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McEwen Mining Inc.

Los Azules Porphyry Copper Project

San Juan Province, Argentina

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1. Summary

This subsection was prepared by M. Bunyard, C. Eng, FAusIMM, Hatch.

The Los Azules Project is a porphyry copper development project located in the Andes Cordilleran region of San Juan Province, Argentina near the border with Chile. A Preliminary Economic Assessment (scoping study) was completed in 2009 and updated in 2010, 2013 and is now updated with this 2017 PEA update.

This 2017 PEA reflects a revised flowsheet and updated economic parameters such as capital and operating costs and new financial model inputs, etc.

The Los Azules Project is an open pit mine and concentrator plant that produces a copper concentrate as the final product for export. Ancillary facilities including the Tailings Storage Facility and the Waste Rock Storage Facility have also been updated for optimized development that now minimises the vertical and horizontal material haulage elements, and provides for gravity deposition of the tailings for the life of mine operations. The 2017 PEA also incorporates an updated development strategy of a phased implementation approach with an initial Phase 1 processing rate of 80,000 tons per day increasing by 50% for Phase 2 to 120,000 tonnes per day in Year 5 through to the completion of processing in Year 36.

The 2017 updated financial outcomes are:

- **IRR of 20.1%**
- **NPV of $2.2 billion**
- **Peak capex of $2.4 billion**
- **Payback on investment period of 3.6 years**
- **C1 costs in the first 10 years of $1.11 per pound copper**

The following three graphs serve to bench mark the Los Azules Project against other world class copper developments and operations.

In terms of the Los Azules Development budget, Figure 1-1 illustrates that the Capital Intensity to deliver the Los Azules Project is aligned to other large copper projects implemented during the previous 20 years.

Annual Copper Production is shown in the Figure 1-2 data set. Los Azules will rank as the 22nd largest copper producer for the first 13 years and rank 33rd when measured over the 36 years of processing operations.

In terms of the cost of production, the Figure 1-3 data set shows that for the first 13 years of operation the average C1 cost is $1.14 per lb copper, confirming Los Azules within the world's lowest cost quartile copper producers. The Life of Mine average C1 costs of $1.28 per lb copper places Los Azules within the second lowest cost quartile.

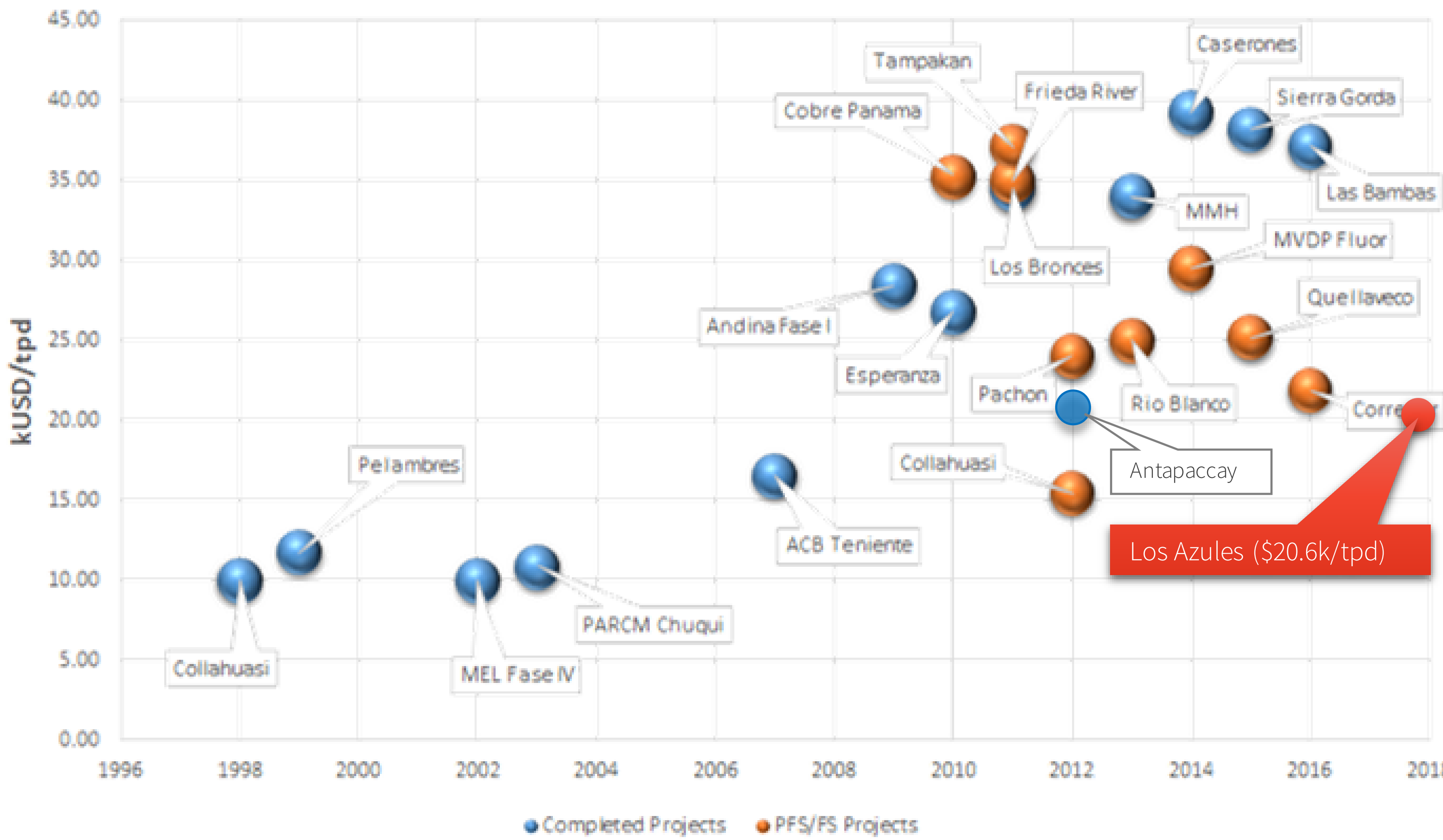

Figure 1-1: Capital Cost Intensity
(Source: Hatch Analysis based on company reports and investor presentations)

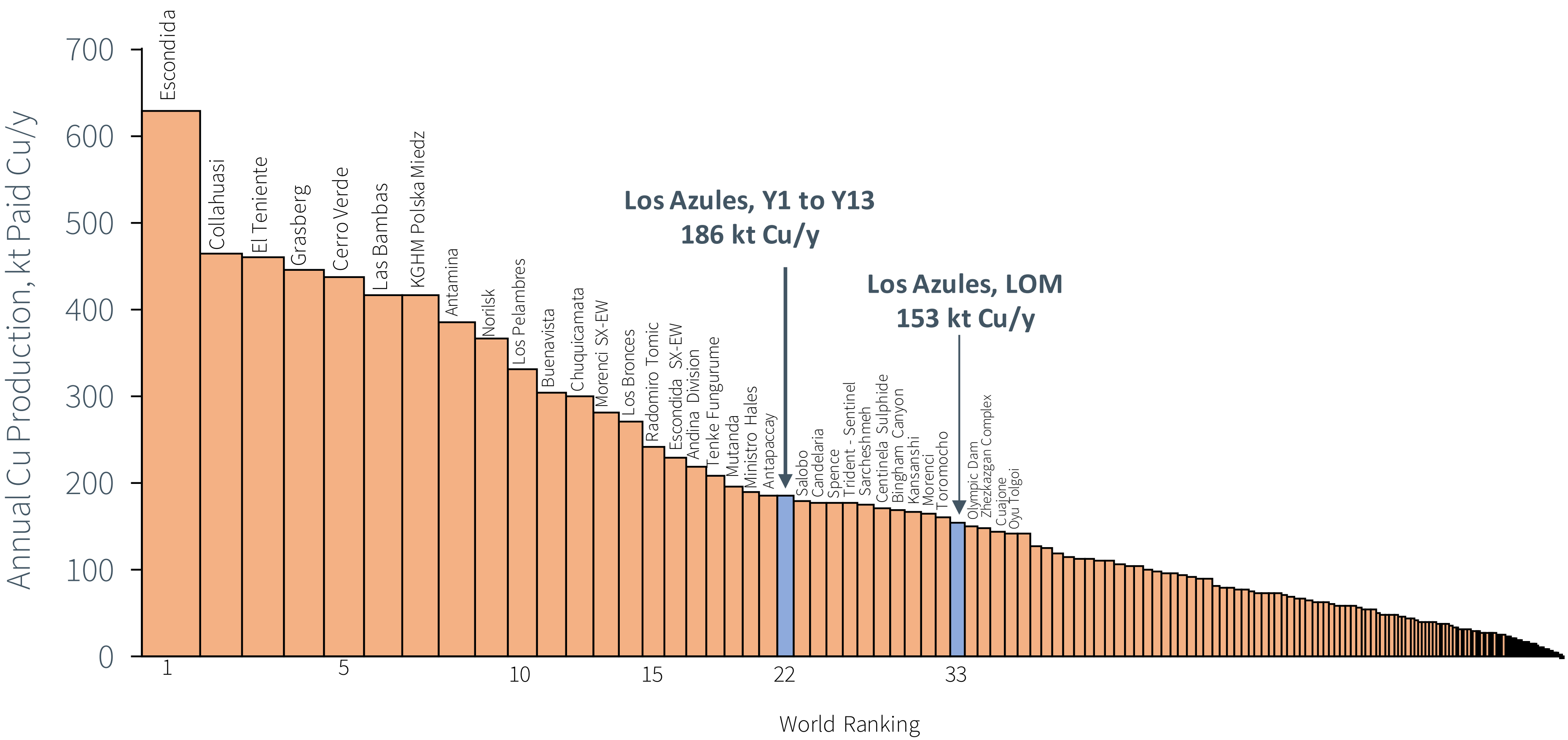

Figure 1-2: Global Copper Producers, Annual Production
(Source: SNL Mine Economics Market Intelligence 2016 Data, Hatch Analysis)

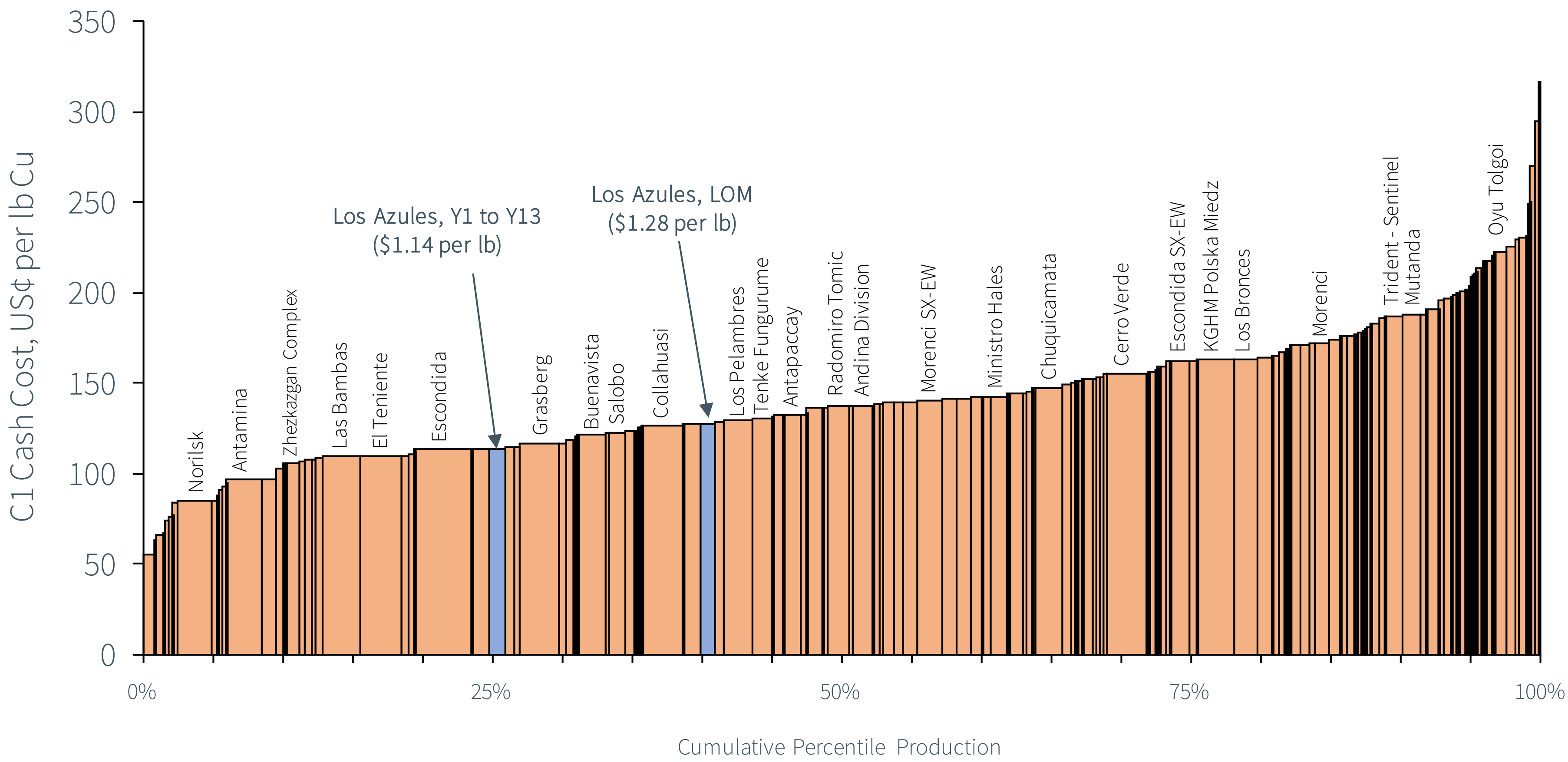

Figure 1-3: C1 Cash Costs by Producer
(Source: SNL Mine Economics Market Intelligence 2016 Data, Hatch Analysis)

The next steps for the Los Azules Project are continuing with infill drilling and environmental baseline studies, and commencing preliminary engineering such as geotechnical drilling at the tailings dam site and within the pit wall slopes.

1.1 Location

This subsection was prepared by D. Brown, CPEng, McEwen.

The Project is approximately 80 km west north west of the small town Calingasta, in the San Juan Province of Argentina at approximately 31° 06' 25" south latitude and 70° 13' 25" west longitude. It is located approximately 6 km from the border with Chile (Figure 1-5). Calingasta is located west of the city of San Juan along Route 12. The terrain elevation at the project site ranges between 3,300 meters above sea level (masl) at the proposed camp location and up to 4,500 masl on the high peaks in proximity to the Project.

The Project area is remote and no infrastructure is present. There are no nearby towns, indigenous residents, or settlements. Seasonal exploration work typically commences in November or December and terminates in April or early-May. Exploration operations are supported by means of two camps within the Project area.

The Mine is situated in a broad valley, with a central ridge called La Ballena (whaleback). Vegetation is sparse and is virtually absent at higher elevations. Deposits of glacial debris (morainal materials) and scree mantle are present over much of the deposit and adjacent mountainsides. In the Project area, these materials locally exceed 60 m in thickness, but on La Ballena the cover is often 10 m or less.

There are no covered or uncovered “white glaciers” (classic ice glaciers) in the Project, although there are several small rock glaciers near the Project area that are not impacted by exploration or development activities.

1.2 Access

This subsection was prepared by D. Brown, CPEng, McEwen.

The Los Azules Project is currently accessed by 120 km of unimproved road with eight river crossings and two mountain passes (both above 4,100 m elevation). This access is subject to snow accumulation and is generally passable only from December through to May. This 2017 update describes in Section 18 “Project Infrastructure” a potential future access route into Los Azules from Chile at a border crossing within McEwen owned lands that is less affected by snow. Also described is an airstrip currently under permitting. A Google Earth satellite image of the Los Azules property is shown below in Figure 1-4 and a location map in Figure 1-5.

Figure 1-4: Google Earth View of the Location of Los Azules in the high Andes

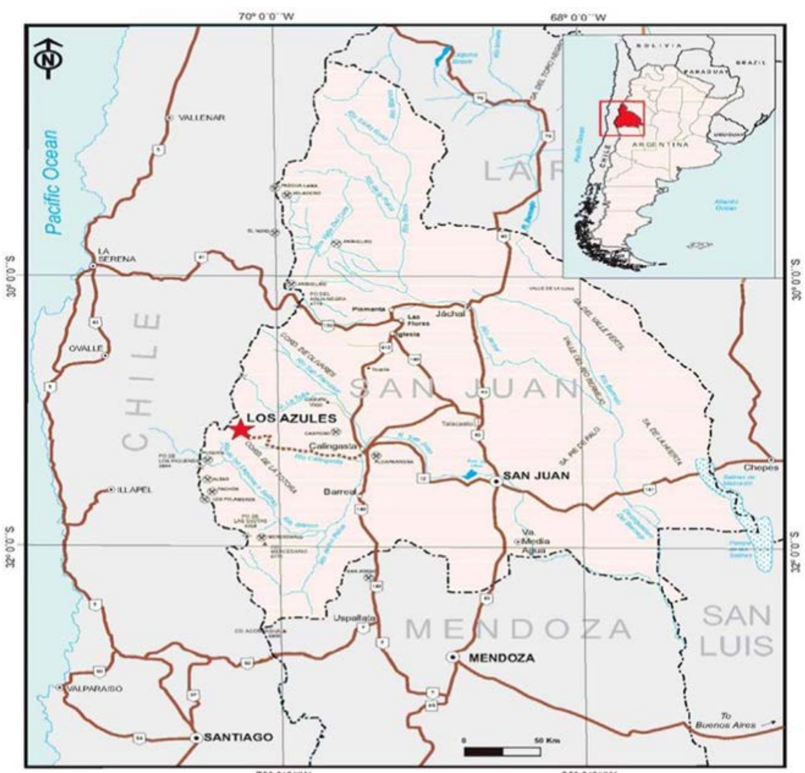

Figure 1-5: Location Map (Minera Andes, 2009)

1.3 Climate

This subsection was prepared by D. Brown, CPEng, McEwen.

Using weather data from the January 2013 to May 2016 period, the climate is categorized as semi-arid. Most of the precipitation occurs during the winter months as moderate snowfalls during the winter and temperatures as low as -24°C and a large diurnal temperature range of approximately 20 degrees . Average year-round wind speed is approximately 11 km/h with a maximum recorded wind speed at the man camp of 50 km/h.

1.4 History

This subsection was prepared by D. Brown, CPEng, McEwen.

There are no formal records of exploration in the Project area prior to 1980. The only important active project in the area prior to 1980 was the El Pachón porphyry copper project, now owned by Glencore plc (Glencore), which is located approximately 90 km south of Los Azules. Evidence of prospecting (small trenches or pits) exists on some of the concessions.

In the mid-1980s through the mid-1990s, Battle Mountain Gold Corporation (BMG) explored the area and discovered a large hydrothermal alteration zone associated with dacite porphyry intrusions and stockwork zones. BMG drilled 24 reverse circulation holes during 1998 and 1999 looking for a high-level gold deposit. Low-grade porphyry copper style mineralization was detected in the drilling, but BMG was focused on gold exploration. Concurrently during the mid-1990s, Minera Andes acquired concessions in the area based on regional exploration and Landsat imaging. Minera Andes' claims adjoined the BMG claims to the south.

In December 2003, Minera Andes initiated an exploration program at Los Azules, including geologic mapping and sampling, ground magnetic and induced polarization (IP) geophysical surveys and core drilling. Minera Andes' initial core drilling intersected porphyry-style copper mineralization and in 2006 drilling intersected high grade intervals up to 1.6% copper over 221 m and 1% copper over 173 m in separate holes. By the end of the 2012-2013 field season, 185 diamond drill holes totaling 59,518 m have been drilled at Los Azules. In addition, 52 reverse circulation holes have been drilled by BMG, Mount Isa Mines (MIM) and Minera Andes/McEwen Mining totaling 10,146 m.

After BMG merged with Newmont in 2000, part of the BMG properties were acquired by Solitario Resources (the "Solitario property"), a Canadian junior exploration company (subsequently called TNR Resources – "TNR") and part were acquired by an individual from San Juan named Hugo Bosque. MIM optioned the Solitario property in May 2004. Xstrata succeeded MIM and in April 2007 it exercised its option to acquire Solitario's concessions. In 2007, Minera Andes (as operator) and Xstrata entered into an option agreement that consolidated Minera Andes' and Xstrata's properties. In October 2009, Xstrata declined to continue to participate in the Project and as a result Xstrata assigned its properties to Minera Andes and the company now owns 100% of the Project.

In January 2012, Minera Andes Inc. was acquired by US Gold Corporation and the combined company was subsequently renamed McEwen Mining Inc.

Certain portions of the northern part of the Project that were formerly held by Xstrata and transferred to Minera Andes following the termination of the Option Agreement were subject to an underlying option agreement between Xstrata and a subsidiary of TNR Gold Corp. This agreement was the subject of litigation in the Supreme Court of British Columbia, Canada. Pursuant to terms of a settlement agreement, TNR retains a Back-in Right for up to 25% of the equity in the Solitario Properties. The Back-in Right is only exercisable after the completion of a feasibility study. To exercise, TNR must pay two times the expenses attributable to the back-in percentage (i.e. paying 2 × 25% of all the costs attributable to the Solitario Properties). Upon backing-in, TNR may elect to continue to participate in the Project, or upon being diluted down to a 5% or less equity interest, have their interest converted to a 0.6% NSR on Solitario Properties.

1.5 Property

This subsection was prepared by D. Brown, CPEng, McEwen.

McEwen Mining controls approximately 32,700 ha of mining rights in the area of the Los Azules deposit. In addition, McEwen Mining owns sufficient surface rights for the Project. The international border with Chile forms the limits of the owned property on the west side (shown as a red and blue line in Figure 1-6). The north east and south limits of the owned property are represented by the dashed red line in Figure 1-6.

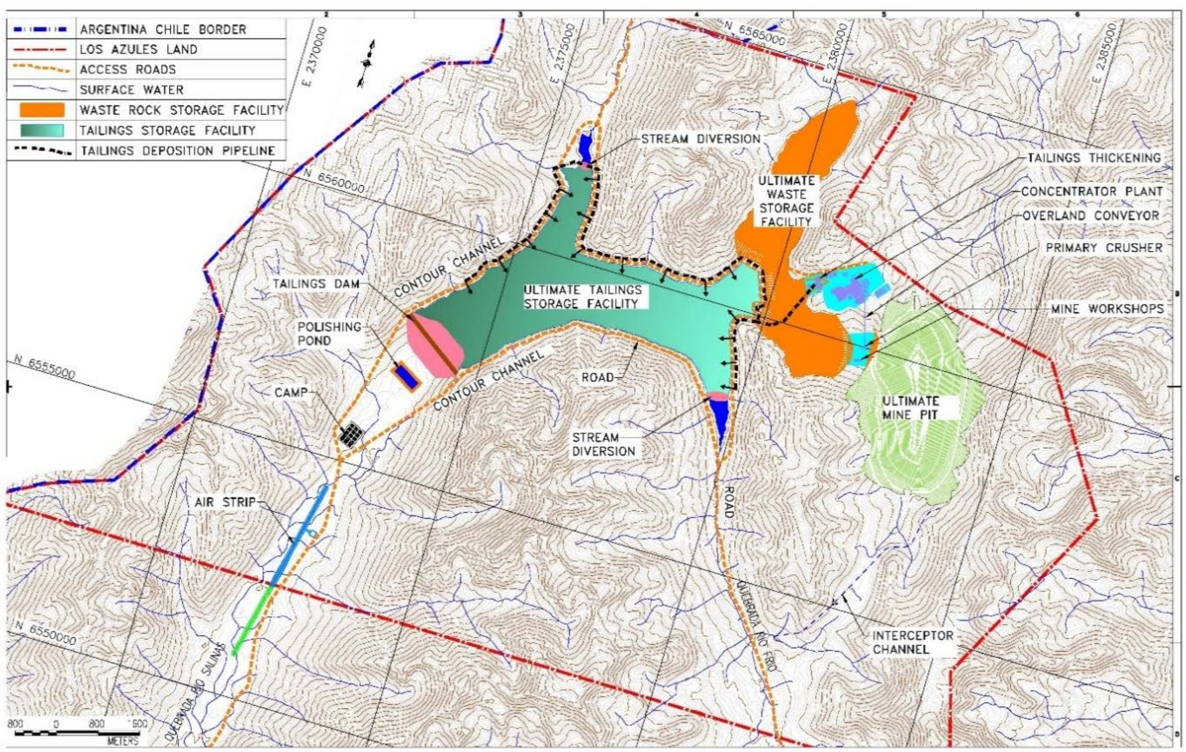

Figure 1-6: Los Azules Project General Arrangement and Property Limits

1.6 Geological Setting

This subsection was prepared by J. Duff, P. Geol, McEwen.

Los Azules is a porphyry copper deposit located in western San Juan Province in west-central Argentina. This region is characterized by a series of north-south elongated mountain ranges that rise in altitude from east to west to form the rugged Andean Cordillera along the border between Argentina and Chile.

Geology at Los Azules comprises Mesozoic volcanic rocks intruded by a Miocene diorite stock, itself intruded by a sub-parallel suite of diorite-dacite porphyry dikes along a major NNW-striking structural zone. Porphyry copper style mineralization and hydrothermal alteration are spatially, temporally and genetically related to the diorite stock and the dikes.

1.7 Mineralization

This subsection was prepared by J. Duff, P. Geol, McEwen.

In many respects the Los Azules deposit is a classic Andean-style porphyry copper deposit. In the bedrock below a thick surface cover of scree and valley fill, a barren leached zone overlies a zone of secondary or supergene enrichment of variable copper grades and thickness. Primary or hypogene mineralization extends to at least 1,000 m below the present surface. Circulation of meteoric ground water near surface leached primary sulphides (mainly pyrite and chalcopyrite) from the host rocks over the past several million years and the leached copper was redeposited below the water table in a sub-horizontal zone of supergene enrichment as secondary chalcocite and covellite. Hypogene bornite appears at deeper levels together with chalcopyrite. Gold, silver and molybdenum are present in trace amounts, but copper is by far the most important economic constituent at Los Azules.

The Los Azules hydrothermal alteration system is at least 5 km long and 4 km wide and is elongated in a NNW direction along a major structural corridor. The system disappears below volcanic cover to the north, so the ultimate extent is unknown. The altered zone surrounds the Los Azules deposit, which is approximately 4 km long by 2.5 km wide. The limits of the mineralization along strike and at depth have not been entirely constrained by drilling.

Recent geological studies have resulted in a new geologic model that shares many features with other well-known Andean porphyry copper deposits. These studies have defined the temporal sequence and spatial distribution of the following distinct alteration phases and mineralization zones.

1. Intrusion of pre-mineral dioritic stock or pluton.
2. Pervasive chlorite-magnetite alteration accompanied by chalcopyrite mineralization in the upper levels of the pluton grading into potassic alteration with chalcopyrite and bornite mineralization at depth.
3. Intrusion of early mineralized porphyry dike phase.
4. Intrusion of later “inter-mineral” phase porphyry dikes and formation of magmatic-hydrothermal breccia bodies.

5. Late sericite alteration accompanied by pyrite and chalcopyrite.
6. Formation of erratic quartz veins containing base and precious metals.
7. Supergene enrichment.

1.8 Drilling

This subsection was prepared by R. Sim, P. Geo, SIM Geological Inc.

Drilling programs have been undertaken at Los Azules between 1998 and 2017 by three different mineral exploration companies: Battle Mountain Gold (BMG), MIM Argentina (now Glencore) and Minera Andes Inc. (now McEwen Mining Inc.). Drilling initially focused on gold exploration and subsequently on diamond drilling for porphyry style copper mineralization. Drilling conditions have been particularly difficult, especially in faulted intersections or in areas of unconsolidated surface scree/talus, which have resulted in low average drilling rates. Target depth of the drilling has typically been 400 m and numerous holes completed in the 2013 campaign exceeded a depth of 1,000 m in the southwestern part of the deposit. Table 1-1 depicts exploration drilling by year and by company.

Table 1-1: Exploration Drilling by Year and by Company

Exploration Drilling by Year and by Company			
Year	**Company**	**No. of Holes**	**Meters Drilled**
1998	Battle Mountain Gold	16	3,614
1999	Battle Mountain Gold	8	2,067
2004	Xstrata Copper (MIM)	4	864
2003 – 2004	Minera Andes	9	2,064
2005 – 2006	Minera Andes	11	2,602
2006 – 2007	Minera Andes	17	3,501
2007 – 2008	Minera Andes	18	5,469
2009 – 2010	Minera Andes	28	10,229
2010 – 2011	Minera Andes	44	10,405
2011 – 2012	McEwen Mining	8	2,830
2012 – 2013	McEwen Mining	22	15,873
2017	McEwen Mining	17	6,469
Total		**202(1)**	**65,987**

(1) This table includes all drilling that has occurred on the property. Some holes were redrilled due to drilling difficulties and as a result, were not included in the database. Holes that were started in one season and completed the following season are counted in the year they were started, but the meters drilled in each season are shown for the respective seasons.

Diamond drilling begins with diamond core rigs using a tricone bit to pass through surface talus or gravels. Core drilling commences with PQ size drill steel, reducing to HQ and then to a minimum NQ size as necessary. Most of the drilling has generated HQ size core. Many of the holes in the central and northern parts of the deposit have bottomed prematurely in mineralization that exceeds the cut-off grade of 0.20% Cu because of difficult drilling conditions. All holes are surveyed by the drilling contractors using REFLEX and/or Sperry-Sun tools. Average drill core recovery is 86%. In general, the deposit remains open at depth.

1.9 Sampling and Analysis

This subsection was prepared by B. Davis, FAusIMM, BD Resource Consulting, Inc. and R. Sim, P. Geo, SIM Geological Inc.

The drill core is photographed, logged and split using a pneumatic core splitter at the Project camp by geologists employed or contracted by McEwen Mining. Details are recorded for interval depth, interval width, lithology, alteration types, alteration intensities, alteration minerals, structure, percentage vein quartz, percentage total disseminated sulphides, mineralization minerals, mineral zone (hypogene/transition/supergene) and other observations. Geotechnical parameters are recorded including percentage of core recovery, rock quality (RQD), fracture density and angle relative to the length of the hole, as well as fracture fill material. The RQD measurements and core recovery are measured at the drill rig by McEwen Mining personnel prior to the core being boxed. The information is transferred at site to a digital database.

The core is sampled at site, typically over 2 m intervals and shipped to either Alex Stewart in Mendoza or ALS Chemex or ACME in Santiago, Chile. Industry-standard QA/QC protocols are strictly adhered to. All of the laboratories are ISO 9001:2000 certified. The samples are analyzed for gold, silver, copper, molybdenum, zinc, lead and arsenic. After the core is logged and sampled it is moved to McEwen Mining's warehouse in Calingasta where the core boxes are stored on pallets.

There are a total of 202 drill holes in the Los Azules database with a cumulative length of approximately 65,987 m and a total of 30,675 samples analyzed for a suite of elements including total copper, gold, silver and molybdenum. A total of 137 of the drill holes have some portion of the sample intervals tested for sequential copper analysis. Density determinations have been made for 1,196 drill core samples.

1.10 Mineral Resource Estimates

This subsection was prepared by R. Sim, P. Geo, SIM Geological Inc.

The mineral resource estimate for Los Azules was prepared utilizing three-dimensional block models based on geostatistical applications. The mineral resources are estimated using ordinary kriging with a nominal block size of 20 x 20 x 15 m. Block grade estimates are derived from drill hole sample results and the interpretation of a geologic model, which relates to the spatial distribution of copper, gold, silver and molybdenum in the deposit. To ensure the reported resource exhibits reasonable prospects for economic extraction, the mineral resource is limited within a pit shell generated around copper grades in blocks classified in the Indicated and Inferred categories. Generalized technical and economic parameters include a copper price of $2.75/lb, site operating costs of $1.70/t (mining), $5.00/t (processing) and $1.00/t (general and administration), a pit slope of 34° and 90% metallurgical recovery. Some of the deeper mineralization may not be economic due to the increased waste stripping requirements.

It is important to recognize that these discussions of surface mining parameters are used solely to test the “reasonable prospects for economic extraction,” and do not represent an attempt to estimate mineral reserves. There are no mineral reserves calculated for the Project. These preliminary evaluations are used to prepare a Mineral Resource Statement and to select appropriate reporting assumptions.

The estimated mineral resource for the Los Azules deposit is shown in Table 1-2. Mineral resources are determined using a base case cut-off grade of 0.20% copper, which is based on the projected technical and economic parameters listed above.

Table 1-2: Estimate of Mineral Resources for Los Azules Deposit (0.20% Cu Cut-Off)

	Average Grade				Contained Metal			
Mtonnes	Cu %	Au g/t	Mo %	Ag g/t	Cu Blbs	Au Moz	Mo Mlbs	Ag Moz
Indicated								
962	0.48	0.06	0.003	1.8	10.2	1.7	57.3	55.7
Inferred								
2,666	0.33	0.04	0.003	1.6	19.3	3.8	194.0	135.4

Note: The mineral resources do not have demonstrated economic viability

1.11 Mining

This subsection was prepared by D. Brown, CPEng, McEwen.

This 2017 PEA mining plan for the Los Azules Project incorporates fundamental changes to the mineral processing, material categorization, material handling, waste rock and tailings storage facilities. The PEA only considers processing of primary and secondary (enriched) sulphide material to produce a copper concentrate for truck haulage to a Pacific port in Chile for export. There is only a minimal tonnage of oxides and this is very low grade and designated as waste material. A revised general arrangement has been developed that minimises vertical and horizontal material haulage distances for both mineralised material and for waste rock material. The 2017 general arrangement of the Los Azules Project is shown below in Figure 1-7 with the mine, waste rock storage facility and tailings storage facility all illustrated at ultimate proposed configuration after 36 years of processing operations. A perspective view looking from the north east is shown in Figure 1-8.

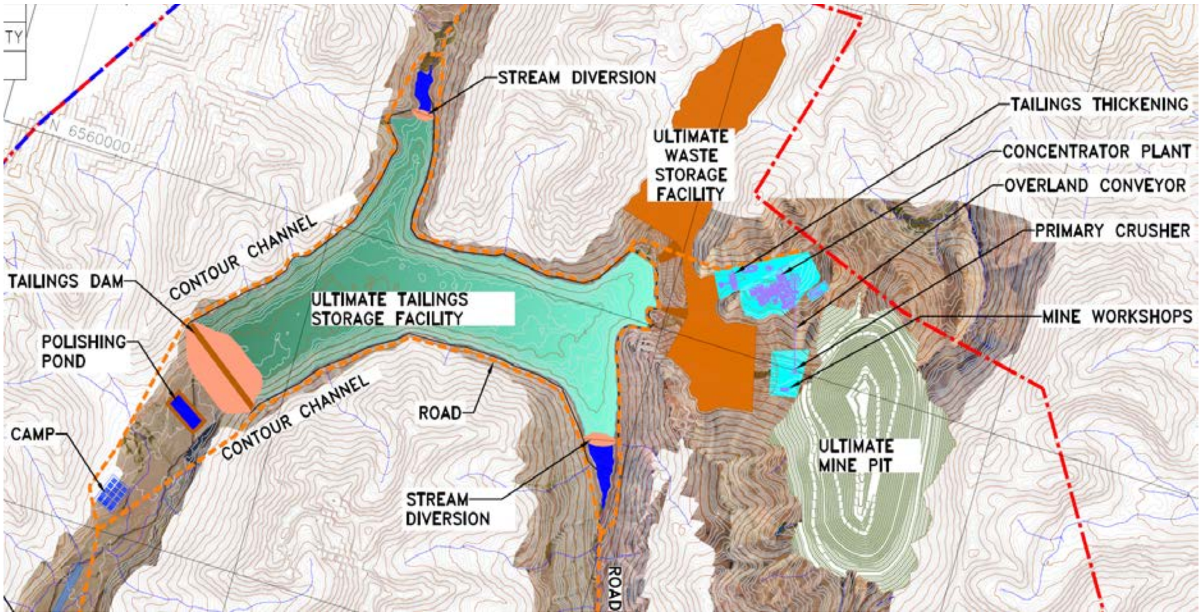

Figure 1-7: General Arrangement of Mining and Processing Facilities

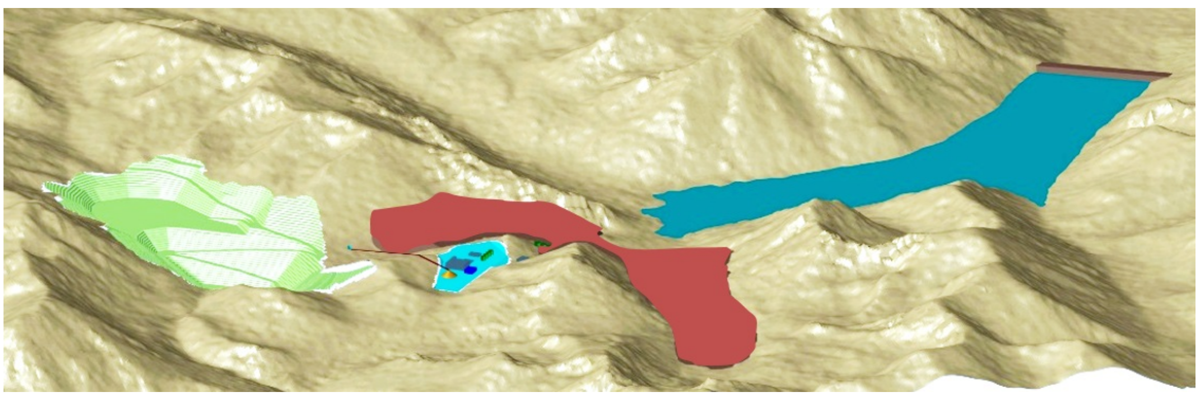

Figure 1-8: Perspective view of the proposed Mining & Processing Facilities

The mine production schedule targets the highest-copper grade material and implements a declining cut-off grade policy to maximize the project present values. In executing this policy, the mine will stockpile any lower than optimum grade mineralised material in pursuit of mining and processing higher grade material.

The concentrator feed in the mine production schedule contains indicated and inferred mineral resources.

This Preliminary Economic Assessment is preliminary in nature and includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. Inferred mineral resources have a great amount of uncertainty as to their existence and as to whether they can be mined legally or economically. There is no certainty that the Preliminary Economic Assessment will be realized.

Mine preproduction stripping will be performed over a period of three years, including site preparation, a gradual build-up of the equipment fleet, and training of personnel. Pre-stripping targets for Years -3, -2 and -1 are 20, 40 and 64 M t, respectively, for a total preproduction stripping tonnage estimated at 124 M t.

The cross section below, Figure 1-9, illustrates the phased pit development sequence that targets the high copper grade, supergene enriched material to maximize the project's present value. In the first five years of mining 93% of this initial mill feed is presently classified as Indicated mineralized material and the remaining 7% is Inferred mineralized material and of lower grade.

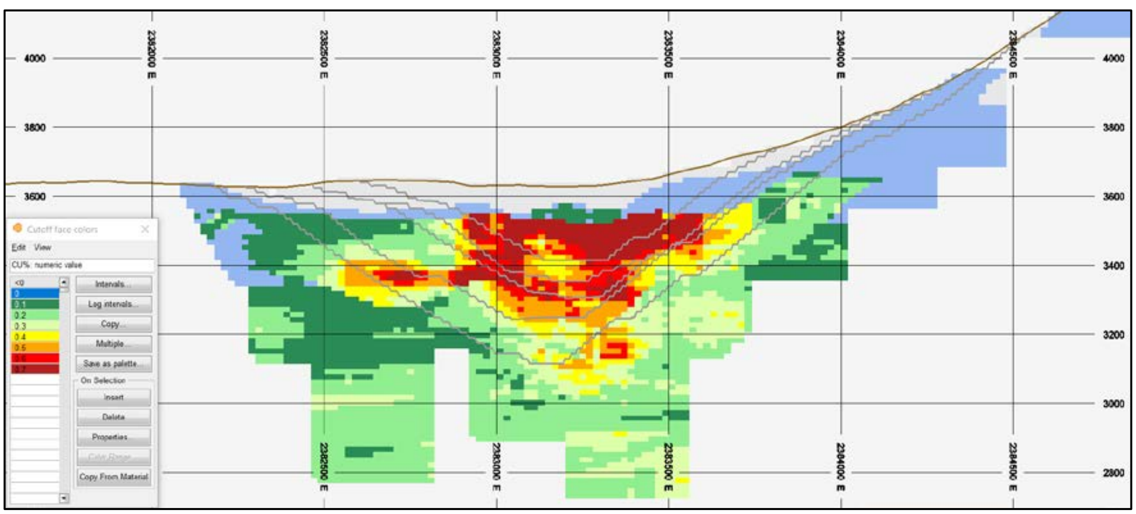

Figure 1-9: Cross Section Showing Phased Pit Development Sequence

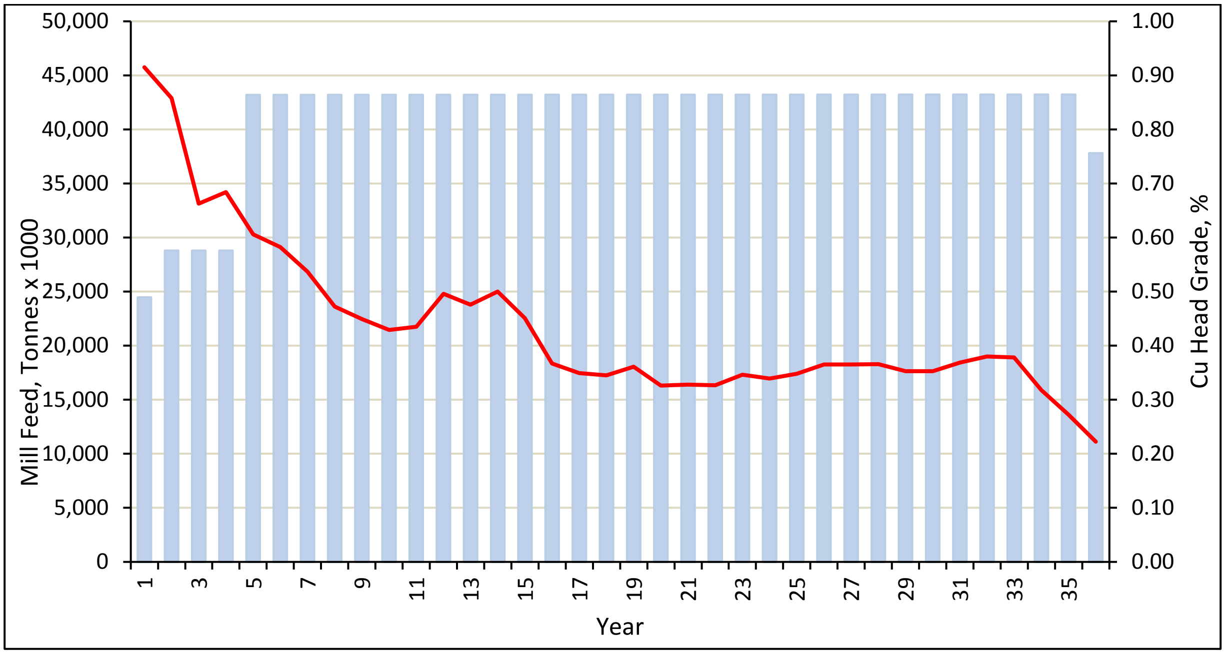

Figure 1-10: Mill Feed Tonnage and Grades

The early years of mining are in the highest grade copper mineralised material as shown on Figure 1-9 above.

The Los Azules deposit is a near surface coper porphyry deposit with glacial overburden and a leached zone overlying the mineralized material. The prestrip proceeding mining of mineralized material is approximately 130 million tons to be performed contemporaneously with the project implementation phase. The Los Azules deposit is amenable to conventional, large scale, open pit mining methods and will utilise large open pit mining equipment operating on 15 meter high cut benches to extract mineralized material and waste rock. Electric drills and electric rope shovels will be the primary production units because of their lower operating costs and better reliability. The rest of the mining fleet will be diesel-powered equipment and machinery to provide flexibility in mining operations.

To minimize crushing and grinding energy demand , high fragmentation blasting methods will be applied to all concentrator feed material. Lower powder factors will be applied to waste zones.

A portion of the waste rock material will be seamlessly delivered to the tailings dam as demand requires to maintain the dam raises ahead of the tailings deposition.

1.12 Metallurgical Testwork and Recovery Methods

This subsection was prepared by M. Bunyard, C. Eng, FAusIMM, MIMMM, Hatch.

Preliminary metallurgical test work has been conducted intermittently since 2008 to determine how the mineralized material responds to flotation as a means of recovering payable copper metal. Results have consistently proved favourable and flotation has been adopted as the processing option of choice. Additional testwork was conducted with favourable results to show the impact of increasing the grind size of the flotation feed material. The results of this testwork have been incorporated into the concentrator flowsheet.

The Los Azules concentrator will produce copper concentrate as a final product. The process flowsheet has been modeled on the Antapaccay Copper Concentrator (Peru) due to similarities in ore properties and process plant altitudes. Some minor changes from the Antapaccay design, in equipment sizing only, have been incorporated based on operating experience at Antapaccay. The plant has been designed for an initial nominal annual throughput of 28,800,000 tonnes. The average daily throughput of 80,000 t assumes 360 operating days per annum. The concentrator would be constructed on-site and would employ one comminution circuit consisting of a primary crusher, stockpile feed conveyor, reclaim conveyor, one SAG mill, two pebble crushers and two ball mills. The comminution circuits would be followed by flotation, thickening and filtration circuits, a Tailings Storage Facility (TSF) and concentrate storage. LOM recovery of copper to concentrate is expected to be 91% at a concentrate grade of 30% Cu.

It is planned to expand the capacity of the plant to 120,000 t/d by Year 5 through the installation of additional comminution and flotation capacity.

Gold and silver are recoverable to the copper concentrate but in low amounts. No other metals have been identified that would yield by-product credits, nor that have significant amounts of penalty elements.

1.13 Local Resources and Infrastructure

This subsection was prepared D. Brown, CPEng, McEwen.

The nearest settlement is the town of Calingasta, which is located approximately 80 km east of the Project. The road from Calingasta to the Project is 120 km over mostly unimproved dirt roads. Approximately 30 km of newly constructed road and upgrades to approximately 60 km of existing road will be required for the Project.

Calingasta is a historic mining town that was based on exploitation of alum (aluminum sulphate) deposits. The principal current economic activity of the area is agriculture with fruit trees (apple and walnut). According to the 2010 census the population of the department of Calingasta is 8,453 inhabitants and the town of Calingasta has 2,700 inhabitants.

Surface water is available on the property in adequate amounts for McEwen Mining's exploration activities. Preliminary hydrological evaluations have indicated sufficient water exists for the proposed Los Azules mining and processing facilities and to provide the necessary fresh water needed to house employees at the mine site. A more detailed evaluation of available water resources will need to be undertaken for an IIA submission.

A 300 km long 220 kV or 500 kV power transmission line will supply power to the Project. The transmission line would originate either from Gran Mendoza (Mendoza, Argentina) or Rodeo (north west of San Juan)and report into a newly constructed substation and terminate at a step-down substation at the Project site. Alternatively a power supply could be sourced from Chile. A trade off study should be performed to evaluate country of origin for power and whether the supply is best transmitted in HVAC or HVDC configuration.

1.14 Project Economics

This subsection was prepared by R. Duinker, P. Eng, MBA, Hatch.

1.14.1 Capital Cost Estimate (CAPEX)

A key desired outcome of this study was to provide a project capital estimate with an expected level of accuracy of +35% to -35%. Unless otherwise specified all estimates are in US dollars.

A summary of the initial capital estimate is provided in Table 1-3.

Table 1-3: Summary of CAPEX

Area	CAPEX (USD Millions)
Mining Equipment	$215
Mine Pre-stripping Costs	$193
Surface Scope (Concentrator, Powerline, Tailings, etc.)	$979
Total Direct Cost	**$1,387**
Total Indirect Costs	**$508**
Contingency	**$420**
Owner's Cost	$48
Total Initial Capital Cost	**$2,363**

1.14.2 Operating Cost Estimate (OPEX)

This updated PEA for the Los Azules project has a total operating cost of $15,385M over the life of the mine. With the proposed configuration, the unit costs for mining are estimated to be $0.44/lb Cu, $0.47/lb Cu for processing, $0.21/lb Cu for transportation and $0.13/lb Cu for General and Administrative (G&A). Taking into consideration the Treatment Charges/Refinery Charges (TCs/RCs) and credits related to gold and silver, the effective net costs are estimated to be $1.28/lb Cu. Table 1-4 displays the operating cost summary.

Table 1-4: Operating Cost Summary

Cost Area	$M LOM	$/t Mill Feed	$/t Cu	$/lb Cu
Mining	5,404	3.63	980	0.44
Process	5,774	3.88	1,047	0.47
Transport	2,587	1.74	469	0.21
G&A	1,620	1.09	294	0.13
Subtotal OPEX	15,385	10.34	2,789	1.26
TCs/RCs	2,684	1.80	487	0.22
Au & Ag Credits	(2,449)	(1.65)	(444)	(0.20)
Net Costs	15,621	10.50	2,831	1.28

1.14.3 Financial Evaluation

The project economics for the Los Azules copper project were evaluated on a post board approval basis (after completion of additional drilling, prefeasibility and feasibility studies) in a real post tax basis financial model. The key financial results, project returns and cash flows are presented herein.

All economic assessments are calculated at the Los Azules project level and therefore; do not include certain costs including corporate office, interest, financing and exploration expenses.

Table 1-5 shows the results of the financial analysis.

Table 1-5: Summary of Key Financial Results

Parameter	Unit	2017 PEA
Initial CAPEX (Real)	US$M	2,363
Phase 2 CAPEX (Real)[1]	US$M	278
$NPV_{8\%}$	US$M	2,239
IRR	%	20.1%
Payback Period	Years	3.6
Long Term Cu Price	US$/lb Cu	3.00
C1 Costs (first 10 yrs)	US$/lb Cu	1.11
C1 Costs (LOM)	US$/lb Cu	1.28

Detailed discussion on the basis and key assumptions used in the financial model are presented in subsequent sections.

Figure 1-11 illustrates the breakdown of the undiscounted cash flows over the life of the project in a waterfall diagram.

[1] Phase 2 CAPEX includes allowance for additional mine fleet and process plant expansion. Phase 2 CAPEX is considered to be Sustaining capital in Table 22-5

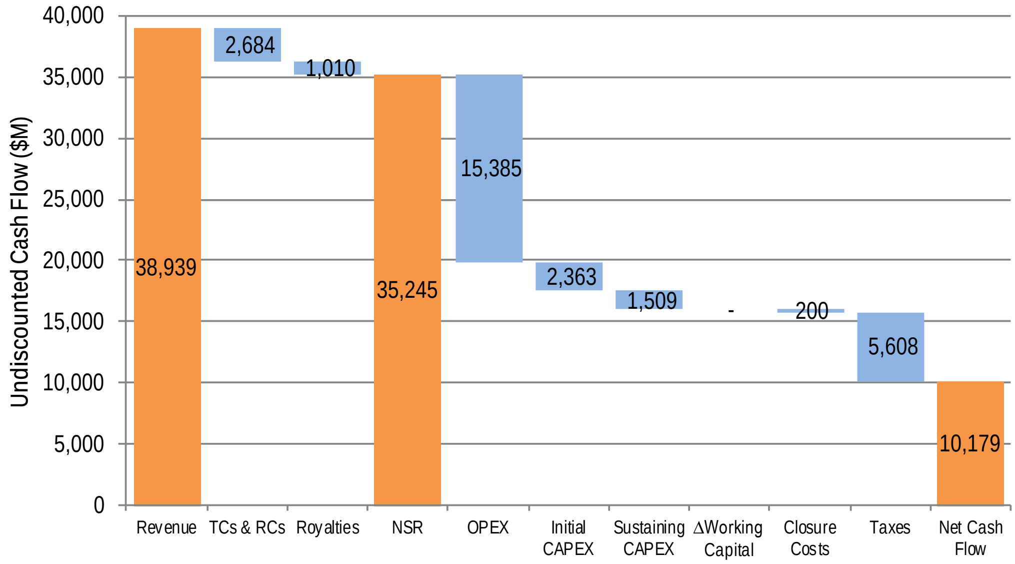

Figure 1-11: Undiscounted Cash Flow Waterfall Diagram

The discounted cash flow waterfall diagram (at 8%) is presented in Figure 1-12.

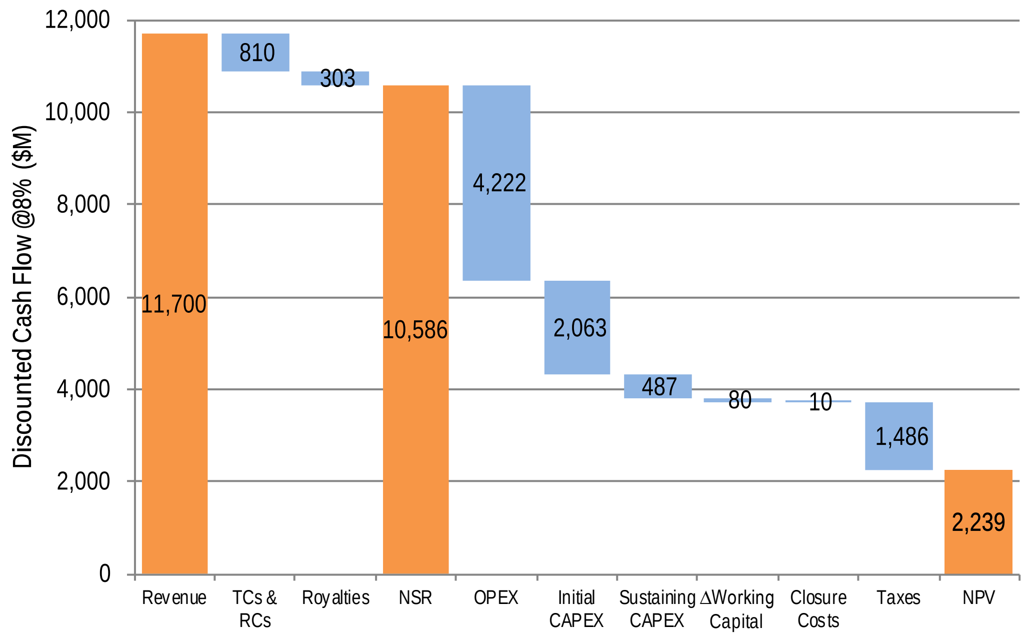

Figure 1-12: Discounted Cash Flow Waterfall Diagram

Free cash flow is presented year on year in Figure 1-13. Bars below the horizontal axis reflect capital expenditures.

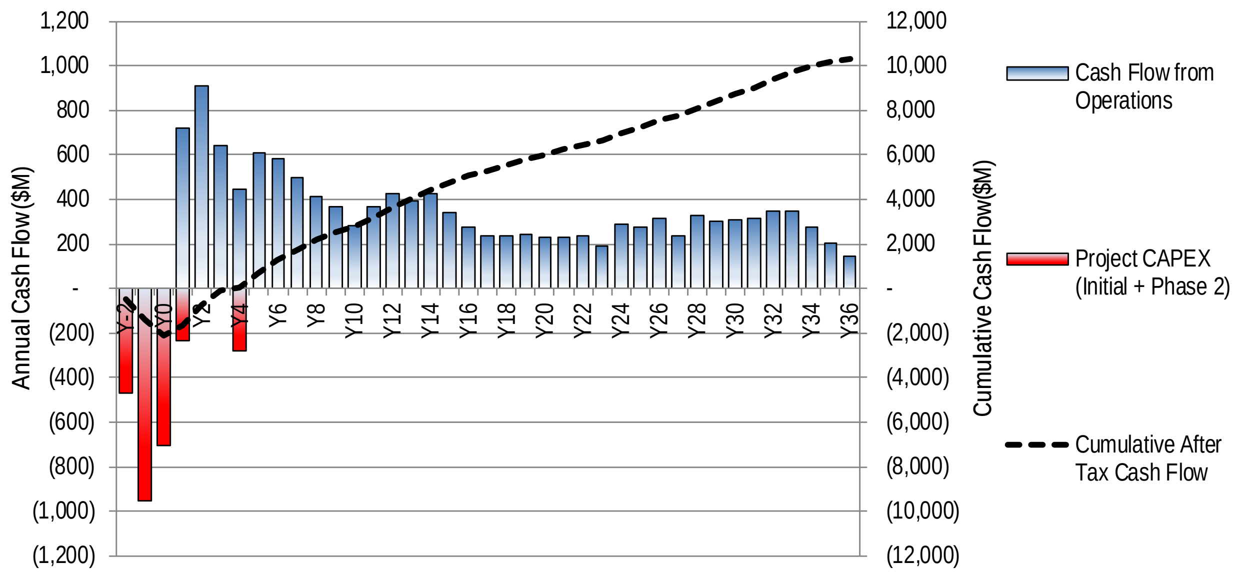

Figure 1-13: Net Cash Flows for the Project and Operations

This updated PEA for the Los Azules project has an initial estimated capital cost of $2,363M for Phase 1 and estimated sustaining capital of $1,509M (including Phase 2). The total operating expenditure is estimated to be $15,385M with a C1 cost of $1.11/lb Cu over the first 10 years and a C1 cost of $1.28/lb Cu over the life of the mine, generating an after-tax internal rate of return of 20% and an after-tax $NPV_{8\%}$ of $2,239M and a payback period of 3.6 years.

This PEA Update is at a scoping level and is preliminary in nature. The updated PEA includes Inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves and there is no certainty that the updated PEA will be realized.

1.15 Qualified Persons Recommendations and Conclusions

This subsection was prepared by M. Bunyard, C. Eng, FAusIMM, Hatch.

Based on the results of this Preliminary Assessment, certain contributing authors recommend that McEwen complete additional work to further de-risk the Project, including more advanced stages of drilling. A list of these tasks and, summary of the interpretations, conclusions and recommendations to advance the Project are provided in Section 1 and Section 26.

2. Introduction

This section was prepared by M. Bunyard, C. Eng, FAusIMM, Hatch. This Technical Report is written to provide information related to the revised flowsheet since the previously disclosed 43-101 report[2]. This report has been prepared for and in collaboration with McEwen to assess the potential economic viability of the Los Azules property.

McEwen was organized under the laws of the State of Colorado on July 24, 1979 and is listed on the New York Stock Exchange (NYSE) and on the Toronto Stock Exchange (TSX) under the symbol MUX. The Company's head office is Toronto, Canada and their principal assets consist of the San José mine (49% interest) and the Los Azules property in Argentina, the El Gallo Gold mine and El Gallo Silver project in Mexico, the Gold Bar project in the USA, and the Timmins projects in Canada. The Los Azules property contains 100% of McEwen's copper resources.

The main differences between this 2017 updated study and previously disclosed 2013 report are:

- A phased implementation approach to the Los Azules development with a minimal initial capex.
- Revised site general arrangement with vertical truck haulage elements minimised, gravity deposition of tailings for life of operations.
- Revision to production of a copper concentrate only.
- Exporting of copper concentrates directly through Chile as the preferred concentrate-logistics solution.
- Air supporting the exploration, the project development phase and operations via an airstrip planned in proximity to the development.

This PEA is triggered by McEwen's intention to publicly disclose excerpts of the engineering and optimization studies completed by Hatch in conjunction with McEwen during 2017. The results from the PEA and the Los Azules property are material to McEwen.

The following information was provided by McEwen to complete the various sections of the report:

- Resource block model incorporating the 2017 drilling campaign.
- Metallurgical test work reports.
- Previous environmental studies.
- Preliminary revised General Arrangement for the Los Azules development.

[2] *Canadian National Instrument 43-101 Technical Report McEwen Mining Inc., Los Azules Porphyry Copper Projet, San Juan Province Argentina.*, Samuel Engineering 2013.

- Preliminary concentrate logistics strategy.
- Preliminary tailings storage facility designs.
- Detailed topography from a photogrammetric survey performed in 2017.
- A Project Information Memorandum from Q1, 2017.

A detailed list of references is provided in Section 27.

A summary of the QP responsible for each section of the report and their respective company affiliation is provided in Table 2-1.

Table 2-1: Summary of Qualified Persons

Responsible Person	Company	Primary Areas of Responsibility	Relevant Sections
D. Brown, CPEng	McEwen	Mining, Project Infrastructure, Geology	1.1 to 1.5, 1.11, 1.13, 4, 5, 6, 9.6, 16.1, 16.5 to 16.8, 18, 19, 21.2.1, 23, Information relating to areas of responsibility for Section 25 & 26
M. Bunyard, C. Eng, FAusIMM	Hatch Ltd	Metallurgical, Process Plant	1.12, 1.15, 2, 3, 13, 17, 21, 27, Information relating to areas of responsibility Section 25 & 26
B. Davis, FAusIMM	BD Resource Consulting, Inc.	Sampling, Data Verification, Resource Estimates	1.9, 11, 12, 14
J. Duff, P. Geol	McEwen	Geology, Exploration	1.6, 1.7, 7, 8, 9,
R. Duinker, P. Eng, MBA	Hatch Ltd	Financial Analysis	1.14, 21.2.3, 22, Information relating to areas of responsibility Section 25 & 26
J. Farrell, P. Eng	Hatch Ltd	Environmental	20, Information relating to areas of responsibility Section 25 & 26
W. Rose, P. E.	WLR Consulting Inc.	Mining	16.2, 16.3, 16.4, Information relating to areas of responsibility Section 25 & 26
K. Seddon, CPEng	ATC Williams	Tailings	18.8
R. Sim, P. Geo	SIM Geological Inc.	Drilling, Resource Estimates	1.8, 1.9, 1.10, 10, 14, Information relating to areas of responsibility Section 25 & 26

2.1 Personal Inspection of Los Azules Property

Donald Brown, CPEng, is the Senior Vice President for Projects for McEwen and has responsibility for the Los Azules development. Mr Brown has visited the Los Azules site three times in 2017, each time for an extended period. Mr Brown has visited the proposed concentrate logistics route from Los Azules through to the Port of Coquimbo in Chile on three occasions in 2017 and has visited the alternative concentrate logistics route in Argentina from Los Azules to the rail-head on two occasions in 2017.

Jim Duff, P. Geol, former COO of Minera Andes and a part-time consultant to McEwen Mining, visited the site once in 2009, three times in each of 2010, 2011 and 2012 and most recently March 2013. Mr. Duff was COO of Minera Andes from March 2009 to January 2012, during which time he was responsible for exploration and engineering activities at Los Azules.

The author considers the foregoing personal inspections to constitute a “current personal inspection” in accordance with NI 43-101.

3. Reliance on Other Experts

This section was prepared by M. Bunyard, C. Eng, FAusIMM, Hatch. This report has been prepared by the QPs referred to in Table 2-1 for McEwen. The information, conclusions, opinions and estimates contained herein are based on:

- Information available to the QPs at the time of preparation of this report, including the 2013 Preliminary Economic Assessment.
- Assumptions, conditions and qualifications as set forth in this report.
- Data, reports and other information supplied by McEwen.

For the purpose of this report, the QPs have relied on property ownership information provided by McEwen. Hatch has not researched property title or mineral rights for the Los Azules property and expresses no opinion as to the ownership status of the property.

A draft copy of the Report has been reviewed for factual errors by McEwen Mining. Any statements and opinions expressed in this document are given in good faith and in the belief that such statements and opinions are not false and misleading at the date of this Report.

4. Property Description and Location

This section was prepared by D. Brown, CPEng, McEwen.

4.1 Location

The Los Azules Project is located in the Frontal Cordillera of Argentina near 31° 06' 25" south latitude and 70° 13' 25" west longitude in the western limits of San Juan Province, Calingasta Department, Argentina. It is approximately 6 km to the Chilean border as shown in Figure 4-1. Elevation ranges from 3,300 masl to 4,500 masl with moderate to high relief.

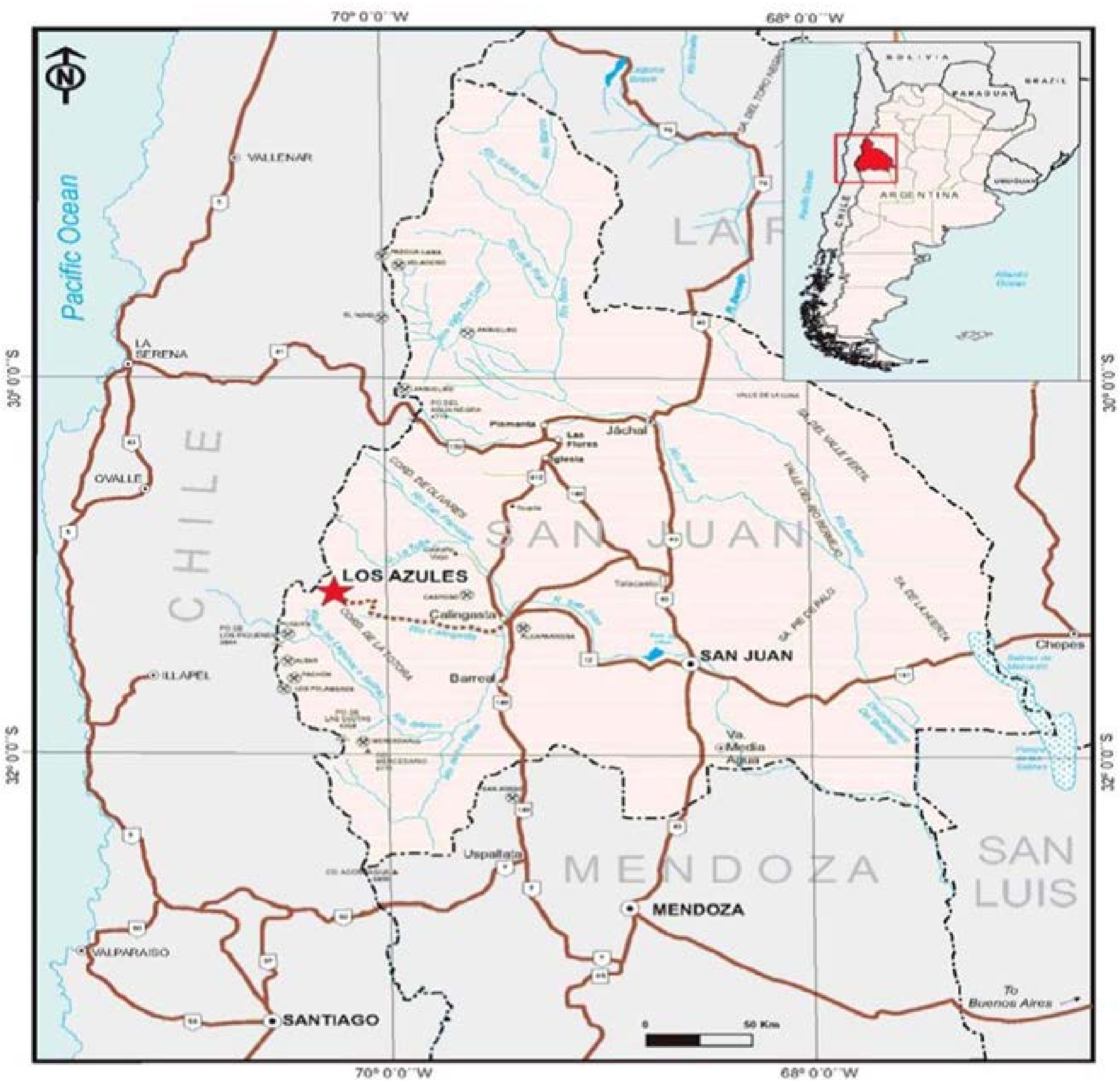

Figure 4-1: Project Location (Minera Andes 2009)

McEwen Mining controls approximately 32,700 ha of mining rights and 18,000 ha of surface rights in the area of the Los Azules project.

Aerial photography and global positioning were utilized to locate the property in the field; the coordinates of the corners of the property are established in the government documents granting the mining rights.

4.2 Property and Title in Argentina

The laws, procedures and terminology regarding mineral title in Argentina differ considerably from those in the United States and in Canada. Mineral rights in Argentina are separate from surface ownership and are owned and administered by the provincial governments. The following summarizes some of the relevant provisions of the Argentine Mining Code and Argentinean mining law terminology to aid in understanding the McEwen Mining land holdings in Argentina.

The provinces are the owners of the natural resources located within their territories and each province retains the power to administer and regulate mineral rights according to the federal Mining Code and supplemental provincial laws and regulations.

Surface rights are separate from mineral rights and they are treated separately under Argentine law. The Mining Code establishes that mining is in the public interest and therefore surface owners cannot prevent the granting of mining rights and properties or commencement and/or continuity of mining activities on their property, but surface owners have a right to collect an indemnity as a consequence of the use of the land by the miner and the damages derived from mining activities. Land over which a mining concession has been granted is legally subject to different types of easements (e.g. right of way, occupation of land, use of water, etc.), provided that an indemnity is paid to the owner of such land.

Mineral rights are considered forms of real property and can be sold, leased or assigned to third parties on a commercial basis. “Cateos” (exploration permit) and “minas” (mining concession) can be forfeited if minimum work requirements are not performed or if annual payments are not made. Generally, notice and an opportunity to remedy defaults are provided to the owner of such rights.

Grants of mining rights, including water rights, are subject to the rights of prior users. Further, the mining code contains environmental and safety provisions administered by the provinces. Prior to conducting operations, applicants must submit an environmental impact report (“Informe de Impacto Ambiental” or IIA in Spanish) to the provincial mining authority describing the proposed operation and the methods to be used to prevent undue environmental damage. When the provincial mining authority approves the IIA it issues a permit in the form of an official declaration (“Declartorio de Impacto Ambiental” or DIA in Spanish). The IIA must be updated every two years, with a report on the results of the protection measures taken. If protection measures are deemed inadequate, additional environmental protection may be required. Mine operators are liable for environmental damage. Violations of environmental standards may cause exploration or mining operations to be shut down but without prejudice to mining title.

4.2.1 *Cateo*

A cateo is an exploration permit that does not allow commercial mining but gives the owner a preferential right to obtain a mining concession for the same area. Cateos are measured in 500 ha unit areas. A cateo cannot exceed 20 units (10,000 ha). No person may hold more than 400 units (200,000 ha) in a single province. The term of a cateo is based on its area: 150 days for the first unit (500 ha) and an additional 50 days for each unit thereafter. After a period of 300 days, 50% of the area over four units (2,000 ha) must be dropped. At 700 days, 50% of the area remaining must be dropped. At each stage, the land can be converted to one or more “Manifestaciones de Descubrimiento” (MD). Time extensions may be granted to allow for bad weather and difficult or seasonally restricted access. Cateos are identified by a file number or "expediente" number and are awarded by the following process:

1. Application for a cateo covering a designated area. The application describes a minimum work program for exploration.
2. Registration by the province and formal placement on the official map or Geographic Register.
3. Publication in the provincial official bulletin and notification to the surface owner.
4. A period following publication for third parties to oppose the claim.
5. Award of the cateo.

The length of this process varies depending on the province and commonly takes up to two years. Accordingly, cateo status is divided into those that are in the application process and those that have been awarded. If two companies apply for cateos on the same land, the first to apply has the superior right unless the area was released from a prior owner, at which point the property is awarded to one of the interested parties through a blind drawing. During the application period, the first applicant has rights to any mineral discoveries made by third parties in the cateo without applicant’s prior consent.

Applicants for cateos may be allowed to explore on the land pending formal award of the cateo, with the approval of the surface owner of the land. The time period after which the owner of a cateo must reduce the quantity of land held does not begin to run until 30 days after a cateo is formally awarded.

A fee (or cannon in Spanish) of AR $400 per unit must be paid upon application for the cateo. This is paid only once. In addition, the 2012 tax act for the province of San Juan requires a fee to be paid upon application for a cateo. The actual value is AR $1,600 for each unit of 500 ha. This fee is only paid one time.

4.2.2 Mina

To convert an exploration permit (cateo) to a mining concession (mina), some or all of the area of a cateo must be declared as MD (Manfestacíon de Descubrimiento) and then converted to a mina. Minas are mining concessions which permit mining on a commercial basis. The area of a mina is measured in pertenencias. Each mina may consist of one or more pertenencias. Conventional pertenencias are 6 ha and pertenencias for disseminated deposits are 100 ha. Once granted, minas have an indefinite term assuming exploration development or mining is in progress and investment conditions according to the Mining Code are met. An annual canon fee of AR $3,200 per pertenencia is payable to the province.

Minas are obtained by the following process:

- Declaration of a MD, in which a point within a cateo is identified as a discovery point. The MD is used as a basis for location of pertenencias of the sizes described above. MDs do not have a definite area until pertenencias are proposed. Within a period following designation of a MD the claimant may do further exploration, if necessary, to determine the size and shape of the mineralized material.
- Survey (mensura) of the mina. Following a publication and opposition period and approval by the province, a formal survey of the pertenencias (together forming the mina) is completed before the granting of a mina. The status of a surveyed mina provides the highest degree of mineral land tenure and rights in Argentina.

4.2.3 Provincial Reserve Areas

Provinces are allowed to withdraw areas from the normal cateo/mina process. These lands may be held directly by the province or assigned to provincial companies for study or exploration and development.

4.3 Ownership of the Los Azules Project

The Project is comprised of properties (the “Properties”) owned by Andes Corporación Minera S.A. (Andes Corp.), an Argentine subsidiary of McEwen Mining.

In 1994, Minera Andes S.A. (MASA), an Argentine subsidiary of Minera Andes, was granted the Cordon de Los Azules Cateo 545.957-D-94. This cateo was divided and converted into two MDs on October 17, 1998, known as Azul 1 and Azul 2. These MDs cover part of the southern portion of the Project. In 2009 MASA transferred these two MDs to Andes Corp. The central portion of the Project is covered by MD Mirta and the northern portion by Escorpio II, all owned by Andes Corp.

McEwen Mining, through one or more subsidiaries has made application to acquire or has acquired cateos and MDs in respect of the area surrounding the Project area. A list of those land holdings is detailed in Table 4-1 and shown on Figure 4-2. The size of the property covered by those tenements, once actually granted, however, may differ from those set out in Table 4-1.

Table 4-1: Minera Andes S.A. Mineral Claim Status

Name	File Number	Hectares (ha)	Claim Type
Principal Mineral Holdings			
Azul 1	520-0279-M98	2,098	MD
Azul 2	520-0280-M98	1,320	MD
Mirta	1124.0141-M-09	354	MD
Escorpio II	0154-C-96	1,991	MD
Peripheral Mineral Holdings			
Azul 3	1124.121-A-06	167	MD
Azul Este	1124.186-A-07	2,373	MD
Azul Norte	1124.668-M-07	132	MD
Azul 4	1124.473-M-08	903	MD
Escorpio I	0153-C-96	169	MD
Escorpio III	0155-C-96	199	MD
Escorpio IV	425.213-C-03	4,412	MD
Totora	414.1324-C-05	505	MD
Totora II	520.496-C-99	1,561	MD
Mercedes	0644-M-96	842	MD
Sofia	1124.157-A-07	3,325	MD
Azul 5	1124.119-A-09	3,001	MD
Marcela	1124.495-A-09	2,953	MD
Agostina	1124.108-A-10	1,184	MD
Rosario	1124.169-A-10	1,768	MD
Gina	1124.168-A-10	1,763	MD
Cecilia	1124.035-A-12	1,702	MD

The extent of the inferred resource is indicated by the red outline in Figure 4-2.

During January 2012, the acquisition of Minera Andes Inc. by US Gold Corporation was completed. The combined business was renamed McEwen Mining Inc. All of Andes Corp.'s mining rights in the Province of San Juan are in good standing and have been duly registered, or are being duly registered.

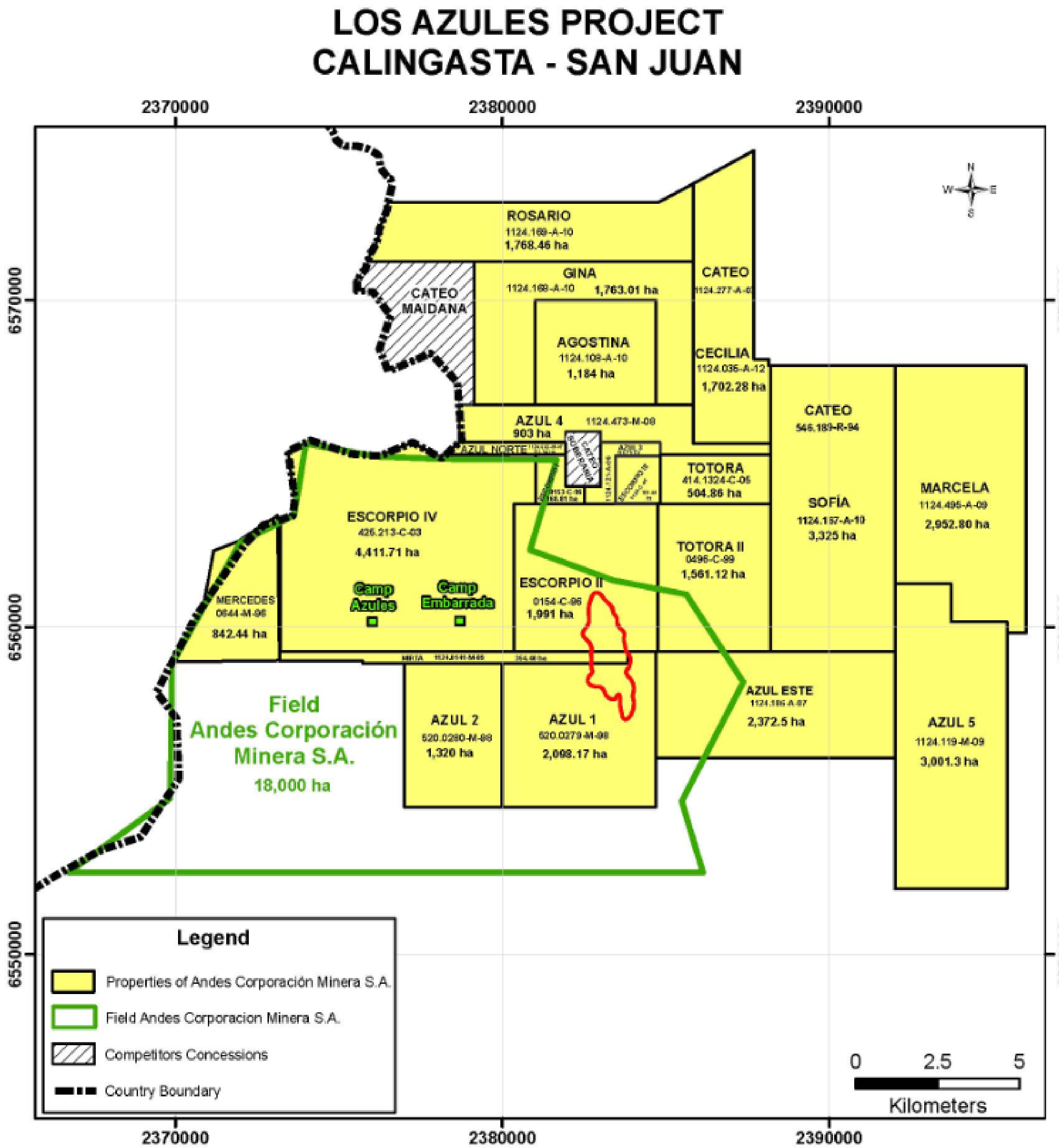

Figure 4-2: Map of Mineral Claims and Surface Ownership (McEwen 2017)

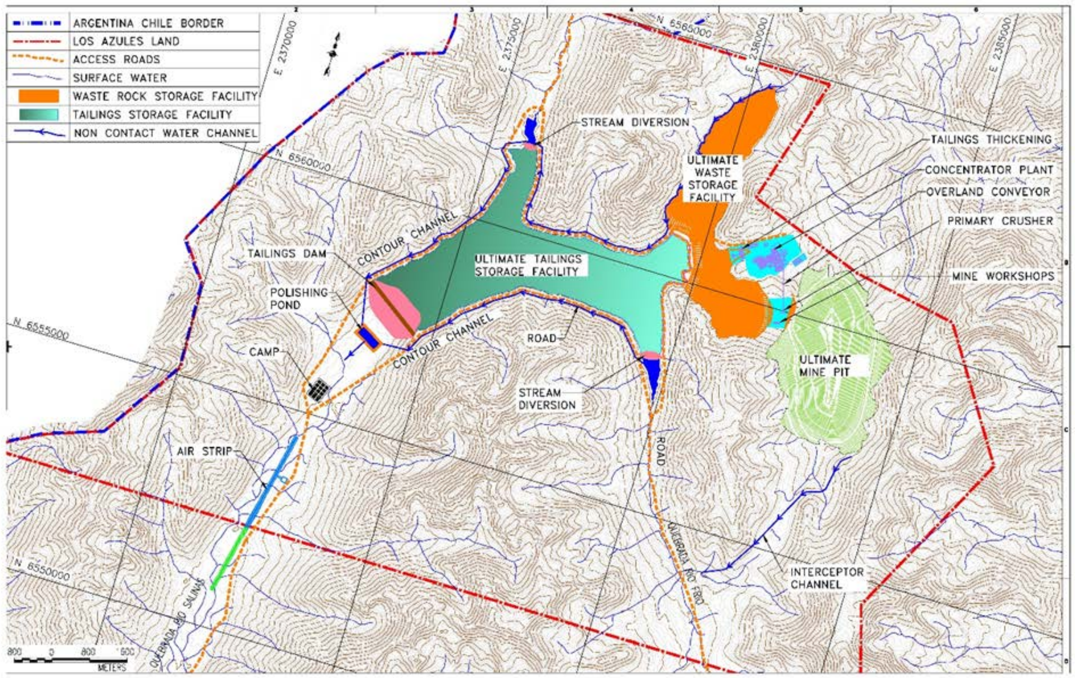

Figure 4-3 : Map of project site area

The red dashed lines on Figure 4-3 indicate the limits of McEwen surface rights (land holdings). The western boundary of the property is the border with Chile.

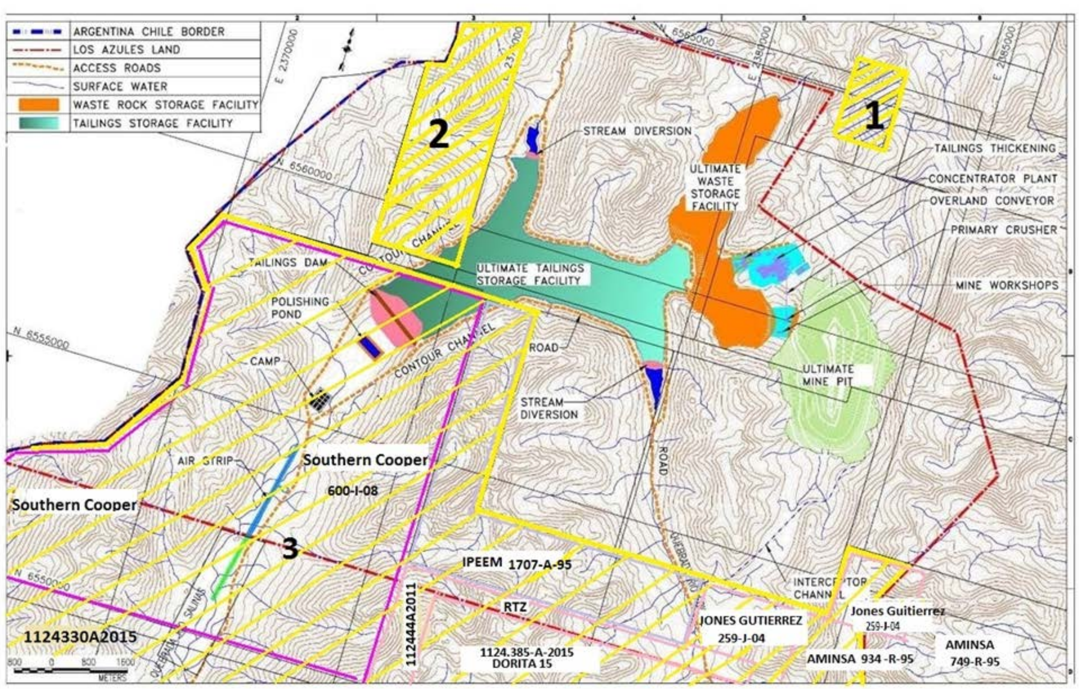

Figure 4-4 : Map of mineral concessions within or adjacent to project area

Mineral concessions hatched in yellow on Figure 4-4 are not owned by McEwen at this time with the exception of the area labled “2” which is owned by McEwen but has some boundary definition issues pending. None of the mineral concessions that are not owned by McEwen but that fall within the McEwen owned lands (surface rights) will have any impact upon the Los Azules Project development. At the Los Azules tailings storage facility McEwen has the surface rights which includes rights for superficial material extraction and dam development under Argentina law. The mining concession holder must demonstrate a resource development potential is affected by the tailings storage facility location for an issue to arise. If such an issue did arise Los Azules has other tailings storage facility solutions available..

4.3.1 Los Azules Surface Rights

In January 2010, Andes Corp. purchased 18,000 ha of surface rights in the Los Azules area. The purchase of this property, located near the Argentina/Chile border region, was subject to governmental approval. Such approval was granted on August 31, 2010, by Resolution #907 of the Ministerio del Interior. Figure 4-2 shows the purchased surface rights. The surface rights currently held by Andes Corp cover the area currently being explored by McEwen Mining. The area represented by the surface rights are also considered to be more than adequate for potential development of the mine, associated processing facilities and infrastructure considered in this technical report.

4.4 Royalties and Retentions

There are no outstanding royalties, payments, or other agreements or encumbrances to which the property is subject other than a one-time $500,000 payment to be made to Hugo Bosque upon delivery of a feasibility study.

San Juan Province charges a three percent royalty based on “mine mouth value.” By definition, the three percent is charged on the value of the contained metal minus all costs associated with the extraction of the metals as far as the pit rim but not including crushing, processing or any administration costs.

In addition, the San Juan province has an unlegislated practice of negotiating a voluntary contribution to a trust fund (“fideicomiso” in Spanish) with mining operations that primarily produce gold, as long as the price of gold remains above US $1,000 per ounce. These contributions are intended to be used to finance infrastructure projects in the province, especially in the local area impacted by the mining operation.

TNR holds a 0.4% NSR on the entire project.

4.5 Back-in Rights

There are no back in rights.

4.6 Environmental Liabilities

At the present time, there are no known environmental liabilities at the Project site, since it is an exploration project. Reclamation activities are comprised of re-grading the drill pad sites, access roads at site and some portions of the main access road to the Project site.

There are two principal activities that have environmental impacts in the Project area. One is the overgrazing of pasture lands and the second is access roads and drill platforms on the property.

Seasonal grazing by “veranadas” from Chile takes place on sparse foraging resources and wetlands in the Project area. The “veranadas” with large animal herds (primarily goats) have affected:

- Vegetation coverage on the grazing land.
- Erosion of the borders of streams.
- The surface drainage capacity due to compaction.

There are numerous previously existing excavation areas for exploration roads in the Project and surrounding areas, including drilling platforms.

4.7 Permitting Requirements

Argentine laws and regulations differentiate between prospecting, exploration and exploitation activities. It is understood that exploration activities include mapping, sampling (including bulk samples), geophysics, trenching and drilling, whereas prospecting activities include only mapping and sampling.

There are different sectorial permits that are required to conduct mining activities, but the most relevant ones are the ones associated with environmental permits. The provisions related to environmental protection applicable to the mining activity were established in 1995 by the General Environmental Law and have been incorporated in Title Thirteen of the Mining Code.

The federal government is empowered to issue minimum environmental protection standard laws (MEPSL), applicable in the whole country by the respective local authorities. The provinces are allowed to supplement and regulate the MEPSL with more stringent local or provincial environmental regulations.

4.7.1 Exploration and Prospecting Requirements

The main permit for the exploration phase at Los Azules is the Environmental Impact Declaration (Declaracion de Impacto Ambiental or DIA in Spanish), which must be updated at least every two years with the provincial mining authority. An EIA must be presented for each phase of the project development: prospecting, exploration, exploitation (including industrialization, storage, transportation and marketing of minerals). The DIA renewal was granted on September 29th, 2016.

Ancillary permits for water usage (domestic, drilling and dust mitigation), archeological research and investigation, hazardous waste, sewage and domestic waste facilities are renewed on an annual basis before the commencement of the exploration season. The permit renewals are expected to be approved on time as per prior exploration seasons.

4.8 Permitting Regulations

There are five main legal requirements that impact the Project during the different stages of development: environmental regulation, mining regulation, hazardous waste regulation, health and safety regulation and the Mining Investment Law.

4.8.1 Environmental Regulation

Environmental regulations applicable to Mining have essentially four sources:

(i) environmental specific regulations applicable to mining arising from the Mining Code;

(ii) environmental laws issued by Federal Congress as MEPSL applicable to all activities including mining,

(iii) local environmental regulations issued by the provinces the MEPSL and applicable to all activities including mining;

(iv) additional local/provincial environmental legislation as long as this does not contradict or is less stringent than a MEPSL.

Lack of compliance or other infringement of the environmental obligation may result in penalties ranging from fines to suspension of works or closure of the mine, but without effect upon title or ownership of the mining concession.

4.8.2 Mine Regulation

The acquisition, exploitation and use of minerals are regulated by the Mining Code (National Law 1919) and Provincial Law 7199. In addition, the province of San Juan has adopted National Law 24585, environmental protection for mining activities.

4.8.3 Hazardous Waste Regulation

Other regulations affecting the Project are related to Hazardous Waste regulations set forth in National Law 24051, adopted by the province of San Juan. This law regulates the generation, handling, transportation, treatment and disposal of hazardous waste materials.

4.8.4 Health and Safety Regulation

Health and safety regulations require that a mining company must hire an Occupational Hazard Insurer (ART, as per the acronym in Spanish) in order to identify and evaluate occupational hazards and to design preventive and emergency programs. For the mining sector, companies must give priority to riskier occupational activities and employee training.

4.8.5 Mining Investment Law

Mining Investment Law 240196 includes article 23, which relates to the preservation of the environment. In order to prevent and correct any impacts to the environment due to mining activities, companies may establish a special accounting provision for that purpose. The annual amount shall be left to the criterion of the company, but shall be considered deductible for income tax purposes up to a sum equivalent to five percent of the operational costs of material extraction.

4.9 Glacier Protection Legislation

In 2010 Argentina passed Federal Legislation to protect its water resources contained in glaciers prohibiting activities which could affect these resources.

- It mandates cataloguing all glaciers in the territory and their status of conservation or impact.
- The legislation created a conflict with regard to federal versus provincial (state) ownership of the natural resources which sits now in front of the Supreme Court.

Following suit In July 2010, the Province of San Juan enacted provincial law 8144, “Glacier Protection Law”, in a compromise with Federal Law, which, among other things, restricts disturbance of glaciers by mining activities. In addition, the federal Congress issued a MESPL on the protection of glaciers and periglacial environment (Law 26639), which is different from the provincial law.

Since 2011, several independent studies have been conducted by the Company.

- No uncovered, or “white glaciers” ice glaciers, have been identified on Los Azules property; however, several small “rock glaciers” have been mapped onsite.
- The company believes it is in full compliance with the law, not having disturbed any glaciers that could be deemed a water resource.
- The provincial inventory has been completed with no rock glaciers having been found to be affected by exploration activities at Los Azules.
- None of these rock glaciers will be impacted by the company’s future exploration activities or the development of a mining project.
- The water storage and watershed contribution from any rock glaciers mapped will be evaluated as part of the Environmental Baseline Studies required for permitting.

The Los Azules exploration area was audited by a multi-agency environmental audit team in March 2013. There were no adverse findings and the audit results indicated that McEwen Mining is in full compliance in all areas protected by the provincial law.

In 2016 the Provincial government started to catalogue the glaciers present in the provincial territory to determine if any impacts have taken place or if any glaciers could impede mineral development in the province.

4.10 Environmental Baseline Studies

Between 2007 – 2012 Ausenco Vector has monitored and collected environmental baseline data on surface and groundwater volumes and quality, soils, flora and fauna, archeology and weather. Ausenco Vector has also studied the boggy wetlands, locally referred to as “Vegas”.

Ausenco Vector implemented a plan to relocate or compensate the vegas where they may be impacted by the project. The plan did not produce satisfactory results. Andes Corporación Minera S.A. requested to the provincial environmental authority to propose an alternative compensation criteria however there has not been any response from the authority to date.

Dr. Andres Meglioli, of Mountain Pass LLC, has been monitoring cryogenic landforms in the project area since 2011.

The environmental baseline data on surface and groundwater volumes and quality as well as the flora and fauna data collection and additional studies on the vegas (including a compensation proposal) have been conducted since 2013 by the Insituto de Investigaciones Hidraulicas, a research center of the National University of San Juan, through their senior biologists Juan C. Acosta and Hector J. Villavicencio. These are ongoing studies contracted by McEwen. After each drilling season, a report is prepared by the consultants and issued to McEwen that summarizes the work completed through the season.

In late 2017 and throughout 2018 McEwen in conjunction with consultants and specialists will commence and perform full year baseline studies for fauna, flora and hydrology that will require extended site access through all seasons and support probably using mules and also using helicopter. Geotechnical studies such as water permeability tests may also be performed to enhance the existing data set.

The objective is to include this baseline data into the IIA documentation (Informe Impacto Ambiental) equivalent to the English EIA that McEwen intends to be submitted to the authorities at the end of 2018

5. Accessibility, Climate, Local Resources, Infrastructure and Physiography

This section was prepared by D. Brown, CPEng, McEwen.

5.1 Accessibility

The Los Azules porphyry copper deposit is approximately 6 km to the east of the border between Chile and Argentina. The Project is west-north-west of Calingasta and accessed by 120 km of unimproved dirt road with eight river crossings and two mountain passes, which are both above 4,100 masl. Calingasta is located west of the city of San Juan along Route 12. The last 95 km of the 120 km dirt road to the Project was constructed by Battle Mountain Gold, prior to which access was by mules. The current driving time from Calingasta to the Project site is approximately five hours. Without snow clearing the road generally becomes impassable for at least six months each year between May and November.

Figure 5-1 below illustrates the existing Access Road route between Los Azules and Calingasta. Other routes are under evaluation including a longer southern route to Calingasta and a western route from Los Azules into Chile, however none of these other routes are formed or passable at this time.

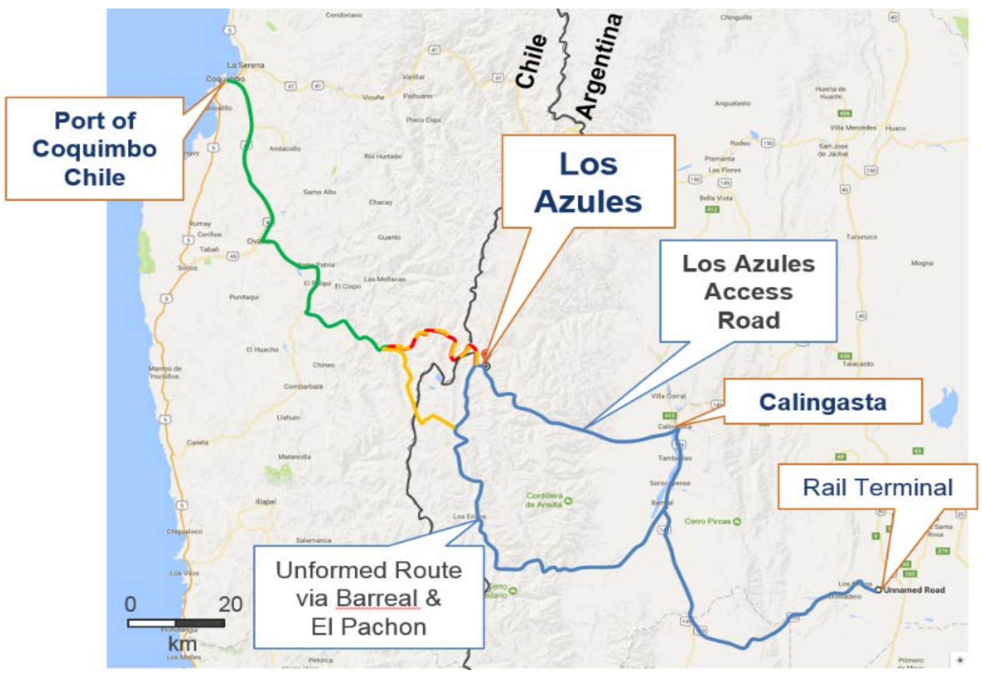

Figure 5-1: Map of Surrounding Region and Site Access Routes

An airstrip is shown in the site General Arrangement drawing (Figure 5-6).This is presently in permitting and when approved and constructed will enable personnel access and equipment access for supporting exploration and development for a greater part of each year.

5.2 Surface Rights

According to Argentine law, mineral rights supersede the overlying surface rights and the holder of the latter is legally unable to impede access to the exploration or extraction of underlying mineralization. Fair compensation is provided to the surface rights holder for access and usage of the land in conjunction with exploration activities and mining operations. In January 2010 "Minera Andes", a company 100% owned by McEwen Mining Inc., purchased 18,000 ha of surface rights covering the Los Azules deposit and the associated surface facilities, as they are currently envisioned. The extent of surface rights and the proposed surface facilities are illustrated in the Los Azules General Arrangement in Figure 5-6.

5.3 Climate and Length of Operating Season

Typically, the field season at Los Azules starts in December and runs through to the end of April. In some years, however, drilling has continued through mid-May, and depending upon the winter snow pack conditions, it is possible in some years to access the site as early as October.

A weather station was installed near the camp site in mid-2010 in order to obtain local climatic information. The station is powered by a solar panel and collects meteorological parameters at 30 minute intervals. The station was manufactured by Coastal Environmental and is built around the ZENO® 3200 datalogger. Data communication is via an iridium satellite modem. Data is downloaded using a companion base station located in the United States. The weather station uses a stand-alone tower with sensors to obtain the following parameters:

- Wind direction (degrees).
- Wind speed (m/s).
- Wind gust (m/s).
- Standard deviation of wind direction (degrees).
- Air temperature (°C).
- Relative humidity (%).
- Barometric pressure (mPa).
- SW solar radiation (W/m^2).
- Rain intensity (mm/min).
- Accumulative precipitation (mm) in precipitation bucket.
- Contents of precipitation bucket (mm^3).
- Snow depth (mm) (installed Q2 2013).

Considering the types of recorded parameters, the Los Azules meteorological station meets the World Meteorological Organization (WMO) standards for a Principal Climatological Station.

Figure 5-2, Figure 5-3 and Figure 5-4, which were obtained from the site meteorological station, present monthly weather data for temperature, total precipitation and wind speed. Snowfall accumulations are recorded by the station as snow water equivalent. Snowfall in the Project area is relatively light, although heavy winter accumulations are common on the two high passes on the access road.

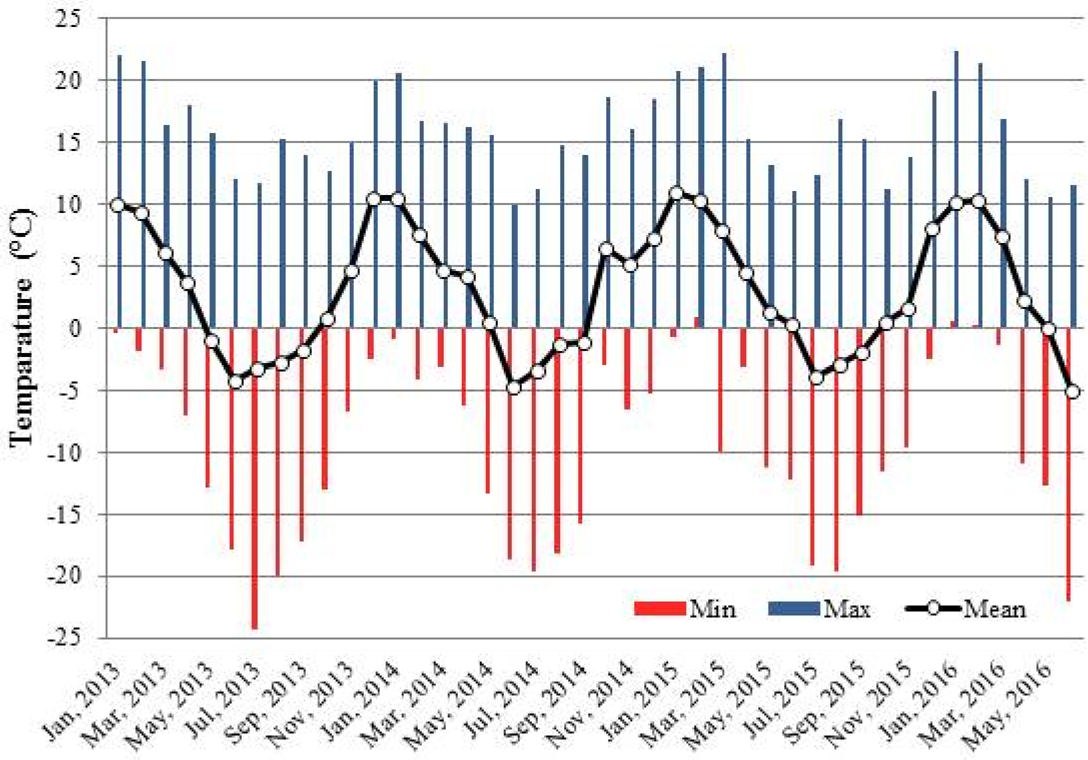

Figure 5-2: Monthly Temperature Data (McEwen 2016)

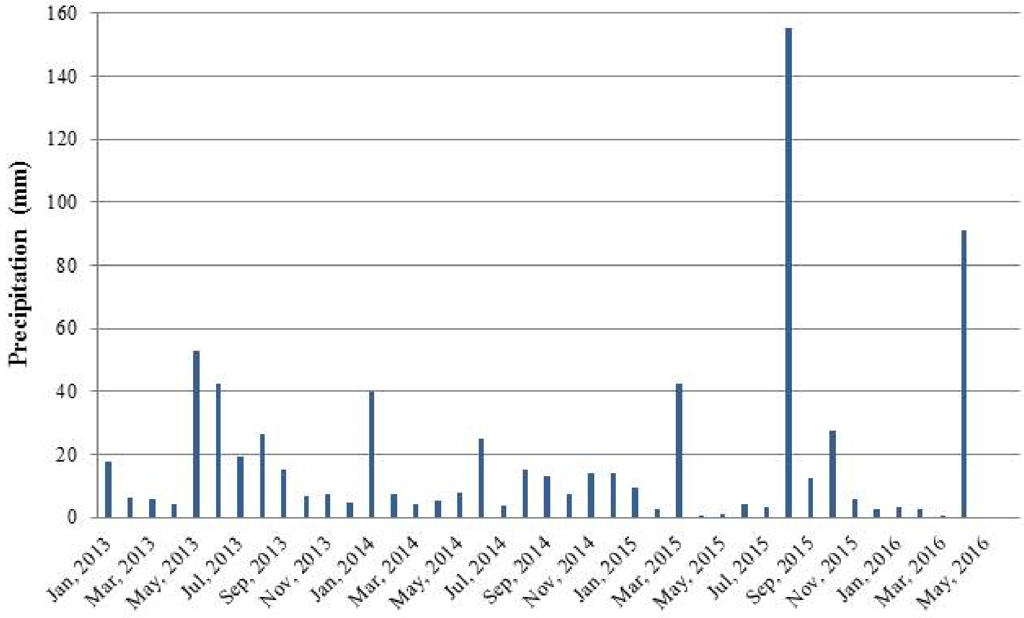

Figure 5-3: Monthly Total Precipitation Data (McEwen 2016)

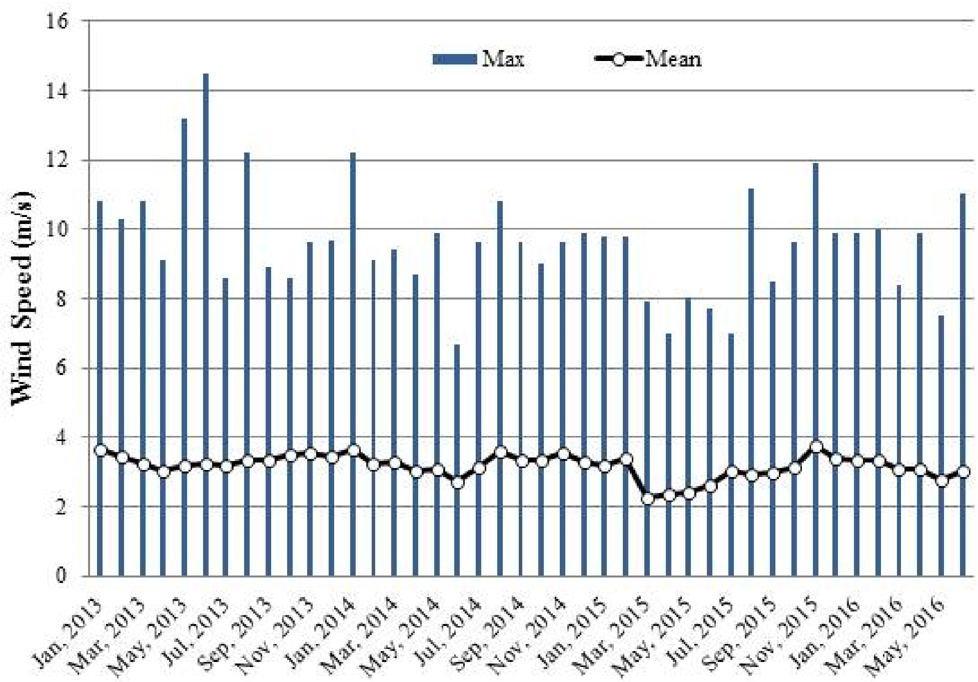

Figure 5-4: Monthly Wind Speed Data (McEwen 2016)

5.4 Local Resources and Infrastructure

The Project area is remote and no infrastructure is present in the Project area. There are no nearby towns and/or settlements. Exploration operations are carried out by means of two man camps within the Project development area.

5.4.1 Available Personnel

Historically, Villa Calingasta was a mining town whose economy was supported by the exploitation of alum deposits, which is used in water purification. The United Nations Development Program (UNDP) and other national and international agencies have established programs to help remediate certain environmental liabilities associated with this activity.

The current principal economic activity of the area is agriculture with fruit trees (apple and walnut) as the principal activity, in addition to employment in the public sector. Lesser activities include the following:

- Timber and vegetables.
- Wood manufacturing activities.
- Cider manufacturing.
- Tourism (hotels, restaurants).
- Commercial activities (shops).
- Public service (health, safety, education).

According to the Argentine National Census Bureau (INDEC) 2010 census, the population of the Calingasta Department (county) was 8,453 people.

5.4.2 Power

Hugo Gil Figueroa & Asociados (Hugo Gil) of Buenos Aires completed a scoping level power supply study in July 2012 and an update to this study was prepared in July 2013 using revised estimated electrical loads and schedule need dates. An update was provided by the same consultant describing the actual status of the power supply including a realistic overview of the future possibilities regarding the latest regulations established by the new administration as of December 2015 and the alternative of importing electricity from Chile.

A preliminary power supply estimate was carried in August 2016 to update power supply based on the current process flow diagram. McEwen has also performed some on site evaluations in Chile and Argentina. The updated preliminary power supply estimate and available options are discussed further in Section 18 of this document.

5.4.3 Water

Surface water is available on the property in adequate amounts for McEwen Mining's exploration activities. Preliminary hydrological evaluations conducted by Ausenco Vector have indicated that there are sufficient sources of water to operate the Los Azules mining and processing facilities and to provide the necessary fresh water needed to house employees at the mine site.

5.5 Topography, Elevation and Vegetation

The Project is centered on La Ballena ridge (English translation: the whale), a low NNW-SSE trending ridge. The Project area is rugged and ranges in elevation from 3,500 to nearly 4,500 masl. Vegetation is sparse and is virtually absent at higher elevations. A photograph of the La Ballena ridge is shown in Figure 5-5.

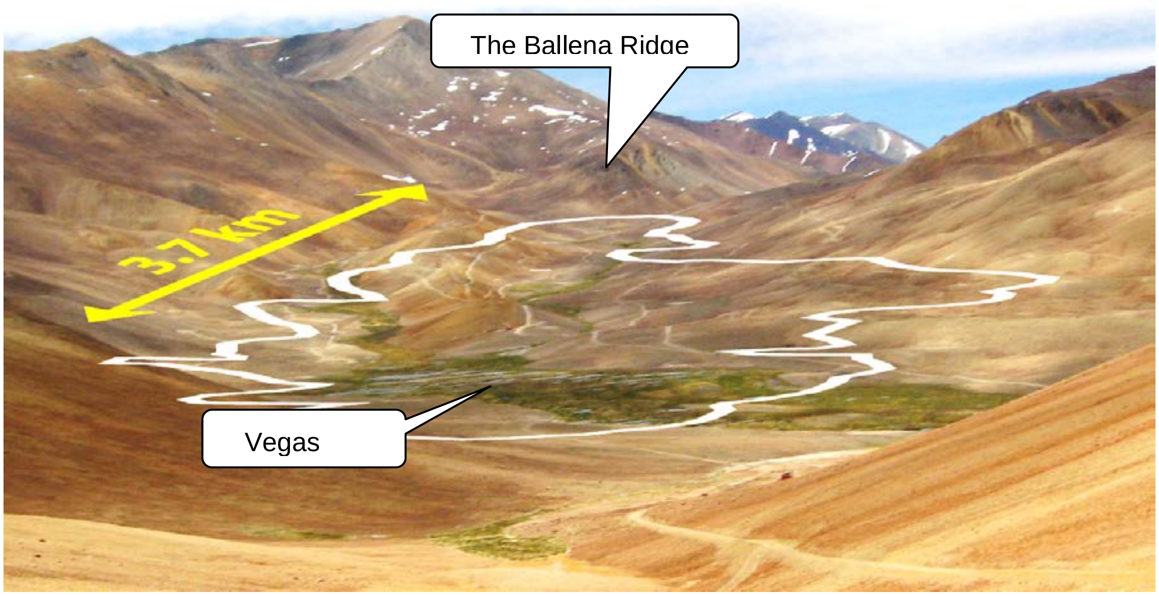

Figure 5-5: Los Azules deposit, looking south towards the Ballena Ridge in the centre distance

Long, narrow vegetated areas ("vegas" in Spanish) occupy the valley floors on either side of La Ballena. These vegas are fed by spring-water and snowmelt, but apparently also reflect the groundwater regime as well, with standing water levels at approximately 3,600 m in elevation. Springs are noted at approximately 3,790 m in elevation upstream of the vegas along the west side of La Ballena ridge. Groundwater-fed springs and marshes are also noted around the range to the west of La Ballena between 3,800 and 3,900 m in elevation and along the eastern flank of the Cordillera de la Totora. These vegas feed the westerly flowing Rio La Embarrada, which joins the Rio Frio to the west before turning south into the Rio de las Salinas, a main tributary to the San Juan River.

Deposits of glacial debris (morainal materials) and scree account for much of the surface area covering the Los Azules deposit and adjacent mountainsides. In the area of the deposit, these materials locally exceed 60 m in thickness, but on La Ballena ridge, the cover is from up to 10 m.

There are no covered or uncovered "white glaciers" (classic ice glaciers) within the Project area, although there are several small rock glaciers near the Project area but these will not be impacted by McEwen Mining's exploration or Project development activities.

5.6 Availability of Area for Tailings Storage, Waste Storage and Processing Facilities

The area around Los Azules provides limited options for siting of the Tailings Storage Facility (TSF), and the waste rock storage facility (WRSF), the processing facilities and other infrastructure needed. The location of the project development surface facilities is yet to be finalized and needs geotechnical investigations and detailed design work to be performed. The proposed General Arrangement of the various project facilities is presented below in Figure 5-6. This is further described in Sections 16 and 18.

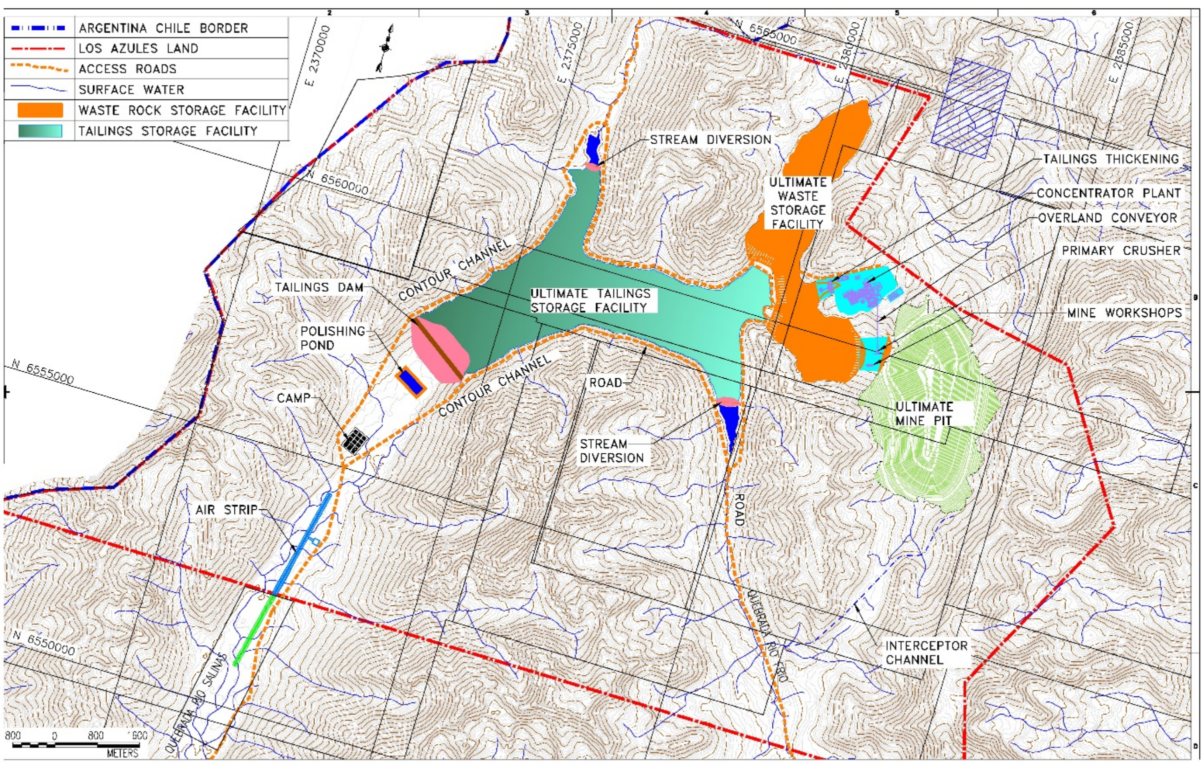

Figure 5-6: Los Azules Project General Arrangement

6. History

This section was prepared by D. Brown, CPEng, McEwen.

6.1 Property History

In 1994, Minera Andes, through its subsidiary Minera Andes S.A. (MASA), acquired lands in the southern portion of the Los Azules area. Battle Mountain Gold Company (BMG), acquired lands immediately to the north through an option from Solitario Argentina S.A. (SASA). For the next couple of years, both companies independently explored for gold on their respective land holdings.

In 1998, a new access road was constructed by BMG while it conducted airborne geophysical surveys, mapping, trenching and drilled several reverse circulation (RC) holes. A large hydrothermal alteration zone associated with dacite porphyry intrusions and stockwork structural zones was recognized in the Project area and Minera Andes signed a Letter of Intent with BMG to form a joint venture to explore the combined land package.

In 1999, Minera Andes and BMG signed a definitive joint venture agreement. BMG subsequently drilled additional RC holes and porphyry copper mineralization was intersected close to the property boundary; however, no drilling was done on the Minera Andes properties.

In 2000, BMG merged with Newmont Mining Corporation (NMC). No further work was done by BMG/NMC and the joint venture was allowed to dissolve without BMG earning any interest in the Minera Andes or Solitario lands. At that time, capitalizing on a surveying error, Mr. Hugo Bosque, an attorney from San Juan, acquired a small strip of land between the Minera Andes and Solitario lands.

In 2003, MIM Argentina S.A. (MIM) optioned the Bosque and Solitario lands and began exploration work. Independently Minera Andes began exploration on its own lands at Los Azules.

In 2005, a Letter of Intent was drafted between Minera Andes and Xstrata Copper (successor to MIM) for earn-in rights on the combined land package. More exploration occurred over the next couple of years.

On November 2, 2007, Minera Andes Inc. entered into an Option Agreement with Xstrata whereby the exclusive right was granted to Minera Andes to explore and evaluate the area called “Los Azules” which included several properties owned by Xstrata as defined in the Option Agreement.

On May 15, 2009, the parties to the Option Agreement, together with Andes Corp. and Los Azules Mining, Inc. (LAMI), each wholly-owned subsidiaries of Minera Andes, signed an Assignment and Amending Agreement whereby Minera Andes properties “Azul 1” and “Azul 2” were transferred to Andes Corp. together with the right to acquire from Xstrata 100% interest in and to the Los Azules properties (as defined in the Option Agreement). In addition, Minera Andes S.A. assigned and transferred to LAMI all of MASA's right, title, benefit and interest in, to and under the Option Agreement (as defined in the Assignment and Amending Agreement).

On May 29, 2009, Los Azules Mining Inc., exercised the option, by delivery of an Earn-in Notice (pursuant to the Option Agreement as amended by the Assignment and Amending Agreement) to acquire 100 percent interest in Los Azules properties (as defined in the Option Agreement). As a consequence, Xstrata subsequently transferred to Andes Corp. all of its properties located in the Los Azules area.

On September 30, 2009, Xstrata elected not to exercise its option to acquire a 51% interest in the Project and has no remaining interests in Los Azules.

In January 2012, Minera Andes Inc., was acquired by US Gold Corporation and the combined company was subsequently renamed McEwen Mining.

As of 2017 McEwen Mining continues to hold 100% of the Los Azules development and associated land holdings and mineral concessions and easements and continues to perform seasonal infill drilling and studies with a view to eventual project development.

7. Geological Setting and Mineralization

This section was prepared by J. Duff, P. Geol, McEwen. This section relies heavily on geological studies conducted by Richard Sillitoe (2014) and Vázquez (2015) as well as other references cited in the Section.

7.1 Regional Geology

Los Azules is a porphyry copper deposit located in western San Juan Province in west-central Argentina. This region is characterized by a series of north-south elongated mountain ranges that rise in altitude from east to west to form the rugged Andean Cordillera along the border between Argentina and Chile. Los Azules lies within the highest altitude Cordillera Principal at an elevation of about 3,700 masl (Figure 7-1).

The Cordillera Principal is composed of strongly folded, faulted and elevated Paleozoic-Mesozoic sedimentary and volcanic lithologies (Gondwanide orogeny) overlain by extensive Upper Miocene ignimbrites (Andean orogeny) as shown in Figure 7-2. Eocene to early Miocene volcaniclastic strata in the region accumulated in an extensional basin followed by plutonic intrusion and contractional deformation from 19 My to 16 My. These units were overlain and intruded by 16 My to 7 My volcanic flows and pyroclastic units with comagmatic 12 My to 8 My plutons and porphyry systems. This was followed by a compressional event at 8 My to 5 My with important crustal shortening, thickening, and regional uplift (Sillitoe and Perello, 2005). Figure 7-2 also shows the relative locations of other major mining projects in the area.

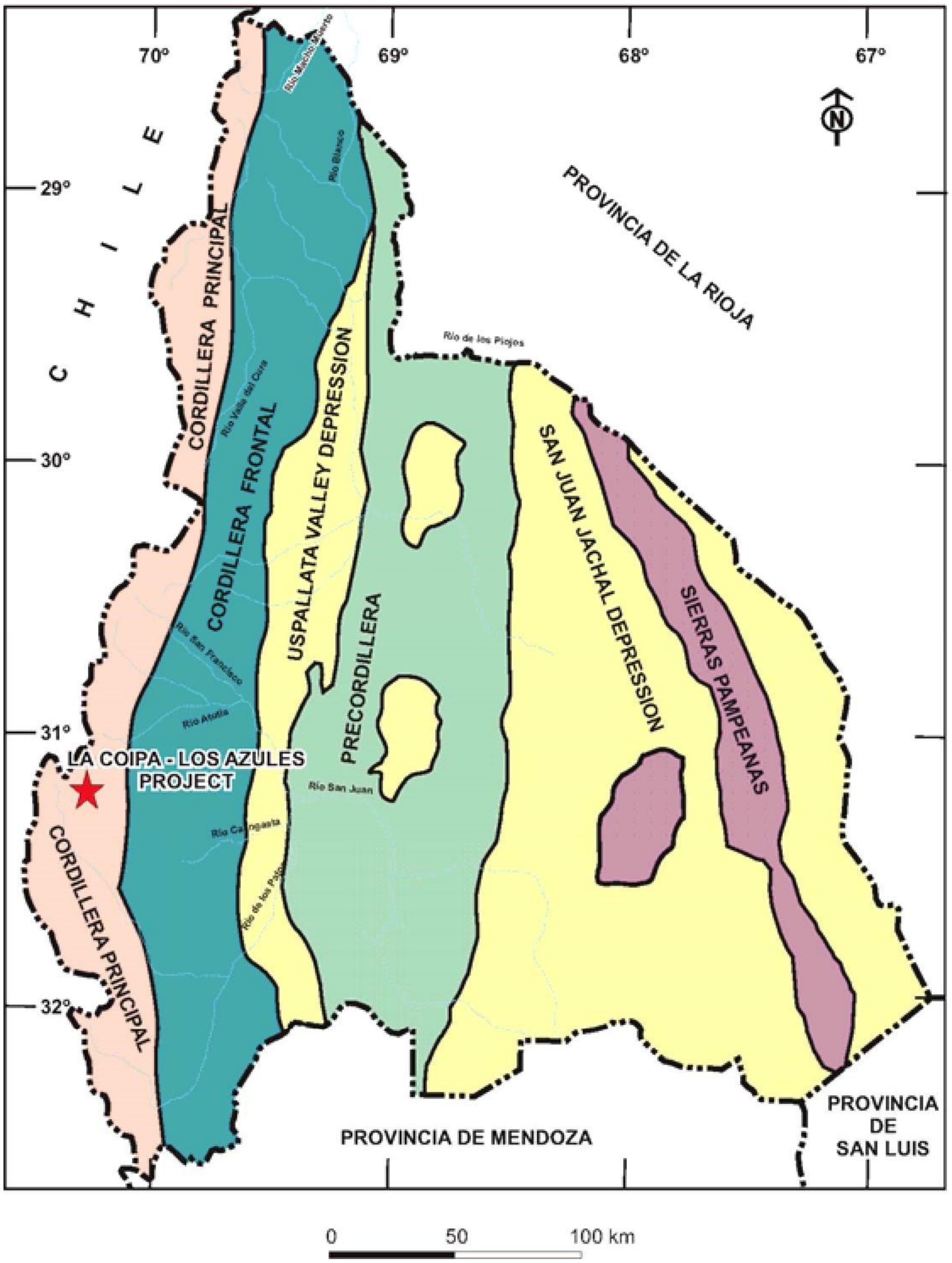

Figure 7-1: Physiographic features of San Juan Province, Argentina (Rojas 2010)

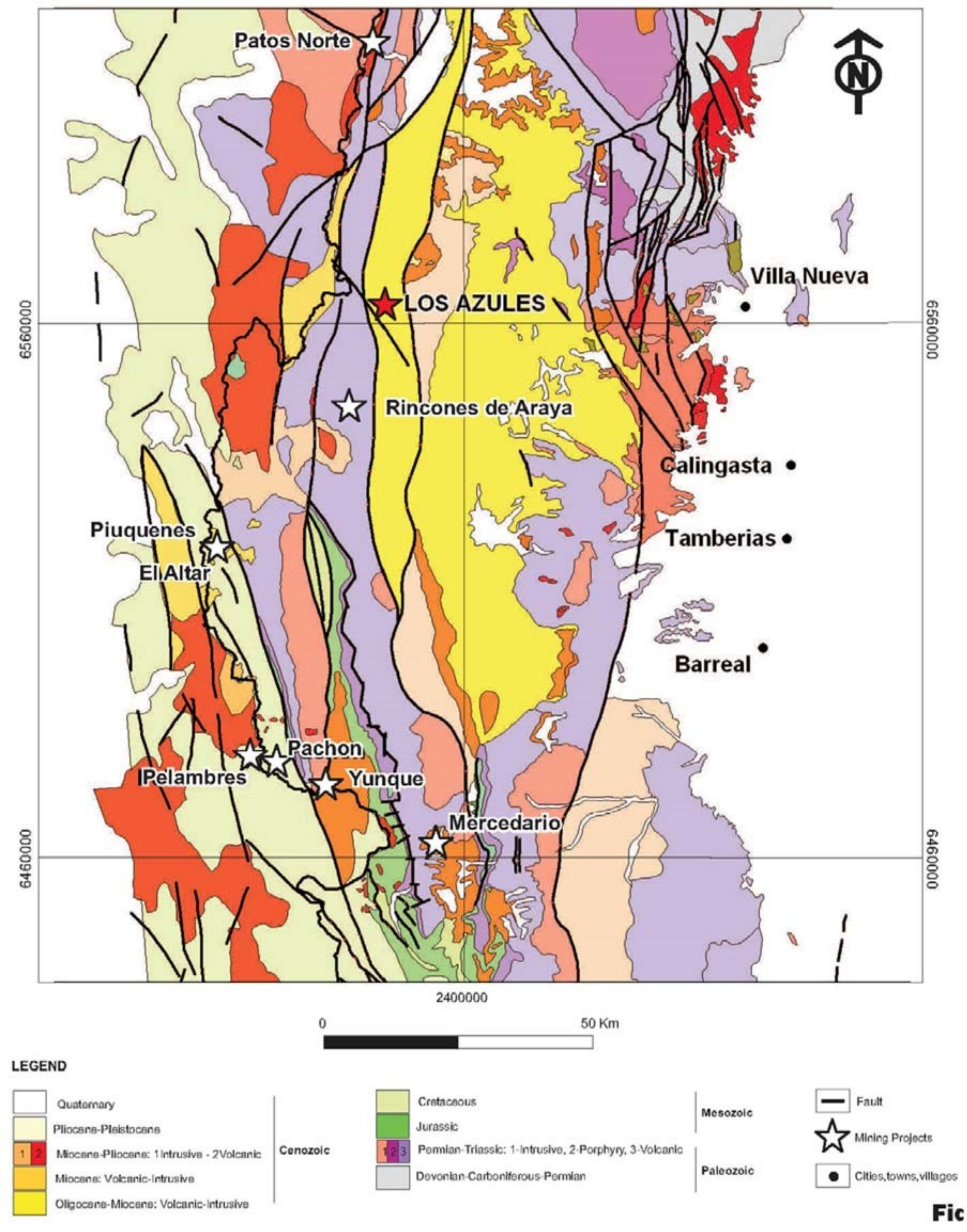

Figure 7-2: Regional geology of the Andean Cordillera of Argentina and Chile (Rojas 2010)

7.2 Property Geology

Los Azules has been geologically mapped on at least four separate occasions (Rojas, 2007; Zurcher, 2009; Almandoz, 2010; Pratt, 2010). The resulting geological maps and interpretations are in general agreement but differ in detail, and Jemielita (2010) reconciled most of the differences. The entire area comprising the Los Azules deposit is covered by thick scree or valley fill, so none of the rocks or structures are exposed in outcrop, although some near-surface exposures have been exposed in shallow trenching at the crest of the La Ballena ridge. Consequently, the interpretation of the structures and intrusive bodies is based almost entirely upon drill hole data.

In many respects the Los Azules deposit is a classic Andean-style porphyry copper deposit. In the bedrock below the surface cover a barren leached zone overlies a zone of secondary supergene enrichment of variable copper grades and thickness, and primary hypogene mineralization extends to at least 1,000 m below the present surface. The Los Azules hydrothermal alteration system is at least 5 km long and 4 km wide and is elongated in a NNW direction along a major structural corridor. The system disappears below volcanic cover to the north, so the ultimate extent is unknown. The altered zone surrounds the Los Azules deposit, which is approximately 4 km long by 2.5 km wide. The limits of the mineralization along strike and at depth have not been entirely constrained by drilling. In fact, almost all holes in the core resource area have been terminated in mineralization that exceeds the cut-off grade of 0.20% Cu.

Hypogene Minerals include chalcopyrite, lesser bornite, chalcocite-digenite, idaite and trace molybdenite, magnetite and lesser hematite, usually deposited on igneous mafic minerals. Chalcopyrite is the most important hypogene copper mineral in the upper levels of the deposit, and hypogene bornite appears at deeper levels together with chalcopyrite. Copper sulfides rarely exceed 2% to 3% of rock volume. Intervals of 0.1% to 0.35% copper are common in hypogene mineralization. Silver (approximately 1 gram/tonne), anomalous gold (up to approximately 150 parts per billion) and molybdenum (up to approximately 600 parts per million) are reported in some intersections.

Circulation of meteoric ground water leached primary sulfides (mainly pyrite and chalcopyrite) from the host rocks over the past several million years, and the leached copper was redeposited below the water table in a sub-horizontal zone, or blanket, of supergene enrichment as secondary chalcocite and covellite. The intensity of secondary enrichment diminishes with depth, except along major structures where it may extend to great depth. Starting at the boundary between the barren leached zone and the supergene mineralization, secondary enrichment mineralization gradually transitions to predominately hypogene mineralization at depth.

Sillitoe (2014) examined about 9,000 m (approximately 25%) of the available drill core and proposed a revised geologic interpretation for Los Azules, which is shown in Figure 7-3. Sillitoe's interpretive model has features in common with the giant Río Blanco-Los Bronces and Los Pelambres deposits in Chile; both are part of the same Miocene-Pliocene porphyry copper belt as Los Azules. Vázquez (2015) subsequently relogged 44,000 m from 98 drill holes representing essentially all of the drill core available at that time. Vázquez confirmed Sillitoe's interpretation, and he also refined the temporal sequence and spatial distribution of distinct phases of alteration and mineralization.

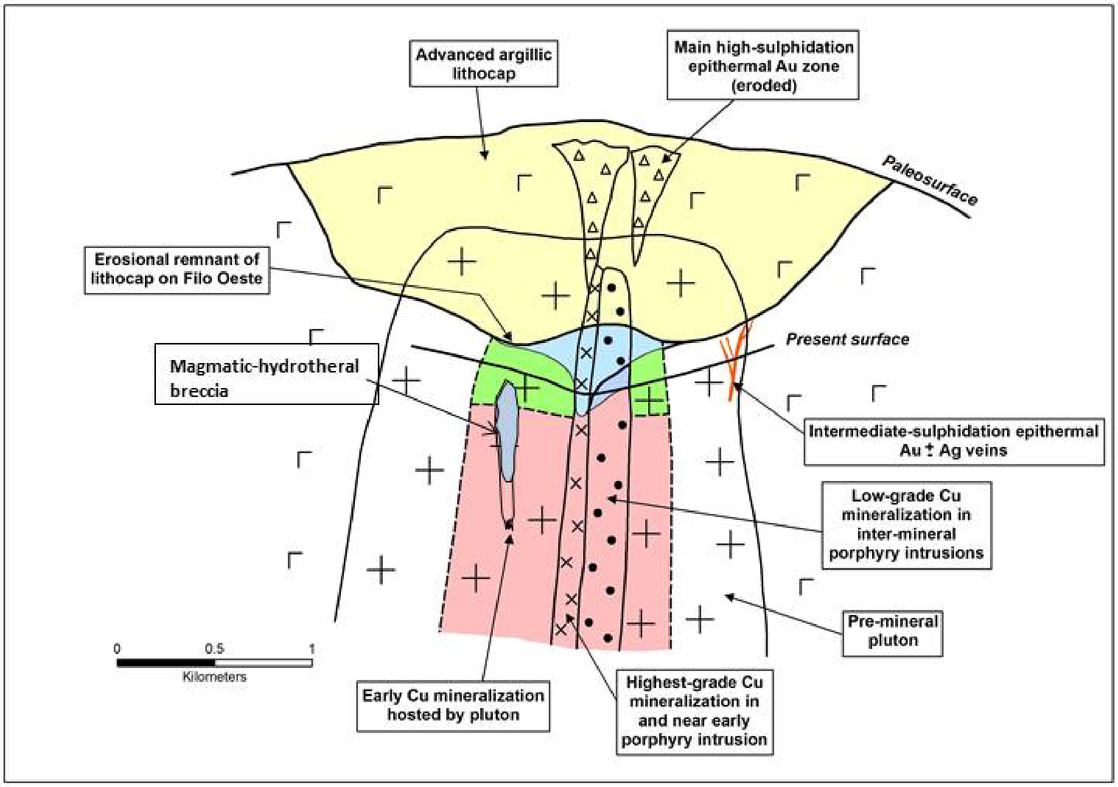

Figure 7-3: Model for Los Azules (pink: potassic alteration, green: chloritic alteration, blue: sericitic alteration, yellow: advanced argillic lithocap), (Sillitoe, 2014)

Sillitoe recognized the presence and importance of an early mineralized porphyry dike phase of igneous intrusion. Much of the hypogene mineralization as well as the supergene mineralization is associated with this phase; later dikes are not as well mineralized. Sillitoe referred to the later dikes as "inter-mineral" stage dikes.

Vásquez established the following sequence of igneous and hydrothermal events at Los Azules, and these will be described in detail in the following sections.

1. Intrusion of pre-mineral dioritic stock (or pluton).
2. Pervasive chlorite-magnetite alteration accompanied by chalcopyrite mineralization in the upper levels of the pluton grading into potassic alteration with chalcopyrite and bornite mineralization at depth.
3. Intrusion of the early mineralized porphyry dike phase.

4. Intrusion of the later “inter-mineral” phase porphyry dikes and formation of magmatic-hydrothermal breccia bodies.
5. Late sericite alteration accompanied by pyrite and chalcopyrite.
6. Formation of erratic quartz veins containing base and precious metals.
7. Supergene enrichment.

7.2.1 Volcanic Country Rocks

Country rocks at Los Azules comprise volcanic lithologies of supposed Triassic age (Choyoi group or equivalents) including rhyolite intrusions and crudely-bedded pyroclastics (flow-domes) ranging from fine grained tuffs to coarse breccias (Rojas, 2008; Pratt, 2010) as shown in Figure 7-4. The legend for Figure 7-4 is provided in Figure 7-5.

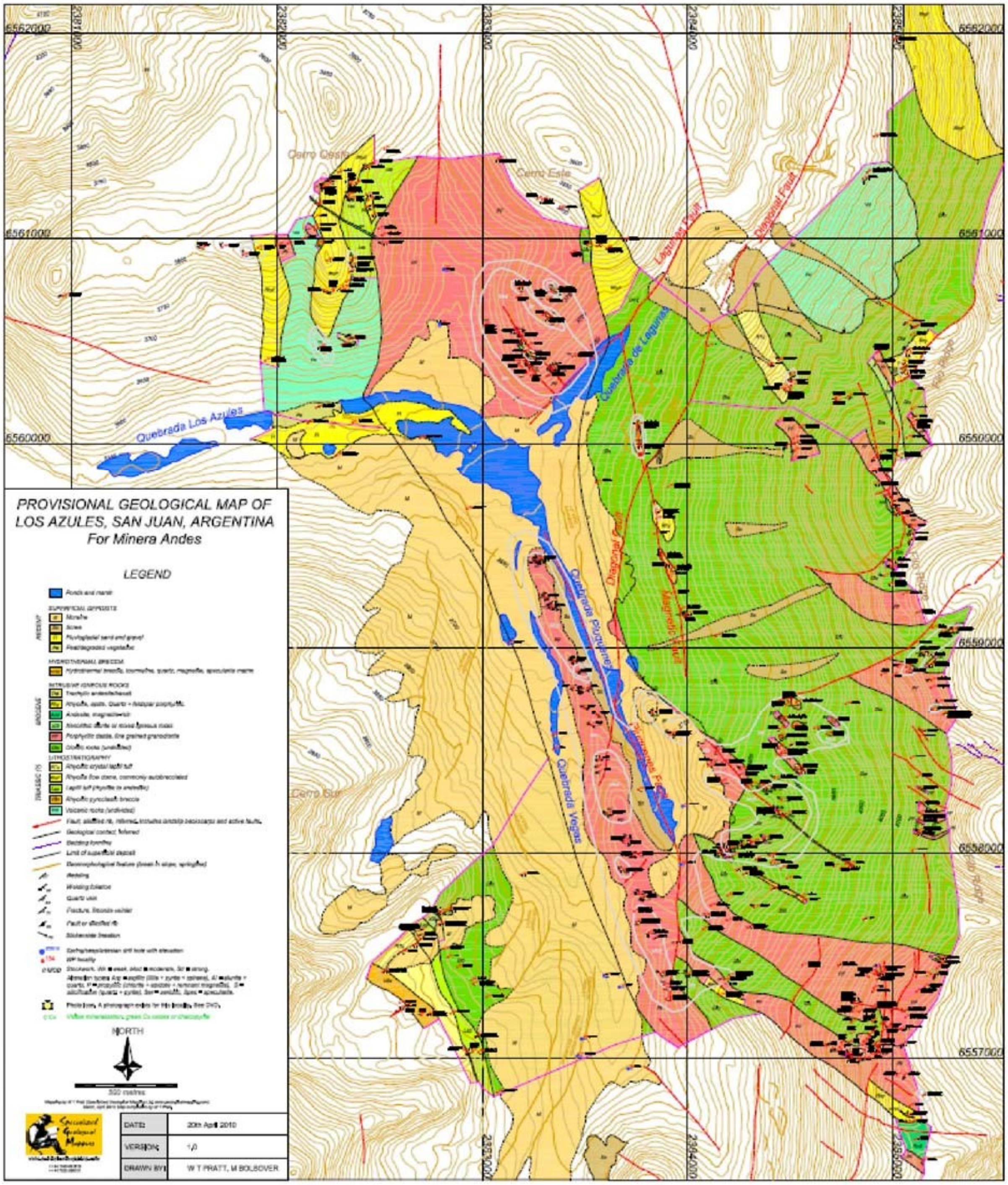

Figure 7-4: Geologic map of Los Azules (Pratt and Bolsover 2010)

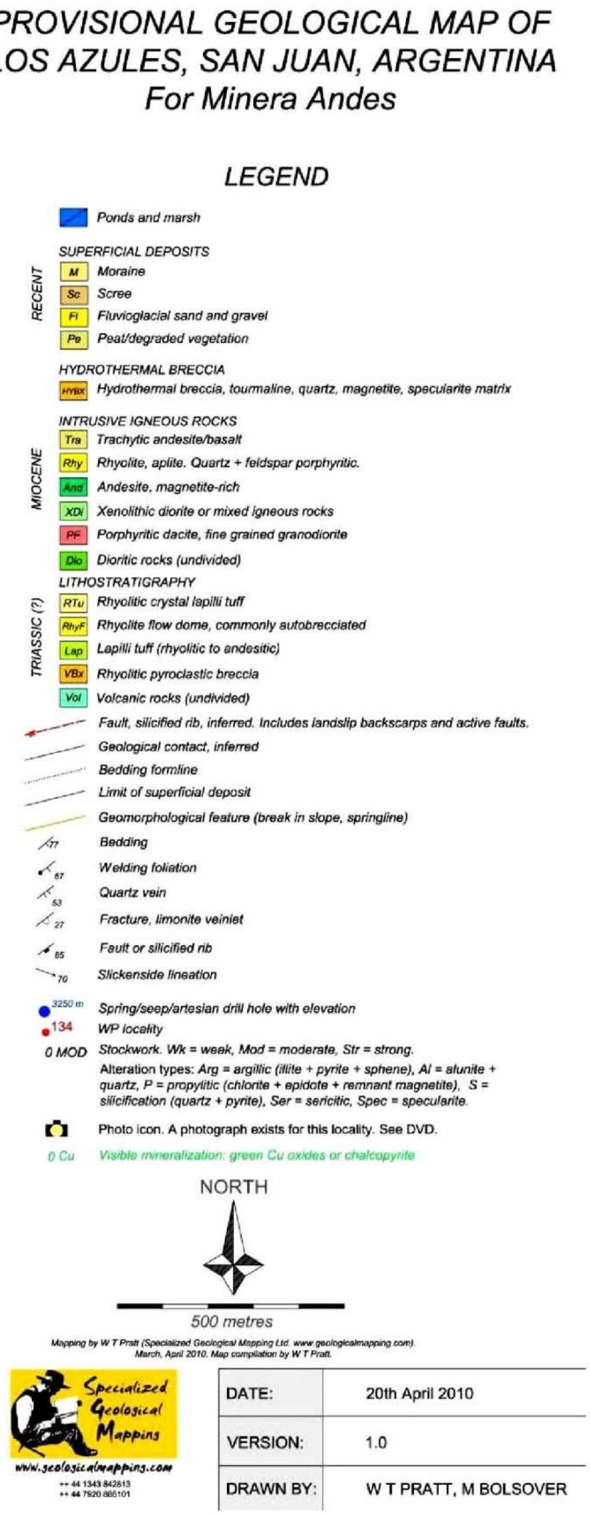

Figure 7-5: Legend for Figure 7.4

7.2.2 Pre-mineral Pluton

Triassic volcanic country rocks at Los Azules are intruded by a pre-mineral multi-phase, calc-alkaline quartz diorite pluton dated at 10.6 My to 10.7 My (Zurcher, 2008b). The pluton is elongated in a NNW direction and is at least 7 km in north-south extent and at least 2.5 km wide (Figure 7-6). The pluton comprises numerous compositionally and texturally distinct phases, of which equigranular, fine- to medium-grained diorite, monzodiorite and quartz diorite appear to be the most abundant within the mineralized zone. However, there are also phases such as felsic as quartz monzonite, and some of the quartz diorites are porphyritic. Medium-grained granodiorite has been identified in drill core from the southern and southwestern sectors of the area and a generally finer-grained quartz diorite or tonalite phase is widespread in the east, northeast and northern sectors of the pluton. The pluton corresponds to the dioritic lithology on the geologic map shown in Figure 7-4.

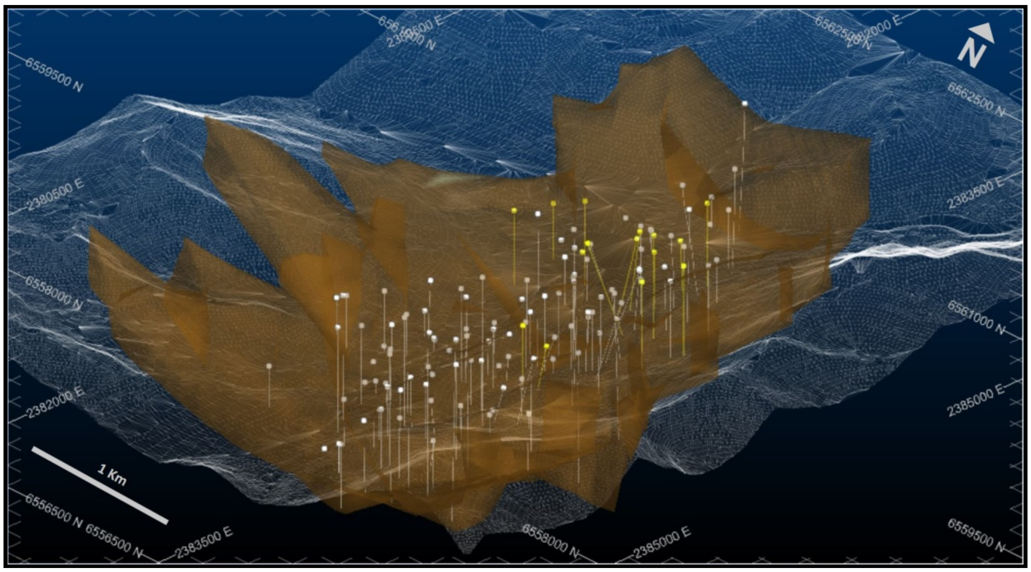

Figure 7-6: Pre-mineral diorite pluton. The pluton is shown in brown and the surface in white. Most of the area is covered by gravel valley fill. In many places the boundaries of the pluton are not constrained due to a lack of drill information, especially at depth and to the north (McEwen Mining, 2017).

7.2.3 Chlorite/Potassic Alteration

Shortly after emplacement, the pluton was affected by pervasive chlorite-magnetite alteration at higher levels in the system (up to depths of 300 m – 400 m below the present surface) contemporaneous with potassic alteration at deeper levels (Figure 7-7, Figure 7-8, Figure 7-9). No age dating is available for this event. The chloritic zone contains scattered specks of epidote, implying that it could be considered as propylitic. The upward transition of this early potassic to chlorite-magnetite alteration at Los Azules does not figure in conventional porphyry copper models, but it has been recognized by Sillitoe at Río Blanco-Los Bronces in Chile.

Vázquez estimated that approximately 50% of the hypogene copper at Los Azules was deposited during this hydrothermal event as veinlets and disseminations, but the grade corresponding to this hypogene mineralization is relatively low (e.g. 0.05-0.35% Cu). Copper mineralization in the pre-mineral pluton is homogeneous in the different lithologic facies of the pluton. However, pyrite and subordinate chalcopyrite characterize the chloritic zone, with chalcopyrite-only veinlets appearing beneath the chloritic-potassic alteration contact. At depths of 400 m – 500 m, bornite appears as an accompaniment to the chalcopyrite, and it increases at deeper levels to attain a maximum chalcopyrite/bornite ratio on the order of one to one.

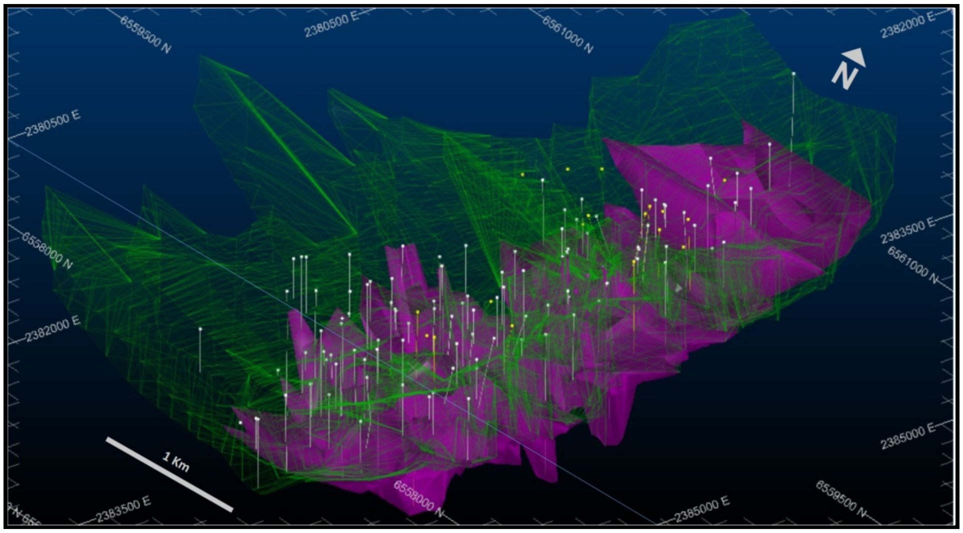

Figure 7-7: Early chlorite alteration zone in green overlying the potassic alteration zone in pink. Boundaries of alteration zones are not entirely constrained by drilling (McEwen Mining 2017).

Figure 7-8: Equigranular diorite (pre-mineral pluton) with chlorite alteration cut by a hairline type-D veinlet containing quartz and chalcopyrite with a sericite alteration halo (Hole AZ1284, 173 m).

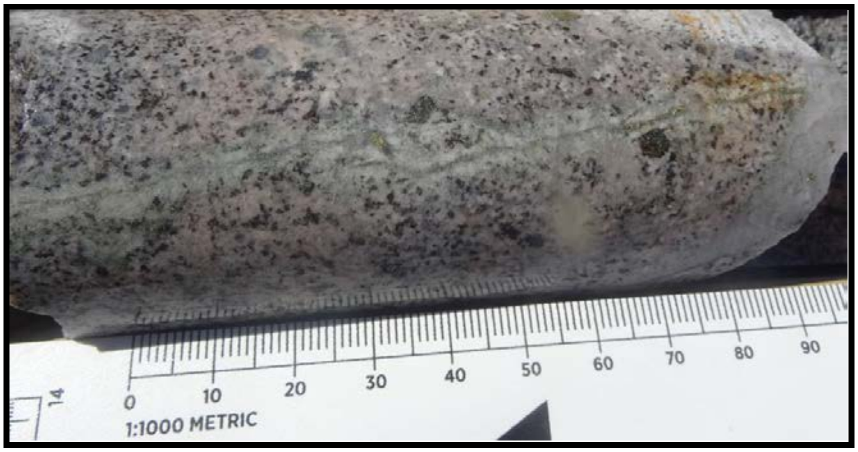

Figure 7-9: Diorite (pre-mineral pluton) with potassic alteration cut by a quartz-chalcopyrite type-A microveinlet (Vázquez, 2015).

Potassium feldspar alteration is characterized by pink orthoclase in veins/veinlets/stockworks and vein envelopes and pervasive replacements of plagioclase phenocrysts and/or matrix in diorite porphyry host rocks. Biotite alteration occurs as veins and pervasive- to selective-replacement of igneous biotite and hornblende in diorite porphyry host rocks in a zone peripheral to, and contemporaneous with, the main potassium feldspar alteration.

Advanced argillic lithocaps developed above and contemporaneous with the potassic alteration zones, with their upper parts characterized by widespread quartz-alunite alteration and vuggy residual quartz bodies, potentially hosting high sulfidation epithermal gold ± silver ± copper (enargite) mineralization (Figure 7-3). Only the root zones of these lithocaps, dominated by quartz-pyrophyllite and quartz-kaolinite assemblages, are now preserved at the highest elevations (Almandoz, 2010).

7.2.4 Early Mineralized Porphyry Dike

Zurcher (2008a) observed that the pre-mineral pluton is cut by a variety of porphyry dikes which he interpreted as trending generally NNW and inclined sharply to the east. Sillitoe made a distinction between "early mineralized porphyry dikes" and later "inter-mineral” dikes, and Vázquez established that there is one main NNW-trending rhyodacite porphyry dike, which is referred to as the “Early Mineralized Porphyry Dike”, or “EMD” for short. The dike is about 1.8 km long, 50 m to 200 m wide, and it dips steeply to the east (Figure 7-10). This dike is responsible for the location and morphology of the prominent La Ballena ridge (Figure 7-11) because the dike is relatively resistant to erosion compared to other nearby rocks due to the silica content associated with its abundant type-A veins.

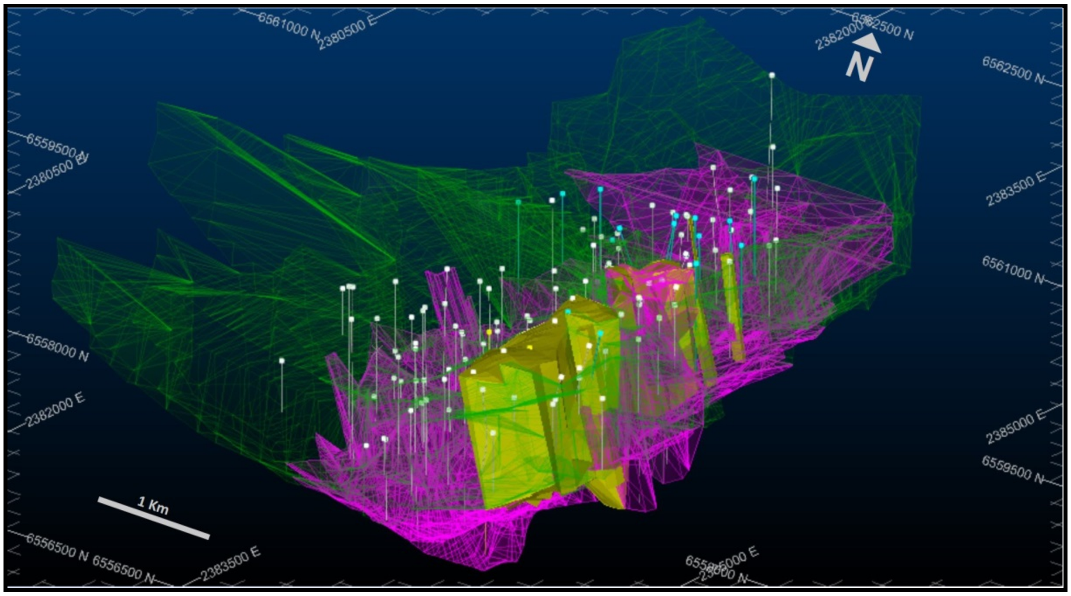

Figure 7-10: Early Mineralized Porphyry Dike shown in yellow, with chloritic alteration in green and potassic alteration in pink. The entire dike is affected by potassic alteration. The dike is not constrained at depth by drilling (McEwen Mining, 2017).

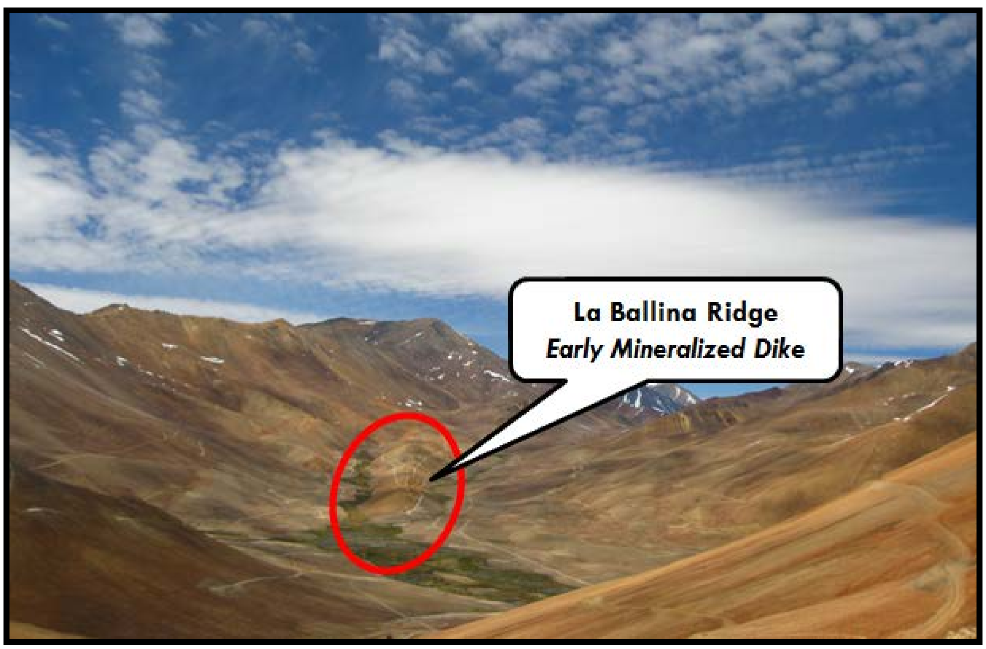

Figure 7-11: La Ballena ridge supported by the Early Mineralized Dike looking south.

The early mineralized porphyry dike(s) are rhyodacitic, and the texture is typically phaneritic-aphanitic with hornblende, biotite, and abundant, typically broken, feldspar phenocrysts and uncommon resorbed and cracked quartz eyes (1% - 5%). Phenocrysts are typically closely packed and grain-supported or set in an aplitic groundmass. This texture is locally referred to as “crowded” texture.

According to Vázquez, the emplacement of the dike took place during the dying stages of the magmatic phase, and the dike was affected everywhere by potassic alteration immediately after its emplacement as evidenced by secondary biotite replacing magmatic amphiboles and biotite with associated type-A quartz veinlets with pyrite and chalcopyrite up to 2 cm in thickness. Despite locally intense alteration, the EMD can be readily distinguished from later "inter-mineral" phase dikes (described below) by the presence of relatively abundant "type-A" veinlets (Figure 7-12), which are commonly composed of pinkish, translucent, granular quartz and are typically 0.5 cm – 1 cm wide. In contrast, later-stage dikes contain few, if any, type-A veinlets, although "type-D" veinlets may be widespread in the later dikes. The classification of vein types follows the system of Gustafson and Hunt (1975). Vázquez established that the EMD corresponds to material that Zurcher (2008b) dated at 9.2 My.

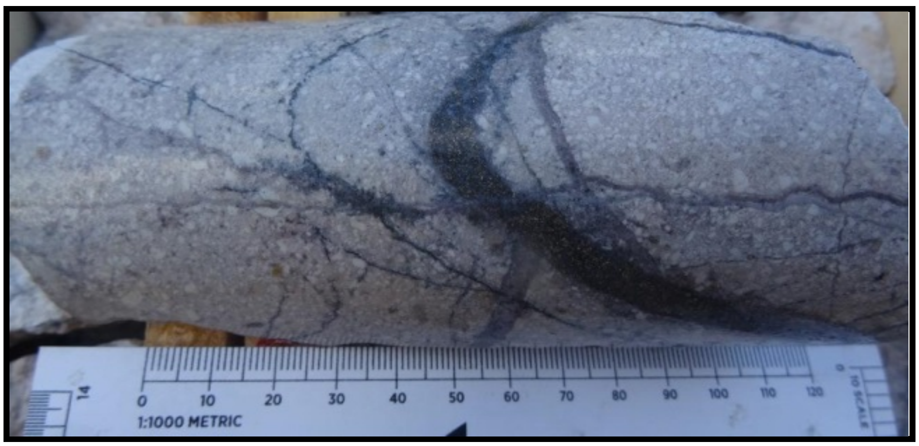

Figure 7-12: Early mineral porphyry with type-A quartz veinlets cut by type-D veinlets of pyrite replaced by supergene chalcocite. Pervasive sericite alteration. (Vásquez, 2015)

The EMD was responsible for the best grade of hypogene mineralization, and it typically contains 0.25% to 0.35% hypogene copper corresponding to about 15% of the hypogene copper in the system according to Vázquez.

7.2.5 Inter-mineral Porphyry Dikes

Subsequent to the intrusion of the EMD, a series of NNW-trending dacitic porphyry dikes that dip steeply to the east were intruded into the diorite pluton. According to Vázquez, these dikes correspond to material that Zurcher dated at 8.2 My. The most prominent inter-mineral dike is located along the east side of the EMD, and it is about 1.7 km long with widths ranging from 50 m to 150 m (Figure 7-13). There are also some minor inter-mineral phase intrusive bodies located west of the EMD. The intermineral dikes are composed of dacitic porphyry with crowded textures, consisting of plagioclase and quartz phenocrysts cut by only a few type-A veinlets. The inter-mineral dikes are intruded into the pre-mineral pluton, although to date no examples have been observed where it cuts the EMD.

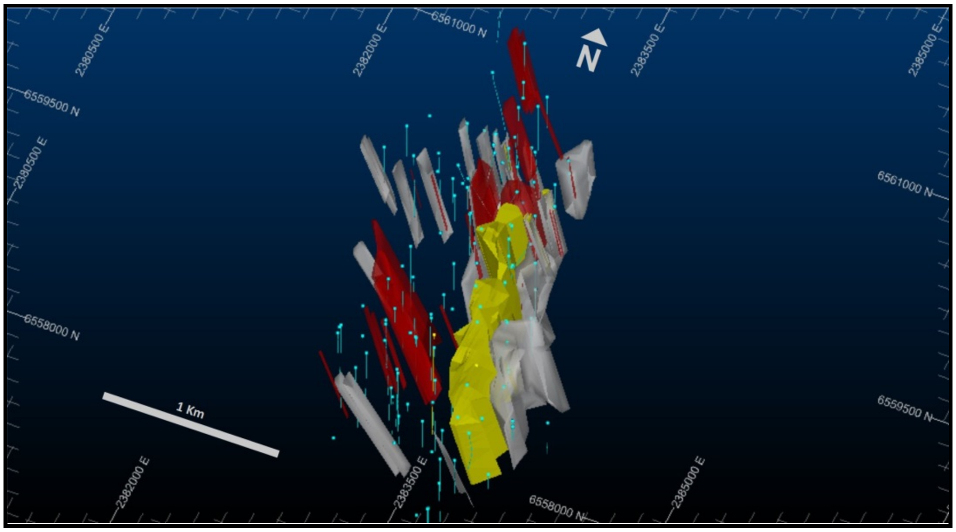

Figure 7-13: Intermineral Dikes in gray and hydrothermal breccias in red. The red lines indicate intercepts that have not been correlated between sections. Chloritic and potassic alteration zones removed for clarity. (McEwen Mining, 2017)

The hypogene grade of the inter-mineralized porphyry dikes is less than that of the EMD due to low content of type-A veinlets. The inter-mineral dikes typically contain 0.1% to 0.2% of hypogene copper and tend to be only weakly enriched. Vásquez estimated that the inter-mineral dikes correspond to about 5% of the hypogene copper in the system.

7.2.6 Hydrothermal-Magmatic Breccias

There are a series relatively small hydrothermal-magmatic type breccia bodies generated by the release of over pressured magmatic fluid. Vázquez interpreted these breccias to be approximately coeval with the inter-mineral dikes because breccia clasts of porphyry were observed with type-A early veinlets of quartz and early hypogene mineralization. The breccia bodies appear to be controlled by high angle pre-mineral faults as they generally trend NNW and dip steeply to the east, but they are discontinuous and relatively small compared to the total mineralized volume of Los Azules. There are two main sectors where these breccia bodies occur. The first is located west of the early mineralized porphyry dike between coordinates 6558,600 N and 6559,900 N as bodies of no more than 20 m to 30 m wide and up to 500 m long. The second domain occurs in the northern sector of the system between coordinates 6559,800 N and 6560,900 N (Figure 7-13) where the breccia bodies appear to have the form of pipes.

In general, breccias in both zones correspond to the crackle breccia type, characterized by a cement that consists of quartz, tourmaline, green sericite, specularite, chalcopyrite and bornite (sericite alteration association) that in some places is partly seriticized with disseminated chalcopyrite associated with this alteration. The sericite alteration transitions to potassic alteration at depth (Figure 7-14).

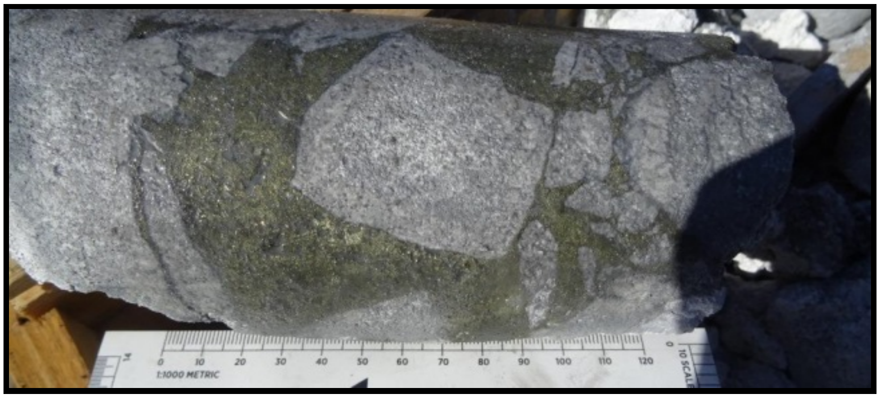

Figure 7-14: Magmatic-hydrothermal breccia with chalcopyrite and tourmaline in the breccia matrix. Clasts are partially seriticized (Hole AZ1297, 477 m) (Vázquez, 2015).

Some of the breccias were intersected in drilling over appreciable (>50 m) vertical intervals, but they are considered to be steeply inclined bodies, commonly less than 10 m wide. However, some may be wider because they appear to occur immediately above cupolas of porphyry intrusions in association with pegmatoidal K-feldspar-quartz pods, aplogranite veins and UST (unidirectional solidification texture) quartz layers (Figure 7-15).

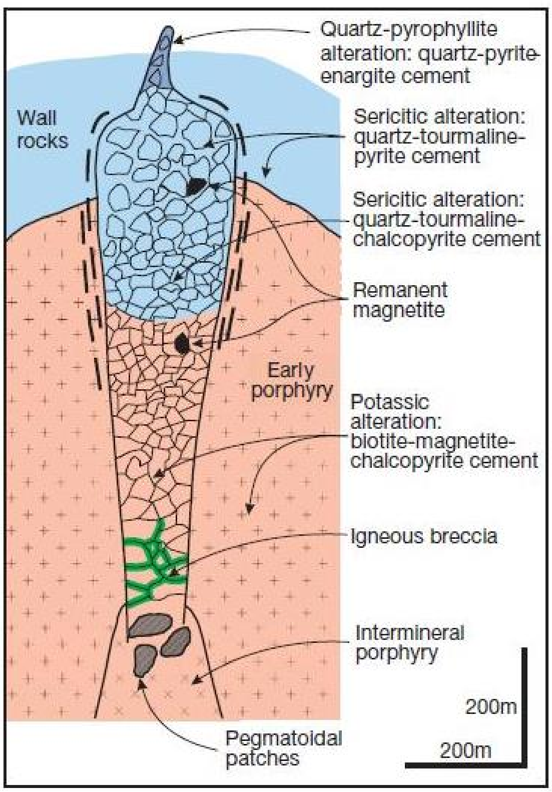

Figure 7-15: Schematic representation of a large magmatic-hydrothermal breccia body genetically linked to the apex of an inter-mineral porphyry intrusion (Sillitoe, 2010).

Many of these breccias contain particularly high-grade hypogene and supergene copper mineralization. Locally, the breccias contain elevated precious-metal values, including the highest recorded to date (8.4 g Au/t, 159 g Ag/t in Hole AZ12106). Vázquez estimated that the hydrothermal-magmatic breccias contain about 5% of the total hypogene copper.

7.2.7 Sericite Alteration

From coordinate 6559,300 N toward the south, sericite alteration was superimposed over the potassic alteration subsequent to the emplacement of the inter-mineral dikes (Figure 7-12). This event supplied pyrite and chalcopyrite to the system and was responsible for the greatest contribution of hypogene copper in the system. This alteration is centered on the EMD and inter-mineral dikes and surrounding rocks, and Vázquez believed that this alteration was controlled by high-angle, steep-dipping, NNW-trending structures (Figure 7-16). This alteration transitions to chlorite-sericite at depth, and Vázquez interpreted that this alteration took place shortly after potassic alteration, which occurred during the cooling of the system. There are no age dates to establish the age of this event. Hypogene copper grades were as much as 0.35% in and near the EMD, and this event accounted for about 25% of the hypogene copper according to Vázquez.

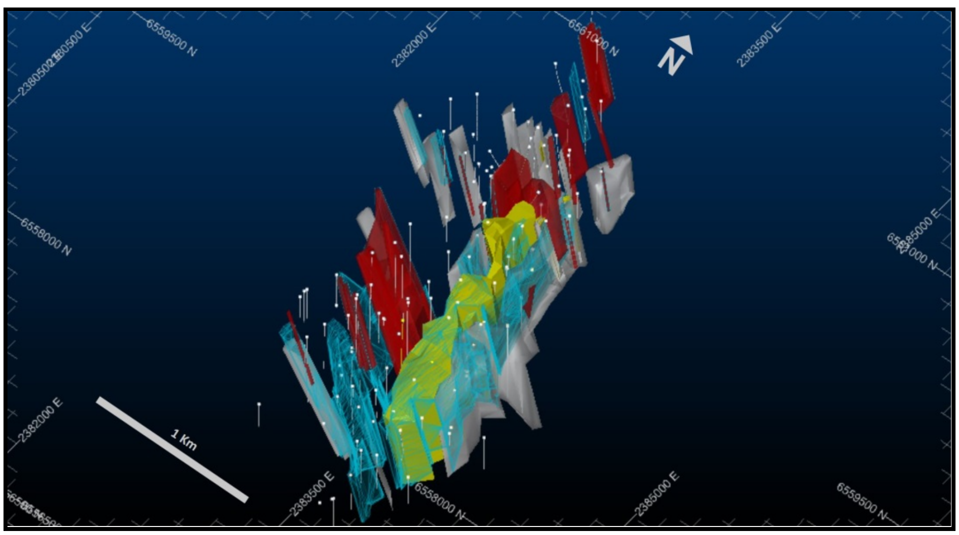

Figure 7-16: Sericite alteration zone shown in light blue. The sericite alteration affected the EMD, inter-mineral dikes and surrounding quartz diorite rock. (McEwen Mining, 2017)

7.2.8 Late Quartz-Sulfide Veins

A number of late quartz-sulfide veins with base and precious metals were emplaced after the sericite alteration event to the west of the EMD, where they are relatively common, and Vázquez believed that these veins are associated with NNW trending, steeply dipping structures (Figure 7-17). The veins are typically 0.1 m to 1.0 m in thickness (up to a maximum of 3 m) and typically consist of quartz and pyrite with variable quantities of chalcopyrite, sphalerite and galena. Precious metal values are commonly in the range of 10 to 50 g Ag/t, and Vázquez suggested that most of the precious metal in the deposit may be related to these veins. However, they do not represent exploration targets because of their discontinuous nature.

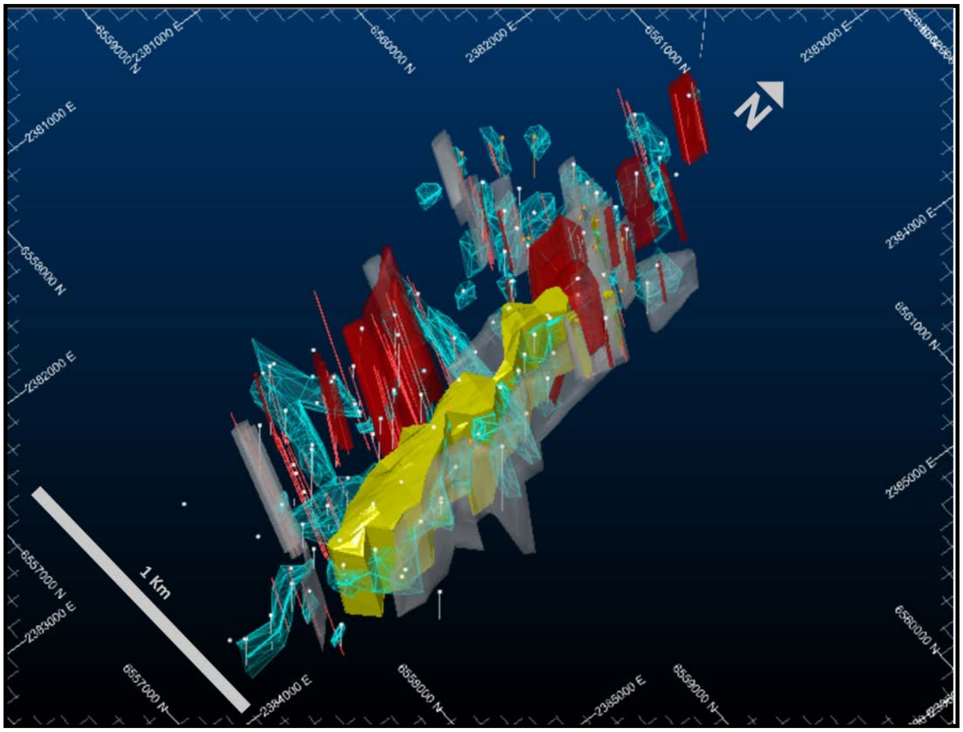

Figure 7-17: Late Quartz-Sulfide veins in pink. Veins are shown as sub-vertical lines because it is not possible to correlate these veins between sections. (McEwen Mining, 2017)

7.2.9 Supergene enrichment

Supergene mineralization at Los Azules comprises a sub-horizontal chalcocite-covellite supergene blanket ("enriched" zone) that grades downwards through a partially enriched zone of incomplete replacement (mixed hypogene-supergene sulfides) into underlying hypogene sulfide mineralization. A sterile oxidized leached cap overlays the supergene blanket. Sillitoe considered that the enriched zone is immature because of the relative youthfulness of the supergene processes, which was probably active only since about 4 My –5 My.

The leached cap ranges from 0 m to 180 m thick and consists of oxidized and argillic-altered rock. Limonitic boxworks and disseminated spots of jarosite, goethite, and hematite are common. Hematite is more abundant in the southern structural block; jarosite is best developed over the central block, while goethite appears relatively more widespread in the northern block (Zurcher, 2008a). Primary magnetite is altered to hematite, and ferrimolybdite also occurs (after molybdenite), but copper minerals and sulfides are mostly absent (Rojas, 2008). Copper oxides are reported from the margins of the leached zone and include brochantite, copper pitch and copper wad. Copper grades in the leached cap range between 0.01% and 0.10%.

Beneath the leached cap, a thin mixed sulfide-oxide zone gives way to a supergene sulfide zone where hypogene sulfides are replaced by chalcocite and minor covellite. The supergene copper blanket is best developed in the central and central-northern structural sectors and is characterized by a more jarositic oxide cap in the pyritic phyllic-altered zone located directly above the potassic alteration zone. Supergene (earthy) chalcocite and minor covellite partially (or rarely) completely replace hypogene sulfides, but pyrite usually survives. Traces of native copper and gypsum after anhydrite occur in the underlying potassic alteration zone.

The thickness of the supergene chalcocite blanket typically varies between 60 m and 250 m but can penetrate to more than 400 m down structures. The intensity of supergene mineralization gradually decreases with depth from the top of the zone and there is typically no distinct lower limit or boundary to the zone of enriched mineralization (Sim and Davis, 2015).

Copper values in the supergene enriched zone vary between 0.4% Cu to greater than one percent in the north-central part of the system and decrease to the south and the peripheries to 0.2% to 0.4% Cu. Supergene mineralization is the most important mineralization of economic interest at Los Azules.

Cyanide soluble copper data is used to interpret the distribution of supergene enrichment mineralization. Mineralization with a ratio of cyanide soluble copper content to total copper content >50% is considered to be “enriched”. The limits may be modified slightly in places to match mineralization observed in the drill core. Figure 7-18 shows the enriched mineralization and the early mineralized dike. Lithology, alteration zones and structures have been removed from the illustration for clarity, except the early mineralized porphyry dike. Supergene mineralization penetrates all lithologies and alteration types, and supergene mineralization appears to extend to greater depths along fault structures.

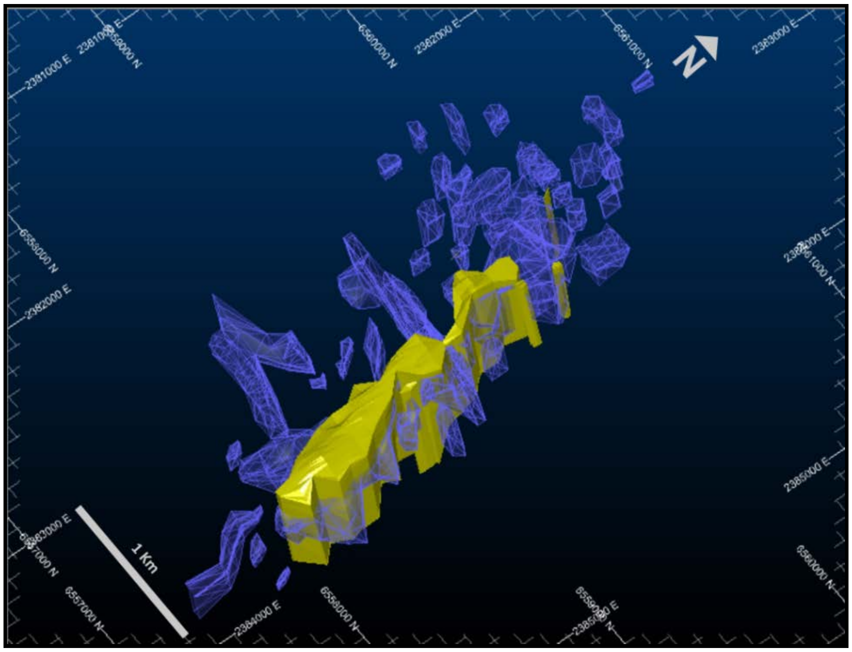

Figure 7-18: Early Mineralized Porphyry (yellow) with supergene enrichment (blue). (McEwen Mining, 2017)

The supergene enrichment zone shown in Figure 7-18 appears to be more patchy than it probably is because Figure 7-18 is based on a relatively conservative criteria utilized by field geologists to constrain the distribution or extension of enriched mineralization of 100 m in the north-south direction and 25 m laterally from drill hole estimates unless limited by a structure or other geological constraint. Sim and Davis utilize a more extensive distribution of the supergene mineralization for the purpose of the resource model as shown in Figure 7-19.

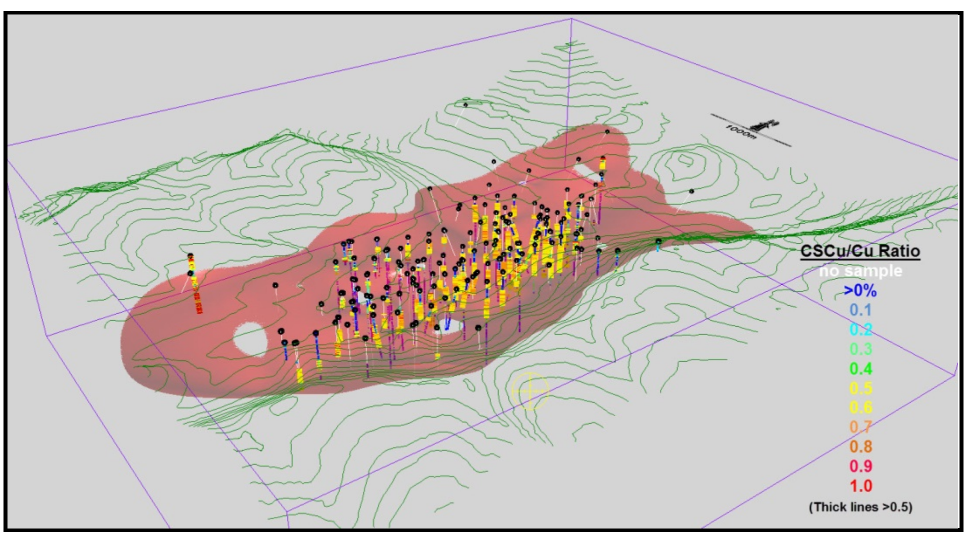

Figure 7-19: Isometric view of Supergene Domain Defined as Soluble Cu >50% and Showing CSCu/CuT Ratios in Drill Holes (Sim and Davis, 2017)

7.2.10 Sulfate Front

The Los Azules deposit is marked by a prominent and abrupt supergene sulfate front, ranging in depth from about 300 m to 700 m below surface, above which all anhydrite and gypsum have been removed by descent of meteoric ground water. The front is marked by the downward appearance of gypsum, which is the supergene hydration product of anhydrite, lining fractures and filling cavities, especially in the breccias. Anhydrite is commonly seen as part of the matrix of hydrothermal magmatic breccias mainly where these breccias are affected by sericitic alteration. Anhydrite remnants become progressively more abundant downwards in the sulfate zone, irrespective of the alteration type in which the mineral is a hypogene constituent. Rock strength beneath the sulfate front increases abruptly, as shown by increased RQD indices.

The widespread occurrence of broken drill core from Los Azules reflects the strongly fractured nature of the rock as shown below in Figure 7-20. This could be a result of fault zone fracturing except that fractures appear to be more or less randomly oriented. Many planar fractures are coated with gypsum, probably after anhydrite. Jemielita (2010) suggested that there may have been a pervasive anhydrite stockwork throughout the porphyry system that has subsequently been hydrated, dissolved and removed.

Figure 7-20: Typical Drill Core from Los Azules indicating the strongly fractured nature of the rock (Jemielita, 2010)

7.2.11 Structural Geology

Triassic volcanic country rocks at Los Azules are deformed into an anticline or monocline with the steep limb in west and the flat limb in the east (Pratt, 2010). The anticlinal axis strikes approximately north and probably coincides with the NNW-striking structural corridor that controlled the locations of volcanic-intrusive centers in the region during the upper Miocene (Rojas, 2008). In the vicinity of Los Azules this structural corridor appears to control the locations of porphyry dikes, hydrothermal alteration, and mineralization zones along a seven kilometer strike length including the Los Azules porphyry system (Rojas, 2008).

The porphyritic dikes at Los Azules were emplaced along numerous, strong, pre- and syn-ore, north-northwest and northwest striking faults with important strike-slip components (Zurcher, 2008a). Based on the few surface exposures, Zürcher proposed a steep easterly dip for most of the north-northwest striking faults. Sillitoe and Vásquez both noted that evidence from diamond drill core indicates that these structures were active as faults during as well as after the deposition of the mineralization because post-mineral movement is evidenced by slickensides in areas with supergene mineralization. Numerous intervals of black fault gouge surrounded by broken zones are observed in the drill core. All the gouge zones are steep, ranging from 75° to vertical, and characterized by sub-horizontal slickensides; however, the amount of transcurrent displacement and strike of the faults is indeterminate.

In the northern sector, following the course of the Quebrada Las Lagunas, a major fault or fault zone occurs with a northeast orientation. However, there is apparently no significant net displacement associated with this fault because mineralization, presence of hydrothermal magmatic breccias bodies and alteration are similar both north and south of the same faults.

Pratt (2010) interpreted a kinematic structural model of the Los Azules porphyry copper deposit. The Piuquenes Fault is part of the north-northwest striking “Vegas” fault system described by Rojas (2008). The northwest-striking faults were named Azules by Rojas (2008). Porphyry-related quartz veins (blue) and deeper level and older (than epithermal) alunite and vuggy quartz silicified ribs (red) are shown in Figure 7-21.

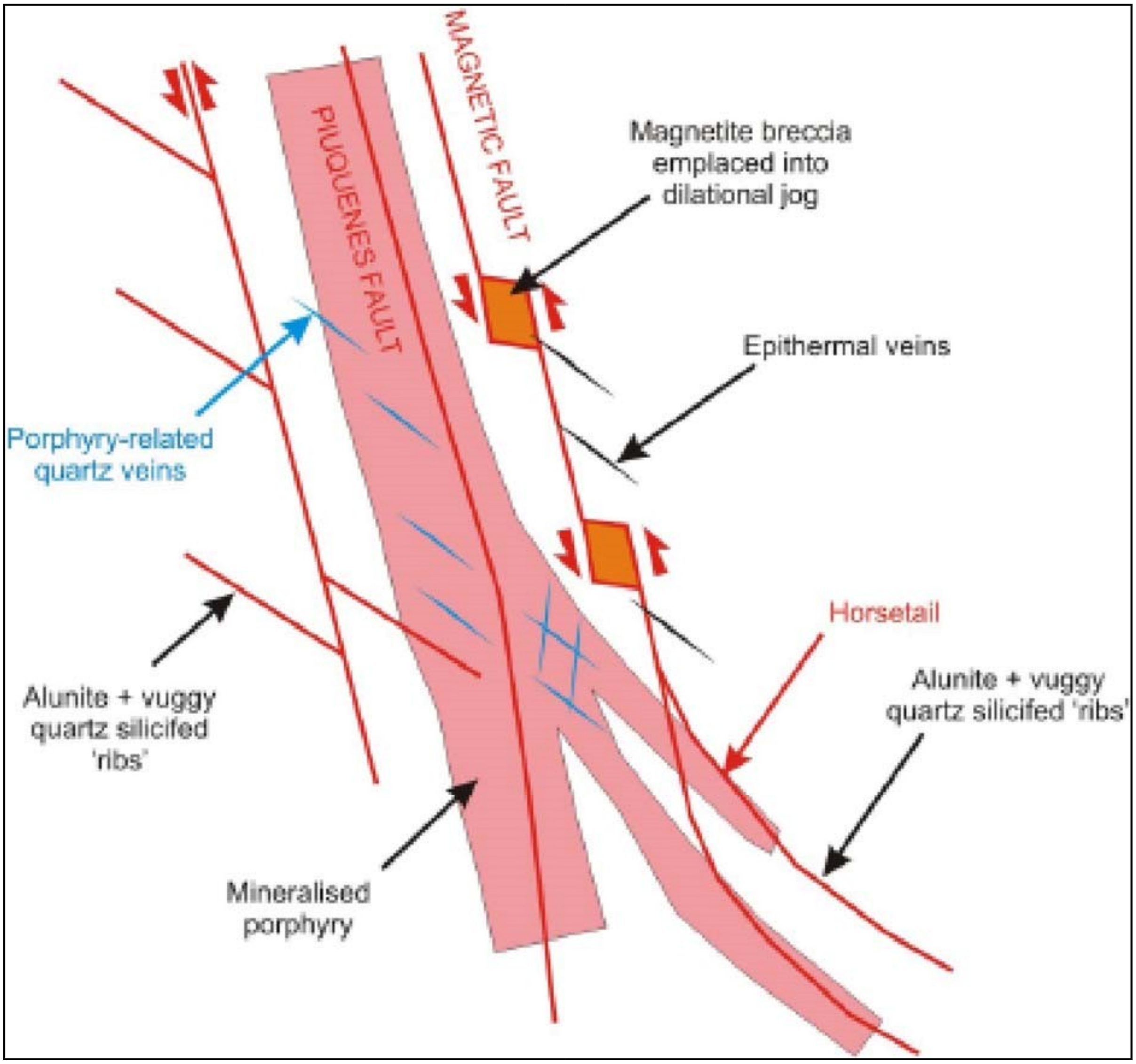

Figure 7-21: Kinematic structural interpretation of Los Azules porphyry copper deposit (Pratt 2010)

7.3 Other Mineralization

Battle Mountain Gold explored Los Azules during 1998-1999 for gold and drilled three holes in altered pyroclastic volcanic rocks in a strongly pyrite-mineralized zone at La Hoya in the extreme northwest of the area, apparently without significant success. The company may have been attracted by hydrothermal breccias with associated kaolinite-illite-dickite-quartz-alunite alteration that are reported in volcanic lithologies intruded by small intrusions and dikes of feldspar porphyry in the Cerros Centrales (Cerro Oeste) area.

Indications of potential gold-silver mineralization around the Los Azules porphyry copper system include late-stage, intermediate-sulfidation epithermal quartz veins described by Pratt (2010). These veins are mainly quartz (with minor sphalerite and galena). A variety of precious metals deposits commonly occur peripheral to many porphyry copper systems, but the district around Los Azules has not been systematically explored for such mineralization.

The existence of a thick leached cap and supergene chalcocite blanket at Los Azules indicates that oxidation, dissolution, vertical transportation and redeposition of copper occurred in the system. Copper may also have been transported laterally away from the deposit and redeposited to form so-called “exotic” copper mineralization (Sillitoe, 2010). No exploration for this style of mineralization has been undertaken in the vicinity of Los Azules.

8. Deposit Types

This section was prepared by J. Duff, P. Geol, McEwen.

8.1 Introduction

Los Azules is located within the Central Chile segment (400 km-long) of the Miocene-early Pliocene porphyry copper belt (6,000 km-long) of the north and Central Andes as shown in Figure 8-1. The figure also shows locations of the major porphyry copper and related epithermal deposits, limits of the porphyry copper belt and permissive northwest-trending structural corridors that influence the location of mineralization along the porphyry belt. Porphyry copper deposits in this sub-belt are 12 to 4 My in age and include the world-class Los Pelambres (Cu-Mo), Rio Blanco-Los Bronces (Cu-Mo) and El Teniente (Cu-Mo) porphyry deposits, the Maracunga belt porphyries (Cu-Au) in Chile and El Pachón (Cu) and Bajo de la Alumbrera (Cu-Au) in Argentina, as well as numerous other porphyry and related deposits (Sillitoe and Perello, 2005).

Mineralization at Los Azules is Andean-Cordilleran, late Miocene, (quartz-) diorite-hosted, oxidized porphyry copper style with a well-developed leached cap and supergene chalcocite-covellite blanket. Los Azules displays numerous features in common with other porphyry deposits as described below.

Panteleyev (1995) describes the common features of porphyry deposits as large zones of hydrothermally-altered rock containing quartz veins and stockworks, sulphide-bearing veinlets, fractures and lesser disseminations in areas up to 10 km^2 in size. These are commonly associated with hydrothermal and/or intrusion breccias and/or dike swarms. Deposit boundaries are determined by economic factors that define ore zones located within larger areas of low-grade, often concentrically zoned mineralization. Important geological controls on porphyry mineralization include igneous contacts, cupolas and the uppermost, bifurcating, parts of stocks and dike swarms. Intrusive and hydrothermal breccias and zones of intensely developed fracturing, respectively due to intersecting or parallel multiple mineralized fracture sets, commonly coincide with the highest metal concentrations.

Surface oxidation commonly modifies porphyry deposits in weathered environments. Low pH meteoric waters leach copper from the oxide zone which is then transported and redeposited as secondary chalcocite and covellite usually immediately below the water table to form sub-horizontal, tabular zones of supergene copper enrichment. This process forms a copper-poor leached cap above a relatively thin but often high-grade zone of supergene copper enrichment that itself caps a thicker zone of often moderate grade hypogene copper mineralization at depth.

Alternatively, or additionally, porphyry systems can exhibit hypogene enrichment related to the introduction of late hydrothermal, copper-enriched fluids along structurally prepared pathways, or the leaching and redeposition of hypogene copper, or a combination of the two. Hypogene copper mineralogy in this instance comprises covellite and chalcocite, often with elevated hypogene copper grades.

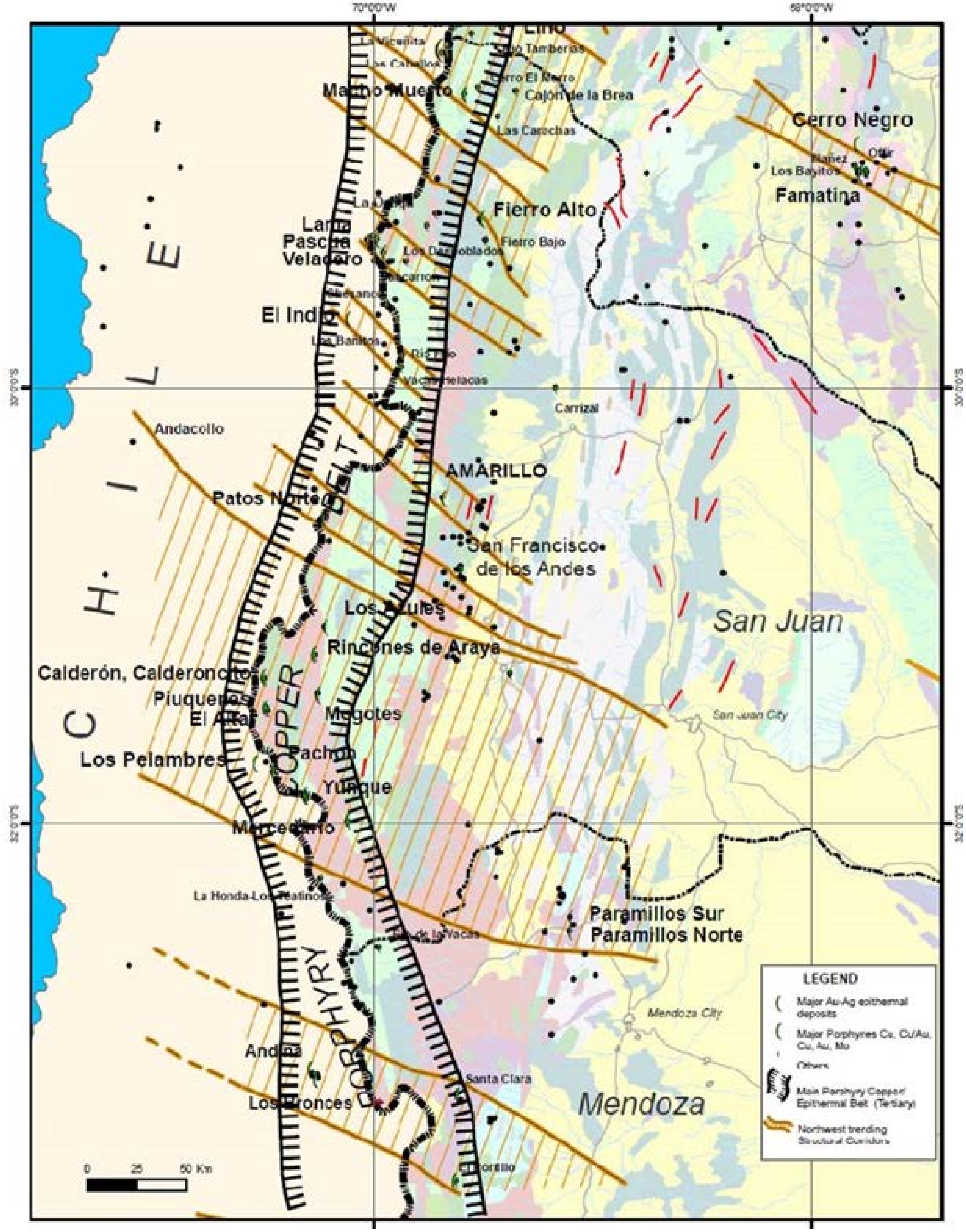

Figure 8-1: Part of the Central Chile Segment of the Miocene-early Pliocene Porphyry Copper Belt (Rojas 2008)

Other deposit styles often spatially, temporally and genetically associated with porphyry deposits include:

- Exotic copper deposits, formed by the lateral migration of copper-bearing fluids away from the main body of porphyry mineralization,
- Mineralized breccia pipes, skarns, sedimentary replacements (mantos) and precious metals-bearing mesothermal-epithermal vein deposits located peripheral to and progressively distant (laterally and vertically) from, the porphyry copper center as shown in Figure 8-2.

The figure shows the spatial relationships between a porphyry copper system and its surrounding environment including host rocks and peripheral styles of mineralization such as skarns, carbonate replacement (chimney-manto), sediment-hosted disseminated sulphides, mesothermal polymetallic veins and higher-level high/intermediate/low sulphidation epithermal gold-silver veins and disseminated deposits.

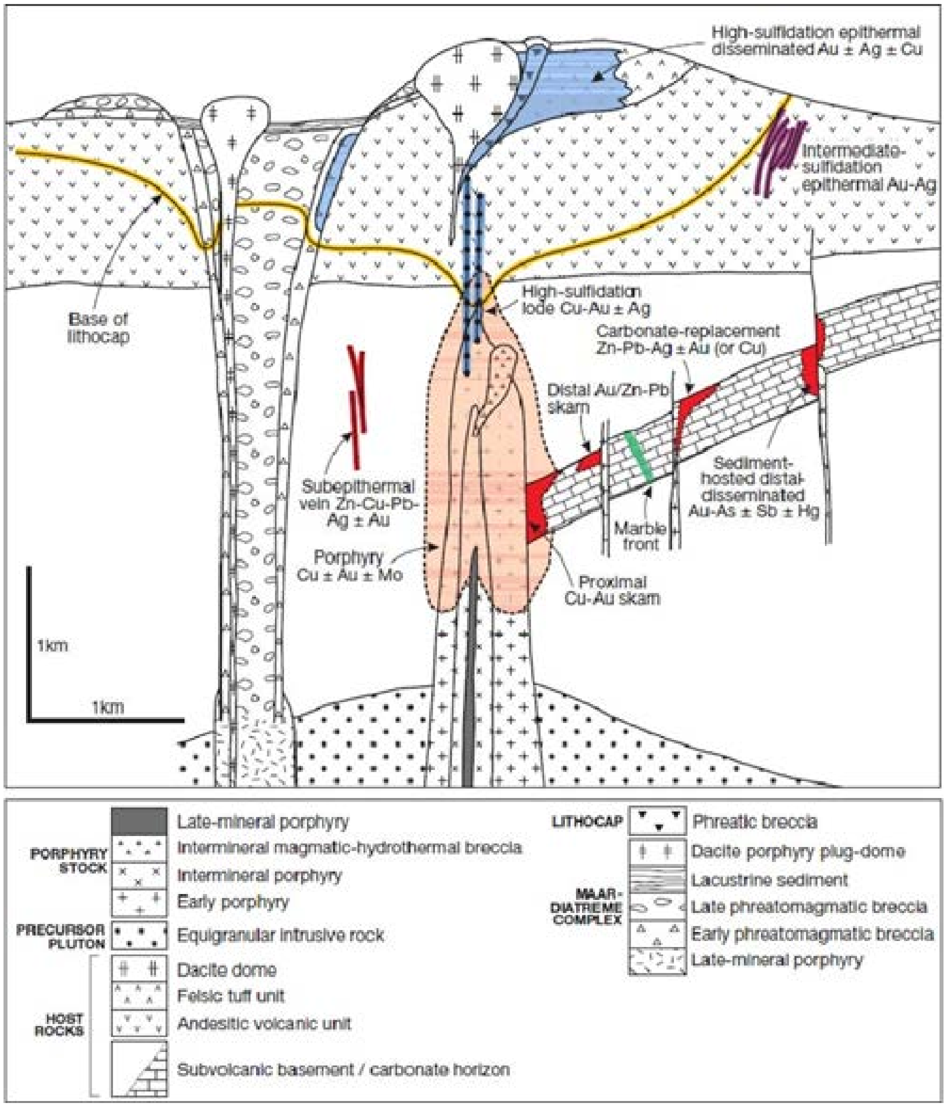

Figure 8-2: Diagram Showing Spatial Relationships between a Porphyry Copper System and the Surrounding Environment (Sillitoe 2010)

9. Exploration

This section was prepared by J. Duff, P. Geol, McEwen.

9.1 Exploration History

Exploration at Los Azules commenced in the mid-1990's and has included various studies of geology, geophysics, and geochemistry, as well as drilling with both reverse circulation and diamond core drills, sampling and analysis of surface and drill core samples, and road construction. Exploration was conducted successively, and sometimes in cooperation, by Battle Mountain Gold, MIM-Xstrata, and Minera Andes/McEwen Mining, principally by the latter company.

9.2 Geological Mapping and Studies

The most comprehensive and up-to-date geological map of Los Azules was produced by Pratt and Bolsover in 2010, as described in Section 7.2. An earlier detailed geological map, with cross sections, was compiled by Rojas (2007), Almandoz (2010b) produced a geological map at 1:5000 scale, and Zürcher (2008a) made a detailed map of the central portion of the north-northwest-trending Ballena ridge that focused on hydrothermal alteration and mineralization. The latter map shows no lithological boundaries, reflecting the difficulty of separating igneous lithologies in the mineralized zone, a problem also reported by Pratt (2010).

Surface and drill core samples have been analyzed since 2004 as part of a mineralogical study using a portable infrared spectrometer (PIMA; Lasry, 2005). Petrographic studies were made in Argentina after the 2006 exploration campaign (Sumay and Meissi, 2006). Petrographic studies of polished sections collected by Zurcher from drill cores, and surface samples were initially studied by DePangher (2008) in Oregon, and then by GEOMAQ in Santiago de Chile (Rojas, 2010). Zurcher (2008b) reported a series of U-Pb age dates for the igneous intrusions.

In 2014 Sillitoe examined about 9,000 m (approximately 25%) of the diamond drill core and proposed a revised geologic interpretation for Los Azules which is described in Section 7.2. Sillitoe recognized the presence and importance of an early mineralized porphyry dike phase of igneous intrusion. Much of the hypogene mineralization as well as the supergene mineralization is associated with this phase; later dikes are not as well mineralized.

In 2015 Vázquez relogged 44,000 m from 98 drill holes representing essentially all of the drill core. Vázquez confirmed Sillitoe's interpretation, and he also refined the temporal sequence and spatial distribution of distinct alteration phases and mineralization zones as described in Section 7.2.

9.3 Geochemistry

More than 27,000 samples have been taken from Los Azules by Battle Mountain Gold, Xstrata, and Minera Andes/McEwen Mining and analyzed and the information processed. Samples include surface, drill hole and control samples such as duplicate samples, blanks and standard samples. These were mostly assayed for gold, silver, copper, molybdenum, zinc, lead and arsenic. Sequential copper analysis has been done on selected drill-hole samples.

9.3.1 Surface Samples

Battle Mountain Gold (1996-1998), MIM-Xstrata (2004) and Minera Andes/McEwen Mining (2004-present) together collected 912 surface samples that were analyzed for copper, molybdenum, gold, silver, lead, zinc and arsenic and, in some cases, antimony and mercury. A summary of the samples taken are provided in Table 9-1 and Figure 9-1 to Figure 9-7. In some sectors with little geochemical data and/or recent sediment cover near surface bedrock drill hole samples substituted for outcrop samples. Analytical results were classified as not anomalous through weakly and moderately to highly anomalous as shown in Table 9-2, then contour plotted to produce geochemical anomaly maps shown in Figure 9-1 to Figure 9-7.

The contour plots clearly show a strong positive correlation between anomalous molybdenum and copper corresponding with the Ballena ridge and the underlying porphyry copper system at Los Azules as shown in Figure 9-1 and Figure 9-2. Other metals including gold, silver, lead, zinc and arsenic as shown in Figure 9-3 to Figure 9-7, are clearly concentrated in areas peripheral to, and at higher altitudes than, the molybdenum and copper anomalies in a zonation pattern typical of porphyry copper deposits.

Table 9-1: Outcrop and Drill Hole Proxy Samples.

Sample Type	Company	Total Samples	Period	Laboratory Employed
Drill Hole	Minera Andes	32	2004-2008	ALS- ACME
Drill Hole	BMG	24	1998-1999	ALS-GEOLAB
Drill Hole	Xstrata	4	2004	unknown
Surface	Minera Andes	216	2004	ALS CHEMEX
Surface	BMG	479	1996-1997	ALS GEOLAB, CIMM
Talus	BMG	157	1998	ALS GEOLAB, CIMM
Total		**912**		

Table 9-2: Range of Anomalous Values in Outcrops.

Anomalies	Au ppm	Ag ppm	As ppm	Mo ppm	Pb ppm	Zn ppm	Cu ppm
Not Anomalous	0.00-0.10	0.0-3.0	0-100	0-10	0-200	0-100	0-100
Weakly Anomalous	0.11-0.30	3.1-10.0	101-300	11-,30	201-500	101-300	101-300
Moderately Anomalous	0.31-1.00	10.1-30.0	301-1000	31-50	501-2000	301-1000	301-1000
Highly Anomalous	>1.00	>30.0	>1000	>50	>2000	>1000	>1000

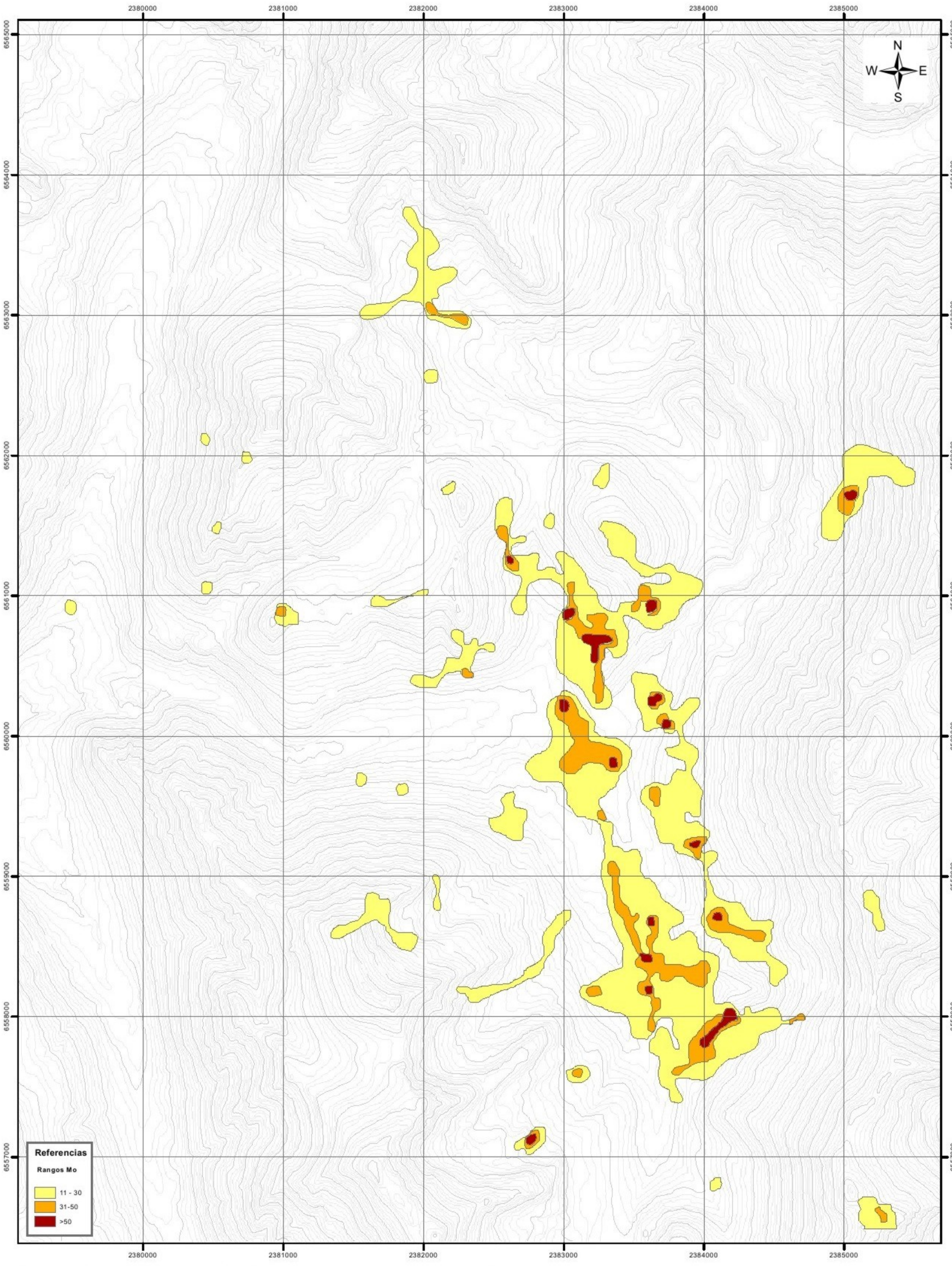

Figure 9-1: Contour Plot Showing Surface Sample Molybdenum Values at Los Azules (Rojas 2008)

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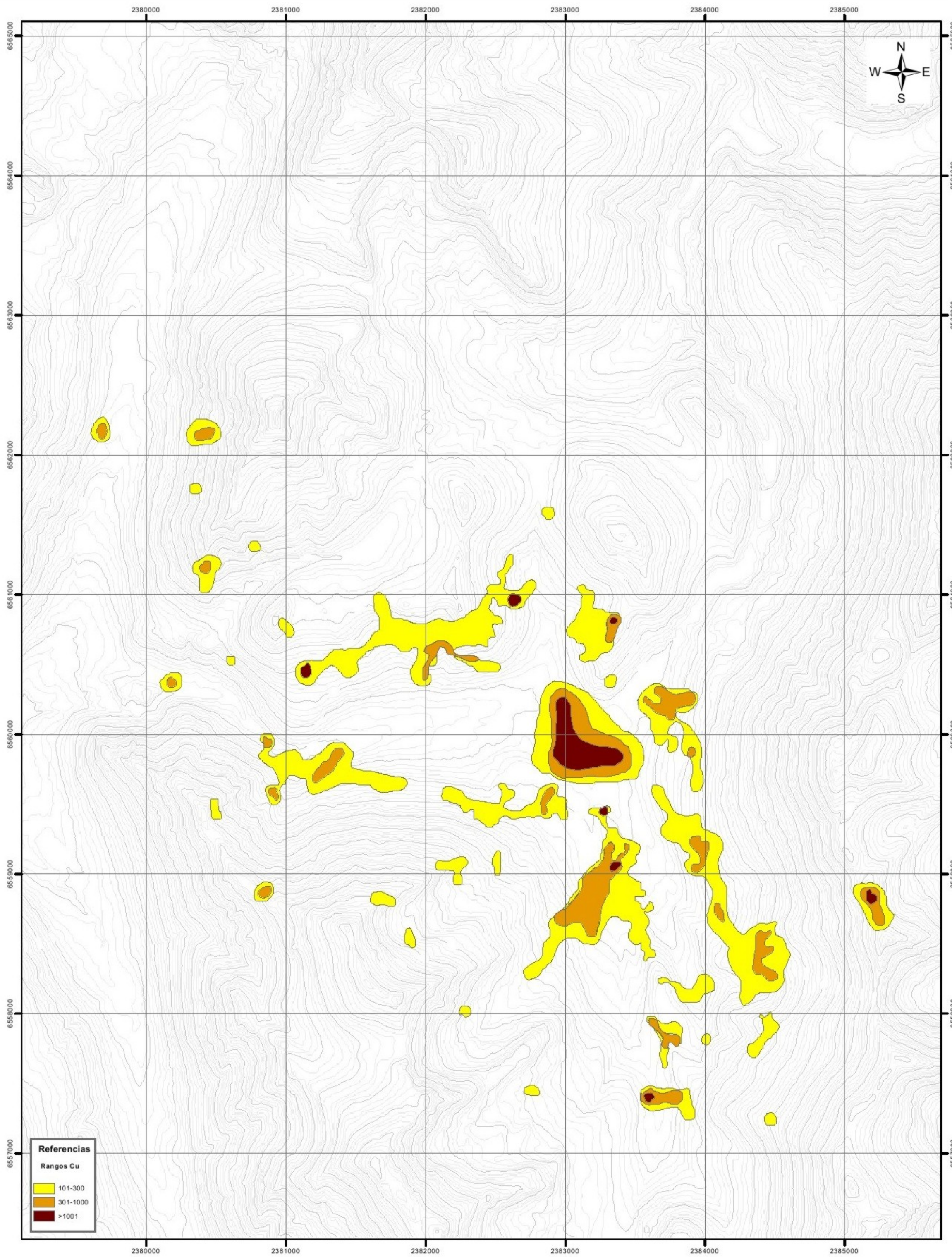


Figure 9-2: Contour Plot Showing Surface Sample Copper Values at Los Azules (Rojas 2008)

Figure 9-2: Contour Plot Showing Surface Sample Copper Values at Los Azules (Rojas 2008).

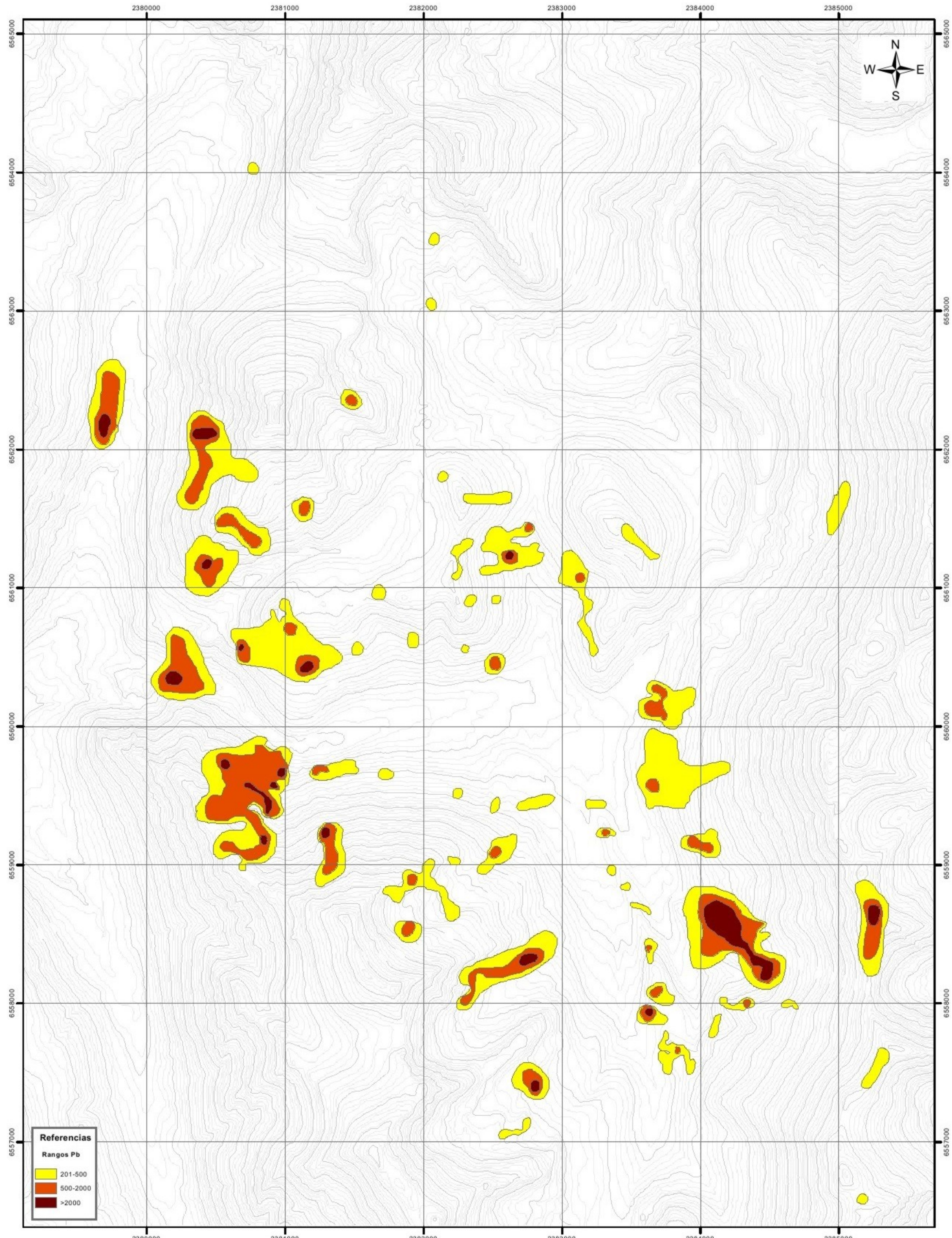


Figure 9-3: Contour Plot Showing Surface Sample Lead Values at Los Azules (Rojas 2008)

Figure 9-3: Contour Plot Showing Surface Sample Lead Values at Los Azules (Rojas 2008).

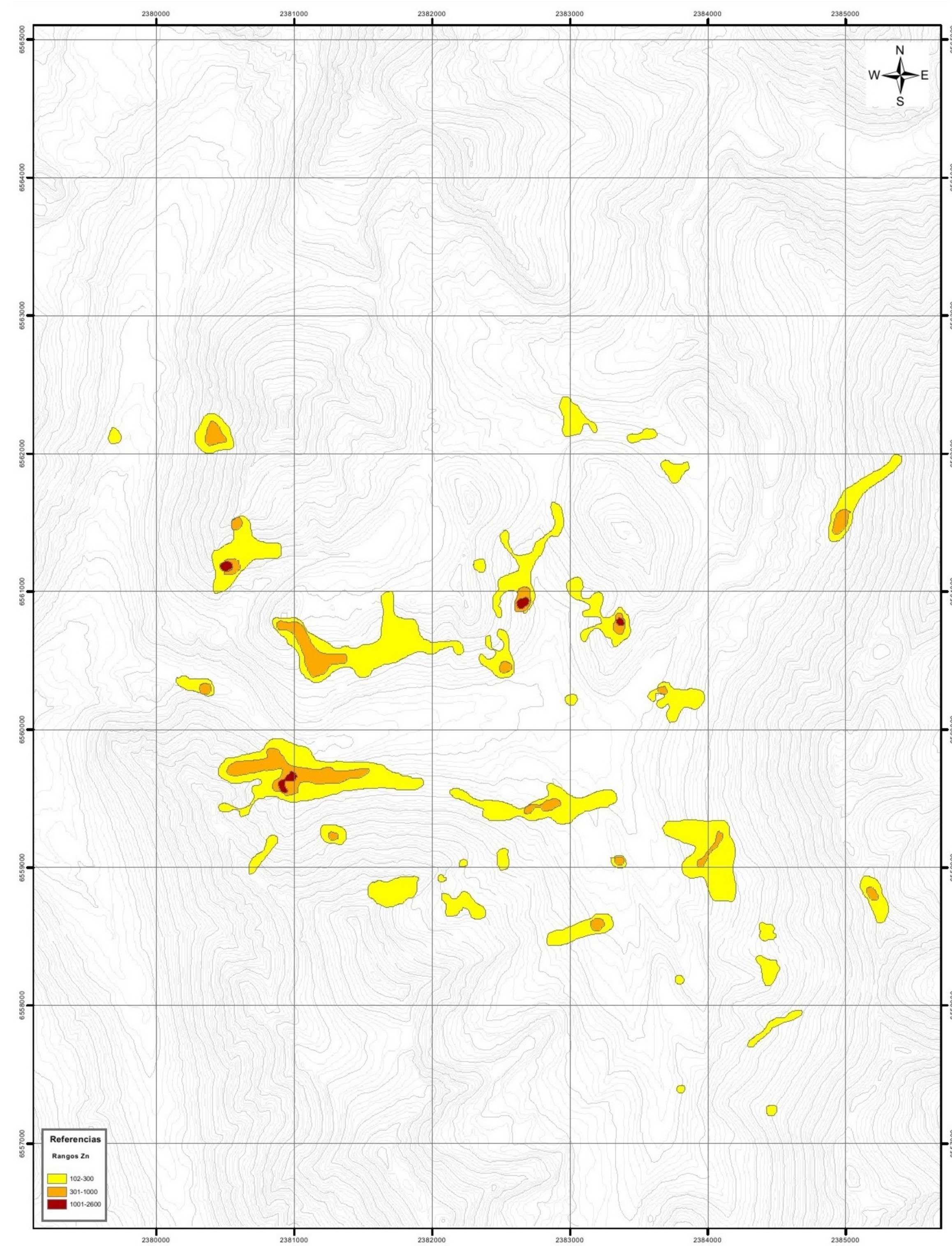


Figure 9-4: Contour Plot Showing Surface Sample Zinc Values at Los Azules (Rojas 2008)

Figure 9-4: Contour Plot Showing Surface Sample Zinc Values at Los Azules (Rojas 2008).

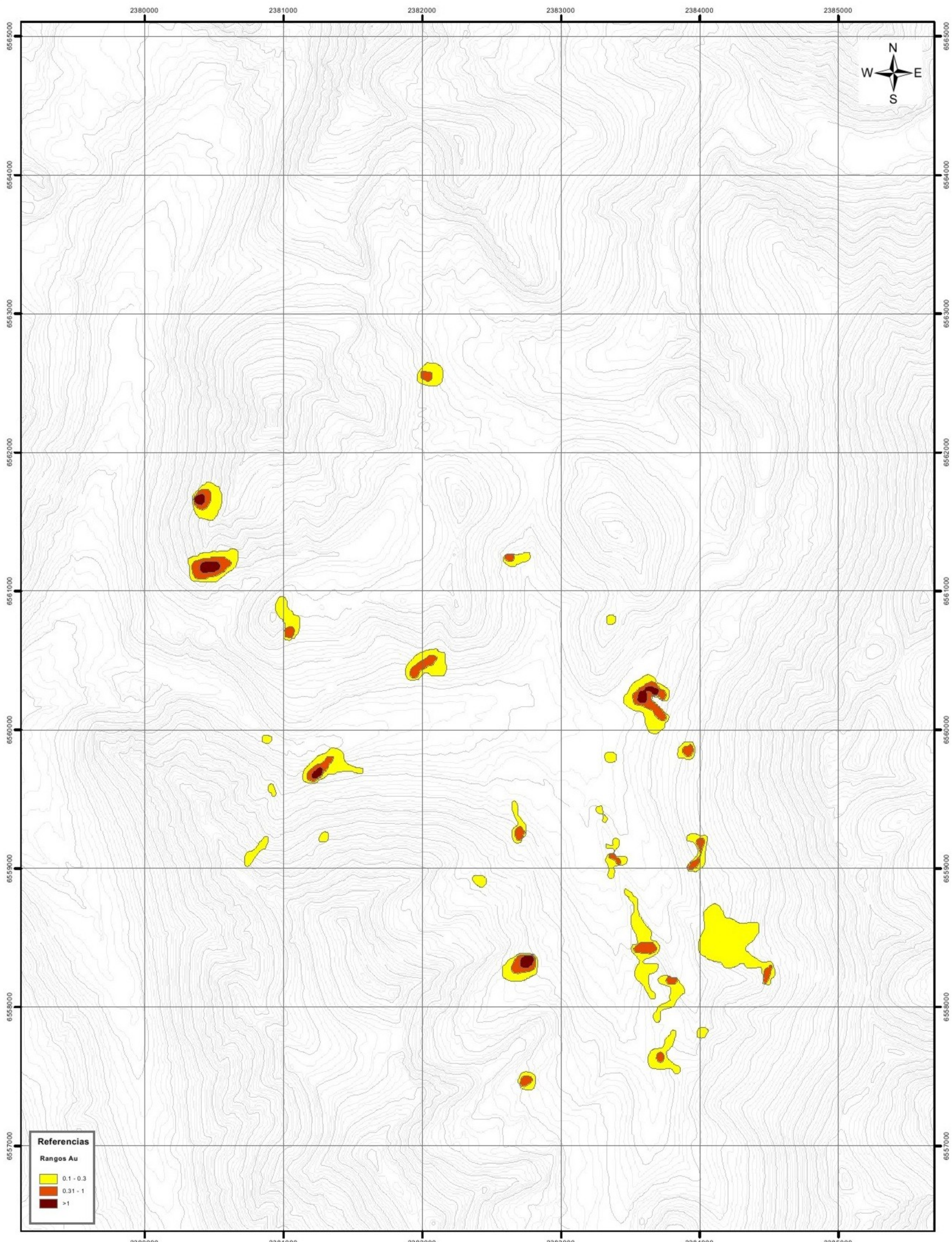


Figure 9-5: Contour Plot Showing the Spotty Distribution or Surface Sample Gold Values at Los Azules (Rojas 2008)

Figure 9-5: Contour Plot Showing the Spotty Distribution of Surface Sample Gold Values at Los Azules (Rojas 2008).

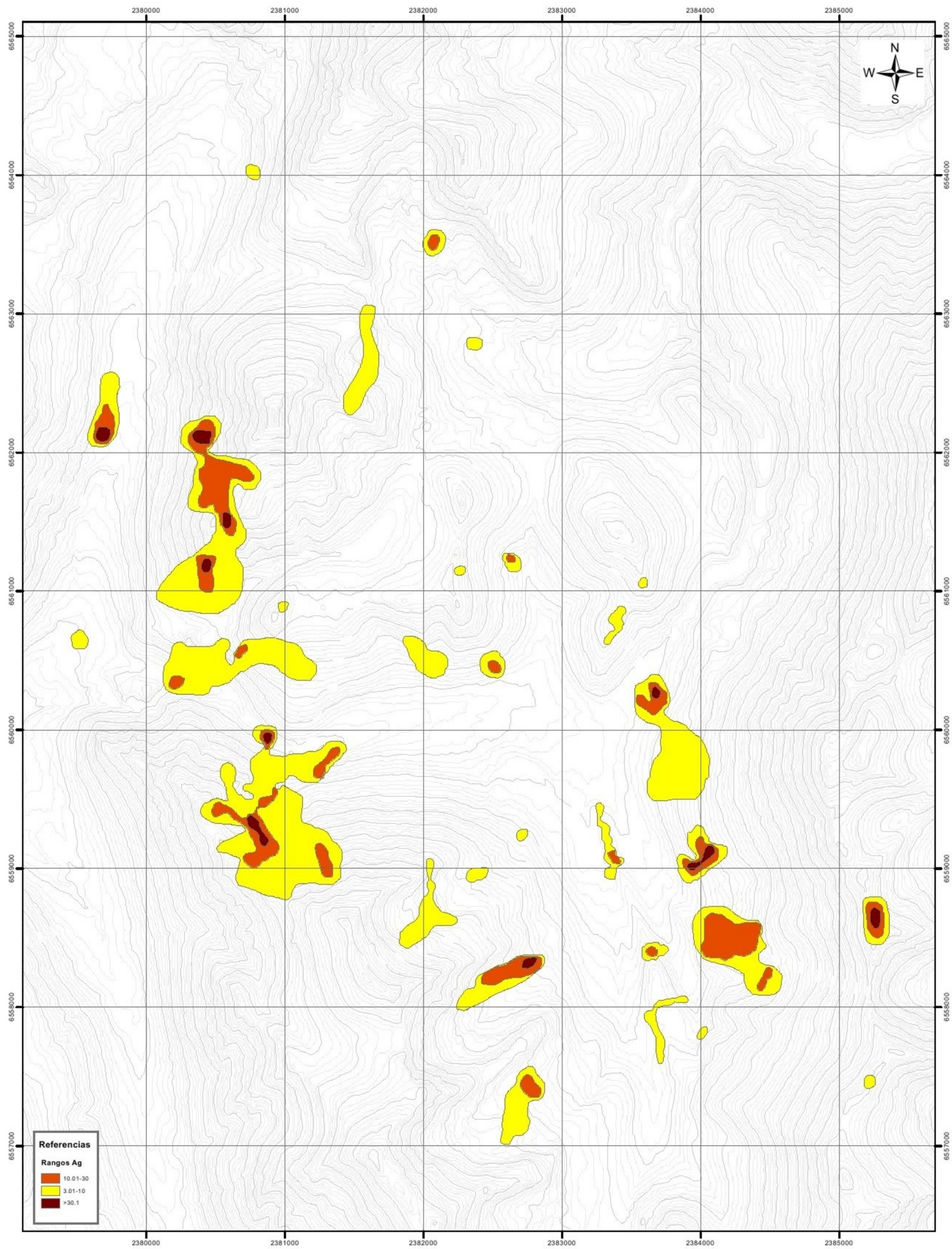


Figure 9-6: Contour Plot Showing Surface Sample Silver Values at Los Azules (Rojas 2008)

Figure 9-6: Contour Plot Showing Surface Sample Silver Values at Los Azules (Rojas 2008).

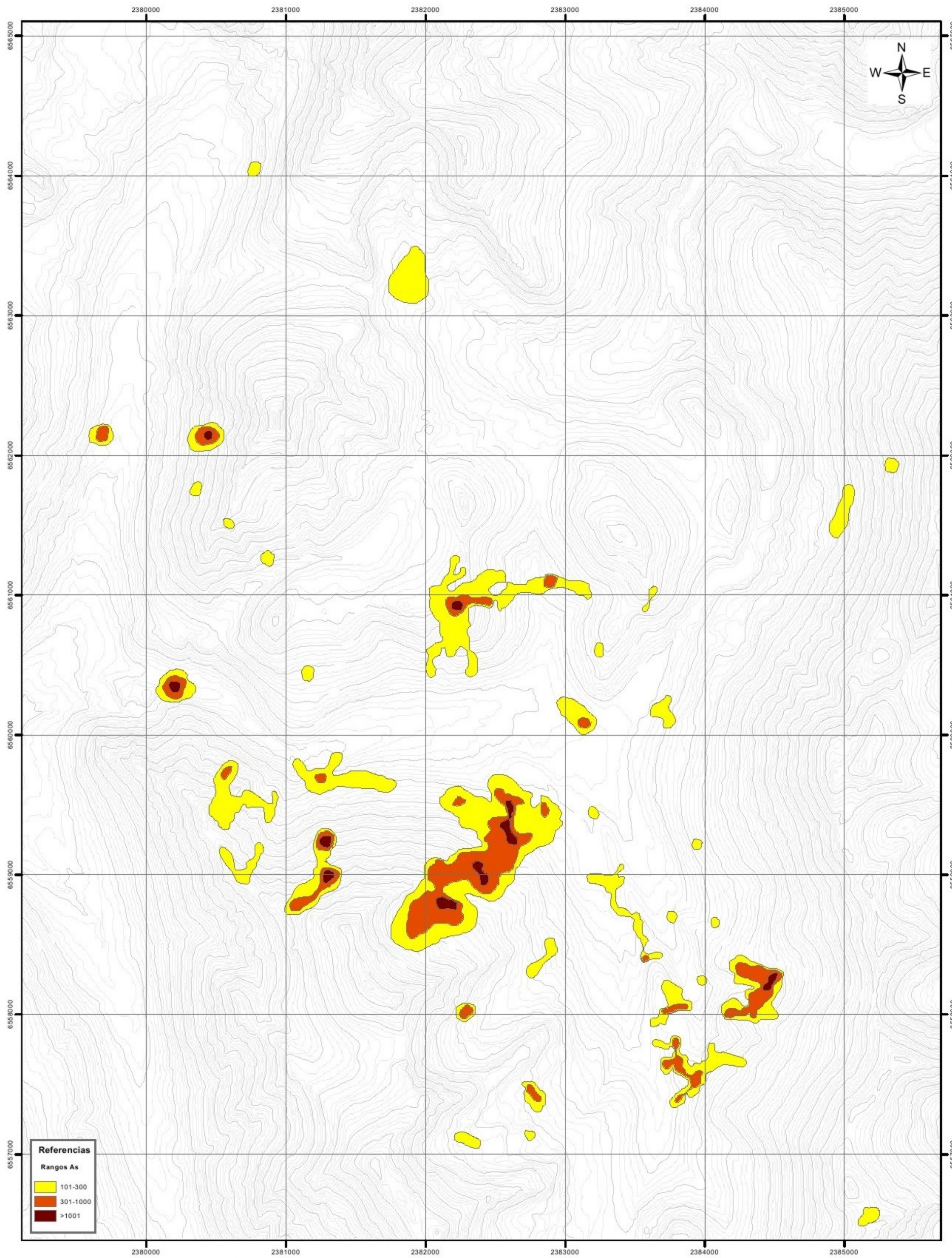


Figure 9-7: Contour Plot Showing Surface Sample Arsenic Values at Los Azules (Rojas 2008)

Figure 9-7: Contour Plot Showing Surface Sample Arsenic Values at Los Azules (Rojas 2008).

9.4 Geophysics

Various geophysical studies were conducted at Los Azules by Battle Mountain Gold and by MIM-Xstrata respectively in 1998-1999 and 2004 and by Minera Andes (Quantec) in early 2010 and McEwen Mining (Quantec) in 2012. Work done and results for these surveys are described in the following section.

9.4.1 Battle Mountain Gold (1998-99)

GEODATOS, a Chilean geophysical company, conducted an airborne geophysical survey in early 1998. The survey covered a 20 km by 10 km area elongated east-west including the Los Azules and Paso de la Coipa areas. Lines were flown north-south at 200 m intervals and control lines were flown east-west at 1,000 m intervals. Instrument altitude was maintained at 20 m during flights.

Results suggested the existence of a structural corridor striking northwest and structures striking east- northeast associated with strong to moderate magnetic low signatures in the Los Azules mineralized body. A total field magnetic plot identified a magnetic high anomaly surrounding a central magnetic low that extended 6 km north-northwest and 3 km northeast as shown in Figure 9-8. Battle Mountain Gold interpreted the magnetic low as altered rocks associated with the mineralized body.

Four lines of induced polarization (IP) were oriented east-west averaging two kilometers long and spaced at 600 m to 900 m apart. The lines were positioned to cross the locations of mineralized drill holes LA04-98, LA-06-98 and LA-08-98. One of the lines extended north to lithocap outcrops with anomalous copper (advanced argillic alteration possibly associated with gold mineralization and underlying porphyry copper mineralization). IP results indicated high chargeability and low resistivity corresponding with the location of the Los Azules porphyry copper deposit.

Two ground magnetic surveys totaling 103 km were conducted in the area of the Los Azules mineralized porphyry and the nearby Sector Mantos, which is 1 km west of Cerro Oeste. Lines were oriented east-west at 100 m spacing and 10 m stations. Results confirmed the existence of north-northwest- and north-northeast-striking structures as indicated by aeromagnetics. Results also confirmed the presence of a magnetic low anomaly in the vicinity of drill holes LA-98-04, LA-98-06 and LA-98-08 and suggested the presence of a magnetic low along the alteration system of La Ballena ridge as shown on Figure 9-8.

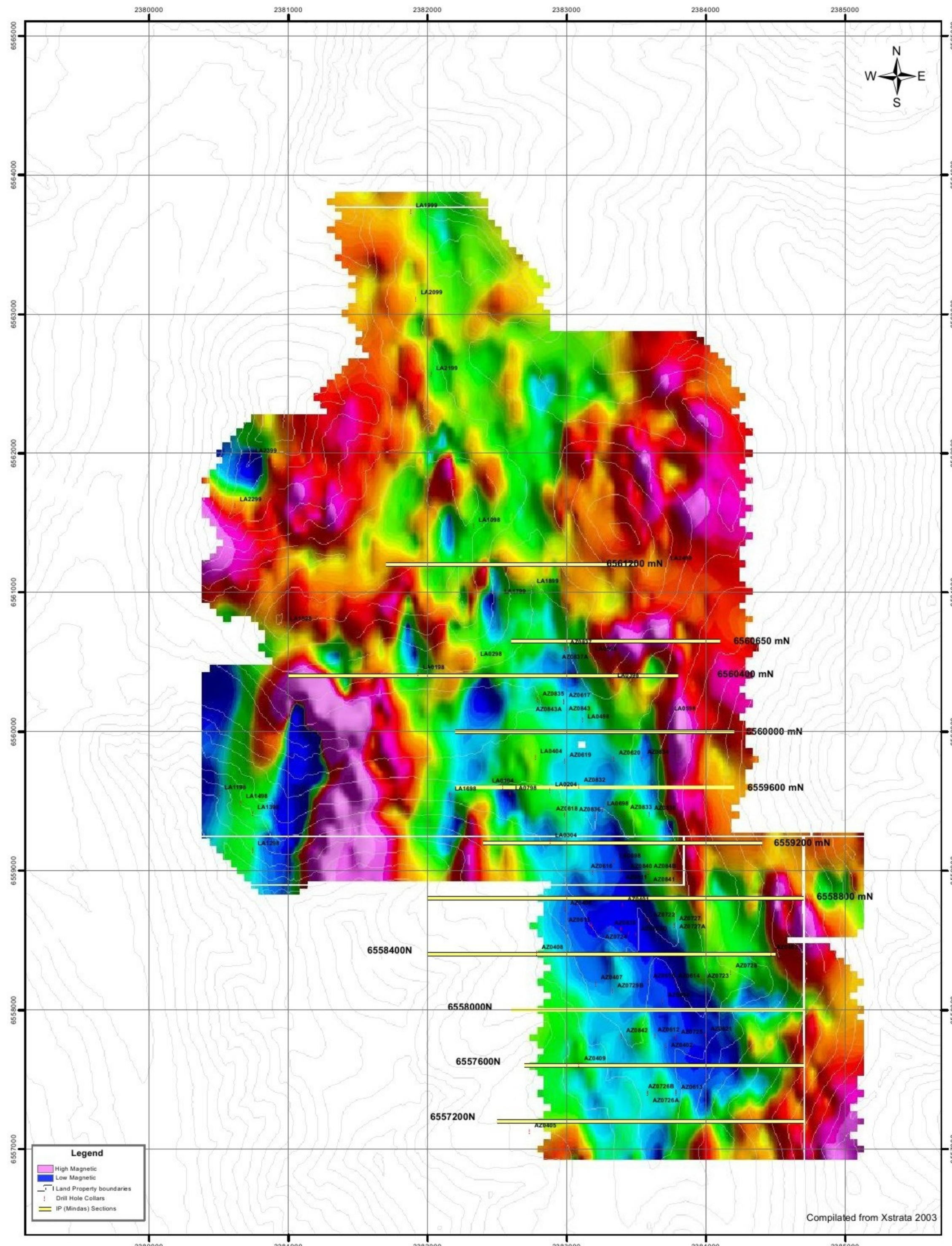


Figure 9-8: Magnetic Map of Los Azules (Reduced to Pole; 1 km^2 grid) (Rojas 2008)

Figure 9-8: Magnetic Map of Los Azules (Reduced to Pole; 1 kilometer square grid) (Rojas 2008).

9.4.2 MIM Xstrata (2003-2004)

During 2003-2004 MIM-Xstrata carried out a magnetic survey of approximately 70 line km at Los Azules. Lines were oriented east-west across the area controlled by the company at that time. In addition, MIM-Xstrata ran six lines of MIMDas (MIM-Xstrata proprietary IP system) east-west totaling 11.8 km. At the request of Minera Andes, MIM-Xstrata extended their geophysical lines south into Minera Andes ground completing five additional lines for a total 11.3 km in 2004. Total surveying by MIMDas was 23.1 km.

Magnetometry indicated a magnetic low beneath the Los Azules porphyry copper system and suggested that it extended north-northwest towards the La Hoya zone (Cerros Oeste and Este). The total field plot identified a magnetic high anomaly surrounding the magnetic low. The magnetic low extends 7 km to 8 km north-northwest and up to 2 km east-northeast confirming the interpretations made by Battle Mountain Gold.

MIMDas IP surveying (2003-2004) indicated high resistivity in the north-northwest zones at Los Azules with much lower resistivity within the porphyry copper system. Chargeability is relatively low to the north but becomes much lower at the porphyry although it increases significantly at depth. These results reflects the occurrence of more superficial sulfides in the Lagunas area of the system (north of the porphyry deposit) and a thicker leached cap in the more altered part of the system.

9.4.3 Minera Andes TITAN 24 Survey (2010)

Titan-24 DC-IP-MT data were acquired at Los Azules during April and May 2010 by Quantec Geoscience Ltd., on behalf of Minera Andes Inc. The Titan-24 system acquires three types of geophysical data– magnetotelluric resistivity (MT), direct current resistivity (DC), and induced polarization (IP). The survey consisted of twelve parallel lines (L58400 N to L62450 N). From L58400 N to L62000 N the lines were 400 m apart, L62550N was 550 m north of L62000 N and L63450 N was 900 m further north. Each line comprised one single spread of 3.6 km, except for L63450 N that was 3.3 km long. Full MT tensor data was acquired in all the lines and DC/IP was collected in all but L59200 N and L59600 N. In total ten spreads of DC and IP data were acquired covering 35.7 km and twelve spreads of MT covering 42.9 km. Grid azimuth was 90° and the station interval was 150 m.

Over 130 IP anomalies were identified. Of these, 20 were classed as priority 1, 20 as priority 2, and 12 as priority 3. The first priority anomalies are generally larger targets, at least 200 m across, and described by Quantec as being consistent with the porphyry and near-porphyry mineralization model.

Two large deep resistivity anomalies, one high to the east, generally under the Los Azules mineralization, and one low to west are well defined by the MT survey. The anomalies occur at depths to center ranging from 800 m to 1.5 km. Depth to top is rarely less than 500 m. The width of the anomalies is 800 m to 1 km for the resistivity low and 500 m to 800 m for the resistivity high. Quantec postulated that the deep anomalies are most likely related to conductive sulfides perhaps in a disseminated pyrite/sulfide shell surrounding a concealed porphyry intrusion. These anomalies, which are referred to as the “Southwest Target”, are the targets that were tested in Hole T-01B in 2011 and Hole 1279 in 2012 (Figure 9-9).

Hole T-01B is located 200 m north of section 58,400N, and Hole 1279 is located 100 m south of the drill section. The section shows the limit of the mineralization prior to the 2010 and 2011 drilling campaigns.

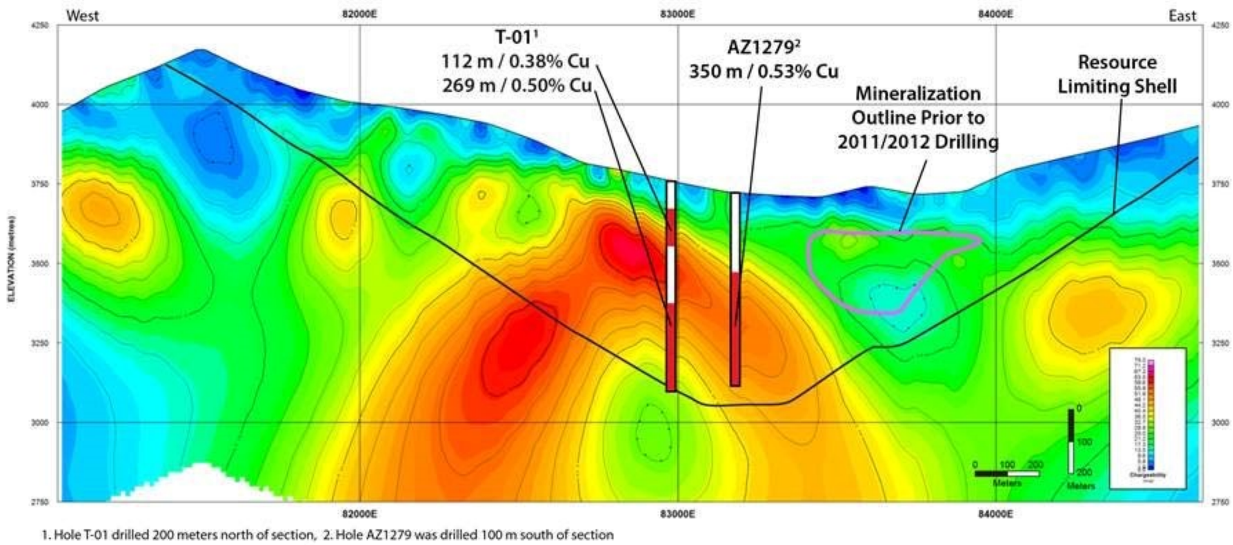


Figure 9-9: Section 58,400N Showing 2D IP Inversion Anomaly (Southwest Target) (McEwen 2012).

9.4.4 McEwen Mining: Ground Magnetic Survey (2012)

During January 2012, Quantec Geoscience Argentina S.A. performed a ground magnetic survey on the southwest portion of the Project. The survey consisted of 37 lines ranging from 1.1 km to 2.5 km, for a total of 57.2 line-km. The objective of the survey was to identify anomalous magnetic signatures that might be related to copper porphyries. The survey was acquired on a “stop-and-go” configuration, collecting data at 10 m intervals. The data was presented as maps of the Total Magnetic Field, Reduction to the Pole transform, Analytic Signal, Tilt Derivative and First Vertical Derivative.

Figure 9-10 is the Total Magnetic Field map for the 2012 survey overlain on the image shown in Figure 9-8. The 2012 magnetic data shows a discontinuous north-northwest trending magnetic low southwest of and roughly parallel to the prominent magnetic low that corresponds to the location of the main Los Azules deposit.

Areas of high magnetic response indicate the presence of elevated levels of magnetic minerals such as magnetite, pyrrhotite and hematite, whereas areas of low magnetic response may be caused by alteration processes such as magnetite destruction or may simply indicate rock types that never had magnetic minerals. This anomaly was tested with one drill hole during the 2012 season, but the hole, which was drilled to a depth of 501 m, intersected only traces of copper mineralization.

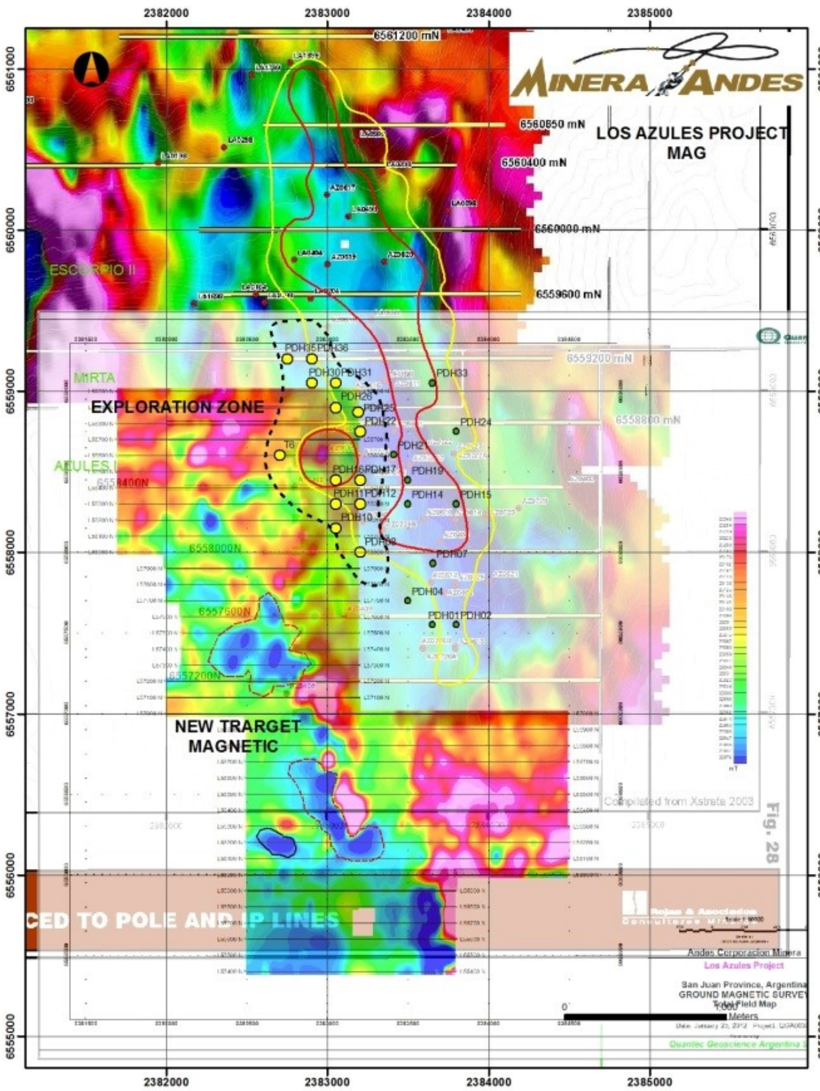


Figure 9-10: Total Magnetic Field for 2012 Survey Overlain on Figure 9.8 (McEwen 2012)

9.5 Surveys and Investigations

Mineral exploration at Los Azules has been carried out successively by Battle Mountain Gold, MIM-Xstrata and Minera Andes-McEwen Mining, and/or professional consultants or contractors employed by these companies.

Jemielita (2010) reviewed the exploration program and data and reported that "Mineral exploration at Los Azules appears to have been carried out in a competent manner and to accepted industry standards.", although he noted that he did not conduct a rigorous confirmation of the quality of exploration work.

9.6 Future Exploration

This subsection was prepared by D. Brown, CPEng, McEwen.

The goals of future exploration at Los Azules include enhancement of property upside potential, geological model refinement, deposit growth, resource category upgrade, and identification/discovery of new porphyry mineralization as extensions of the Los Azules deposit, as well as new porphyry systems.

The planned exploration work program will carry out reconnaissance study, field mapping, geophysical surveying and core drilling to achieve these goals. More specifically, these activities will include:

- Regional scale Spectral study for alteration definition, characterization of known mineralization and generation of new targets;
- Geological mapping to increase geological and structural understanding of the known mineralization and identification of potential exploration target areas;
- Core relogging and section review to refine and reinforce the geological model of the deposit, including distribution and geometry of the supergene enrichment zone.
- Induced Polarization (IP) survey to trace deposit extensions and to reinforce satellite targets prospectivity;
- Strategic core drilling of the Los Azules deposit extensions, more specifically toward the north-east and over selective high-quality exploration targets to be generated on the property;
- Infill core drilling to upgrade priority portion of the resource (starter pit area) from indicated to Measured category.

10. Drilling

This section was prepared by R. Sim, P. Geo, SIM Geological Inc. Drilling programs have been undertaken at Los Azules between 1998 and 2017 by three different mineral exploration companies including BMG, MIM Argentina (now Glencore) and Minera Andes/McEwen Mining. Drilling included reversed circulation programs mostly for gold exploration and diamond drilling focusing of supergene and hypogene porphyry-style copper mineralization. Descriptions of these programs are detailed in the following sections. Table 10-1 provides a summary of the drilling information.

Table 10-1: Exploration Drilling by Year and by Company

Year	Company	No. of	Meters
1998	Battle Mountain Gold	16	3,614
1999	Battle Mountain Gold	8	2,067
2004	Glencore Xstrata (MIM)	4	864
2003 - 2004	Minera Andes	9	2,064
2005 - 2006	Minera Andes	11	2,602
2006 - 2007	Minera Andes	17	3,501
2007 - 2008	Minera Andes	18	5,469
2009 - 2010	Minera Andes	28	10,229
2010 - 2011	Minera Andes	44	10,405
2011 - 2012	McEwen Mining	8	2,830
2012 – 2013	McEwen Mining	22	15,873
2017	McEwen Mining	17	6,469
Total		**202(1)**	**65,987**

1. This table includes all drilling that has occurred on the property. Some holes were redrilled due to drilling difficulties and are not included in the database. Holes that were started in one season and completed the following season are counted in the year they were started, but the meters drilled in each season are shown for the respective seasons

The drill plan showing collar locations, drill hole numbers and drill hole type is shown in Figure 10-1.

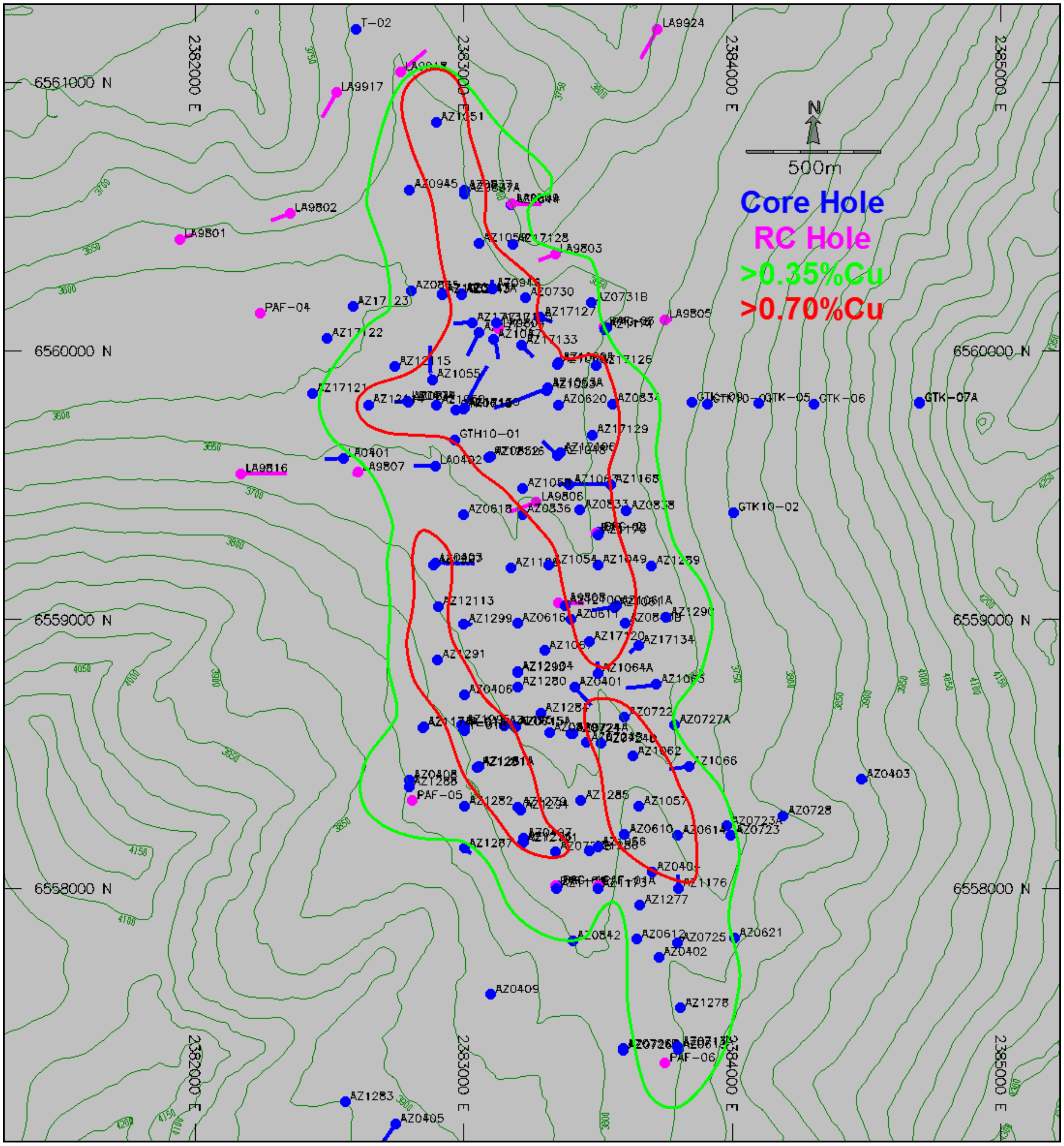


Figure 10-1: Plan Showing Copper Mineralization Distribution and Locations and Type of drill holes at Los Azules (SIM 2017)

10.1 Drilling Procedures and Conditions

Drilling by McEwen Mining Inc. was contracted to various drilling companies including Connors Drilling, Patagonia Drill Mining Services, Adviser Drilling, Boland Minera, Major Drilling, Boart Longyear and McEwen Mining. Drilling conditions have been particularly difficult especially in faulted intersections or in areas of unconsolidated surface scree/talus.

10.2 Battle Mountain Gold (1998-99)

In 1998 and 1999 BMG drilled 24 reverse circulation (RC) holes for a total of 5,681 m during a gold exploration program. Chalcopyrite, chalcocite and covellite mineralization was encountered in at least three drill holes (Rojas, 2010).

10.3 MIM-Xstrata (2004)

In 2004 MIM Argentina (now Glencore) drilled four RC holes (864 m) at Los Azules (Rojas,2010).

10.4 Minera Andes/McEwen Mining (2004-2017)

Minera Andes/McEwen Mining has drilled 174 drill holes for a total 59,442 m in nine campaigns (2003-2004, 2005-2006, 2006-2007, 2007-2008, 2009-2010, 2010-2011, 2011-2012, 2012-2013 and 2017). Drilling concentrated on identifying a zone of secondary enrichment in a grid with holes spaced at 200 m along east-west lines spaced at 400 m. Infill diamond drill holes were drilled during the 2009-10 campaign with a target depth of 400 m achieved or exceeded in seventeen holes, four of which exceeded 600 m in depth. During the 2009-2010 campaign three RC holes for hydrologic and geotechnical testing were completed. Drilling during the 2010-2011 campaign included 16 infill or step-out diamond drill holes, six diamond drill holes for hydrology and geotechnical testing and 20 RC holes for condemnation and hydrology testing. Drilling during the 2011-2012 campaign comprised 10 infill and step-out diamond drill holes. During the 2012-2013 campaign all of the 22 diamond drill holes were for the purposes of expanding the resource either to depth or laterally. The 2017 program included fourteen delineation holes in the northern part of the deposit plus three holes drilled for geotechnical purposes. Figure 10-1 shows the location and distribution of Los Azules drill holes and the known copper mineralization for cut-off grades of 0.35% Cu and 0.70% Cu.

10.5 Logging

Samples taken from drill holes at Los Azules are logged at the Project camp by geologists employed or contracted by McEwen Mining. Sampling procedures are described in Section 11.2. Emphasis is given to recording rock-types, alteration associations, types and distribution of mineralization and the presence of various types of veinlets and structures. These features are logged onsite then transferred to a digital database.

Geotechnical parameters are recorded including percentage of core recovery, RQD, fracture density and angle relative to the length of the hole, as well as fracture fill material. This information is transferred to the digital database. Geotechnical observations were made for 19,281 sample intervals.

Log sheets are coded and details recorded for interval depth, interval width, lithology, alteration types, alteration intensities, alteration minerals, structure, percentage vein quartz, percentage total disseminated sulphides, mineralization minerals, mineral zone (hypogene or supergene), jarosite, goethite, hematite, covellite, chalcocite, pyrite, chalcopyrite, bornite and other observations.

10.6 Surveys

According to McEwen Mining Inc. staff, downhole surveying is done on drill holes by the drilling contractors using REFLEX and/or Sperry-Sun tools. Density determinations were also made for 915 drill core samples.

10.7 Drill Hole Results

There are a total of 202 drill holes in the Los Azules database with a cumulative length of 65,987 m and a total of 30,675 samples analyzed for a suite of elements including total copper, gold, silver and molybdenum. A total of 137 of the drill holes have some portion of the sample intervals tested for sequential copper analysis. A summary of the significant drilling results is found in Table 10-2.

Drilling has confirmed the presence of a hypogene porphyry copper deposit in a continuous body, as well as the presence and continuity of an overlying supergene chalcocite enrichment blanket. The extent of the mineral resource measures approximately 4 km north-south by 1.5 km west-east. Many of the drill holes in the central and northern parts of the deposit have been terminated in mineralization that exceeds the base case cut-off grade of 0.20%Cu. Drilling during the 2012-2013 campaign extended the depth of the mineralized system in the southwestern part of the deposit to at least 1,000 m.

Table 10-2: Examples of Significant Drilling Results

Drill Hole ID	TD (m)	Intersection		Interval (m)	Total Copper (%)
		From (m)	To (m)		
AZ0401	195	130.0	195.0	65.0	0.62
Including		150.0	192.0	42.0	0.82
AZ0402	330.5	164.0	304.0	140.0	0.38
Including		164.0	190.0	26.0	0.47
Including		230.0	304.0	74.0	0.42
AZ0404	300.8	162.0	282.0	120.0	0.54
Including		162.0	202.0	40.0	0.59
Including		236.0	282.0	46.0	0.64
AZ0407	168.8	96.0	152.0	56.0	0.44
Including		126.0	152.0	26.0	0.58
AZ0610	261.35	174.0	261.35	87.35	0.83
AZ0611	270.7	112.0	270.7	158.7	0.51
AZ0614	224.55	132.0	180.0	48.0	1.13
Including		136.0	158.0	22.0	1.40
AZ0617	183.5	66.0	183.5	117.5	0.63
Including		66.0	124.0	58.0	0.84
AZ0619	299.4	78.25	299.4	221.15	1.62
Including		78.25	116.0	37.75	2.22
Including		134.0	146.0	12.0	3.94
AZ0620	253.3	80.0	226.0	146.0	1.10
Including		80.0	106.0	26.0	1.54

Drill Hole ID	TD (m)	Intersection		Interval (m)	Total Copper (%)
		From (m)	To (m)		
AZ0722	271.2	119.0	155.0	36.0	0.99
AZ0724D	278.2	124.0	160.0	36.0	0.79
AZ0729B	226.85	130.0	214.0	84.0	0.73
Including		172.0	204.0	32.0	0.94
AZ0730	342.6	123	323.8	200.8	0.89
Including		140	253	113	1.04
AZ0832	420.0	80	140	60	0.78
AZ0833	387.8	73	313	240	0.94
AZ0837A	540.95	326	516	190	0.82
AZ0841	400.15	241	285	44	1.83
AZ0843	176.0	67.0	131.0	64.0	0.69
AZ0946	469.4	110.0	469.4	360.4	0.63
Including		115.0	260.0	145.0	1.08
AZ1047	493.1	74.0	493.1	401.8	0.50
Including		102.0	182.0	76.8	0.92
AZ1048	466.1	105.0	466.1	359.1	0.77
Including		123.0	339.0	216.0	1.01
AZ1049	491.2	62.0	491.2	429.2	0.75
Including		62.0	298.0	236.0	1.05
AZ1050	408.5	94.0	408.5	238.0	0.30
Including		94.0	132.0	38.0	0.68
AZ1051	620.2	69.0	620.2	551.2	0.35
Including		363.5	426.0	62.5	1.12
AZ1052	425.0	103.0	425.0	322.0	0.42
AZ1053A	650.0	48.9	650.0	541.1	0.54
Including		122.0	230.0	101.5	1.03
AZ1055	408.5	116.0	408.5	282.5	0.55
AZ1056	295.25	70.0	295.25	226.4	0.47
Including		192.0	223.0	31.0	0.88
AZ1057	503.6	173.0	503.6	330.6	0.43
Including		173.0	225.0	52.0	0.84
Including		255.0	293.0	38.0	0.83
AZ1058	451.8	70.0	451.8	381.8	0.52
Including		96.0	181.0	84.0	0.99
AZ1059	656.4	88.0	656.4	568.4	0.47
Including		330.0	404.0	74.0	0.90
AZ1060A	402.5	116.0	402.5	285.5	0.50
Including		130.0	170.0	40.0	0.69
AZ1061A	293.4	71.0	293.4	209.0	0.90
Including		71.0	250.0	168.2	1.04
AZ1062	280.0	130.0	280.0	150.0	0.64
Including		130.0	248.0	118.0	0.70
AZ1063	427.1	94.0	427.1	333.1	0.72
Including		94.0	232.0	138.0	0.81
AZ1064	170.1	136.0	170.1	34.1	0.47
AZ1064A	404.4	120.0	248.0	128.0	0.75
And		248.0	404.4	156.4	0.39
AZ 1168	569.3	148.0	569.3	395.4	0.66
AZ 1169	315.75	86.0	315.75	229.8	0.36
AZ 1170	349.3	112.0	349.3	349.3	0.63

Drill Hole ID	TD (m)	Intersection		Interval (m)	Total Copper (%)
		From (m)	To (m)		
AZ 1175	355.2	74.0	340.0	266.0	0.22
And		340.0	355.2	15.2	0.72
AZ 1176	393.4	162.0	292.0	130.0	0.63
T-01B	656.0	80.0	192.0	112.0	0.38
And		387.0	656.0	269.0	0.50
AZ 1279	622.7	272.0	456.0	184.0	0.38
And		456.0	622.7	166.7	0.71
AZ 1282	482.1	309.5	314.0	7.5	2.60
AZ 1289	367.0	220.0	367.0	147.0	0.44
AZ 1291	890.5	72	232	160	0.61
And		562	790	228	0.40
And		790	890.5	100.5	0.71
AZ 1294	861.9	62.2	74	11.8	0.53
And		252	861.9	609.9	0.47
AZ 1295	1044.5	422	1044.5	618.5	0.51
Including		580	618	38	1.07
Including		720	744	24	1.16
Including		970	1044.5	74.5	0.61
AZ 1296	523.2	156	244	88	0.92
AZ 1297	980.8	276	690	414	0.50
Including		436	490	54	1.07
AZ 1299	1074.6	78	94	16	0.55
And		546	1074.6	528.6	0.44
AZ 12101	237	168	237	69	0.87
AZ 12114	814.5	224	374	150	0.70

Source: Minera Andes press releases dated May 5, 2004, May 31, 2007, November 14, 2007, April 16, 2008, June 6, 2008, March 8, 2010, June 21, 2010 and June 27, 2011 and McEwen Mining press releases dated May 10, 2012, January 17, 2013 and March 28, 2013.

10.8 True Thickness of Mineralization

Supergene mineralization forms a sub-horizontal zone measuring over 5 km north-south by 1.5 km west-east. It is underlain by hypogene mineralization that extends to depths greater than 1 km below surface. The disseminated and relatively homogeneous nature of the porphyry style mineralization at Los Azules means that intersections, with predominantly vertically oriented drill holes, effectively represent the true thicknesses of mineralization.

11. Sample Preparation, Analyses and Security

This section was prepared by B. Davis, F.AusIMM, BD Resource Consulting, Inc.

11.1 Introduction

Robert Sim, of SIM Geological Inc., visited the Los Azules property during the period of March 30-31, 2008 and March 21-23, 2010 and Bruce Davis visited the property during the period of January 23-25, 2012. The results of the most recent drilling program were discussed with the Project staff and select intervals from a series of drill holes were reviewed. A series of surface exposures were visited at the deposit site. Active drill sites were visited and a series of (completed) drill holes collars were observed.

Both Mr. Sim and Dr. Davis reviewed the sampling procedures and Quality Assurance/Quality Control (QA/QC) practices used during the drilling program and Dr. Davis presented a one-day QA/QC seminar to the Project staff. The sampling practices were found to adhere to accepted industry standards. Standard reference material (SRM) was prepared and certified by Alex Stewart laboratory in Mendoza, Argentina from local source rocks. Blank material was initially made from “barren” quartz with a small portion of leached material “to add some color” (i.e. in an attempt to appear anonymous in the sample sequence). As discussed later in the section, this material is not completely sterile and another source of blank material was obtained for QA/QC programs after 2008. “Coarse” duplicates taken at site in 2008 were actually core duplicates obtained from quarter core splits. Coarse reject duplicates were eventually submitted for 2008 and included in the 2009 and subsequent programs.

Assay results from blank material fell within acceptable limits in all programs after 2009 when silica sand was used instead of the previous blank material.

Robert Sim also visited the old Minera Andes office and the old core storage facility in Mendoza on April 2, 2008 and again on March 24, 2010. Drill core was observed from a series of random intervals and comparisons made between the assay results and the visual presence of copper bearing minerals. The assay results were confirmed by visual observations and checking against original assay certificates. Dr. Davis visited the new core storage warehouse in Calingasta (January 2012) when it was being renovated and before the entire core had been moved into the warehouse.

The samples were sent initially to the Alex Stewart lab in Mendoza and later to the ACME lab in Mendoza, for sample preparation and assaying duplicates. The analytical lab of ACME in Chile runs total copper on all samples. Any interval that is greater than 0.20% total copper is analyzed using sequential copper analyses, which consists of acid soluble copper, cyanide soluble copper and residual copper.

Laboratories utilized by McEwen have internal QC samples used in each batch of sampled material provided by McEwen. Each assay certificate lists the drill sample results, plus the laboratory’s internal sample control results that consist of its own duplicates, blank and reference standard pulp with each batch assayed for its internal quality control on precision, instrument drift and accuracy in order to determine if there are any sampling issues for that particular run. Anomalously high values within batches are verified by re-assay as a matter of routine.

Assay results from the laboratory are reported to McEwen in electronic format using both Excel files and PDF format. Complete and final assays are prepared by the labs in PDF format with the lab certification results included with each batch.

11.2 Sampling Methods

The drilling programs that have occurred on the Los Azules property since 1998 have used both reverse circulation (RC) and diamond core (core) equipment. All holes drilled by BMG in 1998 and 1999 were RC type. MIM, now Glencore, drilled four RC holes in 2004. Since 2004, Minera Andes/McEwen Mining has mainly used core-drilling techniques. The procedure for logging the core is described in Section 10.6.

Sample preparation begins at the man camp where the core is labelled and photographed as whole core. The core is split using a pneumatic core splitter. Core that is not whole, or is significantly rubblized is divided with a trowel in order to obtain a reasonable sample. One-half of the core of 2 m sample length is placed in plastic sample bags and tagged accordingly. Both the sample bag and tag are marked with a sample number such that an inventory of samples prepared can be recorded by Minera Andes/McEwen Mining and checked against an inventory prepared by the lab receiving the samples.

11.2.1 Core Sampling

RQD measurements and core recovery are measured at the drill rig by Minera Andes/McEwen Mining personnel prior to the core being boxed. The core is placed in core boxes by the drill crew and is systematically logged by the geology staff at the core shed almost as soon as it becomes available. Core boxes are marked by the geologist every two meters for sampling. Subsequently the core is photographed three boxes at a time by the sampling staff. Core is cut with a pneumatic splitter in order to minimize loss of sooty chalcocite, which could be lost by washing during cutting by the diamond saw.

Alternating core halves are selected for assay. No particular scrutiny that might bias the results is applied to the alternating halves selected. The core inventory system is scrupulously maintained. The sample is bagged immediately after splitting. A lab generated sample ticket is inserted with the sample and a second ticket is stapled into the throat of the bag. Nylon cable ties are used to seal the bags. The bags are then weighed and five to six sample bags are sealed in a larger ripstop-mesh sack. The sacks are sealed with a larger cable tie, labelled and secured with a number attached. Samples are shipped at least once a week.

Drill core recovery is recorded at the drill site and ranges from 0% to 100%. Drill core recovery averages 88% from the supergene and primary mineral zones. Even though core recovery in zones of rubble may be less than 70%, there is no indication sample grades are related to recovery or that there is a bias associated with core recovery.

Geology zones pertinent to the distribution of copper grades are discussed in Section 14. A summary of significant intervals appears in Section 1.

All drill core from the Project is stored at a well-organized core storage warehouse owned by McEwen in Calingasta. Sampling procedures produce samples that are appropriate for subsequent use in resource estimation.

11.3 Sample Preparation

Drill hole samples are bagged and numbered when split. Subsequently five to six samples are placed in sacks containing approximately 25 kg. These sacks are closed with numbered bag ties. The sacks are not opened until they reach the laboratory where the bag tie number is recorded by laboratory personnel. Samples are transported by project personnel from the Project to the laboratory. Once the samples are bagged at the Project site no McEwen employee is involved with any subsequent sample preparation.

During the 2004 and 2006 field season, sample pulps were prepared by Alex Stewart and shipped to the ALS Chemex laboratory in Chile for analysis. For the 2007 field season and initially during the 2008 field season, samples were taken to the Alex Stewart Laboratory in Mendoza for sample preparation. Subsequently, field samples were taken directly to the ACME laboratory in Mendoza which only does sample preparation work. Sample pulps prepared at Alex Stewart and later at the ACME laboratory in Mendoza, were shipped by ACME to ACME's analytical laboratory in Santiago, Chile.

ALS Chemex, Alex Stewart and ACME are all ISO 9001:2000 certified.

The sample preparation protocol consists of samples being dried at 60ºC until the desired moisture content is achieved. The entire sample is crushed to 85% passing 2 mm (10 mesh). The crusher is cleaned with high pressure air after every sample. The entire sample is then run through a Jones or riffle splitter to obtain 500 g. Rejects are retained.

The 500 g sample is pulverized in a ring-and-puck pulverizer to 95% passing 65 µm (150 mesh). The particle size of the samples is checked by screening random samples. The pulverizer is cleaned after every sample with high pressure air.

A 150 g split of the pulp is placed in a pulp envelope, numbered and sent to the assay lab. The remainder of the 500 g pulp sample is saved as a pulp reject. These pulp rejects have been used for later check analysis at the Alex Stewart Laboratory in Mendoza.

11.3.1 QC Sample Insertion

The sampling staff inserts standards as specified in McEwen's quality control sample handling procedure protocol (Davis and Duff, 2014). According to Mr. Sim and Dr. Davis, there is every indication that the procedure is being strictly followed and QC sample coverage was adequate for the drilling.

Duplicate samples are taken every 40 to 45 samples by quartering the assay core splits. Blank material is inserted at the rate of one in every 40 to 45 samples.

11.3.2 Chain of Custody

The chain of custody has been outlined in the previous paragraphs in this section. It appears that any tampering with individual bags or the ties would be immediately evident when the samples arrived at the lab. Any tampering with the larger bags would also be apparent on arrival at the lab. Documentation was provided such that it would be difficult for a mix up in the samples to occur either during shipment or at the lab.

All procedures were being carefully attended to and met or exceeded industry standards for collection, handling and transport of drill core samples.

11.4 Control Samples

Control samples consist of blanks, duplicates and reference standard samples in addition to submitting an appropriate number of check samples to outside, independent laboratories to assure assaying accuracy. Blank samples test for contamination; duplicates test for contamination, precision and intra-sample grade variation; and reference standards test for assay precision and accuracy.

11.4.1 Standard Reference Materials (Standards)

Control standards and blanks used during the 2007 and 2008 field season were prepared using composites of course rejects from the 2006 field season. Color was added to the blanks by adding small amounts of course reject from the leached horizon of the deposit. Six standards ("SRM") were prepared with distinct copper and gold contents as shown in Table 11-1.

Table 11-1: Sample Control Standards (2006-2007)

Sample	Total Cu%	Au (ppm)
STD B	0.0047	0.0500
STD 01	0.1096	0.0470
STD 03	0.3135	0.0330
STD 06	0.5300	0.0260
STD 08	0.8830	0.0680
STD 20	1.9540	0.0670

Note: Values were obtained from statistical analysis received from Alex Stewart.

For the programs after 2007 through 2013, Alex Stewart prepared and certified additional standard material with the same certified values for copper. It should be noted that the lack of precision in the gold assays precluded their use as gold SRM. This was due to the generally low gold values and assay detection limit effects. It was not a failing of either sample preparation or assaying.

For the 2017 program, Acme Laboratories prepared and certified standard material as shown in Table 11-2. The gold values were, again, affected by detection limit effects and not used as SRM.

Table 11-2: Sample Control Standards (2017).

Sample	Total Cu%	Au (ppm)
STD 01	0.101	0.014
STD 03	0.278	0.039
STD 10	1.030	0.059

Note: Values were obtained from statistical analysis received from Acme.

11.4.2 Control Sample Performance

The performance of SRM is evaluated using the criterion that 90% of the results must fall within ±10% of the accepted value for the assay process to be in control. Results are presented using statistical process control charts, an example of which is provided in Figure 11-1. In the chart, the average value appears as a black horizontal line (middle line) and the certified value of the standard is listed near the average value line. Control limits at ±10% of the accepted value appear as red lines above and below the black line showing the accepted value. The assay values for the standard appear on the chart as green triangles.

11.4.2.1 Copper

Results for the copper SRM fall within the control limits above the prescribed rate over the various field programs. The results shown for STD03 during the 2010-2011 field season (Figure 11-1) are typical.

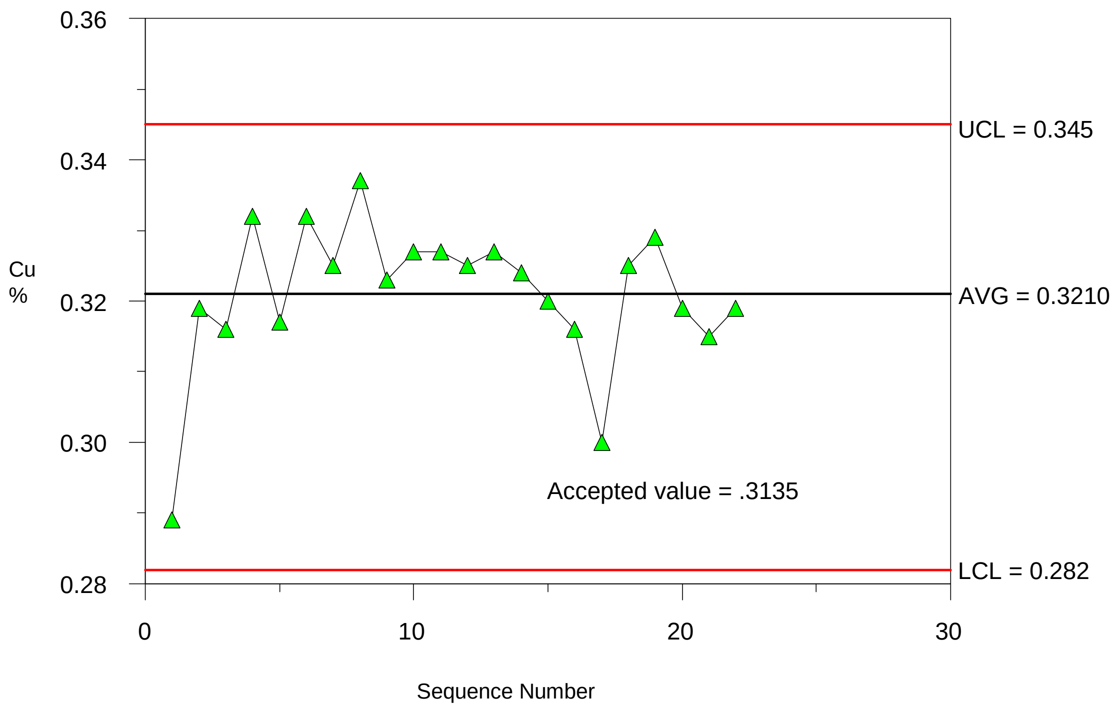


Figure 11-1: Example SRM Control Chart from 2010 Drilling (Davis 2013)

The performance of copper standards was generally similar across the drilling from 2007 through the 2017 field seasons with exceptions as outlined. In the 2009-2010 field season, hole 1049 produced significant QC errors which were addressed by remedial assaying for that hole. In the 2010-2011 field season standards indicated copper values were consistently higher than expected. The errors were addressed by a program of re-assaying in 2012. Original values in the database were replaced by the 2012 re-assay results which were validated by control values. The 2011-2012, 2012-2013 and 2017 field seasons assaying produced no significant QC errors.

11.4.2.2 Gold and Molybdenum

Due to the generally low values of gold and molybdenum, control using standards of comparable values is not possible due to the lack of precision in the assay process; however, duplicates show no indication of systematic assay problems in either gold or molybdenum.

11.4.3 Blank Sample Performance

In the field seasons prior to 2009, the blank material was discovered to be mineralized. This generated a significant number of false positive results. All out of control results during this period were subjected to remedial procedures. No evidence of contamination from sample to sample was detected by the remedial work.

In the 2009-2010 and subsequent field seasons, the blank was silica sand. There were no out of control results for the blank samples submitted during these drilling seasons.

11.4.4 Coarse Duplicate Sample Performance

Duplicate samples of coarse reject material are assayed to check the sample preparation protocol. If the protocol is adequate, 90% of the duplicate pairs of assays should fall within ±30% of each other. During all field seasons, coarse reject copper duplicates fell within control limits. Gold duplicates fell within the control limits at above the prescribed rate.

11.4.5 Pulp Duplicate Sample Performance

Duplicate samples of pulp (or the final sample product) material are assayed as another check on assay accuracy and precision. For all seasons where duplicates were taken, copper duplicates from pulp material fell within control limits above the prescribed rate of 90% within ±10%. Differences with gold duplicates in 2009 – 2010 have been addressed. There are no other outstanding issues with pulp duplicate performance.

11.5 Conclusions

Results from the control sample analysis indicate that the copper, gold and molybdenum assay processes are under sufficient control to produce reliable sample assay data for resource estimation and release of drill hole assay results. Inadequate standards from early field seasons were eliminated. Material that was assumed to be blank but contained low copper values was replaced.

All past deficiencies in the QC program have been addressed. The Los Azules sampling and assaying program appears to be producing sample information that meets industry standards for copper, gold and molybdenum accuracy and reliability. The assay results are sufficiently accurate and precise for use in resource estimation and the release of drill hole results on a hole by hole basis.

12. Data Verification

This section was prepared by B. Davis, F.AusIMM, BD Resource Consulting, Inc.

12.1 Verification of Geologic Data

12.1.1 Database Verification

In 2008, eight holes were randomly selected and the data was sent to independent consultant Nivaldo Rojas of Rojas and Associates in Mendoza, Argentina. The contained information, including collar locations, down-hole survey data, geology codes and assay values were verified back to the original source. The collar location and directional data was traced back to the original survey sheets. The geology data was traced back to the original drill logs and the assay data was compared to the original assay certificates.

There were no errors found in the drill hole collar locations and survey data. Only two assay value errors were identified during this process. A series of differences were noted between geology codes and these “errors” were attributed to relogging of older drill holes. None of the errors identified are considered significant with respect to resource model development.

Similar manual validations were conducted following resource model updates conducted in 2012, 2013 and following the most recent resource model in 2017. No significant errors were found.

12.1.2 Site Visit Validation

Robert Sim visited the Los Azules site from March 30 - April 1, 2008 and again from March 21-23, 2010. During the period from January 23-25, 2012, Bruce Davis also visited the Project site. During each of these visits, a series of randomly selected drill hole intervals were reviewed and in all cases, the type and content of copper minerals observed support the assay results obtained. Sim and Davis also visited the McEwen Mining core storage facilities in Mendoza and Calingasta and similar comparisons between visual/assay copper grades were observed on a random series of drill holes. There were no discrepancies noted during this test.

During each site visit, Mr. Sim and Dr. Davis visited numerous drill site locations on the Los Azules property. The locations of these drill hole collars match the survey and topographic information in the database. Active drilling activities were also observed in several locations. The drill core handling and sampling procedures followed on the property were also observed and discussed with site personnel during the site visits. These practices follow accepted industry standards.

12.1.3 Conclusions

Observations during the site visits confirm the physical presence of the drilling activities completed on the deposit. Sampling procedures have been followed according to accepted industry standards. Observations of the contained mineralogy in the rocks support the assay results and these, as described in Section 11, have been monitored through an appropriate QA/QC program.

The results of the data verification indicate that the database is sound and reliable for the purposes of resource estimation.

13. Mineral Processing and Metallurgical Testing

This section was prepared by M. Bunyard, C. Eng, FAusIMM, Hatch. The author has relied on information presented by Richard Kunter in the 43-101 Technical Report prepared by Samuel Engineering (2013). Further the author has made use of test work results from SGS (2016, 2017), based on verification performed, in drawing the conclusions presented in this section.

The first recorded testwork on flotation optimization is described in the Plenge Labratorio report (May-Sept 2008). The optimization was completed on three main composites (No 1, No 2 and No 3) [3,4]. The second program of optimization testwork was carried out from July until August 2011[5] on two composites taken from the primary and supergene zones. In total there were five samples, two of which were used as the references for the current, concentrate production only, engineering design included in this report. These two were selected because the copper grades of those samples are near to the average copper grade of the deposit.

This engineering design has been used to estimate capital and operating costs for this current preliminary assessment of the economic viability of the project (“PEA”). The processing plant will consist of a grinding circuit and a flotation concentrator that produces a copper concentrate.

13.1 Grinding

The Metallurgical Investigation No.7026-7027 Minera Andes Metallurgical Scoping Study, determined that the Bond Ball Mill Work Index (BMWi) is 12.5 to 13.7 kWh/t. The values for this work index suggest a mineralized material of medium hardness. It is recommended that additional grinding testwork be carried out in the next phases of the project development for further definition and optimization of the engineering design of the grinding circuit.

13.1.1 SMC Testwork

Samples from 10 different drill cores and depths of the Los Azules deposit, representing the first five years of operation, were sent to SGS Minerals Services in Santiago, Chile in early June 2017. SMC Tests were conducted on each of the 10 samples to determine the JKSimMet and SMC Test comminution parameters that could then be used to assess ore behavior in the proposed process flowsheet. SMC Test results are summarized in Table 13-1.

[3] Metallurgical Investigation No. 7026-7027, Minera Andes Incorporated Los Azules Copper Project, Metallurgical Scoping Study

[4] Metallurgical Investigation No. 7028, Minera Andes Incorporated Los Azules Copper Project, Composite No. 3

[5] Metallurgical Investigation No. 9247-69, Minera Andes Incorporated Los Azules Copper Project, Flotation variability and optimization

Table 13-1: SMC Test Results by Ore Sample

Type	Sample	DWi (kWh/m^3)	A x b[6]
Primary	AZ0836	7.55	33.7
	AZ12116	5.35	46.7
Supergene	AZ1047	4.00	64.2
	AZ1050	5.22	47.6
	AZ1053A	2.74	89.5
	AZ17130-148	4.96	50.2
	AZ1048	3.47	72.5
	AZ17125	5.93	42.7
	AZ17106	5.45	46.6
	AZ17130-290	4.44	59.6

The A x b values for the tested Los Azules samples were compared by SGS to the JKTech database. The vertical red lines shown in Figure 13-1 represent the values for Los Azules and the green line represents the frequency distribution from the JKTech database.

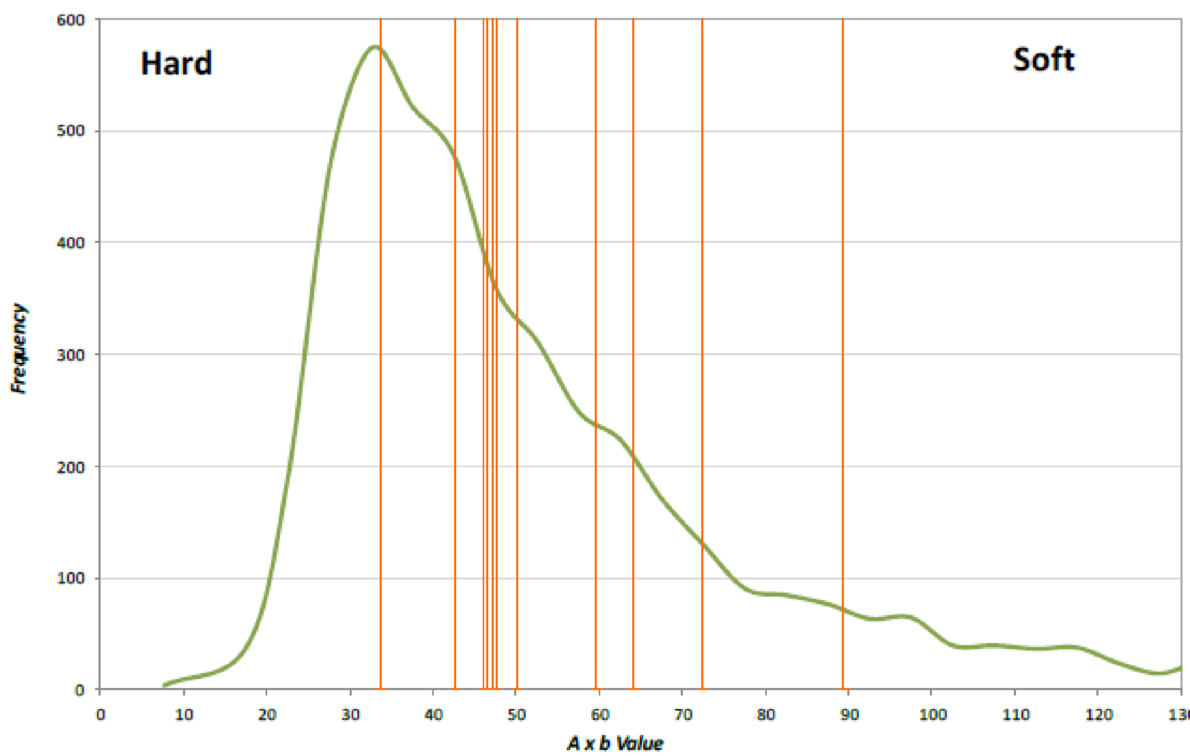


Figure 13-1: Frequency Distribution of A x b values in JKTech Database (SGS, 2017)

Along with Figure 13-1, for each ore sample SGS provided the percentage of material in the JKTech database that is softer. Taking the average of these percentages across the

[6] A x b values are derived from the outputs of the SMC Test Results and are presented in the SGS Report.

10 samples gave 41% i.e. 41% of the material in the JKTech database is softer (59% is harder).

A plot of the A x b values by mean depth below collar is presented below in Figure 13-2.

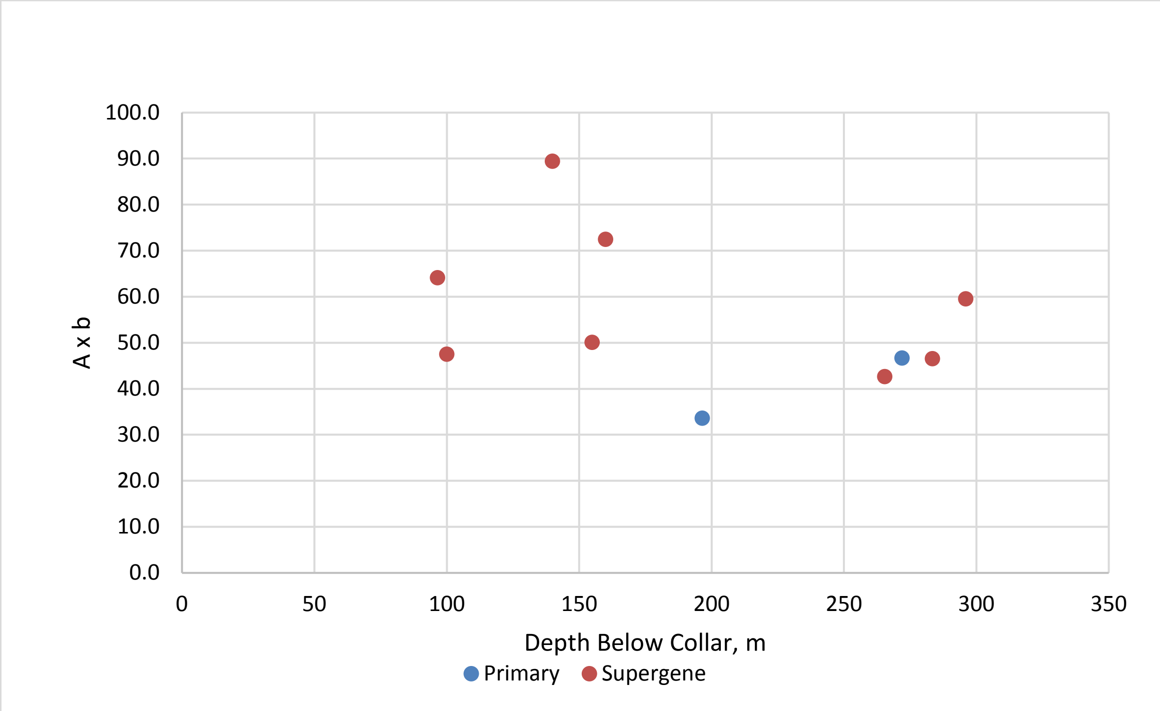


Figure 13-2: A x b Values as Function of Depth

From the 10 ore samples tested the A x b values decrease (i.e. the ore becomes harder) with depth. Furthermore the two samples tested of the primary sulphide ore type show lower A x b values than the supergene material. The primary domain makes up a larger portion of the concentrator feed blend starting in Y24 of plant life. The harder ore type has been factored into the process flowsheet development described in detail in Section 17 (Recovery Methods).

13.2 Flotation Optimization Testwork

The plant feed over the life of the mine is composed of variable proportions of material from the primary zone and from the supergene zone with the average over the whole life being approximately equal proportions. Therefore, the flotation design criteria for the current engineering design were selected based on an average of the optimized flotation conditions determined in the laboratory test work on the primary and supergene samples. In this regard, the following reagents were selected for the flotation design: CaO as a modifier, A-3477, MCX and Z-14 as collectors and DF-1012 as frother. Flotation retention times in the laboratory tests were eight minutes for the rougher stages and 16 minutes for three cleaning stages.

13.2.1 Locked-Cycle Test

A single flotation flow sheet configuration was utilized in all of the testwork programs; therefore the locked cycle test results are comparable. In the case of comparison of supergene and primary flotation efficiency, the locked cycle test results demonstrate that the copper recovery to concentrate for the supergene material is lower than for the primary zone material. A weighted average sample, based on reported tonnages of supergene and primary material, was modeled to provide the basis for predicting the average copper, gold and silver recoveries and the concentrate copper grade for the life of mine. Table 13-2 shows the results of the locked cycle tests.

Table 13-2: Concentrate Grade and Recovery of Primary, Supergene and Modeled Average Sample

Composite	Concentrate Wt. % Of Feed	Copper Concentrate Grade			Recovery %		
		Ag g/t	Au g/t	Cu %	Ag	Au	Cu
Primary	**1.45**	97	3.79	**31.96**	68.8	62.9	**93.2**
Supergene	**2.1**	28.6	3.58	**28.53**	54.0	65.6	**89.3**
Modeled Average	**1.8**	59.4	3.67	**30.07**	60.7	64.4	**91.1**

13.3 Variability Testwork

Variability testwork on the primary and supergene samples was carried out between July and August 2011[7]. The sample head assays for the variability testwork are summarized in Table 13-3. The copper grade varied from 0.2% to 0.5% with a single sample at 0.9% Cu in the primary zone and from 0.4% to 1.9% Cu in the supergene zone.

The average rougher recovery of the primary zone samples was 94.9%, with an average copper grade of 3.7%, whilst the supergene rougher recovery was 92.5%, and the copper grade in the rougher concentrate was 5.6%. The enrichment ratios (ERs) for the primary and the supergene zones were 8.3 and 7.4 respectively.

When evaluating the flotation response (recovery and ER) of the two zones, the variability testwork report showed that the flotation efficiency of the primary zone sample was better than that of the supergene zone sample in the rougher stage.

The average of the overall flotation recovery and concentrate copper grade for primary zone samples was 84.5% and 27.1% Cu, respectively. The testwork on the supergene zone samples shows average overall flotation recovery and concentrate copper grade of 79.8% and 30.7% Cu, respectively.

To have a better understanding of the overall flotation efficiency, the overall ER and recovery for both samples were compared. In this regard, the testwork results of the primary zone samples show 84.5% recovery and a 60.8 ER, whereas for the supergene material the average recovery is 79.8% and with an ER of 40.4. Therefore, the flotation efficiency of the primary zone material is better than that of the supergene material, which is a result of the combination of differences in mineralogy, flotation conditions and particle size distribution.

[7] Metallurgical Investigation No. 9247-69, Minera Andes Incorporated Los Azules Copper Project, Flotation variability and optimization

Determination of the mineralogy and grade variation effects on the flotation performance is the main aim of a variability testwork program. Based on the samples assay data available for the study, the variation of the valuable minerals is not completely defined as only the assays of iron, copper, gold and silver were reported. It was observed, however, that the predominant copper minerals in the primary zone are chalcopyrite and bornite with minor amounts of native copper and native iron/copper alloy and in the supergene zone the same copper minerals plus chalcocite are found.

Flotation conditions were determined through the optimization testwork and the optimum flotation conditions so derived were used in the variability tests.

Table 13-3: Head Assays for Variability Tests

	Sample	CHP	Ag g/t	Au g/t	Cu %	Fe %
Primary	AZ1047	9247	1.8	0.04	0.4	1.6
	AZ1053A	9248	0.6	0.03	0.4	1.4
	AZ1057	9249	0.6	0.08	0.4	1.3
	AZ1059	9250	3	0.14	0.5	1.6
	AZ1060A	9251	<0.6	0.07	0.4	1.7
	AZ1061A	9252	1.2	0.08	0.5	2.6
	AZ1062	9253	0.7	0.04	0.2	1.5
	AZ1064A	9254	3.3	0.13	0.5	2.7
	AZ1168	9255	3.6	0.21	0.9	2
	AZ1170	9256	<0.6	0.17	0.3	1.5
	Average		**1.9**	**0.1**	**0.4**	**1.8**
Supergene	AZ1056	9257	0.6	0.05	0.8	2.1
	AZ1173	9258	<0.6	0.03	0.4	3.1
	AZ1047	9259	3	0.04	0.6	1.2
	AZ1053A	9260	2.4	0.16	1.3	2.1
	AZ1054	9261	1.2	0.02	0.6	1.7
	AZ1057	9262	0.6	0.09	0.4	2.1
	AZ1059	9263	2.4	0.18	0.6	2.2
	AZ1060A	9264	<0.6	0.03	0.4	1.9
	AZ1061A	9265	<0.6	0.07	1.3	1
	AZ1062	9266	0.6	0.09	1.9	1.2
	AZ1064A	9267	<0.6	0.05	0.4	2.8
	AZ 1068	9268	<0.6	0.05	0.5	1
	AZ 1170	9269	0.6	0.05	0.7	1.6
	Average		**1.4**	**0.07**	**0.7**	**1.8**

13.4 Size by Size Distribution of Copper

Table 13-4 summarizes the distribution of copper in different size fractions. As indicated by Mineral Liberation Analysis[8], most of the copper losses in the rougher tailings occur in the form of native copper and native iron-copper alloy and are caused by locking, encapsulation

[8] Metallurgical Investigation No. 9247-69, Minera Andes Incorporated Los Azules Copper Project, Flotation variability and optimization.

in silica and surface tarnishing. The addition of sulphidizing reagents during flotation has not been tested and may provide an opportunity to improve native copper flotation.

Table 13-4 also demonstrates that the maximum copper loss occurs in the fine fraction (minus 45 µm). Decreasing the amount of the ground material in the fine particle size fraction, whilst still maintaining a fine enough top size for good liberation, will improve the overall rougher recovery.

13.5 Grind Size and Flotation Efficiency

Increasing, or coarsening, the grind size shows a decrease in the overall flotation recovery of both the primary and supergene samples. However, increasing the grind size improves the enrichment ratio in both types of samples and the final concentrate contains a higher copper grade. In coarse particle flotation the amount of entrained gangue in the concentrate normally decreases. Figure 13-3 shows the correlations of recovery and enrichment ratio with grind size. Based on the recovery and enrichment ratio correlations with the grind size, a P_{80} of 175 µm is the optimum grind size for the primary and supergene ores. The concentrate regrind size in cleaner flotation did not show a significant effect on the recovery but the enrichment ratio decreased by increasing the grind size in the primary ore samples. Therefore, a P_{80} of 25 µm is likely the optimum grind size to maximize the flotation efficiency.

Table 13-4: Copper Distribution in Rougher Tails of Samples

Primary zone						**Supergene zone**				
Grind Size P80 microns						**Grind Size P80 microns**				
Sample	**150µm**	**75 µm**	**45 µm**	**-45 µm**		**Sample**	**150µm**	**75 µm**	**45 µm**	**-45 µm**
9247	55.8	17	9.8	17.3		9257	16.6	6.9	5.5	71.1
9248	5.8	31.5	17.7	44.9		9258	11.3	15	16.2	57.6
9249	24.3	12.9	11	51.9		9259	42.6	26.8	6.9	23.7
9250	48.1	7	20.5	24.4		9260	21.3	14.6	16.1	48
9251	9.4	11.7	9	69.9		9261	30.5	18.4	7.3	43.8
9252	46.5	20.1	7.6	25.8		9262	7.1	4.9	8.7	79.3
9253	24.4	14.4	13.4	47.7		9263	62.8	6.6	7.1	23.5
9254	17.6	17.7	9.9	54.9		9264	27.6	12.5	5.7	54.2
9255	33	10.3	7	49.7		9265	17.2	14.3	8.1	60.4
9256	29.8	14.3	7	48.9		9266	34.4	12.3	7.8	45.4
Average	**29.5**	**15.7**	**11.3**	**43.5**		9267	5.5	2.8	13.9	77.7
						9268	14	9.9	8	68.2
						9269	24.7	2.5	14.5	58.3
						Average	**24.3**	**11.3**	**9.7**	**54.7**

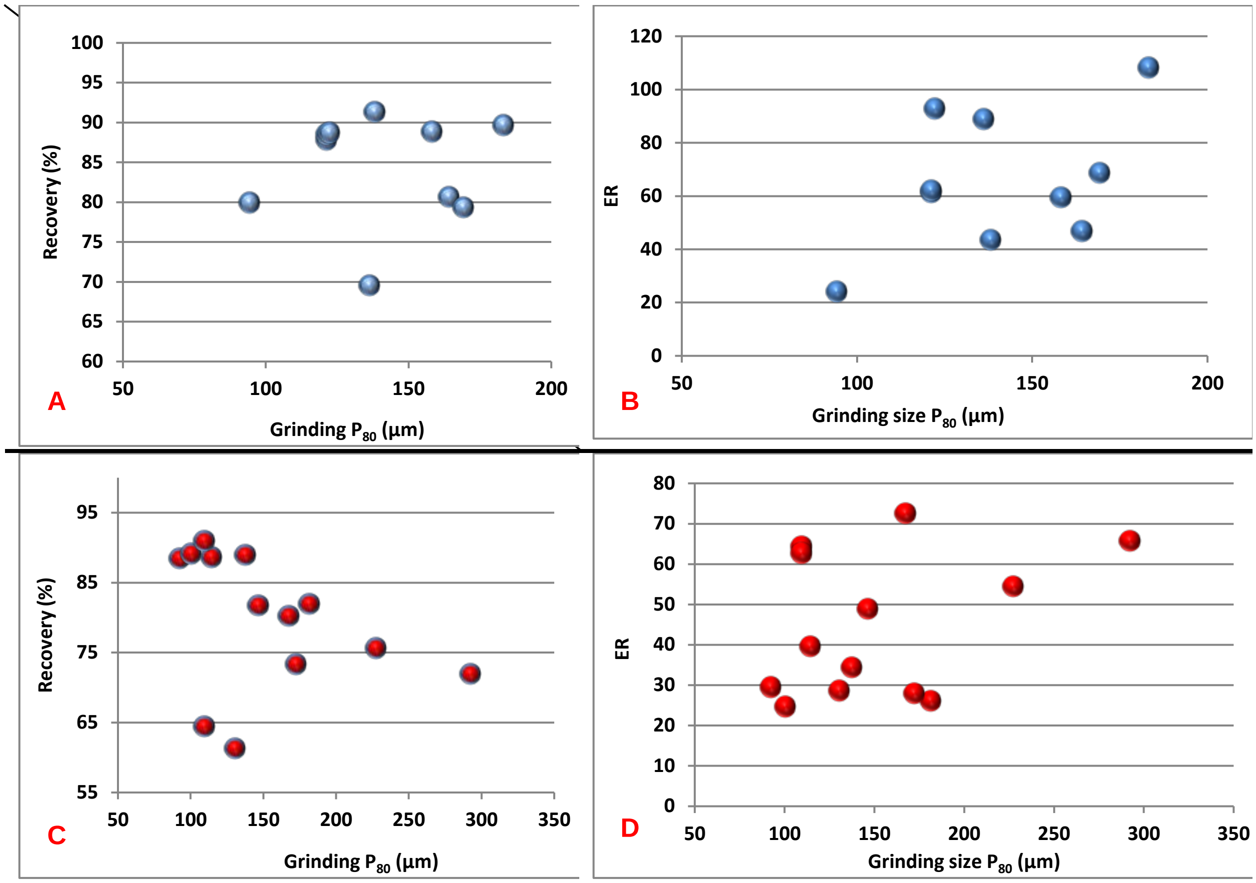


Figure 13-3:
A) Grind Size and Recovery of the Primary Samples,
B) Grind size and ER of the Primary Samples,
C) Grind Size and Recovery of the Supergene Samples,
D) Grind Size and ER of the Supergene Samples

13.6 Coarse Ore Flotation Testwork

An investigation into coarse ore flotation was carried out by SGS Lakefield laboratories in the summer of 2016. Based on the overall life of mine plan tonnages, a blend of 45% from the primary zone and 55% from the supergene zone was tested. The flotation conditions were selected based on the optimum flotation conditions determined from the previously reported tests on the primary and supergene samples. In this regards, the following reagents were selected for the coarse flotation tests: lime as a modifier, A-3477, Flexon 715 and SIBX as collectors and F-150 as frother and the overall flotation retention time was 19 min for the kinetic tests. Figure 13-4 shows neither a fine (92 µm) nor a coarse grind size (262 µm) provide the optimum metallurgical performance. Instead, the medium grind size (134 µm) demonstrates better metallurgical results.

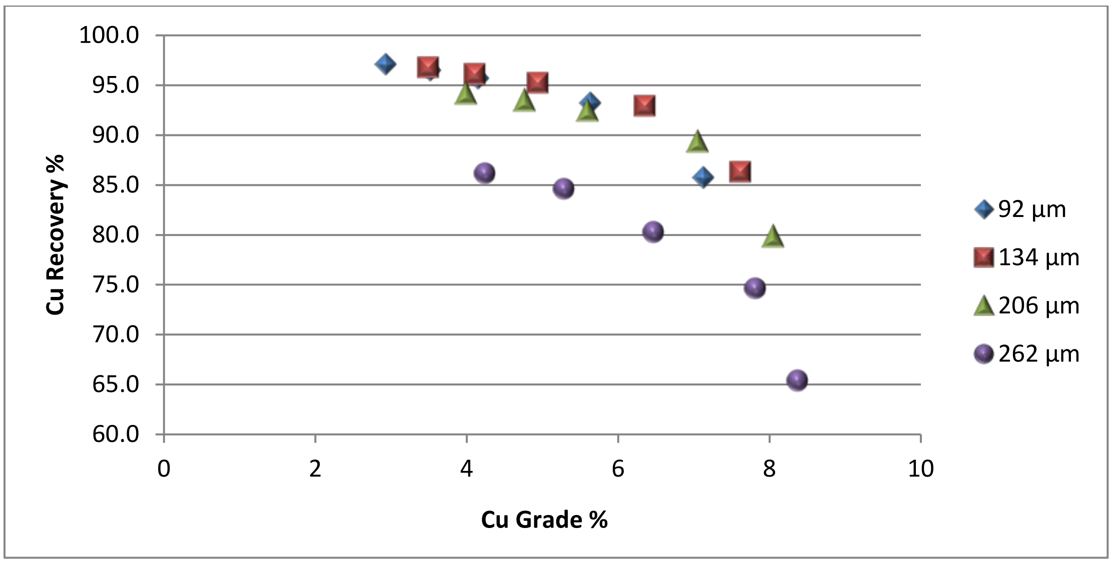


Figure 13-4: Grade-Recovery Curve as a Function of Flotation Feed Particle Size

On the other hand, Table 13-5 demonstrates that increasing the grind size from 125 µm to 206 µm decreases the rougher mass pull by 25% and increases the rougher concentrate grade from 4.49% to 4.76% after 10 minutes of flotation. Copper recovery decreases by 2.7%.

Table 13-5: A Summary of Mass Pull, Grade and Recovery of the Copper Concentrate

	Grind size (µm)						
	92	**125**	**134**	**150**	**175**	**206**	**262**
Mass pull %	16.2	14.2	13.7	13.1	12.3	11.4	9.4
Copper Conc. Grade %	3.51	3.97	4.10	4.24	4.47	4.76	5.27
Copper Recovery%	96.5	96.2	96.1	95.5	94.6	93.5	84.6

An optimum therefore exists based on capital and operational cost savings versus reduced recovery at coarser grind sizes. A preliminary trade-off study was conducted which recommended a 175 µm grind size as it allows for smaller equipment sizes without a drastic loss in overall recovery.

Figure 13-5 shows the rate of recovery of the sulphide minerals (chalcopyrite, bornite and chalcocite) increases as the grind size increases. However, the copper recovery decreases as a result of losing the locked, unliberated copper. Because of this, improving sulphide mineral recovery through coarse flotation does not result in an increase in copper recovery. Figure 13-6 presents the results of kinetic testwork on four grind sizes.

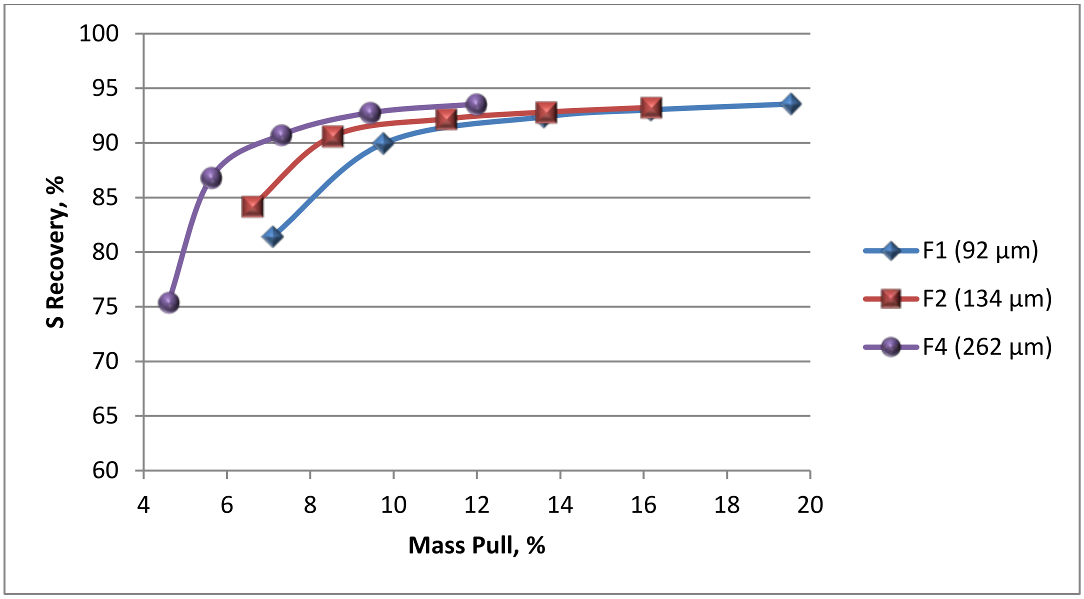


Figure 13-5: Sulphur Recovery Variations in Four Grind Sizes

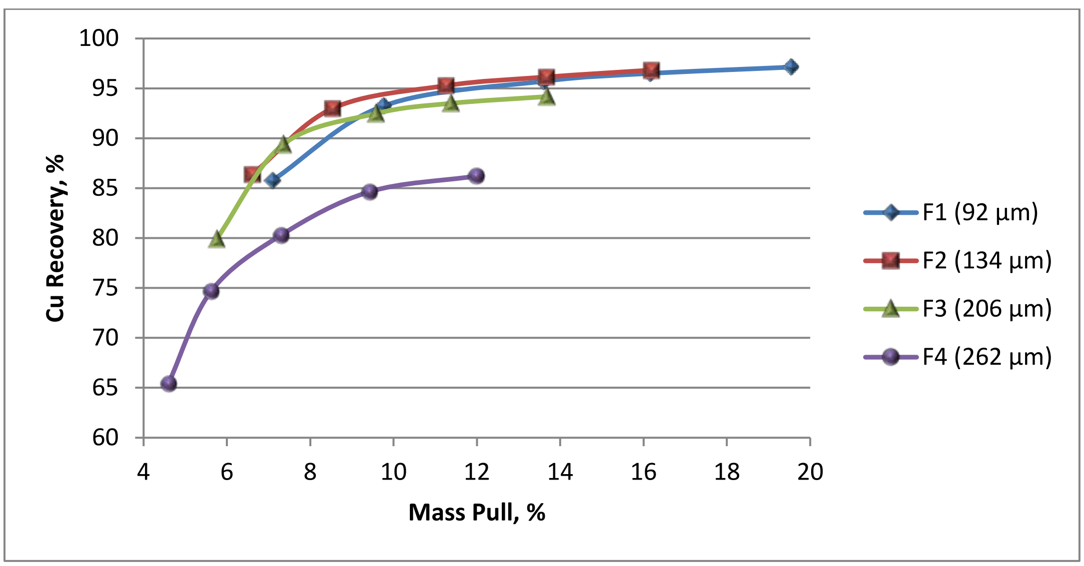


Figure 13-6: Copper Recovery Variations for Four Grind Sizes

14. Mineral Resource Estimates

This section was prepared by R. Sim, P. Geo, SIM Geological Inc, and B. Davis, FAusIMM, BD Resource Consulting Inc., unless otherwise noted.

14.1 Introduction

This mineral resource estimate was prepared under the direction of Robert Sim, PGeo, of SIM Geological Inc., with the assistance of Bruce Davis, PhD, FAusIMM, of BD Resource Consulting Inc. Mr. Sim is the independent Qualified Person (QP) within the requirements of the Canadian Securities Administrators' National Instrument 43-101 (NI 43-101) for the purposes of mineral resource estimates contained in this report.

This section of the technical report describes the resource estimation methodology and summarizes the key assumptions considered by SIM Geological Inc. to prepare the resource model for the copper, gold, molybdenum and silver mineralization at the Los Azules project. This is an update of mineral resource estimates for the Los Azules project based on drilling results and sample data provided by McEwen Mining Inc. (McEwen Mining) on June 3, 2017 and includes data from the 2017 infill drilling campaign. The previous resource estimate was generated in August 2013 and presented in a technical report dated November 1, 2013.

In the opinion of the Qualified Person, the resource evaluation reported herein is a reasonable representation of the mineralization found at the Los Azules project at the current level of sampling. The mineral resource has been estimated in conformity with generally accepted CIM *Estimation of Mineral Resource and Mineral Reserves Best Practices Guidelines* (November 23, 2003) and is reported in accordance with the Canadian Securities Administrators' NI 43-101. Mineral resources are not mineral reserves, and they do not have demonstrated economic viability. There is no certainty that all or any part of the mineral resource will be converted into a mineral reserve upon application of modifying factors.

Estimations are made from 3D block models based on geostatistical applications using commercial mine planning software (MineSight® v12.0). The project limits are based in the UTM coordinate system using a nominal block size of 20 x 20 x 15 m (L x W x H). The majority of drilling was conducted using vertical holes, with the exception of a few rare-angled holes in areas where surface access wasn't possible. Drill holes are generally spaced between 150 m and 400 m intervals over the main area of the resource; the resource measures approximately 4,000 m north-south by 1,500 m west-east. A geologic interpretation of pertinent domains was conducted using a series of vertical west-east-oriented cross sections spaced at 150 m intervals throughout the deposit.

The resource estimate was generated using drill hole sample assay results and the interpretation of a geologic model that relates to the spatial distribution of copper, gold, molybdenum and silver in the deposit. Interpolation characteristics were defined based on the geology, drill hole spacing and geostatistical analysis of the data. In addition to elements listed here, a series of other elements were estimated in the resource model; these include zinc, lead, sulphur and arsenic. The resources were classified according to their proximity to copper sample data locations and were reported, as required by NI 43-101, according to the CIM *Definition Standards for Mineral Resources and Mineral Reserves* (May, 2014).

14.2 Available Data

On June 3, 2017, McEwen Mining provided the drill hole database in an MS Excel® spreadsheet file that contained collar data, assay results, geologic information and geotechnical data for 17 drill holes completed during the 2017 program. Fourteen of these are delineation holes targeting the Los Azules deposit, two holes test the geotechnical conditions of a potential tailings dam site located 6 km west of Los Azules and one hole was completed to evaluate the characteristics of the near-surface pre-strip material overlying the deposit. The data for these newer drill holes were formatted and appended to the previous MineSight® database. The location of the new drill holes, in relation to previous drilling, is shown in Figure 14-1. The majority of the new drill holes are located on the central and northern part of the deposit. The objective of the 2017 program was to test areas where gaps existed in the drilling pattern, and, ultimately, upgrade several zones of previously determined Inferred mineral resources to the Indicated category.

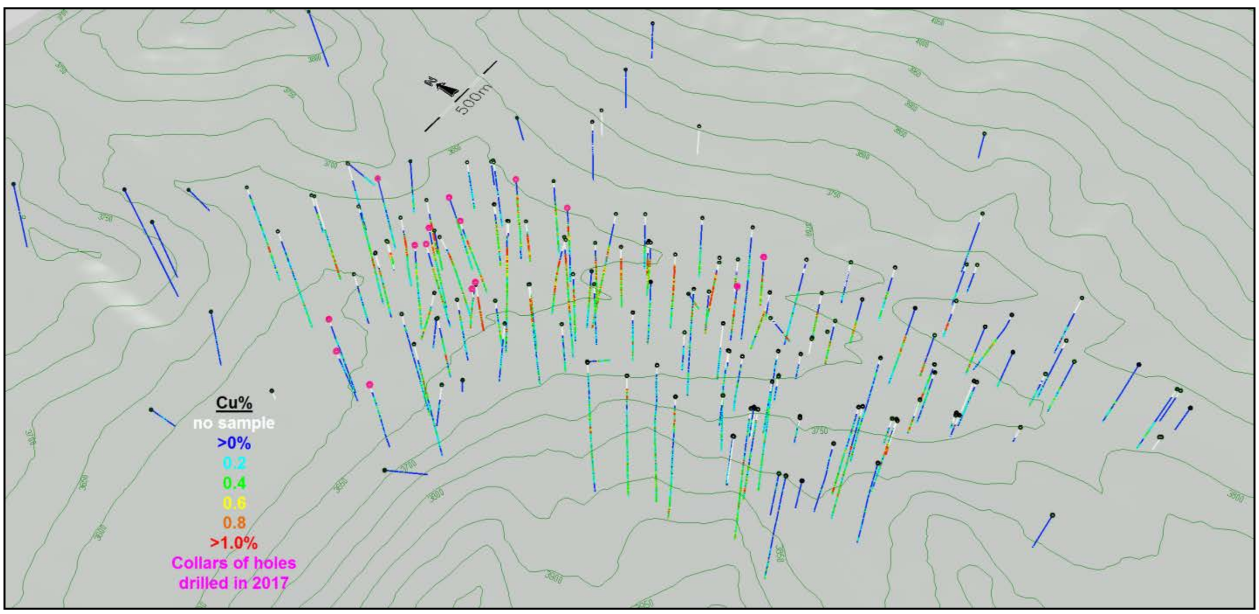


Figure 14-1: Isometric View Showing Copper Grades and Location of New Drill Holes (Sim, 2017)

There are a total of 202 drill holes in the database with a total length of 65,987 m. Twenty holes in the database have no sample results because either problems were encountered during drilling and they had to be terminated and re-drilled, or they were drilled for geotechnical or condemnation purposes. Twenty-four holes in the database were exploratory in nature and tested for satellite deposits. Therefore, there are a total of 158 drill holes located in the vicinity of the Los Azules deposit and the sampling results and geologic information from these holes have been used to generate the resource model. Figure 14-1 shows the distribution of these drill holes.

There are 28 rotary (RC) holes in the database that were drilled before McEwen Mining was involved in the project. Only five of these holes are located in the main mineralized area of the deposit. The geologic and assay results from these RC holes are similar to proximal core holes and, as a result, they were included in the development of the resource model, without modifications or adjustments.

Drill holes are spaced at intervals of between 150 m and 400 m. Since 2009, efforts have been made to delineate the deposit on a nominal 150 m grid. This was hampered by local topography and the presence of a series of vegas (small wetlands) in the northern area of the deposit. The majority of holes are vertically oriented, but some are inclined at angles between -82° and -50°, with various azimuths. There is no apparent difference in the results encountered in vertical versus inclined drill holes.

There are 30,675 individual samples in the database with sample intervals that range between 0.1 m and 12.55 m long, with an average length of 1.83 m. Since 2010, McEwen Mining has standardized samples over 2 m intervals, except where dictated by geologic contacts. A full 40-element assay suite was run during a recent drilling program and includes: copper, gold, silver, arsenic, molybdenum, lead, zinc and sulphur; previous programs analyzed only select elements. Several of these elements (i.e., arsenic, lead, zinc and sulphur) have not been verified with certified standards, but they were included in the resource model to provide additional insight into the nature of the deposit.

Portions of 137 drill holes have also been analyzed for sequential copper concentrations. The cyanide-soluble copper grades provide useful information to locate the base of the supergene horizon. Acid-soluble copper percent and cyanide-soluble copper percent grades have not been validated with a QA/QC program.

The sample results that were originally defined as below the detection limit in the database (total copper < 0.01) were entered at one-half the detection limit value.

A basic statistical summary of assay data information is shown in Table 14-1.

Table 14-1: Summary of Assay Data

Element	Samples	Total Length (m)	Minimum	Maximum	Mean	Standard Deviation
Copper (%)	30,675	56,382	0.00	12.89	0.28	0.36
Gold (g/t)	30,610	56,250	0.00	9.630	0.046	0.143
Silver (g/t)	30,533	56,019	0.05	954.04	1.54	6.02
Molybdenum (%)	30,677	56,382	0.00	0.379	0.003	0.007
Arsenic (%)	30,534	56,020	0.00	1.343	0.009	0.026
Lead (%)	29,615	54,187	0.00	7.52	0.01	0.06
Zinc (%)	29,615	54,187	0.00	25.20	0.03	0.17
AS Copper (%)	19,672	39,714	0.00	0.94	0.03	0.04
CS Copper (%)	19,672	39,714	0.00	7.15	0.14	0.26
Sulphur (%)	11,704	23,647	0.01	18.40	1.00	1.14

Locally, drill hole recoveries were poor due to blocky ground conditions that are common in the area. The average core recovery for the sample intervals in the supergene and primary zones is 88%, with approximately only 6% of sample intervals with recoveries below 50%.

There is no correlation between copper grade and recovery. There have been no adjustments to or exclusions of data in relation to recoveries prior to block grade estimations.

The geologic information is derived from observations during logging and includes lithology, alteration type and mineral zone (MinZone) type.

14.3 Geologic Model, Domains and Coding

Geology at Los Azules comprises Mesozoic volcanic rocks intruded by a Miocene diorite stock which is intruded by a sub-parallel suite of diorite-dacite dikes along a major north-northwest-striking fault zone. Porphyry copper-style mineralization and hydrothermal alteration are spatially, temporally and genetically related to the dikes followed by some remobilization of the higher, near surface, mineralization. In many respects, the Los Azules deposit is a classic, Andean-style porphyry copper deposit. Mineralization consists of pyrite, chalcopyrite and bornite in the primary or hypogene zone, and secondary chalcocite with subsidiary covellite in the secondary or supergene enrichment blanket that overlies the hypogene mineralization.

The supergene enrichment zone was produced by the circulation of acidic, meteoric waters that were created by the breakdown of pyrite. These acidic solutions circulated through the upper oxidized portions of the original deposit leaching out the copper; the copper was re-deposited at lower levels, superimposed on and replacing the original hypogene mineralization. The secondary enrichment zone underlies a barren leached zone, and the primary hypogene mineralization is present below the secondary enrichment zone.

Separate domains have been interpreted for Overburden (OVB), Leach (LX), Supergene (SS) and Primary (PR) zones using a combination of mineral-zone logging (i.e., a visual observation of enrichment minerals, such as chalcocite and/or covellite) and assay grades. In many areas, the base of the SS is defined by intervals with greater than 50% cyanide-soluble copper; the ratio of cyanide-soluble copper (CSCu) divided by total copper (CuT) is expressed as a percentage. Soluble copper assay data are not present in all drill holes, and, in these cases, visual observation information is used. The distribution of the overburden, leach, supergene and primary zone domains are shown in Figure 14-2, Figure 14-3, and Figure 14-4.

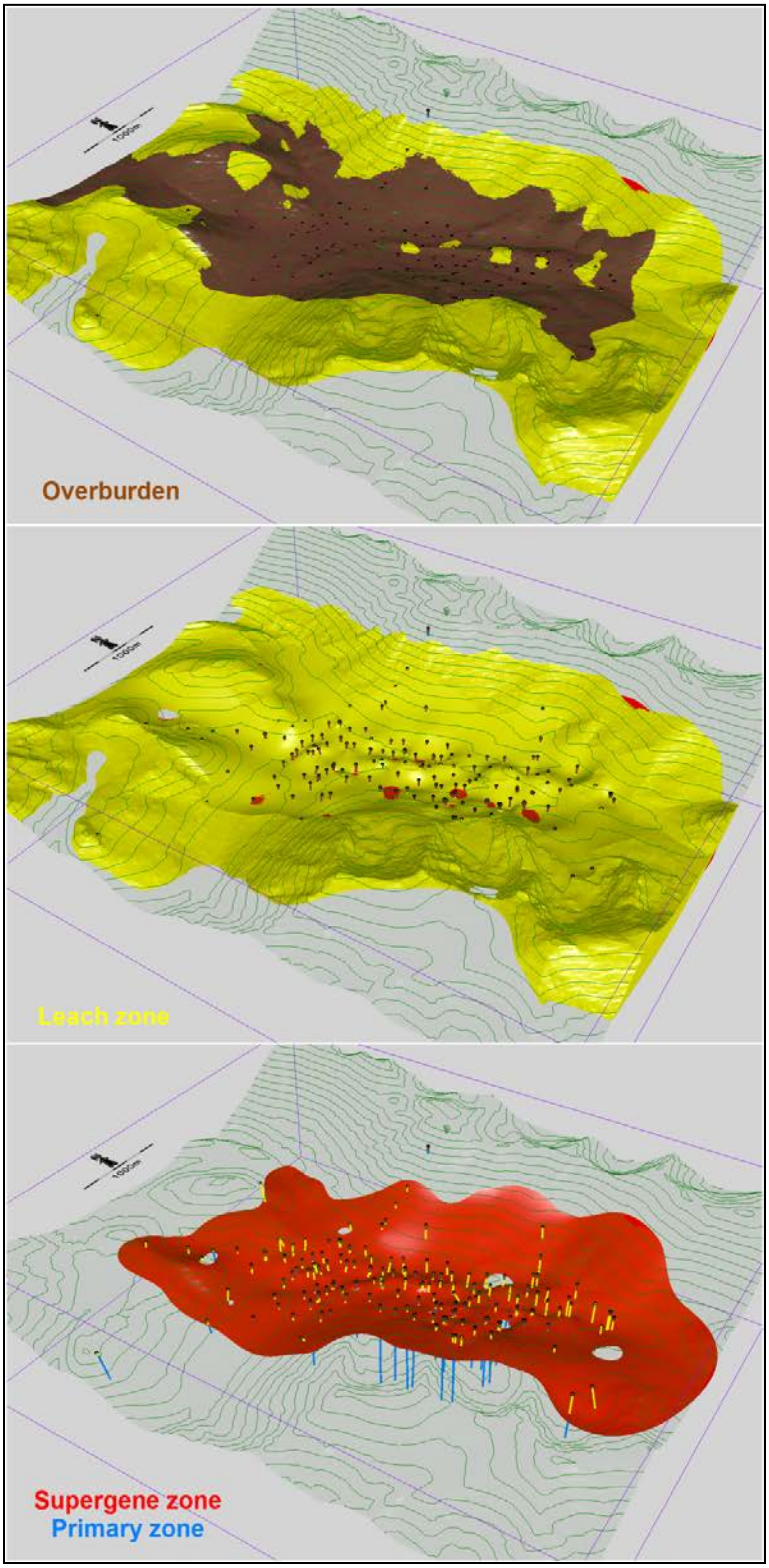


Figure 14-2: Distribution of MinZone Domains (Sim, 2017)

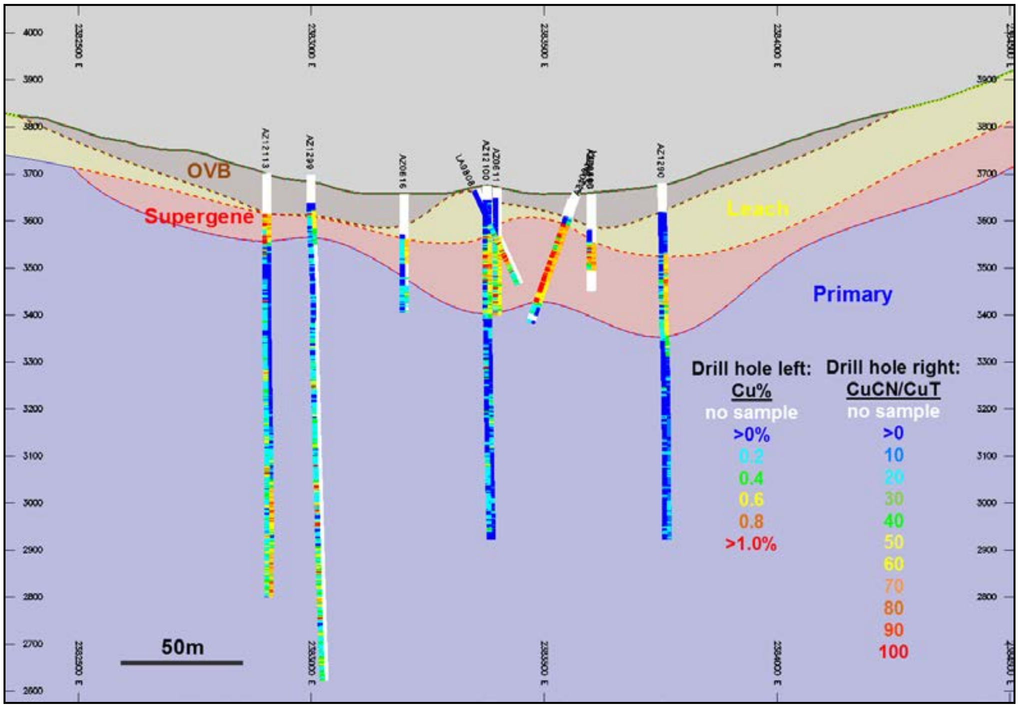


Figure 14-3: Vertical Cross Section 6559050N Showing Copper Grade, Ratio Cyanide-Soluble Copper and MinZone Domains (Sim, 2017)

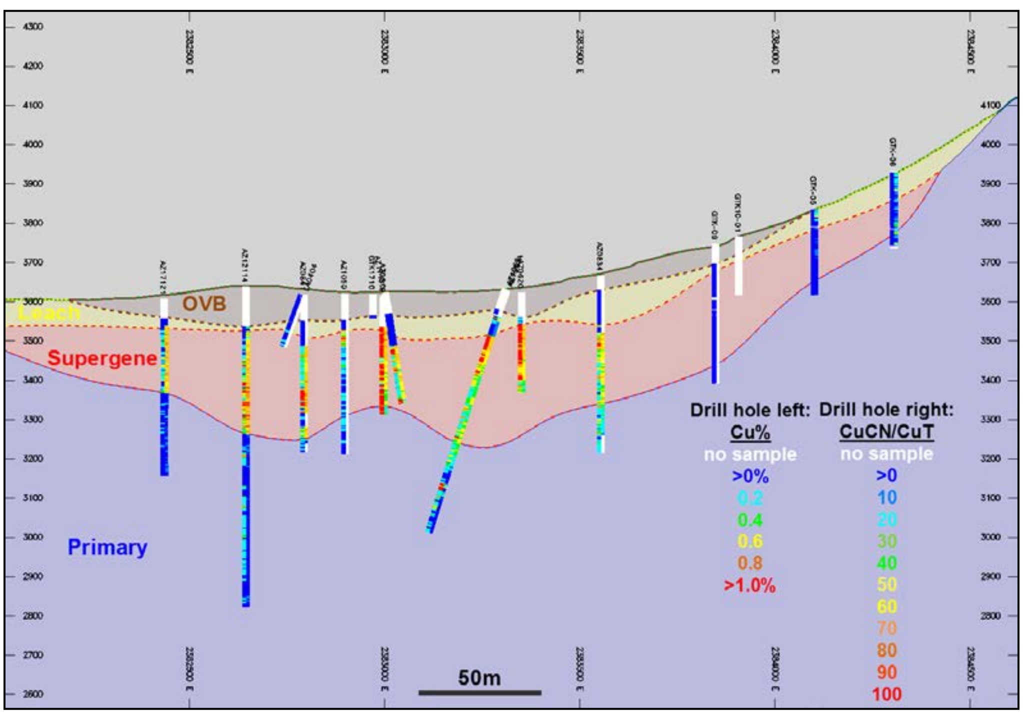


Figure 14-4: Vertical Cross Section 6559800N Showing Copper Grade, Ratio Cyanide-Soluble Copper and MinZone Domains (Sim, 2017)

The OVB zone is thickest in the valley floor and thinnest where the slopes steepen to the west and east. The OVB zone thicknesses are variable and peak at 100 m in some locations, with an average thickness of approximately 60 m above the area of the deposit containing significant copper mineralization. The LX zone is also locally variable in thickness, from non-existent in some drill holes to almost 200 m in others, with an average thickness of approximately 40 m above the deposit. The underlying SS zone is also somewhat variable in thickness from zero to over 250 m, with an average thickness of approximately 70 m. At the northern end of the deposit, visible chalcocite is present to depths of almost 600 m below surface. This deeper, secondary-type mineralization is patchy in nature and may be the result of remobilization along structural features, or it may be primary in nature.

McEwen Mining geologists also produced 3D wireframe domains representing the interpretation of the lithologic units at Los Azules. Figure 14-5 shows the shape and location of two intrusive phases: a rhyodacite porphyry intrusion believed to be related to initial high-grade primary mineralization and a dacite porphyry representing a later-stage that is generally associated with lower-grade areas of mineralization.

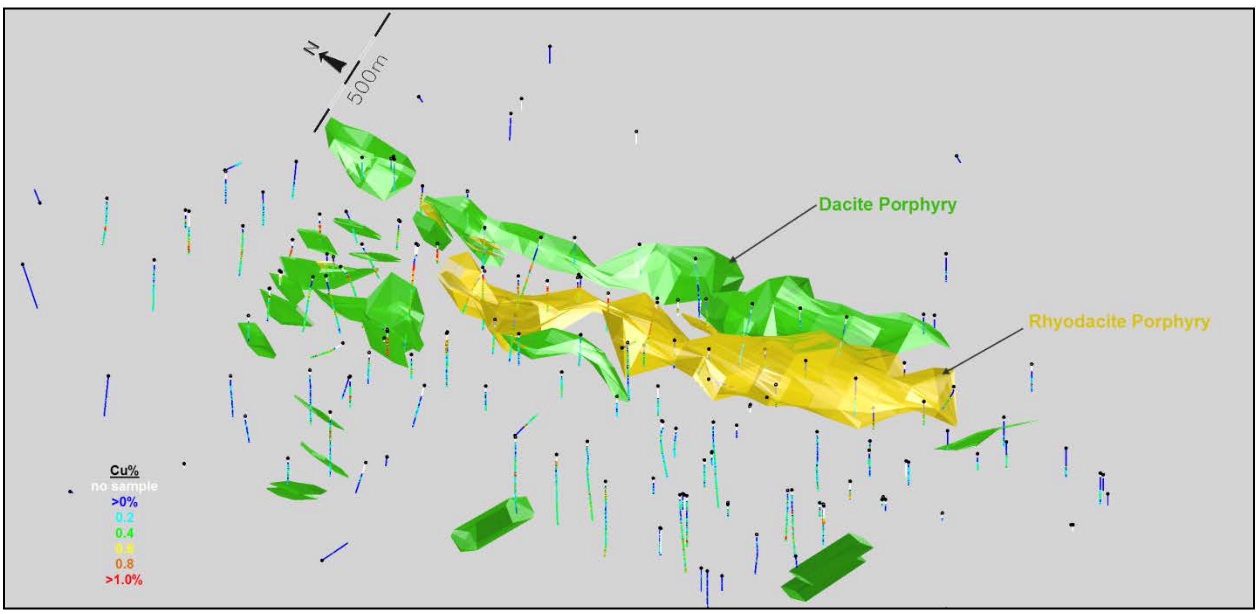


Figure 14-5: Isometric View of Intrusive Dacite and Rhyodacite Porphyries (Sim, 2017)

The distribution of the interpreted sericite and chlorite-sericite alteration domains shown in Figure 14-6 are similar in shape and location to the porphyritic phases shown in Figure 14-5. Other alteration domains include a deep pervasive potassic phase overlain by thick pervasive zone of chlorite alteration.

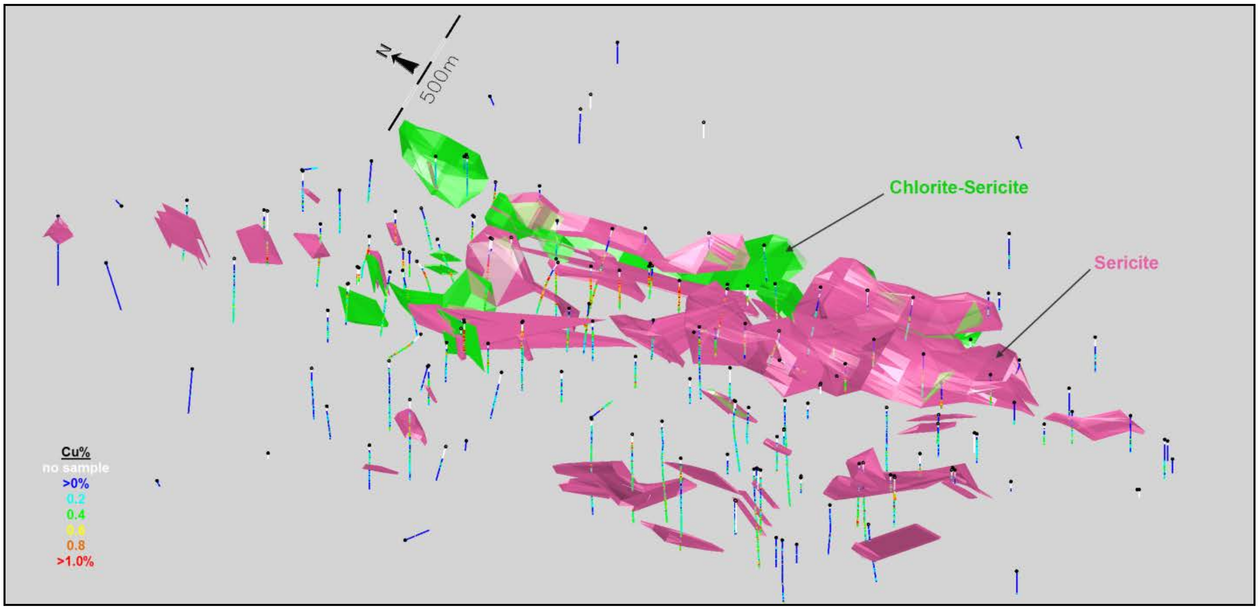


Figure 14-6: Isometric View of Sericite and Chlorite-Sericite Alteration Domains (Sim, 2017)

Finally, McEwen Mining geologists also interpreted zones of hydrothermal breccias that often contain magnetite. The distribution of these zones is shown in Figure 14-7.

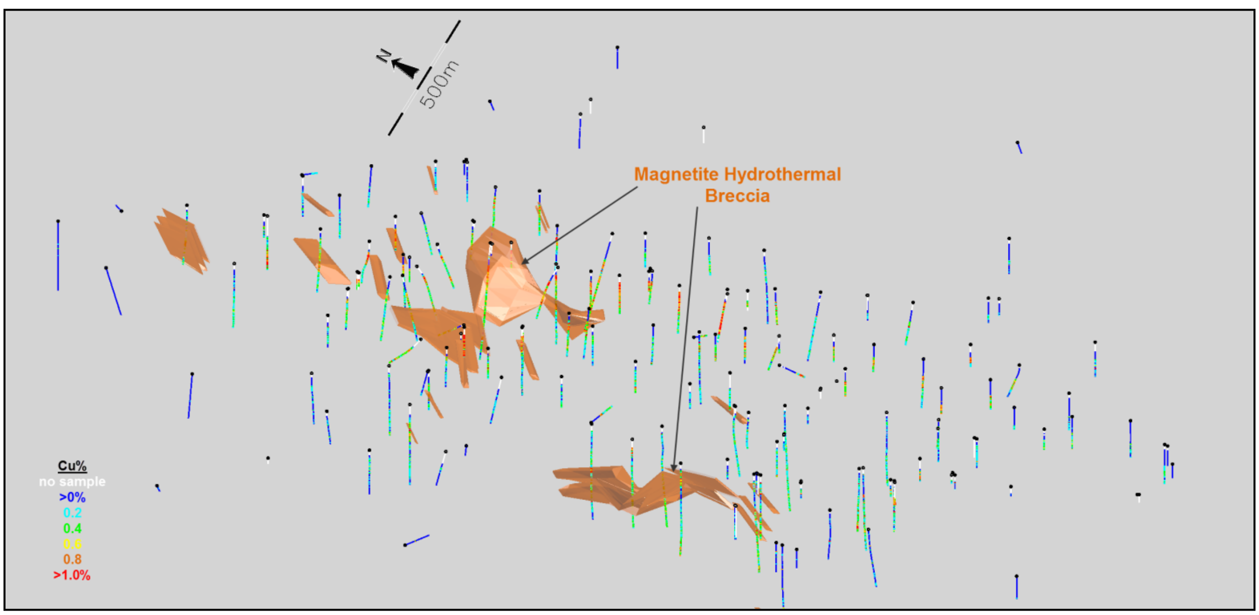


Figure 14-7: Isometric View of Magnetite Hydrothermal Breccias (Sim, 2017)

The various domains interpreted for the Los Azules deposit are listed in Table 14-2.

Table 14-2: Summary of Geologic Domains

Domain	Code	Comments
Mineral Zone		
Overburden (OVB)	1	Surface soil and gravels.
Leach (LX)	2	Rock in which the majority of sulfide mineralization has been leached.
Supergene (SS)	3	Zones where enrichment mineralogy is present (chalcocite and/or covellite); generally > 50% cyanide-soluble copper.
Primary (PR)	4	Hypogene sulfide mineralogy (pyrite, chalcopyrite and bornite).
Lithology		
Diorite	101	Original volcanic host rocks.
Dacite Porphyry	102	Later stage low-grade porphyry.
Rhyodacite Porphyry	103	Early porphyry responsible for higher-grade primary porphyry mineralization.
Alteration		
Chlorite	201	Pervasive upper chlorite alteration.
Potassic	202	Pervasive deeper biotite alteration.
Sericite	203	Sericite zones related to porphyry intrusions.
Chlorite/Sericite	204	Related to porphyry intrusions.
Structure		
Mag. Hydrothermal Breccia	301	Zones of hydrothermal breccias with magnetite.
No Breccia	302	No breccias evident.

14.4 Compositing

Compositing the drill hole samples helps standardize the database for further statistical evaluation. This step eliminates any effect that inconsistent sample lengths might have on the data.

To retain the original characteristics of the underlying data, a composite length was selected that reflects the average original sample length. The generation of longer composites can result in some degree of smoothing which could mask certain features of the data. Sample intervals are relatively small in the database. The average sample length in the whole database is 1.84 m, with 19% of samples exactly 1 m in length and 76% of samples taken at 2 m intervals. A standard 2 m composite sample length was generated for statistical evaluation and was used for grade estimations in the block model.

Drill hole composites are length-weighted and were generated down-the-hole; this means that composites begin at the top of each hole and are generated at 2 m intervals down the length of the hole. The contacts of the MinZone domains were honoured during compositing of drill holes. Several holes were randomly selected and the composited values were checked for accuracy. No errors were found.

14.5 Exploratory Data Analysis

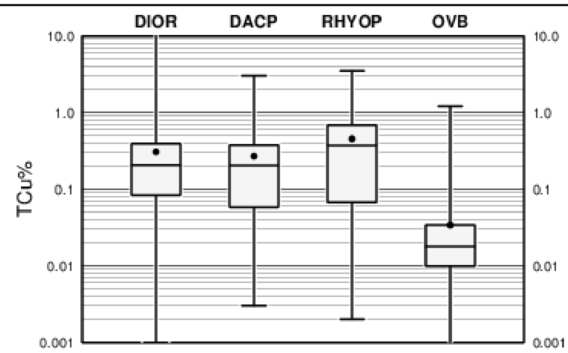
Exploratory data analysis (EDA) involves statistically summarizing the database to quantify the characteristics of the data. The main purpose of EDA is to determine if there is any evidence of spatial distinctions in grade; if this occurs, a separation and isolation of domains during interpolation may be necessary. An unwanted mixing of data is prevented by applying separate domains during interpolation: the result is a grade model that better reflects the unique properties of the deposit. However, applying domain boundaries in areas where the data are not statistically unique may impose a bias in the distribution of grades in the model.

A domain boundary, which segregates the data during interpolation, is typically applied if the average grade in one domain is significantly different from that of another domain. A boundary may also be applied when there is evidence that a significant change in the grade distribution exists across the contact.

14.5.1 Basic Statistics by Domain

The basic statistics for the distribution of copper, and all other elements included in the block model, were generated by lithology type, alteration type and MinZone type.

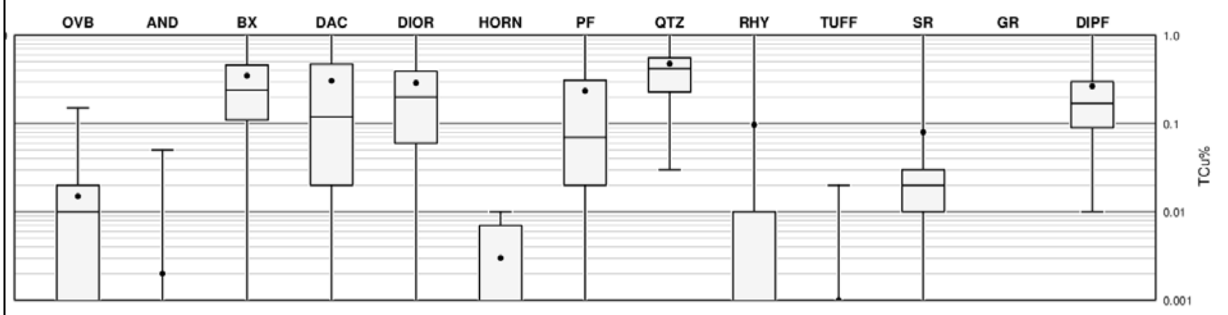
The distribution of total copper (TCu) by interpreted lithology domain, as shown in the boxplot in Figure 14-8, shows similar and overlapping grade distributions in all three lithology domains. Visual observations show that the distribution of copper grade is not distinctly controlled by the lithology domains. This feature is applicable to all elements included in the resource block model.



	DIOR	DACP	RHYOP	OVB	
Number of data	19239	2479	2555	262	Number of data
Mean	0.308	0.27	0.456	0.034	Mean
Variance	0.134	0.078	0.184	0.009	Variance
Skewness	5.569	2.509	1.423	10.091	Skewness
Coef of Variation	1.186	1.035	0.94	2.783	Coef of Variation
Maximum	12.886	3.038	3.523	1.21	Maximum
Upper quartile	0.398	0.38	0.692	0.034	Upper quartile
Median	0.207	0.205	0.376	0.018	Median
Lower quartile	0.084	0.058	0.067	0.01	Lower quartile
Minimum	0.001	0.003	0.002	0.0	Minimum

Figure 14-8: Boxplot of Copper by Lithology Domain (Sim, 2017)

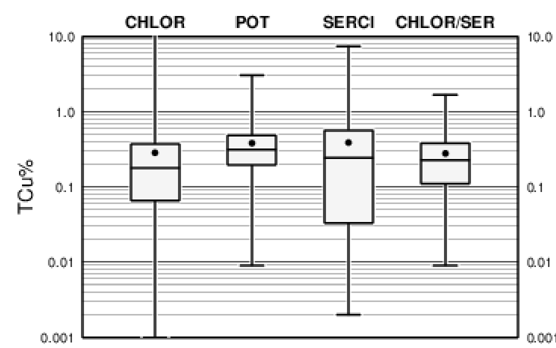
Figure 14-9 is a boxplot showing the distribution of copper by logged rock type. It shows similar copper contents in many rock types (i.e., breccias, dacite, diorite, feldspar porphyry, quartz and feldspar diorite porphyry), which is a further indication that mineralization does not occur in distinct rock units.



OVB	AND	BX	DAC	DIOR	HORN	PF	QTZ	RHY	TUFF	SR	GR	DIPF	
281	263	6009	1291	13537	23	3640	38	1002	68	137	54	1281	Number of data
0.015	0.002	0.349	0.305	0.289	0.003	0.235	0.477	0.097	0.001	0.08	0.0	0.265	Mean
0.0	0.0	0.16	0.153	0.117	0.0	0.14	0.129	0.057	0.0	0.029	0.0	0.096	Variance
2.013	4.518	3.839	1.633	6.438	1.089	3.526	1.566	2.604	3.585	3.834	0.0	3.537	Skewness
1.295	2.98	1.145	1.283	1.183	1.683	1.593	0.753	2.452	3.428	2.157	0.0	1.171	Coef of Variation
0.15	0.05	7.42	2.47	12.89	0.01	5.2	1.64	1.34	0.02	1.26	0.0	3.13	Maximum
0.02	0.0	0.46	0.471	0.39	0.007	0.31	0.554	0.01	0.0	0.03	0.0	0.3	Upper quartile
0.01	0.0	0.24	0.12	0.2	0.0	0.07	0.42	0.0	0.0	0.02	0.0	0.17	Median
0.0	0.0	0.11	0.02	0.06	0.0	0.02	0.228	0.0	0.0	0.01	0.0	0.09	Lower quartile
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.03	0.0	0.0	0.0	0.0	0.01	Minimum

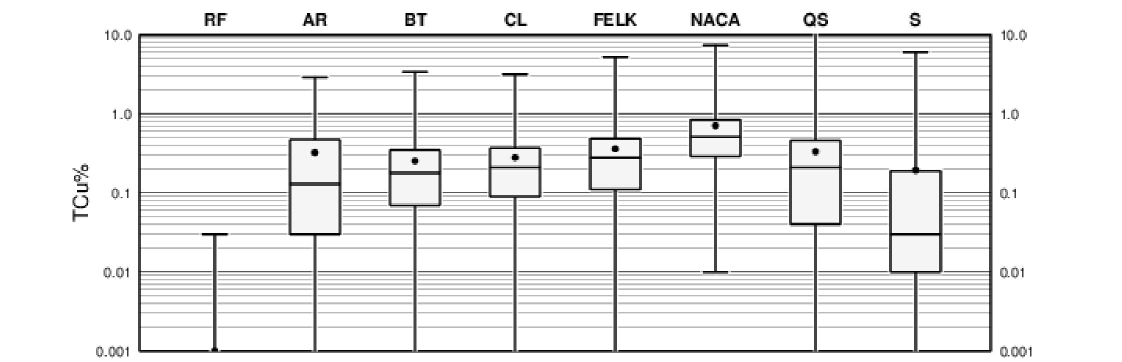
Figure 14-9: Boxplot of Copper by Logged Rock Type (Sim, 2017)

In the boxplot shown in Figure 14-10, the distribution of copper by alteration domain shows similar grade distributions in all alteration types. In the boxplot shown in Figure 14-11, a similar result is generated when comparing copper by logged alteration type, indicating that the distribution of copper is not controlled by alteration. Similar results were observed for all other elements included in the block model.



	CHLOR	POT	SERCI	CHLOR/SER	
Number of data	13886	4321	4240	1136	Number of data
Mean	0.286	0.384	0.391	0.28	Mean
Variance	0.127	0.087	0.231	0.05	Variance
Skewness	6.124	2.42	3.121	1.36	Skewness
Coef of Variation	1.248	0.768	1.23	0.796	Coef of Variation
Maximum	12.886	3.038	7.418	1.695	Maximum
Upper quartile	0.374	0.487	0.569	0.385	Upper quartile
Median	0.18	0.315	0.244	0.228	Median
Lower quartile	0.066	0.197	0.033	0.111	Lower quartile
Minimum	0.001	0.009	0.002	0.009	Minimum

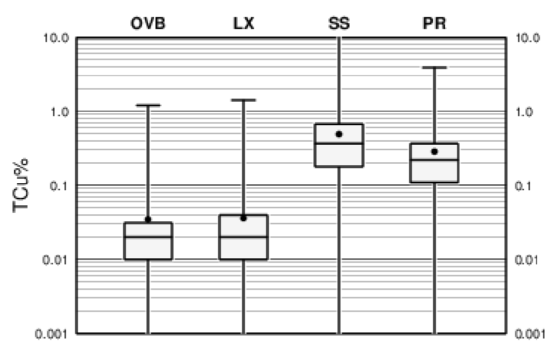
Figure 14-10: Boxplot of Copper by Alteration Domain (Sim 2017)



	RF	AR	BT	CL	FELK	NACA	QS	S
Number of data	707	626	7266	5031	1352	273	9010	2847
Mean	0.001	0.325	0.253	0.281	0.361	0.707	0.334	0.195
Variance	0.0	0.185	0.067	0.075	0.166	0.5	0.177	0.15
Skewness	4.456	2.04	2.473	2.725	4.33	4.062	5.277	4.048
Coef of Variation	3.937	1.323	1.023	0.977	1.128	1.001	1.26	1.98
Maximum	0.03	2.92	3.37	3.15	5.2	7.42	12.89	5.99
Upper quartile	0.0	0.47	0.35	0.37	0.49	0.842	0.46	0.19
Median	0.0	0.13	0.18	0.21	0.28	0.51	0.21	0.03
Lower quartile	0.0	0.03	0.07	0.09	0.11	0.29	0.04	0.01
Minimum	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.0

Figure 14-11: Boxplot of Copper by Logged Alteration Type (Sim, 2017)

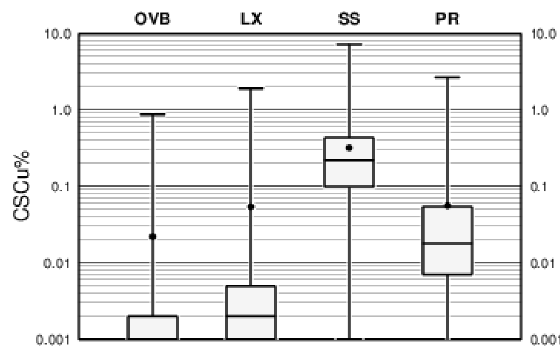
Figure 14-12 shows distinct differences in the distribution of copper by MinZone domain. The overburden and leach zones are essentially void of any significant copper mineralization. Copper grades are higher in the supergene domain compared to the primary zone, but there is quite a bit of overlap in these distributions suggesting that grades may be similar or transitional at the interface between these two domains.



	OVB	LX	SS	PR
Number of data	262	4518	7541	14017
Mean	0.035	0.036	0.494	0.285
Variance	0.009	0.003	0.227	0.078
Skewness	10.101	9.587	4.845	3.381
Coef of Variation	2.763	1.616	0.965	0.979
Maximum	1.21	1.42	12.89	3.93
Upper quartile	0.031	0.04	0.67	0.37
Median	0.02	0.02	0.37	0.22
Lower quartile	0.01	0.01	0.18	0.11
Minimum	0.0	0.0	0.0	0.0

Figure 14-12: Boxplot of Copper by MinZone Type (Sim, 2017)

Figure 14-13 shows the distribution of cyanide-soluble copper by MinZone domain. There is a distinct difference in the distribution of CSCu between the supergene and primary domains suggesting that these do represent areas with mineralization that is emplaced under different geologic conditions.



	OVB	LX	SS	PR
Number of data	200	1849	6667	10174
Mean	0.022	0.054	0.32	0.056
Variance	0.009	0.035	0.12	0.013
Skewness	5.841	5.107	3.661	6.201
Coef of Variation	4.178	3.461	1.081	2.015
Maximum	0.866	1.908	7.15	2.648
Upper quartile	0.002	0.005	0.43	0.054
Median	0.001	0.002	0.219	0.018
Lower quartile	0.001	0.001	0.098	0.007
Minimum	0.0	0.0	0.001	0.0

Figure 14-13: Boxplot of Cyanide-Soluble Copper by MinZone Type (Sim, 2017)

Additional boxplots by MinZone were generated for the other elements in the block model, and only sulphur was found to follow similar trends to those exhibited for total copper.

14.5.2 Contact Profiles

Contact profiles evaluate the nature of grade trends between two domains: they graphically display the average grades at increasing distances from the contact boundary. Those contact profiles that show a marked difference in grade across a domain boundary indicate that the two datasets should be isolated during interpolation. Conversely, if a more gradual change in grade occurs across a contact, the introduction of a hard boundary (e.g., segregation during interpolation) may result in a much different trend in the grade model; in this case, the change in grade between domains in the model is often more abrupt than the trends seen in the raw data. Finally, a flat contact profile indicates no grade changes across the boundary; in this case, hard or soft domain boundaries will produce similar results in the model.

Contact profiles were generated to evaluate the change in copper grade across the main MinZone domain boundaries. Figure 14-14 shows a distinct change in grade between the leach and supergene zone domains. There is a relatively distinct, but much less significant, drop in copper grades between the supergene and primary zone domains, as shown in Figure 14-15.

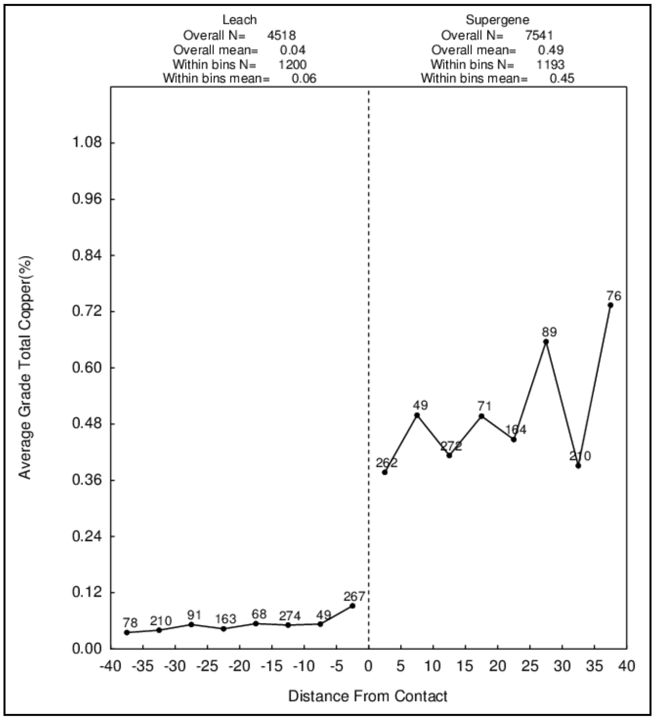


Figure 14-14: Contact Profile of Copper Between Leach and Supergene Domains (Sim, 2017)

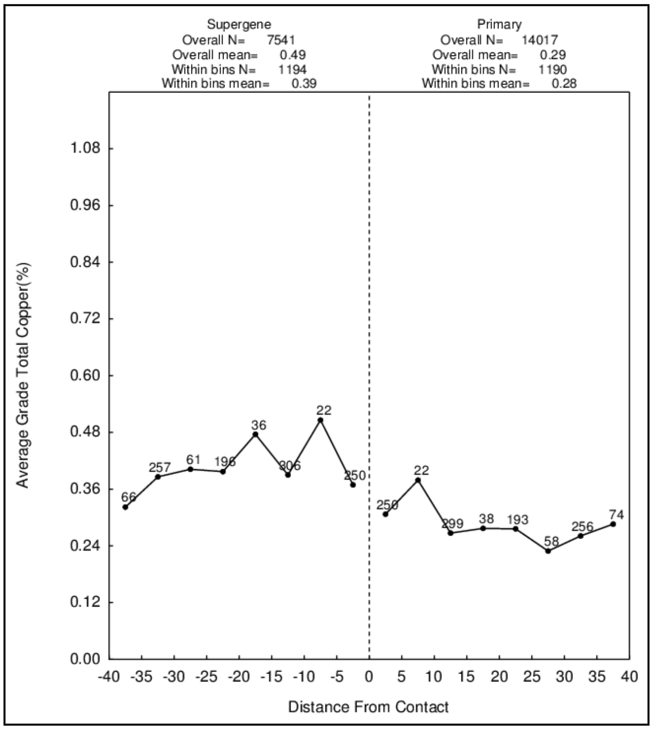


Figure 14-15: Contact Profile of Copper Between Supergene and Primary Domains (Sim, 2017)

Additional contact profiles were generated to evaluate the change in copper grades between the interpreted lithology domains. The results, shown in Figure 14-16, show either no changes or marginally transitional changes in copper grade across these contacts. These results indicate that lithology domains do not contain distinctly different distributions of copper.

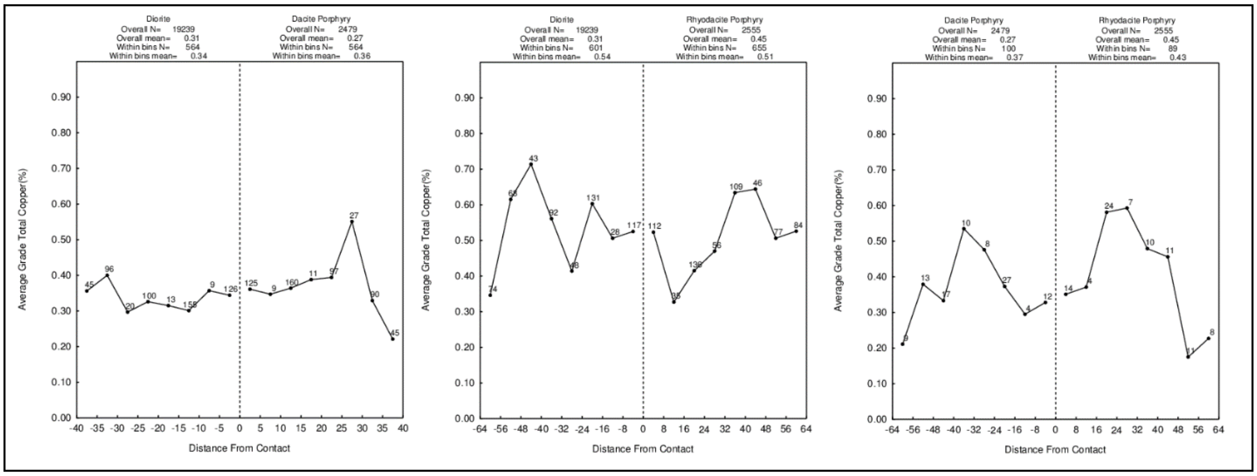


Figure 14-16: Contact Profiles of Copper Between Lithology Domains (Sim, 2017)

14.5.3 Conclusions and Modeling Implications

The EDA results indicate that there are no distinct properties in the distribution of copper based on the rock type or alteration facies. Although there is geologic evidence that the rhyodacite porphyry may be responsible for the emplacement of higher grade copper mineralization in the southern part of the deposit, this mineralization tends to occur both inside the porphyritic unit and also in the surrounding dioritic host rocks. The original copper mineralization has then been partially leached and remobilized in the supergene zone domain that we see today. The distribution of the chlorite-sericite and sericite alteration generally reflects the shape and location of the rhyodacite porphyry and, as a result, these alteration domains exhibit slightly elevated copper grades, but these are subtle differences and not considered distinct with respect to the distribution of copper in the deposit.

There are significant differences in the distribution of copper between the leach and supergene zone domains. Differences in the distribution of copper between supergene and primary zone domains are not as apparent, but are locally very apparent within the deposit; as a result, all MinZone domains are segregated during estimations of copper distribution in the block model. Similar hard boundary limitations are applied during estimations for sulphur. All other modeled elements do not show distinct distributions by domain and, as a result, limitations were not required during modeling.

The interpolation domains for copper are summarized in Table 14-3.

Table 14-3: Summary of Interpolation Domains

Element	Domain Application
Copper	LX, SS and PR hard boundary domains
Sulphur, ASCu and CSCu	LX, SS and PR hard boundary domains
Au, Ag, Mo, As, Pb and Zn	No internal domains required

14.6 Bulk Density Data

Measurements for bulk density were conducted by McEwen Mining on a series of drill core samples using the water displacement method. Solid pieces of drill core, measuring between 10 cm and 15 cm in length, were sealed with paraffin wax and weighed in air and then weighed again under water.

The bulk density is calculated using the following formula:

Bulk density = weight in air / (weight in air – weight in water)

Before 2012, all selected samples were coated in paraffin wax for bulk density determinations. Studies conducted at the Mining Research Institute of Argentina indicated that the rocks found at Los Azules were not porous and, therefore, they were not required to be sealed in wax during the procedure. Therefore, a wax seal was not used for any of the density measurements taken during the 2012, 2013 or 2017 field seasons. Observations during site visits confirm that the competent rocks used for bulk density measurements do not show any visual signs of porosity and, therefore, it is likely that sealed versus non-sealed measurements would produce similar results.

A total of 1,196 samples were tested for bulk density or specific gravity (SG); values ranged between 1.44 t/m^3 and 3.60 t/m^3, with a mean of 2.54 t/m^3. These data were loaded into MineSight® and visual observations indicate that the spatial distribution is insufficient to support direct interpolation of SG values into model blocks. As an alternative, average densities were determined for the MinZone domains and the following SG values were assigned to blocks in the model:

- Overburden Zone: 2.00 t/m^3
- Leach Zone: 2.44 t/m^3
- Supergene Zone: 2.51 t/m^3
- Primary Zone: 2.58 t/m^3

These density averages are considered to be appropriate for calculating resource tonnages for the Los Azules deposit.

14.7 Evaluation of Outlier Grades

Before modeling, histograms and probability plots were reviewed for all elements. The physical location of potential outlier values were reviewed in drilling, and it was found that in most cases these anomalous grades were not extreme and they tended to occur in areas where there were reasonable sample densities and the neighbouring values also tended to be high. As a result, it was decided that the effects of these samples could be effectively controlled through the application of outlier limitations. During interpolation, any samples above the defined threshold limit would be restricted to a maximum influence distance of 75 m.

The various threshold limits for all elements are listed in Table 14-4; this table also includes the model's metal reduction as a result of these controls. Metal lost due to outlier limitations is estimated in blocks within the Indicated and Inferred categories in the supergene and primary zone domains.

Table 14-4: Summary of Outlier Grade Controls

Element/Domain		Threshold	% Metal Lost in Model (*)
Copper (Total)	Leach	1%	-0.5%
	Supergene	3%	
	Primary	2.5%	
Gold		2 g/t	-3.6%
Silver		40 g/t	-9.7%
Molybdenum		0.15%	-3.6%
Arsenic		0.4%	-4.3%
Lead		1%	-5.8%
Zinc		1%	-10.3%
Sulphur	Leach	2%	-2.9%
	Supergene	7%	
	Primary	10%	

* Calculated in combined SS and PR Zones in Indicated and Inferred categories.
Note: Outlier limitation to maximum distance of 75 m during interpolation.

14.8 Variography

The degree of spatial variability in a mineral deposit depends on both the distance and direction between points of comparison. Typically, the variability between samples increases as the distance between those samples increases. If the degree of variability is related to the direction of comparison, then the deposit is said to exhibit anisotropic tendencies which can be summarized with the search ellipse. The semi-variogram is a common function used to measure the spatial variability within a deposit.

The components of the variogram include the nugget, the sill and the range. Often samples compared over very short distances, even samples compared from the same location, show some degree of variability. As a result, the curve of the variogram often begins at some point on the y-axis above the origin: this point is called the *nugget*. The nugget is a measure of not only the natural variability of the data over very short distances, but also a measure of the variability which can be introduced due to errors during sample collection, preparation and the assay process.

The amount of variability between samples typically increases as the distance between the samples increases. Eventually, the degree of variability between samples reaches a constant, maximum value; this is called the *sill* and the distance between samples at which this occurs is called the *range*.

The spatial evaluation of the data in this report was conducted using a correlogram rather than the traditional variogram. The correlogram is normalized to the variance of the data and is less sensitive to outlier values, generally giving better results.

Variograms were generated using the commercial software package SAGE 2001© (Isaacks & Co.). Multidirectional variograms were generated for composited copper samples located within the combined supergene and primary domains. The results for copper are summarized in Table 14-5.

Table 14-5: Variogram Parameters – Copper

Domain	Nugget	S1	S2	1st Structure			2nd Structure		
				Range (m)	Azimuth	Dip	Range (m)	Azimuth	Dip
Leach	0.100	0.682	0.218	79	337	43	2232	200	72
	Spherical			77	75	77	75	8	1533
				9	173	9	173	46	338
Supergene	0.250	0.446	0.304	234	35	-4	1951	337	-5
	Spherical			61	124	15	412	17	83
				54	320	75	303	68	-4
Primary	0.200	0.468	0.332	241	8	343	-25	343	-25
	Spherical			212	59	17	464	335	65
				14	323	19	280	71	3

14.9 Model Setup and Limits

A block model was initialized in MineSight® and the dimensions are defined in Table 14-6. The extents of the block model are represented by the purple rectangle shown in Figure 14-2. The selection of a nominal block size measuring 20 x 20 x 15 m (L x W x H) is considered appropriate with respect to the current drill hole spacing, and the selective mining unit (SMU) size is typical of an operation of this type and scale.

Table 14-6: Block Model Limits

Direction	Minimum	Maximum	Block Size (m)	# Blocks
East	2380800	2385800	20	250
North	6556400	6562300	20	295
Elevation	2605	4390	15	119

Blocks in the model were coded on a majority basis with the MinZone domains. During this stage, blocks along a domain boundary are coded if more than 50% of the block occurs within the boundaries of that domain.

The proportion of blocks that occur below the topographic surface is also calculated and stored within the model as individual percentage items. These values are used as weighting factors to determine the in-situ resources for the deposit.

14.10 Interpolation Parameters

The block model grades for all elements are estimated using Ordinary Kriging (OK). The results of the OK estimation are compared with the Hermitian Polynomial Change of Support method, also referred to as the Discrete Gaussian Correction. This method is described in greater detail in Section 14.11 (Validation).

The Los Azules OK model is generated with a relatively small number of samples to match the change of support, or Herco (*Her*mitian *Co*rrection) grade distribution. This approach reduces the amount of smoothing or averaging in the model, and, while there may be some uncertainty on a localized scale, this approach produces a reliable estimate of the recoverable grades and tonnages for the overall deposit.

All grade estimates use length-weighted composite drill hole sample data. Hard boundaries are applied to the MinZone domains during the interpolation of total copper and sulfur grades. The interpolation parameters are summarized by domain in Table 14-7.

Table 14-7: Interpolation Parameters

Element/ Domain	**Search Ellipse Range (m)**			**# Composites**			**Other**
	X	**Y**	**Z**	**Min/block**	**Max/block**	**Max/hole**	
Copper Leach	1000	1000	100	7	24	8	1 DH per octant
Supergene	1000	1000	100	7	80	20	1 DH per octant
Primary	1000	1000	100	7	60	15	1 DH per octant
Gold	1000	1000	100	10	100	25	1 DH per octant
Silver	1000	1000	100	10	100	25	1 DH per octant
Molybdenum	1000	1000	100	8	60	15	1 DH per octant
Arsenic	1000	1000	100	8	80	20	1 DH per octant
Lead	1000	1000	100	10	30	10	1 DH per octant
Zinc	1000	1000	100	10	40	10	1 DH per octant
Sulphur Leach	1000	1000	100	5	21	7	1 DH per octant
Supergene	1000	1000	100	5	60	15	1 DH per octant
Primary	1000	1000	100	5	100	25	1 DH per octant

14.11 Validation

The results of the modeling process were validated using several methods. These methods included a thorough visual review of the model grades in relation to the underlying drill hole sample grades; comparisons with the change of support model; comparisons with other estimation methods; and grade distribution comparisons using swath plots.

14.11.1 Visual Inspection

A detailed visual inspection of the block model was conducted in both the section and plan to ensure the desired results following interpolation. This inspection confirmed that blocks within the respective domains and below the topographic surface were properly coded. To ensure that there is proper representation in the model, the inspection also included a comparison of the distribution of block grades relative to the drill hole samples.

14.11.2 Model Checks for Change of Support

The relative degree of smoothing in the block model estimates was evaluated using the Discrete Gaussian Correction; it is also referred to as the Hermitian Polynomial Change of Support method. (Journel and Huijbregts, 1978). With this method, the distribution of the hypothetical block grades can be directly compared to the estimated OK model through the use of pseudo-grade/tonnage curves. Adjustments are made to the block model interpolation parameters until an acceptable match is made with the Herco distribution. In general, the estimated model should be slightly higher in tonnage and slightly lower in grade when compared to the Herco distribution at the projected cut-off grade. These differences account for selectivity and other potential ore-handling issues which commonly occur during mining.

The Herco distribution is derived from the declustered composite grades which were adjusted to account for the change in support, moving from smaller drill hole composite samples to the larger blocks in the model. The transformation results in a less-skewed distribution but with the same mean as the original declustered samples.

Pseudo grade/tonnage plots were generated for all elements and pertinent domains in the block model and all show the desired degree of correlation between the Herco results and the OK models. Examples for copper in the supergene and primary zones are shown in Figure 14-17.

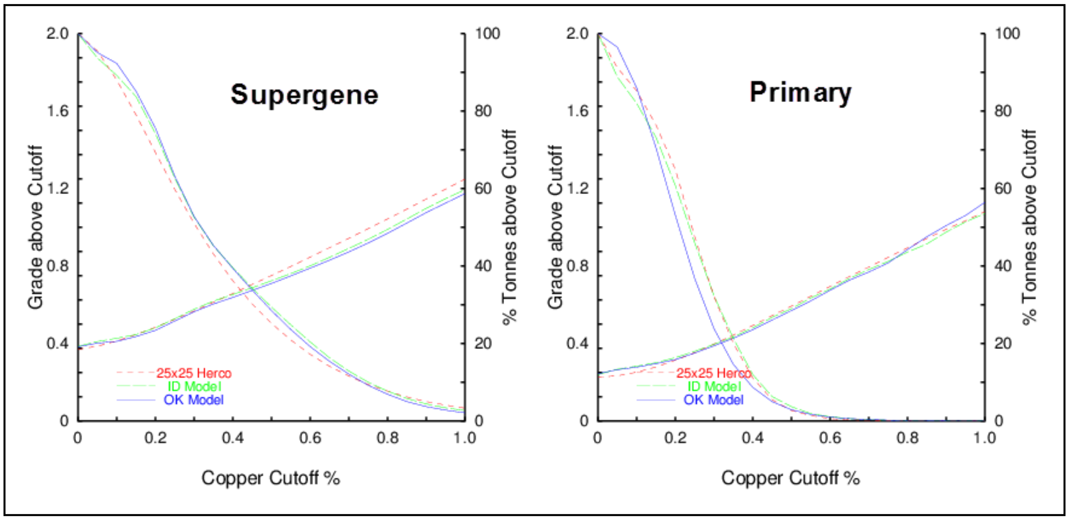


Figure 14-17: Change of Support Curves for Copper in Supergene and Primary Zones (Sim, 2017)

14.11.3 Comparison of Interpolation Methods

For comparison purposes, additional models have been generated using both the inverse distance-weighted (ID) and nearest neighbour (NN) interpolation methods; the ID estimate to the power of two (ID2) and the NN model are created using data composited to 15 m intervals. The results of these models, restricted to the supergene and primary domains, are compared to the OK models at a series of cut-off grades using a grade/tonnage plot shown in Figure 14-18. Overall, there is very good correlation between these models. Reproduction of the model using these different methods increases the overall confidence in the resource.

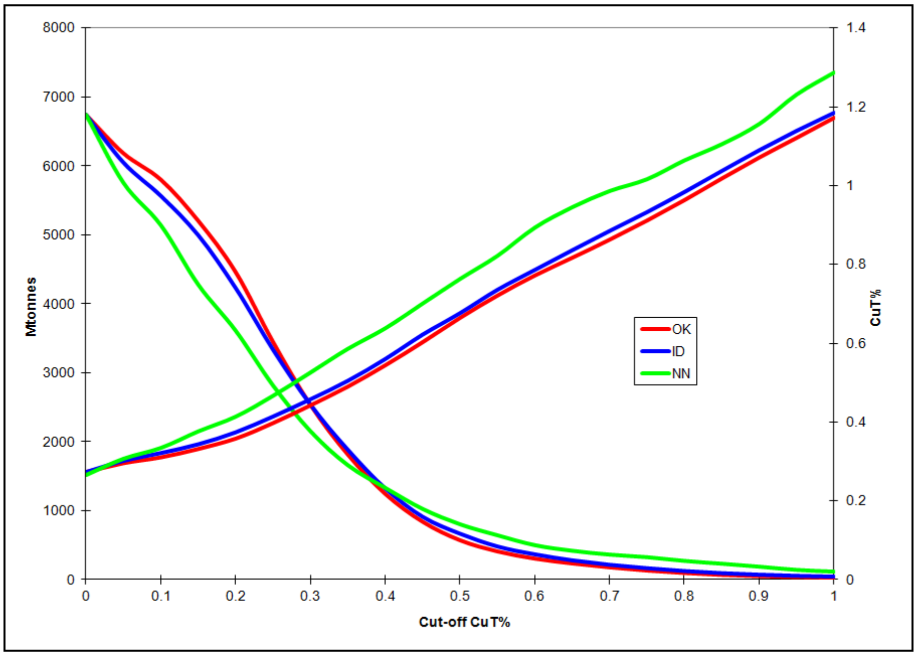


Figure 14-18: Grade-Tonnage Comparison of OK, ID and NN Models (Sim, 2017)

14.11.4 Swath Plots (Drift Analysis)

A swath plot is a graphical display of the grade distribution derived from a series of bands, or swaths, generated in several directions throughout the deposit. Using the swath plot, grade variations from the OK model are compared to the distribution derived from the declustered NN grade model.

On a local scale, the NN model does not provide reliable estimations of grade, but, on a much larger scale, it represents an unbiased estimation of the grade distribution based on the underlying data. Therefore, if the OK model is unbiased, the grade trends may show local fluctuations on a swath plot, but the overall trend should be similar to the NN distribution of grade.

Swath plots have been generated in three orthogonal directions for distribution of all modeled elements. An example is shown in Figure 14-19. There is good correspondence between the models in all of these areas. The degree of smoothing in the OK model is evident in the peaks and valleys shown in the swath plots.

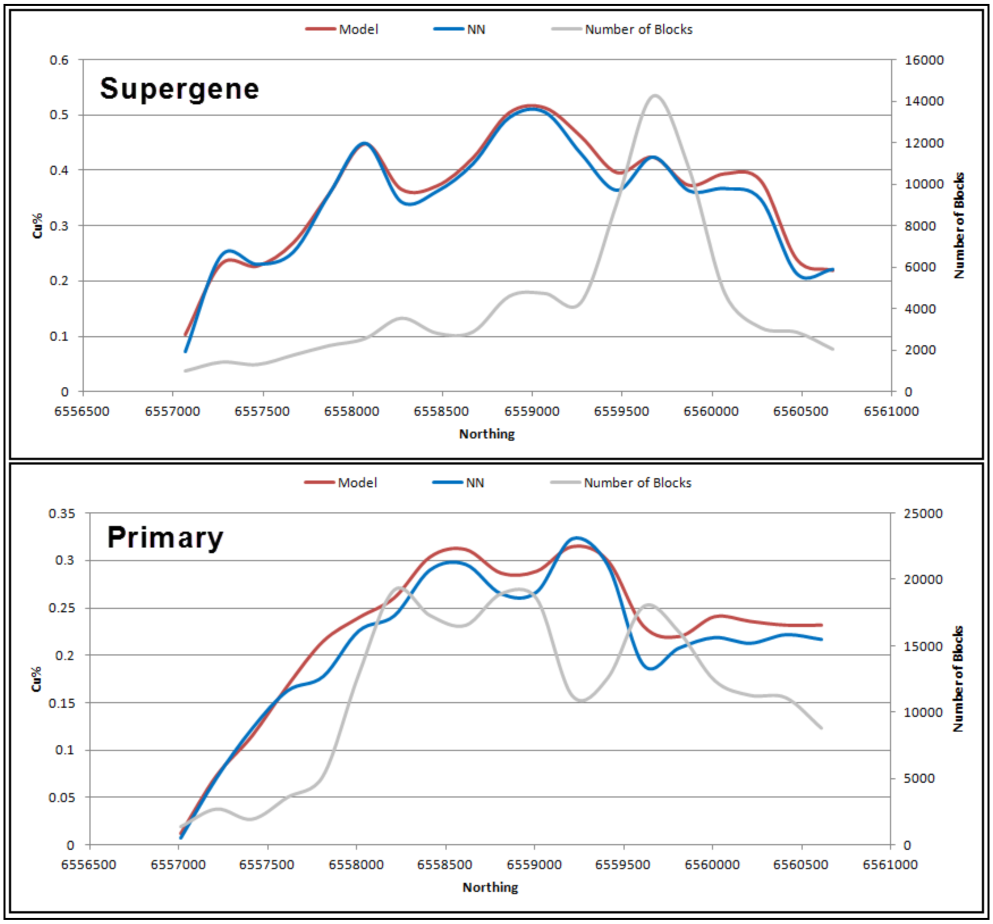


Figure 14-19: East-West Swath Plots of Copper in Supergene and Primary Zones (Sim, 2017)

14.12 Resource Classification

The mineral resources at the Los Azules deposit have been classified in accordance with the CIM *Definition Standards for Mineral Resources and Mineral Reserves* (May, 2014). Based on a drill hole spacing study conducted in 2009, it was found that drilling on a nominal grid spacing of 150 m is required to delineate resources in the Indicated category. Blocks in the model are initially defined based on this strict requirement, and the results are visually reviewed. Areas that show potential for inclusion in the Indicated category must exhibit a high degree of consistency and confidence in the distribution of thickness and copper grade. Ultimately, these areas are defined using manually generated 3D wireframe envelopes that are of reasonable size; defined by sufficient drilling; and, exhibit the degree of confidence necessary to be included in the Indicated category. The extent and location of areas of the deposit considered to be in the Indicated category are shown in Figure 14-20. Note that there are additional areas where drilling is on approximately 150 m spacing, but, at this stage, these areas are too small and isolated and require additional holes to upgrade from an Inferred to Indicated status. The classification parameters for Inferred resources are defined in relation to their distance to sample data and are intended to encompass zones of reasonably continuous mineralization.

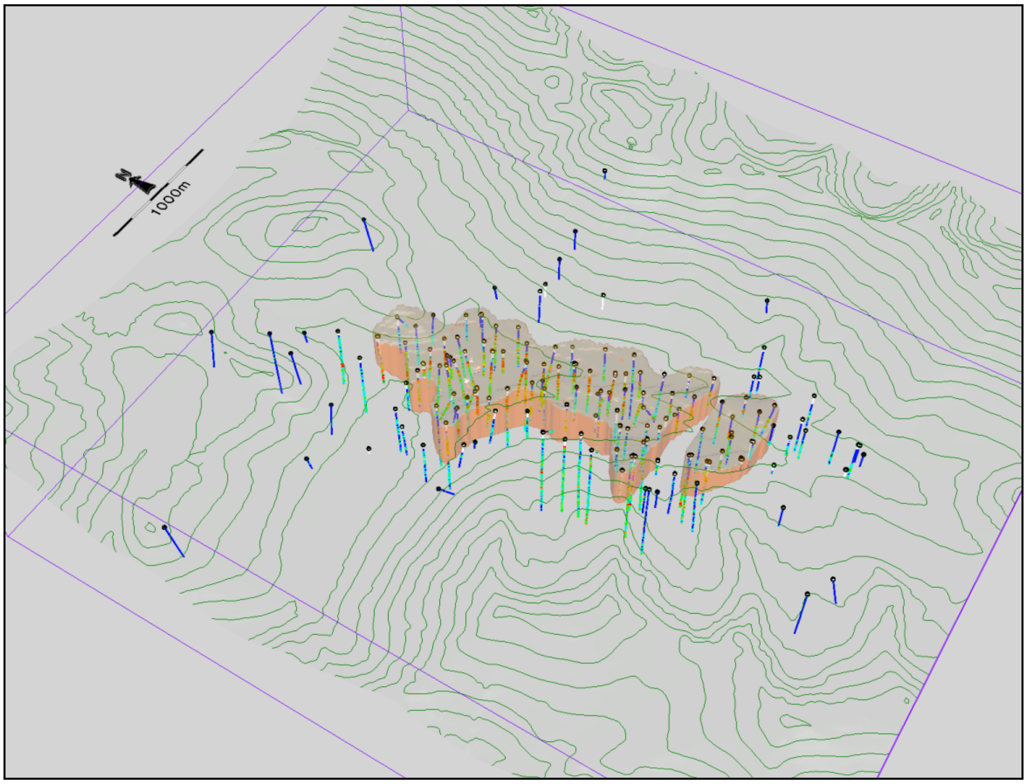


Figure 14-20: Areas of Supergene and Primary Zones Defined in the Indicated Category (Sim, 2017)

Mineral resources are limited to within the supergene and primary zones. The leach domain, by definition, contains little to no potentially economic copper mineralization. Resource categories are defined as follows:

- **Indicated Mineral Resources** – Areas delineated by drilling on 150 m spacing that exhibits a relatively high degree of consistency in the nature of the mineralization.
- **Inferred Mineral Resources** – Blocks in the supergene and primary domains which are a maximum distance of 200 m from a drill hole.

The distance limit for Inferred resources was tested using an indicator variogram generated at a grade threshold of 0.20% Cu (i.e., equivalent to the cut-off grade of the resource estimate). The ranges in this indicator variogram all exceed a distance of 200 m. Note that resources in the Measured category require drill holes spaced on a nominal 75 m grid pattern. There are no resources that meet this criteria at this time.

14.13 Mineral Resources

The estimated mineral resource for the Los Azules deposit is shown in Table 14-8. The extent and location of these resources in relation to the resource limiting pit shell are shown in Figure 14-21.

To ensure the reported resource exhibits reasonable prospects for eventual economic extraction, the mineral resource is limited within a pit shell generated around copper grades in blocks classified in the Indicated and Inferred categories. The projected technical and economic parameters used to generate the resource limiting pit shell are based on studies conducted to date on the Los Azules project.

Generalized technical and economic parameters include the following:

- copper price of $2.75/lb.
- site operating costs of $1.70/t mining, $5.00/t for processing and $1.00/t for general and administration.
- pit slope of 34°.
- Copper metallurgical recovery 90%.

This test indicates that some of the deeper mineralization may not be economic due to the increased waste-stripping requirements. It is important to recognize that these discussions of surface mining parameters are only used to test the “reasonable prospects for eventual economic extraction of mineral resources” and do not represent an attempt to estimate mineral reserves.

The estimate of mineral resources for the Los Azules deposit is summarized in Table 14-8. The base case cut-off grade is estimated to be 0.20% copper. By definition, there is lower confidence in resources in the Inferred category compared to mineral resources in the Indicated category. However, it is assumed that the majority of resources in the Inferred category will be upgraded to Indicated status with further exploration.

Table 14-8: Estimate of Mineral Resources for Los Azules Deposit (0.20% Cu Cut-off)

Mtonnes	Average Grade				Contained Metal			
	Cu (%)	Au (g/t)	Mo (%)	Ag (g/t)	Cu (Blbs)	Au (Moz)	Mo (Mlbs)	Ag (Moz)
Indicated								
962	0.48	0.06	0.003	1.8	10.2	1.7	57.3	55.7
Inferred								
2,666	0.33	0.04	0.003	1.6	19.3	3.8	194.0	135.4

Note: The mineral resources do not have demonstrated economic viability

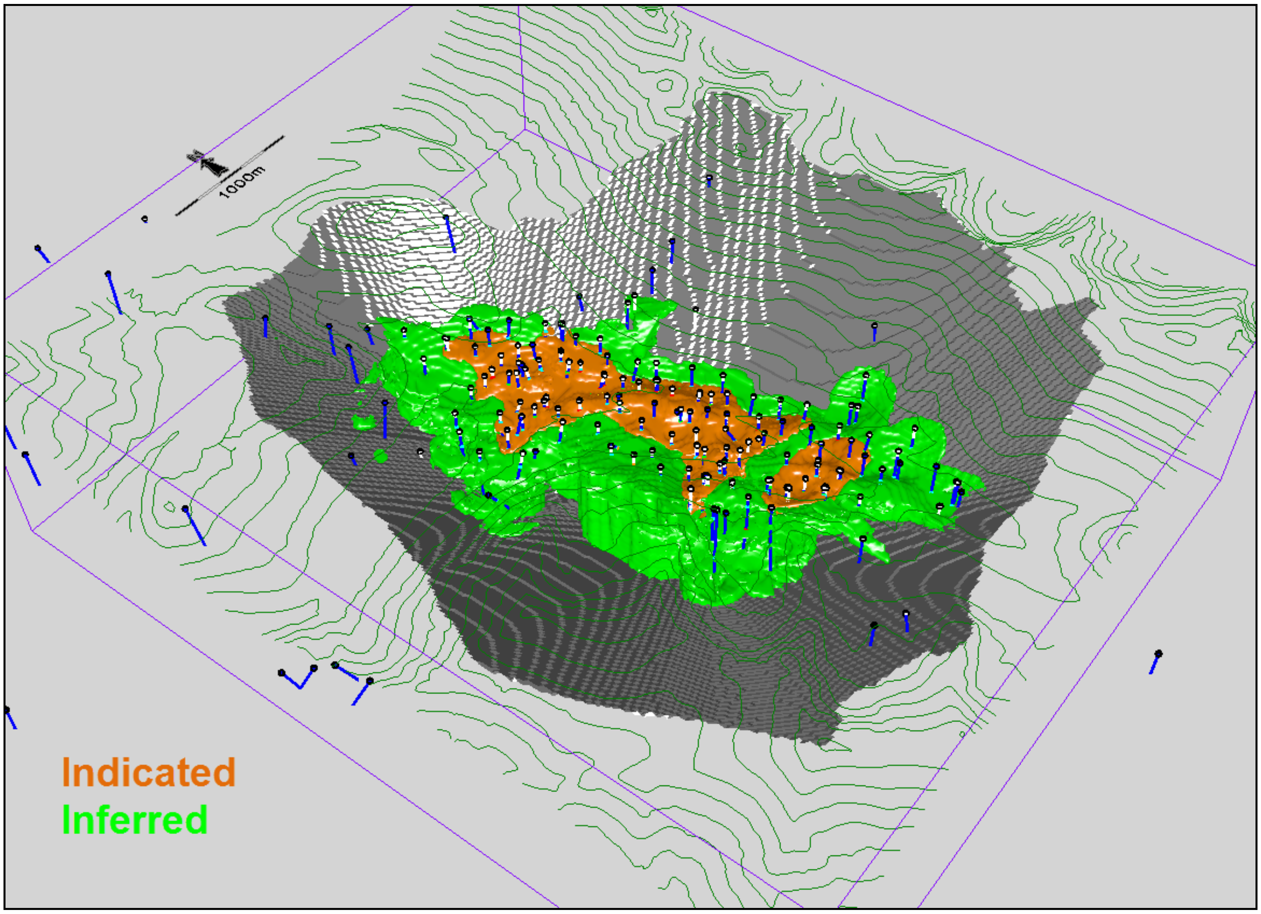


Figure 14-21: Extent of Base Case Resources by Class (Sim, 2017)

To provide information regarding the sensitivity of this resource estimation, the mineral inventory contained within the deposit is shown at a series of copper percent cut-off thresholds in Table 14-9.

Table 14-9: Sensitivity of Mineral Resources

		Average Grade				Contained Metal			
Cut-off Grade (Cu%)	**Mtonnes**	**Cu (%)**	**Au (g/t)**	**Mo (%)**	**Ag (g/t)**	**Cu (Blbs)**	**Au (Moz)**	**Mo (Mlbs)**	**Ag (Moz)**
Indicated									
0.1	1,034	0.46	0.05	0.003	1.8	10.4	1.8	61.6	58.9
0.15	1,016	0.46	0.05	0.003	1.8	10.4	1.8	60.5	58.2
0.2	**962**	**0.48**	**0.06**	**0.003**	**1.8**	**10.2**	**1.7**	**57.3**	**55.7**
0.25	867	0.51	0.06	0.003	1.8	9.7	1.6	51.6	50.4
0.3	750	0.54	0.06	0.003	1.8	9.0	1.5	46.3	44.1
0.35	635	0.58	0.06	0.003	1.9	8.2	1.3	39.2	38.2
0.4	537	0.62	0.07	0.003	1.9	7.3	1.2	33.1	33.0
0.45	444	0.66	0.07	0.003	2.0	6.5	1.0	27.4	27.9
0.5	361	0.71	0.07	0.003	2.0	5.6	0.8	23.1	23.0
0.55	290	0.75	0.07	0.003	2.0	4.8	0.7	18.5	18.7
0.6	234	0.79	0.08	0.003	2.0	4.1	0.6	14.9	15.1
0.65	188	0.83	0.08	0.003	2.0	3.5	0.5	12.0	12.2
0.7	148	0.88	0.08	0.003	2.0	2.9	0.4	9.4	9.4
Inferred									
0.1	3,669	0.28	0.04	0.003	1.5	22.7	4.7	242.7	173.4
0.15	3,196	0.30	0.04	0.003	1.5	21.4	4.3	218.4	157.2
0.2	**2,666**	**0.33**	**0.04**	**0.003**	**1.6**	**19.3**	**3.8**	**194.0**	**135.4**
0.25	1,997	0.36	0.05	0.003	1.7	16.0	3.0	149.7	106.6
0.3	1,384	0.40	0.05	0.004	1.8	12.3	2.2	112.9	77.9
0.35	902	0.45	0.05	0.004	1.8	8.9	1.5	77.5	53.3
0.4	541	0.50	0.06	0.004	1.9	5.9	1.0	47.7	33.6
0.45	314	0.55	0.06	0.004	2.0	3.8	0.6	29.0	20.0
0.5	179	0.60	0.06	0.005	2.0	2.4	0.3	17.7	11.3
0.55	108	0.66	0.06	0.005	1.9	1.6	0.2	11.4	6.7
0.6	68	0.71	0.06	0.005	1.9	1.1	0.1	7.8	4.2
0.65	45	0.76	0.06	0.006	1.9	0.7	0.1	5.5	2.8
0.7	30	0.80	0.06	0.006	1.9	0.5	0.1	4.0	1.8

Note: The mineral resources do not have demonstrated economic viability. The base cut-off grade of 0.20% Cu is highlighted in this table.

The average values of the additional elements included in the resource model are shown in Table 14-10.

Table 14-10: Mineral Resource Including Additional Modeled Elements (0.20% Cu cut-off)

Mtonnes	**Cu (%)**	**Au (g/t)**	**Mo (%)**	**Ag (g/t)**	**As (%)**	**Pb (%)**	**Zn (%)**	**S (%)**
Indicated								
962	0.48	0.06	0.003	1.8	0.007	0.01	0.03	0.93
Inferred								
2,666	0.33	0.04	0.003	1.6	0.006	0.01	0.03	1.24

Note: The mineral resources do not have demonstrated economic viability

The estimated base case mineral resource listed by material type is shown in Table 14-11.

Table 14-11: Estimate of Mineral Resources by Type (0.20% Cu cut-off)

Type	Mtonnes	Average Grade				Contained Metal			
		Cu (%)	Au (g/t)	Mo (%)	Ag (g/t)	Cu (Blbs)	Au (Moz)	Mo (Mlbs)	Ag (Moz)
Indicated									
Supergene	497	0.59	0.06	0.003	1.7	6.4	0.9	55.2	27.8
Primary	466	0.37	0.05	0.003	1.9	3.8	0.8	61.5	27.9
Inferred									
Supergene	423	0.34	0.04	0.003	1.2	3.2	0.5	152.8	16.0
Primary	2,243	0.33	0.05	0.003	1.7	16.2	3.3	199.8	119.7

Note: The mineral resources do not have demonstrated economic viability

14.14 Comparison with the Previous Resource Estimate

The previous estimate of mineral resources for the Los Azules deposit was presented in a technical report dated November 1, 2013 (effective date August 1, 2013). There are differences in the technical and economic parameters used to report mineral resources in 2013 compared with the current estimate. Mineral resources stated in 2013 were based on a cut-off threshold grade of 0.35% copper, a somewhat elevated value that had been retained, for comparison purposes, from the first estimate of mineral resources conducted in 2008. The base case cut-off grade is now reduced to 0.20% copper in order to reflect the current (2017) technical and economic parameters.

Table 14-12 compares the new resource estimate, at 0.20%Cu cut-off, with the mineral resources presented in the November 2013 technical report at a cut-off grade of 0.35%Cu.

Table 14-12: Comparison with Previous Resource Estimate

Type	Mtonnes	Average Grade				Contained Metal			
		Cu (%)	Au (g/t)	Mo (%)	Ag (g/t)	Cu (Blbs)	Au (Moz)	Mo (Mlbs)	Ag (Moz)
Indicated									
June 2017	962	0.48	0.06	0.003	1.8	10.2	1.7	57.3	55.7
Nov 2013	389	0.63	0.07	0.003	1.8	5.4	0.8	25.7	22.9
Inferred									
June 2017	2,666	0.33	0.04	0.003	1.6	19.3	3.8	194.0	135.4
Nov 2013	1,397	0.46	0.06	0.004	1.9	14.3	2.6	114.0	85.8

Note: Cut-off grade 0.20%Cu for 2017 vs. 0.35%Cu for 2013.

The comparison in Table 14-12 shows that the amount of contained copper in Indicated class resources has almost doubled to 10.2 billion pounds. Contained copper in Inferred class resources has increased by 35%. There are three main factors that contribute to the change in mineral resources since 2013 as described below:

First, since the previous estimate of mineral resources in 2013, McEwen Mining has drilled 17 additional holes in the Los Azules deposit that has resulted in the conversion of some Inferred resources to the Indicated category and a slight decrease in the average copper grade.

Second, there have been increases to the projected operating costs, as well as the inclusion of projected metallurgical recovery, used in the generation of the resource limiting pit shell. These changes are the result of more recent engineering and metallurgical studies. The technical and economic parameters used to generate the resource limiting pit shells in 2013 and 2017 are summarized below.

2013 parameters:

- copper price of $2.75/lb
- site operating costs of $1.00/t mining, $4.25/t for combined processing and general and administration
- pit slope of 34°
- There are no adjustments for metallurgical recoveries.

2017 parameters:

- copper price of $2.75/lb
- site operating costs of $1.70/t mining, $5.00/t for processing and $1.00/t for general and administration
- pit slope of 34°.
- Metallurgical recoveries 90% for copper.

Finally, the base case cut-off grade used to calculate the resources has been reduced from 0.35%Cu to 0.20%Cu in order to better reflect the projected operating cost, metal price and metallurgical recovery parameters projected for Los Azules.

Compared to the 2013 resource estimate, increases in the projected operating costs result in a reduction in the depth extent of the resource limiting pit shell, which should result in a reduction in the overall size of the mineral resource. However, this has been offset, to some extent, by a reduction in the base case cut-off grade. These changes are demonstrated, to some degree, by comparing the two resource estimates at a variety of cut-off thresholds in Table 14-13.

Table 14-13: Comparison of 2017 vs. 2013 Resources at Varying Cut-off Grade

	June 2017			November 2013		
Cut-off Grade (Cu%)	**Mtonnes**	**Cu (%)**	**Cu (Blbs)**	**Mtonnes**	**Cu (%)**	**Cu (Blbs)**
Indicated						
0.1	1,034	0.46	10.4	643	0.48	6.8
0.15	1,016	0.46	10.4	627	0.49	6.7
0.2	**962**	**0.48**	**10.2**	584	0.51	6.6
0.25	867	0.51	9.7	523	0.54	6.3
0.3	750	0.54	9.0	450	0.59	5.8
0.35	635	0.58	8.2	**389**	**0.63**	**5.4**

	June 2017			November 2013		
Cut-off Grade (Cu%)	**Mtonnes**	**Cu (%)**	**Cu (Blbs)**	**Mtonnes**	**Cu (%)**	**Cu (Blbs)**
0.4	537	0.62	7.3	338	0.67	5.0
0.45	444	0.66	6.5	293	0.70	4.6
0.5	361	0.71	5.6	253	0.74	4.1
0.55	290	0.75	4.8	217	0.78	3.7
0.6	234	0.79	4.1	184	0.81	3.3
0.65	188	0.83	3.5	151	0.85	2.8
0.7	148	0.88	2.9	120	0.90	2.4
Inferred						
0.1	3,669	0.28	22.7	4,572	0.30	30.7
0.15	3,196	0.30	21.4	4,141	0.32	29.5
0.2	**2,666**	**0.33**	**19.3**	3,583	0.35	27.3
0.25	1,997	0.36	16.0	2,785	0.38	23.4
0.3	1,384	0.40	12.3	2,016	0.42	18.7
0.35	902	0.45	8.9	**1,397**	**0.46**	**14.3**
0.4	541	0.50	5.9	910	0.51	10.3
0.45	314	0.55	3.8	576	0.57	7.2
0.5	179	0.60	2.4	360	0.62	4.9
0.55	108	0.66	1.6	233	0.68	3.5
0.6	68	0.71	1.1	157	0.73	2.5
0.65	45	0.76	0.7	110	0.77	1.9
0.7	30	0.80	0.5	76	0.81	1.4

Note: Cut-off grade 0.20%Cu for 2017 vs. 0.35%Cu for 2013.

15. Mineral Reserve Estimates

No Mineral Reserves are estimated in this Preliminary Economic Assessment.

16. Mining Methods

Subsections 16.1, 16.5, 16.6, 16.7 and 16.8 were prepared by D. Brown, CPEng, McEwen. W. Rose, P Eng., WLR Consulting Inc is responsible for subsections 16.2, 16.3 and 16.4.

This section of this PEA includes Inferred Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves and there is no certainty that the PEA based on these resources will be realized.

16.1 Introduction

This 2017 PEA update for the Los Azules project incorporates an updated geological model, a fundamental revision to the site facilities and general arrangement, changes to the mineral processing, the mineral categorization and the waste rock and tailings storage parameters. The previous PEA for the Los Azules project issued in 2013 by Samuel Engineering (Canadian National Instrument 43-101 Technical Report, McEwan Mining Inc, Los Azules Porphyry Copper project, San Juan Province, Argentina, August 1, 2013) is superseded and substantially revised by this 2017 PEA.

The Los Azules deposit is a near surface strongly folded and faulted porphyry copper deposit located in the high Andes Mountains of Argentina at an altitude of approximately 3,600 m. The deposit is situated within the lower elevations of a broad glacial valley with slopes extending to over 4,000 m altitude and is mostly overlain by unconsolidated glacial outwash materials of up to 60 m thickness.

The Los Azules deposit and the disseminated nature of the mineralization indicates that hard rock, large-scale, open pit mining methods are the most appropriate using large electric rope shovels and mine haul trucks. Mining operations are planned to be staffed to enable continuous operations throughout the year.

A photo with an approximate deposit footprint is shown below in Figure 16-1 looking south from an elevated position. A second photo of the deposit (looking east) is shown below in Figure 16-2 with the waste rock storage facility location extending westwards from the bottom right corner of the photo.

Figure 16-1: An approximation of the Los Azules deposit footprint

Figure 16-2: Looking east towards the Los Azules deposit in the centre of the picture

The 2017 PEA for the Los Azules development incorporates an updated geological block model that includes the 2017 drilling campaign results, a revised mining schedule, a revised mineral processing system producing only a mineral concentrate, and a new site general arrangement with a primary crusher site at the lowest point on the pit western rim.

As illustrated in Figure 16-3, the revised waste rock storage facility is located immediately to the west of the pit and the revised tailings storage facility extending further west.

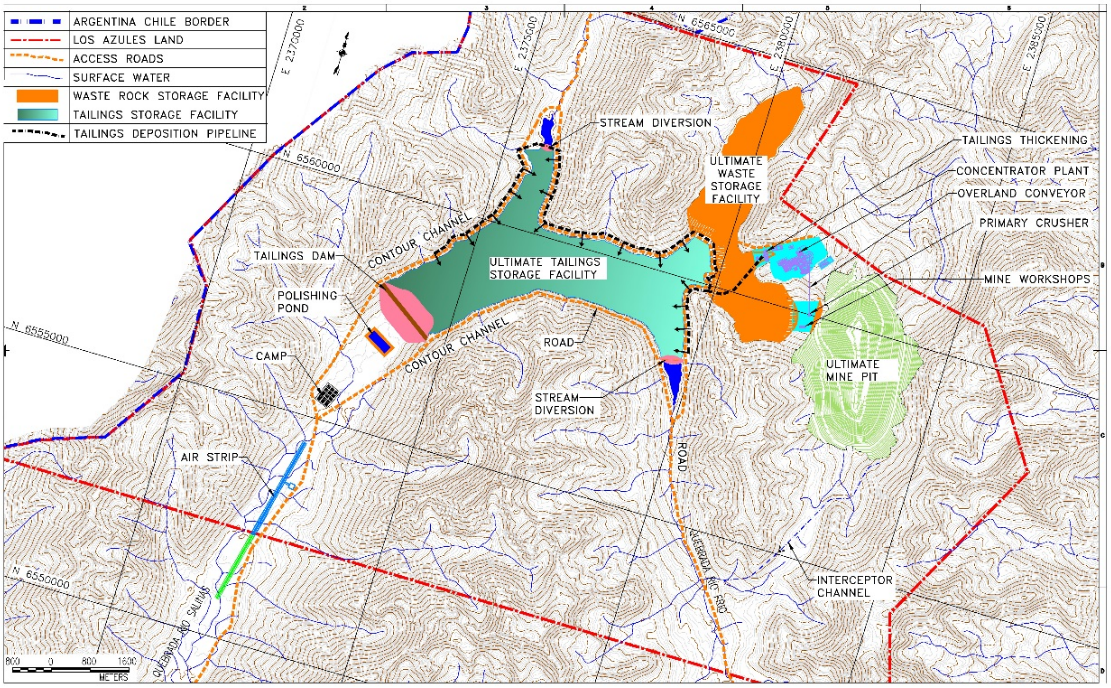


Figure 16-3: 2017 Los Azules General Arrangement

The limit of the McEwen Mining owned lands is shown in red and the international border with Chile is the blue line to the west and north of the tailings dam. The primary crusher, low grade stockpiles, mine workshops and mine offices are all in close proximity to the lowest most western pit rim.

16.2 Economic Pit Limit Evaluations

Floating cone evaluations were conducted to determine potentially economic pit limits and the pushback development sequence. This work was based on the deposit block model completed by Sim Geological Inc. in June 2017 and described in Section 14.

This 2017 PEA incorporates a fundamental concept change from the 2013 PEA and considers processing only the primary sulphide (hypogene) and secondary sulphide (supergene) mineralisation material. The processing facility produces a saleable copper concentrate as described in Section 17. The 2013 PEA had included leaching of oxide as well as a portion of the secondary sulphide mineralization but this is no longer under consideration.

Leach cap (oxide) material above the cut-off grade was investigated for possible batch processing after the sulfide ores are mined. However, the leached oxide material has very low Cu grades and is a small tonnage. Considering the low grade and small tonnage, the oxide material was considered uneconomic to justify the storage, re-handling and a process facility expense and will not be stockpiled.

For this PEA, mineral resources classified as indicated and inferred were allowed to contribute revenues to the floating cone evaluations. To date there are no mineral resources classified as measured. The ore definition parameters used in this 2017 PEA have been updated to prevailing market rates for similar operations in South America perTable 16-1 below. Freight, smelting and refining (FSR) costs were estimated assuming a concentrate grade of 30%Cu, moisture of 9%, a total concentrate freight cost of $90/t, a smelting charge of $75/dmt and a refining cost 0f $0.075/lb Cu.

Table 16-1: Floating Cone Economic and Recovery Parameters

Parameter	Secondary & Primary Sulfides
Cu Price, $/lb	2.25
Cu recovery, %	90%
Cu payable, %	96.5%
Royalties (NSR basis):	3%
FSR cost, US$/lb Cu payable	0.35
Operating Costs:	
Ore mining, US$/t	1.70
Waste mining, US$/t	1.90
Sustaining mine capital, US$/t mined	0.35
Ore processing, US$/t	5.00
General & admin, US$/t ore	1.00
Internal cutoff, Cu%	0.165
Breakeven cutoff, Cu%	0.228

Overall slope angles (OSAs) for the floating cone evaluations varied by azimuth and were derived from geotechnical recommendations and measurements from previous pit designs completed in 2008 and are listed in Table 16-2.

Table 16-2: Floating Cone Overall Slope Angles (in degrees)

Azimuth	Overall Slope Angle (°)
0	34
40	38
85	35
145	33
180	36
220	34
250	31
320	33

In-situ bulk densities vary by rock type and are listed in Table 16-3 below. The average density within the ultimate pit volume is 2.41 t/m^3

Table 16-3: In-situ Densities by Rock Type

Geologic Zone	**Model Code**	**Density** (t/m^3)
Overburden/Alluvium	1	2.00
Leach Cap (oxide)	2	2.45
Secondary Sulfide (supergene)	3	2.51
Primary Sulfide (hypogene)	4	2.58

Hexagon's MineSight® software was used for pit optimisation and mine planning. The Floating Cone (FC) algorithm was employed to generate potentially economic pit shells using the previously described economic parameters and overall slope angles. A base case was generated at a Cu price of $2.25/lb and sensitivities developed for a range of prices from $1.00 to $3.50/lb Cu in $0.25/lb increments. The results of these Cu price sensitivity evaluations are presented in Table 16-4 below. Figure 16-4 plots the average Cu grade and contained resource tonnage curves for this analysis.

Table 16-4: Floating Cone Economic Pit Analyses - Copper Price Sensitivity

Cu Price	Internal	Secondary Sulfides			Primary Sulfides			Total Contained Resources			Waste	Total	Strip
US$/lb	Cutoff Cu%	Ktonnes	Cu%	RCu%	Ktonnes	Cu%	RCu%	Ktonnes	Cu%	RCu%	Ktonnes	Ktonnes	Ratio
1.00	0.479	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000	0	0	-
1.25	0.346	94,517	0.819	0.737	449	0.420	0.379	94,965	0.817	0.735	196,921	291,886	2.07
1.50	0.271	278,234	0.674	0.607	9,350	0.478	0.431	287,583	0.668	0.601	452,259	739,842	1.57
1.75	0.223	474,902	0.599	0.539	84,536	0.438	0.394	559,438	0.575	0.517	816,872	1,376,310	1.46
2.00	0.189	620,758	0.546	0.492	259,352	0.381	0.342	880,110	0.497	0.448	1,084,821	1,964,931	1.23
2.25	**0.165**	**780,515**	**0.497**	**0.448**	**601,027**	**0.342**	**0.308**	**1,381,541**	**0.430**	**0.387**	**1,513,184**	**2,894,725**	**1.10**
2.50	0.145	900,588	0.466	0.419	1,001,866	0.321	0.289	1,902,454	0.390	0.351	2,010,498	3,912,952	1.06
2.75	0.130	971,716	0.448	0.403	1,379,407	0.306	0.276	2,351,124	0.365	0.329	2,513,952	4,865,076	1.07
3.00	0.118	1,016,008	0.438	0.394	1,701,639	0.299	0.269	2,717,647	0.351	0.316	3,065,417	5,783,064	1.13
3.25	0.108	1,051,037	0.429	0.386	2,066,518	0.293	0.264	3,117,556	0.339	0.305	3,839,863	6,957,419	1.23
3.50	0.099	1,086,925	0.421	0.379	2,569,185	0.289	0.260	3,656,110	0.328	0.295	5,137,268	8,793,378	1.41

The $2.25 FC shell was selected as the preferred case to guide the design of an ultimate pit as it offered a conservative estimate of the potential mill feed and delivers an acceptable average Cu grade of 0.43%.

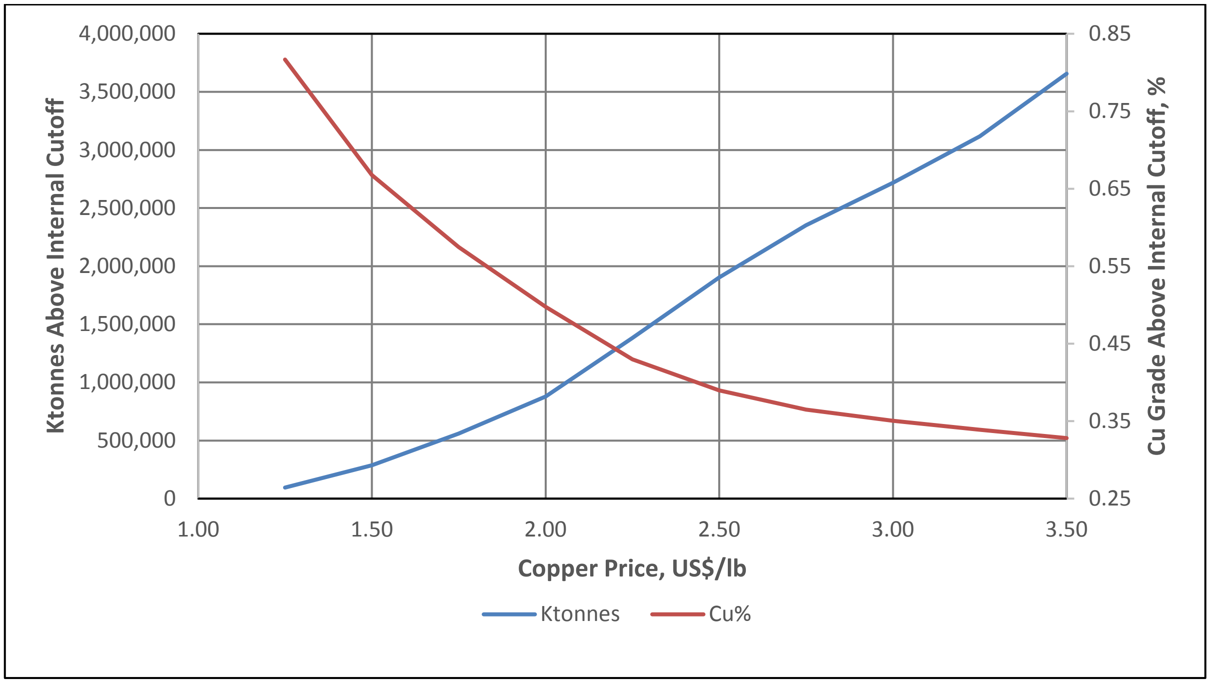


Figure 16-4: Copper Price Sensitivity Grade – Tonnage Curves.

16.3 Mining Phase and Ultimate Pit Designs

The ultimate pit and internal mining phases for Los Azules were designed to accommodate very-large-scale equipment, including rotary drills capable of 311-mm-diameter blastholes, 60-m^3 electric shovels, and diesel-powered haul trucks with payload capacities in excess of 300 tonnes. This equipment will excavate material from 15-m-high benches.

A review of the new $2.25 FC pit shell shows only small differences in the pit extents when compared to the 2013 PEA. This was not surprising as most of the recent exploration work was in-fill drilling to improve resource classification and because similar economic and slope angle parameters were used. It was decided that the 2013 PEA ultimate pit design and last two internal phases (pushbacks) would still be usable for the 2017 PEA scoping-level study. However, the initial two mining pushbacks in the 2013 PEA were subdivided into three phases to reduce preproduction stripping while targeting the highest-grade resources. Consequently, a total of six mining phases were used to define the open pit development sequence in this 2017 PEA.

Pit walls were smoothed to minimize or eliminate, where possible, noses and notches that could affect slope stability. Internal haulage ramps were included in the slope design to allow for truck access to working faces on each level. The basic parameters used in the design of the mining phases, or pushbacks, are summarized in Table 16-5.

Table 16-5: Basic Pit Design Parameters

Parameter	Unit	Value
Bench Height	*(m)*	15
Haul road width (Including ditch & safety berm)	*(m)*	44
Internal ramp gradient	*(%)*	10
Minimum pushback width	*(m)*	90

Overburden/alluvium material was limited to an inter-ramp angle of 28°, while rock – oxide, secondary sulfide, and primary sulfide – slopes were designed to an inter-ramp angle of 40°. Bench face angles were constant for all rock types at 65°. The same slope design parameters were used for the internal phases as for the ultimate pit.

The designed ultimate pit is approximately 3.8 km long N-S and 2.5 km wide E-W at the crest. Elevations range from 3115 meters at the bottom to 4080 meters at the highest crest on the east wall. The maximum overall benched pit wall height is 965 meters. The surface area of the ultimate pit is approximately 970 hectares, while the lateral area is nearly 690 hectares. Figure 16-5 shows images of the six mining phases, with the ultimate pit (Phase 6) in the bottom right corner. The plan view grids are on 1000 m intervals.

The modelled Cu grades with respect to the mining phases are illustrated in the longitudinal and cross sections presented in Figure 16-6 and Figure 16-7, respectively.

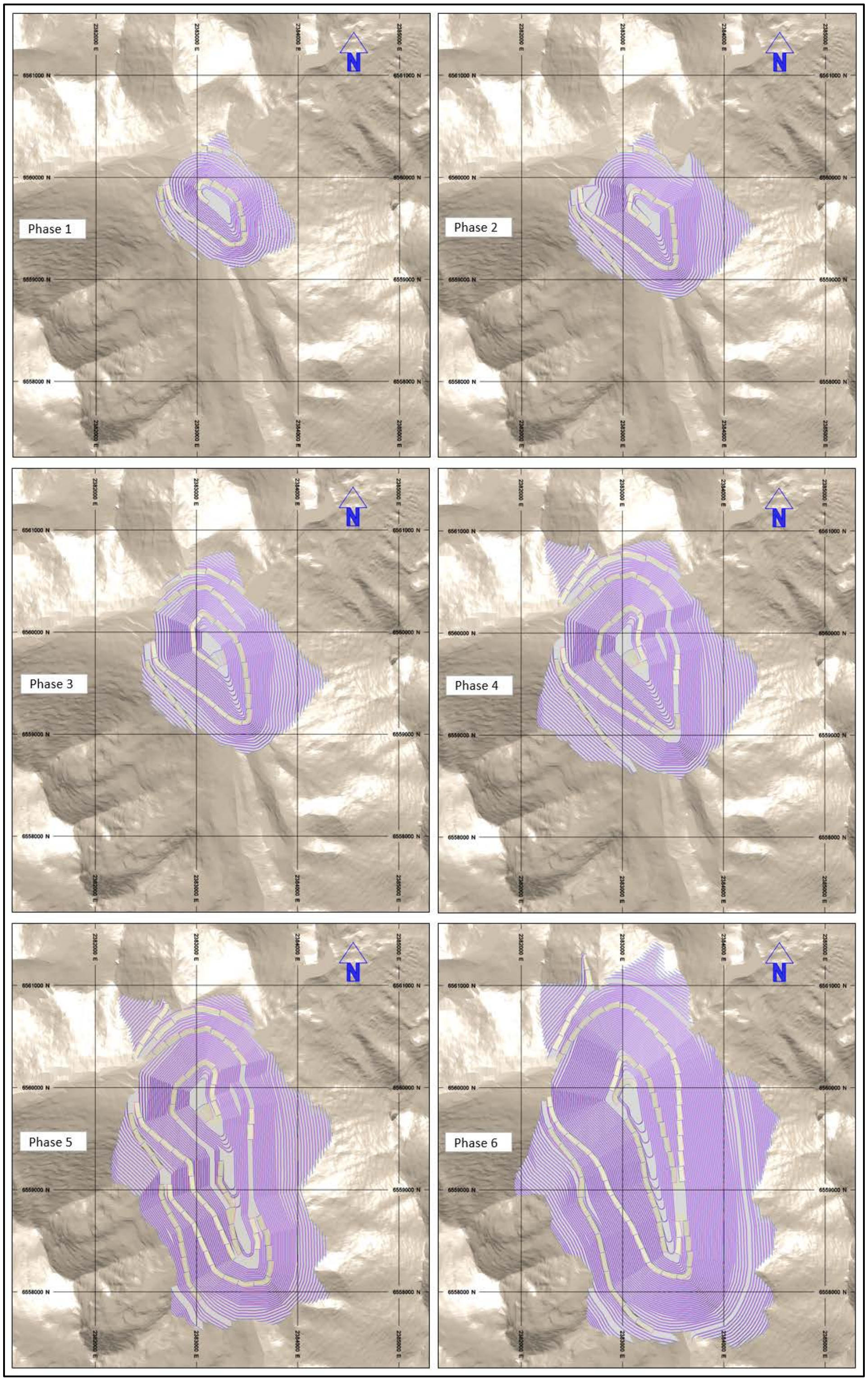


Figure 16-5: Mining Phase Plans

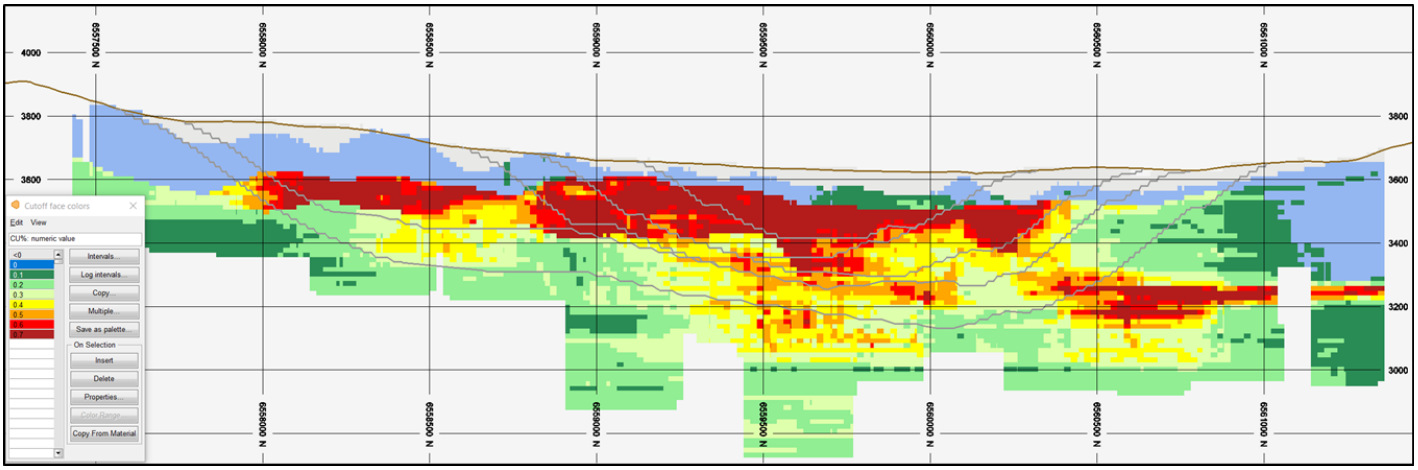


Figure 16-6: Longitudinal Section (looking west-southwest)

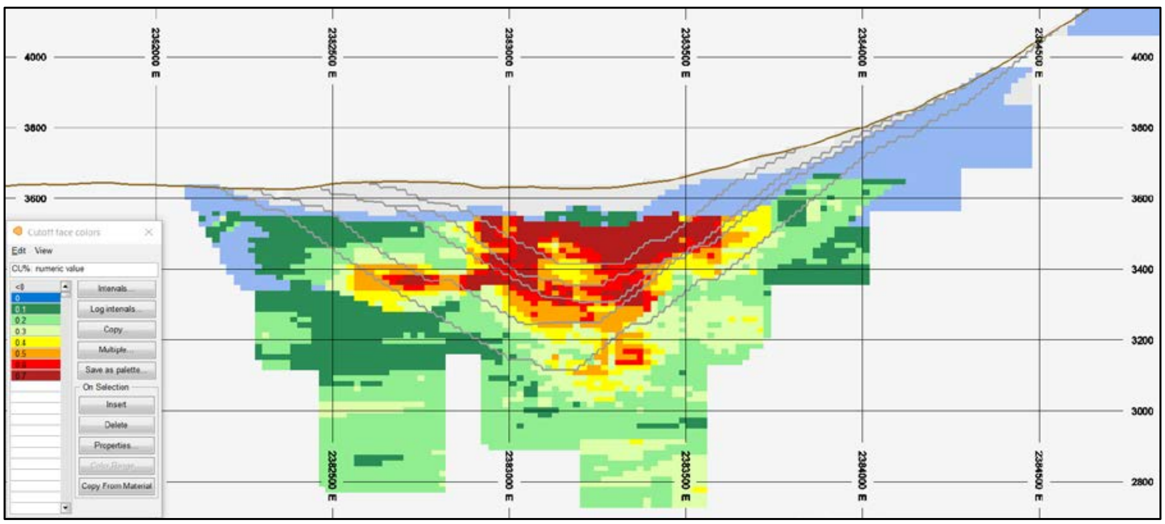


Figure 16-7: Cross Section (looking north)

16.4 Los Azules Mine Production Schedule

Concentrator feed will be hauled out of the open pit to a near-pit gyratory crusher, where a back-up Run-of-Mine (ROM) ore stockpile will also be located. Crushed mill feed will subsequently be conveyed uphill and stacked in the coarse ore stockpile prior to reclaiming for processing through the concentrator.

The proposed development plan for Los Azules envisions starting with two grinding lines rated at a nominal capacity of 40,000 t/d each, for a total initial milling rate of 80,000 t/d (28.8 M t/a). A third grinding circuit will be brought on line at the beginning of Year 5, increasing the total milling rate to a maximum of 120,000 t/d (43.2 M t/a), which will be maintained until the completion of ore processing in Year 36. An allowance for production ramp-up and plant de-bottlenecking was made in Year 1.

The basic operational parameters used to develop the mine production schedule are summarized in the below tabulation, Table 16-6.

Table 16-6: Production Scheduling Parameters

Parameter	Unit	Value
Annual Concentrator Production Targets:		
Y1	M t	24.8
Y2-Y4	M t/a	28.8
Y5-Y36	M t/a	43.2
Operating Hours per Shift	h	12
Operating Shifts per Day	Shifts/d	2
Operating Days per Week	Days/wk	7
Scheduled Operating Days per Year	Days/a	360

The mine production schedule, in concert with the mining phase sequence that initially targets the highest-grade mineral resources, implements a declining cutoff grade policy to maximize the project present values. In executing this policy, the mine will encounter nearly 58 M t of economic but lower than optimum grade mineral resources that will be stored in a designated low-grade ore stockpile and processed in the last two years of operations (Years 35-36) after open pit mining has been completed. A low-grade ore stockpile cutoff of 0.20% Cu was used and includes costs for re-handling this material.

Approximately 125 M t of preproduction stripping, including stockpiling about 1.1 M t of ROM ore, will be required to reach the top of the supergene enrichment zone. This pre-stripping activity is scheduled to coincide with the project implementation phase commencing from Year -3 and be completed as the process plant becomes available to receive mineralized material at the start of Year 1. The ROM ore stockpiled during preproduction will be fed into the concentrator in Year 1.

The Life-of-Mine (LOM) tonnages are estimated to be nearly 1,488 M t of concentrator feed and 1,510 M t of waste stripping. Most of the waste rock and overburden stripping will be placed in the Waste Rock Storage Facility (WRSF), although some waste rock will be hauled to the tailings storage facility for use as construction fill in the tailings dam.

Table 16-7 summarizes the mine production schedule and declining cutoff grade policy for Los Azules. This schedule projects a peak material handling rate in the mine, including waste, of about 330,000 t/d, or nearly 119 M t/y. The stripping ratio, including stockpile re-handling, is projected at 1.05 (tonnes of waste per tonne of sulfide ore milled). Excluding the three-year preproduction period, the mine life is estimated at 35.9 years. Outside of the provisions made in the block model, no additional adjustments were made for mining dilution and ore loss in the mine production schedule.

Table 16-7: Mine Production Schedule

Time	Cutoff	Direct Mine to Plant				To ROM Ore Stockpile				To LG Stockpile (>= 0.20% Cu)				From LG Stockpile to Plant				Concentrator Feed				Waste	Total	Strip
Period	Cu %	Ktonnes	Cu %	Au g/t	Ag g/t	Ktonnes	Cu %	Au g/t	Ag g/t	Ktonnes	Cu %	Au g/t	Ag g/t	Ktonnes	Cu %	Au g/t	Ag g/t	Ktonnes	Cu %	Au g/t	Ag g/t	Ktonnes	Ktonnes	Ratio
PP	0.27					1,070	0.80	0.09	2.05													123,411	124,480	-
1*	0.27	24,480	0.92	0.09	2.08					9	0.25	0.03	0.84					24,480	0.92	0.09	2.08	49,511	74,000	2.02
2	0.27	28,800	0.86	0.08	1.83					131	0.26	0.03	1.23					28,800	0.86	0.08	1.83	58,569	87,500	2.04
3	0.27	28,800	0.66	0.07	1.76					2,981	0.24	0.03	1.34					28,800	0.66	0.07	1.76	55,719	87,500	2.04
4	0.27	28,800	0.68	0.07	1.57					691	0.24	0.03	0.95					28,800	0.68	0.07	1.57	58,010	87,500	2.04
5	0.27	43,200	0.61	0.06	1.70					1,131	0.25	0.03	0.96					43,200	0.61	0.06	1.70	74,469	118,800	1.75
6	0.26	43,200	0.58	0.06	1.77					265	0.23	0.03	0.84					43,200	0.58	0.06	1.77	75,335	118,800	1.75
7	0.26	43,200	0.54	0.06	1.92					5,067	0.24	0.03	0.98					43,200	0.54	0.06	1.92	70,534	118,800	1.75
8	0.25	43,200	0.47	0.04	1.50					10,144	0.23	0.02	0.91					43,200	0.47	0.04	1.50	65,456	118,800	1.75
9	0.25	43,200	0.45	0.05	1.37					7,004	0.23	0.04	0.96					43,200	0.45	0.05	1.37	68,596	118,800	1.75
10	0.24	43,200	0.43	0.05	1.45					5,370	0.22	0.03	1.27					43,200	0.43	0.05	1.45	70,230	118,800	1.75
11	0.24	43,200	0.44	0.05	1.73					7,875	0.22	0.03	1.75					43,200	0.44	0.05	1.73	67,726	118,800	1.75
12	0.23	43,200	0.50	0.06	2.01					121	0.22	0.03	0.99					43,200	0.50	0.06	2.01	75,479	118,800	1.75
13	0.23	43,200	0.48	0.05	1.60					6,126	0.22	0.03	1.52					43,200	0.48	0.05	1.60	69,474	118,800	1.75
14	0.22	43,200	0.50	0.05	1.42					1,838	0.21	0.03	1.06					43,200	0.50	0.05	1.42	73,762	118,800	1.75
15	0.22	43,200	0.45	0.05	1.46					4,970	0.21	0.02	1.11					43,200	0.45	0.05	1.46	70,630	118,800	1.75
16	0.21	43,200	0.37	0.04	1.52					2,059	0.21	0.02	1.17					43,200	0.37	0.04	1.52	73,542	118,800	1.75
17	0.21	43,200	0.35	0.04	1.69					1,939	0.21	0.03	1.72					43,200	0.35	0.04	1.69	73,661	118,800	1.75
18	0.20	43,200	0.35	0.04	1.75													43,200	0.35	0.04	1.75	75,600	118,800	1.75
19	0.20	43,200	0.36	0.04	1.49													43,200	0.36	0.04	1.49	75,600	118,800	1.75
20	0.19	43,200	0.33	0.03	1.45													43,200	0.33	0.03	1.45	35,149	78,349	0.81
21	0.19	43,200	0.33	0.04	1.34													43,200	0.33	0.04	1.34	21,905	65,105	0.51
22	0.18	43,200	0.33	0.04	1.32													43,200	0.33	0.04	1.32	6,135	49,335	0.14
23	0.18	43,200	0.35	0.04	1.67													43,200	0.35	0.04	1.67	4,128	47,328	0.10
24	0.165	43,200	0.34	0.04	1.78													43,200	0.34	0.04	1.78	1,626	44,826	0.04
25	0.165	43,200	0.35	0.04	1.73													43,200	0.35	0.04	1.73	1,992	45,192	0.05
26	0.165	43,200	0.37	0.04	1.74													43,200	0.37	0.04	1.74	1,707	44,907	0.04
27	0.165	43,200	0.37	0.05	1.69													43,200	0.37	0.05	1.69	1,749	44,949	0.04
28	0.165	43,200	0.37	0.05	1.66													43,200	0.37	0.05	1.66	1,806	45,006	0.04
29	0.165	43,200	0.35	0.05	1.58													43,200	0.35	0.05	1.58	1,544	44,744	0.04
30	0.165	43,200	0.35	0.04	1.54													43,200	0.35	0.04	1.54	1,068	44,268	0.02
31	0.165	43,200	0.37	0.05	1.53													43,200	0.37	0.05	1.53	1,309	44,509	0.03
32	0.165	43,200	0.38	0.05	1.62													43,200	0.38	0.05	1.62	1,041	44,241	0.02
33	0.165	43,200	0.38	0.05	1.68													43,200	0.38	0.05	1.68	792	43,992	0.02
34	0.165	43,200	0.32	0.05	1.57													43,200	0.32	0.05	1.57	1,753	44,953	0.04
35	0.165	23,257	0.32	0.06	1.67									19,943	0.22	0.03	1.22	43,200	0.27	0.04	1.46	595	43,795	0.01
36	0.165													37,777	0.22	0.03	1.22	37,777	0.22	0.03	1.22	0	37,777	0.00
Total		**1,430,137**	**0.43**	**0.05**	**1.63**	**1,070**	**0.80**	**0.09**	**2.05**	**57,720**	**0.22**	**0.03**	**1.22**	**57,720**	**0.22**	**0.03**	**1.22**	**1,487,857**	**0.42**	**0.05**	**1.61**	**1,509,610**	**3,056,257**	**1.05**

* ROM ore stockpile reclaimed in Y1

The concentrator feed in the mine production schedule contains indicated and inferred mineral resources.

This Preliminary Economic Assessment is preliminary in nature and includes inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves. Inferred mineral resources have a great amount of uncertainty as to their existence and as to whether they can be mined legally or economically. There is no certainty that the Preliminary Economic Assessment will be realized.

The head grade of concentrator feed during the first five years of operation is predicted to average about 0.73% copper. These grades are approximately double the average head grades in the later years of mining (after Year 20). The mill feed and head grades by year are plotted in Figure 16-8 below.

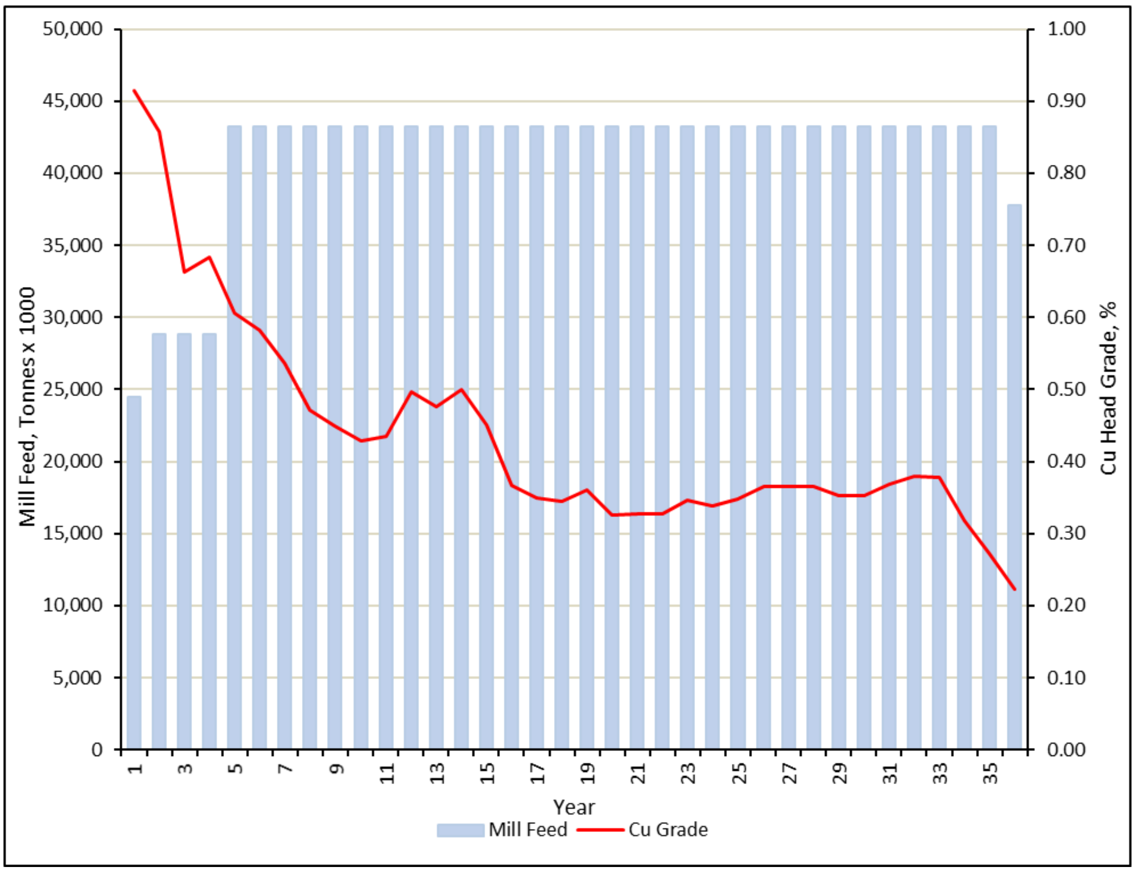


Figure 16-8: Mill Feed Rates and Head Grades

Mine preproduction stripping will be performed over a period of three years, including site preparation, a gradual build-up of the equipment fleet, and training of personnel. Pre-stripping targets for Years -3, -2 and -1 are 20, 40 and 64 M t, respectively, for a total preproduction stripping tonnage estimated at 124 M t. Figure 16-9 illustrates the concentrator feed and waste production rates over the mine's life.

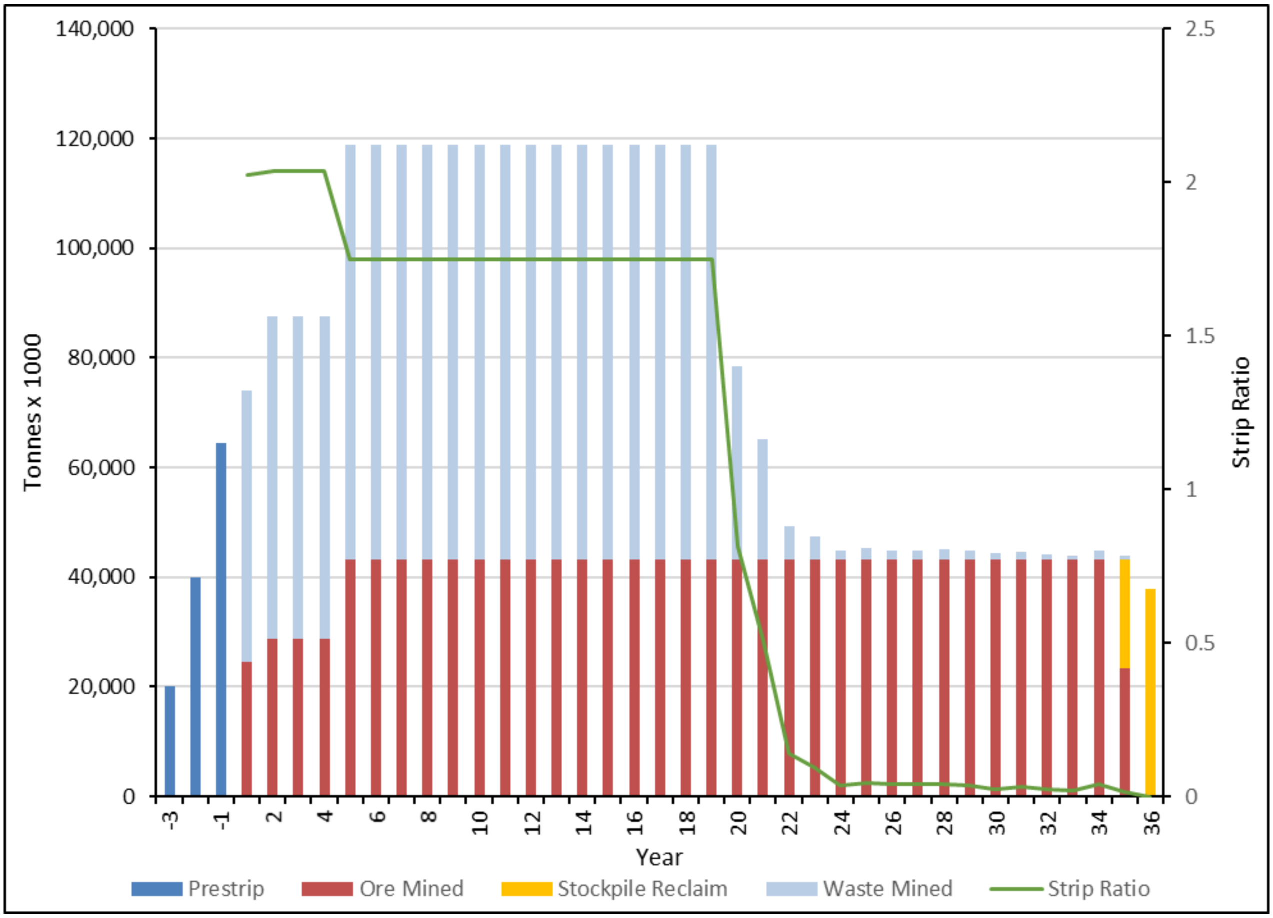


Figure 16-9: Concentrator Feed and Waste Mining Rates

No mineral resources have been classified as Measured at Los Azules. A breakdown of the LOM concentrator feed by resource classification is presented in Table 16-8 below. Approximately 60% of the LOM concentrator feed is classified as Indicated mineral resources, the remainder is Inferred. *Inferred mineral resources have a great amount of uncertainty as to their existence and there is no certainty that they may be upgraded by future exploration work.*

Table 16-8: Concentrator Feed for Life of Mine by Resource Classification

Classification	Contained Sulphide Mineral Resource*			
	Tonnes	Cu %	Au g/t	Ag g/t
Measured	0.0	-	-	-
Indicated	894	0.48	0.06	1.64
Inferred	594	0.33	0.04	1.34
Total	**1,488**	**0.42**	**0.05**	**1.61**

*Above variable cutoff grades ranging from 0.165% to 0.27% Cu

For the first five years of operations, pit development targets the highest copper grade supergene material to maximize the project's present value. Table 16-11 lists the concentrator feed by year, by resource classification for this time period. About 93% of this initial mill feed is classified as Indicated mineral resources and the remaining 7% is Inferred and of lower grade.

Table 16-9: Concentrator Feed for the First Five Years by Resource Classification

	Contained Indicated Resources*				Contained Inferred Resources*				Total Contained Resources*			
Year	Ktonnes	Cu%	Au g/t	Ag g/t	Ktonnes	Cu%	Au g/t	Ag g/t	Ktonnes	Cu%	Au g/t	Ag g/t
1	24,367	0.92	0.09	2.08	113	0.58	0.06	1.90	24,480	0.92	0.08	2.08
2	28,800	0.86	0.08	1.83	0	0.00	0.00	0.00	28,800	0.86	0.08	1.83
3	23,659	0.69	0.08	1.76	5,141	0.52	0.04	1.75	28,800	0.66	0.07	1.76
4	25,853	0.70	0.07	1.57	2,947	0.58	0.04	1.34	28,800	0.68	0.07	1.54
5	41,331	0.61	0.06	1.70	1,869	0.46	0.03	0.96	43,200	0.61	0.06	1.67
Total	**144,010**	**0.74**	**0.07**	**1.78**	**10,070**	**0.53**	**0.04**	**1.49**	**154,080**	**0.73**	**0.07**	**1.76**

Approximate mining sequence plans have been generated to illustrate the development of the open pit as per the mine production schedule (see Table 16-7) through Year 20. Figure 16-10 shows the projected pit progress at the end of: preproduction stripping (Year 1), Year 2, Year 5, Year 10, Year 15, and Year 20 to the nearest whole bench. Grids in the figure are on 1000 m intervals.

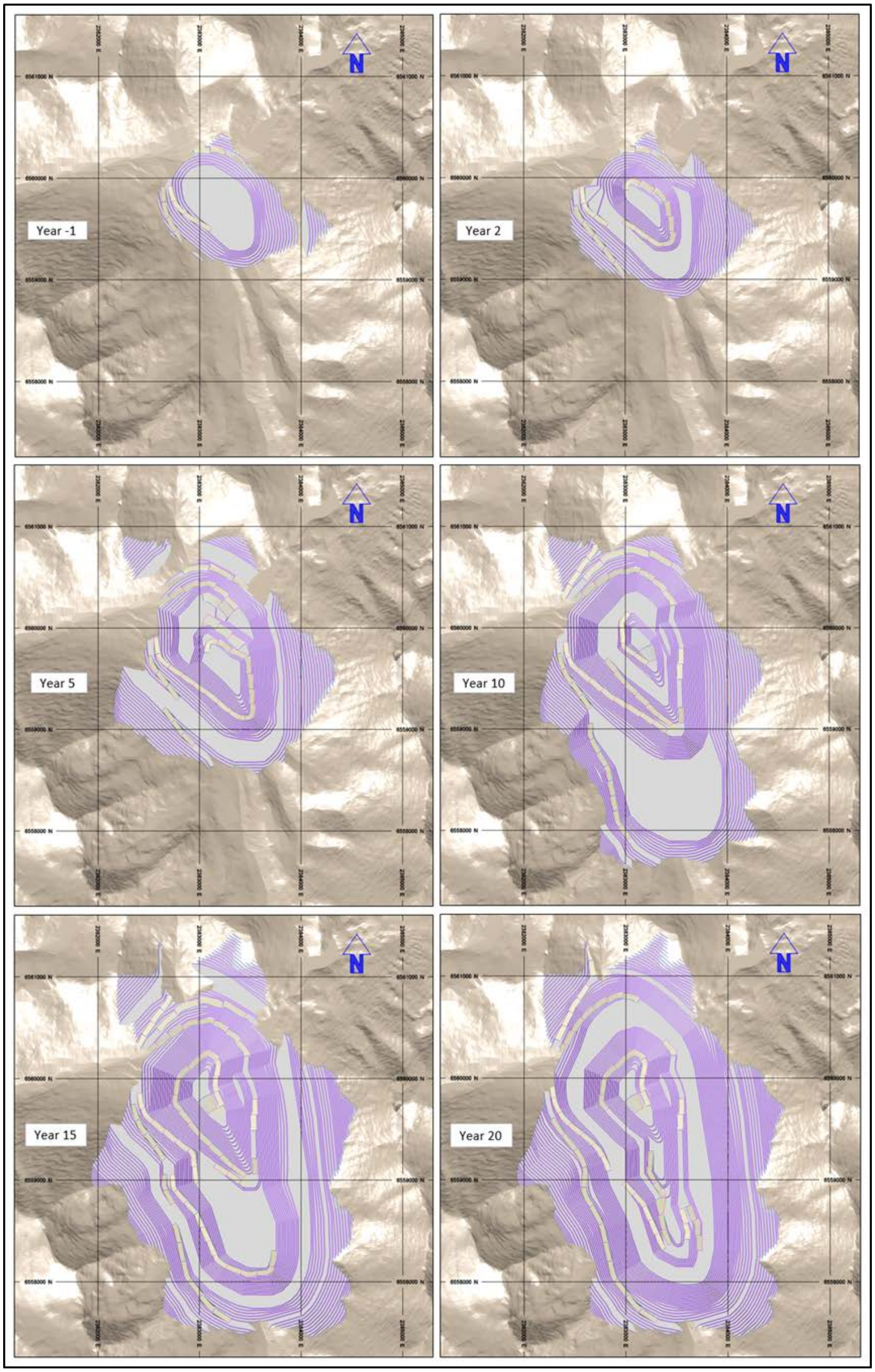


Figure 16-10: Approximate Pit Sequence Plans To Year 20

16.5 Waste Rock Storage Facilities

The Waste Rock Storage Facility (WRSF) is described in detail in Section 18 Project Infrastructure.

Nearly 1,510 M t of waste rock material will be mined to expose sufficient ore to meet the milling targets of the mine production schedule. Mine waste will be used in the construction of a working platform at the western rim of the open pit to support installation of the mine workshop, mine offices, primary crusher, and the low-grade ore stockpile. It will also be used for selected rock fill in the containment dam that impounds the tailings storage facility (TSF). The large majority of the waste rock will be placed in the designated WRSF located immediately west of the mine pit per the general arrangement plan.

The waste rock storage facility is illustrated below in Figure 16-11, at the end of processing in year 36, and in Figure 16-12. The WRSF has a storage capacity of approximately 1.5 billion tons, assuming a placement density of 2.0 tonnes/m^3 (the storage volume is 750 million m^3). Approximately 11% of the waste rock - about 84 million m^3 – will be incorporated into the tailings retention dam. The typical depth of the waste rock storage facility at its planned ultimate capacity is approximately 200 m in proximity to the tailings storage facility.

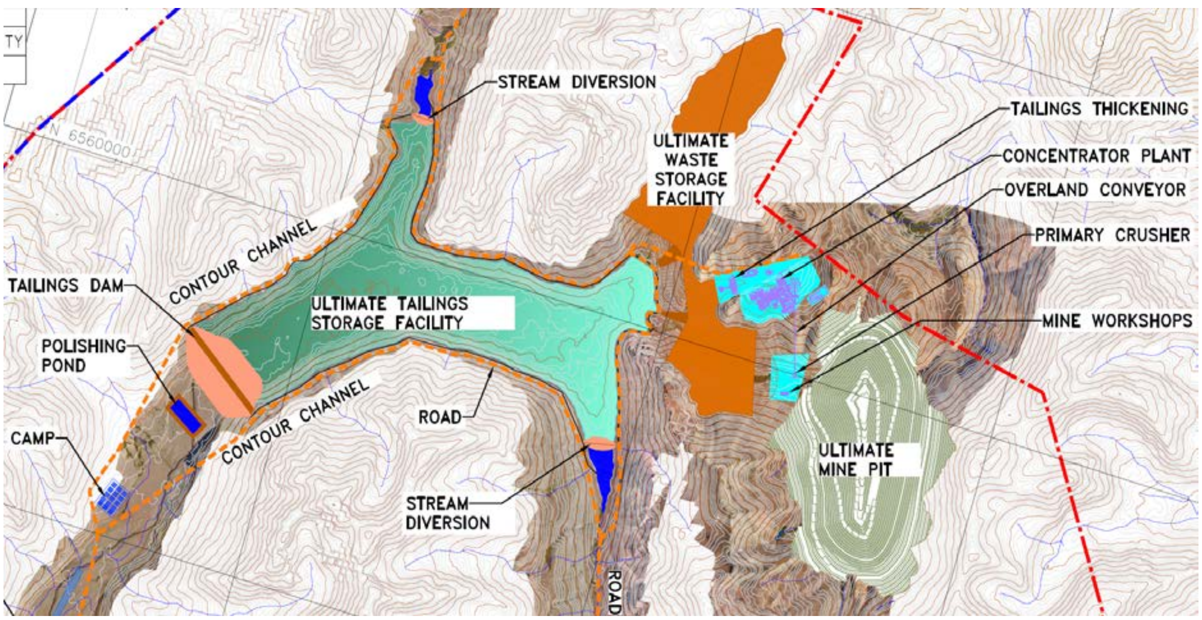


Figure 16-11: Extract from the Los Azules General Arrangement at Year 36.

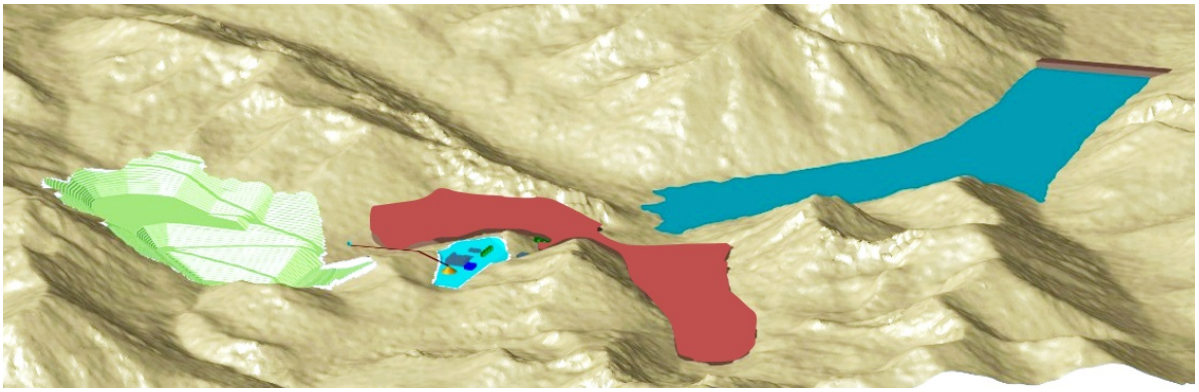


Figure 16-12: Perspective view of the proposed Waste Rock Storage Facility (Red) at Los Azules.

16.6 Mining Equipment

Large-scale open pit mining equipment operating on 15 m benches will be used to extract mineralized material and waste rock at Los Azules. Electric drills and electric rope shovels were chosen as the primary production units because of their lower operating costs and better reliability. The rest of the mining fleet would consist of diesel-powered machinery to provide maximum flexibility in pit operations.

The production schedule presented in Table 16-7 was used as the basis for equipment definition. It was assumed that the owner will perform all mining services, including preproduction stripping, blasting, and maintenance and repair activities. Mine operations are scheduled for 24 hours per day, 7 days per week, for a total of 360 days per year with provision for five days lost per year due to adverse weather and holidays. Four crews would provide continuous operator and maintenance labor coverage for the mine.

Auxiliary equipment will be used for miscellaneous earthworks and construction around the mine and the waste rock storage facility, equipment assembly and maintenance, fueling and lubrication services, transporting mine equipment and electric power cables, loading and unloading mining supplies and repair parts, transporting mine personnel, and other mine support duties. With the deposit centered at the valley bottom and the pit slope laybacks climbing the valley walls, a road building effort will be required to provide access and haulage routes to the upper benches of the mining pushbacks.

In the later phases of the pit life there will be a notable volume of material removed from high valley slopes for mine push backs which may require contractors or specific equipment. As the project planning progresses and designs are advanced this aspect will need further review. For this study, it has been assumed that the proposed mine fleet can perform these tasks.

The proposed primary production and support mining fleet will logically be the largest-in-class models and is shown in Table 16-10 following:

Table 16-10: Primary Production and Support Fleet

Primary Production and Support Fleet	
Equipment	**Peak Units**
Electric Crawler Rotary Drills (311mm)	9
Diesel Crawler Rotary Drills (311mm)	1
Secondary Percussion Drills	3
Electric Shovels, 56m3	5
Loader, 40m3	1
Haul Trucks, 363 tonne	26
Dozers, 635 kW	3
Dozers, 635 kW	2
Grader, 220 Kw	4
Other (utility loaders, water trucks, Towhauls, etc.)	18

Consideration in equipment selection will need to include the moderate altitude and the potentially low winter temperature extremes.

The build up of mining equipment numbers is illustrated in Figure 16-13.

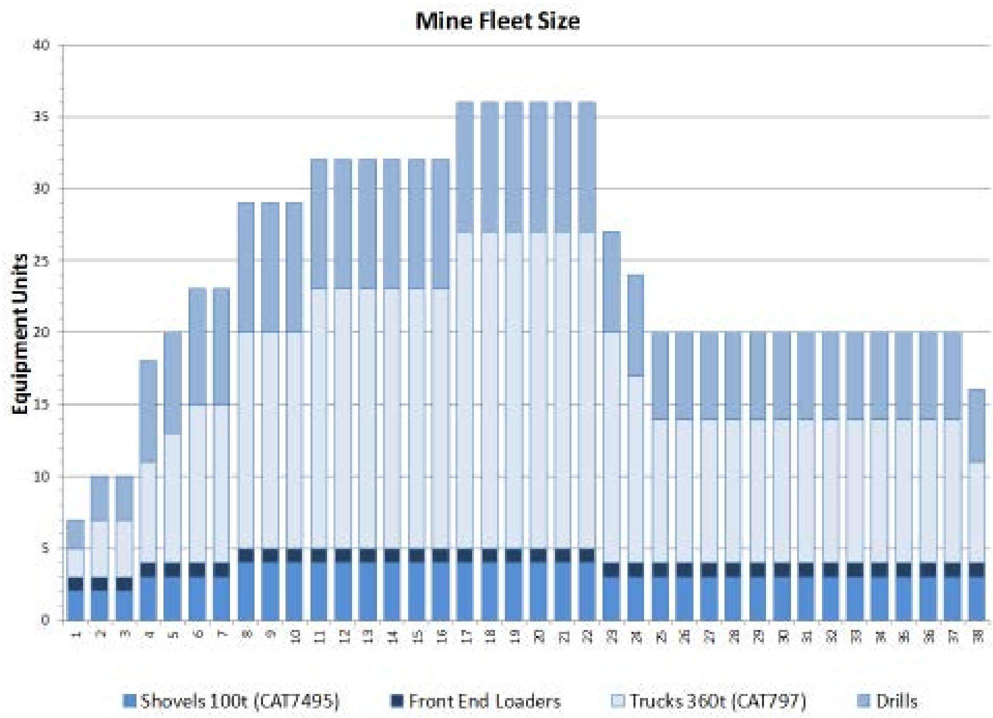


Figure 16-13, Primary Production Annual Equipment Unit Count

A portable crushing and screening plant with a rated capacity of about 500 t/h will produce crushed rock for blasthole stemming and road surfacing throughout the project area. A 30 t vibratory compactor will be needed for haul road maintenance/construction and engineered earthworks. Other auxiliary equipment will be used for miscellaneous earthworks and construction around the mine and WRSF sites, cleaning out minor ditches and sumps, equipment assembly and maintenance, fueling and lubrication services, transporting mine equipment and electric power cables, loading/unloading mining supplies and repair parts, transporting mine personnel, and other mine support duties.

16.7 Mine Workforce

Mine workforce requirements were estimated based on working 24 h, 7 d/wk, and 52 wk/y. A standard, four-crew rotating work schedule for craft labor and front-line supervision will be used for around-the-clock coverage. Expatriate personnel will be hired to help establish safe and efficient mine operations and maintenance systems, and to train Argentine nationals in proper work procedures. As the skill levels of national workers increase, expatriates will be phased out with the eventual goal of minimal expatriate staffing.

Mine personnel requirements are based on the owner performing mine production operations and primary maintenance. The use of contractors for supplemental preproduction stripping has not been incorporated into the workforce and mining cost estimates.

The peak mining department workforce is estimated at approximately 761 people, of which 392 for mine operations, 318 in mine maintenance, and 51 in technical services. An additional peak of 74 contract personnel have been included in the costing estimates for tire maintenance and, explosives delivery and supply.

The projected mine workforce is presented for selected years (1, 7, 13 and 20) in Table 16-11. A peak mine workforce of 789 is projected in Year 13.

Table 16-11: Mine Workforce for Selected Years

Position	Y1	Y7	Y13	Y20
Mine Operations: Supervision & Labor	296	360	376	328
Mine Maintenance: Supervision & Labor	218	281	298	247
Technical Services	51	51	51	51
Contract Services	42	64	64	64
Total Mine Department	**707**	**756**	**789**	**690**

16.8 Hydrogeological Pit Dewatering

An initial hydrogeologic investigation was completed in 2010 and a more extensive hydrologic and hydrogeologic investigation of the proposed pit area was completed in 2011 (Ausenco Vector, 2011). A total of eight standpipe piezometers and six vibrating wire piezometers have been installed, sixteen in-situ permeability tests have been performed and groundwater and surface water quality samples were collected and analyzed by an off-site laboratory. These studies have led to a conceptual understanding of the hydrology and hydrogeology in the area of the proposed open pit.

During pit development, saturated overburden and Tertiary volcanics including porphyritic dacite, dacite, and rhyolite tuff will be encountered. The overburden includes thick deposits of glacial outwash and alluvial materials in the valleys and the northern sectors of the pit, where the thickness can be over 80 m. The permeability of these materials is very high, although the spatial extent, as defined by borehole drilling and a seismic investigation, are limited. Once groundwater is removed from storage the flows from the overburden would be limited to the rate from abutting materials and infiltration.

Groundwater flow in the volcanic bedrock is primarily controlled by ubiquitous fracturing of the porphyritic diorite and geologic structures in the area. The steeply dipping Piuquenes Fault and possibly the Diagonal and Lagunas Fault could be areas of higher groundwater inflow and potentially inter-basin flow. As such, these fault zones warrant further investigation as part of subsequent studies. The degree of fracturing of the porphyritic diorite and the permeability associated with the hydrothermal breccia and fault zones suggest that groundwater inflow to the pit will be high. Numerical groundwater flow modeling suggests that during later stages of pit development the groundwater inflow to the pit will be in excess of 600 L/s.

Given the shallow depth to groundwater and the high permeability of the geologic units in the pit area, high capacity vertical dewatering wells both in-pit and outside the pit boundaries will be necessary. The in-pit wells will be used to remove groundwater occupying the pores and fractures in the rock mass within and surrounding the pit shell. These wells would be operated in advance of mining and are wells that would be consumed by the ultimate pit configuration. In all likelihood these wells will include both overburden and bedrock pumping wells. Overburden pumping could also be supplemented with pumping from shallow excavations (drains) in the areas where the depth to groundwater is shallow. Pit perimeter wells will also be needed to intercept water flowing to the pit from the surrounding groundwater system and to lower the water table behind the pit slopes. These wells will target primary groundwater flow paths and likely be targeted such that they intercept major fault zones (e.g. Piuquenes fault south of the pit). A sump or series of sumps will also be used to pump water out from the pit bottom accumulating from pit wall runoff and/or groundwater inflow not captured by wells.

Prior to discharge of mine water, pit water would be used in the process plant, or if not, routed either to a sediment pond or rapid infiltration basin (RIB). Additional geochemical studies are necessary to evaluate the geochemical characteristics of the pit wall rocks and the potential for acid rock drainage, which could result in the need for treatment of in-pit waters. Most groundwater will be intercepted prior to seeping into the pit using wells. Initial water quality data suggest that this approach may permit discharge of these waters without treatment (e.g. pH, metals, sediment etc.).

Additional hydrogeologic data collected outside the area of mineralization and at greater depths will refine the long-term dewatering requirements and cost estimates. Pumping tests should also be completed to determine the large scale hydraulic properties of the geologic materials in the pit area and evaluate boundary conditions in the flow system that may exert strong controls over groundwater flow in the area.

17. Recovery Methods

This section was prepared by M. Bunyard, C. Eng, FAusIMM, Hatch. The author has relied on information presented by Richard Kunter and Scott Elfen in the NI 43-101 Technical Report prepared by Samuel Engineering (2013).

The images used as illustrations in this section were provided courtesy of D. Brown and Glencore.

17.1 Process Flowsheet

The Los Azules Copper Concentrator is to be a conventional copper flotation circuit. A two-phased implementation approach requiring minimum initial capex is envisioned and is the preferred development strategy favoured by McEwen Mining.

Phase 1 implementation will have a daily throughput of 80,000 tpd over an average of 360 operating days per annum for an annualised throughput of 28,800,000 t.

Phase 2 will deliver a 50% increase in the mining rate and a 50% increase in the Copper Concentrator processing rate to 120,000 t per day for an annualised throughput of 43,200,000 t per annum

The process flowsheet for Phase 1 has been modeled upon the process flowsheet for the recently constructed and operating Antapaccay Copper Concentrator located in the high Andes of Peru . The Antapaccay Copper Concentrator operates at a similar altitude to Los Azules, processing similar porphyry ores of a similar copper and gold content to Los Azules in a similar climate and the Antapaccay plant is designed and constructed to withstand a similar seismic condition.

The illustrated flowsheet for Phase 1 is provided in Figure 17-1,

The Los Azules Copper Concentrator would be constructed on-site and will be comprised of comminution, flotation, concentrate and tailings handling sections. The comminution circuit consists of a single SAG mill feeding into two ball mills in parallel and with recycle pebble crushers (SABC). The comminution circuit is followed by a bulk flotation circuit, regrind mill and a copper cleaner circuit with concentrate thickener and concentrate filtration. Tailings thickening, tailings storage and associated contact water reclaim are part of the tailings storage facility (TSF).

Phase 2 of the implementation will commence in Year 3 to enable uprated operations to start in Year 5. The expansion comprises the addition of a second SAG mill, a third ball mill and additional flotation capacity.

The illustrated flowsheet for Phase 2 is provided in Figure 17-2.

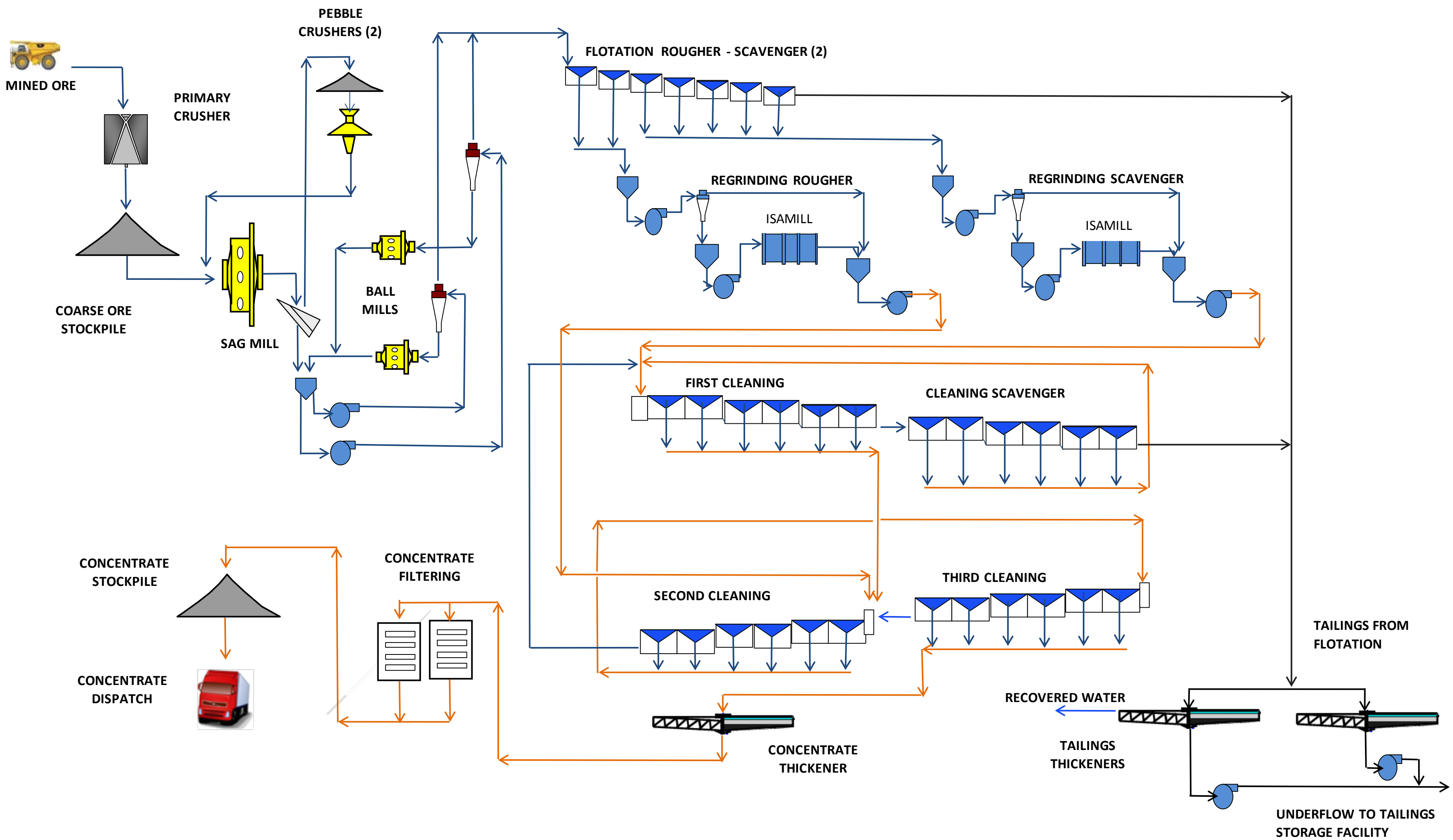


Figure 17-1 : Phase 1 Flowsheet – 80ktpt Process Plant

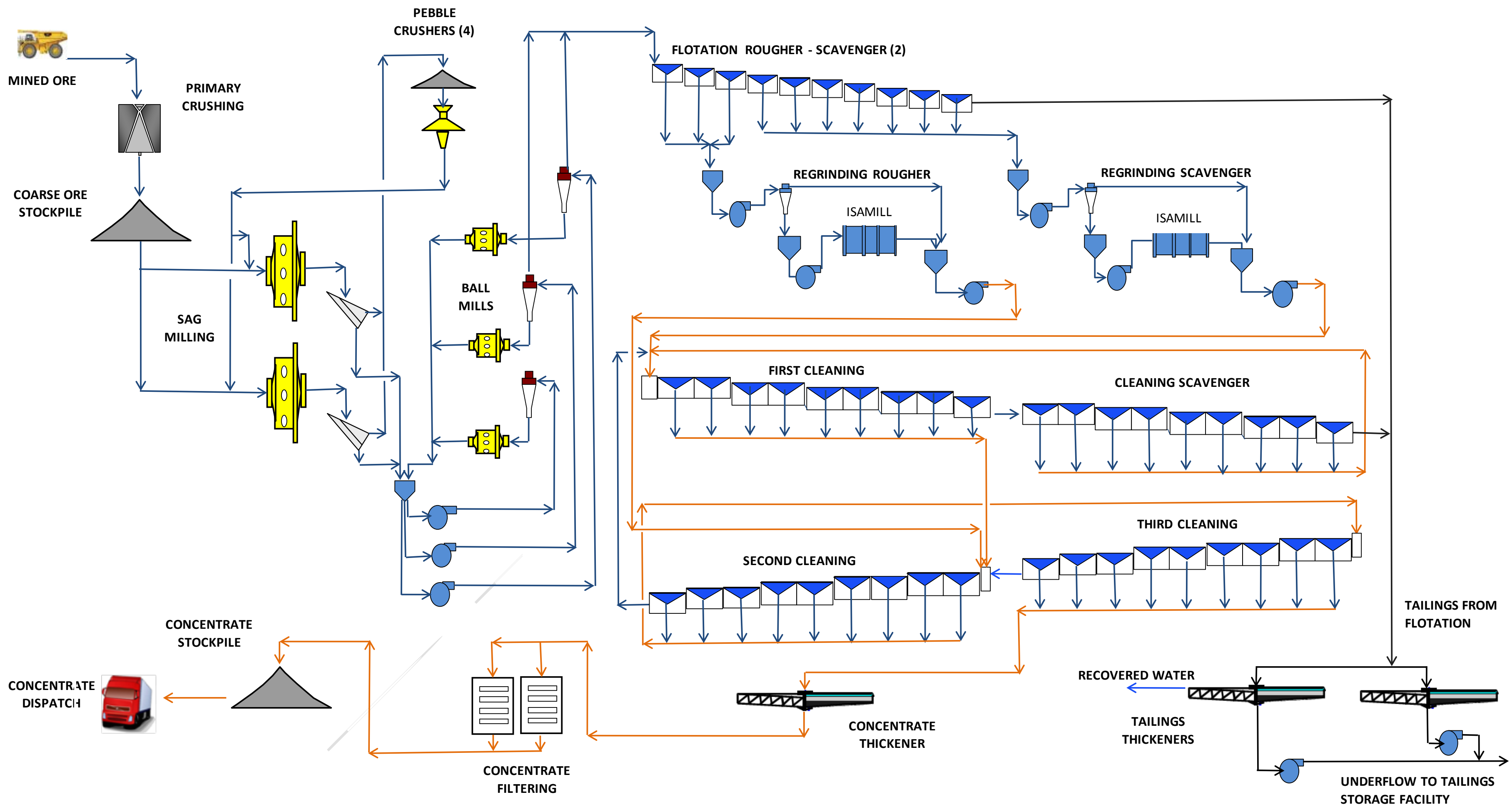


Figure 17-2 : Phase 2 Flowsheet – 120ktpd Process Plant

17.2 Process Plant Location

17.2.1 General Arrangement of Los Azules Site Installations

The 2017 General Arrangement of the Los Azules Process Plant and the supporting infrastructure differs substantially from the general arrangement presented in the 2013 PEA.

Figure 17-3 illustrates the position of the Process Plant within the Overall Site General Arrangement and Figure 17-4 is a general arrangement of the Process Plant site.

The Los Azules mine is developed as a large open pit with a single large waste dump to be in close proximity on the west side. The primary crusher is to be located in proximity to the side ultimate pit rim. The concentrator process plant site facility is to be developed on a platform 175 m above and to the north of the primary crusher with the tailings storage facility further to the west of the waste dump.

The General Arrangement configuration developed for the Los Azules mine development was determined to be the most suitable life of mine arrangement and has been reviewed against the following criteria:

- To utilise gravity in all materials handling and processing wherever practical.
- Minimises vertical and horizontal mined-material haulage distances.
- Ensures the general arrangement footprint is entirely within the boundaries of both the company owned land and the company's mineral concessions and is accessed by legal easements.
- Minimises the area of the environmental footprint while delivering an ultimate life of mine development footprint that can be logically rehabilitated into the natural environment after the cessation of mining activities.
- Ensures that any potential for environmental incidents is inherently considered and that any spillage incident can be retained by gravity within the facility footprint.
- Ensuring that developed installations and infrastructure will deliver separation of contact water from non contact water by gravity flow with all contact water retained for recycling use in the processing facilities.
- Facilities will only be developed at fundamentally geotechnically stable sites in competent ground and not at risk from landslips under seismic and non seismic conditions or by avalanches even under extreme snow fall conditions.
- The tailings storage facility and the mined waste dump will be developed at sites that have potential for future expansion to a capacity exceeding the current life of mine requirements.
- The development will create opportunities to benefit the community and the environment during and after the development phase and after the completion of operations.

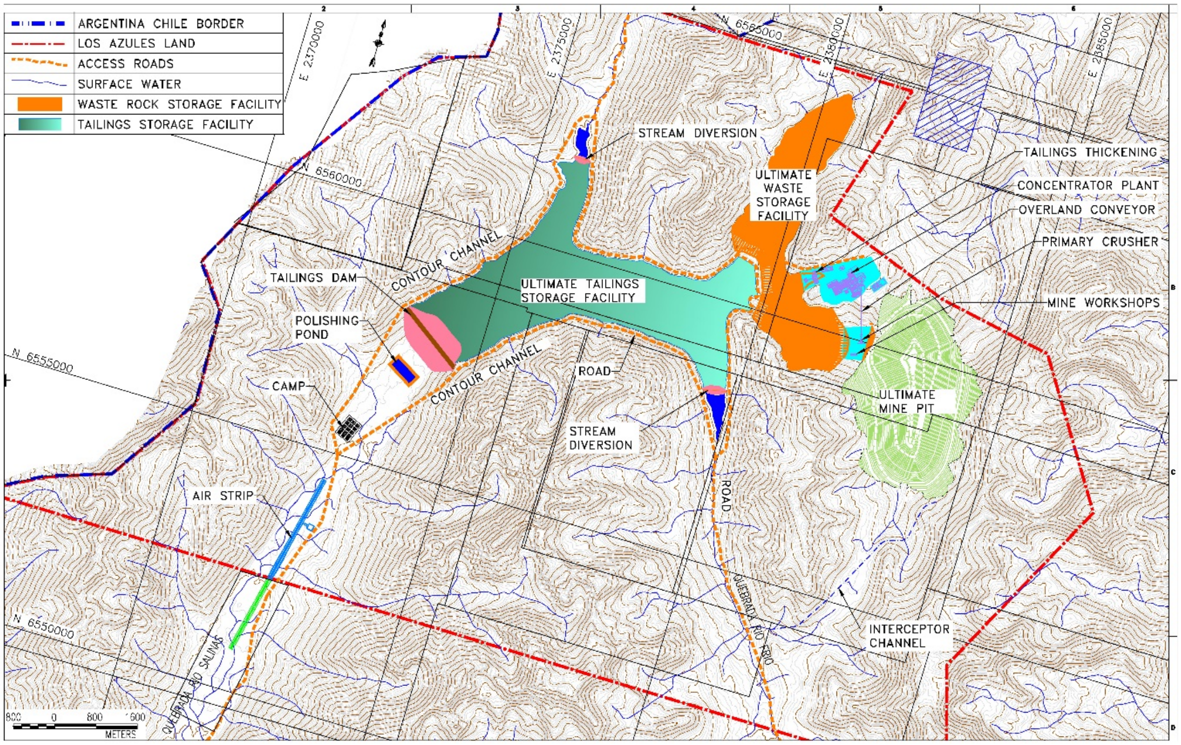


Figure 17-3: General Arrangement of Los Azules Site Installations & Infrastructure.

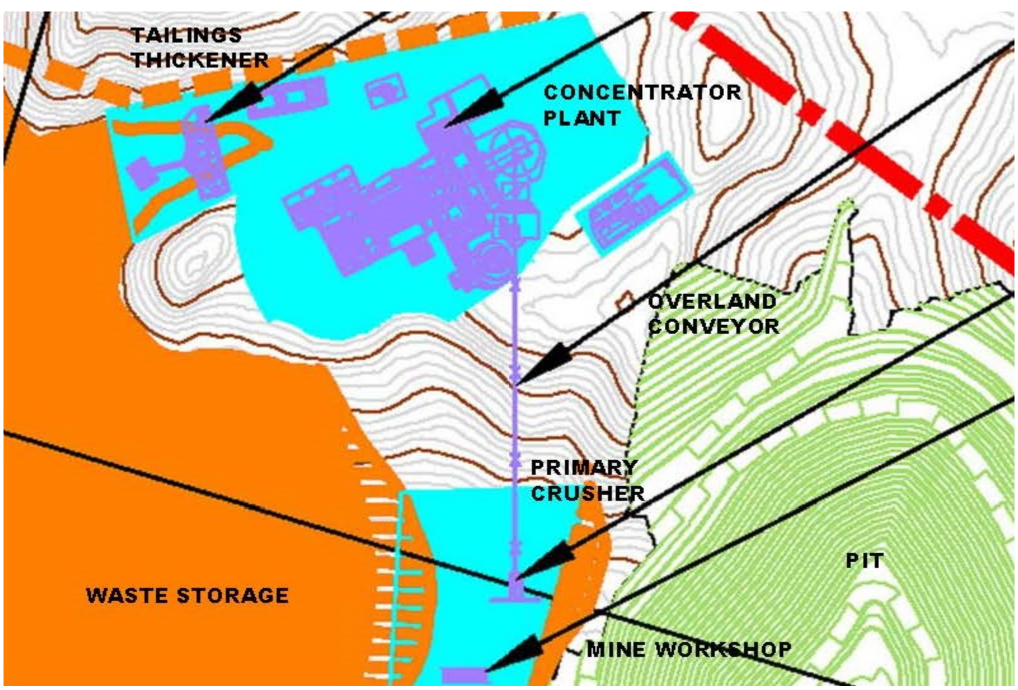


Figure 17-4: General Arrangement of Los Azules Processing Plant.

17.2.2 Location of Processing Plant Site

The Los Azules Concentrate Process Plant is to be located at 175 m higher elevation and 1.7 km immediately north of the primary crusher facility and to the north west of the mine pit.

The site is within hard Rhyolite type rock generally presenting at the surface and largely free of glacial till. The lake in the picture, Figure 17-5, is approx. 1 m deep and of a temporary nature and supports no life or vegetation. The site is fundamentally geotechnically stable and can be expanded to the east and west sides. Development of the facility platforms will be by performing balanced-quantity cut to fill and controlled compaction earthworks processes involving material movement of approximately 3 Mm^3.

Access to the Process Plant platform involves forming at least two easy gradient roadways suitable for transport of over size and overweight loads and two way traffic. The terrain and the geotechnical condition enable shallow excavations for roads to be performed generally without drilling and blasting.

The process plant site platform is formed at a general at approximate elevation 3,775 m and while this is higher elevation than both the mine site and the primary crusher it is approximately 100 m lower than an alternative plant site elevation envisaged in the 2013 PEA.

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Figure 17-5: Looking East over the Los Azules designated Process Plant Site.

This Google Earth screen capture illustrates the barren rocky site above the mine and the primary crusher site.

17.2.3 Primary Crusher Location

The primary gyratory crusher will be located at the closest and safest site in proximity to the lowest elevation section of the ultimate pit rim. This lowest possible elevation location minimises both horizontal and vertical haulage for transport of ores from the mine to the primary crusher. The primary crusher site is located within what is presently a broad valley but which will be filled with competent compacted mined waste material to provide a large working platform suitable for the storage of low grade ores for later stage crusher feed.

The location of the primary crusher will be for the life of mine and the gyratory crusher will have sufficient installed power and capacity to process the ores at the Phase 2 implementation rate of 120,000 tonnes per day.

Figure 17-6 illustrates the primary crusher station installed at Antapaccay.

Figure 17-6: Photo of the Antapaccay Copper Primary Gyratory Crusher with two trucks in position for reverse dumping.

17.2.4 Location of Coarse Ore Conveyor

The Coarse Ore Conveyor extends from the underside of the primary crusher station and rises 170 m across 1.7 km of stable barren hard rock terrain to the process plant site platform at elevation approx. 3,775 m and will deliver ore into the conical "coarse ore stockpile" as feed for the concentrator plant. The gradient of the conveyor belt at its steepest section is still within normal operating limits. Figure 17-7 shows a typical conveyor installation.

Figure 17-7: Photo of the coarse ore overland conveyor delivering coarse ore.

17.2.5 Concentrator Facility Locations

Location of Concentrator Plant

- Process Plant elevation is the primary consideration in locating the concentrator plant at this relatively elevated site in order to eliminate the very high costs of operating and maintaining a pumped system and also to remove the potential for disruptive operating upsets and any environmental impacts from failures that may occur within a pumped and pressurized tailings pipeline. The selected process plant elevation of 3775 m enables gravity-handling of all tailings from the concentrator plant reporting into the TSF for the life of mine.
- Process Plant proximity to the mine and primary crusher enables optimal capex for the installations and optimal opex for the coarse ore feed transportation to the concentrator site. Access will be by one or by two roads that will not have challenging gradients or challenging turning radius curves.
- The site is in proximity to both the reclaim-water returned from the TSF and the fresh make up water sources.
- Critically the site is centrally located within the catchment that reports into the TSF. Any spills or plant upsets no matter how caused over the life of mine if not otherwise intercepted cannot escape beyond the tailings storage facility and cannot report into the environment beyond the tailings dam.

Figure 17-8: Photo of the Antapaccay Copper Concentrator in Peru.

Figure 17-8 shows Glencore's Antapaccay Concentrator Plant in 2014 operating at 80,000ktpd with the coarse ore conveyor and coarse ore stockpile cone in the rear ground. The large building structure is the comminution process area which will be enclosed at Los Azules against any adverse seasonal climate conditions.(the building is now enclosed at Antapaccay) The flotation area is in the right foreground being a series of tanks descending in elevation. Pebble crushing can be seen in the right rear ground, the transformer and electrical substation in the left foreground with power supplied via the last transmission tower of a transmission line in the very bottom left.

17.2.5.1 Location of Tailings Thickening

- The Thickener installations are situated to the west of the Copper Concentrate Process Plant on a large platform at approximately 25 m lower elevation than the Concentrator plant site.

Figure 17-9: Antapaccay Tailings Thickeners

The photo in Figure 17-9 shows two thickeners recovering reclaim water from the tailings for reuse in processing plant prior to discharge of the tailings into the TSF

17.2.5.2 Location of Electrical Substation Installations

- The Electrical substation is situated in close proximity to the concentrator plant to minimise cable lengths and current losses. The ultimate transmission tower from the incoming power connects into the substation.

17.2.5.3 Location of Process Water Tanks

- Process water comprises return-water being water returned into the system from the various stages of the concentrator production process such as the filtrate water from the concentrate filters and the reclaim water from the tailings thickeners.
- These waters are pumped to large storage tanks located on a bench elevated above the process plant by approx. 50 m to enable gravity flow to various pumping installations.
- In this location the process water tanks also receive contact-water pumped and piped from the mine pit and also from the tailings dam. Finally an amount of make up water will be drawn from the mine pit perimeter dewatering wells or otherwise from surface stream run off and pumped and piped to these elevated water tanks.

17.2.5.4 Location of Concentrate Filtering, Storage and Truck Loading Facility

- The filter plant and feed tanks and the negative pressure concentrate storage building are generally situated in close proximity to each other with easy access for concentrate haul trucks to drive through the concentrate storage building. At Los Azules this facility will be on the lower facility platform in proximity to the Tailings Thickeners to the west of the main process plant.

- In this location the concentrate haulage trucks will not have any interface with the concentrator plant site roads, vehicles or pedestrians.

Figure 17-10: Antapaccay Concentrate Filter Plant

The photo in Figure 17-10 shows a concentrate filter plant with the concentrate feed tanks that contain the concentrate slurry in the rear ground. The drive through warehouse for the filtered concentrate in the foreground. Trucks are loaded within this building and transport the concentrate to a port for shipping

17.3 Process Plant Description

17.3.1 Process Plant Capacity - Phase 1 Implementation of 80,000 tpd

The process plant facility will be designed to treat an average of 80,000 t per day of concentrator feed for 360 days per annum. It will operate 24 hours per day seven days per week. The copper will be recovered in a copper flotation process delivering a copper concentrate with a copper content of approximately 30% and with credits of silver, gold and molybdenum. A gravity separation circuit to extract a gold doré from the concentrate can be considered for initial installation or retro installation. The concentrates are filter pressed to a moisture content of approx. 9% and then trucked from site.

17.3.2 Crushing and Coarse Ore Stockpile

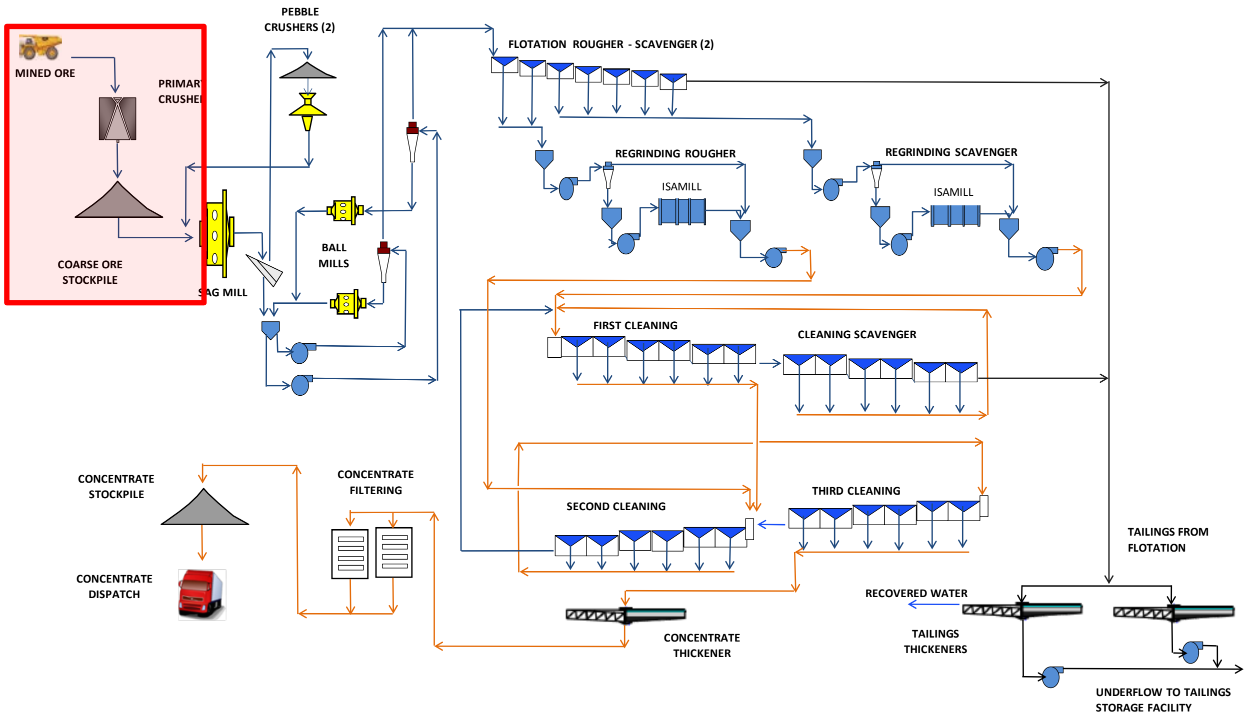


Figure 17-11: Primary Crushing and Coarse Ore Storage

Run-of-mine (ROM) material will be trucked from the mine work-faces up to the primary crushing plant and direct tipped into the crusher feed hopper. Trucks will be able to discharge from three positions into the crusher at the 0° position, 90° position and the 180 position. The primary crusher (60” x 110” gyratory) crushes the ROM (top size of 1,500 mm) to a product size of P_{80} 100 mm. The primary crusher station will have a hydraulic rock breaker to manage any large blocks that may bridge out the crusher mouth. Crushed ore passes down through the crusher and reports onto an apron feeder that controls the discharge rate onto the overland conveyor belt. A large electromagnet (pictured below Figure 17-12) will be installed to remove any tramp ferrous content, it is positioned at the point of discharge onto the overland conveyor belt.

The coarse ore is transported by the overland conveyor, to be rated at 7,500 t/hr (suitable for Phase 2 also) and delivered into the coarse core conical stockpile to the west of the process plant. The stockpile has a live capacity of 120,000 t and a total capacity approximately double the live tonnage, with more capacity possible if a bulldozer or loader pushes out the stockpile.

Figure 17-12: Tramp Magnet Installation

17.3.3 Grinding

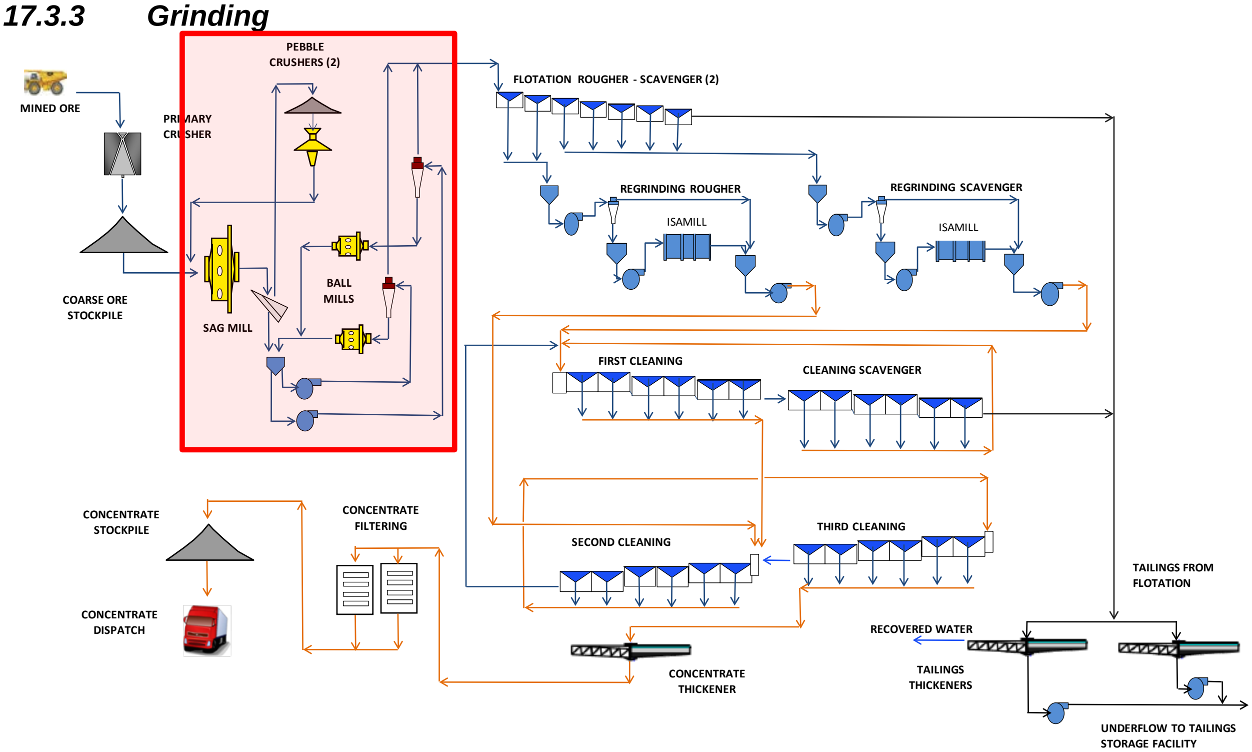


Figure 17-13: Grinding and Classification

Material from the coarse ore stockpile will be reclaimed via 3 reclaim feeders located within the reclaim tunnel constructed below the stockpile. The feeders control the rate of material delivery reporting onto the SAG mill feed conveyor that delivers into the comminution circuit.

The photo below, Figure 17-14, shows reclaimed coarse ore on a SAG mill feed conveyor.

Figure 17-14: SAG Mill Feed Conveyor

The comminution circuit is comprised of one semi-autogenous grinding (SAG) mill (40’ x 22’) and two ball mills in parallel (26’ x 40’ each). The SAG mill discharges through a trommel screen onto a vibrating screen and the screened oversize material (critical size) reports to a conveyor that takes it to the pebble stockpile, see photo Figure 17-16 below Two pebble crushers operating in parallel crush the pebbles before returning them to the SAG mill feed conveyor. Cyclone classification is employed to produce the required particle size distribution of approximately 80 percent passing (P_{80}) 175 µm.

The photo in Figure 17-15 below is the comminution circuit at the operating Antapaccay Concentrator in Peru with the single SAG mill in the rear ground distance feeding into the two ball mills in the foreground

Figure 17-15: Antapaccay Comminution Building

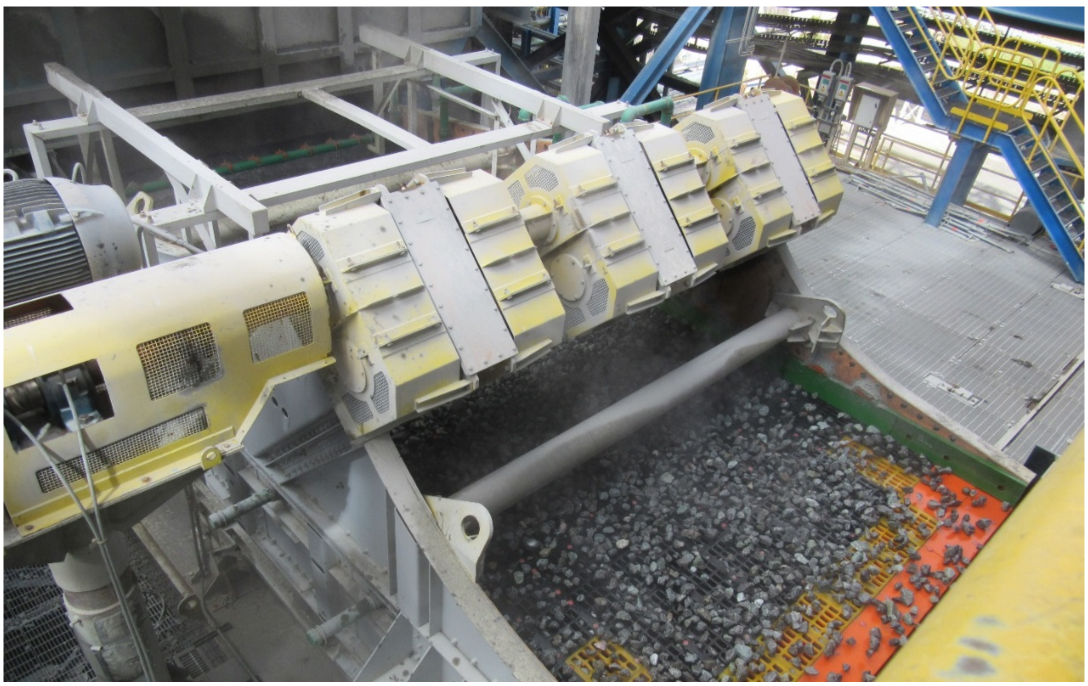


Figure 17-16: SAG Mill Discharge Screen

17.3.4 Flotation and Regrind

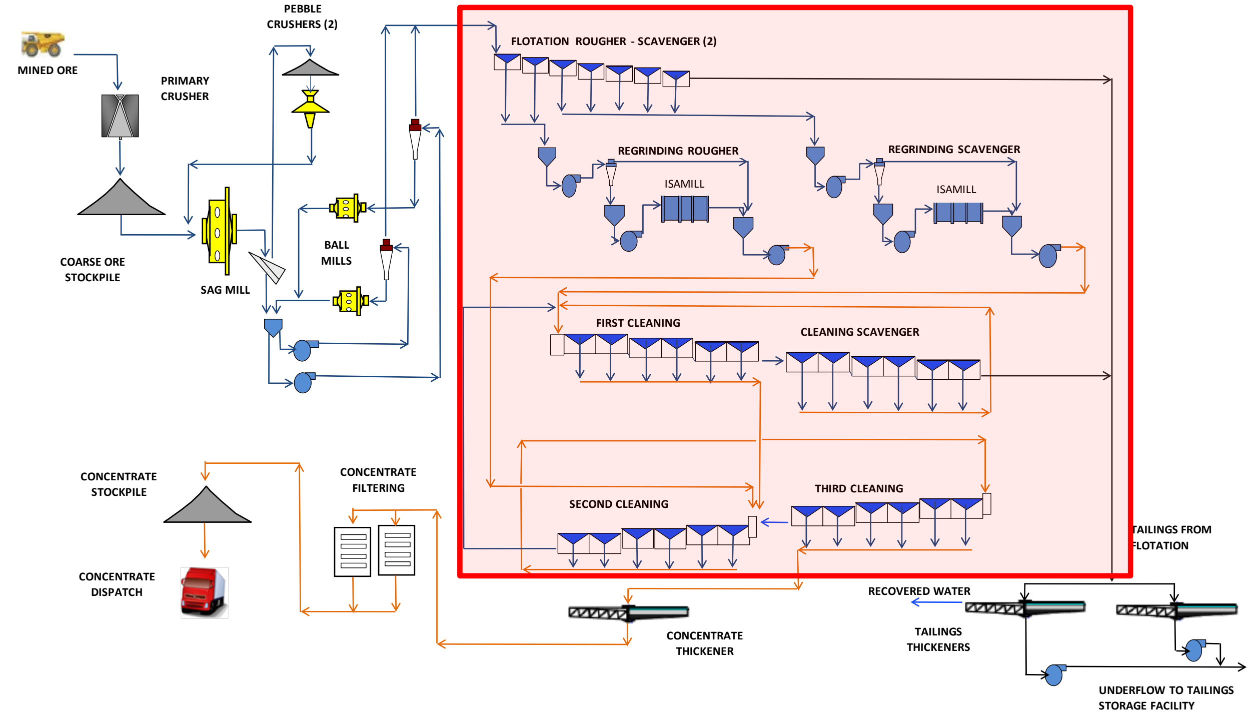


Figure 17-17: Flotation and Regrind Circuit

17.3.4.1 Rougher Cells

The ball mill cyclone overflows from each cyclone cluster (one cluster per ball mill) are combined in the rougher feed distributor box and then redistributed between two parallel rougher/scavenger flotation circuits (seven cells, 257 m^3 per cell per circuit).

The rougher flotation concentrate (from the first two cells of each circuit) are combined and directed to a dedicated regrind circuit. The rougher concentrate is classified to a nominal particle size of 40 µm in a dedicated hydrocyclone cluster. Cyclone underflow is reground in an ISA Mill.

Cyclone overflow is combined with the regrind mill discharge and sent to the second cleaner flotation circuit.

The photo in Figure 17-18 shows an operating cyclone cluster – one cluster is installed per ball mill.

Figure 17-18: Hydrocyclone Cluster

17.3.4.2 Scavenger Cells

The last five cells of each rougher/scavenger flotation circuit operate as scavenger cells. Scavenger concentrate from both circuits are combined and directed to a dedicated regrind circuit. The scavenger concentrate is classified to a nominal particle size of 25 µm in a dedicated hydrocyclone cluster. Cyclone underflow is reground in an ISA Mill. Cyclone overflow is combined with the regrind mill discharge and sent to the first cleaner flotation circuit.

Tailings from the two scavenger circuits are combined with the cleaner scavenger flotation tailings and sent to the tailings thickeners. Two tailings thickeners of 78 m diameter will operate in parallel whereby thickener underflow is discharged via gravity into the tailings storage facility. Tailings thickener overflow from both thickeners is combined and sent to the process water pond where it is reclaimed and pumped back into the process water tanks.

17.3.4.3 Cleaner Cells

The first cleaner flotation cells consists of six 70 m^3 tank cells. First cleaner flotation feed is comprised of scavenger concentrate regrind product, cleaner scavenger concentrate, and second cleaner tailings. First cleaner concentrate reports to the second cleaner flotation cells (six 50 m^3 tank cells) and first cleaner tailings reports to the cleaner scavenger flotation cells (six 70 m^3 tank cells).

Second cleaner flotation feed is comprised of first cleaner concentrate and rougher concentrate regrind product. Second cleaner concentrate reports to the third cleaner flotation cells (six 30 m^3 cells) and second cleaner tailings report to the first cleaner flotation cells.

Third cleaner flotation feed is made up of second cleaner concentrate. The third cleaner concentrate (final concentrate) reports to the concentrate dewatering circuit, and the third cleaner tailings report to the second cleaner flotation circuit.

The photo in Figure 17-19 below shows a sequenced installation of rougher, scavenger and cleaner cells

Figure 17-19: Flotation Circuit

17.3.5 Concentrate Thickening

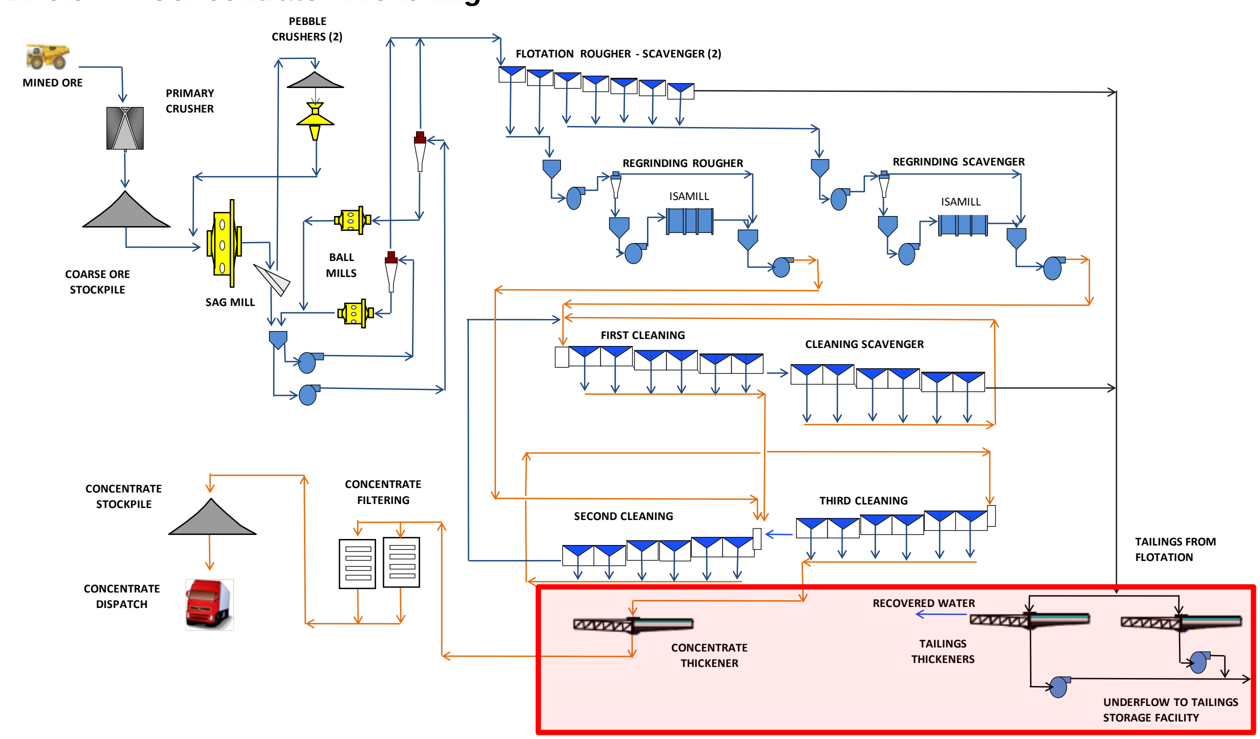


Figure 17-20: Concentrate and Tailings Thickening

The final copper concentrate has a slurry density of 15% solids by weight when it discharges from the third cleaner flotation circuit. It is thickened to 55% solids by weight in a 43 m thickener

The photo in Figure 17-21 below shows a concentrate thickener under construction.

Figure 17-21: Concentrate Thickener Under Construction

17.3.6 Concentrate Filtration

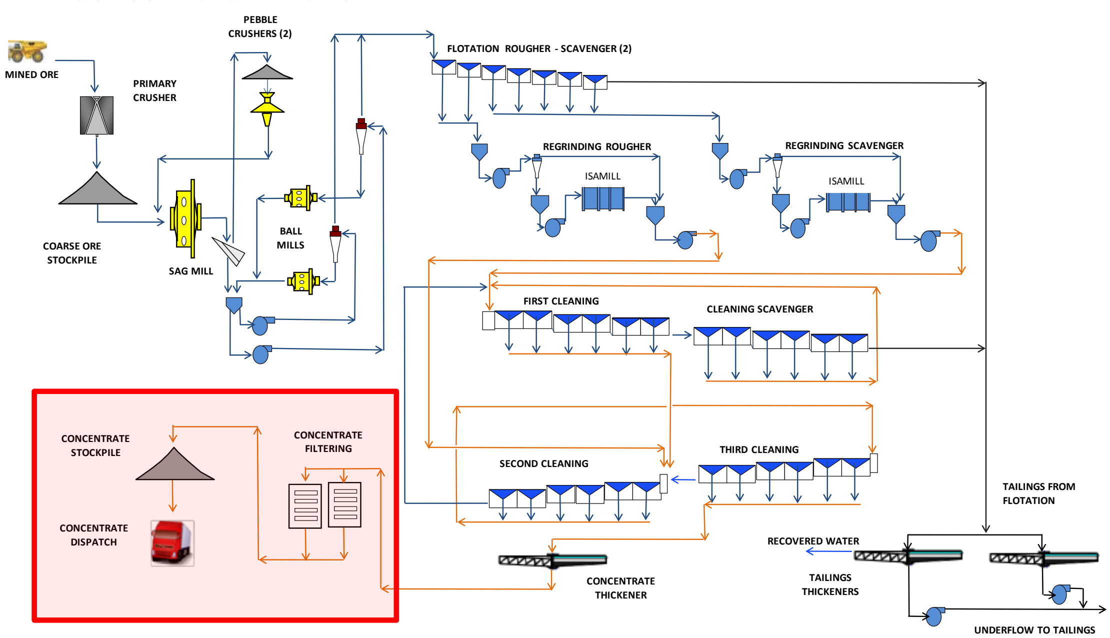


Figure 17-22: Concentrate Filtration

A filter plant containing two vertical pressure-type filters in parallel dewater the copper concentrate to 92% solids by weight. The copper concentrate filter cake is conveyed and stored at the concentrate stockpile and subsequent loading of the concentrate into trucks and export logistics Filtrate water is returned to the concentrator thickener feed tank.

17.3.7 *Tailings*

It is estimated that over 98.7% of the ore material mined and processed will be discharged into the TSF as waste. Current estimates predict the life of mine deposition into the TSF to be approximately 1,470 million tonnes of solids.

The photo in Figure 17-23 is the Tailings Storage Facility at Las Bambas Peru where a PVC liner is placed over a concrete dam face.

Figure 17-23: Tailings Storage Facility

17.4 Expansion to 120,000 tpd

After the initial four years of operations at 80,000 tpd the process plant will increase annual throughput capacity by 50% for an annualised throughput of 43,200,000 tpy of concentrator feed (average of 120,000 tpd for 360 operating days per year).

The following process flowsheet, Figure 17-24, and subsections highlight the required additional capacity in each major processing area to achieve the desired increased throughput.

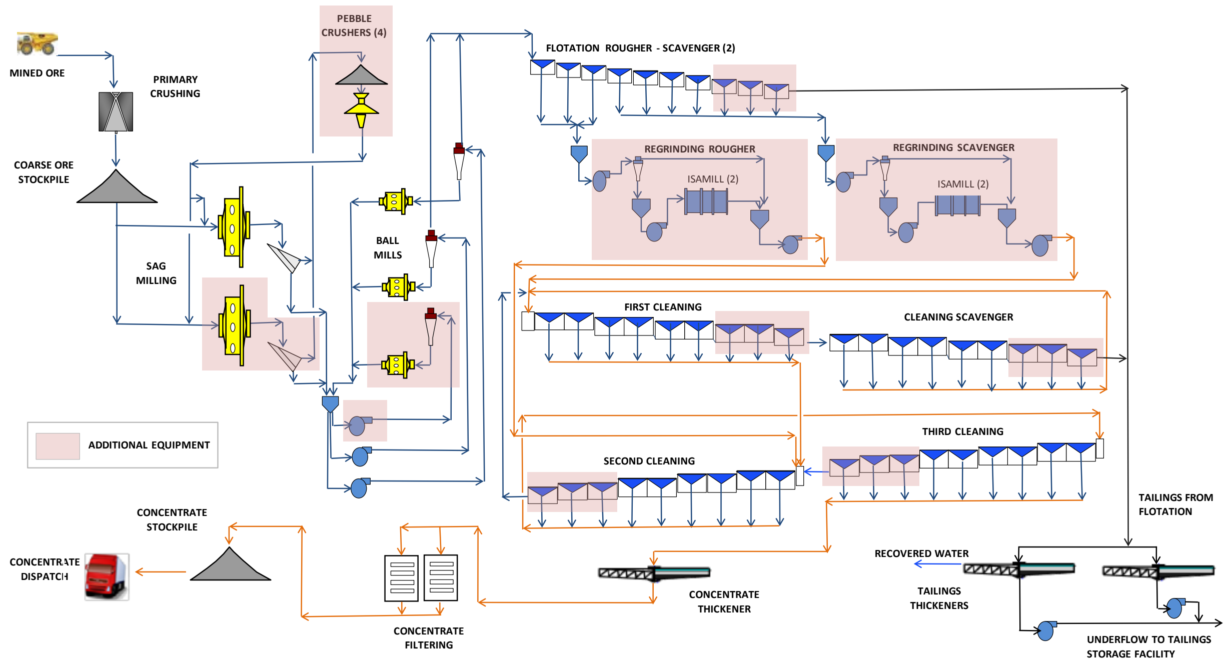


Figure 17-24: Phase 2 Flowsheet – 120ktpd Process Plant

17.4.1 Primary Crushing

No additional equipment is required, the installed 60” x 110” gyratory crusher will be able to handle the additional throughput with a small increase in the product size.

The feeders and conveyors installed in the crushing and stockpile area for Phase 1 are sized to handle the increased throughput in Phase 2.

17.4.2 Comminution

The SMC testwork results, refer section 13.1.1, were used to calculate a theoretical maximum daily throughput capability by ore type. The project mine plan was then used to determine a weighted average of theoretical daily capacity.

The initial analysis assumed a second 24 MW SAG mill and a third 16.4 MW ball would be installed and operational by Year 5 to achieve 120,000 tpd.

The results of the analysis are shown in Figure 17-25.

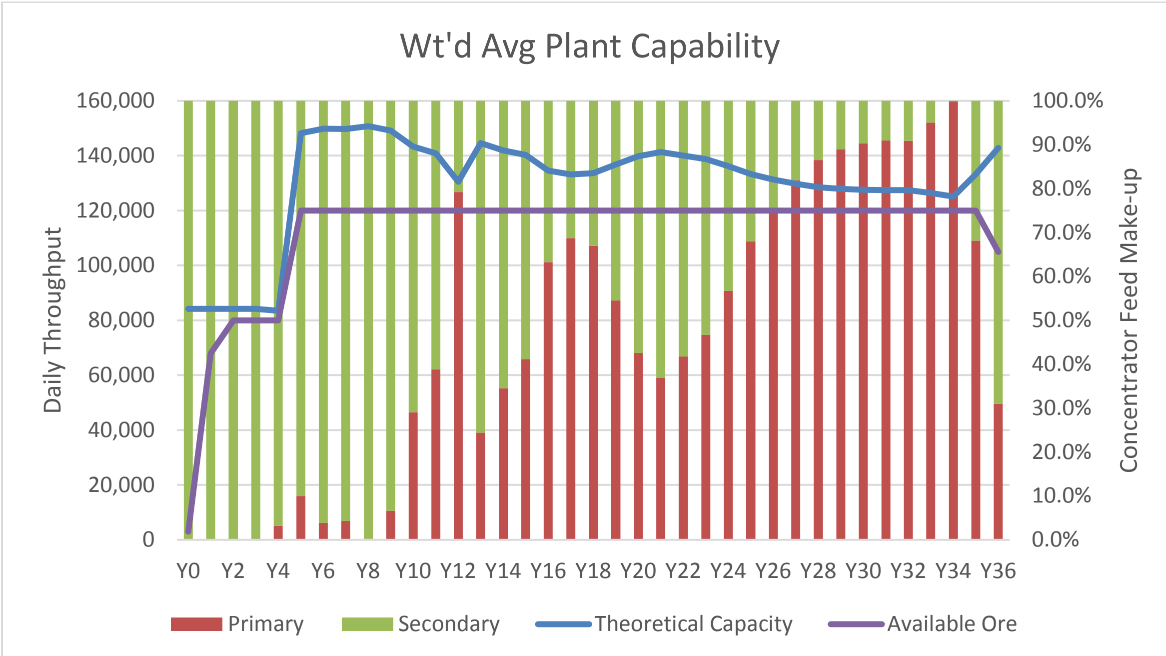


Figure 17-25: Theoretical Plant Capacity

The blue line shows theoretical capacity by year and how it compares to the available concentrator feed (purple line). The analysis shows that in years where the primary sulphide (the harder of the ore types) makes up a more significant portion of the plant feed, the additional SAG mill and ball mill should provide adequate capacity.

The additional SAG mill will require increased pebble crushing capacity. For consistency of spare parts and operability two additional pebble crushers (identical capacity to those installed for 80k tpd) will be required.

Additional testwork on rock competency for both mineralized types, primary and supergene, may show different theoretical capabilities and potentially present an opportunity to revisit the selected mill sizes. For the purposes of the PEA, the SAG mill and ball mill sizes as described above have been carried for the financial analysis.

17.4.3 Flotation and Regrind Milling

The increased plant throughput will require additional flotation cells to ensure adequate residence time. An increase of 50% throughput will therefore likely require 50% additional flotation cells. The additional flotation cells required for the 120,000 t per day expansion are:

- Six rougher/scavenger cells (257 m^3 each)
- Three first stage cleaner cells (70 m^3 each)
- Three second stage cleaner cells (50 m^3 each)
- Three third stage cleaner cells (30 m^3 each)

- Three cleaner scavenger cells (70 m^3 each)

To handle the increased concentrate tonnages, two additional regrind mills will be required (one for rougher concentrate, one for scavenger concentrate). For consistency of spare parts it is recommended that the two additional mills be of the same size as those installed for the 80,000 tpd plant.

17.4.4 Dewatering

17.4.4.1 Concentrate Dewatering

The 43 m thickener in the initial (80,000 tpd) plant design is sufficiently sized to handle the 120,000 tpd throughput. In later years of the mine life the primary sulphide zone makes up a larger portion of the plant feed (Figure 17-25). Testwork has shown the primary sulphide zone to have a lower mass pull to concentrate then the supergene zone. The overall concentrate production rate in later years of the mine life is therefore only slightly higher than the initial 80,000 tpd scenario even though the plant throughput is 50% higher.

17.4.4.2 Tailings Dewatering

Analysis of the tailings dewatering circuit has shown that the 80,000 tpd case requires two thickeners of approximately 60 m diameter (operating in parallel). For the 120,000 tpd case two thickeners of 78 m thickener are required. Due to the relatively small difference in cost of a 60 m thickener and a 78 m thickener, it is recommended that two 78 m thickeners be installed for the initial plant design which will cover both production scenarios.

18. Project Infrastructure

This section was prepared by D. Brown, CPEng, McEwen.

18.1 Introduction

Project infrastructure includes:

- Roads access in Los Azules and internal access and haul roads.
- Infrastructure for Export of Concentrates.
- The Los Azules airstrip.
- Power into Los Azules and internal power distribution.
- Water supply and water management.
- The tailings storage facility (TSF).
- The waste rock facility.
- Employees accommodation.

The 2013 PEA only considered infrastructure for Los Azules within Argentina. This 2017 PEA considers a bi-national approach to infrastructure for both the Los Azules development phase and the operational phase. Bi-National opportunities exist with road access, power supply and concentrate logistics. For definitive costs and scope the preferred solutions are Road Access from both Argentina and Chile, Concentrate Logistics through Chile and Power Supply from Argentina.

18.2 Access to Los Azules

18.2.1 Introduction

No consideration of a bi-national approach for accessing Los Azules for the development and operations phases had received serious consideration until McEwen completed a review in 2017.

During 2017 McEwen completed a review of access roads and concentrate logistics options in both Chile and Argentina as a bi-national approach to the Los Azules development. The preferred outcome promoted and costed in this 2017 PEA is an access road into Los Azules from Chile that links Los Azules to a Chile National Road 55 with connections to the operating port of Coquimbo in vicinity of La Serena. This route enables over dimension and over weight freight deliveries into Los Azules for the development period and the truck haulage of copper concentrate for export via existing port infrastructure and facilities at Coquimbo for the duration of copper mining operations.

If the preferred bi national approach cannot be supported it is still viable to develop and operate Los Azules utilising an Atlantic port and Argentina in-country infrastructure. It is slightly less cost efficient and more operationally challenged than a bi-national approach but nonetheless viable.

18.2.2 History

Three potential road options (all within Argentina) for access into the Los Azules site were previously evaluated by Samuel Engineering. They considered the 106 km “northern route” to Villa Nueva, the 115 km “central route” to Calingasta and a 181 km “southern route” to Barreal via Villa Pituil, distances are measured from Los Azules to existing highways. The main site access road subsequently selected by Ausenco Engineers is the “central route” which is the existing route initially created some 20 years ago (Figure 18-1).

Figure 18-1: The 106 km Northern Route and the 115 km Central Route to Calingasta with extensions to the Argentina railway network at Canada-Honda.

The Central Route tracks east-south-east from the project site to the small community of Calingasta. The route follows two significant valleys, a valley extending west north west from Calingasta and the other valley extending south east from Los Azules. The connection route between the two valleys traverses two significant mountain passes that are over 4,000 masl. Approximately 60 km of the road is above the snowline (3,000 masl) which presently limits site access to at most the six months between mid November and mid May. Between the winter months from June to October snow removal operations will be necessary to keep the access open. A photo of the existing central route is presented in Figure 18-2. An aerial view of the project site is shown in Figure 18-3.

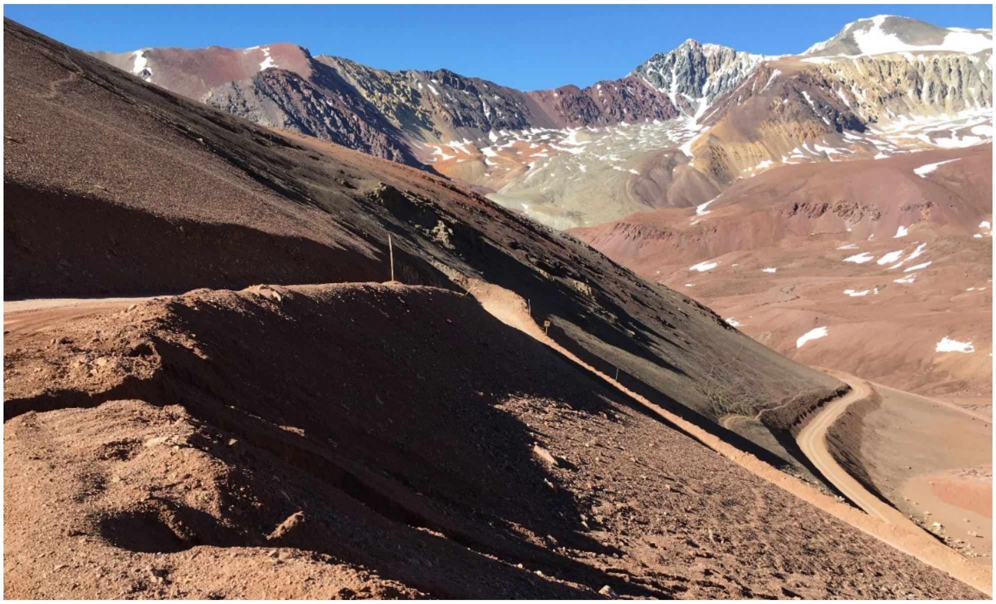


Figure 18-2: Recently graded hair pin bends during January 2017 at Totora Pass on the existing central route to Los Azules, elevation ~4,200 masl.

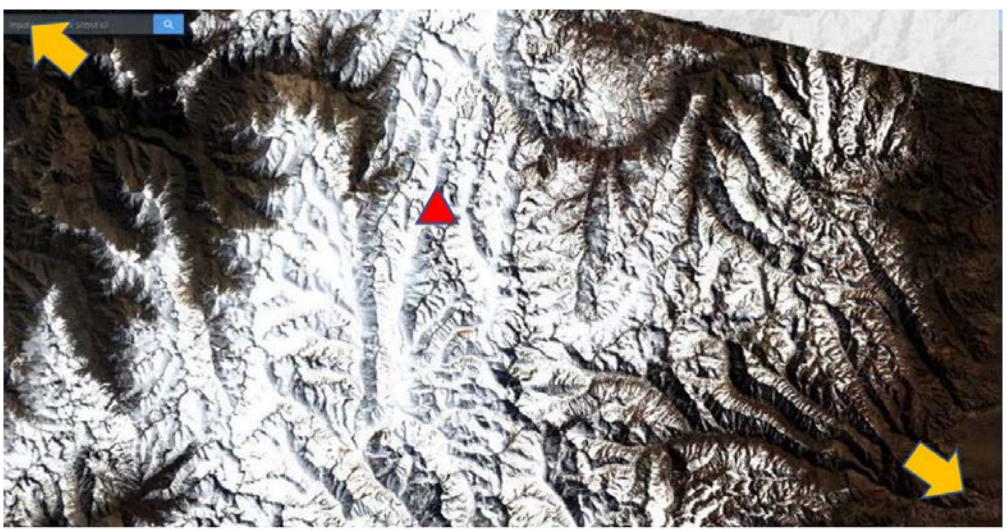


Figure 18-3: Snow cover in August (winter) 2016.

Figure 18-3 shows the extent of snow cover in a typical year. In Figure 18-3 the red triangle is Los Azules, Calingasta is to the south east (bottom right hand corner), Las Serena and Coquimbo in Chile to the north west (top right hand corner. Note the close proximity to the north west of Los Azules of a snow free valley within Chile. The existing access road to the Los Azules development remains unimproved and most of the road is along moderate to steep terrain often with very tight radius curves and not suitable for transporting large equipment or personnel needed for the development of the mine.

The Ausenco prefeasibility level designs and accompanying cost estimate for the access road advised of 29 km of new constructed road and 64 km of the existing road alignment to be upgraded. The new road was to partially replace the higher elevation sections of the current road, which includes steep grades, short radius curves, narrow travel surfaces and heavy snow accumulation (as shown in Figure 18-3) during winter over the 60 km of high country.

18.2.3 The Port of Coquimbio, Chile

During 2017 McEwen Mining performed studies in both Chile and Argentina with a view to the Los Azules development being optimally serviced regardless of political boundaries. Argentina and Chile have a Bi-National Mining INTECUSION Treaty (TRASDA DE INTERXION MUINERA CHILE _ARGENTINA) to facilitate development of resources in proximity to the international border however resource development and cross border infrastructure can also happen outside of the bi-national treaty.

The principal motivation for evaluating a road access from Los Azules into Chile is the proximity of the operating port at Coquimbo on the Pacific coast and situated only 244 km from Los Azules. The Port of Coquimbo is a multipurpose importing and export facility that in addition to general and seasonal goods also receives, stores and exports copper concentrates. A photo of the port facility is shown in Figure 18-4.

Figure 18-4: The Port of Coquimbo in Chile.

The large sheds in shown Figure 18-4 are existing concentrate storage facilities. The orange and white shed closest to the sea is a copper concentrate storage facility for Teck Cominco's Andacollo operations. The blue and white shed is a 50,000 t concentrate storage facility for Mitsui's operations at Caserones some 500 km distant from Coquimbo. Mitsui has confirmed to the port operator "Ultramar" that it will vacate its Port of Coquimbo facilities during early 2018 and relocate to a new port closer to it's mining operations.

The Port of Coquimbo has the following attributes:

- Ability to import and handle the oversize and over weight freight needed for the development phase of Los Azules such as mining fleet components, large structural steel members, large tank sections, heavy items of mechanical equipment. Figure 18-5 below shows the importation and logistics of substantial components for wind turbines.
- Able to import and handle bulk consumables during the development and operating phases such as mill balls and explosives.
- Port is under-utilised with considerable berth occupancy time available.
- Existing exporting port for copper concentrates from Chile based mines.
- Port charges at Coquimbo will be in the region of $14 per ton which benchmarks with similar concession port operations eg Matarani in Peru where concentrates from Antapaccay, Cerro Verde and Las Bambas are handled.
- Has copper concentrate receiving, storage (50,000 t) and exporting facilities recently built by Mitsui and soon to be vacated.
- Located on Pacific Ocean and closer to Asian markets for optimal shipping rates.

Figure 18-5: Wind turbine importing and handling logistics at the Port of Coquimbo in 2017.

18.2.4 Road Access into Los Azules from the Port of Coquimbo, Chile

The distance by road from Los Azules to the Port of Coquimbo is 244 km. The route is formed of two quite different sections basically a section of on-national highway extending from Coquimbo and a section of off-national highway into the Andes foothills and Andes mountains.

The section of on-national highway extends from the Port of Coquimbo for 132 km and is mostly dual carriageway and forms the route as far as the small settlement of Chanaral Alto in the municipality of Monte Patria. Road reconstruction is in progress during 2017 and 2018 and one or two new toll booths will be installed during 2019. This road is appropriate for trucks carrying copper concentrates.

The section of off-national highway extends from Chanaral Alto to Los Azules for 112 km. The route comprises 100 km of existing unsealed (and in the most part unimproved) roads and exploration tracks. The route selected has virtually no current community interactions and will not have any over the long term. All of the section within Chile falls within the Municipality of Monte Patria. Approximately 40% of the route is in public ownership and 60% in private ownership. 12 km of the 112 km are presently unformed, being 6 km of new road proposed to by-pass above and around the community of Tulahuen. The final 6 km are within Chile up to the border with Argentina. All of the proposed route is very easy grade and without any tight curves.

There are no dwellings encountered in the 60 km on the Chile side preceding the international border. The Municipality of Monte Patria is supportive of the proposed route upgrading. The municipality wishes to facilitate a public access to grow a summer tourism industry for people to visit the high Andes and pass through into Argentina. Los Azules intends to have a memorandum of understanding with the Municipality of Monte Patria.

Figure 18-6 shows the road route options considered for Los Azules.

Figure 18-6: Road route options between the Port of Coquimbo, Chile and Los Azules.

In Figure 18-6 the international border is shown as pink. National Highway (shown green and yellow) is unimproved roads. The preferred route is the 112 km route with the northern extension into Los Azules and labelled Route 1 in Figure 18-7 below.

The southern extension route (“Route 2” in Figure 18-7) is a viable option but is 24 km longer and snow affected over approximately 50 km during winter months. Route 2 is preferred by the Municipality of Monte Patria and has a local name “The Lapis Lazuli Route”, referring to the local Lapis Lazuli mines alongside the route. It is also known as “Paso La Chapetona”. Historically and currently Paso La Chapetona is promoted in Chile and Argentina as a potential Chile/Argentina border crossing route. The distances of each option are summarized in Table 18-1.

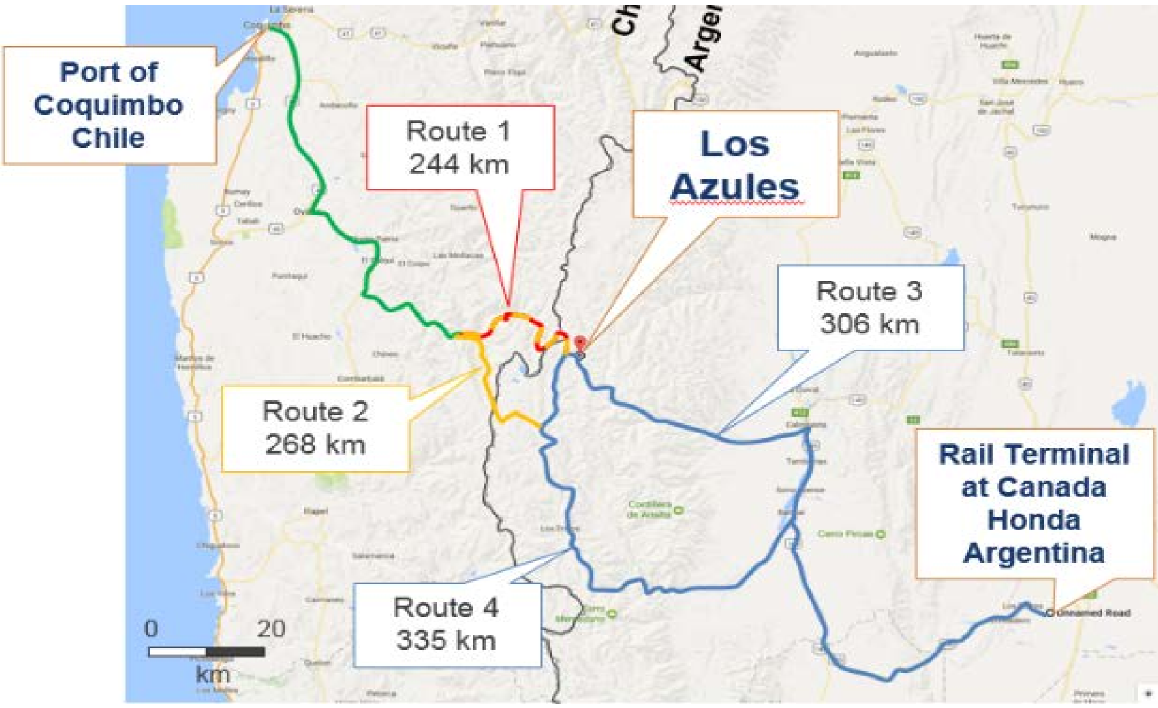


Figure 18-7: Potential road access routes in Chile and in Argentina.

Table 18-1: Distances for Access Road Options

Chile	**Argentina**
Route 1 = 244 km 132 km - National highway 112 km - Minor roads & tracks	**Route 3 = 306 km** 106 km - National highway 200 km - Minor roads & tracks
Route 2 = 268 km 132 km - National highway 136 km - Minor roads & tracks	**Route 4 = 335 km** 70 km - National highway 265 km - Minor roads & tracks

Distances in Chile are measured from Los Azules to the Port of Coquimbo.
Distances in Argentina are measured from Los Azules to the rail-head at Canada-Honda.

The costs to improve the 112 km of Route 1 that is not National Highway to be fit-for-purpose for heavy freight, over size freight and the concentrate logistics is estimated at $30 million. This is made up of $230,000 per km of road plus $300,000 for each of up to 10 river ford crossings and a further $200,000 per km for sealing of the 6 km of by-pass around Tulahuen for control of dust and noise. Figure 18-8 shows the existing, unimproved road within Chile in the area approaching the border with Argentina. It is in arid land in weathered granites which enables easy road gradients and no tight radius curves.

Figure 18-8: Photo of the existing unimproved road within Chile in the border area

The principal attributes for selecting Route 1 as the Preferred Access into Los Azules are:

- Route 1 on the Chile side receives minimal snow. Only 10 km of road from the Los Azules process plant and into Chile is affected by winter snow. This represents the safest, shortest and best route.
- Only one community by pass is needed. The by-pass is at Tulahuen, approximately 70 km from Los Azules. No settlements are passed through. Long term community engagement will be minimal and interfaces with Los Azules traffic minimised.
- The geotechnical conditions for the majority of the Route 1 improvements are weathered granites that can be mechanically excavated and have stable slopes and a durable road platform. This enables simple road maintenance for a safer road .
- One-way travel time for a truck hauling concentrate from Los Azules into the port of Coquimbo will be approximately five hours driving time. This makes round trips in a single work shift a possibility.
- A Memorandum of Understanding (MOU) with landowners and the Municipality of Monte Patria is in formation.

18.2.5 Road Access into Los Azules from within Argentina for Bi-National Development

The following commentary is in reference to Figure 18-7.

The current existing access road into Los Azules is from the small town of Calingasta in San Juan Province, Argentina. This was referred to as the “Central Route” in the 2013 PEA. This is the only serviceable route into Los Azules and is the preferred long term access route from Argentina.

Route 4 is the route from Barreal to the south of Calingasta. This route was envisaged for the possible future development of the El Pachon Copper resource approximately 70 km south of Los Azules. If El Pachon were to move into development then Los Azules may consider to revise away from the existing Route 3 to work in conjunction with the El Pachon developers and use Route 4 as the principal access route to Los Azules.

McEwen Mining completed a photogrammetry survey during 2017Q1 using drones to create a digital terrain model for detailed road design of Route 3. The survey was used to define the extent of works necessary to deliver a fit for purpose road access into Los Azules from Calingasta.

If Los Azules is developed as a bi-national development, the access road from Calingasta into Los Azules will not be required to be improved to the same extent necessary for enabling access for over dimension and overweight freight or for concentrate logistics operations. The standard of the road will still be significantly improved by comparison to the road as it exists today for safe functional use of supply trucks and bussing of personnel. The costs for the road improvements are estimated to be about $400,000 per km. For approximately 75 km this equates to $30M.

18.2.6 Contingency Plan - Road Access to Los Azules and Concentrate Logistics for an exclusively Argentina Development of Los Azules

18.2.6.1 Introduction

During 2018 the preferred road route through Chile will be defined, agreements with land owners developed and road designs and work scopes will be produced for approval and implementation.

In the unlikely event a bi-national development proves to not be possible, Los Azules will be developed and supported 100% from within Argentina. A contingency plan has been developed and is outlined below.

Under contingency the scope of Access Road improvements needed for over weight and over dimension freight access into Los Azules increases substantially within Argentina, but reduces to zero in Chile. Tight curves and steep gradients will be eliminated from the access route. The estimated cost of the road improvements increases to $700,000 per km for the Central (existing) Route for a total expenditure of approximately $55M (comparable to the Ausenco’s earlier estimated value of $50M included in the 2013 PEA).

A 100% Argentina based concentrate logistics solution has been evaluated as a contingency solution. Trucking to Coquimbo in Chile is eliminated and a bi-modal concentrate transport and export solution as outlined below has been costed in detail and benchmarked against similar activities and installations. The effect on the Los Azules development financials is a reduction to the NPV by approximately $160M and to the IRR by approximately 1.1%.

This reduction in value does not significantly detract from the viability of the development but serves to demonstrates the logic in exporting concentrates through Chile and having a reliable all purpose road access through Chile.

18.2.6.2 Description of contingency Bi-modal Concentrate Logistics in Argentina

An Argentina concentrate logistics solution requires delivery of the Los Azules copper concentrates into an Atlantic port approximately 1,400 km from the mine site. The most cost efficient option through Argentina is bi-modal, where concentrates are trucked 306 km from Los Azules to the closest point of access on to the Argentina standard gauge (1.676 m) rail of the Mendoza San-Juan branch. The rail is operated by Argentina Railways' Freight Service (Ferrocarril Argentinos Cargas) at Canada-Honda. Rail transit is then approximately 1,050 km to the port of Rosario for ship loading and export.

Minera Alumbrera has performed a bimodal concentrate logistics operation in Argentina for 25 years from it's Alumbera mine in Tucuman. It uses a mineral concentrate pipeline followed by rail freight to deliver concentrates to the ship loading facility at the port of Rosario.

Figure 18-9 shows three segments of road before connecting to the rail route at Canada-Honda. The road section is 306 km over three road standards with the most challenging section being closest to Los Azules within the high Andes. The remaining rail route to the port of Rosario is shown in Figure 18-10. Figure 18-11 shows rail cars the Canada-Honda facility where locally produced lime is currently loaded on to the Argentina Railways Freight network for domestic distribution.

Figure 18-9: Road route to connect to the FGSM (Ferrocarril General San Martin) at Canada-Honda.

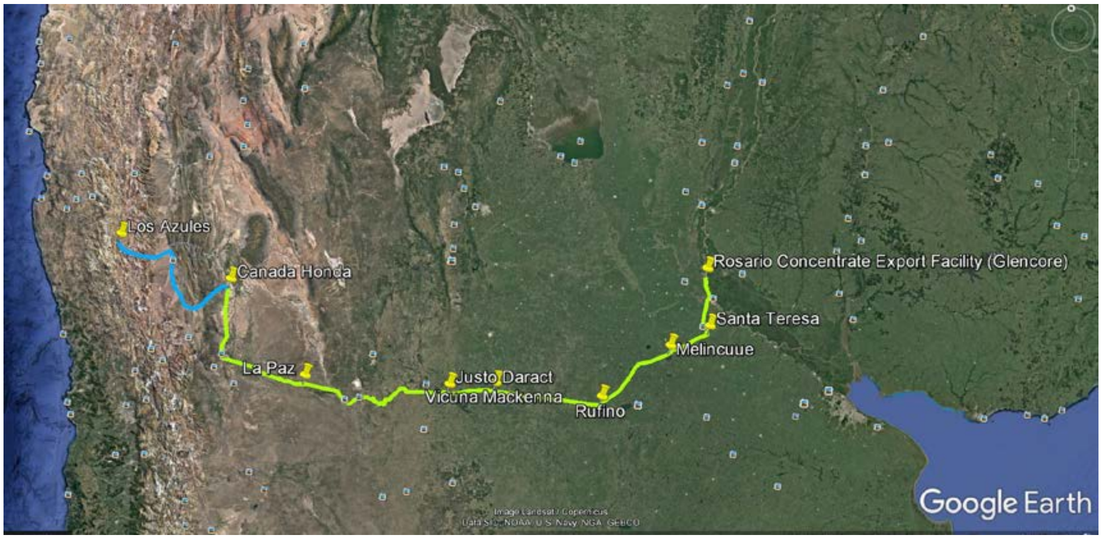


Figure 18-10: Rail route for copper concentrate from Canada Honda to the port of Rosario on the Atlantic Ocean side of Argentina.

Figure 18-11: Rail trucks at Canada-Honda.

The bi-modal export of copper concentrates from Los Azules to export at the port of Rosario on the Atlantic side of Argentina is illustrated in the following sequence in Figure 18-12:

A Concentrate Stockpile Building will be built at Los Azules in proximity to the concentrate filter plant	
Trucking concentrate to Canada-Honda 306 km if the Coquimbo port export solution is not available.	
Storage of concentrate in a transfer station at Canada-Honda for loading into rail wagons. The transfer station would be an additional installation if Coquimbo port is unavailable.	
Railway transport of concentrate over approx. 1,050 km from Canada-Honda to the Port of Rosario. The rail transport is a new activity if Coquimbo port is unavailable.	

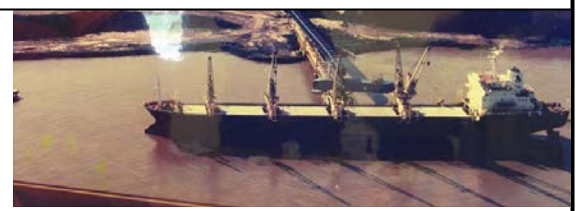
Unloading concentrate and storage in a transfer station for ship loading. Equivalent activity to what is planned at Coquimbo	
Ship loading concentrate. Equivalent activity to what is planned at Coquimbo	

Figure 18-12: Concentrate Logistics Sequencing, Bimodal Approach

18.2.7 Access by Flying into an Airstrip at Los Azules

The Los Azules development is located in the high Andes mountains of western Argentina. To the south west of Los Azules and downstream of the proposed tailings dam the Rio Salinas Valley broadens and straightens. It is of very low gradient and suitable for formation of an airstrip to service Los Azules. The airstrip will be at an altitude of approximately 3,250 masl, 6 km from the proposed camp facility, and 10 km from the proposed mine office.

The first stage STOL airstrip is shown in blue in Figure 18-13 and Figure 18-14. The limit of Los Azules owned lands is shown as red dashed lines in both figures. An future extension to the airstrip is anticipated and shown in green, the extension is to enable larger aircraft types to use the airstrip facility and will require an easement over the affected part of the property to the south of Los Azules lands. A perspective view of the location of the proposed Los Azules airstrip is shown in Figure 18-15, looking north into the broad and straight Salinas Valley within the high Andes.

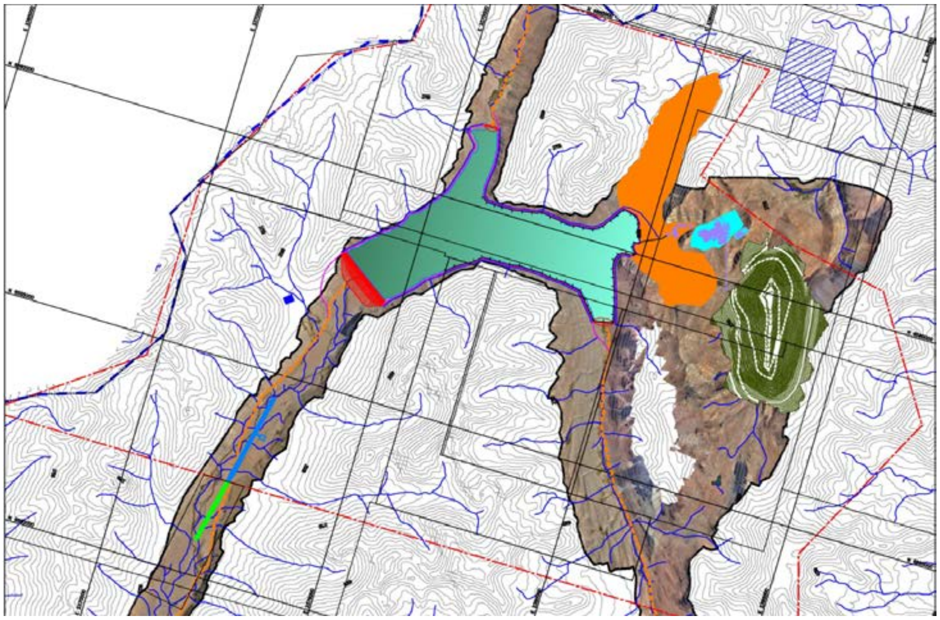


Figure 18-13: Los Azules General Arrangement

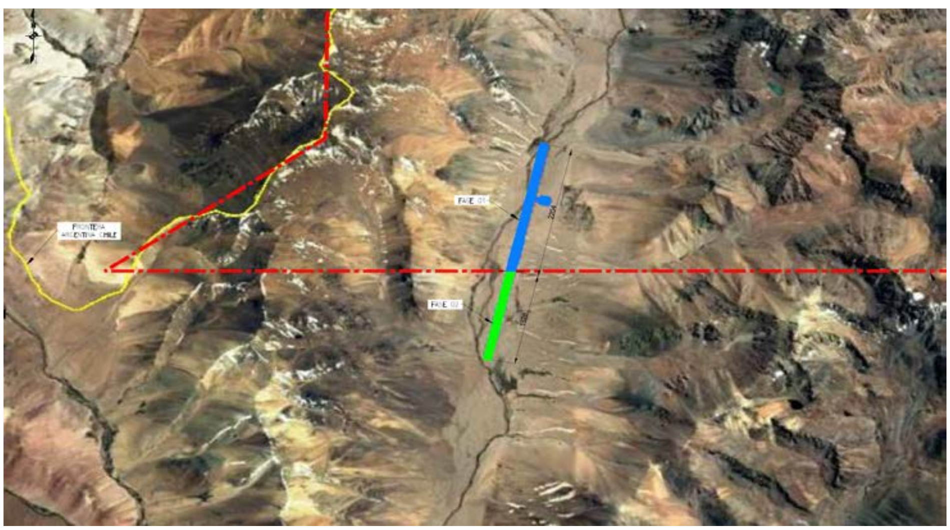


Figure 18-14: Satellite Imagery Showing Proposed Airstrip

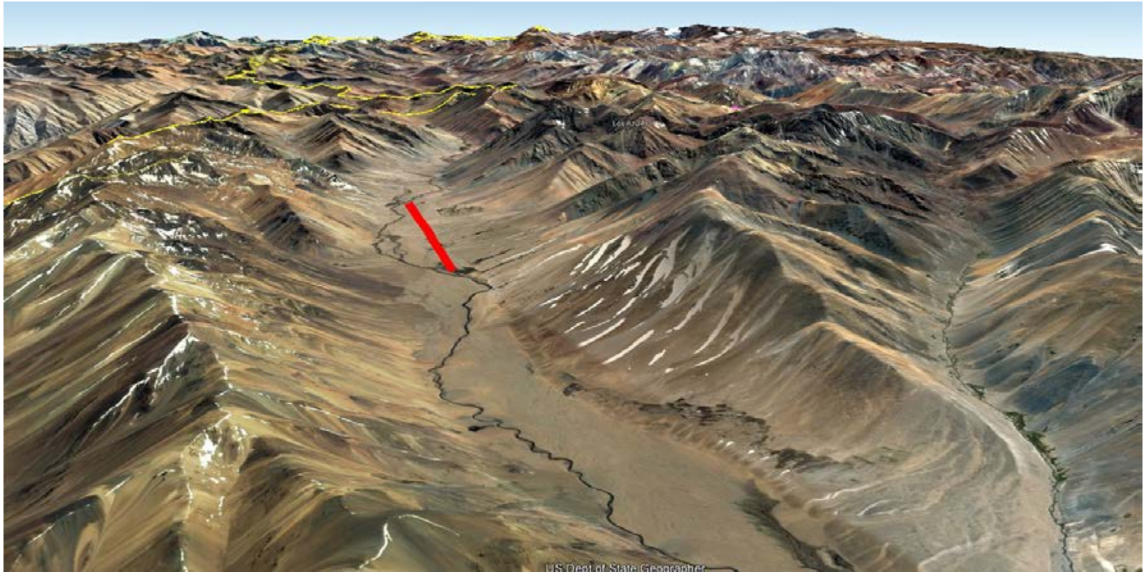


Figure 18-15: Perspective View of Proposed Airstrip, looking north

The proposed Los Azules airstrip is shown in Figure 18-16 in relation to San Juan airport. The proposed airstrip is 180 km from the San Juan Airport with connections to Buenos Aires and other locations within Argentina. Flying time from San Juan to Los Azules will be less than one hour.

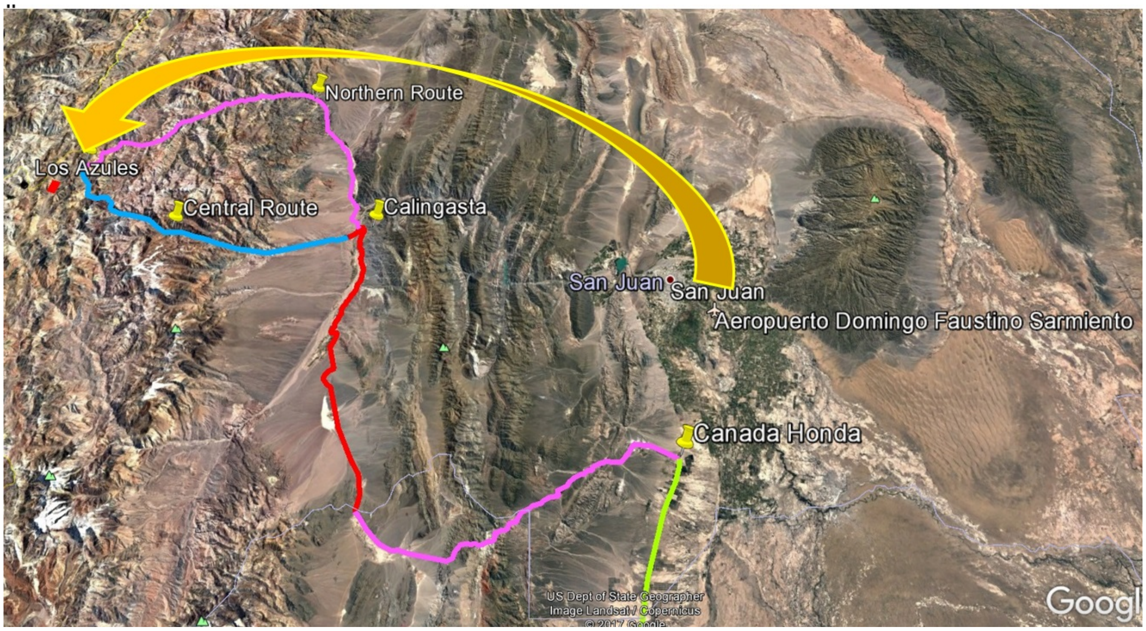


Figure 18-16: Proposed Airstrip in relation to San Juan

A serviceable airstrip at Los Azules delivers the following critical and useful outcomes that, collectively, significantly enhance the exploration, implementation and operating phases of Los Azules development. These include:

- Enables an emergency evacuation and a specialist emergency response.
- Safer personnel travel by aircraft than buses on mountain roads.
- Flying time of less than one hour from San Juan compared to at least 7 hours road travel by bus.
- Enables exploration drilling activities beyond the reliable summer 3-month snow free weather window affecting the high passes and extends the safe drilling season to between nine and 12 months.
- Will enable accelerated timely in-fill drilling and exploration drilling for the mine pit to be drilled from indicated status up to measured status.
- Can be used to supply the Los Azules development if the access road is unserviceable such as from an un-cleared snow fall event.
- Facilitates fly-in-fly-out work rotations per world best practice.
- Facilitates air freight support during development phase.
- Facilitates deliveries of critical air freight needs during development and operations.

By 2017Q2 the airstrip permit had been applied for to the Argentina authority (ANAC) since approximately 2015. Initially a STOL (Short Take Off and Landing) permit has been requested. The permit will allow construction of an airstrip and for planes such as a DH-6 to land at Los Azules and support the exploration, permitting and early implementation phases of the Los Azules development.

A longer-term vision is to utilise larger aircraft at Los Azules such as a Dash 8 type personnel transport aircraft and potentially a C130 Hercules Transport. These aircraft will require a longer airstrip and probably an easement to be negotiated for the airstrip over the adjacent property to the south.

A detailed topographic survey was performed during 2017. Airstrip design will commence later in 2017. A site inspection confirmed the geotechnical condition is glacial outwash sands and gravels. The survey and geotechnical inspection indicated airstrip formation works are without complexity and suitable construction materials are immediately available at the site by screening of in-situ materials.

Navigation aids, safety and security evaluations and flight simulations are pending for later in 2017. A preliminary costing for the STOL airstrip formation at Los Azules is less than $5M and the airstrip formation works can be completed within a single summer season.

18.3 Power Supply to Los Azules

18.3.1 Introduction

Previous studies for the power supply for Los Azules have focused to a supply from Argentina. There has been previous uncertainly of a defined timetable for a viable supply to be available from a viable connection point for Los Azules, presumably Calingasta substation however work is now happening to make this a reality.

During 2016 and 2017 McEwen Mining (McEwen) has engaged in reviews of the potential for a power supply from Chile. Barrick Gold's Veladero mine (also in San Juan province), is in the process of obtaining approval for a power connection to the Chile network. Non-bi national and bi-national arrangements anticipate other power interconnections between Argentina and Chile. In addition to connections from Argentina and from Chile, McEwen is also evaluating renewable energy opportunities.

The McEwen review is a work-in-progress and is also considering power supply solutions to Los Azules in HVAC (High Voltage Alternating Current) and in HVDC (High Voltage Direct Current). The motivation to consider HVDC is that power can be delivered in either underground or overhead lines or a combination. The underground option is an advantage for environmental conditions and also gives greater security of supply i.e. it is more robust compared to HVAC during winter conditions where exposed transmission towers (over high passes) may not meet required reliability.

18.3.2 *Proposed Connection of Los Azules*

This 2017 PEA considers the costs of a conventional HVAC power supply for Los Azules connected to the Calingasta substation. For Calingasta substation to be a useful point of connection it must be energised at 500 kV, either from Gran Mendoza to the south or from Rodeo substation to the north. Figure 18-17 and Table 18-2 show the planned scope and timetable for network expansion by EPRE (Ente Regulador Provincial de Electricidad) the Provincial Electricity Regulator Entity.

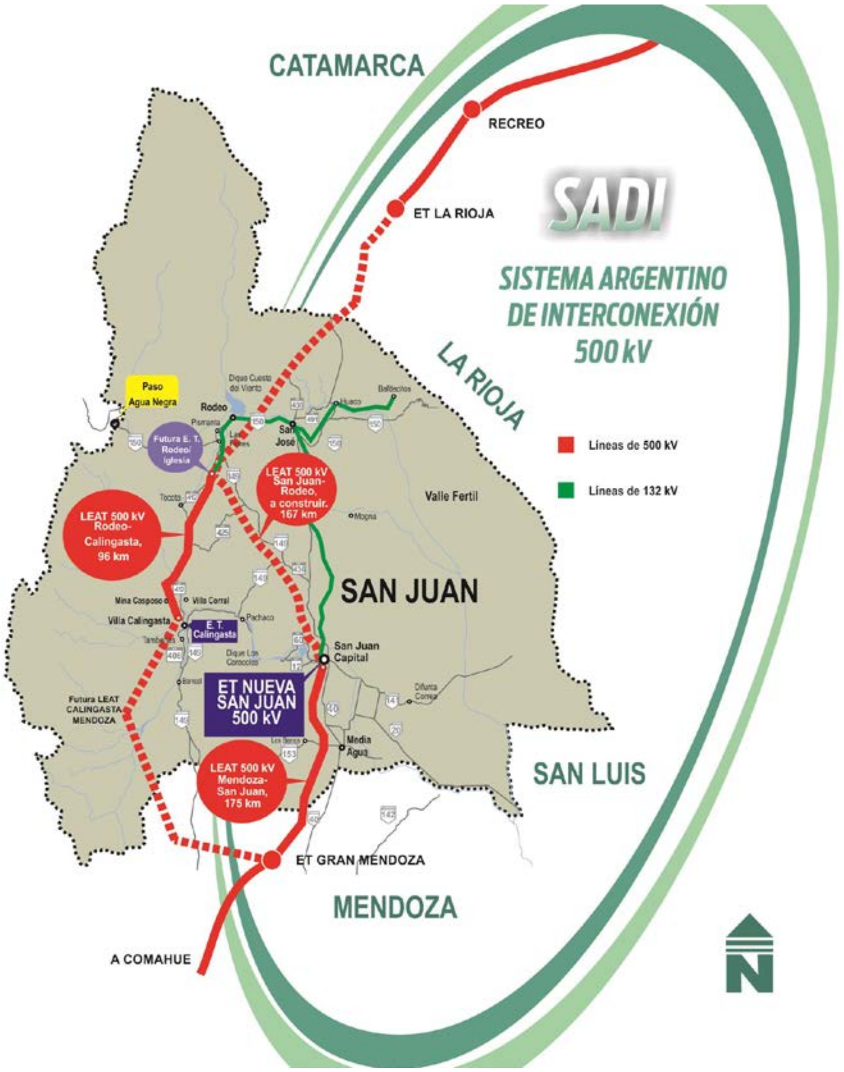


Figure 18-17: EPRE's vision for a 500 kV Interconnection Network for the Province of San Juan (extracted from June 2017 publication by EPRE)

Table 18-2: EPRE Proposed Timelines for Implementation

(i)	Extra High Voltage Line ET New San Juan-ET Rodeo to be built with 500 kV technology and initially operated at 132 kV Start June 2017, Completion December 2018.
(ii)	Extra High Voltage Line 500 kV ET Calingasta-ET Gran Mendoza Start July 2018, Completion February 2021.

The substation at Rodeo is currently being connected to a new 500kV transmission line from San Juan, which will connect to Rodeo in 2019. Though the line will be constructed at 500 kV it will only be energised at 132 kV.

The scope of the works included in this PEA to secure a power connection for Los Azules is as follows:

- From San Juan to Rodeo: the power infrastructure is being constructed for 500 kV (energized to only 132 kV). This section of grid must be upgraded for energization at 500 kV.
- From Rodeo to Calingasta: the existing power infrastructure is also constructed as 500 kV and energised only at 132 kV into Calingasta. This section of grid will also need to be upgraded for energization at 500 kV, requiring new switchgear in Calingasta and Rodeo substations.
- From Calingasta Substation to the future substation at Los Azules: an overhead HVAC transmission tower line (likely energised to 220 kV) will deliver the current estimated load of 230 MW.

The capital allowance included in the PEA estimate should be sufficient for these works. Nonetheless McEwen is continuing with studies to determine not only the most cost and schedule efficient power connection for Los Azules, but also the most robust solution. Furthermore Los Azules needs a comprehensive solution that satisfies the requirement for a portion of the energy consumed at Los Azules to be from renewable energy sources.

Figure 18-18 shows the bi-national power scenarios in relation to Los Azules.

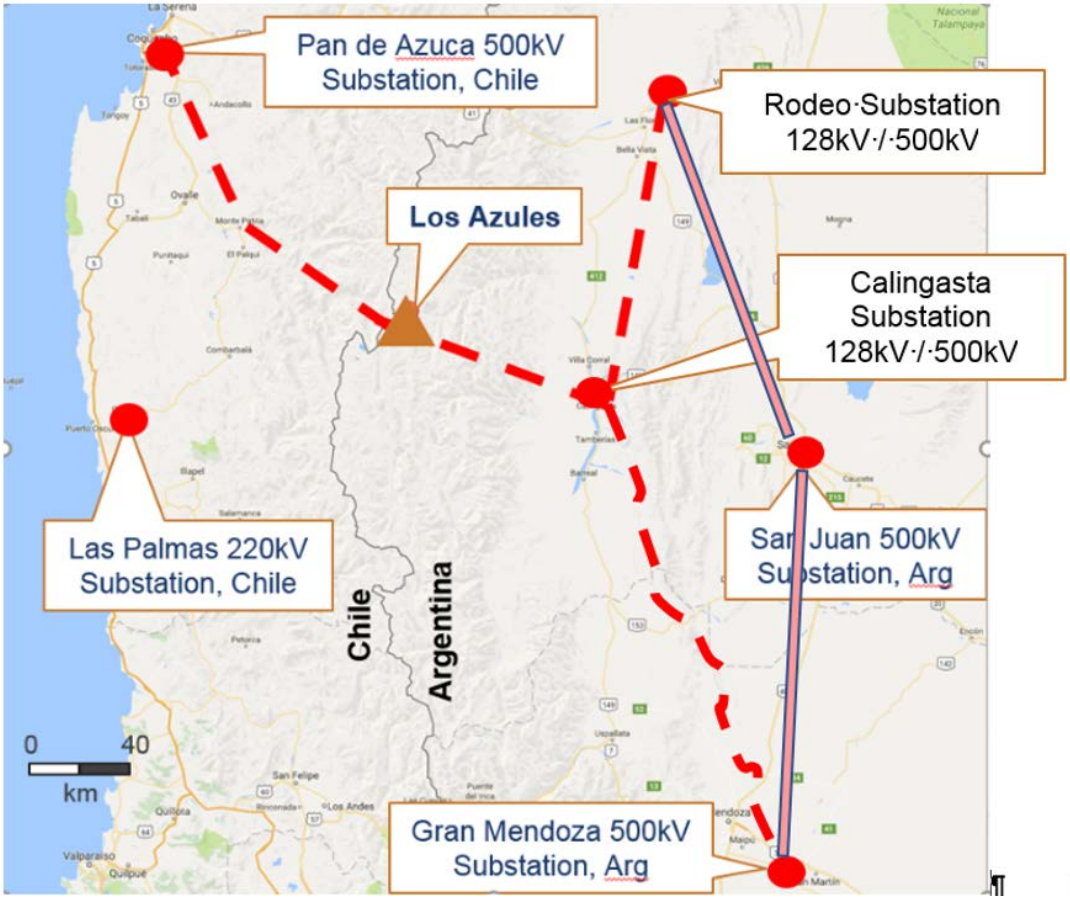


Figure 18-18: Preliminary summary of Bi-National possibilities for a power connection to Los Azules from Chile and Argentina

The 500 kV line from Gran Mendoza to San Juan already exists. The 500 kV line from San Juan to Rodeo is presently under development and will be completed by 2020. It will initially only be energised at 132 kV. The 500 kV transmission line from Gran Mendoza to Calingasta is proposed for completion in 2021.

In Chile, the “New Pan de Azucar” substation is presently under construction on the 500 kV interconnection between the north and south national grids. The existing Las Palmas substation in Chile is situated on the 220 kV network. This network does not presently have available capacity to feed Los Azules and will not be connected to the 500 kV network.

A solution from Chile at this stage would therefore appear to be an HVDC solution with buried cables alongside existing linear infrastructure such as roads. Transmission towers could be used in limited areas. This solution has been discussed with authorities in Chile and received favourable support. However any power supply solution for Los Azules coming from Chile will require environmental baseline studies and an EIA submission in Chile. The experience of others such as Barrick is this process alone needs five years if the EIA is unopposed. Furthermore, the power line will need to be 100% funded by Los Azules.

18.3.3 Recommendations

As the power and transmission line is a major component of the project, it is recommended that the following activities are carried out:

- The status of the Gran Mendoza-San Juan-Rodeo transmission line projects by EPRE are monitored. Having some equity stake in this project may expedite outcomes (as has been past experience with Barrick and others), and may also result in overall cost savings for the Project.
- Corridor assessment to identify the potential corridor, corridor length and any fatal flaws. A cost-effective opportunity may exist to construct a transmission line directly from Los Azules to Rodeo and avoid the high-altitude section and passes. This alignment would more or less follow the proposed “northern route” in Samuel Engineering’s road access study. Refer to Section 18.2.
- Desktop environmental assessment in support of the above.
- Load flow study.
- Preliminary selection of conductor and tower types.
- Trade off between HVAC and HVDC in Argentina.
- Trade off between Argentina and Chile as the source for power to Los Azules. Note that a Chile based power solution requiring an EIA process within Chile will probably be a five year process (assuming EIA is uncontested). This would likely be misaligned to the current Los Azules development schedule.

18.3.4 Renewable Energy Generation

The area around Calingasta offers some of the highest renewable energy generation potential in Argentina. This includes power from photo voltaic panels (PV), wind turbines and to a lesser extent, hydro power.

The Los Azules development is situated within a zone of high intensity PV generation potential. The heat map of the San Juan province Figure 18-19 indicates all the high Andes to be of maximum generation potential in terms of energy intensity per square meter. However, the winter snow and often cloudy climate and the geographical landforms of the high Andes are not complementary for creation of cost effective and useful PV generation. Nonetheless, during the project implementation phase (prior to a definitive connection to the power grid), some PV generation may offset high cost diesel generation.

Figure 18-19 and Figure 18-20 are the heat maps for Horizontal Radiation and Average Wind Speed for the San Juan Province and illustrate the renewable generation potential. Wind generation at the development site has very low potential, and hydro power is limited at site to some potential micro-hydro installations.

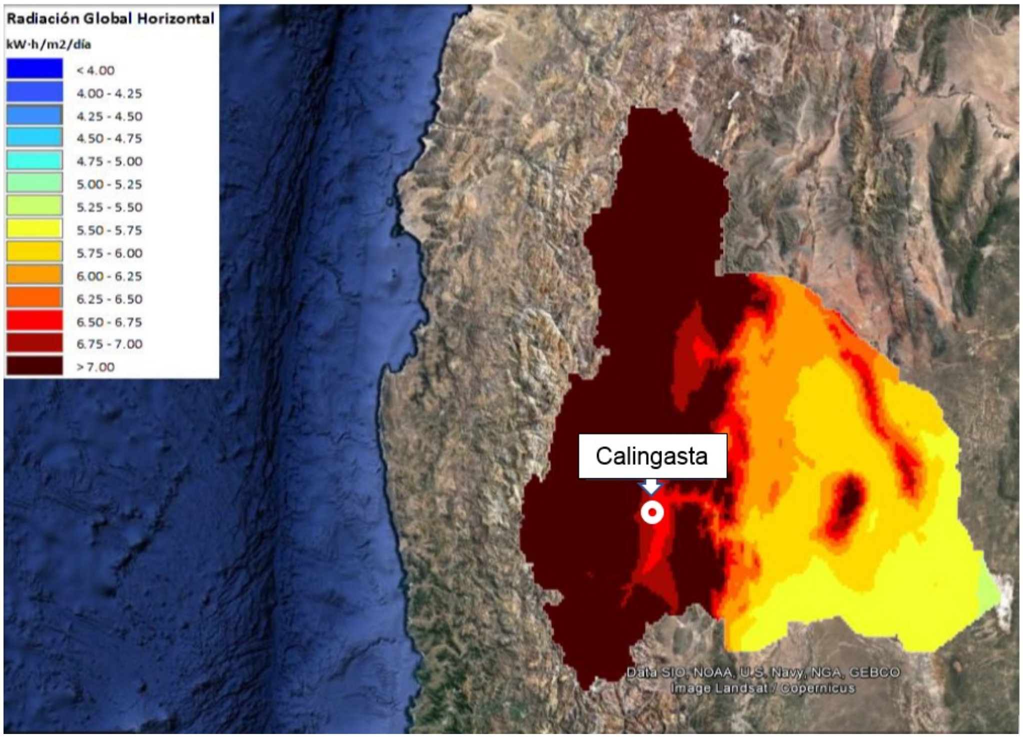


Figure 18-19: Horizontal Solar Radiation Index for San Juan Province

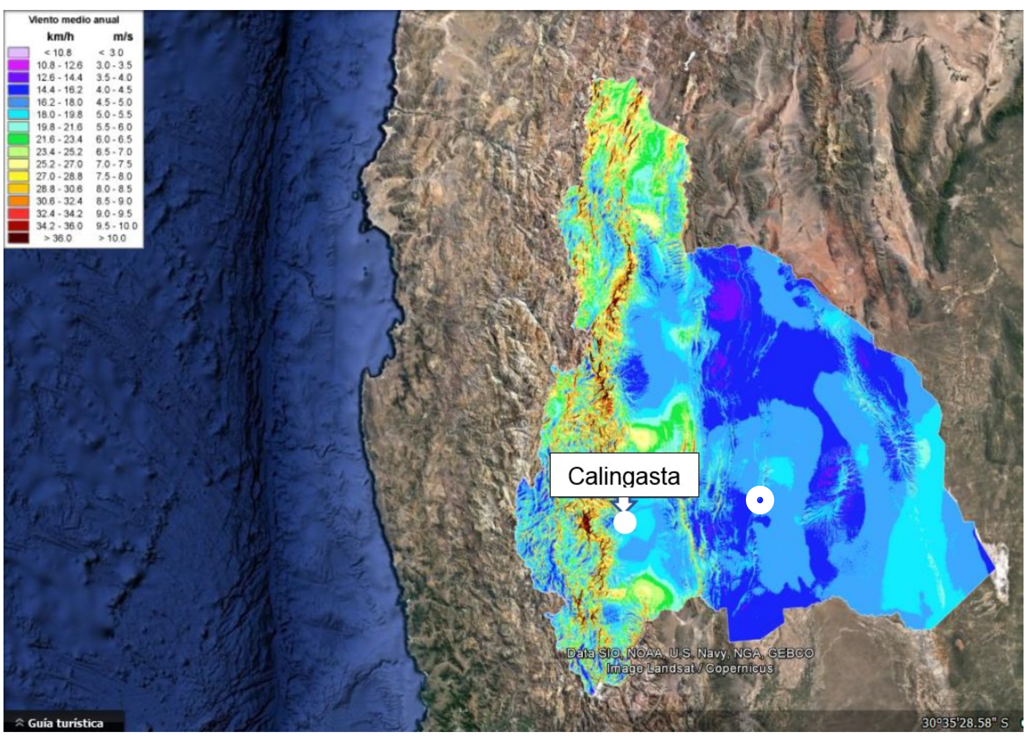


Figure 18-20: Annual average Wind Speed for San Juan Province

To assess long term renewable energy generation feasibility, further studies need to be performed during 2018. These studies would focus on lower altitude locations and to the area of the Andes range-front in the Calingasta Valley. The solar radiation and wind resources in the Calingasta Valley are recognised as high potential for renewables development.

18.4 Waste Rock Storage Facility (WRSF)

The mine waste is divided into two types: waste rock and overburden (per the 2017 mine schedule). The three years of pre-mining stripping and the 34.5 years of productive mining will generate approximately 1.5 billion tonnes of mine waste that will occupy a volume of approximately 750 Mm^3 (assuming a waste material density of 2.0 t/m^3). The waste rock will be used for the development or stored within the development as follows:

- Approximately 85 Mm^3 (170 Mt) of the waste rock will progressively be used to form the embankment for the tailings storage facility.
- Approximately 5 Mm^3 (10 Mt) will be used to form a compacted platform in proximity to the mine pit in the valley. to the east of the mine pit during the early pre-stripping stage of the mine development. The landfill platform will produce a large flat drained usable industrial area for mine equipment workshops, laydown etc. In addition, the platform will provide the foundation for the low-grade stockpile.
- The balance will form the waste rock storage facility between the mine and the tailings storage facility.

The location of the waste rock storage facility is shown in Figure 18-21. The photo was taken in summer of 2017 in close proximity and at similar elevation to the eastern end of the intended process plant site facility platform. The photo shows the location of the tailings dam in the distance, the tailings storage facility in the middle ground and the waste rock storage facility in the foreground.

Figure 18-21: Site photograph

The final elevation of the waste rock storage facility for the life of mine is 3,720 m. This compares to the process plant site elevation of 3,760 m and the underside of the thickened tailings discharge of 3,730 m. The projected elevation of tailings storage facility is much lower at approximately 3,450 m. The proposed tailings and waste rock facility are shown in Figure 18-22.

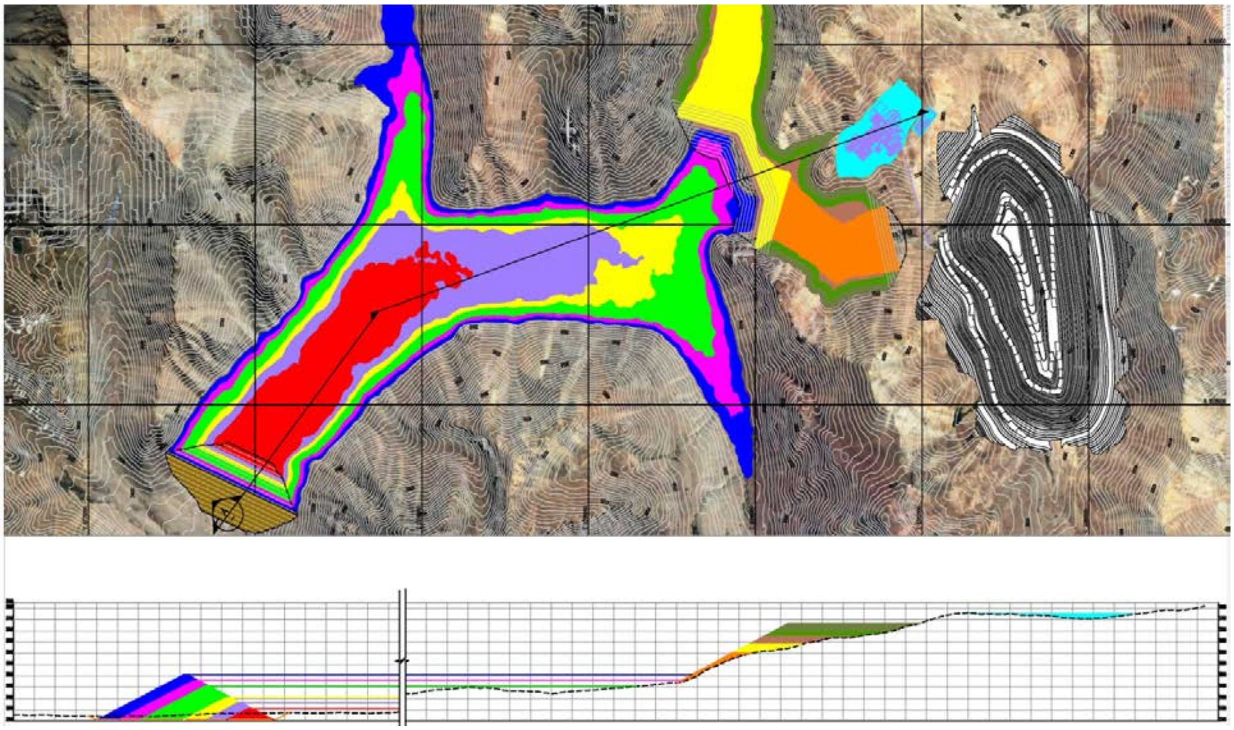


Figure 18-22: Tailings Storage Facility and Waste Rock Storage Facility Location Plan and Section

The waste rock storage facility is expandable beyond the current life of mine storage capacity by either raising the storage area elevation, or by extending south into the Rio Frio headwaters. Preliminary modelling indicates a potential waste rock storage volume double the proposed Waste Storage Facility that is currently planned.

Trenches containing water pipelines will be constructed around the waste storage facility. One of the trenched pipelines will transport contact water (pumped from the mine sump pit) for depositing in the tailings storage facility. Another pipeline will transport intercepted surface run off and the water from the pit perimeter dewatering bores for discharge into the environment beyond the tailings dam as non-contact water.

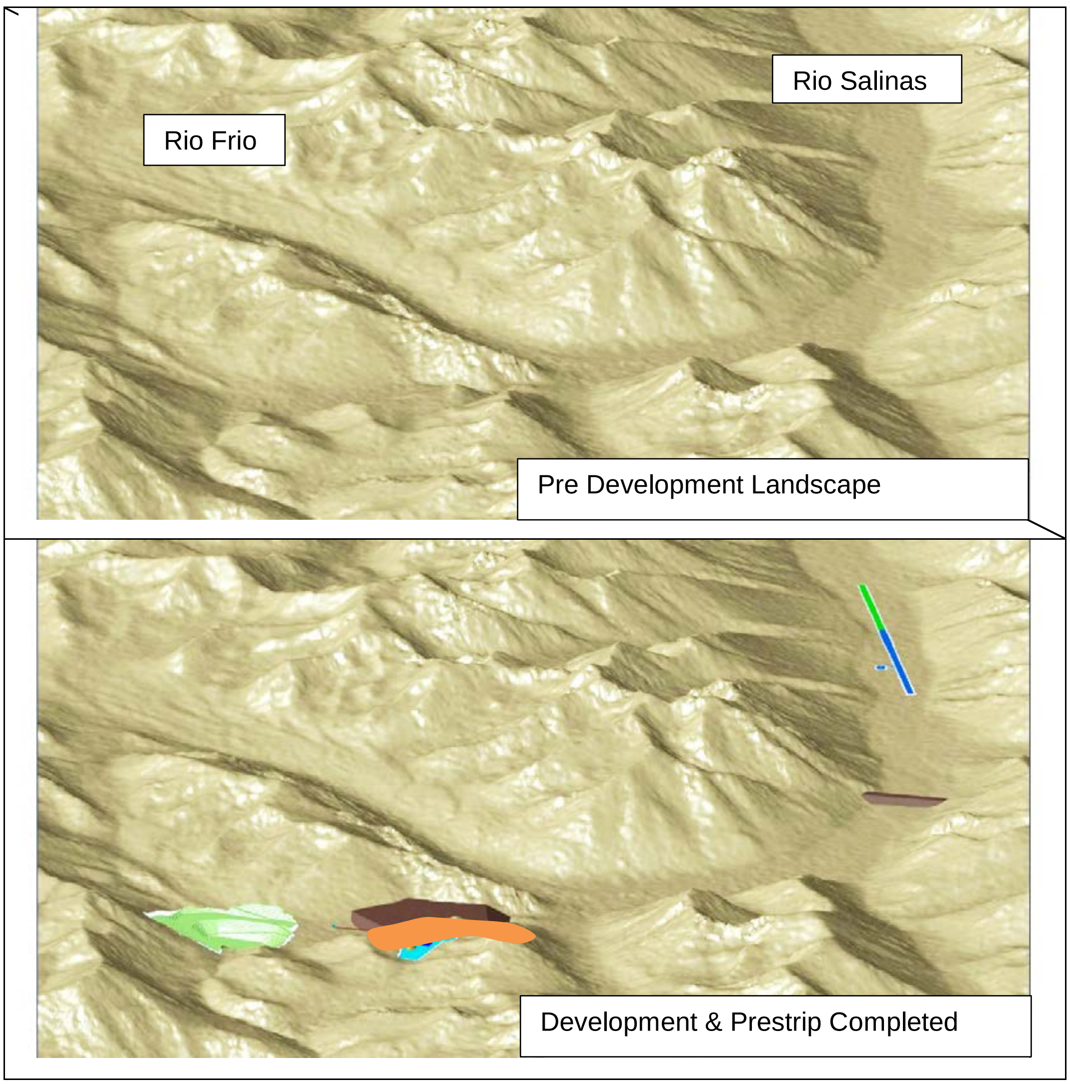
Any drainage or filtration water coming from the waste rock storage facility is considered contact water and will report by gravity flow into the tailings storage facility for reclaiming for use as process water.

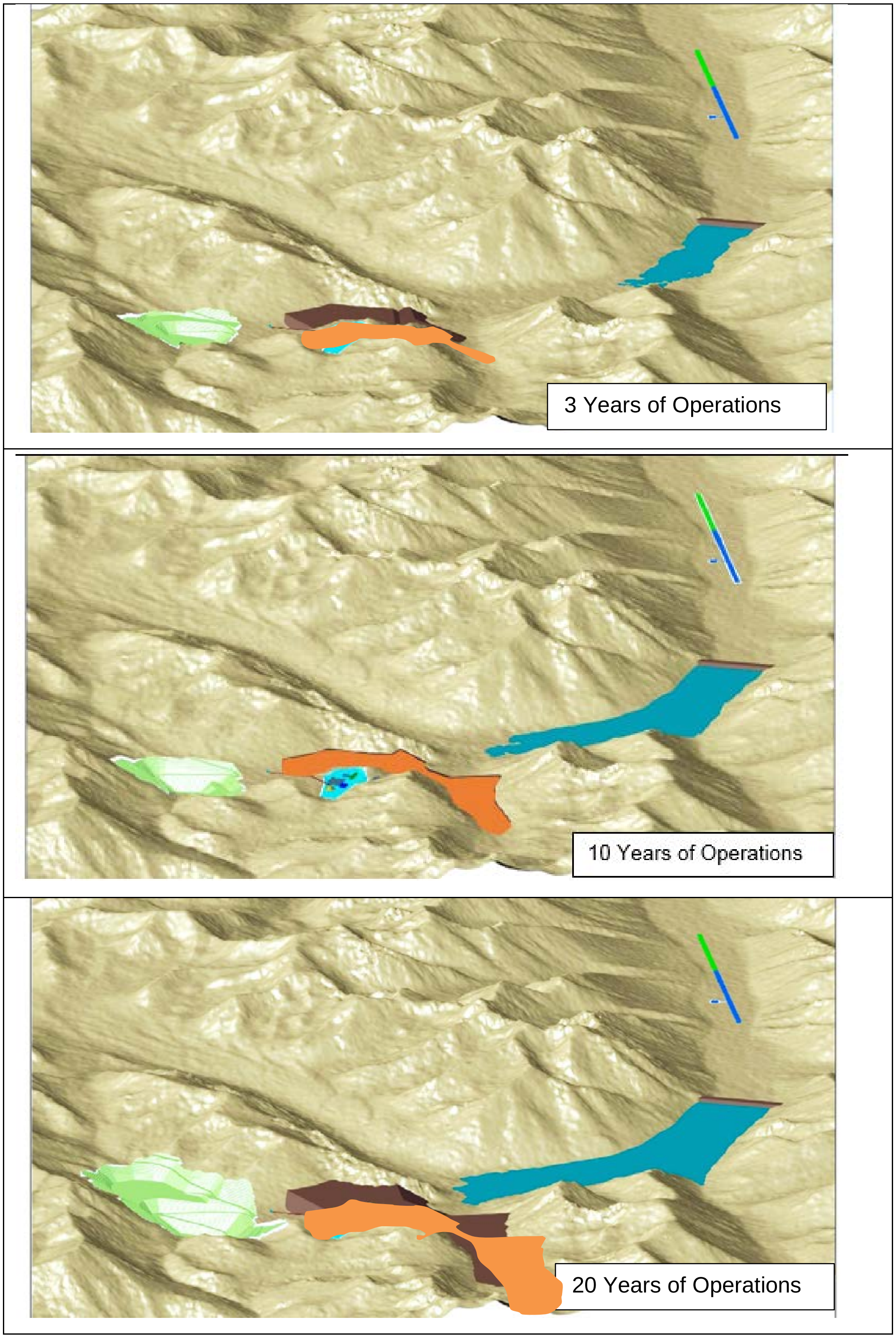
The foundation of the waste rock storage is generally fresh rock, often exposed, but otherwise covered with freeze-thaw material such as gravity deposited scree and fractured superficial rock. Organic and sedimentary materials form limited narrow isolated areas generally wherever drainage is poor.

In the final years of operation, the tailings in the Tailings Storage Facility will rise but it is not envisaged that the waste rock storage facility and the tailings storage facility will come into contact. In any event both the tailings storage and waste rock storage facilities will be designed with stringent seismic loading criteria applied to eliminate any possibility of a waste rock storage run-out event.

Rehabilitation of the waste rock storage facility at the completion of mining is envisaged to involve pushing out the steeper exposed edge slope to a lesser angle, and the grading of the working surface to be a flat platform with minimal gradient. This will be followed by the spreading of fine grained material and any preserved organic material and the formation of drainage controlling rock berms as required to create the conditions conducive for vega regeneration.

Figure 18-23 following is a series of seven slides illustrating the incremental growth of both the waste rock storage facility and the tailings storage facility.




3 Years of Operations
10 Years of Operations
20 Years of Operations

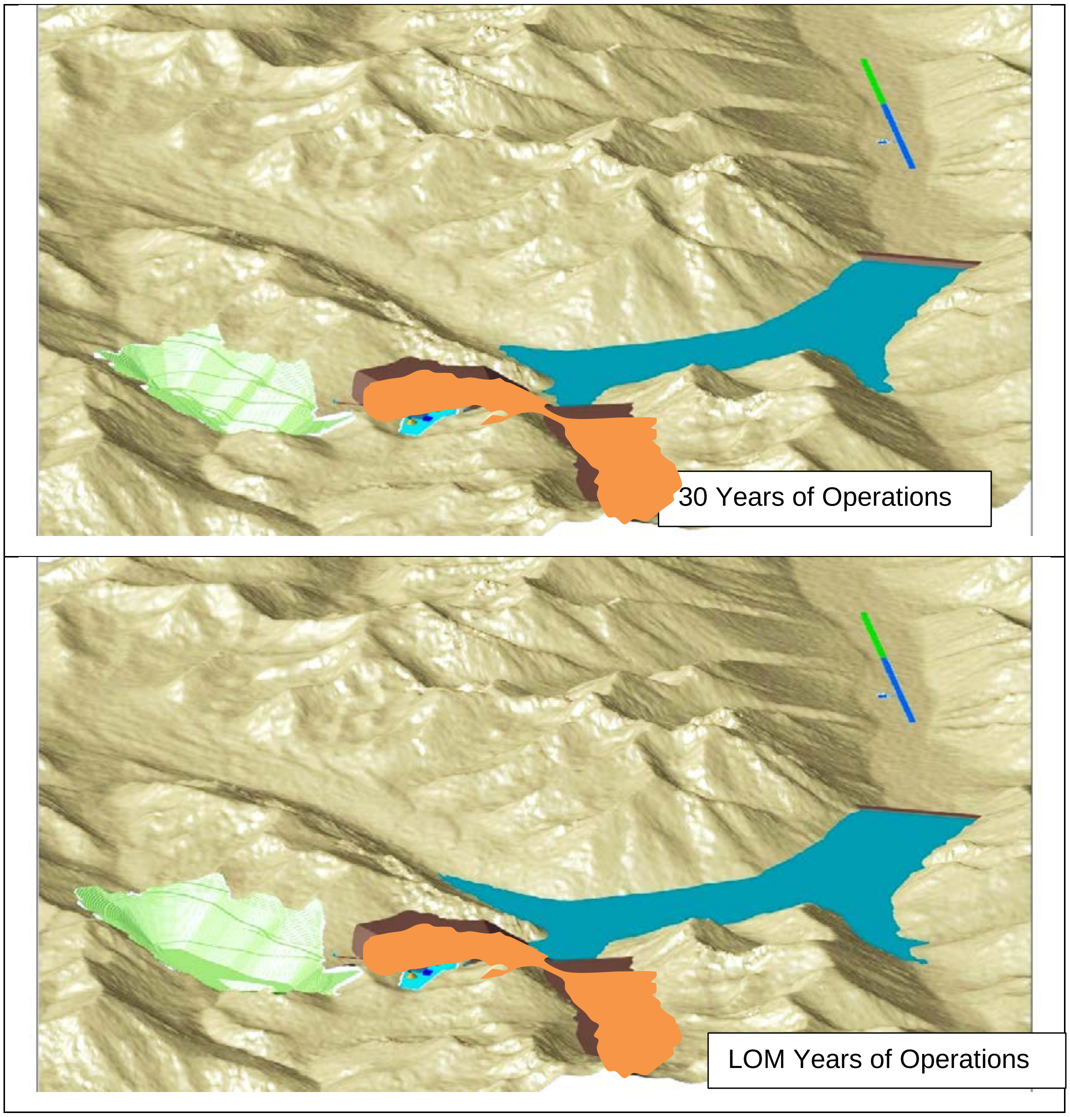


Figure 18-23: Tailings and Waste Storage Facilities by Time Period

18.5 Camp Facilities

Given the remote location of the Project, a permanent man-camp facility will be constructed on the Los Azules site. The camp is envisaged to provide facilities for approximately 2,000 individuals in residence at any given time. The camp will be run as a hotel where personnel at check-in are assigned a room only for the duration of their work roster and they will check out at the end of their work roster. In general an individual is assigned a different room in the camp at the commencement of each work roster. Most camp rooms will be shared occupancy, at least between day shift and night shift personnel. When work rosters are considered a camp with 1,000 rooms caters for a workforce of approximately 4,000 persons. Some contractors will also negotiate to have their own facilities outside of the main camp.

The intention is to convert the construction camp and perform some upgrades to form the facility into the permanent operations camp. The conversion happens as construction nears completion and production ramps up. This eliminates the need for a duplication of facilities.

The construction camp will be formed of insulated panel type, prefabricated modules that can be assembled into single story, 2-story and 3-story blocks for use as offices, support facilities and accommodation units of a type like that shown in Figure 18-24. Used throughout construction, the offices and accommodation revert to become the mine operations offices and mine camp.

Meals, food storage, kitchen, dining, recreation, ablution and accommodation facilities will be provided. An outside contractor will be responsible for meals, housekeeping and maintenance services.

The location of the camp is to be on a level, well drained site downstream of the tailings storage facility, and in proximity to the proposed Los Azules airport. This site is the lowest available elevation (lowest altitude) at approx. 3,300 masl (10,800 ft) and in an area unaffected by avalanches or unstable ground.

Priority will be given to camp construction happening as soon as practical in the project implementation schedule. This avoids the accommodation bottleneck so often encountered in remote projects and that reports as delayed worked man hours and delays to the delivery schedule.

Figure 18-24: Camp and Offices at a recent mine development in similar environment to Los Azules.

18.6 Employee Housing and Transportation

It is assumed that all employees will be housed in the Los Azules camp facilities. Transportation of employees to the various worksites will be provided by on-site buses and light vehicles. Generally, all management will have assigned light vehicles. Lunchtime will generally be taken on board mobile equipment or at designated lunchroom facilities established at each major facility location during the construction phase.

Transportation between the Los Azules site and the city of San Juan for staff embarking on, or returning from work rotation, will be by company aircraft or otherwise by a bus service. The preferred long term solution for Los Azules is a fly-in-fly-out operation from San Juan airport to Los Azules. Flight time is anticipated to be approximately one hour. The workers coming into rotation arrive to the San Juan airport at 05.00 and commence their shift per normal start time at site. On finishing the shift at end of rotation the workers report to the airport and are home early that same evening.

Issues with acclimatisation at the altitude of Los Azules are minimal. In any event medical checks will be required of personnel on arrival and again later in the day. Persons will be trained to recognise and understand any effects, just as they are trained in hot climates about dehydration symptoms.

Flights arriving and departing Los Azules will inevitably suffer delays from time to time due to VFR (Visual Flight Rules) constraints requiring personnel to bus to site. Given technological advances Los Azules may eventually upgrade to a FMS (Flight Management System) where auto pilot landing procedures are used on arriving and departing aircraft. All fly-in-fly-out developments and operations suffer climatic delays to flights but all develop work-around solutions.

18.7 Water Supply

The fresh water available at Los Azules from natural surface streams that progressively confluence to form the Rio Salinas exceeds the projected water consumption demands of the project development and mining operation phases.

The envisaged mine dewatering bores for lowering the level of the groundwater level around the mine pit will also deliver water. Future dewatering of the actual mine pit sumps will also be a source of water, even it is contact water.

The estimated process water demand for Los Azules when operating at 120,000 t per day of concentrator feed is approximately 3,000 L of water per second. This is based on similar operations of similar capacity. Approximately 80% of the process water demand will be satisfied from water reclaimed within the processing plant and from the tailings storage facility. The remaining 20% of the demand (ie. 600 L per second) is make-up water taken from fresh water sources such as the proposed mine area dewatering bores or otherwise collected from surface stream flows.

Surface water flowing from the Los Azules development is all contained within a single watershed. At the location of the proposed tailings dam, the Rio Salinas represents flows at approximately 800 L per second (average annualised flow rate). A photo of the Rio Salinas is shown in Figure 18-25.This flow is in significant surplus to the 600 L per second required for long term make-up water and the surplus is further augmented when mine area dewatering water is considered. Peak flows generally occur in November and December, coinciding with rapid snow melting and minimal flows occur around July and August.

Figure 18-25: The Rio Salinas at the proposed tailings dam site.

In conclusion, the Los Azules development has available water resources exceeding the water demand.

To manage the excess water, non contact water such as stream flow water and dewatering bore water need to be managed by a network of stream diversions, contour channels and pipes. This will deliver the surplus non-contact water back into the environment at a point downstream of the tailings dam.

It is recommended that more studies into water management are performed as a part of baseline environmental assessments, including:

- Ground-water level measurement over a whole year, including winter
- Stream flow gauging measured over a whole year.
- Permeability testing in the area to be dewatered around the mine pit to assess probable dewatering extraction volumes and to confirm dewatering water quality is suitable as non-contact water.

A detailed contact water / non-contact water management plan needs to be developed to support the IIA permitting process including the design and location of water diversion structures, and the staged formation of any contour channels. This will be further supported by an engineered project water balance. At the same time as the IIA Application submission, Los Azules will apply for the water rights and the associated water use permits where Los Azules is granted to have beneficial use of its water rights.

18.8 Tailings Storage Facility (TSF)

18.8.1 Introduction

This section was prepared by K. Seddon, CPEng of ATC Williams Pty Ltd, and D. Brown, CPEng of McEwen.

The proposed tailings dam and storage facility for Los Azules uses proven technologies and construction methodologies.

A similar example of this dam type is the tailings dam in operation since 2015 at Las Bambas, Peru. The Las Bambas tailings dam is situated in the high Andes mountains at approx. 4,000 m altitude and experiences a similar climate, and is also situated in a similar highly active seismic zone. The tailings characteristics and deposition rates are similar and the embankments are substantially formed from mine waste rock fill material.

18.8.2 The Los Azules TSF - Description

The TSF embankment will be constructed in a series of embankment raises performed during the life of the operation. The design was developed based on the topography data provided by McEwen Mining (McEwen).

The proposed tailings embankment design is predicated upon a conservative approach which is appropriate at this stage. The starter dam (Stage 1) embankment will be formed of compacted rock fill obtained from excavated materials at the site and from suitable mined overburden and waste rock materials from the mine pit. For the purposes of this study, upstream and downstream slopes with 1.7:1 to 1.75:1 grades have been adopted, similar to Las Bambas. This is considered appropriate for high seismic areas. Future geotechnical studies will be required to determine the appropriate embankment geometry for the site-specific conditions. Other aspects of the TSF conceptual design include:

- The starter dam of the TSF involves construction of a single embankment across the Rio Salinas.
- The upstream face will be a composite PVC liner with continuous liner anchorage overlying a slip-formed porous concrete kerb facing layer as a water proofing system developed by “Carp Tech B.V.”. The liner system has superior characteristics than HDPE or LDPE but is more expensive to purchase and install. However, it is appropriate at this level of study. It is also the liner used at Las Bambas.
- It is assumed that the embankment foundation will be stripped of all unsuitable materials. A foundation grout curtain will be installed beneath the TSF embankment to reduce any potential seepage, and is assumed to extend 50 m below this stripped ground level.
- An underdrain collection system will be installed beneath the TSF impoundment. This will reduce the potential for development of high pore pressures within the embankment that could subsequently reduce stability, allowing to monitor behavior, and if necessary, collect seepage for return to the TSF or treatment facility at closure.

- A lined polishing pond to collect any eventual seepage water is envisioned at the downstream toe of the main embankment.

Access roads will be constructed along both sides of the TSF from the plant site to the tailings discharge points. This access road will be used as the main corridor for tailings discharge and water reclaim pipelines. The contour drainage channels (or pipelines) will also be situated on the upslope side of these access roads.

18.8.3 Location

The preferred site for the Los Azules tailings storage facility (TSF) presented in this 2017 PEA is within the Rio Salinas valley some 6 km downstream of the Los Azules process plant site. This site was selected after consideration of numerous alternative sites some of which included multiple dam sites. The selected location is shown on Figure 18-26.

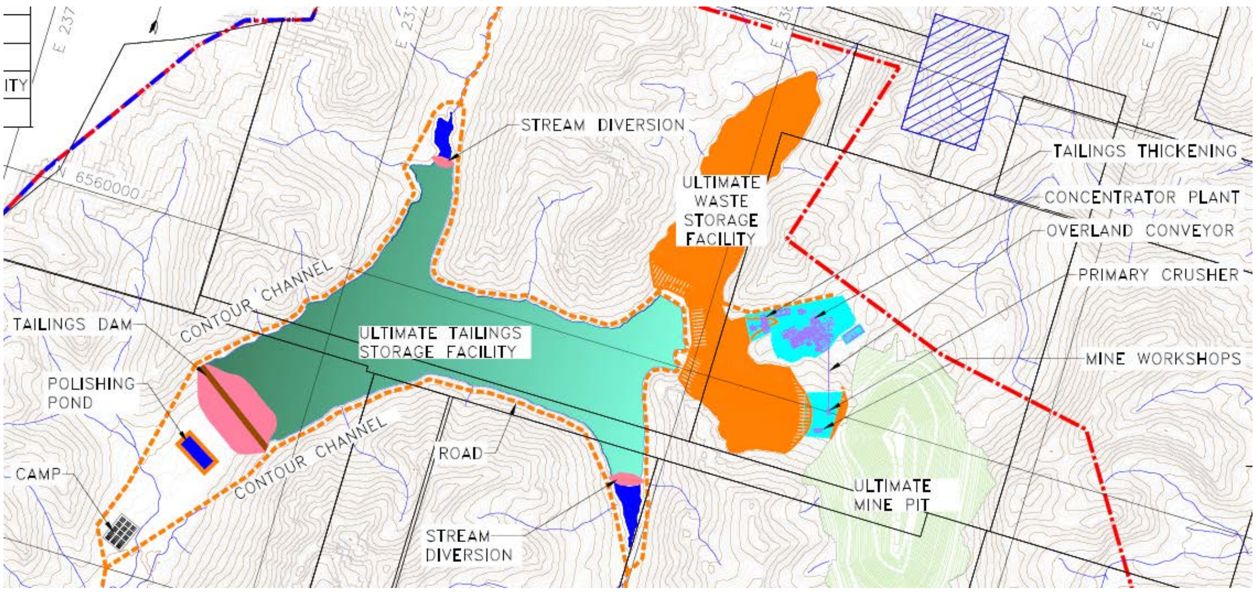


Figure 18-26: The full extent of the Tailings Storage Facility

The site was selected after considering several factors including:

- Large storage capacity for planned life of mine.
- Enables logical separation of non-contact fresh water by upstream interception and diversion into contour drainage channels, and gravity flow around the tailings storage facility.
- Location at a lower elevation than the process plant site to avoid pumping of tailings at any time during the life of operations.
- Downstream of all mine infrastructure (except the landing strip and the Los Azules camp).
- Naturally by location and gravity flow will intercept any contact water generated from mining, processing and waste rock storage.

- Straightforward pumping back recycling of all reclaimed water to the process plant for recycling as process water.
- Provides water storage capacity to cater for drought years.
- Optimized initial capital expenditure and operational costs for life of mine.

18.8.4 Design Criteria

18.8.4.1 General

The TSF has been designed to retain 1,500 Mt of mine tailings deposited over the life of mine at rates initially of 80,000 tpd. In Year 5 it increases to 120,000 tpd through to completion of processing operations.

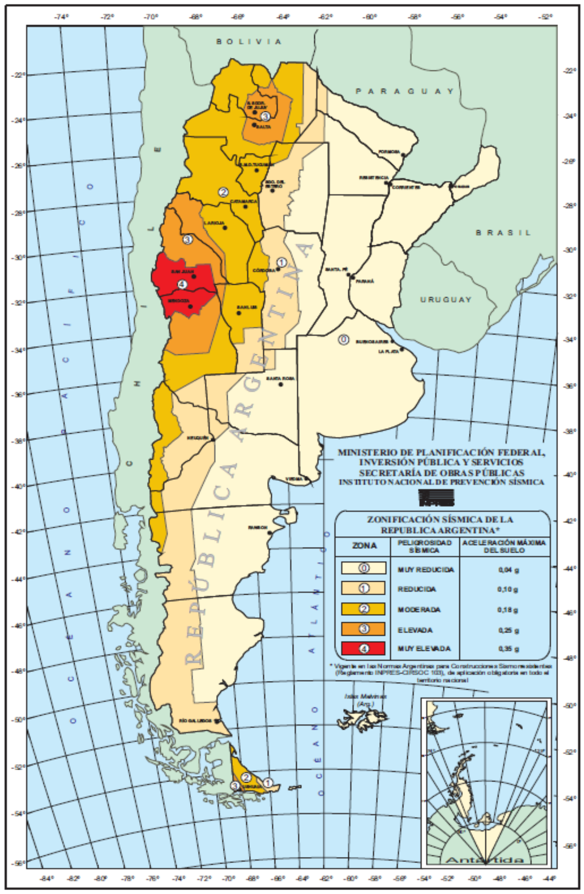
A final tailings density of 1.5 t/m^3 (dry basis) has been used for the life of the facility. This is based on analogous test results of tailings from similar copper process plants that process similar ore deposits in Peru. Initial filling densities for tailings will be much lower at approximately 1.15 t/m^3 to 1.20 t/m^3. The water retained by these early unconsolidated tailings will be significantly higher in these early years until consolidation through solids settling takes place. The TSF is also intended to retain water for operations to continue through two or three years of drought.

18.8.4.2 Foundation Conditions

No geotechnical investigation has yet been carried out at the selected site. Two boreholes were drilled through the valley deposits approximately 3 km upstream of the dam site. These indicated about 15 m of unconsolidated materials comprising sand and gravel sediments and colluvium, but including a layer of glacial silt/clay approximately 5 m thick. These materials overlie a sharp contact to fresh, competent granitic bedrock. It has been assumed that similar conditions apply at the selected tailings dam site and this will be confirmed by a detailed geotechnical investigation to be performed in due course.

18.8.4.3 Seismicity

A detailed seismic risk assessment of the Los Azules site is not yet prepared. For this study, data from the El Pachon site (located approximately 90 km south of Los Azules) has been used considering that both sites correspond to Argentinian Regulations (INPRES-CIRSOC 103 Zone 4). For El Pachon a design peak ground acceleration of 0.6 g was recommended as the maximum credible earthquake, and having a probability of exceedance of approximately one in 2,500 years. This exceeds the Zone 4 Peak Ground Acceleration Standard of 0.35 g (see Figure 18-27). Los Azules and El Pachon are both located within the most red zone (Zone 4).



Mapa de Zonificación sísmica de la República Argentina

Figure 18-27: Argentina Map of Seismic Zones (http://contenidos.inpres.gov.ar/sismologia/linkppal)

18.8.4.4 Tailings Distribution

The tailings slurry will be at a typical concentration of around 58% solids at the underflow discharge from the tailings thickeners. For modelling of tailings slurry flows, a lower value of 55% solids has been used.

18.8.4.5 Water Balance and Catchment diversion

For water balance purposes, an initial tailings settled density of 1.15 t/m^3 has been adopted. The water retained in the tailings at this settled density is close to 0.5 m^3/t of tailings and it is reasonable to assume this early stage retained water is not recoverable. An equivalent volume will be lost to evaporation and hence the make-up water requirement for the tailings is higher in the early years of operation.

18.8.4.6 Return Water

The return water pumps for the water recovered from the TSF have been sized for a maximum plant make up based on a production rate of 120,000 t/day, and a slurry density or 55%. This gives a pumping requirement of 98,000 m^3/d (approximately 1.15 m^3/s).

18.8.4.7 Topography

The design was developed using current detailed contour topography acquired in 2017 for the mine site, but has been supplemented by less accurate data for the high ground at the boundaries of the detailed area.

18.8.5 Embankment Design

18.8.5.1 Storage Capacity of TSF

The TSF has been designed to retain the life of mine tailings production of 1,500 Mt at the adopted design settled tailings density of 1.5 t/m³. This amounts to a volumetric storage capacity of approximately 1,000 Mm³. A storage curve (volume versus elevation) is shown in Figure 18-28, and indicates a final embankment height of approximately 170 m. There is allowance for an addition storage provision of 12 Mm³ for the storage of reserve water to facilitate operation through any dry years, plus an additional freeboard of between 2 m and 5 m to cater for extreme storm events.

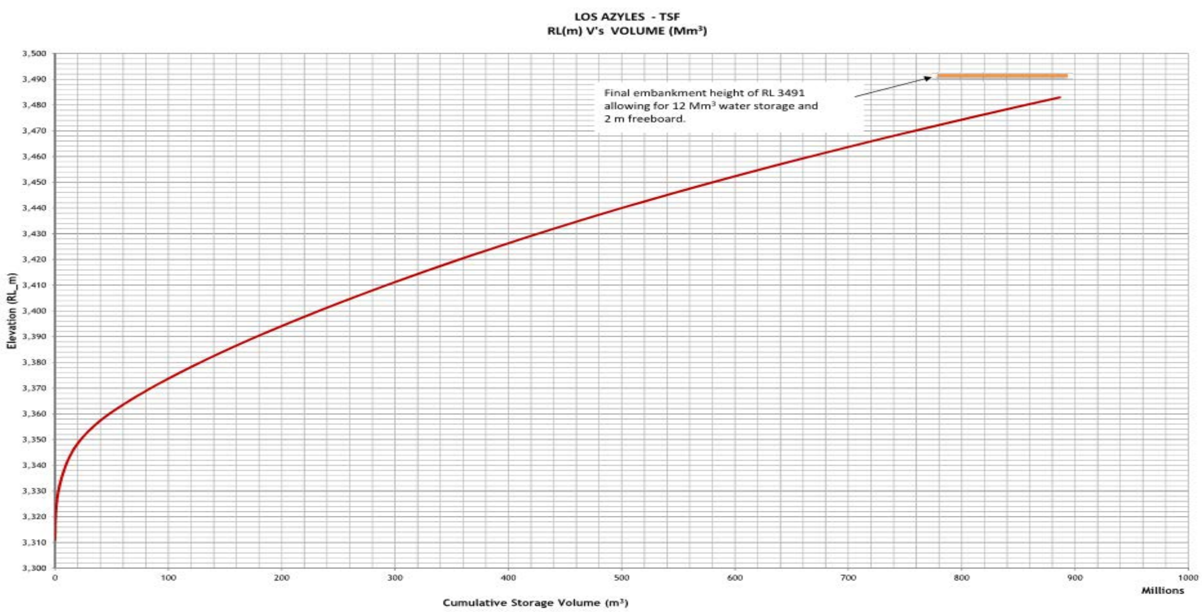


Figure 18-28: TSF Storage Capacity / Fill Curve

18.8.5.2 Embankment Details

The dam will be a zoned rock fill embankment, including a very low permeability PVC composite geomembrane on the upstream face.

The adopted design is based upon the design and method of construction successfully implemented at Las Bambas in the high Andes of Peru. A typical staged embankment cross section is shown in Figure 18-29. In this section slopes are shown at 1.7H:1.0V on the upstream face and 1.75H : 1.0V on the downstream face.

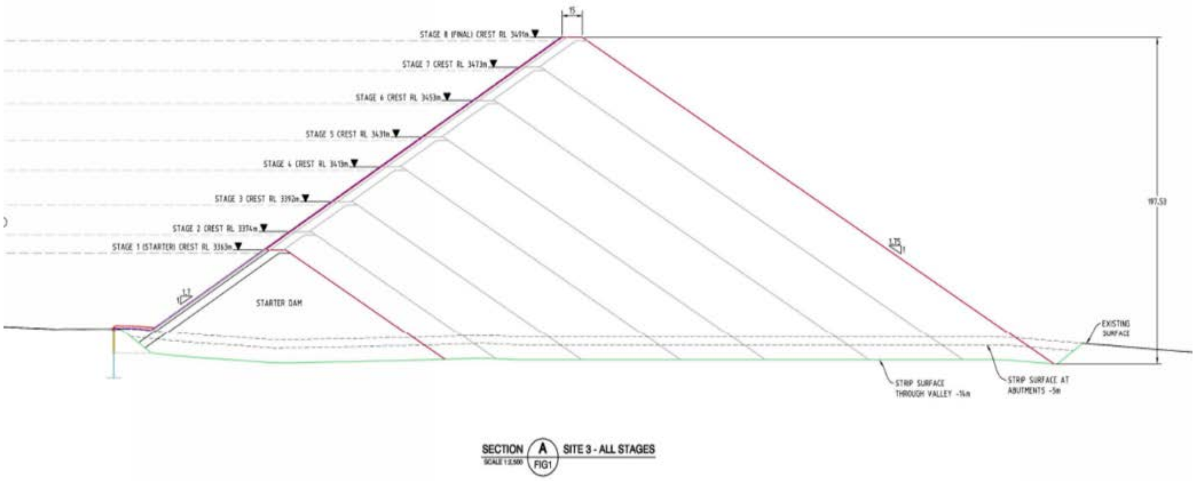


Figure 18-29: TSF Embankment Typical Section with a Staged Construction

Until the completion of definitive hydrogeological and geotechnical investigations and geochemical characterization of the tailings has been undertaken, the following measures have been included in the design to mitigate seepage through the embankment and the foundations:

- A 1 m thick bentonite cement cut-off wall through the saturated sand, gravel and clay layers in the river valley, to be located at the upstream toe of the embankment. This is shown in Figure 18-30 and Figure 18-31.
- A grout curtain into the bedrock across the valley will be installed by drilling through the bentonite cement wall. On the side slopes, it will be installed from the top of the exposed rock after stripping.
- An upstream geocomposite liner installed over a slip-formed, cast-in-place porous concrete base layer as a low permeability element in the embankment. This is shown in Figure 18-32 and Figure 18-33.

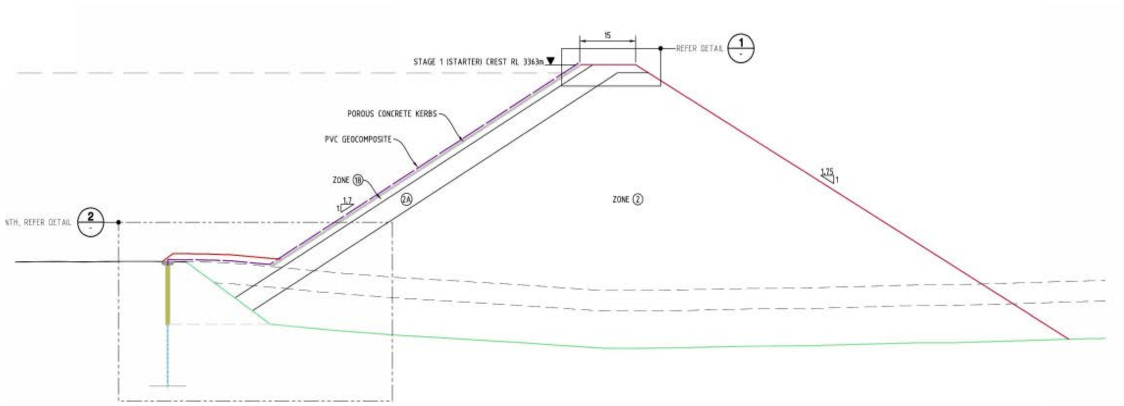


Figure 18-30: TSF Start Up Embankment

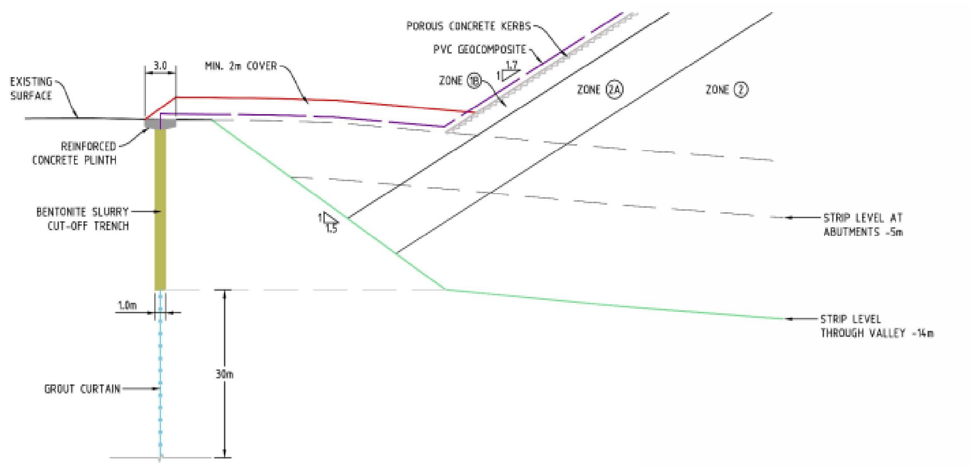


Figure 18-31: Bentonite Cement cut-off and Grout Curtain Detail

Figure 18-32: Typical Construction of the slip-cast porous concrete section which anchors the strips of lining material used for fixing the composite liner.

Figure 18-33: Staged construction of upstream face with slip-formed concrete base, and partially placed geocomposite liner.

18.8.6 Staging of Construction

Construction of the TSF embankment is expected to be essentially continuous during the life of the Project. Construction of stage raises has been based on relatively uniform height increments over the life of the project, as shown on Figure 18-34.

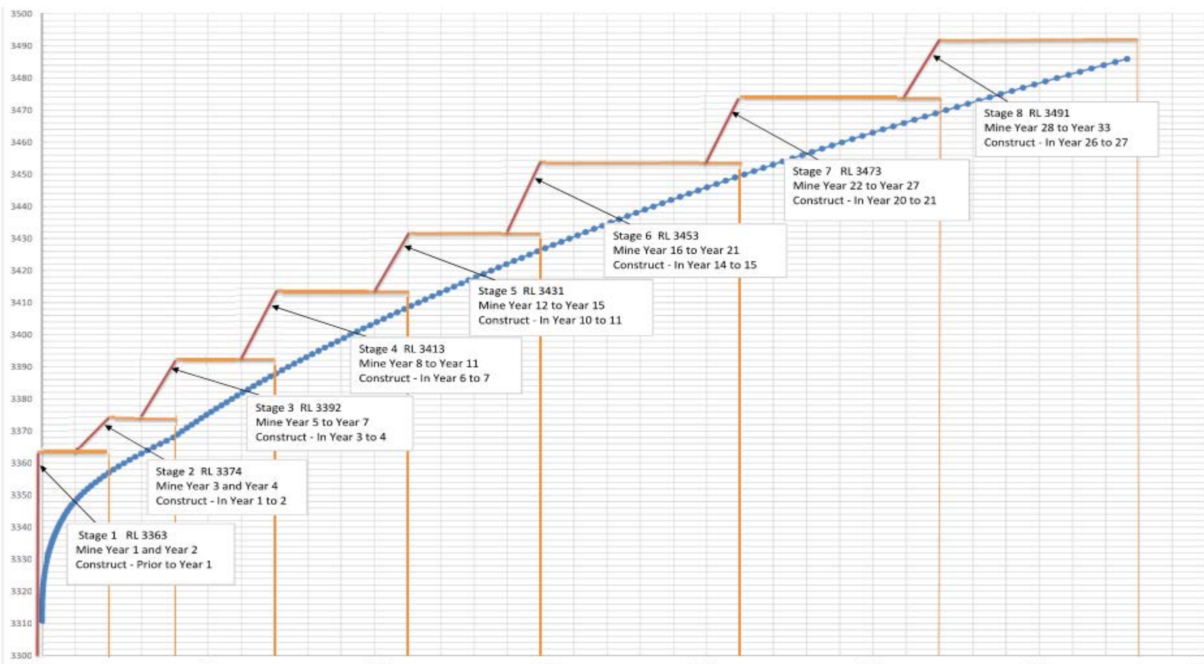


Figure 18-34: TSF Construction Staging.

The initial start-up embankment has been sized to contain tailings from the first two years of production (Figure 18-35). Staging of the construction will be analysed in more detail during future studies.

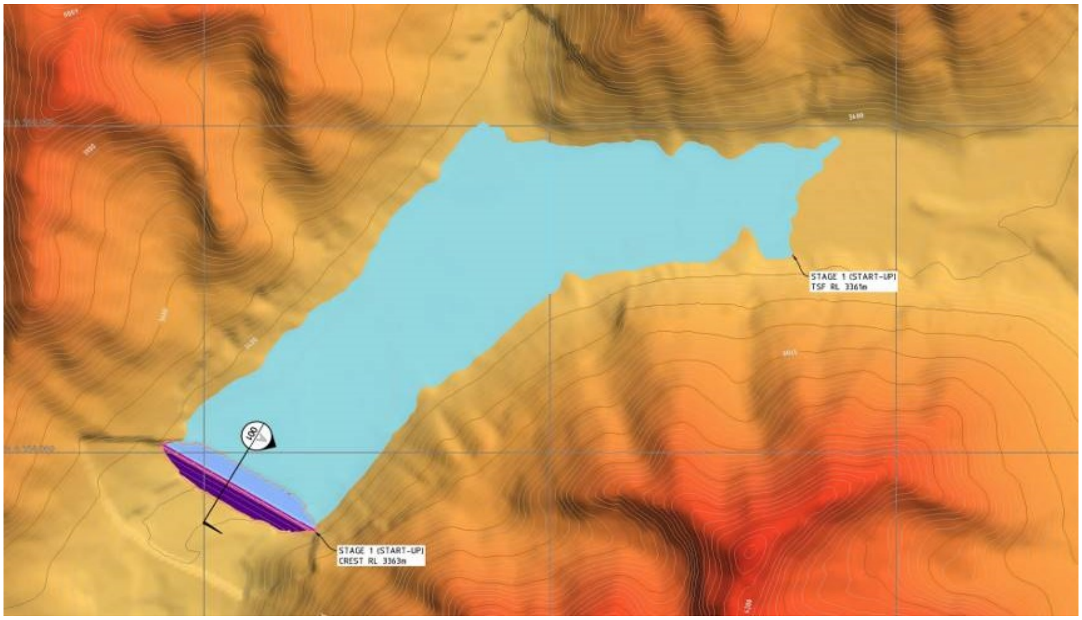


Figure 18-35: The TSF Initial Start-Up Dam with Tailings impoundment shown to end of year two of operations.

18.8.7 Tailing Management

Tailings deposition will be sub-areal in a down-valley direction from the upper sides of the storage, to improve sedimentation and density. No allowances have been included in the design for the beach profile at this stage. This provision could ultimately reduce the required embankment height by some metres.

The design provides for rotation of tailings discharge points around the perimeter of the storage as shown in Figure 18-36 to ensure even filling and provide the ability to maximize the wet beach area for dust suppression when required.

The tailings will be piped from the plant site in a steel pipeline to a pressure break tank. HDPE pipes will be used for the balance of the pipe route.

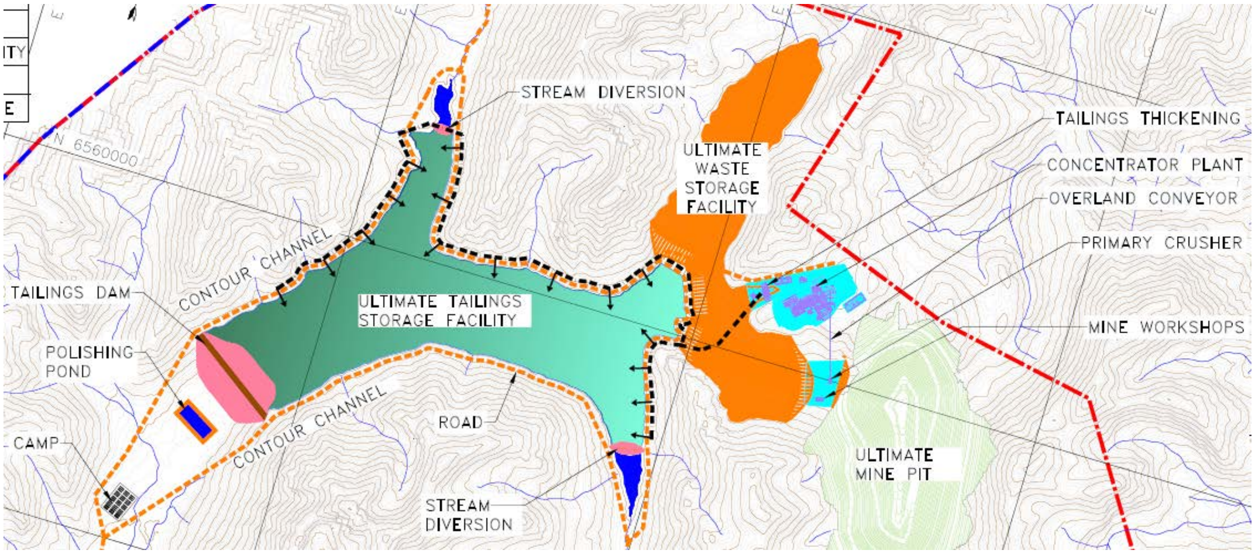


Figure 18-36: Tailings Deposition Pipeline, shown in black dashed line

18.8.8 Tailings Storage Growth Sequence

The incremental growth of both the Tailings Storage Facility and the Waste Rock Storage Facility through to the end of mine life was presented in the seven snapshots shown in Figure 18-23.

18.8.9 Water Management

18.8.9.1 Catchment Runoff

Based on analysis of limited existing precipitation and site streamflow data, the data in Table 18-3 is used to determine the probable site streamflow.

Table 18-3: Probable Stream Flow Values

Value	Unit	Low Precipitation	High Precipitation
Annual	mm	180	350
Catchment Yield	%	50	50
Annual runoff	mm	90	175
Annual runoff	m3/year/km2	90,000	175,000

For a total catchment area of approximately 140 km^2, these values amount to an annual average flow of between 0.4 m^3/s and 0.8 m^3/s in the Rio Salinas at the downstream side of the TSF site. These values have been used in the preliminary site water balance and design of the non-contacted water diversions.

18.8.9.2 Catchment Diversions

Runoff from non-contact water catchments will be diverted around the TSF (Figure 18-37). Contact water from the pit, plant and waste dump catchments will be directed into the TSF for re-cycling (Figure 18-38).

The total catchment area to be diverted is approximately 76 km^2. Diversion will be by buried un-pressurised HDPE pipes which will be sized to convey the base flows, or by open channels, with large peak flows from short rainfall and snow-melt events being by-passed into the TSF. Final polishing dams will be included at the diversion outlets to the downstream river system.

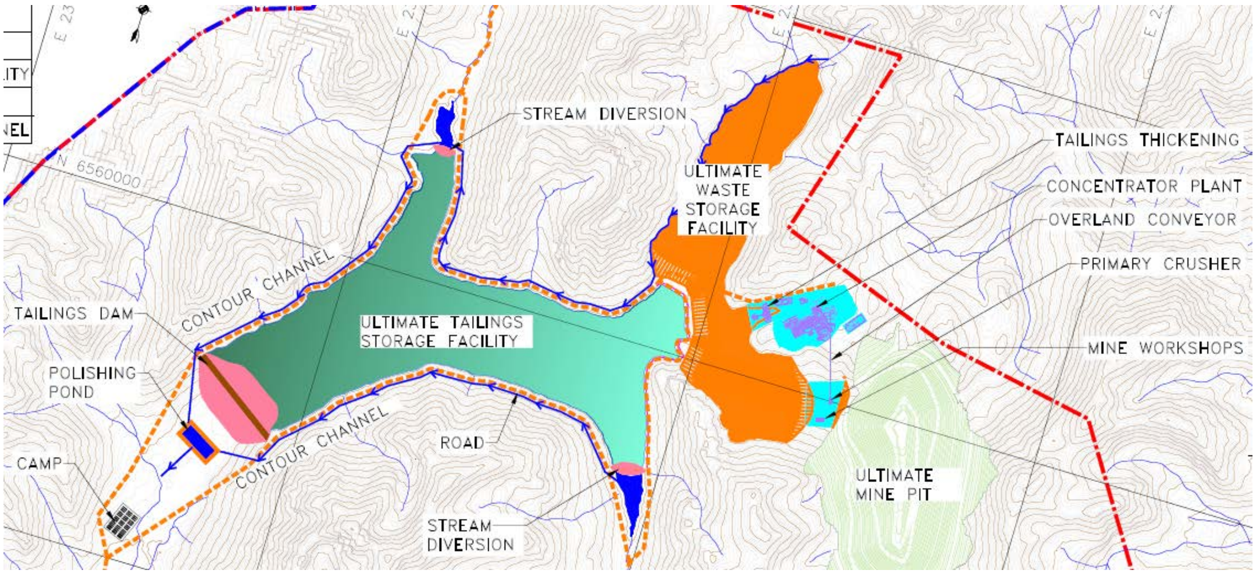


Figure 18-37: Catchment Diversion System

18.8.9.3 Site Water Balance

An initial site water balance has been prepared for a possible range of inflow conditions on the following basis:

<u>Inputs</u>

<u>Catchment Runoff</u>: Runoffs from fresh water catchments that have not been diverted is expected to vary between 4 Mm^3/y and 10 Mm^3/y depending upon the precipitation.

<u>Pit Dewatering</u>: A previous estimate of flows from pit dewatering is 0.5m^3/s over the life of the mine. Initial flows are expected to be higher while the water table around the pit is drawn-down at approximately 2m^3/s (60 Mm3/y), progressively reducing to approximately 0.25 m^3/s (approximately 8 Mm^3/y).

<u>Groundwater Inflows to the TSF Catchment</u>: Preliminary estimates are that groundwater flowing through the foundation soils at the TSF site, which will be intercepted by TSF construction, could vary in the range of 1 Mm^3/y to 5 Mm^3/y.

Retained/Released Water: a make-up water requirement of 600 L/s (60,000 m^3/d, 22 Mm^3/y) has been calculated based on 0.5 m^3 of water per tonne of tailings and a plant throughput of 120,000 tpd.

Diversions: For a total diverted water catchment area of 76 km^2, the maximum flow that may be diverted ranges from between 5 Mm^3/y to 13 Mm^3/y (depending on rainfall). It is expected that even in dry years there will be a requirement to release a portion of this as riparian flow to maintain the stream flow immediately downstream of the site. A minimum release of 3 Mm^3/y (0.1 m^3/s) has been adopted to guarantee flow to the downstream environment and downstream users.

Losses: Losses due to evaporation from the tailings decant pond are expected to be in the order of 250 mm per year which is more or less equivalent to the precipitation into the pond and have been omitted at this stage of evaluations.

The site water balance is summarized in Table 18-4.

Table 18-4: Site Water Balance Summary (Annual, Mm^3)

Condition	Rainfall & Runoff:	Low	Low	High	High
	Dewatering & Seepage:	Low	High	Low	High
Inflows To TSF:					
Runoff from TSF Catchments	Mm^3/y	4	4	10	10
Pit Dewatering	Mm^3/y	16	30	16	30
Groundwater Seepage to TSF Catchment	Mm^3/y	1	5	1	5
TOTAL INFLOW	Mm^3/y	21	39	27	45
Extractions from TSF:	Mm^3/y				
Plant Make Up at 44 Mtpa	Mm^3/y	22	22	22	22
TSF Balance	Mm^3/y	-1	+17	5	+23
Clean Water Diversions:	Mm^3/y				
Available Water	Mm^3/y	5.5	5.5	13.5	13.5
Diverted to TSF / Plant	Mm^3/y	1	0	0	0
Whole of Site Final Balance	Mm^3/y	+4.5	+22.5	+18.5	+33.5
Net Flow Downstream	Mm^3/y	4.5	5.5	13.5	13.5

Table 18-4 indicates that in early years the pit dewatering flows dominate, and the site may have an excess of water. As the pit dewatering reduces, the overall arrangement indicates that the site will be close to being in-balance, but that on-site storage will be required to provide back-up water in dry years. To this end the current design provides for an excess storage of 31 Mm^3 of water on the TSF. This will need to be confirmed by more detailed studies.

18.8.9.4 *Decant Return Water*

The decant pond will form immediately upstream of the tailings embankment. Recovered decant water will be pumped back to the process water tanks at the plant site probably via a pontoon mounted pump set and road side water line (Figure 18-38). A booster pump station may be used to move the recovered water around the perimeter of the tailings storage area to lift the water up to the Process Water Tanks located above the process plant site.

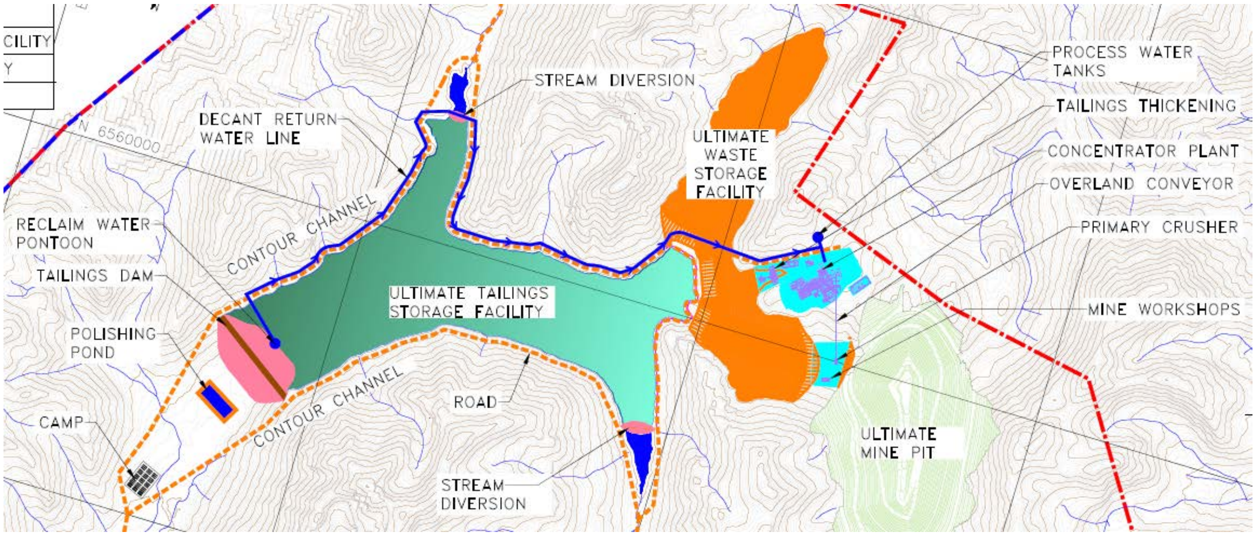


Figure 18-38: Decant Water Return System

18.8.10 *Cost Estimate*

A capital cost estimate has been prepared for the following:

- Embankment including foundation preparation and seepage control measures.
- Access routes for tailings and water management.
- Tailings distribution.
- Catchment diversion.
- Decant return water.

Embankment quantities have been calculated from a digital terrain model of the site, based on the staging and assumptions regarding foundation conditions as discussed above. All pipelines/ diversions have been sized based on flow rates as discussed above, and the necessary pressure ratings.

Unit rates for the estimate have been obtained from an in-house data base of prices from international projects including South America. These rates should be confirmed in due course.

It is noted that the rate adopted for construction of the rockfill zone of the dam assumes that the material will be directly diverted from the waste rock stockpile and hauled directly to the dam site by mine trucks without any intermediate re-handling.

A series of tailings construction photos from a similar project to Los Azules are shown in Figure 18-39 and Figure 18-40.

Figure 18-39: Forming the grout curtain and the PVC composite membrane anchorage on the exposed dam abutments

Figure 18-40: Installation of the PVC membrane over the porous concrete facing

Note the finer grained material placed adjacent to the porous concrete that also serves as road access.

The SIBELON® CNT geocomposite at the Las Bambas project is specially formulated to have a durability of 50 years when covered by tailings and in excess of 25 years if permanently exposed to the environment. The thickness of the SIBELON® CNT geocomposite grants a very robust material that can resist considerable impacts by floating debris and sharp objects such as ice blocks.

Examples of resistance of exposed SIBELON® CNT PVC geo-composites to extreme cases of impact by debris/ice are shown below in Figure 18-41.

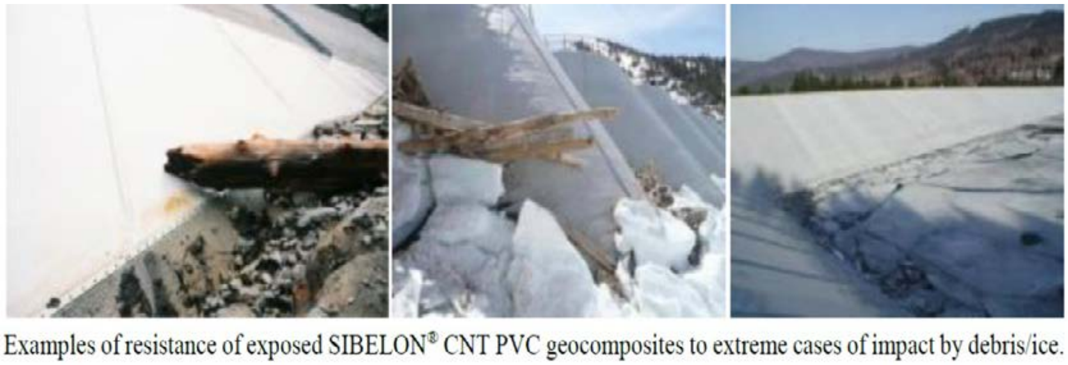


Figure 18-41: Examples of Resistance of Exposed SIBELON CNT PVC geocomposites to extreme cases of impact by debris/ice

A cross section of the slip cast porous concrete backing for the PVC composite membrane of the proposed tailings dam is shown in Figure 18-42.

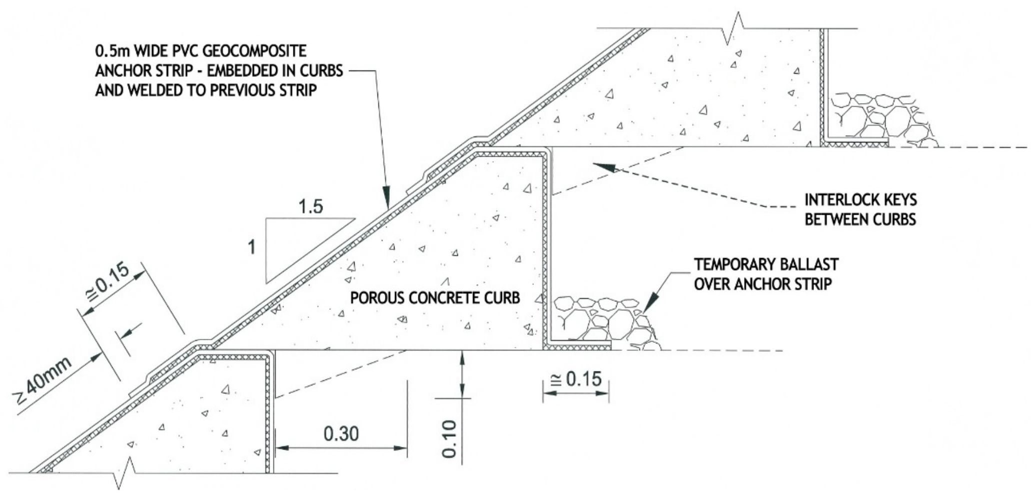


Figure 18-42: Side Profile Schematic, Tailings Dam

19. Market Studies and Contracts

This section was prepared by D. Brown, CPEng, McEwen.

The 2017 PEA for the Los Azules deposit is predicated upon the production of a copper concentrate product of approximately 30% copper content, 9% moisture level and low on impurities for direct export through a Pacific Port in Chile with the majority to sales contracts envisaged to the East-Asia copper smelters.

19.1 Copper Market Outlook – Supply

The global copper supply market is characterised by one consistent long term trend where the worlds best grade copper orebodies are already being mined or have been mined out and worldwide demand is progressively being replaced or augmented by lower grade copper deposits. The decreasing grades are partially offset by economies of operational scale and processing technology enhancements that has delivered the necessary profitability to support the lower grade operations. Consequently, the cost (both opex and capex) to produce one pound of copper will be progressively increasing.

The shorter term cyclic trends are long term repetitive where investment in copper mining projects peaks at the same time as the copper price peaks and investment is at minimum when the copper price is in a trough so many mines complete the implementation phase and enter into the production phase to coincide with low metal prices.

Figures from the 2017 BoAML Metals, Mining & Steel Conference presentation by Glencore are shown below in Figure 19-1 and Figure 19-2.

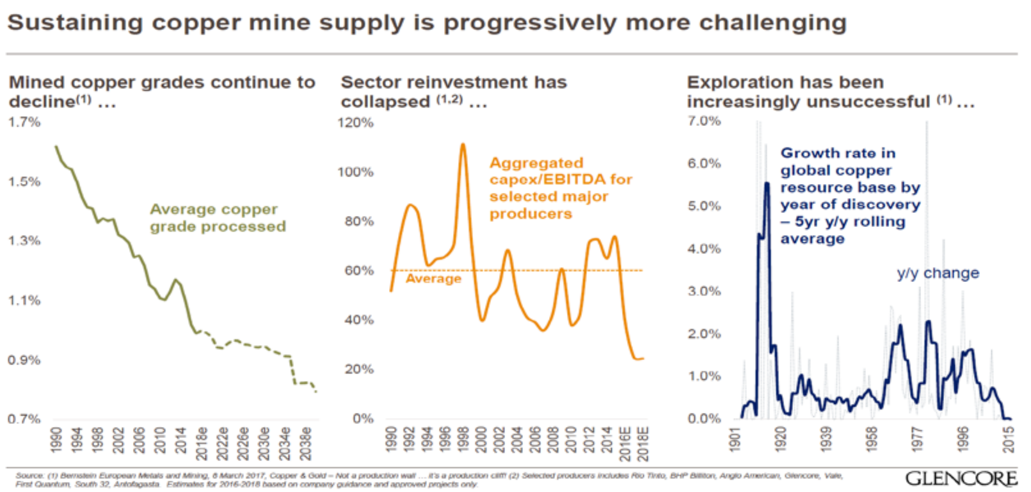


Figure 19-1: Historical Copper Market Performance (Glencore)

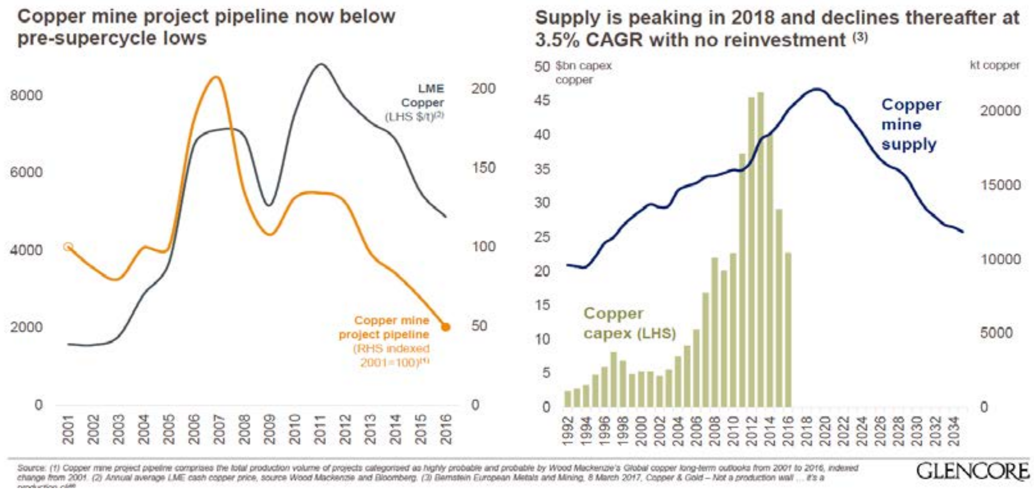


Figure 19-2: Project Pipeline and Copper Mine Supply (Glencore)

19.2 Copper Market Outlook - Demand

The world market demand for copper has a 3% compounded annual growth rate as a long term proven statistic. This growth reflects the world's population growth and the increasing urbanisation happening where copper is the first metal of industrialisation and urbanisation being required in both the supply of electricity and water and in it's use and consumption.

Presently there exists a potential copper market shift with a large shift into renewable energy generation and storage both on a large scale such as grid generation and storage and smaller scale such as electric car use and recharging. It remains to be seen if the long term compounded annual growth rate of 3% will rise but certainly the outlook is positive.

When viewed against the sector reinvestment, the copper project pipeline and the global market supply (predicted to be peaking in 2020) then the outlook for copper is strongly positive for near term prices to rise as demand rises to meet supply and then potentially exceeds supply.

A flat long term price of $3/lb, has been used for the long term pricing in the Economic Analysis. This value is consistent with the current copper price (approx. $2.90c in August 2017) and the results of a PWC survey of long term prices used by companies for the assessment of copper reserves[9] and the April 2017 World Bank price forecast[10]. The $3.00/lb used in the economic analysis is shown relative to the last 10 years of copper price in Figure 19-3.

[9] http://www.pwc.com/ca/en/mining/publications/pwc-global-gold-price-survey-results-2014-11-en.pdf
[10] http://pubdocs.worldbank.org/en/328921469543025388/CMO-July-2016-Full-Report.pdf

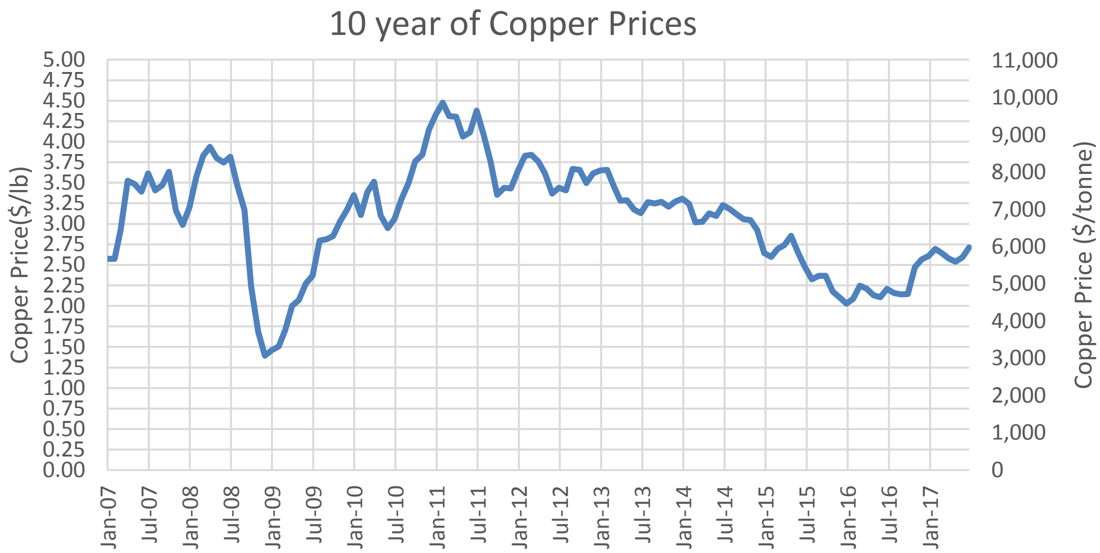


Figure 19-3: Historical and Forecast Copper Prices (source: World Bank)

19.3 Payables, Treatment and Refining Charges

Table 19-1 shows the market assumptions that have been used for the economic analysis.

Table 19-1: Market Assumptions for Financial Analysis

Parameter	Unit	Value
Copper Concentrate Grade	%	30
Long Term Copper Price	$/lb	3.00
Long Term Gold Price	$/oz	1300
Long Term Silver Price	$/oz	17
Payable Cu	%	96.5
Payable Au	%	90
Payable Ag	%	90
Treatment Charge	$/t concentrate CIF	85
Penalties for impurities	$/t concentrate CIF	0 (no penalties anticipated)
Cu Refining Charge	$/lb payable Cu	0.085
Au Refining Charge	$/oz payable Au	8
Ag Refining Charge	$/oz payable Ag	0.5
Concentrate Transportation	$/wmt concentrate	125

19.4 Marketing

No copper concentrate marketing plan has been developed at this stage. Notwithstanding the Los Azules concentrate will be a high quality very saleable concentrate and is intended to be exported through a port already exporting copper concentrates. Exporting the Los Azules copper concentrates through an existing copper concentrate handling port has potential for cooperation, blending and value adding, however this is not yet considered.

19.5 Concentrate Transportation

Concentrate transportation is considered at length in Section 18.

The Los Azules preferred solution is the trucking of concentrates through Chile to the Pacific port at Coquimbo. A bi-national (Argentina-Chile) agreement exists as a legal framework for these cases. However, several other concentrate transport solutions exist both using other ports in Chile and also using rail and port solutions within Argentina. The potential road routes for concentrate transport are shown below in Figure 19-4 and distances are summarized in Table 19-2.

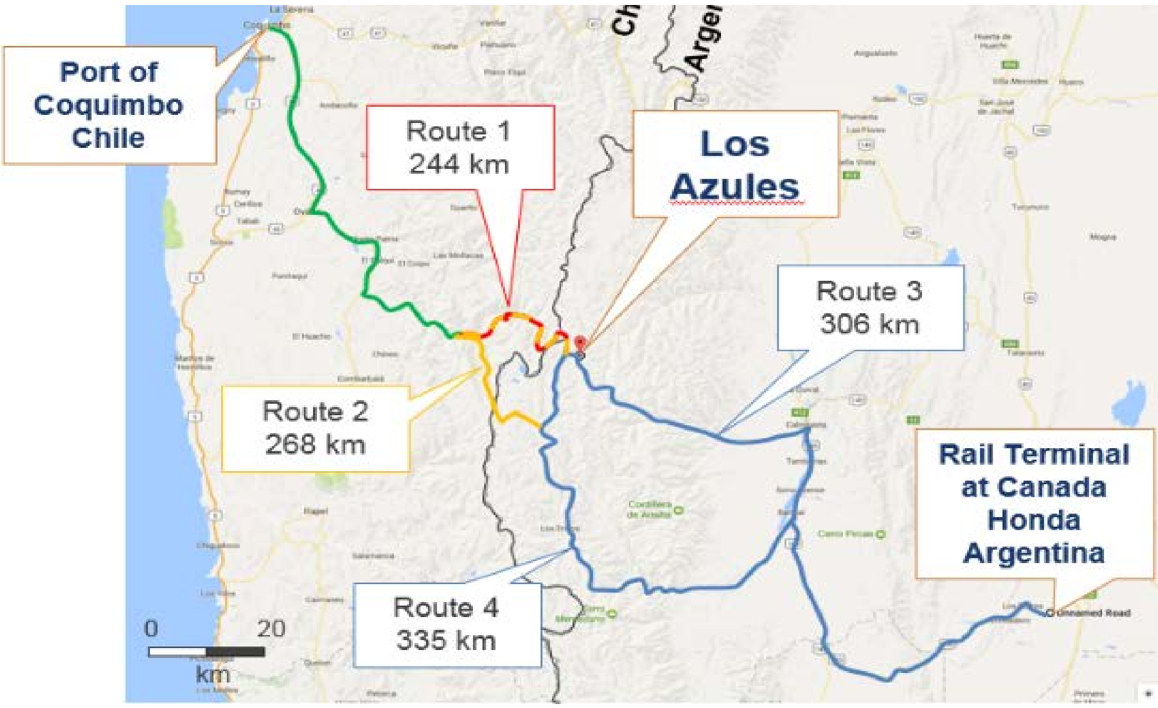


Figure 19-4: Potential road access routes in Chile and in Argentina.

Table 19-2: Distances for Access Road Options

Chile	Argentina
Route 1 = 244 km 132 km - National highway 112 km - Minor roads & tracks	**Route 3 = 306 km** 106 km - National highway 200 km - Minor roads & tracks
Route 2 = 268 km 132 km - National highway 136 km - Minor roads & tracks	**Route 4 = 335 km** 70 km - National highway 265 km - Minor roads & tracks

Distances in Chile are measured from Los Azules to the Port of Coquimbo.
Distances in Argentina are measured from Los Azules to the rail-head at Canada-Honda.

20. Environmental Studies, Permitting and Social or Community Impact

This section was prepared by J. Farrell, P. Eng, Hatch. The author has relied on information presented by Jim Duff and Scott Elfen in the 43-101 Technical Report prepared by Samuel Engineering (2013). Further the author has relied on studies and environmental Impact Assessments (EIA) completed since 2013 by consultants hired on behalf of McEwen and are cited throughout the section.

20.1 Environmental Baseline Studies

The environmental baseline studies for the exploration phase of the Project have been ongoing for various aspects since Q4 2006 in Argentina. No environmental baseline work has been conducted to date in Chile.

The environmental baseline investigations conducted to date in Argentina include, water quality, hydrology, climate, flora, fauna, limnology, air quality, archaeology and social/community.

All baseline data acquisition with the exception of meteorological data has been collected during late spring, summer and early fall times of the year due to the difficulty accessing the site in late fall, winter and early spring represents.

The results of the baseline studies and subsequent biannual updates are documented in the Environmental Impact Report (EIR) (April 2010) and are updated in the 2nd Biannual Environmental Impact Update (April 2014) and 3rd Biannual Environmental Impact Update (April 2016). The EIR updates are based on the compliance conditions identified in Resolutions No. 250-MM-12 (05/11/12) and No. 276-MM-14 (17/10/14) as issued by the provincial mining ministry in support of the required biannual renewal of the Declaración de Impacto Ambiental (DIA) or Environmental Impact Declaration for Exploration Stage Projects. Therefore, they should be considered adequate for the current activities at the cite, but not to be construed as adequate to support an environmental impacts analysis of the proposed mining operations at Los Azules.

Until this 2017 PEA, no environmental baseline studies have been conducted in Chile. Chilean regulations require filing of short environmental impact assessments through a form of fast track sectorial permitting for modifications to existing facilities and infrastructure; however if modifications are deemed significant a full EIS will be required. It is expected that construction of the boarder access road in Chile and transportation of materials and concentrates onto Chilean Roads will trigger a full EIS process for this portion of the infrastructure. Therefore it will become necessary to conduct environmental baseline studies along the proposed road alternatives in Chile.

Multiple components of the baseline studies will require to satisfy International Finance Corporation (IFC) and World Bank Requirements. Best practices indicate that if the assumption is made early in the project to meet the IFC standards it will save a significant amount of time and costs. Additionally, if a decision is made to pursue financing with an IFC credit facility or banks, this reduces the level of challenge that often is presented by lending institutions on baseline information.

Typical components whose compliance with IFC and World Bank Requirements is observed are: Biodiversity and ecosystems, environmental justice aspects, indigenous population concerns, socioeconomic valuations, migratory species, and wilderness and protected areas.

A summary of the baseline studies conducted to date in Argentina follows:

20.1.1 Climate

Meteorological data is continuously collected from a single meteorological station at the exploration camp in order to obtain data to characterize the climate of the Project area. This monitoring is ongoing.

20.1.2 Flora, Fauna and Limnology

Baseline monitoring of the flora, fauna and limnology has been conducted on transects for the Ballena, Frio, Embarrada and Upper Salinas Rivers. Additional baseline monitoring was conducted for an extended area of the Las Salinas River, in addition to the La Ballena River during the 2014-2015 monitoring season to support a proposal for potential compensation of the high altitude wetlands or “vegas” (as referred to herein). Vegas are located in valleys along watercourses and waterbodies (covering only 2% of the region) within and adjacent to the Project area and consist of grasses and plants associated with moist (wetland) environments. The presence of these vegas is considered important (priority for conservation) in order to maintain the biodiversity of the flora and fauna in the area based on their high primary productivity and local diversity.

A test pilot program to relocate or compensate for the areas where Project facilities or infrastructure may potentially impact existing vegas has been conducted, in addition to the continued monitoring of the flora and fauna in all areas. The test pilot program was conducted by Ausenco Vector and included permitting (Department of Hydraulics province of San Juan), evaluation and determination of three (3) candidate areas for relocation/compensation, transplantation of flora and monitoring of a 70 m^2 test pilot site. The plan did not produce satisfactory results. Andes Corporación Minera S.A. requested to the provincial environmental authority to propose an alternative compensation criteria however there has not been any response from the authority thus far.The monitoring reports and proposed compensation plan were provided to the Department of Conservation and Protected Areas of the Ministry of Environment and Sustainable Development. The Department’s decision to accept the proposed compensation remains pending at the time of writing of this report.

20.1.3 Hydrology

An initial hydrogeologic investigation was completed in 2010 and a more extensive hydrologic and hydrogeologic investigation of the proposed pit area was completed in 2011 (Ausenco

Vector, 2011). A total of eight standpipe piezometers and six vibrating wire piezometers have been installed. A total of 16 in-situ permeability tests have been performed.

The environmental baseline data on surface and groundwater volumes have been conducted since 2007 by the *Insituto de Investigaciones Hidraulicas*, a research center of the National University of San Juan. These are ongoing studies contracted by McEwen. After each drilling season, a report is prepared by the consultants and issued to McEwen that summarizes the work completed through the season.

The surface and ground water baseline monitoring has been ongoing since Q1 2007. Water quality monitoring was conducted in 2015 and 2016 for a total of 19 samples and 24 samples respectively, to determine a number of "in-situ" parameters which included electrical conductivity, pH, dissolved oxygen parameters (concentration and saturation) and temperature. Flow measurements were conducted for 12 points along the main watercourses of the Project area and area of influence. The groundwater monitoring included the measurement of the water level in the well and the height of the wellhead. The samples were analyzed in an off-site laboratory for all parameters identified in Annex IV, Table 1 of National Law no. 24,585/95 and other legislation of environmental significance such as Cyanide WAD, HTP, etc. All monitoring reports have been submitted to the responsible authorities for review.

20.1.4 Geomorphology and Glacier Studies

Extensive geomorphological mapping and characterization of the Los Azules area has been carried out since 2011 by Dr. Andres Meglioli, of Mountain Pass LLC and the University of Delaware. Dr. Meglioli and his team have mapped the geomorphological features on the property and access road, analyzed satellite imagery, conducted geophysical and hydro-geochemical studies, carried out detailed topographic survey controls and installed temperature probes to evaluate possible permafrost conditions and overall distribution of periglacial land forms.

The 2014-2015 monitoring program focused on updating and adding to the temperature database, installing equipment to determine the absolute moisture in the soil and air and installing equipment to allow the continuous recording of water discharge from the toe of the rock glacier. Planning began in October 2014 with the determination of equipment type and evaluation of Project areas where additional data is required. Fieldwork began in January 2015. Excavations covering altitudes ranging from 3,500 m to 4,000 m were conducted. Five soil temperature probes were installed in each excavation at depths of 1 m, 70 cm, 50 cm, 25 cm, 10 cm, with relative humidity meters installed at surface. The results of this monitoring program would assist in achieving the main objectives, including:

- Completion of the mapping of the permafrost distribution.
- Characterize the permafrost (dry or wet).
- Quantify the contribution of discharges from the glacier to the hydrology regime on an annual cycle.

Data was collected from all 30 probes in March 2015. Due to equipment failure or vandalism 20 probes (of 30) were taken out of service.

The hydro-geochemical studies are focused on quantifying the contribution of rock glaciers to the overall hydrologic balance of the watersheds where the mining project might be developed. The studies conducted have two main objectives:

- Characterization of permafrost in the area to determine the amount of water produced and the overall contribution to the surface or subsurface water regime and the soil profile distribution.
- Determination of seasonal fluctuations in the hydrological regime and any potential connections to seasonal melt.

Studies and associated activities (in addition to those above) undertaken during the 2015-2016 season, include:

- Use of drone technology to obtain the extent of coverage of the rock glacier located in the northern section of the Project site. Good coverage of the rock glacier was obtained and the photographs will be used to analyze the movement or changes in the glacier for the next 12 months. The analysis will also allow for three dimensional modeling of the landform and allow the calculation of the ice volume.
- Continued monitoring of the temperature probes and conduct topographic surveys to identify and monitor the permafrost. Updates to the 2015 permafrost distribution map will be made if necessary.
- Subsoil conditions did not allow for excavation of wells or pits (for installation of probes) greater than 1 m depth in three of five excavations. Water was encountered at a depth of 1.2 m in one excavation.
- Correlation of the results of the field work and existing meteorological data from the project area to assist with climate modeling.

Dr. Meglioli's preliminary conclusions, based on the studies to date, have found that the Project will not impact any white ice or rock glaciers and that the existing glaciers contribute only approximately 1% to the hydrological flow regime of the watershed. Studies are ongoing.

20.1.5 Archaeology

Ausenco Vector conducted a comprehensive archeological survey of the Project area from 2007 to 2012 which included a visit of the local authorities (*Direction of Heritage Protection or Dirección de Patrimonio Cultural* in Spanish). A few very rustic structures built by the livestock grazers in historic times were identified, but no important archeological artifacts have been discovered in the Project area.

An additional archaeological survey was conducted by Dr. Catalina Teresa Michelli from the University of San Juan in 2013/2014 covering the access road up to the Project area and an area located to the northeast of La Ballena ridge. A site located in close proximity to the access road was identified that requires protection and further investigation to determine the archaeological potential. No additional archeological sites and/or artifacts have been discovered in the area that will be impacted by mining operations. An archaeological/ cultural heritage management plan is required to address undiscovered finds that may be identified during Project activities. There has not been any further archaeological work completed from October 2014 - April 2016 to identify any potential impacts and / or encumbrances on the sites of heritage value identified in the survey carried out by Dr. Catalina Teresa Michelli.

20.1.6 Future Environmental Work Plan

During the remainder of 2017 and in 2018 environmental monitoring activities will focus on acquiring complete and robust data sets that capture the seasonal environmental variations of the site that is adequate to support the preparation of an environmental impact analysis and report (IIA in Spanish) in Argentina and submittal in Chile into the Environmental Impact Evaluation System (SEIA in Spanish).

Additionally, the baseline will serve to establish a complete description of the site and social setting and economic activities in the area of influence before any project development activities are initiated and provide the company with a frame of reference in case future allegations or claims of adverse impacts are made.

Once baseline is fully established, and the site is permitted and constructed, baseline data collection will be maintained for all components that exhibit seasonal or inter annual variations throughout the permitting process until project development is initiated. Once project development is initiated, baseline component monitoring will be converted into compliance monitoring.

New baseline data acquisition in Chilean territory for the access road will also be conducted in compliance with the guidelines and requirements set forth in the SEIA.

The environmental baseline components will be collected and evaluated by major element of the project through the studies identified in Table 20-1.

Table 20-1: Los Azules Environmental Baseline Component Matrix

	Open Pit Mine Area	Ore Processing Facilities	Waste Rock Storage Facilities	Tailings Storage Facilities	Camp Site	Internal Roads	Airstrip	Argentina Access Road	Argentina Border Access Road	Chile Access & Transport
Physical Media										
	Y(a)									Y(b)
Soils & uses	Y(a)									Y(b)
Geology	Y(a)									Y(b)
Geomorphology	Y	Y	Y	Y(a)				Y	Y	Y(b)
Geocriology	Y							Y	Y	Y(b)
	Y	Y	Y	Y(a)				Y	Y	Y(b)
	Y(a)									Y(b)
Meteorology	Y(a)						Y	Summit Winds		Y(b)
Air Quality	Y(a)									Y(b)
Landscape	Y(a)									Y(b)
Geological Hazards	Y			Y	Y	Y	Y	Y	Y	Y(b)
Site Seismology & Seismic Hazards	Y(a)									Y(b)
Paleontology	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y(b)
Biotic Media										
Flora	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y(b)
Fauna	Y(a)									Y(b)
Limnology	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y(b)
Ecosystem	Y(c)									Y(c)
Social and Cultural										
Social Aspects of Area of Influence	Y(c)									Y(c)
Economic Activity	Y(c)									Y(c)

Y= Requires specific study. Y(a)= Global study will address. Y(b)= Specific studies required in Chile. Y(c)= Studies requiring compliance with IFC and World Bank Requirements in addition to local regulations.

20.2 Environmental Management and Monitoring Plans

The environmental management and monitoring plans required to protect the biophysical and social environments are identified in the Environmental Impact Assessment (EIA) (April 2010) prepared by Vector and addressed, when required, in Resolutions No. 250-MM-12 (05/11/12) and No. 276-MM-14 (17/10/14) issued by the provincial mining authority. It is anticipated that detailed environmental management plans may be required for future Project planning and development. Protection measures are identified in the EIA for the following activities or facility/equipment operation:

- Development and operation of access roads, tracking and drill rigs.
- Development and operation of camp facilities.
- Vegetation and wildlife.
- Water quality and Use.
- Protection of Sites/Areas of Cultural and Natural Heritage.
- Operation of Machinery and Equipment.
- Disturbance of Soil.

20.3 Project Permitting

Project permitting is addressed in Section 4.

20.4 Social/Community

The Project is located in the Province of San Juan and the Department (municipality) of Calingasta. The Department of Callingasta has a total population of 8,453 (2010 census) and consists of three principal communities: Barreal, Villa Calingasta and Tamberías. The populations are 4,500, 2,700 and 1,300 respectively. The population of the capital, San Juan, was reportedly 471,000 (INDEC 2010) according to the 2010 census.

The local economies of Barreal, Calingasta and Tamberías are based on tourism, mining and agricultural respectively, although tourism is quickly increasing its contribution to all of the local economies.

The Province of San Juan and the Department of Calingasta have benefited substantially from the development of various large mining projects and thus remains strongly pro-mining as mine development and exploration continues in the area. No organized anti-mining or anti-development groups or organizations were identified by Asesoría Ambiental in the Department of Calingasta.

The 2011 study conducted by Asesoría Ambiental found that there was a broad appreciation for mining as the principal economic activity of the region at the time and the main driver of economic growth. Most people interviewed during this study were generally supportive of mining development with favorable expectations for the future economic development of the region. There has not been any additional social or community work completed since the 2011 study for the Project (pers comm. McEwen Mining).

20.5 Closure Planning

20.5.1 Introduction

Planning for mine reclamation and closure of the associated facilities as early as possible in the planning and design stages of the Project is considered of prime importance in ensuring that environmental and social considerations of the Project are adequately addressed. The initial development of rehabilitation and closure strategies at a conceptual level is an integral component of overall Project planning and provides the basis for further development of appropriate rehabilitation and closure strategies as the Project proceeds through the various Project phases.

The Conceptual Closure and Rehabilitation Plan (CRP) addresses the physical stability, chemical stability and future land use of the Los Azules Project facilities following the completion of mining and processing activities in approximately 35 years. The CRP will be updated with each subsequent Project phase to validate the Conceptual CRP assumptions and update the Project information as it becomes available.

The McEwen Los Azules Project has a current estimated life of mine (LOM) of 33 years and will include the following main components and associated infrastructure:

- Open Pit Mine.
- Run of Mine (ROM) Stockpile.
- Primary Crusher.
- Concentrator Feed Conveyor.
- Crushed Concentrator Feed Stockpile.
- Concentrator.
- Waste Rock Storage Facility (WRSF).
- Tailings Storage Facility (TSF).
- Tailings Pipeline.
- Accommodation Camp.
- Maintenance Shop and Warehouse.
- Fuel Tanks and Fueling Facilities.
- Site Roads and Airstrip.
- Powerline and substations.
- Utilities (Water, Sewerage).

20.5.2 Conceptual CRP Objectives

The overall objective of Project closure and rehabilitation is to ensure public safety and environmental protection by minimizing the long term physical, chemical and biological impacts of the Project (to the extent possible) through rehabilitation of the operational site according to the completion criteria that will be established in the overall Plan.

The specific objectives of closure and rehabilitation are:

- Compliance with or exceed regulatory requirements, international standards and Project commitments.
- Protection of the environment, public health and safety, property over the long term.
- Conduct mine development and operations in a manner that allows progressive rehabilitation to minimize post-operational closure activities and related costs.
- Achieve physical stability thereby reducing or eliminating long term environmental impacts.
- Minimize long-term requirements for active site care and maintenance during the post-closure period (e.g. water collection and treatment).
- Reclaim disturbed land surfaces to a stable condition, including the revegetation with native species (where possible), that are compatible with the land uses prior to Project development.
- Restore watercourses to a stable condition to achieve water quantity and quality objectives in the long term.
- Encourage third party stewardship of the property to promote sustainable use by providing social and economic benefits to the local communities.
- Development of closure plans to include information obtained from public consultations with the local communities and regulatory authorities; and
- Provide an acceptable end use plan.

The principal goal of the overall process is to develop and implement the CRP to ensure that the potential environmental and social impacts associated with the decommissioned operation are identified at an early stage and minimized as a consequence of actions taken during the construction and operation phases of the Project.

20.5.3 Standards and Guidelines

Closure planning for the Los Azules Project is guided by Argentinean provincial and federal legislation, International standards and guidelines (including industry best management practices), commitments made in the EIRs and associated Resolutions (as provided by the provincial Ministry of Mines) and any corporate environmental policies and standards. It should be noted that there is no formal closure or reclamation legislation that provides requirements and standards to achieve during closure and therefore no measure of compliance even though delivery and approval of a Closure Plan is mandated in the San Juan Mining Law (Law # 24.585, Article 17) and is defined as a required component of all Environmental Impact Reports (IIAs in Spanish).

20.5.4 Risk Management

A risk assessment for the closure of the facilities was not completed for the above mentioned facilities based on the availability of information. The Conceptual CRP has been developed to include best industry practices for mine closure and rehabilitation in addition to provision of alternatives for decommissioning of the facilities identified above. It is anticipated that a risk assessment for closure of the Project will be conducted for each subsequent update of the CRP.

20.5.5 Temporary Closure

A defined or indefinite period of temporary closure (care and maintenance) of the mine and therefore of the Project facilities may occur as a result of a change in market conditions or mine-related factors. It should be noted that a state of inactivity might lead to permanent closure if prevailing conditions do not improve. A timeframe for determining when temporary closure leads to permanent closure will be identified in the future CRPs. General closure practices identified by facility below will be implemented.

20.5.6 Closure and Rehabilitation Strategy

The following closure and rehabilitation strategy has been developed to a conceptual level. Final closure activities will commence in year 32 of LOM. Closure and rehabilitation will be conducted through three phases:

- Progressive Rehabilitation.
- Active (Final) Closure and Rehabilitation Phase.
- Post Closure Monitoring and Maintenance.

The progressive rehabilitation, closure and post-closure monitoring/maintenance process for the Project is planned as:

- Progressive rehabilitation (exploration and post-construction) including the grading and landscaping of areas no longer needed for operations, the grading of mined out areas to blend with the surrounding landscape, stabilization of the landforms (appropriate erosion and sediment control) and revegetation (including spreading of topsoil and other growing medium) to allow regeneration of vegetation to a natural state or other approved agronomic/horticultural uses.
- Active (final) closure including active decommissioning and rehabilitation of Project facilities and infrastructure to steady state including implementation of appropriate sediment and erosion control measures.
- Post-closure monitoring and maintenance including transitional stage works during which continuous personnel will not be present and custodial care after the site is stabilized but where additional activities (maintenance activities) may be required.

The following subsections discuss active closure and post-closure monitoring and maintenance. Additional details regarding progressive rehabilitation and post-closure monitoring and maintenance will be discussed in future or updates to the CRP.

20.5.6.1 Assumptions

The development of the Conceptual CRP is based the following assumptions:

- Active closure timeframe is three years followed by 10 years of post-closure monitoring and maintenance of the closure measures to obtain final closure status.
- Final closure activities will commence when the final throughput of material is processed at the concentrator. A stepped methodology will not be utilized based on the current information available for the Project.
- Progressive closure measures, if required, during Project operations will be addressed in Operational Procedures to be developed in future Project planning phases.
- All infrastructure will be dismantled during the closure activities.
- All hazardous waste, including contaminated soil, will be removed from site by a licensed carrier and disposed of at a licensed facility.
- The WRSF at the mine site will be utilized for disposal of site infrastructure and non-hazardous material where possible.
- It is not anticipated that any of the buildings or infrastructure will be turned over at the end of Project life for end use by the local communities. Consultation with the responsible government authorities and public stakeholders related to end use and/or closure plans will be conducted during subsequent Project stages to confirm this assumption.

20.5.6.2 Active (final) Closure by Facility

Site infrastructure is designed to last for the life of mine. A continuous maintenance plan will be required to ensure that all facilities function as designed and specified. The removal of infrastructure and rehabilitation of these areas will occur following the completion of the processing activities. The updates to the CRP will provide plans and species list of native or non-invasive plants to be used in the rehabilitation of these areas. All plant species will be in accordance with any special requirements identified in the EIRs or Provincial Resolutions.

The closure and rehabilitation activities for the Project are discussed below.

Open Pit Mine

Closure and reclamation activities may include, but not be limited to, stabilization of the pit walls, development of a pit lake, provision of overflow drainage channels (if required) and provision of a cover system for any sections of the pit walls that may be acid generating (AG). Development of the pit lake may take a number of years and therefore the potential for acid rock drainage (ARD) generation exists. Methods to address any potential ARD generation (such as lime treatment) should be investigated early in the Project planning process.

Concentrator Feed Stockpile

Any concentrator feed material remaining may only be used if testing confirms that the rock is non-acid generating. The stockpile foundations (including the surge conveyor structure under the main stockpile foundation) will be punctured to allow for natural drainage and covered by overburden. The area will be ripped, if compacted, graded to the surrounding topography and topsoil applied to provide growing medium to assist in establishing vegetation. Sediment and erosion control measures will be implemented on all slopes to ensure stability of the landscape until the vegetation has been established.

Buildings (Primary Crusher, Concentrator, Accommodations Camp, Maintenance Shop and Warehouse, Administration, Substations)

Audits of the buildings will be conducted prior to the commencement of decommissioning activities to identify waste and other materials requiring proper management and removal at closure. It will also include media sampling to identify and document areas of potential safety concerns or environmental liabilities.

All structures will be removed and taken off-site as either scrap or disposed of in a licensed facility. Salvage value was not assumed in the closure costing. The building foundations will be punctured to allow for natural drainage and covered by overburden. The area will be ripped, if compacted, graded to the surrounding topography and topsoil applied to provide growing medium to assist in establishing vegetation. Waste rock may only be used if testing confirms that the rock is non-acid generating. Sediment and erosion control measures will be implemented on all slopes to ensure stability of the landscape until the vegetation has been established. It should be noted that the accommodations camp, administration buildings, water, and sewerage may be required during post-closure monitoring and early planning should clearly identify these requirements.

Machinery and Equipment

All fixed and mobile equipment with marketable value, including comminution equipment, pebble crushers, process tanks and distribution systems, conveyors, feeders, loaders, graders, dozers, etc., will be removed and sold. All equipment tires will be removed from site and disposed according to regulations at an appropriate hazardous materials disposal location. All non-saleable equipment will be removed from site through demolition contracts. Process tanks and distribution systems will be cleaned and flushed by specialists where required, in accordance with any respective requirements or guidelines prior to dismantling, resale or disposal off-site. Concrete thickener tanks will be left in place and filled with overburden to match the existing landscape.

Tailings Storage Facility (including Tailings Pipeline)

Tailings deposition will be managed prior to closure so that the tailings surface landform will be free draining. This approach is based on relatively low rainfall and high evaporation rates that would make long term establishment of a pond over the TSF unlikely. When tailings deposition ceases, the decant pond will be drained and the tailings liquor treated prior to discharge. The surface of tailings will be allowed to dry and gain strength and then the surface of the tailings will be covered and vegetated. The final tailings profile could be managed and shaped to promote flow paths along the southern edge of the closed TSF (without significant double handling of the tailings) and downstream to the river via a post-closure spillway. The downstream face of the TSF embankment will be treated as necessary to manage stability and erosion and inspections undertaken to monitor for any signs of instability. Both surface water and groundwater monitoring will be carried out at locations around the TSF during post-closure to demonstrate performance of the closure strategies.

Waste Rock Storage Facility

Final slopes of the WRSF would be shaped during operations as identified in the mine plan (as progressive rehabilitation) to promote long term stability and free draining slopes to facilitate installation of a soil/gravel cover system where appropriate. Surface water and groundwater monitoring would be carried out at locations around the WRSF during post-closure to demonstrate performance of the closure strategies.

Fuel Storage Tanks (including Fuelling Facilities)

Hydrocarbon facilities and associated contaminates will be removed by a decommissioning specialist who will be responsible for planning and executing the removal of all fuel storage tanks from site, as well as conduct any necessary monitoring required to meet all approvals and permits. Studies to be conducted during subsequent phases of this Project will provide the specialist’s plan for the removal and disposal of all facilities and equipment.

Utilities and Communications Infrastructure (Pipelines, Cables, Powerlines, etc.)

All aboveground utilities and communication infrastructure will be removed. Buried pipelines used for water supply and treatment infrastructure will be drained and removed. Secondary uses and markets for used pipeline could also be identified. All communications cable and support (pole) structures, if provided, will be removed and disposed of in a licensed disposal facility. Powerlines will be removed, although consideration of power requirements for monitoring will need to be considered, prior to scheduling the removal of this infrastructure.

Site Roads & Airstrip

Site service and access roads will remain in place for closure activities with select roads maintained to allow access during post-closure monitoring. The airstrip will be maintained through closure for post closure monitoring access to the site. The road bed/safety berms will be ripped and scarified, or regraded to match the surrounding topography. Drainage ditches and culverts will be removed and the roadbed breached at watercourse crossings to restore natural drainage systems in the area. Topsoil will be applied, the ground will be scarified and appropriate revegetation methodologies applied using both hydro seeding and plantings. Appropriate erosion and sediment control measures will be applied along natural drainage systems and on slopes or embankments where there is a high potential for erosion to occur. Hydro seeding may be used for revegetation in large areas, if feasible, or plantings (end use) determined based on the rehabilitation measures implemented in adjacent areas.

Site Water Management System

The water management system for the Project site, which prevents the surface water within these facilities from being released directly to natural watercourses, will be removed and drainage redirected to the natural drainage systems/watercourses. The ditches and irrigation channels will be broken-up (if concrete) and the concrete used to stabilize the area as an integral component of the erosion and sediment control measures. This approach is based on the assumption that the water quality at the battery limits of the Project sites meets the Project water quality criteria. The site will be contoured to facilitate the flow of surface runoff into the natural drainage system in addition to minimizing the risk for erosion to occur. The area will also be appropriately revegetated and will consist of only native and non-invasive species as identified in vegetation studies to be conducted for the EIRs.

Decommissioning of site drainage features should be planned and staged in smaller areas to minimise any sediment runoff during the rehabilitation process. Where possible grasses that establish easily should be adopted to minimise sediment runoff, as part of further studies.

20.5.6.3 Post-Closure Monitoring and Maintenance

Monitoring of the progressive rehabilitation and closure/rehabilitation of Project facilities will be conducted over a 10 year period to confirm the effectiveness of the rehabilitation activities. The objective of the monitoring program will be to demonstrate stable or improving conditions over the life of the Project operations (progressive rehabilitation), closure/decommissioning and post-closure. The environmental monitoring program for closure and post-closure will be based on the monitoring program defined in the commitments of the EIR updates and any requirements of the responsible provincial government agencies, with appropriate refinements to address closure monitoring.

At the end of the post-closure period, the airstrip will be reclaimed. The landing surface will be ripped and scarified, or regraded to match the surrounding topography. Drainage ditches and culverts will be removed and the roadbed breached at watercourse crossings to restore natural drainage systems in the area. Topsoil will be applied, the ground will be scarified and appropriate revegetation methodologies applied using both hydro seeding and plantings. Appropriate erosion and sediment control measures will be applied.

Reporting on the status of the rehabilitation program will be provided to the responsible government authorities as specified in any Resolutions or conditions of approval (permits). This report will include, but not be limited to, an update on the progress of the CRP and a look ahead at the actions to be conducted in the next reporting period.

21. Capital and Operating Costs

Unless otherwise noted, this section was prepared by M. Bunyard, C. Eng, FAusIMM, Hatch.

21.1 Capital Cost Estimation

21.1.1 Introduction

This section describes the Estimating Guidelines and Procedures used for the preparation of the order of magnitude estimate for the proposed Los Azules project. The targeted accuracy of the capital cost estimate is in the range of +35% to -35%. The design basis for the Los Azules Project is described throughout the previous sections of this report. A summary of the estimate can be found in Table 21-1.

Table 21-1: Summary of CAPEX

Area	CAPEX (USD Millions)
Mining Equipment	$215
Mine Pre-stripping	$193
Surface Scope	
Mining Infrastructure (Truckshop, Dewatering, etc.)	$117
Process – Concentrator	$286
Tailings	$144
Incoming Powerline	$250
Utilities and Power	$81
Main Site Access Roads and Concentrate Haulage	$60
Water Management	$25
In-plant Access Roads	$5
Infrastructure	$5
Mine Haul Roads	$3
Airstrip and Navaids	$2
Border Crossing and Services	$1
Subtotal, Surface Scope	*$979*
Total Direct Cost	**$1,387**
EPCM	$187
Construction Indirects	$117
Construction Camp	$95
Freight	$62
Vendor Representatives	$15
Third Party Engineering	$10
Commissioning	$10
Tailings Indirects	$5
Capital Spare Parts - Process Facilities	$4
Initial Fills - Process Facilities	$3
Total Indirect Costs	**$508**
Contingency	**$420**
Owner's Cost	$48
Total Project Initial Capital Cost	**$2,363**

21.1.2 Basis of Estimate

- The estimate base date is the third quarter of 2017.
- Estimate is reported in United States Dollar.
- Major mechanical equipment list was developed.
- Budget quotes obtained for major equipment and minor equipment factored from Hatch database.
- Discipline cost factored from total mechanical equipment cost.

21.1.3 Direct Costs

Direct costs include the permanent equipment, materials and labour associated with the physical construction of the permanent process facility. Equipment cost factoring technique was utilized for developing the direct cost.

21.1.3.1 Permanent Equipment

Estimates for major equipment were based on single source budget quotes, prices from similar quoted equipment and / or factored pricing based on historical data, where time and cost efficiencies were achieved without significant impact on the estimate accuracy.

The cost for miscellaneous mechanical items was included to account for such items that were not itemized on the equipment list but are required. This includes such items as ductwork, pump boxes, bin hoppers, minor pumps and fans. The factor was developed based on percentages taken from similar projects.

The cost of freight was included as an indirect cost.

Installation costs for equipment was estimated by using Hatch database or where such information is not available, then installation hours were estimated from first principles.

21.1.3.2 Bulk Materials

Bulk materials estimates were developed by factoring from the mechanical equipment cost using factors developed from similar projects.

The estimate for mass earthworks and site road works were allowances based on historical data from projects with similar plant capacity. The cost for the main site access roads was reviewed and updated where required.

The estimates for the above mentioned disciplines were developed by using equipment cost factoring. Factors were developed by taking disciplines as a percentage of the mechanical equipment cost of projects with similar circuits. These percentages were then applied to the total mechanical cost.

21.1.3.3 Infrastructure

An allowance for the Administrative building was included based on staffing requirements for the project.

21.1.3.4 *Utilities and Services*

Allowances were added to the estimate to cover the following items identified to be required but have yet to be clearly defined:

- Waste Water Treatment Plant.
- Potable Water Treatment Plant.
- Water Supply System.
- Backup Generator.
- Communications.

Estimates for Electrical Power Distribution and Substations were reviewed and updated accordingly.

21.1.4 *Indirect Costs*

Indirect costs include items that are necessary for the completion of the project, but are not directly related to the direct construction costs.

Indirect costs were based on historical benchmarked percentage of the direct costs. The indirect costs for the project included the following items listed in Table 21-2 and the respective percentages for each item.

Table 21-2: Indirect Cost Summary

Description	Percentage	Percentage of
EPCM	16%	Percentage of Direct Cost excluding Mining Equipment
Vendor Reps	1.5%	Percentage of Surface Scope Direct Costs
Construction Indirects	12%	Percentage of Surface Scope Direct Costs
Construction Camp	N/A	Developed based on 2,000 person camp
Third Party Engineering	1.0%	Percentage of Surface Scope Direct Costs
Spare Parts – Process Facilities	3.0%	Percentage of Total Equipment Cost
Initial Fills and Inventory	1.0%	Percentage of Process Plant Direct Cost
Freight	4.5%	Percentage of Direct Costs
Commissioning	1.0%	Percentage of Surface Scope Direct Costs

21.1.5 *Owner's Costs*

Owner's Costs are those costs, which are not normally included in the capital cost, scope of the EPCM Consultant, but were included in the estimate at the direction of the client. An allowance of 4% of Direct Cost (excluding initial Mining Pre-strip costs) has been included.

21.1.6 *Project Contingency*

Contingency is a provision for known project costs which will occur, but which cannot be defined in sufficient detail for estimating purposes due to the lack of complete, accurate and detailed information, as well as limited engineering, which has been performed. The addition of contingency is required in order to determine the most likely cost of the project. A contingency of 25% was carried for the Los Azules order of magnitude estimate, which is in line with a Class 5 estimate. The cost of mine equipment was not included in the factored calculation of contingency.

Project contingency does not cover scope changes or project exclusions.

21.1.7 Estimate Clarifications

The following costs are not included in the capital cost estimate:

- Custom Duties and Taxes.
- Schedule acceleration costs.
- Schedule delays and associated costs, such as those caused by:
- Unexpected site conditions
- Unidentified ground conditions.
- Labour disputes.
- Force majeure.
- Permit applications.
- Development fees and approval costs.
- Cost of any disruption to normal operations.
- Foreign currency changes from project exchange rates.
- Inflation.
- Economy factors/pressure on labour productivity (Less skilled workforce).
- Costs for additional drilling geological drilling required to bring currently inferred resources to measure and indicated status.
- Costs for future pre-feasibility and feasibility studies prior to board approval.
- Cost for geotechnical and hydrogeological studies and drilling associated with prefeasibility studies.
- Costs for capital escalation. The estimate has been prepared in 2017-dollar terms.
- Any scope changes (based on the scope of the Project, as defined in this report).
- Costs that may be incurred as a result of the failure of the Owner to follow the project implementation plan and schedule detailed in this report, including any costs incurred to accelerate or decelerate the work or supply of equipment relative to the project schedule set out in this report (e.g., overtime charges, expediting charges, etc.)
- Project financing costs, whether done by way of debt or equity and including any interest costs.

- The work that has been recommended but which shall be conducted at the option of the Owner, as described in Section 26.
- Any facilities or infrastructure work that may be done off the Project Site, except for the power transmission line (and relevant substation) and the site access road.
- Taxes, royalties and other governmental charges and levies.
- Any licensing or permitting costs, including any environmental permitting costs, baseline studies and any costs that are incurred in order to obtain applicable licenses or permits (e.g., development of local infrastructure in order to obtain local support for the project).
- Fees or royalties relating to use of certain technologies or processes.
- Costs incurred in connection with the project prior to [the commencement of the EPCM phase of the Project] (e.g., site acquisition costs, costs associated with the preparation of this study and any prior studies, licensing and royalty charges already incurred).
- Working capital.

21.2 Operating Cost Estimation

Operating costs have been developed on an annual basis for the LOM by project area. Estimated operating costs for the project are summarized by area in Table 21-3.

Table 21-3: Operating Cost Summary

Cost Area	$M LOM	$/t Mill Feed	$/t Cu	$/lb Cu
Mining	5,404	3.63	980	0.44
Process	5,774	3.88	1,047	0.47
Transport	2,587	1.74	469	0.21
G&A	1,620	1.09	294	0.13
Subtotal OPEX	15,385	10.34	2,789	1.26
TCs/RCs	2,684	1.80	487	0.22
Au & Ag Credits	(2,449)	(1.65)	(444)	(0.20)
C1 Costs	15,621	10.50	2,831	1.28

Treatment Charges (TC), Refinery Charges (RC) and Transport Costs are outlined in Section 22 of this report.

The year on year operating costs are presented by area in Figure 21-1. Subsequent sections provide additional details on each area.

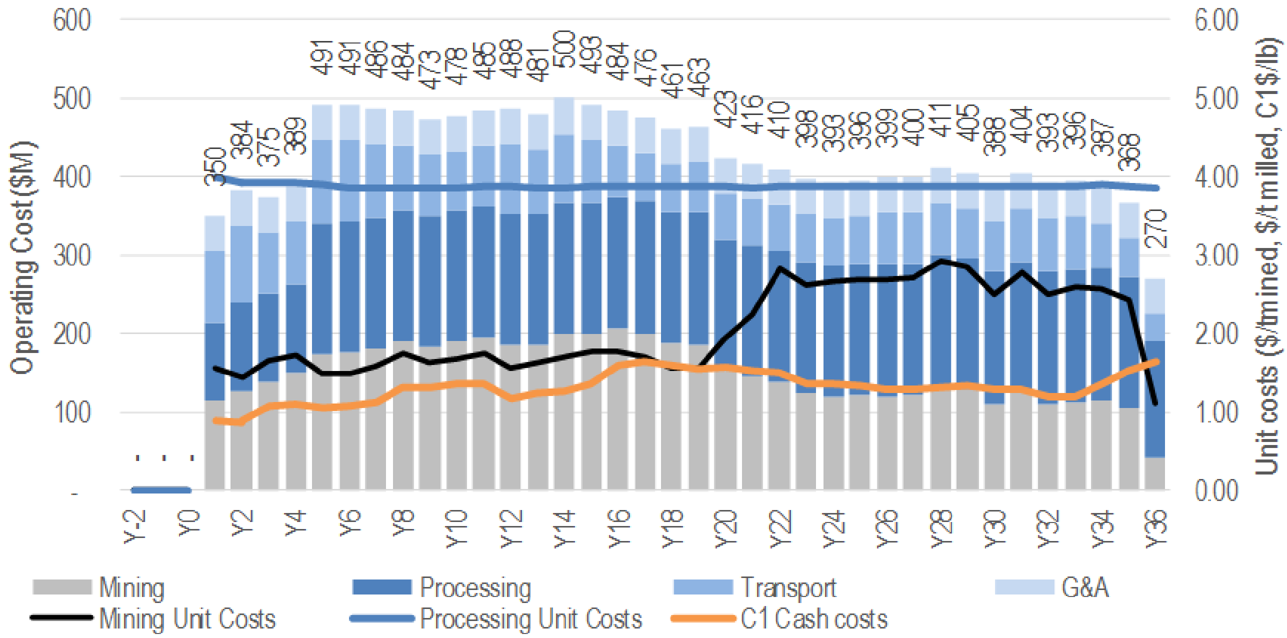


Figure 21-1: Year on Year Operating Costs by Area

An operating cost breakdown by major cost category is presented in Figure 21-2.

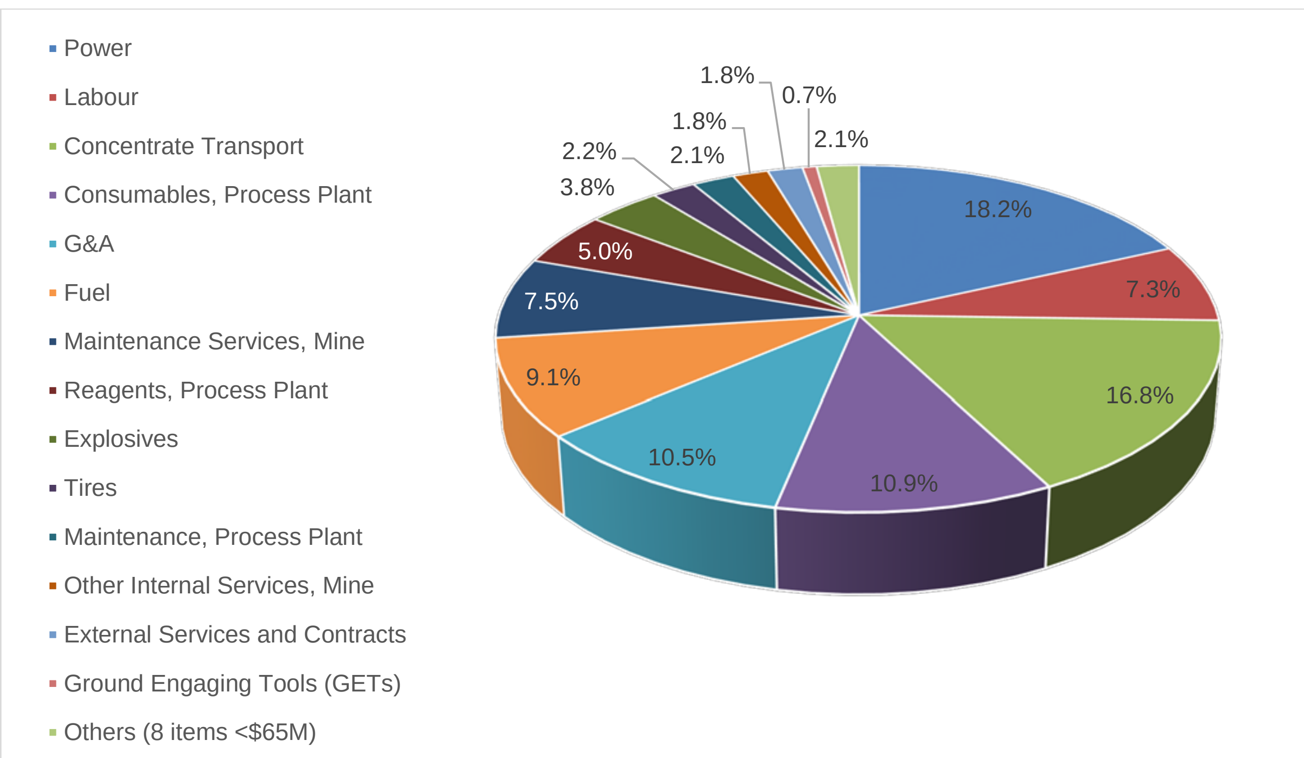


Figure 21-2: Operating Cost Breakdown by Category

21.2.1 *Mining Operating Costs*

This subsection was prepared by D. Brown, C P Eng, McEwen. The LOM mine operating costs for this PEA assessment of the Los Azules project is estimated to total $5.40 billion. Benchmark data in conjunction with equipment hourly requirement estimates were used as the basis for the estimate, which is expressed in 2017 US dollars.

The mining operating estimates were divided into the categories:

- Mine fleet equipment consumables.
- Explosives consumables.
- Equipment parts (maintenance and overhaul).
- Labour.
  - Operations.
  - Maintenance.
  - Supervision.
- Others; including dewatering.

A three year pre-production period is planned and all costs associated with this period are included in the capital expenditure estimate (i.e. not included as part of operating costs).

For consumables, the two main drivers are the diesel and electrical consumptions of the respective equipment. Diesel consumption was estimated based on a unit cost of $1.00/L, while the electrical consumption was calculated based on a unit cost of $0.10/kWh. Other consumables included in the estimate are tire replacement, lube and filters, wear items, such as Ground Engaging Tools (GET), drilling consumables, explosives and assays.

The maintenance costs were estimated based on total parts costs and repair, as well as the hours required to carry out the work. However, these are included under labour, where both mine operations and maintenance along with supervision are accounted for. All labour costs have been benchmarked from similar projects.

A summary of the mine operating cost estimate, expressed as a total for the project life and on a per tonne basis, is shown in Table 21-4.

Table 21-4: Estimated Mine Operating Costs for LOM; excluding Pre-stripping

Mine Operating Cost Estimates	LOM ($M)	$/t mined	$/t mill feed
Operations			
Labour	273.1	0.10	0.18
Fuel	1,405.7	0.49	0.94
Power	91.6	0.03	0.06
Drill Tools	64.5	0.02	0.04
Explosives	578.3	0.20	0.39
Tires	344.7	0.12	0.23
Operations Contractors	117.0	0.04	0.08
Total Operations Costs	**2,874.8**	**1.00**	**1.93**

Mine Operating Cost Estimates	LOM ($M)	$/t mined	$/t mill feed
Maintenance			
Labour	236.9	0.08	0.16
Lubes	50.9	0.02	0.03
GETs	110.2	0.04	0.07
Tires Maintenance	18.3	0.01	0.01
Repair Services	19.8	0.01	0.01
Maintenance Services	1,157.9	0.40	0.78
MARC Contract	0.0	0.00	0.00
Unforeseen	58.9	0.02	0.04
Total Maintenance Costs	**1,652.8**	**0.58**	**1.11**
Indirect Costs			
Labour	383.1	0.13	0.26
Minor Supplies	26.9	0.01	0.02
Minor Mobile Equipment	35.0	0.01	0.02
Other Internal Services	275.7	0.10	0.19
Other External Services	155.7	0.05	0.10
Total Indirect Costs	**876.4**	**0.30**	**0.59**
TOTAL Mine OPEX (excluding pre-stripping)	**5,404.1**	**1.88**	**3.63**

The year on year mining costs are presented below in Figure 21-3. The first three years reflect pre-stripping activities.

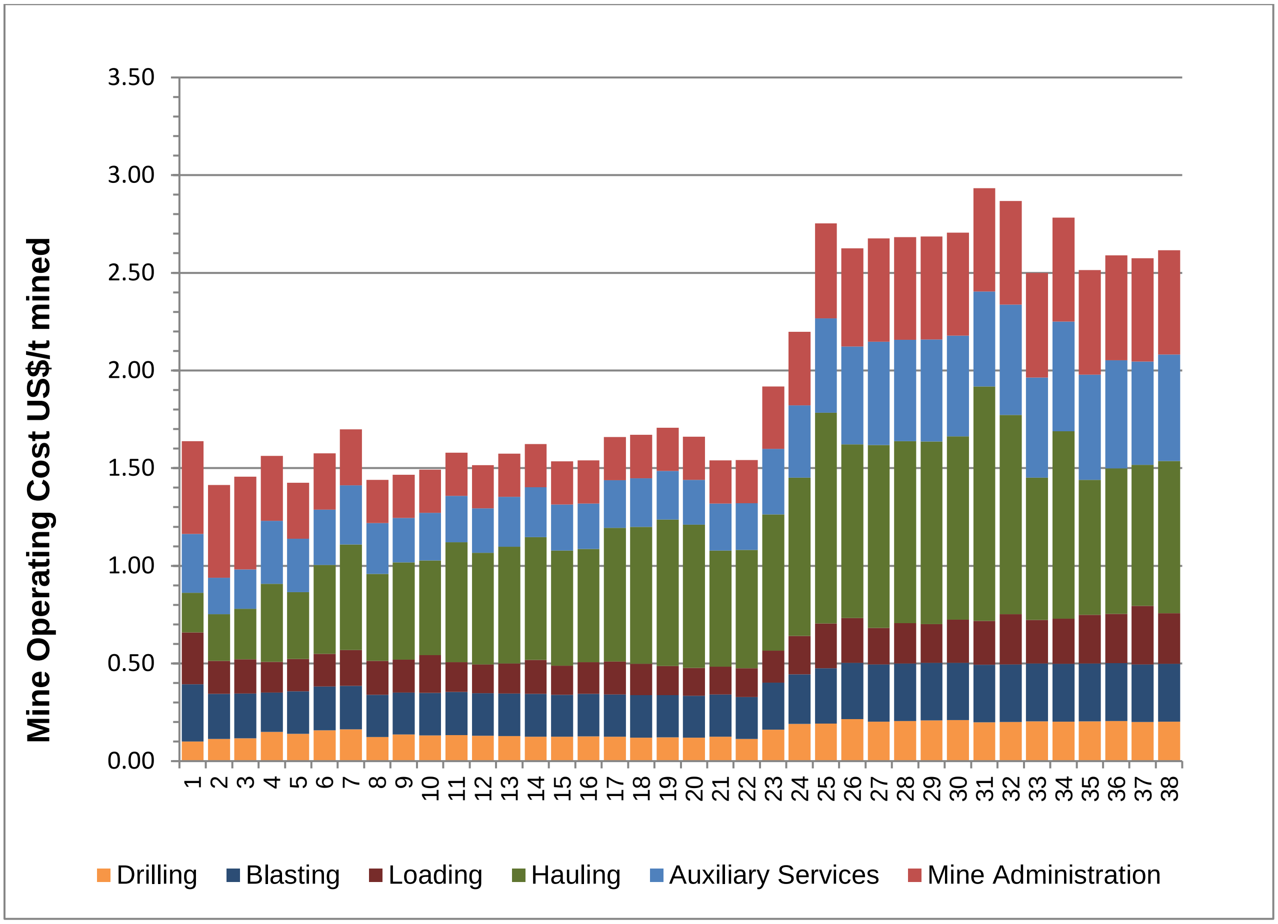


Figure 21-3: Mining Unit Costs by Year

The step change increase between years 22 and 25 corresponds to the completion of waste mining in these years and the consequent distribution of the auxiliary services and administrative costs over only the ore mined, a smaller divisor. This is a conservative approach appropriate at this stage of resource evaluations where only a small number of mining phases are considered. At feasibility stage it is expected that more numerous mining phases will be considered and the waste mining more evenly distributed over time. The step changes seen above will be replaced by a life of mine trend of costs gradually increasing with time, mining depth, waste dump height and associated haul distances.

21.2.2 Process Plant Operating Costs

This subsection was prepared by M Bunyard, C. Eng, FAusIMM, Hatch Major operating cost components were power, maintenance, reagents, consumable, labour and laboratory costs. They have been calculated for each year of the mine life. A summary of the operating costs are provided in Table 21-5.

Table 21-5: A Summary of Process Plant Operating Cost Estimate

Category	$M, LOM	$/t Processed	% of Total
Reagent Cost	770.4	0.52	13%
Consumable Cost	1,683.1	1.13	29%
Power Cost	2,710.3	1.82	47%
Maintenance Cost	330.7	0.22	6%
Labour Cost	225.9	0.15	4%
Laboratory Supplies Cost	53.9	0.04	1%
Total	**5,774.4**	**3.88**	**100%**

21.2.2.1 Basis of Estimate

Reagent consumption rates were estimated based on available testwork results for both primary and supergene material due to the different reagent schemes for each. Reagent unit costs have been provided by suppliers. Where no vendor data was available, unit costs were taken from Hatch's in-house database.

Consumable rates were estimated based on available testwork results and Hatch in-house information of similar operations. The unit costs for consumables were determined from Hatch's in-house database. Power costs were based on the installed power requirements from the major equipment list and allowances made for smaller equipment. A unit rate of $0.10/kWh has been used, as provided by McEwen.

Maintenance costs were estimated as a percentage of equipment, materials and building cost based on Hatch in-house information of similar operations.

Labour costs were estimated based on the staffing requirements and labour structure of similar operations. Monthly average labour costs were provided McEwen. Laboratory costs were estimated as a percentage of total operating cost estimate.

21.2.3 General and Administration Costs

This subsection was prepared by R. Duinker, P. Eng, MBA, Hatch. The General and Administrative (G&A) costs were estimated to be $45M per annum. The G&A costs were estimated based on Hatch's internal benchmarks for similar sized mines in South America. The methodology employed used benchmarks for several G&A cost categories. The following categories were used to build the total G&A cost estimate:

- Management: Salaried Labour costs
- Overhead: Costs associated with Permits, Corporate Allocations, Insurance, Power, Professional Membership, etc.
- Supply Chain: Costs associated with Warehousing, Administrative Supplies, Purchasing and Logistics.
- HSEC and Security: Costs associated with Health and Safety, Environment, Community and Security

- Site Services: Costs associated with HR and training, IT and Communications, Finance and Accounting, Camp Services and other miscellaneous site services.

Table 21-6 shows the estimated G&A Costs for the Los Azules Project.

Table 21-6: G&A Estimate

Area	Au/Cu Site in Argentina ($M)	Au/Cu Site in Peru ($M)	Cu Site in Chile ($M)	Estimate ($M)
Management	10	6	17	10
Overhead	20	8	3	10
Supply Chain	6	2	2	3
HSEC & Security	10	9	3	7
Site Services	20	11	15	15
TOTAL	66	36	40	45

22. Economic Analysis

This subsection was prepared by R. Duinker, P. Eng, MBA, Hatch.

22.1 Introduction

To evaluate the benefits of the required capital investment for the proposed Los Azules Project, the economics were evaluated on a post board approval basis (after completion of additional drilling, prefeasibility and feasibility studies) in an Microsoft Excel based real basis after-tax discounted cash flow (DCF) model in which the production, revenues, operating costs, capital costs and taxes were considered.

The financial model was set up as a single model with multiple sets of input assumptions that can be varied as needed.

The key model assumptions and financial results, project returns and cash flows are presented herein.

This updated PEA is at a scoping level and is preliminary in nature. This option includes Inferred mineral resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves and there is no certainty that the updated PEA will be realized.

All economic assessments are calculated at the Los Azules project level and therefore; do not include certain costs including corporate office, interest, financing and exploration expenses.

22.2 Summary of Results

Table 22-1 shows the results of the financial analysis.

Table 22-1: Summary of Key Financial Results

Parameter	Unit	2017 PEA
Initial CAPEX (Real)	US$M	2,363
Phase 2 CAPEX (Real)[11]	US$M	278
$NPV_{8\%}$	US$M	2,239
IRR	%	20.1%
Payback Period	Years	3.6
Long Term Cu Price	US$/lb Cu	3.00
C1 Costs (first 10 yrs)	US$/lb Cu	1.11
C1 Costs (LOM)	US$/lb Cu	1.28
Life of Mine	Years	37

Detailed discussion on the basis and key assumptions used in the financial model are presented in subsequent sections.

[11] Phase 2 CAPEX includes allowance for additional mine fleet and process plant expansion. Phase 2 CAPEX is considered to be Sustaining capital in Table 22-5

22.2.1 Project Cash Flows

Figure 22-1 illustrates the breakdown of the undiscounted cash flows over the life of the project in a waterfall diagram.

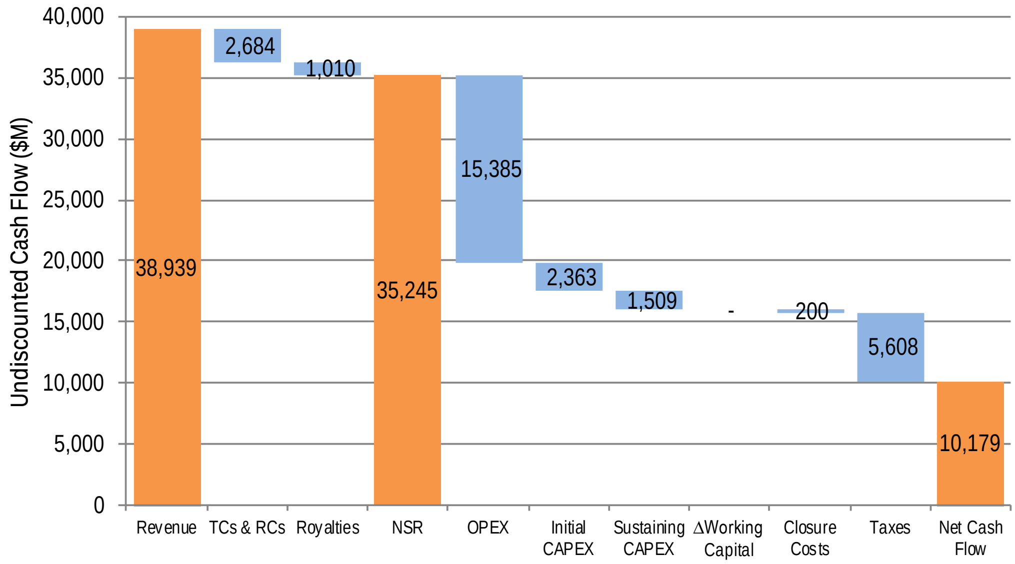


Figure 22-1: Undiscounted Cash Flow Waterfall Diagram

The discounted cash flow waterfall diagram (at 8%) is presented in Figure 22-2.

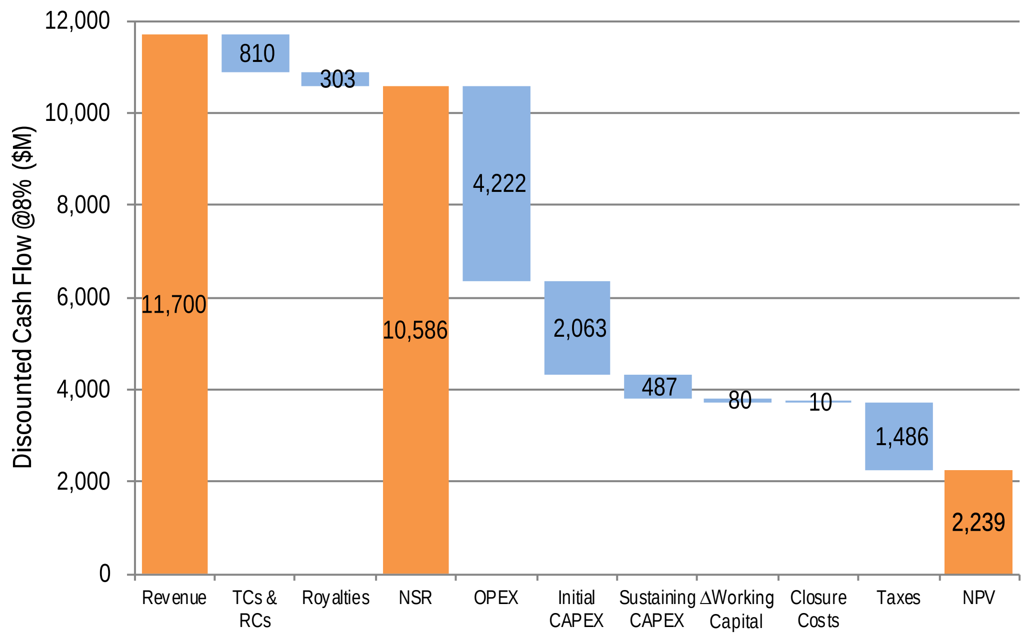


Figure 22-2: Discounted Cash Flow Waterfall Diagram

Free cash flow is presented year on year in Figure 22-3. Bars below the horizontal axis reflect capital expenditures.

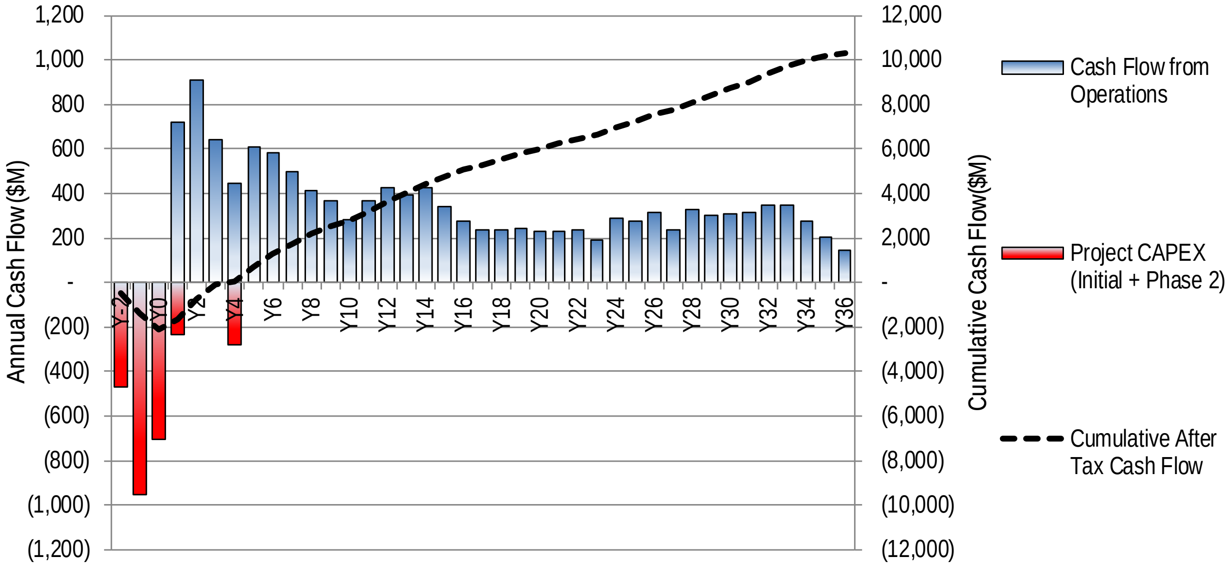


Figure 22-3: Net Cash Flows for the Project and Operations

22.3 Sensitivity Analysis

A sensitivity analysis was conducted on the financial model in order to identify key variables with significant impact on forecasted returns. Particularly, the analysis focused on metal prices, operating and capital costs. Forecasted sets of key variables were independently varied and the resulting net present value was recorded.

The $NPV_{8\%}$ sensitivity to changes in commodity price, head grade, project CAPEX, OPEX, are shown as tornado diagrams for a change of 20% in Figure 22-4 and spider diagrams in Figure 22-5.

As can be seen, the $NPV_{8\%}$ is most sensitive to changes in copper price, and head grade and OPEX.

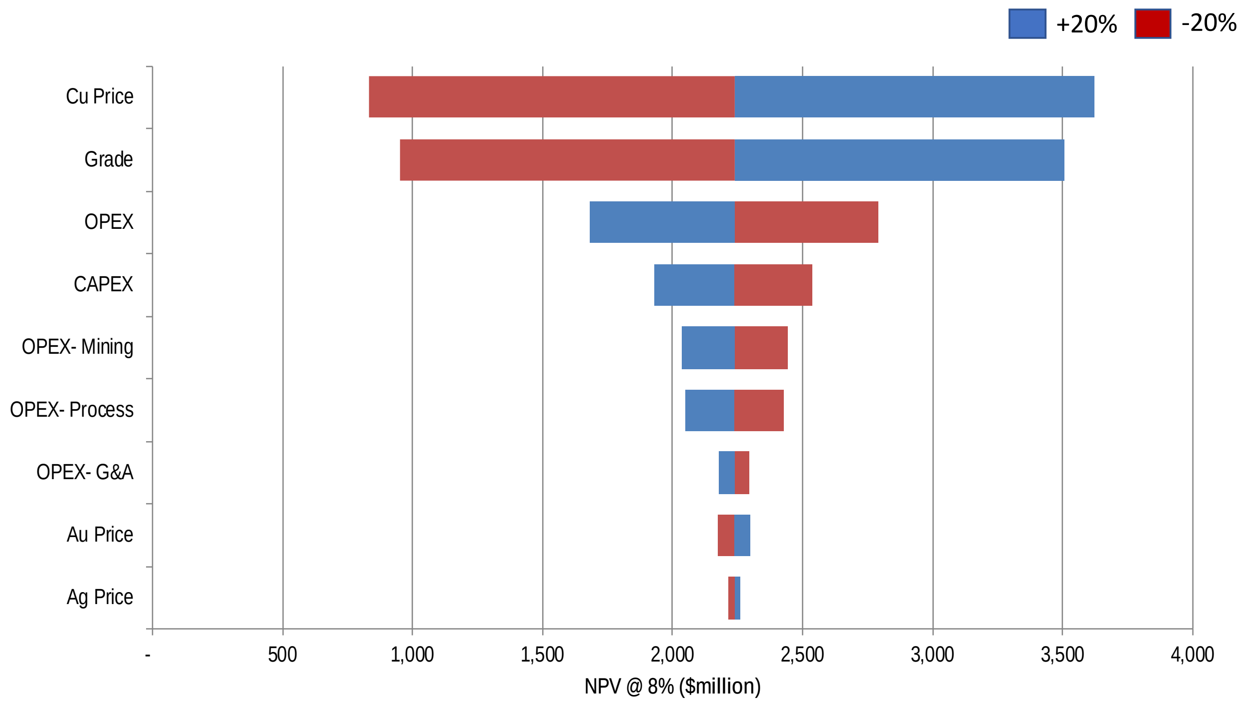


Figure 22-4:Tornado diagram illustrating $NPV_{8\%}$ sensitivity

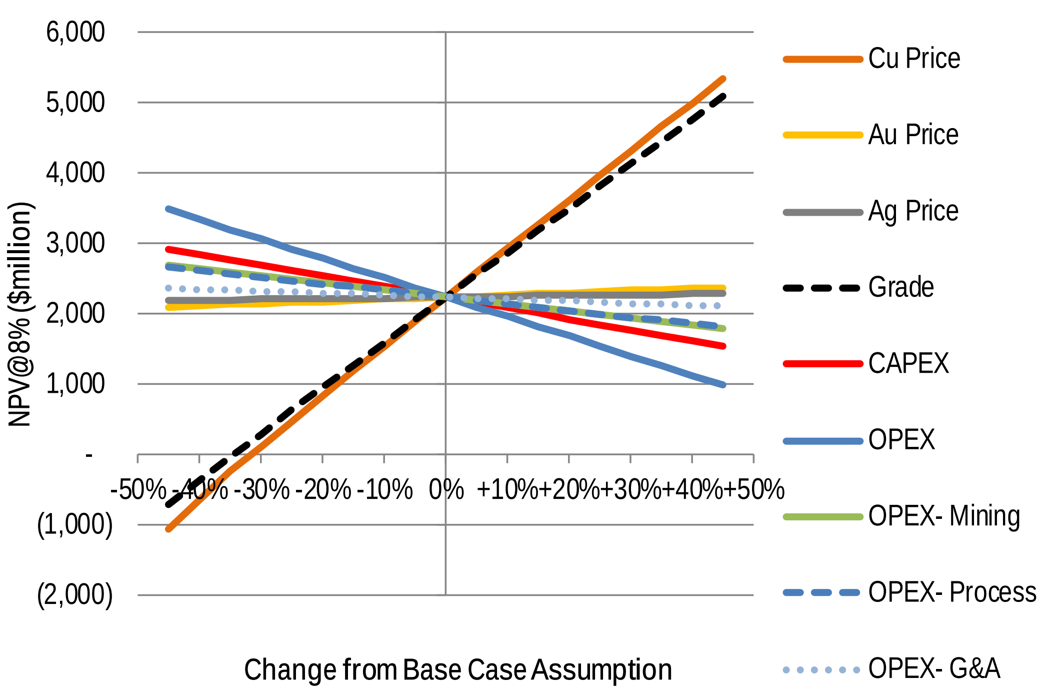


Figure 22-5: Spider diagram illustrating $NPV_{8\%}$ Sensitivity

The IRR sensitivity to changes in commodity price, head grade are shown as tornado diagrams for a change of 20% in and spider diagrams in Figure 22-7.

As can be seen, the IRR is most sensitive to copper price, head grade and CAPEX.

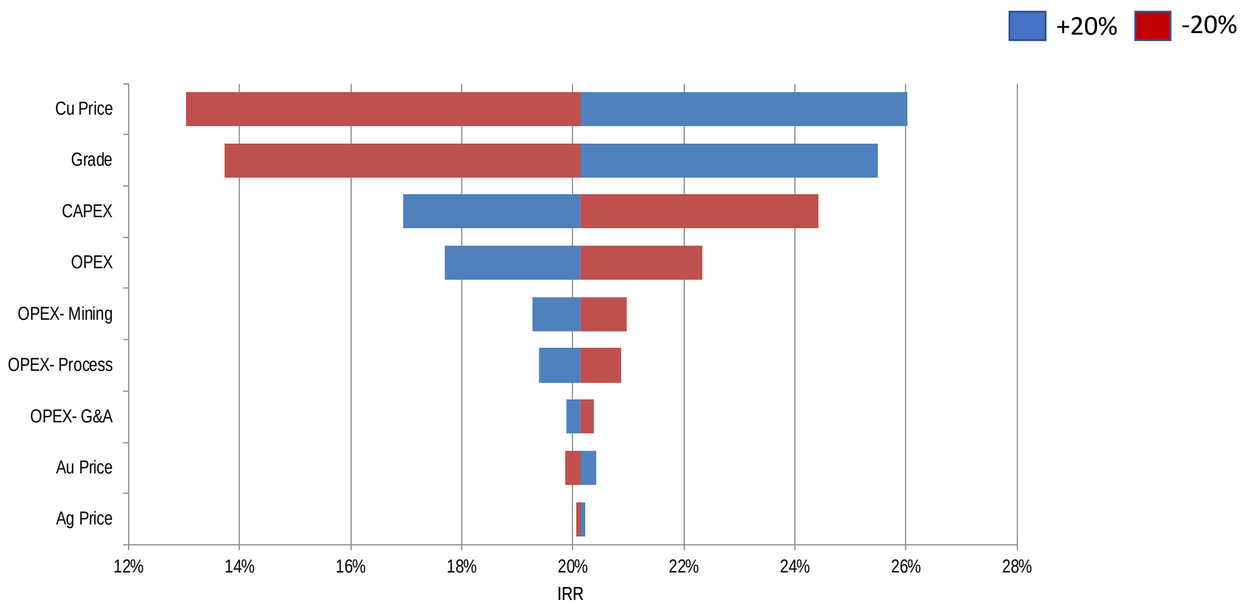


Figure 22-6: Tornado diagram illustrating IRR sensitivity

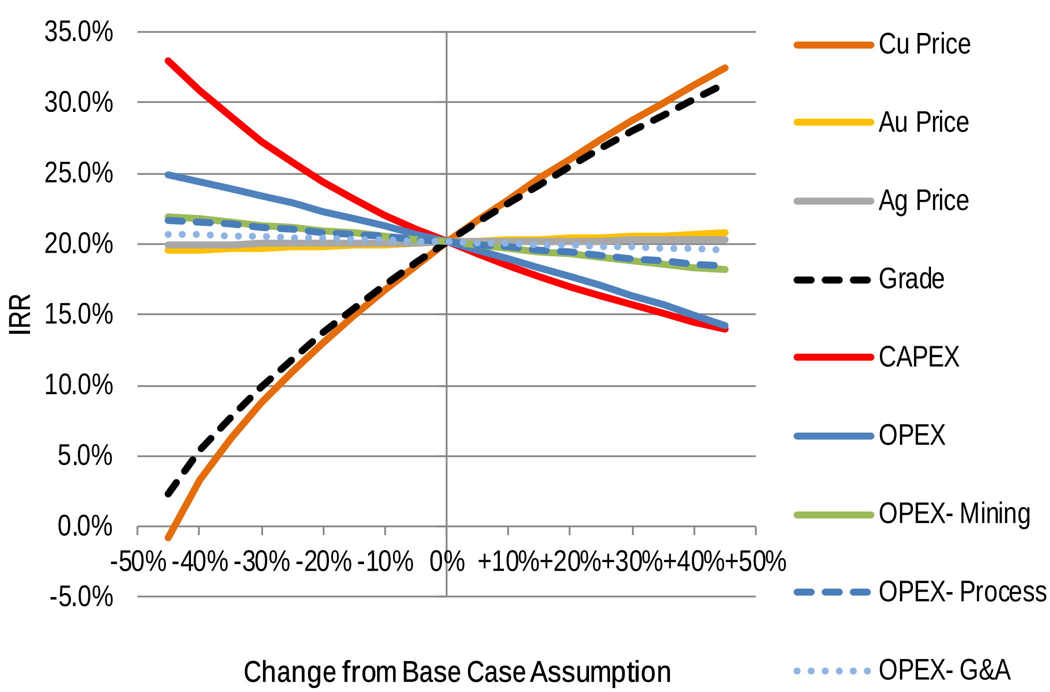


Figure 22-7: Spider diagram illustrating IRR Sensitivity

A detailed account of the impact of copper price on IRR is shown in Figure 22-8. The project base case of $3 per lb copper has been bolded.

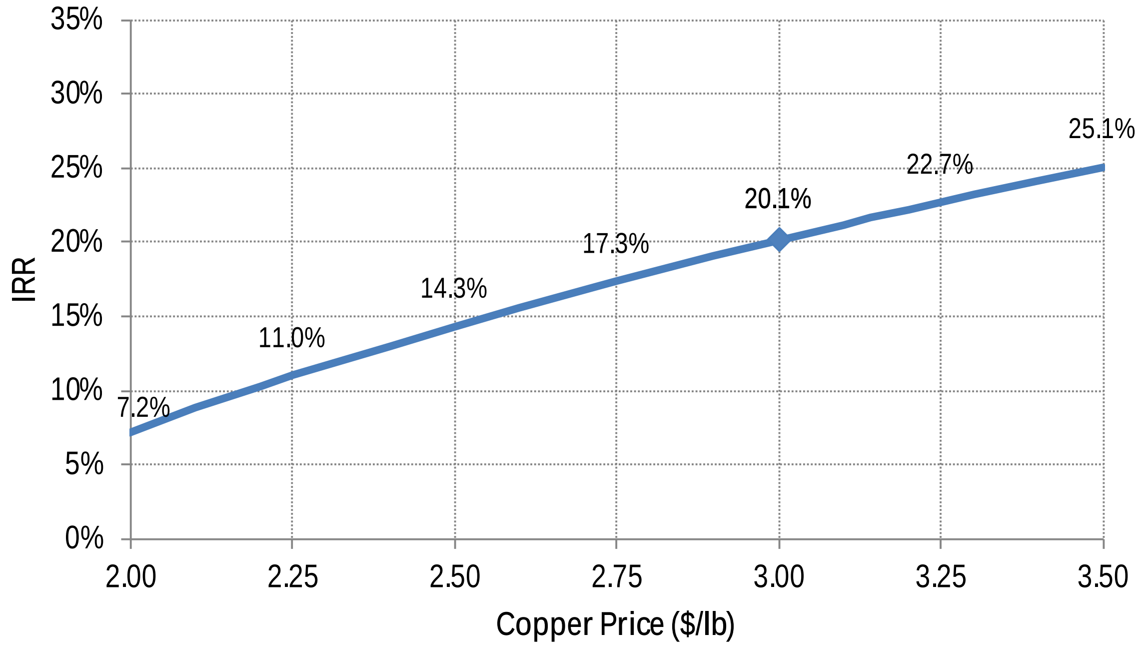


Figure 22-8: IRR Sensitivity to Copper Price

Figure 22-9 below illustrates the sensitivity of NPV to the project discount rate. The project base case discount rate of 8% has been bolded.

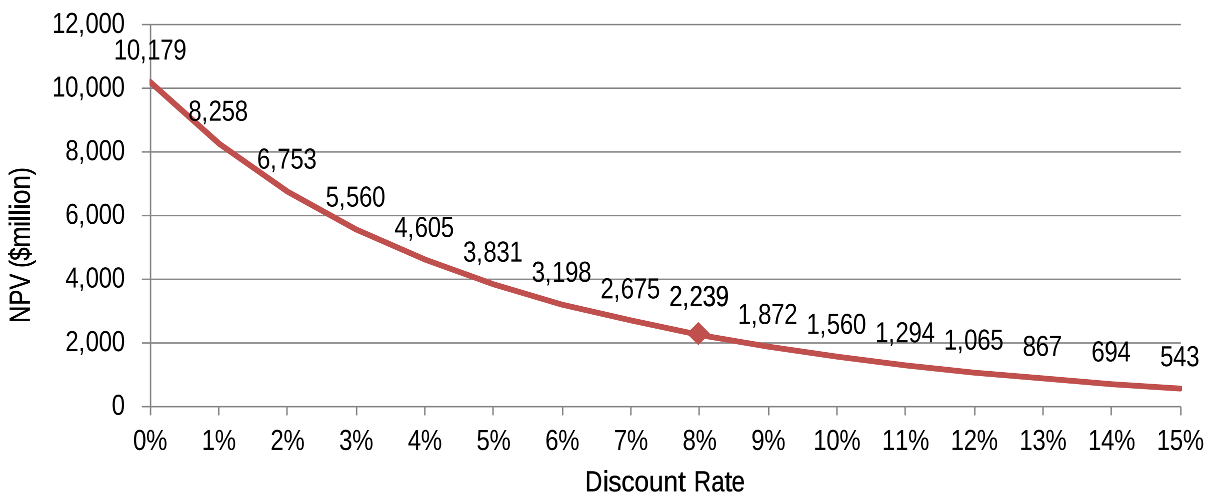


Figure 22-9: NPV sensitivity to project discount rate

22.4 Key Assumptions

The fundamental assumptions used in development of the financial model are shown in Table 22-2.

Table 22-2: Key Financial Model Assumptions

Parameter	Assumption	Description
Units	Metric	The model has been constructed using metric tonnes
Valuation Date	January 1st of Board Approval (year -2)	Post board approval cash flows have been discounted to a valuation date of January 1st of Board Approval (year -2). Costs incurred prior to board approval are considered sunk and are not considered in the economic analysis.
Discount Rate	8%	The financial evaluation has considered 8% as the discount rate. Mid-year discounting has been used in the model. A sensitivity is shown for other discount rates.
Currency	USD	The model has been constructed using US Dollars based on cost estimates developed in USD terms.
Inflation	Real basis	All projected revenue and costs are assumed to be in 2017 real terms over the DCF time frame, with no inflation applied.
Capital Structure	Unlevered	The calculated financial results assume a project financed entirely on equity. No Interest Payments have been assumed.
Royalty	3%	A 3% royalty has been included. No export taxes have been assumed.
Income Tax	35%	A 35% Corporate income taxes have been included in the model.
Tax Depreciation	3 year	3 year (60%, 20%, 20%) depreciation schedule has been utilized in the tax calculations in the analysis as per McEwen guidance regarding the mining investment law in Argentina.
Accounts Receivable	30 days	30 days of total revenue has been assumed for accounts receivable for working capital funding requirements.
Accounts Payable	30 days	30 days of total OPEX has been assumed for accounts payable for working capital funding requirements.
Inventory and Consumables	30 days	30 days of total OPEX has been assumed for inventories and consumables for working capital funding requirements.
Closure and Reclamation Costs	$200 million	$200 million has been included for closure and reclamation costs.
Long Term Prices		
Cu	$3.00/lb	USD
Au	$1300/oz	USD
Ag	$17/oz	USD
Treatment and Refining Charges		
Treatment Charge	$85/t	$85/t of Cu has been used for treatment charges in the model.
Refining Charges	$0.085/lb	$0.085/lb of Cu has been used for refining charges in the model.
Concentrate Transport	$125/wmt	Concentrate transportation charges of $125 per wet tonne including inland and ocean freight costs have been considered in the analysis.

22.5 Pricing Forecast

The long term commodity price forecast was provided by McEwen Mining. These prices are summarized in Table 22-3. The sensitivity to copper prices from USD$2.00/lb to USD$3.50/lb is shown in the sensitivity analysis in section 22.3.

Table 22-3: Commodity Forecast Price

Price	Unit	Forecast
Copper	USD$/lb	3.00
Gold	USD$/oz	1,300
Silver	USD$/oz	17

The financial model has been developed in real terms and in US Dollars.

22.6 Detailed Financial Results

Table 22-4 provides detailed outputs of the financial modeling results.

Table 22-4: Financial Results

LOM Totals	Units	Updated PEA LOM
Tonnes Processed	Mt	1488
Strip Ratio	W:O	1.01
Cu Grade	%	0.42%
Au Grade	g/t	0.05
Ag Grade	g/t	1.61
Cu Payable	Mt	5.5
Au Payable	Moz	1.3
Ag Payable	Moz	42.8
Revenue - Cu	$M	36,490
Revenue - Au	$M	1,722
Revenue - Ag	$M	727
Total Revenue	$M	38,939
TCs & RCs	$M	(2,684)
Royalties	$M	(1,010)
Net Revenue	**$M**	**35,245**
OPEX- Mine	$M	(5,404)
OPEX- Process	$M	(5,774)
OPEX- Transport	$M	(2,587)
OPEX- G&A	$M	(1,620)
Total OPEX	$M	(15,385)
C1 Cost	$/lb Cu	1.28
EBITDA	**$M**	**19,859**
Initial CAPEX	$M	(2,363)
Sustaining CAPEX	$M	(1,509)
Changes in Working Capital	$M	-
Closure Costs	$M	(200)
Pre-Tax Cash Flow	$M	15,787
Taxes	$M	(5,608)
After-Tax Cash Flow	$M	10,179
After Tax NPV@ 6%	$M	3,198
After Tax NPV@ 8%	**$M**	**2,239**
After Tax NPV@ 10%	$M	1,560
After Tax NPV@ 12%	$M	1,065
IRR	**%**	**20.1%**
Payback	yrs	3.6

This updated PEA for the Los Azules project has an initial estimated capital cost of $2,363M for Phase 1 and estimated sustaining capital of $1,509M (which includes Phase 2 expansion capital) and total estimated operating expenditure of $15,385M (with a C1 cost of $1.28/lb Cu) over the life of the mine, generating an after-tax internal rate of return of 20% and an after-tax $NPV_{8\%}$ of $2,239M.

22.6.1 Detailed Project Cash Flows

Based on estimates of revenue, operating costs and capital spending schedule, the after-tax project cumulative cash flows and cumulative discounted cash flows using a 8% discount rate is illustrated in Figure 22-10.

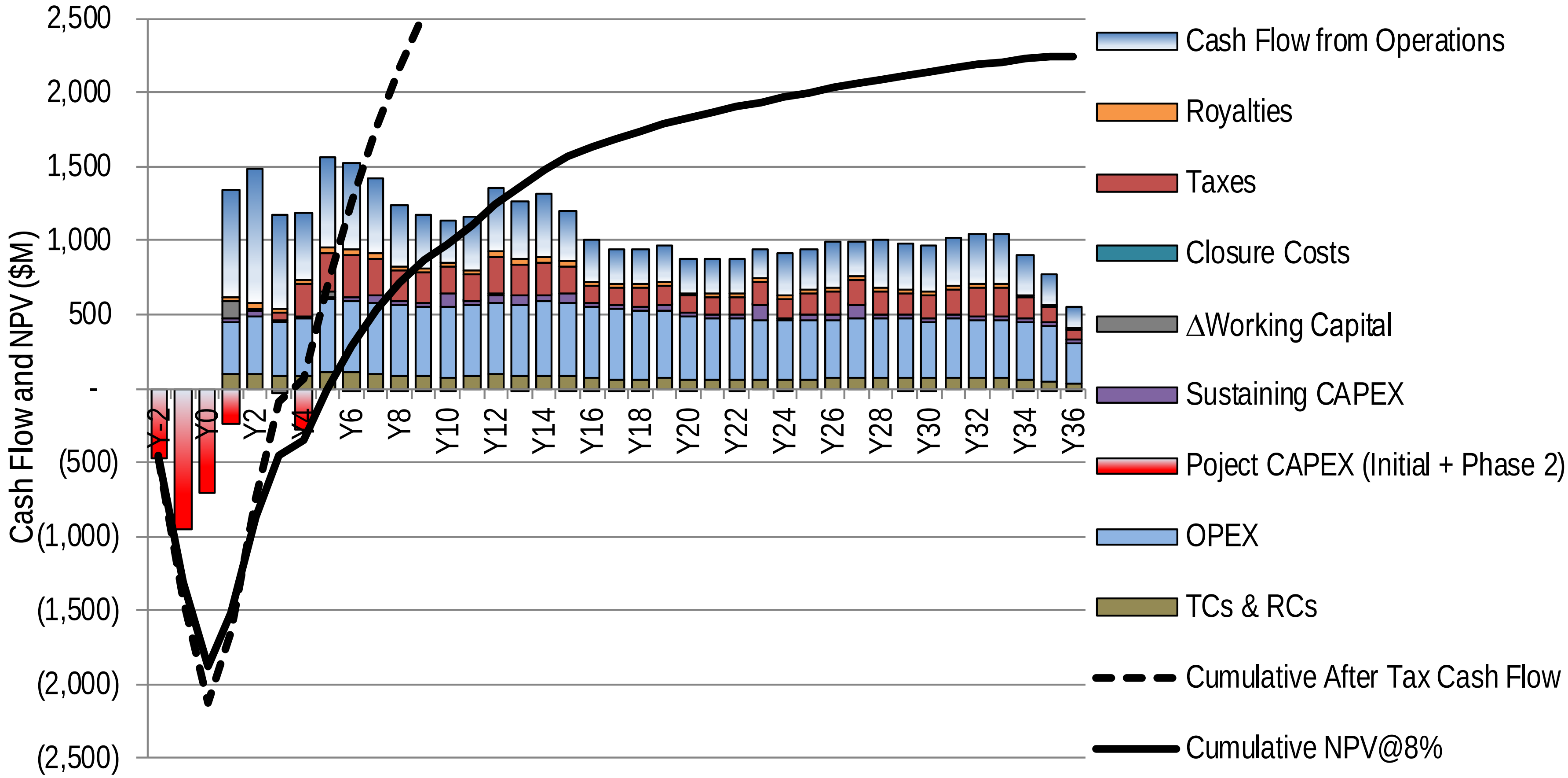


Figure 22-10: Total Project Cash Flows

The buildup of the project cash flows are detailed in the following sections. The summary of the cash flows is provided in Table 22-5.

Table 22-5: Cash Flow Summary

Area	Unit	Total/Avg	Y-2	Y-1	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16
Cu Price	$/lb	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Au Price	$/oz	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300
Ag Price	$/oz	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Mill Feed	Mt	1,487.9	-	-	-	24.5	28.8	28.8	28.8	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2
Waste Mined	Mt	1,509.6	24.7	49.4	49.4	49.5	58.6	55.7	58.0	74.5	75.3	70.5	65.5	68.6	70.2	67.7	75.5	69.5	73.8	70.6	73.5
Strip Ratio	W:O	1.01	-	-	-	2.02	2.03	1.93	2.01	1.72	1.74	1.63	1.52	1.59	1.63	1.57	1.75	1.61	1.71	1.63	1.70
Mill Feed	Mt	1,487.9	-	-	-	24.5	28.8	28.8	28.8	42.7	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2
Cu Grade	%	0.42%	-	-	-	0.92%	0.86%	0.66%	0.68%	0.61%	0.58%	0.54%	0.47%	0.45%	0.43%	0.43%	0.50%	0.48%	0.50%	0.45%	0.37%
Au Grade	g/t	0.05	-	-	-	0.09	0.08	0.07	0.07	0.06	0.06	0.06	0.04	0.05	0.05	0.05	0.06	0.05	0.05	0.04	0.04
Ag Grade	g/t	1.61	-	-	-	2.08	1.83	1.76	1.57	1.70	1.77	1.92	1.50	1.37	1.45	1.73	2.01	1.60	1.42	1.46	1.52
Cu Payable	Mt	5.52	-	-	-	0.19	0.21	0.16	0.17	0.22	0.22	0.20	0.18	0.17	0.16	0.16	0.19	0.18	0.19	0.17	0.14
Au Payable	Moz	1.3	-	-	-	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.03	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.03
Ag Payable	Moz	42.8	-	-	-	0.80	0.83	0.79	0.71	1.16	1.21	1.31	1.02	0.95	1.06	1.30	1.65	1.16	1.06	1.10	1.18
Gross Revenue	$M	38,939	-	-	-	1,342	1,480	1,152	1,183	1,561	1,519	1,408	1,225	1,173	1,136	1,162	1,352	1,257	1,314	1,190	986
TCs & RCs	$M	(2,684)	-	-	-	(94)	(103)	(80)	(82)	(108)	(105)	(97)	(85)	(81)	(78)	(80)	(93)	(87)	(91)	(83)	(68)
Royalties	$M	(1,010)	-	-	-	(35)	(38)	(30)	(31)	(40)	(39)	(37)	(32)	(30)	(29)	(30)	(35)	(33)	(34)	(31)	(26)
OPEX - Mine	$M	(5,404)	-	-	-	(116)	(126)	(139)	(151)	(175)	(177)	(181)	(190)	(183)	(190)	(196)	(185)	(185)	(200)	(201)	(206)
OPEX - Process	$M	(5,774)	-	-	-	(98)	(113)	(113)	(113)	(167)	(167)	(167)	(166)	(167)	(167)	(167)	(168)	(167)	(167)	(167)	(168)
OPEX - Transport	$M	(2,587)	-	-	-	(91)	(100)	(77)	(80)	(105)	(102)	(94)	(82)	(79)	(76)	(77)	(90)	(84)	(88)	(80)	(66)
OPEX - G&A	$M	(1,620)	-	-	-	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)
Total OPEX	$M	(15,385)	-	-	-	(350)	(384)	(375)	(389)	(491)	(491)	(486)	(484)	(473)	(478)	(485)	(488)	(481)	(500)	(493)	(484)
EBITDA	$M	19,859	-	-	-	864	954	668	681	922	883	788	624	588	551	567	736	657	689	584	408
Initial CAPEX	$M	(2,363)	(469)	(956)	(702)	(235)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sustaining CAPEX	$M	(1,509)	-	-	-	(24)	(35)	(9)	(297)	(23)	(23)	(49)	(23)	(30)	(88)	(23)	(51)	(62)	(33)	(62)	(23)
Δ Working Capital	$M	-	-	-	-	(120)	(12)	27	(3)	(34)	3	9	15	5	3	(2)	(16)	8	(5)	10	17
Closure Costs	$M	(200)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pre-Tax Cash Flow	$M	15,787	(469)	(956)	(702)	485	907	686	381	865	864	749	616	563	466	541	670	604	650	532	402
Taxes	$M	(5,608)	-	-	-	-	-	(45)	(216)	(257)	(283)	(249)	(205)	(196)	(181)	(176)	(245)	(212)	(223)	(189)	(123)
After Tax Cash Flow	$M	10,179	(469)	(956)	(702)	485	907	641	165	607	581	500	411	367	285	365	425	392	427	342	279
After Tax NPV@ 6%	$M	3,198	(456)	(876)	(607)	395	698	465	113	392	354	287	223	188	137	166	183	159	163	123	95
After Tax NPV@ 8%	$M	2,239	(452)	(852)	(579)	370	642	419	100	341	302	241	183	151	109	129	139	119	120	89	67
After Tax NPV@ 10%	$M	1,560	(448)	(829)	(553)	347	591	379	89	297	258	202	151	123	86	101	107	89	89	65	48
After Tax NPV@ 12%	$M	1,065	(444)	(807)	(529)	326	545	343	79	260	222	170	125	100	69	79	82	68	66	47	34
After Tax NPV@ 15%	$M	543	(438)	(775)	(495)	297	484	297	67	213	177	132	95	74	50	55	56	45	43	30	21
After Tax IRR	%	20.1%																			

Area	Y17	Y18	Y19	Y20	Y21	Y22	Y23	Y24	Y25	Y26	Y27	Y28	Y29	Y30	Y31	Y32	Y33	Y34	Y35	Y36	Y37
Cu Price	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Au Price	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300	1,300
Ag Price	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Mill Feed	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	37.8	-
Waste Mined	73.7	75.6	75.6	35.1	21.9	6.1	4.1	1.6	2.0	1.7	1.7	1.8	1.5	1.1	1.3	1.0	0.8	1.8	0.6	-	-
Strip Ratio	1.71	1.75	1.75	0.81	0.51	0.14	0.10	0.04	0.05	0.04	0.04	0.04	0.04	0.02	0.03	0.02	0.02	0.04	0.01	-	-
Mill Feed	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	43.2	38.3	-
Cu Grade	0.35%	0.35%	0.36%	0.33%	0.33%	0.33%	0.35%	0.34%	0.35%	0.37%	0.36%	0.37%	0.35%	0.35%	0.37%	0.38%	0.38%	0.32%	0.27%	0.22%	-
Au Grade	0.04	0.04	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.05	0.04	0.03	-
Ag Grade	1.69	1.75	1.49	1.45	1.34	1.31	1.67	1.78	1.73	1.74	1.69	1.66	1.58	1.54	1.53	1.62	1.68	1.57	1.46	1.22	-
Cu Payable	0.13	0.13	0.14	0.12	0.12	0.12	0.13	0.13	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.12	0.10	0.07	-
Au Payable	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.04	0.04	0.04	0.03	0.04	0.04	0.04	0.04	0.03	0.02	-
Ag Payable	1.35	1.41	1.18	1.13	1.03	1.01	1.27	1.41	1.42	1.44	1.41	1.40	1.33	1.30	1.29	1.36	1.42	1.36	1.19	0.80	-
Gross Revenue	943	936	966	870	877	878	935	916	946	996	997	1,006	970	969	1,014	1,049	1,049	895	757	531	-
TCs & RCs	(65)	(64)	(67)	(60)	(60)	(60)	(64)	(63)	(65)	(68)	(68)	(69)	(66)	(66)	(70)	(72)	(72)	(60)	(51)	(36)	-
Royalties	(24)	(24)	(25)	(23)	(23)	(23)	(24)	(24)	(25)	(26)	(26)	(26)	(25)	(25)	(26)	(27)	(27)	(23)	(20)	(14)	-
OPEX - Mine	(200)	(187)	(187)	(153)	(146)	(140)	(124)	(120)	(121)	(121)	(122)	(132)	(128)	(111)	(124)	(111)	(114)	(116)	(106)	(43)	-
OPEX - Process	(168)	(168)	(167)	(167)	(167)	(167)	(167)	(167)	(168)	(168)	(168)	(168)	(168)	(168)	(168)	(168)	(168)	(168)	(168)	(148)	-
OPEX - Transport	(63)	(62)	(64)	(58)	(58)	(58)	(61)	(60)	(62)	(66)	(66)	(66)	(64)	(64)	(67)	(69)	(69)	(58)	(49)	(35)	-
OPEX - G&A	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	-
Total OPEX	(476)	(461)	(463)	(423)	(416)	(410)	(398)	(393)	(396)	(399)	(400)	(411)	(405)	(388)	(404)	(393)	(396)	(387)	(368)	(270)	-
EBITDA	378	386	411	365	377	385	448	437	461	502	503	499	474	490	514	557	555	424	318	210	-
Initial CAPEX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sustaining CAPEX	(23)	(28)	(30)	(25)	(23)	(25)	(105)	(23)	(37)	(28)	(98)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(22)	-
Δ Working Capital	4	1	(3)	9	(0)	0	(4)	2	(3)	(4)	(0)	(1)	3	1	(4)	(3)	(0)	13	12	21	51
Closure Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(200)
Pre-Tax Cash Flow	358	359	378	349	354	360	339	416	421	471	405	475	453	467	487	531	531	414	307	209	(149)
Taxes	(121)	(124)	(135)	(118)	(123)	(126)	(148)	(128)	(147)	(159)	(166)	(150)	(152)	(158)	(172)	(187)	(186)	(140)	(103)	(65)	-
After Tax Cash Flow	238	235	244	231	231	234	191	288	274	312	239	325	301	309	315	344	345	274	203	144	(149)
After Tax NPV@ 6%	76	71	70	62	59	56	43	61	55	59	43	55	48	46	45	46	44	33	23	15	(15)
After Tax NPV@ 8%	53	48	47	41	38	35	27	37	33	35	25	31	27	25	24	24	22	16	11	7	(7)
After Tax NPV@ 10%	37	33	31	27	25	23	17	23	20	21	14	18	15	14	13	13	12	8	6	4	(3)
After Tax NPV@ 12%	26	23	21	18	16	15	11	14	12	12	8	10	8	8	7	7	6	4	3	2	(2)
After Tax NPV@ 15%	16	13	12	10	9	8	5	7	6	6	4	5	4	3	3	3	2	2	1	1	(1)
After Tax IRR																					

22.7 Contract Mining Opportunity

A high level sensitivity analysis was conducted to investigate the potential for contract mining. An allowance of $2.10 per tonne of material mined was used in the analysis. Results of the contract mining scenario are compared against the Base Case in Table 22-6.

Table 22-6: Effect of Contract Mining, Financial Results Summary

Parameter	Unit	Base Case	$2.10 per t Contract Mining
Initial CAPEX (Real)	US$M	2,363	2,188
Phase 2 CAPEX (Real)[12]	US$M	278	206
$NPV_{8\%}$	US$M	2,239	2,232
IRR	%	20.1%	20.8%
Payback Period	Years	3.6	3.2
Long Term Cu Price	US$/lb Cu	3.00	3.00
C1 Costs (first 10 yrs)	US$/lb Cu	1.11	1.23
C1 Costs (LOM)	US$/lb Cu	1.28	1.34

Contract mining offers the opportunity to reduce upfront capital costs but at the expense of higher LOM operating costs. The net impact is an improvement in project IRR of approximately 0.7% to 20.8% and a reduction in the payback period to 3.2 years.

[12] Phase 2 CAPEX includes allowance for additional mine fleet and process plant expansion. Phase 2 CAPEX is considered to be Sustaining capital in Table 22-5

23. Adjacent Properties

This section was prepared by D. Brown, CPEng, McEwen.

The space required for development of the project corresponds to a surface property owned by McEwen Mining's Argentinean subsidiary, Corporación Minera Andes S.A. Under this surface property, portions of it overlay mineral tenements held by McEwen Mining or by third parties.

Shown on Figure 23-1, the surface property boundary is shown with the underlying mineral tenements held by third parties in the cross-hatched numbered polygons. Areas 1 and 3 belong to third parties; while Area 2 belongs to Andes Corp and may become subject to litigation regarding its boundaries.

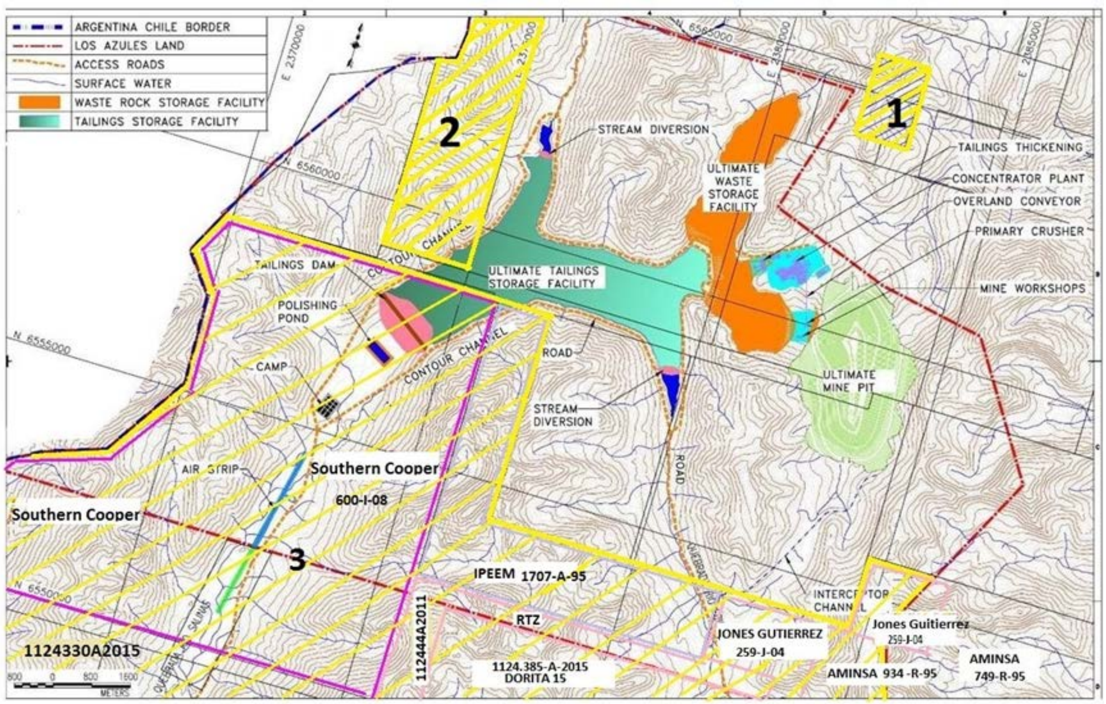


Figure 23-1: Surface property VS. third party mineral tenements

As shown on Figure 23-1 portions of the tailings dam, camp and airstrip are all within McEwen owned lands but not underlain by mineral concessions owned by Andes Corp.

Surface land ownership grants McEwen the right to use the land and all non-metal bearing rocks and minerals in it. This are able to quarry sand and gravel deposits for construction use.

Mining Law in Argentina grants the mineral tenement the right of primacy over the surface land property. In order to stop McEwen from developing surface facilities on its land overlying third parties' mineral tenements, those other parties must demonstrate factually that those lands hold economic mineralization which would be condemned by the planned surface installations. McEwen's own exploration and observations deem such an occurrence of economic mineralization unlikely.

Any future extension of the proposed airstrip to the south outside of McEwen owned surface lands will require an agreement with the neighboring land owner for use of that land

In conclusion, there are no adjacent properties that are material to the proposed project development described in this report.

24. Other Relevant Data and Information

There is no additional information outside of that already referenced and included within the report.

25. Interpretation and Conclusions

This PEA included Inferred Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as mineral reserves and there is no certainty that the PEA based on these resources will be realized.

25.1 Interpretations and Conclusions

Interpretation and conclusions of the Qualified Persons of the Los Azules PEA are listed below:

Geology (D. Brown, CPEng, McEwen)

- The Los Azules deposit is a near surface, strongly folded and faulted porphyry copper deposit located in the high Andes Mountains of Argentina at an altitude of approx. 3600 metres. The deposit is situated within the lower elevations of a broad glacial valley with slopes extending to over 4000 metres elevation and is mostly overlain by unconsolidated glacial outwash materials of up to 60 metres thickness.
- A barren leached (oxide) zone overlies a zone of secondary or supergene enriched mineralised material of variable copper grades and thickness and a primary or hypogene mineralized zone that extends to at least 1,000 m below the present surface.
- Gold, silver and molybdenum are present in trace amounts, but copper is by far the most important economic constituent at Los Azules.
- The Los Azules hydrothermal alteration system is at least 5 km long and 4 km wide and is elongated in a NNW direction along a major structural corridor. The system disappears below volcanic cover to the north, so the ultimate extent is presently unknown. The altered zone surrounds the Los Azules copper deposit, which is approximately 4 km long by 2.5 km wide. The limits of the mineralization along strike and at depth have not been entirely constrained by drilling.
- Geological studies have resulted in a geological model that shares many features with other well-known Andean porphyry copper deposits. These studies have defined the temporal sequence and the spatial distribution of distinct alteration phases and mineralization zones.

Mineral Resources (R. Sim, P. Geo, SIM Geological Inc.)

- Los Azules is a porphyry deposit comprised of a combination of supergene and hypogene style mineralization with an estimated indicated mineral resource of 962 million tonnes of at an average grade of 0.48% copper plus inferred mineral resources of 2,666 million tonnes at an average grade of 0.33% copper.

Mining (W. Rose, P. E., WLR Consulting)

- A mine production schedule has been developed for a staged expansion of the concentrator, commencing at a nominal ore processing rate of 80,000 t/d and increasing to 120,000 t/d in Year 5 with the addition of another (third) grinding line. Ore processing is anticipated to last nearly 36 years, which will be preceded by a three-year preproduction stripping period. Peak material mining rates, including concentrator feed and waste rock, are estimated at about 330,000 t/d. Phased pit development initially targeting high-grade mineralization and a declining cut-off grade strategy were used to maximize concentrator head grades in the early years of operation.
- There are no known factors related to metallurgical, environmental, permitting, legal, title, taxation, socio-economic, marketing, or political issues which could materially affect the mineral resource estimates.

Mineral Processing and Metallurgical Testwork (M. Bunyard, C. Eng, FAusIMM, Hatch)

- Initial metallurgical testwork on the supergene and primary mineralized material gave good recoveries into flotation concentrates. The supergene flotation concentrates were lower grade than would have been initially anticipated by the grade of the mineralization and the presence of higher grade secondary copper minerals. The lower than anticipated grade was caused by the presence of pyrite that floated along with the copper mineralization.

Tailings (D. Brown, CPEng, McEwen)

- The tailings storage facility is proposed as a single embankment across the Rio Salinas. The tailings dam starter embankment will be approximately 50 metres height and after 1.5billion tons of tailings deposition over 36 years the final embankment height will be in the order of 170 metres. A very flexible PVC composite liner will be installed on the upstream face over a slip cast porous concrete with the bulk of the dam formed for mined waste rock delivered from the mining operations.

Project Financials (R. Duinker, P. Eng, MBA, Hatch)

- With a long term copper price of $3.00/lb, the project has an estimated capex of approximately $2.4 billion and an $NPV_{8\%}$ of $2,239M and an estimated IRR of 20.1%. The project economics are positive but sensitive to the price of copper, recovery of copper and production rate. The capital payback period for the project is estimated at 3.6 years.

Environmental (J. Farrell, P. Eng, Hatch)

- The environmental management plans need to be further developed in the next phase of the Project to meet the IIA (Informe Impacto Ambiental) commitments.
- The conceptual closure plan needs to be developed during the next project phase to more accurately reflect the level of development of the Project facilities and advance planning for closure which is best considered in the design development phase.

- Environmental studies have been conducted since 2007 and monitoring activities to obtain additional information has been ongoing. Comprehensive environmental baseline work now needs to be performed requiring year-round measurements and observations by subject matter experts. This is basic information for the pending IIA submission by McEwen.

25.2 Risks and Opportunities

25.2.1 Risks

A list of the Project's potential risks is as follows:

Mining (W. Rose, P. E., WLR Consulting)

- Geotechnical risks within the pit are significant given the possible height of the pit walls, low RQDs and potential groundwater issues. The planned open pit presented in this PEA is very large and will have pit slopes that climb the valley walls to high elevation. Flatter slopes would result in reduced mill feeds and/or higher stripping ratios and correspondingly higher mining costs. Geotechnical and hydrogeological investigations are needed to bring a higher degree of confidence to the groundwater conditions.

Mineral Processing and Metallurgical Testwork (M. Bunyard, C. Eng, FAusIMM, Hatch)

- Initial metallurgical testwork on the supergene and primary mineralized material has not included a full variability program. The range of metallurgical performance is therefore not completely defined and averaged performance used in this report may not be achieved.

Tailings (D. Brown, CPEng, McEwen)

- The current design of Tailings Storage Facility (TSF) requires placement of large quantities of inert rockfill to construct the embankment.. The dam site is within an area of extensive glacial debris and outwash material of undefined depth but estimated at 16 metres. This overburden depth and the overburden material quality must be defined along with the dam foundation condition.
- If availability of mined waste rock from the mine pit is constrained by acid forming rock, even though this is considered unlikely, there may be a dam embankment material shortage and schedule delay.
- Mitigating this is the availability of local borrow pits that could be developed in the glacial outwash gravels..

Project Infrastructure (D. Brown, CPEng, McEwen)

- The preliminary design and the capital costs of the site access road proposed from Calingasta needs to be taken up to a detailed design using the recently performed photogrammetric data. The earlier considered northern route needs to be revisited in view of the fact that it does not cross high passes and may be more optimal for power transmission.

The access and power options and concentrate logistics through Chile delivers security of access and supply through the winter months. Permitting and other studies need priority to convert this opportunity.

- The establishment of an airstrip at Los Azules has assumed higher priority to enable year-round support of exploration drilling and environmental baselining studies. The current application for a permit is to be given priority to accelerate processing.

Environmental (J. Farrell, P. Eng, Hatch)

- Maintaining a good line of communication with the community will be important in future work as no formal social or community work has been done in the last five years.

25.2.2 Opportunities

There exists several opportunities moving forward to improve the Project viability and economics. These include:

Geology (D. Brown, CPEng, McEwen)

- The origin of the gold at Los Azules is not well understood. A detailed analysis of the distribution of gold in the deposit with respect to sulphide mineralization, alteration, structure and other features might lead to the development of exploration targeting vectors and might also lead to opportunities to optimize gold production.

Drilling (D. Brown, CPEng, McEwen)

- Geophysics investigations in particular IP surveys should be performed to understand potential northern extensions of the resource. Focus with drilling is to drill the 5 years mine pit to measured category requiring a closer hole spacing but not requiring great hole depth.
- Priority must be to prolong the drilling season such as by access from Argentina by helicopter or by mules and earthmoving plant clearing tracks from Chile until such times as Los Azules can have its own airstrip.

Mineral Resources (R. Sim, P. Geo, SIM Geological Inc.)

- The deposit remains “open” to further expansion at depth. Most of the drill holes in the central and northern part of the deposit are terminated in mineralization that exceeds the base case cut-off threshold of 0.20% copper.

Mining (W. Rose, P. E., WLR Consulting)

- There is a future opportunity to optimize overall pit slopes by incorporating controlled blasting and/or single benching to steepen bench face angles as well as an opportunity to lessen the degree of pit slope depressurization required from mine dewatering.

Mineral Processing and Metallurgical Testwork (M. Bunyard, C. Eng, FAusIMM, Hatch)

- The opportunity exists that further metallurgical testwork can improve the recovery and grade of the supergene material. The pyrite could be suppressed to improve the grade of the supergene concentrate while decreasing both the mass and the sulphur content.
- Further investigation of coarse particle size flotation could reduce primary grinding costs.
- Newer, more efficient, copper flotation collectors, such as emulsions, are being developed and should be included in future testing programs to assess their value.
- Further investigation of the primary zone ore competency could provide opportunity to revisit selected SAG and ball mill for sizes for the 120,000 tpd expansion.
- More innovative processing routes could be investigated for the expansion phase taking advantage of emerging more efficient and cost saving technologies.
- The opportunity for gold extraction at site from concentrates represents a potential to accelerate cash flow which should be investigated.

Tailings (D. Brown, CPEng, McEwen)

- If proved viable (based on review of further chemical test results), the construction of embankments with coarse cycloned tailings will reduce the dependability on the mine plan for waste material as well as lowering the total storage capacity required for disposing fine tailings.
- The porous concrete facing for the dam embankment will require suitable concrete aggregates and some sand. A crushing and screening plant is envisaged to be established in proximity to the tailings dam to screen the glacial outwash materials for concrete aggregates, road materials and blast hole stemming.
- The proposed tailings dam site can be expanded in capacity if there is a later proven extension to mining operations.

Project Financials (R. Duinker, P. Eng, MBA, Hatch)

- Additional capital expenditure savings could be realized if the entire mining fleet were to be leased.
- Given 35 year mine life supported by inferred mineral resources, there is potential to improve economic results through economies of scale and higher ultimate throughput.
- Potential for phased project development to reduce initial capex and pay for subsequent expansions from operating cash flows.
- Potential for further pit optimization during mine start-up to increase project IRR by prioritizing high grade material.
- Investigate low cost equipment sourcing.

26. Recommendations for Next Steps

Summary (D. Brown, CPEng, McEwen)

Based on the results of this PEA study, it is recommended that McEwen now focuses to further de-risking the Los Azules Project by moving to a more robust knowledge base in several critical areas. The Priority Next Steps should be

- Enhance the definition of the mineralised material by infill drilling programs over two years supported by geological and geophysical work to develop a significant “measured resource” at Los Azules with particular focus to the early years mine pit.
- The performance of all studies, monitoring and engineering related to interactions between the Los Azules Project and naturally occurring water.
- The performance of the environmental baselining work in conjunction with specific engineering to enable an IIA submission to the San Juan authorities by the end of 2018 with the objective of receiving the permitting for the development of Los Azules during the second half of 2019.

In addition to the above there are facilities and infrastructure to optimise, improve and de-risk through further on-site work, off-site work and by performing detailed trade off studies as described in the following text.

Geological & Geophysical (D. Brown, CPEng, McEwen)

- Infill drilling and drill-core assaying with a greater focus to the 5-year mine pit to achieve a “measured resource”. A closer drill hole spacing is required, preferably using angled holes to intersect sub vertical structures. Approximately 25,000 metres of drilling from 100 holes is needed to complete the re-categorisation to measured within the 5-year mine pit. The extent of drilling will need multi rig drilling campaigns to be performed over two extended drilling seasons.
- The 5-year mine pit includes the so-called “pay back pit” defined as the pit limits after 3.6 years of mining. The 3.6-year mine pit by extension of the financial analysis is the limit of the mine pit development when all funds invested in the Los Azules development will be paid back.
- The infill drilling hole locations needs to be defined by careful and detailed planning paying attention to structures, hole spacing, hole orientation and hole depth. Many angles holes to approximately 250 metres depth are envisaged. Some of these holes may be high on the hillsides.
- With the revised location of the processing facility to the northwest of the mine pit, geological and structural mapping of the site is recommended for certainty of stability. At least one deep condemnation drill hole is recommended.

- Extending the drilling season is possible when an emergency access is available through the “Salinas Pass” into Chile as planned to be formed in for 2018. This relatively low altitude access and egress from Chile in conjunction with legal process will enable personnel and equipment to remain at Los Azules for an extended period towards the winter months without risk of snow blocking the high altitude passes that characterise the existing access road into Los Azules.
- Undertake a detailed analysis of the distribution of gold in the Los Azules deposit with respect to sulphide mineralization, alteration, structure and other features.
- Induced Polarisation (IP) and other geophysical surveys should be performed to understand any possible northern, north-western and north-eastern extensions of the copper hosting rocks. It is unlikely that outcomes from this work would influence the location of the early-years mine pit development however it will be useful for confirmation of the later-years pit limits.
- A Remote Spectral Survey was performed in 2017. This may lead to some further recommendations for geological exploration and follow up work on the ground.
- Reprocessing of the existing geophysics surveys and applying the latest available filters can give rise to new interpretations.

Hydrogeology (D. Brown, CPEng, McEwen)

Priority fundamental data needed for the pending IIA Application for the Los Azules Project will be related to water management, water consumption and water quality issues. Comprehensive water monitoring and sampling work is now needed to augment existing data and establish quality, robust hydrogeology data baselines within and around the Project footprint that will support the IIA Application and give confidence to the approving authorities and enable the development of optimal engineering designs.

The following hydrogeology work is recommended

- Develop the work scope, schedule the activities and identify the professional resources needed to perform the work. Analyze and present the data and conclusions to align to the needs of the IIA submission.
- The phreatic surface and the seasonal variations in level needs to be established as a fundamental input into mine pit slope stability and pit dewatering assessments. Year-round monitoring of the ground water levels using existing cased drill holes where they extend down into the ground water are needed to all sides of the proposed developing mine pit. If information gaps exist then drilling additional monitoring wells and the installation of staged piezometers may be required.

- For the modeling of pit dewatering designs and assessing water extraction volumes an understanding of ground permeabilities is required while addressing specific features that may produce larger groundwater inflows such as faults or other structural features. During the proposed infill drilling programme, there will be opportunity to perform permeability testing. Both pumping and falling head permeability tests will be required in boreholes drilled within the proposed mine pit walls. Specifically investigate the Piuquenes, Diagonal and Lagunas Faults to determine the degree of groundwater inflow that the pit may experience from these faults
- Data shortfalls may need specific holes to be drilled. For the phreatic surface and permeability assessments approximately 2,400metres of drilling is an initial assessment of the extent of drilling required.
- Water sampling for establishing the existing groundwater quality is in progress and should continue. It is recommended the infill drilling is used to improve the water sampling frequency and data quality by extracting samples water from various depths during the drilling.
- Develop a hydrological model and perform groundwater flow modeling at the mine pit.
- Apply engineering analysis and computer modeling to develop the envisaged mine pit dewatering designs. Evaluate if there is a need to collect additional hydrogeologic data outside of the area of mineralization and at greater depths and if this data is needed for accuracy of the pit dewatering requirements.
- When the Water Balance for the project is defined then assess the opportunity to use the pumped pit water as process water or otherwise confirm the water quality is suitable for discharge to the environment as non-contact water.
- Perform geochemical studies to evaluate the characteristics of the pit wall rocks and the potential for acid rock drainage from the mine pit and the waste rock storage facility. This data will also confirm if the mined rock can be used within the tailings storage embankment formation.
- Develop a hydrological model and perform groundwater flow modelling at the tailings storage facility
- For the road crossings on all roads, model the peak stream flows needed for design of the road crossings.

Geotechnical (D. Brown, CPEng, McEwen)

The geotechnical data gathering for Los Azules needs a work plan and schedule developed. Multiple geotechnical data inputs are necessary to enable permitting, design development of the Project facilities, infrastructure, mine pit and for planning and operations. The tasks can be phased accordingly:

- Geotechnical data needed to support the IIA application.
- Geotechnical data needed to support Front End Engineering & Design (FEED)
- Geotechnical data needed for Detailed Engineering
- Geotechnical data need for Operations.

At a high summary level, the recommended geotechnical work will include:

- **Tailings Storage Facility.**

  A high level of detailed design is required for this sensitive project facility to support the IIA application.

  - Foundation interrogation including permeability assessments
  - Superficial material interrogation for assessment of cut slope stability and environmental effects of the relatively deep foundation excavation works
  - Stability and route evaluation of lateral non-contact water diversions
  - Identification and testing of suitable bulk filter, embankment forming and concrete aggregate materials.
  - Complete a site specific seismic hazard assessment study and including earthquake characterisation.
  - Complete a geotechnical/geochemical characterization of the tailings.
  - Condemnation drilling
  - Assessment of the mine pre-strip materials as a source of tailings embankment forming materials. Mine pre-strip materials will be available concurrently with embankment formation.

- **Mine Pit**

  - Mine pit slope stability assessments, probably in conjunction with materials sampling and testing. Specific geotechnical testing drill holes will be required.
  - Identification of local areas of potential instability
  - Assessment of the mine pre-strip material for use in structural back fill applications
  - Assessment of the excavation characteristics of the mine pre-strip materials

- **Waste Rock Storage Facility**

  - Location interrogation including structural mapping, rock strength testing and stability analysis.
  - Staged construction of the waste rock fill and slope stability analysis

    - Potential for acid mine drainage from the stored material
    - Condemnation drilling
- **Process Plant Site, Primary Crusher & Overland Conveyor**
    - Foundation interrogation
    - Site slope stability
    - Suitability of excavated material for use in cut to filling operations
- **Access Road and Linear Infrastructure**
    - Slope stability evaluations
    - Identification of borrow pits for suitable road surfacing materials
- **Bulk Materials**

  Identification of suitable sources for quality bulk materials at the earliest time in a project development is vital. Typically, there are deficiencies of sand material in mountain environments and manufacturing or importing of bulk materials can be very detrimental.

    - Identification of suitable quarry locations for concrete aggregate production including testing the aggregate to prove suitable for specification concretes.
    - Identification of borrow pits for filter zone materials to be used for tailings dam formation or specified bedding sands including all materials testing.

Mining (W. Rose, P. E., WLR Consulting)

- Complete an updated detailed mine production scheduling exercise with detailed haulage routing and any geological updates. To include; continued strategic mill feed grade planning, refined pit staging planning, in-pit dumping opportunities and pioneering fleet trade-off assessment.
- Perform a trade-off study to investigate the viability and parameters of utilizing an in-pit crusher conveyor system. Options to be included are semi mobile versus fixed crusher, high angle conveyors and conventional conveying systems.
- Perform a trade-off study to investigate the potential for an alternative overburden material conveyance system to the tailings storage facility.

Mineral Processing and Metallurgical Test work (M. Bunyard, C. Eng, FAusIMM, Hatch)

- Conduct further investigation into coarse particle flotation.
- Investigate new copper collector reagents.
- Assess potential for pyrite depression to improve concentrate grades.

- Investigate potential for gold extraction from concentrates.
- Conduct variability test work to define range of comminution and flotation characteristics to be included in process plant design criteria.
- Use data from the variability testing program together with block model and mine production schedule to better define and optimize metal production.

Geometallurgy (D. Brown, CPEng, McEwen)

Geometallurgy relates to the practice of combining geology and geostatistics with metallurgy to create a spatially geologically based predictive model for copper mineral processing plants, where Metallurgical recovery, plant throughput rate (tonnes per hour) and reagent consumption such as lime can be predicted.

By mapping the rock types, alteration types and mineralogy including weathering zones Supergene, Fresh with an understanding of the metallurgical responses (derived from test work) metallurgical domains predicting plant behaviour can be derived.

A Metallurgical block model can then be used for reference when scheduling the mine in addition to the usual copper/gold grades.

Los Azules has an excellent chemical database (various Cu Acid Sol, Cu Cn Sol etc) this combined with the current geology model and metallurgical input will define like type metallurgical units.

Also recommended

- Perform Paste pH measurement to predict Lime Usage
- Mineralogical studies to determine mineralogy and distribution of Arsenic.

Environmental Activities (J. Farrell, P. Eng, Hatch)

Studies of Fauna and Flora have been performed at Los Azules using subject matter experts from the San Juan Province. It is recommended this work continue.

The high-altitude Andes environment around Los Azules is compromised by the intensive grazing of goats during the summer months. Options for possible elimination or management of goat grazing in the project footprint should be developed.

- The fauna and flora monitoring performed over past years should now be consolidated. If possible, monitoring should include fish stocks and fish health in the Salinas river below the site of the tailings dam. Extended season monitoring will also be useful to understand the flora and fauna present when there are no grazing goats. It will be beneficial to understand the flora and fauna are missing from the area by benchmarking to an area not affected by goat herders grazing their animals.

- The environmental permitting regime is well defined but it is recommended that a permitting register be developed to ensure the tracking of permits and approvals and their status are documented.
- A risk assessment for closure of the Project should be conducted for the next update of the conceptual closure plan.
- A Project Rehabilitation drawing should be produced illustrating the final landscape and rehabilitation works.
- It is recommended that a Compensation Planting proposal or an Environmental Rescue proposal be developed in a timely manner in conjunction with the authorities so it may receive social license.

Recommended Trade-Off Studies D. Brown, CPEng, McEwen)

The following trade-off studies are recommendations to develop highest confidence outcomes to infrastructure solutions at the Los Azules Project.

- **Trade-off Project Infrastructure - The Los Azules Access Route from Calingasta**

  The existing Los Azules access road is affected by snow where the access road crosses two high passes above 4000m and where snow fall related road closure creates safety and access challenges from April to November. Longer in a winter of heavy snow fall.

  A potential Northern Access Road route was evaluated and deemed unsuitable by Ausenco Vector in earlier studies. The Northern Route offers a continuous descent from the Los Azules site down to Calingasta with no high country passes and is much less affected by snow. The Northern Access Route is undoubtedly a serious challenge but needs to be revisited and revaluated once again as part of a final trade off of the site access route that considers the best long term solution for Los Azules in terms of access reliability, power transmission route and reliability, safety of personnel etc

  The next steps are a review of the reports, photos, land ownership and an aerial reconnaissance. If decision is to continue with evaluations then a photogrammetry programme and specific site inspections via horseback will be needed. Two sections, one of 5 km and another of 20km are very challenging with the valley becoming a very narrow and twisted gorge in places. The northern Route is shown green in Figure 26-1.

  A characteristic of the potential Northern Route is the adjacent river has a very large catchment area and storm events in summer and snow melt water in spring can cause the river to run at very high flows. Any river crossings would therefore need to be minimised and the road platform constructed at a safe height above the river.

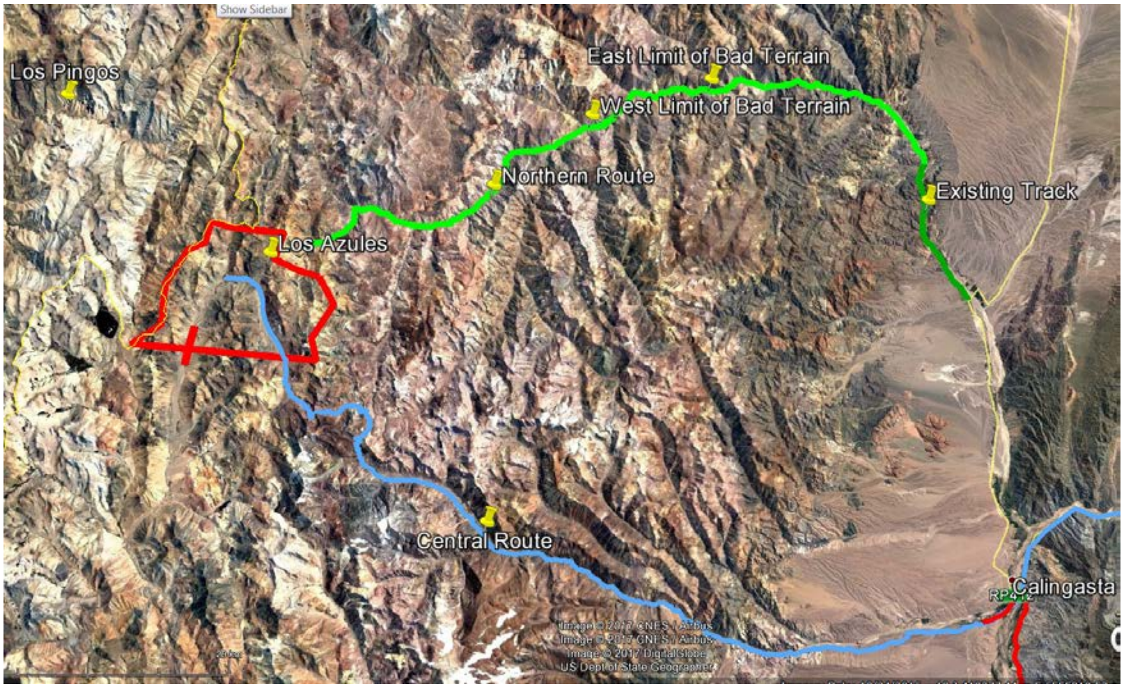


Figure 26-1 A google Earth background illustrating the Potential Northern Route (Green) and the existing Central Route (Blue).

Figure 26-2 Close up from Google Earth of the challenging 20km section of the Northern Route

Figure 26-3 A road constructed through the challenging section of the Northern Route would look similar to this road excavated in a very steep rock slope with the road platform well above any potential peak river flow.

If the Northern Road route is deemed constructible and feasible then perform a comprehensive trade off against the existing Central Road route and define the preferred route.

- **Trade-Off Project Infrastructure – Power Transmission to Los Azules**

  As the power supply and associated transmission line is a major critical component of the project, many aspects must be focussed to in the immediate future to deliver a definitive robust logical and viable solution in which all the stakeholders have confidence and will be supported through the permitting processes and implementation.

  It is recommended all of the following aspects are further developed as a priority:

  - Confirm the suitability and availability of a cost-effective power supply from Argentina
  - Confirm the suitability and availability of a cost-effective power supply from Chile
  - Performance of power grid load flow studies.
  - Conduct a preliminary selection of conductor and transmission tower types suitable to the various climatic environments any transmission line will pass through

- Define the legal easements acquisition challenges and alternative processes. This will potentially eliminate Chile as an option.
- Define the community engagements that should be performed for social license.
- Define permitting requirements. This time necessary for any EIA process in Chile and the risk of challenges could eliminate Chile from further consideration. The Argentina authorities have advised the transmission line is to be included in the main IIA for Los Azules.
- Perform a cost benefit trade off of HVDC power against HVAC power. HVDV enables transmission cables to be buried underground without noteworthy power losses. Unlike HVAC which must be above ground on transmission towers. HVAC underground cables generally lose 1% of power per buried kilometer.
- Include in the trade off study any benefits from a transmission line also aligned to the potential Northern Route which is relatively snow free

Figure 26-4 The 500kV transmission line final tower at Calingasta constructed in anticipation of large mining projects in the high Andes. Presently energised at 128kV for the small population of Calingasta.

Figure 26-5 The new substation yard at Calingasta, presently occupied by a single orange transformer feeding the local township.

When the preferred power source and the transmission route are defined then perform environmental, geotechnical and preliminary engineering such as access for overhead cable pulling and tower construction.

- **Project Infrastructure – Review Renewable Energy for Los Azules**

Renewable Energy is of interest to Los Azules especially in the early years when power will supplied be by diesel generators. In the operating years Los Azules has an obligation to draw a portion of its power from renewable sources. This renewable energy can be purchased or can be developed.

It is recommended some high-level studies are performed to understand the renewable energy generation potential. These studies have commenced in October 2017 and more follow up work is needed. The scope of the studies will include:

- Evaluation of micro-hydro and solar generation for the power supply to advance camps and isolated access control sites.
- Trade-off solar verses diesel generation at the site during the project implementation phase.
- Understand if there is economic potential for a very large reliable renewable energy power supply. Something that is not just a photovoltaic field generating only during the hours of daylight and on cloud free days.

- **Project Infrastructure – Concentrate Logistics and Export through Chile**

  It is recommended that the road route from the Chile border through to the highway at Channaral Alto is given priority attention to secure all necessary land, access easements and agreements for the sections to deliver certainty of outcome.

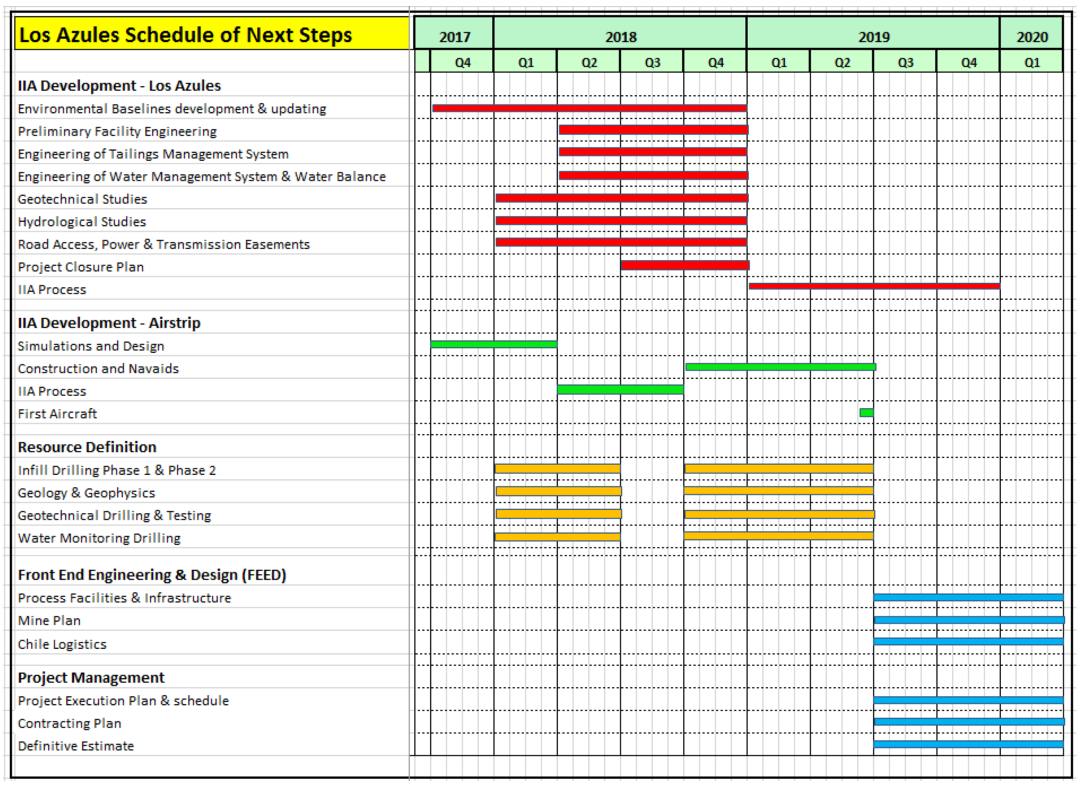
  A Heads of Agreement term sheet should be developed with the Port of Coquimbo

  A permitting schedule for Chile Works should be developed.

  Any bi-national commission issues and engagements should also be developed.

  A legal person, supported by a projects person, should be employed with priority focus to deliver the outcomes needed in Chile.

<u>Preliminary Schedule for Recommended Next Steps D. Brown, C. P. Eng, McEwen)</u>



- To define the project beyond the IIA permit application the following proposals should be requested in the market place.
- Proposals from EPCMs
- Proposals from Specialist Consultants eg Tailings Dam
- Proposals from OEMs
- Proposals from Major Contractors for specific project elements eg Access Road development in Chile and in Argentina

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28. Date and Signature Pages

The undersigned prepared this technical report titled "NI 43-101 Technical Report Preliminary Economic Assessment Update for the Los Azules Project, Argentina". The effective date of this Technical Report is September 1, 2017 and the report date is October 16, 2017.

Qualified Persons for this report are:

- D. Brown, CPEng, McEwen.
- M. Bunyard, C. Eng, FAusIMM, Hatch Ltd.
- B. Davis, FAusIMM , BD Resource Consulting, Inc.
- J. Duff, P. Geol, McEwen.
- R. Duinker, P. Eng, MBA, Hatch Ltd.
- J. Farrell, P. Eng, Hatch Ltd.
- W. Rose, P. E., WLR Consulting Inc.
- K. Seddon, CPEng, ATC Williams Pty Ltd.
- R. Sim, P. Geo, SIM Geological Inc.

Appendix A

Units of Measure and Abbreviations and Acronyms

Units of Measure:

above mean sea level	-	**amsl**
Ampere	-	A
annum (year)	-	a
Argentine Peso	-	AR$
Billion	-	B
British thermal unit	-	BTU
centimetre	-	cm
cubic centimetre	-	cm^3
cubic feet per minute	-	cfm
cubic feet per second	-	ft^3/s
cubic foot	-	ft^3
cubic inch	-	in^3
cubic metre	-	m^3
cubic yard	-	yd^3
Coefficients of Variation	-	CVs
day	-	d
days per week	-	d/wk
days per year (annum)	-	d/a
dead weight tonnes	-	DWT
decibel adjusted	-	dBa
decibel	-	dB
degree	-	°
degrees Celsius	-	°C
diameter	-	ø
dollar (American)	-	US$
dollar (Canadian)	-	CDN$
dry metric ton	-	dmt
foot	-	ft
gallon	-	gal
gallons per minute (US)	-	gpm
Gigajoule	-	GJ
gigapascal	-	GPa
gigawatt	-	GW
gram	-	g
grams per litre	-	g/L
grams per tonne	-	g/t
greater than	-	>
hectare (10,000 m2)	-	ha
hertz	-	Hz
horsepower	-	hp
hour	-	h
hours per day	-	h/d
hours per week	-	h/wk
hours per year	-	h/a
inch	-	in
kilo (thousand	-	k
kilogram	-	kg
kilograms per cubic metre	-	kg/m^3
kilograms per hour	-	kg/h
kilograms per square metre	-	kg/m^2
kilometre	-	km
kilometres per hour	-	km/h
kilopascal	-	kPa
kilotonne	-	kt
kilovolt	-	kV
kilovolt-ampere	-	kVA

kilovolts	-	kV
kilowatt	-	kW
kilowatt hour	-	kWh
kilowatt hours per tonne	-	kWh/t
kilowatt hours per year	-	kWh/a
less than	-	<
litre	-	L
litres per minute	-	L/m
megabytes per second	-	Mb/s
megapascal	-	MPa
megavolt-ampere	-	MVA
megawatt	-	MW
metre	-	m
metres above sea level	-	masl
metres Baltic sea level	-	mbsl
metres per minute	-	m/min
metres per second	-	m/s
micron	-	µm
milligram	-	mg
milligrams per litre	-	mg/L
millilitre	-	mL
millimetre	-	mm
million	-	M
million bank cubic metres	-	Mbm^3
million bank cubic metres per annum	-	Mbm^3/a
million tonnes	-	Mt
minute (plane angle)	-	'
minute (time)	-	min
month	-	mo
ounce	-	oz
pascal	-	Pa
centipoise	-	mPa·s
parts per million	-	ppm
parts per billion	-	ppb
percent	-	%
pound(s)	-	lb
pounds per square inch	-	psi
revolutions per minute	-	rpm
second (plane angle)	-	"
second (time)	-	s
short ton (2,000 lb)	-	st
short tons per day	-	st/d
short tons per year	-	st/y
specific gravity	-	SG
square centimetre	-	cm^2
square foot	-	ft^2
square inch	-	in^2
square kilometre	-	km^2
square metre	-	m^2
three-dimensional	-	3D
tonne (1,000 kg) (metric ton)	-	t
tonnes per day	-	t/d
tonnes per hour	-	t/h
tonnes per year	-	t/a
tonnes seconds per hour metre cubed	-	ts/hm^3
volt	-	V
week	-	wk
weight/weight	-	w/w
wet metric ton	-	wmt

Abbreviations and Acronyms:

acid generating	-	**AG**
acid rock drainage	-	ARD
alternating current	-	AC
ammonium nitrate fuel oil	-	ANFO
Association for the Advancement of Cost Engineering	-	AACE
autogenous/ball mill/crushing	-	ABC
Battle Mountain Gold	-	BMG
Bond ball mill work index	-	BWi
inductively coupled plasma	-	ICP
Canadian Institute of Mining, Metallurgy and Petroleum	-	CIM
Certificate of Approval	-	CofA
close-circuit fully-autogenous grinding milling	-	FAC
Conceptual Closure and Rehabilitation Plan	-	CRP
Construction Quality Assurance	-	CQA
direct current	-	DC
early mineralized porphyry dike	-	EMD
enrichment ratio	-	ER
Environmental Impact Assessment	-	EIA
Environmental Impact Review	-	EIR
exploratory data analysis	-	EDA
Ground Engaging Tools	-	GET
induced polarization	-	IP
internal rate of return	-	IRR
International Organization for Standardization	-	ISO
in-the-hole	-	ITH
inverse distance-weighted	-	ID
leach zone	-	LX
Lerchs-Grossman	-	LG
life-of-mine	-	LOM
load-haul-dump	-	LHD
Los Azules Mining, Inc	-	LAMI
Magnetotelluric	-	MT
Mine Block Intrusion	-	MBI
Minera Andes S.A.	-	MASA

Minimum environmental protection standard laws	-	MEPSL
Mount Isa Mines	-	MIM
National Instrument 43-101	-	NI 43-101
nearest neighbor	-	NN
net present value	-	NPV
net smelter royalty	-	NSR
New York Stock Exchange	-	NYSE
Newmont Mining Corporation	-	NMC
ordinary kriging	-	OK
overburden zone	-	OVB
portable infrared spectrometer	-	PIMA
preliminary economic assessment	-	PEA
primary zone	-	PR
Qualified Persons	-	QPs
quality assurance	-	QA
quality control	-	QC
relative bulk strength	-	RBS
reverse circulation	-	RC
rock quality designation	-	RQD
run-of-mine	-	ROM
selective mining unit	-	SMU
semi-autogenous	-	SAG
semi-autogenous/ball mill/crushing	-	SABC
SGS Lakefield Research Ltd.	-	SGS
Solitario Argentina S.A	-	SASA
specific gravity	-	SG
standard reference material	-	SRM
supergene zone	-	SS
tailings storage facility	-	TSF
Toronto Stock Exchange	-	TSX
unidirectional solidification texture	-	UST
United Nations Development Program	-	UNDP
Waste Rock Storage Facility	-	WRSF
World Meteorological Organization	-	WMO

Appendix B

Certificates

Donald J. Brown, CPEng

Certificate of Author

I, Donald J. Brown, CPEng (Aust), RPEQ, do certify that:

1. I am the Senior Vice President for Projects of:

McEwen Mining Inc.
Suite 2800, 150 King St West
Toronto, Ontario, Canada, M5H 1J9

2. This certificate applies to the report "Canadian National Instrument 43-101 Technical Report, McEwen Mining Inc. Los Azules Porphyry Copper Project, San Juan Province, Argentina", effective 1 September 2017 (the "Technical Report").

3. I graduated with a Bachelor's Degree in Geotechnical Engineering, from the University of Portsmouth, United Kingdom, in 1981 and a Master's Degree in Rock Mechanics and Excavation from the University of Newcastle Upon Tyne, United Kingdom, in 1983.

4. I am a:
   - Registered Professional Engineer of Queensland, Australia (RPEQ 05582)
   - Chartered Professional Engineer with the Institution of Engineers Australia (169180)

5. My relevant experience includes over 35 years in all phases of mineral project evaluation, development and operations management in Hong Kong, Australia, New Zealand, Papua New Guinea, Chile, Argentina, Peru and Colombia.

6. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

7. I am responsible for the preparation of Sections 1.1 through 1.5, 1.11, 1.13, 4 through 6, 9.6, 16.1, 16.5 to 16.9, 18, 19, 21.2.1, 23 and relevant portions of Sections 25 and 26 of the Technical Report.

8. I have visited the Los Azules property frequently in summer of 2017 and stayed at the Los Azules property for most of the period between January and April 2017. I have also visited the locations of all potential supporting infrastructure for the Los Azules development in both Chile and Argentina during late 2016 and throughout 2017.

9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

10. I am not independent of the issuer.

11. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

12. I consent to the public filing of this Technical Report.

Signed and dated on this 3rd day of September 2017.

/Original signature and seal on file/

Donald J. Brown, CPEng (Aust), RPEQ

“Signed and Sealed”

Donald J. Brown, CPEng (Aust), RPEQ

Michael J. Bunyard, CEng, FAusIMM, MIMMM

Certificate of Author

I, Michael J. Bunyard, CEng, FAusIMM, MIMMM do certify that:

1. I am employed as Global Director Mineral Processing with:

Hatch Ltd.
2800 Speakman Drive
Mississauga, Ontario, Canada, L5K 2R7

2. This certificate applies to the report "Canadian National Instrument 43-101 Technical Report, McEwen Mining Inc. Los Azules Porphyry Copper Project, San Juan Province, Argentina", effective 1 September 2017 (the "Technical Report").

3. I graduated with a Bachelor's Degree in Applied Mineral Sciences from Leeds University, England, in 1970 and with a Doctoral Degree in Applied Mineral Sciences from Leeds University, England, in 1973.

4. I am a member of:
   - Chartered Engineer, Engineering Council of United Kingdom (135941)
   - Fellow of the Australian Institute of Mining and Metallurgy (108195)
   - Member of the Institution of Materials, Minerals and Mining (40597)

5. My relevant experience over the past 40 years includes: process plant test work and design, plant operation, plant management and audit roles for potential purchasers and lenders.

6. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

7. I am responsible for the preparation of Sections 1.12, 1.15, 2, 3, 13, 17, 21, 27 and relevant portions of Sections 25 and 26 of the Technical Report.

8. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

9. I am independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101.

10. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

11. I consent to the public filing of this Technical Report.

Signed and dated on this 1st day of September 2017.

/Original signature and seal on file/

Michael J. Bunyard, CEng, FAusIMM, MIMMM

"Signed and Sealed"

Michael J. Bunyard, CEng, FAusIMM, MIMMM

1st September 2017

Bruce M. Davis, FAusIMM

Certificate of Author

I, Bruce M. Davis, FAusIMM do certify that:

1. I am an independent consultant of:

BD Resource Consulting, Inc
4253 Cheyenne Drive
Larkspur, CO 80118 USA

2. I graduated with a Doctor of Philosophy degree from the University of Wyoming in 1978.
3. I am a fellow of the Australasian Institute of Mining and Metallurgy, Registration Number 2111185.
4. I have practiced my profession continuously for 39 years and have been involved in geostatistical studies, mineral resource and reserve estimations and feasibility studies on numerous underground and open pit base metal and gold deposits in Canada, the United States, Central and South America, Europe, Asia, Africa and Australia.
5. I have read the definition of “qualified person” set out in National Instrument 43-101 (“NI 43-101”) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purposes of NI 43-101.
6. I am responsible for the preparation of sections 1.9, 11, 12 and 14 of the Technical Report titled “Canadian National Instrument 43-101 Technical Report McEwen Mining Inc., Los Azules Porphyry Copper Project, San Juan Province, Argentina”, with an effective date of September 1, 2017 (the “Technical Report”).
7. I personally inspected the Los Azules property from January 23 to January 25, 2012.
8. I have had prior involvement with the property that is the subject of the Technical Report. I was a co-author of prior NI 43-101 Technical Reports dated September 26, 2008, December 16, 2010 and August 1, 2013.
9. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
10. I am independent of the issuer applying all of the tests in Section 1.5 of NI 43-101.
11. I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.
12. I consent to the public filing of this Technical Report.

Signed and dated on this 4th day of September 2017.

/Original signature and seal on file/

Bruce M. Davis, FAusIMM

"Signed and Sealed"

Bruce M. Davis, FAusIMM

James K. Duff, P. Geol

Certificate of Author

I, James K. Duff, P. Geol, do certify that:

1. I am employed as a part time consultant to:

McEwen Mining Inc.
Suite 2800, 150 King St West
Toronto, Ontario, Canada, M5H 1J9

2. This certificate applies to the report "Canadian National Instrument 43-101 Technical Report, McEwen Mining Inc. Los Azules Porphyry Copper Project, San Juan Province, Argentina", effective 1 September 2017 (the "Technical Report").

3. I graduated with a Bachelor of Science degree in Geology from the University of Nevada (Reno) in 1968, and I received a Master's of Science degree in Geology from the University of Idaho (Moscow) in 1978.

4. I am a:
   - Licensed Professional Geologist in the State of Idaho (No. PGL-1411)
   - Registered Member of the Society of Mining, Metallurgy and Exploration (No. 859022)

5. I have practiced my profession for 45 years since my graduation from the University of Nevada. I was employed by exploration and operating companies including Pan-Nevada Mining Co., Bear Creek Mining Co. (Kennecott Copper Co.), Idarado Mining Co. (Newmont Mining Co.), Cyprus Mining Corp., White Pine Copper Co., The Bunker Hill Co., St. Joe Minerals/St. Joe Gold, Bond International Gold, Coeur d'Alene Mines Corp. and Minera Andes Inc. (now McEwen Mining Inc.) in a series of positions with increasing levels of responsibility culminating in senior management positions. I have worked as a consultant since I retired from Minera Andes Inc. on January 31, 2012.

6. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

7. I am responsible for the preparation of Sections 1.6, 1.7, 7, 8, and 9 of the Technical Report.

8. I visited the site in December 2009, January, March and December 2010, February, April and December 2011 and January 2012 in my capacity of the former COO of Minera Andes Inc. and I visited the site as a consultant to McEwen Mining Inc. in March 2012, April 2012 and March 2013.

9. I was the Chief Operating Officer of Minera Andes Inc. from March 2009 through January 2012, during which time I was responsible for exploration and engineering activities at Los Azules. I was a coauthor of the previous NI 43-101 Technical Reports dated November 1, 2013.

10. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

11. I am currently employed as a part time consultant by McEwen Mining Inc. I own stock options in McEwen Mining, and I therefore do not meet the criteria in Section 1.5 of National Instrument 43-101 as being independent of the issuer.

12. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

13. I consent to the public filing of this Technical Report.

Signed and dated on this 4th day of September 2017.

/Original signature and seal on file/

James K. Duff, P. Geol

"Signed and Sealed"

James K. Duff, P. Geol

Robert J. Duinker, P. Eng, MBA

Certificate of Author

I, Robert J. Duinker, P. Eng, MBA do certify that:

1. I am employed as Managing Consultant with:

Hatch Ltd.
2800 Speakman Drive
Mississauga, Ontario, Canada, L5K 2R7

2. This certificate applies to the report "Canadian National Instrument 43-101 Technical Report, McEwen Mining Inc. Los Azules Porphyry Copper Project, San Juan Province, Argentina", effective 1 September 2017 (the "Technical Report").
3. I graduated with a Bachelor's of Applied Science from Queen's University, Canada, in 2002 and with a Masters of Business Administration (MBA) from Queen's University, Canada in 2007.
4. I am a member of:
   - Professional Engineers of Ontario (100085220)
5. My relevant experience includes 5 years as a mechanical design engineer and 10 years of experience in management consulting, primarily for the mining industry.
6. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
7. I am responsible for the preparation of Sections 1.14, 21.2.3, 22, and relevant portions of Sections 25 and 26 of the Technical Report.
8. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
9. I am independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101.
10. I have not completed a personal inspection of the property.
11. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.
12. I consent to the public filing of this Technical Report.

Signed and dated on this 4th day of September, 2017.

____

Robert J. Duinker, P. Eng, MBA

James B. Farrell, P. Eng

Certificate of Author

I, James B. Farrell, P. Eng do certify that:

1. I am employed as Senior Environmental Consultant with:

Hatch Ltd.
2800 Speakman Drive
Mississauga, Ontario, Canada, L5K 2R7

2. This certificate applies to the report "Canadian National Instrument 43-101 Technical Report, McEwen Mining Inc. Los Azules Porphyry Copper Project, San Juan Province, Argentina", effective 1 September 2017 (the "Technical Report").

3. I graduated with a Bachelor's Degree in Civil Engineering from the University of Guelph, Canada, in 1987 and with a Master's Degree in Environmental Chemistry from the University of Guelph, Canada, in 1991.

4. I am a member of:
   - Professional Engineers of Ontario (Member No. 90294141)

5. My relevant experience over the past 30 years includes: environmental reviews of mining operations globally and I have been involved in the environmental aspects of property valuation and mergers and acquisitions.

6. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

7. I am responsible for the preparation of Section 20 and relevant portions of Sections 25 and 26 of the Technical Report.

8. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

9. I am independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101.

10. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

11. I consent to the public filing of this Technical Report.

Signed and dated on this 25th day of September 2017.

/Original signature and seal on file/

James B. Farrell, P. Eng

"Signed and Sealed"

James B. Farrell, P. Eng

William L. Rose, P. E.

Certificate of Author

I, William L. Rose, P. E., do certify that:

1. I am the Principal Mining Engineer of:

WLR Consulting, Inc.
9386 West Iowa Avenue
Lakewood, CO 80232-6441 U.S.A

2. This certificate applies to the report "Canadian National Instrument 43-101 Technical Report, McEwen Mining Inc. Los Azules Porphyry Copper Project, San Juan Province, Argentina", effective 1 September 2017 (the "Technical Report").

3. I graduated with a Bachelor of Science degree in Mining Engineering from the Colorado School of Mines in 1977.

4. I am a:
   - Registered Professional Engineer in the State of Colorado (No. 19296)
   - Registered Professional Engineer in the State of Arizona (No. 15055)
   - Registered Member of the Society for Mining, Metallurgy and Exploration, Inc. (No. 2762350RM)

5. I have worked as a mining engineer for a total of 40 years since my graduation from college. I have been involved in open pit mine operations in both management and engineering positions, and have extensive experience in mine design and planning. I have conducted estimations of mineral resources and reserves, mine production schedules, equipment and workforce requirements, and capital and operating costs for numerous projects in North, Central and South America, Europe, Africa and Asia.

6. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

7. I am responsible for the preparation of Sections 16.2, 16.3, 16.4 and relevant portions of Sections 25 and 26 of the Technical Report.

8. I have personally inspected the subject property on March 21-23, 2010.

9. I have had prior involvement with the property that is the subject of the Technical Report. I was a coauthor of three prior NI 43-101 Technical Reports dated March 19, 2009; December 16, 2010, and November 1, 2013.

10. As of the date of this certificate As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

11. I am independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101.

12. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

13. I consent to the public filing of this Technical Report.

Signed and dated on this 1st day of September 2017.

/Original signature and seal on file/

"Signed and Sealed"

William L. Rose, P. E.

Keith Seddon, C. P. Eng

Certificate of Author

I, Keith Seddon, C. P. Eng do certify that:

1. I am employed as Technical Director with:

ATC Williams Pty Ltd.
222 Beach Rd
Mordialloc, Victoria, Australia 3149

2. This certificate applies to the report "Canadian National Instrument 43-101 Technical Report, McEwen Mining Inc. Los Azules Porphyry Copper Project, San Juan Province, Argentina", effective 1 September 2017 (the "Technical Report").

3. I graduated with a Bachelor's Degree in Civil Engineering from Monash University, Melbourne in 1971 and with a Master's Degree in Applied Science from University of Newcastle upon Tyne, England, in 1974.

4. I am a:
   - Chartered Engineer, Institution of Engineers Australia (237841)
   - Member of the Australian Institute of Mining and Metallurgy (109163)

5. My relevant experience over the past 40 years includes: tailings characterization, tailings storage site selection and options studies, design of tailigs storage facilities including embankments and water management and tailings distribution systems, and inputs into construction and operations.

6. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

7. I am responsible for the preparation of Section 18.8 of the Technical Report.

8. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

9. I am independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101.

10. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

11. I consent to the public filing of this Technical Report.

Signed and dated on this 4th day of September 2017.

/Original signature and seal on file/

Keith Seddon, C. P. Eng

"Signed and Sealed"

Keith Seddon, C. P. Eng

Robert Sim, P. Geo

Certificate of Author

I, Robert Sim, P. Geo do certify that:

1. I am an independent consultant of:

   SIM Geological, Inc.
   508-1950 Robson Street
   Vancouver, British Columbia, Canada, V6G 1E8

2. This certificate applies to the report "Canadian National Instrument 43-101 Technical Report, McEwen Mining Inc. Los Azules Porphyry Copper Project, San Juan Province, Argentina", effective 1 September 2017 (the "Technical Report").

3. I graduated with a Bachelor of Science Degree (Honours) in Geology from Lakehead University, Canada, in 1984.

4. I am a member of:
   - Association of Professional Engineers and Geoscientists of British Columbia (24076).

5. I have practiced my profession continuously for 33 years and have been involved in mineral exploration, mine site geology and operations, mineral resource and reserve estimations and feasibility studies on numerous underground and open pit base metal and gold deposits in Canada, the United States, Central and South America, Europe, Asia, Africa and Australia.

6. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

7. I am responsible for the preparation of Sections 1.8 to 1.10, 10, 14 and relevant portions of Sections 25 and 26 of the Technical Report.

8. I visited the Los Azules Property on two occasions: March 30 to April 1, 2008 and also from March 21 to March 23, 2010.

9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

10. I am independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101.

11. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

12. I consent to the public filing of this Technical Report.

Signed and dated on this 3rd day of September 2017.

/Original signature and seal on file/

Robert Sim, P. Geo

"Signed and Sealed"

Robert Sim, P. Geo