181 03203-2760-1	TAURO TRES 3 (SLM)	1	693	V	106	4-May-1994	Property	COPIAPO	Granted	
182 03203-0139-4	TERESA MARIA	3	57	V	38	31-Jul-1943	Property	COPIAPO	Granted	
183 03203-0145-9	TIRANA	5	113	V	56	27-Jul-1949	Property	COPIAPO	Granted	
184 03203-1590-5	TORO 1/20	100	574	V	151	9-May-1989	Property	COPIAPO	Granted	
185 03203 1595-6	TORO 101/120	99	653		164	10-May-1989	Property	COPIAPO	Granted	
186 03203 1596-4	TORO 121/133	39	645		163	10-May-1989	Property	COPIAPO	Granted	
187 03203-1591-3	TORO 21/40	94	630	V	161	10-May-1989	Property	COPIAPO	Granted	
188 03203 1592-1	TORO 41/60	100	580	V	152	9-May-1989	Property	COPIAPO	Granted	
189 03203 1593-K	TORO 61/75	72	639		162	10-May-1989	Property	COPIAPO	Granted	
190 03203 1594-8	TORO 81/100	100	587		153	9-May-1989	Property	COPIAPO	Granted	
191 03203-0985-9	VERI 1/11	48	302	V	100	21-Sep-1967	Property	COPIAPO	Granted	
192 03203-0603-5	VETA GRUESA	2	7	V	3	28-Mar-1918	Property	COPIAPO	Granted	
193 03203-6774-3	VIENTO A10 1	3	866	v	174	18-Feb-2015	Property	COPIAPO	Granted	
194 03203-6775-1	VIENTO A11 1/20	96	872		175	18-Feb-2015	Property	COPIAPO	Granted	
195 03203-1454-2	SAN CARLOS 1/2	6	851	V	736	16-Sep-1986	Discovery	COPIAPO	In Process	
196 03203-7421-9	VIENTO D1 1/3	6	5597		3616	28-Nov-2017	Discovery	COPIAPO	In Process	
197 03203-7422-7	VIENTO D2 1/8	16	5599		3617	28-Nov-2017	Discovery	COPIAPO	In Process	
198 03203-7430-8	MILANO A 1/7	35	5595	V	3615	28-Nov-2017	Discovery	COPIAPO	In Process	
199 03203-7431-6	VIENTO D2 11/17	14	5601		3618	28-Nov-2017	Discovery	COPIAPO	In Process	
200 03203-7440-5	MELENDEZ A1 1-15	75	1082	V	676	19-Feb-2018	Discovery	COPIAPO	In Process	
201 03203-7441-3	MELENDEZ A2 1-11	55	1084		677	19-Feb-2018	Discovery	COPIAPO	In Process	
202 03203-7442-1	MELENDEZ A3 1-9	45	1085	V	678	19-Feb-2018	Discovery	COPIAPO	In Process	
203	VIENTO D1 11/20	50	4456		2751	25-Sep-2018	Discovery	COPIAPO	In Process	
204	VIENTO D2 11/20	50	4458		2752	25-Sep-2018	Discovery	COPIAPO	In Process	
205	VIENTO D3 11/30	100	4460		2753	25-Sep-2018	Discovery	COPIAPO	In Process	

**Schedule B – Minera Ojos del Salado Exploration Concessions**

	Nacional Rol	Name	Area (ha)	Registration Information					Status	Expiration Date
				Page	Number	Year	Register	City		
1	03203-D655-9	VIENTO C1 (renewal)	100	3510	2495	16-Jun-2015	Discover	COPIAPO	Granted	20/Mar/2019
2	03203-D663-K	VIENTO C2 (renewal)	100	3511	v 2496	16-Jun-2015	Discover	COPIAPO	Granted	20/Mar/2019
3	03203-D656-7	VIENTO C3 (renewal)	100	3513	v 2497	16-Jun-2015	Discover	COPIAPO	Granted	20/Mar/2019
4	03203-D662-1	VIENTO C4 (renewal)	100	3515	2498	16-Jun-2015	Discover	COPIAPO	Granted	20/Mar/2019
5	03203-D658-3	VIENTO C5 (renewal)	100	3517	2499	16-Jun-2015	Discover	COPIAPO	Granted	20/Mar/2019
6	03203-D661-3	VIENTO C6 (renewal)	100	3518	v 2500	16-Jun-2015	Discover	COPIAPO	Granted	20/Mar/2019
7	03203-D657-5	VIENTO C7 (renewal)	100	3520	2501	16-Jun-2015	Discover	COPIAPO	Granted	20/Mar/2019
8	03203-D660-5	VIENTO C8 (renewal)	100	3522	2502	16-Jun-2015	Discover	COPIAPO	Granted	20/Mar/2019
9	03203-D659-1	VIENTO C9 (renewal)	100	3524	2503	16-Jun-2015	Discover	COPIAPO	Granted	20/Mar/2019
10	03201-L837-8	NORTE 2	300	4035	2621	4-Sep-2017	Discover	COPIAPO	Granted	27-Jun-2019
11	03201-L838-6	NORTE 6	200	4037	2622	4-Sep-2017	Discover	COPIAPO	Granted	27-Jun-2019
12	03203-E708-9	SUR 5	200	4039	2623	4-Sep-2017	Discover	COPIAPO	Granted	27-Jun-2019
13	03203-E709-7	SUR 9	200	4041	2624	4-Sep-2017	Discover	COPIAPO	Granted	27-Jun-2019
14	03203-E721-6	SUR 4	300	4045	2626	4-Sep-2017	Discover	COPIAPO	Granted	19-Jul-2019
15	03201-L854-8	NORTE 4	300	4047	2627	4-Sep-2017	Discover	COPIAPO	Granted	24-Jul-2019
16	03203-E722-4	SUR 7	300	4043	2625	4-Sep-2017	Discover	COPIAPO	Granted	24-Jul-2019
17	03201-L850-5	NORTE 1	100	5155	3318	2-Nov-2017	Discover	COPIAPO	Granted	27-Jul-2019
18	03201-L851-3	NORTE 5	100	5157	v 3319	2-Nov-2017	Discover	COPIAPO	Granted	27-Jul-2019
19	03203-E716-K	SUR 3	300	5160	3320	2-Nov-2017	Discover	COPIAPO	Granted	27-Jul-2019
20	03203-E717-8	SUR 8	200	5162	v 3321	2-Nov-2017	Discover	COPIAPO	Granted	27-Jul-2019
21	03201-L891-2	NORTE 3	300	4657	2987	2-Oct-2017	Discover	COPIAPO	Granted	17-Aug-2019
22	03203-E730-5	SUR 10	300	4661	v 2990	2-Oct-2017	Discover	COPIAPO	Granted	17-Aug-2019
23	03203-E728-3	SUR 2	300	4658	v 2988	2-Oct-2017	Discover	COPIAPO	Granted	17-Aug-2019
24	03203-E729-1	SUR 6	300	4660	2989	2-Oct-2017	Discover	COPIAPO	Granted	17-Aug-2019
25	03203-D949-3	CORA C3 (renewal)	100	6,780	4752	14-Dec-2015	Discover	COPIAPO	Granted	5/Nov/2019
26	03203-E985-5	PORFIA A1	200	1537	v 945	2-Apr-2018	Discover	COPIAPO	Granted	14-Feb-2020
27	03203-D986-3	CORA D1	300	1541	v 947	2-Apr-2018	Discover	COPIAPO	Granted	20-Feb-2020
28	03203-E992-8	NORTE 7	200	1539	v 946	2-Apr-2018	Discover	COPIAPO	Granted	21-Feb-2020
29	03203-D987-1	CORA D2	300	1543	v 948	2-Apr-2018	Discover	COPIAPO	Granted	22-Feb-2020
30	03203-E990-1	CORA D5	300	1547	950	2-Apr-2018	Discover	COPIAPO	Granted	22-Feb-2020
31	03203-D989-8	CORA D4	300	1545	v 949	2-Apr-2018	Discover	COPIAPO	Granted	23-Feb-2020
32	03203-D988-K	CORA D3	200	2072	v 1267	2-May-2018	Discover	COPIAPO	Granted	9-Mar-2020
33	03203-E991-K	CORA D6	100	2074	1268	2-May-2018	Discover	COPIAPO	Granted	9-Mar-2020
34	03203-F193-0	CAMILA D3	300	3099	1871	3-Jul-2018	Discover	COPIAPO	Granted	11-May-2020
35	03201-M622-2	NEGRA D1	200	3094	1868	3-Jul-2018	Discover	COPIAPO	Granted	11-May-2020
36	03203-F191-4	CAMILA D1	200	3095	v 1869	3-Jul-2018	Discover	COPIAPO	Granted	23-May-2020
37	03203-F192-2	CAMILA D2	300	3097	v 1870	3-Jul-2018	Discover	COPIAPO	Granted	23-May-2020
38	03203-F190-6	NEGRA D2	200	28	v 23	3-Jan-2018	Discover	COPIAPO	Granted	30-May-2020
39	03201-M738-5	MARK D2	200	1078	673	19-Feb-2018	Discover	COPIAPO	Granted	18-Jun-2020
40	03201-M733-4	MARK D1	200	1075	671	19-Feb-2018	Discover	COPIAPO	Granted	20-Jun-2020
41	03201-M734-2	MARK D5	300	1076	v 672	19-Feb-2018	Discover	COPIAPO	Granted	20-Jun-2020
42	03201-M750-4	MARK D4	300	1073	670	19-Feb-2018	Discover	COPIAPO	Granted	22-Jun-2020
43	03201-M739-3	MARK D6	300	1079	v 674	19-Feb-2018	Discover	COPIAPO	Granted	5-Jul-2020
44	03201-M766-0	MARK D3	300	1081	675	19-Feb-2018	Discover	COPIAPO	Granted	13-Jul-2020
45	03203-F306-2	VIENTO A2	200	2620	1586	28-May-2018	Discover	COPIAPO	Granted	12/Sep/2020
46	03203-F307-0	VIENTO A3	200	2621	v 1587	28-May-2018	Discover	COPIAPO	Granted	5/Oct/2020
47	03203-F308-9	VIENTO A4	300	2623	1588	28-May-2018	Discover	COPIAPO	Granted	10/Sep/2020
48	03203-F310-0	VIENTO A6	200	2626	1590	28-May-2018	Discover	COPIAPO	Granted	12/Sep/2020
49	03203-F311-9	VIENTO A7	200	2627	v 1591	28-May-2018	Discover	COPIAPO	Granted	24/Sep/2020

**Schedule B – Continued**

Nacional Rol	Name	Area (ha)	Registration Information						Status	Expiration Date
			Page	Number	Year	Register	City			
50	03203-F312-7	VIENTO A8	200	2629	1592	28-May-2018	Discover	COPIAPO	Granted	5/Oct/2020
51	03203-F314-3	VIENTO A10	300	2632	1594	28-May-2018	Discover	COPIAPO	Granted	10/Sep/2020
52	03203-F315-1	BUITRE D2	300	2633	v 1595	28-May-2018	Discover	COPIAPO	Granted	24/Sep/2020
53	03203-F305-4	VIENTO A1	200	2618	v 1585	28-May-2018	Discover	COPIAPO	In Process	
54	03203-F309-7	VIENTO A5	300	2624	v 1589	28-May-2018	Discover	COPIAPO	In Process	
55	03203-F313-5	VIENTO A9	300	2630	v 1593	28-May-2018	Discover	COPIAPO	In Process	
56		VIENTO D3- a (renewal)	100	5327	3518	21-Nov-2016	Discover	COPIAPO	In Process	
57		VIENTO D2- a (renewal)	100	5631	3738	13-Dec-2016	Discover	COPIAPO	In Process	
50	03203-F312-7	VIENTO A8	200	2629	1592	28-May-2018	Discover	COPIAPO	Granted	5/Oct/2020
51	03203-F314-3	VIENTO A10	300	2632	1594	28-May-2018	Discover	COPIAPO	Granted	10/Sep/2020

## **APPENDIX B**

### **Reconciliation of Gold and Silver Mineral Resources July 2017 to June 2018**

## Gold Reconciliation

### Candelaria Open Pit

Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity (’000 t)	Grade Au (ppm)	Metal Au (’000 Oz)	Quantity (’000 t)	Grade Au (ppm)	Metal Au (’000 Oz)	Quantity (’000 t)	Grade Au (ppm)	Metal Au (’000 Oz)
Jul 2017	964	0.20	6.2	953	0.19	6.0	896	0.20	5.8
Aug 2017	1,758	0.16	8.9	1,515	0.16	7.6	1,632	0.16	8.2
Sept 2017	1,797	0.21	12.1	1,676	0.21	11.1	1,677	0.21	11.3
Oct 2017	1,593	0.17	8.7	1,438	0.16	7.4	1,634	0.17	8.9
Nov 2017	1,421	0.14	6.4	1,338	0.14	6.0	1,441	0.14	6.5
Dec 2017	1,796	0.14	7.9	1,641	0.14	7.3	1,813	0.14	8.0
Jan 2018	1,073	0.11	3.9	842	0.12	3.2	873	0.11	3.2
Feb 2018	817	0.12	3.2	710	0.13	2.9	700	0.12	2.7
Mar 2018	944	0.15	4.7	784	0.15	3.9	818	0.15	4.0
Apr 2018	666	0.14	3.0	521	0.16	2.6	474	0.14	2.1
May 2018	309	0.19	1.9	269	0.18	1.5	335	0.19	2.1
Jun 2018	132	0.22	0.9	109	0.18	0.6	178	0.22	1.2
<b>Total</b>	<b>13,271</b>	<b>0.16</b>	<b>67.8</b>	<b>11,796</b>	<b>0.16</b>	<b>60.2</b>	<b>12,471</b>	<b>0.16</b>	<b>64.1</b>
<b>Overall relative difference*</b>				<b>-11.1%</b>	<b>-0.2%</b>	<b>-11.3%</b>	<b>-6.0%</b>	<b>0.6%</b>	<b>-5.4%</b>

\* Long term vs short term and mine extraction

### Candelaria North

Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity (’000 t)	Grade Au (ppm)	Metal Au (’000 Oz)	Quantity (’000 t)	Grade Au (ppm)	Metal Au (’000 Oz)	Quantity (’000 t)	Grade Au (ppm)	Metal Au (’000 Oz)
Jul 2017	192	0.24	1.5	192	0.24	1.5	228	0.24	1.8
Aug 2017	183	0.24	1.4	183	0.24	1.4	227	0.24	1.8
Sept 2017	180	0.27	1.6	180	0.27	1.6	233	0.27	2.0
Oct 2017	188	0.24	1.5	188	0.24	1.5	231	0.24	1.8
Nov 2017	194	0.35	2.2	194	0.35	2.2	232	0.35	2.6
Dec 2017	159	0.35	1.8	159	0.35	1.8	222	0.35	2.5
Jan 2018	150	0.27	1.3	150	0.27	1.3	205	0.27	1.8
Feb 2018	184	0.26	1.5	184	0.26	1.5	220	0.26	1.8
Mar 2018	228	0.23	1.7	228	0.23	1.7	267	0.23	2.0
Apr 2018	229	0.26	1.9	229	0.26	1.9	262	0.26	2.2
May 2018	248	0.28	2.2	248	0.28	2.2	275	0.28	2.5
Jun 2018	239	0.26	2.0	239	0.26	2.0	279	0.26	2.3
<b>Total</b>	<b>2,373</b>	<b>0.27</b>	<b>20.6</b>	<b>2,373</b>	<b>0.27</b>	<b>20.6</b>	<b>2,883</b>	<b>0.27</b>	<b>25.1</b>
<b>Overall relative difference*</b>				<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>21.5%</b>	<b>0.3%</b>	<b>21.9%</b>

\* Long term vs short term and mine extraction

**Alcaparrosa**

Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity	Grade	Metal Au	Quantity	Grade	Metal Au	Quantity	Grade	Metal Au
	('000 t)	Au (ppm)	('000 Oz)	('000 t)	Au (ppm)	('000 Oz)	('000 t)	Au (ppm)	('000 Oz)
Jul 2017	125	0.22	0.9	125	0.22	0.9	130	0.22	0.9
Aug 2017	127	0.26	1.1	127	0.26	1.1	132	0.26	1.1
Sept 2017	138	0.21	0.9	138	0.21	0.9	138	0.21	0.9
Oct 2017	143	0.21	1.0	143	0.21	1.0	137	0.21	0.9
Nov 2017	118	0.21	0.8	118	0.21	0.8	128	0.21	0.9
Dec 2017	118	0.22	0.8	118	0.22	0.8	125	0.22	0.9
Jan 2018	122	0.19	0.7	122	0.19	0.7	131	0.19	0.8
Feb 2018	109	0.19	0.7	109	0.19	0.7	106	0.19	0.7
Mar 2018	129	0.20	0.8	129	0.20	0.8	134	0.20	0.9
Apr 2018	131	0.20	0.8	131	0.20	0.8	143	0.20	0.9
May 2018	121	0.18	0.7	121	0.18	0.7	134	0.18	0.8
Jun 2018	130	0.16	0.7	130	0.16	0.7	143	0.16	0.8
<b>Total</b>	<b>1,513</b>	<b>0.20</b>	<b>10.0</b>	<b>1,513</b>	<b>0.20</b>	<b>10.0</b>	<b>1,581</b>	<b>0.20</b>	<b>10.4</b>
<b>Overall relative difference*</b>				<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>4.5%</b>	<b>-0.2%</b>	<b>4.3%</b>

\* Long term vs short term and mine extraction

**Santos Candelaria Plant**

Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity	Grade	Metal Au	Quantity	Grade	Metal Au	Quantity	Grade	Metal Au
	('000 t)	Au (ppm)	('000 Oz)	('000 t)	Au (ppm)	('000 Oz)	('000 t)	Au (ppm)	('000 Oz)
Jul 2017	39	0.22	0.3	39	0.22	0.3	47	0.22	0.3
Aug 2017	35	0.22	0.2	35	0.22	0.2	44	0.22	0.3
Sept 2017	43	0.23	0.3	43	0.23	0.3	45	0.23	0.3
Oct 2017	38	0.23	0.3	38	0.23	0.3	44	0.23	0.3
Nov 2017	32	0.22	0.2	31	0.22	0.2	34	0.22	0.2
Dec 2017	30	0.22	0.2	30	0.22	0.2	36	0.22	0.2
Jan 2018	35	0.15	0.1	35	0.15	0.1	39	0.15	0.1
Feb 2018	27	0.19	0.1	27	0.19	0.1	32	0.19	0.1
Mar 2018	39	0.18	0.1	39	0.18	0.1	36	0.18	0.1
Apr 2018	47	0.23	0.1	47	0.23	0.1	49	0.23	0.1
May 2018	47	0.17	0.1	50	0.17	0.1	52	0.17	0.1
Jun 2018	46	0.21	0.1	46	0.21	0.1	47	0.21	0.1
<b>Total</b>	<b>459</b>	<b>0.21</b>	<b>2.0</b>	<b>462</b>	<b>0.21</b>	<b>2.0</b>	<b>504</b>	<b>0.21</b>	<b>2.3</b>
<b>Overall relative difference*</b>				<b>0.6%</b>	<b>-0.1%</b>	<b>0.3%</b>	<b>9.8%</b>	<b>0.2%</b>	<b>12.3%</b>

\* Long term vs short term and mine extraction

**Santos PAC Plant**

Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity (’000 t)	Grade Au (ppm)	Metal Au (’000 Oz)	Quantity (’000 t)	Grade Au (ppm)	Metal Au (’000 Oz)	Quantity (’000 t)	Grade Au (ppm)	Metal Au (’000 Oz)
Jul 2017	112	0.29	0.3	112	0.29	0.3	111	0.29	0.3
Aug 2017	108	0.29	0.3	108	0.29	0.3	114	0.29	0.3
Sept 2017	105	0.29	0.3	105	0.29	0.3	115	0.29	0.3
Oct 2017	95	0.26	0.2	95	0.26	0.2	108	0.26	0.3
Nov 2017	87	0.24	0.2	87	0.24	0.2	106	0.24	0.3
Dec 2017	100	0.28	0.3	100	0.28	0.3	109	0.28	0.3
Jan 2018	102	0.26	0.3	102	0.26	0.3	108	0.26	0.3
Feb 2018	87	0.23	0.2	87	0.23	0.2	99	0.23	0.2
Mar 2018	99	0.20	0.2	99	0.20	0.2	115	0.20	0.2
Apr 2018	113	0.21	0.2	113	0.21	0.2	123	0.21	0.3
May 2018	121	0.17	0.2	121	0.17	0.2	128	0.17	0.2
Jun 2018	106	0.22	0.2	106	0.22	0.2	112	0.22	0.2
<b>Total</b>	<b>1,235</b>	<b>0.24</b>	<b>3.0</b>	<b>1,235</b>	<b>0.24</b>	<b>3.0</b>	<b>1,347</b>	<b>0.24</b>	<b>3.3</b>
<b>Overall relative difference*</b>				<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>9.1%</b>	<b>-0.2%</b>	<b>8.9%</b>

\* Long term vs short term and mine extraction

**Santos Candelaria +PAC Plant**

Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity (’000 t)	Grade Au (ppm)	Metal Au (’000 Oz)	Quantity (’000 t)	Grade Au (ppm)	Metal Au (’000 Oz)	Quantity (’000 t)	Grade Au (ppm)	Metal Au (’000 Oz)
Jul 2017	151	0.40	0.6	151	0.40	0.6	158	0.41	0.7
Aug 2017	143	0.39	0.6	143	0.39	0.6	158	0.41	0.6
Sept 2017	148	0.42	0.6	148	0.42	0.6	160	0.41	0.7
Oct 2017	133	0.39	0.5	133	0.39	0.5	152	0.39	0.6
Nov 2017	119	0.37	0.4	118	0.37	0.4	140	0.35	0.5
Dec 2017	130	0.38	0.5	130	0.38	0.5	145	0.39	0.6
Jan 2018	136	0.23	0.3	136	0.23	0.3	147	0.23	0.3
Feb 2018	114	0.22	0.3	114	0.22	0.3	131	0.22	0.3
Mar 2018	138	0.19	0.3	138	0.19	0.3	151	0.19	0.3
Apr 2018	161	0.22	0.4	161	0.22	0.4	172	0.22	0.4
May 2018	168	0.17	0.3	171	0.17	0.3	180	0.17	0.3
Jun 2018	153	0.21	0.3	153	0.21	0.3	159	0.21	0.3
<b>Total</b>	<b>1,694</b>	<b>0.30</b>	<b>5.0</b>	<b>1,697</b>	<b>0.30</b>	<b>5.0</b>	<b>1,852</b>	<b>0.30</b>	<b>5.5</b>
<b>Overall relative difference*</b>				<b>0.2%</b>	<b>-0.1%</b>	<b>0.1%</b>	<b>9.3%</b>	<b>0.9%</b>	<b>10.2%</b>

\* Long term vs short term and mine extraction

## Silver Reconciliation

### Candelaria Open Pit

Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity (’000 t)	Grade Ag (ppm)	Metal Ag (’000 Oz)	Quantity (’000 t)	Grade Ag (ppm)	Metal Ag (’000 Oz)	Quantity (’000 t)	Grade Ag (ppm)	Metal Ag (’000 Oz)
Jul 2017	964	3.98	123.3	953	3.81	116.8	896	3.98	114.6
Aug 2017	1,758	2.78	157.2	1,515	2.81	137.1	1,632	2.78	146.0
Sept 2017	1,797	3.95	228.5	1,676	3.87	208.8	1,677	3.95	213.2
Oct 2017	1,593	3.50	179.1	1,438	3.39	156.8	1,634	3.50	183.8
Nov 2017	1,421	2.04	92.9	1,338	2.07	89.2	1,441	2.04	94.3
Dec 2017	1,796	1.92	110.7	1,641	1.92	101.5	1,813	1.92	111.8
Jan 2018	1,073	1.69	58.4	842	1.79	48.4	873	1.69	47.5
Feb 2018	817	1.42	37.2	710	1.47	33.6	700	1.42	31.9
Mar 2018	944	1.95	59.2	784	1.91	48.0	818	1.95	51.3
Apr 2018	666	1.73	37.0	521	1.70	28.5	474	1.73	26.4
May 2018	309	1.91	19.0	269	2.14	18.5	335	1.91	20.6
Jun 2018	132	4.15	17.6	109	3.92	13.8	178	4.15	23.7
<b>Total</b>	<b>13,271</b>	<b>2.63</b>	<b>1,120.4</b>	<b>11,796</b>	<b>2.64</b>	<b>1,001.0</b>	<b>12,471</b>	<b>2.66</b>	<b>1,064.9</b>
<b>Overall relative difference*</b>				<b>-11.1%</b>	<b>0.5%</b>	<b>-10.7%</b>	<b>-6.0%</b>	<b>1.2%</b>	<b>-4.9%</b>

\* Long term vs short term and mine extraction

### Candelaria North

Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity (’000 t)	Grade Ag (ppm)	Metal Ag (’000 Oz)	Quantity (’000 t)	Grade Ag (ppm)	Metal Ag (’000 Oz)	Quantity (’000 t)	Grade Ag (ppm)	Metal Ag (’000 Oz)
Jul 2017	192	5.71	35.2	192	5.71	35.2	228	5.71	41.9
Aug 2017	183	5.37	31.6	183	5.37	31.6	227	5.37	39.2
Sept 2017	180	5.61	32.5	180	5.61	32.5	233	5.61	42.0
Oct 2017	188	5.65	34.2	188	5.65	34.2	231	5.65	41.9
Nov 2017	194	7.08	44.1	194	7.08	44.1	232	7.08	52.9
Dec 2017	159	7.36	37.5	159	7.36	37.5	222	7.36	52.5
Jan 2018	150	7.11	34.3	150	7.11	34.3	205	7.11	46.8
Feb 2018	184	5.63	33.3	184	5.63	33.3	220	5.63	39.8
Mar 2018	228	4.18	30.6	228	4.18	30.6	267	4.18	35.9
Apr 2018	229	4.59	33.8	229	4.59	33.8	262	4.59	38.8
May 2018	248	5.90	47.0	248	5.90	47.0	275	5.90	52.2
Jun 2018	239	5.57	42.8	239	5.57	42.8	279	5.57	50.0
<b>Total</b>	<b>2,373</b>	<b>5.73</b>	<b>436.8</b>	<b>2,373</b>	<b>5.73</b>	<b>436.8</b>	<b>2,883</b>	<b>5.76</b>	<b>534.0</b>
<b>Overall relative difference*</b>				<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>21.5%</b>	<b>0.6%</b>	<b>22.3%</b>

\* Long term vs short term and mine extraction

### Alcaparrosa

Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity	Grade	Metal Ag	Quantity	Grade	Metal Ag	Quantity	Grade	Metal Ag
	('000 t)	Ag (ppm)	('000 Oz)	('000 t)	Ag (ppm)	('000 Oz)	('000 t)	Ag (ppm)	('000 Oz)
Jul 2017	125	1.26	5.1	125	1.26	5.1	130	1.26	5.3
Aug 2017	127	1.03	4.2	127	1.03	4.2	132	1.03	4.4
Sept 2017	138	0.96	4.2	138	0.96	4.2	138	0.96	4.2
Oct 2017	143	0.94	4.3	143	0.94	4.3	137	0.94	4.2
Nov 2017	118	0.95	3.6	118	0.95	3.6	128	0.95	3.9
Dec 2017	118	0.90	3.4	118	0.90	3.4	125	0.90	3.6
Jan 2018	122	1.01	4.0	122	1.01	4.0	131	1.01	4.3
Feb 2018	109	1.03	3.6	109	1.03	3.6	106	1.03	3.5
Mar 2018	129	1.05	4.3	129	1.05	4.3	134	1.05	4.5
Apr 2018	131	1.05	4.4	131	1.05	4.4	143	1.05	4.8
May 2018	121	0.97	3.8	121	0.97	3.8	134	0.97	4.2
Jun 2018	130	1.09	4.6	130	1.09	4.6	143	1.09	5.0
<b>Total</b>	<b>1,513</b>	<b>1.02</b>	<b>49.5</b>	<b>1,513</b>	<b>1.02</b>	<b>49.5</b>	<b>1,581</b>	<b>1.02</b>	<b>51.8</b>
<b>Overall relative difference*</b>				<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>4.5%</b>	<b>0.1%</b>	<b>4.6%</b>

\* Long term vs short term and mine extraction

### Santos Candelaria Plant

Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity	Grade	Metal Ag	Quantity	Grade	Metal Ag	Quantity	Grade	Metal Ag
	('000 t)	Ag (ppm)	('000 Oz)	('000 t)	Ag (ppm)	('000 Oz)	('000 t)	Ag (ppm)	('000 Oz)
Jul 2017	39	2.45	3.1	39	2.45	3.1	47	2.45	3.7
Aug 2017	35	2.04	2.3	35	2.04	2.3	44	2.04	2.9
Sept 2017	43	2.30	3.2	43	2.30	3.2	45	2.30	3.3
Oct 2017	38	2.25	2.8	38	2.25	2.8	44	2.25	3.2
Nov 2017	31	2.52	2.6	31	2.52	2.6	34	2.52	2.7
Dec 2017	30	2.37	2.3	30	2.37	2.3	36	2.37	2.7
Jan 2018	35	2.10	2.3	35	2.10	2.3	39	2.10	2.6
Feb 2018	27	2.24	2.0	27	2.24	2.0	32	2.24	2.3
Mar 2018	39	2.26	2.8	39	2.26	2.8	36	2.26	2.6
Apr 2018	47	3.13	4.8	47	3.13	4.8	49	3.13	5.0
May 2018	47	2.46	3.8	50	2.46	4.0	52	2.46	4.1
Jun 2018	46	2.98	4.4	46	2.98	4.4	47	2.98	4.5
<b>Total</b>	<b>459</b>	<b>2.46</b>	<b>36.3</b>	<b>462</b>	<b>2.46</b>	<b>36.5</b>	<b>504</b>	<b>2.45</b>	<b>39.6</b>
<b>Overall relative difference*</b>				<b>0.6%</b>	<b>0.0%</b>	<b>0.6%</b>	<b>9.8%</b>	<b>-0.5%</b>	<b>9.3%</b>

\* Long term vs short term and mine extraction

**Santos PAC Plant**

Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity	Grade	Metal Ag	Quantity	Grade	Metal Ag	Quantity	Grade	Metal Ag
	('000 t)	Ag (ppm)	('000 Oz)	('000 t)	Ag (ppm)	('000 Oz)	('000 t)	Ag (ppm)	('000 Oz)
Jul 2017	112	2.62	9.4	112	2.62	9.4	111	2.62	9.3
Aug 2017	108	2.71	9.4	108	2.71	9.4	114	2.71	9.9
Sept 2017	105	2.82	9.5	105	2.82	9.5	115	2.82	10.4
Oct 2017	95	2.51	7.7	95	2.51	7.7	108	2.51	8.7
Nov 2017	87	2.69	7.5	87	2.69	7.5	106	2.69	9.1
Dec 2017	100	2.74	8.8	100	2.74	8.8	109	2.74	9.6
Jan 2018	102	2.57	8.4	102	2.57	8.4	108	2.57	9.0
Feb 2018	87	2.55	7.1	87	2.55	7.1	99	2.55	8.1
Mar 2018	99	2.48	7.9	99	2.48	7.9	115	2.48	9.2
Apr 2018	113	2.95	10.7	113	2.95	10.7	123	2.95	11.6
May 2018	121	2.42	9.4	121	2.42	9.4	128	2.42	9.9
Jun 2018	106	3.03	10.4	106	3.03	10.4	112	3.03	10.9
<b>Total</b>	<b>1,235</b>	<b>2.68</b>	<b>106.3</b>	<b>1,235</b>	<b>2.68</b>	<b>106.3</b>	<b>1,347</b>	<b>2.68</b>	<b>115.8</b>
<b>Overall relative difference*</b>				<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>9.0%</b>	<b>-0.1%</b>	<b>9.0%</b>

\* Long term vs short term and mine extraction

**Santos Candelaria + PAC Plant**

Period	Long Term Model 2017			Short Term Model			As Mined		
	Quantity	Grade	Metal Ag	Quantity	Grade	Metal Ag	Quantity	Grade	Metal Ag
	('000 t)	Ag (ppm)	('000 Oz)	('000 t)	Ag (ppm)	('000 Oz)	('000 t)	Ag (ppm)	('000 Oz)
Jul 2017	151	8.28	12.5	151	8.28	12.5	157	8.26	13.0
Aug 2017	143	8.19	11.7	143	8.19	11.7	158	8.11	12.8
Sept 2017	148	8.58	12.7	148	8.58	12.7	160	8.60	13.7
Oct 2017	133	7.83	10.4	133	7.83	10.4	152	7.83	11.9
Nov 2017	118	8.49	10.1	118	8.49	10.1	139	8.51	11.9
Dec 2017	130	8.53	11.1	130	8.53	11.1	145	8.51	12.3
Jan 2018	136	7.88	10.8	136	7.88	10.8	147	7.87	11.6
Feb 2018	114	7.96	9.1	114	7.96	9.1	131	7.96	10.4
Mar 2018	138	7.79	10.7	138	7.79	10.7	151	7.81	11.8
Apr 2018	161	9.65	15.5	161	9.65	15.5	172	9.65	16.6
May 2018	168	7.81	13.1	171	7.81	13.4	180	7.81	14.0
Jun 2018	153	9.70	14.8	153	9.70	14.8	159	9.70	15.5
<b>Total</b>	<b>1,694</b>	<b>8.42</b>	<b>142.6</b>	<b>1,697</b>	<b>8.41</b>	<b>142.8</b>	<b>1,851</b>	<b>8.40</b>	<b>155.5</b>
<b>Overall relative difference*</b>				<b>0.2%</b>	<b>0.0%</b>	<b>0.2%</b>	<b>9.2%</b>	<b>-0.2%</b>	<b>9.0%</b>

\* Long term vs short term and mine extraction

## CERTIFICATE OF QUALIFIED PERSON

To accompany the report entitled *Technical Report for the Candelaria Copper Mining Complex, Atacama Region, Region III, Chile* and having an effective date of June 30, 2018 and a signature date of November 28, 2018.

I, Glen Cole, do hereby certify that:

- 1) I am a Principal Consultant (Resource Geology) with the firm of SRK Consulting (Canada) Inc. with an office at Suite 1500, 155 University Avenue, Toronto, Ontario, M5H 3B7;
- 2) I am a graduate of the University of Cape Town in South Africa with a BSc (Hons) in Geology in 1983; I obtained a MSc (Geology) from the University of Johannesburg in South Africa in 1995 and a MEng in Mineral Economics from the University of the Witwatersrand in South Africa in 1999. I have practiced my profession continuously since 1986. Between 1986 and 1989 I worked as a staff geologist on various Anglo-American mines. Between 1989 and 2005 I worked at several exploration projects, underground and open pit mining operations in Africa and held various senior positions, with the responsibility for estimation of Mineral Resources and Mineral Reserves for development projects and operating mines. Since 2006, I have estimated and audited Mineral Resources for a variety of early and advanced international base and precious metals projects;
- 3) I am a Professional Geoscientist registered with the Association of Professional Geoscientists of the Province of Ontario (APGO#1416), the Association of Professional Engineers and Geoscientists of the Province of Saskatchewan (PEGS#26003) and am also registered as a Professional Natural Scientist with the South African Council for Scientific Professions (Reg#400070/02);
- 4) I have personally inspected the subject projects on various occasions from June 16 to 18, 2014, December 14 to 16, 2016, November 8 to 9, 2017, and October 30 to 31, 2018;
- 5) I have read the definition of Qualified Person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a Qualified Person for the purposes of National Instrument 43-101 and this technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1;
- 6) I, as a Qualified Person, am independent of the issuer as defined in Section 1.5 of National Instrument 43-101;
- 7) I am the co-author of this report and responsible for the Executive Summary, and Sections 1 to 11, 13, 17, 18, 21, 22, 23, 24, 25, 26, Appendix A and Appendix B, and accept professional responsibility for those sections of this technical report;
- 8) In 2014, 2015, and 2017 I have co-authored previous technical reports about the subject property for Lundin Mining Corporation and Franco-Nevada Corporation;
- 9) I have read National Instrument 43-101 and confirm that this technical report has been prepared in compliance therewith;
- 10) SRK Consulting (Canada) Inc. was retained by Lundin Mining Corporation to prepare a technical report for the Candelaria Copper Mining Complex located in Chile in accordance with National Instrument 43-101 and Form 43-101F1 guidelines. This assignment was completed using *CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines* and Canadian Securities Administrators' National Instrument 43-101 guidelines. This assignment was completed using the environmental and social requirements applicable at the time in Chile and taking cognizance of good international industry practice as specified in the IFC Performance Standards;
- 11) I have not received, nor do I expect to receive, any interest, directly or indirectly, in the Compañía Contractual Minera Candelaria and Compañía Contractual Minera Ojos del Salado copper projects or securities of Lundin Mining Corporation; and
- 12) That, as of the effective date of this technical report, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Toronto, Ontario  
November 28, 2018

[“signed and sealed”]  
Glen Cole, PGeo (APGO#1416)  
Principal Consultant (Resource Geology)

## CERTIFICATE OF QUALIFIED PERSON

To accompany the report entitled *Technical Report for the Candelaria Copper Mining Complex, Atacama Region, Region III, Chile* and having an effective date of June 30, 2018 and a signature date of November 28, 2018.

I, Adrian Dance, do hereby certify that:

- 1) I am a Principal Consultant (Metallurgy) with the firm of SRK Consulting (Canada) Inc. with an office at 22<sup>nd</sup> Floor, 1066 West Hastings Street, Vancouver, British Columbia, Canada;
- 2) I am a graduate of the University of British Columbia in 1987 and the University of Queensland in 1991 where I obtained a BAsC in Mineral Processing and a PhD in Mineral Processing. I have practiced my profession continuously since 1991 where I have both worked at copper processing operations in Canada and Peru as well as consulted on a range of copper-gold processing projects around the world;
- 3) I am a professional engineer registered with the APEGBC, license # 37151;
- 4) I have not personally visited the subject projects;
- 5) I have read the definition of Qualified Person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a Qualified Person for the purposes of National Instrument 43-101 and this technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1;
- 6) I, as a Qualified Person, am independent of the issuer as defined in Section 1.5 of National Instrument 43-101;
- 7) I am the co-author of this report and responsible for the Executive Summary, Sections 12, 16, 20.1.2, 20.1.3, 20.1.4, and 20.2 and accept professional responsibility for those sections of this technical report;
- 8) I have participated in a review of Candelaria's grinding circuit performance in 2006, and from 2014 to 2017, I have co-authored previous technical reports about the subject property for Lundin Mining Corporation and Franco-Nevada Corporation;
- 9) I have read National Instrument 43-101 and confirm that this technical report has been prepared in compliance therewith;
- 10) SRK Consulting (Canada) Inc. was retained by Lundin Mining Corporation to prepare a technical report for the Candelaria Copper Mining Complex located in Chile in accordance with National Instrument 43-101 and Form 43-101F1 guidelines. This assignment was completed using CIM *Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines* and Canadian Securities Administrators' National Instrument 43-101 guidelines. This assignment was completed using the environmental and social requirements applicable at the time in Chile and taking cognizance of good international industry practice as specified in the IFC Performance Standards;
- 11) I have not received, nor do I expect to receive, any interest, directly or indirectly, in the Compañía Contractual Minera Candelaria and Compañía Contractual Minera Ojos del Salado copper projects or securities of Lundin Mining Corporation; and
- 12) That, as of the effective date of this technical report, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Vancouver, British Columbia  
November 28, 2018

["signed and sealed"]  
Adrian Dance (PEng #37151)  
Principal Consultant (Mineral Processing)

## CERTIFICATE OF QUALIFIED PERSON

To accompany the report entitled *Technical Report for the Candelaria Copper Mining Complex, Atacama Region, Region III, Chile* and having an effective date of June 30, 2018 and a signature date of November 28, 2018.

I, Benny Zhang, do hereby certify that:

- 1) I am a Principal Consultant (Mine Engineering) with the firm of SRK Consulting (Canada) Inc. with an office at Suite 1500, 155 University Avenue, Toronto, Ontario, M5H 3B7;
- 2) I graduated with a Bachelor of Engineering degree in Mining Engineering from Central South University, China in 1984, and a Master of Engineering degree in Applied Rock Mechanics for Mine Planning from McGill University, Canada in 2006. I have practiced my profession for 34 years. I have been directly involved in mine operations, mine design and planning, technical review and audit, due diligence, mining project valuation, equipment selection, ventilation, rock mechanics and ground support, and providing various technical services for more than 80 base metal and precious metal mines / projects, including base metal sulphide deposit projects. Since 2000 I have been focusing my career on mining project related consulting services worldwide
- 3) I am a Professional Engineer registered with Professional Engineers Ontario (PEO#100115459);
- 4) I have personally inspected the subject projects between December 14 and 16, 2016 and November 8 and 9, 2017;
- 5) I have read the definition of Qualified Person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a Qualified Person for the purposes of National Instrument 43-101 and this technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1;
- 6) I, as a Qualified Person, am independent of the issuer as defined in Section 1.5 of National Instrument 43-101;
- 7) I am the co-author of this report and responsible for the Executive Summary and Sections 14.1, 14.2.3, 14.3, 14.4, 15.1, 15.3, 15.4, 15.5, 15.6.2, 15.7, 20.1.1, 20.1.3, 20.1.4, 20.2, 24, 25, and 26, and accept professional responsibility for those sections of this technical report;
- 8) In 2017, I co-authored two previous technical reports about the subject property for Lundin Mining Corporation;
- 9) I have read National Instrument 43-101 and confirm that this technical report has been prepared in compliance therewith;
- 10) SRK Consulting (Canada) Inc. was retained by Lundin Mining Corporation to prepare a technical report for the Candelaria Copper Mining Complex located in Chile in accordance with National Instrument 43-101 and Form 43-101F1 guidelines. This assignment was completed using *CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines* and Canadian Securities Administrators' National Instrument 43-101 guidelines. This assignment was completed using the environmental and social requirements applicable at the time in Chile and taking cognizance of good international industry practice as specified in the IFC Performance Standards;
- 11) I have not received, nor do I expect to receive, any interest, directly or indirectly, in the Compañía Contractual Minera Candelaria and Compañía Contractual Minera Ojos del Salado copper projects or securities of Lundin Mining Corporation; and
- 12) That, as of the effective date of this technical report, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Toronto, Ontario  
November 28, 2018

["signed and sealed"]  
Benny Zhang, PEng (PEO#100115459)  
Principal Consultant (Mine Engineering)

## CERTIFICATE OF QUALIFIED PERSON

To accompany the report entitled *Technical Report for the Candelaria Copper Mining Complex, Atacama Region, Region III, Chile* and having an effective date of June 30, 2018 and a signature date of November 28, 2018.

I, John Nilsson, do hereby certify that:

- 1) I am President with the firm of Nilsson Mine Services with an office at 20263 Mountain Place, Pitt Meadows, British Columbia;
- 2) I am a graduate of Queen's University in Kingston, Ontario with a BSc in Geology in 1977, I obtained an MSc in Mining Engineering from Queen's University in 1990. I have practiced my profession continuously since 1977.
- 3) I am a professional Engineer registered with the Association of Professional Engineers and Geoscientists of British Columbia (#20697);
- 4) I have personally inspected the subject projects between June 10 and 12, 2014, June 16 and 18, 2014, July 6 to 10, 2015, December 14 to 16, 2016, October 9 to 13, 2017 and October 30 to 31, 2018;
- 5) I have read the definition of Qualified Person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a Qualified Person for the purposes of National Instrument 43-101 and this technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1;
- 6) I, as a Qualified Person, am independent of the issuer as defined in Section 1.5 of National Instrument 43-101;
- 7) I am the co-author of this report and responsible for the Executive Summary and Sections 14.1, 14.2.1, 14.2.2, 14.4, 15.1, 15.2, 15.5, 15.6.1, 15.7, 20.1.1, 20.1.3, 20.1.4, 20.2, 24, 25, and 26, and accept professional responsibility for those sections of this technical report;
- 8) In 2014, 2015 and 2017, I have co-authored previous technical reports about the subject property for Lundin Mining Corporation and Franco-Nevada Corporation;
- 9) I have read National Instrument 43-101 and confirm that this technical report has been prepared in compliance therewith;
- 10) Nilsson Mine Services Ltd. was retained by Lundin Mining Corporation to prepare sections of a technical report, including contributions to a Mineral Reserve Statement, for the Candelaria Copper Mining Project located in Chile in accordance with National Instrument 43-101 and Form 43-101F1 guidelines. This assignment was completed using *CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines* and Canadian Securities Administrators' National Instrument 43-101 guidelines;
- 11) I have not received, nor do I expect to receive, any interest, directly or indirectly, in the Compañía Contractual Minera Candelaria and Compañía Contractual Minera Ojos del Salado copper projects or securities of Lundin Mining Corporation; and
- 12) That, as of the effective date of this technical report, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Pitt Meadows, British Columbia  
November 28, 2018

[“signed and sealed”]  
John Nilsson, PEng (APEGBC#20697)  
President Nilsson Mine Services Ltd.

## CERTIFICATE OF QUALIFIED PERSON

To accompany the report entitled *Technical Report for the Candelaria Copper Mining Complex, Atacama Region, Region III, Chile* and having an effective date of June 30, 2018 and a signature date of November 28, 2018.

I, Cameron C. Scott, do hereby certify that:

- 1) I am a Principal Consultant (Geotechnical Engineering) with the firm of SRK Consulting (Canada) Inc. with an office at Suite 2200, 1066 West Hastings Street, Vancouver, British Columbia, Canada;
- 2) I am a graduate of the University of British Columbia in 1974, I obtained a BASc Degree in Geological Engineering and subsequently was granted an MEng. I also obtained a Degree in Civil Engineering (Geotechnical Option) by the University of Alberta in 1984. I have practiced my profession continuously since 1974. I have worked as a Geotechnical Engineer for a total of 40 years. Most of my professional practice has focused on the geotechnical and hydrogeological aspects of mining, including the site selection, design, permitting, operation and closure of mine waste facilities in Canada, the US, Mexico, Central and South America, Europe and various countries within the former Soviet Union.
- 3) I am a professional Engineer registered with the Association of Professional Engineers and Geoscientists of British Columbia (#11523) since 1978;
- 4) I have not personally visited the subject projects;
- 5) I have read the definition of Qualified Person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a Qualified Person for the purposes of National Instrument 43-101 and this technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1;
- 6) I, as a Qualified Person, am independent of the issuer as defined in Section 1.5 of National Instrument 43-101;
- 7) I am the co-author of this report and responsible for the Executive Summary, Sections 19, 24, 25 and 26, and accept professional responsibility for that section of this technical report;
- 8) In 2014, 2015 and 2017, I have co-authored previous technical reports about the subject property for Lundin Mining Corporation and Franco-Nevada Corporation;
- 9) I have read National Instrument 43-101 and confirm that this technical report has been prepared in compliance therewith;
- 10) SRK Consulting (Canada) Inc. was retained by Lundin Mining Corporation to prepare a technical report for the Candelaria Copper Mining Complex located in Chile in accordance with National Instrument 43-101 and Form 43-101F1 guidelines. This assignment was completed using CIM *Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines* and Canadian Securities Administrators' National Instrument 43-101 guidelines. This assignment was completed using the environmental and social requirements applicable at the time in Chile and taking cognizance of good international industry practice as specified in the IFC Performance Standards;
- 11) I have not received, nor do I expect to receive, any interest, directly or indirectly, in the Compañía Contractual Minera Candelaria and Compañía Contractual Minera Ojos del Salado copper projects or securities of Lundin Mining Corporation; and
- 12) That, as of the effective date of this technical report, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Vancouver, British Columbia  
November 28, 2018

["signed and sealed"]  
Cameron C. Scott (PEng #11523)  
Principal Consultant (Geotechnical Engineering)