SANTA CRUZ
ARIZONA, USA

NI 43-101 PRELIMINARY ECONOMIC ASSESSMENT
& TECHNICAL REPORT

SANTA CRUZ PROJECT, ARIZONA

REPORT PREPARED BY:

MINERAL RESOURCES EFFECTIVE DATE: 31 DECEMBER 2022

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1 Summary

This report was prepared as a preliminary economic assessment level National Instrument 43-101 (NI 43-101) Technical Report (Technical Report) for Ivanhoe Electric (IE or Company) by SRK Consulting (U.S.), Inc. (SRK) on the Santa Cruz Project located in Arizona.

Sections of this report pertaining to geology and mineral resources were authored by Nordmin Engineering Ltd. (Nordmin). Sections of this report pertaining to processing and infrastructure were authored by M3 Engineering and Technology Corp. (M3). Sections of this report pertaining to tailings storage were authored by KCB Consultants Ltd. (KCB). Sections of this report pertaining to geotechnical studies were authored by Call & Nicholas, Inc. (CNI) Sections of this report pertaining to hydrogeology were authored by INTERA Incorporated (INTERA). Sections of this report pertaining to environmental studies were authored by Tetra Tech, Inc. (Tetra Tech). Sections of this report pertaining to mine closure, geochemistry, and water quality were authored by Haley & Aldrich, Inc. (H&A). Sections of this report pertaining to power sources and green power were authored by Met Engineering, LLC (Met Engineering). Further detail on the specific sections that were authored by each Qualified Person is set out in section 2.8. None of the Qualified Persons are affiliated with IE or another entity that has an ownership, royalty, or other interest in the property.

1.1 Property Description, Mineral Tenure, Ownership, Surface Rights, Royalties, Agreements, and Permits

The Santa Cruz Project is located 11 kilometers (km) west of the town of Casa Grande, Arizona, and is approximately one hour’s drive south of the capital Phoenix and covers a cluster of deposits about 11 km long and 1.6 km wide. The Santa Cruz Project centroid is approximately -111.88212, 32.89319 (WGS84) in Township 6 S, Range 4E, Section 13, Quarter C.

The Santa Cruz Project lies primarily on private land, which is dominantly fee simple (complete and irrevocable ownership). Surface titles and associated rights were acquired by IE in 2022 and 2023 as purchases and options on private parcels. Mineral title for the Project was acquired in 2021 via an agreement with Central Arizona Resources (CAR) for the right to acquire 100% of CAR’s option over the DR Horton Energy (DRHE) mineral title.

DRHE also holds 39 Federal unpatented mining claims in T06S R04E in N/2 Section 12, W/2 Section 23 and W/2 Section 24.

Royalties

Noted royalties on future mineral development of the Project are summarized here:

- Royalty interests in favor of the royalty holders of a 5% net smelter return royalty interest for minerals derived from all portions of the property pursuant to terms contained therein recorded in the royalty document.
- Royalty interests in favor of the royalty holder of a 10% net smelter return royalty interest in sections 13, 18, 19, and 24, Township 6 South, Range 4 East, for minerals derived from the property pursuant to terms contained therein recorded in the royalty document.
- Rights conveyed to the royalty holder in sections 13, 18, 19, and 24, Township 6 South, Range 4 East, consisting of 10% of one eight-hundredth of Fair Market Value and interest in

the Cu and other associated minerals with additional terms, conditions, and matters contained therein, recorded in the royalty documents.

- Rights granted to the royalty holders, as joint tenants with right of survivorship, a royalty in sections 13, 18, 19, and 24, Township 6 South, Range 4 East, consisting of 30% of five tenths of 1% of the net smelter return from all minerals with additional terms, conditions, and matters contained therein, recorded in the royalty documents.
- Rights conveyed to the royalty holder in sections 13, 23, 24, 25, and 26, Township 6 South, Range 4 East and sections 5, 6, 18, 18, 19, and 30, Township 6 South, Range 5 East, consisting of 60% of one eighth-hundredth of Fair Market Value and interest in the Cu and other minerals with additional terms, conditions, and matters contained therein, recorded in the royalty documents.
- Reservation of a 1% royalty interest in favor of the royalty holder recorded in the royalty document, for E$^{1}/_{2}$ of Section 5, Township 6 South, Range 5 East, south and west of Southern Pacific RR, "that when mined or extracted therefrom shall be equal in value to 1% of the net smelter returns on all ores, concentrated, and precipitates mined, and shipped from said property."
- Reservation of a royalty interest in favor of the royalty holders in the SW$^{1}/_{4}$ of Section 17, Township 6 South, Range 5 East, for an amount equal to one half of 1% net smelter returns in the sale and disposal of all ores, minerals, and other products mined and removed from the above described parcel and sold to a commercial smelter or chemical hydrometallurgical plant or one half of 1% of 60% of the sales price if the mine product is disposed of other than to a commercial smelter, additional provisions contained therein, recorded in the royalty documents.

Permits

Current exploration is conducted on private land. State, County, and Municipal permits for exploration, development, and operations are prepared as needed. The ability to operate on private land has the potential to reduce lengthy permitting timelines that result from federal permitting processes. The precise list of permits required to authorize the construction and operation of this Project will be determined as the mining and processing methods are designed.

1.2 Geology and Mineralization

The Santa Cruz project is located within the Southwestern Porphyry Copper Belt. The Belt includes many productive copper deposits in Arizona such as Mineral Park, Bagdad, Resolution, Miami-Globe, San Manuel-Kalamazoo, Ray, Morenci, Sierrita, Twin Buttes, and the neighboring historical Sacaton Mine. These deposits lie within a broader physiographic region known as the Basin and Range province that covers much of the Southwest United States. The porphyry copper deposits within the Southwestern Porphyry Copper Belt include the genetic product of igneous activity during the Laramide Orogeny (80 Ma to 50 Ma) when subduction of the Farallon Tectonic Plate beneath the North American Tectonic Plate produced a magmatic arc and associated porphyry copper systems.

The Santa Cruz Project comprises five separate areas along a southwest-northeast corridor. These areas from southwest to northeast are known as the Southwest Exploration Area, the Santa Cruz deposit, the East Ridge deposit, the Texaco Ridge Exploration Area, and the Texaco deposit, all of which represent portions of one or more large porphyry copper systems separated by extensional

Basin and Range normal faults. Each area has experienced variable periods of erosion, supergene enrichment, fault displacement, and tilting into their present positions.

Mineralization at the Santa Cruz Project is divided into three main groups:

- Primary hypogene sulfide mineralization consists of chalcopyrite, pyrite, and molybdenite hosted within quartz-sulfide stringers, veinlets, veins, vein breccias, and breccias and alteration related to Laramide-aged porphyritic dykes (75 Ma).
- Secondary supergene sulfide mineralization is dominantly chalcocite which rims primary hypogene sulfide and completely replaces hypogene disseminated and vein-hosted sulfides.
- Supergene copper oxide mineralization is comprised dominantly by chrysocolla (copper silicate) with subordinate dioptase, tenorite, cuprite, copper wad, native copper, and as copper-bearing smectite group clays. Superimposed in-situ within the copper oxide zone is atacamite (copper chloride), copper sulfates, antlerite, and chalcanthite.

1.3 Status of Exploration, Development and Operations

Copper mineralization was first discovered in the region in the 1960s and led to extensive drill programs across the Santa Cruz Project area. Exploration programs by several companies and joint ventures included diamond drilling and several geophysical surveys between the 1960s through the 1990s. IE completed an updated mineral resource estimate with effective date December 31, 2022 entitled "Mineral Resource Estimate Update and NI 43-101 Technical Report for the Santa Cruz, Texaco, and East Ridge Deposits, Arizona, USA."

IE exploration in 2021 – 2022 included:

- Geophysical surveys – ground gravity, ground magnetics, Typhoon™ three-dimensional Perpendicular Pole Dipole Induced Polarization (3D PPD IP), refraction, and passive seismic.
- Drilling – a combination of diamond drill and rotary drilling totaling 88 holes and approximately 55,291 meters (m)

IE exploration in 2023, to June 8, 2023, included:

- Drilling – a combination of diamond drill and rotary drilling totaling 36 holes and approximately 29,322.02 m. This data is not part of the mineral resource estimate.
- Exploration is continuing around the Project to identify new zones that may be incorporated into future studies.

Combined with the historical exploration, there are over 200 drillholes totaling over 162 km within the Santa Cruz Project area.

1.4 Sample Analysis and Security

From September 2021 to December 2022, IE samples were sent to one of four laboratories: Skyline Laboratories facility located in Tucson, SGS Laboratories located in Burnaby, BC, Canada, SGS Lakefield, ON, Canada for SEQ Copper Analysis, or Arizona, American Assay Laboratories located in Sparks, Nevada. All samples sent to SGS Laboratories were prepared at SGS Burnaby, BC, Canada. At the time, all assay labs were well established and recognized assay and geochemical analytical services companies and are independent of IE.

All four laboratories are recognized by the International Standard demonstrating technical competence for a defined scope and the operation of a laboratory quality management system (ISO 17025).

Additionally, Skyline Laboratories is recognized by ISO 9001, indicating that the quality management system conforms to the requirements of the international standard. SGS Canada Minerals Burnaby conforms to requirements of ISO/IEC 17025 for specific tests as listed on their scope of accreditation. American Assay Laboratories carries approval from the State of Nevada Department of Conservation and Natural Resources Division of Environmental Protection. Due to QA/QC failures at American Assay Laboratories, IE discontinued work with this lab.

Specific gravity (SG) measurements for the Santa Cruz, Texaco, and East Ridge deposits were provided during 2021-2022 on site drill core measurements. SG measurements were taken from representative core sample intervals and measured using a water dispersion method.

The Santa Cruz, Texaco, and East Ridge core is stored in wax impregnated core boxes and transported to the core logging shack. After being logged, the core boxes are palletized, weatherized, and stored in IE's core storage facilities. The core storage is locked behind bay doors or chain link fencing for security purposes. All samples for analyses are transported by courier to the laboratory in Tucson, Arizona, or Burnaby, BC, Canada.

1.5 Mineral Processing and Metallurgical Testing

Metallurgy and processing test work were directed by Met Engineering LLC and conducted at McClelland Labs in Sparks, Nevada. McClelland Labs is recognized by the International Accreditation Service (IAS) for its technical competence and quality of service and has proven that it meets recognized standards. The studies are ongoing. Study focus has been on:

- Confirming total copper recovery of the leach-float flow sheet proposed by historical operator, CGCC, circa 1980, on Exotic, Oxide and Chalcocite mineral domains.
- Investigating heap leaching of Exotic, Oxide and Chalcocite mineral domains. The test program for heap leaching is in progress and is reported as such in section 10. Some early results are described below. Column leach testing will complete in the fourth quarter of 2023.

Agitation leach tests undertaken in mid-2022 verified historical test results and after adjusting the particle size distribution, acid-soluble copper recovery of 92% was achieved. IE subsequently conducted a leach-float test program in which the same mill composite sample used in prior testing was subjected to the standard leach procedure developed earlier in the year. Three standard leach tests were conducted, each subjected to different grind sizes. IE successfully confirmed that up to 94% total copper recovery with the leach-float circuit was achievable at the Santa Cruz deposit. It was confirmed that a smelter saleable concentrate could be produced without any penalties grading 48% total copper and 23% sulfur.

One column cell test has been completed and is in the phase of water rinsing and removing leach residue for analysis. The seven remaining column cell tests are operating normally and are all in the final stage of secondary sulfide leaching. There were no solution flow issues in any of the eight column cells. There were no significant operational issues on any of the column cells. Estimated copper recoveries and extraction rates on the two column cells cured with a chloride dopant, 98% and 94% estimated copper recovery in 70 and 63 days of column rinsing, respectively.

There are some factors to follow up on with future testing to ensure all processing factors are effectively investigated. These are confirmation of corrosion resistant materials and linings for the thickeners in the counter-current-decantation system for pregnant leach solution recovery and studying sulfide flotation with expected process water chemistry at the site. Otherwise, there are no deleterious elements that could have a significant effect on economic extraction.

1.6 Mineral Resource Estimate

This PEA is based upon the Mineral Resource Estimate (MRE), effective date December 31, 2022, which includes a detailed geological and structural re-examination of the Santa Cruz, East Ridge, and Texaco deposits.

The Santa Cruz deposit MRE benefits from approximately 116,388 m of diamond drilling in 129 drillholes, the East Ridge deposit MRE has 18 holes totaling 15,448 m, and the Texaco deposit MRE has 23 drillholes totaling 21,289 m (Table 1-1). All drillholes included in the December 2022 MRE were completed from 1964 to 2022.

Diamond drillhole samples were analyzed for total Cu and acid soluble Cu using atomic absorption spectrometry (AAS). A decade after initial drilling, ASARCO re-analyzed select samples for cyanide soluble Cu (AAS) and molybdenum (multi-element ICP). The Company currently analyzes all samples for total Cu, acid soluble Cu, cyanide soluble Cu, and molybdenum. Due to the re-analyses to determine cyanide soluble Cu within historic samples, there are instances where cyanide soluble Cu is greater than total Cu. It has been determined that the historic cyanide soluble assays are valid as they align with recent assays in 2022 drillholes.

Table 1-1: December 2022 MRE Drillhole Summary

	Total Drilling			IE Drilling		
Deposit	**Number of Drillholes**	**Meters (m)**	**Meters Intersecting the Deposit**	**Number of Drillholes**	**Meters (m)**	**Meters Intersecting the Deposit**
Santa Cruz	129	116,388	57,326	41	34,769	14,172
East Ridge	18	15,448	1,501	0	0	0
Texaco	23	21,289	2,661	3	3,286	685
Total	**170**	**153,125**	**61,488**	**44**	**38,055**	**14,857**

Source: Nordmin, 2023

Geological domains were developed within the Santa Cruz Project based upon geographical, lithological, and mineralogical characteristics, along with incorporating both regional and local structural information. Several extensional fault systems are recognized at Santa Cruz with a transport direction towards the south-west of which deformation event 1 (D1) is the oldest, followed by deformation event 2 (D2) faulting. Local D2 fault structures separate the mineralization at the adjacent Santa Cruz, Texaco, and East Ridge deposits. The Santa Cruz, Texaco, and East Ridge deposits were divided into four main geological domains based upon their type of Cu speciation, including primarily acid soluble (Oxide Domain), cyanide soluble (Chalcocite Enriched Domain), primary Cu sulfide (Primary Domain), and exotic Cu (Cu oxides in overlying Tertiary sediments). All four domains are present within the Santa Cruz deposit, whereas all mineralization at East Ridge is within an Oxide Domain, and Texaco is comprised of all but an Exotic Domain.

Mineralization wireframes were initially created to reflect the known controls on each mineralization type. Once a geologic interpretation was established, wireframes were created. When not cut-off by drilling, the wireframes terminate at either the contact of the Cu-oxide boundary layer, the Tertiary sediments/Oracle Granite contact, or the D2 fault structure. There is an overlap of the Chalcocite Enriched Domain with both the Oxide Domain in the weathered supergene and with the Primary Domain in the primary hypogene mineralization. Otherwise, no wireframe overlapping exists within a given grade domain. Implicit modeling was completed in Leapfrog Geo™ which produced reasonable mineral domains that appropriately represent the known controls on grade mineralization.

A block model for each deposit was created that incorporated lithological, structural, and mineralization trends and selection of the block modeling parameters. Each block model validation process included visual comparisons between block estimates and composite grades in plan and section views, local versus global estimates for NN, ID2, ID3, and OK when available, and swath plots. The Santa Cruz deposit block model was estimated using Nearest Neighbor (NN), inverse distance squared (ID2), inverse distance cubed (ID3), and ordinary kriging (OK) interpolation methods for global comparisons and validation purposes. The OK method was used for the Mineral Resource Estimate; it was selected over ID2, ID3, and NN as the OK method was the most representative approach to controlling the smoothing of grades. The Texaco and East Ridge block models were estimated using NN, ID2, and ID3, and the ID3 method was used for the mineral estimate for the Texaco and East Ridge deposits.

Nordmin considers that the interpreted geological and mineralization domains produced accurately represent the deposit style of the Santa Cruz, Texaco, and East Ridge deposits.

The MRE was classified in accordance with CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) and the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (2019). Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. This estimate of Mineral Resources may be materially affected by environmental permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.

Mineral Resource Classification was assigned to regions of the block model based on the Nordmin QP's confidence and judgment related to geological understanding, continuity of mineralization in conjunction with data quality, spatial continuity based on variography, estimation pass, data density, and block model representativeness.

The areas of greatest uncertainty are attributed to Inferred Resources, which are areas with limited drilling and/or large drill spacing (greater than (>) 100 m). Indicated Resources are resources derived from adequately detailed and reliable exploration, sampling, and testing, and are sufficient to assume geological and grade or quality continuity between points of observation. In the Santa Cruz deposit, the drill spacing that supports the Indicated Resource classification constitutes approximately 80 m to 100 m. There is the possibility for Indicated Resources to be upgraded to Measured Resources via additional infill drilling that would reduce the drill spacing to less than (<) 25 m. Currently none of the deposits have a Measured Resource.

The 2021 twin drilling program conducted by IE, outlined in Sections 10.1.3 and 12.3 has demonstrated overall grade continuity, location, and continuity between intercepts. There is the potential for unknown errors within the database which could affect the size and quantity of Measured, Indicated, and Inferred Mineral Resources.

While most of the Texaco deposit is classified as Inferred, there is a small portion of Indicated Resource. The East Ridge deposit is currently classed as Inferred, as the area is defined by historic drilling which has yet to be validated with modern drilling. This work is forthcoming and will help to improve resource class confidence in subsequent iterations.

To demonstrate reasonable prospects for economic extraction for the Santa Cruz, Texaco, and East Ridge Mineral Resource Estimates, representational minimum mining unit shapes were created using Deswik's minimum mining unit shape optimizer (MSO) tool.

The Santa Cruz Project Mineral Resource Estimate, which is exclusive of mineral reserves, is presented in Table 1-2.

Table 1-2: In situ Santa Cruz Project Mineral Resource Estimates at 0.70% Cu cut-off for Santa Cruz, 0.80% Cu cut-off for Texaco, and 0.90% Cu Cut-off for East Ridge

Classification	Deposit	Mineralized Material (kt)	Mineralized Material (k ton)	Total Cu (%)	Total Soluble Cu (%)	Acid Soluble Cu (%)	Cyanide Soluble Cu (%)	Total Cu (kt)	Total Soluble Cu (kt)	Acid Soluble Cu (kt)	Cyanide Soluble Cu (kt)	Total Cu (Mlb)
Indicated	Santa Cruz (0.70% CoG)	223,155	245,987	1.24	0.82	0.58	0.24	2,759	1,824	1,292	533	6,083
	Texaco (0.80% CoG)	3,560	3,924	1.33	0.97	0.25	0.73	47	35	9	26	104
	East Ridge (0.90% CoG)	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0
Inferred	Santa Cruz (0.70% CoG)	62,709	69,125	1.23	0.92	0.74	0.18	768	576	462	114	1,694
	Texaco (0.80% CoG)	62,311	68,687	1.21	0.56	0.21	0.35	753	348	132	215	1,660
	East Ridge (0.90% CoG)	23,978	26,431	1.36	1.26	0.69	0.57	326	302	164	137	718
Total												
Indicated	**All Deposits**	**226,715**	**249,910**	**1.24**	**0.82**	**0.57**	**0.25**	**2,807**	**1,859**	**1,300**	**558**	**6,188**
Inferred	**All Deposits**	**148,998**	**164,242**	**1.24**	**0.82**	**0.51**	**0.31**	**1,847**	**1,225**	**759**	**466**	**4,072**

Source: Nordmin, 2023
Mlb = million pounds
kt = thousand tonnes
Notes on Mineral Resources

- The Mineral Resources in this estimate were independently prepared by Christian Ballard, P.Geo. of Nordmin Engineering Ltd and the Mineral Resources were prepared in accordance with NI 43-101 and the CIM Definition Standards for Mineral Resources and Mineral Reserves (2014) and the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (2019).
- Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. This estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.
- Verification included multiple site visits to inspect drilling, logging, density measurement procedures and sampling procedures, and a review of the control sample results used to assess laboratory assay quality. In addition, a random selection of the drillhole database results was compared with the original records.
- The Mineral Resources in this estimate for the Santa Cruz, East Ridge, and Texaco deposits used Datamine Studio RM™ software to create the block models.
- The Mineral Resources have an effective date of December 31, 2022.
- Underground-constrained Mineral Resources for the Santa Cruz deposit are reported at a cut-off grade (CoG) of 0.70% total copper, Texaco deposit are reported at a CoG of 0.80% total copper and East Ridge deposit are reported at a CoG of 0.90% total copper. The CoG reflects total operating costs to define reasonable prospects for eventual economic extracted by conventional underground mining methods with a maximum production rate of 15,000 tonnes per day (t/d). All material within mineable shape-optimized wireframes has been included in the Mineral Resource
- Underground mineable shape optimization parameters include a long-term copper price of US$3.70/lb, process recovery of 94%, direct mining costs between US$24.50-$40.00/processed tonne reflecting various mining method costs (long hole or room and pillar), mining general and administration cost of US$4.00/t processed, onsite processing and SX/EW costs between US$13.40-$14.47/t processed, offsite costs between US$3.29 to US$4.67/t processed, along with variable royalties between 5.00% to 6.96% NSR and a mining recovery of 100%.
- Specific Gravity was applied using weighted averages by Deposit Sub-Domain.
- All figures are rounded to reflect the relative accuracy of the estimates, and totals may not add correctly.
- Excludes unclassified mineralization located along edges of the Santa Cruz, East Ridge, and Texaco deposits where drill density is poor.
- Reported from within a mineralization envelope accounting for mineral continuity.
- Total soluble copper means the addition of sequential acid soluble copper and sequential cyanide soluble copper assays. Total soluble copper is not reported for the Primary Domain

Areas of uncertainty that may materially impact the Mineral Resource Estimate include:

- Changes to long term metal price assumptions
- Changes to the input values for mining, processing, and general and administrative (G&A) costs to constrain the estimate
- Changes to local interpretations of mineralization geometry and continuity of mineralized zones
- Changes to the density values applied to the mineralized zones
- Changes to metallurgical recovery assumptions
- Changes in assumption of marketability of the final product
- Variations in geotechnical, hydrogeological, and mining assumptions
- Changes to assumptions with an existing agreement or new agreements
- Changes to environmental, permitting, and social license assumptions
- Logistics of securing and moving adequate services, labor, and supplies could be affected by epidemics, pandemics and other public health crises including COVID-19 or similar viruses

These risks and uncertainties may cause delays in economic resource extraction and/or cause the resource to become economically non-viable.

1.7 Mineral Reserve Estimate

A prefeasibility study (PFS) is required to demonstrate the economic merit of Mineral Resources for any conversion to Mineral Reserves. At this time, no such PFS study has been completed; therefore, the Santa Cruz Project currently has no defined Mineral Reserves, according to CIM definitions and guidelines (CIM, 2014).

1.8 Mining Methods

The Project is currently not being mined. Mineral resources are stated for three deposits: Santa Cruz, Texaco, and East Ridge. For mine planning work, only the Santa Cruz and East Ridge deposits were evaluated.

Santa Cruz is located approximately 430 to 970 m below the surface. Based on the mineralization geometry and geotechnical information, an underground longhole stoping (LHS) method is suitable for the Oxide and Chalcocite-enriched domains within the deposit. The Santa Cruz deposit will be mined in blocks where mining within a block occurs from bottom to top with paste backfill (PBF) for support. A sill pillar is left in situ between blocks.

Within the Santa Cruz deposit, there is an Exotic domain located approximately 500 to 688 m below the surface and to the east of the main deposit. The Exotic domain consists of flatter lenses that are more amenable to drift and fill (DAF) mining. Cemented waste rockfill will be used for support. The backfill will have sufficient strength to allow mining of adjacent drifts without leaving pillars.

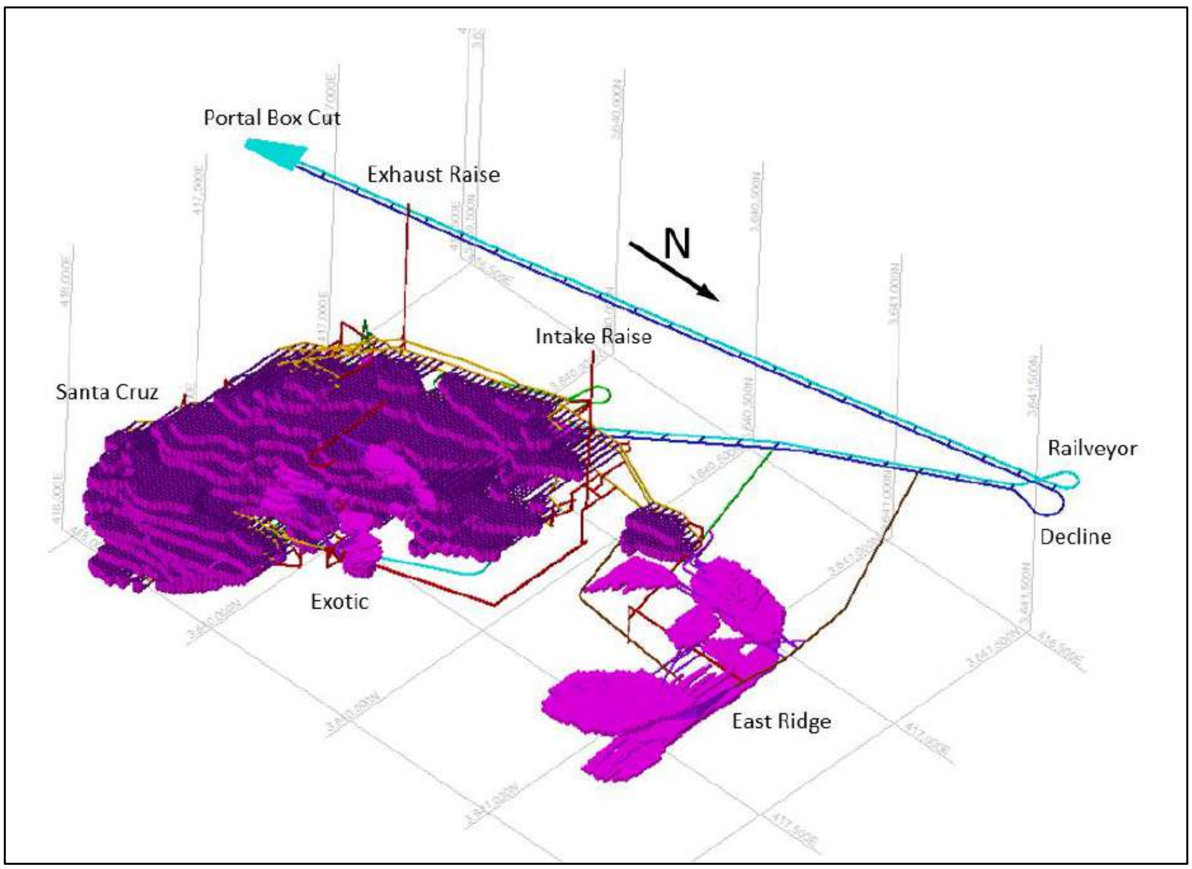
The East Ridge deposit is approximately 380 to 690 m below the surface and to the north of the main Santa Cruz deposit. The East Ridge deposit consists of two tabular lenses and will be mined using DAF with cemented waste rock backfill for support.

The mine will be accessed by dual decline drifts from surface, with one drift serving as the main access and the other as a railveyor drift for material handling. Mineralization is transported from stopes via loader to an ore pass system and then to surface by the railveyor. Main intake and exhaust raises will be developed with conventional shaft sinking methods to provide air to the mine workings. The mine will target a combined production of 15,000 t/d from Santa Cruz and East Ridge.

Portal box cut is assumed to start in 2026. Decline and railveyor activities begin in 2027 through to 2028 to access the top portion of the mine. Decline and railveyor resumes in 2033 to access the bottom of the mine. Stoping begins in 2029 with a 1 year ramp-up period until the mine and plant are operating at full capacity. The currently defined mine life is approximately 3 years of construction and 20 years of production.

Using historical data and the results of recent hydrogeologic testing, the hydrogeological conceptual site model was updated and the groundwater flow model was developed and finalized. The groundwater flow model was used to evaluate multiple passive and active dewatering scenarios for the proposed Mine Plan. With an active dewatering scenario pumping approximately 3,000 gallons per minute (gpm) for the first two years of life of mine (LoM), the model shows that the annual average residual passive inflows for the first 10 years of the mine are at or below 12,000 gpm. From year 11 through 25 of LoM, the residual passive inflows range from approximately 15,000 to 18,000 gpm.

Figure 1-1 shows the completed mine plan. Table 1-3 summarizes the total tonnage and grades within the mine plan by area.



Source: SRK, 2023

Figure 1-1: Mine Design, Santa Cruz, Santa Cruz Exotic, and East Ridge

Table 1-3: Mine Plan Summary

Classification	Domain	Tonnage (kt)	Total Soluble Cu (%)	Acid Soluble Cu (%)	Cyanide Soluble Cu (%)
Indicated	Santa Cruz	73,582	1.62	1.05	0.39
	East Ridge	-	-	-	-
	Santa Cruz Exotic	1,131	2.79	2.28	0.22
Inferred	Santa Cruz	14,991	1.45	0.98	0.32
	East Ridge	9,799	1.76	0.95	0.75
	Santa Cruz Exotic	741	2.47	1.83	0.17
Indicated	**Total**	**74,713**	**1.64**	**1.07**	**0.39**
Inferred	**Total**	**25,530**	**1.60**	**0.99**	**0.48**

Source: SRK, 2023
Note:4.94 Mt of marginal material at a grade of 0.56% is not included in this table.

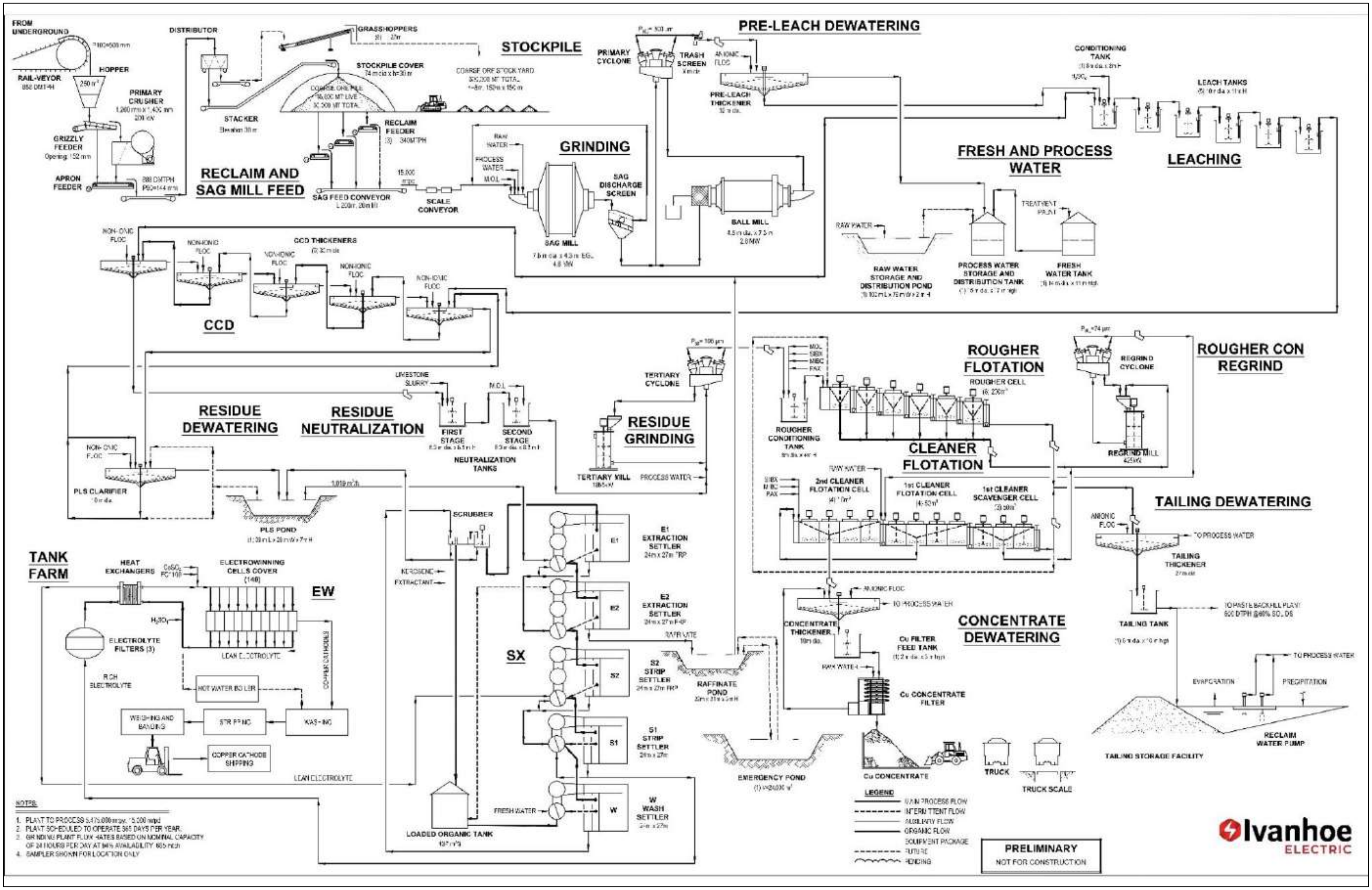
The PEA is preliminary in nature, that it includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves, and there is no certainty that the PEA will be realized. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

1.9 Recovery Methods

The Santa Cruz processing facility will recover copper by conventional weak sulfuric acid agitated leaching of the oxide mineralized material, and by sulfide flotation of the residue produced after leaching. Leached oxide copper will be processed through solvent extraction and electrowinning (SX-EW) to produce high purity copper cathodes. Sulfide copper and by-product precious metals will be recovered in copper flotation mineral concentrate. Copper concentrates will be of suitable quality to be sold to a domestic or international copper smelters.

The process design is based on metallurgical tests results from The Hanna Mining Company's research center (circa 1980) and new PEA-level mineral process testing initiated by IE in 2022 and 2023.

The process flow diagram in Figure 1-2 illustrates sequence of operations to recover copper in the Santa Cruz plant. This flowsheet provides the basis for the process description that follows.



Source: M3, 2023

Figure 1-2: Process Flow Sheet

1.9.1 Process Design Criteria

The nominal capacity of the mill process is 5.475 million tonnes per year (Mt/y). Process availability factors include both the mechanical availability and the use of this mechanical availability. For the design, an availability factor of 92% is used throughout the plant because the primary and secondary grinding lines have a single ball mill in each.

The current mine plan developed for the Project is based on a 365-day calendar year. The yearly mine production tonnage will vary from 4.0 million tonnes (Mt) at the start of production to a high of 5.9 Mt in Year 5 of production.

The mass balance was developed for the Santa Cruz process using MetSim mass balance software. The process simulation used overall recoveries of 96% for the acid soluble copper as cathode copper and 93% for the sulfide copper into concentrate. These recoveries are based on 1980 studies and confirmed by mineral process testing in 2023 on recent drill core samples and include process losses attributed to PLS wash efficiency (2023 liquid solid separation test results) and cleaner scavenger flotation losses (1980 and 2023 test programs).

1.10 Project Infrastructure

The Santa Cruz Project has excellent existing infrastructure for road and highway access, railroads for incoming consumables and outgoing products, access to ports and domestic and foreign smelters, access to power lines, and access to water from existing wells and from potential dewatering operations. The Project owns sufficient fee simple land to allow for all surface infrastructure including the process facility, Tailings Storage Facility (TSF), offices borrow pit, and other related mine structures.

Interstate highways near the Project (<10 km) are Interstate 8 and Interstate 10. The Union Pacific/Southern Pacific (UPSP) rail borders the northern edge of the Santa Cruz property and the BNSF rail has a spur and terminal in Phoenix, Arizona.

Tailings Storage Facility

A significant portion of the mined material will be returned underground as backfill in the mine. Backfill is used to fill voids created during mining. By returning tailings as paste backfill underground, the size and impact of the surface TSF will be reduced.

The TSF is proposed to be located on relatively flat terrain directly east of the plant site and sited to avoid: the underground ore body outline; mine's infrastructure; and the 1% annual exceedance probability (AEP) (1 in 100-yr return period) floodplain from Federal Emergency Management Agency (FEMA) (2007) flood hazard mapping. The TSF is sized to store all the tailings estimated to be produced over the mine life and not used for underground backfill (56.7 Mt, without additional contingency) on surface. The tailings will be retained by a perimeter embankment (up to 50 m high) constructed primarily of compacted, structural fill sourced from on-site borrow areas. The TSF impoundment will be lined with a low-permeability liner, which will be raised within the perimeter embankment for seepage control. During operations, tailings slurry water and precipitation which collects in the TSF will be reclaimed to the mine for use in the mining process or treated (if required) and discharged. At closure, the TSF impoundment will be regraded to prevent ponding and covered with a soil cover and vegetated to limit infiltration and resist erosion. Closure channels will be constructed to shed water off the impoundment surface and over the embankment slopes.

Power

Power consumption for the Santa Cruz site is anticipated to average 450,000 MWh/y. Initially the source of power for the Project will be provided from a 69 kV power line operated by Pinal County Electric District 3 (ED3). Several other higher voltage transmission lines border the property within close proximity.

Power for the Project could be provided from a number of sources, or combination of sources, ranging from grid supply to microgrid renewable energy supply. The goal of the mine development is to achieve much of the energy supply from renewable sources, such as solar or geothermal, either at the start or through a phased in approach during the mine operation. The base case of the project is that the mine will operate using 70% renewable power within the first three years of operations.

Water

The water balance for the Santa Cruz Project indicates that there will be a surplus of water from the Project from dewatering of the underground operations. The mining and processing operations will consume approximately 3.5 million cubic meters (Mm^3) of water per year, while water supplies from dewatering will range from 20 million to over 30 million cubic meters per year (Mm^3/y). The amount of water for distribution to local stakeholders during operations will average 27 Mm^3/y. The water balance excludes the water rights associated with the surface title of the Project.

1.11 Market Studies and Contracts

The Santa Cruz project is envisioned to produce both copper cathode and copper concentrate into its regional market. Copper demand is driven by both developing and developed locations in the drive towards electrification. Expectations for long term copper demand are positive over the next several decades. This is somewhat tempered in the near term should significant economic headwinds materialize that slow global growth.

Global mined copper production in 2022 was estimated at 22 Mt. Long lead times for mine development result in a slow supply response to changes in demand. This dynamic is likely to result in price volatility.

A flat copper price of US$3.80/lb has been selected for this study. In the opinion of SRK, this price is generally in-line with pricing over the last 3 years and forward-looking pricing is appropriate for use during a PEA of the Project with an estimated mine life of 20 years. As the Project progresses, more detailed market work in the form of market studies will be completed to support further study efforts. SRK cautions that price forecasting is an inherently forward-looking exercise dependent upon numerous assumptions. The uncertainty around timing of supply and demand forces has the potential to create a volatile price environment and SRK fully expects that the price will move significantly above and below the selected price over the expected life of the Project.

Cathode is assumed to be 100% payable with no premium or discount applied for the purposes of the study. This approach assumes that the cathode has not received registration or certification that would result in a premium; nor is the cathode assumed to contain any deleterious or penalty elements.

Concentrate terms for the study are generic terms and do not reflect the presence of any deleterious or penalty elements within the concentrate. Table 1-4 presents the concentrate terms applied for this study.

Table 1-4: Concentrate Terms

Item	Unit	Value
Payability	%	96.5
Treatment Charge	US$/dmt	65
Refining Charge	US$/lb	0.065
Transport Cost	US$/wmt	90

Source: SRK, 2023

As the Project is an early-stage greenfield project, there are a large number of contracts required for the development and operation of the site. None of the major required contracts have been executed at the time of this study.

1.12 Environmental, Closure and Permitting

The Project is located on private land. Permitting is primarily with the State of Arizona, Pinal County, and City of Casa Grande. While the Project will be required to obtain several permits to operate it is on private land and is not anticipated to be subject to lengthy federal permitting timelines.

Baseline studies are underway for resources of concern and studies will continue as the Project develops. There are no known occurrences of federally listed threatened and endangered species and there are no planned impacts to potential federally regulated waters of the US. Portions of the Project site is a known nesting area for burrowing owls protected under the Migratory Bird Treaty Act and US Fish and Wildlife beneficial practices to avoid and minimize impacts to birds have been and will continue to be implemented as the Project develops.

The utilization of a renewable microgrid will allow the Santa Cruz Project to produce copper with one of the industries lowest carbon intensities. Such intensities highlight IE’s commitment to implementing cutting-edge mining techniques, conserving energy, and utilizing renewable energy.

Aside from the pending reclamation plan for exploration activities at the Site, IE has no current obligations to tender post mining performance or reclamation bonds for the Project. Once the facility achieves the level of design necessary to advance to mine development and operation, IE will need to submit and gain approval of an Arizona Department of Environmental Quality (ADEQ)-approved Aquifer Protection Permit (APP) and an Arizona State Mine Inspector (ASMI)-approved Reclamation Plan. The closure approach and related closure cost estimates must be submitted following approval and before facility construction and operation.

IE plans to create an all-encompassing environmental, social, and governance framework designed to effectively address any community concerns and ensure that the Santa Cruz Project operates in a socially responsible manner.

1.13 Capital and Operating Cost Estimates

1.13.1 Mining Capital Cost Estimate

The mining capital cost estimate is based on first principal cost model build-up and budgetary quotes. The total capital estimate is US$960.48 million, this includes an estimated capital of US$878.08 million plus 9.4% contingency of US$82.40 million.

Development costs are derived from the mining schedule prepared by SRK. The prepared mining schedule includes meters of development during pre-production, this schedule of meters was combined with unit costs, based on site specific data, to estimate the cost of this development operation. The breakdown of the estimated initial capital costs is shown in Table 1-5.

Table 1-5: Estimated Mining Initial Capital Cost

Item	US$ Million
Capital Development Cost	166.99
Equipment Purchase and Rebuilds	241.24
Mine Services	17.96
Owner Cost	32.75
Contingency	38.76
Total	**497.70**

Source: SRK, 2023

The Santa Cruz Project will require sustaining capital to maintain the equipment and all supporting infrastructure necessary to continue operations until the end of its projected production schedule. The sustaining capital cost estimate developed includes the costs associated with the engineering, procurement, construction and commissioning.

The estimate indicates that the Project requires sustaining capital of US$462.78 million to support the projected production schedule through the LoM. The sustaining capital cost is shown in Table 1-6.

Table 1-6: Estimated Mining Sustaining Capital Cost

Item	US$ Million
Capital Development Cost	60.79
Equipment Purchase and Rebuilds	322.64
Mine Services	0.00
Owner Cost	35.71
Contingency	43.63
Total	**462.78**

Source: SRK, 2023

1.13.2 Process Capital Cost Estimate

The initial capital cost for the Santa Cruz plant and infrastructure facilities totals US$563.7 million as summarized in Table 1-7. This capital cost includes all process areas facilities in the Santa Cruz plant proper starting with the primary crushing, and continuing through grinding, agitated leaching, solvent extraction and electrowinning, leach residue neutralization, leach residue grinding, rougher flotation, concentrate regrinding, cleaner flotation, concentrate dewatering and tailing dewatering and pumping to the TSF. The initial capex includes the ventilation chiller for the underground mine, the main plant substation, fresh and process water ponds, and the batch plant, and the surface ancillary buildings.

Table 1-7: Estimated Initial Plant Capital Cost Summary

Description	Hours	Total Cost (US$ million)	% of Total Capital Cost
Directs	1,290,000	345.4	61.3
Indirects		72.0	12.8
Contingency		111.3	19.7
Owner’s Costs		35.0	6.2
Escalation		-	0.0
Total Capital Cost (TCC)		**563.7**	**100.0**

Source: M3, 2023

No sustaining capital costs have been included for the Santa Cruz process plant. The mine life is 20 years, and the capital equipment will be designed to last for the duration of the Project. Preventative maintenance and periodic rebuilds/relining is captured in the annual maintenance cost estimation. The only place where sustaining capital is expected is in the TSF for annual embankment enlargement which was estimated separately.

1.13.3 Tailings Capital Cost Estimate

The initial capital cost for the Santa Cruz tailings facilities totals US$75.1 million as shown in Table 1-8. The estimated sustaining capital costs total US$486.8 million as shown in Table 1-9. The key elements of the tailings capital cost estimation methodology include:

- Material take offs by year were provided by KCB
- Earthworks, lining, and piping rates from standard schedule
- Borrow-to-fill provided by budgetary quotation – Turner Mining Group

Table 1-8: Estimated TSF Initial Capital Cost

Item	US$ Million
Directs	48.8
Indirects	11.3
Contingency	15.0
Total	**75.1**

Source: M3, 2023

Table 1-9: Estimated TSF Sustaining Capital Cost

Item	US$ Million
Sustaining	382.2
Closure	104.6
Total	**486.8**

Source: M3, 2023

1.13.4 Mining Operating Cost Estimate

The required mining equipment fleet, required production operating hours, and manpower to arrive at an estimate of the mining costs that the mining operations would incur was estimated. The mining costs were developed from first principles and compared to recent actual costs.

A maintenance cost was allocated to each category that required equipment maintenance. A summary of the LoM unit mine operating costs is presented in Table 1-10.

Table 1-10: Mining Operating Costs

LoM Tonnes Mined (000)		**107,134***
Category	**US$000**	**US$/t Mined**
Operating Development	481,021	4.49
Production (Drilling, Blasting, Loading, Hauling and Backfill)	1,139,843	10.64
Other mining costs (Services, Maintenance, Rehab and Definition Drilling)	458,564	4.28
Mine engineering and administration	592,085	5.54
Contingency (9.5%)	254,664	2.39
Total	**2,926,177**	**27.33**

* LoM Tonnes mined includes 100,244 kt of process material, 4,942 kt of marginal material and 1,948 kt of waste.
Source: SRK, 2023

1.13.5 Processing Operating Cost Estimate

The process plant operating costs are summarized by the categories of labor, electric power, liners (wear steel), grinding media, reagents, maintenance parts, and supplies and services, as presented in Table 1-11.

Table 1-11: Process Plant OPEX Summary by Category

Operating and Maintenance	Average Annual Cost (US$000)	$/t Processed (US$)	LoM Operating Cost (US$000)	%
Labor	11,119	2.11	222,383	16.8%
Electrical Power	23,297	4.43	465,939	35.1%
Reagents	18,447	3.51	368,947	27.8%
Wear Parts (Liners & grinding media)	6,811	1.30	136,221	10.3%
Maintenance Parts	5,993	1.14	119,865	9.0%
Supplies and Services	628	0.12	12,557	0.9%
Total (US$000)	**$66,296**	**$12.61**	**$1,325,912**	**100.0%**

Source: M3, 2023

TSF operating costs are included in the processing operating costs and include labor, power, reagents, and maintenance.

1.13.6 G&A Operating Cost Estimate

The G&A and laboratory costs are summarized in Table 1-12.

Table 1-12: G&A Operating Cost Summary

	US$/t processed (US$)	LoM Operating Cost (US$000)
Lab Opex	0.24	24,798
G&A Opex	2.39	251,543
Total	**$2.63**	**$276,341**

Source: M3, 2023

1.14 Economic Analysis

Economic analysis, including estimation of capital and operating costs is inherently a forward-looking exercise. These estimates rely upon a range of assumptions and forecasts that are subject to change depending upon macroeconomic conditions, operating strategy and new data collected through future study or operations and therefore actual economic outcomes often deviate significantly from forecasts.

The Santa Cruz Project consists of an underground mine and processing facility producing both copper concentrate and copper cathode.

The economic analysis metrics are prepared on annual after-tax basis in US$. The results of the analysis are presented in Table 1-13. The results indicate that, at a copper price of US$3.80/lb the after tax NPV @ 8% is US$1.3 billion, the after tax IRR is 23% and the payback period is 7 years from the start of construction.

The PEA is preliminary in nature, that it 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 PEA will be realized. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

The economic model is based on mine plans that were prepared as outlined in previous sections. Inferred resources account for approximately 21% of the tonnage contained within the mine plan.

As the stage of study for the Santa Cruz Project is a PEA, no reserves are estimated for use in this analysis. The economic evaluation was completed using resource material that includes material in the Inferred category.

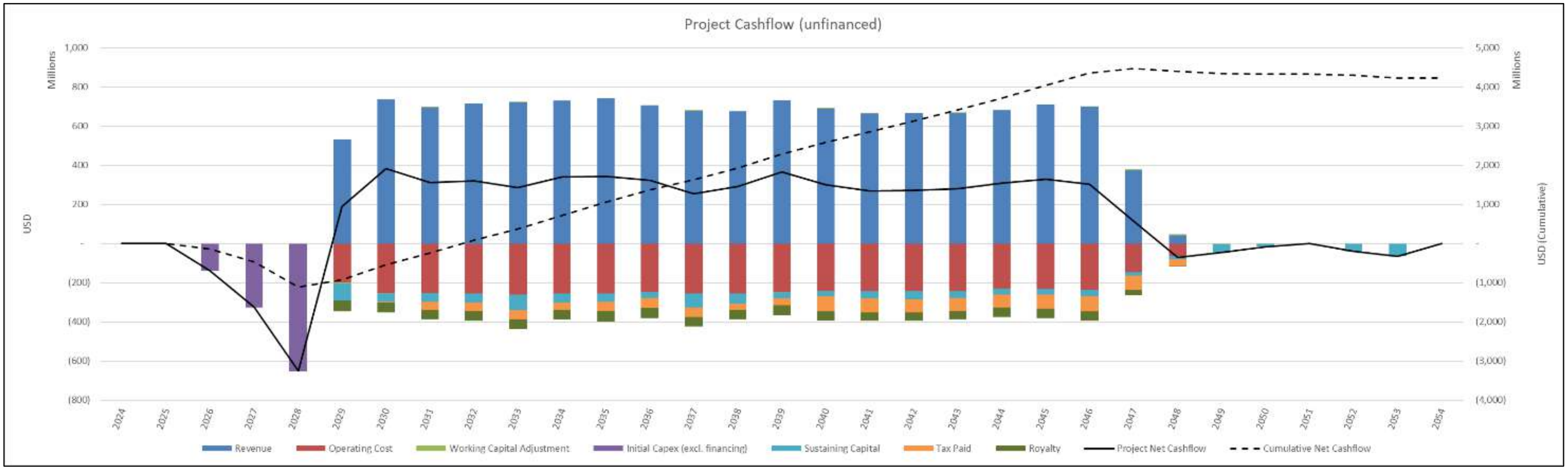
Table 1-13: Indicative Economic Results

LoM Cash Flow (Unfinanced)	**Units**	**Value**
Total Revenue	**US$ million**	12,865.9
Total Opex	**US$ million**	(4,617.0)
Operating Margin	US$ million	8,248.9
Operating Margin Ratio	%	64%
Taxes Paid	US$ million	(984.8)
Free Cash Flow	US$ million	5,350.1
Free Cash Flow	US$ million	5,216.7
NPV at 8%	US$ million	1,642.5
IRR	%	25%
Free Cash Flow	US$ million	4,231.9
NPV at 8%	US$ million	1,316.6
IRR	%	23%
Payback	years	7

Source: SRK, 2023

Within the constraints of this analysis, the Project appears to be most sensitive to metal prices followed by initial capital cost.

A summary of the cash flow on an annual basis is presented in Figure 1-3.



Source: SRK, 2023

Figure 1-3: Annual Cash Flow Summary (Tabular data in Table 22-13)

1.15 Conclusions and Recommendations

Under the assumptions presented in this Technical Report, and based on the available data, the Mineral Resource Estimates show reasonable prospects of economic extraction.

The recommended program is for the company to complete a preliminary feasibility level (PFS) Technical Report. The work program required to complete a PFS will consist of associated infill and exploration drilling, analytical and metallurgical test work, hydrogeological and geotechnical drilling, geological modeling, mine planning, and environmental baseline studies to support permitting efforts.

Specific conclusions and recommendations by discipline are as follows:

Process Facilities

Processing technologies used in this study have been proven at large scales in the industry (mill ores):

- Agitation leaching of copper oxide minerals with sulfuric acid followed by SX-EW to produce salable copper cathodes.
- Sulfide flotation to produce salable copper chalcocite/chalcopyrite concentrate.

The milling and process facilities can be expanded within the current process area footprint to accommodate processing additional ore as needed. In the next stage of analysis, some process trade-off studies should be evaluated with regards to optimizing process capital and operating costs.

Economics

The Santa Cruz Project consists of an underground mine and processing facility producing both copper concentrate and copper cathode. The operation is expected to have a 20 year mine life. Under the forward-looking assumptions modeled and documented in this report, the operation is forecast to generate positive cash flow. This estimated cash flow is inherently forward-looking and dependent upon numerous assumptions and forecasts, such as macroeconomic conditions, mine plans and operating strategy, that are subject to change.

The economic analysis metrics are prepared on annual after-tax basis in US$. The results indicate that, at a copper price of US$3.80/lb the after tax NPV @ 8% is US$1.3 billion, the after tax IRR is 23% and the payback period is 7 years from the start of construction.

The PEA is preliminary in nature, that it 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 PEA will be realized. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

The economic model is based on mine plans that were prepared as outlined in previous sections. Inferred resources account for approximately 21% of the tonnage contained within the mine plan.

The analysis performed for this report indicates that the operation's NPV is most sensitive to the metal price received.

Geotechnical

The Project is amenable to mining using conventional LHS and DAF methods depending on the ore geometries and rock qualities within the geotechnical domains. Access to the orebody will be achievable using roadheader development and drill and blast techniques using industry standard ground support methodologies. To advance the geotechnical understanding of the Project to a PFS level of study the following investigations are recommended:

- Incorporate additional drill data to further characterize rock quality domains, rock strengths, and geological structure. East Ridge and Texaco should be targeted for additional drilling.
- Update the geotechnical block model with additional drill data and lithology interpretation.
- Update all stability analyses using new rock characterization data. This includes stope optimization studies and sill pillar recovery techniques.
- Continue exploration drilling along potential decline routes to improve decline placement within better rock qualities.
- Conduct in-situ stress measurements to better understand the current stress field at site. These learnings can be applied to stability analyses and used in numerical modeling.
- Conduct numerical modeling of the mine sequence to better understand redistributions of mining induced stresses which could be detrimental to stability.
- An underhand DAF method should be considered for mining at East Ridge and the Exotics at Santa Cruz. An underhand method might allow wider DAF spans but would require additional cement binder and a higher minimum compressive strength requirement.
- A study should be conducted to evaluate whether mine waste aggregate is suitable for CRF.

Hydrogeology

The groundwater flow model developed for the Santa Cruz Project shows that with an active dewatering scenario of pumping from the surface approximately 3,000 gpm for the first 2 years of LoM that the annual average residual passive inflows for the first 10 years of the mine are at or below 12,000 gpm. To advance the understanding of the site hydrogeology to the PFS stage, the following investigations are recommended:

- Additional characterization of the conglomerates and non-mineralized Oracle Granite around the proposed decline.
- Additional characterization of the variability of hydraulic parameters of the mineralized Oracle Granite, along with the porphyry and diabase intrusions, around the Santa Cruz, East Ridge, and Texaco deposits.
- Characterization of the hydraulic parameters of the conglomerate within the Exotics at the Santa Cruz deposit.
- Hydrogeological characterization of the impact of faulting on groundwater movement.
- Installation of monitoring wells to collect baseline groundwater data.

Environmental & Permitting

Recommendations for Environmental and Permitting would include the following:

- Continued environmental baseline data collection to support major local county and state permitting programs.
- Continue permitting activities and agency engagement for Pinal County Class II air permit, City of Casa Grande General Plan amendment and zoning changes, Arizona Department of Environmental Quality Aquifer Protection and Reclaim Water Discharge permits, and Arizona Department of Water Resources dewatering permit.
- As the facility engineering progresses, advance the closure and reclamation design and engage Arizona State Mining Inspector to obtain an approved Mined Land Reclamation Plan.

- Develop and implement a community working group to keep local stakeholders informed about the Project's potential economic and community benefits, as well as the Company's commitment to safety and the environment.

TSF Design

The key risks identified for the TSF design are:

- Unknown risks related to limited site-specific information for characterizing the TSF foundation and geotechnical/geochemical properties of the tailings.
- Natural flood inundation.
- Seepage management/geochemical control requirements.
- Suitability of on-site borrow areas for construction fill.
- Dust management.

Recommendations to advance the TSF design to the next design stage are:

- Conduct a tailings alternatives assessment following a multiple accounts analysis (MAA) framework. The alternatives assessment must consider technical, environmental, and social objectives, and engage a range of Project stakeholders.
- Conduct a site investigation to evaluate the geotechnical, hydrogeological and geochemical properties of the TSF foundation, and suitability of potential borrow sources. The investigation should comprise drilling, test pitting, geophysics, in-situ hydrogeological testing, sampling and associated laboratory testing.
- Perform additional test work (geotechnical, rheological and geochemical) on the tailings. Geochemical testing should include static and kinetic testing to understand long-term acid rock drainage and metal leaching potential, to inform geochemical management strategy.
- Conduct site-specific flood-routing modeling to assess TSF and borrow area flood risk.
- Perform a TSF staging assessment and review the embankment design approach. This assessment should evaluate beach wetting as a viable approach for dust suppression and serve as key input to the TSF water balance.
- Develop a TSF water balance as an input to the site-wide water balance. If warranted, investigate TSF configurations with smaller impoundment footprints to limit evaporation loss.
- Evaluate the design of the TSF liner system based on modeling and consider changes to seepage management strategy based on findings of the tailings characterization.
- Consider tailings processing methods (e.g., filtration, cycloning) to produce construction materials and offset borrow requirements.
- Conduct a site-specific seismic hazard assessment.

2 Introduction

2.1 Terms of Reference and Purpose of the Report

This report was prepared as a preliminary economic assessment level National Instrument 43-101 (NI 43-101) Technical Report (Technical Report) for Ivanhoe Electric (IE or Company) by SRK Consulting (U.S.), Inc. (SRK) on the Santa Cruz Project located in Arizona.

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

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

The PEA is preliminary in nature, that it 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 PEA will be realized. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

2.2 Qualifications of Consultants

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

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

- Anton Chan, SRK Senior Consultant (Mining Engineering) is the QP responsible for Sections 2, 3, 4, 15, Introduction paragraphs of section 16 and Sections 16.1, 16.4.2, 16.5, 16.6, 16.7, 16.8, the mining portions of Section 21, Sections 23, 24 and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.
- Matt Sullivan, SRK Principal Consultant (Mining Economics), is the QP responsible for Sections 19, 22, and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.

- Robert Cook, Call & Nicholas, Principal 1 Geological Engineer is the QP responsible for the Geotechnical Section 16.2 and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.
- Annelia Tinklenberg, INTERA Incorporated, Senior Hydrogeologist is the QP responsible for Sections 16.3, 16.4.1, and portions of Sections 1, 25, and 26 summarized therefrom, of this Technical Report.
- Jim Casey, KCB Senior Geological Engineer, is the QP responsible for Section 18.5, and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.
- Christian Ballard, Nordmin Engineering Ltd., Senior Geoscientist, is the QP responsible for Sections 5-12, 14, and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.
- James J. Moore, Met Engineering LLC President, is the QP responsible for Section 18.6.1 and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.
- Daryl L. Longwell, P.E., Tetra Tech, Principal Civil Engineer, is the QP responsible for section 20.1 with the exception of sections 20.1.9 (Groundwater Monitoring) and 20.1.10 (Material Characterization), 20.2, 20.6, and for portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.
- Richard Frechette, Haley & Aldrich Principal Engineer, is the QP responsible for Sections 20.1.9, 20.1.10, 20.3, 20.4, 20.5, 20.7, and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.
- Laurie Tahija, Process Engineering Manager, M3 Engineering & Technology Corporation, is the QP responsible for section 13, 17, and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.
- John Woodson, P.E., Chief Financial Officer, M3 Engineering & Technology Corporation, is the QP responsible for section 18.1, 18.2, 18.3, 18.4, 18.6.2, 18.6.3, 18.7, 18.8, 21 with the exception of the mining portion, and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.

2.3 Details of Inspection

Table 2-1 summarizes the details of the personal inspections on the property by each qualified person or, if applicable, the reason why a personal inspection has not been completed.

Table 2-1: Site Visit

Personnel	Expertise	Company	Date(s) of Visit	Details of Inspection
Anton Chan	Mining/Reserves	SRK Consulting (U.S.), Inc (SRK)	2/23/2023	Site examination, visited core shed, reviewed select core samples. Discussion on mining strategy, geotech, infrastructure locations.
Laurie Tahija	Metallurgical Testwork Mineral Recovery	M3 Engineering and Technology Corp. (M3)	2/23/2023	Site examination, visited core shed, reviewed select core samples. Visited Project site; Discussion on site layout, utilities, infrastructure locations.
John Woodson	Infrastructure, Plant Capital & Operating Costs G&A Costs	M3 Engineering and Technology Corp. (M3)	8/30/2023	Site examination, visited core shed, reviewed select core samples. Visited Project site; assessed infrastructure, Discussion on site layout, floodplain, utilities, infrastructure locations.
Jim Casey	Tailings Facility	KCB Consultants Ltd. (KCB)	7/13/2023	Visited locations near the perimeter of the TSF footprint for visual observation. Discussion on site layout and available geotechnical information.
Rob Cook	Geotechnical	Call & Nicholas, Inc. (CNI)	12/16/2022	Site examination, core shed visit, discussion of geotechnical characterization, and provided summaries of CNI's geotechnical studies.
Christian Ballard	Geology/Mineral Resources	Nordmin Engineering Ltd. (Nordmin)	3/2/2022 – 3/6/2022 11/7/2022 – 11/10/2022	Site examination; inspection of logging, geological setting, mineralization, and structural controls; review of chain of custody; review of drilling, logging, sampling, analytical testing, and QA/QC; facility inspection; drillhole collar confirmation; structural validation; and partial drillhole database validation.
Annelia Tinklenberg	Hydrogeology	INTERA Incorporated (INTERA)	8/10/2023	Site examination, observed vibrating wire piezometer installation, visited core shed, reviewed select core samples, discussion of formation properties.
Daryl L. Longwell	Environmental	Tetra Tech, Inc. (Tetra Tech)	8/24/2023	Site examination, visited core facility, and reviewed environmental components of the proposed Project.
Jim Moore	Power Sources - Green Power	Met Engineering, LLC (Met Engineering)	3/26/2022 2/24/2023	Visited the core facilities (2) and the probable surface facility sites for processing, maintenance, substation, warehousing, administration and PV solar energy

Source: All Companies, 2023

2.4 Report Version Update

This Technical Report supersedes the previous report, Mineral Resource Estimate Update and NI 43-101 Technical Report for the Santa Cruz, Texaco, and East Ridge deposits, Arizona, USA, effective date 31 December 2022.

This is the third Technical Report prepared under NI 43-101 for the Santa Cruz Project.

2.5 Sources of Information

This report is based in part on internal Company technical reports, previous studies, maps, published government reports, Company letters and memoranda, and public information as cited throughout this report and listed in Section 27 References.

2.6 Effective Dates

The effective date of the Mineral Resource Estimate is December 31, 2022.

The effective date of the Technical Report is July 27, 2023.

The date of this report is September 11, 2023.

2.7 Units of Measure

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

3 Reliance on Other Experts

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

SRK relied on IE's legal representation to describe the:

- Mineral Rights
- Nature and Extent of Ownership
- Royalties, Agreements and Encumbrances

These items have not been independently reviewed by SRK, and SRK did not seek an independent legal opinion of these items.

SRK has relied on publicly available data and IE management for information to address various Project financial aspects including:

- Taxes
- Carry forward losses; and
- Depreciation methods and eligible assets

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

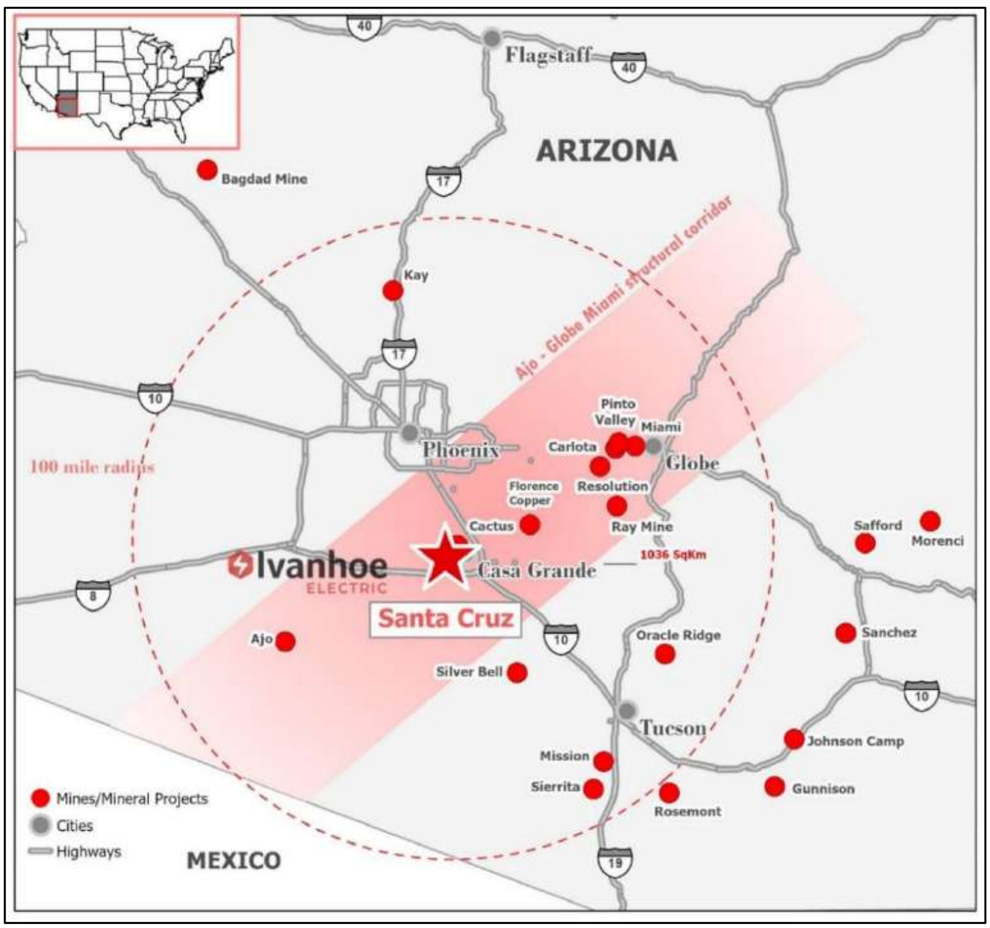
4 Property Description and Location

4.1 Legal Description of Real Property

The property and rights owned by IE, through IE's fully-owned subsidiary Mesa Cobre Holding Corp., are described in Appendix B. These rights and titles have been provided by IE and have not been independently verified by Nordmin. The Title Opinion and Reliance letter by Marian Lalonde dated August 30, 2023, of Fennemore Law, Tucson, Arizona, has been relied upon by the QP for this section of the Technical Report.

4.2 Property Location

The Santa Cruz Project is located 11 km west of Casa Grande, Arizona, which is approximately a one-hour drive south of the capital, Phoenix as shown in Figure 4-1. It is approximately 9 km southwest of the Sacaton deposit which was previously mined by ASARCO. The Santa Cruz Project covers a cluster of deposits and exploration areas approximately 11 km long and 1.6 km wide. Access to the Project from Casa Grande is west on West Gila Bend Highway for 7.5 km and then north on unpaved Midway Road for 1.5 km. The Santa Cruz Project centroid is approximately -111.88212, 32.89319 (WGS84) in Township 6 S, Range 4E, Section 13, Quarter C.



Source: IE, 2023a

Figure 4-1: Santa Cruz Project Location Map

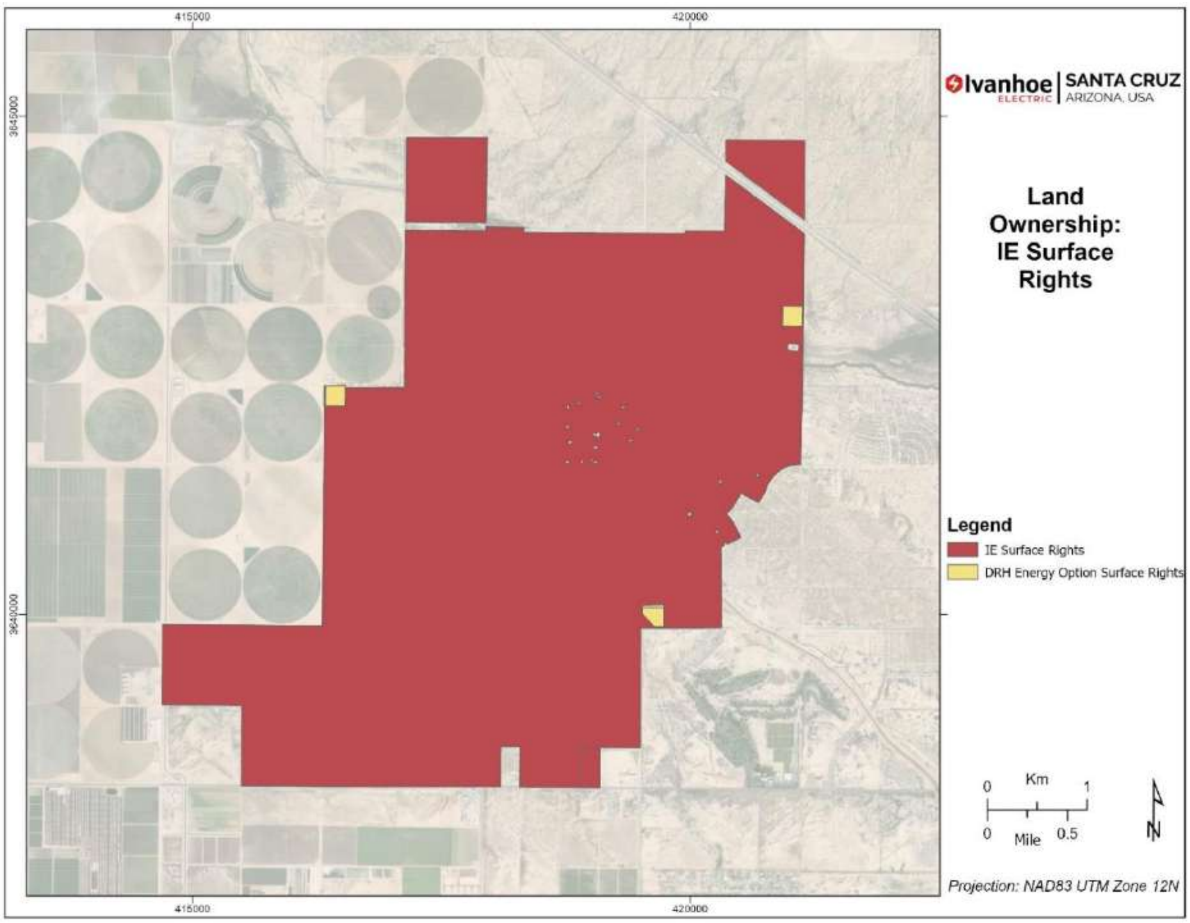
4.3 Mineral Title, Claim, Mineral Right, Lease or Option Disclosure

4.3.1 Land Tenure and Underlying Agreements

In 2021, IE executed an agreement with Central Arizona Resources (CAR) for the right to acquire 100% of CAR's option over the DR Horton Energy (DRHE) mineral title. In May 2023, IE acquired 5,974.57 acres of surface title to Legend Property Group land (now known as Wolff-Harvard Ventures). The Santa Cruz exploration area covers 47.71 km^2, including 25.79 km^2 of private land, 2.6 km^2 of Stockraising Homestead Act (SRHA) lands, and 238 unpatented claims, or 19.32 km^2 of BLM land.

4.3.2 Private Parcels

The Santa Cruz Project lies primarily on private land, which is dominantly fee simple. Surface titles and associated rights were acquired by IE as purchases and options on private parcels as shown in Figure 4-2. Mineral title for the Project has been acquired via an option with CAR and staking unpatented federal lode mining claims.



Source: IE, 2023

Figure 4-2: Santa Cruz Surface Title

The three surface titles are summarized as follows.

Surface Title – Legend/Wolff-Harvard

In May 2023, IE acquired the surface title and associated water rights to 5,975 acres encompassing the entire Santa Cruz Project. At closing of the purchase, IE paid a total of $34.3 million to the seller, which includes $5.1 million of previously paid deposits. IE has also issued a secured promissory note to the seller in the principal amount of approximately $82.6 million over a period of 4.5 years. The promissory note includes an annual interest rate of prime plus 1%.

Surface Title – CG100

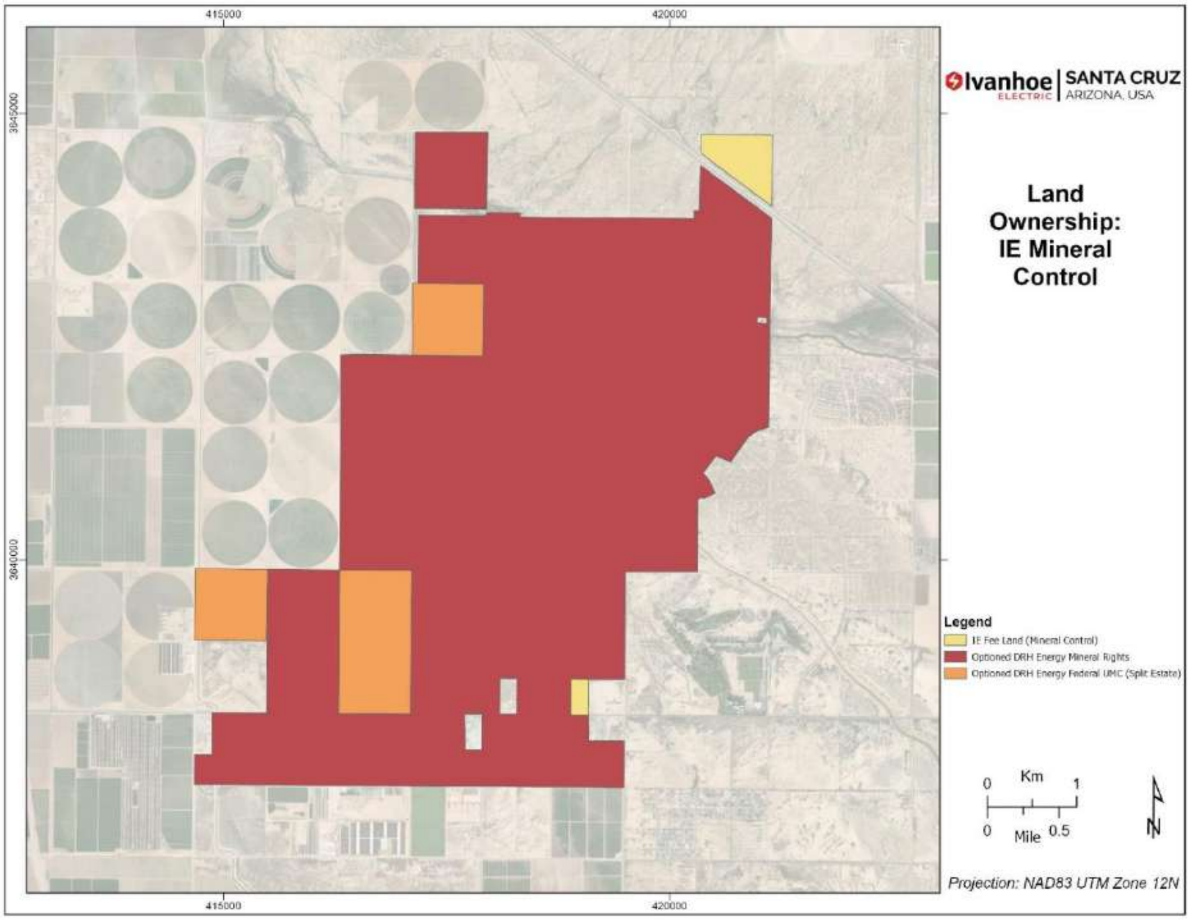
In May 2022, IE acquired the surface title to 100.33 acres in the northeast area of the Santa Cruz Project. IE paid a total of:

- On the closing date, IE shall pay the "**Initial Payment**" of $300,000 (paid)
- On the first anniversary of the closing date, IE shall pay $300,000 (paid)
- On the second anniversary of the closing date, IE shall pay $300,000
- On the third anniversary of the closing date, IE shall pay the final installment of $600,000 to release the deed from escrow.

Surface Title – Skull Valley

In February 2022, IE acquired the surface title to 20 acres in the southeast area of the Santa Cruz Project.

The mineral rights are shown in Figure 4-3.



Source: IE, 2023

Figure 4-3: Santa Cruz Mineral Title

<u>Mineral Title - DRHE Option</u>

The agreement with DRHE provides that IE, by way of assignment from CAR, has the right, but not the obligation, to earn 100% of the mineral title in the fee simple mineral estate, 39 Federal Unpatented mining claims, and three small approximately 10-acre surface parcels , in cash or IE shares at DRHE election, over the course of three years as follows:

- On the Effective Date, IE shall pay the "Initial Payment" (paid)
- Within five (5) days following of the expiration of the Due Diligence Period, IE shall pay "Due Diligence Payment" (paid)
- On or before the first anniversary of the Effective Date, IE shall pay "First Payment" (paid].)
- On or before the second anniversary of the Effective Date, IE shall pay collectively with the Initial Payment, the Due Diligence Payment, and the First Payment, the "Option Payments" (paid)
- Following the exercise of the Option (16 August 2024) and upon the Closing Date (21 August 2024), IE shall pay the "Closing Payment.

These mineral rights will be formally acquired upon the completion of scheduled payments by IE to the current mineral title holder in August of 2024. At that time, IE will have a unified land and mineral package encompassing the entire Santa Cruz Project.

Mineral Title – CG100

The mineral rights to CG100 were acquired in May 2022 along with the surface title to 100.33 acres in the northeast area of the Santa Cruz Project

Mineral Title - Skull Valley

The mineral rights to Skull Valley were acquired in February 2022 along with the surface title to 20 acres in the southeast area of the Santa Cruz Project.

4.3.3 Federal Unpatented Mineral Claims

IE, by way of assignment and deed from CAR, holds 238 unpatented Federal Mining claims (Appendix B).

DRHE also holds 39 Federal unpatented mining claims in T06S R04E in N/2 Section 12, W/2 Section 23 and W/2 Section 24, which are subject to the option described in Section 4.3.12.

4.3.4 Royalties

Noted royalties on future mineral development of the Project are summarized here:

- Royalty interests in favor of the royalty holders of a 5% net smelter return royalty interest for minerals derived from all portions of the property pursuant to terms contained therein recorded in the royalty document.
- Royalty interests in favor of the royalty holder of a 10% net smelter return royalty interest in sections 13, 18, 19, and 24, Township 6 South, Range 4 East, for minerals derived from the property pursuant to terms contained therein recorded in the royalty document.
- Rights conveyed to the royalty holder in Sections 13, 18, 19, and 24, Township 6 South, Range 4 East, consisting of 10% of one eight-hundredth of Fair Market Value and interest in the Cu and other associated minerals with additional terms, conditions, and matters contained therein, recorded in the royalty documents.
- Rights granted to the royalty holders, as joint tenants with right of survivorship, a royalty in sections 13, 18, 19, and 24, Township 6 South, Range 4 East, consisting of 30% of five tenths of 1% of the net smelter return from all minerals with additional terms, conditions, and matters contained therein, recorded in the royalty documents.
- Rights conveyed to the royalty holder in sections 13, 23, 24, 25, and 26, Township 6 South, Range 4 East and sections 5, 6, 18, 18, 19, and 30, Township 6 South, Range 5 East, consisting of 60% of one eighth-hundredth of Fair Market Value and interest in the Cu and other minerals with additional terms, conditions, and matters contained therein, recorded in the royalty documents.
- Reservation of a 1% royalty interest in favor of the royalty holder recorded in the royalty document, for E$^{1}/_{2}$ of Section5, Township 6 South, Range 5 East, south and west of Southern Pacific RR, “that when mined or extracted therefrom shall be equal in value to 1% of the net smelter returns on all ores, concentrated, and precipitates mined, and shipped from said property.”

- Reservation of a royalty interest in favor of the royalty holders in the SW$^1/_4$ of Section 17, Township 6 South, Range 5 East, for an amount equal to one half of 1% net smelter returns in the sale and disposal of all ores, minerals, and other products mined and removed from the above described parcel and sold to a commercial smelter or chemical hydrometallurgical plant or one half of 1% of 60% of the sales price if the mine product is disposed of other than to a commercial smelter, additional provisions contained therein, recorded in the royalty documents.

4.4 Permits and Authorization

Current exploration is conducted on private land. Current permits are listed in Table 4-1.

Table 4-1: Permit Requirements for Exploration Work Required on Private Land

Permit Name	Agency	Status	Renewal Date	Requirements	Violations
Dust Control Permit DUSTW-23-0362	Pinal County Air Quality Control District (PCAQCD)	Approved	05/11/2024	Bi-weekly inspections; limit vehicle access to work areas; reduce vehicle speeds; water disturbed areas; apply stabilizers as needed; concurrent reclamation; install track-out devices as needed.	No Violations
NOI AZPDES Stormwater General Construction Permit AZCN96111	Arizona Dept. of Environmental Quality	Approved	06/30/2025	Stormwater Pollution Prevention Plan in place; monthly inspections.	No Violations
Temporary Use Permit DSA-22-00200	City of Casa Grande	Approved	11/08/2025	N/A	No Violations
Floodplain Use Permit FUP2206-165	Pinal County	Approved	N/A	Existing grades within the area of disturbance shall be restored per the reclamation plan.	No Violations
Special Flood Hazard Area Permit – CDP-23-01296	City of Casa Grande	Approved	N/A	Existing grades within the area of disturbance shall be restored per the reclamation plan. Stormwater shall be managed per the Stormwater Pollution Prevention Plan.	No Violations
Temporary Use Permit – (Non-SFHA) – DSA-23-00116	City of Casa Grande	Approved	11/08/2025	Existing grades within the area of disturbance shall be restored per the reclamation plan. Stormwater shall be managed per the Stormwater Pollution Prevention Plan.	No Violations
Exploration Drilling Reclamation Plan	Arizona State Mine Inspector (ASMI)	In Review	TBD	Maximum extent of surface disturbance to be left unreclaimed at any one time during exploration operations is 20.0 acres.	N/A

Source: IE, 2023

The Migratory Bird Treaty Act prohibits “Take” without prior authorization by the U.S. Fish and Wildlife Service (USFWS). This includes “Incidental Take” which is harming or killing that results from, but is not the purpose of, carrying out an otherwise lawful act. Santa Cruz has implemented beneficial practices in accordance with USFWS Nationwide Standard Conservation Measures which include employee education, preconstruction surveys, nest monitoring, and avoidance of active nests. This may affect access points and the ability to perform work on the property.

Existing and past land uses in the Project area and immediately surrounding areas include agriculture, residential home development, light industrial facilities, and mineral exploration and development. Some dispersed recreation occurs in the area. The climate is dry, and most of the Project area is flat, sandy, and sparsely vegetated. Portions of the Project area are in the 100-year flood plain. Within the Project area, approximately 85 acres of land located 1.2 km north of the intersection of N. Spike Road and W. Clayton Road was used during an in situ leaching project in 1991. A Phase 1 Environmental Site Assessment (ESA) was conducted on the Project area (Environmental Site Assessments, Inc. 2023).

There is a large private land package covering the Project area and area of known mineralization. The ability to operate on private land has the potential to reduce lengthy permitting timelines that result from federal permitting processes. The precise list of permits required to authorize the construction and operation of this Project will be determined as the mining and processing methods are designed.

The permit approval process for some permits includes review and approval of the process design. Thus, the project design must be substantially advanced to support the application for those permits. These technical permits typically represent the “longest lead” permits. Technical permits with substantial technical design are needed as part of the applications. The anticipated issuing agencies include:

- Mined Land Reclamation Plan (ASMI)
- 45-513 Groundwater Withdrawal Permit (Arizona Department of Water Resources (ADWR))
- Recycled Water Discharge Permit (Arizona Department of Environmental Quality (ADEQ))
- Aquifer Protection Permit(s) (ADEQ)
- Air Quality Operating Permit (PCAQCD)
- General Plan Amendment (City of Casa Grande)
- Zone Change or Planned Area of Development (PAD) Amendment (City of Casa Grande)
- Site Plan Approval (City of Casa Grande)

4.5 Environmental Liabilities

The 2023 Phase I ESA, completed by Environmental Site Assessments, Inc. found the following environmental liabilities associated with the Santa Cruz Project:

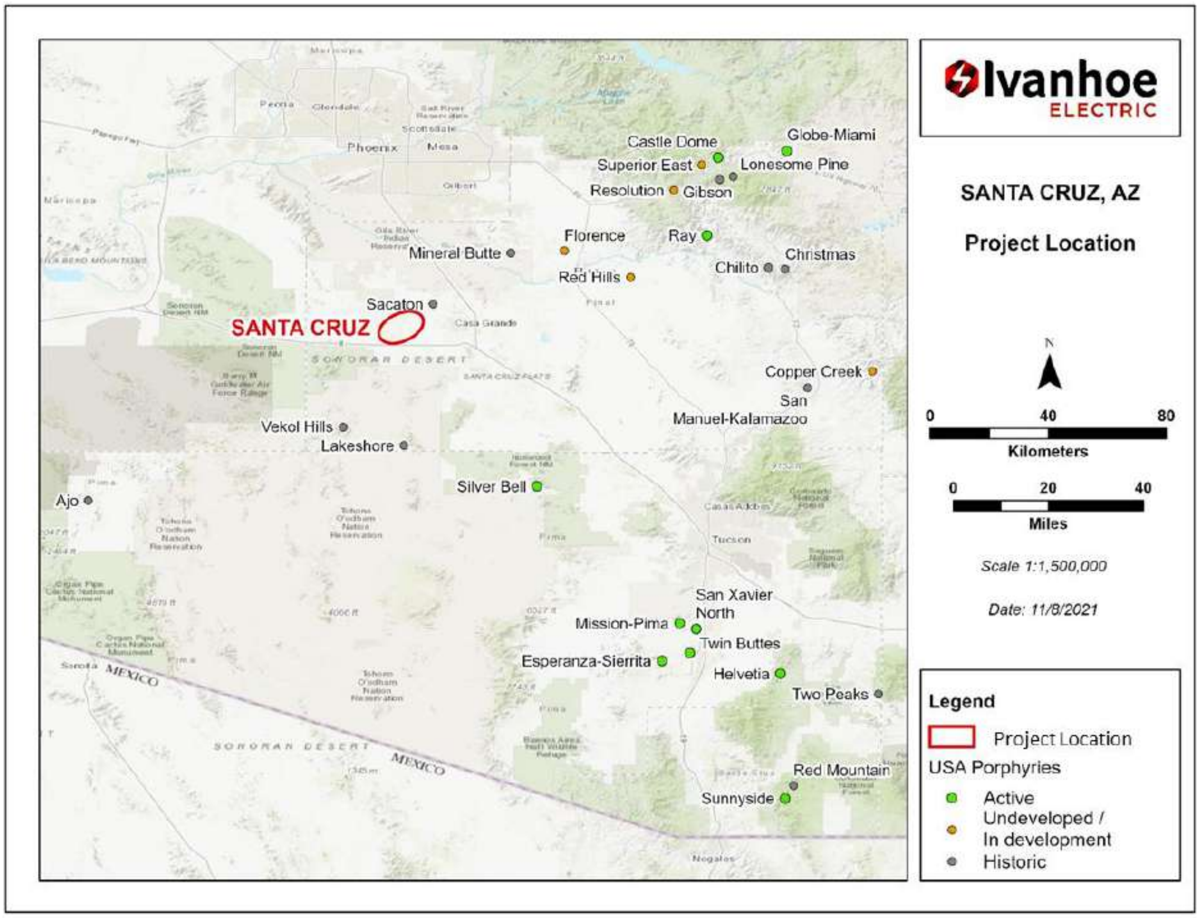
- An ASARCO/Freeport McMoRan joint venture operated an In Situ Leach Pilot Test from circa 1980s until late 1990s. Operations were mainly within Section 13 of the subject site. As part of a Class III Underground Injection Control permit for the In Situ Leach Pilot Test there is a special warranty deed and an aquifer exemption in place for a portion of the site stating, in general, that no drinking water wells shall be completed in the subsurface zone over the interval from approximately 800-ft to 4,000-ft below the ground surface over an approximate aerial extent of 960 acres. The aquifer exemption is under the jurisdiction of the U.S. Environmental Protection Agency (EPA) Region 9 and shall remain on the property in perpetuity. This limitation of the site is representative of a controlled recognized environmental condition (REC). The Santa Cruz Project will comply with this regulatory limitation during all phases of the Project.

- Screening of former crop fields at the site evaluated as part of the 2008 Phase II ESA identified agrochemical contaminate concentrations in excess of Soil Remediation Limits (SRLs). Surficial crop field agrochemical contamination represents a recognized environmental condition for the site.
- The Santa Cruz Project recognizes that agrochemical contamination of soils will need to be further assessed prior to any earthwork for redevelopment of former crop fields, in order to verify that agrochemical contaminate levels are below ADEQ SRL's for the intended use.
- Previous evaluations identified elevated concentrations of the pesticides DDE, DDT, dieldrin, and toxaphene in the surficial soils surrounding a concrete loading pad in the southeast portion of Section 24 just northwest of the intersection of Highway 84 and Midway Road.
  The Santa Cruz Project currently has no plans for development in this area, however, the team recognizes that agrochemical contamination of soils will need to be further assessed prior to any earthwork for redevelopment of this portion of the property, in order to verify that agrochemical contaminate levels are below ADEQ SRL's for the intended use.

In summary, the Santa Cruz Project acknowledges and fully comprehends the environmental liabilities identified in the 2023 Phase I Environmental Site Assessment (ESA). The Project team is committed to adhering to all regulatory limitations associated with the site and will ensure all necessary measures to address the recognized environmental concerns associated with the site are taken prior to development.

5 Accessibility, Climate, Local Resources, Infrastructure and Physiography

The Santa Cruz Project is located 60 km south-southwest of the greater Phoenix metropolitan area and is accessed from the Gila Bend highway, 9 km west from the city of Casa Grande (population of 57,699 persons). The Santa Cruz Project, as shown in Figure 5-1, is surrounded by current and past-producing copper mines and processing facilities. The greater Phoenix area is a major population center (approximately 4.8 million persons) with a major international airport (Phoenix Sky Harbor International Airport), and well-developed infrastructure and services that support the mining industry. The cities of Casa Grande, Maricopa, and Phoenix can supply sufficient electricity, water, skilled labor, and supplies for the Santa Cruz Project.

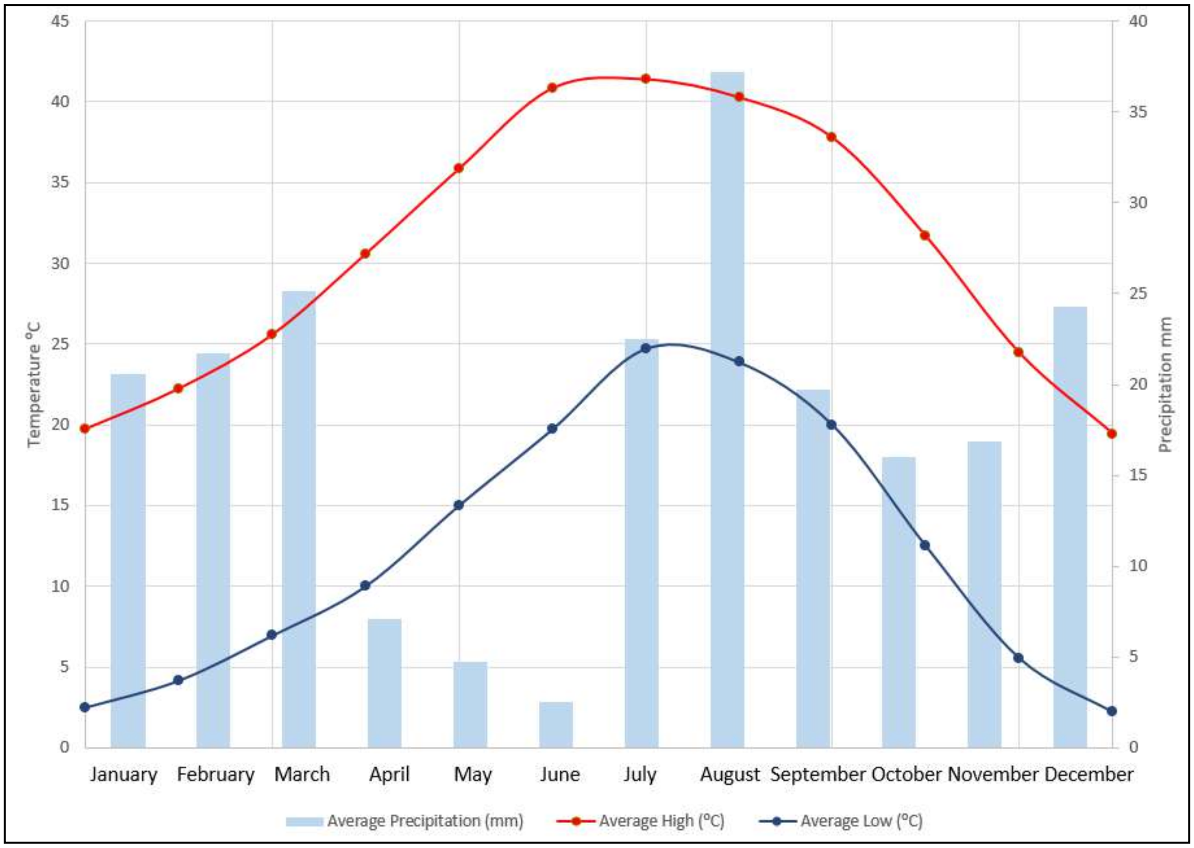


Source: IE, 2023

Figure 5-1: Location Map

5.1 Climate

The climate at the Santa Cruz Project is typical of the Sonoran Desert, with temperatures ranging from -7 degrees Celsius (°C) (19 degrees Fahrenheit (°F)) to 47°C (117°F) and average annual precipitation ranging from 76° to 500 millimeters (mm) (3 to 30 inches) per year. Precipitation occurs as frequent low-intensity winter (December/January) rains and violent summer (July/August) "monsoon" thunderstorms (Figure 5-2). The Santa Cruz Project site contains no surface water resources. Storm runoff waters from the site are drained toward the Santa Cruz River by minor tributaries to the Santa Rosa and North Santa Cruz washes. Operations at the Santa Cruz Project site can continue year-round as there are no limiting weather or accessibility factors.



Source: IE, 2023

Figure 5-2: Average Temperatures and Precipitation

The wind is usually calm. The windiest month is May, followed by April and July. May's average wind speed of around 5.5 knots (6.4 mph or 10.3 km/h) is considered a light breeze. IE has instituted measures to reduce dust that could be produced at the Santa Cruz Project site.

5.2 Local Resources

IE is in the process of transferring Irrigation Grandfathered Rights and Type 1 Non-Irrigation Grandfathered Water Rights in association with the private land purchased in 2023. To date, water for exploration drilling has been sourced from the City of Casa Grande. IE is planning on sourcing water from wells on the Project property in the future.

Electrical power is available along Midway Road with a high voltage line along the Maricopa-Casa Grande Highway along the northern edges of the Santa Cruz Project area. Also, an east-west rail line parallels the Highway and passes through Casa Grande. A natural gas line is available along Clayton Road on the southern side of the Project area.

IE is securing water rights and additional lands surrounding the Santa Cruz and Texaco deposits to allow for future mine development activities including potential tailings storage, potential waste disposal, and processing plant areas, as well as space for ramps for underground development.

5.3 Physiography

The Santa Cruz Project is in the Middle Gila Basin, entirely within the Sonoran Desert Ecoregion of Basin and Range Physiographic Province. The area is characterized by low, jagged mountain ranges separated by broad alluvial-filled basins. This portion of the Sonoran Desert is sparsely vegetated with greater variability near washes and in areas that have long lain fallow. Near washes and longer abandoned areas, catclaw acacia, mesquite, creosote bush, bursage, and salt cedar are common. The Santa Cruz Project area is flat and featureless with an elevation of 403±5 masl and sloping gently to the northwest. Much of the Santa Cruz Project area has been used for irrigated agriculture, with decaying remnants of an extensive system of wells and concrete lined ditches still present. The alignments of furrows are still visible despite decades of lying fallow. Efforts at real estate development in the 1990s and 2000s have also left visible remnants with preliminary roadworks and some planting (palm trees) overlying the previous agricultural remains. Soils proximal to washes tend to be more sand and gravel-rich, while soils in old agricultural areas are more silt and clay-rich. The physiography is further described in Table 5-1.

Table 5-1: Description of Physiography of the Casa Grande Area, Santa Cruz Property

General Physiographic Area	Intermontane Plateaus
Physiographic Province	Basin and Range
Physiographic Section	Sonoran Desert
Alteration	Potassic, Phyllic, and Argillic – more intense in mineralized areas
Associated Rocks	Breccia Conglomerate Schist Porphyry Granite Diabase
Rock Unit Names	Gila Conglomerate Laramide Porphyry Oracle Granite Pinal Schist

Source: Nordmin, 2023

6 History

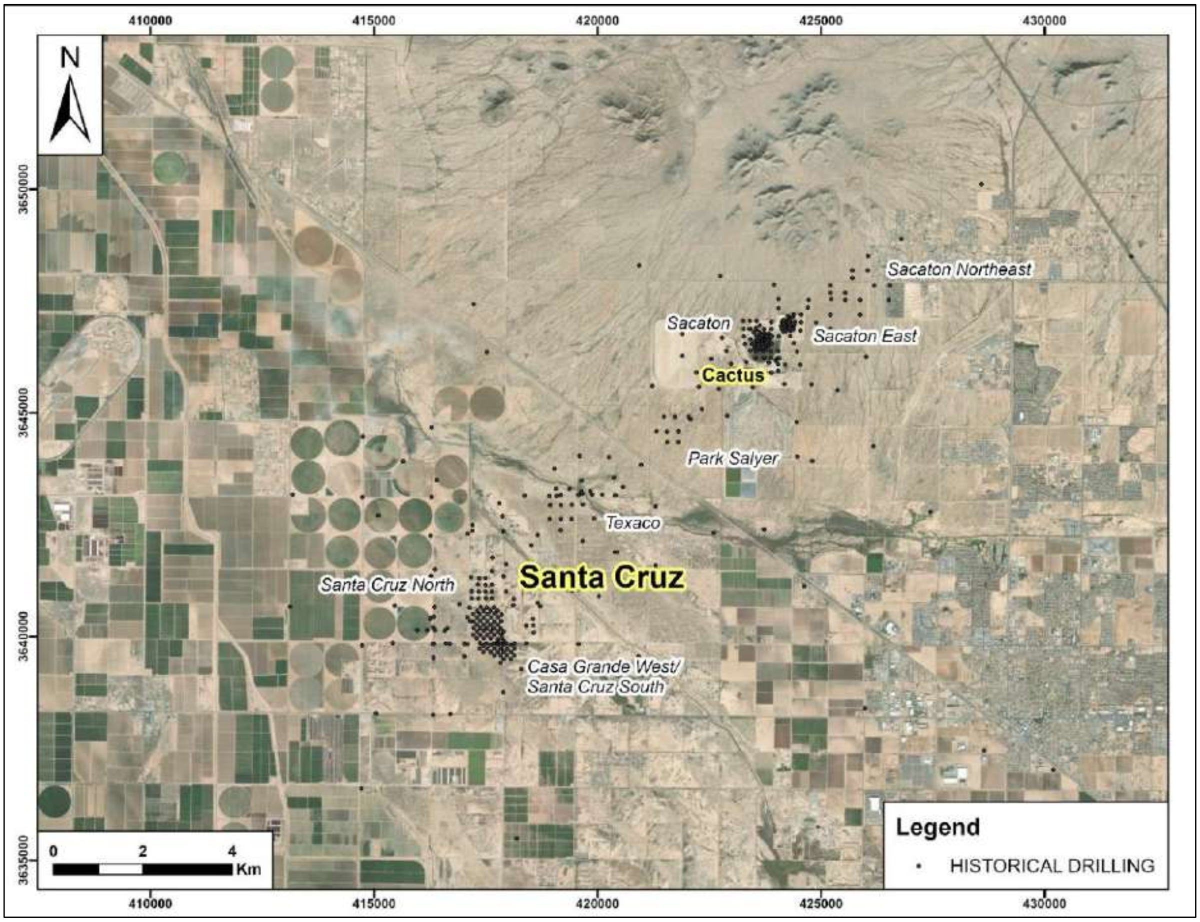
6.1 Introduction

Historically, there were three main deposit areas that are part of the current Santa Cruz Project: Texaco (to the northeast), Santa Cruz North (southwest of Texaco), and Casa Grande West/Santa Cruz South which is the southernmost deposit (Figure 6-1).

ASARCO owned and drilled the Texaco and Santa Cruz North deposits. Hanna-Getty owned and drilled the Casa Grande/ Santa Cruz South deposit. In 1990, ASARCO entered a joint venture with Freeport McMoRan Copper & Gold Inc. on the Texaco land position. Hanna-Getty continued to own and operate the Casa Grande West/Santa Cruz South deposit.

The first discovery of copper mineralization in the area occurred in February 1961 by geologists from ASARCO. They discovered a small outcrop of leached capping composed of granite cut by a thin monzonite porphyry dyke. The outcrop was altered to quartz-sericite-clay with weak but pervasive jarosite-goethite and a few specks of hematite after chalcocite, particularly in the dyke.

ASARCO proceeded with preliminary geophysical surveys that same year, including IP, resistivity, seismic reflection, and magnetics. Upon positive results from the geophysical surveys, a small drill program of six holes was funded, with the last hole being the first to intersect the significant mineralization that became known as the West Orebody and, in time, the Sacaton open pit mine (Figure 6-1).



Source: IE, 2023

Figure 6-1: Historical Drill Collars, Deposit, and Exploration Area Names (white) as well as Current Project Names for IE and Neighboring Project (in yellow)

Encouraged by the discovery at Sacaton, ASARCO expanded exploration efforts across the Casa Grande Valley and in 1964 the first hole was drilled on the Santa Cruz Project. By May 1965, seventeen drillholes were completed without similar success, and ASARCO reduced its land position. Subsequent reviews in 1970-1971 deemed the Santa Cruz Project worth renewed exploration activity. Following the initiation of the Santa Cruz Joint Venture (SCJV) between ASARCO Santa Cruz, Inc. and Freeport McMoRan Copper & Gold Inc. in 1974, additional ground was acquired around the Santa Cruz North deposit. By this time, various joint ventures, as below, had staked considerable ground over and around what would eventually be the Casa Grande West (now Santa Cruz) deposit.

In 1973, David Lowell put together an exploration program called the Covered Area Project (CAP) that was funded first by Newmont Mining, then, in succession, by a joint venture between Newmont and Hanna Mining, then Hanna with Getty Oil Corp. and Quintana Corp.; though both Quintana and Newmont would pull out of the project before any discoveries were made. In 1974, after having systematically drilled over 120 holes at 20 projects across Southwestern Arizona, David Lowell and his team focused their attention on the Santa Cruz system (which Lowell and his team called the Casa Grande project). ASARCO had just put the Sacaton operation into production and Lowell and associates were aware of the evidence for shallow angle faulting and potential for dissected porphyry mineralization that might have been displaced undercover in the Casa Grande Valley (Lowell, unpublished personal communication). Furthermore, the CAP program had compiled historic data of the area that indicated several water wells drilled had returned pebbles of Cu-oxide mineralization. Careful stream mapping and drainage analysis revealed that the Santa Cruz River had reversed flow directions at least twice in recent history, and it was this revelation that allowed Lowell to trace the exogenous oxide-Cu pebbles back to the Santa Cruz deposit area. They discovered evidence for porphyry mineralization in their first drillhole, which intersected leached capping, and by their seventh hole (CG-7), they had intersected significant supergene enriched Cu mineralization at what they called the Casa Grande West deposit. Drilling under the CAP program continued through to 1977, at which point Hanna Mining took over as operator under a joint venture with operation funding from Getty Oil Corp. Between 1977 and 1982, Hanna-Getty advanced a tight spaced drill program that delineated an estimated 500 Mt of 1% Cu at Casa Grande West, and countless exploration holes in the surrounding Casa Grande Valley (Lowell unpublished personal communication). The decision to go underground and mine the Casa Grande West deposit was never made, and the combination of encroaching real estate, the growing environmental movement, and potential mismanagement by Hanna-Getty followed by the fall of Cu commodity prices all resulted in the Casa Grande West project becoming inactive in the early 80s.

6.2 Previous Exploration

6.2.1 Sacaton Mine

ASARCO went on to mine the Sacaton deposit from 1974 to 1984. The Sacaton deposit was mined using open pit methods with the beginnings of underground workings initiated but depressed Cu prices resulted in the halt of all mining at Sacaton. Table 6-1 shows the historical mine production from Sacaton.

Table 6-1: Sacaton Historical Mine Production (Fiscal Years Ended December 31)

Year	Ore Milled Short Tons	Mill Grade Cu%	Cu Short Tons	Au Troy Oz.	Ag Troy Oz.
1974	2,020,000	0.63	9,516	N/A	N/A
1975	3,630,000	0.74	21,918	3,153	N/A
1976	3,782,000	0.71	22,021	3,151	N/A
1977	3,471,000	0.70	19,872	3,103	N/A
1978	4,153,000	0.67	23,042	3,691	N/A
1979	4,006,000	0.65	21,367	3,558	142,000
1980	3,819,000	-	16,097	2,504	124,000
1981	4,103,000	-	21,015	3,334	172,000
1982	4,165,000	-	20,892	2,499	154,000
1983	4,003,000	-	18,794	1,983	134,000
1984	1,000,000	-	4,496	479	33,000
Total	**38,152,000**	**0.69**	**199,030**	**27,455**	**759,000**

Source: Nordmin, 2023

6.2.2 Santa Cruz and Texaco Deposits

Several deposits, including Santa Cruz South (also known as Casa Grande West), Santa Cruz North (Santa Cruz North and South are collectively referred to as "Santa Cruz"), Texaco, and Parks-Salyer were identified during ASARCO drilling in the 1960s and subsequent drilling in the 1970s and 1980s by numerous exploration companies including Newmont Mining, Hanna, Hanna-Getty, and a joint venture between ASARCO Santa Cruz Inc. and Freeport McMoRan Copper & Gold Company (SCJV). In total, 362 drillholes totaling 229,577 m have been drilled by previous owners delineating the cluster of deposits. Table 6-2 presents a summarized history of exploration on the property. There are no records of work by Texaco, but the company held land over what is now called the Texaco deposit.

Table 6-2: History of Exploration Activities Across the Santa Cruz and Texaco Deposits

Dates	Activities	Company(s)	Description	Notes
1961	Prospecting and discovery	ASARCO	ASARCO geologists Kinnison and Blucher identify Sacaton Discovery Outcrop	An outcrop of granite with a thin dyke of porphyry was discovered.
1961	Geophysical Surveying	ASARCO	ASARCO Geophysical Dept. report	Geophysical surveys including IP, resistivity, magnetics.
1962	Drilling	ASARCO	Six exploration drillholes at Sacaton	The first five holes cut sulfides, but only a few short runs of ore grade rock. The sixth hole was the first hole within the West Orebody.
1964	Drilling	ASARCO	Five holes were drilled near the Santa Cruz deposit by ASARCO (SC-2 to SC-6)	These were exploration drillholes, none of which intersected the main mineralization at Santa Cruz. SC-5 was drilled nearly 3 km SW of the main deposit.
1965	Drilling	ASARCO	11 holes were drilled near the Santa Cruz deposit by ASARCO (SC-7 to SC-17)	These were exploration drillholes, SC-1 was drilled along the western margin of the subsequent Independent Mining Consultants, Inc. (IMC) block model. And SC-16 was just to the East of the future Santa Cruz North deposit. SC-17 was drilled approximately 4 km SW of the Casa Grande deposit (furthest step out exploration hole in the database).
1974	Drilling and Discovery	Hanna-Getty	Five holes were drilled around Santa Cruz North and one at Casa Grande by Hanna-Getty (CG-1 to CG-6)	Six holes drilled by Hanna-Getty under the CAP led by Lowell, one of which (CG-3) intersected near ore grade mineralization along the western boundary of what would become the Santa Cruz North and Casa Grande deposits.
1974	Drilling and Discovery	ASARCO	SC-18,19 and 20 are drilled at Santa Cruz North by ASARCO	Following the initiation of exploration in the Santa Cruz area by the CAP initiative, led by Lowell, ASARCO re-initiated exploration drilling in the area. All three holes intersected porphyry-style mineralization at what would be called the Santa Cruz North deposit.
1975	Drilling	Hanna-Getty	Two holes were drilled at Casa Grande, two holes drilled at Santa Cruz North and one hole drilled at Texaco by Hanna-Getty (CG-7 to CG-11)	Hole CG-7 was the first intersection of ore grade mineralization, as reported by Lowell.
1975	Drilling and Discovery	ASARCO	Four holes were drilled at Santa Cruz North and one at Texaco by ASARCO (SC-21 to SC-24)	ASARCO drilled five holes, three nearby 1974 drilling that intersected mineralization at Santa Cruz North, and two exploration step out holes each 1.5 km to the NE of the Santa Cruz North area, SC-21, and SC-23 which intersected the Texaco deposit mineralization.
1976	Drilling and land position expansion	Hanna-Getty	Two holes were drilled at Santa Cruz North and 14 holes were drilled at Casa Grande by Hanna-Getty (CG-12 to CG-33)	Bolstered by success in CG-7, and led by Lowell, key ground over what would eventually be the Casa Grande deposit was picked up, and exploration drilling advanced through 1976.
1976	Drilling	ASARCO	One hole was drilled approximately 1 km NE of the Casa Grande deposit (SC-25), and six holes were drilled at Texaco (SC-27, -28, -29, -30, -31, and -34)	
1977	Drilling and Operatorship change	Hanna-Getty	One hole was drilled at Texaco (CG-48), and 45 holes were drilled at Casa Grande (CG-34-CG-79)	Hanna-Getty took over operatorship from Lowell and the CAP team and began a close-spaced drill program to delineate the ore body at Casa Grande.
1977	Drilling	ASARCO	Six holes were drilled at Texaco and 12 holes were drilled at Santa Cruz North by ASARCO (SC-35 to SC-52)	
1978	Drilling	Hanna-Getty	One hole was drilled north of Santa Cruz North and 31 holes drilled at Casa	

Dates	Activities	Company(s)	Description	Notes
			Grande by Hanna-Getty (CG-80 to CG-122)	
1979	Drilling	Hanna-Getty	Six holes drilled by Hanna-Getty approximately 1 km west of the Casa Grande and Santa Cruz North deposits	
1979	Drilling	ASARCO	Four holes were drilled at Santa Cruz North by ASARCO (SC-55 to SC-58)	
1980	Drilling	ASARCO	Six holes were drilled at Santa Cruz North by ASARCO (SC-59 to SC-64)	
1981	Drilling	Hanna-Getty	Two holes were drilled north and west of Santa Cruz North	
1982	Drilling	Hanna-Getty	Two holes were drilled north and west of Santa Cruz North	
1990-1991	Land Consolidation	SCJV (ASARCO, Santa Cruz Inc., and Freeport McMoRan Copper & Gold Inc.) – Texaco	Texaco approached SCJV (ASARCO-Freeport) regarding the sale of the Texaco land position	A series of internal memos from SCJV discussed the opportunity and holding costs and why they should acquire the lands from Texaco.
1994	In situ Cu Mining Research Project	US Bureau of Reclamation (USBR) and SCJV		Permits received to begin injection of sulfuric acid.
1995	In situ Cu Mining Research Project	USBR – SCJV		Pilot plant completed.
1996	Drilling	SCJV	11 holes drilled at and around Texaco by ASARCO (SC-65 to SC-74)	
1996	In situ Cu Mining Research Project	USBR-SCJV		Mining test started In February.
1997	Drilling	SCJV	Four holes were drilled by ASARCO at Texaco (SC-75 to SC-78)	
1997	In situ Cu Mining Research Project	USBR-SCJV	Lost funding – closure started	USBR lost Congressional funding in October. Injection continued until December.
1998	In situ CU Mining Research Project	USBR-SCJV	State required closure activities – final report to Bureau of Reclamation	Pumping continued until the end of February. Plant to care and maintenance. The final research report was never made public.

Source: IE, 2023

6.3 Previous Reporting

6.3.1 Hanna 1982

Watts Griffis McOuat Ltd. (Watts Griffis McOuat) calculated a historical mineral inventory for Hanna Mining in 1982. Mineralization was determined from sections by calculating areas from drillhole intercepts and distance between holes, and by assigning the weighted average grade of the neighboring holes to each area. In the case of a single hole in a section, the grade of that hole was assigned to that area.

Watts Griffis McOuat recommended additional consideration be given to a more flexible mining method such as sublevel caving.

6.3.2 In Situ Joint Venture 1997

In 1986, the Bureau of Mines obtained Congressional approval and funding to study in situ copper mining. In 1988, the Santa Cruz deposit was selected for this research project sponsored by a joint venture program between landowners ASARCO Santa Cruz Inc. and Freeport McMoRan Copper & Gold Inc., and the US Department of the Interior, Bureau of Reclamation, who funded most of the program.

Field testing began in 1988, and the test wells were constructed in 1989 in a 5-point pattern with one injection well centered between four extraction wells. Salt tracer tests were conducted in 1991, permits for the use of sulfuric acid were received in 1994, and the solvent extraction-electrowinning (SX-EW) pilot plant was completed in 1995.

The in-situ testing began in February 1996, but research funding was halted in October 1997 due to a change from Congress. Utilizing the carryover funds from previous years of the program, injections continued until December 1997 and pumping until mid-February 1998. At this point, the remaining fluids in the leach zone were less acidic, and metals remaining in the solution were redeposited into the ore body through precipitation. A final report was not made publicly available. However, a newsletter from the project was circulated in March 1998 and noted that 35,000 lbs. of Cu were extracted.

6.3.3 IMC 2013

IMC constructed a block model for the Santa Cruz South deposit, the Texaco deposit, and the Parks-Salyer deposit for Russell Mining and Minerals in 2013. The block model for the Santa Cruz South deposit was based on 116 drillholes with 18,034 assay intervals for a total of approximately 342,338 feet (ft) (104,344 m) of drilling, in which 90.7% of the intervals were assayed for Cu. 40% of the drill intervals were assayed for acid soluble Cu and 5% for cyanide soluble Cu.

The block model for the Texaco deposit was based on all Cu drilling data available as of April 5, 2013. The block model was based on 29 drillholes with 2,281 assay intervals for a total of approximately 82,696 ft (25,205 m) of drilling, in which 92.5% of the intervals were assayed for Cu. Less than 9% of the drill intervals were assayed for acid soluble Cu or cyanide soluble Cu.

The block model for the Parks-Salyer deposit was based on seven drillholes with 7,398 ft (2,254 m) of drilling. The model incorporated the topography, the bottom of the conglomerate, and the top of the bedrock, as well drillhole collars, and downhole information, plus additional drillhole data from outside the model limits. These surfaces are a rough approximation based on the limited amount of information available.

6.3.4 Stantec-Mining 2013

Stantec completed a conceptual study for Presidio Capital in August 2013 on the Santa Cruz South, Texaco, and Sacaton exploration properties.

6.3.5 Physical Resource Engineering 2014

In 2014 Physical Resource Engineering completed a conceptual study, "Mining Study Exploitation of the Santa Cruz South deposit by Undercut Caving" for Casa Grande Resources LLC.

6.4 Ivanhoe Electric Technical Report Summaries

6.4.1 Mineral Resource Estimate 2021

Nordmin produced a Mineral Resource Estimate for IE dated December 8, 2021 included within the Technical Report Summary dated June 8, 2022.

6.4.2 Mineral Resource Estimate Update 2022

Nordmin produced a Mineral Resource Estimate for IE, effective date December 31, 2022, entitled "Mineral Resource Estimate Update and NI 43-101 Technical Report for the Santa Cruz, Texaco, and East Ridge Deposits, Arizona, USA." The Mineral Resource Estimates for the Santa Cruz and East Ridge Deposits from this report are used for this PEA and are available in Section 14.9.

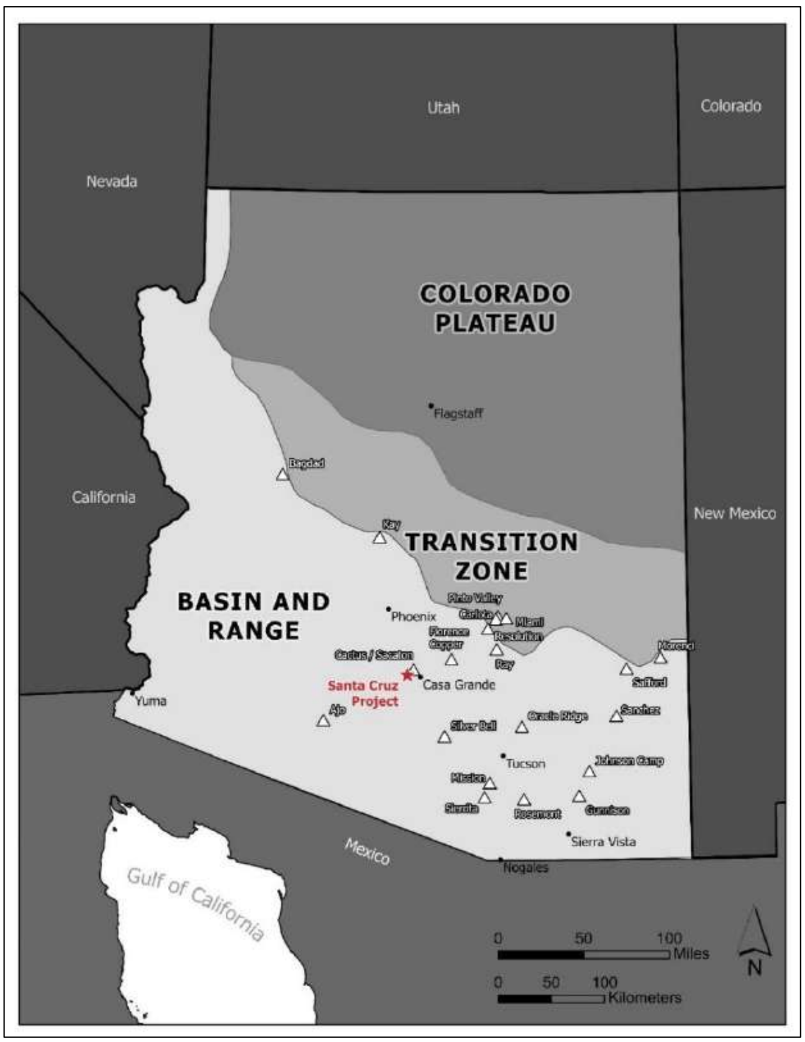
6.5 Historical Production

No historical production has been carried out on the property.

7 Geological Setting and Mineralization

7.1 Regional Geology

The Santa Cruz Project is located within an approximately 600 km long northwest to southeast trending metallogenic belt known as the Southwestern Porphyry Belt, which extends from northern Mexico into the southwestern United States. The belt includes many productive copper deposits in Arizona such as Mineral Park, Bagdad, Resolution, Miami-Globe, San Manuel-Kalamazoo, Ray, Morenci, and the neighboring Sacaton Mine (Figure 7-1). These deposits lie within a broader physiographic region known as the Basin and Range province that covers and defines most of the southwestern United States and northwestern Mexico. This region is characterized by linear sub-parallel mountain chains separated by broad flat valleys formed by regional tectonic extension during the mid- to late-Cenozoic Period.



Source: IE, 2023

Figure 7-1: Regional Geology of the Southwestern Porphyry Belt and the Cu Porphyry Deposits in the Area around the Santa Cruz Project

Basement geologic units of Arizona consist of formations developed during the Paleoproterozoic collisional orogeny that were subsequently stitched together by anorogenic granitic plutonic suites within the Mesoproterozoic. Basement Proterozoic lithologies at the Santa Cruz Project are represented by three primary units: Pinal Schist, Oracle Granite, and Diabase dykes.

The Pinal Schist is a metasedimentary to metavolcanic basal schist which spans much of southern Arizona. Proterozoic anorogenic granitic complexes were emplaced into the schist between 1450-1350 Ma. Continental rifting in the Mesoproterozoic brought both Paleo- and early Mesoproterozoic granitic complexes to the surface where they were subsequently buried beneath early Neoproterozoic rocks of the Apache Group, which represents a very shallow intracontinental basin. Around 1100 Ma, these rocks were intruded by Diabase intrusions related to the break-up of the Rodinia supercontinent. Throughout the Paleozoic Era, Arizona was located within a craton with major disconformities in the stratigraphy interpreted to represent relative sea level changes. Continental shortening throughout the Cretaceous period is contemporaneous with diachronous magmatism within the same location (Tosdal and Wooden, 2015). Cessation of magmatic activity in the Paleocene Period marked the onset of erosion of the uplifted arc, which lay southwest of the Colorado Plateau.

7.2 Metallogenic Setting

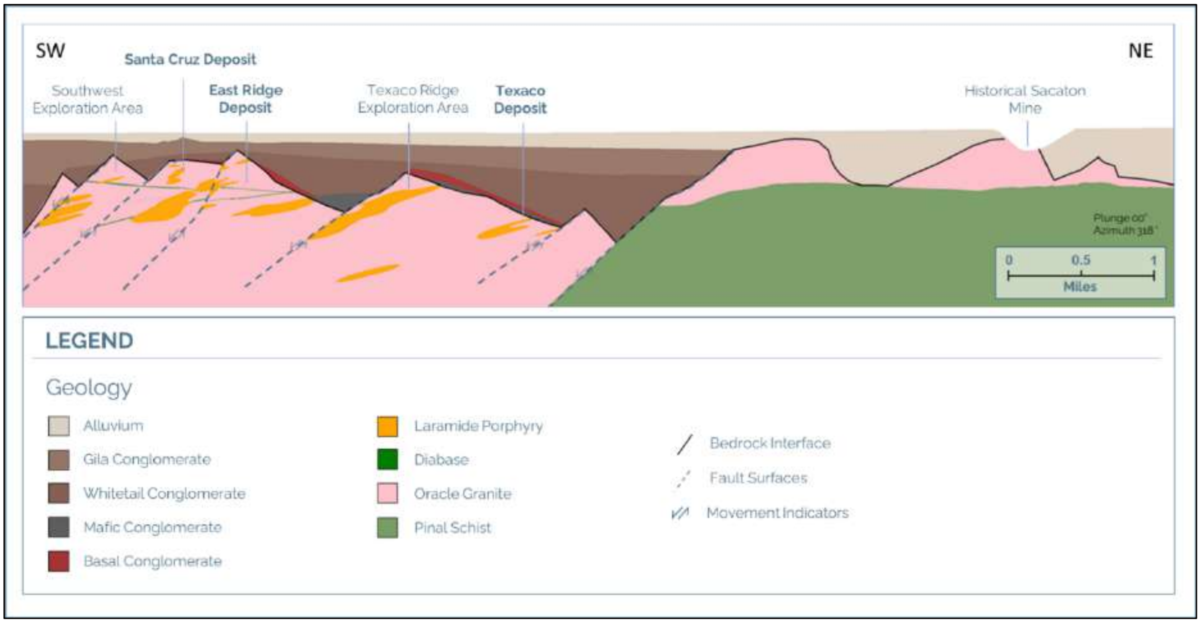
The porphyry copper deposits within the Southwestern Porphyry Copper Belt are the genetic product of igneous activity during the Laramide Orogeny (80 Ma to 50 Ma). Laramide porphyry systems near the Santa Cruz Project define a southwest to northeast linear array orthogonal to the trend of magmatic arc environment.

During the tectonic extension of the mid-Cenozoic Period, the Laramide arc and related porphyry copper systems were variably dismembered, tilted, and buried beneath basin alluvium and conglomeratic deposits that fill the Casa Grande Valley. Prior to concealment, many of the Laramide porphyry systems of Arizona experienced supergene enrichment events that make them such economically significant deposits.

Supergene alunite from the Sacaton porphyry copper deposit, located approximately 8.5 km from the Santa Cruz deposit, was K-Ar dated at 41 Ma (Cook, 1994). At the Santa Cruz Project, evidence for multiple cycles of supergene enrichment is represented by multiple chalcocite and oxide-copper ”blankets”. These “blankets” were developed oblique to each other as a result of rotation and subsequent overprinting by new supergene blankets. This enrichment has been shown to occur throughout the Tertiary Period and ceased with the deposition of overlying sedimentary packages, comprised predominantly of conglomerates, which changed the hydrology near the deposits. The earliest supergene enrichment is interpreted to have occurred in the Eocene Epoch (Tosdal and Wooden, 2015).

7.3 Santa Cruz Project Geology

The Santa Cruz Project is comprised of five separate areas along a southwest-northeast corridor. These areas from southwest to northeast are known as the Southwest Exploration Area, the Santa Cruz deposit, the East Ridge deposit, the Texaco Ridge Exploration Area, and the Texaco deposit. Each of these deposits represent portions of one or more large porphyry copper systems separated by extensional Basin and Range normal faults. Each area has variably experienced periods of erosion, supergene enrichment, fault displacement and tilting into their present positions due to Basin and range extensional faulting (Figure 7-2).



Source: IE, 2023

Figure 7-2: Generalized Cross-section of the Santa Cruz - Sacaton System

7.3.1 Santa Cruz Project Lithologies

The bedrock geology at the Santa Cruz Project is dominated by Oracle Granite (1450 to 1350 Ma) with lesser proportions of Proterozoic Diabase intrusions (1100 Ma), dipping at ~40 degrees (°) to 50° to the south-southwest, and Laramide porphyry intrusions (75 Ma), dipping at ~30° to 40° to the southwest.

The Oracle Granite is prevailingly a coarse-grained hypidiomorphic biotite granite with large pink or salmon-colored orthoclase feldspars 32 mm to 38 mm across that gives rock a pink or gray mottled appearance on fresh surfaces. Groundmass composed of uniformly sized, 5 mm, grains of clear white feldspar and glassy quartz with greenish-black masses of biotite and magnetite. Composition suggests that rock should be classed as quartz monzonite rather than granite. Surface exposures of light-buff color. Age is interpreted to be 1450 to 1350 Ma (Tosdal and Wooden, 2015). Alteration minerals are dominated by secondary orthoclase and sericite.

Proterozoic diabase is Holocrystalline, medium- to coarse-grained ophitic to subophitic textures with plagioclase and clinopyroxene (augite) as the dominant primary phases. Magnetite, oligoclase, sulfide (pyrite and chacopyrite) mineralization are reported as minor phases within the diabase. These diabase intrusions were dominantly emplaced as horizontal to sub-horizontal sills, though rare dykes are recognized. These dykes are associated with local discrete increases in observed hypogene sulfide mineralization – interpreted as being a more reactive and receptive host rock for hydrothermal fluid deposition of sulfide mineralization. Historic petrographic thin section analysis indicates diabase is dominantly associated with hydrothermal biotite and epidote.

Laramide porphyry intrusions are strongly associated with primary hypogene mineralization. The porphyry has a quartz monzonite composition (35% quartz, 6% biotite, 29% feldspar, 30% K-feldspar, and plagioclase) with 40% phenocrysts averaging 1.5 mm and 60% aplitic to aphanitic groundmass. Quartz phenocrysts are less than 10 mm, sub-spherical, and comprise approximately 25% of the phenocrysts. Biotite makes up 15% of the phenocrysts and are less than 5 mm. Subhedral plagioclase phenocrysts, 60%, are generally less than 7 mm. There are two distinct groups of Laramide-aged porphyry intrusions. One contains quartz phenocrysts <5% by volume, and is generally associated with increased biotite phenocrysts as well as increased biotite content in the groundmass, typically giving this unit a darker color. The other variant contains more quartz phenocrysts (>5%), and is often described as being more siliceous and lighter in color.

A later late biotite-quartz feldspar monzonite porphyry is composed of 15% biotite, 25% K-feldspar, 40% plagioclase and 20% quartz with 15% phenocrysts consisting of 20% biotite, 70% plagioclase and 10% quartz in an aphanitic 15% biotite, 30% K-feldspar, 35% plagioclase, 20% and quartz groundmass with 0.06 mm average crystal size.

Alteration minerals in mineralized Laramide dykes are dominated by hydrothermal biotite, sericite, and lesser orthoclase feldspar.

Directly overlying the erosional surface of the basement rocks is a series of sedimentary and volcanic units. These consist of predominantly syn-extensional sediments and conglomerates, airfall volcanic tuffs, and andesitic basalts associated with dykes or flows. Sediments and conglomerate units include the Alluvium, Gila Conglomerate, Whitetail Conglomerate, and Basal Conglomerate. The Gila Conglomerate and Whitetail Conglomerate are separated stratigraphically and conformably by a thin marker bed of rhyolitic Apache Leap Tuff (20 Ma) usually of no greater thickness than 1 m. Basaltic dykes or flows include the Mafic Conglomerate unit which exists variably above, below, or intercalated within the Basal Conglomerate.

The syn-extensional sedimentary and volcanic units are well understood across the Santa Cruz Project and have all been intersected in numerous drilling intersections through coring from surface. A general stratigraphic cross-section can be viewed in Figure 7-3. Quaternary alluvium consists of poorly sorted silt and sand spread out in a thin veneer across the entirety of the Casa Grande Valley, reaching up to 70 m thick near the Santa Cruz River and displays a conformable relationship with underlying Gila Conglomerate. Dissected alluvial fans flank the Tabletop Mountain area to the southwest of the Santa Cruz Project and are largely comprised of volcanic rubble.

The Tertiary Gila Conglomerate consists of alternating valley beds most of which are sub-rounded to sub-angular cobble to boulder conglomerates with periodically interbedded layers of moderately sorted sand and gravel, collectively averaging 150 to 300 m thick across the Santa Cruz Project, reaching thickest intersections over paleo-valleys controlled by buried extensional structural block configurations and displays a conformable relationship with the underlying Apache Leap Tuff.

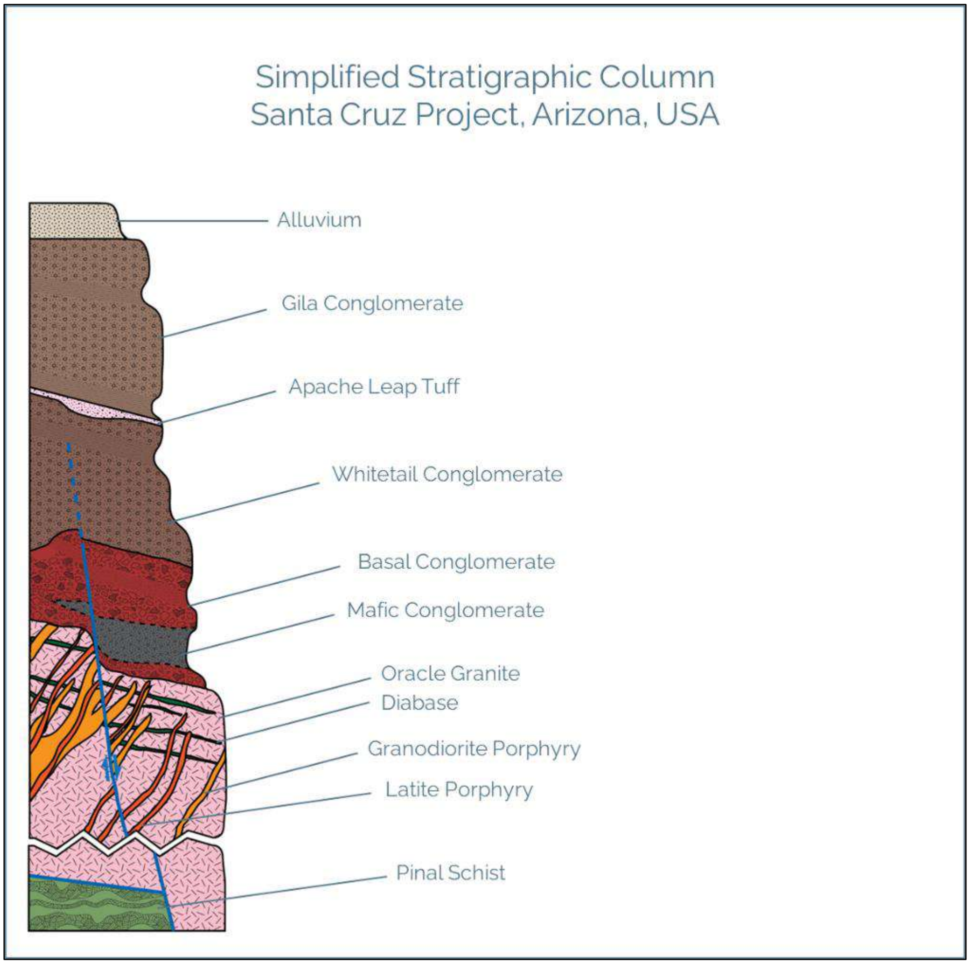
The Tertiary Apache Leap Tuff is defined as a single rhyolitic airfall tuff layer. The tuff layer consists primarily of devitrified quartzofeldspathic cryptocrystalline groundmass and displays a conformable relationship with the underlying Whitetail Conglomerate.

The Tertiary Whitetail Conglomerate is temporally and characteristically regarded as the stratigraphically lower and older equivalent of Gila Conglomerate. It consists of alternating valley beds of mostly angular to subangular cobble to boulder conglomerates with periodically interbedded layers of moderately to poorly sorted sand and gravel. It is interpreted to represent a period of higher intensity erosion. The unit collectively averages 100 m to 400 m thick across the Santa Cruz Project. The thickest intersections are found over paleo-valleys controlled by extensional structural block configurations. It displays a conformable relationship with the underlying Basal Conglomerate or Mafic Conglomerate.

Tertiary Mafic Conglomerate consists of tightly compacted monomictic conglomerate composed of angular cobble to boulder sized clasts of andesitic to basaltic composition and is distinguished by the abrupt change in clast composition and coloration. The unit collectively averages 10 to 50 m thickness across the Santa Cruz Project but displays layers at the edges of occurrences as narrow as < 1 m. The unit displays a conformable relationship with the underlying Basal Conglomerate or Whitetail Conglomerate or an unconformable relationship with the underlying Oracle Granite or Laramide Porphyry.

Tertiary Basal Conglomerate is characterized as a tightly compacted, monomictic conglomerate consisting of angular cobble to boulder sized clasts of Oracle Granite. The unit is also distinguished by a sharp and significant introduction or increase in total hematitic iron oxidation throughout the rock mass. The unit averages 25 m to 100 m thickness across the Santa Cruz Project, reaching the thickest intersections at the base of paleo-valleys due to slope erosion and sedimentation. The unit displays a conformable relationship with the underlying Mafic Conglomerate or an unconformable relationship with the underlying Oracle Granite.

The Santa Cruz Project lithologies are shown in the simplified stratigraphic column (Figure 7-3).



Source: IE, 2023

Figure 7-3: Simplified Stratigraphic Section of Santa Cruz Project Alteration

7.3.2 Alteration

Alteration at the Santa Cruz Project is variable across the property based on host lithology and mineralization type. Hypogene hydrothermal alteration assemblages consist predominantly of quartz, secondary biotite, orthoclase, magnetite, sericite, phengite. Low-temperature broad overprints are present consisting of illite and smectite, lesser kaolinite (which occurs primarily in the oracle granite), and late low-temperature chlorite and calcite. Rare subordinate phases such as epidote, albite, and tremolite may also occur. Supergene alteration related to the weathering and oxidation of primary hypogene sulfides. It is also important to note it can be difficult to discriminate from retrograde intermediate-argillic hypogene alteration. Supergene clays occur dominantly in the weathering environment where the breakdown of primary hypogene sulfides results in sulfuric acid and the formation of limonites, alunite, jarosite, and kaolinite-bearing assemblages. Supergene alteration also includes alteration due to heated meteoric groundwater resulting from Miocene igneous activity. This includes late propylitic overprints, smectite clay alteration of mafic to intermediate-composition igneous rocks, smectite alteration along Miocene Basin-and-Range faults, and broad pervasive illite-smectite alteration overprints.

7.3.3 Structural Geology

The Santa Cruz Project lies within the Basin and Range Province, within a domain that has experienced some of the greatest degrees of extensional tectonism Figure 7-2. The Santa Cruz Project, including the Southwest Exploration Area, Santa Cruz deposit, East Ridge deposit, Texaco Ridge Exploration Area, and Texaco deposit represents portions of one or more large porphyry copper systems that have been dismembered and displaced during Tertiary extensional faulting. As such, faulting at the Santa Cruz Project is intimately associated with mineralization and the current deposit configuration in several ways. The extensional fault systems are recognized at Santa Cruz with a transport direction towards the south-west of which D1 is the oldest, followed by D2 faulting.

Firstly, major deep-seated NE-SW striking basement structures that run from Colorado to Mexico (i.e., The Jemez Lineament) likely controlled or constrained Laramide age intrusive emplacement and metal endowment during transpressional arc magmatism. These structures have been reactivated multiple times, potentially serving as transfer faults for dextral offset during basin and range extension. Secondly, post-mineral faulting is recognized at Santa Cruz Project, and it is evident that at least three different generations of approximately NW-SE striking normal faulting have developed during basin and range extension. This has resulted in significant rotation and offset of fault blocks with the earliest generation of D1 faults exhibiting a sub-horizontal configuration. This rotation and offset of faults and fault blocks during basin and range extension is well documented in Arizona.

Additionally, it is evident within the Santa Cruz Project that post emplacement faulting has controlled and affected groundwater dynamics and the subsequent mobilization and deposition of copper in supergene enrichment processes. These faults also played a role in shaping the paleotopographic landscape and had a controlling influence on the development and distribution of exotic copper mineralization in paleodrainages that are recognized at the Santa Cruz Project.

7.3.4 Property Mineralization

The Santa Cruz Project is comprised of five separate areas known as the Southwest Exploration Area, Santa Cruz deposit, East Ridge deposit, Texaco Ridge Exploration Area, and Texaco deposit which represent portions of one or more large porphyry copper systems. Each deposit contains porphyry-style hypogene sulfide mineralization and subsequent tertiary-supergene oxide copper and chalcocite enrichment. Intensity varies by deposit along with speciation, and characteristics depending on spatial and vertical positions and the timing and total amount of overlying post-mineral tertiary sediment deposition.

Mineralization at the Santa Cruz Project is generally divided into three main groups:

1. Primary hypogene sulfide mineralization: chalcopyrite, pyrite, and molybdenite hosted within quartz-sulfide stringers, veinlets, veins, vein breccias, and breccias as well as fine to coarse disseminations within vein envelopes associated with hydrothermal porphyry-style mineralization. Hypogene mineralization appears to be the most concentrated within the Southwest Exploration Area, Texaco Ridge Exploration Area, and Texaco deposit areas based on IE drillholes. Hypogene mineralization at these locations is defined by elevated amounts of pyrite and chalcopyrite mineralization compared to the other project areas with equal or lesser amounts of molybdenite mineralization.
2. Secondary supergene sulfide mineralization: dominantly chalcocite which rims primary hypogene sulfides and completely replaces hypogene mineralization. Other sulfides that fall within this category include lesser bornite and covellite as well as djurleite and digenite which have been identified by historic XRD analyses. Supergene sulfide mineralization developed as sub-horizontal domains, known as “chalcocite blankets”, within the phreatic zone (below the paleo water table). They result from the weathering, oxidation, and leaching of sulfides under oxidizing conditions in the vadose zone (above the water table) and the transport and re-precipitation of copper sulfides in a more reducing environment below the water table. Basin and range extension dissected and tilted older chalcocite blankets to the southeast, younger chalcocite blankets may have formed after the bulk of miocene tilting.
3. Supergene copper oxide mineralization: Supergene oxide mineralization is dominantly comprised of chrysocolla (copper silicate) with lesser dioptase, tenorite, cuprite, copper wad, and native copper, and as copper-bearing smectite group clays. This mineralization style resides immediately above supergene sulfide mineralization near the paleo water table. Superimposed in-situ within the copper oxide zone is atacamite (copper chloride) and copper sulfates (e.g., antlerite, chalcanthite). Atacamite accounts for much of the copper grades within the oxide zone and requires formation of a brine to precipitate. The timing and mechanism for brine formation and atacamite precipitation remains poorly understood. One possibility is that atacamite may reconstitute copper from supergene copper oxides. As a consequence of this model, atacamite distribution may be controlled by the distribution of readily leachable copper oxides and permeability generated by Miocene faulting. Exogenous, or “exotic” copper occurrences also occur, including copper-oxide cemented gravels, sediments, and conglomerates; copper incorporation into ferricrete and smectite-group clays in the volcaniclastic tephra of the mafic conglomerate and in diabase sills; and finally, reworked clasts containing copper oxide mineralization.

7.3.5 Mineralization at the Santa Cruz Deposit

Hypogene Mineralization

Lithologies hosting hypogene mineralization in and around the Santa Cruz deposit include Precambrian oracle granite, Laramide porphyry, and Precambrian diabase.

Primary hypogene sulfide mineralization consists of chalcopyrite, pyrite, molybdenite, and minor bornite hosted within quartz-sulfide stringers, veinlets, veins, vein breccias, and breccias as well as fine to coarse disseminations within vein envelopes associated with hydrothermal porphyry-style mineralization. Lateral and vertical continuity of highest hypogene grades locally varies within the deposit due to clustering of Laramide porphyry dike intrusions.

Supergene Mineralization

Prior to burial by Tertiary sediments, hypogene sulfide mineralization near the paleo ground surface was subjected to multiple cycles of oxidation and enrichment resulting in locally abundant atacamite, chrysocolla, and chalcocite mineralization that form a supergene zone with complex geometries up to 600 m thick in vertical drillholes. Supergene mineralization is generally subdivided into supergene sulfide and -oxide mineralization with minor quantities of exotic copper mineralization. Atacamite and associated copper sulfate mineralization occurs dominantly within the copper oxide zone, although the relative timing and mechanism for formation is less well understood. The exotic Cu mineralization is dominantly hosted in the overlying clastic and volcanic rocks at the Santa Cruz deposit. Supergene mineralization at the Santa Cruz deposit reflects a mature, long lived supergene system (nearly complete chalcocite replacement of hypogene sulfides) with a well-developed supergene stratigraphy consisting of distinctly zoned mineralization with chrysocolla overlying chrysocolla-atacamite, overlying atacamite, overlying chalcocite. There is also abundant evidence for post rotational development of multiple supergene enrichment horizons that shows two or more distinct supergene sulfide events. During the tertiary (no later than 15 Ma), the rapid burial of the Santa Cruz deposit led to the cessation of supergene enrichment processes.

7.3.6 Mineralization at the Texaco Deposit

Hypogene Mineralization

Hypogene mineralization at the Texaco deposit has been intersected with over a dozen widely spaced drillholes, historical and modern. However, the hypogene system has not been systematically tested and remains open in several directions. Hypogene mineral assemblages consist of chalcopyrite, pyrite, and molybdenite hosted within sulfide and quartz-sulfide veins, veinlets, vein breccias, and breccias, as well as fine to coarse disseminations within vein envelopes (dominantly replacing mafic minerals biotite and hornblende). Chalcopyrite and pyrite mineralization also occur locally as chemical cements in breccias similar to those found in the Southwest Exploration Area that occur with quartz and gypsum minerals. Hypogene mineralization is related to Laramide-aged quartz-biotite-feldspar granodiorite and latite porphyry dikes. At the Texaco deposit these sulfide minerals are interpreted to exhibit a distinct zoning pattern with a core zone of chalcopyrite-molybdenite, a chalcopyrite zone, and a pyrite zone. The core and chalcopyrite zone host rocks are altered by biotite-orthoclase-sericite and represent a potassic core transitionally overprinted by retrograde phyllic-style veins and alteration. Host rocks in the outer chalcopyrite zone and pyrite zone are altered by quartz-sericite (Kreis, 1978).

Supergene Mineralization

Drilling by ASARCO at Texaco deposit delineated supergene copper mineralization that remains open in several directions. The supergene mineralization at the Texaco deposit consists of a similar geochemical stratigraphy to that observed at the Santa Cruz deposit. Supergene mineralization contains a well-developed leached cap with abundant limonite consisting of hematite over goethite and minor jarosite. The limonite leached cap zone overlies a chalcocite enrichment blanket of variable thickness. However, supergene mineralization at the Texaco deposit contains much less copper-oxide and copper-chloride mineralization compared to the Santa Cruz deposit. Brochantite (copper sulfate) was also noted as the dominant copper-bearing phase in historic hole SC-23, where it is overprinting chalcocite (Kreis, 1978). Chalcocite mineralization was historically interpreted by previous operators as having been developed in an originally thick sub-horizontal blanket and subsequently thinned due to faulting and extension.

7.3.7 Mineralization at the Texaco Ridge Exploration Area

Recent drilling of the Texaco Ridge Exploration Area has identified some of the highest quartz-sulfide vein densities within the various deposits which may reflect proximity to one of the main hypogene hydrothermal centers. Hypogene mineralization includes quartz vein-hosted and disseminated chalcopyrite, pyrite, and molybdenite. Hypogene mineralization is associated with Laramide-aged biotite granodiorite porphyries, biotite latite porphyries, and rare amphibole-biotite latite porphyry dikes.

As with the Santa Cruz and East Ridge deposits, the Texaco Ridge Exploration Area contains a laterally extensive mafic conglomerate sequence within the basal conglomerates. Classic supergene chalcocite, chrysocolla, and atacamite are absent from the Texaco Ridge Exploration Area either due to erosion or poor development well below the paleo water table. Exogeneous mineralization, however, occurs as narrow bands of copper-bearing vermiculite and smectite-group clays within finely laminated lacustrine sediments above the mafic conglomerate and at the upper contact of the mafic conglomerate. Calcite and siderite occur commonly throughout the mafic conglomerate. The interior and basal sections of the mafic conglomerate are relatively unaltered or weakly altered by low-temperature weathering clays. Below the bedrock contact, the only noteworthy supergene mineralization identified is chalcocite rimming and partial replacement of primary hypogene chalcopyrite. The relatively thick sequence of mafic conglomerates in this exploration area may have acted as a significant reductant diminishing the weathering of hypogene sulfides and/or the supergene enrichment may have been eroded away by denudation prior to the deposition of the mafic conglomerate locally. It is important to note that supergene enrichment does occur within the Texaco deposit, located immediately east of the Texaco Ridge Exploration Area, at lower elevations of the paleotopography. If supergene enrichment of the Texaco Ridge Exploration Area was eroded, then there is still potential for supergene enrichment to exist laterally or at lower elevations to the east within the same structural block.

7.3.8 Mineralization at the East Ridge deposit

Hypogene Mineralization

Hypogene mineralization in the East Ridge deposit is correlative and displaced from the Santa Cruz deposit. Hypogene mineralization includes broad zones of low to moderate-density quartz-sulfide veins consisting of pyrite, chalcopyrite, molybdenite, and rare bornite mineralization. Lithologies hosting hypogene mineralization in and around the East Ridge deposit include Precambrian Oracle Granite, Laramide Porphyry, and Precambrian Diabase.

Supergene Mineralization

Supergene mineralization in the East Ridge deposit is also correlative and partially displaced from the Santa Cruz deposit. Supergene sulfides are present as thin, stacked intervals displaced from those in the Santa Cruz deposit by D2 faulting. Chrysocolla and atacamite mineralization is more broadly distributed, especially near the fault-controlled paleo-valley formed between the Santa Cruz deposit and the East Ridge deposit. Supergene mineralization tends to thin to the east and south within the East Ridge deposit.

7.3.9 Mineralization at the Southwest Exploration Area

Hypogene Mineralization

Hypogene mineralization within the Southwest Exploration Area is characterized by a single drill intercept that encountered bedrock at approximately 1000 m depth. The hypogene sulfides include pyrite and chalcopyrite that occur dominantly as a chemical cement within a magmatic-hydrothermal breccia. The breccia may resemble collapse breccias observed as late-stage features in many porphyry copper deposits. The breccia clasts are dominated by a Laramide-aged porphyritic diorite with lesser oracle granite and Laramide-age aplite, each with sparse quartz-sulfide veining; the clasts have been moderately to intensely potassically altered. Gangue minerals within the breccia cement include quartz, gypsum, and locally, anhydrite.

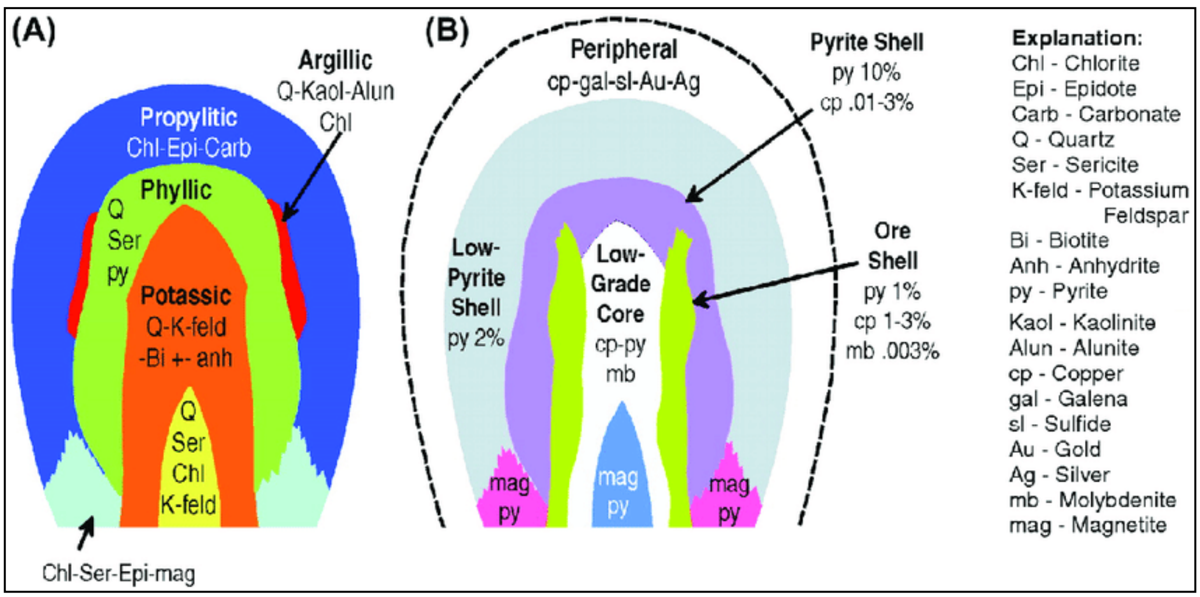
Supergene Mineralization

Supergene mineralization has not been encountered in the Southwest Exploration Area with diamond drilling. The bedrock contact was a faulted contact, and thus any supergene mineralization was displaced. Supergene mineralization may occur higher within the structural block.

8 Deposit Type

The Santa Cruz Project consists of a series of porphyry copper systems exhibiting typical features of porphyry copper deposits. Porphyry copper deposits form in areas of shallow magmatism within subduction-related tectonic environments (Sillitoe, 2010). The Santa Cruz Project has typical characteristics of a porphyry copper deposit defined by Berger et al. (2008) as follows (Figure 8-1):

- Copper-bearing sulfides are localized in a network of fracture-controlled stockwork veinlets and as disseminated grains in the adjacent altered rock matrix.
- Alteration and mineralization at 1 km to 4 km depth are genetically related to magma reservoirs emplaced into the shallow crust (6 km to over 8 km), predominantly intermediate to silicic in composition, in magmatic arcs above subduction zones.
- Intrusive rock complexes associated with porphyry Cu mineralization and alteration are predominantly in the form of upright-vertical cylindrical stocks and/or complexes of dykes.
- Zones of phyllic-argillic and marginal propylitic alteration overlap or surround a potassic alteration assemblage.
- Cu may also be introduced during overprinting phyllic-argillic alteration events.

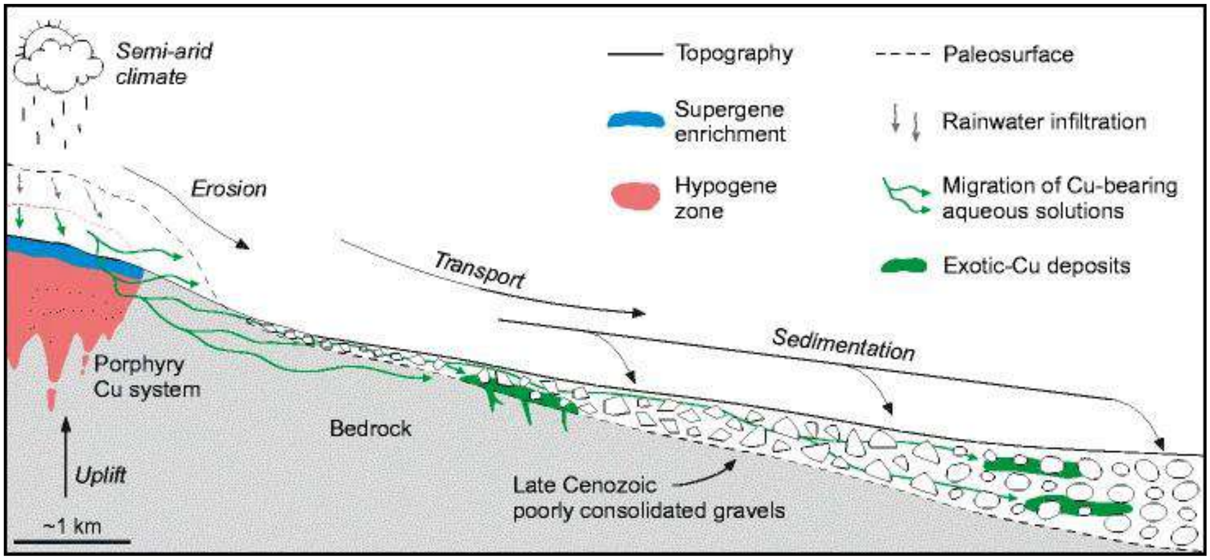


Source: Modified after Lowell and Guilbert, 1970

Figure 8-1: Simplified Alteration and Mineralization Zonation Model of a Porphyry Cu Deposit

Hypogene (or primary) mineralization occurs as disseminations and in stockworks of veins, in hydrothermally altered, shallow intrusive complexes and their adjacent country rocks (Berger, Ayuso, Wynn, & Seal, 2008). Sulfides of the hypogene zone are dominantly chalcopyrite and pyrite, with minor bornite. The hydrothermal alteration zones and vein paragenesis of porphyry copper deposits is well known and provide an excellent tool for advancing exploration. Schematic cross sections of typical alteration zonations and associated minerals are presented in Figure 8-2.

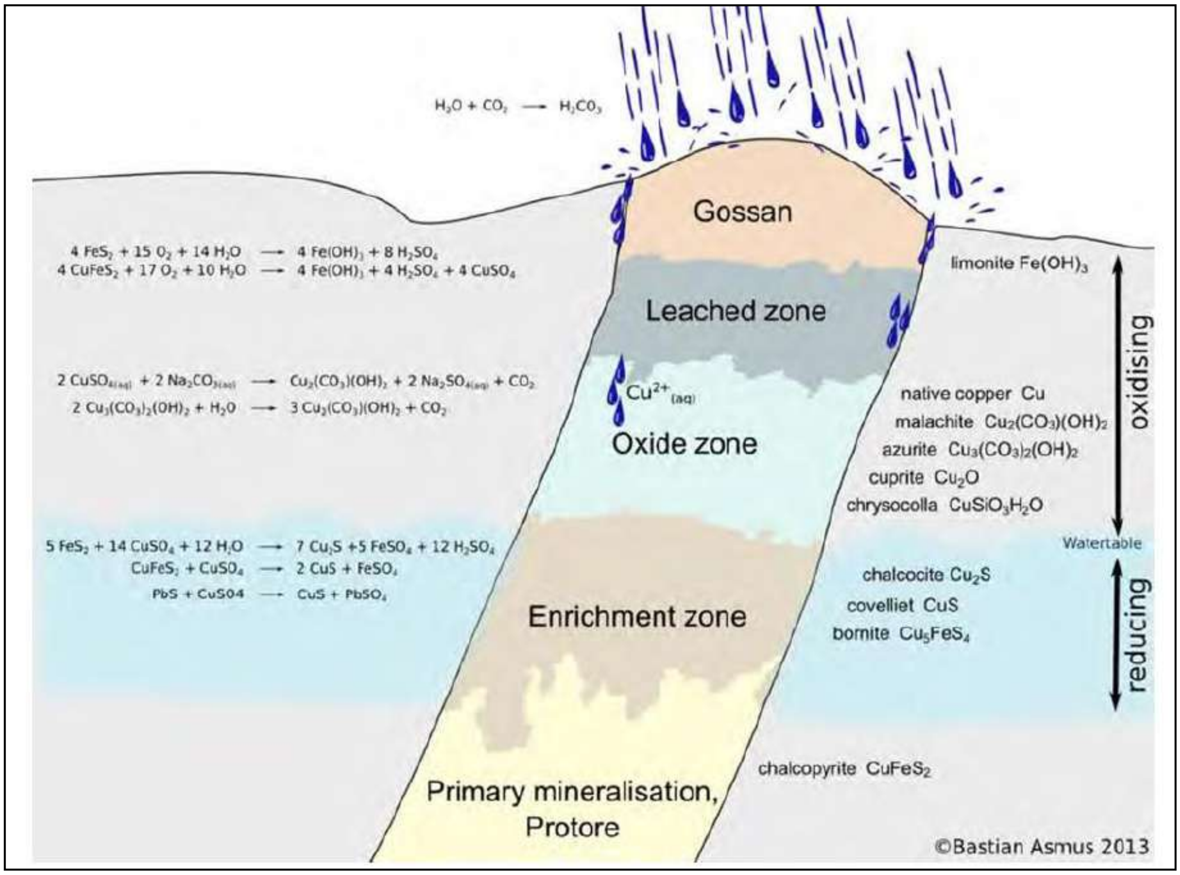
Supergene enrichment processes are a common feature of many porphyry copper systems located in certain physiogeographical regions (semi-arid). It can result in upgrading of low-grade porphyry copper sulfide mineralization into economically significant accumulations of supergene copper species (copper oxides, halides, carbonates, etc.). This is particularly important in the southwestern United States. Supergene enrichment occurs when a porphyry system is uplifted to shallow depths and is exposed to surface oxidation processes. This leads to the copper being leached from the hypogene mineralization during weathering of primarily pyrite, which generates significant sulfuric acid in oxidizing conditions, and redeposits the copper below the water table as supergene copper sulfides such as chalcocite and covellite. Figure 8-2 illustrates a schematic section through a secondary enriched porphyry copper deposit, identifying the main mineral zones formed as an overprint from weathering of the hypogene system.



Source: Fernandez-Mote et al., 2018; modified after Münchmeyer 1996; Sillitoe 2005

Figure 8-2: Schematic Representation of an Exotic Cu Deposit and its Relative Position to an Exposed Porphyry Cu System

The Santa Cruz Project has a history of oxidation and leaching that resulted in the formation of enriched chalcocite horizons, and later stages of oxidation and leaching, which modified the supergene Cu mineralization by oxidizing portions of it in place and mobilizing some of the chalcocite to a greater depth (Figure 8-3). This process is associated with descending water tables and or erosion and uplift of the system, or changes in climate, or hydrogeological systematics.



Source: modified from Asmus, B., 2013

Figure 8-3: Typical Cu Porphyry Cross-section Displaying Hypogene and Supergene Mineralization Processes and Associated Minerals

These processes are also known to be associated with the generation of exotic copper deposits. Exotic copper mineralization is a complex hydrochemical process linking supergene enrichment, lateral copper transport, and precipitation of copper-oxide minerals in the drainage network of a porphyry copper deposit (Mote et al., 2001).

9 Exploration

9.1 Geophysical Exploration

IE has completed several geophysical exploration surveys over the Santa Cruz Project area including ground gravity, ground magnetics, seismic, and proprietary Typhoon™ 3D PPD IP. The geophysical datasets have been used to assist with geological interpretation and improved drill targeting.

9.1.1 Ground Gravity Survey

Phase 1 of the Santa Cruz ground gravity survey was completed in January 2022. 615 stations were collected within the property boundaries. Phase 2 of the survey was done in August 2022 with 307 more gravity stations collected (Figure 9-1).

Topographic surveying was performed simultaneously with gravity data acquisition. The gravity stations were surveyed in WGS84 UTM Zone 12 North coordinates in meters. The GEOID18 geoid model was used to calculate North American Vertical Datum of 1988 (NAVD88) elevations from ellipsoid heights. The coordinate system parameters used on this survey are summarized in Table 9-1.

Table 9-1: Ground Gravity Topographic Survey Coordinate System Parameters

Datum Name	WGS84
Ellipsoid	World Geodetic System 1984
Semi-Major Axis	6378137.000 m
Inverse Flattening	298.257223563
Transformation	None
Projection Type	Universal Transverse Mercator
Zone	UTM 12 North
Origin Latitude	00º 00' 00.00000" N
Central Meridian	111º 00' 00.00000" W
Scale Factor	0.9996
False Northing	0
False Easting	500000 m
Geoid Model	GEOID18 (CONUS)

Source: Nordmin, 2023

Relative gravity measurements were made with Scintrex CG-5 Autograv gravity meters. Topographic surveying was performed with Trimble Real-Time Kinematic (RTK) and Fast-Static (FS) GPS. The gravity survey is tied to a gravity base established in January 2022 and was designated “CASA”. The CASA base is tied to the U.S. Department of Defense gravity base in Florence, AZ; designated “FLORENCE” (DoD reference number 3213-1). The integer value 9999 was used in the CG-5 gravity meters as the identifier for CASA and 8888 was used for Florence. The coordinates in WGS84/NAVD88 on these bases is in Table 9-2.

Table 9-2: Ground Gravity Base Information

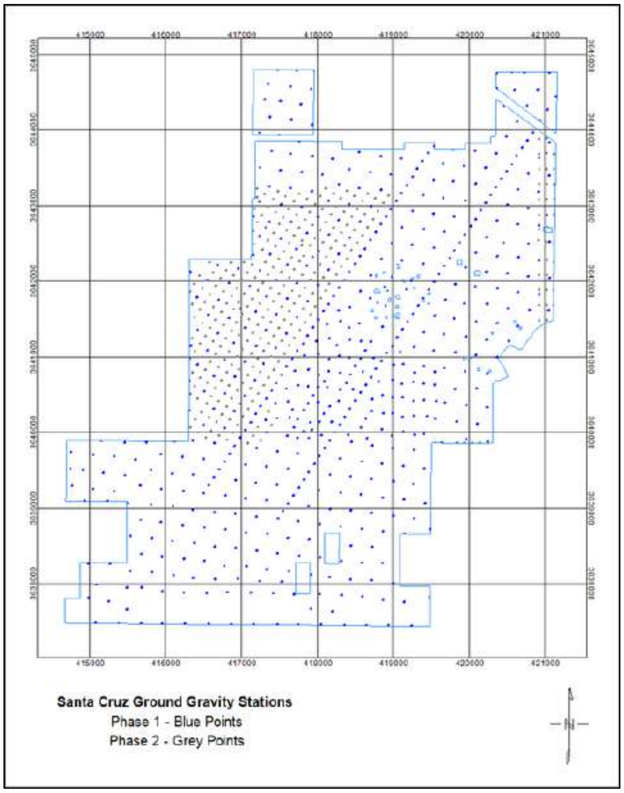
Base ID	CG5 ID	Absolute Gravity	Latitude	Longitude	Elevation (m)
FLORENCE	8888	979 393.50 mGal	33.03114	-111.37930	459.3
CASA	9999	979 393.522 mGal	32.87787	-111.70788	399.59

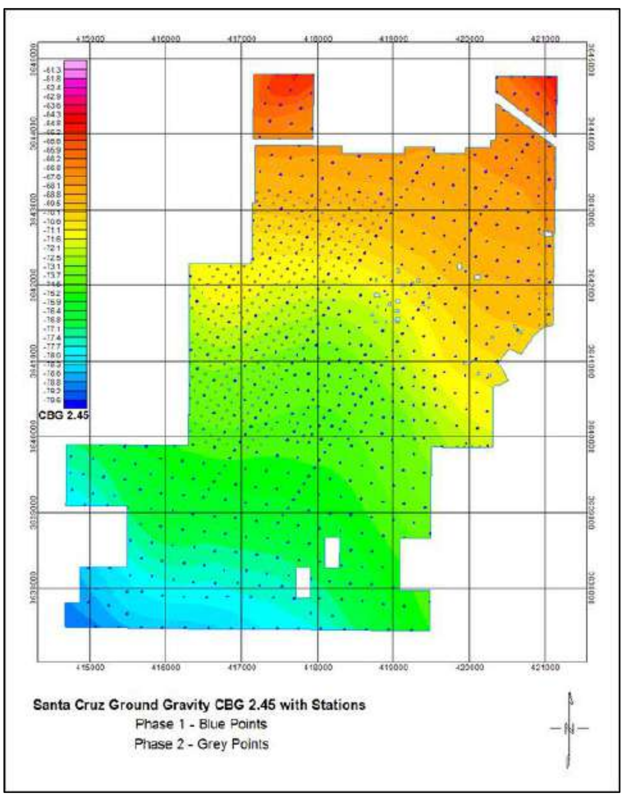
Source: Nordmin, 2023

Gravity data processing was performed with the Gravity and Terrain Correction module of Seequent's Oasis montaj (Version 2021.2 [20211201.32]) The raw ASCII text files were edited to remove unwanted records prior to data processing in Oasis montaj. Editing consisted of:

- Removal of incomplete integration records (i.e., <90 sec).
- Removal of assumed additional low frequency noise likely associated with elastic relaxation, instabilities in the sensor and/or high tilt susceptibility introduced during transport between stations.

Local slope measurements were also entered into the *Line* column of the ASCII text file during this stage. A residual drift correction was then applied to produce observed gravity. Gravity data were then processed to Complete Bouguer Anomaly (CBA) over a range of densities from 2.00 g/cc through 3.00 g/cc at steps of 0.05 g/cc using standard procedures and formulas.



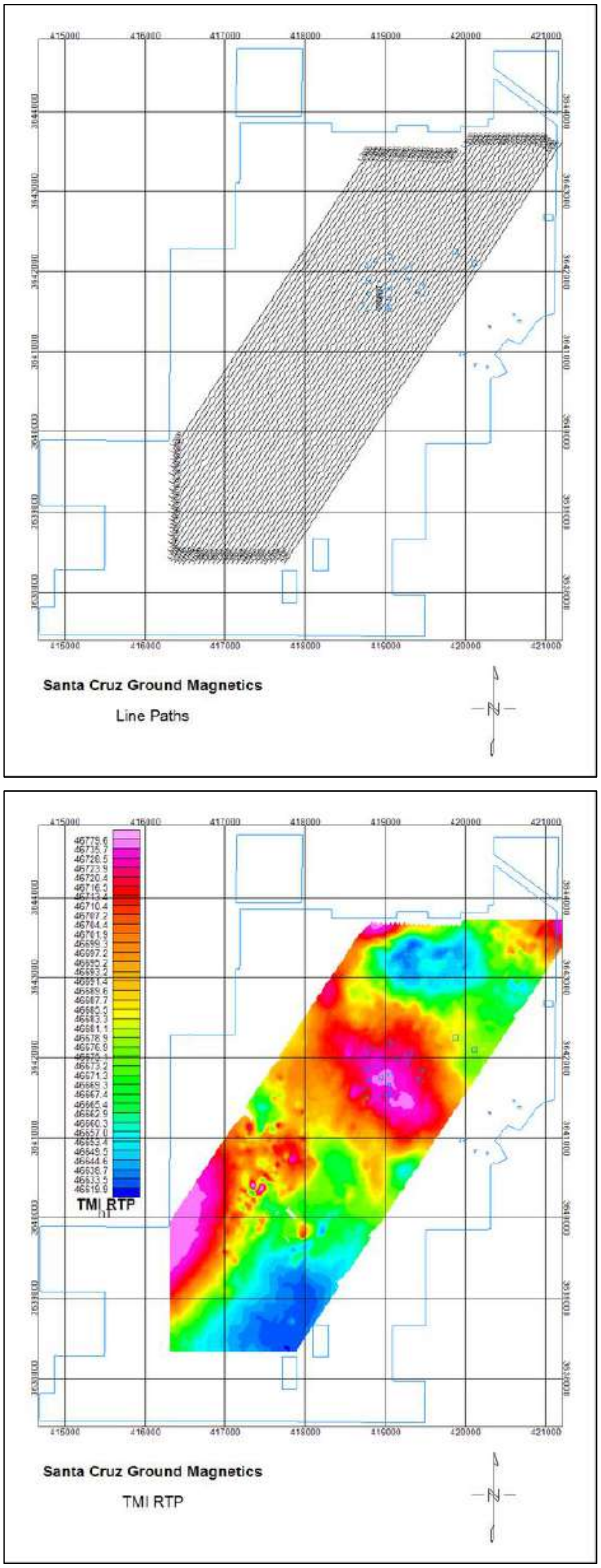


Source: Nordmin, 2023

Figure 9-1: Gravity Survey Stations (top) and Complete Gravity Survey Results (bottom)

9.1.2 Ground Magnetics Survey

A 243 line-kilometer (line-km) ground magnet survey was carried out between January 22-27, 2022. Data was collected on lines spaced 50 m apart with an orientation of 33° from true north. Results and lines used can be seen in Figure 9-2. The survey was completed by Magee Geophysical services of Reno, Nevada, using geometrics G858 Cesium vapor magnetometers for both base station and rover data collection. G858 magnetometers can sample the earth's magnetic field at a 10Hz frequency. GPS data is collected synchronously during data acquisition at a rate of 1Hz and is embedded in the data for accurate positioning of the transects. Data from the rover and base were downloaded daily and diurnal variations were corrected for in Geometric's own MagMap software. Final data processing was completed in Seequent's Oasis montaj software. Artifacts from cultural noise were removed and a narrow non-linear filter was used to smooth very short wavelength near surface features.



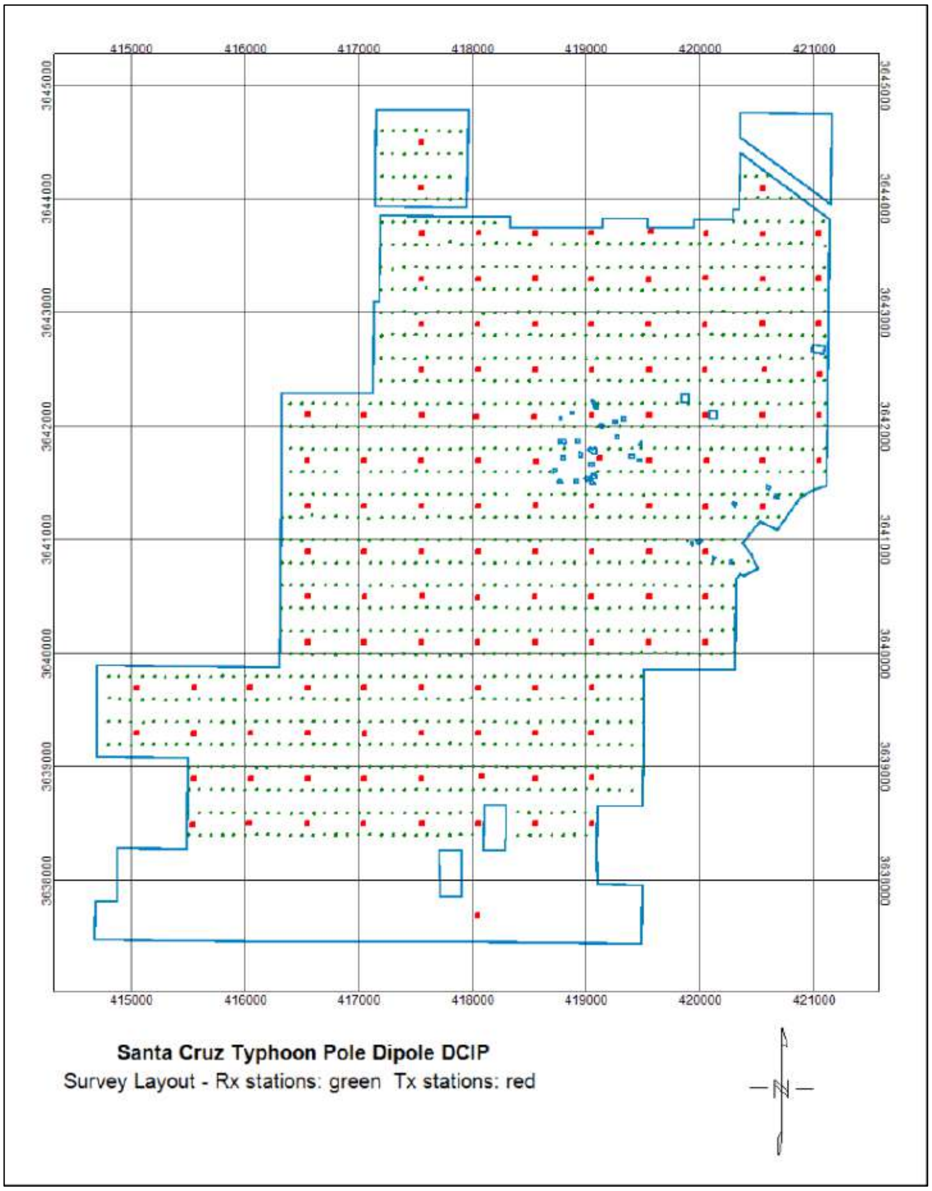
Source: Nordmin, 2023

Figure 9-2: Ground Magnetics Survey Lines (top) and Ground TMI RTP Ground Magnetics Results (bottom)

9.1.3 Typhoon™ Survey

The Santa Cruz Project Typhoon™ 3D PPD IP survey was conducted by IE using the Typhoon™ 2 high power geophysical system. Acquisition of 50 line-km of 3D PPD time domain IP data was completed over an area of 27 km^2 from May to July 2022 (Figure 9-3).

The survey was designed as a 3D PPD array with 32 East-West receiver lines spaced 200 m apart with electrodes spaced at 100 m intervals along the lines. Current injections were performed at 136 transmitter pits spaced 500 m apart East-West and 400 m apart North-South (Figure 9-3). The remote electrode was installed approximately 4 km south of the center of the grid for the first half of the survey and then moved to a pit at the Northwest corner of the survey for receiver lines south of Clayton Road.



Source: Nordmin, 2023
Note: Green dots are receiver electrodes and red dots are transmitter points.

Figure 9-3: Layout of the Santa Cruz 3D IP Survey

Table 9-3: Santa Cruz Typhoon™ 3D PPD IP Survey Specifications

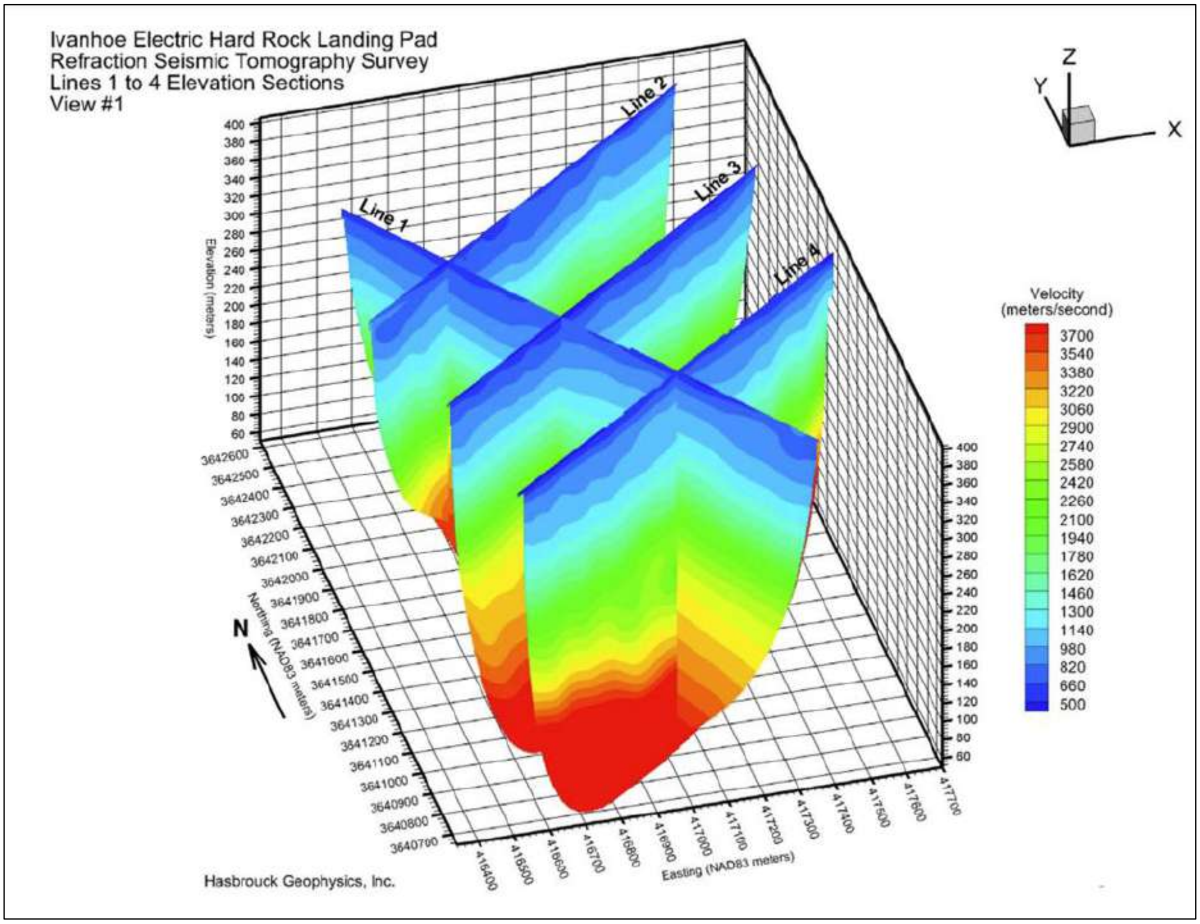
Survey type	Time domain 3D IP
Survey design	Pole-dipole IP 200m receiver line spacing; 100m electrode spacing
Survey area	27 km^2
Transmitter	Typhoon™ 2
Planned number of Tx poles	154
Transmit frequencies	1/12 Hz (= 0.0833 Hz)
Injected current	8-26 Amps
Receiver sampling rate	150 Hz
Recording time	12 minutes
Number of cycles for stacking	100
Receiver Type	DIAS 32
Number of receiver dipoles	5,000-7,000 unique dipoles per injection, 1011000 total dipole recordings
Line km	128.6 line-km of receivers
Receiver dipole lengths	100 m to 1,000 m
Receiver electrode station spacing	Grid: 200 m north-south, 100 m east-west
Recovered frequency range	0.0833 Hz
IP integration window	450 -2,940 ms
IP conversion factor	None applied
Sensor	N/A
GPS datum	WGS84
GPS projection	UTM Zone 12N
GPS heights	WGS84

Source: Nordmin, 2023

9.1.4 2D Seismic Refraction Tomography

Two-dimensional (2D) surface seismic refraction tomography surveys were conducted at the Santa Cruz Project. The purpose of the survey was to determine bedrock depth and topography. Surface seismic data were acquired along four lines by Bird Seismic Services, Inc., Globe, Arizona, in a manner suitable for 2D tomographic analyses using a Seistronix EX-6 seismograph, configured with sufficient channels to extend the entire length of each line, in 32-bit floating-point format data, 2 second record length and 0.5 ms sample rate. Geospace SM24 geophones (one per takeout) with 10-Hz natural frequencies were placed at intervals of 12.2 m along each line and source points were located between geophones at intervals of 36.6 m. A United Service Alliance AF-450 nitrogen gas accelerated weight-drop seismic source with a 450 lb weight was used. For this Project, the seismic data were stacked nominally five to ten times at each source point to increase the signal-to-noise ratio. Stacking, or signal enhancement, involved repeated source impacts at the same point into the same set of geophones.

The seismic tomography data for this Project were processed using the Rayfract (version 3.36) computer software program developed by Intelligent Resources Inc. of Vancouver, BC, Canada. The models produced by the Rayfract tomography program use multiple signal propagation paths (e.g., refraction, reflection, transmission, and diffusion) that comprise a first break. See Figure 9-4.



Source: Nordmin, 2023

Figure 9-4: Refraction Seismic Tomography Survey Results

9.1.5 Historical Geophysical Exploration

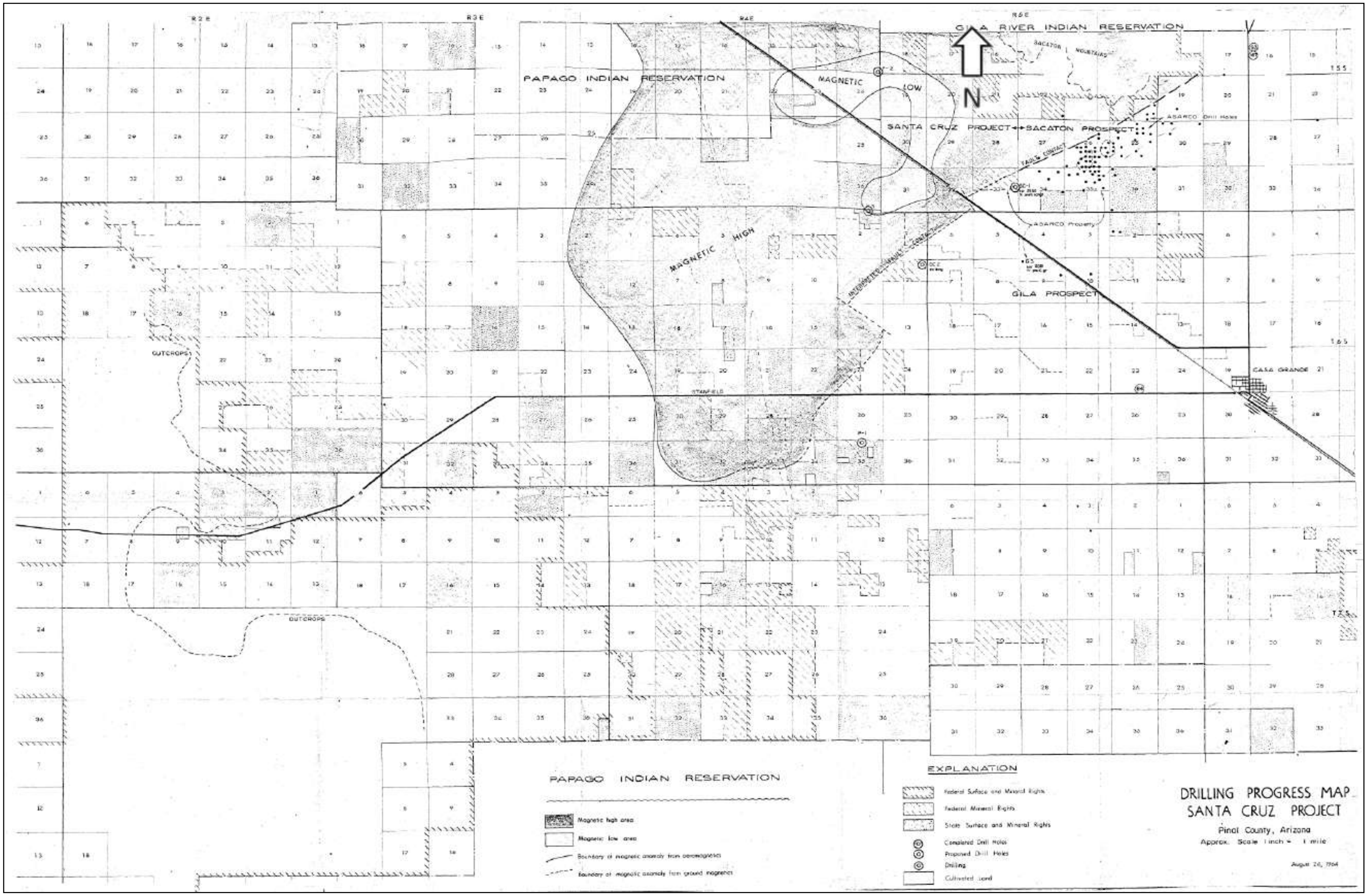
IE has historical documents that detail historical geophysical exploration efforts and results over the Santa Cruz – Sacaton system (Table 9-4). To date, none of the original data has been located, but historic interpretations, and results remain valuable.

Table 9-4: Summary of Historical Exploration on the Santa Cruz Project and Surrounding Area

Year	Activities	Company(s)	Prospect/ Deposit	Description	Notes
1961	Prospecting and discovery	ASARCO	Sacaton	ASARCO geologists Kinnison and Blucher identify *Sacaton Discovery Outcrop,* consisting of weak Cu-oxide mineralization on what will eventually be the margin of the Sacaton pit.	Based on Asarco's recognition that porphyry Cu deposits often have little or no associated Cu staining and on information from surrounding porphyry Cu deposits, Asarco's geologists were looking for other prospects in the area by driving and walking around. There was a faint trace of Cu-stain but not enough to have attracted previous exploration or prospecting. The outcrop was granite with a thin dyke of porphyry – both altered to quartz-sericite-clay with weak but pervasive jarosite-goethite and a few specks of hematite after chalcocite, particularly in the dyke. The outcrop was expected to have originally contained about 2% sulfides as pyrite/chalcocite/chalcopyrite.
1961	Geophysical Surveying	ASARCO	Sacaton	ASARCO Geophysical Dept. report.	Geophysical survey results were used to improve the interpretations of bedrock depth in the Sacaton area.
1967	Ground IP geophysics	ASARCO		1967 Internal report indicates eight holes were drilled over a large 13.2 mv/v IP anomaly around 15 miles SW of Sacaton.	None of the drillholes intersected primary sulfides, and the chargeability response was interpreted to have been caused by water-saturated clays in the overlying conglomerate.
1988-1991	Borehole Geophysics	SCJV	Santa Cruz	Downhole geophysical data was collected during the in situ leach test program.	During the SCJV In Situ leach tests (approximately 1988-1991), an undisclosed number of holes were subjected to downhole/borehole geophysical surveying that implemented the collection of caliper, density, resistivity, gamma-ray spectrometer, neutron activation spectrometry, dipmeter, sonic waveform, IP, and magnetic susceptibility data collection methods.
1988	In situ Cu Mining Research Project	USBR, SCJV (ASARCO Santa Cruz Inc., and Freeport McMoRan Copper & Gold Inc.)	Santa Cruz	Santa Cruz selected over other deposits for research site; Field testing begins.	The Santa Cruz deposit was 1,250 ft to 3,200 ft below the surface and contains 1.0 billion tons of potentially leachable grading 0.55% total Cu. The joint venture owns 7,000 surface acres, with the Cu mineralization under approximately 250 acres.

Source: Nordmin, 2023

Historical ASARCO documents detail multiple IP surveys over the Sacaton and Santa Cruz deposits, as well as the historic Santa Rosa Prospect. Historic IP survey reports indicate that extraneous responses in IP surveys at Sacaton and Santa Cruz resulted from groundwater present in the valley fill conglomerates (i.e., W.G. Farley "ASARCO, 1967, Induced Polarization Pinal County" report documents IP response correlating with the water table at Santa Cruz and Sacaton, within the overlying gravels, and well above the basement contact). In 1991, the ASARCO-Hanna-Getty-Bureau of Mines joint venture contracted Zonge Geophysical to implement Controlled Source Audio-frequency Magnetotelluric (CSAMT) tests evaluating the potential to use the application to non-invasively monitor in situ leachate plume activity during in situ leach tests. Results from phase one and two testing from May 1990 through June 1991 were considered promising for tracking leachate detectability with salt doping/tracing. Historic airborne and ground magnetic interpretations are also available, though of lesser value than modern magnetic datasets (Figure 9-5).



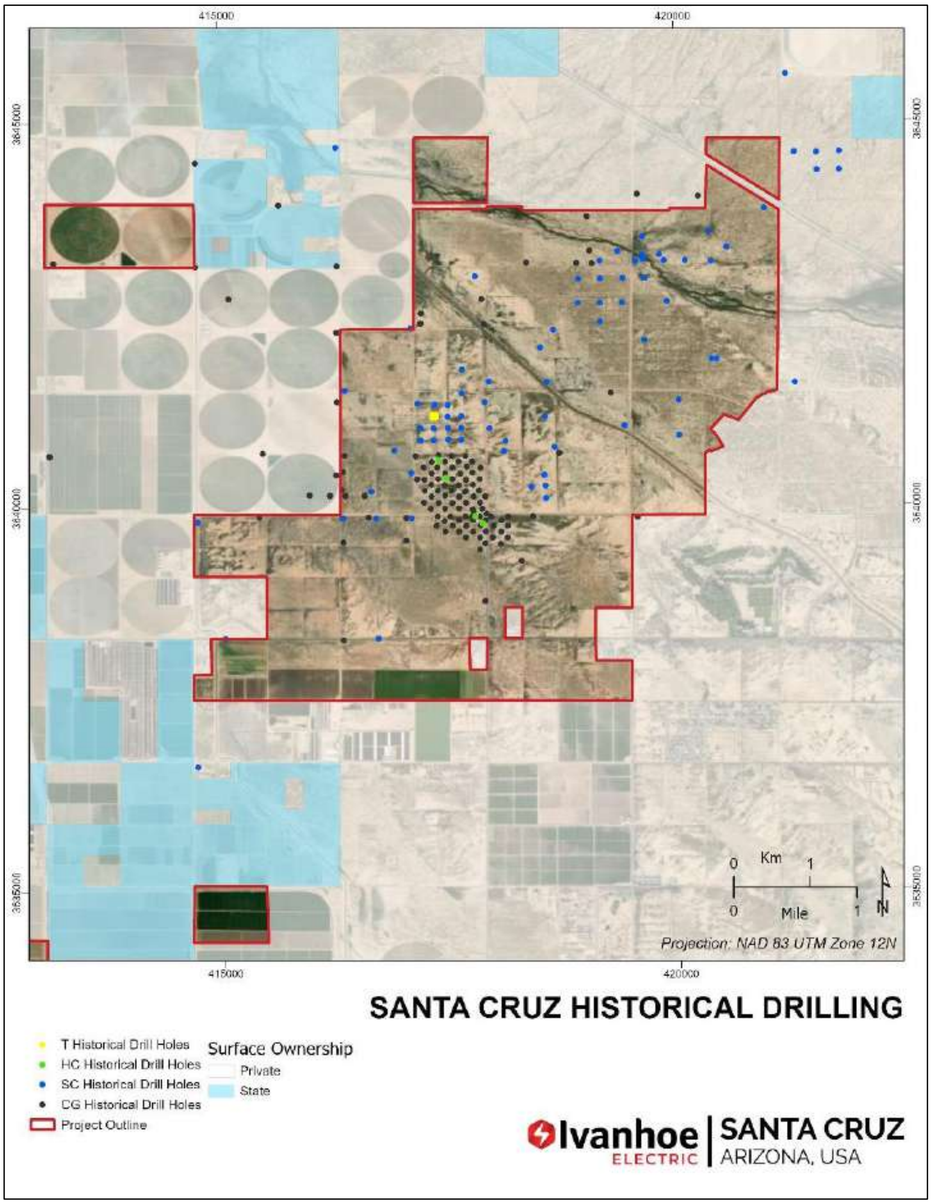
Source: Nordmin, 2023

Figure 9-5: ASARCO Map Illustrating Interpreted Ground and Aeromagnetic Data Detailed in Historic Report: "Recommended Drilling Santa Cruz Project," M.A.970 Pinal County, Arizona, August 21, 1964, by W.E. Saegart

9.2 Historical Data Compilation

IE has obtained geological information in the form of historical maps, sections, drill reports, drill logs, and assay result reports. As a significant component of the exploration program, the historical drill logs were interpreted and used to create a 3D (Leapfrog Geo™) geologic model of the Santa Cruz Project. Three-dimensional geological interpretations were derived from historical drill logs and 2D sections containing geologic interpretations. The drill core data was compiled by IE geologists.

The historical drilling within the Project area can be separated into several series: CG (Hanna-Getty), SC (ASARCO), and T and HC drilling (related to the In Situ program described in Section 6.3.2). A plan view map of collar locations is in Figure 9-6 and a summary is provided in Table 9-5.



Source: IE, 2023

Figure 9-6: Plan Map of Historical Drillhole Collars

The CG series drilling comprised 122 drillholes (CG-001 to CG-122) with 102,563 m drilled. Twenty-nine original drill cross-sections from 1978 to 1980 covering 92 holes were digitized. Information collected included elevation, total and rotary depths, basic lithology, assays from the three most predominant Cu minerals (total Cu, acid soluble Cu, and molybdenum), and survey depth. The archived data was originally recorded using a series of numerical codes documented in the "Casa Grande Copper Company Ore Reserves Study" for the Hanna Mining Company (Watts Griffis McOuat, 1982).

The SC series drilling, by ASARCO, comprised 80 drillholes (SC-001 to SC-078) with 62,754 m drilled. The archived data was originally logged using a series of numerical codes documented in the Casa Grande Copper Company Ore Reserves Study for the Hanna Mining Company (Watts Griffis McOuat, 1982).

The T and HC drilling were related to the In Situ testing in the 1990's described in Section 6.3.2. The T series drilling comprised five holes (T-1 to T-5) with 2,295 m drilled. The HC series drillings comprised five holes (HC-1 to HC-5) with 3,622 m drilled. A summary of data available by each of the drill sets is shown in Table 9-5.

Table 9-5: Summary of Available Data by Region

	Dataset Region				Total
	CG	SC	HC	T	
Total number of holes	121	80	5	5	211
Total drilled (m)	102,563	62,754	3,622	2,295	165,317
% Collar Survey (holes)	100	100	0	0	100
% Downhole Survey (m drilled)	62.1	65.9			63.4
% Assay (m drilled)	96.5	34.4			73.0

Source: Nordmin, 2023

10 Drilling

10.1.1 Historical Drilling – Santa Cruz and East Ridge Deposits

Santa Cruz deposit diamond drilling consists of 108,301 m of core from 126 NQ drillholes completed between 1965 to 1996. Historically, these two deposits were undifferentiated, thus drilling totals are cumulative for both deposits. The historic diamond drill core is currently unavailable for review. Table 10-1 provides a summary of the drill campaigns by year and operator.

Table 10-1: Drilling History Within the Santa Cruz Deposit and East Ridge Deposit Area

Year	Operator	Total (m)
Unknown	Casa Grande Copper Company, Hanna-Getty Mining	9,083
	ASARCO/Freeport McMoRan Gold Co. JV	744
1965	ASARCO/Freeport McMoRan Gold Co. JV	2,698
1974		2,068
1975	Casa Grande Copper Company, Hanna-Getty Mining	2,348
	ASARCO/Freeport McMoRan Gold Co. JV	682
1976	Casa Grande Copper Company, Hanna-Getty Mining	16,633
	ASARCO/Freeport McMoRan Gold Co. JV	513
1977	Casa Grande Copper Company, Hanna-Getty Mining	28,147
	ASARCO/Freeport McMoRan Gold Co. JV	9,184
1978	Casa Grande Copper Company, Hanna-Getty Mining	22,301
1979	ASARCO/Freeport McMoRan Gold Co. JV	2,468
1980		5,516
1989	In Situ Testing	2,630
1996		3,286

Source: Nordmin, 2023

During the initial site assessment, it was determined that historical collar coordinates had variable errors. A program was conducted to check the collar locations of a selection from the drillhole database using a professionally licensed surveying company, D2 land surveying. Based on the transformation for these spot-checked drillholes, nearby hole collar locations were adjusted. All historical drilling is conducted with a vertical dip. For the Santa Cruz deposit, the drilling has been completed along 100 m spaced section lines with drillholes spaced 90 to 100 m apart on each section line.

Holes are reverse circulation (RC) drilled through Tertiary sediments until the approximate depth of the Oracle Granite is reached by Major Drilling. Drilling is then switched to diamond drilling through the crystalline basement rocks, and again drilling is executed by Major Drilling.

10.1.2 Historic Drilling – Texaco Deposit

The historic Texaco deposit diamond drilling consists of 23,848 m of core from 27 diamond NQ drillholes completed between 1975 to 1997. The drillholes in this deposit area consist of the SC drillhole series. The historic diamond drill core is currently unavailable for review. Table 10-2 provides a summary of the drill campaigns by year and operator.

Table 10-2: Drilling History within the Texaco Deposit

Year	Operator	Total (m)
1975	ASARCO and Freeport McMoRan Gold JV	1,719
1976	ASARCO and Freeport McMoRan Gold JV	5,207
1977	Casa Grande Copper Co., Hanna-Getty Mining	2,883
	ASARCO and Freeport McMoRan Gold JV	5,906
1996	ASARCO and Freeport McMoRan Gold JV	5,086
1997		3,043

Source: Nordmin, 2023

During the initial site assessment, it was determined that historical collar coordinates had variable errors. A program was conducted to check the collar locations of a selection from the drillhole database using a professionally licensed surveying company, D2 land surveying. Based on the transformation for these spot-checked drillholes, nearby hole collar locations were adjusted. All historical drilling is conducted with a vertical dip. For the Texaco deposit, historical drilling has been completed along 100 m to 200 m spaced section lines with drillholes spaced 200 m apart on each section line. The average drill section and spacing in the Texaco deposit is approximately 200 m and varies between approximately 90 m and 250 m.

10.1.3 2021 Twin Hole Drilling – IE

The company completed five diamond drillholes totaling 4,739 m within the Santa Cruz deposit at the time of this Technical Report (Table 10-3). The five diamond drillholes were twins of the historical drillholes. All drilling was a mix of rotary and diamond drilling where the first 300 m to 500 m of drilling was rotary to get past the barren tertiary sediments. All samples from within the interpreted mineralized zone were assayed for total Cu (%), acid soluble Cu (%), cyanide soluble Cu (%), and molybdenum (ppm). The collar locations, downhole surveys, logging (lithology, alteration, and mineralization), sampling and assaying between the two sets of drillholes were used to determine if the historical holes had valid information and would not be introducing a bias within the geological model or Mineral Resource Estimate. The comparison included a QA/QC analysis of the historical drillholes (Section 0). Plans for infill drilling and drilling of angled holes have been made to test the continuity of mineralization and gain more information.

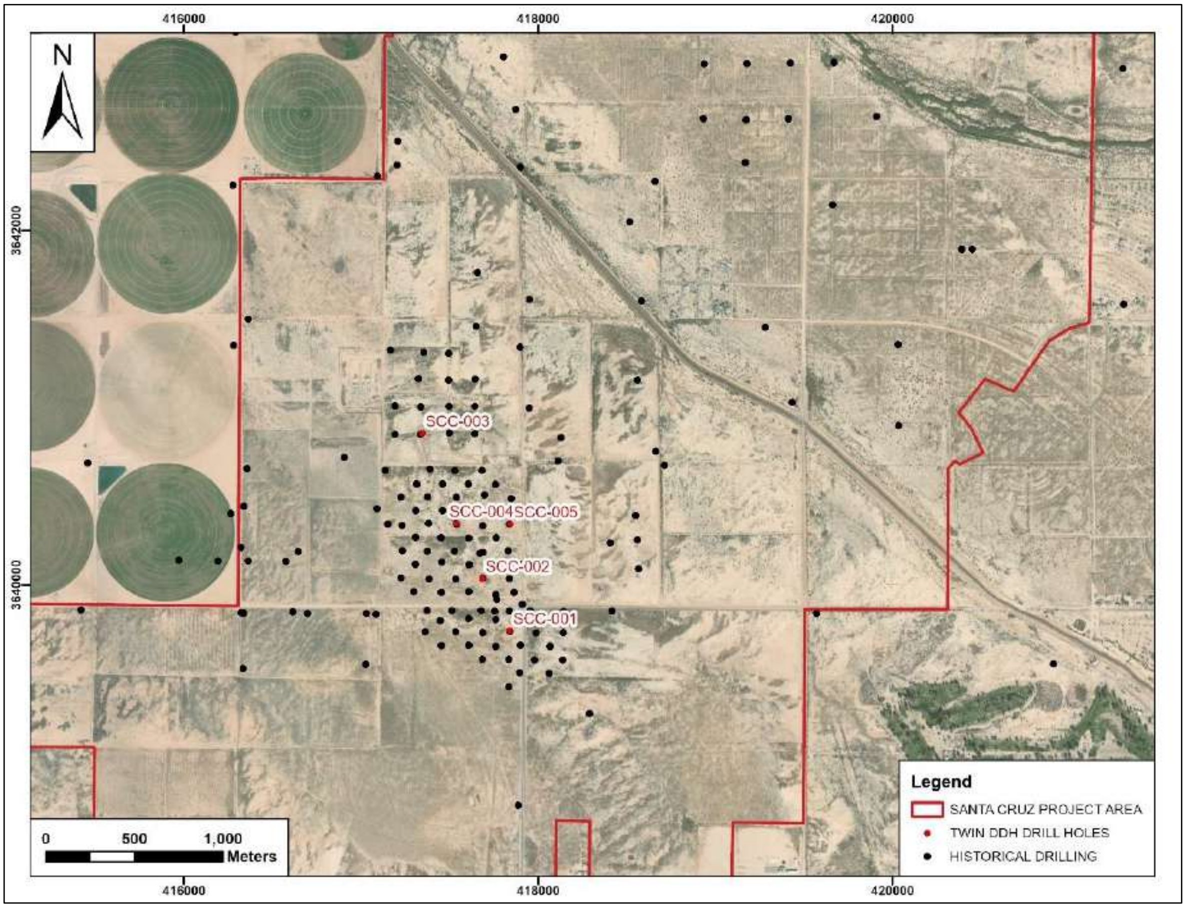
Table 10-3: IE 2021 Twin Hole Drilling on the Santa Cruz Deposit

Year	Operator	Total (m)
2021	IE	4,739

Source: Nordmin, 2023

A total of five historical holes were reviewed with the following outcomes (Figure 10-1):

- All five historical hole assays aligned with the 2021 diamond drilling assays.
- The 2021 diamond drilling assays were of higher resolution due to smaller sample sizes.
- The recent drilling validated the ASARCO cyanide soluble assays.



Source: IE, 2023

Figure 10-1: Plan Map of the Twinned Drillholes and Historical Drillhole Collars

10.1.4 2021-2022 Drilling Program – IE

Core Logging

Initially, IE Geologists enter information into several tabs within MX Deposit™ while logging, including lithology, alteration, veining, structural zone, structure point, and mineralization. Optional characterizers, including color and grain size, are available for further identification.

The current database has five major rock types, including 47 major lithologies in line with historically logged lithologies, 21 lithological textures, 17 alteration types, and 15 lithological structures. There are 28 unique economic minerals recorded in the current database, including chalcocite, chrysocolla, chalcopyrite, cuprite, molybdenum, and atacamite. X-ray fluorescence (XRF) measurements are taken by IE wherever mineralization of interest is present for internal use.

Surveying

During 2021-2022 drilling, downhole surveying was conducted using an EZ Gyro single shot taken from the collar and every 30 m afterwards as the tool is being pulled from the hole.

After hole completion, all drillholes were surveyed using borehole geophysics and video through Southwest Exploration Service, LLC. Each borehole was surveyed for 4RX Sonic-Gamma (sampled every 0.06 m), Acoustic Televiewer (sampled every 0.003 m), E-Logs-Gamma (sampled every 0.06 m), and a Gamma Caliper test for fluid temperature conduction (sampled every 0.06 m). This downhole surveying allowed for the calibration of drillhole information post-drilling to ensure that surveying was correct and lithological and mineralogical contacts were logged properly. The downhole surveying has collected very accurate structural measurements.

Specific Gravity

At both the Santa Cruz and Texaco deposits, no specific gravity (SG) measurements were taken from historical diamond drill core. The 2021 diamond drilling was aimed at twinning CG historical drilling to confirm the historical logging and assays. The 2022 diamond drilling program was aimed at expanding and defining the mineral resource. IE collected 2,639 SG measurements over 74 diamond drillholes across the Santa Cruz Project (Table 10-4). SG measurements are taken every 3 m or at each new lithology to ensure a well-established database of measurements for each rock type. Measurements are taken using a water dispersion method. The samples are weighed in air, and then the uncoated sample is placed in a basket suspended in water and weighed again.

Table 10-4: Santa Cruz Project SG Measurements

Lithology	Average SG
Alluvium	1.88
Whitetail Conglomerate	2.28
Apache Leap Tuff	2.25
Gila Conglomerate	2.29
Mafic Conglomerate	2.37
Basal Conglomerate	2.43
Diabase	2.61
Laramide Porphyry	2.56
Oracle Granite	2.52
Pinal Schist	2.65
Unspecified	2.36

Source: Nordmin, 2023

Due to the overall low SG values, multiple styles of SG measurement were tested, all of which indicated that these values are correct. The low SG values are interpreted to be due to the high porosity from leaching, faulting, and brecciation throughout the mineralized rock.

2021-2022 Drilling Program Summary

Drilling performed by IE over the 2021-2022 calendar years included 6005.18 m from 6 completed drillholes in 2021 and 60,116.54 m from 106 completed drillholes completed in 2022. Drilling during the 2021-2022 drilling campaigns was focused on multiple areas at the Santa Cruz Project including the Southwest Exploration Area, Santa Cruz Deposit, East Ridge Deposit, Texaco Ridge Exploration Area, and Texaco Deposit. Much of the drilling was focused on mineral resource definition within the Santa Cruz Deposit with secondary exploration drilling in the other project Areas.

Drilling was performed using a variety of drilling equipment and methodologies including reverse circulation, diamond coring, tricone rotary, and shallow sonic boring. Drilling methodology varied across the Santa Cruz Project depending on objective and target depth. The majority of drilling was standard PQ diamond coring from surface to maximize the amount of core sample recovered for use in multiple sampling and testing programs. Non-resource related drilling, particularly focused outside the Santa Cruz Deposit itself was performed using tricone rotary surface as pre-collar parent holes for subsequent HQ size coring at target depths. Tricone rotary with HQ tails was utilized when targets did not require large-diameter coring from surface, allowing for this more cost-efficient technique.

Reverse circulation and sonic drilling were also used in 2022 for rapid characterization of: bedrock interface underneath sedimentary cover, soil and clay, and overburden sediments and conglomerate units, respectively.

Abandonment procedures for all drilling performed during the 2021 and 2022 campaigns were designed and held to meet or exceed State mandated requirements. The majority of drilling reaching or exceeding depths over 100 m utilized borehole abandonment of State approved methods involving: abandonite to approximately 20 m below the geological contact between bedrock and overburden sediments, if present, then the installation of appropriately sized Bradley plugs, labeled with the associated borehole ID, as the base for pumping and curing State approved cement across the geological contact to seal the interface, followed by additional abandonite to approximately 20 m below the topographic surface, with an approximately 20 m cement cap, with the hole tagged and labeled for collar demarcation. Shallow drillholes, particularly those drilled utilizing only reverse circulation or sonic drilling methods, were abandoned using cement from total depth to surface with cap, with the hole tagged and labeled for collar demarcation.

A drillhole summary complete to December 31, 2022 can be seen in Table 10-5. A map of drillhole collar locations can be seen in Figure 10-2. Cross sections and further geological discussion is presented in Section 14.

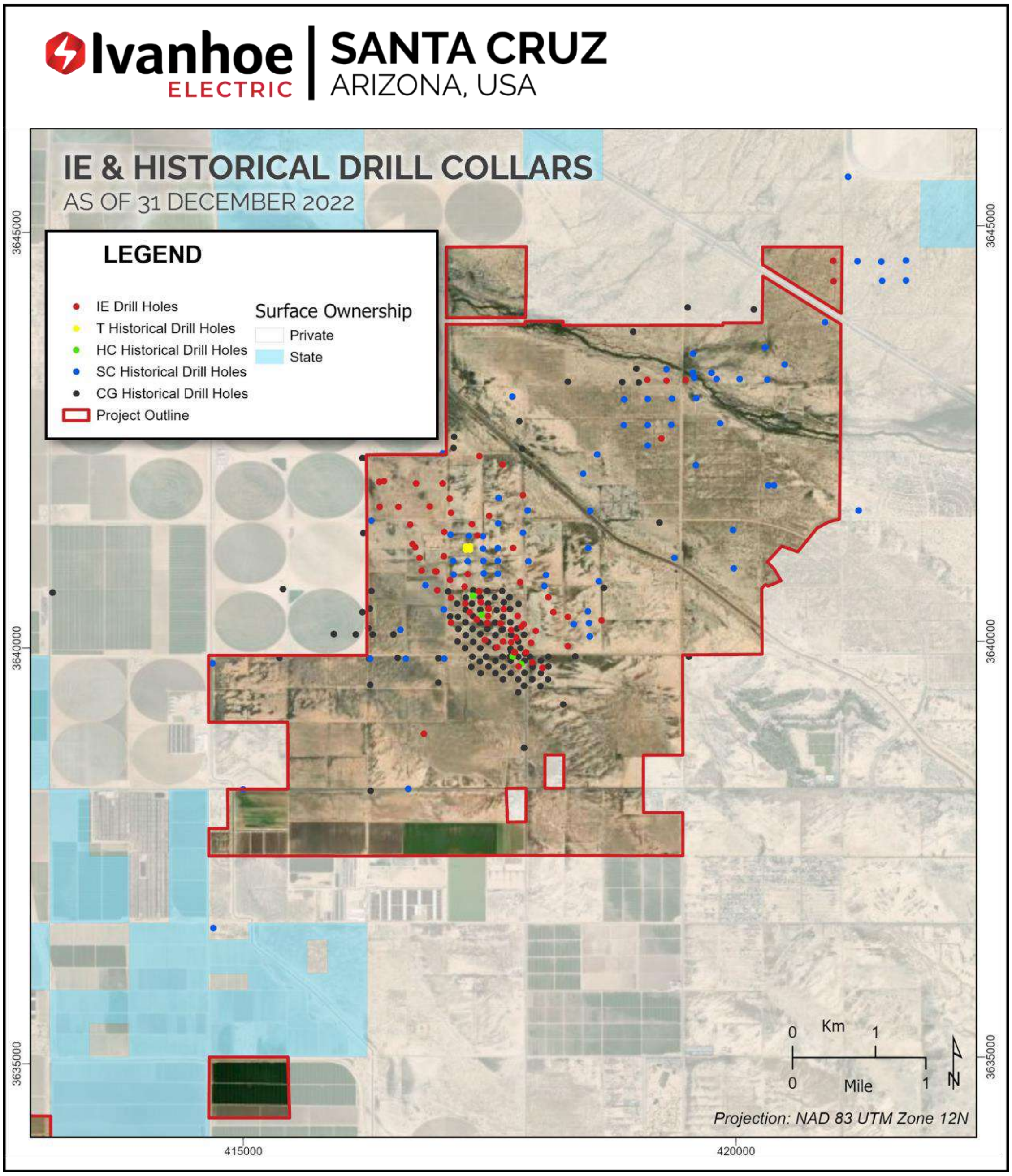
Table 10-5: 2021-2022 Drilling Summary

Drillhole	Depth (m)	Azimuth (˚)	Dip (˚)	Assay Status/Comment
SCC-001	1274.98	0	-90	All Assays Received
SCC-002	965.30	0	-90	All Assays Received
SCC-003	778.46	0	-90	All Assays Received
SCC-004	926.91	0	-90	All Assays Received
SCC-005	793.70	0	-90	All Assays Received
SCC-006	1344.17	235	-50	All Assays Received
SCC-007	1220.27	0	-90	All Assays Received
SCC-008	945.79	225	-75	All Assays Received
SCC-009	664.46	0	-90	All Assays Received
SCC-010	1099.41	225	-90	All Assays Received
SCC-011	379.78	0	-90	All Assays Received
SCC-012	855.27	0	-90	Hole Abandoned, No Assays Taken
SCC-013	1023.52	190	-84	All Assays Received
SCC-014	548.94	0	-90	All Assays Received
SCC-015	931.16	0	-90	Hole Abandoned, No Assays Taken
SCC-016	1139.34	0	-90	All Assays Received
SCC-017	848.87	0	-90	All Assays Received
SCC-018	1123.34	0	-90	All Assays Received
SCC-019	284.07	0	-90	All Assays Received
SCC-020	822.35	230	-80	All Assays Received
SCC-021	446.83	241	-80	All Assays Received
SCC-022	446.80	241	-80	All Assays Received
SCC-022A	406.50	241	-80	All Assays Received
SCC-023	897.94	207	-75	All Assays Received
SCC-024	309.82	0	-90	All Assays Received
SCC-025	858.77	228	-82	In Lab, Assays Pending for 494-570;739.5-858.77 m
SCC-026	741.88	209	-80	In Lab, Assays Pending for 396-688 m
SCC-027	550.47	259	-82	All Assays Received
SCC-028	369.72	230	-75	All Assays Received
SCC-029	917.91	227	-78	In Lab, Assays Pending for 402-453.69; 855-906 m
SCC-030	280.26	230	-75	All Assays Received
SCC-031	904.34	222	-85	In Lab, Assays Pending for 749-900 m
SCC-032	811.68	220	-78	In Lab, Assays Pending for 557.63-811.68
SCC-033	455.07	230	-60	All Assays Received
SCC-034	201.17	230	-60	All Assays Received
SCC-035	161.54	230	-75	All Assays Received
SCC-036	181.36	230	-60	All Assays Received
SCC-037	379.78	230	-80	All Assays Received
SCC-038	311.81	230	-75	All Assays Received
SCC-039	252.98	230	-60	All Assays Received
SCC-040	292.60	230	-75	All Assays Received
SCC-041	323.09	230	-60	All Assays Received
SCC-042	360.58	230	-60	All Assays Received
SCC-043	127.10	230	-60	Hole Abandoned, No Assays Taken
SCC-044	304.80	230	-60	All Assays Received
SCC-045	883.76	225	-73	All Assays Received
SCC-046	210.31	230	-60	All Assays Received
SCC-047	474.57	230	-60	All Assays Received
SCC-048	915.47	259	-82	In Lab, Assays Pending for 587-781; 808-829; 869-915.47 m
SCC-049	274.32	230	-60	All Assays Received
SCC-050	398.22	230	-60	All Assays Received

Drillhole	Depth (m)	Azimuth (˚)	Dip (˚)	Assay Status/Comment
SCC-051	114.30	230	-60	All Assays Received
SCC-052	880.87	224	-75	All Assays Received
SCC-053	1041.80	224	-85	In Lab, Assays Pending for 471-656; 756-951 m
SCC-054	686.71	248	-85	In Lab, All Assays Pending
SCC-055	304.80	224	-85	RC pre-collar, No Assays Taken
SCC-056	846.73	224	-78	In Lab, Assays Pending for 561-846.73 m
SCC-057	996.70	221	-74	In Lab, All Assays Pending
SCC-058	889.25	226	-69	In Lab, All Assays Pending
SCC-059	977.18	212	-80	In Lab, All Assays Pending
SCC-060	304.80	224	-75	RC pre-collar, No Assays Taken
SCC-061	304.80	238	-75	RC pre-collar, No Assays Taken
SCC-062	304.80	250	-82	RC pre-collar, No Assays Taken
SCC-063	932.99	200	-80	In Lab, Assays Pending for 390.31-405; 475-932.99 m
SCC-064	204.22	0	-90	RC Hole - Not Sampled, No Assays Taken
SCC-065	577.90	0	-90	In lab, Assays Pending for 576-577.9 m
SCC-066	228.60	0	-90	RC Hole - Not Sampled, No Assays Taken
SCC-067	243.84	0	-90	RC Hole - Not Sampled, No Assays Taken
SCC-068	1019.09	231	-75	In Lab, Assays Pending 487-556; 807-890; 917-1,019.1 m
SCC-069	228.65	0	-90	RC Hole - Not Sampled, No Assays Taken
SCC-070	246.89	0	-90	RC Hole - Not Sampled, No Assays Taken
SCC-071	243.84	0	-90	RC Hole - Not Sampled, No Assays Taken
SCC-072	274.32	0	-90	RC Hole - Not Sampled, No Assays Taken
SCC-073	916.38	0	-90	In Lab, All Assays Pending
SCC-074	259.08	0	-90	RC Hole - Not Sampled, No Assays Taken
SCC-075	280.41	0	-90	RC Hole - Not Sampled, No Assays Taken
SCC-076	152.40	0	-90	RC Hole - Not Sampled, No Assays Taken
SCC-077	320.04	0	-90	RC Hole - Not Sampled, No Assays Taken
SCC-078	100.00	0	-90	Sonic Hole - Not Sampled, No Assays Taken
SCC-079	454.15	232	-75	RC pre-collar, No Assays Taken
SCC-080	759.56	205	-85	In Lab, Assays Pending
SCC-081	525.17	0	-90	In Lab, All Assays Pending
SCC-082	112.70	0	-90	Sonic Hole - Not Sampled, No Assays Taken
SCC-083	399.28	222	-85	RC pre-collar, No Assays Taken
SCC-084	915.92	214	-80	All Assays Received
SCC-085	388.00	254	-78	RC pre-collar, No Assays Taken
SCC-086	149.96	0	-90	Sonic Hole - Not Sampled, No Assays Taken
SCC-087	426.72	234	-80	RC pre-collar, No Assays Taken
SCC-088	579.73	0	-90	In Lab, All Assays Pending
SCC-089	100.28	0	-90	Sonic Hole - Not Sampled, No Assays Taken
SCC-090	712.01	0	-90	Currently Sampling, All Assays Pending
SCC-091	457.20	0	-90	All Assays Received
SCC-092	666.60	0	-90	In Lab, All Assays Pending
SCC-093	546.81	0	-90	In Lab, All Assays Pending
SCC-093A	959.20	0	-90	In Lab, All Assays Pending
SCC-094	99.06	0	-90	Sonic Hole - Not Sampled, No Assays Taken
SCC-095	457.20	0	-90	All Assays Received
SCC-096	981.76	0	-90	Currently Sampling, All Assays Pending
SCC-097	457.20	0	-90	All Assays Received
SCC-098	ACTIVE	0	-90	Actively Drilling
SCC-099	884.38	0	-90	In Lab, All Assays Pending
SCC-100	259.08	0	-90	RC Hole - Not Sampled, No Assays Taken
SCC-101	413.00	0	-90	In Lab, All Assays Pending
SCC-102	827.37	0	-90	In Lab, Assays Pending for 270-468; 638.5-827.38m
SCC-103	60.96	0	-90	Hole Abandoned, No Assays Taken
SCC-105	1029.30	0	-90	In Lab, Assays Pending for 554-637; 756-1,029.31 m
SCC-106	583.84	0	-90	Currently Sampling, All Assays Pending

Drillhole	Depth (m)	Azimuth (˚)	Dip (˚)	Assay Status/Comment
SCC-107	1074.12	0	-90	In Lab, All Assays Pending
SCC-108	858.62	0	-90	Currently Sampling, All Assays Pending
SCC-109	859.08	0	-90	Currently Sampling, All Assays Pending
SCC-110	864.71	0	-90	Currently Sampling, All Assays Pending
SCC-111	ACTIVE	270	-80	Actively Drilling
SCC-112	ACTIVE	0	-90	Actively Drilling

Source: Nordmin, 2023



Source: IE, 2023

Figure 10-2: Plan Map of Historical and 2021 and 2022 IE Drillhole Collars

10.1.5 2023 Drilling Program

Drilling performed by IE over the 2023 calendar year to-date includes 29,322.02 m from 36 completed drillholes. Drilling during the 2023 campaign focused on exploration, mineral resource infill and definition, and geotechnical and hydrogeological infill and definition. Exploration is continuing around the Project to identify new zones that may be incorporated into future studies.

Drilling was performed using tricone or polycrystalline diamond compact rotary drilling and diamond core drilling. The drilling methodology used depended on the objective and target depth. The majority of drilling was polycrystalline diamond compact or rotary drilling through the overburden sediments to a pre-planned depth, followed by standard PQ or HQ diamond coring through the bedrock complex for data collection and use in multiple sampling and testing programs. Some drilling was performed as core from surface to provide drill core material of the overburden for certain sampling and testing programs.

Abandonment procedures for all drilling performed during 2023 were designed to meet or exceed State mandated requirements. The majority of drilling reaching or exceeding depths over 100 m utilized State approved borehole abandonment methods involving: abandonite to approximately 20 m below the geological contact between bedrock and overburden sediments, if present, then the installation of appropriately sized Bradley plugs, labeled with the associated borehole ID, as the base for pumping and curing State approved cement across the geological contact to seal the interface, followed by additional abandonite to approximately 20 m below the topographic surface, with an approximately 20 m cement cap, with the hole tagged and labeled for collar demarcation.

A drillhole summary complete to June 8th, 2023, can be seen in Table 10-6. A map of drillhole collar locations can be seen in Figure 10-3.

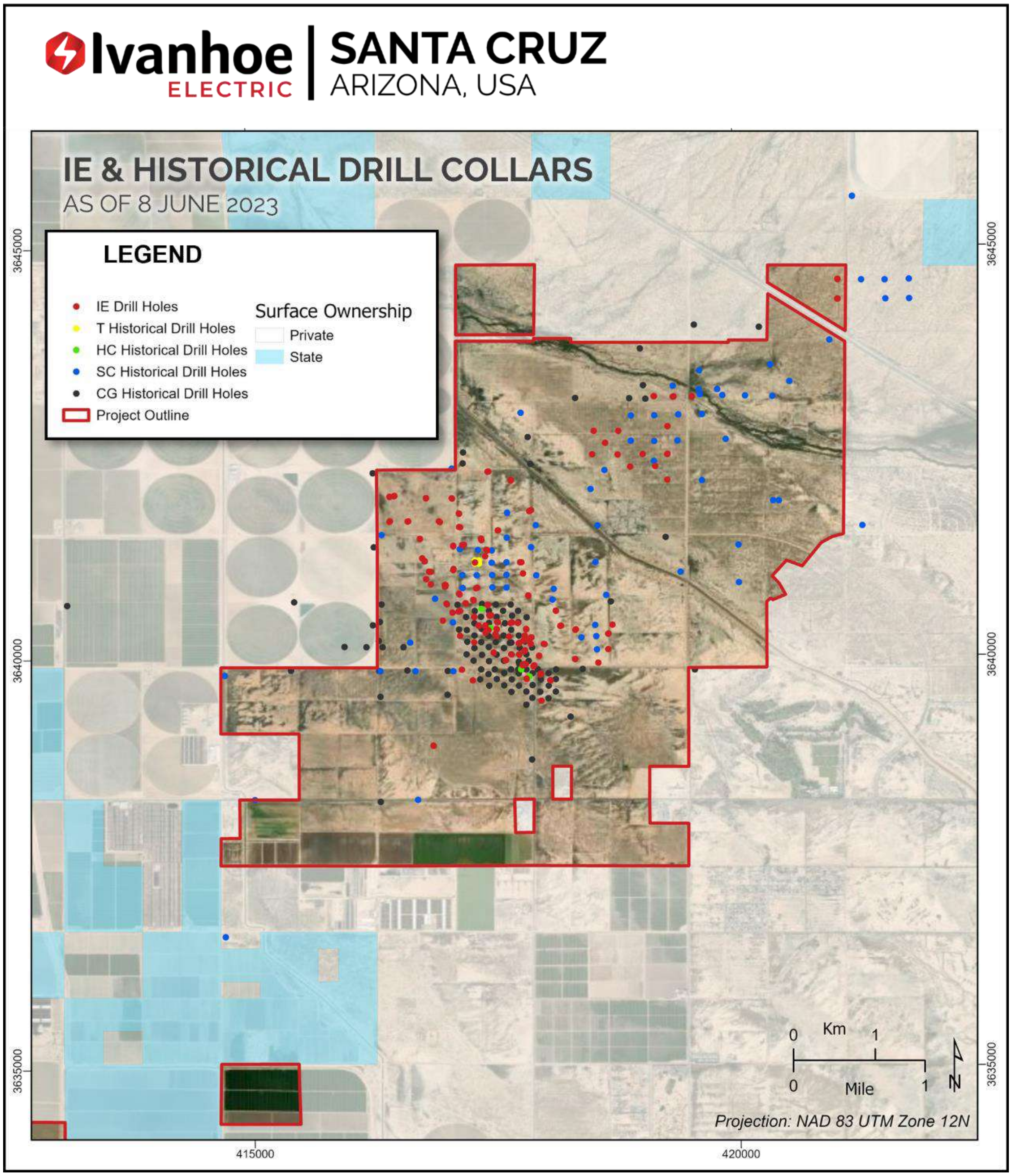
Table 10-6: 2023 Drilling Summary

Drillhole	Depth (m)	Azimuth (˚)	Dip (˚)	Assay Status/Comment
SCC-001	1,274.98	0	-90	All Assays Received
SCC-002	965.30	0	-90	All Assays Received
SCC-003	778.46	0	-90	All Assays Received
SCC-004	926.91	0	-90	All Assays Received
SCC-005	793.70	0	-90	All Assays Received
SCC-006	1,265.83	225	-56	All Assays Received
SCC-007	1,344.17	235	-50	All Assays Received
SCC-008	1220.27	0	-90	All Assays Received
SCC-009	945.79	225	-75	All Assays Received
SCC-011	1,099.41	0	-90	All Assays Received
SCC-012	379.78	0	-90	Hole Abandoned, No Assays Taken
SCC-013	855.27	0	-90	All Assays Received
SCC-014	1023.52	190	-84	All Assays Received
SCC-015	548.94	0	-90	Hole Abandoned, No Assays Taken
SCC-016	931.16	0	-90	All Assays Received
SCC-017	1,139.34	0	-90	All Assays Received
SCC-018	848.87	0	-90	All Assays Received
SCC-019	1,123.34	0	-90	All Assays Received
SCC-021	822.35	230	-80	All Assays Received
SCC-022	446.80	241	-80	All Assays Received
SCC-022A	813.36	241	-80	All Assays Received
SCC-023	897.94	207	-75	All Assays Received
SCC-025	858.77	228	-82	All Assays Received
SCC-026	741.88	209	-80	All Assays Received
SCC-027	550.47	259	-82	All Assays Received
SCC-029	917.91	227	-78	All Assays Received
SCC-031	904.34	222	-85	All Assays Received
SCC-032	811.68	220	-78	All Assays Received
SCC-045	883.76	225	-73	All Assays Received
SCC-048	915.47	259	-82	All Assays Received
SCC-052	880.87	224	-75	All Assays Received
SCC-053	1,041.80	224	-85	All Assays Received
SCC-054	686.71	248	-85	All Assays Received
SCC-055	304.80	224	-85	Hole Abandoned, No Assays Taken
SCC-056	846.73	224	-78	All Assays Received
SCC-057	996.70	221	-74	All Assays Received
SCC-058	889.25	226	-69	All Assays Received
SCC-059	980.24	212	-80	All Assays Received
SCC-060	274.32	224	-75	Hole Abandoned, No Assays Taken
SCC-061	304.80	238	-75	Hole Abandoned, No Assays Taken
SCC-062	304.80	250	-82	Hole Not Sampled, No Assays Pending
SCC-063	932.99	200	-80	All Assays Received
SCC-064	204.22	0	-90	Hole Not Sampled, No Assays Pending
SCC-065	577.90	0	-90	All Assays Received
SCC-066	228.60	0	-90	Hole Not Sampled, No Assays Pending
SCC-067	243.84	0	-90	Hole Not Sampled, No Assays Pending
SCC-068	1,019.09	231	-75	All Assays Received
SCC-069	228.60	0	-90	Hole Abandoned, No Assays Taken
SCC-070	246.89	0	-90	Hole Abandoned, No Assays Taken
SCC-071	243.84	0	-90	Hole Abandoned, No Assays Taken
SCC-072	274.32	0	-90	Hole Abandoned, No Assays Taken
SCC-073	916.38	0	-90	All Assays Received
SCC-074	259.08	0	-90	Hole Not Sampled, No Assays Pending
SCC-075	289.56	0	-90	Hole Not Sampled, No Assays Pending
SCC-076	152.40	0	-90	Hole Not Sampled, No Assays Pending
SCC-077	320.04	0	-90	Hole Not Sampled, No Assays Pending

Drillhole	Depth (m)	Azimuth (˚)	Dip (˚)	Assay Status/Comment
SCC-078	100.00	0	-90	Hole Not Sampled, No Assays Pending
SCC-079	454.15	232	-75	Hole Not Sampled, No Assays Pending
SCC-080	759.56	205	-85	All Assays Received
SCC-081	525.17	0	-90	All Assays Received
SCC-082	112.70	0	-90	Hole Not Sampled, No Assays Pending
SCC-083	457.20	222	-85	Hole Abandoned, No Assays Taken
SCC-084	915.92	214	-80	All Assays Received
SCC-085	387.10	254	-78	Hole Not Sampled, No Assays Pending
SCC-086	149.96	0	-90	Hole Not Sampled, No Assays Pending
SCC-087	426.72	234	-80	Hole Not Sampled, No Assays Pending
SCC-088	579.73	0	-90	All Assays Received
SCC-089	100.28	0	-90	Hole Not Sampled, No Assays Pending
SCC-090	712.01	0	-90	All Assays Received
SCC-091	457.20	0	-90	All Assays Received
SCC-092	666.60	0	-90	All Assays Received
SCC-093	546.81	0	-90	All Assays Received
SCC-093A	959.21	0	-90	All Assays Received
SCC-095	457.20	0	-90	All Assays Received
SCC-096	981.76	0	-90	All Assays Received
SCC-097	457.20	0	-90	All Assays Received
SCC-098	1274.52	0	-90	All Assays Received
SCC-099	884.38	0	-90	All Assays Received
SCC-101	413.00	0	-90	All Assays Received
SCC-102	827.38	0	-90	All Assays Received
SCC-103	60.96	0	-90	Hole Abandoned, No Assays Taken
SCC-105	1,029.30	0	-90	All Assays Received
SCC-106	583.84	0	-90	All Assays Received
SCC-107	1,074.12	0	-90	All Assays Received
SCC-108	858.62	0	-90	All Assays Received
SCC-109	859.08	0	-90	All Assays Received
SCC-110	864.72	0	-90	All Assays Received
SCC-111	660.50	270	-80	All Assays Received
SCC-112	1,025.96	0	-90	All Assays Received
SCC-113	994.26	0	-90	All Assays Received
SCC-114	808.33	0	-90	All Assays Received
SCC-115	931.77	0	-90	All Assays Received
SCC-116	726.80	0	-90	All Assays Received
SCC-117	865.02	0	-90	All Assays Received
SCC-118	381.30	140	-65	All Assays Received
SCC-119	998.83	0	-90	All Assays Received
SCC-120	980.54	140	-65	Currently cutting and sampling
SCC-121	760.48	0	-90	All Assays Received
SCC-122	921.56	0	-90	In Lab, All Assays Pending
SCC-123	819.00	0	-90	In Lab, All Assays Pending
SCC-124	710.79	0	-90	In Lab, Assays Pending
SCC-125	890.78	0	-90	In Lab, All Assays Pending
SCC-126	404.93	320	-67	Hole Not Sampled, No Assays Pending
SCC-127	922.02	0	-90	In Lab, Assays Pending
SCC-128	692.96	0	-90	In Lab, Assays Pending
SCC-129	832.10	0	-90	In Lab, All Assays Pending
SCC-130	779.37	0	-90	In Lab, All Assays Pending
SCC-131	873.86	0	-90	Currently cutting and Sampling
SCC-132	898.70	0	-90	In Lab, All Assays Pending
SCC-133	890.93	0	-90	Cutting and sampling
SCC-134	931.62	0	-90	Cutting and sampling
SCC-135	829.05	0	-90	Cutting and sampling
SCC-136	803.76	46	-65	Cutting and sampling

Drillhole	Depth (m)	Azimuth (˚)	Dip (˚)	Assay Status/Comment
SCC-137	865.94	0	-90	Cutting and sampling
SCC-138	698.44	0	-90	Cutting and sampling
SCC-139	738.68	0	-90	Cutting and sampling
SCC-140	882.70	0	-90	Cutting and sampling
SCC-141	790.80	0	-90	Cutting and sampling
SCC-142	670.71	0	-90	Actively Drilling
SCC-143	590.09	0	-90	Actively Drilling
SCC-144	ACTIVE	0	-90	Actively Drilling
SCC-145	ACTIVE	0	-90	Actively Drilling
SCC-146	ACTIVE	143	-65	Actively Drilling
SCC-147	ACTIVE	0	-90	In Lab, All Assays Pending
SCC23-GT-001	1,141.78	100	-70	In Lab, All Assays Pending
SCC23-GT-002	874.01	140	-75	Currently cutting and sampling
SCC23-GT-003	733.65	45	-80	Actively Drilling

Source: IE, 2023



Source: IE, 2023

Figure 10-3: Plan Map of Historical and 2021 and 2022 IE Drillhole Collars

10.1.6 Geotechnical Drilling

See Section 16.2.

10.1.7 Hydrogeology

See Section 16.3.

11 Sample Preparation, Analysis and Security

11.1 Sample Preparation Methods and Quality Control Measures

From September 2021 to December 2022, IE samples were sent to one of four independent laboratories: Skyline Laboratories located in Tucson, AZ, USA; SGS Laboratories located in Burnaby, BC, Canada, SGS Lakefield, ON, Canada for SEQ Analysis; or American Assay Laboratories located in Sparks, NV, USA. All samples sent through SGS Laboratories were prepped at SGS Burnaby, BC, Canada. At the time, all assay labs were well established and recognized assay and geochemical analytical services companies and are independent of IE.

All four laboratories are recognized by the International Standard demonstrating technical competence for a defined scope and the operation of a laboratory quality management system (ISO 17025). Additionally, Skyline Laboratories is recognized by ISO 9001, indicating that the quality management system conforms to the requirements of the international standard. SGS Canada Minerals Burnaby conforms to requirements of ISO/IEC 17025 for specific tests as listed on their scope of accreditation. American Assay Laboratories carries approval from the State of Nevada Department of Conservation and Natural Resources Division of Environmental Protection. Due to QA/QC failures at American Assay Laboratories, IE discontinued work with this lab.

11.2 Sample Preparation, Assaying and Analytical Procedures

The diamond drill core from the Santa Cruz and Texaco Deposits were sampled by IE in 2021 under the direct supervision of Santa Cruz Geology Manager Christopher Seligman, MAusIMM CP(Geo) and Eric Castleberry, PG, US Operations Manager. Diamond drill core from the Santa Cruz, East Ridge, and Texaco Deposits sampled by IE in 2022 were completed under the direct supervision of Santa Cruz Geology Manager Christopher Seligman and Santa Cruz Exploration Manager Arron Jergenson.

Samples were cut lengthwise, either in half or in four quarters, using an NTT brand diamond bladed saw or a Husqvarna table saw (Figure 11-1). The sample consisted of one half or one quarter of the core which was placed in a plastic sample bag labeled with the sample number and the sample bag was sealed with a zip tie. That bag was then placed in a burlap sample bag labeled with the sample number and a sample tag added between the plastic and burlap bags. The sample tag corresponded with the tag stapled to the core box where the remaining half or three-quarters of the core was placed for catalog and storage (Figure 11-2). The burlap sample bags were then placed in labeled large plastic bags in batches of 25, that bag was sealed with a zip tie, and those bags were placed in large fold-out plastic bins for transport to the lab facility (Figure 11-3).

Source: Nordmin, 2023

Figure 11-1: NTT Diamond Bladed Automatic Core Saw used for Cutting Diamond Drill Core for Sampling

Source: Nordmin, 2023

Figure 11-2: Tee Street Core Storage Facility

Source: Nordmin, 2023

Figure 11-3: (Left) samples placed in burlap and inner plastic bags labeled with sample numbers; (Right) sample batches placed in large plastic bags and bins for shipping to lab

11.2.1 Skyline Laboratories

Half of the total drill core samples taken during the 2021 and 2022 diamond drilling program were prepared and analyzed at Skyline Laboratories, Tucson, Arizona. The samples were crushed from the split core to prepare a total sample of up to 5 kilograms (kg) at 75% passing 6 mm. Samples were then riffle split, and a 250 g sample was pulverized with a standard steel to plus 95% passing at 150 µm. After sample pulp preparation, the samples were analyzed in the following manner:

- All samples were analyzed for total Cu using multi-acid digestions with an atomic absorption spectrometry (AAS) finish. The lower limit of detection is 0.01% for total Cu, with an upper detection limit of 10%.
- Sequential Analysis for cyanide soluble and acid soluble Cu were conducted via multi-acid leaching with an AAS finish. For sequential acid leaching (SEQ) Cu analyses, the lower limit of detection is 0.005%, with an upper detection limit of 10%.
- Molybdenum was prepared using multi-acid digestion and analyzed using inductively coupled plasma optical emission spectrometry (ICP-OES). This analysis has a lower detection limit of 0.001%.
- Samples greater than 10% Cu, with a 20% threshold, were analyzed again using a Long Iodine method.

11.2.2 SGS Laboratories

Half of the total drill core samples taken during the 2022 diamond drilling program were prepared and analyzed at SGS Laboratories in Burnaby, BC, Canada or SGS Lakefield, ON, Canada. The samples were crushed from the split core to prepare a total sample of up to 5 kg at 6 mm. Samples were then riffle split, and a 250 g sample was crushed to 75% passing at 2 mm. The sample was then pulverized with a standard steel to plus 85% passing at 75 µm. After sample pulp preparation, the samples were analyzed in the following manner:

- All samples were analyzed for total Cu using a sodium peroxide fusion with an inductively coupled plasma atomic emission spectroscopy (ICP-AES) finish. The lower limit of detection is 0.001% for total Cu, with an upper detection limit of 5%.
- Sequential analysis for cyanide soluble and acid soluble Cu were conducted via multi-acid leaching with an AAS finish. For SEQ Cu analyses, the lower limit of detection is 0.005%, with an upper detection limit of 100%.
- Molybdenum was prepared using multi-acid digestion and analyzed using ICP-OES. This analysis has a lower detection limit of 0.05 ppm and an upper detection of 10,000 ppm.
- Samples greater than 5% Cu, with a 30% threshold, were analyzed again using sodium peroxide fusion overlimit with an ICP-OES finish.

11.2.3 American Assay Laboratories

A single drillhole from the 2021 drill campaign was prepared and analyzed at American Assay Laboratories in Sparks, Nevada. The samples were crushed from the split core to prepare a total sample of up to 5 kg at 75% passing 10 mm. Samples were then riffle split and pulverized with a standard steel to plus 95% passing at 150 µm. After sample pulp preparation, the samples were analyzed in the following manner:

- All samples were analyzed for total Cu using AAS, total molybdenum with an inductively coupled plasma mass spectrometer (ICP-MS), and acid soluble and cyanide soluble Cu with sequential leaching with an AAS finish. A measurement for residual Cu was also taken; this is essentially the Cu that is measured that cannot be attributed to cyanide soluble, acid soluble, or total Cu. The lower detection limit is 0.001%, with an upper limit of 10%. Samples greater than or equal to 10% were alternatively measured using Long Iodine analysis, which has an upper detection limit of 20%.
- The detection limit at American Assay Laboratories is an order of magnitude less than at Skyline Laboratories; therefore, there is a lower resolution, but during a comparison between the two labs, it was found that the results were similar.
- Due to QA/QC failures at American Assay Laboratories, IE discontinued work with this lab.

11.2.4 Historical Core Assay Sample and Analysis

Historically, samples for both the Texaco and Santa Cruz Deposit drilling were sent to Skyline Laboratories to be assayed for standard total Cu and non-sulfide Cu methods. Samples were crushed and split; a 250 to 500 mg sample was then prepared in the following ways:

- Total Cu analysis samples were dissolved using a mixture of hydrochloric acid (HCl), nitric acid (HNO_3) and perchloric acid ($HClO_4$) over low heat. The mixture was then measured using AAS.
- Non-sulfide Cu was dissolved using a mixture of sulfuric acid (H_2SO_4) and sulfurous acid (H_2SO_3) over moderate to high heat. This mixture was then filtered, diluted, and measured using AAS.

11.3 Specific Gravity Sampling

A combined total of 2,637 SG measurements for the Santa Cruz, East Ridge, and Texaco Deposits were provided during 2021-2022 on site drill core measurements. SG measurements were taken from representative core sample intervals (approximately 0.1 m to 0.2 m long). SG was measured using a water dispersion method. The samples were weighed in air, and then the uncoated sample was placed in a basket suspended in water and weighed again. SG is calculated by using the weight in air versus the weight in water method (Archimedes), by applying the following formula:

$$\text{Specific Gravity} = \frac{\text{Weight in Air}}{(\text{Weight in Air} - \text{Weight in Water})}$$

11.4 Quality Control Procedures/Quality Assurance

Quality assurance and quality control (QA/QC) measures were set in place to ensure the reliability and trustworthiness of exploration data. These measures include written field procedures and independent verifications of aspects such as drilling, surveying, sampling, assaying, data management, and database integrity. Appropriate documentation of QC measures and regular analysis of QC data is essential as a safeguard for project data and form the basis for the QA program implemented during exploration.

Analytical QC measures involve internal and external laboratory procedures implemented to monitor the precision and accuracy of the sample preparation and assay data. These measures are also important to identify potential sample sequencing errors and to monitor for contamination of samples.

The Company submitted a blank, standard, or duplicate sample on every seventh sample. Sampling and analytical QA/QC protocols typically involve taking duplicate samples and inserting QC samples (certified reference material [CRM] and blanks) to monitor the assay results' reliability throughout the drill program.

11.4.1 IE Santa Cruz Sampling

Standards

During the 2022 drilling campaign, IE submitted eight different CRMs as a part of their QA/QC protocol across the Santa Cruz, East Ridge, and Texaco Deposits. OREAS 905 was archived by OREAS and was replaced with OREAS 901 by the Company as the new low-grade copper standard. The review of the CRM results identified no laboratory failures at Skyline Laboratories or SGS Laboratories. Table 11-1 shows the eight standards submitted to Skyline by IE and their mean measured values. At the time of writing, not enough results for CRMs measured at SGS Laboratories had been returned to adequately track their progress. Table 11-2 shows the seven internal standards used by Skyline as quality control and tracking of their average results. Figure 11-4 to Figure 11-8 are charts which track the progress of CRM measurements over time. Few measurements go above or below three standard deviations, which is followed by a recalibration at the lab and a re-analysis of the sample.

Table 11-1: IE Submitted Standards Measured at Skyline Laboratories

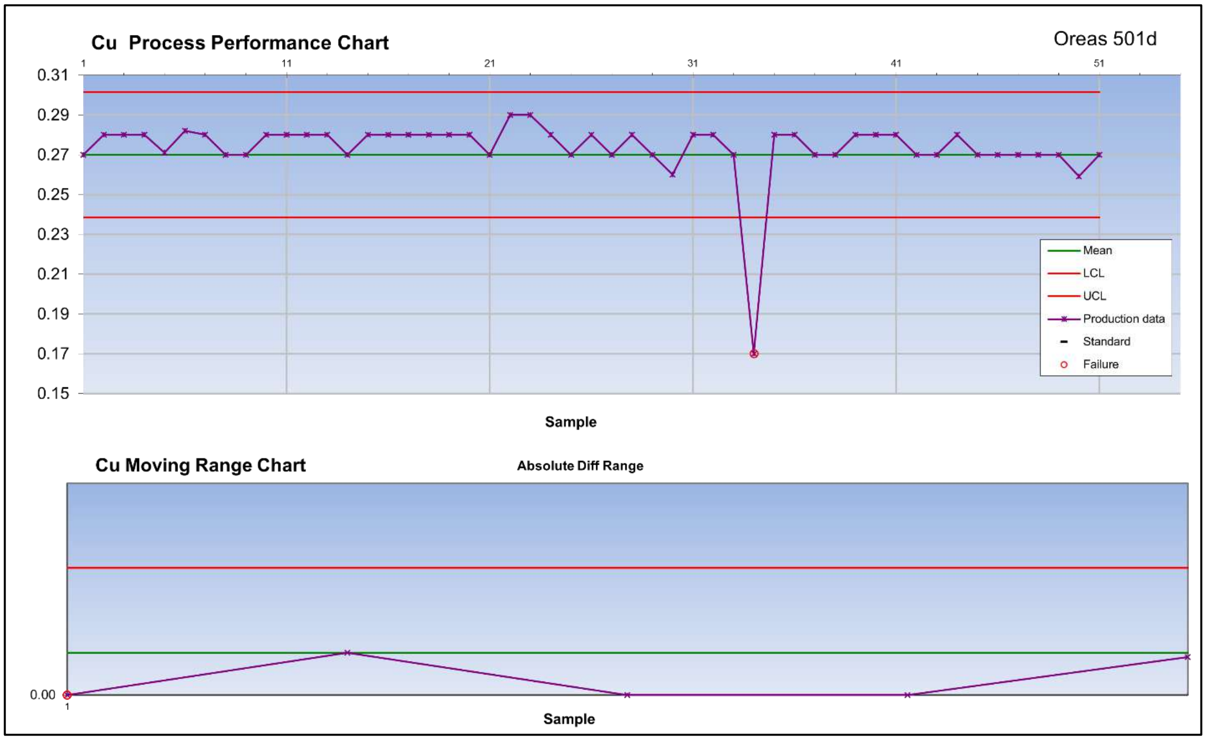
Standard	Count	Best Cu Total	Mean Value Cu Total (%)	Bias (%)	Best Value CuAs-SEQ (%)	Mean Value CuAS-SEQ (%)	Bias (%)	Best Value CuCN-SEQ (%)	Mean Value CuCN -SEQ (%)	Bias (%)
OREAS 908	64	1.26	1.25	0.01	1.078	1.08	-0.002	0.023	0.023	0.002
OREAS 907	28	0.6	0.649	0.049	0.531	0.55	0.019	0.018	0.012	0.006
OREAS 906	19	0.31	0.322	0.012	-	-	-	-	-	-
OREAS 905	21	0.155	0.159	0.004	-	-	-	-	-	-
OREAS 901	55	0.141	0.140	-0.71	-	-	-	-	-	-
OREAS 501d	51	0.27	0.273	0.003	-	-	-	-	-	-
OREAS 503d	35	0.53	0.528	0.002	-	-	-	-	-	-
OREAS 504c	44	1.13	1.108	0.022	-	-	-	-	-	-

Source: Nordmin, 2023

Table 11-2: Skyline Internal QA/QC CRM Samples and Results

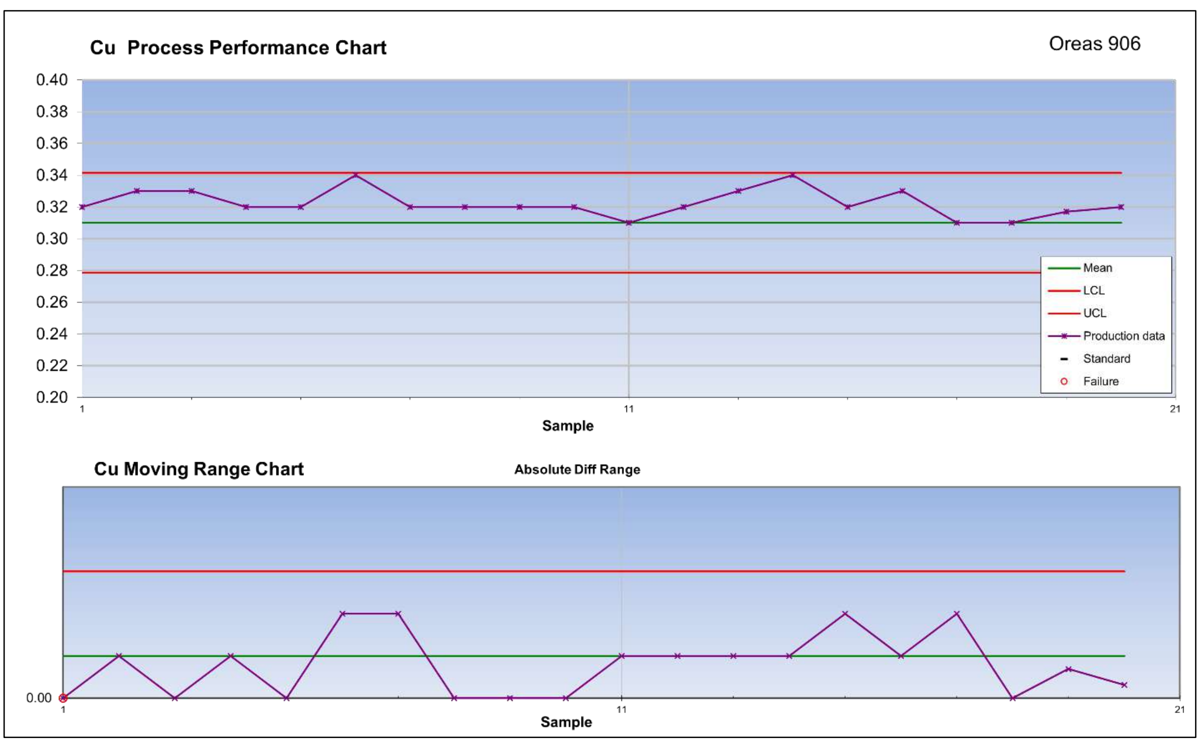
Standard	Count	Best Value CuT (%)	Mean Value CuT (%)	Bias (%)	Best Value Cu-AS-SEQ (%)	Mean Value	Bias (%)	Best Value Cu-CN-SEQ (%)	Mean Value	Bias (%)
SKY5	801	-	-	-	0.18	0.18	0.0	0.155	0.153	0.658
SKY6	783	-	-	-	0.42	0.4	-4.1	0.076	0.083	6.410
CDN-CM-21	221	0.54	0.53	0	-	-	-	-	-	-
CDN-CM-14	442	1.06	1.06	0	-	-	-	-	-	-
CDN-CM-29	187	0.74	0.74	0	-	-	-	-	-	-
CDN-CM-33	185	0.35	0.35	0	-	-	-	-	-	-
CDN-W-4	220	0.14	0.14	0.00	-	-	-	-	-	-

Source: Nordmin, 2023



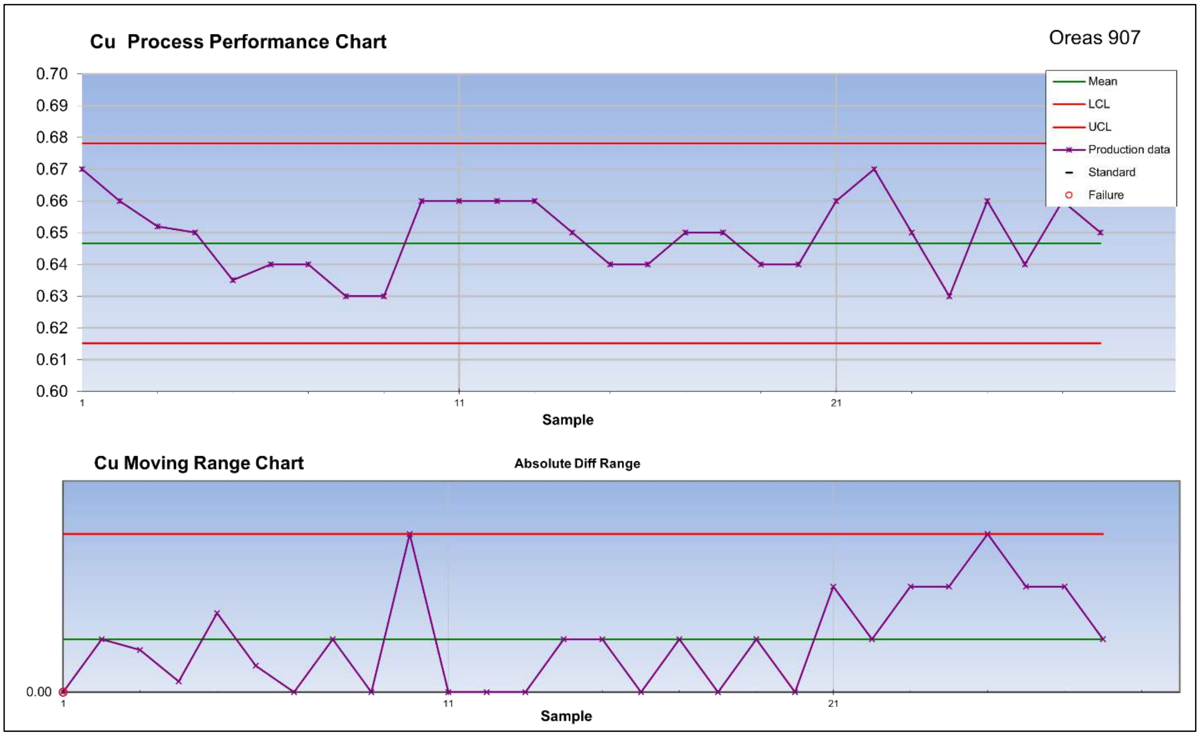
Source: Nordmin, 2023

Figure 11-4: Santa Cruz Deposit, OREAS 501d Standard Total Cu (g/t), Assayed at Skyline Laboratories



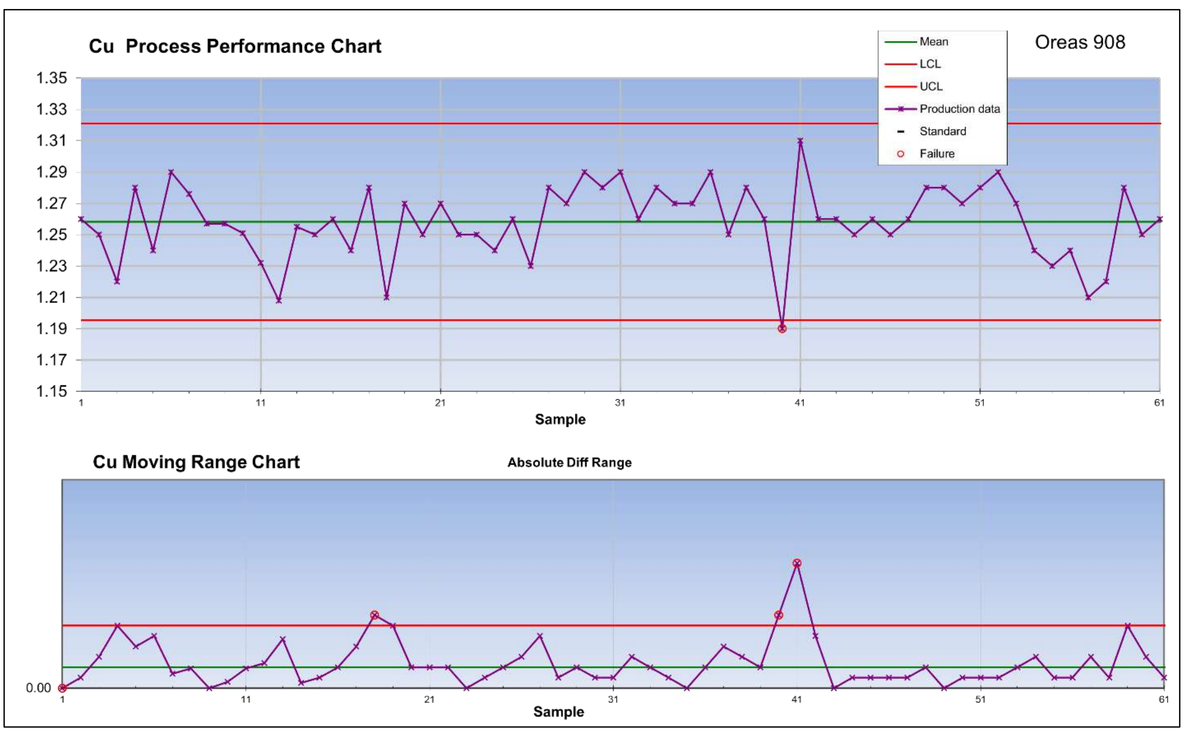
Source: Nordmin, 2023

Figure 11-5: Santa Cruz Deposit, OREAS 906 Standard Total Cu (g/t), Assayed at Skyline Laboratories



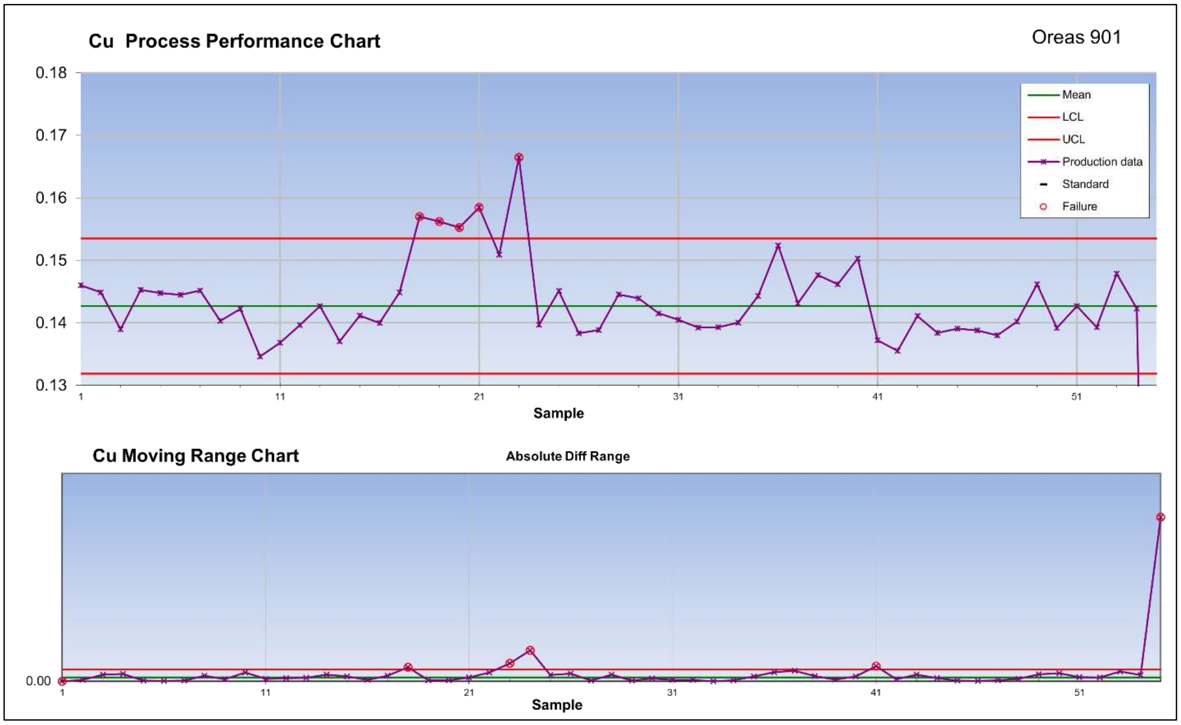
Source: Nordmin, 2023

Figure 11-6: Santa Cruz Deposit, OREAS 907 Standard Total Cu (g/t), Assayed at Skyline Laboratories



Source: Nordmin, 2023

Figure 11-7: Santa Cruz Deposit, OREAS 908 Standard Total Cu (g/t), Assayed at Skyline Laboratories

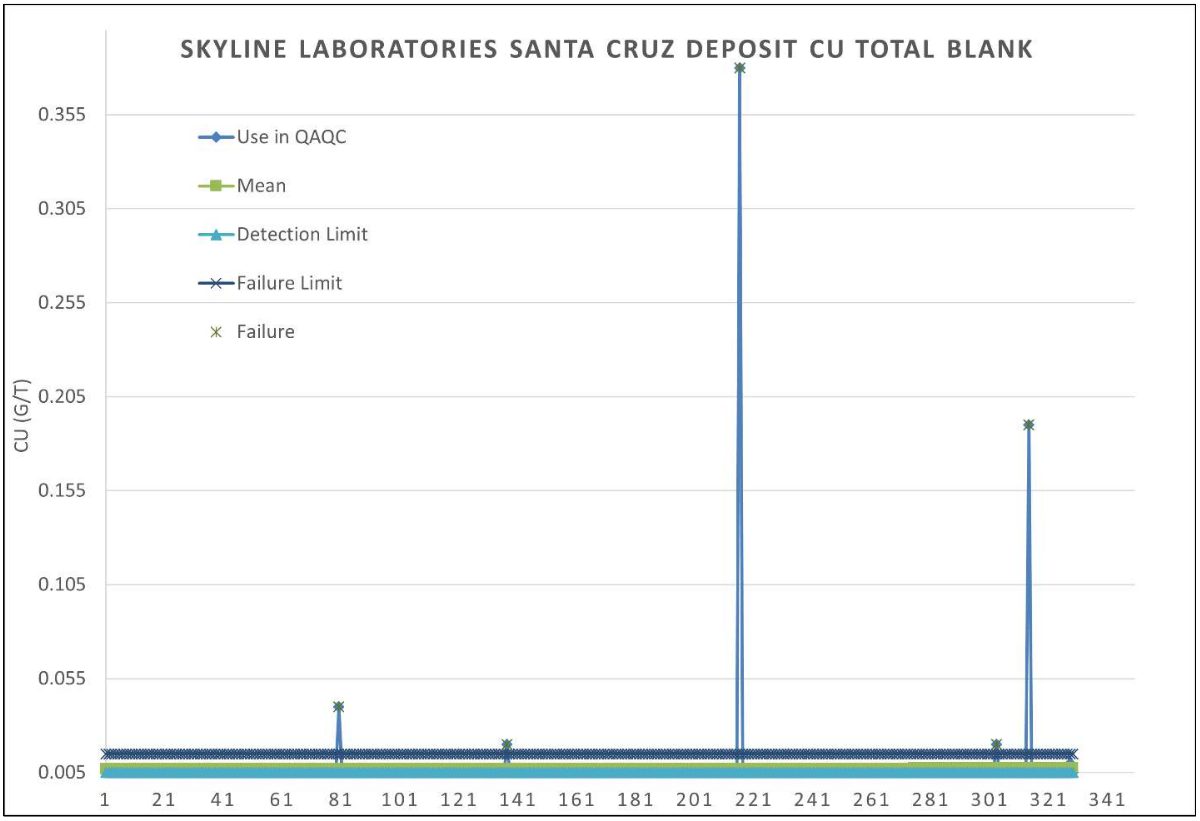


Source: Nordmin, 2023

Figure 11-8: Santa Cruz Deposit, OREAS 901 Standard Total Cu (g/t), Assayed at Skyline Laboratories

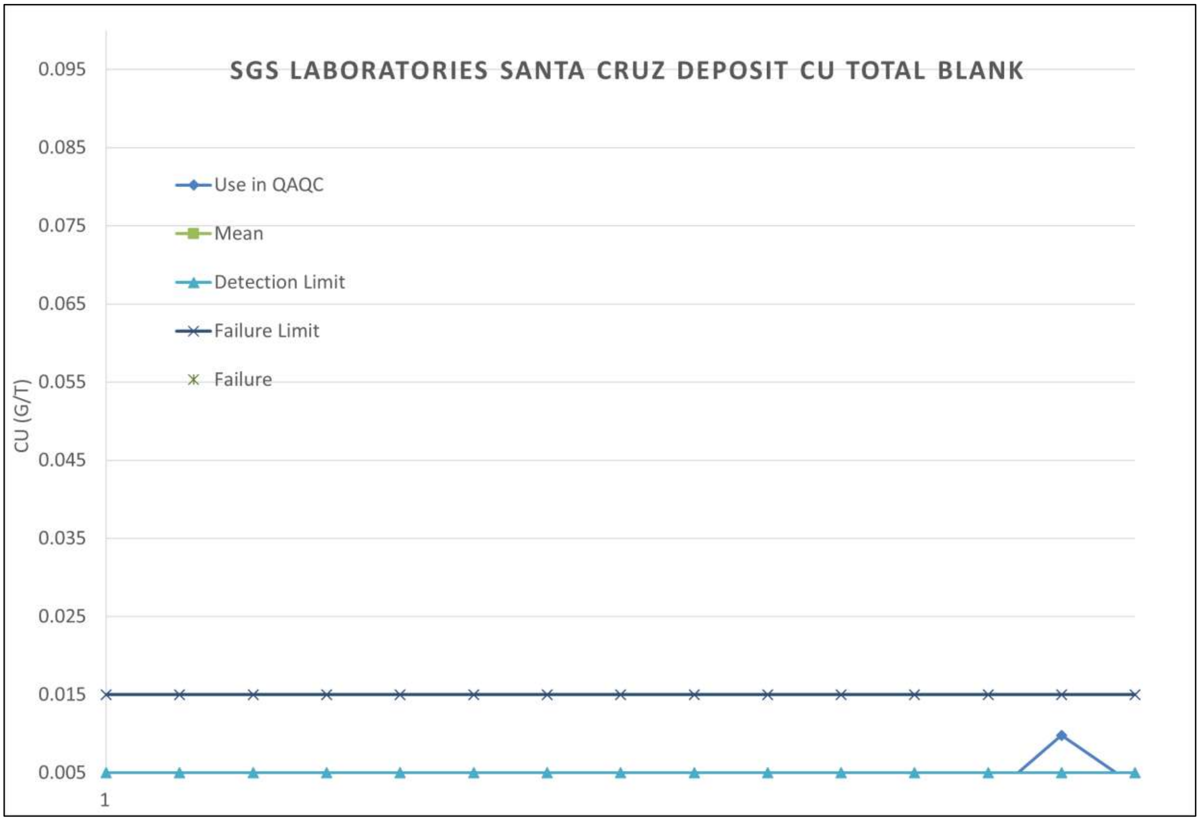
Blanks

The Company submitted 725 coarse granite blanks to Skyline Laboratories and 147 coarse granite blanks to SGS Laboratories for the Santa Cruz Deposit drilling in 2022 as part of its QA/QC process. No significant carryover of elevated metals is evident in blanks measured at Skyline Laboratories nor SGS Laboratories. A threshold of +/- 0.02% Cu was accepted for blank samples, if samples did not initially pass. Samples which failed were reanalyzed. Figure 11-9 illustrates the blank performance of Skyline and Figure 11-10 displays the performance of SGS.



Source: Nordmin, 2023

Figure 11-9: Blank Results from Skyline Laboratory Analyses from the 2021 and 2022 Drill Program

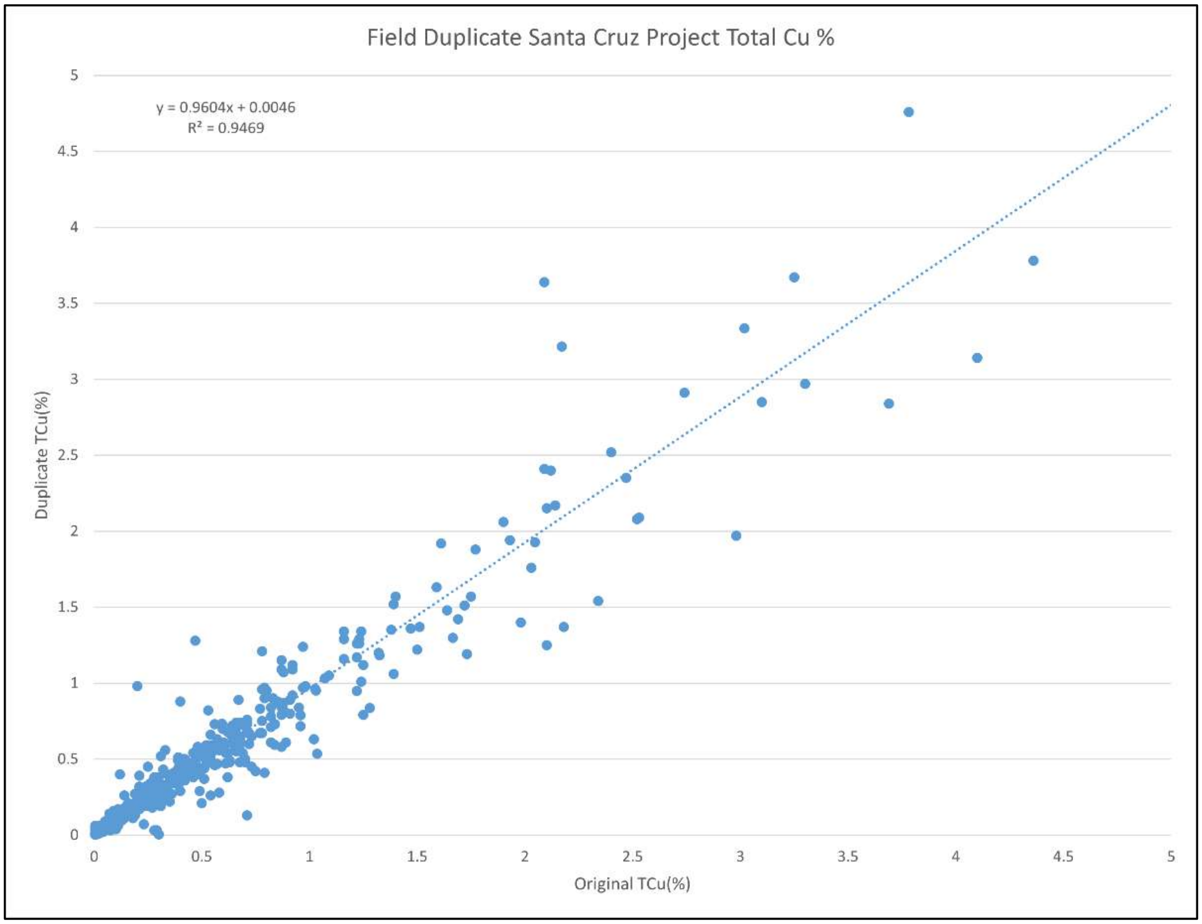


Source: Nordmin, 2023

Figure 11-10: SGS Blank Results from the 2022 Drill Program

Duplicates

The Company submitted 737 field duplicates to Skyline Laboratories during the 2021 and 2022 drill campaigns as a part of its QA/QC process. Duplicates were also submitted to SGS Laboratories for the 2022 drill program, but not enough samples had been returned to track results at the time of writing. Original versus duplicate sample results for total Cu (%) are present in Figure 11-11. The results of the field duplicates are in good agreement for total Cu (%), acid soluble Cu (%) and cyanide soluble Cu (%).



Source: Nordmin, 2023

Figure 11-11: Field Duplicate Results, in Cu (%), Measured at Skyline Laboratories for the Santa Cruz Deposit

11.4.2 2022 East Ridge and Texaco Sampling

Standards

During the 2022 drilling campaign IE submitted 5 CRMs for drilling conducted within the Texaco exploration property and 5 CRMs for the drilling within East Ridge. Results for two submitted CRMs were available for East Ridge at the time of writing. A review of the CRM results identified no failures from Skyline Laboratories or SGS laboratories for samples submitted from either deposit. Table 11-3 and Table 11-4 show the CRMs submitted to Skyline and a comparison of the average grade for different measured elements for Texaco and East Ridge, respectively. Figure 11-12 to Figure 11-14 are charts tracking submitted standard results to Skyline Laboratories for the Texaco Deposit. Figure 11-15 and Figure 11-16 are charts tracking submitted standard results to Skyline Laboratories for the East Ridge Deposit. Table 11-5 and Figure 11-16 show the CRM results submitted to SGS Laboratories for East Ridge drilling. Not enough assays were received for standard OREAS 906 or OREAS 503d to create a chart tracking progress. In the rare instance of failure (outside three standard deviations), the lab re-calibrated equipment and re-analyzed the batch.

Table 11-5 contains Skyline internal CRM measurements and their results.

Table 11-3: IE Inserted CRMs for Texaco Drilling 2022

Standard	Count	Best Value Cu (%)	Mean Value Cu (%)	Bias (%)
Oreas 906	3	0.32	0.31	0.00
Oreas 501d	12	0.27	0.27	0.18
Oreas 503d	3	0.53	0.53	1.32
Oreas 504c	28	1.13	1.082	-2.54
OREAS 151a	12	0.166	0.171	2.91

Source: Nordmin, 2023

Table 11-4: IE inserted CRMs for East Ridge Drilling 2022, measured at Skyline Laboratories

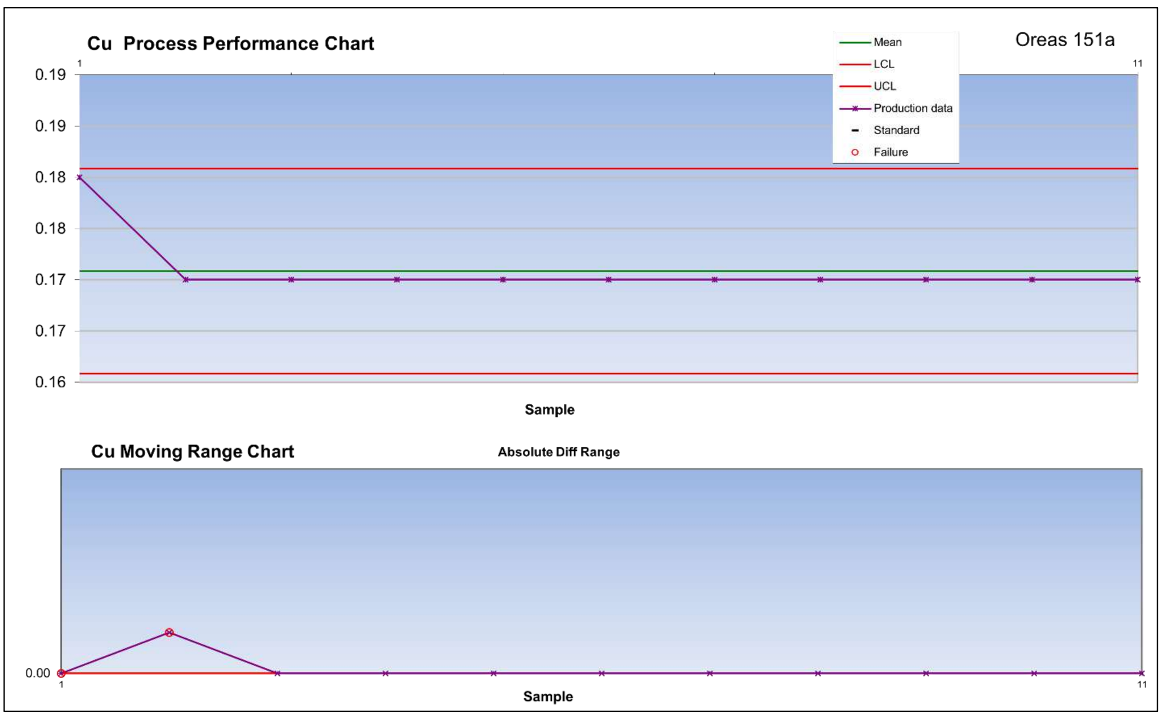
Standard	Count	Best Value Cu (%)	Mean Value Cu (%)	Bias (%)	Best Value SEQ (%)	Mean Value SEQ (%)	Bias (%)
OREAS 901	9	0.141	0.144	2.13	-	-	-
OREAS 906	2	0.31	0.31	-0.13	0.259	0.263	1.54

Source: Nordmin, 2023

Table 11-5: IE inserted CRMs for East Ridge Drilling 2022, measured at SGS Laboratories

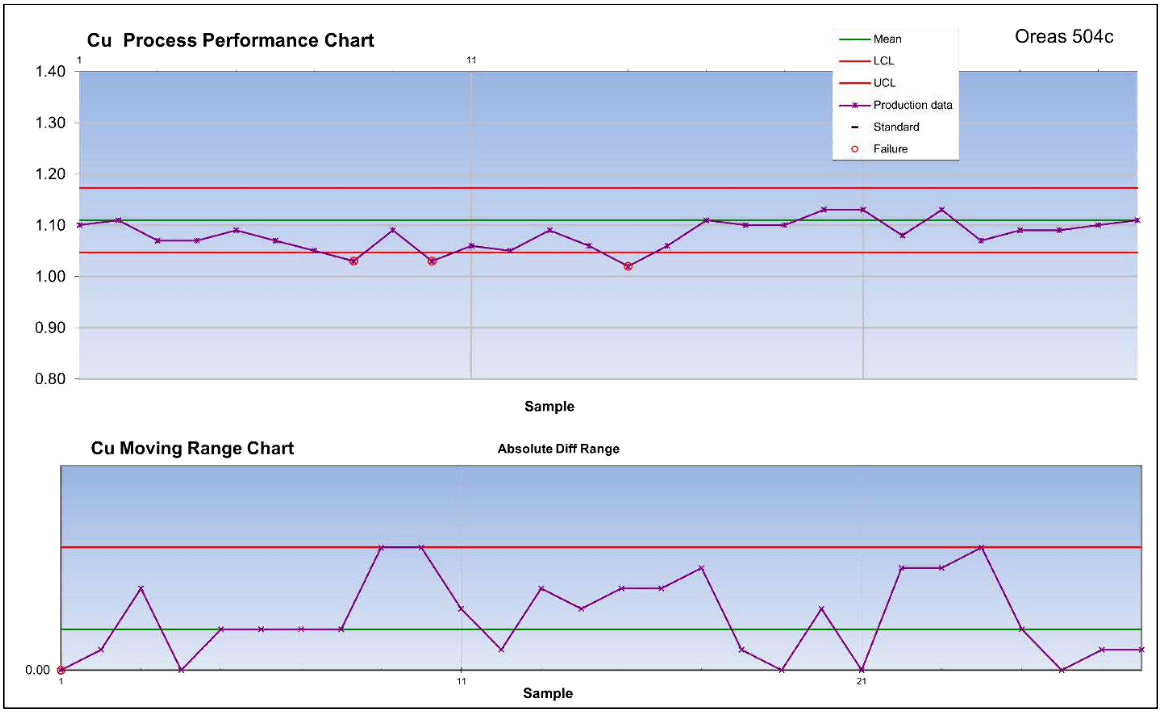
Standard	Count	Best Value CuT (%)	Mean Value CuT (%)	Bias (%)	Best Value SEQ Cu (%)	Mean Value	Bias (%)
OREAS 906	3	0.31	0.309	0.32	0.259	0.266	-2.63

Source: Nordmin, 2023



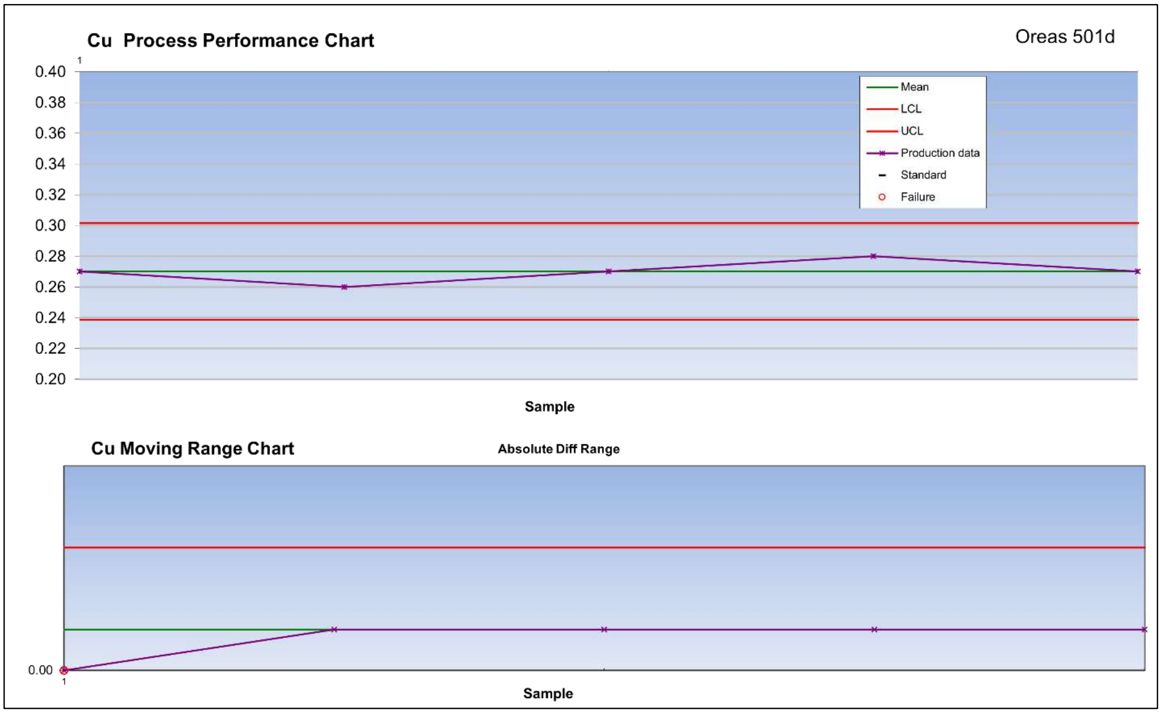
Source: Nordmin, 2023

Figure 11-12: Texaco Deposit, OREAS 151a Standard Total Cu (g/t), Assayed at Skyline Laboratories



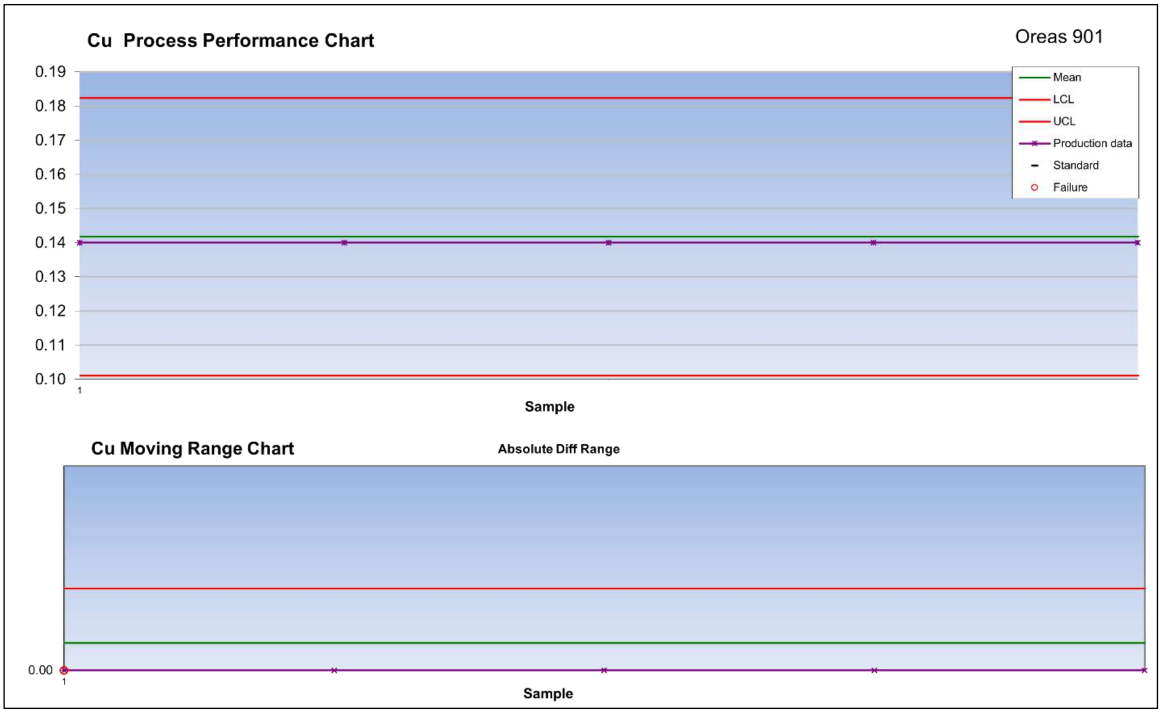
Source: Nordmin, 2023

Figure 11-13: Texaco Deposit, OREAS 504c Standard Total Cu (%), Assayed at Skyline Laboratories



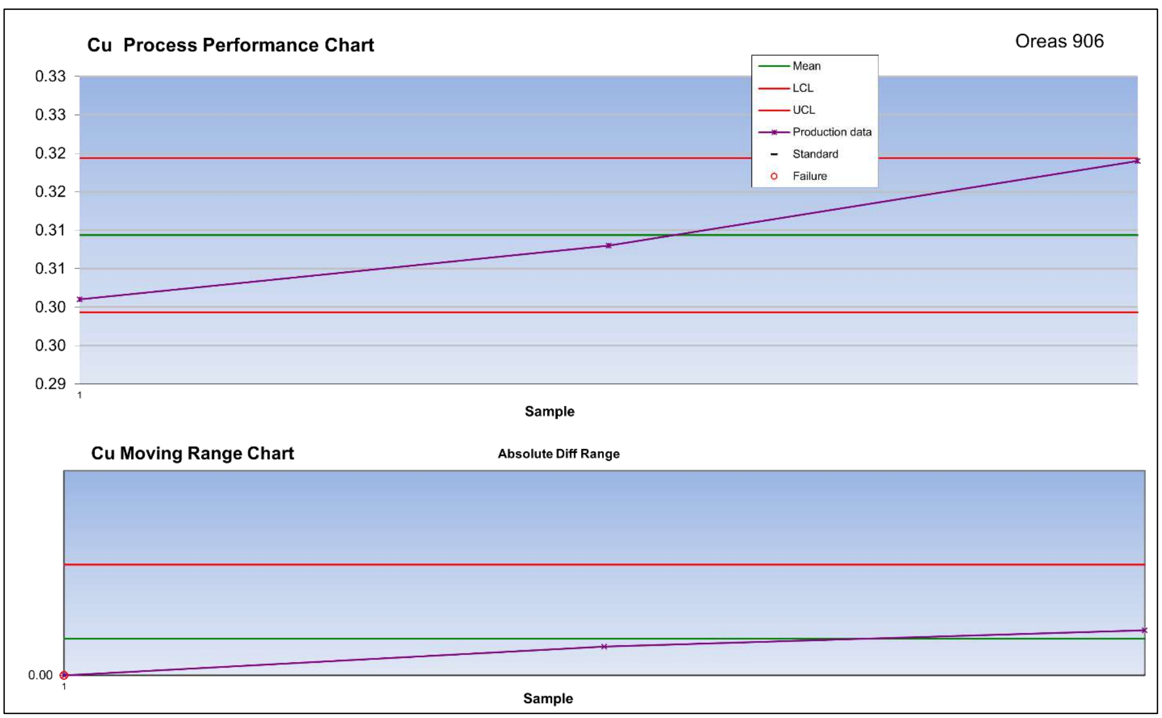
Source: Nordmin, 2023

Figure 11-14: Texaco Deposit, OREAS 501d Standard Total Cu (%), Assayed at Skyline Laboratories



Source: Nordmin, 2023

Figure 11-15 East Ridge Deposit, OREAS 901 Standard Total Cu (%), Assayed at Skyline Laboratories

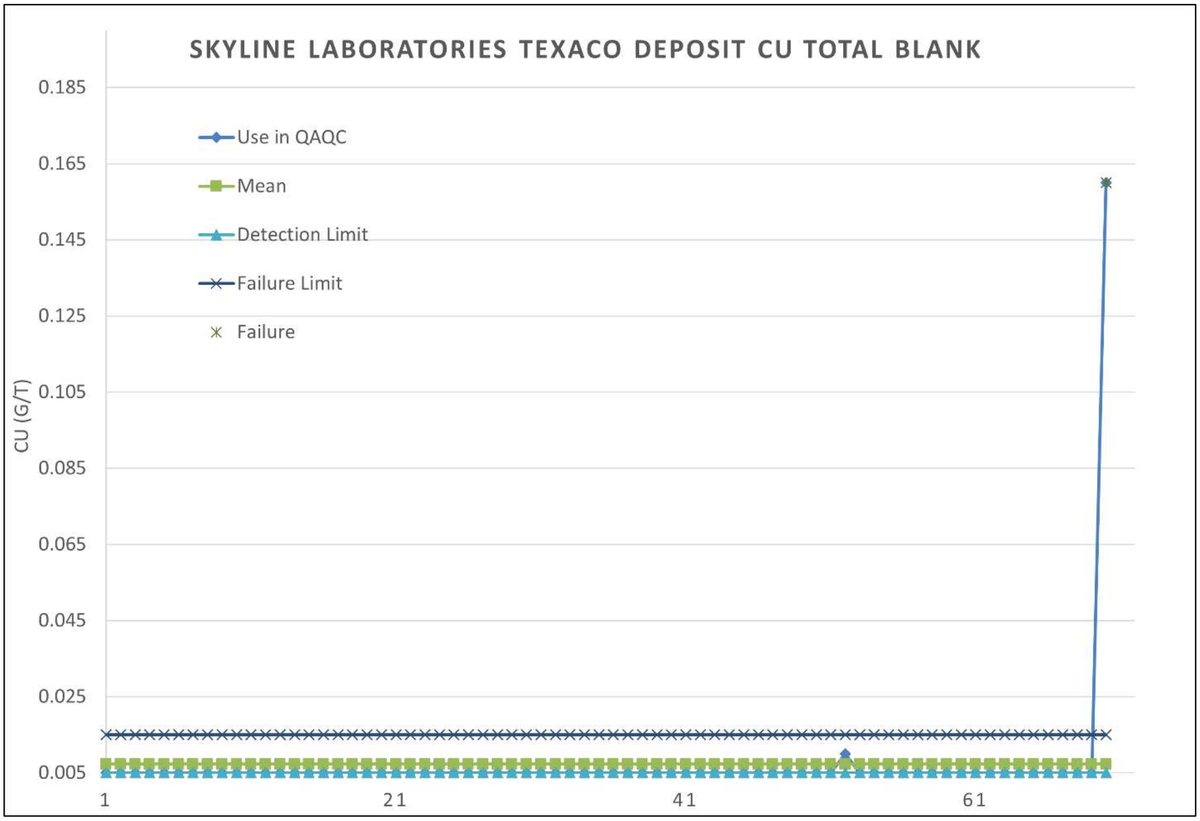


Source: Nordmin, 2023

Figure 11-16: East Ridge Deposit, OREAS 906 Standard Total Cu (%), Assayed at SGS Laboratories

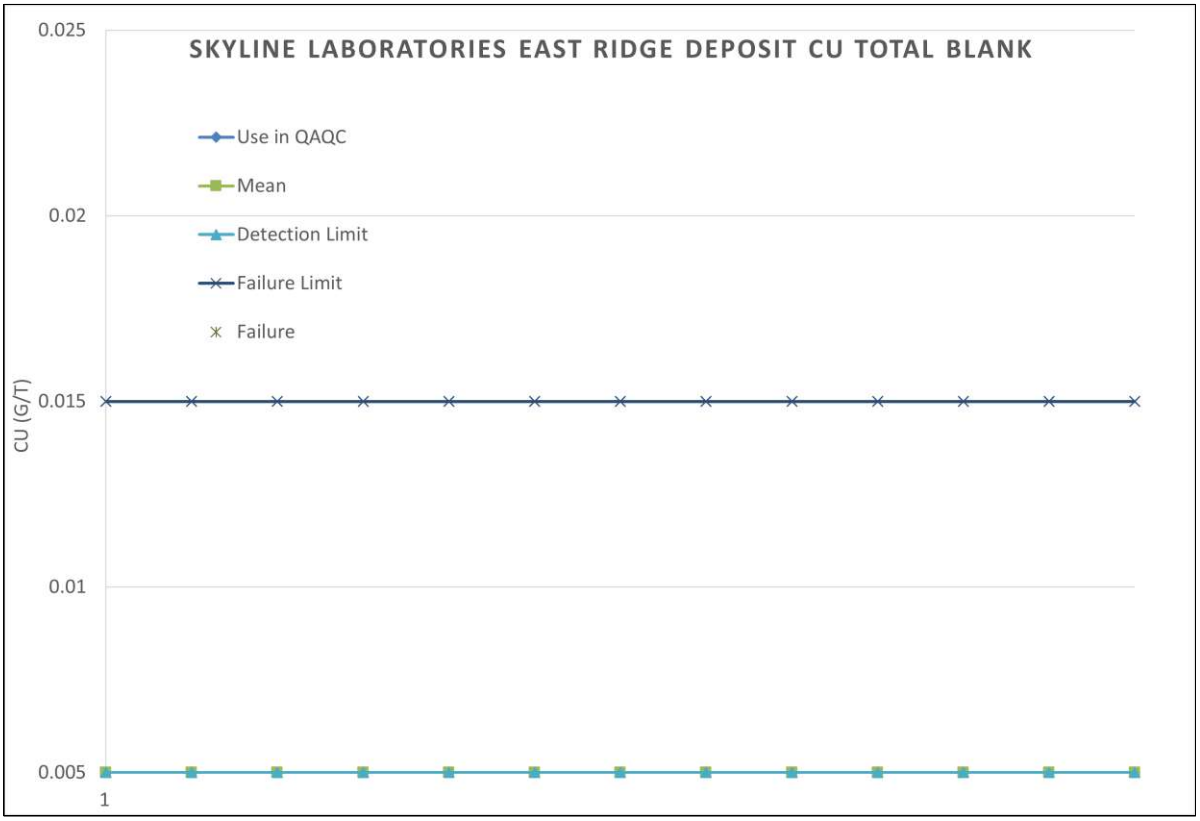
Blanks

The Company submitted 70 coarse granite blanks for the Texaco Deposit drilling and 13 for East Ridge during the 2022 drill campaign to Skyline Laboratories, at the time of this report, as part of its QA/QC process. Additionally, four blanks were sent to SGS Laboratories for the East Ridge Deposit during the 2022 drill campaign. No significant carryover of elevated metals is evident in blanks measured at Skyline Laboratories. A threshold of +/- 0.02% Cu was accepted for blank samples, if samples did not initially pass. Samples which failed were reanalyzed. Figure 11-17 and Figure 11-18 are charts for blanks inserted into Texaco and East Ridge drilling measured at Skyline Laboratories. Figure 11-19 is a chart for blanks inserted into East Ridge drilling, measured by SGS Laboratories.



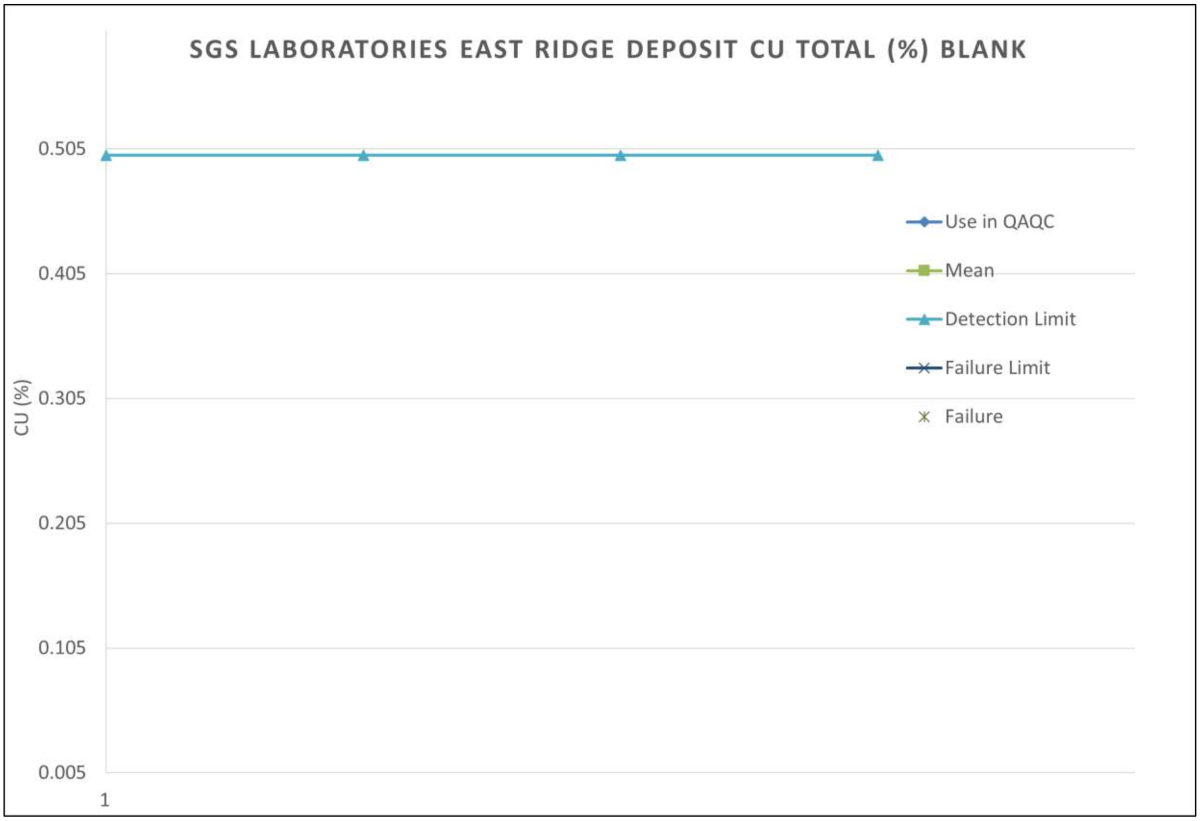
Source: Nordmin, 2023

Figure 11-17: Texaco Blanks for Total Cu



Source: Nordmin, 2023

Figure 11-18: East Ridge Blanks, Total Cu

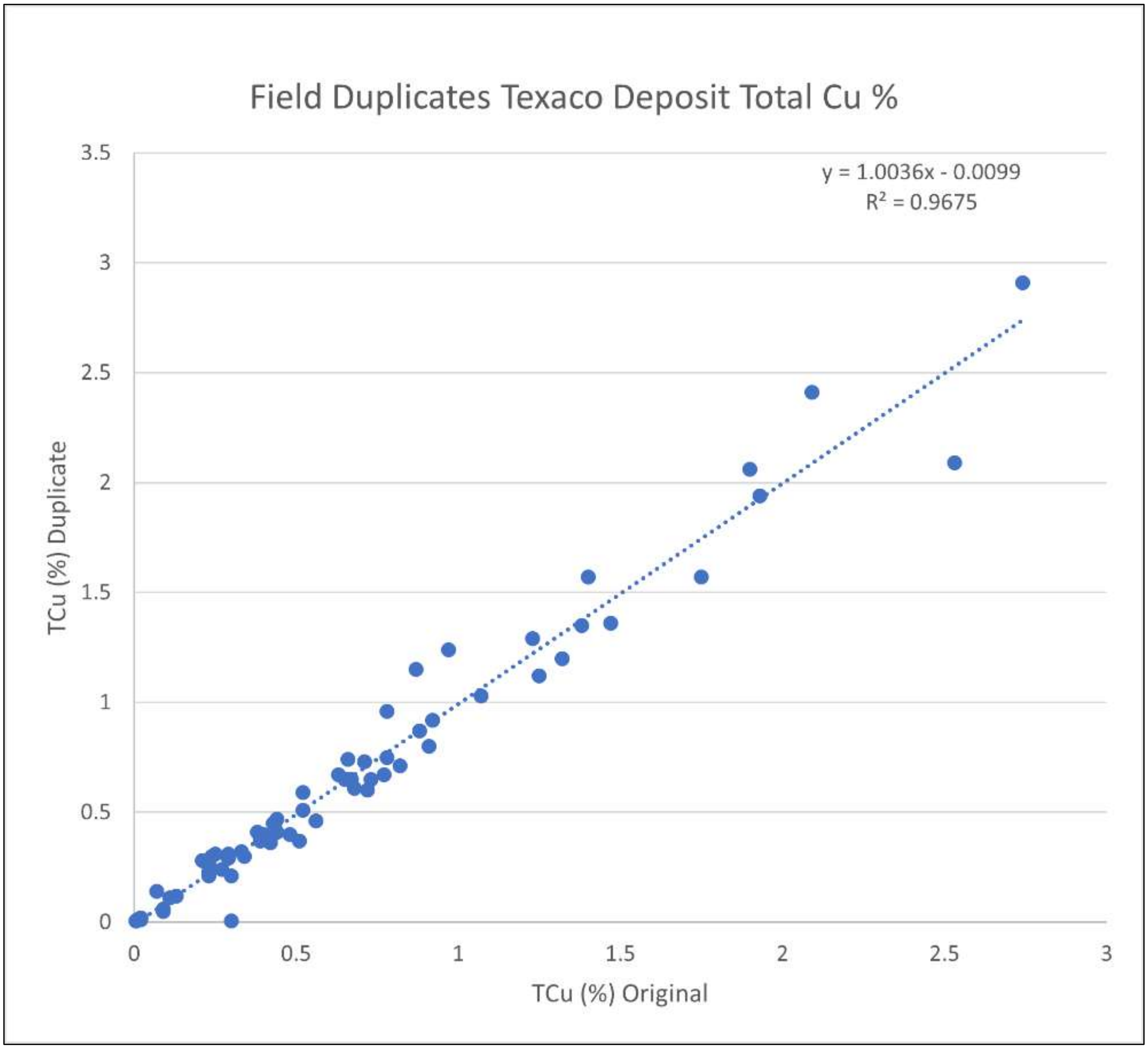


Source: Nordmin, 2023

Figure 11-19: East Ridge SGS Laboratories Blanks, Total Cu (%)

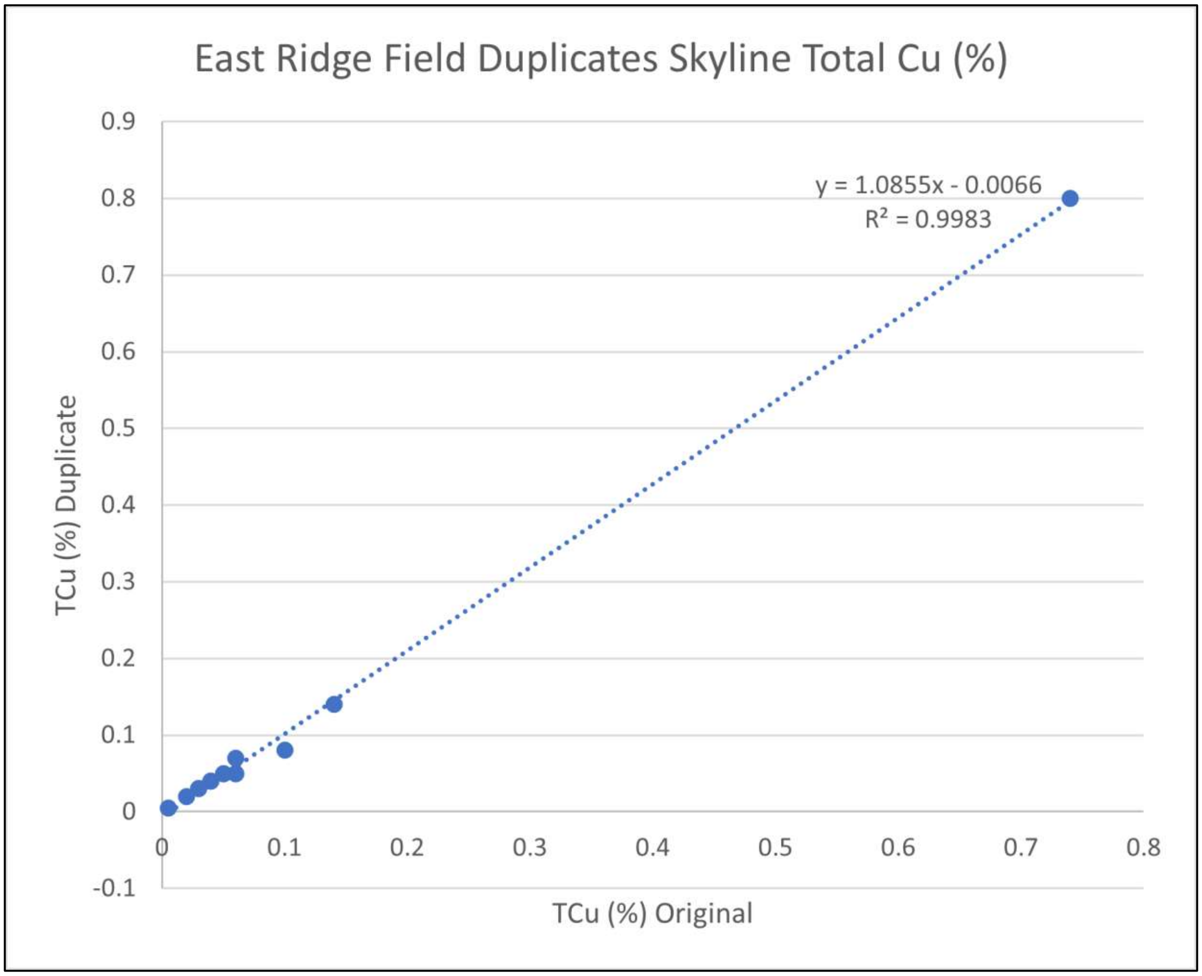
Duplicates

The Company submitted 14 field duplicates to Skyline Laboratories and five to SGS Laboratories for East Ridge and 74 to Skyline Laboratories for Texaco during the 2022 drilling campaign, at the time of this report, as a part of its QA/QC process. Original versus duplicate sample results for total Cu (%) are present in Figure 11-20 to Figure 11-22. All samples appear to be in reasonable agreement. Slight to moderate differences can be explained by a “nugget” effect and geological inconsistencies in mineralization.



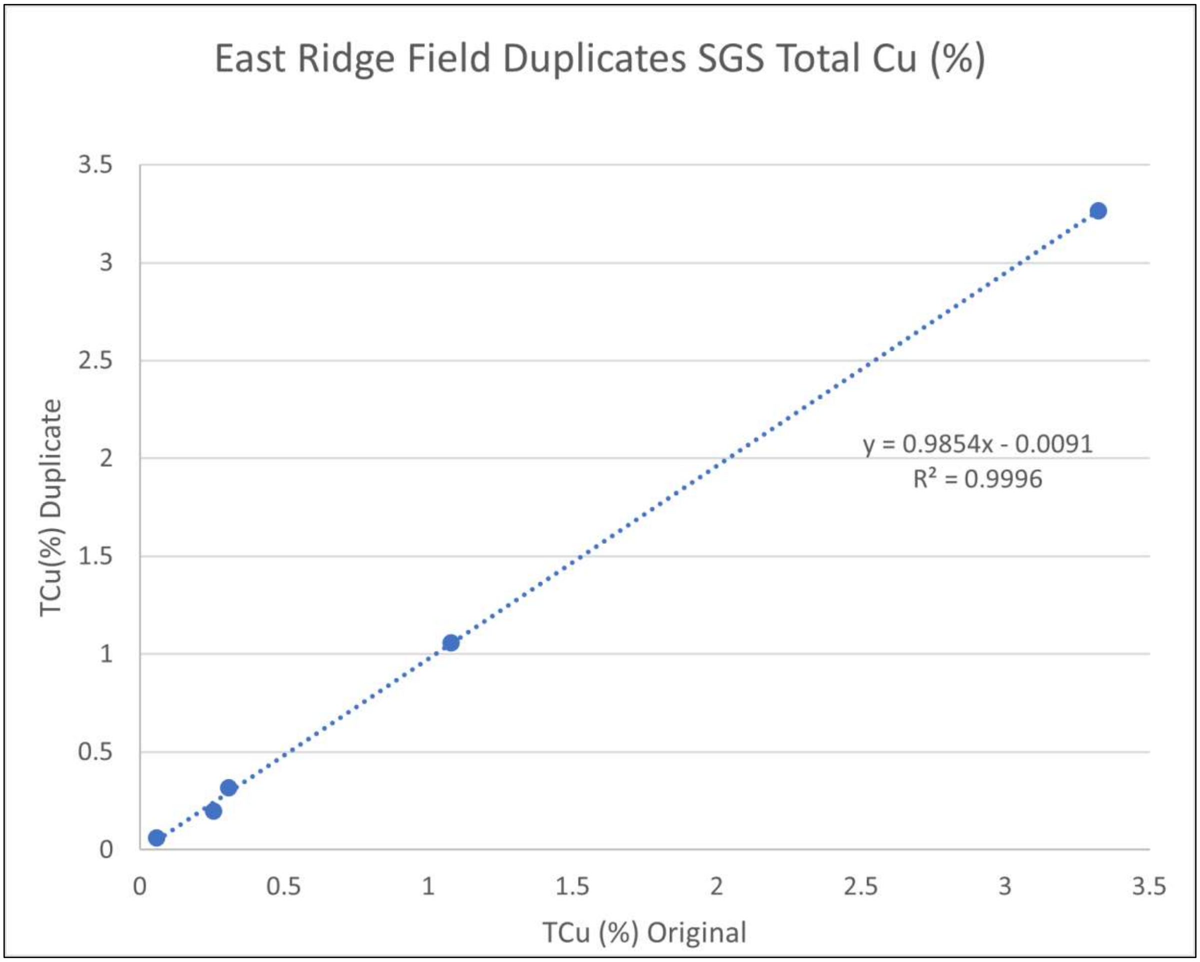
Source: Nordmin, 2023

Figure 11-20: Original Versus Field Duplicate Sample Results for the Texaco Deposit as total Cu (%) from Samples Submitted to Skyline Laboratories



Source: Nordmin, 2023

Figure 11-21: Original Versus Field Duplicate Sample Results for the East Ridge Deposit as Total Cu (%) from Samples Submitted to Skyline Laboratories



Source: Nordmin, 2023

Figure 11-22: Original Versus Field Duplicate Sample Results for East Ridge Deposit as Total Cu (%) from Samples Submitted to SGS Laboratories

11.4.3 2021 IE Sampling

Standards

During the 2021 drilling campaign IE submitted six different CRMs as a part of their QA/QC protocol, with 33 submitted in total. The review of the CRM results identified no laboratory failures at Skyline Laboratories and seven failures at American Assay Laboratories. OREAS 908 falls within the range of +/- two standard deviations for Cu Total (%) and acid soluble Cu (%) (Table 11-6 and Table 11-7 and Figure 11-23 to Figure 11-28). Skyline Laboratories submitted seven different CRMs, including two inhouse CRMs, as a part of their QA/QC process (Table 11-8), and American Assay Laboratories submitted three different CRMs as a part of their QA/QC process (Table 11-9).

Table 11-6: CRMs Inserted by IE into Sample Batches Sent to Skyline Laboratories

Standard	Count	Best Value Cu (%)	Mean Value Cu (%)	Bias (%)	Best Value Cu-AS-SEQ (%)	Mean Value Cu-AS-SEQ (%)	Bias (%)	Best Value CuCN-SEQ (%)	Mean Value CuCN-SEQ (%)	Bias (%)
OREAS 908	9	1.26	1.256	0.004	1.078	1.067	0.011	0.022	0.024	0.002
OREAS 907	6	0.6	0.652	0.052	0.531	0.54	0.009	0.018	0.015	0.003
OREAS 906	4	0.31	0.31	0	0.269	1.126	-0.86	0.01	0.019-	-0.009
OREAS 501 d	6	0.27	0.27	0	-	-	-	-	-	-
OREAS 503 d	4	0.53	0.524	0.006	-	-	-	-	-	-
OREAS 504c	1	1.13	1.09	0.04	-	-	-	-	-	-

Source: Nordmin, 2023

Table 11-7: CRMs Inserted by IE into Sample Batches Sent to American Assay Laboratories

Standard	Count	Best Value Cu (%)	Mean Value Cu (%)	Bias (%)	Best Value CuAS-SEQ (%)	Mean Value CuAS-SEQ (%)	Bias (%)	Best Value CuCN-SEQ (%)	Mean Value CuCN-SEQ (%)	Bias (%)
OREAS 908	10	1.26	1.299	0.039	1.078	1.067	0.64	0.022	0.023	0.001
OREAS 907	5	0.6	0.643	0.043	0.531	0.54	1.31	0.018	0.009	0.009
OREAS 906	2	0.31	0.33	0.02	-	-	-	-	-	-
OREAS 503c	1	0.27	0.545	0.275	-	-	-	-	-	-
OREAS 504c	3	1.13	1.11	0.02	-	-	-	-	-	-

Source: Nordmin, 2023

Table 11-8: Skyline Laboratory Submitted CRMs

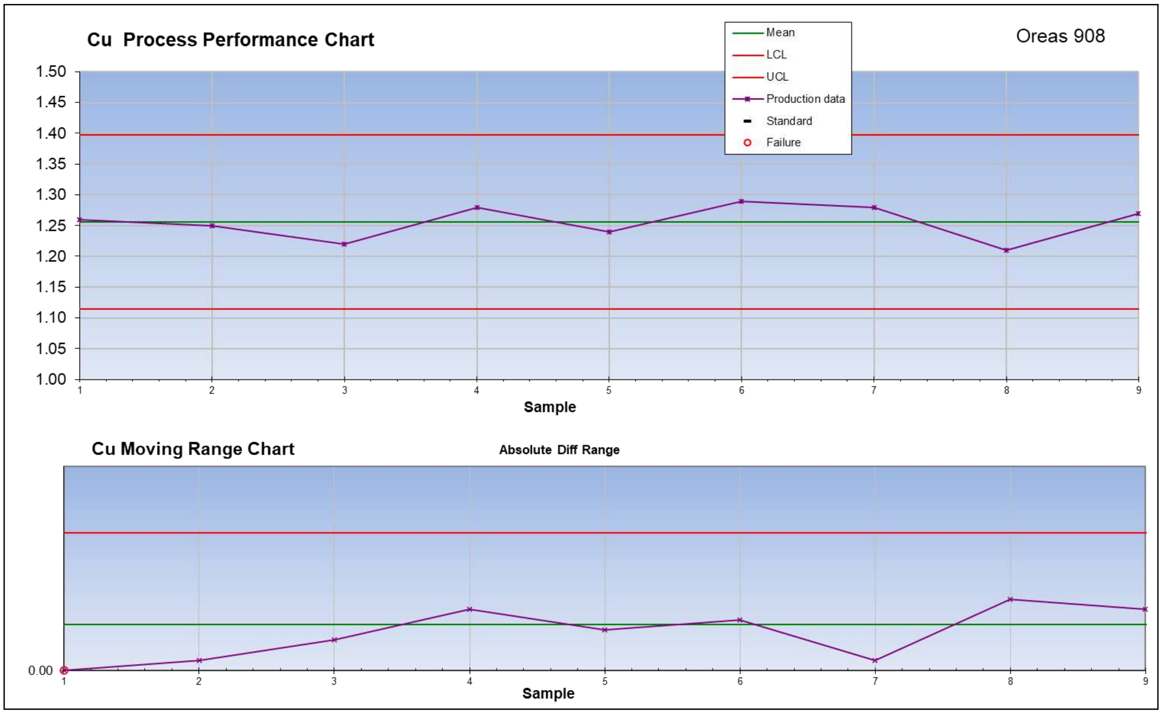
Standard	Count	Best Value CuT (%)	Mean Value CuT (%)	Bias (%)	Best Value Cu-AS-SEQ (%)	Mean Value	Bias (%)	Best Value Cu-CN-SEQ (%)	Mean Value	Bias (%)
SKY5	48	-	-	-	0.18	0.18	0.00	0.155	0.156	0.00
SKY6	48	-	-	-	0.42	0.41	0.01	0.076	0.077	0.00
CDN-CM-21	14	0.54	0.54	0.00	-	-	-	-	-	-
CDN-CM-14	34	1.06	1.07	-0.01	-	-	-	-	-	-
CDN-CM-29	12	0.74	0.74	0.00	-	-	-	-	-	-
CDN-CM-33	12	0.35	0.36	-0.01	-	-	-	-	-	-
CDN-W-4	20	0.14	0.14	0.00	-	-	-	-	-	-

Source: Nordmin, 2023

Table 11-9: American Assay Laboratory Submitted CRMs

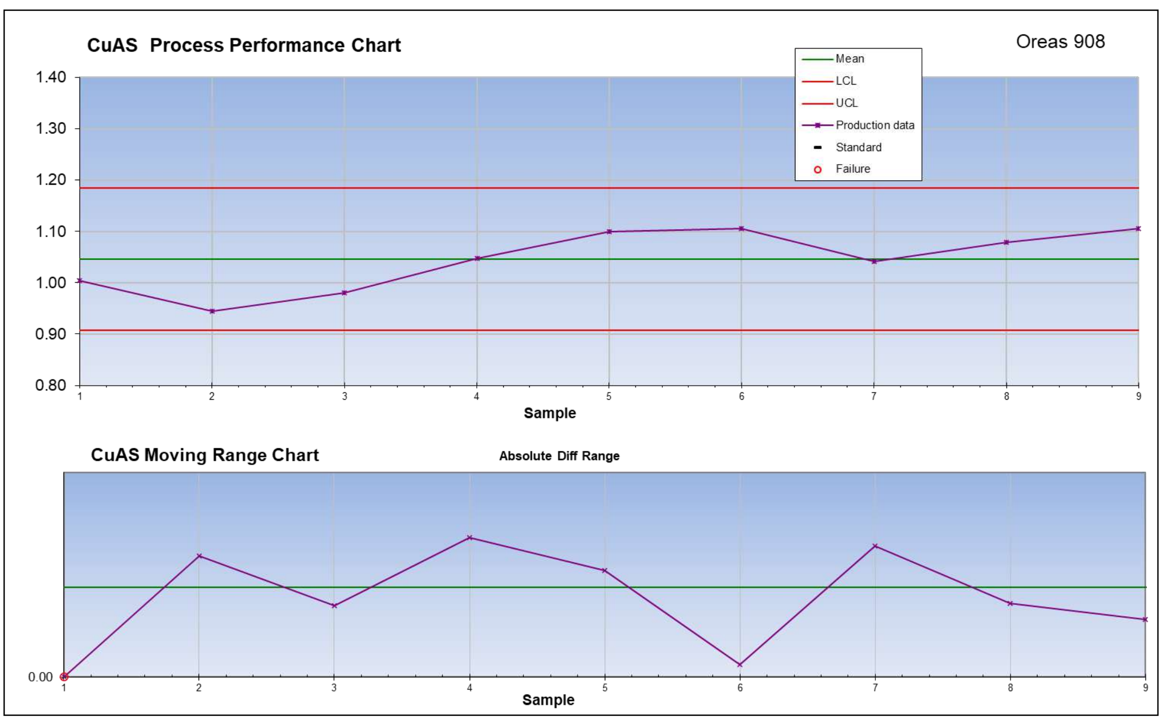
Standard	Count	Best Value Cu (%)	Mean Value Cu (%)	Bias (%)	Best Value CuAS-SEQ (%)	Mean Value Cu-AS-SEQ (%)	Bias (%)
OREAS 600b	3	0.05	0.051	0.00	-	-	-
OREAS 602b	3	0.494	0.495	0.00	-	-	-
OREAS 905	3	0.157	0.158	0.00	0.128	0.127	0.001

Source: Nordmin, 2023



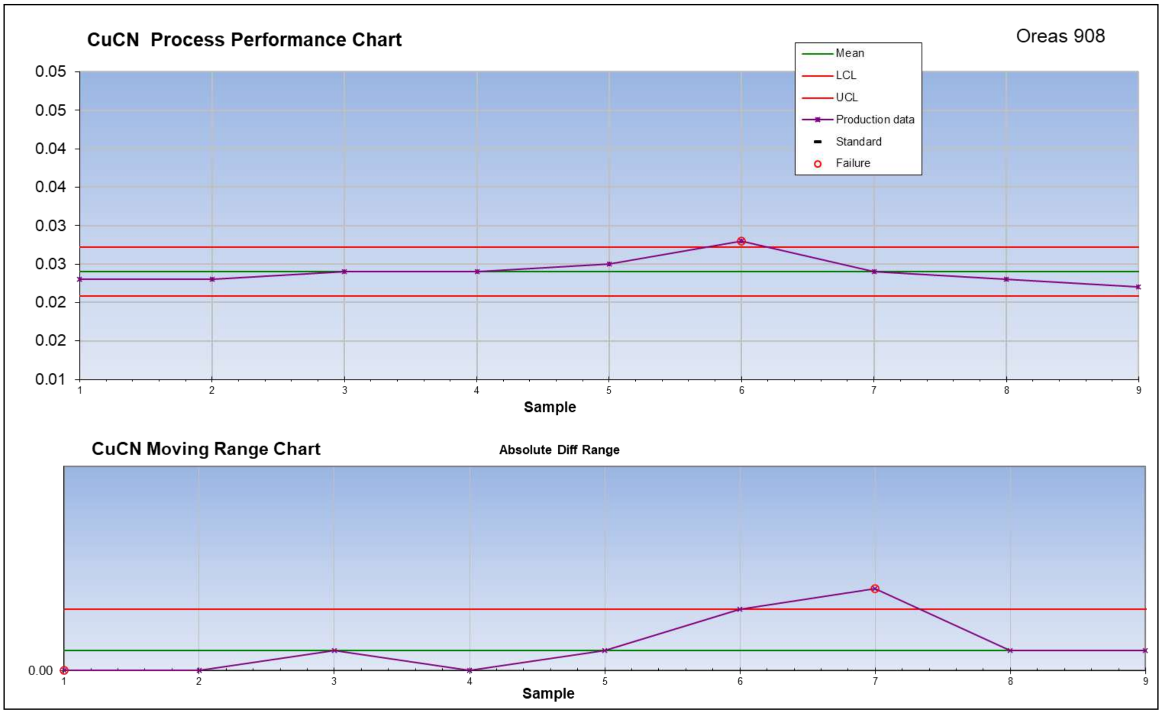
Source: Nordmin, 2023

Figure 11-23: Santa Cruz Deposit, OREAS 908 Standard Total Cu (g/t), Assayed at Skyline Laboratories



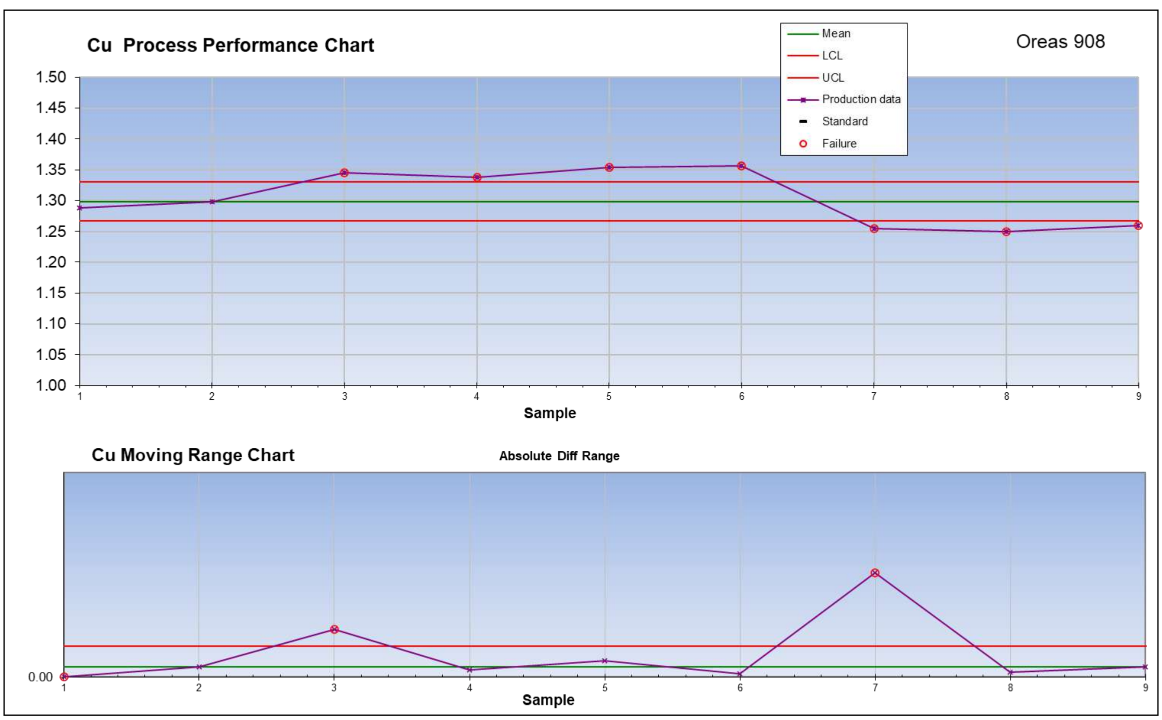
Source: Nordmin, 2023

Figure 11-24: Santa Cruz Deposit, OREAS 908 Standard Cyanide Soluble Cu (g/t), Assayed at Skyline Laboratories



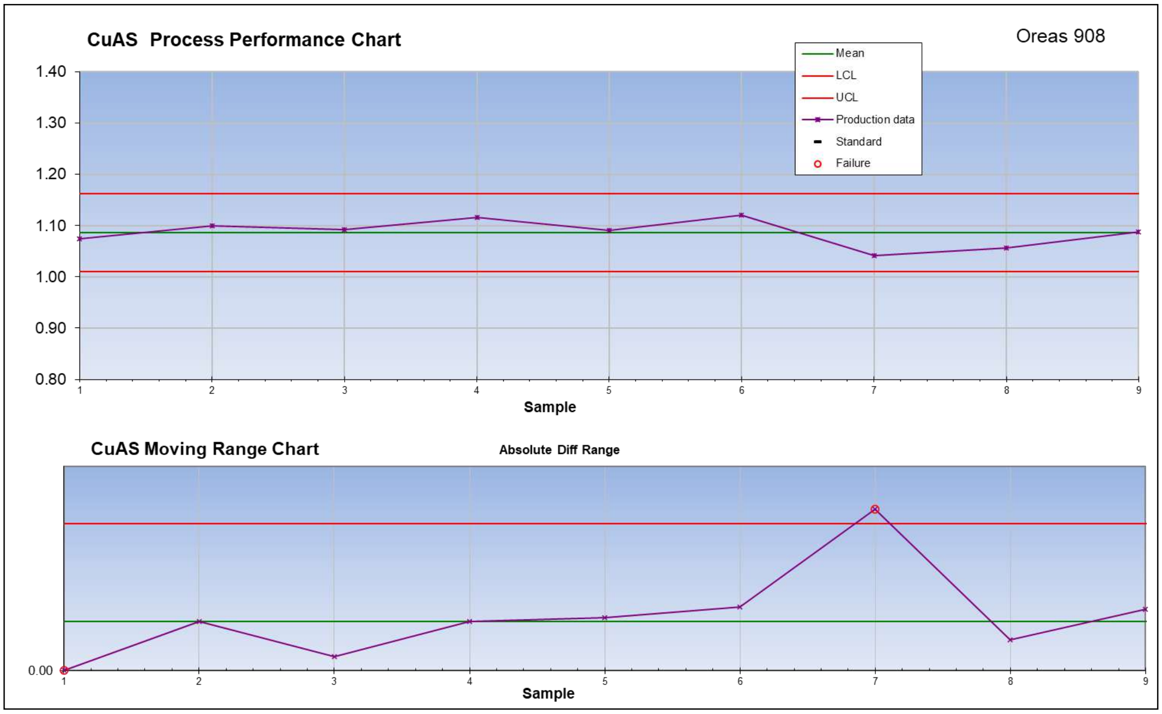
Source: Nordmin, 2023

Figure 11-25: Santa Cruz Deposit, OREAS 908 Standard Cyanide Soluble Cu (g/t), Assayed at Skyline Laboratories



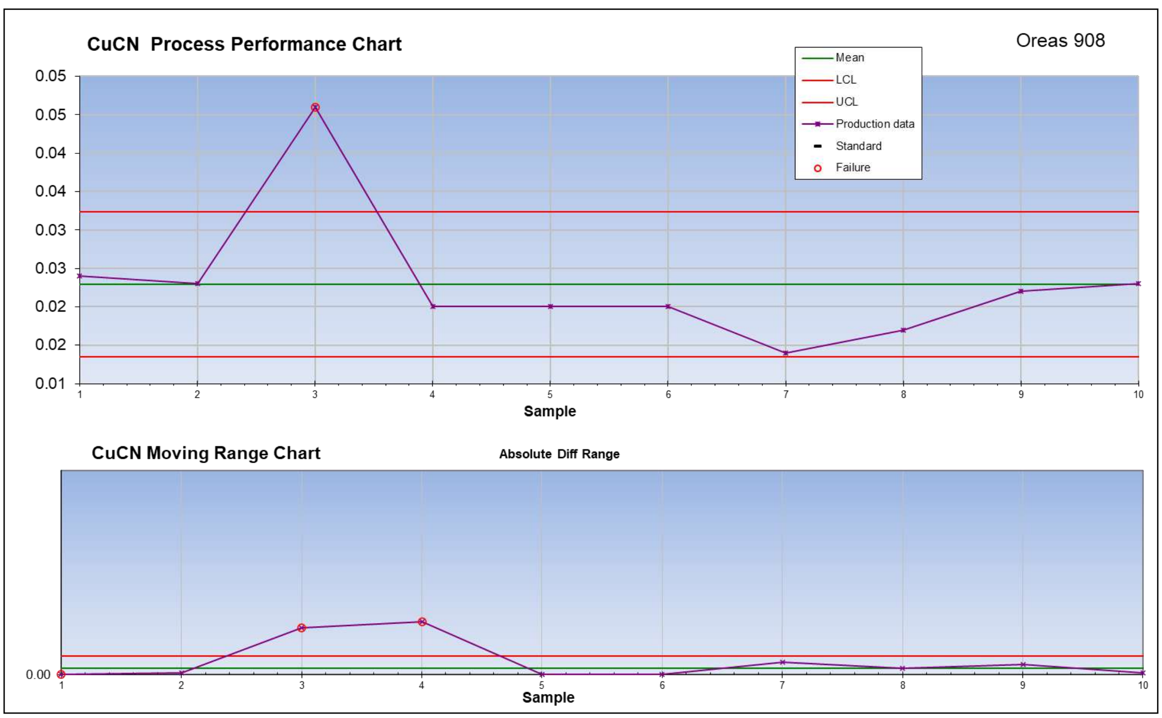
Source: Nordmin, 2023

Figure 11-26: Santa Cruz Deposit, OREAS 908 Standard Total Cu (g/t), Assayed at American Assay Laboratories



Source: Nordmin, 2023

Figure 11-27: Santa Cruz Deposit, OREAS 908 Standard Acid Soluble Cu (g/t), Assayed at American Assay Laboratories

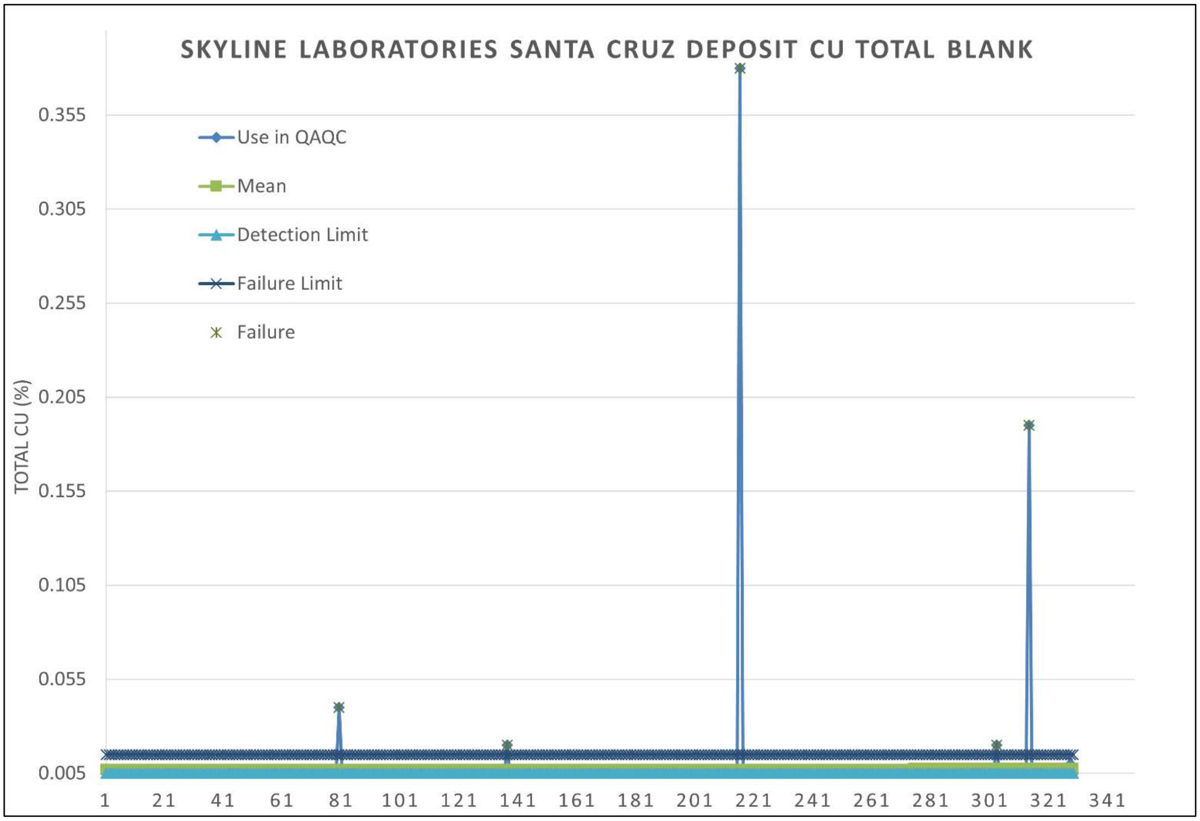


Source: Nordmin, 2023

Figure 11-28: Santa Cruz Deposit, OREAS 908 Standard Cyanide Soluble Cu (g/t), Assayed at American Assay Laboratories

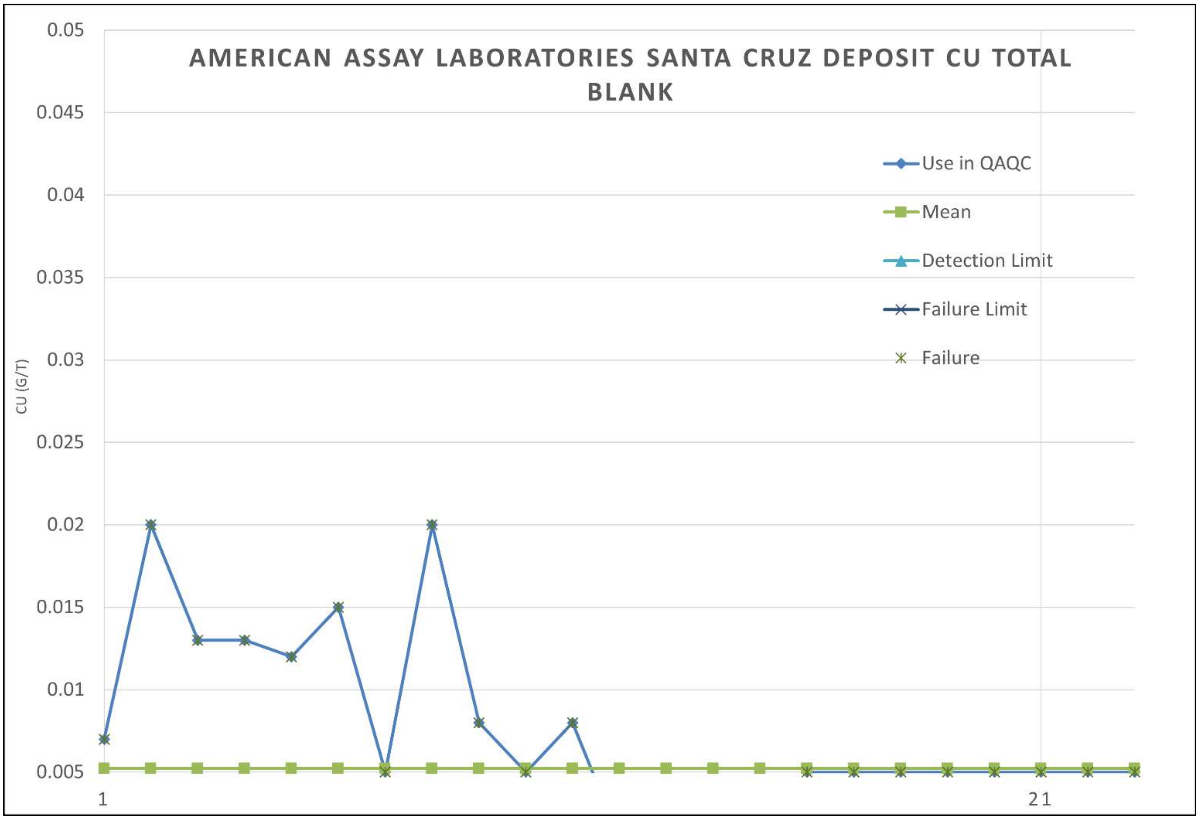
Blanks

The Company submitted 50 coarse blanks during the 2021 drill campaign, at the time of this report, as part of its QA/QC process. The Company used local granite blanks during the 2021 drill campaign as part of its QA/QC process. One blank was used labeled as Blank. The blank has been tested by Skyline Laboratories to ensure that there is no trace of Cu present. No significant carryover of elevated metals is evident in blanks measured at Skyline Laboratories (Figure 11-29). There is a carryover of metals evident in blanks measured at American Assay Laboratories related to dust control issues at this lab (Figure 11-30). The samples from these batches were re-analyzed by the lab, as set out in the QA/QC protocol.



Source: Nordmin, 2023

Figure 11-29: Blanks Submitted by IE to Skyline Laboratories for QA/QC Process

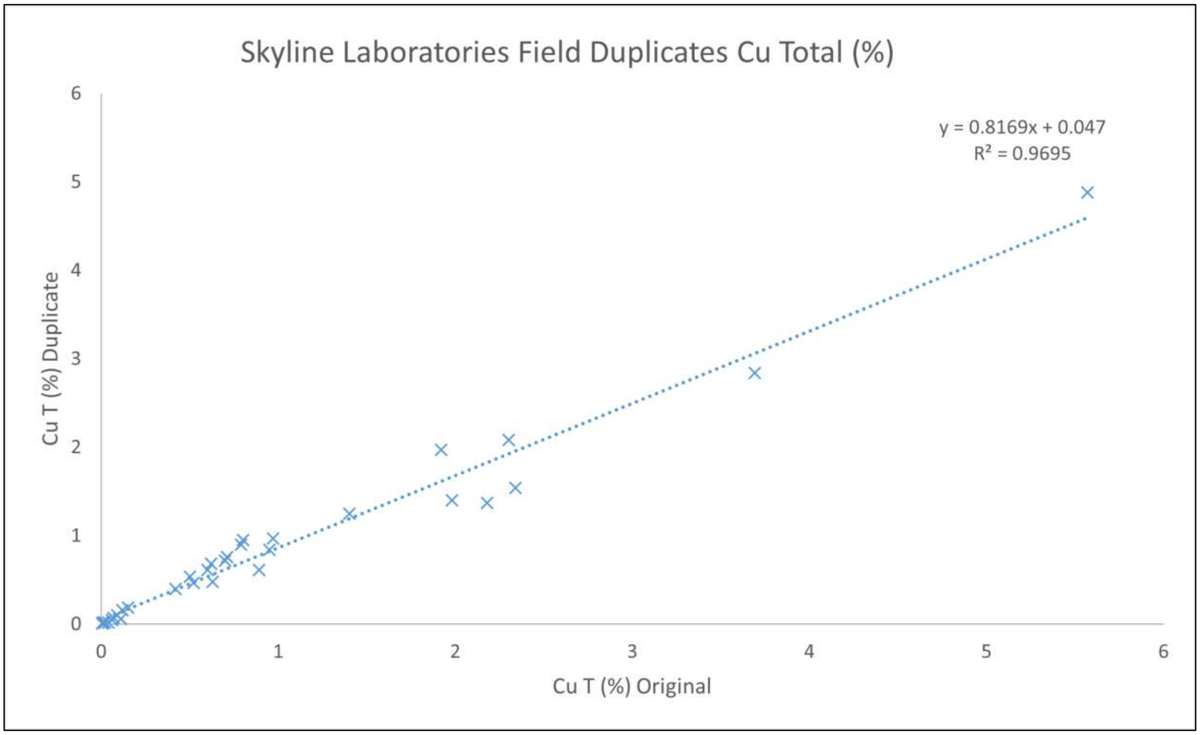


Source: Nordmin, 2023

Figure 11-30: Blanks Submitted by IE to American Assay Laboratories for QA/QC Process

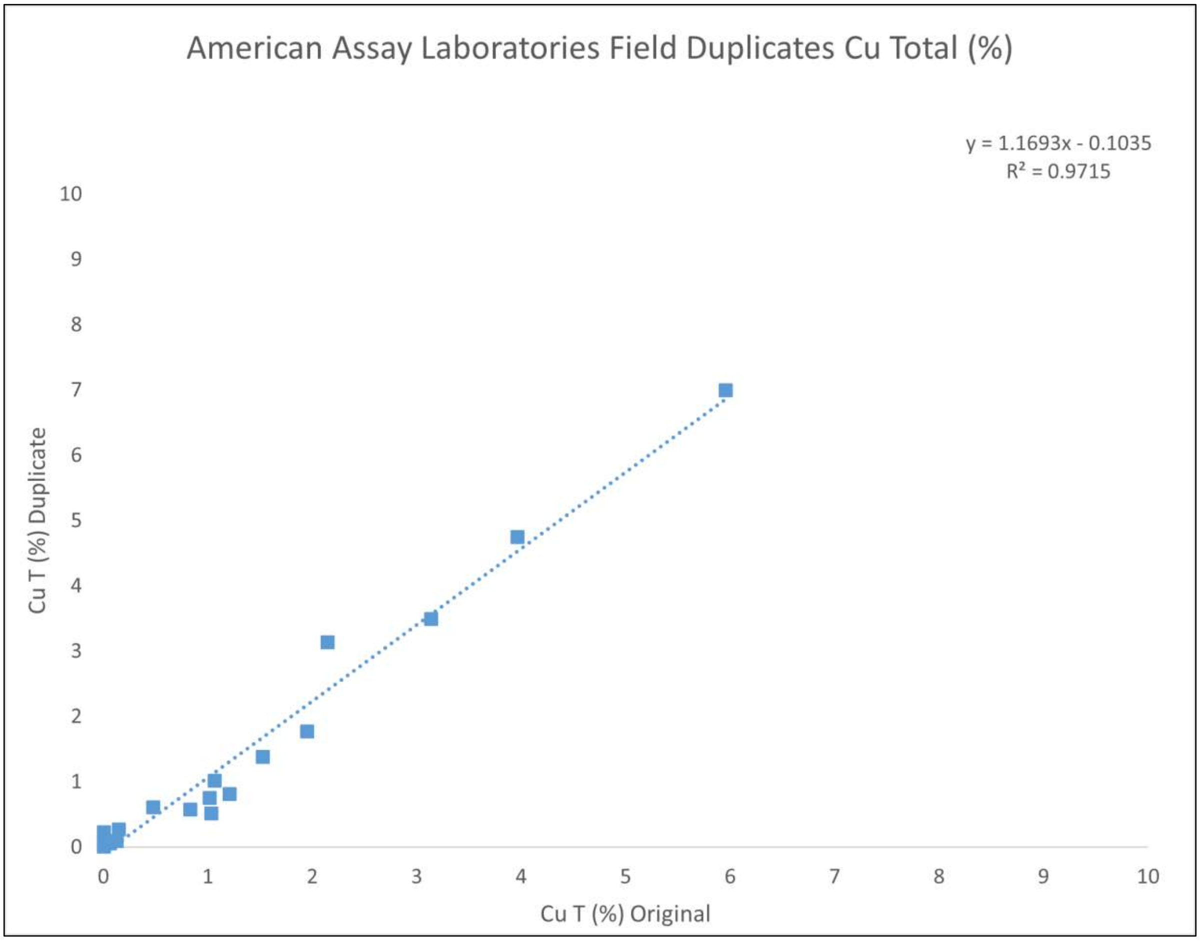
Duplicates

The Company submitted 64 field duplicates during the 2021 drill campaign, at the time of this report, as a part of its QA/QC process. Original versus duplicate sample results for total Cu (%) are present in Figure 11-31 and Figure 11-32. The results of the field duplicates are in good agreement for total Cu (%), acid soluble Cu (%) and cyanide soluble Cu (%). Skyline Laboratories submitted 175 lab duplicates (119 total Cu, 125 Acid Soluble, 125 Cyanide Soluble and 119 Mo) during the 2021 drill campaign as a part of their QA/QC process. The results of the laboratory duplicates versus the original sample measurements for total Cu (%) are presented in Figure 11-33. The results of the laboratory duplicates are in good agreement for total Cu (%), acid soluble Cu (%) and cyanide soluble Cu (%). American Assay Laboratories submitted 21 Lab duplicates (all measured for total Cu, acid soluble Cu, cyanide soluble Cu and molybdenum) during the 2021 drill campaign as a part of their QA/QC process. The results of the laboratory duplicates are in good agreement for total Cu (%), acid soluble Cu (%) and cyanide soluble Cu (%) and molybdenum (ppm). The results of the duplicates versus the original sample measurements for total Cu (%) can be viewed in Figure 11-34.



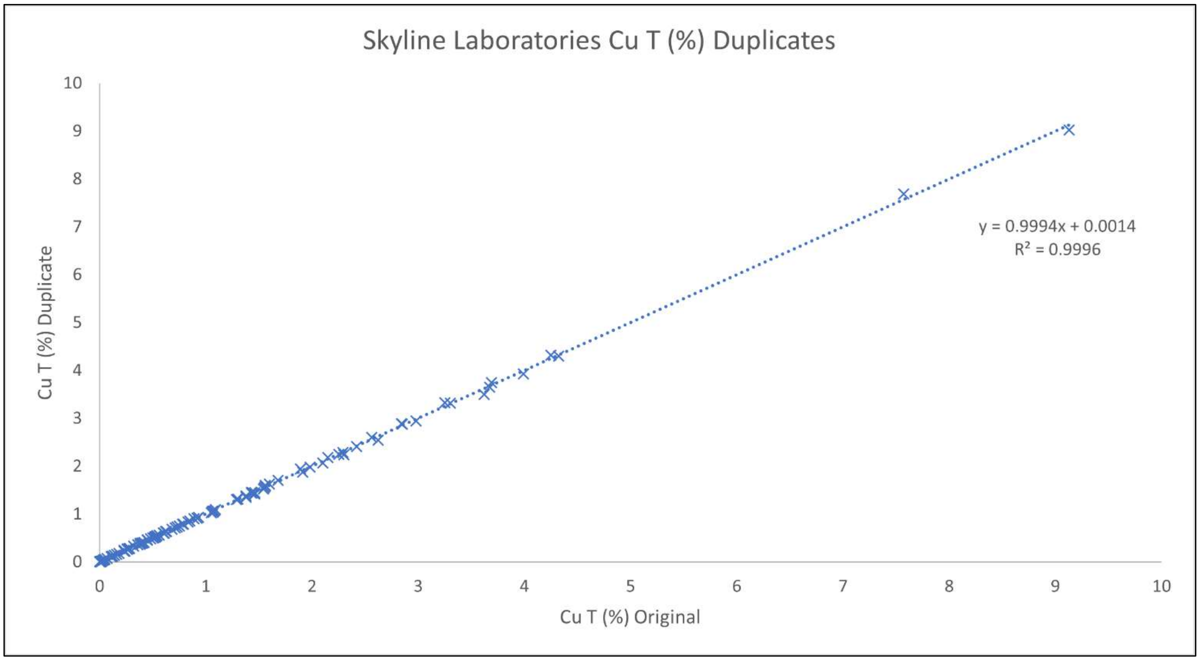
Source: Nordmin, 2023

Figure 11-31: Original Versus Field Duplicate Sample Results as Total Cu (%) from Samples Submitted to Skyline Laboratories



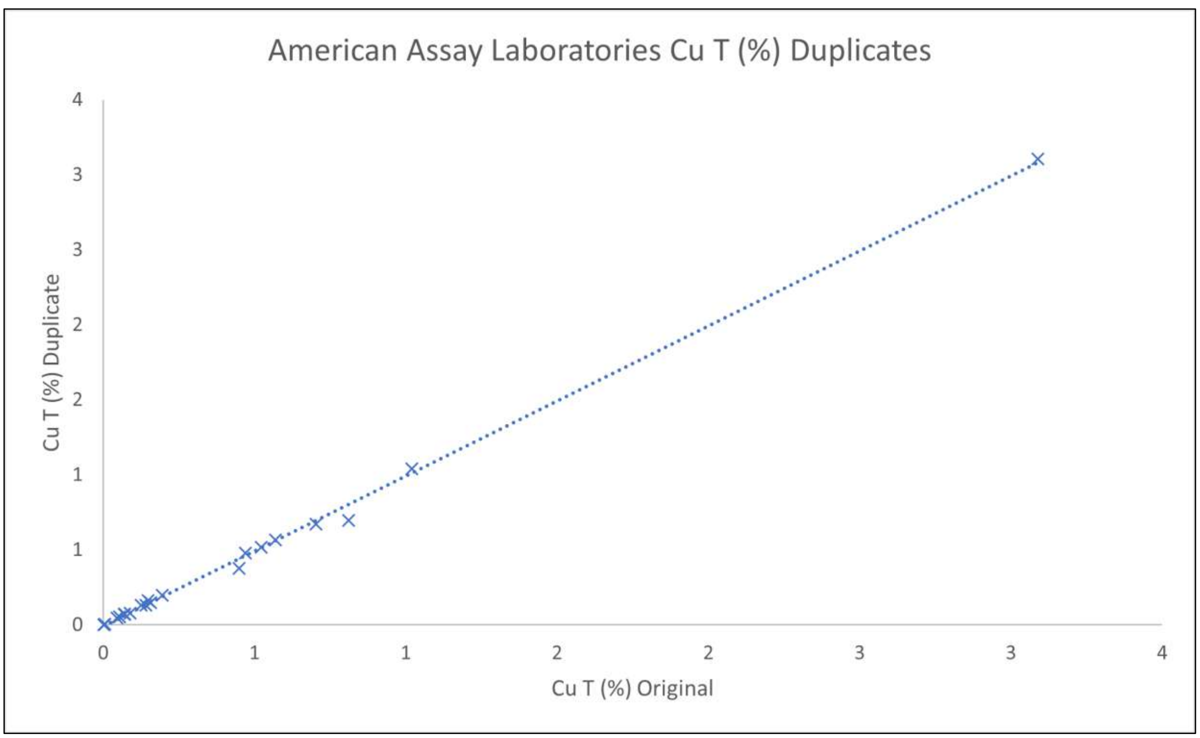
Source: Nordmin, 2023

Figure 11-32: Original Versus Field Duplicate Sample Results as Total Cu (%) from Samples Submitted to American Assay Laboratories



Source: Nordmin, 2023

Figure 11-33: Duplicates Completed by Skyline Laboratories for QA/QC Process



Source: Nordmin, 2023

Figure 11-34: Duplicates Completed by American Assay Laboratories for QA/QC Process

11.5 Security and Storage

The Santa Cruz East Ridge, and Texaco core is stored in wax impregnated core boxes and transported to the core logging shack. After being logged, the core boxes are palletized, weatherized, and stored in IE's core storage facilities. The core storage is locked behind bay doors or chain link fencing for security purposes. All samples for analyses are transported by courier to the laboratory in Tucson, Arizona, or Burnaby, BC, Canada.

12 Data Verification

12.1 Data Verification Procedures

Nordmin completed several data verification checks throughout the duration of the Mineral Resource Estimate. The verification process included two site visits to the Santa Cruz Project by Nordmin to review surface geology, drill core geology, geological procedures, QA/QC procedures, chain of custody of drill core, and the collection of independent samples for assay verification. The site visits occurred from March 2nd to 6th, 2022 and November 7th to 10th, 2022. The data verification included:

- Survey spot check of drill collars
- Spot check comparison of assays from the drillhole database against original assay records (lab certificates)
- Spot check of drill core lithologies recorded in the database versus the core located in the core processing and storage facilities
- Spot check of drill core lithologies in the database versus the lithological model
- Review of the QA/QC performance of the drill programs

Nordmin has also completed additional data analysis and validation, as outlined in Section 8.

12.2 Nordmin Site Visit 2022

Nordmin completed a site visit to the Santa Cruz Project from March 2nd to March 6th, 2022. Nordmin was accompanied by IE management team members and project geologists. Additionally, Nordmin also visited the site on November 7th through November 10th, 2022.

Activities during the site visits included:

- Review of the geological and geographical setting of the Santa Cruz Project
- Review and inspection of the site geology, mineralization, and structural controls on mineralization
- Review of the drilling, logging, sampling, analytical, and QA/QC procedures
- Review of the chain of custody of samples from the field to the assay lab
- Review of the drill logs, drill core, storage facilities, and independent assay verification on selected core samples
- Confirmation of several drillhole collar locations
- Review of the structural measurements recorded within the drill logs and how they are utilized within the 3D structural model
- Verification of a portion of the drillhole database

IE geologists completed the geological mapping, core logging, and sampling associated with each drill location, therefore, Nordmin relied on IE's database to review the core logging procedures, collection of samples, and chain of custody associated with the drilling programs. IE provided Nordmin with digital copies of the logging and assay reports; all drilling data, including collars, logs, and assay results, prior to the site visit.

No significant issues were identified during the site visit.

IE employs a rigorous QA/QC protocol, including the routine insertion of field duplicates, blanks, and certified reference standards. Nordmin was provided with an excerpt from the database for review.

Currently, IE's core logging scope includes measured sections of fractures, faults, shears, and other structures. Downhole televiewer data is collected and compiled with the logging information. This allows for the accurate measurement of structures.

The geological data collection procedures and the chain of custody were found to be consistent with industry standards and following IE's internal procedural documentation. Nordmin was able to verify the quality of geological and sampling information and develop an interpretation of Cu (primary, acid soluble and cyanide soluble) grade distributions appropriate for the MRE.

12.2.1 Field Collar Validation

Nordmin and a senior IE geologist verified several collar locations during the November site visit using a Garmin GPSMAP 64sx handheld GPS unit. The collars taken by Nordmin are very similar, if not exact, to what IE had for collar locations. Figure 12-1 demonstrate the comparison between the collected collar locations for select historical and 2021/2022 IE drillholes to the IE collar locations used in the MRE.

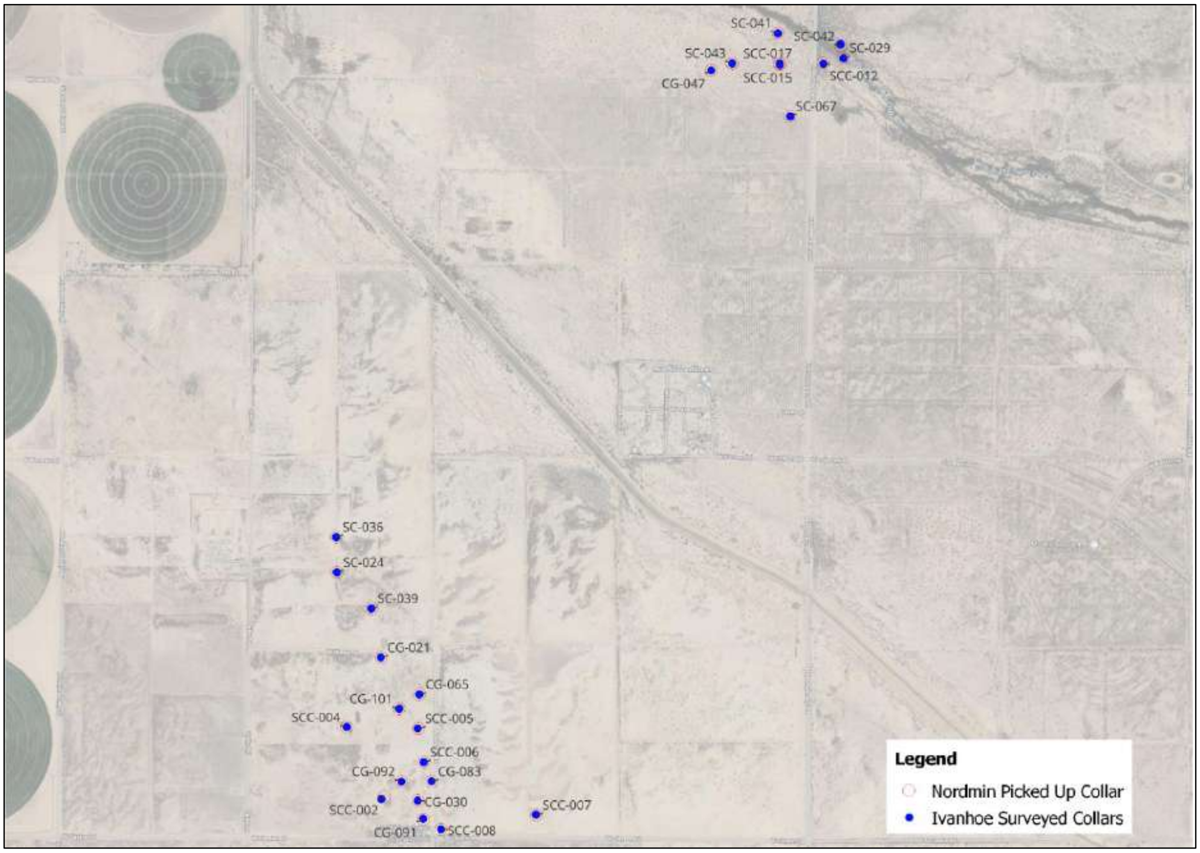
Photos of drillhole collars for historic holes CG-091 and CG-030 can be seen in Figure 12-2.

Table 12-1: Check Coordinates for Drilling Within the Santa Cruz, East Ridge, and Texaco Deposits November 9, 2022

	Original Coordinates		Check Coordinates	
Hole ID	**Easting**	**Northing**	**Easting**	**Northing**
CG-021	417,681.0	3,640,646.1	417,692.2	3,640,646.4
CG-030	417,838.1	3,640,036.4	417,838.5	3,640,036.4
CG-047	419,086.6	3,643,143.5	419,086.5	3,643,144.2
CG-055	417,832.8	3,639,424.9	417,833.4	3,639,420.8
CG-061	417,833.9	3,639,581.1	417,834.5	3,639,579.8
CG-065	417,844.7	3,640,488.8	417,844.1	3,640,490.1
CG-068	417,894.1	3,639,506.3	417,893.1	3,639,504.3
CG-083	417,897.0	3,640,118.5	417,898.2	3,640,118.6
CG-091	417,861.4	3,639,958.8	417,862.3	3,639,957.2
CG-092	417,768.0	3,640,117.3	417,768.7	3,640,117.6
CG-099	417,898.7	3,639,661.0	417,898.5	3,639,660.8
CG-100	417,758.8	3,639,654.9	417,758.3	3,639,654.3
CG-101	417,759.1	3,640,427.4	417,758.4	3,640,427.4
SC-024	417,494.1	3,641,007.9	417,496.6	3,641,006.9
SC-029	419,648.6	3,643,194.8	419,648.0	3,643,196.2
SC-036	417,491.3	3,641,157.6	417,492.9	3,641,149.2
SC-039	417,640.6	3,640,854.2	417,645.0	3,640,860.3
SC-041	419,369.7	3,643,301.1	419,369.7	3,643,302.5
SC-042	419,636.1	3,643,254.0	419,638.0	3,643,246.7
SC-043	419,174.8	3,643,173.9	419,176.4	3,643,173.8
SC-067	419,422.9	3,642,948.3	419,420.1	3,642,947.9
SCC-001	417,838.0	3,639,741.0	417,837.1	3,639,741.1
SCC-002	417,683.0	3,640,043.0	417,696.1	3,640,053.3
SCC-004	417,536.0	3,640,350.0	417,534.6	3,640,348.6
SCC-005	417,837.7	3,640,344.0	417,840.7	3,640,342.8
SCC-006	417,863.6	3,640,199.8	417,864.8	3,640,201.7
SCC-007	418,341.0	3,639,977.0	418,342.3	3,639,974.7
SCC-008	417,937.0	3,639,914.0	417,937.4	3,639,914.4
SCC-012	419,564.0	3,643,172.0	419,562.1	3,643,175.6
SCC-014	419,175.1	3,643,173.6	419,176.4	3,643,173.8
SCC-015	419,378.5	3,643,167.5	419,379.2	3,643,169.5
SCC-017	419,378.0	3,643,172.7	419,378.2	3,643,174.1

Source: Nordmin, 2023

Note: Drillholes beginning with “SCC” are recent holes drilled by IE. All other hole ID’s represent historical drillholes throughout the property.



Source: Nordmin, 2023

Figure 12-1: Map of Check Drillhole Collar Locations from November 2022 Site Visit

Source: Nordmin, 2023

Figure 12-2: Collars for Historic Diamond Drillholes CG-091 and CG-030

12.2.2 Core Logging, Sampling, and Storage Facilities

The Company drillholes are logged, photographed, and sampled on site at the core logging facility (Figure 12-3 to Figure 12-5). No historical core is available. Recently drilled core is palletized, winterized, stored at IE's core storage facilities Figure 12-3). The core samples, pulps, and coarse rejects are kept at the core logging facility or at IE's core storage facilities.

Source: Nordmin, 2023

Figure 12-3: IE Core Logging Facility Located in Casa Grande, Arizona

Source: Nordmin, 2023

Figure 12-4: IE's Core Storage Facilities - Core is Predominantly Stored Outside, Winterized and on Pallets. Further Core Storage is Available in Buildings 1 and 2

Source: Nordmin, 2023

Figure 12-5: Core Photography Station at IE Core Logging Facility

MX Deposit™ logging software is used for the drill program. The software has been extensively customized, and all core loggers have been very well trained. As a result, the QP found great consistency of logging across all personnel, a rarity in the industry. Geotechnical measurements are also taken in MX Deposit and are equally robust and consistent across personnel.

Documented drilling, logging, and sampling SOPs, including a standardized drill inspection checklist are used to standardize and enforce procedures. QA/QC samples, including blanks, duplicates, and standards, are appropriately selected and applied to the assaying.

Prior to the November site visit by the QP, anomalous SG values were observed in database exports. This included negative values and values less than or close to the SG of water (1.0). Upon inspection of the SG station (Figure 12-6), it was noted that the vessel used for weight in water was not of adequate size and the water contained large amounts of sediment, likely causing erroneous measurements. The QP discussed how to rectify these issues with the on-site team and will be closely monitoring SG values going forward. All suggested changes have since been implemented. The existing SG database was subsequently corrected and validated to the satisfaction of the QP, all incoming SG measurements have been reviewed and were acceptable.

Source: Nordmin, 2023

Figure 12-6 Specific Gravity Measuring Station within Core Logging Facility

Historical drill core has not been preserved; several core dumps can be found around the property, but it is not available for review.

12.2.3 Independent Sampling

Nordmin selected intervals from two Santa Cruz Deposit holes. A total of 14 verification samples were collected (Table 12-2) from the Santa Cruz available diamond drillholes. During the November 2022 site visit an additional 50 samples were selected for verification from the Texaco Deposit diamond drillholes (Table 12-3). Diamond drill core previously sampled (halved) was re-sampled by having the labs re-analyze the coarse reject material. Two assay laboratories were used during the 2021 drill campaign; therefore, the decision was made by Nordmin to send the independent samples to both laboratories to check for any lab bias.

Table 12-2: Original Assay Values Versus Nordmin Check Sample Assay Values from the March 2022 Site Visit

			Original Sample				Check Sample			
Sample Number	From	To	TCu (%)	ASCu-SEQ	CNCu-SEQ	Mo (%)	TCu (%)	ASCu-SEQ	CNCu-SEQ	Mo (%)
SKY5022508	582.35	583.70	0.12	0.041	0.005	0.013	0.12	0.045	0.007	0.011
SKY5022513	587.70	588.70	6.05	4.535	0.014	0.012	6.03	5.544	0.012	0.012
SKY5022517	590.70	591.70	2.02	1.756	0.007	0.008	2.17	2.134	0.007	0.007
SKY5022525	591.70	600.70	1.2	1.069	0.011	0.009	1.23	1.207	0.012	0.006
SKY5022601	600.70	687.23	3.99	3.803	0.039	0.005	4.05	3.947	0.039	0.005
SKY5022604	600.70	690.23	6.89	1.472	3.742	0.011	6.95	1.527	5.31	0.01
SKY5022585	664.23	666.23	1.98	1.818	0.007	0.012	1.99	1.98	0.007	0.011
SKY5022565	666.23	642.10	2.63	2.348	0.012	0.007	2.62	2.621	0.014	0.005
SKY5022730	816.00	817.00	0.61	0.0025	0.068	0.005	0.62	0.005	0.075	0.003
SKY5022754	836.00	837.00	1.99	0.0025	0.204	0.012	2.05	0.0025	0.214	0.011
SKY5022823	939.00	941.00	0.62	0.007	0.064	0.002	0.64	0.009	0.066	0.002
SKY5022824	941.00	943.00	0.55	0.0025	0.031	0.006	0.55	0.005	0.031	0.006
SKY5022823	939.00	941.00	0.62	0.007	0.064	0.002	0.65	0.0025	0.06	0.002
SKY5022824	941.00	943.00	0.55	0.0025	0.031	0.006	0.55	0.0025	0.032	0.002

Source: Nordmin, 2023

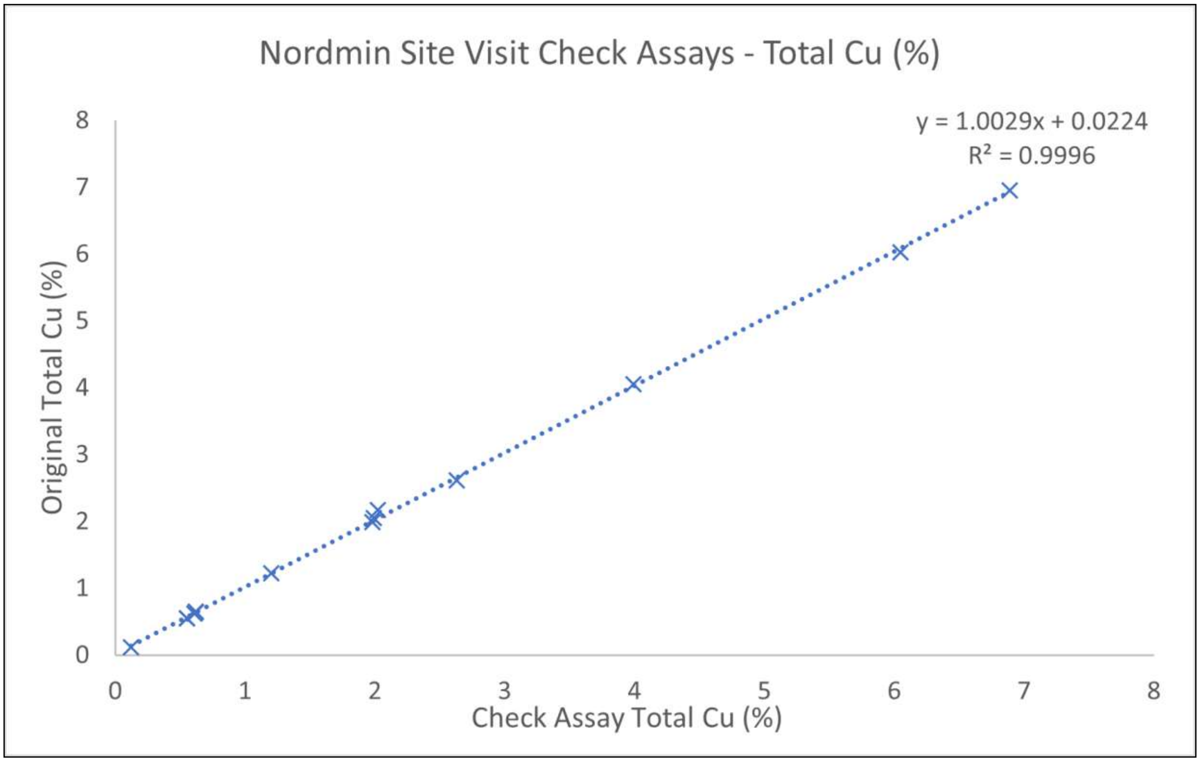
Table 12-3: Original Assay Values versus Nordmin Check Sample Assay Values from the November 2022 Site Visit

			Original Sample				Check Sample			
Sample Number	**From**	**To**	**TCu %**	**ASCu %**	**CNCu %**	**Mo %**	**TCu %**	**ASCu %**	**CNCu %**	**Mo %**
695481	774.4	775	0.91	0.901	0.005	0.001	1.18	1.169	0.009	0.001
695482	775	776	2.72	2.686	0.016	0.006	2.74	2.684	0.022	0.007
695483	776	777	0.74	0.707	0.032	0.005	0.74	0.702	0.038	0.005
695484	777	778	1.61	1.576	0.026	0.006	1.66	1.618	0.03	0.007
695514	802	803	3.55	0.164	3.189	0.015	3.33	0.228	3.048	0.013
695517	805	806	3.08	0.148	2.876	0.029	3.14	0.167	2.833	0.032
695518	806	807	2.15	0.058	1.89	0.012	2.09	0.084	1.822	0.011
695670	937	938	0.98	0.013	0.191	0.003	0.99	0.02	0.223	0.003
695671	938	939	1.13	0.005	0.092	0.015	1.31	0.014	0.142	0.018
695672	939	940	1.66	0.0025	0.403	0.009	1.71	0.019	0.418	0.01
695673	940	941	1.34	0.005	0.21	0.009	1.36	0.013	0.254	0.009
695687	952	953	0.25	0.0025	0.01	0.017	0.22	<0.005	0.017	0.013
695689	953	954	0.29	0.0025	0.017	0.004	0.31	0.008	0.03	0.004
695690	954	955	0.37	0.0025	0.014	0.003	0.39	0.008	0.025	0.003
695691	955	956	0.18	0.0025	0.009	0.003	0.16	0.005	0.017	0.002
695692	956	957	0.2	0.0025	0.009	0.002	0.2	<0.005	0.016	0.003
694625	793	794	0.95	0.029	0.799	0.02	0.95	0.04	0.844	0.02
694626	794	795	0.65	0.019	0.494	0.033	0.66	0.038	0.515	0.03
694627	795	796	1.1	0.028	0.957	0.067	1.15	0.04	0.916	0.066
694629	796	797	0.58	0.035	0.441	0.007	0.58	0.038	0.452	0.006
694630	797	798	0.99	0.027	0.736	0.045	0.98	0.043	0.824	0.045
694631	798	799	1.55	0.026	1.018	0.035	1.46	0.042	1.171	0.034
694639	805	806	1.05	0.013	0.383	0.022	1.06	0.023	0.41	0.023
694640	806	807	1.37	0.033	0.828	0.016	1.42	0.036	0.831	0.019
694641	807	808	0.97	0.025	0.546	0.036	0.99	0.032	0.571	0.039
694643	808	809	0.87	0.015	0.512	0.028	0.89	0.032	0.524	0.03
694644	809	810	0.8	0.025	0.453	0.01	0.81	0.028	0.454	0.009
694645	810	811	1.06	0.021	0.474	0.011	1.13	0.02	0.475	0.011
694646	811	812	1.28	0.014	0.72	0.032	1.25	0.022	0.73	0.027
694647	812	813	1.21	0.024	0.707	0.026	1.14	0.032	0.706	0.023
694648	813	814	0.85	0.016	0.498	0.031	0.89	0.023	0.582	0.032
694650	814	815	0.72	0.019	0.408	0.051	0.54	0.01	0.03	0.003
694651	815	815.9	1.13	0.022	0.467	0.037	1.15	0.025	0.448	0.036
694712	867	868	0.82	0.006	0.038	0.074	0.82	0.012	0.034	0.061
694713	868	869	0.41	0.0025	0.016	0.006	0.39	0.01	0.016	0.005
694714	869	870	0.72	0.007	0.033	0.014	0.77	0.013	0.036	0.017
694715	870	871	1.31	0.026	0.104	0.126	1.45	0.027	0.107	0.105
694716	871	872	1	0.038	0.178	0.053	1.13	0.043	0.203	0.048
694717	872	873	1.22	0.016	0.38	0.019	1.29	0.018	0.384	0.017
694718	873	874	3.07	0.008	0.44	0.168	3.13	0.021	0.462	0.163
694720	874	875	1.67	0.015	0.386	0.033	1.72	0.026	0.381	0.026
694721	875	876	2.01	0.017	0.514	0.054	1.96	0.02	0.502	0.047
694722	876	877	1.59	0.022	0.702	0.046	1.68	0.026	0.702	0.046
694723	877	878	2.15	0.023	1.015	0.017	2.09	0.034	0.871	0.014
694724	878	879	2.12	0.026	0.855	0.044	2	0.028	0.812	0.042
694949	1070	1071	1.25	0.0025	0.091	0.008	1.26	0.007	0.075	0.007
694950	1071	1072	0.59	0.006	0.041	0.003	0.74	0.029	0.421	0.056
694952	1072	1073	0.25	0.0025	0.022	0.001	0.24	0.006	0.02	0.001
694953	1073	1074	0.25	0.006	0.046	0.004	0.22	0.006	0.023	0.003
694954	1074	1075	0.5	0.005	0.028	0.003	0.44	0.008	0.026	0.002

Source: Nordmin, 2023

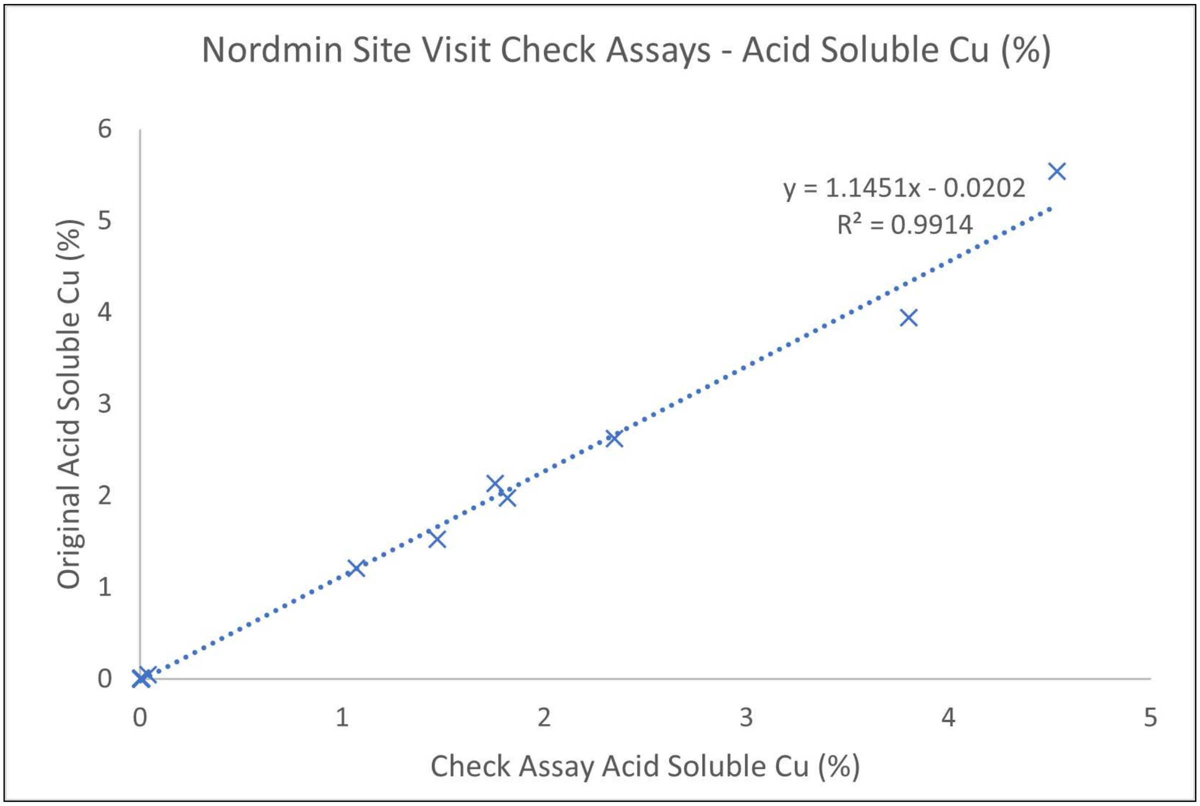
IE uses unmineralized material (an alkaline granite from the area), where values of ore minerals are below detection limits or quartz gravel as sample blanks. The blank material was analyzed at Skyline Laboratories to ensure that there was no significant amount of Cu present. Coarse blanks are crushed as normal samples within the sample stream so that contamination during sample preparation can be detected. Blanks are used to assess proper instrument cleaning and instrument detection limits and contaminations within the lab.

The Nordmin assay results for verification samples from the Santa Cruz Deposit were compared to IE's database and summarized in the scatter plots for total Cu (%), acid soluble Cu (%), and cyanide soluble Cu (%) (Figure 12-7, Figure 12-8 and Figure 12-9). Assay results for verification samples from the Texaco Deposit are summarized in Figure 12-10 to Figure 12-12. Despite some significant sample variances in a few samples, most assays compared within reasonable tolerances for the deposit type and no material bias was evident. No bias was evident among lab analyses.



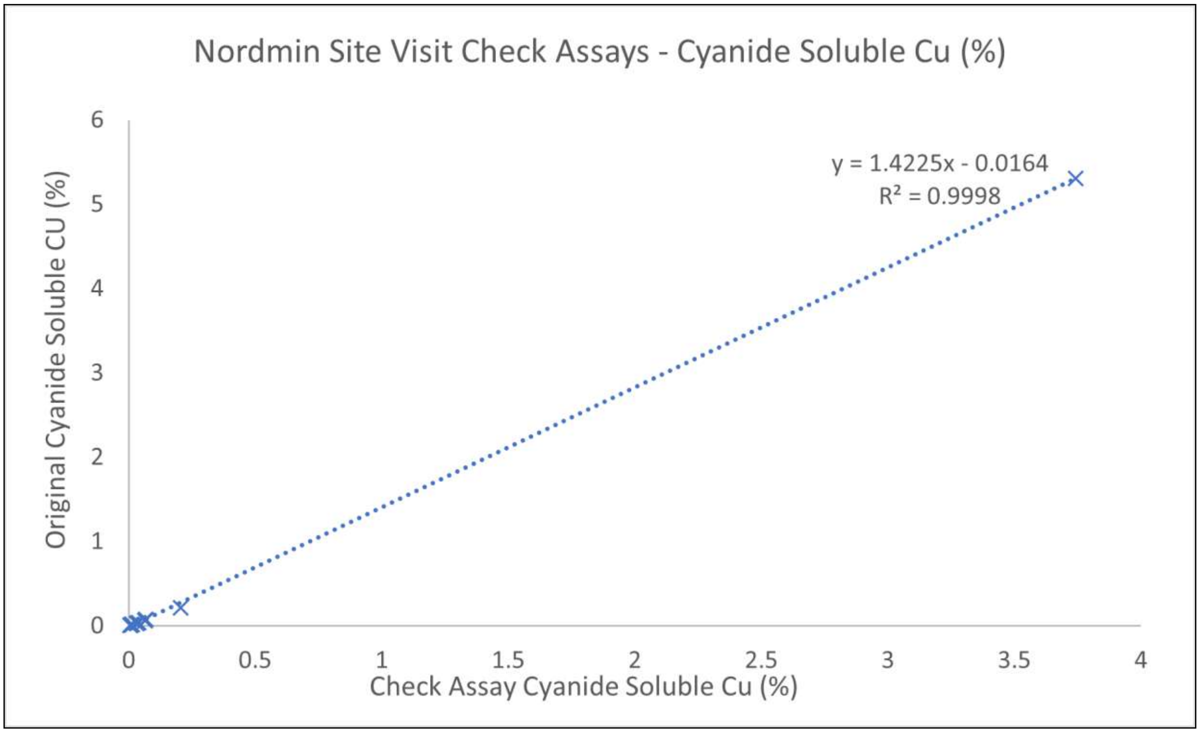
Source: Nordmin, 2023

Figure 12-7: Nordmin Independent Sampling Total Cu (%) Assays from Skyline Laboratories, Santa Cruz Deposit



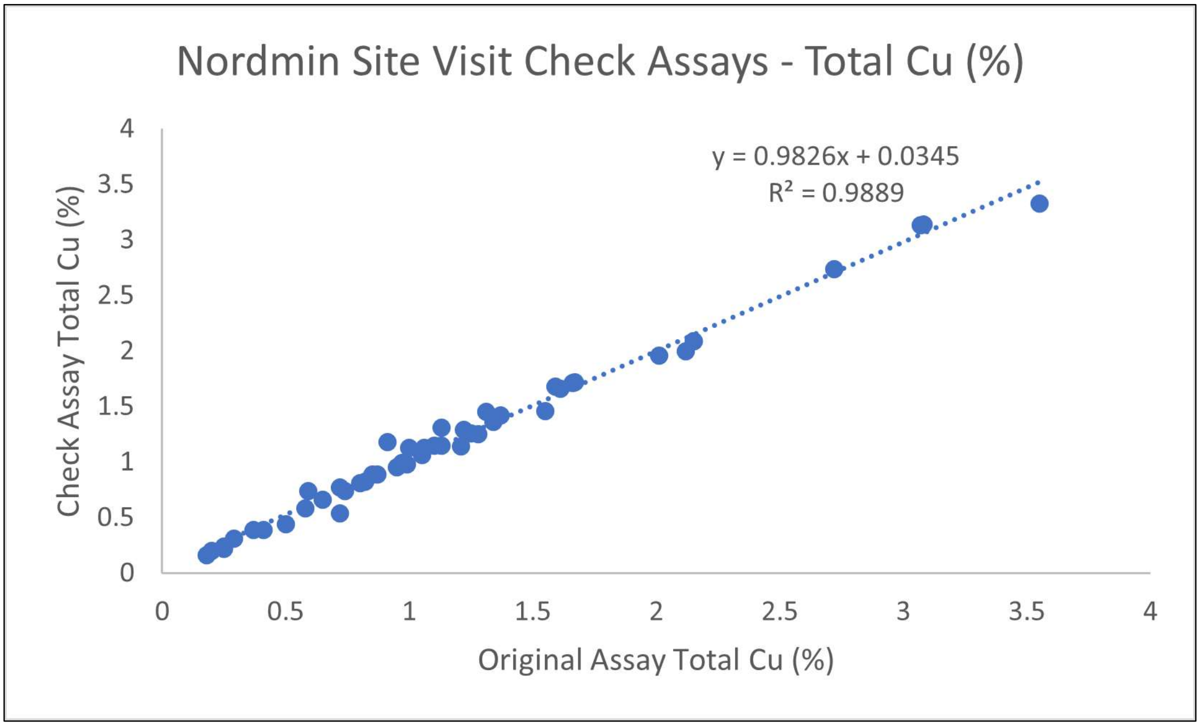
Source: Nordmin, 2023

Figure 12-8: Nordmin Independent Sampling Acid Soluble Cu (%) Assays from Skyline Laboratories, Santa Cruz Deposit



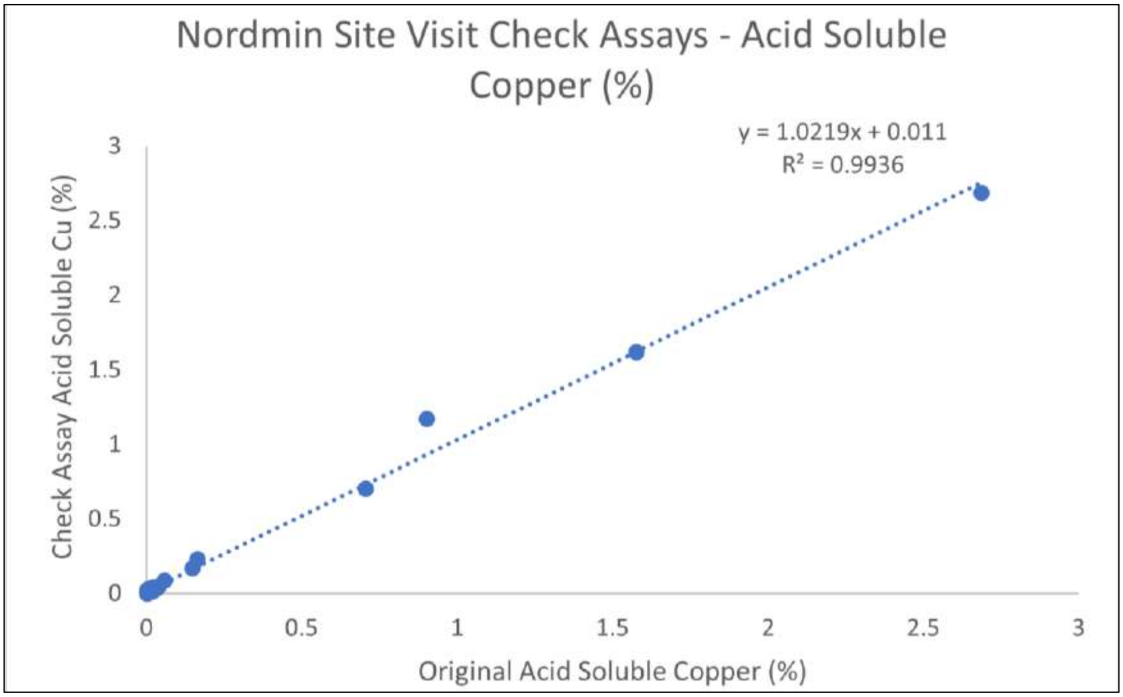
Source: Nordmin, 2023

Figure 12-9: Nordmin Independent Sampling of Cyanide Soluble (%) Assays from Skyline Laboratories, Santa Cruz Deposit



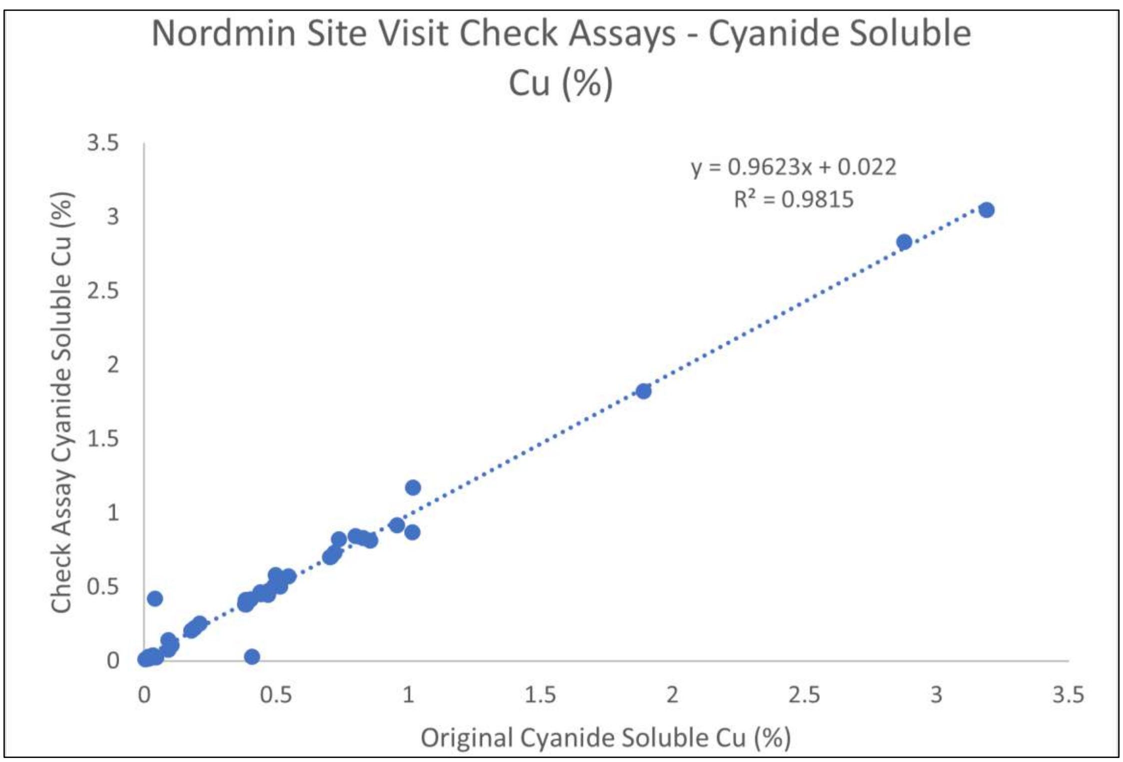
Source: Nordmin, 2023

Figure 12-10: Nordmin Independent Sampling of Total Copper (%) Assays from Skyline Laboratories, Texaco Deposit



Source: Nordmin, 2023

Figure 12-11: Nordmin Independent Sampling of Acid Soluble Copper (%) Assays from Skyline Laboratories, Texaco Deposit



Source: Nordmin, 2023

Figure 12-12: Nordmin Independent Sampling of Cyanide Soluble Copper (%) Assays from Skyline Laboratories, Texaco Deposit

12.2.4 Audit of Analytical Laboratory

On September 17, 2021, the Nordmin QP and representatives from IE audited the sample preparation and analysis facilities of Skyline Laboratories in Tucson, Arizona. Recommendations from the audit were provided to Skyline Laboratories and follow up was completed by IE representatives to ensure that the recommendations were implemented. An additional audit of Skyline Laboratories, Tucson, AZ was conducted on June 29, 2022 by members of IE. Recommendations from the 2021 visit were found to have improved (i.e., dust control, air quality). Overall, the lab was found to be clean and organized for sample preparation and analysis. Recommendations from the audit were shared with the lab, follow up audits by IE representatives will be completed to ensure that recommendations were implemented. Another audit of Skyline is planned for 2023.

12.3 Twin Hole Analysis

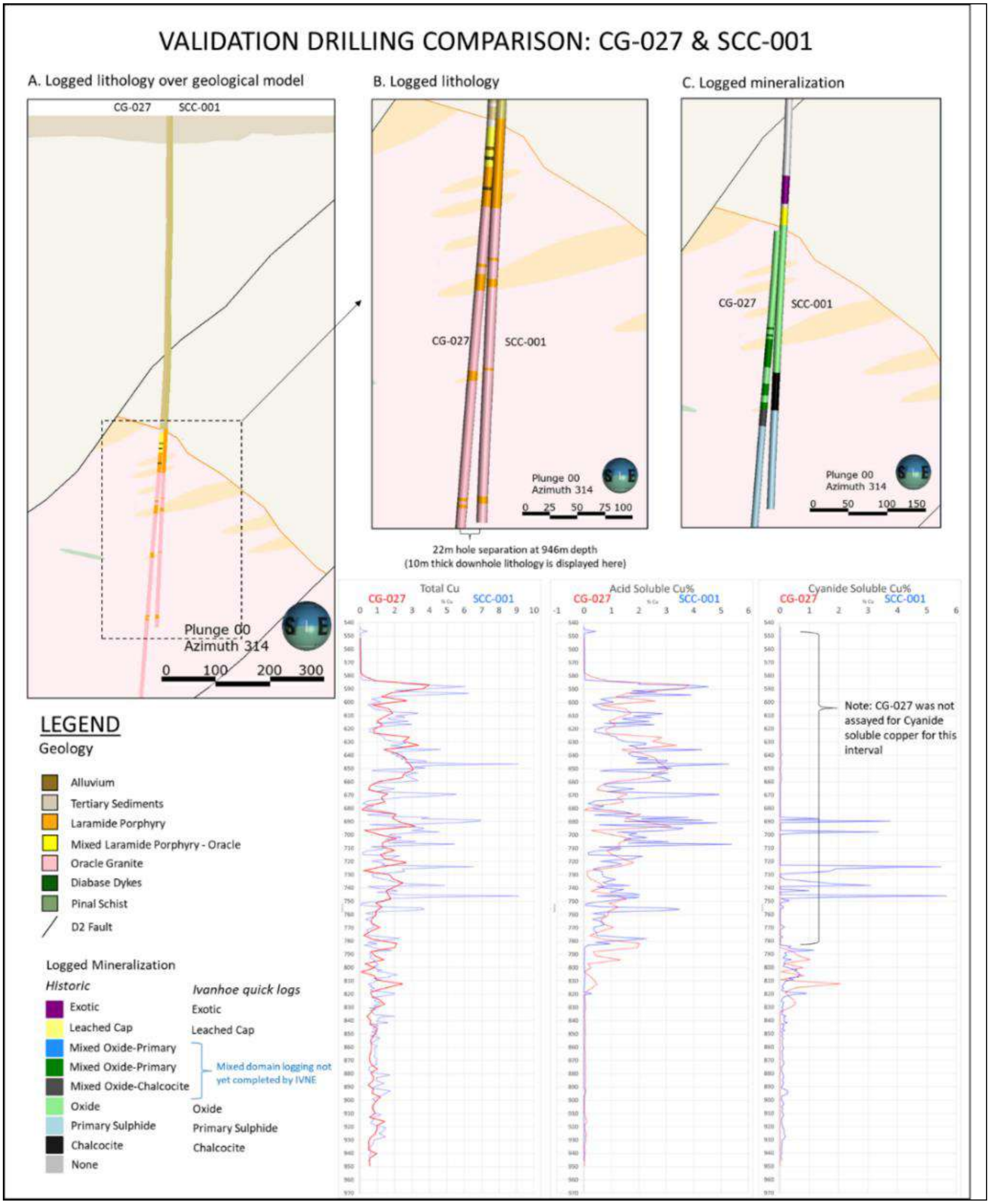
In the 2021 MRE, Nordmin completed a twin hole analysis between the historical Hanna-Getty and ASARCO diamond drilling versus the 2021 IE drilling to determine if the historical information could be used in the geologic model and Resource Estimate. The analysis compared the collar locations, downhole surveys, logging (lithology, alteration, and mineralization), sampling and assaying between the two groups to determine if the historical holes had valid information and would not be introducing a bias within the geological model or Resource Estimate. The comparison included a QA/QC analysis of the historical drillholes.

A total of five historical holes were reviewed with the following outcomes:

- All five historical hole assays aligned with 2021 diamond drilling assays.
- 2021 diamond drilling assays were of higher resolution due to smaller sample sizes.
- Recent drilling validated the ASARCO cyanide soluble assays.

Figure 12-13: Comparison of Assays From SCC-001 Versus CG-027

demonstrates that grade variability and location were insignificant between CG-027 and SCC-001 and demonstrated overall grade continuity between the intercepts. Resolution is higher in SCC-001 downhole due to smaller sample sizes compared to historic drilling. Table 12-4 demonstrates good agreement between historic logging and current logging using the same regional lithology types. This provides confidence in the accuracy of the geologic model and that associations made between mineralization and lithology are valid. Similar patterns are observed within the other three historical drillholes used within the Resource Estimate, which included reliable QA/QC data.



Source: Nordmin, 2023

A) shows the direct comparison of total Cu assays as Cu (%).

B) SCC-001 and CG-027 showing downhole charts of acid soluble Cu assays (%) on the left and total Cu (%) assays on the right.

Figure 12-13: Comparison of Assays From SCC-001 Versus CG-027

Table 12-4: Downhole Lithology Logging Comparison of CG-027 versus SCC-001

Hole ID	FROM (m)	TO (m)	Lithology	Hole ID	FROM (m)	TO (m)	Lithology
CG-027	0	24.38	Tert. Sediments	SCC-001	0	514.78	Conglomerate
	24.38	85.34	Tert. Sediments				Conglomerate
	85.34	195.07	Tert. Sediments				Conglomerate
	195.07	347.47	Tert. Sediments				Conglomerate
	347.47	542.54	Tert. Sediments		514.78	544.03	Conglomerate
	542.54	563.88	Tert. Sediments		544.03	551.28	Conglomerate
	563.88	566.92	No data		551.28	556.26	Fault
	566.92	576.07	Tert. Sediments		556.26	578.76	Breccia
	576.07	579.12	Tert. Sediments		578.76	600.93	Quartz Monzonite
	579.12	585.52	No data		600.93	603.35	Quartz Monzonite
	585.52	603.5	Mixed				
	603.5	606.55	Tert. Sediments		603.35	615.03	Quartz Monzonite
	606.55	612.64	Mixed				
	612.64	615.69	Tert. Sediments				
	615.69	621.79	Mixed		615.03	660.24	Granodiorite
	621.79	640.08	Laramide Int.				
	640.08	643.12	Tert. Sediments				
	643.12	658.36	Laramide Int.				
	658.36	694.94	Granite		660.24	705.39	Granite
	694.94	697.99	Granite		705.39	707.83	Granodiorite
	697.99	710.18	Granite				
	710.18	713.23	Laramide Int.		707.83	724.47	Granite
	713.23	719.32	Granite		724.47	732.03	Granodiorite
	719.32	731.52	Laramide Int.				
	731.52	734.56	Laramide Int.		732.03	751.71	Granite
	734.56	807.72	Granite		751.71	769.62	Granite
					769.62	802.66	Granite
					802.66	807.511	Gabbro
	807.72	816.86	Laramide Int.		807.511	818.39	Granite
	816.86	923.54	Granite		818.39	820.23	Fault
					820.23	845.75	Granite
					845.75	849.17	Fault
					849.17	891.7	Granite
					891.7	897.94	Granite
					897.94	910	Granite
					910	921.22	Fault
	923.54	926.59	Laramide Int.		921.22	928.75	Granodiorite
	926.59	929.64	Granite		928.75	946.09	Fault

Source: Nordmin, 2023
TgcU = Tertiary unconsolidated sediments, TgcL = Tertiary Lithified Sediments, Mixed = breccias
LI = Laramide Intrusives, pC = Precambrian Granites/Diabase Dykes and Aplites

Several holes have been twinned over the course of the exploration work conducted on the Santa Cruz Deposit. Nordmin was able to match most of the intervals for each of the pairs and plotted the grades for Cu, Cu-SEQ, and Mo. In Nordmin's opinion, for most of the pairs, the assay results compared reasonably well; the high-grade (HG) and low-grade (LG) zones were similar, and the grades tended to cluster in the same ranges. In Nordmin's opinion, the twinning has provided a reasonably consistent verification of the earlier Hanna-Getty and ASARCO drill results, particularly considering the differences in the assay, survey methods and QA/QC protocols.

12.4 Database Validation

The Nordmin QP completed a spot check verification of the following drillholes:

- Santa Cruz Deposit – Five drillholes which included 89 lithology entries (19%), 388 geotechnical measurements (55%), and 328 assay entries (70%)
- Texaco Deposit – Two drillholes were checked which included 78 lithology entries (47%), 441 geotechnical measurements (44%), and 1059 assays (56%)
- East Ridge Deposit – One drillhole was checked which included 27 lithology entries (12.7%), 176 geotechnical measurements (11%), and 306 assays (23%)

The historical geology was validated for lithological units from handwritten logs transcribed into excel tables and historical logs compiled into a database. Lithological units being implemented in current logging were based on the historical description. Detail and interpretation of the lithologic units have developed along with the 2021-2022 drilling and are more robust than earlier descriptions. The geological contacts and lithology aligned with the core contacts and lithology and are acceptable for use. Two assay depth errors from 2021 drilling were brought to the attention of the on-site geologists. These errors were rectified, and the database was updated. The entire database was run through the QGIS validity check to look for errors. No significant errors were found in the database.

Within the database, a portion of historic drillholes is missing the downhole survey and assay data. Holes drilled by Casa Grande Copper Co. have 62.1% of the survey data and 96.5% of the assay data. Holes drilled by ASARCO have 65.9% of the downhole survey data and only 34.4% of the assay data available. Missing data has been well documented by IE, and vertical twins of historic drillholes have been and continue to be drilled to confirm lithology, assay, and geotechnical data (Section 12.2.4).

12.5 Review of Company's QA/QC

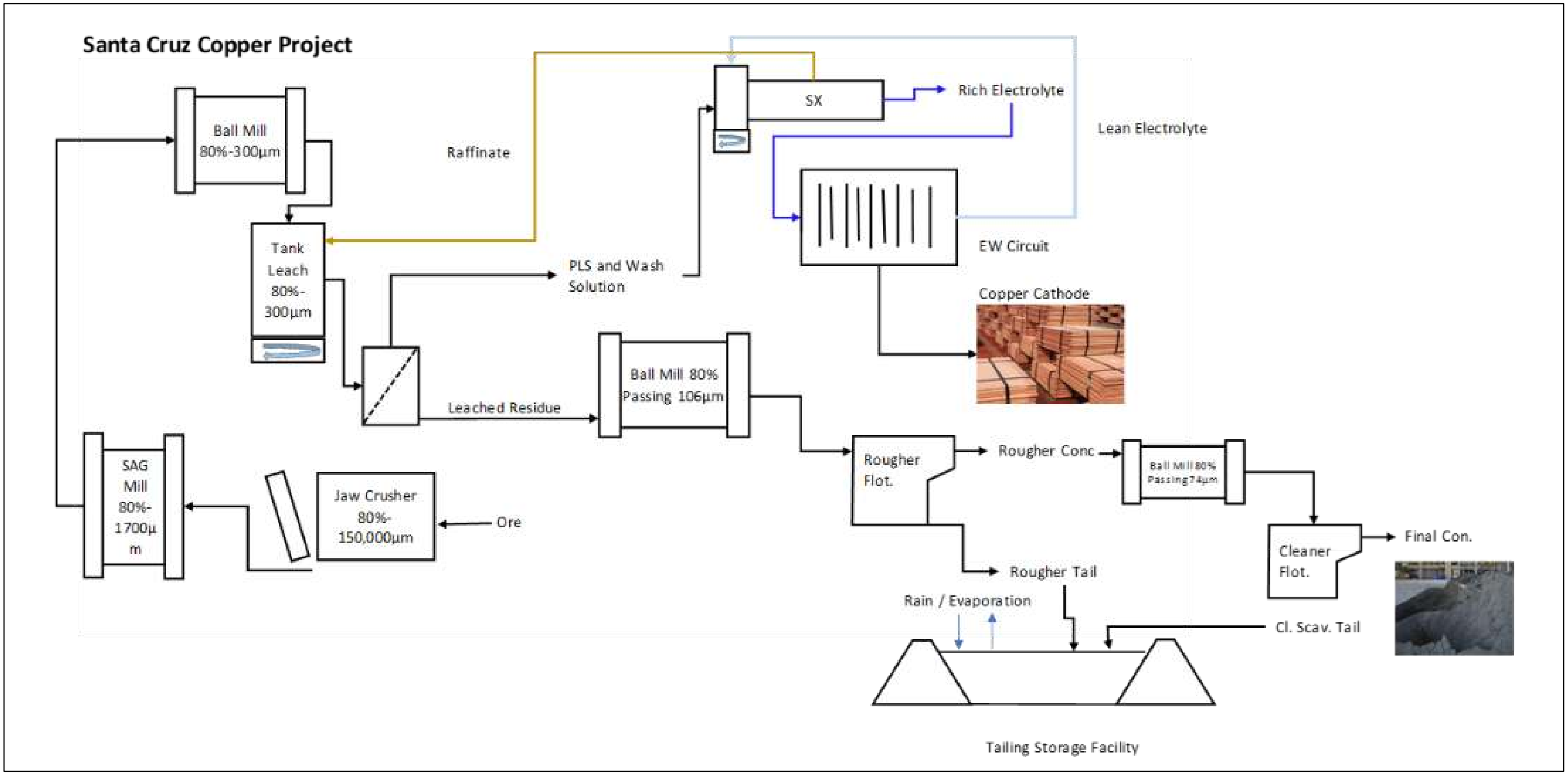
Nordmin conducted an independent review of IE's QA/QC procedures as part of the validation process and believes that the Company has a robust QA/QC process in place, as previously described in Section 11.

13 Mineral Processing and Metallurgical Testing

Metallurgy and processing test work were directed by Met Engineering LLC and conducted at McClelland Labs in Sparks, Nevada. McClelland Labs is recognized by the International Accreditation Service (IAS) for its technical competence, is independent of the Issuer, and quality of service and has proven that it meets recognized standards. The studies are ongoing. Study focus has been on:

- Confirming total copper recovery of the leach-float flow sheet proposed by historical operator, Casa Grande Copper, circa 1980, on Exotic, Oxide, and Chalcocite mineral domains. PEA level testing studies have finished for this flow sheet.
- Investigating heap leaching of Exotic, Oxide, and Chalcocite mineral domains. The test program for heap leaching is in the latter stages of the secondary copper sulfide column cell leach and will be completed in the fourth quarter of 2023. A progress report is presented below in section 10.2.8.

The preferred flow sheet reported in the PEA is the Leach-Float Process, developed by Casa Grande Copper Corp. in 1980. A simplified flow sheet is illustrated in Figure 13-1.



Source: Met Engineering, 2023

Figure 13-1: Simplified Process Flow Sheet

13.1 CGCC Studies (1976-1982)

The Casa Grande Copper Corp. (CGCC) studies were conducted by the Hanna Mining Company's internal Research Centre in Minnesota, USA. Hanna Mining Company was the first mining company to try to advance the Santa Cruz deposit. They evaluated the three distinct processing routes listed below. Detailed reports were prepared for each process. There is a fourth process, heap leach, that was investigated with conceptual studies, but no detailed study was pursued for this process. Approximately 90 mineral processing and metallurgical test programs were conducted. The number of tests conducted in each program ranged from 6 to 40. Three different processes were considered by CGCC:

- All Agitated Tank Leach Approach (91% total Cu recovery to cathodes)
- All-Float Approach (92% total Cu recovery to cathodes or a mixture of cathodes and saleable Cu concentrates)
- Leach – Float Process (94% Cu recovery to cathodes or to a mixture of cathodes and saleable Cu concentrates)

13.1.1 Sample Selection

Historical testing in 1979-1980 was performed on drill core coarse rejects. Grinding tests, open cycle and closed cycle bench level flotation tests, and bottle roll leach tests were performed.

Composite samples of seven "ore" types (listed below) were prepared from drill core intervals based on the estimate of mineralized material in the Santa Cruz Deposit developed by Hanna, dated November 15, 1978. The purpose of these ore type composites was to have material readily available for blending to represent different mine plans for various flow sheet development:

- High-grade Supergene
- Supergene Dilution
- Low-grade Supergene
- Mixed Chalcocite/Chalcopyrite
- Primary Chalcopyrite
- Exotic Ore
- Exotic Dilution Ore

Mineral processing and metallurgical tests were conducted on blends of each ore type representing the ore expected in each mine plan related to the three flow sheets mentioned in Section 13.1.1

Table 13-1 through Table 13-20 are the drillholes, intervals, and sample quantities blended for each ore type composite along with the analyses and copper mineralization. Note that some of the tables lack section data as these were not present in the historical data source. The QP is of the opinion that industry accepted practices were applied in regard to preparing sample blends for each ore type composite, and that the composite samples represent the ore type indicated.

Table 13-1: Upper Ore Body Sample Composite 76-122 for Leach – Float Testing

Drillhole	From (m)	To (m)	% Wt.	% CuTot	% ASCu	% S_Cu	% Mo
CG-11	494	533	10.64	1.04	0.95	0.09	0.0075
CG-11	533	579	12.27	1.70	0.26	1.44	0.0181
CG-11	579	616	9.82	2.26	2.05	0.21	0.0099
CG-12	596	623	9.78	1.81	1.75	0.06	0.0045
CG-13	597	628	6.19	2.19	1.90	0.20	0.013
CG-13	655	747	18.46	1.08	0.18	0.90	0.015
CG-16	NR	NR	13.09	0.72	0.52	0.20	0.006
CG-16	NR	NR	19.76	1.86	0.19	1.67	0.010
Calc. Assay			100.00	1.52	0.762	0.747	0.0108
Comp. Assay			1.565	1.565	0.777	0.788	

Source: Met Engineering, 2023

Table 13-2: Analyses of High-grade Supergene Composite No.79-88 (A&B)

	Analyses		
Composite No.	**Total Cu (%)**	**ASCu (%)**	**Chloride (%)**
79-88A (-3/8")	1.50	1.14	0.191
79-88B (-10 Mesh)	1.47	1.14	0.185

Source: Met Engineering, 2023

Table 13-3: Mineralogy of High-grade Supergene Composite No.79-88

	Mineralogy	
Mineral	**% Cu**	**% Cu Dist.**
Atacamite	0.62	41.6
Chrysocolla, Cuprite	0.45	30.2
Copper Clay	0.07	4.7
Copper Sulfides	0.35	23.5
Total	**1.49**	**100.0**

Source: Met Engineering, 2023

Table 13-4: Drillholes, Intervals and Sample Weights of High-grade Supergene Composite No. @79-88 (A&B)

		Feet			Meters			Sample Weight (g)	
Section	**Drillhole ID**	**From**	**To**	**ft**	**From**	**To**	**m**	**-3/8 inch**	**-10 Mesh**
14500	11	1,620	2,010	390	494	613	119	15,080	15,077
14500	12	1,965	2,075	110	599	632	34	6,260	6,260
14250	81	1,934	2,068	134	589	630	41	9,782	9,782
14250	96	1,537	1,801	264	468	549	80	11,129	11,129
14250	96	1,640	1,801	161	500	549	49		
14250	106	1,937	2,127	190	590	648	58	7,810	7,810
14000	13	1,960	2,450	490	597	747	149	17,760	17,760
14000	29	1,520	1,570	50	463	479	15	795	795
14000	40	2,006	2,049	43	611	625	13	366	366
13750	98	1,633	1,805	172	498	550	52	8,186	8,186
13750	84	1,827	2,118	291	557	646	89	15,128	15,128
13750	77	2,041	2,150	109	622	655	33	9,392	9,392
13750	77	2,199	2,279	80	670	695	24		
13500	20	1,680	1,860	180	512	567	55	10,433	10,437
13500	18	2,000	2,190	190	610	667	58	5,371	5,378
13500	60	1,592	1,638	46	485	499	14	1,894	1,894
13250	78	1,802	1,927	125	549	587	38	8,913	8,913
12750	93	1,712	1,820	108	522	555	33	5095	5,095
12750	90	1,682	1,877	195	513	572	59	14,657	14,657
12750	82	1,472	1,566	94	449	477	29	19,725	19,725
12750	82	1,807	1,947	140	551	593	43		
12400	23	1,840	2,010	170	561	613	52	10,948	10,936
12400	37	1,710	2,270	560	521	692	171	25,922	25,933
12400	38	2,050	2,646	596	625	806	182	24,132	24,063
12400	16	2,410	2,550	140	735	777	43	12,898	12,799
12400	16	2,770	3,170	400	844	966	122		
12250	88	1,867	2,178	311	569	664	95	13,350	13,350
12250	94	2,225	2,342	117	678	714	36	10,447	10,447
12250	94	2,565	2,758	193	782	841	59		
12250	87	1,899	1,977	78	579	603	24	874	874
12000	27A	1,953	2,667	714	595	813	218	47,272	47,269
12000	57	2,219	2,336	117	676	712	36	14,833	14,833
12000	57	2,582	2,627	45	787	801	14		
12000	57	2,753	2,870	117	839	875	36		
12000	24	1,990	2,060	70	607	628	21	2,548	2,548
12000	62	1,972	2,021	49	601	616	15	3,402	3,402
11750	89	2,051	2,104	53	625	641	16	3,494	3,494
11500	31	2,420	2,440	20	738	744	6	1,296	1,296
11500	61	2,484	2,609	125	757	795	38	10,574	10,574
	32 Drillholes			**7,437**			**2,267**	**349,766**	**349,602**

Source: Met Engineering, 2023

Table 13-5: Analyses of Supergene Dilution Composite No.79-99

	Analyses				
Composite No.	**Total Cu (%)**	**ASCu (%)**	**Chloride (%)**	**Sulfur (%)**	**Total Iron (%)**
79-99	0.31	0.278	0.037	0.22	2.71

Source: Met Engineering, 2023

Table 13-6: Mineralogy of Supergene Dilution Composite No.79-99

	Mineralogy	
Mineral	**% Cu**	**% Cu Dist.**
Atacamite	0.079	25.5
Chrysocolla, Cuprite	0.136	44.1
Copper Clay	0.063	20.4
Copper Sulfides	0.031	10.0
Total	0.309	100.0

Source: Met Engineering, 2023

Table 13-7: Drillholes, Intervals and Sample Weights of Supergene Dilution Composite No.79-99

Supergene Dilution Composite No. 79-99									
	Feet				Meters			Sample Weight (g)	
Section	**Drillhole ID**	**From**	**To**	**ft**	**From**	**To**	**m**	**-3/8 inch**	**-10 Mesh**
14500N	11	1,550	1,620	70	472	494	21	10,150	10,155
14250N	76	1,876	1,893	17	572	577	5	2,465	2,470
14250N	106	1,916	1,937	21	584	590	6	3,045	3,050
14250N	81	1,919	1,934	15	585	589	5	2,175	2,177
14000N	13	1,910	1,953	43	582	595	13	6,235	6,250
13750N	98	1,605	1,633	28	489	498	9	4,060	4,080
13750N	84	1,798	1,827	29	548	557	9	4,205	4,205
13750N	77	2,011	2,041	30	613	622	9	4,350	4,355
13500N	20	1,670	1,700	30	509	518	9	4,350	4,355
13500N	18	1,970	2,000	30	600	610	9	4,350	4,365
13500N	18A	1,970	2,000	30	600	610	9	4,350	4,359
13250N	78	1,772	1,802	30	540	549	9	4,350	4,352
12750N	93	1,697	1,712	15	517	522	5	2,175	2,078
12750N	82	1,446	1,472	26	441	449	8	3,770	3,777
12750N	82	1,781	1,807	26	543	551	8	3,770	3,770
12400N	23	1,800	1,840	40	549	561	12	5,800	5,800
12400N	37	1,590	1,710	120	485	521	37	17,400	17,596
12400N	38	2,004	2,050	46	611	625	14	6,670	6,668
12400N	16	2,380	2,410	30	725	735	9	4,350	4,352
12400N	16	2,700	2,770	70	823	844	21	10,150	4,601
12250N	88	1,747	1,867	120	532	569	37	17,400	17,397
12250N	94	2,198	2,225	27	670	678	8	3,915	3,910
12250N	94	2,504	2,565	61	763	782	19	8,845	8,830
12000N	57	2,168	2,219	51	661	676	16	7,395	7,385
11500N	61	2,464	2,484	20	751	757	6	2,900	2,915
	22 drillholes			**1,025**			**312**	**148,625**	**143,252**

Source: Met Engineering, 2023

Table 13-8: Analyses of Low-grade Supergene Composite No.79-128

	Analyses					
Composite No.	**Total Cu (%)**	**ASCu (%)**	**Mo (%)**	**Chloride (%)**	**Sulfur (%)**	**Total Iron (%)**
79-128	0.486	0.140	0.011	0.020	0.24	1.45

Source: Met Engineering, 2023

Table 13-9: Mineralogy of Low-grade Supergene Composite No.79-128

	Mineralogy	
Mineral	**% Cu**	**% Cu Dist.**
Atacamite	0.018	3.7
Chrysocolla, Cuprite	0.091	18.7
Copper Clay	0.031	6.4
Copper Sulfides	0.346	71.2
Total	**0.486**	**100.0**

Source: Met Engineering, 2023

Table 13-10: Drillholes, Intervals and Sample Weights of Low-grade Supergene Composite No.79-128

	Feet			Meters			Sample Weight (g)
Drillhole ID	**From**	**To**	**ft**	**From**	**To**	**m**	**-3/8 inch**
12	2,075	2,185	110	632	666	34	12,720
78	1,927	1,954	27	587	596	8	3,140
80	1,925	2,173	248	587	662	76	28,710
98	1,797	2,041	244	548	622	74	28,190
13	2,500	2,670	170	762	814	52	18,520
96	1,801	2,061	260	549	628	79	29,770
81	2,068	2,411	343	630	735	105	39,560
11	2,010	2,260	250	613	689	76	28,920
23	2,010	2,310	300	613	704	91	34,690
16	2,550	2,770	220	777	844	67	11,370
90	1,877	1,917	40	572	584	12	12,670
90	1,956	2,025	69	596	617	21	
82	1,947	2,084	137	593	635	42	15,910
109	2,505	2,598	93	763	792	28	10,810
91	2,691	2,781	90	820	848	27	21,975
91	2,896	2,995	99	883	913	30	
61	2,609	2,679	70	795	817	21	6,605
100	2,338	2,463	125	713	751	38	14,540
57	2,486	2,582	96	758	787	29	37,625
57	2,666	2,733	67	813	833	20	
57	2,907	3,064	157	886	934	48	
88	2,178	2,236	58	664	681	18	6,740
94	2,342	2,565	223	714	782	68	25,225
19 drillholes			**3496**			**1066**	**387,690**

Source: Met Engineering, 2023

Table 13-11: Analyses of Mixed Chalcocite / Chalcopyrite Composite No.79-109

	Analyses					
Composite No.	**Total Cu (%)**	**ASCu (%)**	**Mo (%)**	**Chloride (%)**	**Sulfur (%)**	**Total Iron (%)**
79-109	0.824	0.073	0.024	0.024	0.94	1.73

Source: Met Engineering, 2023

Table 13-12: Mineralogy of Mixed Chalcocite / Chalcopyrite Composite No.79-109

	Mineralogy	
Mineral	**% Cu**	**% Cu Dist.**
Atacamite	0.032	3.9
Chrysocolla, Cuprite	0.009	1.1
Copper Clay	0.032	3.9
Copper Sulfides	0.751	91.1
Total	0.824	100.0

Source: Met Engineering, 2023

Table 13-13: Drillholes, Intervals and Sample Weights of Mixed Chalcocite / Chalcopyrite Composite No.79-109

	Feet			Meters			Sample Weight (g)
Drillhole ID	**From**	**To**	**ft**	**From**	**To**	**m**	**-3/8 inch**
81	2,411	2,663	252	735	812	77	22,750
78	1,954	2,225	271	596	678	83	24,495
80	2,284	2,355	71	696	718	22	6,435
20	2,020	2,080	60	616	634	18	5,440
84	2,118	2,681	563	646	817	172	50,950
37	2,270	2,699	429	692	823	131	17,180
38	2,646	3,041	395	806	927	120	13,840
90	2,025	2,287	262	617	697	80	23,725
82	2,084	2,277	193	635	694	59	17,440
109	2,598	3,003	405	792	915	123	36.585
91	2,995	3,043	48	913	927	15	4,350
61	2,679	2,808	129	817	856	39	11,650
100	2,463	2,702	239	751	824	73	21,585
99	3,079	3,143	64	938	958	20	5,805
27A	2,667	2,715	48	813	827	15	4,325
57	3,123	3,180	57	952	969	17	5,170
88	2,236	2,306	70	681	703	21	6,360
94	2,832	3,030	198	863	923	60	17,915
18 Drillholes			**3,754**			**1,144**	**296,000**

Source: Met Engineering, 2023

Table 13-14: Analyses of Chalcopyrite Composite No.79-118

	Analyses					
Composite No.	**Total Cu (%)**	**ASCu (%)**	**Mo (%)**	**Chloride (%)**	**Sulfur (%)**	**Total Iron (%)**
79-118	0.740	0.020	0.01	0.015	1.23	2.34

Source: Met Engineering, 2023

Table 13-15: Mineralogy of Chalcopyrite Composite No.79-118

	Mineralogy	
Mineral	**% Cu**	**% Cu Dist.**
Atacamite	0.0	0.0
Chrysocolla, Cuprite	0.012	1.6
Copper Clay	0.008	1.1
Copper Sulfides	0.720	97.3
Total	0.74	100.0

Source: Met Engineering, 2023

Table 13-16: Drillholes, Intervals and Sample Weights of Chalcopyrite Composite No.79-118

	Feet			Meters			Sample Weight (g)
Drillhole ID	**From**	**To**	**ft**	**From**	**To**	**m**	**-3/8 inch**
20	2,080	2,570	490	634	783	149	27,600
98	2,118	2,390	272	646	728	83	16,320
78	2,225	2,987	762	678	910	232	45,720
80	2,355	3,147	792	718	959	241	46,980
38	3,041	3,193	152	927	973	46	6,080
90	2,287	3,119	832	697	951	254	49,920
82	2,227	2,908	681	679	886	208	37,860
91	3,043	3,215	172	927	980	52	10,320
57	3,180	3,419	239	969	1,042	73	14,340
88	2,306	2,607	301	703	795	92	18,060
87	2,275	2,636	361	693	803	110	21,660
94	3,030	3,389	359	923	1,033	109	21,540
61	2,808	3,577	769	856	1,090	234	46,140
100	2,702	3,250	548	824	991	167	32,340
99	3,143	3,437	294	958	1,048	90	17,640
50	2,915	3,459	544	888	1,054	166	32,280
16 Drillholes			**7,568**			**2,307**	**444,800**

Source: Met Engineering, 2023

Table 13-17: Analyses of Exotic Ore and Exotic Dilution Ore Composites Nos. 79-101 and 79-102

	Analyses		
Composite	**Total Cu (%)**	**ASCu (%)**	**Chloride (%)**
Exotic Ore Composite No. 79-101	2.210	1.980	0.365
Exotic Dilution Ore Composite No. 79-102	0.379	0.227	0.015

Source: Met Engineering, 2023

Table 13-18: Mineralogy of Exotic Ore and Exotic Dilution Ore Composites Nos. 79-101 and 79-102

	Mineralogy			
	Exotic Ore No. 79-101		**Exotic Dilution Ore No.79-102**	
Mineral	**% Cu**	**% Cu Dist.**	**% Cu**	**% Cu Dist.**
Atacamite	1.25	54.3	0.0	0.0
Chrysocolla, Cuprite	0.73	31.4	0.23	59.9
Copper Clay	0.23	10.0	0.11	28.8
Copper Sulfides	0.10	4.3	0.04	11.3
Total	**2.31**	**100.0**	**0.38**	**100.0**

Source: Met Engineering, 2023

Table 13-19:Drillholes, Intervals and Sample Weights of Exotic Ore Composite No. 79-101

		Feet		Meters			Sample Weight (g)	
Section	**Drillhole ID**	**From**	**To**	**ft**	**From**	**To**	**m**	**-3/8 inch**
13500N	52	2,101	2,230	129	640	680	39	11,665
13500N	18	1,830	1,930	100	558	588	30	9,060
13750N	77	1,677	1,740	63	511	530	19	5,700
13750N	85	1,971	2,095	124	601	639	38	11,225
14000N	22	1,970	2,270	300	600	692	91	27,155
	5 Drillholes			**716**			**218**	**64,805**

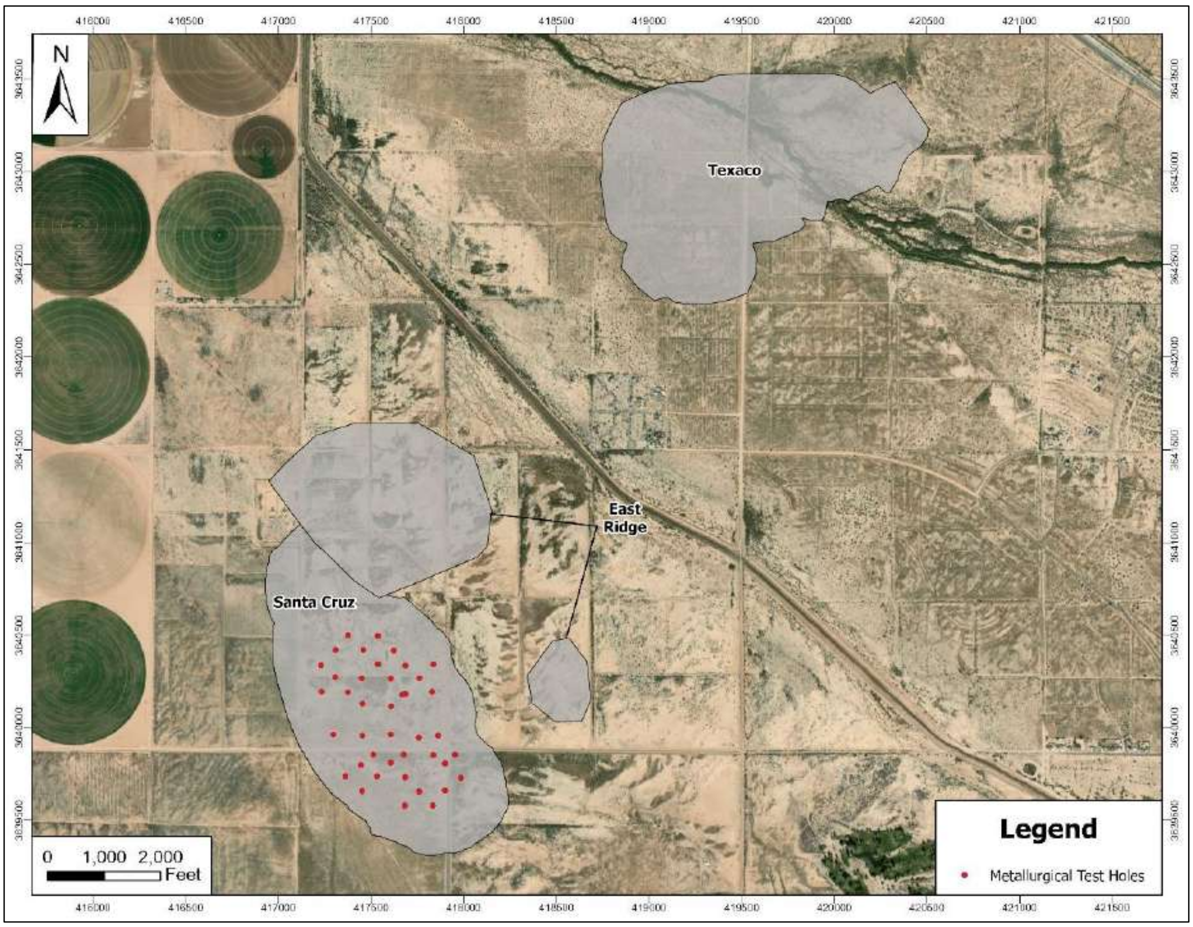
Source: Met Engineering, 2023

Table 13-20: Drillholes, Intervals and Sample Weights of Exotic Dilution Ore Composite No. 79-102

		Feet			Meters			Sample Weight (grams)
Section	Drillhole ID	From	To	ft	From	To	m	-3/8 inch
13500N	52	2,088	2,101	13	636	640	4	2,610
13500N	18A	1,820	1,840	20	555	561	6	4,010
13750N	77	1,658	1,677	19	505	511	6	3,810
13750N	85	1,952	1,971	19	595	601	6	3,805
	4 Drillholes			**71**			**22**	**14,235**

Source: Met Engineering, 2023

Figure 13-2 is a surface map of the locations of 43 drillholes used in the ore type composites and their relative positions in the projected outline of the Mineral Resource of the Santa Cruz Deposit. The distribution of drillholes indicates that the holes selected represent the current defined resource.



Source: Met Engineering, 2023

Figure 13-2: Surface Map of the Drillholes Used in the Ore Type Composites

13.1.2 Grinding Studies

Grinding studies were conducted using laboratory size ball mills on 1,000 g samples. The initial sample types from the early drilling programs were tested, as were the major composite samples of the Santa Cruz Deposit. Grinding for leaching was investigated separately from grinding for flotation purposes.

Ground samples for flotation were subjected to rougher flotation and standard Cu recovery (non-acid soluble Cu) and concentrate grade relationships were developed to determine the best primary grind P_{80}. Ground samples for leaching were subjected to bottle roll leaching with sulfuric acid or sulfuric acid and ferric sulfate as lixiviant.

The results of the grinding studies (leaching and flotation) on the major composite sample representing the entire deposit were used to test later blended composites of the listed ore types, to develop a flow sheet. The optimum grind size for whole ore agitated tank leaching, with either type lixiviant mixture, was determined to P_{80} 800 µ. The optimum primary grinding size for rougher copper sulfide flotation was P80 74 µ. The estimated specific energy of the ball mill for leaching was 1.2 kWh/t. The estimated specific energy of the ball mill for flotation was 9.8 kWh/t. The estimated energy of the SAG mill was 2.2 kWh/t.

These grinding studies were applied to blended composites for flow sheet development of ore types listed under Sample Selection. There was no variability testing conducted, therefore the test results would be acceptable for a PEA-level study program under NI 43-101. A prefeasibility level study would require 30 to 40 variability tests of selected drillholes and drill intervals and a feasibility level study would require 100 intervals or more.

Bond Mill Work Index Analysis

Six laboratory ball mill grinding studies were conducted on the upper ore body samples labeled Composite Sample 78-17 and 78-77 utilizing a calibrated 7.75-inch diameter by 7-inch Galigher batch ball mill. These samples had head grades of 1.54% and 1.61% total copper and represented approximately 118 and 90 Mt of mineralized material in the 1979 study, respectively.

Procedure

This mill had been calibrated so that specific grinding energies could be reported for batch grinds. The level of accuracy was estimated to be +/-20%. Grinds were performed wet at 60% solids by weight using tap water and 35% ball charge.

Ore was ground for a fixed time and the energy input could be calculated for this grind time. The ground solids were wet screened at 150 µ, 74 µ and 37 µ. The screen fractions were then filtered, dried and weighed. The screen dried solids were repulped and ground for additional time. The energy input, screening and drying procedure was repeated until the desired grind was obtained.

A number of final grind sizes (80% passing a grind size) were evaluated. Table 13-21 shows the results. Specific grinding energy varied with the fineness of the grind from 3.96 to 10.01 KWh/t of material. Theoretically, the Bond Ball Mill Index should be approximately the same in each test. Bond Ball Mine Index varied from 9.79 to 11.38 KWh/t of material and increased as the fineness of the grind increased. Bond Ball Mill Index was back calculated using Bond's Third Theory or Law of Comminution:

$$\mathbf{E = 10\ W_i\ (1/P_{80}^{1/2} - 1/F_{80}^{1/2})}$$

Where:

E = Specific Energy Consumption, kWh/t ground.

F_{80} = 80% passing size in the Fresh Ore Feed Stream, microns.

P_{80} = 80% passing size in the Final Ground Product, microns.

W_i = Bond's Work Index, indicative of the hardness of the ore, kWh/t

Table 13-21: Evaluated Grinds

Sample Description	Sample ID	Particle Size, μ (80% passing)	Specific Energy, KWh/t	Bond Work Index, kWh/t
Unground material	78-17	1,131		
Ground material	78-17	223	3.96	10.64
Ground material	78-17	93	8.03	10.84
Ground material	78-17	72	10.01	11.38
Unground material	78-17	1,101		
Ground material	78-17	201	3.96	9.79
Ground material	78-17	89	8.03	10.59
Ground material	78-17	68	10.01	11.03
Average Bond Work Index				**10.71**

Source: Met Engineering, 2023

13.1.3 Flotation Studies

The flotation equipment described is still in use today. All tests were documented as they would be today, with such information as: P_{80}'s, float times, reagent names, and consumptions, notes on froth appearance, etc. The regrind test program for the cleaner circuit flotation was vague. However, copper sulfide concentrate grade and overall copper recovery (non-acid soluble copper) results were typical based on the rougher flotation recoveries reported in the mid-90% range, so, the regrind was performed correctly. copper recovery after cleaning was in the low 90% range and the concentrate grade varied from 25% to 50% copper depending on copper sulfide ore mineralogy.

Flotation of atacamite together with copper sulfides was evaluated and found to be successful in producing a 12% concentrate at recoveries in the mid 90% range for atacamite and copper sulfide minerals. The chloride in this concentrate was leached out almost completely with a patented NaOH leach leaving behind copper sulfides and copper hydroxide. The Copper hydroxide was leached out with weak sulfuric acid solution producing a pregnant leach solution (PLS) for solvent extraction-electrowinning (SX-EW), and remaining copper sulfides were pH adjusted, reground, and upgraded in a cleaner flotation circuit. copper recovery of the copper oxides (excluding atacamite) was poor. Thus, total Cu recovery was in the mid 80% range. An all-float process was developed later where the copper oxides were economically recovered, and total copper recovery was raised to the low 90% range in the flow sheet. Concentrate products were not suitable for sale to a copper smelter and needed to be processed on site by a roast-leach-electrowinning process.

Flotation test programs were applied to all the composite blends samples for flow sheet development as described in Sample Selection. The test programs would be acceptable for an PEA-level program today but not for a PFS or FS level study due to the lack of any significant variability flotation testing of the Santa Cruz Deposit.

Sulfide Flotation Test Work Results

Open Cycle Flotation Test Results

Table 13-22 shows the open cycle leach – float results for sample composite 76-122, which is material from the upper orebody. Two tests were run utilizing a grind to approximately 80% passing 74 micron, rougher flotation with Z-200 collector at 50 grams per tonne (g/t) (isopropyl ethyl thiocarbonate collector). Total leach-float recovery was 91.06% for test 10 and 94.17%.for test 11. These recoveries were calculated without credit for the copper in the middling material from the cleaner circuit which is usually treated in a cleaner scavenger flotation circuit in a commercial plant achieving 50-90% copper recovery. Assuming a worst case of 50% recovery of the cleaner tailing copper brings the total recovery to 92.79% and 95.07%, respectively. Total copper recovery to the pregnant leach solution (PLS) was 44.17% for test 10 and 46.67% for test 11. Total copper recovery to cleaner concentrate was 46.89% for test 10 and 47.50% for test 11. The cleaner concentrate grade was 28.34% copper and 25.15% copper, respectively. Cleaner concentrate grade and total copper recovery could have been significantly improved with regrinding the rougher concentrate to 80% passing 50 µ.

Table 13-22: Open Cycle Leach – Float Test Results Using 50 Grams per Tonne Z-200 Collector

		Assay							Distribution				
Test No.	**Description**	**Mass, Grams**	**% Weight**	**% Total Copper**	**% Acid Soluble Copper**	**% Sulfide Copper**	**% Molyb-denum**	**% Sulfur**	**% Total Copper**	**% Acid Soluble Copper**	**% Sulfide Copper**	**% Molyb-denum**	**% Sulfur**
10	**Composite 76-122**												
	Head Assay			1.565	0.777	0.788	0.0133	0.43					
	Calculated Head Assay	**1000**	100	1.508	0.777	0.731	0.0158						
	Agitated Leach												
	PLS	**2000**		0.333					44.17	84.72	1.05		
	Residue	**975.1**	97.51						55.83	15.28	98.95		
	Sulfide Flotation												
	Cleaner Concentrate	**24.95**	2.495	28.34	1.22	27.12	0.127	15.06	46.89	3.91	92.56	20.62	87.4
	Cleaner Circuit Middlings	**122.95**	12.295	0.425	0.308	0.117	0.032		3.46	4.88	1.97	25.58	
	Tailings	**827.2**	82.72	0.100	0.061	0.039	0.01		5.48	6.49	4.42	53.79	
11	**Composite 76-122**		100										
	Head Assay			1.565	0.777	0.788	0.0133						
	Calculated Head Assay	**1000**		1.504	0.777	0.727	0.0158						
	Agitated Leach												
	PLS	**2000**		0.351					46.67	87.82	2.68		
	Residue	**973.4**	97.34						53.33	12.18	97.32		
	Sulfide Flotation												
	Cleaner Concentrate	**28.4**	2.84	25.15	1.13	24.02	0.123	13.52	47.5	4.13	93.83	22.11	89.3
	Cleaner Circuit Middlings	**111.4**	11.4	0.255	0.181	0.074			1.89	2.6	1.13		
	Tailings	**833.6**	83.36	0.0712	0.0507	0.0205			3.94	5.45	2.36		

Source: Met Engineering, 2023

<u>Locked-Cycle Flotation Test Results</u>

Three lock-cycle sulfide flotation tests were run on the upper ore zone material utilizing the composite sample identified as 78-77. These tests were numbered 181-183. The circuit configuration consisted of grinding the ore to approximately 80% passing 74 microns, conditioning, rougher flotation with collectors Z-200 followed by two stages of cleaner flotation. Underflow from the first cleaner stage was recycled to rougher flotation and underflow from the second stage of cleaning was recycled to the first stage of flotation. The number of lock-cycles was six. Results were reported for the last three cycles of each locked-float float test. Results of the tests are shown in Table 13-23.

Table 13-23: Results of Locked-Cycle Flotation Using 50 grams per tonne Z-200 Collector

		Assay				Distribution		
Test No.	**Description**	**% Weight**	**% Total Copper**	**% Acid Soluble Copper**	**% Sulfide Copper**	**% Total Copper**	**% Acid Soluble Copper**	**% Sulfide Copper**
181	**Composite 78-77**							
	Calculated Head Assay	100	1.615	1.102	0.513			
	Sulfide Flotation							
	Cleaner Concentrate	1.62	33.24	3.85	29.39	33.41	5.67	92.98
	Tailings	98.38	1.093	1.057	0.037	66.59	94.33	7.02
182	**Composite 78-77**							
	Calculated Head Assay	100	1.591	1.083	0.508			
	Sulfide Flotation							
	Cleaner Concentrate	1.71	30.42	4.18	26.24	32.72	6.60	88.40
	Tailings	98.29	1.089	1.029	0.060	67.28	93.40	11.60
183	**Composite 78-77**							
	Calculated Head Assay	100	1.606	1.186	0.420			
	Sulfide Flotation							
	Cleaner Concentrate	1.28	34.00	0.828	33.17	26.27	0.89	90.26
	Tailings	98.72	1.199	1.191	0.041	73.73	99.11	9.74

Source: Met Engineering, 2023

13.1.4 Leaching Studies

Leaching test programs were applied to a composite sample blend representing the whole resource, from the samples of the ore types described above under Sample Selection. They were also applied to another ore deposit composite blend that represented mineralization containing principally acid soluble copper minerals and secondary sulfide copper minerals, composite sample 78-77.

Industry accepted practices for bottle roll tests were used where PLS samples were withdrawn at timed intervals, and copper, acid, ferric, and pH levels were measured. Acid was added to maintain pH. Optimum leach time, ferric level, and pH were determined based on plots of copper extraction rate, acid consumption rate, and ferric consumption rate.

Acid leach test results on the tested composites were generally consistent. Acid soluble copper recovery was in the mid 90% range for a four hour leach time. Acid consumption ranged from 18.5 to 23 kg of acid per tonne of ore without the SX-EW acid credit on copper electrowon. The best pH was 1.5.

Acidic ferric sulfate leaching on a composite of acid soluble copper minerals and secondary sulfide minerals was successful. The best agitated tank leach conditions were determined to be:

- 24-hour leach time
- 40ºC leach temperature
- 10 grams per liter (gpl) ferric concentration

Acid soluble copper recovery was 95%. Non-acid soluble copper recovery was 90%. Total copper recovery was 90-91%.

Test procedures described meet current industry accepted practices for determining the leachability of an ore with sulfuric acid or acidic ferric sulfate at the PEA level. Once again, lack of any variability test program prevents use for PFS and FS levels.

Sulfuric acid heap leaching was evaluated on one hole, 27 A, across most of its length using the column cell test method. Nine column cell tests were conducted from selected intervals of core. The calculated head grade was 1.4% total copper and 1.2% acid soluble copper. Total copper extraction was 77% and acid soluble copper was 89%. Gangue acid consumption (including SX-EW acid credit) was 9.2 kilograms per tonne (kg/t) ore.

The QP is of the opinion that procedures applied during the tests were acceptable industry practices.

13.1.5 Copper Measurement

An important aspect of the test programs described above are the analytical techniques used for measuring total copper and acid soluble copper in ores, and total copper in concentrates. The sequential copper assaying method had yet to be developed for the CGCC test programs from 1976 to 1982. Thus, secondary sulfide concentrations in the test composite samples were estimated from mineralogy studies on the composites and from drill core mineral logging records. The analytical methods used by CGCC for total copper assaying are still in use today. The method used digestion by aqua regia and measurement after dilution with DI-water with atomic adsorption. The method described by Hanna for oxide copper determination is in use today minus the addition of 10 ml of sulfurous acid (digestion at boiling temperature for 5 minutes with 100 ml of 5% sulfuric acid and 10 ml of sulfurous acid) and is considered satisfactory for determination of acid soluble copper content in the sample.

13.1.6 ASARCO Study by Mountain States Engineering (1980)

This study evaluated leaching in place of fragmented acid soluble copper ore from block cave mining. There were no mineral processing and metallurgical tests associated with this study. Copper recovery factor and column of ore caving factors are used from nearby underground block cave mines and/or that were leaching block cave rubblized ore with dilute sulfuric acid. This study could not be used today at an PEA-level study due the lack of testwork. This work can be considered conceptual and is referenced as such.

13.1.7 Santa Cruz In-Situ Study

The Santa Cruz in-situ project was a research project between the Department of the Interior Bureau of Mines (subsequently Bureau of Reclamation) and the landowners, the SCJV, consisting of ASARCO Santa Cruz Inc. and Freemont McMoRan Copper & Gold Inc (Mountain States Engineering, 1980).

Metallurgical studies of core (2-inch diameter by 2.5-inch-long), from the proposed in situ leach zone in the pilot program reported copper recoveries ranging from 57% to 90%. Total Cu ranged from 2.3% to 9%. Tests were run for 3,000 hours to 3,800 hours (125 days to 158 days), and no extraction rate versus time data was reported, which is unusual because it is critical for the process design and for the well development schedule. Flow volumes varied from two milliliters per day to several liters per day, and pressures ranged from 0 psi to 1,000 psi. The studies reported the acid consumption would be 1.2 lbs per 1.0 lb of Cu recovered on atacamite samples and ranged between three to eight pounds per pound of Cu for chrysocolla samples (with some very high consumption rates initially of, 10+ lbs/lb Cu). The initial acid concentration in the feed solution varied from 5 to 40 gpl H_2SO_4.

Leach tests on the core showed that initial permeability rates were very low when the solution initially contacted the core in the test apparatus. Later, as copper-oxide minerals dissolved from the filled fractures acceptable permeability rates were achieved.

The In Situ leach test program used industry accepted practices. Total copper and acid soluble analytical methods were satisfactory for the measurement of the core samples. Identification of the core sample by drillhole and interval was performed. Cross sections of the sample location in the proposed ore area for the five-spot injection and test well design was provided. Samples were representative of the proposed test region.

13.2 2022-2023 Test Work Studies

The IE studies were directed by Met Engineering LLC and conducted at McClelland Labs in Sparks, Nevada. McClelland Labs is recognized by the IAS for its technical competence and quality of service and has proven that it meets recognized standards. The studies are in progress currently at a PEA level. Study focus has been on:

- Confirming total copper recovery of the leach-float flow sheet proposed by CGCC in circa 1980 on Oxide, and Chalcocite mineral domains.
- Investigating heap leaching of Oxide and Chalcocite mineral domains. The test program for heap leaching is at the slow chalcocite leach stage and will not be completed until the fourth quarter 2023. A progress report is presented in section 10.2.8 below later stage of the Project.

13.2.1 Sample Selection

Testing was performed on a composite of drill core (1/2 core) samples from the 2021 - 2022 drilling program, designated as the mill composite. Details of the mill composite are listed Table 13-24. The composite generally characterizes minerals found in the Oxide and Chalcocite mineral domains.

Table 13-24: Drillholes, Intervals and Sample Lengths of the Mill Composite

Drillhole ID	From (m)	To (m)	Number of Samples
SCC-002	615	765	60
SCC-004	595	637	33
SCC-006	665	681	13

Source: Met Engineering, 2023

Column cell testing was performed on two composites of drill core (1/2 core) samples from the 2021 - 2022 drilling program, designated as heap leach No.1 (4815-002) and No.2 (4815-003). Details of the heap leach composites are listed in Table 13-25 and Table 13-26. The composites generally characterize minerals found in the oxide and chalcocite mineral domains.

Table 13-25: Heap Leach Sample No.1 (Lab sample No. 4815-002)

Hole ID	From (m)	To (m)	Number of Samples
SCC-007	811.12	1089	145
SCC-008	752.39	791.44	40

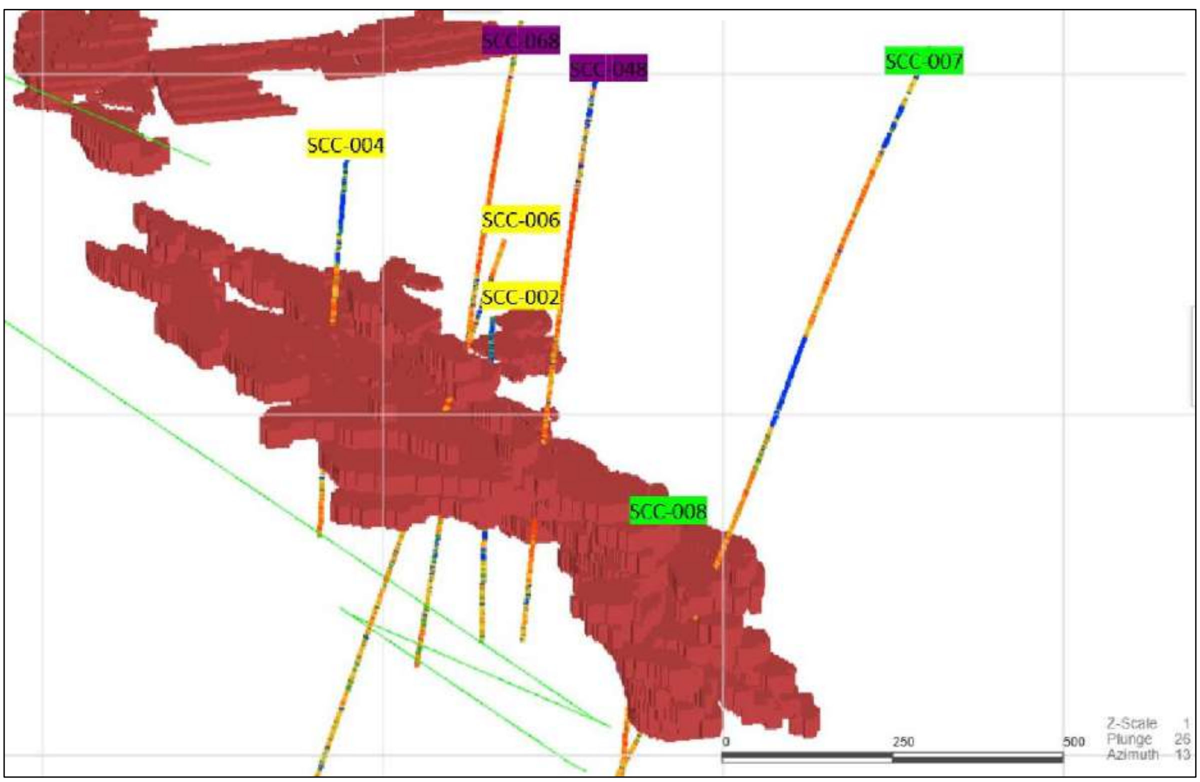
Source: Met Engineering, 2023

Table 13-26: Heap Leach Sample No.2 (Lab sample No. 4815-003)

Hole ID	From (m)	To (m)	Number of Samples
SCC-048	580.27	774.51	135
SCC-068	577.82	697.6	113

Source: Met Engineering, 2023

Figure 13-3 illustrates the location of the drillholes and their intervals used in each composite. All the drill intercepts are positioned inside the minable portion of the mineralized material depicted in the figure. Drillholes SCC-002, -004 and -006 represent the Mill Composite sample (McClelland Labs sample identification 4815-001). Drillholes SCC-007 and -008 represent the No. 1 Heap Leach Composite sample (McClelland Labs sample identification 4815-002). Drillholes SCC-048 and -068 represent the No. 2 Heap Leach Composite sample (McClelland Labs sample identification 4815-003).



Source: Met Engineering, 2023

Figure 13-3: Mineral Process Testing Sample Drillhole Intercepts in the Minable Material

13.2.2 Grinding Studies

The Bond Mill Work Index (10.71 kWh/t) estimated for the upper body of mineralized material in 1980 by CGCC was applied for predicting the energy consumption per tonne of ore for the flow sheet proposed. The proposed flow sheet employs a SAG and ball mill to grind ore for agitation leaching purposes, followed by a second ball mill to grind the leach residue in preparation for copper sulfide flotation. Finer grinds were determined from the IE studies on the mill composite described above compared to the CGCC studies to achieve the same total copper recovery for the leach-float process flow sheet. The grinding flow sheet reduces primary crushed product at a P_{80} of 150,000 µ to P_{80} 300 µ for leaching, requiring an estimated 7.17 kWh/t. Leached residue needs to be reduced from P_{80} 300 µ to P_{80} 106 µ to achieve optimal rougher flotation recovery, requiring 4.22 kWh/t. Combined grinding circuit energy requirements are 11.39 kWh/t.

A confirmatory bond mill work index test was performed on the mill sample (4815-001). Results are shown in Table 13-27. The Bond Mill Work Index was 13.82 KWh/t of material, which is somewhat larger than the CGCC work found, and places the material in the medium hard category. For process design the CGCC results were used because they represent the minable area better than the mill sample (4815-001).

Table 13-27: Confirmatory Bond Mill Work Index Test

Results			
Ball Mill Work Index		12.53	kW-hr/st
Ball Mill Work Index & Classification	Medium	13.82	kW-hr/mt

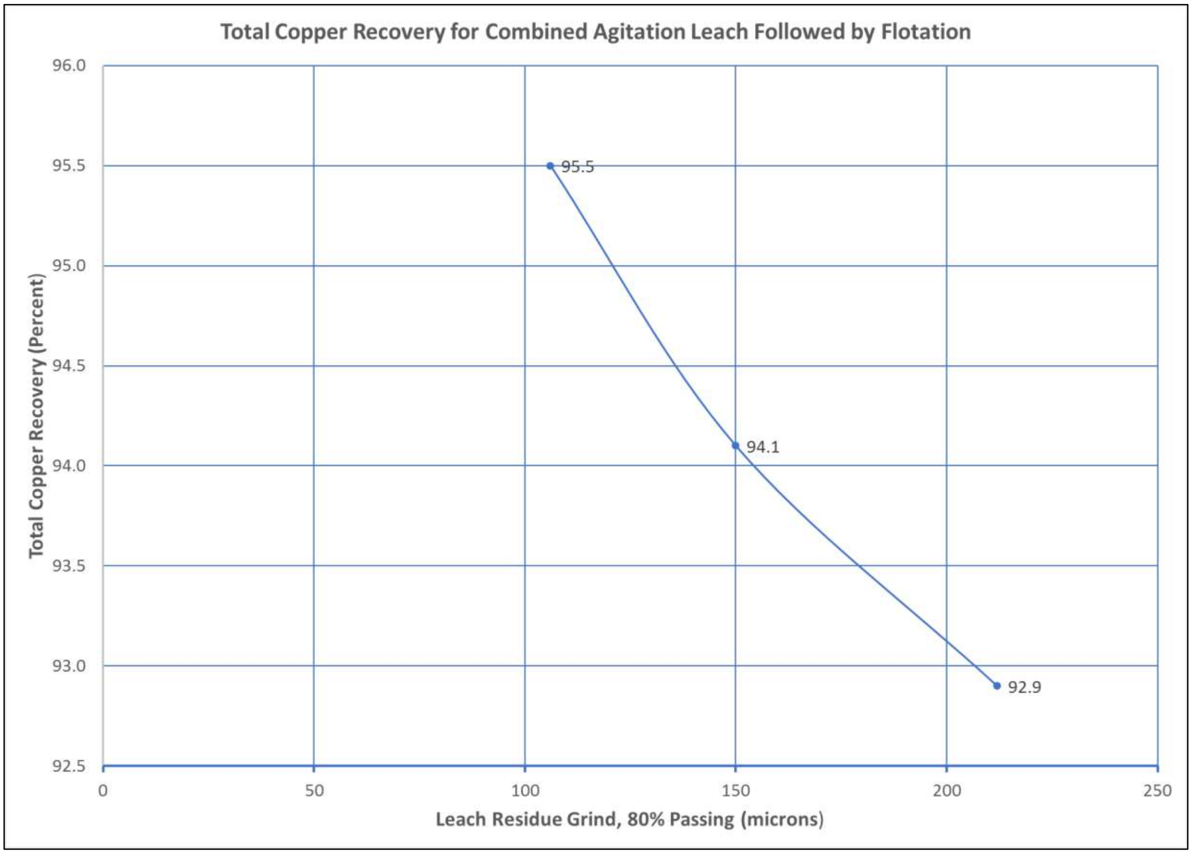
Source: Met Engineering, 2023

13.2.3 Leaching Studies

Testing was conducted in the summer of 2022 to confirm that high ASCu recovery (plus 93% recovery) achieved in the circa 1980 test programs by the Case Grande Copper Corporation (CGCC) were achievable on the mill composite described above. After some experimentation with particle size distribution, similar results were achieved to those reported by CCGC. ASCu recovery of 92% was achieved consistently at a grind size of P_{80} 300 µ and leach conditions of pH 1.6, ambient temperature and four hours of residence time. The next step was to confirm that 94% total copper recovery of the CGCC test program was achievable by the leach – float circuit. Table 13-28 in the flotation section shows the combined copper recoveries for the leach-float test on sample 4815-001.

13.2.4 Flotation Studies

In December 2022, the same mill composite sample as used above was subjected to the standard leach procedure developed in the summer of 2022 (leach after P_{80} 300 µ grind). Neutralized residue was then subjected to conventional froth floatation (rougher flotation stage, only) utilizing parameters and reagents utilized in the CGCC studies. However, because some experimentation on particle size distribution was needed earlier in the leach phase of testing, three standard leach tests were run and the neutralized residue from each was subject to different grind sizes. The results are illustrated in Figure 13-4 that shows total copper recovery for each test. These test results are also shown in more detail in Table 13-28 .



Source: Met Engineering, 2023

Figure 13-4: Leach – Float Testing Results at Different Leach Residue Grinds

Table 13-28: Results of Leach – Float Tests at Different Leach Residue Grinds

Test Description	Head Grade (% Cu)	Calculated Head Grade (% Cu)	Leach Recovery (%)	Flotation Recovery (%)	Total Copper Recovery (%)	Rougher Con (% Cu)	Rougher Con (%S)
Test, standard leach, grind residue to P80 212 microns	1.41	1.38	54.3	38.6	**92.9**	9.91	4.71
Test 2, standard leach, grind residue to P80 150 microns	1.41	1.36	59.7	34.4	**94.1**	10	5.36
Test 3, standard leach, grind residue to P80 106 microns	1.41	1.38	58.8	36.7	**95.5**	6.83	3.09

Source: Met Engineering, 2023

The test program demonstrated that total copper recovery increases with finer grinding of the leach residue. Grinding the leach residue to P_{80} 106 µ seems optimal with the current data, producing a total copper recovery of 95.5%. Total copper recovery the flotation test improved to 89.1% for the P_{80} 106 µ grind from 85.3% for the P_{80} 150 µ grind. Recovery of non-ASCu copper in the P_{80} copper grind was the highest at approximately 93.9%. Factoring in process losses a total copper recovery of 94% is possible. This total copper recovery at the P_{80} 106 grind confirms the total copper recovery results predicted by GCC test programs.

Cleaner Stage Flotation Results

A larger bulk leach and flotation sample was treated by the standard leach on material from sample 4815-001 followed by flotation of the leach residue after re-grinding to 80% passing 106 microns. This procedure created a large enough rougher concentrate sample to use in a cleaner circuit test utilizing two stages of cleaning, which was the configuration that worked effectively in the CCGC test programs. The new circuit design included a regrind of the rougher concentrate, which is effectively used at most copper concentrators, to 100% passing 74 microns. The cleaner test produced a final concentrate of 42% total copper and 96% of the copper in the rougher concentrate reported to the cleaner concentrate product. A scavenger cleaner circuit on the tailings from the second cleaner would likely result in 98 to 99% recovery of copper from the rougher concentrate to the cleaner concentrate. Table 13-29 illustrates the results from agitation leach through to final concentrate.

Table 13-29: Combined Metallurgical Results, Whole Ore Acid Leaching, Residue Cleaner Flotation, Composite 4815-001

	Feed	**Weight**	**Cu Grade**	**Cu Distribution**	**Units**
Product	**Size**	**%**	**% Cu**	**% of Total**	**% Cu**
Whole Ore Acid Leach	80%-300 µm	100.0			
Extraction			0.79	58.6	0.79
Residue Cleaner Flotation	80%-106 µm	93.6*			
Cleaner Concentrate		1.1	41.50	34.6	0.47
Recleaner Tail		1.7	1.01	1.3	0.02
Cleaner Tail		0.2	2.7	0.4	0.01
Residue Rougher Flotation					
Rougher Tails		90.6	0.08	5.2	0.07
Total Recovered			**1.26**	**93.2**	**1.35**
Tail			**0.07**	**6.8**	
Composite		**93.6**	**1.33**	**100.0**	

Source: Met Engineering, 2023
*Weight percent reporting to flotation, reflects weight loss during leaching

There were other metals of interest in the cleaner concentrate. Gold and silver were at smelter payable levels of 2.71 ppm gold (fire assay and AA finish) and 57.4 ppm silver (ICP). Molybdenum was present at 11,300 ppm (4 acid digestion and ICP), which could warrant evaluating recovery of a separate molybdenite concentrate on-site for sale.

There were no deleterious smelter penalty elements for compounds in the final cleaner concentrate. See Table 13-30 and Table 13-31 for the full suite of assays on the final copper concentrate.

Table 13-30: Base Metal Concentrate Results

Santa Cruz		
Analyte	**Unit**	**F-5 Cleaner**
Al_2O_3	%	1.26
As	%	0.01
Ba	%	0.04
Bi	%	<0.01
CaO	%	0.09
Co	%	0.02
Cr	%	0.01
Cu	%	45.4
Fe	%	15.10
K_2O	%	0.36
MgO	%	0.06
Mn	%	<0.01
Mo	%	0.988
Nb	%	<0.01
Ni	%	0.02
P	%	0.04
Pb	%	0.04
S	%	26.5
Sb	%	<0.01
SiO_2	%	6.03
Sn	%	<0.01
Ta	%	0.01
TiO_2	%	0.08
LOI[1]	%	11.52
Total	%	>110
V	%	0.01
WO_3	%	0.01
Zn	%	<0.01
Zr	%	0.02

Source: Met Engineering, 2023
[1.] Loss of ignition
ALS Report No. RE23055348

Table 13-31: Chloride Analyses

Santa Cruz		
		Sample
Analyte	**Unit**	**F-5 Cleaner Concentrate**
Cl	mg/kg	280

Source: Met Engineering, 2023
ALS Report No. RE23055348

13.2.5 Copper Measurement

McClelland Labs used modern copper measurement methods on ore grade material for total copper and sequential copper assaying, assays are acceptable in the QP’s opinion.

13.2.6 Thickener Sizing Tests

Pocock Industrial (Salt Lake City) was commissioned to conduct solid-liquid separation (SLS) tests on Santa Cruz material to generate data for thickener design and sizing criteria. Tests were conducted on samples of pre-leach ground feed material, leach residue tails, and flotation tails. The resulting data was used to size the ground ore dewatering thickener (treating pre-leach). Counter current decantation

(CCD) thickeners (treating leach residue) and flotation tailing dewatering thickener. A 32 m diameter design was found to be effective for each situation.

This work produced the following high-rate thickener design parameter recommendations (Table 13-32):

Table 13-32: High-Rate Thickener Sizing Test Results

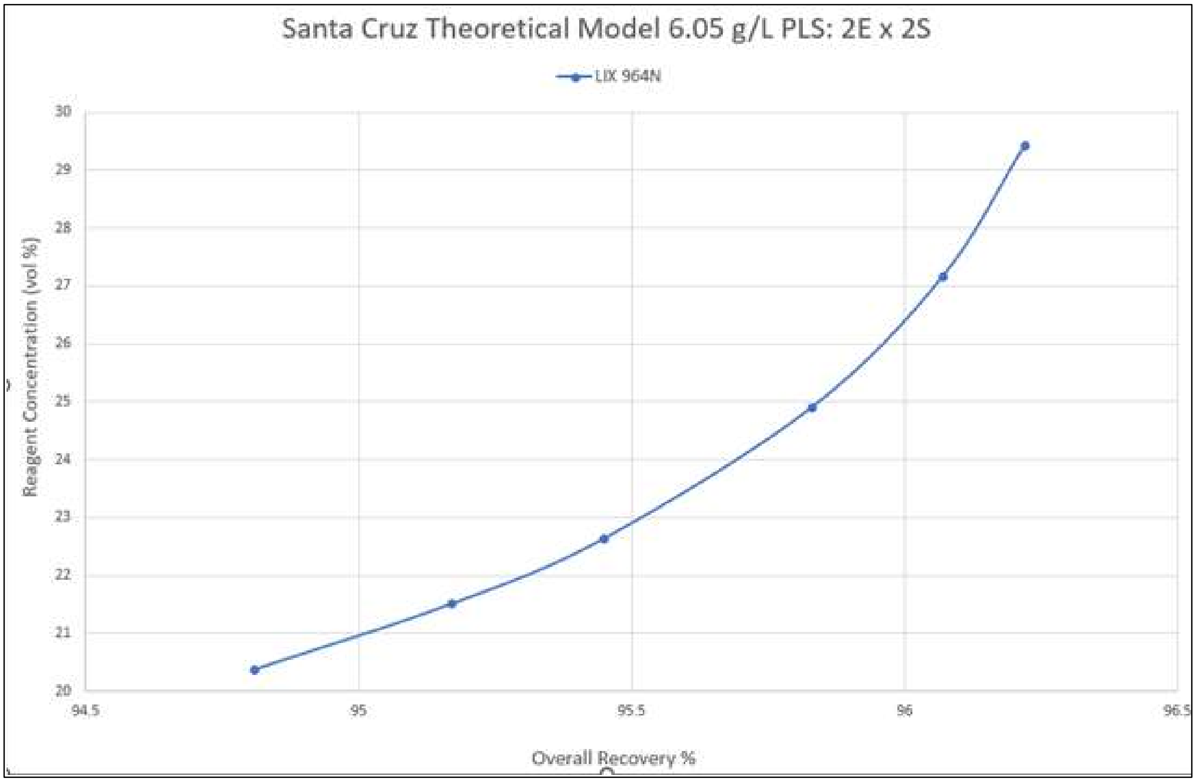
Material	pH	Feed Solids %	Max Underflow Solids, %	Unit Feed Rate $m^3/m^2 \cdot hr$
Pre-leach	7.15	24.11	72.7	3.62
Leach residue	2.2	23.48	70.2	3.45
Tailings	10.5	18.72	63.0	2.90

Source: Met Engineering, 2023
m3 = cubic meters
m2 = square meters

Flocculant screening was conducted on small pulp samples in static settling tests to determine the effectiveness of each flocculant. Pocock selected SNF FA920SH a widely used flocculant of medium high molecular weight, nonionic polyacrylamide, for best overall performance for thickening the pre-leach ground feed, for the CCD thickeners (leach residue) and for the tailings thickener. The non-ionic flocculant will avoid phase disengagement problems in the downstream solvent extraction process. Flocculant consumption rate will be 18-23 g/t for pre-leach material. The first CCD thickener will use 19 to 26 g/t flocculant and subsequent CCD thickeners will decline steadily due to flocculant carry over; overall usage for the CCD circuit will be 70 to 80 g/t. The finer material reporting to the tailing thickener will require 40 to 50 g/t.

13.2.7 Solvent Extraction Testing

A PLS sample from an agitated leach test on sample 4815-001 was sent to BASF (Tucson) for isotherm analysis. The results of that testing indicated that typical non-modified solvent extraction reagents will be able to extract and strip copper effectively from the Santa Cruz PLS. Simulations at the expected copper PLS level of 6.05 grams of copper per liter of solution indicated 95.8% extraction could be expected with a 25% by volume extractant level for a circuit design of two extractors, one wash stage and two strip stages (Figure 13-5).



Source: Met Engineering, 2023

Figure 13-5: Copper Recovery vs Organic Extractant Concentration for PLS Extraction of Copper from Santa Cruz PLS

13.2.8 Column Leach Tests

The column leach work was performed to develop leach parameters at the PEA level. One phase of column leaching tests was performed on two composite samples (No.1 and No.2) representing oxide and chalcocite mineral domains in the upper ore. The two samples varied in spatial location and in the dominant oxide mineral present. Heap leach composite sample No.1 (lab sample ID 4815-002) dominant oxide mineral was chrysocolla while No.2 dominant oxide mineral was atacamite.

Bottle roll tests were conducted on various crush sizes of material, ranging from -2 inch to -1/2 inch, to determine the optimum crush size and the probable net acid consumption rate. Copper recovery improved as crush size decreased, without corresponding net acid consumption increase, and there was a pronounced improvement from crush size -3/4 inch to crush size -1/2 inch. Therefore, after establishing the fines generation was not too much for the -1/2 inch crushed material, it was decided to set up all the column cells at the -1/2 inch size using 4 inch diameter PVC pipe.

Eight column cells were set up using material from both composite samples mentioned above. Six column cells were set up as conventional bacterial assisted acidic ferric leaches to extract both copper from copper oxides and secondary copper sulfides. Various operating parameters were examined: acid cure amount (kilograms acid per tonne material, 3 and 5 kg/t), length of cure (7 and 14 days) and irrigation rates (5 and 10 liters per hour (L/h) per square meter of surface area). Two of the bacterial leaches were short columns investigating a blend of exotic material with each of the two composites.

Two regular height columns (3 m) were set up as experimental chloride dopant assisted acidic ferric leaches where acid and chloride dopant levels in the curing were varied.

All of the column cells are in operation or are in the drain down and water wash stage at this time.

All the column cells have run without significant incident except for very high extraction rates (and high PLS levels, +30 gpl copper) initially that drove the PLS solution pH into the 3-3.5 range and precipitated the ferric sulfate temporarily until the high acid solvent extraction raffinate rinse drove them back down and re-solubilized the ferric.

The chloride dopant cure columns experienced rapid extraction of the oxide copper and the secondary sulfide copper. Material with dominant copper oxide as atacamite leached faster than those with chrysocolla. The bacterial assisted leaches have reached the slow extraction period that is typically encountered with leaching secondary sulfide copper. One column cell is in the acid solution drain down mode, which will be followed by water rinse and drain down. Afterwards, it will be broken down and the residue analyzed.

Bacterial assisted column leaches will continue to run for several more weeks as the copper is leached from the secondary copper sulfides. The remaining seven column cells remain under acid rinse conditions at 5 L/h per square meter of area. Column cells initially operating under rinse conditions of 10 L/h per square meter of area were reduced to 5 L/h per square meter after the chalcocite leach was well underway. This change was made to increase PLS grade exiting the columns and follows typical commercial operating practice.

Rough estimates of total copper recovery, based on column ore weights, head grades and weights of copper in solution recovered, range from 72% to 98% after 63-70 days of rinsing. Net acid consumption, kilograms acid per tonne of ore, range from -4 to +4 kilograms acid per tonne of ore. Negative numbers are due to ferric sulfate leaching of chalcocite, which generates acid, and naturally occurring low acid consumers in the ore of sample 4815-003.

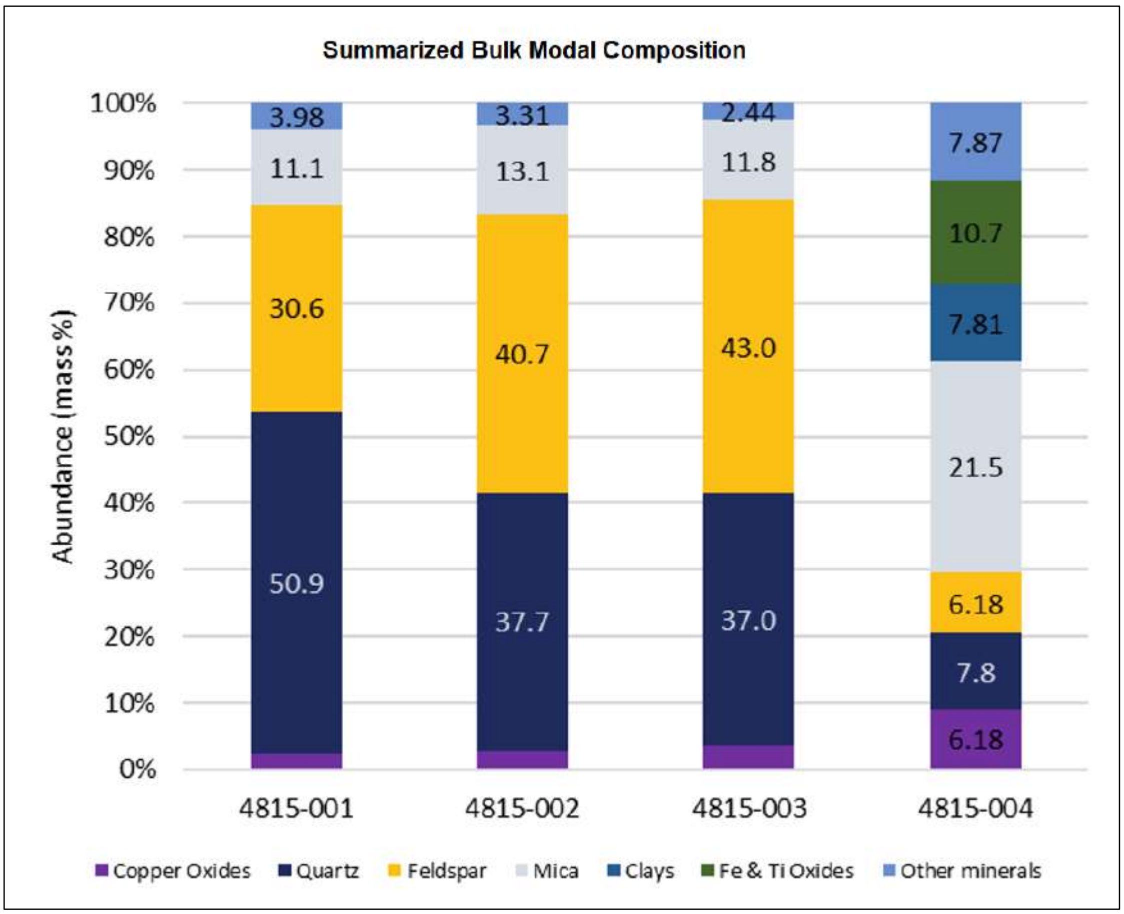
13.2.9 Sample Mineralogy and Assays

PMC Laboratory Limited (British Columbia, Canada) was commissioned to to provide rapid ore characterization of four composite samples from the mineral process testing program IE was executing with McClelland Labs in Sparks, Nevada. Samples were 4815-001 (mill composite sample), 4815-002 (heap leach sample No.1), 4815-003 (heap leach sample No.2) and 4815-004 (exotic mineralized material). Each sample was homogenized and between 2 and 2.5 grams was riffled out for a single polished block section per sample for analysis. Each sample's polished block was scanned by automated scanning electron microscope (AutoSEM), specifically the Tescan Integrated Mineral Analyser (TIMA), to determine the bulk modal composition of each, as well as the deportment of copper (Cu-) bearing phases.

Summary of Observations

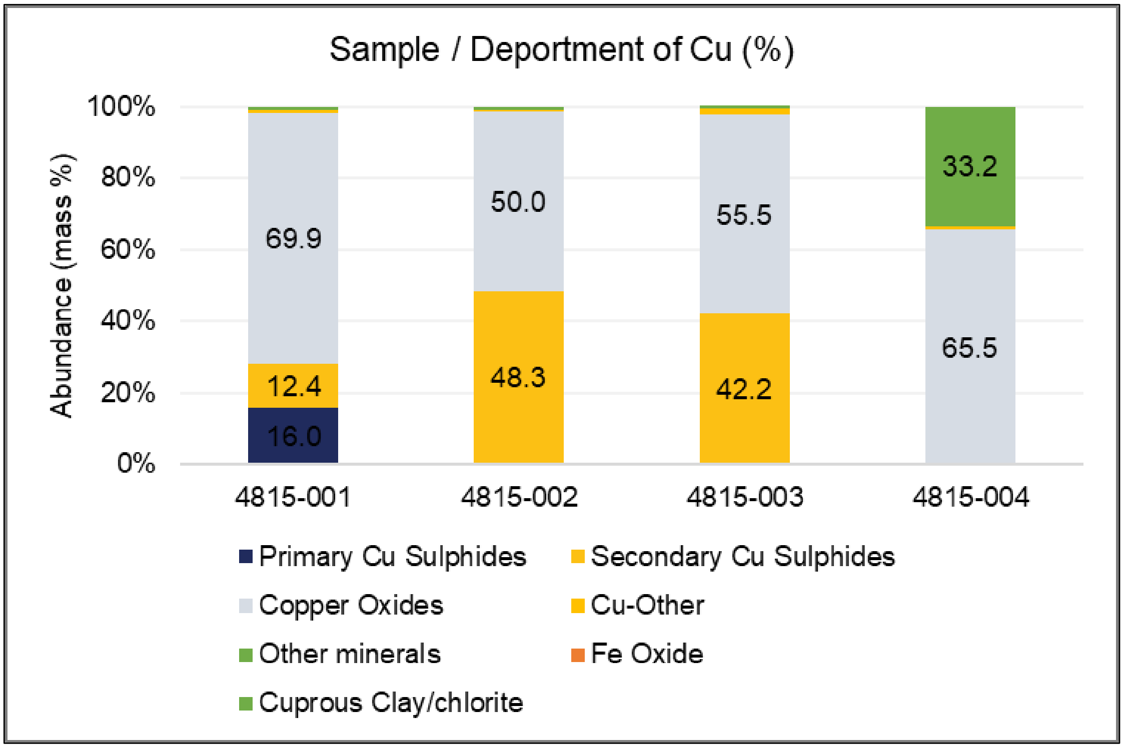
- Copper in the samples examined occurred mostly in three forms – chalcopyrite, chalcocite/digenite and copper oxides and malachite – however in varying abundances (Figure 13-7).

- Primary copper sulfides (chalcopyrite, bornite) are most abundant in sample 4815-001 (Figure 13-7).
- The copper oxides are most abundant in sample 4815-004 with an Fe- and Cu-bearing clay (Figure 13-7).
- Secondary copper sulfides are the most abundant Cu-bearing minerals in samples 4815-002 and 4815-003, with lesser amounts or Cu oxides (Figure 13-7).
- Quartz is the predominant phase in samples 4815-001, but feldspar more so in 4815-002 and 4815-003. Micas were detected at approximately 11 mass % in all samples, except 4815-004 where its abundance is double that of the other samples (Figure 13-6).
- Copper oxides, chrysocolla and atacamite, and cu-bearing clays were the only cu-bearing species identified in sample 4815-004 (Figure 13-6).
- Due to the nature of the sampling, analysis and over-representation of coarse particles, adjusted SGs were utilized in the mineral reconciliation.



Source: Met Engineering, 2023

Figure 13-6: Summarized Sample Composition



Source: Met Engineering, 2023

Figure 13-7: Copper Deportment (%) of Each Sample

Assays for sample 4815-001 through 4815-004 are reported in Table 13-33 and Table 13-34.

Table 13-33: Sequential Copper Analyses, Santa Cruz Samples

	% Cu								
				Head Grade		Cu, % of Total			
Composite	Acid Sol	CN Sol	Residual	Calculated	Assayed	Acid Sol	CN Sol	Residual	Total
4815-001	0.79	0.40	0.18	1.37	1.41	57.7	29.2	13.1	100.0
4815-002	0.74	0.58	0.04	1.36	1.41	54.4	42.7	2.9	100.0
4815-003	1.22	0.46	0.01	1.69	1.68	72.2	27.2	0.6	100.0
4815-004	2.62	0.32	0.74	3.68	3.79	71.2	8.7	20.1	100.0

Source: Met Engineering, 2023

Table 13-34: ICP Metals Analysis Results for Santa Cruz Samples

Santa Cruz					
		Sample			
Analysis	**Unit**	**4815-001**	**4815-002**	**4815-003**	**IE Exotic Copper**
Ag	mg/kg	1.46	3.15	1.57	0.09
Al	%	6.46	6.51	6.28	7.08
As	mg/kg	1.3	3.1	1.6	1.3
Ba	mg/kg	430	420	430	140
Be	mg/kg	1.25	1.53	1.24	4.76
Bi	mg/kg	0.53	0.81	0.52	0.19
Ca	%	0.08	0.18	0.05	0.71
Cd	mg/kg	0.47	0.66	0.45	0.18
Ce	mg/kg	99.3	82.8	91.3	71.1
Co	mg/kg	6.6	11.0	4.5	80.2
Cr	mg/kg	36	26	26	105
Cs	mg/kg	2.54	3.32	2.34	5.03
Cu	%	1.450[1)]	1.415[1)]	1.810[1)]	3.69[1)]
Dy	mg/kg	2.82	1.92	2.02	8.55
Er	mg/kg	1.19	0.90	0.85	4.08
Eu	mg/kg	1.04	0.86	0.94	2.20
Fe	%	1.22	1.29	0.74	6.59
Ga	mg/kg	13.70	13.35	12.1	17.40
Gd	mg/kg	4.64	3.41	3.31	9.18
Ge	mg/kg	0.19	0.12	0.14	0.19
Hf	mg/kg	0.6	0.5	0.5	4.0
Ho	mg/kg	0.47	0.31	0.29	1.61
In	mg/kg	0.141	0.125	0.082	0.094
K	%	4.79	5.10	5.50	1.89
La	mg/kg	49.7	38.7	50.9	34.9
Li	mg/kg	13.4	14.0	10.5	43.0
Lu	mg/kg	0.17	0.14	0.11	0.40
Mg	%	0.18	0.24	0.14	0.47
Mn	mg/kg	36	91	45	511
Mo	mg/kg	251	118	196	60.2
Na	%	0.25	0.28	0.26	0.32
Nb	mg/kg	4.4	4.2	4.6	30.8
Nd	mg/kg	36.3	32.9	32.4	34.6
Ni	mg/kg	5.4	6.1	4.7	108.5
P	mg/kg	370	300	220	1,170
Pb	mg/kg	20.4	27.7	28.3	8.1
Pr	mg/kg	11.15	8.71	10.05	7.93
Rb	mg/kg	158.0	134.0	162.0	97.8
Re	mg/kg	0.219	0.011	0.107	0.002
S	%	0.33	0.24	0.19	0.03
Sb	mg/kg	0.27	0.14	0.17	0.30
Sc	mg/kg	7.0	6.2	5.7	15.2
Se	mg/kg	12	8	12	3
Sm	mg/kg	6.82	5.44	5.93	7.88
Sn	mg/kg	8.3	6.8	6.8	5.7
Sr	mg/kg	304	113.5	193	299
Ta	mg/kg	0.39	0.40	0.51	1.75
Tb	mg/kg	0.58	0.39	0.42	1.46
Te	mg/kg	0.13	0.13	0.05	0.14
Th	mg/kg	35.8	29.9	34	11.75
Ti	%	0.088	0.098	0.07	1.125
Tl	mg/kg	0.66	0.70	0.70	0.24
Tm	mg/kg	0.17	0.13	0.12	0.56
U	mg/kg	6.1	8.1	3.4	33.2

Santa Cruz					
		Sample			
V	mg/kg	31	39	27	144
W	mg/kg	5.9	6.3	6.7	5.8
Y	mg/kg	14.0	8.7	8.6	45.9
Yb	mg/kg	1.09	0.87	0.82	2.93
Zn	mg/kg	11	17	38	240
Zr	mg/kg	14.1	13.0	9.7	153.0
ALS USA, Inc. Report No.		RE22157772	RE22275100	RE23019039	RE23046119

Source: Met Engineering, 2023
1) Cu reported using the OG62 method.

13.3 Process Factors and Deleterious Elements

There are some factors to follow up on with future testing to ensure all processing factors are effectively covered. These are confirmation of corrosion resistant materials and linings, to elevated chloride levels, for the thickeners in the counter-current-decantation system for pregnant leach solution recovery, and studying sulfide flotation with expected process water chemistry at the site. Otherwise, there are no other processing factors or deleterious elements that could have a significant effect on economic extraction. The processes proposed in the IE, CGCC, ASARCO, and Santa Cruz In-Situ studies for extraction of copper from the ore are all conventional in design and have been used economically for decades. There have been significant advances in most of these technologies since 1980, when most of the studies were conducted, which have improved the economics of these processes. Some examples are:

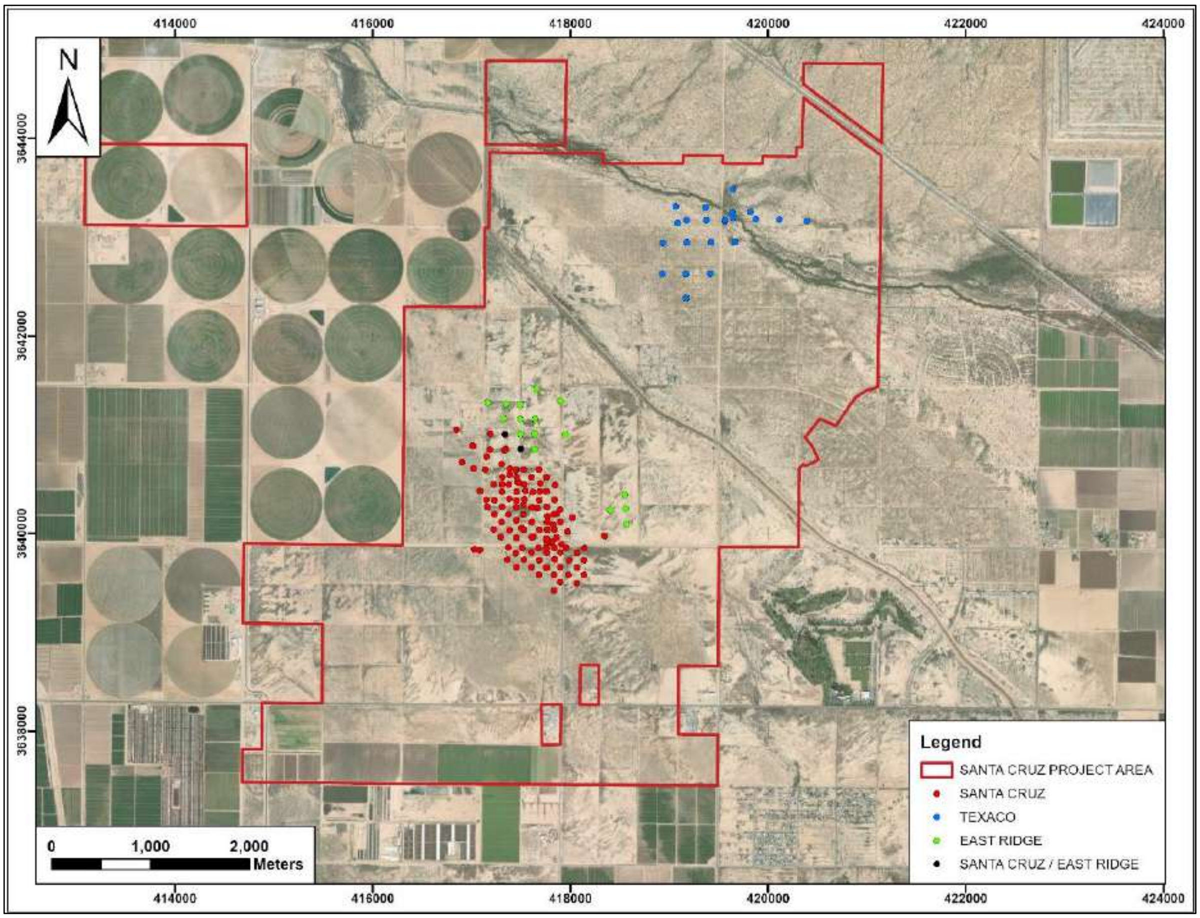
- Materials for construction of SX plants are cheaper and more resistant to chlorides in solution from leaching atacamite. SX wash circuits and/or organic coalescers eliminate the concern of chloride carryover to the EW.
- SX reagents are much more selective for copper extraction, react faster, separate faster from the aqueous media they are mixed with and are more robust today.
- SAG and ball mill grinding circuits are designed much more efficiently today and the liner and grinding media used last much longer than in 1980.
- Flotation cell designs are more efficient now and have raised recovery and concentrate grades.
- Environmental controls for dust, volatile organic compounds (VOC), and aerosol mists are much more efficient compared to 1980.

14 Mineral Resource Estimate

14.1 Drillhole Database

The work on the Mineral Resource Estimates included a detailed geological and structural re-examination of the Santa Cruz Deposit along with the East Ridge and Texaco Deposits.

The Santa Cruz Deposit Mineral Resource Estimate benefits from approximately 116,388 m of diamond drilling in 129 drillholes, while Texaco has 23 drillholes totaling 21,289 m, and East Ridge has 18 holes totaling 15,448 m. All holes were drilled between 1964 to 2022 (Table 14-1, Figure 14-1).



Source: Nordmin, 2023

Figure 14-1: Plan View of Santa Cruz Project Diamond Drilling by Deposit

Diamond drillhole samples were analyzed for total copper and acid soluble copper using AAS. A decade after initial drilling, ASARCO re-analyzed select samples for cyanide soluble copper (AAS) and molybdenum (ICP). The Company currently analyzes all samples for total copper, acid soluble copper, cyanide soluble copper, and molybdenum. Due to the re-analyses to determine cyanide soluble copper within the historic samples, there are instances where cyanide soluble copper is greater than total copper. It has been determined that the historic cyanide soluble assays are valid as they align with recent assays in 2022 drillholes. Therefore, a cap has been applied to historic cyanide soluble assays such that they must be equal to or less than the associated total copper value for each sample. A breakdown of the drillhole summary is in Table 14-1, and the number of assays used within each Mineral Resource Estimate is provided in Table 14-2.

Table 14-1: Drillhole Summary

	Total Drilling			IE Electric Drilling		
Deposit	**Number of Drillholes**	**Meters**	**Meters Intersecting Deposit**	**Number of Drillholes**	**Meters**	**Meters Intersecting Deposit**
Santa Cruz	129	116,388	57,326	41	34,769	14,172
East Ridge	18	15,448	1,501	0	0	0
Texaco	23	21,289	2,661	3	3,286	685
Total	**170**	**153,125**	**61,488**	**44**	**38,055**	**14,857**

Source: Nordmin, 2023

Table 14-2: Mineral Resource Estimate Number of Assays by Assay Type

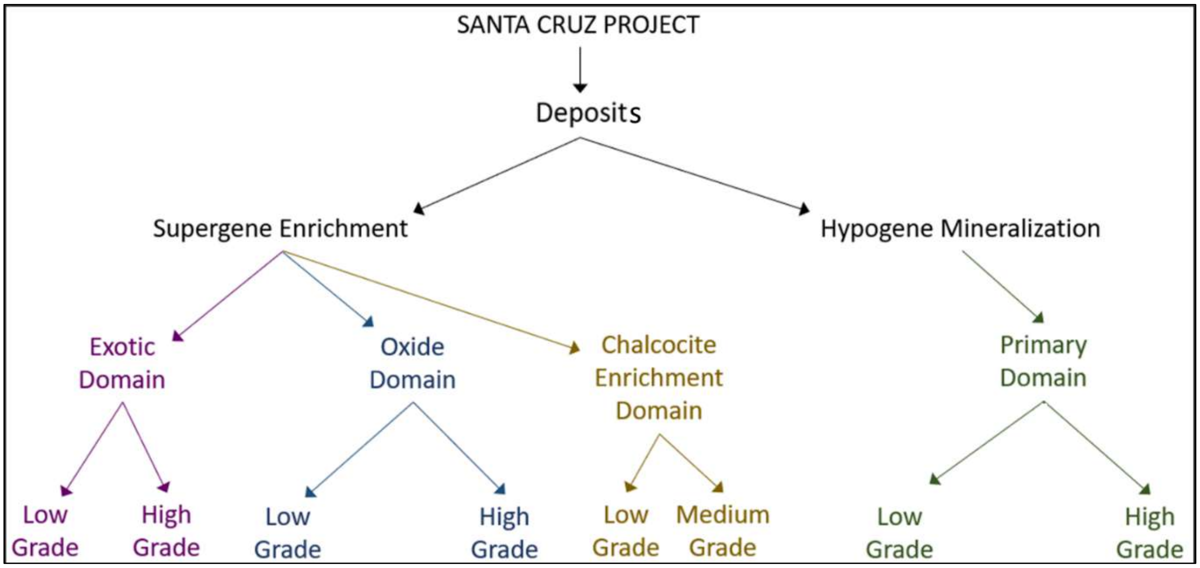
Assay Type	Santa Cruz Deposit Assays	Texaco Deposit Assays	East Ridge Deposit Assays
Total Cu	21,898	1,403	1,389
Acid Soluble Cu	15,859	787	0
Cyanide Soluble Cu	10,278	893	0
Molybdenum	13,193	712	86

Source: Nordmin, 2023

14.2 Domaining

14.2.1 Geological Domaining

Geological domains were developed within the Santa Cruz Project based upon geographical, lithological, and mineralogical characteristics, along with incorporating both regional and local structural information. Local D2 fault structures separate the mineralization at the Santa Cruz, Texaco, and East Ridge Deposits. Local fault zones were created and/or extrapolated by Rogue Consulting using Seequent's Leapfrog Geo™ (Leapfrog) geological software. The three Deposits were divided into two main geological domains consisting of the weathered supergene enrichment and the primary hypogene mineralization domain, each of which were further subdivided based upon their type of Cu speciation, specifically acid soluble-rich (Oxide Domain), cyanide soluble-rich (Chalcocite Enriched Domain), primary Cu sulfide (Primary Domain), and Cu oxides in overlying Tertiary sediments (Exotic Domain). Collectively, each of these domains was further sub-domained based upon their individual grade profiles. A schematic for Santa Cruz, Texaco, and East Ridge Deposit hierarchies is outlined in Figure 14-2 and Table 14-3. The following terms are assigned to the sub-domains; these represent a local definition of the grade profile: high-grade (HG), medium grade (MG), and low grade (LG).



Source: Nordmin, 2023

Figure 14-2: Santa Cruz, Texaco, and East Ridge Geological Domains

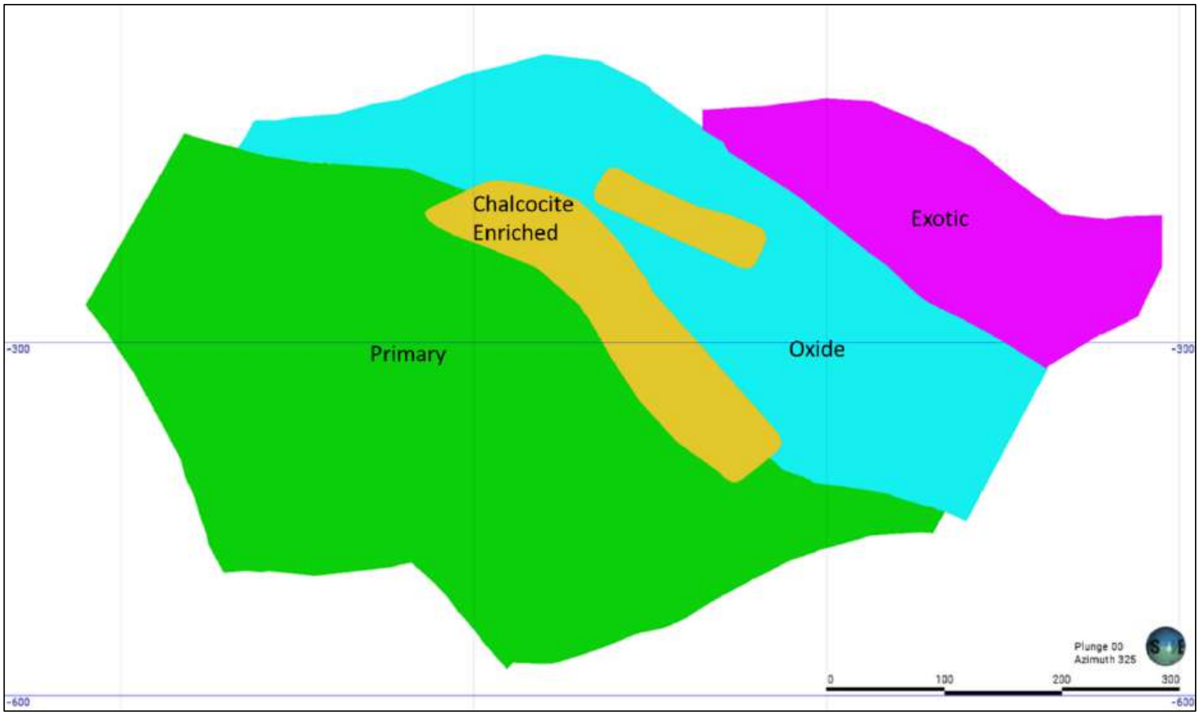
Table 14-3: Santa Cruz, Texaco, and East Ridge Geological Domains

Santa Cruz Deposit	
Weathered Supergene Enrichment	Oxide Domain (Primarily Acid Soluble Cu)
	Chalcocite Enriched Domain (Primarily Cyanide Soluble Cu)
	Exotic Domain (Tertiary-Hosted "Exotic" Cu)
Hypogene Mineralization	Primary Domain (Primary Sulfide Cu)
Texaco Deposit	
Weathered Supergene Enrichment	Oxide Domain (Primarily Acid Soluble Cu)
	Chalcocite Enriched Domain (Primarily Cyanide Soluble Cu)
Hypogene Mineralization	Primary Domain (Primary Sulfide Cu)
East Ridge Deposit	
Weathered Supergene Enrichment	Oxide Domain (Primarily Acid Soluble Cu)

Source: Nordmin, 2023

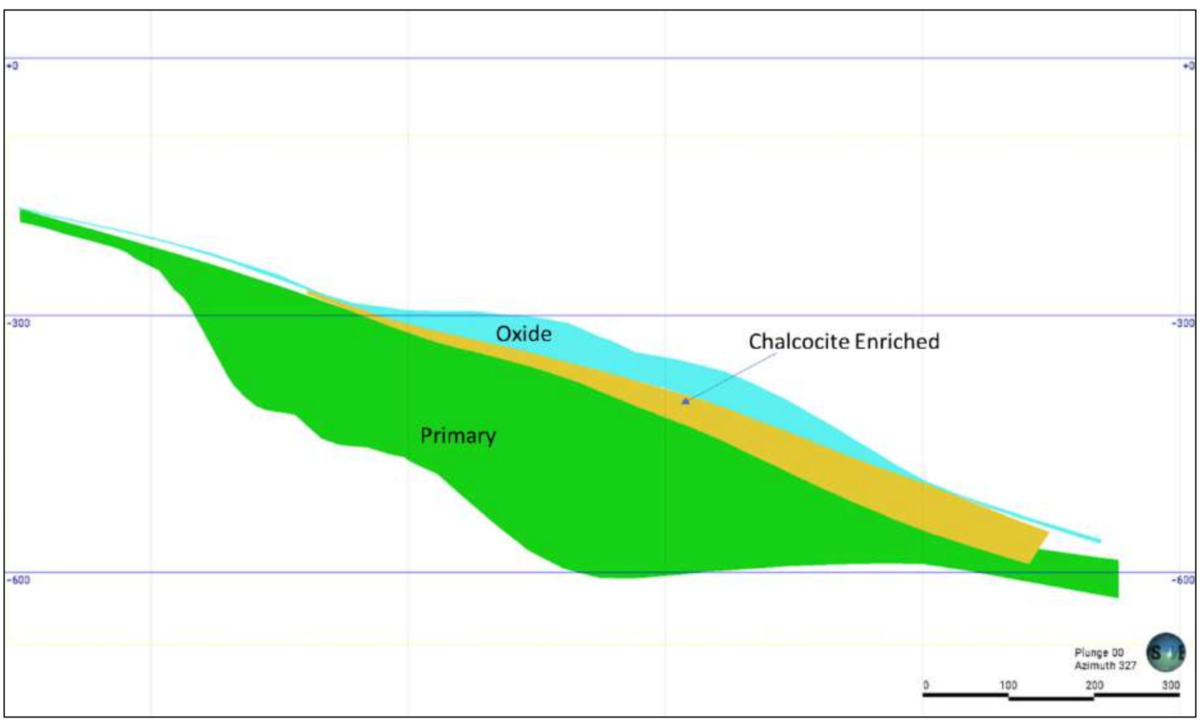
Exotic Cu is primarily present within the CG2 and CG3 D2 fault structures. All other Cu styles of mineralization hosted within the oracle granite lithology terminate at the contact of the tertiary sediments. The current drilling indicates that the Cu mineralization is truncated at depth by the basal faults within the region.

The oracle granite hosts both the laramide porphyry and diabase dykes, both of which are associated with brecciation and Cu mineralization. Secondary supergene Cu mineralization is separated from the primary hypogene mineralization by a Cu-oxide boundary layer called the chalcocite enriched domain. This domain is defined by a 2:1 relationship of acid soluble to total Cu and follows the dip of the contact of the oracle granite-tertiary sediments contact. The chalcocite enriched domain was formed by two different enrichment events. HG Cu oxides follow the trend of the laramide porphyries closely and likely contain significant amounts of primary mineralization. Cyanide soluble Cu can be found within both the supergene Cu and hypogene Cu domains as a form of secondary enrichment of chalcocite. Figure 14-3 is a conceptual example of the Santa Cruz Deposit domaining. Figure 14-4 and Figure 14-5 are examples of Texaco and East Ridge domaining.



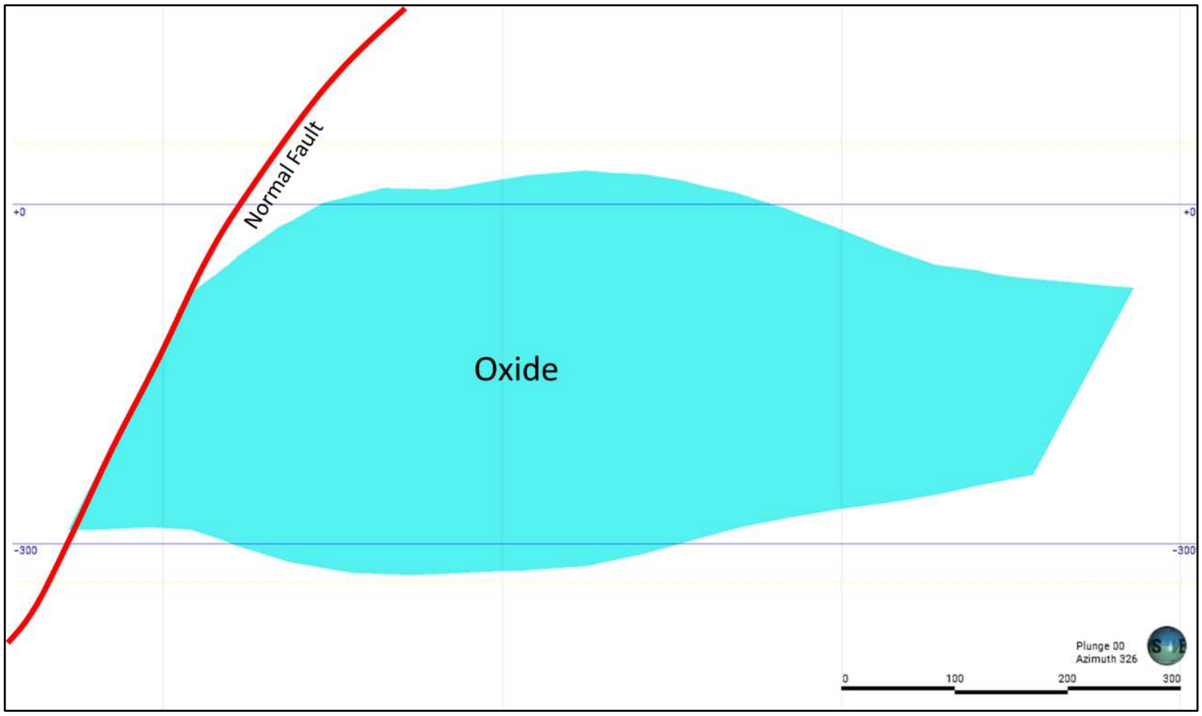
Source: Nordmin, 2023

Figure 14-3: Santa Cruz Deposit Domain Idealized Cross-section



Source: Nordmin, 2023

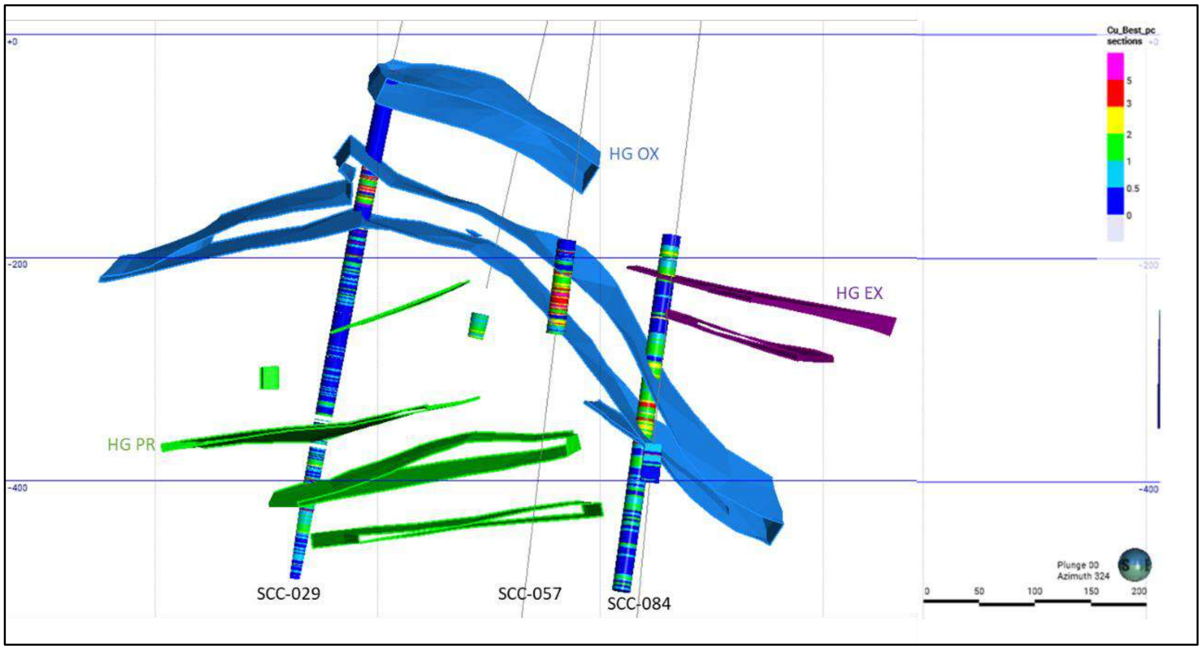
Figure 14-4: Texaco Deposit Domain Idealized Cross-section



Source: Nordmin, 2023
Note: Another discrete oxide domain exists to the south but has little interpretation due to lack of data.

Figure 14-5: East Ridge Deposit Domain Idealized Cross-section with Structural Control, Comprised Solely of Oxide Mineralization

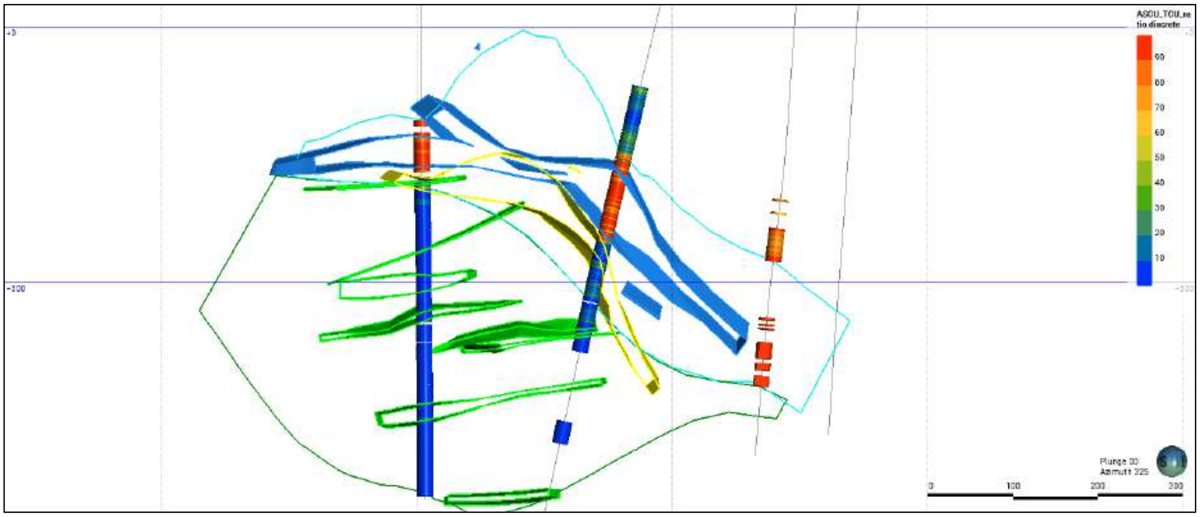
The current mineral domains have been significantly revised based on improved understanding of the deposition mechanisms for each mineral type. The high-grade oxide domain has been revised to better reflect the supergene enrichment process. Subsequent drilling has confirmed the new interpretation, as in Figure 14-6 and Figure 14-7.



Source: Nordmin, 2023
Note: The three displayed drillholes were completed after the revision in interpretation and confirm the new wireframes as they intersected high grade copper mineralization

Figure 14-6: Revised Santa Cruz High-Grade Domains for Exotic, Oxide, and Primary Mineralization

The oxide domains consider the acid soluble copper assay to total copper assay ratio, while the chalcocite zone considers the cyanide soluble assay to total copper assay ratio. This is important as an additional level of interpretation considers possible ore type mixing and gradational zones between oxide, chalcocite, and primary ore types.



Source: Nordmin, 2023

Figure 14-7: Santa Cruz Cross-section Showing Acid Soluble Copper Assay to Total Copper Assay Ratio

14.2.2 Regression

Cyanide soluble and acid soluble assays were measured approximately a decade after initial diamond drilling by ASARCO, therefore assay data is not available for all sample intervals within the drillholes. A regression analysis was conducted to infill the downhole intervals that are missing relevant acid soluble and cyanide soluble data. The analysis used the relationships between all applicable data available to determine the most appropriate regression calculations using Orange Data Mining™ Software (version 3.34) and Microsoft Excel™. Regression formulas were created and applied in a recursive manner to the assays for all three Deposits using the total Cu assays, flagged Sub-Domains, and lithology to calculate acid soluble and/or cyanide soluble values. Because internal correlations differ for all Domains, Sub-Domains, and lithologies, regression contains formulas up to five levels deep to allow the most accurate correlation formula to be applied. All further references to acid soluble and cyanide soluble Cu grades apply to the full regression-applied values. Regression analyses can be found in Table 14-4 and Table 14-5.

Table 14-4: Regression Analysis for Acid Soluble Cu

Sub-characterization	ID	Linear Formula (y=mx+b)	Formula m	Formula b
General				
All	AA	(0.4868 * TCu) – 0.0619	0.4868	0.0619
STEP 1 – Domain				
Exotic	1EA	(0.5502 * TCu) + 0.2338	0.5502	0.2338
Oxide	1OA	(0.5895 * TCu) + 0.0958	0.5895	0.0958
Chalcocite	1CA	(0.2285 * TCu) + 0.0532	0.2285	0.0532
Primary	1PA	(0.0912 * TCu) + 0.116	0.0912	0.116
Background	1BA	(0.5823 * TCu) – 0.0551	0.5823	-0.0551
STEP 2 – Sub-Domain				
Exotic LG	2ELA	(0.7962 * TCu) – 0.0358	0.7962	-0.0358
Exotic HG	2EHA	(0.4261 * TCu) + 1.0446	0.4261	1.0446
Oxide LG	2PLA	(0.1186 * TCu) – 0.0022	0.1186	-0.0022
Oxide HG	2OHA	(0.629 * TCu) + 0.3405	0.629	0.3405
Chalcocite LG	2CLA	(0.4529 * TCu) – 0.0642	0.4529	-0.0642
Chalcocite MG	2CHA	(0.1625 * TCu + 0.0703	0.1625	0.0703
Background	2BGA	1BA	1BA	1BA
STEP 3 – Lithology				
Alluvium	3MA1	(0.9458 * TCu) – 0.0275	0.9458	-0.0275
Igneous	3MA2	(0.4594 * TCu) – 0.0611	0.4594	-0.0611
Conglomerates	3MA3	(0.8871 * TCu) – 0.0329	0.8871	-0.0329
Diabase	3MA4	AA	AA	AA
Mafic Conglomerate	3MA5	(0.8073 * TCu + 0.0666	0.8073	0.0666
Pinal Schist	3MA6	AA	AA	AA
Porphyries	3MA7	(0.5782 * TCu) – 0.0557	0.5782	-0.0557
STEP 4 – Individual Lithology				
Background Porphyries	4MBA1	(0.7503 * TCu) – 0.066	0.7503	-0.066

Source: Nordmin, 2023

Table 14-5: Regression Analysis for Cyanide Soluble Cu

Characterization	ID	Formula *(y=mx+b)*	Formula m	Formula b
General				
All	AC	(0.4408 * TCu) – 0.0337	0.4408	-0.0337
STEP 1 – Domain				
Exotic	1EC	(0.3154 * TCu) – 0.2166	0.3154	-0.2166
Oxide	1OC	(0.4369 * TCu) – 0.0722	0.4369	-0.0722
Chalcocite	1CC	(0.8295 * TCu) – 0.1311	0.8295	-0.1311
Primary	1PC	(0.7766 * TCu) – 0.2052	0.7766	-0.2052
Background	1BC	(0.0565 * TCu) + 0.0047	0.0565	0.0047
STEP 2 – Sub-Domain				
Exotic LG	2ELC	(0.0475 * TCu) + 0.0026	0.0475	0.0026
Exotic HG	2EHC	(0.398 * TCu) – 0.787	0.398	-0.787
Oxide LG	2OLC	(0.7541 * TCu) – 0.1051	0.7541	-0.1051
Oxide HG	2OHC	(0.3682 * TCu) – 0.3011	0.3682	-0.3011
Chalcocite LG	2CLC	(0.591 * TCu) – 0.0551	0.591	-0.0551
Chalcocite MG	2CHC	(0.8391 * TCu) – 0.0549	0.8391	-0.0549
Primary LG	2PLC	(0.6232 * TCu) – 0.1344	0.6232	-0.1344
Primary HG	2PHC	(1.0344 * TCu) – 0.3695	1.0344	-0.3695
Background	2BGC	1BC	BC	1BC
Step 3 – Lithology				
Alluvium	3MC1	(0.229 * TCu + 0.008	0.229	0.008
Igneous	3MC2	(0.5312 * TCu) – 0.0631	0.5312	-0.0631
Conglomerates	3MC3	AC	AC	AC
Diabase	3MC4	(0.826 * TCu) – 0.2475	0.826	-0.2475
Mafic Conglomerate	3MC5	(0.0467 * TCu + 0.0049	0.0467	0.0049
Pinal Schist	3MC6	AC	AC	AC
Porphyries	3MC7	(0.3385 * TCu) – 0.0221	0.3385	-0.0221
STEP 4 – Individual Lithology				
Background Conglomerates	4MBC1	(0.0211 * TCu + 0.0038	0.0211	0.0038

Source: Nordmin, 2023

14.2.3 Mineralization Domaining

Mineralization within the Santa Cruz, Texaco, and East Ridge Deposits is hosted within crystalline basement rocks, including the Oracle Granite, Laramide Porphyry, and Diabase Dykes.

Nordmin and IE examined and modeled the grade distributions for the hypogene and supergene Cu domains and their corresponding Domains. Each Domain was further domained into Sub-Domains based upon their Cu grade distribution, with grade distributions created for the Exotic, Oxides, Chalcocite Enriched, and Primary Domains. Analysis confirmed that the changes in mineralization and corresponding grade are associated with the type of Cu mineralization. The higher-grade mineralization is a result of secondary supergene enrichment and is near the contact between the Oracle Granite and Tertiary sediments. While the Primary Domain consists of moderate grade hypogene Cu that is predominately hosted within the Laramide porphyry, Diabase dykes, and associated breccias at greater depth. As such, Nordmin and IE created grade shells for each of the Cu types at multiple grade cut-offs to reflect the mineralogical and geochemical differences.

Mineralization wireframes were initially created to honor the known controls on each mineralization type, such as paleowater table for Cu-oxide mineralization and dike orientation for primary mineralization. When not cut-off by drilling, the wireframes terminate at either the contact of the Cu-oxide boundary layer, the Tertiary sediments/Oracle Granite contact, or the D2 fault structure. There is overlap of the Chalcocite Enriched Domain with the Oxide Domain in the weathered supergene or with the Primary Domain in the primary hypogene mineralization; no wireframe overlapping exists within a given Sub-Domain and no other Sub-Domain or Domain wireframe overlapping exists. Implicit modeling was completed in Leapfrog which produced reasonable mineral domains that represent the known controls on high-grade and low-grade mineralization. Leapfrog performs implicit modeling via their proprietary FastRBF™ technology, which is a mathematical algorithm developed from radial basis functions allowing the use of variables provided to create wireframes.

Grade domain wireframes were modeled for four domains: Oxide, Primary, Chalcocite Enriched, and Exotic Domains. Each Domain consists of Sub-Domains, that are based on the following grade distributions outlined in Table 14-6.

Table 14-6: Santa Cruz, East Ridge, and Texaco Deposit Domain Wireframes

Santa Cruz Domains	Sub-Domain	Grade Bin
Exotic	LG	Total Cu 0.5-2.0%
	HG	Total Cu >= 2.0%
Oxide	LG	Acid Soluble Cu 0.5-2.0%
	HG	Acid Soluble Cu >= 2.0%
Chalcocite Enriched	LG	Cyanide Soluble Cu 0.5-1.0%
	MG	Cyanide Soluble Cu >= 1.0%
Primary	LG	Total Cu 0.5-1.0%
	HG	Total Cu >= 1.5%
Texaco Domains	**Sub-Domain**	**Grade Bin**
Oxide	LG	Total Cu 0.5-1.0%
	MG	Total Cu >= 1.0%
Chalcocite Enriched	MG	Total Cu >= 1.0%
Primary	LG	Total Cu 0.5-1.0%
East Ridge Domains	**Sub-Domain**	**Grade Bin**
Oxide	LG	Total Cu 0.5-1.0%
	MG	Total Cu >= 1.0%

Source: Nordmin, 2023

14.3 Exploratory Data Analysis

The exploratory data analysis was conducted on raw drillhole data to determine the nature of the element distribution, correlation of grades within individual lithologic units, and the identification of high-grade outlier samples. Nordmin used a combination of descriptive statistics, histograms, probability plots, and XY scatter plots to analyze the grade population data using X10 Geo™ (V1.4.18). The findings of the exploratory data analysis were used to help define modeling procedures and parameters used in the Mineral Resource Estimate.

Descriptive statistics were used to analyze the grade distribution and continuity of each sample population, determine the presence of outliers, and identify correlations between grade and rock types for each mineral Sub-Domain.

The following are some data errors which were identified and rectified:

- One drillhole, SC-013, contained assay interval errors. The interval from 0 m to 696.77 m was removed from the flagging process and was not used in the estimate.
- CG-018 had historical collar and survey errors. This drillhole was historically re-drilled and named CG-018A. Relevant data for CG-018 can be found in CG-018A. Because all appropriate drilling data can be found in the re-drilled hole, CG-018 was removed from the database and was not used in the estimate.

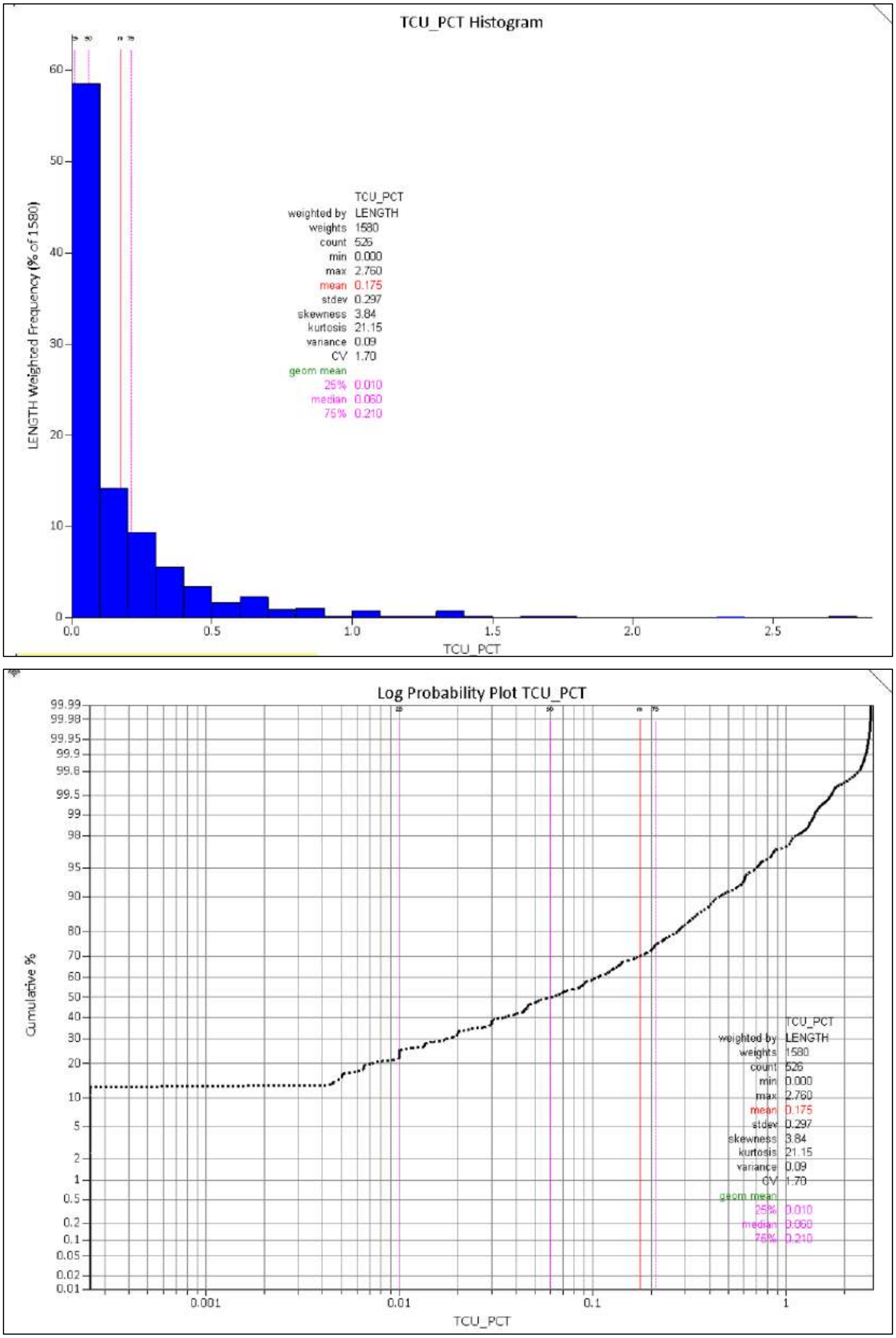
Individual drillhole tables (collar, survey, assay, etc.) were merged to create one single master de-surveyed drillhole file in Datamine Studio RM™. The processing to create this file splits assay intervals to allow for all records in all drilling tables to be included in one single file. Values in Table 14-7 are based on analysis of this master file; counts will differ when compared with the original data due to these splits.

Table 14-7: Santa Cruz Deposit Domain, Assays by Cu Grade Sub-Domain

Santa Cruz Domain	Sub-Domain	Sample Count	Total Cu	Acid Soluble Cu	Cyanide Soluble Cu	Mo
Exotic	LG (0.5%)	555	555	322	211	292
	HG (2.0%)	136	136	136	78	106
Oxide	LG (0.5%)	4,765	4,765	3,588	2,662	2,949
	HG (2.0%)	1,315	1,315	1,301	835	913
Chalcocite Enriched	LG (0.5%)	828	828	770	692	609
	MG (1.0%)	751	751	746	704	491
Primary	LG (0.5%)	5,988	5,988	5,208	2,817	3,370
	HG (1.5%)	351	351	351	209	184
Background		8,783	8,783	4,920	3,423	5,349
Total		**23,472**	**23,472**	**17,342**	**11,631**	**14,263**
Texaco Domain	**Sub-Domain**	**Sample Count**	**Total Cu**	**Acid Soluble Cu**	**Cyanide Soluble Cu**	**Mo**
Oxide	LG (0.5%)	190	190	106	98	86
	MG (1.0%)	32	32	11	4	4
Chalcocite Enriched	MG (1.0%)	194	194	75	122	60
Primary	LG (0.5%)	842	842	463	454	427
	MG (1.0%)	150	150	135	128	135
Total		**1,408**	**1,408**	**790**	**806**	**712**
East Ridge Domain	**Sub-Domain**	**Sample Count**	**Total Cu**	**Acid Soluble Cu**	**Cyanide Soluble Cu**	**Mo**
Oxide	LG (0.5%)	1,078	1,078	n/a	n/a	67
	MG (1.0%)	310	310	n/a	n/a	18
Total		**1,388**	**1,388**	**n/a**	**n/a**	**n/a**

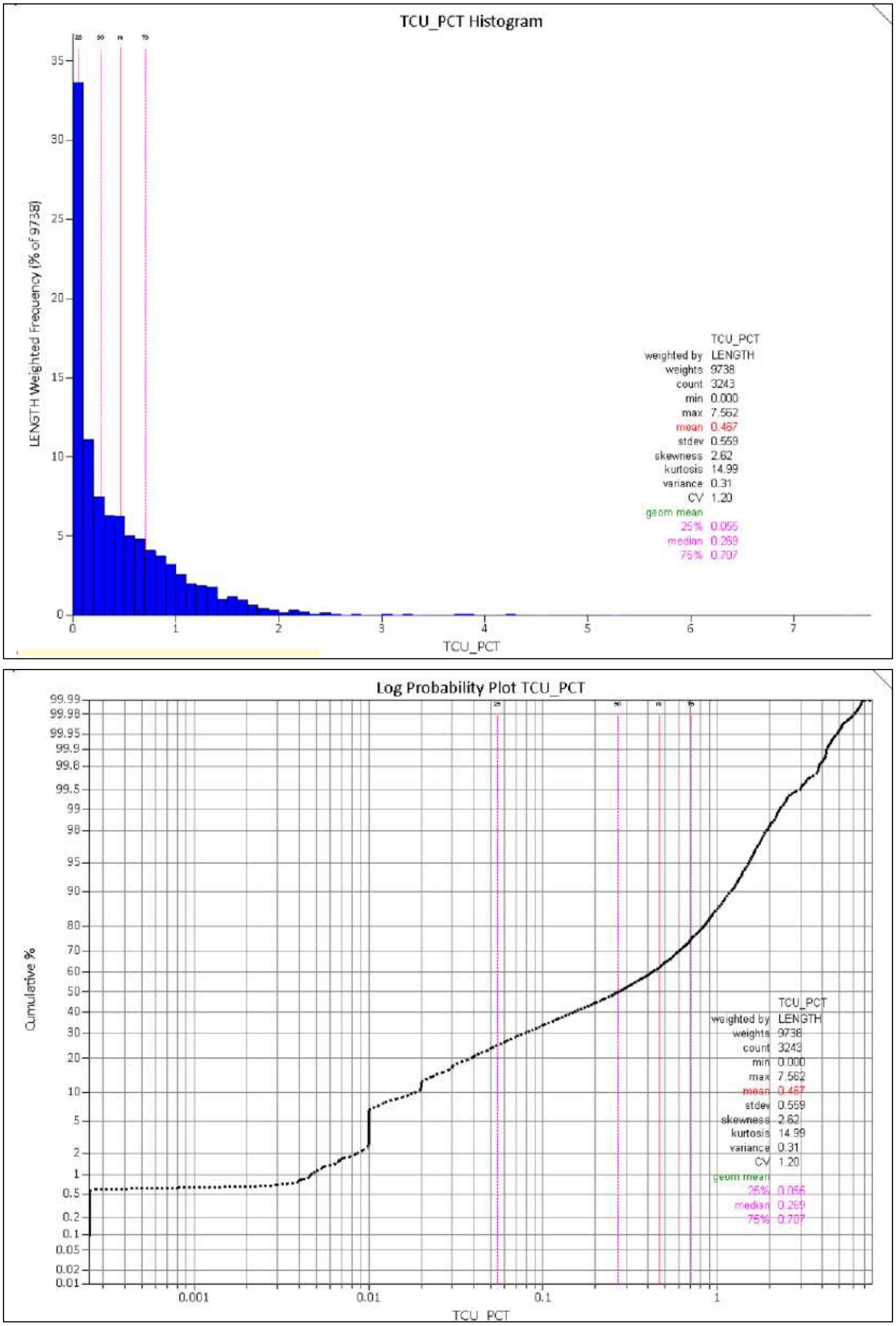
Source: Nordmin, 2023

Figure 14-8 to Figure 14-13 provide the data analysis for the total Cu for all low-grade (LG) domains at Santa Cruz, the primary LG domain at Texaco, and the oxide LG domain at East Ridge.



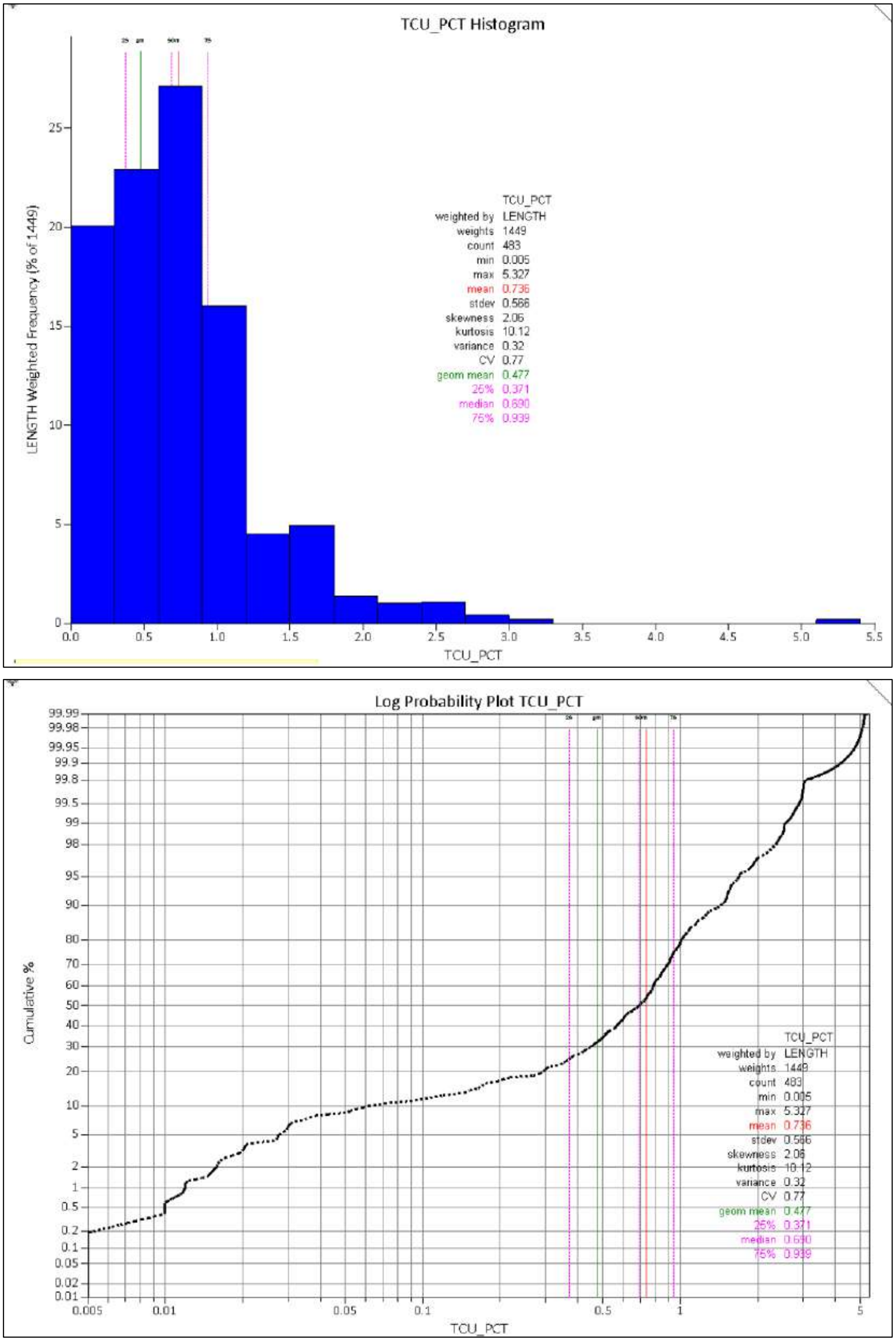
Source: Nordmin, 2023

Figure 14-8: Histogram and Log Probability Plots for Santa Cruz Exotic Cu LG Sub-Domain



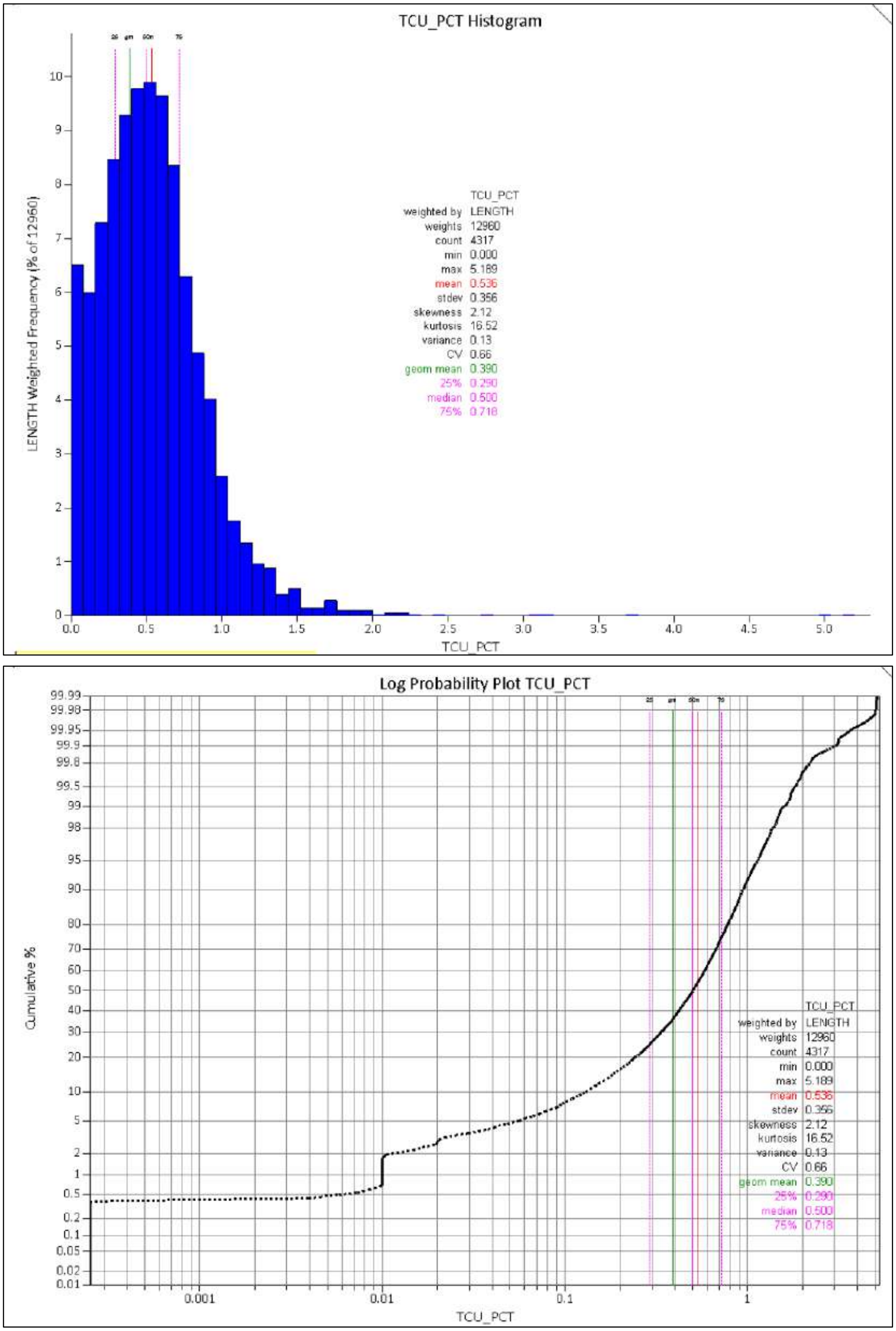
Source: Nordmin, 2023

Figure 14-9: Histogram and Log Probability Plots for Santa Cruz Oxide Cu LG Sub-Domain



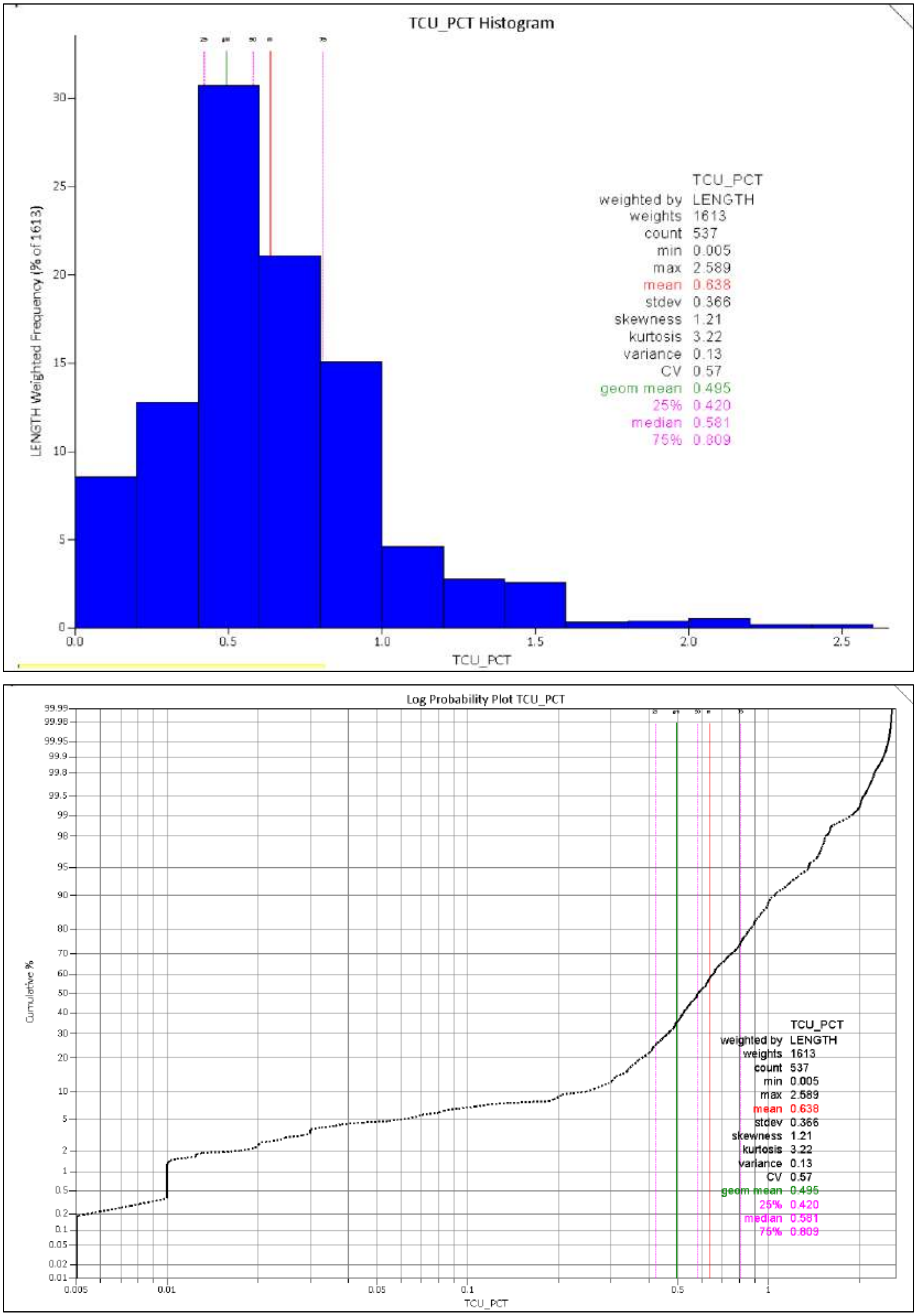
Source: Nordmin, 2023

Figure 14-10: Histogram and Log Probability Plots for Santa Cruz Chalcocite Enriched Cu LG Sub-Domain



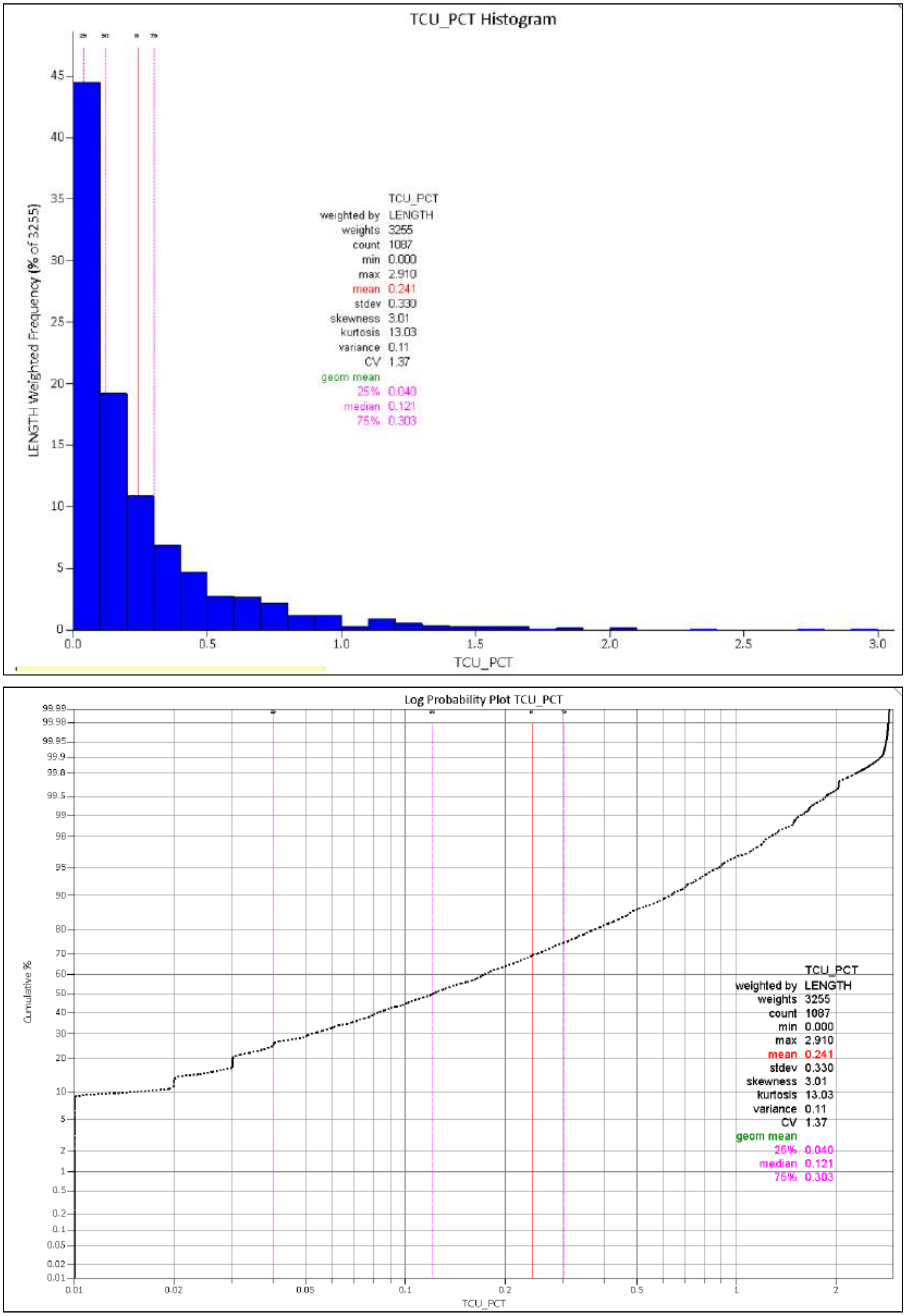
Source: Nordmin, 2023

Figure 14-11: Histogram and Log Probability Plots for Santa Cruz Primary Cu LG Sub-Domain



Source: Nordmin, 2023

Figure 14-12: Histogram and Log Probability Plots for Texaco Primary Cu LG Sub-Domain



Source: Nordmin, 2023

Figure 14-13: Histogram and Log Probability Plots for East Ridge Oxide Cu LG Sub-Domain

14.4 Data Preparation

Prior to grade estimation, the data was prepared in the following matter:

- All drillhole assays that intersected a wireframe within each domain were assigned a set of codes representative of the domain, wireframe number, and mineralization type.
- The drillhole assay data was combined by Datamine Studio RM™ to a single static drillhole file, which was then "flagged" to intersecting Cu mineralization Sub-Domains outlined by the wireframe coding process.
- HG outlier assays in each domain were reviewed, and top cutting (capping) was applied where necessary and applicable.

14.4.1 Assay Intervals at Minimum Detection Limits

Table 14-8 summarizes the assays at minimum detection in the drillhole database. The assay database provided to Nordmin by IE contained appropriately substituted half-minimum detection assay values for the current lab and analytical method.

Table 14-8: Assays at Minimum Detection

Field	Count	Minimum Detection Limit	Count at Minimum Detection Limit	% at Minimum Detection Limit
Santa Cruz Deposit				
Cu Total (%)	21,898	0.0005/0.0025	8	0.04%
Acid Soluble Cu (%)	15,859	0.0005	155	0.98%
Cyanide Soluble Cu (%)	10,278	0.0005	343	3.34%
Mo (%)	13,193	0.0002	566	4.29%
East Ridge and Texaco Deposit				
Cu Total (%)	1,792	0.0002/0.0005	11	0.61%
Acid Soluble Cu (%)	787	0.0025	171	21.72%
Cyanide Soluble Cu (%)	893	0.0025	20	2.24%
Mo (%)	798	0.0002/0.0005	9	1.13%

Source: Nordmin, 2023

14.4.2 Outlier Analysis and Capping

Grade outliers that are much higher than the general population of assays have the potential to bias (inflate) the quantity of metal estimated in a block model. Geostatistical analysis using X-Y scatter plots, cumulative probability plots, and decile analysis was used by Nordmin to analyze the raw drillhole assay data for each domain to determine appropriate grade capping. Statistical analysis was performed independently on all Sub-Domains. After capping, the resulting change to the overall mean grades is insignificant at the Santa Cruz Deposit. Cap values for each deposit are described in Table 14-9.

Table 14-9: Santa Cruz, Texaco, and East Ridge Capping Values

Santa Cruz Deposit					
Domains	**Zone**	**Total Copper %**	**Acid-Soluble Cu %**	**Cyanide-Soluble Cu %**	**Mo**
Exotic	LG	10.00	No cap	No cap	No cap
	HG	2.50	No cap	No cap	No cap
Oxide	LG	No cap	No cap	No cap	No cap
	HG	11.00	No cap	No cap	No cap
Chalcocite Enriched	LG	No cap	No cap	No cap	No cap
	MG	No cap	No cap	No cap	No cap
Primary	LG	No cap	4.00	No cap	No cap
	HG	No cap	No cap	No cap	No cap
Background		2.50	1.00	2.00	0.11
Texaco Deposit					
Domains	**Zone**	**Total Copper %**	**Acid-Soluble Cu %**	**Cyanide-Soluble Cu %**	**Mo**
Oxide	LG	4.00	No cap	9.00	0.10
	MG	No cap	No cap	No cap	No cap
Chalcocite	MG	No cap	No cap	No cap	No cap
Primary	LG	No cap	3.50	No cap	No cap
	MG	No cap	No cap	No cap	No cap
East Ridge Deposit					
Domains	**Zone**	**Total Copper %**	**Acid-Soluble Cu %**	**Cyanide-Soluble Cu %**	**Mo**
Oxide	LG1	No cap	No cap	No cap	No cap
	LG2	8.00	5.00	5.00	No cap
	LG3	No cap	No cap	No cap	No cap
Background		3.00	1.00	2.00	No cap

Source: Nordmin, 2023

14.4.3 Compositing

Compositing of assays is a technique used to give each assay a relatively equal length and therefore reduce the potential for bias due to uneven assay lengths; it prevents the potential loss of assay data and reduces the potential for grade bias due to the possible creation of short and potentially high-grade composites that tend to be situated along the edge of a wireframe contact when using a fixed length.

The raw assay data was found to have a relatively narrow range of assay lengths. Assays captured within all wireframes were composited to 3.0 m regular intervals based on the observed modal distribution of assay lengths, which supports a 5.0 m x 5.0 m x 5.0 m block model (with sub-blocking). An option to use a slightly variable composite length was chosen to allow for backstitching shorter composites that are located along the edges of the composited interval. All composite assays were generated within each mineral lens with no overlaps along boundaries. The composite assays were validated statistically to ensure there was no loss of data or change to the mean grade of each assay population (Table 14-10).

Table 14-10: Santa Cruz Deposit Composite Analysis

Santa Cruz Domains	Sub-Domain	Number of Composites
Exotic	LG	526
	HG	83
Oxide	LG	4,064
	HG	821
Chalcocite Enriched	LG	483
	MG	493
Primary	LG	4,332
	HG	251
Background	n/a	9,883
Texaco Domains	**Sub-Domain**	**Number of Composites**
Oxide	LG	141
	MG	29
Chalcocite Enriched	MG	147
Primary	LG	598
	MG	69
East Ridge Domains	**Sub-Domain**	**Number of Composites**
Oxide	LG	1,087
	MG	309

Source: Nordmin, 2023

14.4.4 Specific Gravity

A total of 2,639 SG measurements from seventy-four diamond drillholes exist from the Santa Cruz Deposit. Measurements were calculated using the weight in air versus the weight in water method (Archimedes), by applying the following formula:

$$Specific\ Gravity = \frac{Weight\ in\ Air}{(Weight\ in\ Air - Weight\ in\ Water)}$$

Nordmin determined that the required amount and distribution of SG measurements for direct estimation within the block model was not met. SG values were assigned to blocks based on Sub-Domains as seen in East Ridge and Texaco employ SG values from Santa Cruz as the two deposits lacked sufficient samples to calculate a local average. Table 14-11 gives average SG values for Santa Cruz geologic domains.

Table 14-11: SG Values Measured for the Santa Cruz Deposit by Geologic Domain

Santa Cruz Domain	Sub-Domain	Average SG
Exotic	LG	2.52
	HG	2.38
Oxide	LG	2.48
	HG	2.53
Chalcocite Enriched	LG	2.49
	MG	2.54
Primary	LG	2.53
	HG	2.51
Background		2.50

Source: Nordmin, 2023

14.4.5 Block Model Strategy and Analysis

A series of upfront test modeling was completed to define an estimation methodology to meet the following criteria:

- Representative of the Santa Cruz Deposit geological and structural controls
- Accounts for the variability of grade, orientation, and continuity of mineralization
- Controls the smoothing (grade spreading) or grades and the influence of outliers
- Accounts for most of the mineralization within the Santa Cruz Deposit
- Is robust and repeatable within the mineral domains
- Supports multiple domains

Multiple test scenarios were evaluated to determine the optimum processes and parameters to use to achieve the stated criteria. Each scenario was based on nearest neighbour (NN), inverse distance squared (ID2), inverse distance cubed (ID3), and ordinary kriging (OK) interpolation methods (only for the Santa Cruz Deposit). All test scenarios were evaluated based on global statistical comparisons, visual comparisons of composite assays versus block grades, and the assessment of overall smoothing. Based on the results of the testing, it was determined that the final resource estimation methodology would constrain the mineralization by using hard wireframe boundaries to control the spread of mineralization. OK was selected as the best and most applicable interpolation method for the Santa Cruz Deposit, and ID3 was selected as the best and most applicable interpolation method for the East Ridge and Texaco Deposits.

14.4.6 Assessment of Spatial Grade Continuity

Datamine, Leapfrog Geo™, and Leapfrog Edge™ were used to determine the geostatistical relationships of the Santa Cruz Deposit. Texaco and East Ridge Deposits did not have sufficient data density to perform variography. Independent variography was performed on composite data for each domain. Experimental grade variograms were calculated from the capped/composited assay data for each element to determine the approximate search ellipse dimensions and orientations.

The following was considered for each analysis:

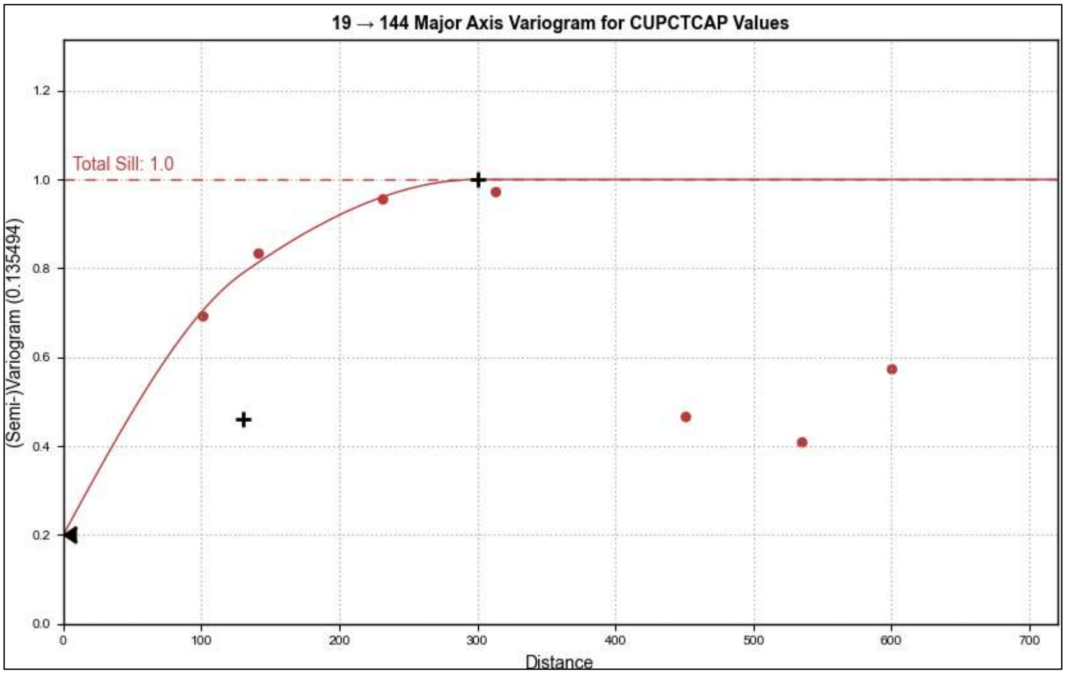
- Downhole variograms were created and modeled to define the nugget effect.
- Experimental semi-variograms were calculated to determine directional variograms for the strike and down dip orientations.
- Variograms were modeled using an exponential model with practical range.
- Directional variograms were modeled using the nugget defined in the downhole variography, and the ranges for the along strike, perpendicular to strike, and down dip directions. Variograms outputs were re-oriented to reflect the orientation of the mineralization.

Some domains share variography parameters due to similar behavior. The variography used for Santa Cruz is provided in Table 14-2. Semi-variograms for several Cu domains are provided in Figure 14-14 to Figure 14-18.

Table 14-12: Santa Cruz Deposit Variography Parameters

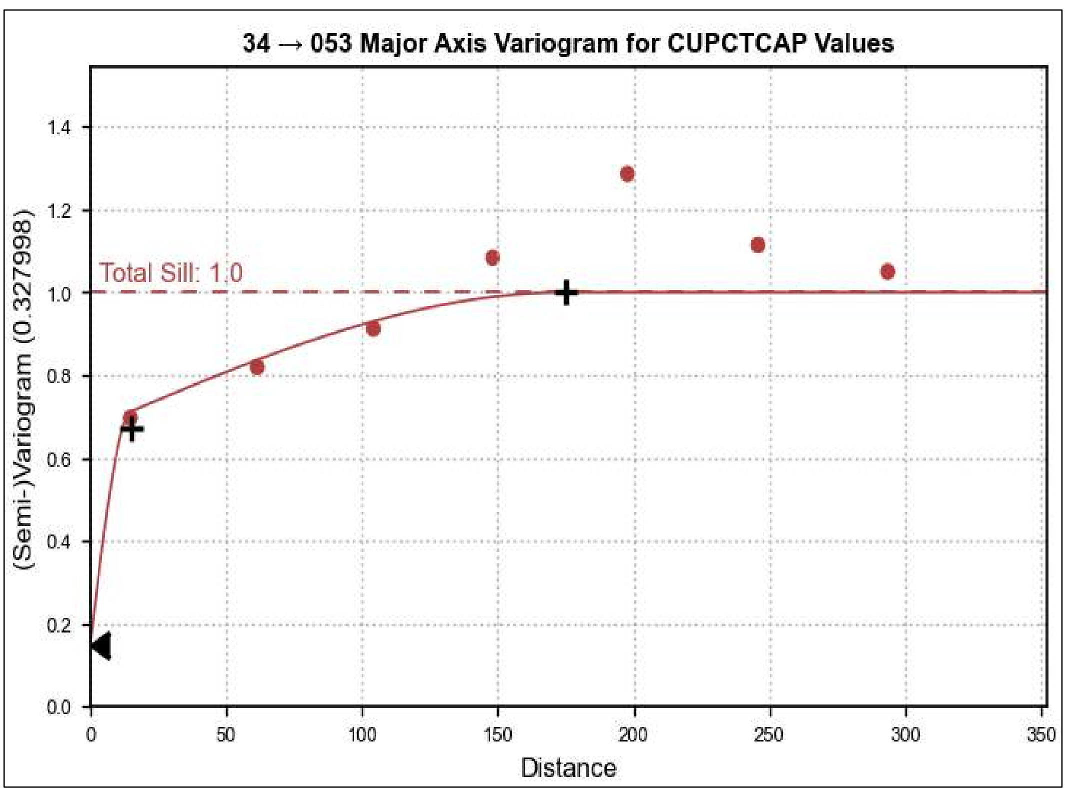
		Rotation Angles						Structure 1				Structure 2		
Domain	**Type**	**1**	**2**	**3**	**Axes**	**Nugget**	**C1**	**Range 1**	**Range 2**	**Range 3**	**C2**	**Range 1**	**Range 2**	**Range 3**
Exotic	TCu	30	90	140	Z-Y-Z	0.20	0.26	130	90	35	0.54	300	130	50
	ASCu	30	90	140	Z-Y-Z	0.20	0.26	190	100	20	0.54	233	125	44
	CNCu	30	90	140	Z-Y-Z	0.25	0.75	290	125	35	0	n/a		
Oxide	TCu	90	40	60	Z-Y-Z	0.15	0.52	15	126	60	0.33	175	200	95
	ASCu	90	40	30	Z-Y-Z	0.15	0.50	40	30	40	0.35	145	100	100
	CNCu	90	30	20	Z-Y-Z	0.13	0.32	150	30	10	0.55	150	230	70
Chalcocite Enriched	TCu	35	60	75	Z-Y-Z	0.25	0.75	210	200	45	0	n/a		
	ASCu	35	60	135	Z-Y-Z	0.13	0.87	250	245	35	0	n/a		
	CNCu	35	60	80	Z-Y-Z	0.20	0.80	295	225	21	0	n/a		
Primary	TCu	30	180	45	Z-Y-Z	0.20	0.37	130	160	80	0.43	470	195	200
	ASCu	30	0	120	Z-Y-Z	0.20	0.37	200	100	50	0.43	420	200	100
	CNCu	20	150	135	Z-Y-Z	0.12	0.45	100	55	45	0.43	370	310	265
Background	TCu	90	30	150	Z-Y-Z	0.12	0.35	20	133	35	0.53	780	800	430
	ASCu	90	30	150	Z-Y-Z	0.13	0.87	330	195	45	0	n/a		
	CNCu	90	30	20	Z-Y-Z	0.11	0.89	355	220	32	0.53	n/a		

Source: Nordmin, 2023



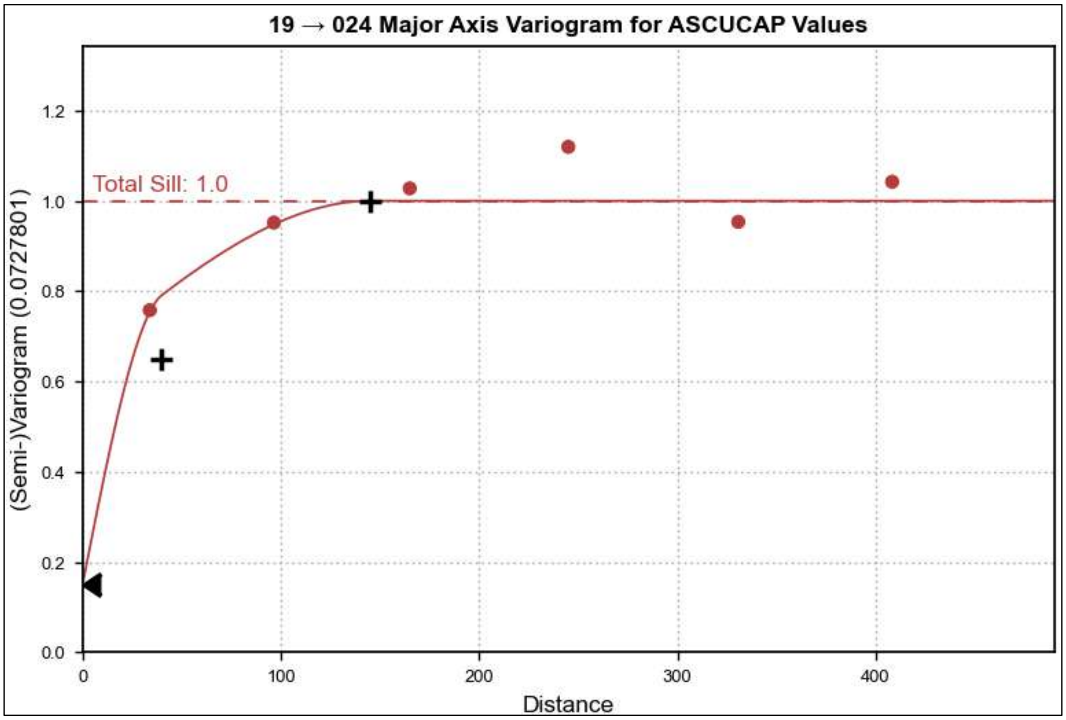
Source: Nordmin, 2023

Figure 14-14: Exotic Domain Total Cu Variogram



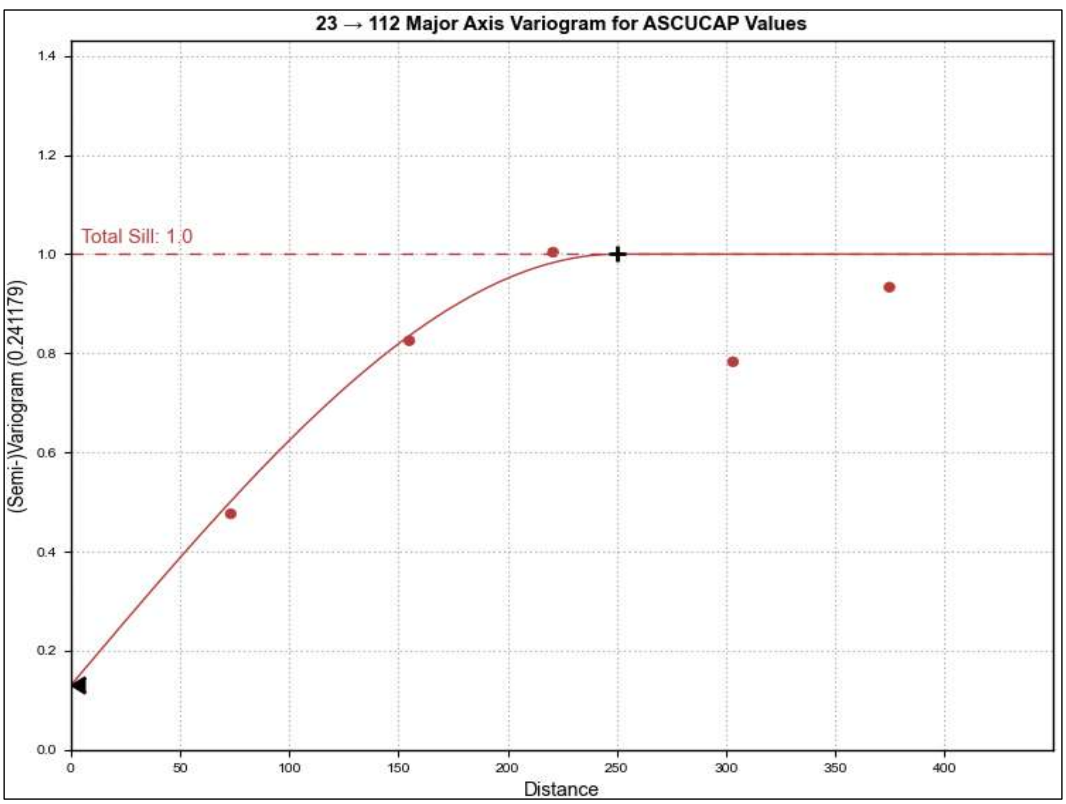
Source: Nordmin, 2023

Figure 14-15: Oxide Domain Total Cu Variogram



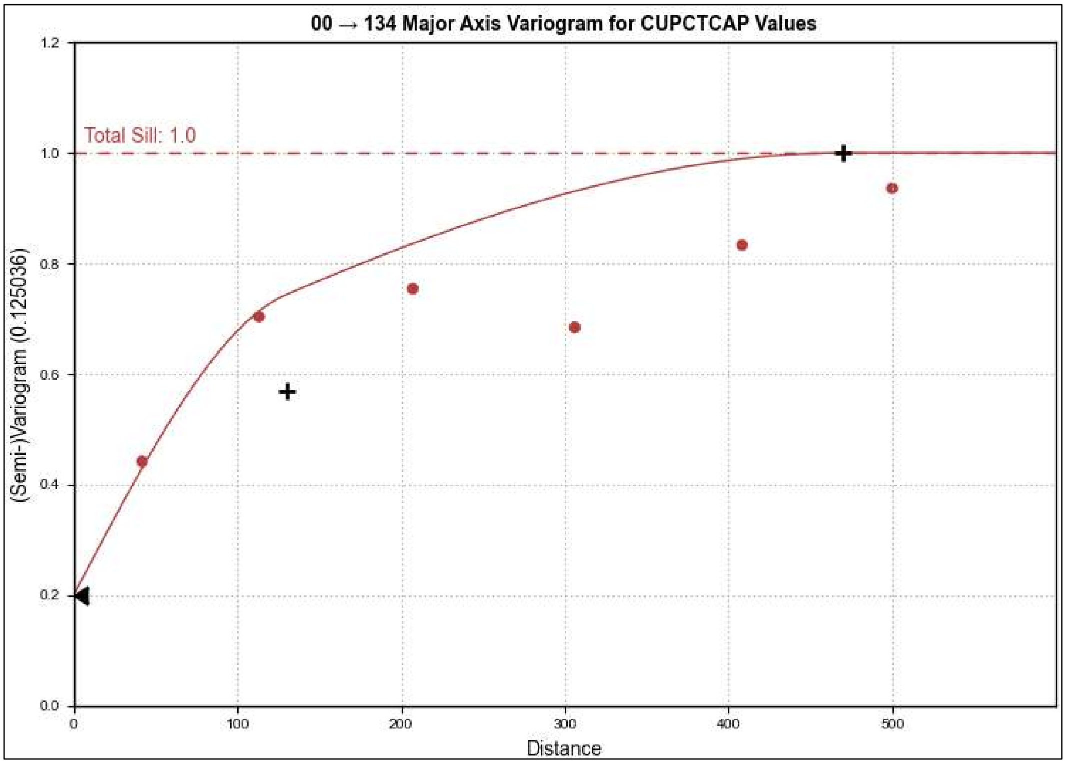
Source: Nordmin, 2023

Figure 14-16: Oxide Domain Acid Soluble Cu Variogram



Source: Nordmin, 2023

Figure 14-17: Chalcocite Enriched Domain Acid Soluble Cu Variogram



Source: Nordmin, 2023

Figure 14-18: Primary Domain Total Cu Variogram

14.4.7 Block Model Definition

The block model shape and size are typically a function of the geometry of the deposit, the density of assay data, drillhole spacing, and the selected mining unit. Taking this into consideration, the block model was defined with parent blocks at 5.0 m x 5.0 m x 5.0 m (N-S x E-W x Elevation). All three deposits use the same model definition parameters. The block model prototype parameters are listed in Table 14-13. All three deposits employed the same prototype parameters.

Table 14-13: Santa Cruz, Texaco, and East Ridge Block Model Definition Parameters

Item	Block Origin (m)	Block Max (m)	Block Dimension (m)	Number of Parent Blocks	Minimum Sub-Block (m)
Easting	414,200	421,500	5	1,460	1.25
Northing	3,637,800	3,644,800	5	1,400	1.25
Elevation	-1,200	500	5	340	1.25

Source: Nordmin, 2023

All mineral Sub-Domain wireframe volumes were filled with blocks using the parameters described in Table 14-13. Block volumes were compared to the mineral sub-domain wireframe volumes to confirm there were no significant differences. Block volumes for all sub-domains were found to be within reasonable tolerance limits for all mineral sub-domain volumes. Sub-blocking was allowed to maintain the geological interpretation and accommodate the HG, MG, and LG Sub-Domains (wireframes), the lithological SG, and the category application. Sub-blocking has been allowed to the following minimums:

- 5.0 m x 5.0 m x 5.0 m blocks are sub-blocked two-fold to 1.25 m x 1.25 m in the N to S and E to W directions with a variable elevation calculated based on the other sizes.

The block models were not rotated, and it was not necessary to clip them to topography due to their depth. The resource estimation was conducted using Datamine Studio RM™ version 1.12.113.0 within the NAD 83 UTM Zone 12 N projection grid.

14.4.8 Interpolation Method

The Santa Cruz Deposit block model was estimated using NN, ID2, ID3, and OK interpolation methods for global comparisons and validation purposes. The OK method was used for the Mineral Resource Estimate; it was selected over ID2, ID3, and NN as the OK method was the most representative approach to controlling the smoothing of grades. The Santa Cruz Deposit was estimated using NN, ID2, ID3, OK, and the OK method was used for the Mineral Resource Estimate. The Texaco and East Ridge block models were estimated using NN, ID2, and ID3, and the ID3 method was used for the mineral estimate for the Texaco and East Ridge Deposits.

14.4.9 Search Strategy

Zonal controls for all three deposits were used to constrain the grade estimates to within each LG, MG, and HG wireframe. These controls prevented the assays from individual domain wireframes from influencing the block grades of one another, acting as a “hard boundary” between the Sub-Domains. For instance, the composites identified within the Background total Cu wireframe were used to estimate the Background total Cu, and all other composites were ignored during the estimation. A “soft boundary” was used in the LG Oxide Sub-Domain, where composites from the HG model were included with the LG composites for the purposes of LG Oxide Sub-Domain estimation.

Search orientations for each deposit were used for estimation of the block model and were based on the shape of the modeled mineral domains; see Table 14-14 (Santa Cruz Deposit), Table 14-15 (Texaco Deposit), and Table 14-16 (East Ridge Deposit). A total of three nested searches were performed on all Sub-Domains. Table 14-14 to Table 14-16 display search parameters used in the estimation of the Santa Cruz, Texaco, and East Ridge Deposit mineral resource estimates. The search distances were based upon the variography ranges outlined in Table 14-12. The search radius of the first search was based upon the first structure of the variogram, the second search is generally two times the first search pass, and the third search pass is 8 times the initial search for the purposes of block model filling – note that this third-pass material was not considered for anything other than Inferred Categorization. Search strategies used an ellipsoidal search with a defined overall minimum and maximum number of composites as well as a maximum number of composites per hole for each block. Blocks which did not meet these criteria did not estimate and do not appear in the MRE.

Table 14-14: Santa Cruz Block Model Search Parameters

Santa Cruz Deposit																								
Total Copper																								
							Pass 1						**Pass 2**						**Pass 3**					
	Search Rotation			**Search Axes**			**Search Distances**			**Comps**			**Search Distances**			**Comps**			**Search Distances**			**Comps**		
Domain	**Rot 1**	**Rot 2**	**Rot 3**	**Axis 1**	**Axis 2**	**Axis 3**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**
Exotic (LG/HG)	-12	-11	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	400	640	240	2	8	2
Oxide LG	-12	-11	-5	3	2	3	50	80	30	3	8	2	100	160	60	2	8	2	400	640	240	2	8	2
Oxide HG	-12	-11	-5	3	2	3	50	80	30	3	10	2	100	160	60	3	8	2	400	640	240	2	8	2
Chalcocite (LG/MG)	-12	-11	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	400	640	240	2	8	2
Primary LG	-12	-11	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	400	640	240	2	8	2
Primary HG	-12	12	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	400	640	240	2	8	2
Background	-12	-11	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	400	640	240	2	8	2
Acid Soluble Copper																								
							Pass 1						**Pass 2**						**Pass 3**					
	Search Rotation			**Search Axes**			**Search Distances**			**Comps**			**Search Distances**			**Comps**			**Search Distances**			**Comps**		
Domain	**Rot 1**	**Rot 2**	**Rot 3**	**Axis 1**	**Axis 2**	**Axis 3**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**
Exotic (LG/HG)	-12	-11	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	400	640	240	2	8	2
Oxide LG	-12	-11	-5	3	2	3	50	80	30	3	8	2	100	160	60	2	8	2	400	640	240	2	8	2
Oxide HG	-12	-11	-5	3	2	3	50	80	30	3	10	2	100	160	60	3	8	2	400	640	240	2	8	2
Chalcocite (LG/MG)	-12	-11	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	300	480	180	2	8	2
Primary LG	-12	-11	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	400	640	240	2	8	2
Primary HG	-12	12	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	400	640	240	2	8	2
Background	-12	-11	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	300	480	180	2	8	2
Cyanide Soluble Copper																								
							Pass 1						**Pass 2**						**Pass 3**					
	Search Rotation			**Search Axes**			**Search Distances**			**Comps**			**Search Distances**			**Comps**			**Search Distances**			**Comps**		
Domain	**Rot 1**	**Rot 2**	**Rot 3**	**Axis 1**	**Axis 2**	**Axis 3**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**
Exotic (LG/HG)	-12	-11	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	400	640	240	2	8	2
Oxide LG	-12	-11	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	400	640	240	2	8	2
Oxide HG	-12	-11	-5	3	2	3	50	80	30	3	10	2	100	160	60	2	8	2	400	640	240	2	8	2
Chalcocite (LG/MG)	-12	-11	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	400	640	240	2	8	2
Primary LG	-12	-11	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	400	640	240	2	8	2
Primary HG	-12	12	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	400	640	240	2	8	2
Background	-12	-11	-5	3	2	3	50	80	30	3	8	2	100	160	60	3	8	2	400	640	240	2	8	2

Source: Nordmin, 2023

Table 14-15: Texaco Block Model Search Parameters

Texaco Deposit																								
Total Copper																								
							Pass 1						**Pass 2**						**Pass 3**					
	Search Rotation			**Search Axes**			**Search Distances**			**Comps**			**Search Distances**			**Comps**			**Search Distances**			**Comps**		
Domain	**Rot 1**	**Rot 2**	**Rot 3**	**Axis 1**	**Axis 2**	**Axis 3**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**
Oxide (LG/MG)	60	8	15	3	2	1	50	80	30	3	8	2	100	160	60	3	8	2	350	480	180	3	8	2
Chalcocite (LG/MG)	60	8	15	3	2	1	50	80	30	3	8	2	100	160	60	3	8	2	350	480	180	3	8	2
Primary LG	60	8	15	3	2	1	50	80	30	3	8	2	87.5	140	52.5	3	8	2	150	240	90	3	8	2
Primary MG	85	17	-8	3	2	1	50	80	30	3	8	2	100	160	60	3	8	2	350	480	180	3	8	2
Background	60	8	15	3	2	1	50	80	30	3	8	2	100	160	60	3	8	2	350	480	180	3	8	2
Acid Soluble Copper																								
							Pass 1						**Pass 2**						**Pass 3**					
	Search Rotation			**Search Axes**			**Search Distances**			**Comps**			**Search Distances**			**Comps**			**Search Distances**			**Comps**		
Domain	**Rot 1**	**Rot 2**	**Rot 3**	**Axis 1**	**Axis 2**	**Axis 3**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**
Oxide (LG/MG)	60	8	15	3	2	1	50	80	30	2	10	2	100	160	60	2	8	2	350	480	180	3	8	2
Chalcocite (LG/MG)	60	8	15	3	2	1	60	45	30	3	8	2	120	90	60	3	8	2	360	270	180	3	8	2
Primary LG	60	8	15	3	2	1	50	80	30	3	8	2	75	120	45	3	8	2	100	160	60	3	8	2
Primary MG	75	12	10	3	2	1	50	80	30	3	8	2	100	160	60	3	8	2	350	480	180	3	8	2
Background	60	8	15	3	2	1	60	45	30	3	8	2	120	90	60	3	8	2	360	270	180	3	8	2
Cyanide Soluble Copper																								
							Pass 1						**Pass 2**						**Pass 3**					
	Search Rotation			**Search Axes**			**Search Distances**			**Comps**			**Search Distances**			**Comps**			**Search Distances**			**Comps**		
Domain	**Rot 1**	**Rot 2**	**Rot 3**	**Axis 1**	**Axis 2**	**Axis 3**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**
Oxide (LG/MG)	60	8	15	3	2	1	50	80	30	3	8	2	100	160	60	3	8	2	350	480	180	3	8	2
Chalcocite (LG/MG)	60	8	15	3	2	1	40	50	20	3	8	2	60	75	30	3	8	2	240	350	120	3	8	2
Primary LG	60	8	15	3	2	1	50	80	30	3	8	2	100	160	60	3	8	2	-	-	-	-	-	-
Primary MG	60	12	10	3	2	1	50	80	30	3	8	2	100	160	60	3	8	2	350	480	180	3	8	2
Background	60	8	15	3	2	1	40	50	20	3	8	2	75	120	30	3	8	2	240	350	120	3	8	2

Source: Nordmin, 2023

Table 14-16: East Ridge Block Model Search Parameters

Texaco Deposit																								
Total Copper																								
							Pass 1						**Pass 2**						**Pass 3**					
	Search Rotation			**Search Axes**			**Search Distances**			**Comps**			**Search Distances**			**Comps**			**Search Distances**			**Comps**		
Domain	**Rot 1**	**Rot 2**	**Rot 3**	**Axis 1**	**Axis 2**	**Axis 3**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**
Oxide (LG/MG)	-40	10	-9	3	2	1	50	80	30	3	8	2	100	160	60	3	8	2	450	640	240	3	8	2
Background	-40	10	-9	3	2	1	50	80	30	3	8	2	100	160	60	3	8	2	600	960	360	3	8	2
Acid Soluble Copper																								
							Pass 1						**Pass 2**						**Pass 3**					
	Search Rotation			**Search Axes**			**Search Distances**			**Comps**			**Search Distances**			**Comps**			**Search Distances**			**Comps**		
Domain	**Rot 1**	**Rot 2**	**Rot 3**	**Axis 1**	**Axis 2**	**Axis 3**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**
Oxide (LG/MG)	60	8	15	3	2	1	50	80	30	3	8	2	100	160	60	3	8	2	350	480	180	3	8	2
Background	60	8	15	3	2	1	60	45	30	3	8	2	120	90	60	3	8	2	360	270	180	3	8	2
Cyanide Soluble Copper																								
							Pass 1						**Pass 2**						**Pass 3**					
	Search Rotation			**Search Axes**			**Search Distances**			**Comps**			**Search Distances**			**Comps**			**Search Distances**			**Comps**		
Domain	**Rot 1**	**Rot 2**	**Rot 3**	**Axis 1**	**Axis 2**	**Axis 3**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**	**Dist 1**	**Dist 2**	**Dist 3**	**Min**	**Max**	**Max Per Hole**
Oxide (LG/MG)	60	8	15	3	2	1	50	80	30	3	8	2	100	160	60	3	8	2	350	480	180	3	8	2
Background	60	8	15	3	2	1	40	50	20	3	8	2	60	75	30	3	8	2	240	350	120	3	8	2

Source: Nordmin, 2023

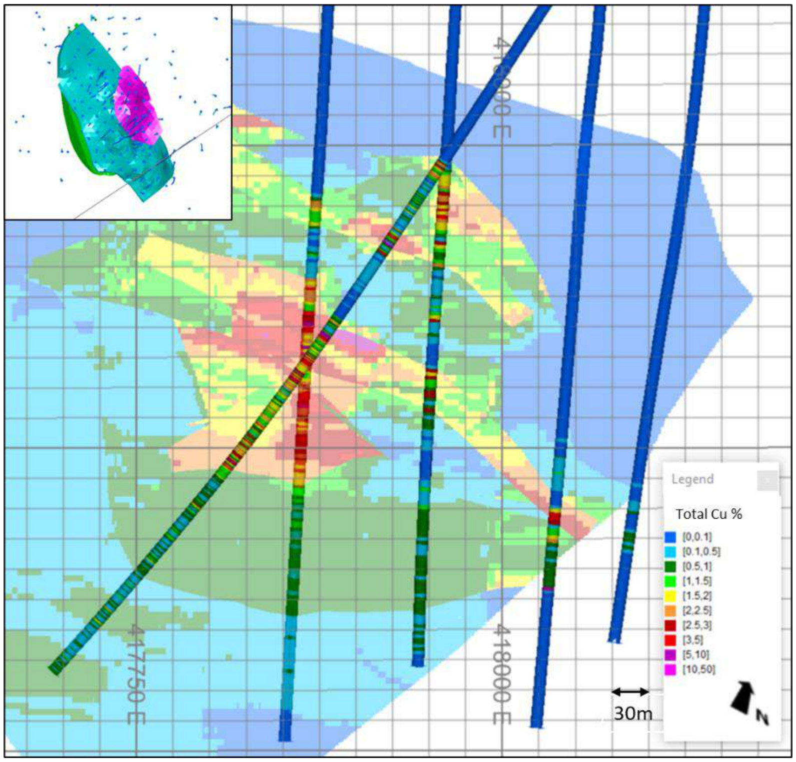
14.5 Block Model Validation

The Santa Cruz Deposit block model was estimated using NN, ID2, ID3, and OK interpolation methods for global comparisons and validation purposes. The OK method was used for the MRE; it was selected over ID2, ID3, and NN as the OK method was the most representative approach to controlling the smoothing of grades. The Texaco and East Ridge Deposit block models were estimated using NN, ID2, and ID3. The ID3 method was used for the mineral estimate for the Texaco and East Ridge Deposits and was used in the MRE.

14.5.1 Visual Comparison

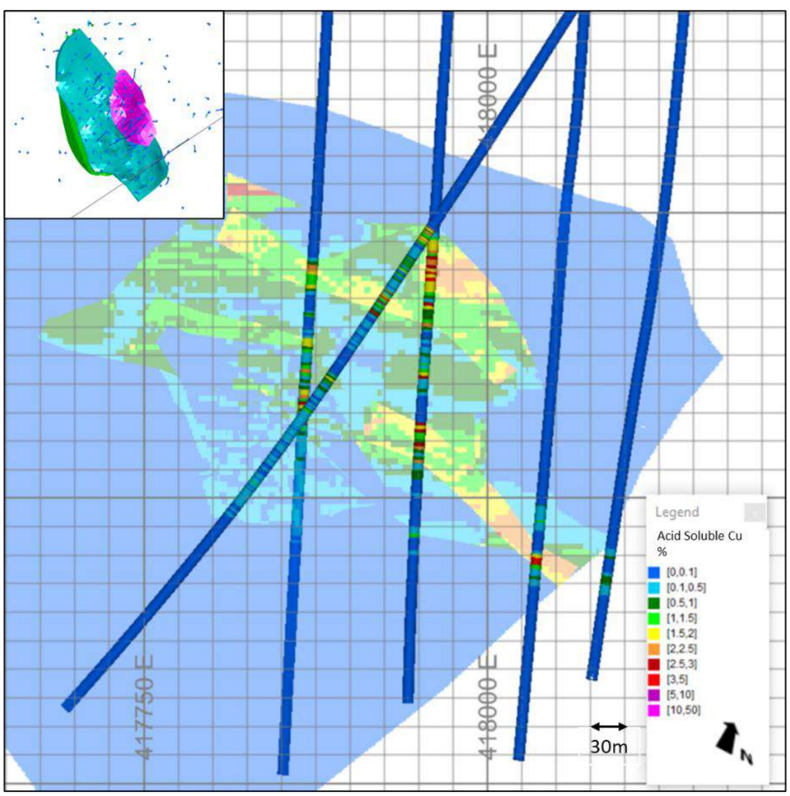
The validation of the interpolated block model was assessed by using visual assessments and validation plots of block grades versus capped assay grades and composites. The review demonstrated a good comparison between local block estimates and nearby samples without excessive smoothing in the block model.

Figure 14-19 through Figure 14-35 are the block model validation images, displaying total Cu, acid soluble Cu, or cyanide soluble Cu grades in the block model and drillholes for Santa Cruz, Texaco, and East Ridge.



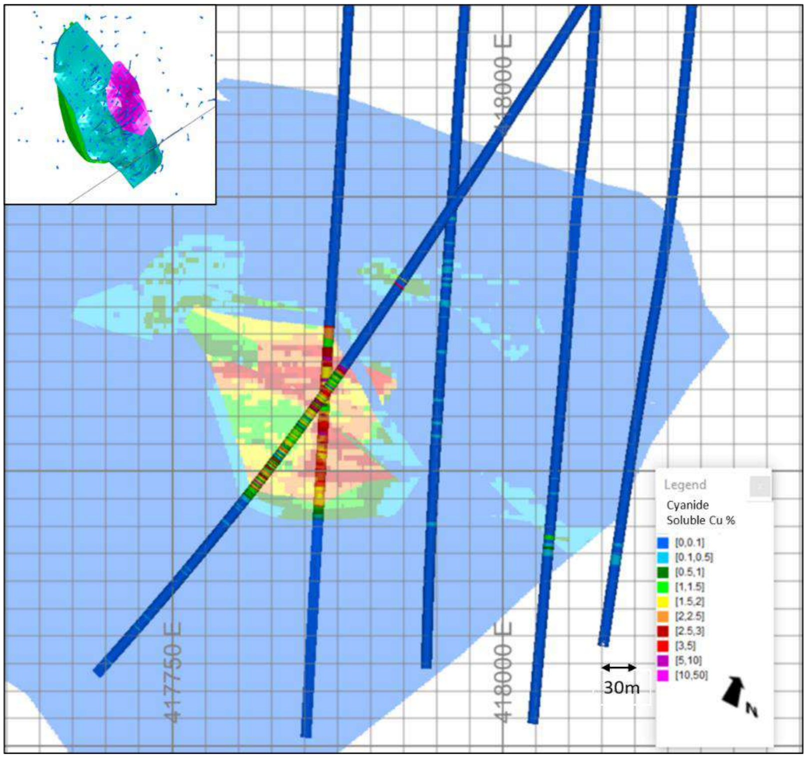
Source: Nordmin, 2023

Figure 14-19: Santa Cruz Block Model Validation, Total Cu, Cross-section



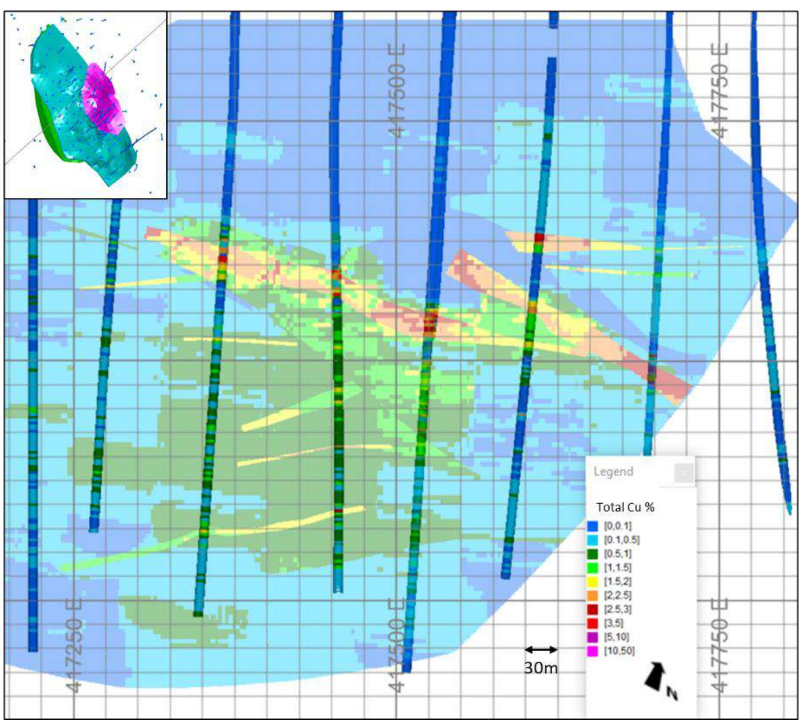
Source: Nordmin, 2023

Figure 14-20: Santa Cruz Block Model Validation, Acid Soluble Cu, Cross-section, +/-50 m Width



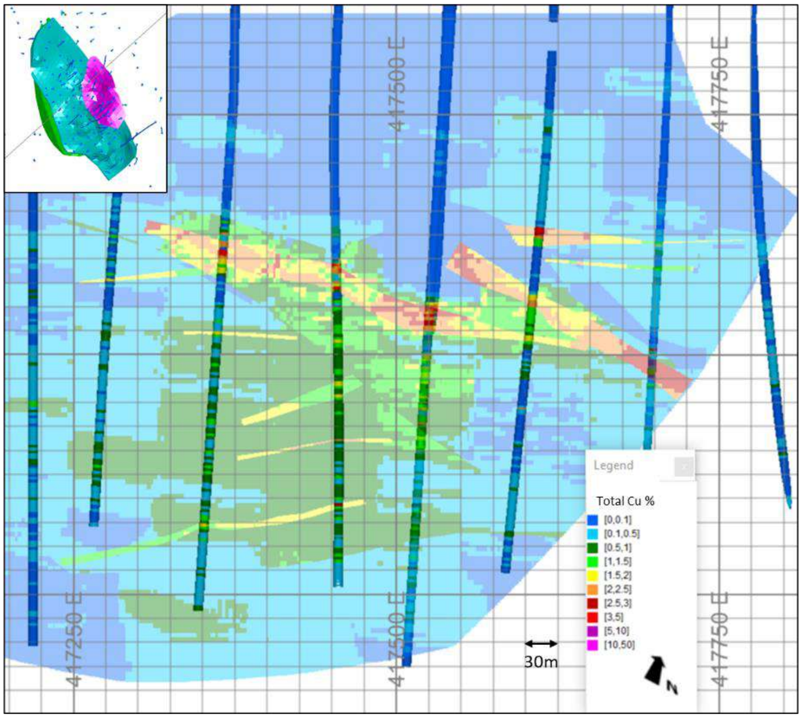
Source: Nordmin, 2023

Figure 14-21: Santa Cruz Block Model Validation, Cyanide Soluble Cu, Cross-section +/-50 m Width



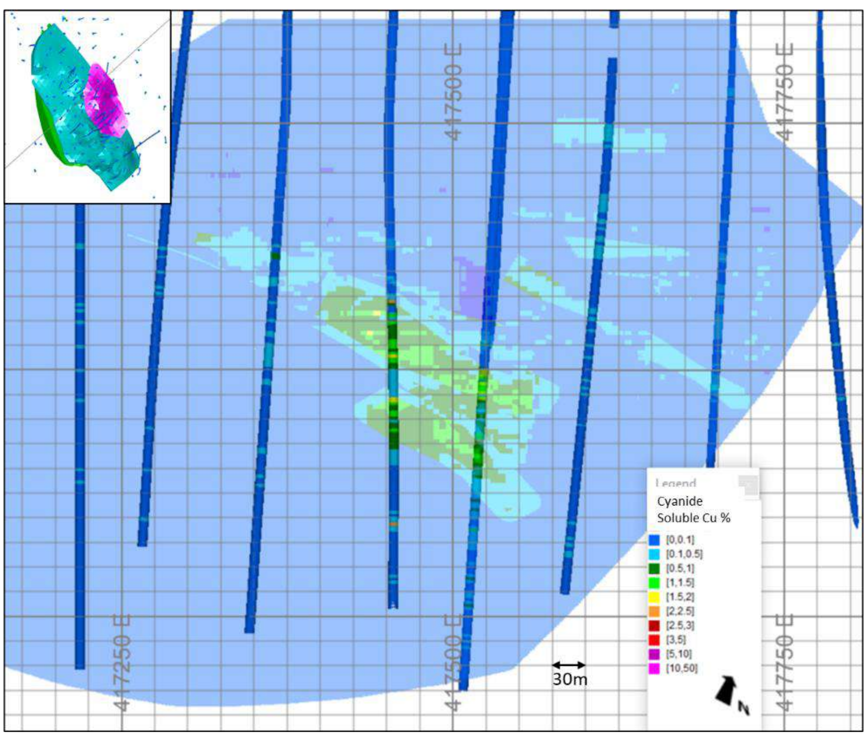
Source: Nordmin, 2023

Figure 14-22: Santa Cruz Block Model Validation, Total Cu, Cross-section +-/50 m Width



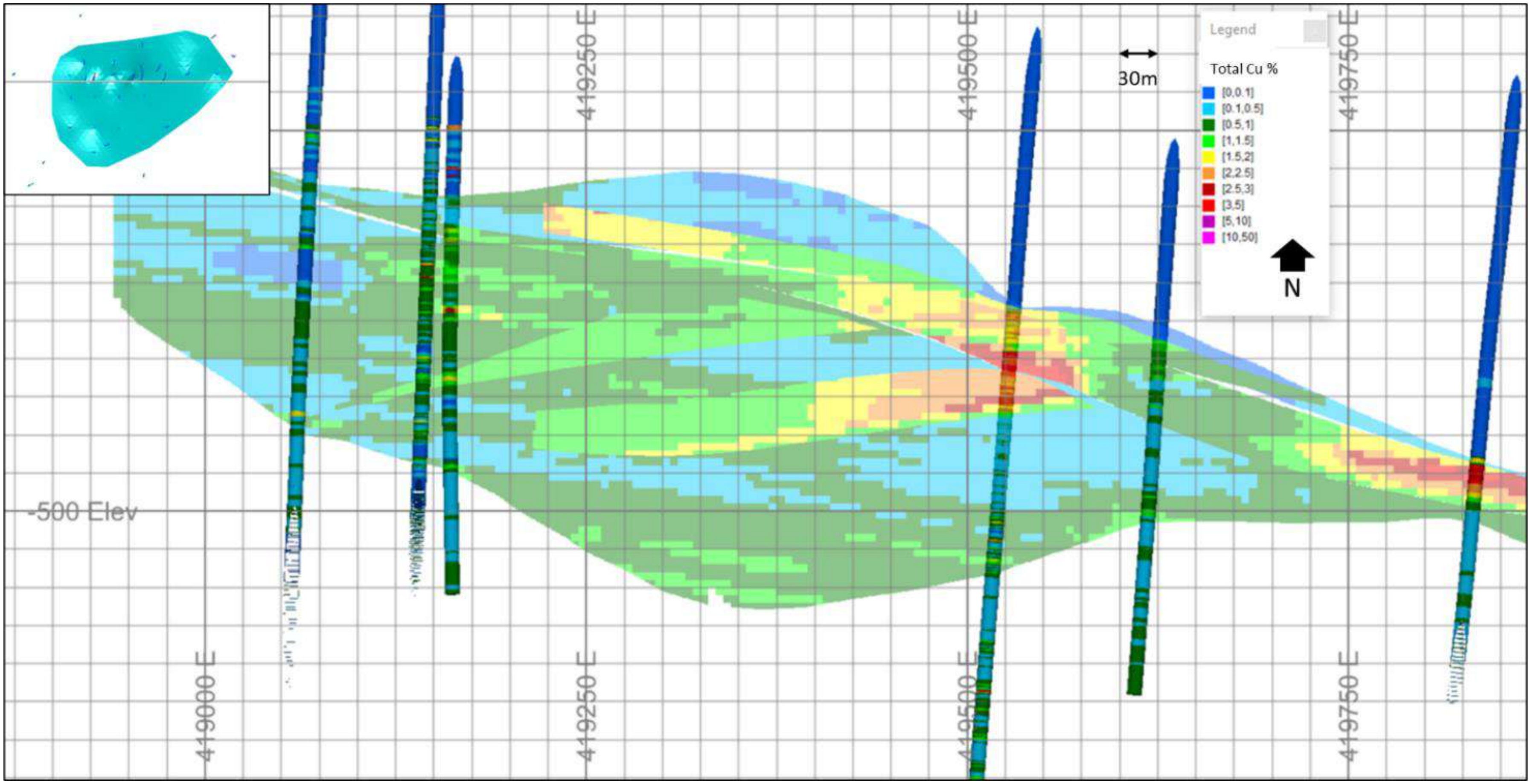
Source: Nordmin, 2023

Figure 14-23: Santa Cruz Block Model Validation, Acid Soluble Cu, Cross-section +/-50 m Width



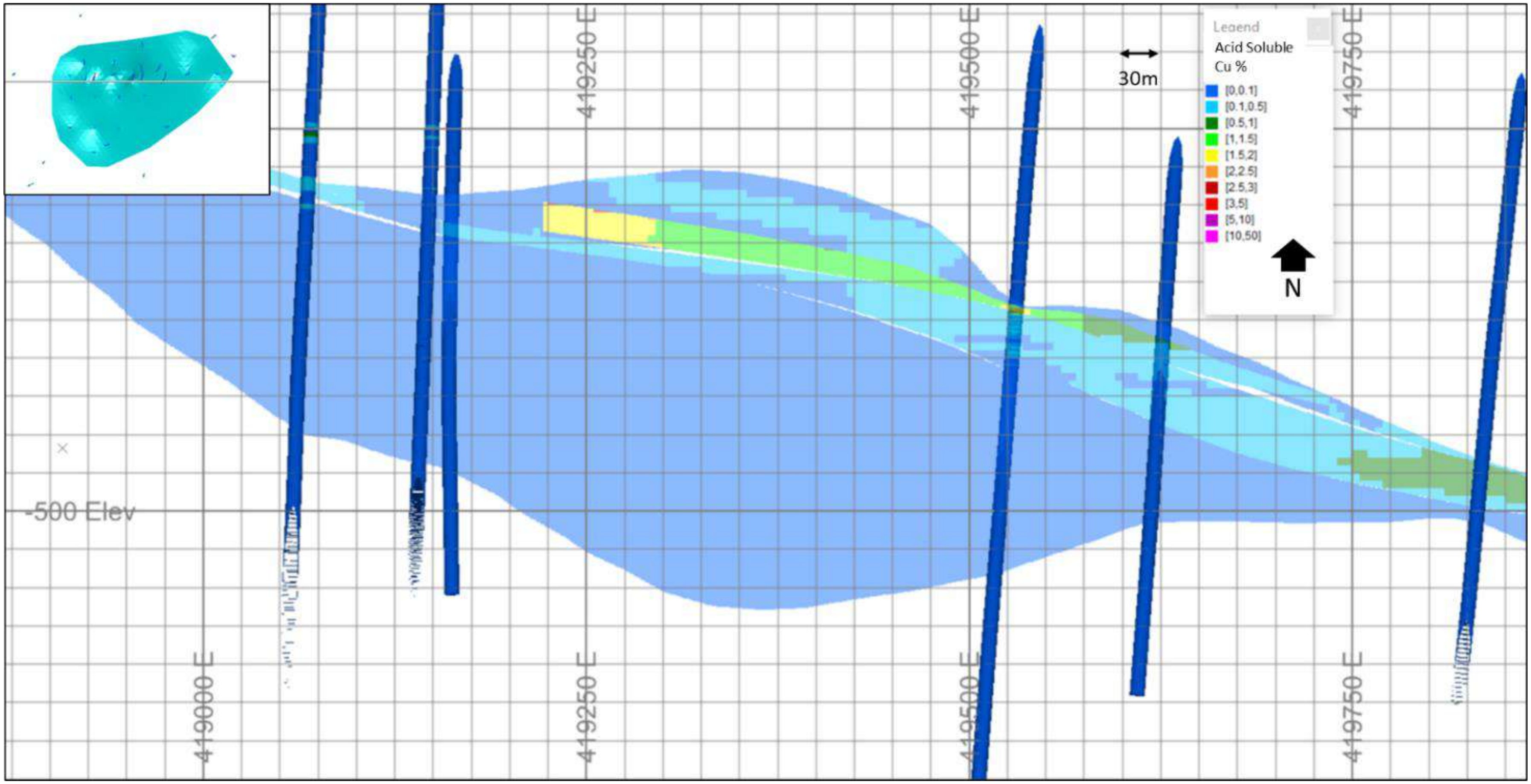
Source: Nordmin, 2023

Figure 14-24: Santa Cruz Block Model Validation, Cyanide Soluble Cu, Cross-section +/-50 m Width



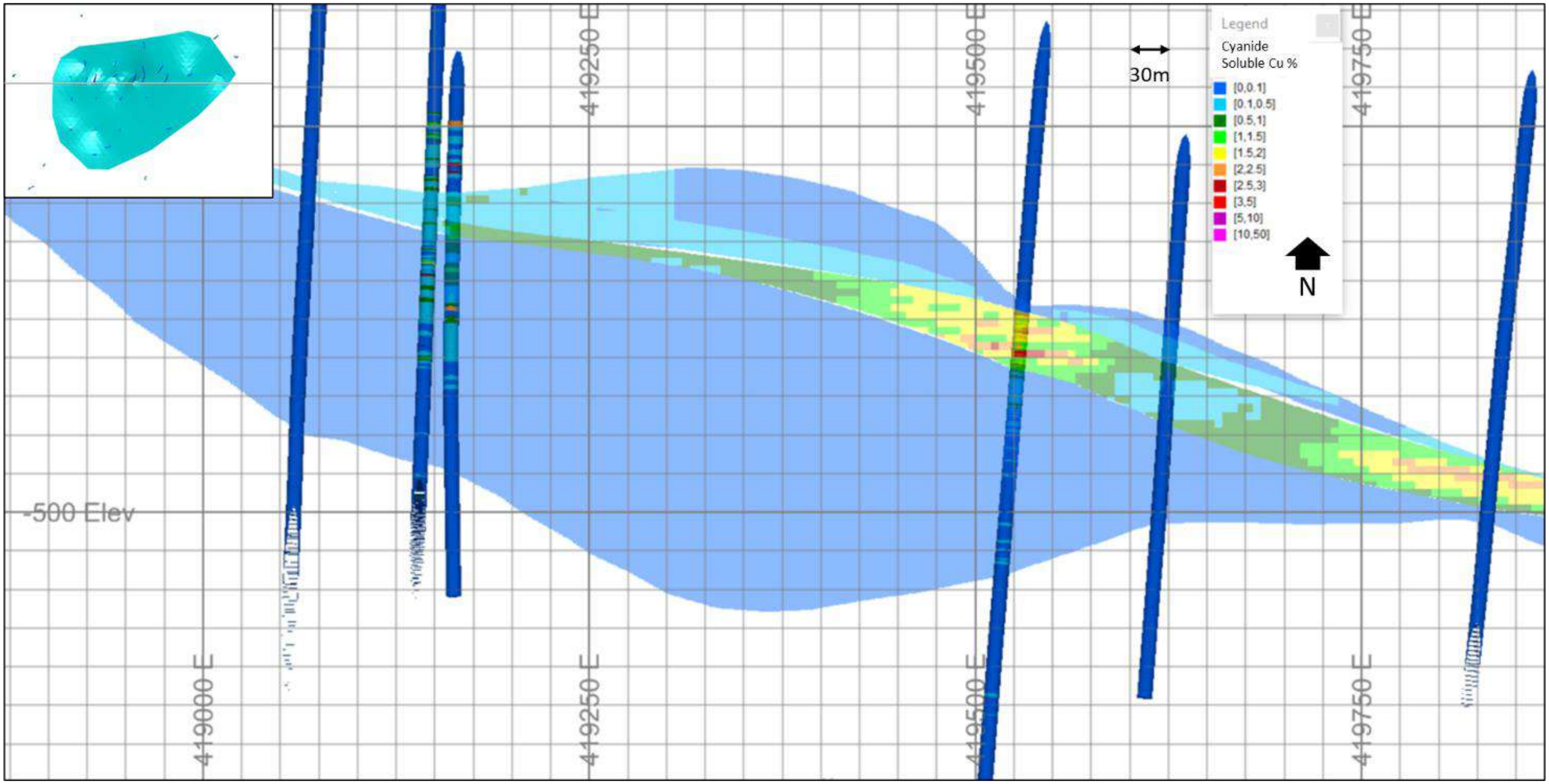
Source: Nordmin, 2023

Figure 14-25: Texaco Block Model Validation, Total Cu, Cross-section +/-50 m Width



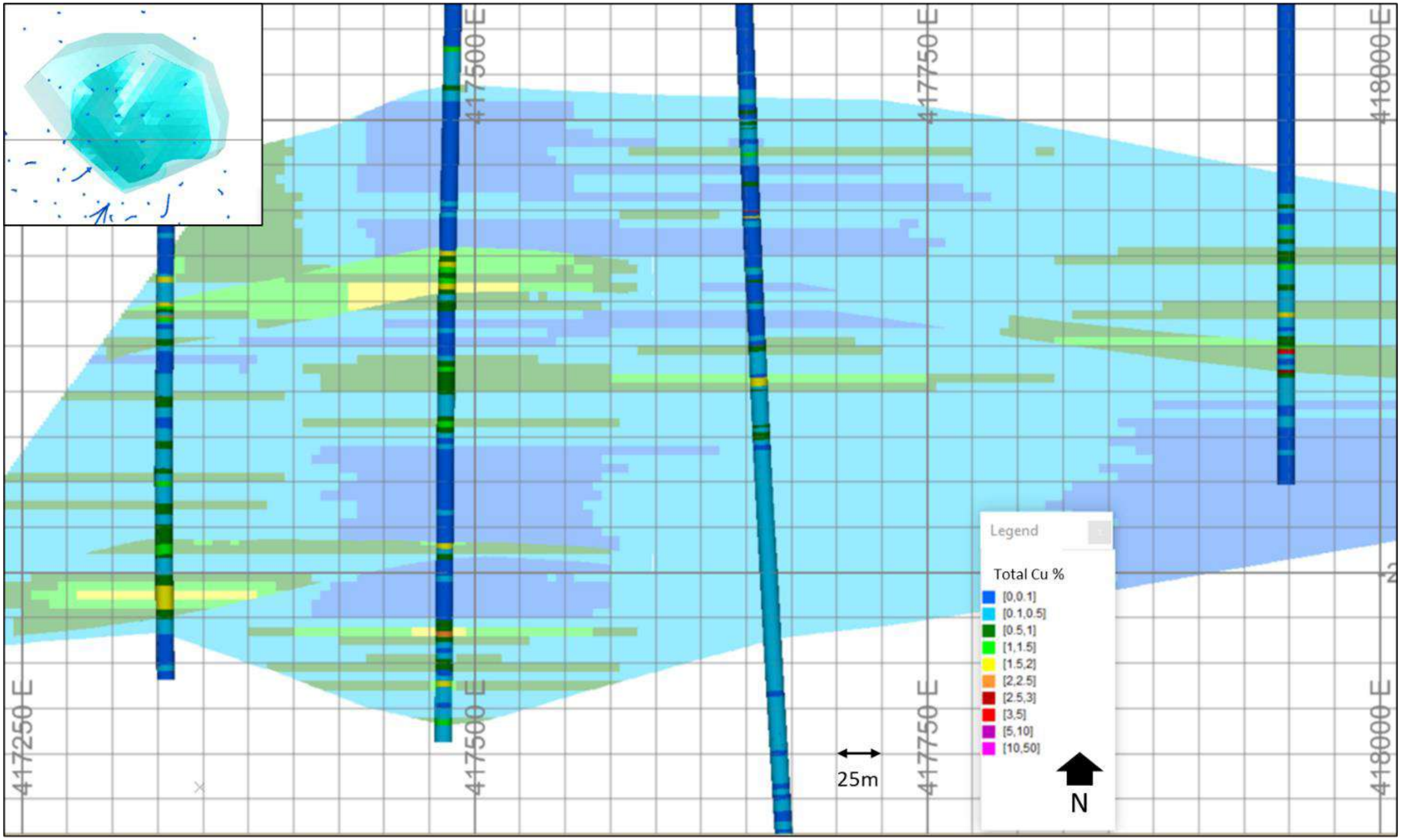
Source: Nordmin, 2023

Figure 14-26: Texaco Block Model Validation, Acid Soluble Cu, Cross-section +/-50 m Width



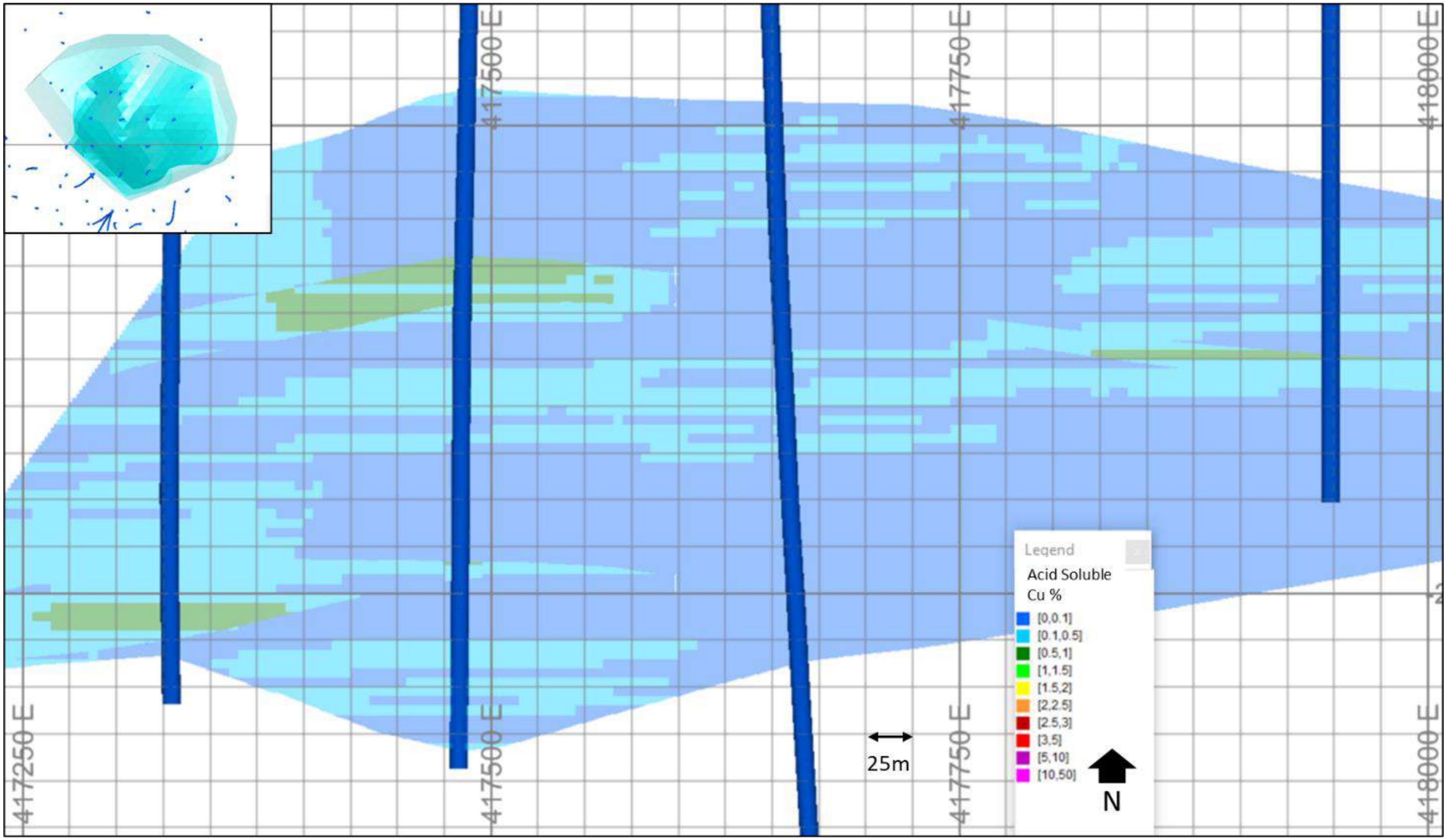
Source: Nordmin, 2023

Figure 14-27: Texaco Block Model Validation, Cyanide Soluble Cu, Cross-section +/-50 m Width



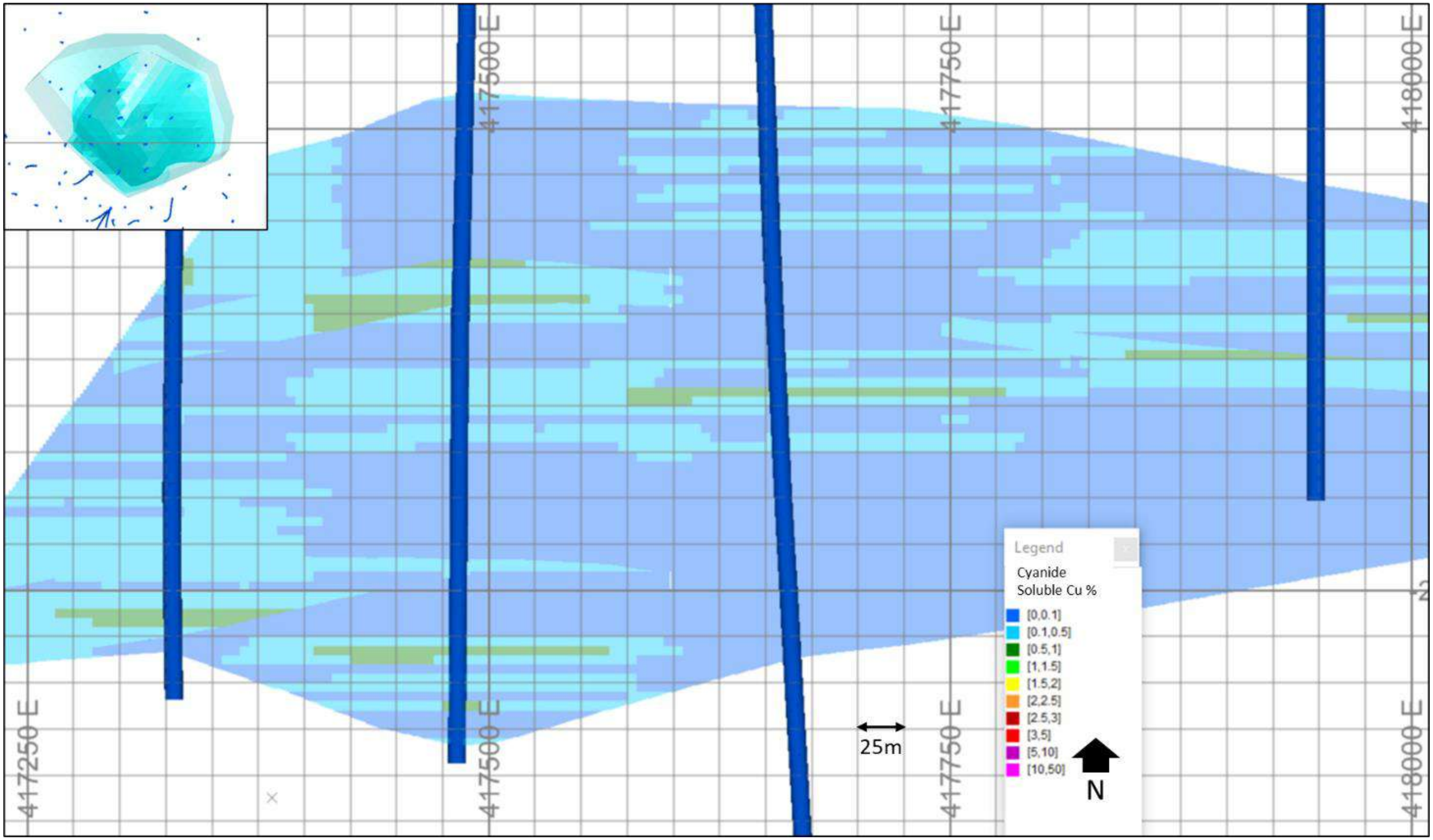
Source: Nordmin, 2023

Figure 14-28: East Ridge Block Model Validation, Total Cu, Cross-section +/-50 m Width



Source: Nordmin, 2023

Figure 14-29: East Ridge Block Model Validation, Acid Soluble Cu, Cross-section +/-50 m Width

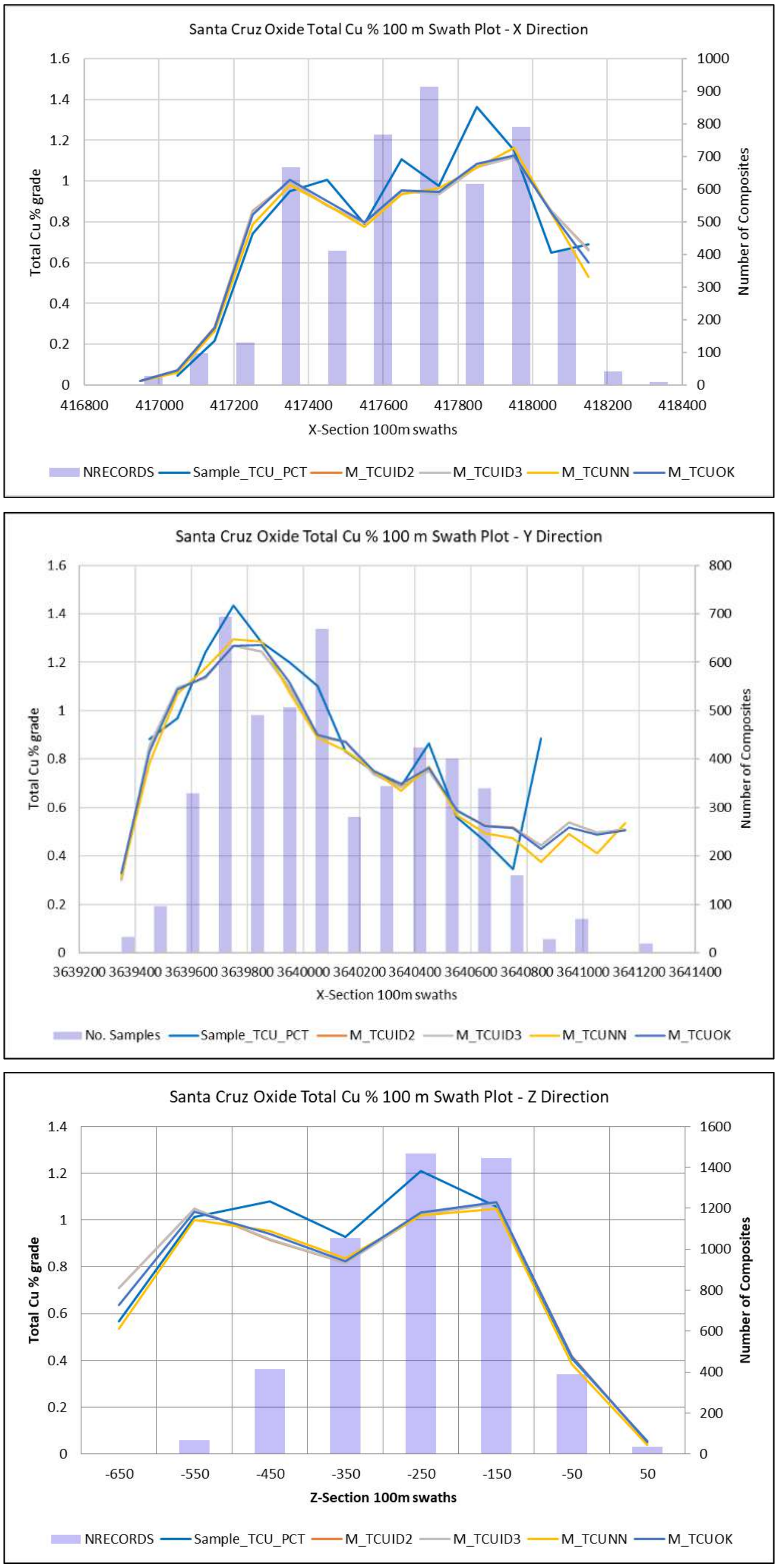


Source: Nordmin, 2023

Figure 14-30: East Ridge Block Model Validation, Cyanide Soluble Cu, Cross-section +/- 50 m Width

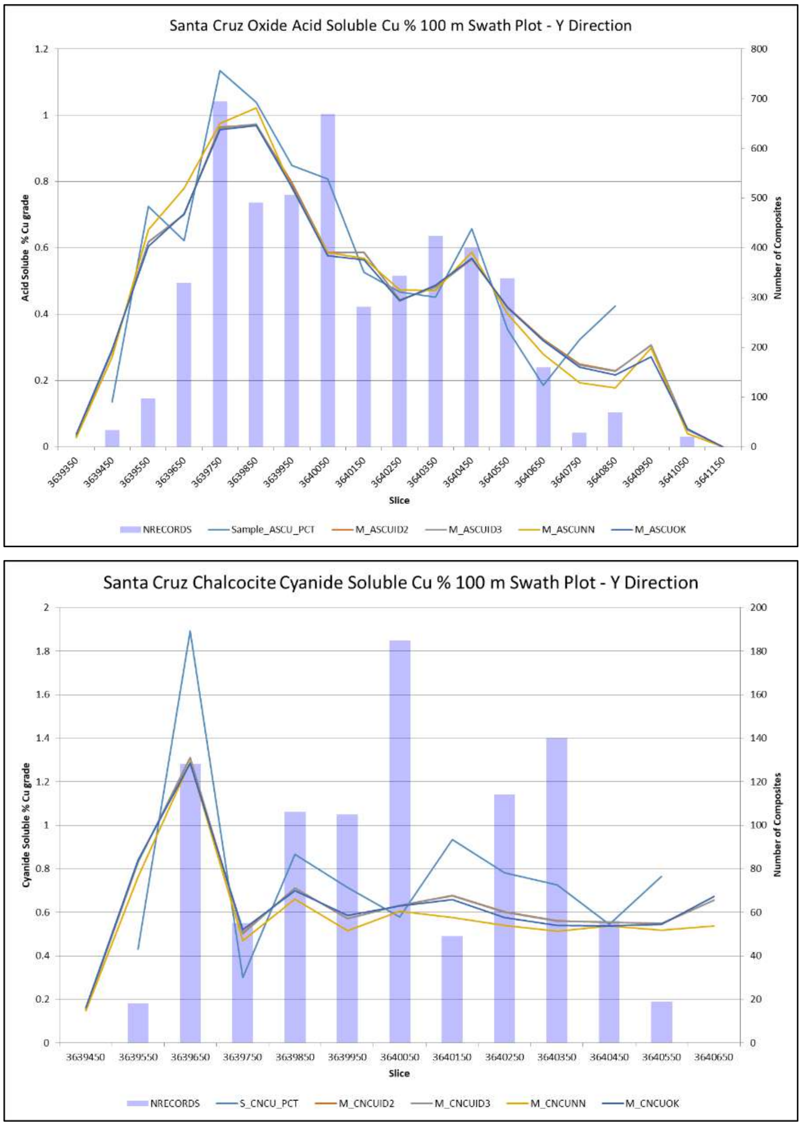
14.5.2 Swath Plots

A series of swath plots were generated for total Cu, acid soluble Cu, and cyanide soluble Cu from slices throughout each deposit for various domains. They compare the block model grades for NN, ID2, ID3, and OK to the drillhole composite grades to evaluate any potential local grade bias. A review of the swath plots did not identify bias in the model that is material to the Mineral Resource Estimate, as there was a strong overall correlation between the block model grade and the capped composites used in the Mineral Resource Estimate. Figure 14-31 and Figure 14-32 are the swath plots for Santa Cruz Deposit total Cu, acid soluble Cu, and cyanide soluble Cu, Figure 14-33 is for the Texaco Deposit, and Figure 14-34 is for the East Ridge Deposit.



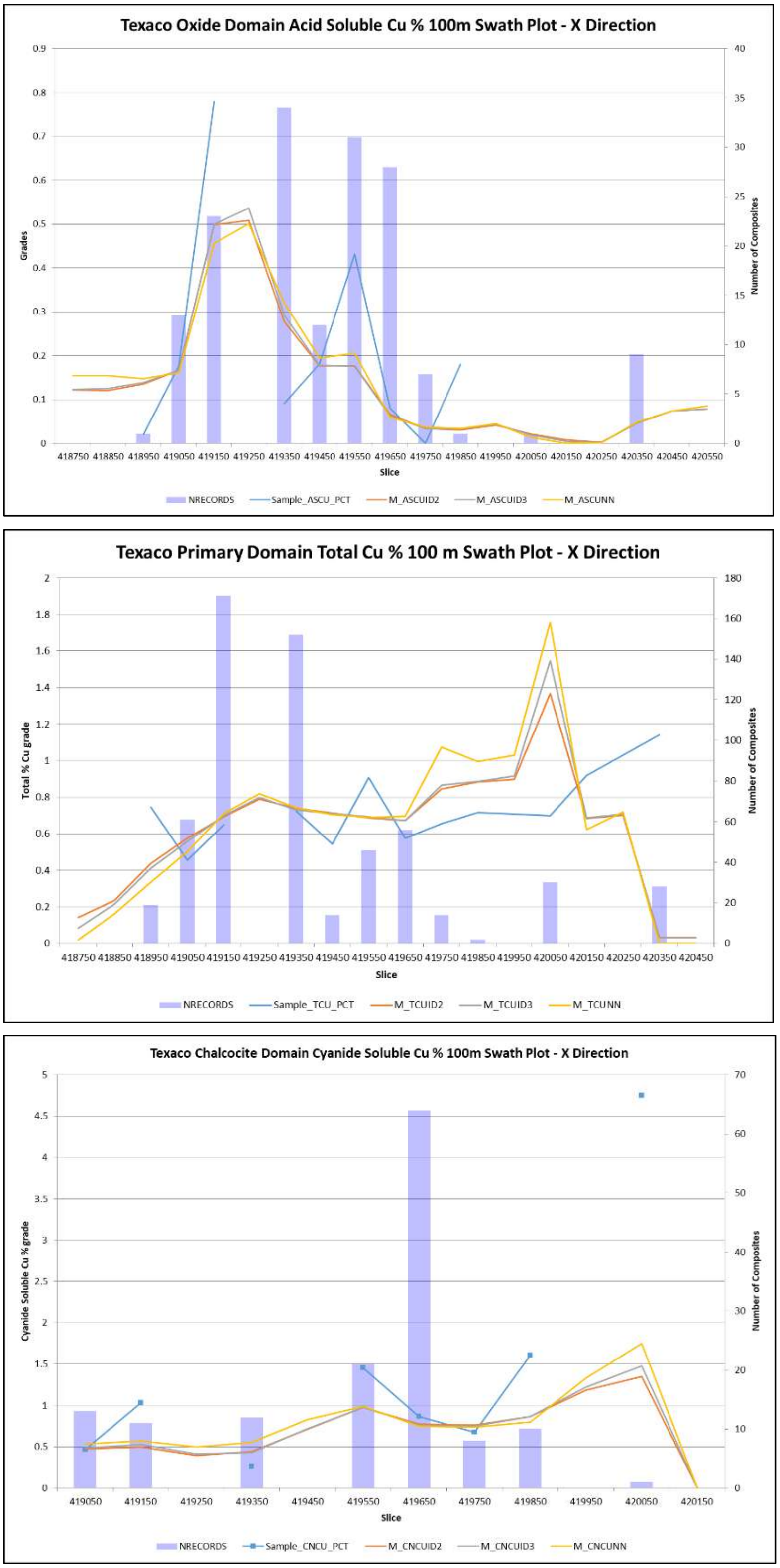
Source: Nordmin, 2023

Figure 14-31: Santa Cruz Oxide Domain Swath Plots, Total Cu % in X, Y, and Z Directions



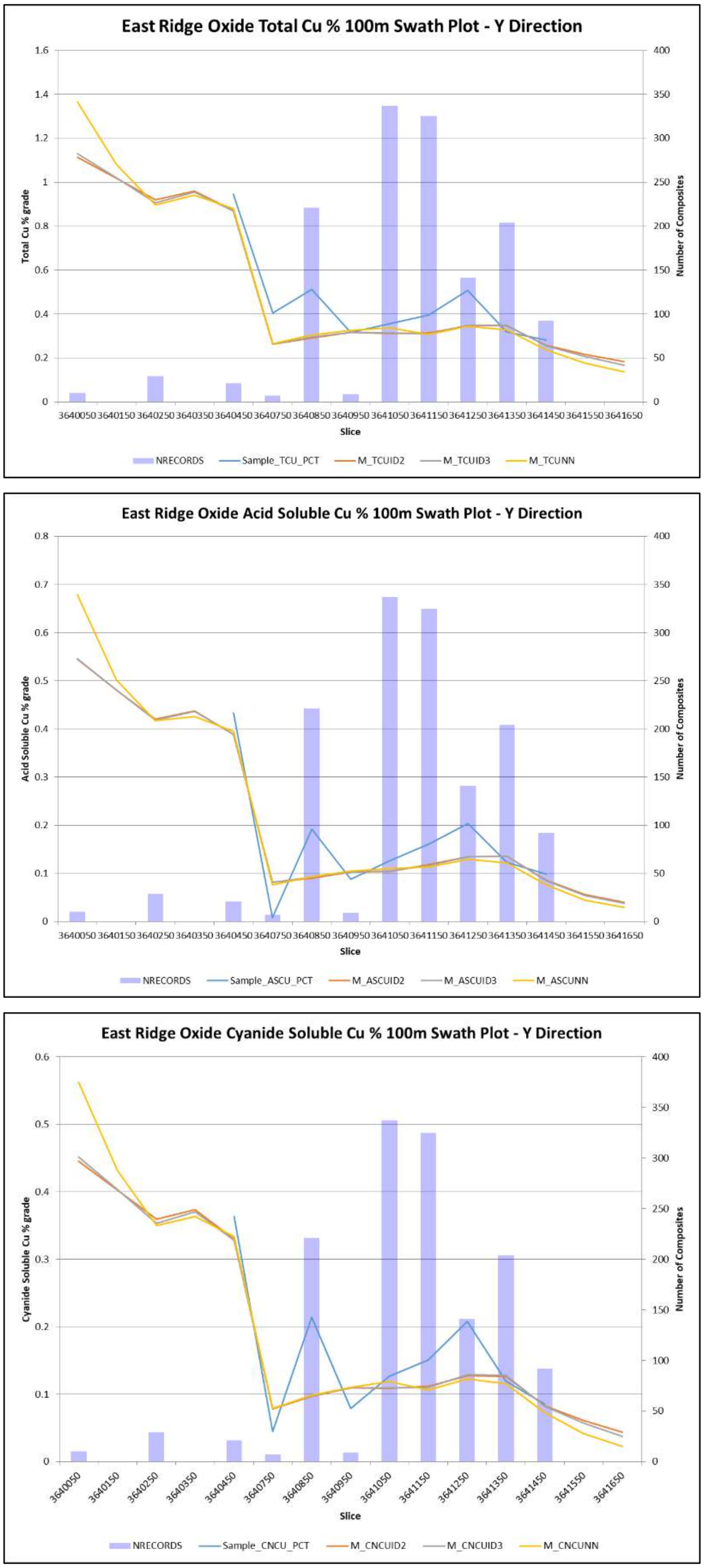
Source: Nordmin, 2023

Figure 14-32: Santa Cruz Oxide and Chalcocite Domain Swath Plots, Acid Soluble and Cyanide Soluble Cu %



Source: Nordmin, 2023

Figure 14-33: Texaco Primary Domain Swath Plot, Total Cu %



Source: Nordmin, 2023

Figure 14-34: East Ridge Oxide Domain Total Cu, Acid Soluble, and Cyanide Soluble Swath Plots

14.6 Mineral Resource Classification

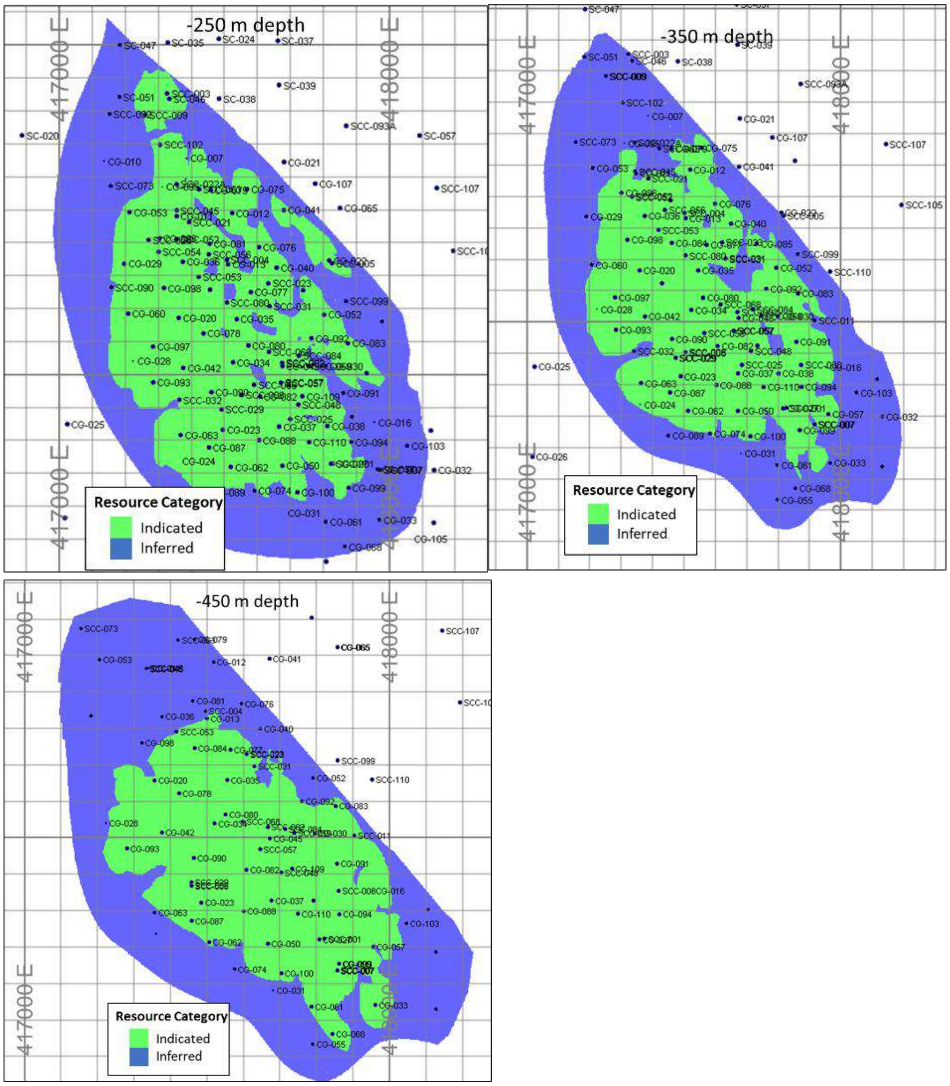
The Mineral Resource Estimate was classified in accordance with CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) and the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (2019).. Mineral Resource classifications were assigned to broad regions of the block model based on the Nordmin QP's confidence and judgment related to geological understanding, continuity of mineralization in conjunction with data quality, spatial continuity based on variography, estimation parameters, data density, and block model representativeness.

Classification (Indicated and Inferred) was applied to the Santa Cruz, Texaco, and East Ridge Deposits based on a full review that included the examination of drill spacing, visual comparison, kriging variance, distance to nearest composite, and search volume estimation (the estimation pass in which each block was populated) along with the search ellipsoid ranges. Collectively this information was used to produce an initial classification script followed by manual wireframes application to further limit the mineral resource classification.

Figure 14-35 and Figure 14-36 demonstrate the resource classification in section throughout the Santa Cruz, Texaco, and East Ridge Deposits.

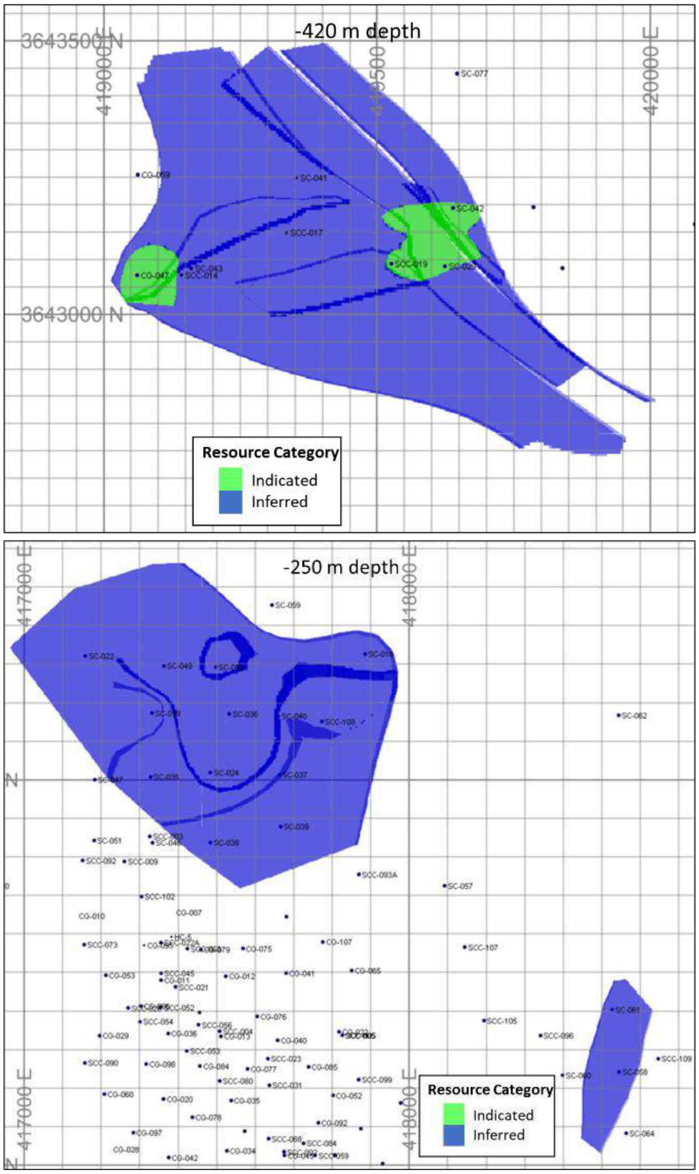
The areas of greatest uncertainty are attributed to Inferred Resources. These are areas with limited drilling or very large drill spacing (greater than 100 m). Due to lack of drilling density it is difficult to be confident in the continuity of mineralization and is therefore classified as Inferred and may be upgraded via infill drilling to support mineralization continuity. Indicated Resources are resources that have consistent drill spacing, low to moderate kriging variance and a visual comparison. In the Santa Cruz Deposit the drill spacing that supports the Indicated Resource classification constitutes approximately 80 m to 100 m. There is the possibility for Indicated Resources to be upgraded to Measured Resources via additional infill drilling that would reduce the drill spacing to < 25 m. Currently, none of the deposits have a Measured Resource. Additional uncertainty lies in the historical drill measurements including logging, assaying, and surveying. The 2021 twin drilling program conducted by IE outlined in Sections 10.1.3 and 12.3 has demonstrated overall grade continuity, location, and continuity between intercepts. There is the potential for unknown errors within the database which could affect the size and quantity of Indicated and Inferred Mineral Resources.

While most of the Texaco Deposit is classified as Inferred, there is a small portion of Indicated Resource. There are three IE drilled holes in Texaco which have served to prove depth, continuity, and grade of the historic drilling. The East Ridge Deposit is currently classified as Inferred as the area is defined by historical drilling which has yet to be validated with modern drilling. This work is forthcoming and will help to improve resource class confidence in subsequent iterations.



Source: Nordmin, 2023

Figure 14-35: Plan section Demonstrating Resource Classification,-250 m, -350 m, and -450 m Depth, with North Upward



Source: Nordmin, 2023

Figure 14-36: Texaco (left) and East Ridge (right) Plan Sections Demonstrating Resources Classification, With North Upward

14.7 Copper Pricing

Mineral Resources were estimated based on a long-term copper price of US$3.70/lb.

Nordmin notes that US$3.70/lb copper price is approximately equal to current spot pricing. In the opinion of Nordmin, this price is generally in-line with pricing over the last 3 years and forward-looking pricing is appropriate for use during a Preliminary Economic Assessment of the Project with an estimated 20-year long mine life. The values presented here may differ from the economic model, however Nordmin is of the opinion that the differences are not material. Additional commentary on selected pricing is included in Section 19.

14.8 Reasonable Prospects of Economic Extraction

The Mineral Resource was created using Datamine Studio RMTM version 1.7.100.0 software to create the block models for the Santa Cruz, Texaco, and East Ridge Deposits, and Deswik.CADTM 2022.1 and Deswik.SOTM 4.1 for stope optimization.

To demonstrate reasonable prospects for economic extraction for the Santa Cruz, Texaco, and East Ridge Mineral Resource Estimates, representational minimum mining unit shapes were created using Deswik's minimum MSO tool. This MSO tool constrains and evaluates the block model based on economic and geometric parameters, shown in Table 14-17, generating potentially mineable shapes. The Santa Cruz Deposit was assumed to be developed as a long-life operation consisting of an underground longhole stoping plan, with an initial mining rate of 15,000 t/d to produce a Cu concentrate. The Texaco Deposit was assumed to be a longhole stoping plan at 7,000 t/d, while East Ridge was assumed to be a room & pillar plan at 3,500 t/d. The Mineral Resource Estimate comprises of all material found within the MSO wireframes generated at a cut-off of 0.70% Cu for Santa Cruz, 0.80% Cu cut-off for Texaco, and 0.90% Cu cut-off for East Ridge, including material below cut-off.

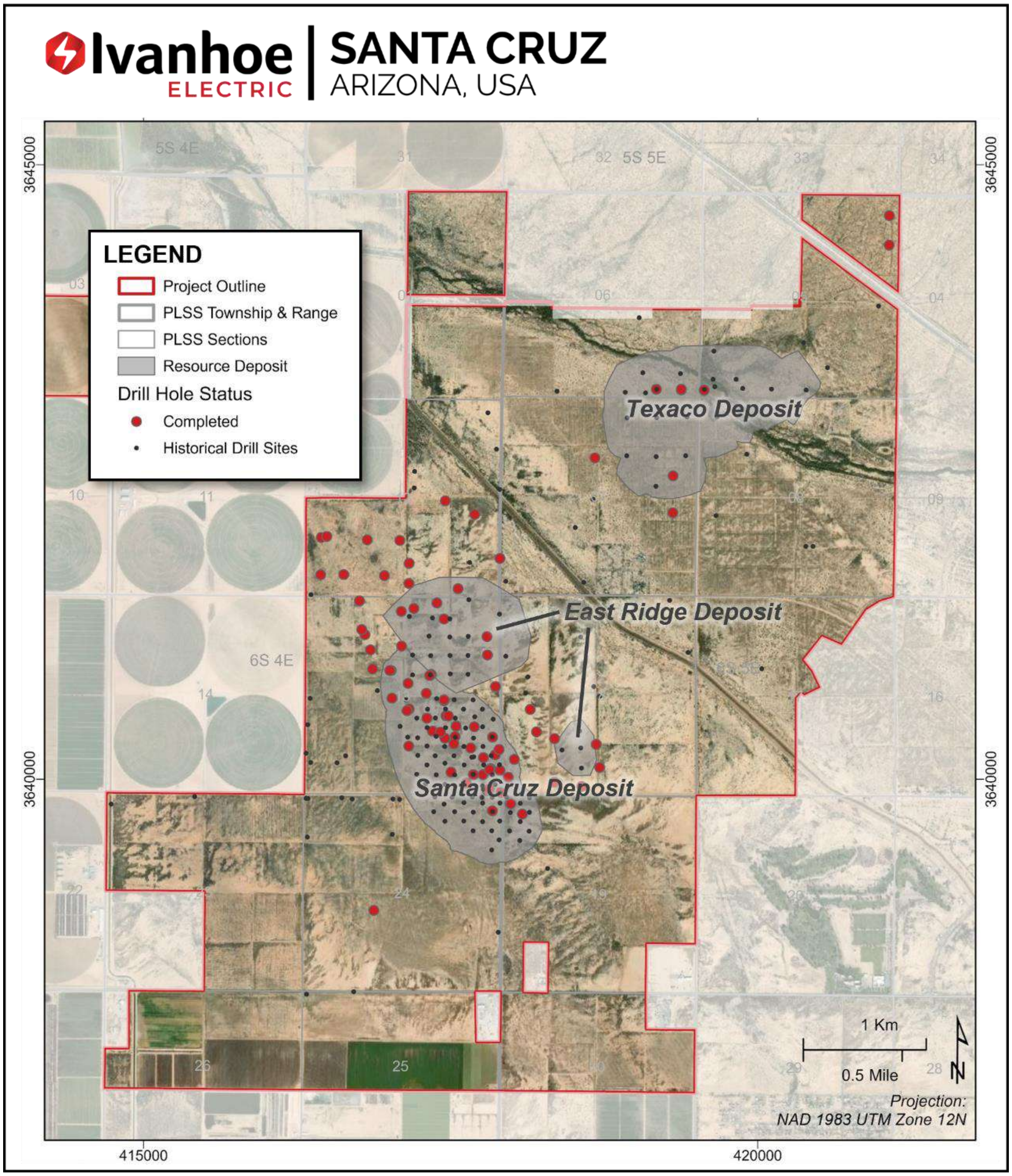
Table 14-17: Input Parameter Assumptions

		December 2022 MRE		
*** All prices in US$**		**Santa Cruz**	**Texaco**	**East Ridge**
		30m Longhole	20m Longhole	Room & Pillar
	Units	Flotation	Flotation	Flotation
Key Criteria and Inputs				
Assumed Production	t/d	15,000	7,000	3,500
Annual Tonnage	t/y	5,250,000	2,450,000	1,225,000
Annual Cathode Production	tonnes Cu/year	30,104	4,836	7,945
	lbs Cu/year	66,366,176	10,662,107	17,516,319
% of Total	%	49.6%	17.4%	50.7%
Annual Copper in Concentrate	tonnes Cu/year	30,597	23,030	7,715
	lbs Cu/year	67,454,146	50,771,938	17,008,599
% of Total	%	50.4%	82.6%	49.3%
Copper Price	US$/lb	US$3.70	US$3.70	US$3.70
Payable Copper	%	96.0%	96.0%	96.0%
On-site Costs				
Mining Costs - Direct	US$/t Proc.	$24.50	$31.50	$40.00
Mining Costs - G&A	US$/t Proc.	$4.00	$4.00	$4.00
Processing - Concentrator	US$/t Proc.	$8.40	$8.40	$8.40
Refining - SX-EW	$/lb Cu Cath	$0.180	$0.180	$0.180
	US$/t Proc.	$2.28	$1.50	$2.57
Processing - Laboratory/Water Treatment	US$/t Proc.	$0.50	$0.50	$0.50
Processing - G&A Costs	US$/t Proc.	$3.00	$3.00	$3.00
Total On-site Costs	US$/t Proc.	$42.68	$48.90	$58.47
Off-site and Downstream Costs				
Cathode Shipping	US$/t Proc.	$0.51	$0.17	$0.57
Concentrate Shipping	US$/t Proc.	$1.259	$2.031	$1.361
Concentrate Smelting & Refining	US$/t Proc.	$1.529	$2.466	$1.652
Total Off-site and Downstream Costs	US$/t Proc.	$3.29	$4.67	$3.58
Royalties				
Average Royalties	%NSR	6.96%	6.06%	5.00%
	US$/t Proc.	$5.95	$5.08	$4.72
Recoveries/Dilution				
Mining Dilution	%	0.0%	0.0%	0.0%
Mining Recovery	%	100.0%	100.0%	100.0%
Processing Recovery	%	94.0%	94.0%	94.0%
MRE Selected Copper Insitu Cut-off	%	0.70%	0.80%	0.90%

Source: Nordmin, 2023
See Section 14.7 for Copper Pricing

14.9 Mineral Resource Estimate

Due to a lack of sample data as well as a bias in sampling for acid soluble Cu and cyanide soluble Cu within the Primary Domain, it was determined that the acid soluble Cu and cyanide soluble Cu estimation within the Primary Domain was not representative of the actual cyanide soluble Cu within the domain and has been removed from all reports and totals. Acid soluble Cu and cyanide soluble Cu was determined to be accurate within the Exotic Domain, Oxide Domain, and Chalcocite Enriched Domain. A plan view of the Deposits is shown in Figure 14-37. The Mineral Resource Estimate, which is exclusive of mineral reserves, can be found in Table 14-18.



Source: IE, 2023

Figure 14-37: Plan View of the Mineral Resource Envelopes

14.9.1 Mineral Resource Estimate

Table 14-18: In Situ Santa Cruz Project Mineral Resource Estimates at 0.70% Cu cut-off for Santa Cruz, 0.80% Cu cut-off for Texaco, and 0.90% Cu Cut-off for East Ridge

Classification	Deposit	Mineralized Material (kt)	Mineralized Material (k ton)	Total Cu (%)	Total Soluble Cu (%)	Acid Soluble Cu (%)	Cyanide Soluble Cu (%)	Total Cu (kt)	Total Soluble Cu (kt)	Acid Soluble Cu (kt)	Cyanide Soluble Cu (kt)	Total Cu (Mlb)
Indicated	Santa Cruz (0.70% COG)	223,155	245,987	1.24	0.82	0.58	0.24	2,759	1,824	1,292	533	6,083
	Texaco (0.80% COG)	3,560	3,924	1.33	0.97	0.25	0.73	47	35	9	26	104
	East Ridge (0.90% COG)	0	0	0.00	0	0.00	0.00	0	0	0	0	0
Inferred	Santa Cruz (0.70% COG)	62,709	69,125	1.23	0.92	0.74	0.18	768	576	462	114	1,694
	Texaco (0.80% COG)	62,311	68,687	1.21	0.56	0.21	0.35	753	348	132	215	1,660
	East Ridge (0.90% COG)	23,978	26,431	1.36	1.26	0.69	0.57	326	302	164	137	718
Total												
Indicated	**All Deposits**	**226,715**	**249,910**	**1.24**	**0.82**	**0.57**	**0.25**	**2,807**	**1,859**	**1,300**	**558**	**6,188**
Inferred	**All Deposits**	**148,998**	**164,242**	**1.24**	**0.82**	**0.51**	**0.31**	**1,847**	**1,225**	**759**	**466**	**4,072**

Source: Nordmin, 2023

Notes on Mineral Resources

- The Mineral Resources in this estimate were independently prepared by Christian Ballard, P.Geo. of Nordmin Engineering Ltd and the Mineral Resources were prepared in accordance with NI 43-101 and the CIM Definition Standards for Mineral Resources and Mineral Reserves (2014) and the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (2019). Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. No environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues are known that may affect this estimate of Mineral Resources.
- Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. This estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.
- Verification included multiple site visits to inspect drilling, logging, density measurement procedures and sampling procedures, and a review of the control sample results used to assess laboratory assay quality. In addition, a random selection of the drillhole database results was compared with the original records.
- The Mineral Resources in this estimate for the Santa Cruz, East Ridge, and Texaco deposits used Datamine Studio RM™ software to create the block models.
- The Mineral Resources have an effective date of December 31, 2022.
- Underground-constrained Mineral Resources for the Santa Cruz deposit are reported at a cut-off grade (CoG) of 0.70% total copper, Texaco deposit are reported at a CoG of 0.80% total copper and East Ridge deposit are reported at a CoG of 0.90% total copper. The CoG reflects total operating costs to define reasonable prospects for eventual economic extracted by conventional underground mining methods with a maximum production rate of 15,000 tonnes per day (t/d). All material within mineable shape-optimized wireframes has been included in the Mineral Resource
- Underground mineable shape optimization parameters include a long-term copper price of US$3.70/lb, process recovery of 94%, direct mining costs between US$24.50-$40.00/processed tonne reflecting various mining method costs (long hole or room and pillar), mining general and administration cost of US$4.00/t processed, onsite processing and SX/EW costs between US$13.40-$14.47/t processed, offsite costs between US$3.29 to US$4.67/t processed, along with variable royalties between 5.00% to 6.96% NSR and a mining recovery of 100%.
- Specific Gravity was applied using weighted averages by Deposit Sub-Domain.
- All figures are rounded to reflect the relative accuracy of the estimates, and totals may not add correctly.
- Excludes unclassified mineralization located along edges of the Santa Cruz, East Ridge, and Texaco deposits where drill density is poor.
- Reported from within a mineralization envelope accounting for mineral continuity.
- Total soluble copper means the addition of sequential acid soluble copper and sequential cyanide soluble copper assays. Total soluble copper is not reported for the Primary Domain

14.9.2 Santa Cruz Mineral Resource Estimate

The Santa Cruz Deposit Mineral Resource Estimate, which is exclusive of mineral reserves, is presented in Table 14-19.

Table 14-19: In Situ Santa Cruz Deposit Mineral Resource Estimate, 0.70% Total Cu CoG

Santa Cruz Deposit 0.70% Cu COG Classification	Domain	Mineralized Material (kt)	Mineralized Material (k ton)	Total Cu (%)	Total Soluble Cu (%)	Acid Soluble Cu (%)	Cyanide Soluble Cu (%)	Total Cu (kt)	Total Soluble Cu (kt)	Acid Soluble Cu (kt)	Cyanide Soluble Cu (kt)	Total Cu (Mlb)
Indicated	Exotic	4,993	5,504	1.79	1.59	1.46	0.13	90	79	73	6	198
	Oxide	96,746	106,644	1.44	1.29	1.10	0.19	1,388	1,244	1,064	179	3,061
	Chalcocite Enriched	45,247	49,877	1.34	1.11	0.34	0.77	608	501	154	347	1,341
	Primary	76,169	83,962	0.88	N/A	N/A	N/A	673	N/A	N/A	N/A	1,484
Inferred	Exotic	5,690	6,273	1.61	1.28	1.17	0.11	91	73	67	6	201
	Oxide	43,252	47,678	1.23	1.02	0.88	0.14	532	411	379	62	1,172
	Chalcocite Enriched	5,779	6,371	1.25	1.07	0.28	0.79	72	62	16	46	159
	Primary	7,987	8,804	0.92	N/A	N/A	N/A	73	N/A	N/A	N/A	161
Total												
Indicated	**All Domains**	**223,155**	**245,987**	**1.24**	**0.82**	**0.58**	**0.24**	**2,759**	**1,824**	**1,292**	**533**	**6,083**
Inferred	**All Domains**	**62,709**	**69,125**	**1.23**	**0.92**	**0.74**	**0.18**	**768**	**576**	**462**	**114**	**1,694**

Source: Nordmin, 2023
Note: Refer to notes on Table 14-18.

14.9.3 Texaco Mineral Resource Estimate

The Texaco Deposit Mineral Resource Estimate, which is exclusive of mineral reserves, is presented in Table 14-20.

Table 14-20: In Situ Texaco Deposit Mineral Resource Estimate, 0.80% Total Cu CoG

Texaco Deposit 0.80% Cu COG Classification	Domain	Mineralized Material (kt)	Mineralized Material (k ton)	Total Cu (%)	Total Soluble Cu (%)	Acid Soluble Cu (%)	Cyanide Soluble Cu (%)	Total Cu (kt)	Total Soluble Cu (kt)	Acid Soluble Cu (kt)	Cyanide Soluble Cu (kt)	Total Cu (Mlb)
Indicated	Exotic	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	Oxide	747	823	1.09	1.00	0.62	0.38	8	7	5	3	18
	Chalcocite Enriched	1,944	2,143	1.55	1.40	0.21	1.18	30	27	4	23	66
	Primary	869	958	1.05	N/A	N/A	N/A	9	N/A	N/A	N/A	20
Inferred	Exotic	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	Oxide	7,536	8,307	1.27	1.24	1.09	0.14	96	93	82	11	211
	Chalcocite Enriched	19,763	21,785	1.44	1.29	0.25	1.03	285	254	50	204	628
	Primary	35,012	38,594	1.06	N/A	N/A	N/A	372	N/A	N/A	N/A	821
Total												
Indicated	**All Domains**	**3,560**	**3,924**	**1.33**	**0.97**	**0.25**	**0.73**	**47**	**35**	**9**	**26**	**104**
Inferred	**All Domains**	**62,311**	**68,687**	**1.21**	**0.56**	**0.21**	**0.35**	**753**	**348**	**132**	**215**	**1,660**

Source: Nordmin, 2023
Note: Refer to notes on Table 14-18.

14.9.4 East Ridge Mineral Resource Estimate

The East Ridge Deposit Mineral Resource Estimate, which is exclusive of mineral reserves, is presented in Table 14-21.

Table 14-21: In Situ East Ridge Deposit Mineral Resource Estimate, 0.90% Total Cu CoG

East Ridge Deposit 0.90% Cu COG Classification	Domain	Mineralized Material (kt)	Mineralized Material (k ton)	Total Cu (%)	Total Soluble Cu (%)	Acid Soluble Cu (%)	Cyanide Soluble Cu (%)	Total Cu (kt)	Total Soluble Cu (kt)	Acid Soluble Cu (kt)	Cyanide Soluble Cu (kt)	Total Cu (Mlb)
Indicated	Exotic	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	Oxide	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	Chalcocite Enriched	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	Primary	0	0	0.00	N/A	N/A	N/A	0	N/A	N/A	N/A	0
Inferred	Exotic	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	Oxide	23,978	26,431	1.36	1.26	0.69	0.57	326	302	164	137	718
	Chalcocite Enriched	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0
	Primary	0	0	0.00	N/A	N/A	N/A	0	N/A	N/A	N/A	0
TOTAL												
Indicated	All Domains	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0
Inferred	All Domains	23,978	26,431	1.36	1.26	0.69	0.57	326	164	164	137	718

Source: Nordmin, 2023
Note: Refer to notes on Table 14-18.

14.10 Mineral Resource Sensitivity to Reporting Cut-off

The updated Santa Cruz, Texaco, and East Ridge Mineral Resource Estimates to a Cu (%) cut-off are summarized in Table 14-22, Table 14-23, and Table 14-24 across all interpolation methods.

Table 14-22: Mineral Resource Sensitivity for Santa Cruz Total Cu

Santa Cruz Deposit		Mineralized Material (kt)	Mineralized Material (k ton)	Total Cu (%)	Acid Soluble Cu (%)	Cyanide Soluble Cu (%)	Total Cu (kt)	Acid Soluble Cu (kt)	Cyanide Soluble Cu (kt)	Total Cu (Mlb)
Classification	COG (%)									
Indicated	0.30	438,378	483,228	0.88	0.34	0.14	3,862	1,483	608	8,514
Inferred	0.30	277,102	305,452	0.60	0.22	0.06	1,659	613	154	3,658
Indicated	0.40	387,905	427,592	0.95	0.37	0.15	3,682	1,448	598	8,118
Inferred	0.40	169,542	186,888	0.76	0.34	0.08	1,288	572	143	2,839
Indicated	0.50	338,866	373,536	1.02	0.41	0.17	3,458	1,404	583	7,623
Inferred	0.50	104,653	115,360	0.96	0.51	0.13	1,005	534	133	2,215
Indicated	0.60	279,596	308,201	1.12	0.48	0.20	3,126	1,353	562	6,892
Inferred	0.60	78,033	86,016	1.11	0.64	0.16	864	498	124	1,904
Indicated	0.70	223,155	245,987	1.24	0.58	0.24	2,759	1,292	533	6,083
Inferred	0.70	62,709	69,125	1.23	0.74	0.18	768	462	114	1,694
Indicated	0.80	179,905	198,312	1.35	0.69	0.27	2,432	1,233	491	5,362
Inferred	0.80	51,794	57,093	1.33	0.82	0.20	689	426	101	1,519
Indicated	0.90	144,115	158,860	1.48	0.81	0.30	2,128	1,171	436	4,692
Inferred	0.90	42,840	47,223	1.43	0.91	0.21	614	389	88	1,355
Indicated	1.00	119,293	131,497	1.59	0.93	0.32	1,892	1,106	386	4,172
Inferred	1.00	36,856	40,627	1.52	0.97	0.22	559	357	79	1,232
Indicated	1.20	83,837	92,415	1.79	1.14	0.37	1,502	958	310	3,312
Inferred	1.20	26,055	28,721	1.70	1.10	0.24	443	287	61	977
Indicated	1.50	53,218	58,663	2.05	1.33	0.45	1,089	705	241	2,401
Inferred	1.50	14,892	16,416	1.99	1.29	0.30	296	193	44	652
Indicated	2.00	21,736	23,960	2.51	1.53	0.65	547	332	142	1,205
Inferred	2.00	5,935	6,542	2.43	1.59	0.37	144	95	22	318

Source: Nordmin, 2023

Table 14-23: Mineral Resource Sensitivity for Texaco Total Cu

Texaco Deposit		Mineralized Material (kt)	Mineralized Material (k ton)	Total Cu (%)	Acid Soluble Cu (%)	Cyanide Soluble Cu (%)	Total Cu (kt)	Acid Soluble Cu (kt)	Cyanide Soluble Cu (kt)	Total Cu (Mlb)
Classification	COG (%)									
Indicated	0.30%	9,609	10,592	0.83	0.12	0.31	80	11	30	177
Inferred	0.30%	182,697	201,389	0.77	0.10	0.17	1,411	176	303	3,111
Indicated	0.40%	8,564	9,440	0.89	0.12	0.34	77	11	29	169
Inferred	0.40%	162,879	179,543	0.82	0.10	0.18	1,342	167	290	2,958
Indicated	0.50%	7,441	8,202	0.96	0.14	0.39	71	10	29	158
Inferred	0.50%	135,652	149,530	0.90	0.12	0.20	1,218	158	273	2,685
Indicated	0.60%	5,688	6,270	1.09	0.17	0.49	62	10	28	136
Inferred	0.60%	105,215	115,979	1.00	0.14	0.24	1,051	147	249	2,317
Indicated	0.70%	4,297	4,737	1.23	0.22	0.62	53	9	27	117
Inferred	0.70%	82,390	90,819	1.10	0.17	0.28	903	140	232	1,991
Indicated	0.80%	3,560	3,924	1.33	0.25	0.73	47	9	26	104
Inferred	0.80%	62,311	68,687	1.21	0.21	0.35	753	132	215	1,660
Indicated	0.90%	3,106	3,423	1.40	0.26	0.80	44	8	25	96
Inferred	0.90%	47,899	52,799	1.32	0.26	0.41	631	124	198	1,391
Indicated	1.00%	2,705	2,982	1.47	0.28	0.87	40	7	24	88
Inferred	1.00%	37,071	40,863	1.43	0.31	0.48	528	115	179	1,165
Indicated	1.20%	2,037	2,246	1.59	0.28	1.00	32	6	20	71
Inferred	1.20%	22,788	25,119	1.63	0.42	0.61	372	96	138	821
Indicated	1.50%	932	1,027	1.88	0.20	1.26	18	2	12	39
Inferred	1.50%	12,162	13,406	1.90	0.54	0.65	231	65	79	509
Indicated	2.00%	251	276	2.26	0.08	1.21	6	0	3	13
Inferred	2.00%	4,239	4,672	2.25	0.74	0.65	95	32	27	210

Source: Nordmin, 2023

Table 14-24: Mineral Resource Sensitivity for East Ridge Total Cu - There are no Indicated Resources at East Ridge

East Ridge Deposit		Mineralized Material (kt)	Mineralized Material (k ton)	Total Cu (%)	Acid Soluble Cu (%)	Cyanide Soluble Cu (%)	Total Cu (kt)	Acid Soluble Cu (kt)	Cyanide Soluble Cu (kt)	Total Cu (Mlb)
Classification	COG									
Inferred	0.30%	159,015	175,284	0.62	0.25	0.25	987	392	397	2,175
Inferred	0.40%	107,999	119,049	0.75	0.31	0.31	809	338	334	1,785
Inferred	0.50%	75,452	83,172	0.88	0.39	0.37	664	292	277	1,464
Inferred	0.60%	56,069	61,806	1.00	0.46	0.42	558	255	234	1,230
Inferred	0.70%	41,496	45,741	1.12	0.53	0.47	464	221	195	1,023
Inferred	0.80%	31,172	34,361	1.24	0.61	0.52	387	190	163	852
Inferred	0.90%	23,978	26,431	1.36	0.69	0.57	326	164	137	718
Inferred	1.00%	18,886	20,818	1.47	0.76	0.62	277	143	117	612
Inferred	1.20%	11,995	13,223	1.69	0.90	0.71	202	108	86	446
Inferred	1.50%	6,142	6,771	2.02	1.11	0.87	124	68	53	274
Inferred	2.00%	2,223	2,450	2.58	1.44	1.12	57	32	25	127

Source: Nordmin, 2023

14.11 Interpolation Comparison

Global statistical comparisons between the composite samples, NN estimates, ID2 estimates, ID3 estimates, and OK for various CoGs were compared to assess global bias, where the NN model estimates represent de-clustered composite data. Clustering of the drillhole data can result in differences between the global means of the composites and NN estimates. The OK method was used as the reporting estimation interpolation method for the Santa Cruz Deposit and the ID3 method was used for the East Ridge and Texaco Deposits Table 14-25 through Table 14-27). NN, ID2, ID3, and OK were estimated for validation purposes for all block models, as described in Section 14.4.8. (Santa Cruz Deposit), Table 14-25 (Texaco Deposit), Table 14-27 (East Ridge Deposit) demonstrate the total Cu interpolation comparison across ID2, ID3, NN, and OK (in the Santa Cruz Deposit) interpolation methods.

Table 14-25: Santa Cruz Interpolation Comparison

Cut-Off Total Cu %	Total Cu OK	Total Cu ID2	Total Cu ID3	Total Cu NN	Acid Soluble Cu OK	Acid Soluble Cu ID2	Acid Soluble Cu ID3	Acid Soluble Cu NN	Cyanide Soluble Cu OK	Cyanide Soluble Cu ID2	Cyanide Soluble Cu ID3	Cyanide Soluble Cu NN
0.30	0.82	0.81	0.81	0.82	0.31	0.31	0.31	0.35	0.11	0.12	0.12	0.16
0.60	1.26	1.24	1.25	1.27	0.59	0.60	0.60	0.63	0.21	0.22	0.22	0.27
0.70	1.45	1.42	1.42	1.45	0.74	0.74	0.74	0.77	0.26	0.27	0.27	0.32
0.80	1.61	1.58	1.58	1.61	0.87	0.88	0.88	0.91	0.29	0.31	0.31	0.35
1.00	1.90	1.85	1.85	1.90	1.13	1.14	1.13	1.16	0.33	0.35	0.35	0.39
1.50	2.27	2.21	2.21	2.28	1.41	1.41	1.41	1.44	0.38	0.39	0.39	0.44
2.00	2.66	2.57	2.58	2.62	1.70	1.70	1.70	1.71	0.47	0.48	0.48	0.53

Source: Nordmin, 2023

Table 14-26: Texaco Interpolation Comparison

Cut-Off Total Cu %	Total Cu ID2	Total Cu ID3	Total Cu NN	Acid Soluble Cu ID2	Acid Soluble Cu ID3	Acid Soluble Cu NN	Cyanide Soluble Cu ID2	Cyanide Soluble Cu ID3	Cyanide Soluble Cu NN
0.30	0.84	0.84	0.86	0.11	0.11	0.11	0.19	0.19	0.20
0.50	0.96	0.97	1.01	0.12	0.13	0.13	0.23	0.23	0.24
0.70	1.21	1.23	1.31	0.18	0.19	0.19	0.34	0.34	0.36
0.80	1.34	1.37	1.47	0.22	0.23	0.23	0.41	0.41	0.44
0.90	1.45	1.50	1.61	0.26	0.27	0.28	0.47	0.48	0.52
1.00	1.57	1.63	1.77	0.31	0.32	0.32	0.54	0.55	0.59
1.50	2.19	2.34	2.73	0.56	0.58	0.57	0.86	0.90	1.05
2.00	2.69	2.94	3.70	0.76	0.79	0.79	0.95	1.01	1.26

Source: Nordmin, 2023

Table 14-27: East Ridge Deposit Interpolation Comparison

Cut-Off Total Cu %	Total Cu ID2	Total Cu ID3	Total Cu NN	Acid Soluble Cu ID2	Acid Soluble Cu ID3	Acid Soluble Cu NN	Cyanide Soluble Cu ID2	Cyanide Soluble Cu ID3	Cyanide Soluble Cu NN
0.30	0.69	0.71	0.73	0.27	0.27	0.27	0.28	0.29	0.29
0.50	0.97	1.00	1.05	0.42	0.42	0.43	0.41	0.43	0.45
0.70	1.20	1.24	1.29	0.56	0.57	0.58	0.51	0.53	0.56
0.80	1.31	1.35	1.40	0.64	0.64	0.65	0.56	0.58	0.60
0.90	1.42	1.47	1.52	0.71	0.72	0.72	0.60	0.63	0.65
1.00	1.51	1.56	1.63	0.77	0.78	0.79	0.64	0.67	0.70
1.50	2.04	2.15	2.17	1.16	1.17	1.13	0.88	0.93	0.94
2.00	2.59	2.75	2.71	1.53	1.55	1.43	1.13	1.20	1.18

Source: Nordmin, 2023

14.12 Factors That May Affect Mineral Resources

Areas of uncertainty that may materially impact the Mineral Resource Estimates include:

- Changes to long term metal price assumptions.
- Changes to the input values for mining, processing, and G&A costs to constrain the estimate.
- Changes to local interpretations of mineralization geometry and continuity of mineralized Sub-Domains.
- Changes to the density values applied to the mineralized zones.
- Changes to metallurgical recovery assumptions.
- Changes in assumptions of marketability of the final product.
- Variations in geotechnical, hydrogeological and mining assumptions.
- Changes to assumptions with an existing agreement or new agreements.
- Changes to environmental, permitting, and social license assumptions.
- Logistics of securing and moving adequate services, labor, and supplies could be affected by epidemics, pandemics and other public health crises, including COVID-19, or similar such viruses.

15 Mineral Reserve Estimate

A prefeasibility study (PFS) is required to demonstrate the economic merit of Mineral Resources for any conversion to Mineral Reserves. At this time, no such PFS study has been completed; therefore, the Santa Cruz Project currently has no defined Mineral Reserves, according to CIM definitions and guidelines (CIM, 2014).

16 Mining Methods

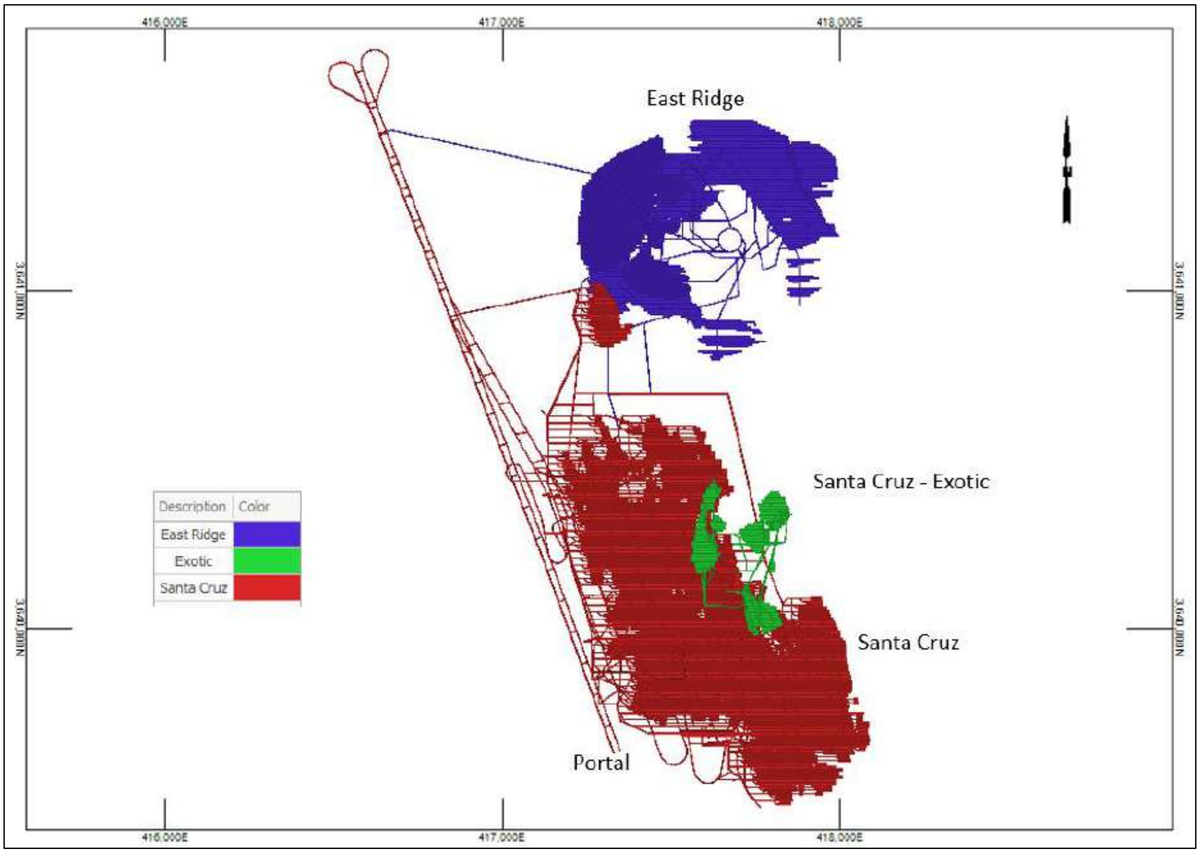
The Project is currently not in operation. Mineral resources are stated for three deposits: Santa Cruz, Texaco, and East Ridge. For mine planning work, only the Santa Cruz and East Ridge deposits were evaluated.

The Santa Cruz deposit is located approximately 430 to 970 m below the surface. Based on the mineralization geometry and geotechnical information, an underground longhole stoping (LHS) method is suitable for the deposit. The Santa Cruz deposit will be mined in blocks where mining within a block occurs from bottom to top with paste backfill (PBF) for support. A sill pillar is left in situ between blocks. The PBF will have sufficient strength to allow for mining adjacent to filled stopes without the need for pillars. The stopes will be 10 m wide, and stope lengths range from 12 to 33 m depending on the level, location, and sequence. A spacing of 30 m between levels has been used.

Within the Santa Cruz deposit, there is an Exotic domain located approximately 500 to 688 m below the surface and to the east of the main deposit. The Exotic domain consists of flatter lenses that are more amenable to drift and fill (DAF) mining. The drift will be 9 m high and 6 m wide. Drift lengths vary depending on the extents of the mineralization. An initial 5 m high and 6 m wide drift will be taken, followed by a 4 m high back slash to achieve the final dimensions. Cemented waste rockfill will be used for support. The backfill will have sufficient strength to allow mining of adjacent drifts without leaving pillars.

The East Ridge deposit is approximately 380 to 690 m below the surface and to the north of the main Santa Cruz deposit. The East Ridge deposit consists of two tabular lenses and will be mined using DAF with cemented waste rock backfill for support. The drift dimensions will be 9 m high, 6 m wide, and of variable length depending on the extents of the mineralization. An initial 5 m high and 6 m wide drift will be taken, followed by a 4 m high back slash to achieve the final dimensions.

The mine will be accessed by dual decline drifts from surface, with one drift serving as the main access and the other as a railveyor drift for material handling. Mineralization is transported from stopes via loader to an ore pass system and then to surface by the railveyor. Main intake and exhaust raises will be developed with conventional shaft sinking methods to provide air to the mine workings. The mine will target a combined production of 15,000 t/d from Santa Cruz and East Ridge. Figure 16-1 shows the location of the different deposits and the portal.



Source: SRK, 2023

Figure 16-1: Location of the Different Zones

16.1 Cut-Off Grade Calculations

Table 16-1 shows estimated project costs and calculated CoG's.

Table 16-1: Cut-Off Grade Assumptions

Parameter	Unit	LHS Method	DAF Method
On-Site Costs			
Mining Cost	US$/t-proc	25.50	45.00
Process Cost	US$/t-proc	11.18	11.47
G&A Costs	US$/t-proc	7.00	7.00
Sub-total On-Site Cost	**US$/t-proc**	**43.68**	**63.47**
Off-Site Cost			
Cathode Shipping	US$/t-proc	0.51	0.57
Concentrate Shipping	US$/t-proc	1.26	1.36
Concentrate Smelting and Refining	US$/t-proc	1.53	1.65
Sub total Off-Site Cost	**US$/t-proc**	**3.29**	**3.58**
Royalties	**US$/t-proc**	**5.22**	**4.49**
Total Cost	**US$/t-proc**	**52.19**	**71.54**
Parameters			
Copper Price	US$/lb	3.70	3.70
Payable Copper	%	96.0	96.0
Metallurgical Recovery	%	94.0	94.0
Mining Dilution	%	13.5	5.0
Mining Recovery	%	100.00	100.00
Calculated In Situ Cut-Off	%	0.79	1.00
Selected Cut-Off for MSO	%	0.80	1.00

Source: SRK, 2023

SRK notes that US$3.70/lb copper price is approximately equal to current spot pricing. In the opinion of SRK, this price is generally in-line with pricing over the last 3 years and forward-looking pricing is appropriate for use during a PEA of the Project with an estimated 20-year long mine life. The values presented here may differ from the economic model, however SRK is of the opinion that the differences are not material. Additional commentary on selected pricing is included in Section 19.

16.2 Geotechnical

IE contracted geotechnical engineering consulting firm CNI based out of Tucson, Arizona, USA, to perform a geotechnical evaluation in support of a PEA for the Santa Cruz Copper Project located in Pinal County of southern Arizona. The purpose of the study was to provide underground mine design parameters based on recent and historic geotechnical data collected at the site. Key design recommendations were provided for the following:

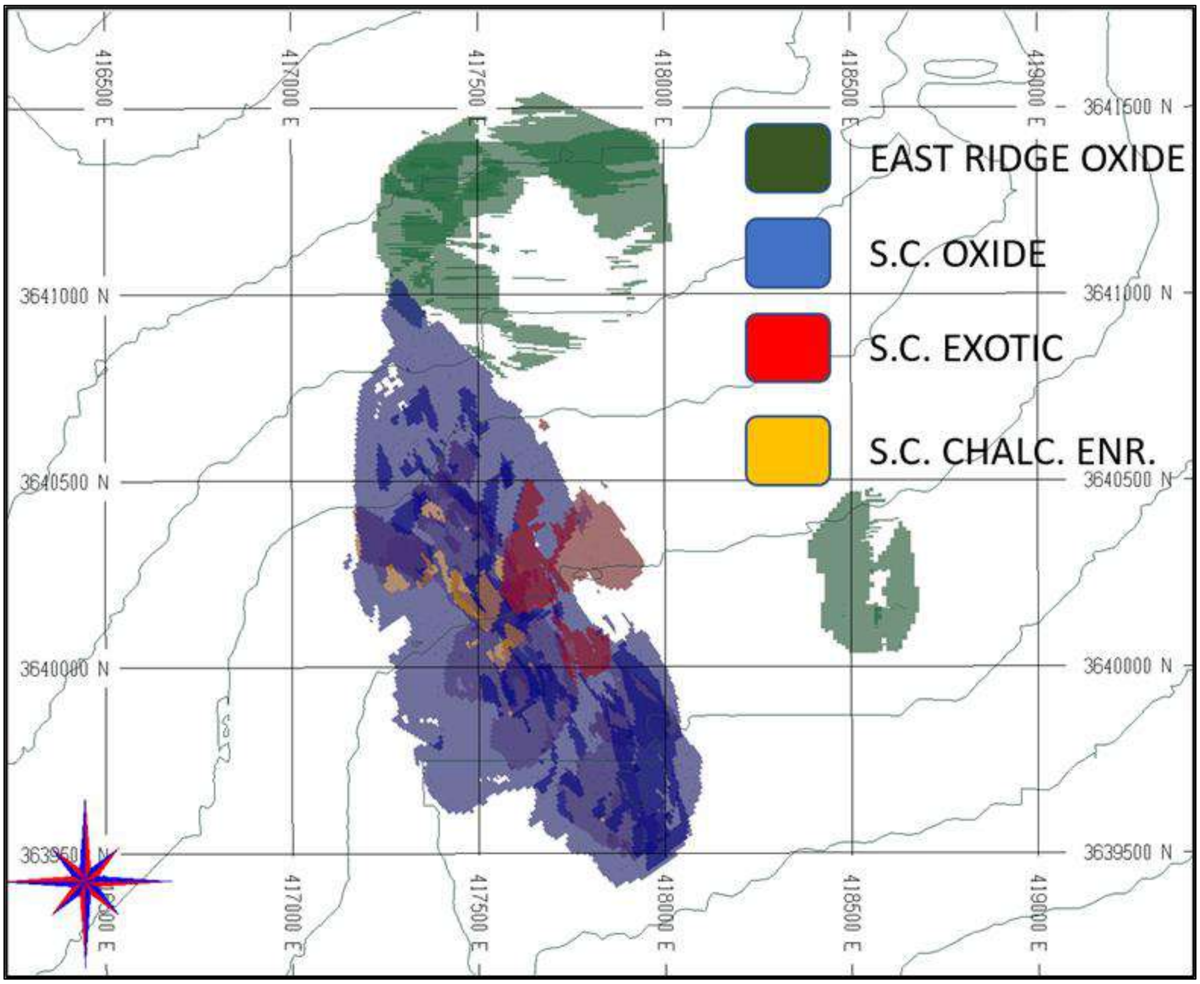
- Longhole stope (LHS) dimensions
- Drift and fill (DAF) dimensions
- General mining sequence guidelines
- Dilution estimates based on equivalent length of slough (ELOS)
- Configurations and dimensions for access pillars and sill pillars
- Ground support requirements
- Backfill strength minimum requirements

16.2.1 Dataset

Data utilized in the study include the following:

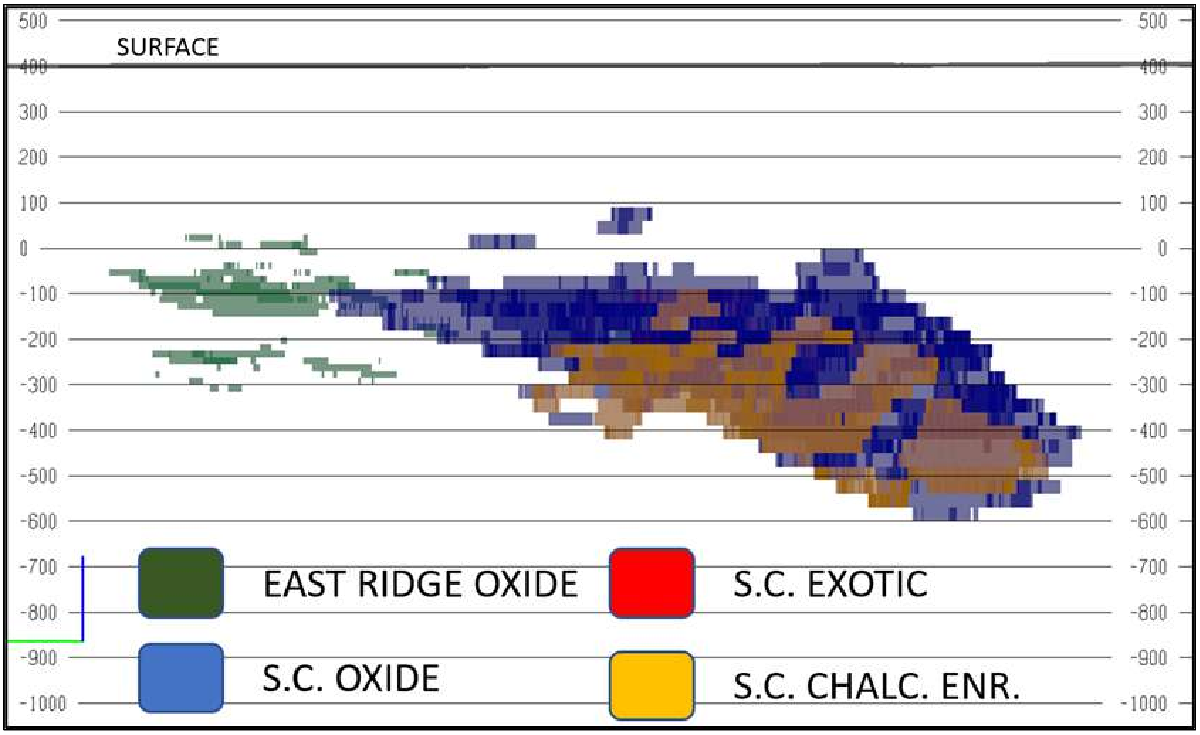
- MSO shapes for the Santa Cruz (S.C.) and East Ridge mining targets (received January 23, 2023), presented in Figure 16-2 and Figure 16-3.

- Geomechanical data from 152 drillholes (71,620 m), as presented in Table 16-2 and on Figure 16-4:
  - 83 drillholes (35,555 m) are historical (prefix CG-XXX) and include RQD and recovery only.
  - 69 holes (36,065 m) drilled in 2021 through 2022 under IE direction (prefix SCC-XXX) and logged by CNI engineers and geologists. The 69 drillholes were logged for data using the Modified NGI Q' system of rock mass classification.
- Rock fabric orientations from acoustic televiewer (ATV) survey data from 24 drillholes (prefix SCC-XXX) throughout the Santa Cruz area, as presented in Table 16-3 and on Figure 16-5.
- Geomechanical laboratory testing, as summarized in Table 16-4. Rock strength estimates were determined utilizing this information.
- VWP data from 13 drillholes, installed by CNI engineers and geologists.



Source: CNI, 2023

Figure 16-2: Plan View of Santa Cruz and East Ridge Mining Targets



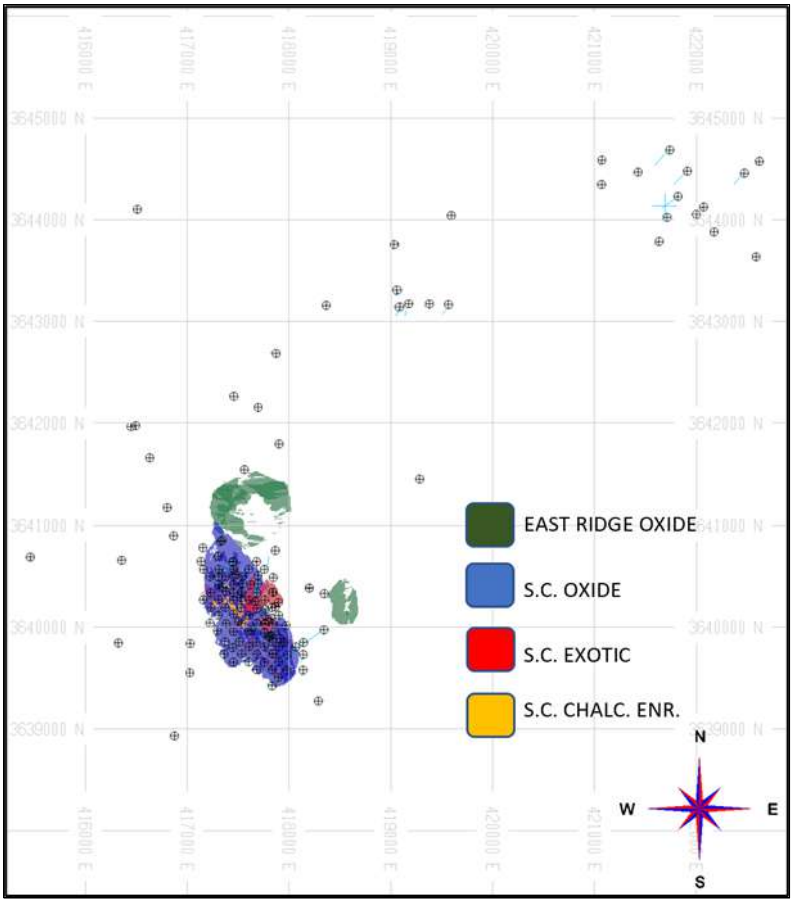
Source: CNI, 2023

Figure 16-3: Section View (Looking East) of Santa Cruz and East Ridge Mining Targets

Table 16-2: Drillholes Utilized for 2023 PEA

Drillhole ID							
CG-010	CG-034	CG-055	CG-084	CG-113	SCC-020	SCC-048	SCC-089
CG-011	CG-035	CG-057	CG-085	CG-116	SCC-021	SCC-050	SCC-090
CG-012	CG-036	CG-059	CG-087	CG-118	SCC-022	SCC-052	SCC-092
CG-013	CG-037	CG-060	CG-088	SCC-001	SCC-023	SCC-053	SCC-093
CG-016	CG-038	CG-061	CG-089	SCC-002	SCC-024	SCC-054	SCC-094
CG-018A	CG-039	CG-062	CG-090	SCC-003	SCC-025	SCC-056	SCC-096
CG-020	CG-040	CG-063	CG-091	SCC-004	SCC-026	SCC-057	SCC-098
CG-021	CG-041	CG-064	CG-092	SCC-005	SCC-027	SCC-058	SCC-099
CG-022	CG-042	CG-065	CG-093	SCC-006	SCC-028	SCC-059	SCC-101
CG-023	CG-043	CG-068	CG-094	SCC-007	SCC-029	SCC-063	SCC-102
CG-024	CG-044	CG-074	CG-095	SCC-008	SCC-030	SCC-065	SCC-103
CG-025	CG-045	CG-075	CG-096	SCC-009	SCC-031	SCC-068	SCC-105
CG-026	CG-046	CG-076	CG-097	SCC-010	SCC-032	SCC-073	
CG-027	CG-047	CG-077	CG-098	SCC-011	SCC-033	SCC-078	
CG-028	CG-048	CG-078	CG-099	SCC-013	SCC-037	SCC-080	
CG-029	CG-050	CG-079	CG-100	SCC-014	SCC-038	SCC-081	
CG-030	CG-051	CG-080	CG-103	SCC-016	SCC-042	SCC-082	
CG-031	CG-052	CG-081	CG-107	SCC-017	SCC-043	SCC-084	
CG-032	CG-053	CG-082	CG-109	SCC-018	SCC-045	SCC-086	
CG-033	CG-054	CG-083	CG-110	SCC-019	SCC-047	SCC-088	

Source: CNI, 2023



Source: CNI, 2023

Figure 16-4: Plan View of Geotechnical Drillhole Collars

Table 16-3: ATV Drillholes by Structural Domain

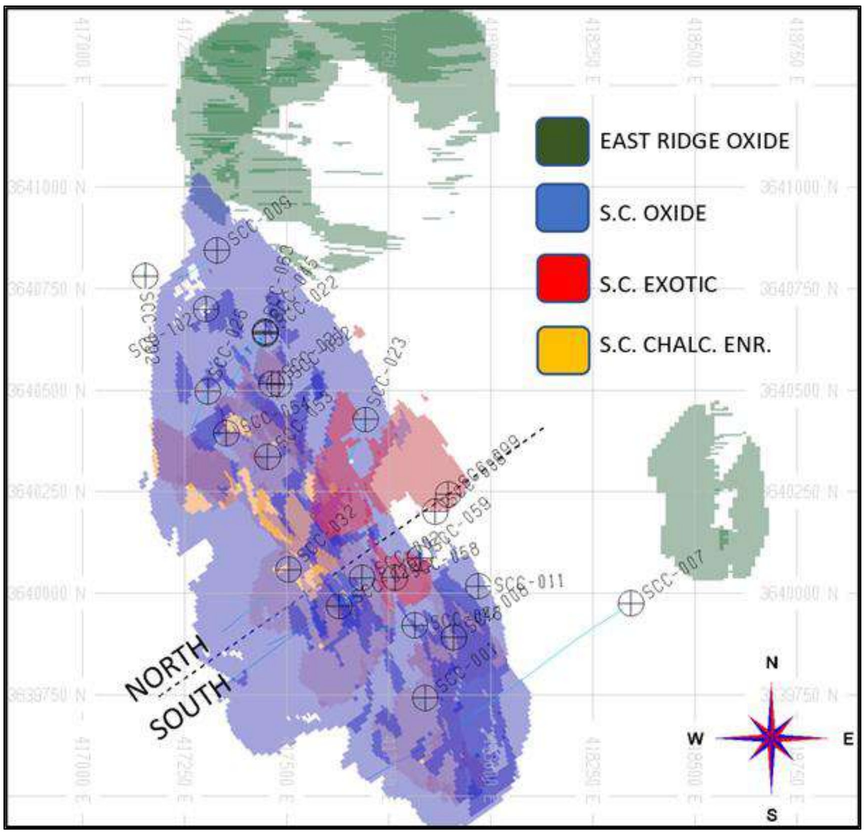
<table>
<tr><th colspan="4">Drillholes with ATV Survey used in Structural Investigation</th></tr>
<tr><td>SCC-006</td><td rowspan="15">North Structural Domain</td><td>SCC-001</td><td rowspan="15">South Structural Domain</td></tr>
<tr><td>SCC-009</td><td>SCC-002</td></tr>
<tr><td>SCC-021</td><td>SCC-007</td></tr>
<tr><td>SCC-022</td><td>SCC-008</td></tr>
<tr><td>SCC-023</td><td>SCC-011</td></tr>
<tr><td>SCC-026</td><td>SCC-029</td></tr>
<tr><td>SCC-032</td><td>SCC-048</td></tr>
<tr><td>SCC-045</td><td>SCC-058</td></tr>
<tr><td>SCC-052</td><td>SCC-059</td></tr>
<tr><td>SCC-053</td><td></td></tr>
<tr><td>SCC-054</td><td></td></tr>
<tr><td>SCC-063</td><td></td></tr>
<tr><td>SCC-092</td><td></td></tr>
<tr><td>SCC-099</td><td></td></tr>
<tr><td>SCC-102</td><td></td></tr>
</table>

Source: CNI, 2023

Table 16-4: Summary of Geomechanical Laboratory Testing, 2023 PEA

Test Type	Number of Tests
Unconfined Compressive Strength (UCS)	26
Point Load	21
Triaxial Compressive Strength (TCS)	23
Brazilian Disk Tension	37
Small Scale Direct Shear	7
Unified Soil Classification System (USCS)	14

Source: CNI, 2023



Source: CNI, 2023

Figure 16-5: Plan View of Drillhole Collars with ATV Survey

The following are additional information utilized in the geotechnical evaluation:

- MSO shapes for the S.C. and East Ridge mining targets (received January 23, 2023), presented in Figure 16-6.
- Geology model (June 2022 model) provided by IE, including coded lithology, mineral domains, and fault wireframes.
- Various decline options provided by IE.
- A geotechnical block model was constructed using data from the 152 drilled holes. Details of the geotechnical block model are presented in the CNI report 2023 Geotechnical Block Model Santa Cruz Project (May 2023).

16.2.2 Mine Design Geotechnical Parameters

Table 16-5 and Table 16-6 present a summary of design parameters for mine planning using a LHS mining method. Table 16-7 presents a summary of design parameters for mine planning using a drift and fill (DAF) mining method. Due to its orebody geometry and rock quality, the mining of the East Ridge deposit is currently planned using a DAF method with jammed cemented rock backfill. The Oxide and Chalcocite-Enriched mineral domains of the Santa Cruz deposit will be mined using the LHS method, while the Exotic mineral domain will be mined using the DAF method. The primary (hypogene) mineral domain of Santa Cruz is not currently planned for production mining.

Table 16-5: Summary of LHS Geotechnical Design Recommendations

Design Parameter	Recommendation
Stope height (from sill to sill) (m)	30
Stope width (from sidewall to sidewall) (m)	10
Stope length before backfilling (m)	Varies by Mineral Domain, Muck Level, and North/South Structural Domains*
Cable bolt square spacing for back (m)	2
Cable bolt length (m)	6
Sill pillar thickness (m)	30
Haulage level setback distance (m)	40
Stope orientation (azimuth) (°)	090
PBF compressive strength (kilopascals (kPa)) at 7 days cure time	600
Estimated cement in solids (%)	3

Source: CNI, 2023
*See Table 16-6 for stope dimensions.

Table 16-6: Summary of LHS Dimensions and ELOS by North and South Area, Mineral Domain

Muck Level	Design Dimensions (m)						ELOS (m)			
	Oxide Mineral Domain			Chalcocite-Enriched			Oxide		Chalcocite-Enriched	
	Height	Width	Length	Height	Width	Length	Side Walls	End Walls	Side Walls	End Walls
North Area										
60	30.0	10.0	11.0				0.75	0.75		
30	30.0	10.0	8.2				1.00	1.50		
0	30.0	10.0	10.8				0.75	0.75		
-30	30.0	10.0	9.6				0.75	1.00		
-60	30.0	10.0	12.0				0.50	0.75		
-90	30.0	10.0	13.4	30.0	10.0	46.5	0.50	0.50	<0.50	<0.50
-120	30.0	10.0	14.4	30.0	10.0	46.7	0.50	0.50	<0.50	<0.50
-150	30.0	10.0	16.3	30.0	10.0	29.7	<0.50	<0.50	<0.50	<0.50
-180	30.0	10.0	15.2	30.0	10.0	25.7	0.50	<0.50	<0.50	<0.50
-210	30.0	10.0	17.8	30.0	10.0	26.6	<0.50	<0.50	<0.50	<0.50
-240	30.0	10.0	19.5	30.0	10.0	25.2	<0.50	<0.50	<0.50	<0.50
-270	30.0	10.0	14.8	30.0	10.0	17.6	0.50	<0.50	<0.50	<0.50
-300	30.0	10.0	15.7	30.0	10.0	16.3	<0.50	<0.50	<0.50	<0.50
-330	30.0	10.0	16.9	30.0	10.0	13.4	<0.50	<0.50	0.50	0.50
-360	30.0	10.0	15.7	30.0	10.0	15.9	<0.50	<0.50	<0.50	<0.50
-390	30.0	10.0	15.8	30.0	10.0	20.1	<0.50	<0.50	<0.50	<0.50
-420	30.0	10.0	14.9	30.0	10.0	22.0	0.50	<0.50	<0.50	<0.50
-450	30.0	10.0	12.8	30.0	10.0	16.6	0.50	0.50	<0.50	<0.50
-480	30.0	10.0	18.2	30.0	10.0	16.1	<0.50	<0.50	<0.50	<0.50
-510	30.0	10.0	18.7	30.0	10.0	12.0	<0.50	<0.50	0.50	0.75
-540	30.0	10.0	14.9	30.0	10.0	10.2	0.50	<0.50	0.75	1.00
-570	30.0	10.0	16.5	30.0	10.0	8.2	<0.50	<0.50	1.00	1.50
-600	30.0	10.0	16.2				<0.50	<0.50		
-630										
South Area										
60	30.0	10.0	11.5				0.50	1.50		
30	30.0	10.0	8.6				1.00	2.00		
0	30.0	10.0	11.3				0.75	1.50		
-30	30.0	10.0	10.0				0.75	1.50		
-60	30.0	10.0	12.6				0.50	1.00		
-90	30.0	10.0	14.1	30.0	10.0	51.1	0.50	1.00	<0.50	<0.50
-120	30.0	10.0	15.1	30.0	10.0	51.2	0.50	0.75	<0.50	<0.50
-150	30.0	10.0	17.3	30.0	10.0	31.9	<0.50	0.75	<0.50	<0.50
-180	30.0	10.0	16.1	30.0	10.0	27.5	0.50	0.75	<0.50	<0.50
-210	30.0	10.0	18.8	30.0	10.0	28.5	<0.50	0.50	<0.50	<0.50
-240	30.0	10.0	20.6	30.0	10.0	26.9	<0.50	0.50	<0.50	<0.50
-270	30.0	10.0	15.6	30.0	10.0	18.6	0.50	0.75	<0.50	0.50
-300	30.0	10.0	16.6	30.0	10.0	17.2	<0.50	0.75	<0.50	0.75
-330	30.0	10.0	17.9	30.0	10.0	14.1	<0.50	0.50	0.50	1.00
-360	30.0	10.0	16.6	30.0	10.0	16.8	<0.50	0.75	<0.50	0.75
-390	30.0	10.0	16.7	30.0	10.0	21.4	<0.50	0.75	<0.50	<0.50
-420	30.0	10.0	15.7	30.0	10.0	23.4	0.50	0.75	<0.50	<0.50
-450	30.0	10.0	13.4	30.0	10.0	17.5	0.50	1.00	<0.50	0.75
-480	30.0	10.0	19.3	30.0	10.0	17.0	<0.50	0.50	<0.50	0.75
-510	30.0	10.0	19.8	30.0	10.0	12.6	<0.50	0.50	0.50	1.00
-540	30.0	10.0	15.7	30.0	10.0	10.7	0.50	0.75	0.75	1.50
-570	30.0	10.0	17.5	30.0	10.0	8.6	<0.50	0.75	1.00	2.00
-600	30.0	10.0	17.1				<0.50	0.75		
-630										

Source: CNI, 2023

Table 16-7: Summary of DAF Geotechnical Design Recommendations

Design Parameter	Recommendation
Drift span (m)	6
Floor pull maximum height (m)	9
Cemented rock fill (CRF) compressive strength (kPa) target at 28 days*	400
Estimated cement binder (%)**	3

Source: CNI, 2023
*Includes a safety factor = 2
**A minimum binder content of 3% was assumed to ensure no uncemented particles are in the CRF.

16.2.3 Risks and Opportunities

Risks and Opportunities

- There will always be differences between the predicted conditions and the field conditions. Additional drilling is ongoing to better characterize and predict potential ground conditions throughout the Project area.
- Additional data have been collected in the East Ridge area since completion of the geotechnical model. Improvements in the East Ridge rock quality could allow for wider operating spans and potential stoping zones where the orebody thickness is suitable.
- All analyses assume generally dry conditions and that the mining areas are effectively depressurized. Should there be residual water within the surrounding rock mass of excavations or depressurization is incomplete, the stability of openings and ground support designs will be less than predicted.
- Maximum extraction of the orebody will be contingent on the ability to backfill stope and DAF openings tightly to their backs. Furthermore, there is uncertainty that the tailings, mine water, and mine waste rock are suitable for PBF and CRF. Additional analyses are necessary to further investigate this.
- If the results of in situ stress measurement indicate lower horizontal stresses (k<0.8), larger stopes may be possible.
- Alternative ground support types should be considered, which could optimize lengths and installation density of bolting options.

16.2.4 Rock Quality, Strength, and Joint Orientations

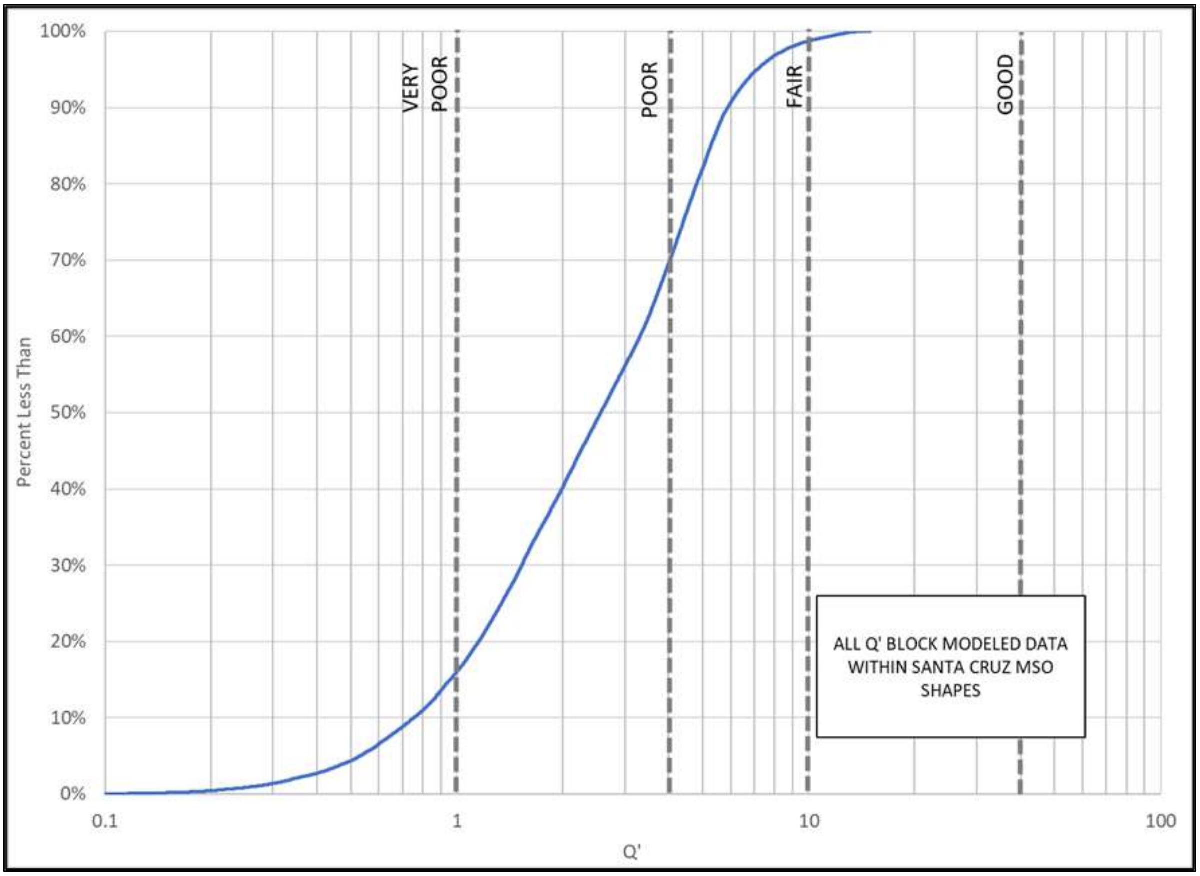
Rock Quality

Rock quality was estimated using a geotechnical block model. Using this model, rock quality was predicted for each mineral domain and for each 30 m stope sublevel where MSO shapes are situated. Table 16-8 presents a summary of rock quality (Q’) estimates by muck level, which were used to determine stope dimensions. Figure 16-6 presents a cumulative distribution of Q’ for all blocks within MSO shapes.

Table 16-8: Summary of Q' Rock Quality by Mining Level

Muck Level	Number of Blocks	By Domain, 50% Q'				By Domain, 75% Q'			
		Exotic	Oxide	Chalcocite-Enriched	Primary/ Hypogene	Exotic	Oxide	Chalcocite-Enriched	Primary/ Hypogene
60	990	1.073				0.794	0.729		
30	480	1.079				0.405	0.403		
0	1,110	1.248				0.705	0.705		
-30	756	0.736			1.067	0.98	0.553		1.017
-60	3,326	0.893	1.094		1.142	0.882	0.873		0.912
-90	12,375	0.93	1.56	6.848	1.664	0.93	1.077	6.848	1.215
-120	42,434	0.299	1.839	6.992	2.157	0.186	1.227	6.867	0.971
-150	61,093	0.414	3.026	5.342	2.157	0.321	1.546	3.961	1.813
-180	62,380	0.984	3.649	4.905	4.633	0.519	1.538	3.625	2.253
-210	72,377	0.989	4.27	5.38	4.112	0.604	2.014	3.812	1.51
-240	80,218	0.83	4.307	4.801	4.24	0.511	2.349	3.526	1.753
-270	64,663	1.318	2.442	3.347	4.345	0.711	1.667	2.269	3.087
-300	58,363	0.757	3.131	2.512	3.524	0.401	1.85	1.975	1.791
-330	60,473	1.132	3.196	2.274	2.008	0.711	2.107	1.388	1.377
-360	66,713	0.925	3.358	3.751	1.43	0.562	2.164	2.202	0.946
-390	65,608	0.855	3.774	5.287	1.409	0.518	2.181	3.311	0.997
-420	60,090	0.694	3.597	4.491	1.284	0.544	1.964	3.819	0.81
-450	52,595	1.038	2.542	3.475	1.065	0.685	1.77	2.855	0.681
-480	42,619	4.493	4.369	3.249	1.475		3.357	2.72	1.066
-510	31,295	1.015	3.972	2.435	1.336		3.516	1.566	0.833
-540	29,781	1.988	3.816	2.449	1.398		2.932	1.409	1.008
-570	23,383		3.887	1.825	1.336		3.556	0.897	0.919
-600	5,686		3.472		1.283		3.429		0.87
-630	2,634				0.934				0.813

Source: CNI, 2023



Source: CNI, 2023

Figure 16-6: Cumulative Distribution Plot of All Q' Data within the Santa Cruz MSO Shapes

The average rock quality (Q' = 2.5) is poor according to Barton's classification system. Rock quality is best (median Q' = 4.5) within the middle of the orebody (between the minus 150- and minus 240 m elevations), and then lessens above and below. Table 16-9 presents summaries of modeled RQD, Q', and geological strength index (GSI) by modeled domain within these elevation ranges.

Table 16-9: Santa Cruz Rock Quality Summary

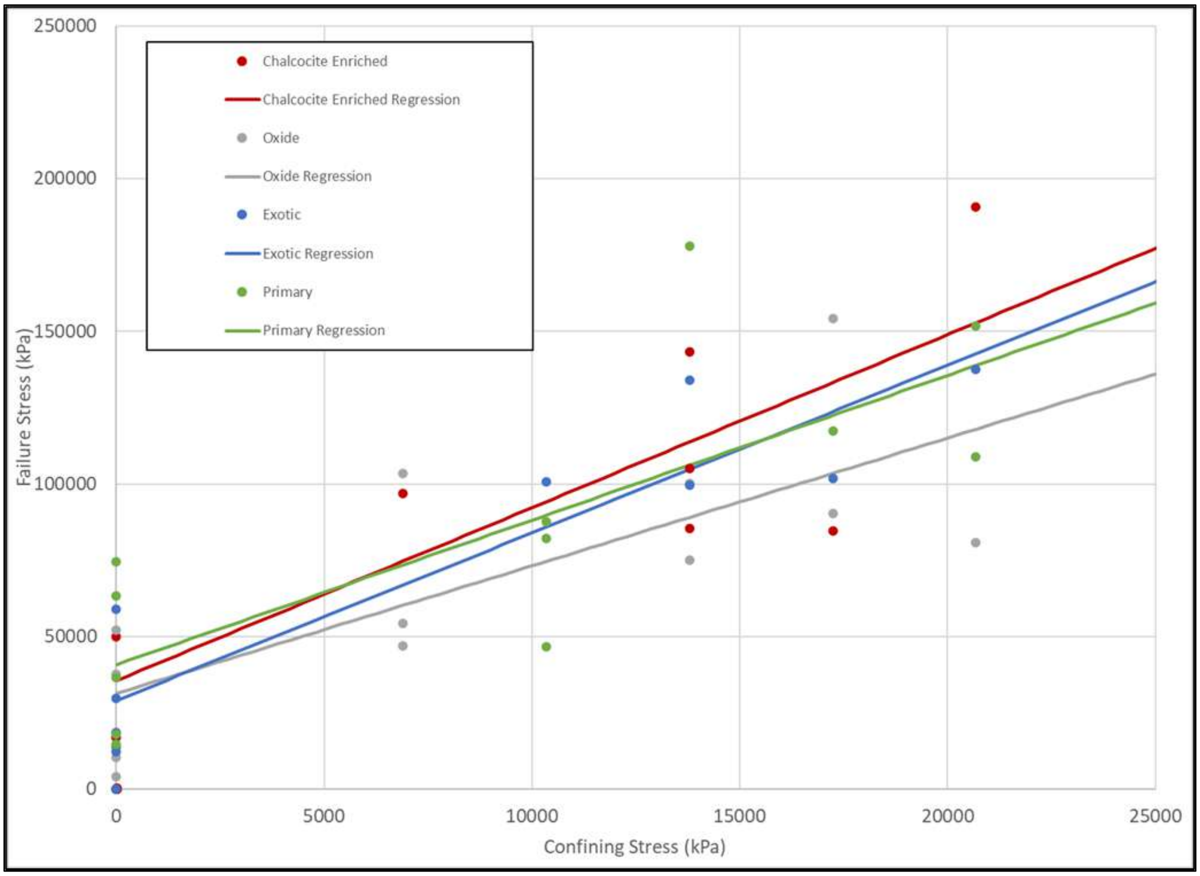
Rock Quality Type	Mineral Domain	Minimum	Q1	Q2	Q3	Maximum
Above -150						
RQD	All	11.02	37.21	50.12	61.81	88.95
	Exotic	11.02	22.64	28.58	34.66	67.13
	Oxide	13.75	41.29	53.28	61.94	84.24
	Chalcocite-Enriched	68.23	81.22	83.45	87.93	88.95
	Hypogene\Primary	15.68	37.42	49.74	64.05	81.81
Q'	All	0.07	0.96	1.57	2.74	14.73
	Exotic	0.07	0.20	0.39	0.59	2.81
	Oxide	0.21	1.15	1.71	2.81	10.43
	Chalcocite-Enriched	3.77	6.85	6.99	7.37	14.73
	Hypogene\Primary	0.16	0.98	1.61	2.71	6.56
GSI	All	20.57	43.60	48.04	53.08	68.21
	Exotic	20.57	29.69	35.53	39.25	53.31
	Oxide	29.91	45.28	48.84	53.29	65.10
	Chalcocite-Enriched	55.95	61.32	61.50	61.97	68.21
	Hypogene\Primary	27.73	43.82	48.27	52.96	60.93
-150 to -240						
RQD	All	11.94	55.62	67.21	76.20	93.83
	Exotic	17.46	37.44	47.30	57.35	74.58
	Oxide	11.94	54.30	65.77	75.10	92.51
	Chalcocite-Enriched	35.60	64.87	73.29	79.25	93.34
	Hypogene\Primary	17.19	52.11	67.92	77.13	93.83
Q'	All	0.10	2.00	4.02	5.74	14.94
	Exotic	0.10	0.46	0.80	1.39	5.94
	Oxide	0.15	1.85	3.84	5.52	14.04
	Chalcocite-Enriched	0.87	3.65	5.06	6.74	14.94
	Hypogene\Primary	0.32	1.86	3.67	5.99	11.93
GSI	All	22.91	50.22	56.53	59.72	68.34
	Exotic	22.91	37.03	41.98	46.94	60.01
	Oxide	26.93	49.53	56.11	59.38	67.78
	Chalcocite-Enriched	42.77	55.66	58.60	61.17	68.34
	Hypogene\Primary	33.66	49.56	55.70	60.11	66.31
Below -240						
RQD	All	7.08	37.98	50.01	61.48	90.16
	Exotic	12.31	31.74	52.23	63.35	84.00
	Oxide	7.08	43.69	56.06	65.60	90.16
	Chalcocite-Enriched	19.74	49.23	59.49	68.88	86.22
	Hypogene\Primary	9.01	33.08	42.62	52.10	87.96
Q'	All	0.09	1.28	2.28	3.88	11.57
	Exotic	0.20	0.54	1.03	1.81	7.00
	Oxide	0.13	2.09	3.43	4.51	11.57
	Chalcocite-Enriched	0.32	2.13	3.19	4.53	10.66
	Hypogene\Primary	0.09	0.95	1.48	2.52	11.57
GSI	All	22.23	46.24	51.43	56.19	66.04
	Exotic	29.29	38.52	44.22	49.32	61.51
	Oxide	25.50	50.63	55.09	57.56	66.04
	Chalcocite-Enriched	33.86	50.78	54.44	57.59	65.30
	Hypogene\Primary	22.23	43.54	47.54	52.33	65.91

Source: CNI, 2023

At the time that the PEA block model was created, there were insufficient drill data within East Ridge to confidently interpolate rock quality. As a result, a nominal value of Q' = 0.8 was utilized for span analyses at East Ridge based on data from Drillhole SCC-118, which is similar to the median value of the Exotic mineralization domain at Santa Cruz.

Rock Strength

Most mining is planned in the mineralized domains of the Oracle Granite, and as a result, these mineral domains were the focus of the laboratory testing campaign. Figure 16-7 presents a summary of intact rock strengths based on UCS and TCS testing. While all mineral domains are similar in intact strength, the chalcocite-enriched and primary mineral domains demonstrate slightly superior intact strength.



Source: CNI, 2023

Figure 16-7: Intact Rock Strength Summary

Rock mass strengths were evaluated by applying a linear approximation to a Hoek-Brown strength envelope using laboratory strength data and modeled rock quality (GSI) data; this was done to determine linear rock mass strengths for use in pillar stability analyses. Table 16-10 presents the results. Confining stress (σ3max) was limited to a nominal 70% of the mining depth by target and assumes σ3=σ1.

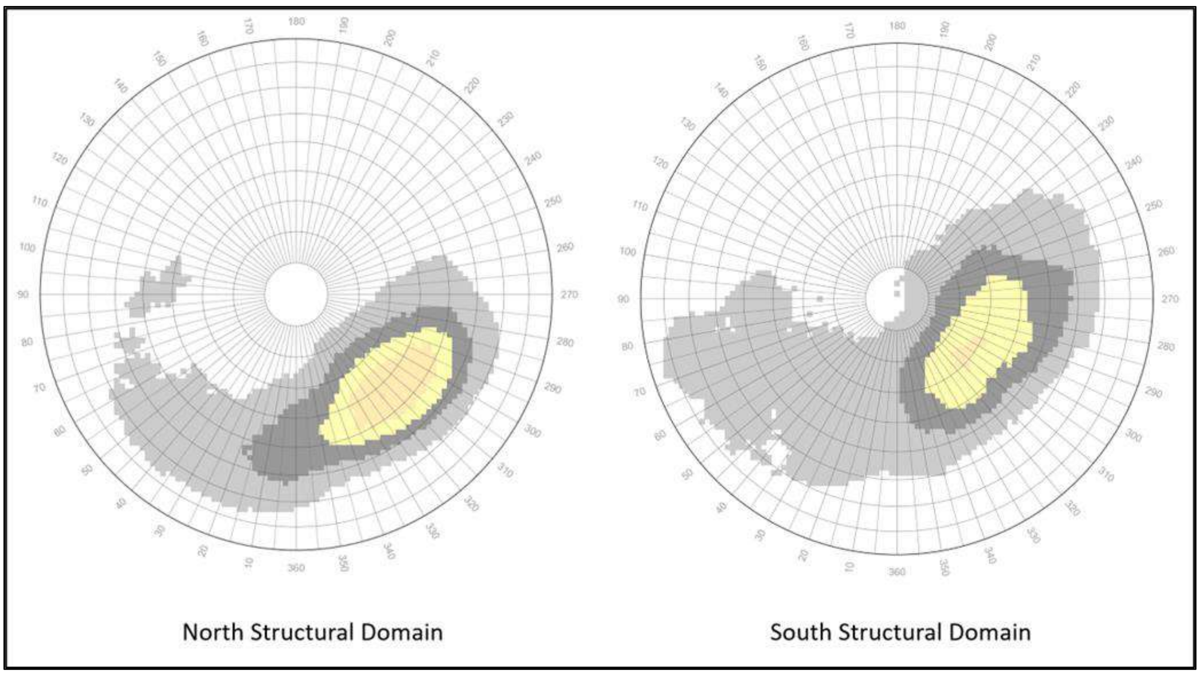
Table 16-10: Santa Cruz Rock Mass Strength by Mineral Domain Summary

Domain	Exotic	Oxide	Chalcocite-Enriched	Primary
Number of samples	10	12	8	12
UCS (megapascals (MPa))	27.0	27.0	33.4	40.1
mi	22.4	14.3	20.4	13.3
GSI (75% reliability)	37.5	52.3	55.0	46.6
σ3max (MPa)*	11.8	14.1	14.1	14.1
Friction angle, Φ (°)	29.1	28.2	33.8	29.2
Cohesion (MPa)	2.09	2.51	3.14	2.59

Source: CNI, 2023
*Based on 500 m depth for Exotic, 700 m depth for all others

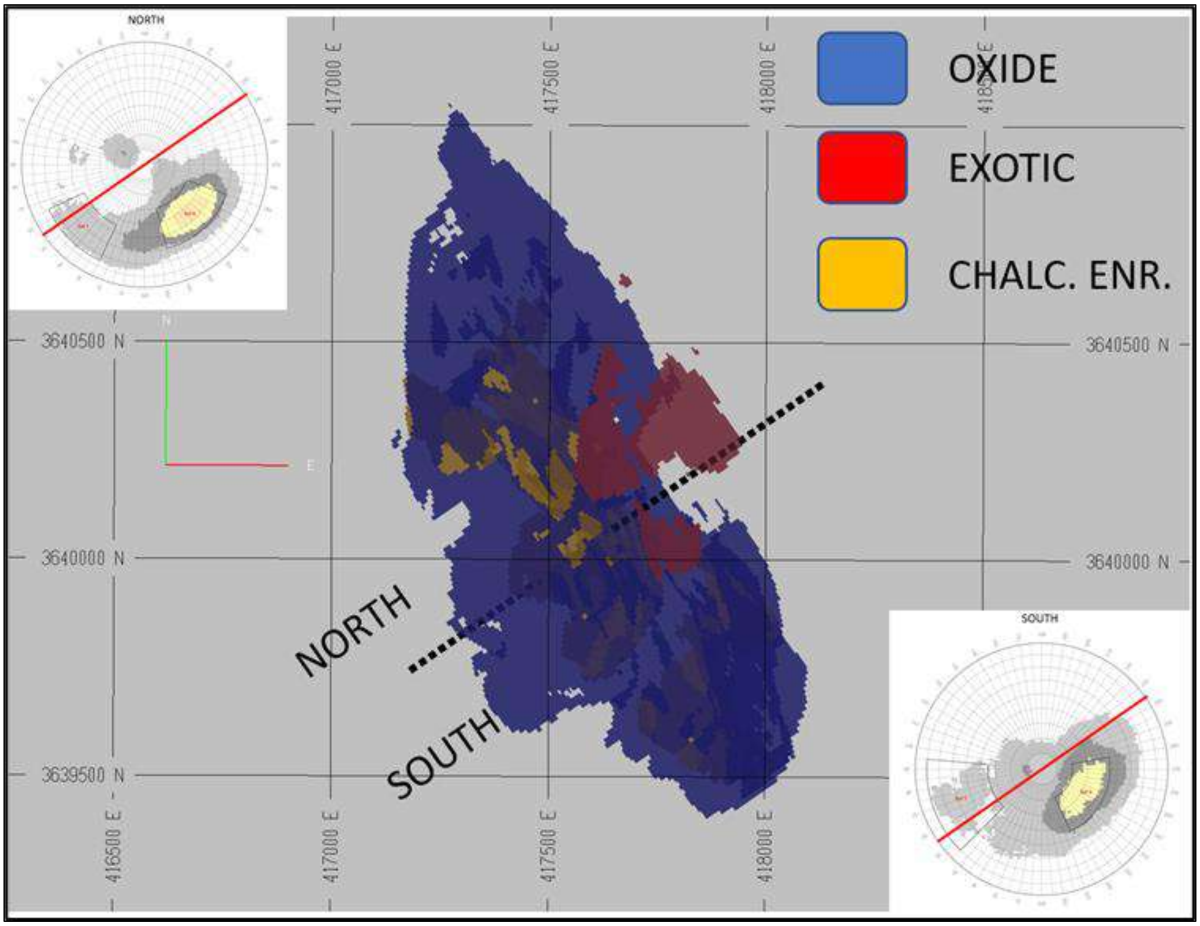
Rock Joint Fabric

Joint orientation data from drillholes was collected using ATV survey data. Figure 16-8 presents lower hemisphere, equal area Schmidt nets, which indicate that the deposit can be divided into two dominant structural domains including north and south structural domains. While joint orientations are similar across the entirety of the Project, a slight rotation and change in inclination was identified in the southern structural domain which influences stope sidewall stability. Figure 16-9 presents the estimated division of the north and south structural domains.



Source: CNI, 2023

Figure 16-8: North and South Structural Domain Stereonets



Source: CNI, 2023

Figure 16-9: North and South Structural Domains

16.2.5 Engineering Analysis

Santa Cruz will utilize LHS with PBF for all Oxide and Chalcocite-Enriched targets, and DAF for all Exotic targets. At East Ridge, DAF with jammed CRF will be utilized.

Longhole Stope Analysis

The LHS method requires a top cut, which is used as a drilling platform, and a bottom cut, which is used as a mucking level. The pillar between the top cut and the bottom cut is excavated by initiating a small vertical opening (slot raise) and then by line blasts that progressively open up a large excavation with four walls (two side walls and two end walls) and a back (roof). All ore is drawn from the bottom cut sublevel. Backfill is placed to fill the void space. Backfilled pillars can then be used as the sidewalls for subsequent secondary stopes. Stopes that have total strike lengths in excess of their stable length can be paneled such that consolidated backfill is placed once the stope is at its maximum stable length. Subsequent panels can be re-slotted against the poured backfill, and stoping can recommence until the entire strike length of the stope has been mined. Risks associated with subsidence are generally eliminated due to the placement of backfill in the completed stopes.

<u>Stability Graph Method for Stoping Dimensions</u>

The Mathews stability graph method (1980) was used to evaluate stope dimensions. This method is an empirical design tool based on case histories from hard rock mines that typically have good to very good quality rock.

The stability graph method accounts for key factors influencing open stope design, including rock mass strength and structure, stresses surrounding the opening, and the shape and orientation of the stope. The method is based on two calculated factors: modified stability number (N') and hydraulic radius (S). The stability number (N') is comprised of the following components:

$$N' = Q' * A * B * C$$

where:

Q' = Modified Q tunneling quality index

A = Rock stress factor

B = Joint orientation factor

C = Gravity adjustment factor

The hydraulic radius (S) is calculated as follows:

S = (area of stope face – square meters) / (perimeter of stope face - meters)

N' and S values are used to classify the excavations as one of the following:

- Stable zone
- Stable without support
- Stable with support
- Supported transition zone
- Caving zone

The analysis assumes the following:

- The horizontal in situ stresses are less than the vertical in situ stress (a stress ratio, k, of 0.8), which has been measured at other underground mining projects in southern Arizona
- Mining depths down to 1,000 m
- Q' based on the 75% reliability values from modeled blocks within each 30 m mining level by mineral domain as presented in Table 16-8
- Stopes oriented in west-to-east (090 azimuth) alignment
- Flat stope backs and vertical stope walls
- Stope walls that are oriented oblique to the primary joint orientation. The south domain has less dominant jointing parallel to the stope side walls, which is advantageous for stope lengths.
- A nominal UCS of 34.5 MPa
- 10 m width (based on end wall stability) and 30 m height for all stopes. Wider and/or taller stope dimensions were considered; however, this results in an excessive frequency of end walls within the transition or caving zone.

<u>Mathews Stability Graph Results</u>

Each mining sublevel was analyzed to predict maximum stable stope configurations by mineral domain. The stability charts updated by Hutchinson and Diederichs (1996) were utilized for all stope dimension evaluations. For non-supported surfaces (such as end walls and side walls), it is recommended that the upper boundary of the transition zone between stable and caving cases be used for design (Hutchinson and Diederichs, 1996). For stope backs, the stability number was plotted to the stable with support line and assumes effective cable bolt support across the stope spans. Stopes were optimized for length for each 30 m stope sublevel while maintaining constant stope widths. With effective support installed within stope backs, stability is controlled by sidewall dimensions. Table 16-11, Table 16-12, Figure 16-10, and Figure 16-11 present results of the Mathews stability graph analyses for side and end walls for the North and South domains.

Table 16-11: Stability Graph Results, North Domain

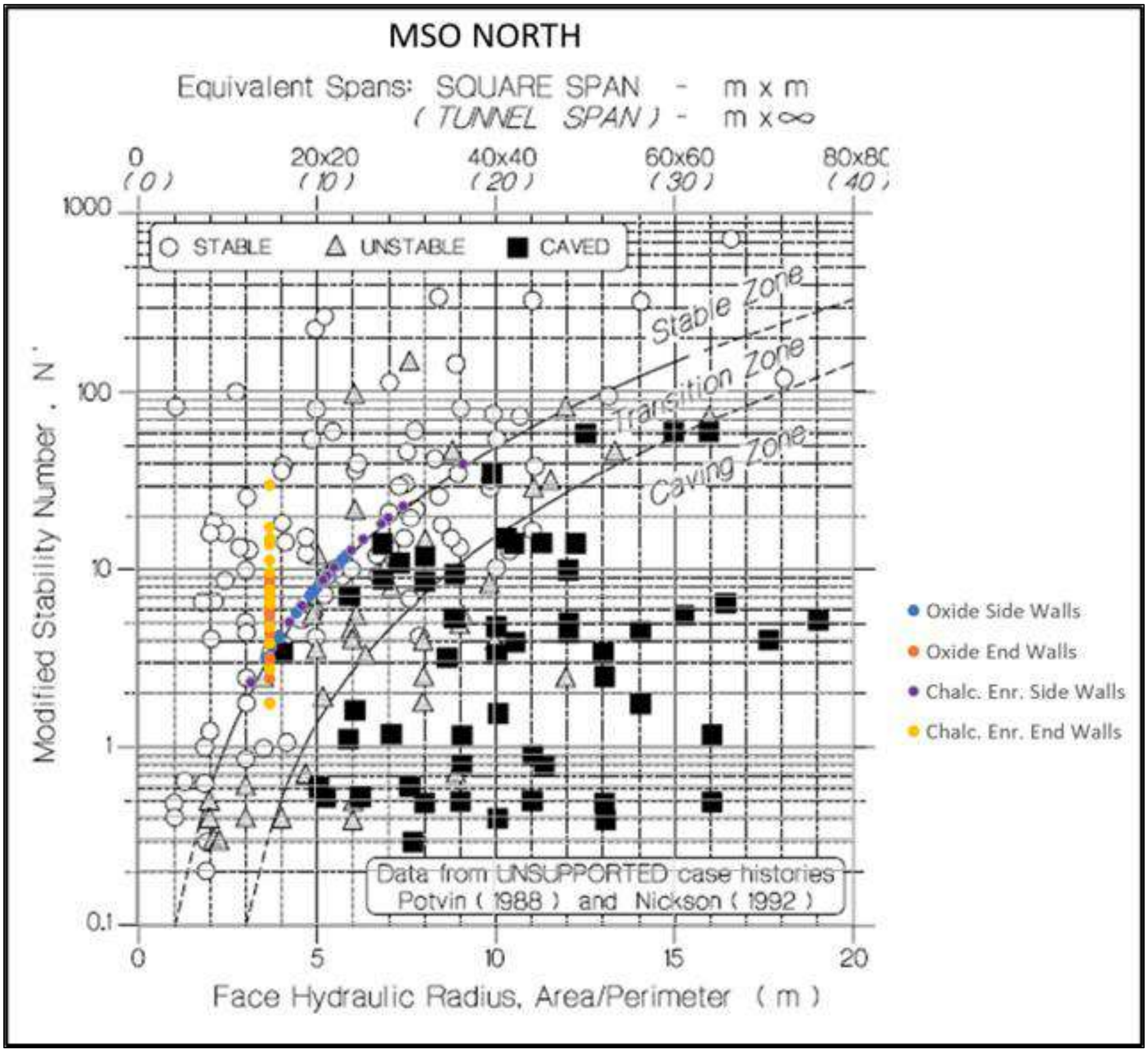
Muck Level	North Domain											
	Stability Number (N')						Maximum Hydraulic Radius (m)					
	Oxide			Chalcocite-Enriched			Oxide			Chalcocite-Enriched		
	Backs	Side Walls	End Walls	Backs	Side Walls	End Walls	Backs	Side Walls	End Walls	Backs	Side Walls	End Walls
60	0.03	4.15	3.15				4.76	4.01	3.63			
30	0.02	2.29	1.74				4.71	3.23	2.92			
0	0.03	4.01	3.05				4.75	3.97	3.59			
-30	0.02	3.15	2.39				4.73	3.63	3.28			
-60	0.03	4.97	3.77				4.78	4.29	3.88			
-90	0.04	6.13	4.65	0.27	38.95	29.58	4.81	4.63	4.19	5.47	9.12	8.25
-120	0.05	6.98	5.30	0.27	39.06	29.67	4.83	4.86	4.39	5.47	9.13	8.26
-150	0.06	8.79	6.68	0.16	22.53	17.11	4.87	5.29	4.78	5.18	7.46	6.75
-180	0.06	7.78	5.91	0.15	18.33	13.92	4.87	5.05	4.57	5.14	6.92	6.26
-210	0.08	10.18	7.73	0.15	19.27	14.64	4.94	5.58	5.04	5.16	7.05	6.37
-240	0.09	11.88	9.02	0.14	17.83	13.54	4.98	5.90	5.34	5.13	6.85	6.19
-270	0.07	7.37	5.60	0.09	10.04	7.62	4.89	4.96	4.48	4.97	5.55	5.02
-300	0.07	8.18	6.22	0.08	8.74	6.64	4.91	5.15	4.66	4.93	5.28	4.77
-330	0.08	9.32	7.08	0.06	6.14	4.66	4.95	5.40	4.88	4.85	4.64	4.19
-360	0.09	8.21	6.23	0.09	8.35	6.34	4.96	5.16	4.66	4.96	5.19	4.69
-390	0.09	8.27	6.28	0.13	12.56	9.54	4.96	5.17	4.67	5.10	6.02	5.45
-420	0.08	7.45	5.66	0.15	14.48	11.00	4.93	4.98	4.50	5.16	6.35	5.74
-450	0.07	5.59	4.25	0.11	9.02	6.85	4.90	4.48	4.05	5.04	5.34	4.83
-480	0.13	10.61	8.06	0.11	8.60	6.53	5.11	5.66	5.12	5.03	5.24	4.74
-510	0.14	11.11	8.44	0.06	4.95	3.76	5.12	5.76	5.21	4.88	4.28	3.87
-540	0.12	7.41	5.63	0.06	3.56	2.71	5.05	4.97	4.49	4.85	3.80	3.43
-570	0.14	8.99	6.83	0.04	2.27	1.72	5.13	5.33	4.82	4.78	3.22	2.91
-600	0.14	8.67	6.58				5.11	5.26	4.76			
-630												

Source: CNI, 2023

Table 16-12: Stability Graph Results, South Domain

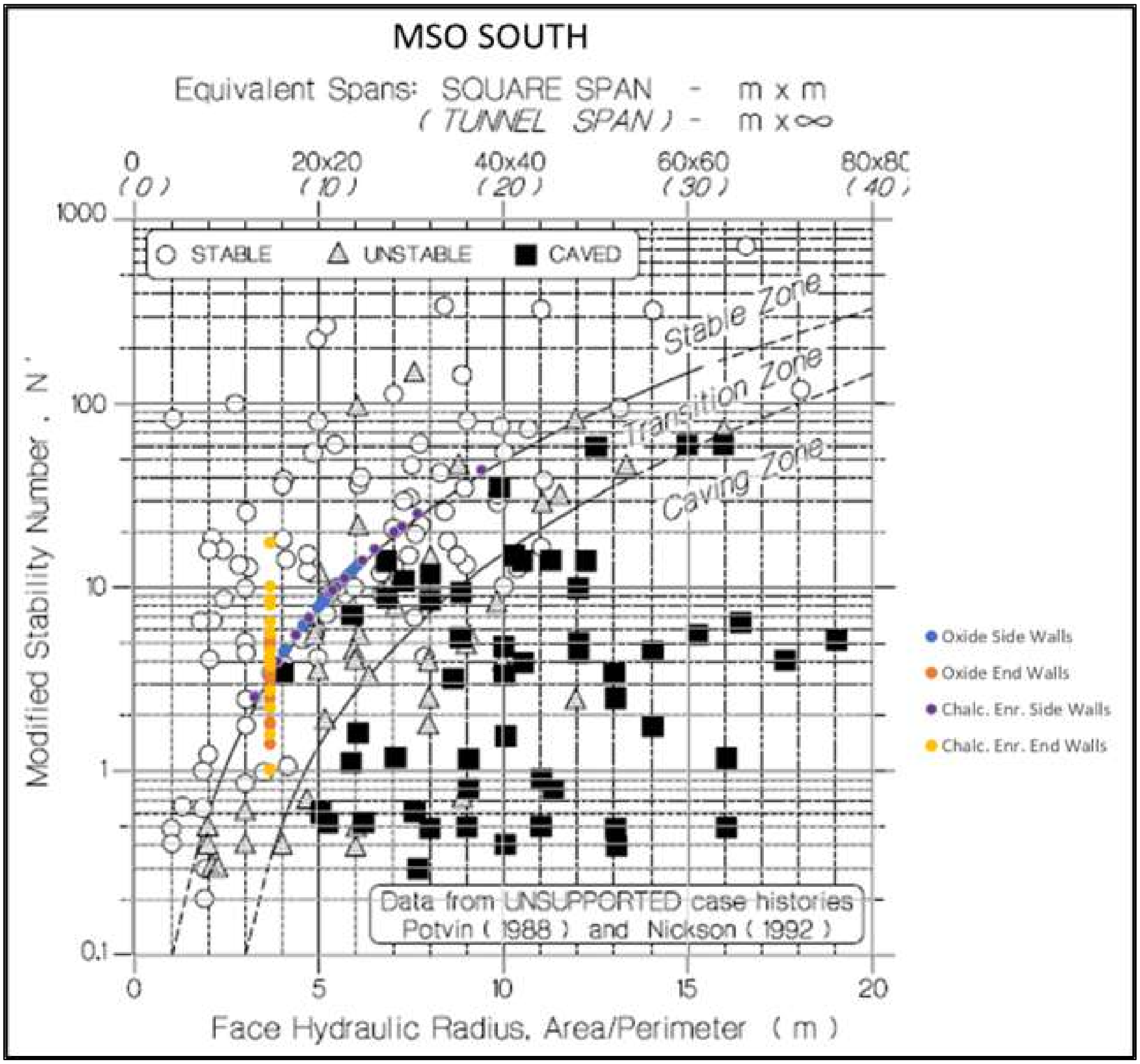
Muck Level	South Domain											
	Stability Number (N')						Maximum Hydraulic Radius (m)					
	Oxide			Chalcocite-Enriched			Oxide			Chalcocite-Enriched		
	Backs	Side Walls	End Walls	Backs	Side Walls	End Walls	Backs	Side Walls	End Walls	Backs	Side Walls	End Walls
60	0.03	4.57	1.84				4.76	4.16	2.98			
30	0.02	2.52	1.02				4.71	3.35	2.40			
0	0.03	4.42	1.78				4.75	4.11	2.94			
-30	0.02	3.46	1.39				4.73	3.76	2.69			
-60	0.03	5.47	2.20				4.78	4.44	3.18			
-90	0.04	6.75	2.71	0.27	42.90	17.26	4.81	4.80	3.44	5.47	9.45	6.77
-120	0.05	7.69	3.09	0.27	43.01	17.30	4.83	5.03	3.61	5.47	9.46	6.78
-150	0.06	9.68	3.90	0.16	24.81	9.98	4.87	5.48	3.92	5.18	7.73	5.54
-180	0.06	8.56	3.45	0.15	20.18	8.12	4.87	5.24	3.75	5.14	7.17	5.14
-210	0.08	11.21	4.51	0.15	21.23	8.54	4.94	5.78	4.14	5.16	7.30	5.23
-240	0.09	13.08	5.26	0.14	19.63	7.90	4.98	6.12	4.38	5.13	7.10	5.08
-270	0.07	8.12	3.27	0.09	11.05	4.45	4.89	5.14	3.68	4.97	5.75	4.12
-300	0.07	9.01	3.63	0.08	9.62	3.87	4.91	5.34	3.82	4.93	5.46	3.91
-330	0.08	10.27	4.13	0.06	6.76	2.72	4.95	5.60	4.01	4.85	4.80	3.44
-360	0.09	9.04	3.64	0.09	9.20	3.70	4.96	5.34	3.83	4.96	5.37	3.85
-390	0.09	9.11	3.66	0.13	13.83	5.56	4.96	5.36	3.84	5.10	6.24	4.47
-420	0.08	8.20	3.30	0.15	15.95	6.42	4.93	5.15	3.69	5.16	6.58	4.71
-450	0.07	6.16	2.48	0.11	9.94	4.00	4.90	4.64	3.32	5.04	5.53	3.96
-480	0.13	11.68	4.70	0.11	9.47	3.81	5.11	5.87	4.20	5.03	5.43	3.89
-510	0.14	12.24	4.92	0.06	5.45	2.19	5.12	5.97	4.28	4.88	4.44	3.18
-540	0.12	8.16	3.28	0.06	3.92	1.58	5.05	5.15	3.69	4.85	3.93	2.82
-570	0.14	9.90	3.98	0.04	2.50	1.00	5.13	5.52	3.96	4.78	3.33	2.39
-600	0.14	9.55	3.84				5.11	5.45	3.90			
-630												

Source: CNI, 2023



Source: CNI, 2023

Figure 16-10: North Domain Stability Graph Results (10 m Wide, 30 m High)



Source: CNI, 2023

Figure 16-11: South Domain Stability Graph Results (10 m Wide, 30 m High)

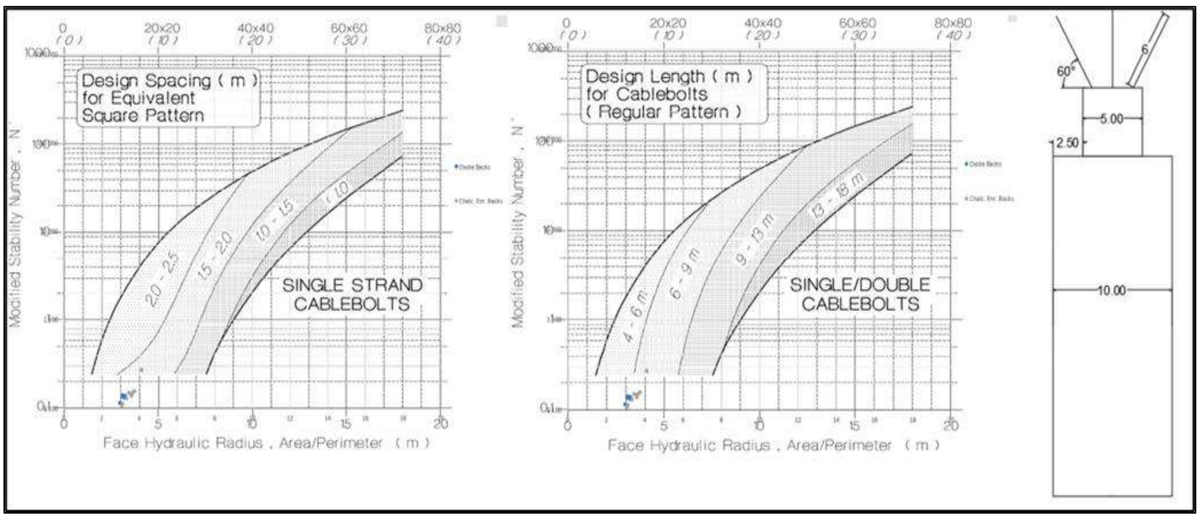
<u>Ground Support for Stopes and Production Headings</u>

To maintain back stability, cable bolt support in addition to primary support is required for all stope backs. Based on the empirical charts by Hutchinson and Diederichs, cables (single strand) should be spaced on a nominal 2 m square pattern and should be a minimum of 6 m in length. Table 16-13 presents a summary of ground support for stope top cuts. Figure 16-12 presents an example of stope cable support.

Table 16-13: Stope and Production Headings Ground Support

Primary/ Secondary	Support Category	Q value	Estimated RMR_{76}\ GSI	% of MSO Shapes	Advance Length (m)	Support Type
Primary support	Category 1	>1.0	>44	83	3*	2.4 m #7 rebar** on 1.2 m x 1.2 m spacing with welded mesh (10 cm/6 Ga.) to within 1.5 m of sill
	Category 2	0.7 to 1.0	<44	17	2.5	2.4 m #7 rebar** on 1.2 m x 1.2 m spacing with welded mesh (10 cm/6 Ga.) and 5 cm of shotcrete to within 1.5 m of sill
Secondary support	All stope top cuts					6.0 m cable bolts (single strand) on 2.0 m x 2.0 m spacing in the backs (minimum three each per row); installed prior to stoping

Source: CNI, 2023
cm = centimeter
4 m advances are possible when Q > 3.0; estimated 45% of MSO shape
**12-ton capacity inflatable friction bolts are acceptable alternative to rebar in headings with <1 year service life
***Stoping not recommended in areas with Q < 0.7
RMR_{76}: Bieniawski's rock mass rating system



Source: CNI, 2023

Figure 16-12: Cable Bolt Support

<u>Dilution Estimates Using the ELOS Method</u>

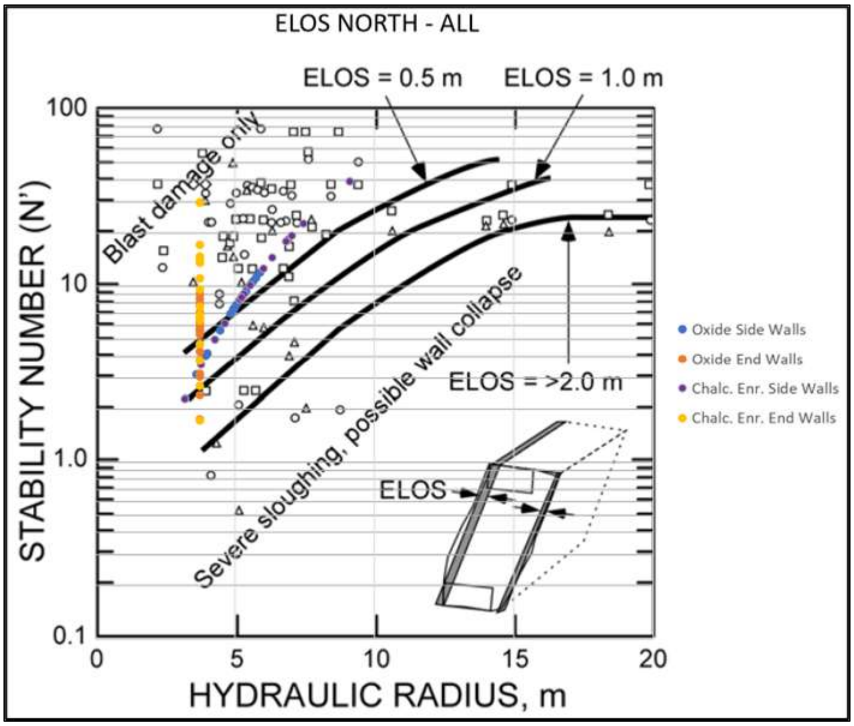
The equivalent length of overbreak was estimated using the ELOS chart (Clark and Pakalnis, 1997). The ELOS chart is an extension of the Mathews stability graph, using empirical evidence to estimate the amount of overbreak for different ground conditions at varying hydraulic radii. Intentionally mining stopes of poorer rock quality at widths beyond their stable configuration will lead to additional sloughing. The ELOS method is widely used to predict dilution in LHS mining.

Table 16-14 presents the ELOS design zones. Dilution estimates based on the ELOS design zones were predicted by mineral domain and stope level at the specified dimension. Dilution estimates are presented in Table 16-6 and plotted on Figure 16-13 and Figure 16-14 for the North and South structural domains, respectively.

Table 16-14: ELOS Design Zones

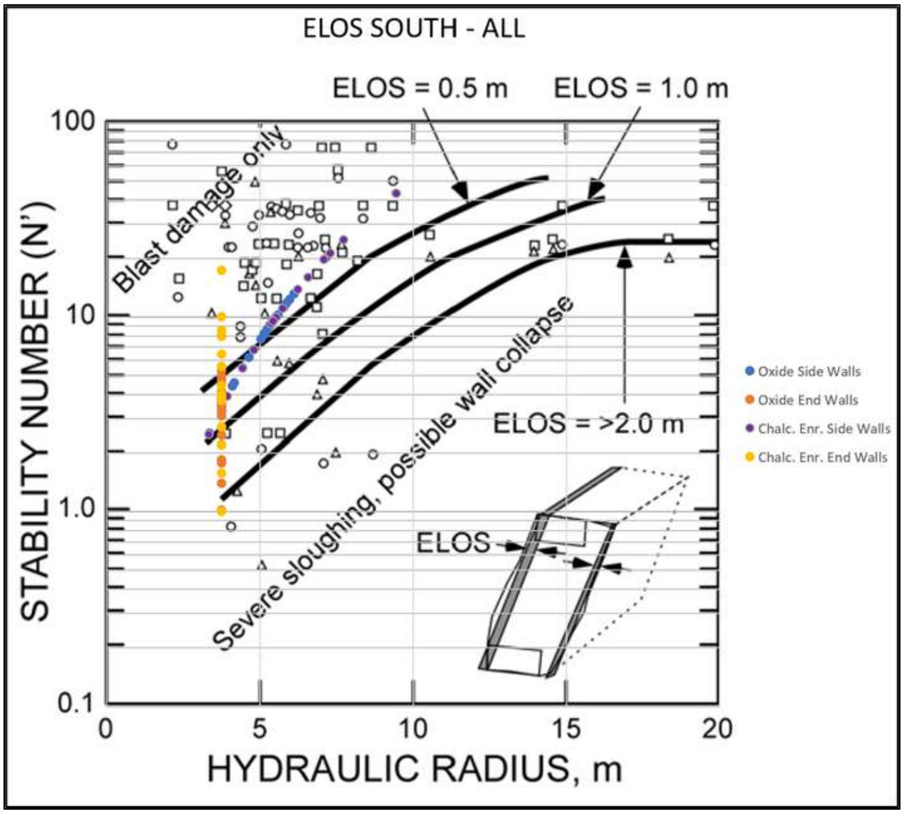
ELOS Range	ELOS Design Zones
ELOS < 0.5 m	Blast damage only; surface is self-supporting.
ELOS = 0.5 to 1.0 m	Minor sloughing; some failure from unsupported stope wall should be anticipated before a stable shape configuration is achieved.
ELOS = 1.0 to 2.0 m	Moderate sloughing; significant failure from unsupported stope wall is anticipated before reaching stable shape configuration.
ELOS > 2.0 m	Severe sloughing; large failures from unsupported stope wall should be anticipated. Wall collapse is possible.

Source: CNI, 2023



Source: CNI, 2023

Figure 16-13: North Domain ELOS Estimates (10 m Wide, 30 m High)

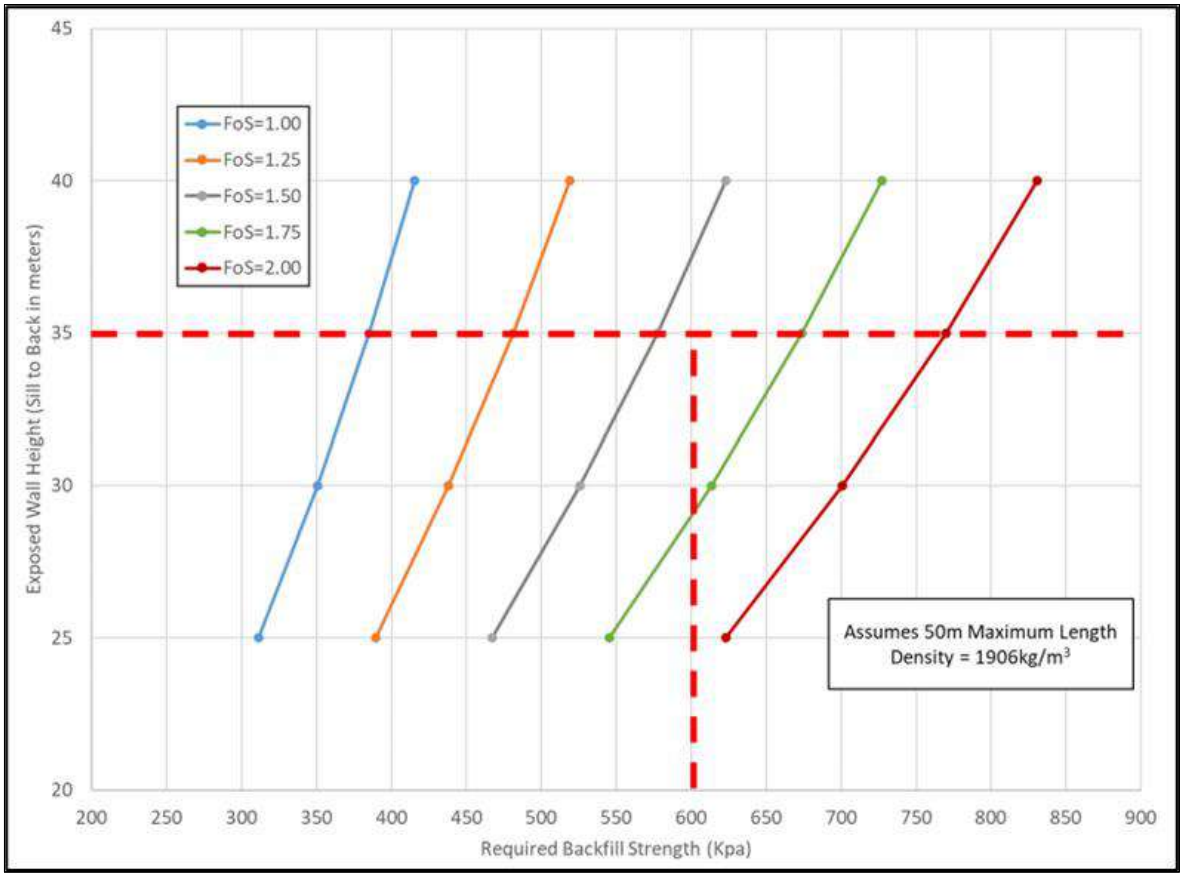


Source: CNI, 2023

Figure 16-14: South Domain ELOS Estimates (10 m Wide, 30 m High)

PBF

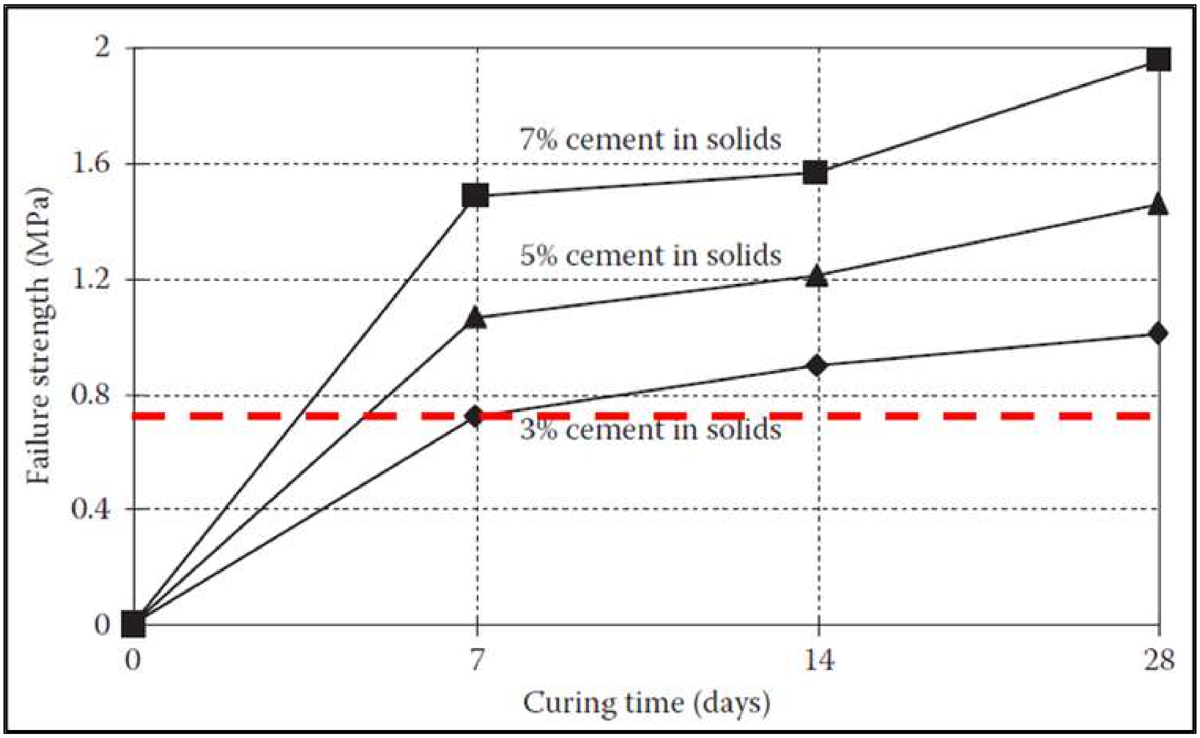
Stope panels will be backfilled with PBF delivered via a reticulation system. The purpose of the PBF is to support and confine the sidewalls of primary stopes and allow rapid cure so that stope panels can be re-slotted against PBF endwalls. Consequently, the PBF must remain stable at a full vertical stope height when adjacent secondary stopes are opened, or when re-slotting a stope panel. PBF strength estimates by stope height were calculated using the frictionless wedge model proposed by Mitchell et al. and are presented on Figure 16-15. Assuming a 35 m total exposed wall height, 600 kPa are required to achieve a 1.5 factor of safety (FoS).



Source: CNI, 2023

Figure 16-15: PBF Strength Estimates

An estimated 3% cement in solids will be required to achieve the strength target, as presented on Figure 16-16 (Saw, Villaescusa, 2011); this should allow for sufficient cure (7 days) in the case that a stope panel is backfilled and the subsequent panel is being re-slotted against the cured fill. Laboratory testing on Santa Cruz tailings materials is ongoing to verify adequacy for PBF usage.



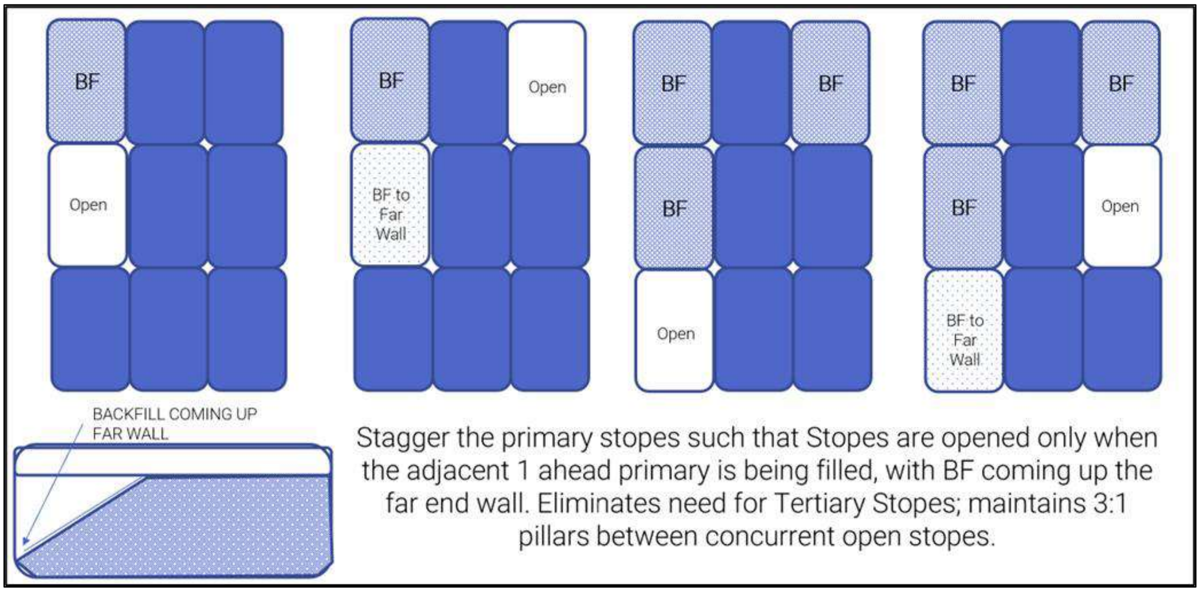
Source: CNI, 2023

Figure 16-16: Cement in Solids Estimate

Some secondary stopes will not be exposed for re-slotting or adjacent mining and as a result do not need to achieve a free-standing strength criterion. In these cases, a minimum 2% to 3% binder is necessary to prevent liquefaction. To be suitable for trafficability (mobile equipment operating atop the fill), a capping fill strength of 500 kPa is required for the uppermost nominal 5 m.

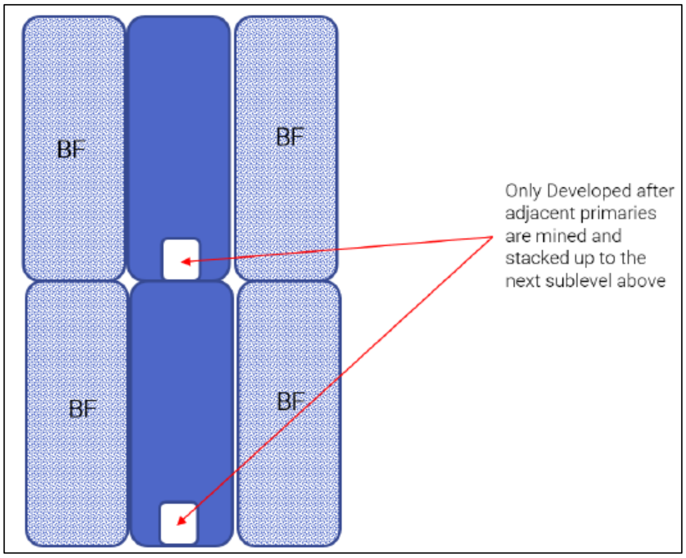
<u>Dilution Estimates Using the ELOS Method</u>

A staggered 1-3-5 sequence will be utilized, as presented on Figure 16-17. The sequence offers the advantage of allowing several primary stopes to be mined simultaneously, which increases productivity. To maintain pillar stability, both sides of a pillar cannot be mined simultaneously. Stopes should be staggered such that panels are backfilled before opening the nearest stope in section. By utilizing this sequence with a staggered leading panel, a 3x pillar width (of rock or backfill) is maintained between concurrently open stope panels. Furthermore, one full stope sublevel must be mined above a secondary pillar before recovering it. Stope top cut and bottom cut development cannot commence until the adjacent stopes are filled to the entire vertical extent (Figure 16-18). As the stope sequence progresses, mining-induced stress redistributions will occur, which may be detrimental to later stage stope recovery and accesses.



Source: CNI, 2023
*BF = Back Filled

Figure 16-17: Staggered 1-3-5 Sequence Plan View

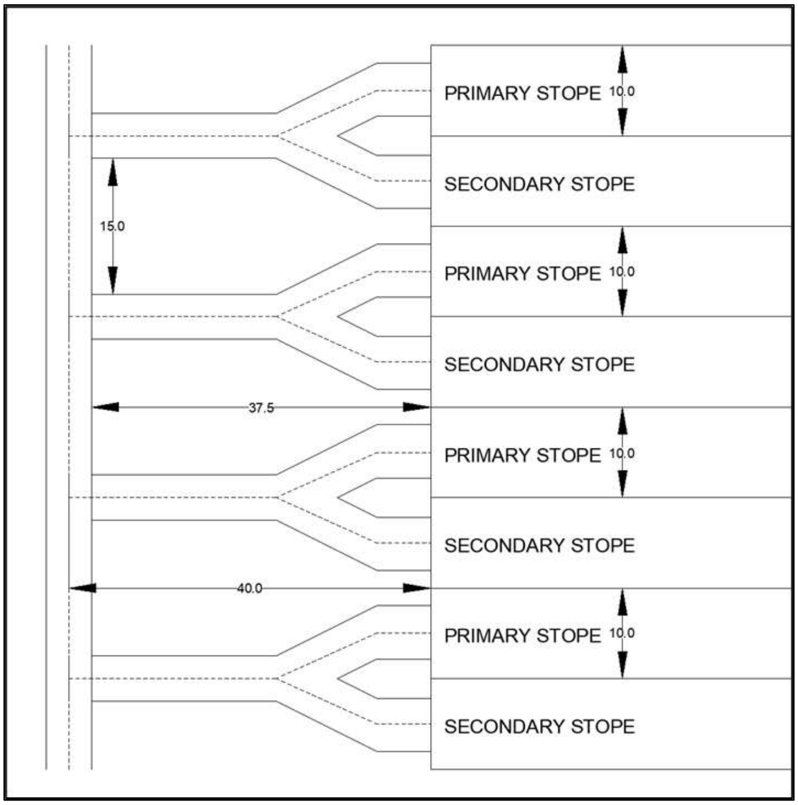


Source: CNI, 2023
*BF = Back Filled

Figure 16-18: 1-3-5 Sublevel Vertical Sequence Section View

Access Pillars and Sill Pillars

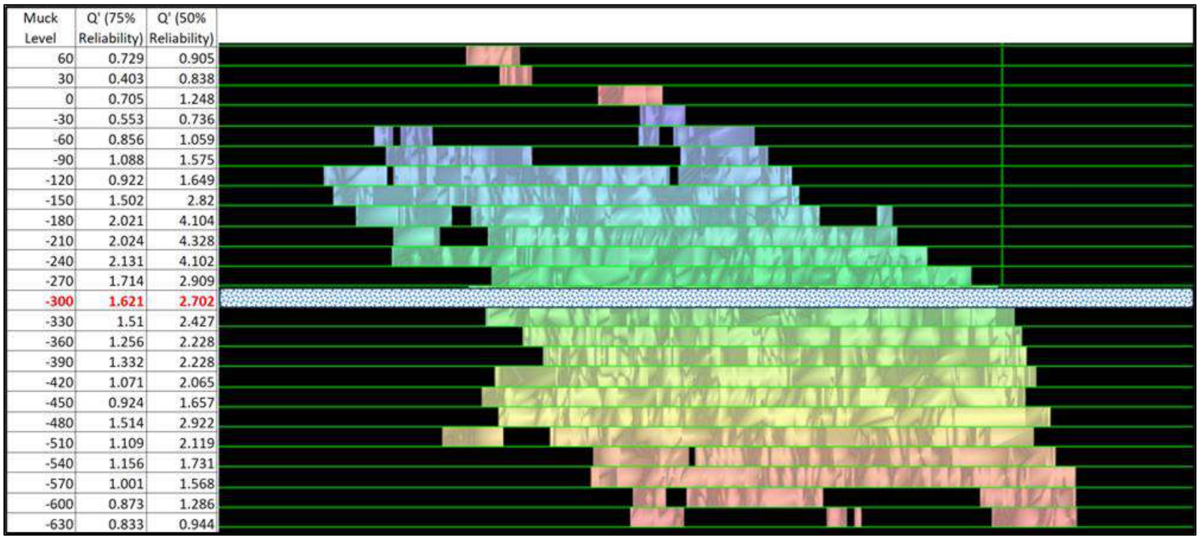
Level haulage should be set back at least 40 m (to haulage centerline) from the nearest stope brow, as presented on Figure 16-19. Access should be shared between the primary stope and an adjacent secondary stope in order to maintain sufficient rock pillar between the accesses, stopes, and haulage to accommodate abutment loadings. Pillar stability was evaluated using Wilson's confined core method of pillar stability (1972).



Source: CNI, 2023

Figure 16-19: Haulage Setback Minimum Distances

As presented on Figure 16-20, a sill pillar is planned between the minus 300 to minus 270 m elevations to divide stoping blocks so that the uppermost stopes may be brought into production prior to completing development to the lower levels. The 30 m sill pillar was evaluated using Carter's scaled span method (2014). This method considers the thickness, length, and width of the sill pillar to predict stability based on rock quality. Rock quality estimates are based on the modeled blocks within the sill pillar zone, as presented in Table 16-15. Figure 16-21 presents the results of the sill pillar analysis. The resulting classifications of the sill pillar (Classes B to D) are considered acceptable provided that monitoring instrumentation is installed and individual stopes beneath the sill pillar are open for no longer than 1 year of service life based on Carter's exposure guidelines presented on Figure 16-22.



Muck Level	Q' (75% Reliability)	Q' (50% Reliability)
60	0.729	0.905
30	0.403	0.838
0	0.705	1.248
-30	0.553	0.736
-60	0.856	1.059
-90	1.088	1.575
-120	0.922	1.649
-150	1.502	2.82
-180	2.021	4.104
-210	2.024	4.328
-240	2.131	4.102
-270	1.714	2.909
-300	1.621	2.702
-330	1.51	2.427
-360	1.256	2.228
-390	1.332	2.228
-420	1.071	2.065
-450	0.924	1.657
-480	1.514	2.922
-510	1.109	2.119
-540	1.156	1.731
-570	1.001	1.568
-600	0.873	1.286
-630	0.833	0.944

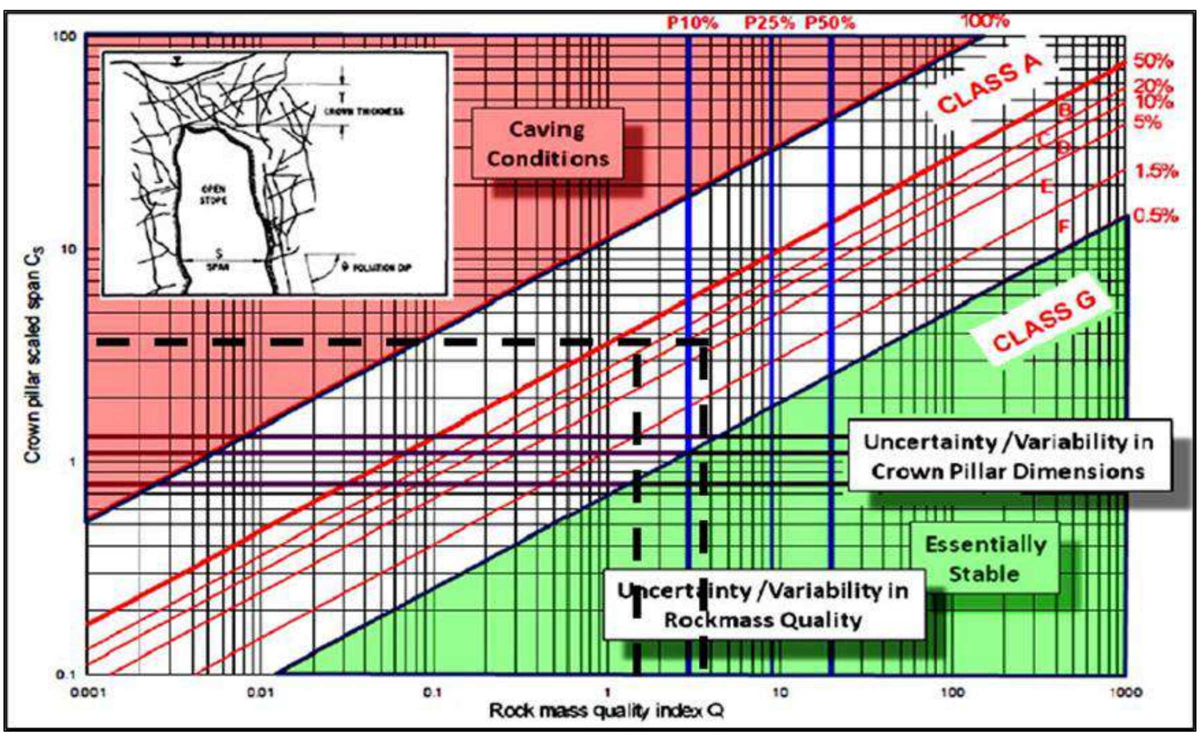
Source: CNI, 2023

Figure 16-20: Proposed Sill Pillar

Table 16-15: Sill Pillar Rock Qualities and Carter Classification

Q' Reliability		Sill Pillar Thickness (m)	FoS	Carter Class
50%	2.70	30	1.4	B
75%	1.62		1.1	D

Source: CNI, 2023



Source: CNI, 2023

Figure 16-21: Carter's Scaled Span Sill Pillar Estimate

Class	Probability of Failure %	Minimum Factor of Safety	Maximum Scaled Span, Cs (= Sc)	ESR (Barton et al. 1974)	Design Guidelines for Pillar Acceptability/Serviceable Life of Crown Pillar				
					Expectancy	Years	Public Access	Regulatory position on closure	Operating Surveillance Required
A	50 – 100	<1	$11.31Q^{0.44}$	>5	Effectively zero	< 0.5	Forbidden	Totally unacceptable	Ineffective
B	20 – 50	1.0	$3.58Q^{0.44}$	3	Very, very short-term (temporary mining purposes only ; unacceptable risk of failure for temporary civil tunnel portals	1.0	Forcibly Prevented	Not acceptable	Continuous sophisticated monitoring
C	10 – 20	1.2	$2.74Q^{0.44}$	1.6	Very short-term (quasi-temporary stope crowns ; undesirable risk of failure for temporary civil works)	2 – 5	Actively prevented	High level of concern	Continuous monitoring with instruments
D	5 – 10	1.5	$2.33Q^{0.44}$	1.4	Short-term (semi-temporary crowns, e.g.under non-sensitive mine infrastructure)	5 – 10	Prevented	Moderate level of concern	Continuous simple monitoring
E	1.5 – 5	1.8	$1.84Q^{0.44}$	1.3	Medium-term (semi-permanent crowns, possibly under structures)	15–20	Discouraged	Low to moderate level of concern	Conscious superficial monitoring
F	0.5 – 1.5	2	$1.12Q^{0.44}$	1	Long-term (quasi-permanent crowns, civil portals, near-surface sewer tunnels)	50–100	Allowed	Of limited concern	Incidental superficial monitoring
G	<0.5	>>2	$0.69\ Q^{0.44}$	0.8	Very long-term (permanent crowns over civil tunnels)	>100	Free	Of no concern	None required

Source: CNI, 2023

Figure 16-22: Carter's Scaled Span Exposure Guidelines

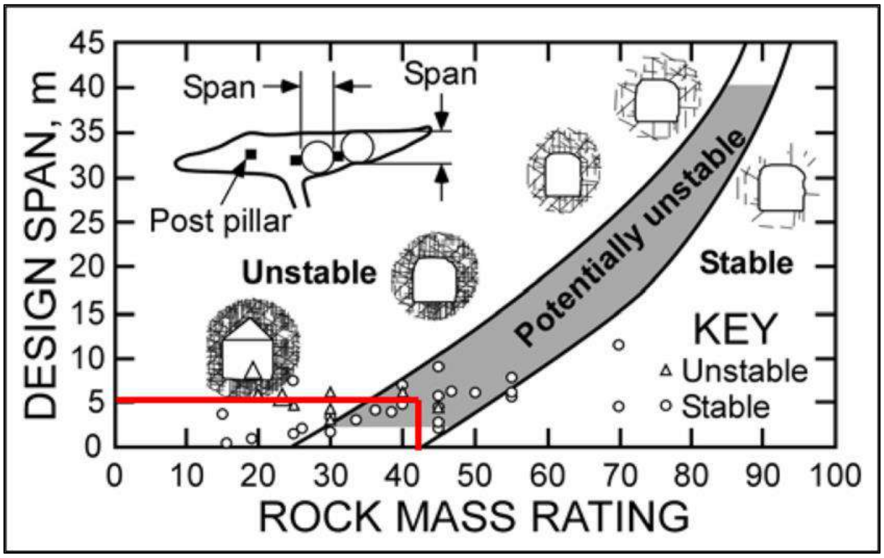
Drift and Fill Analysis

In poor rock quality or areas which do not have appropriate geometry for LHS, DAF mining will be conducted. Specific areas where DAF are to be utilized include the Exotic mineralization of Santa Cruz and East Ridge. In DAF mining, the ore zone is split into drift-sized slices or lifts. Each slice is mined and then promptly backfilled using CRF jammed tightly to the back. After jamming is completed, adjacent drifts can be mined alongside the backfilled drifts in primary-secondary-tertiary (PST) sequence. Once an entire slice horizon is depleted (typically in a chevron pattern or transverse based on the size and shape of the orebody), DAF mining can progress overhand, operating atop the jammed CRF.

Rock quality estimates of the East Ridge and Exotics mineral domains are summarized below:

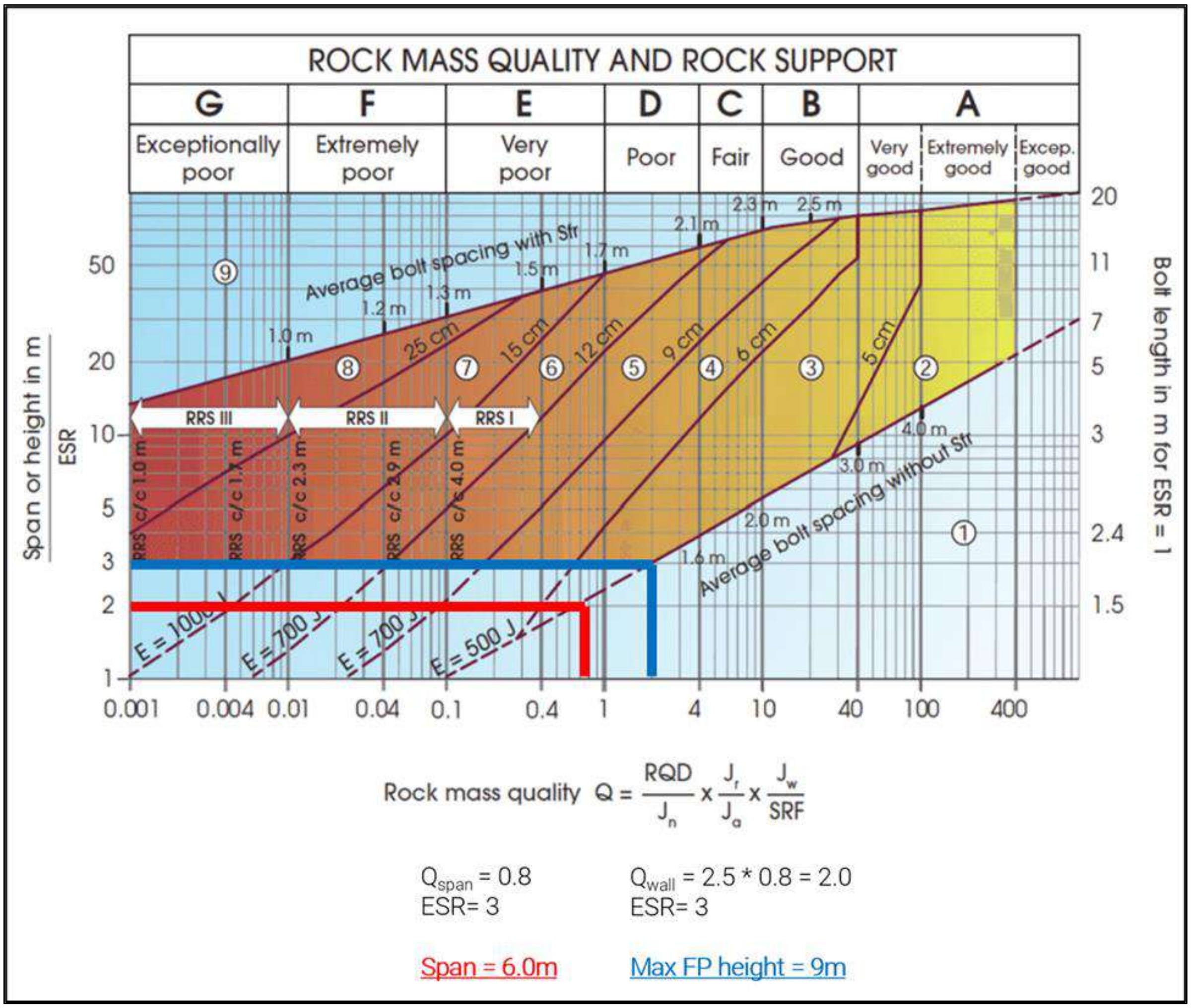
- East Ridge Q' estimate: 0.6 to 1.0 based on SCC-118 due to paucity of block model data; however, it should be noted that subsequent data (collected after the completion of the block model) from East Ridge indicates improved rock quality (RQD between 30% and 50%) within the mineralized zones.
- Exotics of Santa Cruz Q' estimate: 0.8 based on the median block model estimate from all exotic data.

For all DAF span and height estimation, Q' was estimated as 0.8, which correlates to an RMR_{76} equal to 42. Based on this RMR, a 6 m design span will be used based on the critical span curve presented on Figure 16-23 (Brady, Pakalnis et al., 2004). Drift floors can be excavated to a maximum vertical slice height of 9 m based on Grimstad and Barton's support chart (1993), which also predicts similar spans (Figure 16-24). Due to the temporary service life of each drift and narrow spans, ground support can be limited to primary support specified for production headings, as summarized in Table 16-13. Furthermore, due to the precise method of mining, dilution from overbreak is generally considered minimal.



Source: CNI, 2023

Figure 16-23: Critical Span Curve



Source: CNI, 2023

Figure 16-24: Ground Support Chart for DAF Span and Maximum Height

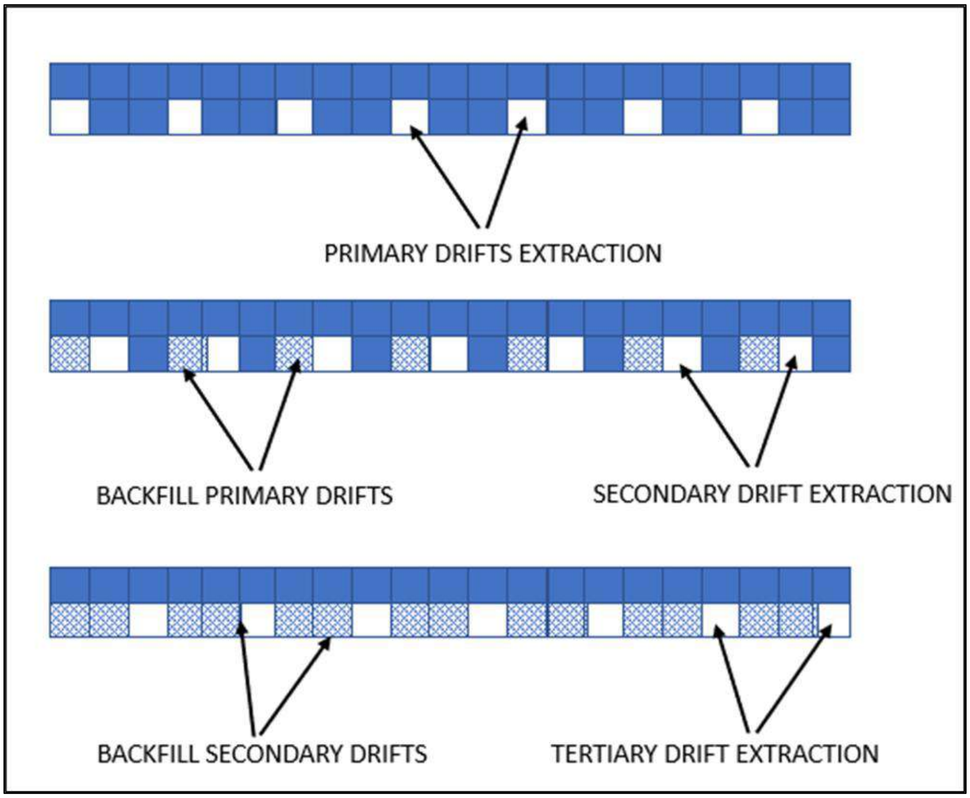
Cemented Rock Backfill

To achieve full recovery of the orebody in DAF, drifts must be carefully jammed with backfill. Cemented rock backfill can be trucked into the drifts and compacted using a rammer jammer to achieve tight filling to the back.

According to the Mitchell Solution, for a maximum 9 m-tall slice, an estimated 400 kPa are required to achieve a safety factor of 2. A nominal 3% cement binder is required to achieve adequate binder dispersion through the aggregate fill, prevent liquefaction, and be suitable for trafficking when mobile equipment is operating overhand. It is currently uncertain whether run-of-mine waste will be suitable for CRF usage at Santa Cruz. Additional investigation should be conducted to address this.

PST Sequence

The PST sequence (Figure 16-25) enables access to multiple mining faces that can be advanced simultaneously, which improves productivity along an operating level (ore slice). However, primary and secondary cuts must be jammed tightly, or tertiary cuts will likely be irrecoverable.



Source: CNI, 2023

Figure 16-25: PST DAF Mining Sequence

16.2.6 Primary Ground Support for Development

Primary ground support for development varies based on the anticipated ground conditions estimated from the geotechnical block model. Table 16-16 summarizes the ground support specifications for permanent development, which includes four discrete ranges of ground conditions specified by Q'.

Table 16-16: Primary Ground Support for Permanent Development

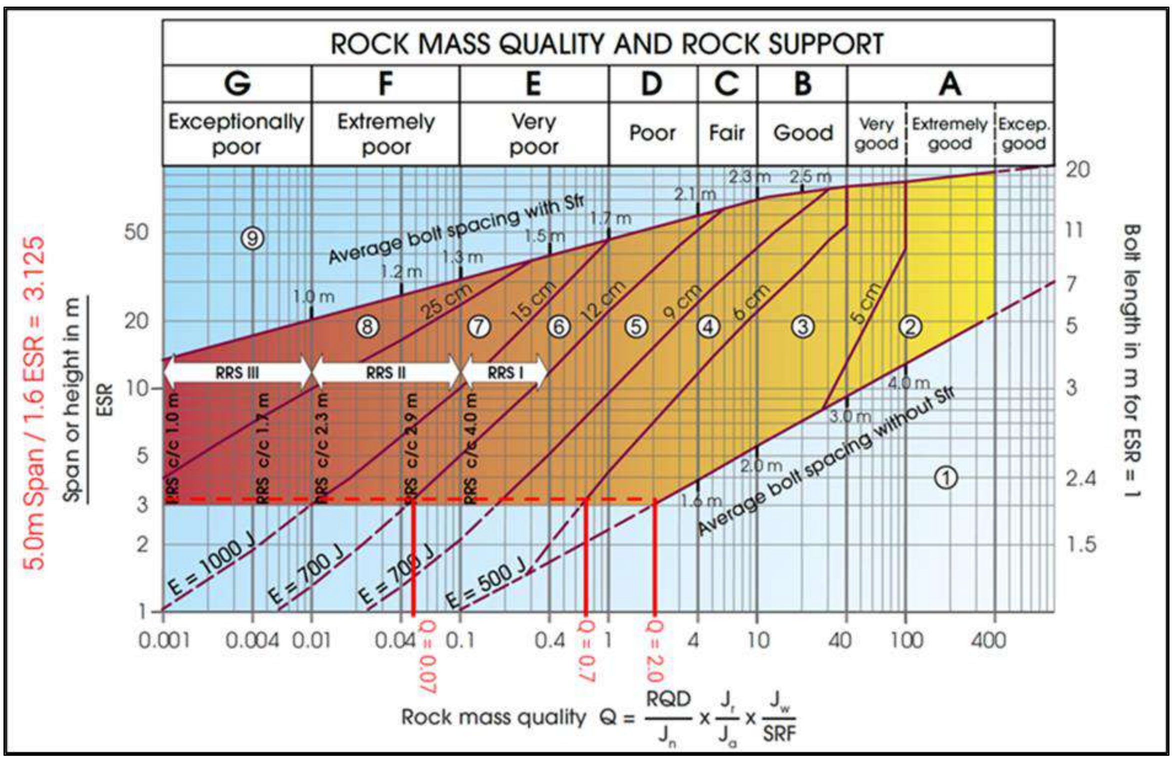
Support Category	Q value	Estimated RMR_{76}\GSI	Advance Length (m)	Support Type
Category 1	>2.0	>50	3.0	2.4 m #7 rebar on 1.2 m x 1.2 m spacing with welded mesh (10 cm/6 Ga.) to within 1.5 m of sill
Category 2	0.7 to 2.0	41 to 50	2.5	2.4 m #7 rebar on 1.2 m x 1.2 m spacing with welded mesh (10 cm/6 Ga.) and 5 cm of shotcrete to within 1.5 m of sill
Category 3	0.07 to 0.7	20 to 40	1.2	10 cm of fiber-reinforced shotcrete (FRS) and 2.4 m #7 rebar on 1.2 m x 1.2 m spacing with welded mesh (10 cm/6 Ga.) down to sill
Category 4	<0.07	<20	0.5 to 1.0	15 cm of FRS and 2.4 m #7 rebar on 1.2 m x 1.2 m spacing with welded mesh (10 cm/6 Ga.) down to sill with 6 count #7 rebar arch spaced each 2.4 m and encased in 35 mm of shotcrete; forepoling (spiling)

Source: CNI, 2023

Ground support at a minimum will include 2.4 m rebar (minimum #7 gauge, Grade 60 steel) on 1.2 m x 1.2 m spacing and welded wire mesh. Additional ground support (shotcrete, fibercrete, steel arches, etc.) is required in zones of poor or extremely poor-quality ground. In Category 4 ground, spiling or forepoling is required.

Additional, deeper ground support is necessary for three-way and four-way intersections. Four-way intersections should be avoided whenever possible due to wider spans. Ground support specifications in intersections and passing/muck bays are in addition to the bolting standard for advance drifting. Because of the increased spans, secondary (deep) bolt lengths of 3.65 m on 1.8 m x 1.8 m spacing are required. Deep support should include either cable bolts (single or double strand) or #8 rebar (minimum Grade 60 steel) to provide the additional capacity to support deeper wedges, which are more likely in wider spans.

Ground support categories were estimated using the ground support chart developed by Grimstad and Barton (1993), as presented on Figure 16-26. An excavation support ratio (ESR) value of 1.6 was assumed, which is typical for permanent mine openings. The support requirements for production headings (Table 16-13) utilize an ESR of 3.0 due to their more temporary service lives.

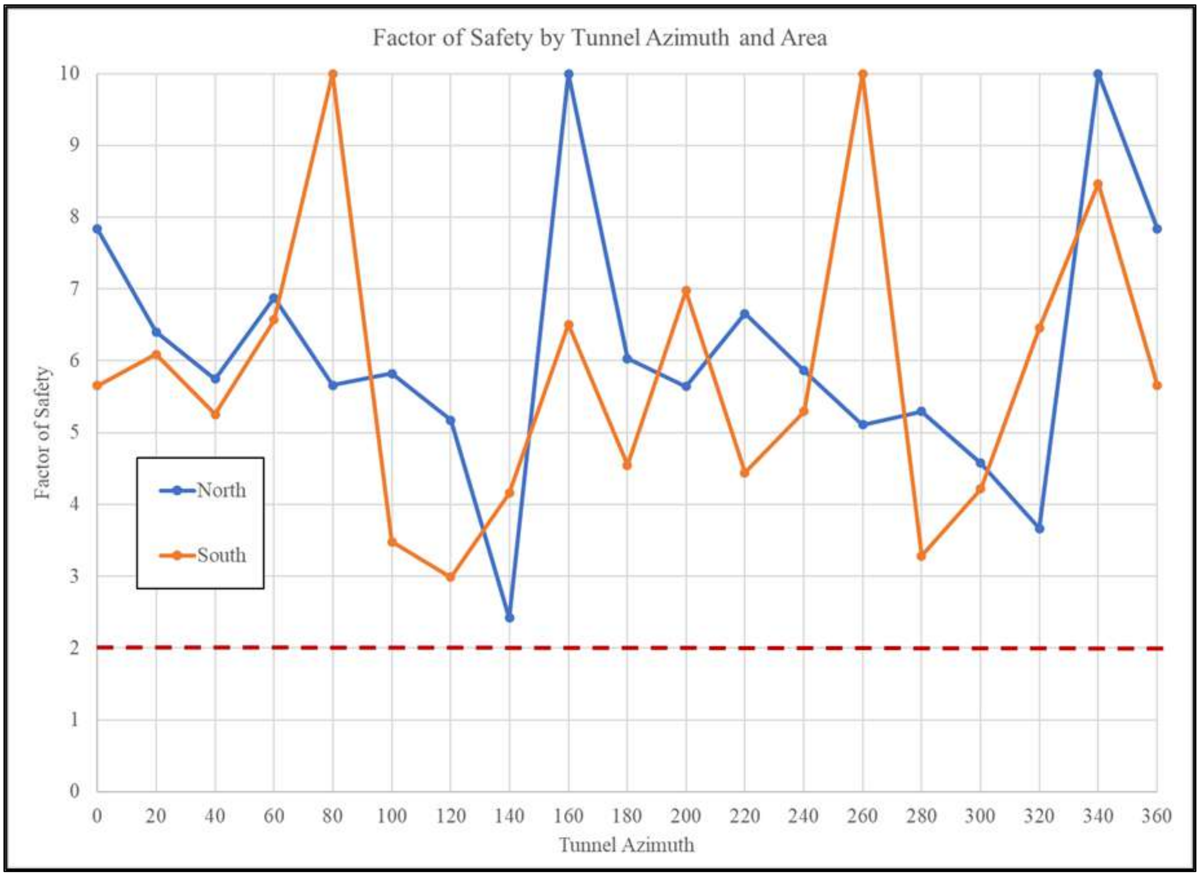


Source: CNI, 2023

Figure 16-26: Ground Support Category Estimates Using the Ground Support Chart

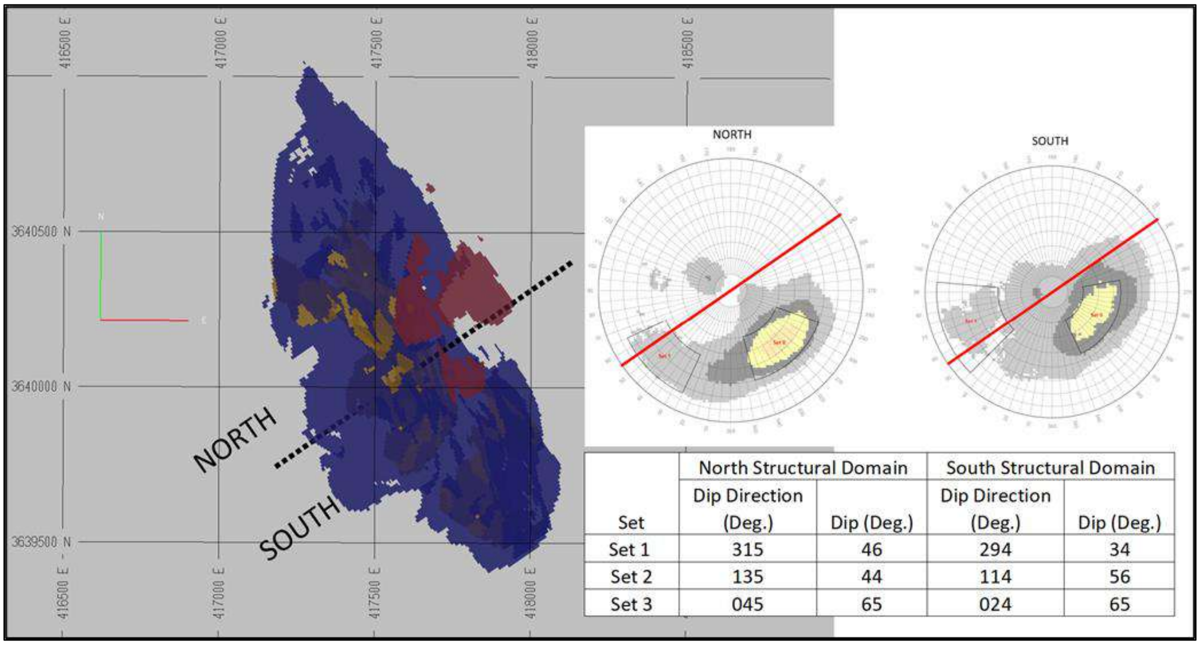
Where development is intended to be permanent infrastructure with a service life greater than 1 year, fully grouted resin rebar bolts are required. Friction-type bolts, such as Swellex or Split Sets, are susceptible to corrosion in environments that are rich in sulfide mineralization. However, in drifts with shorter service lives (<1 year), inflatable friction bolts may be a suitable alternative to rebar.

Bolt lengths (2.4 m) and spacing are based on the results of both kinematic wedge deterministic analyses and empirical analysis. Wedge stability was evaluated at various tunnel azimuth orientations based on joint orientations from ATV data. Figure 16-27 presents the results of the kinematic wedge analyses by area, with orientations resulting in small skinny wedges truncated to a maximum FoS of 10. The ATV data were divided spatially into two areas with differing structural trends, as presented on Figure 16-28. The structural domains are identical to the North and South structural stoping domains.



Source: CNI, 2023

Figure 16-27: Kinematic Wedge Analysis Results



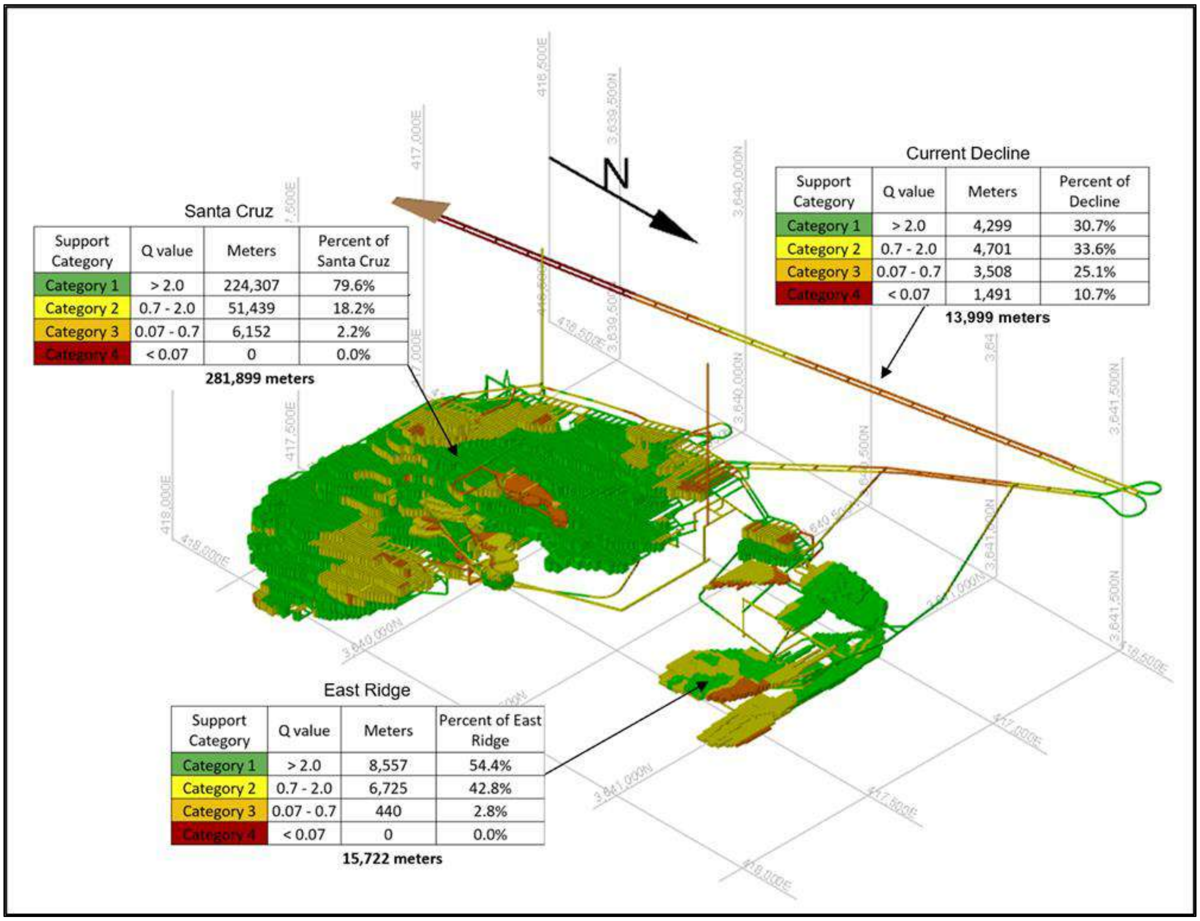
Set	North Structural Domain		South Structural Domain	
	Dip Direction (Deg.)	Dip (Deg.)	Dip Direction (Deg.)	Dip (Deg.)
Set 1	315	46	294	34
Set 2	135	44	114	56
Set 3	045	65	024	65

Source: CNI, 2023

Figure 16-28: Structural Analysis with Dominant Joint Set Orientations

16.2.7 Boxcut and Decline Access

A boxcut of nominal 20 m total depth will be excavated into the alluvium to establish a portal face for decline entry. Multiple decline options were evaluated which access the orebody from the north and west. The most current option is presented in Figure 16-29, which also includes the distribution of development within ground support categories.



Source: CNI, 2023

Figure 16-29: Isometric View of Most Recent Mine Design with Ground Support Estimates

Based on rock qualities and strengths along the potential routes, decline development is amenable to road header development with a shield, with sporadic drill and blast required through stronger rock types (thin intervals of diabase). Additional details regarding ground characterization and decline development requirements are summarized in the CNI memo, Decline Characterization and Support Estimation (December 2022). The actual locations and designs for the boxcut entry and decline railveyor pathways are still to be determined.

16.3 Hydrogeology

Historical hydrogeological data available for the Santa Cruz Project was reviewed and evaluated to develop the hydrogeological conceptual site model. Using the historical data and the results of recent hydrogeologic testing conducted by Ivanhoe, the groundwater flow model developed by Montgomery & Associates was updated and finalized. The groundwater flow model was used to evaluate multiple passive and active dewatering scenarios for the proposed mine plan.

16.3.1 Surface Water

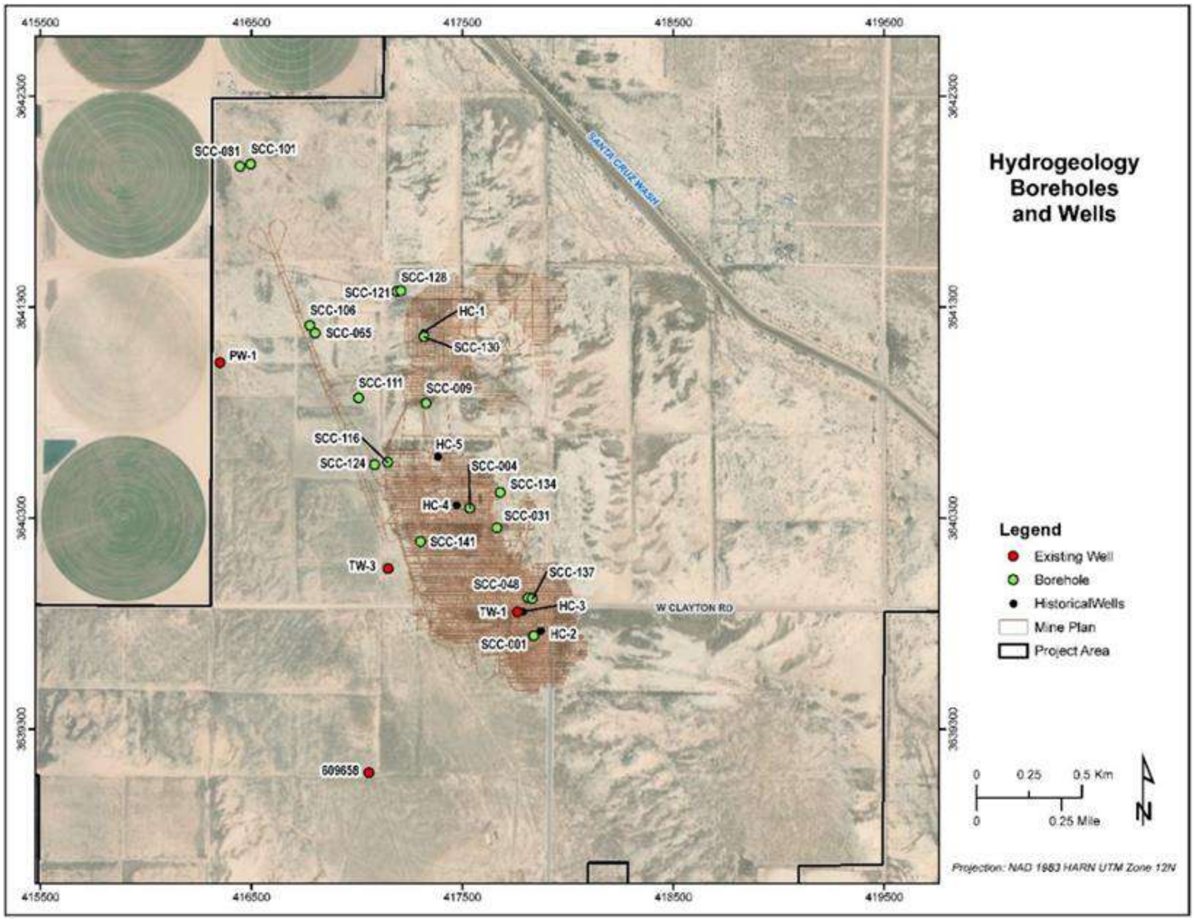
The Santa Cruz Project area is located within the Gila River basin, and contains two surface water features in the northeast portion of the Project area, the Santa Cruz Wash Canal and the North Branch Santa Cruz Wash. The Santa Cruz Wash Canal confluences with the North Branch Santa Cruz Wash in the very northern portion of the Project property, which then reports to the Gila River further to the northwest via a series of irrigation canals and levees. Both surface water features are ephemeral with the exception of intermittent flow originating from upstream municipal sources. Flow direction is roughly southeast to northwest.

A surface water monitoring program that involves collecting samples for water quality at multiple points along the North Branch Santa Cruz Wash and Santa Cruz Wash Canal began in 2023 and will continue, on a quarterly basis, for baseline studies.

16.3.2 Hydrogeology Investigations

The Santa Cruz Project has been the subject of multiple studies aimed at characterizing the hydrogeologic properties of the stratigraphy within the Project area and the surrounding region. Aquifer testing completed during the late 1970s and early 1980s at the behest of the Santa Cruz Copper Company (e.g., Harshbarger & Associates, 1978a; Harshbarger & Associates, 1978b; Harshbarger & Montgomery, 1980; Harshbarger & Montgomery, 1981) established an early conceptual hydrogeological model and characterized the physical properties of major water bearing geologic units. Continuing in the late 1980s through the end of the 1990s, additional hydrogeologic studies were completed by the Santa Cruz Joint Venture and the U.S. Bureau of Mines in support of the Santa Cruz In Situ Copper Mining Research project (Montgomery & Associates, 1989; 1990a; 1990b; 1991; 1992a; 1992b; 1992c; 1993; 1995; 1997; and 1998). More than fifteen additional pumping tests were conducted at five new hydrogeologic characterization wells and five new test wells. During this period, fluid movement investigations using spinner flowmeter logging provided additional estimates of the hydraulic conductivity of different hydrogeologic zones.

More recently, IE contracted Montgomery & Associates to conduct packer testing at the Santa Cruz Project to estimate hydraulic parameters for bedrock and conglomerate lithologic units near the proposed decline and part of the proposed underground mine (Montgomery & Associates, 2023). Between October 22, 2022 and April 11, 2023, forty-five successful packer tests were completed at depths ranging from 182.1 to 684.6 m below ground surface in exploration boreholes SCC-101, SCC-106, SCC-111, SCC-124, and SCC-128. Presently, IE monitors pore pressure, which can be converted to groundwater elevation, in 71 vibrating wireline piezometers that were installed starting in 2021 across 14 locations (Figure 16-30).



Source: INTERA, 2023

Figure 16-30: Boreholes and Well Locations of Collected Hydrogeology Data used in Groundwater Model

16.3.3 Hydrogeologic Conceptual Site Model

The hydrogeology of the Santa Cruz Project can be generally divided into 3 main rock types: alluvium, conglomerates, and Oracle Granite. Each rock type can be further subdivided into different hydrostratigraphic units, which are portions of a body of rock that by virtue of their physical properties have a distinct influence on the storage or movement of groundwater. The hydraulic properties based on previous test work for each of these hydrostratigraphic units are described in INTERA (2023) and are summarized below.

Alluvium

The quaternary alluvium, or basin-fill, is composed of poorly sorted silt and sand, over an area approximately 70 to 100 m thick. In the Santa Cruz Project area, groundwater levels are below the alluvial deposits.

Conglomerates

There are four Tertiary conglomerate units recognized in the study area: the Gila conglomerate, the Whitetail conglomerate, the Basal conglomerate, and the Mafic conglomerate. The Gila conglomerate underlies the alluvium and ranges in thickness from 150 to 300 m. The Whitetail conglomerate is considered to be the stratigraphically lower and older equivalent of the Gila conglomerate. The Whitetail conglomerate is separated from the Gila conglomerate by a thin layer of the Apache leap tuff and ranges in thickness from approximately 100 to 400 m in the Santa Cruz Project area. The Gila conglomerate and Whitetail conglomerate are thickest where they overlie the paleo-valleys of the faulted and tilted Oracle granite. Both the Gila conglomerate and the Whitetail conglomerate are characterized by semi-consolidated to consolidated coarse sediments and consist of cobble to boulder sized clasts with interbedded layers of moderately to poorly sorted sand and gravel. The Mafic conglomerate and Basal conglomerate are not extensive formations and are only present in localized areas across the Santa Cruz Project area.

Depth to groundwater in the Santa Cruz Project area is approximately 150 m below ground surface, in the Gila conglomerate. Most early aquifer test investigations on the conglomerates were completed across the entirety of the conglomerate units, and occasionally included alluvium, and often were referred to as part of the basin fill deposits. The hydraulic conductivity of the undifferentiated conglomerates range from approximately 1.8E-4 centimeters per second (cm/s) to 4.2E-3 cm/s (summarized in INTERA, 2023). Analysis of recent borehole packer testing by Montgomery & Associates (2023) provided estimates of hydraulic conductivity for distinct units including 7.1E-6 cm/s for the lower Gila Conglomerate. Hydraulic conductivity estimates of packer tests on the Whitetail Conglomerate range from a minimum of 1.8E-7 cm/s to a maximum of 3.2E-6 cm/s (Montgomery & Associates, 2023). Additional estimates of hydraulic conductivity from tests conducted in the lower portions of the conglomerates range from 1.3E-5 cm/s to 8.3E-4 cm/s (Montgomery & Associates, 1997). Results of the aquifer tests and packer tests in the lower portion of the conglomerates indicate that the permeability of the conglomerates decreases with depth.

Oracle Granite

The Precambrian oracle granite unconformably underlies the conglomerate units at varying depths of approximately 200 to 650 m below ground surface due to faulting and tilting caused by tectonic extension events of the mid-Cenozoic Period. Laramide monzonite porphyry and younger Precambrian diabase dikes and sills intrude the Oracle Granite. The upper part of the oracle granite comprises a leached zone that has been weathered, fractured, and locally brecciated. Copper oxide and sulfide zones with varying degrees of mineralization exist within the lower part of the oracle granite. Because of these different zones, the hydraulic conductivity of the oracle granite is highly variable, ranging from 9.9E-12 cm/s to 4.4E-3 cm/s (summarized in INTERA, 2023), and generally decreases with depth (Montgomery & Associates, 1989).

Emplaced within the oracle granite are laramide quartz monzonite porphyry intrusions dipping approximately 30° to 40° to the southwest (M&A, 1992b) that make up about 15% of the host rock within the Santa Cruz deposit (Kreis, 1982). Estimated hydraulic conductivity of the laramide porphyry is between 2.1E-7 cm/s and 2.1E-6 cm/s, based on packer tests conducted by Montgomery & Associates (2023). The oracle granite is also intruded by diabase dikes and sills dipping approximately 40° to 50° to the south-southwest (Montgomery & Associates, 1992b; Nelson, 1991). Previous work summarized in INTERA (2023) shows that hydraulic conductivity of the diabase dikes ranges from 4.9E-12 cm/s to 7.1E-6 cm/s.

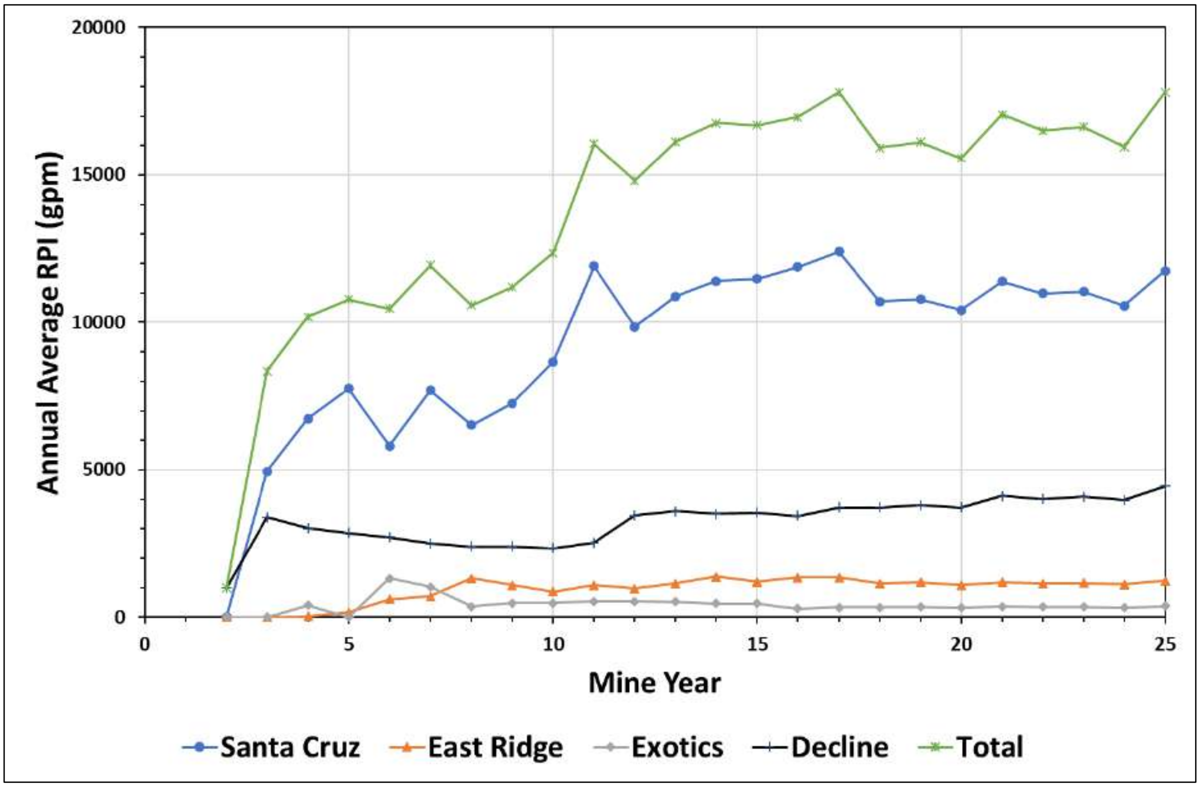
16.3.4 Groundwater Flow Model

A preliminary groundwater flow model was developed by Montgomery & Associates in late-2022 and early-2023. The model was further refined and finalized by INTERA (2023) to estimate the mine dewatering requirements for the proposed Mine Plan described in Section 14.6. The model described in INTERA (2023) was used to compare mine dewatering requirements under passive and active dewatering scenarios.

The mine plan contains several important attributes used in adapting the model to evaluate residual passive inflow. For each mine working, e.g., decline, ore drives, stopes, etc, the mine plan outlines the scheduled construction of the features as well as the specified ground type that the workings will be constructed in. The ground type reflects the level of sealing, such as shotcrete, that will be applied to the opening once constructed. One modification was made for implementation of the mine plan in the model: the footwall and ore drives extending into the conglomerate in the Santa Cruz area were modified to reflect the lower hydraulic conductivity of the granite to further reduce passive inflows. Under the passive scenario, groundwater pumping was not used to depressurize the aquifer and reduce inflows.

Under the active dewatering scenario, different rates and distributions of groundwater pumping wells were used to evaluate the potential benefits of reducing inflows through pumping from the surface during year 2 of mine development when the upper part of the decline is constructed. The residual passive inflow for the decline is especially important in year 2 of mining. The hydraulic conductivity of the conglomerate is higher in the area where the upper decline is planned, which allows for higher inflow rates to the decline during construction through the conglomerate. To reduce inflows during this period, active pumping scenarios were investigated to reduce the hydraulic pressure in the aquifer leading to reduced residual passive inflow in the decline. In the active dewatering scenario, pumping occurs during year 1 and 2 of mine development only.

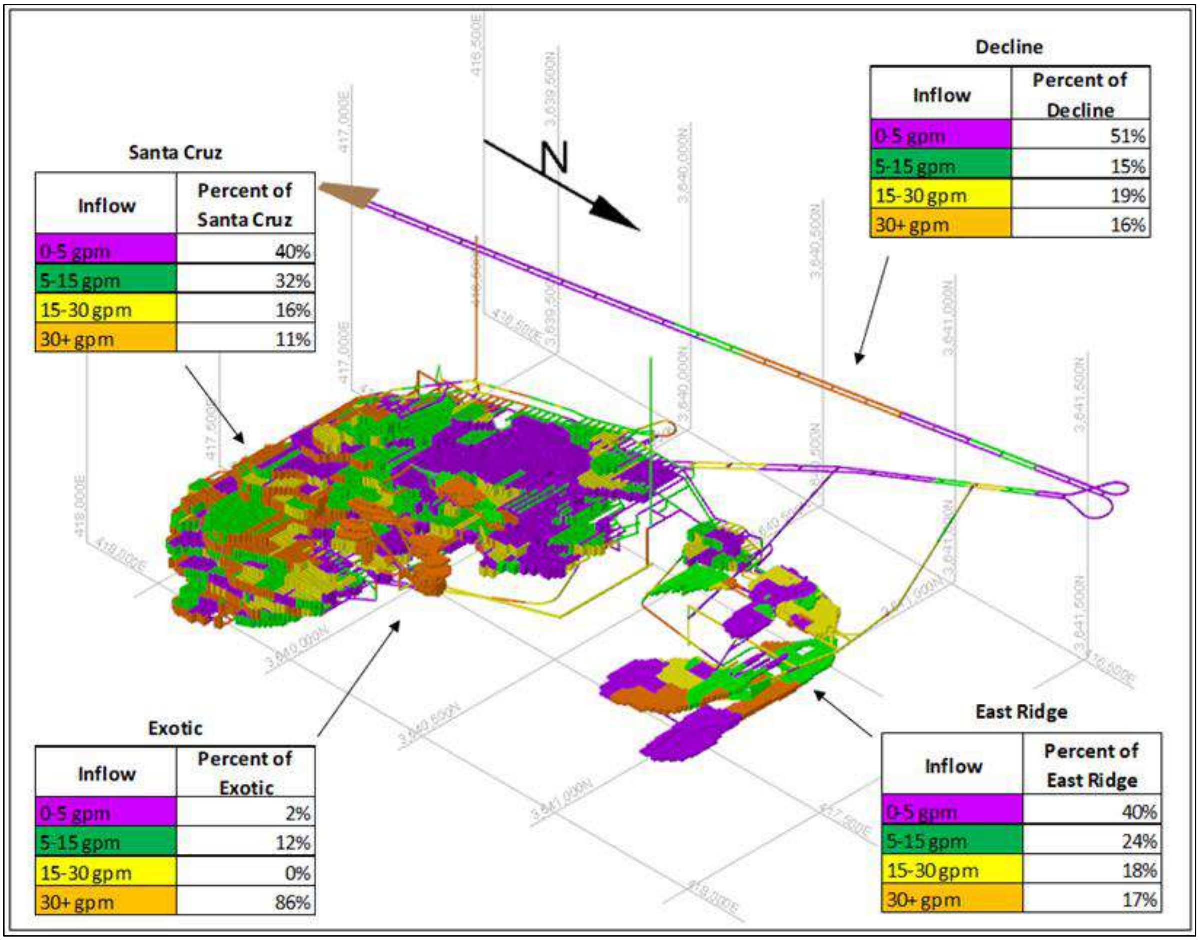
The simulated residual passive inflow for the 25-year LoM, which represents the annual average residual passive inflow rates by year, is shown in Figure 16-31 for the active dewatering scenario. Results are shown for the Santa Cruz area, the East Ridge area, the Exotics, the combined decline and railveyor (presented as the decline), and the total average annual residual passive inflow of all areas of the mine plan combined. A sensitivity analysis of active dewatering simulations showed that 3 wells along the decline, completed in the conglomerate, each pumping 1,000 gpm, would reduce the residual passive inflow in the conglomerate in year 2 from 2,054 gpm to 986 gpm (as shown in Figure 16-31). The effects of pumping in years 1 and 2 on residual passive inflow after year 2 are negligible. Model results show that the residual passive inflow for the first 10 years of mining are at or below 12,000 gpm. From year 11 through 25 of LoM, the residual passive inflow ranges from approximately 15,000 gpm to 18,000 gpm.



Source: INTERA, 2023

Figure 16-31: Mine Residual Passive Inflow (RPI) by Area and Total Mine Plan Combined with Active Dewatering During Years 1 and 2

The distribution of residual passive inflow across the mine is shown in Figure 16-32. The residual passive inflow for the decline is highest along the upper part of the decline where 30+ gpm inflows are indicated. This is the area of highest concern for inflows during construction of the Decline and is where the pumping in years 1 and 2 has the greatest effect on reducing residual passive inflow. Other areas of the mine show varying levels of inflow. The Exotics show a high percentage (86%) of higher residual passive inflow due to their location in the conglomerate. The Santa Cruz and East Ridge areas show varying residual passive inflow with high percentages of 0 to 5 gpm and 5 to 15 gpm inflows. These areas of lower residual passive inflow represent both stopes, that are only open for short periods during mining, and regions of low hydraulic conductivity in the oracle granite and porphyry.



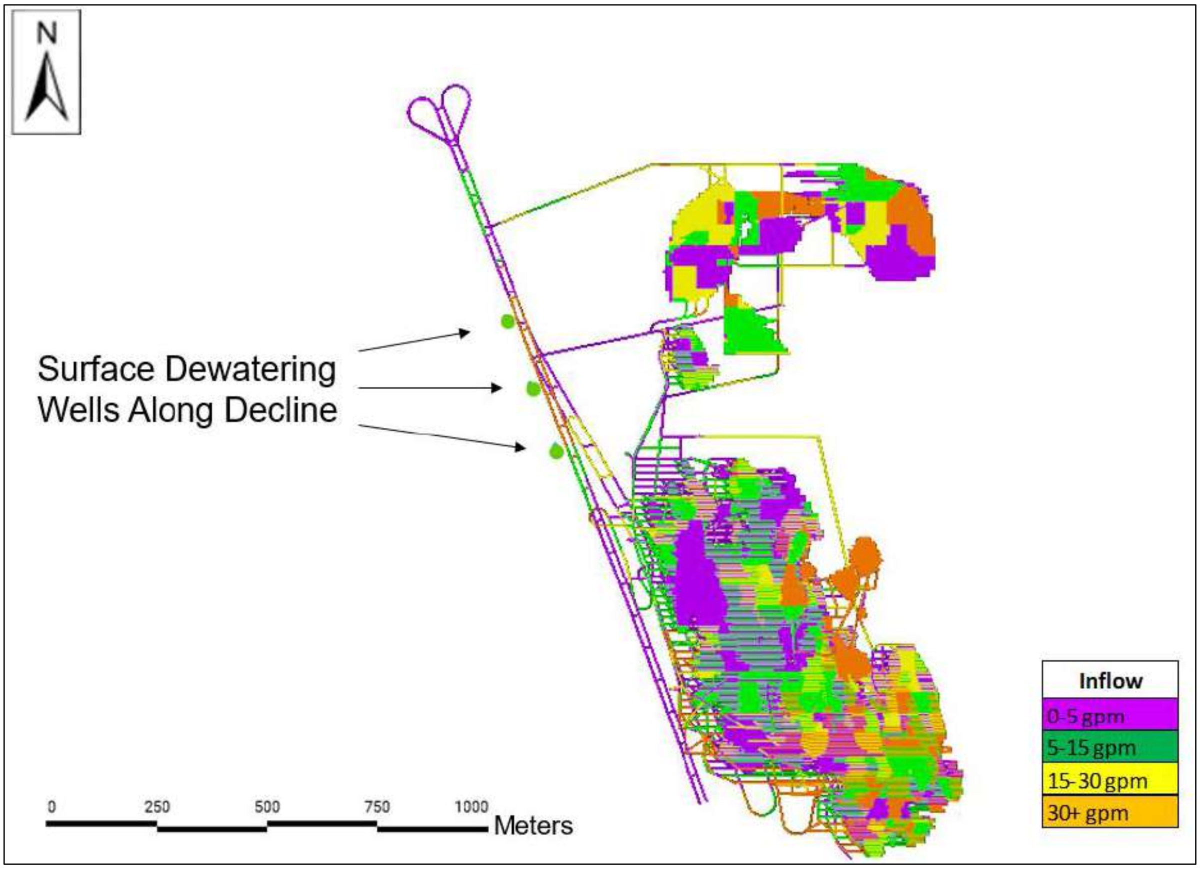
Source: INTERA, 2023

Figure 16-32: Model Estimates of Residual Passive Inflows Mine Workings

16.4 Mine Dewatering

16.4.1 Ramp Dewatering

During initial ramp construction, three surface dewatering wells will be utilized in Year 1 and Year 2 to depressurize the portion of the decline hosted in the conglomerate. A number of scenarios were evaluated with the numerical groundwater model using three variables: number of wells, total pumping rate, and well locations. The results for the optimal scenario showed that three specifically located dewatering wells with a total discharge of 3,000 gpm provided appropriate depressurization and reduction in residual passive inflow with 2 years of pumping. The scenario's pumping rate of 3,000 gpm was effective to provide safe development through the water table at this location. The analysis also showed that pumping durations longer than 2 years had negligible improvements to conditions once shotcrete was properly completed in the target area. Figure 16-33 shows the surface dewatering well locations near the decline.



Source: INTERA, 2023

Figure 16-33: Surface Dewatering Well Locations

16.4.2 Mining Area Dewatering

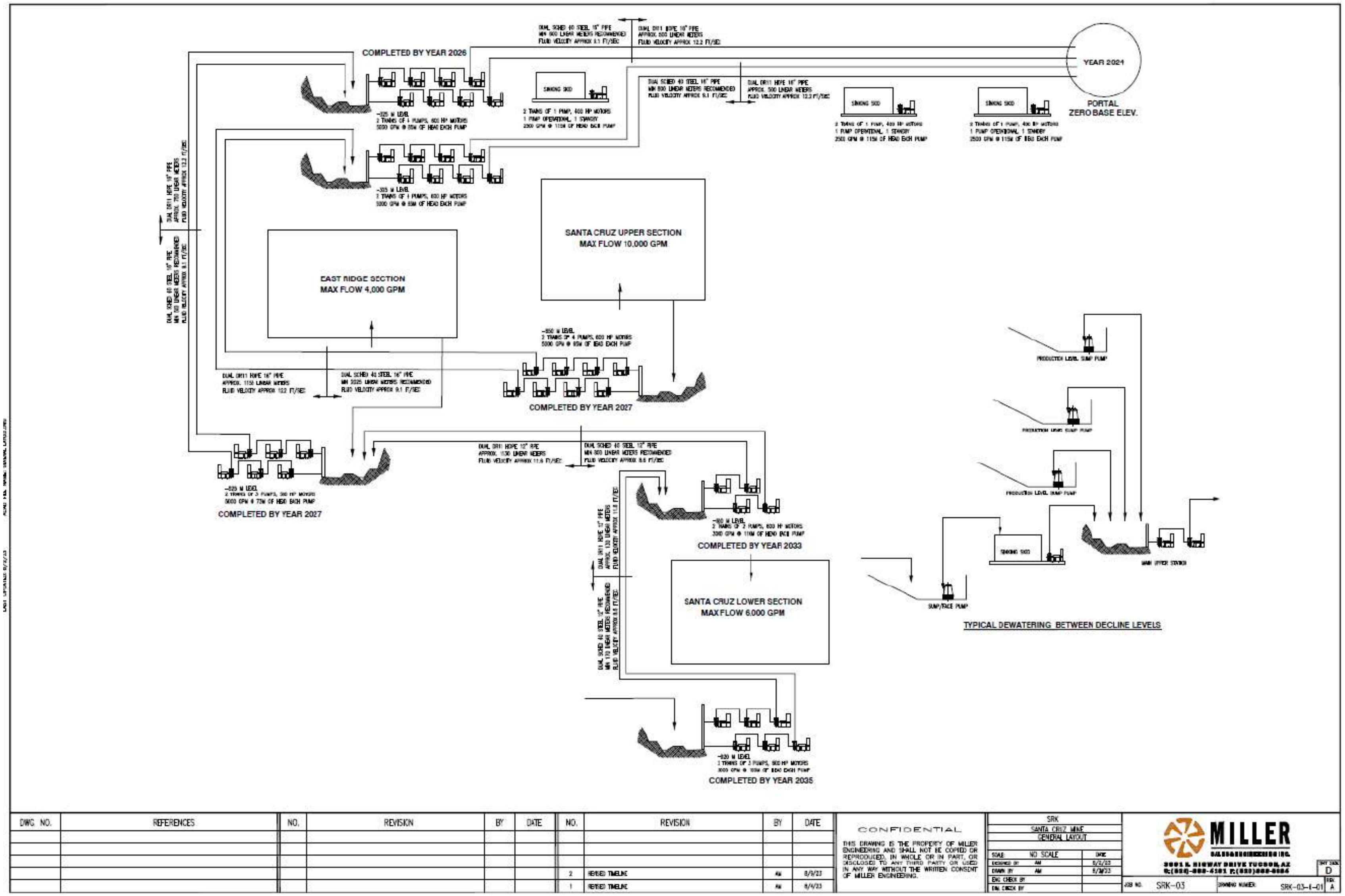
The maximum expected water flow to the mine that needs to be managed is 18,000 gallons per minute (GPM), and the pumping system is designed to handle 20,000 gpm. Figure 16-31 shows the annual average RPI for the different zones through the LoM.

The mine pumping system is divided into two systems, the Santa Cruz upper system and the East Ridge – Santa Cruz lower system. The Santa Cruz upper system consists of a main sump on level -270 with two trains of 4 pumps in series. The water is pumped to an intermediate pumping station on the decline at elevation 75 with two trains of 4 pumps in series to pump the water to surface.

The East Ridge – Santa Cruz lower system will pump water from Santa Cruz lower to East Ridge and then to the surface. At East Ridge, one sump is installed on level -150 with two trains of 3 pumps in series. The mine water is pumped to an intermediate pumping station, different from the one in the Santa Cruz upper system, on the decline at elevation 75 with two trains of 4 pumps in series to pump the water to surface. At Santa Cruz lower, a sump is installed on level -570 with two trains of 3 pumps in series pumping to an intermediate sump on level -270. The intermediate sump consists of 2 trains of 3 pumps in series to pump the water to the East Ridge sump and subsequently to surface.

Initially, one train can be operational and the other one will be on standby. Eventually, the standby train will need to be operational more frequently.

All pumps use high wear-resistant slurry pumps. Santa Cruz upper system uses dual 16” schedule 40 steel pipes as the main pipe with 16” DR11 HDPE pipes where appropriate to surface. The Santa Cruz lower sump uses dual 12” Schedule 40 steel pipes as the main pipe with 12” DR11 HDPE pipes where appropriate. The East Ridge sump uses dual 16” schedule 40 steel pipes as the main pipe with 16” DR11 HDPE pipes where appropriate to surface. Pipes for the Santa Cruz upper and East Ridge will run on the decline. Pipes for Santa Cruz lower can either run on the decline or in vertical raises. Figure 16-34 shows the dewatering system piping and instrumentation diagram (P&ID).



Source: Miller, 2023

Figure 16-34: Dewatering System P&ID

Sinking skids consisting of 400 HP pumps that will be used during the decline development. Additionally, 15 HP to 30 HP transfer pumps will dewater the active headings.

Keeping water away from working faces and managing the inflows will be a key to achieving the mine plan presented here, particularly for the main decline,

16.5 Identifying Potentially Minable Areas

For the Santa Cruz Oxide and chalcocite enriched domains, a LHS method is selected. The Santa Cruz Exotic domain and East Ridge deposit will use a DAF mining method. Stope optimization (MSO) within Deswik software was used to determine potentially economically minable material. Wall dilution was not applied at the optimization stage. A range of mining cut-offs were run to identify higher grade mining areas and understand the sensitivity of the deposit to CoG.

Table 16-17 shows stope optimization parameters used. Once stopes are generated, the stopes are cut to the appropriate lengths based on the location and sequence as determined by geotechnical data.

Table 16-17: MSO Parameters

Parameter	Units	LHS	DAF
Stope width	m	10	6
Stope height	m	30	9
Stope length	m	5 to 500	5 to 500
Copper cut-off	%	1.0	1.0

Source: SRK, 2023

Table 16-18 through Table 16-20 and Figure 16-35 through Figure 16-37 show the stope optimization results.

Table 16-18: Santa Cruz Deposit MSO Summary

Santa Cruz Deposit Oxide and Chalcocite MSO Summary					
Cut-Off (%)	**Tonnage (kt)**	**AsCu (%)**	**CnCu (%)**	**TCu (%)**	**Contained Cu (Mlb)**
0.60	190,113	0.85	0.31	1.32	5,532
0.80	154,085	0.95	0.34	1.47	4,994
0.90	136,810	1.01	0.34	1.55	4,675
1.00	121,724	1.07	0.35	1.62	4,347
1.10	107,077	1.13	0.36	1.70	4,013
1.20	93,664	1.19	0.37	1.77	3,655
1.30	81,976	1.24	0.39	1.85	3,343
1.40	70,748	1.28	0.42	1.92	2,995
1.50	60,595	1.31	0.45	2.00	2,672
1.75	39,308	1.39	0.53	2.20	1,906
2.00	24,387	1.44	0.64	2.40	1,290
2.25	13,980	1.50	0.75	2.61	804
2.50	7,212	1.47	0.94	2.83	450

Source: SRK, 2023

Table 16-19: Santa Cruz Exotic Deposit MSO Summary

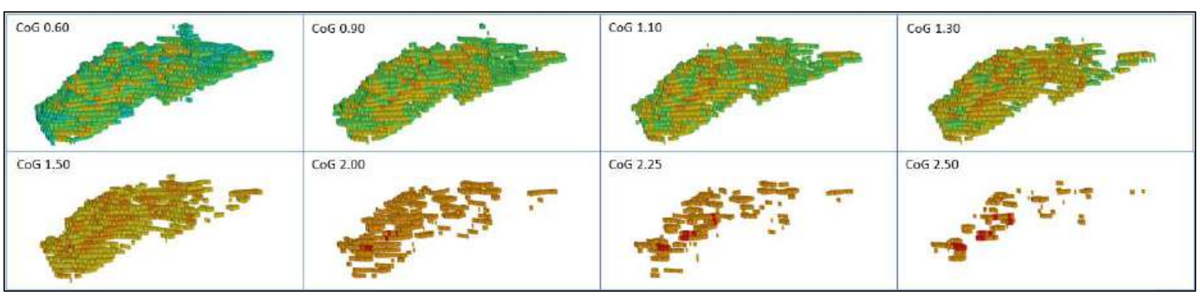
Santa Cruz Deposit Exotic MSO Summary					
Cut-Off (%)	Tonnage (kt)	AsCu (%)	CnCu (%)	TCu (%)	Contained Cu (Mlb)
0.60	11,230	1.45	0.12	1.85	458
0.80	8,553	1.74	0.14	2.21	417
0.90	7,625	1.88	0.15	2.37	398
1.00	6,931	2.00	0.16	2.51	384
1.10	6,355	2.11	0.16	2.64	370
1.20	5,818	2.22	0.17	2.78	357
1.30	5,337	2.33	0.18	2.91	342
1.40	4,947	2.43	0.19	3.03	330
1.50	4,553	2.53	0.20	3.16	317
1.75	3,833	2.75	0.22	3.45	292
2.00	3,237	2.97	0.25	3.72	265
2.25	2,736	3.20	0.27	4.01	242
2.50	2,368	3.39	0.29	4.25	222

Source: SRK, 2023

Table 16-20: East Ridge Deposit MSO Summary

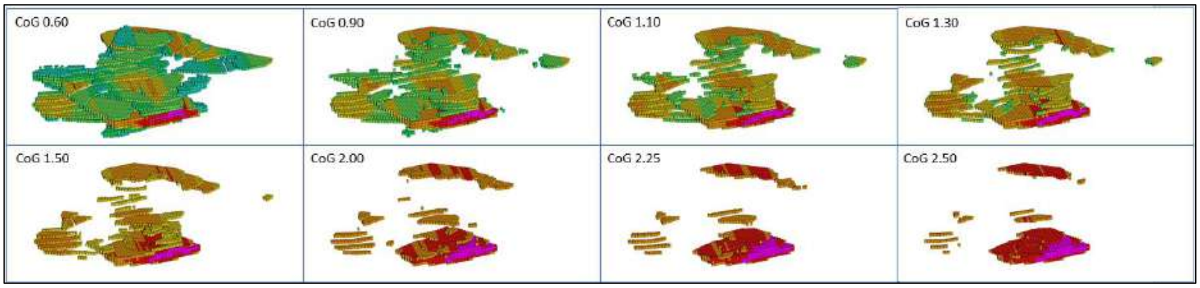
East Ridge Deposit MSO Summary					
Cut-Off (%)	Tonnage (kt)	AsCu (%)	CnCu (%)	TCu (%)	Contained Cu (Mlb)
0.60	59,054	0.47	0.45	1.06	1,380
0.80	36,245	0.62	0.55	1.29	1,031
0.90	28,706	0.70	0.60	1.40	886
1.00	23,200	0.77	0.64	1.51	772
1.10	19,087	0.83	0.69	1.61	677
1.20	15,435	0.91	0.73	1.72	585
1.30	12,345	0.99	0.79	1.84	501
1.40	9,898	1.06	0.84	1.96	428
1.50	8,124	1.13	0.89	2.07	371
1.75	5,346	1.28	1.00	2.31	272
2.00	3,137	1.47	1.14	2.62	181
2.25	2,130	1.62	1.25	2.86	134
2.50	1,526	1.74	1.34	3.05	103

Source: SRK, 2023



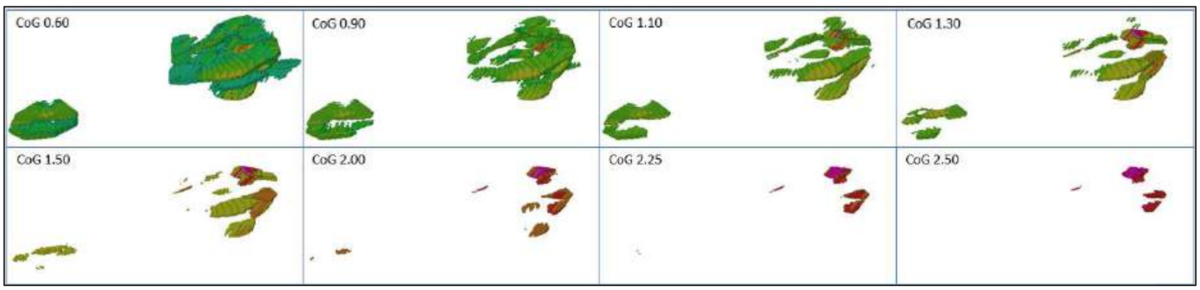
Source: SRK, 2023

Figure 16-35: Santa Cruz Oxide and Chalcocite Undiluted MSO Results (Looking to the Northwest)



Source: SRK, 2023

Figure 16-36: Santa Cruz Exotic Undiluted MSO Results (Looking to the Southwest)



Source: SRK, 2023

Figure 16-37: East Ridge Undiluted MSO Results (Looking to the West)

16.5.1 Dilution

The mining dilution estimate for LHS is based on ELOS (Clark and Pakalnis, 1997). ELOS is an empirical design method that is used to estimate the amount of overbreak/slough that will occur in an underground opening based on rock quality and the hydraulic radius of the opening. ELOS was applied to in situ rock exposed and to the PBF walls wherever mining will occur adjacent to a secondary stope. In addition to the ELOS allowances, an additional allowance was used to account for backfill dilution from the floor when mucking a stope. Table 16-21 shows the dilution assumptions.

Table 16-21: Dilution Assumptions

North Area

Muck Level	DESIGN DIMENSIONS (m)						ELOS (m)			
	Oxide Mineral Domain			Chalc. Enr. Mineral Domain			Oxide ELOS		Chalc. Enr. ELOS	
	Height	Width	Length	Height	Width	Length	Side Walls	End Walls	Side Walls	End Walls
60	30.0	10.0	11.0				0.75	0.75		
30	30.0	10.0	8.2				1.00	1.50		
0	30.0	10.0	10.8				0.75	0.75		
-30	30.0	10.0	9.6				0.75	1.00		
-60	30.0	10.0	12.0				0.50	0.75		
-90	30.0	10.0	13.4	30.0	10.0	46.5	0.50	0.50	<0.50	<0.50
-120	30.0	10.0	14.4	30.0	10.0	46.7	0.50	0.50	<0.50	<0.50
-150	30.0	10.0	16.3	30.0	10.0	29.7	<0.50	<0.50	<0.50	<0.50
-180	30.0	10.0	15.2	30.0	10.0	25.7	0.50	<0.50	<0.50	<0.50
-210	30.0	10.0	17.8	30.0	10.0	26.6	<0.50	<0.50	<0.50	<0.50
-240	30.0	10.0	19.5	30.0	10.0	25.2	<0.50	<0.50	<0.50	<0.50
-270	30.0	10.0	14.8	30.0	10.0	17.6	0.50	<0.50	<0.50	<0.50
-300	30.0	10.0	15.7	30.0	10.0	16.3	<0.50	<0.50	<0.50	<0.50
-330	30.0	10.0	16.9	30.0	10.0	13.4	<0.50	<0.50	0.50	0.50
-360	30.0	10.0	15.7	30.0	10.0	15.9	<0.50	<0.50	<0.50	<0.50
-390	30.0	10.0	15.8	30.0	10.0	20.1	<0.50	<0.50	<0.50	<0.50
-420	30.0	10.0	14.9	30.0	10.0	22.0	0.50	<0.50	<0.50	<0.50
-450	30.0	10.0	12.8	30.0	10.0	16.6	0.50	0.50	<0.50	<0.50
-480	30.0	10.0	18.2	30.0	10.0	16.1	<0.50	<0.50	<0.50	<0.50
-510	30.0	10.0	18.7	30.0	10.0	12.0	<0.50	<0.50	0.50	0.75
-540	30.0	10.0	14.9	30.0	10.0	10.2	0.50	<0.50	0.75	1.00
-570	30.0	10.0	16.5	30.0	10.0	8.2	<0.50	<0.50	1.00	1.50
-600	30.0	10.0	16.2				<0.50	<0.50		
-630										

South Area

Muck Level	DESIGN DIMENSIONS (m)						ELOS (m)			
	Oxide Mineral Domain			Chalc. Enr. Mineral Domain			Oxide ELOS		Chalc. Enr. ELOS	
	Height	Width	Length	Height	Width	Length	Side Walls	End Walls	Side Walls	End Walls
60	30.0	10.0	11.5				0.50	1.50		
30	30.0	10.0	8.6				1.00	2.00		
0	30.0	10.0	11.3				0.75	1.50		
-30	30.0	10.0	10.0				0.75	1.50		
-60	30.0	10.0	12.6				0.50	1.00		
-90	30.0	10.0	14.1	30.0	10.0	51.1	0.50	1.00	<0.50	<0.50
-120	30.0	10.0	15.1	30.0	10.0	51.2	0.50	0.75	<0.50	<0.50
-150	30.0	10.0	17.3	30.0	10.0	31.9	<0.50	0.75	<0.50	<0.50
-180	30.0	10.0	16.1	30.0	10.0	27.5	0.50	0.75	<0.50	<0.50
-210	30.0	10.0	18.8	30.0	10.0	28.5	<0.50	0.50	<0.50	<0.50
-240	30.0	10.0	20.6	30.0	10.0	26.9	<0.50	0.50	<0.50	<0.50
-270	30.0	10.0	15.6	30.0	10.0	18.6	0.50	0.75	<0.50	0.50
-300	30.0	10.0	16.6	30.0	10.0	17.2	<0.50	0.75	<0.50	0.75
-330	30.0	10.0	17.9	30.0	10.0	14.1	<0.50	0.50	0.50	1.00
-360	30.0	10.0	16.6	30.0	10.0	16.8	<0.50	0.75	<0.50	0.75
-390	30.0	10.0	16.7	30.0	10.0	21.4	<0.50	0.75	<0.50	<0.50
-420	30.0	10.0	15.7	30.0	10.0	23.4	0.50	0.75	<0.50	<0.50
-450	30.0	10.0	13.4	30.0	10.0	17.5	0.50	1.00	<0.50	0.75
-480	30.0	10.0	19.3	30.0	10.0	17.0	<0.50	0.50	<0.50	0.75
-510	30.0	10.0	19.8	30.0	10.0	12.6	<0.50	0.50	0.50	1.00
-540	30.0	10.0	15.7	30.0	10.0	10.7	0.50	0.75	0.75	1.50
-570	30.0	10.0	17.5	30.0	10.0	8.6	<0.50	0.75	1.00	2.00
-600	30.0	10.0	17.1				<0.50	0.75		
-630										

Source: CNI, 2023

Backfill dilution is assumed to have zero grade. The rock portion of primary stopes in the Santa Cruz longhole areas is expected to contain grade. The grade applied to rock dilution is based on querying block model grades just outside the stope designs in a representative area. This exercise showed that the dilution was approximately 75% of the stope grade, and therefore for the mine plan the grade applied to the rock dilution is 75% of the stope grade. For drift and fill areas, dilution is assumed to be 5% based on benchmarking data and dilution is assumed to have zero grade. Development headings are assumed to have 0% dilution. Table 16-22 summarizes the total dilution for the various stopes by mining method.

Table 16-22: Total Dilution

Description	Value
LHS dilution in primaries	6%
LHS dilution in secondaries	10%
LHS dilution grade	75%
DAF stope dilution	5%
Development dilution	0%

Source: SRK, 2023

Further dilution studies are recommended for future work to confirm or modify the factors used here.

16.5.2 Stope Recovery Factor

Stope recovery factors of 91% and 98% were used for LHS and DAF, respectively. The following items were considered to calculate these factors:

- Material loss into floor of 0.1 m
- Material loss to mucking along sides and in blind corners
- Additional loss factor due to rockfalls, misdirected loads, and other geotechnical reasons

A development recovery factor of 100% was used for all lateral development. Tight filling will be necessary to achieve these recoveries.

16.5.3 Development Allowance

Additional ramp allowance factors were used to account for additional excavations not included in the design; Table 16-23 summarizes these allowance assumptions. These items should be designed at the detailed planning stage. The average length item shown in the table is the representative length of ramp that the listed allowances are applied to.

Table 16-23: Development Allowance Assumptions

Type	Units	Main Ramp	Railveyor
Average length	m	500	100
Drill bays	m^3	135	
Electrical bays	m^3	91	
Pump stations	m^3	324	
Passing bays	m^3	780	
Railveyor drive station	m^3	0	33
Total additional allowance	m^3	1,330	33
Expressed as a percentage of representative length of development	%	9.8	1.2

Source: SRK , 2023
m^3: Cubic meter

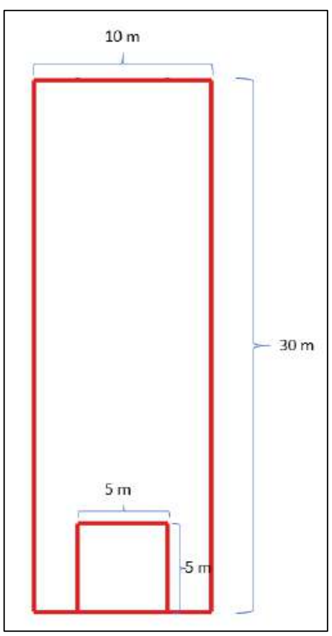
16.5.4 Block Model Indicator Shells

Prior to undertaking mine planning, SRK reviewed the resource presented in Section 11 of this report and identified areas of higher risk which in SRK's opinion should not be included in the mine plan. For the use in mine planning, SRK have generated a re-domaining exercise for the exotic oxide and oxide domains to identify areas of potential risk that require further drilling for mine planning purposes. SRK treated faults and geologic constraints were treated as hard boundaries and grade shells were generated using Leapfrog's implicit modeling tools. Structural trends were applied to generate grade shells that honor the crescent shape of the mineralized domains as defined by Nordmin, which resulted in a geologically constrained and statistically supported grade shells. Based on a visual review of the existing model and drilling composites SRK selected an ISO value of 0.25 (probability factor of 25% percent) to the indicator shells as a limit for risk to the mine plan. Only areas inside the indicator shells are used for the mine plan described in the following sections.

16.6 Mine Design

16.6.1 Santa Cruz - Longhole Stope

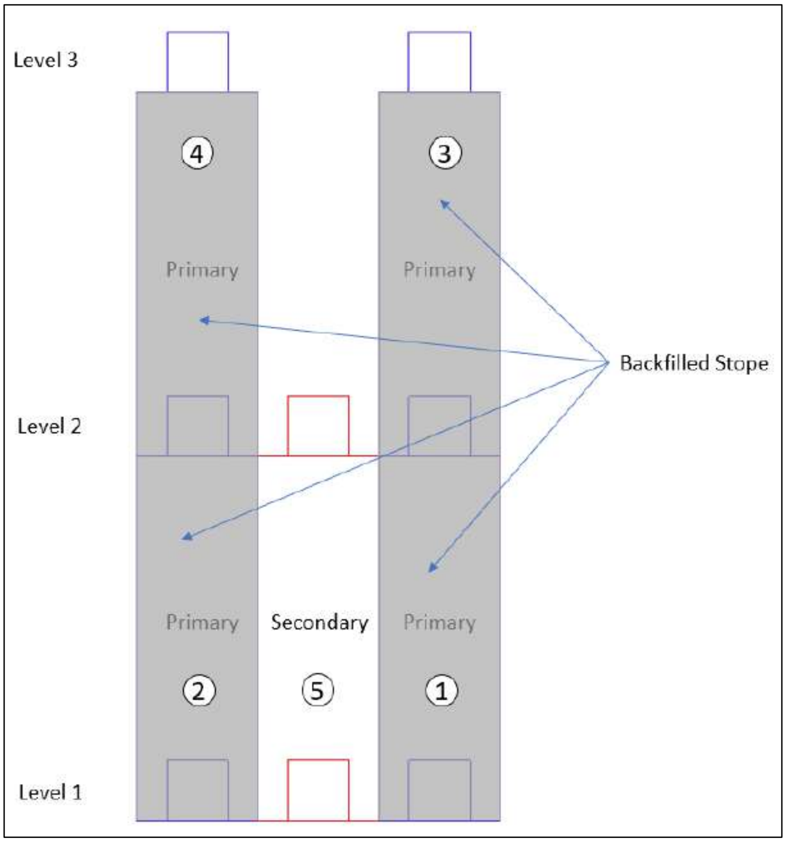
LHS stopes will be 10 m wide and 30 m high with varying length. Each stope will have a 5 m x 5 m access located at the top and bottom of the stope. Figure 16-38 shows a typical stope cross-section. Top accesses will be used for drilling and backfilling, and the bottom access will be used for mucking. The stopes will be drilled from top down, and rings will be blasted from the end of a stope towards the access. The blasted material will be remotely mucked from the bottom access and dumped into the ore pass.



Source: SRK, 2023

Figure 16-38: Typical Stope Cross-Section

A primary/secondary stoping sequence will be used, where on any given level, primary stopes must be separated by a secondary stope. Extraction of the secondary stope can only occur after the two immediately adjacent primary stopes and the two primary stopes immediately above have been mined, backfilled, and have had time to cure. Figure 16-39 shows the mining sequence. Backfilling will be an integral part of the LHS mining cycle, and a 14 day cure time is planned.



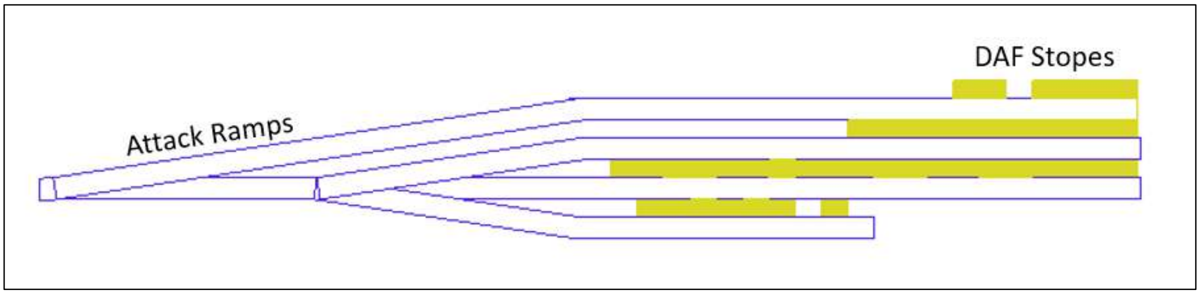
Source: SRK, 2023

Figure 16-39: Typical Mining Sequence

The primary stope accesses (5 m x 5 m) will be connected to a 5 m wide x 5.5 m high footwall access, which is offset a minimum 20 m away from the end of the stopes. Secondary stope accesses will branch off of the primary stope access to reduce the amount of development and to maintain an adequate pillar between primary stope accesses.

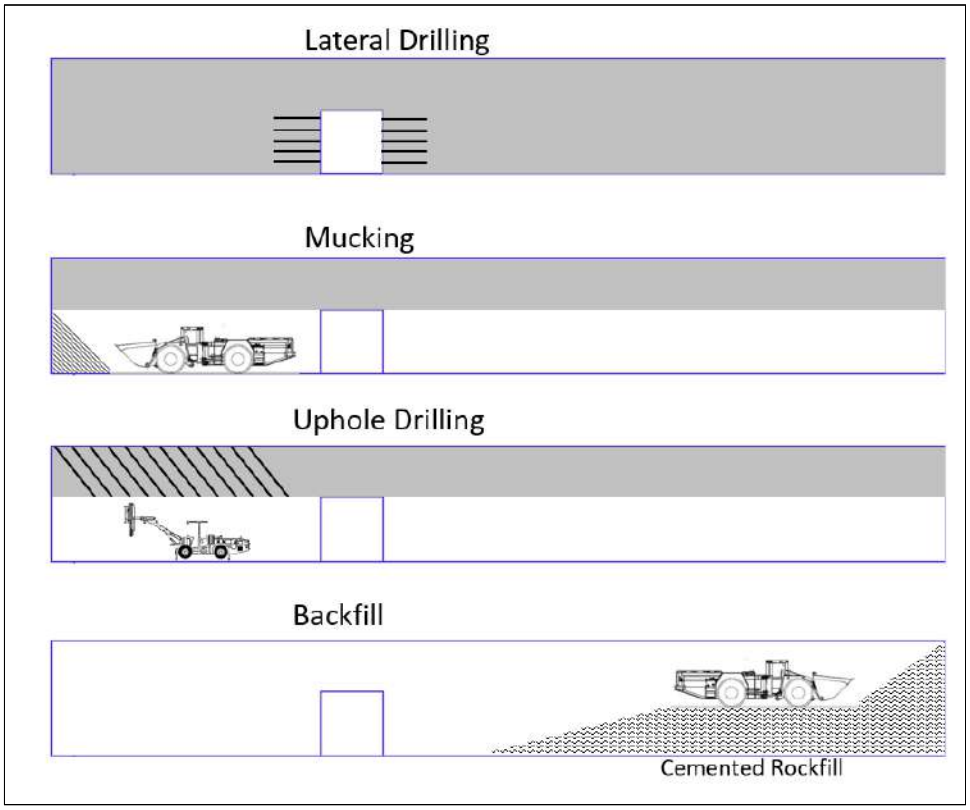
16.6.2 Santa Cruz Exotic and East Ridge, Drift and Fill

DAF stopes will be 6 m wide x 9 m high and varying length. Stopes will be accessed perpendicularly via 5 m wide x 5 m-high attack ramps. A 6 m wide x 5 m high initial cut will be drilled and blasted. Once the blasted material is extracted, vertical holes will be drilled into the back to slash the remaining 4 m height. Cemented waste rock fill will be placed in the emptied stope for support. A rammer jammer will be used to ensure the backfill is tight to the back. Figure 16-40 and Figure 16-41 show the attack ramp access to stopes and typical stope cycle, respectively.



Source: SRK, 2023

Figure 16-40: Attack Ramp Access to Stopes



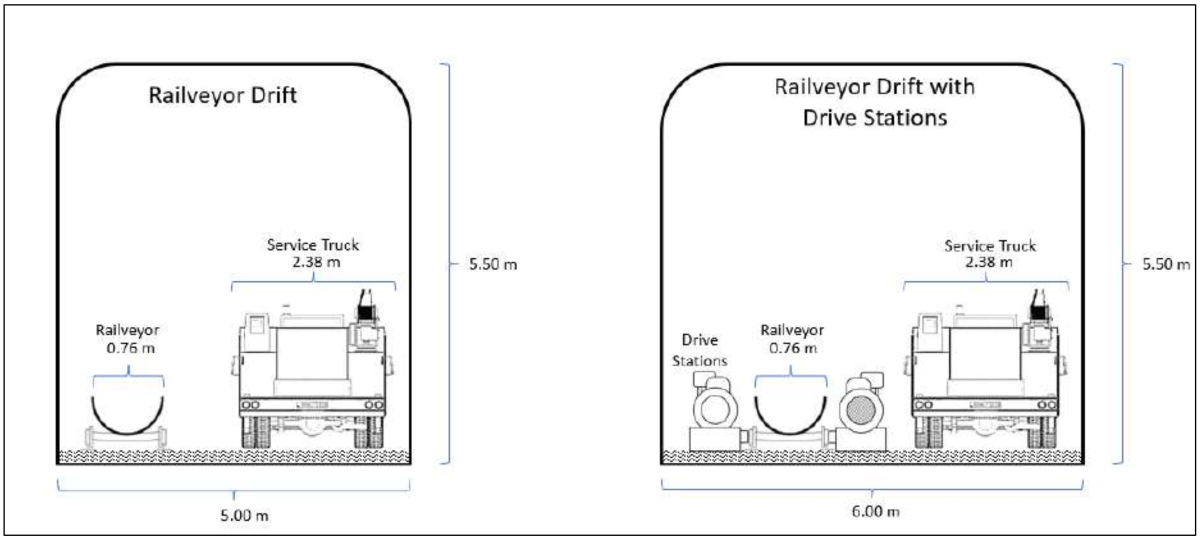
Source: SRK, 2023

Figure 16-41: Typical Stope Cycle

Stopes will follow a primary/secondary/tertiary sequence. Primary stopes will be mined, backfilled, and cured before an adjacent secondary can be mined. Tertiary stopes follow secondary stopes in a similar manner.

16.6.3 Development

A dual decline will be developed from the plant site to access the Santa Cruz and East Ridge deposits. The declines are each 5 m wide x 5.5 m high. Figure 16-42 shows a schematic tunnel layout showing railveyor in the decline. Every 100 m, the railveyor tunnel will be slashed to 6 m wide for a length of 5 m to allow for sufficient room for drive stations, railveyor, and maintenance truck access.



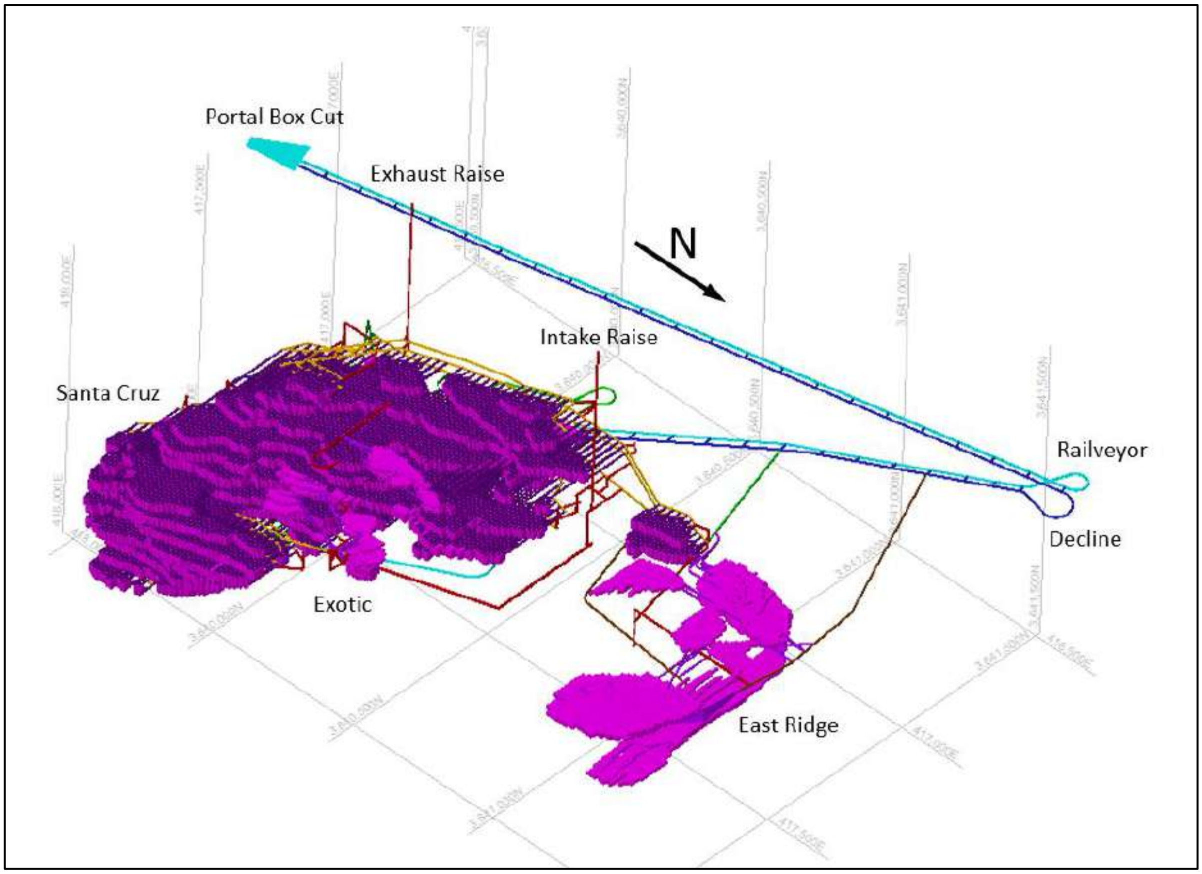
Source: SRK, 2023

Figure 16-42: Railveyor Decline Cross-Section

The second decline is for personnel/materials access and will accommodate utilities as necessary. During development, ventilation ducting will be necessary; however, for the long term, ventilation will be removed.

16.6.4 Mine Plan Resource

Figure 16-43 shows the completed mine plan. Table 16-24 summarizes the total tonnage and grades within the mine plan by area.



Source: SRK, 2023

Figure 16-43: Mine Design, Santa Cruz, Santa Cruz Exotic, and East Ridge

Table 16-24: Mine Plan Summary

Classification	Domain	Tonnage (kt)	Total Soluble Cu (%)	Acid Soluble Cu (%)	Cyanide Soluble Cu (%)
Indicated	Santa Cruz	73,582	1.62	1.05	0.39
	East Ridge	-	-	-	-
	Santa Cruz Exotic	1,131	2.79	2.28	0.22
Inferred	Santa Cruz	14,991	1.45	0.98	0.32
	East Ridge	9,799	1.76	0.95	0.75
	Santa Cruz Exotic	741	2.47	1.83	0.17
Indicated	**Total**	**74,713**	**1.64**	**1.07**	**0.39**
Inferred	**Total**	**25,530**	**1.60**	**0.99**	**0.48**

Note:4.94Mt of marginal material at a grade of 0.56% is not included in this table.
Source: SRK, 2023

The PEA is preliminary in nature, that it 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 PEA will be realized. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

16.7 Production Schedule

The production schedule is based on the mine design discussed in previous sections and was completed using Deswik software. Productivities were developed from first principles. Inputs from mining contractors and equipment vendors were considered for key parameters, such as capital cost, life of equipment, development rates, etc. The rates developed from first principles were adjusted based on benchmarking and SRK's experience and judgment.

Table 16-25 shows the productivity rates used for the mine scheduling, followed by a description of the general and activity-specific parameters upon which the productivity rates are based. Decline and railveyor drift is assumed to be excavated simultaneously with a roadheader. The rest of the development is assumed to be excavated through drill and blast methods using bulk emulsion. Multiple areas/faces are mined at the same time to generate the production schedule. Stoping rates include drilling, blasting, and mucking for the slot and stope.

Table 16-25: Productivity Rates

Activity	Type	Dimensions	Rate
Roadheader drifting	Decline	5.0 m x 5.5 m	8.0 meters per day (m/d)
	Railveyor	6.0 m x 6.0 m	8.0 m/d
	Railveyor	5.0 m x 5.5 m	8.0 m/d
Drill and blast drifting	Ramp	5.0 m x 5.5 m	4.0 m/d
	Level access	5.0 m x 5.5 m	4.0 m/d
	Footwall drive	5.0 m x 5.5 m	4.0 m/d
	Ore drive	5.0 m x 5.0 m	4.0 m/d
	Ore pass access	5.0 m x 5.5 m	4.0 m/d
	Vent drives	5.0 m x 5.0 m	4.0 m/d
	Vent drives	5.0 m x 6.0 m	4.0 m/d
	Vent drives	6.0 m x 6.0 m	4.0 m/d
	Attack ramps	5.0 m x 5.0 m	4.0 m/d
	Underground shop	5.0 m x 5.0 m	4.0 m/d
	Underground bay	6.0 m x 6.0 m	4.0 m/d
Stoping	LHS stoping	-	960 t/d
	DAF stoping	-	335 t/d
Vertical development	Ventilation intake shaft	6.5 m diameter	1.4 m/d
	Ventilation exhaust shaft	6.0 m diameter	1.4 m/d
	Ventilation raise	4.0 m diameter	1.4 m/d
	Blasted raise	5.0 m x 6.0 m	3.3 m/d
	Blasted raise	5.0 m x 5.0 m	3.3 m/d
	Blasted raise for ore pass	2.0 m x 2.0 m	3.0 m/d
Backfill	PBF	-	8,900 m^3/day
	Cemented rock backfill	-	1,000 m^3/day

Source: SRK, 2023

Ventilation shafts are assumed to be conventional shaft sinking at a rate of 1.4 m/d. The shaft wall will be supported by 12 inches of concrete. Ventilation raise is assumed to be excavated with the raiseboring method with a liner installed once boring is complete. The blasted drop raises will be drilled off by the production drill and blasted in a series of three blasts. Safescape escape ladders will be installed in select raises as secondary escape ways. Table 16-26 presents general schedule parameters applicable to all underground mining activities.

Table 16-26: Schedule Parameters for Underground Mining

Schedule Parameters	**Units**	**Value**
Annual mining days(1)	Days/year	365
Mining days per week	Days/week	7
Shifts per day	Shifts/day	2
Scheduled shift length	Hours/shift	12
Scheduled Deductions		
Shift change	Hours/shift	0.25
Travel time	Hours/shift	0.50
Equipment inspection	Hours/shift	0.25
Lunch break	Hours/shift	1.00
Equipment parking/reporting	Hours/shift	0.50
Total scheduled deductions	Hours/shift	2.50
Operating time (scheduled shift length less scheduled deductions)	Hours/shift	9.50
Effective time (operating time reduced to a 50-minute hour (i.e., multiplied by 83.3%)	Hours/shift	7.92

Source: SRK, 2023

Table 16-27 details key assumptions regarding ore and waste material characteristics.

Table 16-27: Material Characteristics

Characteristic	**Units**	**Value**
In situ ore density	t/m^3	2.70
In situ waste density	t/m^3	2.50
Swell	%	40
Loose ore density	t/m^3	1.93
Loose waste density	t/m^3	1.79

Source: SRK, 2023

The production schedule targets 15,000t/d of mineralized material to the process facility. This is a very high overall production for an underground mine and require an average of 23 LHS headings and 2 CAF headings over the LoM and a maximum of 30 LHS headings and 6 CAF headings.

Portal boxcut and alluvium decline development is assumed to start in 2026. Decline and railveyor activities begin in 2027 through to 2028 to access the top portion of the mine. Decline and railveyor resumes in 2033 to access the bottom of the mine. Stoping begins in 2029 with a 1 -year ramp-up period until the mine and plant are operating at full capacity. presents the summarized production schedule. Table 16-28 to Table 16-29 summarize the production schedule and development schedule, respectively. Figure 16-44 shows the mine production schedule by year.

Table 16-28: Summarized Production Schedule

Years	Total Tonnage (kt)	Total Soluble Cu (%)	Total Waste (kt)
2027			477
2028	430	1.35	488
2029	3,366	1.71	120
2030	5,471	1.71	22
2031	5,474	1.63	85
2032	5,474	1.66	98
2033	5,474	1.66	215
2034	5,474	1.69	127
2035	5,474	1.71	236
2036	5,439	1.64	44
2037	5,462	1.57	106
2038	5,474	1.58	114
2039	5,473	1.72	13
2040	5,474	1.62	77
2041	5,474	1.56	41
2042	5,474	1.56	65
2043	5,475	1.56	28
2044	5,475	1.61	22
2045	5,475	1.67	21
2046	5,475	1.64	26
2047	3,066	1.56	
2048	368	1.43	
Total	**100,244**	**1.63**	**2,426**

Source: SRK, 2023
Note: 4.94 Mt of marginal material at a grade of 0.56% is not included in this table.

The PEA is preliminary in nature, that it 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 PEA will be realized. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

Table 16-29: Detailed Production Schedule

Production Summary	Row Total	Unit	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048
Santa Cruz Ox/Chalc. En.																								
Santa Cruz Ox/Chalc. En. Total	**88,573**	**kt**		**430**	**2,685**	**4,580**	**4,677**	**4,744**	**4,666**	**4,753**	**4,900**	**4,864**	**4,870**	**4,791**	**4,862**	**5,079**	**4,976**	**4,917**	**4,933**	**5,083**	**4,889**	**4,688**	**2,817**	**368**
Diluted TCu	1.60	%		1.35	1.64	1.68	1.56	1.51	1.59	1.61	1.68	1.63	1.48	1.57	1.65	1.62	1.55	1.57	1.56	1.62	1.65	1.61	1.59	1.43
Diluted ASCu	1.04	%		0.68	1.14	1.15	1.04	1.03	1.18	1.10	1.17	1.10	1.06	0.99	0.98	0.92	1.00	0.96	0.98	0.96	1.04	1.00	1.14	0.96
Diluted CNCu	0.38	%		0.38	0.32	0.37	0.37	0.33	0.26	0.33	0.31	0.35	0.25	0.35	0.49	0.49	0.37	0.44	0.42	0.48	0.46	0.45	0.32	0.29
Santa Cruz Exotic																								
Santa Cruz Exotic Total	**1,872**	**kt**				**19**	**174**	**135**	**39**	**35**	**60**	**28**	**310**	**10**	**378**	**4**	**33**	**68**	**151**	**40**	**234**	**155**		
Diluted Tcu	2.66	%				1.32	1.59	2.96	2.04	5.53	3.34	5.33	3.20	1.51	2.79	1.10	2.56	2.31	1.86	2.55	2.37	2.63		
Diluted ASCu	2.09	%				1.06	1.40	2.34	1.52	3.64	2.47	4.12	2.42	0.86	2.29	0.69	2.09	1.94	1.47	1.99	1.91	2.05		
Diluted CNCu	0.20	%				0.09	0.09	0.36	0.19	0.82	0.39	0.68	0.26	0.06	0.11	0.03	0.13	0.13	0.11	0.19	0.17	0.16		
East Ridge																								
East Ridge Total	**9,799**	**kt**			**681**	**872**	**623**	**596**	**769**	**686**	**515**	**546**	**282**	**674**	**233**	**391**	**466**	**489**	**390**	**351**	**352**	**632**	**250**	
Diluted Tcu	1.76	%			2.00	1.87	2.15	2.57	2.03	2.01	1.74	1.53	1.32	1.61	1.37	1.54	1.56	1.42	1.46	1.32	1.51	1.65	1.3	
Diluted ASCu	0.95	%			1.10	1.02	1.19	1.44	1.11	1.12	0.93	0.83	0.68	0.85	0.71	0.82	0.82	0.74	0.79	0.70	0.81	0.89	0.7	
Diluted CNCu	0.75	%			0.86	0.80	0.93	1.12	0.87	0.87	0.74	0.64	0.54	0.68	0.57	0.65	0.65	0.59	0.61	0.54	0.64	0.70	0.5	
Total																								
Total Tonnage	**100,244**	**kt**			**3,366**	**5,471**	**5,474**	**5,474**	**5,474**	**5,474**	**5,474**	**5,439**	**5,462**	**5,474**	**5,473**	**5,474**	**5,474**	**5,474**	**5,475**	**5,475**	**5,475**	**5,475**	**3,066**	**368**
Diluted Tcu	1.63	%			1.71	1.71	1.63	1.66	1.66	1.69	1.71	1.64	1.57	1.58	1.72	1.62	1.56	1.56	1.56	1.61	1.67	1.64	1.56	1.43
Diluted ASCu	1.05	%			1.13	1.13	1.07	1.11	1.17	1.12	1.16	1.09	1.12	0.97	1.06	0.91	0.99	0.95	0.98	0.95	1.06	1.01	1.10	0.96
Diluted CNCu	0.41	%			0.43	0.44	0.42	0.41	0.35	0.40	0.35	0.38	0.27	0.39	0.46	0.50	0.40	0.45	0.43	0.49	0.46	0.47	0.33	0.29
Marginal Material	4,942	kt		463.9	584.0	240.0	195.0	320.9	471.6	359.1	431.1	268.9	343.0	258.7	182.2	193.7	84.6	145.4	134.3	106.7	74.5	46.6	37.1	
Marginal Tcu	0.56	%		0.47	0.58	0.60	0.58	0.57	0.53	0.54	0.53	0.61	0.55	0.52	0.62	0.57	0.51	0.61	0.67	0.61	0.60	0.65	0.68	
Marginal AsCu	0.24	%		0.07	0.19	0.21	0.21	0.37	0.19	0.29	0.23	0.40	0.18	0.16	0.28	0.28	0.39	0.38	0.34	0.27	0.33	0.38	0.44	
Marginal CNCu	0.11	%		0.09	0.17	0.21	0.17	0.09	0.07	0.07	0.11	0.09	0.08	0.10	0.12	0.13	0.06	0.10	0.12	0.18	0.17	0.16	0.16	
Waste and Backfill Summary																								
Waste Tonnage with Marginal	7,367	kt	477	952	704	262	280	419	687	486	667	313	449	372	196	271	126	210	162	129	96	72	37	
Waste Tonnage minus Marginal	2,426	kt	477	488	120	22	85	98	215	127	236	44	106	114	13	77	41	65	28	22	21	26		
Pastefill Total																								
High Strength Pastefill	25,838,273	m3			776,684	1,527,669	1,369,851	1,536,362	1,396,269	1,546,885	1,591,011	1,464,343	1,374,605	1,248,770	1,385,978	1,525,083	1,364,139	1,407,813	1,423,979	1,503,444	1,287,281	1,305,805	712,154	90,150
Low Strength Pastefill	5,144,684	m3				18,128	193,367	116,813	172,684	142,632	205,732	289,788	295,190	370,606	305,210	271,236	375,358	327,685	312,242	392,332	524,393	404,600	336,752	89,937
Total Rockfill																								
CRF Total	**4,315,695**	**m3**			**219,999**	**329,067**	**300,393**	**257,014**	**319,025**	**261,920**	**237,675**	**205,990**	**238,578**	**253,373**	**194,246**	**133,191**	**216,743**	**172,410**	**227,972**	**142,461**	**215,148**	**287,123**	**103,365**	
Rockfill Total	**227,671**	**m3**					**9,726**	**15,231**	**13,717**				**41,126**	**3,239**	**41,267**	**8,754**		**1,079**	**29,631**	**7,337**	**26,450**	**30,115**		

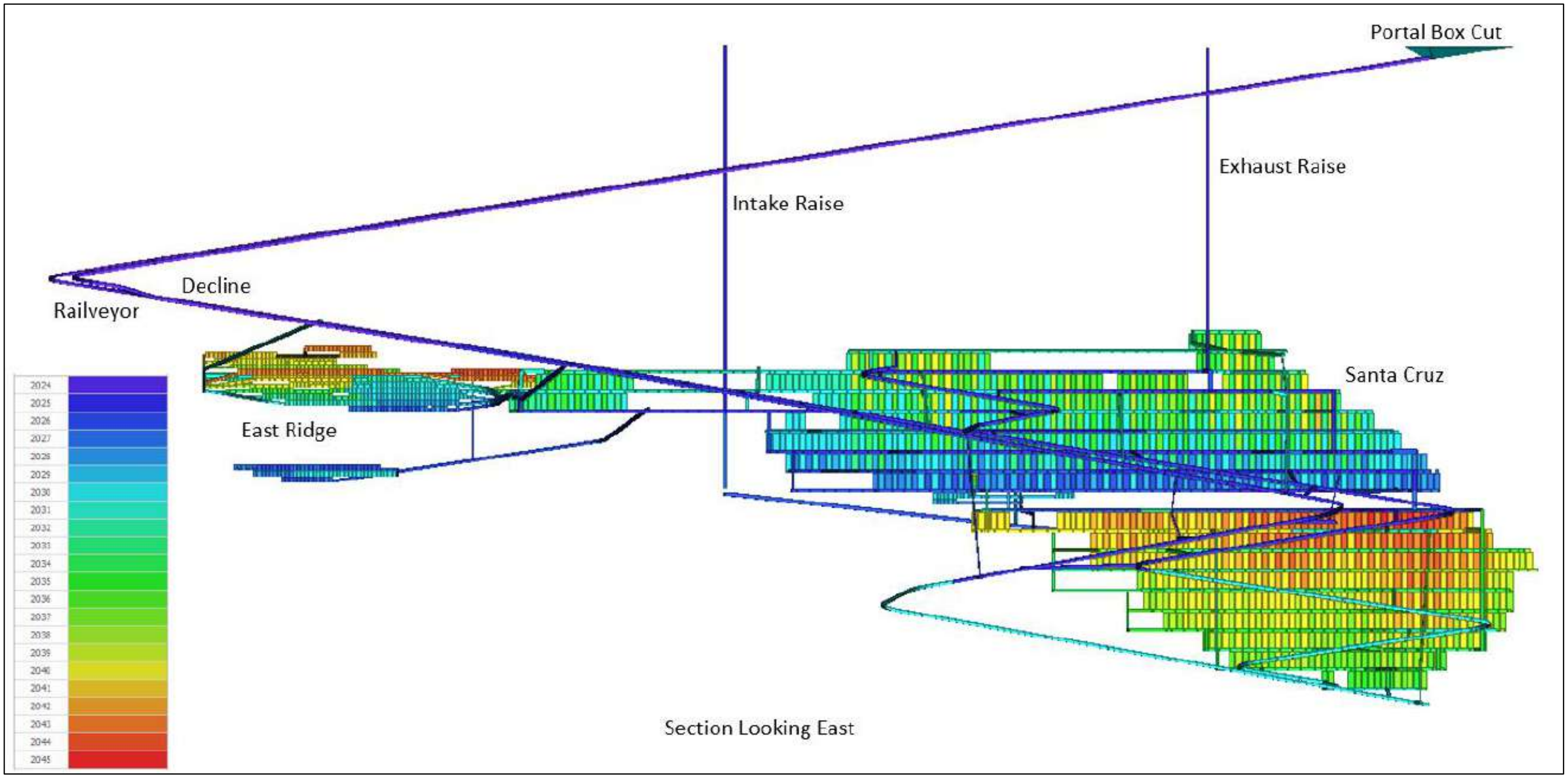
Source: SRK, 2023

Note: Marginal material is broken out separately and not included in totals for each area.

Table 16-30: Detailed Development Schedule

Development Summary	Row Total	Unit	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048
Lateral Development	308,261	m	6,254	19,531	22,822	18,167	18,237	18,246	23,422	17,792	18,777	14,029	18,993	17,773	13,541	14,802	12,486	13,711	12,746	8,547	7,855	8,361	2,169	
Decline	7,017	m	2,928	2,837					1,252															
Decline Crosscut	643	m	398	245																				
Railveyor 6x6	2,578	m	2,578																					
Railveyor 5x5.5	3,761	m	350	2,277					1,134															
Railveyor Access	367	m		104	178				85															
Ramp	1,082	m		1,082																				
Level Access	4,043	m		1,110	605				934	349	163	103	591	189										
Footwall Drive	16,336	m		3,739	2,597	200	533	717	704	1,395	1,704	573	2,108	593	386	407		467	214					
Hangingwall Drive	505	m								30	185	100					127	63						
Hangingwall Access	334	m			334																			
Ore Drive	250,222	m		6,905	15,591	16,818	16,703	16,401	16,763	15,233	14,564	12,898	14,263	16,069	12,427	13,677	12,223	12,376	12,418	7,581	7,557	7,733	2,024	
Ore pass Access	2,256	m		309	374	124	137	108	167	129	212	75	35	336	102	127		20						
Vent Drive 5 x 5	2,065	m		287	246	47	245	69	61	170	59	57	375	197	80	111			60					
Vent Drive 5 x 6	2,592	m		636	248		41	9	477	266	632		238					45						
Vent Drive 6 x 6	864	m			830	33																		
Underground Shop	100	m			100																			
Underground Bay	157	m			157																			
Attack Ramp	13,338	m			1,562	945	579	942	1,845	221	1,259	222	1,383	389	546	479	136	740	54	965	298	628	145	
Vertical Development	3,812	m		1,287	527	180	180		412	351	124		210	492	19				30					
6 m Vent Raise	489	m		489																				
6.5 m Vent Raise	552	m		552																				
4 m Vent Raise	128	m			86				42															
5 x 6 Raise	540	m		65	103	60				12	30		120	150										
5 x 5 Raise	804	m			120	120	180			95	30		90	120	19				30					
2 x 2 Raise	1,299	m		182	218				370	244	64			222										

Source: SRK, 2023



Source: SRK, 2023

Figure 16-44: Mine Production Schedule Colored by Year

16.8 Mining Operations

16.8.1 Stoping

Stopes will be mined using the LHS method. Individual stope blocks are designed to be 10 m wide, up to 30 m long in secondaries, and will have a transverse orientation. Levels are spaced 30 m apart, and each stope block will have a top and bottom access (5 m x 5 m flat back drifts).

Stopes will be drilled downward from the top access using 90 mm-diameter holes (stope production rings will be drilled with a top-hammer drill). A bottom up, primary/secondary extraction sequence will be followed. Primary stopes will be backfilled with high-strength PBF, and secondary stopes will be backfilled with low-strength PBF.

Stope extraction will occur in two steps. During the first step, a slot will be drilled with a V30 Machine Roger at the far end of the stope and 10 fan-drilled slash holes. The slot is required to create sufficient void space for the remainder of the stope to be blasted. During the second step, production rings will be blasted five rows at a time (12 blastholes per ring) until the stope is completely extracted. The number of five-row blasts in a given stope will depend on the length of the stope. All blasting will be performed with bulk emulsion.

Ore will be remotely mucked from the bottom stope access using an 8.8 m^3 (17-t) loader. The loader will transport the ore to the nearest ore pass on the level. The ore pass will load the railveyor and haul the ore to surface.

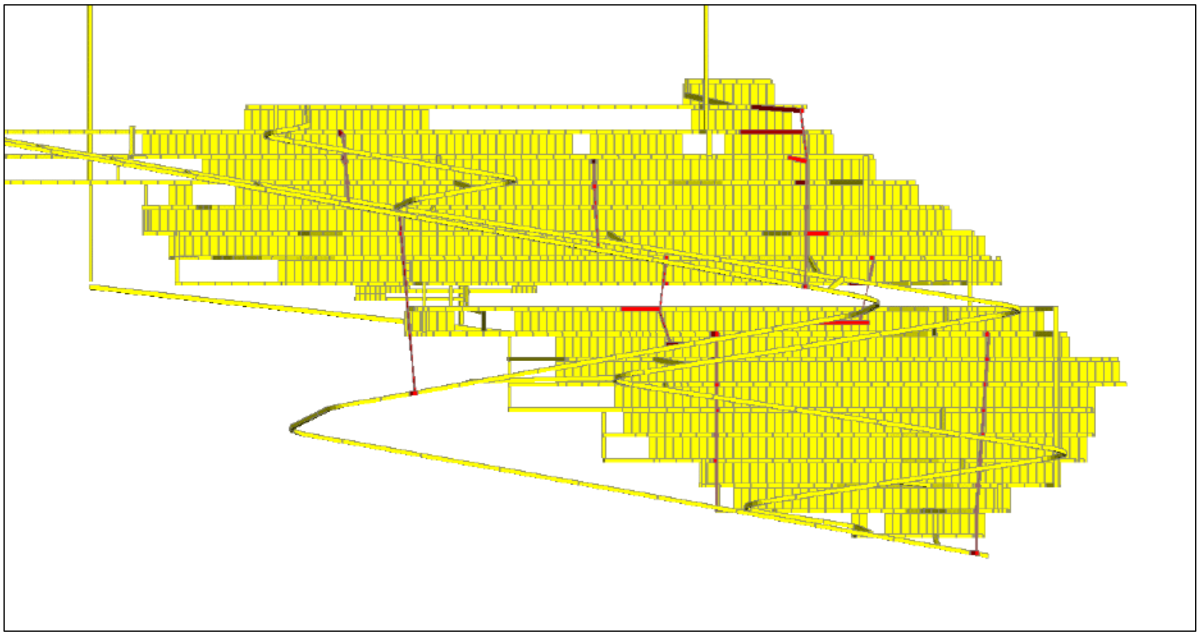
16.8.2 Drift and Fill (DAF)

The stopes will be mined using the DAF method. The stopes will be 6 m wide, 9 m high, and at varying lengths. A 5 m x 5 m attack ramp will provide access to each cut, and the stopes in each cut will be mined in a PST sequence.

Stopes are mined in two steps. A horizontal cut is first taken at 6 m wide and 5 m high using a development jumbo. After the ore is extracted and the stope is supported, a 4 m back slash is taken to extract the remaining ore. Broken muck may be left behind as a platform to support the stope before being emptied. Ore from the Exotic domain in Santa Cruz will be mucked by loaders and transported to the ore pass system. Ore from the East Ridge deposit will be loaded to a fleet of 42-t haul trucks and transported to the main ore pass system.

16.8.3 Underground Material Handling System

The underground material handling system is designed to provide some storage capacity underground and be an efficient, automated system for moving the rock to surface via railveyor. For the Santa Cruz stoping areas, material will be brought to one of several ore passes via load haul dump loaders (LHD) directly from the stopes. For the Santa Cruz Exotic domain and East Ridge deposit, an LHD will load a truck near the mining face, and the truck will transport material to an ore pass. Figure 16-45 shows the location of ore passes.



Source: SRK, 2023

Figure 16-45: Ore Pass Locations in Red

Material from the ore passes will be stored in a bin until the railveyor arrives for loading. The number of train cars and frequency of train arrival will need to be determined in future studies; however, at this time, the railveyor is not seen as a bottleneck and can be adapted as necessary. Note that railveyor is a newer technology existing at several operations worldwide, however it is currently not widely used in the industry.

16.8.4 Backfill

The Santa Cruz mine will be backfilled using cemented tailings paste. The backfill replaces excavated ore to provide support for the remaining rock and reduces the need for pillars.

The Santa Cruz Paste Plant will receive thickened tailings slurry from the concentrator via a pipeline. A large, agitated buffer tank will be located adjacent to the paste plant to provide some tailings storage and operational flexibility in tailings supply. A portion of the tailings slurry stream will be dewatered using vacuum disc filters and the resulting filter cake recombined with the remainder of the tailings slurry stream in two continuous mixers. The ratio of slurry to filter cake will be adjusted to maintain the desired solids content and flow properties of the paste. Binder will be added in the mixers according to strength requirements for each underground stope.

A network of boreholes and piping will distribute the paste from the plant to underground stopes using gravity flow. Each stope will employ a barricade to confine the paste within the stope until it cures, and mining can progress in the adjacent stope or panel.

<u>Production Rate</u>

The underground mining rate is planned to be 15,000 t/d. After considering availability, utilization, and concentrate production, the concentrator will produce 15,000 t/d of tailings when operating or roughly 625 tph. Tailings will be diverted to either the paste plant, or to the tailings management facility for permanent storage.

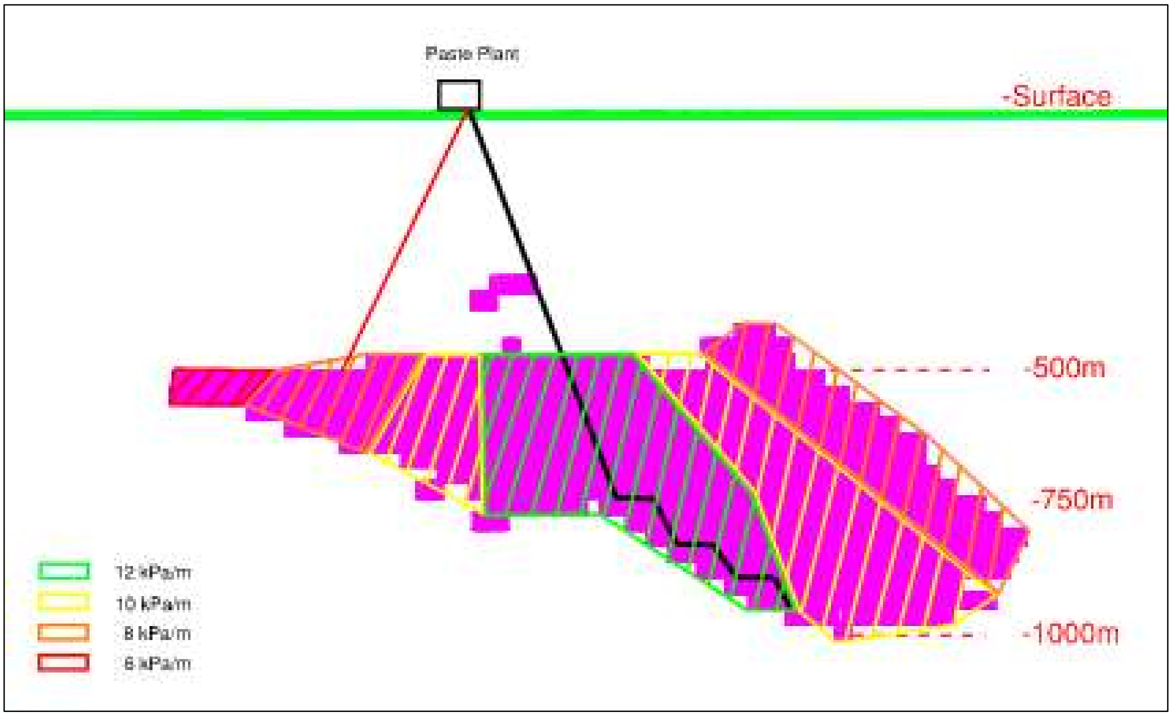
The design of the paste system will include a single paste plant as it poses the least operational complexity and lowest capital cost. The design challenges associated with high production rates can be mitigated without causing additional risks to the Project.

Underground Distribution System

The underground distribution system will consist of a network of boreholes and steel piping to convey the paste from the paste plant to the stopes throughout the mine. The paste plant is designed to operate at 625 tph of tailings plus binder and sufficient water to make a paste product which can flow through a pipeline. The resulting flowrate of that paste is approximately 450 to 475 m^3/h.

Based on estimated velocities and the expected paste production rate, the line size can be calculated to be 16-inch nominal pipe which would result in a pipeline velocity of 1.3 m/s. Boreholes should be cased unless there is certainty that the boreholes will be dry (not add any water to the paste) and will be stable. The assumption for Santa Cruz is that all boreholes will be drilled oversize and cased with steel pipe which will either be grouted in place or hung in the boreholes. The diameter of the casing should match the level piping at 16-inch nominal pipe size. Boreholes should be drilled at 70° from horizontal or less to reduce wear and damage from free falls.

It was determined that if the paste plant was located centrally above the orebody, gravity flow could be used and paste pumps would not be required. The long section contained in Figure 16-46 highlights the central distribution trunkline in black. The trunkline transports the paste to levels where it's transported horizontally along footwall drives to the extents of the orebody. The colored shading shows the maximum allowable pipeline friction loss under gravity flow for that distribution route. Benchmark friction loss for paste system indicates that the friction loss in the larger pipelines should range from 5 to10 kPa/m for this system. A second optional borehole from the paste plant is shown in red to allow higher friction paste to be reticulated to the North if needed.



Source: SRK, 2023

Figure 16-46: Long Section of Paste Distribution System and Maximum Allowable Friction Loss for Gravity Flow (looking East)

Paste Process Design

Table 16-31 shows the design criteria for the paste plant.

Table 16-31: Design Criteria

Design Parameter	Criteria
Tailings production rate	15,000 t/d or 625 tph
Tailings solids specific gravity	2.67
Thickener underflow solids content	64% (w/w)
Paste solids content	73.8 – 75.7 % (w/w)
Binder content	2-7%
Mixer retention time	2 minutes minimum

Source: Barr, 2023

Tailings will be received in a large, agitated tank at the paste plant. This tank provides needed buffering capacity between the concentrator and paste plant to allow for switching of line when the paste plant is not operating and short operational interruptions from the concentrator. It is also recommended that the concentrator have a similarly sized buffer tank to double the storage and blending capacity after the thickener.

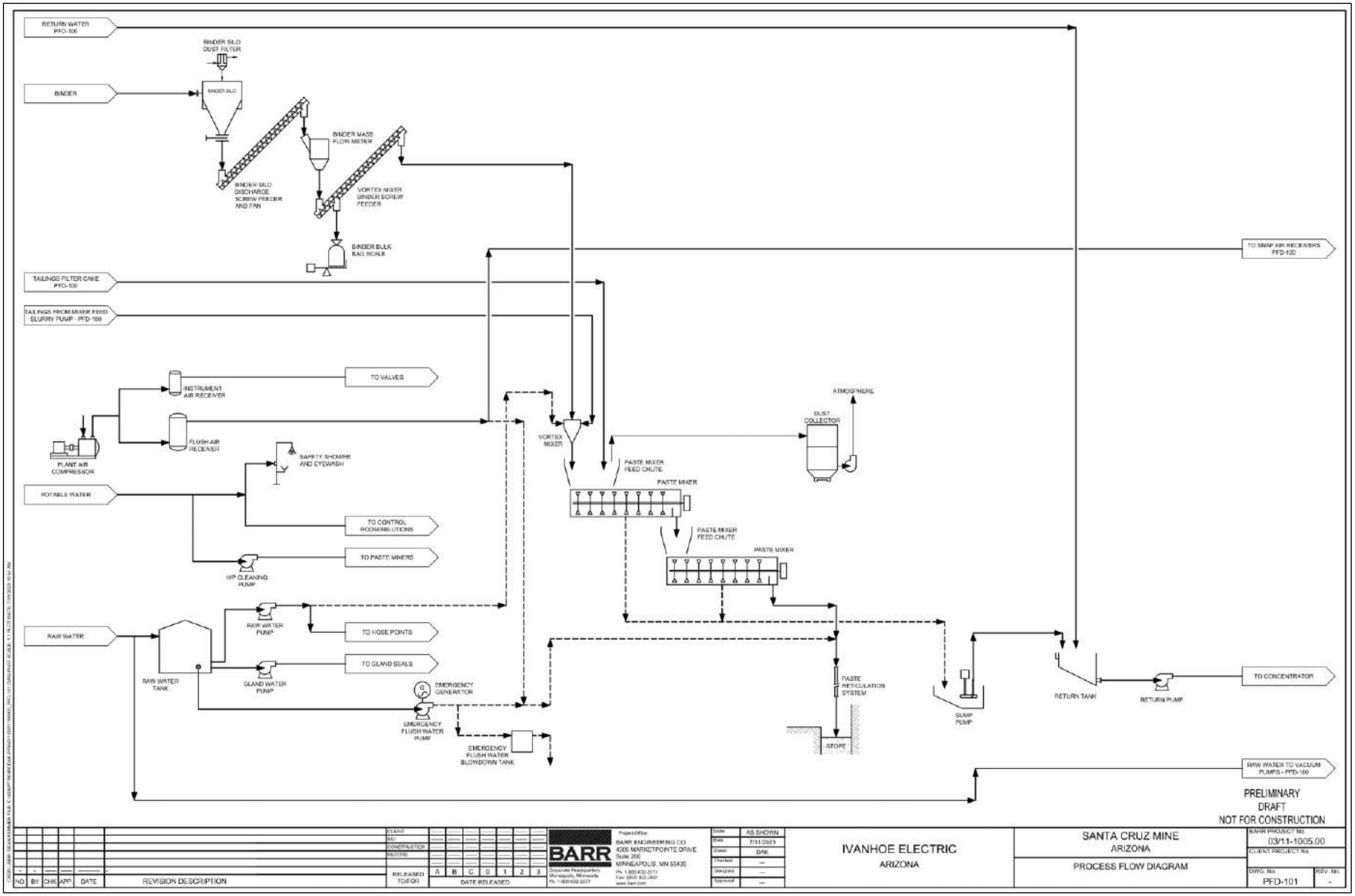
The thickened tailings slurry feed to the paste plant contains too much water for paste production. Vacuum disc filters will be used to dewater a portion of the tailings stream. The control system of the paste plant will measure and adjust the ratio of tailings which require filtration to achieve the desired target moisture of the final paste backfill. The Santa Cruz Paste Plant will require 4 operating filters to achieve the design capacity of the system. It is recommended that a fifth redundant filter be considered in future study stages.

The paste mixers will blend tailings filter cake, thickened tailings slurry and binder to make the backfill for Santa Cruz. The flow rate through the mixer will be approximately 475 m^3/h. This flow rate makes the retention time in mixers available on the market to be too short. It is recommended to utilize two continuous mixers in series to achieve the desired retention time in the mixer to properly blend tailings, binder, and slurry.

A single 1,500 t binder silo has been included in the design. This provides sufficient capacity to operate for 48 hours at a binder consumption rate of 5%. Preliminary UCS testing indicates lower binder contents may be possible at Santa Cruz. Future study stages should examine the stability and proximity of the binder supply for the mine to determine the required binder storage.

Binder will be metered into the paste process using a rotary valve and screw conveyors. A continuous mass flow measuring instrument is recommended between screw conveyors. The paste plant control system will calculate the required binder flow rate based on the tailings flow rate and the recipe input by the operator.

Figure 16-47 shows the Santa Cruz paste backfill process flow sheet.



Source: Barr, 2023

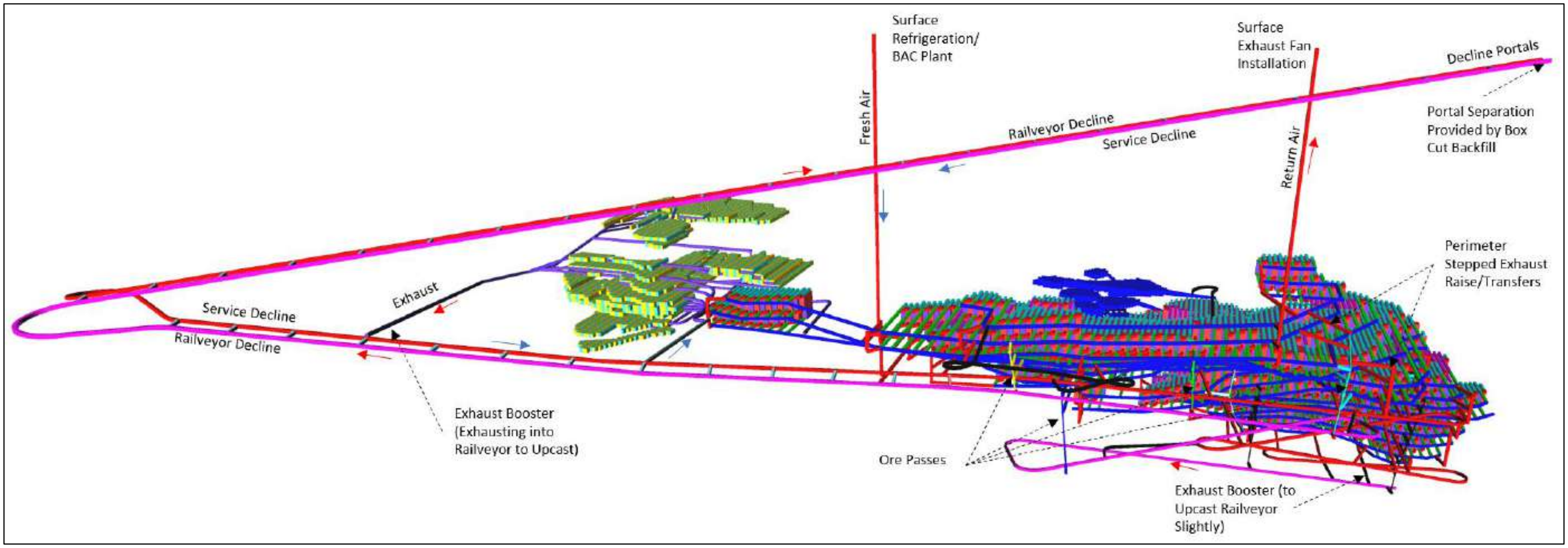
Figure 16-47: Santa Cruz Paste Process Flow Sheet

16.8.5 Grade Control

Short and mid-range production drilling will precede advancement of individual levels and headings. As headings are advanced, the geologic controls will be verified spatially, with grab samples taken and assayed as each round advances. Any observed controlling geology, lithology, structures, geochemical features, etc. will be mapped, reconciled to, and updated in the model. During advance, a geologist will determine whether to route the material as ore or waste. If a determination cannot be made immediately, the material can be stockpiled in an underground muckbay while awaiting the assay results. If areas of high model variability are encountered, in-stope drilling may be conducted to refine the short-term mill feed predictability. Model performance will be tracked over time and adjustments will be made if needed.

16.8.6 Ventilation

The ventilation design required to support the development and production at the Santa Cruz Project incorporates four connections to surface: one service access decline, one exhaust railveyor decline, one dedicated exhaust shaft, and one dedicated fresh air raise as shown in Figure 16-48. Because of the automated electric haulage provided by the railveyor system and the use of electric equipment, the airflow quantity required to ventilate the mine is reduced from what a typical diesel equipment fleet would require. However, because of the geologic setting and high thermal gradient, refrigeration will be required for the ventilation system for a portion of the year. The main benefit with respect to the electrification of the mining equipment will be the reduction in refrigeration. The diesel equipment fleet would present a heat load likely greater than three times the heat load developed by the electric equipment fleet. In addition, the production of CO_2 may be reduced by as much as 70% to 80% with the use of an electric equipment fleet, however, this will be required to be confirmed through future studies.



Source: SRK, 2023

Figure 16-48: General Ventilation Infrastructure and Layout

The basic airflow requirement for the mine is based on achieving a minimum design air velocity in various point-of-use areas, as shown in Table 16-32.

Table 16-32: General Airflow Calculations

Zone		Point of Use	Number of Areas	Air Velocity (m/s)	Dimension (m)		Airflow (m^3/s)	Airflow (m^3/s)
					Height	Width		
Main Zone		Production mucking	10	0.75	5	5	187.5	375
		Development/setup	10	0.50	5	5	125	
		Open level footwall	1	0.50	5	5	12.5	
		Development level	1				50	
East Ridge	Lower	Production mucking	2	0.75	5	5	18.75	112.5
		Development/setup	2	0.50	5	5	12.5	
	Upper	Production mucking	2	0.75	5	5	18.75	
		Development/setup	2	0.50	5	5	12.5	
	Development						50	
General		Light shop					25	25
Leakage (15%)								77
Total								**564**

Source: SRK, 2023
m/s: Meters per second
m^3/s: Cubic meters per second

There will be two basic independently ventilated/exhausted mining zones: East Ridge and Main Zone. The East Ridge mining zone will draw airflow in from both the fresh air shaft and service decline and exhaust the airflow to surface through the railveyor decline. The air velocity in the railveyor decline will be high, but it will be in the same direction as the materials' movement, which will minimize the dust liberation. An exhaust booster fan will be required to be installed in the ramp leading to the railveyor from the East Ridge mining zone. The Main Zone will draw airflow in from the fresh air shaft and service decline and will exhaust through the perimeter exhaust raise that extends to surface. To upcast the lower portion of the railveyor, a small booster fan will be required to be installed at the last crosscut between the railveyor and service declines. The main exhaust fan installation for the Main Zone will be located on surface at the top of the exhaust shaft. Individual stopes can be ventilated with 100-kilowatt (kW) auxiliary fans and 1.4 m flexible duct.

A high-level ventilation model was developed using the VentSIM software so that the overall life-of-mine (LoM) fan operating points could be determined, which would include leakage, decline interactions, and general level ventilation. This model established the applied fan power for the operating fan installations, as shown in Table 16-33.

Table 16-33: Main Fan LoM Operating Points

Fan Location	Airflow (m^3/s)	Pressure (kPa) 0.5 kPa Added Losses	Power (kW) (80% Efficiency)	Notes
Temporary portal fan	225	2.4	675	Used for decline construction to establish flow through ventilation prior to the shafts
East Ridge railveyor exhaust fan	200	2.8	700	Two fans mounted in parallel in a bulkhead to draw airflow through East Ridge and upcast the conveyor
Base of railveyor exhaust fan	50	2.6	165	To upcast the conveyor away from the Main Zone
Main Zone exhaust fan	500	4.1	2,562	Two fans mounted in parallel on the surface to provide Main Zone exhaust

Source: SRK, 2023

A basic heat balance was developed for the ventilation system to identify the initial required refrigeration quantity to be applied to fresh air raise at the surface. Although refrigeration could be applied at places other than the surface, the surface was chosen because it allows for an easier installation/construction, easier maintenance, and a greater degree of flexibility, which will allow for expansion if the mine progresses deeper or if production is increased. The heat balance considered the electric equipment fleet and fans, compression, rock mass, and the natural cooling from the circulating airflow. Table 16-34 identifies the equipment and operating parameters used to calculate the equipment heat load.

The thermal gradient of 2.1°C/100 m with a surface rock temperature of 24.8°C was identified by site drilling logs dated November 11, 2022. This was input to the ventilation model without any equipment loads so that the heat developed from only the rock mass could be identified. This is a general assumption and will change depending upon production rates, stope orientations, number of active headings, and the exposure of the rock mass to airflow. The age of the exposed rock was kept fresh to help balance the heat generated from backfill which was not separately identified. At this stage, a thermal model was not developed. A thermal model will be useful to identify discrete areas which may have elevated air temperatures.

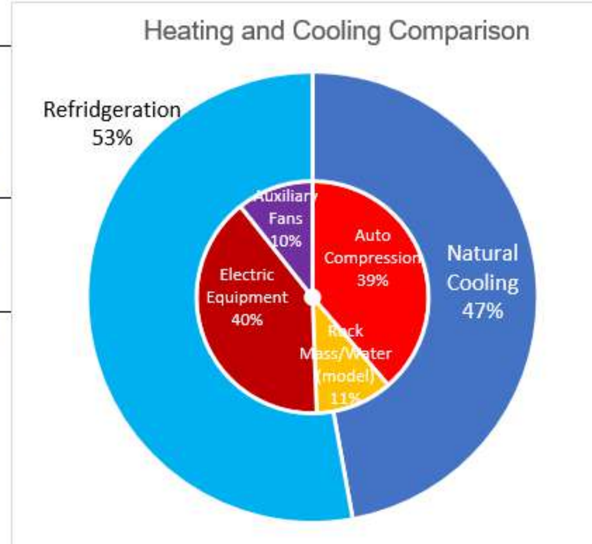
To add both a degree of conservativeness and a more-reasonable working environment for non-acclimated personnel, a reject wet bulb temperature of 26°C was used to derive the cooling capacity of the natural intake airflow. Figure 16-49 provides a summary of the heat balance, which reflects an applied refrigeration quantity of approximately 8.4 megawatts of refrigeration ($MW_{(R)}$).

Table 16-34: Overall LoM Equipment Heat Loads

Equipment	Potential Make and Model	Power Source*	Peak Power (kW)	On Shift Utilization (%)	Estimated Motor Utilization (%)	Power Utilized (kW)	Equipment Numbers	Total Power (kW)
LHD	Epiroc ST18 (17.5t) BEV	BEV	450	100	50	225	8	1,800
Haul truck	Epiroc MT54 (54t)	BEV	567	100	50	283.5	7	1,985
Jumbo	Epiroc Boomer M2C BEV	BEV/tethered	150	60	25	22.5	6	135
Scaler	MacLean RB3-EV	BEV/tethered	110	40	25	11	2	22
Bolter	Epiroc Boltec M BEV	BEV/tethered	150	50	25	18.75	6	113
Cable bolter	MacLean CB3-EV	BEV/tethered	150	60	25	22.5	3	68
Rockbreaker	MacLean RB3-EV	BEV	150	40	25	15	2	30
ITH	Epiroc Simba E7C BEV	BEV	150	80	25	30	5	150
Small LHD	Epiroc ST3.5 (6t)	BEV	75	40	25	7.5	2	15
Probe hole drill	Epiroc Boomer E1 C	BEV/tethered	140	20	25	7	1	7
Shotcrete sprayer	MacLean SS5-EV	BEV/tethered	200	60	50	60	2	120
Transmixer	MacLean TM3-EV	BEV	200	60	75	90	3	270
Explosives loader	MacLean EC3-EV	BEV	200	40	75	60	5	300
Personnel carrier (bus)	MacLean PC3-EV	BEV	150	20	75	22.5	3	68
Light vehicles (shifters, crews, management, etc.)	Kovatera KT200e	BEV	150	35	25	13.125	9	118
Cable reeler/ electrician	Kovatera KF200e	BEV	150	50	25	18.75	2	38
Mine rescue	Kovatera KT200e	BEV	150	5	100	7.5	2	15
Maintenance (mechanic)	Kovatera KF200e	BEV	150	40	75	45	5	225
Fuel/lube truck	MacLean FL3-EV	BEV	150	10	75	11.25	1	11
Grader	MacLean GR3-EV	BEV	200	40	100	80	1	80
Boom truck	MacLean BT3-EV	BEV	200	50	75	75	2	150
Scissor lift	MacLean LR3-EV	BEV	200	50	50	50	2	100
Telehandler	Genie GTH-1056 (5.5t)	BEV	130	20	75	19.5	3	59
Skidsteer	Kovaco ECO	BEV	81	40	50	16.2	3	49
Portable compressor (service cable bolter, mechanical, production)		BEV	75	30	100	22.5	12	270
Diamond drill	Epiroc Diamec 6	BEV	90	40	100	36	3	108
Stope development fans			100	100	75	75	10	750
Stope production fans			100	100	75	75	10	750
General fans			50	100	75	37.5	5	188
Total electric equipment heat load								**7,990**

Source: SRK, 2023
*BEV = Battery Electric Vehicle

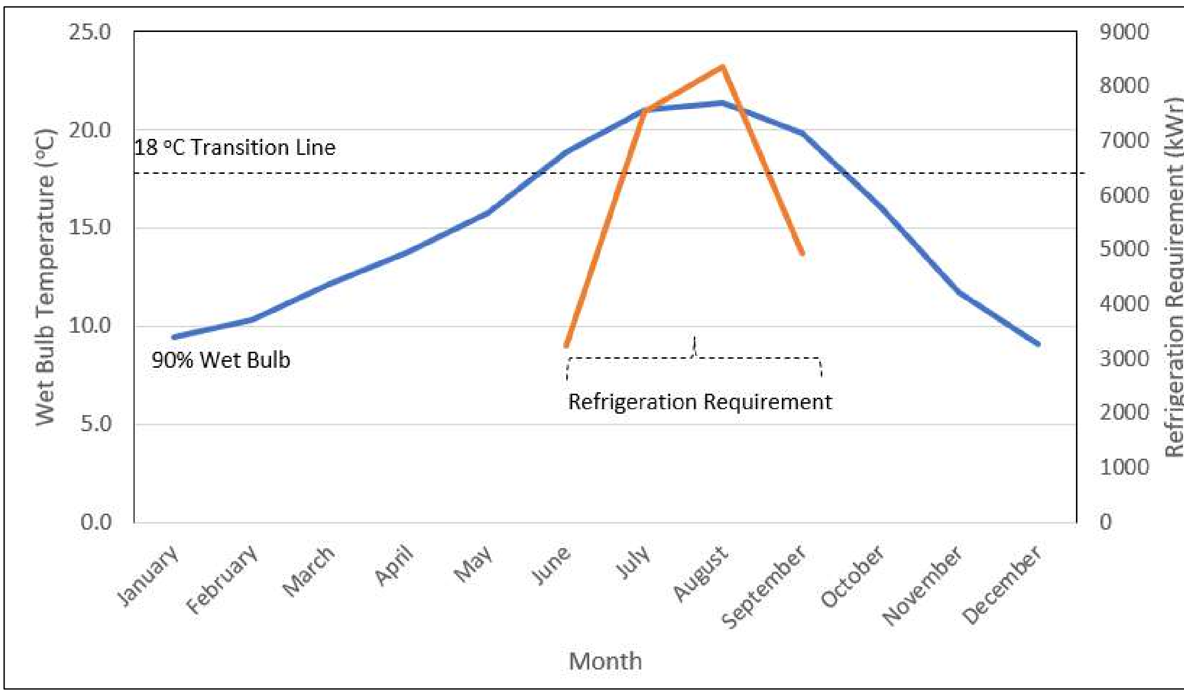
Area	Magnitude	
Heat Loads	26° Reject	
Auto Compression	6112	kW
Equipment	7990	kW
Rock Mass/Water (model)	**1700**	kW
Cooling		
Natural Cooling	7450	kW
Fresh Air		
Difference	**-8353**	kW



Source: SRK, 2023

Figure 16-49: Refrigeration Summary Breakdown

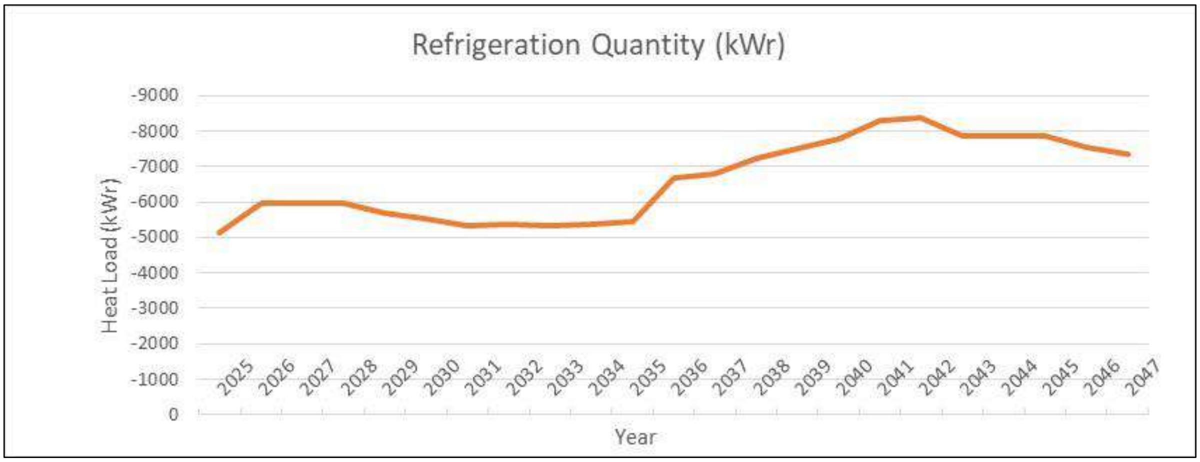
Refrigeration will not be required all year. Once the general surface wet bulb temperature is drawn below 18°C wet bulb, refrigeration will not be required, as shown on Figure 16-50.



Source: SRK, 2023

Figure 16-50: Seasonal Refrigeration Operation

To establish the maximum refrigeration requirement on an annual basis over the LoM, the factors of depth and production rate were modulated based on the mine schedule. The refrigeration quantities shown on Figure 16-51 identify the possibility to develop the surface refrigeration plant in stages with modular units, with the first unit in 2025 and the second unit in 2034.



Source: SRK, 2023

Figure 16-51: Refrigeration Requirements Over the LoM

16.8.7 Mine Services

Electrical

Power to the mine is delivered from the main substation to the mine electrical building at the Portal via 13.8 kV power lines. From the Portal electrical building, three 13.8 kV power lines are hung down the decline to level -270, at the bottom of the upper block. From there, mine power centers will be installed on various levels to provide power to the working face. The power will support the mine working faces and the battery charging stations for the BEV equipment.

Health and Safety

The mine design includes refuge stations placed throughout the mine. Escape ladders are installed in vent raises to serve as secondary egress. A stench warning system through the ventilation system will notify workers of emergency conditions.

Manpower

Decline, railveyor, and ventilation shaft development are assumed to be contractor operated. Mine development and production will be owner operated. The estimated management and technical staff is 50, and operating and maintenance personnel is 274. Table 16-35 shows the estimated number of management and technical staff. Table 16-36 shows the estimated number of operating and maintenance personnel.

Table 16-35: Management and Technical Staff Labor Estimate

Department/Section	Category	Shift Hours	Maximum Staff
Mine Technical Staff			**43**
Underground Mine Manager	Salary	8	1
Underground Mine General Foreman	Salary	8	2
Technical Services Manager	Salary	8	1
Chief Mining Engineer	Salary	8	1
Senior Mining Engineer	Salary	8	2
Long-Term Planning Engineer	Salary	8	1
Short-Term Planning Engineer	Salary	8	2
Backfill Engineer	Salary	8	1
Ventilation Engineer	Salary	8	1
Ventilation Technician	Salary	8	2
Surveyors	Salary	8	6
Senior Geotechnical Engineer	Salary	8	1
Geotechnical Engineer	Salary	8	1
Geotechnical Technician	Salary	8	1
Chief Mine Geologist	Salary	8	1
Senior Mine Geologist	Salary	8	1
Beat Geologist	Salary	8	6
Senior Modeling Geologist	Salary	8	1
Infill Drilling Supervisor	Salary	8	1
Senior Field Logging Geologist	Salary	8	1
Core Logger	Salary	8	4
Project Lead	Salary	8	1
Mechanical Engineer	Salary	8	2
Civil Engineer	Salary	8	2
Mine Maintenance Staff			**7**
Maintenance Superintendent	Salary	8	1
Maintenance General Foreman	Salary	8	1
Maintenance Planning Coordinator	Salary	8	1
Maintenance Planning Engineer	Salary	8	1
Maintenance Planning Technician	Salary	8	3

Source: SRK, 2023

Table 16-36: Operating and Maintenance Labor Estimate

Department/Section	Category	Shift Hours	Maximum Staff
Mine Operations Labor			**219**
Development Supervisor	Hourly	12	3
Jumbo Operator	Hourly	12	12
Bolter Operator	Hourly	12	15
Cablebolter Operator	Hourly	12	6
Service Crew	Hourly	12	18
Production Supervisor	Hourly	12	3
Truck Driver	Hourly	12	12
LHD Operator	Hourly	12	33
Production Drill Operator	Hourly	12	21
Lead Blaster	Hourly	12	21
Blaster Helper	Hourly	12	21
Grader Operator	Hourly	12	3
Utility/Laborer/Nipper/Helper	Hourly	12	25
Underground Pastefill and Construction Supervisor	Hourly	12	1
Pastefill Piping Crew	Hourly	12	1
Pastefill Barricade Crew	Hourly	12	3
Pastefill Plant Operator	Hourly	12	1
Shotcrete Operator	Hourly	12	6
Construction Crew	Hourly	12	9
Backfill Plant Supervisor	Hourly	12	1
Backfill Plant Operator	Hourly	12	1
Backfill Plant Helper	Hourly	12	3
Binder Transport and Delivery Operator	Hourly	12	3
Mine Maintenance Hourly Labor			**55**
Underground Shop Supervisor	Hourly	12	1
Underground Shop Mechanic	Hourly	12	19
Underground Millwright	Hourly	12	4
Underground Shop Electrician	Hourly	12	19
Underground Shop Welder	Hourly	12	3
Underground Shop Mechanic Helper	Hourly	12	3
Underground Shop Electrician Helper	Hourly	12	3
Underground Shop Welder Helper	Hourly	12	2

Source: SRK, 2023

Equipment

Santa Cruz will primarily use a battery electric fleet for development and production. Auxiliary equipment is mostly diesel. Table 16-37 shows the estimated required mobile equipment. Note that use of battery electric equipment is newer technology and is currently not widely used in the industry.

Table 16-37: Santa Cruz Estimated Mobile Equipment

Major Mobile Equipment	Requirement
Epiroc BEV M20 - Jumbo - BE	4
Epiroc BEV Boltec M10 - Mechanical Bolter	5
Epiroc BEV M6 - Simba Longhole	7
Maclean EC3 - Emulsion Charger	7
MacLean SS5 - Shotcrete Sprayer	1
MacLean TM3 - Transmixer Truck	1
Epiroc BEV ST18 - LHD, 8.8 m3, 17 t - BE	11
Epiroc ST18 - LHD, 8.8 m3, 17 t	0
Epiroc MT42 - Haulage Truck, 42 t	0
Eprioc BEV MT42 - Haulage Truck, 42 t - BE	4
Epiroc BEV Cabletec M - Cablebolter	1
MacLean SL3 - Scissor Lift	4
MacLean FL3 - Fuel/Lube Truck	2
MacLean GR5 - Grader	2
MacLean BT3 - Boom Truck	2
Miller Toyota Hurth - Mechanic Truck	3
Miller Toyota Van - Personnel Carrier, 9 per.	20

Source: SRK, 2023

17 Recovery Methods

17.1 Operation Results

All plant equipment will be sized for the ultimate plant production estimated to be 15,000 dry metric tonnes per day (t/d) at 94% utilization on a 24-hour per day, 365 day per year basis (15,957 dry t/d operating rate).

Santa Cruz Project ore mineralization can be subdivided into four (4) copper containing major groups:

- Exotic domain - Copper found in basal gravels
- Oxide domain - Chrysocolla and atacamite hosted in oracle granite
- Chalcocite domain – supergene chalcocite with or without chalcopyrite hosted in oracle granite
- Primary domain – hypogene chalcopyrite, molybdenite, bornite, covellite hosted in oracle granite

Primary hypogene sulfides are not included in the mine plan.

Table 17-1 shows the planned operating schedule and throughput targets per the mine plan.

Table 17-1: Planned Operating Schedule and Target Throughputs

Description	Unit	Value
Plant Throughput		
Overall Plant Feed	t/y	5,475,000
Overall Plant Feed	t/d	10,800 to 16,300
Operating Schedule		
Shift/Day	-	2
Hours/Shift	h/s	12
Hours/Day	h/d	24
Days/Year	d/a	365
Unit Operation Availability		
Crushing Circuit	%	Approx. 70
Crushing Rate	t/h	888
Grinding and Flotation	%	94
Grinding Circuit Onward	t/h	665
Plant Feed Grade (LoM)		
Copper (TCu)	%	1.60
Acid Soluble Copper (ASCu)	%	1.04
Cyanide Soluble Copper (CNCu)	%	0.38
Copper Production		
Cathode Production		
Copper in Cathode LoM	t	1,032,000
Copper Recovery from SX-EW	%	62.2%
Annual Cathode Production	t	32,000 to 61,400
Concentrate Production		
Copper in Concentrate LoM	t	555,000
Copper Recovery from Concentrator	%	33.4%
Annual Copper in Concentrate	t	14,000 to 35,100
Combined Copper Recovery	%	95.4

Source: M3, 2023
t/h = tonnes per hour

Operating Schedule

- Hours per shift 12
- Shifts per day 2
- Days per week 7

- Days per year 365

Material Placement Rate

- Tonnes per day, average (actual tonnage varies by year) 15,000
- Tonnes, average (actual tonnage varies by year) 7,000-16,000
- Years of Operation Planned 20

Area Characteristics

- Run of Mine Ore, (100%) minus, mm 500
- SG (bulk density) 1.7
- P80, mm 144

17.2 Processing Overview

The current flowsheet includes:

- Crushing of ROM ore to 80% passing 144 mm
- SAG and Ball mill grinding to 80% passing 300 microns
- Whole ore agitated leaching in sulfuric acid in five tanks in series
- PLS recovery in a 5-stage CCD wash of leach residue
- 2-stage neutralization of leach residue with limestone in the first stage and with lime in second stage
- Tertiary grinding of leach residue in a vertical mill to 80% passing 106 microns
- Rougher flotation one bank of six tank cells
- Regrinding of rougher concentrate in a vertical mill to 80% passing 74 microns
- 2-stage copper concentrate cleaning and a cleaner scavenger flotation
- Concentrate thickening
- Concentrate filtration in a horizontal press filter
- Tailing (rougher and cleaner tailing) thickening
- Pumping of tailing to the TSF
- Reclaim of water from the TSF back to the process plant

17.3 Processing Method

The following items summarize the process operations required to extract copper from the Santa Cruz:

17.3.1 Comminution

- The primary crushing circuit will be located on the surface and will be fed directly from the Railveyor.
- Size reduction of the ore by a primary crusher to reduce the ore size from run of mine (ROM) to 80 percent passing 144 mm. Crushed will be conveyed to a covered coarse ore stockpile located near the concentrator.
- Stockpiling the primary crushed ore and then reclaiming by feeders and conveying to the grinding circuit.
- Grinding ore in a conventional semi-autogenous (SAG) and ball mill circuit to a product size of 80 percent passing 300 microns prior to processing in a tank leach circuit. The primary grinding circuit will consist of one SAG mill operating in closed circuit with a screen. The

secondary grinding circuit will consist of a single ball mill operating in closed circuit with hydrocyclones.

- Ground slurry will be dewatered prior to being sent to the leach plant. Ground mineralized material is thickened in a Pre-Leach thickener and then conditioned in a Conditioning tank to bring the leach tank feed to 50% solids.

17.3.2 Whole Ore Leaching

- The slurry will be leached with sulfuric acid in a series of five lined agitated tanks with a capacity of 862 m^3, each.
- The PLS slurry then discharges at a rate of 1,380 m^3/h to five stages of counter current decantation (CCD) thickeners to wash the leach residue as thickener bed and recovery pregnant leach solution (PLS) as thickener overflow. The final thickener underflow reports to the neutralization circuit.

17.3.3 Solvent Extraction / Electrowinning

- The PLS reports to the PLS clarifier where it settles any residual solids. The clarifier overflow reports to the PLS Pond, while the clarifier underflow is recycled back to the CCD circuit.
- The double lined PLS pond serves to settle any residual solids for eight hours and de-aerate PLS before it is pumped to the solvent extraction circuit.
- Copper is extracted from PLS in a series of three mix tanks, each for two stages of extraction settlers. The organic (diluent and extractant) into which copper is partitioned, reports to the organic scrubber for aqueous removal. The barren PLS aqueous phase reports to the Raffinate pond. Scrubbed organic advances to the loaded organic tank.

Loaded organic is pumped to the mix tanks of the organic wash stage where more aqueous entrainment from the PLS is removed and the organic is cleaned of any remaining chloride contamination prior to stripping with electrolyte. Clean organic advances to the mix tanks of the stripper section:

- Copper is stripped from the organic into electrolyte via two mix tanks, each, in two stages of strip settlers by strong acid in the lean electrolyte creating a rich electrolyte.
- Rich electrolyte is filtered in electrolyte filters to remove any residual organic phase. The filtered rich electrolyte is then heated by a heat exchanger and pumped to the electrowinning cells in the EW tank house.
- There are 140 EW cells in the EW tank house with 60 cathode blanks and 61 lead anodes per EW cell. The harvesting cycle for copper cathode is seven days.
- The lean electrolyte is pumped back through the heat exchanger and ultimately reports to the strip settler circuit.
- Copper cathodes are stripped from cathode blanks in a robotic stripping machine, washed, sampled and stacked for market.

17.3.4 Leach Residue Neutralization

- The leach residue is neutralized in a neutralization tank using limestone slurry at grind size of 80% passing 44 microns.
- A second stage of leach residue neutralization is made using Milk of Lime slurry.

- The neutralized slurry is ground in a single tertiary mill operating in closed circuit with hydrocyclones to an 80% passing of 106µm prior to processing in a flotation plant.

17.3.5 Flotation Circuit

- The flotation plant will consist of a conventional copper flotation circuit. The rougher flotation circuit will consist of one bank of six 200 m^3 flotation tank cells. The rougher tailing will report to the tailing thickener.
- The rougher concentrate will be reground using a vertical stirred mill to 100% passing of 74 microns. The ground rougher concentrate reports to the cleaner circuit. The cleaner circuit consists of two stages of four tank cells each and one cleaner scavenger stage.
- Copper concentrate from the discharge of the second cleaner stage reports to the concentrate thickener where it will be thickened to a slurry density of 60% to 65% solids.
- Concentrate slurry will be washed and filtered in a press filter, and stored in a bunker from where it will be shipped to an offsite smelter by trucks.

17.3.6 Tailing

- Flotation tails will be thickened in a tailing thickener and pumped to a conventional tailings storage facility at a slurry density of 65% solids.
- A split of approximately half of the tailing slurry reports to the paste backfill plant where it is mixed with cement and other amendments to provide structural backfill in the underground mine.
- Solution from the tailing dewatering will be recycled for reuse in the process. Plant water stream types will include process water, fresh water, and potable water.

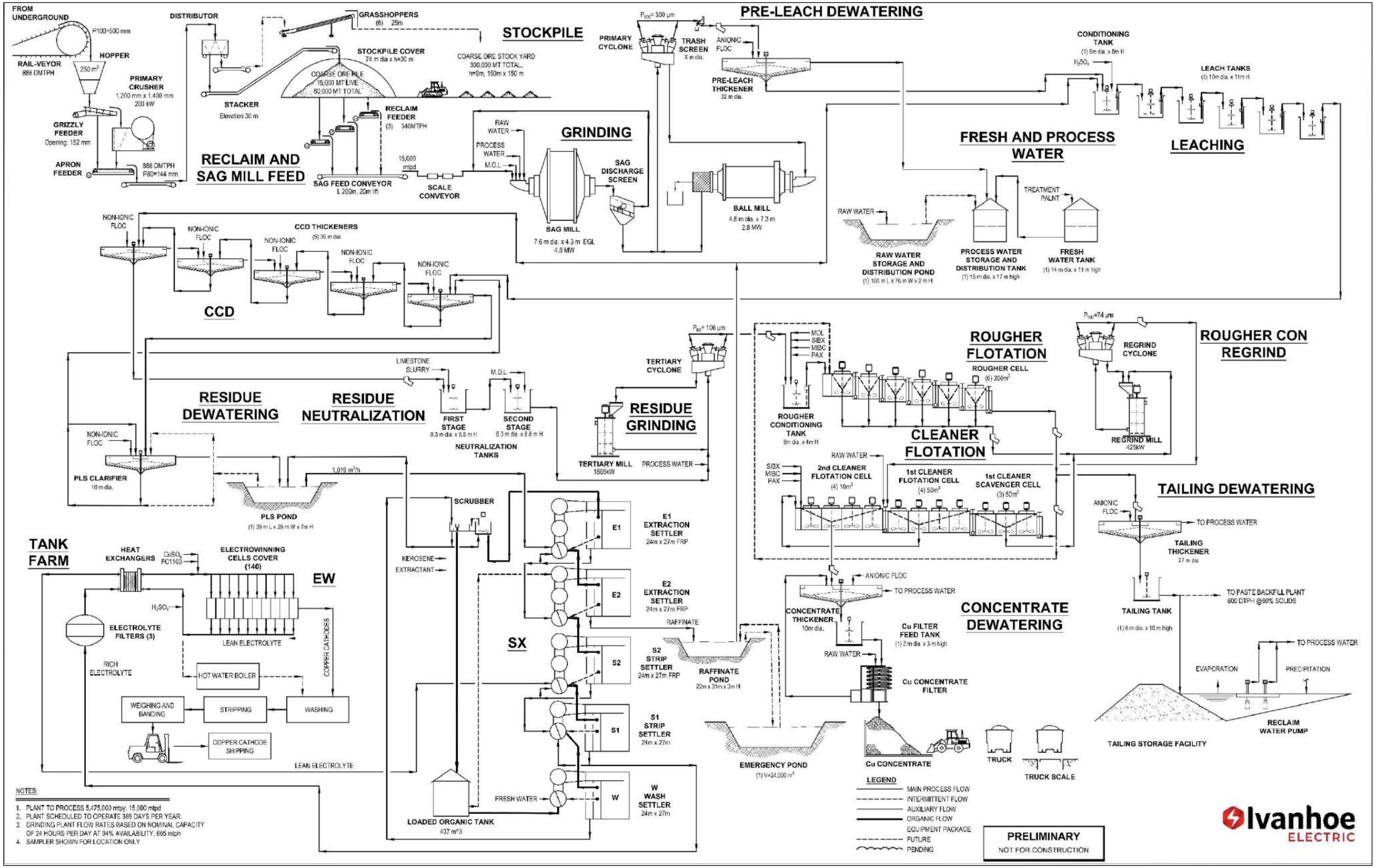
17.3.7 Reagents

Storage, preparation, and distribution of reagents to be used in the process. Reagents which require storage and distribution will include:

- Sulfuric acid for leaching
- Diluent and extractant for SX
- Cobalt sulfate and guar smoothing agents in EW
- Mist-op for acid mist suppression
- Limestone and lime for neutralization of leach residue
- Milk of lime for pH control in flotation
- Sodium isobutyl xanthate (SIBX) or potassium amyl xanthate (PAX), or possibly an alkyl di-thiophosphate based reagent as collectors
- Methyl isobutyl carbinol (MIBC) or equivalent as frother
- Flocculant for dewatering concentrate and tailing

17.4 Flowsheet

The Santa Cruz process flow diagram is shown as Figure 17-1. This flowsheet is the basis for the Equipment List, equipment selection and plant layout described below.



Source: M3, 2023

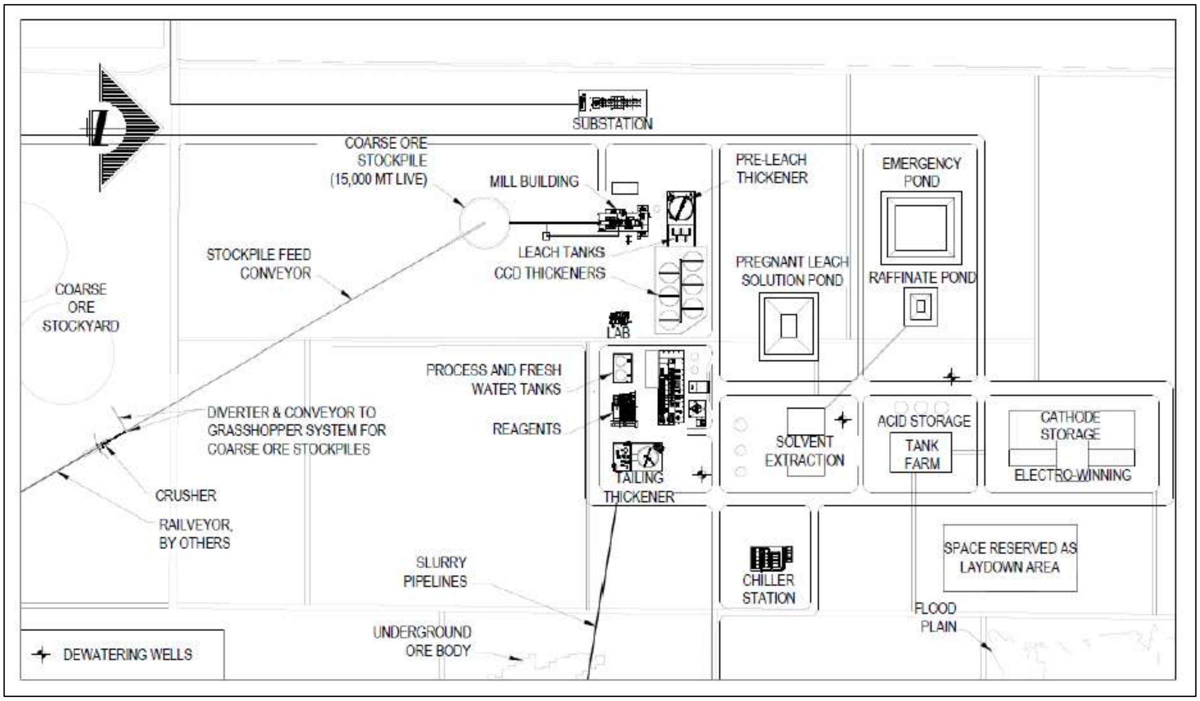
Figure 17-1: Conceptual Flowsheet for the Santa Cruz Process Plant

17.5 Plant Design and Equipment Design

17.5.1 Plant Layout

The Santa Cruz plant has been laid out to the west of the underground mine in a north-south arrangement of facilities. Figure 17-2 is a layout drawing of the plant facilities (north facing to the right).

Material produced from the underground is transported via a railveyor, which daylights at the mine portal and runs along the surface to a bin that feeds the primary jaw crusher which discharges to the covered coarse ore stockpile. Coarse crushed ore is reclaimed to the SAG mill via a belt conveyor.



Source: M3, 2023

Figure 17-2: Conceptual Santa Cruz Plant Layout

Comminution operations include the jaw crusher, stockpile and reclaim, SAG mill and ball mill are arranged end-to-end with the ball mill sump between them.

The Pre-Leach thickener is situated due north of the ball mill. From there, unit operations are arranged west to east over 500 m: agitated leach tanks, CCD thickeners, neutralization tanks, tertiary grinding, rougher flotation, concentrate regrinding, cleaner flotation, concentrate dewatering and filtration, and tailing dewatering.

The PLS pond lies 200 m north of the CCD thickeners. From there, solvent extraction circuit, tank farm and EW tankhouse are arranged south to north.

The main substation that powers the site is located due west of the grinding area.

The chiller station that supports that underground mine is located due east of solvent extraction.

17.5.2 Equipment Design

An Equipment List has been compiled for the Santa Cruz plant based on the flowsheets, the Metsim mass balance, the Process Design Criteria, and comparisons with similar projects of similar scale. This equipment is summarized below by area:

- **Primary Crusher** – 888 t/h; fed by the railveyor discharge surge bin by a vibrating grizzly. 130 mm closed setting. Size: Metso C150 or equivalent; Stockpile feed conveyor is 300 m long by 36 inch wide belt. 680 t/h capacity
- **Stockpile** – Total storage – 60,000 t; Live storage – 15,000 t; Stockpile cover 74 m diameter by 30 m high; Reclaim by three apron feeders (two operating) at a rate of 340 t/h. SAG mill feed conveyor has a 782 t/h rate of which 665 t/h is fresh feed and 117 t/h is from recycled pebbles. The SAG mill feed conveyor measures 200 m long x 1.2 m wide, 20 m lift
- **SAG mill** – 7.6 m diameter by 3.4 m EGL; Synchronous 4.8 MW motor; F80 = 144 mm; P80 = 2 mm; Relining machine to handle cast steel liners
- Two SAG mill 3.6 m x 7.3 m double deck discharge screens (one operating, one standby), 782 t/h capacity
- **Ball Mill** – 4.8 m diameter x 7.3 m long; pinion drive 2.8 MW motor
- **Primary cyclone cluster** – 2,625 m^3/h slurry at 37% slurry density. Overflow flow rate is 1,380 m^3/h with a P80 = 300 microns
- **Pre-Leach Thickener** – 1,380 m^3/h capacity; 32 m diameter, conventional thickener; underflow density = 70%
- **Leach Tanks** – Five operating; 862 m^3 working volume; 10 m diameter x 11 m high; C.S. with HDPE or other lining; MOC must tolerate chloride as well a sulfate. Solids density of 50%; chlorobutyl rubber lined agitators with 90 kW power each
- **CCD Thickeners** – Five operating; 30 m in diameter; high rate thickener; C.S. tank with HDPE or brick lining; chlorobutyl rubber lined mechanism; MOC must tolerate chloride as well a sulfate. Feed solids density is 41.5%; Underflow solids density is 70%
- **Solvent Extraction Settlers/Mix Tanks** – Tthree stages of mix tanks per settler, 25 m^3 volume , 3 minutes retention time; FRP construction, 2 Extraction Settlers with dimensions 16 m x 21 m; FRP construction
- **Strip Settlers –** Two stages of strip settlers; 16 m x 21 m; flowrate = 582 m^3/h; FRP construction; one mix tank for first settler stage; 2 mix tanks for second stage
- **Electrolyte Filters** – Four multimedia filters; 316SS construction; total flow rate = 300 m^3/h; max flow rate per filter is 100 m^3/h. One filter scour air blower 576 m^3/h at 50 kPa; Fed from 8m diameter x 6 m high 316SS Filter Feed Tank
- **EW Tankhouse** – 140 polymer concrete EW cells arranged in two rows; 6.5 m long x 1.25 m wide; Solution feed = 240 l/min/cell; Current density = 330 A per/m^2; cell voltage drop 2.1V with current efficiency of 92%; 60 316SS cathode blanks per cell; 61 lead anodes per cell; Rich electrolyte Cu grade = 52 g/l; Lean electrolyte grade = 33 g/l
- **Cathode Stripping Machine** – Fully automatic, robotic; features include washing, stripping and stacking cathode copper; designed to produce 197 cathodes per hour
- **EW Crane –** Class E 10-ton crane; travel speed 91.5 m/min; acid vapor resistant design; no aluminum motor housings
- **Residue Neutralization Tanks** – Two 450 m^3 capacity agitated tanks; 8.3 m dia x 8.8 m; C.S. with chlorobutyl rubber lining; first tank for neutralization w/ limestone at 50% solids density;

second tank for neutralization w/ lime at 50% solids density; to accommodate approximately 900 m^3/h slurry flow rate

- **Residue Grinding Mill** – One vertical stirred mill; Metso VTM-2500 or equal; 355 t/h feed rate; product size P80 = 106 microns
- **Rougher Flotation** – Six 200 m^3 tank cells; feed flow rate = 1,795 m^3/h at 30% solids & 15% froth factor; concentrate flow rate = 151 m^3/h; at 28% solids
- **Concentrate Regrind Mill** – vertical stirred mill; VTM-200; Feed flow rate = 295 m^3/h slurry with 52 t/h of solids, P80 = 74 microns
- **Cleaner Flotation – First cleaner** is one bank of four 50 m^3 tank cells; feed flow rate = 295 m^3/h at 19% solids and 15% froth factor; concentrate flow rate = 63 m^3/h; concentrate flow rate at 28% solids; tailing flow rate = 232 m^3/h at 16% solids
- **First Cleaner Scavenger** – One bank of 50 m^3 tank cells, feed flow rate = 232 m^3/h at 16% solids and 15% froth factor; concentrate flow rate = 3.6 m^3/h at 28% solids; tailing flow rate = 228 m^3/h at 16% solids
- **Second Cleaner -** Cleaner is one bank of four 10 m^3 tank cells; feed flow rate = 131 m^3/h at 16% solids and 15% froth factor; concentrate flow rate = 32 m^3/h; at 28% solids; tailing flow rate = 99 m^3/h at 10% solids
- **Tailing Thickener** – One thickener, 27 m in diameter. Feed flow rate = 525 m^3/h of slurry containing 653 t/h of solids; underflow density of 63% solids
- **Limestone Preparation** – Feed is P100 = 50 mm; Combination of cone crusher, ball mill, and hydrocyclone to produce limestone with P80 = 44 microns
- **Lime Package** – 300 t silo, vertical stirred mill, mixing and distribution tanks; piping and pumps

17.6 Consumable Requirements

The Santa Cruz plant has two full process lines, one for copper hydrometallurgical recovery of acid soluble (oxide) copper and a conventional copper flotation concentrator for the recovery of copper sulfide minerals as mineral concentrate. In between these process lines is a neutralization section of the plant to prepare the leach residue to be suitable for the flotation concentrator. The suite of consumables and reagents for both process lines is listed in Figure 17-3.

The upstream comminution section of the plant requires wear liners for the crusher and grinding mills. The grinding mills also require grinding media, steel balls in the SAG and ball mills and ceramic media in the vertical stirred mills in the flotation section.

The copper hydrometallurgical section requires sulfuric acid for agitated tank leaching. The solvent extraction circuit requires large quantities of diluent (organic), and extractant, which partitions the copper ions in solution between the aqueous and organic phases. The EW tank house requires cobalt sulfate and guar to smooth the electrowinning of copper on to cathode blanks. It also requires a mist suppressant to diminish sulfuric acid inside the tank house.

The neutralization section requires both limestone and lime for treatment of leach residue. Both consumables must be ground at the plant to a fine grind size to achieve maximum neutralization efficiency.

The mineral concentrator section requires a suite of organic collectors and frothers.

Flocculant is required to promote settling in the various thickeners and CCDs in the plant.

Figure 17-3 lists the primary reagents and consumables used in the Santa Cruz plant. Other reagents and consumables not described above: diatomaceous earth and anti-scalant, are relatively minor.

Design daily throughput, MTPD		**15,000**			
Availability, %		**94%**			
Annual Ore Processing, MTPY		**5,475,000**			
Annual Cu Cathode Processing, MTPY		**60,000**			
					IE calculations
					M3 calculations
Item	**Description**	**Description**	**Unit**	**Rate**	**Comment**
1	Sulfuric Acid		kg/t	12.07	Net acid consumption (average of AL-12, Al-13, AL-14AL tests) + Metsim Model, pre-leach thickener, 5-stage CCD (5.87+6.20 kg/t)
2	Pebble Lime (80% CaO)		kg/t	0.56	Metsim Model, pre-leach thickener, 5-stage CCD
3	Ground Limestone (80% CaCO3)		kg/t	8.24	Metsim Model, pre-leach thickener, 5-stage CCD
4	Jaw Crusher Liners		kg/t	0.0022	M3 calculations
5	SAG Mill Liners		kg/t	0.06	IE calculations
6	Ball Mill Liners		kg/t	0.063	M3 calculations
7	Tertiary Mill Liners		set/year	1	M3 calculations
8	Regrind Mill Liners		set/year	1	M3 calculations
9	SAG Mill Grinding Balls		kg/t	0.48	M3 calculations
10	Ball Mill grinding Balls		kg/t	0.35	M3 calculations
11	Tertiary Mill		kg/t	0.31	M3 calculations
12	Regrind Mill - Rougher Con		kg/t	0.003	M3 calculations
13	Collector	Sodium Isobutyl Xanthate (SIBX)	kg/t	0.099	IE calculations
		Potassium Amyl Xanthate (PAX)			
		Alkyl Dithiophosphate based			
14	Frother	Methyl Isobutyl Carbinol (MIBC)	kg/t	0.065	IE calculations
		MIBC equivalent			
15	Floculant	Anionic Floc	kg/t	0.001	M3 calculations
		Non-ionic Floc	kg/t	0.121	20 gpt in pre-leach thickener + (25+19+14+10+8)=76 gpt in CCD + 25 gpt in Tailing thickener
16	Antiscalant		kg/t	0.015	IE calculations
17	Co, 8% Cobalt Sulfate solution		kg/t Cu Cath.	0.206	Metsim 230307D
18	Mistop (Reemplace FC 1100)		kg/t Cu Cath.	0.066	M3 calculations
19	SX Extractant	Hydroxyoxime based	kg/t Cu Cath.	2.13	Metsim Model, pre-leach thickener, 5-stage CCD
20	SX Diluent		kg/t Cu Cath.	6.45	Metsim Model, pre-leach thickener, 5-stage CCD
21	Guar		kg/t Cu Cath.	0.25	M3 calculations
22	Deatomaceous Earth (org. Treatment)		kg/t Cu Cath.	3.78	Duplicated from previous 1.89 kg/t since the flow rate of organic was duplicated

Source: M3, 2023

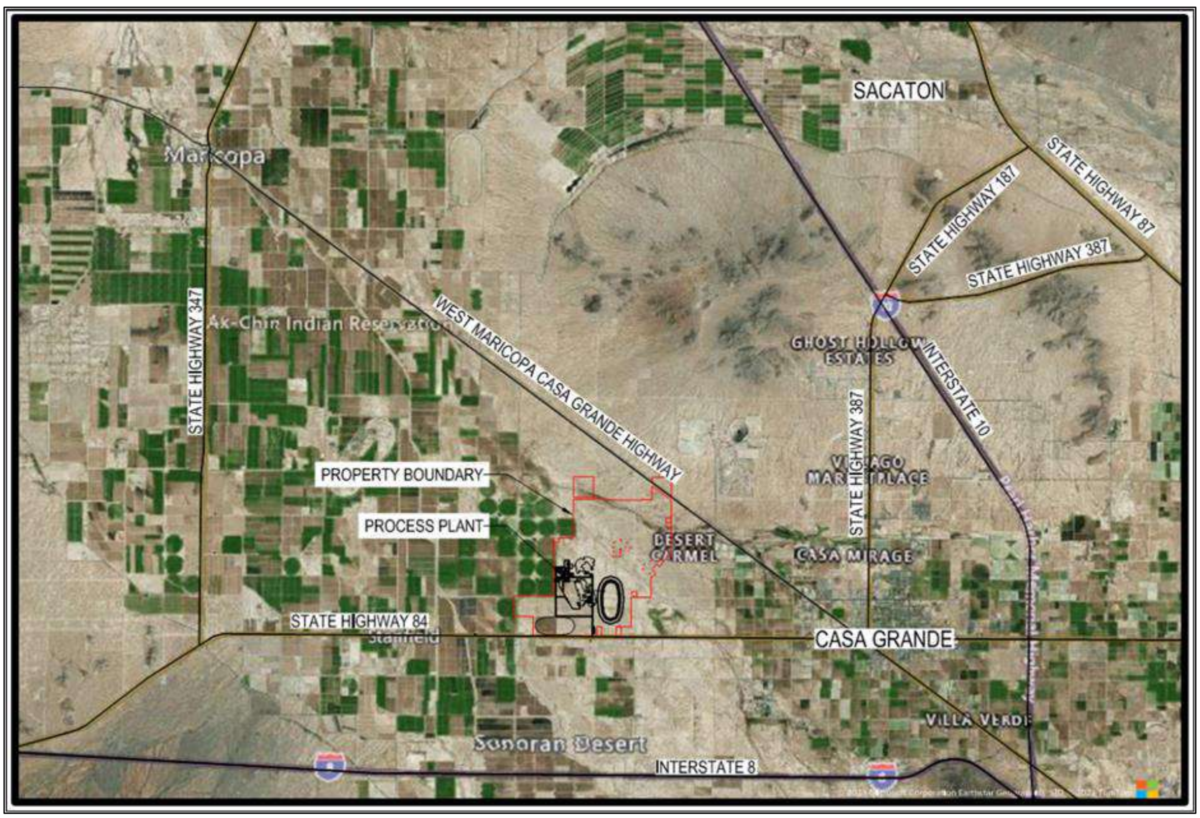
Figure 17-3: Santa Cruz Plant Primary Reagents and Consumables

18 Project Infrastructure

18.1 Location & Roads

The Santa Cruz Project is located 11 km west of Casa Grande, Arizona. It is approximately 9 km southwest of ASARCO's Sacaton open pit copper deposit. The Santa Cruz Project covers a three primary copper deposits and various exploration areas along a belt of deposits approximately 11 km long and 1.6 km wide. The Santa Cruz Project located in in Township 6 S, Range 4E, Section 13, Quarter C.

From a standpoint of logistics, the Santa Cruz Project is well accessed and well served by highways and paved roads surrounding the property. Figure 18-1 shows the location of the Santa Cruz Project relative to highway and road access to the property. Two US Interstate highways, I-8 to the south and I-10 on the east are 8 km and 15 km from the Project site, respectively. State Highway 84 between Casa Grande and Stanfield borders the south of the property. The West Maricopa – Casa Grande highway borders the property on the northeast side and runs parallel to the United Pacific Southern Pacific (USPS) rail line. A network of paved and improved unpaved roads run along section and quarter section lines throughout the Project area.



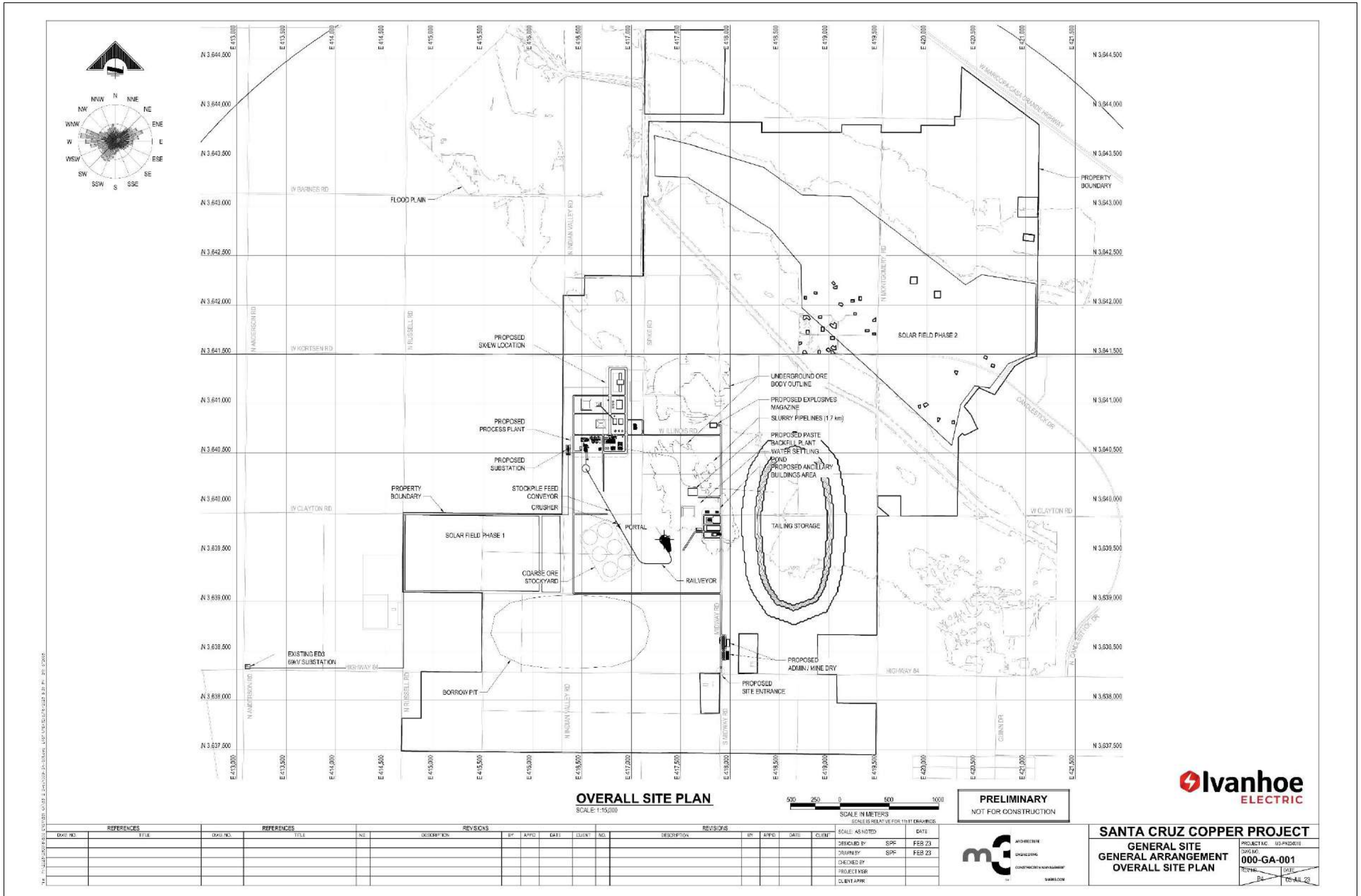
Source: M3, 2023

Figure 18-1: Project Location and Road Network

18.2 Project Layout

The Santa Cruz Project lies in a flat valley west of the city of Casa Grande. The land is nearly completely level except for a small depression along the wide ancestral Santa Cruz flood plain. The Santa Cruz mine and plant site are shown on the Project site plan as Figure 18-2. Prominent features included in the site plan include the mine portal, the trace of the railveyor that delivers mineralized material from the underground mine to the plant, the plant site proper, the Tailing Storage Facility (TSF), two phases of the mine solar field, the borrow pit for the TSF impoundment fill, the paste backfill plant, the mine administration buildings, the mine workshops and ancillary facilities, the proposed main substation, and the water settling pond for collecting mine dewatering water. With the exception of the TSF, these facilities lie outside of the Santa Cruz River flood plain.

The layout as presented reflects the current level of study. Modifications to the Project site plan will be evaluated as engineering and permitting progress at more advanced levels of study.



Source: M3, 2023

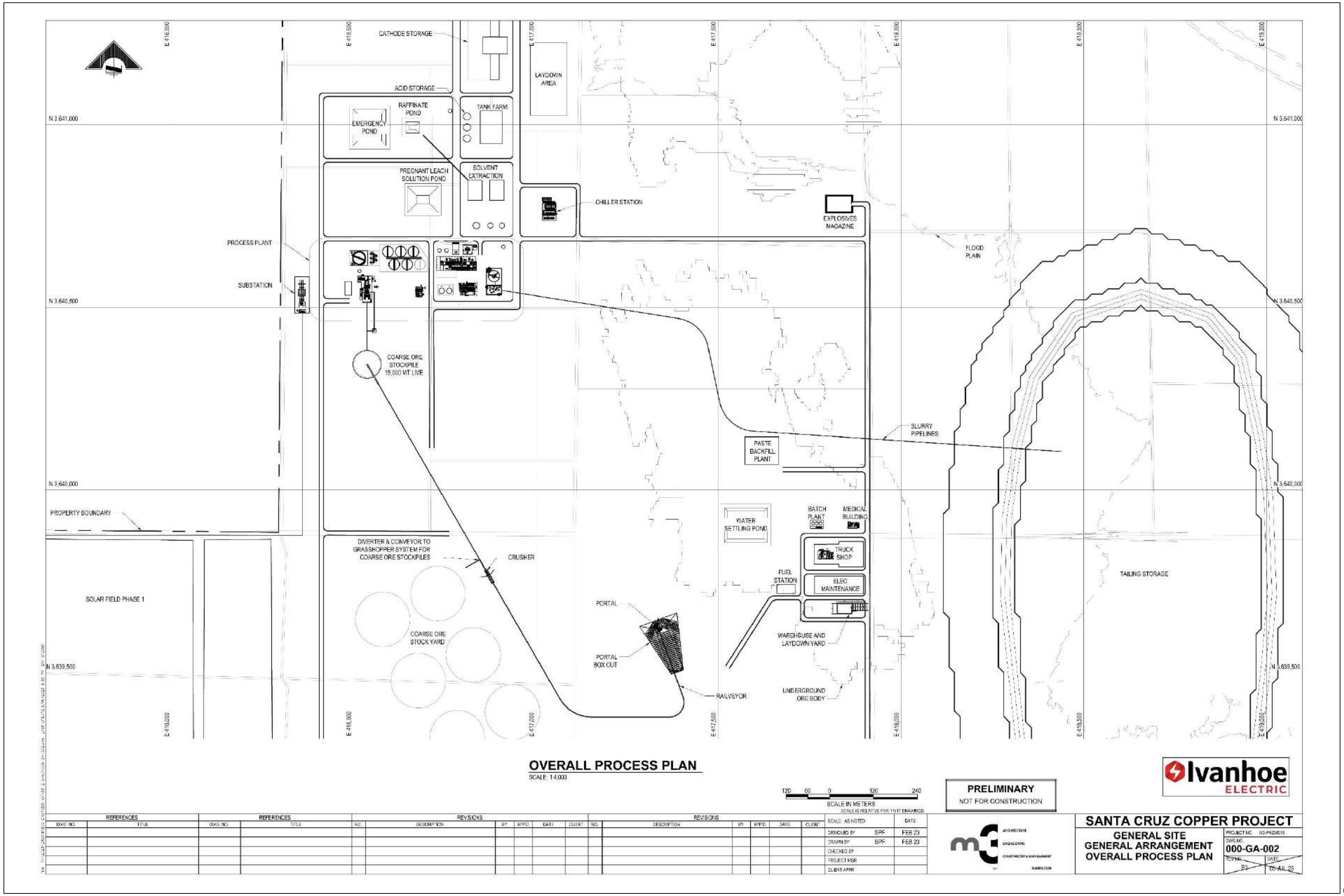
Figure 18-2: Santa Cruz Site Plan

Figure 18-3 is a general arrangement showing some of the mine and plant facilities in better detail. One of the priorities in the layout of the facilities is to keep some separation between the mine and plant buildings.

A minimum of the facilities were located directly above the Santa Cruz mineral deposit to avoid any subsidence that could disturb surface facilities. Most of the mine shops that are located within the outline of the Santa Cruz mineral deposit footprint are light structures with a minimum of potential for settling.

Figure 18-3 also show the location of the ventilation chiller located on the east side of the plant. The Chiller needs to be located where is can best access the underground workings to support mining in hot conditions. The paste backfill plant is also located over the top of the Santa Cruz mineral deposit to be able to reach the stopes that require backfill by gravity.

The water settling pond will be the collection point for dewatering water from development wells during construction and water pumped from the underground mine sumps during development and operations. It will also collect reclaim water from the TSF and filtrate from the paste backfill plant.



Source: M3, 2023

Figure 18-3: Santa Cruz General Arrangement Detail

18.3 Rail

The Santa Cruz Project has excellent access to railroads. The Union Pacific/Southern Pacific (UPSP) main line is a coast-to-coast railroad that in runs within 5 km of the center of the property. It has numerous sidings along the W Maricopa – Casa Grande Highway that access factories and businesses along its length. While no rail siding and rail unloading yard are presently planned for the Santa Cruz Project, the proximity of the rail line to the Project for short distinct provides logistical advantages for the delivery of the primary consumables: sulfuric acid, cement, limestone, and lime, and the outbound shipping of mineral concentrates and copper cathodes to smelters, ports, and offtakers.

Figure 18-4 shows the UPSP network of railroads across the United States. The major smelters in the US and in nearby Sonora, Mexico can be accessed by rail from the Santa Cruz Project. Also, the major transshipment ports all have rail access that provide advantages for the Santa Cruz Project.

Source: M3, 2023

Figure 18-4: UPSP Rail Network Across Western US

The Burlington Northern Santa Fe (BNSF) railroad also has routes across northern Arizona, connecting to California as well as points to the east. Figure 18-5 shows the routes of the BNSF and the spur that accesses the Phoenix area. The BNSF system directly accesses the Port of Long Beach, CA as well as the other west coast ports.

Source: M3, 2023

Figure 18-5: BNSF Rail Network Across Western US

18.4 Port Facilities

There are several candidates for port facilities on the west coast that can support the Project. The Port of Long Beach is the largest container port in the US. The Port of Los Angeles can support international shipping as can ports located in San Francisco and Stockton, California. In Mexico, the Port of Guaymas is used for shipping mineral concentrates to overseas smelters.

There is a sulfuric acid terminal in Stockton, California that could be an inexpensive source of acid for the property. Figure 18-6 shows the location of the nearest ports as well as the distribution of inland smelters.

Source: M3, 2023

Figure 18-6: Ports and Copper Smelters in the Western US and Mexico

Smelters are located in Arizona at Hayden (ASARCO) and Miami (Freeport McMoran). The Hayden smelter is currently closed and the future of this facility is currently unknown. The Kennecott smelter (Rio Tinto) in Magna, Utah, is also accessible by railroads. Another inland smelter is the Nacozari smelter (Grupo Mexico) located in Sonora, Mexico. This facility accepts mineral concentrates from ASARCO mines and supplies sulfuric acid to its properties.

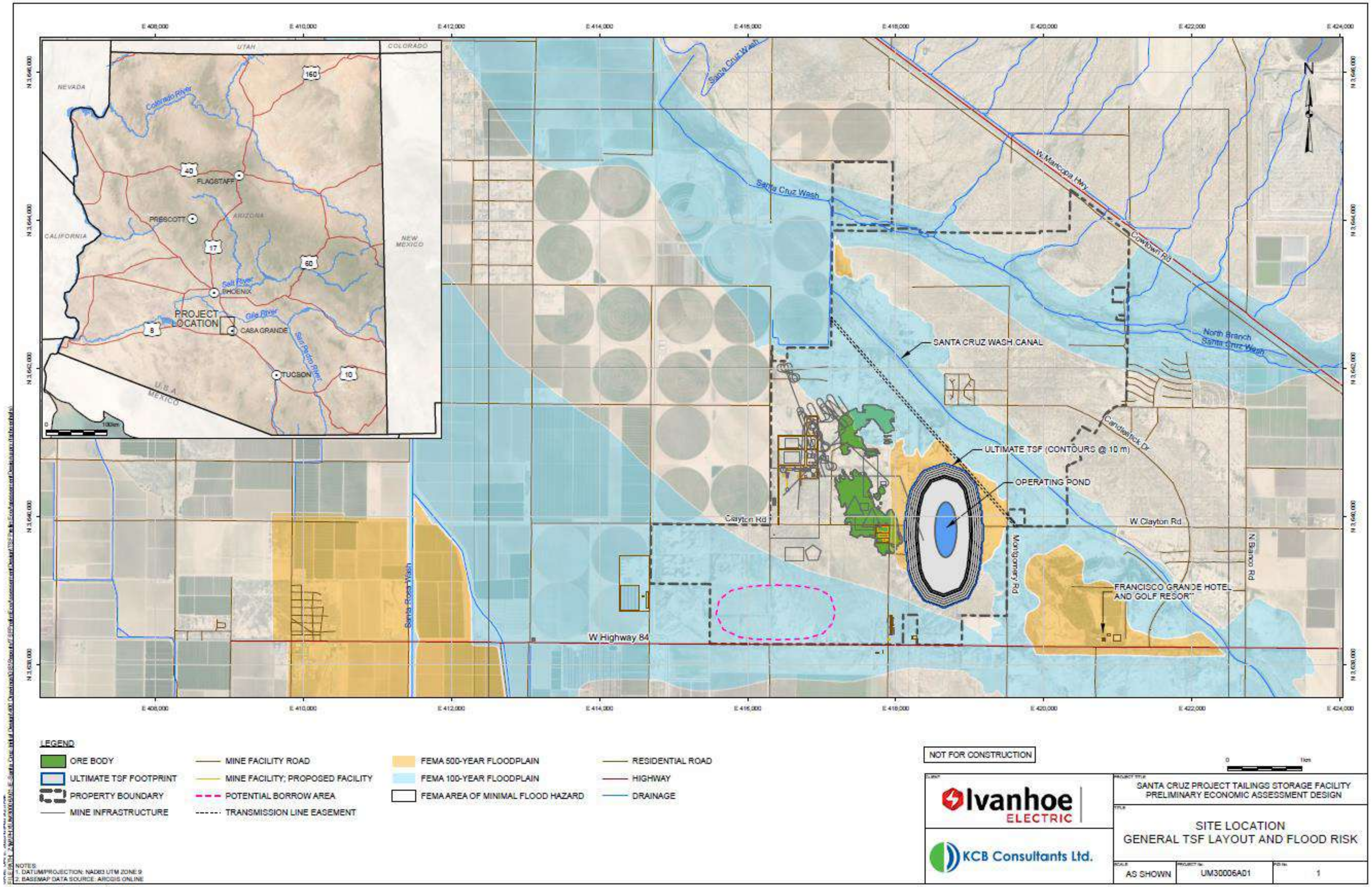
18.5 Tailings Disposal

KCB prepared the TSF PEA design for the Santa Cruz Project.

18.5.1 TSF Siting and Foundation Characterization

The TSF is located within the Project's property boundary and sited to avoid: the underground ore body outline, mine's infrastructure, and the 1% annual exceedance probability (AEP) (1 in 100 yr return period) floodplain from Federal Emergency Management Agency (FEMA) (2007) flood hazard mapping (Figure 18-7). The TSF is sited primarily in the 1 in 0.2% AEP (500-yr return period) floodplain (FEMA 2007).

Subsurface geotechnical hydrogeological investigations have not been performed to characterize the properties or conditions of the TSF foundation for design. Drilling conducted in other areas of the Project site, and surficial geology maps produced by the US Geological Survey (Klawon et al. 1998) indicate the TSF is founded on thick (> 200 m) floodplain sediments (CNI 2022). As such, these sediments are the likely foundation units that will influence TSF design. The regional groundwater table in the TSF footprint is assumed to be > 100 m below surface based on investigations performed in the mine area.



Source: KCB, 2023

Figure 18-7:Site Location, General TSF Layout, and Flood Risk

18.5.2 Design Basis

The following summarizes key design basis assumptions for the TSF:

- The TSF operating life is 23 years. Based on annual tailings production and underground backfill requirement estimates, an average of 6,750 tonnes per day (t/day) and a maximum of 9,800 t/day of tailings will be sent to the TSF.
- The TSF will have capacity to store all tailings that are not used for underground backfill. For TSF design, a target total tailings tonnage of 56.7 Mt was selected.
- The tailings comprise ~30% sand-sized and ~70% silt/clay sized particles based on index testing performed to date. Based on understanding of the ore body geochemistry, ore and tailings processing methods and tailings test work completed to date, IE has indicated that the tailings are assumed to be non-potentially acid generating (NPAG).
- Tailings will be transported from the plant site at 60% to 65% solids by weight and discharged as a slurry from a perimeter embankment. For TSF sizing KCB assumed an average tailings beach slope angle of 1%.
- An average tailings dry density of 1.4 t/m^3 for TSF sizing, resulting in a total storage volume of 40.5 Mm^3. The TSF starter dam will be sized to store the first two years of tailings production (1.0 Mm^3).
- The TSF will meet stability, water management and closure criteria that align with ADEQ (2005) and internationally recognized guidelines for TSF design (GTR 2020, CDA 2019).

18.5.3 Design Features

The ultimate TSF footprint is shown on Figure 18-7 and covers an area of approximately 170 hectares. Pipeline(s) and associated pumps, designed by others (not shown on Figure 18-7), will transport thickened tailings slurry from the plant site to the TSF. Due to very little topographic relief within the TSF footprint (from 403 masl to 407.3 masl), the TSF will have a ring dyke/perimeter embankment configuration with tailings deposited from the embankment crest towards the middle of the impoundment. The TSF footprint is expanded, as far as practical, to reduce overall embankment fill requirements and improve embankment fill to storage ratios.

Key features of the TSF during operations are summarized below and illustrated on a schematic cross section on Figure 18-8.

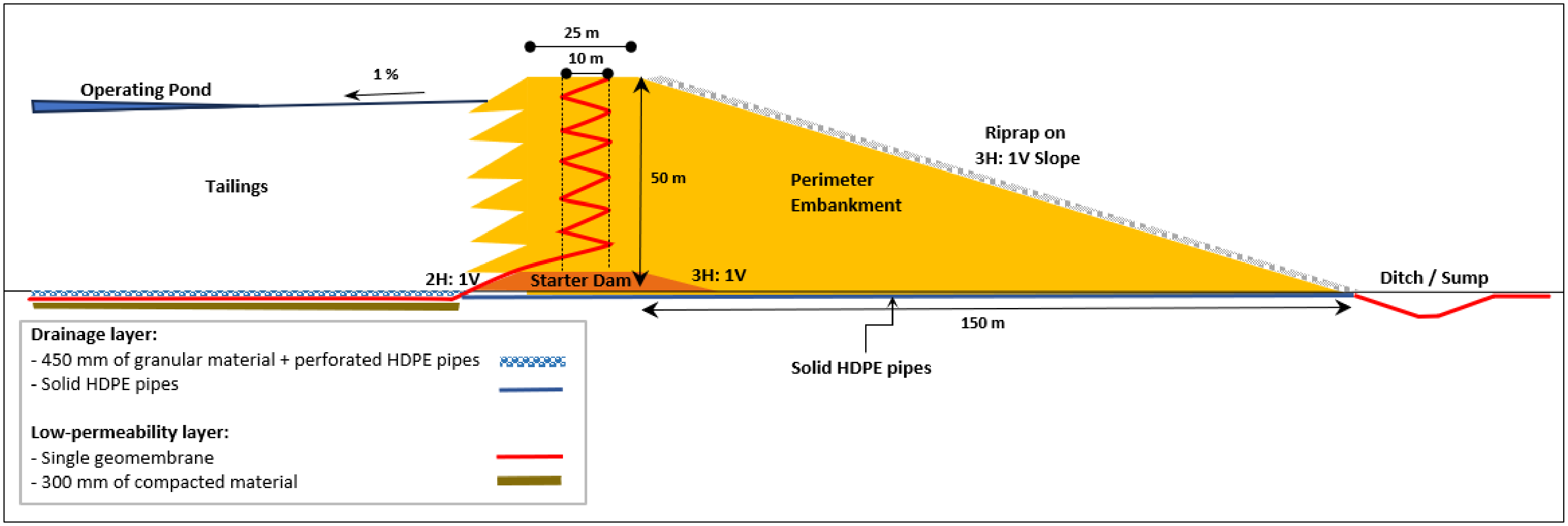
- A starter dam constructed from compacted, structural fill sourced from within the TSF impoundment. Details are summarized in Table 18-1.
- A progressively raised, perimeter embankment constructed from compacted, structural fill sourced from an on-site borrow area and a geomembrane liner for seepage control (details summarized in Table 18-1). The perimeter embankment will be raised using a centerline approach whereby the embankment centerline established with the starter dam is maintained throughout operations and each raise is constructed by placing fill onto the tailings beach and onto the downstream slope of the previous raise. The centerline of the embankment remains founded on structural fill throughout operations. This approach has the following benefits:
    - Eliminates need to develop a structural zone within the deposited tailings to meet stability compliance criteria.
    - Maintaining the centerline simplifies liner raising.

- A liner system within the TSF impoundment, below the tailings, comprised of low permeability layers (80 mil high-density polyethylene (HDPE) liner overlying a 300 mm thick layer of low-permeability compacted fill) and an above-liner drainage layer (450 mm thick layer of 19 mm-minus sand and gravel with perforated HDPE pipes spaced 60 m apart), to limit seepage into the foundation. The perforated pipes in the above-liner drainage layer will report to solid HDPE pipes which run below the embankment and convey water to the perimeter sumps (see below). This approach generally follows the ADEQ (2005) Prescriptive guidelines for TSF design. The requirements for the liner system will be reviewed in future design stages when the geochemical characteristics of the tailings, process water and foundation are better understood.
- Riprap for embankment slope erosion protection which will be progressively placed as the ultimate downstream slope of the perimeter embankment is established; and
- Contact water collection ditches and sumps along the toe of the embankment to collect slope surface runoff and flow from the above-liner drainage layer.

Table 18-1: Starter Dam and Ultimate Embankment Summary

Parameter	**Starter Dam**	**Perimeter Embankment (End of Operations)**
Storage Capacity	1.35 Mt tailings (1.0 Mm^3) + Operating Pond + Inflow Design Flood (IDF) (0.3 m) + 1.0 m freeboard	56.7 Mt tailings (40.5 Mm^3) + Operating Pond + IDF (0.3 m) + 1.0 m freeboard
Crest Elevation	409.2 masl.	453.5 masl
Crest and Slope Details	3H:1V downstream slope 2H:1V upstream slope 25 m crest width	3H:1V downstream slope Vertical upstream face 25 m crest width
Height	2 to 6 m	46 to 50 m
Fill Volume	0.6 Mm^3	19.8 Mm^3

Source: KCB, 2023



Source: KCB, 2023
Note: Not to scale

Figure 18-8: TSF Embankment Schematic Cross Section During Operations

18.5.4 Embankment Stability

TSF stability was analyzed using the 2D limit-equilibrium analysis software Slope/W (GeoStudio 2021.3) for the following scenarios:

- Static: normal loading conditions with effective friction angles assigned to all materials.
- Post-Earthquake: post-earthquake loading conditions using effective friction angles for the fill and foundation, and residual, undrained shear strength (i.e., liquefied strength) for the tailings.
  - Uncertainties regarding the tailings' response to seismic loading at this design stage are managed by the assumption that all tailings will liquefy during design earthquake loading. This approach is consistent with guidelines (e.g., GTR 2020) for new TSF designs with potentially brittle failure modes.

The pseudo-static criterion referenced in the ADEQ (2005) guidelines is not appropriate for this design, where the tailings are assumed to be susceptible to liquefaction. A deformation analysis may be appropriate for future design stages to confirm containment integrity under seismic loading.

The target FoS was achieved for both loading scenarios (Table 18-2). The critical slip surfaces for both loading scenarios were shallow, passing through the embankment fill. Higher FoS was calculated for slip surfaces passing through the tailings. This is due to the embankment design and the resulting wide structural zone supporting the tailings.

Table 18-2: TSF Target and Calculated FoS

Scenario	Target FoS	Calculated FoS
Static	1.5	2.0
Post-Earthquake	1.2	2.0

Source: KCB, 2023

18.5.5 Water Management

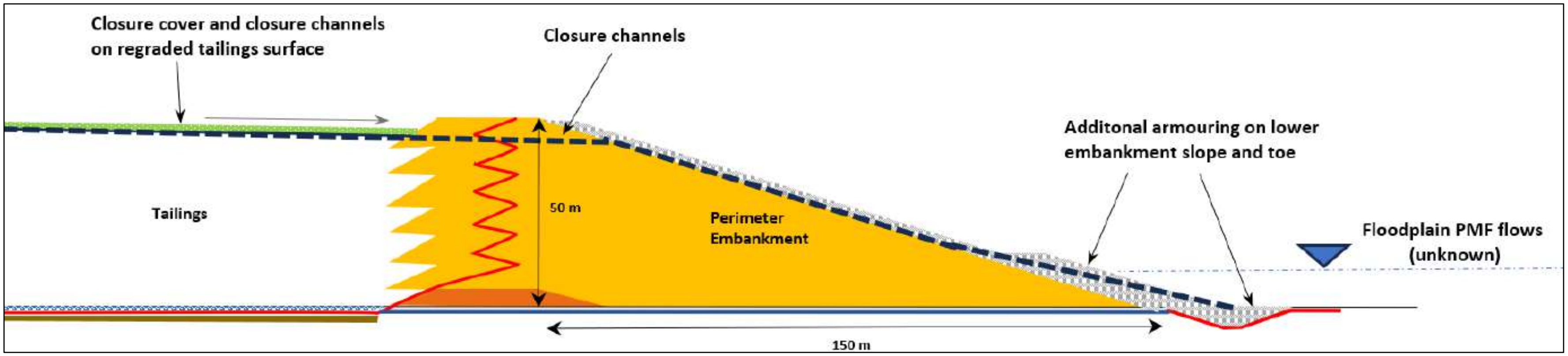
The TSF impoundment will have capacity to store the 72-hour probable maximum flood (PMF) volume above the assumed operating pond volume, while maintaining a minimum 1.0 m freeboard below the embankment crest. The TSF will not have an emergency spillway since the impoundment can store the PMF volume.

The perimeter ditches and sumps located along the downstream toe of the ultimate embankment will collect peak flow reporting from the TSF slopes and collect TSF seepage from the above-liner drainage layer (refer to Section 15.5.3). Water collected in the sumps will be returned to the plant site for reuse in processing or treated, if required, and discharged.

The TSF pond has a net water deficit on an annual basis due to high evaporation rates, as such, the TSF will not be able to supply mill makeup water consistently throughout the year.

18.5.6 Closure Plan

At closure, additional riprap armoring will be placed on the embankment slope and toe to resist the slope runoff and floodplain inundation during the PMF. The TSF impoundment will be re-graded to prevent ponding and covered with a soil cover and vegetated to limit infiltration and resist erosion. Channels will be constructed over the impoundment surface and embankment slopes for surface water routing. Refer to Figure 18-9 for a schematic cross section illustrating some of these features.



Source: KCB, 2023
Note: Not to scale

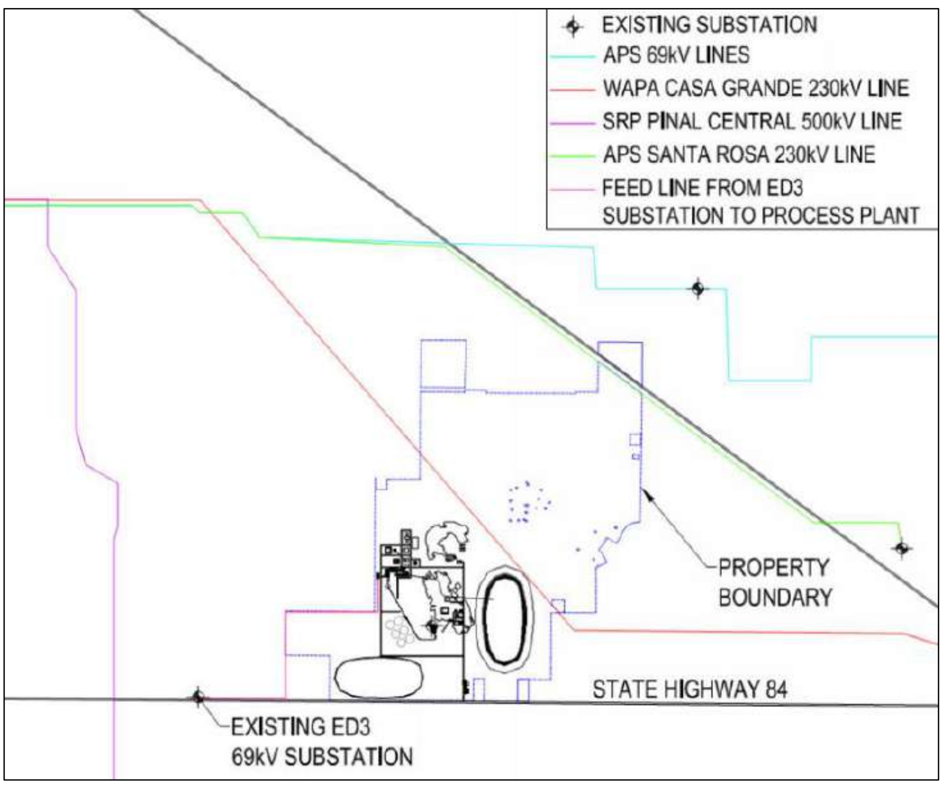
Figure 18-9: TSF Embankment Schematic Cross Section – Closure

18.6 Power

18.6.1 Power Sources

Power for the Project could be provided from a number of sources or combination of sources ranging from grid supply to microgrid renewable energy supply. The goal of the mine development is to achieve much of the energy supply from renewable sources either at the start or through a phased in approach during the mine operation. Two independent third parties (Sage Geosystems and KR Saline & Associates), with experience with local grid supplied power and with renewable supplied power, have produced studies for this report regarding energy supply and the potential energy cost per megawatt hour.

Regular grid supplied power could come from one of three potential suppliers that have transmission lines and substations nearby the Project site: Electrical District No.3 (ED-3), Arizona Public Service (APS) or Salt River project (SRP) are the potential suppliers. The latter two are the largest utilities in Arizona and ED-3 is a small local supplier to the Maricopa Stanfield area including the Maricopa Stanfield Irrigation and Drainage District (MSIDD). Figure 18-10 shows the various power transmission lines within close proximity of the Santa Cruz Project. The proposed mine substation and surface facilities lie in the ED-3 service area. ED-3 could be the grid power supplier in the future.



Source: M3, 2023

Figure 18-10: Transmission lines near the Santa Cruz Project

Renewable energy supply (energy storage, batteries probably) could come from an independent power provider (over-the-fence contract agreement), a microgrid renewable energy system or as wheeled in renewable energy as APS supplies currently to some customers. Renewable energy could be generated and stored on site in the first two options mentioned. There is very high solar irradiation at site (Arizona has the highest solar irradiation factor in the nation) so PV solar energy would be an option. Additionally, the site is situated over a significant source of geothermal energy that could be used to generate power by conventional geothermal methods. A combination of solar, geothermal and battery storage was evaluated by both consultants mentioned above.

Several energy supply solutions were evaluated ranging from all or a portion of the power coming from the grid from ED-3 and/or all or a portion coming from renewable energy provided by an independent power provider. Without consideration for escalation over the next twenty years, the cost of energy ranged from a low of US$71 per megawatt hour (large industrial supply rate from ED-3) to US$121 per megawatt hour for a renewable energy supply from a combination of solar, geothermal and battery storage (from an independent power provider). The base economic case for the Project uses the option where 30% of the energy comes from a local grid source (ED-3 at US$71 per megawatt) and 70% comes from an independent power provider (utilizing a combination of PV solar, geothermal and battery storage at US$121 per megawatt). The weighted average energy cost in the base case is US$106 per megawatt hour.

18.6.2 Power Distribution

Grid power to the site will likely come from the 69kV power line operated by Pinal County Electrical District 3 (ED3). The nearest substation drop from the ED3 power line is located at intersection of State Highway 84 and South Anderson Road, a distance of 5 km from the Santa Cruz main substation at the plant site. At this substation, power will be transformed to 13.8 kV for sitewide power distribution to facilities. Overhead power lines will follow existing roads wherever possible for ease of maintenance and re-use of existing power poles.

Each cluster of process facility will have its own E building and transformer to step down power to the needed voltage. Most process facilities require 480V 3phase 60Hz power for operations. The grinding mills, the EW rectifiers, the chiller facility and the mine ventilation fans will require a higher voltage supply, most likely 4,160 volts.

The underground mine requires three power circuits to be distributed for the mine dewatering pumps, the railveyor, and for a power recharging station for underground vehicles. Three 13.8 kV feeders will be installed on a pole line along 2.5 km of existing roads to the mine E-building at the surface outside the mine portal. From there, the 13.8 kV feeders will be run down the main mine decline for a distance of 5 km to the main mine load center where the power will be stepped down to its operating voltages.

Duct banks will be used inside the plant at road crossings wherever necessary.

18.6.3 Power Consumption

The Santa Cruz Project has a total connected load of 60.8 MW and an annual consumption of between 436,000 MWh and 473,000 MWh in peak years of production.

The connected power for the underground mine equipment averages 26.2 MW. The total annual consumption attributed to the UG mine over the LoM averages 211,000 MWh/y. The high consumers of power in the underground mine are:

- Mine ventilation fans
- Mine dewatering pumping system
- Railveyor material conveying system

- Battery recharging station for electric UG mining equipment
- AC cable mobile equipment
- Paste backfill plant

The connected power for the Santa Cruz process plant and surface facilities is 34.6 MW, the annual power consumption during peak production years is 242,000 MW/y. The large consumers of power include:

- Grinding mills (SAG and ball mills)
- Leach tank agitators
- Electrowinning of copper by DC power
- Regrinding and flotation
- Slurry pumping o various facilities and unit operations
- Ventilation chiller

The usage load of connected power for the Santa Cruz operation averages 86% of connected power at peak production. is an estimation of power consumption by Year of operation over the course of the mine life.

Mine dewatering from surface wells during pre-production will require generator power for approximately 3 MW of connected power during Years -3 and -2. These costs will be capitalized and are not part of the annual operating costs. Table 18-3 summarizes the power consumption for the Santa Cruz Project over the LoM.

Table 18-3: Summary of Power Consumption over the LoM for Surface and Underground Facilities

Year	Surface		Underground Mine		Total	
	Connected, MW	Usage, MWh	Connected, MW	Usage, MWh	Connected, MW	Usage, MWh
-3		Running on diesel gensets first 2 years of the Project				
-2						
-1	-	-	16.53	124,219	16.53	124,219
1	34.63	167,067	21.71	175,131	56.34	342,198
2	34.63	242,404	23.07	194,771	57.70	437,175
3	34.63	240,467	23.45	195,762	58.08	436,229
4	34.63	248,805	23.71	196,467	58.34	445,272
5	34.63	252,963	23.71	197,508	58.34	450,470
6	34.63	249,898	24.60	204,476	59.23	454,374
7	34.63	252,419	24.60	205,393	59.23	457,812
8	34.63	245,601	24.60	202,295	59.23	447,896
9	34.63	245,958	27.74	229,451	62.37	475,409
10	34.63	235,323	27.74	229,213	62.37	464,537
11	34.63	245,119	27.74	227,543	62.37	472,662
12	34.63	232,192	27.74	227,129	62.37	459,321
13	34.63	236,439	27.74	225,636	62.37	462,075
14	34.63	234,413	27.74	226,731	62.37	461,144
15	34.63	236,333	27.74	226,729	62.37	463,061
16	34.63	235,125	27.96	224,423	62.59	459,548
17	34.63	243,957	27.96	224,034	62.59	467,991
18	34.63	239,995	27.92	223,040	62.55	463,035
19	34.63	102,431	27.92	204,691	62.55	307,122
20	34.63	8,743	27.74	184,385	62.37	193,129
	34.63	4,395,651	26.16	4,224,809	60.79	8,620,460

Source: M3, 2023

18.7 Water

The main sources of water for the Santa Cruz Project will come from non-contact dewatering water estimated to be 6 Mm^3/y and residual passive inflows from precipitation estimated to be approximately 2 Mm^3/y. Another 170,000 m^3 per water comes from moisture in mined material. Other sources of water: rainwater on ponds, are insignificant.

Precipitation in the Casa Grande area over the years from 2016 to 2020 averages 22 cm/y. Annual evaporation of water averages nearly 250 cm per year (cm/y), far outweighing precipitation.

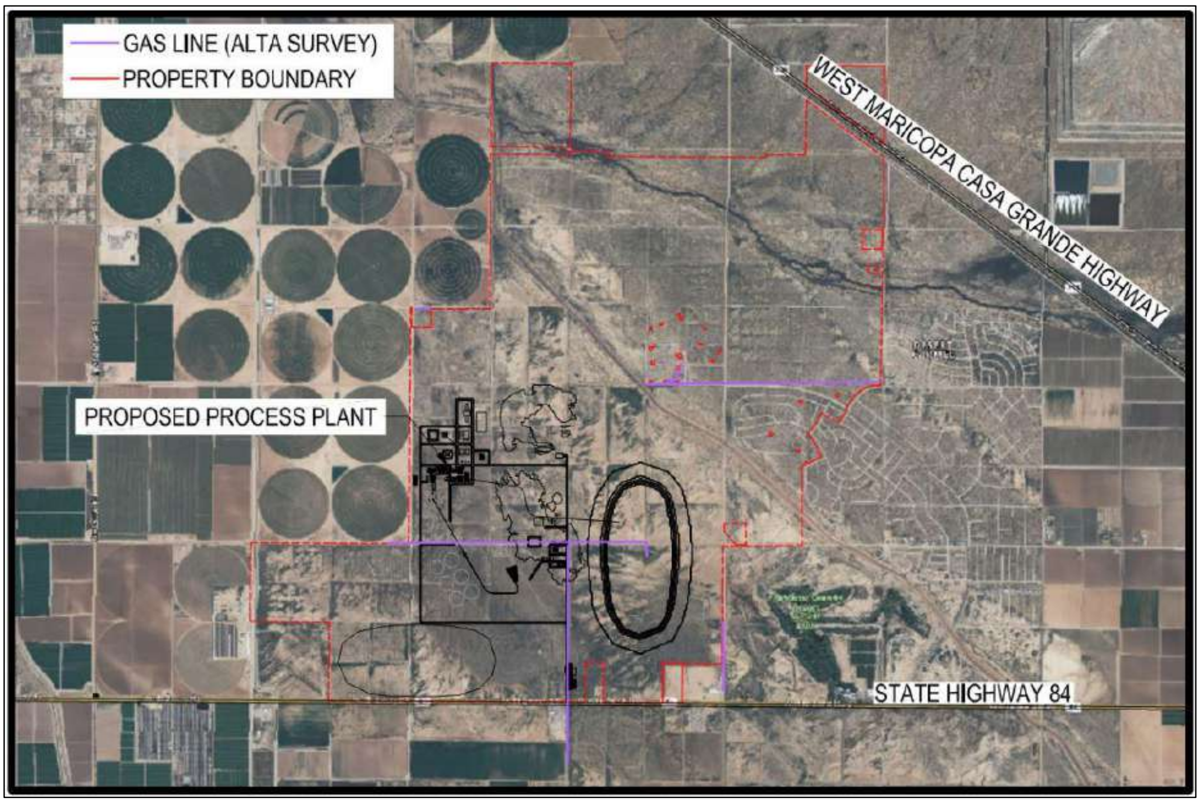
The total water consumption for the Santa Cruz operation is estimated to be 3,500,000 $m^{3/y}$ (400 m^3/h). The largest sink for water is entrained water from the TSF. Approximately 37% of the tailing by weight is water is 37% of which 30% remains entrained after tailing consolidation. That amount translates to 1.65 million cubic meters per year (Mm^3/y) of water lost to the TSF. Water entrained in paste backfill amounts to approximately 850,000 m^3 per year. The third largest consumer of water at Santa Cruz is water for dust control, estimated to be 290,000 m^3 per year. Potable water consumption, evaporation from the PLS pond, evaporation for the Water settling pond, and evaporation from the Raffinate pond are each under 100,000 m^3 per year.

Water will be recovered from TFS seepage and from filtration of tailing slurry during preparation of paste backfill for underground operation amounting to a combined 600,000 to 700,000 m^3 per year. These two sources of water will be recycled to the Process Water tank, provided the quality of the water is sufficient for use in leaching and flotation.

Water available for stakeholder distribution is estimated to average approximately 25 Mm^3/y over the LoM including the development years from early dewatering. The amount of water available for distribution increases from approximately 20 Mm^3 per year in the early years to nearly 30 Mm^3/y in the latter years of the mine life due to deeper levels of development and greater inflows are more water at depth. This amount of water for distribution amounts to approximately 3,040 m^3/h.

18.8 Pipelines

A natural gas pipeline crosses the Santa Cruz property and accesses various residential customers, farms, and businesses west of Casa Grande. Natural gas could be used in the Santa Cruz plant for hot water heaters for the EW tankhouse and possibly for onsite emergency power generation. Figure 18-11 shows the distribution of natural gas pipelines within the Project site. A section of the pipeline crosses the proposed location of the TSF, so it is probable that this section of the gas line would have to be relocated at some point during Project development.



Source: M3, 2023

Figure 18-11: Transmission lines near the Santa Cruz Project

19 Market Studies and Contracts

19.1 Market Information

Copper metal is a ductile metal with high electrical and thermal conductivity. It is used extensively in building construction, equipment manufacture, power generation and transmission, electrical motors and cabling, and electronics.

Copper is a globally traded commodity that has established benchmark pricing in the form of exchanges such as the London Metals Exchange (LME) or Commodity Exchange Inc. (COMEX). Copper from mine sites is typically sold as either electrowon copper cathode or as a concentrate or precipitate containing a significant amount of copper metal. In 2022, the US copper production totaled 1.26 Mt (USGS, 2023a). Slightly less than half of this production (approximately 44%) was in the form of electrowon copper.

Electrowon copper cathode can be sold to downstream manufacturers for use while copper concentrate must first be smelted to produce blister, matte or anode and potentially further refined before being useful to downstream users.

19.1.1 Market for Santa Cruz

The Santa Cruz Project is envisioned to produce both copper cathode and copper concentrate.

IE has indicated that the copper produced from Santa Cruz will be sold into regional markets within which the Project is located. The Project is envisioned to produce generic copper cathode grading at least 99.9% and concentrate grading greater than 35% copper.

19.1.2 Copper Demand

Copper is required for electrification and equipment manufacturing. In developing areas, copper consumption mainly occurs in the form of infrastructure build-out and the manufacture of equipment and electronics. In developed areas, consumption is typically driven by infrastructure replacement or upgrades and equipment manufacture. The drive toward electrification increases the demand for copper as a result of an increase in power generation, transmission and consumption.

Electrification and continuing development in previously undeveloped areas of the world requires a significant amount of copper and is expected to continue to be a driving force for the consumption of copper. This results in a long-term positive outlook for copper demand over the next several decades. This is somewhat tempered in the near term should significant economic headwinds materialize that slow global growth.

19.1.3 Copper Supply

The USGS estimates that the global copper mine production at 22 Mt in 2022 (USGS, 2023b). The process for discovering, studying, building and bringing new mines into production or out of production is one that can take decades to complete. This results in a slow supply response within the copper market and the likely development of supply deficits and surpluses that will create price volatility. In the long term, these deficits and surpluses will diminish as new operations come online or expansions of existing operations are completed, or existing operation shut down or depleted. However, the market is unlikely to remain in balance for significant periods of time due to the slow supply response and price volatility will result.

19.1.4 Trailing Price

Table 19-1 presents the average annual price for copper (LME Grade A).

Table 19-1: Average Annual and Spot Pricing

Year	Year 5	Year 4	Year 3	Year 2	Year 1	Spot (August 15, 2023)
Price (US$/lb)	2.77	2.60	3.78	4.28	3.81	3.69

Source: SRK (S&P Global Data) , 2023

The 3-year trailing average is US$3.95/lb.

19.1.5 Study Price and Sales Terms

Pricing

A price of US$3.80/lb has been selected for this study exercise. This price is below the three year trailing average, equal to the 1 year trailing average and slightly elevated from the current spot price. In the opinion of SRK, this price is generally in-line with pricing over the last 3 years and forward looking pricing is appropriate for use during a PEA of the Project with an estimated mine life extending into 2048. As the Project progresses, more detailed market work in the form of market studies will be completed to support further study efforts. SRK cautions that price forecasting is an inherently forward looking exercise dependent upon numerous assumptions. The uncertainty around timing of supply and demand forces has the potential create a volatile price environment and SRK fully expects that the price will move significantly above and below the selected price over the expected life of the Project. In light of this expected volatility, it is SRK's opinion that the selected price is a reasonable assumption for the evaluation of a long term mining asset with a 20+ year life as it provides a neutral price point both in line with historical pricing and with expected long term pricing.

Cathode

Cathode is assumed to be 100% payable with no premium or discount applied. This approach assumes that the cathode has not received registration or certification that would result in in a premium; nor is the cathode assumed to contain any deleterious or penalty elements.

Concentrate

Concentrate terms are generic terms and do not reflect the presence of any deleterious or penalty elements within the concentrate. Table 19-2 presents the concentrate terms applied for this study.

Table 19-2: Concentrate Terms

Item	Unit	Value
Payability	%	96.5
Treatment Charge	US$/dmt	65
Refining Charge	US$/lb	0.065
Transport Cost	US$/wmt	90

Source: SRK, 2023

20 Environmental Studies, Permitting and Social or Community Impact

20.1 Environmental Study Results

20.1.1 Flora and Fauna

Site flora and fauna are described in a biological evaluation by WestLand Engineering & Environmental Services (WestLand) (2022a) and are summarized here. Undisturbed uplands within and surrounding the property are open with a shrubland community dominated by creosote bush, saltbush, burroweed (Isocoma tenuisecta), desert ironwood (Olneya tesota), barrel cactus (Echinocactus spp.), white thorn (Acacia constricta), and velvet mesquite shrubs (Prosopis velutina). Much of the property south of North Branch Santa Cruz Wash contains abandoned agricultural fields. These abandoned agricultural areas contain the same vegetation community as the less-disturbed areas but with an appreciably higher annual grass and forb component. North Branch Santa Cruz Wash within the property supports xeroriparian vegetation dominated by velvet mesquite, wolfberry (Lycium sp.) creosote bush, and crucifixion thorn (Canotia holacantha). Desert broom (Baccharis sarothroides), Mexican palo verde (Parkinsonia aculeata), desert hackberry (Celtis ehrenbergiana), cocklebur (Xanthium strumarium), and nonnative and invasive tamarisk (Tamarix sp.) are present along North Branch Santa Cruz Wash in low densities, as well as a lone Fremont cottonwood (Populus fremontii). Bermuda grass (Cynodon dactylon) and other grasses and forbs line the irrigation levee that confines Santa Cruz Wash.

WestLand (2022a) describes that wildlife species activity observed within or close to the property include coyote (Canis latrans), javelina (Tayassu tajacu), gray fox (Urocyon cinereoargenteus), round-tailed ground squirrel (Xerospermophilus tereticaudus), common raven (Corvus corax), phainopepla (Phainopepla nitens), Cooper’s hawk (Accipiter cooperii), great blue heron (Ardea herodias), mourning dove (Zenaida macroura), black-tailed jackrabbit (Lepus californicus), greater roadrunner (Geococcyx californianus), turkey vulture (Cathartes aura), and hummingbird spp. (family Trochilidae). Carp spp. (family Cyprinidae) and catfish spp. (family Ictaluridae) were observed in the East Main canal bording a portion of the southwest corner of the property (WestLand, 2022a).

20.1.2 Threatened and Endangered Species

Special-status species include species designated by the USFWS as endangered, threatened, proposed for listing, or candidate for listing under the Endangered Species Act and species protected under the Bald and Golden Eagle Protection Act (BEGPA). WestLand (2022a) evaluated the federal protection status, known suitable habitat, total range, and distribution in Arizona and determined that there are no Endangered Species Act species with potential to occur within the property. No USFWS designated or proposed critical habitat occurs on the property. A search of the Heritage Data Management System using the Arizona Game and Fish Department Online Environmental Review Tool found no records of Endangered Species Act listed special-status species within 3 miles (5 km) of the property (WestLand, 2022a). Two BEGPA species (golden eagle and bald eagle) were determined to have some potential to occur within the property (WestLand, 2022a).

A review of publicly available bald eagle sighting records in the area (ebird, 2023) show eagles perching on transmission poles and irrigation pivots to the west of the property, likely foraging in the agricultural field, irrigation canals, and ponds. There are no breeding behavior observations in the records. An incidental take permit from USFWS may be required for construction activities within 660 ft or blasting within a half-mile of an active eagle nest. As there are no known eagle nests in the area at this time, the Project is not expected to need an incidental take permit. Bald eagle use of the properties to the west of the Project will continue to be tracked, and best management practices will be implemented to protect bald and golden eagle.

20.1.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) is intended to ensure the sustainability of all protected migratory bird species and currently includes protection of 1,106 avian species. Pre-construction clearance surveys are conducted weekly within the Project area to avoid the incidental take of migratory birds during active and evolving exploratory drilling operations.

Nesting migratory bird species identified in the Project area include the horned lark (Eremophila alpestris), red-tailed hawk (Buteo jamaicensis), mourning dove (Zenaida macroura), nighthawk (Chordeilinae sp.), cactus wren (Campylorhynchus brunneicapillus), raven (Corvus corax), ground sparrow (Spizella pusilla), and burrowing owl (Athene cunicularia) (WestLand, 2023).

All employees and contractors are trained on MBTA requirements and the Project's migratory bird survey and monitoring protocols. Pre-construction clearance surveys and implementation of beneficial practices and procedures to protect migratory bird species will continue throughout the life of the Project.

20.1.4 Surface Water Mapping

Under Section 404 of the Clean Water Act (CWA), the U.S. Army Corps of Engineers (USACE) is responsible for regulating the discharge of fill to surface water features determined to be Waters of the United States (WOTUS). WestLand (2022b) developed a Geographic Information System (GIS) delineation of the ordinary high-water mark (OHWM) within the surface water features of the property using current, publicly available aerial photography and subsequent, targeted field reconnaissance. This delineation was created based on the practices typically utilized by the USACE in assessing ephemeral channels in the arid Southwest.

Westland (2022b) concluded that much of the property has been previously disturbed from its natural state. These disturbances include flood control features, such as the canal identified as the Santa Cruz Wash Canal, paved and unpaved roads, and agricultural practices. These disturbances have removed all potential natural surface water features that may have existed in this area. The only features within the property that possess characteristics of an OHWM (and may be potential WOTUS) are the North Branch of the Santa Cruz Wash and the constructed Santa Cruz Wash Canal.

The North Branch of the Santa Cruz Wash is the downgradient extension of the Santa Cruz River between the Santa Cruz Flats to the south and the confluence with the Gila River to the north. This feature possesses the characteristics of an OHWM including changes in soil character, debris, scour, and an abrupt change in plant community. Based on the observed vegetation, it is possible that the channels of this feature may possess adjacent wetlands. The constructed Santa Cruz Wash Canal also serves a similar function as the North Branch, namely channeling flows from the Santa Cruz River northward through the City of Maricopa and the Ak-Chin Indian Community, towards the confluence with the Gila River to the north. As this canal serves to connect two other potential WOTUS (the Santa Cruz River and the Gila River), the canal is itself a potential WOTUS.

It is important to note that the USACE retains the final authority for determining the presence of WOTUS and has, to date, not been asked to provide its concurrence with this delineation. However, the Project has been designed to avoid impacting potential WOTUS and is not expected to require a permit under Section 404 of the CWA.

20.1.5 Cultural Heritage

An archeological evaluation of the property was completed by SWCA in 2005 and 2006 (Foster et al., 2006). In 2022, IE enlisted WestLand and their tribal monitor team to complete a Class III Cultural Survey to reassess 20 previously recorded sites (Middleton, 2022) and their eligibility for listing in the National Register of Historic Places (NRHP). Of the 20 sites reassessed, five sites were recommended eligible for listing in the NRHP. Despite there being no federal permitting or requirements under Section 106 of the National Prehistoric Preservation Act for private lands, the Santa Cruz team is committed to working directly with descendant communities to help preserve and protect places of important cultural value.

20.1.6 Air Quality

The Santa Cruz Project is committed to responsible environmental management, with a particular focus on minimizing air quality impacts. This section provides an overview of the anticipated air emissions and the control measures that will be implemented to reduce those emissions. Through a thorough assessment of air emissions and the implementation of effective mitigation strategies, the Project is expected to be categorized as a synthetic minor source.

The challenges of operating in an arid climate are of particular concern to the Santa Cruz Project, especially regarding the location of the Project, within the West Pinal County PM_{10} (particulate matter emissions with a diameter less than 10 microns) Nonattainment Area. Recognizing this, the Project will take specific measures to control and effectively mitigate dust. These measures will be in alignment with both local and state requirements, demonstrating the Project's commitment to environmental stewardship.

The primary sources of air pollutants from the Project include:

Dust: Generated from mining activities, material handling, transportation, stockpiling, and windblown dust.

Combustion Emissions: Emissions from the operation of generators, equipment, and other fuel-burning equipment.

The Project is expected to be a synthetic minor source for regulated air pollutants. This means that while potential uncontrolled emissions may be above major source thresholds, they will be reduced to levels below major source thresholds through the implementation of operational restrictions and emission control technologies and practices.

The Santa Cruz Project will employ a multifaceted approach to air quality management, focusing on both the prevention and mitigation of emissions:

Water Sprays and Enclosures: For material handling activities, water sprays and enclosures will be strategically utilized to control dust emissions. Water sprays help increase the material moisture content, reducing the potential for dust generation, while enclosures capture and contain the dust and limit the potential dust generation from exposure to high winds.

Control of Fugitive Dust within the West Pinal PM_{10} Nonattainment Area: Recognizing the specific requirements of the West Pinal PM_{10} nonattainment area, additional control measures will be put in place to reduce PM_{10}. This will include enhanced dust suppression techniques using water or chemical suppressants, paving areas of high traffic, and the potential implementation of operational restrictions (e.g., reduced speed limits or pausing work during high wind events). The Project's dust control measures will be designed to comply with all applicable regulations and guidelines for this specific nonattainment area.

Selective Catalytic Reduction (SCR) for Generators: Non-emergency generators will be equipped with SCR systems, a technology that converts nitrogen oxides into nitrogen and water. This method is highly effective in reducing emissions associated with combustion activities.

Regular Monitoring and Maintenance: As required by regulations and applicable permits, continuous monitoring, scheduled inspections, regular maintenance of equipment, and documentation of such activities may be implemented to ensure that all emission controls are functioning effectively, and best management practices are being followed. Additionally, comprehensive employee training is integral to this process, equipping personnel with the necessary knowledge and skills to prevent, recognize, and mitigate avoidable emissions.

20.1.7 Carbon Intensity

As part of IE’s commitment to responsible resource extraction, a comprehensive carbon impact assessment has been conducted. This work evaluates the expected Scope 1 and Scope 2 emissions associated with the Project over its lifetime and compares these emissions to the average carbon intensity for copper mining.

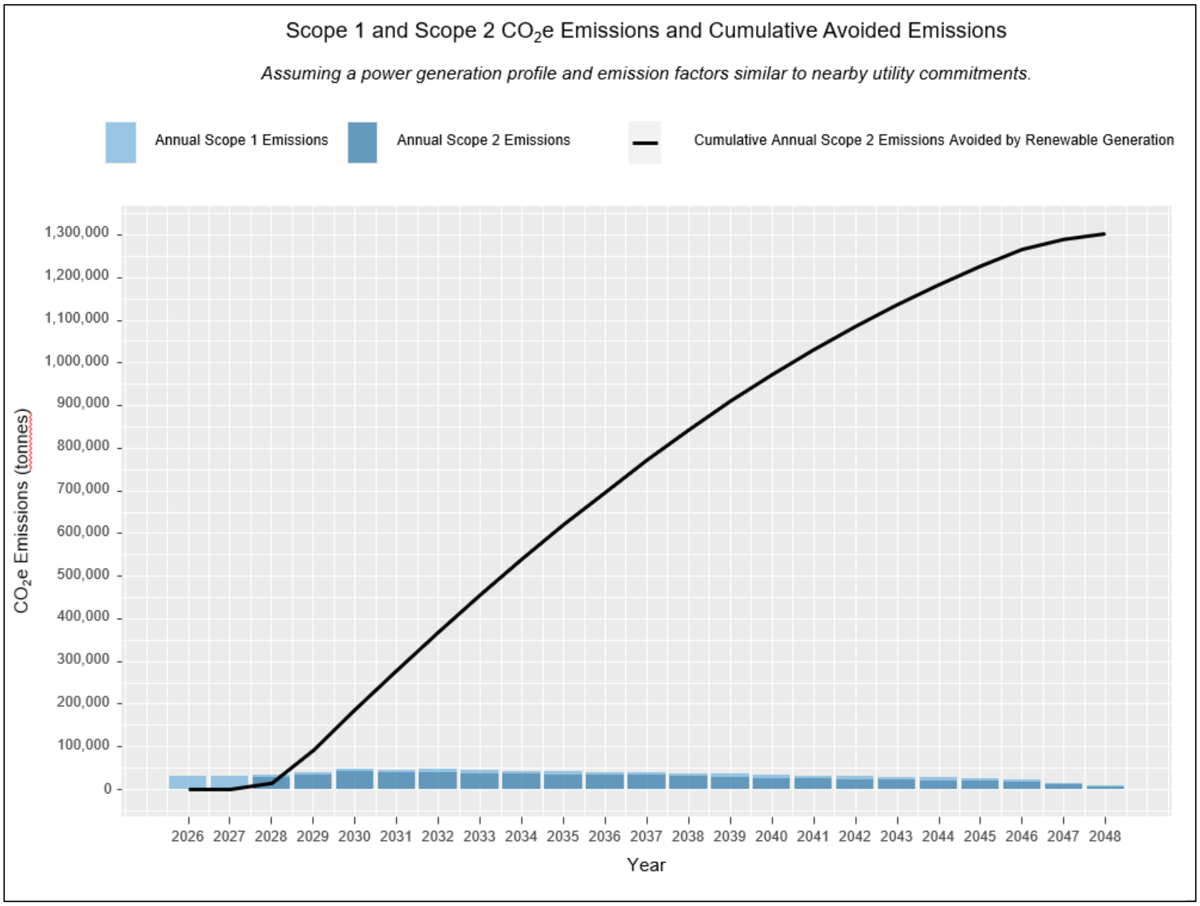
The global warming potentials (GWPs) used in this PEA were derived from Table A–1 to Subpart A of Part 98 of the US Code of Federal Regulations. This table provides the 100-year GWPs for various greenhouse gases (GHGs), as defined in the Intergovernmental Panel on Climate Change's (IPCC) Fourth Assessment Report (AR4). Utilizing these GWPs allows for the conversion of different GHGs into carbon dioxide equivalents (CO_2e), standardizing their impact on global warming. Scope 1 emissions include all direct GHG emissions that are emitted from sources owned or controlled by the organization. In the context of the Santa Cruz Project, these emissions primarily originate from on-site fuel combustion and ore extraction processes.

The direct emissions will mainly come from the combustion of diesel fuel for the operation of mining equipment, excavation, material handling, and transportation of the extracted ore. Emissions will also be produced from the use of explosives in the development and mining processes.

The calculation of Scope 1 emissions relies on methodologies grounded in industry standards and federal guidelines. Specifically, emissions from fuel combustion were estimated using the emission factors outlined in Tables C-1 and C-2 to Subpart C of Part 98 from Title 40 of the US Code of Federal Regulations. These tables provide greenhouse gas emission factors for various types of fuel, which have been integral to estimating the emissions resulting from onsite fuel combustion processes. In addition to this, industry-standard emission factors to capture the emissions generated from other direct sources, such as the usage of explosives in mining operations, were also utilized.

Scope 2 emissions refer to those resulting from the generation of electricity, steam, heating, and cooling that are purchased or acquired by an organization. In the context of the Santa Cruz Project, these emissions include the electricity consumed in various activities such as the crushing and grinding of ore, as well as ancillary functions like lighting, ventilation, and office operations.

The Santa Cruz Project, however, is forging an innovative path by planning to utilize a solar and geothermal-driven microgrid. This state-of-the-art system will enable the Project to use 70% renewably generated electricity by the third year of construction and operation, drastically reducing Scope 2 emissions. By using solar and geothermal energy, the Project not only aligns with environmental best practices but also demonstrates leadership in sustainable energy in the mining industry. The CO_2 equivalent (CO_2e) emissions avoided by using 70% renewable energy are shown in Figure 20-1.



Source: Tipple Consulting, 2023

Figure 20-1: Scope 1 and 2 CO_2e Emissions and Avoided Emissions

The Scope 2 emissions for the early phase of Santa Cruz Project were derived from representative emission factors from neighboring utility providers. These representative emission factors represent the estimated emissions generated per unit of electricity consumed and are important for estimating the greenhouse gas emissions associated with the use of purchased electricity.

The carbon intensity of a mining Project represents the amount of CO_2e emissions generated per unit of copper equivalent. A review of sustainability reports from 2021 and 2022 shows that carbon intensities in the global copper mining industry generally range from 1.5 to 6.5 t CO_2e per tonne of recovered copper. The average figure stands at approximately 3.9 t CO_2e per tonne of copper equivalent, encompassing both Scope 1 and 2 emissions.

Two examples of future mining Projects with a strong emphasis on minimizing global warming impact have reported their expected carbon intensities as in Table 20-1.

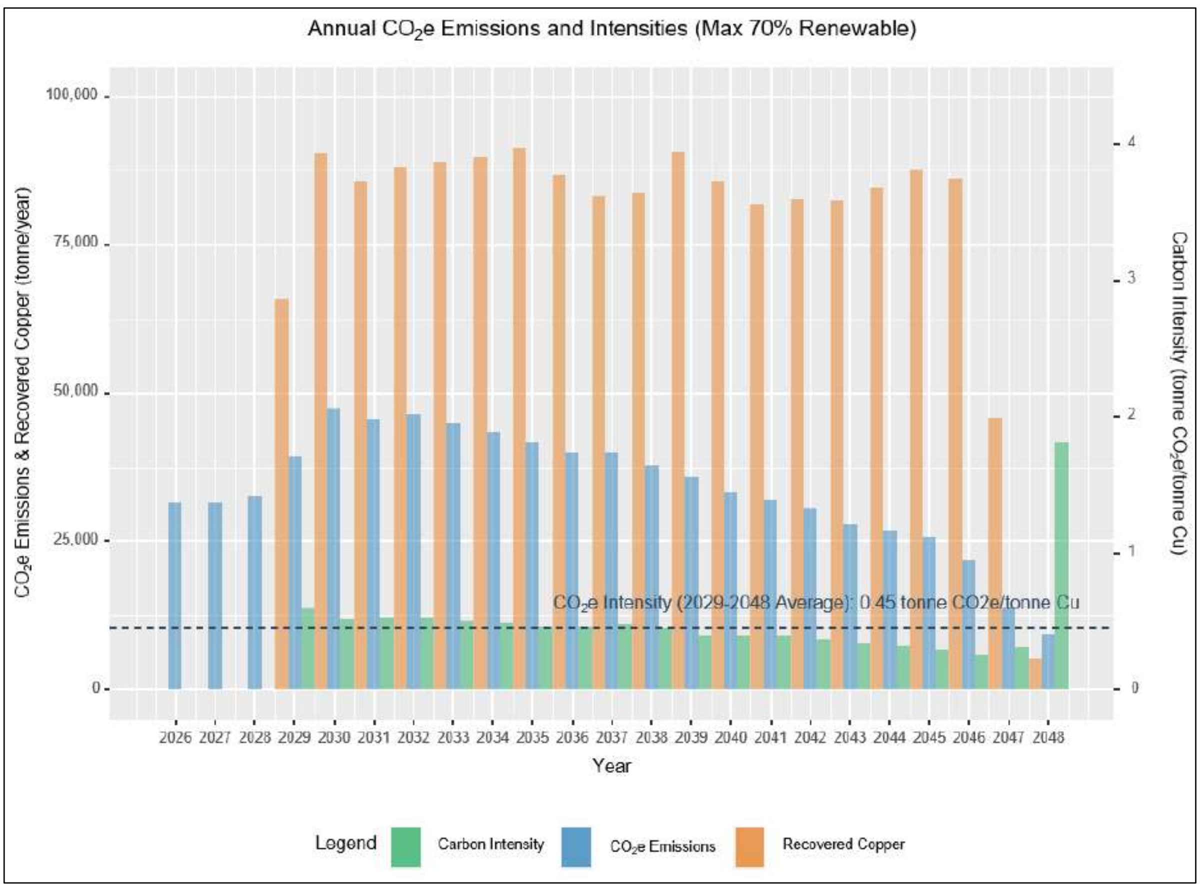
Table 20-1: Expected Carbon Intensity of Other Mining Projects

Location	Carbon Intensity (Scope 1 and 2) tonne CO_2e/tonne copper equivalent	Type of Product
Argentina	0.90 – 1.07	cathode/concentrate
United States	0.12	concentrate

Source: Tipple Consulting, 2023

For the Santa Cruz Project, which will produce a combination of copper cathode and copper concentrate (approximately two thirds cathode), the anticipated average carbon intensity is 0.49 t CO_2e per tonne of copper for Scope 1 and 2 emissions across both development and mining stages. Considering only the mining phase (projected to span from 2029 to 2048), the expected carbon intensity is somewhat lower, dropping to 0.45 t CO_2e per tonne of copper equivalent. Further, Santa Cruz's production of mostly copper cathode will minimize the emissions associated with processing the mined copper into a usable raw material after the sale of the copper product, in contrast to projects that focus solely on producing copper concentrate.

Employing a 70% renewable microgrid will allow the Santa Cruz Project to produce copper with one of the industry's lowest carbon intensities. Such intensities highlight IE 's commitment to implementing cutting-edge mining techniques, conserving energy, and utilizing renewable energy. The annual carbon intensities for 70% renewable microgrid utilization can be seen in Figure 20-2.



Source: Tipple Consulting, 2023

Figure 20-2: Annual CO_2e Emissions and Intensities

20.1.8 Surface Water Monitoring

A baseline surface water monitoring program (Section 16.3.1) has been implemented to support permitting processes.

20.1.9 Groundwater Monitoring

Area water quality data, spanning from roughly 1976 to 2000, have been reviewed to understand historic baseline conditions. Additional water quality sampling to establish a current baseline is planned for this year. Review of the historic water quality indicates that area bedrock and overburden water quality generally meet Arizona Drinking Water Standards (ADWS) with a few exceptions:

- Water quality in many overburden wells exceeds ADWS for gross alpha (15 picocuries per liter (pCi/L)), with concentrations as high as 50 pCi/L (uncorrected for natural uranium or radon).
- Numerous overburden wells and a few bedrock wells indicate arsenic above ADWS (0.01 milligrams per liter (mg/L) (revised proposed standard)), with concentrations approximating 0.04 to 0.05 mg/L.
- Nitrate concentrations in a number of overburden wells exceeds ADWS (44 mg/L), with concentrations as high as 55 mg/L.

It is suspected that elevated nitrate concentrations are associated with area agricultural activities, whereas the arsenic and gross alpha exceedances are likely tied to local leaching of overburden and mineralized bedrock, as supported by the ongoing materials characterization program.

A groundwater monitoring program to continue collecting baseline water quality data is in development.

20.1.10 Material Characterization

Material characterization studies have been initiated and are ongoing. The purpose of the mine characterization studies for the Santa Cruz Project is to develop the site environmental conceptual model and to understand both long-term material environmental behavior and environmental risks associated with various planned waste facilities. Baseline water quality studies have also been initiated to quantify pre-mining water quality within and around the planned project footprint.

Anticipated mine material types can be developed into three broad project classes, as follows:

- Mine-access material includes both overburden and bedrock material that must be mined to develop the Project. The mine-access material may potentially be stored on the surface during or after development of underground access to the mine area. Access area overburden has been extensively characterized, while access area bedrock material is currently being sampled and characterized.
- Mine area material refers to mineralized bedrock that will be excavated predominantly as ore for processing with accompanying minor waste rock. A preliminary set of mineralized bedrock samples has been characterized, with additional samples currently being characterized and more samples anticipated in future years.
- Ore processing residuals are initial bench-scale samples of mill/flotation tailings and heap leach spent ore that have been characterized. Additional tailings and spent ore samples are expected in future years as the mine and metallurgical plans evolve and as associated geochemical test programs advance. Paste tailings samples are currently being generated and will be characterized later this year.

Results of the various characterization programs indicate that the following broad conclusions can be drawn about expected environmental behavior of various material types that will comprise future waste facilities at Santa Cruz:

- All overburden (access material) material is non-acid-generating and contains considerable neutralization potential that makes it potentially useful as borrow/construction material that would not generate acidic and/or metalliferous drainage (AMD)/metal leaching (ML). Overburden material also exhibits low-level arsenic-leaching potential, which will need to be further evaluated (especially in light of potentially elevated baseline arsenic in groundwater; see previous section).
- Mine-area, mineralized bedrock is mixed potentially acid-generating and non-acid-generating. Although exact proportions are currently unknown as characterization studies continue, bedrock appears likely to be at least 50% non-acid-generating. Under acidic conditions, bedrock drainage quality is expected to be acidic pH (~3), with high concentrations of sulfate and chalcophile metals. Under alkaline conditions, bedrock indicates some potential in initial materials-characterization testing to leach low to very low concentrations of oxy-anions (e.g., antimony and selenium), natural uranium, and presumably some natural uranium decay products.

Spent ore and tailings are both likely to be non-acid-generating based on preliminary test results. Tailings process water is expected to be alkaline, contain high sulfate and likely very high chloride (due to processing of atacamite). Spent ore process water will likely be acidic.

20.2 Permitting and Authorizations

Table 20-2 lists the federal, state, and local permits required as a precursor for project construction.

Table 20-2: Permitting Table

Jurisdiction	Agency	Permit Needed	Description	Comment
Federal	USEPA	RCRA	Resource Conservation Recovery Act – Hazardous Waste Management	Waste accumulation threshold will determine when hazardous waste ID number (permit) is required
Federal	USFWS	MBTA	Migratory Bird Treaty Act	Ongoing monitoring and implementation of beneficial practices throughout life of project
Federal	USEPA	Class V UIC Permit	Underground Injection Control Permit for tailings paste backfill	Permit by rule or individual permit depending on materials characterization; UIC program expected to be under state jurisdiction by 2027
State	ADEQ	APP	Aquifer Protection Prescriptive or Individual Permit	Facility-specific permit for tailings, waste rock, and contact water ponds
State	ADEQ	Recycled Water Discharge Permit	Redistribution of excess treated water to priority users	For distribution of treated water for third party uses (e.g., irrigated crops).
State	ADWR	45-513 – Groundwater Withdrawal Permit	Permit to withdraw groundwater for dewatering purposes in an Active Management Area	Project is within the Pinal Active Management Area
State	ASMI	MLRP	Mined Land Reclamation Plan	Closure plans developed as part of PEA/PFS.
State	Arizona Department of Transportation (ADOT)	Encroachment Permit	Permit for access off Hwy 84	Traffic Impact Analysis completion required prior to permit submittal
County	PCAQCD	Air Quality Control Permit	Air permit determined by quantity of emissions from stationary sources and process emissions	Required for any industrial operation that has the potential to emit 5.5 pounds per day or 1 ton per year of any regulated air pollutant is required to obtain a permit from Pinal County Air Quality
County	PCAQCD	Dust Permit – West Pinal Non-Attainment	Pinal County Dust Control Permit	Existing permit will be amended as needed
City	City of Casa Grande	Special Flood Hazard Area Development Permit	Any development that is proposed within a floodplain requires a permit	Likely not required as facilities have been designed to avoid development within Special Flood Hazard Areas
City	City of Casa Grande	General Plan Amendment	Major amendment to city plan	Required to include mining operations and infrastructure within city limits.
City	City of Casa Grande	Major Site Plan/PAD Plan	Major Amendment to existing PAD plan	Required to accommodate industrial use/mining operations in a PAD zone

Source: IE, 2023

20.3 Requirements and Plans for Waste and Tailings Disposal, Site Monitoring, and Water Management During Operations and After Mine Closure

Arizona Best Available Demonstrated Control Technology (BADCT) guidance defines discharge as, “the addition of a pollutant from a facility either directly to an aquifer or to the land surface or to the vadose zone in such a manner that there is a reasonable probability that the pollutant will reach the aquifer.” Operators must demonstrate, within their mine plans, that such discharges will be prevented or that waste facility design effectively manages any discharge to prevent discharge from traveling beyond compliance points. BADCT stipulates the following with respect to planning for materials and water management and design of storage facilities:

- Applicant proposes and presents a waste characterization plan to the ADEQ. A site-specific sampling and analysis plan has been submitted to ADEQ and is continuously revised as new test material becomes available.
- Waste facilities can be designed with pre-designated engineered containment (prescriptive approach) under the assumption that facilities will be discharging and that the discharge will need to be managed.
- Waste facilities can also be designed without pre-designated containment (individual approach). This approach places the burden on the operator to demonstrate that any facility discharge will not result in downgradient impacts to aquifer, vadose zone, or land surface.
- Monitoring for compliance with facility APP(s) will be dictated by the conditions of the permit.

Based on BADCT guidance for materials and water management and the results of characterization testing performed to date, the following plans would be typical for waste and tailings disposal, site monitoring, and water management during operations and after mine closure:

- **Metal Leaching/Acid Rock Drainage (ML/ARD) Management Plan:** The ML/ARD management plan should include definitions and classification criteria for potentially metal-leaching and acid-generating materials, handling and storage plan, monitoring plan, sampling plan, and contingency plan.
- **TSF Operations, Maintenance, and Surveillance Manual:** The OMS manual contents should include information such as governance (such as roles, responsibilities, and authority, communication, training) TSF description, operational requirements (such as performance objectives and Trigger Action Response Plan (TARP)), maintenance requirements, surveillance requirements (number, type, instrumentation, frequency), and linkages with the Emergency Response Plan.
- **Site-Wide Water Management Plan:** The site-wide WMP should include information specific to the TSF, such as TSF water balance, water management plan, protection against floodplain, flood management, seepage management, discharge management, risks of TSF runoff/seepage discharge to the receiving environment, TSF water quality and quantity mitigation measures, and trigger response plan for upset conditions.
- **Site-Wide Surface Water and Groundwater Monitoring Plan:** The site-wide water monitoring plan should include information such as monitoring objectives, methods, rationale for the monitoring locations/depths, water quality parameters to be monitored, sampling frequency and period, analytical testing procedures, QA/QC methods, and reporting requirements.

- **Post-Closure Monitoring and Maintenance Plan:** The plan should include information specific to the TSF, such as environmental monitoring requirements, annual dam safety inspections, and post-closure maintenance requirements for the TSF closure cover, closure channels, slope and toe riprap.

20.4 Post-Performance or Reclamations Bonds

The eventual closure and reclamation of the Santa Cruz Project will be directed and regulated under two separate and somewhat interconnected regulatory programs in Arizona. Both programs are well established in Arizona statutes and rules, are subject to licensing timeframes and the agencies are required by statute to issue approvals when credible applications are deemed administratively and technically complete.

- The first program, established in Chapter 5 of Title 11 of Arizona Revised Statutes (ARS) authorizes the Arizona State Mine Inspector (ASMI) to establish mined land reclamation requirements. The ASMI's primary role in this context is the approval (or denial) of mined land reclamation plans submitted by all metalliferous and aggregate mining units and exploration operations with surface disturbances greater than five acres on private lands within the State of Arizona.
- The second program, established in ARS Title 49 Chapter 2, authorizes the Arizona Department of Environmental Quality (ADEQ) to regulate discharges (or potential discharges) to an aquifer or vadose zone in the State or requires those who operate a facility that discharges to obtain an Aquifer Protection Permit (APP). While typically considered an operational permit, the APP program also considers the eventual cessation of operations and the restoration of vadose and aquifer conditions.

20.4.1 Arizona State Mine Inspector: Reclamation Plan

The ASMI reviews and analyzes reclamation plans (including reclamation cost estimates) and approves or denies proposed reclamation plans. ASMI is also responsible for the coordinated review and approval of reclamation plans with other state and federal land use agencies as well as conducting on-site inspections to determine compliance with the Mined Land Reclamation Act and Rules. Reclamation rules cannot replace or duplicate provisions of Title 49 (see Section 20.4.2) that regulate mining operations with regards to the protection of public health and the environment.

ASMI also has the responsibility to receive an appropriate reclamation financial assurance mechanism to guarantee that reclamation activities and related costs as defined in the Plan can be conducted by a third party in the event of an operator default. Requirements for a Mined Land Reclamation plan cannot supersede an APP Closure Plan for the same mining unit although financial assurance requirements shall not be redundant, inconsistent or contradictory.

Beginning in 1997, an owner or operator of a new exploration operation or new mining unit cannot create a surface disturbance of more than five contiguous acres until a reclamation plan and financial assurance mechanism are approved by ASMI. Generally, reclamation must be initiated within two years following the cessation of mining activity although the ASMI can generally extend the period in which to initiate reclamation if the operator can demonstrate a reasonable likelihood that the Project can resume. Once closure is initiated, the final reclamation measures shall be performed as stated in the approved reclamation plan (as amended) unless the mining operation is reactivated.

20.4.2 Arizona Department Of Environmental Quality: Aquifer Protection Permit

The ADEQ shall consider any application for an individual permit if the application furnishes a design of the discharging facilities sufficient to document those elements of the facility affecting discharge, a description of how the facilities will be operated, a demonstration of existing and proposed pollutant control measures, a hydrogeologic study defining and characterizing the pollution management area and the discharge impact area, a background aquifer analysis, a characterization of the pollutants discharged by the facility and a closure strategy.

Discharging facilities must be designed, constructed, and operated to ensure the greatest degree of discharge reduction achievable through the application of Best Available Demonstrated Control Technologies (BADCT) including, where practicable, technologies that result in no discharge of pollutants. Once permitted, facilities must be constructed and operated in a manner that discharged pollutants cannot cause or contribute to a violation of aquifer water quality standards at the applicable point of compliance for the facility.

Regarding closure, ADEQ may consider a closure strategy and cost estimate rather than a detailed closure plan. Like the ASMI-required bonding requirements, the closure cost estimate shall be based on the costs for a third party to implement the closure strategy or plan (including conducting post-closure monitoring and maintenance) unless the surety mechanism is a self-assurance or a corporate guarantee.

Unless specifically exempted or designed, constructed and operated so that there will be no migration of pollutants directly to the aquifer or to the vadose zone, mine facilities such as surface impoundments, waste rock or overburden disposal units, tailings impoundments, and leaching facilities are generally considered to be discharging facilities and must be operated pursuant to either an individual APP or general permit.

20.5 Status of Permit Applications

20.5.1 Arizona State Mine Inspector: Reclamation Plan

Although exploration activities previously conducted by IE are subject to an exploration level reclamation plan, IE must submit and obtain approval for a Mined Land Reclamation Plan (Plan) prior to initiating actual mining operations. Unreclaimed disturbances from prior or ongoing exploration activities can simply be incorporated into the disturbance footprint of the operating Plan or reclaimed under the existing exploration level plan.

Future mining operations that are the subject of this document will require a Mined Land Reclamation Plan as established in Chapter 5 of Title 11 in ARS. The Plan should be developed once IE has completed at least 75% design drawings for all surface disturbances and structures at the Site subject to the Plan. The closure of discharging facilities as defined in APP rules (such as tailings impoundments, process ponds and waste rock stockpiles) must be included within the approved Plan even though the detailed plans and approach to closing these facilities are documented in the APP and approved by the ADEQ. Consequently, the present project design status prevents any substantive APP activities at this time.

20.5.2 Arizona Department of Environmental Quality: Aquifer Protection Permit

Future mining operations that are the subject of this document will require an approved Aquifer Protection Permit as established in Chapter 2, Title 49 of ARS. Although the ADEQ does allow pre-application meetings and certain preliminary permitting activities to be conducted under 30% design drawings, the APP can only be approved once IE has submitted at least 75% design drawings for all surface disturbances and structures at the Site subject to the permit. Consequently, the Project design status prevents any substantive APP activities at this time.

The closure of discharging facilities as defined in APP rules (such as tailings impoundments, process ponds and waste rock stockpiles) must be included within the approved Plan even though the detailed plans and approach to closing these facilities are documented in the APP and approved by the ADEQ. Costs for closing these facilities must be addressed in the APP application package although Arizona Revised Statutes expressly prohibits duplicative bonding requirements.

20.5.3 Known Requirements to Post Performance or Reclamation Bonds

Aside from the pending reclamation plan for exploration activities at the Site, IE has no current obligations to tender post mining performance or reclamation bonds for the Project. Once the facility achieves the level of design necessary to advance to mine development and operation, IE will need to submit and gain approval of an ADEQ-approved APP and an ASMI-approved Reclamation Plan. The closure approach and related closure cost estimates must be submitted following approval and before facility construction and operation.

Although a Mined Land Reclamation Plan has not yet been developed for the Santa Cruz Project, a preliminary closure cost estimate has been developed. Based on the conceptual design plan described in this document, the estimated closure costs for the Santa Cruz Project are US$27 million.

20.6 Local Individuals and Groups

In alignment with IE's community engagement and partnership standards, the Santa Cruz Project is being developed with a well-defined strategy to establish and uphold the support of the surrounding communities. At present, the Project has initiated early-stage community outreach and is actively assessing potential partnerships within the local community.

The Santa Cruz Project recognizes the need to keep stakeholders well informed about the Project's potential economic and community benefits and IE's commitment to safety and the environment. To achieve this, the Santa Cruz team has initiated meetings with various key groups, including local community leaders, neighboring communities, and regional- and state-level representatives. Consistent communication will continue through the development of a community working group. This group will provide a forum for stakeholder involvement and will allow interested community members to engage with the team as the Project progresses.

Furthermore, the Project team recognizes the potential impacts of noise and dust from the proposed activities and is taking proactive steps to address them. During the facility design phase, engineering controls will be incorporated to minimize noise and dust disturbances and maintain harmony with the surrounding community. IE plans to create an all-encompassing environmental, social, and governance framework designed to effectively address any community concerns and ensure that the Santa Cruz Project operates in a socially responsible manner.

20.7 Mine Closure

As discussed above, the present level of design considered in this document is insufficient to generate specific Closure or Reclamations Plans as required by ASMI and ADEQ for facility construction and operation. It is possible, based on the conceptual mine plans and facility layout discussed herein, to contemplate certain closure and reclamation obligations and approaches for the following Site elements:

20.7.1 Waste and Development Rock Closure and Reclamation Approach

Generally, the APP permitting process will determine the geochemical reactivity of those materials. This geochemical characterization informs the need as well as means and methods for capping and covering these materials to prevent stormwater contamination and seepage that could continue to impact the vadose zone or underlying aquifer. If characterization of these materials suggest that the “wastes” are geochemically inert, then isolation measures needed to prevent water-rock interactions are not necessary. Sufficient geochemical modeling has not been completed to assess if these materials will be inert.

The ASMI will not address or review the adequacy of closure or capping systems in the Reclamation Plan. However, ASMI will require a geotechnical analysis to demonstrate that the stockpiles are safe and stable under static and pseudo-static conditions.

20.7.2 Tailings Closure and Reclamation Approach

Again, the APP permitting process will determine the geochemical reactivity of tailings materials. This geochemical characterization informs the need as well as means and methods for capping and covering these materials to prevent stormwater contamination and seepage that could continue to impact the vadose zone or underlying aquifer. If characterization of these materials suggest that the “wastes” are geochemically inert, then isolation measures needed to prevent water-rock interactions are not necessary to protect groundwater but still may be required to meet stability requirements below. Sufficient geochemical modeling has not been completed to assess if these materials will be inert.

As with waste and development rock, the ASMI will not address or review the adequacy of closure or capping systems in the Reclamation Plan. However, ASMI will require a geotechnical analysis by the Engineer of Record to demonstrate that the tailings impoundment is safe and stable under static and pseudo-static conditions and that the impoundment is practically drained and dewatered.

20.7.3 General Grading and Revegetation Approach

There are typically no grading or revegetation requirements included in an approved APP. The ASMI-approved reclamation plan will address all grading, site recontouring and revegetation requirements. To the extent practicable, the Plan will require the grading and recontouring to restore surface topography and drainage patterns. Roads and other compacted areas must be ripped and scarified to encourage the establishment and success of revegetation efforts. Material stockpiles should be graded and contoured to reduce erosive effects of rainfall events, enhance long-term stability, and reduce ponding and infiltration.

Inert materials (such as broken concrete and asphalt) generated from facility decommissioning activities can be buried on-site without a permit provided those materials are categorically inert or are determined to be inert via approved testing protocols.

20.7.4 Mill and Process Area Closure and Reclamation Approach

The approved closure approach or plan will require that all process liquid and solid residues will be removed from the mill and leaching circuits. These facilities can be rinsed with the resultant liquids and sediments discharged to an onsite permitted process pond. Liquids can be allowed to evaporate but remaining sludges and sediments must be characterized and profiled for offsite transportation and disposal in order to achieve Clean Closure under APP rules.

All solid wastes, laboratory and assay chemicals, and general household wastes must be removed from the structures prior to structural decommissioning. These materials must be recycled or characterized and profiled for appropriate offsite transportation and disposal.

20.7.5 Process and Chemical Ponds Closure and Reclamation Approach

The approved ADEQ APP will require that process ponds are eventually drained and cleaned to remove remaining sludges and sediments. Liquids can be allowed to evaporate but remaining sludges and sediments must be characterized and profiled for offsite transportation and disposal in accordance with APP rules. Once drained and cleaned, pond liners can be perforated and buried onsite or transported from the property as solid waste.

The ASMI-approved reclamation plan will not address pond closure per se, but any remaining surface depressions must be regraded to achieve the safe and stable requirements of the reclamation rules. These efforts would typically be addressed in the general grading and reclamation approach.

20.7.6 Structural Decommissioning Approach

The ADEQ-approved APP closure plan will not specifically address the decommissioning of surface structures aside from the requirement that any process liquids or residues are not discharged in an uncontrolled manner.

The ASMI approved reclamation plan will address structural decommissioning efforts to the extent that closure cost estimates include the demolition and removal of all surface facilities not specifically excluded from the Plan. The ASMI does allow the retention of specific structures such as water wells, utility infrastructure or buildings where these structures can enhance the productive post-mining use of the property. These facilities must be specifically identified in the approved Plan.

Again, any remaining surface depressions must be regraded to achieve the safe and stable requirements of the reclamation rules. Inert materials (such as broken concrete and asphalt) generated from facility decommissioning activities can be buried on-site without permit provided those materials are categorically inert or are determined to be inert via approved testing protocols. These efforts would typically be addressed in the general grading and reclamation approach.

20.7.7 Underground Operations Closure Approach

The ADEQ approved APP will require that all fuels, chemicals, wastes, and explosives used in the development and operation of underground operations are removed and disposed to prevent potential impacts to mine flooding. Fluid-containing equipment and machinery left underground must be drained and any hydrocarbon-impacted “soils” occurring as a result of maintenance activities must be removed and properly disposed.

Geochemical and hydrologic modeling required in the APP should predict the resulting rock-water and water-water interactions occurring as a consequence of mine flooding. If these interactions have the potential to impact the aquifer above a specific alert level as measured at the approved points of compliance, then actions prescribed in the APP must be implemented. Sufficient geochemical and hydrologic modeling has not been completed to assess this possibility.

The ASMI-approved reclamation Plan will require that the mine portal and any associated escape or ventilation shafts be appropriately closed and sealed to establish long term safety and stability.

20.7.8 Aquifer Restoration and Post Closure Monitoring Approach

Post closure monitoring related to the APP may include confirmation sampling related to the clean closure of any process areas or individual discharging facilities and the long-term monitoring of groundwater conditions across the Site following closure. IE will be required to maintain, survey and routinely sample the monitoring well network including the point of compliance wells until such time as groundwater conditions have stabilized and no constituents of interest are at risk of exceeding an alert level at any of the points of compliance. It is estimated that post closure monitoring will be required for at least ten (10) years depending on the speed at which the aquifer rebounds from dewatering and aquifer conditions stabilize.

The ASMI-approved reclamation Plan will require Site monitoring to document the effectiveness of grading and reclamation efforts including the success of revegetation. The Plan will require the maintenance of fencing and other Site barriers, the removal of trash or wildcat dumping and the repair of any erosion damage to capped and covered structures.

Once groundwater conditions have stabilized and ADEQ grants closure, IE must abandon all monitoring and Point of compliance wells in accordance with the APP. Following revegetation success after at least four (4) growing seasons, the ASMI can determine that the site has been successfully reclaimed and return all or part of the reclamation bond established with the ASMI.

Certain facilities (like a large tailings impoundment, for instance) may not achieve clean closure and would thus require long-term monitoring and Engineer of Record (EoR) involvement. Depending on how quickly these facilities dewater and stabilize, certain types of legacy facilities may not ever be released and declared closed. However, characterization and design efforts at the Site have not progressed sufficiently to determine the long-term closure requirements of any facilities.

21 Capital and Operating Costs

Estimation of capital and operating costs is essential to the evaluation of the economic viability of a prospective project. These factors, combined with revenue and other expense projections, form the basis for the financial analysis presented in Section 19. Capital (CAPEX) and operating (OPEX) costs for the Santa Cruz Project were estimated on the basis of a PEA mine plan, plant design, estimates of materials and labor based on that design, analysis of the process flowsheet and predicted consumption of power and supplies, budgetary quotes for major equipment, labor requirements, and estimates from consultants and potential suppliers to the Project.

Capital and operating costs are incurred and reported in US dollars and are estimated at a PEA level with an accuracy +/-50%.

21.1 Capital Cost Estimates

The Project is currently in the exploration stage. The Santa Cruz Project consists of an underground copper mine that has a conceptual mine schedule containing 105.2 Mt of exotic, oxide, supergene (secondary) sulfide mineralized material. The Santa Cruz process plant is designed to handle 5.5 Mt/y over a period of 20 years. The daily throughput of the process plant is 15,000 tonnes per day (t/d) of mineralized material.

21.1.1 Mining Capital Cost

The mining capital cost estimate is based on first principal cost model build-up and budgetary quotes. The total capital estimate is US$960.48 million, this includes an estimated capital of US$878.08 million plus 9.4% contingency of US$82.40 million.

The construction capital is supported by the following items:

- Schedule of mine equipment purchases
- Budgetary estimates for portal, decline and railveyor development
- Budgetary estimates for paste backfill plant and distribution system
- Budgetary estimates for mine dewatering
- Budgetary estimates for vertical shaft development
- Cost model estimate to install underground facilities like shops, ventilation systems, refuge chambers, pumping systems, paste distribution, fuel distribution, ancillary equipment, etc.

Development costs are derived from the mining schedule prepared by SRK. The prepared mining schedule includes meters of development during pre-production, this schedule of meters was combined with unit costs, based on site specific data, to estimate the cost of this development operation. The breakdown of the estimated initial capital costs is shown in Table 21-1.

Table 21-1: Estimated Mining Initial Capital Cost

Item	**US$ (million)**
Capital Development Cost	166.99
Equipment Purchase and Rebuilds	241.24
Mine Services	17.96
Owner Cost	32.75
Contingency	38.76
Total	**497.7**

Source: SRK, 2023

The Santa Cruz Project will require sustaining capital to maintain the equipment and all supporting infrastructure necessary to continue operations until the end of its projected production schedule. The sustaining capital cost estimate developed includes the costs associated with the engineering, procurement, construction and commissioning. The cost estimate is based on designs and cost models prepared by SRK with site specific inputs from IE. The estimate indicates that the Project requires sustaining capital of US$462.78 million to support the projected production schedule through the LoM. The sustaining capital cost is shown in Table 21-2.

Table 21-2: Estimated Mining Sustaining Capital Cost

Item	US$ (million)
Capital Development Cost	60.79
Equipment Purchase and Rebuilds	322.64
Mine Services	0.00
Owner Cost	35.71
Contingency	43.63
Total	**462.78**

Source: SRK, 2023

21.1.2 Process Capital Cost

Capital costs for the Santa Cruz process plant were primarily estimated using historical equipment quotes from recent M3 projects, material take-offs (MTOs) for earthwork, concrete, steel, and some overland piping, internet quotes for plant mobile equipment, and estimates based on experience with similar projects of this type. The capital cost estimate for the plant is shown in Table 21-3. Some of the costs and quantity estimates used by M3 were supplied by other consultants.

Table 21-3 summarizes the initial capital costs for the Project. The process capital categories include:

<u>Direct Costs</u>

- Civil Earthworks, Concrete, Steelwork by MTO (comparison with similar facilities from other constructed projects
- Factored Estimates for Piping, Electrical, and Instrumentation & Controls based on Plant Equipment priced from similar projects
- Power Supply Equipment & Infrastructure
- Fresh and Process Water Equipment, Ponds & Infrastructure
- Ancillary Facilities (Buildings)
- Freight

<u>Indirect Costs</u>

- Construction indirect costs: mobilization, temporary facilities, temporary, power,
- EPCM costs
- Vendor Support & Spares
- Contingency

<u>Owners Costs</u>

- Owners Management Team Construction
- Plant Pre-Production
- Security

- Project Insurance
- Recruiting & Training
- Warehouse Spares
- Permits & Environmental

Note that Owners costs includes an allocation of US$30 million plus first fills plus plant mobile equipment.

Table 21-3: Estimated Initial Plant Capital Cost Summary

Description	Hours	Total Cost (US$ million)	% of Total Capital Cost
Directs	1,290,000	345.4	61.3
Indirects		72.0	12.8
Contingency		111.3	19.7
Owner's Costs		35.0	6.2
Escalation		-	0.0
Total Capital Cost (TCC)		563.7	100.0

Source: M3, 2023

The initial capital cost for the Santa Cruz plant and infrastructure facilities totals US$563.7 million. This capital cost includes all process areas facilities in the Santa Cruz plant proper starting with the primary crushing, and continuing through grinding, agitated leaching, solvent extraction and electrowinning, leach residue neutralization, leach residue grinding, rougher flotation, concentrate regrinding, cleaner flotation, concentrate dewatering and tailing dewatering and pumping to the TSF. The initial capex includes the ventilation chiller for the underground mine, the main plant substation, fresh and process water ponds, and the batch plant, and the surface ancillary buildings.

The initial plant capex excludes the mining capex, mining pre-production, the paste backfill plant, the mine ventilation fans, and initial Tailing Storage Facility (TSF) costs. These costs are captured elsewhere in the financial build-up.

The expenditures percentages by development year are:

- Year -3: 10%
- Year -2: 35%
- Year -1: 50%
- Year 1: 5%

No sustaining capital costs have been included for the Santa Cruz process plant. The mine life is 20 years and the capital equipment will be designed to last for the duration of the Project. Preventative maintenance and periodic rebuilds/relining is captured in the annual maintenance cost estimation. The only place where sustaining capital is expected is in the TSF for annual embankment enlargement which was estimated separately.

21.1.3 Tailings Capital Costs

The capital components that make-up the tailings management system consist of the TSF embankment, the tailings impoundment and liner, water reclaim system, TSF under-liner drains, TSF surface water diversions, and the civil work that is required to route the tailings and reclaim water lines between the process plant and the TSF. MTO’s for the TSF water diversions, embankment and impoundment construction, liner, and over-liner drain were estimated by KCB. The water reclaim system consists of seepage ponds sump pumps, pipeline, and process water storage tank, estimated by M3.

KCB provided a year-by-year Bill of Quantities for the conceptual Santa Cruz design. Current civil rates were applied to KCB's quantities. The largest cost center for the TSF comes from the yearly embankment construction from the borrow-to-fill rate for the TSF embankment, which is expanded every year. In this case, IE solicited a budgetary proposal from Turner Mining Group (TMG), a local constructor, to provide material for the TSF embankment. TMG provided a price of US$6.36 per yd^3 which converts to US$8.42/$m^3$.

Other unit rates for geomembrane lining, drain piping, overliner and underliner, and trenching align with 2023 civil and piping rates for southern Arizona. Table 21-4 and Table 21-5 show a summary of the TSF initial and sustaining capital costs over the LoM. Indirects and contingency have only been applied to the initial capex.

Table 21-4: Estimated TSF Initial Capital Cost

Item	US$ Million
Directs	48.8
Indirects	11.3
Contingency	15.0
Total	**75.1**

Source: M3, 2023

Table 21-5: Estimated TSF Sustaining Capital Cost

Item	US$ Million
Sustaining	382.2
Closure	104.6
Total	**486.8**

Source: M3, 2023

21.1.4 Basis for Cost Estimates

Mining Capital Costs

The mining equipment requirements were based on the mine production schedule, and estimates for scheduled production time, mechanical availabilities, equipment utilization, and operating efficiencies.

Estimates of annual operating hours for each type of equipment were made, and equipment units were utilized in the mining operations until a unit reached its planned equipment life, after which a replacement unit was added to the fleet, if necessary. Major mining equipment rebuild (overhaul) costs were included in the mining equipment capital cost estimates.

The mining equipment capital cost estimate was based on the following:

- All replacement mining units are based on new equipment purchases.
- Freight cost and spare parts for mining equipment was generally estimated to be between 3% and 5%.
- Mining equipment rebuilds were included at appropriate intervals in the mining capital costs.
- Contingency was included in the mining equipment capital cost estimate. Contingency range from 5%, when there are budgetary quotes, to 15% from first principal build-ups.

Process Capital Costs

The key elements of the capital cost estimation methodology are summarized below:

- Equipment capacities, duty specification and quantities were determined from flowsheets, process design criteria, material mass balance, and engineering calculations for service and duty.
- EPCM rates were estimated based on M3's updated rate of 16.8% of direct constructed cost. That cost is broken down into seven components: management/accounting, engineering, project services, project control, construction management, EPCM fee, and temporary facilities.

Tailings Capital Costs

The key elements of the capital cost estimation methodology are summarized below:

- Material take offs by year were provided by KCB
- Earthworks, lining, and piping rates from standard schedule
- Borrow-to-fill provided by budgetary quotation – Turner Mining Group

21.2 Operating Cost Estimates

For mining, the operating costs were estimated by SRK from a first principles basis.

Process operating costs were estimated based on the best current pricing for labor, power, reagents, and consumables. Maintenance, spares and services were estimated as factors of capital equipment. As with capital costs, operating costs are captured in US dollars and are estimated at a PEA level withing an accuracy bound of +/- 50%.

21.2.1 Mine Operating Cost

SRK estimated the required mining equipment fleet, required production operating hours, and manpower to arrive at an estimate of the mining costs that the mining operations would incur. The mining costs were developed from first principles and compared to recent actual costs. The mining operating costs are presented in the following categories:

- Drilling
- Blasting
- Loading
- Hauling
- Backfill
- Support Equipment Operations
- Miscellaneous Operations (various support operations, etc.)
- Mine Engineering (mine technical personnel and technical consulting)
- Mine Administration and Supervision (mine and maintenance supervision, etc.)
- Freight (for equipment supplies and parts, excluding freight for fuel)
- Contingency

A maintenance cost was allocated to each category that required equipment maintenance. A US$2/t rehandling cost is used for rehandling the surface ore stockpile to the mill in early mine life. Additionally, the operating expense, totaling US$9.78 million, associated with handling the development ore in construction year 3 is capitalized. A summary of the LoM unit mine operating costs is presented in Table 21-6.

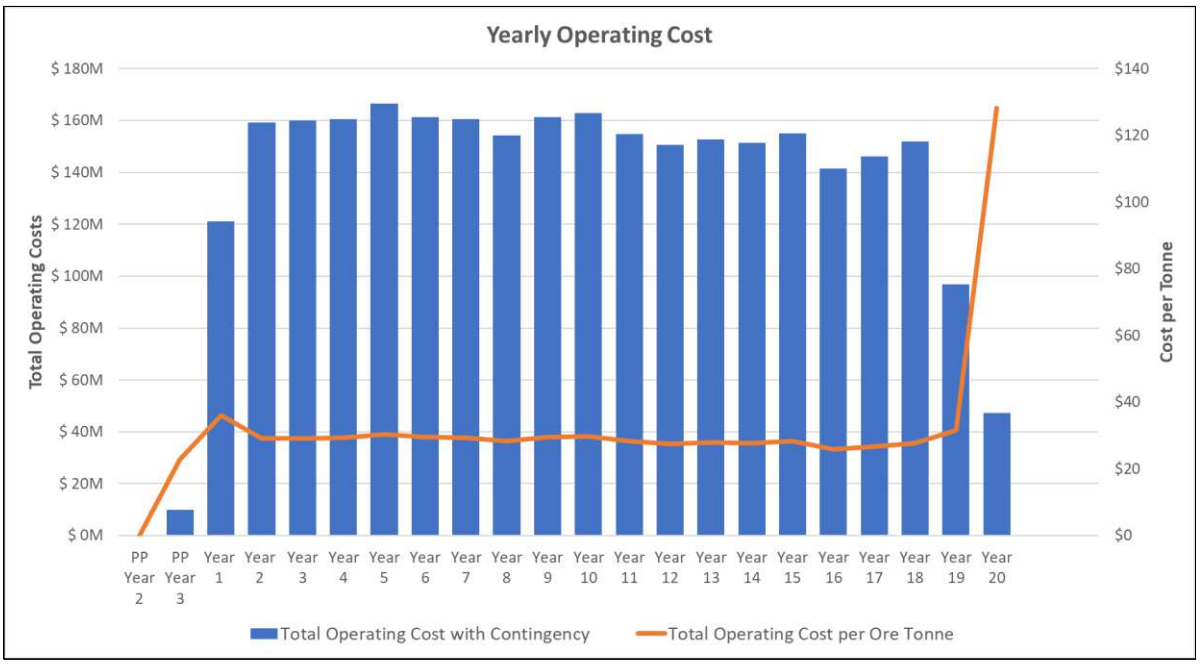
Table 21-6: Mining Operating Costs

LoM Tonnes Mined (000)		**107,134***
Category	**US$000**	**US$/t Mined**
Operating Development	481,021	4.49
Production (Drilling, Blasting, Loading, Hauling and Backfill)	1,139,843	10.64
Other mining costs (Services, Maintenance, Rehab and Definition Drilling)	458,564	4.28
Mine engineering and administration	592,085	5.54
Contingency (9.5%)	254,664	2.39
Total	**2,926,177**	**27.33**

Source: SRK, 2023

* LoM Tonnes mined includes 100,244 kt of process material, 4,942 kt of marginal material and 1,948 kt of waste.

The annual mining cost and unit costs are presented in Figure 21-1.



Source: SRK, 2023

Figure 21-1: Mining Unit Cost Profile

The basis for the mining operating cost estimates includes the following parameters:

- Diesel fuel cost of US$3.17/US gallon (delivered to site)
- Power cost of US$0.11/kWh, which is comprised of 70% Renewable power at US$0.121/kWh and 30% Grid power at US$0.071/kWh
- Average insitu density for waste of 2.5 t/m^3
- Average insitu density for ore of 2.7 t/m^3
- Estimated average tire lives of:
    - Wheel loaders: 2,000 operating hours
    - Haul trucks: 2,500 operating hours
    - Other major mining equipment: 1,000 – 2,000 operating hours

- 3% freight cost on mining operating and maintenance supplies
- 9.5% contingency is included in the mining operating cost estimates

Employee wages, bonus and wage burdens (20%) were based on information provided by IE. The costs for maintenance supplies and materials were based on estimates presented in the current InfoMine mining cost service publications. Other mining related costs were provided by IE.

Included in the mine operating cost estimate are the following:

- Labor (supervision, operations, maintenance, administrative, etc.)
- Maintenance (tools, spare parts)
- Consumables
- Lubricants and fuels
- Electricity
- Other recurring expenses needed for mine operations

SRK performed a benchmarking exercise comparing the mining cost build up to other mining operations using the longhole stoping method. Figure 21-2 shows the benchmarking results and Santa Cruz mining cost is roughly in-line with other operations of this size, however, SRK notes that there ae not too many underground operations of this size and the ones shown here are from Latin America which has quite different labor rates. Additional study work is recommended to further detail costs for the specific mining method presented here to confirm or modify the estimated costs.

Source: SRK, 2023

Figure 21-2: Longhole Stoping Mining Cost Benchmarking

21.2.2 Processing Operating Cost

The process plant operating costs are summarized by the categories of labor, electric power, liners (wear steel), grinding media, reagents, maintenance parts, and supplies and services, as presented in Table 21-7.

Table 21-7: Process Plant OPEX Summary by Category

Operating & Maintenance	Average Annual Cost (US$000)	$/t processed (US$)	LoM Operating Cost (US$000)	%
Labor	11,119	2.11	222,383	16.8%
Electrical Power	23,297	4.43	465,939	35.1%
Reagents	18,447	3.51	368,947	27.8%
Wear Parts (Liners & grinding media)	6,811	1.30	136,221	10.3%
Maintenance Parts	5,993	1.14	119,865	9.0%
Supplies and Services	628	0.12	12,557	0.9%
Total (US$)	**$66,296**	**$12.61**	**$1,325,912**	**100.0%**

Source: M3, 2023

TSF operating costs are included in the processing operating costs and include labor, power, reagents, and maintenance.

21.2.3 General and Administrative Operating Costs

General and Administrative (G&A) costs include management, accounting, human resources, environmental and safety compliance, laboratory, community relations, communications, insurance, legal, training, and other costs not associated with either mining or processing. The LoM G&A cost estimated for the Project are presented in Table 21-8.

Table 21-8: Life-of Mine General and Administration Cost Detail

	Average Annual Cost (US$000)	$/t Processed (US$)	LoM Operating Cost (US$000)
Labor (G&A + Laboratory)	8,192	1.56	163,843
Accounting (excluding labor)	152	0.03	3,036
Safety & Environmental (excluding labor)	121	0.02	2,429
Human Resources (excluding labor)	59	0.01	1,178
Security (excluding labor)	152	0.03	3,036
Office Operating Supplies and Postage	59	0.01	1,178
Maintenance Supplies	179	0.03	3,588
Propane	78	0.01	1,564
Communications	117	0.02	2,346
Small Vehicles	117	0.02	2,346
Real Property Tax	1,564	0.30	31,277
Legal & Audit	276	0.05	5,520
Consultants	586	0.11	11,729
Janitorial Services	96	0.02	1,913
Insurances	920	0.17	18,399
Subs, Dues, PR, and Donations	55	0.01	1,104
Travel, Lodging, and Meals	184	0.03	3,680
Recruiting/Relocation	184	0.03	3,680
PPE	83	0.02	1,656
Medical/First-aid	126	0.02	2,528
License Fees	120	0.02	2,392
Laboratory (excluding labor)	396	0.08	7,923
Total	**$13,817**	**$2.63**	**$276,341**

Source: M3, 2023

22 Economic Analysis

The PEA is preliminary in nature, that it 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 PEA will be realized. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

22.1 General Description

SRK prepared a cash flow model to evaluate the Santa Cruz Project on a real basis. This model was prepared on an annual basis from the start of operation through the exhaustion of mineable material. This section presents the main assumptions used in the cash flow model and the resulting indicative economics. The model results are presented in U.S. dollars (US$), unless otherwise stated.

This assessment is preliminary in nature and is based on mineral resources. Unlike mineral reserves, mineral resources do not have demonstrated economic viability. This assessment also includes inferred mineral resources that are considered too speculative geologically to have modifying factors applied to them that would enable them to be categorized as mineral reserves, and there is no certainty that this economic assessment will be realized.

The economic model is based on mine plans that were prepared as outlined in previous sections. Inferred resources account for approximately 21% of the tonnage contained within the mine plan. The economic results of the Project both without inferred resources and including inferred resources are presented within this section. However, the removal of the inferred material from the mine plan is a gross adjustment and no recalculation of fixed capital and operating costs has been completed for the scenario without inferred mineral resources.

Capital and operating costs were developed in previous sections and the build-ups and associated accuracy, and contingency can be found in those sections.

All results and technical and cost information are presented in this section on a 100% basis reflective of IE's ownership unless otherwise noted.

As with the capital and operating cost and pricing forecasts, the economic analysis is inherently a forward-looking exercise. These estimates rely upon a range of assumptions and forecasts that are subject to change depending upon macroeconomic conditions, operating strategy and new data collected through future study and operation.

22.1.1 Basic Model Parameters

Key criteria used in the analysis are presented throughout this section. Basic model parameters are summarized in Table 22-1.

Table 22-1: Basic Model Parameters

Description	Value
TEM Time Zero Start Date	January 1, 2024
Delay to construction (years)	2
Construction period (years)	3
Mine Life (years)	20
Discount Rate	8%

Source: SRK, IE, 2023

All costs incurred prior to the model start date are considered sunk costs. The potential impact of these costs on the economics of the Project is not evaluated. This includes contributions to depreciation and working capital as these items are assumed to have a zero balance at model start.

The model continues several years beyond the mine life to incorporate closure costs in the cash flow analysis.

The selected discount rate is 8% as directed by IE.

22.1.2 External Factors

Pricing

Modeled prices are based on the prices developed in the Market Study section of this report. The prices are modeled as US$3.80/lb of copper over the life of the Project.

All product streams produced by the operation are modeled as being subject to the price presented above.

Taxes and Royalties

As modeled the Project is subject to a combined state and federal income tax rate estimated at 24.87%. All expended capital is subject to depreciation. Two depreciation methods are utilized:

- Mine Development Costs – Certain costs associated with development of the underground mine are depreciated via an accelerated depreciation schedule that is presented in Table 22-2. Approximately 33% of the LoM capital is assumed to be subject to this accelerated depreciation schedule.

Table 22-2: Mine Development Cost Accelerated Depreciation Schedule

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
73%	6%	6%	6%	6%	3%

Source: SRK, 2023

- Other – All other capital depreciation occurs via straight line method over a 10 year period.

Property tax has been included as a line item in the model. This line item is approximately US$100 million over the life of the mine and has been included as a G&A cost.

The Project is modeled as being subject to Arizona Mineral Severance Tax payable at a rate of 2.5% on revenue minus production costs.

Taxable income is adjusted by depletion is calculated via cost depletion methodology and percentage depletion methodology appropriate to a copper operation and varies depending upon the year of operation.

The Project is subject to a number of royalties as outlined in previous sections. These royalties vary in rate and area of influence. The material subject to royalties was provided in the mining schedule and the appropriate rates were applied in the model. This approach results in a combined net smelter royalty rate of approximately 7.4% and totaling approximately US$742.5 million over the life of the Project for the scenario without Inferred material and approximately 7.1% and totaling approximately US$909.5 million over the life of the Project for the scenario that includes the Inferred material.

Working Capital

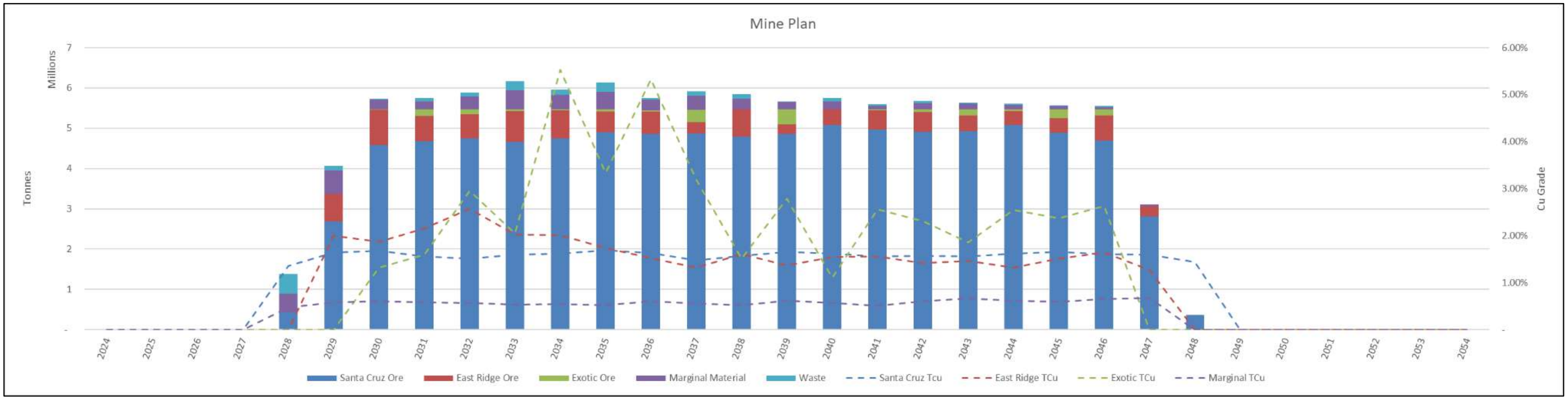
The assumptions used for working capital in this analysis are as follows:

- Accounts Receivable (A/R): 15 day delay
- Accounts Payable (A/P): 30 day delay
- Zero opening balance for A/R and A/P

22.1.3 Technical Factors

Mining Profile

The modeled mining profile was developed by SRK. The details of mining profile are presented previously in this report. No modifications were made to the profile for use in the economic model. The modeled profile is presented in Figure 22-1.



Source: SRK, 2023

Figure 22-1: Santa Cruz Mining Profile (Tabular data in Table 22-13)

A summary of the modeled LoM mining profile is presented in Table 22-3.

The PEA is preliminary in nature, that it 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 PEA will be realized. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

The economic model is based on mine plans that were prepared as outlined in previous sections. Inferred resources account for approximately 21% of the tonnage contained within the mine plan.

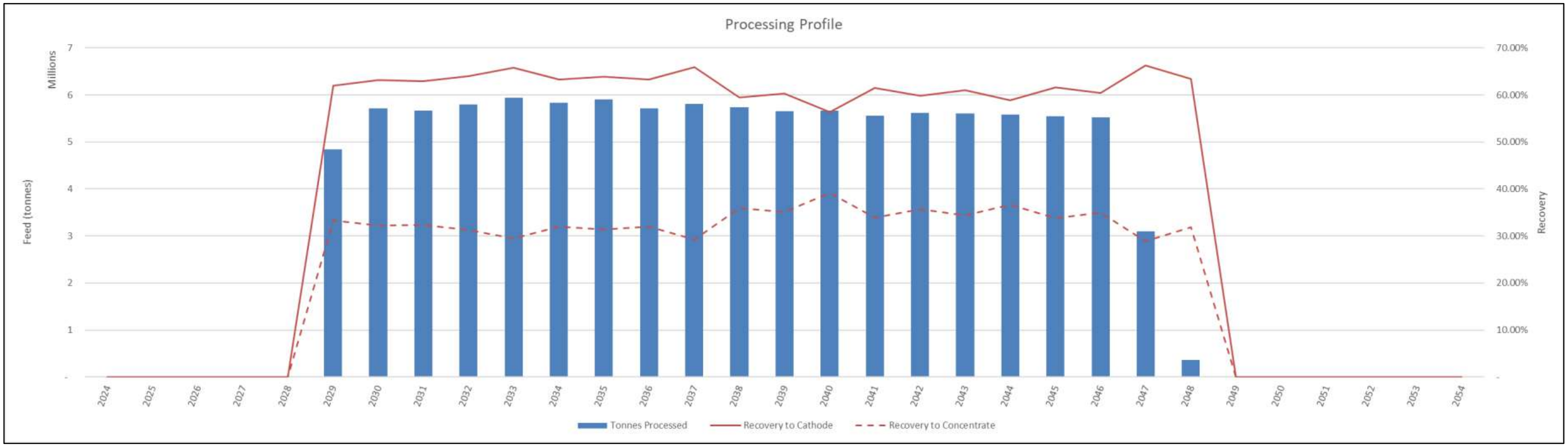
Table 22-3: Santa Cruz Mining Summary

LoM Mining	Unit	Value
Santa Cruz Ore Mined	tonnes	88,573,207
East Ridge Ore Mined	tonnes	9,799,031
Exotic Ore Mined	tonnes	1,871,821
Total Ore Mined	**tonnes**	**100,244,060**
Marginal Material Mined	tonnes	4,941,504
Total Grade Bearing Mined	**tonnes**	**105,185,563**
Waste Mined	tonnes	1,948,116
Total Material Mined	**tonnes**	**107,133,680**
Total Copper Grade		
Santa Cruz	%	1.60%
East Ridge	%	1.76%
Exotic	%	2.66%
Total	**%**	**1.63%**
Marginal	%	0.56%
Contained Metal (TCu)		
Santa Cruz	tonnes	1,414,388
East Ridge	tonnes	172,526
Exotic	tonnes	49,727
Total	**tonnes**	**1,636,641**
Marginal	tonnes	27,673

Source: SRK, 2023

Processing Profile

The processing profile is a result of the mining profile and the application of stockpile logic to the mining profile. The recovery profile was developed external to the model as outlined in the sections above. No modifications to the recovery profile were made in the model. The modeled profile is presented in Figure 22-2.



Source: SRK, 2023

Figure 22-2: Santa Cruz Processing Profile (Tabular data in Table 22-13)

A summary of the modeled LoM processing profile is presented in Table 22-4.

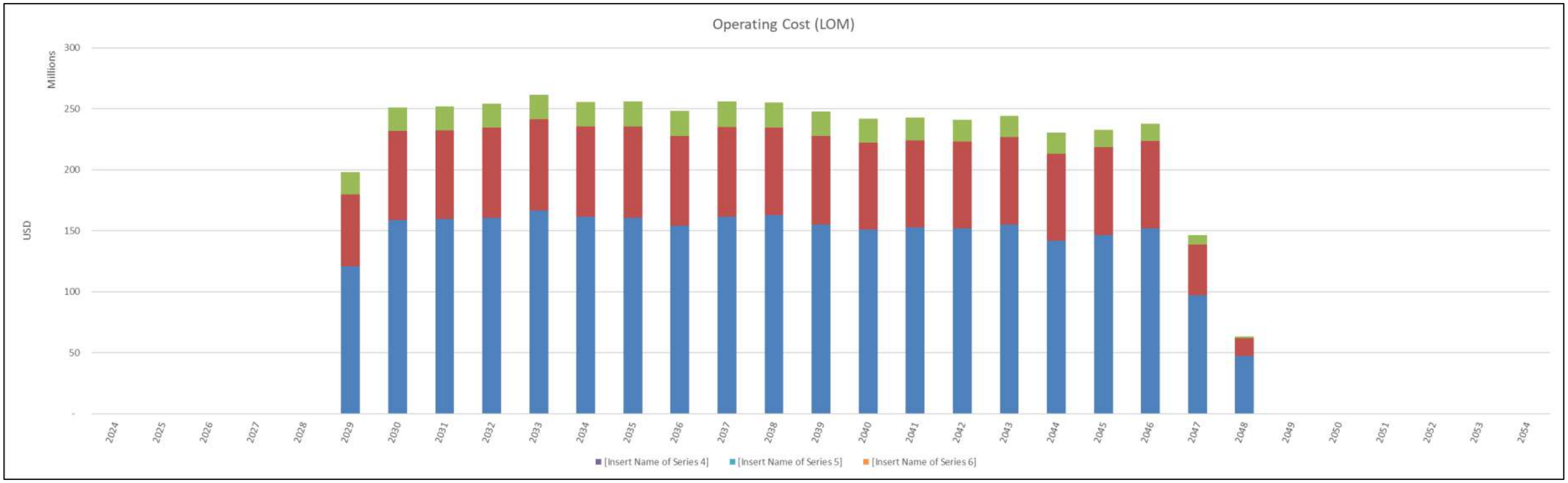
Table 22-4: Santa Cruz Processing Summary

LoM Processing	Unit	Value
Ore Feed	tonnes	105,185,563
Average Feed Grade	% TCu	1.58%
Contained Metal (Total)	tonnes	1,664,313
Cathode Recovery	%	62.03%
Concentrate Recovery	%	33.33%
Overall Copper Recovery	%	95.36%
Copper Recovered to Cathode	tonnes	1,032,325
Copper Recovered to Concentrate	tonnes	554,773
Total Recovered Copper	**tonnes**	**1,587,098**
Cathode Produced	tonnes	1,032,325
Concentrate Produced (48% Cu)	dmt	1,155,777

Source: SRK, 2023

Operating Costs

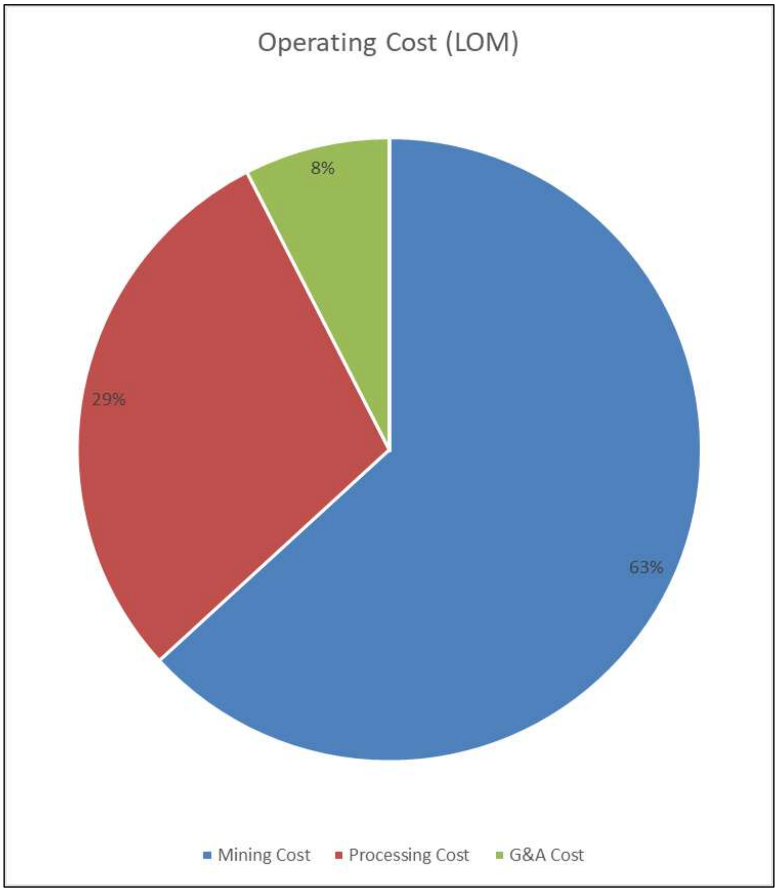
Operating costs modeled in US dollars and can be categorized as mining, processing and G&A costs. Within the model laboratory costs have been captured as processing costs and G&A costs include estimated property tax payments over the life of the operation. No contingency amounts have been added to the operating costs within the model. A summary of the operating costs over the life of the operation is presented in Figure 22-3.



Source: SRK, 2023

Figure 22-3: LoM Operating Cost Summary (Tabular Data in Table 22-14)

The contributions of the different operating cost segments over the life of the operation are presented in Figure 22-4.



Source: SRK, 2023

Figure 22-4: LoM Operating Cost Contributions

Mining

The mining cost profile was developed external to the model and incorporated into the model as fixed costs and variable costs. Variable costs are applied to material reclaimed from construction period stockpiles in ramp-up. Note that this table includes approximately US$ 10 million in preproduction mining costs that are capitalized in order to present a complete analysis of the cost per tonne mined. The result of this approach is presented in Table 22-5.

Table 22-5: Santa Cruz Mining Cost Summary

LoM Mining Costs	Unit	Value
Mining Cost	US$ million	2,928
	US$/t mined	27.33

Source: SRK, 2023

Processing

Processing costs were developed external to the model and incorporated into the model. The result of this approach is presented in Table 22-6.

Table 22-6: Santa Cruz Processing Cost Summary

LoM Processing Costs	Unit	Value
Processing Cost	US$ million	1,351
	US$/t processed	12.84

Source: SRK, 2023

G&A

G&A cost profiles were developed external to the model and incorporated into the model as fixed costs. In addition to the G&A cost developed in earlier sections, property tax for the operation is included in the G&A cost. The fixed costs presented Table 22-7 and the result is presented in Table 22-8.

Table 22-7: G&A Fixed Costs

G&A LoM	Unit	Value
G&A	US$ million	251.5
Property Tax	US$ million	96.5
Total	US$ million	348.1

Source: SRK, 2023

Table 22-8: Santa Cruz G&A Cost Summary

LoM SG&A Costs	Unit	Value
G&A Costs	US$ million	348
	US$/t processed	3.31

Source: SRK, 2023

Selling Cost

Selling costs consist of the transport costs associated with moving the operation's product to the selling point. And the treatment and refining charges incurred. These costs are presented on a 100% basis in Table 22-9.

Table 22-9: Transport Costs and TC/RCs

Item	Unit	Value
Payability	%	96.5%
Treatment Cost	US$/t concentrate	65
Refining Cost	US$/lb Cu	0.065
Transport Costs	US$/t concentrate	90

Source: SRK, 2023

No transport cost is applied to the cathode product as it is assumed to be sold at mine gate as indicated by IE.

Capital Costs

Initial capital estimates and expenditure schedule were developed external to the model as outlined in the previous sections. No additional contingency has been included in the model. Table 22-10 outlines the initial capital expenditure.

Table 22-10: Modeled Initial Capital

Initial Capital Cost	Unit	Value
Underground Capital Development Cost	US$ million	167.0
Underground Equipment Purchase	US$ million	240.4
Underground Rebuilds	US$ million	0.8
Underground Services	US$ million	18.0
Underground Owner Cost	US$ million	10.9
Underground Related Contingency Costs	US$ million	34.8
Underground Capitalized Opex	US$ million	35.6
Mill And Surface Capital	US$ million	563.7
TSF	US$ million	75.1
Total	**US$ million**	**1,146.3**

Source: SRK, 2023

Sustaining capital is modeled on an annual basis and is used in the model as developed in previous sections. No contingency amounts have been added to the sustaining capital within the model. General closure costs are modeled as sustaining capital and are captured as a one-time payment the year following cessation of operations. For the tailings impoundment, closure costs run several years past the end of the mine life, this cost has been captured by extending the model life beyond the end of the mine life.

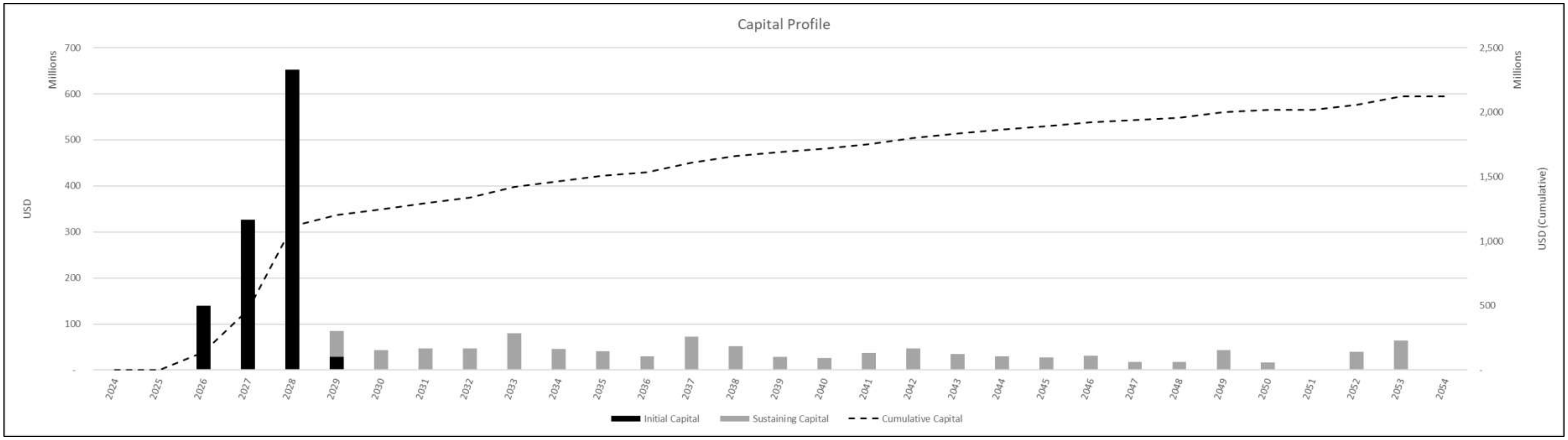
Total sustaining capital is presented in Table 22-11.

Table 22-11: Modeled Sustaining Capital

Sustaining Capital	Unit	Value
Underground Mining	US$ million	462.8
Tailings	US$ million	486.6
Closure	US$ million	27.0
Total	**US$ million**	**976.4**

Source: SRK, 2023

The modeled capital profile is presented in Figure 22-5.



Source: SRK, 2023

Figure 22-5: Santa Cruz Capital Profile (Tabular data in Table 22-13)

22.2 Results

The PEA is preliminary in nature, that it 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 PEA will be realized. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

The economic analysis metrics are prepared on annual after-tax basis in US$. The results of the analysis are presented in Table 22-12. The results indicate that, at a copper price of US$3.80/lb, the after tax NPV @ 8% is US$1.3 billion, the after tax IRR is 23% and the payback period is 7 years from the start of construction.

As the stage of study for the Santa Cruz Project is at a PEA level, no reserves are estimated for use in this analysis. The economic evaluation was completed using resource material that includes material in the Inferred category.

This estimated cash flow is inherently forward-looking and dependent upon numerous assumptions and forecasts, such as macroeconomic conditions, mine plans and operating strategy, that are subject to change.

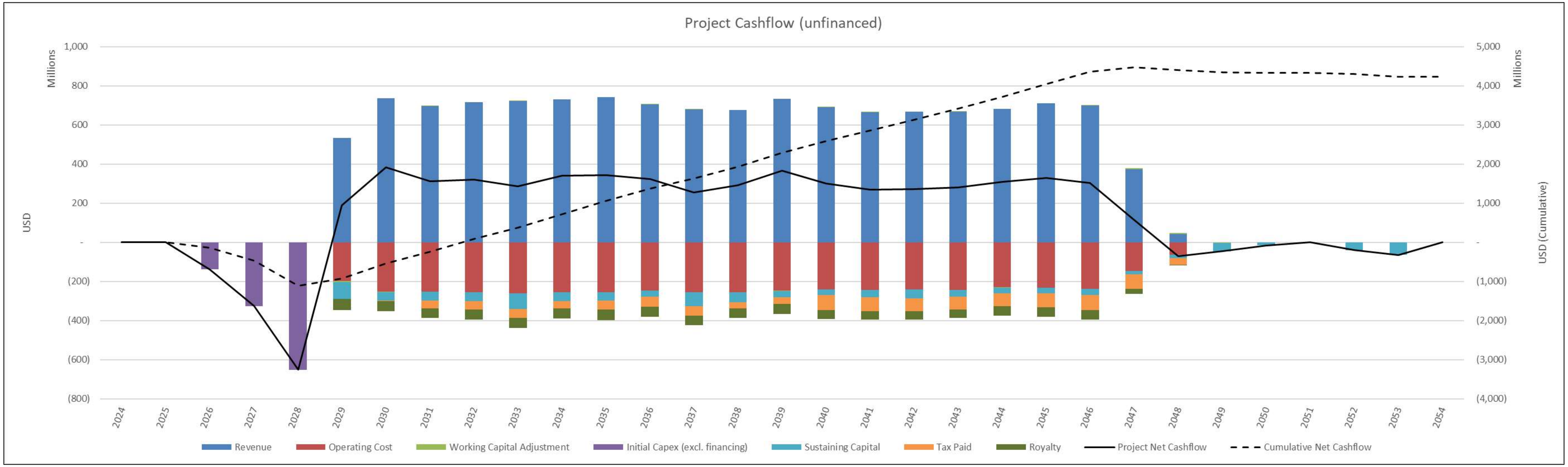
Table 22-12: Indicative Economic Results

LoM Cash Flow (Unfinanced)	Units	Value
Total Revenue	**US$ million**	12,865.9
Total Opex	**US$ million**	(4,617.0)
Operating Margin	US$ million	8,248.9
Operating Margin Ratio	%	64%
Taxes Paid	US$ million	(984.8)
Free Cash Flow	US$ million	5,350.1
Before Tax		
Free Cash Flow	US$ million	5,216.7
NPV at 8%	US$ million	1,642.5
IRR	%	25%
After Tax		
Free Cash Flow	US$ million	4,231.9
NPV at 8%	US$ million	1,316.6
IRR	%	23%
Payback	years	7

Source: SRK, 2023

The life of mine C1 and C3 cost are estimated at US$1.36/lb Cu and US$2.84/lb Cu, respectively.

The economic results and back-up chart information for charts within this section are presented on an annual basis in Figure 22-6, and Table 22-13.



Source: SRK, 2023

Figure 22-6: Annual Cash Flow Summary with Inferred Material (Tabular data in Table 22-13)

Table 22-13: Economic Results - Tabular Data

Report Table			**r**											
Period Start				**1-Jan-24**	**1-Jan-25**	**1-Jan-26**	**1-Jan-27**	**1-Jan-28**	**1-Jan-29**	**1-Jan-30**	**1-Jan-31**	**1-Jan-32**	**1-Jan-33**	**1-Jan-34**
Period End				**31-Dec-24**	**31-Dec-25**	**31-Dec-26**	**31-Dec-27**	**31-Dec-28**	**31-Dec-29**	**31-Dec-30**	**31-Dec-31**	**31-Dec-32**	**31-Dec-33**	**31-Dec-34**
Delay				1	1	-	-	-	-	-	-	-	-	-
Construction				-	-	1	1	1	-	-	-	-	-	-
Operations				-	-	-	-	-	1	1	1	1	1	1
	Counters													
	Calendar Year	Num#		2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
	Days in Period	Num#		366	365	365	365	366	365	365	365	366	365	365
	Delay Year	Num#		1	2	-	-	-	-	-	-	-	-	-
	Construction Year	Num#		-	-	1	2	3	-	-	-	-	-	-
	Operations Year	Num#		-	-	-	-	-	1	2	3	4	5	6
	Project Cash Flow (unfinanced)													
	Revenue	US$	12,865,918,857	-	-	-	-	-	534,266,541	734,977,306	696,950,686	716,270,272	722,943,893	730,087,939
	Operating Cost	US$	(4,616,980,576)	-	-	-	-	-	(197,827,037)	(252,835,578)	(251,744,034)	(254,203,423)	(261,548,146)	(255,485,142)
	Royalty	US$	(909,496,543)	-	-	-	-	-	(57,187,409)	(51,539,446)	(49,247,823)	(50,312,425)	(50,782,156)	(50,993,865)
	Working Capital Adjustment	US$	-	-	-	-	-	-	(5,696,403)	(3,727,138)	1,473,022	(568,474)	306,078	(791,920)
	Initial Capex (excl. financing)	US$	(1,118,145,146)	-	-	(139,332,319)	(326,387,722)	(652,425,106)	-	-	-	-	-	-
	Sustaining Capital	US$	(1,004,582,085)	-	-	-	-	-	(85,357,740)	(42,835,855)	(46,395,396)	(47,203,914)	(80,112,842)	(45,623,051)
	Tax Paid	US$	(984,805,100)	-	-	-	-	-	-	(691,787)	(40,160,510)	(43,250,679)	(45,374,529)	(37,312,612)
	Project Net Cash Flow	US$	4,231,909,406	-	-	(139,332,319)	(326,387,722)	(652,425,106)	188,197,953	383,347,502	310,875,947	320,731,357	285,432,297	339,881,350
	Cumulative Net Cash Flow	US$		-	-	(139,332,319)	(465,720,040)	(1,118,145,146)	(929,947,193)	(546,599,691)	(235,723,745)	85,007,612	370,439,909	710,321,259
	Operating Cost (LoM)													
	Mining Cost	US$	2,916,396,693	-	-	-	-	-	120,839,344	158,914,078	159,855,316	160,478,820	166,324,004	161,247,363
	Processing Cost	US$	1,350,709,303	-	-	-	-	-	59,072,476	72,896,025	72,369,144	73,908,664	75,097,022	74,214,719
	G&A Cost	US$	348,086,428	-	-	-	-	-	17,915,217	19,237,322	19,519,574	19,815,938	20,127,121	20,023,061
	Mine Plan													
	Santa Cruz Ore	tonnes	88,573,207	-	-	-	-	430,215	2,685,405	4,579,715	4,677,475	4,744,123	4,666,098	4,753,313
	East Ridge Ore	tonnes	9,799,031	-	-	-	-	-	680,703	871,652	623,423	595,812	769,043	686,299
	Exotic Ore	tonnes	1,871,821	-	-	-	-	-	-	19,207	173,564	134,528	39,337	34,861
	Marginal Material	tonnes	4,941,504	-	-	-	-	463,861	584,019	239,983	195,024	320,944	471,607	359,088
	Waste	tonnes	1,948,116	-	-	-	-	488,306	120,352	22,287	84,759	97,981	214,948	126,644
	Santa Cruz Tcu	%	1.60%	-	-	-	-	1.35%	1.64%	1.68%	1.56%	1.51%	1.59%	1.61%
	East Ridge TCu	%	1.76%	-	-	-	-	-	2.00%	1.87%	2.15%	2.57%	2.03%	2.01%
	Exotic TCu	%	2.66%	-	-	-	-	-	-	1.32%	1.59%	2.96%	2.04%	5.53%
	Marginal TCu	%	0.56%	-	-	-	-	0.47%	0.58%	0.60%	0.58%	0.57%	0.53%	0.54%
	Production Profile													
	Equivalent Copper Sold	lbs	3,385,768,120	-	-	-	-	-	140,596,458	193,415,081	183,408,075	188,492,177	190,248,393	192,128,405
	C1 Cost	US$/lb		-	-	-	-	-	1.41	1.31	1.37	1.35	1.37	1.33
	C2 Cost	US$/lb		-	-	-	-	-	3.74	2.54	2.67	2.65	2.82	2.62
	C3 Cost	US$/lb		-	-	-	-	-	4.16	2.82	2.96	2.94	3.11	2.91
	Capital Profile													
	Initial Capital	US$	1,146,331,004	-	-	139,332,319	326,387,722	652,425,106	28,185,858	-	-	-	-	-
	Sustaining Capital	US$	976,396,228	-	-	-	-	-	57,171,882	42,835,855	46,395,396	47,203,914	80,112,842	45,623,051
	Cumulative Capital	US$		-	-	139,332,319	465,720,040	1,118,145,146	1,203,502,886	1,246,338,741	1,292,734,136	1,339,938,050	1,420,050,892	1,465,673,943
	Processing Profile													
	Tonnes Processed		105,185,563	-	-	-	-	-	4,844,204	5,710,556	5,669,486	5,795,408	5,946,084	5,833,561
	Recovery to Cathode			-	-	-	-	-	62.02%	63.13%	62.92%	63.98%	65.77%	63.35%
	Recovery to Concentrate			-	-	-	-	-	33.34%	32.18%	32.40%	31.30%	29.43%	31.96%

Report Table														
Period Start				**1-Jan-35**	**1-Jan-36**	**1-Jan-37**	**1-Jan-38**	**1-Jan-39**	**1-Jan-40**	**1-Jan-41**	**1-Jan-42**	**1-Jan-43**	**1-Jan-44**	**1-Jan-45**
Period End				**31-Dec-35**	**31-Dec-36**	**31-Dec-37**	**31-Dec-38**	**31-Dec-39**	**31-Dec-40**	**31-Dec-41**	**31-Dec-42**	**31-Dec-43**	**31-Dec-44**	**31-Dec-45**
Delay				-	-	-	-	-	-	-	-	-	-	-
Construction				-	-	-	-	-	-	-	-	-	-	-
Operations				1	1	1	1	1	1	1	1	1	1	1
	Counters													
	Calendar Year	Num#		2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
	Days in Period	Num#		365	366	365	365	365	366	365	365	365	366	365
	Delay Year	Num#		-	-	-	-	-	-	-	-	-	-	-
	Construction Year	Num#		-	-	-	-	-	-	-	-	-	-	-
	Operations Year	Num#		7	8	9	10	11	12	13	14	15	16	17
	Project Cash Flow (unfinanced)													
	Revenue	US$	12,865,918,857	740,663,382	703,648,089	678,173,920	677,128,331	733,936,249	690,917,170	663,772,684	667,930,989	667,664,444	683,054,334	711,473,628
	Operating Cost	US$	(4,616,980,576)	(255,846,964)	(248,146,838)	(255,957,606)	(255,144,278)	(247,821,754)	(241,773,603)	(242,884,596)	(241,104,629)	(244,310,441)	(230,343,515)	(232,584,416)
	Royalty	US$	(909,496,543)	(52,344,536)	(50,162,519)	(49,367,714)	(46,362,946)	(50,526,441)	(46,400,428)	(43,906,667)	(43,752,245)	(44,617,789)	(47,063,297)	(48,852,204)
	Working Capital Adjustment	US$	-	(404,868)	911,572	1,665,582	(23,879)	(2,936,423)	1,294,083	1,183,557	(317,188)	274,445	(1,755,459)	(1,008,701)
	Initial Capex (excl. financing)	US$	(1,118,145,146)	-	-	-	-	-	-	-	-	-	-	-
	Sustaining Capital	US$	(1,004,582,085)	(40,771,637)	(29,956,968)	(72,108,195)	(52,113,768)	(29,057,490)	(26,548,305)	(37,378,840)	(46,404,322)	(34,853,513)	(29,923,933)	(26,951,719)
	Tax Paid	US$	(984,805,100)	(47,653,073)	(51,876,561)	(47,799,002)	(32,022,225)	(35,992,391)	(77,382,929)	(71,849,697)	(64,231,583)	(64,215,330)	(65,578,545)	(73,064,449)
	Project Net Cashflow	US$	4,231,909,406	343,642,304	324,416,774	254,606,986	291,461,234	367,601,749	300,105,988	268,936,440	272,121,023	279,941,817	308,389,583	329,012,139
	Cumulative Net Cashflow	US$		1,053,963,563	1,378,380,337	1,632,987,323	1,924,448,557	2,292,050,307	2,592,156,294	2,861,092,735	3,133,213,757	3,413,155,574	3,721,545,157	4,050,557,296
	Operating Cost (LoM)													
	Mining Cost	US$	2,916,396,693	160,650,830	154,348,776	161,336,124	162,707,217	154,944,322	151,023,563	152,854,950	151,686,962	155,079,474	141,834,445	146,245,760
	Processing Cost	US$	1,350,709,303	74,851,534	73,115,847	73,584,771	71,903,773	72,828,492	71,218,915	71,292,444	71,295,306	71,494,389	71,219,633	72,216,997
	G&A Cost	US$	348,086,428	20,344,599	20,682,215	21,036,711	20,533,288	20,048,940	19,531,125	18,737,202	18,122,361	17,736,578	17,289,437	14,121,659
	Mine Plan													
	Santa Cruz Ore	tonnes	88,573,207	4,900,033	4,864,180	4,870,245	4,790,891	4,862,207	5,079,352	4,976,008	4,916,815	4,933,324	5,082,887	4,888,669
	East Ridge Ore	tonnes	9,799,031	514,572	546,294	281,730	674,042	233,284	391,141	465,817	489,403	390,410	351,231	352,061
	Exotic Ore	tonnes	1,871,821	59,858	28,232	310,199	9,533	377,944	3,974	32,667	68,247	150,790	40,439	233,853
	Marginal Material	tonnes	4,941,504	431,148	268,934	343,030	258,734	182,247	193,733	84,554	145,400	134,273	106,709	74,534
	Waste	tonnes	1,948,116	235,553	43,970	106,399	113,504	13,290	77,151	40,989	64,660	27,784	22,370	21,496
	Santa Cruz Tcu	%	1.60%	1.68%	1.63%	1.48%	1.57%	1.65%	1.62%	1.55%	1.57%	1.56%	1.62%	1.65%
	East Ridge TCu	%	1.76%	1.74%	1.53%	1.32%	1.61%	1.37%	1.54%	1.56%	1.42%	1.46%	1.32%	1.51%
	Exotic TCu	%	2.66%	3.34%	5.33%	3.20%	1.51%	2.79%	1.10%	2.56%	2.31%	1.86%	2.55%	2.37%
	Marginal TCu	%	0.56%	0.53%	0.61%	0.55%	0.52%	0.62%	0.57%	0.51%	0.61%	0.67%	0.61%	0.60%
	Production Profile													
	Equivalent Copper Sold	lbs	3,385,768,120	194,911,416	185,170,550	178,466,821	178,191,666	193,141,118	181,820,308	174,677,022	175,771,313	175,701,169	179,751,140	187,229,902
	C1 Cost	US$/lb		1.31	1.34	1.43	1.43	1.28	1.33	1.39	1.37	1.39	1.28	1.24
	C2 Cost	US$/lb		2.55	2.58	2.88	2.81	2.04	2.07	2.18	2.19	2.16	2.02	1.97
	C3 Cost	US$/lb		2.84	2.87	3.17	3.09	2.33	2.36	2.46	2.47	2.44	2.31	2.26
	Capital Profile													
	Initial Capital	US$	1,146,331,004	-	-	-	-	-	-	-	-	-	-	-
	Sustaining Capital	US$	976,396,228	40,771,637	29,956,968	72,108,195	52,113,768	29,057,490	26,548,305	37,378,840	46,404,322	34,853,513	29,923,933	26,951,719
	Cumulative Capital	US$		1,506,445,580	1,536,402,548	1,608,510,743	1,660,624,511	1,689,682,001	1,716,230,306	1,753,609,146	1,800,013,468	1,834,866,981	1,864,790,915	1,891,742,634
	Processing Profile													
	Tonnes Processed		105,185,563	5,905,612	5,707,639	5,805,204	5,733,200	5,655,682	5,668,200	5,559,045	5,619,864	5,608,798	5,581,265	5,549,117
	Recovery to Cathode			63.83%	63.27%	65.96%	59.52%	60.29%	56.41%	61.46%	59.80%	61.02%	58.86%	61.58%
	Recovery to Concentrate			31.46%	32.04%	29.23%	35.95%	35.15%	39.19%	33.93%	35.66%	34.38%	36.63%	33.80%

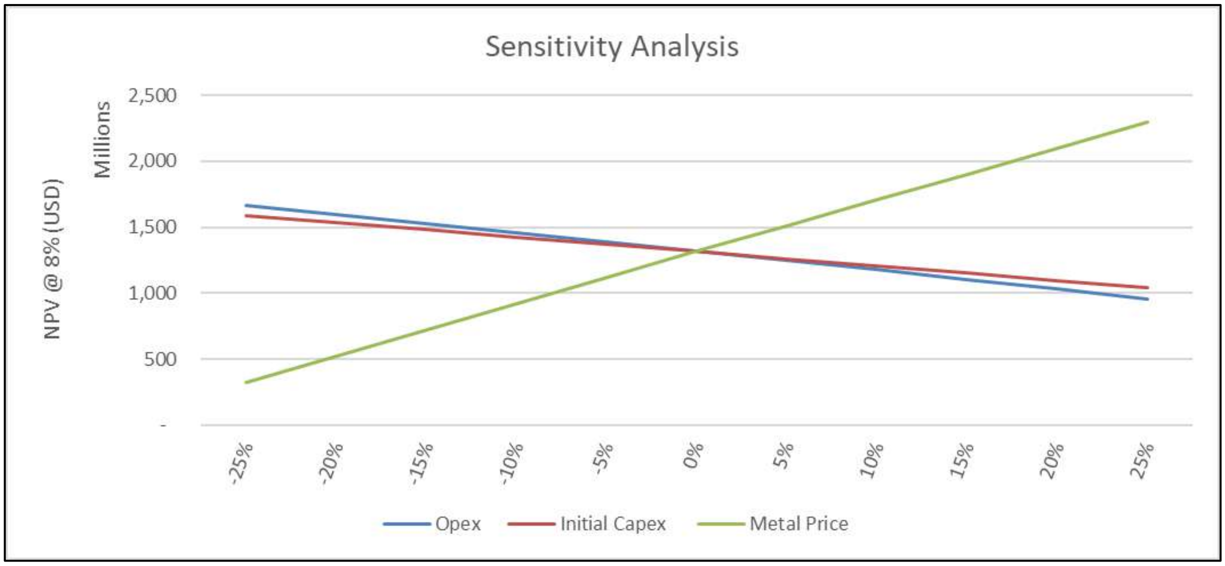
Report Table														
Period Start				**1-Jan-46**	**1-Jan-47**	**1-Jan-48**	**1-Jan-49**	**1-Jan-50**	**1-Jan-51**	**1-Jan-52**	**1-Jan-53**	**1-Jan-54**	**1-Jan-55**	**1-Jan-56**
Period End				**31-Dec-46**	**31-Dec-47**	**31-Dec-48**	**31-Dec-49**	**31-Dec-50**	**31-Dec-51**	**31-Dec-52**	**31-Dec-53**	**31-Dec-54**	**31-Dec-55**	**31-Dec-56**
Delay				-	-	-	-	-	-	-	-	-	-	-
Construction				-	-	-	-	-	-	-	-	-	-	-
Operations				1	1	1	1	1	1	1	1	-	-	-
	Counters													
	Calendar Year	Num#		2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
	Days in Period	Num#		365	365	366	365	365	365	366	365	365	365	366
	Delay Year	Num#		-	-	-	-	-	-	-	-	-	-	-
	Construction Year	Num#		-	-	-	-	-	-	-	-	-	-	-
	Operations Year	Num#		18	19	20	21	22	23	24	25	-	-	-
	Project Cash Flow (unfinanced)													
	Revenue	US$	12,865,918,857	697,888,993	373,321,896	40,848,113	-	-	-	-	-	-	-	-
	Operating Cost	US$	(4,616,980,576)	(237,565,964)	(146,369,106)	(63,483,509)	-	-	-	-	-	-	-	-
	Royalty	US$	(909,496,543)	(47,981,240)	(25,063,078)	(3,032,314)	-	-	-	-	-	-	-	-
	Working Capital Adjustment	US$	-	967,715	5,842,742	6,841,122	(3,529,463)	-	-	-	-	-	-	-
	Initial Capex (excl. financing)	US$	(1,118,145,146)	-	-	-	-	-	-	-	-	-	-	-
	Sustaining Capital	US$	(1,004,582,085)	(31,445,734)	(17,786,713)	(17,786,713)	(43,169,739)	(16,169,739)	-	(40,031,207)	(64,594,754)	-	-	-
	Tax Paid	US$	(984,805,100)	(78,888,417)	(73,941,723)	(33,519,058)	-	-	-	-	-	-	-	-
	Project Net Cash Flow	US$	4,231,909,406	302,975,353	116,004,019	(70,132,360)	(46,699,202)	(16,169,739)	-	(40,031,207)	(64,594,754)	-	-	-
	Cumulative Net Cash Flow	US$		4,353,532,649	4,469,536,668	4,399,404,308	4,352,705,106	4,336,535,367	4,336,535,367	4,296,504,160	4,231,909,406	4,231,909,406	4,231,909,406	4,231,909,406
	Operating Cost (LoM)													
	Mining Cost	US$	2,916,396,693	151,836,766	97,041,909	47,146,670	-	-	-	-	-	-	-	-
	Processing Cost	US$	1,350,709,303	71,586,110	41,654,733	14,888,310	-	-	-	-	-	-	-	-
	G&A Cost	US$	348,086,428	14,143,087	7,672,464	1,448,530	-	-	-	-	-	-	-	-
	Mine Plan													
	Santa Cruz Ore	tonnes	88,573,207	4,687,544	2,816,684	368,024	-	-	-	-	-	-	-	-
	East Ridge Ore	tonnes	9,799,031	632,462	249,654	-	-	-	-	-	-	-	-	-
	Exotic Ore	tonnes	1,871,821	154,588	-	-	-	-	-	-	-	-	-	-
	Marginal Material	tonnes	4,941,504	46,623	37,060	-	-	-	-	-	-	-	-	-
	Waste	tonnes	1,948,116	25,675	-	-	-	-	-	-	-	-	-	-
	Santa Cruz Tcu	%	1.60%	1.61%	1.59%	1.43%	-	-	-	-	-	-	-	-
	East Ridge TCu	%	1.76%	1.65%	1.27%	-	-	-	-	-	-	-	-	-
	Exotic TCu	%	2.66%	2.63%	-	-	-	-	-	-	-	-	-	-
	Marginal TCu	%	0.56%	0.65%	0.68%	-	-	-	-	-	-	-	-	-
	Production Profile													
	Equivalent Copper Sold	lbs	3,385,768,120	183,654,998	98,242,604	10,749,503	-	-	-	-	-	-	-	-
	C1 Cost	US$/lb		1.29	1.49	5.91	-	-	-	-	-	-	-	-
	C2 Cost	US$/lb		2.04	2.28	8.13	-	-	-	-	-	-	-	-
	C3 Cost	US$/lb		2.33	2.56	8.41	-	-	-	-	-	-	-	-
	Capital Profile													
	Initial Capital	US$	1,146,331,004	-	-	-	-	-	-	-	-	-	-	-
	Sustaining Capital	US$	976,396,228	31,445,734	17,786,713	17,786,713	43,169,739	16,169,739	-	40,031,207	64,594,754	-	-	-
	Cumulative Capital	US$		1,923,188,368	1,940,975,081	1,958,761,793	2,001,931,532	2,018,101,271	2,018,101,271	2,058,132,478	2,122,727,232	2,122,727,232	2,122,727,232	2,122,727,232
	Processing Profile													
	Tonnes Processed		105,185,563	5,521,217	3,103,397	368,024	-	-	-	-	-	-	-	-
	Recovery to Cathode			60.46%	66.25%	63.40%	-	-	-	-	-	-	-	-
	Recovery to Concentrate			34.96%	28.93%	31.90%	-	-	-	-	-	-	-	-

Source: SRK, 2023

22.3 Sensitivity Analysis

SRK performed a sensitivity analysis to determine the relative sensitivity of the Project's NPV to a operating costs, initial capital cost and metal prices (Figure 22-7). This is accomplished by flexing each parameter upwards and downwards by increments of 5%. Within the constraints of this analysis, the Project appears to be most sensitive to metal prices followed by initial capital cost.

SRK cautions that this sensitivity analysis is for information only and notes that these parameters were flexed in isolation within the model and are assumed to be uncorrelated with one another which may not be reflective of reality.



Source: SRK, 2023

Figure 22-7: NPV Sensitivity Analysis

23 Adjacent Properties

23.1 Cactus Project

The Cactus project in Pinal County, Arizona, is owned by the Arizona Sonoran Copper Company (ASCU, https://arizonasonoran.com/). The project includes the past producing Sacaton open pit mine and stockpile and further land holdings. The Cactus project is located approximately 9.4 km northeast of IE's Santa Cruz Project.

The QP has been unable to verify the geology and mineralization on the adjacent Cactus project. The Cactus project is not necessarily indicative of the mineralization of the Santa Cruz Project.

24 Other Relevant Data and Information

There are no additional relevant data or information that would be material to the mineral resource of mine plan for the Santa Cruz Project, beyond what is discussed in the other sections of this report.

25 Interpretation and Conclusions

25.1 Geology

The Santa Cruz Project is comprised of several areas along a southwest-northeast corridor representing portions of a large porphyry copper system separated by extensional Basin and Range normal faults. Each area has experienced variable periods of erosion, supergene enrichment, fault displacement, and tilting into their present positions.

The bedrock geology at the Santa Cruz Project is dominated by Oracle Granite with lesser Proterozoic Diabase intrusions and Laramide porphyry intrusions. There are three main types of copper mineralization found within the Santa Cruz Project: primary hypogene sulfide mineralization which consists of primary cu-sulfide minerals; secondary supergene sulfide mineralization which consists of dominantly chalcocite; and secondary supergene oxide mineralization which consists of mainly atacamite and chrysocolla. Modeling of the Santa Cruz Deposit was divided into four main Cu domains which represent different subcategories of Cu mineralization: the Exotic Domain, Oxide Domain, Chalcocite Enriched Domain, and Primary Domain. The Santa Cruz Deposit contains all 4 domains, whereas the Texaco Deposit contains no exotic copper, and the East Ridge Deposit only consists of the Oxide Domain (primarily acid soluble Cu).

The Santa Cruz Deposit Mineral Resource Estimate was created from the main drillhole database containing 116,388 m of diamond drilling in 129 drillholes, while the Texaco MRE was created from 23 drillholes totaling 21,289 m, and the East Ridge MRE comprises of 18 holes totaling 15,448 m. All drillholes were drilled between 1964 and 2022. Historic diamond drillhole samples were analyzed for total Cu and acid soluble Cu using AAS. Later samples were re-analyzed for cyanide soluble Cu (AAS) and molybdenum (ICP). The Company currently analyzes all samples for total Cu, acid soluble Cu, cyanide soluble Cu, and molybdenum. Due to the re-analyses to determine cyanide soluble Cu within historic samples, there are instances where cyanide soluble Cu is greater than total Cu. It has been determined that the historic cyanide soluble assays are valid as they align with recent assays in 2022 drillholes.

Geological domains were developed within the Santa Cruz Project based upon geographical, lithological, and mineralogical characteristics, along with incorporating both regional and local structural information; local D2 fault structures separate the mineralization at the adjacent Santa Cruz and Texaco Deposits. The Santa Cruz, Texaco, and East Ridge Deposits were divided into four main geological domains based upon their type of Cu speciation, specifically acid soluble (Oxide Domain), cyanide soluble (Chalcocite Enriched Domain), primary Cu sulfide (Primary Domain), and exotic Cu (Cu oxides in overlying Tertiary sediments).

Once a geologic interpretation was established, wireframes were created. When not cut-off by drilling, the wireframes terminate at either the contact of the Cu-oxide boundary layer, the Tertiary sediments/Oracle Granite contact, or the D2 fault. There is an overlap of the Chalcocite Enriched Domain with both the Oxide Domain in the weathered supergene and with the Primary Domain in the primary hypogene mineralization. Otherwise, no wireframe overlapping exists within a given grade domain. Implicit modeling was completed in Leapfrog Geo™ which produced reasonable mineral domains that appropriately represent the known controls on grade mineralization.

A block model for each deposit was created that incorporated lithological, structural, and mineralization trends. Each block model was fully validated.

Nordmin feels that the interpreted geological and mineralization domains produced accurately represents the deposit style of the Santa Cruz, Texaco, and East Ridge Deposits.

25.2 Exploration, Drilling, and Analytical Data Collection in Support of Mineral Resource Estimation

The exploration programs completed by IE, and previous operators are appropriate for the deposit style. The programs delineated the Santa Cruz, Texaco, and East Ridge Deposits. Diamond drilling indicates the potential to further define and potentially expand on known exploration areas.

The quantity and the quality of lithological, collar, and downhole survey data collected in the various exploration programs by various operators are sufficient to support the Mineral Resource Estimate. The sampling is representative of total Cu, acid soluble Cu, cyanide soluble Cu, and molybdenum data in the Santa Cruz, Texaco, and East Ridge Deposits reflecting areas of higher and lower grades, which has been confirmed by 2021 and 2022 diamond drillhole twinning of historic, high-grade drillholes. The twin-hole analysis compared the collar locations, downhole surveys, logging (lithology, alteration, and mineralization), sampling, and assaying between the two groups to determine if the historical holes had valid information and would not be introducing a bias within the geological model or Resource Estimate. Nordmin was able to match most of the intervals for each of the pairs and plotted the grades for Cu, Cu-SEQ, and Mo. In Nordmin's opinion, for most of the pairs, the assay results compared very well; the high-grade (HG) and low-grade (LG) zones were similar, and the grades tended to cluster in the same local ranges. In Nordmin's opinion, the twinning has provided a reasonably consistent verification of the earlier Hanna-Getty and ASARCO drill results across all deposits, particularly considering the differences in the assay, survey methods, and QA/QC protocols. Nordmin considered the QA/QC protocols in place for the Project to be acceptable and in line with standard industry practice. Based on the data validation and results of standard, blank, and duplicate analyses, Nordmin is of the opinion that the assay and SG databases are of sufficient quality for the creation of a Mineral Resource Estimate for the Project.

Nordmin is not aware of any drilling, sampling, or recovery factors that could materially impact the accuracy and reliability of the results. In Nordmin's opinion the drilling, core handling, logging, and sampling procedures meet or exceed industry standards, and are adequate for the purpose of Mineral Resource Estimation.

25.3 Mineral Resource Estimate

The Mineral Resource Estimate was classified in accordance with CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) and the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (2019). Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. This estimate of Mineral Resources may be materially affected by environmental permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.

Mineral Resource Classification was assigned to broad regions of the Santa Cruz, Texaco, and East Ridge Deposit block models based on the Nordmin QP's confidence and judgment related to several factors as defined in Section 14. To demonstrate reasonable prospects for eventual economic extraction for the Santa Cruz, Texaco, and East Ridge Mineral Resource Estimates, representational minimum mining unit shapes were created using Deswik's minimum MSO tool.

The Santa Cruz Project Mineral Resource Estimate, which is exclusive of mineral reserves, is presented in Table 25-1.

Table 25-1: In Situ Mineral Resource Estimate for Santa Cruz, Texaco, and East Ridge Deposits

Classification	Deposit	Mineralized Material (kt)	Mineralized Material (k ton)	Total Cu (%)	Total Soluble Cu (%)	Acid Soluble Cu (%)	Cyanide Soluble Cu (%)	Total Cu (kt)	Total Soluble Cu (kt)	Acid Soluble Cu (kt)	Cyanide Soluble Cu (kt)	Total Cu (Mlb)
Indicated	Santa Cruz (0.70% CoG)	223,155	245,987	1.24	0.82	0.58	0.24	2,759	1,824	1,292	533	6,083
	Texaco (0.80% CoG)	3,560	3,924	1.33	0.97	0.25	0.73	47	35	9	26	104
	East Ridge (0.90% CoG)	0	0	0.00	0.00	0.00	0.00	0	0	0	0	0
Inferred	Santa Cruz (0.70% CoG)	62,709	69,125	1.23	0.92	0.74	0.18	768	576	462	114	1,694
	Texaco (0.80% CoG)	62,311	68,687	1.21	0.56	0.21	0.35	753	348	132	215	1,660
	East Ridge (0.90% CoG)	23,978	26,431	1.36	1.26	0.69	0.57	326	302	164	137	718
Total												
Indicated	**All Deposits**	**226,715**	**249,910**	**1.24**	**0.82**	**0.57**	**0.25**	**2,807**	**1,859**	**1,300**	**558**	**6,188**
Inferred	**All Deposits**	**148,998**	**164,242**	**1.24**	**0.82**	**0.51**	**0.31**	**1,847**	**1,225**	**759**	**466**	**4,072**

Source: Nordmin, 2023

Notes on Mineral Resources:

- The Mineral Resources in this estimate were independently prepared by Christian Ballard, P.Geo. of Nordmin Engineering Ltd and the Mineral Resources were prepared in accordance with NI 43-101 and the CIM Definition Standards for Mineral Resources and Mineral Reserves (2014) and the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (2019). Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. No environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues are known that may affect this estimate of Mineral Resources.
- Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability. This estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.
- Verification included multiple site visits to inspect drilling, logging, density measurement procedures and sampling procedures, and a review of the control sample results used to assess laboratory assay quality. In addition, a random selection of the drillhole database results was compared with the original records.
- The Mineral Resources in this estimate for the Santa Cruz, East Ridge, and Texaco deposits used Datamine Studio RM™ software to create the block models.
- The Mineral Resources have an effective date of December 31, 2022.
- Underground-constrained Mineral Resources for the Santa Cruz deposit are reported at a cut-off grade (CoG) of 0.70% total copper, Texaco deposit are reported at a CoG of 0.80% total copper and East Ridge deposit are reported at a CoG of 0.90% total copper. The CoG reflects total operating costs to define reasonable prospects for eventual economic extracted by conventional underground mining methods with a maximum production rate of 15,000 tonnes per day (t/d). All material within mineable shape-optimized wireframes has been included in the Mineral Resource
- Underground mineable shape optimization parameters include a long-term copper price of US$3.70/lb, process recovery of 94%, direct mining costs between US$24.50-$40.00/processed tonne reflecting various mining method costs (long hole or room and pillar), mining general and administration cost of US$4.00/t processed, onsite processing and SX/EW costs between US$13.40-$14.47/t processed, offsite costs between US$3.29 to US$4.67/t processed, along with variable royalties between 5.00% to 6.96% NSR and a mining recovery of 100%.
- Specific Gravity was applied using weighted averages by Deposit Sub-Domain.
- All figures are rounded to reflect the relative accuracy of the estimates, and totals may not add correctly.
- Excludes unclassified mineralization located along edges of the Santa Cruz, East Ridge, and Texaco deposits where drill density is poor.
- Reported from within a mineralization envelope accounting for mineral continuity.
- Total soluble copper means the addition of sequential acid soluble copper and sequential cyanide soluble copper assays. Total soluble copper is not reported for the Primary Domain

There is a potential to increase the Mineral Resource by using infill drilling to expand and increase the Mineral Resource category.

Areas of uncertainty that may materially impact the Mineral Resource Estimate include:

- Changes to long term metal price assumptions.
- Changes to the input values for mining, processing, and G&A costs to constrain the estimate.
- Changes to local interpretations of mineralization geometry and continuity of mineralized zones.
- Changes to the density values applied to the mineralized zones.
- Changes to metallurgical recovery assumptions.
- Changes in assumption of marketability of the final product.
- Variations in geotechnical, hydrogeological, and mining assumptions.
- Changes to assumptions with an existing agreement or new agreements.
- Changes to environmental, permitting, and social license assumptions.

Logistics of securing and moving adequate services, labor, and supplies could be affected by epidemics, pandemics and other public health crises including COVID-19 or similar viruses.

These risks and uncertainties may cause delays in economic resource extraction and/or cause the resource to become economically non-viable.

25.4 Mining Methods

The Project is currently not in operation. Mineral resources are stated for three areas: Santa Cruz, Texaco, and East Ridge. For mine planning work, only the Santa Cruz and East Ridge areas were evaluated.

Santa Cruz is located approximately 430 to 970 m below the surface. Based on the mineralization geometry and geotechnical information, an underground longhole stoping (LHS) method is suitable for the deposit. The Santa Cruz deposit will be mined in blocks where mining within a block occurs from bottom to top with paste backfill (PBF) for support. A sill pillar is left in situ between blocks.

Within the Santa Cruz deposit, there is an Exotic domain located approximately 500 to 688 m below the surface and to the east of the main deposit. The Exotic domain consists of flatter lenses that are more amenable to drift and fill (DAF) mining. Cemented waste rockfill will be used for support. The backfill will have sufficient strength to allow mining of adjacent drifts without leaving pillars.

The East Ridge deposit is approximately 380 to 690 m below the surface and to the north of the main Santa Cruz deposit. The East Ridge deposit consists of two tabular lenses and will be mined using DAF with cemented waste rock backfill for support.

The groundwater flow model developed for the Santa Cruz Project shows that with an active dewatering scenario of pumping from the surface approximately 3,000 gpm for the first 2 years of LoM that the annual average residual passive inflows for the first 10 years of the mine are at or below 12,000 gpm. From year 11 through 25 of LoM, the residual passive inflows range from approximately 15,000 to 18,000 gpm.

Optimizations were run issuing various cut-off grades to identify higher grade areas and to understand the sensitivity of the deposit to cut-off grade.

The mine will be accessed by dual decline drifts from surface, with one drift serving as the main access and the other as a railveyor drift for material handling. Mineralization is transported from stopes via loader to an ore pass system and then to surface by the railveyor. Main intake and exhaust raises will be developed with conventional shaft sinking methods to provide air to the mine workings. The mine will target a combined production of 15,000 t/d from Santa Cruz and East Ridge.

Portal boxcut is assumed to start in 2026. Decline and railveyor activities begin in 2027 through to 2028 to access the top portion of the mine. Decline and railveyor resumes in 2033 to access the bottom of the mine. Stoping begins in 2029 with a 1 -year ramp-up period until the mine and plant are operating at full capacity. The currently defined mine life is approximately 3 years of construction and 20 years of production.

25.5 Metallurgy and Processing

Investigating heap leaching of Exotic, Oxide and Chalcocite mineral domains. The test program for heap leaching is in progress and is reported as such in section 10. Some early results are described below. Column leach testing will complete in the fourth quarter of 2023.

25.6 Project Infrastructure

As the Santa Cruz Project is situated in close proximity to Casa Grande, an existing city in Arizona with development and industry, the Project infrastructure road access, rail access, access to ports and smelters, the supply of grid power, and the availability of water for operations for the Santa Cruz Project is well situated.

Power consumption will average 450,000 MW per year over the LoM. Power can initially be provided to the site by grid power from a 69kV transmission line operated by Pinal County ED3. The nearest substation to the Project is 5 km from the current location for the main Santa Cruz mine substation. The Project will ultimately replace grid power with renewable power from solar and other sources that IE is investigating now. IE envisions an overall split of 70% renewable power and 30% grid power when the project reaches maturity.

There appears to be a large water surplus at the Santa Cruz Project due the amount of water that must be pumped to dewater the underground ahead of and during mining operations. The supply of water from dewatering and a smaller component from passive water inflows averages approximately 3,040 m^3 per hour over the LoM while water consumption averages 400 m^3 per hour. The surplus of water can be distributed to local stakeholders for use.

In KCB's opinion, the TSF design approach is viable and appropriate for this stage of design. KCB has identified several key risks that could potentially impact the TSF design approach, which should be investigated in future design stages:

- No site-specific information is currently available in the TSF footprint to characterize foundation conditions for design. For this design, KCB has assumed conditions based on surficial geology maps, surface observations and subsurface data from other areas of the Project site. Unfavorable foundation conditions may be identified that influence design.
- Geotechnical and geochemical testing on tailings is limited at this stage. The limited testing represents uncertainty related to geotechnical properties (e.g., tailings strength; beach angles) and geochemical management requirements. KCB elected to include a low-permeability liner in the TSF design to manage uncertainties around geochemical characterization.

- The TSF could be impacted by significant flood events (the footprint is within the 1 in 500-yr flood plain and borders the 1 in 100-yr flood plain). Embankment erosion protection is included in the design; however, sizing and extent of protection is not based on site-specific flood mapping.
- The identified embankment fill borrow area is located within the 1 in 100-yr return period floodplain, and conceptually will be developed as a pit. Although the regional groundwater table is understood to be well below surface (>125 m) on the site, subsurface conditions in this area are not well understood. Flooding or groundwater rise to the level of the pit would impact the borrow pit and borrow operations.
- KCB has assumed that all engineered fills except riprap will be sourced from on-site borrow areas; however, borrow areas have not been characterized to confirm suitability. Fill zones with tighter constraints (e.g., select fill for the perimeter embankment liner corridor; low-permeability fill for the low-permeability layer; clean sand and gravel for the above-liner drainage layer) may require significant processing (e.g., screening; washing) if on-site sources are used.
- Wind-blown tailings or construction materials could impact and exceed air quality standards if areas of the impoundment or embankment are left unmitigated. At this design stage, KCB assume that dusting can be controlled through beach wetting, compaction of the embankment fill and progressive placement of embankment slope closure cover/armoring, or use of temporary dust management alternatives prior to placement of the closure cover.

Recommended studies for to address the key uncertainties/risks in the future design stages are presented in Section 26.4.3.

25.7 Environmental, Closure, and Permitting

The Project is located on private land and permitting is primarily with the State of Arizona, Pinal County, and City of Casa Grande. The ability to operate on private land has the potential to reduce lengthy permitting timelines that result from federal permitting processes.

Baseline studies are underway for resources of concern and studies will continue as the Project develops. There are no known occurrences of federally listed threatened and endangered species and there are no planned impacts to potential federally regulated waters of the US. Portions of the Project site is a known nesting area for burrowing owls protected under the Migratory Bird Treaty Act and US Fish and Wildlife beneficial practices to avoid and minimize impacts to birds have been and will continue to be implemented as the Project develops.

The utilization of a renewable microgrid will allow the Santa Cruz Project to produce copper with one of the industry's lowest carbon intensities. Such intensities highlight IE 's commitment to implementing cutting-edge mining techniques, conserving energy, and utilizing renewable energy.

Aside from the pending reclamation plan for exploration activities at the Site, IE has no current obligations to tender post mining performance or reclamation bonds for the Project. Once the facility achieves the level of design necessary to advance to mine development and operation, IE will need to submit and gain approval of an ADEQ-approved APP and an ASMI-approved Reclamation Plan. The closure approach and related closure cost estimates must be submitted following approval and before facility construction and operation.

IE plans to create an all-encompassing environmental, social, and governance framework designed to effectively address any community concerns and ensure that the Santa Cruz Project operates in a socially responsible manner.

25.8 Project Economics

The Santa Cruz Project consists of an underground mine and processing facility producing both copper concentrate and copper cathode. The operation is expected to have a 20-year mine life. Under the forward-looking assumptions modeled and documented in this report, the operation is forecast to generate positive cash flow. This estimated cash flow is inherently forward-looking and dependent upon numerous assumptions and forecasts, such as macroeconomic conditions, mine plans and operating strategy, that are subject to change.

The PEA is preliminary in nature, that it 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 PEA will be realized. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

The economic model is based on mine plans that were prepared as outlined in previous sections. Inferred resources account for approximately 21% of the tonnage contained within the mine plan.

The results indicate that, at a copper price of US$3.80/lb the after tax NPV @ 8% is US$1.3 billion, the after tax IRR is 23% and the payback period is 7 years from the start of construction.

The sensitivity analysis performed for this report indicates that the operation's NPV is most sensitive to metal price followed by initial capital cost.

26 Recommendations

The recommended program is for the company to complete a preliminary feasibility level (PFS) Technical Report Summary. The work program required to complete a PFS will consist of associated infill and exploration drilling, analytical and metallurgical test work, hydrogeological and geotechnical drilling, geological modeling, mine planning, and environmental baseline studies to support permitting efforts.

26.1 Resources and Reserves

To advance the Project to a PFS level, Nordmin recommends that infill drilling is performed and that drill results are incorporated into an updated resource model that would allow for the Indicated Mineral Resource to be developed into an initial Probable Mineral Reserve with a focus on the initial 5 years of production. Drilling should be targeted to continue to upgrade Inferred Mineral Resources to Indicated Mineral Resources.

Additional drilling is expected to target:

- The Santa Cruz deposit high-grade exotic copper domain.
- The Southern East Ridge oxide domain.
- The Texaco deposit to the south (Texaco Ridge).
- Primary Domains, that are not mined or processed in this PEA.

Subsequent to a new resource model, engineering work should be completed to a PFS level of study which will provide reserves for the Project.

26.2 Mining Methods

SRK recommends exploring different mining orientations for the Santa Cruz LHS. Currently the Santa Cruz deposit is mining in a transverse orientation. There are areas that require long ore drives to access. Exploring different orientations can potentially lead to shorter ore drives and consequently shorter hauls to the ore passes.

SRK recommends optimizing the stope size when additional geotechnical information is available. Larger stopes allow for more efficient mining and lower operating costs.

SRK recommends evaluating recovering the sill pillar between the upper and lower blocks. The sill pillar is mineralized and it is left in-situ in the current mine plan.

26.2.1 Geotechnical Recommendations

To advance the geotechnical understanding of the Project to a PFS level of study the following investigations are recommended:

- Incorporate additional drill data to further characterize rock quality domains, rock strengths, and geological structure. East Ridge and Texaco should be targeted for additional drilling.
- Update the geotechnical block model with additional drill data and lithology interpretation.
- Update all stability analyses using new rock characterization data. This includes stope optimization studies and sill pillar recovery techniques.
- Continue exploration drilling along potential decline routes to improve decline placement within better rock qualities.

- Conduct in-situ stress measurements to better understand the current stress field at site. These learnings can be applied to stability analyses and used in numerical modeling.
- Conduct numerical modeling of the mine sequence to better understand redistributions of mining induced stresses which could be detrimental to stability.
- An underhand DAF method should be considered for mining at East Ridge and the Exotics at Santa Cruz. An underhand method might allow wider DAF spans but would require additional cement binder and a higher minimum compressive strength requirement.
- A study should be conducted to evaluate whether mine waste aggregate is suitable for CRF.

26.2.2 Hydrogeology

To advance the understanding of the site hydrogeology to the PFS stage, the following investigations are recommended:

- Additional characterization of the conglomerates and non-mineralized Oracle Granite around the proposed Decline.
- Additional characterization of the variability of hydraulic parameters of the mineralized Oracle Granite, along with the porphyry and diabase intrusions, around the Santa Cruz, East Ridge, and Texaco Deposits.
- Characterization of the hydraulic parameters of the conglomerate within the Exotics at the Santa Cruz Deposit.
- Hydrogeological characterization of the impact of faulting on groundwater movement.
- Installation of monitoring wells to collect baseline groundwater data.

26.2.3 Ventilation

The development and specification of the ventilation system will be critical to the success of the Project in that the mining zones are located in an area of elevated ground/water temperatures. It is recommended that a series of staged ventilation and thermal models be developed to simulate the ventilation system and predict the climatic temperatures in the working areas. The refinement of the ventilation system through proper modeling will directly impact the timing of the ventilation infrastructure and annual electric power consumption totals.

26.3 Mineral Processing

It is recommended to conduct PFS level studies of both the preferred mill processing system with a conventional slurry type tailings storage facility and cemented paste backfill, and the potentially less costly heap leach processing system. Both mineral process testing studies would focus on geometallurgy and deposit variability regarding economic copper recovery and recovery of other economic by-products, such as molybdenite concentrate.

The high-level scope of the mill processing PFS level study would include:

- Geometallurgy and variability sample selection, preparation and characterization
- Comminution studies (SPI, JK Tech DWT, HPGR, BWI, Ai) including leach residue and rougher concentrate regrind optimization
- Leach – Float studies: kinetic bottle roll leach tests followed by rougher flotation and cleaner flotation testing. Use qualitative testing to evaluate settling and filtration characteristics of pre-leach, leach residue and tailings. Evaluate smelter penalty elements

- Locked cycle flotation testing on geometallurgical units determined from test program
- Neutralization testing of acidic leach residue
- Solvent extraction testing of PLS samples of various grades and contaminant levels at copper extractant manufacturer
- Liquid-solid separation testing on geometallurgical units: pre-leach, leach residue, tailings, rougher concentrate and cleaner concentrate
- Evaluate new flotation technologies
- Develop recovery formulas for agitated leaching and flotation for each geometallurgical unit
- Examine alternative flow sheets
- Process vessel materials of construction corrosion testing
- Cemented paste backfill testing with tailings
- Geotechnical testing of tailings
- Geochemical testing of tailings

The high-level scope of the heap leach processing PFS level study would include:

- Geometallurgy and variability sample selection, preparation and characterization
- Crushing study
- Column leach study
- Ferric iron generation column leach study
- PLS solvent extraction isotherm testing
- Geotechnical study of heap leach material
- Geochemical study of heap leach residue and solution
- Cemented paste backfill testing with materials locally available

26.4 Infrastructure

26.4.1 Power

The Project needs to secure grid power supply in order to complete development and commence operations. IE must continue its discussions with ED3, the local power utility, to investigate the conditions, costs for connection and system upgrades, and timeframe to connect to grid power from the local ED3 substation nearest the Santa Cruz property. Third party utility consultants can be employed to speak with ED3 on behalf of IE, and also investigate the possibilities with Salt River Project (SRP) and Public Service of Arizona (APS) for the supply of power from their nearby transmission lines.

IE also should continue its investigations into renewable power options for the Project to develop costs and timelines for installing solar and other green power generating facilities on or near the site.

26.4.2 Water

IE will continue to evaluate the quality of groundwater to model the total dissolved solids and constituents in groundwater over time. The need to distribute water to agricultural and other stakeholders is dependent on meeting water quality standards for those uses.

IE will commence stakeholder engagement in concert with permitting activities to determine the best path forward for distributing or re-injecting excess groundwater.

26.4.3 Tailings Storage

KCB recommend the following key studies to advance the TSF design:

- Conduct a tailings alternatives assessment following a multiple accounts analysis (MAA) framework. The alternatives assessment must consider technical, environmental, and social objectives, and engage a range of project stakeholders.
- Conduct a site investigation program to evaluate the geotechnical, hydrogeological and geochemical properties of the TSF foundation, and suitability of potential borrow sources. The investigation should comprise drilling, test pitting, geophysics, in-situ hydrogeological testing, sampling and associated laboratory testing.
- Perform additional test work (geotechnical, rheological and geochemical) on the tailings. Geochemical testing should include static and kinetic testing to understand long-term acid rock drainage and metal leaching potential, to inform geochemical management strategy.
- Conduct site-specific flood-routing modeling to assess TSF and borrow area flood risk.
- Perform a TSF staging assessment and review embankment design approach. This assessment should evaluate beach wetting as a viable approach for dust suppression and serve as key input to the TSF water balance.
- Develop a TSF water balance as an input to the site-wide water balance. If warranted, investigate TSF configurations with smaller impoundment footprints to limit evaporation loss.
- Evaluate the design of the TSF liner system based on modeling and consider changes to seepage management strategy based on findings of the tailings characterization. If an impoundment drainage layer is required, explore alternatives to running outlet pipes below the TSF embankment.
- Consider tailings processing methods (e.g., filtration, cycloning) to produce construction materials and offset borrow requirements.
- Conduct a site-specific seismic hazard assessment.

26.5 Environmental and Permitting

Recommendations for environmental and permitting would include the following:

- Continue environmental baseline data collection to support major local county and state permitting programs.
- Continue permitting activities and agency engagement for Pinal County Class II air permit, City of Casa Grande General Plan amendment and zoning changes, Arizona Department of Environmental Quality Aquifer Protection and Reclaim Water Discharge permits, and Arizona Department of Water Resources dewatering permit.
- As the facility engineering progresses, advance the closure and reclamation design and engage Arizona State Mining Inspector to obtain an approved Mined Land Reclamation Plan.
- Develop and implement a community working group to keep local stakeholders informed about the Project’s potential economic and community benefits, as well as the Company’s commitment to safety and the environment.

26.6 Recommended Work Program Costs

Table 26-1 summarizes the costs for recommended work programs.

Table 26-1: Summary of Costs for Recommended Work

Discipline	Program Description	Cost (US$)
Drilling	Resource Infill, Hydrogeology, Geotechnical, Geometallurgical Variability	29.2 million
Engineering Studies	Geotechnical, Mining Optimization, Hydrogeology, Ventilation, Power, Process Flowsheet, Tailings Storage	16.1 million
Laboratory Testing	Geotechnical, Backfill, Water Quality, Metallurgical Recovery, Geometallurgical Variability	5.6 million
Pilot Plant	Metallurgical Flowsheet and Recovery	3.3 million
Permitting	Permitting	3.0 million
PFS Report	PFS Reporting and QP Work for all disciplines	5.5 million
Total US$		**$62.7 million**

Source: SRK, 2023

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28 Glossary

The Mineral Resources and Mineral Reserves have been classified according to CIM (CIM, 2014). Accordingly, the Resources have been classified as Measured, Indicated or Inferred, the Reserves have been classified as Proven, and Probable based on the Measured and Indicated Resources as defined below.

28.1 Mineral Resources

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

An **Inferred Mineral Resource** is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity. An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

An **Indicated Mineral Resource** is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation. An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Mineral Reserve.

A **Measured Mineral Resource** is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit. Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation. A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proven Mineral Reserve or to a Probable Mineral Reserve.

28.2 Mineral Reserves

A **Mineral Reserve** is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include application of Modifying Factors. Such studies demonstrate that, at the time of reporting, extraction could reasonably be justified.

The reference point at which Mineral Reserves are defined, usually the point where the ore is delivered to the processing plant, must be stated. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported. The public disclosure of a Mineral Reserve must be demonstrated by a Pre-Feasibility Study or Feasibility Study.

A **Probable Mineral Reserve** is the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. The confidence in the Modifying Factors applying to a Probable Mineral Reserve is lower than that applying to a Proven Mineral Reserve.

A **Proven Mineral Reserve** is the economically mineable part of a Measured Mineral Resource. A Proven Mineral Reserve implies a high degree of confidence in the Modifying Factors.

28.3 Definition of Terms

The following general mining terms may be used in this report.

Table 28-1: Definition of Terms

Term	Definition
Assay	The chemical analysis of mineral samples to determine the metal content.
Capital Expenditure	All other expenditures not classified as operating costs.
Composite	Combining more than one sample result to give an average result over a larger distance.
Concentrate	A metal-rich product resulting from a mineral enrichment process such as gravity concentration or flotation, in which most of the desired mineral has been separated from the waste material in the ore.
Crushing	Initial process of reducing ore particle size to render it more amenable for further processing.
Cut-off Grade (CoG)	The grade of mineralized rock, which determines as to whether or not it is economic to recover its gold content by further concentration.
Dilution	Waste, which is unavoidably mined with ore.
Dip	Angle of inclination of a geological feature/rock from the horizontal.
Fault	The surface of a fracture along which movement has occurred.
Footwall	The underlying side of an orebody or stope.
Gangue	Non-valuable components of the ore.
Grade	The measure of concentration of gold within mineralized rock.
Hangingwall	The overlying side of an orebody or slope.
Haulage	A horizontal underground excavation which is used to transport mined ore.
Hydrocyclone	A process whereby material is graded according to size by exploiting centrifugal forces of particulate materials.
Igneous	Primary crystalline rock formed by the solidification of magma.
Kriging	An interpolation method of assigning values from samples to blocks that minimizes the estimation error.
Level	Horizontal tunnel the primary purpose is the transportation of personnel and materials.
Lithological	Geological description pertaining to different rock types.
LoM Plans	Life-of-Mine plans.
LRP	Long Range Plan.
Material Properties	Mine properties.
Milling	A general term used to describe the process in which the ore is crushed and ground and subjected to physical or chemical treatment to extract the valuable metals to a concentrate or finished product.
Mineral/Mining Lease	A lease area for which mineral rights are held.
Mining Assets	The Material Properties and Significant Exploration Properties.
Ongoing Capital	Capital estimates of a routine nature, which is necessary for sustaining operations.
Ore Reserve	See Mineral Reserve.
Pillar	Rock left behind to help support the excavations in an underground mine.
RoM	Run-of-Mine.
Sedimentary	Pertaining to rocks formed by the accumulation of sediments, formed by the erosion of other rocks.

Term	Definition
Shaft	An opening cut downwards from the surface for transporting personnel, equipment, supplies, ore and waste.
Sill	A thin, tabular, horizontal to sub-horizontal body of igneous rock formed by the injection of magma into planar zones of weakness.
Smelting	A high temperature pyrometallurgical operation conducted in a furnace, in which the valuable metal is collected to a molten matte or doré phase and separated from the gangue components that accumulate in a less dense molten slag phase.
Stope	Underground void created by mining.
Stratigraphy	The study of stratified rocks in terms of time and space.
Strike	Direction of line formed by the intersection of strata surfaces with the horizontal plane, always perpendicular to the dip direction.
Sulfide	A sulfur bearing mineral.
Tailings	Finely ground waste rock from which valuable minerals or metals have been extracted.
Thickening	The process of concentrating solid particles in suspension.
Total Expenditure	All expenditures including those of an operating and capital nature.
Variogram	A statistical representation of the characteristics (usually grade).

28.4 Abbreviations

The following abbreviations may be used in this report.

Table 28-2: Abbreviations

Abbreviation	Unit or Term
%	percent
<	less than
>	greater than
°	degree (degrees)
°C	degrees Celsius
°F	degrees Fahrenheit
µm	micron or microns
2D	Two-dimensional
A	ampere
A/m^2	amperes per square meter
AA	atomic absorption
AAS	atomic absorption spectrometry
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
ADWS	Arizona Drinking Water Standards
Ag	silver
AMD	acidic and/or metalliferous drainage
ANFO	ammonium nitrate fuel oil
APP	Aquifer Protection Permit
AR4	Fourth Assessment Report
ASMI	Arizona State Mine Inspector
ATV	acoustic televiewer
Au	gold
AuEq	gold equivalent grade
BADCT	Best Available Demonstrated Control Technology
BEGPA	Bald and Golden Eagle Protection Act
BEV	Battery Electric Vehicle
CAP	Covered Area Project
CAR	Central Arizona Resources
CBA	Complete Bouguer Anomaly
CCD	Counter Current Decantation

Abbreviation	Unit or Term
CF	Cut-and-fill
cfm	cubic feet per minute
CIL	carbon-in-leach
cm	centimeter
cm/s	Centimeter per second
cm^2	square centimeter
cm^3	cubic centimeter
cm/y	Centimeters per year
CNI	Call & Nicholas, Inc.
CO^2e	carbon dioxide equivalents
CoG	cut-off grade
ConfC	confidence code
CRec	core recovery
CRF	cemented rock fill
CSAMT	Controlled Source Audio-frequency Magnetotelluric
CSS	closed-side setting
CTW	calculated true width
CWA	Clean Water Act
DAF	drift and fill
dia.	diameter
DRHE	DR Horton Energy
EIS	Environmental Impact Statement
ELOS	equivalent length of slough
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
ESR	excavation support ratio
FA	fire assay
FEMA	Federal Emergency Management Agency
FoS	Factor of Safety
FRS	fiber-reinforced shotcrete
FS	Fast-Static
ft	foot (feet)
ft^2	square foot (feet)
ft^3	cubic foot (feet)
g	gram
G&A	general and administrative
g/L	gram per liter
g/t	grams per tonne
gal	gallon
GHGs	greenhouse gases
GIS	Geographic Information System
g-mol	gram-mole
gpm	gallons per minute
GSI	geological strength index
GWPs	global warming potentials
ha	hectares
HDPE	Height Density Polyethylene
HG	high-grade
hp	horsepower
HTW	horizontal true width
IAS	International Accreditation Service
ICP	inductively coupled plasma
ICP-OES	inductively coupled plasma optical emission spectrometry
ID2	inverse-distance squared
ID3	inverse-distance cubed
IE	Ivanhoe Electric Inc.
IFC	International Finance Corporation

Abbreviation	Unit or Term
ILS	Intermediate Leach Solution
IPCC	Intergovernmental Panel on Climate Change's
kA	kiloamperes
kg	kilograms
km	kilometer
km^2	square kilometer
koz	thousand troy ounce
kPa	kilopascal
kt	thousand tonnes
kt/d	thousand tonnes per day
kt/y	thousand tonnes per year
kV	kilovolt
kW	kilowatt
kWh	kilowatt-hour
kWh/t	kilowatt-hour per metric tonne
L	liter
L/h	Liters per hour
L/sec	liters per second
L/sec/m	liters per second per meter
lb	pound
LG	low-grade
LHD	long-haul dump truck
LHS	longhole stoping
line-km	line kilometer
LLDDP	Linear Low Density Polyethylene Plastic
LME	London Metal Exchange
LOI	Loss On Ignition
LoM	life-of-mine
m	meter
m.y.	million years
m/d	meters per day
m/s	meters per second
m^2	square meter
m^3	cubic meter
m^3/s	cubic meters per second
MARN	Ministry of the Environment and Natural Resources
masl	meters above sea level
MBTA	Migratory Bird Treaty Act
MDA	Mine Development Associates
MG	medium grade
mg/L	milligrams/liter
ML	Metal Leaching
Mlb	million pounds
MLRP	Mined Land Reclamation Plan
mm	millimeter
mm^2	square millimeter
mm^3	cubic millimeter
MME	Mine & Mill Engineering
Mm^3	million cubic meters
Mm^3/y	Million cubic meters per year
Moz	million troy ounces
MPa	megapascal
MSO	mining unit shape optimizer
Mt	million tonnes
MTW	measured true width
MW	million watts
MWh/y	megawatt hours per year

Abbreviation	Unit or Term
$MW_{(R)}$	megawatts of refrigeration
NEPA	National Environmental Policy Act
NGO	non-governmental organization
NI 43-101	Canadian National Instrument 43-101
NN	Nearest Neighbor
NRHP	National Register of Historic Places
OHWM	ordinary high-water mark
OK	Ordinary kriging
OSC	Ontario Securities Commission
oz	troy ounce
PAD	Planned Area of Development
PBF	paste backfill
PCAQCD	Pinal County Air Quality Control District
pCi/L	picocuries per liter
PEA	preliminary economic assessment
PFS	prefeasibility study
PLC	Programmable Logic Controller
PLS	Pregnant Leach Solution
PMF	probable maximum flood
ppb	parts per billion
ppm	parts per million
PST	primary-seconday-tertiary
QA/QC	Quality Assurance/Quality Control
RC	reverse circulation
RCRA	Resource Conservation Recovery Act
REC	recognized environmental condition
RMR_{76}	Bieniawski's rock mass rating
ROFO	Right of First Offer
ROFR	Right of First Refusal
RoM	Run-of-Mine
RQD	Rock Quality Designation
RTK	Real-Time Kinematic
S.C.	Santa Cruz
SCR	Selective Catalytic Reduction
SCJV	Joint venture between ASARCO Santa Cruz Inc. and Freeport McMoRan Copper & Gold Company
SEC	U.S. Securities & Exchange Commission
sec	second
SEQ	sequential acid leaching
SG	specific gravity
SLS	solid-liquid separation
SPT	standard penetration testing
SRHA	Stockraising Homestead Act
st	short ton (2,000 pounds)
SUA	Surface Use Agreement
t	tonne (metric ton) (2,204.6 pounds)
t/d	tonnes per day
t/h	tonnes per hour
t/y	tonnes per year
TIMA	Tescan Integrated Mineral Analyser
TSF	tailings storage facility
TSP	total suspended particulates
UCS	unconfined compressive strength
UIC	Underground Injection Control
USACE	U.S. Army Corps of Engineers
USCS	Unified Soil Classification System
USFWS	U.S. Fish and Wildlife Service

Abbreviation	Unit or Term
V	volts
VFD	variable frequency drive
VOC	Volatile Organic Compounds
VWP	vibrating wire piezometer
W	watt
WestLand	WestLand Engineering & Environmental Services
WOTUS	Waters of the United States
XRD	x-ray diffraction
XRF	X-ray fluorescence
y	year

Appendices

Appendix A: Certificates of Qualified Persons

SRK Consulting (U.S.), Inc.
Suite 400
999 Seventeenth Street
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T: 303.985.1333
F: 303.985.9947

denver@srk.com
www.srk.com

CERTIFICATE OF QUALIFIED PERSON

I, Anton Chan, BEng Mining, MS Earth Science, P. Eng., MMSAQP do hereby certify that:

1. I am Senior Consultant (Mining Engineer) of SRK Consulting (U.S.), Inc., 999 Seventeenth Street, Suite 400, Denver, CO, USA, 80202.
2. This certificate applies to the technical report titled "NI 43-101 Preliminary Economic Assessment & Technical Report, Santa Cruz Project, Arizona" with a report date of September 11, 2023, an effective date of the Technical Report of July 27, 2023, and an effective date of the Mineral Resource Estimate of December 31, 2022 (the "Technical Report").
3. I graduated with a degree in Bachelor of Engineering from McGill University in 2008. In addition, I have obtained a Masters degree in Earth Science from Delft University of Technology in 2010. I am a Registered member and QP Member of the Mining and Metallurgical Society of America and a Professional Engineer with the Engineers Geoscientist s Manitoba. I have worked as a mining engineer for a total of 12 years since my graduation from university. My relevant experience includes open pit and underground design, mine scheduling, pit optimization, and cost modeling.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I visited the Santa Cruz Property property on February 22, 2023 for 2 days.
6. I am responsible for mining Sections 2, 3, 4, 15, Introduction paragraphs of section 16 and Sections 16.1, 16.4.2, 16.5, 16.6, 16.7, 16.8, the mining portions of Section 21, Sections 23, 24 and portions of Sections 1, 25 and 26.
7. I am independent of the issuer applying all of the tests in section 1.5 of NI 43-101.
8. I have not had prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101 and Form 43-101F1 and the sections of the Technical Report I am responsible for have been prepared in compliance with that instrument and form.
10. As of the aforementioned Effective Date, to the best of my knowledge, information and belief, the sections of the Technical Report I am responsible for contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 11th Day of September, 2023.

"Signed" *"Stamped"*

____

Anton Chan, BEng Mining, MS Earth Science, P. Eng., MMSAQP

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CERTIFICATE OF QUALIFIED PERSON

I, Matthew Sullivan, BS Economics, BS Metallurgy do hereby certify that:

1. I am Principal Consultant (Mining Economics) of SRK Consulting (U.S.), Inc., 999 Seventeenth Street, Suite 400, Denver, CO, USA, 80202.
2. This certificate applies to the technical report titled "NI 43-101 Preliminary Economic Assessment & Technical Report, Santa Cruz Project, Arizona" with a report date of September 11, 2023, an effective date of the Technical Report of July 27, 2023, and an effective date of the Mineral Resource Estimate of December 31, 2022 (the "Technical Report").
3. I graduated with a degree in Metallurgical and Materials Engineering from Colorado School of Mines in 2009. In addition, I also obtained a degree in Economics and Business from the Colorado School of Mines in 2009. I am an SME Registered Member. I have worked evaluating mining projects for a total of 10 years since my graduation from university. My relevant experience includes economic evaluation of mining projects supporting mining sector investment and economic analysis supporting mining project studies.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I have not visited the Santa Cruz property.
6. I am responsible for mining economics Sections 19, 22, and portions of Sections 1, 25 and 26.
7. I am independent of the issuer applying all of the tests in section 1.5 of NI 43-101.
8. I have not had prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101 and Form 43-101F1 and the sections of the Technical Report I am responsible for have been prepared in compliance with that instrument and form.
10. As of the aforementioned Effective Date, to the best of my knowledge, information and belief, the sections of the Technical Report I am responsible for contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 11th Day of September, 2023.

"Signed" *"Stamped"*

____

Matthew Sullivan, BS Economics, BS Metallurgy

CERTIFICATE OF QUALIFIED PERSON

I, Robert Cook, P.E. do hereby certify that:

1. I am Principal I Geological Engineer of Call and Nicholas, Inc., 2475 N Coyote Dr. Tucson, AZ USA.
2. This certificate applies to the technical report titled "NI 43-101 Preliminary Economic Assessment & Technical Report, Santa Cruz Project, Arizona" with a report date of September 11, 2023, an effective date of the Technical Report of July 27, 2023, and an effective date of the Mineral Resource Estimate of December 31, 2022 (the "Technical Report").
3. I graduated with a degree in Geological Engineering from University of Arizona in 2008. I am a Registered Member of the Society for Mining, Metallurgy, & Exploration (SME). I have worked as a Geological Engineer for a total of 15 years since my graduation from university. My relevant experience includes 5 years as an underground geological engineer for Newmont Mining Corporation in operations using the long hole stoping (LHS) method as well as consulting on LHS projects for more than 9 years with Call and Nicholas, Inc.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I visited the Santa Cruz property on 16 December 2022 for 1 days.
6. I am responsible for Geotechnical Section 16.2 and portions of Sections 1, 25, and 26 summarized therefrom, of this Technical Report.
7. I am independent of the issuer applying all of the tests in section 1.5 of NI 43-101.
8. I have not had prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101 and Form 43-101F1 and the sections of the Technical Report I am responsible for have been prepared in compliance with that instrument and form.
10. As of the aforementioned Effective Date, to the best of my knowledge, information and belief, the sections of the Technical Report I am responsible for contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 11 Day of September, 2023.

RWCook

Robert Cook

Registered Professional Engineer (Geological)
CERTIFICATE NO.
70503
ROBERT
COOK
Date Signed: 9-11-23
ARIZONA, U.S.A.
RWCook

INTERA Incorporated
2440 Louisiana Blvd. NE, Suite 700
Albuquerque, NM 87110 USA
505.539.8100

September 11, 2023

CERTIFICATE OF QUALIFIED PERSON

I, Annelia Tinklenberg, M.S., P.G. do hereby certify that:

1. I am Senior Hydrogeologist of INTERA Incorporated, 2440 Louisiana Blvd. NE, Suite 700, Albuquerque, NM 87110.
2. This certificate applies to the technical report titled "NI 43-101 Preliminary Economic Assessment & Technical Report, Santa Cruz Project, Arizona" with a report date of September 11, 2023, an effective date of the Technical Report of July 27, 2023, and an effective date of the Mineral Resource Estimate of December 31, 2022 (the "Technical Report").
3. I graduated with a degree in Geology (B.S.) from Calvin College in 2003. In addition, I have obtained a M.S. degree in Water Resource Management from the University of New Mexico in 2007. I am a Qualified Person (Registered Member) of the Society for Mining, Metallurgy & Exploration of the. I am also a Registered Professional Geologist in the State of Arizona (77118) and a Professional Geologist in the State of California (9572). I have worked as a Hydrogeologist for a total of 19 years since my graduation from university. My relevant experience includes designing and leading groundwater investigations and drilling programs, background groundwater site assessment and baseline studies, environmental data collection work plans and groundwater sampling and monitoring programs, multi-year hydrogeological investigations, as well as developing Mine Plan of Operation and Reclamation documents and contributing to NI 43-101 compliant technical reports.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I visited the Santa Cruz property on August 10, 2023 for 1 day.
6. I am responsible for hydrogeology Sections 16.3, 16.4.1, and portions of Sections 1, 25, and 26.
7. I am independent of the issuer applying all of the tests in section 1.5 of NI 43-101.
8. I have not had prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101 and Form 43-101F1 and the sections of the Technical Report I am responsible for have been prepared in compliance with that instrument and form.
10. As of the aforementioned Effective Date, to the best of my knowledge, information and belief, the sections of the Technical Report I am responsible for contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 11 Day of September, 2023.

Annelia Tinklenberg

SME
Society for Mining, Metallurgy & Exploration
Annelia Tinklenberg
SME Registered Member No. 4265112
Signature
Date Signed 9-11-23
Expiration date 12-31-23

KCB Consultants Ltd.

CERTIFICATE OF QUALIFIED PERSON

I, Jim Casey, P.E., P.Eng. do hereby certify that:

1. I am Senior Geological Engineer of Klohn Crippen Berger Ltd., 500-2955 Virtual Way, Vancouver, British Columbia, Canada, V5M 4X6. KCB Consultants Ltd. is the US subsidiary of Klohn Crippen Berger Ltd. with an office at 2 North Central Avenue, Phoenix, Arizona, USA, 85004.
2. This certificate applies to the technical report titled "NI 43-101 Preliminary Economic Assessment & Technical Report, Santa Cruz Project, Arizona" with a report date of September 11, 2023, an effective date of the Technical Report of July 27, 2023, and an effective date of the Mineral Resource Estimate of December 31, 2022 (the "Technical Report").
3. I graduated with a degree in Geological Engineering from the University of British Columbia in 2009. In addition, I am a Registered Professional Civil Engineer in the states of Arizona, Alaska and New Mexico and the province of British Columbia. I have worked as an engineer for a total of 13 years since my graduation from university. My relevant experience includes geotechnical site investigation, construction quality control and quality assurance, and design of tailings storage facilities.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I visited the Santa Cruz property on July 13, 2023 for 1 day.
6. I am responsible for tailings storage facility design in Section 18.5 and portions of Sections 1, 25 and 26.
7. I am independent of the issuer applying all of the tests in section 1.5 of NI 43-101.
8. I have not had prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101 and Form 43-101F1 and the sections of the Technical Report I am responsible for have been prepared in compliance with that instrument and form.
10. As of the aforementioned Effective Date, to the best of my knowledge, information and belief, the sections of the Technical Report I am responsible for contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 11 Day of September, 2023.

Jim Casey, P.E., P.Eng.

KCB Consultants Ltd.
2 North Central Avenue, 18th Floor • Phoenix Arizona 85004 • USA
t 602.283.1006 • www.kcbconsultants.com

Nordmin Engineering

CERTIFICATE OF QUALIFIED PERSON

I, Christian Ballard, P.Geo of Thunder Bay, Ontario do hereby certify that:

1. I am a Senior Geoscientist with Nordmin Engineering Ltd, 160 Logan Avenue, Thunder Bay, Ontario, P7A 6R1.
2. This certificate applies to the technical report titled “NI 43-101 Preliminary Economic Assessment & Technical Report, Santa Cruz Project, Arizona” with a report date of September 11, 2023 (the “Technical Report”), an effective date of the Technical Report of July 27, 2023, and an effective date of the Mineral Resource Estimate of December 31, 2022.
3. I am a graduate of the University of Saskatchewan, 2002, with a Bachelor of Science in Geology. I am a member in good standing of the Association of Professional Geoscientists of Ontario and am registered as a Professional Geoscientist, license number 3025. I have worked as a Geologist for 20 years since graduation from university. My relevant experience includes operations, exploration, and resource estimation.
4. I have read the definition of “qualified person” set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purposes of NI 43-101.
5. My most recent visit to the Santa Cruz property was on March 2, 2023 for 5 days.
6. I am responsible for geology Sections 5-12, 14, and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.
7. I am independent of the issuer applying all the tests in section 1.5 of NI 43-101.
8. I have had prior involvement with the property that is the subject of the Technical Report. The nature of my prior involvement is with previous geology sections in Technical Reports, including Mineral Resource Estimates.
9. I have read NI 43-101 and Form 43-101F1 and the sections of the Technical Report I am responsible for have been prepared in compliance with that instrument and form.
10. As of the aforementioned Effective Date, to the best of my knowledge, information and belief, the sections of the Technical Report I am responsible for contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 11th Day of September, 2023.

Christian Ballard

PROFESSIONAL GEOSCIENTIST
CHRISTIAN A. L. BALLARD
PRACTISING MEMBER
3025
ONTARIO

Met Engineering, LLC

CERTIFICATE OF QUALIFIED PERSON

I, James Moore, BSc. Of Metallurgical Engineering, P. E., of Mesa, Arizona US, do hereby certify that:

1. I am the President of Met Engineering LLC with a business address at 802 S. Reseda, Mesa, Arizona USA.
2. This certificate applies to the technical report titled "NI 43-101 Preliminary Economic Assessment & Technical Report, Santa Cruz Project, Arizona" with a report date of September 11, 2023, an effective date of the Technical Report of July 27, 2023, and an effective date of the Mineral Resource Estimate of 31 December, 2022 (the "Technical Report").
3. I graduated with a BSc. Degree in Metallurgical Engineering from Colorado School of Mines in 1978. In addition, I am a professional member in good standing of the Society of Mining Engineers (SME, member No. 04163163) and a registered Professional Engineer in the state of Colorado, license number 0024529. I have worked as a Metallurgical Engineer for a total of 45 years since my graduation from university. My relevant experience includes 22 years of experience in mineral processing and metallurgical operations, 4 years in mineral processing equipment testing and sales, and 19 years in exploration and mineral resource project development.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I visited the Santa Cruz Arizona property on March 26, 2022 and February 23, 2023 for one day each time.
6. I am responsible for the Section 18.6.1 and portions of Sections 1, 25 and 26 summarized therefrom.
7. I am independent of the issuer applying all of the tests in section 1.5 of NI 43-101.
8. I have had prior involvement with the property that is the subject of the Technical Report. The nature of my prior involvement is for the chapter on mineral process and metallurgical testing in the Mineral Resource Estimate Update and NI 43-101 Technical Report for the Santa Cruz, Texaco and East Ridge Deposits, Arizona, USA, effective date 31 December 2022.
9. I have read NI 43-101 and Form 43-101F1 and the sections of the Technical Report I am responsible for have been prepared in compliance with that instrument and form.
10. As of the aforementioned Effective Date, to the best of my knowledge, information and belief, the sections of the Technical Report I am responsible for contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 11th Day of September 2023.

COLORADO LICENSED PROFESSIONAL ENGINEER
JAMES J MOORE
24529

James J. Moore

TETRA TECH

CERTIFICATE OF QUALIFIED PERSON

I, Daryl L. Longwell, P.E. do hereby certify that:

1. I am a Principal Civil Engineer of Tetra Tech, Inc., 390 Union Boulevard, Lakewood, Colorado, 80228.
2. This certificate applies to the technical report titled "NI 43-101 Preliminary Economic Assessment & Technical Report, Santa Cruz Project, Arizona" with a report date of September 11, 2023, an effective date of the Technical Report of July 27, 2023, and an effective date of the Mineral Resource Estimate of December 31, 2022 (the "Technical Report").
3. I graduated with a degree in Civil Engineering from The University of Colorado in 1986. I am a registered Professional Engineer in the State of Arizona. I have worked as a Civil Engineer for a total of 36 years since my graduation from university. My relevant experience includes: the design and execution of mine closure and remediation/reclamation projects; the development of environmental monitoring programs and the evaluation of collected surface water, groundwater, air, and biological resource data in consideration of both baseline conditions and potential project impacts; and environmental permitting under Federal, State and local jurisdictions for proposed, operating and inactive mine projects in Colorado, Arizona, South Carolina, Michigan, Idaho, New Mexico and Washington.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I visited the Santa Cruz project property on August 24, 2023 for 1 day.
6. I am responsible for the evaluation of environmental permitting requirements; review and summary of environmental baseline studies; review and summary of the community engagement plan; and review and summary of required federal, state, and local permits and authorizations; Sections 20.1 (with the exception of 20.1.9 and 20.1.10), 20.2 and 20.6, and portions of Sections 1, 25 and 26.
7. I am independent of the issuer applying all of the tests in section 1.5 of NI 43-101.
8. I have had prior involvement with the property that is the subject of the Technical Report. The nature of my prior involvement has been as a consultant to the Permitting and Social Responsibility Team and has included evaluating and summarizing results of baseline environmental studies including flora and fauna, threatened and endangered species, migratory birds, surface water mapping, cultural heritage, air quality, carbon intensity, as well as the community engagement plan. I have also assisted with county permitting associated with the exploration drilling program.
9. I have read NI 43-101 and Form 43-101F1 and the sections of the Technical Report I am responsible for have been prepared in compliance with that instrument and form.
10. As of the aforementioned Effective Date, to the best of my knowledge, information and belief, the sections of the Technical Report I am responsible for contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 11th Day of September, 2023.

Daryl L. Longwell

Registered Professional Engineer (Civil) CERTIFICATE NO. 66840 DARYL LONGWELL Date Signed 9.11.2023 ARIZONA U.S.A.

HALEY ALDRICH

CERTIFICATE OF QUALIFIED PERSON

I, Rick Frechette, P.E., do hereby certify that:

1. I am a Principal Geotechnical Engineer of Haley & Aldrich, Inc., 8101 E Prentice Avenue, Suite 600, Greenwood Village, Colorado 80111.
2. This certificate applies to the technical report titled "NI 43-101 Preliminary Economic Assessment & Technical Report, Santa Cruz Project, Arizona" with a report date of September 11, 2023, an effective date of the Technical Report of July 27, 2023, and an effective date of the Mineral Resource Estimate of December 31, 2022 (the "Technical Report").
3. I graduated with a Bachelor of Science degree in Geological Engineering, Geotechnics emphasis from University of Arizona in 1983. In addition, I am a Professional Engineer registered in the State of Arizona, No. 25788, holding a license since 1991. I have worked as a Geotechnical Engineer in the mining industry for a total of 39 years since my graduation from university. My relevant experience includes the permitting, design, construction support, and closure of tailings storage facilities as well as other large mining and mineral processing landforms.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I am responsible for Groundwater monitoring, material characterization, environmental permitting, and reclamation and closure. Sections 20.1.9 Groundwater Monitoring; 20.1.10 Material Characterization; 20.3 Requirements and Plans for Waste and Tailings Disposal, Site Monitoring, and Water Management During Operations and After Mine Closure; 20.4 Post-Performance or Reclamation Bonds; 20.5 Status of Permit Applications; 20.7 Mine Closure; and portions of Sections 1 Summary, 25 Interpretation and Conclusions, and 26 Recommendation as applicable.
6. I am independent of the issuer applying all of the tests in Section 1.5 of NI 43-101.
7. I have not had prior involvement with the property that is the subject of the Technical Report.
8. I have read NI 43-101 and Form 43-101F1 and the sections of the Technical Report I am responsible for have been prepared in compliance with that instrument and form.
9. As of the aforementioned Effective Date, to the best of my knowledge, information and belief, the sections of the Technical Report I am responsible for contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 11th Day of September, 2023.

____

Rick Frechette, P.E.

Registered Professional Engineer (Civil)
Certificate No.
Richard J. Frechette
No. 25788
Date Signed
Arizona, U.S.A.

ARCHITECTURE
ENGINEERING
CONSTRUCTION MANAGEMENT

CERTIFICATE OF QUALIFIED PERSON

This certificate applies to the technical report titled "NI 43-101 Preliminary Economic Assessment & Technical Report, Santa Cruz Project, Arizona" with a report date of September 11, 2023, an effective date of the Technical Report of July 27, 2023, and an effective date of the Mineral Resource Estimate of 31 December 2022 (the "Technical Report").

I, Laurie Tahija, MMSA-QP, Consultant (Processing), do hereby certify that:

1. I am currently employed as Senior Vice President by M3 Engineering & Technology Corporation, 2051 W. Sunset Road, Ste. 101, Tucson, Arizona 85704, USA.
2. I am a graduate of Montana College of Mineral Science and Technology, in Butte, Montana and received a Bachelor of Science degree in Mineral Processing Engineering in 1981.
3. I am recognized as a Qualified Professional (QP) member (#01399QP) with special expertise in Metallurgy/Processing by the Mining and Metallurgical Society of America (MMSA).
4. I have practiced mineral processing for 40 years. I have over twenty (20) years of plant operations and project management experience at a variety of mines including both precious metals and base metals. I have worked both in the United States (Nevada, Idaho, California) and overseas (Papua New Guinea, China, Chile, Mexico) at existing operations and at new operations during construction and startup. My operating experience in base metal processing includes copper heap leaching with SX/EW and zinc recovery using ion exchange, SX/EW, and casting. My operating experience in precious metals processing includes heap leaching, agitation leaching, gravity, flotation, Merrill-Crowe, and ADR (CIC & CIL). I have been responsible for process design for new plants and the retrofitting of existing operations. I have been involved in projects from construction to startup and continuing into operation. I have worked on scoping, pre-feasibility and feasibility studies for mining projects in the United States and Latin America, as well as worked on the design and construction phases of some of these projects.
5. I visited the property that is the subject of the Technical Report on February 23, 2023, for one (1) day.
6. I have read the definition of "qualified person" set out in National Instrument 43-101 Standards of Disclosure for Mineral Projects ("NI 43-101") and certify that by virtue of my education, affiliation with a professional association and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
7. I am independent of the issuer as defined by Section 1.5 of NI 43-101.
8. I accept professional responsibility for Sections 13 and 17 as well as relevant information in Section 1, 25, & 26 of the Technical Report.
9. I have not had prior involvement with the property that is the subject of the Technical Report.
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.

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Tucson, Arizona
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t 520.293.1488
f 520.293.8349
www.m3eng.com

11. I have read NI 43-101 and Form 43-101F1. The sections of the Technical Report that I am responsible for have been prepared in compliance with that instrument and form.

Dated this 11th day of September 2023.

Signature of Qualified Person

Laurie Tahija
Print Name of Qualified Person

Laurie M. Tahija
01399QP
Mining & Metallurgical Society of America

CERTIFICATE OF QUALIFIED PERSON

This certificate applies to the technical report titled "NI 43-101 Preliminary Economic Assessment & Technical Report, Santa Cruz Project, Arizona" with a report date of September 11, 2023, an effective date of the Technical Report of July 27, 2023, and an effective date of the Mineral Resource Estimate of 31 December 2022 (the "Technical Report").

I, John W. Woodson, P.E., SME-RM, do hereby certify that:

1. I am employed as Chief Financial Officer, Senior Vice President, Project Manager and Project Sponsor of:

   M3 Engineering and Technology Corporation
   2051 W. Sunset Rd., Ste. 101
   Tucson, AZ 85704
   U.S.A.

2. I graduated with a Bachelor of Science in Civil Engineering from the University of Arizona in 2003 and a Master of Science in Civil Engineering from the University of Arizona in 2008.

3. I am a registered professional engineer in good standing in the State of Arizona in the area of Structural Engineering (No. 47714). I am also registered as a professional engineer in the states of California (No. 73405), Nevada (No. 029163) and Michigan (No. 6201057625).

4. I am a registered member in good standing of the Society for Mining, Metallurgy and Exploration, Inc. (No. 4316227).

5. I have worked as an engineer for a total of 18 years. My experience includes 16 years at M3 Engineering and Technology Corporation working on all aspects of mine plant development for base and precious metals projects with a specific focus on plant layout, infrastructure, estimating and scheduling. As Project Manager and Sponsor, I have been involved with studies as well as full engineering, procurement, and construction management (EPCM) projects.

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. I am a contributing author for the preparation of the technical report titled "NI 43-101 Technical Report Preliminary Economic Assessment Santa Cruz Arizona" (the "Technical Report"), dated effective September 8, 2023, prepared for Ivanhoe Electric Inc., and am responsible for Sections 18.1, 18.2, 18.3, 18.4, 18.6.2, 18.6.3, 18.7, 18.8, 21 - with the exception of the mining portion, and portions of Sections 1, 25 and 26 summarized therefrom, of this Technical Report.

7. I visited the project site on August 30, 2023, for one day, for an in-person inspection.

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www.m3eng.com

8. I have not had prior involvement with the subject property.

9. As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the Technical Report for which I was responsible contain 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 NI 43-101 and Form 43-101F1, and the sections of the Technical Report for which I was responsible for have been prepared in compliance with that instrument and form.

Signed and dated this 11th day of September 2023.

Signature of Qualified Person

John W. Woodson
Print Name of Qualified Person

Appendix B: Property and Rights

Owner	Claim Name	Serial Number	Dispostion	Case Type	Last Assmt Year	Location Date	Acreage	Meridian Township Range Section	Subdiv	Active Serial Count	Lead Case Serial Number
Mesa Cobre Holding Corporation	SCX 1	AMC460163	ACTIVE	LODE	2020	2/26/2020	20.66	14 0060S 0040E 003	NW,SW	AMC460163	AMC460163
Mesa Cobre Holding Corporation	SCX 2	AMC460164	ACTIVE	LODE	2020	2/26/2020	20.66	14 0060S 0040E 003	NW,SW	AMC460164	AMC460163
Mesa Cobre Holding Corporation	SCX 3	AMC460165	ACTIVE	LODE	2020	2/26/2020	20.66	14 0060S 0040E 003	NW,SW	AMC460165	AMC460163
Mesa Cobre Holding Corporation	SCX 4	AMC460166	ACTIVE	LODE	2020	2/26/2020	20.66	14 0060S 0040E 003	NW,SW	AMC460166	AMC460163
Mesa Cobre Holding Corporation	SCX 5	AMC460167	ACTIVE	LODE	2020	2/26/2020	20.66	14 0060S 0040E 003	NE,NW,SW,SE	AMC460167	AMC460163
Mesa Cobre Holding Corporation	SCX 6	AMC460168	ACTIVE	LODE	2020	3/1/2020	20.66	14 0060S 0040E 003	NE,SE	AMC460168	AMC460163
Mesa Cobre Holding Corporation	SCX 7	AMC460169	ACTIVE	LODE	2020	3/1/2020	20.66	14 0060S 0040E 003	NE,SE	AMC460169	AMC460163
Mesa Cobre Holding Corporation	SCX 8	AMC460170	ACTIVE	LODE	2020	3/1/2020	20.66	14 0060S 0040E 003	NE,SE	AMC460170	AMC460163
Mesa Cobre Holding Corporation	SCX 9	AMC460171	ACTIVE	LODE	2020	3/1/2020	20.66	14 0060S 0040E 003	NE,SE	AMC460171	AMC460163
Mesa Cobre Holding Corporation	SCX 10	AMC460172	ACTIVE	LODE	2020	2/26/2020	20.66	14 0060S 0040E 004	SE	AMC460172	AMC460163
Mesa Cobre Holding Corporation	SCX 11	AMC460173	ACTIVE	LODE	2020	2/26/2020	20.66	14 0060S 0040E 003	SW,SE	AMC460173	AMC460163
Mesa Cobre Holding Corporation	SCX 12	AMC460174	ACTIVE	LODE	2020	2/26/2020	20.66	14 0060S 0040E 003	SW	AMC460174	AMC460163
Mesa Cobre Holding Corporation	SCX 13	AMC460175	ACTIVE	LODE	2020	2/26/2020	20.66	14 0060S 0040E 010	NE,NW	AMC460175	AMC460163
Mesa Cobre Holding Corporation	SCX 14	AMC460176	ACTIVE	LODE	2020	3/1/2020	20.66	14 0060S 0040E 003	SE	AMC460176	AMC460163
Mesa Cobre Holding Corporation	SCX 15	AMC460177	ACTIVE	LODE	2020	3/1/2020	12.4	14 0060S 0040E 003	SE	AMC460177	AMC460163
Mesa Cobre Holding Corporation	SCX 16	AMC460178	ACTIVE	LODE	2020	3/1/2020	20.66	14 0060S 0040E 003	SE	AMC460178	AMC460163
Mesa Cobre Holding Corporation	SCX 17	AMC460179	ACTIVE	LODE	2020	3/1/2020	12.4	14 0060S 0040E 002	SW	AMC460179	AMC460163
Mesa Cobre Holding Corporation	SCX 18	AMC460180	ACTIVE	LODE	2020	2/26/2020	20.66	14 0060S 0040E 034	SE	AMC460180	AMC460163
Mesa Cobre Holding Corporation	SCX 19	AMC460181	ACTIVE	LODE	2020	2/26/2020	20.66	14 0070S 0040E 002	NE,SE	AMC460181	AMC460163
Mesa Cobre Holding Corporation	SCX 20	AMC460182	ACTIVE	LODE	2020	2/26/2020	20.66	14 0070S 0040E 002	SE	AMC460182	AMC460163
Mesa Cobre Holding Corporation	SCX 21	AMC460183	ACTIVE	LODE	2020	2/26/2020	20.66	14 0070S 0040E 001	SW	AMC460183	AMC460163
Mesa Cobre Holding Corporation	SCX 22	AMC460184	ACTIVE	LODE	2020	2/26/2020	20.66	14 0070S 0040E 001	NW,SW	AMC460184	AMC460163
Mesa Cobre Holding Corporation	SCX 23	AMC460185	ACTIVE	LODE	2020	2/26/2020	12.4	14 0070S 0040E 001	SW	AMC460185	AMC460163
Mesa Cobre Holding Corporation	SCX 24	AMC460186	ACTIVE	LODE	2020	2/26/2020	20.66	14 0070S 0040E 001	SW,SE	AMC460186	AMC460163
Mesa Cobre Holding Corporation	SCX 25	AMC460187	ACTIVE	LODE	2020	2/26/2020	12.4	14 0070S 0040E 001	SW,SE	AMC460187	AMC460163
Mesa Cobre Holding Corporation	SCX 26	AMC460188	ACTIVE	LODE	2020	3/8/2020	20.66	14 0060S 0030E 033	NW	AMC460188	AMC460163
Mesa Cobre Holding Corporation	SCX 27	AMC460189	ACTIVE	LODE	2020	3/8/2020	20.66	14 0060S 0030E 032	NE	AMC460189	AMC460163
Mesa Cobre Holding Corporation	SCX 28	AMC460190	ACTIVE	LODE	2020	3/8/2020	20.66	14 0060S 0030E 033	NW	AMC460190	AMC460163
Mesa Cobre Holding Corporation	SCX 29	AMC460191	ACTIVE	LODE	2020	3/8/2020	20.66	14 0060S 0030E 033	NW	AMC460191	AMC460163
Mesa Cobre Holding Corporation	SCX 30	AMC460192	ACTIVE	LODE	2020	3/8/2020	20.66	14 0060S 0030E 032	NE,SE	AMC460192	AMC460163
Mesa Cobre Holding Corporation	SCX 31	AMC460193	ACTIVE	LODE	2020	3/8/2020	20.66	14 0060S 0030E 033	NW	AMC460193	AMC460163
Mesa Cobre Holding Corporation	SCX 32	AMC460194	ACTIVE	LODE	2020	3/8/2020	20.66	14 0060S 0030E 033	NW,SW	AMC460194	AMC460163
Mesa Cobre Holding Corporation	SCX 33	AMC460195	ACTIVE	LODE	2020	3/8/2020	20.66	14 0060S 0030E 033	NE,NW	AMC460195	AMC460163
Mesa Cobre Holding Corporation	SCX 34	AMC460196	ACTIVE	LODE	2020	3/8/2020	20.66	14 0060S 0030E 033	NE,NW,SW,SE	AMC460196	AMC460163
Mesa Cobre Holding Corporation	SCX 35	AMC460197	ACTIVE	LODE	2020	3/9/2020	20.66	14 0060S 0030E 032	SE	AMC460197	AMC460163
Mesa Cobre Holding Corporation	SCX 36	AMC460198	ACTIVE	LODE	2020	3/9/2020	20.66	14 0070S 0030E 003	NW	AMC460198	AMC460163
Mesa Cobre Holding Corporation	SCX 37	AMC460199	ACTIVE	LODE	2020	3/9/2020	20.66	14 0060S 0030E 033	SW	AMC460199	AMC460163
Mesa Cobre Holding Corporation	SCX 38	AMC460200	ACTIVE	LODE	2020	3/9/2020	20.66	14 0070S 0030E 003	NW	AMC460200	AMC460163
Mesa Cobre Holding Corporation	SCX 39	AMC460201	ACTIVE	LODE	2020	3/9/2020	20.66	14 0060S 0030E 033	SW	AMC460201	AMC460163
Mesa Cobre Holding Corporation	SCX 40	AMC460202	ACTIVE	LODE	2020	3/9/2020	20.66	14 0070S 0030E 003	NW	AMC460202	AMC460163
Mesa Cobre Holding Corporation	SCX 41	AMC460203	ACTIVE	LODE	2020	3/9/2020	20.66	14 0060S 0030E 033	SW	AMC460203	AMC460163
Mesa Cobre Holding Corporation	SCX 42	AMC460204	ACTIVE	LODE	2020	3/9/2020	20.66	14 0060S 0030E 033	SW	AMC460204	AMC460163
Mesa Cobre Holding Corporation	SCX 43	AMC460205	ACTIVE	LODE	2020	3/9/2020	20.66	14 0060S 0030E 033	SW,SE	AMC460205	AMC460163
Owner	Claim Name	Serial Number	Dispostion	Case Type	Last Assmt Year	Location Date	Acreage	Meridian Township Range Section	Subdiv	Active Serial Count	Lead Case Serial Number
Mesa Cobre Holding Corporation	SCX 44	AMC460206	ACTIVE	LODE	2020	3/9/2020	20.66	14 0070S 0030E 003	NE,NW	AMC460206	AMC460163
Mesa Cobre Holding Corporation	SCX 45	AMC460207	ACTIVE	LODE	2020	3/9/2020	20.66	14 0060S 0030E 033	SE	AMC460207	AMC460163

Mesa Cobre Holding Corporation	SCX 46	AMC460208	ACTIVE	LODE	2020	3/9/2020	20.66	14 0070S 0030E 003	NE	AMC460208	AMC460163
Mesa Cobre Holding Corporation	SCX 47	AMC460209	ACTIVE	LODE	2020	3/9/2020	20.66	14 0060S 0030E 033	SE	AMC460209	AMC460163
Mesa Cobre Holding Corporation	SCX 48	AMC460210	ACTIVE	LODE	2020	3/9/2020	20.66	14 0070S 0030E 003	NE	AMC460210	AMC460163
Mesa Cobre Holding Corporation	SCX 49	AMC460211	ACTIVE	LODE	2020	3/9/2020	20.66	14 0060S 0030E 033	SE	AMC460211	AMC460163
Mesa Cobre Holding Corporation	SCX 50	AMC460212	ACTIVE	LODE	2020	3/9/2020	20.66	14 0060S 0030E 033	SE	AMC460212	AMC460163
Mesa Cobre Holding Corporation	SCX 51	AMC460213	ACTIVE	LODE	2020	3/9/2020	20.66	14 0060S 0030E 034	SW	AMC460213	AMC460163
Mesa Cobre Holding Corporation	SCX 52	AMC460214	ACTIVE	LODE	2020	3/9/2020	20.66	14 0060S 0030E 033	SE	AMC460214	AMC460163
Mesa Cobre Holding Corporation	SCX 53	AMC460215	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 003	NW,SW	AMC460215	AMC460163
Mesa Cobre Holding Corporation	SCX 54	AMC460216	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NW	AMC460216	AMC460163
Mesa Cobre Holding Corporation	SCX 55	AMC460217	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 003	NW,SW	AMC460217	AMC460163
Mesa Cobre Holding Corporation	SCX 56	AMC460218	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NW	AMC460218	AMC460163
Mesa Cobre Holding Corporation	SCX 57	AMC460219	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 003	NW,SW	AMC460219	AMC460163
Mesa Cobre Holding Corporation	SCX 58	AMC460220	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NW	AMC460220	AMC460163
Mesa Cobre Holding Corporation	SCX 59	AMC460221	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 003	NW,SW	AMC460221	AMC460163
Mesa Cobre Holding Corporation	SCX 60	AMC460222	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 003	SW	AMC460222	AMC460163
Mesa Cobre Holding Corporation	SCX 61	AMC460223	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 003	NE,NW,SW,SE	AMC460223	AMC460163
Mesa Cobre Holding Corporation	SCX 62	AMC460224	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NE,NW	AMC460224	AMC460163
Mesa Cobre Holding Corporation	SCX 63	AMC460225	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 003	NE,SE	AMC460225	AMC460163
Mesa Cobre Holding Corporation	SCX 64	AMC460226	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NE	AMC460226	AMC460163
Mesa Cobre Holding Corporation	SCX 65	AMC460227	ACTIVE	LODE	2020	3/8/2020	20.66	14 0070S 0030E 003	NE,SE	AMC460227	AMC460163
Mesa Cobre Holding Corporation	SCX 66	AMC460228	ACTIVE	LODE	2020	3/8/2020	20.66	14 0070S 0030E 010	NE	AMC460228	AMC460163
Mesa Cobre Holding Corporation	SCX 67	AMC460229	ACTIVE	LODE	2020	3/8/2020	20.66	14 0070S 0030E 003	NE,SE	AMC460229	AMC460163
Mesa Cobre Holding Corporation	SCX 68	AMC460230	ACTIVE	LODE	2020	3/8/2020	20.66	14 0070S 0030E 003	SE	AMC460230	AMC460163
Mesa Cobre Holding Corporation	SCX 69	AMC460231	ACTIVE	LODE	2020	3/8/2020	20.66	14 0070S 0030E 003	NE,SE	AMC460231	AMC460163
Mesa Cobre Holding Corporation	SCX 70	AMC460232	ACTIVE	LODE	2020	3/8/2020	20.66	14 0070S 0030E 002	SW	AMC460232	AMC460163
Mesa Cobre Holding Corporation	SCX 71	AMC460233	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NW	AMC460233	AMC460163
Mesa Cobre Holding Corporation	SCX 72	AMC460234	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NW,SW	AMC460234	AMC460163
Mesa Cobre Holding Corporation	SCX 73	AMC460235	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NW	AMC460235	AMC460163
Mesa Cobre Holding Corporation	SCX 74	AMC460236	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NW,SW	AMC460236	AMC460163
Mesa Cobre Holding Corporation	SCX 75	AMC460237	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NW	AMC460237	AMC460163
Mesa Cobre Holding Corporation	SCX 76	AMC460238	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NW,SW	AMC460238	AMC460163
Mesa Cobre Holding Corporation	SCX 77	AMC460239	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NW	AMC460239	AMC460163
Mesa Cobre Holding Corporation	SCX 78	AMC460240	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NW,SW	AMC460240	AMC460163
Mesa Cobre Holding Corporation	SCX 79	AMC460241	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NE,NW	AMC460241	AMC460163
Mesa Cobre Holding Corporation	SCX 80	AMC460242	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NE,NW,SW,SE	AMC460242	AMC460163
Mesa Cobre Holding Corporation	SCX 81	AMC460243	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NE	AMC460243	AMC460163
Mesa Cobre Holding Corporation	SCX 82	AMC460244	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NE,SE	AMC460244	AMC460163
Mesa Cobre Holding Corporation	SCX 83	AMC460245	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NE	AMC460245	AMC460163
Mesa Cobre Holding Corporation	SCX 84	AMC460246	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NE,SE	AMC460246	AMC460163
Mesa Cobre Holding Corporation	SCX 85	AMC460247	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NE	AMC460247	AMC460163
Mesa Cobre Holding Corporation	SCX 86	AMC460248	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NE,SE	AMC460248	AMC460163
Owner	**Claim Name**	**Serial Number**	**Dispostion**	**Case Type**	**Last Assmt Year**	**Location Date**	**Acreage**	**Meridian Township Range Section**	**Subdiv**	**Active Serial Count**	**Lead Case Serial Number**
Mesa Cobre Holding Corporation	SCX 87	AMC460249	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 010	NE	AMC460249	AMC460163
Mesa Cobre Holding Corporation	SCX 88	AMC460250	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NW,SW	AMC460250	AMC460163
Mesa Cobre Holding Corporation	SCX 89	AMC460251	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NW	AMC460251	AMC460163
Mesa Cobre Holding Corporation	SCX 90	AMC460252	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NW,SW	AMC460252	AMC460163
Mesa Cobre Holding Corporation	SCX 91	AMC460253	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NW	AMC460253	AMC460163

Mesa Cobre Holding Corporation	SCX 92	AMC460254	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NW,SW	AMC460254	AMC460163
Mesa Cobre Holding Corporation	SCX 93	AMC460255	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NW	AMC460255	AMC460163
Mesa Cobre Holding Corporation	SCX 94	AMC460256	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NW,SW	AMC460256	AMC460163
Mesa Cobre Holding Corporation	SCX 95	AMC460257	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NW	AMC460257	AMC460163
Mesa Cobre Holding Corporation	SCX 96	AMC460258	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NW,SW	AMC460258	AMC460163
Mesa Cobre Holding Corporation	SCX 97	AMC460259	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NE,NW	AMC460259	AMC460163
Mesa Cobre Holding Corporation	SCX 98	AMC460260	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NE,NW,SW,SE	AMC460260	AMC460163
Mesa Cobre Holding Corporation	SCX 99	AMC460261	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NE	AMC460261	AMC460163
Mesa Cobre Holding Corporation	SCX 100	AMC460262	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NE,SE	AMC460262	AMC460163
Mesa Cobre Holding Corporation	SCX 101	AMC460263	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NE	AMC460263	AMC460163
Mesa Cobre Holding Corporation	SCX 102	AMC460264	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NE	AMC460264	AMC460163
Mesa Cobre Holding Corporation	SCX 103	AMC460265	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NE	AMC460265	AMC460163
Mesa Cobre Holding Corporation	SCX 104	AMC460266	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NE	AMC460266	AMC460163
Mesa Cobre Holding Corporation	SCX 105	AMC460267	ACTIVE	LODE	2020	2/29/2020	20.66	14 0070S 0030E 011	NE,SE	AMC460267	AMC460163
Mesa Cobre Holding Corporation	SCX 106	AMC460268	ACTIVE	LODE	2020	3/8/2020	20.66	14 0070S 0040E 003	SW	AMC460268	AMC460163
Mesa Cobre Holding Corporation	SCX 107	AMC460269	ACTIVE	LODE	2020	3/31/2020	20.66	14 0070S 0040E 010	NW	AMC460269	AMC460163
Mesa Cobre Holding Corporation	SCX 108	AMC460270	ACTIVE	LODE	2020	3/8/2020	20.66	14 0070S 0040E 010	NW	AMC460270	AMC460163
Mesa Cobre Holding Corporation	SCX 109	AMC460271	ACTIVE	LODE	2020	3/31/2020	20.66	14 0070S 0040E 010	NW	AMC460271	AMC460163
Mesa Cobre Holding Corporation	SCX 110	AMC460272	ACTIVE	LODE	2020	3/8/2020	20.66	14 0070S 0040E 003	SW	AMC460272	AMC460163
Mesa Cobre Holding Corporation	SCX 111	AMC460273	ACTIVE	LODE	2020	3/31/2020	20.66	14 0070S 0040E 010	NW	AMC460273	AMC460163
Mesa Cobre Holding Corporation	SCX 112	AMC460274	ACTIVE	LODE	2020	3/8/2020	20.66	14 0070S 0040E 010	NW	AMC460274	AMC460163
Mesa Cobre Holding Corporation	SCX 113	AMC460275	ACTIVE	LODE	2020	3/31/2020	20.66	14 0070S 0040E 010	NW	AMC460275	AMC460163
Mesa Cobre Holding Corporation	SCX 114	AMC460276	ACTIVE	LODE	2020	3/8/2020	20.66	14 0070S 0040E 003	SW,SE	AMC460276	AMC460163
Mesa Cobre Holding Corporation	SCX 118	AMC460277	ACTIVE	LODE	2020	3/6/2020	18.6	14 0070S 0040E 021	SW	AMC460277	AMC460163
Mesa Cobre Holding Corporation	SCX 119	AMC460278	ACTIVE	LODE	2020	3/6/2020	18.6	14 0070S 0040E 021	SW	AMC460278	AMC460163
Mesa Cobre Holding Corporation	SCX 120	AMC460279	ACTIVE	LODE	2020	3/6/2020	18.6	14 0070S 0040E 020	SE	AMC460279	AMC460163
Mesa Cobre Holding Corporation	SCX 121	AMC460280	ACTIVE	LODE	2020	3/6/2020	18.6	14 0070S 0040E 021	SW	AMC460280	AMC460163
Mesa Cobre Holding Corporation	SCX 122	AMC460281	ACTIVE	LODE	2020	3/6/2020	20.66	14 0070S 0040E 020	SE	AMC460281	AMC460163
Mesa Cobre Holding Corporation	SCX 123	AMC460282	ACTIVE	LODE	2020	3/6/2020	20.66	14 0070S 0040E 029	NE	AMC460282	AMC460163
Mesa Cobre Holding Corporation	SCX 124	AMC460283	ACTIVE	LODE	2020	3/6/2020	20.66	14 0070S 0040E 029	NE	AMC460283	AMC460163
Mesa Cobre Holding Corporation	SCX 125	AMC460284	ACTIVE	LODE	2020	3/6/2020	20.66	14 0070S 0040E 028	NW	AMC460284	AMC460163
Mesa Cobre Holding Corporation	SCX 126	AMC460285	ACTIVE	LODE	2020	3/6/2020	20.66	14 0070S 0040E 028	NW,SW	AMC460285	AMC460163
Mesa Cobre Holding Corporation	SCX 127	AMC460286	ACTIVE	LODE	2020	3/6/2020	20.66	14 0070S 0040E 028	SW	AMC460286	AMC460163
Mesa Cobre Holding Corporation	SCX 128	AMC460287	ACTIVE	LODE	2020	3/6/2020	20.66	14 0070S 0040E 028	SW	AMC460287	AMC460163
Mesa Cobre Holding Corporation	SCX 129	AMC460288	ACTIVE	LODE	2020	3/6/2020	20.66	14 0070S 0040E 028	SW	AMC460288	AMC460163
Mesa Cobre Holding Corporation	SCX 130	AMC460289	ACTIVE	LODE	2020	3/6/2020	20.66	14 0070S 0040E 028	SW	AMC460289	AMC460163
Mesa Cobre Holding Corporation	SCX 131	AMC460290	ACTIVE	LODE	2020	3/6/2020	9.99	14 0070S 0040E 028	NW	AMC460290	AMC460163
Mesa Cobre Holding Corporation	SCX 132	AMC460291	ACTIVE	LODE	2020	3/6/2020	20.66	14 0070S 0040E 028	NW	AMC460291	AMC460163
Owner	**Claim Name**	**Serial Number**	**Dispostion**	**Case Type**	**Last Assmt Year**	**Location Date**	**Acreage**	**Meridian Township Range Section**	**Subdiv**	**Active Serial Count**	**Lead Case Serial Number**
Mesa Cobre Holding Corporation	SCX 133	AMC460292	ACTIVE	LODE	2020	3/6/2020	9.99	14 0070S 0040E 028	NE,NW	AMC460292	AMC460163
Mesa Cobre Holding Corporation	SCX 134	AMC460293	ACTIVE	LODE	2020	3/6/2020	20.66	14 0070S 0040E 028	NE,NW	AMC460293	AMC460163
Mesa Cobre Holding Corporation	SCX 135	AMC460294	ACTIVE	LODE	2020	3/6/2020	20.66	14 0070S 0040E 028	NW,SW	AMC460294	AMC460163
Mesa Cobre Holding Corporation	SCX 136	AMC460295	ACTIVE	LODE	2020	3/6/2020	20.66	14 0070S 0040E 028	SW	AMC460295	AMC460163
Mesa Cobre Holding Corporation	SCX 137	AMC460296	ACTIVE	LODE	2020	3/6/2020	20.66	14 0070S 0040E 028	NE,NW,SW,SE	AMC460296	AMC460163
Mesa Cobre Holding Corporation	SCX 138	AMC460297	ACTIVE	LODE	2020	3/6/2020	20.66	14 0070S 0040E 028	SW,SE	AMC460297	AMC460163
Mesa Cobre Holding Corporation	SCX 139	AMC460298	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	NW	AMC460298	AMC460163
Mesa Cobre Holding Corporation	SCX 140	AMC460299	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	NW,SW	AMC460299	AMC460163

Mesa Cobre Holding Corporation	SCX 141	AMC460300	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	NW	AMC460300	AMC460163
Mesa Cobre Holding Corporation	SCX 142	AMC460301	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	NW,SW	AMC460301	AMC460163
Mesa Cobre Holding Corporation	SCX 143	AMC460302	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	NW	AMC460302	AMC460163
Mesa Cobre Holding Corporation	SCX 144	AMC460303	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	NW,SW	AMC460303	AMC460163
Mesa Cobre Holding Corporation	SCX 145	AMC460304	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	NW	AMC460304	AMC460163
Mesa Cobre Holding Corporation	SCX 146	AMC460305	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	NW,SW	AMC460305	AMC460163
Mesa Cobre Holding Corporation	SCX 147	AMC460306	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 027	NE,NW	AMC460306	AMC460163
Mesa Cobre Holding Corporation	SCX 148	AMC460307	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 027	NE,NW,SW,SE	AMC460307	AMC460163
Mesa Cobre Holding Corporation	SCX 149	AMC460308	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 027	NE	AMC460308	AMC460163
Mesa Cobre Holding Corporation	SCX 150	AMC460309	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 027	NE,SE	AMC460309	AMC460163
Mesa Cobre Holding Corporation	SCX 151	AMC460310	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 027	NE	AMC460310	AMC460163
Mesa Cobre Holding Corporation	SCX 152	AMC460311	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 027	NE,SE	AMC460311	AMC460163
Mesa Cobre Holding Corporation	SCX 153	AMC460312	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 027	NE	AMC460312	AMC460163
Mesa Cobre Holding Corporation	SCX 154	AMC460313	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 027	NE,SE	AMC460313	AMC460163
Mesa Cobre Holding Corporation	SCX 155	AMC460314	ACTIVE	LODE	2020	3/3/2020	16.7	14 0070S 0040E 026	NW	AMC460314	AMC460163
Mesa Cobre Holding Corporation	SCX 156	AMC460315	ACTIVE	LODE	2020	3/3/2020	16.7	14 0070S 0040E 027	NE,SE	AMC460315	AMC460163
Mesa Cobre Holding Corporation	SCX 157	AMC460316	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	SW	AMC460316	AMC460163
Mesa Cobre Holding Corporation	SCX 158	AMC460317	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	SW	AMC460317	AMC460163
Mesa Cobre Holding Corporation	SCX 159	AMC460318	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	SW	AMC460318	AMC460163
Mesa Cobre Holding Corporation	SCX 160	AMC460319	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NW	AMC460319	AMC460163
Mesa Cobre Holding Corporation	SCX 161	AMC460320	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	SW	AMC460320	AMC460163
Mesa Cobre Holding Corporation	SCX 162	AMC460321	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	SW	AMC460321	AMC460163
Mesa Cobre Holding Corporation	SCX 163	AMC460322	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	SW	AMC460322	AMC460163
Mesa Cobre Holding Corporation	SCX 164	AMC460323	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NW	AMC460323	AMC460163
Mesa Cobre Holding Corporation	SCX 165	AMC460324	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	SW,SE	AMC460324	AMC460163
Mesa Cobre Holding Corporation	SCX 166	AMC460325	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NE,NW	AMC460325	AMC460163
Mesa Cobre Holding Corporation	SCX 167	AMC460326	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	SE	AMC460326	AMC460163
Mesa Cobre Holding Corporation	SCX 168	AMC460327	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	SE	AMC460327	AMC460163
Mesa Cobre Holding Corporation	SCX 169	AMC460328	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 027	SE	AMC460328	AMC460163
Mesa Cobre Holding Corporation	SCX 170	AMC460329	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NE	AMC460329	AMC460163
Mesa Cobre Holding Corporation	SCX 171	AMC460330	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 027	SE	AMC460330	AMC460163
Mesa Cobre Holding Corporation	SCX 172	AMC460331	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 027	SE	AMC460331	AMC460163
Mesa Cobre Holding Corporation	SCX 173	AMC460332	ACTIVE	LODE	2020	3/3/2020	16.7	14 0070S 0040E 027	SE	AMC460332	AMC460163
Mesa Cobre Holding Corporation	SCX 174	AMC460333	ACTIVE	LODE	2020	3/3/2020	10.02	14 0070S 0040E 026	SW	AMC460333	AMC460163
Mesa Cobre Holding Corporation	SCX 175	AMC460334	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 035	NW	AMC460334	AMC460163
Owner	**Claim Name**	**Serial Number**	**Dispostion**	**Case Type**	**Last Assmt Year**	**Location Date**	**Acreage**	**Meridian Township Range Section**	**Subdiv**	**Active Serial Count**	**Lead Case Serial Number**
Mesa Cobre Holding Corporation	SCX 176	AMC460335	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 035	NW	AMC460335	AMC460163
Mesa Cobre Holding Corporation	SCX 177	AMC460336	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NW	AMC460336	AMC460163
Mesa Cobre Holding Corporation	SCX 178	AMC460337	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NW,SW	AMC460337	AMC460163
Mesa Cobre Holding Corporation	SCX 179	AMC460338	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NW	AMC460338	AMC460163
Mesa Cobre Holding Corporation	SCX 180	AMC460339	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NW,SW	AMC460339	AMC460163
Mesa Cobre Holding Corporation	SCX 181	AMC460340	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NW	AMC460340	AMC460163
Mesa Cobre Holding Corporation	SCX 182	AMC460341	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NW,SW	AMC460341	AMC460163
Mesa Cobre Holding Corporation	SCX 183	AMC460342	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NW	AMC460342	AMC460163
Mesa Cobre Holding Corporation	SCX 184	AMC460343	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NW,SW	AMC460343	AMC460163
Mesa Cobre Holding Corporation	SCX 185	AMC460344	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NE,NW	AMC460344	AMC460163
Mesa Cobre Holding Corporation	SCX 186	AMC460345	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NE,NW,SW,SE	AMC460345	AMC460163

Mesa Cobre Holding Corporation	SCX 187	AMC460346	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NE	AMC460346	AMC460163
Mesa Cobre Holding Corporation	SCX 188	AMC460347	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NE,SE	AMC460347	AMC460163
Mesa Cobre Holding Corporation	SCX 189	AMC460348	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NE	AMC460348	AMC460163
Mesa Cobre Holding Corporation	SCX 190	AMC460349	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NE,SE	AMC460349	AMC460163
Mesa Cobre Holding Corporation	SCX 191	AMC460350	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NE	AMC460350	AMC460163
Mesa Cobre Holding Corporation	SCX 192	AMC460351	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NE,SE	AMC460351	AMC460163
Mesa Cobre Holding Corporation	SCX 193	AMC460352	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 034	NE	AMC460352	AMC460163
Mesa Cobre Holding Corporation	SCX 194	AMC460353	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 035	NW,SW	AMC460353	AMC460163
Mesa Cobre Holding Corporation	SCX 195	AMC460354	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 035	NW	AMC460354	AMC460163
Mesa Cobre Holding Corporation	SCX 196	AMC460355	ACTIVE	LODE	2020	3/4/2020	20.66	14 0070S 0040E 035	NW,SW	AMC460355	AMC460163
Mesa Cobre Holding Corporation	SCX 197	AMC460356	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 035	NW	AMC460356	AMC460163
Mesa Cobre Holding Corporation	SCX 198	AMC460357	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 035	NW,SW	AMC460357	AMC460163
Mesa Cobre Holding Corporation	SCX 199	AMC460358	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 035	NW	AMC460358	AMC460163
Mesa Cobre Holding Corporation	SCX 200	AMC460359	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 035	NW,SW	AMC460359	AMC460163
Mesa Cobre Holding Corporation	SCX 201	AMC460360	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 035	NW	AMC460360	AMC460163
Mesa Cobre Holding Corporation	SCX 202	AMC460361	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 035	NW,SW	AMC460361	AMC460163
Mesa Cobre Holding Corporation	SCX 203	AMC460362	ACTIVE	LODE	2020	3/5/2020	20.66	14 0070S 0040E 034	SW	AMC460362	AMC460163
Mesa Cobre Holding Corporation	SCX 204	AMC460363	ACTIVE	LODE	2020	3/5/2020	20.66	14 0070S 0040E 034	SW	AMC460363	AMC460163
Mesa Cobre Holding Corporation	SCX 205	AMC460364	ACTIVE	LODE	2020	3/5/2020	20.66	14 0070S 0040E 034	SW	AMC460364	AMC460163
Mesa Cobre Holding Corporation	SCX 206	AMC460365	ACTIVE	LODE	2020	3/5/2020	20.66	14 0070S 0040E 034	SW	AMC460365	AMC460163
Mesa Cobre Holding Corporation	SCX 207	AMC460366	ACTIVE	LODE	2020	3/5/2020	20.66	14 0070S 0040E 034	SW,SE	AMC460366	AMC460163
Mesa Cobre Holding Corporation	SCX 208	AMC460367	ACTIVE	LODE	2020	3/5/2020	20.66	14 0070S 0040E 034	SE	AMC460367	AMC460163
Mesa Cobre Holding Corporation	SCX 209	AMC460368	ACTIVE	LODE	2020	3/5/2020	20.66	14 0070S 0040E 034	SE	AMC460368	AMC460163
Mesa Cobre Holding Corporation	SCX 210	AMC460369	ACTIVE	LODE	2020	3/5/2020	20.66	14 0070S 0040E 034	SE	AMC460369	AMC460163
Mesa Cobre Holding Corporation	SCX 211	AMC460370	ACTIVE	LODE	2020	3/5/2020	20.66	14 0070S 0040E 035	SW	AMC460370	AMC460163
Mesa Cobre Holding Corporation	SCX 212	AMC460371	ACTIVE	LODE	2020	3/5/2020	20.66	14 0070S 0040E 035	SW	AMC460371	AMC460163
Mesa Cobre Holding Corporation	SCX 213	AMC460372	ACTIVE	LODE	2020	3/5/2020	20.66	14 0070S 0040E 035	SW	AMC460372	AMC460163
Mesa Cobre Holding Corporation	SCX 214	AMC460373	ACTIVE	LODE	2020	3/5/2020	20.66	14 0070S 0040E 035	SW	AMC460373	AMC460163
Mesa Cobre Holding Corporation	SCX 215	AMC460374	ACTIVE	LODE	2020	3/3/2020	20.66	14 0070S 0040E 035	SW	AMC460374	AMC460163
Mesa Cobre Holding Corporation	SCX 216	AMC460375	ACTIVE	LODE	2020	4/6/2020	20.66	14 0050S 0050E 022	SE	AMC460375	AMC460163
Mesa Cobre Holding Corporation	SCX 217	AMC460376	ACTIVE	LODE	2020	4/6/2020	9.64	14 0050S 0050E 022	SE	AMC460376	AMC460163
Mesa Cobre Holding Corporation	SCX 218	AMC460377	ACTIVE	LODE	2020	4/6/2020	9.7	14 0050S 0050E 022	SE	AMC460377	AMC460163
Owner	**Claim Name**	**Serial Number**	**Dispostion**	**Case Type**	**Last Assmt Year**	**Location Date**	**Acreage**	**Meridian Township Range Section**	**Subdiv**	**Active Serial Count**	**Lead Case Serial Number**
Mesa Cobre Holding Corporation	SCX 219	AMC460378	ACTIVE	LODE	2020	3/1/2020	20.66	14 0050S 0050E 022	SE	AMC460378	AMC460163
Mesa Cobre Holding Corporation	SCX 220	AMC460379	ACTIVE	LODE	2020	3/1/2020	9.64	14 0050S 0050E 022	SE	AMC460379	AMC460163
Mesa Cobre Holding Corporation	SCX 221	AMC460380	ACTIVE	LODE	2020	3/1/2020	9.7	14 0050S 0050E 022	SE	AMC460380	AMC460163
Mesa Cobre Holding Corporation	SCX 222	AMC460381	ACTIVE	LODE	2020	4/6/2020	16.53	14 0070S 0040E 010	NE	AMC460381	AMC460163
Mesa Cobre Holding Corporation	SCX 223	AMC460382	ACTIVE	LODE	2020	3/8/2020	17.22	14 0070S 0040E 003	SE	AMC460382	AMC460163
Mesa Cobre Holding Corporation	SCX 224	AMC460383	ACTIVE	LODE	2020	4/6/2020	13.77	14 0070S 0040E 010	NE	AMC460383	AMC460163
Mesa Cobre Holding Corporation	SCX 225	AMC460384	ACTIVE	LODE	2020	3/31/2020	20.66	14 0070S 0040E 010	NW,SW	AMC460384	AMC460163
Mesa Cobre Holding Corporation	SCX 226	AMC460385	ACTIVE	LODE	2020	3/31/2020	20.66	14 0070S 0040E 010	NW,SW	AMC460385	AMC460163
Mesa Cobre Holding Corporation	SCX 227	AMC460386	ACTIVE	LODE	2020	3/31/2020	20.66	14 0070S 0040E 010	NW,SW	AMC460386	AMC460163
Mesa Cobre Holding Corporation	SCX 228	AMC460387	ACTIVE	LODE	2020	3/31/2020	20.66	14 0070S 0040E 010	NW,SW	AMC460387	AMC460163
Mesa Cobre Holding Corporation	SCX 229	AMC460388	ACTIVE	LODE	2020	3/31/2020	8.61	14 0070S 0040E 010	NE,NW,SW,SE	AMC460388	AMC460163
Mesa Cobre Holding Corporation	SCX 230	AMC460389	ACTIVE	LODE	2020	3/31/2020	20.66	14 0070S 0040E 009	SE	AMC460389	AMC460163
Mesa Cobre Holding Corporation	SCX 231	AMC460390	ACTIVE	LODE	2020	3/31/2020	15.84	14 0070S 0040E 010	SW,SE	AMC460390	AMC460163
Mesa Cobre Holding Corporation	SCX 232	AMC460391	ACTIVE	LODE	2020	3/31/2020	17.22	14 0070S 0040E 010	SW	AMC460391	AMC460163

Mesa Cobre Holding Corporation	SCX 233	AMC460392	ACTIVE	LODE	2020	3/31/2020	13.2	14 0070S 0040E 010	SW,SE	AMC460392	AMC460163
Mesa Cobre Holding Corporation	SCX 244	AMC460393	ACTIVE	LODE	2020	4/7/2020	20.66	14 0070S 0040E 010	SW	AMC460393	AMC460163
Mesa Cobre Holding Corporation	SCX 245	AMC460394	ACTIVE	LODE	2020	4/7/2020	15.84	14 0070S 0040E 010	SW	AMC460394	AMC460163
Mesa Cobre Holding Corporation	SCX 246	AMC460395	ACTIVE	LODE	2020	4/6/2020	20.66	14 0070S 0040E 010	NE,NW	AMC460395	AMC460163
Mesa Cobre Holding Corporation	SCX 247	AMC460396	ACTIVE	LODE	2020	3/8/2020	20.66	14 0070S 0040E 003	SE	AMC460396	AMC460163
Mesa Cobre Holding Corporation	SCX 248	AMC460397	ACTIVE	LODE	2020	4/6/2020	16.53	14 0070S 0040E 010	NE	AMC460397	AMC460163
Mesa Cobre Holding Corporation	SCX 249	AMC460398	ACTIVE	LODE	2020	3/8/2020	20.66	14 0070S 0040E 003	SE	AMC460398	AMC460163
Mesa Cobre Holding Corporation	SCX 250	AMC460399	ACTIVE	LODE	2020	4/6/2020	16.53	14 0070S 0040E 010	NE	AMC460399	AMC460163
Mesa Cobre Holding Corporation	SCX 251	AMC460400	ACTIVE	LODE	2020	3/8/2020	20.66	14 0070S 0040E 003	SE	AMC460400	AMC460163