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Cactus Mine Project

NI 43-101 Technical Report
Preliminary Economic Assessment

of the Cactus Mine Project,
Pinal County, Casa Grande Arizona

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DATE AND SIGNATURES PAGE

The effective date of this report is August 07, 2024. See Appendix A, of the NI 43-101 Technical Report Preliminary Economic Assessment Contributors and Professional Qualifications, for certificates of qualified persons. These certificates are considered the date and signature of this report in accordance with NI 43-101.

CACTUS MINE PROJECT
NI 43-101 TECHNICAL REPORT

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1 SUMMARY

1.1 INTRODUCTION

This Technical Report presents a Preliminary Economic Assessment (PEA) for the Cactus Mine Project (the "Project") owned by Arizona Sonoran Copper Company (ASCU).

This PEA was developed by M3 Engineering & Technology Corp. (M3), Arizona Sonoran Copper Company (ASCU), Clear Creek Associates (CC), ALS Geo Resources LLC (GR), Geo-Logic Associates, Inc. (GLA), AGP Mining (AGP), and Samuel Engineering (SE).

The responsibilities of the engineering consultants are as follows:

- M3 was commissioned by ASCU to manage and coordinate the work related to the PEA and the technical report. M3 was also retained to complete the infrastructure design, and to compile the overall cost estimate and financial model.
- AGP was commissioned to provide the mining methods for the underground and open pit. AGP provided designs for waste piles. Mine capital and operating costs were included in their scope.
- M3 reviewed and used Samuel Engineering's description of the mineral processing metallurgical testing. M3 then conducted conceptual design of the SX/EW plant, leaching process, conveyor systems, crushing and stockpile designs. Process and infrastructure capital and operating costs were included as part of their scope.
- Clear Creek managed the hydrogeologic evaluation of the project and conducted groundwater computer modeling.
- ALS Geo Resources was retained to provide background data for the Project. The local history, mineralization, exploration, QA/QC, general geology, creation of the resource model and estimation of final resource numbers were provided by ALS Geo Resources.
- Geo-Logic Associates provided the conceptual design for the Heap Leach Facility (HLF) including capital and operating cost related to this scope.

1.2 PROPERTY DESCRIPTION AND LOCATION

The Cactus Mine property is located 40 road miles (mi) south-southeast of the Greater Phoenix metropolitan area and approximately 3 miles northwest of the city of Casa Grande, in Pinal County, Arizona.

The current project is located at the historic Sacaton Mine, which is 10 miles due west of the Interstate 10 (I-10) freeway. The total site area is approximately 5,720.08 acres. Figure 1-1 shows the Cactus Project location.

Source: ASCU, 2024.

Figure 1-1: Cactus Project Location

In August 2019, Cactus 110 LLC, a wholly owned subsidiary of ASCU, executed a purchase agreement (PA) and prospective purchaser's agreement (PPA) with a multi-state custodial trust, and the Arizona Department of Environmental Quality (ADEQ), respectively, for the right to acquire all American Smelting and Refining Company (ASARCO) land parcels representing the Project, as well as all infrastructure therein, and all associated mineral rights.

In July 2020, ASCU successfully closed on the property and acquired full title for the Project. In addition, Cactus 110 LLC closed on the Merrill Properties, comprising the Parks/Salyer Project. Also in 2020, ASCU acquired a prospecting permit for adjacent land owned by the Arizona State Lands Department. In February 2021, Cactus 110 LLC executed an agreement with Arcus Copper Mountain Holdings LLC and several co-owners to purchase 750 acres of land also adjacent to the project. Further, in May 2021, Cactus 110 LLC entered into an agreement with LKY/Copper Mountain Investments Limited Partnership LLP to purchase 1,000 acres of land adjacent to the Project referred to as the LKY Property. Additionally, in February 2022, ASCU entered into an agreement with Bronco Creek Exploration Inc. to transfer Bronco Creek Explorations Mineral Exploration Lease (MEP) with the Arizona State Lands Department to ASCU. This MEP consists of 157.50 acres of State-owned surface and minerals rights. In February 2023, Cactus 110 LLC executed an agreement with MainSpring Casa Grande LLC to purchase 522.78 acres of land adjacent to the Project, increasing its total landholding to 5,720.08 acres. The privately-owned land assets represent, among other things, the mineral rights to the old Sacaton East, Sacaton West, and Parks/Salyer deposits. Arizona Sonoran Copper Company USA, Inc. is a subsidiary of Arizona Sonoran Copper Company, Inc, and intends to operate the mine under the name Cactus.

1.3 MINERAL TENURE, SURFACE RIGHTS, WATER RIGHTS, ROYALTIES, AND AGREEMENTS

The Project is subject to three royalties based on potential mining production, as detailed in this section. Figure 4-2 shows the claims applicable to royalties.

There are also three additional 5.00% net smelter return royalties that are payable to three individuals that ASARCO originally had in place. Based on this current PEA and MRE there is no anticipated production from these areas. Figure 4-2, Cactus Property Royalty Ownership Map shows these locations.

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

The project is located in Pinal County approximately 6 miles (10 km) northwest of the city of Casa Grande, Pinal County, Arizona and 40 road miles south southwest of the Greater Phoenix metropolitan area which is also 70 road miles northwest of Tucson. Access to the Project is 4.6 miles (7.4 km) west of AZ-387 on North Bianco Road off West Maricopa-Casa Grande Highway. The coordinates for the center of the Project are -111.828129° longitude and 32.948166° latitude, with a variable elevation between 1,330 to 1,510 ft (405 to 460 m) above sea level (asl).

It is easily accessible from the Interstate 10 (I-10) freeway, which is approximately 10 miles east of the historic Sacaton Mine. The Greater Phoenix area is a major population center (approximately 4.5 million people) with a major airport and transportation hub and well-developed infrastructure and services that support the mining industry.

Climate at the mine is also typical of the Arizona Sonoran Desert, with temperatures ranging from 19°F to 117°F and with average annual precipitation of 8.6 inches (in), falling primarily in high-intensity, short-duration events. The mine site contains no surface water resources.

Electric power is available from Arizona Public Service's (APS) 230-kilovolt (kV) transmission line which passes on the South side of the site.

Water rights are discussed in Section 4.5 It is expected that credits will be obtained for de-watering of the pit and underground shaft.

Casa Grande and Maricopa, in conjunction with Phoenix, are in proximity and can collectively offer an ample pool of skilled labor for the Project.

1.5 HISTORY

ASARCO (American Smelting and Refining Company) geologists first discovered the Sacaton mineral deposit in the early 1960s while examining an outcrop of leached capping composed of granite cut by several thin monzonite porphyry dykes. The nature of this original find indicated the likely presence of porphyry copper-type mineralization. Following this lead, ASARCO initiated a drilling program which defined copper mineralization zones. The west zone contained the deposit which was ultimately accessed through the open pit. The deeper east zone was the target of potential mining by underground methods.

Project construction and mining of the west zone via open pit method commenced by 1972, and the mine operated continuously from 1974 until 1984. An underground copper deposit at Sacaton (now known as Cactus East) was under development until September 1981 when work was suspended because of high costs and a weak copper market. The Sacaton Mine was permanently closed on March 31, 1984, due to exhaustion of the open pit feed material reserves.

The resultant Sacaton open pit mine is roughly circular, approximately 3,000 ft (914 m) in diameter and 1,040 ft (317 m) in depth. The pit also has a visible internal lake with the surface positioned at a depth of approximately 980 ft (299 m) from the rim of the pit. During operation, the Sacaton mine consisted of the pit, crushing facilities and coarse feed material stockpile, a 9,000 ton/d flotation mill, a tailings storage facility (TSF) that covered approximately 300 acres, a return water impoundment, an overburden dump, and a waste rock dump (WRD) that covered approximately 500 acres.

Production from the open pit was approximately 11,000 ton/d. Copper flotation mill concentrate was sent by rail to the ASARCO smelter in El Paso, Texas. Over the mine's operating life 38.1 million tons (Mton) of feed material were mined and processed, recovering 400 million pounds of copper (Cu), 27,455 oz of gold (Au), 759,000 oz of silver (Ag).

During mining of the open pit, a waste dump was created through dumping of defined waste material. All oxide copper mineralization, and sulfide copper mineralization below the working grade control cutoff of 0.3% Cu, were deposited to the waste dump. The historic waste dump forms the basis of the Stockpile Project resource modelled in this PFS due to the level of mineralized material discarded.

1.6 GEOLOGY AND MINERALIZATION

The Cactus and Parks/Salyer Projects occur in the desert region of the Basin and Range province of Arizona (AZ). These combined deposits are part of a large porphyry copper system. Major host rocks are Precambrian Oracle Granite and Laramide monzonite porphyry and quartz monzonite porphyry. The porphyries intruded the older rocks and form mixed breccias; monolithic breccias and occur as large masses, poorly defined dyke-like masses; and thin well-defined but discontinuous dykes. Structurally the deposit is complex with intense fracturing, faulting, and both pre-mineral and post-mineral brecciation. It is bounded on the east and west sides by normal faults.

Chalcocite and covellite are the only supergene sulfides recognized. The chalcocite blanket in the mineralized zone is irregular in thickness, grade, and continuity. The thickness of leached capping varies from less than 100 ft (30 m) to over 650 ft (198 m), with the thicker intercepts on the north side. Substantial quantities of oxidized copper minerals are found erratically distributed through the capping. Chrysocolla, brochantite, and malachite are the most common oxidized copper minerals. In upper portions of the capping, chrysocolla predominates, while brochantite and malachite are predominant in the lower portions. The dominant hypogene alteration assemblages in the deposit are phyllic and potassic. The major hypogene sulfide minerals in the deposit are pyrite, chalcopyrite, and molybdenite. Hypogene sulfides occur as disseminated grains, veins, and vug fillings.

1.7 DEPOSIT TYPES

The Cactus and Parks/Salyer deposits are portions of a large porphyry copper system that has been dismembered and displaced by Tertiary extensional faulting. Porphyry copper deposits form in areas of shallow magmatism within subduction-related tectonic environments (Berger et al., 2008). Cactus has typical characteristics of a porphyry copper deposit which Berger et al. (2008) define as follows:

- One wherein 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 that are emplaced immediately before porphyry deposit formation and that host the deposits 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.

- Copper may also be introduced during overprinting phyllic-argillic alteration events.

1.8 EXPLORATION

ASARCO geologists John Kinnison and Art Bloucher first identified the Sacaton mine area in early 1961 while doing regional mapping and sampling in and around the Sacaton Mountains. A lone outcrop of altered and weakly mineralized granite encompassed by alluvium was the only indicator of the potential for porphyry copper-type mineralization in the surrounding area. A six-hole drilling program was authorized and initiated in the fall of 1961. Eighty-two additional holes were drilled from 1962 through the first half of 1963. These eighty-eight holes outlined a northeasterly trending alteration zone approximately 4 miles (6.4 km) long and 1.5 miles (2.4 km) wide dominated by what was recognized as two potential deposits, the Sacaton West and East deposits, as well as widespread intercepts of copper mineralization throughout. Low copper prices precluded any further exploration drilling at that time.

Improving market conditions prompted ASARCO to continue exploration drilling in 1968 and 1969 leading to 37 more holes being drilled. An additional 10 holes were drilled (1970 and 1971) to sterilize areas under planned facilities. After mining was initiated in 1972, development and definition drilling were conducted for the open pit (Cactus West deposit).

Eight additional holes were drilled from 1974 through 1976, in the Cactus East deposit for definition purposes.

1.9 DRILLING

Sacaton East and West were re-named as Cactus East and West when the property was purchased by then Elim Mining in 2019. Elim Mining was later renamed Arizona Sonoran Copper Company (ASCU). In 2019, ASCU drilled two vertical PQ (4.95 in or 12.57 cm) core holes into the Cactus East mineralized zone for verification of grade and for metallurgical testing as part of the evaluation program prior to purchase. An additional vertical PQ core hole was drilled into Cactus East in 2020 for further metallurgical testing, for a total of 5,768 ft (1,758 m). Five angled HQ (3.75 in or 9.6 cm) core holes totaling 9,252 ft (2,820 m) were drilled in late 2019 and 2020 around the northern and western edges of Cactus East to define and expand mineralization. Also, in 2020, 11 angled HQ core holes totaling 15,377 ft (4,687 m) were drilled around the perimeter of the West Pit to further define and expand Cactus West mineralization beyond the pit limits. Drilling activities conducted at Cactus East and Cactus West in 2021, 2022, and early 2023 upgraded most of the Inferred material in the resource to Indicated and some Measured.

In late 2020, ASCU successfully extended mineralization historically drilled at Parks/Salyer. Initially in 1996, two diamond drillholes totaling 3,753 ft (1,144 m) were drilled by ASARCO into the Parks/Salyer deposit, intercepting high grades of porphyry copper enrichment and primary sulfides. This drilling was a follow-up to previous drilling conducted to the south of ASCU's property in which porphyry copper mineralization had been intersected and the characteristics indicated that the potential higher grades should be located to the north. In late 2020, ASCU undertook two exploration holes totaling 4,573 ft (1,394 m) that continued to hit high grade mineralization 800 ft (244 m) further to the north. In late 2021, ASCU began an exploration diamond drilling (DD) program over Parks/Salyer, which through 2022 was expanded to cover the bulk of the interpreted deposit with 500 ft (152 m) spaced drilling. The Infill drilling process that continued through early 2023 and involved 47 DD holes totaling 105,810 ft (32,251 m), brought the defined Parks/Salyer resource to a mostly Indicated and Inferred confidence level. The total Parks/Salyer program covered 74 DDs for 166,685 ft (50,806 m).

In 2019, 55 surface sonic drill holes totaling 5,120 ft (1,560 m) of 6-in diameter holes were drilled across the Stockpile Project to support an initial resource based on approximately 750 ft (229 m) spaced drilling. Through late 2020 and early 2021, an infill surface sonic drill program was undertaken to reduce the spacing to 400 ft (122 m). The resource database for the Stockpile Project resource contains 210 holes. Sonic drilling continued on the Project to ultimately reduce the spacing to 200 ft (61 m).

1.10 SAMPLE PREPARATION AND SECURITY

Arizona Sonoran has been exclusively using Skyline Assayers and Laboratories (Skyline Labs), in Tucson, Arizona, for their sample preparation and analysis. Bagged samples with identification tags are placed in large 3 foot (1 meter) square plastic totes, which are stored at a core shed and situated within the secured mine site, away from any point of access until ready for transport. A transmittal sheet is prepared that lists all the samples in the shipment with an assay order sheet for the analysis to be done. A chain of custody sheet is signed by ASCU upon dispatch, signed by Skyline Labs upon arrival, and returned to ASCU to show secure delivery.

Upon arrival at the lab, totes were offloaded and stored. When the samples were ready to be processed, the bags were emptied into metal bins and the sample bags with tags placed on top. The bins and bags were placed in an oven at 220°F (93°C) for 24 hours to dry before moving into the lab for processing.

As a first pass, each sample was assayed for total copper (CuT) value. To support potential heap leaching for metal recovery, a sequential acid leach assay procedure was conducted on each sample to return an acid soluble copper (CuAS) value and a cyanide soluble copper (CuCN) value. The remaining pulverized sample in the heavy paper envelope was returned to Arizona Sonoran together with the coarse reject.

1.11 DATA VERIFICATION

The bulk of the Cactus drilling database was rebuilt from historical drilling logs and assay certificates from exploration work undertaken by ASARCO. Since 2019, ASCU has drilled 73 new holes at the Project to support verification, metallurgical testing, and resource extension for the new Cactus mineral resource estimate. The Parks/Salyer resource database holes are composed primarily of 74 new holes drilled by ASCU between 2021 and 2022. There were only four historical holes supporting the Parks/Salyer resource estimate.

Specific data verification work undertaken by ASCU for the historical drill holes included the following:

- Verification of the collar locations.
- Reinstatement of downhole survey data drilled into the Cactus East deposit.
- Verification of drill hole locations and geological interpretations against historical cross sections and pit maps.
- Relogging of historical drill hole lithology, copper mineral zones, and alteration.
- Re-assaying of historical pulp samples to compare CuT grades and establish soluble copper contents confirming expected copper mineral zones and leachable copper mineralogies.

1.12 MINERAL PROCESSING AND METALLURGICAL TESTING

Metallurgical testwork used for the PEA was based upon the March 2024 PFS met work. Test work to this date shows good metallurgical recoveries from all deposits with no deleterious elements. The PFS testing showed an average of 73% of total copper extracted overall.

Feed material sources considered in this report include:

- Mine stockpile which includes oxide and lower grade sulfide material containing primarily copper mineralization. The Stockpile was a significant percentage of material in the March 2024 PFS (76 million tons). The mine plan in the PEA has reduced the amount of Stockpile material to 10 million tons.
- Cactus West open pit containing oxide, enriched, and primary sulfide material.
- Cactus East (underground) which contains sulfide material.
- Parks/Salyer plus MainSpring (open pit), renamed Parks/Salyer which contains oxide, enriched, and primary sulfide material.

The materials are believed to be suitable for conventional treatment in a heap leach, solvent extraction, and electrowinning (SX/EW) process facility to produce copper cathodes at LME Grade A quality standards ASTM B115-10 - Cathode Grade 1.

In consideration of a potential copper heap leaching and SX/EW processing facility at Cactus and Parks/Salyer, a hydrometallurgical approach is contemplated to process the oxide, enriched, and primary sulfide material identified in the mineralized Cactus and Parks/Salyer extensions to the existing open pit and underground at Cactus East underground mined materials reported in this Mineral Resource Estimate.

The Cactus heap leaching process design includes crushing of all material types to a minus ¾" P80 size for leaching. All material types, oxides, enriched and primary are to be leached in on a single pad with an initial leaching cycle of 180 days. A maximum 3-year leaching cycle has been assumed (3 lifts) as the practical limit for effective recovery based on experience and hydrodynamic analysis of the materials by HGS. The copper leaching metallurgical test data has been extrapolated from the testing data at one year based on the rates prevailing after one year using a logarithmic curve fit projection that considers the decaying rate of copper extraction.

Scalability has been considered by employing a 95% extraction efficiency factor to both the CuAS and CuCN average column copper extractions achieved to date, allowing for inefficiencies in the leach solution flows and heap operations. The recommended copper recovery projections include this efficiency factor applied to the extraction obtained from the column testing. Based on the above, the recommend copper extraction estimates for use in evaluating the Cactus Project resources are presented in Table 1-1.

Table 1-1: Copper Recovery by Sequential Assay Fraction

Resource Area	Units	Value
Stockpile Heap Leach (3/4" Crush)		
Acid Soluble Copper Recovery	%	87.7
Cyanide Soluble Copper Recovery	%	84.5
Oxide Heap (3/4" Crush)		
Acid Soluble Copper Recovery	%	93.1
Cyanide Soluble Copper Recovery	%	84.5
Enriched Heap Leach (3/4" Crush)		
Acid Soluble Copper Recovery	%	91.2
Cyanide Soluble Copper Recovery	%	84.5
Primary Heap Leach (3/4" Crush)		
Total Copper Recovery in Primary Material	%	25.0

Applying these extraction criteria, the calculated overall soluble copper (Tsol) recovery to cathodes is 86% and the corresponding total copper recovery is 73% for the resources contained in the mine plan.

The average gross acid consumption for all the materials included in the mine plan, averages 22 lbs of acid per ton of material. Net acid consumption accounts for acid regenerated in the electrowinning process when copper is plated to product. Net acid consumption per ton of material is dependent on recoverable copper content with a stochiometric conversion of 1.54 tons of acid generated per ton of copper plated in electrowinning.

1.13 MINERAL RESOURCE ESTIMATE

The Cactus Project resource estimate, including the Cactus East, West, Parks/Salyer, and Stockpile deposits, was calculated in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum's (CIM's) Definitions Standards for Mineral Resources and Mineral Reserves. Resources for Parks/Slayer are inclusive of the recent MainSpring extension. It includes the results of drilling programs undertaken by ASCU between 2019 and 2023. The material mined in the Sacaton open pit, operational from 1974 through 1984, has depleted the resource. The estimate of the Mineral Resources supports Measured, Indicated and Inferred Resources for Cactus and Parks/Salyer, and Inferred and Indicated Resources for the Stockpile Project. Mineral resources that are not mineral reserves do not have demonstrated economic viability.

All data coordinates are presented in NAD 83 ft. Zone 12 truncated to the last six whole digits for easting, and five whole digits for northing. All quantities are given in imperial units unless indicated otherwise. All copper values are presented in percentages.

Cactus Project Mineral resources meeting the cutoff grades (CoG) for Cactus West and East, Parks/Salyer, and the stockpile are combined and reported in Table 1-2.

Table 1-2: Cactus Project Total Measured, Indicated, and Inferred Resource

Material Type	ktons (kt)	CuT (%)	Tsol (%)	Contained Total Cu (K lbs)	Contained Tsol Cu (K Lbs.)
Total Resources					
MEASURED					
Total Leachable	55,200	0.94	0.79	1,032,000	873,800
Total Primary	12,300	0.51	0.05	124,400	13,400
Total Measured	**67,500**	**0.88**	**0.66**	**1,156,500**	**887,200**
INDICATED					
Total Leachable	414,800	0.60	0.53	4,964,000	4,365,700
Total Primary	150,400	0.39	0.04	1,172,900	126,000
Total Indicated	**565,200**	**0.54**	**0.40**	**6,137,200**	**4,491,700**
M&I					
Total Leachable	470,000	0.64	0.56	5,996,200	5,239,500
Total Primary	162,700	0.40	0.04	1,297,600	139,400
Total M&I	**632,700**	**0.58**	**0.43**	**7,294,800**	**5,378,900**
INFERRED					
Total Leachable	299,600	0.43	0.38	2,572,400	2,262,800
Total Primary	174,500	0.36	0.04	1,267,500	124,700
Total Inferred	**474,100**	**0.41**	**0.25**	**3,839,900**	**2,367,500**

Notes:

1. Total soluble copper grades (Cu TSol) are reported using sequential assaying to calculate the soluble copper grade. Tons are reported as short tons.
2. Stockpile resource estimates have an effective date of 1st March, 2022, Cactus mineral resource estimates have an effective date of 29th April, 2022, Parks/Salyer-MainSpring mineral resource estimates have an effective date of 11th July, 2024. All mineral resources use a copper price of US$3.75/lb.
3. Technical and economic parameters defining mineral resource pit shells: mining cost US$2.43/t; G&A US$0.55/t, 10% dilution, and 44°-46° pit slope angle.

4. Technical and economic parameters defining underground mineral resource: mining cost US$27.62/t, G&A US$0.55/t, and 5% dilution. Underground mineral resources are only reported for material located outside of the open pit mineral resource shells. Designation as open pit or underground mineral resources are not confirmatory of the mining method that may be employed at the mine design stage.

5. Technical and economic parameters defining processing: Oxide heap leach ("HL") processing cost of US$2.24/t assuming 86.3% recoveries, enriched HL processing cost of US$2.13/t assuming 90.5% recoveries, sulfide mill processing cost of US$8.50/t assuming 92% recoveries. HL selling cost of US$0.27/lb; Mill selling cost of US$0.62/lb.

6. Royalties of 3.18% and 2.5% apply to the ASCU properties and state land respectively. No royalties apply to the MainSpring property.

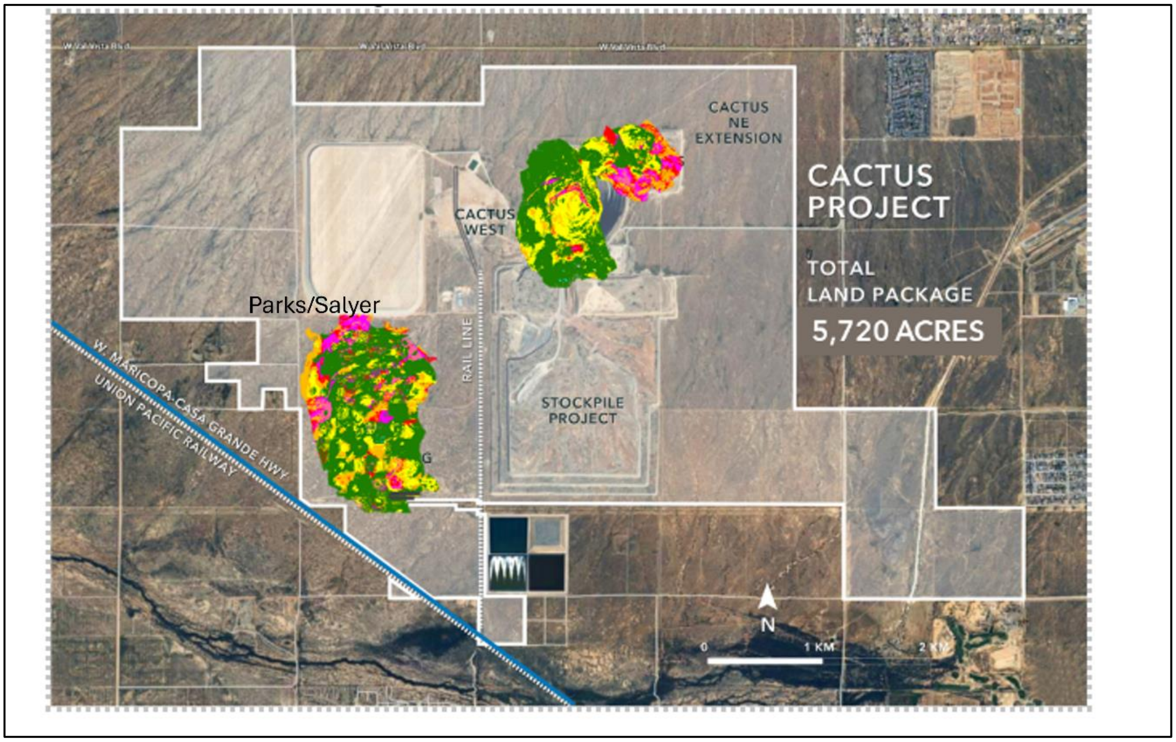
7. Variable cut-off grades were reported depending on material type, potential mining method, potential processing method, and applicable royalties. For ASCU properties - Oxide open pit or underground material = 0.099% or 0.549% TSol respectively; enriched open pit or underground material = 0.092% or 0.522% TSol respectively; primary open pit or underground material = 0.226% or 0.691% CuT respectively. For state land property – Oxide open pit or underground material = 0.098 % or 0.545% TSol respectively; enriched open pit or underground material = 0.092% or 0.518% TSol respectively; primary open pit or underground material = 0.225% or 0.686% CuT respectively. For MainSpring properties – Oxide open pit or underground material = 0.096% or 0.532% TSol respectively; enriched open pit or underground material = 0.089% or 0.505% TSol respectively; primary open pit or underground material = 0.219% or 0.669% CuT respectively. Stockpile cutoff = 0.095% TSol.

8. Mineral resources, which are not mineral reserves, do not have demonstrated economic viability. The estimate of mineral resources may be materially affected by environmental, permitting, legal, title, sociopolitical, marketing, or other relevant factors.

9. The quantity and grade of reported inferred mineral resources in this estimation are uncertain in nature and there is insufficient exploration to define these inferred mineral resources as an indicated or measured mineral resource; it is uncertain if further exploration will result in upgrading them to an indicated or measured classification.

10. Totals may not add up due to rounding

Figure 1-2 is a plan view of the mineralized zones with Cactus property.



Source: ASCU, 2024.

Figure 1-2: Plan View of Cactus Project Mineralization.

1.13.1 Capping

Composite assay data were reviewed to determine if there were sufficient high grades in the various populations to require capping of the high grades during compositing. The data were analyzed according to material type, potential mining, and potential processing methods. Histogram and log normal cumulative probability plots were reviewed for CuT assays and Tsol results in each of the mineral zones in the Cactus Project resource. The results of these analysis for both the Cactus and Parks/Salyer are presented in Table 1-3.

Table 1-3: Capping Levels for Cactus and Parks/Salyer Estimation Domains

Capping Grades				
	Leached	**Oxide**	**Enriched**	**Primary**
TCu	0.20	2.50	3.80	1.20
ASCu	0.04	1.80	0.50	0.03
CuCN	0.05	0.50	3.30	0.15
Tsol	0.09	2.30	3.80	0.08

For the Stockpile Project, histogram and log normal cumulative probability plots were reviewed for CuT, CuAS, CuCN, and Tsol assays. Cutoffs were defined within individual Stockpile Project lifts and ranged between 0.43% to 0.65% for CuT, 0.33% to 0.50% for CuAS, 0.10% to 0.29% for CuCN, 0.40% to 0.59 for Tsol, and 0.40 to 1.68 for Ca.

1.13.2 Resource Cutoff Grades (CoGs)

To meet a Reasonable Expectation of Eventual Economic Extraction (REEEE) requirement, as stated in CIM 2019 Best Practices, CoGs were applied to a potential expanded open pit across the Cactus East and West deposits with an underground extension at Cactus East. There is a potential open pit at Parks/Salyer encompassing the MainSpring extension, with an additional underground extension.

Conceptually, copper from oxide and enriched material in the open pit would be recovered in a heap leach. Therefore, CoGs in the amenable oxide and enriched zones were based on Tsol assays. CoGs for the sulfides in the primary material was based on CuT assays. High- level cost analysis for the open pit suggested CoGs of 0.099% Tsol for the oxides, and 0.092% Tsol for the enriched material. Whittle open pit optimization software was applied using these parameters to define the ultimate pit shell for reporting of open pit resources.

Additional resources outside of the Whittle pit in Cactus East have the potential to be amenable to underground mining. High-level analysis of the material yielded cutoffs of 0.549% Tsol for the oxides and 0.522% Tsol for the enriched.

Sections of the Parks/Salyer deposit are subject to variable royalty charges, this leads to slightly variant cutoff grades. Mineral resources for Parks/Salyer were also determined based on its amenability to open pit mining. ASCU used a US$3.75/lb Cu price to determine the cutoff grades for the 2024 resource statement. High-level analysis of the material on ASCU property yielded Tsol cutoffs of 0.549% Tsol for the oxides and 0.522% Tsol for the enriched. For the State Land property, the Tsol cutoffs were 0.545% and 0.518 for oxide and enriched material, respectively. Primary material had a cutoff of 0.686% CuT.

The Stockpile Project resources were defined using a CoG of 0.095% Tsol.

1.14 MINING METHODS

1.14.1 Open Pit Mining Methods

The Cactus West deposit lies adjacent to and beneath the historically mined Cactus (Sacaton) Pit while the Historic Stockpile is located to the South of the existing pit and proposed Cactus West pit expansion. The Stockpile mining area is a historical waste dump which contains significant quantities of oxide copper mineralization. This material was considered waste in the historical operation because the sole processing method on site was a flotation mill which could not recover oxide copper mineralization. The Parks/Salyer deposit is centered approximately 8000 ft (2400 m) to the south-west of the Sacaton pit. Parks/Salyer has not been historically mined. It is covered by a sedimentary deposit of alluvium and Gila Conglomerate.

Heap leach processing in the mine schedules involves all material types from Parks/Salyer, Cactus West, Cactus East and the historic Stockpile being processed on a heap leach after multi-stage crushing. In the initial 14 years of the mine schedule, only oxide and enriched material types will be processed. In years 1-8, the processing rate will be 24 M tons per annum, with an expansion to 31.3 M tons per annum beginning in year 9. From year 15 to the end of the mine life, hypogene material will be processed starting at a rate of 7.3 M tons per annum from year 15 to 23, and then at variable rates between 7.3 and 24 M tons per annum for the remainder of the mine life.

Initial open pit mining occurs at Parks/Salyer, with a pre-production period stripping 70 M tons. In Year 1, 10 M tons of Historical Stockpile material is processed to help facilitate pit development and commissioning of the process plant. Open pit mining rates are held at 140-163 M tons per annum from years 1-10, and then gradually reduced to 90 M tons in year 15, and 16 M tons in year 22 when Parks/Salyer is completed. A period of heavy stockpile reclaim occurs in years 21-24 as low-grade and hypogene surface stockpiles are consumed to allow for the mining of Cactus West Phase 2 and 3. Mining then ramps up again slightly to 60-70 M tons per annum from years 24-27 to facilitate mining Cactus West Phase 2 and 3, before tapering down to the conclusion of mining in year 31. Portions of the Parks/Salyer open pit mining inventory require mining waste materials on adjacent properties not currently owned by Arizona Sonoran. It is understood that preliminary consultations have occurred, and that it is reasonable to assume future agreements between the current landowners and Arizona Sonoran will allow for the mining of this land in the future. A cost allowance for the purchase of these lands has been included in the financial model. Should an agreement not be reached, future mining scenarios will require adjustments to the open pit designs that will adversely impact the available open pit mining inventories.

Waste from open pits will be placed into multiple locations, with the entire available land package from the western edge of the historical TSF to the southern, eastern and northern extents of the property being filled with waste materials to a height of 250 ft (76 m) above original ground (excepting the Cactus West and Parkes Salyer open pit areas and necessary haulage roads). Some waste will also be backfilled into the Parkes Salyer open pit after it is exhausted late in the mine life. Several adjacent properties which Arizona Sonoran does not currently own have been utilized for waste storage, as these properties make the land package more contiguous and additional space is required to store the projected waste quantities at heights of 250 ft (76 m) or less. A cost allowance for the purchase of the land has been made in the financial model. It is believed that alternate property solutions for waste storage can be realized should purchasing the selected properties be impractical.

Open pit designs were completed in Hexagon's MinePlan software according to geotechnical design parameters provided by Call and Nicholas, with design assumptions for road and minimum mining widths provided by AGP. Parks/Salyer consists of seven phases, while Cactus West consists of three phases. Both Parks/Salyer and Cactus West will be mined using 40 ft (12.1 m) single benches, with ramps sized to allow 320-ton class haul trucks. At Parks/Salyer, all walls have been designed with 45-degree inter-ramp slopes, while geotechnical step-outs are employed to reduce the overall slope to approximately 40 degrees. At Cactus West, inter-ramp slopes range from 45–50 degrees depending on material type, with typical overall slope angles of 41-43 degrees. The slope designs assume that controlled blasting will be implemented, and horizontal depressurization drains installed to achieve the recommended slope parameters.

The historic stockpile was divided into three phases for mining: the east phase, south phase, and west phase. Only approximately 12% (10 M tons) of the available stockpile inventory was mined and processed in the schedule, because of several considerations including leach pad space, schedule priority for higher grades, and the desire to cover the historical stockpile with waste early in the mine life to capture shorter haul distances and reduce fleet costs. Waste materials generated from mining Parks/Salyer, Cactus West and the Stockpile areas will be composed of predominantly Gila Conglomerate and Alluvium overburden (87%) with the remainder being granite and other porphyry rock or dykes with lower copper grades. A portion of the historical tailings facility (approximately 16 M tons of tails and dam materials) will be mined out and co-disposed in the waste dumps to facilitate mining the later stages of Parks/Salyer open pit. No waste segregation is required in the mine schedule, and as such different waste types can be placed into any of the available waste facilities as required by scheduling and fleet optimization constraints.

Primary production drilling will be completed with a peak of twelve down the hole hammer (DTH) drills using 8 in (203 mm) bits. This will provide the capability to drill patterns for either 20 ft (6.1 m) or 40 ft (12.2 m) bench heights. Two smaller drills using 5 ½ in (140 mm) bits will be utilized to perform wall control drilling in the form of buffer patterns and inclined holes for passive wall depressurization.

Production mining will be completed with four 46 yd^3 electric hydraulic shovels, two 40.5 yd^3 loaders, and a peak of fifty-two 320-ton rigid body trucks. The support equipment fleet will be responsible for the usual road, pit, and dump maintenance requirements and is composed of 14-ft graders, track dozers, and assorted auxiliary fleet.

1.14.2 Underground Mining Methods

As part of the initial phase of the PEA Study, AGP undertook a high-level review of underground mining options which included sublevel open stoping, room and pillar, inclined caving, block caving and the sublevel caving (SLC) method.

The small size of the Cactus East deposit, low angle plunge of the mineralization and sharp hanging wall and footwall contacts restricted the economic potential for the block caving option. The geotechnical conditions were not considered favorable for the complex development geometries required for the development of an extraction level for the block cave option. Call & Nicholas were of the view that draw point spacings required to be marginally stable would result in relatively poor recovery and high dilution due to the expected fine fragmentation. SLC was, therefore, selected as the preferred underground mining method for the Cactus East deposit.

The initial Cactus East SLC will commence at a depth of 1,265 feet below the surface and will consist of eight sub-levels, reaching a final depth of 1,845 feet. Access to the SLC will be facilitated through a single decline, with a portal situated within the existing Cactus West pit. Feed material haulage to the surface will primarily utilize a vertical conveyor system, with the option to supplement it with truck haulage via the open pit if required. Production will start in Year 8 of the overall project and will continue for 14 years, peaking at 3.8 Mt/y.

Each level has been designed for the SLC cave front to retreat to the decline and the intra-level infrastructure. Locating infrastructure in this position is designed to minimize cave induced damage as the cave propagates and stresses redistribute into the surrounding rock mass.

SLC production crosscuts have primarily been designed so that each level is horizontally offset from the level above and below. The design parameters for the SLC production drives at Cactus East are in line with other SLC operations.

The amount of feed material to be extracted will be limited in the upper three production levels to the following proportions.

- First Level ~40% (swell only)
- Second Level ~60%
- Third level ~100%
- Lower levels >100% to shutoff grades or dollar values.

The production strategy will help control cave ability, minimize the formation of air gaps and create a blasted material blanket above the production levels to minimize early dilution entry from the overburden rocks. These restricted draw rates also apply to areas where large step-out distances are required from one sublevel to the next.

The Cactus East Feed/Waste Handling System consists of a crusher station and a 1,600 ft (488 m) vertical conveyor with a capacity of 630 tons/h that will convey feed material from the top of the deposit to surface via a vertical raise feeding an overland conveyor. Feed material will be hauled by 55-ton diesel trucks to a sizer located adjacent to the bottom of the vertical conveyor. Material will be crushed to a maximum 6-in dimension. A short conveyor from the sizer will feed the vertical conveyor. Waste will be trucked to the portal for disposal within the Cactus West open pit.

Ventilation is driven by a fresh air drive developed from the access drive, in which the fresh air will be splitting right and left to connect to the return air drives at the extremities of the footprint. This allows natural flow of ventilation through the entire footprint.

1.14.3 Mine Plan

The Cactus Mine PEA plan includes production from four separate mining areas: Parks/Salyer Open Pit, Cactus West Open Pit, Historical Stockpile, and Cactus East Underground.

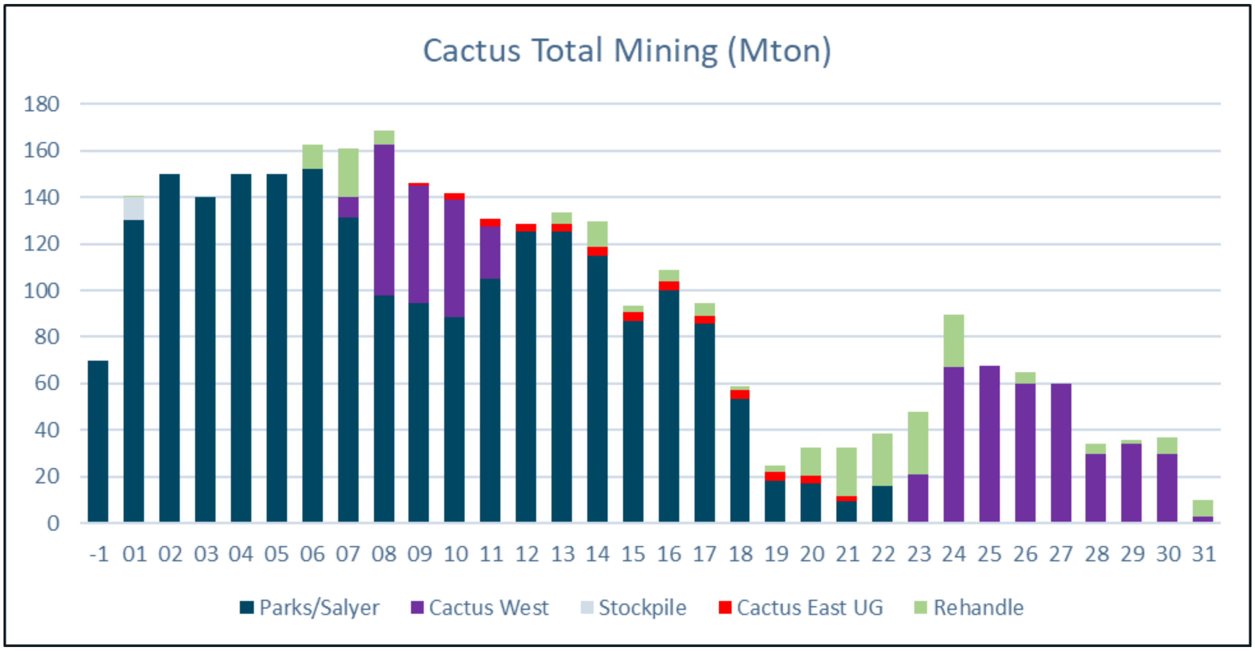
Initial open pit mining occurs at Parks/Salyer, with a pre-production period stripping 70 M tons. In Year 1, 10 M tons of Historical Stockpile material is processed to help facilitate pit development and commissioning of the process plant. Open pit mining rates are held at 140-163 M tons per annum from years 1-10, and then gradually reduced to 90 M tons in year 15, and 16 M tons in year 22 when Parks/Salyer is completed. A period of heavy stockpile reclaim occurs in years 21-24 as low-grade and hypogene surface stockpiles are consumed to allow for the mining of Cactus West Phase 2 and 3. Mining then ramps up again slightly to 60-70 M tons per annum from years 24-27 to facilitate mining Cactus West Phase 2 and 3, before tapering down to the conclusion of mining in year 31.

Cactus East Underground SLC has development initiated in Year 8, with full production capacity achieved in Year 11. Underground mining continues for 14 years until concluding in Year 21. Scheduled material movement by period from each mining area is shown in Figure 1-3.

Over the course of the open pit mine schedule, approximately 200 M tons of low-grade and hypogene leach material is stockpiled and reclaimed in order to accelerate copper production, smooth the feed material release from the open pits, and to defer processing of hypogene feed material.

Detailed pit phase inventories showing total feed, waste, and grades are displayed in Table 1-4, while detailed splits of oxide/enriched leach feed and hypogene leach feed by phase are displayed in Table 1-5 and

Table 1-6, respectively.



Source: AGP, 2024.

Figure 1-3: Life of Mine Material Movement by Mining Area

Table 1-4: Open Pit Phases, Tons, and Grade

Phase	Total Feed	TCU	CUAS	CUCN	Waste	Total	Strip Ratio
	(M ton)	(%)	(%)	(%)	(M ton)	(M ton)	(w:f)
PS-PH1	75.3	0.246	0.089	0.130	121.5	196.7	1.6
PS-PH2	76.1	0.357	0.068	0.256	220.8	296.9	2.9
PS-PH3	66.0	0.606	0.089	0.407	186.4	252.4	2.8
PS-PH4	51.0	0.652	0.082	0.391	220.0	271.0	4.3
PS-PH5	124.6	0.669	0.107	0.410	383.7	508.3	3.1
PS-PH6	58.3	0.645	0.080	0.466	346.0	404.3	5.9
PS-PH7	80.0	0.524	0.088	0.268	201.5	281.6	2.5
PS-Total	531.2	0.530	0.088	0.331	1,680.0	2,211.1	3.1
CW-PH1	96.2	0.288	0.112	0.105	137	233.0	2.4
CW-PH2	77.7	0.298	0.016	0.035	29	106.9	1.4
CW-PH3	132.1	0.278	0.045	0.049	136	268.6	2.0
CW-Total	306.0	0.286	0.059	0.063	302	608.5	2.0
Stockpile	9.8	0.235	0.168	0.033	0.2	10.0	0.0
Total Open Pit	847.0	0.438	0.078	0.231	1,982	2,830	2.3

Table 1-5: Open Pit Oxide and Enriched Feed Tons and Grade by Phase

Phase	Leach Feed	TCU	CUAS	CUCN
	(M ton)	(%)	(%)	(%)
PS-PH1	74.5	0.25	0.09	0.13
PS-PH2	75.5	0.36	0.07	0.26
PS-PH3	58.1	0.63	0.10	0.46
PS-PH4	41.8	0.68	0.10	0.47
PS-PH5	101.9	0.72	0.13	0.49
PS-PH6	53.0	0.68	0.09	0.51
PS-PH7	48.4	0.63	0.14	0.42
PS-Total	453.3	0.55	0.10	0.38
CW-PH1	86.3	0.28	0.12	0.11
CW-PH2	13.0	0.22	0.05	0.12
CW-PH3	54.2	0.22	0.10	0.08
CW-Total	153.5	0.26	0.11	0.10
Stockpile	9.8	0.24	0.17	0.03
Total Open Pit	**616.7**	**0.47**	**0.10**	**0.31**

Table 1-6: Open Pit Hypogene Feed Tons and Grade by Phase

Phase	Leach Feed	TCU	CUAS	CUCN
	(M ton)	(%)	(%)	(%)
PS-PH1	0.8	0.22	0.01	0.05
PS-PH2	0.5	0.19	0.01	0.05
PS-PH3	7.8	0.45	0.01	0.05
PS-PH4	9.2	0.55	0.01	0.05
PS-PH5	22.7	0.45	0.01	0.04
PS-PH6	5.2	0.30	0.01	0.03
PS-PH7	31.7	0.36	0.01	0.03
PS-Total	77.9	0.41	0.01	0.04
CW-PH1	9.9	0.32	0.01	0.03
CW-PH2	64.7	0.31	0.01	0.02
CW-PH3	78.1	0.32	0.01	0.03
CW -Total	152.7	0.32	0.01	0.02
Stockpile				
Total Open Pit	**230.6**	**0.35**	**0.01**	**0.03**

1.15 RECOVERY METHODS

Material will be mined and transferred by haul truck to the crushing circuit where it will be crushed to P_{80} minus ¾-in. From the crushing circuit, the material will be conveyed to the agglomeration drums, mobile transfer conveyors, and mobile radial stacker to be stacked in 30-ft lifts on the lined heap leach pad facility.

Leach solution, containing dilute sulfuric acid will be pumped and applied to the top of each lift and allowed to percolate though the copper leach material. Copper is dissolved into the solution. The height of the leach material on the pad will eventually reach approximately 250 ft (76 m) in overall height.

The pregnant leach solution from the heap leach ponds will be pumped for processing in a copper SX/EW plant capable of producing initially up to 60,000 ton/y of copper cathodes with a design PLS flow of up to 12,000 gpm.

The electrowinning circuit capacity will be expanded in Year 3, doubling in size to the overall plant capacity required to a nominal 120,000 ton/y of copper cathodes.

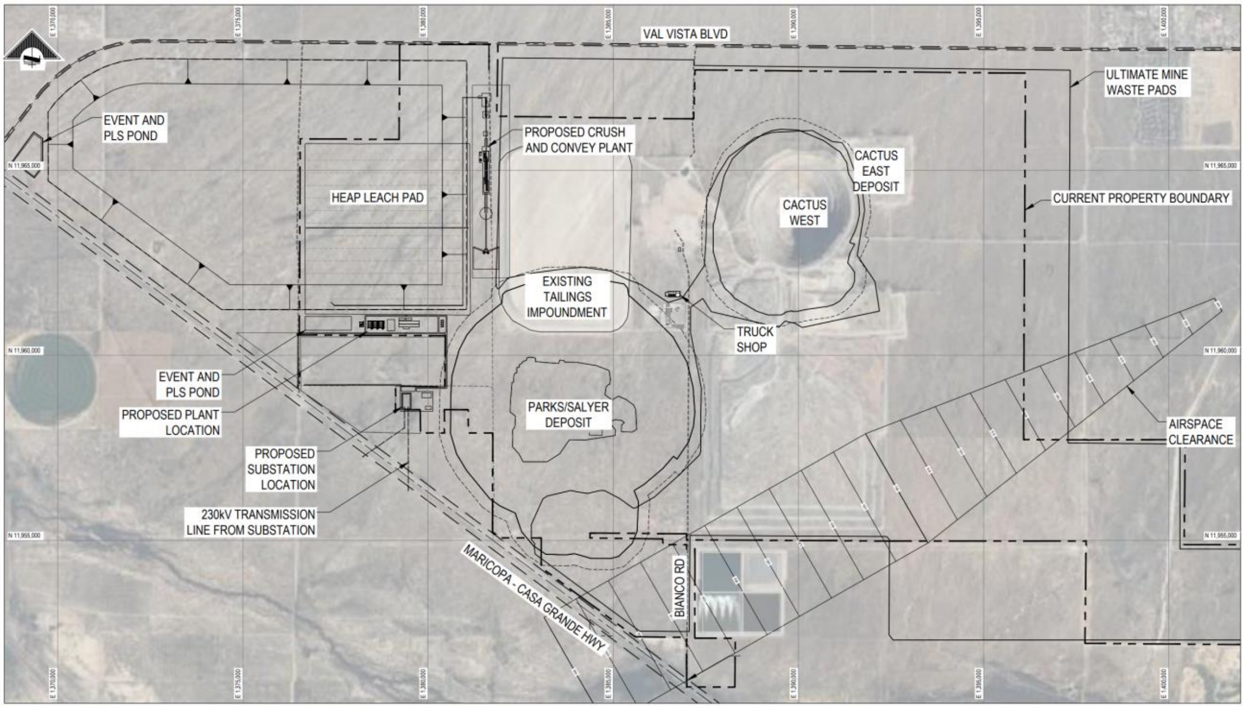
1.16 INFRASTRUCTURE

1.16.1 Project Infrastructure

The Cactus Mine project, located at the historic Sacaton Mine, is 40 road miles southeast of the Greater Phoenix metropolitan area and 3 miles northeast of the city of Casa Grande in Pinal County, Arizona. The site is accessible from West Maricopa Casa Grande Highway (Highway) via Bianco Road, a 2.2-mile paved access road. The site will require the following facilities as listed below and shown in Figure 1-4:

- Mining facilities including an administration trailer, truck shop, explosives storage, fuel storage and distribution, feed material stockpiles, waste stockpiles, and truck wash slab.
- Process facilities including the crushing facilities, SX/EW process plant, reagents storage, process plant maintenance workshop, warehouse, and freshwater infrastructure.
- Heap leach pads, ponds and associated equipment.
- Power supply, distribution and associated electrical rooms.
- Ancillary facilities including guardhouse, administration trailer, and weighing scale.
- Catchments, ponds, water wells, drainage, and other site water management infrastructure were not included at this time and will be detailed in the Pre-feasibility Study.

An overall site layout is provided in Figure 1-4.



Source: M3, 2024

Figure 1-4: Overall Site Layout

1.16.2 Heap Leach Facility (HLF)

The HLF will be constructed in three phases, has an approximate final footprint area of 70.3 million square feet and will support approximately 773 million tons (short tons) of leach material. It is designed to be operated as a fully drained system with no leachate solution storage within the pad. The leach pad has a composite liner system to mitigate seepage to the environment. Above the liner system is a series of solution collection pipes encapsulated in an overliner to rapidly collect pregnant solution and transport it to the double lined pregnant leach solution (PLS) pond(s). There is no raffinate pond associated with this HLF as the raffinate solution will be routed to a tank for reapplication to the HLF. In addition, PLS pond(s) will be double lined with capacities to contain the 100-year, 24-hour storm event, operational pumping heads required, and emergency 24-hour drain-down during power outages (with back-up power sources installed) for the total pad design during the various phases of operations. Crushed feed material materials will be stacked in 30 ft lifts to a maximum height of 250 ft with overall exterior slopes of 3.0:1. The collected pregnant solution will be pumped to the SX/EW circuit.

1.17 MARKET STUDIES AND CONTRACTS

Project economics were estimated based on long-term flat metal prices of US$3.90/lb Cu. This copper price is in accordance with consensus market forecasts from various financial institutions and is consistent with historic prices for this commodity.

No market studies or product valuations were completed as part of the 2024 PEA. Market price assumptions were based on a review of public information, industry consensus, standard practices, and specific information from comparable operations in the region.

1.18 ENVIRONMENTAL, PERMITTING, AND SOCIAL CONSIDERATIONS

The Project includes legacy environmental issues related to the former ASARCO Sacaton operations that have been addressed by Arizona Department of Environmental Quality (ADEQ) as part of the ASARCO bankruptcy settlement with the state. ADEQ, through a prospective Purchaser Agreement, has released ASCU from any potential liability associated with the legacy environmental issues at the site. Permitting is limited to State of Arizona-required permits including the Aquifer Protection Permit and the Mined Land Reclamation Permit which ASCU has received from state regulators. Modifications of each will be required to address changes in the mine plan presented in this PEA.

ASCU has a well-developed community engagement plan that it has implemented through numerous public meetings and outreach. With the presence of legacy mining in the Casa Grande area, the local community is supportive of this project. There is no significant opposition to the Project.

1.18.1 Environmental Considerations

In 2009, approximately 15 years after the Cactus Mine ceased operation, the mine was conveyed to the ASARCO Multi-State Environmental Custodial Trust (the Trust) as part of ASARCO bankruptcy proceedings. The Trust entered the property into the Voluntary Remediation Program (VRP) with Arizona Department of Environmental Quality in 2010. In the following years, structures were demolished and reclaimed, and characterization studies were conducted. Based on the results of the characterization studies and reclamation work, in August 2019, Elim entered into a Prospective Purchaser Agreement (PPA) with ADEQ. The PPA, which ADEQ issued because of the substantial public benefit to the remedial work conducted at the site, released Elim from potential liabilities related to existing, known contamination under CERCLA, WQARF, and RCRA. The PPA does not cover unidentified environmental conditions or contamination.

1.18.2 Closure and Reclamation Considerations

A Mined Land Reclamation Permit (MLRP) was issued by the state in 2023, and an Amended Aquifer Protection Permit was issued in 2021, based on ASCU’s original PEA design. ASCU has posted a bond of $4,797,829 for the MLRP reclamation costs and has a $1,144,576 bond with APP that has not been posted yet but will be posted prior to construction. ASCU will need to amend these permits to reflect changes from this PFS. The APP will cover closure and remediation of the leach pads, which consists of rinsing and caping the leach pads, and the ponds, which consists of draining and treating any residual fluids, then removing the liners. The MLRP covers the removal of any buildings, scarification and revegetating existing roads, capping of waste rock disposal sites, and safeguarding access to the pit and any underground access.

ASCU estimates that the new closure bond estimates for both the APP and MLRP will be $25,000,000 based on the increase in production from the Parks/Salyer deposit and the increase in leach pads and waste rock disposal.

1.18.3 Social Considerations

In keeping with ASCU's community engagement and partnership standards, the Project will be developed with a plan to establish and maintain the support of its host communities. ASCU commenced community outreach at the earliest stages of the Project and is currently evaluating and building partnerships within the community. As the Project's permits will involve a public process and are based on the permit submission and review schedule, ASCU understands the importance of outreach during the permitting process and throughout the life of the mine. ASCU is encouraged by the positive response to the project from the community. Its status as a “brownfields” project makes it potentially more appealing than a new mine might be.

1.19 CAPITAL AND OPERATING COST ESTIMATES

1.19.1 Operating Cost Estimate

The capital cost estimates for this PEA were developed with a -25% to +30% accuracy and an estimated contingency of approximately 25% according to the Association of the Advancement of Cost Engineering International (AACE) Class 5 estimate requirements. The estimates include the cost to complete the design, engineering, procurement, construction, and commissioning of all process plant facilities.

The facilities at the mine site will consist of an open pit, underground mining operation, SX/EW process plant, conveying, crushing, and screening equipment, site sub-station, site power distribution, access roads, heap leach facilities and associated infrastructure.

ASCU has engaged third-party consultants to contribute to the total project scope of work and overall capital cost estimate. On behalf of ASCU, M3 incorporated the third-party contributions into an overall Preliminary Economic Assessment study cost estimate.

All third-party contributors are accountable for the development and quality of their cost estimates, which will be inclusive of all direct costs, growth allowances, project indirect costs, and associated contingency within their scope of work, but separately identified. Each aligns with the overall project WBS numbering system.

The total initial capital cost for the Cactus Project is US$667.9M and the LOM sustaining cost including financing is US$1,168.6M.

Table 1-7 provides a summary of the capital costs for the Project.

Table 1-7: Total Project Costs Summary

Area	Detail	Initial CAPEX ($000s)	Sustaining CAPEX ($000s)	Total CAPEX ($000s)
Direct Costs	Mine Costs	156,856	543,609	700,465
	Processing Plant	259,320	408,240	667,560
	On-Site Infrastructure	95,740	17,211	112,951
	Off-Site Infrastructure	-	-	-
Indirect Costs		45,470	16,944	62,414
Owner's Costs, First Fills, & Light Vehicles		22,921	72,030	94,951
Offsite Environmental Mitigation Costs		-	-	-
Onsite Mitigation, Monitoring, and Closure Costs		-	-	-
Total CAPEX without Contingency		580,307	1,058,034	1,638,341
Contingency		87,558	110,599	198,157
Total CAPEX with Contingency		667,865	1,168,633	1,836,498

Estimated closure requirements inclusive of all necessary demolition, rehabilitation, revegetation, earth grading/contouring, scrap metal disposal/tipping fees, as well as post-closure monitoring. The total closure cost was calculated to be US$25M, with salvage credits of US$225M.

1.19.2 Operating Cost Estimate

The total life-of-mine (LoM) costs, operating costs per short ton ($/st) of processed material, and dollars per pound ($/lb) of cathode produced are summarized in Table 1-8. The project operating costs include mine operating, process plant operating, and general and administrative costs (G&A). Total production costs include royalty expenses. The All-In Sustaining Costs (AISC) and the All-In Costs (AIC) additionally include initial Capex, sustaining Capex, reclamation & closure, estimated salvage value, and property & severance taxes. A summary of these costs is presented in Table 1-8, with further details provided in Section 21.

Table 1-8: Operating Cost, All-In Sustaining Costs and All-In Costs

Cost Elements	LoM		
	Total Cost ($M)	$ / st Processed	$ / lb Copper
Mine Operating Cost	$7,252	$8.16	$1.36
Process Plant Operating Cost	$2,039	$2.29	$0.38
G & A	$50	$0.06	$0.01
Operating Costs	$9,341	$10.51	$1.75
Royalties	$388	$0.44	$0.07
Total Production Costs	$9,729	$10.94	$1.82
Sustaining Capex	$1,169	$1.31	$0.22
Reclamation & Closure	$25	$0.03	$0.00
Salvage	-$225	-$0.25	-$0.04
All-In Sustaining Costs	$10,697	$12.03	$2.00
Property & Severance Taxes	$562	$0.63	$0.11
Initial Capex (non-sustaining)	$668	$0.75	$0.13
All-In Costs	$11,927	$13.42	$2.23

1.20 ECONOMIC ANALYSIS

1.20.1 Economic Summary

The economic analysis was performed assuming an 8% discount rate. On a post-tax basis, the NPV8% is US$2,031.7M, the internal rate of return (IRR) is 24.0%, and the payback period is 4.9 years. A summary of project economics is tabulated in Table 1-9.

Table 1-9: Economic Analysis Table Summary

General	Units	LOM Total / Avg.	
Copper Price	US$/lb	3.90	
Mine Life	Years	31.0	
Total Mineralized Material Processed	Kst	889,004	
Total Waste	Kst	1,982,200	
Avg. TCu	%	0.458	
Avg. CuAS Head Grade	%	0.089	
Avg. CuCN Head Grade	%	0.242	
Production	**Units**	**LOM Total / Avg.**	
Avg. Recovery Rate – CuAS	%	88.0	
Avg. Recovery Rate – CuCN	%	83.0	
Total Payable Copper	M lb	5,338.7	
Annual Payable Copper	M lb/y	172	
Operating Costs	**Units**	**LOM Total / Avg.**	
Mining Cost	US$/st processed	8.16	
Mining Cost	US$/lb copper	1.36	
Processing Cost	US$/st processed	2.29	
G&A Cost	US$/st processed	0.06	
Operating Cash Costs*	US$/lb Cu	1.75	
C1 Cash Costs**	US$/lb Cu	1.82	
C3 Cash Costs (AISC)***	US$/lb Cu	2.00	
Capital Costs	**Units**	**LOM Total / Avg.**	
Initial Capital (Incl. Capitalized Opex)	US$M	668	
Sustaining Capital	US$M	1,169	
Closure Costs	US$M	25	
Salvage Value	US$M	225	
Financials	**Units**	**Pre-Tax**	**Post-Tax**
NPV (8%)	US$M	2,769.3	2,031.7
IRR	%	27.7	24.0
Payback	Years	4.7	4.9

*Operating cash costs consist of mining costs, processing costs, and G&A.
**Total production costs consist of operating cash costs plus transportation cost, royalties, treatment, and refinancing.
***AISC consists of total cash costs plus sustaining capital, closure cost, and salvage value.

1.20.2 Sensitivity Analysis

A sensitivity analysis was conducted on the base case pre-tax and post-tax NPV8% and IRR of the Project using the following variables: metal price, discount rate, total operating cost, and initial capital cost.

The sensitivity analysis revealed that the Project is most sensitive to commodity price, operating cost, and less sensitive to initial capital cost.

1.21 ADJACENT PROPERTIES

The nearest adjacent mineral property is the Santa Cruz copper porphyry deposit, located just over 2 miles (3 km) southeast of the Cactus site and 7 miles (11 km) west of Casa Grande, Arizona. Deposit information obtained from an abstract of the Geology of the Santa Cruz Porphyry Copper Deposit by Henry G. Keis (2020), ASARCO, Incorporated, Tucson, Arizona, reports that the associated alteration and mineralization in the Santa Cruz copper porphyry, including that of fault-displaced portions like the Cactus Project, spans about 7 miles (11 km) in length and about a mile (1.6 km) in width. Ivanhoe Electric Inc. (IE) filed a NI 43-101 compliant Technical Report of their Mineral Resource Estimate on 24 May 2022. The QP was able to visit IE's core shed and view selected core from the property. The combined knowledge from review of the report and viewing the core confirmed that mineralization at Santa Cruz in very similar to the mineralization of the Cactus Project.

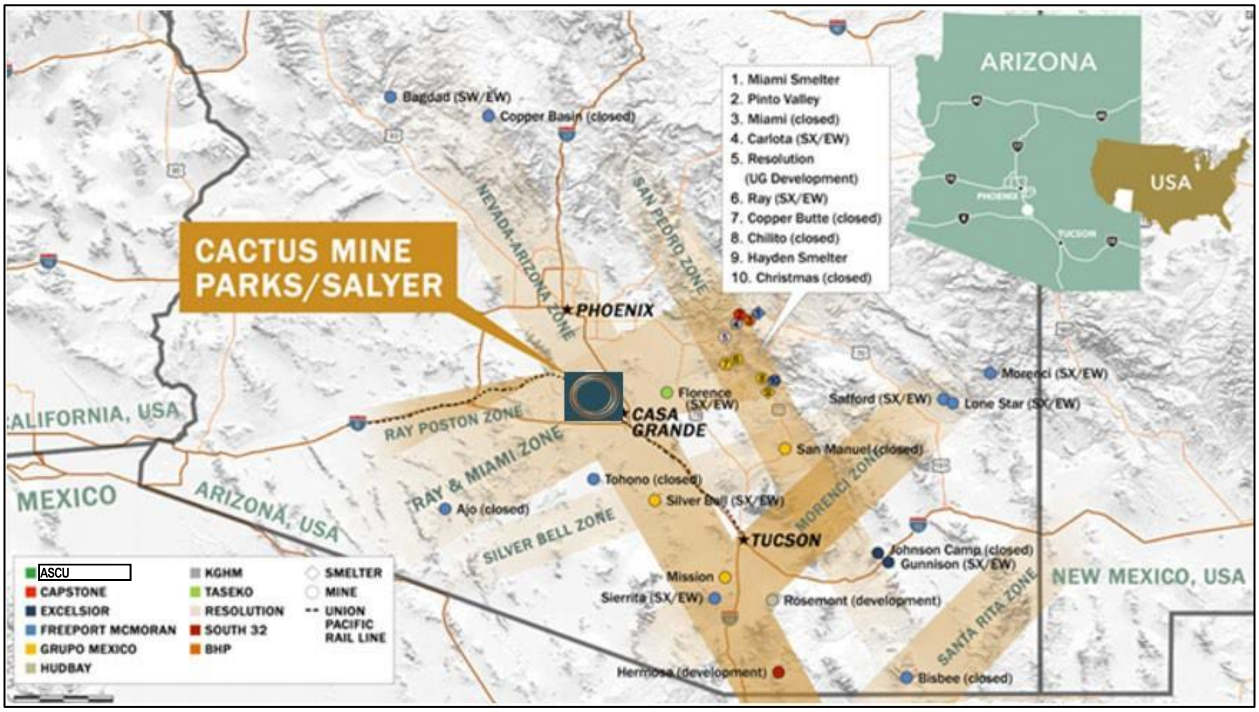


Figure 1-5: Regional Copper Mines and Processing Facilities

1.22 CONCLUSIONS AND INTERPRETATIONS

The total measured and indicated mineral resources estimate for the Cactus Mine Project is 704 Mton of combined leachable and primary mineralogies, averaging 0.43% copper for a total of 7.3 billion lbs of copper.

Based on the assumptions and parameters in this report, the preliminary economic assessment shows positive economics (i.e. post-tax NPV of US$2.03B and 24% post-tax IRR). This PEA supports a decision to carry out additional detailed studies.

1.23 RECOMMENDATIONS

Table 1-10 provides a summary of all major recommended works proposed to be completed in support of future engineering studies and field work to advance the project through Pre-feasibility. The recommended budget of $20.4M and the scope for all work listed below is summarized in Section 26.

Table 1-10: Summary of Budget for Recommendations

Items	($M)
Exploration and Drilling	$10.0
Mining Geotechnical	$2.8
Open Pit Mine Design and Scheduling	$0.4
Underground Mine Design and Scheduling	$0.5
Mine Capital and Operating Cost Estimation	$0.5
Metallurgical Testwork	$3.0
Mineral Resource Estimates	$0.2
Recovery Methods	$1.0
Infrastructure	$0.1
Heap Leach Facility	$0.2
Environmental, Permitting, and Social Recommendations	$0.2
PFS Study Management, Trade-offs, Process Optimization	$1.5
Total	$20.4

Detailed discussion of these items is included in Sections 25 and 26 of this report.

2 INTRODUCTION

The Cactus Mine Project is a project located 40 road miles south-southeast of the Greater Phoenix metropolitan area and approximately 3 miles northwest of the city of Casa Grande, in Pinal County, Arizona.

Arizona Sonoran Copper Company requested that M3 Engineering & Technology Corporation (M3) coordinate the preparation of a Preliminary Economic Assessment (PEA) of the property using the previously published technical report as a basis.

The PEA is preliminary in nature and includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves, and there is no certainty that the PEA will be realized.

2.1 QUALIFIED PERSONS AND PERSONAL INSPECTIONS

Table 2-1 shows the Qualified Persons (QP) for this Technical Report and their associated areas of responsibility. By virtue of their education, experience, and professional association membership, they are considered Qualified Person as defined by NI 43-101.

Table 2-1: Qualified Persons and Areas of Responsibility

Name of Qualified Person	Registration	Company	Date of Site Visit	Area of Responsibility
John Woodson	PE, SME-RM	M3	Feb 7, 2024	Sections 1.1, 1.16, 1.17, 1.19, 1.20, 1.22, 1.23, 2, 3, 18, 19, 21, 22, 24, 25.1, 25.9, 25.11, 25.12, 25.13, 25.14.1.9, 25.14.2.5, 25.14.2.7, 25.14.2.8, 26.1, 26.8, 27
Laurie Tahija	QP-MMSA	M3	Feb 7, 2024	Sections 1.12, 1.15, 13, 17, 25.6, 25.8, 25.14.1.2, 25.14.1.3, 25.14.1.8, 25.14.2.2, 25.14.2.4, 26.3, 26.5, and 26.7
Allan L. Schappert	CPG, SME-RM	ALS Geo Resources LLC	Jun 24, 2024	Sections 1.2, 1.3, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11, 1.13, 1.14, 1.21, 1.23, 2.2, 2.5, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 6, 7, 8, 9, 10, 11, 12, 14, 23, 25.2, 25.3, 25.4, 25.5, 25.14.1.1, 25.14.1.4, 25.14.2.1, 26.2, 26.6 and 27
R. Douglas Bartlett	CPG, RG	Clear Creek Associates, a subsidiary of Geo-Logic Associates	Apr 11, 2023	Sections 1.4, 1.18, 2.3.4, 3.2, 4.7, 4.8, 4.9, 5, 16.3, 20, 25.10, 25.14.1.10, 25.14.2.6, 26.9 and 27
Gordon Zurowski	P.Eng.	AGP Mining Consultants Inc.	Jan 24, 2023.	Sections 1.14, 16.1, 16.2, 16.4-16.8, 21.1.1, 21.2.1, 25.7, 25.14.1.5, 25.14.1.6, 25.14.1.7, 25.14.2.3, 26.4.1, 26.4.2, 26.4.3, 26.4.4, 26.4.5, and 27
James L. Sorensen	FAusIMM	Samuel Engineering, Inc.	Aug 31, 2023	Section 25.14.2.9

2.2 TERMS OF REFERENCE

All measurements presented in this report are in imperial units unless otherwise noted. Currency is expressed in US dollars (US$ or USD) unless otherwise noted. Mineral resources and mineral reserves are reported in accordance with the Canadian Institute of Mining, Metallurgy, and Petroleum (CIM) Definition Standards for Mineral Resources and

Mineral Reserves (CIM, 2014) and the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (CIM, 2019).

The ASCU property contains one past-producing mine that operated from 1972 until 1984. The Sacaton Mine, which sourced feed material from the Cactus West deposit, collectively produced 400 M lbs of copper (Cu), 27,455 oz of gold (Au) and 759,000 oz of silver (Ag).

A prior PFS was filed on the Cactus Mine Project titled "Preliminary Feasibility Study, Ausenco, Effective Date: 21 February 2024, Prepared for Arizona Sonoran Copper Company, Inc. The resource was used as basis for this PEA and the information was vetted by the Qualified Persons (QPs) discussed in Section 2.1.

2.3 SITE VISITS AND SCOPE OF PERSONAL INSPECTION

2.3.1 Site Inspection by John Woodson

John Woodson visited the property once on February 7, 2024. The site visit included a site tour by vehicle starting at the Cactus East overlook point, then to the stockpile before descending to Bianco Road to look west over the future Parks/Salyer deposit. The tour then continued north and turned west at the existing Tru-Stone Facility to view areas west of the project and then proceed north to the top of the existing revegetated tailing facility. The tour finished with a visit to the core shack and finally a debriefing meeting at the Cactus Mine office.

2.3.2 Site Inspection by Laurie Tahija

Laurie Tahija visited the property once on February 7, 2024. The site visits included a site tour by vehicle starting at the Cactus East overlook point, then to the stockpile before descending to Bianco Road to look west over the future Parks/Salyer deposit. The tour then continued north and turned west at the existing Tru-Stone Facility to view areas west of the project and then proceed north to the top of the existing revegetated tailing facility. The tour finished with a visit to the core shack and finally a debriefing meeting at the Cactus Mine office.

2.3.3 Site Inspection by Allan L. Schappert

Mr. Allan L. Schappert, previously with Stantec and now ALS Geoservices, first visited the site in August of 2019. He has made numerous visits to the site each year since; three in 2019, three in 2020, two in 2021, and four in 2022, three in 2023, and two in 2024 to date. The most recent visit to site was on June 23rd and 24th 2024. During these visits, Allan visited active drill sites, checked collar locations against database records, watched core recovery procedures and secure transport to the core shed. He also made trips to the stockpile to watch ongoing sonic drilling and sampling/logging of the material stored there.

Mr. Schappert also visited the core shed where he observed the logging, splitting, sampling, and storage of drill core. Targeted visits were made during the oriented core program to provide direction and training with tools to assist in the logging of fracture data. On each of these visits, Allan had meetings and discussions with on-site personnel and management to provide guidance to maintain compliance with current CIM best practices.

Mr. Schappert also visited Skyline Laboratories in Tucson, Arizona, which is Cactus' sole assay lab. At least one visit each year since 2019 including one visit early in 2024. During these visits Allan observed sample storage and security protocols, sample prep procedures, assay methodologies, and internal QA/QC programs and reporting. Visits to both site and the lab are ongoing as drilling continues.

2.3.4 Site Inspection by R. Douglas Bartlett

R. Douglas Bartlett conducted a site visit on May 12, 2020, to conduct a due diligence review for Tembo Capital Management Ltd. Additionally, he visited on various dates in 2022 and 2023 to meet with ASCU staff, review data, visit drill rig during well installation for a total of 10 days over two years. During the site inspection, Mr. Bartlett reviewed hydrogeologic and geologic data, maps, reports, lithologic logs, core, and personally interviewed onsite personnel.

2.3.5 Site Inspection by Gordon Zurowski

Mr. Gordon Zurowski conducted a site visit to the Cactus Project property for one day on January 24, 2023. While on site, Mr. Zurowski reviewed recent drill core, viewed the existing pit from a distance permitted by the existing site protocol, visited the potential waste dump locations and the historic stockpile. Additionally, he proposed infrastructure locations including the existing brick works which will be repurposed for mining in the PFS, proposed plant and heap leach locations and nearby railway sidings.

2.3.6 Site Inspection by James L. Sorensen

Mr. James L. Sorensen has conducted several site visits between 2019 and 2023 (at least one annually) with respect to metallurgical sampling, geo-metallurgical coordination and project reviews. The most recent site visit was completed on August 31, 2023.

While on site Mr. Sorensen has witnessed and directed metallurgical sample collection activities for the testing completed at the McLelland facilities over the course of the various metallurgical programs, reviewed and inspected the ASCU metallurgical on-site testing facility, inspected the potential process plant facility locations and associated infrastructure. This was performed for the March 2024 PFS.

Meetings were held on site with the various team members including ASCU personnel responsible for geology, environmental activities and other team members for processing and infrastructure.

2.4 EFFECTIVE DATES

The Stockpile Resource Estimates has an effective date of March 1, 2022, and uses a copper price of US$3.15/lb. The Cactus Mineral Resource Estimate has an effective date of April 29, 2022, and the Parks/Salyer Resource Estimate has an effective date of May 19, 2022. Both used a copper price of US$3.75/lb.

2.5 INFORMATION SOURCES AND REFERENCES

The authors are not experts with respect to legal, socio-economic, land title, or political issues, and are therefore not qualified to comment on issues related to the status of permitting, legal agreements, and royalties. Information related to these matters has been provided directly by ASCU and includes, without limitation, validity, status of environmental and other liabilities, and permitting to allow completion of environmental assessment work. Allan L/ Schappert (QP) visited the Arizona State Lands and Department, and Pinal County Recorder and Assessors Office website to review publicly available data on ASLD leases and property ownership for the project. These matters were not otherwise independently verified by the QPs but appear to be reasonable representations that are suitable for inclusion in Section 4 of this report.

The primary sources of geology and drilling information in this report was ASCU and was collected and validated by Allan L. Schappert (QP) during multiple site visits and communications from 2019 through 2024 Additional information and assay data referenced for Skyline Assayers and Laboratories Tucson, Arizona.

2.5.1 Previous Technical Reports

The Cactus Parks/Salyer project has been the subject of previous technical reports as follows:

- Parks/Salyer Open Pit Slope Angles for Preliminary Economic Analysis, Call & Nicholas, Inc., (Internal document) July 2024, Prepared for Arizona Sonoran Copper Company, Inc.
- Preliminary Feasibility Study, Ausenco, Effective Date: 21 February 2024, Prepared for Arizona Sonoran Copper Company, Inc.
- Geotechnical Preliminary Feasibility Study, Call & Nicholas, Inc., (Internal document) December 2023, Prepared for Arizona Sonoran Copper Company, Inc.
- Mineral Resource Estimate and Technical Report, Stantec, Effective Date: 10 November 2022, Prepared for Arizona Sonoran Copper Company, Inc.
- Preliminary Economic Assessment, Stantec, Effective Date: 31 August 2021, Prepared for Arizona Sonoran Copper Company, Inc.
- Preliminary Economic Assessment, Samuel Engineering, Effective Date March 12, 2020, Prepared for Elim Mining Inc. Cactus Mine Stockpile Processing Project.

2.6 CURRENCY, UNITS, ABBREVIATIONS, AND DEFINITIONS

All units of measurement in this report are imperial and all currencies are expressed in US dollars (symbol: US$ or currency: USD) unless otherwise stated. Copper metal is expressed in tons. All material tons are expressed as dry tons unless stated otherwise.

Table 2-2 shows a list of abbreviations, acronyms, and Table 2-3 shows units of measurements used in this report.

Table 2-2: General Abbreviations Used in this Report

Abbreviation	Term	Abbreviation	Term
AA	atomic absorption spectroscopy	AZPDES	Arizona Pollutant Discharge Elimination System
APP	Aquifer Protection Permit Amendment	BCE	Bronco Creek Exploration
APS	Arizona Public Service	BLM	Bureau of Land Management
ADEQ	Arizona Department of Environmental Quality	CE	Cactus East
ADWR	Arizona Department of Water Resources	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Ag	Silver	CIM	Canadian Institute of Mining, Metallurgy and Petroleum
AGP	AGP Mining Consultants Inc.	CIM Definition Standards	CIM Definition Standards for Mineral Resources and Mineral Reserves 2014
ALS	ALS Geo Resources, LLC	CNI	Call & Nicholas Inc.
AMA	Active Management Area	CoGs	cut-off grades
APS	Arizona Public Service	Cu	Copper
ASARCO	American Smelting and Refining Company	CuT	total copper
ASCU	Arizona Sonoran Copper Company	CuAS	acid soluble copper
ASLD	Arizona State Land Department	CuCN	cyanide soluble copper
Au	Gold	CW	Cactus West
AZ	Arizona		

Abbreviation	Term
DDH	diamond drill hole
EM	electromagnetic
EPA	Environmental Protection Agency
FA	fire assay
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FET	federal excise tax
FS	feasibility study
G & A	General and Administrative
GPS	Global Positioning System
GRWS	Gila River Water Storage, LLC
HLF	Heap Leach Facility
HLF	Heap Leach Pad
HQ	H-size and Q-group wireline diamond drilling system
HV	High voltage
ICP-AES	Inductively coupled plasma atomic emission spectroscopy
IE	Ivanhoe Electric Inc.
IP	induced polarization
IPC	International Plumbing Code
ISO	International Organization for Standardization
IRR	internal rate of return
LCU	lower conglomerate unit
LHD	load, haul, dump
LIDAR	light detection and ranging
LLC	limited liability company
LOM	life of mine
LV	low voltage
M3	M3 Engineering & Technology Corp.
MCC	motor control center
MEP	Mineral Exploration Permits
MOU	Memorandum of understanding
MRE	mineral resource estimate
MSCU	middle silt and clay unit
MV	medium voltage
NaCN	sodium cyanide
NAG	non acid-generating

Abbreviation	Term
NI 43 101	National Instrument 43-101 (Regulation 43-101 in Quebec)
NN	nearest neighbor
NPV	Net Present Value
NSR	Net Smelter Return
NW	northwest
PA	purchase agreement
Pb	Lead
PEA	Preliminary Economic Assessment
PFS	Prefeasibility Study
PLS	pregnant leach solution
PPA	Prospective Purchaser Agreement
PQ	cores designed specifically for switched-mode power supplies.
PS	Parks/Salyer
QA/QC	quality assurance/quality control
QP	Qualified Person (as defined in National Instrument 43-101)
RCRA	Resource Conservation and Recovery Act
RMSE	root mean square error
ROGR	Registry of Groundwater Rights
ROM	run of mine
RQD	rock quality designation
SG	specific gravity
SCIP	San Carlos Irrigation Project
SIP	site improvement plan
SLUP	state land use permit
SOP	standard operating procedure
Std. dev.	Standard deviation
TSF	tailings storage facility
Tsol	total soluble copper
UAU	upper alluvial unit
UG	underground
ULC	unlimited liability corporation
USA	United States of America
UTM	Universal Transverse Mercator coordinate system
VMS	volcanogenic massive sulfide
VRP	Voluntary Remediation Program
WOTUS	waters of the US

Abbreviation	Term
WQARF	Water Quality Assurance Revolving Fund
WG	Water gauge
WRD	waste rock dump
WRSF	Waste Rock Storage Facility
Zn	Zinc

2.7 UNITS OF MEASUREMENT

Table 2-3: Measurement Abbreviations Used in this Report

Abbreviation	Term
$	United States dollars
$/lb	dollars per pound
$/oz	dollars per ounce
$/t	US dollars per metric tonne
$M US	million US dollars
$/t	dollars per ton
%	percent
% solids	percent solids by weight
°	angular degree
°C	degrees Celsius
°F	degrees Fahrenheit
µm	micron (micrometer)
af	acre-foot
afy	acre feet per year
asl	above sea level
dmt	dry metric tonne
ft	foot (12 inches)
g/cm^3	grams per cubic centimeter
gpl	grams per liter
gpm	gallons per minute
g/t	grams per tonne
h	hour (60 minutes)
ha	hectares
in	inch
K	thousand
kg/t	kilogram per tonne
km	kilometer
kph	kilometers per hour
kst/h	kiloton per hour
kmt/y	thousand tonnes per year
kV	kilovolt
kW	kilowatt
kWh/t	kilowatt-hour per ton
lb	pound
m	meter
m^2	meter squared
m^3	meter cubed
M	million
Ma	million years (annum)
mi	mile
ml	milliliter
mm	millimeter
Moz	million (troy) ounces
mph	miles per hour
Mtonnes	Million metric tons
Mton	million short tons
Mst/y	Million short tons per annum
Mstpa	Million short tons per annum
MVA	megavolt-amperes
MW	megawatt
oz	troy ounce
oz/ton	ounce (troy) per short ton (2,000 lbs)
ppb	parts per billion
ppm	parts per million
mt	metric tonne
mt/d	metric ton per day
t/m^3	metric tonnes per cubic meter
ton	short ton (2,000 lbs)
ton/d	short tons per day
TrOz	Troy Ounce
Tsol	total soluble copper
US$	US dollar (as symbol)
USD	US dollars (currency)
y	year
y^3	yards cubed

2.8 WORK BREAKDOWN STRUCTURE (WBS)

The physical facilities and utilities for the project include, but are not limited to, the following areas defined in Table 2-4. Area descriptions are noted in the WBS Level 2 Descriptions.

Table 2-4: Work Breakdown Structure

WBS	Description
1000	**INFRASTRUCTURE**
1100	Site Preparation
1200	Sewage and Waste Management
1300	Environmental Management Facilities
1400	TBD
1500	Administration Buildings and Offices
1600	Maintenance and Supporting Facilities
1700	Power Supply
1800	Rail
1900	Water Management
2000	**MINING**
2100	Mining Existing Stockpiles
2200	Open Pit Development
2300	Open Pit Equipment
2400	Open Pit Infrastructure
2500	Underground – Cactus East
2600	Underground – Parks/Salyer
2700	Underground – Combined
2800	TBD
2900	Mine Maintenance and Support Facilities
3000	**CRUSHING AND CONVEYING**
3100	Primary Crushing
3200	Coarse Feed Material Storage and Reclaim
3300	Secondary Crusher
3400	Crushed Feed Material Stockpile
4000	**LEACHING AND WASTE ROCK STORAGE**
4100	Heap Leach Pads (HLF)
4140	Pad Aeration
4200	HLF Feed Material Handling
4300	Pregnant Leach Solution Management
4400	Raffinate Management
4500	Event Ponds
4600	Waste Rock

WBS	Description
5000	**SOLVENT EXTRACTION (SX)**
5100	Solvent Extraction
5200	Tank Farm
5300	Crud Treatment
6000	**ELECTROWINNING (EW)**
6100	Electrowinning (EW)
6200	Cathode Storage
6300	Laboratory
6400	Electrowinning Building
6500	Control Room
7000	**REAGENTS**
7100	Reagents
8000	**PROCESS PLANT SERVICES AND UTILITIES**
8500	Plant Services
9000	**PROJECT EXECUTION**
9100	Construction Indirect
9200	Execution – EPCM
9300	Commissioning
9400	Spare Parts
9500	First Fills
9600	Mobile Equipment
9700	Owner’s Project Costs
9800	Other Costs
9900	Contingency

3 RELIANCE ON OTHER EXPERTS

3.1 INTRODUCTION

This report has been prepared by the Qualified Persons (QP) listed in Section 2 for Arizona Sonoran Copper Company. The information, conclusions, opinions, and estimates contained herein are based on:

- Information available to the QPs at the time of preparation of this report;
- Assumptions, conditions, and qualifications as set forth in this report; and
- Data, reports, and other information supplied by ASCU and other third-party sources.

Reports received from other experts who are not QPs of this technical report have been reviewed for factual errors by the QPs. Any changes made as a result of these reviews did not involve any alteration to the conclusions made. Hence, the statements and opinions expressed in these documents are given in good faith and in the belief that such statements and opinions are not false or misleading at the date of this report.

While the authors have carefully reviewed within the scope of their technical expertise, all the available information presented to them, they cannot guarantee its accuracy and completeness. The authors reserve the right, but will not be obligated to, revise the technical report and its conclusions if additional information becomes known to them subsequent to the effective date of this report.

The QPs have relied upon other experts for data as indicated in the following sections.

3.2 PROPERTY AGREEMENTS, MINERAL TENURE, SURFACE RIGHTS AND ROYALTIES

The land tenure and title was validated by visits to the Arizona State Lands Department and Pinal County Recorder and Assessors Offices' websites to review publicly available data on ASLD leases and property ownership for the project.

3.3 ENVIRONMENTAL, PERMITTING, CLOSURE, AND SOCIAL AND COMMUNITY IMPACTS

Clear Creek relied on information provided by ASCU and on their experience in permitting mining projects in Arizona to prepare Sections 1.21, 20 and 25.11. ASCU and the previous owner, Elim Mining, performed much of the permitting activities to date. Independent verification has not been pursued at this time with the agencies cited to confirm status and potential timing. Documents relied upon included:

- ADEQ, 2020. Letter to ASARCO Multi-State Custodial Trust dated February 28, 2020, granting covenant not to use. Signed by Laura L. Malone, Director of Waste Programs Division, ADEQ.

- ADWR, 2020, https://new.azwater.gov/sites/default/files/media/20200305_PAMA4MP_Draft.pdf

- City of Casa Grande, 2009. General Plan. https://drive.google.com/file/d/0B4vKG2urQq2OMDd5X0dSSWZBRjA/view

- Errol Montgomery and Associates (M&A), (1986): Hydrogeologic Conditions, ASARCO Sacaton Open-Pit Mine, Pinal County, Arizona. Document prepared as part of Groundwater Quality Protection Permit Application, November 21, 1986.

- Samuel Engineering, 2020. NI 43-101 Technical Report; Preliminary Economic Assessment (PEA), prepared for Elim Mining Incorporated Cactus Mine Stockpile Processing Project, Pinal County, Arizona, USA. March 12, 2020, Revision 1

- Tetra Tech, Inc., 2017a. Sacaton Site Characterization Work Plan, prepared for ASARCO Multi-State Environmental Custodial Trust. May 1, 2017.
- Tetra Tech, Inc., 2017b. Technical Memorandum Re: Initial Hydrogeologic Characterization Study submitted to John Patricki and Tina LePage, Arizona Department of Environmental Quality. December 21.
- Tetra Tech, Inc., 2018a. Technical Memorandum Re: 201 Sacaton –Comprehensive Facility Inspection submitted to John Patricki, Arizona Department of Environmental Quality. July 15.
- Tetra Tech, Inc., 2018b. Technical Memorandum Re: Tru-Stone Comprehensive Facility Inspection, submitted to John Patricki, Arizona Department of Environmental Quality. July 15.
- Tetra Tech, Inc., 2019a. Demolition Completion Report – Sacaton Mine Site, prepared for ASARCO Multi-State Environmental Custodial Trust. March 11.
- Tetra Tech, Inc., 2019b. Site Improvement Plan – Sacaton Mine Site, prepared for ASARCO Multi-State Environmental Custodial Trust. March 11.
- Tetra Tech, Inc., 2019c. Site Improvement Plan – Sacaton Mine Site Amendment 1, prepared for ASARCO Multi-State Environmental Custodial Trust. November 26, 2019. United States Environmental Protection Agency (EPA): Lean & Water Toolkit: Appendix C – Water Unit Conversions and Calculations. https://www.epa.gov/sustainability/lean-water-toolkit-appendix-c

3.4 TAXATION

The QPs have not independently reviewed the taxation information. The QPs have fully relied upon, and disclaim responsibility for, taxation information derived from experts retained by ASCU as contained in the following document: A letter authored by Mining Tax Plan LLC (MTP) titled: Arizona Sonoran Cactus PEA_7-1-24

MTP specializes in U.S. federal and state income taxation including foreign income taxation of precious metal, non-metallic feed material, coal, and quarry mining companies. MTP has experience with extractive and natural resource industries and specializes in state mineral property and severance taxes in Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, and Utah.

3.5 AGREEMENTS

The QP’s have fully relied upon, and disclaim responsibility for, information derived from ASCU for information related to the following agreement for the purchase of used equipment: A letter authored by Arizona Sonoran Copper Company titled: ASCU Letter of Intent to Purchase (Rev 1.0 25Jan2024), dated January 26, 2024.

4 PROPERTY DESCRIPTION AND LOCATION

4.1 DESCRIPTION OF LOCATION

The entire Cactus Mine Project is located on private land approximately 6 miles (10 km) northwest of the City of Casa Grande and 40 road miles south southwest of the Greater Phoenix metropolitan area. Access to the Project is approximately 4.6 miles (7.4 km) west of AZ-387 on North Bianco Road off of West Maricopa-Casa Grande Highway. The coordinates for the center of the Project are 111.82° W longitude and 32.94° N latitude, with a variable elevation between 1,330 to 1,510 ft (405 to 460 m) above sea level (asl).

4.2 PROJECT OWNERSHIP

In 2019, Cactus 110 LLC, a wholly owned subsidiary of ASCU, executed both PA and PPA with a Multi-State Custodial Trust and the ADEQ, respectively, for the right to acquire all ASARCO land parcels representing the Project, as well as all infrastructure therein, and all associated mineral rights. In June of 2020, ASCU successfully closed on the property and acquired full title for the Project. In addition, Cactus 110 LLC closed on the Merrill Properties comprising the Parks/Salyer Project. Also, in 2020, ASCU acquired a prospecting permit for adjacent land owned by the Arizona State Lands Department.

In February 2021, Cactus 110 LLC executed an agreement with Arcus Copper Mountain Holdings LLC and several co-owners to purchase 750 acres of land also adjacent to the Project.

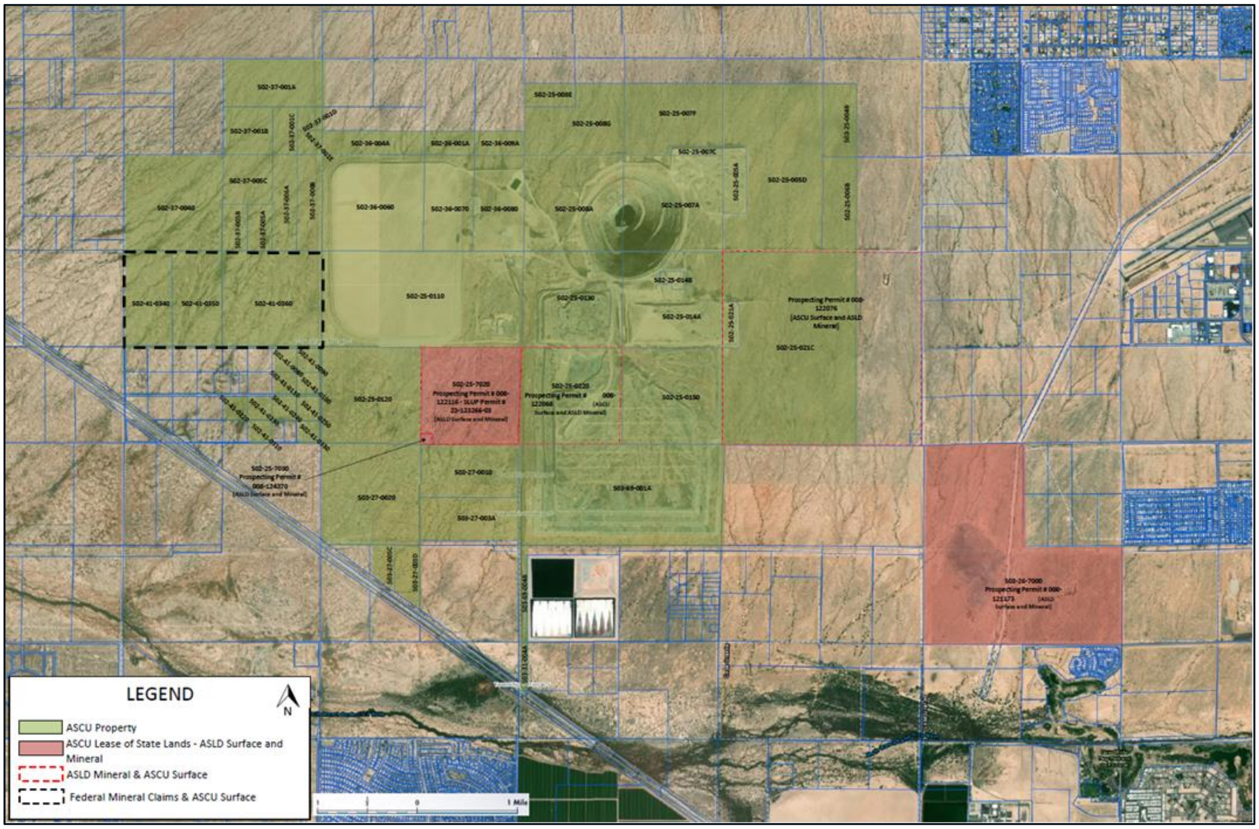
In May 2021, Cactus 110 LLC entered into an agreement with LKY/Copper Mountain Investments Limited Partnership LLP to purchase 1,000 acres of land adjacent to the Project referred to as the LKY Property.

In February 2022, ASCU entered into an agreement to transfer Bronco Creek Explorations Mineral Exploration Lease (MEP) with the Arizona State Lands Department to ASCU. This MEP consists of 157.50 acres of State-owned surface and minerals and is held under Cactus 110. This land contained a portion of the Parks/Salyer project.

In February 2023, Cactus 110 LLC executed an agreement with MainSpring Casa Grande LLC to purchase 522.78 acres of land adjacent to the Project.

Cactus 110 LLC also has three ASLD Mineral Prospecting Permits (MEP's) that the State has surface and mineral rights (649.12 acres), two ASLD Mineral Prospecting Permits (MEP's) that the State has mineral rights only with ASCU owning the surface rights (797.5 acres). In addition to the MEP's Cactus 110 LLC also has two Special Land Use Permits (SLUP) with the State to allow for surface use that the State owns.

The Project comprises total landholdings of approximately 5,720.08 acres. A summary of the current landholdings is as provided in Section 4.4. Figure 4-1 is a plan map showing these holdings.



Source: ASCU, 2023.

Figure 4-1: Location of Mineral Tenure and Surface Rights

These private land assets represent, among other things, the mineral rights to the Cactus East, Cactus West, Parks/Salyer, and MainSpring deposits. Arizona Sonoran Copper Company (USA) Inc., a subsidiary of ASCU, intends to operate the mine under the name Cactus.

4.3 PROPERTY MINERAL TENURE LOCATION AND SURFACE RIGHTS

The Project is 100% controlled by ASCU through its wholly owned subsidiary Cactus 110 LLC, which encompasses an area of approximately 5,720.08 acres. Of that, 4,731.92 acres is fee simple land. This includes:

- 3 ASLD prospecting permits that the State has surface and mineral rights (649.12 acres).
- 2 ASLD prospecting permits that the State has mineral rights only with ASCU owning the surface rights (797.5 acres).
- 2 ASLD Special Land Use Permits (SLUP's) allowing for surface use (496.5 acres)
- 18 BLM unpatented mining lode claims for mineral rights only as ASCU owns the surface rights (320 acres). The BLM unpatented mining claims are outside of the known mineralization and there are no plans for mining in these areas.

Table 4-1 identifies ASCU's Fee Simple Lands it owns or has lease agreements with ASLD. Property mineral tenure is shown in Figure 4-1.

Table 4-2 Lode Claims and Mineral Exploration Permits (MEP'S) and Special Land Use Permits (SLUP's) are with Arizona State Lands Department (ASLD).

Table 4-3 lists all the Arizona State Lands Department Mineral Exploration Permits.

Table 4-4 Mineral Tenure Plan shows the requirements for maintaining the ASCU land package.

Table 4-1: Fee Simple Lands Table

Owner	Parcel No.	Property Description	Township	Range	Section	Acres
CACTUS 110 LLC						
CACTUS 110 LLC	503-31-004B	NWNW LESS WEST 215 FEET OF SEC 10, 6S-5E	6 South	5 East	10	33.5
CACTUS 110 LLC	502-36-004A	S1/2S1/2NW OF SEC 27, 5S-5E	5 South	5 East	27	40
CACTUS 110 LLC	502-36-001A	S1/2S1/2W1/2NE OF SEC 27, 5S-5E	5 South	5 East	27	20
CACTUS 110 LLC	502-36-009A	S1/2S1/2E1/2NE OF SEC 27, 5S-5E	5 South	5 East	27	20
CACTUS 110 LLC	502-37-001E	SESENE OF SEC 28, 5S-5E	5 South	5 East	28	10
CACTUS 110 LLC	502-37-006B	E1/2E1/2SE OF SEC 28, 5S-5E	5 South	5 East	28	40
CACTUS 110 LLC	502-41-0080	LOT 7 OF SEC 33, 5S-5E	5 South	5 East	33	10
CACTUS 110 LLC	502-41-0090	LOT 8 OF SEC 33, 5S-5E	5 South	5 East	33	10
CACTUS 110 LLC	502-41-0100	LOT 9 OF SEC 33, 5S-5E	5 South	5 East	33	10
CACTUS 110 LLC	502-41-0110	LOT 10 OF SEC 33, 5S-5E	5 South	5 East	33	10
CACTUS 110 LLC	502-41-0220	LOT 21 OF SEC 33, 5S-5E	5 South	5 East	33	10
CACTUS 110 LLC	502-41-0230	LOT 22 OF SEC 33, 5S-5E	5 South	5 East	33	10
CACTUS 110 LLC	502-41-0240	LOT 23 OF SEC 33, 5S-5E	5 South	5 East	33	10
CACTUS 110 LLC	502-41-0250	LOT 24 OF SEC 33, 5S-5E	5 South	5 East	33	10
CACTUS 110 LLC	502-41-0310	LOT 30 OF SEC 33, 5S-5E	5 South	5 East	33	10
CACTUS 110 LLC	502-41-0330	LOT 32 OF SEC 33, 5S-5E	5 South	5 East	33	10
CACTUS 110 LLC	502-25-0120	SW OF SEC 34-5S-5E	5 South	5 East	34	160
CACTUS 110 LLC	503-69-004B	WEST 215 FET OF SW OF SEC 3-5S-5E	5 South	5 East	3	10
CACTUS 110 LLC	503-31-004A	WEST 215 FET OF NWNW OF SEC 10-5S-5E	5 South	5 East	10	6.5
CACTUS 110 LLC	502-36-0060	SW OF SEC 27-5S-5E	5 South	5 East	27	160
CACTUS 110 LLC	502-36-0070	W1/2SE OF SEC 27-5S-5E	5 South	5 East	27	80
CACTUS 110 LLC	502-36-0080	E1/2SE OF SEC 27-5S-5E	5 South	5 East	27	80
CACTUS 110 LLC	502-25-008A	SW OF SEC 26-5S-5E	5 South	5 East	26	160
CACTUS 110 LLC	502-25-007A	SE OF SEC 26-5S-5E	5 South	5 East	26	160
CACTUS 110 LLC	502-25-007C	S-265.72 OF E-1450 OF NE OF SEC 26-5S-5E	5 South	5 East	26	8.85
CACTUS 110 LLC	502-25-005A	W-630 OF THE N-1855 OF THE S-2905 OF SEC 25-5S-5E	5 South	5 East	25	26
CACTUS 110 LLC	502-25-014A & 502-25-014B	NE OF SEC 35-5S-5E	5 South	5 East	35	160
CACTUS 110 LLC	502-25-0130	NW OF SEC 35-5S-5E	5 South	5 East	35	160

Owner	Parcel No.	Property Description	Township	Range	Section	Acres
CACTUS 110 LLC						
CACTUS 110 LLC	502-25-0110	N1/2 OF SEC 34-5S-5E AC E-CRETE IPR #502-25-800	5 South	5 East	34	320
CACTUS 110 LLC	502-25-0220	SW SEC 35-5S-5E	5 South	5 East	35	160
		(surface only)				
CACTUS 110 LLC	502-25-0150	SE OF SEC 35-5S-5E	5 South	5 East	35	160
CACTUS 110 LLC	502-25-021A	COMM @ NW COR OF SEC 36-5S-5E TH S-1316.64' TO POB TH S88D E- 227.58' TO POB THE POINT OF A TANG-CUR CONCAVE SW W/RAD OF 217.19' TH SWLY 325.21- TH S02D E-980.73' TO THE POINT OF A NON- TANG-CUR CONCAVE NW W/RAD OF 123.28' TH SWLY 192.7' TH W-360.55' TH N-1313.81' TO POB 13.50 AC	5 South	5 East	36	13.5
		(Surface Only)				
CACTUS 110 LLC	503-69-001A	LOTS 1-4 & S1/2N1/2 OF SEC 3-6S-5E	6 South	5 East	3	340.24
CACTUS 110 LLC	515-28-0020	SEC 28-5S-6E WATERWELL SITE #1 NWNENE AND PIPELINE RIGHT OF WAY EXTENDING IRREGULARLY FROM EAST EDGE OF NE TO N EDGE OF NE	5 South	6 East	28	15.46
CACTUS 110 LLC	515-28-0100	SEC 28-5S-6E WATERWELL SITE IN NENENESE AND PIPELINE RIGHT OF WAY ALONG EAST EDGE OF SE	5 South	6 East	28	15.12
CACTUS 110 LLC	502-37-006A	W1/2E1/2SE OF SEC 28-5S-5E	5 South	5 East	28	40
CACTUS 110 LLC	502-37-005C	NWSE OF SEC 28-5S-5E	5 South	5 East	28	40
CACTUS 110 LLC	502-37-005A	E1/2SWSE OF SEC 28-5S-5E	5 South	5 East	28	20
CACTUS 110 LLC	502-37-005B	W1/2SWSE OF SEC 28-5S-5E	5 South	5 East	28	20
CACTUS 110 LLC	502-37-001A	N1/2NE OF SEC 28-5S-5E	5 South	5 East	28	80
CACTUS 110 LLC	502-37-001B	SWNE OF SEC 28-5S-5E	5 South	5 East	28	40
CACTUS 110 LLC	502-37-001C	W1/2SENE OF SEC 28-5S-5E	5 South	5 East	28	20
CACTUS 110 LLC	502-37-001D	NESENE OF SEC 28-5S-5E	5 South	5 East	28	10
CACTUS 110 LLC	502-37-0040	SW OF SEC 28-5S-5E	5 South	5 East	28	160
CACTUS 110 LLC	502-41-0360	NE OF SEC 33-5S-5E 160.00 AC	5 South	5 East	33	160
		(surface only)				
CACTUS 110 LLC	502-41-0340	W1/2NW OF SEC 33-5S-5E	5 South	5 East	33	80
		(surface only)				
CACTUS 110 LLC	502-41-0350	E1/2NW OF SEC 33-5S-5E	5 South	5 East	33	80
		(surface only)				

Owner	Parcel No.	Property Description	Township	Range	Section	Acres
CACTUS 110 LLC						
CACTUS 110 LLC	502-25-005D	THE ENTIRE WEST HALF OF SECTION 25, TOWNSHIP 05 SOUTH, RANGE 05 EAST; EXCEPT THE NORTH HALF OF THE NORTH HALF OF THE NORTHWEST QUARTER OF SAID SECTION 25; ALSO EXCEPT THE FOLLOWING DESCRIBED PARCEL: COMMENCING AT THE SOUTHWEST CORNER OF SAID SECTION 25, THENCE NORTH 1050.01 FEET TO THE POINT OF BEGINNING, THENCE CONTINUING NORTH 1589.24 FEET, THENCE CONTINUING NORTH 265.79 FEET, THENCE EAST 630.01 FEET, THENCE SOUTH 1855.03 FEET, THENCE WEST 630.01 FEET TO THE POINT OF BEGINNING, 11,108,062.86 SQUARE FEET, 255.01 ACRES	5 South	5 East	25	255.01
CACTUS 110 LLC	502-25-004B	THE WEST 894.69 FEET OF THE SOUTH 1979.31 FEET OF THE NORTHEAST QUARTER OF SECTION 25, TOWNSHIP 05 SOUTH, RANGE 05 EAST, 1,770,868.86 SQUARE FEET, 40.65 ACRES	5 South	5 East	25	40.65
CACTUS 110 LLC	502-25-006B	THE WEST 894.69 FEET OF THE SOUTHEAST QUARTER OF SECTION 25, TOWNSHIP 05 SOUTH, RANGE 05 EAST, 2,360,406.95 SQUARE FEET, 54.19 ACRES	5 South	5 East	25	54.19
CACTUS 110 LLC	502-25-008E	THE SOUTH HALF OF THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SECTION 26, TOWNSHIP 05 SOUTH, RANGE 05 EAST, 874,495.13 SQUARE FEET, 20.08 ACRES	5 South	5 East	26	20.08
CACTUS 110 LLC	502-25-008G	THE ENTIRE NORTHWEST QUARTER OF SECTION 26, TOWNSHIP 05 SOUTH, RANGE 05 EAST; EXCEPT THE NORTH HALF OF THE NORTHEAST QUARTER OF SAID NORTHWEST QUARTER; ALSO EXCEPT THE NORTHWEST QUARTER OF THE NORTHWEST QUARTER OF SAID SECTION 26, 4,377,953.92 SQUARE FEET, 100.50 ACRES	5 South	5 East	26	100.5

Owner	Parcel No.	Property Description	Township	Range	Section	Acres
CACTUS 110 LLC						
CACTUS 110 LLC	502-25-007F	THE ENTIRE NORTHEAST QUARTER OF SECTION 26, TOWNSHIP 05 SOUTH, RANGE 05 EAST; EXCEPT THE NORTH HALF OF THE NORTH HALF OF SAID NORTHEAST QUARTER; ALSO EXCEPT THE FOLLOWING DESCRIBED PARCEL: COMMENCING AT THE SOUTHEAST CORNER OF SAID SECTION 26, THENCE NORTH 2639.25 FEET TO THE POINT OF BEGINNING, THENCE WEST 1450.01 FEET, THENCE NORTH 265.79 FEET, THENCE EAST 1450.01 FEET, THENCE SOUTH 265.79 FEET TO THE POINT OF BEGINNING, 4,873,050.52 SQUARE FEET, 111.87 ACRES	5 South	5 East	26	111.87
CACTUS 110 LLC	502-25-021C	THE ENTIRE WEST HALF OF SECTION 36, TOWNSHIP 05 SOUTH, RANGE 05 EAST AND THE WEST 894.69 FEET OF THE EAST HALF OF SAID SECTION 36; EXCEPT THE FOLLOWING DESCRIBED PARCEL: COMMENCING AT THE NORTHWEST CORNER OF SAID SECTION 36, THENCE SOUTH 1316.64 FEET TO THE POINT OF BEGINNING, THENCE SOUTH 88 DEGREES EAST 227.57 FEET TO A TANGENT CURVE TO THE RIGHT, HAVING A RADIUS 217.19 FEET, THENCE SOUTHEASTERLY ALONG THE CURVE WITH A CENTRAL ANGLE OF 85 DEGREES 47 MINUTES 34 SECONDS, AN ARC DISTANCE 325.21 FEET, THENCE SOUTH 02 DEGREES EAST 980.73 FEET TO A NON-TANGENT CURVE TO THE RIGHT, WITH A RADIAL BEARING OF SOUTH 89 DEGREES 36 MINUTES 12 SECONDS WEST, HAVING A RADIUS 123.28 FEET, THENCE SOUTHWESTERLY ALONG SAID CURVE WITH A CENTRAL ANGLE OF 89 DEGREES 33 MINUTES 32 SECONDS, AN ARC DISTANCE OF 192.70 FEET, THENCE WEST 360.55 FEET, THENCE NORTH 1313.81 FEET TO THE POINT OF BEGINNING, ALSO KNOWN AS PARCEL 2 OF SURVEY 2022-016495, 18,193,685.88 SQUARE FEET, 417.67 ACRES	5 South	5 East	36	417.67
		(surface only)				
CACTUS 110 LLC	503-27-0020	LOTS 3 4 & S1/2 NW OF SEC 4-6S-5E 170.71 AC	6 South	5 East	4	170.71

Owner	Parcel No.	Property Description	Township	Range	Section	Acres
CACTUS 110 LLC						
CACTUS 110 LLC	503-27-0010	LOT 1 & 2 OF SEC 4-6S-5E 90.56 AC	6 South	5 East	4	90.56
CACTUS 110 LLC	503-27-003A	S1/2 NE EXC S-140' OF SEC 4-6S-5E 72.00 AC	6 South	5 East	4	72
CACTUS 110 LLC	503-27-005C	THAT PRT OF E1/2 OF SW 6S-5E: COM AT THE CTR QUARTER CR OF SAID SEC 4; TH W-658.75' TO POB; TH S-1278.13' TO N ROW LINE OF CG-MAR HYWY; TH N-53 DEG W-818.53' ALNG SAID ROW; TH N-796.85' TH E-658.75' TO POB SEC 4-6S-5E 15.69 AC	6 South	5 East	4	15.69
CACTUS 110 LLC	503-27-005D	E1/2 E1/2 SW OF SEC 4-6S-5E N OF R/R SEC 4-6S-5E 28.01 AC	6 South	5 East	4	28.01
CACTUS 110 LLC	503-27-004A	SE LYNG N OF HWY R/W SEC 4-6S-5E EXC N-150' OF E-660' 142.72 AC	6 South	5 East	4	142.72
CACTUS 110 LLC	503-27-004C	SW SW SE LYNG S OF SPRR R/W IN SEC 4-6S-5E 3.09 AC	6 South	5 East	4	3.09
TOTAL FOR CACTUS 110 LLC						**4,731.92**

Table 4-2: BLM Unpatented Mining Lode Claims Table

Claim Name	Claim Number	Holder	Type of Claim	Issue Date	Expiration Date	Area (AC)
S1	AMC459838	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S2	AMC459839	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S3	AMC459840	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S4	AMC459841	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S5	AMC459842	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S6	AMC459843	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S7	AMC459844	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S8	AMC459845	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S9	AMC459846	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S10	AMC459847	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S11	AMC459848	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S12	AMC459849	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S13	AMC459850	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S14	AMC459851	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S15	AMC459852	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S16	AMC459853	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S17	AMC459854	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66
S18	AMC459855	Cactus 110 LLC	Lode Claim	1-17-2020	9-2-2025	20.66

Table 4-3: Arizona State Lands Department Mineral Exploration Permits Table

Owner	Parcel No.	Property Description	Township	Range	Section	Acres
Arizona State Lands Department (Leased Lands)						
Arizona State Lands Department (Mineral Exploration Permit#008-121173)	503-26-7000	Lots 3 4 S2NW S2	6 South	5 East	1	489.12
Arizona State Lands Department (Mineral Exploration Permit#008-122116 & SLUP#23-123266-03)	502-25-7020	SE EX SWSWSWSE	5 South	5 East	34	157.5
Arizona State Lands Department (Mineral Exploration Permit# 008-124370)	502-25-7030	SWSWSWSE	5 South	5 East	34	2.5
Arizona State Lands Department (Mineral Exploration Permit#008-122068)	502-25-0220	SW SEC 35-5S-5E 160.00 AC (mineral only)	5 South	5 East	35	160
Arizona State Lands Department (Mineral Exploration Permit#008-122076)	502-25-021A	COMM @ NW COR OF SEC 36-5S-5E TH S-1316.64’ TO POB TH S88D E- 227.58’ TO POB THE POINT OF A TANG-CUR CONCAVE SW W/RAD OF 217.19’ TH SWLY 325.21- TH S02D E-980.73’ TO THE POINT OF A NON- TANG-CUR CONCAVE NW W/RAD OF 123.28’ TH SWLY 192.7’ TH W-360.55’ TH N-1313.81’ TO POB 13.50 AC (mineral only)	5 South	5 East	36	13.5
Arizona State Lands Department (Mineral Exploration Permit#008-122076)	502-25-021C	THE ENTIRE WEST HALF OF SECTION 36, TOWNSHIP 05 SOUTH, RANGE 05 EAST AND THE WEST 894.69 FT OF THE EAST HALF OF SAID SECTION 36; EXCEPT THE FOLLOWING DESCRIBED PARCEL: COMMENCING AT THE NORTHWEST CORNER OF SAID SECTION 36, THENCE SOUTH 1316.64 FT TO THE POINT OF BEGINNING, THENCE SOUTH 88 DEGREES EAST 227.57 FT TO A TANGENT CURVE TO THE RIGHT, HAVING A RADIUS	5 South	5 East	36	417.67

Owner	Parcel No.	Property Description	Township	Range	Section	Acres
		217.19 FT, THENCE SOUTHEASTERLY ALONG THE CURVE WITH A CENTRAL ANGLE OF 85 DEGREES 47 MINUTES 34 SECONDS, AN ARC DISTANCE 325.21 FT, THENCE SOUTH 02 DEGREES EAST 980.73 FT TO A NON-TANGENT CURVE TO THE RIGHT, WITH A RADIAL BEARING OF SOUTH 89 DEGREES 36 MINUTES 12 SECONDS WEST, HAVING A RADIUS 123.28 FT, THENCE SOUTHWESTERLY ALONG SAID CURVE WITH A CENTRAL ANGLE OF 89 DEGREES 33 MINUTES 32 SECONDS, AN ARC DISTANCE OF 192.70 FT, THENCE WEST 360.55 FT, THENCE NORTH 1313.81 FT TO THE POINT OF BEGINNING, ALSO KNOWN AS PARCEL 2 OF SURVEY 2022-016495, 18,193,685.88 SQUARE FT, 417.67 ACRES				
		(mineral only)				
Arizona State Lands Department (Mineral Exploration Permit#008-122076)	502-25-021D	THE ENTIRE EAST HALF OF SECTION 36, TOWNSHIP 05 SOUTH, RANGE 05 EAST; EXCEPT THE WEST 894.69 FT OF THE EAST HALF OF SAID SECTION 36; ALSO, EXCEPT THE SOUTHEAST QUARTER OF THE SOUTHEAST QUARTER OF THE SOUTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SAID SECTION 36, 206.33 ACRES	5 South	5 East	36	206.33
		(mineral only)				
Arizona State Lands Department (Mineral Exploration Permit#008-122076)	NA	SESESESE	5 South	5 East	36	2.5
		(mineral only)				
Total For Arizona State Lands Department (Leased Lands)						**649.12**

The majority of the Project is fee simple with additional portions that are held under Mineral Exploration Permits (MEP's) or Special Land Use Permits (SLUP's) with the Arizona State Lands Department (ASLD) and 18 Federal Lode Claims.

Table 4-4: Mineral Tenure Plan

Land Package Category	Payee	Payment/Renewal Date	Fee USD
Private land parcels	Pinal County Treasurer	3-Sep-24	Varies based on location and size of property
BLM unpatented claims	BLM	31-Aug-24	$165/claim
ASLD MEP's and SLUP's	ASLD (MEP)	008-122116-00 - 01-Aug-26	$157.50
	ASLD (MEP)	008-124370-00 - 23-Aug-28	$3,000.00
	ASLD (MEP)	008-122068-00 - 18-Oct-28	$320.00
	ASLD (MEP)	008-122076-00 - 18-Oct-28	$1,280.00
	ASLD (MEP)	008-121173-00 - 29-Jan-25	$489.12
	ASLD (SLUP)	023-123266-03 - 30-Sep-24	$21,000.00
	ASLD (SLUP)	023-124589-11 - 12-Feb-26	$1,800.00

4.4 SURFACE RIGHTS

The Project is 100% controlled by ASCU through its wholly owned subsidiary Cactus 110 LLC, encompasses an area of approximately 5,720.08 acres of that 4,731.92 acres is fee simple land, three ASLD prospecting permits that the State has surface and minerals (649.12 acres), two ASLD prospecting permits that the State has minerals only with ASCU owning the surface (797.5 acres) and 18 BLM unpatented mining claims, this is for mineral only as ASCU owns the surface rights (320 acres). The BLM unpatented mining claims are outside of the known mineralization and there are no plans for mining in these areas see Figure 4-2.

4.5 WATER RIGHTS

Water supply is already available via buried pipeline to the property boundary as a result of prior mining and commercial operations. The property, at present, has groundwater rights associated with mining activities.

- Type 2 Non-Irrigation Grandfathered Right No. 58-100706.0004. This right includes 136-acre foot per year (afy).
- Permit to Withdraw Groundwater for Mineral Extraction and Metallurgical Processing Permit No. 59-233782.0000. This permit allows ASCU the rights to 3,600 afy for 50 years for heap leach mining activities, dust control and processing at the Cactus Project site. The effective date of permit is April 14, 2021, and the Expiration Date of permit is April 14, 2070.
    - This permit was modified and approved on August 4, 2021, to reflect the corporate name change from Elim Mining (USA) inc. to Arizona Sonoran Copper Company (USA) Inc. The revised Permit No. is 59-233782.0001.
    - This permit was modified and approved on May 25, 2023, to add newly acquired lands to the permit. No changes were made to the volume of water per year or how long the permit is valid for. They remain the same at 3,600 afy good until April 14, 2070. The revised Permit No. is 59-233782.0002.

The two owned water rights allow for 3,736 afy. Currently, there are five wells/locations that water could be pumped from, these are Well 1, Well 2, Well 5, Well 6, and the prior ASARCO Production Shaft. Additional locations may need to be identified for water production depending on facility layout and future needs.

A memorandum of understanding (MOU) is also in place with the City of Casa Grande to purchase Grade A+ Effluent Water from the city at $100/af.

If needed additional requirements could be met in two ways.

- Purchase of water from the Gila River Water Storage, LLC (GRWS) resources in the Pinal Active Management Area (AMA).
- Mine dewatering credits as the project is developed in the future.

4.6 ROYALTIES AND ENCUMBRANCES

The Project is subject to three royalties based on potential mining production, as detailed in this section. Figure 4-2 shows the claims applicable to royalties.

4.6.1 Tembo Capital Management Ltd / Elemental Altus Royalties Corp.

A 3.18% net smelter return (NSR) royalty is payable to Tembo Capital Management Ltd (Tembo)/Elemental Altus Royalties Corp. (Elemental Altus) on a portion of production from the mineral inventory in the PFS based on the current area of the MRE. ASCU can buy back 0.64% of this royalty. This will take the royalty down to 2.54%.

4.6.2 Bronco Creek Exploration (BCE)

A 1.50% NSR royalty is payable to BCE on a portion of production from the mineral inventory in the PFS based on the current area of the MRE for the Parks/Salyer Deposit. ASCU can buy back 1.00% of this royalty. This will take the royalty down to 0.50%.

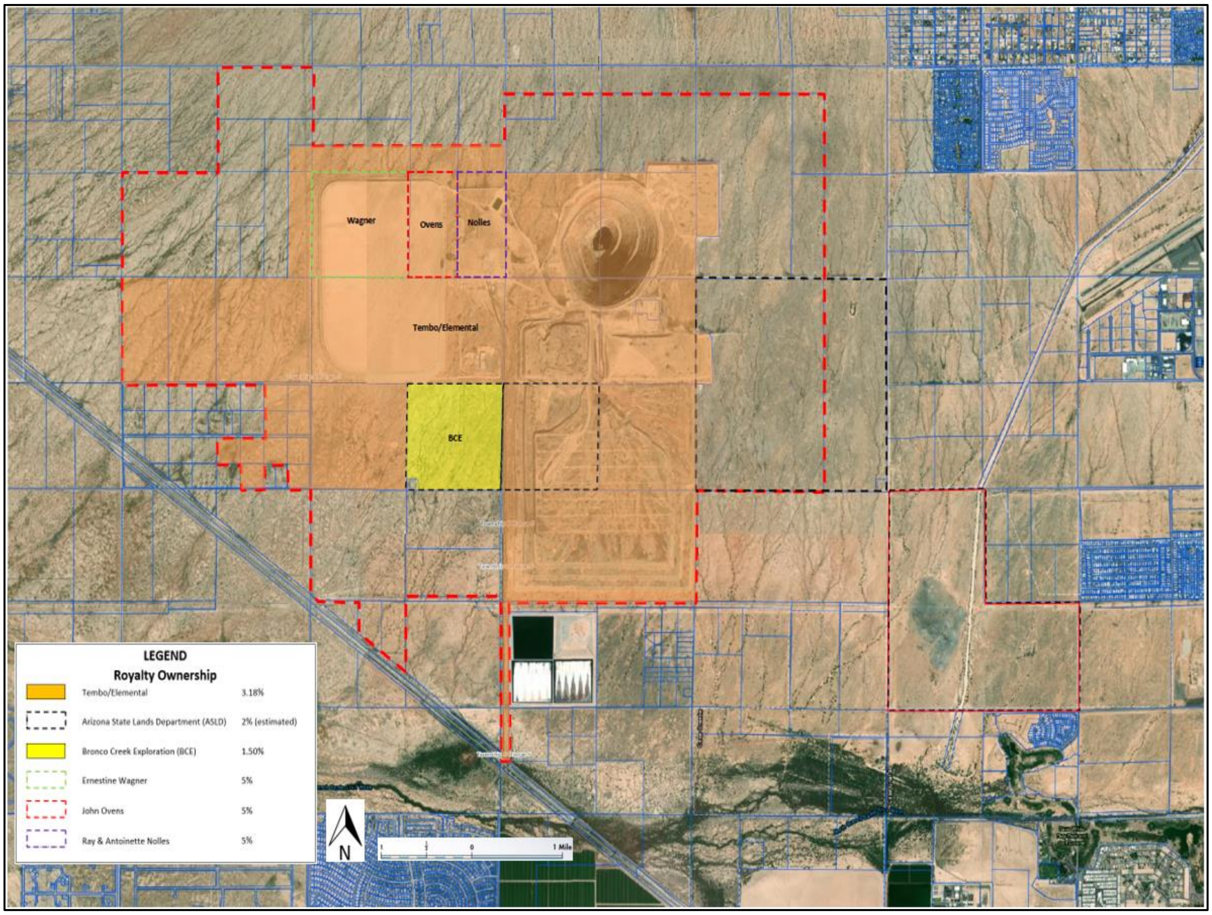
4.6.3 Arizona State Lands Department (ASLD)

A sliding net returns royalty (2.00% to 8.00%) is payable ASLD and the State Trust on a portion of production from the mineral inventory in the PFS based on the current area of the MRE for the Parks/Salyer Deposit. ASCU still needs to formalize the royalty percentages. This will be done once ACSU submits a Mineral Development Report to ASLD to convert the existing MEP to a Mineral Lease.

For the purposes of this report, it is assumed a 2.00% NSR is payable to ASLD. Figure 4-2, Cactus Property Royalty Ownership Map shows these locations.

4.6.4 Additional Royalties

There are also three additional 5.00% net smelter return royalties that are payable to three individuals that ASARCO originally had in place. Based on this current PFS and MRE there is no anticipated production from these areas. Figure 4-2, Cactus Property Royalty Ownership Map shows these locations.



Source: ASCU, November 15, 2023.

Figure 4-2: Cactus Property Royalty Ownership Map

4.7 ENVIRONMENTAL CONSIDERATIONS

The Cactus Mine has an environmental legacy that relates to the former ASARCO Sacaton mining operation. Please refer to Section 20.1 for a complete description of the environmental history of the site.

4.8 PERMITTING CONSIDERATIONS

Mining activities will be on private land and on Arizona State Land. The Army Corps of Engineers has determined that there are no Waters of the US at the project. Therefore, there is no federal nexus to the permitting, which is expected to reduce permitting timeframes. A list of permitting requirements is provided in Section 20.2. Compliance with environmental permits will be required both during and after mine closure as described in Section 26.9. All permits required to conduct the work described in Section 26.9, including drilling permits will be obtained prior to initiation of the work.

4.9 SOCIAL LICENSE CONSIDERATIONS

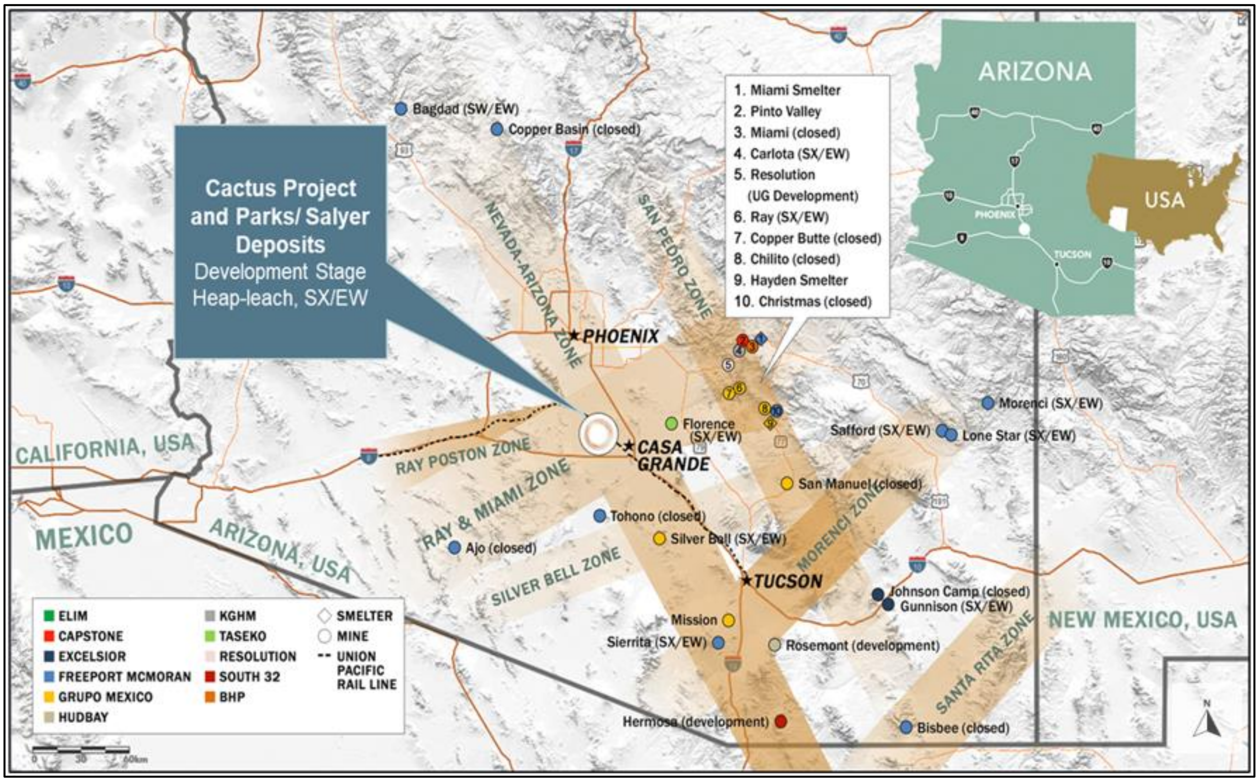
The community near the Project has been well exposed to and is familiar with similar types of mining operations. The historical economic benefits of mining in the area are acknowledged. There is no known organized opposition to the project and announcements regarding project status have been favorably received thus far.

Environmental remediation measures conducted under ADEQ’s Voluntary Remediation Program have resulted in ADEQ issuing a prospective purchaser agreement (PPA). The PPA, which releases ASCU from potential liabilities related to existing, known contamination under CERCLA, WQARF, and RCRA, is based on ADEQ’s recognition of the substantial public benefit to the remedial work conducted at the site. No other significant risk factors that could affect access to the site are known at this time.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 ACCESSIBILITY

The Project is located approximately 3 mi northwest of the City of Casa Grande, Pinal County, Arizona. It is 40 road miles south-southeast of the Greater Phoenix metropolitan area and approximately 70 road miles northwest of Tucson. It is easily accessible from the Interstate 10 (I-10) freeway, which is approximately 10 mi east of the historic Sacaton Mine (see Figure 5-1). The Greater Phoenix area is a major population center (approximately 4.5 million persons) with a major airport and transportation hub and well-developed infrastructure and services that support the mining industry.



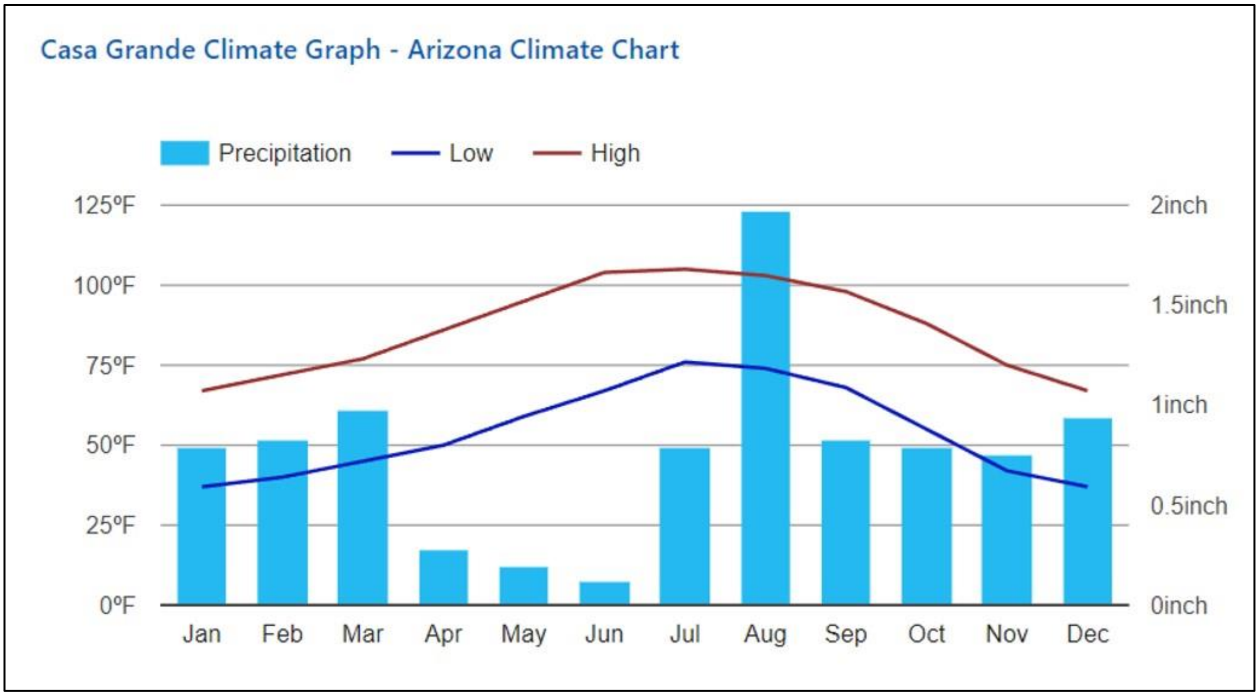
Source: ASCU, 2021.

Figure 5-1: Regional Copper Mines and Processing Facilities

5.2 CLIMATE

The climate at the mine is also typical of the Arizona Sonoran Desert, with temperatures ranging from 19°F to 117°F, and with average annual precipitation of 8.6 in, falling primarily in high-intensity, short-duration events. See climate data in Figure 5-2. The mine site contains no surface water resources. Storm run-off waters from the site are drained toward the Santa Cruz River by minor tributaries to the Santa Rosa and Brawley washes. Groundwater flows are generally to the south and southwest and towards the open pit, which acts as a "terminal sink". A terminal sink occurs as the result of at least two factors. First, the pit lake is below the surrounding water table. Second, the area is arid, leading to significant evaporation from the pit lake. Storm and groundwater that enters the pit lake evaporates before migrating into the surrounding groundwater. The mild climate of Arizona affords year-round operations for mining.

The average relative humidity is approximately 25%. The least humid month is June (10.2% relative humidity), and the most humid month is December (39.3%).

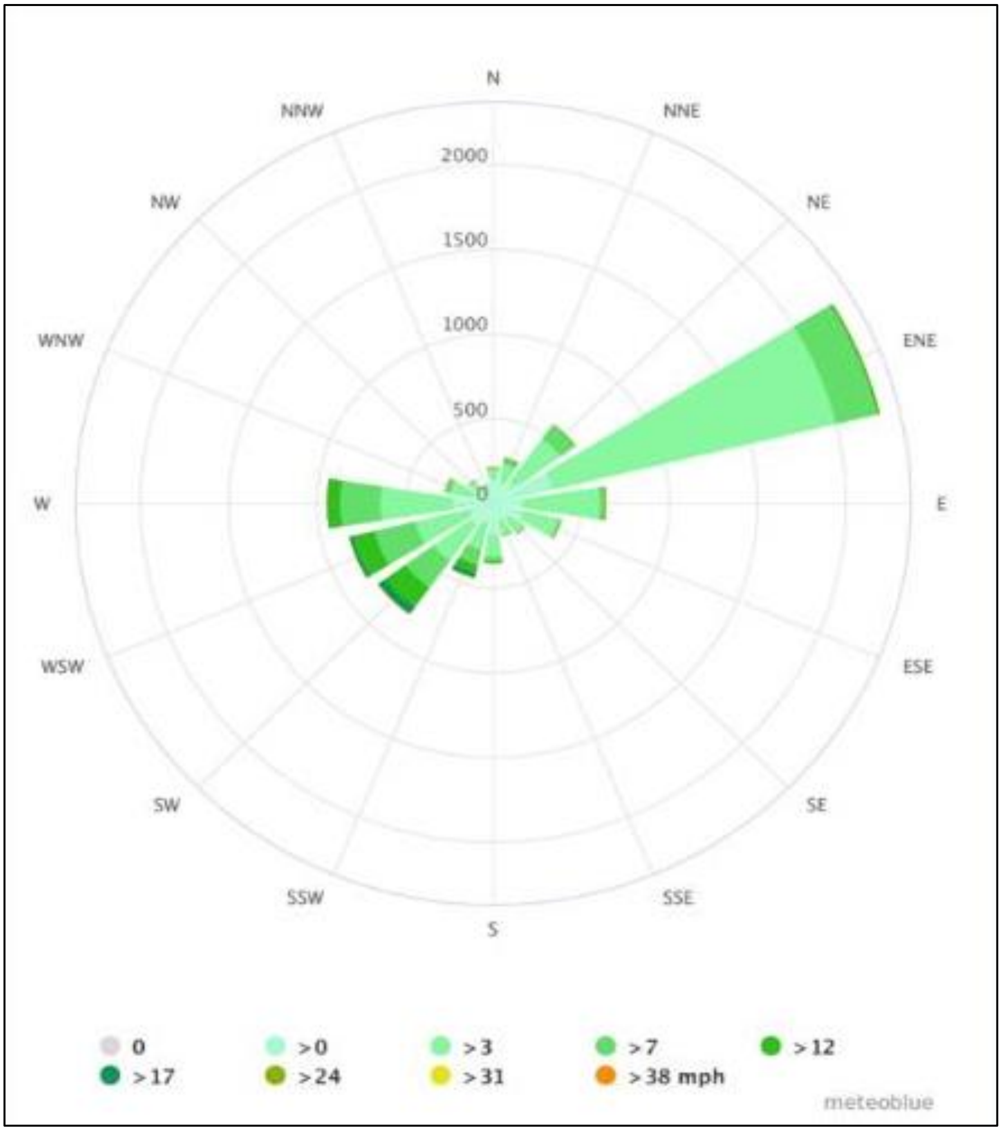


Source: https://www.usclimatedata.com/climate/casa-grande/arizona/united-states/usaz0028, 2021.

Figure 5-2: Climate (High/Low)

Wind is usually calm. The windiest month is May, followed by April and July. May's average wind speed of around 6.4 mph or 10.3 kt/h is considered "a light breeze." Maximum sustained winds (the highest speed for the day lasting more than a few moments) are at their highest in mid-July, where average top sustained speeds reach 19.9 mph, which is considered a fresh breeze. The wind rose for Casa Grande (Figure 5-3) shows how many hours per year the wind blows from the indicated direction. Example SW:

Wind is blowing from South-West (SW) to North-East (NE), refer to Figure 5-3.



Source: Stantec, 2021.

Figure 5-3: Wind and Speed Direction

5.3 LOCAL RESOURCES AND INFRASTRUCTURE

Electric power is available from Arizona Public Service's (APS) 230 kV transmission line which passes on the South side of the site.

Paved road and easy access to the interstate networks for transport and two major Interstates Highways (I-10 & I-8) are less than 10 miles away from the project.

Well established road network existing from either ADOT, Pinal County or the City of Casa Grande is surrounding the property.

The Union Pacific Railway line is adjacent to the property.

It is five miles distance to Casa Grande and allows the ability of the town to supply materials/consumables in addition to just labor.

Kinder Morgan/El Paso Natural Gas are two high pressure natural gas pipelines adjacent to the property should natural gas be needed.

The City of Casa Grande Wate Water Treatment Facility is located within 3 miles of the project that can supply effluent water for the operation and possibly treat waste.

An existing Arizona Water Company potable water line is adjacent to the property.

Water rights are discussed in Section 4.5. It is expected that credits will be obtained for dewatering of the pit and underground shaft. The State of Arizona can issue a withdrawal permit for mine de-watering. This permit allows the mine to use the specified amount of water in the permit for mining purposes.

The cities of Casa Grande and Maricopa are nearby and, combined with Phoenix, can supply sufficient skilled labor for the Project. In addition, the State of Arizona has a significant presence of copper mining in the state that can specifically provide skilled labor to the Project.

5.4 PHYSIOGRAPHY

The Project is situated within the Sonoran Desert Section of the Basin and Range Lowlands Province of Arizona in the lower Santa Cruz Basin. The area is characterized by broad, level valley plains, gently sloping pediments, and widely separated mountain ranges. Elevations at the mine vary from approximately 1,360 ft asl to 1,460 ft asl. Soils have very low levels of available plant nutrients and vegetation on the property is typical of the Sonoran Desert and includes bunchgrasses, yucca, mesquite, and cacti.

5.5 SEISMICITY

The Project is located in one of the areas of lowest seismic activity in the state based on mapping by the Arizona Geological Survey. Most seismic activity in Arizona is north of the Mogollon Rim. The nearest recorded earthquake to the site was 29 mi to the southeast: the 2007 event at less than 1.3 on the Richter scale. The next nearest quake was recorded in Mesa 31 mi to the north in 1915; it had a magnitude of 3.9 (Arizona Geological Survey, n.d.). The Arizona Geological Survey map does not identify any active faults mapped in the area.

5.6 PROJECT RISKS AND UNCERTAINTIES

The risks and uncertainties associated with the Project are related to litigation, economics, regulatory developments, and financing.

ASCU is currently in litigation with RAMM Power Group, which seeks to acquire the project site through eminent domain. This risk is considered low, as the cost to acquire the property, considering the value of the mineral resource is prohibitive.

Economic risks include copper prices, stock market volatility, and interest and currency rates. These factors are not controllable by ASCU. However, the outlook for copper demand is generally positive. Higher interest rates will affect financing costs; ASCU has factored this into the economic model.

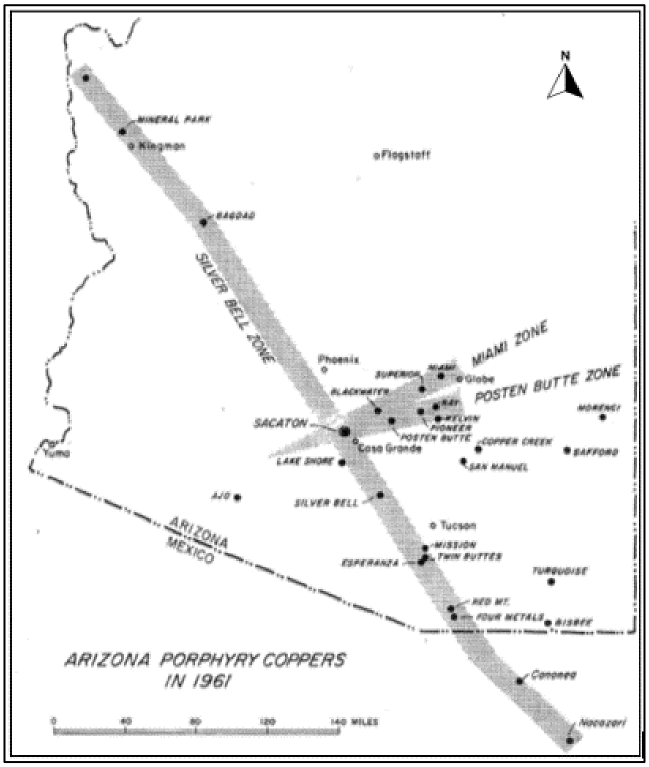
Legislative and regulatory developments are a potential risk. However, ASCU knows of no planned or pending legislation that will adversely affect the Project.

No cash flow has been generated from operations, and there is no assurance that it will generate positive cash flow in the future. Additional financing will be required to continue project development. There is no assurance that this will be obtained.

6 HISTORY

ASARCO geologists first discovered the Sacaton (now renamed Cactus West and Cactus East) mineral deposit in the early 1960s while examining an outcrop of leached capping composed of granite cut by several thin monzonite porphyry dykes. The search was based on re-prospecting large areas of the US, including central Arizona, and used the exploration philosophies of Harold Courtright and Kenyon Richards. They had observed that many porphyry copper deposits did not contain large areas of copper oxide mineralization above the feed material body. They used observations related to the oxidized products of the sulfide mineralization (leached capping interpretation) on the surface to evaluate the sulfide mineralization below.

In the 1960s, very few porphyry copper deposits were expected to be found outcropping in well prospected areas. The program was designed to search for unrecognized or partially covered altered rocks that could host porphyry copper deposits. Explorationists at the time had many ideas about regional structures that may have controlled the emplacement of copper deposits. Figure 6-1 is a map showing known porphyry deposits of the day and recognized trends in their relative locations. According to Kenyon Richard (1983), ASARCO did not feel that this was a significant exploration tool, but they did see that alignment of altered zones and deposits could be useful.



Source: ASARCO, 1981.

Figure 6-1: Arizona Porphyry Coppers in 1961

Part of the exploration program was to understand the post mineral stratigraphy and examine areas on the edge of these cover rocks which may contain clues to underlying mineralization. Accordingly, ASARCO geologist John Kinnison was mapping the area SW of Superior in 1960 and discovered a small, altered outcrop at the base of Poston Butte just north of Florence. This led to the discovery of the Poston Butte deposit which is now known as the Florence deposit. Reconnaissance mapping continued to the SW and on February 10, 1961, Kinnison, along with ASARCO geologist Art Bloucher, noticed an inconspicuous outcrop (Discovery Outcrop) west of Casa Grande. The exposure was about 300 ft (90 m) in diameter and surrounded by alluvial cover. The nearest bedrock exposures were a mile and a half to the north. The hill, composed of granite and cut by a monzonite porphyry dyke, contained pervasive sericite and argillic alteration. Both rock types exhibited limonite derived from the oxidation of pyrite and traces of live limonite derived from the oxidation and leaching of chalcocite. Photos taken from the Discovery Outcrop are in Figure 6-2 and Figure 6-3.

Source: ASARCO, 1960's.

Figure 6-2: View from Discovery Outcrop from Historic ASARCO Exploration Site

Source: ASCU, 2019.

Figure 6-3: View from Discovery Outcrop Today Post-Mining of the Sacaton Pit

The nature of this original find indicated the likely presence of porphyry copper-type mineralization. Following this lead, ASARCO initiated a drilling program which defined copper mineralization zones. The west zone contained the feed material body which was ultimately accessed through the open pit. The deeper east zone was the target of potential mining by underground methods.

During the life of the project ASARCO drilled an approximate 223,246.4 ft (68,045.5 m) of both Core and Rotary exploration drilling. Elim Mining, now ASCU, completed a rigorous review and validation of this data before it was included in MRE calculations. Further details are provided in Section 10 of this report.

Project construction and mining of the west zone via open pit method commenced by 1972, and the mine operated continuously from 1974 until 1984. An underground copper deposit at Sacaton was under development until September 1981 when work was suspended because of high costs and a weak copper market. The Sacaton Mine was permanently closed March 31, 1984, due to exhaustion of the open pit feed material reserves. Table 6-1 presents historic production rates.

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

Year	Feed material Milled Short Tons	Mill Grade Cu%	Mill Grade Ag Oz/T	Cu Short Tons	Au Troy Oz	Ag Troy Oz
1974	2,020,000	0.63	0.05	9,516	N/A	N/A
1975	3,630,000	0.74	0.06	21,918	3,153	N/A
1976	3,782,000	0.71	0.07	22,021	3,151	N/A
1977	3,471,000	0.70	0.06	19,872	3,103	N/A
1978	4,153,000	0.67	0.07	23,042	3,691	N/A
1979	4,006,000	0.65	0.07	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**	**0.06**	**199,030**	**27,455**	**759,000**

Source: Sacaton Mining Operations Report Version 2005 By David F. Briggs, 22 October 2004.

The resultant Sacaton open pit mine is roughly circular, approximately 3,000 ft (914 m) in diameter and 1,040 ft (317 m) deep (Figure 6-4). The pit has a visible internal lake with the surface at approximately 980 ft (299 m) in depth from the pit rim. During operation, the Sacaton mine consisted of the pit, crushing facilities and coarse feed material stockpile, a 9,000 ton/d flotation mill, a TSF that covered approximately 300 acres, a return water impoundment, an overburden dump, and a WRD that covered approximately 500 acres. Production from the open pit was approximately 11,000 ton/d. Copper flotation mill concentrate was sent by rail to the ASARCO smelter in El Paso, Texas.

During mining of the open pit, a waste dump was created through dumping of defined waste material. All oxide copper mineralization, and sulfide copper mineralization below the working grade control cutoff of 0.3% Cu, were deposited to the waste dump. The historical waste dump forms the basis of the Stockpile Project resource modelled in this report due to the level of mineralized material discarded.

During the operating period, ASARCO sank a 1,790 ft (456 m) production shaft (Figure 6-5) and a 1,070 ft (326 m) ventilation shaft just east of the pit to access the deeper east deposit. Development of the underground mine was suspended in 1981, and the site further suspended overall activity in 1984. Since then, intermittently and per a site improvement plan (SIP), fixed equipment and rolling stock have been removed from the site, and fixed plant locations and the tailings disposal facility were covered with previously salvaged and stockpiled desert alluvial soil material and revegetated.

Source: ASARCO, 1980s.

Figure 6-4: Historic Overview of Prior Sacaton Mine Site

Source: ASARCO, 1980s.

Figure 6-5: Historic Overview of Sacaton Pit and Underground Shaft with Headframe

Parks/Salyer was the first drill intercepted in January 1976 as part of a work commitment hole. S-144 was ultimately located on the very eastern edge of the current Parks/Salyer resource. Later in 1976, three follow-up holes were drilled on the property now known as MainSpring and intercepted the southern side of the Parks/Salyer deposit as part of an

ASARCO-Freeport joint venture. No immediate further exploration work was undertaken at Parks/Salyer. However, exploration targeting interpretations in 1978, 1981, and 1984 had interpreted the potential of higher-grade enrichment mineralization to the north in the area now known for the Parks/Salyer deposit. Four holes had been planned in 1984 but were undrilled at the time. In May 1996, two of those planned holes were drilled (S-200 and S-201) which were successful in intercepting higher grade and thicker enriched and primary mineralization; however, no further exploration was undertaken at Parks/Salyer until ASCU acquired the property in 2020.

In 2005, ASARCO filed for reorganization under Section 11 of the Bankruptcy Code in the United States Bankruptcy Court for the Southern District of Texas, Corpus Christi Division. By 2008, the Bankruptcy Court for the Southern District of Texas, Corpus Christi Division approved the process by which ASARCO would pursue the selection of a plan sponsor and sale of its operating assets.

During that year, and after a bidding process for the purchase of ASARCO's assets, Sterlite (USA), Inc., a subsidiary of Vedanta Resources Plc (a UK corporation), executed a purchase and sales agreement in the amount of $2.6 billion for ASARCO's assets. After the purchase and sales agreement was executed, copper prices began to decline, and by October 2008, Sterlite representatives informed the United States Bankruptcy Court for the Southern District of Texas, Corpus Christi Division that the company could not honor the contract.

On June 5, 2009, the Bankruptcy Court for the Southern District of Texas, Corpus Christi Division approved a Custodial Trust Settlement Agreement that resolved claims pertaining to past and potential future cleanup costs associated with approximately 18 ASARCO owned sites in 11 states. The agreement required the establishment of a custodial trust to oversee cleanup of the sites and transfer of site property to the custodial trust.

The settlement agreement provided funding in the amount of $20M to clean up the Sacaton site and to fund the administrative expenses associated with the custodial trust.

From 2009 up to 2018, attempts were made by other parties to purchase the Sacaton site and associated facilities. In 2018, Cactus110 LLC, a subsidiary of Arizona Sonoran Copper Company (ASCU), Inc, executed both purchase and PPA with said Trust and the ADEQ respectively for the right to acquire all ASARCO land parcels representing the historic Sacaton Mine, as well as all infrastructure therein, and all associated mineral rights. Final purchase acquisition closed July 2020, following the completion and approval of SIP activities undertaken by the Trust and approved by ADEQ. In addition, Cactus 110 holds title to the Merrill land parcels (as shown in Section 4). With associated royalties, these private land assets represent, among other things, the mineral rights to the old Sacaton East, Sacaton West, Parks/Salyer deposits, and the MainSpring Project. Further landholdings acquired by Arizona Sonoran or leased are also referred to above (as shown in Section 4). The Sacaton deposits since 2020 are now referred to as the Cactus deposits.

ASARCO had worked continuously on the project from the early 1960s to the mid-1980s. Significant records of the development of the geological understanding, mining operations, and processing results remained with the property. ASCU benefits from the high quality of work and historical records remaining from past operators.

7 GEOLOGICAL SETTING AND MINERALIZATION

7.1 REGIONAL GEOLOGY

The Cactus Project is located in the desert region of the Basin and Range province of Arizona. The basal formation in the area is the Proterozoic Pinal Schist. At the close of Older Precambrian, the Oracle Granite batholith intruded the Pinal Schist. In Younger Precambrian time Apache Group sediments were deposited and igneous activity resulted in the emplacement of the Sacaton Granite northwest of the mine along with numerous diabase dykes. In the Paleozoic Era, an unknown thickness of sediments was deposited and later eroded along with most of the Apache Group rocks. During the Laramide Orogeny two granitic stocks, the Three Peaks Monzonite and the Sacaton Peak granite were emplaced in the vicinity of the Project. Figure 7-1 shows the major intrusive rocks in the Project area.

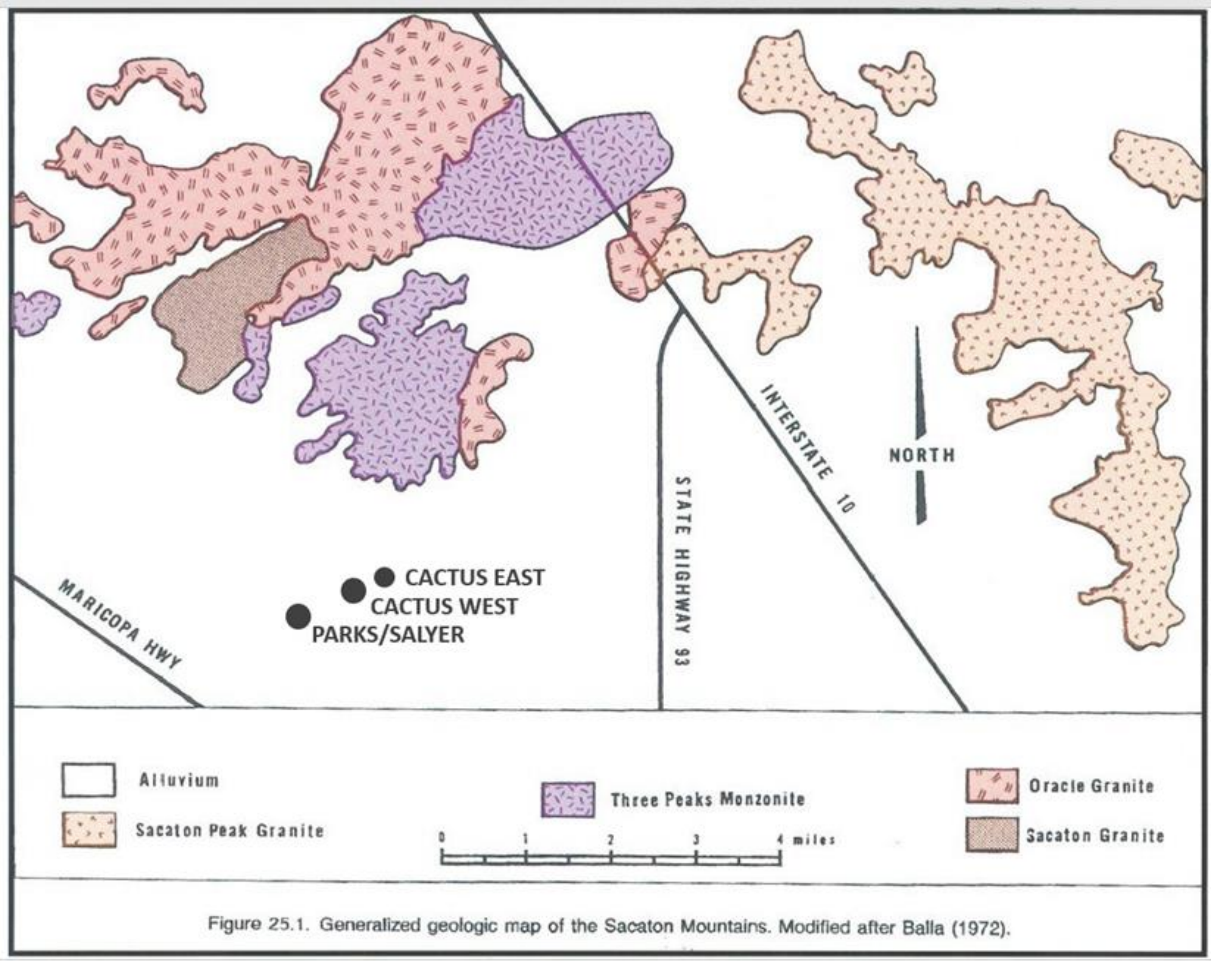


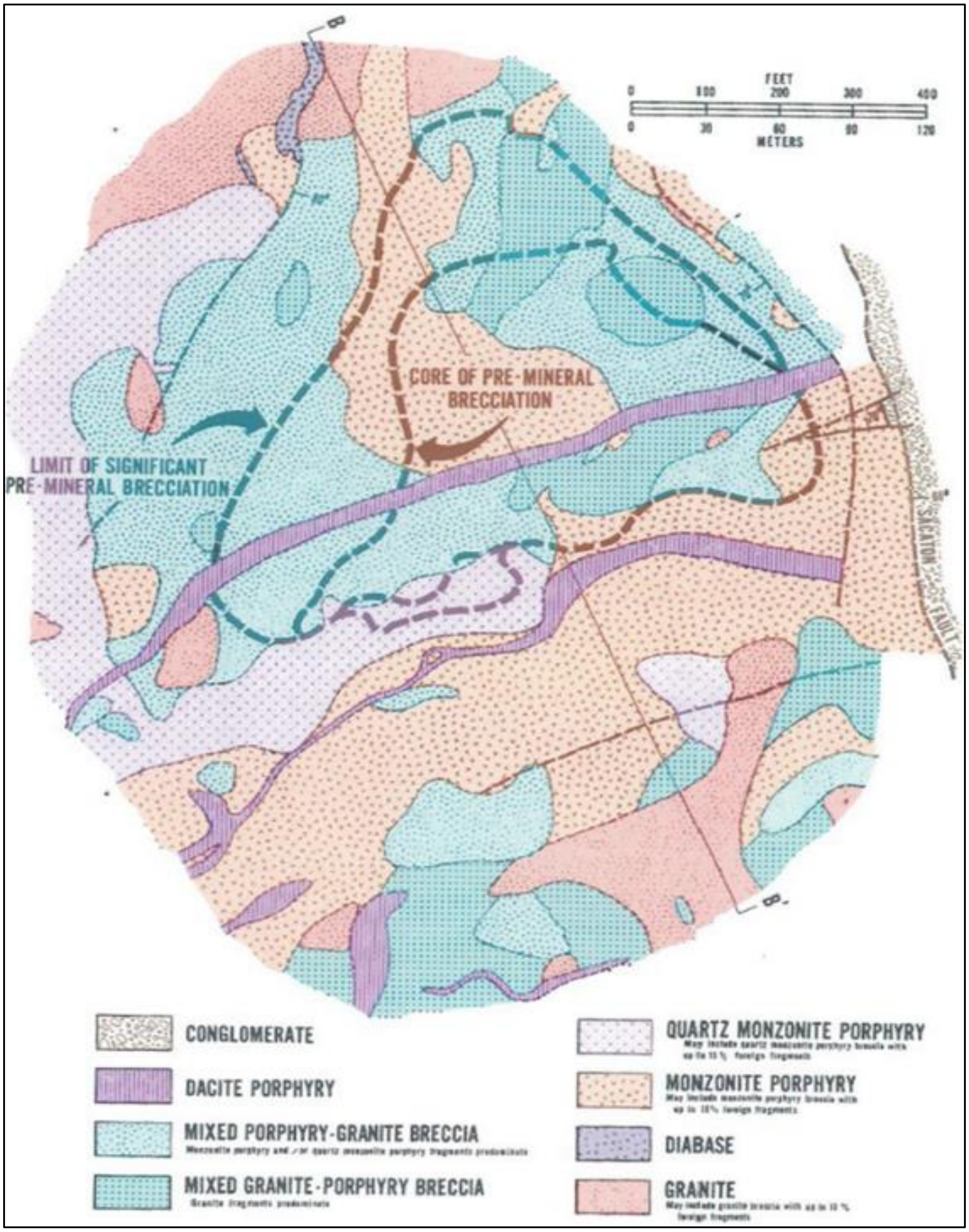
Figure 25.1. Generalized geologic map of the Sacaton Mountains. Modified after Balla (1972).

Source: Balloa, 1972.

Figure 7-1: Major Intrusions in The Cactus Project Area

At a location removed from the current mine, Laramide porphyries of a similar composition intruded the Oracle Granite and introduced hydrothermal solutions which altered and mineralized a large area of the surrounding rocks. Subsequent Tertiary extension rotated and dismembered the mineralized rocks. A low angle Listric fault (the Basement Fault) moved the Cactus deposits to their current location. Quaternary basin-fill deposits covered all evidence of mineralization except for the small Sacaton discovery outcrop. The Parks/Salyer Project, also owned by ASCU, is located 1.3 mi (2.1 km) to the SW of Cactus and displays the same geological characteristics as Cactus. Located within a separate horst block to Cactus, it is a portion of the same larger porphyry system that shows lesser displacement from the in-situ source.

With the exception of the Pinal Schist, found below the Basement fault, all pre-mineral rocks in the vicinity of the mineralized deposits are pervasively altered. In addition, two stages of brecciation are present, often resulting in an intimate mixture of rock types. These features have complicated the delineation and identification of the rocks. Major host rocks are Precambrian Oracle Granite, Laramide monzonite porphyry, and quartz monzonite porphyry. The porphyries are similar in composition and texture but are distinguished by the presence of 10% clear quartz phenocrysts in the latter. They intrude the older rocks and occur as large masses, poorly defined dyke-like masses, and thin well-defined but discontinuous dykes. They also form monolithic breccias and mixed breccias containing varying percentages of granite. Discontinuous pre-mineral diabase and post-mineral dacite porphyry dykes intrude the older rocks in both deposits. Figure 7-2 through Figure 7-5 show the rock type distribution of the geological units in both deposits.

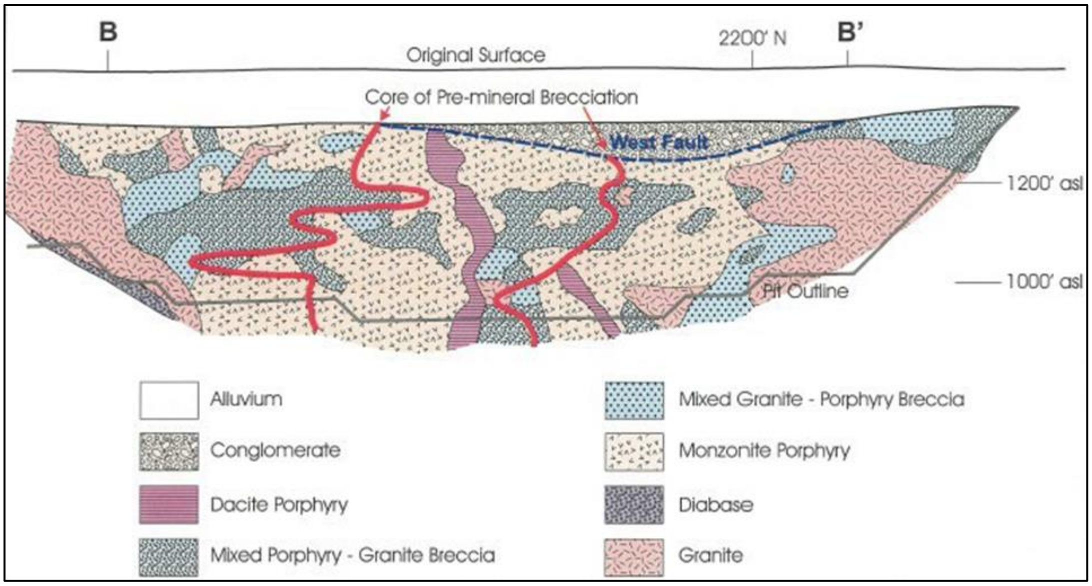


Source: ASCU, 2020.

Figure 7-2: Plan View through the Cactus West Deposit on the 1,040 ft (317 m) Elevation

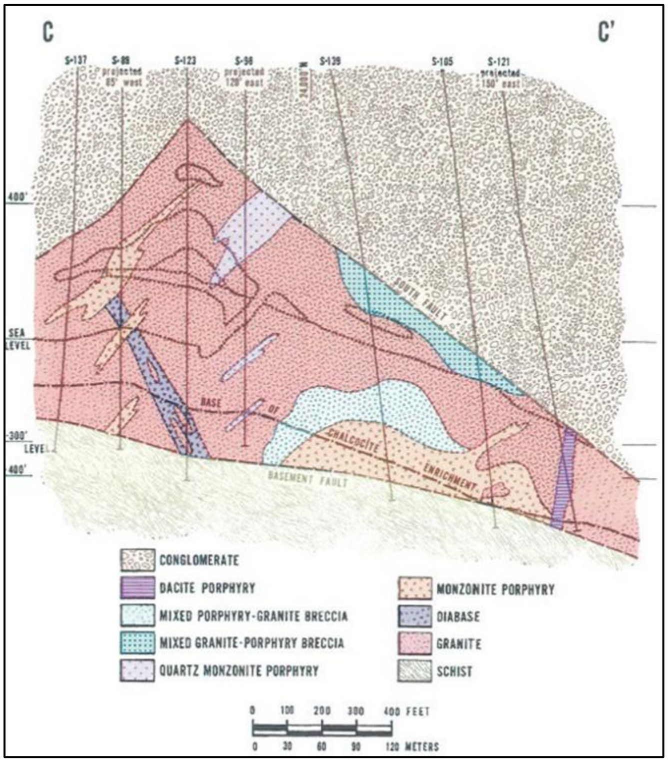
Source: ASCU, 2020.

Figure 7-3: Location of Cross Sections B-B' and C-C' through the Cactus West and East Deposits



Source: ASCU, 2020.

Figure 7-4: Cross Section B-B' through the Cactus West Deposit



Source: ASCU, 2020.

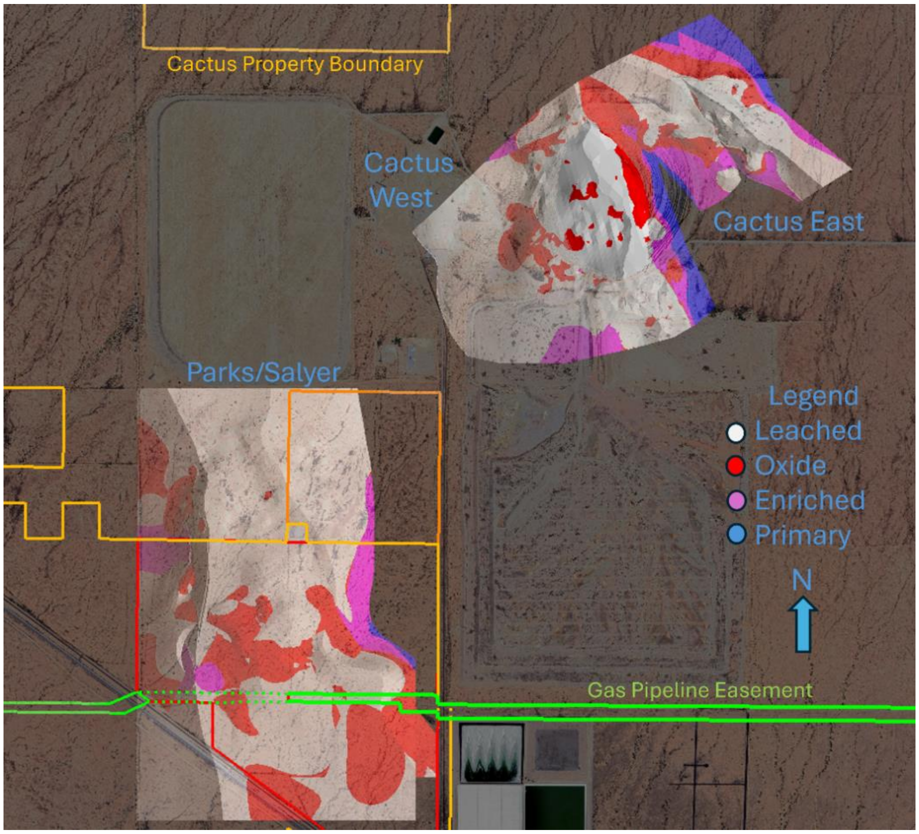
Figure 7-5: Cross Section C-C' through the Cactus East Deposit

Structurally both deposits are complex with intense fracturing, faulting, and brecciation. Pre-mineral brecciation is related to the intrusion of the Laramide porphyries and occurs primarily in the west deposit which had a central core of pre-mineral brecciation that was a control for hypogene mineralization. Angular vugs are a diagnostic feature of the pre-mineral breccia. They occur between fragments in the breccia and vary in size from 0.2 in (0.5 cm) to 2.0 in (5.0cm). Post-mineral brecciation is ubiquitous in both deposits and has affected the rocks in a number of ways, depending on rock composition, degree and type of alteration, and relative location in the mineralized deposits. Manifestations of this period of brecciation include shattering, crushing and granulation, mixing of rock types, and the presence of linear breccia structures containing crushed sulfides. Mineralized fractures in the west deposit generally strike E-NE while post-mineral fractures strike N-NW.

A great number of minor faults have been mapped in the West mineralized deposit. The faults are often variable in strike and dip and are usually difficult to trace along strike. The prevailing strike direction is N60°E to E-W. Slickensides on some of the faults indicate that horizontal components of displacement are relatively common. Generally, the lack of predictable lithologic contacts to act as markers makes the direction and magnitude of displacement difficult to estimate. Total displacement on most of the faults is thought to be less than 100 ft (30 m). Both pre-mineral and post-mineral movement is often present.

Besides being terminated at depth by the Basement fault, both deposits are bounded by normal faults that drop post-mineral conglomerate into contact with the mineralized rocks. The west deposit is in a horst block formed with the Sacaton fault forming the east side which strikes N20°W and the West fault trending N45°W on the west side. The Sacaton Fault dips 60° to the east and has a displacement of up to 1,500 ft (457 m). The east deposit is the displaced portion of the west deposit in the hanging wall of the Sacaton fault.

The Parks/Salyer Project, also owned by ASCU, is located 1.3 mi (2.1 km) to the SW of Cactus and displays the same geological characteristics as Cactus. Located within a repeat horst block similar to Cactus (Figure 7-6), it is a portion of the same larger porphyry system that shows lesser displacement from the insitu source. Similar northwest trending normal faults are interpreted to bound the Parks/Salyer mineralization.



Source: ALS Geo Resources, 2024

Figure 7-6: Plan View of Parks/Salyer Project with Respect to the Cactus West Pit.

7.2 ALTERATION AND MINERALIZATION

The dominant hypogene alteration assemblages in the deposit are phyllic and potassic. Phyllic alteration is characterized by quartz, sericite, and clay, but quartz and sericite predominate. Secondary silica in the porphyries occurs as a fine-grained replacement of the groundmass (intergrown with sericite and clay). Minor amounts of quartz are also found, with sericite and clay replacing plagioclase phenocrysts in the porphyries and granite. Quartz-sulfide veinlets are associated with the phyllic assemblage and comprise up to 1% of the rock by volume. Alteration minerals occurring in rocks of the potassic assemblage include varying quantities of biotite, chlorite, quartz, sericite, and clay with traces of secondary K-feldspar, calcite, and anhydrite. Secondary biotite and chlorite characterize the potassic assemblage. Since phyllic and supergene alteration are superimposed upon, and largely destroy, potassic alteration, it is uncertain how much of the quartz, sericite, and clay are part of the original potassic suite. Supergene alteration associated with the process of secondary enrichment of sulfides has modified the suite of hypogene alteration minerals. In Cactus West, effects of this supergene overprint are not always assessable due to post-enrichment oxidation and leaching penetrating the chalcocite blanket into the primary sulfide zone.

Similar if not identical alteration assemblages can be found in Parks/Salyer. Both assemblages include hypogene and supergene alteration overprint. Hypogene alteration assemblages include both potassic and phyllic. Alteration minerals occurring in the potassic altered rock include secondary K-feldspar, magnetite, biotite, chlorite, quartz, sericite, and clay. Such zones are typically low grade. Secondary biotite, magnetite and chlorite characterize the potassic assemblage. Phyllic assemblages are noted to include strong secondary silicification, bleaching, quartz, sericite, pyrite, and clays. The secondary silica replacement appears as fine-grained replacement of the groundmass, intergrowing between the sericite and other clays. Alteration halos surrounding quartz-sericite and sulfide veins are common within these phyllic alteration zones. These phyllic zones are typically higher in grade compared to the potassic zones. It should be noted that much of the potassic alteration is found to the north of the section and above the Basement Fault.

The major hypogene sulfide minerals at Cactus are pyrite, chalcopyrite, and molybdenite. Traces of bornite and sphalerite have been observed in concentrate samples. Hypogene sulfides occur as disseminated grains, veins, and vug fillings. Disseminated sulfides are more abundant in the granite and strongly brecciated rocks than in the porphyries and weakly brecciated rocks. In the West mineralized zone, disseminated grains usually comprise less than 50% of the hypogene sulfides, but in the East mineralized zone, where granite breccia is the main rock type, disseminated grains account for over 50% of the sulfides.

The major hypogene sulfide minerals at Parks/Salyer are pyrite, chalcopyrite, and molybdenite. Trace amounts of bornite and sphalerite have been observed within the upper sections of the hypogene and lower edges of the supergene mineralization. Hypogene sulfides occur as disseminated grains, veins/veinlets, and patchy blebs. Disseminated sulfides are abundant in the brecciated rocks, monzonite porphyry, and in the granite.

Sulfides are also present within quartz veins and veinlets throughout the deposit. Disseminated sulfides account for roughly 50% of the hypogene sulfides within the site, but in zones of intensely brecciated porphyries, disseminated grains appear comprise of less than 50% of the sulfides, instead favoring veinlets and patches.

The total sulfide content for both mineralized zones is variable, ranging from approximately 1.0% to 4.0% by volume. Rock type and pre-mineral brecciation cannot be directly correlated to variations in total sulfide content. North and south of the mineralized zones the total sulfide content decreases similarly to the overall alteration intensity. Drilling and pit mapping have defined a core zone within which the grade of hypogene mineralization is at least 0.40% Cu as chalcopyrite. Outside the zone the copper grade gradually drops off to less than 0.10% Cu. The pyrite: chalcopyrite ratio varies from 1:1 to 3:1 within the core zone and increases to 10:1 or more outside of it. Molybdenite occurs in quartz veins and smears on fractures. The molybdenum content averages approximately 0.010% for the West mineralized zone and 0.025% for the East mineralized zone.

Similarly, within the Parks/Salyer, molybdenite occurs in quartz veins, as smears on fractures, as well as in disseminated crystals in the groundmass. Molybdenite content averages between 0.010%-0.025%. We see similar ratios of pyrite: chalcopyrite within this deposit as in Cactus. The major supergene sulfide mineral at Cactus is chalcocite. Covellite and digenite are also present in much smaller quantities. The intensity of secondary enrichment is greatest at the top of the enriched zone and decreases gradually toward the base. In the upper portions of the enriched zone chalcocite completely replaces chalcopyrite and partially replaces pyrite. Toward the base of the zone chalcopyrite is partially replaced and pyrite is rimmed by thin coatings of chalcocite. The enrichment factor (the ratio of supergene copper grade to hypogene copper grade) varies from 3:1 to 5:1 for both mineralized zones. The most important control for supergene enrichment is the grade of primary mineralization. The bulk of economic supergene mineralization is underlain by primary sulfides averaging at least 0.40% Cu.

The major supergene sulfide minerals at Parks/Salyer are chalcocite, covellite, and pyrite. Digenite is also present in smaller quantities. The intensity of the secondary enrichment is greatest at the upper portion of the enriched zone, decreasing gradually towards the base. In the upper portions chalcocite and covellite completely replace chalcopyrite and partially replace pyrite. Near the base of the zone, chalcopyrite is partially replaced, and pyrite is rimmed by chalcocite. Covellite is discontinuous and often is seen as replacing blebs and grains of pyrite. The enrichment factor varies from 3:1 to 5:1 for both mineralized zones. The most important control for supergene enrichment is the grade of primary mineralization which is controlled by a NE trending structural zone containing a higher density of quartz/sulfide veining.

The Cactus deposits have undergone two periods of oxidation and leaching. The first period resulted in the formation of what was probably a uniform high grade chalcocite blanket that was continuous through the East and West deposits. Some, and probably all, of the original blanket formed prior to movement on the Sacaton and West faults. Substantial quantities of oxidized copper minerals are found erratically distributed through the capping of both deposits. In the East deposit, the oxide minerals usually occur just above chalcocite mineralization and are thought to have resulted from in-place oxidation of chalcocite along zones of deep oxidation. Copper grades over 1.0% are common. In-place oxidation is also found in the West deposit, but generally the oxides occur over a greater horizontal and vertical range, and the copper has likely been transported from the point of oxidation.

Chrysocolla, brochantite, and malachite are the most common oxidized copper minerals. In the upper portions of the capping chrysocolla predominates, while brochantite and malachite predominate in the lower portions.

The Parks/Salyer deposit has undergone at least two periods of oxidation and leaching. A large suite of transported iron oxide is present, along with remnant copper oxide minerals left behind after the initial leaching and oxidizing events. Oxidized copper occurs erratically within the leach capping; most commonly observed near the lower contact between the leached zone and the enrichment. Minerals observed include hematite, limonite, goethite, jarosite, manganese oxides, chrysocolla, malachite, brochantite, azurite, atacamite, native copper, tenorite, and cuprite. Native copper is often observed at the contact. Chrysocolla, malachite, azurite and brochantite are the most common oxidized copper minerals, with a few zones of cuprite appearing erratically with the native copper and chrysocolla.

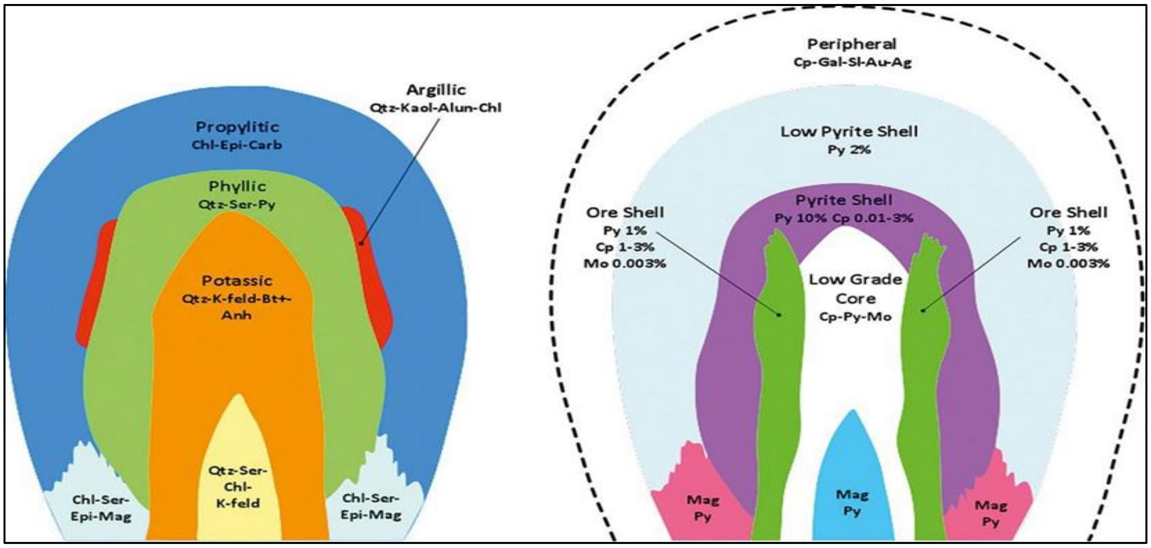
8 DEPOSIT TYPES

The Cactus and Parks/Salyer deposits are a portion of a large porphyry copper system that has been dismembered and displaced by Tertiary extensional faulting. Porphyry copper deposits form in areas of shallow magmatism within subduction-related tectonic environments (Berger et al., 2008). Both Cactus and Parks/Salyer have typical characteristics of a porphyry copper deposit which Berger et al. (2008) define as follows:

- A deposit wherein 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 0.6 mi (1 km) to 2.5 mi (4 km) depth are genetically related to magma reservoirs emplaced into the shallow crust 3.5 mi (6 km) to over 5 mi (8 km), predominantly intermediate to silicic in composition, in magmatic arcs above subduction zones.
- Intrusive rock complexes that are emplaced immediately before porphyry deposit formation and that host the deposits 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.
- Copper may also be introduced during overprinting phyllic-argillic alteration events.

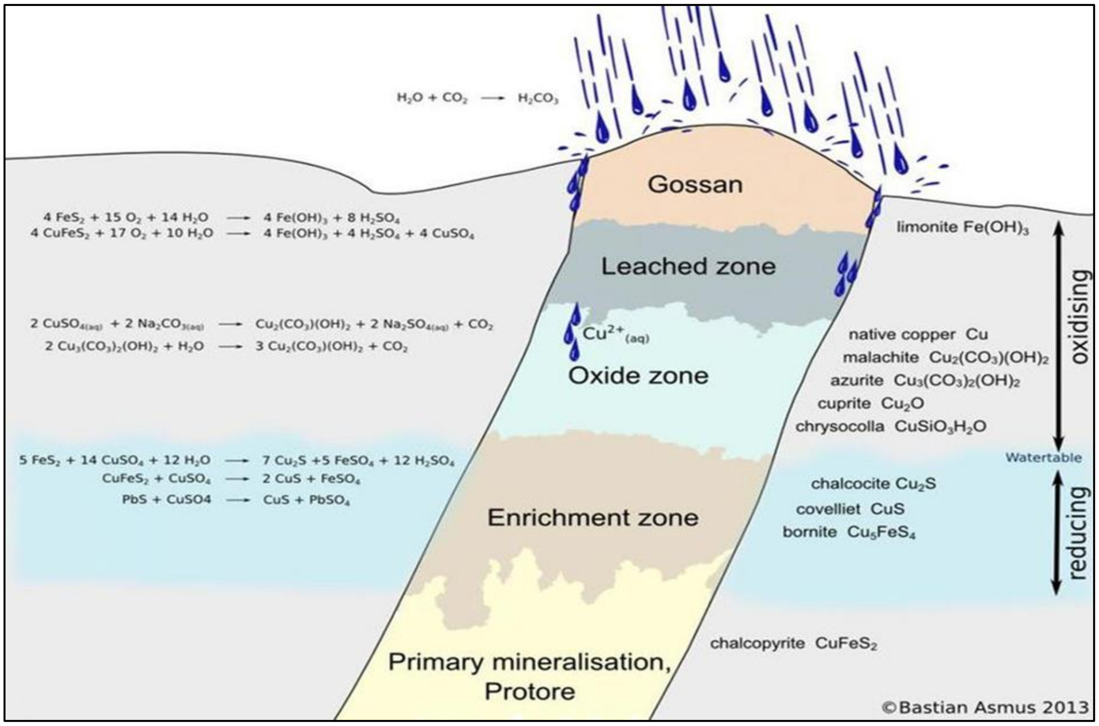
Hypogene (or primary) mineralization occurs as disseminations and in stockworks of veins, in hydrothermally altered, shallow intrusive complexes, and their adjacent country rocks (Berger et al 2008). Sulfides of the hypogene zone are dominantly chalcopyrite and pyrite. The hydrothermal alteration zones of porphyry copper deposits are well known and provide an excellent tool for advancing exploration. Schematic cross sections of the typical alteration zonations and associated minerals are presented in Figure 8-1 which were originally presented by Lowell and Guilbert in 1970. Left is a schematic cross-section of the hydrothermal alteration minerals and types associated. Right is the sulfide minerals and typical percentages.

Uplift of the porphyry system to shallow depths can result in secondary enrichment processes where copper is leached from the weathering of hypogene mineralization and redeposited below the water table as supergene copper sulfides such as chalcocite and covellite. Above the water table, copper oxide minerals typically form. Figure 8-2 represents 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. Both the Cactus and Parks/Salyer deposits have a history of oxidation and leaching which resulted in the formation of an enriched chalcocite blanket. A later stage of oxidation and leaching modified the blanket by oxidizing portions of it in place and mobilized some of the chalcocite to a greater depth.



Source: ASCU, 2020. (Modified from Lowell and Guilbert,1970)

Figure 8-1: Deposit Model of a Porphyry Copper Deposit



Source: Asmus, 2013.

Figure 8-2: Schematic Cross Section of a Porphyry Copper Deposit and Typical Copper Minerals Present

9 EXPLORATION

9.1 EXPLORATION ON THE CACTUS MINE PROPERTY

ASARCO geologists John Kinnison and Art Bloucher first identified the Sacaton mine area in early 1961 while performing regional mapping and sampling in and around the Sacaton Mountains. A lone outcrop of altered and weakly mineralized granite in a sea of alluvium was the only indicator of the potential for porphyry copper-type mineralization in the surrounding area. Following acquisition of mineral rights ASARCO conducted several geophysical surveys, including magnetics and induced polarization (IP). The IP survey identified a large area just south of the outcrop with a chargeability response indicative of sulfide mineralization. A modest drilling program was authorized and initiated in the fall of 1961.

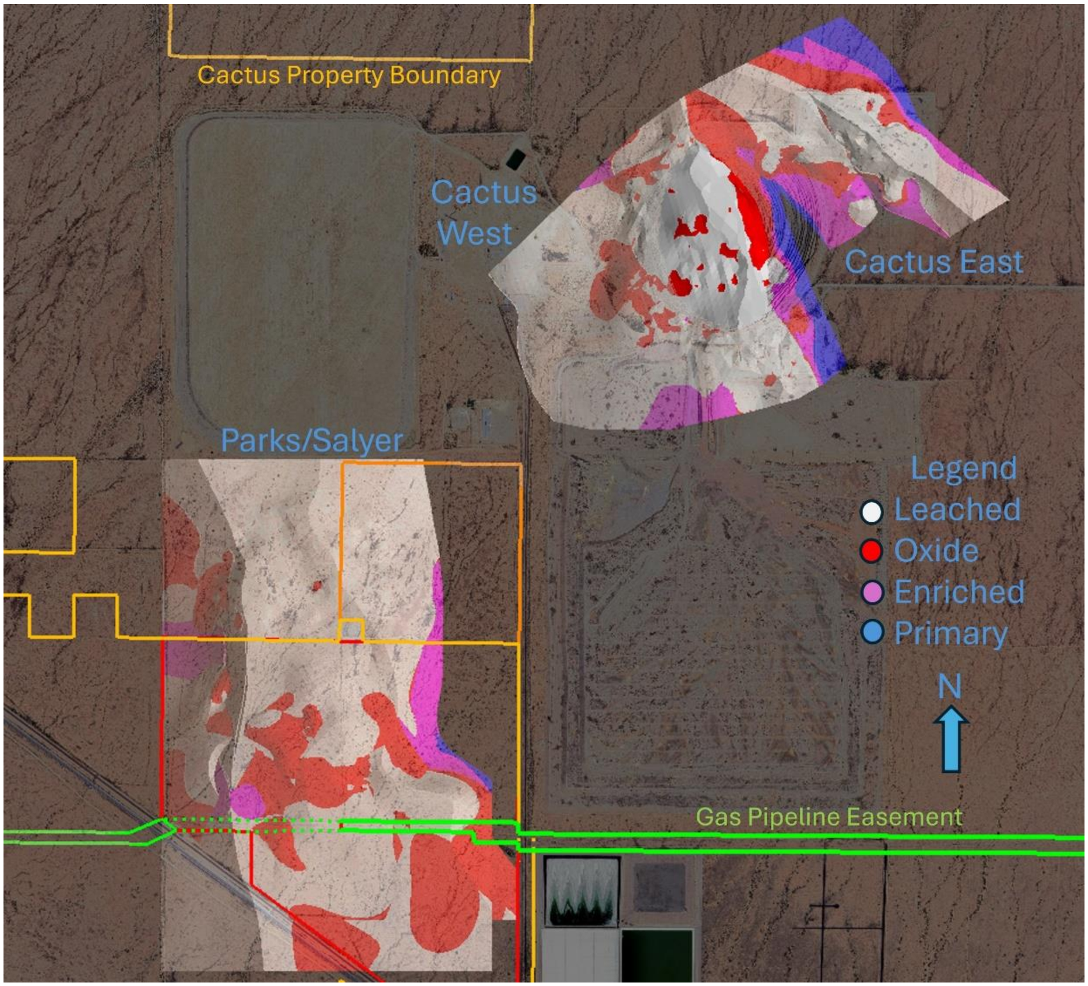
The first drill hole was located just north of the discovery outcrop; intersecting approximately 50 ft (15 m) averaging close to 0.5% Cu. The next four holes were drilled south, east, and west of the first hole in the geophysical target area but did not hit significant results. The sixth and final budgeted drill hole (located to the northwest of the IP anomaly and the Discovery Outcrop) did intercept high grade mineralization—the discovery of the Sacaton West deposit. No further ground geophysics work was done at Sacaton by ASARCO. In 1962 through the first half of 1963 eighty-two more holes were drilled. These 88 holes outlined a northeasterly trending alteration zone approximately 4 mi (6.4 km) long and 1.5 mi (2.4 km) wide dominated by what was recognized as two potential feed material bodies, the Sacaton West and East deposits, as well as widespread intercepts of copper mineralization throughout. Low copper prices precluded any further exploration drilling at that time.

Improving market conditions prompted ASARCO to continue exploration drilling in 1968 and 1969 leading to thirty-seven more holes being drilled. The additional information led to the decision to plan and develop the mine. An additional 10 holes were drilled (1970 and 1971) to sterilize areas under planned facilities. After mining was initiated in 1972, development and definition drilling were conducted for the open pit (Sacaton West deposit). Through 1974 and 1976, eight additional holes were drilled in the Sacaton East deposit for definition purposes.

The adjacent Parks/Salyer property has been variably explored from the 1970s through the late 1990s. Parks/Salyer is also a displaced portion of the larger porphyry copper system. A number of diamond holes drilled to the south of the then current resource area identified mineralization and geological characteristics consistent with the Cactus deposits in a similar horst block environment. Two exploration diamond drill holes were undertaken in 1996 by ASARCO at the southern edge of the current resource area (S-200 and S-201). As interpreted, they intersected well mineralized zones of oxide, enriched, and primary material that indicated grades were increasing to the north.

ASCU conducted an ionic leach soil geochemistry program over the Parks/Salyer property in 2019 on 325 ft (100 m) spacing. This confirmed anomalous soil geochemistry across the property for copper, molybdenum, silver, and gold and a general NE trend of the higher anomalous values. ASCU followed this work up with two diamond drill holes in 2020 (ECP-018 and ECP-019). This extended mineralization a further 900-1,000 ft (275 – 305 m) to the NE of previously drilled mineralization. Drilling resumed in late 2021 with hole ECP-042, continued throughout 2021 and into 2022 with the completion of ECP-144, resulting in a total of 75 holes totaling 166,658.8 ft (50,797.6 m) of HQ core.

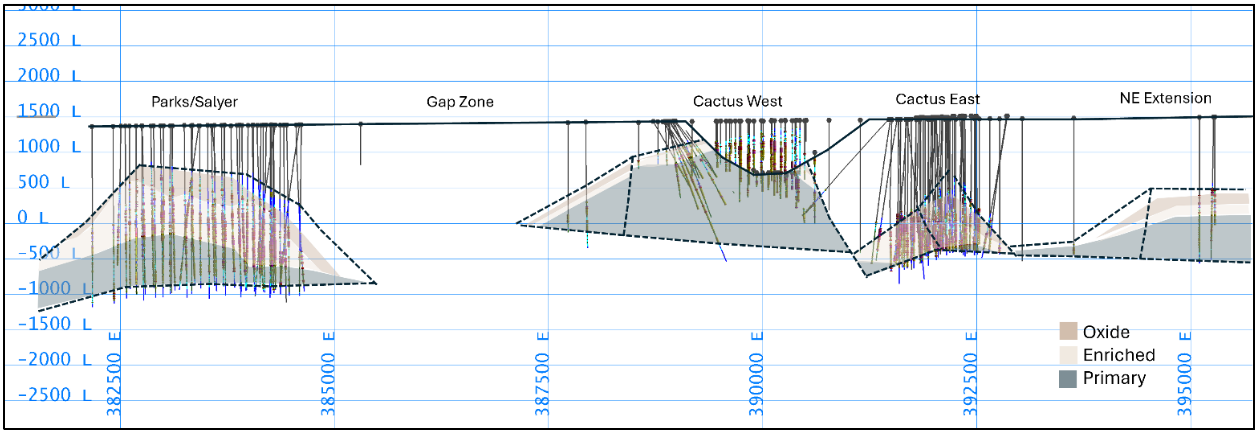
Figure 9-1 plots the location and scale of the potential Parks/Salyer deposit with respect to the Cactus Mine deposits. The general location, orientation, and displacement direction of major faults dissecting the deposits are also shown.



Source: ALS Geo Resources, 2024.

Figure 9-1: Location and Scale of the Potential Parks/Salyer Deposit with Respect to the Cactus Mine Deposits

Figure 9-2 is a NE oriented long section displaying the horst and graben block fault and mineralization interpretation from the northern portion of the Parks/Salyer deposit in the SW through to the NE Extension mineralization in NE. NE movement along the basement fault was accommodated by block rotation and the formation of NW trending normal faults. The existing Cactus West pit is displayed on the long section.



Source: ASCU, 2022.

Figure 9-2: NE Oriented Long Section Displaying Mineralization Interpretation and Property Boundaries

The NE Extension is located 3,000 ft (915 m) to the NE of Cactus East. ASARCO defined the mineralized zone with wide spaced exploration drilling (> 1,000 ft) (> 305 m) in 1962 and 1963 as part of the initial property wide exploration program. Table 9-1 reports the significant intercepts of the main holes drilled into the NE Extension mineralization. ASCU drilled one exploratory drill hole into the NE Extension in January 2023, intersecting mineralization consistent with previous drilling.

ASCU has continued their exploration by way of definition and expansion core drilling around the Cactus East and West deposits. In 2019, two vertical PQ core holes were drilled into the East mineralized zone for verification of grade and for metallurgical testing as part of the evaluation program prior to purchase. One additional vertical PQ core hole was drilled into Cactus East in 2020 for further metallurgical testing, for a total of 5,768ft (1,768 m). In 2020, a drilling program was initiated on both Cactus West and Cactus East to expand the deposit extents to define an initial resource that would support PEA. This consisted of five angled HQ core holes totaling 9,252 ft (2,820 m) around the northern and western edges of Cactus East and 11 angled HQ core holes totaling 15,377 ft (4,687 m) around the perimeter of the West Pit.

With the successful completion of the PEA incorporating Cactus East and Cactus West, a significant infill drilling program was undertaken throughout 2021 and 2022 to upgrade previous inferred resources to indicated. Whilst not targeting primary mineralization, this program also drilled into the upper parts of the primary material in Cactus West for exploration purposes that may support future initiatives for mining and processing of primary mineralization. In 2024, ASCU plans to target exploration of the primary mineralization associated with the Cactus West deposit.

In 2019, 55 surface sonic drill holes totaling 5,120 ft (1,560 m) of 6-in diameter holes were drilled across the Cactus Stockpile Project to support an initial resource based on approximately 750 ft (230 m) spaced drilling. Through late 2020, 2021 and 2022, an infill surface sonic drill program was undertaken to reduce the spacing to 200 ft (60 m). The resource database for the Stockpile Project contains 511 holes for a total of 44,348.2 ft (13,517.3 m) of drilling.

At present there are three defined mineralized deposits on the Cactus Project. Cactus East and Cactus West Combined are approximately 4,300 ft (1,300 m) long, average about 3,000 ft (914 m) wide and 1,300 ft (395 m) thick. Parks/Salyer averages 48,000 ft (2,450 m) long, 3,300 ft (1,005 m) wide, and 2,100 ft (640 m) thick. The stockpile is 4,000 ft (1,220 m) long, 4,500 ft (1,370 m) wide, and 120 ft (36 m) high. The size of the stockpile if fixed however, there is potential to increase the size of both Cactus East, Cactus West, and Parks/Salyer.

Table 9-1: Significant Intercepts for the Three Holes Drilled into the NE Extension Mineralization

Hole Id	MinZone	From (ft)	To (ft)	Length (ft)	CuT (%)	Tsol (%)
ECN-128	oxide	996.7	1,114.8	118.1	0.97	0.94
	enriched	1,182.6	1,334.0	151.4	0.46	0.38
	including	1,334.0	1,206.4	23.8	1.35	1.34
	primary	1,334.0	1,987.4	653.4	0.40	0.03
	including	1,419.0	1,469.0	50.0	0.55	0.04
	and	1,510.0	1,629.0	119.0	0.58	0.04
	and	1,733.3	1,752.3	19.0	1.60	0.10
S-68	oxide	1,016.50	1,044.50	28	1.27	n/a
	oxide	1,078.50	1,125.80	47.3	0.95	n/a
	oxide	1,161.00	1,208.80	47.8	3.05	n/a
	enriched	1,275.00	1,290.10	15.1	1.96	n/a
	enriched	1,322.40	1,354.10	31.7	0.97	n/a
	primary	1,354.10	1,526.00	171.9	0.38	n/a
S-64	oxide	1,093.90	1,104.20	10.3	1.01	n/a
	enriched	1,163.00	1,227.30	64.3	1.37	n/a
	enriched	1,333.70	1,350.90	17.2	0.89	n/a
	primary	1,350.90	1,776.00	425.1	0.34	n/a

10 DRILLING

10.1 INTRODUCTION

The Cactus (Sacaton) deposits are covered with post mineral alluvium and conglomerate, which may be up to 1,500 ft (457.2 m) thick. ASARCO rotary drilled through the cover alluvium and conglomerate and completed the remainder of the holes with NX/HX core tails. Only the diamond drill core was saved and further processed for analysis. All ASARCO's drill holes (exploratory and production), within the developing pit were drilled vertically and only a very few were down hole surveyed. Elim Mining (now ASCU) started a similar program in 2019 on the first two (PQ) metallurgy holes but converted to coring the full hole after unsatisfactory drilling results in the conglomerate. Core recovery, on average, was greater than 95%.

When Elim Mining (now ASCU) acquired the Sacaton Mine property in 2019 they found the offices and warehouses containing desks and file cabinets filled with disorganized files and data sheets. There were 2 core sheds full of boxed core, samples, and sample pulps. The data were organized and paired with the physical core and samples in the core sheds to build a database of historical drilling from 1961 to the early 1980s.

Each drill hole was reviewed in turn and the associated data and samples validated to ensure that in total, the hole met CIM Best Practices Guidelines for inclusion in a NI 43-101 Technical Report. In total 179 RC and Diamond drill holes were validated and used for subsequent MREs. Drilling completed by ASCU since has been consistent with these original data.

As detailed in Table 10-1, ASCU completed a total of 86 core holes in the Cactus resource area in 2019 through 2023 for a total of 137,032.6 ft (41,767.5 m) of drilling. Table 10-2 details the 79 RC drillholes completed on the Cactus deposit since 2021 for a total of 35,695.0 ft (10,879.8 m). Table 10-4 details the 100 drillholes undertaken by ASCU in the Parks/Salyer resource area in 2021 through 2024 for a total of 223,502.2 ft (68,150.9 m) of drilling.

Figure 10-1 shows the location of the drilling relative to the Cactus and Parks/Salyer deposits with green and blue circles locating the collars of ASCU's recent holes, and grey circles locating the collars of ASARCO's historical holes. The orange circles indicate the location of sonic drill holes on the Stockpile resource on the property.

Of the 361 diamond drill holes completed in the Cactus area, 359 were used for the Cactus Mineral Resource estimates. All 137 holes completed in Parks/Salyer, plus the 22 holes from IE (total 159) were used for a Parks/Salyer- Mineral Resource estimate.

Table 10-1: 2019–2023 Cactus Drilling Completed by Arizona Sonoran

Drill Hole	Core	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
ECE-001	HQ	1896.0	577.9	220	-80	CE
ECE-002	HQ	2013.0	613.6	230	-80	CE
ECE-015	HQ	1722.5	525.0	0	-90	CE
ECE-016	NQ	1782.6	543.3	330	-80	CE
ECE-017	HQ	1837.0	559.9	260	-80	CE
ECE-020	HQ	1770.2	539.6	0	-90	CE
ECE-021	HQ	1948.7	594.0	0	-90	CE
ECE-043	HQ	2054.8	626.3	235	-80	CE
ECE-044	HQ	1917.0	584.3	0	-90	CE

Drill Hole	Core	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
ECE-051	HQ	1956.0	596.2	0	-90	CE
ECE-052	HQ	1871.4	570.4	0	-90	CE
ECE-053	HQ	2035.2	620.3	0	-90	CE
ECE-058	HQ	1903.0	580.0	0	-90	CE
ECE-059	HQ	1368.6	417.1	0	-90	CE
ECE-059A	HQ	1906.3	581.0	0	-90	CE
ECE-060	HQ	1936.5	590.2	0	-90	CE
ECE-062	HQ	1888.0	575.5	0	-90	CE
ECE-063	HQ	1976.3	602.4	0	-90	CE
ECE-064	HQ	1924.3	586.5	0	-90	CE
ECE-066	HQ	1947.0	593.4	0	-90	CE
ECE-067	HQ	1897.8	578.4	0	-90	CE
ECE-069	HQ	1878.8	572.7	0	-90	CE
ECE-070	HQ	1948.0	593.8	0	-90	CE
ECE-072	HQ	2055.0	626.4	0	-80	CE
ECE-073	HQ	2103.0	641.0	0	-90	CE
ECE-076	HQ	1930.0	588.3	360	-80	CE
ECE-078	HQ	2093.0	637.9	360	-80	CE
ECE-082	HQ	2314.1	705.3	0	-90	CE
ECE-085	HQ	2117.0	645.3	0	-90	CE
ECE-143	HQ	2274.0	693.1	90	-80	CE
ECE-146	HQ	2096.0	638.9	320	-80	CE
ECE-149	HQ	2000.0	609.6	335	-80	CE
ECE-177	HQ	2120.3	646.3	0	-90	CE
ECE-179	HQ	2090.4	637.2	0	-90	CE
ECE-182	HQ	1934.5	589.6	235	-80	CE
ECE-183	HQ	2030.3	618.8	235	-80	CE
ECE-185	HQ	1835.2	559.4	0	-90	CE
ECN-128	HQ	2013.6	613.7	0	-90	NE
ECW-003	HQ	1936.0	590.1	180	-60	CW
ECW-004	HQ	500.0	152.4	0	-60	CW
ECW-005	HQ	664.2	202.4	130	-60	CW
ECW-006	HQ	1000.2	304.9	10	-60	CW
ECW-007	HQ	1810.5	551.8	125	-55	CW
ECW-008	HQ	1000.0	304.8	15	-65	CW
ECW-009	HQ	906.0	276.1	30	-60	CW
ECW-010	HQ	1469.2	447.8	110	-65	CW

Drill Hole	Core	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
ECW-011	HQ	1329.0	405.1	60	-65	CW
ECW-012	HQ	1459.6	444.9	70	-65	CW
ECW-013	HQ	1616.0	492.6	205	-60	CW
ECW-014	HQ	1687.4	514.3	160	-50	CW
ECW-022	HQ	1304.6	397.6	90	-45	CW
ECW-023	HQ	1396.0	425.5	90	-55	CW
ECW-024	HQ	1011.0	308.2	80	-50	CW
ECW-025	HQ	1049.3	319.8	70	-60	CW
ECW-026	HQ	944.0	287.7	70	-55	CW
ECW-027	HQ	1540.0	469.4	90	-60	CW
ECW-028	HQ	1300.0	396.2	94	-55	CW
ECW-029	HQ	1094.0	333.5	70	-80	CW
ECW-030	HQ	458.0	139.6	190	-60	CW
ECW-031	HQ	1828.6	557.4	240	-45	CW
ECW-032	HQ	1367.7	416.9	140	-50	CW
ECW-033	HQ	1418.0	432.2	140	-45	CW
ECW-034	HQ	1347.0	410.6	140	-45	CW
ECW-035	HQ	1008.0	307.2	135	-45	CW
ECW-036	HQ	1443.0	439.8	135	-55	CW
ECW-037	HQ	938.3	286.0	130	-45	CW
ECW-038	HQ	1449.7	441.9	110	-65	CW
ECW-039	HQ	450.6	137.3	0	-90	CW
ECW-040	HQ	1287.0	392.3	110	-50	CW
ECW-041	HQ	1948.0	593.8	235	-45	CW
ECW-046	HQ	607.0	185.0	0	-90	CW
ECW-047	HQ	537.0	163.7	0	-90	CW
ECW-048	HQ	500.0	152.4	0	-90	CW
ECW-049	HQ	400.0	121.9	0	-90	CW
ECW-050	HQ	400.0	121.9	0	-90	CW
ECW-054	HQ	1350.0	411.5	10	-55	CW
ECW-055	HQ	1600.0	487.7	100	-45	CW
ECW-056	HQ	1490.4	454.3	150	-50	CW
ECW-150	HQ	2156.0	657.1	45	-65	CW
ECW-151	HQ	2017.0	614.8	0	-60	CW
ECW-153	HQ	1874.9	571.5	175	-65	CW
ECW-154	HQ	1877.0	572.1	180	-65	CW
ECW-157	HQ	2032.7	701.7	90	-80	CW

Drill Hole	Core	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
ECW-160	HQ	1773.0	540.4	0	-90	CW
SE-01	PQ	2058.3	627.4	0	-90	CE
SE-02	PQ	2013.0	613.6	0	-90	CE
Totals		**137,032.6**	**41,767.5**			

Table 10-2: 2021 Cactus RC Drilling Completed by Arizona Sonoran

Drill Hole	RC	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
RCW-001	4.5"	600.00	182.88	0	-90	CW
RCW-002	4.5"	620	188.976	0	-90	CW
RCW-003	4.5"	420	128.016	0	-90	CW
RCW-004	4.5"	430	131.064	0	-90	CW
RCW-005	4.5"	420	128.016	0	-90	CW
RCW-006	4.5"	400	121.92	0	-90	CW
RCW-007	4.5"	385	117.348	0	-90	CW
RCW-008	4.5"	400	121.92	0	-90	CW
RCW-009	4.5"	585	178.308	0	-90	CW
RCW-010	4.5"	390	118.872	0	-90	CW
RCW-011	4.5"	385	117.348	0	-90	CW
RCW-012	4.5"	450	137.16	0	-90	CW
RCW-013	4.5"	410	124.968	0	-90	CW
RCW-014	4.5"	390	118.872	0	-90	CW
RCW-015	4.5"	760	231.648	0	-90	CW
RCW-016	4.5"	530	161.544	355	-50	CW
RCW-017	4.5"	380	115.824	335	-70	CW
RCW-018	4.5"	800	243.84	310	-45	CW
RCW-019	4.5"	1180	359.664	275	-45	CW
RCW-020	4.5"	700	213.36	35	-55	CW
RCW-021	4.5"	625	190.5	0	-90	CW
RCW-022	4.5"	400	121.92	330	-80	CW
RCW-023	4.5"	380	115.824	0	-80	CW
RCW-024	4.5"	400	121.92	0	-90	CW
RCW-025	4.5"	550	167.64	0	-50	CW
RCW-026	4.5"	400	121.92	0	-90	CW
RCW-027	4.5"	1000	304.8	355	-50	CW
RCW-028	4.5"	450	137.16	0	-90	CW
RCW-029	4.5"	550	167.64	5	-50	CW

Drill Hole	RC	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
RCW-030	4.5"	960	292.608	40	-50	CW
RCW-031	4.5"	480	146.304	70	-80	CW
RCW-032	4.5"	420	128.016	70	-55	CW
RCW-033	4.5"	365	111.252	0	-90	CW
RCW-034	4.5"	600	182.88	0	-90	CW
RCW-035	4.5"	400	121.92	0	-90	CW
RCW-036	4.5"	375	114.3	0	-90	CW
RCW-037	4.5"	425	129.54	0	-90	CW
RCW-038	4.5"	400	121.92	0	-90	CW
RCW-039	4.5"	400	121.92	0	-90	CW
RCW-040	4.5"	425	129.54	0	-90	CW
RCW-041	4.5"	425	129.54	0	-90	CW
RCW-042	4.5"	480	146.304	0	-90	CW
RCW-043	4.5"	370	112.776	0	-90	CW
RCW-044	4.5"	425	129.54	0	-90	CW
RCW-045	4.5"	400	121.92	0	-90	CW
RCW-046	4.5"	360	109.728	0	-90	CW
RCW-047	4.5"	360	109.728	0	-90	CW
RCW-048	4.5"	480	146.304	0	-90	CW
RCW-049	4.5"	460	140.208	0	-90	CW
RCW-050	4.5"	425	129.54	0	-90	CW
RCW-051	4.5"	375	114.3	0	-90	CW
RCW-052	4.5"	360	109.728	0	-90	CW
RCW-053	4.5"	360	109.728	0	-90	CW
RCW-054	4.5"	440	134.112	0	-90	CW
RCW-055	4.5"	375	114.3	0	-90	CW
RCW-056	4.5"	400	121.92	0	-90	CW
RCW-057	4.5"	400	121.92	0	-90	CW
RCW-058	4.5"	380	115.824	0	-90	CW
RCW-059	4.5"	380	115.824	0	-90	CW
RCW-060	4.5"	400	121.92	0	-90	CW
RCW-061	4.5"	400	121.92	0	-90	CW
RCW-062	4.5"	500	152.4	0	-60	CW
RCW-063	4.5"	375	114.3	0	-90	CW
RCW-064	4.5"	500	152.4	0	-90	CW
RCW-065	4.5"	450	137.16	0	-90	CW
RCW-066	4.5"	140	42.672	0	-90	CW

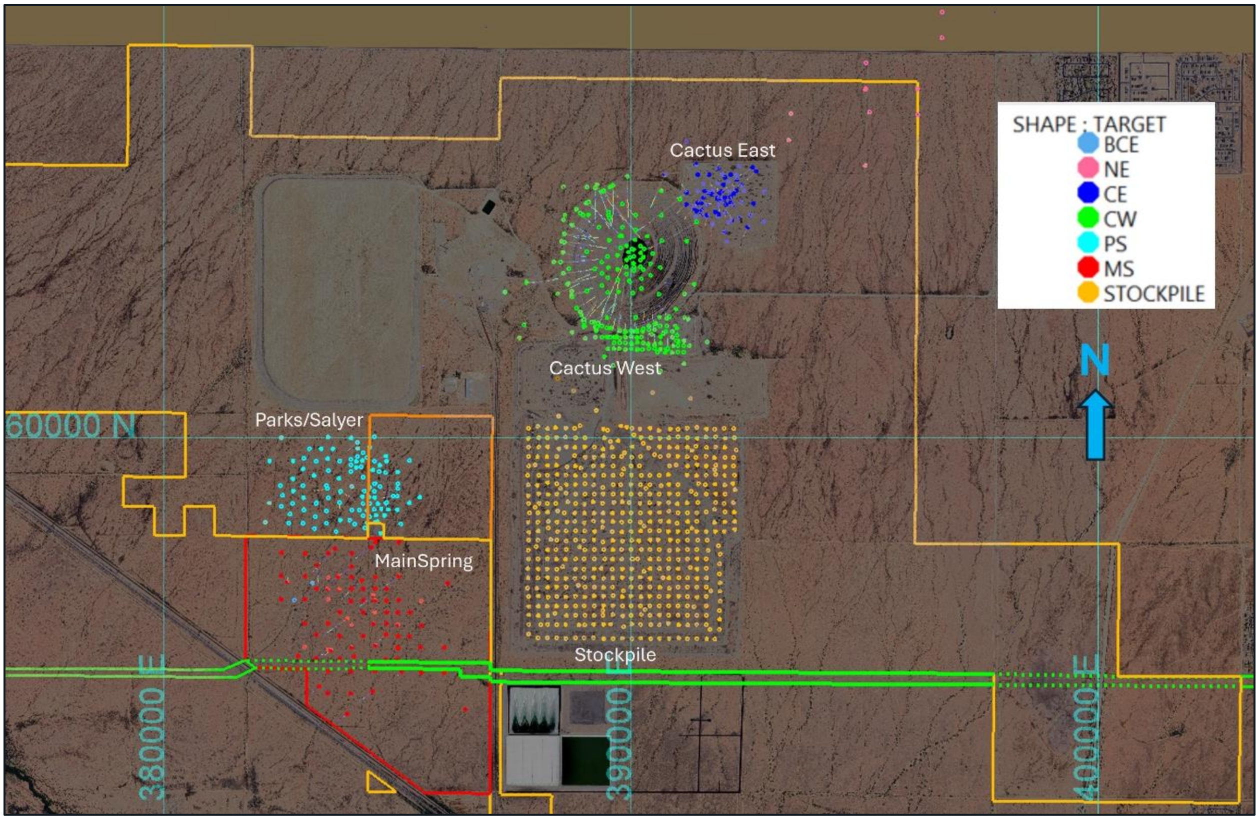
Drill Hole	RC	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
RCW-066A	4.5"	365	111.252	0	-90	CW
RCW-067	4.5"	300	91.44	0	-90	CW
RCW-068	4.5"	340	103.632	0	-90	CW
RCW-069	4.5"	400	121.92	0	-90	CW
RCW-070	4.5"	580	176.784	40	-55	CW
RCW-071	4.5"	100	30.48	40	-60	CW
RCW-072	4.5"	100	30.48	20	-70	CW
RCW-073	4.5"	500	152.4	0	-70	CW
RCW-074	4.5"	450	137.16	0	-75	CW
RCW-075	4.5"	425	129.54	355	-70	CW
RCW-076	4.5"	525	160.02	315	-45	CW
RCW-077	4.5"	200	60.96	0	-90	CW
RCW-078	4.5"	350	106.68	0	-90	CW
Totals		**35,695.00**	**10,879.84**			

Table 10-3: 2021–2023 Parks/Salyer Drilling Completed by Arizona Sonoran

Drill Hole	Core	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
ECP-018	HQ	2,297.1	700.2	0	-90	PS
ECP-019	HQ	2,275.7	693.6	0	-90	PS
ECP-042	HQ	2,151.5	655.8	0	-90	PS
ECP-045	HQ	2,127.0	648.3	0	-90	PS
ECP-057	HQ	2,345.3	714.8	0	-90	PS
ECP-061	HQ	2,317.0	706.2	0	-90	PS
ECP-065	HQ	2,379.2	725.2	0	-90	PS
ECP-068	HQ	2,051.0	625.1	0	-90	PS
ECP-071	HQ	2,436.0	742.5	0	-90	PS
ECP-074	HQ	2,441.5	744.2	0	-90	PS
ECP-075	HQ	2,452.0	747.4	0	-90	PS
ECP-077	HQ	2,691.0	820.2	0	-90	PS
ECP-079	HQ	2,071.5	631.4	0	-90	PS
ECP-080	HQ	2,373.8	723.5	0	-90	PS
ECP-081	HQ	2,455.8	748.5	0	-90	PS
ECP-083	HQ	2,354.4	717.6	0	-90	PS
ECP-084	HQ	2,167.5	660.7	0	-90	PS
ECP-086	HQ	1,973.6	601.6	0	-90	PS
ECP-087	HQ	2,412.3	735.3	0	-90	PS

Drill Hole	Core	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
ECP-088	HQ	2,068.9	630.6	0	-90	PS
ECP-089	HQ	2,192.6	668.3	0	-90	PS
ECP-090	HQ	1,900.0	579.1	0	-90	PS
ECP-091	HQ	1,627.3	496.0	0	-90	PS
ECP-092	HQ	1,807.0	550.8	0	-90	PS
ECP-093	HQ	2,463.3	750.8	0	-90	PS
ECP-094	HQ	2,498.0	761.4	0	-90	PS
ECP-095	HQ	2,545.5	775.9	0	-90	PS
ECP-096	HQ	2,652.1	808.4	0	-90	PS
ECP-097	HQ	2,344.5	714.6	0	-90	PS
ECP-098	HQ	2,332.4	710.9	0	-90	PS
ECP-099	HQ	2,244.0	684.0	0	-90	PS
ECP-100	HQ	2,157.0	657.5	0	-90	PS
ECP-101	HQ	2,266.5	690.8	0	-90	PS
ECP-102	HQ	2,252.4	686.5	0	-90	PS
ECP-103	HQ	2,060.3	628.0	0	-90	PS
ECP-104	HQ	1,948.0	593.8	0	-90	PS
ECP-105	HQ	2,067.0	630.0	0	-90	PS
ECP-106	HQ	1,979.6	603.4	0	-90	PS
ECP-107	HQ	2,207.0	672.7	0	-90	PS
ECP-108	HQ	1,957.5	596.6	0	-90	PS
ECP-109	HQ	2,233.0	680.6	0	-90	PS
ECP-110	HQ	1,910.5	582.3	0	-90	PS
ECP-111	HQ	2,335.5	711.9	0	-90	PS
ECP-112	HQ	2,076.5	632.9	0	-90	PS
ECP-113	HQ	2,397.0	730.6	0	-90	PS
ECP-114	HQ	2,252.4	686.5	0	-90	PS
ECP-115	HQ	2,424.5	739.0	0	-90	PS
ECP-116	HQ	2,213.7	674.7	0	-90	PS
ECP-117	HQ	2,444.4	745.1	0	-90	PS
ECP-118	HQ	2,138.0	651.7	0	-90	PS
ECP-119	HQ	2,406.0	733.3	0	-90	PS
ECP-120	HQ	1,949.2	594.1	0	-90	PS
ECP-121	HQ	2,477.0	755.0	0	-90	PS
ECP-122	HQ	1,857.6	566.2	0	-90	PS
ECP-123	HQ	2,377.0	724.5	0	-90	PS
ECP-124	HQ	2,434.2	741.9	0	-90	PS

Drill Hole	Core	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
ECP-125	HQ	2,039.4	621.6	0	-90	PS
ECP-126	HQ	2,151.6	655.8	0	-90	PS
ECP-127	HQ	2,427.0	739.7	0	-90	PS
ECP-129	HQ	2,316.0	705.9	255	-80	PS
ECP-130	HQ	2,367.7	721.7	0	-90	PS
ECP-131	HQ	2,268.2	691.3	0	-90	PS
ECP-132	HQ	2,430.0	740.7	235	-80	PS
ECP-133	HQ	2,417.0	736.7	0	-90	PS
ECP-134	HQ	2,248.0	685.2	0	-90	PS
ECP-135	HQ	2,086.0	635.8	0	-90	PS
ECP-136	HQ	2,420.2	737.7	0	-90	PS
ECP-137	HQ	2,278.5	694.5	0	-90	PS
ECP-138	HQ	2,248.0	685.2	115	-80	PS
ECP-139	HQ	2,285.7	696.7	0	-90	PS
ECP-140	HQ	2,333.5	711.3	260	-80	PS
ECP-141	HQ	2,290.5	698.1	0	-90	PS
ECP-142	HQ	2,378.2	724.9	0	-90	PS
ECP-144	HQ	2,429.2	740.4	0	-90	PS
Totals		**166,685.3**	**50,805.7**			



Source: ALS Geo Resources, 2024.

Figure 10-1: Map Showing Collar Locations of Historical and Recent Drilling Campaigns

The Stockpile Project has been infilled drilled by ASCU to 200 ft (61 m) spacing by sonic surface drilling since the initial 750 ft (230 m) spacing completed in 2019. This accounts for 514 holes in addition to four historical sterilization holes drilled into the barren alluvium dumps to the immediate north of the Stockpile Project.

In March of 2023 ASCU began a program of infill drilling to bring the Parks/Salyer resources to indicated and ultimately measured status. To date they have drilled 100 drill holes for a total of 223,592.2 ft (68,150.9 m). These holes are highlighted as variable shades of blue in Figure 10-2 below. The shades of blue indicated whether the holes were part of the original exploration, which generated an inferred resource, or part of subsequent infill drilling to Indicated, then Measured resource. Table 10-4 shows the details of the most recent drilling for the Measured program.

Table 10-4: 2023 Measured Infill Drilling at Parks/Salyer Completed by Arizona Sonoran

Drill Hole	Drill Type	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
ECP-145	HQ	2011.6	613.1	0	-90	PS
ECP-147	HQ	2219.9	676.6	0	-90	PS
ECP-148	HQ	2287.3	697.2	0	-90	PS
ECP-152	HQ	2315.0	705.6	0	-90	PS
ECP-155	HQ	2315.4	705.7	0	-90	PS
ECP-156	HQ	2103.0	641.0	0	-90	PS
ECP-158	HQ	2347.2	715.4	0	-90	PS

Drill Hole	Drill Type	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
ECP-159	HQ	2077.0	633.1	0	-90	PS
ECP-161	HQ	2137.0	651.4	0	-90	PS
ECP-162	HQ	2323.0	708.1	0	-90	PS
ECP-164	HQ	2017.0	614.8	0	-90	PS
ECP-165	HQ	2373.0	723.3	0	-90	PS
ECP-167	HQ	1964.9	598.9	0	-90	PS
ECP-168	HQ	2360.1	719.4	0	-90	PS
ECP-169	HQ	1912.8	583.0	0	-90	PS
ECP-170	HQ	1894.5	577.4	0	-90	PS
ECP-171	HQ	2013.2	613.6	0	-90	PS
ECP-172	HQ	2385.4	727.1	0	-90	PS
ECP-173	HQ	2241.1	683.1	0	-90	PS
ECP-174	HQ	2495.2	760.5	0	-90	PS
ECP-175	HQ	2281.5	695.4	0	-90	PS
ECP-176	HQ	2210.0	673.6	0	-90	PS
ECP-178	HQ	2280.2	695.0	0	-90	PS
ECP-180	HQ	2102.7	640.9	0	-90	PS
ECP-181	HQ	2102.5	640.8	0	-90	PS
ECP-184	HQ	2136.4	651.2	0	-90	PS

The MainSpring property is a parcel of 522.87 acres (52,278 ha) that lies immediately south of Parks/Salyer and stretches to the Maricopa Casa Grande Highway to the south. IE had an option to purchase this property and explored the property, drilling 22 holes before dropping the option. In February 2023 ASCU exercised their option on the property. MainSpring is combined with Parks/Salyer as the Parks/Salyer deposit.

Having acquired the property ASCU began a drill program to explore the area and validate previous drilling. A total of 37 holes were drilled for a total of 49,193.3 ft (14,994.1 m). Most of ASCU's drilling has been on a 500 ft by 500 ft pattern concentrating on the northwestern portion of the property near the Parks/Salyer boundary. These holes are shown as green in Figure 10-2 below. Table 10-5 details the 37 holes drilled by ASCU on the MainSpring property in 2023.

Table 10-5: 2023 – 2024 MainSpring Drilling Completed by Arizona Sonoran

Drill Hole	Core	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
ECM-186	HQ	945.0	288.0	0	-90	MS
ECM-187	HQ	1024.6	312.3	0	-90	MS
ECM-188	HQ	1117.0	340.5	0	-90	MS
ECM-189	NQ	1220.0	371.9	0	-90	MS
ECM-190	HQ	1233.4	375.9	0	-90	MS
ECM-191	HQ	1454.5	443.3	0	-90	MS

Drill Hole	Core	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
ECM-192	HQ	1716.5	523.2	0	-90	MS
ECM-193	HQ	937.0	285.6	0	-90	MS
ECM-194	HQ	1342.8	409.3	0	-90	MS
ECM-195	HQ	1480.6	451.3	0	-90	MS
ECM-196	HQ	1156.0	352.3	0	-90	MS
ECM-197	HQ	1127.0	343.5	0	-90	MS
ECM-198	HQ	2353.0	717.2	0	-90	MS
ECM-199	HQ	1117.1	340.5	0	-90	MS
ECM-200	HQ	1004.9	306.3	0	-90	MS
ECM-201	HQ	1063.2	324.1	0	-90	MS
ECM-202	HQ	918.6	280.0	0	-90	MS
ECM-203	HQ	876.8	267.2	0	-90	MS
ECM-204	HQ	852.3	259.8	0	-90	MS
ECM-205	HQ	857.0	261.2	0	-90	MS
ECM-206	HQ	1549.0	472.1	0	-90	MS
ECM-207	HQ	928.0	282.9	0	-90	MS
ECM-208	HQ	895.7	273.0	0	-90	MS
ECM-209	HQ	974.5	297.0	0	-90	MS
ECM-210	HQ	945.1	288.1	0	-90	MS
ECM-211	HQ	907.0	276.5	0	-90	MS
ECM-212	HQ	1281.2	390.5	0	-90	MS
ECM-213	HQ	1402.7	427.5	0	-90	MS
ECM-214	HQ	1714.6	522.6	0	-90	MS
ECM-215	HQ	1893.2	577.0	0	-90	MS
ECM-216	HQ	1731.3	527.7	0	-90	MS
ECM-217	HQ	1609.9	490.7	0	-90	MS
ECM-218	HQ	2040.7	622.0	0	-90	MS
ECM-219	HQ	1444.7	440.3	0	-90	MS
ECM-220	HQ	2041.5	622.2	0	-90	MS
ECM-221	HQ	1893.8	577.2	0	-90	MS
ECM-222	HQ	2143.1	653.2	0	-90	MS

10.1.1 MainSpring Data Swap

On December 21st, 2023, ASCU acquired from IE the physical core, assay certificates, drilling logs and downhole surveys from holes that IE drilled on the MainSpring property in 2022. This included 22 holes for a total of 22,091.4 ft (6,733.46 m) of drilling both RC and Diamond Core. IE used a process of drilling RC collars through the overlying alluvium and conglomerate. The drill hole was completed through the mineralized zones with PQ or HQ sized diamond drilling. These holes are indicated as red dots in Figure 10-2 below. Table 10-6 details the drilling completed by IE in 2022.

Table 10-6: 2022 MainSpring Drilling Completed by Ivanhoe Electric (IE)

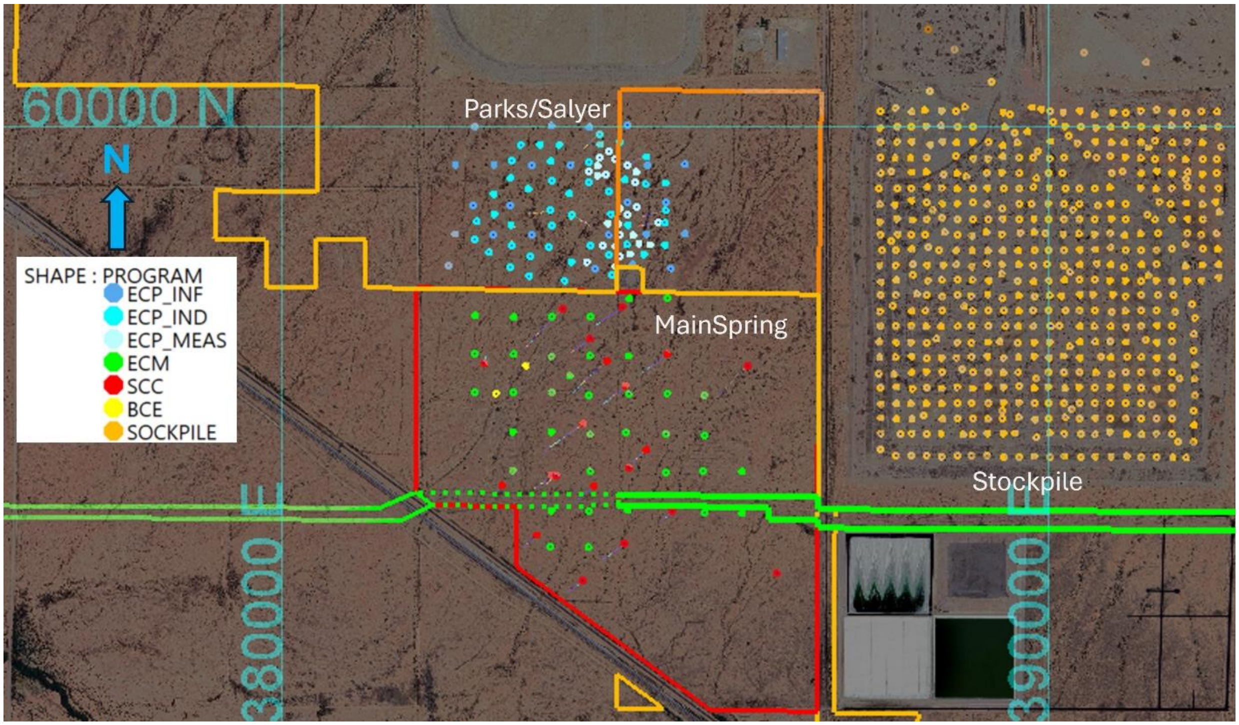
Drill Hole	Drill Type	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
SCC-010	HQ	2180.0	664.5	13	-87	MS
SCC-020	PQ	932.0	284.1	320	-90	MS
SCC-024	PQ	1016.5	309.8	30	-90	MS
SCC-028	PQ	1213.0	369.7	230	-75	MS
SCC-030	PQ	919.5	280.3	230	-75	MS
SCC-033	PQ	1493.0	455.1	235	-60	MS
SCC-034	RC	660.0	201.2	230	-60	MS
SCC-035	RC	530.0	161.5	230	-75	MS
SCC-036	RC	595.0	181.4	230	-60	MS
SCC-037	PQ	1246.0	379.8	230	-80	MS
SCC-038	PQ	1023.0	311.8	230	-75	MS
SCC-039	RC	830.0	253.0	231	-60	MS
SCC-040	RC	960.0	292.6	230	-75	MS
SCC-041	RC	1060.0	323.1	230	-60	MS
SCC-042	HQ	1183.0	360.6	230	-65	MS
ACC-043	HQ	417.0	127.1	230	-60	MS
SCC-044	RC	1000.0	304.8	230	-60	MS
SCC-046	RC	690.0	210.3	230	-60	MS
SCC-047	HQ	1554.1	473.7	230	-60	MS
SCC-049	RC	900.0	274.3	230	-60	MS
SCC-050	HQ	1306.5	398.2	230	-60	MS
SCC-051	RC	380.0	115.8	230	-60	MS

In October of 2023 ASCU also obtained the core, assay, and all associated data for a couple of holes drilled by Bronco Creek Exploration Inc. of Tucson, Arizona, a wholly owned subsidiary of EMX Royalties Corp. These holes were located within the MainSpring property. These holes are indicated by yellow dots in Figure 10-2 below. Table 10-7 exhibits the details of these holes.

Table 10-7: MainSpring Drilling Completed by Bronco Creek Exploration

Drill Hole	Drill Type	Total Depth (ft)	Total Depth (m)	Azimuth	Dip	Deposit
BCE-01	HQ	708	215.8	0	-90	MS
BCE-02	HQ	808.1	246.3	0	-90	MS

Figure 10-2 is a map showing the location of ASCU's, IE's, and Bronco Creek's drilling on the Parks/Salyer and Mainspring properties. MainSpring property boundary is included for clarification.



Source ALS GEO Resources, 2024.

Figure 10-2: Map Showing Collar Locations of Parks/Salyer and MainSpring Drilling

10.2 COLLAR SURVEYING

The coordinates for the drill hole collars were determined using a Trimble R8 Model 2 Base and Rover GNSS GPS System, surveyed in Real Time Kinematic. Accuracy for this system is rated to be sub-centimeter. Post processing of baseline vectors are not required on Real Time Kinematic; however, the data processing and preparation for delivery to the client was completed by Harvey Surveying using Trimble Business Center software. The report was delivered in Universal Transverse Mercator (UTM) Zone 12-grid projection with readings measured in metric units. The collar coordinates for the Parks/Salyer drilling used the same equipment and methodology that was used for Cactus East and West.

10.3 DOWNHOLE SURVEYING

All ASCU's diamond drill holes for the Cactus Project, including vertical drill holes, have downhole surveys completed by the drill contractor using either a Reflex EZTRAC XTF magnetic survey instrument or a Reflex EZGYRO MEMS gyroscopic survey instrument. The drillers run a check every 500' going down the hole while drilling to check that the hole is on course. The drillers then run a survey every 100' down the hole after completion of drilling and that data is recorded in the database.

All drill holes for the Cactus Stockpile Project were drilled vertically; because the hole depth averaged approximately 80 ft, downhole surveys were not deemed necessary.

10.4 CORE LOGGING AND PHOTOGRAPHY

Core logging was performed in ASCU's core shed at the Project site. Drill core was delivered to the core shed by the drillers at the end of each drill shift. The following preparation and logging processes were performed on the core:

- The core was given a final cleaning.
- Core boxes were marked for identification/verification of footages.
- Core boxes were photographed.
- Point-load testing was performed.
- Geological characteristics of the core such as lithology, copper mineralogy, brecciation, alteration, and oxidation were logged.
- Geotechnical characteristics of the core such as core recovery, rock quality designation (RQD), fracture frequency, and joint types were logged.
- Two holes (one in Cactus West and one in Cactus East) were drilled with oriented core. For these holes, structures were measured for orientation data and the information was logged into the database.
- ASCU has also completed Acoustic Televiewer (ATV) and detailed geotechnical logging on selected holes across the project. To date this work has included three holes at Cactus East, five holes at Cactus West, six holes at Parks/Salyer, and one hole at MainSpring. Additionally, IE provided the ATV and detailed geotechnical logging for six holes they drilled on MainSpring. ASCU has since replaced those geotechnical logs with their own to ensure consistency in the product.

Data logging of all core characteristics is performed digitally on Galaxy S5e tablets that write directly into the cloud-based MX Deposit drill hole database when internet connection is available. When internet connection is not available, holes are locked by the logging geologist who can then log the hole offline. Locking out of the hole ensures two geologists cannot edit the same hole at the same time. Once the internet is available, the logging information is uploaded to the database. In addition to the digital table view of the database for logging, a visual strip log view is used to review logging. Figure 10-3 is a photograph of Cactus core and the tablet used for logging. Note, the visible strip log as data is entered along the hole.

Source: ALS Georesources, 2022.

Figure 10-3: Cactus Drill Core with Logging Tablet

Core sample intervals are determined by the logging geologist based on logging characteristics. Sample interval breaks are determined by geological parameters, but within core containing the same geological characteristics, samples are undertaken on a regular 10 ft sample length.

Each sample interval is defined as follows:

- Sample interval is marked at its beginning in the core box with the interval and a unique sample identification number.
- The sample number is taken from a tag book of sequential sample cards to ensure duplicate samples cannot be produced. The sample tag is stapled into the box at the sample start location.
- A twin sample tag is stapled to a clean sample bag to collect the sample when it is split and then will be sent to the lab.
- Interval information for the hole Identification, and from/to depths is written in the tag book.
- The logging geologist enters the same from/to intervals directly into the sample logging table of MX-Deposit for the drillhole being logged.

All cores sampled were split into two equal portions along the long axis of the core, using either a diamond saw or a hydraulic blade splitter. One half of the split core is placed into the sample bag marked with that sample's unique sample number. The bagged samples are placed in a shipping tote for transport to the analytical lab in Tucson. The other half of the split core is placed back in the core box and is archived in ASCU's secure core storage room located at the Cactus site. Figure 10-4 is a photograph of the rock saw and hydraulic splitter used to split core at the Cactus Project core shed. Figure 10-5 is a photograph comparing a box of sawn core and a box of mechanically split core, permanently stored at the Cactus Project core shed.

Source: ASCU, 2022.

Figure 10-4: Cactus Project's Rock Saw and Hydraulic Splitter

Source: ASCU, 2022.

Figure 10-5: Sawn and Split Core to be Stored

For the Cactus Stockpile Project, sonic drill holes are logged for main material type, lithologies, color, iron oxide minerals, copper minerals, and clast size distribution. Data logging of all characteristics is performed digitally on Galaxy S5e tablets that write directly into the cloud-based MX Deposit drill hole database and use the same lockout version control features as the Cactus Project Deposit logging. Cactus Stockpile Project drill holes are managed in a separate database activity to the Cactus Project deposit drill holes.

All Stockpile Project samples are collected at the drill in plastic tubing at regular 2.5 ft intervals. After logging, each sample interval is placed into a new sample bag with a unique sample number unrelated to drill hole number or drill interval in a manner similar to that described for core samples.

10.5 QUALIFIED PERSON OPINION

The QP reviewed the survey methodology and results of the drill hole location and down hole data for historical and recent drilling on the Cactus Project. The QP also reviewed abnormal grades within the mineralized zone to ensure they were based on visible mineralization.

Individual high grades were dealt with in the capping grades as explained in Section 14.2.7.

The drill recovery has been consistently above 95%, with good control of sample location with the downhole survey program. The QP feels that the drilling results of the in situ mineralized zones and the stockpile resource meets the expected standards and best practices as defined in CIM’s Best Practices Guidelines 2019. The drill hole spacing, and sample location data meets the level of accuracy expected for this PEA report.

11 SAMPLE PREPARATION, ANALYSES AND SECURITY

11.1 SAMPLE SECURITY

Bagged samples with identification tags are placed in large 3 ft square plastic totes which are stored at the core shed which is within the secured mine site away from any point of access. ASCU uses a private contractor to transport the samples totes to the lab. When 8 to 10 totes are filled, the contractor is called to make a pickup. A transmittal sheet is prepared that lists all the samples in the shipment with an assay order sheet for the analysis to be done. A chain of custody sheet is signed by ASCU upon dispatch, signed by Skyline Labs upon arrival, and returned to ASCU to show secure delivery.

11.2 SAMPLE PREPARATION

ASCU has been exclusively using Skyline Assayers and Laboratories (Skyline Labs), in Tucson, Arizona, for their sample preparation and analysis. This lab is independent of ASCU and any of its subsidiaries. This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017, Certificate #2953.01. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system. The QP has visited this lab to review the procedures used for sample preparation, analysis, and the lab's internal quality assurance/quality control (QA/QC) system.

ASCU uses a private contractor to ship samples to the lab in large heavy plastic totes. Upon arrival at the lab, totes are offloaded and stored. When the samples are ready to be processed, the bags are emptied into metal bins and the sample bags with tags placed on top. The bins and bags are placed in an oven at 220ºF (105 ºC) for 24 hours to dry before moving into the lab for processing.

Each sample is crushed in a TM Engineering – Terminator roll crusher to 75% passing ¼ inch. This material is passed through a riffle splitter and mixed three times to ensure homogeneity of the sample. If the sample is multi-colored the sample is re-mixed and split until the color in homogeneous. Three-quarters of the sample is then bagged, labelled, and returned to ASCU as coarse reject. The remaining material is returned to the roll crushers and crushed to 95% passing -10 mesh. A 280-g sample of this material is put in a glass jar sealed, labelled, and returned to ASCU. A 50-gram sample from the same trays as the jarred sample is put in Labtech LM2-P puck pulverizer and run to 95% passing -150 mesh. This sample is placed into labelled heavy paper envelopes and sent to the lab for assay.

At each step after crushing and pulverizing, every 20th sample is tested with a sieve to ensure that it meets requirements. The results of these tests are entered int a log and initialed by the operator. This log is kept up to date and is available for review by senior staff and the project QP.

11.3 SAMPLE ANALYSIS

As a first pass each sample is assayed for CuT. The pulverized samples are received from sample prep and a measured portion of the sample is digested in a mix of hydrochloric acid (HCl), nitric acid (HNO_3), and perchloric acid (HClO4) on a hot plate for 15 minutes to 20 minutes. The sample is left to cool, rinsed with distilled water, and then digested in HCl for an additional 15 minutes on a hot plate. The sample is then cooled and sent to atomic absorption (AA) analysis to return a CuT value.

A sequential acid leach assay procedure is conducted on each sample to support potential heap leaching for metal recovery. These samples are first run using a digestion in 5% sulfuric acid (H_2SO_4) for 1 hour on a shaker table, then 15 minutes in a centrifuge before the liquid is transferred to a 250 ml flask. The residue is rinsed, and that liquid is used to top up the flask. The flask is sent to the assay lab for AA analysis to return an ASCu value.

The residue from the centrifuge is then digested in 10% sodium cyanide (NaCN) for 30 minutes on a shaker table. After 15 minutes in the centrifuge, the liquid portion is transferred to a flask and the residue is rinsed and that liquid is used to top off the flask. That sample is sent to the assay lab for AA analysis to return a CuCN value. The remaining pulverized sample in the heavy paper envelope is returned to ASCU together with the coarse reject.

11.4 LAB QUALITY ASSURANCE/QUALITY CONTROL

Skyline Labs is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. Their quality management system has been certified as conforming to the requirements defined in the International Standard ISO 9001:2015. The standard operating procedure (SOP) used while processing the ASCU samples is to process samples in groups of 24. Each tray consisted of 20 samples with samples No. 1 and No. 10 repeated as duplicates. Additionally, Skyline adds two prepared standards to check for accuracy. The results from each tray are analyzed and any variance in the duplicates or standards of more than 3% would result in the entire tray being re-assayed.

The results of these analyses, including the QA/QC checks, are transmitted to a select set of individuals at ASCU and the QP.

11.5 QUALIFIED PERSON OPINION

The QP for Section 11 has reviewed the assay lab's procedures and QA/QC results in detail and finds that it meets all the expected standards and best practices as defined in CIM's Best Practices Guidelines 2019. The assay results and associated data meets the level of accuracy expected for this PEA report.

The QP revisited Skyline lab facilities in December of 2023. The purpose of this visit was two-fold. Firstly, to review all procedures described above to ensure that there have not been any material changes since previous visits. No real changes were noted and if anything, the overall process seemed more streamlined and cleaner. Additionally, the QP asked the managers of the sample prep and analytical departments about the handling of IE's samples from their Santa Cruz project. Like ASCU, IE uses Skyline Labs in Tucson exclusively for analysis of exploration core from their Santa Cruz project, which neighbors ASCU's Cactus project. Recently, ASCU acquired physical drill core, assay records, and associated data from IE. After this most recent visit the QP feels that the assay data received by ASCU is cleared to be mixed with ASCU's assay database and used for resource estimates.

12 DATA VERIFICATION

A significant portion of the Cactus drilling database was rebuilt from historical drilling logs and assay certificates from exploration work undertaken by ASARCO. Since 2019, ASCU has drilled 86 new holes at the Project to support verification, metallurgical testing, and resource extension for the new Cactus mineral resource estimate. The Parks/Salyer resource database holes are composed primarily of 100 new holes drilled by ASCU between 2021 and 2024. There were only four historical holes supporting the Parks/Salyer resource estimate. Recently, ASCU acquired the MainSpring property immediately south of the Parks/Salyer claims. Since acquisition ASCU has drilled 37 holes on the property. Prior to acquisition IE had drilled 22 holes on the property. ASCU has acquired the physical core and all associated data, including assays and assay certificates for these holes. Also, within the MainSpring property boundaries there are two holes drilled by Bronco Creek Exploration Inc. of Tucson, Arizona, a wholly owned subsidiary of EMX Royalties Corp. ASCU has the physical core and all associated data, including assays and assay certificates for these holes.

12.1 HISTORICAL ASARCO EXPLORATION DATA

Two core sheds (Figure 12-1) were located at the Project that stored the historical drill core and sample pulps from ASARCO's exploration programs. This physical data verified the historical data quality and its use in the new mineral resource statement. While modern assay QA/QC procedures have evolved significantly, there is evidence in the historical records that ASARCO was using best practices of the day. In addition to these procedures, ASARCO ran a series of pulp duplicate checks against their regular laboratories to test assay quality.

Specific data verification work undertaken by ASCU for the historical drill holes included the following:

- Verification of the collar locations.
- Reinstatement of downhole survey data drilled into the Cactus East deposit.
- Verification of drill hole locations and geological interpretations against historical cross sections and pit maps.
- Relogging of historical drill hole lithology, copper mineral zones, and alteration.
- Re-assaying of historical pulp samples to compare CuT grades and establish soluble copper contents confirming expected copper mineral zones and leachable copper mineralogies.

Source: ASCU, 2022.

Figure 12-1: Onsite Core Shed with Historical Core and Pulps

12.2 HISTORICAL COLLAR LOCATIONS

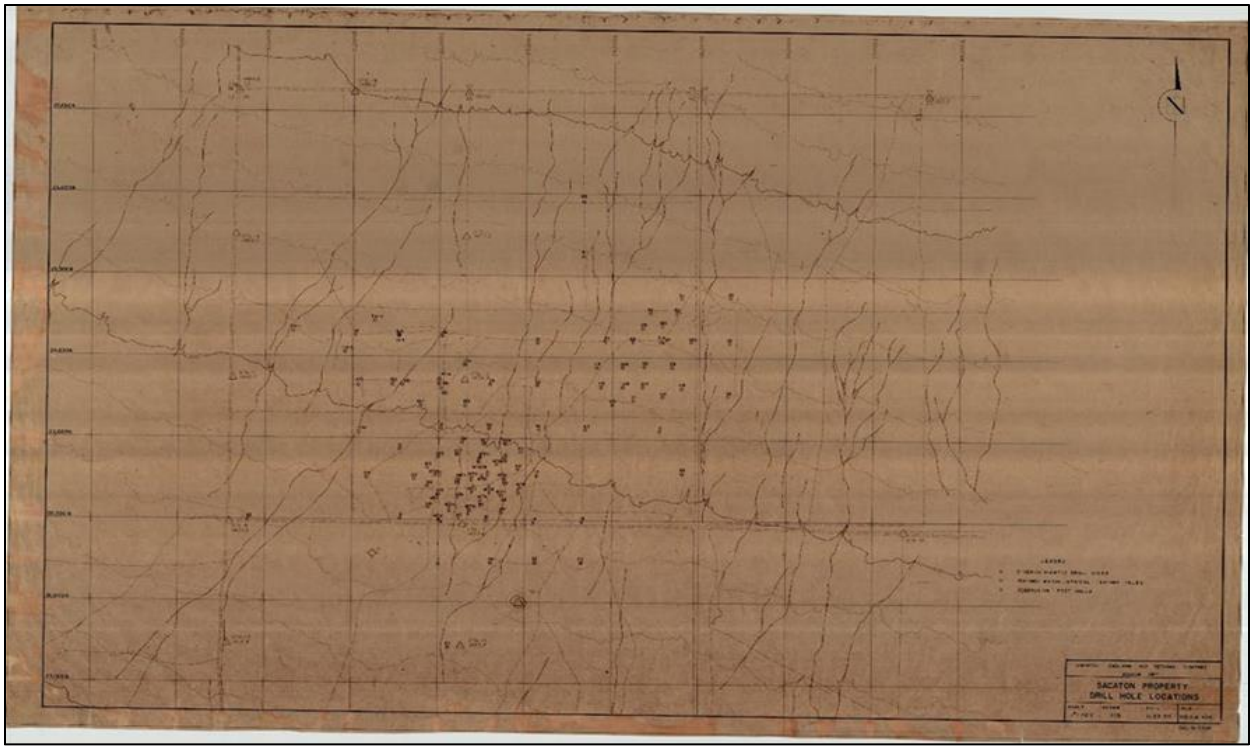
Historical collar locations were verified through the identification of historical survey control and field survey pickup. A final ASARCO control document entitled Sacaton – Drill Hole Files and Information produced in 1998 by Bret S. Canale was located. A page from this document detailed the final collar survey coordinates for all Sacaton drill holes and the aerial control survey points for the property (Table 12-1). The coordinates were specified in two local grids: the Santa

Cruz coordinate system and the Sacaton coordinate system. The Sacaton coordinate system was used for all drilling and mapping information related to the Cactus deposits. In addition to this document, a survey control map (Figure 12-2) was located at site that detailed the location of the historical drill holes and survey control points spatially and in conjunction with site locations such as land sections and the discovery outcrop. From this information, new survey control could be established from the known historical locations in the field to tie the historical local grid coordinates to a modern grid system.

Table 12-1: Survey Control Points Reported in the Sacaton Coordinate System

Sacaton Aerial Control Survey Points (Santa Cruz and Sacaton Coordinate Systems)					
Point	SC Coordinates		SAC Coordinates		Elevation
	North	East	North	East	
EPNG	74531.48	75292.07	13854.48	27634.07	1375.70
NW26	87927.37	67342.53	27250.37	19684.53	1494.60
NW27	87939.34	62020.02	27262.34	14362.02	1458.20
S1/4, 23-26	87914.55	69986.19	27237.55	22328.19	1501.60
S1/4, 24-25	87896.00	75289.69	27219.00	27631.69	1521.50
ST-1	86153.25	69970.84	25476.25	22312.84	1477.20
ST-2	84394.09	69955.02	23717.09	22297.02	1458.90
ST-3	82636.49	69938.42	21959.49	22280.42	1437.40
ST-4	81137.84	69925.26	20460.84	22267.26	1423.30
ST-5	81151.31	67225.64	20474.31	19567.64	1413.50
ST-6	82648.26	67249.65	21971.26	19591.65	1427.90
ST-7	84408.50	67283.70	23731.50	19625.70	1446.70
ST-8	86168.19	67313.65	25491.19	19655.65	1468.00
ST-9	87915.70	68664.83	27238.70	21006.83	1499.60
ST-10	82680.06	62049.26	22003.06	14391.26	1408.50
ST-11	74556.21	61913.04	13879.21	14255.04	1340.00
ST-12	74553.97	68554.80	13876.97	20896.80	1361.70
ST-13	82555.18	75016.98	21878.18	27358.98	-
TRI-1	81669.50	70588.64	20992.50	22930.64	-

Source: ASARCO, 1970.



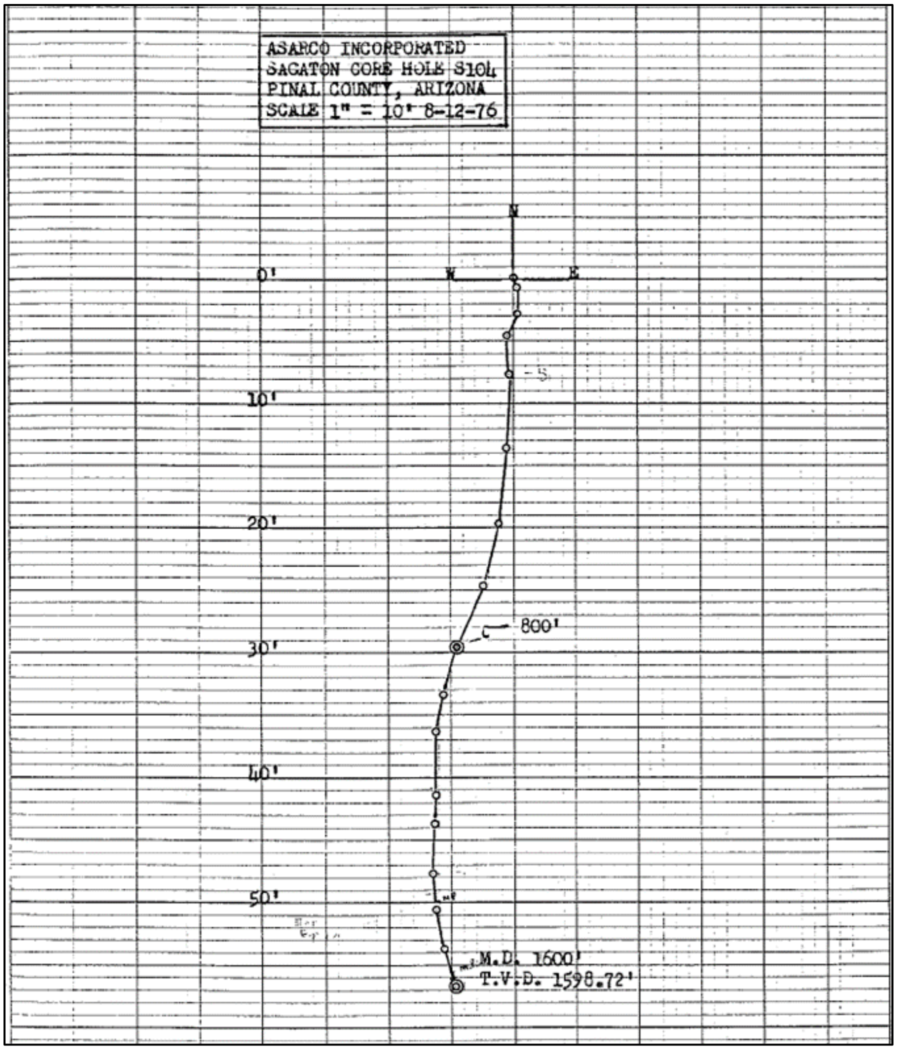
Source: ASARCO, 1970.

Figure 12-2: 1970 Survey Control Map

As a cross validation of this work, historical drill hole collars were located in the field and their collars were surveyed by differential GPS (DGPS). There were holes which could not have their collar surveys checked due to their location being within the mined pit extents or under alluvium dumps. The consistency of the field collar locations and historical collar coordinates for those that could be located, and consistency of historical drill hole locations against historical cross sections and pit maps, confirmed that collars that could not be verified in the field, are correctly spatially located.

12.2.1 Historical Downhole Survey Data

Historically, ASARCO had a policy of drilling a pre-collar for each hole drilling through the alluvium and barren conglomerates with a rotary drill, then switching to a diamond drill rig to finish the hole. In the Cactus East deposit, deep vertical holes were drilled. In some cases, the holes deviated significantly as a function of the rotary drilled pre-collar, the depth, and local drilling conditions. The downhole survey data was plotted on downhole survey plots (Figure 12-3). Using Vulcan software, the plots could be remapped into 3D and the downhole survey data reinstated. From these strings, downhole surveys were created so that the drill holes were plotted correctly in three dimensions. Holes were then compared against historical cross sections to confirm downhole survey data had been reinstated correctly. The following holes from Cactus East contained historical downhole surveys – S-49, S-98, S-99, S-104, S-108, S-113, S-118, S-121, S-123, S-137, S-138, S-139, S-140, S-142, S-145, S-146, S-147, and S-149. All other historical holes within Cactus East and all historical holes within Cactus West were drilled vertically and contain no downhole surveys.

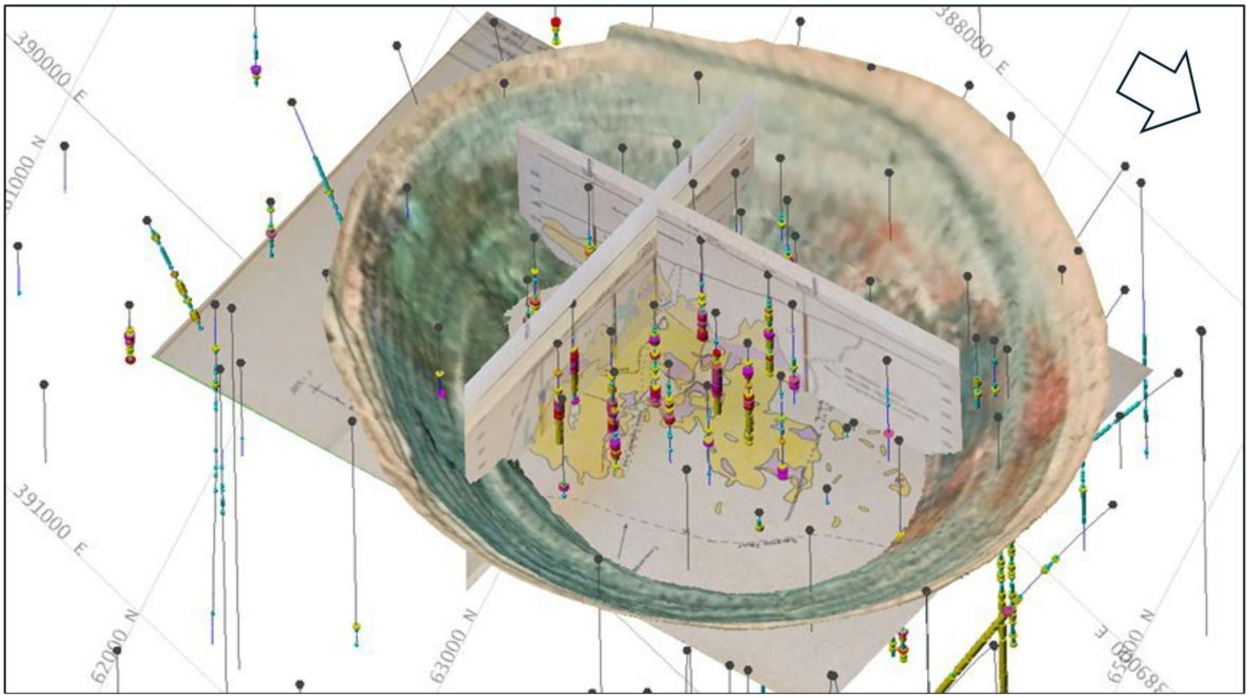


Source: ASCU, 2020.

Figure 12-3: Example Downhole Survey Plot for Hole S-104

12.2.2 Comparison Against Historical Maps

ASARCO compiled a dataset of maps and cross sections to interpret the geology of the Cactus deposits. This information provided support to the verification of historical drilling information, fault interpretation, and copper mineral zonation modelling (Figure 12-4). The consistency of independent datasets to correlate with one another and the in-pit geology that can be observed in the field, provided verification that data were well located spatially and supported the deposit style and characteristics. The addition of ASCU's 86 modern drill holes provided further confirmation that the geological model, historical data, and modern data were consistent with one another.



Source: ASCU, 2020.

Figure 12-4: Three-Dimensional View of the Cactus West Pit, Facing Southwest

12.2.3 Relogging of Historical Core

ASCU used the MX-Deposit drill hole database software to relog historical drill holes within the Cactus West, Cactus East, and Parks/Salyer deposits. Holes were logged digitally on a tablet, directly into the drill hole database, or where internet connection was not available, onto the tablet for later uploading to the drill hole database. Holes being logged are locked when offline, so two people cannot log the same drill hole at the same time. There were two objectives to the relogging effort of historical drill holes:

1. To re-instate logging of drill holes where historical drill core exists, but no historical log was present.
2. To re-log historical holes to ensure consistency of the logging process.

The logging processes used by ASARCO historically were very similar to the logging processes used by ASCU. Areas of focus in the geological logging were lithology, copper mineral zone, alteration, and oxidation. Where historical and modern logs were undertaken, there was consistency between the two sets of logs, particularly for the critical areas with respect to resource modelling and metallurgy such as the copper mineral zones.

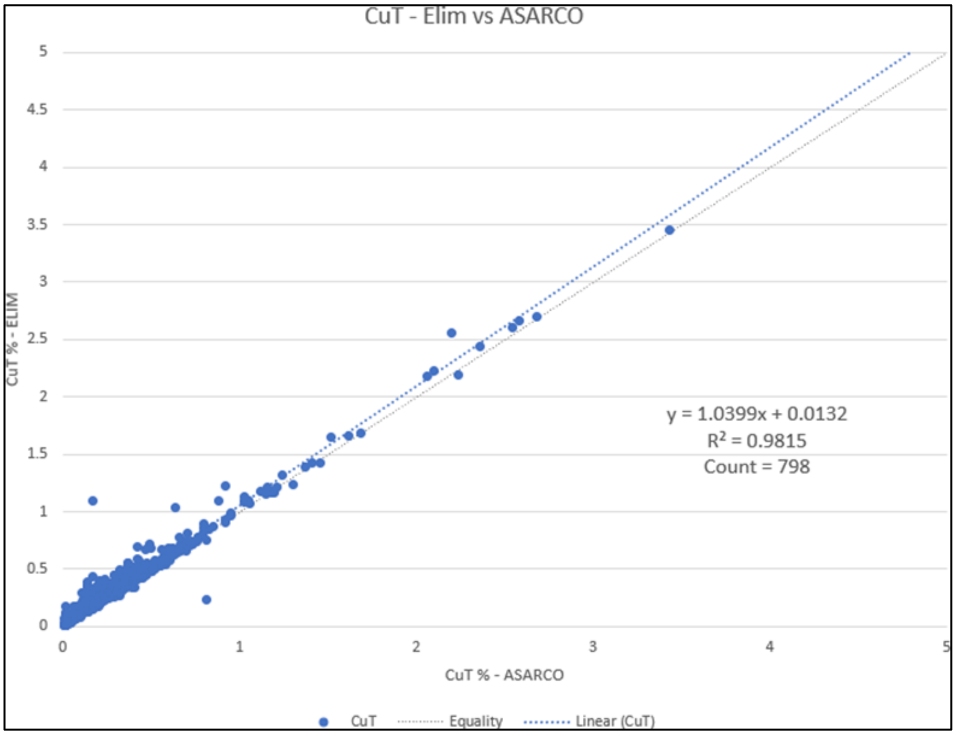
12.3 RE-ASSAYING OF HISTORICAL PULPS

The historical core and pulp samples provided the opportunity to verify the historical assay results as follows:

- Historical pulps were re-assayed to enable comparison of the CuT assays against the historical CuT assay results. In some cases, where historical assays did not exist, the re-assays provided the opportunity to reinstate this data.
- Historical pulps were re-assayed with sequential copper analyses to measure the TSol copper present representing oxides and supergene sulfides. In addition to TSol copper, sequential assays for acid soluble and cyanide soluble results supported the determination of the copper mineral zones into oxide, enriched, and primary.

- Historical core was re-assayed where historical pulps were not present, or where core had not been historically sampled. This occurred rarely but did occur in oxide zones due to ASARCO's focus on sulfide zones to support mill flotation.

There were 798 re-sampled pulps to compare against the historical ASARCO assay results for CuT. The scatter plot in Figure 12-5 shows this comparison and confirms a strong correlation between historical CuT assays and modern re-assays of the pulps (correlation coefficient = 0.98). This supports the use of historical assays in the new mineral resource estimate.



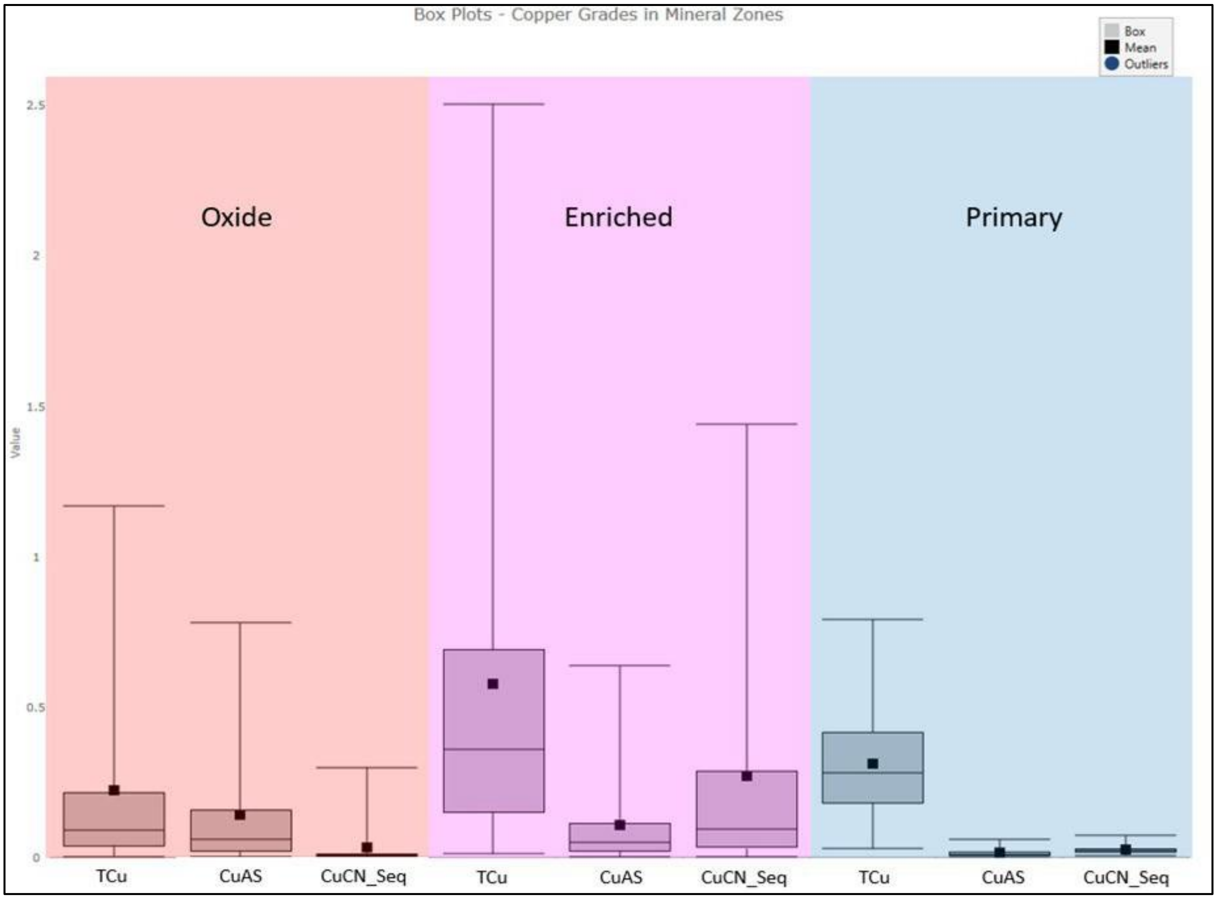
Note: Three-Dimensional View of the Cactus West Pit, Facing Southwest. Source: ASCU, 2022.

Figure 12-5: Historical ASARCO Total Copper Grades against Modern Arizona Sonoran Pulp Re-Assays

ASARCO did not undertake the same level of QA/QC with blanks, standards, and duplicates compared to current industry best practices. However, there is evidence in the historical records of significant pulp duplicate analysis and comparison work being undertaken.

ASARCO's procedures and assaying methodologies would have been considered industry best practice for that time in that deposit style.

The addition of the re-assay dataset, inclusive of sequential copper acid soluble and cyanide soluble assay results, provided a check against the modelling of the copper mineral zones to ensure mixing of mineral types or the presence of significant transition zones of mixed mineral types was understood. Figure 12-6 shows box plots of the main copper mineral zones and the makeup of the soluble copper distributions within them. The results support the logging, that mineral zones mostly transition rapidly and that there are not considerable zones of transitional or mixed mineralogies.



Source: ASCU, 2022.

Figure 12-6: Box Plots for the Copper Mineral Zones

In the oxide zones, the CuT is mostly made up of ASCu grade as expected due to the presence of highly soluble oxide minerals. In the enriched copper zones, the CuT is mostly made up of cyanide soluble copper grade (CuCN-Seq) as expected due to the presence of chalcocite and covellite supergene enriched sulfides. In the primary zones, the CuT is not made up of either of the soluble copper grades as expected due to the presence of low solubility chalcopyrite. This provides verification of the logging and modelling of the copper mineral zones with historical and modern drill holes.

12.4 RECENT DRILLING

For the 86 new Cactus drill holes, 100 new Parks/Salyer drillholes, 79 MainSpring new drill holes, and 511 new Stockpile Project drill holes undertaken by ASCU since 2019, physical checks on collar location, downhole survey, and logging have been completed by the QP on several recorded site visits.

12.4.1 Collar Location Checks

Collar locations were picked up in the field by DGPS and the coordinates imported into the MX-Deposit drill hole database by CSV file. Collar coordinates were independently field checked by the QP on site visits at the end of the drilling programs to ensure surveyed collar coordinates matched their field locations. Visual inspection by the QP confirmed that the drill holes were located as shown in the drilling database. This was also confirmed with a handheld GPS.

12.4.2 Downhole Surveys

All modern drill holes, regardless of the drill angle or depth, are surveyed with a Reflex EZTrac XTR instrument for their downhole deviation. Downhole surveys were reviewed by the QP against the designed survey and in the field for the collar survey orientation. A review of the downhole survey data for a few of the early holes drilled in Arizona Sonoran's 2019/2020 drill campaign revealed that magnetic declination had been improperly applied. This was fixed in the affected holes. The entire database was reviewed to ensure that the error did not occur elsewhere. The database was found to be correct.

12.4.3 Core Logging

All modern drill holes are logged for lithology, copper minerals and mineralization, alteration, oxidation, brecciation, and geotechnical attributes. Logging is viewed in three-dimensional software to confirm consistency with surrounding drilling and the geological interpretation.

Once assays are attained, results are compared back against the logged copper mineral zones to ensure consistency and as continuous improvement of the logging process.

The QP reviewed specifically requested drill holes to confirm logging and assays against the physical core. Several pseudo-random drill holes were selected, from each drill campaign, to check notable oddities in each. Visual inspection of these intervals confirmed the logging notes and assay certificates confirmed grade related inspections.

All the pseudo-random checks of drilling showed compliance with logging.

12.4.4 Drill Hole Database Checks

In addition to validation checks performed in the MX Deposit drill hole database, specific drill hole database checks are undertaken on the Vulcan ISIS drill hole database to be used for the resource estimate. Checks that were undertaken and passed were as follows:

- All drill hole collars had a unique collar location.
- No collar end of hole depth was less than individual intercept depths logged within the hole.
- There were no overlapping from/to intervals in any table.
- All fields (including depths) that should increase between records were increasing.
- All hole IDs and sample IDs were unique.
- All assay grades were within expected tolerance ranges.
- All mandatory critical fields were populated in the database (e.g., easting, northing, elevation, total depth, from, to, azimuth, dip, and assay values).

12.5 SAMPLE QUALITY ASSURANCE/QUALITY CONTROL

For the new Cactus drill holes, Parks/Salyer, MainSpring, and 511 Cactus Stockpile Project drill holes undertaken by Arizona Sonoran since 2019, and the re-assay program undertaken on historical pulps, a modern QA/QC program was undertaken composed of duplicates, blanks, and standards. Pulp duplicates were discussed earlier with respect to historical pulp samples and will feature in future programs on modern pulp samples.

12.5.1 Standards

The primary purpose for the insertion of standards into the sample stream is to check the accuracy of results returned from the lab. Any deviation above 2 standard deviations lead to an inquiry with the lab which may result in re-assay of the and neighboring sample. Site-specific standards were created from onsite samples. The following standards were created, with the specific purpose of characterizing the mineral and grade characteristics of the Cactus and Parks/Salyer deposits. Table 12-2 shows the standards in use and the certified results attained from independent round robin testing for CuT grade.

The main standards created are as follows:

- R-Blank – unmineralized rhyolite blank acting as a waste standard.
- OX-1 – oxide standard.
- EN-H, EN-M, EN-L – enriched standards of high, medium, and low grades.
- PR-H, PR-M, PR-L – primary standards of high, medium, and low grades.

Table 12-2: Arizona Sonoran Drilling Program Standards and Certified Values

CRM Code	Sample Decomposition	Analytical Method	Element	Unit	Certified Values	Standard Deviation	95% Confidence	Minimum Value	Maximum Value
R-Blank	AD	ICP	CuT	%				0	0.015
OX-1	AD	ICP	CuT	%	0.725	0.043	0.173	0.683	0.818
EN-H	AD	ICP	CuT	%	1.958	0.074	0.295	1.72	2.109
EN-M	AD	ICP	CuT	%	0.978	0.021	0.082	0.9613	1.02
EN-L	AD	ICP	CuT	%	0.417	0.018	0.073	0.388	0.465
PR-H	AD	ICP	CuT	%	0.787	0.055	0.221	0.675	0.911
PR-M	AD	ICP	CuT	%	0.52	0.025	0.099	0.475	0.579
PR-L	AD	ICP	CuT	%	0.336	0.016	0.066	0.304	0.384

Source: ASCU, 2022.

Standards were inserted into the sample stream to test for precision of the lab to replicate an expected assay value. Standards were inserted in the sample stream at a rate of 1 per 20 samples or 5%.

12.5.2 Blanks

The primary purpose of the insertion of prepared blanks into the sample stream is to check the sample prep portion of the assay process. Blanks that return anything other than a zero assay indicate that the sample was contaminated during sample prep with material from previous samples. Blanks were inserted into the sample stream at a rate of 1 per 20 samples or 5%, to test the sample preparation process.

Two blanks were used:

- R-Blank – an unmineralized rhyolite blank.
- MEG-Blank – an unmineralized blank.

The assay results for these duplicates, blanks, and standards are returned with the actual core samples sent to the lab. The identification of these “special” samples is known only to ASCU staff. Each is plotted on graphs and charts to check for compliance with expected results. Any deviation of a sample above 2 standard deviations, or recognition of a pattern of inaccurate results leads to an inquiry with the lab, and potential re-assay of samples.

Skyline Assayers and Laboratories has its own internal QA/QC program, the results of which are made available to the client and project QP.

12.6 QUALIFIED PERSON OPINION

During early visits to the mine site and core sheds, the QP worked with the geologists to select a number of pulps from historical core and requested that they be sent to Skyline labs to compare results with historical assay records and certificates. These data were analyzed and verified by the QP as an independent check of the assaying controls and procedures used by the assay lab and core samplers. Particular attention was paid to the QA/QC records for this group of samples both internal to the lab and the blanks, duplicates, and standards submitted by ASCU.

The QP for Section 12 has reviewed all the associated data in detail and finds that it meets all the expected standards and best practices as defined in CIM's Best Practices Guidelines 2019. The drill results and associated data meet the level of accuracy expected for this PEA report.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 METALLURGICAL TESTING OVERVIEW

The metallurgical studies and testing for the Cactus Project have been ongoing since late 2019. The testing was conducted in four phases through the current information completed in 2023. This section discusses the metallurgical test work completed for the Cactus Project in 2023 and identifies previous test work used as a basis for the current process design

Arizona Sonoran geologists worked with metallurgical engineers to quantify the recovery of copper from samples obtained in a series of large drilling campaigns used in the previous testwork. The drill core samples were studied by geologists and subsequently shipped to a well-established mineral processing research and development firm in Reno, Nevada (McClelland Analytical Service Laboratory (McClelland), an ISO 9000, ISO 17025 accredited facility). Additional test work was completed on-site by ASCU staff and at HydroGeoSense Inc. (HGS) laboratories in Tucson, Arizona. The metallurgical test program completed at McClelland for the 2024 PFS study was developed and supervised by Mr. James L. Sorensen. Mr. Sorensen has also reviewed and inspected the ongoing metallurgical testing at site and information developed by HGS. A summary of the various testing programs completed for the Cactus project is shown in Table 13-1 and Table 13-2.

Table 13-1: Historical Testing Programs

Year	Source Material	Laboratory	Testwork Performed	Reference Report No.
2020/2021	Stockpile - Oxide	McClelland Laboratories, Inc.	Column Testing, Column Screen Size Analysis, Recovery by Size Fraction	MLI Job No. 4517
2021	Cactus-Sulfide	McClelland Laboratories, Inc.	Preliminary flotation, comminution and work indices/abrasion index	MLI Job No. 4650
2021	Cactus-Sulfide	Hazen Research (reviewed by JK Tech	Preliminary SMC mineral comminution testing	JKTech Job No. 21012/P4
2021	Stockpile/Cactus	Western Environmental Testing Laboratory & ALS Global	TCLP analysis of McLelland test column PLS and Raffinate, residues analysis	21030379 21090879 21120038
2021	Stockpile	HydroGeoSense Inc.	Leach pad hydrodynamic and hydrological column testing	Technical Memo - Final
2022	Stockpile – Oxide	McClelland Laboratories, Inc.	Bottle Roll	MLI Job No. 4600
2022-2023	Cactus - Oxide and Sulfide	McClelland Laboratories, Inc.	Column Testing, Column Screen Size Analysis	MLI Job No. 4631
2022-2023	Stockpile, Cactus oxide and Sulfide	HydroGeoSense Inc.	Cactus Oxide and Sulfide	20076-01-PS-105
2023	Parks/Salyer – Oxide and Sulfide	ASCU Tru-Stone, HydroGeoSense	Column Testing, Head Assay	Note: Column tests done in-house, used by Samuel Engineering

Year	Source Material	Laboratory	Testwork Performed	Reference Report No.
2023-2024	Parks/Salyer – Oxide and Sulfide	Process Mineralogical Testing Ltd.	Rapid Feed Material Characterization, SEM-BSE Imaging	APR2021-06 FEB2022-05 MAR2021-02 NOV2021-05 OCT2021-03
2023	Stockpile	Base Metallurgical Laboratories (BML)	Column Testing, Head Assay	BL1372

Table 13-2: Current Testing Programs

Year	Source Materials	Laboratory	Testwork Performed	Reference Report No.
2024	Parks/Salyer and MainSpring	McClelland Laboratories, Inc.	Column Testing	MLI Job No. 5009
2024	Parks/Salyer Primary Sulfide & Enriched	HydroGeoSense Inc.	Column Permeability	Technical Memorandum June 25, 2024
2024	Cactus Oxide	HydroGeoSense Inc.	Permeability	Technical Memorandum March 5, 2024
2024	Stockpile and Parks/Salyer Sulfide	Base Metallurgical Laboratories (BML)	Column Testing	BL1499

Resources considered for beneficial processing in this Report are related to four sources:

- An existing mine stockpile built during the development and operation of a copper open pit and milling facility from 1974 to 1984. The Stockpile includes oxide and lower grade sulfide.
- Cactus West open pit containing oxide and lower grade sulfide material.
- The underground resource called Cactus East located northeast immediately adjacent to the existing Cactus open pit and at a depth of 1,200 ft. This resource contains mostly lower-grade sulfide material.
- The open pit resource called Parks/Salyer (including MainSpring) located about 1 mile to the southwest of the Cactus West open pit at a depth of 1,500 ft. This resource contains mostly higher-grade secondary and primary copper sulfide material.

The QP believes the metallurgical testing and data collected to date is sufficient to establish the required supporting metallurgical performance expectations used in estimating the project Reserves and economics for the Stockpile, Cactus East, Cactus West and Parks/Salyer deposits included in the Cactus Project. Additional testing is ongoing for the Parks/Salyer deposit.

The mineral resource estimate for the Parks/Salyer Project is described in this report in Section 14. The results and conclusions of the 2024 Cactus PFS are considered current and therefore have been carried over for this report. The material to be processed as part of the Cactus open pit expansion project is an extension of the open pit mining operations by ASARCO that took place in the 1970s and early 1980s. Prior operations considered traditional copper milling and flotation concentration operations to produce copper sulfide concentrates for processing at local smelters.

A copper heap leaching and SX/EW processing facility at Cactus was selected to process oxide and sulfide mineralized material. Mineralized material from Parks/Salyer, Stockpile, Cactus East and Cactus West resources will be processed.

Approximately 45 column tests were completed (Stockpile - 25, Cactus – 14, Parks/Salyer - 6) covering the resources identified in the 2024 PFS. In addition, over 150 bottle roll tests, mineralogical analyses and other metallurgical and materials property testing have been completed.

Based on typical recovery estimates for CuAS and CuCN as provided by a standard sequential copper assay methodology developed at the Skyline Laboratory facility in Tucson, Arizona, projected copper recovery estimates were derived based on leachable copper (Tsol) content from the completed column testing programs and reported in the 2024 PFS. The recovery used in this report is the same as what was defined in the 2024 PFS.

Materials with a Tsol grade above the cutoff of 0.095% Tsol but having a CuAS content of less than 80% is classified as sulfide or enriched materials for leaching purposes. Primary mineralization that is not acid or cyanide copper soluble (e.g., chalcopyrite) that reports in the CuT assays is not considered as recoverable metal in the current analysis.

For the current mine plans, the distribution of leachable oxide, enriched, and primary material types is provided in Table 13-3.

Table 13-3: Potential Leach Materials Distribution

Mining Source	Material Type	Tons of Leach Material (tons)	Grade % TSol (% Cu)	Leachable Cu (tons)
Low Grade Stockpile	Oxide	9,791,736	0.202%	19,779
Cactus West plus Parks/Salyer	Oxide	190,727,558	0.221%	421,508
Cactus East Underground	Enriched	42,211,231	0.761%	321,227
Cactus West plus Parks/Salyer	Enriched	416,217,938	0.502%	2,089,380
Total	**Oxide & Enriched**	**658,948,463**	**0.433%**	**2,851,894**
	Primary	230,055,034	0.348%	320,237
Total Combined	**Oxide, Enriched & Primary**	**889,003,605**		**6,024,025**

Source : ASCU PEA – v1D Plan – 2024-06-21.xlsx

13.2 DISCLOSURE

The test work completed to date is appropriate for this level of study but more test work on a larger suite of samples taken from across the mineralization is required for the next level of study.

There is no relationship between the analytical laboratories and the issuer of this report.

Laurie Tahija, (Bsc Mineral Processing Engineering, MMSA-QP) was not directly involved in the collection of samples used for testing for the study but undertook a review of all tests relied upon for the purpose of the 2024 PEA.

13.3 HISTORICAL PROCESSING AND MINERALOGICAL INFORMATION

A summary of all known metallurgical test work, for Cactus, prior to 2024, was presented in the 2024 Cactus Mine Project, NI 43 101 Technical Report and Pre-feasibility Study, Arizona, United States of America-(2024 PFS) prepared for ASCU. Historical test work is summarized in this section of the report. Reports were issued with all results at the completion of all programs. Current test work completed in support of the PEA is discussed in this section.

The Sacaton Mine, now renamed Cactus Mine, mined and processed primarily secondary sulfide material between 1972 and 1984. During the years of operation ASARCO mined material from the Sacaton West open pit orebody. Oxidized material from the East Sacaton ore body was tested and considered an in-place leaching operation by ASARCO. A summary of the historical operating data and test results on oxidized material is listed in the 2024 PFS report.

13.3.1 Metallurgical Sample Selection

The QP believes that the samples used for testing for Stockpile, Cactus West, Cactus East, and Parks/Salyer for the 2024 PFS were sufficient for the level of study. Details can be found in the 2024 PFS.

13.3.2 Project Material Testing

The tons of material from the stockpile used in the mine plan for this study have been reduced from 76 million per the 2024 PFS to less than 10 million. The conversion of Parks/Salyer to open pit from underground resulted in a significant increase in tons of material being processed in this study. Cactus East and Cactus West have slightly increased tons of material being processed in this study.

No additional testing was completed for this study, recoveries are assumed to be the same for the oxide and enriched material as used in the 2024 PFS.

13.3.3 Hydro-Metallurgical Testwork

Prior work can be found here:

- Cactus Open Pit data was previously summarized in the 2021 PEA and the 2024 PFS.
- Sample Characterization data was previously summarized in the 2021 PEA and the 2024 PFS.
- Mineralogy work by Process Mineralogical Testing Ltd. can be found in the 2024 PFS.
- Bottle roll test results can be found in the 2024 PFS.

13.3.4 Sulfuric Acid Consumption

Historically, ASARCO testing in 1968 suggested a gross acid consumption of approximately 20.8 lb/t for the Sacaton West fresh core material. The gross sulfuric acid consumption used in the 2024 PFS was based on individual feed material types and was 22 lb/t of material processed on a weighted basis for Stockpile, Cactus East and Cactus West material.

The gross sulfuric acid consumption used in the 2024 PFS for the enriched material was 21 lb/t of material processed.

13.4 CURRENT TESTWORK

13.4.1 Stacking and Dissolution Tests

Additional stacking and dissolution test work was done by HGS on material from the Cactus deposit. Samples used for testing were to reflect an average grade of the Cactus deposit and included granitic secondary sulfide material. Samples were taken from the onsite column tests labeled as column 7 and 9 (C7 and C9) and blended to target a total copper grade of 1.0% to represent the average grade of the Cactus pit.

The objective of the tests was to evaluate the effect of size reduction on initial copper extraction and evaluate the effect of sample preparation (e.g. increased iron, addition of concentrated acid during agglomeration, cure time and forced aeration) on copper extraction. Two (2) tests were conducted on material crushed to a top size of P100 32 mm

(1.25 inch) to represent the Base Case design. In addition, three (3) tests were done at crush top size of 12.7 mm (0.5 inch). Samples for these three tests were a blend from both column 7 and 9 (33 to 67 blend). The tests using the Base Case design were done to simulate a height of 64 meters and the tests done at the finer cush size were done to simulate a single 8-meter lift. The samples for these tests were also agglomerated. A summary of the test condition is shown in Table 13-4 below.

Table 13-4: Summary of Test Conditions

Sample ID	Crush Size (mm)	Solution Acidity (g/L)	Fe 3+ in Solution (g/L)	Conc. Acid Cure (kg/t)	Cure Time (day)	Heap Height (m)	Forced Aeration
C7-1.25-7.5-0-1c-64m-L2	32	7.5	-	0.0	1	64	No
C9-1.25-7.5-0-1c-64m-L2	32	5.0	-	0.0	1	64	No
C7&C9g-0.5-7.5-0-1c-8m-L2	12.7	7.5	-	0.0	1	8	No
C7&C9g-0.5-7.5-0-1c-8m-L2	12.7	7.5	1.8	3.0	5	8	Yes
C7&C9g-0.5-7.5-0-1c-8m-L2	12.7	7.5	1.8	5.0	8	8	Yes

Stacking test results for the samples with a top size of 32 mm (1.5 inch) indicated the density to be 1.85 t/m^3 and 1.76 t/m^3 for column 7 and column 9 respectively at heap leach height of 64 meters (210 ft). Based on these results, it was decided to crush the three blended samples to P100 of 12.7 mm (0.5 inch) to evaluate the effect of the top size on the hydrodynamic and metallurgical response of the feed material under a lift height of 8 meters (26 ft). The maximum density for these samples at an 8-meter lift was 1.56 t/m^3. All samples, except for test on Column 7 (P100 32 mm), maintained a total porosity greater than 30% which is the minimum porosity to efficiently support a leaching process. The density and porosity profiles obtained from the stacking tests are shown in Figure 13-1.

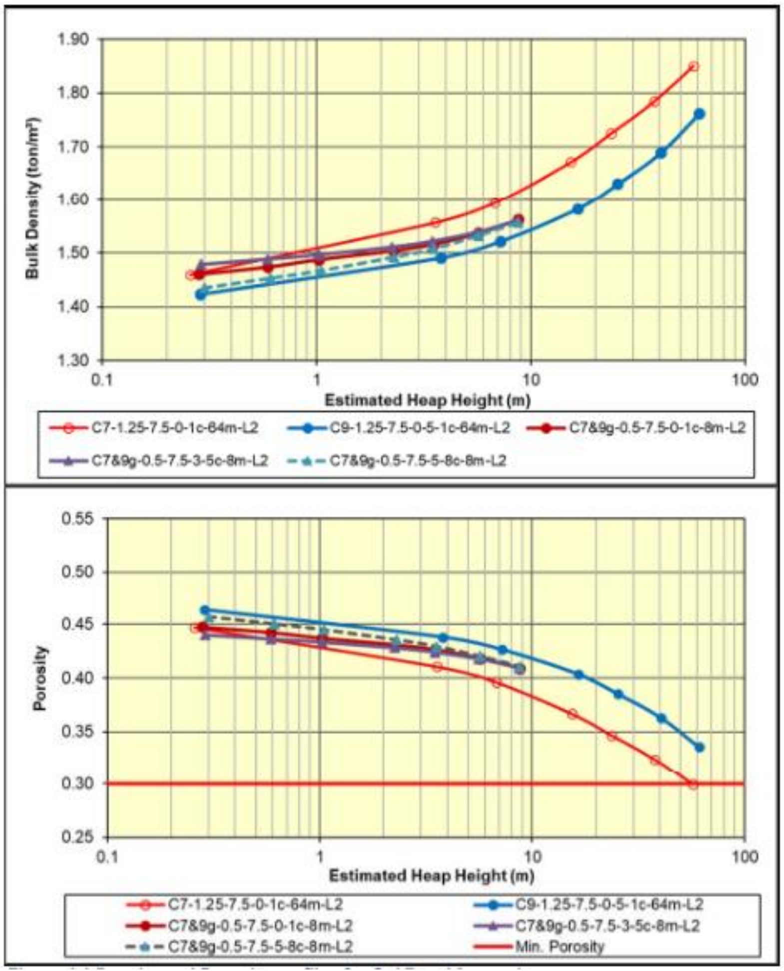


Figure 13-1: Bulk Density and Porosity Profiles

Conductivity profiles and porosity partitioning were evaluated for the five samples. A comparison of the hydraulic conductivity targeting an application rate of 6 L/h/m2 at different heap heights was done for the samples at the two different top sizes. Results showed the samples at the coarser top size (32 mm) having sufficient percolation capacity at the application tested. The percolation capacity for the samples with a top size of 12.7 mm was six times less at a heap height of 10 meters (33 ft). To help evaluate the percolation of the samples, the porosity is evaluated by micro and macro-porosity components. The macro-porosity for samples with a top size of 32 mm (1.5 inch) ranged between 67% and 74% total porosity. The macro-porosity for the samples at a top size of 12.7 mm (0.5 inch) range between 62% and 65% total porosity. Figure 13-2 are the conductivity profile and the porosity partitioning from the stacking tests results.

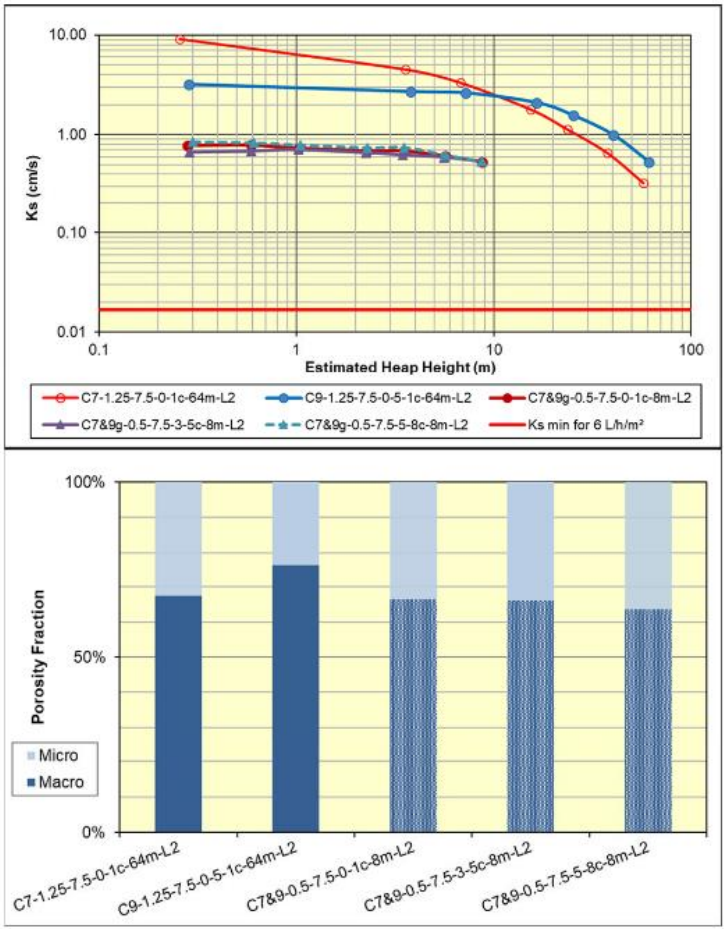


Figure 13-2: Conductivity Profile and Porosity Partitioning

Initial dissolution tests (IDT) were done on five (5) samples to determine initial extraction, initial dissolution and acid consumption. The results of these tests give an indication of the effect of the test conditions such as cure dosage, cure time, forced aeration and percolating solution on the rate and level of extraction of the first few days of the leach cycle.

13.4.2 Ongoing Testwork Excluded

Currently there are column leach tests being conducted by Base Met and McClelland laboratories. Tests are estimated to be complete at the end of the year.

13.5 CONCENTRATOR OPPORTUNITY SCOPING

13.5.1 Introduction

ASARCO processed primary sulfide material through a conventional flotation concentrator between 1974 and 1984. Due to the historical operations, a conventional flotation concentrator was evaluated in the 2024 PFS. The evaluation included scoping level comminution and flotation test work on material from recent drill hole samples taken from the Cactus East resource. The copper concentrator opportunity and test results are summarized in the 2024 PFS report.

13.6 RESULTS SUMMARY AND CONCLUSIONS

The QP believes the metallurgical testing and data collected to date is sufficient to establish the required supporting metallurgical performance expectations used in estimating the project Reserves and economics for the Stockpile, Cactus East, Cactus West and Parks/Salyer deposits included in the Cactus Project. However, only a small amount of metallurgical testing has been completed for the Parks/Salyer deposit and additional confirmatory work is required to better understand the deposit variability.

13.6.1 Metallurgical Performance Recommendations

The Cactus heap leaching process design includes crushing of all material types for leaching to a minus ¾” P_{80} size. All material types, oxides, enriched, and primary are expected to be leached in a single pad with an initial leaching cycle of 180 days. A maximum 3-year leaching cycle has been assumed (3 lifts) as the practical limit for effective recovery based on experience and hydrodynamic analysis of the materials by HGS. The copper leaching metallurgical test data has been extrapolated from the testing data at one year based on the rates prevailing after one year using a logarithmic curve fit projection that considers the decaying rate of copper extraction.

Based on the above, the recommended copper extraction estimates for use in this PEA study for evaluating the Cactus Project resources is presented in Table 13-5.

Table 13-5: Copper Recovery by Sequential Assay Fraction

Resource Area	Units	Value
Stockpile Heap Leach (3/4" Crush)		
Acid Soluble Copper Recovery	%	87.7
Cyanide Soluble Copper Recovery	%	84.5
Oxide Heap (3/4" Crush)		
Acid Soluble Copper Recovery	%	93.1
Cyanide Soluble Copper Recovery	%	84.5
Enriched Heap Leach (3/4" Crush)		
Acid Soluble Copper Recovery	%	91.2
Cyanide Soluble Copper Recovery	%	84.5
Primary Heap Leach (3/4” Crush)		
Total Copper Recovery in Primary Material	%	25

Applying these recovery criteria to the mine plan V1D, the calculated overall soluble copper (Tsol) recovery to cathodes is 86% and the corresponding total copper recovery (TCu) is 73% for the resources contained in the mine plan.

Scalability has been considered by employing a 95% extraction efficiency factor to both the CuAS and CuCN average column copper extractions achieved to date, allowing for inefficiencies in the leach solution flows and heap operations. The recommended copper recovery projections include this efficiency factor applied to the extraction obtained from the column testing.

A production timing has been assigned for each material type corresponding to the material mined in one year and the expected delays in achieving the final recovery values.

The recommended annual distribution of recoverable copper for all feed material types is 65% Year 1, 30% Year 2 and 5% Year 3 for use in the production plan. These factors are intended to account for material placement timing over the course of a year and leach cycle delays in subsequent new lift placements.

Gross acid consumption for this study is assumed to be constant at 22 lb/t for each material type in each deposit. Net acid consumption accounts for acid regenerated in the electrowinning process when copper is plated to product. Net acid consumption per ton of material is dependent on recoverable copper content with a stochiometric conversion of 1.54 tons of acid generated per ton of copper plated in electrowinning.

The LOM Net acid consumption is calculated to be 11.5 lb per ton and varies from 17.7 lb/ton to zero (net acid generating) in a given year. Years with high copper in the PLS will generate acid in the raffinate above the design level of 5 g/L. The acid will be consumed by the gangue in the heap.

Acid consumption is recommended to be considered consumed in the first leach cycle.

13.6.2 Deleterious Elements

Preliminary testing was completed for the 2024 PFS on leach solutions, residues and testwork head samples that do not indicate the presence of constituents that would be deleterious to the proposed process methodology or indicate unexpected environmental impacts. Details of testing are discussed in the 2024 PFS. There has been no additional work completed.

Water chemistry for probable site well make up sources have not been analyzed as part of this work and is recommended for the next phase of study. Prior hydrogeologic characterization completed by Tetra Tech Inc. for the Site Improvement Plan – Sacaton Mine Site, for the ASARCO Multi-State Environmental Custodial Trust (March 11, 2019) indicates water sources may contain natural chloride levels up to approximately 120 ppm which may have an impact on bioleaching if confirmed and not mitigated.

14 MINERAL RESOURCE ESTIMATES

14.1 INTRODUCTION

The Cactus Project resource was estimated in accordance with the CIM Definition Standards for Mineral Resources and Mineral Reserves, adopted by CIM council on November 29, 2019 (CIM 2019). The resource estimates for the Project are composed of three parts:

- Cactus Deposits – in situ Cactus West and Cactus East deposits located adjacent to the historical Sacaton pit. The Cactus West deposit is approximately 4,300 ft (1,300 m) long and 4,300 ft (1,300 m) wide. It averages about 900 ft (275 m) thick and sits near the surface. The deposit is drill limited and open to the southwest and northeast. Cactus East is about 2,600 ft (800 m) long, 3,400 ft (1,000 m) wide, and averages 700 ft (210m) thick. The mineralized zone sits about 1,100 ft (335 m) below the surface. The Mineral Resource estimate includes all drilling, geological logging, and historical mapping completed prior to April 29, 2022, and mining depletion of the historical pit mined by ASARCO between 1972 and 1984.

- Cactus Stockpile Project – a mineralized stockpile generated as the result of waste and low-grade material dumping from the historic Sacaton pit. The stockpile is about 3,900 ft (1,200 m) long, 4,900 ft (1,500 m) wide and is comprised of 3 lifts, each with a maximum of 40’ (12m) height. Material historically considered as waste included all oxide material, sulfide material considered below the mining cut off grade (CoG) of 0.3% total copper (CuT), and sulfide material above the mining CoG but where the oxide component was considered too high. The Mineral Resource estimate includes all drilling, geological logging, historic pit dump information, and topographical updates from rehabilitation work to March 1, 2022.

- Parks/Salyer Deposit – the in-situ Parks/Salyer deposit is located to the SW of the historical Sacaton pit and contains mineralization of a similar nature to Cactus. The defined resource is about 4,000 ft (1,200 m) long, 3,400 ft (1,000 m) wide and averages about 1,280 ft (390 m) thick. The mineralized zone sits about 1,100 ft (335 m) below the surface. This updated mineral resource estimate undertaken for the Parks/Salyer deposit includes all drilling and geological logging completed prior to July 11, 2024.
    - MainSpring Extension – The MainSpring property is a package of 522.9 acres (52,278 ha) that lies immediately south of Parks/Salyer. In February of 2023 ASCU exercised its option and acquired the property. Subsequent drilling has confirmed that MainSpring is an extension of Parks/Slayer mineralization and continues some 3,800 ft (1160 m) south of the Parks/Salyer border, shallowing to nearly 140 ft (45 m) below surface at the southern extent. Drilled mineralization indicates that in this area the deposit is about 3,000 ft (915 m) wide. The mineral resources at MainSpring are being included with Parks/Salyer in resource tabulations.

All data coordinates are presented in NAD 83 ft., Zone 12 truncated to the last six whole digits for easting, and five whole digits for northing. All quantities are given in imperial units unless indicated otherwise. All copper values are presented in percentages.

The copper mineralization at the Project was estimated using Vulcan modelling software. Modelling of the geological domains to support the estimate was undertaken by ASCU personnel. Grade estimates were reviewed and approved by Allan Schappert, Certified Professional Geologist (CPG #11758).

14.2 CACTUS PROJECT DEPOSITS

The Ordinary kriging (OK) method was used for the estimation of copper grades to the models, with the exception of the inferred areas of the Parks/Salyer model where inverse distance (ID^3) was used. Variogram analysis and copper grade estimates were performed on CuT assays and total soluble copper (Tsol) results. Tsol results were performed through sequential analysis of the pulp sample with acid soluble analysis followed by cyanide soluble analysis. Results were then added to one another for Tsol copper. Validations made use of the nearest neighbor (polygonal) method for statistical review and Discrete Gaussian change of support for grade tonnage smoothing checks.

14.2.1 Resource Drill Hole Databased

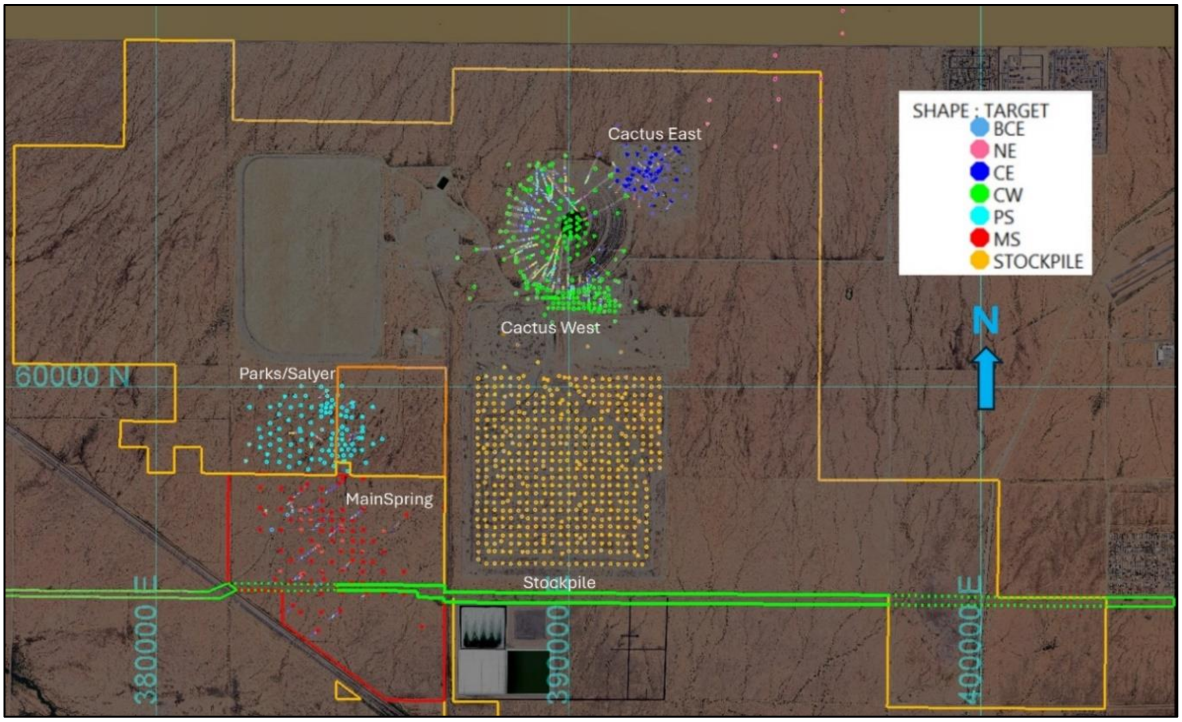
The Cactus Project drill hole databases are managed in MX-Deposit software. CSV format files were exported from MX-Deposit using a resource specific template for the tables required for the resource database. CSV files were imported into a Vulcan ISIS database using a designated resource import LAVA script. The LAVA script and export template ensured the database was loaded consistently each time. The drill hole database used for the Cactus Project resource estimation was called “cacdrilling_mx_resource_20240123.ddh.isis.” The drillhole database used for the Parks/Salyer resource estimation was called “cacdrilling_mx_resource_ps_20240405.ddh.isis.”

Lithology logging was used to build broad lithological zones that control where potential mineralization could occur and the assignment of specific gravity to the model. Mineralization logging, in addition to sequential copper assaying and historical mapping, was used to determine the main copper mineral zones that were fundamental to the estimation domains.

The Cactus and Parks/Salyer drill hole databases can be summarized by the following points:

- The Cactus resource drill hole database contains 360 total holes. This is inclusive of 164 recent drill holes drilled by ASCU since 2019. To support the resource estimate 285 of these holes were drilled into the Cactus Deposits.
- The Parks/Salyer drill hole database contains 103 holes supporting the resource estimate, composed of 100 modern holes drilled by ASCU since 2021 and three historical holes drilled by ASARCO. Additionally, there are 56 diamond drill and 1 rotary drill hole completed by ASCU in the MainSpring Extension. A data swap with IE yielded an additional 22 diamond drill holes in MainSpring.
- Historic drill holes were drilled vertically with rotary pre-collars through the barren cover and diamond tails through the mineralized zones.
- Most historic ASARCO drill holes were not downhole surveyed aside from a number of historic holes drilled into the central area of the mineralized zone of the Cactus East deposit and two of the historic Parks/Salyer drillholes.
- Recent drill holes surrounding the pit rim, were drilled using angled diamond drill holes.
- Recent drill holes drilled into the northern expansion of the Cactus East deposit and the Parks/Salyer deposit were mostly drilled vertically. Angled holes were also drilled to support geotechnical analysis and as a check on the interpretation of geology.
- All recent holes have been downhole surveyed.
- Samples were assayed on 10 ft (3 m) lengths, except where strong lithological or structural contacts determined a variation in sample length was required.
- All drill holes were logged for lithology, mineralization, alteration, brecciation, and oxidation.
- A significant relogging and re-assaying program was undertaken as part of the recent drilling program to reinstate and/or confirm historical information.

Figure 14-1 plots the drill hole locations within the Cactus Project area including the location of the historical Sacaton pit, which forms part of the Cactus West Deposit, and the NE alluvium dump. The NE alluvium dump outlines the location of the Cactus East deposit. Offsetting the location of the two deposits is the Sacaton Fault which is visible in the eastern wall of the historical pit. The Parks/Salyer deposit is located to the SW of the image adjoining the southern boundary of ASCU’s land holdings.



Source: ALS Geo Resources, 2024

Figure 14-1: Drill Hole Collars and Traces within the Cactus Project

14.2.1.1 Total Soluble Copper Assays

Tsol copper assay information was gained through sequential copper analysis consisting of acid soluble and sequential cyanide soluble assay analysis. From these assays, Tsol copper was calculated as the addition of the two sequential assay values. All recent drilling was analyzed for sequential copper analysis. In addition, a large re-assay program was undertaken to verify historic data and provide sequential copper analyses on historic drill holes. As a priority, drill holes influencing the estimation of material adjacent to the historic pit were re-assayed. This program provided good coverage of Tsol copper assays throughout the deposit; however, there were a small number of drill holes that were not re-assayed.

To maintain the assay relationships of total copper and Tsol copper in the oxide and enriched estimated blocks, drill holes containing both assays were analyzed, and a method was determined to calculate Tsol copper in the samples where it was not currently present. Calculations were undertaken on the raw drill hole database intercepts prior to compositing based on Table 14-1. Back-calculated Tsol grades represent only 3.5% of the total Cactus resource database.

Table 14-1: Values Used to Back calculate missing Tsol Grades

Deposit	Minzone	TSol %	CuAS %
CE/PS	Leached	90	99
	Oxide	97	80
	Enriched	98	18
CW	Leached	90	99
	Oxide	81	60
	Enriched	98	18

14.2.1.2 Gold, Silver, and Molybdenum

Gold and silver credits in the copper concentrate were awarded to ASARCO when mining the Sacaton pit. Limited data is available relating to gold and silver grades from historic drill hole composites and mill reconciliation reports. Gold and silver are present throughout the deposit but at very low grades. Future work is planned, specifically in the primary material, to improve the knowledge and understanding through re-assay of historic and recent pulps.

This is expected to only provide small incremental value to the Project due to the low grades reported to date.

Within Cactus, molybdenum (Mo) is present through the deposit but has only been reported on in limited drill hole composites and some recent drill holes. At Parks/Salyer 98% of the copper assay intervals contain Mo assay values. These have been used to estimate Mo in that block model. Future work is planned to re-assay primary material as a potential value addition to the Project.

Gold, silver, and molybdenum are not considered recoverable through planned copper heap leaching applications.

14.2.2 Geological Modelling

14.2.2.1 Faults

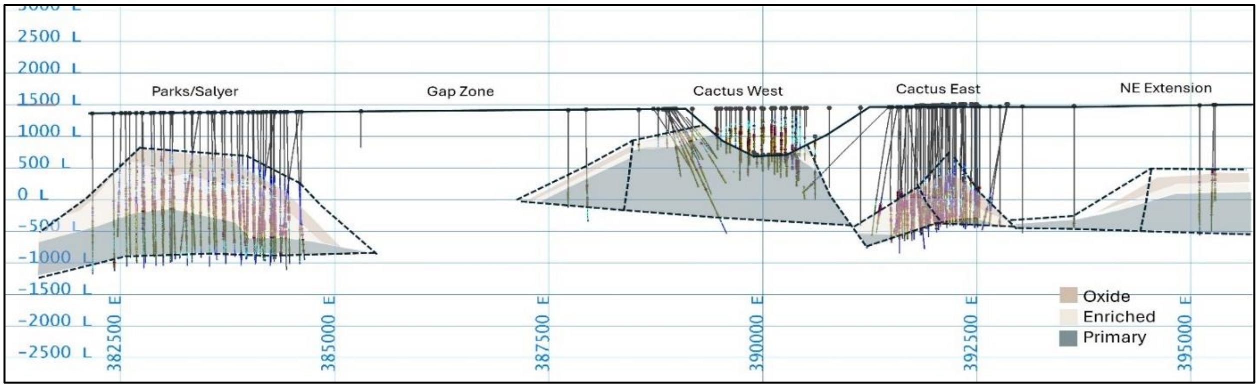
A number of fault structures define the main fault blocks that control the location and general geometry of mineralization. The Cactus deposits were offset to the NE for up to 4 mi along a regional listric fault known as the Basement fault. To accommodate extensional movement and block rotation along the Basement fault, NW striking normal faults developed. These created a regular series of horst and graben blocks which were infilled with gravel and conglomerate. The discovery outcrop represents the only outcrop of the Santa Cruz porphyry system at surface. Exploration drilling, and mining of the Sacaton pit, has defined the broad geometries of the mineralized blocks within the Cactus deposit area.

The main fault blocks modelled were defined by the modelling of the individual fault surfaces that form the contacts. The Basement fault was modelled from drill holes that pierce the structure, below this fault there has been no mineralization identified to date. It is sub- horizontal with local undulations and evidence of local offset, likely by later reactivation, along the Sacaton fault. In the Parks/Salyer area the basement fault dips at a low angle to the north-west. Drilling completed to date at Parks/Salyer has not identified any major vertical or near vertical faults that offset the mineralized package.

The Sacaton and East faults define the eastern edges of the Cactus West and Cactus East blocks. These represent normal faults that strike approximately 160° and dip between 50°-70° to the east. Blocks were down dropped to the east along these faults. A conjugate set of normal faults, accommodating basement extension, and represented by the fault contact between cover conglomerate and bedrock is known as the west fault. The orientation of this fault varies considerably. In Cactus west, it strikes approximately 340° and dips 25° to the west. In Cactus East, this fault is known as the south fault and the strike and dip is more variable but could generally be defined as striking approximately 85° and dipping 40° to the South. Parks/Salyer is similarly defined by extensional faults creating a horst block. The overall angles of the NE trending normal faults at Parks/Salyer dip at a lower angle. Individual fault planes were modelled by defining intercept points in drilling and historic interpreted cross-section and plan maps. Points were then modelled as surfaces and clipped to one another to define fault block solids. The outer extents of the fault blocks were defined by a generalized alteration halo defined by ASARCO and based on regional exploration drilling. As new angled drilling is added, this outer boundary and its controls continue to be refined and present the potential to add more mineralization to the resource within the resource pit limits.

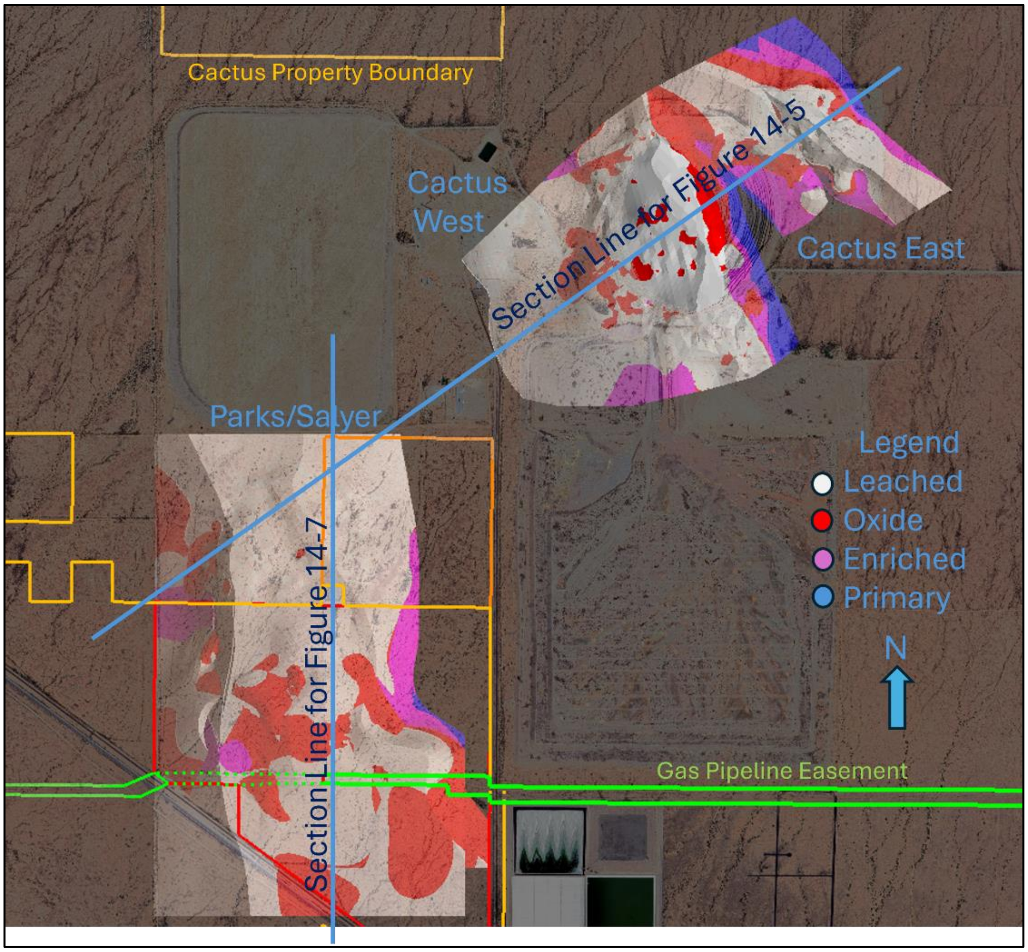
Figure 14-3 is a long section, facing northwest through the Cactus and northern portion of the Parks/Salyer deposit. It shows the major faults that control mineralization, with the down dropped blocks evident from west to east.

Figure 14-2 is a plan map of the mineralized zones in the Cactus Property color coded by mineral zone.



Source: ASCU, 2022.

Figure 14-2: NE Oriented Long Section displaying Fault Block Geometries, Facing NW



Source: ALS Geo Resources,.2024

Figure 14-3: Plan View of Mineralized Zones in the Cactus Project

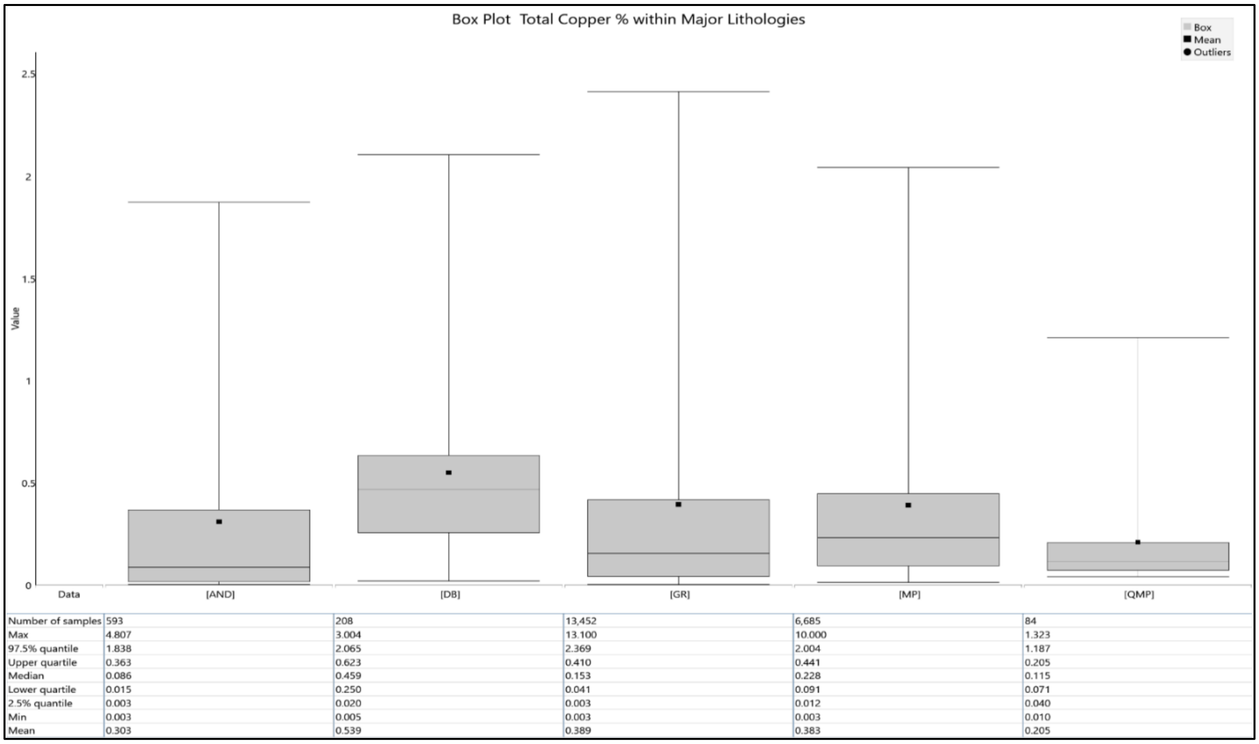
14.2.2.2 Lithology

Lithology was grouped into multiple domains within the Cactus Project that relate to the presence or absence of mineralization. The main lithological domains modelled are defined in Table 14-2 along with the expected presence or absence of mineralization in that domain.

Figure 14-4 displays box plots comparing the CuT distributions of the main logged lithologies within the bedrock. Results show no clear control on grade distributions based on host lithology alone. Dykes are generally a late feature in the system and have been modelled and estimated separately due to their different grade characteristics. Dykes represent only ~1% of the mineralized material. Figure 14-5 displays a NW-oriented cross-section through the Cactus and northern portion of the Parks/Salyer deposits as shown in Figure 14-3 Note how the section shows Cactus East being down-dropped from Cactus West and another down-dropped block hosting mineralization in the NE Extension. Lithological domains were modelled by combining individually logged lithologies into formations representing the four main lithological domains. Points were then extracted from the drill holes representing the footwall contacts of the alluvium and the conglomerate, in addition to interpretive points being added based on historic cross section and plan maps. Surfaces were modelled from these point sets and the surfaces clipped against the fault block solids to create solid triangulations of the alluvium, conglomerate, and bedrock.

Table 14-2: Lithological Domains Properties

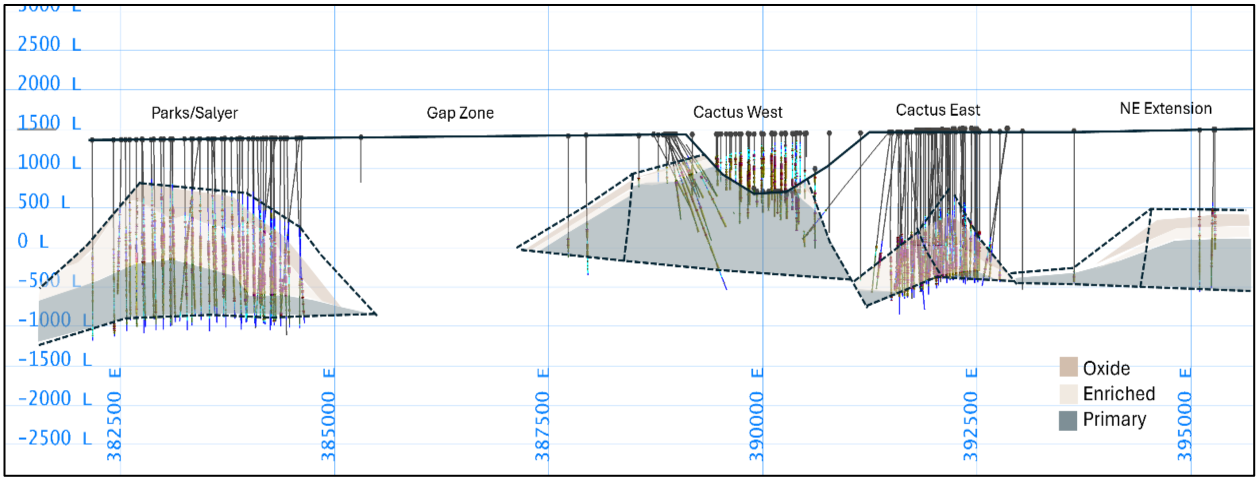
Lithological Domain	Relationship to Mineralization
Alluvium – Quaternary in age.	Non-mineralized
Conglomerate – Tertiary in age.	Non-mineralized
Bedrock units including granite, diabase, and monzonite and quartz monzonite porphyries with varying degrees of brecciation. Oracle granite is of Precambrian age, porphyry intrusions are Laramide in age.	Mineralized
Basement metamorphosed units including the Pinal Schist and metamorphosed granitic, gneissic, and metavolcanic rocks below the Basement fault.	Non-mineralized



Data	[AND]	[DB]	[GR]	[MP]	[QMP]
Number of samples	593	208	13,452	6,685	84
Max	4.807	3.004	13.100	10.000	1.323
97.5% quantile	1.838	2.065	2.369	2.004	1.187
Upper quartile	0.363	0.623	0.410	0.441	0.205
Median	0.086	0.459	0.153	0.228	0.115
Lower quartile	0.015	0.250	0.041	0.091	0.071
2.5% quantile	0.003	0.020	0.003	0.012	0.040
Min	0.003	0.005	0.003	0.003	0.010
Mean	0.303	0.539	0.389	0.383	0.205

Source: ASCU, 2022.

Figure 14-4: Box Plots of the Main Logged Lithologies Hosting Mineralization



Source: ASCU, 2022.

Figure 14-5: NE Oriented Long Section displaying Lithology Zones, Facing NW

14.2.2.3 Copper Mineral Zones

Of most importance to the estimation of copper grades at Cactus, was the distribution and zonation of the copper mineral zones. Cactus East, Cactus West and Parks/Salyer exhibit typical porphyry copper mineral zonation due to the leaching of copper in sulfides at shallow depths with redeposition below the water table to enriched chalcocite and/or covellite copper sulfides. Above the water table, copper oxide minerals formed. Drilling shows the highest grades were typically encountered at the interface of the enriched and oxide zones as a remnant feature of the historic water table level. Contacts between copper mineral zones within the Cactus deposits were generally sharp, with short transitions.

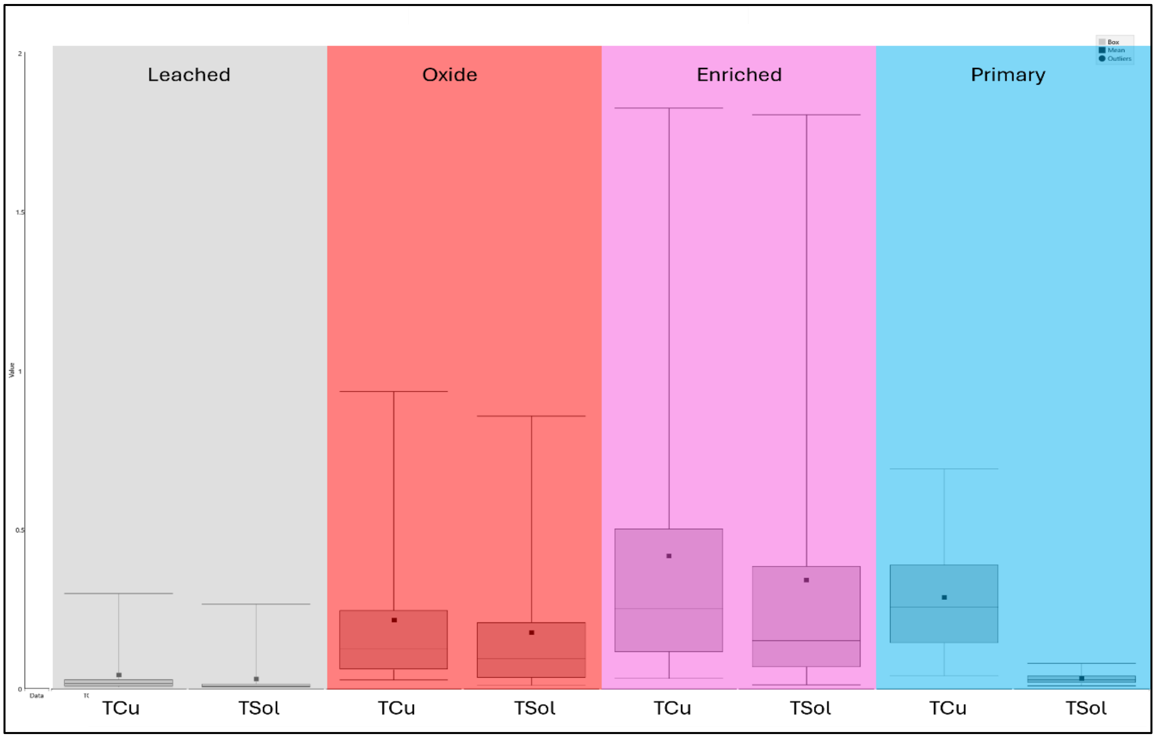
Contact boundaries were identified by the analysis of sequential copper assays and geological logging. Copper mineral zones were modelled within the bedrock lithological domain only.

Table 14-3 indicates the main copper mineral domains modelled and their relationship to mineralization. Figure 14-6 displays box plots for the three copper mineral zones highlighting the different CuT distributions between the zones, the limited transitional material evidenced by high solubilities in the oxide and enriched zones, and very low solubility in the primary zone.

Figure 14-7 displays the NS cross-section through the Parks/Salyer deposit as shown in Figure 14-3 with the copper mineral zones of the bedrock overlayed to show the spatial relationships of the zones. Within the bedrock, points were extracted from the drill holes representing the hanging wall contacts of the oxide, enriched, and primary contacts. In addition, interpretive points were added based on historical cross section and plan maps. Surfaces were modelled from these point sets and the surfaces clipped against the bedrock solids to create solid triangulations of the leached, oxide, enriched, and primary copper mineral zones.

Table 14-3: Lithological Domains

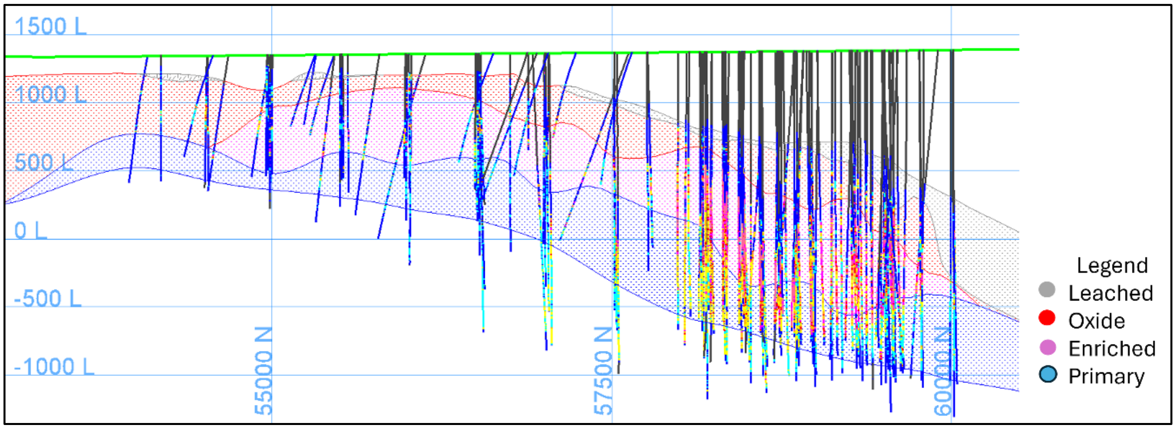
Copper Mineral Domain	Relationship to Mineralization
Leached – incorporating the gossanous and leached weathering zones. Cactus West contains multiple phases of leaching.	Poorly mineralized. Copper mineralization typically confined to selvages of oxide enriched, or primary entrapped during subsequent leaching phases.
Oxide	Mineralized with oxide and carbonate copper minerals. Represents potential conventional heap leach mineralization.
Supergene Enriched	Mineralized with secondary chalcocite and covellite. Represents potential conventional heap leach or mill flotation mineralization.
Primary (hypogene)	Mineralized with primary chalcopyrite and pyrite. Represents potential mill flotation mineralization.



Source: ASCU, 2022.

Figure 14-6: Box Plots of Copper Grades in Mineralized Zones

Figure 14-6 displays box plots for CuT and the total soluble copper assay components to show both the distinct CuT grade distributions defined by the copper mineral zones, the limited transitional material as defined by the high solubilities in the oxide and enriched, and low solubility results in the primary. Figure 14-7 shows North-South cross-section facing west showing the mineralized zones and diamond drilling used in the resource calculation.

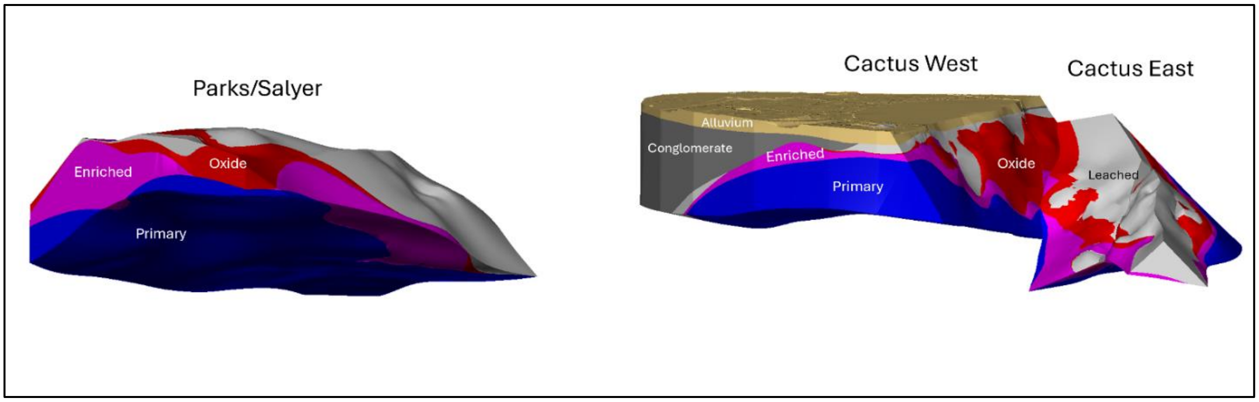


Source: ALS Geo Resources, 2024.

Figure 14-7: North-South Cross Section Facing West Displaying Copper Mineral Zones at Parks/Salyer

14.2.3 Estimation Domains

Final estimation domains were composed of the leached, oxide, enriched, and primary copper mineral zones. Figure 14-8 shows an isometric view of the final copper mineral zones in three dimensions. The alluvium and conglomerate cover have been removed above Cactus East and Parks/Salyer to aid visualization.



Source: ALS Reo Resources, 2024.

Figure 14-8: Isometric View of the Copper Mineral Estimation Domains

14.2.4 Specific Gravity

As of May 2023, historical drill hole logs for the Cactus Project drilling contained extensive record of specific gravity measurements (3,347 readings). Measurements were undertaken using the wet/dry weight methodology. Values were recorded in metric g/cm^3 in the historic logs. To support imperial units and reporting of short tons, the original readings were converted to ft^3/t by multiplying the specific gravity value by 0.0312. Variations in specific gravity were recognized between the alluvium, conglomerate, bedrock, and basement zones. Most lithological units within the bedrock contain similar aspects of mineralogy. Due to this, the larger differences in specific gravity were deemed a result of the level of weathering of the rock or level of brecciation between deposits.

The copper mineral zones defined basic zones to encompass different levels of weathering. As such, they were the basis of defining specific gravity average values within the bedrock. Average specific gravity values were calculated and applied based on the copper mineral and lithological domains. Due to the mineralization being disseminated, sulfide content is not highly correlated to specific gravity. Table 14-4 displays the specific gravity values assigned for each domain.

Table 14-4: Specific Gravity Values Applied per Lithological Domain

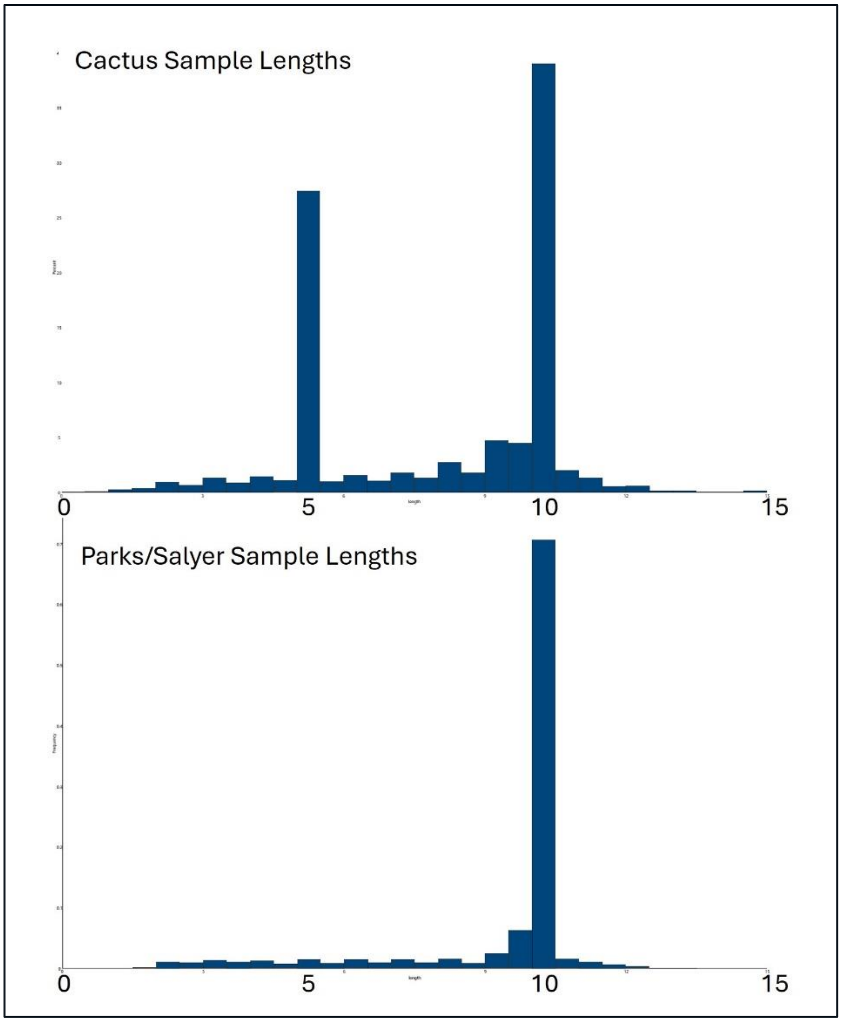
Area	Rock type	Minzone	Density (st/ft^3)
	Alluvium		0.0468
	Conglomerate		0.0780
	Basement		0.0810
CW	Granite or Monzonite porphyry	Leached	0.0800
		Oxide	0.0800
		Enriched	0.0810
		Primary	0.0800
	Andesite Porphyry		0.0810
	Diabase or Dacite	Leached	0.0790
		Oxide	0.0790
		Enriched	0.0800
		Primary	0.0810
CE	Granite or Monzonite porphyry	Leached	0.0770
		Oxide	0.0790
		Enriched	0.0800

Area	Rock type	Minzone	Density (st/ft^3)
		Primary	0.0790
	Diabase or Dacite	Leached	0.0770
		Oxide	0.0770
		Enriched	0.0790
		Primary	0.0790
PS	Granite or Monzonite porphyry	Leached	0.0750
		Oxide	0.0720
		Enriched	0.0800
		Primary	0.0750
	Diabase or Dacite		0.0710
MS	Granite or Monzonite porphyry	Leached	0.0710
		Oxide	0.0750
		Enriched	0.0800
		Primary	0.0810
	Diabase or Dacite		0.0710

Note: Standard deviation (std.dev.)

14.2.5 Compositing

Sampling in the drill hole database was historically undertaken on nominal 10 ft samples, except where strong structural or lithological contacts supported a change in this regime. In the Cactus deposits, the drill hole database was composited to 10 ft lengths with composite lengths cut at the copper mineral contacts, as defined by the triangulation solids. Samples of less than 3 ft at the mineral zone contact were added to the previous composite to avoid having very short composites in the database. At the Parks/Slyer a 20ft composite was chosen as this better reports to the 40 ft block size used for open pit modelling. The same rules about shorter intervals were applied. This was done to support later grade estimation processes using this database. Figure 14-9 displays the histogram for the drill hole sample lengths within the Cactus Project resource drill hole database. At Cactus East and West 95% of sample lengths are 10 ft or less in length with 39% sampled at 10 ft and 27.5% sampled as 5 ft. Most of the 5 ft drilling samples were attained from the RC drilling program. At Parks/Salyer 96% of sample lengths were 10 ft or less in length with 70% sampled at 10 ft.



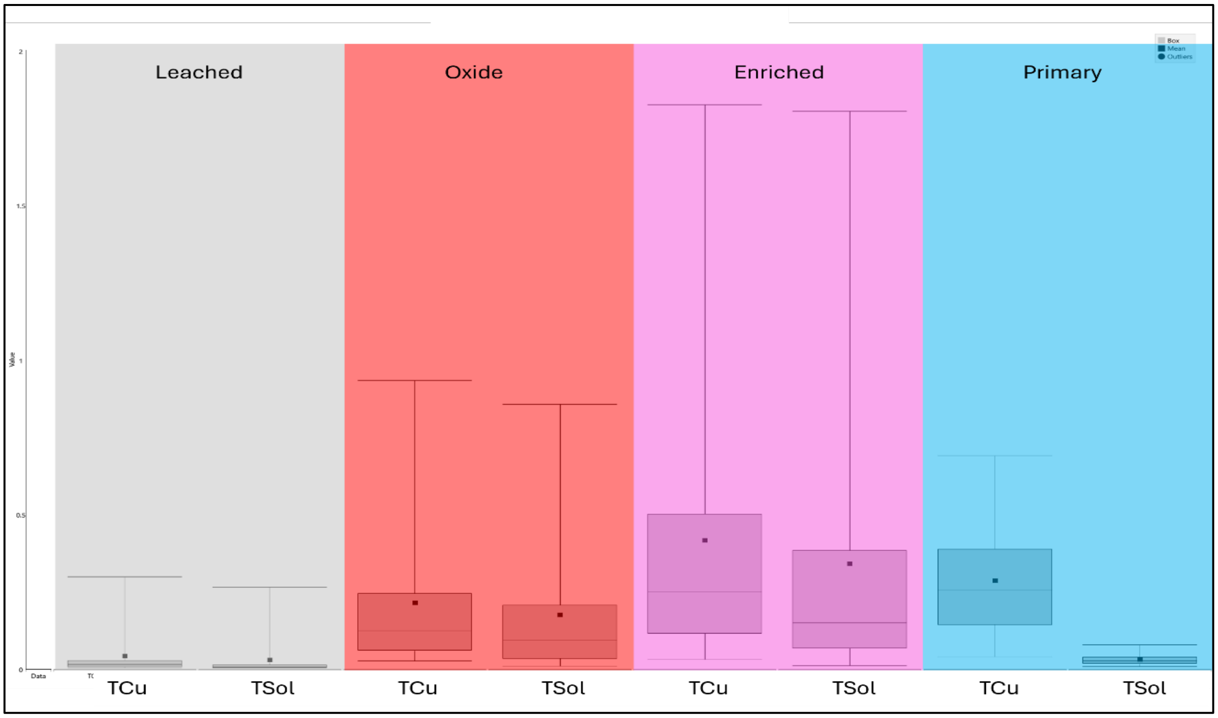
Source: ALS Reo Resources, 2024.

Figure 14-9: Histogram of Drill Hole Sample Lengths

14.2.6 Exploratory Data Analysis

14.2.6.1 Cactus West

In Figure 14-10, CuT and Tsol copper were plotted as box plots for the leached, oxide, enriched, and primary domains. Oxide and enriched domains show strong relationships of high levels of Tsol copper which is expected of these domains. The primary domain shows a low level of soluble copper as expected. The grade distributions are as expected with the highest-grade domain being the enriched. The oxide domain reports lower grade; however, this domain does contain deeper leaching locally, which leads to the increased skewness of the population. The box plots show very good domain control in separating copper population distributions and material types. Table 14-5 reports the statistics for the main domains in support of the box plot distributions in Figure 14-10.



Source: ASCU, 2022.

Figure 14-10: Box Plots of Total Copper and Total Soluble Copper Grades for Cactus West

Table 14-5: Cactus West Descriptive Statistics of Total Copper and Total Soluble Copper Grades

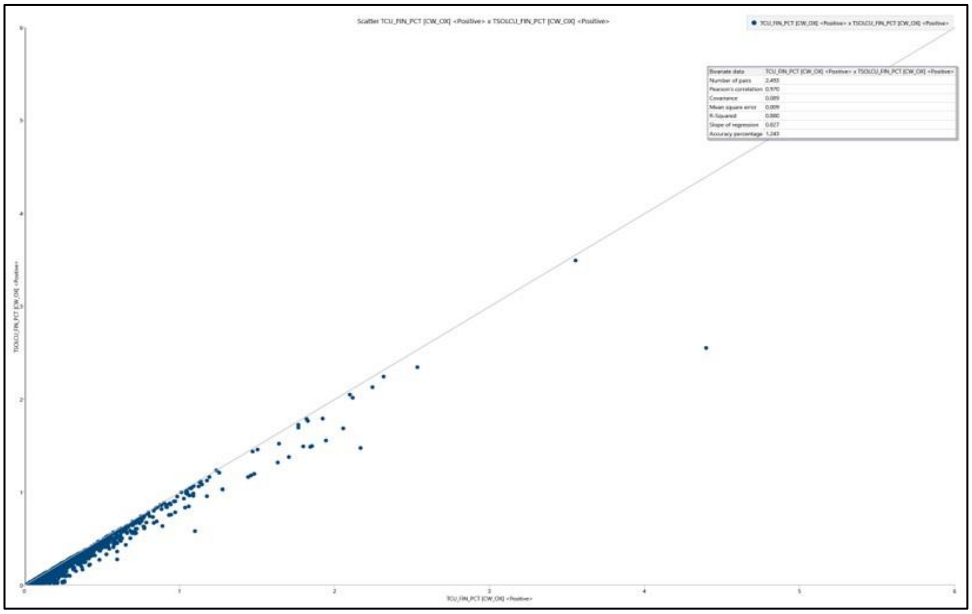
Variable Name	Count	Mean	Std Dev.	Variance	CV	Max	Upper quartile	Median	Lower quartile	Min
TCU_FIN_PCT [CW_LEA] <Positive>	1466	0.045	0.130	0.017	2.899	2.969	0.031	0.018	0.010	0.005
TSOLCU_FIN_PCT [CW_LEA] <POSITIVE>	1466	0.032	0.123	0.015	3.832	2.964	0.016	0.009	0.006	0.004
TCU_FIN_PCT [CW_OX] <Positive>	2493	0.216	0.328	0.108	1.516	7.378	0.247	0.126	0.062	0.015
TSOLCU_FIN_PCT [CW_OX] <POSITIVE>	2493	0.178	0.280	0.078	1.575	5.379	0.209	0.095	0.035	0.006
TCU_FIN_PCT [CW_ENR] <Positive>	2786	0.418	0.537	0.288	1.285	9.740	0.502	0.252	0.117	0.010
TSOLCU_FIN_PCT [CW_ENR] <POSITIVE>	2786	0.342	0.525	0.275	1.533	8.532	0.385	0.152	0.070	0.006
TCU_FIN_PCT [CW_PRI] <Positive>	2886	0.288	0.183	0.033	0.636	1.526	0.390	0.257	0.146	0.006
TSOLCU_FIN_PCT [CW_PRI] <POSITIVE>	1827	0.033	0.020	0.000	0.598	0.242	0.041	0.029	0.020	0.006

To confirm the relationship between Tsol copper and CuT, scatterplots were plotted for the oxide, enriched, and primary domains (Figure 14-11 through Figure 14-13). For the soluble domains, namely oxide and enriched, the bulk of the Tsol copper is expected to plot towards the 45° line, indicating a 1:1 relationship. Samples plotting well away from this line would indicate significant mixing of populations and the potential for significant transitional zones within the mineralization.

For oxide and enriched domains, the bulk of the copper is soluble and plots towards the 45° line indicating a 1:1 relationship with CuT. For the primary domain, as expected, the bulk of the copper is chalcopyrite; therefore, the Tsol is low and plots well away from the 45° line.

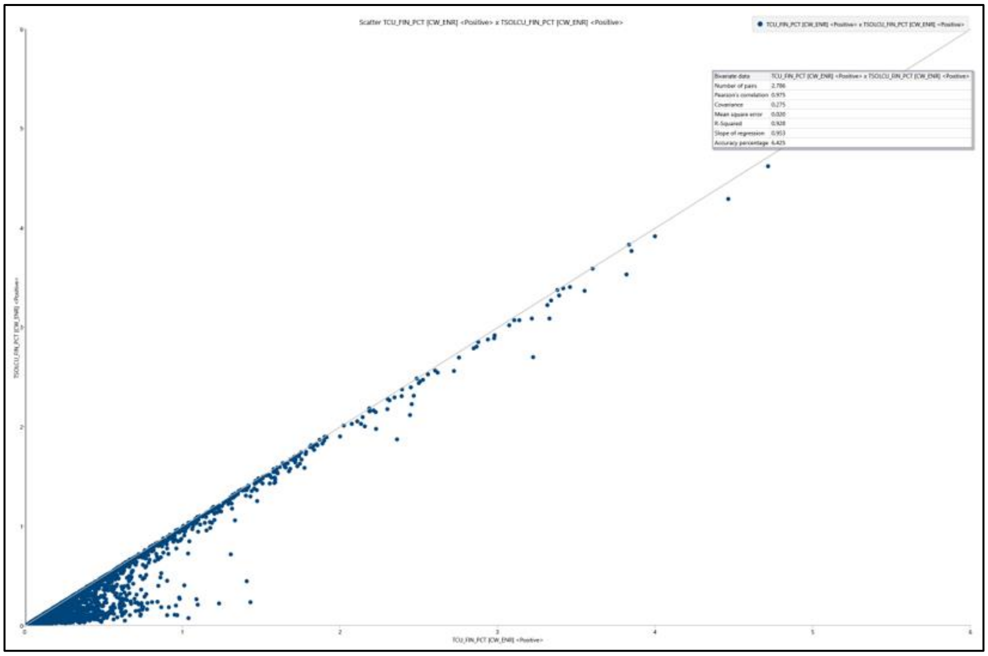
Due to the different copper mineral species within the copper mineral domains (supported by the different grade distributions) and different mechanisms for precipitation, contacts between the copper mineral domains in Cactus West were treated as hard contacts and therefore contact analysis was not undertaken.

The defined estimation domains show a high degree of control over the copper distributions seen within the Cactus West deposit and are appropriate for use in grade estimation to produce robust estimates of copper grades.



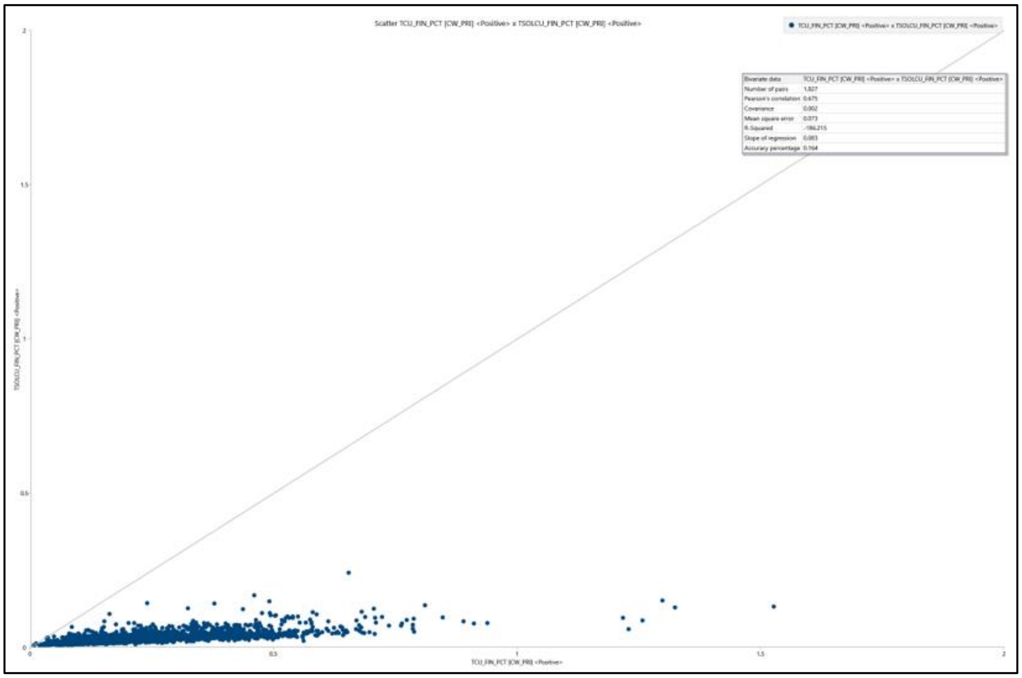
Source: ASCU, 2022.

Figure 14-11: Scatter Plots of Total Soluble Copper versus Total Copper within the Oxide Domain for Cactus West



Source: ASCU, 2022.

Figure 14-12: Scatter Plots of Total Soluble Copper versus Total Copper within the Enriched Domain for Cactus West



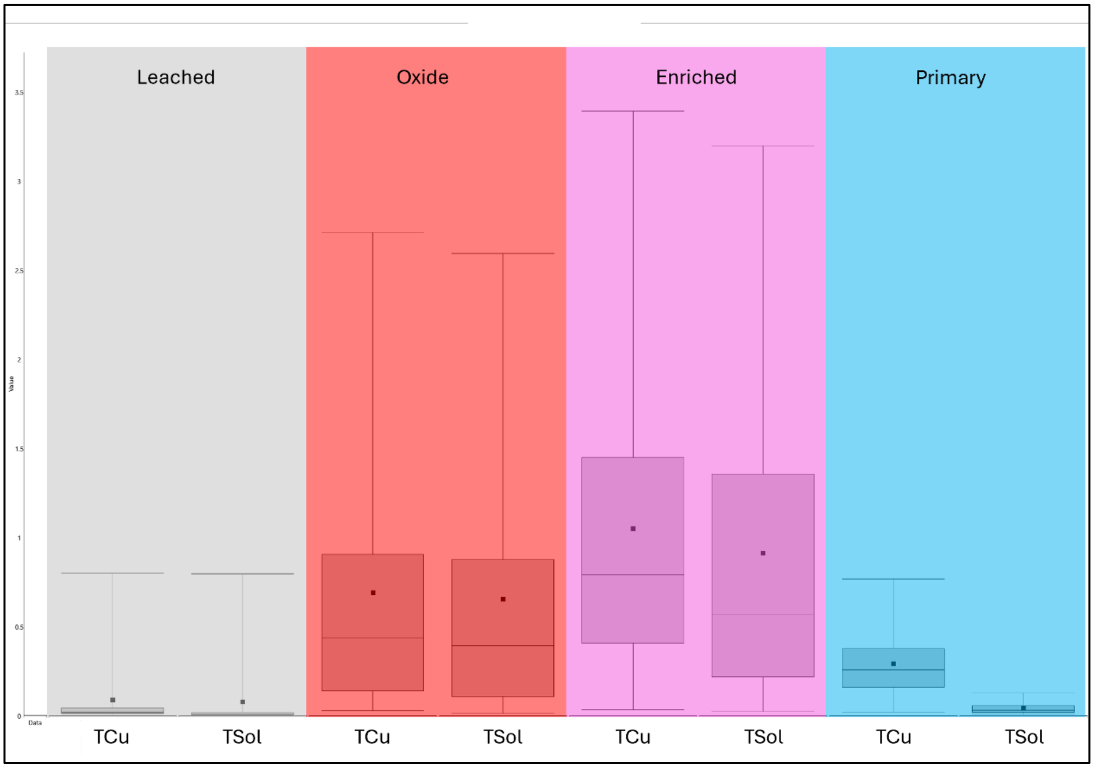
Source: ASCU, 2022.

Figure 14-13: Scatter Plots of Total Soluble Copper versus Total Copper within the Primary Domain for Cactus West

14.2.6.2 Cactus East

In Figure 14-14, CuT and Tsol copper are plotted as box plots for leached, oxide, enriched, and primary domains. Oxide and Enriched domains show strong relationships of high levels of Tsol copper which is expected of these domains. The primary domain shows a low level of soluble copper as expected. The grade distributions are as expected with the highest-grade domains being the enriched and oxide. The box plots show very good domain control in separating copper population distributions and material types. Table 14-6 reports the statistics for the main domains in support of the box plot distributions in Figure 14-14.

To confirm the relationship between Tsol copper and CuT, scatter plots were plotted for the oxide, enriched, and primary domains (Figure 14-15 through Figure 14-17). For the soluble domains, namely oxide and enriched, the bulk of the Tsol copper is expected to plot towards the 45° line, indicating a 1:1 relationship. Samples plotting well away from this line would indicate significant mixing of populations and the potential for significant transitional zones within the mineralization.

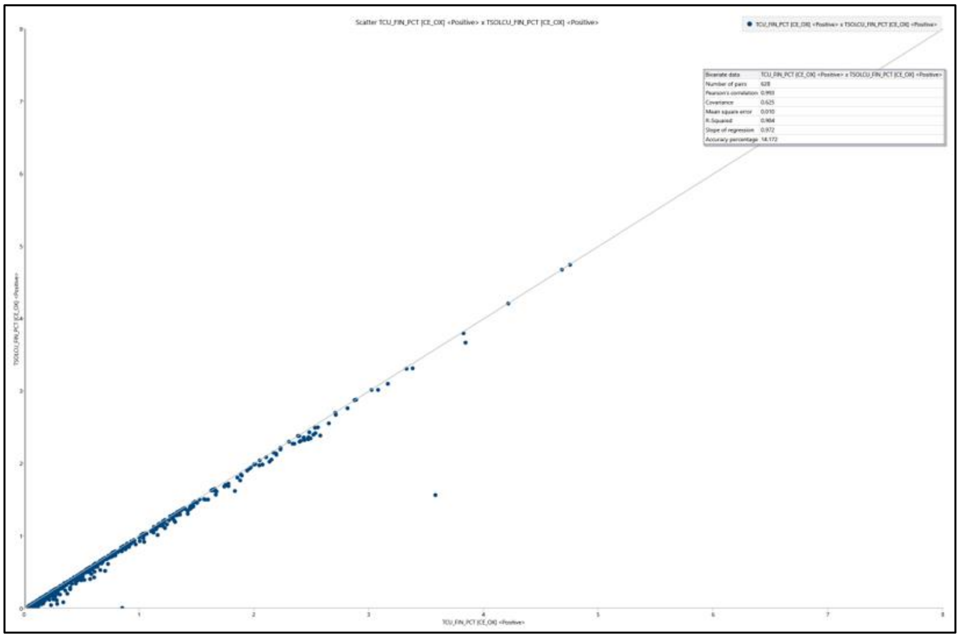


Source: ASCU, 2022.

Figure 14-14: Box Plots of Total Copper and Total Soluble Copper Grades within Copper Mineral Domains for Cactus East

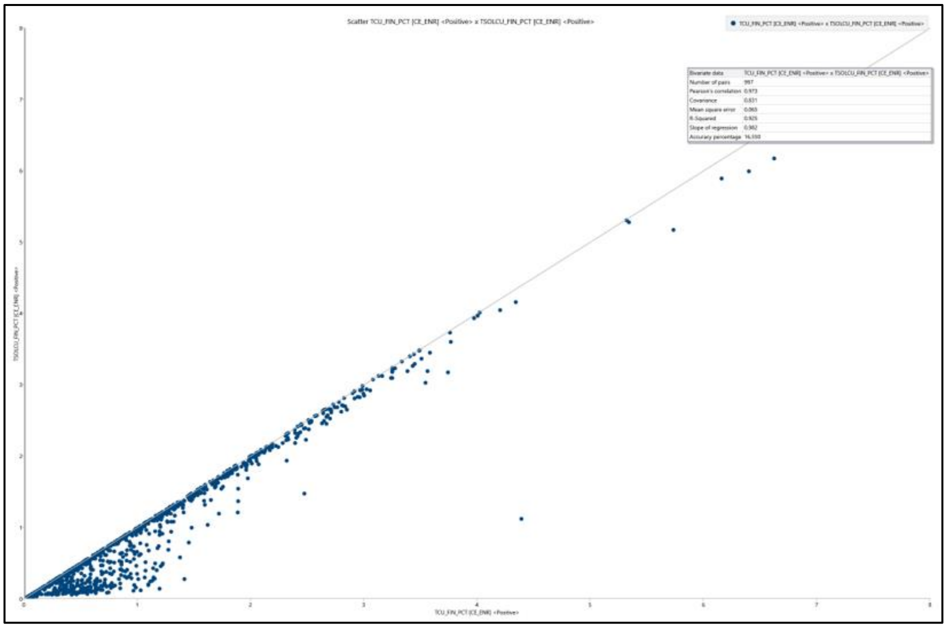
Table 14-6: Cactus East Descriptive Statistics of Total Copper and Total Soluble Copper Grades

Variable Name	Count	Mean	Std Dev.	Variance	CV	Max	Upper quartile	Median	Lower quartile	Min
TCU_FIN_PCT [CE_LEA] <Positive>	312	0.091	0.267	0.071	2.922	2.495	0.045	0.022	0.015	0.006
TSOLCU_FIN_PCT [CE_LEA] <POSITIVE>	312	0.078	0.266	0.071	3.405	2.491	0.020	0.010	0.006	0.006
TCU_FIN_PCT [CE_OX] <Positive>	628	0.691	0.802	0.644	1.161	7.340	0.906	0.436	0.139	0.026
TSOLCU_FIN_PCT [CE_OX] <POSITIVE>	628	0.653	0.785	0.616	1.201	7.016	0.879	0.393	0.108	0.006
TCU_FIN_PCT [CE_ENR] <Positive>	997	1.048	0.920	0.846	0.877	6.619	1.449	0.792	0.407	0.025
TSOLCU_FIN_PCT [CE_ENR] <POSITIVE>	997	0.913	0.929	0.862	1.017	6.170	1.354	0.567	0.216	0.009
TCU_FIN_PCT [CE_PRI] <Positive>	705	0.292	0.189	0.036	0.646	1.582	0.378	0.258	0.159	0.003
TSOLCU_FIN_PCT [CE_PRI] <POSITIVE>	523	0.44	0.035	0.001	0.797	0.280	0.058	0.034	0.019	0.006



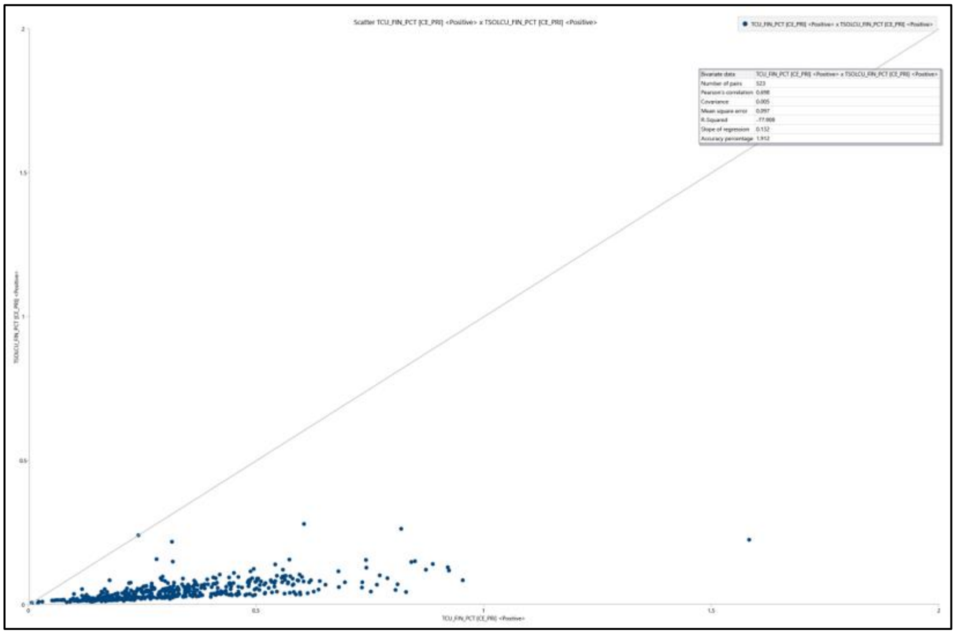
Source: ASCU, 2022.

Figure 14-15: Scatter Plots of Total Soluble Copper versus Total Copper within the Oxide Domain for Cactus East



Source: ASCU, 2022.

Figure 14-16: Scatter Plots of Total Soluble Copper versus Total Copper within the Enriched Domain for Cactus East



Source: ASCU, 2022.

Figure 14-17: Scatter Plots of Total Soluble Copper versus Total Copper within the Primary Domain for Cactus East

For oxide and enriched domains, the bulk of the copper is soluble and plots towards the 45° line indicating a 1:1 relationship with CuT. For the primary domain, as expected, the bulk of the copper is chalcopyrite and therefore the Tsol copper is low and plots well away from the 45° line.

Due to the different copper mineral species within the copper mineral domains (supported by the different grade distributions) and different mechanisms for precipitation, contacts between the copper mineral domains in Cactus East were treated as hard contacts and therefore contact analysis was not undertaken.

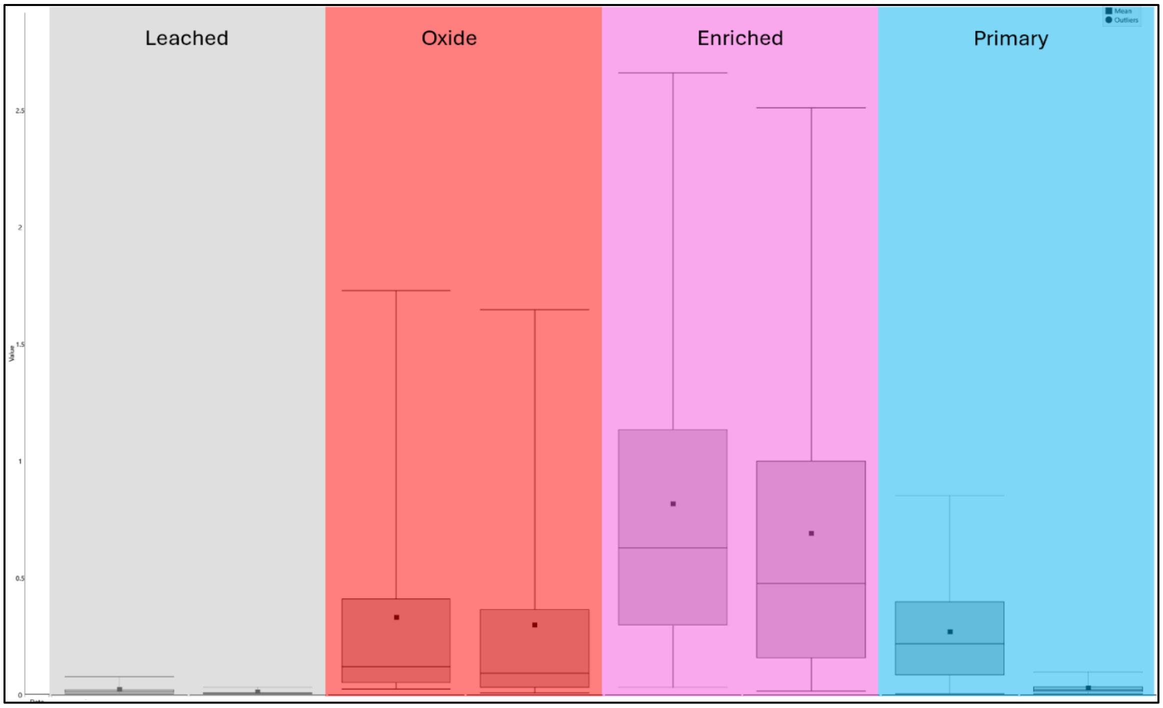
The defined estimation domains show a high degree of control over the copper distributions seen within the Cactus East deposit and are appropriate for use in grade estimation to produce robust estimates of copper grades.

14.2.6.3 Parks/Salyer

CuT and Tsol copper are plotted as box plots for leached, oxide, enriched, and primary domains. Oxide and Enriched domains show strong relationships of high levels of Tsol copper which is expected of these domains. The primary domain shows a low level of soluble copper as expected. The grade distributions are as expected with the highest-grade domains being the enriched and oxide. The box plots show very good domain control in separating copper population distributions and material types. Table 14-7 reports the statistics for the main domains in support of the box plot distributions in Figure 14-18.

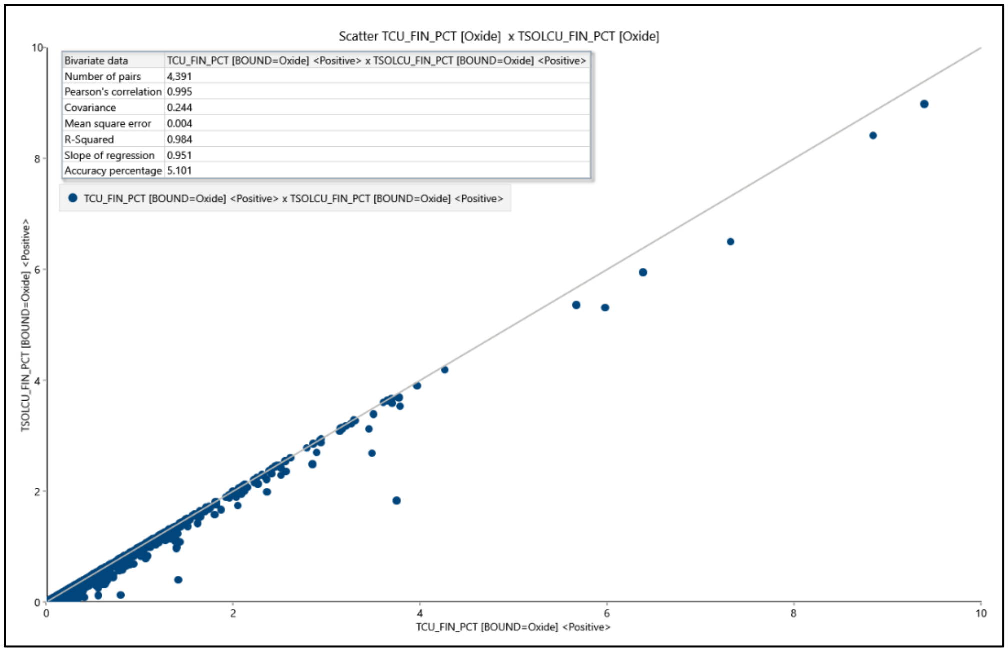
Table 14-7: Parks/Salyer Descriptive Statistics of Total Copper and Total Soluble Copper Grades

Variable Name	Count	Mean	Std. Dev.	Variance	CV	Max	Upper Quartile	Med.	Lowe Quartile	Min
TCU_FIN_PCT [PS_LEA] <Positive>	2149	0.026	0.047	0.002	1.773	0.795	0.027	0.016	0.010	0.003
TSOLCU_FIN_PCT [PS_LEA] <POSITIVE>	2132	0.011	0.025	0.001	2.194	0.691	0.009	0.006	0.006	0.005
TCU_FIN_PCT [PS_OX] <Positive>	4462	0.205	0.507	0.257	2.474	9.390	0.140	0.043	0.020	0.003
TSOLCU_FIN_PCT [PS_OX] <POSITIVE>	4391	0.179	0.484	0.234	2.708	8.977	0.099	0.020	0.008	0.005
TCU_FIN_PCT [PS_ENR] <Positive>	9328	0.654	0.828	0.686	1.266	12.570	0.963	0.375	0.055	0.003
TSOLCU_FIN_PCT [PS_ENR] <POSITIVE>	9102	0.562	0.789	0.622	1.404	10.538	0.824	0.229	0.033	0.006
TCU_FIN_PCT [PS_PRI] <Positive>	6904	0.261	0.319	0.102	1.223	15.163	0.368	0.187	0.070	0.003
TSOLCU_FIN_PCT [PS_PRI] <POSITIVE>	6839	0.034	0.089	0.008	2.645	4.801	0.035	0.021	0.012	0.006



Source: ALS Geo Resources, 2024.

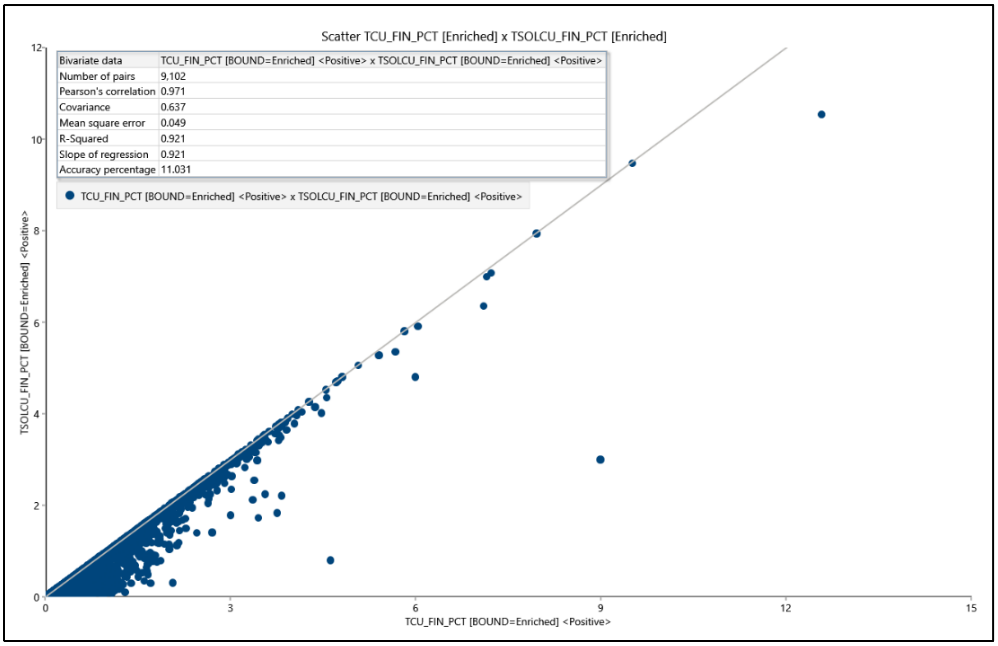
Figure 14-18: Box Plots of Total Copper and Total Soluble Copper Grades within Copper Mineral Domains for Parks/Salyer



Bivariate data	TCU_FIN_PCT [BOUND=Oxide] <Positive> x TSOLCU_FIN_PCT [BOUND=Oxide] <Positive>
Number of pairs	4,391
Pearson's correlation	0.995
Covariance	0.244
Mean square error	0.004
R-Squared	0.984
Slope of regression	0.951
Accuracy percentage	5.101

Source: ALS Geo Resources, 2024.

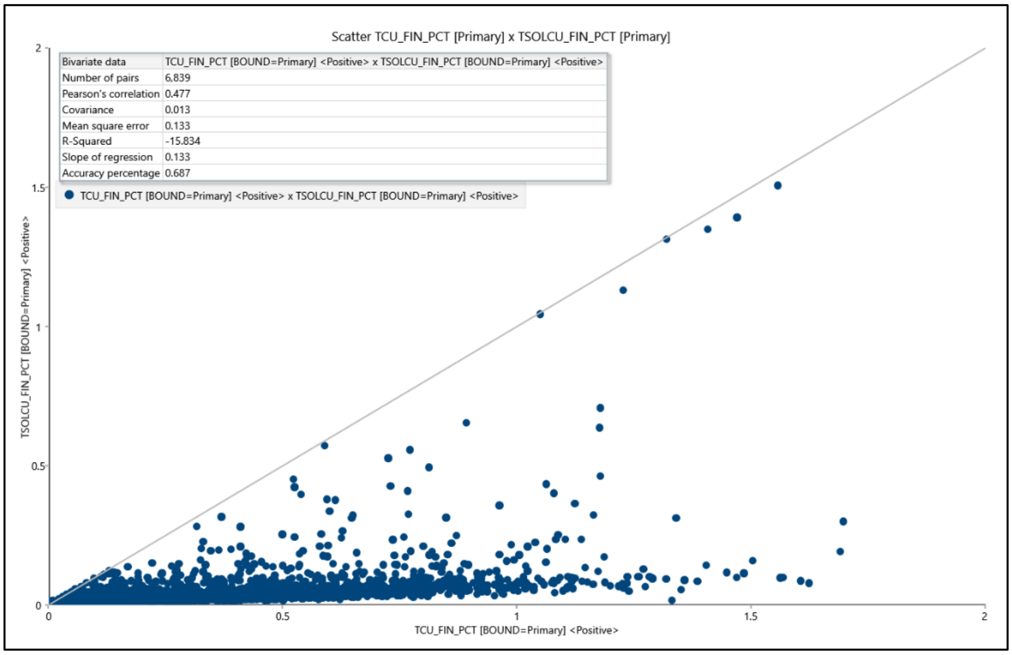
Figure 14-19: Scatter Plots of Total Soluble Copper versus Total Copper within the Oxide Domain for Parks/Salyer



Bivariate data	TCU_FIN_PCT [BOUND=Enriched] <Positive> x TSOLCU_FIN_PCT [BOUND=Enriched] <Positive>
Number of pairs	9,102
Pearson's correlation	0.971
Covariance	0.637
Mean square error	0.049
R-Squared	0.921
Slope of regression	0.921
Accuracy percentage	11.031

Source: ALS Geo Resources, 2024.

Figure 14-20: Scatter Plots of Total Soluble Copper versus Total Copper within the Enriched Domain for Parks/Salyer



Bivariate data	TCU_FIN_PCT [BOUND=Primary] <Positive> x TSOLCU_FIN_PCT [BOUND=Primary] <Positive>
Number of pairs	6,839
Pearson's correlation	0.477
Covariance	0.013
Mean square error	0.133
R-Squared	-15.834
Slope of regression	0.133
Accuracy percentage	0.687

Source: ALS Geo Resources, 2024.

Figure 14-21: Scatter Plots of Total Soluble Copper versus Total Copper within the Primary Domain for Parks/Salyer

To confirm the relationship between Tsol copper and CuT, scatterplots were plotted for the oxide, enriched, and primary domains (Figure 14-19 through Figure 14-21). For the soluble domains, namely oxide and enriched, the bulk of the Tsol copper is expected to plot towards the 45° line, indicating a 1:1 relationship. Samples plotting well away from this line would indicate significant mixing of populations and the potential for significant transitional zones within the mineralization.

For oxide and enriched domains, the bulk of the copper is soluble and plots towards the 45° line indicating a 1:1 relationship with CuT. For the primary domain, as expected, the bulk of the copper is chalcopyrite and therefore the Tsol copper is low and plots well away from the 45° line however a transitional zone to the eastern side of the deposit is present, in conjunction with covellite enriched and hypogene mineralization, which is visible in the scatterplot results.

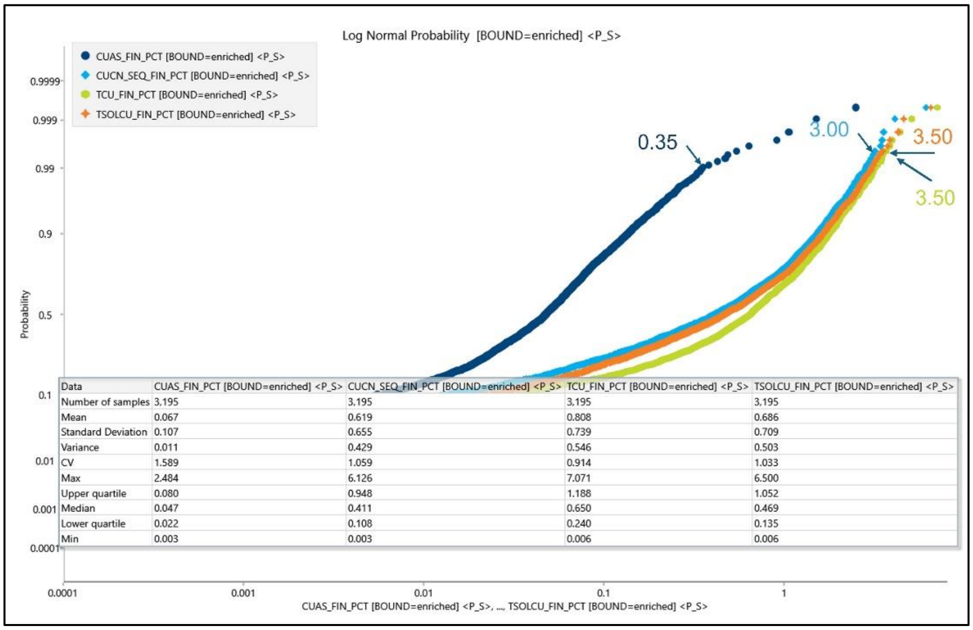
Due to the different copper mineral species within the copper mineral domains (supported by the different grade distributions) and different mechanisms for precipitation, contacts between the copper mineral domains in Parks/Salyer were treated as hard contacts and therefore contact analysis was not undertaken.

The defined estimation domains show a high degree of control over the copper distributions seen within the Parks/Salyer deposit and are appropriate for use in grade estimation to produce robust estimates of copper grades.

14.2.7 Capping

Composite assay data were reviewed to determine if there were sufficient high grades in the various populations to require capping of the high grades during compositing. Histogram and log normal cumulative probability plots were reviewed for CuT, ASCu, CuCN, and Tsol in each of the mineral zones in the Cactus Project resource. Figure 14-22 is an example probability plot of the composites in the enriched zone showing a good linear plot of values above detection levels on the left side of the chart.

The process was repeated for each mineralized zone in the deposit.



Data	CUAS_FIN_PCT [BOUND=enriched] <P_S>	CUCN_SEQ_FIN_PCT [BOUND=enriched] <P_S>	TCU_FIN_PCT [BOUND=enriched] <P_S>	TSOLCU_FIN_PCT [BOUND=enriched] <P_S>
Number of samples	3,195	3,195	3,195	3,195
Mean	0.067	0.619	0.808	0.686
Standard Deviation	0.107	0.655	0.739	0.709
Variance	0.011	0.429	0.546	0.503
CV	1.589	1.059	0.914	1.033
Max	2.484	6.126	7.071	6.500
Upper quartile	0.080	0.948	1.188	1.052
Median	0.047	0.411	0.650	0.469
Lower quartile	0.022	0.108	0.240	0.135
Min	0.003	0.003	0.006	0.006

Source: ALS Geo Resources, 2024.

Figure 14-22: Example Log Normal Probability Plot of Copper Composites in the Enriched Zone at Parks/Salyer

Capping values per deposit and copper analysis method are posted in Table 14-8.

Table 14-8: Capping Levels for Cactus Project Estimation Domains

Area	Rock type	Minzone	TCu (%)	Tsol (%)	CuAS (%)	CuCN (%)
CW	granite or monzonite porphyry	leached	0.16	0.12	0.10	0.04
		oxide	1.30	1.20	1.05	0.50
		enriched	2.75	2.70	0.55	2.30
		primary	1.00	0.12	0.06	0.085
	diabase nth		0.56	0.51	0.48	0.03
	diabase sth		1.83	1.77	1.51	0.24
	dacite		1.00	0.93	0.91	0.03
	andesite porphyry		0.37	0.35	0.11	0.24
CE	granite or monzonite porphyry	leached	0.30	0.20	0.19	0.01
		oxide	2.50	2.30	2.28	0.90
		enriched	3.75	3.50	0.60	3.00
		primary	1.00	0.15	0.05	0.11
	diabase nth		0.67	0.55	0.09	0.47
PS	granite or monzonite porphyry	leached	0.07	0.03	0.03	0.01
		oxide	2.10	2.10	2.05	0.40
		enriched	3.50	3.50	0.35	3.00
		primary	1.15	0.17	0.04	0.11
	diabase nth		0.42	0.10	0.03	0.07
	diabase sth		1.54	1.48	1.42	0.71
MS	granite or monzonite porphyry	leached	0.04	0.02	0.02	0.01
		oxide	1.20	1.16	1.10	0.16
		enriched	1.40	1.38	0.66	1.18
		primary	0.45	0.08	0.03	0.08

14.2.8 Variography

Variogram analysis was undertaken to generate specific variograms for each mineral zone with each deposit. It was found that primary material had the best continuity and therefore the lowest nugget and longest ranges generally. The well-developed enrichment blanket has less continuity than primary but better than oxide. Oxide, being the most variable weathering process, has the highest variability. Table 14-9 show the variogram models applied for each mineralized zone within the three deposits.

Table 14-9: Variogram Results Form Mineralized Zones in Each Deposit

Variogram						Structure 1					Structure 2				
Deposit	Domain	Nugget	Bearing	Azimuth	Dip	Type	Sill Diff	Max	Semi	Minor	Type	Sill Diff	Max	Semi	Minor
CW	Oxide/Leached	0.18	45	0	0	Spherical	0.35	75	130	20	Spherical	0.47	320	500	90
	Enriched	0.10	45	0	0	Spherical	0.55	200	190	50	Spherical	0.35	2,500	1,500	400
	Primary	0.05	45	0	0	Spherical	0.20	275	375	30	Spherical	0.75	1,300	900	700
CE	Oxide/Leached	0.18	130	-25	0	Spherical	0.52	375	200	55	Spherical	0.30	1,100	600	200
	Enriched	0.18	130	-25	0	Spherical	0.40	260	250	55	Spherical	0.42	1,700	500	550
	Primary	0.05	90	0	0	Spherical	0.35	300	200	30	Spherical	0.60	1,100	600	200
PS	Oxide/Leached	0.05	70	0	0	Spherical	0.55	300	300	25	Spherical	0.40	1,500	650	160
	Enriched	0.10	70	0	0	Spherical	0.50	300	700	35	Spherical	0.40	1,000	900	350
	Primary	0.05	45	0	0	Spherical	0.18	350	400	30	Spherical	0.77	1,800	1,050	900

14.2.9 Block Model

The block model for Cactus was constructed to encompass the full extents of the Cactus East and West deposits, including additional waste outside the model to support pit optimization work. The block model for Parks/Salyer was expanded to encompass the extents of Parks/Salyer and MainSpring mineralization. Parent blocks in the Cactus models were defined with 20 ft (6 m) by 20 ft (6 m) by 20 ft (6 m) block sizes to support minimum pit selectivity with sub-blocking to honor geological and topographical contacts of 5 ft (1.5 m) by 5 ft (1.5 m) by 2.5 ft (0.8 m). The Parks/Salyer model had parent block size set to 120 ft (36.6 m) X 120 ft (36.6 m) X 120 ft (36.6 m) to reduce the block model size. Within the mineralized zones the parent block size is reduced to 40 ft (12.2 m) X 40 ft (12.2 m) X 40 ft (12.2 m) to support open pit optimization and sub-blocking to honor geological and topographical contacts of 5 ft (1.5 m) by 5 ft (1.5 m) by 2.5 ft (0.8 m).

Table 14-10 outlines the Cactus block model definition parameters.

Table 14-11 outlines the Parks/Salyer block model definition parameters.

Table 14-10: Cactus Block Model Definition Parameters

Block Model Definition	X	Y	Z
Origin	385,900	60,800	-1,000
Bearing/Plunge/Dip	90	0	0
Offset Minimum	0	0	0
Offset Maximum	9,100	8,100	3,000
Parent Block Size	20	20	20
Sub-Block Size	5	5	2.5
Total Blocks			**13,258,231**

Table 14-11: Parks/Salyer Block Model Definition Parameters

Block Model Definition	X	Y	Z
Origin	379,500	52,500	-1,500
Bearing/Plunge/Dip	90	0	0
Offset Minimum	0	0	0
Offset Maximum	8,520	10,560	3,600
Parent Block Size	120	120	120
Sub-Block Size	5	5	2.5
Total Blocks			**11,422,031**

14.2.10 Estimation Plan

With the completion of infill drilling of the Cactus and Parks/Salyer deposits to 250 ft (76 m) spacing, ordinary kriging (OK) is now a reasonable option for the estimation of copper and other grades into these models. Smoothing checks in the estimation validation support the use of OK as a reasonable approximation of the expected grade tonnage curve supporting open pit and underground CoGs for this level study. For the oxide and enriched domains, a waste indicator was applied, based on a 0.025% CuT grade, to define deeper leaching within the oxide and enriched zones and these blocks were estimated as part of the overall leached domain.

The estimation passes were defined based on the general drill spacings present within the project area. Pass 1 was defined to estimate drilling with approximately 125 ft (38 m) spacing. This drill spacing was planned to target definition of measured resources. Pass 2 was defined to estimate drilling with an approximately 250 ft (76 m) spacing. This drill spacing was planned to target definition of indicated resources. Pass 3 was defined to estimate drilling with an approximately 500 ft (152 m) spacing. This drill spacing was planned to target definition of inferred resources.

The measured (pass 1) and indicated (pass2) were then outlined and smoothed to alleviate small islands and holes in the shape. Measured resource was only outlined south of the existing pit where shallow close spaced RC drilling met the criteria required.

Minor dacite and diabase dykes within the resource area were assigned an average grade the number of samples in the domain was sufficient for estimation to be applied. Table 14-12 details the grade assignment strategy for each dyke lithology within the resource area.

Table 14-12: Dyke Grade Assignments by Lithology

Lith	Block	Leached	Oxide	Enriched	Primary
andp	CW	0.003 applied	0.003 applied	estimated (andpe)	mean grade applied
dac	CW	0.003 applied	estimated (daco)	mean grade applied	estimated tcu only (dacp)
db_nth	CW	0.003 applied	estimated (dbno)	mean grade applied	mean grade applied
db_sth	CW	Leached and oxide estimate as one (dbso)		mean grade applied	mean grade applied
db_nth	CE	0.003 applied	mean grade applied	estimated (dbne)	mean grade applied
db_sth	CE	0.003 applied	mean grade applied	0.003 applied	mean grade applied
Dac nth	PS	Estimated as one (D=dacn)			
Dac sth	PS	Estimated as one (D=dacs)			

Multiple pass estimation was undertaken with estimation criteria such as the number of samples and search ellipse relaxed with each subsequent pass. Once a block was estimated with a grade, the block was flagged as estimated. Subsequent estimation passes would only see blocks that were not flagged as estimated. Key parameters used in the estimation plan of both the Cactus and Parks/Salyer block models are outlined in Table 14-13 and Table 14-14, respectively. Block grade estimates were undertaken on the parent cell size.

Table 14-13: Key Parameters used in Each Search Pass for Cactus

Minzone	Domain	Pass	Number of Samples					Search Distances		
			Min	Max	Max/Octant	Min Octant	Max/Hole	Major	Semi	Minor
Enriched and Oxide	mineralized	1	5	12	3	3	3	160	160	75
		2	5	10			3	300	300	100
		3	3	8			2	500	500	250
		4	2	7			3	750	750	300
	Leached/Waste	1	5	12	3	3	3	160	160	75
		2	5	10			3	300	300	100
		3	3	8			2	500	500	250
		4	2	7			3	750	750	300
Primary	mineralized	1	5	12	3	3	3	160	160	75
		2	5	10			3	300	300	100
		3	3	8			2	500	500	250
		4	2	7			3	750	750	300

Table 14-14: Key Parameters used in Each Search Pass for Parks/Salyer

Minzone	Domain	Pass	Number of Samples				Search Distances				Soft Boundaries			
			Min	Max	Max/ Octant	Min Octant	Max/ Hole	Major	Semi	Minor	Domain	Major	Semi	Minor
Enriched and Oxide	Hg	1	5	10	3	3	3	320	160	100	Lg	160	160	35
		2	3	8			2	600	300	250	Lg	300	300	50
		3	2	7			3	750	500	300	Lg	300	300	50
	lg	1	5	10	3	3	3	320	750	100	Hg	130	130	35
		2	3	8			2	600	160	250	Hg	130	130	35
		3	2	7			3	750	300	300	Hg	130	130	35
	Leached/waste	1	5	10	3	3	3	320	500	100				
		2	3	8			2	600	750	250				
		3	2	7			3	750	160	300				
Primary	mineralized	1	5	10	3	3	3	320	300	100				
		2	3	8			2	600	500	250				
		3	2	7			3	750	750	300				

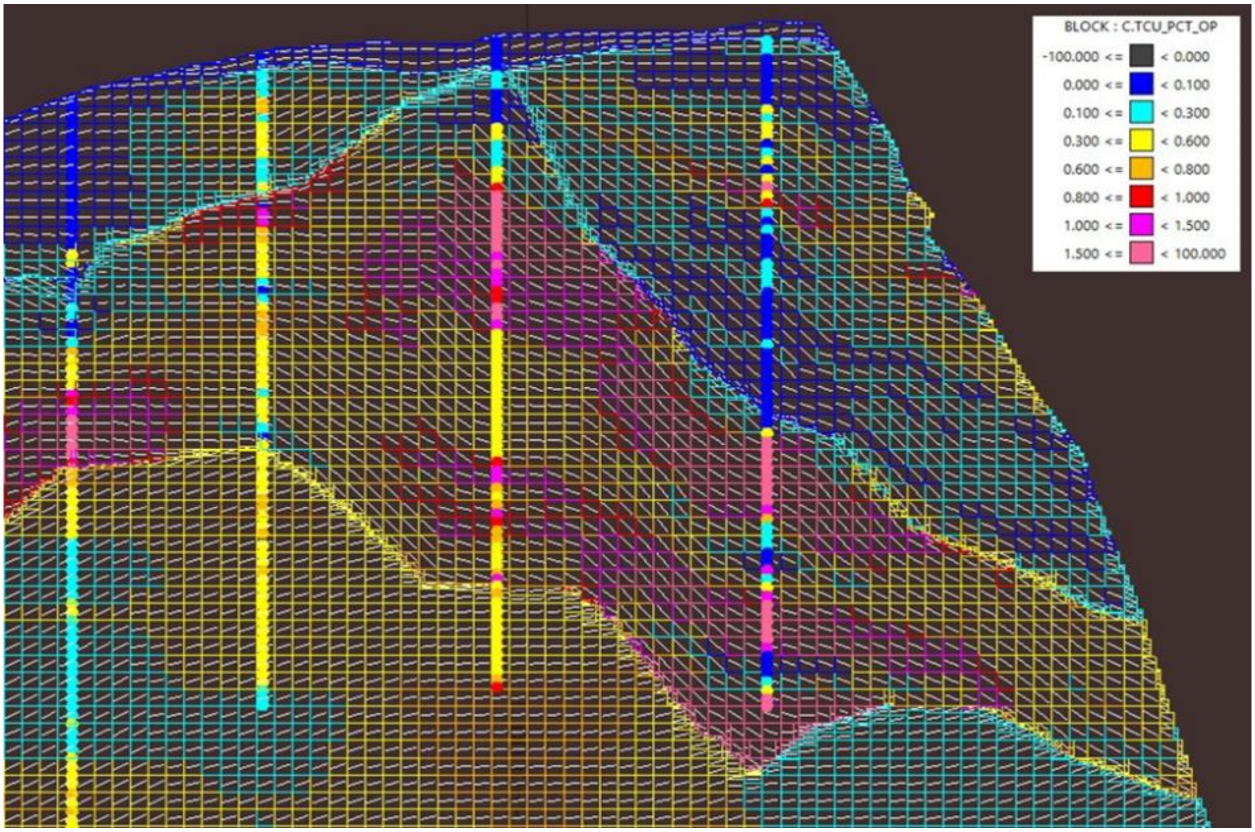
In addition, the following parameters were applied to the estimate:

- The Cactus West and Cactus East deposits were estimated separately with each treated as a hard domain, therefore only composites within Cactus West could be used to estimate Cactus West blocks and visa-versa.
- Each copper mineral domain was treated as a hard domain.
- The estimates for Cactus and Parks/Salyer were undertaken using three passes.
- Un-estimated blocks were assigned a grade of 0.001% CuT.
- Grades were capped using a top-cut method.
- A nearest neighbor was assigned to the blocks during the estimation process for use in validation of the estimate.

A locally varying search orientation methodology was adopted because of these factors. This ensured that blocks being estimated nearer the contact of the oxide and enriched would see samples nearby that were also near the contact of the oxide and enriched (Figure 14-23) and so forth. The white line within each block displays the orientation vector of the major direction of continuity. This corresponds to the major search direction of the search ellipse at each block. Local search orientation vectors were defined using the most appropriate surfaces relating to each copper mineral domain. Table 14-15 outlines the surfaces used to define orientation vectors in each copper mineral domain.

Table 14-15: Domain Surfaces

Domain	Surface(s) Defining Vector Orientation	Description
Leached	South or west fault contact and the top of oxide	Surfaces define upper and lower contacts of the domain as controls on leaching profile.
Oxide	Top of oxide and top of enriched	Surfaces define upper and lower contacts of the domain as controls on secondary enrichment profile.
Enriched	Top of enriched and top of primary	Surfaces define upper and lower contacts of the domain as controls on secondary enrichment profile.
Primary	South or west fault contact	Contact describes the rotation of the overall fault block which controls broader continuity of primary mineralization.



Source: ASCU, May 2022.

Figure 14-23: Representative Cross Section View of the Cactus West Block Model

14.2.11 Mining Depletion

Blocks within the historically mined pit were estimated to aid in validation of the block model estimates and to run a reconciliation of the estimates against reported historical production. Prior to pit optimization and reporting, the block model grades were depleted from the historic pit using a surveyed pit shell. Due to the presence of water in the bottom of the pit, late-stage pit maps and mining reconciliation were reviewed to determine the ultimate depth of the pit. The pit shell was adjusted below the water level to fully deplete for historic production.

No historical mining has been undertaken into either the Cactus East or Parks/Salyer deposits; therefore, no depletion has been applied to these models.

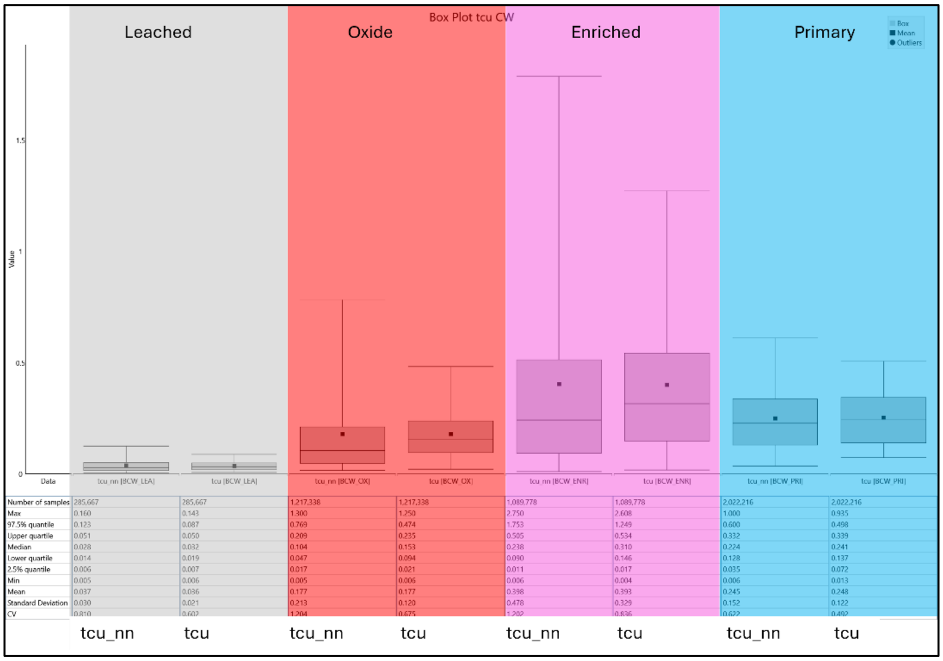
14.2.12 Validations

Validations in this Section include the mined material from the historical open pit. Grades reported in this Section for Cactus West include depleted material and therefore reported grades should not be considered as representative of the material that is remaining.

14.2.12.1 Box Plots

Box plots were created for CuT and Tsol copper to compare estimated mean grades and distributions for each domain against the nearest neighbor. Box plots for Cactus West, Cactus East, and Parks/Salyer are presented in Figure 14-24 through Figure 14-29.

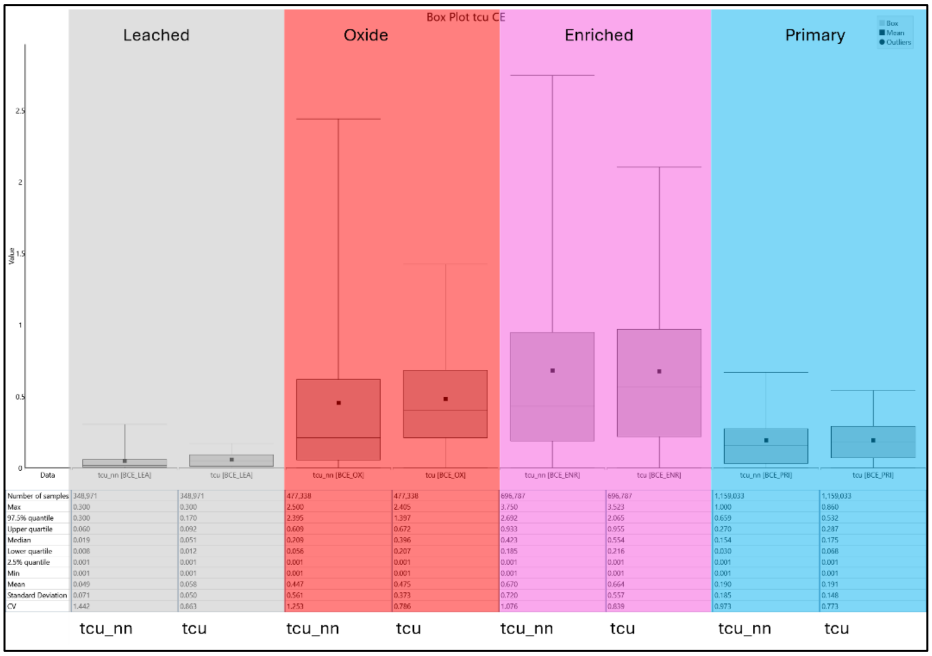
Comparisons show similar mean grades between the estimated blocks and the nearest neighbor. The adjustment from a nearest neighbor sample support to a block estimate support incurs smoothing (particularly for wider spaced drilling programs). This smoothing is visible in the box plots by the restricted box size within the plots for the estimated blocks versus that of the comparison nearest neighbor plots. No maximum values of the nearest neighbor statistics were reported higher than the planned capping grades, indicating that the top cut was applied to the estimation as planned.



	tcu_nn [BCW_LEA]	tcu [BCW_LEA]	tcu_nn [BCW_OX]	tcu [BCW_OX]	tcu_nn [BCW_ENR]	tcu [BCW_ENR]	tcu_nn [BCW_PRI]	tcu [BCW_PRI]
Number of samples	285,667	285,667	1,217,338	1,217,338	1,089,778	1,089,778	2,022,216	2,022,216
Max	0.160	0.143	1.300	1.250	2.750	2.608	1.000	0.935
97.5% quantile	0.123	0.087	0.769	0.474	1.753	1.249	0.600	0.498
Upper quartile	0.051	0.050	0.209	0.235	0.505	0.534	0.332	0.339
Median	0.028	0.032	0.104	0.153	0.238	0.310	0.224	0.241
Lower quartile	0.014	0.019	0.047	0.094	0.090	0.146	0.128	0.137
2.5% quantile	0.006	0.007	0.017	0.021	0.011	0.017	0.035	0.072
Min	0.005	0.006	0.005	0.006	0.006	0.004	0.006	0.013
Mean	0.037	0.036	0.177	0.177	0.398	0.393	0.245	0.248
Standard Deviation	0.030	0.021	0.213	0.120	0.478	0.329	0.152	0.122
CV	0.810	0.602	1.204	0.675	1.202	0.836	0.622	0.492

Source: ASCU, 2022.

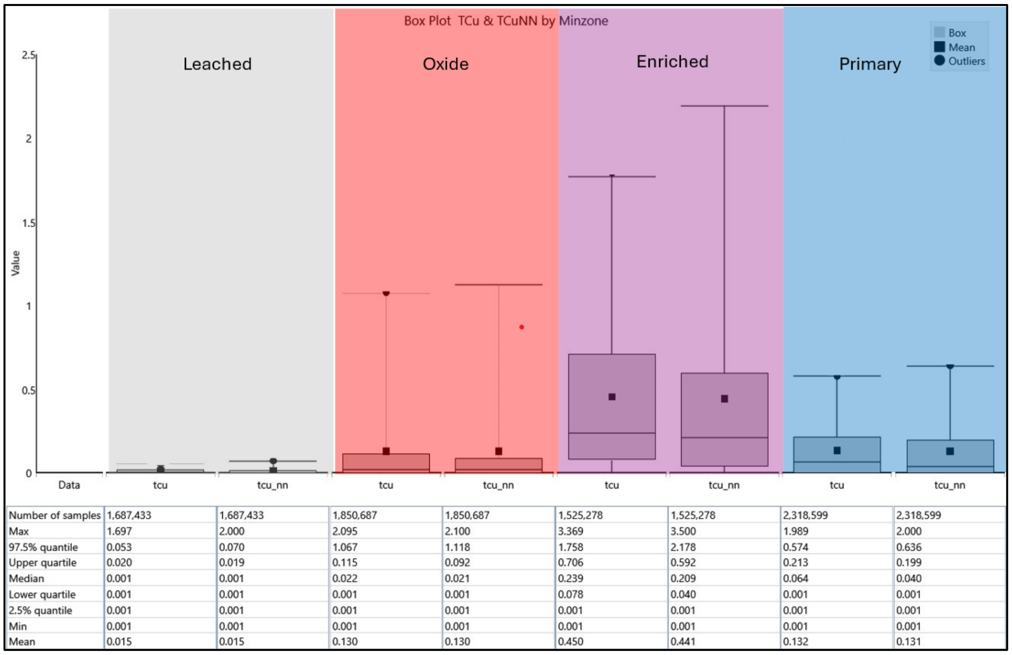
Figure 14-24: Box Plots Comparing the Total Copper for Cactus West Domains Against the Nearest Neighbor



	tcu_nn [BCE_LEA]	tcu [BCE_LEA]	tcu_nn [BCE_OX]	tcu [BCE_OX]	tcu_nn [BCE_ENR]	tcu [BCE_ENR]	tcu_nn [BCE_PRI]	tcu [BCE_PRI]
Number of samples	348,971	348,971	477,338	477,338	696,787	696,787	1,159,033	1,159,033
Max	0.300	0.300	2.500	2.405	3.750	3.523	1.000	0.860
97.5% quantile	0.300	0.170	2.395	1.397	2.692	2.065	0.659	0.532
Upper quartile	0.060	0.092	0.609	0.672	0.933	0.955	0.270	0.287
Median	0.019	0.051	0.209	0.396	0.423	0.554	0.154	0.175
Lower quartile	0.008	0.012	0.056	0.207	0.185	0.216	0.030	0.068
2.5% quantile	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Min	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Mean	0.049	0.058	0.447	0.475	0.670	0.664	0.190	0.191
Standard Deviation	0.071	0.050	0.561	0.373	0.720	0.557	0.185	0.148
CV	1.442	0.863	1.253	0.786	1.076	0.839	0.973	0.773

Source: ASCU, 2022.

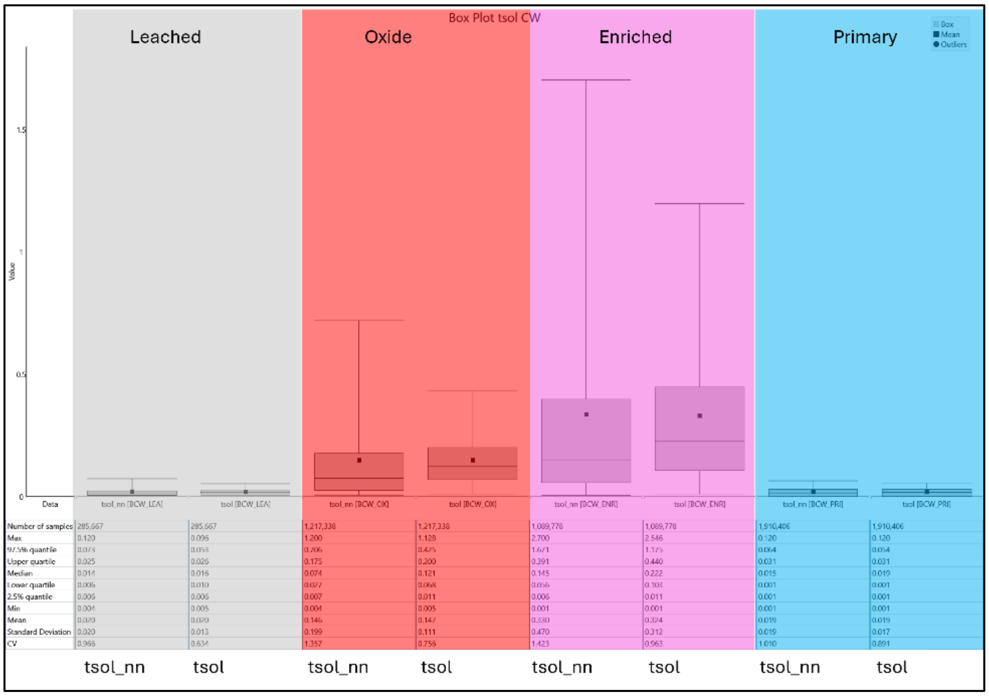
Figure 14-25: Box Plots Comparing the CuT for Cactus East Domains Against the Nearest Neighbor



Data	tcu	tcu_nn	tcu	tcu_nn	tcu	tcu_nn	tcu	tcu_nn
Number of samples	1,687,433	1,687,433	1,850,687	1,850,687	1,525,278	1,525,278	2,318,599	2,318,599
Max	1.697	2.000	2.095	2.100	3.369	3.500	1.989	2.000
97.5% quantile	0.053	0.070	1.067	1.118	1.758	2.178	0.574	0.636
Upper quartile	0.020	0.019	0.115	0.092	0.706	0.592	0.213	0.199
Median	0.001	0.001	0.022	0.021	0.239	0.209	0.064	0.040
Lower quartile	0.001	0.001	0.001	0.001	0.078	0.040	0.001	0.001
2.5% quantile	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Min	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Mean	0.015	0.015	0.130	0.130	0.450	0.441	0.132	0.131

Source: ALS Geo Resources, 2024.

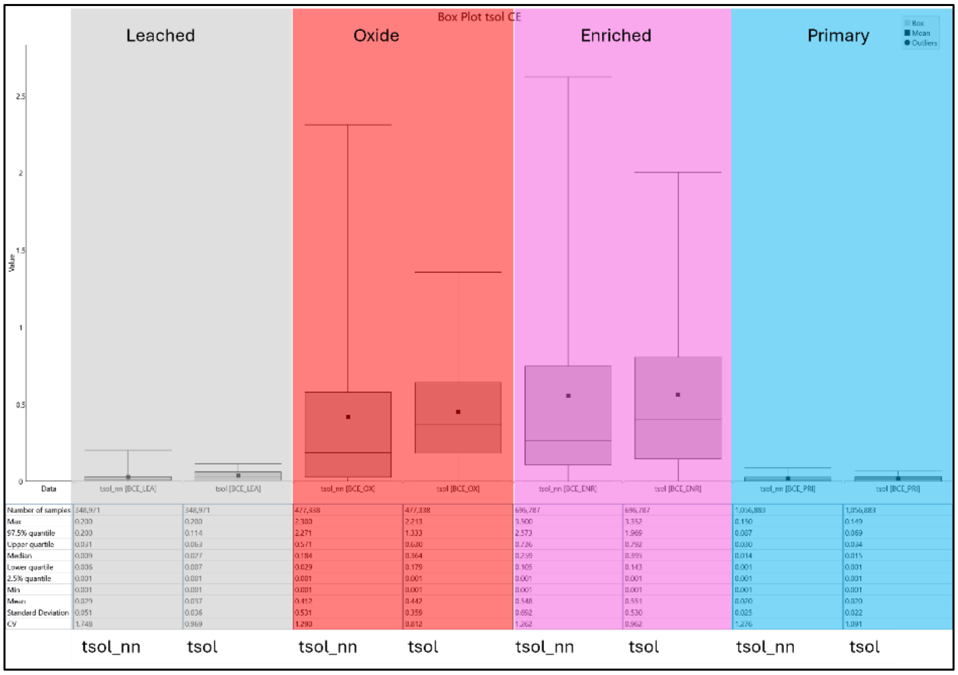
Figure 14-26: Box Plots Comparing the CuT for Parks/Salyer Domains Against the Nearest Neighbor



Data	tsol_nn [BCW_LEA]	tsol [BCW_LEA]	tsol_nn [BCW_OX]	tsol [BCW_OX]	tsol_nn [BCW_ENR]	tsol [BCW_ENR]	tsol_nn [BCW_PRI]	tsol [BCW_PRI]
Number of samples	285,667	285,667	1,217,338	1,217,338	1,089,778	1,089,778	1,910,406	1,910,406
Max	0.120	0.096	1.200	1.128	2.700	2.546	0.120	0.120
97.5% quantile	0.073	0.053	0.706	0.425	1.671	1.175	0.064	0.054
Upper quartile	0.025	0.026	0.175	0.200	0.391	0.440	0.031	0.031
Median	0.014	0.016	0.074	0.121	0.145	0.222	0.015	0.019
Lower quartile	0.006	0.010	0.027	0.068	0.056	0.103	0.001	0.001
2.5% quantile	0.006	0.006	0.007	0.011	0.006	0.011	0.001	0.001
Min	0.004	0.005	0.004	0.005	0.001	0.001	0.001	0.001
Mean	0.020	0.020	0.146	0.147	0.330	0.324	0.019	0.019
Standard Deviation	0.020	0.013	0.199	0.111	0.470	0.312	0.019	0.017
CV	0.966	0.634	1.357	0.756	1.423	0.963	1.010	0.891

Source: ASCU, 2022.

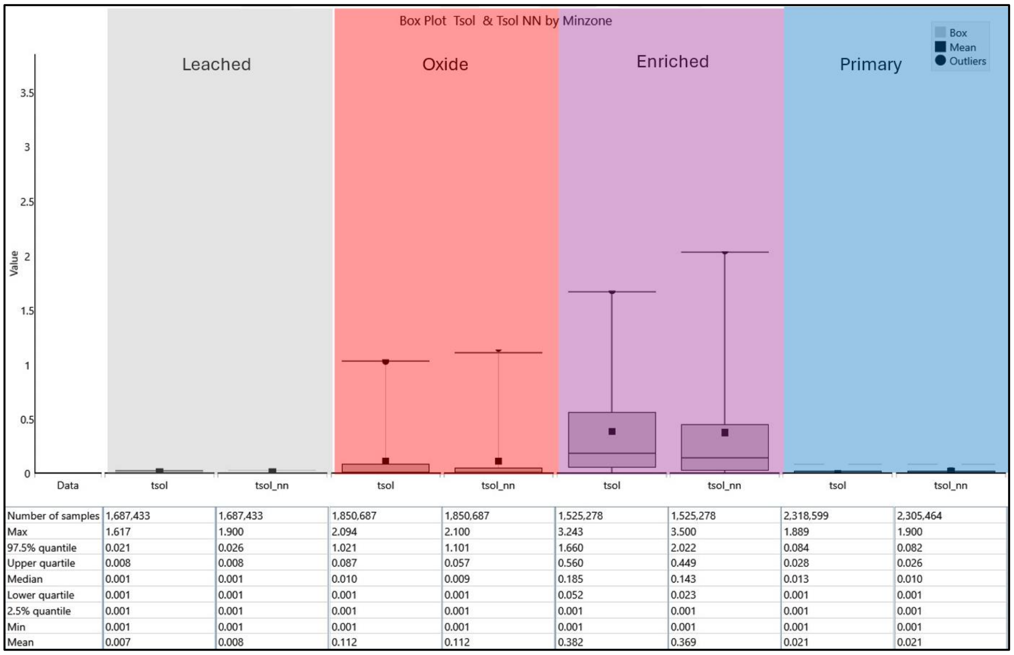
Figure 14-27: Box Plots Comparing the Total Soluble Copper for Cactus West Domains Against the Nearest Neighbor



	tsol_nn [BCE_LEA]	tsol [BCE_LEA]	tsol_nn [BCE_OX]	tsol [BCE_OX]	tsol_nn [BCE_ENR]	tsol [BCE_ENR]	tsol_nn [BCE_PRI]	tsol [BCE_PRI]
Number of samples	348,971	348,971	477,338	477,338	696,787	696,787	1,056,883	1,056,883
Max	0.200	0.200	2.300	2.213	3.500	3.352	0.150	0.149
97.5% quantile	0.200	0.114	2.271	1.333	2.573	1.969	0.087	0.069
Upper quartile	0.031	0.063	0.571	0.630	0.736	0.792	0.030	0.034
Median	0.009	0.027	0.184	0.364	0.259	0.395	0.014	0.015
Lower quartile	0.006	0.007	0.029	0.179	0.105	0.143	0.001	0.001
2.5% quantile	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Min	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Mean	0.029	0.037	0.412	0.442	0.548	0.551	0.020	0.020
Standard Deviation	0.051	0.036	0.531	0.359	0.692	0.530	0.025	0.022
CV	1.748	0.969	1.290	0.812	1.262	0.962	1.276	1.091

Source: ASCU, 2022.

Figure 14-28: Box Plots Comparing the Total Soluble Copper for Cactus East Domains Against the Nearest Neighbor



	tsol	tsol_nn	tsol	tsol_nn	tsol	tsol_nn	tsol	tsol_nn
Number of samples	1,687,433	1,687,433	1,850,687	1,850,687	1,525,278	1,525,278	2,318,599	2,305,464
Max	1.617	1.900	2.094	2.100	3.243	3.500	1.889	1.900
97.5% quantile	0.021	0.026	1.021	1.101	1.660	2.022	0.084	0.082
Upper quartile	0.008	0.008	0.087	0.057	0.560	0.449	0.028	0.026
Median	0.001	0.001	0.010	0.009	0.185	0.143	0.013	0.010
Lower quartile	0.001	0.001	0.001	0.001	0.052	0.023	0.001	0.001
2.5% quantile	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Min	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Mean	0.007	0.008	0.112	0.112	0.382	0.369	0.021	0.021

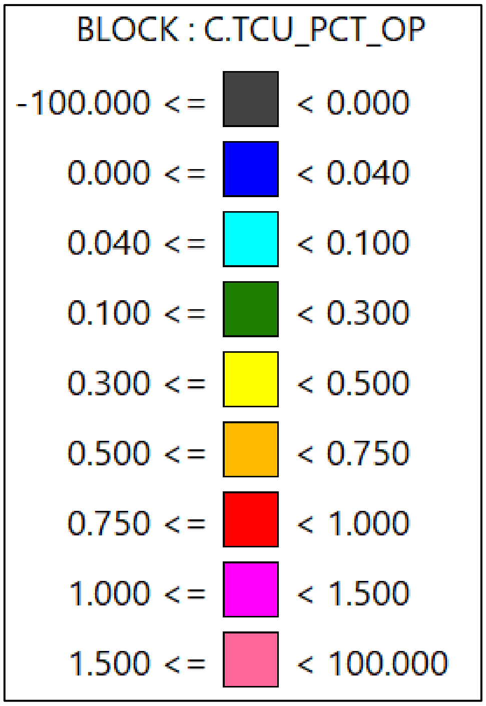
Source: ALS Geo Resources, 2024.

Figure 14-29: Box Plots Comparing the Total Soluble Copper for Parks/Salyer Domains Against the Nearest Neighbor

14.2.12.2 Visual Validations

The color legend of Figure 14-30 is applied to all block and composite grade values for comparative purposes. The legend applies to CuT and Tsol. Examination indicates appropriate agreement of block grade estimates with the composites. Visual validations confirm the overall grade trends through the copper mineral domains are represented as planned.

On a local scale, model validation can be confirmed by the visual comparison of block grades to composite grades. A long Section through the Cactus East and Cactus West, plus a cross Section through each of the Cactus East, Cactus West, and Parks/Salyer deposits, show grade trends through the block model. The first Section of each pair shows total copper values, the second shows Tsol values. Each Section shows the estimated variables with composites superimposed as dots on block grades in Figure 14-31 through Figure 14-38.

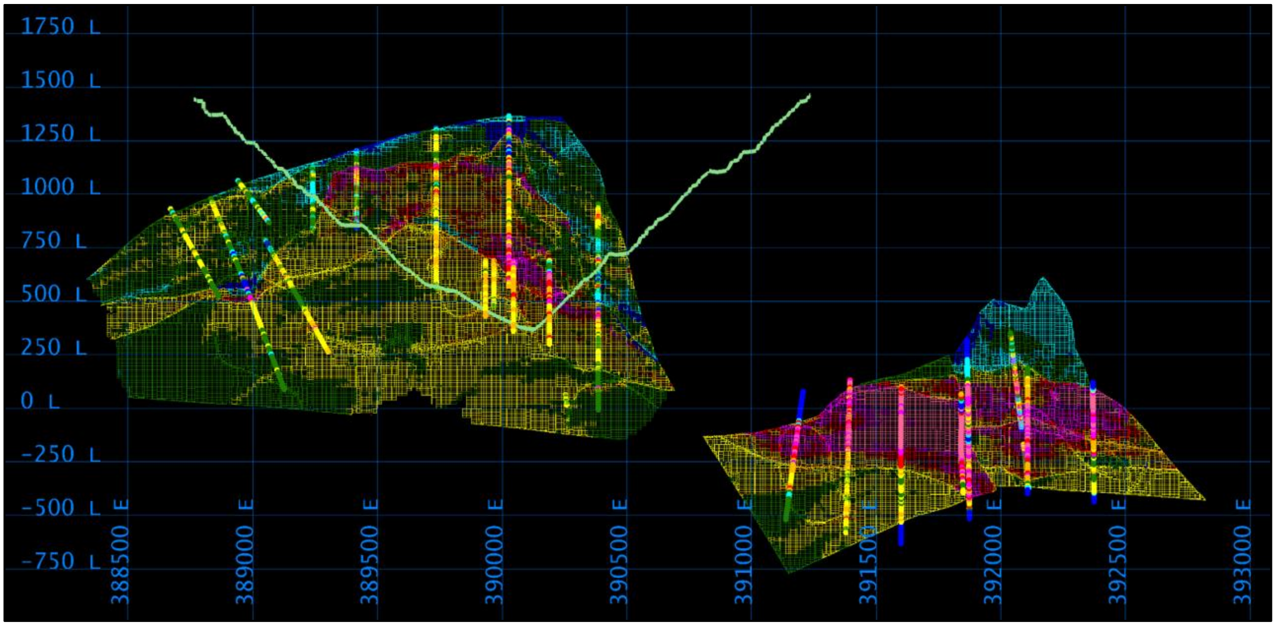


BLOCK : C.TCU_PCT_OP

-100.000	<=	⬛	<	0.000
0.000	<=	🟦	<	0.040
0.040	<=	🟦	<	0.100
0.100	<=	🟩	<	0.300
0.300	<=	🟨	<	0.500
0.500	<=	🟧	<	0.750
0.750	<=	🟥	<	1.000
1.000	<=	🟪	<	1.500
1.500	<=	🟥	<	100.000

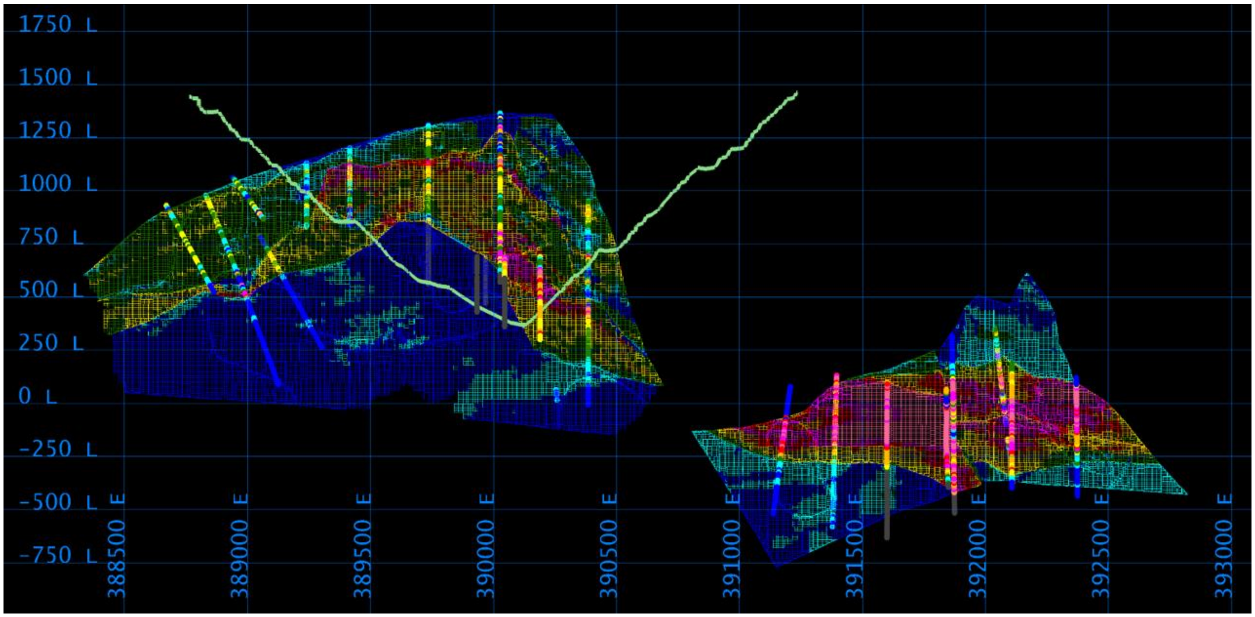
Source: ASCU, 2022

Figure 14-30: Legend for Total Copper and Total Soluble Grades



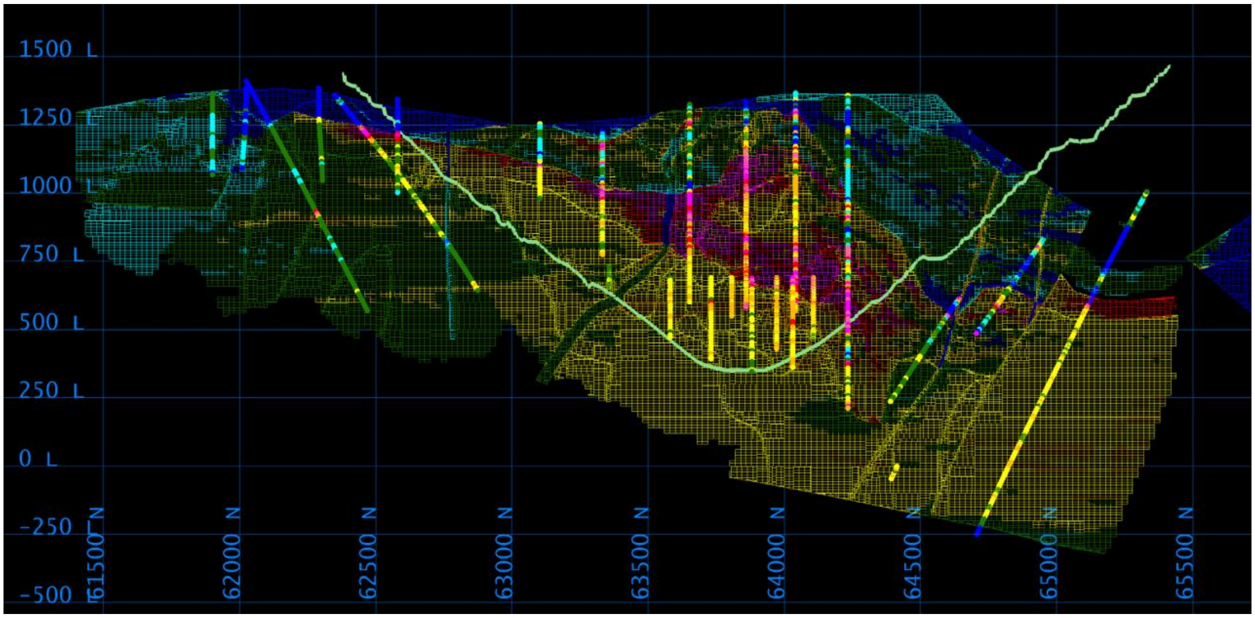
Note: Viewing Total Copper Grades for Both Composites and Block Estimates. Source: ASCU, 2022.

Figure 14-31: Long Section through Cactus West and Cactus East, Facing Northwest



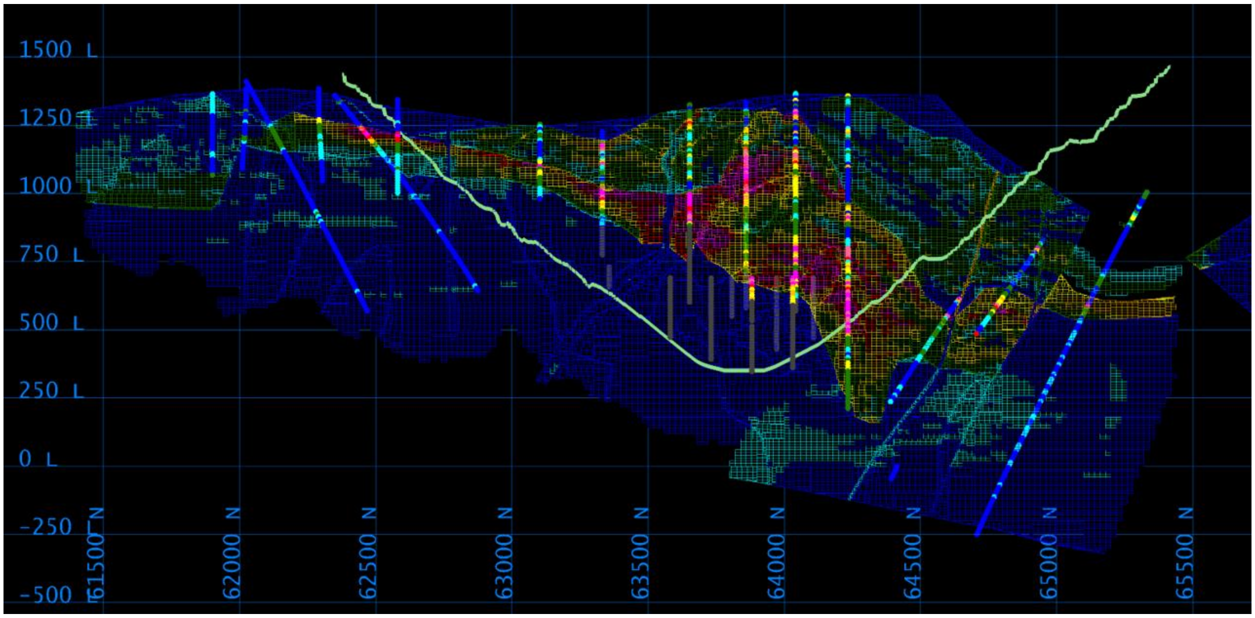
Note: Viewing Tsol grades for both composites and block estimates. Source: ASCU, 2022.

Figure 14-32: Long Section through Cactus West and Cactus East, Facing Northwest



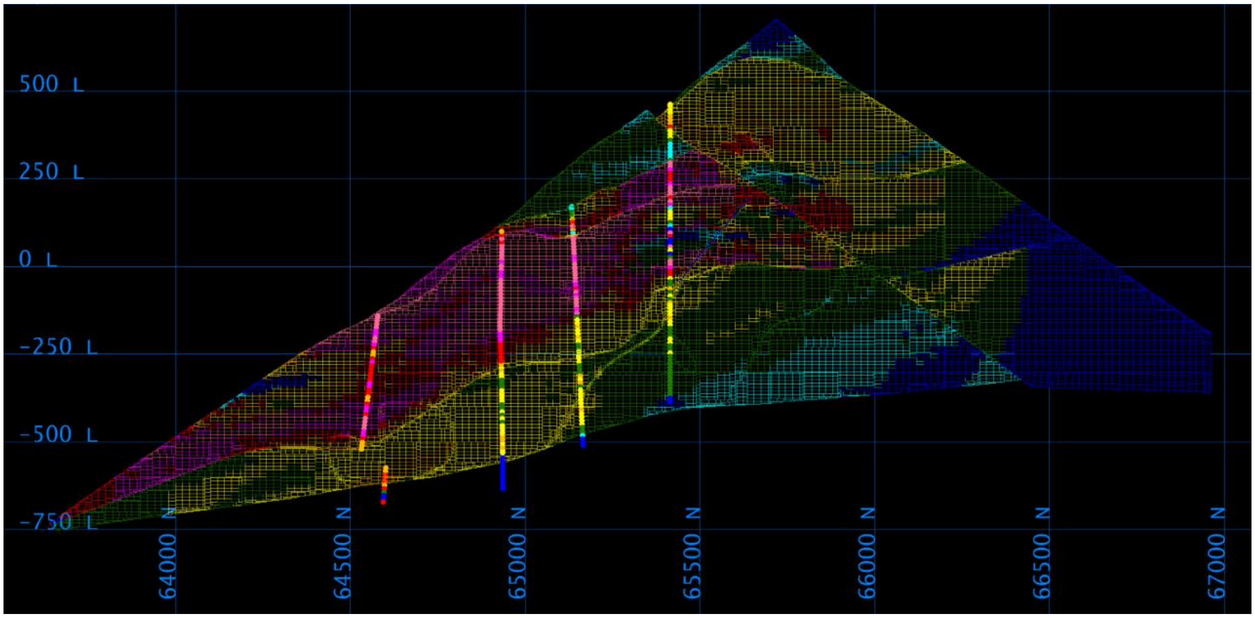
Note: Viewing CuT grades for both composites and block estimates. Source: ASCU, 2022

Figure 14-33: Cross Section (390000E) through Cactus West, Facing West



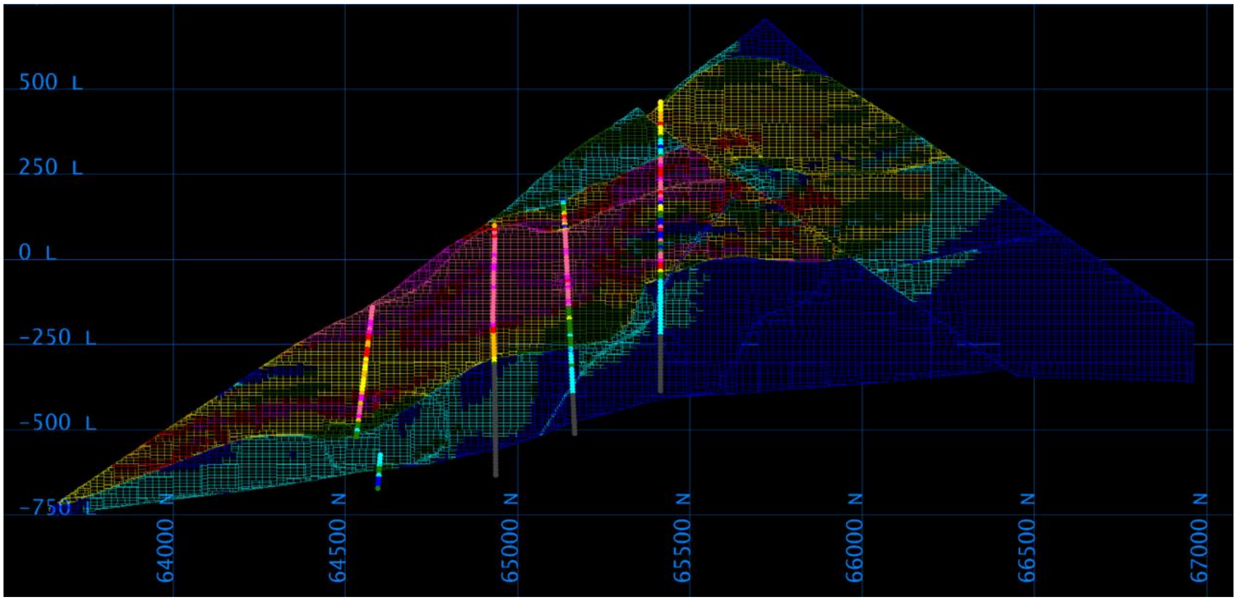
Note: Viewing Tsol grades for both composites and block estimates. Source: ASCU, 2022.

Figure 14-34: Cross Section (390000E) through Cactus West, Facing West



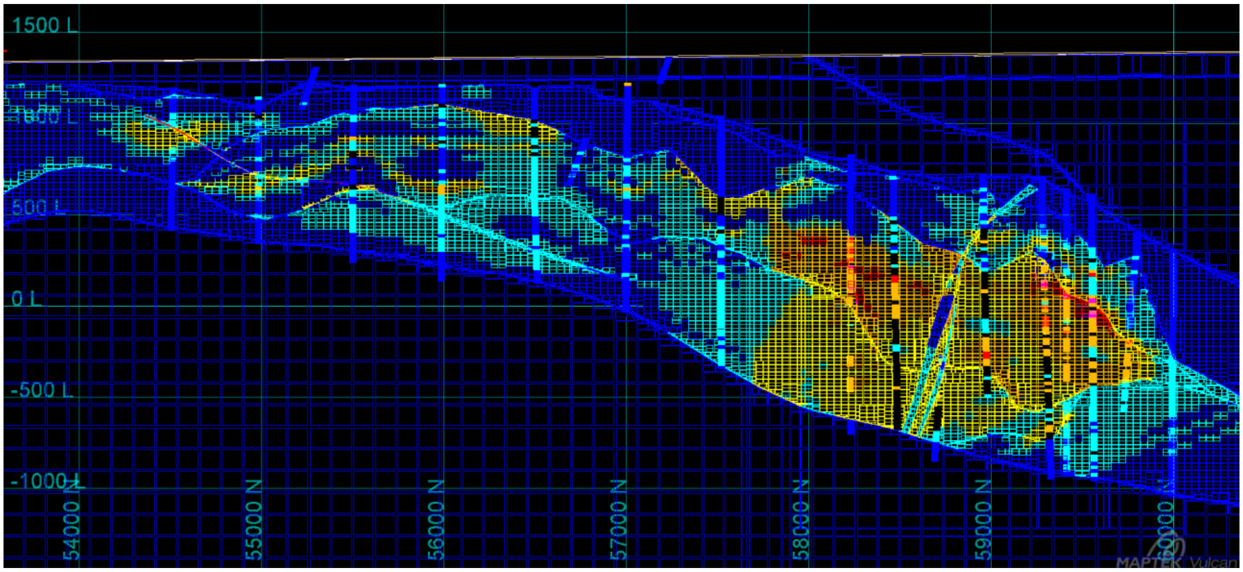
Note: Viewing CuT grades for both composites and block estimates. Source: ASCU, 2022.

Figure 14-35: Cross Section (391550E) through Cactus East, Facing West



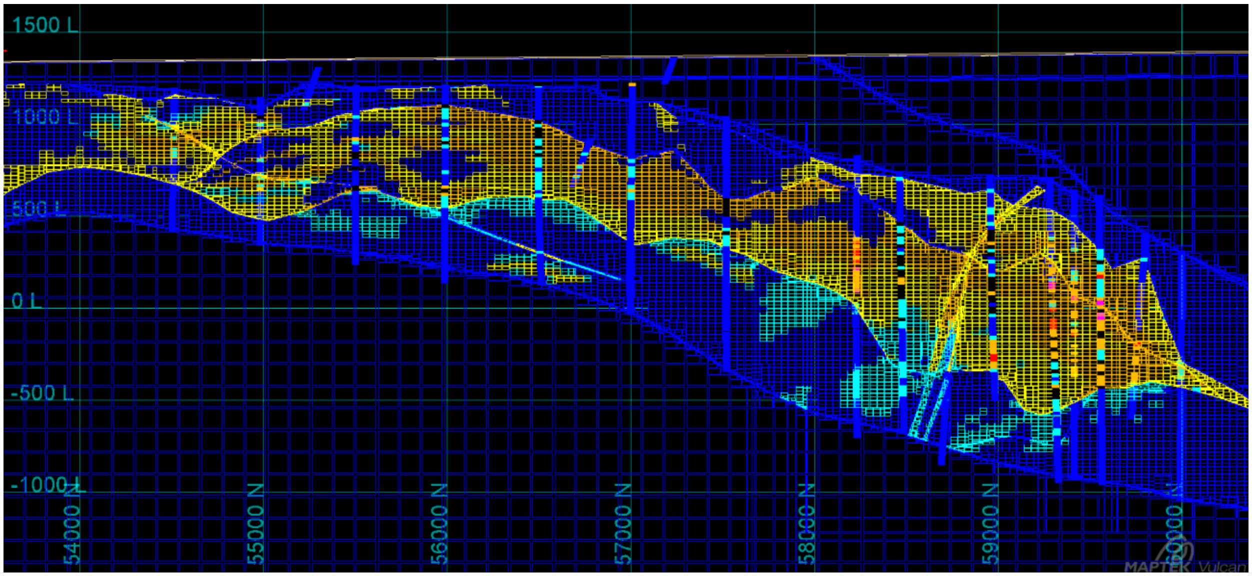
Note: Viewing Tsol grades for both composites and block estimates. Source: ASCU, 2022.

Figure 14-36: Cross Section (391550E) through Cactus East, Facing West



Viewing CuT grades for both composites and block estimates. Source: ALS Geo Resources, 2024.

Figure 14-37: Cross Section (384000E) through Parks/Salyer, Facing West



Note: Viewing Tsol grades for both composites and block estimates. ALS Geo Resources, 2024

Figure 14-38: Cross Section (384000E) through Parks/Salyer, Facing West

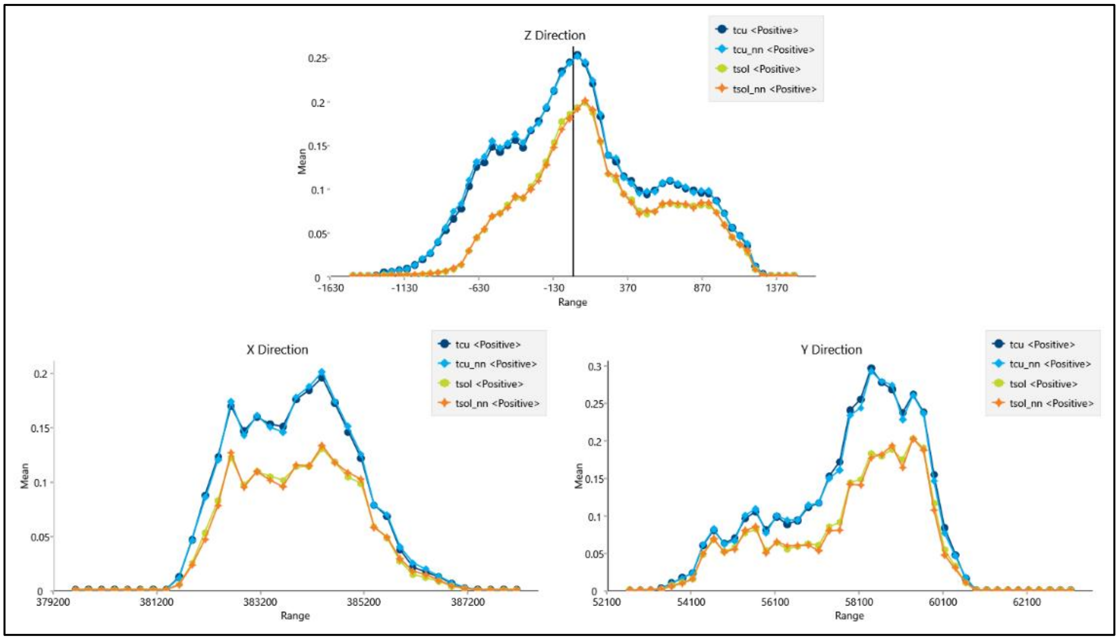
14.2.12.3 Swath Plots

Swath plots were created to compare the grade trends through the Cactus West, Cactus East, and Parks/Salyer deposits between the estimated CuT and Tsol against the nearest neighbor models.

Comparisons for CuT and Tsol in Cactus West and West and Parks/Salyer are shown in Figure 14-40 and Figure 14-41, respectively, for easting (X direction), northing (Y direction), and elevation (Z direction).

There is good consistency in the grade trends defined by both the nearest neighbor values and the estimated block grades for both Cactus West and East, and Parks/Salyer Block Model Regularization

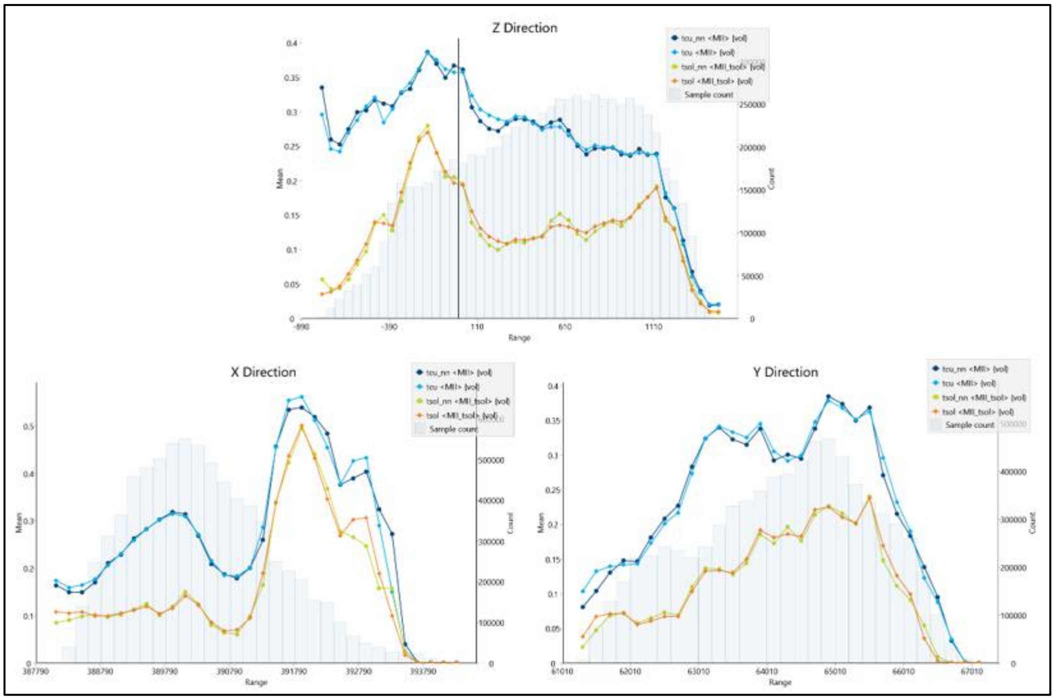
Prior to running the pit optimizer, the Cactus sub-blocked model was regularized to a new block model with regular block dimensions of 20 ft (6 m) by 20 ft (6 m) by 20 ft (6 m). Estimated grades were averaged to the regular blocks using volume weighted averaging of each of the smaller blocks falling within the larger block. In many cases, the estimated block size was the same as the regularized block size. This regularization process added contact dilution at the boundaries of the copper mineral domains. Table 14-16 outlines the block model parameters which match the Cactus sub-block model entirely except for the application of sub- blocking.



Source: ALS Geo Resources, 2024.

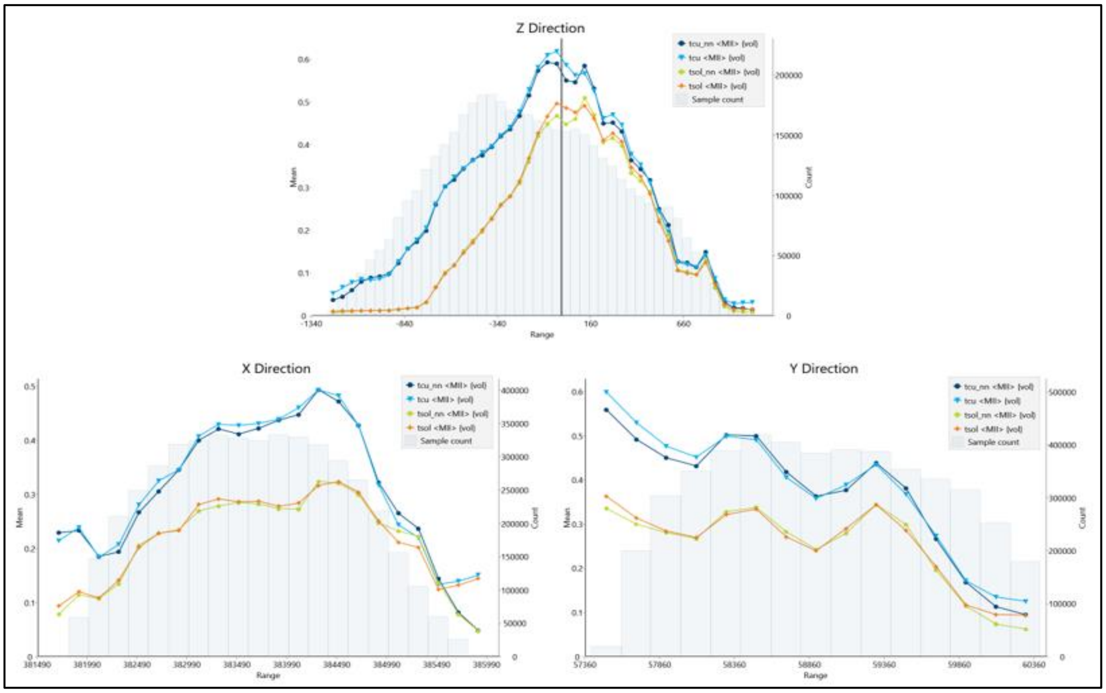
Figure 14-39: Swath Plots through Parks/Salyer Comparison with Associated Nearest Neighbor Grade Trends

Table 14-16 outlines the block model parameters which match the Cactus sub-block model entirely except for the application of sub- blocking.



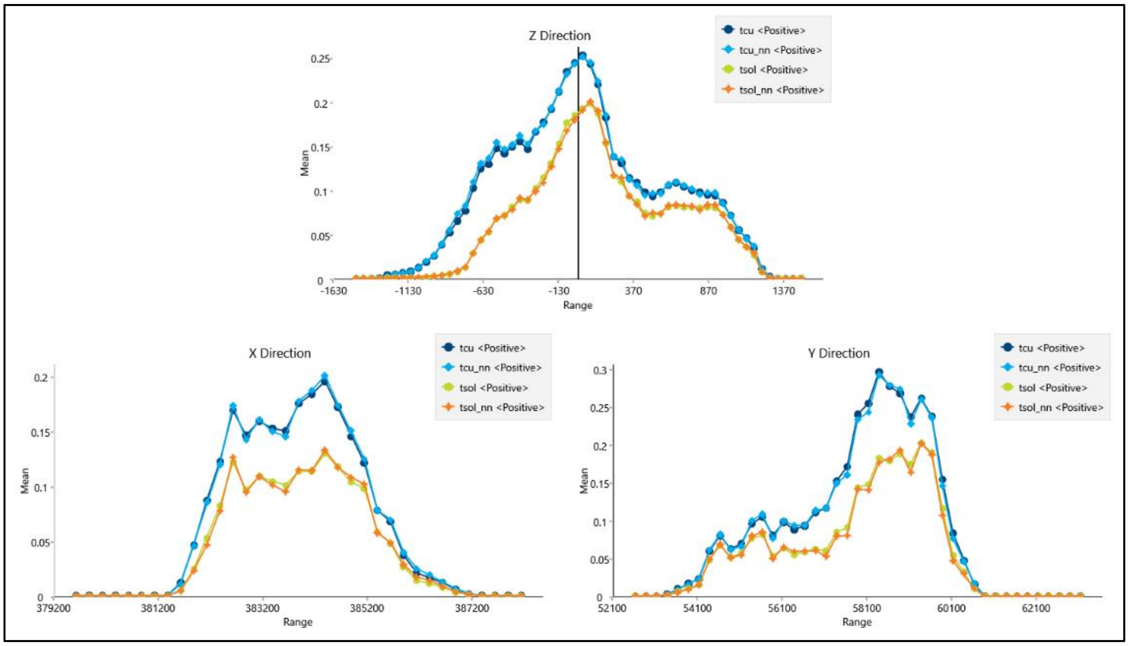
Source: ASCU, 2022.

Figure 14-40: Swath Plots through Cactus West Comparison with Associated Nearest Neighbor Grade Trends



Source: ASCU, 2022.

Figure 14-41: Swath Plots through Cactus East Comparison with Associated Nearest Neighbor Grade Trends



Source: ALS Geo Resources, 2024.

Figure 14-41: Swath Plots through Parks/Salyer Comparison with Associated Nearest Neighbor Grade Trends

Table 14-16: Cactus Regularized Block Model Definition Parameters

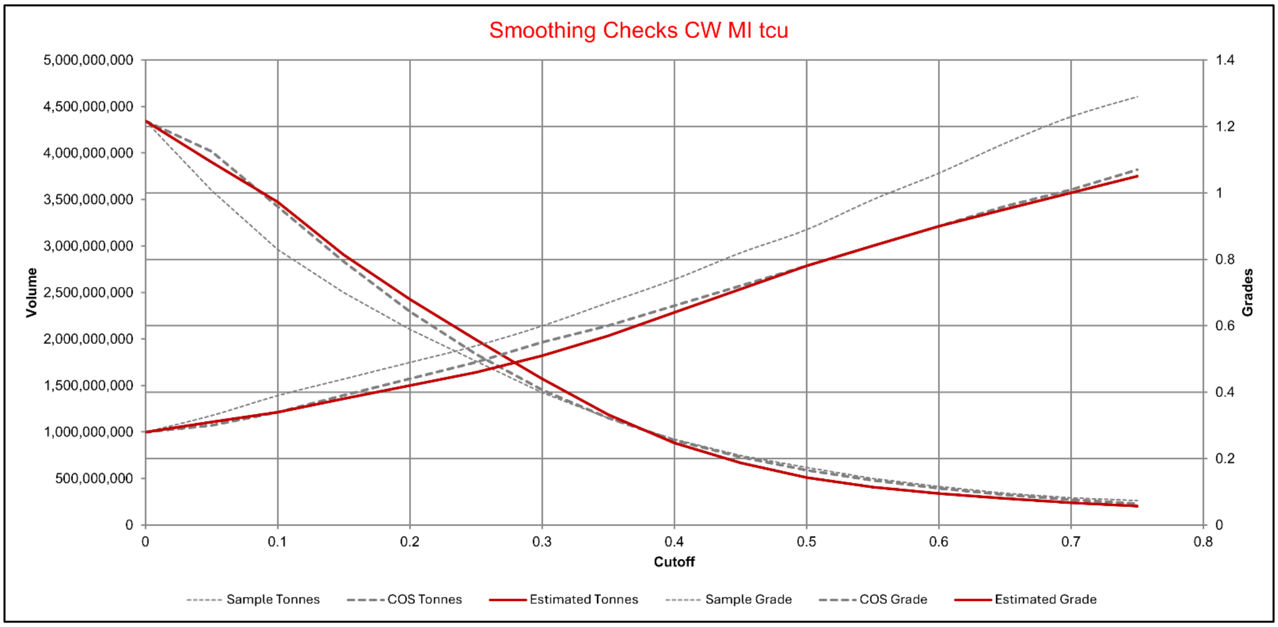
Block Model Definitions	X	Y	Z
Origin	385,900	60,800	-1,000
Bearing/Dip/Plunge	90	0	0
Offset Minimum	0	0	0
Extent Maximum	9,100	8,100	3,000
Parent Block Size	40	40	40
Total Blocks		**27,641,250**	

Table 14-17: Parks/Salyer Regularized Block Model Definition Parameters

Block Model Definitions	X	Y	Z
Origin	379,500	52,500	-1,500
Bearing/Dip/Plunge	90	0	0
Offset Minimum	0	0	0
Extent Maximum	8,520	10,560	3,600
Parent Block Size	40	40	40
Total Blocks		**5,060,880**	

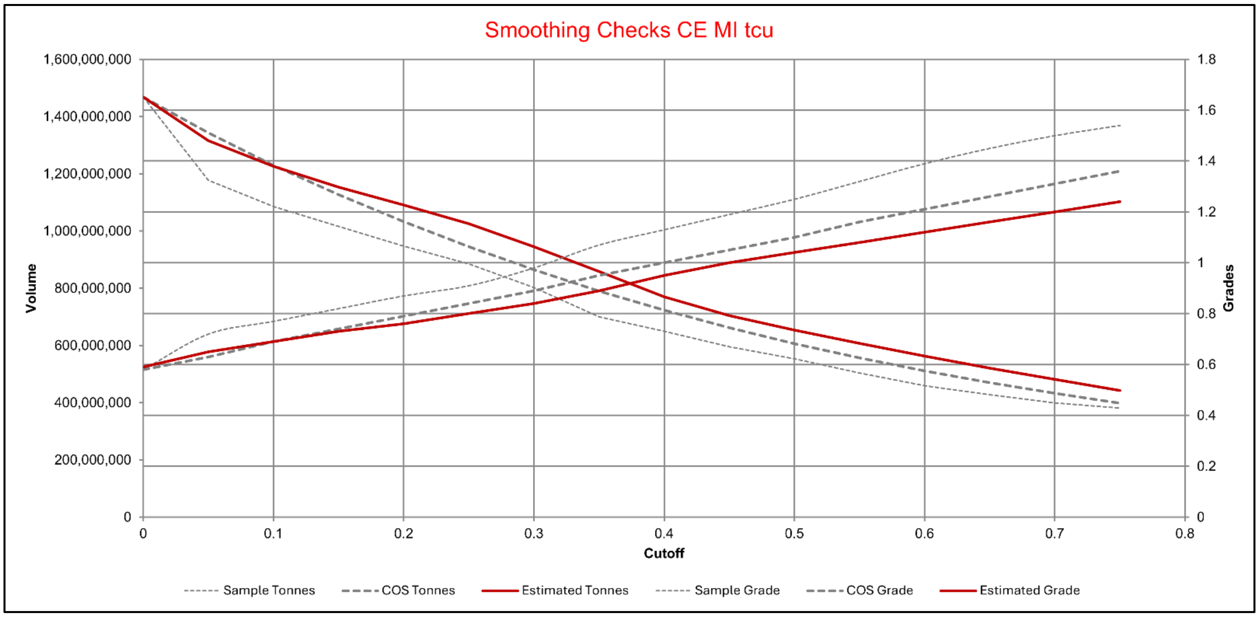
14.2.12.4 Smoothing Checks

Change of support smoothing checks were undertaken to measure the appropriateness of the estimated grade tonnage curve in generating a recoverable resource appropriate to the potential mining method, associated selective mining unit size, and a range of potential economic CoGs. Change of support smoothing checks allow the determination of the expected global grade tonnage curve based on a selective mining unit support size (20 ft (6 m) by 20 ft (6 m) by 20 ft (6 m) in this case) and make use of the underlying sample distribution and a model of grade continuity to remap the grade tonnage curve appropriately for that support. Whilst theoretical and global in nature, the change of support grade tonnage curve provides a reasonable measure of the level of smoothing that should be expected in the estimated resource model. The estimation of small blocks from wide spaced drilling is known to over-smooth resource model estimates when reporting against a cutoff. Smoothing checks provide a measure of the level of smoothing to allow tuning of the estimation plan to estimate a grade tonnage curve more appropriate for mine planning purposes. Smoothing checks were performed on the regularized block model to ensure block volume supports were consistent. Smoothing checks for Cactus West, Cactus East, and Parks/Salyer are presented in Figure 14-42 through Figure 14-44, respectively. The smoothing of Cactus East matches the change of support model well with grade, tons, and final metal within 5% for all cutoffs. The smoothing of Cactus West does not match the change of support metal so well, it is reasonable for tons, but much lower with respect to grade. The grade tonnage curve presented is depleted for the mined pit material. It may be that the higher-grade depleted pit material is affecting this comparison which makes the grade appear low. Efforts to increase the grade in the estimate did not provide a significant grade uplift. This may indicate some conservatism in the estimates for Cactus West. The cause of this effect, and the true grade tonnage curve will be confirmed with further infill drilling. The smoothing of Cactus East and Parks/Salyer match the theoretical change of support models well. Figure 14-42 through Figure 14-44 show change of support smoothing check comparisons.



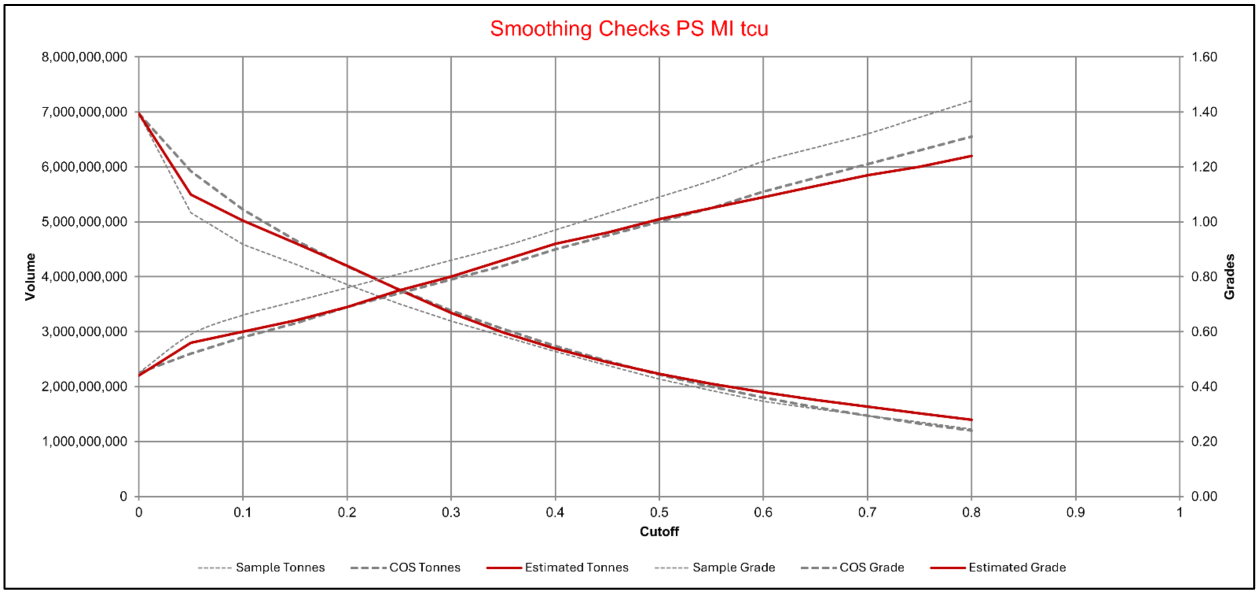
Source: ASCU, 2022.

Figure 14-42: Change of Support Smoothing Check Comparison for Cactus West



Source: ASCU, 2022.

Figure 14-43: Change of Support Smoothing Check Comparison for Cactus East



Source: ASCU, 2022.

Figure 14-44: Change of Support Smoothing Check Comparison for Parks/Salyer

14.2.13 Resource Classification

Following are the key criteria affecting the classification of Resources for the Cactus and Parks/Salyer deposits:

- Understanding of the geological model and controls on mineralization, drill hole spacing, and the presence of downhole surveys for deeper mineralization such as Cactus East.

- The geological model and its controls on mineralization is generally well understood with the combination of copper mineral zones and sequential copper analyses to confirm relationships.

Drill spacing within the Cactus and Parks/Salyer deposits were defined with the following in mind:

- Wide exploration drill holes were infilled to 500 ft (152 m) spacing to support initial resource delineation. 500 ft (152 m) spacing was determined to be an appropriate spacing for an Inferred Resource classification. Drilling to 500 ft (152 m) spacing was undertaken both historically, and as part of the resource expansion drilling undertaken by Arizona Sonoran between 2020 and 2023.

- In the higher-grade core of the deposits, further infill drilling was undertaken historically to reduce the drill spacing to 250 ft (72 m) spacing to support more detailed mine planning. A 250 ft (72 m) drill spacing is seen as an appropriate spacing to determine an Indicated Resource classification.

- Within the south portion of the Cactus West deposit shallow RC drilling was undertaken to reduce spacing down to 125 ft (38 m). In Parks/Salyer a higher-grade area on the eastern portion of the deposit was infilled to 125 ft (38 m). In Parks/Salyer a higher-grade area on the eastern portion of the deposit was infilled to 125 ft (38 m). This spacing supports Measured Resources.

In the historic ASARCO drilling, only a few of the holes within the core of the Cactus East mineralized zone contained downhole surveys. In the early drilling phases of the Project, vertical holes drilled were assumed to not deviate significantly at depth. Later downhole surveying proved this to be untrue, especially as holes got deeper. In areas of the Cactus East deposit where holes did not have downhole surveys, material has been downgraded from Indicated back to Inferred as the accuracy of the drill hole location, and therefore geological contacts and metal, may vary significantly from that modelled.

Basic definition of Measured, Indicated, and Inferred classifications was defined by the estimation pass in which the blocks were estimated. Blocks estimated in Pass 1 could be assigned to Measured, blocks estimated in Pass 2 could be assigned to Indicated, and blocks estimated in Pass 3 could be assigned to Inferred. For Measured an additional requirement was applied using an octant reach. This required that blocks had drilling surrounding them before they were flagged as Measured. A subsequent test pass of the Measured and Indicated classification was undertaken using only holes that contained downhole surveys.

For Cactus, interpreted triangulation were created to define the classification of Measured and Indicated encompassing the drillholes drilled to 125 ft (38 m) and 250 ft (76 m) spacing respectively and, in the case of CE, ensuring that holes contained downhole surveys. Inferred classification was assigned based on material falling outside these triangulations but having been estimated in any of passes 1 to 3.

For Parks/Salyer, an interpreted triangulation was created to define the classification of Measured, Indicated, and Inferred encompassing the drillholes drilled to 125 ft, (38 m), 250 ft (76 m), and 500 ft (152 m.) spacing respectively.

14.3 CACTUS STOCKPILE PROJECT

The inverse distance (ID1) method was used for the estimation of copper grades to the model due to the generally unstructured geological nature of a stockpile. Copper estimates were performed on CuT, CuAS, and sequential CuCN. Tsol results were calculated by adding the estimated CuAS to the CuCN. Validations made use of the nearest neighbor (polygonal) method for statistical and visual review.

14.3.1 Stockpile Project Modelling

The mineralized Stockpile Project represents a mixture of material types mined from the pit spatially over time. For this reason, the focus of the modelling was the following:

- Create an accurate topographical surface of the Stockpile Project surface and its base to define the Stockpile Project volume and extents.
- Characterize definitively non-mineralized zones from potentially mineralized zones.
- Define the historical lifts throughout the Stockpile Project that would vertically separate material mined in different time periods.
- Understand historical stockpile dumping schedules to honor long-lived internal stockpile boundaries.

The topography was modeled from a site-specific Lidar survey undertaken in 2018. Lidar data contains fine point resolution to accurately reflect the elevational changes of the topographic surface. The surface was filtered to remove and combine adjacent flat triangles. This improves efficiency of the triangulation for use in modelling with little to no loss in fidelity.

Aside from surface infrastructure such as the Stockpile itself, dumps, and pits, the topography is generally gently dipping to the south with insignificant drainage channels. The discovery outcrop to the south of the historic Sacaton open pit represents the only natural land feature of any prominence in the local area of the historic mine.

There were two small volume areas on the mineralized Stockpile Project that had been reshaped due to rehabilitation activities since the Lidar was undertaken. These areas were surveyed in the field measuring toe, crest, and spot height observations and the data used to update the Lidar topography locally Figure 14-45 identifies these areas within the mineralized Stockpile Project that were adjusted.

Source: ASCU, 2022.

Figure 14-45: Plan View of Mineralized Stockpile Project

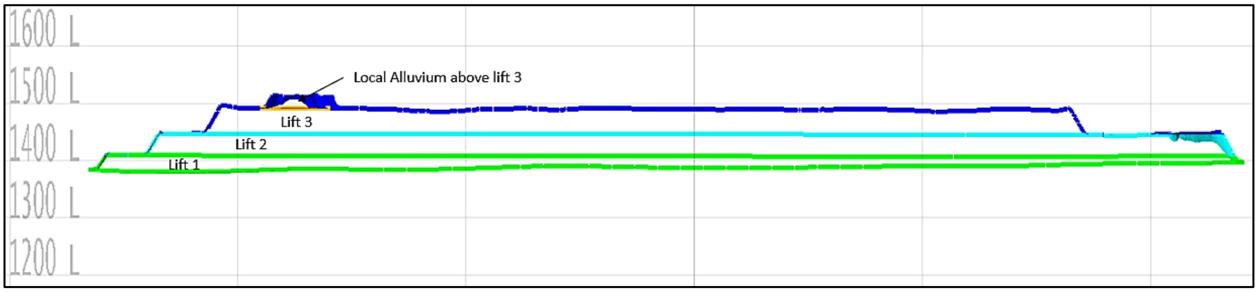
Red points indicated the updated survey data acquired to adjust for rehabilitation works undertaken since the lidar survey. The northern surveyed area is locally termed the “bowl” and in the block model is defined as Lift 4.

The three lifts of the mineralized Stockpile Project were defined spatially to enable separate treatment of composites and blocks for exploratory data analysis (EDA) and estimation. The lifts were separated by modelling surfaces for the original topography below the Stockpile Project (base of the Stockpile Project), the base of Lift 2, and the base of Lift 3. Lift 4 has been defined as the northern surveyed area in Figure 14-46. It is part of rehabilitation work material from a small historic primary sulfide dump that was recontoured into this zone.

Drilling has shown that the material in the bowl (Lift 4) has oxidized and represents a local high-grade zone of the Stockpile Project.

The base of the Stockpile Project was modeled by clipping out the Stockpile Project extents from the Lidar topographic surface. In most of the sonic drilling, the soil underlying the Stockpile Project was penetrated and the depth of this logged. The base of the Stockpile Project was identified in the holes and used in conjunction with the clipped lidar topography surface to generate a surface representing the original topography pre-Stockpile Project. The current topography was then clipped with this surface to create a new solid representing the full mineralized Stockpile Project volume.

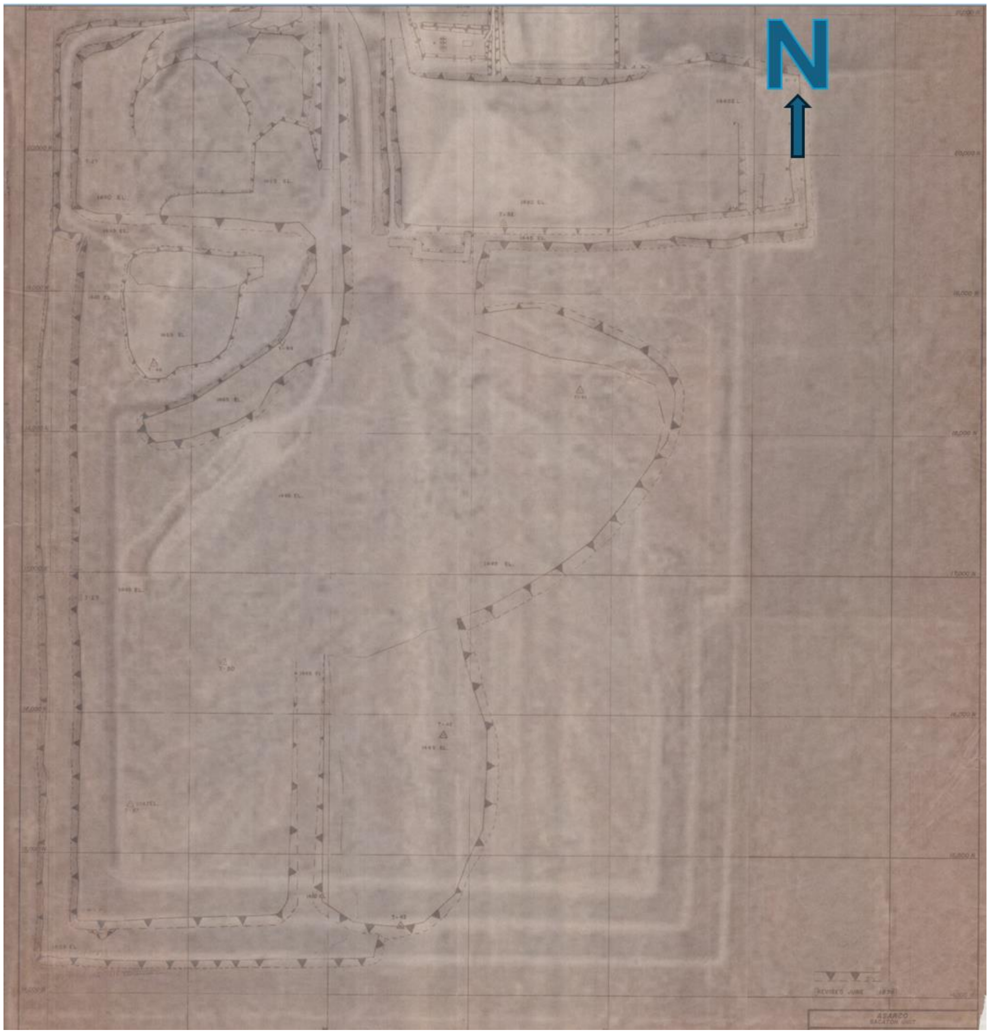
The lifts were separated by defining the planes representing the base of Lift 2 and the base of Lift 3. These surfaces were defined by digitizing points on the outer berms of both levels and then modelling a planar surface using these points. The Stockpile Project solid was then clipped against these surfaces to create three separate solids representing each of the Stockpile Project lifts (see Figure 14-46). The two upper lifts are consistently 40 ft (12 m) in height. Lift 1 is considerably lower in height than the upper lifts due to the gentle dip of the topography from north to south. The height of Lift 1 in the north is approximately 5 ft (1.5 m) increasing to the full 40 ft (12 m) in the south. The vertical exaggeration in Figure 14-47 is set to 250 to aid visualization.



Source: ASCU, 2022.

Figure 14-46: Section Through WRD Showing Lifts

Historical dump maps were registered into Vulcan and analyzed to identify long-lived internal stockpile faces that may separate material removed from the pit at very different time periods but that may be located spatially near each other within the current stockpile. Long-lived faces may separate material that has very different grade characteristics. From this work, it was recognized that large portions of lift 1 and 2 were actually dumped as part of a single face and therefore there are areas of the stockpile that have very little difference between lifts 1 and 2 vertically. This was supported by visual review of the grades down drillholes in these areas. Lift 3 by contrast, was dumped as a single lift and far later in the pit life and therefore displays very different grade characteristics to lifts 1 and 2. Crest and toe contours were created from the historical maps so that the stockpile could be separated into different time periods which were then honored in the estimation plan. Figure 14-47 shows a plan view of the stockpile with the dump progress on June 30, 1976. Of note in this map is the presence of a long-lived ramp on the southern side of the stockpile and the singular dump face for lifts 1 and 2 covering the eastern side of the stockpile. Lifts 1 and 2 can therefore be combined on the eastern side of the stockpile as they were created at the same time.



Source: ASCU, 2022.

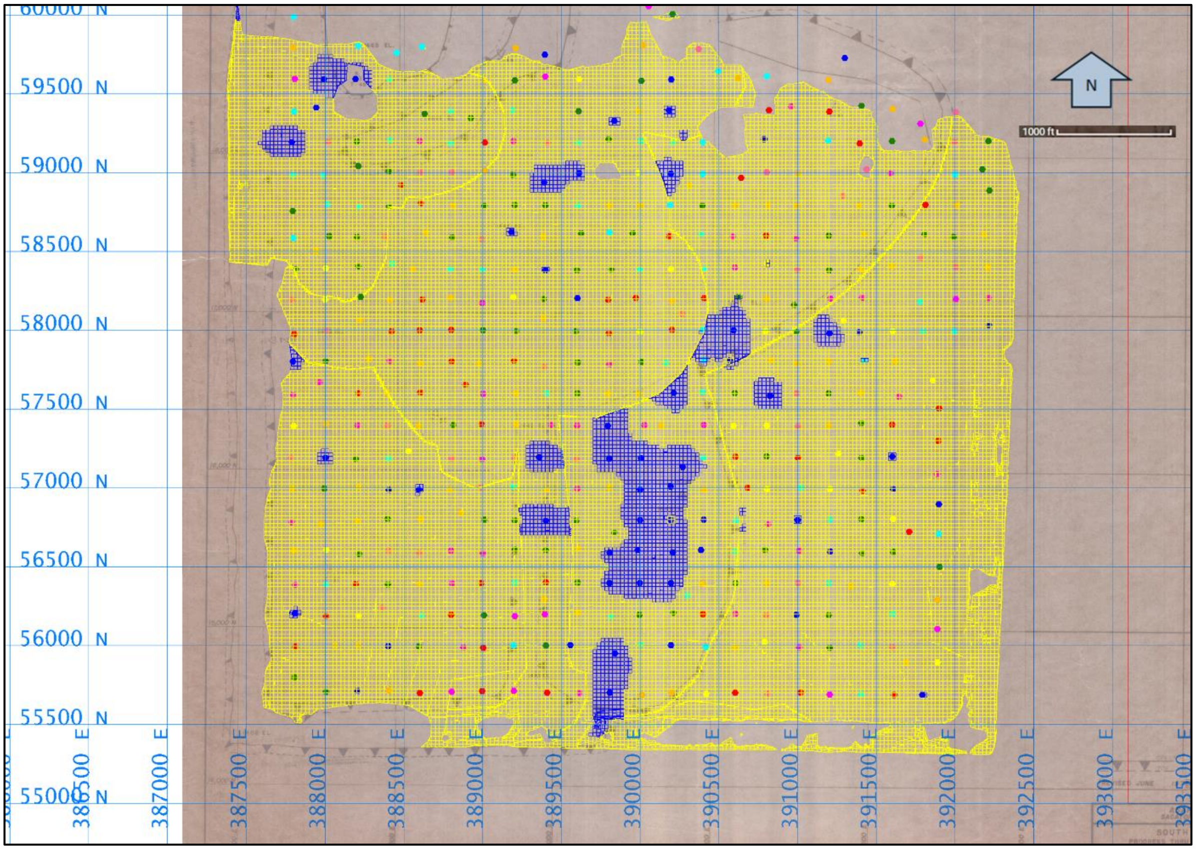
Figure 14-47: June 1976 Dump Plan

14.3.2 Waste Indicator

To reduce the potential of grade estimation into unmineralized zones a waste indicator model was implemented to identify definitive waste zones within the Stockpile Project. Logged zones of significant non-mineralized material were not sampled and a grade of 0.002% was applied (half the detection limit). Due to the lack of geological controls to the stockpile material, composite grades provide a general view to the grade. However, individual drill holes may not be a good predictor of the grades of the local volume they support. For this reason, the estimate is highly smoothed with the goal to estimate the global grade distribution and identify broad zones that are mineralized with economic grades from those that are not.

With such high smoothing, there is potential to smear metal into areas that are definitively waste. In an extreme case this can create material that may be waste and report to feed material. Therefore, an indicator estimation method was required to define definitive waste zones that may have continuity and ensure these blocks were not estimated. This would be most effective in the lower lifts where significant overburden was mined from the pit. This procedure did not limit the grade estimation itself from defining waste areas where low grades prevailed in the composites.

An indicator estimation method was used to assign the mineralized extents to the block model so that these could be estimated separately from definitive waste areas. In Figure 14-48, the Stockpile Project blocks are shown color coded according to its indicator estimation. Blocks defined by the estimation as potentially mineralized are colored yellow, definitive waste areas are colored blue. The estimation is based on composite grades, which are displayed as dots for reference. Composites are colored yellow if their CuAS value is above 0.01%, blue if their value is below. CuAS grades were used as this indicates the readily leachable material which is most likely to support mineralization that could be economic for conventional heap leaching.



Source: ASCU, 2022.

Figure 14-48: Plan View (1405L) Showing the Indicator Defining Zones of Consistent Waste Intercepts

The indicator method was assigned to the block model as follows:

- For CuAS, a mineralized composite for stockpile purposes was defined as a sample having a grade greater than 0.01% CuAS.
- Each composite was assigned a 1 if its grade was above the specified threshold, or a 0 if its grade was below.
- These 1 and 0 values were estimated into the stockpile blocks using the stockpile time periods as separate estimation domains for composite selection. This results in an estimated value between 0 and 1 being assigned to each block – this value represents the probability that the block is mineralized above 0.01% CuAS.
- If a block had a probability of greater than 50% (or 0.5) then it was determined to be potentially a mineralized block. If the value was less than 0.5, the block was assigned as waste material.
- Blocks defined as part of the mineralized material were estimated for grade separately from blocks defined as waste. The mineralized estimate may use any sample within the domain stockpile time period, the waste blocks were not estimated and were automatically assigned grades of 0.002% for CuAS, CuCN, and CuT.

Selection of all samples to estimate the potentially mineralized blocks adds a level of conservatism to the estimate which takes into account that wide spaced drilling does not define these material contacts well.

The indicator ensured high grades from mineralized areas could not be used to estimate adjacent areas determined as waste.

The use of an indicator complements both the grade estimation and the capping thresholds used in the grade estimation since high grades are only used to estimate potentially mineralized areas of the Stockpile Project. CuAS, CuCN, and CuT used the same indicator to determine which blocks could be estimated as potentially mineralized.

14.3.2.1 Resource Drill Hole Database

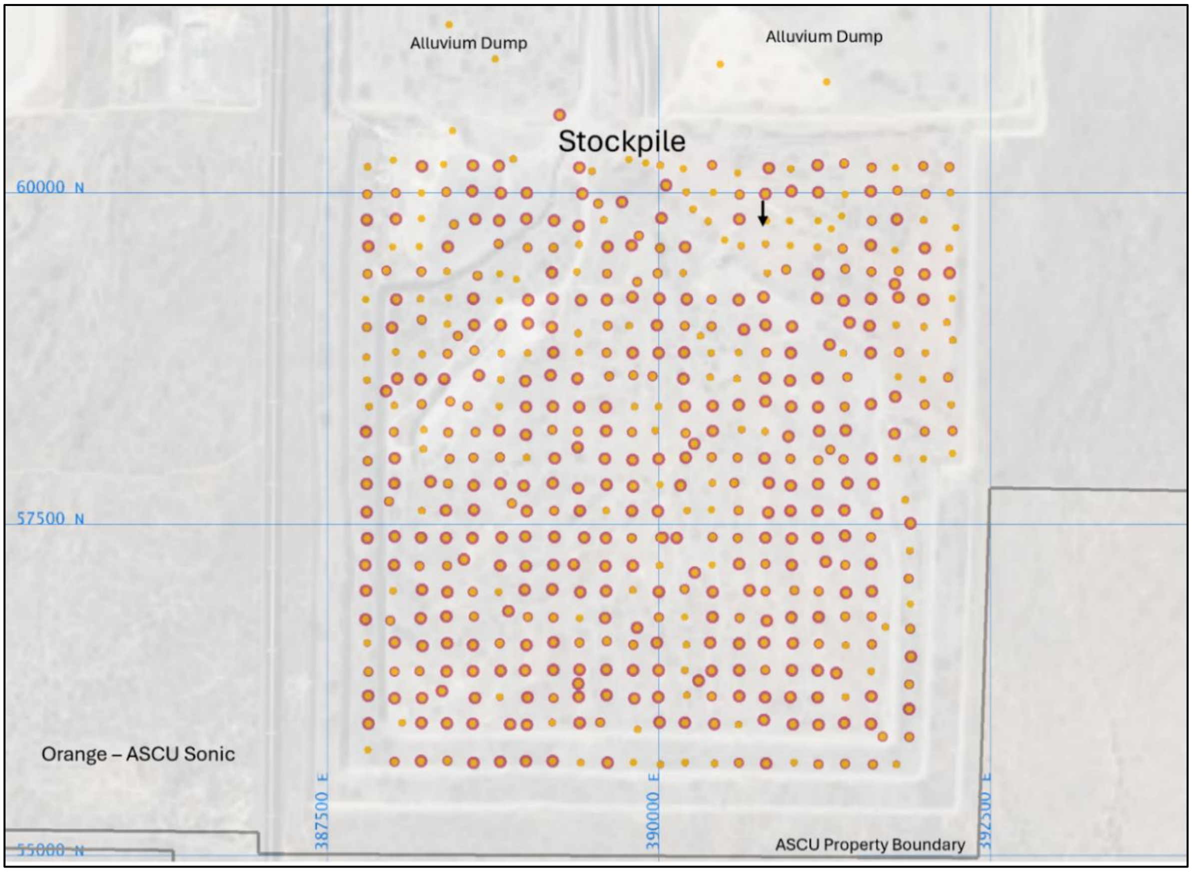
The Cactus Stockpile Project drill hole database is managed in MX-Deposit software. CSV format files were exported from MX-Deposit using a resource specific template for the tables required for the resource database. CSV files were imported into a Vulcan ISIS database using a designated resource import LAVA script. The LAVA script and export template ensured the database was loaded consistently each time. The drill hole database used for the Cactus Stockpile Project mineral resource estimation was called cacstockpile _mx_resource_20210402.stp.isis.

Lithology and mineralization logging was used to define zones for assay. Due to the nature of the dumping schedule and waste handling, logging is not considered as part of the mineral resource estimation process.

The Cactus Stockpile Project drill hole databases can be summarized by the following points:

- All holes within the database were drilled vertically.
- There are no downhole surveys measured as the deepest hole is only 125 ft (38.1 m) and all holes were drilled vertically.
- Drill spacing has been reduced to approximately 200 ft 60 m) across the stockpile.
- CuT assays were sampled on 2.5 ft (0.8 m) lengths.
- CuAS and CuCN assays were conducted on 10 ft (3.0 m) composites for the first 40 ft (12.2 m) of the first 55 holes (using the same pulp material as the CuT assays). CuAS and CuCN assays were then conducted on the original 2.5 ft (0.8 m) sample pulps used in CuT assaying for depths greater than 40 ft (12.2 m) downhole of those holes and all parts of subsequent holes.
- The combined table was used in the database to contain the CuAS and CuCN assays and the matching CuT grades. Tsol grades were calculated as a validation of the Tsol copper grades for comparison against the CuT grade.
- In some zones within the holes there were significant intervals of non-mineralized material (such as conglomerate or alluvium). In these cases, often the intervals were not assayed, a grade of 0.002% CuT (half the detection limit) was applied to these intervals.
- Where an intercept was not assayed, and was not identified as a definitive waste sample, a default value of -99 was assigned so the sample could be ignored for future use.
- Lithology and color were logged for drill hole intercepts to the database. These serve as a guide to identifying non-mineralized zones (grey and tan) against potentially mineralized zones (orange and green). Red and brown logged colors can relate to both mineralized and non-mineralized material within the Stockpile Project.
- Copper mineralization, including copper oxides, was logged.

Figure 14-49 plots the drill hole locations within the Cactus Stockpile Project area. Light colored dumps to the north of the image represent alluvium dumps that have been sterilized by four drill holes as being unmineralized.



Source: ASCU, 2022.

Figure 14-49: Drill Hole Collars on the Cactus Stockpile Project

14.3.3 Lithology

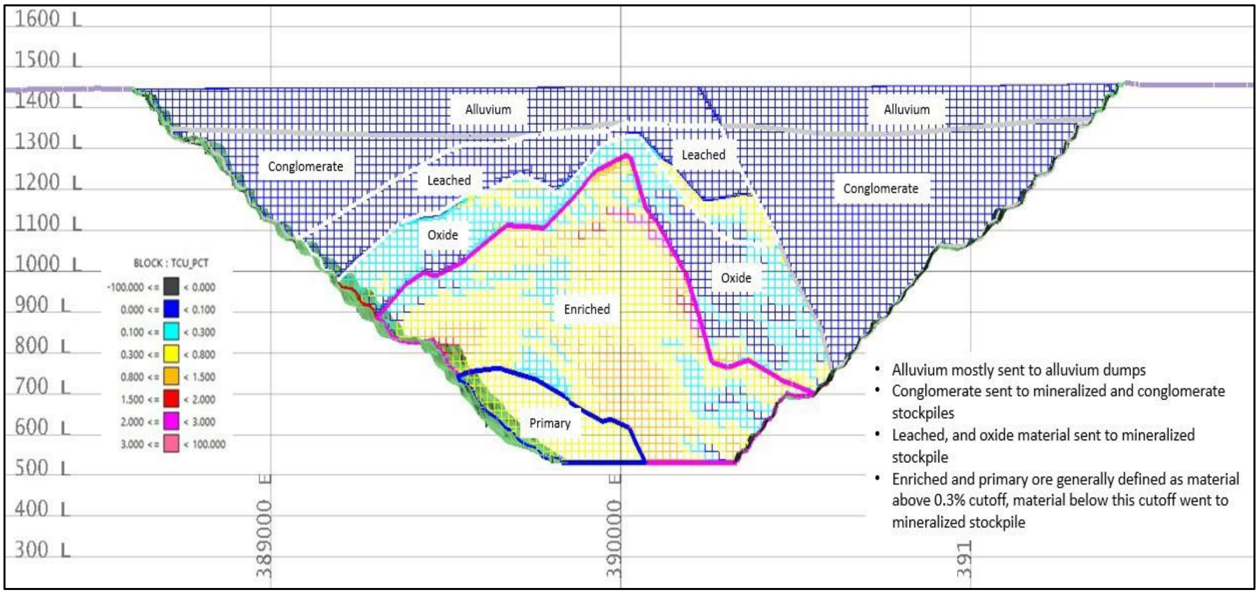
The nature of the mining operations at the historic Sacaton open pit from 1974 through 1984 has led to the dumping of material on the mineralized Stockpile Project where material types are broadly mixed. Lithology within the stockpile has no geological context, and as such is not used as any basis for the stockpile mineral resource estimate, except to withhold assaying where broad zones of non-mineralized lithologies were present and assigned a grade of 0.002%. Table 14-18 and Figure 14-50 present the major lithological and porphyry copper alteration material types that represent mineralized and/or non-mineralized material within the stockpile. The host units to mineralization are monzonite porphyry and granite.

Table 14-18: Lithology Codes

Lithological/Alteration Unit	Relationship to Mineralization	Destination*
Alluvium	Non-mineralized	Most material sent to alluvium dumps.
Conglomerate	Non-mineralized	All material sent to either the conglomerate dump or mineralized Stockpile Project.
Leached Zone (monzonite porphyry and granite)	Largely non-mineralized excepting the case of selvages of mineralization	All material sent to the mineralized Stockpile Project.
Oxide Zone (monzonite porphyry and granite)	Mineralized – copper oxides dominant	All material sent to the mineralized Stockpile Project.

Lithological/Alteration Unit	Relationship to Mineralization	Destination*
Enriched Zone (monzonite porphyry and granite)	Mineralized – chalcocite dominant	Material above 0.3% Cu sent as feed material. Material below 0.3% Cu sent to the mineralized Stockpile Project.
Primary Zone (monzonite porphyry and granite)	Mineralized – chalcopyrite dominant	Material above 0.3% Cu sent as feed material. Material below 0.3% Cu sent to the mineralized Stockpile Project.

Note: *Refer to Figure 14-54 for map of destinations.



- Alluvium mostly sent to alluvium dumps
- Conglomerate sent to mineralized and conglomerate stockpiles
- Leached, and oxide material sent to mineralized stockpile
- Enriched and primary ore generally defined as material above 0.3% cutoff, material below this cutoff went to mineralized stockpile

Source: ASCU, 2022.

Figure 14-50: Cross Section (64000N) Lithologies and Destinations of Material Mined from the Pit

14.3.4 Estimation Domains

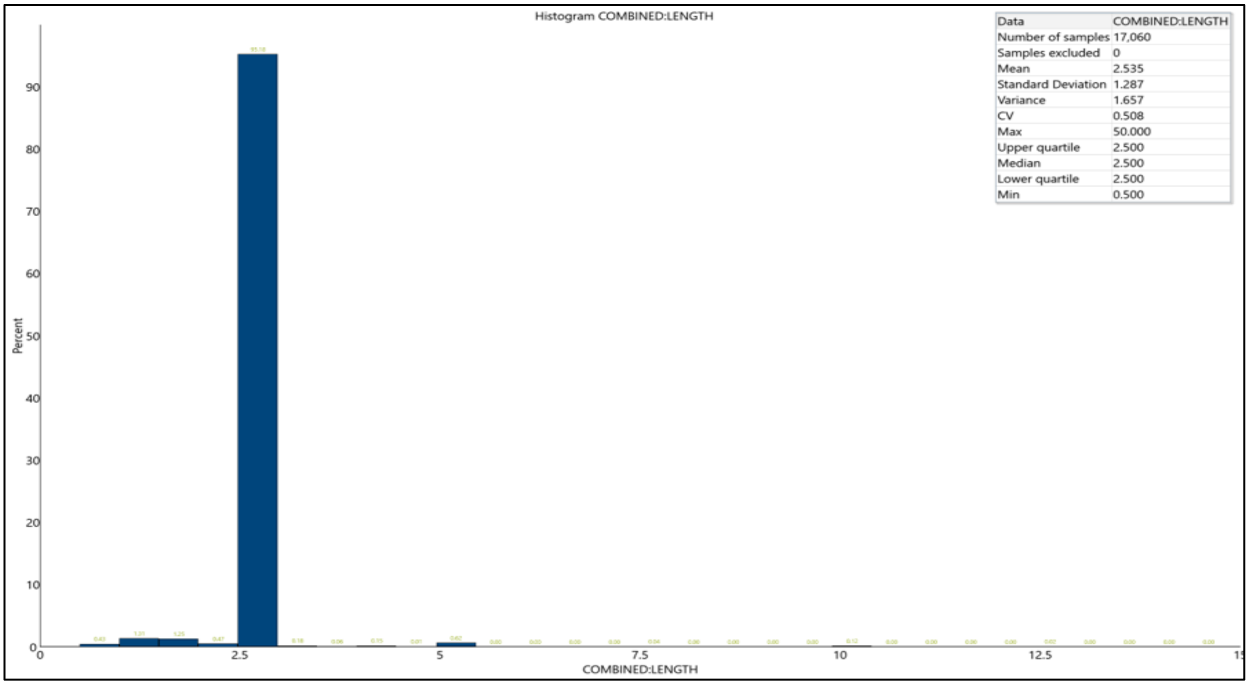
Final estimation domains were based on the combination of the dump lift, stockpile time period and the waste indicator discussed in Section 14.2.2. No grades were estimated into zones defined as definitive waste.

14.3.5 Specific Gravity

Due to the unconsolidated nature of the stockpile material, measuring bulk density can be problematic. In September 2021 four test pits were excavated to provide direct measurement of the bulk density of the insitu material. These were undertaken by excavating test pits, surveying an accurate volume of the material removed, drying the material removed, and then accurately weighing the removed material. Bulk densities for the four samples range between 0.0535 st/ft³ to 0.0753 st/ft³ with a mean of 0.0643 st/ft³. The mean bulk density was applied to the stockpile blocks.

14.3.6 Compositing

The drillhole intercepts were composited to 10 ft (3 m) composite lengths for CuAS, CuCN, and CuT. The stockpile was built in three vertical lifts of approximately 40 ft (12.1 m) height (Figure 14-51). Composites were split at the modelled lift contacts and the lifts and stockpile time periods were flagged to the composites. Where a composite was generated at less than half the composite length of 5 ft (1.5 m), it was combined into the previous 10 ft (3 m) composite to ensure short length composites were not generated. Sample grades with values of -99 were ignored during compositing.



Data	COMBINED:LENGTH
Number of samples	17,060
Samples excluded	0
Mean	2.535
Standard Deviation	1.287
Variance	1.657
CV	0.508
Max	50.000
Upper quartile	2.500
Median	2.500
Lower quartile	2.500
Min	0.500

Source: ASCU, 2022.

Figure 14-51: Histogram of Drill Hole Sample Lengths

The stockpile designation was flagged to the composites as were the bench levels that could define future 20 ft (6 m) working mining benches for the Stockpile Project. Tsol was back calculated to the composites as the addition of CuAS and CuCN.

14.3.7 Exploratory Data Analysis

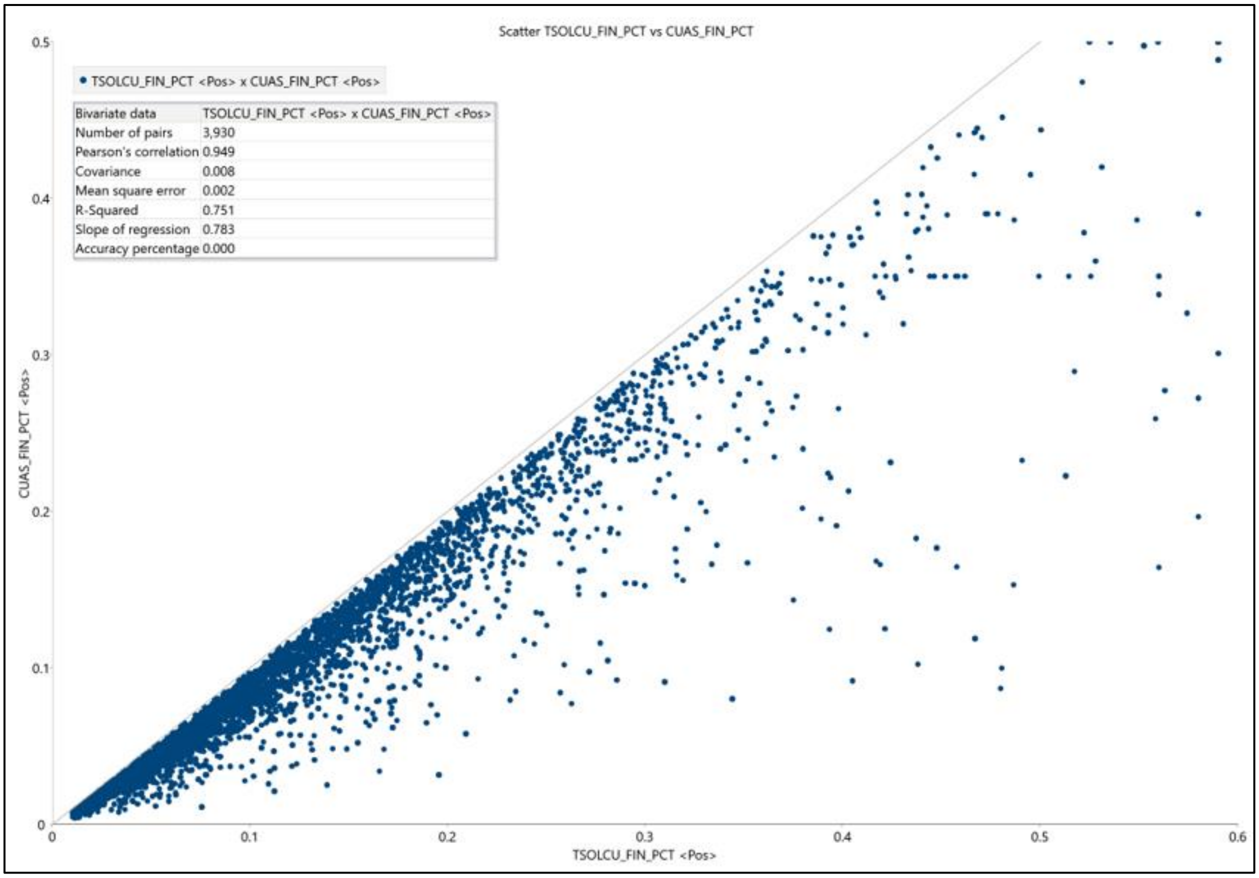
CuT grades represent the total copper present within the drilled intercept. Copper mineralization in the form of chalcopyrite, mostly present in the primary zone, typically leaches poorly using conventional heap leaching processes. To measure the expected leachable copper, sequential copper analysis was undertaken by first leaching the sample using acid to attain the CuAS, and then leaching the residue with cyanide to attain the CuCN. CuAS assays are expected to account for the copper content of the copper oxides and up to half of the chalcocite. CuAS assays also account for the readily leachable component of the copper within the sample. CuCN assays will account for the copper content of any covellite and the remainder of the chalcocite. This copper is still leachable by acid solutions or bio-solutions, but recovery will be slower and less effective (lower recoveries over a longer period, up to two years). Tsol is calculated as the addition of CuAS and CuCN as a measure of the total leachable copper grade for the composite.

Univariate statistics were calculated for the mineralized material of the stockpile for CuAS, CuCN, Tsol, and CuT and results were reported for the entire stockpile and by individual lifts. The summary statistics are shown in Table 14-19. This table shows that mean grades decrease through the stockpile lifts. This is consistent with the scheduled waste dumping from the historical open pit where considerably more mineralized waste is expected to have been mined later in the mine life which would position this material in the upper levels of the mineralized stockpile.

Table 14-19: Lift Drill Hole 10 ft Composite Statistics for CuT, CuAS, CuCN, and Tsol

Variable Name	Count	Mean	Std Dev.	Variance	CV	Max	Upper Quartile	Median	Lower Quartile	Min
TCU_FIN_PCT LIFT1	736	0.130	0.119	0.014	0.922	1.495	0.164	0.103	0.057	0.002
TCU_FIN_PCTLIFT2	1851	0.137	0.119	0.014	0.868	2.326	0.174	0.109	0.067	0.002
TCU_FIN_PCT LIFT3	1352	0.187	0.135	0.018	0.722	1.609	0.247	0.158	0.092	0.002
TCU_FIN_PCT LIFT4	24	0.340	0.153	0.024	0.452	0.805	0.389	0.338	0.282	0.095
CUAS_FIN_PCT LIFT1	736	0.084	0.090	0.008	1.072	1.344	0.110	0.065	0.029	0.004
CUAS_FIN_PCT LIFT2	1851	0.092	0.093	0.009	1.014	1.848	0.121	0.069	0.036	0.004
CUAS_FIN_PCT LIFT3	1352	0.133	0.106	0.011	0.795	0.993	0.177	0.106	0.059	0.005
CUAS_FIN_PCT LIFT4	24	0.254	0.142	0.020	0.558	0.754	0.279	0.237	0.199	0.062
CUCN_SEQ_FIN_PCT LIFT1	736	0.024	0.048	0.002	2.025	0.797	0.021	0.011	0.006	0.002
CUCN_SEQ_FIN_PCT LIFT2	1851	0.023	0.041	0.002	1.795	0.692	0.023	0.012	0.007	0.002
CUCN_SEQ_FIN_PCT LIFT3	1352	0.026	0.036	0.001	1.359	0.587	0.031	0.017	0.010	0.002
CUCN_SEQ_FIN_PCT LIFT4	24	0.058	0.032	0.001	0.553	0.119	0.084	0.060	0.030	0.006
TSOL_FIN_PCT LIFT1	736	0.108	0.113	0.013	1.046	1.372	0.136	0.081	0.039	0.010
TSOL_FIN_PCT LIFT2	1851	0.144	0.113	0.013	0.990	2.248	0.148	0.086	0.048	0.010
TSOL_FIN_PCT LIFT3	1352	0.159	0.125	0.016	0.784	1.580	0.208	0.131	0.073	0.011
TSOL_FIN_PCT LIFT4	24	0.312	0.149	0.022	0.478	0.772	0.772	0.303	0.258	0.068

Figure 14-52 is a scatter plot produced to compare the CuAS grades to the Tsol grades on a composite basis. This indicates the presence of readily leachable copper within the Tsol copper population. The closer a composite value plots to the 45° grey line, the higher the proportion of readily leachable copper present within that composite. The bulk of the samples plot close to the grey line indicating that much of the soluble copper should leach well.

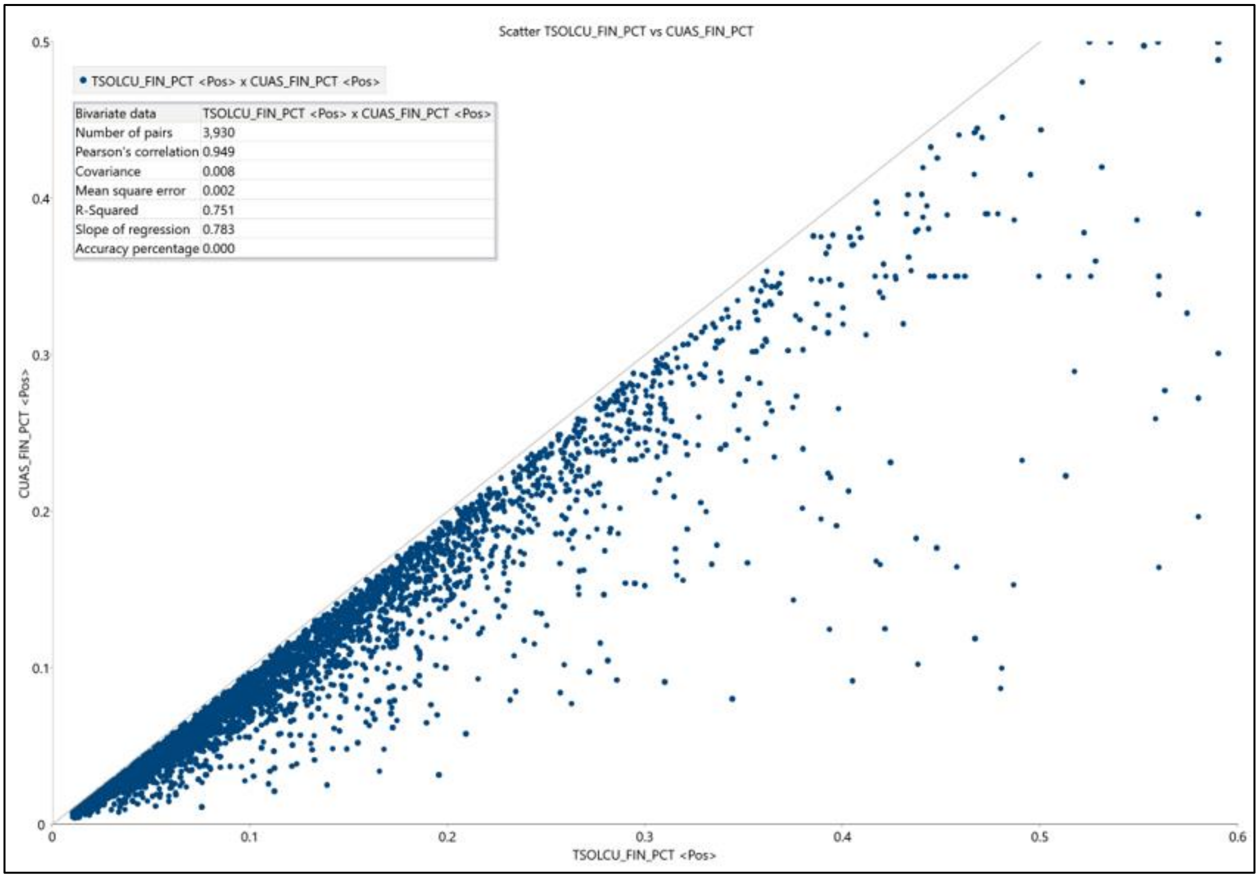


Bivariate data	TSOLCU_FIN_PCT <Pos> x CUAS_FIN_PCT <Pos>
Number of pairs	3,930
Pearson's correlation	0.949
Covariance	0.008
Mean square error	0.002
R-Squared	0.751
Slope of regression	0.783
Accuracy percentage	0.000

Source: ASCU, 2022.

Figure 14-52: Scatter Plot of CuAS Against Tsol

Figure 14-53 is a scatter plot produced to compare the Tsol grades to the CuT grades on a composite basis. This indicates the presence of leachable copper within the CuT population. The closer a composite plot is to the 45° grey line, the higher the proportion of leachable copper present within that composite. The bulk of the samples plot close to the grey line indicating that much of the CuT is in a mineralogy that is leachable. Copper that is not leachable in the analysis undertaken is expected to be chalcopyrite primary mineralization and for the purposes of metallurgy will not be recoverable.

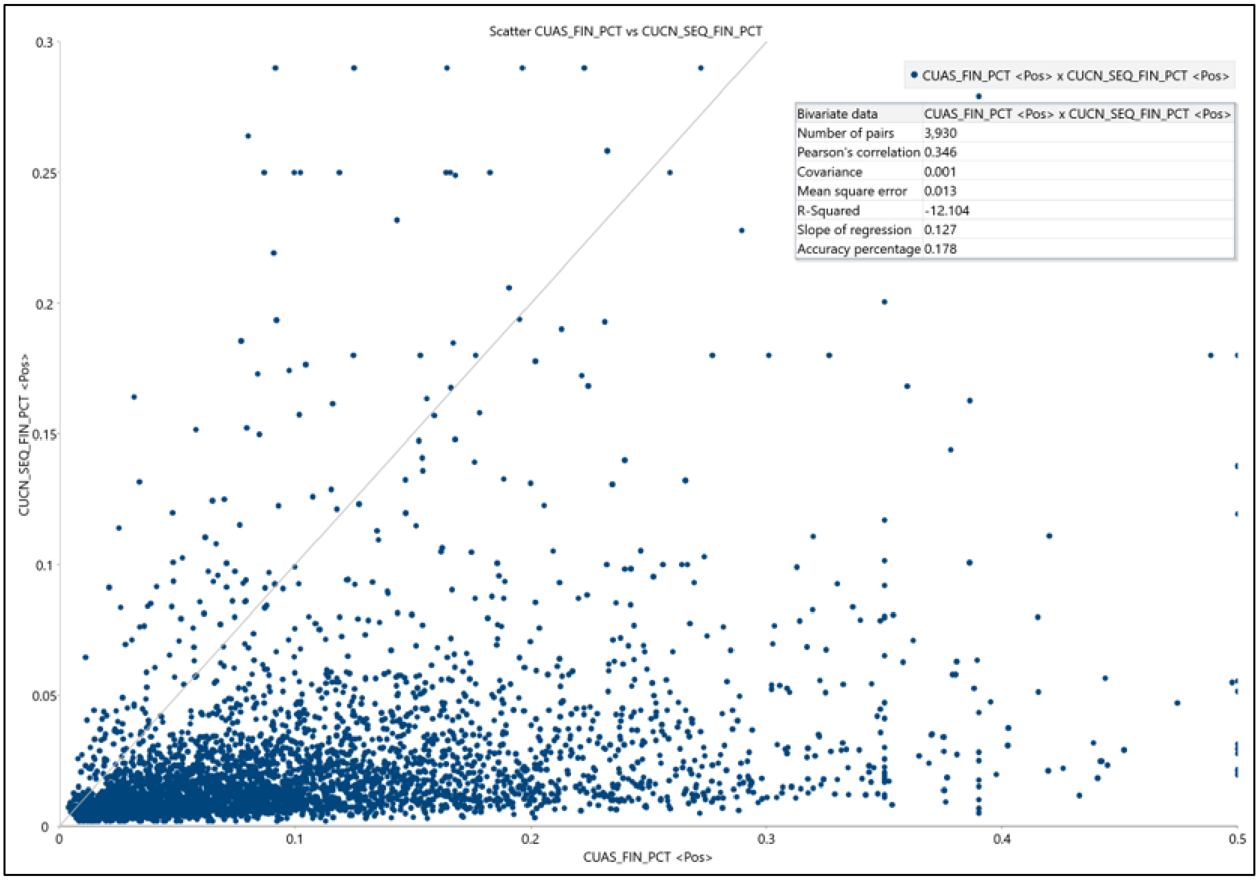


Bivariate data	TSOLCU_FIN_PCT <Pos> x CUAS_FIN_PCT <Pos>
Number of pairs	3,930
Pearson's correlation	0.949
Covariance	0.008
Mean square error	0.002
R-Squared	0.751
Slope of regression	0.783
Accuracy percentage	0.000

Source: ASCU, 2022.

Figure 14-53: Scatter Plot of Tsol Against CuT

Figure 14-54 is a scatter plot produced to compare the CuCN grades to the CuAS grades on a composite basis. This indicates if there is a relationship between assay distributions that should be honored in the grade estimation stage. The closer the composites plot to a straight line, the stronger the evidence that there is for a relationship between the grades that should be honored in the block estimation. The plot indicates that there is little relationship at the composite level between these two grade datasets and that therefore they can be treated independently.

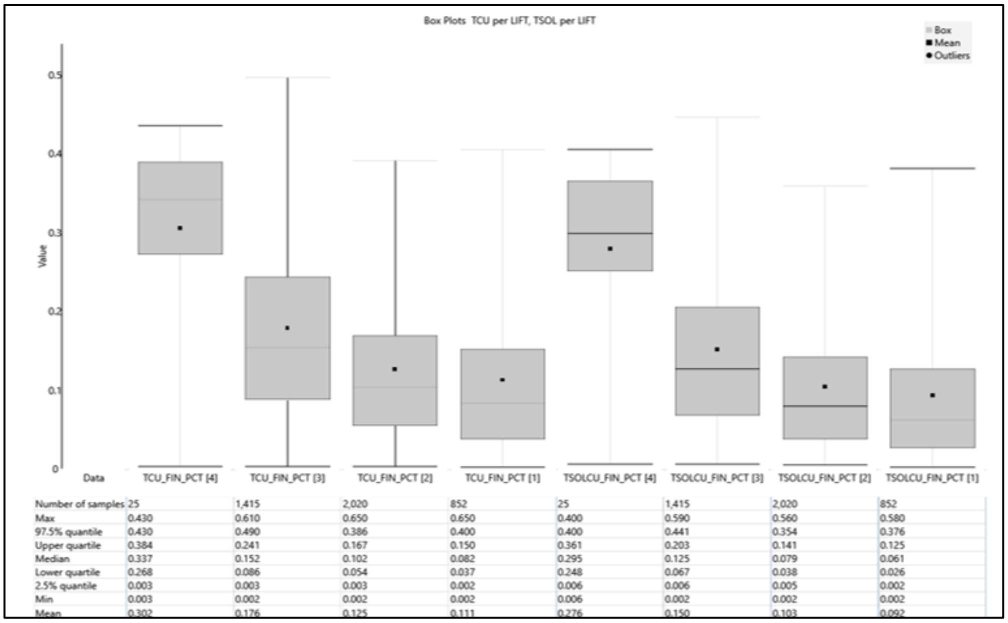


Bivariate data	CUAS_FIN_PCT <Pos> x CUCN_SEQ_FIN_PCT <Pos>
Number of pairs	3,930
Pearson's correlation	0.346
Covariance	0.001
Mean square error	0.013
R-Squared	-12.104
Slope of regression	0.127
Accuracy percentage	0.178

Source: ASCU, 2022.

Figure 14-54: Scatter Plot of CuCN Against CuAS

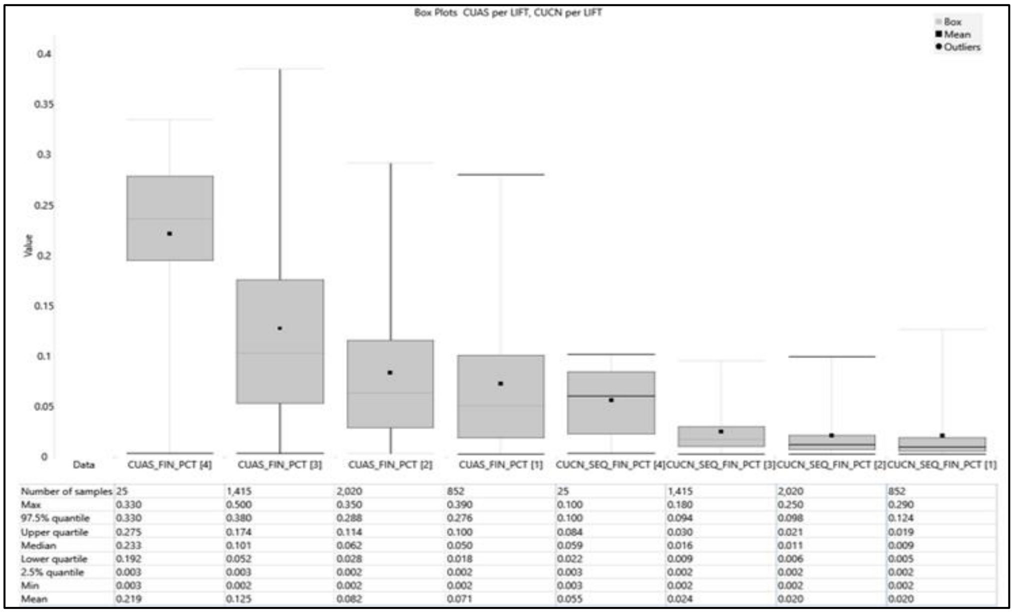
Figure 14-55 and Figure 14-56 show box plots created for CuT, Tsol, CuAS, and CuCN grouped by lift within the stockpile. The box plots show the clear relationship of decreasing grade moving down through the lifts from Lift 3 to Lift 1. This supports the waste dumping schedule history. Lift 4 represents the “bowl’ are of lift 3 that was created more recently due to rehabilitation works Figure 14-57 also highlights the significant proportion of copper that is present in a readily leachable form signified by the CuAS grade distribution versus the copper that will leach more slowly signified by the CuCN grade distribution.



Data	TCU_FIN_PCT [4]	TCU_FIN_PCT [3]	TCU_FIN_PCT [2]	TCU_FIN_PCT [1]	TSOLCU_FIN_PCT [4]	TSOLCU_FIN_PCT [3]	TSOLCU_FIN_PCT [2]	TSOLCU_FIN_PCT [1]
Number of samples	25	1,415	2,020	852	25	1,415	2,020	852
Max	0.430	0.610	0.650	0.650	0.400	0.590	0.560	0.580
97.5% quantile	0.430	0.490	0.386	0.400	0.400	0.441	0.354	0.376
Upper quartile	0.384	0.241	0.167	0.150	0.361	0.203	0.141	0.125
Median	0.337	0.152	0.102	0.082	0.295	0.125	0.079	0.061
Lower quartile	0.268	0.086	0.054	0.037	0.248	0.067	0.038	0.026
2.5% quantile	0.003	0.003	0.003	0.002	0.006	0.006	0.005	0.002
Min	0.003	0.002	0.002	0.002	0.006	0.002	0.002	0.002
Mean	0.302	0.176	0.125	0.111	0.276	0.150	0.103	0.092

Source: ASCU, 2022.

Figure 14-55: Box Plots for CuT and Tsol Grouped by Lift Showing the Grade Reduction Down Through the Stockpile Lifts



Data	CUAS_FIN_PCT [4]	CUAS_FIN_PCT [3]	CUAS_FIN_PCT [2]	CUAS_FIN_PCT [1]	CUCN_SEQ_FIN_PCT [4]	CUCN_SEQ_FIN_PCT [3]	CUCN_SEQ_FIN_PCT [2]	CUCN_SEQ_FIN_PCT [1]
Number of samples	25	1,415	2,020	852	25	1,415	2,020	852
Max	0.330	0.500	0.350	0.390	0.100	0.180	0.250	0.290
97.5% quantile	0.330	0.380	0.288	0.276	0.100	0.094	0.098	0.124
Upper quartile	0.275	0.174	0.114	0.100	0.084	0.030	0.021	0.019
Median	0.233	0.101	0.062	0.050	0.059	0.016	0.011	0.009
Lower quartile	0.192	0.052	0.028	0.018	0.022	0.009	0.006	0.005
2.5% quantile	0.003	0.003	0.002	0.002	0.003	0.002	0.002	0.002
Min	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002
Mean	0.219	0.125	0.082	0.071	0.055	0.024	0.020	0.020

Source: ASCU, 2022.

Figure 14-56: Box Plots for CuAS and CuCN Grouped by Lift

14.3.8 Capping

Grade capping for CuAS, CuCN, and CuT was applied to the composites at the estimation stage using a top cut method. Composite grades above this threshold were reset to the threshold level during the estimation process.

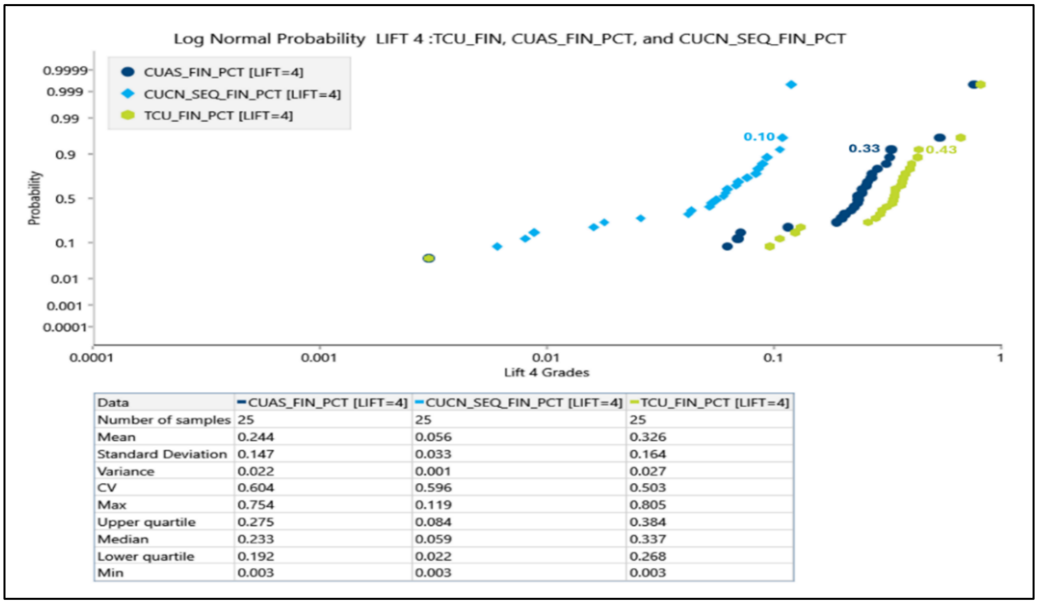
Capping levels were determined using the industry standard log normal probability plot method. Analysis of the upper end of the log probability distributions identified the threshold at which point the distribution loses consistency. This indicates that grades above this level are inconsistent with the population characteristics and therefore represent metal at risk in the estimation process.

Log normal probability plots were generated per lift to define applicable capping levels within each lift. Due to the grade distribution differences between lifts, a single threshold defined for the global population was not appropriate.

Table 14-20 shows the capping levels determined for CuAS, CuCN, and CuT per lift. For CuAS and CuT, capping levels decrease down through the lifts as expected from the underlying data distributions (see Figure 14-57 through Figure 14-60). Lift 4 represents only a very limited dataset with its own characteristics.

Table 14-20: Capping Threshold Values Applied per Lift to the Estimation of CuT, CuAS, and CuCN

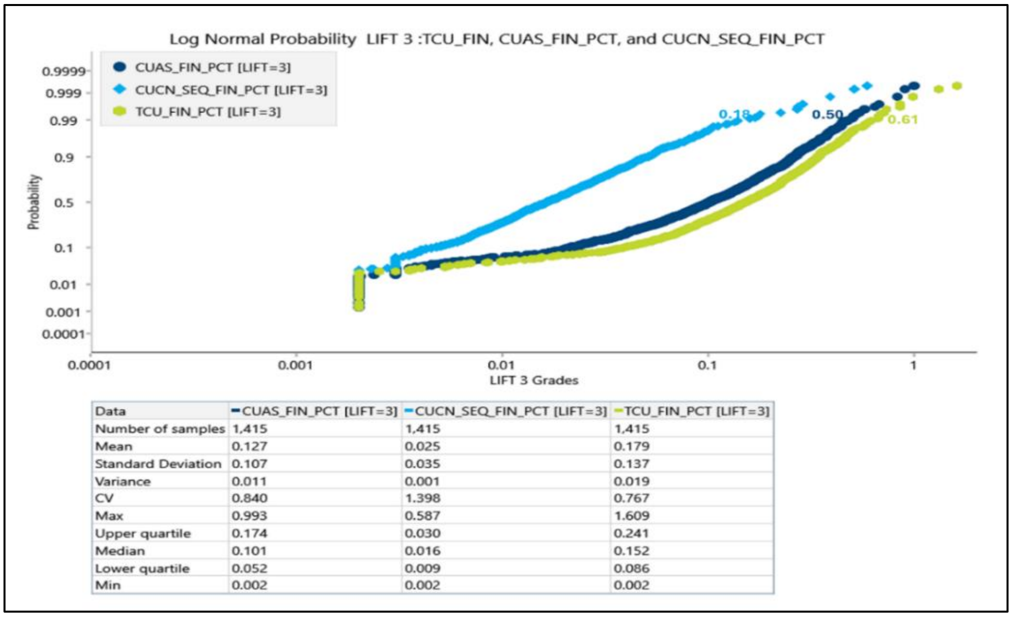
Lift	CuT	CuAS	CuCN
Lift 4	0.43	0.33	0.10
Lift 3	0.61	0.50	0.18
Lift 2	0.65	0.35	0.25
Lift 1	0.65	0.39	0.29



Data	CUAS_FIN_PCT [LIFT=4]	CUCN_SEQ_FIN_PCT [LIFT=4]	TCU_FIN_PCT [LIFT=4]
Number of samples	25	25	25
Mean	0.244	0.056	0.326
Standard Deviation	0.147	0.033	0.164
Variance	0.022	0.001	0.027
CV	0.604	0.596	0.503
Max	0.754	0.119	0.805
Upper quartile	0.275	0.084	0.384
Median	0.233	0.059	0.337
Lower quartile	0.192	0.022	0.268
Min	0.003	0.003	0.003

Source: ASCU, 2022.

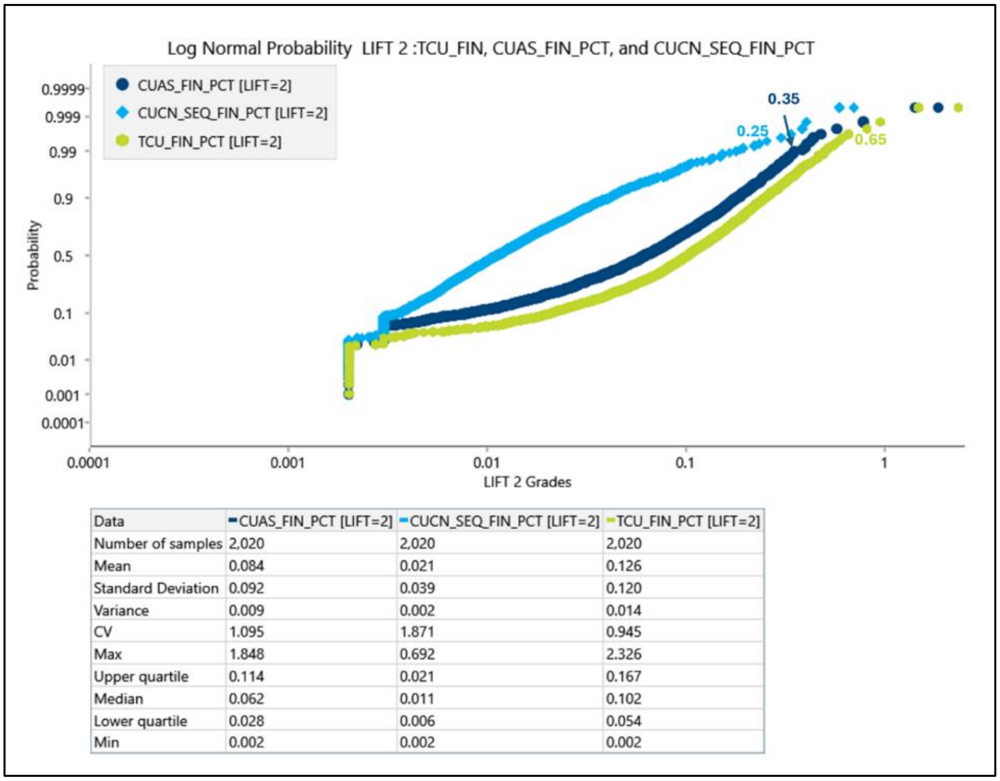
Figure 14-57: Log Normal Probability Plot of Lift 4 Copper Assays with Capping Grades



Data	CUAS_FIN_PCT [LIFT=3]	CUCN_SEQ_FIN_PCT [LIFT=3]	TCU_FIN_PCT [LIFT=3]
Number of samples	1,415	1,415	1,415
Mean	0.127	0.025	0.179
Standard Deviation	0.107	0.035	0.137
Variance	0.011	0.001	0.019
CV	0.840	1.398	0.767
Max	0.993	0.587	1.609
Upper quartile	0.174	0.030	0.241
Median	0.101	0.016	0.152
Lower quartile	0.052	0.009	0.086
Min	0.002	0.002	0.002

Source: ASCU, 2022.

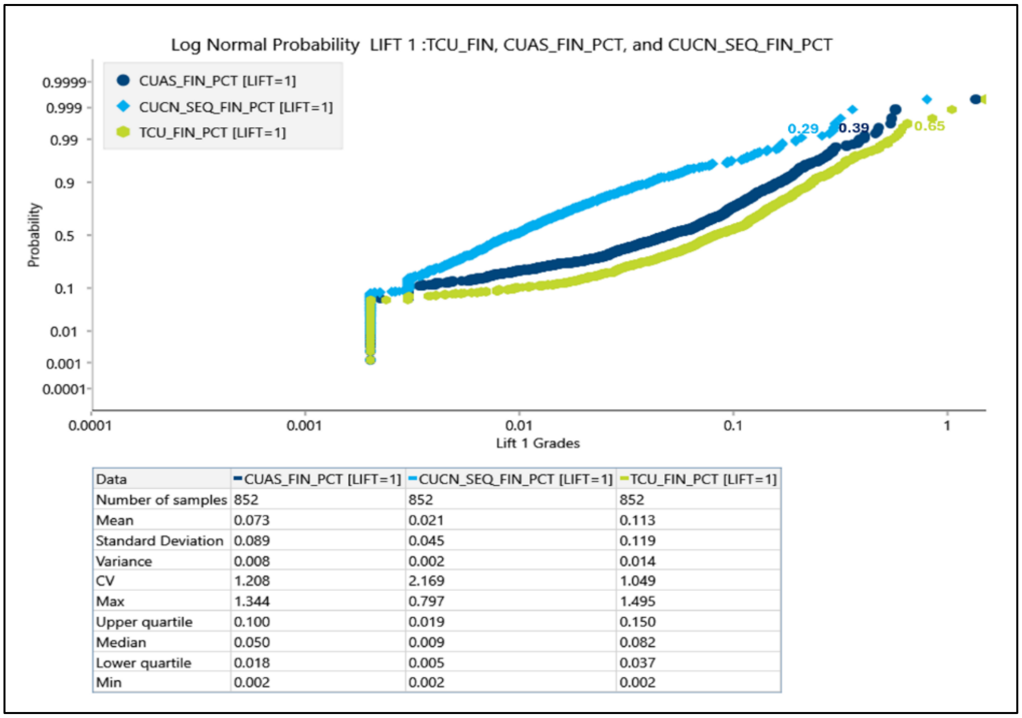
Figure 14-58: Log Normal Probability Plot of Lift 3 Copper Assays with Capping Grades



Data	CUAS_FIN_PCT [LIFT=2]	CUCN_SEQ_FIN_PCT [LIFT=2]	TCU_FIN_PCT [LIFT=2]
Number of samples	2,020	2,020	2,020
Mean	0.084	0.021	0.126
Standard Deviation	0.092	0.039	0.120
Variance	0.009	0.002	0.014
CV	1.095	1.871	0.945
Max	1.848	0.692	2.326
Upper quartile	0.114	0.021	0.167
Median	0.062	0.011	0.102
Lower quartile	0.028	0.006	0.054
Min	0.002	0.002	0.002

Source: ASCU, 2022.

Figure 14-59: Log Normal Probability Plot of Lift 2 Copper Assays with Capping Grades



Data	CUAS_FIN_PCT [LIFT=1]	CUCN_SEQ_FIN_PCT [LIFT=1]	TCU_FIN_PCT [LIFT=1]
Number of samples	852	852	852
Mean	0.073	0.021	0.113
Standard Deviation	0.089	0.045	0.119
Variance	0.008	0.002	0.014
CV	1.208	2.169	1.049
Max	1.344	0.797	1.495
Upper quartile	0.100	0.019	0.150
Median	0.050	0.009	0.082
Lower quartile	0.018	0.005	0.037
Min	0.002	0.002	0.002

Source: ASCU, 2022.

Figure 14-60: Log Normal Probability Plot of Lift 1 Copper Assays with Capping Grades

14.3.9 Variography

Variogram modelling is inappropriate for use with material that is not in situ as there is no geological context or expected continuity due to the material being dumped to the pile inconsistently.

14.3.10 Block Model

The mineralized dump represents an area approximately 5,100 ft (1,554 m) north-south by 5,000 ft (1,524 m) east-west. The height of the material in the stockpile is approximately 65 ft (19.8 m) in the far north, increasing to 120 ft (36.6 m) on the south end. The Stockpile Project block model was constructed using a 100 ft (30.5 m) × 100 ft (30.5 m) × 20 ft (6.1 m) parent block size (XYZ), with sub-blocking to 2.50 ft (0.8 m) × 2.50 ft (0.8 m) ×0.25 ft (0.08 m) to accurately reflect the mineralized stockpile volume. The 20 ft (6 m) block height was incorporated to reflect the planned bench heights that could be utilized to potentially mine the stockpile (two benches per lift). Table 14-21 displays the key block definition parameters.

Table 14-21: Block Model Definition Parameters

Parameter	X	Y	Z
Origin	387,000.0	55,000.0	1,345.00
Bearing / Dip / Plunge	90.0	0.0	0.00
Offset Minimum	0.0	0.0	0.00
Extent Maximum	6,100.0	7,500.0	200.00
Parent Block Size	25.0	25.0	10.00
Sub-block Block Size	2.5	2.5	0.25
Total Blocks		**4,290,456**	

The mineralized stockpile material was assigned a material type of stockpile. There is one small volume alluvium dump located on top of Lift 3. These blocks were set to a material type of alluvium. Stacked material immediately to the north of the mineralized stockpile was also incorporated into the block model extents and assigned a material type of alluvium. The blocks below the original topographic surface and below the stockpile at depth were assigned a material type of soil. Block model volumes were compared against the input triangulation volumes to ensure the block model sub-blocking schema satisfactorily reflected the volume of the total mineralized stockpile. Results are reported in Table 14-22.

Table 14-22: Block Model Volumes Compared to Triangulation Volumes

Material	Block Volume	Triangulation Volume	Difference
Total	**2,371,321,695**	**2,371,318,913**	**0.0%**

The lifts were designated to the block model with lift numbers of 1, 2, and 3. An area on the north end called the bowl was backfilled with historical sulfide material and has been designated as Lift 4. Alluvium dumps were assigned similar lift numbers but with a suffix to delimit them from the mineralized lifts easily (i.e., 4w, 5w).

Review of historical dump maps indicated six major periods of time that reflected the presence of long-lived dump faces that should be honored by the stockpile estimates. These periods were designated as 1973, 1975, 1976, 1979, 1980, and 1984.

Twenty-foot (6.1-m) benches were assigned into the blocks based on the bench within which the block sits. These were aligned with the lift elevations.

14.3.11 Estimation Plan

For combination of lift and time period in the mineralized stockpile, CuT, CuAS, and CuCN values were estimated using the Inverse Distance to the Power of 1 (ID1) method. Due to the characteristics of the dumping schedule for the stockpile and the wide spaced drilling, a high level of smoothing was implemented as individual composites may not represent the volumes adjacent to them that they are supporting.

Significant parameters used in the copper estimates included the following:

- Domain combinations of stockpile lifts and time periods were estimated with soft boundaries being implemented generally between adjacent time periods.
- The estimation was undertaken using two passes. The first pass focused on estimating the 200 ft (61 m) drill spacing which covers the bulk of the Stockpile Project. The second pass filled out the estimates throughout the mineralized part of the Stockpile Project.
- A minimum number of six composites and a maximum number of 12 composites were used to estimate a block for the bulk of the estimation based on 200 ft drilling.
- Only blocks with a mineralized indicator probability of 0.5 could be estimated for grade (based on a 0.01% CuAS indicator). All other blocks were assigned a default grade of 0.002%.
- Un-estimated blocks were automatically assigned a grade of 0.002%.
- To ensure multiple holes from numerous directions around a block were used in the estimate, the maximum number of samples that could be used from a single hole was set to 3. In conjunction with the minimum number of samples, this ensured at least two holes were required to estimate a block.
- The search ellipse was set to 300 ft (91.4 m) × 300 ft (91.4 m) × 30 ft (9.1 m) for the first pass. The search ellipse was set to 500 ft (57 m) × 500 ft (57 m) × 30 ft (9.1 m) for the second pass.
- Grades were capped using a top cut method. Cap levels were set on a per lift basis.

- A nearest neighbor value was assigned to the blocks during the estimation process for use in validations of the estimate.

14.3.12 Mining Depletion

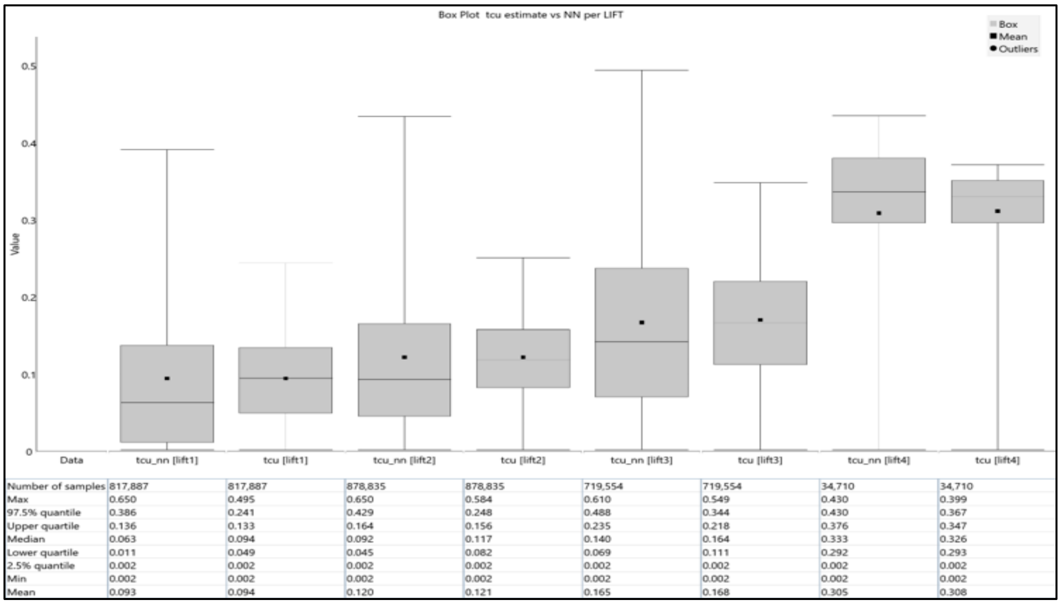
There was no depletion applied to the mineralized stockpile as no mining has taken place. Updates were made to the topographic surface as discussed in Section 14.2.2 which removed some overburden alluvium from the stockpile and added some mineralized material to the bowl area as part of rehabilitation earthworks that were undertaken by the Trust.

14.3.13 Validations

The main set of validations consists of comparisons against a nearest neighbor and are composed of box plots, visual validations, and swath plots.

14.3.13.1 Box Plots

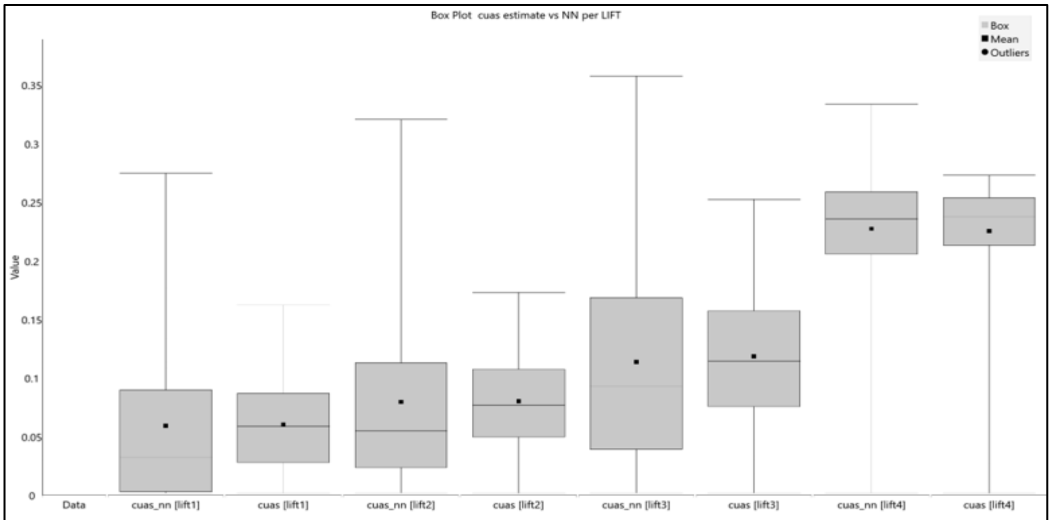
Box plots were created for CuT, CuAS, and CuCN mean grades and distributions within each lift to compare against the nearest neighbor (representing declustered composites) in Figure 14-61 through Figure 14-64, respectively. All comparisons show very similar mean grades between the estimated blocks and the nearest neighbor. The adjustment from a nearest neighbor sample support to a block estimate support incurs significant smoothing (particularly for wider spaced drilling programs and where smoothing is a planned feature of the model such as for the Stockpile Project estimate). This smoothing is visible in the box plots by the restricted box size within the plots for the estimated blocks versus that of the comparison nearest neighbor plots. No maximum values of the nearest neighbor statistics are reported higher than the planned top cuts, indicating that the top cut was applied to the estimation as planned.



Data	tcu_nn [lift1]	tcu [lift1]	tcu_nn [lift2]	tcu [lift2]	tcu_nn [lift3]	tcu [lift3]	tcu_nn [lift4]	tcu [lift4]
Number of samples	817,887	817,887	878,835	878,835	719,554	719,554	34,710	34,710
Max	0.650	0.495	0.650	0.584	0.610	0.549	0.430	0.399
97.5% quantile	0.386	0.241	0.429	0.248	0.488	0.344	0.430	0.367
Upper quartile	0.136	0.133	0.164	0.156	0.235	0.218	0.376	0.347
Median	0.063	0.094	0.092	0.117	0.140	0.164	0.333	0.326
Lower quartile	0.011	0.049	0.045	0.082	0.069	0.111	0.292	0.293
2.5% quantile	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Min	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Mean	0.093	0.094	0.120	0.121	0.165	0.168	0.305	0.308

Source: ASCU, 2022.

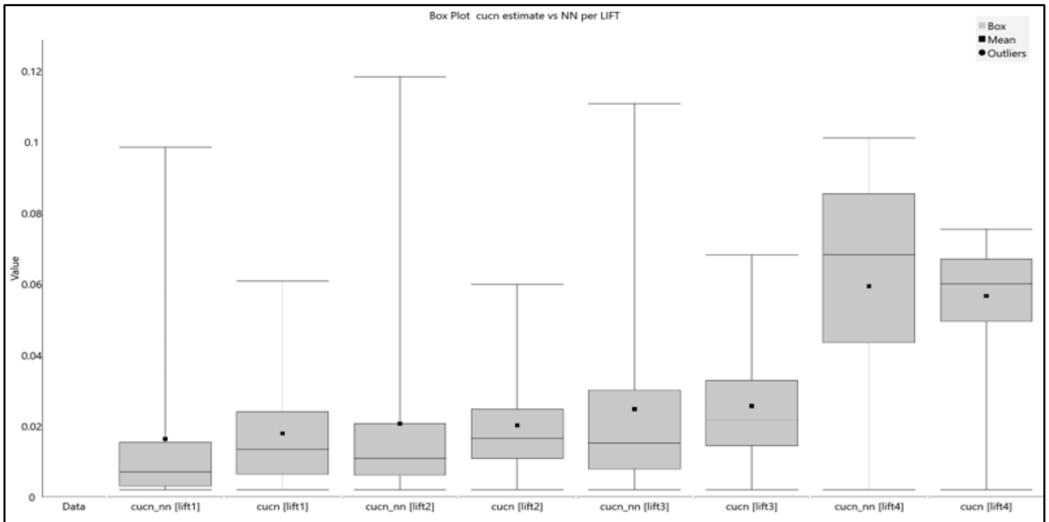
Figure 14-61: Box Plots Comparing CuT for the Cactus Stockpile Project Against the Nearest Neighbor Grouped by Lift



Data	cuas_nn [lift1]	cuas [lift1]	cuas_nn [lift2]	cuas [lift2]	cuas_nn [lift3]	cuas [lift3]	cuas_nn [lift4]	cuas [lift4]
Number of samples	817,887	817,887	878,835	878,835	719,554	719,554	34,710	34,710
Max	0.390	0.270	0.390	0.318	0.500	0.400	0.330	0.301
97.5% quantile	0.272	0.161	0.317	0.171	0.354	0.250	0.330	0.270
Upper quartile	0.089	0.086	0.112	0.107	0.167	0.156	0.256	0.251
Median	0.032	0.058	0.054	0.076	0.092	0.113	0.233	0.235
Lower quartile	0.003	0.028	0.023	0.049	0.038	0.075	0.203	0.211
2.5% quantile	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Min	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Mean	0.058	0.060	0.079	0.079	0.112	0.117	0.225	0.223

Source: ASCU, 2022.

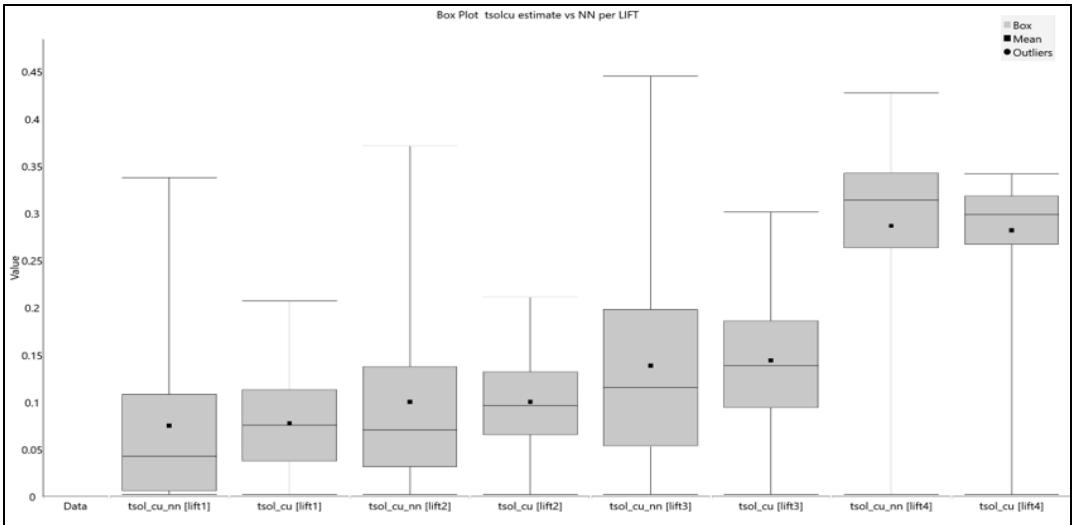
Figure 14-62: Box Plots Comparing CuAS for the Cactus Stockpile Project Against the Nearest Neighbor Grouped by Lift



Data	cucn_nn [lift1]	cucn [lift1]	cucn_nn [lift2]	cucn [lift2]	cucn_nn [lift3]	cucn [lift3]	cucn_nn [lift4]	cucn [lift4]
Number of samples	817,887	817,887	878,835	878,835	719,554	719,554	34,710	34,710
Max	0.290	0.227	0.279	0.219	0.180	0.115	0.100	0.085
97.5% quantile	0.097	0.060	0.117	0.059	0.109	0.067	0.100	0.075
Upper quartile	0.015	0.024	0.020	0.024	0.030	0.033	0.084	0.066
Median	0.007	0.013	0.011	0.016	0.015	0.021	0.068	0.059
Lower quartile	0.003	0.006	0.006	0.011	0.008	0.014	0.043	0.049
2.5% quantile	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Min	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Mean	0.016	0.018	0.020	0.020	0.024	0.025	0.059	0.056

Source: ASCU, 2022.

Figure 14-63: Box Plots Comparing CuCN for the Cactus Stockpile Project Against the Nearest Neighbor Grouped by Lift



Data	tsol_cu_nn [lift1]	tsol_cu [lift1]	tsol_cu_nn [lift2]	tsol_cu [lift2]	tsol_cu_nn [lift3]	tsol_cu [lift3]	tsol_cu_nn [lift4]	tsol_cu [lift4]
Number of samples	817,887	817,887	878,835	878,835	719,554	719,554	34,710	34,710
Max	0.669	0.432	0.669	0.536	0.680	0.516	0.423	0.383
97.5% quantile	0.334	0.205	0.367	0.209	0.440	0.298	0.423	0.337
Upper quartile	0.107	0.112	0.136	0.131	0.196	0.184	0.339	0.314
Median	0.042	0.075	0.070	0.095	0.114	0.137	0.310	0.295
Lower quartile	0.006	0.037	0.031	0.065	0.053	0.093	0.260	0.264
2.5% quantile	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Min	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Mean	0.074	0.077	0.099	0.099	0.137	0.142	0.283	0.279

Source: ASCU, 2022.

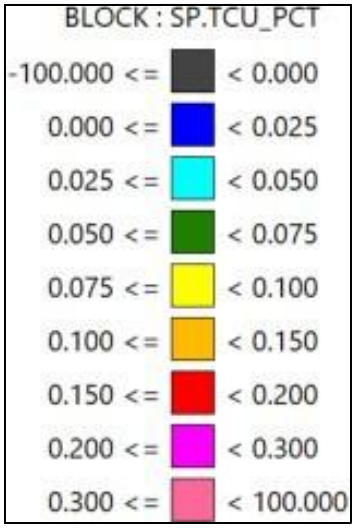
Figure 14-64: Box Plots Comparing Tsol for the Cactus Stockpile Project Against the Nearest Neighbor as an Independent Cross Check Grouped by Lift

As an independent check on the grade estimates, box plots were created for Tsol mean grades and distributions within each lift to compare against the nearest neighbor.

Figure 14-64 shows the box plots and confirms similar mean grades and smoothed distributions in line with the composite distributions.

14.3.13.2 Visual Validations

On a local scale, model validation can be confirmed by the visual comparison of block grades to composite grades. The color legend of Figure 14-65 is applied to all block and composite grade values for comparative purposes. A plan view and long Section of each of the estimated variables showing composites superimposed as dots on block grades is shown in Figure 14-66 through Figure 14-70. The legend applies to CuT, CuAS, and CuCN. Examination indicates appropriate agreement of block grade estimates with the composite grades considering the level of smoothing that has been built into the model. Visual validations confirm the overall grade trends through the stockpile are represented as planned.



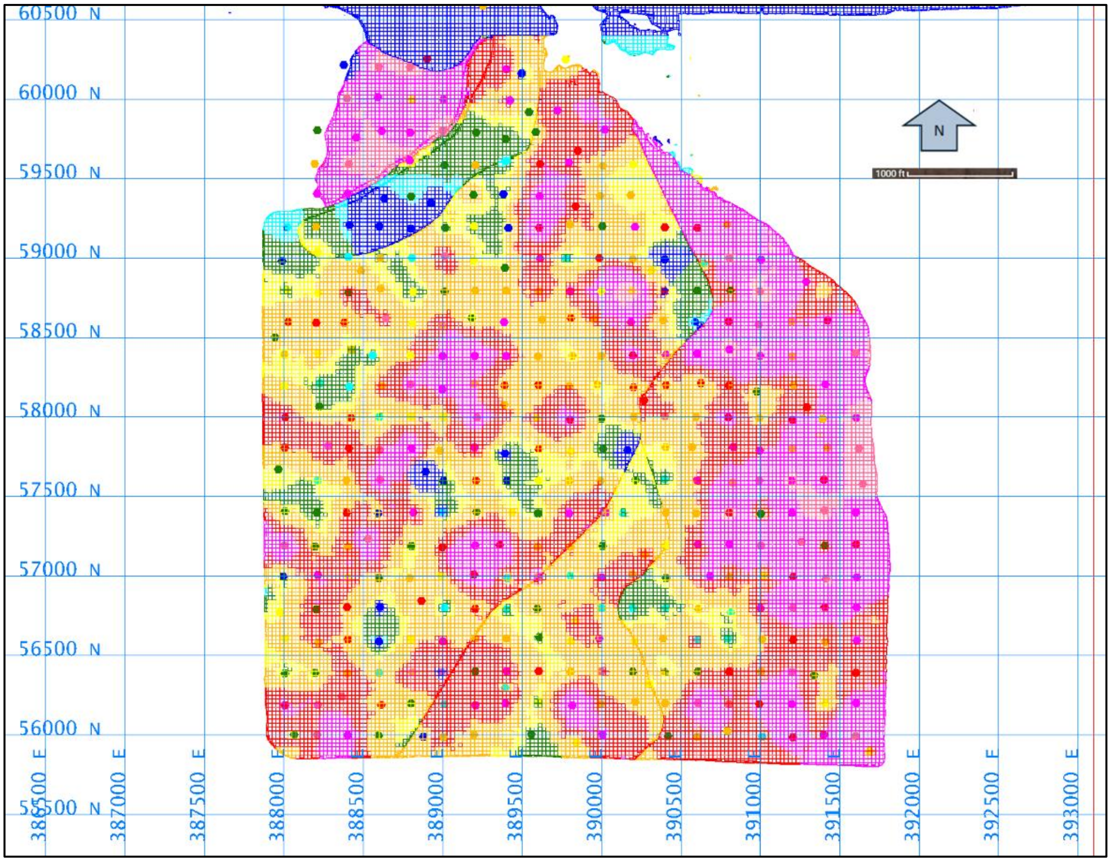
BLOCK : SP.TCU_PCT

-100.000 <=	⬛	< 0.000
0.000 <=	🟦	< 0.025
0.025 <=	🟦	< 0.050
0.050 <=	🟩	< 0.075
0.075 <=	🟨	< 0.100
0.100 <=	🟧	< 0.150
0.150 <=	🟥	< 0.200
0.200 <=	🟪	< 0.300
0.300 <=	🟪	< 100.000

Source: ASCU, 2022.

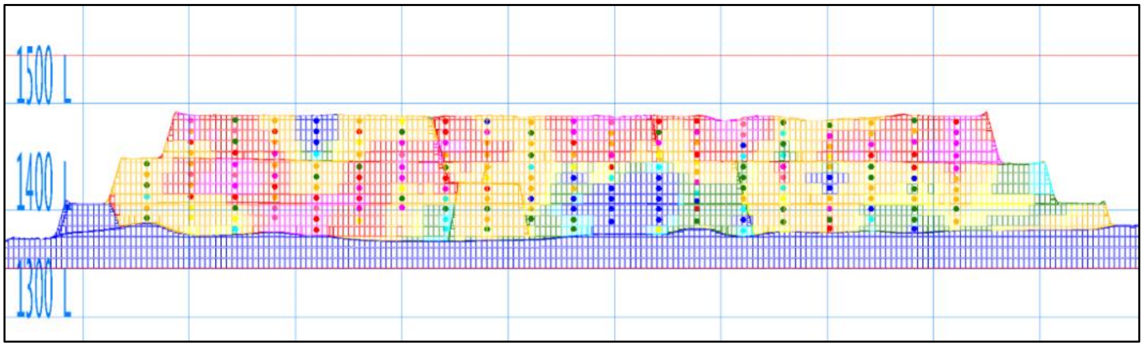
Figure 14-65: Legend for all Copper Grade Sections

As an independent check on the grade estimates, a visual comparison of block grades to composite grades was also performed for the Tsol grades (see Figure 14-66 and Figure 14-73). The examination confirms appropriate agreement and that overall grade trends are represented as planned.



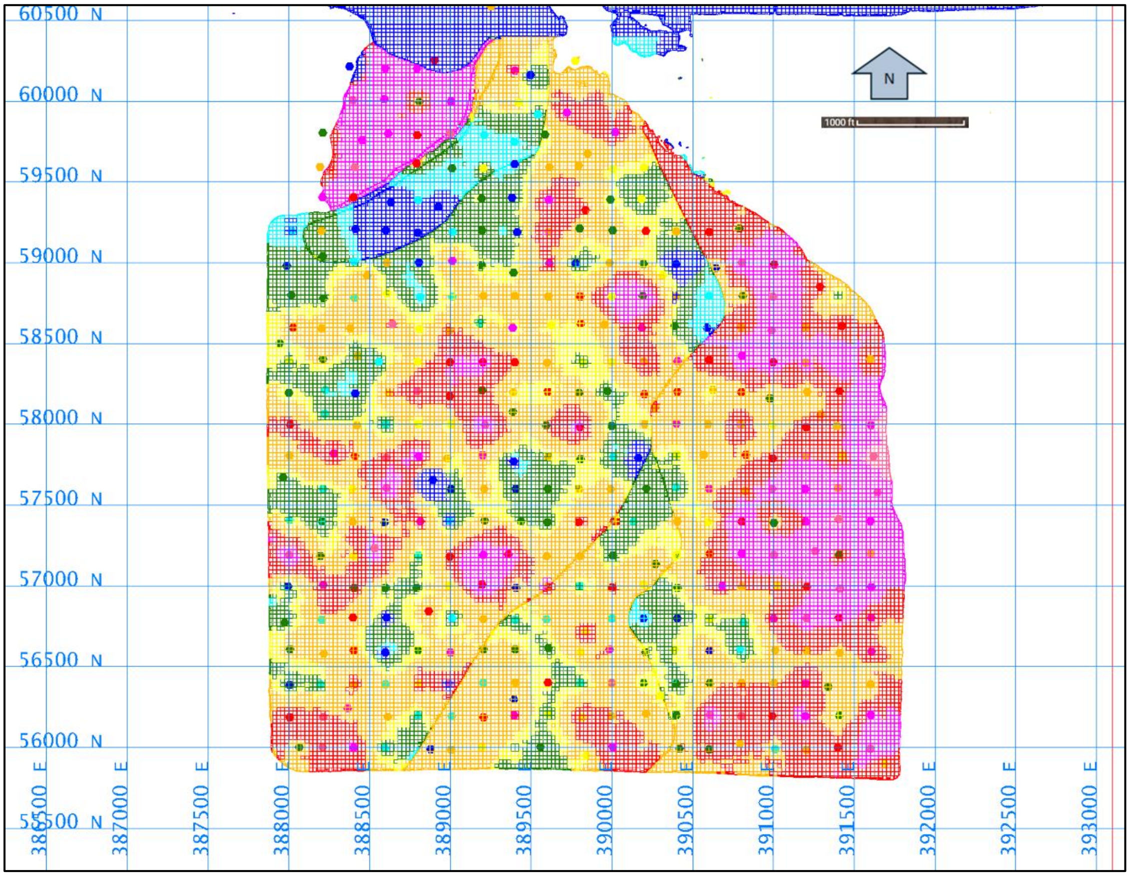
Note: Clipping is 5 ft either side of the section. Source: ASCU, 2022.

Figure 14-66: Plan View Lift 3 (1455) for CuT Grade Comparing Blocks to Sample Composites



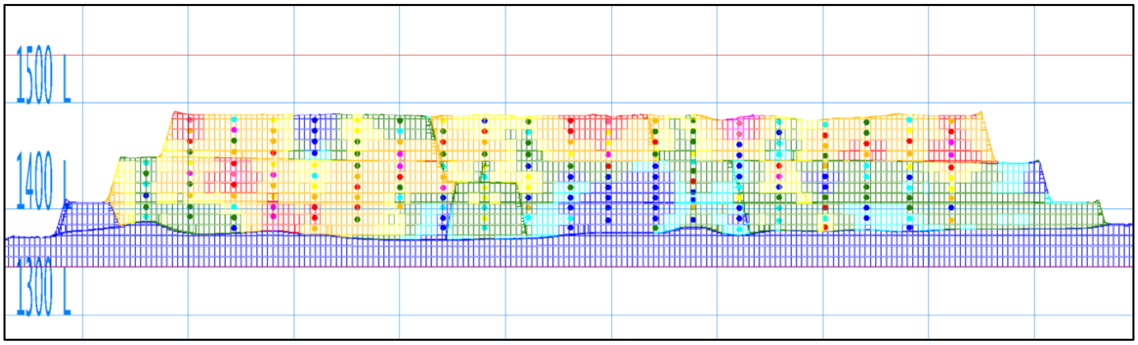
Note: Clipping is 75 ft either side of the section. Vertical exaggeration is set to 500. Source: ASCU, 2022.

Figure 14-67: Cross Section view (56600N) for CuT Grade Comparing Blocks to Sample Composites



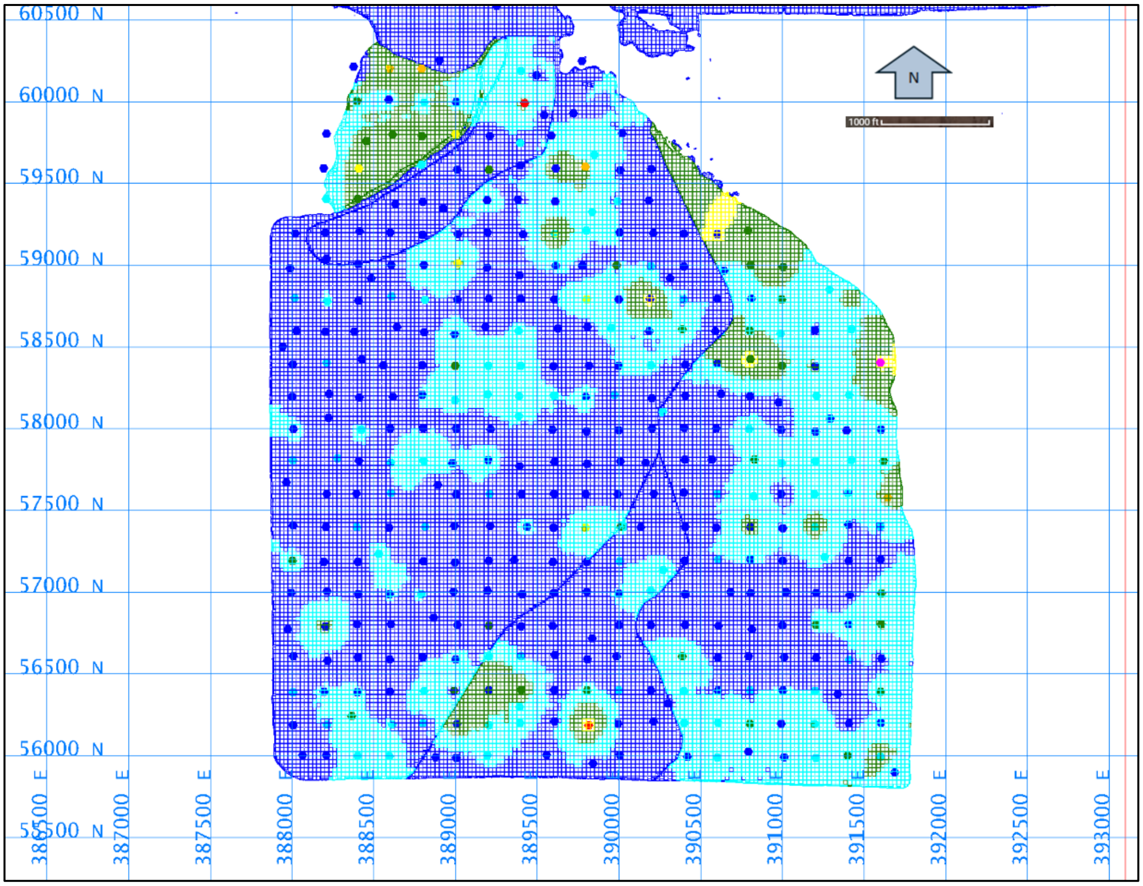
Note: Clipping is 5 ft either side of the section. Source: ASCU, 2022.

Figure 14-68: Plan View Lift 3 (1455) for CuAS Grade Comparing Blocks to Sample Composites



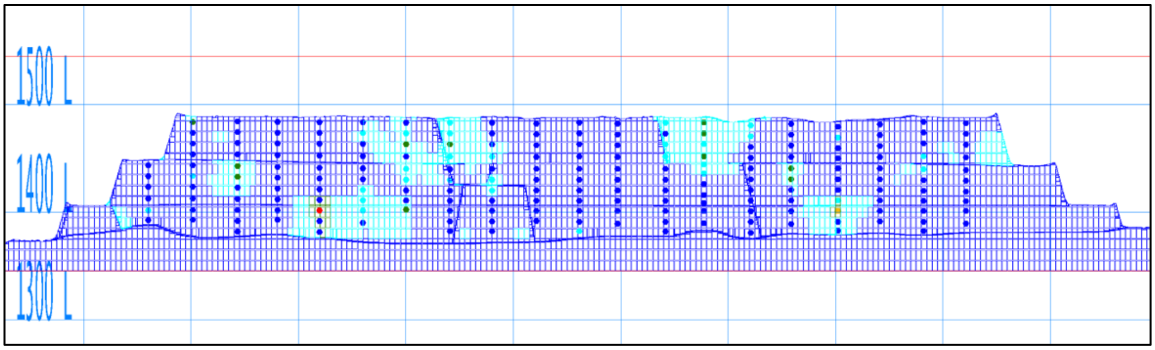
Note: Clipping is 75 ft either side of the section. Vertical exaggeration is set to 500. Source: ASCU, 2022.

Figure 14-69: Cross Section View (56600N) for CuAS Grade Comparing Blocks to Sample Composites



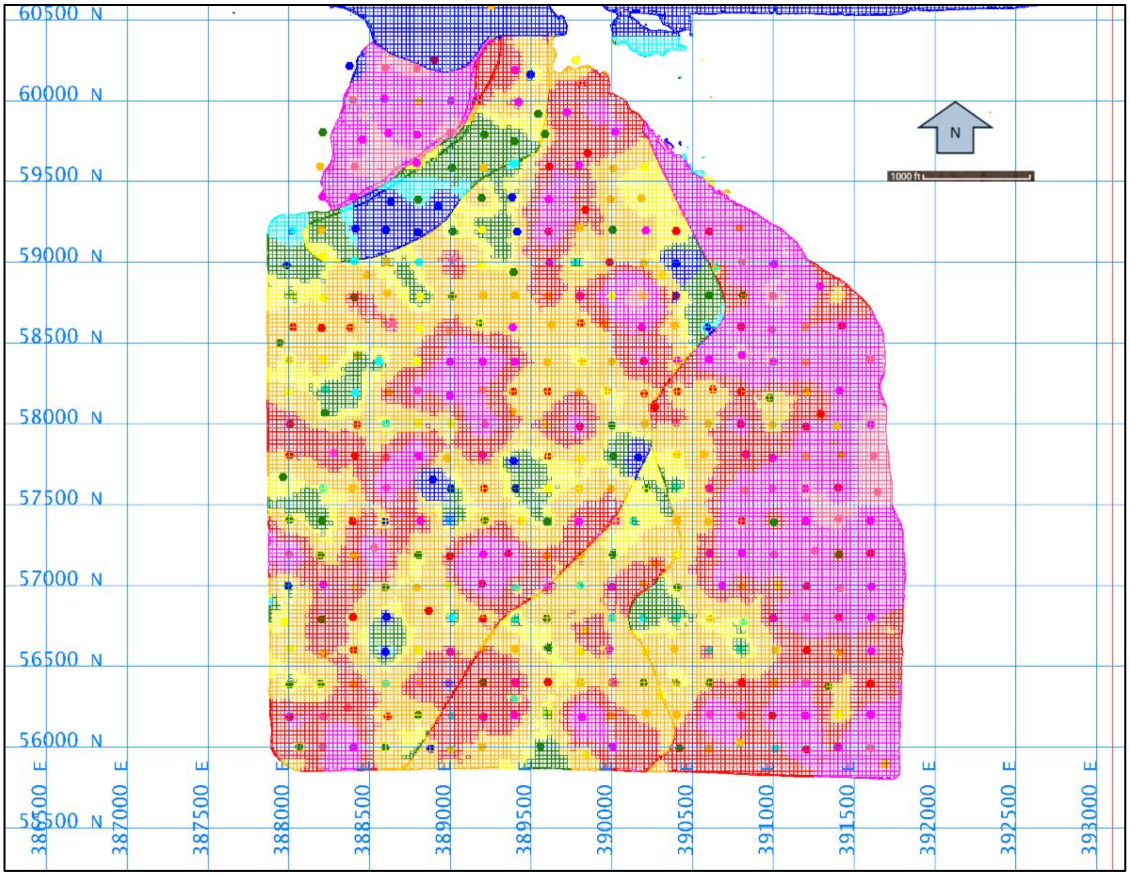
Note: Clipping is 5 ft either side of the section. Source: ASCU, 2022.

Figure 14-70: Plan View Lift 3 (1455) for CuCN Grade Comparing Blocks to Sample Composites



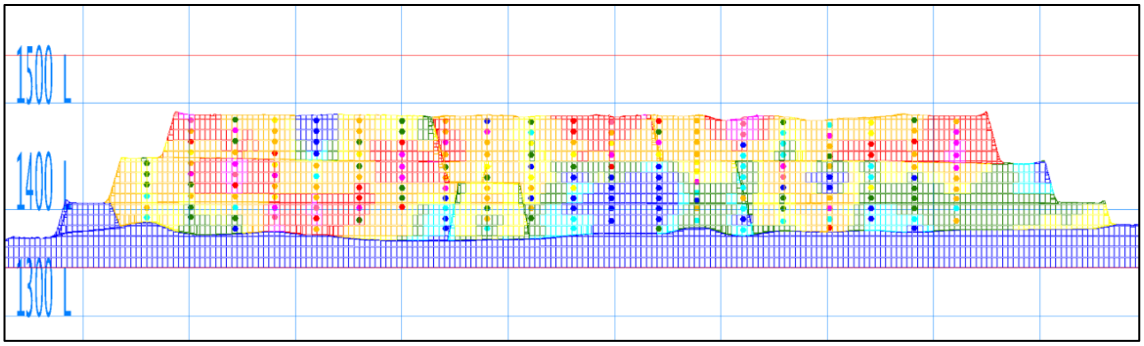
Note: Clipping is 75 ft either side of the section. Vertical exaggeration is set to 500. Source: ASCU, 2022.

Figure 14-71: Cross Section View (56600N) for CuCN Grade Comparing Blocks to Sample Composites



Note: Clipping is 5 ft either side of the section. Source: ASCU, 2022.

Figure 14-72: Plan View Lift 3 (1455) for Tsol Grade Comparing Blocks to Sample Composites



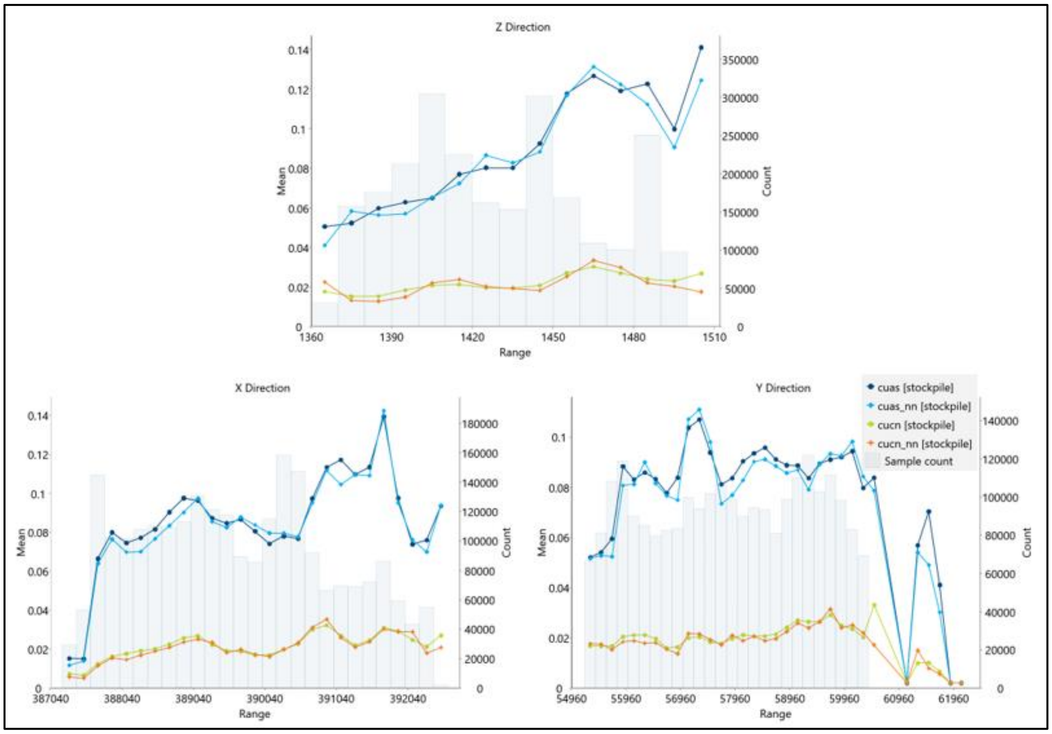
Note: Clipping is 75 ft either side of the section. Vertical exaggeration is set to 500. Source: ASCU, 2022.

Figure 14-73: Cross Section View (56600N) for Tsol Grade Comparing Blocks to Sample Composites

14.3.13.3 Swath Plots

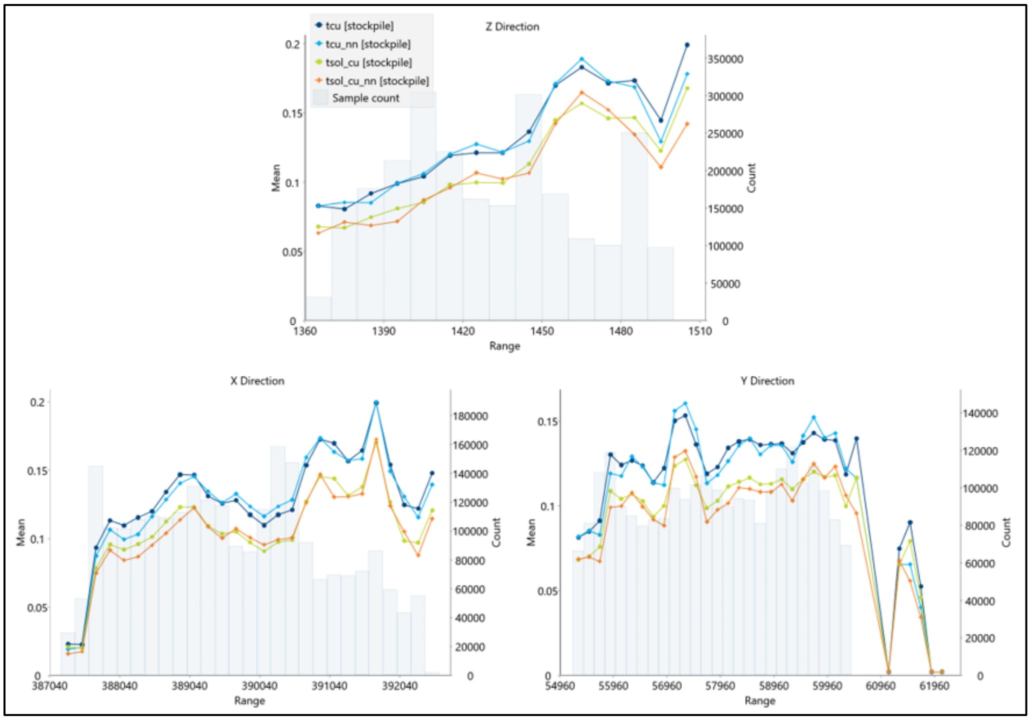
Swath plots were created to compare the grade trends through the mineralized stockpile between the estimated CuT, CuAS, and CuCN against the nearest neighbor model. As an independent check on the estimates, swath plots were also generated for Tsol.

Comparisons for CuAS and CuCN are shown in Figure 14-74. Comparisons for CuT and Tsol are shown in Figure 14-75.



Source: ASCU, 2022.

Figure 14-74: Swath Plots through Cactus West Comparison with Associated Nearest Neighbor Grade Trends



Source: ASCU, 2022.

Figure 14-75: Swath Plots through the Cactus Stockpile Project with Associated Nearest Neighbor Grade Trends

14.3.14 Resource Classification

The drill spacing for the Cactus Stockpile Project has been reduced from approximately 750 ft (229 m) to 200 ft (61 m) spacing. Due to the nature of the dumping of material to the stockpile and inherent variability, at this drill spacing the mineral resource classification has been assigned an Indicated status. Of particular note is that through the process of significantly reducing the drill spacing and significantly increasing the number of drill holes, there has been little change to the grade tonnage curve and global resource from that previously reported in 2020 based on the 750 ft (229 m) drill spacing.

14.4 RESOURCE REPORTING

14.4.1 Resource Cutoff Grades

To meet a Reasonable Prospects for Eventual Economic Extraction (RPEEE) requirement, as stated in CIM 2019 Best Practices, Cutoff Grades (CoGs) were applied to a potential open pit across the Cactus deposit, a potential underground mine at depth in Cactus East, and a potential underground mine at Parks/Salyer. Mineral resources that are not mineral reserves do not have demonstrated economic viability.

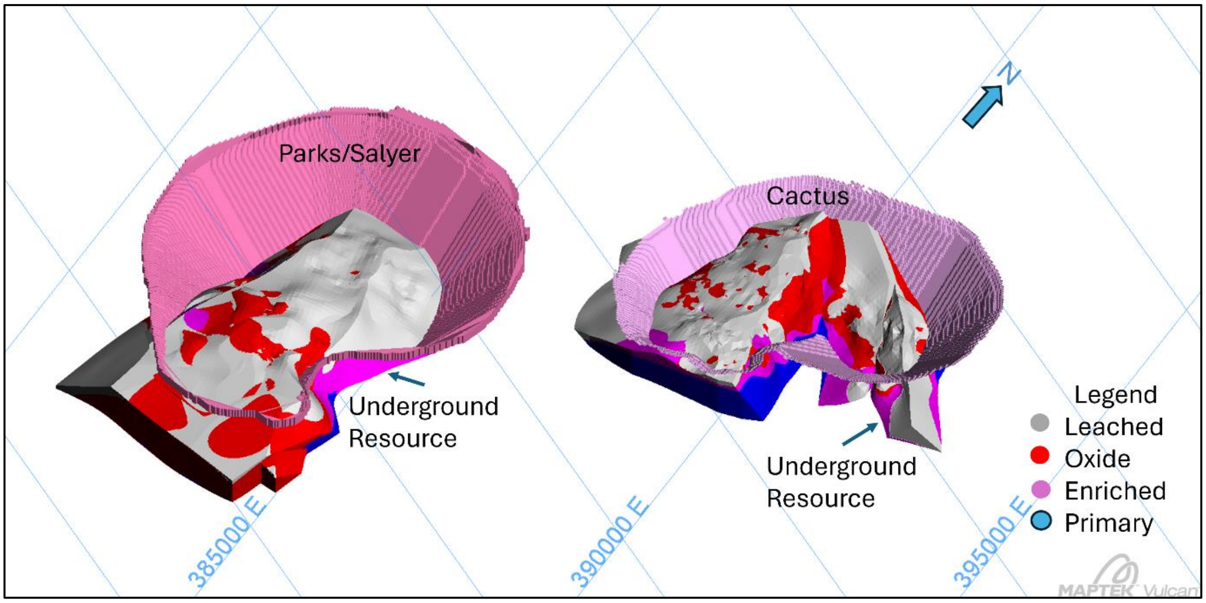
Conceptually, copper from oxide and enriched material in the open pit would be recovered in a heap leach. Therefore, CoGs in the amenable oxide and enriched zones were based on Tsol assays. CoGs for the sulfides in the primary material were based on CuT assays. High- level cost analysis for the Cactus open pit suggested CoGs of 0.099% Tsol for the oxides, and 0.092% Tsol for the enriched material. A Whittle pit was run using these parameters and the reported resource is for material within that pit.

Additional mineral resources outside of the Whittle pit in Cactus East have the potential to be amenable to underground mining. High-level analysis of the material yielded cutoffs of 0.549% Tsol for the oxides and 0.522% Tsol for the enriched.

Mineral resources for Parks/Salyer were also determined based on its amenability to open pit mining and vary due to applicable royalties. High-level analysis of the material yielded cutoffs of 0.549% Tsol for the oxides, 0.522% Tsol for the enriched and for primary on ASCU owned land. Cutoffs of 0.545% Tsol for the oxides, 0.518% Tsol for the enriched, and 0.686% for primary apply to the state land. Cutoffs of 0.532% Tsol for the oxides, 0.505% Tsol for the enriched, and 0.669% for primary apply to the MainSpring property for which no royalties apply.

Stockpile Project mineral resources were defined using a CoG of 0.095% Tsol.

Figure 14-76 displays an oblique image of the Cactus and Parks/Salyer open pits and underground resources as defined by the Whittle pit shells and underground CoG.



Source: ALS Geo Resources

Figure 14-76: Oblique Image Displaying Open Pit and Underground Resources for Cactus West, Cactus East, and Parks/Salyer and Material Types

14.4.2 Resource Tables

Table 14-23 details the breakdown of resources for Cactus West and Cactus East by mineral zone and classification within the Whittle pit. Table 14-24 through Table 14-27 have the same breakdown for the potential underground mineral resources for Cactus East and Parks/Salyer. Table 14-28 shows the combined total of the two previous tables.

Table 14-23: Cactus West and Cactus East Open Pit Measured, Indicated, and Inferred Resource

Cactus O/P Resource					
Material Type	**ktons (kt)**	**CuT (%)**	**Tsol (%)**	**Contained Cu (k lbs)**	**Contained Tsol (k lbs)**
MEASURED					
Oxide	200	0.194	0.132	800	500
Enriched	10,000	0.250	0.222	50,000	44,400
Primary	1,300	0.314	0.042	8,200	1,100
Total Measured	11,500	0.256	0.200	59,000	46,100
INDICATED					
Oxide	70,900	0.378	0.341	536,000	483,500
Enriched	60,100	0.757	0.660	909,900	796,300
Primary	68,300	0.341	0.033	465,800	45,100
Total Indicated	199,300	0.480	0.332	1,911,900	1,322,100
M&I					
Oxide	71,100	0.380	0.343	539,800	487,400
Enriched	70,100	0.792	0.709	1,109,900	993,300
Primary	69,600	0.353	0.051	491,800	71,100
Total M&I	210,800	0.5087	0.368	2,141,800	1.552,000
INFERRED					
Oxide	28,100	0.313	0.278	175,900	156,200
Enriched	22,400	0.378	0.293	169,300	131,300
Primary	117,800	0.339	0.029	798,700	68,300
Total Inferred	168,200	0.340	0.106	1,143,300	355,200

Note: Refer to Table 14-24 for applicable notes to the underground resource parameters and assumptions. Totals may not add up due to rounding.

Table 14-24: Cactus East Underground Indicated and Inferred Resource

Cactus U/G Resource					
Material Type	**ktons (kt)**	**CuT (%)**	**Tsol (%)**	**Contained Cu (k lbs)**	**Contained Tsol (k lbs)**
INDICATED					
Oxide	1,200	0.830	0.784	19,900	18,800
Enriched	9,000	1.071	0.899	192,800	161,800
Primary	1,600	0.812	0.363	25,700	11,500
Total Indicated	11,800	1.011	0.815	238,600	192,600
INFERRED					
Oxide	500	0.798	0.744	8,000	7,400
Enriched	3,300	0.966	0.770	63,800	50,800
Primary	1,500	0.817	0.334	24,500	10,000
Total Inferred	5,400	0.908	0.644	97,700	69,300

Note: Refer to Table 14-27 for applicable notes to the underground resource parameters and assumptions. Totals may not add up due to rounding.

Table 14-25: Parks/Salyer Open Pit Measured, Indicated, and Inferred Resource

Parks/Salyer O/P Resource					
Material Type	**ktons (kt)**	**CuT (%)**	**Tsol (%)**	**Contained Cu (k lbs)**	**Contained Tsol (k lbs)**
MEASURED					
Oxide	4,000	0.476	0.456	38,100	36,500
Enriched	41,100	1.150	0.966	943,000	792,100
Primary	10,900	0.528	0.056	115,100	12,200
Total Measured	55,900	0.981	0.752	1,096,200	840,800
INDICATED					
Oxide	34,400	0.469	0.437	322,700	300,700
Enriched	166,900	0.810	0.710	2,703,800	2,370,000
Primary	80,400	0.423	0.043	680,200	69,100
Total Indicated	281,700	0.658	0.486	3,706,700	2,739,800
M&I					
Oxide	38,400	0.470	0.439	360,800	337,100
Enriched	207,900	0.877	0.760	3,646,800	3,162,100
Primary	91,400	0.435	0.045	795,300	81,400
Total M&I	337,700	0.711	0.530	4,802,900	3,580,600
INFERRED					
Oxide	43,100	0.372	0.328	320,400	282,900
Enriched	191,300	0.436	0.388	1,669,200	1,484,100
Primary	54,100	0.395	0.038	427,100	41,000
Total Inferred	288,500	0.419	0.313	2,416,700	1,808,000

Note: Refer to Table 14-24 for applicable notes to the stockpile resource parameters and assumptions. Totals may not add up due to rounding.

Table 14-26: Parks/Salyer Underground Measured, Indicated, and Inferred Resource

Parks/Salyer U/G Resource					
Material Type	**ktons (kt)**	**CuT (%)**	**Tsol (%)**	**Contained Cu (k lbs)**	**Contained Tsol (k lbs)**
MEASURED					
Oxide	~	~	~	~	~
Enriched	5	1.299	0.924	134	95
Primary	43	0.770	0.071	669	62
Total Measured	49	0.826	0.161	909	157
INDICATED					
Oxide	9	0.660	0.642	125	122
Enriched	1,104	0.962	0.850	21,200	18,800
Primary	76	0.767	0.115	1,200	200
Total Indicated	1,200	0.938	0.796	22,500	19,100

Parks/Salyer U/G Resource					
Material Type	ktons (kt)	CuT (%)	Tsol (%)	Contained Cu (k lbs)	Contained Tsol (k lbs)
M&I					
Oxide	9	0.660	0.642	125	122
Enriched	1,100	0.972	0.858	21,300	18,900
Primary	100	0.916	0.118	1,900	262
Total M&I	1,200	0.971	0.804	23,300	19,300
INFERRED					
Oxide	4,001	0.801	0.737	64,100	59,000
Enriched	5,600	0.863	0.776	97,100	87,300
Primary	1,000	0.815	0.258	16,700	5,300
Total Inferred	10,600	0.839	0.715	177,900	151,600

Note: Refer to Table 14-24 for applicable notes to the stockpile resource parameters and assumptions. Totals may not add up due to rounding.

Table 14-27: Cactus Stockpile Project Indicated and Inferred Resource

Cactus Stockpile					
Material Type	ktons (kt)	CuT (%)	Tsol (%)	Contained Cu (k lbs)	Contained Tsol (k lbs)
INDICATED					
Oxide	71,000	0.181	0.153	257,400	217,600
INFERRED					
Oxide	1,200	0.150	0.127	3,600	3,000

Note: Refer to Table 14-24 for applicable notes to the stockpile resource parameters and assumptions. Totals may not add up due to rounding.

Table 14-28: Cactus Project Total Measured, Indicated and Inferred Resource

Cactus Project Total Resource					
Material Type	ktons (kt)	CuT (%)	Tsol (%)	Contained Cu (k lbs)	Contained Tsol (k lbs)
MEASURED					
Oxide	4,200	0.463	0.440	38,900	37,000
Enriched	51,000	0.974	0.820	993,100	836,600
Primary	12,300	0.504	0.054	124,000	13,400
Total Measured	67,500	0.856	0.657	1,156,000	887,100
INDICATED					
Oxide	177,600	0.320	0.288	1,136,600	1,021,200
Enriched	237,200	0.807	0.705	3,827,700	3,343,900
Primary	150,400	0.390	0.042	1,172,900	125,900
Total Indicated	565,200	0.543	0.397	6,137,200	4,481,000

Cactus Project Total Resource					
Material Type	**ktons (kt)**	**CuT (%)**	**Tsol (%)**	**Contained Cu (k lbs)**	**Contained Tsol (k lbs)**
M&I					
Oxide	181,800	0.323	0.291	1,175,500	1,058,200
Enriched	288,200	0.836	0.725	4,820,800	4,180,500
Primary	162,700	0.399	0.043	1,296,900	139,300
Total M&I	632,700	0.576	0.425	7,293,200	5,378,000
INFERRED					
Oxide	76,900	0.372	0.331	572,100	508,600
Enriched	222,700	0.449	0.394	2,000,300	1,754,300
Primary	174,500	0.363	0.036	1,267,400	124,800
Total Inferred	474,100	0.405	0.2524	3,839,800	2,387,700

Notes:

1. Total soluble copper grades (Cu TSol) are reported using sequential assaying to calculate the soluble copper grade. Tons are reported as short tons.

2. Stockpile resource estimates have an effective date of 1st March 2022, Cactus mineral resource estimates have an effective date of 29th April, 2022, Parks/Salyer-MainSpring mineral resource estimates have an effective date of 11th July, 2024. All mineral resources use a copper price of US$3.75/lb.

3. Technical and economic parameters defining mineral resource pit shells: mining cost US$2.43/t; G&A US$0.55/t, 10% dilution, and 44°-46° pit slope angle.

4. Technical and economic parameters defining underground mineral resource: mining cost US$27.62/t, G&A US$0.55/t, and 5% dilution. Underground mineral resources are only reported for material located outside of the open pit mineral resource shells. Designation as open pit or underground mineral resources are not confirmatory of the mining method that may be employed at the mine design stage.

5. Technical and economic parameters defining processing: Oxide heap leach ("HL") processing cost of US$2.24/t assuming 86.3% recoveries, enriched HL processing cost of US$2.13/t assuming 90.5% recoveries, sulfide mill processing cost of US$8.50/t assuming 92% recoveries. HL selling cost of US$0.27/lb; Mill selling cost of US$0.62/lb.

6. Royalties of 3.18% and 2.5% apply to the ASCU properties and state land respectively. No royalties apply to the MainSpring property.

7. Variable cut-off grades were reported depending on material type, potential mining method, potential processing method, and applicable royalties. For ASCU properties - Oxide open pit or underground material = 0.099% or 0.549% TSol respectively; enriched open pit or underground material = 0.092% or 0.522% TSol respectively; primary open pit or underground material = 0.226% or 0.691% CuT respectively. For state land property – Oxide open pit or underground material = 0.098 % or 0.545% TSol respectively; enriched open pit or underground material = 0.092% or 0.518% TSol respectively; primary open pit or underground material = 0.225% or 0.686% CuT respectively. For MainSpring properties – Oxide open pit or underground material = 0.096% or 0.532% TSol respectively; enriched open pit or underground material = 0.089% or 0.505% TSol respectively; primary open pit or underground material = 0.219% or 0.669% CuT respectively. Stockpile cutoff = 0.095% TSol.

8. Mineral resources, which are not mineral reserves, do not have demonstrated economic viability. The estimate of mineral resources may be materially affected by environmental, permitting, legal, title, sociopolitical, marketing, or other relevant factors.

9. The quantity and grade of reported inferred mineral resources in this estimation are uncertain in nature and there is insufficient exploration to define these inferred mineral resources as an indicated or measured mineral resource; it is uncertain if further exploration will result in upgrading them to an indicated or measured classification.

10. Totals may not add up due to rounding

15 MINERAL RESERVE ESTIMATES

There were no reserves to report.

16 MINING METHODS

16.1 OVERVIEW MINE DESIGN

The Cactus Project is comprised of the Cactus and Parks/Salyer deposits and an existing surface stockpile (Stockpile Project) of previously mined material. The deposits are planned to be developed using conventional open pit mining and underground mining methods. The surface mining portion of the Project includes Parks/Salyer, Cactus West and the Stockpile. Underground mining methods will be used for the Cactus East deposit.

The Project located at the historic Sacaton Mine is 40 road miles south southeast of the Greater Phoenix metropolitan area and approximately 3 mi (5 km) northwest of the city of Casa Grande in Pinal County, Arizona. The property operated as a conventional open pit copper mine mining the Cactus deposit from 1974 until 1984. The mine schedule for open pit mining at Parks/Salyer consists of 531 M ton of feed material grading 0.530% CuT, including 453 M tons of oxide/enriched leach feed material grading 0.551% CuT and 78 M tons of hypogene leach feed material grading 0.413% CuT. The mine schedule for open pit mining at Cactus West consists of 306 M tons of feed material grading 0.286% CuT, including 154 M tons of oxide/enriched leach feed material grading 0.258% CuT and 152 M tons of hypogene leach feed material grading 0.315% CuT. The Stockpile Project contributes 9.8 M tons of conventional leach feed material grading 0.235 % CuT which will be used for project commissioning in Year 1 of processing. Open pit mining will initiate in Parks/Salyer in Year -1 and operate continuously for 23 years over seven pit phases. Total waste mined in Parks/Salyer is 1,680 M ton. Open pit mining will take place at Cactus West in the years of 7-11, 15, 19, and 23-31. Phase 1 Cactus West is used to smooth stripping requirements of Parks/Salyer in the middle-years of the mine plan, while Phase 2-3 are mined in the later years and predominantly supply hypogene feed material. Total waste mined from Cactus West is 299 M ton. A sublevel cave underground mine is planned for Cactus East with development beginning in Year 8 and mining completed in Year 22. Total Cactus East feed material mined is projected to be 42 M ton grading 0.834% CuT. Total planned feed material is 889 M tons grading 0.458% CuT, including 659 M tons grading 0.496% CuT of oxide/enriched leach material, and 230 M tons grading 0.348% CuT of hypogene leach material. Total waste mined during the mine life is 1,979 M tons.

Open pit mining of Parks/Salyer was determined to maximize inclusion of resources into the mine schedule while also maximizing economic value, production capacity and reducing technical complexity relative to underground mining options.

The sublevel caving method for Cactus East was deemed to offer the best opportunity to maximize inclusion of resources into the mine schedule whilst offering feed material with favorable economic and production capacity outcomes compared to the other underground mining options considered.

The initial Cactus East SLC level will commence 1,265 ft below surface and be comprised of 8 sublevels to a final depth 1,845 ft below surface. Access will be via a single decline with a portal located within the existing Cactus West pit. Feed material haulage to surface will be via a vertical conveyor which can be supplemented with truck haulage to surface via the open pit if necessary. Production will continue for 14 years and will peak at 3.9 Mt/y.

16.2 CACTUS PROJECT PEA GEOTECHNICAL – PARKS/SALYER OPEN PIT AND CACTUS EAST UNDERGROUND

16.2.1 Open Pit Summary and Recommendations

16.2.1.1 Introduction

Call & Nicholas, Inc. was requested by Arizona Sonoran Copper to perform a Preliminary Economic Analysis (PEA) slope stability study for an open pit for the Parks/Salyer and MainSpring deposits at the Cactus Mine site near Casa Grande, Arizona. The final design incorporated both deposits in one design and the two pit designs are referred as Parks/Salyer for the remainder of this section.

In 2023, Call & Nicholas, Inc. participated in the Pre-Feasibility Study for underground mining of the Parks/Salyer deposit and a report was published in December of 2023 titled “Geotechnical PFS Study for the ASCU Cactus Project” (Call & Nicholas, Inc., 2023). The 2023 PFS evaluation forms the basis for this PEA to develop and evaluate a Parks/Salyer open pit.

The main objective of this study was to:

1. Provide preliminary interramp slope angles and geotechnical constraints for mine planning to develop economic Lerchs-Grossmann (LG) pit shells,
2. Evaluate the pit shells relative to overall slope height, to material types exposed in the slope walls, and to major structures impacting slope stability,
3. Provide updated geotechnical recommendations for a revised LG evaluation and development of an open pit design, and
4. Evaluate overall slope stability for the life-of-mine (LOM) Parks-MainSpring open pit. This open pit is planned to mine down to the primary mineral domain just above the basement fault which is the limit of the mineralized material in both the MainSpring and Parks/Salyer deposits

For this PEA study, the primary focus has been on evaluating the overall slope factor of safety for the final LOM pit geometry. Internal mining phases and mine sequencing have not been considered at this stage. The design acceptance criteria for the slope design are an 80 percent bench slope reliability, a 90 percent interramp slope reliability, and an overall slope factor of safety of 1.2 using two-dimensional slope analysis.

16.2.1.2 Preliminary Design Pit

To develop a preliminary pit design to evaluate in this PEA study, initial interramp slope angle recommendations provided were based on the work conducted for the Cactus Pit expansion in the PFS study (Call & Nicholas, Inc., 2023). Geologic and geotechnical material types in the Parks/Salyer and MainSpring deposits are very similar to the Cactus Pit. Historically, ASARCO mined 45-degree interramp slopes successfully in the Cactus Pit. Although the Gila conglomerate is weaker in strength than the underlying rocks, it is unjointed. Many of the benches in the Gila conglomerate in the Cactus Pit are standing at 75 degrees or steeper, so it is expected that 50 degrees is achievable based on the drone mapping conducted in 2023 and 2024.

Based on the mapping of the Cactus Pit benches and the review of structural data collected using drill holes and televiewer methodology, initial recommendations of interramp slope angles for the Parks/Salyer open pit are 45-degrees for the Oxide, Leached, Enriched, and Primary rock groups, and 50-degrees for the conglomerate, as shown in Table 16-1.

Table 16-1: Initial Geotechnical Recommendations for the Parks/Salyer LG

Geologic Material	Interramp Slope Angle (deg.)	Bench Layout				
		Bench Height (ft)	Layout Bench Face Angle (deg.)	Layout Catch Bench Width (ft)	Minimum Bench Face Angle (deg.)	Minimum Catch Bench Width (ft)
Alluvium	50	60	70	28.5	69	27
Gila conglomerate	50	60	70	28.5	69	27
Oracle Granite	45	60	70	38.2	61	27

In February 2024, the LG design shell of a Parks-MainSpring pit was provided to Call & Nicholas, Inc. for review. The LG pit shell provided encompasses the Parks/Salyer resource and the MainSpring extension to the south, forming a larger footprint than what was studied previously for the underground mining.

Review of the LG pit has identified several geotechnical concerns which include:

1. The proximity of the toe of the pit slopes to the basement fault (the design slope in the SE pit area mines primary material adjacent to the basement fault, which dips towards the NW).
2. Slopes will be constructed within the primary mineral domain.
3. Mining will extend into the tailings pile on the north side of the pit.
4. The slope height of Gila conglomerate is nearly twice that of the slopes in the Cactus West pit.

Based on the review of this and preliminary stability analysis of this LG shell, updated geotechnical design guidance was provided to ASCU and AGP in March 2024, as shown in Table 16-2.

Table 16-2: Updated Geotechnical Slope Design Recommendations for the Parks/Salyer Pit Design

Rock Type	Overall Slope Angle (deg.)	Interramp Slope Angle (deg.)	Bench Layout		
			Bench Height (ft)	Layout Bench Face Angle (deg.)	Layout Catch Bench Width (ft)
Alluvium	40	40	40	70	33.1
Gila conglomerate [1]	40	45	40	70	25.4
Oracle Granite [2]	40	45	40	70	25.4
Notes:					
1. Maximum 500-foot interramp slope height in Gila conglomerate – haul road or step-in needed at 500-foot height					
2. Maintain 250-foot vertical offset between Oracle Granite and basement fault					

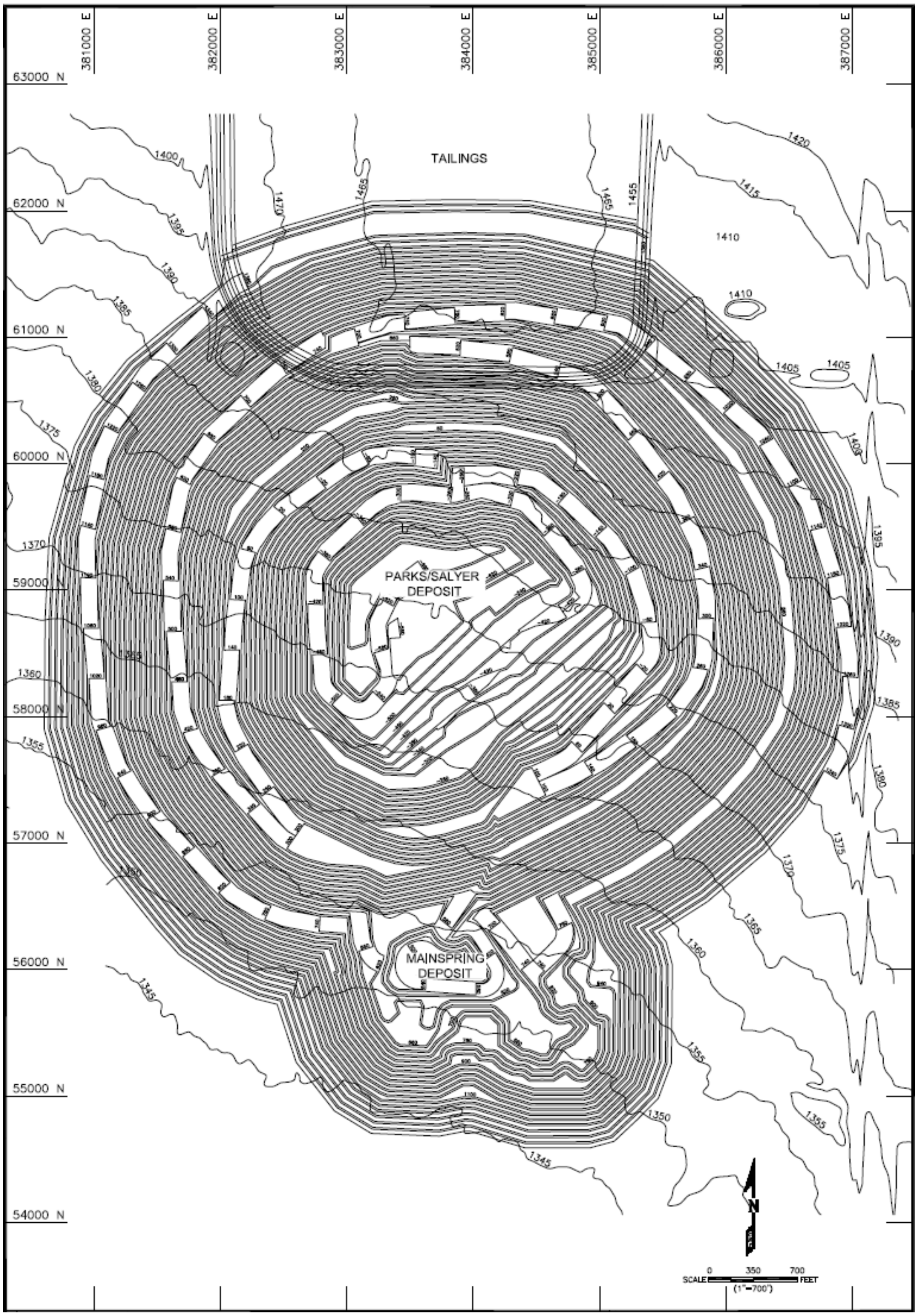
16.2.1.3 Parks/Salyer V2 Pit Design

Utilizing the recommendations shown in Table 16-2, AGP developed an economic pit and phased open pit design which was provided to Call & Nicholas, Inc. in April 2024. Figure 16-1 shows the current topography and the Parks/Salyer V2 pit design. Figure 16-2 shows the V2 design pit with intersected faults and exposed mineral domains on this design. Figure 16-3 shows the V2 design and faults along with slope angle and slope height measurements.

While the Cactus West pit benches were designed by mining two 30-foot bench increments to form a 60-foot-high double bench, the Parks/Salyer V2 design pit is based on a mining increment of 40-foot single benches in the Gila conglomerate (cover material) and the Oracle Granite. The V2 design incorporates the 250-foot offset from the basement fault in the SE pit sector. The designed slope crest is at the 1400-foot elevation, with the pit bottom near the minus 660-foot (-660) elevation, resulting in slope heights up to 2000 feet.

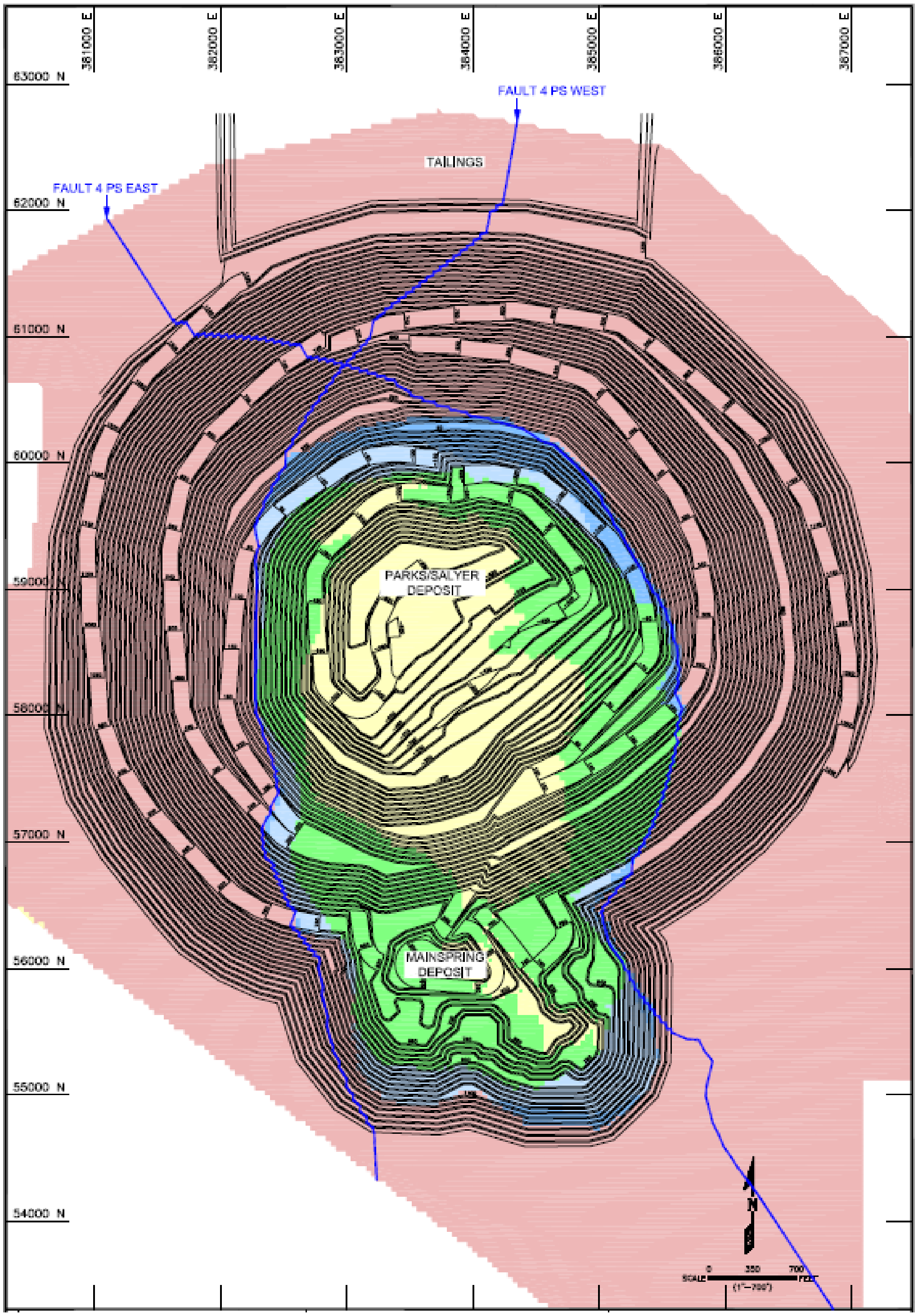
Measured heights of the Gila conglomerate slopes are a maximum of 1300 feet in the west, and nearly 1500 feet in the northeast. As the Gila conglomerate has very little tensile strength, observations at other mining operations have shown that toe deformation of underlying materials can lead to slope destabilization. Step-outs placed every 500 feet vertically in the cover materials to achieve an overall slope angle of 40 degrees are designed to decouple continuous slopes and allow for managing the risk of overall stability.

The northern limit of the V2 design pit requires mining into the tailings material placed in the 1980s. The tailings are approximately 80 feet over a large area. Since mining and tailings placement were suspended in the early 1980s, no stability issues have been noted for this material. The V2 design mines two 40-foot benches through the tailings with an ISA of 40 degrees. To contain material and minimize catch bench infill in the pit, a 170-foot-wide bench has been included in the design to create an offset between the crest of the pit and the tailings slope. This offset effectively decouples the stability of the pit from the stability of the tailings pile.



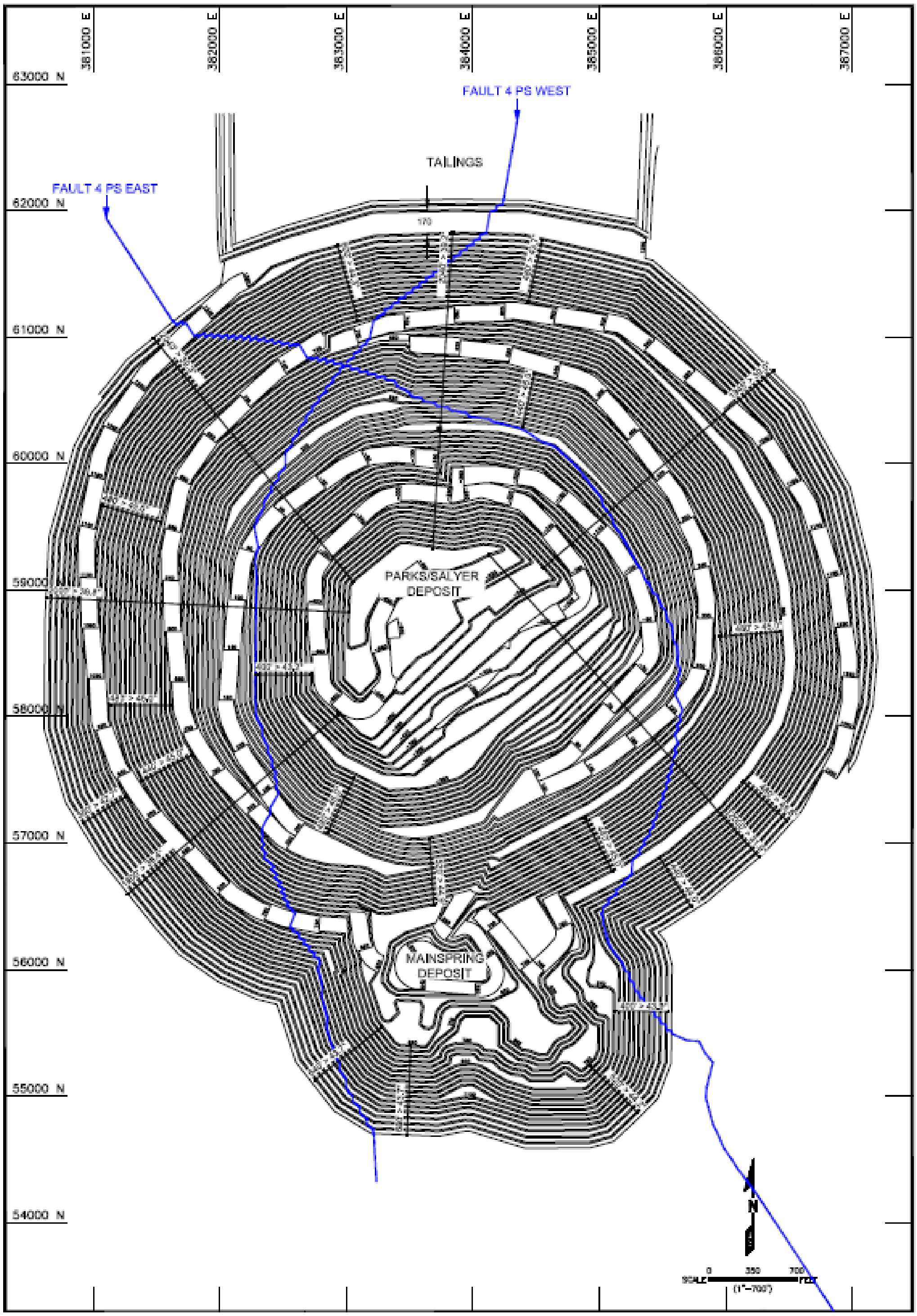
Source: Call & Nicholas, Inc. 2024

Figure 16-1: Parks/Salyer V2 Pit with Current Topography



Source: Call & Nicholas, Inc. 2024

Figure 16-2: Parks/Salyer V2 Pit with Mineral Domains and Faults



Source: Call & Nicholas, Inc. 2024

Figure 16-3: Parks/Salyer V2 Pit with Measured Slope Height, ISA and Overall Slope Angles

16.2.1.4 Overall Slope Stability

The design acceptance criteria (DAC) for overall slope stability for this stage of design is a factor of safety of 1.2 using the two-dimensional limit equilibrium stability analysis method. The Parks/Salyer V2 design is oval in shape and includes the smaller MainSpring area to the south. The MainSpring portion of the pit has significantly lower slope heights as compared to the higher slopes in the Parks/Salyer area which were the focus of stability analysis.

Three cross sections were chosen for analysis based on a review of a series of cross sections all around the proposed pit. These three sections include a north wall section, a west wall section, and a southeast region section. The mineral domains and faults were projected to the V2 pit with the locations of the analysis sections, as shown in Figure 16-4.

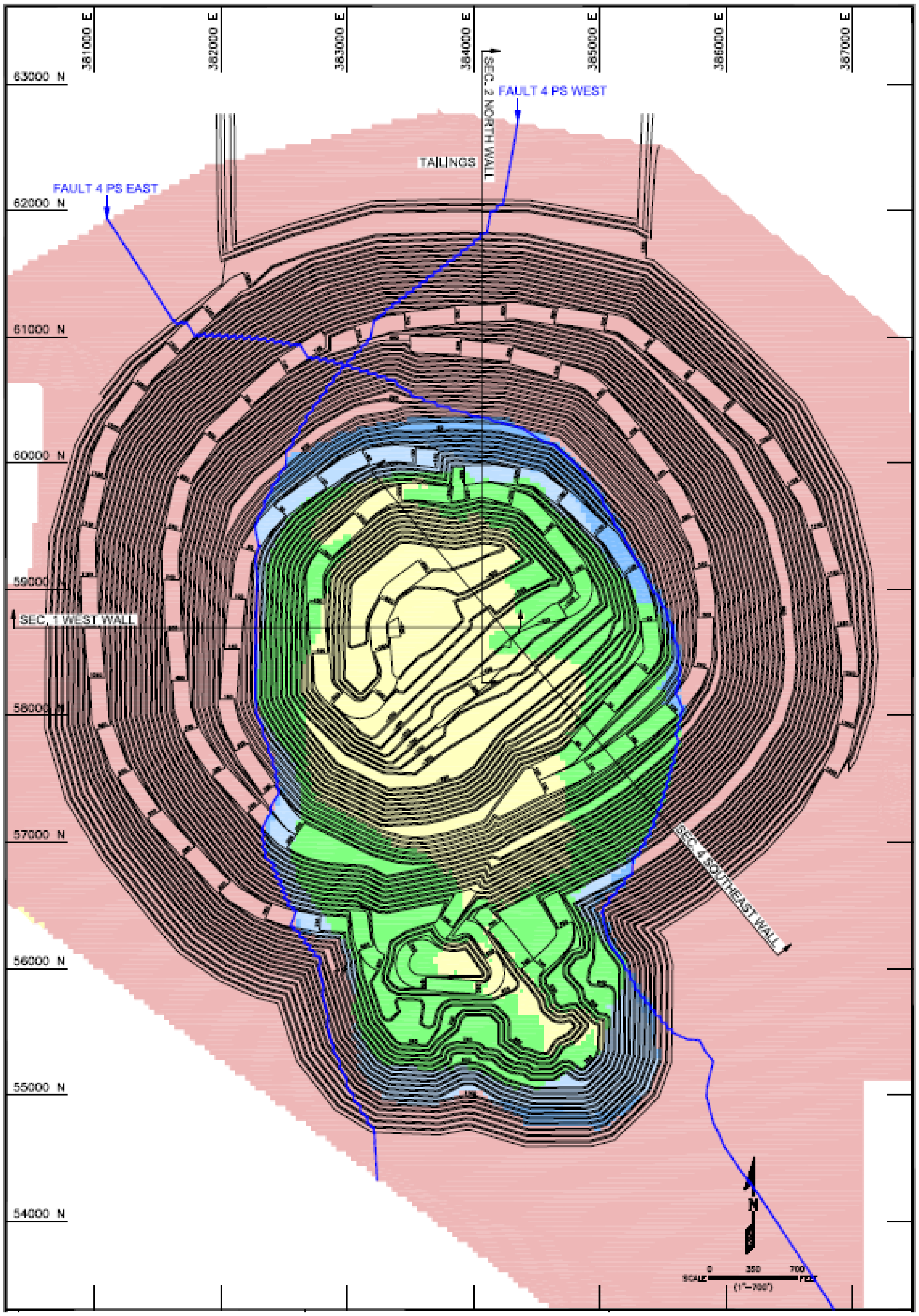
The sections are:

- Section 1 – West Wall, selected due to the height Gila conglomerate and overall slope height.
- Section 2 – North Wall, selected due to the proposed mining into the tailings.
- Section 4 – Southeast Wall, selected due to the flat pit wall dipping basement fault.

A summary of the 2D stability analysis is shown in Table 16-3 for both dry and depressurized conditions. Hydrogeologic data has confirmed pore pressures in the Gila conglomerate and Oracle Granite. Stability analysis confirms depressurization is required for all slopes. Section 4 southeast wall does not meet the DAC; however, the 2D analysis is considered conservative as it does not include the effects of out of plane confining stresses.

Table 16-3: Overall Stability Analysis Results of the Parks/Salyer V2 Pit

Section	Conditions	Design		
		Slope Height (ft)	OSA (deg)	FOS
Section 1 West Wall	Dry	2024	40	1.45
	Dewatered 500'			1.2
Section 2 North Wall	Dry	2122	38	1.34
	Dewatered 750'			1.22
Section 4 South-East Wall	Dry	2025	31	1.04
	Dewatered 700'			1.03



Source: Call & Nicholas, Inc. 2024

Figure 16-4: Parks/Salyer V2 Pit with Mineral Domains, Faults and Analysis Sections

16.2.1.5 Recommendation

The following are recommendations for future work to advance to a pre-feasibility level of study:

- Additional geotechnical drilling is required to advance the study to pre-feasibility. The footprint of the proposed pit is larger than for the proposed underground mine design and drill holes are needed outside the deposit and behind the pit slopes. Preliminary geotechnical and hydrogeologic drill holes have been provided to ASCU.
- The drilling campaign needs to be extended out behind the final pit slopes all around the proposed pit.
- Geotechnical logging should be standard practice on all geotechnical holes throughout the property. This should include the Gila Conglomerate.
- Some of the holes should be considered for piezometers.
- Additional rock strength testing will be needed to advance the study.
- Joint shear tests were not as important for the underground study but are critical for the slope analyses. Additional joint shear tests are needed.
- The Gila conglomerate design strengths are still based on regional experience and site-specific strengths need to be developed with testing of the Gila conglomerate.
- Characterization and shear testing is needed for the basement fault.
- The pit slope interaction with ground water needs additional study.
- A three-dimensional ground water model is needed to estimate pore pressures for the next stage of stability analysis.
- The next stage of analysis will define slope dewatering targets and dewatering methodology for prefeasibility costing.
- Additional analysis is needed for the slope constructed in the tailings sands.
- Gradation and strength testing of the tailings sands is needed for the next stage of design.
- Slope analysis of the tailings sands is needed to confirm the slope angle to be excavated.
- Numerical stability modeling is needed for confirming the size of the decoupling bench and for understanding the pit interaction with the tailings pile, the stress interaction, and the risk of a failure runout in the sands.
- The placement of the non-mineralized materials relative to the pit has not been considered. Stability of the slopes needs to be evaluated once the stockpile designs are completed.
- Measurement of in-situ stress is recommended. In-situ stress measurements can be conducted in drilled holes from surface. Estimates of the in-situ stress orientations and magnitudes are necessary for the numerical modeling work and to improve the geotechnical understanding of the deposit for either a future underground or open pit mine.

- Three-dimensional (3D) numerical stress modeling is needed for the southeast area of the proposed pit to evaluate the stability of the area where the pit comes close to the basement fault. The location of the proposed pit relative to the basement fault needs to be studied in 3D as no cross section fully captures the geometry. For now, a 250-foot offset has been recommended between the pit slope and the basement fault based on two-dimensional stability analysis. The 3D model is needed to refine that offset

- Mineral domains were used as the geotechnical domains for this study. Their interpretation has an impact on the design recommendations. Consequently, mineral domain interpretations should be updated with additional drilling. In particular, the delineation of the leached zone versus the oxide zones is more critical for the open pit than for the underground mining methods previously studied.

16.2.1.6 Risk and Opportunity

There will always be differences between the predicted conditions and the field conditions. Additional drilling, sampling, and lab testing is needed to better characterize and predict potential ground conditions throughout the project area.

There are stability risks associated with the slope angle in the conglomerate, the tailings pile, and with the interaction between the proposed slopes and the basement fault. The current stability analyses clearly show the need for slope depressurization. Depressurization targets need to be refined and the method and cost to achieve the depressurization targets need further study.

Several geotechnical areas of study could improve the economics of a future pit. Slope angles could increase, and this could have a major impact on the design. The current pit has incorporated a 250-foot buttress between the pit and the basement fault. This “no mining zone” can be optimized via future 3D stability modeling which could greatly improve economics. The stand-off bench between the tailings slope and the pit crest can also be optimized with additional stability analysis.

- The characterization of the geologic structures (both major faults and joints) necessary to estimate slope stability is inadequate. Due to this, the as-mined slopes in the Cactus Pit are being relied upon for bench and interramp slope design.

- The strength testing for all rock types and for the basement fault are inadequate. Additional testing is needed to optimize the pit slopes, including the slope angles, the geotechnical benches needed, the dewatering targets, the interramp slope angles, and the stand-off that may be needed from the basement fault.

- All slope analyses assume that the pit slopes are effectively depressurized. If there is residual water within the rock mass surrounding the excavation, or depressurization is incomplete, then the stability of the slopes will be less than predicted.

- The north side of the proposed pit will mine into the tailings pile. The sands in this pile have not been geotechnically characterized so the slope angle being proposed is the same as what is standing today. It is not known what safety factor the sand slopes have and whether they meet the DAC.

- A decoupling bench 170 feet wide has been included in the design to separate the slope in the tailings sands from the proposed pit slopes. This needs to be optimized by stability analysis in the next stage of design.

- The potential interaction of the non-mineralized stockpiles and the pit has not been considered.

- In this study, bench analyses have been conducted on the existing Cactus Pit via photogrammetry on weathered benches. In-pit mapping is needed to confirm the structural fabric controlling slope stability. Freshly blasted benches may perform better than estimated. Controlled blasting, including pre-split blasting, may provide opportunity for steeper slope angles in the Oracle Granite.

- Much of the proposed pit has a tall slope in Gila conglomerate (1300 feet in the west, and 1500 feet in the northeast). Economics are greatly impacted by the angle in the Gila conglomerate. Additional drilling for sampling, laboratory testing, and piezometer installations is recommended to confirm the Gila conglomerate slope angle. Even a 1-degree change in slope angle in the Gila conglomerate could have a major economic impact for the project.
- Overall slope stability analyses are two-dimensional in critically defined cross sections. Full three-dimensional numerical stability modeling of the pit should be conducted to further characterize the slopes and determine the basement fault’s structural control on slope stability

16.2.2 Data Source

Data published in the pre-feasibility study of the Parks/Salyer underground mining method (Call & Nicholas, Inc., 2023) has been reviewed and applied to this study when appropriate. Since the publication of the PFS report, additional data has been collected in support of this Parks/Salyer PEA study. The data utilized in this PEA study is summarized in Table 16-4.

Table 16-4: Data Utilized for the Parks-MainSpring PEA Study

Data Category	Details	Provided By
Drilling/Logging	Parks/Salyer holes drilled and logged afterwards	ASCU
	IE’s MainSpring drill hole logging data	ASCU
	MainSpring drill hole data through 23 May 2024	ASCU
Resource Model	February 2024 Parks/Salyer resource block model	AGP
	April 2024 updated resource model, lithology and mineral domain solids, and fault surfaces	ASCU
Pit Design	February 2024 MainSpring phased pit LG shells	AGP
	April 2024 Parks-MainSpring PEA design pits, V1 without the 250-foot offset, and V2 with the 250-foot offset from the basement fault	AGP
Hydrogeology	2023 Parks/Salyer nested piezometers (ECP-132, SE-17, SE-18)	ASCU
	2024 MainSpring nested piezometers (ECM-250, ECM-254)	ASCU
	Piezometer readings from July 2024 for ECP-132, SE-17, SE-18 May 2024 from ECM-250. Data from ECM-254 was not available.	ASCU
Laboratory Testing	2022 and 2023 laboratory testing results (Call & Nicholas, Inc., 2023, Appendix D)	CNI
	2024 laboratory testing - in progress	CNI
RQD Model	2023 Parks/Salyer RQD model (Call & Nicholas, Inc., 2023)	CNI
	2024 Parks/Salyer RQD model using drillhole logging data through 23 May 2024	CNI

Arizona Sonoran Copper provided Call & Nicholas, Inc. with an updated geology model in April of 2024. ASCU also has also provided Call & Nicholas, Inc. with the televiewer logging of geological structures in several exploration core holes in the recent drilling campaign. Televiewer logging was also conducted by IE in drill holes in the MainSpring area and that data was provided to Call & Nicholas, Inc. Vibrating wire piezometer data was provided by ASCU and has been used by Call & Nicholas, Inc. to estimate the phreatic surface of the groundwater in the Parks/Salyer MainSpring region. Rock samples for lab strength testing have been routinely collected on the Oracle granite and provided to Call

& Nicholas, Inc. ASCU geologists also helped Call & Nicholas, Inc. pick samples of rock below the basement fault for strength testing. Samples of the basement fault have also been collected and provided to Call & Nicholas, Inc. and are currently being tested in the laboratory.

AGP provided Call & Nicholas, Inc. with the preliminary open pit mine designs. Slope angles used by AGP in the preliminary open pit mine designs were the same as for the pre-feasibility study of the expansion of the existing Cactus open pit. Based on a preliminary 2D stability analysis, Call & Nicholas, Inc. recommended that AGP keep the slopes of the pit at least 250 feet away from the basement fault. A stand-off bench was also recommended between the excavation in the tailings pile and the crest of the proposed pit. These recommendations were incorporated by AGP into the designs evaluated for this PEA.

Since the publication of the PFS report, Call & Nicholas, Inc. has conducted additional rock strength testing and has entered the Cactus Open Pit to visually examine the slopes up close. Two additional piezometers (ECM-250 and ECM 254) were installed in May of 2024 in the Parks/Salyer deposit. Call & Nicholas, Inc. updated the regional RQD model in June of 2024 using the most recent geology model and the new drilling data collected between August 2023 and 23 May 2024.

16.2.3 Engineering Geology

This section presents a general geologic summary of the Parks/Salyer deposit. Much of the information presented is based on information taken from the NI 43-101 Technical Report and references therein. The Cactus Project (comprising the Cactus West, Cactus East, and Parks/Salyer areas) represents portions of one or more large porphyry Cu systems that have experienced supergene enrichment, dismemberment, and displacement during Tertiary extensional faulting.

16.2.3.1 Lithology

16.2.3.2 For the geology of the Parks/Salyer area see Section 7.1. Mineral Domains

The deposit within the Oracle Granite has been categorized into four mineral zones based on alteration and mineralization type: Leached, Oxide, Enriched, and Primary. These mineral zones have been consistently logged during the exploration drilling, have been modeled in three dimensions, and are strongly correlated to the geotechnical character of the rocks (both RQD and rock strength). Consequently, the slope design has considered these mineral zones as geotechnical domains. The mineral zones on the proposed pit are shown in Figure 16-1.

16.2.3.3 Structural Trends

At Parks/Salyer, the main structural trends have been evaluated using the televiewer logging of core. The dominant structure set is shown on Figure 16-2. The general trend of measured structure is northwest-southeast, although there is jointing at many orientations within the Oracle Granite. The main structure set has a dip direction of 250 degrees and a dip of 52 degrees.

16.2.3.4 Basement Fault

The basement fault in the Parks/Salyer area dips 0-30 degrees to the northwest. The basement fault has a thickness that varies from a foot to 20 feet based on visual observation of the core that has penetrated it in Parks/Salyer. The fault gouge has been tested in the lab and is a low plasticity clay (CL). Additional testing is planned to determine the frictional properties of the gouge for future stability analysis. Drilling that has penetrated the basement fault has encountered primarily Pinal Schist with some unmineralized andesite. Figure 16-3 shows the dip of the basement fault.

16.2.4 Rock Strengths

Rock strength data from the 2024 Pre-Feasibility Study, including the Parks/Salyer underground mining analysis, were reviewed for applicability to the Parks/Salyer open pit. Previous studies considered mineral domains as the engineering rock types. The Parks/Salyer open pit with the MainSpring extension to the south has a much larger footprint than the underground mining. The pit also has unique geotechnical concerns that are different from the previous work conducted on the underground mining methods: (1) the proximity of the slopes to the basement fault, (2) that mining will occur within the primary mineral domain, and (3) the pit will extend into the tailings pile. Based on that review, Call & Nicholas, Inc.:

1. Decided to continue using the mineral domains as the engineering rock groups.
2. Derived regional rock strengths for each mineral domain by combining results from all mining regions.
3. Identified data gaps and prioritized additional lab testing to support the PEA; specifically, the character of the basement fault and the basement rock underneath the basement fault.
4. Updated the RQD model with data from the recent drilling campaign for estimating rock-mass strengths.

16.2.4.1 Basement Fault

The basement fault has been tested for gradation and plasticity. The results of the Atterberg testing indicate that the fault gouge has up to 83% fines (silt and clay). The Atterberg testing of the fines material resulted in a liquid limit of 27, a plastic limit of 13, and a plasticity index of 14. This places the material in the low plasticity clay category (CL). Based on these results, Call & Nicholas, Inc. has estimated the basement fault strength for this study. A friction angle of 18.5 degrees and a cohesion of 2 psi has been used in the stability analyses. Further testing on the basement fault should be conducted to refine this estimate.

16.2.4.2 Gila Conglomerate

Slope heights in the Gila conglomerate are expected to be higher for the Parks/Salyer Pit than for the current Cactus Pit. Understanding the shear strength of the Gila conglomerate and the groundwater conditions within the Gila conglomerate will be critical for the future slope design. Testing is currently underway of bulk samples collected from the recent core drilling using a large-scale direct shear testing machine at the University of Arizona's rock mechanics laboratory. Until those results are obtained, the shear strength for the Gila conglomerate rock group was estimated based on Call & Nicholas, Inc.'s experience with Gila conglomerate at other mine properties in southern Arizona. The degree of cementation and the amount of sand sized particles are two of the factors that control Gila conglomerate strength. Two small-scale direct shear tests on fractures in the Gila conglomerate core have been used as a guide for estimating the sand fraction and the frictional shear strength for the Gila conglomerate.

16.2.4.3 Regional Intact Rock Strengths from Laboratory Testing

The Parks/Salyer open pit will be constructed in seven engineering rock groups: alluvium, Gila conglomerate, leached, oxide, enriched, primary, and basement. Laboratory strength testing was conducted in 2023 on four of the seven rock groups; testing in the Gila conglomerate, alluvium, and basement rock is being conducted in 2024. The rock groups and the average tested values for each rock group based on all testing for Cactus East, Cactus West, Parks/Salyer, and MainSpring are shown in Table 16-5. The leached and oxide test data have been combined for this study.

Table 16-5: Regional Intact Rock Strengths for the Cactus Mine Property

Material	Number of Tests	Friction Angle (deg)	Cohesion (psi)	UCS (psi)
Leached & Oxide combined	24	46.7	265.2	1338
Enriched	21	47.1	695.1	3538

Primary	32	47.9	421.6	2192
Basement Pinal Schist	3			7772
Basement Andesite	2			8803

16.2.4.4 Regional Fracture Shear Strengths

In 2023, a total of 14 fracture samples underwent direct shear strength testing for all rock groups and all mining regions. In 2024, an additional four direct shear tests have been completed on the Pinal Schist below the basement fault. Table 16-6 summarizes the results of the direct shear testing conducted to date for all rocks on the Cactus Mine property.

Table 16-6: Regional Fracture Shear Strengths for the Cactus Mine Property

Material	Number of Tests	Friction Angle (deg)	Cohesion (psi)
Conglomerate	2	32.8	9.6
Leached & Oxide combined	1	25.1	2.1
Enriched	6	28.6	3.4
Primary	5	26.7	2.3
Basement Pinal Schist	4	25.3	2.8

16.2.4.5 Rock Mass Shear Strength

Call & Nicholas, Inc. estimated the rock-mass strengths for this study using an empirical rock-mass strength estimation method (Cylwik et al., 2022). The premise of the method is to reduce the intact rock strength to account for the influence of discontinuities. The rock-mass strength is estimated by combining the intact and fracture strength with a weighting factor, r, that is based on the degree of fracturing within the rock mass as measured by either RQD or fracture frequency. For this study, the RQD data for the Parks/Salyer region was used. The C_{rf} is a cohesion adjustment parameter that typically varies from 0.25 to 0.5, and is used to account for disturbance, scale effects, blasting, or joint continuity. The equations for estimating the Mohr-Coulomb linear rock-mass cohesion (cohm) and friction angle (Φm) are shown below:

$$coh_m=C_{rf}[r\ coh_i + (1 - r)^{coh_{fracture}}]$$

$$\varnothing_m=atan[r^{2/3}\tan\varnothing_i + (1 - r^{2/3})^{\tan\varnothing_{fracture}}]$$

$$r=0.05e^{0.026\cdot RQD}$$

$$\tau_m=coh_m+\sigma_n\tan\varnothing_m$$

where:

C_{rf} =0.25 to 0.50 for open pit mining
C_{rf} =0.35 to 0.70 for underground mining

and:

$\varnothing_m$ = rock-mass friction angle
Coh_m = rock-mass cohesion
$\varnothing_i$ = intact rock friction angle
coh_i = intact rock cohesion
$\varnothing_{fracture}$ = joint friction angle
$Coh_{fracture}$ = joint cohesion

Table 16-7 summarizes the linear Mohr-Coulomb rock-mass strengths for the geotechnical rock units considering a CRF value of 0.5 and the median RQD value in each mineral domain (50 percent reliability for RQD).

Table 16-7: Regional Rock-Mass Shear Strengths for the Cactus Mine Property

Material	RQD 50% Reliability	Rock Mass	
		Friction Angle (deg)	Cohesion (psi)
Gila conglomerate	-	44.3	67.8
Leached & Oxide combined	47.0	33.0	23.4
Enriched	45.2	35.1	57.7
Primary	34.9	33.2	27.1
Basement Fault		18.5	2.0
Basement Pinal Schist			

16.2.5 Hydrogeology

Understanding the groundwater system in and around the Parks-MainSpring/Salyer pit is a critical aspect that impacts slope stability. During the 2023 PFS work, three geotechnical drill holes were utilized to install nested vibrating wire piezometers (VWP) to collect groundwater information. These holes are identified as SE-17, SE-18, and ECP-132 and were installed during January and February 2023. In May 2024, two holes from the MainSpring exploration drilling program were also utilized to install nested piezometers in holes ECM-250 and ECM-254. A summary of the installations and sensor locations is presented in Table 16-8,. Engineering memorandums contain additional details for each VWP installation and were provided to ASCU upon completion (Call & Nicholas, Inc., 2023 and Call & Nicholas, Inc., 2024).

16.2.5.1 Vibrating Wire Piezometer Hydrographs

The water pressure data generally shows a very slight downward vertical hydraulic gradient as the deeper installed VWPs indicate lower water elevations than those installed higher in the holes. There are indications in the drill campaign of higher groundwater levels in the MainSpring area but this will need to be confirmed with a piezometer. Pressure changes in ECP-132 can be observed that, based on timing, are thought to be related to drilling nearby core holes and drilling of a well. The installed piezometers also provide temperature data, and indicate a moderate temperature gradient, increasing approximately 0.6 – 0.7° C per 100 feet of depth below surface.

16.2.5.2 Pore Pressures Used in Stability Analysis

The current phreatic surface for the Parks/Salyer open pit area has been estimated using the upper most piezometers (Table 16-8). For the stability analysis, this surface has been projected onto the cross sections and the impact of the open pit mining on the phreatic surface has been estimated for the area just behind the slopes. Hydrostatic pore pressures below the phreatic surface were assumed for the slope stability analysis. Conceptual sensitivity analysis has been conducted to simulate the effect of slope depressurization from dewatering wells or horizontal drains. Given the height of the planned pit slopes, the level of the current phreatic surface, and the strength of the rocks and the Gila conglomerate, it is expected that an active slope dewatering program will be needed to achieve the open pit design. The next stage of analysis should include groundwater modeling to better estimate pore pressures to be expected in the pit slopes, pore pressure targets for slope stability, and the most effective way to achieve the dewatering targets.

Pit inflow has not been evaluated as part of this study and will need to be estimated in the next phase of study for planning a pit dewatering system.

Table 16-8: Summary of Vibrating Wire Piezometer, Sensor Locations, Status, and Water Elevations as of July 2024

Piezometer / Sensor ID	Easting (ft)	Northing (ft)	Elevation (ft)	Status	Water Elevation July 2024 (ft)
SE-18	384515	59023	1383		
SE-18_1			-974	Good	1124.0
SE-18_2			-55	Good	1159.4
SE-18_3			1012	Good	1235.4
SE-17	383263	58601	1373		
SE-17_1			-813	Bad	-
SE-17_2			-88	Bad	-
SE-17_3			899	Good	1225.3
ECP-132	384130	59906	1387		
ECP-132_1	383787	59666	-983	Good	1183.0
ECP-132_2	383932	59768	17	Good	1198.1
ECP-132_3	384056	59854	875	Good	1267.0
ECM-250*	383261	57290	1355		
ECM-250_1			-350	Good	1212.11
ECM-250_2			-335	Good	1191.71
ECM-250_3			581	Bad	-
ECM-250_4			838	Bad	-
ECM-254*	383497	56781	1364		
ECM-254_1			781	Good	N/A
ECM-254_2			1150	Good	N/A

* Note - Coordinates and elevations are approximate.

16.2.6 Stability Analysis

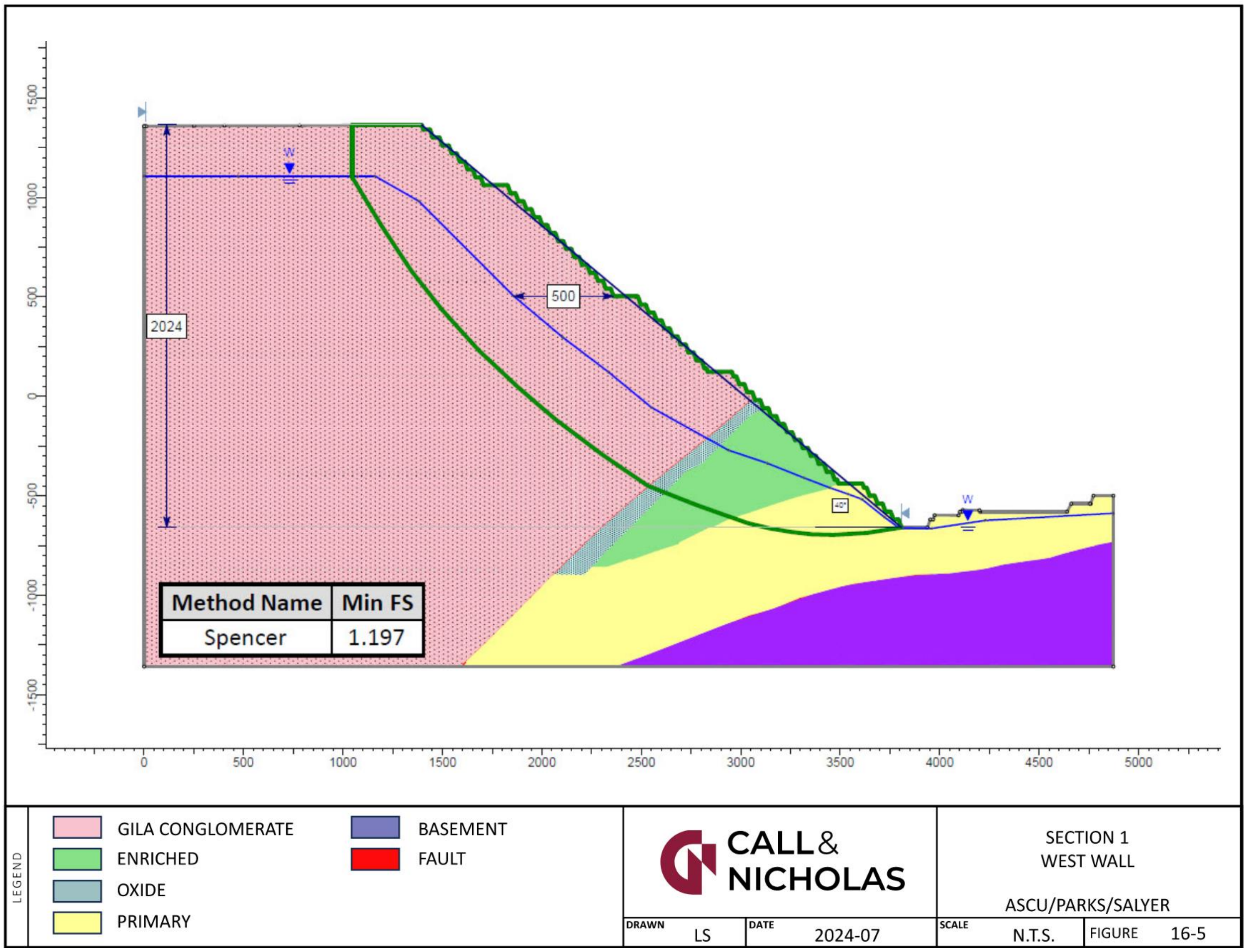
The design acceptance criteria for overall slope stability for this stage of the Parks/Salyer pit design is a factor of safety of 1.2 using the two-dimensional limit equilibrium stability analysis method. The final life-of-mine pit provided by AGP was analyzed and interim phases were not considered. The Parks/Salyer V2 design is oval in shape and merges with a smaller MainSpring pit to the south.

The MainSpring pit area has significantly lower slope heights as compared to the higher slopes in the Parks/Salyer area. The overall slopes in the MainSpring area do not have overall slope stability limits at this time; however, the slopes in the MainSpring area will need slope depressurization based on the estimated phreatic surface. Additional stability analysis should be conducted in the next stage of design to determine the slope dewatering targets for the MainSpring area.

The slopes in the Parks/Salyer area were the focus of the stability analyses as they are up to 2000 feet high. The north wall of the Parks/Salyer pit will mine into the existing tailings pile. Three cross sections were chosen for analysis based on a review of a series of cross sections all around the proposed pit. These three sections include a north wall section, a west wall section, and a southeast wall section.

16.2.6.1 Section 1 – West Wall

The west wall section of the V2 pit is shown in Figure 16-5. This section was chosen as it has the highest slope within the Gila conglomerate. The total slope height is 2024 feet. The Gila conglomerate slope is 1360 feet high, and the toe of the pit is located within the primary mineral domain at the minus 660 (-660) elevation. In this section, the basement fault does not play a role in controlling stability. The pre-mine phreatic surface is estimated to be at the 1100-foot elevation. Stability analysis shows that the slope can achieve a factor of safety of 1.2 for 500 feet of horizontal depressurization.

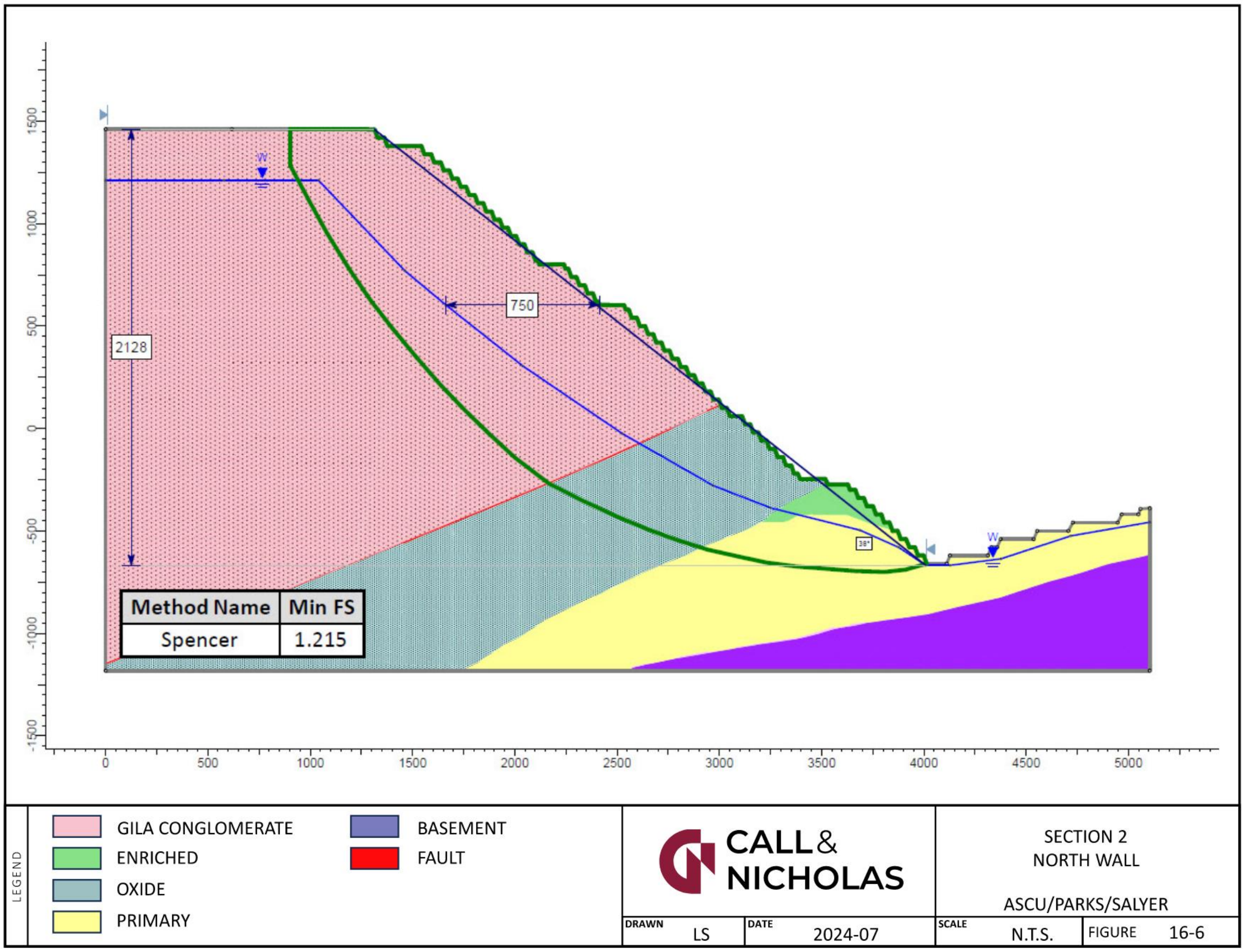


Source: Call & Nicholas, Inc. 2024

Figure 16-5: Section 1 – West Wall

16.2.6.2 Section 2 – North Wall

The north wall section of the V2 pit is shown in Figure 16-6. This section was chosen to evaluate the tailings pile interacting with the pit slope. The total slope height is 2128 feet. The tailings slope is 80 feet high, the Gila Conglomerate slope is 1160 feet high, and the toe of the pit is located within the primary mineral domain at the minus 660 (-660) elevation. In this section, the basement fault does not play a role in controlling stability. The pre-mine phreatic surface is estimated to be at the 1200-foot elevation. To decouple the tailings slope and the pit slope, a 170-foot wide bench has been incorporated into the design at the 1340 elevation. Stability analysis shows that the slope can achieve a factor of safety of 1.2 for 750 feet of horizontal depressurization.

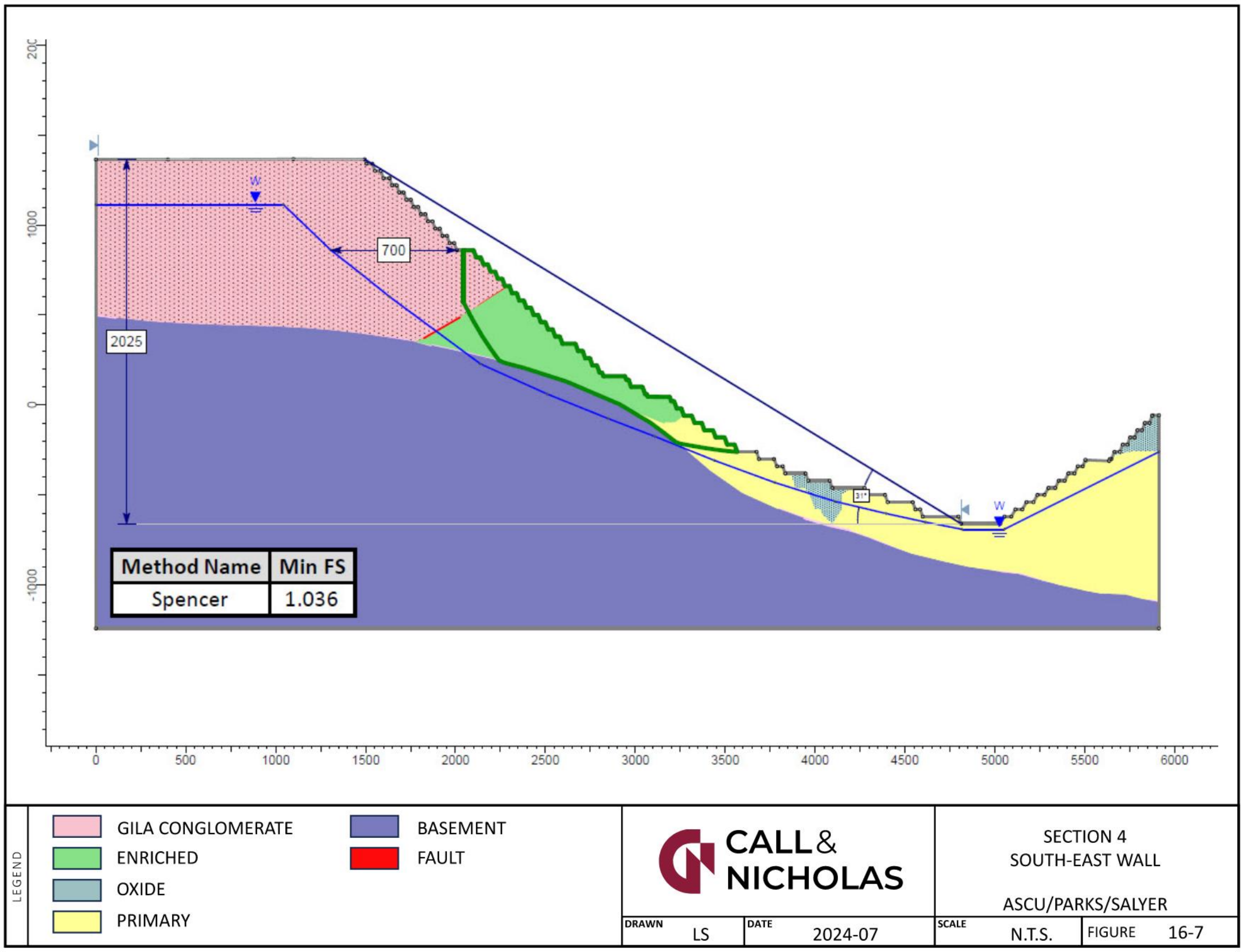


Source: Call & Nicholas, Inc. 2024

Figure 16-6: Section 2 – North Wall

16.2.6.3 Section 4 – South-East Wall

The southeast wall section of the V2 pit is shown in Figure 16-7. This section was chosen due to the proximity of the pit slope to the basement fault. The total slope height is 2025 feet. The Gila Conglomerate slope is 1000 feet high, and the toe of the pit is located within the primary mineral domain at the minus 660 (-660) elevation. In this section, the basement fault plays a critical role in controlling stability. The pre-mine phreatic surface is estimated to be at the 1100-foot elevation. Stability analysis shows that when the slope gets closer than 250 feet to the basement fault, the slope will fail even if dry.



Source: Call & Nicholas, Inc. 2024

Figure 16-7: Section 4 – South-East Wall

A sensitivity analysis was conducted to evaluate the stand-off from the fault and the level of dewatering required. With a buttress of 250 feet from the basement fault, the slope can achieve a factor of safety of 1.0 for 700 feet of horizontal depressurization. Although this dewatered condition does not achieve the DAC for a 250-foot stand-off, the analysis of the failure mechanism is considered to be very conservative when analyzed in two-dimensional limit equilibrium. On either side of the analysis section, the size of the buttress increases and the 2D analyses do not consider the effect of lateral confining stress perpendicular to the plane of the section. It is recommended that the southeast region of the pit be analyzed in 3D FLAC in the next stage of design to refine the dewatering target and the stand-off buttress.

The summary of the results is shown in Table 16-9.

Table 16-9: Summary of Overall Stability Analysis Results of the Parks/Salyer V2 Pit

Section	Conditions	Design		
		Slope Height (ft)	OSA (deg)	FOS
Section 1 West Wall	Dry	2024	40	1.45
	Dewatered 500'			1.2
Section 2 North Wall	Dry	2122	38	1.34
	Dewatered 750'			1.22
Section 4 South-East Wall	Dry	2025	31	1.04
	Dewatered 700'			1.03

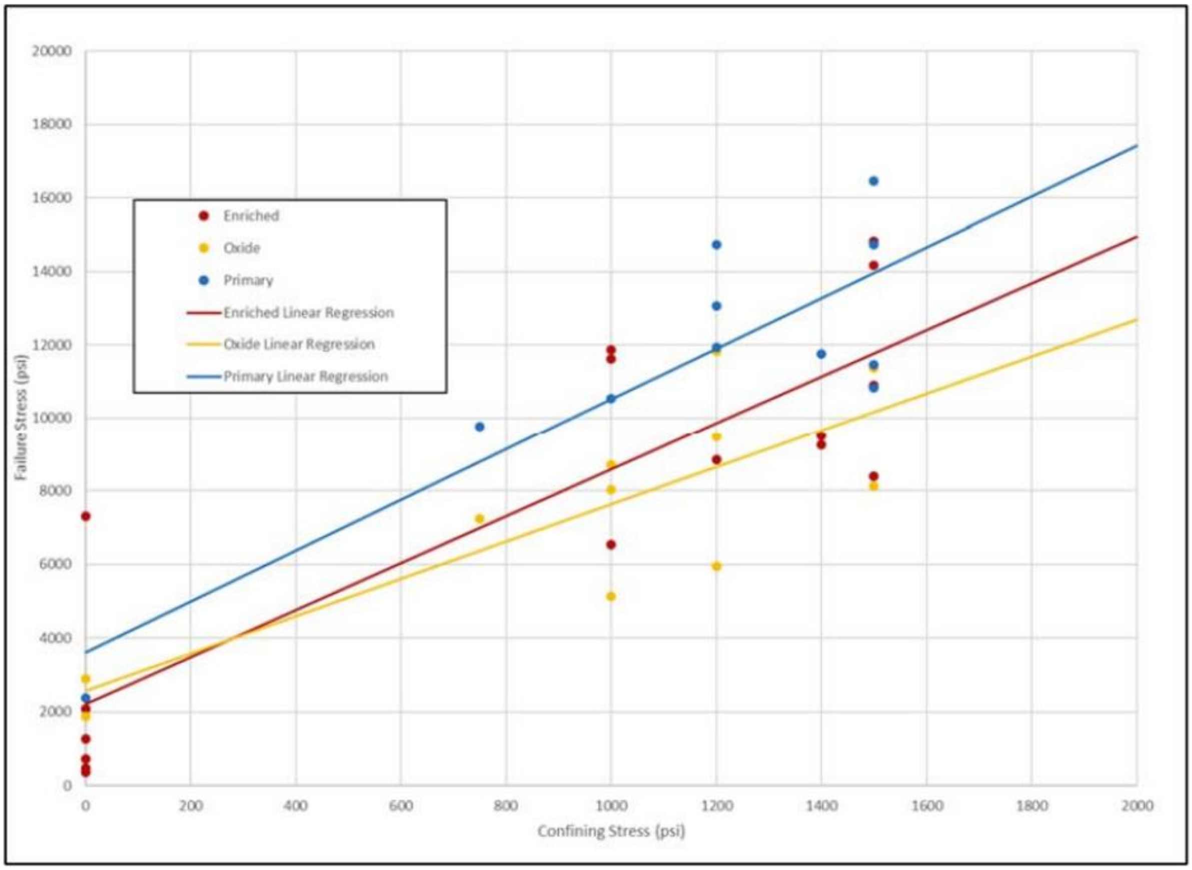
16.2.7 Cactus East Underground Geotechnical

Work completed by Call & Nicholas, Inc. for the Cactus Project PFS in 2023 was relied upon for the design of the Cactus East (CE) underground design in the PEA. No change in design parameters was implemented as no additional geotechnical work has been completed at CE since the previous analysis. Information provided in this section can be found in CNI's Geotechnical PFS Study report (CNI, 2023).

16.2.7.1 Material Properties

Samples collected from the geotechnical core holes were sent for testing at Call & Nicholas, Inc.'s geomechanics laboratory located in Tucson, Arizona. The purpose of the laboratory testing was to determine strength parameters for use in stability analyses. Laboratory testing was conducted to ASTM standards and included uniaxial compression tests, triaxial compression tests, Brazilian disk tension tests, and small-scale direct-shear tests. 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. Table 16-10 presents a summary of intact rock strengths based on unconfined compressive strength (UCS) and triaxial compressive strength testing. While all mineral domains are similar in intact strength, the chalcocite enriched, and primary mineral domains demonstrate slightly superior intact strength.

Rock-mass strengths were evaluated by applying a linear approximation to a Hoek-Brown strength envelope for each target underground mining area by depth using laboratory strength data (Figure 16-8).



Source: Call & Nicholas, Inc. 2024

Figure 16-8: Intact Strength Summary for UG Strength Estimation

Table 16-10: Rock Mass Strength Summary

Mineral Domain	INTACT		Source	GSI / RMR76	Sig3 (ksf) at 1,000ft depth	Hoek-Brown			Rock Mass		
	PHI (Deg.)	Cohesion (psi)				mi	UCS (ksf)	UCS (psi)	PHI (Deg.)	Coh (ksf)	Coh (psi)
Oxide	42.0	571	CE + PS	38	150	17.6	340.7	2366.1	27.24	24.561	170.6
Chalcocite Enriched	46.8	437	CE + PS	38		30.9	295.8	2054.4	30.82	28.387	197.1
Primary	49.2	415	CE + PS	38		38.1	358.9	2492.7	34.23	32.37	224.8

16.2.7.2 Rock Mass Classification

For underground analyses using empirical methods, Barton's Q' (1974) rock tunneling quality index was calculated from the logged parameters. During the logging, a significant amount of the core was identified to have ISRM rock hardness less than R2, indicating very low rock strengths, which is corroborated by the laboratory testing. Barton's Q rock tunneling quality index does not consider the rock strength in the logged parameters and this could affect some of the results of the underground analyses. To avoid discrepancies in the data, Call & Nicholas, Inc. applied some corrections to the dataset.

A geotechnical block model was generated for predicting rock conditions at the Cactus (East and West) project areas. The summary statistics of RQD by lithology are summarized in Table 16-11.

Table 16-11: Cactus East/West RQD Summary Statistics by Lithology

Lithology	Lith Codes	Model Code	Statistics									
			Count	Min	Max	Mean	Variance	Std. Dev.	C.o.V.	Q1	Q2	Q3
Basement	10-19	0	489	0	118.8	52.5	725.2	26.9	0.5	31.8	56.3	71.3
Monzonite Porphyry	40-49	1	6515	0	100.0	41.4	718.2	26.8	0.6	18.7	41.2	64.0
Granite	20-29	2	6674	0	102.9	50.7	738.1	27.2	0.5	28.9	52.6	73.4
Conglomerate	70	3	2315	0	104.0	58.5	438.0	20.9	0.4	45.1	60.0	74.0
Alluvium	80	6	145	0	89.1	4.1	115.8	10.8	2.6	0.0	0.0	0.0
Dacite Porphyry	60	7	84	0	86.0	24.2	557.2	23.6	1.0	0.3	20.2	37.7
Andesite	61	8	165	0	100.8	58.2	658.8	25.7	0.4	46.9	62.7	76.7
Diabase	30-39	9	137	0	92.0	28.1	691.9	26.3	0.9	0.2	21.1	49.2

16.2.7.3 Cavability

Cavability was estimated using Laubscher's cavability chart. The range of Laubscher RMR values are presented in Figure 16-12.

Table 16-12: Laubscher RMR and MRMR Estimates

Laubscher 1990 RMR	Cactus East			Parks/Salyer		
Parameter	Min	Mid	Max	Min	Mid	Max
IRS (Mpa)	6	7	8	4	4.5	5
RQD	6	9	12	4	6	10
Fracture Frequency	11.3	14	16.3	10	11	12
Joint Condition	13.5	17	20.5	14.5	17	20.5
RMR:	36.8	47	56.8	32.5	38.5	47.5
Joint Orientation Adjustment:	75%	80%	90%	75%	80%	90%
Shear Zone Orientation Adjustment:	90%	90%	90%	90%	90%	90%
Adjusted Rock Mass Rating (MRMR):	24.8	33.8	46.0	21.9	27.7	38.5
H.R. for Caving:	16	21	28	13	18	24

Adjustments to the RMR (MRMR) were applied based on joint orientation and the orientation of development relative major structures. No adjustment was applied to account for mining-induced stresses as these are not currently well understood.

Cactus East is expected to begin sustained caving at a hydraulic radius of 20 meters (equivalent to a 260 by 260 ft square) based on central estimates. The Cactus East area has a footprint which far exceeds the minimum hydraulic radius for caving. Consequently, the SLC backs are expected to cave naturally with no preconditioning necessary.

16.2.7.4 Fragmentation

The rock mass overlying the SLC development area at Cactus East will generate very fine fragmentation as it caves to surface. A majority of the feed material recovered by SLC mining will be derived from blasted rock, however, the fragmentation generated from the caved overburden is important in understanding issues such as:

- Ingress of dilution (note that dilution is here defined as any material outside the SLC blasted volumes and can therefore, be economic or sub-economic in grade)
- Assessing the impact of differential flow rates.
- Assessing the proportion of fines material and potential for mud rushes in the cave column over time.
- Understanding the porosity/permeability of the caved rock mass
- Estimating the proportion of oversize material requiring secondary blasting at the drawpoint

Estimations of primary fragmentation based on measured core piece lengths suggest that a medium volume size of 1.2 ft^2 and 0.54 ft^2 could be generated for Cactus East based on length weighted averages.

An assessment of secondary fragmentation was undertaken by AGP for the Cactus East deposit using the Block Cave Fragmentation program BCF (V3.05) developed by Dr. Essie Esterhuizen. BCF has been widely used in the caving industry for estimating fragmentation. The program relies on information derived from core logging, mapping data and material properties. Primary fragmentation is defined as primary blocks that are formed and released from the cave back and is influenced by the joint distribution, orientation, and joint condition characteristics. If stress levels exceed the rock mass strength, then additional stress induced fractures are also included. Secondary fragmentation is an indication of the rock size reporting to the draw points and is influenced by cave shape, stress magnitudes, rock strength, height of draw and production rates.

The data inputs used for this assessment were sourced from a combination of preliminary summary data reports prepared by Call & Nicholas, Inc., however, a number of assumptions and parameters were also included to address information gaps. The results should therefore be regarded as indicative.

Fragmentation assessments were made for the following areas:

- Cactus East mineralized zone (all areas)
- Conglomerates above Cactus East

The Cactus East deposit is expected to generate fine primary fragmentation (Table 16-13).

Table 16-13: Primary Fragmentation

Zone	Average Volume	P_{50}	P_{80}
CE Mineralized Zone	0.046 m^3 (1.62 ft^3)	<0.12 m^3 (4.2 ft^3)	<0.25 m^3 (8.8 ft^3)

Secondary fragmentation profiles were generated for the rock mass after the equivalent drawdown of 100 m and 300 m. There is a significant reduction in rock size due to the impacts of comminution and breakup of the rock fragments, principally due to the inherit weak rock strength (Table 16-14).

Table 16-14: Secondary Fragmentation

Zone	Average Volume 100 m Draw	Average Volume 300 m Draw
CE Mineralized Zone	0.01 m^3 (0.35 ft^3)	0.0046 m^3 (0.16 ft^3)

Of particular importance is the high proportion of "fines" (<5cm;<2inches) expected in the rock mass in the order of 20-30%. The fines component is a subjective estimate based on RQD results and visual inspection of selected core photos. This indicates that the rock mass is highly prone to formation of mud columns if the cave were to be saturated by ground or meteoric waters. This may have implications for ore recoveries towards the later stages of the mine life when high levels of overdraw are scheduled to be mined from the SLC.

The very weak rock strengths and lack of dependable structural information precluded a reliable assessment of the fragmentation for the overlying conglomerates using the BCF method. The breakdown and denigration of the conglomerates in the cave column is expected to result in the generation of significant fines over time. The vertical movement of these rocks are expected to flow more readily than the underlying oxides, leached and mineralized zones assuming dry conditions.

Stress induced fracturing is expected to be minor due to the low stress environment within an extensional tectonic setting. The largest impact to secondary fragmentation will be the rapid degradation of the rock mass as it flows within the cave column. Later stages of SLC mining could encounter higher levels of dilution when overdraw strategies are implemented. Future studies should consider the impact of differential draw by changing the mobility factors for overlying caved rocks.

The flow behavior of the overburden could be unpredictable under saturated conditions. The cohesive strength of the saturated clays could hamper flow and increase the risk of mud forming columns in the overburden. Draw strategies and ground monitoring programs will be critical in minimizing and identifying mud rush risks.

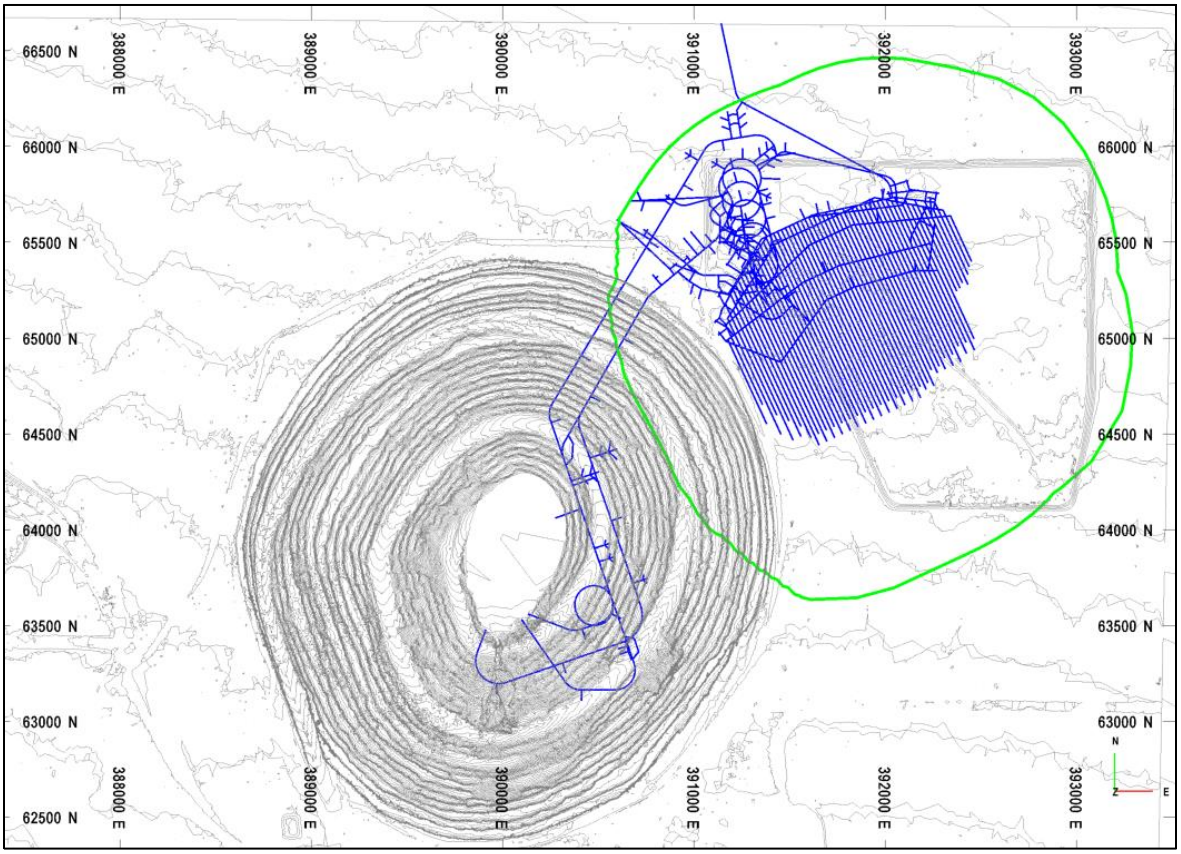
16.2.7.5 Subsidence

As material is drawn from the underground using the SLC method, a surface depression will occur from subsidence. Any disturbance to rock on the surface can impact the viability and stability of open pit targets or other surface infrastructure. As a result, the ultimate extents of surface disturbance must be considered. The extent of vertical subsidence decreases with distance from the center of the surface depression, as summarized below:

- Glory hole (nominal 80-degree cone) – zone where the depression is most extensive and native topography is dropped downward.
- Crack limits (nominal 70-degree cone) – zone outboard of the glory hole where tension cracks are visible.
- Zone of influence (nominal 65-degree cone) – zone where the surface is disturbed, although it may be difficult to observe visually.

For the prediction of subsidence affecting surface mining targets and infrastructure, Call & Nicholas, Inc. used a 65-degree composite subsidence angle which is inclusive of all three zones of deformation (glory hole, crack limits, and zone of influence). These composite angles are based on both site-specific observations (slope audits in Gila), as well as prior experience with mining projects in Arizona overlain by Gila Conglomerate, including the Lakeshore (Tohono) panel cave operation, San Manuel, and the various Miami block cave operations.

The estimated ultimate subsidence extents for Cactus East are shown in Figure 16-9.



Source: Call & Nicholas, Inc., 2023

Figure 16-9: Surface Subsidence Predictions – CE, Plan View

16.2.7.6 Ground Support Provisions

Ground support for capital development is considered permanent and requires a high level of stability. Table 16-15 presents the ground support categories for long term development.

Table 16-15: Long Term Development Ground Support Categories

Support Category	Q Value	D&B Advance Length (ft)	Roadheader Unsupported Advance Length (ft)	Support Type
Category 1	> 3.0	13.0	13.0	8-foot #7 rebar on 4-foot x 4-foot spacing with welded mesh (4 inches / 6 Ga.) to within 5 feet of sill
Category 2	0.8 - 3.0	10.0	13.0	8-foot #7 rebar on 4-foot x 4-foot spacing with welded mesh (4 inches / 6 Ga.) and 2 inches of shotcrete to within 5 feet of sill
Category 3	0.07 - 0.8	8.0	10.5	4 inches of fiber reinforced shotcrete (FRS) and 8-foot #7 rebar on 4-foot x 4-foot spacing with welded mesh (4 inches / 6 Ga.) down to sill
Category 4	< 0.07	4.0	5.5	6 inches of FRS and 8-foot #7 rebar on 4-foot x 4-foot spacing with welded mesh (4 inches / 6 Ga.) down to sill with 6 count #7 rebar arch spaced each 8 feet and fully encased in shotcrete; fore poling (spiling)

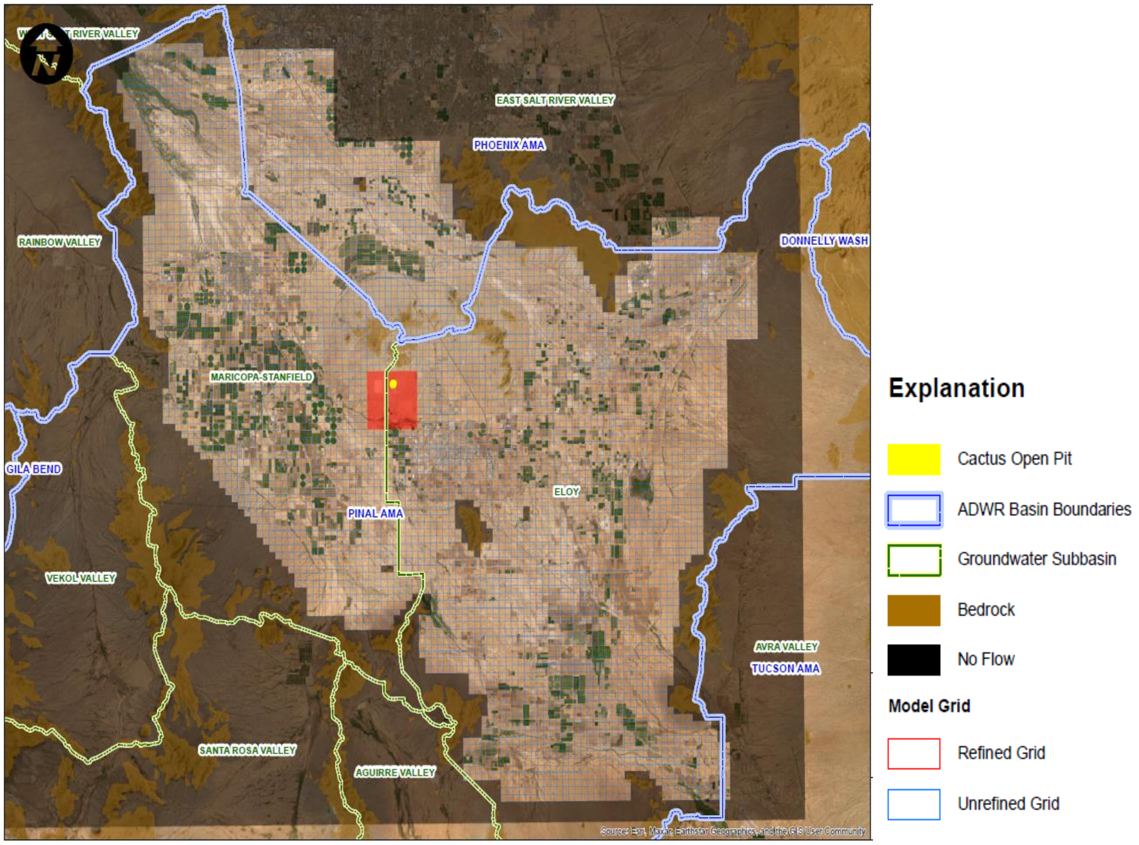
Ground support for the sublevel drifts is considered temporary and requires less security than long term openings. Production heading ground support will consist of split set type friction bolts (SS-39), welded wire mesh (4 inches / 6 Ga.), and shotcrete as summarized in Table 16-16. In areas of particularly poor rock quality (Q ≤ 2.0), secondary support of high-capacity bolts should be installed within each brow and shotcrete carried down to the sill level.

Table 16-16: Production Heading (Sublevel Drift) Ground Support Categories

Production Ground Support - SLC Drives				
Support Category	**Q value**	**Advance Length (ft)**	**Primary/ Secondary**	**Support Type**
Category 1	> 2.0	9.0 -13.0	Primary Support	8-foot #7 Split Sets (SS39) on 3-x 3-ft spacing with welded mesh (3-inch spacing - 7 SWG / W 2.7) sill to sill
			Secondary Support	2 inches of shotcrete on back only
Category 2	0.7 - 2.0	8	Primary Support	8-foot #7 Split Sets (SS39) on 3-x 3-ft spacing with welded mesh (3-inch spacing - 7 SWG / W 2.7) and 2 inches of shotcrete sill to sill
			Secondary Support	Two rows of 12-ft high-capacity bolts on 4-ft spacing at each production brow
*13-foot advances are possible when Q > 3.0 **High-capacity bolts include Super Swellex, #8 rebar or DIWYDAG, cable bolts, or R28 self-drilling hollow-core bolts				

16.3 HYDROGEOLOGICAL CONSIDERATIONS

To assess the groundwater conditions and the potential dewatering rates associated with the Cactus East and the Parks/Salyer underground operations, a computer groundwater model was constructed. The model constructed for this project was based upon the Arizona Department of Water Resources (ADWR) Pinal Active Management Area (Pinal AMA) Groundwater Flow Model (Pinal Model), which was released in 2014 (Liu, et al, 2014). The aquifer in the Pinal AMA consists of three units, the upper alluvial unit (UAU), the middle silt and clay unit (MSCU), and the lower conglomerate unit (LCU). In the Eloy Subbasin near and east of the mine, the aquifer is divided into just two units, an Upper Aquifer, and a Lower Aquifer (Hammett, 1992). The Upper Aquifer is the primary aquifer for groundwater production within the Eloy sub-basin, although wells also produce from the LCU.



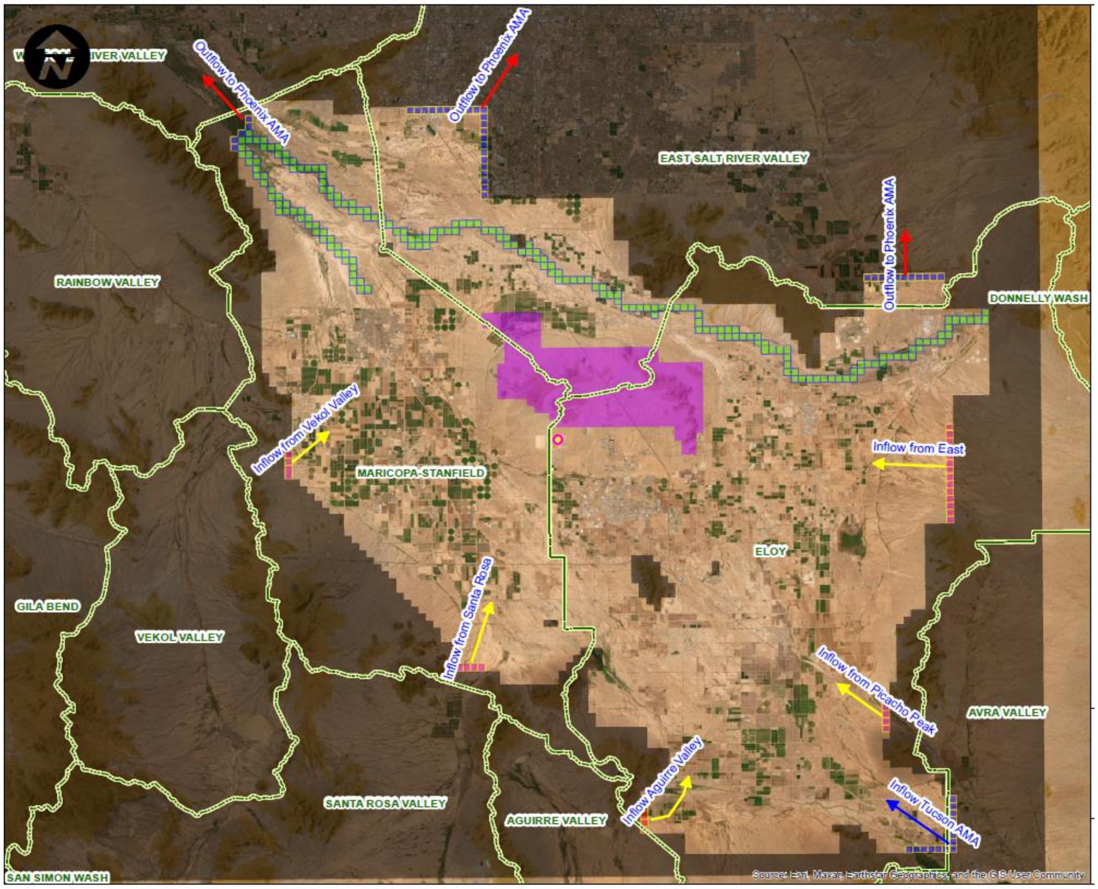
Source: Clear Creek Associates, 2024.

Figure 16-10: Refined Model Grid

16.3.1 Model Development

The Pinal AMA model was modified by adding two model layers to simulate the upper bedrock (feed material deposit layer) and the basement rocks (Pinal Schist) at the site. The model was also converted to use the MODFLOW-Unstructured Grid (MODFLOW-USG) model code, which allows for selective refinement of the model grid. A refinement of the model grid was included in the area of the mine site (Figure 16-10). This level of detail allows for representation of the underground mining activities, such as the excavation of declines and mining of feed material deposits and individual pumping wells.

Figure 16-11 shows the model boundary conditions derived from the Pinal Model, which includes specified flux inflow and outflow, constant head outflow and stream cells representing the Gila River and lower reaches of the Santa Cruz River. Groundwater generally flows south to north across the model domain, although significant pumping in the Maricopa-Stanfield area has caused a cone of depression which acts as a groundwater sink.

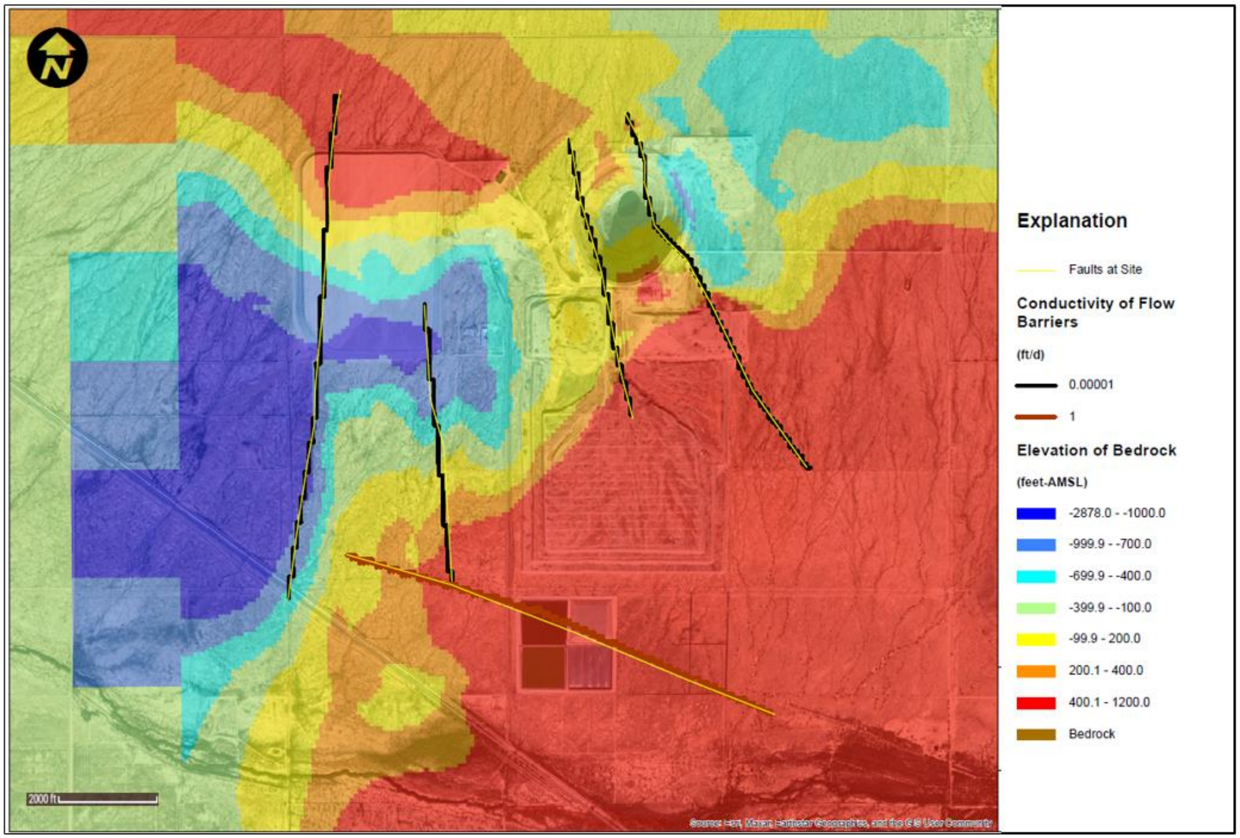


Source: Clear Creek Associates, 2024.

Figure 16-11: Model Boundary Conditions

No modifications were made to the Pinal AMA model boundary flow conditions, with rates and levels remaining unchanged. Model layer elevations were modified in the area of the mine using compiled 3-dimensional surfaces representing the bottom of the conglomerate (Layer 3), and the surface representing the basement fault (which separates model layers 4 and 5) with elevations based upon the ASCU exploration drilling program. Model layers 4 and 5 are separated by the basement fault, a low angle normal fault which separates the older basement rocks of the Precambrian Pinal Schist from the younger Oracle Granite, Sacaton Granite and Three Peaks Monzonite.

Data from the site suggests that the faults that cut the conglomerate (Layer 3) may act as barriers to horizontal groundwater flow. Figure 16-12 shows hydrogeologically significant mapped faults at the site, based on available geologic information. Horizontal flow barriers were inserted in layers 3 and 4 to reflect these faults and allow for their simulation as impediments to flow. Horizontal flow barriers change the cell-to-cell conductance, by altering the hydraulic conductivity between cells.



Source: Clear Creek Associates, 2024.

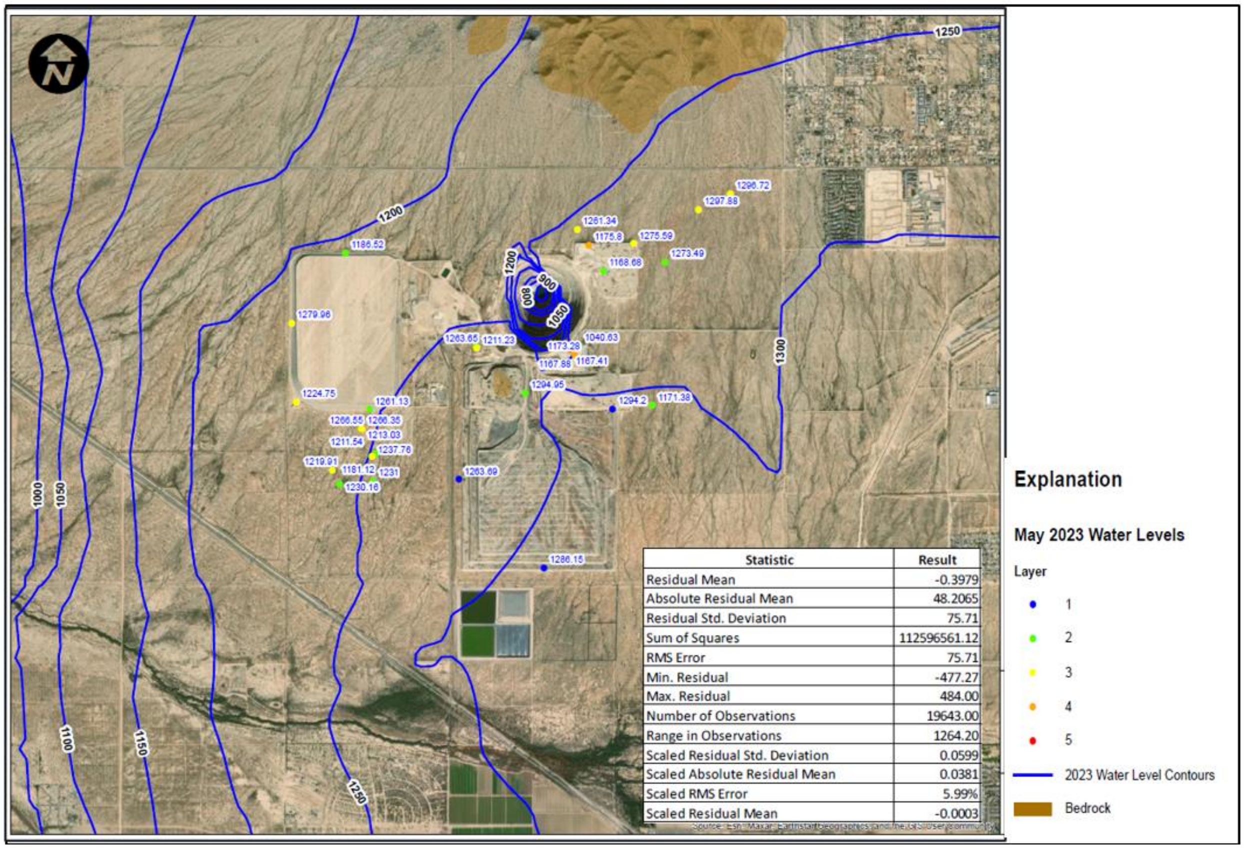
Figure 16-12: Faults and Horizontal Flow Barriers

16.3.2 Transient Simulation 1984 to 2023

A predictive model simulation was conducted to condition the model with the pit lake and establish local hydrologic conditions with the pit in place. The model was run from 1984 to 2023, representing 40 years of transient conditions. Pumping stresses were updated from the pumpage database of reported Registry of Groundwater Rights (ROGR) and estimates based upon San Carlos Irrigation Project (SCIP) surface water deliveries and estimated pumpage for 1984 to 2021. Rates were then held constant through 2023. This extended the Pinal AMA model from 2009 to 2023, although other boundary stresses, such as recharge, stream flows and specified flux boundaries were not updated after 2009.

Figure 16-13 shows the simulated heads for 2023, showing the influence of the pit. The overall calibration statistics are also shown, indicating an overall scaled root mean square error (RMSE) of 5.99%. Because the purpose of this model was to evaluate drainage flows in the pit and proposed underground workings, the calibration statistics were deemed acceptable.

Simulated inflow to the constant head cells representing the open pit is 35 gpm, at the end of the transient simulation. This is similar to the previous estimates (M&A, 1986), for inflow into the pit, which indicated an average of 33 gpm.



Statistic	Result
Residual Mean	-0.3979
Absolute Residual Mean	48.2065
Residual Std. Deviation	75.71
Sum of Squares	112596561.12
RMS Error	75.71
Min. Residual	-477.27
Max. Residual	484.00
Number of Observations	19643.00
Range in Observations	1264.20
Scaled Residual Std. Deviation	0.0599
Scaled Absolute Residual Mean	0.0381
Scaled RMS Error	5.99%
Scaled Residual Mean	-0.0003

Source: Clear Creek Associates, 2024.

Figure 16-13: Simulated Water Levels for 2023

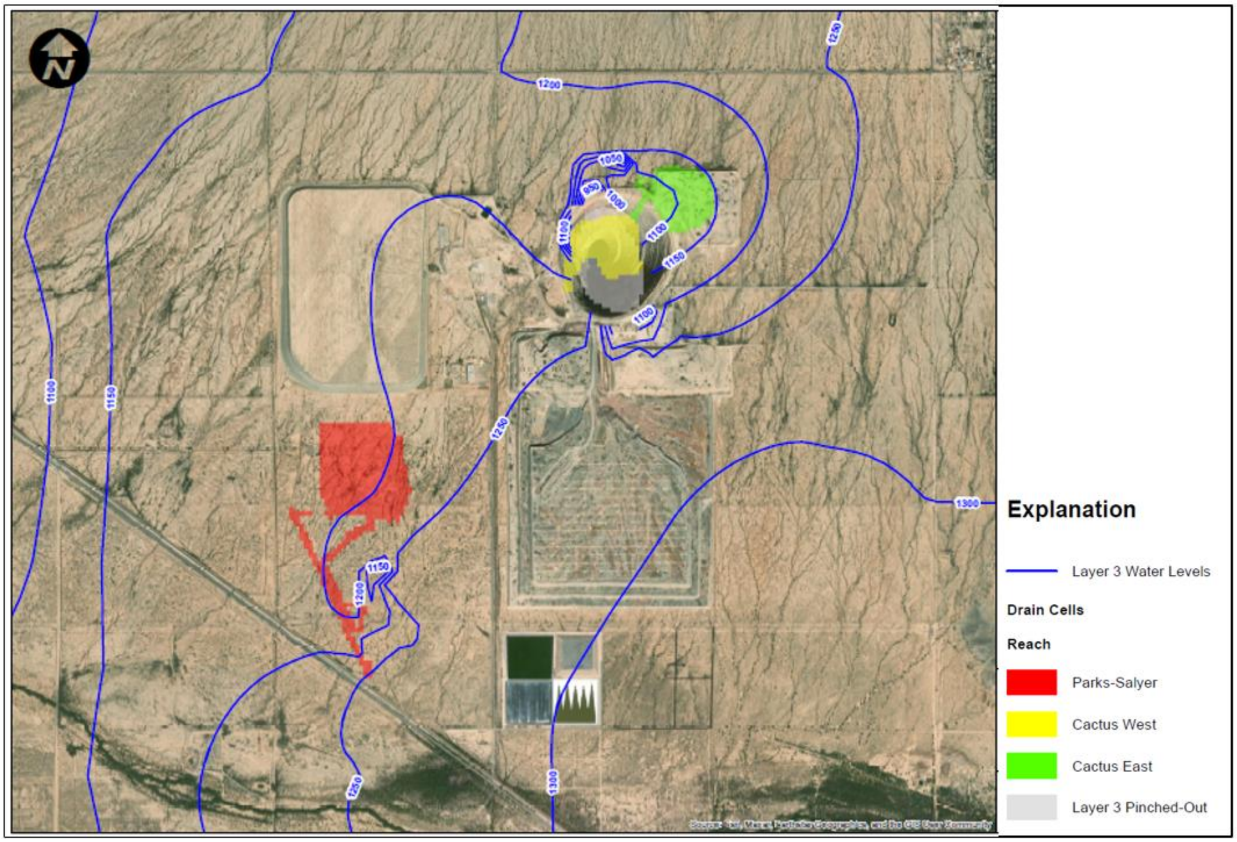
16.3.3 Simulation of Mining Activities

The model as designed will be used in later studies to simulate three principal proposed phases of mining at the site:

- Continued mining in the existing Cactus West open pit.
- Development of open pit operations at the Parks/Salyer deposit,
- Development of the underground Cactus East deposit.

The predictive simulation will be used to assess impact on the local aquifer and any additional dewatering requirements necessary for the proposed large scale open pits. This work was not completed for the PEA as the scenarios were varied and the open pit more flexible in its water management strategy.

In addition to evaluating drainage from the surrounding aquifer, the impact of subsidence was evaluated by assuming that the hydraulic conductivity in the subsidence zone associated with the Cactus East underground operation increases as the mining progresses. Subsidence will propagate upward into the overlying conglomerate and alluvium. The impact appears to be small, approximately 9 gpm. Subsidence does not appear to significantly increase drainage flows, based on these assumptions. This may be explained by the fact that much of the rock and conglomerate overlying the underground workings are primarily desaturated by time subsidence occurs.



Source: Clear Creek Associates, 2024.

Figure 16-14: Water Level Elevation for Mining Year 20

16.3.4 Conclusions

An assessment of the model results incorporating underground workings at Parks/Salyer rather than the current open pit mining method indicates that the total flow into the workings reaches a maximum of about 640 gpm by mining Year 14, if the hydraulic properties that define the drainage remain similar to the current pit drainage inflow rates. Inflow to the Cactus East workings is predicted to peak in mining Year 11 at slightly more than 200 gpm. Flow into the expanded open pit is expected to peak in mining year 4 at about 100 gpm declining to 80 gpm by end of mining.

Subsidence that is expected to occur over the Cactus East underground operation is not expected to significantly increase inflow rates and therefore dewatering rates. Subsidence will, however, allow a direct connection between the ground surface and the underground workings. Of concern is the potential for large rain events to contribute water to the workings. A 24-hour, 100-year rain event in this area would result in 3.66 (9.25 cm) inches of rain. Given the area of subsidence over the Cactus East orebody, a total of 25,500,000 gallons would enter the Cactus East operation. The volume of the water entering the Cactus East operation is large because the subsidence zone at Cactus East intersects the open pit effectively enlarging the catchment of the subsidence zone. Depending on where the subsidence breaches the open pit, the pit may retain storage capacity that could prevent some of the rainwater from entering the mine workings of the Cactus East underground operation therefore we believe the volumetric estimate of water entering the Cactus East operation is conservatively high.

The mine plan described in this PEA includes an open pit operation at Parks/Salyer, therefore subsidence will not be a factor at Parks/Salyer. Future groundwater modeling will incorporate the revised mine plan as described in this PEA.

16.4 OPEN PIT MINING METHODS

Open pit mining methods have been selected for the extraction of Mineral Resources in the Parks/Salyer, Cactus West and historical Stockpile areas of the Cactus Project based on the size of the resource, grade tenor, grade distribution and proximity to topography, while Cactus East will be mined using underground methods, specifically sub-level caving.

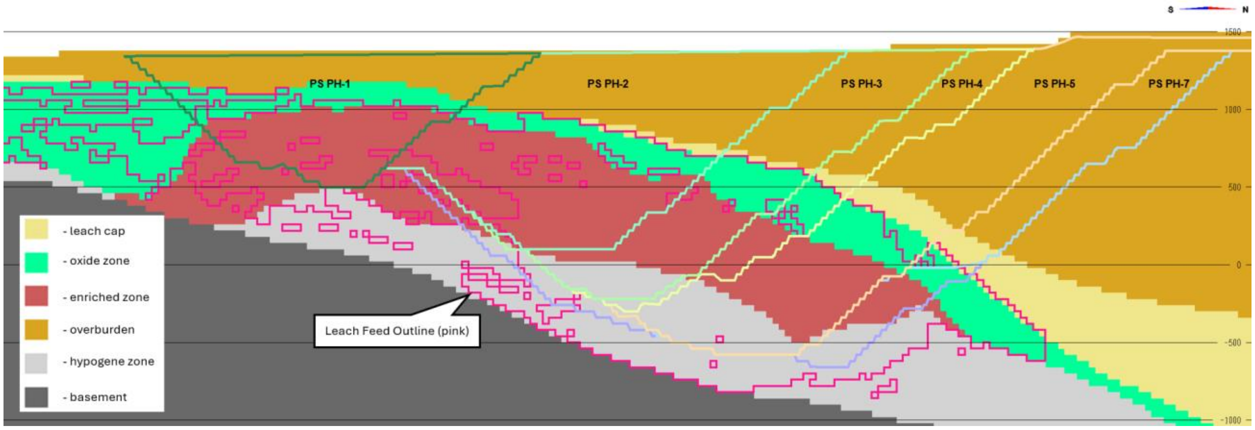
The Cactus West deposit lies adjacent to and beneath the historically mined Cactus Pit which has a demonstrated open pit geotechnical suitability, with existing pit walls relatively unchanged since mining ceased approximately 30 years ago. The Cactus West deposit includes several different lithological units, including Alluvium and Gila Conglomerate waste overburden which typically range in depth from 50-150 ft (15 m to 46 m) for Alluvium and 0-600 ft (0 m to 183 m) thick for Gila Conglomerate. Intrusive granites and porphyries underly the overburden and include leached/oxide and enriched porphyry zones, as well as hypogene porphyry. A cross section showing the Cactus West mining phases and mineralization types is shown in Figure 16-16.

The Parks/Salyer deposit lies approximately 8,000 ft (2,400 m) south-west of the Cactus West deposit. Parks/Salyer is a massive deposit with dimensions exceeding 7,000 ft (2,100 m) in north-south, 4,000 ft (1,200 m) in east-west and 1,500 ft (454 m) vertically. The mineralization does include significant grade variability internally, but there is relatively little internal waste dilution below cut-off grade. Overlying the mineralized zone is a thick layer of Gila Conglomerate and Alluvium which can vary in depth from 100 ft (30 m) in the southern Mainspring portion of the Parks/Salyer pit, to over 1300 ft (390 m) in the northern end of the pit. Beneath the mineral deposit there is a flat-dipping contact called the Basement Fault, which is a geotechnical constraint for the mine. This fault separates the productive granite rocks from the underlying schists which are barren. Mineralization types at Parks/Salyer include leached and oxide domains which are relatively thin on average and have little sulfide minerals, a thick enriched or supergene strata which hosts the majority of the high-grade copper mineralization, and an underlying hypogene sulfide deposit which is somewhat lower grade. This is illustrated in Figure 16-15.

The Stockpile mining area is a historical waste dump which contains significant quantities of oxide copper mineralization. This material was considered waste in the historical operation because the sole processing method on site was a flotation mill which could not recover oxide copper mineralization. The Stockpile area has recently been drilled to define a Mineral Resource block model which was used for mine planning. This block model includes the same planning framework which was applied to Cactus West. There are portions of the Stockpile area which have inclusions of non-mineralized waste, but typically the strip ratios are very low. The depth of the Stockpile area varies from approximately 30 ft to 130 ft (9 m to 40 m).

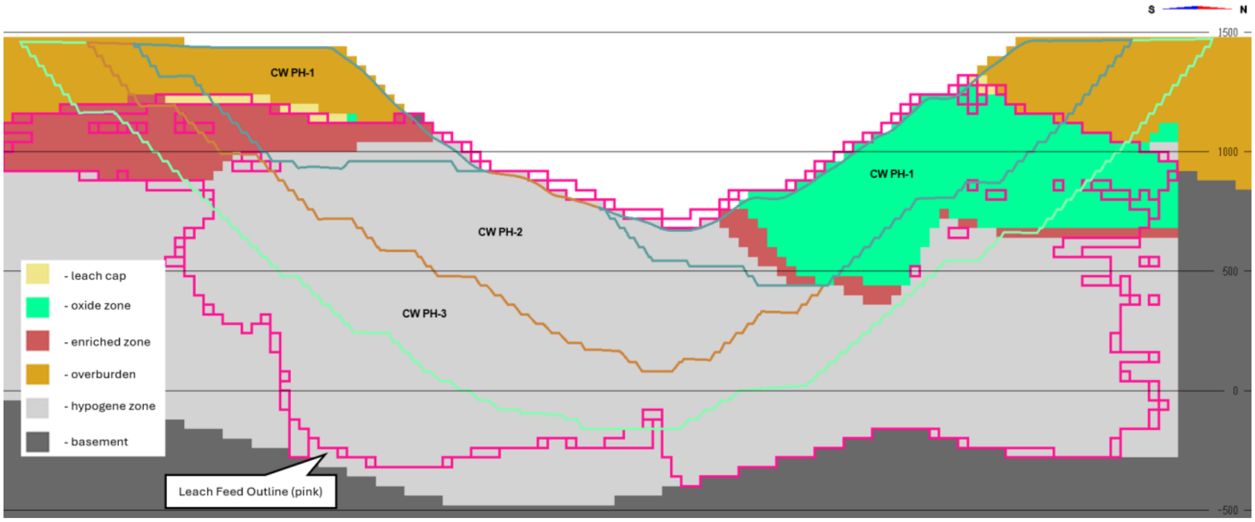
Feed material processed in the mine schedules involves all feed material types from Parks/Salyer, Cactus West, Cactus East, and the Historic Stockpile being processed after multistage crushing. A multi-stage crush plant will be located to the north-west of the Parks/Salyer pit area. Stockpiling of feed material is envisaged in the mine schedule to help smooth the stripping and feed material release profile and to accelerate the copper production profile of the project. Hypogene leach materials mined in the first 14 years of the mine schedule will be stockpiled until processing of that material begins in year 15. These hypogene and lower-grade stockpiles will be placed around the perimeter of the Cactus West and will be relocated in advance of the mining of Cactus West Phase 2 and Phase 3 late in the mine life. A high-grade stockpile will be located closer to the crusher to the west of the Parks/Salyer Pit.

Waste from the open pit mining areas will be placed into waste dumps filled to a depth of 250 ft (76 m) covering effectively the entire eastern half of the property, starting from the western edge of the existing tailings storage facility and extending to the extents of the property boundaries in the north, east, and south of the property. Some waste from Cactus West will also be placed into the Parks/Salyer open pit after the completion of mining at Parks/Salyer. Certain areas of the waste dump designs utilize lands which the Company does not currently own, but which are believed to be reasonable to acquire over time as required to support mine operations. Allowances have been made in the financial model for purchasing these properties, and it is believed that other reasonable alternatives for waste storage can be located if not.



Source: AGP 2024.

Figure 16-15: West-looking cross section of Parks/Salyer Pit showing pit phases, mineralization/lithology domains, and feed material outline (pink)



Source: AGP 2024.

Figure 16-16: West-looking cross section of Cactus West Pit showing pit phases, mineralization/lithology domains, and feed material outline (pink)

16.4.1 Geological Model Importation

The initial Cactus West and Parks/Salyer resource block models were provided to AGP from Arizona Sonoran in Vulcan ".bmf" format and converted to Hexagon MinePlan® block model format used by AGP for the mining portion of the PEA including pit and WRF design and mine scheduling tools. The Historic Stockpile block model was provided by Ausenco (Stantec / ALS Geo Resources) in Hexagon MinePlan® block model format. Items imported from the Initial models are shown in Table 16-17. Framework details for the open pit block models are provided in Table 16-18. The final open pit mine planning model items are displayed in Table 16-19.

Table 16-17: Imported Model Items

Field Name	Min	Max	Precision	Units	Comments
CuT	0	9.9	0.001	%	Total copper grade
CuAS	0	9.9	0.001	%	Acid-soluble copper grade
CuCN	0	9.9	0.001	%	Cyanide-soluble copper grade
CLASS	0	9	1	-	Resource category where 1=Measured; 2=Indicated; 3=Inferred
MINZN	0	9	1	-	Mineralization type
LITH	0	9	1	-	Lithology domain
SG	0	0.99	0.001	Tons/CUY	Density

Table 16-18: Open Pit Model Framework

Framework Description	Cactus West Open Pit Model (Value)	Parks/Salyer Open Pit Model (Value)	Stockpile Area Open Pit Model (Value)
MinePlan file 10 (control file)	CTUS10.dat	PS10.dat	STKP10.dat
MinePlan file 15 (model file)	CTUS15.dat	PS15.dat	STKP15.pln
X origin (ft)	385,900	379,500	387,000
Y origin (ft)	60,800	525,000	55,000
Z origin (ft) (min)	-1000	-1500	1345
Rotation (degrees clockwise)	0	0	0
Number of blocks in X direction	225	213	244
Number of blocks in Y direction	201	264	300
Number of blocks in Z direction	75	90	20
X block size (ft)	40	40	25
Y block size (ft)	40	40	25
Z block size (ft)	40	40	10

Table 16-19: Resource Model Item Descriptions (items are the same in both models)

Field Name	Min	Max	Precision	Units	Comments
CuT	0	9.9	0.001	%	Total copper grade
CuAS	0	9.9	0.001	%	Acid-soluble copper grade
CuCN	0	9.9	0.001	%	Cyanide-soluble copper grade
CLASS	0	9	1	-	Resource category where 1=Measured; 2=Indicated; 3=Inferred
MINZN	0	9	1	-	Mineral domain where 1=Leached; 2=Oxide; 3=Enriched; 4=Hypogene; 5=Basement; 6=Overburden
LITH	0	9	1	-	Lithology domain
SG	0	0.99	0.001	Tons/CUY	Density
RCUTC	0	9.9	0.001	%	Conv. Leach recovered copper grade when tertiary-crushed
RCUNT	0	9.9	0.001	%	Hypo. Leach recovered copper grade when tertiary-crushed

Field Name	Min	Max	Precision	Units	Comments
ACDTC	-99	99	0.1	lbs/ton	Conventional leach net acid consumption
ACDNT	-99	99	0.1	lbs/ton	Conventional leach net acid consumption
CFBST	-99	999	0.01	$/ton	Block cash flow of best process destination - $3.75/lb Cu
CFTC1	-99	999	0.01	$/ton	Block cash flow conventional leach - $3.75/lb Cu
CFTC2	-99	999	0.01	$/ton	Block cash flow conventional leach - $3.00/lb Cu
CFNT1	-99	999	0.01	$/ton	Block cash flow hypogene leach - $3.75/lb Cu
CFNT2	-99	999	0.01	$/ton	Block cash flow hypogene leach - $3.00/lb Cu
MINE1	0	9.99	0.001	$/ton	Open pit mining cost estimate
SLPCD	0	9	1	-	Geotechnical zone code
OSA	0	90	0.1	Degrees	Overall slope angle for pit limits analysis
IRA	0	90	0.1	Degrees	Inter-ramp angle for pit design
FACE	0	90	0.1	Degrees	Face slope angle for pit design
BERM	0	99	0.1	ft	Catchment berm width

16.4.2 Economic Pit Shell Development

The open pit ultimate size and phasing requirements were determined with various input parameters including estimates of the expected mining, processing and G&A costs, as well as metallurgical recoveries, pit slopes and reasonable long-term metal price assumptions. AGP worked together with ASCU personnel to select appropriate operating cost parameters for both the proposed Cactus West and Parks/Salyer open pits. The mining costs are estimates based on cost estimates completed by AGP. The costs represent what is expected as a blended cost over the life of the mine for all material types to the various dump locations. Process costs and a portion of the G&A costs were taken from previous studies and ASCU based on preliminary costing results.

The parameters used are shown in Table 16-20. The net value calculations are in US$ unless otherwise noted. The initial mining cost estimates are based on the use of 100-ton trucks using an approximate Waste Rock Storage Facility (WRSF) configuration to determine incremental hauls for mineralized material and waste.

Table 16-20: Pit Shell Parameter Assumptions

Description	Units	Value	Copper Value
Resource Model			
Block classification used		M+I+I	
Block Model height	ft	40	
Mining Bench height	ft	40	
Metal Prices			
Price	$/lb		3.75
Royalty	%		2.54%
Refining, Transportation Terms			
Product Grade		LME cathode	
Payable	%	100%	
Selling Costs	$/lb	0.04	

Description	Units	Value	Copper Value
SX/EW Cost	$/lb	0.23	
Metallurgical Information – Leach Cap and Oxide Alteration Zones			
Recovery of Acid-Soluble Copper – Tertiary Crush	%	91	
Recovery of Cyanide-Soluble Copper – Tertiary Crush	%	55	
Bulk Acid Consumption	Acid lbs/ton feed material	22	
Acid Production	lbs/lbs Recovered Cu	1.54	
Metallurgical Information – Enriched Alteration Zones			
Recovery of Acid-Soluble Copper – Tertiary Crush	%	94.3	
Recovery of Cyanide-Soluble Copper – Tertiary Crush	%	89.6	
Bulk Acid Consumption	Acid lbs/ton feed material	21	
Metallurgical Information – Hypogene Alteration Zones			
Recovery of Total Copper – Tertiary Crush	%	75.0	
Bulk Acid Consumption	Acid lbs/ton feed material	21	
Cost Information			
Mining Cost *		Feed material	Waste
Mining Cost base rate – 1400' elevation	$/t	2.12	2.62
Incremental rate - above	$/t/40 in bench	0	0
Incremental rate - below	$/t/40 in bench	0.0255	0.0255
Processing Costs include Base Cost + Net Acid Consumption			
Processing Base Cost – Tertiary Crush – Oxide/Leached	$/ton leach	$0.48	
Processing Base Cost – Tertiary Crush – Enriched	$/ton leach	$1.20	
Processing Base Cost – Hypogene Feed material	$/ton leach	$5.40	
Acid Cost	$/lb acid	$0.08	
General and Administrative Cost			
G&A cost	$/ton leach	$0.47	

Note: * mining costs based on using 100-ton haul trucks. ** process costs based on 22 Mt/y dry throughput

Wall slopes for pit optimization were based on guidance from Call & Nicholas, Inc. A design sector map for Cactus West was created which was defined by structural domains and dominant geotechnical units, as shown in Figure 16-17. Wireframe solids were used to code the model SLPCD item, then overall slopes at Cactus West were applied by code as shown in Table 16-21.

Table 16-21: Pit Shell Slopes – Cactus West

Structural Domain	SLP Code	Azimuths		Angle (°)
		Start (°)	End (°)	
Alluvium	1	All orientations		30
Gila Conglomerate	2	All orientations		45
Granite NE	3	260	310	42
Granite NW	3	0	135	42
Granite South	4	135	260	40
Granite North	5	310	360	40

Overall slopes angles used for the Parks/Salyer pit optimization are shown in Table 16-22. The slope code was assigned based on the rock typed domain in the resource model. The Parks/Salyer slopes are based on geotechnical information from similar rock types at Cactus West and preliminary slope design recommendations received from Call & Nicholas, Inc. dated March 17,2024.

Table 16-22: Pit Shell Slopes – Parks/Salyer

Structural Domain	SLP Code	Azimuths		Angle (°)
		Start (°)	End (°)	
Alluvium	1	0	360	30
Gila Conglomerate	2	0	360	40
Granite	3	0	360	40

Nested L–G pit shells were generated to examine sensitivity to the copper prices with a target of US$3.70/lb Cu. This was to gain an understanding of the deposit and highlight potential opportunities in the design process to follow. Measured, Indicated, and Inferred resources were used in the analysis. The nested pit shells were run using copper price factors to US$3.70/lb Cu at US$0.10/lb Cu increments. The resulting nested pit shells assist in visualizing natural breakpoints in the deposit and selecting shells to act as design guidance for phase design. The net profit per tonne of feed material not considering capital for each pit was calculated on an undiscounted basis for each pit shell.

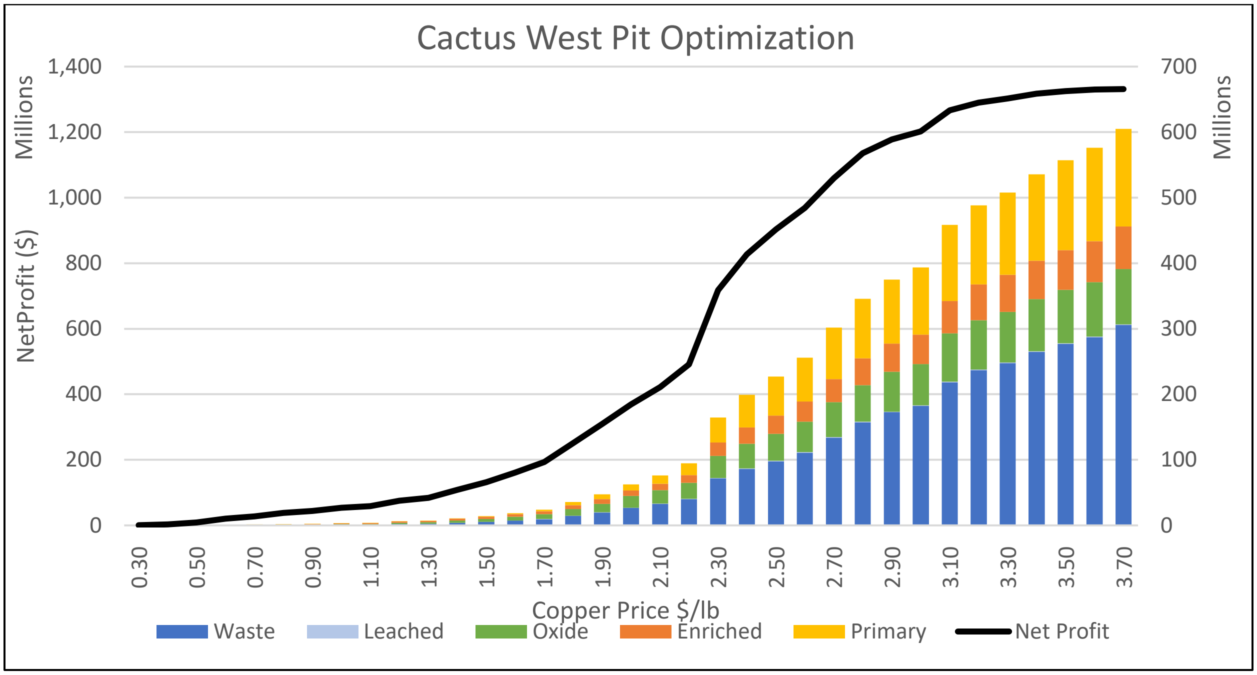
Pit optimization at the Cactus deposit was restricted to the Cactus West part of the deposit and not allowed to value the deeper Cactus East resource. The inclusion of the Cactus East resource, which generates a pit at higher copper prices would have skewed the nested pit analysis. Leach material, waste tonnages, and potential net profit were plotted against the copper price and are displayed in Figure 16-9.

No restrictions were applied to the final pit optimization at Parks/Salyer. Leach material, waste tonnages, and potential net profit were plotted against the copper price and are displayed in Figure 16-17.

These were used as a guide for sequencing pit phase designs. The initial phase design is at the US$2.30/lb pit shell. This break point represented 54% of the net value of the US$3.70/lb pit, includes 40% of the leach feed material and only 23% of the waste of the larger pit shell.

The second pit shell selected for phase 2 is at US$3.00/lb Cu. This US$3.00/lb Cu break point represented 90% of the net value of a US$3.00/lb pit but with only 60% of the waste of the US$3.70/lb pit shell. The final pit is designed to the $3.50-/lb pit shell. A visual check of the selected pit shells shows sufficient mining room exists between the selected phase shells.

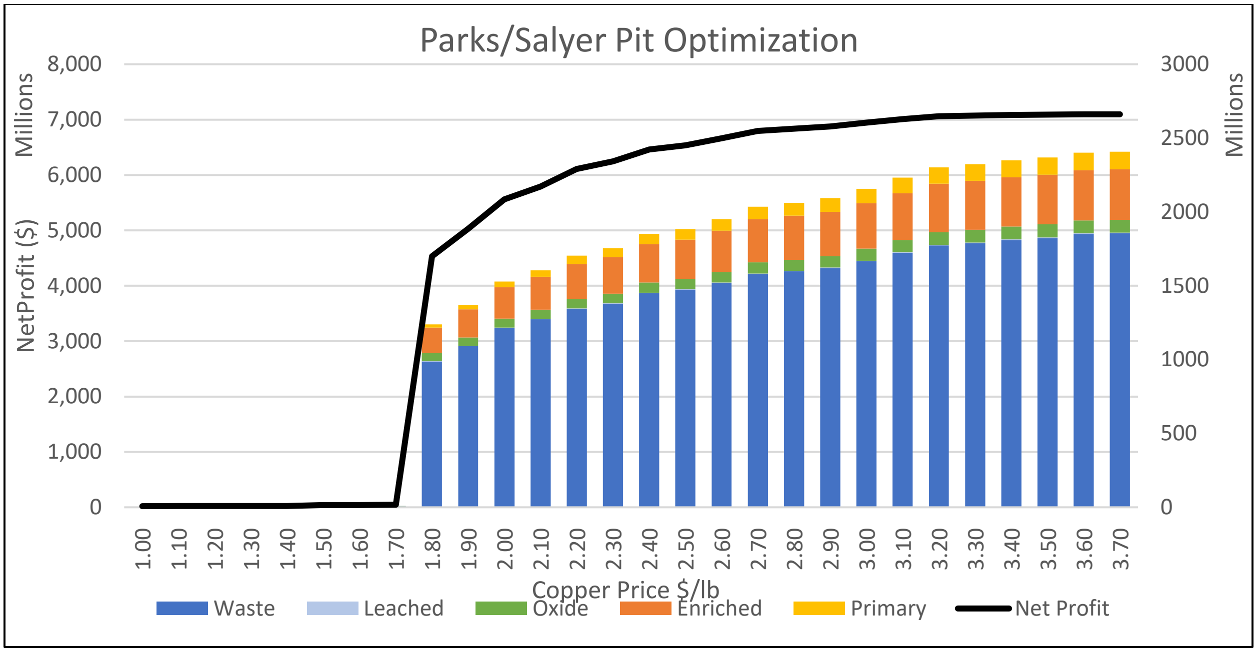
Portions of the Parks/Salyer open pit mining inventory require mining waste materials on adjacent properties not currently owned by Arizona Sonoran. It is understood that preliminary consultations have occurred, and that it is reasonable to assume future agreements between the current landowners and Arizona Sonoran will allow for the mining of this land in the future. A cost allowance for the purchase of these lands has been included in the financial model. Should an agreement not be reached, future mining scenarios will require adjustments to the open pit designs that will adversely impact the available open pit mining inventories.



Source: AGP, 2024.

Figure 16-17: Cactus West Optimization

Figure 16-18 shows the Parks/Salyer pit shells. There are no distinct break points in the Parks/Salyer pit shells. The pits get incrementally larger and deeper at higher copper prices. The initial shell at $1.80/lb contains over 1 billion tons of material mined. The phase designs for Parks/Salyer are based on a logical mining sequence from south to north that respects the optimization shells and mines shallower parts of the deposit in the early phases and the deeper part of the deposit to the north in the latter phases.



Source: AGP, 2024.

Figure 16-18: Parks/Salyer Optimization

16.4.3 Dilution

The Mineral Resource block models for the Parks/Salyer and Cactus West open pits have block dimensions of 40 ft (12.2 m) x 40 ft (12.2 m) x 40 ft (12.2 m). This was determined to be an acceptable selective mining unit for the project under the assumption that mining will be undertaken with large equipment and the nature of the feed material body and cut-off grades is such that feed material -waste contacts are relatively infrequent and gradational in nature. As a result of low processing costs and good recoveries, cutoff grades are low and there is a relatively low penalty cost to any dilution incurred. Given this dynamic it was determined that the Mineral Resource block model is suitable for use in planning for the PEA without any secondary factors for feed material loss or dilution applied. In the Stockpile area, there is a very low ratio of internal waste in the model, and as such it was similarly determined that no secondary dilution or feed material loss was required.

16.4.4 Pit Design

Open pit designs were completed in MinePlan software according to geotechnical design parameters provided by Call and Nicholas, with design assumptions for road and minimum mining widths provided by AGP. The geotechnical design parameters employed are described in Table 16-23 for Cactus West, and Table 16-24 for Parks/Salyer.

Haul road widths were selected to accommodate 300-ton class trucks with a two-way design width of 140 ft (42.4 m) applied to the pit designs. Typical mining widths are well in excess of 330’ (100m), with localized exceptions where ramp retreats or geotechnical berms are removed at widths of 150 ft (45.4 m) over restricted vertical intervals.

Phase designs at Parks/Salyer begin by mining Phase 1 in the relatively lower-strip ratio area known as Mainspring, where the feed material body approaches closer to surface, but is relatively lower grade. Phase 2 expands the pit approximately 1800 ft (545 m) north. Phase 1 achieves a final depth of 848 ft (255 m) while Phase 2 is 1250’ (380 m) deep. Phase 3 expands the pit another 800 ft (242 m) north, and 350 ft (106 m) east and west, achieving a final depth of 1600 ft (484 m). Phase 4 expands the pit 1000 ft (303 m) to the north-east, and to a final depth of 1700 ft (515 m), which is within 300 ft (90 m) of the ultimate pit depth. Phase 5 expands the pit expands the pit approximately 750 ft

(227 m) north and west, while also removing the southern 1500 ft (454 m) of the historical tailings storage facility. Phase 6 and Phase 7 together expand the pit 600-700 ft (181-212 m) on the west, north, and east sides, with Phase 6 focused on the eastern side, while Phase 7 is focused on the west. The ultimate pit depth is approximately 2050 ft (621 m) at the 660 ft elevation.

Phase designs at Cactus West are configured with Phase 1 being optimized to extract only conventional-leach material types (oxide and supergene feed materials), while Phase 2 and Phase 3 are optimized with hypogene as well as oxide/supergene feed materials. Phase 1 mines a 500-800 ft (151-242 m) expansion of the historical Sacaton pit on the south and west sides, with a minimum width expansion around the north and east side of the pit. As Phase 1 is developed, it progressively steps in from the south leaving un-mined low-strip ratio hypogene feed materials which become the target for Phase 2 when the ability to process hypogene feed materials comes online. Phase 1 is approximately 1150 ft (348 m) deep, while Phase 2 is 1385 ft (420 m) deep. Phase 3 expands the pit 150-400 ft (45-121 m) on the north, west, and southern side. Final depth of Phase 3 is 1605 ft (486 m). Phase 1 is predominantly oxide/supergene feed material, Phase 2 is predominantly hypogene feed material, and Phase 3 is approximately 41% oxide/supergene feed material, and 59% hypogene feed material.

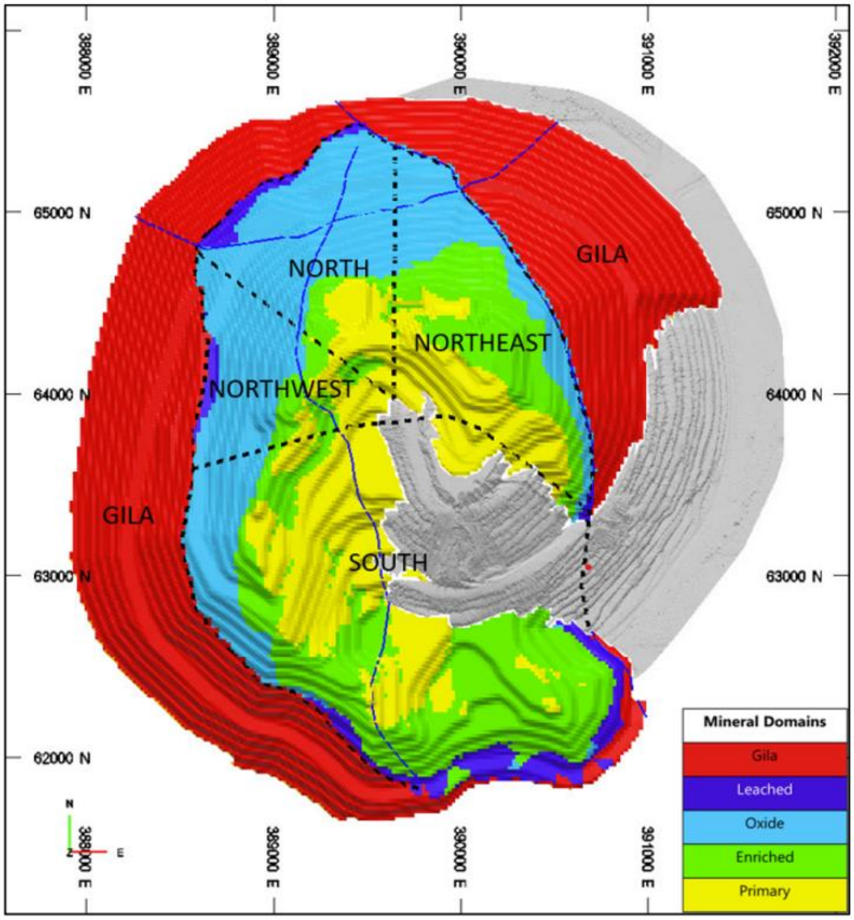
Table 16-23: Cactus West Open Pit Slope Design Parameters

Design Sector	Slope Azimuth		Pit Design Geometry			
			Face Height	Face Angle	Berm Width	Inter-Ramp Angle
	Start (°)	End (°)	Bh (ft)	Da (°)	Dw (ft)	Ia (°)
Alluvium	All	-	40	64	18	47
Gila Conglomerate	All	-	40	69	18	50
Granite North	310	360	40	61	18	45
Granite South	135	260	40	61	18	45
Granite NE	260	310	40	64	18	47
Granite NW	0	135	40	64	18	47

Table 16-24: Parks/Salyer Open Pit Slope Design Parameters

Design Sector	Slope Azimuth		Pit Design Geometry			
			Face Height	Face Angle	Berm Width	Inter-Ramp Angle
	Start (°)	End (°)	Bh (ft)	Da (°)	Dw (ft)	Ia (°)
Alluvium	All	-	40	70	33.1	40
Gila Conglomerate	All	-	40	70	25.4	45
Granite	All	-	40	70	25.4	45

Pit designs at both Parks/Salyer and Cactus East incorporate geotechnical berms to ensure that the Gila Conglomerate and Alluvium slopes do not exceed 500 ft (151 m) at the inter-ramp design angle. Additional geotechnical breaks are also included in the Parks/Salyer designs where the contact between Gila and Granite is located to decouple the pit wall. At Parks/Salyer, geotechnical berms are employed at regular intervals to achieve an overall slope angle which is approximately 40 degrees. The Parks/Salyer open pit depth was also constrained to not encroach within 250 ft (75 m) of the basement fault.



Source: Call & Nicholas, 2023.

Figure 16-19: Cactus West Pit Design Slope Sectors

Tons and grade for the Parks/Salyer, Cactus West, and Stockpile phases are reported in Table 16-25. Feed material tons and grades by phase split into oxide/enriched and hypogene feed materials are presented in Table 16-26 and Table 16-27, respectively. Only Measured, Indicated, and Inferred Mineral Resources were included in the leach feed material inventory. The Parks/Salyer pit phases are shown in Figure 16-20. The Cactus West phases are shown in Figure 16-25.

Table 16-25: Open Pit Phases, Tons, and Grade

Phase	Leach Feed material	TCU	CUAS	CUCN	Waste	Total	Strip Ratio
	(M ton)	(%)	(%)	(%)	(M ton)	(M ton)	(w:f)
PS-PH1	75.3	0.246	0.089	0.130	121.5	196.7	1.6
PS-PH2	76.1	0.357	0.068	0.256	220.8	296.9	2.9
PS-PH3	66.0	0.606	0.089	0.407	186.4	252.4	2.8
PS-PH4	51.0	0.652	0.082	0.391	220.0	271.0	4.3
PS-PH5	124.6	0.669	0.107	0.410	383.7	508.3	3.1
PS-PH6	58.3	0.645	0.080	0.466	346.0	404.3	5.9
PS-PH7	80.0	0.524	0.088	0.268	201.5	281.6	2.5
PS-Total	**531.2**	**0.530**	**0.088**	**0.331**	**1,680.0**	**2,211.1**	**3.1**
CW-PH1	96.2	0.288	0.112	0.105	137	233.0	1.4
CW-PH2	77.7	0.298	0.016	0.035	29	106.9	0.4
CW-PH3	132.1	0.278	0.045	0.049	136	268.6	1.0
CW -Total	**306.0**	**0.286**	**0.059**	**0.063**	**302**	**608.5**	**1.0**
Stockpile	**9.8**	**0.235**	**0.168**	**0.033**	**0.2**	**10.0**	**0.0**
Total Open Pit	**847.0**	**0.438**	**0.078**	**0.231**	**1,982**	**2,830**	**2.3**

Table 16-26: Open Pit Oxide and Enriched Feed material tons and grade by phase

Phase	Leach Feed material	TCU	CUAS	CUCN
	(M ton)	(%)	(%)	(%)
PS-PH1	74.5	0.25	0.09	0.13
PS-PH2	75.5	0.36	0.07	0.26
PS-PH3	58.1	0.63	0.10	0.46
PS-PH4	41.8	0.68	0.10	0.47
PS-PH5	101.9	0.72	0.13	0.49
PS-PH6	53.0	0.68	0.09	0.51
PS-PH7	48.4	0.63	0.14	0.42
PS-Total	**453.3**	**0.55**	**0.10**	**0.38**
CW-PH1	86.3	0.28	0.12	0.11
CW-PH2	13.0	0.22	0.05	0.12
CW-PH3	54.2	0.22	0.10	0.08
CW -Total	**153.5**	**0.26**	**0.11**	**0.10**
Stockpile	**9.8**	**0.24**	**0.17**	**0.03**
Total Open Pit	**616.7**	**0.47**	**0.10**	**0.31**

Table 16-27: Open Pit Hypogene Feed material tons and grade by phase

Phase	Leach Feed material	TCU	CUAS	CUCN
	(M ton)	(%)	(%)	(%)
PS-PH1	0.8	0.22	0.01	0.05
PS-PH2	0.5	0.19	0.01	0.05
PS-PH3	7.8	0.45	0.01	0.05
PS-PH4	9.2	0.55	0.01	0.05
PS-PH5	22.7	0.45	0.01	0.04
PS-PH6	5.2	0.30	0.01	0.03
PS-PH7	31.7	0.36	0.01	0.03
PS-Total	**77.9**	**0.41**	**0.01**	**0.04**
CW-PH1	9.9	0.32	0.01	0.03
CW-PH2	64.7	0.31	0.01	0.02
CW-PH3	78.1	0.32	0.01	0.03
CW -Total	**152.7**	**0.32**	**0.01**	**0.02**
Stockpile				
Total Open Pit	**230.6**	**0.35**	**0.01**	**0.03**

Parks/Salyer PH-1 is shown in Figure 16-21 (in brown) and is referred to as the Mainspring area. This phase is the first mining target in the mine schedule and is initiated in Year -1 (pre-stripping period). This pushback has a relatively low strip ratio which helps to reduce the pre-production stripping requirements for the mine schedule. The mine schedule envisions mining 50 Mt in Year -1 and 65 Mt in Year 1 to prepare the pushback to deliver approximately 12 Mt of feed material to process in the second half of Year 1. Phase 1 is completed in Year 3, at which point the southern portion of the pit phase is planned to become an in-pit waste dumping location that will merge into the Highway Dump area. Haulage access into Phase 1 is located on the North-East edge of the pit, chosen for proximity to waste dump locations. Feed material haulage will be directed north, over un-mined pit phases and eventually around the open pit rim. An image showing the completed configuration of Parks/Salyer PH-1 is shown in Figure 16-21.

Parks/Salyer PH-2 is shown in Figure 16-21 (in orange). This Phase is the second mining priority, mining from Year -1 to Year 6, with significant feed material release in Year 4. Haulage access to this mining phase is in the South-East corner of the pit and is co-located with the PH-1 ramp exit point. An image showing the completed configuration of Parks/Salyer PH-2 is shown in Figure 16-21.

Parks/Salyer PH-3 is shown in Figure 16-22 (in pink). This Phase is the third mining priority, mining from Year 1 to Year 7, with significant feed material release in Year 5 and 6. Haulage access to this mining phase is in the South-East corner of the pit and is located in proximity to the PH-1 and PH-2 ramp exit point. Phase 3 represents the first access to significantly higher grades in Parks/Salyer. An image showing the completed configuration of Parks/Salyer PH-3 is shown in Figure 16 31. Developing PH-3 is a primary objective in the early mine schedule.

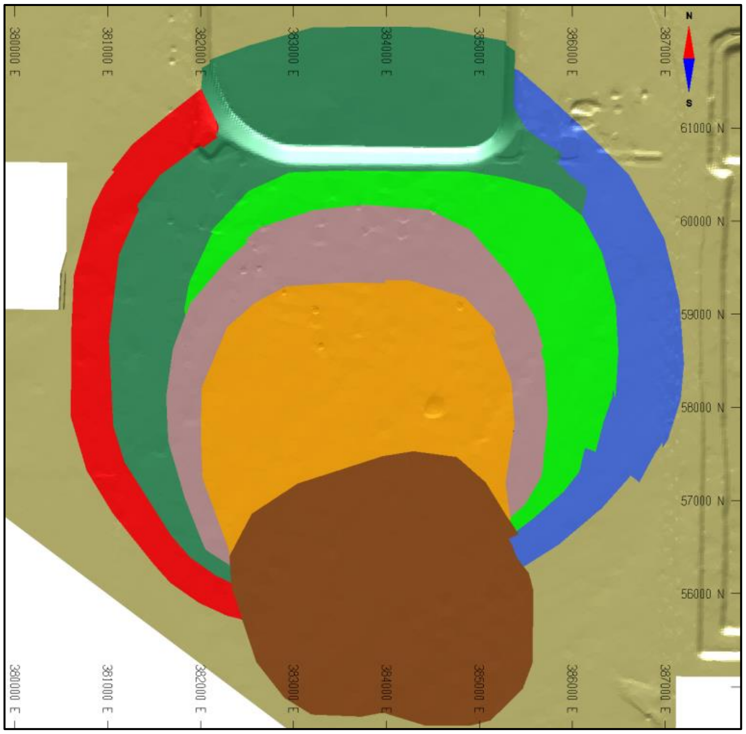
Parks/Salyer PH-4 is shown in Figure 16-22 (in lime green). This Phase is the fourth mining priority, mining from Year 4 to Year 10, with significant feed material release in Year 8 and 9. Haulage access to this mining phase is in the South-East edge of the pit. Phase 4 is the first Parks/Salyer pit phase with a significant component of hypogene feed material, with 22% of feed material tons being hypogene. This material is typically found in the lowest benches of the pushback and is mined at the end of the pushback. An image showing the completed configuration of Parks/Salyer PH-4 is shown in Figure 16-22.

Parks/Salyer PH-5 is shown in Figure 16-23 (in dark green). This Phase is the fifth mining priority, mining from Year 6 to Year 14, with significant feed material release in Year 11-14. Haulage access to this mining phase is on the North edge of the pit. This pushback has a large stripping burden, partially as a result of the requirement to relocate the historical tailings storage facility which is located above the pit area. This tailings area is removed to the maximum extent required in a single phase for efficiency. Tailings relocated are assumed to be dry, mined with the conventional mining fleet, and blended/collocated into waste facilities along with other run-of-mine waste. Phase 5 includes over 300 Mt of stripping waste, and as such, the first Phase of Cactus West is mined concurrently with Phase 5 to secure an intermediate source of feed material supply while avoiding having to accelerate mining rates further. Phase 5 includes a significant amount of hypogene feed material, with 22% of feed material tons being hypogene. Similar to Phase 4, these hypogene tons are mined slowly over many years as they are not required to fulfill the hypogene processing allocation until Year 15, at which point adequate surface stockpiles of equal or higher grade exist. An image showing the completed configuration of Parks/Salyer PH-5 is shown in Figure 16-23.

Parks/Salyer PH-6 is shown in Figure 16-23 (in blue). This Phase is the sixth mining priority, mining from Year 10 to Year 17, with significant feed material release in Year 16 and 17. Haulage access to this mining phase is in the South-East edge of the pit. Phase 6 contains relatively little hypogene feed material, with only 9% of feed material tons being hypogene. Phase 6 represents the ultimate pit wall on the Eastern half of the pit, and portions of the haulage ramp will be used by Phase 7 to increase pit slope efficiency. An image showing the completed configuration of Parks/Salyer PH-5 is shown in Figure 16-23.

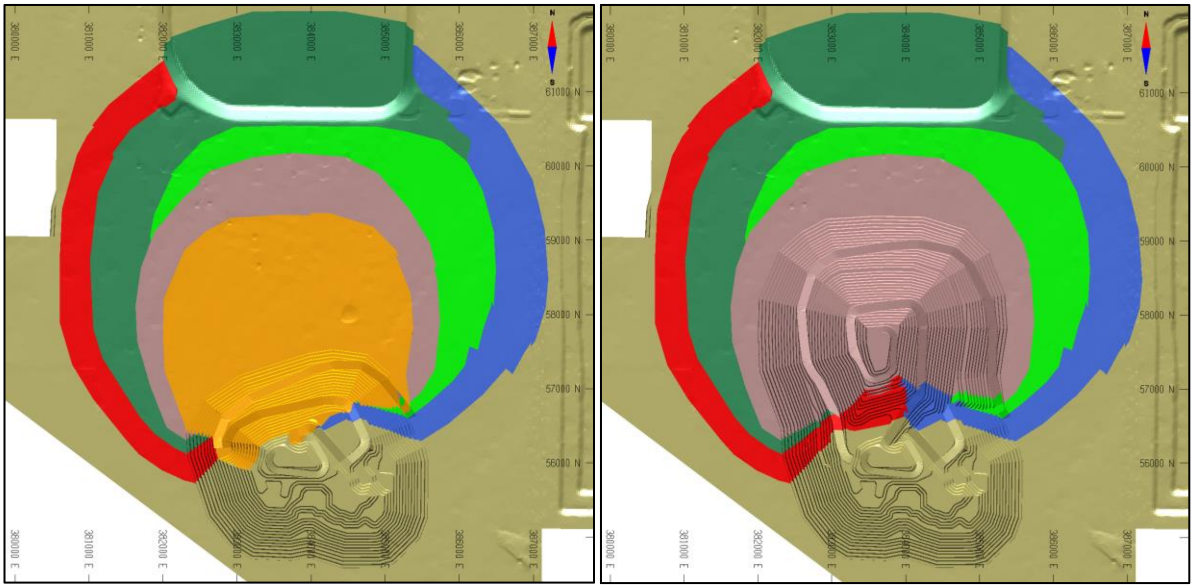
Parks/Salyer PH-7 is shown in Figure 16-24 (in red). This Phase is the seventh mining priority, mining from Year 12 to Year 22, with significant feed material release from Years 18-22. Haulage access to this mining phase is initially from the North-West edge of the pit, but eventually transitions to the Phase 6 ramp which exits the pit on the Eastern side. Phase 7 contains a significant amount of hypogene feed material, with 65% of feed material tons being hypogene. Phase 7 represents the ultimate pit wall on the Western half of the pit. An image showing the completed configuration of Parks/Salyer PH-5 is shown in Figure 16-23.

Portions of Phase 5, 6, and 7 could be deepened in the future, should further geotechnical investigation determine that a 250 ft offset to the Basement Fault is not required for slope stability.



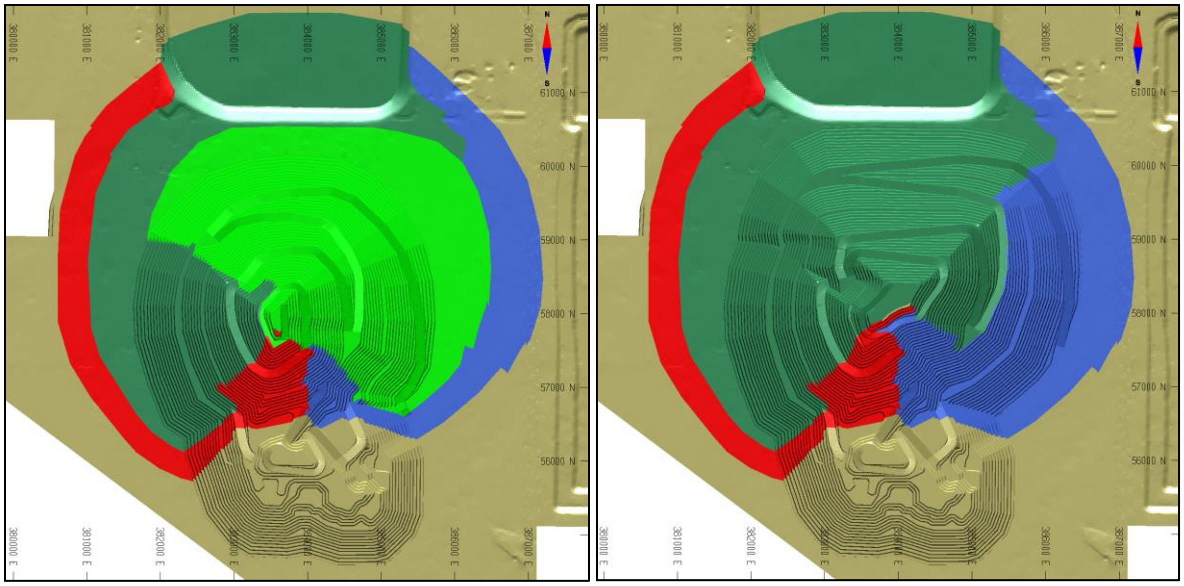
Source: AGP 2024.

Figure 16-20: Parks/Salyer Mining Phases



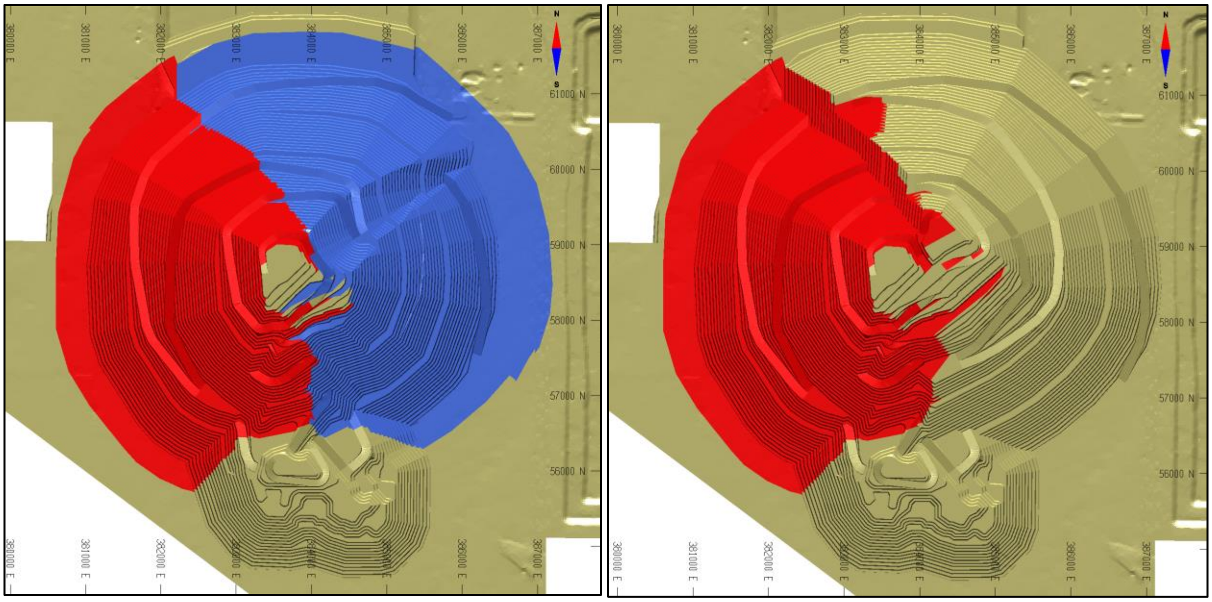
Source: AGP 2024.

Figure 16-21: Parks/Salyer PH-1 and PH-2 Completed



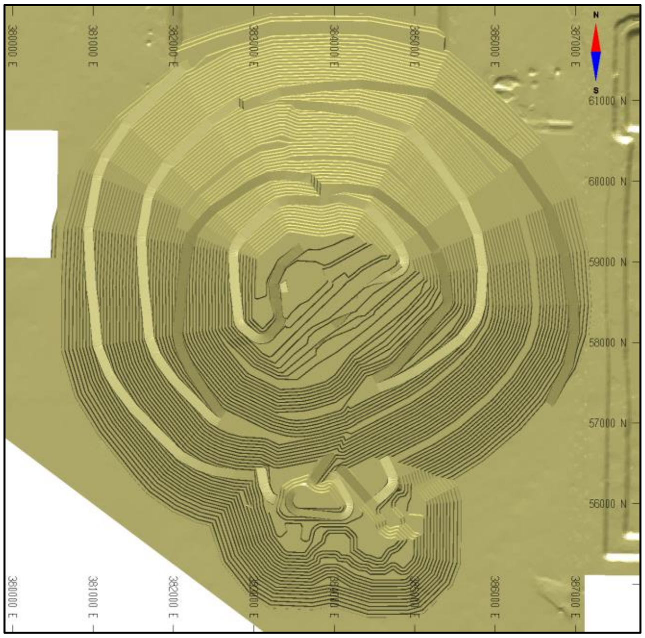
Source: AGP 2024.

Figure 16-22: Parks/Salyer PH-3 and PH-4 Completed



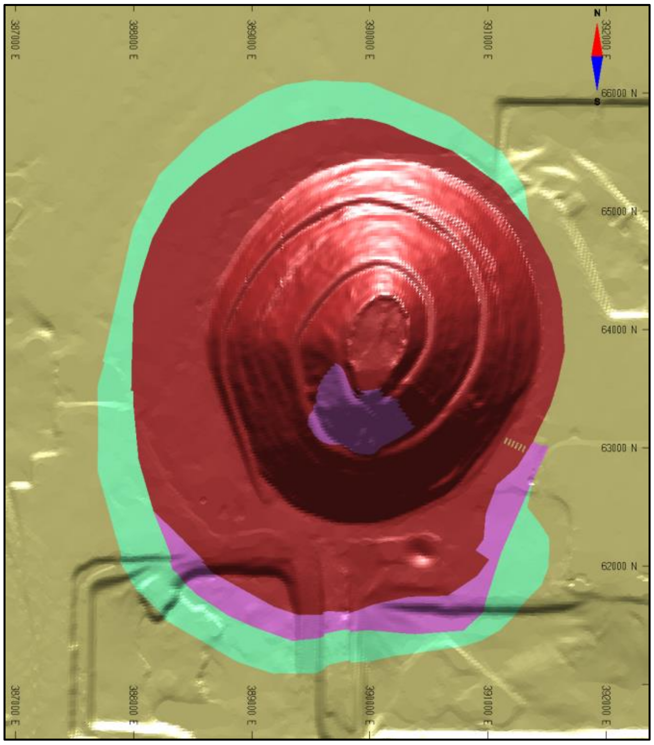
Source: AGP 2024.

Figure 16-23: Parks/Salyer PH-5 and PH-6 Completed



Source: AGP 2024.

Figure 16-24: Parks/Salyer PH-7 Completed



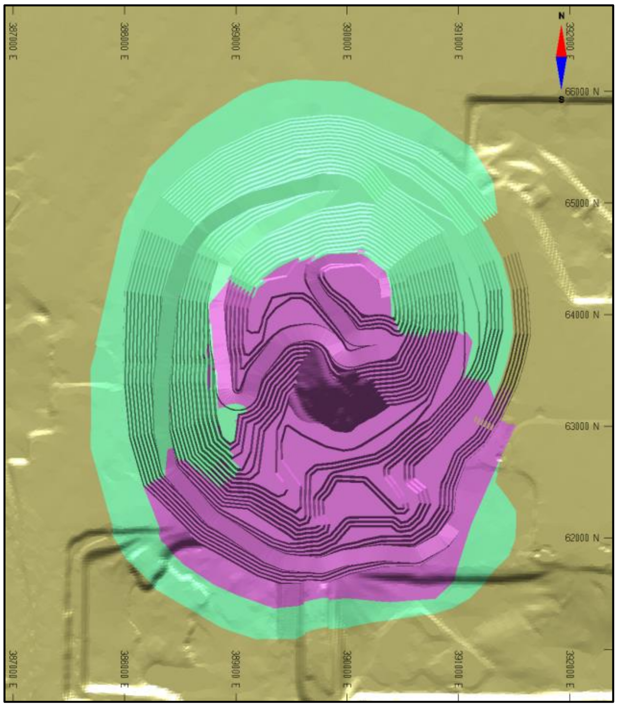
Source: AGP 2024.

Figure 16-25: Cactus West Mining Phases

Cactus West Phase 1, shown in Figure 16-25 (in red), is located predominantly west and south of the existing pit and will start mining in Year 7. Bench elevations range from 1,440 ft (439 m) to 320 ft (97 m). The access ramp is located in the South-East corner of the pit, facilitating access to the crushers to the West, and allocated waste dump locations in the North-East quadrant of the property. Mining begins in Year 7 and continues through Year 11. During this time the phase is used as a lower-strip ratio source of feed material as mining Parks/Salyer is developing a high-strip ratio pushback. As such, once higher-grade feed material is sourced from Parks/Salyer, the mining in Cactus West is paused until Year 15 and Year 19 when the residual pit bottom becomes the best available feed material. This phase will provide operational flexibility and redundancy of feed material supply in the middle years of the mine schedule, in conjunction with low-grade surface stockpiles. The completed pit design for Cactus West PH-1 is shown in Figure 16-26.

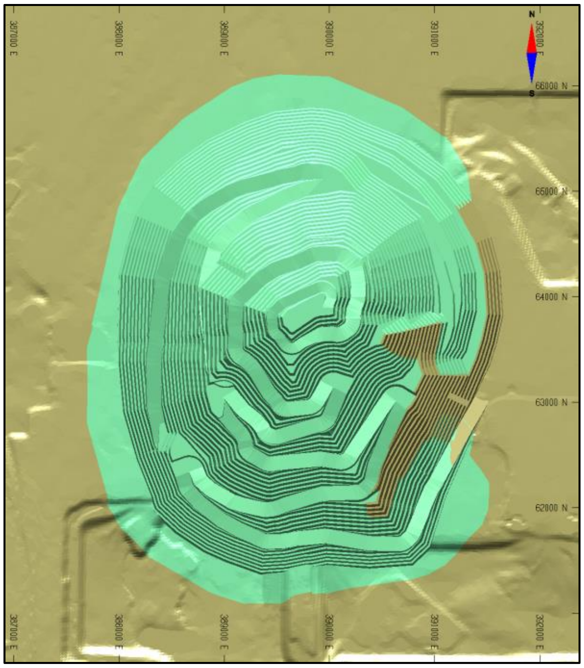
Cactus West Phase 2, shown in Figure 16-27 (in pink), extends the pit to south of Phase 1, capturing hypogene feed material not mined as a part of Phase 1. Bench elevations range from 1,440 ft (439 m) to 80 ft (24 m). Similar to Phase 1, the access ramp exits the pit on the south-east side of the pit and is located to maximize ramp efficiency over the limited wall length of the pushback, as opposed to haulage efficiency on surface. Mining of Phase 2 occurs in Years 23-28 and largely matches the pace of required hypogene feed material supply. The completed pit design for Cactus West PH-2 is shown in Figure 16-27.

Cactus West Phase 3, shown in Figure 16-28 (in green), extends the pit to south, west, and north of Phase 2, capturing both oxide/enriched and hypogene feed materials. Bench elevations range from 1,440 ft (439 m) to -160 ft (-48 m). Mining begins in Year 3 and Phase 2 is mined out in Year 7. Similar to Phase 1, the access ramp exits the pit on the south-east side of the pit and is located to maximize ramp efficiency over the limited length of the pushback, as opposed to haulage efficiency on surface. Mining of Phase 3 begins in Year 24, after low-grade stockpiles situated above the pushback are exhausted. Mining is completed in Year 31. The completed pit design for Cactus West PH-3 is shown in Figure 16-28.



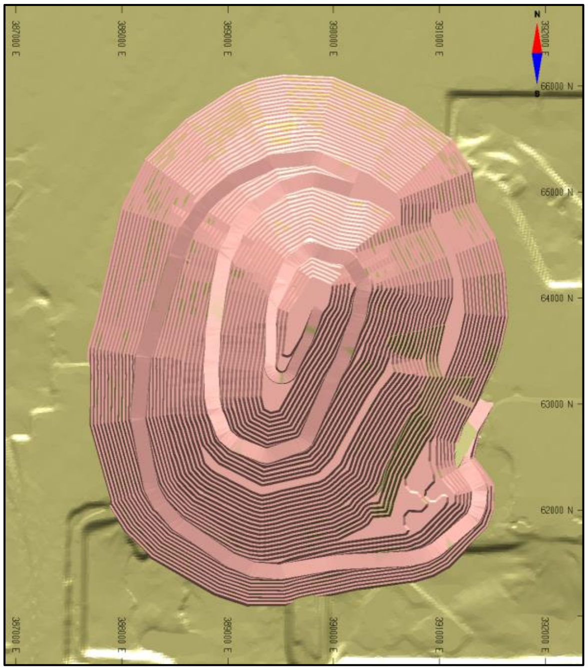
Source: AGP 2024

Figure 16-26: Cactus West PH-1 Completed



Source: AGP 2024

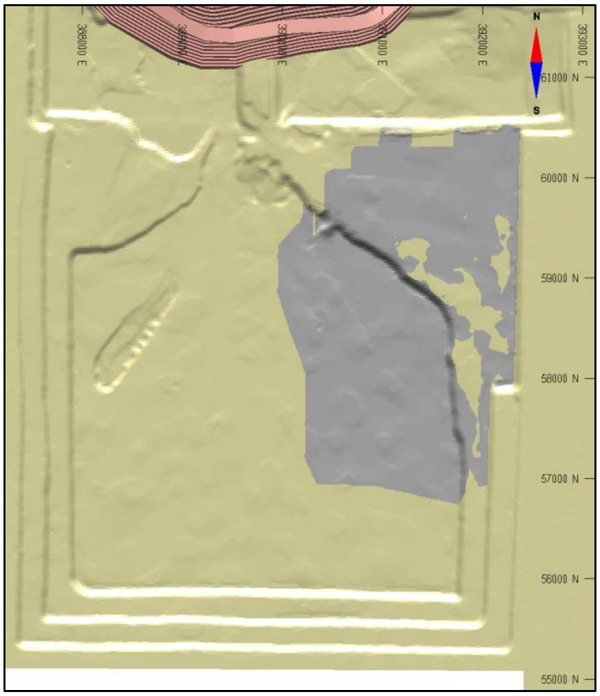
Figure 16-27: Cactus West PH-2 Completed



Source: AGP 2024

Figure 16-28: Cactus West PH-3 Completed

The Historic Stockpile was divided into three phases for mining: the east phase, south phase, and west phase. Only approximately 12% of the available inventory in Stockpile Phase designs was processed in the mine schedule due to space constraints on heap leach pads. The Stockpile area is mined in Year 1 to provide low-strip ratio feed material feed for plant commissioning while the Parks/Salyer open pit is developed. The portion of the stockpile mined is shown in Figure 16-29.



Source: AGP 2024

Figure 16-29: Stockpile Mining

16.4.5 Cutoff Grade Calculations

Cutoff grade decisions on the mine schedule are based on a block value calculation, which is effectively a net-smelter return with expected processing, G&A, and royalty cost removed. This block value calculation employed all the same assumptions as outlined in Table 16-28, including a $3.70/lb copper price. The cutoff block value employed was a marginal cutoff grade of $0/t, meaning that any block which would generate a net positive value was either processed on the heap leach or placed into stockpiles. This cutoff calculation does not include mining costs which are considered sunk for the purpose of cut-off grade determination.

Cutoff grade determinations consider the projected recoveries generated by each block. For leaching of oxide and enriched mineralization, these recoveries are strongly influenced by the proportion of each type of copper speciation present in the block (acid-soluble, cyanide-soluble, and non-soluble). As such, it is not possible to state a generic cutoff grade for the mine schedule, as the ratio of copper speciation is variable resulting in variable cutoff grades for different materials. As a reference point, for the typical copper speciation in oxide and enriched materials, the cutoff grades are approximately 0.050% and 0.055% acid-soluble plus cyanide-soluble copper, respectively. For hypogene leach, which employs a static 25% recovery of total copper grade and increased processing costs, the cut-off grade is approximately 0.12 % CuT.

Over the course of the open pit mine schedule, approximately 200 Mton of low-grade and hypogene feed material is stockpiled and reclaimed in order to accelerate the copper production profile of the project, and to supplement feed material release from the open pits during periods of high waste stripping. This amount of stockpiling includes 58 Mt of hypogene feed material, which is stockpiled until adequate feed is liberated in Year 15 to support continuous processing of hypogene feed materials, and until the majority of the higher-grade Parks/Salyer enriched materials have been processed. 90 Mt of low-grade oxide/enriched feed material is also stockpiled, predominantly in the first 10 years of the mine schedule as priority is given to the highest available grades, and while the processing capacity is limited to 24 million tons per annum.

16.4.6 Waste Rock Facilities

Waste materials generated from mining Parks/Salyer, Cactus West and the Stockpile open pit areas will be composed of predominantly Gila Conglomerate and Alluvium overburden (75% and 12% of total waste, respectively) with the remainder being granite, dykes, or other porphyry rock with low copper grades. Total waste mass is 1,979.8 M tons, with an average long-term bulk waste dump density of 17 cubic feet per ton assumed. This average density was calculated by applying variable swell factors to each waste rock lithology then computing the weighted average. A swell factor of 25% was applied to Gila Conglomerate, 5% to alluvium, and 30% to other rock and using the Mineral Resource model Insitu densities.

No waste segregation is planned in the mine schedule aside from the stockpiling of feed material materials of different mineralization types and grades, and as such, different waste types can be placed into any of the available waste facilities as required by scheduling and fleet optimization constraints. This includes approximately 18 M tons of mixed construction materials and tailings which will be excavated out of the historical TSF.

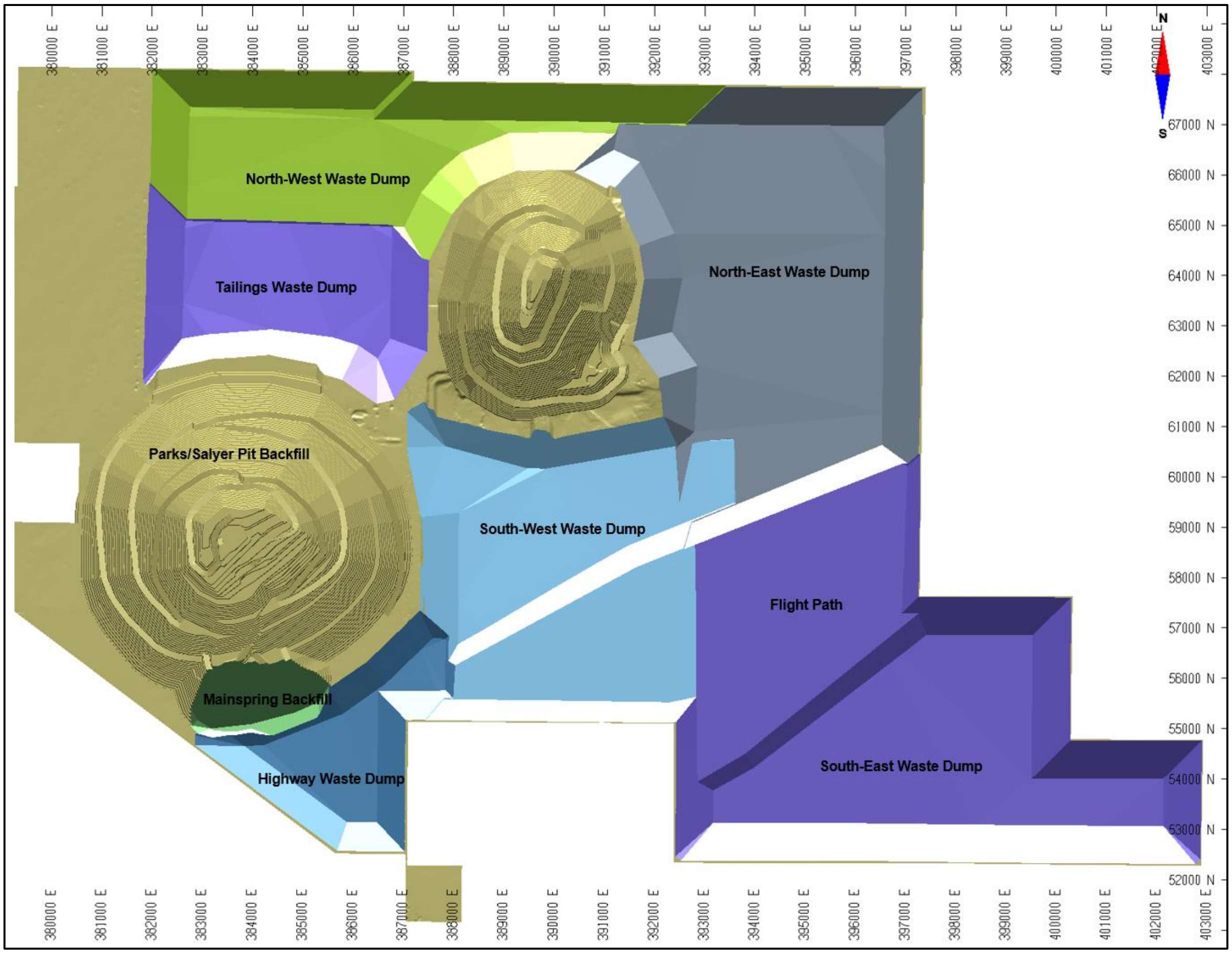
An allowance for flight path height restrictions related to a local airport have been included in the waste dump designs with sufficient contingency to allow heavy equipment to operate beneath the flight path.

The volume of waste materials being mined in the life-of-mine schedule necessitates that most of the available site footprint, as well as some adjacent properties, which the company does not currently own, will be utilized to store waste rock to a filled height of 250 ft (76 m). For the purposes of storage efficiency, these waste dumps will be contiguous in the later stages of the mine schedule, but they have been separated into different areas to allow for optimization of haulage requirements over time.

The sequencing of waste dumps is organized to minimize haulage distances in the early portion of the mine life while stripping into Parks/Salyer, with the remainder of the mine life utilizing the remaining capacity when cash flows are stronger and mining rates are declining, managing truck quantities required. Generally, waste from Parks/Salyer avoids the north-eastern dumps for as long as is possible, reserving some space for Cactus waste. Cactus West open pit waste is primarily deposited into the North-East Dump or is backfilled into the exhausted Parks/Salyer open pit late in the mine life. A summary of the available waste dump locations and the capacities utilized in the mine schedule is provided in Table 16-28, and a graphic displaying the waste dump locations is provided in Figure 16-30.

Table 16-28: Waste Dump Capacity and Utilization

Waste Dump	Design Capacity	Design Capacity	Utilized Capacity
	(M cuf)	(M ton)	(M ton)
Highway Dump	1,358	80.0	80.0
Mainspring Backfill	1,302	77.0	77.0
South-West Dump	3,550	215.8	215.8
Tailings Dump	3,166	186.3	186.3
North-West Dump	5,381	317.0	317.0
North-East Dump	8,988	528.7	466.7
South-East Dump	9,095	535.0	474.3
Parks/Salyer Pit Backfill	N/A	>500Mt	161.9
Total	**32,840**	**1,939.8**	**1,979.8**



Source: AGP 2024

Figure 16-30: Waste Dump Facilities

16.4.7 Mine Equipment Selection

The mining equipment selected to meet the required production schedule is conventional mining equipment, with additional support equipment for site maintenance.

Primary production drilling will be completed with a peak of twelve down the hole hammer (DTH) drills using 8 in (203 mm) bits. This will provide the capability to drill patterns for either 20 ft (6.1 m) or 40 ft (12.2 m) bench heights. Two smaller drills using 5 ½ in (140 mm) bits will be utilized to perform wall control drilling in the form of buffer patterns and inclined holes for passive wall depressurization.

Production mining will be completed with four 46 yd^3 electric hydraulic shovels, two 40.5 yd^3 loaders, and a peak of fifty-two 320-ton rigid body trucks.

The support equipment fleet will be responsible for the usual road, pit, and dump maintenance requirements and is composed of 14-ft graders, track dozers, and assorted auxiliary fleet.

The proposed equipment requirements for the LOMP are included in Section 21.

16.4.8 Blasting and Explosives

Blasting will be undertaken using 8 in blastholes on an 18 ft (5.6 m) x 20 ft (6.2 m) pattern spacing. Blasting will be performed on 40 ft (12.2 m) benches heights in waste and overburden areas. The subdrill will be 4 feet (1.1 m). Bulk explosives are expected to be 80% ANFO and 20% emulsion, with emulsion potentially required in deeper benches if water is encountered. Three rows of smaller 5 ½ in buffer holes will be drilled around pit wall contacts to minimize blast damage.

The powder factor will be 0.51 lb/ton (0.26 kg/t).

16.4.9 Grade Control

Grade control assaying will be performed using cuttings from production blastholes. A cost allowance has been included which assumes that approximately 100% of the blastholes in feed material areas and 25% of blastholes in waste areas will be assayed. Assaying will be completed at an offsite lab, with the results used to generate feed material control polygons which will be surveyed in the field to guide mine operations. Assaying will include sequential copper grades (acid-soluble, cyanide-soluble, and total copper) in order to best model process performance. All feed material will be placed on the leach facilities by stacking conveyors after multi-stage crushing.

16.5 UNDERGROUND MINING OPERATIONS

16.5.1 Introduction

As part of the initial phase of the PEA Study AGP undertook a high-level review of underground mining options which included, sublevel open stoping, room and pillar, inclined caving, block caving and the SLC method.

Sublevel caving was selected as the preferred underground mining method for the Cactus East deposit. The mine design is based on geotechnical recommendations and heap leach feed material is recovered by blasting rings between sublevels in a staggered retreat direction towards the material handling system.

SLC is a common method with which design criteria such as drive configurations, ring designs, ramp up profiles, draw rate and flow behavior are generally well understood and have been effective in achieving good productivity and feed material recovery in mine operations worldwide.

The SLC method commences close to the top of the mineralized zone and is mined by drilling and blasting a ring pattern between sublevel horizons. At Cactus East the overburden between the top of the mineralized zone and the surface is expected to cave naturally in response to the feed material volume being extracted, thereby supplying the waste fill into the mine. A subsidence zone (crater) will form and expand at the surface in response to continued mining.

16.5.2 Cutoff Grade

The footprint delineation for the Cactus East mine was based on a resource model block cash flow dollar value (CFBST) of $27.62 (net of process, G&A and royalties) assuming a copper price of $3.70/lb. The drawpoints were shut-off when the grade value of the drawn material falls below a CFBST value of $23.31. There is further opportunity of optimizing the shut-off value based on a Hill of Value and NPV study in later stages.

Breakeven cut off grades (values) using the study mine operating and sustaining capital cost estimates for Cactus East are summarized in Table 16-29.

Table 16-29: Summary of Break-even Cutoff Analysis

Description	Unit	Value	Cactus East	
			Oxide	Enriched
Insitu Cut-Off Grade				
Total Soluble Cu	% Tsol		0.60	0.59
Copper Grade CuAS	% CuAS		0.53	0.09
Copper Grade CuCN	% CuCN		0.06	0.50
Contained Metal Value	US$		44.14	43.64
Mining Dilution	%		21.0	21.0
Feed material To Process Plant				
Copper Grade	% Tsol		0.50	0.50
	% CuAS		0.45	0.08
	% CuCN		0.05	0.42
Contained Metal Value	US$		37.12	36.70
Metal Price				
Copper	US$/lb		3.70	3.70
REVENUES				
Recovery of CuAS	% of CuAS		91.0	94.3
Recovery of CuCN	% of CuCN		55.0	89.6
Total Cu Recovered	lbs Cu		8.74	8.96
Gross Metal Value	US$	99.9%	32.32	33.12
Downstream Charges				
Selling Cost	US$/lb recovered Cu	0.04	0.35	0.36
SXEW	US$/lb recovered Cu	0.23	2.01	2.06
COPPER CHARGES	US$		2.36	2.42
NET REVENUE	US$/ton processed		29.96	30.70
Operating Costs			**US$**	**US$**
U/G Mining Costs Used	US$/ton Processed		23.16	23.16
Sustaining Capital (Mining)	US$/ton Processed		4.79	4.79
Surface Haulage	US$/ton Processed		0.30	0.30
Crushing, Stack, Leach	US$/ton Processed		0.48	1.20
Acid Consumption	US$/ton Processed		0.00	0.00
G & A	US$/ton Processed		0.47	0.47
Copper Royalty	Cu Net Revenue	2.54%	0.76	0.78
Total Operating Cost	**US$/ton processed**		**29.96**	**30.70**

16.5.3 Application of Modifying Factors

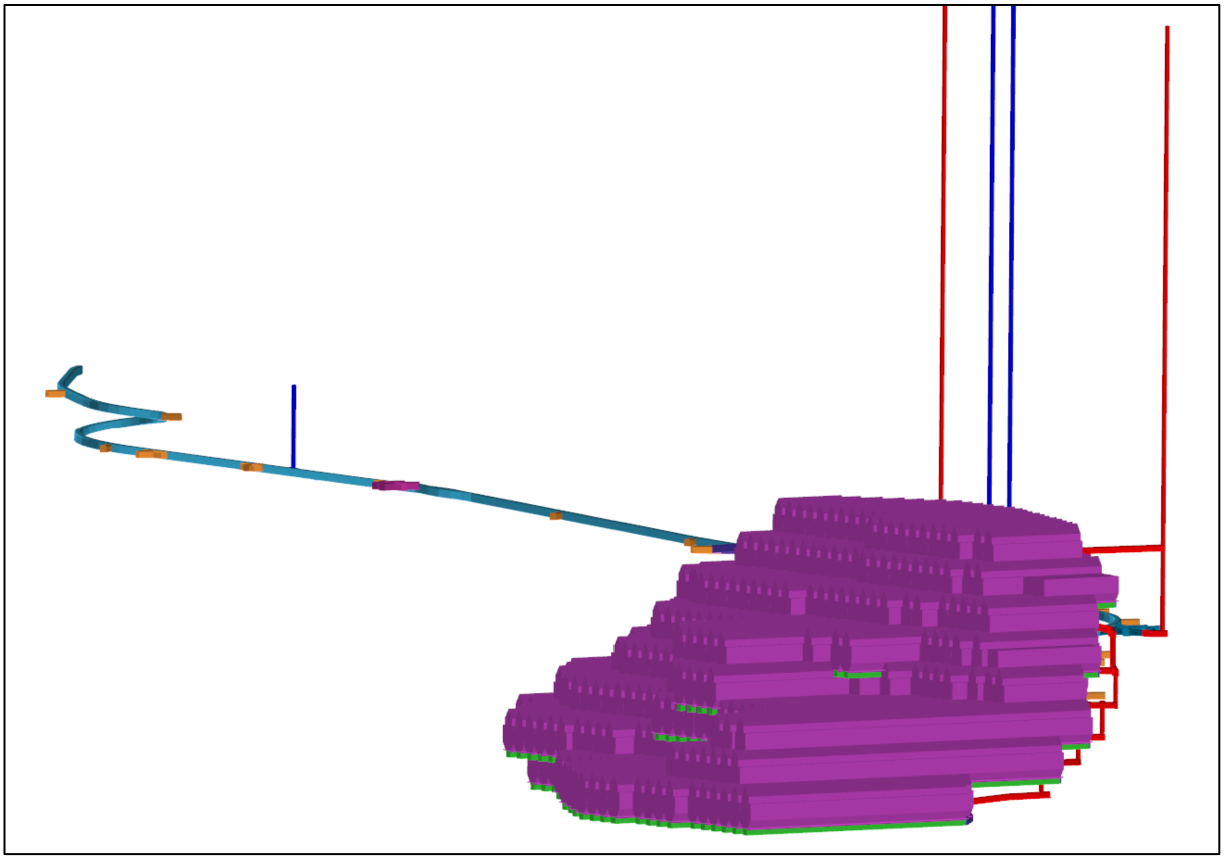
Table 16-30 presents a summary of geotechnical design parameters for mine planning using a sublevel cave (SLC) mining method for Cactus East.

Table 16-30: Sublevel Cave Mining Recommendations

Design Parameter	Recommendation
Sublevel Vertical Spacing (ft)	80
Sublevel Horizontal Spacing - Centerline to Centerline (ft)	45
Sublevel Drift Width (ft)	16.5
Distance from Nearest Brow to Ramp Access (ft)	100
Vertical Echelon (Horizontal Distance between Vertical Faces on Adjacent Sublevels)	> 50
Horizontal Echelon (Horizontal Distance between Vertical Faces on Same Sublevel)	2 – 8 Burden Rings
Hydraulic Radius (m) for Caving	21
Retreat Direction (Azimuth in Deg.)	335
Max Panel Width (ft)	800
Panel Transition Zone Thickness (ft)	74 - 119
Total Draw to Recover 90% of Feed material (% of feed material tons)	135
Subsidence Limits (Composite Angle in Deg.)	65

16.5.4 Underground Mining Design

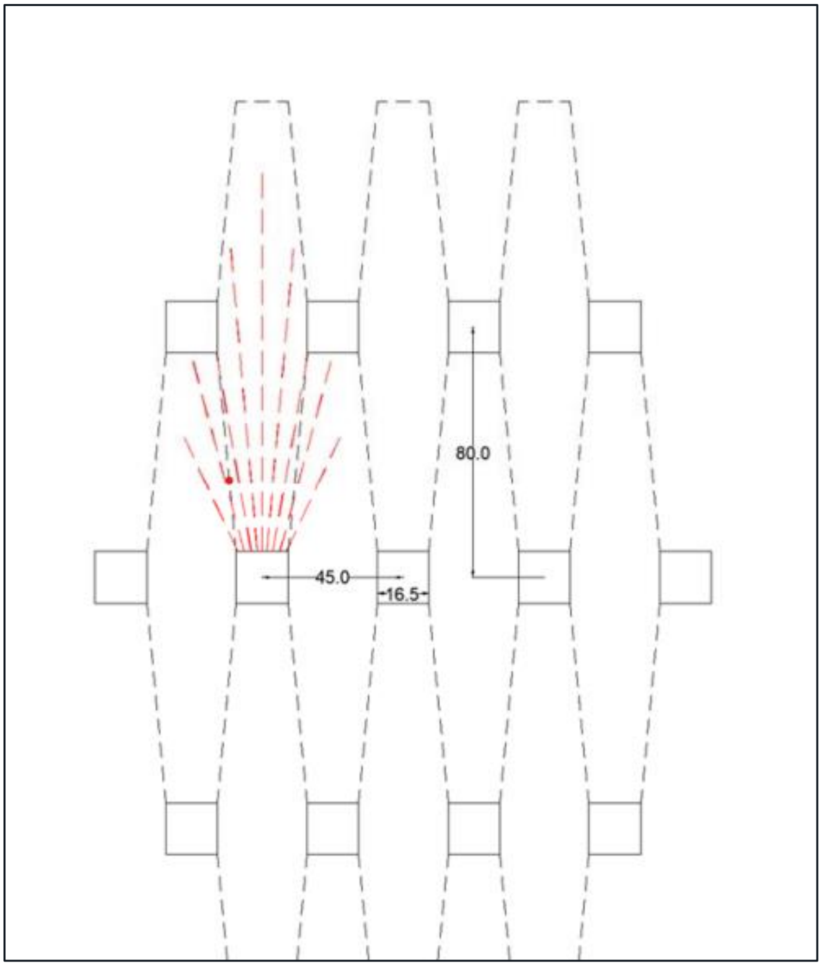
The initial Cactus East SLC will commence at a depth of 1,265 feet below the surface and will consist of eight sub-levels, reaching a final depth of 1,845 feet. Access to the SLC will be facilitated through a single decline, with a portal situated within the existing Cactus West pit. Feed material haulage to the surface will primarily utilize a vertical conveyor system, with the option to supplement it with truck haulage via the open pit if required. The final configuration for the Cactus East SLC mine is illustrated in Figure 16-31.



Source: AGP 2024

Figure 16-31: Cactus East Mine

The design parameters for the SLC production drives at Cactus East are in line with standard practices in similar operations. Production crosscuts have been strategically designed to horizontally offset drives from the levels above and below, maximizing feed material recovery. The production drives are 16.5 feet wide, spaced 45 feet (13.75 meters) apart, center to center, enhancing recoveries by accounting for expected finer fragmentation. The vertical separation between production levels is maintained at 80 feet (25 meters), consistent with other SLC mining operations. Typical production drive profile and level spacings are shown in Figure 16-32.



Source: Call & Nicholas, Inc. 2023.

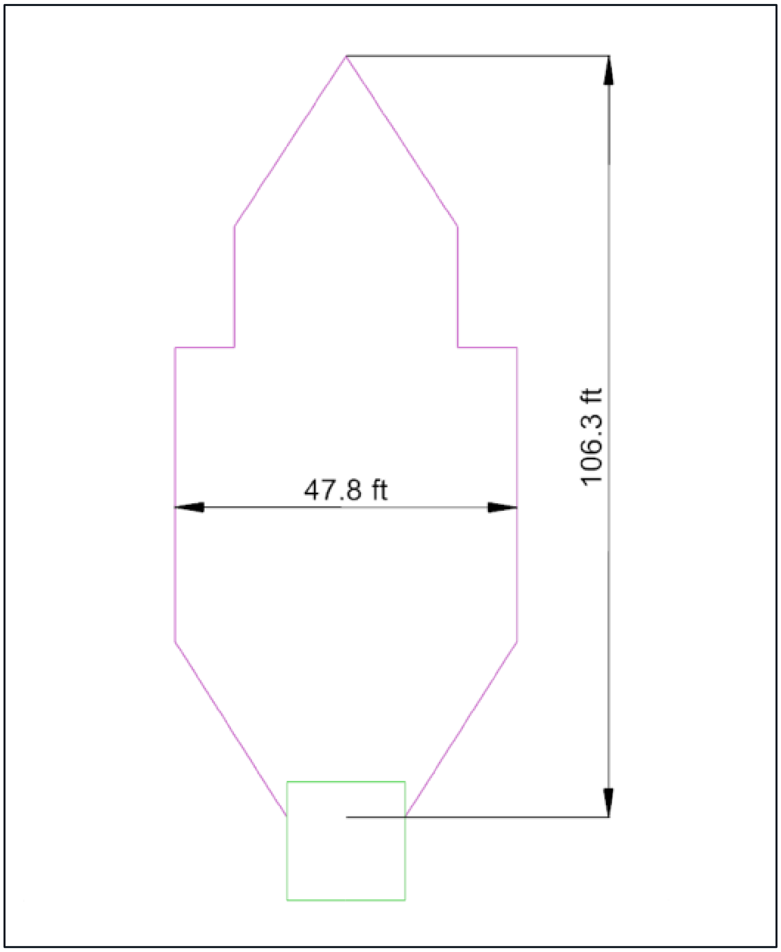
Figure 16-32: General Arrangement – Section View

The production drives in Cactus East have predominantly been designed with each level horizontally offset from the levels both above and below. The typical practice is to advance the SLC face position on the upper level ahead of the SLC face position on the lower level. This is necessary to mitigate hazards related to drilling breakthroughs into the level above, manage the draw of feed material and waste through the cave, and prevent the above level from being 'undercut,' which could lead to a loss of access. The sub-level caving advances primarily from south to north.

Typical SLC production ring parameters:

- 3.5” to 4” hole diameter
- 8.5 ft ring burden (horizontal)
- 75° – 80° ring inclination

A standard SLC ring configuration is shown in Figure 16-33.



Source: AGP, 2023.

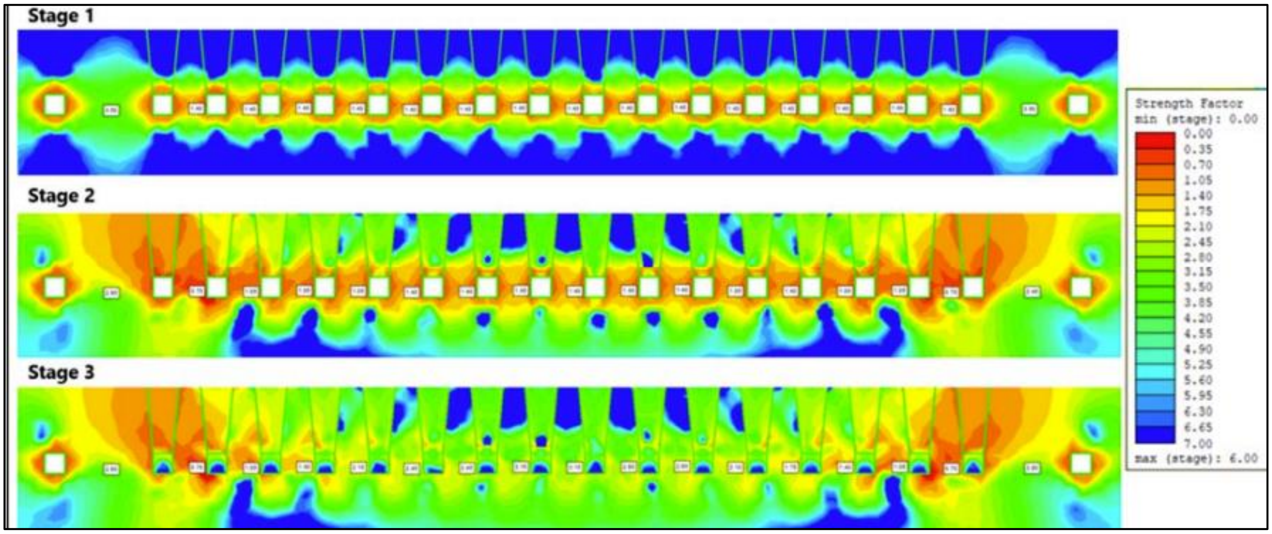
Figure 16-33: SLC Ring Layout

Table 16-31 lists the range of design profiles used in the underground mine design. The development profiles have been chosen based on minimizing the excavation size to facilitate the selected mining method, whilst still being able to operate equipment of a size necessary to achieve required rates of productivity. The maximum decline gradient in the design was set to 15% to ensure that mobile equipment considered would be able to operate effectively throughout the mine.

Table 16-31: Development Drive Profiles

Drive Type	Width (ft)	Height (ft)	Profile
Conveyor Decline	18.0	20.0	Arched
Crusher Feed Material Pass	16.5	-	Circle
Crusher Reclaim Chamber	18.0	24.0	Arched
Conveyor Transfer Chamber	20.0	60.0	Arched
Decline	18.0	20.0	Arched
Permanent Electrical Bay	16.5	16.5	Arched
Escape Raise (Raise bored)	8.0	-	Circle
Escape Raise Access	15.0	15.0	Arched

Drive Type	Width (ft)	Height (ft)	Profile
Escape Raise (Drop Raise)	12.0	-	Circle
Finger Raise (Drop Raise)	10.0	-	Circle
Footwall Drive	16.5	18.0	Arched
Haulage Drive	18.0	20.0	Arched
Loader Crosscut	16.5	18.0	Arched
Level Access	16.5	18.0	Arched
Laydown	16.5	16.5	Arched
Magazine	16.5	18.0	Arched
Maintenance Bay	16.5	18.0	Arched
Production Drive	16.5	16.5	Square
Permanent Refuge	16.5	16.5	Arched
Remuck	16.5	16.5	Arched
Ramp	18.0	20.0	Arched
Sump	16.5	20.0	Arched
Truck Loadout	18.0	20.0	Arched
Transfer Raise (Raise bored)	11.5	-	Circle
Transfer Raise (Drop Raise)	11.5	-	Circle
Vent Raise (Raise bored)	11.5	-	Circle
Vent Raise Access	15.0	15.0	Arched
Vent Raise (Drop Raise)	15.0	-	Circle
Wash bay	16.5	20.0	Arched
Crosscut	18.0	20.0	Arched



Source: Call & Nicholas, Inc., 2023.

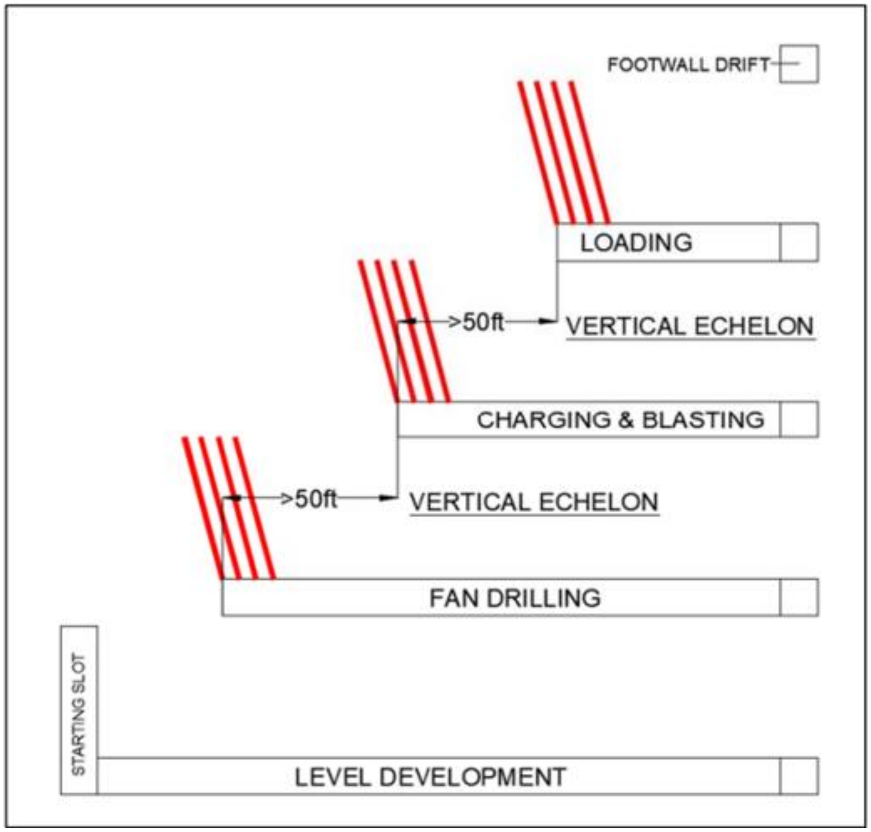
Figure 16-34: Stability Results of Sublevel Drift Pillars and Panel Transition Zones

Key takeaways from modeling include:

- Pillars between sublevel drifts achieve a nominal 1.4 strength factor during development,
- A 90-ft transition zone to separate panels achieves a nominal 2.4 strength factor; and
- Increased abutment loading is expected on outboard pillars within the panels (0.7 strength factor).

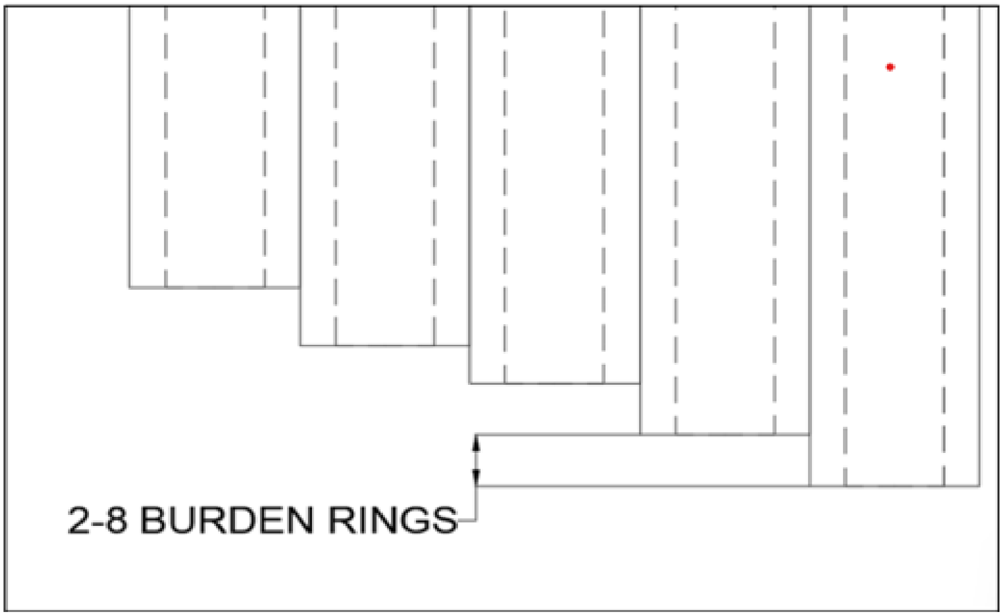
This is illustrated in Figure 16-34.

The vertical echelon between sublevels is greater than 50 ft (15.2 m). This is defined as the horizontal distance between vertical faces on adjacent sublevels (above/below), as presented in Figure 16-35. The horizontal echelon, which is the horizontal distance between vertical faces on the same sublevel, shall be at minimum, approximately two burden rings but not to exceed eight burden rings, as presented in Figure 16-36. The horizontal echelon within each caving panel shall be executed in one approximately straight line.



Source: Call & Nicholas, Inc., 2023.

Figure 16-35: Vertical Echelon – Long Section View (N.T.S.)



Source: Call & Nicholas, Inc., 2023.

Figure 16-36: Horizontal Echelon – Plan View (N.T.S.)

The decline translates to an access drive closest to the leading drive on the SLC footprint. This enables an efficient opening of the level for production purposes. The ventilation is driven by a fresh air drive developed from the access drive, in which the fresh air will be splitting right and left to connect to the return air drives at the extremities of the footprint. This allows natural flow of ventilation through the entire footprint.

16.5.5 SLC Initiation

The amount of feed material to be extracted will be limited in the upper three production levels to the following proportions:

- First Level ~40% (swell only)
- Second Level ~60%
- Third level ~100%
- Lower levels >100% to shutoff grades or dollar values.

The restricted draw rates on the upper levels are used to establish a feed material blanket above the production area, control caveability, and minimize the formation of air gaps. The main aim of the draw strategy is to limit the draw rate in upper levels to avoid early ingress of waste (dilution) into the cave (SLC envelope) and preserve the high-grade feed material in the drawpoints. These restricted draw rates also apply to areas where large step-outs distances are required from one sublevel to the next.

The cave will begin to propagate towards the surface once the mining span exceeds the critical hydraulic radius required to induce caving. The deposit is expected to begin sustained caving at a hydraulic radius of 65.6 ft (20 m) (equivalent to a 260 ft (79.2 m) by 260 ft (79.2 m) square). The mechanism for caving is expected to be gravity driven, hence the rate of propagation will depend on the natural bulking factor of the overburden and the quantity of feed material extracted from the sublevels.

16.5.6 Material Handling Systems

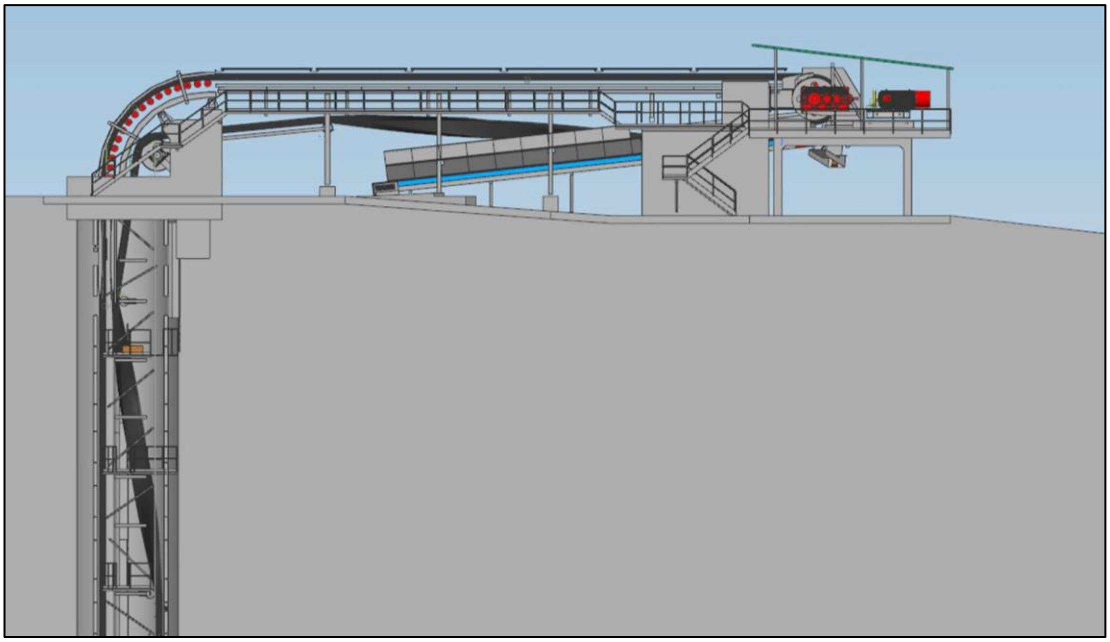
At Cactus East the mine production stages involve first the mucking of the SLC rings fired from the feed material drive drawpoint with a load haul dump (LHD) loader. Rings are retreated towards the access following an interlevel lead/lag rule. The feed material is then trammed to the closest stockpile within the perimeter drive. Trucks are then loaded on the level, through the main decline and to the crusher at the bottom of the vertical conveyor loading pocket or waste to the surface through the main decline.

16.5.6.1 Cactus East Feed Material/Waste Handling System

The Cactus East Feed Material/Waste Handling System consists of a crusher station and a 1,600 ft (488 m) vertical conveyor with a capacity of 630 tons per hour that will convey feed material from the top of the feed sizer to surface via a vertical raise feeding an overland conveyor. Feed material will be hauled by 55-ton diesel trucks to a sizer located adjacent to the bottom of the vertical conveyor. Feed material will be crushed to maximum 6-in dimension. A short conveyor from the sizer will feed the vertical conveyor.

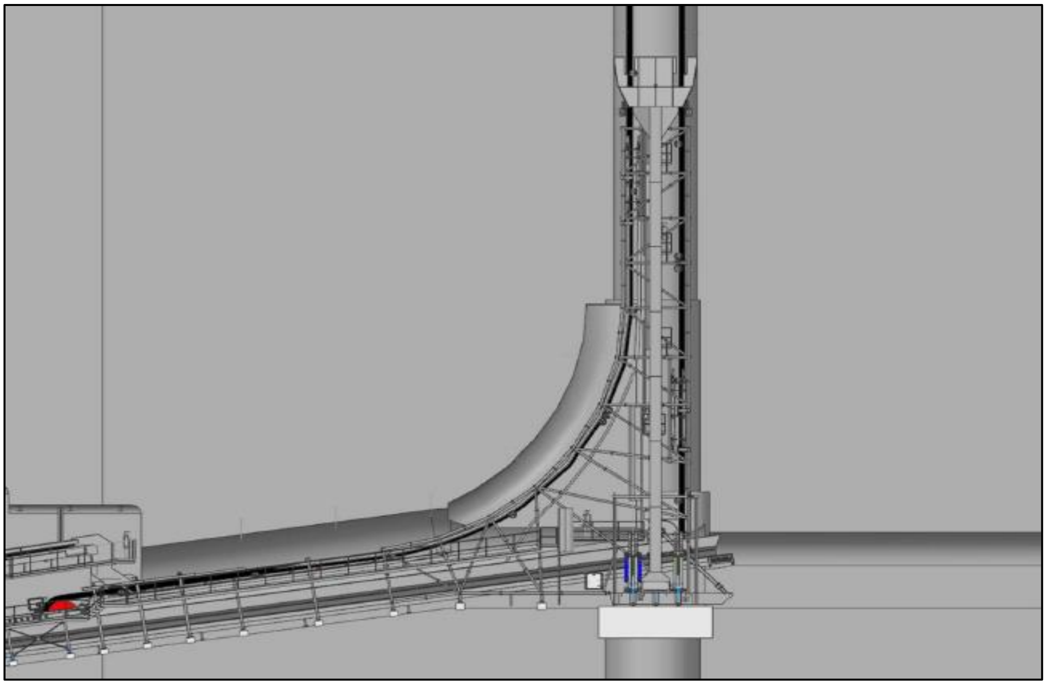
The vertical conveyor could necessitate a shaft diameter of up to 15 ft (4.6 m). Call & Nicholas, Inc. estimate that a shaft of this span has a nominal 85% to 90% reliability of successful execution. Detailed design of the vertical conveyor and configuration within the shaft is necessary to minimize final raise dimensions. Any vertical conveyor through the overburden conglomerate should be fully lined with either concrete or steel cans. Due to the weakness of the overburden materials which would not achieve good bond strength, Call & Nicholas, Inc. does not recommend anchoring utilities or other infrastructure to the rock wall inside the shaft.

Waste will be trucked to the portal for disposal within the Cactus West open pit. General arrangements for the top and bottom of the vertical conveyor are shown in Figure 16-37 and Figure 16-38.



Source: AGP 2023.

Figure 16-37: General Arrangement at Top of Vertical Conveyor



Source: AGP 2023.

Figure 16-38: General Arrangement at Bottom of Vertical Conveyor

Four locked, steel wire track ropes form the line structure of the conveyor system within the raise. The track ropes which form the line structure on which the conveyor belt travels are tightly tensioned and therefore must be anchored at both ends.

The conveyor transports the material on a continuous cross-reinforced flat belt with corrugated side walls. The belt is manufactured in fire retardant rubber. Additional to the sidewalls, cleats are fixed to the belt in which the feed material is transported. Belt tensioning is carried out at the underground loading station, using a similar system than for conventional conveyor systems. The conveyor belt can be re-tensioned via the return drum by means of the hydraulic tensioning equipment. When the conveyor belt has passed the unloading point, the belt turning unit turns the belt 180° to bring the soiled side of the belt upwards again. This prevents soiling of the track. Loose particles are then cleaned from the belt after turning. The conveyor belt is turned once more before it reaches the loading point.

Drive units are located on the surface area, where maintenance activities can be performed safely and easily.

16.5.7 Ventilation

The function of the ventilation system is to cool the air, dilute/remove airborne dust, diesel emissions, and explosive gases at levels necessary to ensure safe production throughout the life of the mine. The ventilation phases described generally follow major ventilation milestones.

The ventilation system for the project was modeled using Ventsim Visual™ Advanced. This software provides for 3D visualization of a network and uses a form of the Hardy-Cross method for the ventilation network calculations. From the Ventsim Visual™ manual:

> *"The [Hardy-Cross Method is] used by Ventsim Visual™ to perform the calculation of airflows in a network. It uses an iterative estimation method that adjusts the airflows through a network until the estimation errors lie within acceptable limits. Ventsim Visual™ Advanced uses a modified method which considers density changes and mass flow balances."*

The ventilation network analysis for the project was undertaken by importing the mine design from the Deswik 3D program and then applying attributes for each of the airways relative to their dimensions, frictional resistance, length, etc.

Table 16-32 outlines the velocity design criteria for the project. These upper limit values are comparable to industry standards used in the US and elsewhere and generally align with industry best practice. The estimated friction factor k values used in the ventilation model and for calculations are based on recommendations by M. J. McPherson and industry best practice. Table 16-33 lists the friction factor k values used in modeling.

Table 16-32: Air Velocity Design Criteria

Type of Opening	Velocity Limits (m/s)	Comments
Fresh Air Decline	6.5	above stopes, vehicular traffic only
Return Air Decline	6.5	no pedestrian access
Stope and Level Accesses	6.5	in mining areas to minimize dust
Return Air Raises	20	rule of thumb, airway economics
Return Air Raises	7.0 to 12.0	design outside this range to minimize water blanketing

Table 16-33: Friction k-Factor Values

Airway Description	Friction Factor, k (kg/m^3)	Comments
Arched drifts	0.0120	
Drop or longhole raises	0.0120	if contains a ladderway area is decreased by 1.0 m^2
PVC type Ventilation Duct	0.0035	lay-flat type ducting
Plastic Ventilation Duct	0.0019	plastic duct
Steel Spiral Ventilation Duct	0.0029	

The air volume supplied must be able to dilute and remove noxious gases as well as diesel particulate matter, exhaust and heat generated using such equipment. The amount of air required is largely determined by the number and size of diesel equipment operating underground.

The mines will use MSHA rates for airflow requirements for diesel powered equipment, using specific engine models. An example of this analysis referencing Cactus East is shown in Table 16-34.

The number of equipment items and required airflow is shown graphically in Figure 16-39 and Figure 16-40 for Cactus East.

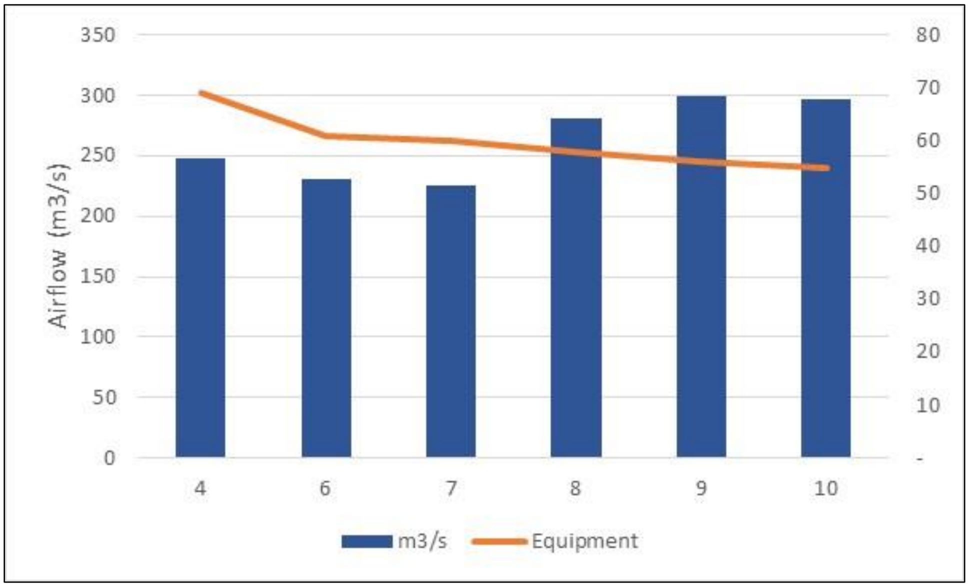
The Cactus Project is located within a very hot surface temperature area and well-known geothermal area of Arizona. The ventilation system will be designed to limit the wet-bulb temperature to 85.1°F (29.5°C) in any location.

The current planned maximum depth of the Project is about 2,000 ft (~600m) below surface. The virgin rock temperature at depth will approach 104°F (40°C). A preliminary level heat evaluation was modeled, and it was determined that refrigeration would be required for both the development and production phases of the project. Heat modelling thermal parameters are shown in Figure 16-40.

Figure 16-40 graphically identifies the origin of the greatest heat gains. This confirms the large amounts of heat created using diesel equipment, as compared to other sources. One area which is of concern and cannot be determined based on available data is if there is any inflow of hot water. This will have a major effect on cooling and wet-bulb temperatures. It is recommended that for the next level of study the presence or non-presence of geothermal water be determined.

Table 16-34: Cactus East (Vertical Conveyor) Air Volume Requirements for Selected Years

Equipment Model	MSHA Total m^3/s per unit	MSHA Total Utilized m^3/s per unit	Equip Utilization (%)	Equip Qty Year 4	MSHA Total m^3/s	Equip Qty Year 6	MSHA Total m^3/s	Equip Qty Year 7	MSHA Total m^3/s	Equip Qty Year 8	MSHA Total m^3/s	Equip Qty Year 9	MSHA Total m^3/s	Equip Qty Year 10	MSHA Total m^3/s
2-500ER Emulsion Loader	3.1	1.5	50	3	4.6	2	3.1	3	4.6	3	4.6	2	3.1	2	3.1
8 Man Landcruiser	4.3	4.3	100	3	12.9	3	12.9	3	12.9	3	12.9	3	12.9	3	12.9
A-64 Flatdeck/Pallets	3.1	1.5	50	2	3.1	2	3.1	2	3.1	2	3.1	2	3.1	2	3.1
A-64 Fuel	3.1	1.5	50	2	3.1	2	3.1	2	3.1	2	3.1	2	3.1	2	3.1
A64 HDR60	3.1	1.5	50	2	3.1	2	3.1	2	3.1	2	3.1	2	3.1	2	3.1
A-64 Scissor	3.1	1.5	50	7	10.7	5	7.7	5	7.7	3	4.6	2	3.1	2	3.1
CAT 120K	5.0	2.5	50	1	2.5	1	2.5	1	2.5	1	2.5	1	2.5	1	2.5
DD422i	3.3	0.8	25	4	3.3	3	2.5	3	2.5	2	1.7	1	0.8	1	0.8
DL 422i	3.3	1.7	50	4	6.6	3	5.0	4	6.6	4	6.6	5	8.3	4	6.6
DS411	3.1	1.5	50	6	9.2	4	6.1	4	6.1	3	4.6	2	3.1	2	3.1
Elec Landcruiser	4.3	4.3	100	2	8.6	2	8.6	2	8.6	2	8.6	2	8.6	2	8.6
LH307	3.5	3.5	100	2	7.1	2	7.1	2	7.1	1	3.5	1	3.5	1	3.5
LH410	7.6	7.6	100	4	30.2	3	22.7	3	22.7	2	15.1	2	15.1	2	15.1
LH517i	8.7	8.7	100	3	26.2	3	26.2	4	34.9	5	43.7	5	43.7	5	43.7
Mech Landcruiser	4.3	4.3	100	2	8.6	2	8.6	2	8.6	2	8.6	2	8.6	2	8.6
Mine Mate SL3/Pipe Handler	3.3	0.8	25	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8	1	0.8
Mine Mate WS3	3.3	1.7	50	1	1.7	1	1.7	1	1.7	1	1.7	1	1.7	1	1.7
SST Shotcrete	3.1	1.5	50	2	3.1	2	3.1	2	3.1	2	3.1	2	3.1	2	3.1
Supv Landcruiser	4.3	4.3	100	14	60.2	14	60.2	10	43.0	10	43.0	10	43.0	10	43.0
TH551i	21.2	21.2	100	2	42.5	2	42.5	2	42.5	5	106.2	6	127.4	6	127.4
TM15XH Mobile Rock breaker	2.1	0.5	25%	1	0.5	1	0.5	1	0.5	1	0.5	1	0.5	1	0.5
Toyota Rescue	4.3	-		1	-	1	-	1	-	1	-	1	-	1	-
Total				69	248	61	231	60	225	58	281	56	299	55	297

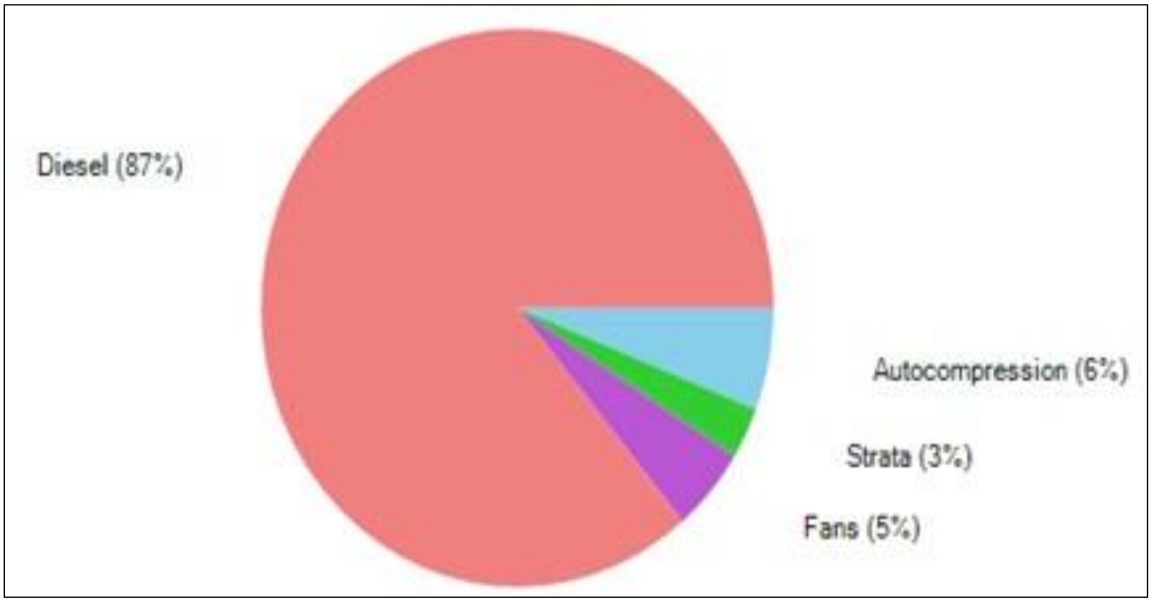


Source: AGP, 2023.

Figure 16-39: Cactus East Airflow Requirements

Table 16-35: Heat Modelling Thermal Parameters

Thermal Parameter	Value	Comments
Maximum UG Wet Bulb Temperature (°C)	29.5	
Maximum UG Dry Bulb Temperature (°C)	45	
Surface Elevation (masl)	420	
Geothermal gradient °C /100 m)	2.80	
Rock Density (kg/m^3)	2700	average
Rock Wetness Fraction	0.50	0.5 indicates a 50% wet surface
Rock Thermal Conductivity (W/mC)	3.20	average
Surface Rock Temp (°C)	20	
Surface Relative Humidity (%)	20	
Surface Temperature-Wet Bulb (°C)	16.5	
Surface Temperature-Dry Bulb (°C)	32.0	



Source: AGP, 2023.

Figure 16-40: Heat

16.5.7.1 Ventilation Strategy

16.5.7.1.1 Ventilation Shafts, Main Fans and Air Cooling

Ventilation raises will be excavated using a raisebore drill within the Gila Conglomerate overburden. To evaluate the use of a raisebore drill to excavate raises, Call & Nicholas, Inc. utilized the Stacey and McCracken method (1989) of assessing geotechnical risk for large diameter raisebored shafts. The details of this evaluation are presented in Call & Nicholas, Inc.'s memo Raisebore Stability within Gila Conglomerate at ASCU (August 2023).

The maximum stable span based on the estimated rock quality is 11.6 ft (3.5 m) and ventilation fresh and return raises have been planned at this diameter. This estimate is based on Stacey and McCracken's recommendation for a ventilation shaft with a service life of 10 years and is considered permanent (RSR = 1.3) and achieves a 95% reliability (Probability of Failure = 5%). Because the actual site conditions are unknown, these evaluations are considered preliminary. To have a better understanding of the rock and soil types and their quality at any raise location, a pilot hole should be core-drilled so that core can be carefully logged for geomechanical properties and lithology, and raise stability reassessed.

At Cactus East the Intake and West Exhaust fan installations are located on the surface and the East Exhaust fan installation will be underground due to surface constraints. All installations will be controlled with variable frequency drives (VFD) to allow fluctuation in air volumes during the LOM (see Table 16-36).

Table 16-36: East Main Fans

Location	Fan Type	Fan Type	Raise Diameter ft (m)	Flow ft^3/s (m^3/s)	Fan Power (kW)	Est Pressure (Pa)
Intake	Surface	Axial	11.5 (3.5)	7946 (225)	825	2725
West Exhaust	Surface	Axial	11.5 (3.5)	5827 (165)	350	975
East Exhaust	Underground	Axial	11.5 (3.5)	4662 (132)	175	1000

Air cooling requirements are shown in Table 16-37.

Table 16-37: Overall Air-Cooling Requirements

In Deposit Mine Development	Location	Estimated Cooling Capacity (kW)	Estimated Power Requirements (kW)
Cactus East	Surface	10,000	3,000

16.5.7.1.2 Auxiliary Ventilation

Auxiliary fans will be required for access development and production.

For decline development, it is estimated that these fans will operate at a volume of up to 169,500 cfm (80 m3/s) and at an estimated pressure of up to 12 in water gauge (WG) (3,000 Pa), their motor size will be approximately 125-150 kW. These fans may operate singly or in a series configuration for longer duct runs. These fans will allow provide sufficient volumes for 1 truck and 1 LHD and ancillary equipment per heading. The duct will be PVC plastic with a diameter of 4.5 ft (1.37 m). Decline development fan installations will operate in a pull or exhaust type configuration.

It is estimated that these fans for production will operate at a volume of 1,060 ft3/s (30 m3/s) and at an estimated pressure of 1,100 Pa, their motor size will be approximately 50 kW. These fans will allow provide sufficient volumes for 1 LHD per heading as loading will be outside of all feed material drives. The duct will be PVC plastic with a diameter of 3.5 ft (1.07 m).

As a contingency duct leakage of 15% has been added to the auxiliary fan requirements.

16.5.7.1.3 Access Development Ventilation Phasing

The Cactus East mine will be developed using a single decline system. This results in a requirement for a temporary raise into the pit at approximately the half-way point to the deposit, which will establish a surface through ventilation circuit. Initially the single decline will require a small refrigeration plant at the portal, but only until the pit raise is established, after which time decline refrigeration will not be required until the main ventilation cooling system is established for the deposit.

The access ramp auxiliary fans and duct will operate in a pull-type arrangement pulling hot air and blast gases from the face in an exhaust type installation. This provides a benefit in minimizing blast re-entry times improving development advance rates.

The access development at Cactus East was divided into phases as shown in the following subsections.

16.5.7.1.3.1 Cactus East Phase 1

The initial decline development will employ a pull or exhaust type of ventilation. Initially this will be accomplished using a single 4.5 ft (1.37 m) diameter PVC duct lines and 2 in series installed 125 kW axial fans supplying up to 169,500 cfm (80 m3/s) at an estimated maximum pressure of 12 in. WG (3,000 Pa). No refrigeration is required for this stage (see Figure 16-41).

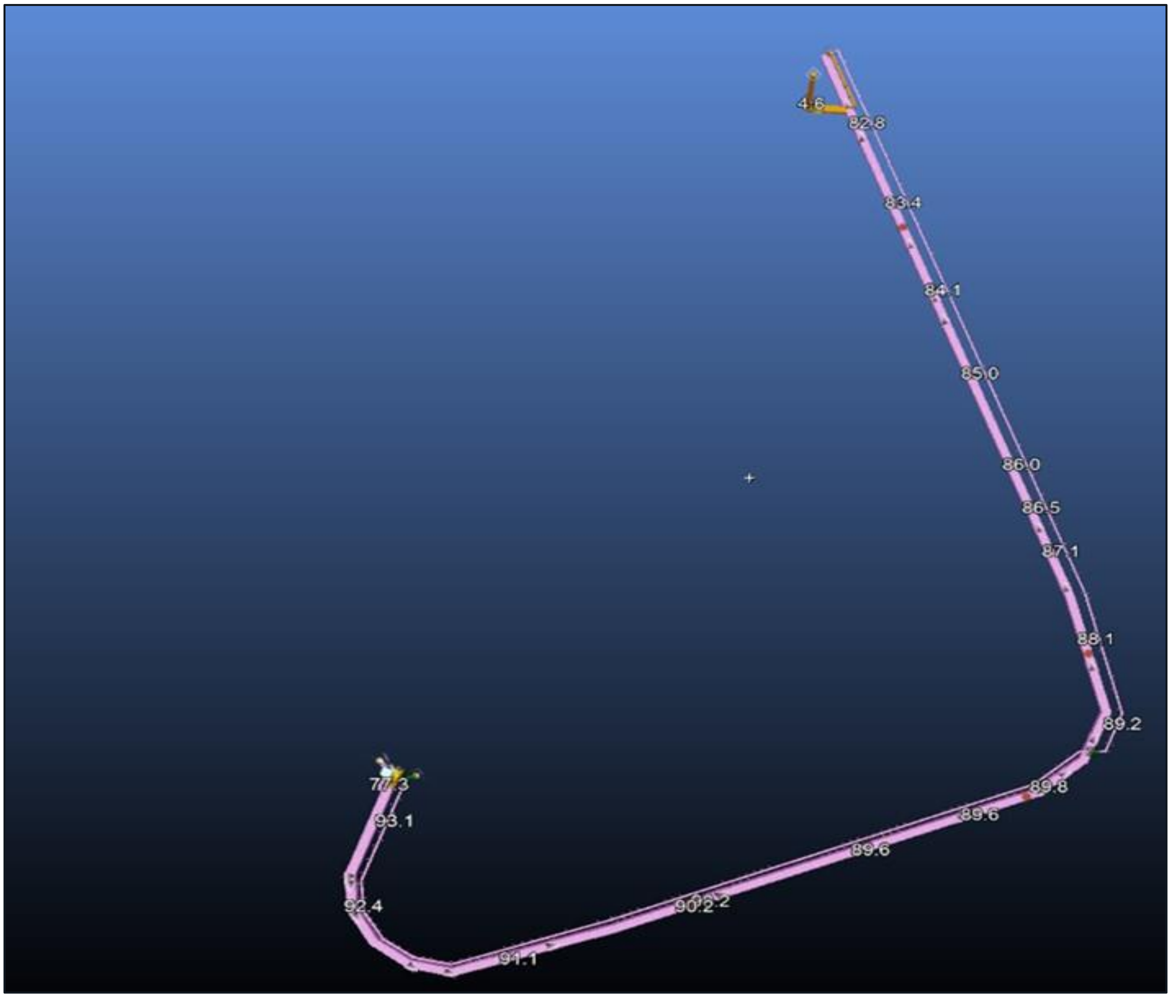
Source: BBA 2023.

Figure 16-41: Phase 1 Ventilation

16.5.7.1.3.2 Cactus East Phase 2a

Phase 2a decline development will continue to employ a pull or exhaust type of ventilation. Initially this will be accomplished using a single 4.5 ft (1.37 m) diameter PVC duct lines and 2 in series installed 125 kW axial fans supplying up to 169,500 cfm (80 m3/s) at an estimated maximum pressure of 12 in WG (3,000 Pa). Refrigeration of 1,000 kW is required for this stage (see Figure 16-42).

The milestone at the end of this stage is the breakthrough to surface of a midpoint intake raise allowing for a through ventilation circuit to be established and will remove the requirement for refrigeration in later development stages.

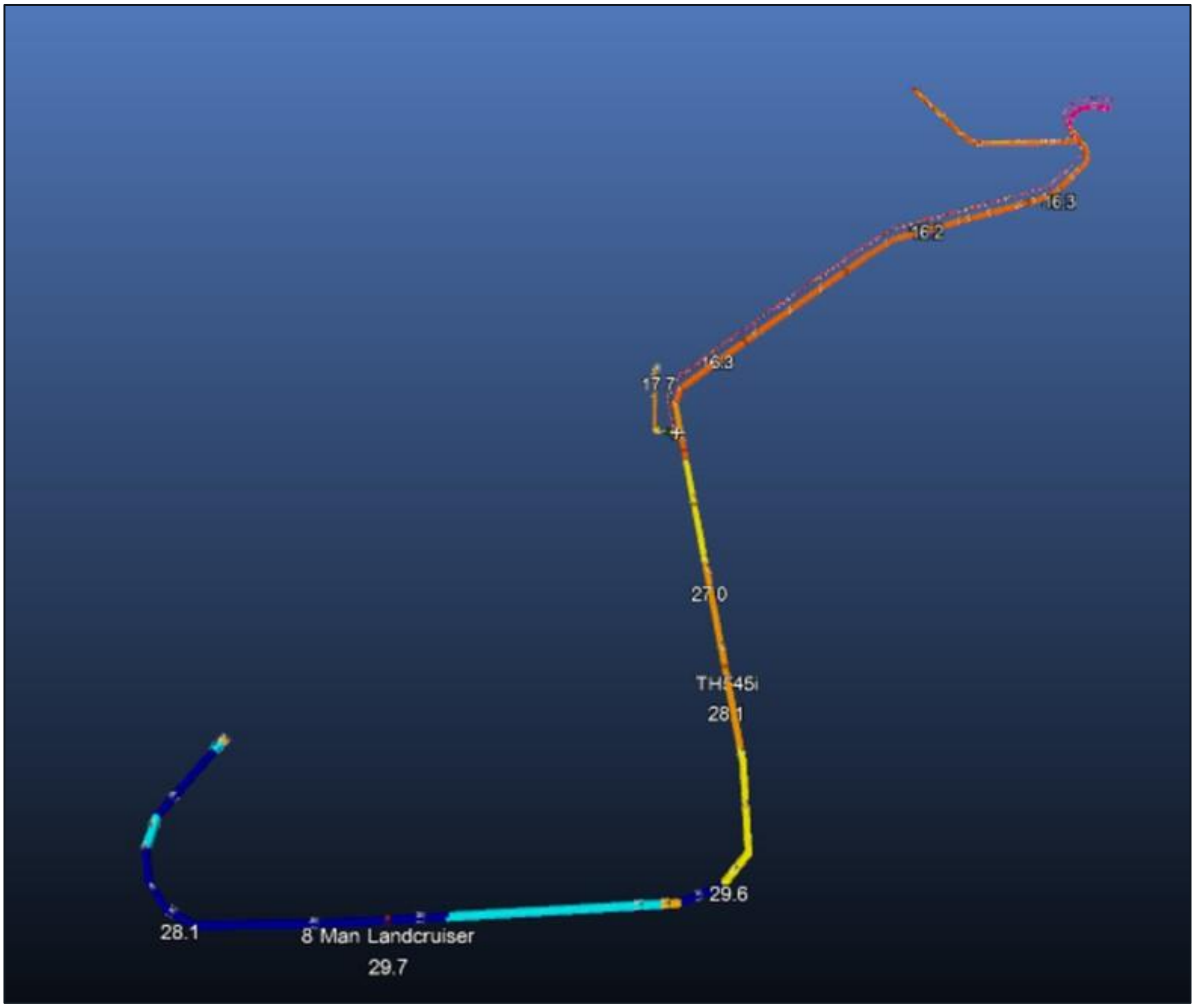


Source: BBA 2023.

Figure 16-42: Cactus East Phase 2a Ventilation

16.5.7.1.3.3 Cactus East Phase 2b

Phase 2b commences with the breakthrough to surface of an open pit intake raise and installation of an intake fan at the bottom of this raise. This will eliminate the requirement for ramp auxiliary ventilation above this point and will allow development to continue without refrigeration to the bottom of the permanent intake raise. Auxiliary ventilation will switch to a push type of ventilation using a single 4.5 ft (1.37 m) diameter PVC duct lines and 2 in series installed 125 kW axial fans supplying up to 169,500 cfm (80 m3/s) at an estimated maximum pressure of 12 in WG (3,000 Pa) (see Figure 16-43).

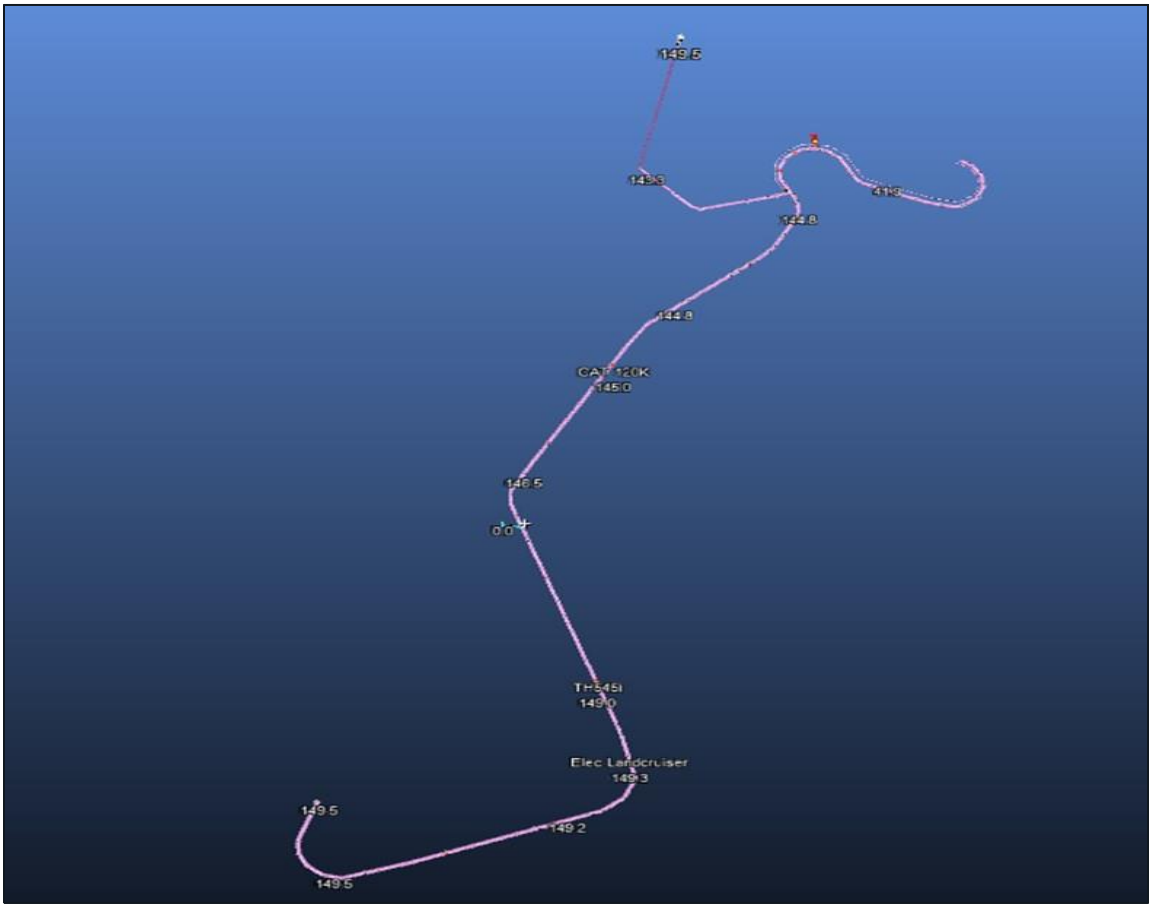


Source: BBA 2023.

Figure 16-43: Cactus East Phase 2b Ventilation

16.5.7.1.3.4 Cactus East Phase 3

Phase 3 commences with the breakthrough to surface of the main intake raise and installation of a surface intake fan supplying 5,300 ft3/s (150 m3/s) and the first phase of the main refrigeration/cooling plant with an output of 3,000 kW. These installations allow for development to continue to the deposit and connection to the first main exhaust raise. Auxiliary ventilation will continue to be a push type of ventilation using a single 4.5 ft (1.37 m) diameter PVC duct lines and 2 in series installed 125 kW axial fans supplying up to 169,500 cfm (80 m3/s) at an estimated maximum pressure of 12 in WG (3,000 Pa) (see Figure 16-44).

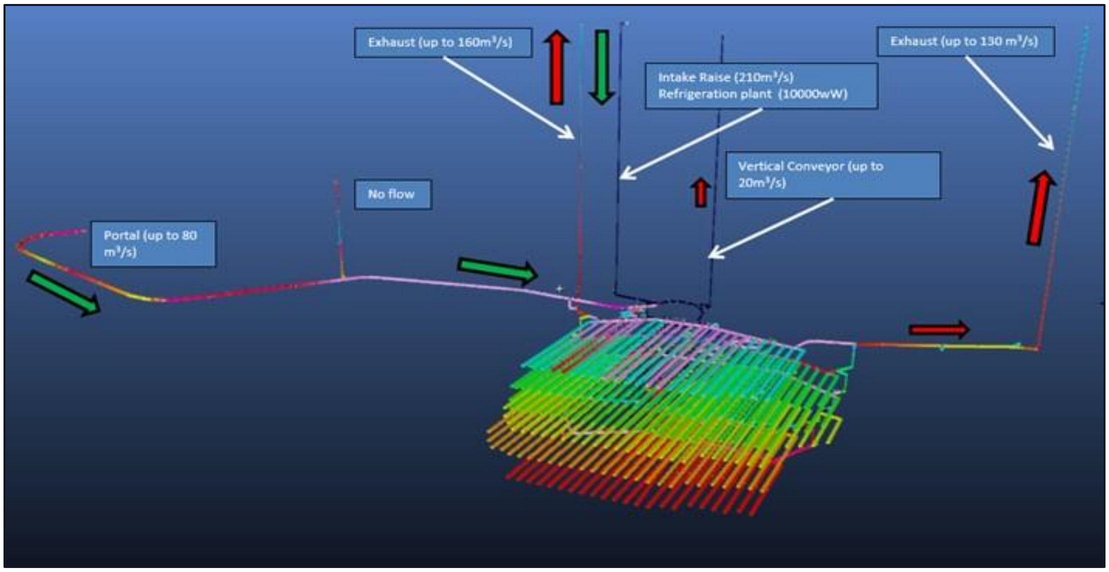


Source: BBA 2023.

Figure 16-44: Cactus East Phase 3 Ventilation

16.5.7.1.4 Steady State Production

Cactus East production ventilation will rely on cooled fresh air in a flow-through ventilation design across the deposit controlled by automated regulators at each end of the foot wall drifts. These will be regulated to allow for up to 1,410 ft^3/s (40 m3/s) up each exhaust raise on each footwall drift for a total of up to 169,500 cfm (80 m^3/s) on each production level. This quantity will be sufficient to allow for 710 ft^3/s (20 m^3/s) for staggered LHD production activities off the footwall drift (see Figure 16-45).



Source: BBA 2023.

Figure 16-45: Cactus East Maximum Ventilation Requirement

16.5.8 Dewatering

The underground dewatering systems for Cactus East have been designed based on a steady inflow pumping requirement of 500 gpm at the main level sump and pump stations with the capacity to support an emergency outflow condition of 1,500 gpm in the event of a sudden inflow caused by rainfall or aquifer intersection.

Main level sumps are spaced to allow the same set of pumps to be used at each main pump station located throughout the mine workings. Level sumps located on each mining level in between the main level sumps will cascade their flow downwards via borehole and by means of gravity to the nearest sump, in turn relaying the reporting flows to the nearest main level sump. The location of the lowest main sump is set to be above the bottom mining level, in the mine, in order to allow for the bottom of the mine to flood in the event that the required pumping rate at any main level sump exceeds 1,500 gpm. A 15 hp submersible sump will be used to pump fluids from the mine's bottom level sump up to the nearest main level sump.

Each main level sump arrangement will consist of excavated drifts, with concrete partitions to form one clean and two dirty sumps. Each dirty sump is provided with a means of access via LHD for mucking out. The intent is to alternate the use of dirty sumps to have one in use while the other is cleaned/maintained.

The dirty sumps are dimensioned to provide one square foot of surface area for each gpm of expected flow during normal operating conditions (500 gpm outflow) based on a drift profile of 16.5 ft (5 m) wide by 16.5 ft (5 m) high. The total length required for each dirty sump is 30.3 ft (9.2 m).

Each clean water sump is sized to provide one full eight-hour shift of filling, at a rate of 400 gpm, in the event of a power interruption, which renders the pumps inoperable. This requires a sump live volume of 192,000 gal. As the drifts are dimensions at 16.5 ft (5 m) wide by 16.5 ft (5 m) high, the total required length of the clean sump is 158 ft.

An array of four x 200 hp horizontal centrifugal pumps, comprising (three duty and one installed spare), will pump the clean water sump via flooded suction pipe that draws water through a pipe penetration in a concrete dam wall. During normal operations, a single pump operates and discharges water through a 6 in pipe to the next main level sump. In an emergency operating condition, three pumps operate through two pump discharge pipes, 6 in and 8 in, to provide a combined outflow rate of 1,500 gpm. There will be one installed spare pump at each pump station.

Water from the mines will discharge at the portal locations.

16.5.8.1 Cactus East Dewatering

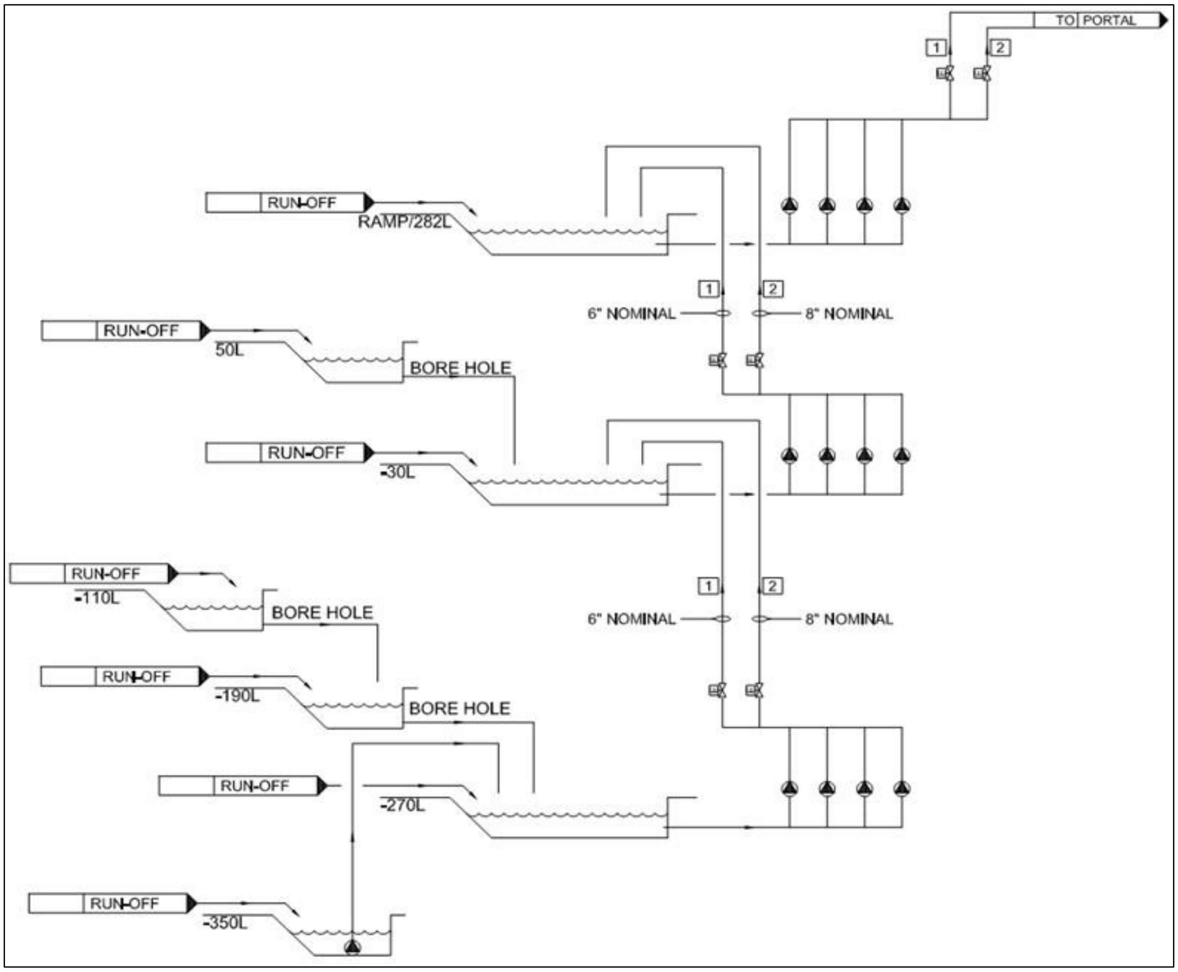
The Cactus East dewatering system consists of three typical level sumps and three main level sumps.

Figure 16-46 is a schematic of the dewatering system Level sumps will cascade their flow downwards via borehole and by means of gravity to the nearest sump, in turn relaying the reporting flows to the nearest main level sump. The level sump located on -350 L will be equipped with a submersible pump directing its flow to the main level sump on -270 L.

Table 16-38 provides a summary of sump locations and pumps installed.

Table 16-38: Summary of Cactus East Dewatering Sump Requirements

Type of Sump	Number of Sumps	Location (s)	Pump Description
Typical Level Sump	3	350 Level (bottom of mine)	1 x 15 hp submersible
		-190 Level	-
		50 Level	-
Main Level Sump	3	-270 Level	4 x 200 hp horizontal centrifugal
		-30 Level	4 x 200 hp horizontal centrifugal
		282 Level (off the ramp)	4 x 200 hp horizontal centrifugal



Source: AGP, 2023.

Figure 16-46: Schematic of Cactus East Dewatering Arrangement

16.5.9 Power Distribution

The mine electrical infrastructure includes provisions to support access portal development, dewatering pump stations, conveyors, crushers, ventilation, exploration activities and underground communications. All underground feeds for Cactus East terminate in switchgears on surface for connection to one or more overhead (surface) power distribution feeders. As the facility is grid connected, substation upgrades will be required. Estimated loads at the connection point to the 13.8 kV gear are expected to peak at East Cactus, at 10,425 kVA.

Should the feed be supplied by two feeders, it would be likely that the bus would be split with a normally open tie breaker connecting both bus sections.

Most of the power distribution design is looped (redundant) in nature, not only to supply load levels, but to provide failover should a cable develop a fault or require maintenance. Loop feeds are brought to the surface switch gear to connection to one or more surface power feeders. Most loads on the site will be fed with a high resistance ground system, created by installing a neutral grounding resistor on the secondary (4,160 V or 480 V) side of the neutral of each power transformer. This will limit fault currents for single-line-ground faults. However, 120/208 V auxiliary systems will be solidly grounded to permit line to neutral (120 V) loads.

High resistance grounded (HRG) systems are very common in industrial and mining applications. HRG systems provide high availability, reliability and safety for personnel and equipment. Ground fault protection on these systems provides additional safety. It should also be noted that the grounding resistors do require monitoring equipment to ensure proper operation and the ability to respond to failures.

For underground power distribution, mine power feeders are proposed to leave the surface substation and feed the underground workings (through the portal) through a set of fuses or breakers, this will provide isolation and protection for the underground portion of the circuit. The underground feeder cable will be spliced with junction boxes at each proposed underground substation and will also include sectionalizing load break switches at regular intervals so that portions of the system may be de-energized for faults or maintenance (typically at each mine power station).

A looped configuration is proposed; allowing damaged sections of cabling to be isolated and repaired and allowing flexibility in the power distribution system in order to limit impacts to the mining operations. However, it should be noted that when peak loading is expected (e.g., after a large rainfall) some load curtailment may be required to ensure all cable segments remain within loading limits.

The underground mine power centers contain breakers; while they may be ordered with motor starters, it was assumed that pumps and other loads will have VFDs, or starters supplied in external cabinets. Fuses and disconnects will be provided for portable mine construction power substations and radial feeder branches to remote substations.

Surface loads in close proximity to the portal are connected directly to the surface power distribution switchgear. Substations are provided to supply the cooling, ventilation, and hoisting loads directly at 4,160 V.

By adding current transformers, potential transformers, and metering equipment; greater operational flexibility can be attained by allowing the central control room to monitor current on all key pieces of infrastructure and avoiding overload by curtailing loads as required. It would be assumed that metering would be added at the surface switchgear at a minimum on each primary underground feeder cable.

16.5.9.1 Cactus East Underground Power Distribution

Nine main substations will be established, each supplied with a local Mine Power Center (MPC) installed at a nearby ESS:

- Surface Level (Switching Station with Connection for Mobile Construction Substation MPC)
- Surface Level Cooling and Hoisting MPCs (x2)
- 282 Level
- -30 Level
- -170 Level
- -270 Level (Pumping)
- -270 Level (Primary underground fan)
- -350 Level

Additionally, there will be two portable construction mine power centers (MPCs). These are to be connected to a spare fused disconnect at 13.8 kV at various locations throughout the mine as construction and development progresses.

The intent is for these units to be relocated as development progresses. Further, these units allow high voltage power to be brought closer to the load centers to reduce copper costs and cabling requirements of extensive 480 V distribution.

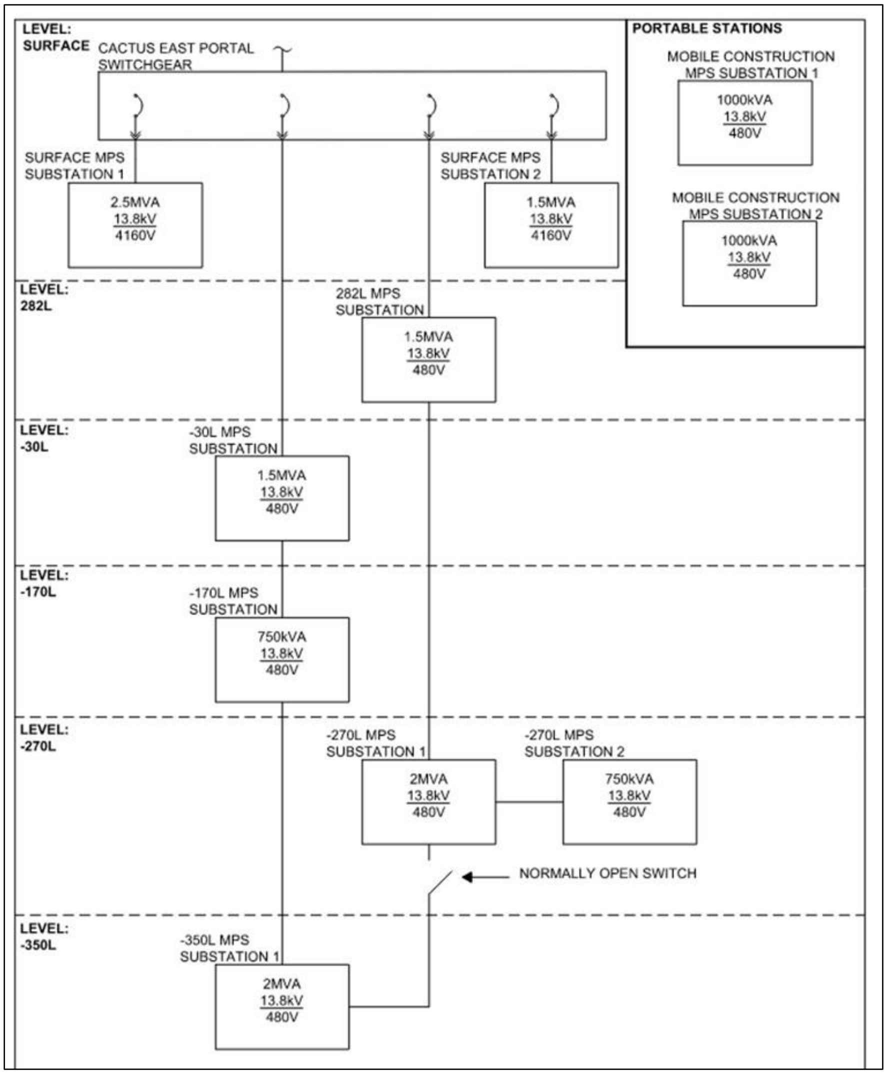
Each permanent substation is equipped with several gang operated switches to sectionalize the main feeder loop within the mine and provide redundancy. Switching will allow sections of cable to be taken out of service for faults or maintenance activities. Fused disconnect switches are provided to feed radial sections of cable for remote mine substations and other loads located at a distance from the primary underground cabling. Switches are also provided with a connector for quick connection of the portable MPCs.

Assumptions have been made to include auxiliary fans connected to several of the permanent MPCs, while others may be temporary and connected to the portable construction MPCs at 480 V. Pumps are assumed to be supplied with a soft starter as part of the mechanical supply package. Power Take Off (PTO) panels have also been included at many points along the ramp for connection of bolters and other mining equipment.

On surface, one mine power substation is provided to supply cooling units and a primary fan at 4160 V. The cooling plants are assumed to be delivered as a prepackaged unit, where incoming power will be provided directly from the 4160 V bus. However, the primary fan will require a VFD, and a cost has been carried in the electrical cost estimate. Additionally, a second MPC will provide 4160 V to a vertical conveyor motor on surface.

The 120/208V loads would be supplied by local dry type distribution transformers and panel boards. IT equipment, local lighting and other ancillary loads would be connected to these panels.

Shops and maintenance facilities would be supplied at 480 V from the nearest available MPC. A high-level overview of the power system for the Cactus East deposit is shown in Figure 16-47.



Source: AGP, 2023.

Figure 16-47: High Level Overview of Cactus East Power Distribution

16.5.10 Mine Communications

The underground communications systems are proposed to be ethernet based and leaky feeder based for radio communications. The proposed topology for communications and automation will be through a primary fiber optic trunk network. Fiber interface panels will be located at key locations to provide interconnectivity to associated users. Primary user networks will be:

Voice – VOIP phones for communications in shop spaces and other strategic locations

Business Network – provide wired and wireless connectivity to the business network for mine resources to connect to the internet, email, and other business applications while in the mine.

Process Network – provide a communications network for programmable logic controllers (PLCs), distributed control systems (DCS) and other process specific devices. This network would be secured and access to the business network and internet would be restricted by firewall to protect the integrity of the control systems. Other systems on this network include geotechnical monitoring, personnel tracking, and vehicle telemetry.

Security – provide a dedicated VLAN for the connection of underground cameras to a remote digital video recorder (DVR).

The fiber/ethernet network is designed with site communications in mind; however, a router and connection to external networking would be provided in either the surface substation or in the office/administrative space.

Leaky feeder coverage is also assumed to be for underground operations only. By providing leaky feeder communications, mine wide Wi-Fi network coverage is not required, and reliable communications can be extended into each mining zone. As new zones are developed, leaky feeder coax can be T-tapped and spliced throughout the mine by site electricians.

Both the leaky feeder system and ethernet/fiber system cables are extended as the mine drift and ramps are developed and will connect to devices as required by the mine instrumentation personnel.

16.5.11 Safety

16.5.11.1 Stench Gas System

The emergency notification system will be in the form of a stench gas system which can be released into the fresh air stream at the main portal and in the main fresh air raises. These systems are simple and very effective in a high-volume intake system as proposed at both mines.

16.5.11.2 Emergency Egress

At Cactus East, there is a single main ramp access. In order to provide a secondary emergency egress to surface a ladderway will be installed in one of the fresh air intake raises. Again, ladderway systems will also be installed in the return air raise from each sub-level to the level above providing secondary egress from each sub-level in every mining area.

16.5.11.3 Refuge Stations

Purpose built self-contained portable refuge stations will be installed at specific locations within the underground workings. The refuge stations can be moved to new locations as the mine expands and areas of activity change. It has assumed that a total of six 16-man capacity refuges will be provided. The refuge stations will be equipped with compressed air, potable water, and first aid equipment. They will also be equipped with a fixed telephone line and emergency lighting. The refuge chambers will be sealable to prevent the entry of gases.

As initial development is completed permanent refuges/lunchrooms will be provided at suitable locations in each mine.

Self-rescuers will be allocated to personnel to ensure safe passage to refuge chambers in case of smoke or gas.

16.5.11.4 Mine Rescue

A fully trained and equipped Mine Rescue Team is essential to the safe operation of any mine and shall be provided at the Cactus Project with a dedicated rescue center and equipment. Team members will be drawn from volunteers from the mine workforce. The mine rescue team will be trained for surface and underground emergencies. A dedicated mine rescue/first aid vehicle will be purchased.

16.5.11.5 Fire Prevention

Fire extinguishers will be provided and maintained in accordance with regulations and best practices at underground refuge stations, electrical substations, pump stations, fueling stations, explosive magazines, and other strategic areas.

Every vehicle would carry at least one fire extinguisher; the correct size and type will depend on the type of vehicle. All underground heavy equipment will be equipped with automatic fire suppression systems (Ansul system).

16.5.11.6 Traffic Control

A traffic control system will be installed in the main access ramp and at other strategic locations at Cactus East. Provision for this system has been included in the mine communications systems.

16.5.12 Underground Mine Development and Production Schedules

The development schedule within Deswik employs an Effort driven methodology. A resource is assigned as Effort-driven if the resource's production rate, as opposed to the task duration, will determine the number of resources used to complete a task. When a resource is assigned as Effort-driven:

The duration of the task is not changed to maximize the use of the resource if the resource is not used to its full potential.

Then additional resources must be assigned if one resource is not enough to complete a task over the task's duration.

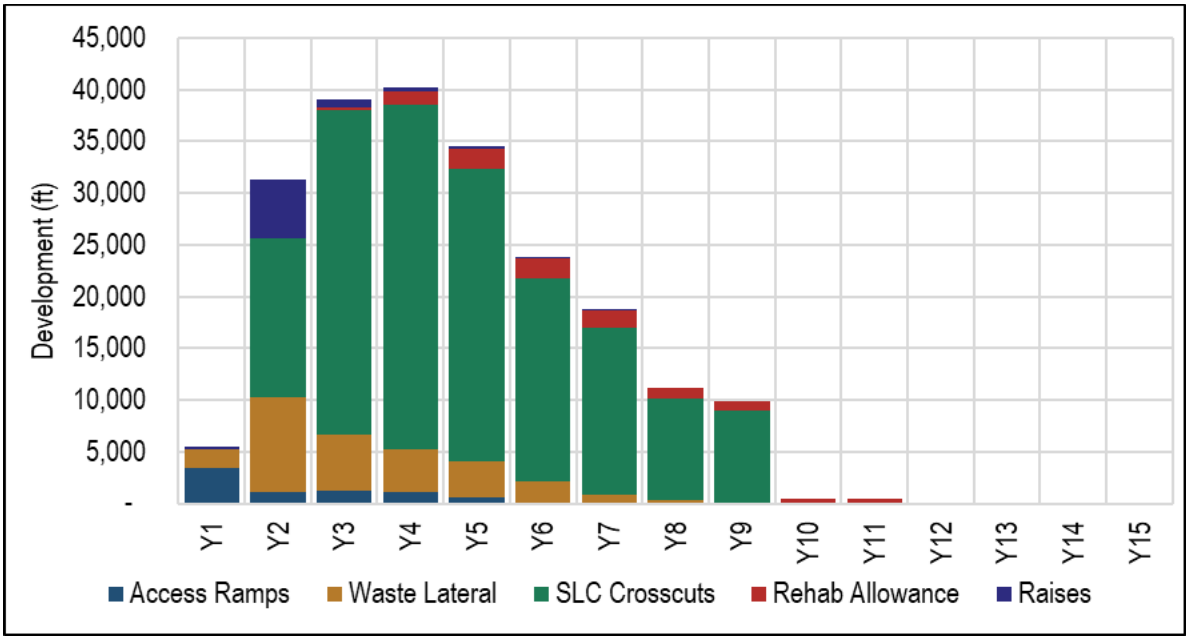
The development was resourced accordingly to support the production profile requirement. Each task had its specific task rate based on heading availability. Development zones were developed based on the geotechnical domains provided to constrain advance through the SLC mine.

The production schedule within Deswik employs a driving scheduling methodology. A resource is assigned as Driving if the duration of the task will be determined by the production rate and the number of resources available. The footprint size and cave front propagation were used for the determination of equipment requirement. This included the loaders, production drills and raisebore drill.

The production was resourced according to the drawpoint availability, numbers of levels open for production and production ramp up of the SLC to reach the maximum throughput rate. The through rate was then maintained consistently across the life of mine. The resources were reduced based on the decline on production rates across the mine life.

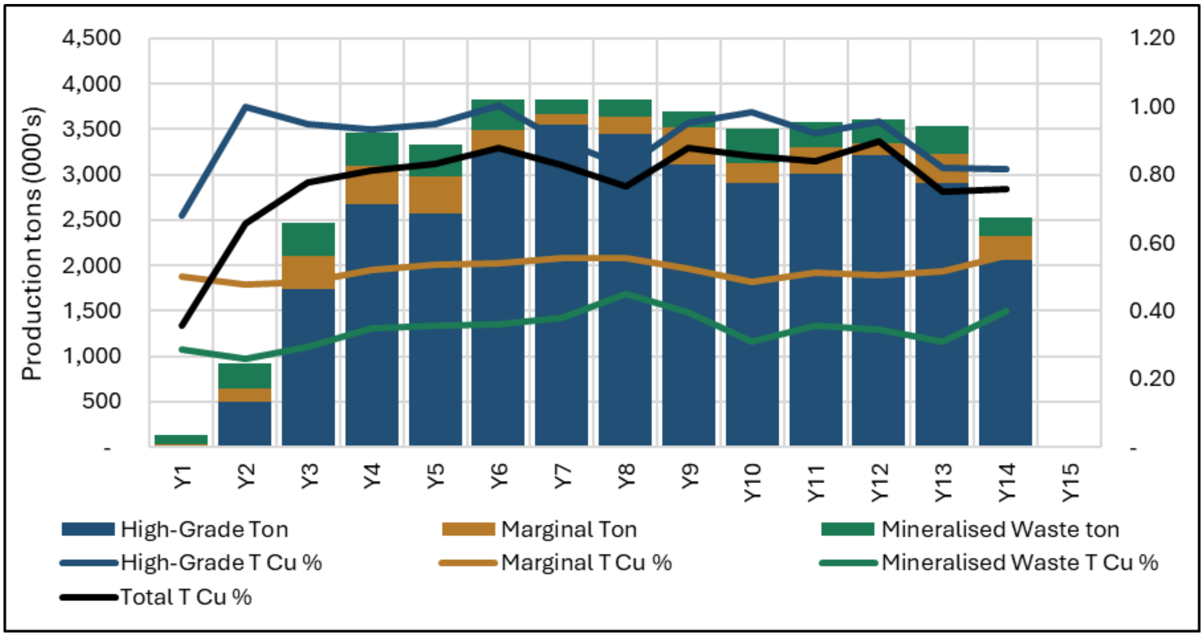
All development and production tasks were linked, creating dependencies, based on mining SLC guidelines and requirements and geotechnical guidelines for caving progression and stress regimes.

Cactus East mine was scheduled commencing with a Year 1. Subsequently the schedule was included in the consolidated project schedules commencing in the best project year to meet corporate objectives. Year 1 for Cactus East was taken to be Year 8 in the overall project schedule. The development and production schedules for Cactus East are shown in Figure 16-48 through Figure 16-50.



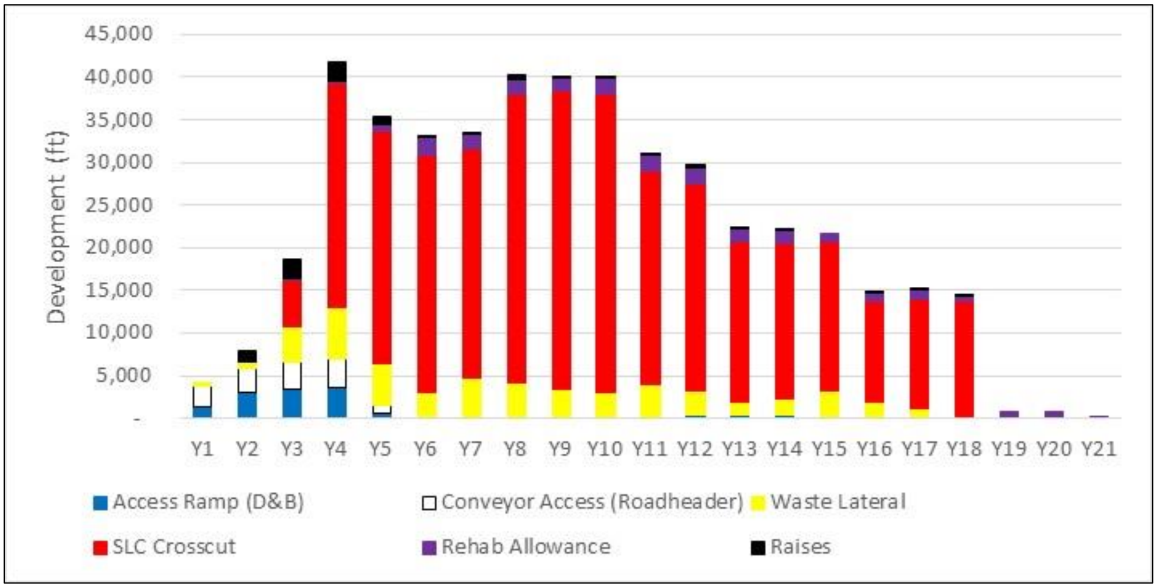
Source: AGP, 2024

Figure 16-48: Cactus East Development Schedule



Source: AGP, 2023.

Figure 16-49:Cactus East Production Schedule



Source: AGP, 2023.

Figure 16-50: Parks/Salyer Underground Mine Costing Methodology

The direct capital development and operating costs for the underground mine were generated from first principal unit cost models. Each of the models was developed using the mine design criteria and other general engineering estimates of performance. The mine was assumed to operate two 12-hour shifts per day, 365 days per year. Costs were estimated on a quarterly basis for the first ten years and annually thereafter. All costs were modelled in 2024 Q1 US dollars.

Wherever possible the mine consumable cost database was updated locally during the course of the study. Labor costs were derived from a recent underground feasibility study in Arizona. Budget quotations were provided by mobile equipment suppliers.

Separate drill and blast development cost models included detailed design and ground support assumptions for each mine and each different rock type as provided by Call & Nicholas, Inc. Other models were developed for application to the other mine activities, raising, stope drilling and blasting, stope mucking, trucking, and delineation drilling. The unit rates were applied to the scheduled quantities in order to estimate the direct costs.

Initial development to first main stoping production was assumed to be undertaken by contractors. The contractors will provide all labor, consumables and equipment until Year 3 Q2 at Cactus East. During this period ASCU will provide only contract supervision and technical services. Thereafter all activities will be undertaken by owner crews apart from roadheader development and raising which will continue to be undertaken by reduced contractor crews.

Additional models were designed to reflect overhead-type activities at the mines:

- Mine Services (including Labor, supplies and equipment for construction, materials transport, road maintenance and sanitation). Diesel maintenance Labor costs are also included.
- Vertical Conveying and Sizing at Cactus East.
- Owners Mine Supervision and Technical (including mine management, production supervision, maintenance supervision, and mine technical and safety staff).
- Air Cooling.

- Mine Power (developed from aggregation of mine loads and estimated usage).

Overheads were estimated by quarter and applied as a fixed daily cost. The overheads for each period were split between operating and capital development estimates in the ratio of the respective direct costs.

The models were also used to track Labor and equipment hours to identify annual requirements in each Labor category and equipment type.

All owner mobile equipment will be leased with 15% down payment followed by a five-year lease at 8.3% pa interest.

Replacement capital for fixed plant was included in the daily overhead cost estimates. Replacement capital for mobile mining equipment was estimated by tracking equipment fleet operating hours with a mid-life rebuild equivalent to 50% of the purchase price. Rebuild capital is not subject to leasing. Replacement equipment will be purchased after assumed useful life, subject to the normal leasing criteria.

Equipment downpayments and rebuild costs are capitalized. Lease payments are divided between capital development and operating costs in the ratio of each period's direct costs.

16.5.13 Underground Labor

Hourly paid employees will workday, afternoon and night shifts, each of 12 hours. Two crews will be employed to allow for continuous operations, 365 mine operating days per year. Labor requirements were tracked during the cost modelling process. The estimate of effective working hours during the shift for hourly paid underground workers is shown in Table 16-39.

Table 16-39: Effective Working Time

Factor	Unit	Value
Shift length	h	12.0
Travel time	h	1.00
Safety huddle	h	0.50
Breaks	h	1.00
Efficiency Factor (50 min/h)	%	83
Effective Hours	h/shift	7.9

The most senior managers and superintendents may have shared responsibility between the underground and open pit operations, however, for the purposes of this study the underground operations assume their own dedicated workforce. The majority of staff will work 8 hours per day, 5 days per week. Some job categories will be filled one or two shifts per day basis depending on the position to support continuous operations. A duty roster and call-out system will be employed to ensure effective coverage for ongoing operation during off-duty time.

Hourly paid employed labor for selected periods during the Cactus East life of mine are shown in Table 16-40. Employed staff for the same periods are shown in Table 16-41.

Table 16-40: Cactus East Employed Hourly Labor

	Yr 2 Q1	Yr 4 Q1	Yr 6 Q1	Yr 8 Q1	Yr 14
Development Miner, Miner 1	-	5	4	2	-
Longhole Drilling Miner 1	-	21	20	27	27

	Yr 2 Q1	Yr 4 Q1	Yr 6 Q1	Yr 8 Q1	Yr 14
Development Miner, Miner 1 Lead	-	28	17	7	-
Scoop Driver	-	20	16	19	20
Stope Blasting Miner 1	-	10	10	13	13
Construction Lead	-	4	4	4	4
Construction	-	-	-	-	-
Materials	-	-	-	-	-
Truck Driver	-	2	3	13	19
Refrigeration UG	-	4	4	4	4
Pumps	-	4	4	4	4
Road Maintenance	-	2	2	2	2
Diesel Mechanic I	-	24	20	20	16
Diesel Mechanic 2	-	24	20	20	16
Diesel Mechanic 3	-	24	20	20	16
Mechanic I	-	6	6	6	6
Mechanic 2	-	5	5	5	5
Mechanic 3	-	5	5	5	5
Electrician I	-	5	5	5	5
Electrician 2	-	5	5	5	5
Electrician 3	-	6	6	6	6
Welder	-	5	5	5	5
Drill Maintenance	-	5	5	5	5
Conveyor Operator	-	6	6	6	6
UG Helper	-	66	66	66	48
Crusher Operator	-	2	2	2	2
TOTAL	**-**	**282**	**236**	**247**	**233**

Table 16-41: Cactus East Employed Staff

	Yr 2 Q1	Yr 4 Q1	Yr 6 Q1	Yr 8 Q1	Yr 14
Maintenance Supt	-	1	1	1	1
Maintenance Foreman	1	2	2	2	2
Maintenance Planner	-	1	1	1	1
Mine Superintendent	1	1	1	1	1
Mine Foreman	-	2	2	2	2
Shift Boss	4	16	16	16	16
Mine Dry/Lamps/Bits	4	6	6	6	6
Secretary/Clerk/Stores	2	4	4	4	4
Mine Trainers/Safety	-	1	1	1	1
Safety	2	4	4	4	4

	Yr 2 Q1	Yr 4 Q1	Yr 6 Q1	Yr 8 Q1	Yr 14
Technical Services Manager	1	1	1	1	1
Senior Mine Eng/Geo/Geotech/Hydro	2	3	3	3	3
Mine Geologist	1	3	3	3	3
Mine/Hydro Technician	2	3	3	3	3
Geology Technician/Grade Control	2	3	3	3	3
Mine Engineer	2	3	3	3	3
Surveyor	2	4	4	4	4
Survey Helper	4	8	8	8	8
Ventilation /Samplers/Rock Mechanics Asst	4	8	8	8	8
Total Staff	34	74	74	74	74

16.5.14 Underground Mine Equipment

Modelled equipment requirements are based on operational hours. Some potential may remain for fleets to be reduced by rescheduling and optimization of activities during the prefeasibility study process. It is planned that the development contractor will provide all mobile equipment during the project capital phase for each mine. The owner will purchase equipment required for operations thereafter under a lease arrangement.

Typical current leasing terms were provided by a major supplier during the study and comprise a 15% down payment on acquisition followed by a five-year lease at the rate of 8.3% Pa. The leasing cost estimate was derived from quotations for the PEA and other recent AGP projects were used for the equipment types selected. These quotations were escalated by 3% Pa from the date of quotation where necessary. An allowance for initial spare parts (5%) was included in the purchase price used for modeling, but freight to site was excluded. Mechanical availability, utilization and operational life were estimated by AGP for each equipment type and the hourly operating costs were assessed. A mid-life rebuild equivalent to 50% of the purchase price was included in the capital estimate to increase operational life.

The mobile equipment requirements during selected periods of the mine life are provided in Table 16-42 for Cactus East.

Table 16-42: Cactus East Owner Mobile Equipment Requirements

	Yr2 Q1	Yr 4 Q1	Yr 6 Q1	Yr 8 Q1	Yr14
4 yd Scoop		2	2	1	1
11yd Scoop		6	6	5	5
6yd Scoop		4	3	2	1
55-ton Diesel Truck		8	11	11	5
Development Jumbo		5	3	1	1
Longhole Drill		6	7	7	5
Rockbolter		7	5	3	1
Scissors		8	8	4	1
Fuel & Lube Service		4	4	4	4
Flatdeck		4	4	4	4

	Yr2 Q1	Yr 4 Q1	Yr 6 Q1	Yr 8 Q1	Yr14
Supv Landcruiser		16	16	16	11
8 Man Landcruiser		3	3	3	3
Mech Landcruiser		2	2	2	2
Elec Landcruiser		2	2	2	2
Emulsion Loader		4	4	4	4
Mobile Rockbreaker		1	1	1	1
Rescue/First Aid		1	1	1	1
Grader		1	1	1	1
Transmixer		2	2	2	1
Shotcrete		2	2	2	1
Scissors/Pipe Handler		1	1	1	1
Water Truck		1	1	1	1

16.5.15 Underground Power

A load list was compiled for the underground mine. Estimated total installed power for Cactus East is shown in Table 16-43.

Table 16-43: Cactus East

Area	Installed Power (kW)
Ventilation	3,900
Dewatering	898
Air Cooling	4,000
Workshop & Equipment	3,594
Vertical Conveyor System	2,296
Total Installed kW	**14,688**

With reference to the activity schedules and milestone achievements AGP reviewed each line item of the load list on a period-by-period basis to estimate the power requirements by quarter.

A power cost of $0.071/kWh was then applied to estimate the power cost.

16.6 COMBINED PRODUCTION SCHEDULE

The Cactus Mine combined schedule includes production from four separate mining areas: Parks/Salyer Open Pits, Cactus West Open Pits, Historical Stockpiles, and Cactus East Underground. The mine production schedule is initially focused on the Parks/Salyer Pit which mines continuously from Year -1 to Year 22, with some commissioning feed material supplied by Historical Stockpiles in Year 1. Cactus West Open Pits are mined from Years 7-11 and again from Years 23-31. Cactus East Underground begins development in Year 8, and mines through Year 21.

Surface material movement begins with a pre-stripping period in Year -1 at 70 M tons mined, then stabilizes at 140-150 M tons per year mined from Year 1-7 before material peaking at 163 M tons mined in Year 8. Mining rates slowly reduce from Year 10 onwards as the pits deepen and strip ratios reduce. In Years 19-22, mining rates are minimal as pit bottoms at Parks/Salyer are completed, and low-grade surface stockpiles are exhausted before material mining the Cactus West areas which they sit on top of. Mining then ramps up to 60-70 M tons per year between Year 24 and Year 27 before material tapering down to a conclusion in Year 31.

The schedule details are shown in Table 16-44 to Table 16-46 and Figure 16-51.

Table 16-44: Total Tons Mined by Area (Feed Material and Waste)

Mining Area	Total Tonnage (M ton)													
	Total	**Y-2**	**Y-1**	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**	**Y11**
Parks/SalyerOP	**2,211**		70	130	150	140	150	150	152	131	98	94	89	105
Cactus OP	**605**									9	65	51	51	22
Stockpile	**10**			10										
CE UG	**42**										0	1	2	3
Total	**2,869**	0	70	140	150	140	150	150	152	140	163	146	142	131

Mining Area	Total Tonnage (M ton)													
	12	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Parks/Salyer OP	125	125	115	87	100	86	53	18	17	9	16			
Cactus OP				28				8				21	67	68
Stockpile														
CE UG	3	4	4	4	4	4	4	4	4	3				
Total	128	129	119	115	104	89	57	30	21	12	16	21	67	68

Mining Area	Total Tonnage (M ton)													
	26	**27**	**28**	**29**	**30**	**31**								
Parks/Salyer OP														
Cactus OP	60	60	30	34	30	3								
Stockpile														
CE UG														
Total	60	60	30	34	30	3								

Table 16-45: Productive Feed Material Tons Mined by Area

Mining Area	Total Tonnage (M ton)													
	Total	**Y-2**	**Y-1**	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**	**Y11**
Parks/Salyer OP	531		0	15	34	31	36	78	21	4	14	24	4	16
Cactus OP	306									0	4	12	30	18
Stockpile	10			10										
CE UG	42										0	1	2	3
Total	889	0	0	25	34	31	36	78	21	4	18	37	36	37

Mining Area	Total Tonnage (M ton)													
	12	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
Parks/Salyer OP	49	34	27	5	25	25	29	18	17	9	16			
Cactus OP				25				8				4	15	35
Stockpile														
CE UG	3	4	4	4	4	4	4	4	4	3				
Total	53	37	31	34	28	29	32	29	20	12	16	4	15	35

Mining Area	Total Tonnage (M ton)													
	26	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**				
Parks/Salyer OP														
Cactus OP	30	42	27	29	25	1								
Stockpile														
CE UG														
Total	30	42	27	29	25	1								

Table 16-46: Feed Material Processed by Feed Material Type

Oxide/Enriched	Total Tonnage (M ton)													
	Total	Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11
Tons (Mt)	658.9			24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	31.3	31.3	31.3
TCU (%)	0.496			0.234	0.290	0.283	0.319	0.952	0.842	0.305	0.309	0.671	0.342	0.414
CU-AS (%)	0.117			0.165	0.089	0.077	0.106	0.118	0.092	0.067	0.104	0.090	0.156	0.213
CU-CN (%)	0.317			0.038	0.179	0.180	0.197	0.761	0.646	0.205	0.174	0.475	0.120	0.160

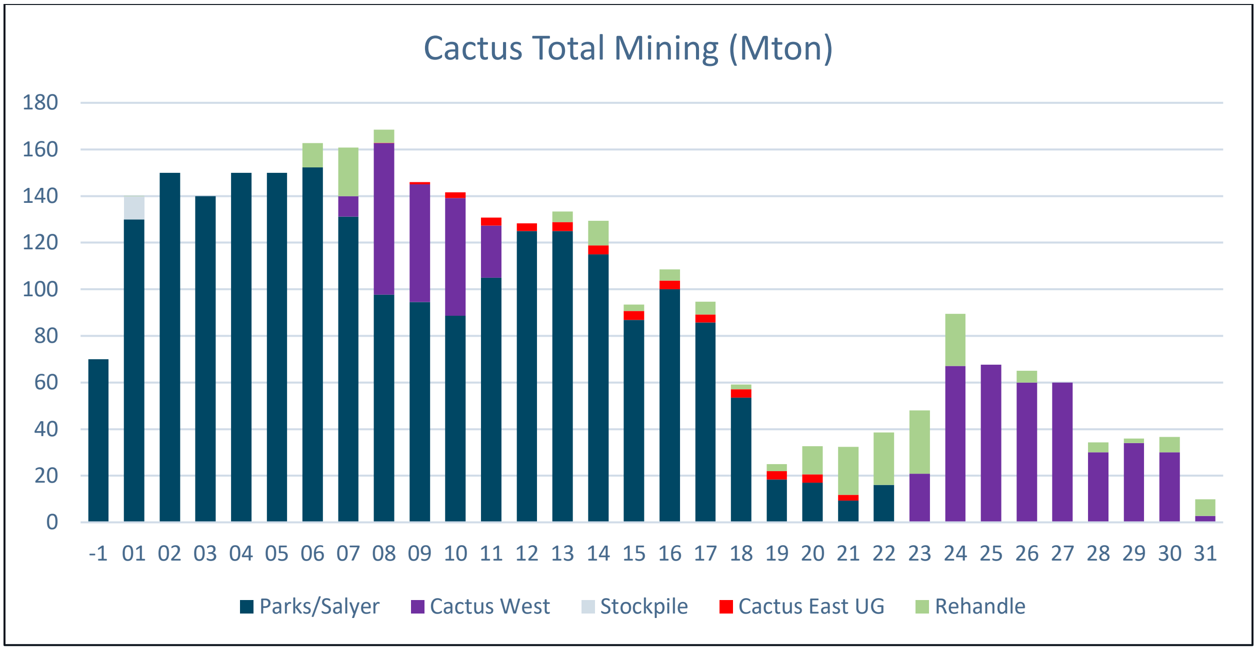
Oxide/Enriched	Total Tonnage (M ton)													
	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Tons (Mt)	31.3	31.3	31.3	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	7.3	7.3
TCU (%)	1.000	0.829	0.628	0.387	0.663	0.807	0.871	0.656	0.461	0.258	0.173	0.143	0.182	0.199
CU-AS (%)	0.173	0.121	0.131	0.132	0.138	0.102	0.240	0.125	0.098	0.059	0.050	0.048	0.038	0.050
CU-CN (%)	0.771	0.584	0.352	0.208	0.477	0.604	0.539	0.454	0.291	0.142	0.081	0.064	0.107	0.107

Oxide/Enriched	Total Tonnage (M ton)													
	26	27	28	29	30	31	32	33	34	35				
Tons (Mt)	7.3	11.9	12.1	7.3	7.3	2.6								
TCU (%)	0.245	0.204	0.279	0.289	0.205	0.139								
CU-AS (%)	0.087	0.112	0.140	0.096	0.074	0.072								
CU-CN (%)	0.129	0.052	0.086	0.136	0.064	0.033								

Hypogene	Total Tonnage (M ton)													
	Total	Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11
Tons (Mt)	230.1													
TCU (%)	0.348													
CU-AS (%)	0.010													
CU-CN (%)	0.028													

Hypogene	Total Tonnage (M ton)													
	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Tons (Mt)				7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	24.0	24.0
TCU (%)				0.386	0.413	0.466	0.449	0.436	0.403	0.386	0.410	0.370	0.371	0.322
CU-AS (%)				0.013	0.014	0.015	0.012	0.012	0.011	0.011	0.009	0.012	0.012	0.011
CU-CN (%)				0.035	0.043	0.045	0.044	0.040	0.037	0.037	0.031	0.037	0.037	0.020

Hypogene	Total Tonnage (M ton)													
	26	27	28	29	30	31	32	33	34	35				
Tons (Mt)	24.0	19.4	19.2	24.0	24.0	5.8								
TCU (%)	0.300	0.272	0.341	0.323	0.342	0.237								
CU-AS (%)	0.007	0.009	0.007	0.007	0.008	0.010								
CU-CN (%)	0.016	0.023	0.021	0.024	0.026	0.023								

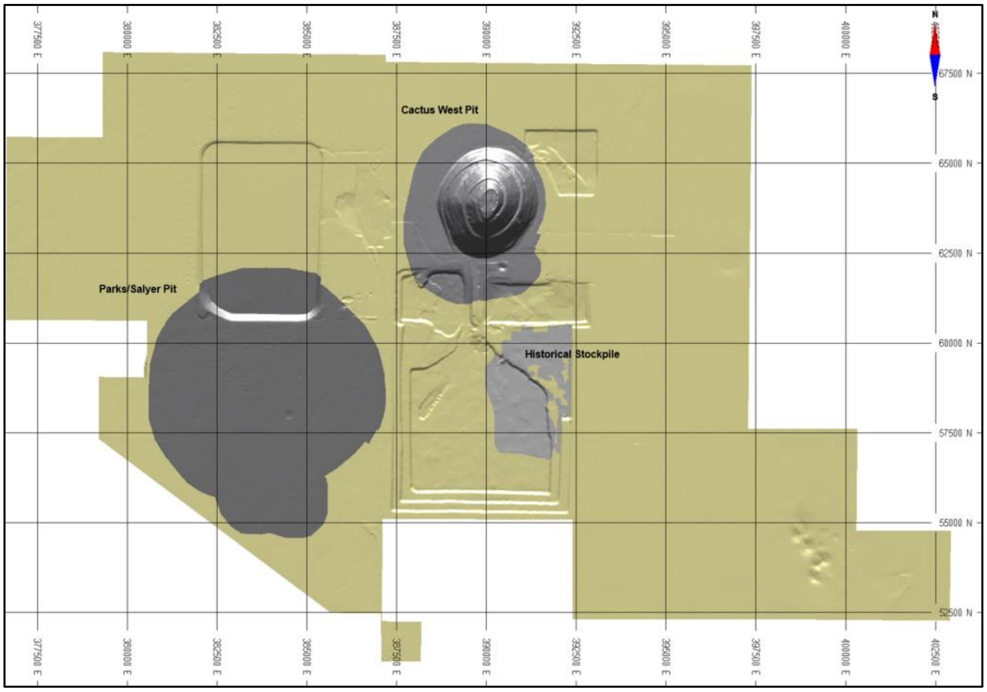


Source: AGP, 2024.

Figure 16-51: Tons Mined by Area

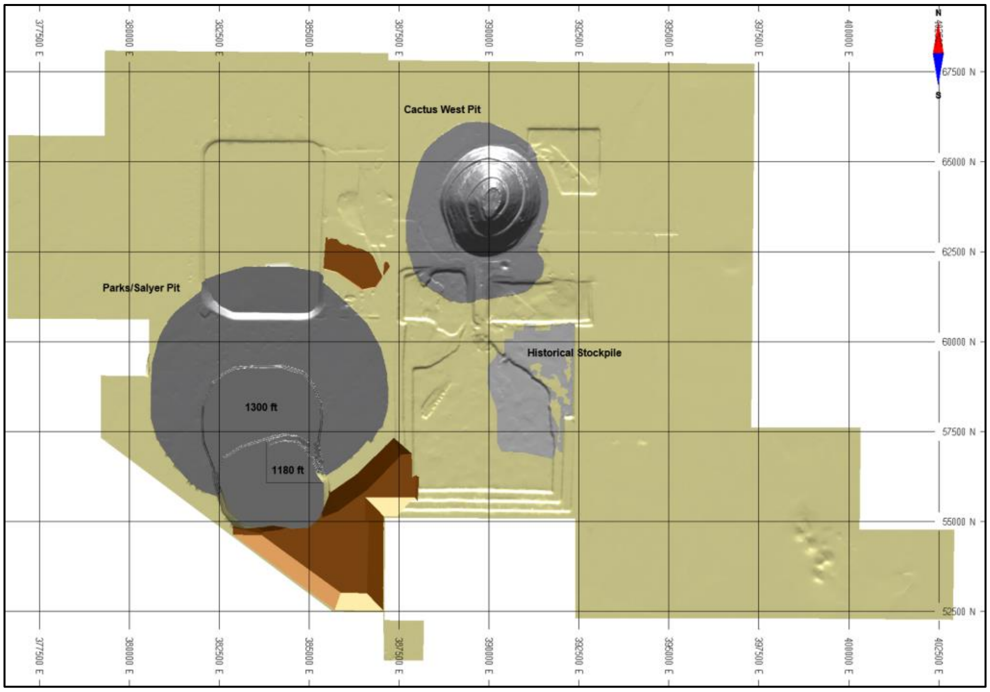
16.7 END OF PERIOD PLANS – OPEN PIT

End of period graphics for the open pits are displayed in Figure 16-52 through Figure 16-63.



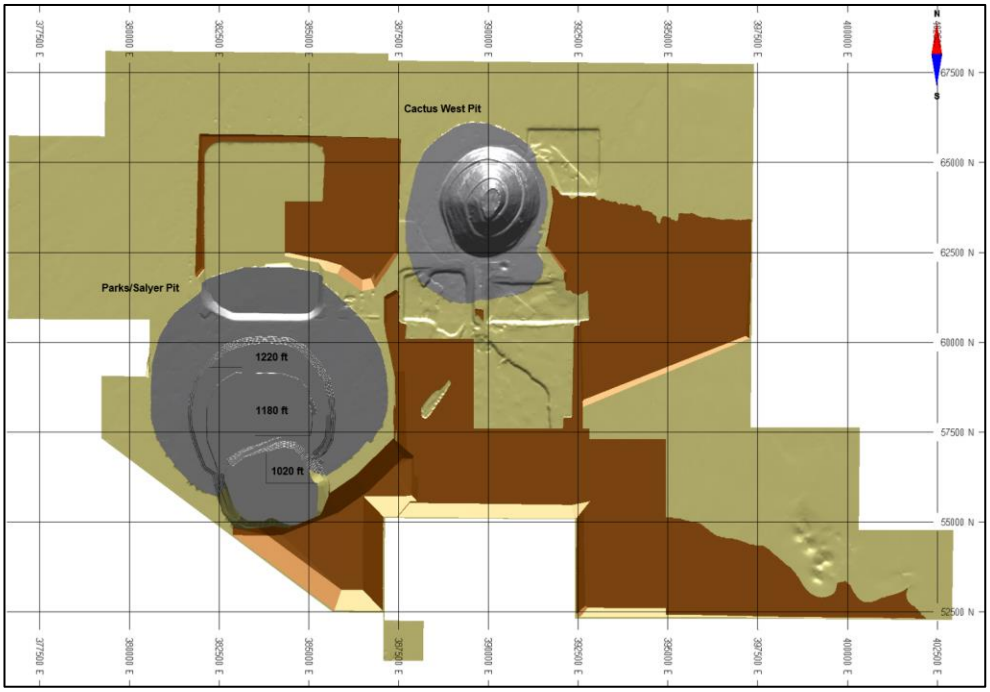
Source: AGP 2024.

Figure 16-52: Mining Starting Condition



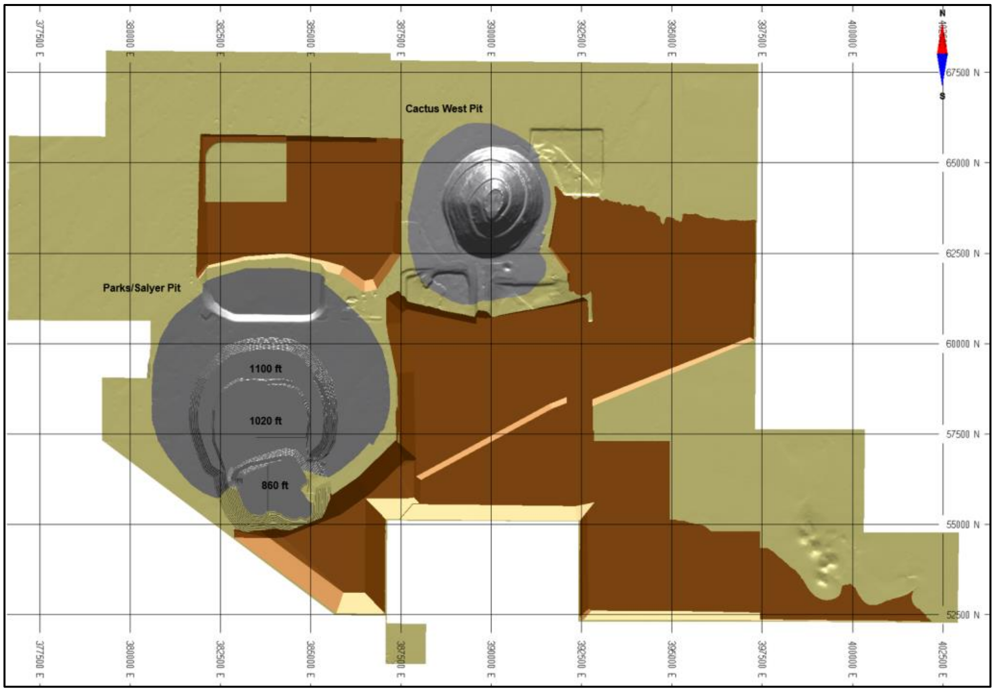
Source: AGP 2024.

Figure 16-53: End of Year 1 (Pre-production period)



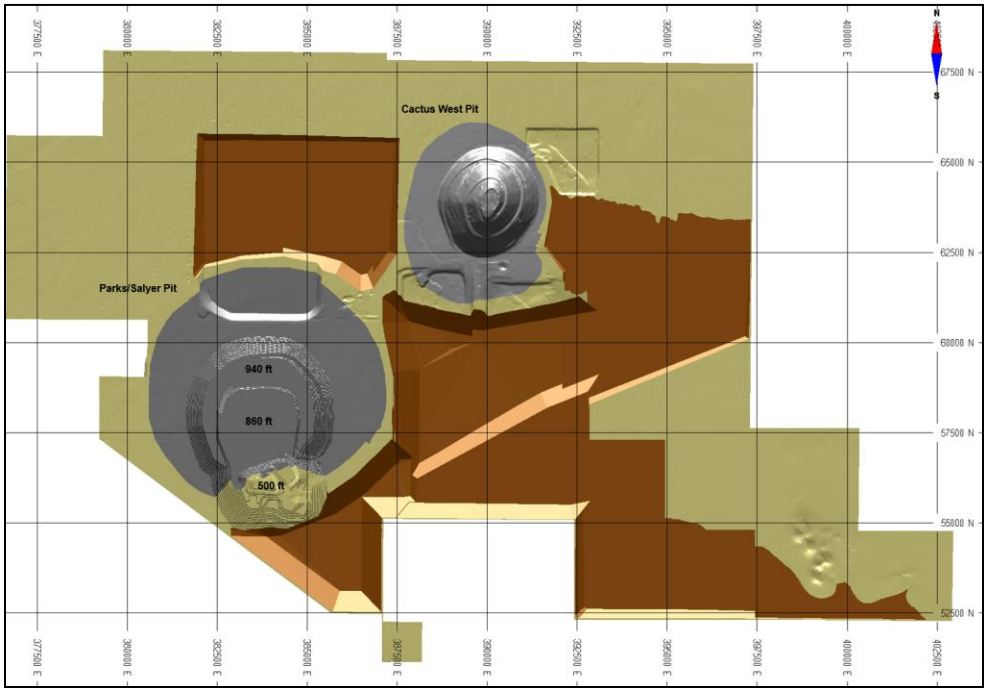
Source: AGP 2024.

Figure 16-54: End of Year 1



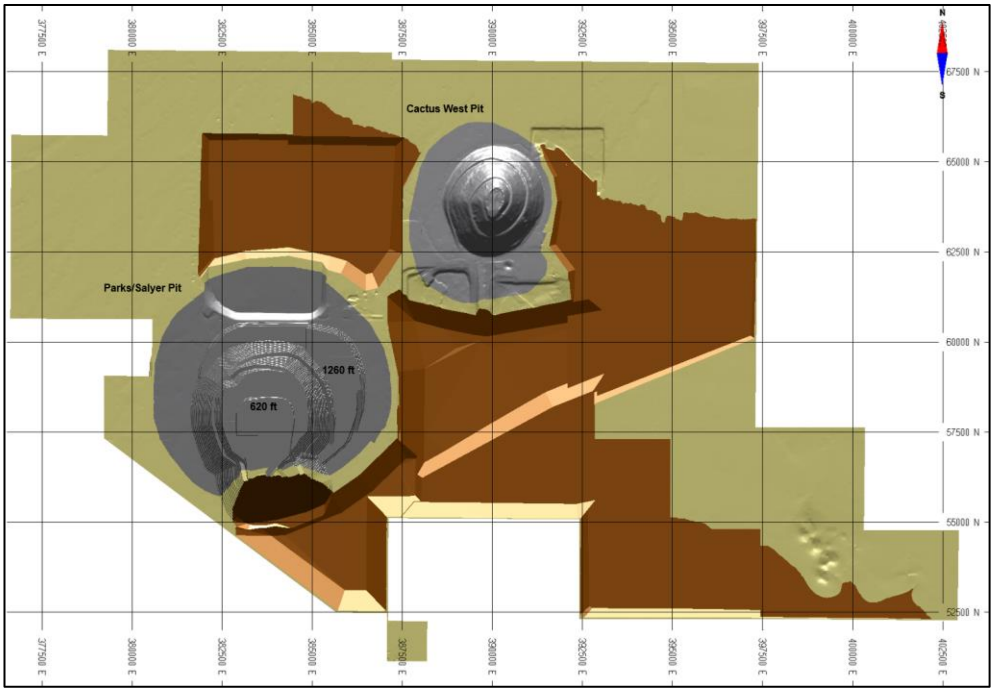
Source: AGP 2024.

Figure 16-55: End of Year 2



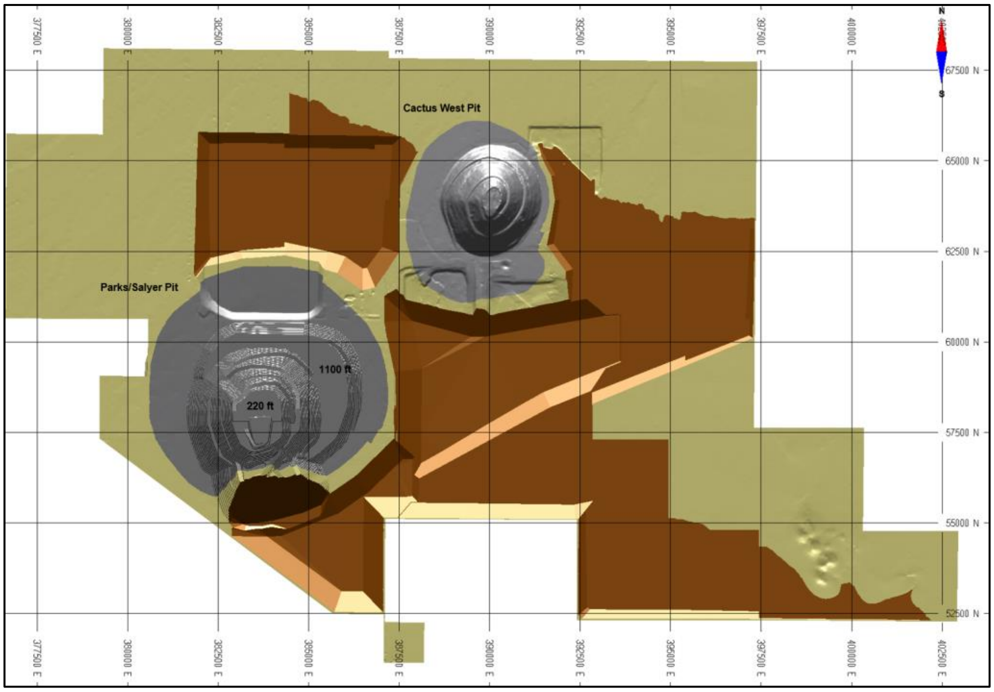
Source: AGP 2024.

Figure 16-56: End of Year 3



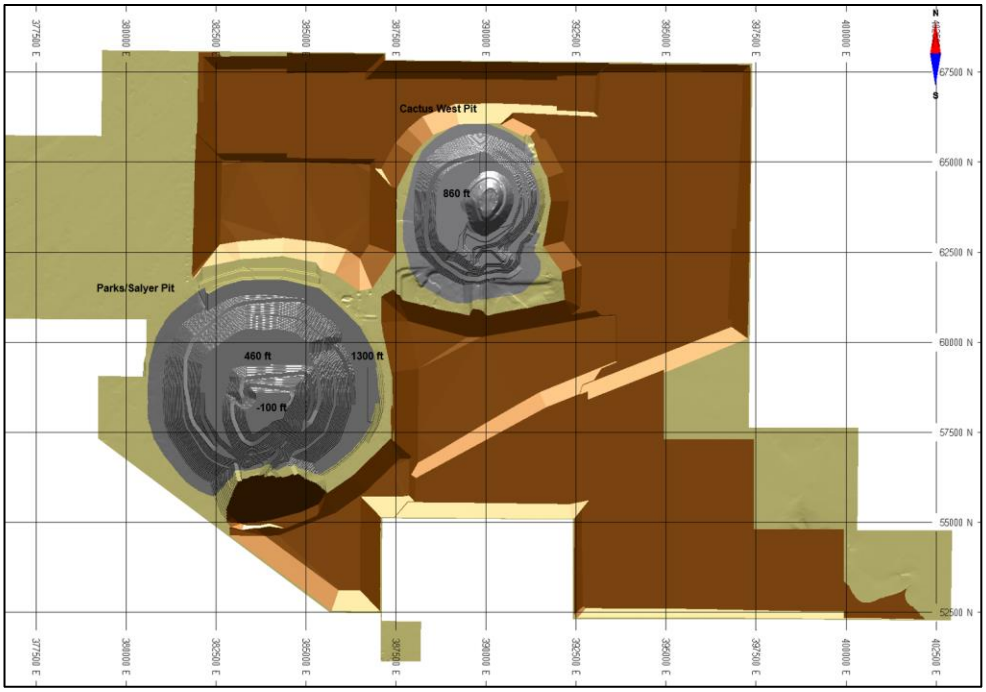
Source: AGP 2024.

Figure 16-57: End of Year 4



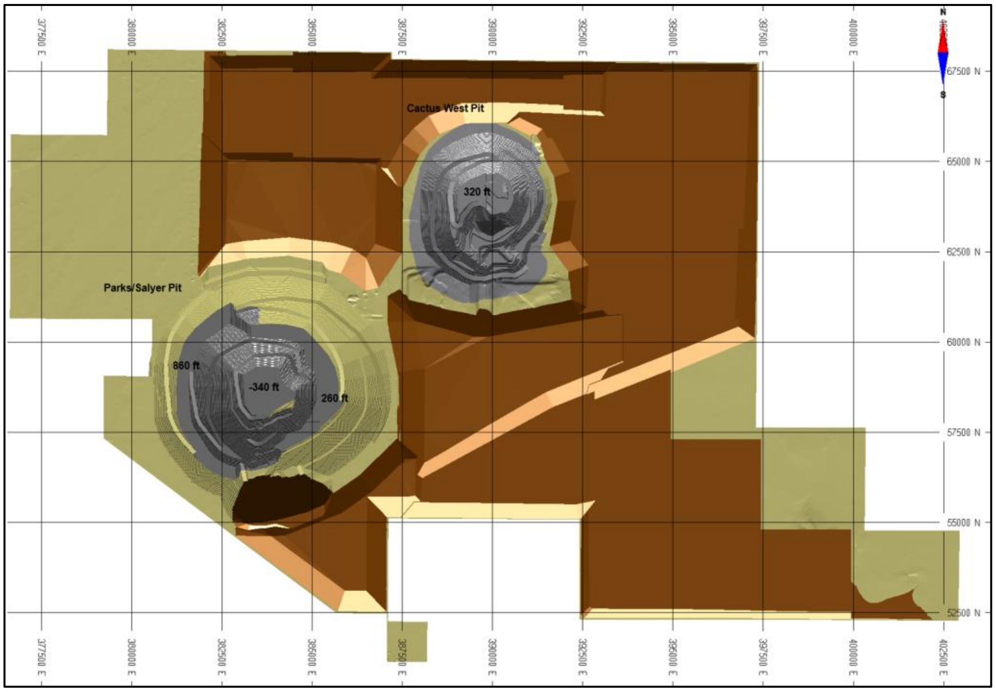
Source: AGP 2024.

Figure 16-58: End of Year 5



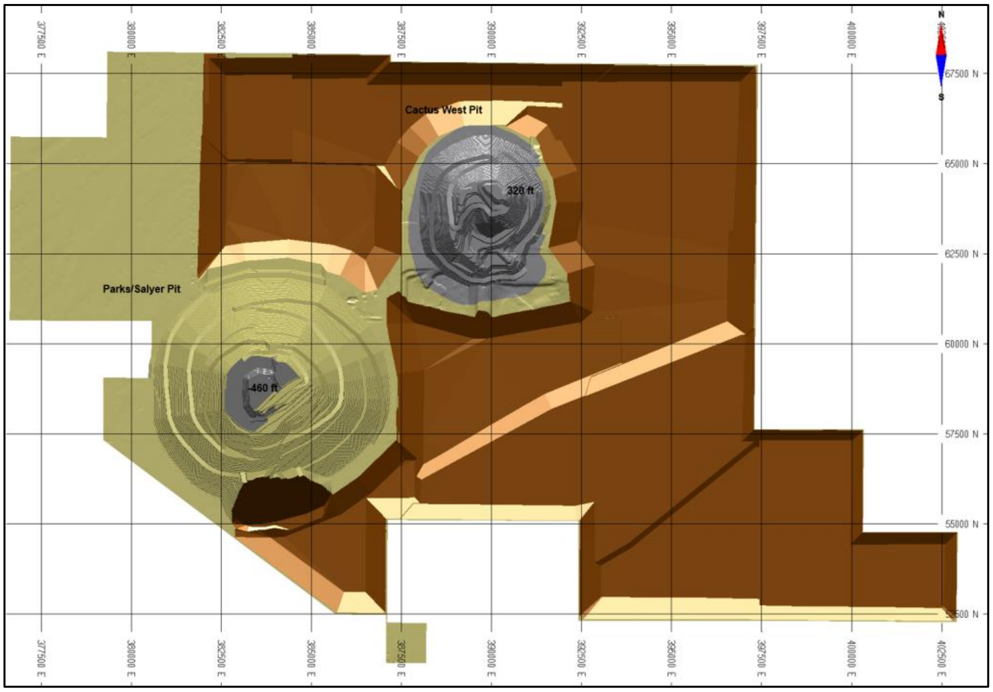
Source: AGP 2024.

Figure 16-59: End of Year 10



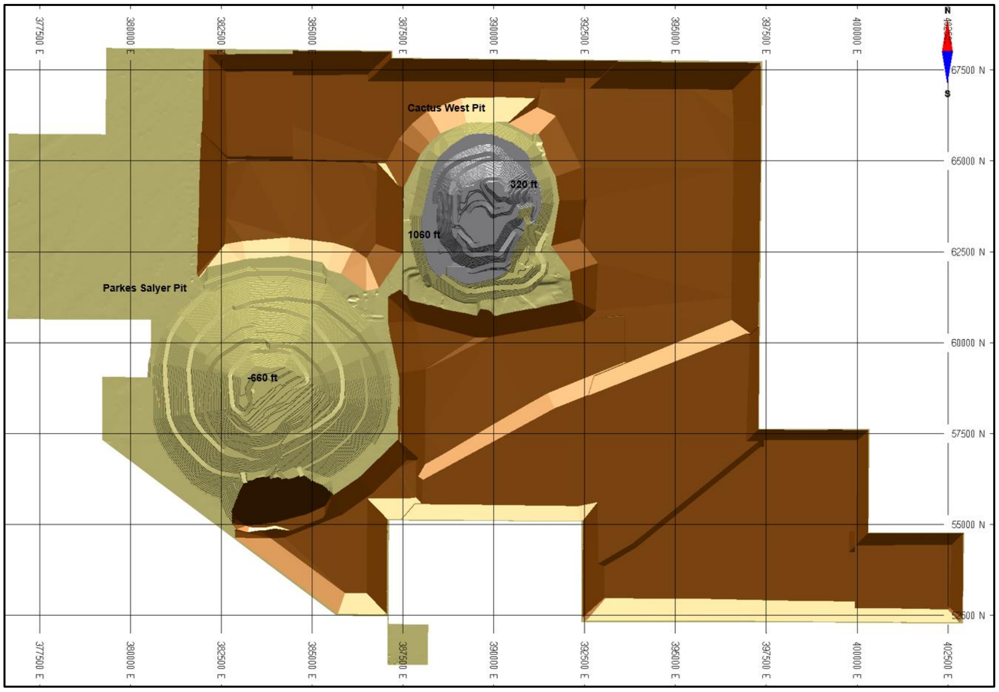
Source: AGP 2024.

Figure 16-60: End of Year 15



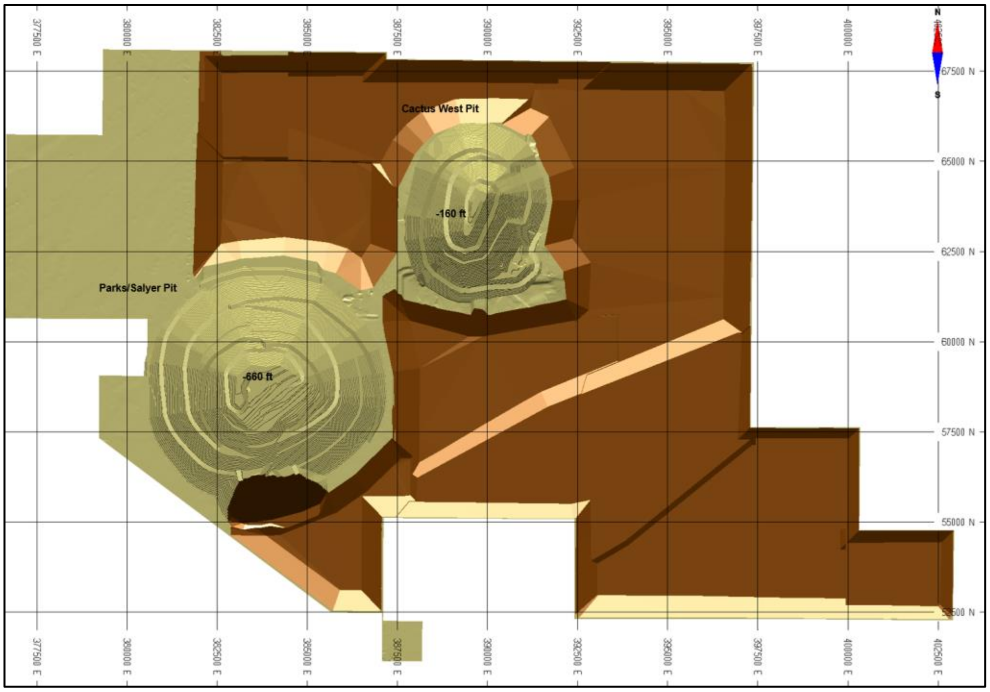
Source: AGP 2024.

Figure 16-61: End of Year 20



Source: AGP 2024.

Figure 16-62: End of Year 25

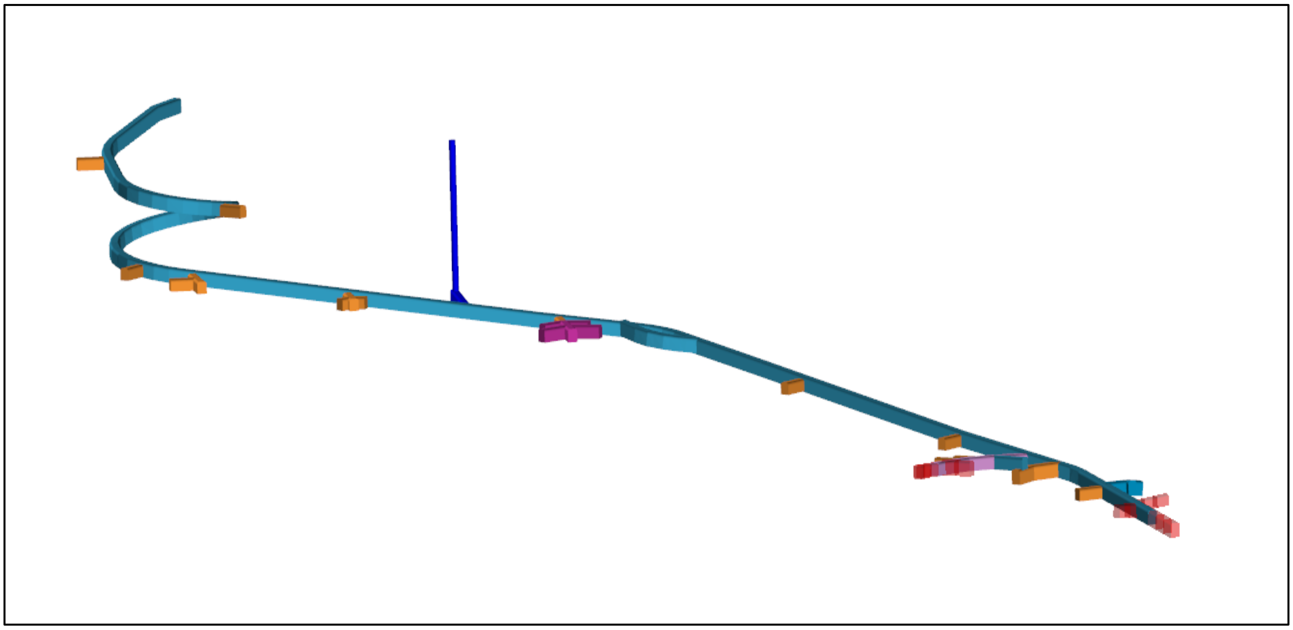


Source: AGP 2024.

Figure 16-63: End of Year 31

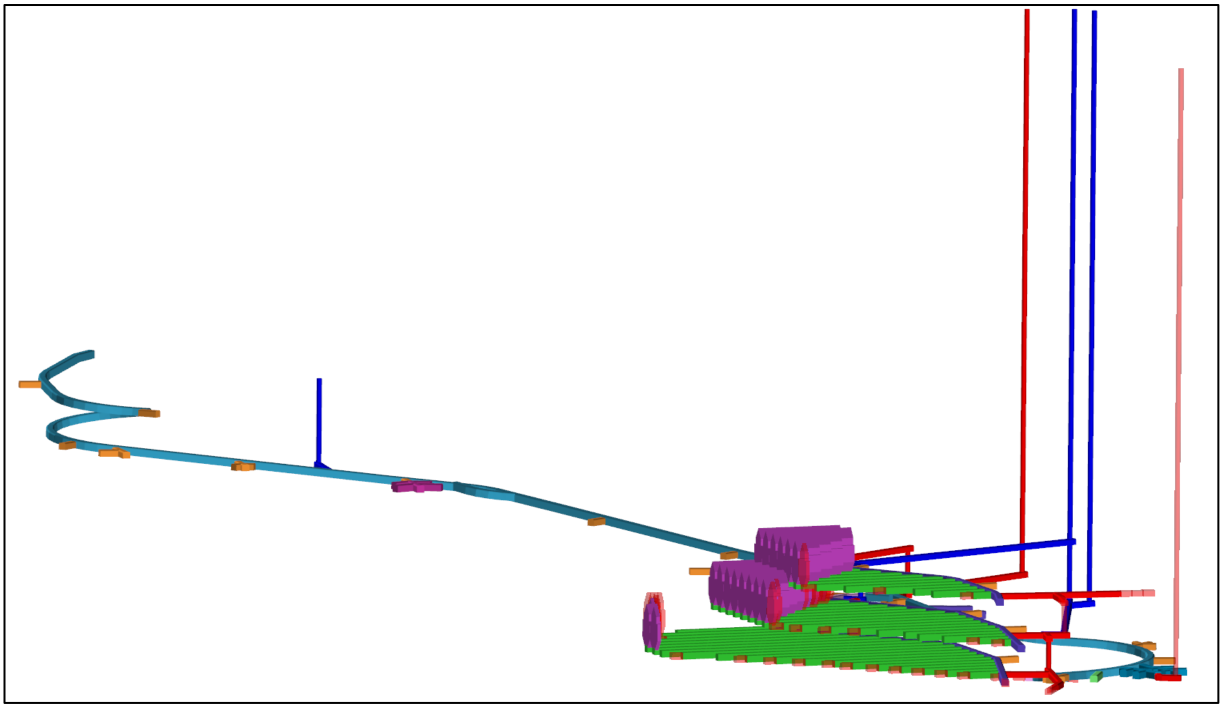
16.8 END OF PERIOD PLANS – UNDERGROUND

Figure 16-64 through Figure 16-69 shows these plans.



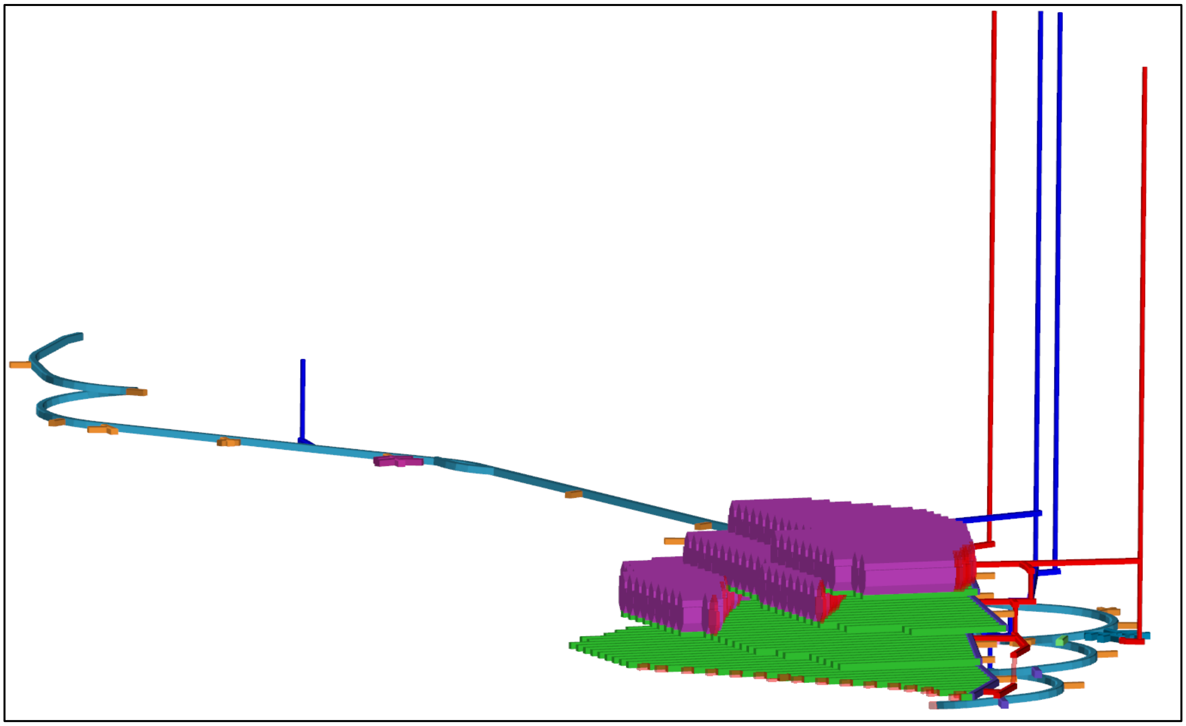
Source: AGP 2024.

Figure 16-64: Cactus East – Year 8 (First Year of UG) (looking Northwest)



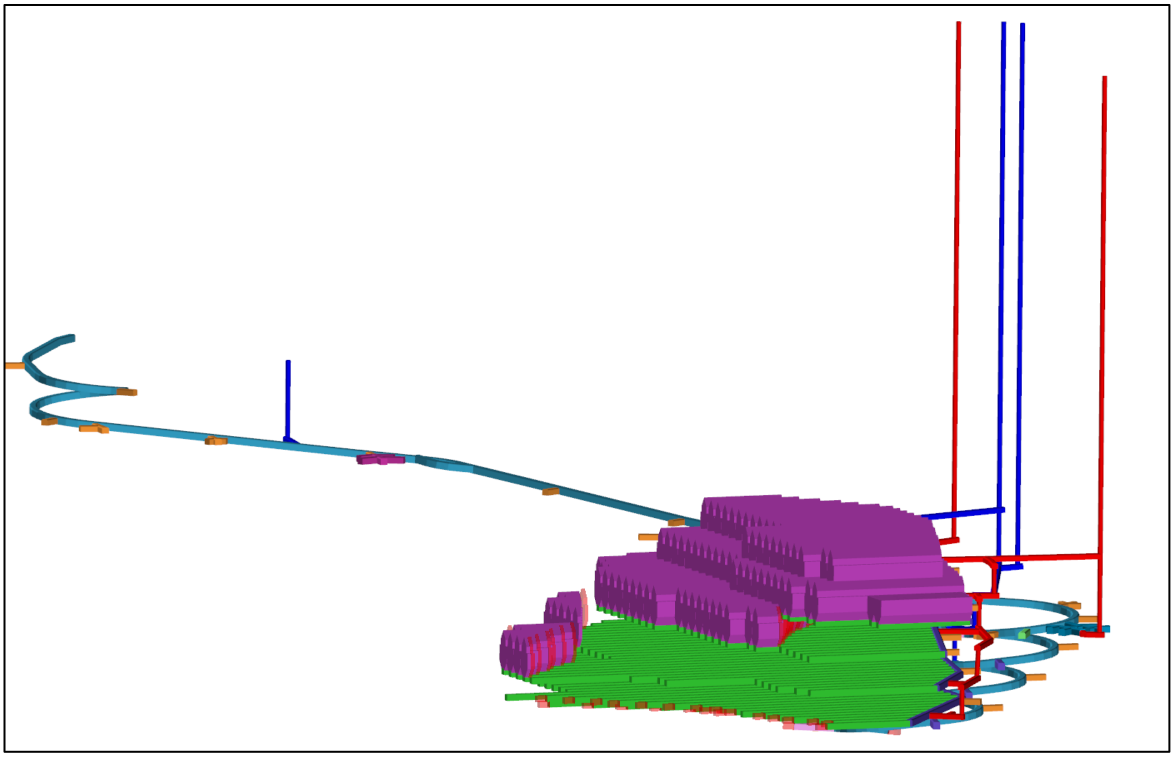
Source: AGP 2024.

Figure 16-65: Cactus East –Year 9 (looking Northwest)



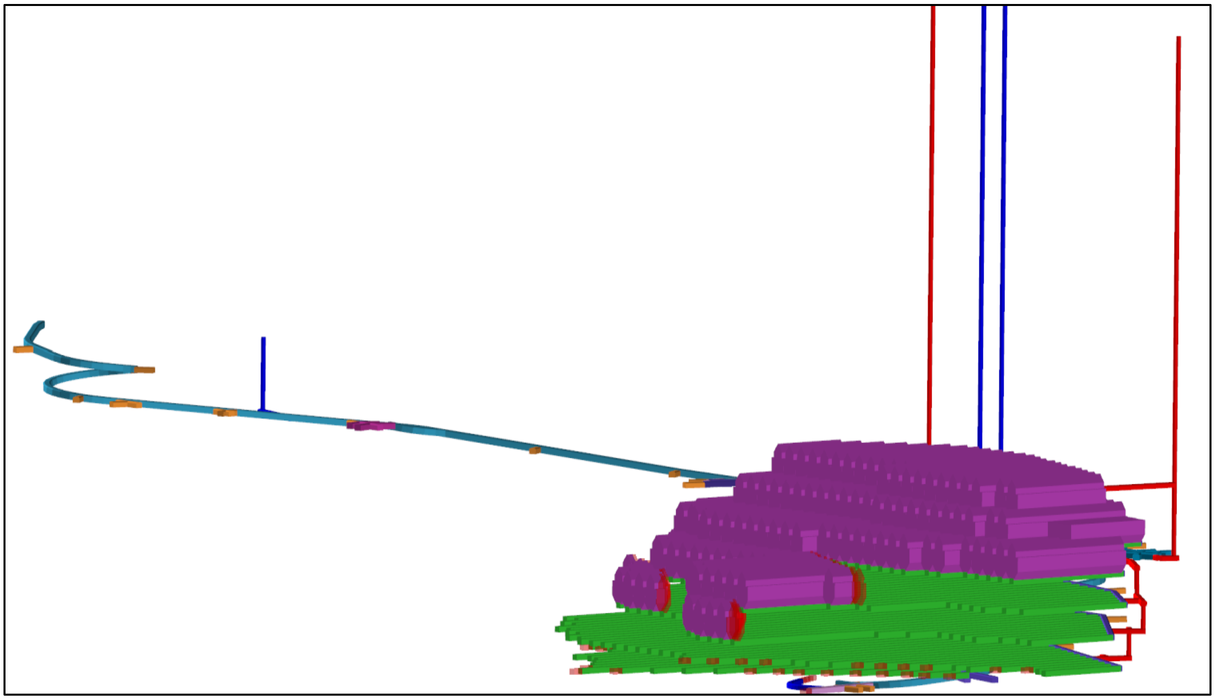
Source: AGP 2023.

Figure 16-66: Cactus East –Year 10 (looking Northwest)



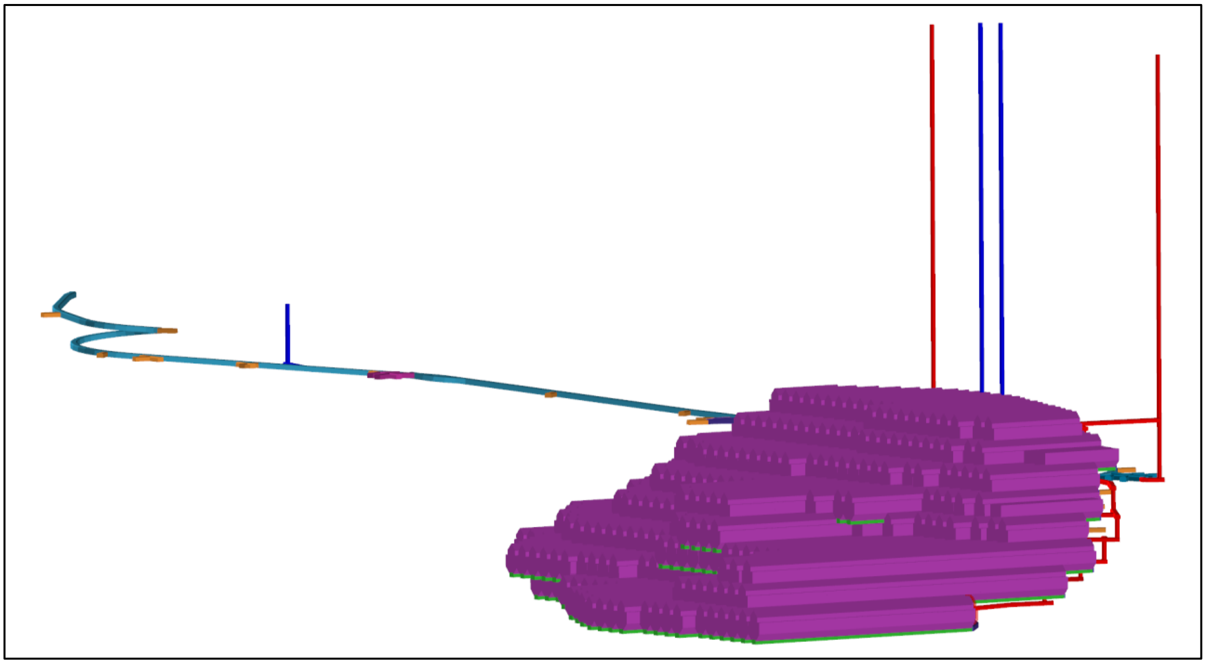
Source: AGP 2024.

Figure 16-67: Cactus East –Year 11 (looking Northwest)



Source: AGP 2024.

Figure 16-68: Cactus East –Year 12 (looking Northwest)



Source: AGP 2024.

Figure 16-69: Cactus East –Year 21 (Final Underground Year) (looking Northwest)

17 RECOVERY METHODS

The basis of the design for this study is a daily throughput of 65,753 tons of feed material per day placed on the heap leach pad, a pregnant leach solution (PLS) flowrate of 12,000 gpm and a copper cathode production of 60,000 ton per year. The cathode production will expand to 120,000 ton per year in year 4.

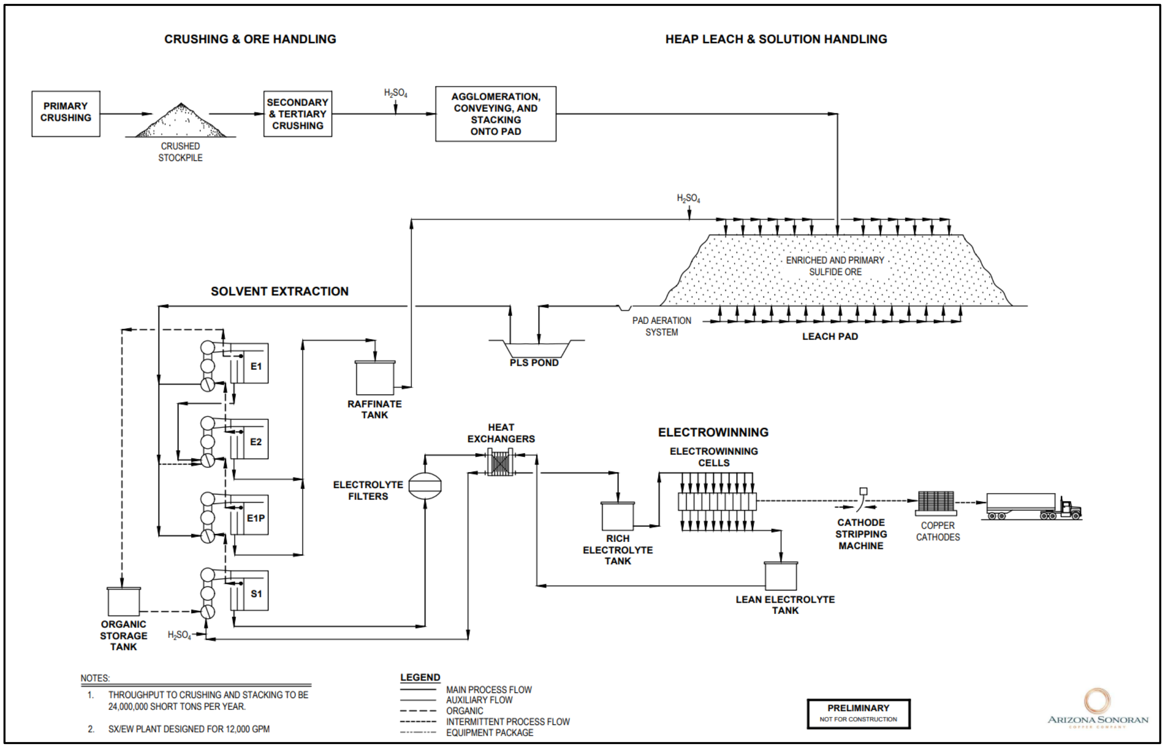
Feed material sources considered in this report include:

- Mine stockpile which includes oxide and lower grade sulfide material containing primarily copper mineralization.
- Cactus West open pit containing oxide, enriched and primary sulfide material.
- Cactus East (underground) which contains sulfide material.
- Parks/Salyer plus MainSpring (open pit) which contains oxide, enriched, and primary sulfide material.

Based on the metallurgical tests and analyses described in Section 13 of this report the materials are believed to be suitable for treatment in a heap leach, solvent extraction, and electrowinning (SX/EW) process facility to produce copper cathodes at LME Grade A quality standards ASTM B115-10 - Cathode Grade 1.

17.1 PROCESS PLANT DESCRIPTION AND FLOWSHEET

The Cactus Mine process plant will consist of a three-stage crushing plant ahead of heap leach. The pregnant leach solution (PLS) will be processed in a solvent extraction (SX) and electrowinning (EW) plant. The SX/EW plant process design will include three extraction settlers, one strip settler, a tank house, and initial electrowinning cathode capacity of 60 kt/y. The electrowinning will be expanded in year four (4) doubling in size to a capacity of 120k t/y. Figure 17-1 provides a conceptual overview of the process.



Source: M3 Engineering, 2024.

Figure 17-1: Process Flowsheet (Conceptual Flow Diagram)

17.1.1 Crushing

Material mined will be transferred by haul truck to the crushing circuit where it will be crushed down to P80 ¾-in. Product from the crushing circuit will be conveyed to agglomeration drums, mobile transfer conveyors, and mobile radial stacker to be stacked in 30 ft lifts on the lined heap leach pad. The maximum height of the heap will be 250 ft. Leaching solutions containing dilute sulfuric acid will be pumped and applied to the top of each lift and allowed to percolate though the leach material. Copper is dissolved into the solution and reports to the PLS pond.

The primary crusher will be a sizer capable of processing 2,740 t/h. Material will then be conveyed to the secondary and tertiary crushing circuits. Final product will have a P80 size of ¾”.

Once crushed, all material will be agglomerated using three agglomeration drums with the overall capacity of 2,740 t/h. Agglomerated material will be conveyed to the leach pad by overland tripper conveyor and tripper car tied to a series of mobile grasshopper conveyors, index conveyor, and radial stacker.

Table 17-1 is a list of the conveying equipment that will be used to transfer from the primary sizer to the secondary/tertiary crushing plant, agglomeration, and then for placement onto the leach pad.

The crushing and conveying system included in the project design are based on used equipment that ASCU is currently negotiating the purchase of with an equipment broker for a facility located in Namibia. The broker AMKING based in Oroville, California has an exclusive agreement with Orano to sell the various assets that make up the Trekkopje project. The AREVA ORANO Trekkopje material handling facilities located in Namibia has an oversized throughput of 7.5k tph for the Cactus application criteria and is partially installed, however has not been commercially operated.

Table 17-1: Proposed Conveying/Stacking Equipment List

Conveyor Number	Qty	Description	Belt width (in)	Horizontal Length(ft)	Vertical Lift (ft)	Installed Motor Power (kW)
425-CV-310	1	Fine Crushed Feed Material Primary Crusher Discharge Conveyor	54	200	49	150
425-CV-311	1	Fine Crushed Feed Material Secondary Crusher Discharge Conveyor	42	200	49	100
425-CV-312	1	Fine Crushed Feed Material Tertiary Crusher Return Conveyor	42	200	30	100
425-CV-314	1	Fine Crushed Feed Material Overland Tripper Conveyor	48	3950	13	373
425-CV-315	1	Fine Crushed Feed material Tripper Car	54	32	10	37
425-CV-319	1	Fine Crushed Feed Material Overland Conveyor	48	2000	98	373
425-CV-366-393	28	Fine Crushed Feed Material Portable "Grasshopper" Conveyor	54	151	10	56
425-CV-394	1	Fine Crushed Feed Material Index Feed Conveyor	54	138	11	112
425-CV-395	1	Fine Crushed Feed Material Index Conveyor	54	134	0	56
425-CV-396	1	Fine Crushed Feed Material Radial Stacking Conveyor	54	144	26	112
NA	1	Electrical Control Design and Supply				

The Trekkopje project MAXI Phase represents the largest fraction of the installation and incorporates all mechanical and electrical gear specific to twin Primary Crusher Relocatable Sizer Stations, twin secondary/tertiary crushing and screening circuits, three parallel agglomeration circuits, all interconnecting in-plant conveyors and feed mechanisms for a combined design capacity of 7,870 st/h. This system includes both a plant compressed air system and uninstalled Donaldson dust extraction system with six separate baghouses which were intended to provide collection at the various process steps and material transfer points. Figure 17-2 shows the Trekkopje crushing and screening plant.

The processing plant was designed to crush feed material at a rate of 7,870 st/h to a product size of 100% passing 1.5”. The crushing and screening plant consists of two parallel circuits from primary through to tertiaries, each circuit with a throughput design capacity of 3,935 st/h. Although the crushing/screening plant is sized for the full 7,870 st/h production rate, the leach pad equipment of interest is per the MIDI design and stacking equipment supply in this area was limited to one circuit sized for half tonnage, approximately 3,935 st/h.

An onsite contractor has determined an estimate for the disassembly, transport of 70 miles to the port at Walvis Bay and ocean freight to Houston USA.

Source: https://inventory.amking.com/, 2024.

Figure 17-2: Trekkopje Crushing and Screening Plant

17.1.2 Solvent Extraction

The pregnant leach solution from the heap leach pond will be pumped to a copper SX/EW plant for processing. The SX/EW plant will be capable of producing initially up to 60,000 ton/y of copper cathodes. The SX plant has a design capacity of 12,000 gpm. The electrowinning circuit will expand in Year four (4), doubling in size so the overall plant capacity will increase to 120,000 t/y of copper cathodes. The first step is termed extraction; and the second step, stripping. Extraction is done in series parallel configuration with countercurrent flow of the organic and aqueous phases. The copper in the PLS is preferentially exchanged for acid (hydrogen ion) in the organic extractant reagent, increasing the copper in the organic phase from 1.5 to 3.5 g/L, while the acid in the organic phase decreases by an equivalent (stoichiometric) amount. The extractant reagent is very selective toward copper in preference to iron and other cations, implying that very little iron advances from extraction to stripping.

The process is reversed in the stripping stage as a result of the high acid strength (170 to 180 g/L) of the electrolyte. Copper in the organic phase transfers to the aqueous (electrolyte) phase in the stripping mixer settler, while acid from the electrolyte transfers to the organic phase. This acid is generated as part of the anode reaction in the EW cells. The stripped organic returns to the extraction circuit to extract more copper, while the rich electrolyte advances to the EW circuit.

The solvent extraction plant is intended to be operated in a series parallel configuration with a single stage of stripping. Two minutes mixing time per mixer is anticipated. No wash stages or after-settlers are anticipated or included in the design. A loaded organic tank and a diluent storage tank are located near the solvent extraction mixer settlers. A foam-based fire protection system is included for the SX area and diesel back-up pump is included in the fire water system for the processing areas.

17.1.3 Electrowinning

Copper is plated from the electrolyte solution onto stainless steel plates in the EW operation. The electrolytic cells use insoluble lead alloy anodes with stainless steel blanks as the starter cathodes. When the desired thickness of copper has plated, the cathodes are harvested from the electrolytic cells and the copper is mechanically stripped from the blank. The pure copper cathodes are the final product, which are bundled and shipped for sale. Copper cathode bundles of up to 5,000 lb each will be sampled, weighed, labeled, and strapped then placed in a secure area for pick up by a copper broker for transport and sale.

Copper electrowinning is expected to initially require 160 cells containing 54 cathodes and 55 anodes per cell. The EW cells are connected to three (two operating, one installed standby) rectifier transformer units. A second electrowinning circuit of the same size will be installed in Year four (4) for the expansion. The second electrowinning circuit will also have three rectifier transformer units. Expected current efficiency is 92% operating at a nominal 28 amps per square foot current density. Cathode stripping from the permanent stainless-steel blanks will be done using a semi-automatic, robotic design stripping machine. The rectifier turn-up capacity is 20% to account for annual production changes and catch-up.

The plant design is based on common SX/EW technology utilizing a vendor who designs low capital cost and easily transportable equipment. Equipment will be modular and relocatable in nature to lower the final installed cost of the process plant.

Oxygen evolves from the EW cells as a result of the electrochemical reaction at the anode, creating acidic mists or aerosols of electrolyte and oxygen gas bubbles. Polypropylene balls and vented covers will be used to control mist concentrations immediately over the cells. Cobalt sulfate will be added to the electrolyte to passivate the anodes. Guar will be used to improve the quality of copper deposition on the cathodes. All these additives are widely used in the industry and are readily available.

17.1.4 Process Design Criteria

The overall Process Design Criteria used for the crushing, conveying and SX/EW facilities is provided in Table 17-2.

Table 17-2: Process Design Criteria

Description	Units	Data	
		Nominal	Design
Site Data			
Location		Casa Grande, AZ	
Elevation	ft	1,400	

Description	Units	Data	
		Nominal	Design
Crushing & Heap Leach Throughput			
Throughput	t/y	24,000,000	
Throughput	t/d	65,753	
Grade			
Average – Initial	% Cu	0.328	
LOM	% Cu	0.458	
Annual Production			
Production (Copper Cathode) - Initial	t/y	60,000	72,000
Production (Copper Cathode) - Expanded	t/y	120,000	144,000
Operating Schedule			
Operating Days per Year	d	365	
Shifts Per Day	shifts/d	2	
Hours per Shift	h/shift	12	
Operating Days per Week	d/w	7.0	
Overall Plant Utilization			
Crushing/Materials Handling	%	72	
SXEW	%	96	
Copper Recovery			
LOM Copper Recovery (% Total Copper)	%	73	
LOM Copper Recovery (% Soluble Copper)	%	86	
Sulfuric Acid Consumption (Gross)			
Oxide Heap Leach	lb/ton	22	
Enriched Heap Leach (Cactus East/West)	lb/ton	22	
Enriched Heap Leach (Parks/Salyer)	lb/ton	22	
Feed material Characteristics			
Feed material Specific Gravity	-	2.63	
Feed material Bulk Density	lb/ft3	114	
Maximum ROM Feed material Size	in	24	
Feed material Moisture Content	%	3.00	
Crusher Work Index (CWi)			
CWi	kWh/st	3.90	
Classification		Very Soft	
Bond Work Index (BWi)			
BWi	kWh/st	11.3	
Classification	-	Medium	
Abrasion Index (Ai)			
Ai	grams	0.047	
Classification		Lightly Abrasive	

Description	Units	Data	
		Nominal	Design
Heap Leach			
Ultimate height	ft	250	
Lift height	ft	30	
Primary cycle time	days	180	
Application rate	gpm/ft2	0.0025	
SX Plant			
PLS flowrate	gpm	12,000	
Raffinate flowrate	gpm	12,000	
Acid in raffinate	g/L	5	
Number of trains	Qty	1	
Number of extraction stages per train	Qty	3	
Number of stripping stages per train	Qty	1	
EW Plant			
Number of circuits	Qty	2	
Cells, per circuit	Qty	160	
Anodes, per cell	Qty	54	
Cathodes, per cell	Qty	55	
Current density	A/m2	346	
Rich electrolyte	g/L Cu	55.35	
Lean electrolyte	g/L Cu	40	
Acid in lean electrolyte	g/L H2SO4	180	

17.1.5 Process Plant Layout

The general layout of the proposed processing facilities is provided in Figure 17-3. An overall site plan is shown in Figure 17-4: Overall Site Plan

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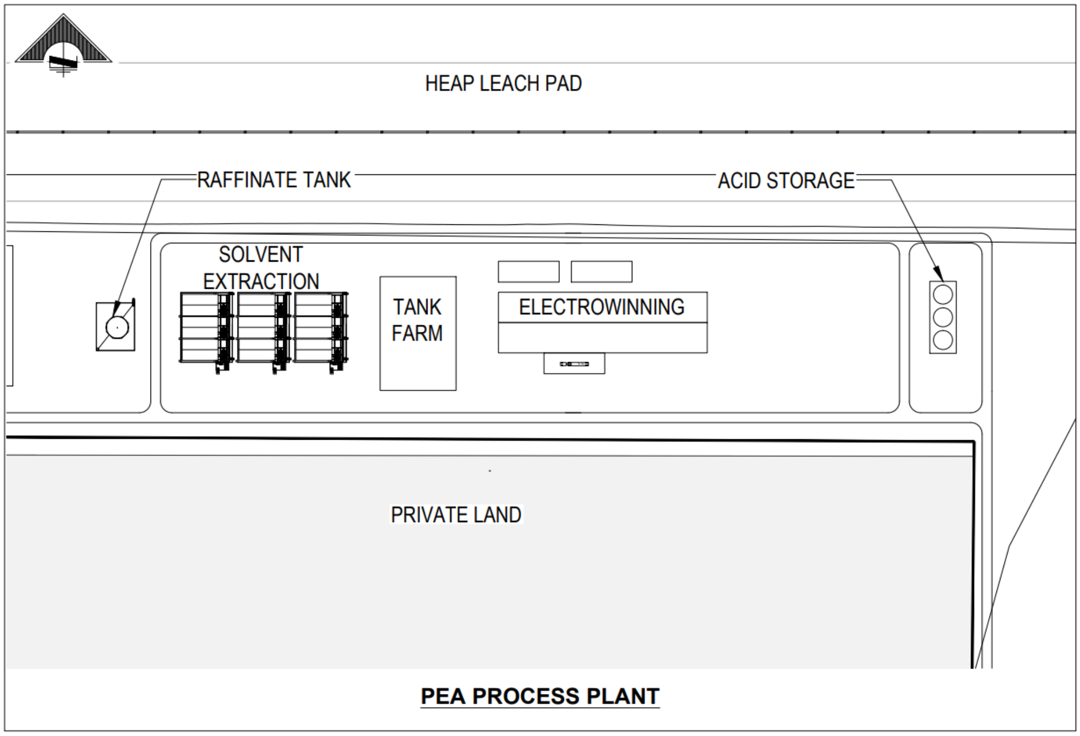
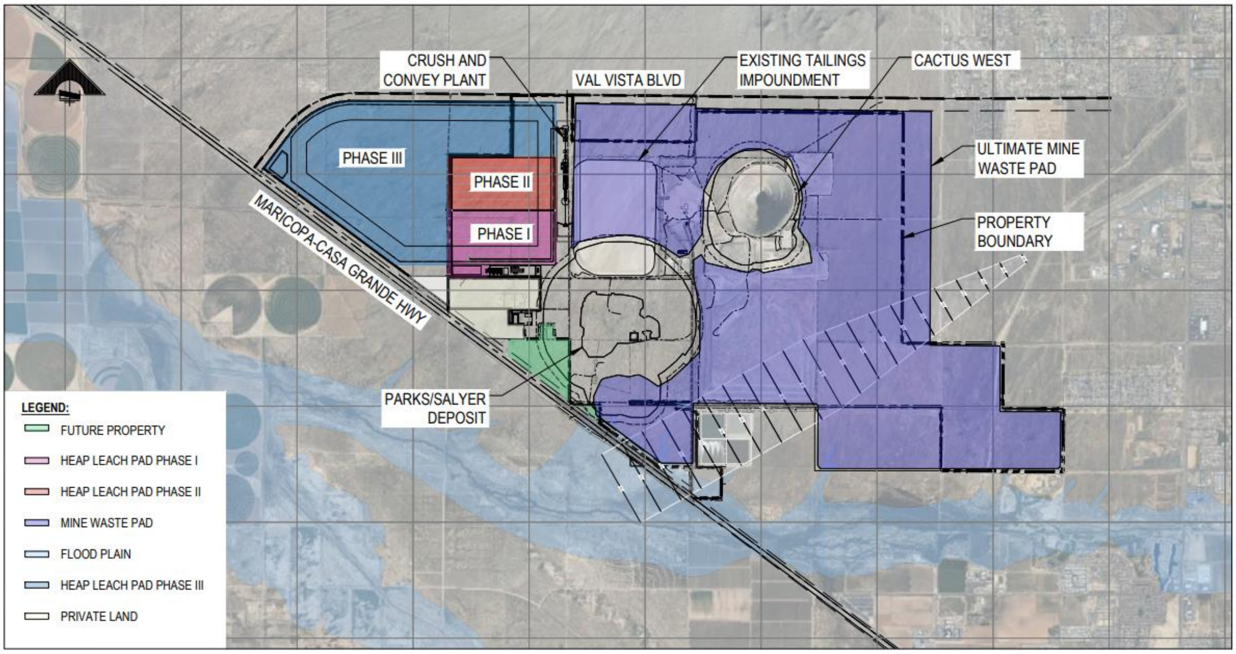


Source: M3 Engineering, 2024.

Figure 17-3: General Process Plant Layout



Source: M3 Engineering, 2024.

Figure 17-4: Overall Site Plan

17.2 REAGENTS, WATER, AIR, AND POWER

Projected reagent and operating consumable requirements for the Project are summarized as:

Energy:	2.2 kWh/lb Cu produced,
Makeup fresh water:	1,200 gpm,
Crushing wear material	0.24 pounds of steel per crusher kWh energy usage in crushing plant,
Sulfuric Acid:	378 t/d,
SX Reagents.	
Extractant:	37 gal/d,
Diluent:	269 gal/d,
EW Reagents.	
Cobalt Sulfate	2.28 lb/ton Cu produced,
Guar:	0.55 lb/ton Cu produced,
Air	TBD

17.2.1 Acid

The expected sulfuric acid consumption is 345 t/d on a 100% basis. The delivered concentration is expected to be 94.5%. The heap leach acid consumption estimate is included in Table 17-3.

Table 17-3: Acid Consumption Heap Leach Operations

Acid Consumption/Regeneration	Units	Consumption
Net Acid Consumption – Average of Life of Mine	lb H2SO4/ton feed material	11.5
	lb H2SO4/d	-756,160
Net Unit Consumption	lb H2SO4/lb Cu	0.71

The consumption includes 2 t/d to satisfy electrolyte bleed make-up and all other SX/EW requirements. This acid would report to the raffinate pond and be used in the leaching operation.

17.2.2 Water

The estimated average water requirement for the Cactus Mine Process Areas at average full production rate, is approximately 1,200 gallons per minute.

Water supply is described in Section 18.6 and already available via buried pipeline to the property boundary as a result of prior mining and commercial operations.

17.2.3 Air

Blowers will supply air to the heap leach pad at an estimated specific rate of 0.06 cfm/ft2. Requirements will be further defined in the next phase of the project.

17.2.4 Power

Approximately 60 MW of power will be required for the process areas as shown in Table 17-4. Detailed power consumption is described in Section 21.

Table 17-4: Projected Process Plant Connected Power

Area	Unit	Value
Crushing & Leaching	kW	15,803
SX/EW & Reagents	kW	33,619
Water & Air	kW	478
Total		49,900

18 PROJECT INFRASTRUCTURE

18.1 INTRODUCTION

The Cactus Mine project, located at the historic Sacaton Mine, is 40 road miles southeast of the Greater Phoenix metropolitan area and 3 miles northeast of the city of Casa Grande in Pinal County, Arizona. The site is accessible from West Maricopa Casa Grande Highway via Bianco Road, a 2.2-mile paved access road. The site will require the following facilities as shown in Figure 18-1: Infrastructure Site Plan

(Infrastructure Site Plan) and listed below:

- Mining facilities include an administration trailer, truck shop, explosives storage, fuel storage and distribution, feed material stockpiles, waste stockpiles, and truck wash slab.
- Process facilities include the crushing facilities, SX/EW process plant, reagents storage, process plant maintenance workshop, warehouse, and freshwater infrastructure.
- Heap leach pads, ponds, and associated equipment.
- Power supply, distribution, and associated electrical rooms.
- Ancillary facilities include a guardhouse, administration trailer, and weighing scale.

- Catchments, ponds, water wells, drainage, and other site water management infrastructure were not included at this time and will be detailed in the Pre-feasibility Study.

- The location of site facilities was based on the following criteria:
    - Locate facilities within the claim boundaries.
    - Consider locations of existing features such as roads and buildings. power lines, open pit, tailings, stockpiles, and waste rock areas.
    - Comply with flight path requirements outlined by nearby Casa Grande Municipal Airport and the Federal Aviation Administration (FAA) due to the mine site's proximity.
    - Utilize existing infrastructure such as buildings, access roads, and power supply to the greatest extent possible.
    - Locate the rock storage facilities near the mine pits to reduce haul distance.

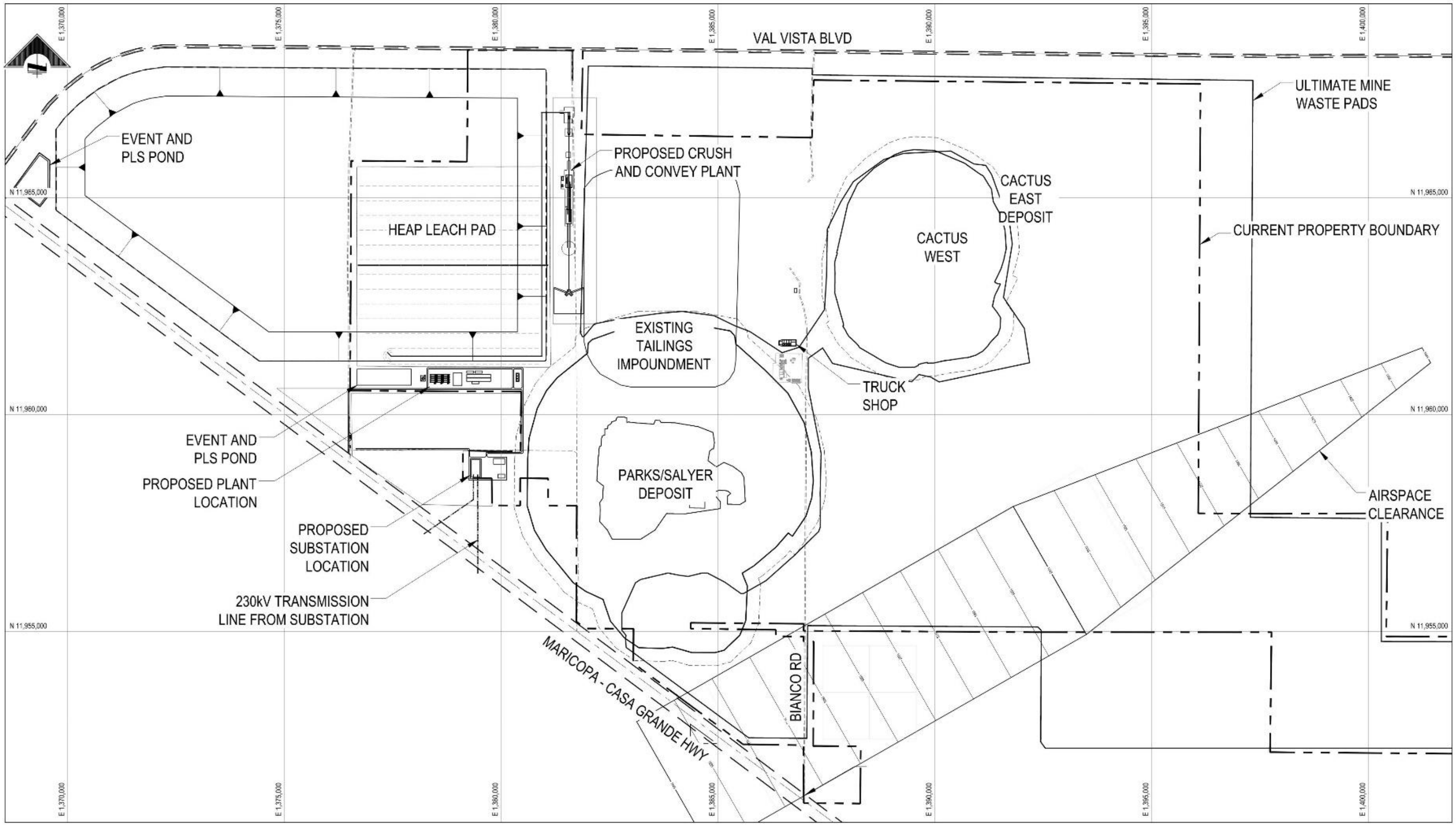


Figure 18-1: Infrastructure Site Plan

18.2 ROADS AND LOGISTICS

18.2.1 Site Access

The property is accessed from West Maricopa Casa Grande Highway that links the cities of Casa Grande and Maricopa, Arizona.

The following buildings and facilities will be accessible from the gravel access road that will be located along the existing North Montgomery Road:

- Control gate, Guard house and weigh scale.
- SX/EW plant and acid unloading/storage.
- Heap leach facility.

The existing West Bellvue Avenue will be used to access the main substation. The existing North Corrales Road will be used as access to the proposed crush and convey plant. The existing Bianco Road currently extends North to an existing building known as the Tru-Stone facility, as well as the new truck shop slab, the administration trailer, and mine operations.

Existing unpaved maintenance roads originating from primary access roads will be repaired to ensure suitable light vehicle traffic. Additional maintenance roads to connect explosive storage and water wells to existing unpaved roads will be constructed.

Copper bundles will be prepared, stored and loaded onsite for shipment by truck. The storage and loadout facilities are included as part of the processing plant. Existing roadways will be used for transport. No additional infrastructure is required to facilitate transport of product from the mine.

18.2.2 Airports

There is no airport at the project site. Nearby airport facilities are listed in Table 18-1.

Table 18-1: Nearby Airports

Airport	Distance to Site (Road Travel) (mi)
Ak-Chin Regional Airport	9.5
Casa Grande Municipal Airport	10.5
Eloy Municipal Airport	20.6
Chandler Municipal Airport	35.7
Coolidge-Randolph Municipal Airport	36.6
Phoenix-Mesa Gateway Airport	45.7
Phoenix Sky Harbor International Airport	48.7
Gila Bend Municipal Airport	63.5

Given the site's proximity to the Casa Grande Municipal Airport, the maximum height of the site facilities will be in accordance with the Federal Aviation Act of 1958. A summary of the relevant Federal Aviation Regulations (FAR) Part 77 Section 77.9 is provided as follows:

> *{77.9} – Any person/organization who intends to sponsor any of the following construction or alterations must notify the Administrator of the FAA.*

- Any construction or alteration exceeding 200 ft above ground level.
- Any construction or alteration within 20,000 ft of a public use or military airport that exceeds a 100:1 surface from any point on the runway of each airport with at least one runway more than 3,200 ft.
- Any construction or alteration within 10,000 ft of a public use or military airport that exceeds a 50:1 surface from any point on the runway of each airport with its longest runway no more than 3,200 ft.
- Any construction or alteration within 5,000 ft of a public use heliport that exceeds a 25:1 surface.
- Any highway, railroad or other traverse way whose prescribed adjusted height would exceed that above noted standards.
- When requested by the FAA.
- Any construction or alteration located on a public use airport or heliport regardless of the height or location.

18.2.3 Rail

There is an existing isolated rain spur that dead ends in front of the remaining processing plant building from historic Sacaton mining operations. It is not connected to the main line that runs parallel to the West Maricopa Casa Grande Highway. There are no current plans to reconnect or use the rail line.

18.2.4 Security

The site will be accessible year-round via the primary access road off West Maricopa Casa Grande Highway.

Access to the processing plant, mining areas, workshops, administrative trailer and other process facilities will be controlled by a control gate and guard house at the entrance of the site. The site has existing peripheral wire fencing.

18.2.5 Accommodation

Due to the close proximity to the town of Casa Grande and the city of Phoenix, personnel will be housed offsite.

18.3 BUILT INFRASTRUCTURE

18.3.1 Support Buildings

As shown in the site infrastructure layout in Figure 18-1: Infrastructure Site Plan

, the mine will require several support buildings. A list of support buildings is shown in the Table 18-2.

Table 18-2: Description of On-Site Buildings

Building Name	Construction Type	L (ft)	W (ft)	H (ft)	Area (ft^2)
Administration Building	Trailer	128	60	9	7,680
Communications, IT and Computing	Modular Building (In Mine Office)	20	12	9	240
Gatehouse & Weighbridge	Trailer	20	12	9	240

Building Name	Construction Type	L (ft)	W (ft)	H (ft)	Area (ft^2)
Plant Workshop and Warehouse	Pre-engineered building	144	74	26	10,656
Assay Laboratory	Trailer for Contractor	78	30	9	2,340
Mine Office	Trailer	175	60	9	10,500
Mine Maintenance Office	Trailer	48	34	9	1,632
Mine Truck Shop	Slab	140	80	50	11,200
Heavy Equipment Maintenance	Slab	131	107	26	14,017

18.3.2 Explosives Facilities

Explosives facilities are limited to a fenced area with a concrete pad. Electric power and water will be available for use by a registered explosives contractor.

18.3.3 Truck Shop and Truck Wash Pad

The truck shop and truck wash facilities are located adjacent to the existing Tru-Stone complex. The truck shop will be a slab without a roof.

The truck wash is an open area (without roof) located on the same platform as the truck shop.

18.3.4 Mine Office

The Mine office is a double wide trailer.

18.3.5 Administration Building

The Administration building is a double-wide trailer located near the SX-EW facility. It will be divided in three areas: plant office area, lunchroom, and infirmary.

18.3.6 Stormwater Controls

A Stormwater Management Plan was not developed for this study but will be conducted for the Pre-Feasibility Study (PFS).

18.4 POWER SUPPLY

A 230 kV overhead transmission line segment will be built and used as the main power supply to feed the main substation in Cactus Mine. The main substation will be rated at a voltage level of 230 kV. The approximate physical area the substation occupies is 300 ft by 500 ft. The substation will have a 230 kV bus where the incoming and outgoing sections of the transmission line will be connected. The 230 kV outgoing transmission line connects to the existing line for continuing service. The main substation is placed in a central area in the mine to facilitate the distribution of 34.5 kV overhead distribution power lines.

The main substation consists of two (2) 37.5/50 MVA 230 kV to 34.5 kV power transformers which feed a 34.5 kV switchgear with two (2) main breakers and one (1) tie breaker. Each main breaker in the switchgear will be fed with 34.5 kV from the secondary side of the 37.5/50MVA transformers. The 34.5 kV switchgear has eight (8) feeder breakers where six (6) of them feed electrical loads distributed in Cactus Mine and two (2) feeder breakers assigned as spare for future mine expansion. The main substation is arranged for redundant operation.

18.5 ELECTRICAL DISTRIBUTION

The substation will distribute power at a voltage level of 34.5 kV to all areas of Cactus Mine including Solvent Extraction and Electrowinning Area, Plant Services, Crushing/Conveying Facilities, Raffinate Pumps, and HLF Feed material. Table 18-3 shows the distribution of power to different areas of the mine.

Table 18-3: Electrical Load List

		Misc Loads	Connected Load		Operating Load		Annual Energy Consumption	
WBS	**Infrastructure**	**kW**	**kVA**	**kW**	**kVA**	**kW**	**HOURS**	**MWh**
1510	Administration Trailer	63	105	90	84	72	4,380	316
1610	Security Gatehouse & Weighbridge	9	15	13	12	10	8,760	90
1620	Plant Workshop and Warehouse	32	53	46	42	36	4,380	160
1630	Laboratory	23	39	34	31	27	4,380	118
1720	Main Substation	51	85	73	68	58	8,760	512
1910	Water Wells		260	224	221	257	8,760	2,253
2920	Mine Maintenance Office	22	36	31	29	25	4,380	108
2930	Mine Truck Shop	166	277	238	222	191	4,380	835
2940	Truck Wash Pad	44	74	64	59	51	4,380	223
2950	Heavy Equipment Maintenance	95	159	137	127	109	4,380	479
2960	Tire Workshop	26	43	37	34	30	4,380	130
3100	Primary Crushing		1,058	949	847	759	8,736	6,631
3300	Secondary Crushing		5,352	4784	3723	3325	8,736	29,047
4200	HLF Feed Material Handling Area		5,115	4,434	4,092	3,547	8,736	30,987
4300	Pregnant Leach Solution Management		355	319	141	127	8,736	1,109
4400	Raffinate Management		3,929	3,535	2,096	1,886	8,736	16,476
5000/6000	Solvent Extraction & Electrowinning Area (SX/EW)		33,911	33,602	14,044	13,871	8,736	121,177
7000	Reagents		130	104	53	42	8,736	367
8500	Plant Services		621	517	315	263	8,736	2,298
	Drills and Shovels		5,968	5,371	4,774	4,297	8,736	37,539
2500	Underground Cactus East	15,985	18,806	16,173	15,045	12,939	8,760	113,342
2600	Underground Parks/Salyer	18,985	18,806	16,173	15,045	12,939	8,760	113,342
TOTAL		34970	104051	95961	70175	63995	122352	559674

Distribution lines will be constructed at the project site to provide stepped-down power to the site administration, process facilities, underground mine, and well water distribution system.

Individual E-house/MCC buildings and MV to LV transformers are located strategically around the site to provide power and control to individual areas and processes, and to minimize distance of LV power runs.

18.6 WATER SUPPLY AND MANAGEMENT

Water Supply and Management was not developed for this study but will be conducted in detail for the Pre-Feasibility Study (PFS).

18.7 HEAP LEACH FACILITY

The HLF will be constructed in three phases, has an approximate final footprint area of 70.3 M ft^2 and will support approximately 773,3 Mton (short tons) of leach material. It is designed to be operated as a fully drained system with no leachate solution storage within the pad. The leach pad has a composite liner system to mitigate seepage to the environment. Above the liner system is a series of solution collection pipes encapsulated in an overliner to rapidly collect pregnant solution and transport it to the double lined pregnant leach solution (PLS) pond(s). There is no raffinate pond associated with this HLF as the raffinate solution will be routed to a tank for reapplication to the HLF. In addition, PLS pond(s) will be double lined with capacities to contain the 100-year, 24-hour storm event, operational pumping heads required, and emergency 24-hour drain-down during power outages (with back-up power sources installed) for the total pad design during the various phases of operations. Crushed feed material materials will be stacked in 30 ft lifts to a maximum height of 250 ft with overall exterior slopes of 3.0:1. The collected pregnant solution will be pumped to the SX/EW circuit.

Phases 1 & 2 are located west of the existing tailings facility. In general, the HLF is a gently sloping topography from the northeast to the southwest at an approximate slope of 1% which facilitates phased construction of the HLF as needed. Phase 1 will have an area of 10.37 M ft^2. and hold 77,1 Mton of feed material. Phase 1 will support two types of material, oxide feed material and fine crushed feed material. Construction of the first phase will start in year -2 and will have an operating time of 1.75 years before the stacking and leaching cycle limitations require the construction of Phase 2 to meet production needs.

Consecutive phase 2 will be constructed and extended to the north of Phase 1. The following phase 3 will be constructed in various phases as needed starting around year 8 of operations as needed to sustain mining and leaching operations. Sequencing of Phase 3 of the HLF expansion will depend on land acquisitions and timing. Table 18-4 shows the capacities and stacking times of each phase. Figure 18-2 shows the location of each of the phases of the HLF and Ponds.

The designed feed material production will be approximately 65,700 ton/d for the first nine years and increase to 86,300 ton/d after that for the LOM.

Table 18-4: HLF Capacity by Phase

HLF Phase	Capacity (tons)	Avg. Throughput (Mt/y)	Stacking time (y)
Phase 1	77,035,131	24.0	~3.2
Phase 1 & 2	111,193,324	24.0	~4.6
Phase 3	585,124,797	24.0	24.4
Total	773,353,252		32.2

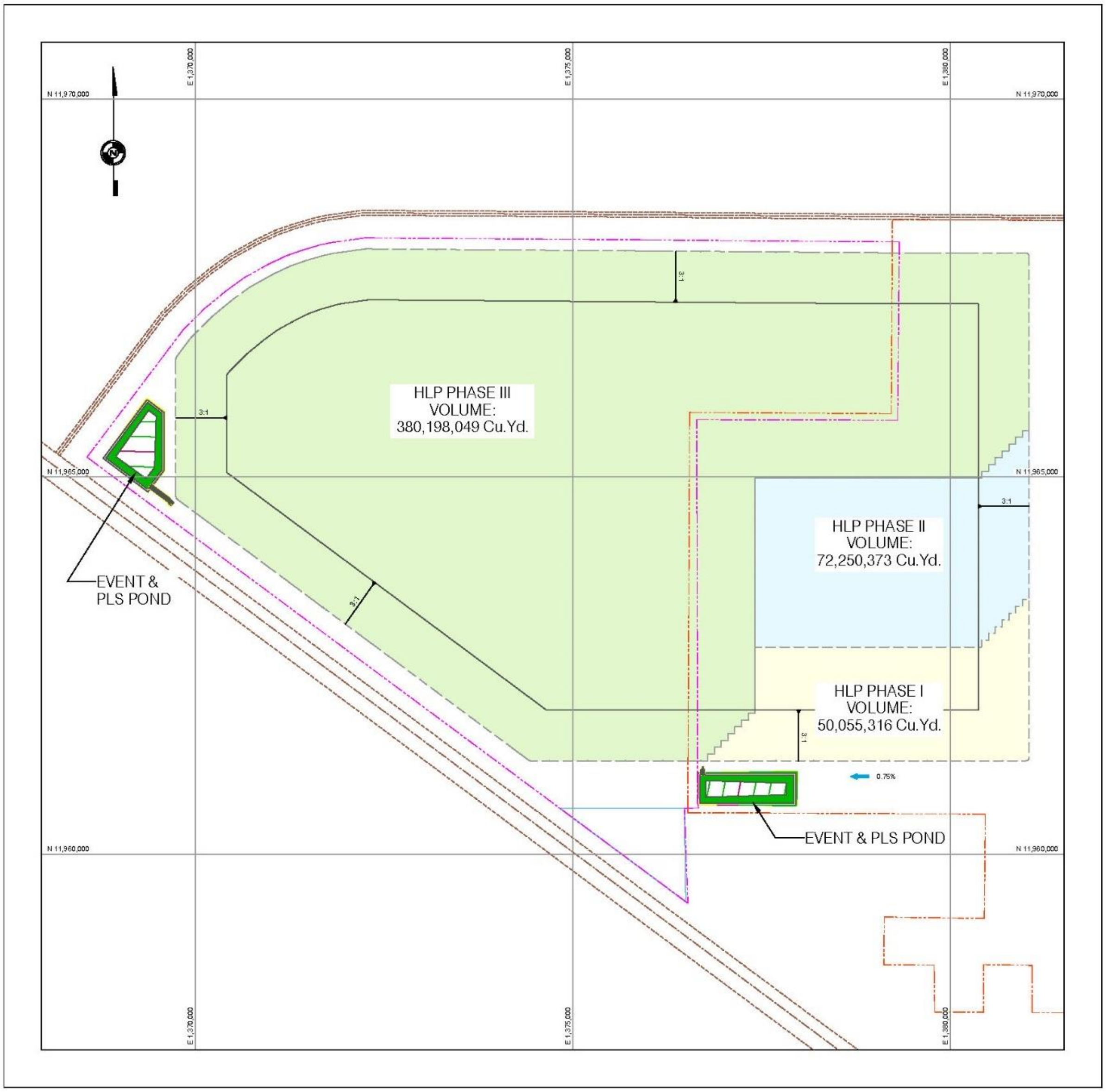


Figure 18-2: Heap Leach Facility Phasing

18.7.1 Leach Pad Liner System

The liner system involves placing a 1 ft (minimum) thick low permeability soil layer followed by an 80 mils thick smooth Low Linear Density Polyethylene (LLDPE) geomembrane that will be deployed on top of this soil liner. It shall then be covered with 1.5 ft thick overliner drainage layer preferably a select durable feed material crushed to P80 of -3/4 inch with less than 5% fines -200 mesh.

18.7.2 Low Permeability Soil Layer

Soil liner material (low permeability soil that consists of clayey soils such as clay, clayey sand, and clayey gravel) shall be conditioned to adequate moisture and compacted according to the requirements indicated in the Technical Specifications. The upper 4 in of this soil liner layer shall be free of angular gravel greater than 1 in that may have the potential to damage the geomembrane liner during installation or feed material stacking operations. According to the quantity estimation, the volume of the low permeability soil liner material necessary is approximately 2,727,915 yd^3 for all 3 phases of the HLF with Phase 1 requiring 366,746 yd^3. It is indicated by ASCU that construction materials for the low permeability soil layer will be sourced from the existing stockpiles and/or from select overburden stripping materials. However, moisture condition of the soil liner will be necessary to compact the soil liner material to achieve the required permeability and utilize the suitable soil liner materials coming from all sources. The soil liner materials shall be pre-screened and evaluated to verify the requirements indicated in the technical specifications.

18.7.3 80 MIL LLDPE Smooth Geomembrane Liner

For the leach pad liner system, a smooth low linear density polyethylene (LLDPE) geomembrane of 80 mils in thickness will be utilized. This type of geomembrane has been chosen due to its flexibility and puncture resistance against the load (or weight) of the feed material.

The contractor shall provide temporary and permanent anchorage of the outer edges of the geomembrane. Temporary anchorage may consist of sandbags or other ballast material which are necessary for the liner materials to avoid significant displacements and uplift due to high winds during deployment and welding activities.

Permanent anchorage will consist of placing the outer edges of the geomembrane in anchor trenches backfilled and compacted with the spoils from the trench excavation.

18.7.4 Overliner

A 1.5 ft minimum thick overliner layer shall be placed over the geomembrane to protect geomembrane liner and solution collection pipes from possible damage caused by transport and feed material stacking system on the pads. This overliner drainage material will be increased to cover the primary collection pipes that exceed the 1.5 feet thick cover material allowing for a minimum of 0.5 feet thickness of cover over these primary collection pipes in the solution drainage collection system. The overliner also serves the purpose of facilitating solution collection by acting as a drainage element.

Overliner materials shall consist of selected and durable granular feed material with preferably 1 to 2 orders of magnitude greater permeability coefficients than the feed material to be leached. This overliner material shall be placed around the collection system to protect pipes and geomembrane liner. The origin of this overliner material shall be delimited to the existing stockpile area and/or select material from open pit stripping materials.

18.7.5 Solution Collection System

The purpose of the solution collection system, which will be installed in the base of the heap leach pad to provide a rapid evacuation of leach solution and storm water that reaches the liner system. The pipe network has been designed to minimize the solution height over the liner system per regulations to reduce risk of leak migration into the subgrade, as well as to facilitate and accelerate solution collection.

The leach pad solution collection system has been configured to independently collect flows coming from each phase of the leaching process. Defined slopes in the grading plan direct the solution by gravity to the PLS pond(s) located within the current property boundaries at the south-west corner for Phase 1 and 2, and similarly for the additional solution pond at the south-west corner for Phase 3 HLF.

The internal HLF solution collection system consists of perforated dual wall header pipes of 20-inch diameter and perforated dual wall lateral pipes of 6-in diameter extending out from the header pipes in a “herring bone” configuration. At the collection point of each cell the primary solution collection pipes will transition to 20-inch non-perforated dual wall pipes with watertight bell and spigot connections. These non-perforated primary solution collection pipes will be installed in a geomembrane lined ditch (secondary containment) and connected to the main single wall solution pipes to convey pregnant solution along the south perimeter of the phased HLF facilities conveying solution flows to the PLS and Event ponds. The piping diameter for the perimeter solution varies. For Phase 1 & 2 solutions will be conveyed in a 24-inch diameter single walled pipe with bell and spigot watertight connections at a grade of 0.75%. For Phase 3, this pipe diameter changes to a 36-inch diameter pipe due to the reduced pipeline grade of 0.16%. This lined channel will also serve to convey excess storm water run-off from the HLF to the LS pond which has been designed for the 100-year, 24-hour storm event.

18.8 PONDS

The double lined PLS pond for Phase 1 and 2 and the double lined Solution collection pond for Phase 3 pad expansion been designed to accommodate the following volumes listed in the table below (see Table 18-5).

Table 18-5: PLS Ponds Design Criteria

POND CAPACITY	Units	PHASE 1-2	PHASE 3
100-YR; 24-HR Storm Runoff	cu.ft.	3,227,719	4,092,475
Operational Dead Storage Allowed - 3 ft	cu.ft.	1,952,225	2,354,848
Operating Volumes - 6hrs	cu.ft.	577,500	577,500
Drain down Maintenance - 6hrs	cu.ft.	577,500	577,500
100-yr Direct Precipitation Volume 3.68"	cu.ft.	141,833	153,272
Emergency Storage for 24-hr Draindown	cu.ft.	2,310,001	2,310,001
REQUIRED POND VOLUMES	cu.ft.	8,786,778	10,065,596
VOLUME TO FREEBOARD	cu.ft.	8,997,102	10,370,808

PLS ponds are designed to provide storage for solution to be pumped to the SW/EW plant as well as containment of the storm water run-off and emergency drain-down due to extended power outages. The PLS pond is situated immediately down-gradient in the southwest corner of Phase 1 & 2 HLF and solution is conveyed to this pond through the collection system pipes by gravity. During major storm events, excess solution will be diverted to the PLS pond(s) via spillways from each individual cell of all the phases of the HLF into the main solution collection channel. For minor storm events the runoff will be mixed at the cell collection points with the PLS solution and diverted to the PLS ponds via the main solution collection pipes in the solution collection channel. A second double lined PLS pond will be constructed when Phase 3 comes online. The design criteria considered for the process ponds capacities are shown in Table 18-5:

The liner system for the double lined PLS ponds will include a leak collection and recovery system (LCRS) and consists of the following components (from top to bottom):

- 60 MIL HDPE Smooth Geomembrane Liner.
- Geonet (including a Leak detection sump, riser, and pump located in a corner of these ponds).
- 60 MIL HDPE Smooth Geomembrane Liner.
- Suitable soil liner.
- Prepared Subgrade.

18.9 GEOTECHNICAL PARAMETERS

18.9.1 Alluvial, Conglomerate, and Feed material

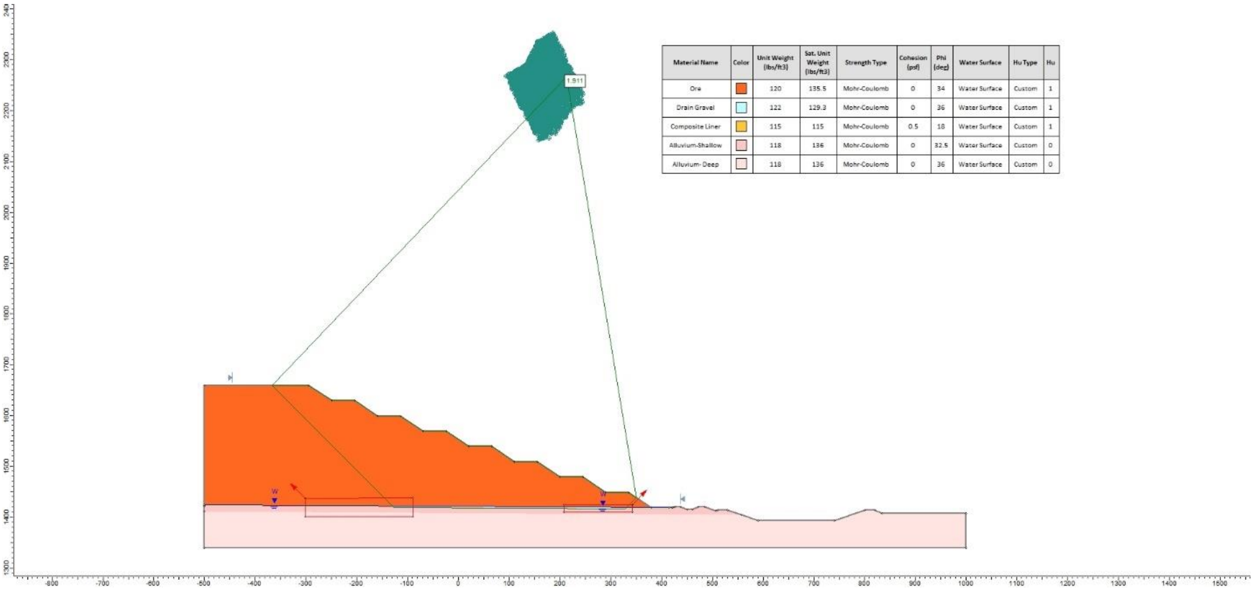
Previous geotechnical investigations for HLF locations were completed on similar soils within the bounds of this Cactus project and are used for this PEA. Additional geotechnical investigations are recommended for advancing this PEA to feasibility level study. These investigations and laboratory tests results were used to estimate the physical and mechanical properties of the alluvial and conglomerate subgrade below the HLF. In addition, the geotechnical investigations also looked at the physical and mechanical properties of the historical feed material stockpile. The results of the geotechnical parameters used in previous investigations are shown in Table 18-6.

Table 18-6: Geotechnical Parameters

Description	Wet Density (lbs/ft^3)	Sat Density (lbs/ft^3)	% Gravel	% Sand	% Fines	C' (psf)	Friction Angle Φ
Feed material	114	114	42	51	7	0	36
Alluvial	121	124	1	61.5	37.5	0	31
Conglomerate	127	131				2506	34

18.10 STABILITY ANALYSIS

One section was identified as a critical section for long-term slope stability analysis in a North South section through Phase 1 and 2 and the PLS pond. This section covers the extents of the HLF Phase 1 & 2. Analyses were undertaken for both static and pseudo-static (earthquake loading) with the calculated factors of safety (FOS) higher than the minimum required values per the BADCT of 1.3 FOS for static, 1.0 FOS for pseudo-static. Pseudo-static stability analysis for angle of repose slopes will tend to a FOS<1.0 for the infinite angle of repose slopes of the stacked feed material between the setback benches of the feed material lifts. The overall stacked slope is 3H:1V with the angle of repose estimated at 1.5H:1V. Angle of repose slopes will unravel and be contained on to the "catch bench" of 45 feet width with adequate capacity to contain the raveled slope material. The feed material should be maintained in an unsaturated state and hence there should not be any phreatic surface development within the feed material. The Phreatic surface will be developed in the drainage collection material at the base of the heap facility with a maximum estimate height of 2 feet above the geosynthetic liner. This phreatic surface was used in the stability analysis. Figure 18-3 below shows the configuration of the heap slope for Phase 1-2 to a maximum height of 240 feet. Material properties used in the stability evaluation are shown in Figure 18-4 below.



Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type	Hu
Ore	🟧	120	135.5	Mohr-Coulomb	0	34	Water Surface	Custom	1
Drain Gravel	🟦	122	129.3	Mohr-Coulomb	0	36	Water Surface	Custom	1
Composite Liner	🟨	115	115	Mohr-Coulomb	0.5	18	Water Surface	Custom	1
Alluvium-Shallow	🟥	118	136	Mohr-Coulomb	0	32.5	Water Surface	Custom	0
Alluvium- Deep	▢	118	136	Mohr-Coulomb	0	36	Water Surface	Custom	0

Figure 18-3: Heap Leach Facility Phasing – Block Static Analysis

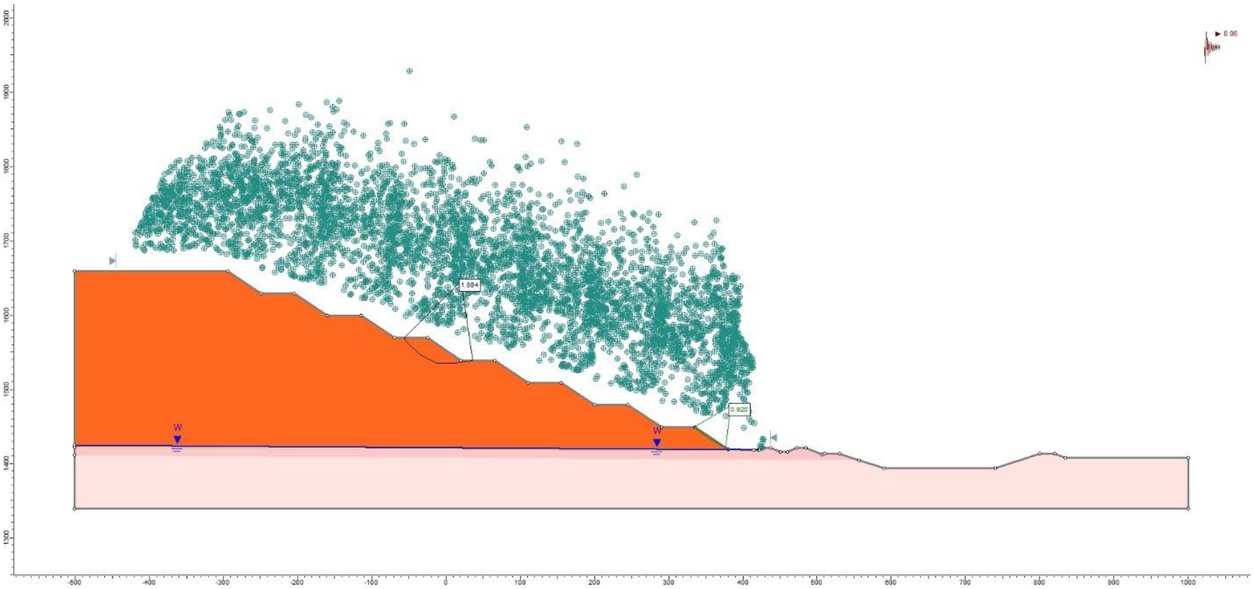


Figure 18-4: Heap Leach Facility Phasing – Non-Circular search Pseudo- Static Analysis

Table 18-7: Stability Analysis Results

Analysis Type	Factor of Safety (FOS) Static	Factor of Safety (FOS) Pseudostatic
Block Sliding	1.911	1.639
Non-Circular Search	1.044 See note 1	0.920 See note 1

Note 1: These results indicate raveling of angle of repose slopes between benches and trend to a FOS = 1.0 for static and FOS <1.0 for pseudostatic analysis.

The stability analysis indicates the heap slopes are satisfactory and comply with relevant regulations pertaining to slope stability of the HLF as shown in Table 18-7.

18.11 WATER BALANCE

18.11.1 Introduction

The water balance model for a heap leach pad operation is essentially a water budget that tracks all of the water entering and leaving the lined containment system. Sources of water entering the system include pore water delivered with the feed material, precipitation falling as rain or snow, and any fresh water (makeup water) added to the system from outside the lined limits of the pad. System losses are a bit more complicated and include three basic categories of loss.

- Evaporative losses
- Losses to surface tension
- Extraction losses

Evaporative losses include the solution application system (2% to 3% volume loss for sprinklers or about a 0.5% loss for drip emitters), lake evaporation from the free water surface in any of the process ponds (pregnant, intermediate, or barren) or storm ponds, and potential evaporation from any wetted soil surfaces (primarily the portion of the feed material heap under active leach, but potentially any portion of the feed material after rainfall events). In order to calculate the volume evaporated from pond surfaces, the surface area of each pond must be known at a particular point in time. Therefore, all sources of new water added to the system must be routed within the system and the net increase that must go into storage allocated to the various ponds. In order to avoid "circular references" and a mathematically in-determinant condition, a consistent point in time must be selected for reconciliation. In the case of our water balance model, this is the end of each month. Therefore, evaporative losses from ponds are determined by computing the volume stored in each pond at the end of the prior month, calculating the depth and area of each pond, and using that calculated surface area to calculate the volume of lake evaporation from each pond. Then applying the calculated change in volume along with all other losses and additions, a new volume is computed for the end of the current month. This allows a new depth and area to be calculated and the process repeats itself.

Evaporative losses on soil surfaces must be handled differently, as there is no well-defined free water surface. The evaporative loss will be limited by one of two factors:

1. The maximum "potential" evaporation, or the greatest depth (volume per unit area) that could be evaporated under the weather conditions for that month given an unlimited supply of water, or
2. The maximum amount of water available.

In the case of an operating heap leach pad, the area under active leach is assumed to be continuously wetted by sprinklers or emitters with a limitless supply of water. Therefore, the full potential depth of evapotranspiration is applied to that area. Outside of the area under active leach, the feed material surface is assumed to be dry, except for that fraction of the month's rainfall events that coated the soil particles or infiltrated into the soil and did not run off. This volume of water is assumed to be available during that month for evapotranspiration. Any portion of the infiltrated water volume that is not lost to evapotranspiration during the same month it falls is assumed to be beyond the reach of evapotranspiration in the following month and is routed into the solution collection system along with the other applied solution. Therefore, during months where evaporation/evapotranspiration greatly exceeds rainfall, rain events add nothing to the water volume stored in the system. However, during months where rainfall greatly exceeds evaporation/ evapotranspiration, a significant volume of water may be added to storage.

Losses to surface tension involve changes in the water content of the feed material during operations. The feed material is not delivered to the heap leach pad in a truly dry condition, but rather contains some relatively small amount of moisture in the pore spaces that is held in place by surface tension. This delivered water content is typically less than the "specific retention" of the feed material. The specific retention is a threshold moisture content that marks the position on the soil water characteristic curve where the soil begins refusing to release its water to gravity (i.e., below that moisture content it simply will not readily drain). Therefore, in order to get the feed material to release the applied solution carrying the dissolved precious metals to the solution collection system, it is necessary to raise the moisture content of the soil to a level above the specific retention. For example, if the delivered moisture content of the feed material is at 8% moisture by weight and the specific retention of the feed material is 10% by weight, then the difference of 2% is "soaked up" by the feed material upon first wetting and is considered for all practical purposes to be permanently lost or locked up in storage in the feed material. However, even at the specific retention moisture content, the feed material will not pass the applied solution on to the solution collection system. Unsaturated hydraulic conductivity of the feed material is a function of the moisture content. The moisture content of the feed material must be increased to a level that allows the water to be passed through the feed material at the same rate that it is being applied so that the system is in equilibrium or in balance. If for example this operating moisture content were 14% by weight, then an additional 4% (14% minus the specific retention of 10%) would be required to bring the feed material under active leach into equilibrium. Once an area is no longer actively being leached (i.e., no new solution is being applied), then the feed material would drain back down to its specific retention moisture content and release the 4% difference back into the solution collection system. The water balance model tracks these changes in moisture content in the feed material and accounts for the addition and subtraction of water volume in the system. Once all additions and losses to the volume of water stored in the system have been estimated and accounted for at the end of the month, the model evaluates whether or not there is sufficient water available in storage to maintain the solution application rate for the next month.

Heap leach pads are designed as fully lined containment systems that in theory release nothing back into the environment. Solutions that are not stored within the feed material itself as described in the earlier paragraphs, are routed through the system and stored in various lined ponds. However, should extreme events exceed the storage capacity of the system, then the excess must be extracted from the system. The water balance model computes any excess volume detected in the system and routes that volume into a phantom pond that is labeled "treatment and discharge". This allows the model to estimate both the frequency and size of events that could exceed the design capacity of the pond storage and require extraction of water and a reduction in storage through the treatment and discharge of solutions.

Figure 18-5 shows a schematic of the heap leach pad with respect to water balance. Using the feed material heap as a control volume, the following equation may be written:

$$SC = SA + Pi - Es - Ed - (Wo - Wi) + Wd$$

Where:

SA = Water available for solution application

SC = Solution Collection

P = Precipitation

Pi = The infiltration component of precipitation

Es = Evapotranspiration from soil

Ed = Evaporative losses from sprinklers/emitters (the distribution system)

$(Wo - Wi)$ = Water captured in the feed material from the difference in initial and operating water contents

Wd = Water returned from the feed material (operating moisture minus specific retention)

Then using the lined ponds as a control volume, the water balance equation can be written as follows:

$$0 = SC + Pr - Ep - D - SA + \Delta S + M$$

Where:

Pr = The runoff component of precipitation

Ep = Evaporation from ponds

D = Discharge out of the system

M = Makeup water

ΔS = The change in storage in the system

Rearranging the terms to isolate the two (2) unknowns (makeup water and change in storage) yields:

$$M + \Delta S = SA - SC + D + Ep - Pr$$

The water balance model uses this equation to track the water available in storage and then calculate the outside makeup water required for each monthly period. The term $[SA - SC]$ defines the net changes in water content in the feed material stack area while the term $[D + Ep - Pr]$ defines the net changes in water stored in the ponds.

Another way to look at the water balance is to expand the SC parameter and rearrange the equation to get the following:

$$M + \Delta S = Es + Ed + Ep - (Pi + Pr) + (Wo - Wi) + Wd + D$$

Where:

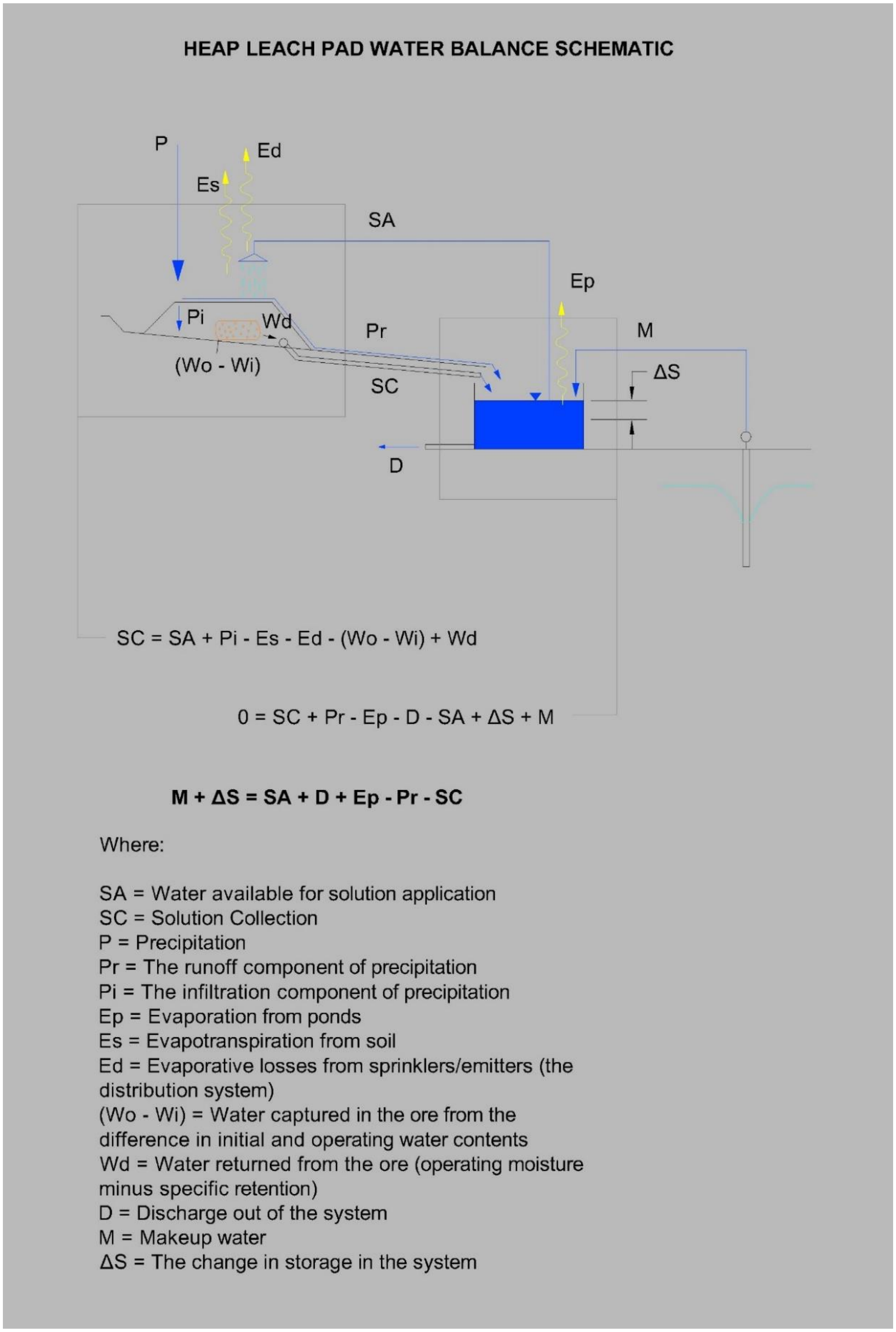
$[Es + Ed + Ep]$ represents all the evaporative losses in the system;

$[Pi + Pr]$ represents all the gains in the system due to precipitation;

$[(Wo - Wi) + Wd]$ represents the net impact of changes in pore water content in the feed material, and

D is simply the volume of water physically removed from the system for treatment.

As long as water is available in storage in the system, it will be allocated for use in processing the feed material in future months. ΔS increases and decreases in response to precipitation and demands for processing water and M is zero. However, once the storage in the ponds falls to operational minimums, the model assumes that the ponds are not capable of supplying the demand and any shortfall in supply is made up as “outside makeup water” (M) or freshwater from outside the lined system, introduced into the lined system to meet the processing water demand.



$$SC = SA + Pi - Es - Ed - (Wo - Wi) + Wd$$

$$0 = SC + Pr - Ep - D - SA + \Delta S + M$$

$$\mathbf{M + \Delta S = SA + D + Ep - Pr - SC}$$

Where:

SA = Water available for solution application
SC = Solution Collection
P = Precipitation
Pr = The runoff component of precipitation
Pi = The infiltration component of precipitation
Ep = Evaporation from ponds
Es = Evapotranspiration from soil
Ed = Evaporative losses from sprinklers/emitters (the distribution system)
(Wo - Wi) = Water captured in the ore from the difference in initial and operating water contents
Wd = Water returned from the ore (operating moisture minus specific retention)
D = Discharge out of the system
M = Makeup water
ΔS = The change in storage in the system

Figure 18-5: Heap Leach Pad Water Balance Schematic

18.11.2 Stochastic vs. Deterministic Models

There are two (2) different classifications of water balance model that can be used to evaluate heap leach pad performance and makeup water requirements. A deterministic model uses a chain of single valued input parameters to produce a series of single valued results. The weather data (which is the primary input) is often derived from some portion of an existing historic record or may consist of a synthetic record generated using the statistical summaries of the historic record. The potential range of variability can only be evaluated in a general sense over the full-time history of the model. In a stochastic model, the single valued input parameters are replaced with probability distributions derived from the computed statistics of the observations (in this case the monthly mean and variance or its square root, the standard deviation).

Rainfall distributions are assumed to be Gamma distributed, i.e., there can be no negative values permitted in the sampling since a negative rainfall has no meaning. Shape and scale parameters for the Gamma distributions are computed as a function of the mean and standard deviation. A Monte Carlo procedure is then used to propagate the uncertainty through the model by sampling all of the input parameter distributions and compiling output distributions for all the results of interest. In this way results are also probability distributions that permit exceedance probabilities to be associated with each event or outcome. For example, the probability of exceeding a particular makeup water flow rate during the month of October during Phase 3 of the heap leach pad operation can be quantified from the results of the stochastic model. Probability distributions in hydrology are often highly skewed distributions, such that the mean or average result may not be the most frequently observed result (i.e., the mean and mode of the distribution do not coincide). Stochastic model results can be very useful in setting system design criteria and quantifying risk.

The water balance modeling associated with the current study is deterministic only.

18.11.3 Project Description

A deterministic water balance model was developed for Phase 1 through 3 configurations of the Cactus Mine heap leach facilities. These facilities consist of a single heap leach pad constructed in three (3) phases with two (2) PLS (pregnant leach solution)\Event Ponds, the first constructed for Phases 1 and 2 and a second pond constructed for Phase 3. It is our understanding that the Heap Leach Facility (HLF) will receive feed material from two (2) open pits at a rate of 24 million tons per year (65,753 tons/day). Feed material will be stacked using a lift height of 30 ft. The feed material stack will be irrigated with a sulfuric acid solution using a drip emitter system at an application rate of 0.0025 gallons per minute per square foot (gpm/ft2). The leach cycle is expected to be 180 days. The Phase 1 lined area of the HLF will be 9,955,530 ft2, the Phase 2 lined area will be 10,065,571 ft2, and the Phase 3 lined area will be 53,819,231 ft2. The pumping rate for solution application will be 12,000 gallons per minute (gpm).

All of the feed material types to be delivered to the heap leach facility are expected to be crushed feed materials. In the absence of any specific testing data, the following assumptions have been made with respect to gravimetric moisture conditions in the feed material:

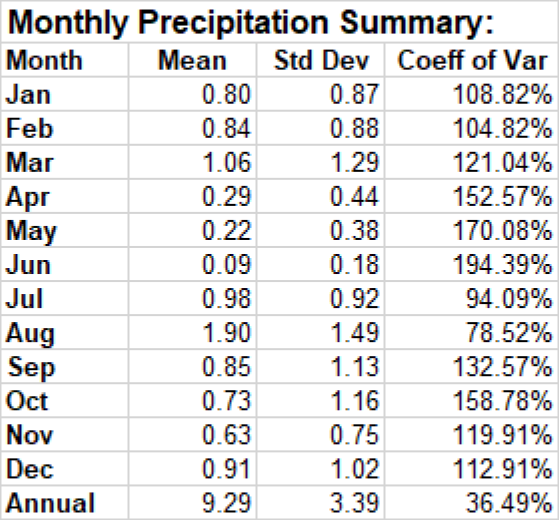
- Delivered moisture = 3%
- Specific retention = 8%
- Active leach/operating moisture = 12%

The water balance model was developed in metric units; however, the results are presented in imperial units. The current model does not consider concurrent reclamation or a closure sequence.

18.11.4 Meteoric Data

A meteoric record of precipitation, days with precipitation, and temperature was developed using a monthly timestep from published data at the NOAA Casa Grande site resulting in a 20-yr record length. Detailed information on evaporation at the site was not available. Therefore, a synthetic record of estimated pan evaporation was generated using available data on humidity, solar radiation (cloud cover/percent sunshine), wind, and temperature using a Penman-Monteith evaporation model. Summaries of the meteoric data acquired will be found in Table 18-8 through Table 18-11 and Figure 18-6 through Figure 18-8 below.

Table 18-8: Monthly Precipitation Summary



Monthly Precipitation Summary:

Month	Mean	Std Dev	Coeff of Var
Jan	0.80	0.87	108.82%
Feb	0.84	0.88	104.82%
Mar	1.06	1.29	121.04%
Apr	0.29	0.44	152.57%
May	0.22	0.38	170.08%
Jun	0.09	0.18	194.39%
Jul	0.98	0.92	94.09%
Aug	1.90	1.49	78.52%
Sep	0.85	1.13	132.57%
Oct	0.73	1.16	158.78%
Nov	0.63	0.75	119.91%
Dec	0.91	1.02	112.91%
Annual	9.29	3.39	36.49%

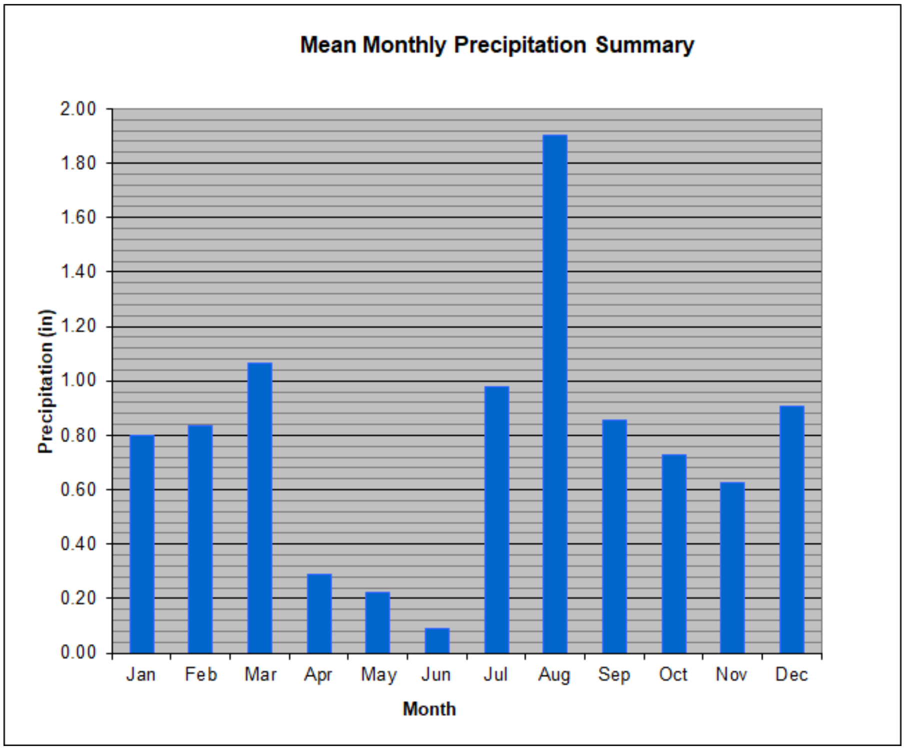


Figure 18-6: Mean Monthly Precipitation Summary

Table 18-9: Days with Precipitation

Number of Days with Precipitation:

Month	Mean	Std Dev	Coeff of Var
Jan	4.03	3.76	93.38%
Feb	3.67	2.60	70.88%
Mar	3.57	2.56	71.63%
Apr	1.58	1.74	110.34%
May	1.41	1.83	129.85%
Jun	0.76	1.06	140.70%
Jul	4.05	2.76	68.18%
Aug	5.03	2.47	49.06%
Sep	2.73	2.43	89.17%
Oct	2.79	3.42	122.54%
Nov	2.16	1.80	83.39%
Dec	3.69	2.56	69.57%
Annual	35.45	12.27	34.60%

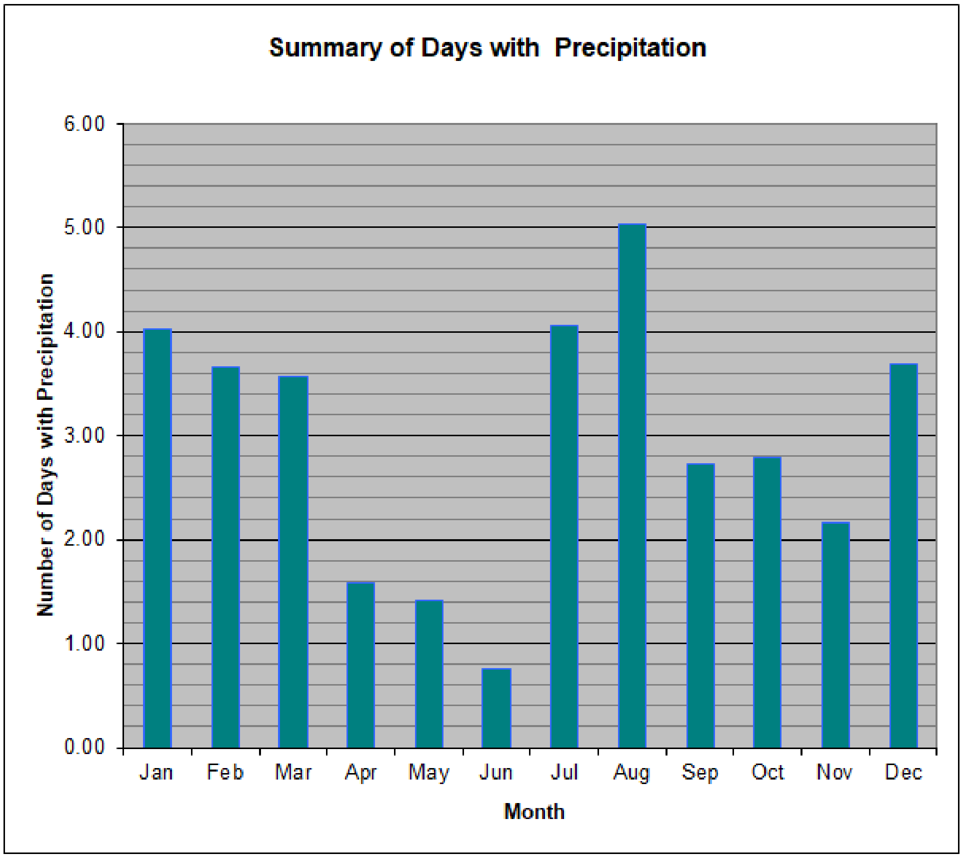
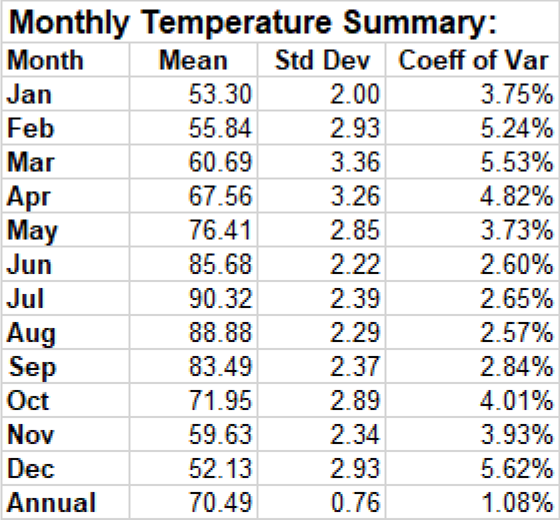


Figure 18-7: Summary of Days with Precipitation

Table 18-10: Monthly Temperature Summary



Monthly Temperature Summary:

Month	Mean	Std Dev	Coeff of Var
Jan	53.30	2.00	3.75%
Feb	55.84	2.93	5.24%
Mar	60.69	3.36	5.53%
Apr	67.56	3.26	4.82%
May	76.41	2.85	3.73%
Jun	85.68	2.22	2.60%
Jul	90.32	2.39	2.65%
Aug	88.88	2.29	2.57%
Sep	83.49	2.37	2.84%
Oct	71.95	2.89	4.01%
Nov	59.63	2.34	3.93%
Dec	52.13	2.93	5.62%
Annual	70.49	0.76	1.08%

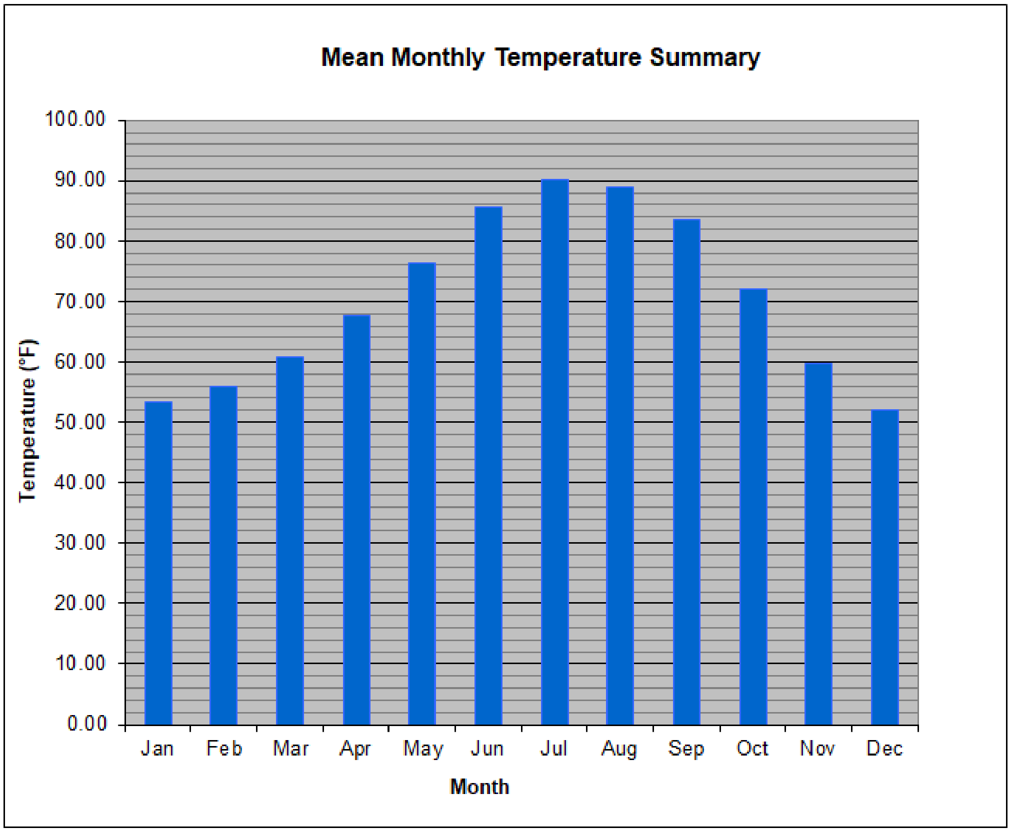
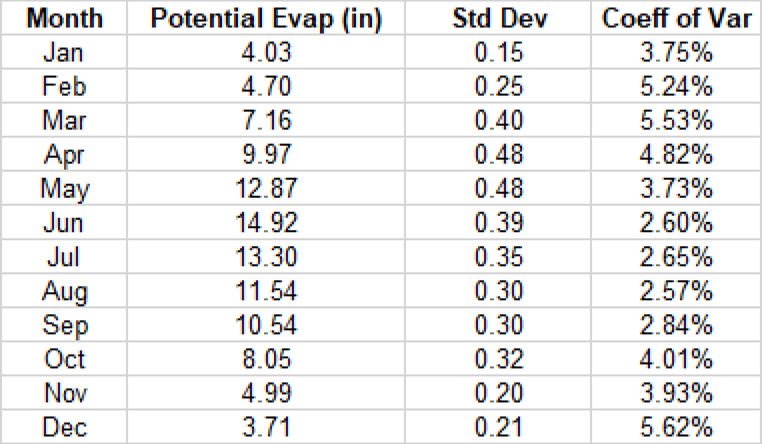


Figure 18-8: Mean Monthly Temperature Summary

Table 18-11: Monthly Potential Evaporation



Month	Potential Evap (in)	Std Dev	Coeff of Var
Jan	4.03	0.15	3.75%
Feb	4.70	0.25	5.24%
Mar	7.16	0.40	5.53%
Apr	9.97	0.48	4.82%
May	12.87	0.48	3.73%
Jun	14.92	0.39	2.60%
Jul	13.30	0.35	2.65%
Aug	11.54	0.30	2.57%
Sep	10.54	0.30	2.84%
Oct	8.05	0.32	4.01%
Nov	4.99	0.20	3.93%
Dec	3.71	0.21	5.62%

Ponds were designed based on the following design criteria:

- Ponds were sized to contain the immediate runoff (full precipitation depth minus initial abstraction and infiltration) from a 100-yr 24-hr precipitation event (3.68 inches). Storm surge from infiltration arriving in the subsequent weeks would be mitigated through a temporary increase in pumping rate and makeup water demand.
- SCS Curve Numbers (CN) on the feed material surface were assumed to be 70 and on lined surfaces 99.
- In addition to the captured storm runoff, ponds would be sized to capture draindown from a 6-hour maintenance power outage and provide a minimum freeboard of 2 ft.
- Ponds would involve no evaporation reduction devices (covers, bird balls, etc.) and process ponds would maintain minimum pumping depth requirements of approximately 3 ft.

Results are summarized in Table 18-12.

Table 18-12: Design Pond Capacities

Pond	Design Capacity (m^3)	Design Capacity (ft^3)
Phase 1&2 PLS\Event Pond	280,415	9,902,763
Phase 3 PLS\Event Pond	321,481	11,352,980

On the dry side of the spectrum, Table 18-13 provides a summary of expected makeup water demand for the three (3) phases of operations. Note that emitter lines are assumed to be laid out on the surface of the heap and in the hot, dry climate of the Cactus Mine, makeup water demand is expectedly high. Makeup water demand can be significantly reduced by burying emitter lines in the feed material (reduction will be a function of the depth of burial). However, the current water balance model does not reflect the burial of emitters.

Table 18-13: Summary of Makeup Water Demand by Phase

Parameter	Makeup Water Demand (Gallons/Month)	Makeup Water Demand (Gallons/Ton of Feed material)
Phase 1		
Mean	1,854,224	28.1
Std Dev	456,489	6.93
Max	2,709,612	41.2
Min	1,150,997	17.5
Phase 2		
Mean	1,800,333	27.3
Std Dev	421,090	6.39
Max	2,583,603	39.2
Min	992,758	15.1
Phase 3		
Mean	1,416,226	21.5
Std Dev	544,986	8.27
Max	2,420,609	36.7
Min	0	0.0

Below are a series of figures (Figure 18-9 to Figure 18-23) showing plots of various deterministic water balance model results which may be of use in understanding the behavior of the zero-discharge heap leach system at the cactus Mine. The plots include assumptions and estimates for Phase ~~2~~1 through ~~4~~3 that may change as designs proceed beyond the Phase 1 conditions currently reported. Also note that the water balance model and the plotted results are developed in the metric/SI system of units and must be converted into Imperial units if desired.

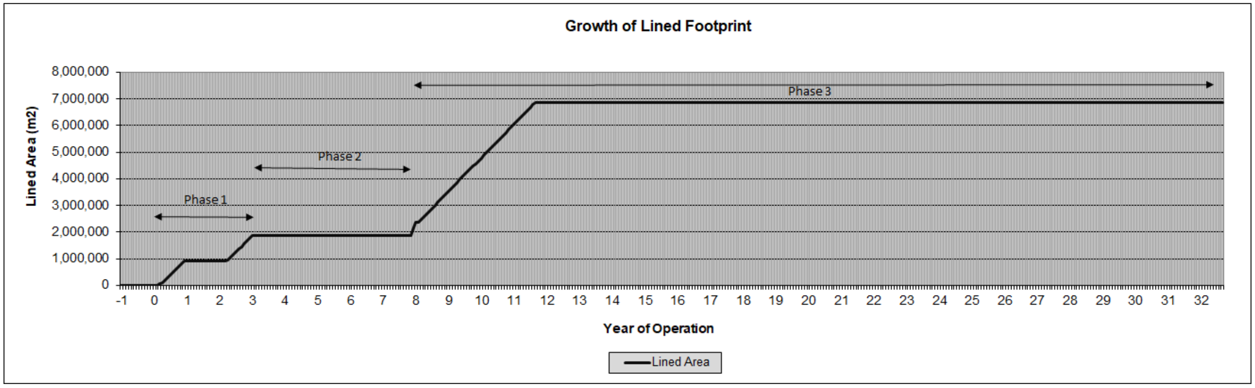


Figure 18-9: Growth of Lined Footprint

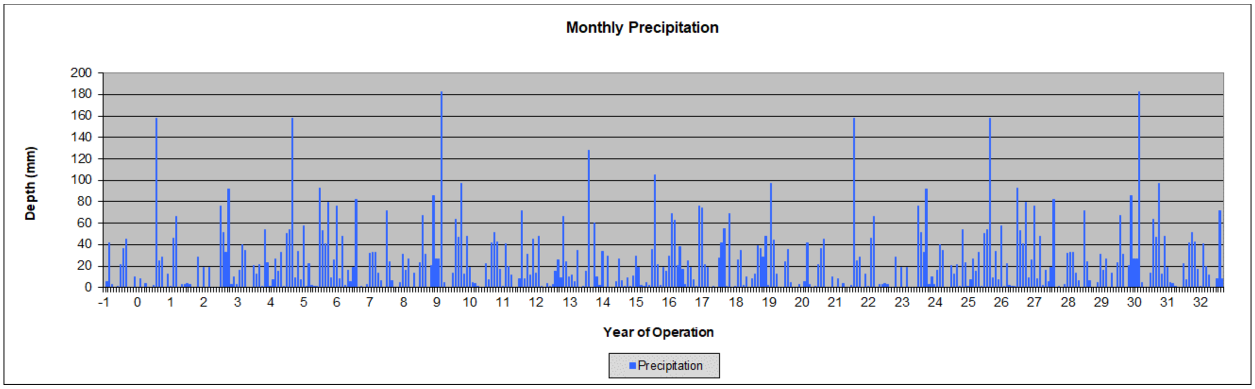


Figure 18-10: Monthly Precipitation

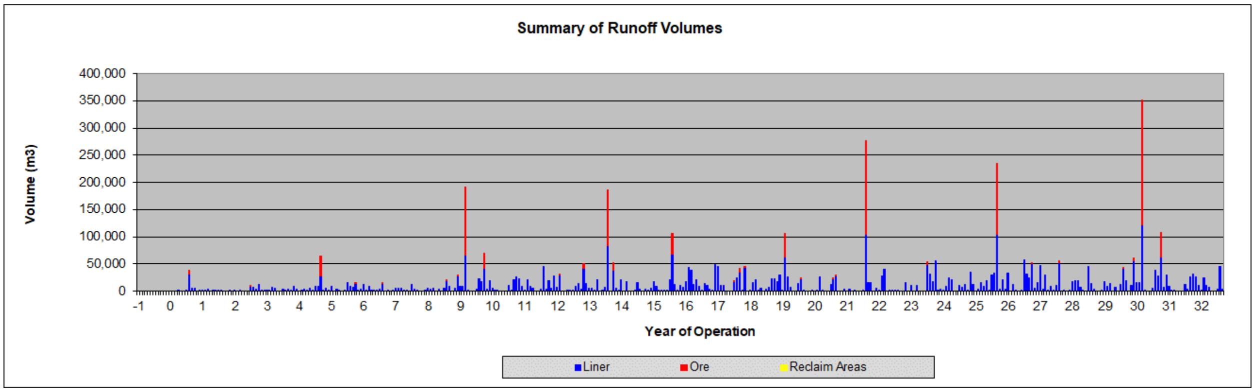


Figure 18-11: Summary of Runoff Volumes

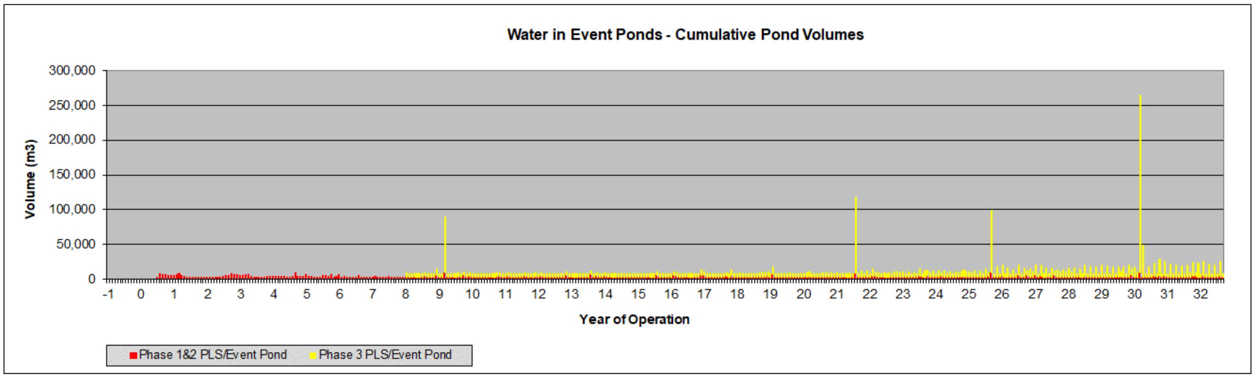


Figure 18-12: Water in Event Ponds – Cumulative Pond Volumes

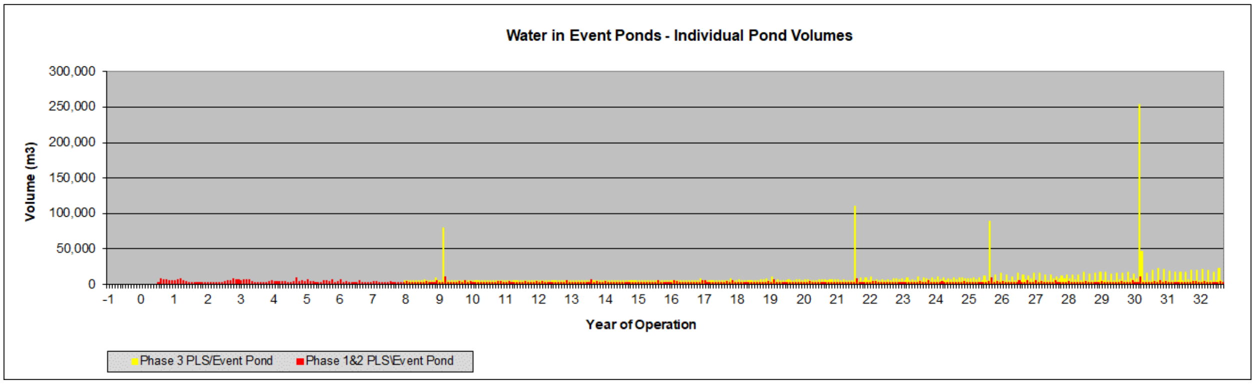


Figure 18-13: Water in Event Ponds – Individual Pond Volumes

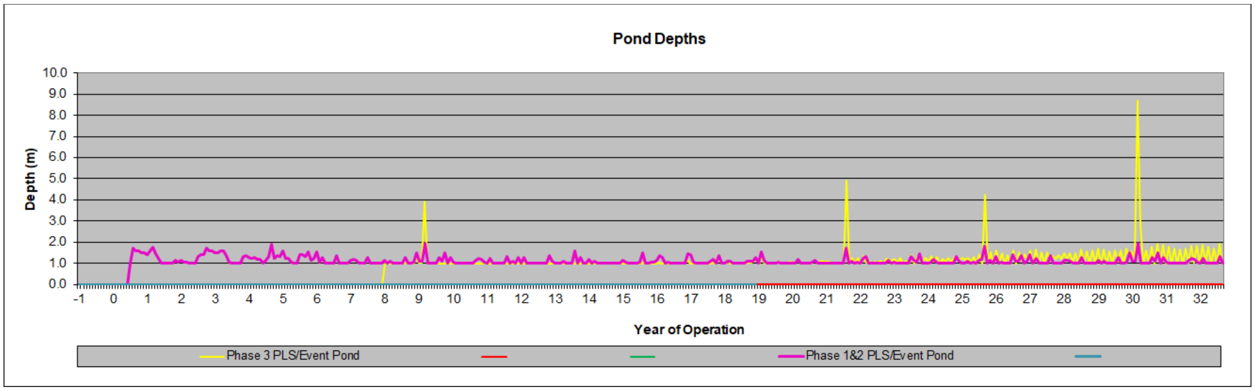


Figure 18-14: Pond Depths

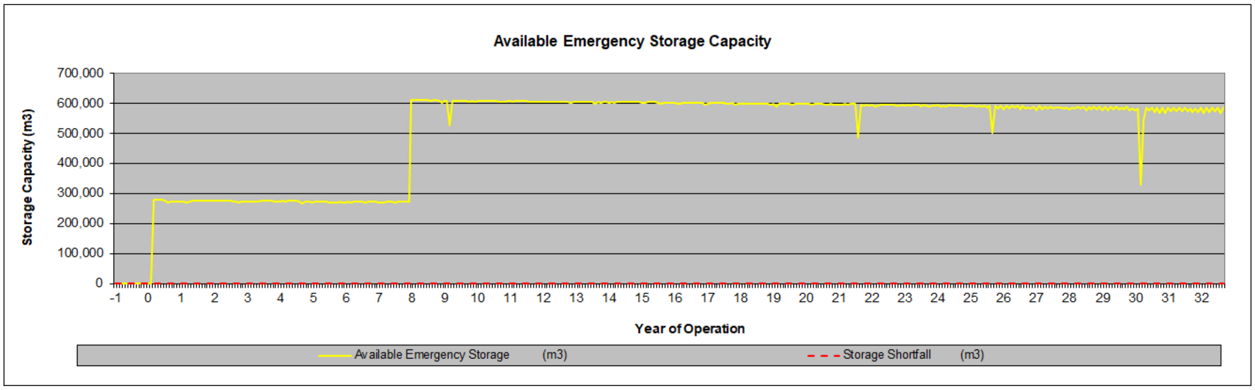


Figure 18-15: Available Emergency Storage Capacity

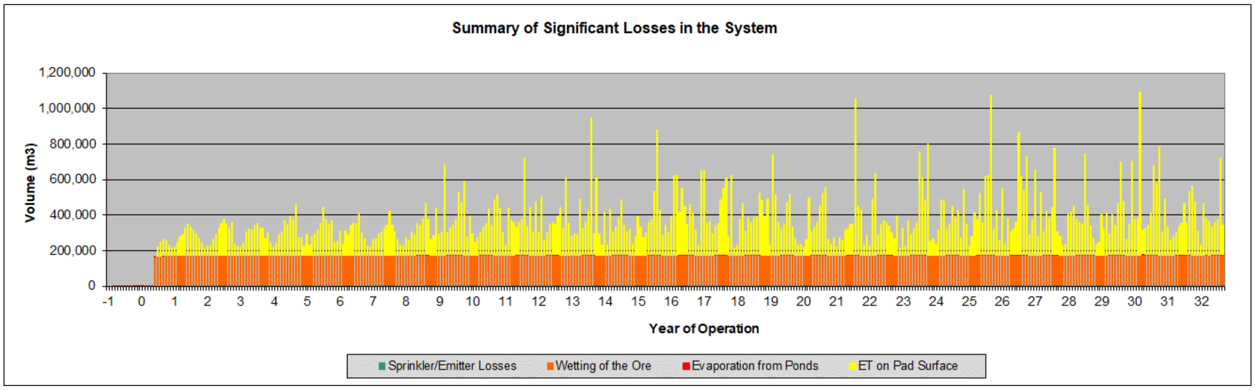


Figure 18-16: Summary of Significant Losses in the System

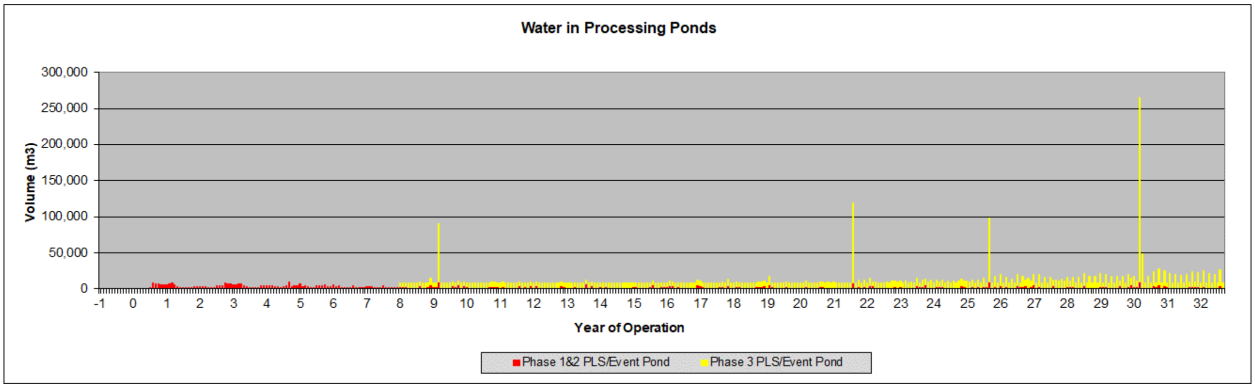


Figure 18-17: Water in Processing Ponds

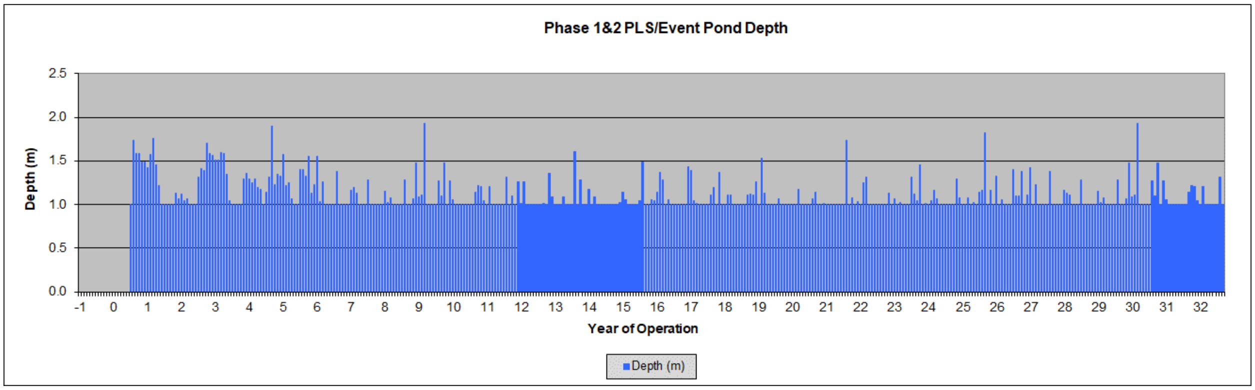


Figure 18-18: Phase 1 & 2 PLS/Event Pond Depth

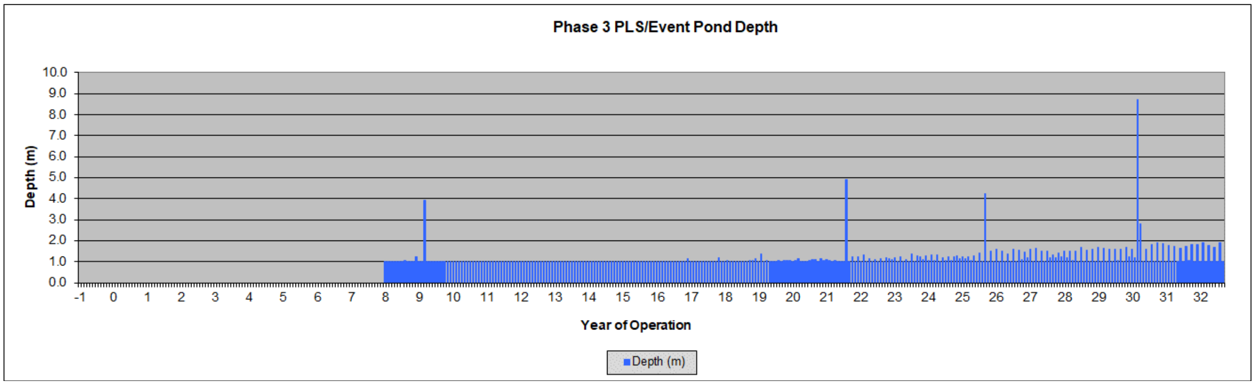


Figure 18-19: Phase 3 PLS/Event Pond Depth

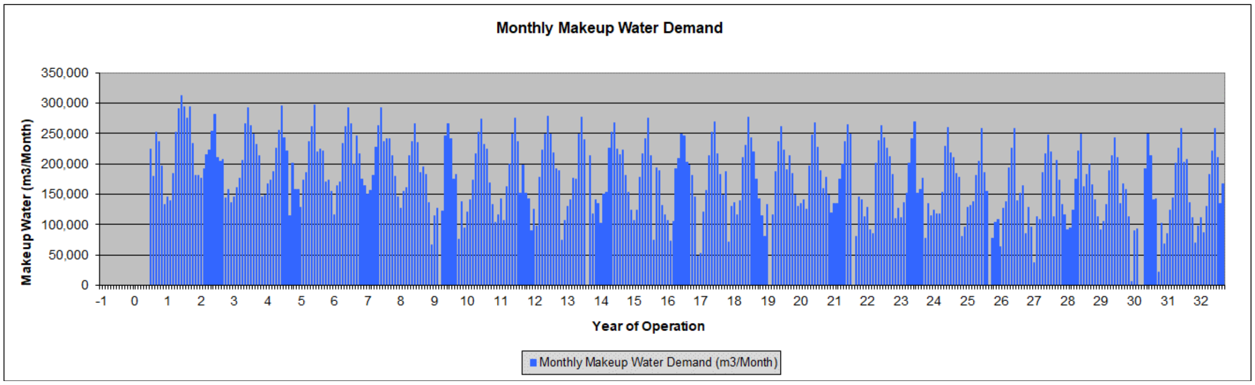


Figure 18-20: Monthly Makeup Water Demand

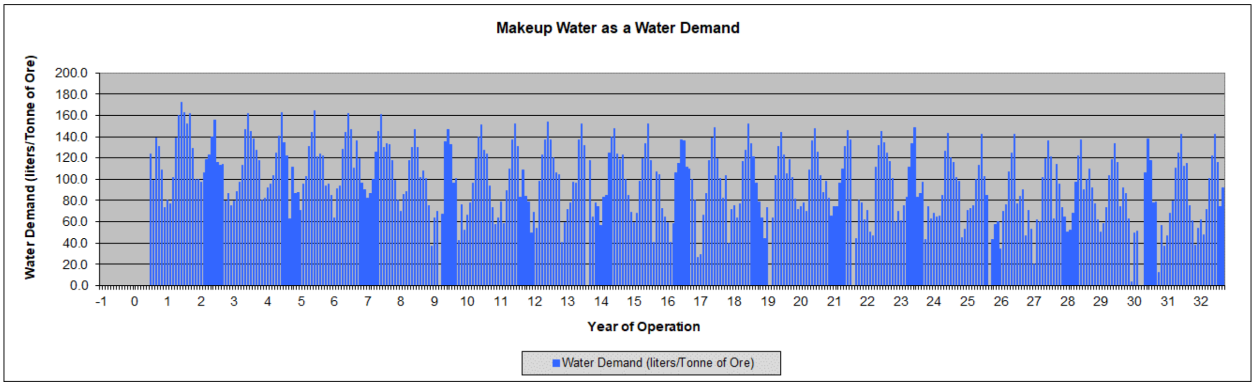


Figure 18-21: Makeup Water as a Water Demand

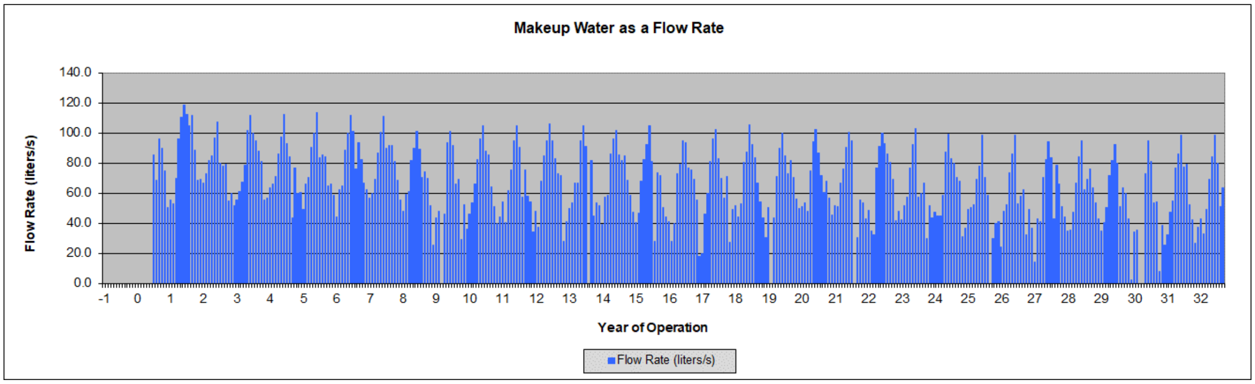


Figure 18-22: Makeup Water as a Flow Rate

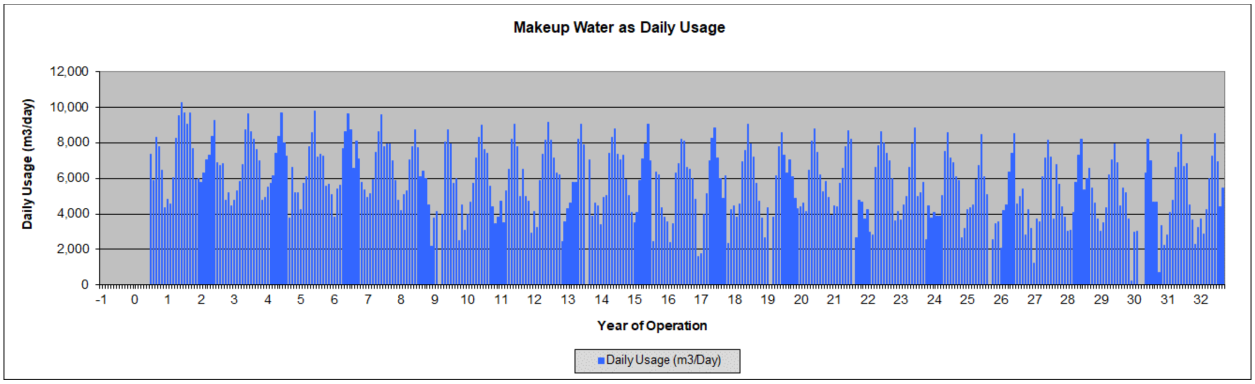


Figure 18-23: Makeup Water as Daily Usage

19 MARKET STUDIES AND CONTRACTS

19.1 MARKET STUDIES

No market studies or product valuations were completed as part of the 2024 PEA. Market price assumptions were based on a review of public information, industry consensus, standard practices and specific information from comparable operations in the region.

Copper cathodes are widely traded and can be marketed domestically with significant optionality regarding the ultimate customer base. It is assumed that Cactus will produce an LME deliverable copper cathode quality.

19.2 COMMODITY PRICE PROJECTIONS

Project economics were estimated based on long-term flat metal prices of US$3.90/lb Cu. This copper price is in accordance with consensus market forecasts from various financial institutions and are consistent with historic prices, shown in Table 19-1, sourced from Capital IQ on September 25, 2023. The QP also considers the prices used in this study to be consistent with the range of prices being used for other project studies.

Table 19-1: Summary of Historic Commodity Pricing (Sept 25, 2023)

Metal	1-Year Average	2-Year Average	3-Year Average
Copper (US$/lb)	3.81	3.88	4.03

19.3 CONTRACTS

No contracts for transportation or off-take of the copper cathode are currently in place, but if they are negotiated, they are expected to be within the industry norms. Similarly, there are no contracts currently in place for the supply of reagents, utilities, or other bulk commodities required to construct and operate the Project.

20 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

20.1 ENVIRONMENTAL CONSIDERATIONS

In 2009, approximately 15 years after the Cactus Mine ceased operation, the mine was conveyed to the ASARCO Multi-State Environmental Custodial Trust (the Trust) as part of ASARCO bankruptcy proceedings. The Trust entered the property into the Voluntary Remediation Program (VRP) with Arizona Department of Environmental Quality in 2010. In the following years, structures were demolished and reclaimed, and characterization studies were conducted. Environmental studies were conducted as part of the VRP program and included sampling and testing of groundwater quality and pit lake water quality, and whether the pit lake is a terminal sink (Tetra Tech, 2017a, 2017b, 2018a, 2019a, 2019b, 2019c).

Limited historic analytical data was included in reports reviewed by Tetra Tech (2017a). Based on narrative information, sampling and analysis of groundwater at and near the Sacaton Mine began prior to the mine's operations in the early 1970's. A reference to historic groundwater quality conditions suggests that the water quality in the tailings pond was better than the underlying groundwater system and that discharges from the site were "freshening" the groundwater system (Montgomery & Associates, 1986). The most complete set of analytical data located is found in a November 1986 preliminary report titled "Hydrogeologic Conditions, Asarco Sacaton Open-Pit Mine, Pinal County, Arizona," prepared by Errol L. Montgomery & Associates (Montgomery & Associates, 1986).

Montgomery & Associates also conducted field investigations in 2013 on behalf of Russell Mining Corporation as part of a due diligence study and reported results in an Interim Data Report (Montgomery & Associates, 2013).

The Tetra Tech investigations of groundwater and soil chemical quality resulted in the following conclusions:

- The initial Hydrogeology Investigation prepared by TetraTech (2017b) for the Trust dated December 21, 2017, demonstrated that the open pit is a hydraulic sink and does not, therefore, contribute to groundwater chemical degradation.

- A comprehensive facility inspection by TetraTech (2018a) was submitted to ADEQ Voluntary Remediation Program (VRP) Project Manager John Patricki on July 15, 2018. This report identified eight areas of stained soil for further investigation. This inspection was conducted in accordance with Part 4.3 of the Arizona Pollutant Discharge Elimination System General Permit for Stormwater Areas previously identified as potential source areas in the work plan, and areas of stained soil were inspected. Discharges were found to be contained within the site.

- A comprehensive facility inspection of the Tru-Stone facility was carried out by TetraTech (2018b). A report was submitted to ADEQ VRP Project manager John Patricki on July 15, 2018. This inspection was conducted in accordance with Part 4.3 of the Arizona Pollutant Discharge Elimination System General Permit for Stormwater Discharges from non-mining industrial facilities. No signs of discharge from the sediment basins were observed, nor was evidence of discharges to any drainages or washes.

- Tetra Tech (2019a) prepared a Demolition Completion report for the Trust dated March 11, 2019. This report documented removal of buildings and other structures that posed health and safety risks. Asbestos containing materials, electrical components containing PCBs, and lead-based paint were investigated and addressed.

- A Site Improvement Plan (SIP) was prepared by TetraTech (2019b) for the Trust and dated March 11, 2019. The objectives of the SIP were to (1) mitigate potential human/ecological health hazards; (2) mitigate offsite transport of tailings/waste rock sediments and wind-blown dust; and (3) stabilize the TSF, WRD and the underground mine workings area. The SIP states that "Tru-Stone facility was not considered in the creation of the SIP. Any future activities proposed for the Tru-Stone facility will be addressed under a separate scope of work."

- In 2019-2020, nine monitoring wells were installed at the site and one older monitoring well (TM-1) was rehabilitated to characterize hydrogeologic conditions and to establish baseline conditions for an Aquifer Protection permit for future mining operations. Clear Creek was provided with a table summarizing the groundwater quality and well completion logs.

- TetraTech prepared the Sacaton Mine Site Construction Completion report (dated January 27, 2020, and an addendum dated February 14, 2020). The report documented the environmental issues that were remediated and addressed at the site. It also documents the baseline groundwater quality from the monitor wells installed at the mine site. ADEQ approved these reports (ADEQ, 2020). Based on the information reported, ADEQ agreed not to sue the Trust under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA) or Water Quality Assurance Revolving Fund (WQARF) based on "any claim or cause of action arising out of the ownership or performance of the remedial activities at the Sacaton Mine Site."

Based on the results of the characterization studies and reclamation work, in August 2019, Elim entered into a Prospective Purchaser Agreement (PPA) with ADEQ. The PPA, which ADEQ issued because of the substantial public benefit to the remedial work conducted at the site, released Elim from potential liabilities related to existing, known contamination under CERCLA, WQARF, and RCRA. The PPA does not cover unidentified environmental conditions or contamination.

No environmental fatal flaws that would materially impede the advancement of the project have been identified.

20.2 PERMITTING CONSIDERATIONS

The Project includes exploration and mining on private land and on five Arizona State Land Department (ASLD) leases. There is no federal nexus for permitting of the Project.

The primary permit with the longest permitting timeframe is anticipated to be the Aquifer Protection Permit Amendment (APP). ASCU currently has an APP (no. P-513324) for the following facilities: oxide leach pad, enriched leach pad, oxide PLS pond, enriched PLS pond, raffinate pond, oxide events pond, enriched events pond, site runoff pond 1, site runoff pond 2, and the waste rock stockpile runoff pond. ASCU will apply for amendments to the APP for additional discharging facilities, as needed. An APP Significant Amendment (without a public hearing) has a licensing timeframe of 221 business days. ASCU has agreed to post a bond for the APP of $1,144,576.00 prior to beginning project construction. Other permits/authorizations/notifications for which ASCU has applied for or currently holds include:

- Mineral Leases on Arizona State Land: ASCU has five mineral leases on State land.

- Permit for exploration on Arizona State Land: ASCU currently has five prospecting Permits with the ASLD for exploration operations on State land.

- Dust Permit: ASCU has been issued dust permit # DUSTW-24-0029 by Pinal County.

- Industrial Permit from Pinal County: ASCU has been issued the Industrial Air Permit on May 12, 2023, Permit #C31407.000 This applies to any industrial operation that has the potential to emit 5.5 pounds per day or 1 ton per year of any regulated air pollutant. Generators, stationary fuel burning equipment, and petroleum storage tanks are regulated under Industrial Permits.

- Mined Land Reclamation plan (MLRP). An MLRP is required for surface disturbances on private land greater than 5 acres. Financial assurance requirements such as bonding apply. An MLRP was issued on March 27, 2023, by the Arizona State Mine Inspector. The bond has been submitted and the bond amount was $4,797,829. ASCU plans to update the MLRP as necessary to reflect changes to the mine plan.
- Type 2 Grandfathered Water Right: ASCU currently has a right for 136 afy.
- Groundwater Withdrawal Permit: ASCU currently has Permit 59-233782.0000 for 3,600 afy.
- Special Land Use Permit for use of State Surface to construct facilities for mining operations has been granted by ASLD (permit no. 23-123266-03).
- Stormwater Pollution Prevention Plan (SWPPP) – LTF/ID 95924.
- Permits/ authorizations that ASCU may need to apply for include the following:
- Notice of Intent to Clear Land: ASCU will notify the Arizona Department of Agriculture regarding potential destruction of protected native plants.
- Notice of Startup: ASCU will submit a notice to the Arizona State Mine Inspector prior to commencing mining. ASMI issues permits for underground diesel equipment, inspects and permits elevators, enforces fuel storage rules.
- EPA Hazardous Waste Generator: ASCU will apply for an EPA ID number as required by RCRA when needed.
- Cultural Resources: ASCU must notify Arizona State Museum if cultural artifacts are found on private property. Arizona State Land Department will consult with the State Historic Preservation officer regarding potential impacts to resources on State Land. ASLD has provided a “letter of no survey” for Section 34, Township 5 South, Range 5 East.
- ADWR requires that industrial facilities including mines submit a Conservation Plan for water use if the water demand is greater than 500 afy. ASCU has prepared a plan and will submit it to ADWR when and if water use reaches the 500 afy threshold.
- ADWR also requires that a Notice of Intent to Drill and Abandon an Exploration/Specialty Well Permit be obtained by an Arizona Licensed Well Driller for any drilling deeper than 100 ft on private land.
- ASCU does not anticipate having to apply for an Arizona Pollution Discharge Elimination System (AZPDES) permit. The US Army Corps of Engineers conducted a Jurisdictional Determination and found that there are no “waters of the US” (WOTUS) on the project site.

20.3 SOCIAL CONSIDERATIONS

In keeping with ASCU's community engagement and partnership standards, the Project will be developed with a plan to establish and maintain the support of our host communities. ASCU has commenced community outreach at the earliest stages of the Project and is currently evaluating and building partnerships within the community. As the Project's permits will involve a public process and are based on the permit submission and review schedule, ASCU understands the importance of outreach during the permitting process and throughout the life of the mine. ASCU is encouraged by the positive response to the project from the community. Its status as a “brownfields” project makes it a more appealing project than a new mine might be.

20.4 CLOSURE AND RECLAMATION PLANNING

A Mined Land Reclamation Permit (MLRP) was issued by the state in 2023, and an Amended Aquifer Protection Permit was issued in 2021 based on ASCU's original PEA design. ASCU has posted a bond of $4,797,829 for the MLRP reclamation costs and has a $1,144,576 bond with APP that has not been posted yet but will be posted prior to construction. ASCU will need to amend these permits to reflect changes from this PFS. The APP will cover closure and remediation of the leach pads, which consists of rinsing and caping the leach pads, and the ponds which consists of draining and treating any residual fluids, then removing the liners. The MLRP covers the removal of any buildings, scarification and revegetating existing roads, capping of waste rock disposal sites, and safeguarding access to the pit and any underground access.

ASCU estimates that the new closure bond estimates for both the APP and MLRP will be $23,000,000 based on the increase in production from the Parks/Salyer deposit and the increase in leach pads and waste rock disposal.

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 22. Capital (**CAPEX**) and operating (**OPEX**) costs for the Cactus Mine project were estimated on the basis of the 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 and escalated prices for major equipment, labor requirements, and estimates from consultants and potential suppliers to the project.

21.1 CAPITAL COST SUMMARY

Estimated CAPEX, or capital expenditures, include two components: (1) the initial CAPEX to undertake the detailed design, pre-strip, construct, and commission the mine, plant facilities, ancillary facilities, utilities, and operations camp, and complete on and offsite environmental mitigation and remediation; (2) the sustaining CAPEX for facilities expansions, mining equipment replacements, expected replacements of process equipment and ongoing environmental mitigation activities. Table 21-1 summarizes the initial and sustaining CAPEX for the Project.

Table 21-1: Capital Cost Summary

Area	Detail	Initial CAPEX ($000s)	Sustaining CAPEX ($000s)	Total CAPEX ($000s)
Direct Costs	Mine Costs	156,856	543,609	700,465
	Processing Plant	259,320	17,161	276,481
	On-Site Infrastructure	95,740	408,290	504,030
	Off-Site Infrastructure	0	-	0
Indirect Costs		45,470	16,944	62,414
Owner's Costs, First Fills, & Light Vehicles		22,921	72,030	94,951
Offsite Environmental Mitigation Costs		0	-	0
Onsite Mitigation, Monitoring, and Closure Costs		0	0	0
Total CAPEX without Contingency		**580,307**	**1,058,034**	**1,718,772**
Contingency		87,558	110,599	198,157
Total CAPEX with Contingency		**667,865**	**1,168,633**	**1,836,498**

The CAPEX estimate includes direct mining equipment and pre-stripping costs, process plant costs, on-site infrastructure such as the HLF and the pipeline relocation. The initial CAPEX also includes indirect costs for detailed design and engineering. Initial CAPEX also includes an estimate of contingency based on the accuracy and level of detail of the cost estimate. The purpose of the contingency provision is to make allowance for uncertain cost elements that may occur but are not included in the cost estimate. These cost elements include uncertainties concerning completeness, accuracy and characteristics or nature of material takeoffs, accuracy of labor and material rates, accuracy of labor productivity expectations, and accuracy of equipment pricing. The CAPEX estimates are considered to have an accuracy range of -25% to +30%.

The primary assumptions used to develop the CAPEX are provided below:

- The estimate is based on 2nd quarter 2024 costs.

- All cost estimates were developed and are reported in United States of America (US) dollars.
- Units of measure for this project are primarily in Imperial customary units.
- At the time of this estimate, engineering was approximately 1% complete.
- Contingency during the pre-production period is specific to each major component of the Project as determined by the various consultants.
- Qualified and experienced construction contractors will be available at the time of Project execution.
- No provision has been made for currency fluctuations.

21.1.1 Mine Capital Costs

21.1.1.1 Mining

The mining capital cost estimate is grouped into two main areas each with its own capital cost categories. They are broken into the following with their range of WBS numbers:

- Open Pit (Parks/Salyer, Cactus West) – WBS 2110 to 2430
- Underground (Cactus East) – WBS 2510 to 2580

A summary of the breakdown is shown in Table 21-2.

Table 21-2: Mine Capital Cost Estimate (US$M)

Area	Mining Capital Category	WBS	Initial Cost ($M)		Sustaining Cost ($M)	Total Capital Cost ($M)
			Y-2	Y-1	Y 1 – Y 31	
Open Pit	Pre-Production Stripping	2210	-	113.4	-	113.4
	Major Mine Equipment Capital	2310	-	27.4	169.8	197.2
	Support/Auxiliary Mine Capital	2320	1.1	10.9	14.4	26.4
	Mine Electrical Supply	2410	-	3.0	-	3.0
	Mine Infrastructure	2430	-	1.1	63.4	64.5
Cactus East	Portal/Development	2510,2520	-	-	125.7	125.7
	Mine Equipment	2530	-	-	66.7	66.7
	Mine Ventilation	2550	-	-	20.6	20.6
	Mine Dewatering	2560	-	-	3.6	3.6
	Mine Electrical	2570	-	-	16.3	16.3
	Mine Infrastructure	2580	-	-	62.9	62.9
Total			**1.1**	**155.8**	**543.6**	**700.5**

Source: AGP Mining, 2024.

21.1.1.1.1 Open Pit - Pre-Production Stripping (2210)

Mining activity commences in Parks/Salyer in advance of the processing facility commissioning. This includes the mining of some heap leach feed that is stockpiled prior to placement on the heap facility in Year 1. Portions of the waste from this mining will be used for infrastructure purposes such as heap leach facility construction, roads and the view shed berm. The WRSF will also be initiated. The prestripping includes 69.8 M tons of waste and stockpiling of 0.2 M tons of feed for when the crushers are available.

The prestripping cost covers all associated management, dewatering, drilling, blasting, loading, hauling, support, engineering and geology labour, grade control costs, and mobilization costs. It also includes any finance costs that have been added to the operating cost for that period. This is estimated at $113.4M.

21.1.1.1.2 Open Pit Major - Mine Equipment Capital (2310)

The open pit mining equipment capital is determined based on the use of an operating lease. The capital portion of the lease requires a 20% downpayment with the remainder plus a set interest rate applied to the operating cost as a lease payment. Only the downpayment is included in the capital. The major equipment fleet for the Project was purchased in this manner. Certain items such as spare buckets for the shovels and trays for the trucks were not leased but considered as a capital purchase. The total initial capital cost was $27.4M and sustaining capital was $169.8M.

21.1.1.1.3 Open Pit - Support/Auxiliary Mine Capital (2320)

The mine support equipment was a mixture of capital purchase and lease depending on the unit type and ability to lease that unit. In the case of pickup trucks, buses, road maintenance loaders, etc. these were leased with the appropriate downpayment included in this category. Other items such as the ambulance and firetruck with the necessary supplies were purchased outright. The rough terrain cranes and certain site-specific trucks were also assumed as a capital purchase.

Additional items in this category include the engineering office equipment (computers, drones, mining specific software) as well as the dispatch system hardware purchase. The preparation of the waste storage facility foundation and initial mine access roads are included as capital purchases.

The initial capital for the WBS 2320 category was $12.0M with sustaining capital of $14.4M.

21.1.1.1.4 Open Pit - Mine Infrastructure (2430)

This category of capital purchase is the dewatering system planned for use in the two pit areas and any dewatering needs mining the Historical Stockpile. The assumption is the use of high lift diesel pumps with associated piping. The system cost covers the equipment necessary to move the water to the pit rim where it ties into the proposed project water system for distribution to the appropriate area.

While not required in initial capital, an annual program of horizontal drain holes in the Parks/Salyer and Cactus West pit walls is included in the sustaining capital. This is to depressurize the wall slopes to assist in stability.

The Cactus West system will also aid in dealing with potential storm events that may rapidly fill the open pit and potentially be an issue to the Cactus East underground. This allowance has been made to reduce infiltration to the underground mine adjacent to the pit.

Initial capital costs were $1.1M with sustaining capital totaling $63.4M.

21.1.1.1.5 Cactus East - Portal/Development (2510,2520)

Costs associated with this category are for the initial preparation of the portal. The cost includes the preparation of the rock face in the existing pit, already in rock, and support around this opening. While a sustaining cost for the project due to its timing, it is part of the initial costs necessary for production from Cactus East. This portion of the cost is estimated at $1.1M for WBS 2510.

The single decline development prior to production and the ongoing development necessary to access the various sublevels is included in WBS 2520. The length of the access decline is 7,440 ft. There is also a portion of the operating cost that has been capitalized as part of the mine development plan. The internal split between initial capital and sustaining capital for Cactus East was considered 3 years into the mine development. Small quantities of feed material are produced as part of the development in the first two years of underground mining (928,000 tons) but in the third year of development (Year 10 in the overall project) the project feed release rises to 2.5 Mton.

The total capital cost in WBS 2520 is $124.5M. Using the logic discussed, the initial capital totals $97.4M. The remaining capital cost, internally called sustaining, is strictly the development charge. This is a further $27.2M over the life of the underground mine.

It is important to note that waste development is included in capital and leach feed development is included in the operating costs.

21.1.1.1.6 Cactus East - Mine Equipment (2530)

Mine production equipment capital costs are included in this category. Major equipment was leased in a manner similar to the open pit major equipment, but with different rates. The vendors of the underground equipment provided terms that allowed for a 15% downpayment, but slightly higher interest rate then used in the open pit equipment.

The mine equipment includes the initial purchase amount as well as any rebuilds during the life of the equipment.

For Cactus East, the life of mine capital cost is estimated at $66.9M. The initial capital during the production ramp up is $11.4M with the remaining $55.5M as sustaining capital for Cactus East.

21.1.1.1.7 Cactus East - Mine Ventilation (2550)

The cost of ventilation equipment installed in the mine is covered in this category. The vent raises are in development capital. This cost area includes all fans, doors, ducting, and refrigeration necessary to ensure the Cactus East mine is safe and efficient.

Life of mine the capital cost is $20.6M for the necessary items and their installation. Initial capital is estimated to be $13.6M with the sustaining cost at $7.0M.

21.1.1.1.8 Cactus East - Mine Dewatering (2560)

The mine dewatering system is developed as the mine progresses in depth. The system will use pump stations and transfer pumps to bring the water to the portal. From this point it will be combined with the open pit dewatering system for removal from the area. The costs only consider the system to the portal.

Life of mine the capital cost estimated is $3.6M with $2.6M in initial capital and the remaining million in sustaining.

21.1.1.1.9 Cactus East - Mine Electrical (2570)

The mine electrical system will carry the loads for the electrical mine equipment but also the ventilation, cooling and vertical conveyor. The system is costed from the portal of the Cactus East mine to the interior of the mine at the various levels. This includes all necessary switchgear and distribution lines.

The life of mine electrical budget for Cactus East is $16.3M with $11.2M initial and $5.1M in sustaining cost.

21.1.1.1.10 Cactus East - Mine Infrastructure (2580)

Mine infrastructure in Cactus East totals $62.9M life of mine. The majority of the infrastructure cost is in the initial capital period of the first three years and totals $59.5M. This is primarily the cost of the vertical conveyor system and sizer which are commissioned just prior to the major rise in mine feed release in Year 10. The conveyor and sizer total $37.9M. The remaining infrastructure includes the underground workshop, lunchrooms, refuges, etc.

21.1.1.2 The sustaining capital is less at $3.4M.

21.1.2 Plant Capital Costs

Capital costs for the processing plant were estimated using budgetary equipment quotes, material take-offs (MTOs) for concrete, steel, and earthwork, estimates from vendors and consultants, 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: Plant Capital Cost Summary

Area Description	Initial ($000s)	Sustaining ($000s)	Total ($000s)
Site Preparation	13,750		13,750
Primary Crushing	20,931		20,931
Primary Crusher Station	1,366		1,366
Conveyors	261		261
Reclaim Tunnel & Feeders	253		253
Conveyors	144		144
Secondary Crusher	9,344		9,344
Secondary & Tertiary Crushers	3,699		3,699
Conveyors	193		193
Crushed Feed material Reclaim Tunnel	1,142		1,142
Crushed Feed material Conveyors	193		193
HLF Feed material Handling	33,307		33,307
Pregnant Leach Solution Management	2,016		2,016
Raffinate Management	8,326		8,326
Event Ponds	1,008		1,008
Solvent Extraction	21,585		21,585
Tank Farm	10,834		10,834
Electrowinning	33,062	2,373	35,435
Cathode Storage	6,245		6,245
Electrowinning Building	10,079		10,079
Reagents	1,916		1,916
Sulfuric Acid	1,311	377	1,688
Guar	219		219
Cobalt Sulfate	217		217
SX Diluent	159		159
SX Extractant	50		50
Site Sewage Facility	475	-	475
Administration Building	325	-	325
Security Gatehouse & Warehouse	3,510	-	3,510
Plant Workshop and Warehouse	414	-	414
Laboratory	0	204	204
Power Supply	7,551	7,052	14,603
Main Substation	18,910	4,729	23,639

Power Supply to Process Plant	3,285	-	3,285
Power Supply to Open Pit	5,916	-	5,916
Power Supply to Crusher	900	-	900
Water Wells	414	-	414
Plant Services	503	-	503
Plant Water Services	2,551	-	2,551
Freight	25,630		
Air Services	259,320	17,161	276,481

Civil Earthworks

The earthwork quantities for the Cactus Mine PEA were based on the existing survey extracted from the AutoDesk application Infraworks. Using AutoDesk Civil3d, these existing grade elevations were used to design the finished grade surfaces for the project infrastructure pads and access roads. An earthworks quantities comparison analysis was performed to calculate the earthwork cut and fill quantities (CY).

Electrical Equipment

One-line electrical distribution diagrams were created based on the plant arrangement and the equipment located in each area per the equipment list. The required number and size of transformers, switchgears, and motor control centers were selected based on the demand load at each location of the plant. The cost of the electrical equipment was estimated based on historical cost of similar equipment purchased recently for other projects.

Electrical bulk materials were factored by area and benchmarked from recent projects. The cost of electrical equipment was subtracted from the factors except in cases where the electrical costs were judged to be too low. in Mechanical Equipment. All major mechanical equipment was priced for the capital cost estimate by soliciting budgetary quotations, or in the case of minor equipment, from quotes or purchases from recent jobs. The vendors that were approached were generally the best-known suppliers of process equipment in the mining industry: Operating data sheets (ODSs) were developed to provide duty specifications for each unique piece of major equipment in the Equipment Register. The ODSs were populated with process flows and data from the METSIM process simulation, from specifications in the Process Design Criteria, and from physical information derived from General Arrangement drawings. Vendors were provided other information needed to receive a credible quote. All quotes were evaluated to determine if they met the duty specifications. The price that was used in the capital cost estimate was based on the most suitable quote.

Piping, Pump, and Valve Quotes

A list of pumps was developed for all process areas. Operating data were tabulated for all pumps on this list. Requests for budgetary quotes were furnished to three or more pump suppliers for comparative quotes. A piping engineer reviewed the vendor submissions and technical information to select the appropriate equipment to include in the capital cost estimate.

Piping costs were factored by area and benchmarked from recent projects.

Structural Steel and Concrete Quantity Estimates

Structural steel and concrete quantities were based on MTOs. Dimensions were taken from design drawings and used for estimation. The MTO provided total quantities of each category of steel by plant area number. Concrete quantity totals were similarly compiled by type and plant area number.

Concrete & Structural Commodity Pricing

Structural steel pricing was developed from recent M3 benchmarking data for similar materials local to the project.

Concrete supply pricing was developed from recent M3 benchmarking on the assumption that a batch plant would be set up on site and that aggregate would be available from site-furnished materials.

Instrumentation

Instrumentation materials costs were factored by area and benchmarked from recent projects.

21.1.3 Infrastructure Costs

21.1.3.1 Onsite Infrastructure

The onsite Infrastructure includes site utilities, ancillary facilities, and the HLF. Table 21-4 summarizes the direct costs for onsite infrastructure.

Table 21-4: Onsite Infrastructure CAPEX Summary

Onsite Infrastructure	Initial ($000s)	Sustaining ($000s)	Total ($000s)
HLF	75,740	408,240	483,980
Pipeline Relocation	20,000	-	20,000
Total Onsite Infrastructure	**146,679**	**420,225**	**566,904**

21.1.3.2 Offsite Infrastructure

No offsite infrastructure was included in the capital estimates.

21.1.4 Indirect Costs

Indirect costs are those costs that can generally not be tied to a specific work area, as summarized in Table 21-5. This category includes “other direct costs” that are related to construction that cannot be assigned directly to a work area.

Table 21-5: Indirect Capital Cost Summary

Indirect Cost Items	Cost ($000s)
Quality Assurance Testing	2,168
Surveying	475
EP Costs	26,774
Project Indirects for Office Facilities	5,775
EPCM Commissioning	2,677
Vendor Support	1,932
Vendor Precommissioning	902
Vendor Commissioning	902
Commissioning and Capital Spares	3,865
Total Indirect Costs	**45,470**

21.1.4.1 EP Costs

M3 breaks down estimated EP costs into various categories that total 10% of direct constructed field cost excluding mining pre-strip and mine equipment costs. The owner's is self-performing construction management and is included in the owner's cost.

21.1.4.2 Other Indirect Costs

No other Indirect Costs were included in the capital estimates.

21.1.5 Owner Costs

Owner costs are included at 5% of total contracted costs and include the estimated cost for the owner self-performing construction management (CM) activities. The CM costs is included at $6.146M with a 25% contingency.

Equipment operators will be hired as early as three months prior to start-up for training and preparation work. Senior staff and engineering personnel will also be hired several months prior to start-up as they become available. Environmental monitoring will continue through the construction period. Other Owner Cost items include:

- Owner's construction and administrative costs, including the Owners office;
- Plant mobile equipment and light vehicles;
- Insurance, accounting and legal;
- Furniture and office equipment;
- Tools;
- Staffing and operator training cost; and
- Initial fills and wear steel spares.

21.1.6 Environmental Mitigation, Reclamation, and Closure Costs

Reclamation and Closure costs are included in the financial model for the project.

21.1.7 Contingency

Contingency costs, as summarized in Table 21-6. The purpose of the contingency provision is to make allowance for uncertain cost elements that may occur but are not included in the cost estimate. The total estimated contingency for the processing plant, heap leach facility and infrastructure for this Project is 15.1% of the total initial CAPEX before sales tax.

Table 21-6: Summary of Contingency Capital Costs

Contingency Components	Percent	Cost ($000s)
Plant Construction (M3)	25.0%	76,197
Heap Leach Facility (Geo-Logic)	15.0%	11,361
Owner's Cost (Included in Owner's Cost)	25.0%	1,536
Contingency Total	**15.1%**	**89,095**

21.2 OPERATING COSTS (OPEX)

The total life-of-mine (LoM) costs, operating costs per short ton ($/st) of processed material, and dollars per pound ($/lb) of cathode produced are summarized in Table 21-7. The project operating costs include mine operating process plant operating, and general and administrative costs (G&A). Total production costs include royalty expenses. The All-In Sustaining Costs (AISC) and the All-In Costs (AIC) additionally include initial Capex, sustaining Capex, reclamation & closure, estimated salvage value, and property & severance taxes. Total costs in each category are divided by the total tonnage of processed material or the total pounds produced to arrive at the values shown in Table 21-7.

Table 21-7: Operating Costs, All-In Sustaining Costs, and All-In Costs

Cost Elements	LoM		
	Total Cost ($M)	$ / st Processed	$ / lb Copper
Mine Operating Cost	$7,252	$8.16	$1.36
Process Plant Operating Cost	$2,039	$2.29	$0.38
G & A	$50	$0.06	$0.01
Operating Costs	$9,341	$10.51	$1.75
Royalties	$388	$0.44	$0.07
Total Production Costs	$9,729	$10.94	$1.82
Sustaining Capex	$1,169	$1.31	$0.22
Reclamation & Closure	$25	$0.03	$0.00
Salvage	-$225	-$0.25	-$0.04
All-In Sustaining Costs	$10,697	$12.03	$2.00
Property & Severance Taxes	$562	$0.63	$0.11
Initial Capex (non-sustaining)	$668	$0.75	$0.13
All-In Costs	$11,927	$13.42	$2.23

21.2.1 Mining

The mine operating costs for both the open pit and underground estimates have been estimated from local mine equipment vendors and include locally supplied consumables.

The underground costs have been detailed in Section 16 and a summary will be provided here. The open pit operating costs will be discussed in detail in this section. Both areas consider leasing as part of the cost strategy for their respective fleets with the lease payments included in the operating costs.

The open pit equipment is diesel powered. The underground equipment is a mix of diesel and electric equipment. The diesel price for the operating cost estimate is $3.49/ gal.

21.2.1.1 Open Pit Operating Cost

The open pit operating cost covers the mining of the Parks/Salyer and Cactus West Pits, the historic Stockpile and rehandle as part of the mine schedule. Material movement within the mining cost is used to build the view shed berm and haul roads for mine use.

The vertical conveyor at Cactus East transports leach feed material to the surface where it is placed on an overland conveyor for transport to the crushers. At various times in the mine schedule that conveyor is not available, and the mine will be responsible for moving the underground leach feed to the crushers. This occurs while the Cactus East underground mine is being developed. The mine fleet will be used to transport that material to its final destination.

21.2.1.2 Labor

Labour costs for the various job classifications were obtained from review of other operations and discussion with their personnel. A burden rate of 30% was applied to the staff rates and 40% to the hourly rates. Labour was estimated for both staff and hourly on a 12-hour shift basis. Mine staff positions and salaries are shown in Table 21-8.

The mine staff Labour remains constant from Year 1 until Year 4, when the trainers are removed as the open pit mining continues forward.

Hourly employee Labour force levels in mine operations and maintenance fluctuate with production requirements. The hourly Labour requirements for Year 3 are shown in Table 21-9. Labour costs are based on Owner-operated mining with Arizona Sonoran responsible for the equipment with its own employees.

Overseeing all the mine operations is the Mine Operations Technical Superintendent. They will have the Maintenance Superintendent, the Chief Engineer, the Chief Geologist and the Mine General Foreman reporting directly to them.

Th mine will have four mine operations crews with a Senior and Junior supervisor. Over the mine life, there will also be a road crew/services supervisor responsible for roads, drainage, and pumping around the mine. This person would also be a backup mine shift supervisor. There are four junior shift supervisors due to the large area and volume of material being moved. The mine operations department will have its own administration clerk. The entire staff will report to the Mine General foreman.

Table 21-8: Hourly Labor Requirements and Annual Salaries (Year 3)

Position	Employees	Annual Salary (US$/y)
Mine Maintenance		
Maintenance Superintendent	1	188,900
Maintenance General Foreman	1	162,500
Maintenance Shift Supervisor	8	150,800
Maintenance Planner/Contract Administration	2	121,300
Clerk	1	74,400
Subtotal	13	-
Mine Operations		
Mine Operations Technical Superintendent	1	203,200
Mine General Foreman	1	162,500
Mine Shift Supervisor	4	149,800
Junior Shift Supervisor	4	130,000
Trainers	2	130,000
Road Crew/Services Supervisor	1	149,800
Clerk	1	74,400
Subtotal	14	-
Mine Engineering		
Chief Engineer	1	158,000
Senior Engineer	1	136,500
Open Pit Planning Engineer	2	113,500

Position	Employees	Annual Salary (US$/y)
Geotechnical Engineer	2	113,500
Blasting Engineer	1	113,500
Blasting/Geotechnical Technician	1	83,500
Dispatch Technician	4	91,000
Surveyor/Mining Technician	2	98,200
Surveyor/Mining Technician Helper	2	83,500
Subtotal	16	-
Geology		
Chief Geologist	1	158,000
Senior Geologist	1	136,500
Grade Control Geologist/Modeller	2	113,500
Sampling/Geology Technician	2	98,200
Subtotal	6	-
Total	49	

Table 21-9: Hourly Labor Requirements and Annual Salaries (Year 3)

Position	Employees	Annual Salary (US$/y)
Mine General		
General Equipment Operator	4	98,900
Road/Pump Crew	4	86,300
General Mine Labourer	4	67,900
Trainee	4	65,900
Tire Technician	4	86,300
Light Duty Mechanic	2	107,100
Lube Truck Driver	4	86,300
Subtotal	26	-
Mine Operations		
Driller	48	90,600
Blaster	2	107,100
Blast Helper	4	85,700
Loader Operator	4	111,100
Hydraulic Shovel Operator	16	111,100
Haul Truck Driver	164	86,300
Dozer Operator	23	107,100
Grader Operator	9	107,100
Crusher Loader Operator	3	107,100
Water Truck	11	86,300

Position	Employees	Annual Salary (US$/y)
Subtotal	284	-
Mine Maintenance		
Heavy Duty Mechanics	69	107,100
Welder	38	107,100
Electrician	3	111,100
Apprentice	12	89,000
Subtotal	122	-
Total Hourly	432	

The chief engineer will have one senior engineer and two open pit engineers reporting to them. There will also be two geotechnical engineers and one blasting engineer included in the short-range planning group.

The short-range planning group in engineering will have a blasting/geotechnical technician, four dispatch technicians, two surveyor/mine technicians and two surveyors/mine helpers. These employees will assist in the field with staking, surveying, and sample collection with the geology group.

In the geology department, there will be one senior geologist reporting to the chief geologist. There will also be two grade control geologist/modellers. Between the senior geologist and the grade control geologists they will manage the short range and grade control drilling, and long range/reserves. There will also be two grade control/sampling technicians.

The maintenance department will be led by a Maintenance Superintendent who reports to the Mine Operations Technical Superintendent. In the maintenance department there will be a maintenance general foreman. Eight mine maintenance shift supervisors will report to him. There will also be two maintenance planners/contract administrators and a clerk.

The hourly Labor force includes positions for light duty mechanic, tire technician, and lube truck drivers. These positions will all report to maintenance. There will generally be one of each position per crew. Other general Labor includes general mine Laborers (one per crew) and trainees (one per crew until Year 4) plus four road/pump crew personnel per crew for water management/road maintenance.

The drilling Labor force is based on one operator per drill, per crew while operating. This peaks at 68 drillers in Year 8 and then trends downwards as the mine stripping requirements drop but averages 36 drillers from Year 9 to 19.

Shovel and loader operators peak at 24 in Year 6 and hold that level until Year 10 when they start to tail off as the mine strip ratio declines. Haulage truck drivers peak at 244 in Year 12 and then tapers off to the end of the mine life.

Maintenance factors are used to determine the number of heavy-duty mechanics, welders and electricians are required and are based on the number of equipment operators. Heavy duty mechanic requirements work out to 0.25 mechanics required for each drill operator for example. Welders are 0.25 per operator and electricians are 0.05 per operator.

The number of loader, truck and support equipment operators is estimated using the projected equipment operating hours. The maximum number of employees is four per unit, to match the mine crews.

21.2.1.3 Equipment Operating Costs

Vendors provided repair and maintenance (R&M) costs for each piece of equipment selected for the Cactus project. Fuel consumption rates were estimated from the supplied information and knowledge of the working conditions. The costs for the R&M are expressed in US dollars per hour.

Tire costs were also collected from various vendors for the sizes expected to be used. Estimates of tire life are based on AGP's experience. The operating cost of the tires is also expressed in dollars per hour. The life of the haulage truck tires is estimated at 5,000 hours per tire for the 320 t trucks with proper rotation from front to back. Each truck tire for the 320-ton truck costs $42,000 so the cost per hour for tires is $50.40 per hour for the truck using six tires in the calculation.

The cost for ground-engaging tools (GET) is estimated from other projects and is an area that will be fine-tuned when the project is operational.

Drill consumables are estimated as a complete drill string using the parts list and component lives provided by the vendor. Drill productivity is estimated at 85 ft/h for the smaller drill and 83 ft/h for the larger drill for both heap feed and waste. The equipment costs used in the estimate are shown in Table 21-10.

Table 21-10: Major Equipment Operating Costs – No Labor ($/h)

Equipment	Fuel/ Power	Lube/ Oil	Tires/ Undercarriage	Repair & Maintenance	GET/ Consumables	Total
Production Drill – 5 ½ inch	55.32	5.53	3.00	55.00	86.32	205.17
Production Drill – 8 inch	34.08	-	6.00	60.00	84.17	184.25
Production Loader - 30 yd^3	106.04	10.60	43.71	150.27	30.00	340.62
Hydraulic Shovel – 55 yd^3	127.80	-	-	363.37	50.00	576.67
Crusher Loader - 15 y^3	79.30	7.93	29.76	98.25	10.00	225.24
Haulage Truck – 320 t	180.72	18.07	50.40	170.68	3.00	422.88
Track Dozer	54.40	5.44	15.00	74.00	7.00	155.84
Grader – 14'	13.83	1.38	2.53	14.00	2.00	33.75

21.2.1.4 Drilling

Drilling in the open pit will use down-the-hole hammer drill rigs. The pattern size varies between the drills but is the same for heap feed and waste for each drill. The material will be smaller and finer to improve productivity and reduce maintenance costs as well as improve crusher performance.

The smaller drill will be used as a supplemental drill and also for horizontal drain holes. The drill selected is capable of holes at -5 degrees from the horizontal which will allow open holes to be drilled up to 150 feet into the wall to aid in depressurization of the slopes.

The drilling pattern parameters are shown in Table 21-11.

Table 21-11: Drill Pattern Specifications

		Drill 5 ½ inch		Drill 8 inch	
Specification	Unit	Heap Feed	Waste	Heap Feed	Waste
Bench Height	Ft	40	40	40	40
Sub-drill	Ft	3.6	3.6	3.6	3.6
Blasthole Diameter	Inches	5 ½	5 ½	8	8
Pattern Spacing – Staggered	Ft	14.8	14.8	20.3	20.3
Pattern Burden – Staggered	Ft	13.5	13.5	18.4	18.4
Hole Depth	Ft	43.6	43.6	43.6	43.6

The sub-drill is included to allow for caving of the holes in weaker zones, reducing re-drill requirements or short holes that would affect bench floor conditions.

The parameters used to estimate drill productivity are shown in Table 21-12.

Table 21-12: Drill Productivity Calculation

Drill Activity	Unit	Drill 5 ½ inch		Drill 8 inch	
		Heap Feed	Waste	Heap Feed	Waste
Pure Penetration Rate	ft/min	1.8	1.8	1.6	1.6
Hole Depth	Ft	43.6	43.6	26.60	26.60
Drill Time	min	24.18	24.18	26.60	26.60
Move, Spot and Collar Hole	min	3.00	3.00	3.00	3.00
Level Drill	min	0.50	0.50	0.50	0.50
Add Steel	min	1.00	1.00	0.00	0.00
Pull Drill Rods	min	2.00	2.00	1.50	1.50
Total Setup/Breakdown Time	min	6.50	6.50	5.00	5.00
Total Drill Time per Hole	min	30.17	30.17	31.6	31.6
Drill Productivity	ft/h	85.3	85.3	83.0	83.0

21.2.1.5 Blasting

Quotations from local explosive vendors were obtained which included delivery to the blasthole. The explosives cost includes monthly fees from the explosive vendor for magazine rental and all costs associated with delivering the product to the open pit and down the hole.

Powder factors that result from the proposed equipment are shown in Table 21-13. The cost for blasting is approximately $0.20 per ton mined over the life of mine.

Table 21-13: Design Powder Factors

Description	Unit	Heap Feed	Waste
Powder Factor	Lb/yd3	1.10	1.10
Powder Factor	Lb/t	0.51	0.51

21.2.1.6 Loading

Loading costs for both heap feed and waste are based on the use of electric hydraulic shovels and front-end loaders. The average percentage of each material type that the various loading units are responsible for is shown in Table 21-14.

“Trucks present at the loading unit” refers to the percentage of time a truck is available to be loaded. To maximize truck productivity and reduce operating costs, it is more efficient to slightly under-truck the loading unit. One of the largest operating cost items is haulage and minimizing this cost by maximizing the truck productivity is crucial to lower operating costs. The value of 75-85% comes from the standby time shovels/loaders typically encounter due to a lack of trucks.

Table 21-14: Loading Parameters – Year 3

Description	Unit	Hydraulic Shovel	Front End Loader
Bucket Capacity	yd3	55	30
Truck Capacity Loaded	t	320	320
Waste Tonnage Loaded	%	95	5
Mill Feed Tonnage Loaded	%	50	50
Bucket Fill Factor	%	94	85
Cycle Time	sec	35	42
Trucks Present at Loading Unit	%	85	85
Loading Time	min	2.45	4.20

21.2.1.7 Hauling

Haulage profiles were determined for each pit phase for the primary crusher, waste rock facility, view shed berm and heap material for each period. Cycle times were generated for the appropriate period tonnage by destination and phase to estimate the haulage costs. Maximum speed on the trucks is limited to 30 m/h for tire life and safety reasons. Calculation speeds for various segments are shown in Table 21-15.

Table 21-15: Haulage Cycle Speeds

Flat (0%) on Surface	Flat (0%) In-pit, Crusher, Dump	Slope Up (5%)	Slope Up (10%)	Slope Down (5%)	Slope Down (10%)	Flat (0%) on Surface
Loaded (m/h)	25	10	7.5	19	19	30
Empty (m/h)	25	22	15.5	22	22	30

21.2.1.8 Support Equipment

Support equipment hours and costs are determined by factors applied to various major pieces of equipment. For the PEA, some of the factors used are shown in Table 21-16.

These factors resulted in the need for eight track dozers, three graders, and two small support backhoes with hammers. Their tasks will include clean-up of the loader faces, roads, WRSFs, and blast patterns. The graders will maintain the crusher and waste haul routes. In addition, water trucks will have the responsibility for patrolling the haul roads controlling fugitive dust for safety and environmental reasons. The small backhoe and road crew dump trucks will be responsible for maintaining roads, ditches and pumping facilities.

The hours generated in this manner were applied to the individual operating costs for each piece of equipment. Many of these units will be support equipment, so no direct Labor is allocated to them due to their variable function. The operators will come from the General Equipment operator pool.

Table 21-16: Support Equipment Operating Factors

Mine Equipment	Factor	Factor Units
Track Dozer	15%	Of haulage hours to maximum of 5 dozers
Grader	10%	Of haulage hours to maximum of 3 graders
Crusher Loader	40%	Of loading hours to maximum of 1 loader
Water Truck	10%	Of haulage hours to maximum of 3 trucks
Road Crew Backhoe	2	hours/day/unit
Road Crew Dump Truck	2	hours/day/unit
Road Crew Loader	2	hours/day/unit
Lube/Fuel Truck	12	hours/day/unit
Mechanics Truck	14	hours/day/unit
Integrated Tool Carrier	4	hours/day/unit
Light Plants	12	hours/day/unit
Pickup Trucks	10	hours/day/unit

21.2.1.9 Grade Control

The grade control program will be completed with blast hole cuttings. Known heap feed samples will be collected in addition to 25% of the waste samples to identify new mineralized zones. Samples will be sent to the assay laboratory with the results applied to the short-range mining model.

If additional grade control is required, a reverse-circulation drilling program can be incorporated but is not considered at this time.

Annual samples are expected to average 80,100 per year for the first 5 years. The total grade control program is estimated to cost approximately $800,000 annually or about $0.01 per ton mined.

21.2.1.10 Leasing

Leasing of the mine fleet is considered a viable option to reduce initial capital. Various vendors offer this as an option to help select their equipment. Both Caterpillar and Komatsu have the ability, and desire, to allow leasing of their product lines.

Indicative terms for leasing provided by the vendors are as follows:

- Down payment = 20% of equipment cost
- Term length = 3 to 5 years (depending on equipment)
- Interest rate = SOFR plus a percentage
- Residual = $0.

The proposed interest rate is used to calculate a multiplier on the amount being leased. The multiplier is 1.20 to equate to the rate. It does not consider a declining balance on the interest, but rather the full amount of interest paid over the term, equally distributed over those years. The calculation is as follows:

Annual Lease Cost = {[(Initial Capital Cost) x 80%] x 1.20} / term in years.

The support equipment fleet is calculated in the same manner as the major mining equipment.

All the major mine equipment, and most of the support equipment where it was considered reasonable, was assumed to be leased. If the equipment had a life greater than the lease term length, then the years after the lease did not have a lease payment applied. In the case of the mine trucks, with an approximate 10-year working life, the lease would be complete, and the trucks would simply incur operating costs after that time. For this reason, the operating cost would vary annually depending on the equipment replacement schedule and timing of the leases.

Using the leasing option adds $0.34/t to the mine operating cost over the life of the mine or $1.12/t of heap feed.

21.2.1.11 Dewatering

The dewatering quantity is currently estimated at 154 million gallons per year. Two in-pit diesel pumps will remove this water from the pit and another diesel pump will direct it horizontally to the transfer pond where it joins the site water system. Normal pumping rates are estimated at 422,000 gal/d with peak rates of 924,000 gal/d during the wetter part of the year. Additional dewatering in the form of horizontal drain holes is included in the dewatering cost. These holes will be campaigned and included in sustaining capital. The dewatering operating cost is expected to be approximately $392,000 per year.

21.2.1.12 Total Open Pit Operating Costs

The total life-of-mine operating costs per ton of material mined (in situ and rehandling) is $2.22/ton. The cost per ton stacked is estimated at $7.44/ton of open pit material. The costs for the PEA are shown in Table 21-17 and Table 21-18.

Table 21-17: Open Pit Operating Costs – with Leasing ($/ton mined)

Open Pit Category	Unit	Year 1	Year 3	Year 5	LOM Average
General Mine and Engineering	$/t mined	0.07	0.07	0.06	0.09
Drilling	$/t mined	0.13	0.14	0.15	0.14
Blasting	$/t mined	0.24	0.24	0.24	0.24
Loading	$/t mined	0.13	0.13	0.13	0.15
Hauling	$/t mined	0.70	0.91	0.99	1.08
Support	$/t mined	0.12	0.13	0.12	0.16
Grade Control	$/t mined	0.00	0.01	0.01	0.01
Leasing Costs	$/t mined	0.49	0.61	0.43	0.34
Dewatering	$/t mined	0.00	0.00	0.00	0.01
Total	**$/t mined**	**1.89**	**2.24**	**2.15**	**2.22**

Table 21-18: Open Pit Operating Costs – with Leasing ($/ton open pit heap feed)

Open Pit Category	Unit	Year 1	Year 3	Year 5	LOM Average
General Mine and Engineering	$/t stacked	0.42	0.42	0.40	0.29
Drilling	$/t stacked	0.77	0.80	0.95	0.47
Blasting	$/t stacked	1.39	1.39	1.48	0.82
Loading	$/t stacked	0.77	0.77	0.81	0.49
Hauling	$/t stacked	4.10	5.29	6.20	3.65
Support	$/t stacked	0.71	0.78	0.78	0.56
Grade Control	$/t stacked	0.03	0.04	0.09	0.03
Leasing Costs	$/t stacked	2.83	3.58	2.69	1.12
Dewatering	$/t stacked	0.02	0.02	0.02	0.02
Total	**$/t stacked**	**11.04**	**13.09**	**13.42**	**7.44**

21.2.2 Underground Operating Costs

The direct operating costs for the Cactus East underground mine was generated from first principal unit cost models. The model was developed using the mine design criteria and other general engineering estimates of performance. The mine was assumed to operate two 12-hour shifts per day, 365 days per year.

Costs were estimated on a quarterly basis for the length of the mine life.

Wherever possible the mine consumable cost database was updated locally during the course of the study. Labour costs were derived from a recent underground feasibility study in Arizona. Budget quotations were provided by mobile equipment suppliers.

The drill and blast development cost model included detailed design and ground support assumptions for Cactus East for each different rock type as provided by Call & Nicholas, Inc. Other models were developed for application to the other mine activities, raising, stope drilling and blasting, stope mucking, trucking, and delineation drilling. The unit rates were applied to the scheduled quantities in order to estimate the direct costs.

Initial development to first main stoping production was assumed to be undertaken by contractors. The contractors will provide all labour, consumables and equipment until Year 3, and during this period ASCU will provide only contract supervision and technical services. Thereafter all activities will be undertaken by owner crews apart from raising which will continue to be undertaken by reduced contractor crews.

Additional models were designed to reflect overhead-type activities at the mines:

- Mine Services (including Labour, supplies and equipment for construction, materials transport, road maintenance and sanitation). Diesel maintenance Labour costs are also included.
- Vertical Conveying and Sizing at Cactus East.
- Owners Mine Supervision and Technical (including mine management, production supervision, maintenance supervision, and mine technical and safety staff).
- Air Cooling
- Mine Power (developed from aggregation of mine loads and estimated usage).

Overheads were estimated by quarter and applied as a fixed daily cost. The overheads for each period were split between operating and capital development estimates in the ratio of the respective direct costs.

The models were also used to track Labour and equipment hours to identify annual requirements in each Labour category and equipment type.

All owner mobile equipment will be leased with 15% downpayment followed by a five-year lease at 8.3% pa interest.

The detailed underground operating cost can be reviewed in Section 16 of this report but has been summarized for the reader in Table 21-19.

Table 21-19: Underground Operating Costs by Area ($/t leach feed)

Underground Cost Category	Unit	Cactus East UG
In Deposit Development	$/t stacked	3.78
Stoping and Mucking	$/t stacked	6.25
Truck Haulage	$/t stacked	3.32
Delineation Drilling	$/t stacked	0.16
Mine Services	$/t stacked	4.02
Sizing and Vertical Conveying	$/t stacked	1.12
Refrigeration	$/t stacked	0.29
Equipment Leasing	$/t stacked	3.47
Supervision and Technical	$/t stacked	2.99
Power	$/t stacked	1.32
Total	**$/t stacked**	**26.73**

21.2.3 Plant Operating Costs

The operating costs assume a heap leach with a planned average placement of 28.0M short tons per year and an SX/EW facility producing copper cathodes. The process plant operating costs are summarized by the categories of labor, electric power, crushing wear parts, reagents, maintenance parts, and supplies and services, as presented in Table 21-20.

Table 21-20: Process Plant OPEX Summary by Cost Element

Cost Elements	Average Annual Cost ($M)	LoM Cost ($M)	$/st processed	% Distribution
Labor	$12.1	$375	$0.42	18.4%
Electrical Power	$14.8	$460	$0.52	22.6%
Reagents	$29.1	$902	$1.01	44.3%
Wear Parts	$1.7	$54	$0.06	2.7%
Maintenance Parts	$5.7	$176	$0.20	8.6%
Supplies and Services	$2.3	$71	$0.08	3.5%
Total (US$)	**$65.8**	**$2,039**	**$2.29**	**100.0%**

21.2.3.1 General and Administrative Costs

General and Administrative (G&A) costs include items such as 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 has been estimated by ASCU with input from sub-consultants. The average annual expense is $1.6M or approximately $0.06 / short tons processed.

21.2.4 Processing Labor

Labor for the Project was estimated based on a staffing plan for the process plant operations and maintenance areas. Labor rates were estimated using benchmark market data for the region and comparable wage rates from other mining operations in the area and included discussions with ASCU. The annual salaries include an allowance for benefits for both salaried and hourly employees. The benefits allowance was estimated using a burden rate of 28% for both hourly and salaried staff. Personnel were assumed to be working 12-hour shifts except for salaried employees. A breakdown of the labor staffing, stratified by function (operations, maintenance and process administration, is presented in Table 21-21 with the estimated payroll for an average year.

Table 21-21: Estimated Labor Requirements

Labor Function	Staff Count	Average Annual Cost ($M)	LoM Cost ($M)
Administration	18	$2.1	$64
Operations	91	$8.4	$260
Maintenance	16	$1.6	$50
Total Process Labor	**125**	**$12.1**	**$375**

21.2.5 Reagents, Wear Parts, and Electricity Costs

The reagent and wear parts costs were estimated using metallurgical test data and established industry practice assumptions and unit prices from similar size and type project benchmarks. Table 21-22 below lists the average per short ton ($/st) feed material processed factors.

Table 21-22: Cost Assumptions for Reagents and Wear Parts

Item	Average $/st processed
Cobalt Sulfate	$0.060
Diluent	$0.033
Extractant	$0.045
Guar	$0.006
Sulfuric Acid	$0.870
Wear Parts	$0.061
Total Reagent & Wear Parts	$1.08

Electrical Power costs were estimated based on a detailed capital equipment list and connected horsepower as determined by the electrical engineering team. Power will be sourced from the local Casa Grande power grid at a rate of $0.08/kWh. Table 21-23 summarizes the average annual power consumption by area.

Table 21-23: Average Annual Power Consumption

Area	Annual MWh
Primary Crushing	6,502
Secondary & Tertiary Crushing	29,046
HLF Feed material Handling	30,988
PLS Management	1,108
Raffinate Management	16,476
Event Ponds	8
Waste Rock	5
SX Solvent Extraction	3,195
SX Tank Farm	3,013
Crud Treatment	473
EW Electrowinning	113,367
Cathode Storage	863
Sulfuric Acid	284
Guar	9
Cobalt Sulfate	38
SX Diluent	30
SX Extractant	7
Plant Water Services	1,572
Air Services	728
Total Power	**207,713**

21.2.6 Maintenance Costs

An allowance is used to estimate the cost of maintenance for the process equipment and facilities. The annual allowance is estimated using a benchmark percentage of 5% applied to the direct cost of the capital equipment for each area.

21.2.7 Operating Supply Costs

An allowance is used to estimate the cost of operating and maintenance supplies that are in addition to the other costs elements discussed above. The annual allowance is estimated using a factor of $0.08/st feed material processed.

22 ECONOMIC ANALYSIS

22.1 FORWARD-LOOKING INFORMATION CAUTIONARY STATEMENTS

The results of the economic analyses discussed in this Section represent forward-looking information as defined under Canadian securities law. The results depend on inputs that are subject to known and unknown risks, uncertainties, and other factors that may cause actual results to differ materially from those presented here. Information that is forward looking includes the following:

- Mineral resource estimate.
- Assumed commodity prices and exchange rates.
- The proposed mine production plan.
- Projected mining and process recovery rates.
- Assumptions as to mining dilution and ability to mine in areas previously exploited using mining methods as envisaged the timing and amount of estimated future production.
- Sustaining costs and proposed operating costs.
- Assumptions as to closure costs and closure requirements.
- Assumptions as to environmental, permitting, and social risks.

Additional risks to the forward-looking information include:

- Changes to costs of production from what is assumed.
- Unrecognized environmental risks.
- Unanticipated reclamation expenses.
- Unexpected variations in quantity of mineralized material, grade, or recovery rates.
- Accidents, Labor disputes and other risks of the mining industry.
- Geotechnical or hydrogeological considerations during mining being different from what was assumed.
- Failure of mining methods to operate as anticipated.
- Failure of plant, equipment, or processes to operate as anticipated.
- Changes to assumptions as to the availability of electrical power, and the power rates used in the operating cost estimates and financial analysis.
- Ability to maintain the social license to operate.
- Changes to interest rates.
- Changes to tax rates.

22.2 METHODOLOGIES USED

The project has been evaluated using a discounted cash flow (DCF) analysis based on an 8% discount rate. Cash inflows consist of annual revenue projections. Cash outflows consist of capital expenditures, including pre-production costs, operating costs, taxes, and royalties. These are subtracted from the inflows to arrive at the annual cash flow projections.

Cash flows are taken to occur at the mid-point of each period. It must be noted that tax calculations involve complex variables that can only be accurately determined during operations and, as such, the actual post-tax results may differ from those estimated. A sensitivity analysis was performed to assess the impact of variations in copper price, discount rate, recovery, total operating cost, and total capital costs.

The capital and operating cost estimates developed specifically for this project are presented in Section 21. The economic analysis has been run on a constant dollar basis with no inflation.

22.3 FINANCIAL MODEL PARAMETERS

The economic analysis was performed assuming the copper price of US$3.90/lb; this price is based on consensus analyst estimates and recently published economic studies. The forecasts used are meant to reflect the average metals price expectation over the life of the Project. No price inflation or escalation factors were taken into account. Commodity prices can be volatile, and there is the potential for deviation from the forecast.

The economic analysis also used the following assumptions:

- Construction period of two years
- Total mine life of 31 years
- Cost estimates in constant Q2 2024 US$ with no inflation or escalation factors considered.
- Results based on 100% ownership with a series of NSR royalties applicable to distinct portions of the mineralized material.
- Capital cost funded with 100% equity (no financing cost assumed)
- All cash flows discounted to start of construction period using mid-period discounting convention.
- All metal products are sold in the same year they are produced.
- Project revenue is derived from the sale of copper cathode with no other metal credits payable.
- No contractual arrangements for refining currently exist.

22.3.1 Taxes

The project has been evaluated on a post-tax basis to provide an approximate value of the potential economics. The tax model calculations are based on the tax regime as of the date of the PEA technical report. At the effective date of this report, the Project is assumed to be subject to the Arizona Property Tax, Arizona Severance Tax, and Federal and State Income taxes resulting in a total estimated tax payable of US$2,161M over the life of mine.

ASCU has prepared the U.S federal and state income tax computation based on the Internal Revenue Code of 1986, as amended and the regulations thereunder including Arizona Revised Statutes as in effect as of December 31, 2023. Any subsequent changes or modifications to U.S. federal or state tax statutes, regulations or to the judicial and administrative interpretations thereof may impact the federal and state income tax computations. ASCU has reviewed the economic and operating assumptions of the Preliminary Feasibility Study Model for reasonableness and accuracy

The following is a summary of tax elections incorporated into this tax computation:

- The overall effective federal and state income tax rate for Arizona Sonoran Copper Company USA Inc. is 25.9 percent which is comprised of 21 percent for federal and for Arizona 4.9 percent net of federal tax deduction.
- The surface and underground mines of the Cactus Copper Mine Project will be treated as separate depletable properties under Section 614.
- The Cactus Copper Mine Project will opt out of bonus depreciation under Section 168(k) for 2027, the last year of allowed bonus depreciation under the phase out and elect 150 DB MACRS Section 168(a) for all subsequent years.
- The Cactus Copper Mine Project will deduct mine development costs as incurred under Section 616(a) subject to Section 291(b)(2) limitation for corporate preferences.
- The Cactus East underground development capital expenditures from years 7-8 are treated as tax mine development and for years 9 and later are treated as inventoriable cost. The Park/Salyer underground development capital expenditures are treated as inventoriable cost for all years.
- All metal sales will occur at the mine site and therefore will not be eligible for Section 250 FDII deduction available on exported goods.

- No Section 382 ownership change will occur during the construction or operation of the mine which could limit the tax attributes available.
- The severance tax liability has been computed in accordance with the Arizona Department of Revenue statutes and regulations. The tax rate is 2.5 percent and is applied to 50 percent of the gross margins on metal sales.
- The property tax liability has been computed in accordance with Arizona Department of Revenue statutes, regulations, guidelines and discussions with the State for the Cactus Copper Mine Project. Under these provisions the cost approach was used for years 1 through 5, a 60/40 ratio split between the income and cost approaches utilizing a $3.60 copper price for years 6 through 27, and again the cost approach was utilized for the final 5 years of the mine life.

22.3.2 Economic Analysis

The economic analysis was performed assuming an 8% discount rate. The pre-tax NPV discounted at 8% is US$2,769.3M; the internal rate of return (IRR) is 27.7%, and payback period is 4.7 years. On a post-tax basis, the NPV discounted at 8% is US$2,031.7M; the IRR is 24.0%, and the payback period is 4.9 years. A summary of project economics is tabulated in Table 22-1. The analysis was done on an annual cashflow basis; the cashflow output is shown in **Error! Reference source not found.** and cashflow is represented graphically in Figure 22-1 on a post-tax basis.

Table 22-1: Economic Analysis Summary Table

General	Units	LOM Total / Avg.
Copper Price	US$/lb	3.90
Mine Life	Years	31.0
Total Mineralized Material Processed	Kst	889,004
Total Waste	Kst	1,982,200
Avg. TCu	%	0.458
Avg. CuAS Head Grade	%	0.089
Avg. CuCN Head Grade	%	0.24
Production	**Units**	**LOM Total / Avg.**
Avg. Recovery Rate – CuAS	%	88.0
Avg. Recovery Rate – CuCN	%	83.0
Total Payable Copper	M lb	5,338.7
Annual Payable Copper	M lb/y	172
Operating Costs	**Units**	**LOM Total / Avg.**
Mining Cost	US$/st processed	8.16
Mining Cost	US$/lb copper	1.36
Processing Cost	US$/st processed	2.29
G&A Cost	US$/st processed	0.06
Operating Cash Costs*	US$/lb Cu	1.75
C1 Cash Costs**	US$/lb Cu	1.82
C3 Cash Costs (AISC)***	US$/lb Cu	2.00
Capital Costs	**Units**	**LOM Total / Avg.**
Initial Capital (Incl. Capitalized Opex)	US$M	668
Sustaining Capital	US$M	1,169
Closure Costs	US$M	25
Salvage Value	US$M	225

Financials	Units	Pre-Tax	Post-Tax
NPV (8%)	US$M	2,769.3	2,031.7
IRR	%	27.7	24.0

Payback	Years	4.7	4.9

*Operating cash costs consist of mining costs, processing costs, and G&A.
**Total cash costs consist of operating cash costs plus transportation cost, royalties, treatment, and refinancing.
***AISC consists of total cash costs pls sustaining capital, closure cost, and salvage value.

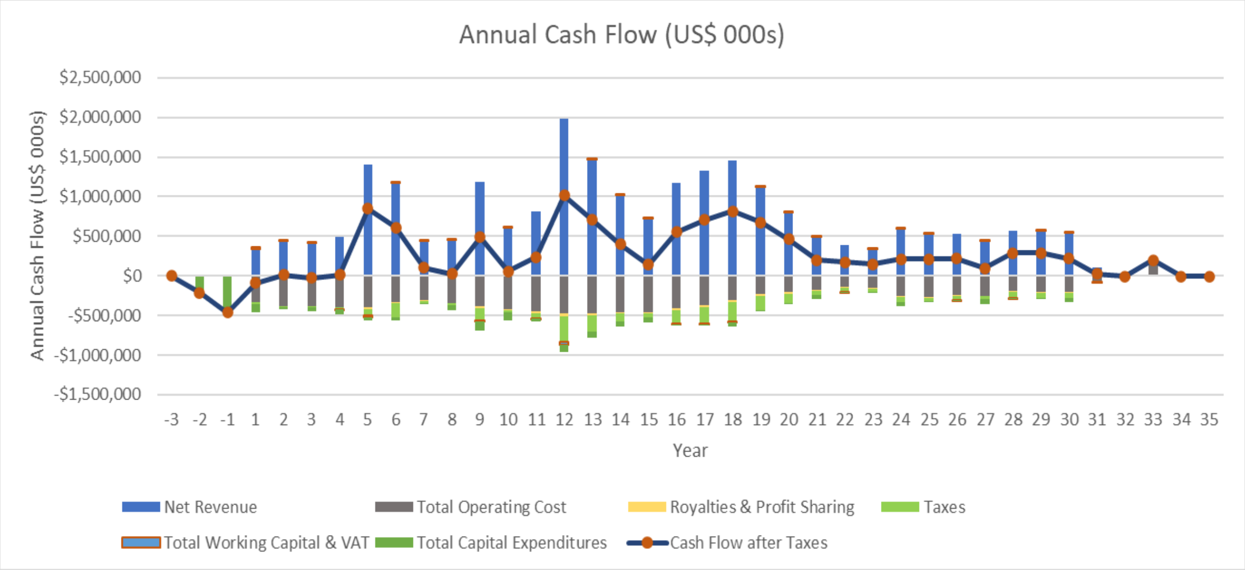


Figure 22-1: Free Cash Flow – Post Tax

22.4 SENSITIVITY ANALYSIS

A sensitivity analysis was conducted on the base post-tax NPV8% and IRR of the Project using the following variables: metal price, total operating cost, capital costs and metal recovery. Table 22-2 shows a summary of the post-tax.

As shown in Figure 22-2 and Figure 22-3, the sensitivity analysis revealed that the Project is most sensitive to commodity price, operating cost and less sensitive to initial capital cost.

Table 22-2: Post-Tax Sensitivity Summary

NPV, after Tax @ 8% ($M)					
	Cu Recovery +/- 5%	Initial Capital +/- 10%	All Capital +/- 10%	Opex +/- 10%	Cu Price +/- 10%
Decrease	$2,009	$2,093	$2,141	$2,301	$1,451
100%	$2,032	$2,032	$2,032	$2,032	$2,032
Increase	$2,055	$1,971	$1,923	$1,762	$2,613

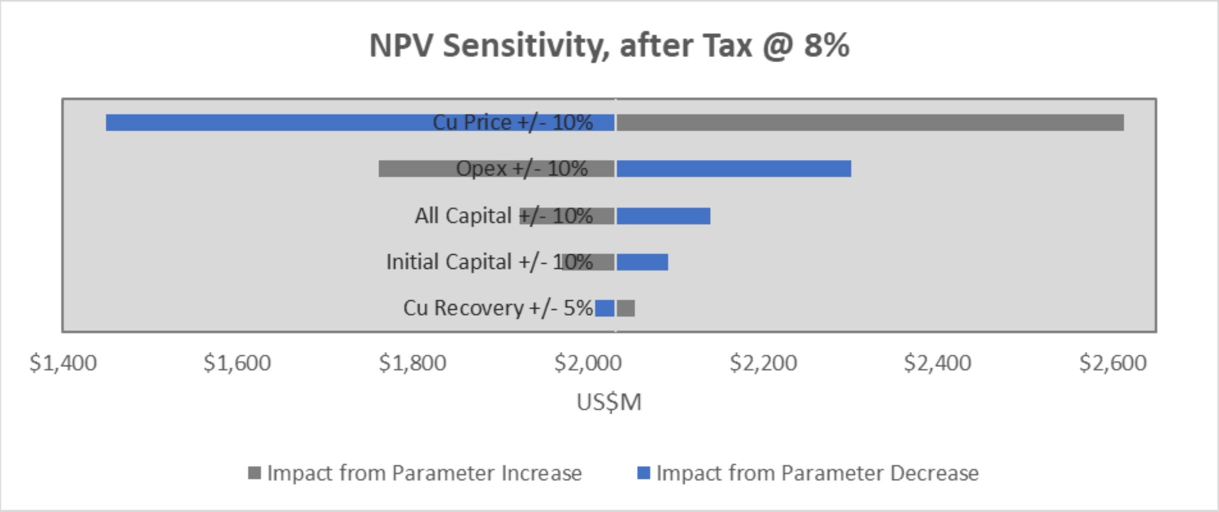


Figure 22-2: Post-Tax NPV Sensitivity Chart

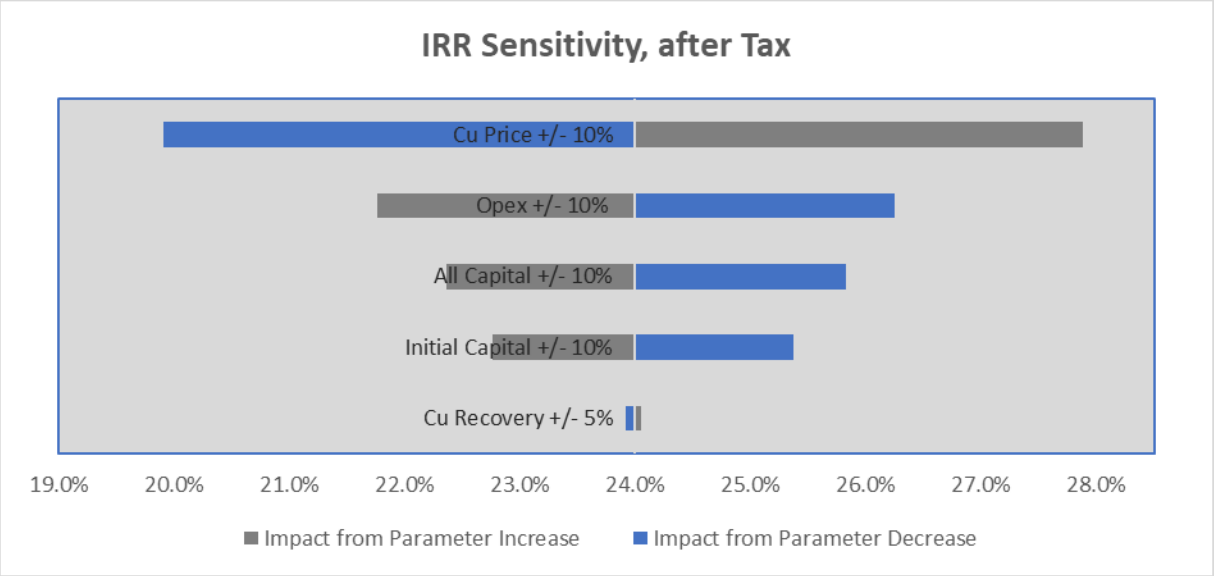


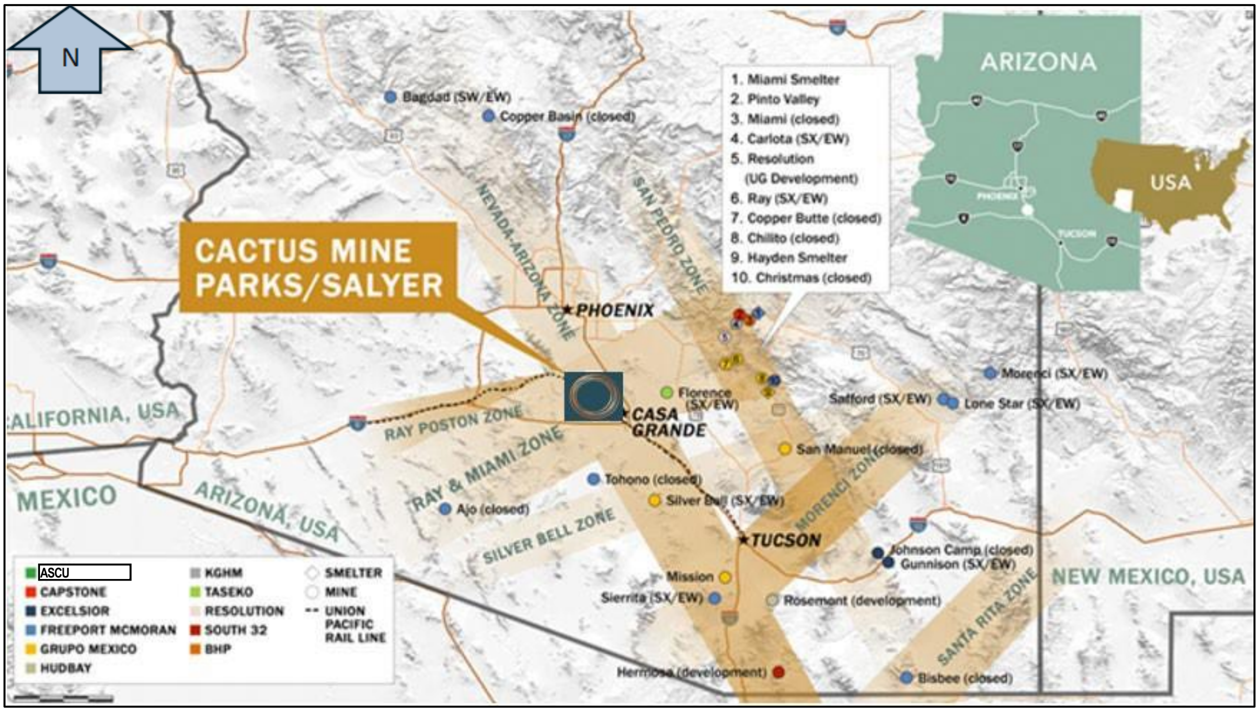
Figure 22-3: Post-Tax IRR Sensitivity Chart

23 ADJACENT PROPERTIES

The Project, as shown in Figure 23-1, is surrounded by other, current and past-producing, copper deposit mines and similar processing facilities.

The nearest adjacent mineral property is the Santa Cruz copper porphyry deposit just over 2 miles (3 Km) southeast of the Cactus site and 7 miles (11 Km) west of Casa Grande, Arizona. Deposit information, obtained from an abstract of the Geology of the Santa Cruz Porphyry Copper Deposit Henry G. Keis, ASARCO, Incorporated, Tucson, Arizona, reports associated alteration and mineralization in the Santa Cruz copper porphyry, including that of fault displaced portions (such as the Cactus Project), is about 7 miles (11 Km) long and about a mile (1.6 Km) wide. The property is now owned and being explored by IE. IE filed a NI 43-101 compliant Technical Report of their Mineral Resource Estimate on 24 May 2022. The QP was able to visit IE's core shed and view selected core from the property. The combined knowledge from review of the report and viewing the core confirmed that mineralization at Santa Crus is very similar to the mineralization of the Cactus Project.

Within Pinal County there are currently two operating copper mines. These mines are the Florence Copper Mine, owned and operated by Taseko Mines Ltd. approximately 25 mi (40 Km) ENE and the Ray Mine, owned, and operated by ASARCO LLC, a subsidiary to Grupo Mexico (approximately 50 mi ENE) of the Cactus Mine.



Source: ASCU, 2022

Figure 23-1: Regional Copper Mines and Processing Facilities

24 OTHER RELEVANT DATA AND INFORMATION

There is no other relevant data and information required for this project.

25 INTERPRETATION AND CONCLUSIONS

25.1 OVERALL RESULTS

The QPs note the following interpretations and conclusions in their respective areas of expertise, based on the review of data available for this report.

25.2 MINERAL TENURE, SURFACE RIGHTS, WATER RIGHTS, ROYALTIES AND AGREEMENTS

The Project is 100% controlled by ASCU through its wholly owned subsidiary Cactus 110 LLC, encompassing an area of approximately 5,720.08 acres and of that total, 4,731.92 acres is fee simple land. This includes, three ASLD prospecting permits that the State has surface and mineral rights to (649.12 acres), two ASLD prospecting permits that the State has mineral rights only with ASCU owning the surface (797.5 acres), ASCU also has two Special Land Use Permits (SLUPs) with ASLD to use the surface that the State owns (496.54 acres), and 18 BLM unpatented mining lode claims, this is for mineral rights only as ASCU owns the surface rights (320 acres). The BLM unpatented mining claims are outside of the known mineralization and there are currently no plans for mining in these areas.

The ASCU Cactus Mine project is a viable copper mining opportunity in a community that supports mining. The challenges facing the project are consistent with almost any mining operation in Arizona including risks associated with broad economic cycles that can impact profitability, unforeseen legislative and regulatory changes and maintaining a long-term water supply in a basin that has many groundwater users. None of the identified risks are insurmountable.

25.3 GEOLOGY AND MINERALIZATION

The Cactus and Parks/Salyer copper deposits are part of a large porphyry copper system that has been dismembered and displaced by Tertiary extensional faulting. It is similar in most regards to the model proposed by Lowell and Guilbert (1970) and these concepts will guide exploration. The deposit has a complex weathering history including oxidation and leaching which resulted in the formation of a chalcocite blanket. The chalcocite blanket in the mineralized deposit is irregular in thickness, grade, and continuity. These irregularities are caused by tilting, post-enrichment oxidation, and possibly by fault offsets. The thickness of leached capping varies from less than 100 ft (30 m) to over 650 ft (198 m), with the thicker intercepts on the north side. The later stage of oxidation and leaching modified the blanket by oxidizing portions of it in place and mobilizing some of the chalcocite to a greater depth. Substantial quantities of oxidized copper minerals are found in the oxidized zone

Arizona Sonoran's understanding of mineral zoning in general and characteristics of the supergene oxidized, and enriched zones, will help in the interpretation of exploration drill results and aid in understanding the distribution of mineralization in both the Cactus and Parks/Salyer deposits and the Stockpile Project. The current Stockpile Project was created through dumping of defined waste material from the historic Sacaton open pit mine operations by ASARCO during the period 1972 to 1984. All oxide copper mineralization, and sulfide copper mineralization below the working grade control cutoff of 0.3% Cu, as well as non-mineralized Gila Conglomerate from the west and east sides of the open pit, was directed to the WRD.

25.4 EXPLORATION, DRILLING, AND ANALYTICAL DATA COLLECTION SUPPORTING MINERAL RESOURCE ESTIMATION

The Cactus and Parks/Salyer deposits have been drilled historically under ASARCO and recently by Arizona Sonoran. Core drilling has been undertaken in mineralized zones defining two zones of economic mineralization in Cactus West and Cactus East and separate deposit at Parks/Salyer. Cactus West was mined from 1972 to 1984 prior to closure of the mine. An underground shaft and development were underway in the 1980s prior to the closure. Arizona Sonoran performed significant verification work on the historical drillholes to support the use of this data in the PEA. In addition, Arizona Sonoran drilled 184 core holes on the project to confirm mineralization characteristics, attain metallurgical test samples, and expand the resource.

Samples undertaken on 10 ft (3.0 m) lengths except where geological contacts or alteration determined otherwise. Samples were logged and photographed on site.

To drill test the mineral potential of the Stockpile Project, Arizona Sonoran designed a program of sonic drilling, using a Boart Longyear LS 600 sonic drill to drill 6-inch diameter vertical test holes through the lifts into the underlying paleo surface (anywhere from 40 ft (12.2 m) to 105 ft (32.0 m) below lift surface). Five hundred eleven sonic holes have been drilled on the Stockpile Project to infill to approximately 200 ft (61 m) centers. The core was bagged by the drillers at 2.5 ft (0.76 m) intervals using tubular plastic bags; each bag was marked with drill hole and interval footage. The drill holes were logged geologically on site, identifying primary lithology (barren conglomerate, alluvium, or mineralized waste) for selection of samples to be sent for assay; alluvial samples were not assayed.

Use of QA/QC measures such as blind analytical standards and blanks as well as blind preparatory blanks aided in the verification of analytical accuracy for data use in both the Cactus Project deposits and Stockpile Project resources.

25.5 MINERAL RESOURCE ESTIMATE

The assays and geological logging described in the previous sections were used to generate three individual Mineral Resource Estimates (MRE). This involved the update and expansion of three previously generated resource block models. These models were created and updated using Vulcan Mine Planning Software. The three MREs referenced in this report have the effective dates of;

- Cactus East and Cactus West – April 29, 2022
- Parks/Salyer – May 19, 2023, Updated July 11, 2024
- Stockpile – March 1, 2022

Each of these models was updated with all available analytical and geologic data available at the time of the effective date. All data used to generate and update the MRE followed the format, checks, and balances outlines in the CIM Best Practices Guidelines (2019).

The QP believes the geologic and analytical data collected to date is sufficient to support the generation of the resource statements for the Cactus, Parks/Salyer, and Stockpile deposits used in this report.

25.6 METALLURGICAL TESTWORK

The risks associated with the predicted metallurgical performance of the various resources at Cactus are consistent with other copper leaching projects. Copper recovery is expected to be within a +/-5% (absolute recovery) window of certainty. Similarly, acid consumption requirements are also expected to be within a +/-10% (net consumption) window of certainty. Metallurgical testing continues to further optimize the leaching protocols for commercial operations.

A significant amount of metallurgical performance information has been developed for the design basis for the stockpile, Cactus East, and Cactus West resources. The work completed for these deposits is considered adequate for the level of study undertaken, PEA.

The work completed represents only a minimal metallurgical understanding of the Parks/Salyer resource and additional confirmatory work is required to better understand the resource variability.

Approximately 45 column tests have been completed (Stockpile - 25, Cactus – 14, Parks/Salyer - 6) covering the resources identified in the current study effort for processing. In addition, over 150 bottle roll tests, mineralogical analyses and other metallurgical and materials property testing have been completed.

Testing designed to support the final commercial protocols envisioned for the resources contemplated as the project basis for the 2024 PFS were developed and conducted by the ASCU technical staff in their facility located on site. A significant effort was expended to ensure adequate QA/QC records existed and test data integrity have not been compromised. The impacts are not considered high risk, but there still exists more risk than would normally be expected in the information developed. The next phase of testing should repeat these tests as part of the work to ensure that the results are repeatable and fully validated.

The QP believes the metallurgical testing and data collected to date is sufficient to establish the required supporting metallurgical performance expectations used in estimating the project Reserves for the Stockpile, Cactus East, Cactus West and Parks/Salyer deposits. However, only a small amount of metallurgical testing has been completed for the Parks/Salyer deposit. The work completed represents only a minimal metallurgical understanding of this deposit and additional confirmatory work is required to better understand the Parks/Salyer deposit variability.

25.6.1 Copper Recovery

The current testing does not show meaningful differences overall for each material type (stockpile, predominantly oxide and enriched) relative to lithologic types. The sequential assay method for copper mineralogical variability is an adequate proxy for copper leaching kinetic variability for each material type.

With the leaching configuration in mind, a maximum 3-year leaching cycle has been assumed (3 lifts) as the practical limit for effective recovery based on experience and preliminary hydrodynamic analysis of the materials by HGS. The copper leaching metallurgical test data has been extrapolated from the testing data at one year based on the rates prevailing after one year using a logarithmic curve fit projection that considers the decaying rate of copper extraction. Scalability has been considered by employing a 95% extraction efficiency factor to both the CuAS and CuCN average column copper extractions achieved to date, allowing for inefficiencies in the leach solution flows and heap operations. The recommended copper recovery projections include the efficiency factor applied to the expected extraction from column testing. Based on the above, the recommended copper extraction estimates for use in evaluating the Cactus Project resources are presented in Table 25-1. A production timing has been assigned for each material type corresponding to material mined in one year and the expected delays in achieving the two- or three-year final recovery values. This factor is intended to account for material placement timing over the course of a year and leach cycle delays in subsequent new lift placements.

Table 25-1: Cactus Project Copper Recovery & Production Timing Distribution Recommendations

Resource Area	Units	Value
Stockpile Heap Leach (3/4" Crush)		
Acid Soluble Copper Recovery	%	87.7
Cyanide Soluble Copper Recovery	%	84.5
Leach Cycle Distribution - Year 1	%	65.0
Leach Cycle Distribution - Year 2	%	30.0
Leach Cycle Distribution - Year 3	%	5.0
Oxide Heap (3/4" Crush)		
Acid Soluble Copper Recovery	%	93.1
Cyanide Soluble Copper Recovery	%	84.5

Resource Area	Units	Value
Leach Cycle Distribution - Year 1	%	65.0
Leach Cycle Distribution - Year 2	%	30.0
Leach Cycle Distribution - Year 3	%	5.0
Enriched Heap Leach (3/4" Crush)		
Acid Soluble Copper Recovery	%	91.2
Cyanide Soluble Copper Recovery	%	84.5
Leach Cycle Distribution - Year 1	%	65.0
Leach Cycle Distribution - Year 2	%	30.0
Leach Cycle Distribution - Year 3	%	5.0
Primary Heap Leach (3/4" Crush)		
Total Copper Recovery of Primary Material	%	25.0
Leach Cycle Distribution - Year 1	%	65
Leach Cycle Distribution - Year 2	%	30
Leach Cycle Distribution - Year 3	%	5

Applying these extraction criteria, the calculated overall soluble copper (Tsol) recovery to cathodes is 86% and the corresponding total copper recovery is 73% for the resources contained in the mine plan.

25.6.2 Acid Consumption

Sulfuric acid consumption per ton of material leached is 22 lbs/ton. Net acid consumption accounts for acid regenerated in the electrowinning process when copper is plated to product. Net acid consumption per ton of material is dependent on recoverable copper content with a stochiometric conversion of 1.54 tons of acid generated per ton of copper plated in electrowinning.

Years where acid regenerated exceeds acid required to be consumed will be attenuated with gangue in the heap.

Acid consumption occurs in the first year.

25.7 MINING METHODS

The Cactus Mine project is envisaged as a large-scale open pit operation for the Parks/Salyer, Cactus West deposits and the Historical Stockpile with a smaller SLC in Cactus East later in the mine life. Parks/Salyer has not been historically mined and is covered by a sedimentary deposit of alluvium and Gila Conglomerate.

Heap leach processing in the mine schedules involves all material types from Parks/Salyer, Cactus West, Cactus East and the historic Stockpile being processed on a heap leach after multi-stage crushing. In the initial 14 years of the mine schedule, only oxide and enriched material types will be processed. In years 1-8, the processing rate will be 24 M tons per annum, with an expansion to 31.3 M tons per annum beginning in year 9. From year 15 to the end of the mine life, hypogene material will be processed, starting at a rate of 7.3 M tons per annum from year 15 to 23, and then at variable rates between 7.3 and 24 M tons per annum for the remainder of the mine life.

25.7.1 Open Pit

Initial open pit mining occurs at Parks/Salyer, with a pre-production period stripping 70 M tons. Open pit mining rates are held at 140-163 M tons per annum from years 1-10, and then gradually reduced to 90 M tons in year 15, and 16 M tons in year 22 when Parks/Salyer is completed. A period of heavy stockpile reclaim occurs in years 21-24 as low-grade and hypogene surface stockpiles are consumed to allow for the mining of Cactus West Phase 2 and 3. Mining then ramps up again slightly to 60-70 M tons per annum from years 24-27 to facilitate mining Cactus West Phase 2 and 3, before tapering down to the conclusion of mining in year 31.

Waste from open pits will be placed into multiple locations, with the entire available land package from the western edge of the historical TSF to the southern, eastern and northern extents of the property being filled with waste materials to a height of 250 ft (76 m) above original ground (excepting the Cactus West and Parks/Salyer open pit areas and necessary haulage roads). Some waste will also be backfilled into the Parks/Salyer open pit after it is exhausted late in the mine life. Several adjacent properties which Arizona Sonoran does not currently own have been utilized for waste storage, as these properties make the land package more contiguous and additional space is required to store the projected waste quantities at heights of 250 ft (76 m) or less. A cost allowance for the purchase of the land has been made in the financial model. It is believed that alternate property solutions for waste storage can be realized should purchasing the selected properties be impractical.

Open pit designs were completed according to geotechnical design parameters provided by Call and Nicholas, with design assumptions for road and minimum mining widths provided by AGP. Parks/Salyer consists of seven phases, while Cactus West consists of three phases. Both Parks/Salyer and Cactus West will be mined using 40 ft (12.1 m) single benches, with ramps sized to allow 320-ton class haul trucks. At Parks/Salyer, all walls have been designed with 45-degree inter-ramp slopes, while geotechnical step-outs are employed to reduce the overall slope to approximately 40 degrees. At Cactus West, inter-ramp slopes range from 45–50 degrees depending on material type, with typical overall slope angles of 41-43 degrees.

The historic stockpile was divided into three phases for mining: the east phase, south phase, and west phase. Only approximately 12% (10 M tons) of the available stockpile inventory was mined and processed in the schedule, because of several considerations including leach pad space, schedule priority for higher grades, and the desire to cover the historical stockpile with waste early in the mine life to capture shorter haul distances and reduce fleet costs.

Waste materials generated from mining Parks/Salyer, Cactus West and the Stockpile areas will be composed of predominantly Gila Conglomerate and Alluvium overburden (87%) with the remainder being granite and other porphyry rock or dykes with lower copper grades. A portion of the historical tailings facility (approximately 16 M tons of tails and dam materials) will be mined out and co-disposed in the waste dumps to facilitate mining the later stages of Parks/Salyer open pit. No waste segregation is required in the mine schedule, and as such different waste types can be placed into any of the available waste facilities as required by scheduling and fleet optimization constraints.

Production mining will be completed with four 46 yd3 electric hydraulic shovels, two 40.5 yd3 loaders, and a peak of fifty-two 320-ton rigid body trucks. The support equipment fleet will be responsible for the usual road, pit, and dump maintenance requirements and is composed of 14-ft graders, track dozers, and assorted auxiliary fleet.

25.7.2 Underground

The small size of the Cactus East deposit, low angle plunge of the mineralization and sharp hanging wall and footwall contacts restricted the economic potential for a block caving option. SLC was, therefore, selected as the preferred underground mining method for the Cactus East deposit.

The initial Cactus East SLC will commence at a depth of 1,265 feet below the surface and will consist of eight sub-levels, reaching a final depth of 1,845 feet. Access to the SLC will be facilitated through a single decline, with a portal situated within the existing Cactus West pit. Feed material haulage to the surface will primarily utilize a vertical conveyor system, with the option to supplement it with truck haulage via the open pit if required. Production will start in Year 8 of the overall project and will continue for 14 years, peaking at 3.8 Mt/y.

Each level has been designed for the SLC cave front to retreat to the decline and the intra-level infrastructure. Locating infrastructure in this position is designed to minimize cave induced damage as the cave propagates and stresses redistribute into the surrounding rock mass.

SLC production crosscuts have primarily been designed so that each level is horizontally offset from the level above and below. The design parameters for the SLC production drives at Cactus East are in line with other SLC operations.

The amount of feed material to be extracted will be limited in the upper three production levels. The production strategy will help control cave ability, minimize the formation of air gaps and create a blasted material blanket above the production levels to minimize early dilution entry from the overburden rocks. These restricted draw rates also apply to areas where large step-outs distances are required from one sublevel to the next.

The Cactus East Feed/Waste Handling System consists of a crusher station and a 1,600 ft (488 m) vertical conveyor with a capacity of 630 tons/h that will convey feed material from the top of the deposit to surface via a vertical raise feeding an overland conveyor. Feed material will be hauled by 55-ton diesel trucks to a sizer located adjacent to the bottom of the vertical conveyor. Material will be crushed to a maximum 6-in dimension. A short conveyor from the sizer will feed the vertical conveyor. Waste will be trucked to the portal for disposal within the Cactus West open pit.

Ventilation is driven by a fresh air drive developed from the access drive, in which the fresh air will be splitting right and left to connect to the return air drives at the extremities of the footprint. This allows natural flow of ventilation through the entire footprint.

Cactus East Underground begins development in Year 8 and mines through Year 21. The Cactus East SLC will provide 42 M tons grading 0.83% copper over its 14 year mine life into the production schedule.

The combined mine schedule of open pit and underground delivers 889 M tons at an average total copper grade of 0.46% copper over a proposed 31 year mine life.

25.8 RECOVERY METHODS

The current processing plant design is adequate for the mining and leaching plans considered in this PFS. A modular plant design has been considered using prefabricated components and fiberglass construction due to the potential for high chloride content in the leaching solutions and make-up water.

The solvent extraction facility is designed to operate in series-parallel configuration. PLS flowrate is 12,000 gpm.

The crushing and screening plant employs used equipment that has been partially installed but never operated. While used equipment is typically not considered at this stage of study, ASCU has advanced commitments to the equipment broker to establish as reasonable expectation for acquisition. The Trekkopje project MAXI Phase incorporates all mechanical and electrical gear specific to twin Primary Crusher Relocatable Sizer Stations, twin secondary/tertiary crushing and screening circuits, three parallel agglomeration circuits, all interconnecting in-plant conveyors and feed mechanisms for a combined design capacity of 7,870stph. This system includes both a plant compressed air system and uninstalled Donaldson dust extraction system with six separate baghouses which were intended to provide collection at the various process steps and material transfer points.

The designs considered are believed to be suitable for treatment in a crushed feed material heap leach, solvent extraction, and electrowinning (SX/EW) process facility to produce copper cathodes at LME Grade A quality standards ASTM B115-10 - Cathode Grade 1 on consistent basis with appropriate operating practices.

The EW facility is designed to be doubled in capacity with the addition of a second production bay opposite to the stripping machine and initial production bay.

No work was completed in terms of SXEW performance or piloting, and none is deemed necessary given the well understood nature of the process and design conditions. No deleterious elements have been found in the feed material samples tested or the resulting leach solutions and residues analyzed.

There does exist a potential for higher chloride content in process solutions related to the ground water and possible make-up water sources. Continued development of this possible impact to the SX plant configuration (an organic wash stage may be required) and materials of construction is warranted. In anticipation of potential concerns and future technological options, the SX plant is contemplated as a fiberglass-based design.

As higher-grade copper feed materials are leached, the amount of acid regenerated through the SXEW operation will increase. There is a potential for an excess amount of acid returned to the leaching system than can be consumed by the gangue materials.

25.9 INFRASTRUCTURE

Project infrastructure for this PEA effort was done with a focus on efficiency of initial capital expenditures. The project infrastructure is a conventional open-pit and underground mining operation. The mineral is processed by conventional crushing, agglomeration, stacking, leaching SX/EW. The project is adjacent to various established modes of transportation, utilities, maintenance facilities and external support services.

The HLF conceptual design can hold 600 million tons of material. The facility phasing will allow for work with the construction schedules to allow for the appropriate leaching cycles while keeping a lower capital cost. It is possible that additional area for leaching may be required to support the additional feed material reserves that may arise throughout the mine life.

25.10 ENVIRONMENTAL, PERMITTING AND SOCIAL CONSIDERATIONS

Due to historic mining operations, the project site is considered a Brownfields Project. ADEQ entered into a Prospective Purchaser Agreement (PPA) with Elim, ASCU's predecessor, because of the substantial public benefit to the remedial work conducted at the site. The PPA releases ASCU from potential liabilities related to existing, known contamination under CERCLA, WQARF, and RCRA, but does not cover unidentified environmental conditions or contamination. No environmental fatal flaws that would materially impede the advancement of the project have been identified.

There is no federal nexus for permitting of the project, reducing potential permitting delays. Of the permits/authorizations/notifications listed in Section 20, the APP will likely require the most review time by regulators. An APP Significant Amendment (without a public hearing) has a licensing timeframe of 221 business days. Other permits/ authorizations/and notifications have relatively short turnaround times.

25.11 CAPITAL COST ESTIMATE

The initial and sustaining capital cost estimate conforms to Class 5 guidelines for a preliminary economic assessment -level estimate with a -25% to +30% accuracy according to the Association for the Advancement of Cost Engineering International (AACE International). The capital cost estimate was developed in Q2 2024 US$ based on budgetary quotations for equipment, contractor's costs, in-house data from projects and studies as well as experience from similar operations.

25.12 OPERATING COST ESTIMATE

The operating cost estimate was developed in Q2 2024 dollars from budgetary quotations and in-house database of projects and studies as well as experience from similar operations. Mine operating costs have been estimated from base principles using quotations from local mine equipment vendors plus local supply consumables. The accuracy of the operating cost estimate is -25% to +30%. The estimate includes mining, processing, and general and administration (G&A) costs. For more details, refer to Section 21.2.

25.13 ECONOMIC ANALYSIS

Based on the assumptions and parameters in this report, the PEA shows positive economics of US$2,031.7M post-tax NPV (8%) and 24.0% post-tax IRR.

25.13.1 Project Economics

Economic risks include copper prices, stock market volatility, and interest and currency rates. These factors are not controllable by ASCU. However, the outlook for copper demand is generally positive.

25.14 RISKS AND OPPORTUNITIES

25.14.1 Risks

The risks and uncertainties associated with the project are related to litigation, economics, regulatory developments, and financing.

25.14.1.1 Mineral Tenure, Surface Rights, Water Rights, Royalties and Agreements

ASCU is in litigation with RAMM Power Group, which wishes to acquire the project site through imminent domain. This risk is considered low, as the cost to acquire the property, considering the value of the mineral resource, is prohibitive.

25.14.1.2 Metallurgical Testwork

The risks associated with the predicted metallurgical performance of the various resources at Cactus are consistent with other copper leaching projects. Copper recovery is expected be within a +/-5% (absolute recovery) window of certainty. Similarly, acid consumption requirements are also to be considered to be within a +/-10% (net consumption) window of certainty. Metallurgical testing continues to further optimize the leaching protocols for commercial operations.

A significant amount of metallurgical performance information has been developed for the design basis for the stockpile, Cactus East and Cactus West resources. The work completed for these deposits is considered adequate for the level of study undertaken, PEA. Further optimization work related to reducing the acid consumption requirements is recommended.

Only a small amount of metallurgical testing has been completed for the Parks/Salyer deposit. The work completed represents only a minimal metallurgical understanding of this deposit and additional confirmatory work is required to better understand the deposit variability.

25.14.1.3 Primary Material Leaching

Additional column tests need to be started using conventional heap leach techniques. The goal is to maximize pyrite oxidation to increase temperature in order to increase copper extraction.

25.14.1.4 Mineral Resource Estimate

25.14.1.4.1 Resource Expansion

As with resource definition, the ability to obtain truly representative samples from the Stockpile Project, or waste rock facility is somewhat compromised. An inherent risk exists as to representativeness of the samples tested to date or in future. Sequential assaying methodology provides a broader interpretation spatially within the Stockpile Project related to recovery expectations.

The potential for crushing larger materials may be required to achieve the recovery results projected and assessed against costs.

Mitigation measures for the potential leach hydrodynamics may need to consider conveyor stacking as a means to avoid surficial compaction and associated leach solution flow distribution and effectiveness.

25.14.1.5 Mining Methods

Portions of the Parks/Salyer open pit mining inventory require mining waste materials on adjacent properties not currently owned by Arizona Sonoran. It is understood that preliminary consultations have occurred, and that it is reasonable to assume future agreements between the current landowners and Arizona Sonoran will allow for the mining of this land in the future. A cost allowance for the purchase of these lands has been included in the financial model. Should an agreement not be reached, future mining scenarios will require adjustments to the open pit designs that will adversely impact the available open pit mining inventories.

The mining of Cactus East as a sublevel cave will cause a subsidence zone that encroaches upon the Cactus West Phase 2 and Phase 3 pit designs. It is believed that mining through this subsidence zone can be managed operationally after underground mining is completed, however additional considerations for pit slope designs may be required in the future.

Mine design and modifying factors for the SLC mine are based on geotechnical constraints. More detailed geotechnical analysis is required to assess the rock mass response to mine development and planning. This could impact design configurations, production layouts, and mine sequencing.

There is presently limited drilling information along the access development to the underground resources and related infrastructure. A targeted drilling program is required to assess structural and geotechnical conditions. The results of future work may alter the decline access path and critical surface and subsurface infrastructure locations.

The Cactus East portal location is planned to be located in the Cactus West open pit. Numerical modelling of the subsidence zone and pit wall interactions is required to verify the suitability of the portal location as well as the position of ventilation raises and production shafts. Changes to portal or vertical development locations could impact development costs and mine scheduling.

Hydrology for the mine operations must be advanced during the PFS.

25.14.1.6 Cactus East Geotechnical

Much of the Gila Conglomerate contains large clasts (up to several ft in diameter). This will cause delays in road header advance rates and delays due to additional ground support requirements where large clasts are dislodged, leaving unstable pockets.

There are portions of the proposed Cactus East decline parallel to and within 200 ft of the LOM pit shell. This will likely position the decline within the zone of rock mass yielding. Numerical modelling will be required to understand the extent of this “no go” zone so it can be avoided to reduce ground support requirements.

There will always be uncertainty between the predicted ground conditions and the actual field conditions. Additional drilling is ongoing to better characterize ground conditions throughout the project area and improve confidence in predictions.

The geotechnical data (Q) necessary to estimate ground support requirements is inadequate. Due to this, the geotechnical block model estimation of Q relies heavily on drill holes which have only RQD data to estimate NGI Q system parameters. This estimation method has uncertainty and support requirements could vary substantially from what is currently predicted. Where possible, the methodology to estimate Q from RQD was compared to logged values and the estimation method was found to under predict Q, which suggests there could be opportunity to reduce ground support requirements with additional geotechnical drilling.

The geotechnical block model and all analyses are based on logged geotechnical data from core holes which includes fracture statistics (RQD) and joint conditions (number of joint sets, joint alteration, and joint roughness) to estimate the modified NGI Q system of rock classification. However, many empirical methods rely on characterization using the full NGI Q system which also considers in-situ conditions of the rock, such as stress and water factors, that are not captured in core logging. The decline pathway in particular, being within conglomerate, may be of poorer quality than currently predicted because these stress and water factors have not been considered. Additional evaluation should be conducted to assess the impact of the weak rock mass and residual water inflows and pore pressures during tunnelling.

All analyses assume generally dry conditions and that the mining areas are effectively depressurized. If there is residual water within the rock-mass surrounding the excavations, or depressurization is incomplete, then the stability of openings and ground support performance will be less than predicted.

Wet muck is a risk for the sublevel caving operations. While left unchecked, this poses a significant risk to personnel and equipment. Managing wet muck can be achieved by allowing proper drainage time; however, this will result in delays and reduced production.

Structural geology is not currently well understood in the underground mining targets. Major faults have been modeled but have not been characterized, and secondary faults and dykes are not well understood or identified in most areas outside of the existing open pit.

25.14.1.7 Open Pit Mining

The Cactus West and Parks/Salyer open pits have a high wall in Gila Conglomerate. Additional geotechnical drilling in this wall for sampling, laboratory testing, and piezometer installations is recommended to confirm Gila Conglomerate stability.

Overall slope stability analyses do not include strength anisotropy. Once access to the Cactus West pit is reestablished, mapping should be conducted to further characterize the rock fabric in the Oracle Granite and determine structural control on slope stability.

25.14.1.8 Recovery Methods

No work was completed in terms of SXEW performance testing and piloting, and none is deemed necessary given the well understood nature of the process and design conditions. No deleterious elements have been found in the feed material samples tested or the resulting leach solutions and residues.

There does exist a potential for higher chloride content in process solutions related to the ground water and possible make-up water sources. Continued development of this possible impact to the SX plant configuration (an organic wash stage may be required) and materials of construction are warranted. In anticipation of potential concerns and future technological options, the SX plant is contemplated as a fiberglass-based design.

The crushing and conveying system included in the project design are based on used equipment ASCU is negotiating the purchase of with a broker (A.M. King) for the Trekkopje project materials handling facility located in Namibia. The used facility has a slightly oversized throughput, is partially installed and has not been operated. There is a risk that the negotiations may not be concluded, and the equipment is not available as included. The relative capital cost differences between the used equipment and "new" comparable equipment are shown below:

- PEA Crushing & Conveying (3.0k tph) CapEx = $52.6M (new equipment basis)

- Namibia Plant (7.9k tph) CapEx = $31.5M, with Namibia plant "used" pricing from A.M. King)

Should "new" equipment be necessitated for the materials handling systems additional capital will be required.

Securing the complete Trekkopje circuit will provide additional benefits in terms of project schedule and cost reduction, project execution and the ability to easily expand the circuit at marginal cost to 7,870 stph, consistent with the increased capacity requirements for future production.

25.14.1.9 Infrastructure

- Land acquisition is the largest risk to the project infrastructure in terms of locating and sizing waste and leach pad facilities.

- Geotechnical investigations need to be completed during the amended PFS for the leach pad and process plant infrastructure.

- The trade-off of using city potable water versus bottled water needs to be evaluated in the PFS.

- The WWTF has the capacity to provide ample make-up water, but the contract with the city in still in process.

- The quantities of water expected from the geotechnical assessments have not been confirmed. The actual amounts available may be less than those predicted. The quality of water obtained from planned wells needs to be tested to ensure its adequate safety for the intended equipment applications such as washing trucks, grinders, etc.

- The water obtained from the Sacaton Pit is acidic with an approximate pH of 2.6 and in addition a copper concentration of 2 g/L, characteristics that require processing in the SX Plant facility for leaching applications. This fluid will be used to start the leaching process. This fluid must not be allowed to mix with other plant water sources designated for washing, grinding, or dust control.

25.14.1.10 Environmental, Permitting and Social Considerations

Economic risks include copper prices, stock market volatility, and interest and currency rates. These factors are not controllable by ASCU. However, the outlook for copper demand is generally positive. Higher interest rates will affect financing costs; ASCU has factored this into the economic model.

Legislative and regulatory developments are a potential risk. However, ASCU knows of no planned or pending legislation that will adversely affect the project.

25.14.2 Opportunities

25.14.2.1 Mineral Tenure, Surface Rights, Water Rights, Royalties and Agreements

Additional copper resources may exist in the area and would provide a substantial opportunity for future expansion.

25.14.2.2 Metallurgical Testwork

The consumption of acid is dependent on the lift height, primary leach cycle time, irrigation rate, raffinate acid concentration and gangue mineralogy. Net acid consumption (new acid required to be purchased) is influenced by the amount of copper recovered from each ton of material leached and plated in the electrowinning operation. The chemical reaction in this operation hydrolyzes water as copper is plated to regenerate sulfuric acid that is transferred to the SX operation as electrolytes are recirculated in the stripping part of the operation. Acid is transferred to the leach systems as copper is transferred from the leaching solutions and replaced with hydrogen ions generating acid returning to the leaching operation. The more copper that can be leached from a ton of material leached, the higher the return acid content will be off setting the gangue acid consumption.

25.14.2.3 Geotechnical

Accelerated development rates may be possible through the use of road headers based on the high estimated instantaneous cutting rates. An additional study of overall advance rates that account for pick consumption, installation of ground support, and utility advancement is required to confirm this.

Alternative ground support types should be considered which could optimize lengths and installation density of bolting options.

The Gila Conglomerate is a weak but generally massive unit, with sub horizontal bedding partings. Due to this, there is opportunity to support the ribs with only mesh and fibercrete and minimize or eliminate rib bolting.

In this study, bench analyses have been conducted via photogrammetry on weathered benches. In-pit mapping is needed to confirm the structural fabric controlling slope stability. Freshly blasted benches may perform better than estimated. Controlled blasting, including pre-split blasting, may provide opportunity for steeper slope angles in the Oracle Granite.

25.14.2.4 Recovery Methods

Opportunities related to the processing areas are limited to continued optimization of the equipment selection and requirements.

Used equipment that can be verified and confirmed through an executable agreement may have some applications in areas other than the materials handling facilities currently contemplated.

- Flotation of enriched and primary feed material for recovery of copper, molybdenum, silver and gold.

25.14.2.5 Infrastructure

- A detailed evaluation of the primary access road could provide opportunity to reduce repairs to specific areas that are in need of repair. For this study it was assumed that the entire road surface would be rehabilitated.
- Plant water use includes a high demand for dust suppression. It is possible to reduce the use of water by adding surfactants, gravel, or pavement to reduce dust from the roadways. This should be evaluated as a way to minimize the environmental impact and preserve water resources.
- Use of in-pit crush conveying (IPCC) of waste reduce mine operating costs.
- Use of existing rail infrastructure for delivery of acid and reagents.

- Addition of sulfur burning for acid and power generation.
- Sale of mine waste for aggregate supply to local contractors.

25.14.2.6 Environmental, Permitting and Social Considerations

The site's status as a pre-existing mine is helpful to engendering support from the community. Mining projects on previously undeveloped land generally raise concerns regarding habitat and other environmental impacts from nearby residents and environmental groups. ADEQ, through a prospective Purchaser Agreement, has released ASCU from any potential liability associated with the legacy environmental issues at the site, based on investigations and remedial efforts conducted. The "brownfields" status of the project presents an opportunity for ASCU to engage with the community regarding the work that has been done to address legacy environmental issues.

25.14.2.7 Technical Studies

Following the issuance of the PEA, the anticipated next steps for the Cactus Project include a PFS (which is expected to be completed in 1H2025) (the "2025 PFS"), followed by an early works program, and expects to initiate a Feasibility Study in 2H2025. The Company is planning Project financing for the Cactus Project in conjunction with a potential construction decision.

It is expected that the 2025 PFS will include Nuton Technologies. Infill drilling programs are planned for Parks/Salyer composing the first 10 years of operations, and into Cactus West for the expansion of primary mineralization suitable for leaching via the Nuton Technologies. Completion of the 2025 PFS will require additional infill drilling and updated metallurgical studies, including Phase 2 Nuton metallurgical testing.

Parks/Salyer's grade, scale and scope secures it as the main contributor from day one to the Cactus project. Cactus West, drilling and finding more primary material. Any future work on the project is not expected to change the mine plan within the first 10 to 15 years of the operation. It provides further optionality on a robust standalone plan.

An Early Works program is in the early phases of being defined and planned for mid-2025, dependent upon funding. The program includes executing the permitting and bonding requirements and optimizing a pre-stripping program for Parks/Salyer.

25.14.2.8 Other Future Opportunities

The project has several other opportunities available to continue the optimization of the operation.

- The addition of an In-Pit-Crush-Convey (IPCC) for waste handling instead of truck haulage will be evaluated for improvement in the economics of the project.
- There is a potential to access the high-grade Parks/Salyer material earlier, by moving the Parks/Salyer open pit centroid north
- In response to the significant primary mineral resource at the Cactus Project, trade off studies will take place between the PEA and the 2025 PFS to determine if a traditional milling circuit will generate increased economic value compared to heap leach operation.

25.14.2.9 Nuton

Incorporation of the Nuton™ leaching technology is being studied for primary copper mineralization and the plant design development should consider any impacts related to that application when introduced. Nuton is a Rio Tinto venture bio-heap leaching technology that has the potential to produce copper from sulfide copper resources that were previously too technically challenging or too costly to process in through conventional processes. This technology has shown promising results with primary sulfide feed material which underlies the oxide and enriched sulfide (primarily chalcocite) at the Cactus project. Nuton eliminates the need for concentrating, smelting, and refining of sulfide copper. In a single integrated process, Nuton technology has the potential to produce a high-quality copper cathode on site from an estimated 230 million tons of primary sulfide through SX-EW processing.

26 RECOMMENDATIONS

26.1 SUMMARY AND BUDGET

The QP's note the following recommendations for their respective areas of expertise as the project advances to the next level of study, Prefeasibility.

The proposed budget for the recommendations is shown in Table 26-1

Table 26-1: Summary of Budget for Recommendations

Items	($M)
Exploration and Drilling	$10.0
Mining Geotechnical	$2.8
Open Pit Mine Design and Scheduling	$0.4
Underground Mine Design and Scheduling	$0.5
Mine Capital and Operating Cost Estimation	$0.5
Metallurgical Testwork	$3.0
Mineral Resource Estimates	$0.2
Recovery Methods	$1.0
Infrastructure	$0.1
Heap Leach Facility	$0.2
Environmental, Permitting, and Social Recommendations	$0.2
PFS Study Management, Trade-offs, Process Optimization	$1.5
Total	$20.4

26.2 EXPLORATION AND DRILLING

The present Cactus West and East deposit outlines appear to be drill limited to the north and east. Continued step out drilling in these areas could very well extend the limits of known mineralization.

Continue metallurgical sample drilling across the Project area.

Condemnation/step-out drilling to be completed to confirm the placement of dumps, leach pads and plant facilities.

If the decision is made to go underground at the Cactus East, plans should be made to have a close spaced definition drilling program to provide a more detailed understanding of mineralized material zone boundaries for stope design purposes. The proposed budget for these activities is estimated at $10 million.

26.3 METALLURGY AND PROCESS DESIGN

- The current mine plan extracts 10 million tons of material from the stockpile. It is important the material has less than 0.2% calcium content. Further work is required to verify this opportunity, the main elements are:
    - Additional column testing is in progress to define the impact of calcium content in the Stockpile material on acid consumption and copper extraction.

The pH of the PLS must be less than 4 to ensure copper is not precipitated in the heap. The cost of this testing is included in Section 26.5 Metallurgical Testwork.

26.4 MINING

26.4.1 Mining Geotechnical Parks/Salyer Open Pit

The following are recommendations for future work to advance to a pre-feasibility level of study:

- Additional geotechnical drilling is required to advance the study to pre-feasibility. The footprint of the proposed pit is larger than for the proposed underground mine design and drill holes are needed outside the ore body and behind the pit slopes. Preliminary geotechnical and hydrogeologic drill holes have been provided to ASCU and are included in Appendix B - Proposed GMX/Hydro Drilling for the Parks/Salyer Pit.
- The drilling campaign needs to be extended out behind the final pit slopes all around the proposed pit.
- Geotechnical logging should be standard practice on all geotechnical holes throughout the property. This should include the Gila Conglomerate.
- Some of the holes should be considered for piezometers.
- Additional rock strength testing will be needed to advance the study.
- Joint shear tests were not as important for the underground study but are critical for the slope analyses. Additional joint shear tests are needed.
- The Gila conglomerate design strengths are still based on regional experience and site-specific strengths need to be developed with testing of the Gila conglomerate.
- Characterization and shear testing is needed for the basement fault.
- The pit slope interaction with ground water needs additional study.
- A three-dimensional ground water model is needed to estimate pore pressures for the next stage of stability analysis.
- The next stage of analysis will define slope dewatering targets and dewatering methodology for prefeasibility costing.
- Additional analysis is needed for the slope constructed in the tailings sands.
- Gradation and strength testing of the tailings sands is needed for the next stage of design.
- Slope analysis of the tailings sands is needed to confirm the slope angle to be excavated.
- Numerical stability modeling is needed for confirming the size of the decoupling bench and for understanding the pit interaction with the tailings pile, the stress interaction, and the risk of a failure runout in the sands.
- The placement of the non-mineralized materials relative to the pit has not been considered. Stability of the slopes needs to be evaluated once the stockpile designs are completed.

- Measurement of in-situ stress is recommended. In-situ stress measurements can be conducted in drilled holes from surface. Estimates of the in-situ stress orientations and magnitudes are necessary for the numerical modeling work and to improve the geotechnical understanding of the deposit for either a future underground or open pit mine.

- Three-dimensional (3D) numerical stress modeling is needed for the southeast area of the proposed pit to evaluate the stability of the area where the pit comes close to the basement fault. The location of the proposed pit relative to the basement fault needs to be studied in 3D as no cross section fully captures the geometry. For now, a 250-foot offset has been recommended between the pit slope and the basement fault based on two-dimensional stability analysis. The 3D model is needed to refine that offset.

- Mineral domains were used as the geotechnical domains for this study. Their interpretation has an impact on the design recommendations. Consequently, mineral domain interpretations should be updated with additional drilling. In particular, the delineation of the leached zone versus the oxide zones is more critical for the open pit than for the underground mining methods previously studied.

- The proposed budget for these activities is estimated at $1.3 million.

26.4.2 Mining Geotechnical Cactus West and Cactus East

The following are recommendations for future work to advance to a feasibility level of study:

- Pit access should be re-established, and in-pit mapping should be conducted, and piezometers installed.

- Additional rock strength testing will be needed to advance the study both for the pit and the underground.

- The pit slope interaction with ground water needs additional study. Stability in the north region of the pit will be impacted by ground water. Ground water of the pit expansion is needed to develop dewatering targets and for determining dewatering methodology.

- Additional geotechnical drilling is required to advance the study to feasibility. Geotechnical logging (parameters necessary to calculate NGI Q and RMR) should be conducted on all in-fill holes and on dedicated holes drilled at locations of critical infrastructure, such as raise locations, decline pathways, underground workshops, etc. In particular, the decline pathways require drilling to characterize geotechnical and hydrogeological conditions.

- Geotechnical logging should be standard practice on all feed material delineation holes throughout the property. This should include the Gila Conglomerate.

- Mineral domains were used as the geotechnical domains for this study. Their interpretation has an impact on the design recommendations. Consequently, mineral domain interpretations should be updated with additional drilling.

- Once portal sites are located, discrete ground support designs for the portals should be conducted.

- Numerical stress modeling is recommended to identify the general timing and locations of the detrimental stress redistributions so that they can be accounted for in the mine plan and sequencing.

- Measurement of in-situ stress is recommended. In-situ stress measurements can be conducted in drilled holes from surface. Estimates of the in-situ stress orientations and magnitudes are necessary for the numerical modeling work and to improve the geological understanding of the deposit.

- Addressing these recommendations is estimated to cost $1.5 million.

26.4.3 Open Pit Mining

The mineable resource for the Cactus Project includes the Cactus deposit (West and East) and Parks/Salyer deposit in addition to the Historical stockpile. Conventional large scale open pit mining will be used for Parks/Salyer (PS), Cactus West (CW) and the Stockpile (SP) while SLC will be used for Cactus East (CE).

Access to the existing Cactus West pit walls was not possible due to safety concerns and legal status of the mine closure. Detailed mapping and geotechnical review of the existing pit walls when access is available and recommendations to reduce stripping while providing a safe work environment is required.

Parks/Salyer has had drilling focused in a vertical manner around the deposit. The large pit proposed has significant slopes that lack drilling information. The work proposed in the Mining Geotechnical area will fill in the information gap and allow planning to assess the impact of various configurations. This also includes an understanding of the basement fault and its impact on the side slopes.

Optimization of the mining schedule and design should be completed with updated metallurgical inputs resulting from this study and ongoing and planned test work.

Opportunity exists to consider higher processing rates earlier in the mine schedule, and as potentially the inclusion of run-of-mine leaching of lower grades to reduce cut-off grades and de-bottleneck the mine schedule and reduce stockpiling.

Continued pit phase design optimization should be considered to balance stripping requirements between phases. Inclusion of secondary haulage ramps in some larger pushbacks should be considered to allow for higher mining rates and increased rates of vertical advance in large pushbacks.

Increased understanding of acid balance (net acid consumption, net acid producing) and recovered metal recovery can be used to improve the overall mine plan.

Further examination of alternate processing for the primary mineralization needs to be considered. This could include sulfide leaching or conventional milling.

The updates to the open pit mine designs and scheduling are estimated to cost $0.4 million.

26.4.4 Underground Mining

- The drill coverage along the proposed decline paths and major areas where infrastructure is planned is minimal to non-existent. Large portions of the long-term development are too far from drilling data to estimate rock mass quality. A detailed drilling program is required to test portal locations, decline paths, vertical development, transfer, and crusher stations for detailed mine planning.

- The geological knowledge concerning the definition and characterization of major faults varies significantly between ore sources. For example, mapping information from historical mining provides good information for the Cactus West open pit but Cactus East will require explicit definition and characterisation of major faults in order to assist geotechnical modelling and mine planning.

- The majority of the drilling orientation is subvertical. Some angled holes at strategic locations to better define structural and mineral boundaries and provide lateral geological and geotechnical coverage would be useful.

Better definition of boundaries between good and poor rock classes in the footwall areas of Cactus East will help optimise the access development locations.

- Geotechnical domains are currently based on gross lithology and mineralogy changes. i.e. (Oxide, Enriched, Primary etc.). There, however, remains a high degree of variability within these domains which require further definition. Efforts should be made to establish sub-domains within this broader category to define zones of variability. This will allow mine planning and ground support provisions to be more specifically targeted.

- The geotechnical block models should be revised once new data, geotechnical domains and fault interpretations are updated. A closer link and association between the geotechnical data and geological models will help establish more meaningful data interpolation trends which will improve the accuracy for the forecasting of local ground conditions.

- Areas of surface subsidence generated by the underground mining activities are based on nominal break back angles derived from industry experience. The interaction of the Cactus East cave with the Cactus West pit does not currently consider the influence of major faults. Numerical modelling of the interaction between the underground and pit is required to finalise the location of the Cactus East portal, vent raises and production shafts.

- Further studies such as durability and weathering tests on materials that may degrade in the draw column to form mud and plasticity and dispersion tests on soils in the weathered zone that may result in mud rushes is required. The impact of stockpiling waste above the Cactus East SLC mine needs to be considered. A review of industry experience in clay management and risk mitigation measures would be useful to better understand the potential impacts in order to minimise operational risks.

- The PGCA flow modelling work assumes all rock types have the same flow mobility characteristics. The impacts of differential flow rates between the different geological units require to be evaluated to determine dilution sensitivities particularly where the waste rocks are exposed along some sections of the mining front at the initial stages mining.

- Detailed planning of geotechnical monitoring strategies supported by trigger and response protocols are needed for operational guidance for areas including ground stability, cave propagation, air gap detection, fragmentation, water balance and micro seismics.

- The geologic, hydrogeological and geotechnical information collection cost is included in their respective area. The data suggested to be collected for the PFS will form the design parameters for the updated underground designs and scheduling at Cactus East. This work is expected to cost $0.5 million to complete to a PFS level.

26.4.5 Mine Capital and Operating Cost Estimating

- With the significant open pits considered for mining of Parks/Salyer and Cactus West, large equipment will be required to keep mining efficient. This will include a focused look at material transportation methods, drilling and blasting, dewatering and waste management.

- Material movement could include the use of inpit or at pit crushing with conveying and stacking of waste material. This may also include the use of RailVeyor or trolley assist. These methodologies need to be examined in the PFS.

- The large quantity of stripping will require efficient mining practices. Finer material for loading ensures costs are kept low. Detailed drill and blast testing is recommended for cost determination. This should involve the use of independent or vendor experts to simulate fragmentation.

- The mining fleet selection has a large impact on both capital and operating costs. Conversations with vendors on best practices and equipment pricing is recommended to help advance the project forward.

- Dewatering of the pits is an area that needs further definition. This is a recommendation from the geotechnical team and the design and costing of the system needs to be completed to a PFS level.

- The cost of these various activities is estimated at $0.5 million.

26.5 METALLURGICAL TESTWORK

Only a small amount of metallurgical testing has been completed for the Parks/Salyer deposit. The work completed represents only a minimal metallurgical understanding of this deposit and additional confirmatory work is required to better understand the deposit variability. This work should include testing of material from areas with variable lithology and mineralogy known to exist. The main area of interest is a higher covellite content portion of the deposit. Covellite mineralization is leachable using the current methods, however kinetics are expected to be slower, and this impact will need to be confirmed. Column tests to compare the extraction of covellite to chalcocite are in progress at McClelland and Base Met laboratories.

The next phase of study is for the amended PFS. This amended PFS will require additional columns to investigate the variability of copper extraction from each deposit using the design leach operating conditions of 6 L/hr/m2 and 5 gpl acid in the raffinate.

Based on commercial laboratory rates, the costs of sample prep, sample material characterizations, chemical and mineralogical analyses, test conductance for up to 180 days and reporting is estimated at $50,000 per column test. A total budget for 20 columns is $1,000,000. All tests will be done in a commercial lab (McClelland or Base Met).

Total additional metallurgical testing is in a proposed budget of $3 million.

26.6 MINERAL RESOURCE ESTIMATES

As drill hole spacing decreases with continued in-fill drilling there will be an opportunity to use more sophisticated estimation techniques such as kriging to better define grade distribution within the known resource. Variographic analysis of the growing drilling database should be used to validate the use of these estimation methodologies.

These refined efforts have a proposed budget of $0.2 million.

26.7 RECOVERY METHODS

ASCU is considering the acquisition of a used crushing, screening and conveying facility partially erected in an African location. The equipment that is included can support most of the requirements for the Cactus materials handling requirements. A set of commercial terms have been developed and the pricing is considered in the current study work. ASCU will need to finalize an agreement and field verify the current condition of all components, registration and licensing, manufacturer’s warranties, and code compliance for an installation in the United States if included in an ensuing Feasibility Study. Field verification should include vendor representation.

The used equipment considered will need to be optimized for the duty at Cactus. Given the possibility of increased feed material reserves, ASCU should verify adequacy of the equipment for any reconfiguration of the leaching design and throughput capacity in the next stage of study. Finalizing these details can be estimated to cost $1.0 million.

26.8 INFRASTRUCTURE

26.8.1 Roads and Logistics

A transportation study should be included with the next phase of the work. Existing traffic on the highway approaching the site is not typically excessive, however the increased traffic load may require the addition of turning lanes or similar upgrades. Proposed budget for this activity is $0.1 million.

26.8.2 Heap Leach Facility

ASCU must perform a geotechnical investigation within the footprint of the HLF to expand the understanding of the underlying foundation. It is also recommended that a seismic hazard analysis is performed to further develop the geotechnical stability sections. Proposed budget for this activity is $0.2 million.

26.9 ENVIRONMENTAL, PERMITTING, AND SOCIAL RECOMMENDATIONS

ASCU must maintain compliance with the monitoring requirements specified in the Aquifer Protection Permit as well as additional monitoring that may be required when the permit is updated with the Parks/Salyer mine plan. In addition, ASCU will need to continue its engagement with the local community to maintain a positive relationship with key local stakeholders. It is estimated that future environmental costs will be incurred based on what future mine plans are purposed. Proposed budget for this activity is $0.2 million.

27 REFERENCES

ADEQ, 2020. Letter to ASARCO Multi-State Custodial Trust dated February 28, 2020, granting covenant not to use. Signed by Laura L. Malone, Director of Waste Programs Division, ADEQ.

ADWR, 2020, https://new.azwater.gov/sites/default/files/media/20200305_PAMA4MP_Draft.pdf

Arizona Geological Survey. (n.d.): *Natural Hazards in Arizona*. Arizona Geological Survey. https://uagis.maps.arcgis.com/apps/webappviewer/index.html?id=98729f76e4644f1093d1c2cd6dabb584.

Berger et al., (2008): Berger, B.R., Ayuso, R.A., Wynn, J.C., and Seal, R.R., 2008, *Preliminary model of porphyry copper deposits:* U.S. Geological Survey Open-File Report 2008–1321, 55 p.

Berger, B. R., W. G. McLaughlin, T. G. Blakely, & M. L. Brantley. (2008). *Porphyry copper deposits form in areas of shallow magmatism within subduction-related tectonic environments*. Economic Geology, 103(4), 573-598.

Call & Nicholas, Inc., (2023): *Geotechnical PFS Study for the ASCU Cactus Project*. Internal document prepared by Call & Nicholas, Inc. for ASCU, December, 2023.

Call & Nicholas, Inc., 2023. *Geotechnical PFS Study for the ASCU Cactus Project*, December 2023 consultant's report.

Call & Nicholas, Inc., 2023. *Parks/Salyer and Cactus East Geotechnical Block Model Release Notes*, September 2023 consultant's memorandum.

Call & Nicholas, Inc., 2023. *Parks/Salyer PSI-19 (ECP-132) Piezometer Installation*, April 2023 consultant's memorandum.

Call & Nicholas, Inc., 2023. *Parks/Salyer SE-17 Piezometer Installation*, March 2023 consultant's memorandum.

Call & Nicholas, Inc., 2023. *Parks/Salyer SE-18 Piezometer Installation*, March 2023 consultant's memorandum.

Call & Nicholas, Inc., 2024. *MainSpring ECM-250 Vibrating Wire Piezometer Installation Record*, May 2024 consultant's memorandum.

Call & Nicholas, Inc., 2024. *MainSpring ECM-254 Vibrating Wire Piezometer Installation Record*, May 2024 consultant's memorandum, PENDING.

Call & Nicholas, Inc., 2024. *Parks-MainSpring RQD Block Model Release Notes*, July 2024 consultant's memorandum.

City of Casa Grande, 2009. General Plan. https://drive.google.com/file/d/0B4vKG2urQq2OMDd5X0dSSWZBRjA/view

Clear Creek Associates, (2024): *Cactus Mine Groundwater Flow Model, Cactus-East and Parks/Salyer Deposits Operations Simulation*. Internal document prepared by Clear Creek Associates for ASCU, January 30, 2024.

Errol Montgomery and Associates (M&A), (1986): *Hydrogeologic Conditions, ASARCO Sacaton Open-Pit Mine, Pinal County, Arizona*. Document prepared as part of Groundwater Quality Protection Permit Application, November 21, 1986.

Hammett, (1992): *Maps showing groundwater conditions in the Eloy and Maricopa-Stanfield sub-basins of the Pinal Active Management Area, Pinal, Pima, and Maricopa Counties, Arizona – 1989*. Arizona Department of Water Resources Hydrologic Map Series Report No. 23, 3 sheets, scale 1:125,000.

International Code Council (ICC), (2021): *International Plumbing Code (IPC), Section 6*. https://codes.iccsafe.org/

Liu, S., Nelson, K., Yunker, D., Hipke, W., Corkhill, F. (2014): *Regional Groundwater Flow Model of the Pinal Active Management Area, Arizona – Model Update and Calibration*. Model Report No. 26, Arizona Department of Water Resources, Hydrology Division.

Parsons, (2022): *Cactus Mine, Phase 1 Reclamation Plan*. Prepared by Parsons, December 2022.

Pienta, G. (ed.)(2017): *Plumbing Engineering Design Handbook, American Society of Plumbing Engineers*. https://www.aspe.org/

Samuel Engineering, 2020. NI 43-101 Technical Report; Preliminary Economic Assessment (PEA), prepared for Elim Mining Incorporated Cactus Mine Stockpile Processing Project, Pinal County, Arizona, USA. March 12, 2020, Revision 1

Tetra Tech, Inc., 2017a. Sacaton Site Characterization Work Plan, prepared for ASARCO Multi-State Environmental Custodial Trust. May 1, 2017.

Tetra Tech, Inc., 2017b. Technical Memorandum Re: Initial Hydrogeologic Characterization Study submitted to John Patricki and Tina LePage, Arizona Department of Environmental Quality. December 21.

Tetra Tech, Inc., 2018a. Technical Memorandum Re: 201 Sacaton –Comprehensive Facility Inspection submitted to John Patricki, Arizona Department of Environmental Quality. July 15.

Tetra Tech, Inc., 2018b. Technical Memorandum Re: Tru-Stone Comprehensive Facility Inspection, submitted to John Patricki, Arizona Department of Environmental Quality. July 15.

Tetra Tech, Inc., 2019a. Demolition Completion Report – Sacaton Mine Site, prepared for ASARCO Multi-State Environmental Custodial Trust. March 11.

Tetra Tech, Inc., 2019b. Site Improvement Plan – Sacaton Mine Site, prepared for ASARCO Multi-State Environmental Custodial Trust. March 11.

Tetra Tech, Inc., 2019c. Site Improvement Plan – Sacaton Mine Site Amendment 1, prepared for ASARCO Multi-State Environmental Custodial Trust. November 26, 2019. United States Environmental Protection Agency (EPA): *Lean & Water Toolkit: Appendix C – Water Unit Conversions and Calculations*. https://www.epa.gov/sustainability/lean-water-toolkit-appendix-c

APPENDIX A – PEA CONTRIBUTORS AND PROFESSIONAL QUALIFICATIONS

CERTIFICATE OF QUALIFIED PERSON

John Woodson

I, John 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 & Technology Corporation
   2051 W. Sunset Road, Ste. 101
   Tucson, Arizona. 85704

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 have worked as an engineer for a total of 21 years. My experience includes 19 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.

5. I have read the definition of “Qualified Person” set out in National Instrument 43-101 (“NI 43-101”) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “Qualified Person” for the purposes of NI 43-101.

6. I am a contributing author for the preparation of the technical report titled “Cactus Mine Project NI 43-101 Preliminary Economic Assessment” (the “Technical Report”), dated effective August 07, 2024, prepared for Arizona Sonoran Copper Company; and am responsible for Sections 1.1, 1.16, 1.17, 1.19, 1.20, 1.22, 1.23, 2, 3, 18, 19, 21, 22, 24, 25.1, 25.9, 25.11, 25.12, 25.13, 25.14.1.9, 25.14.2.5, 25.14.2.7, 25.14.2.8, 26.1, 26.8, and 27. I visited the project site on February 7, 2024.

7. I have not had prior involvement with the property that is the subject of the Technical Report.

8. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

9. I am independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101.

10. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

11. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Signed and dated this 23 day of August 2024.

“signed” John W. Woodson
Signature of Qualified Person

John W. Woodson
Print Name of Qualified Person

CERTIFICATE OF QUALIFIED PERSON

This certificate applies to the technical report entitled titled “Cactus Mine Project NI 43-101 Preliminary Economic Assessment” dated effective August 07, 2024, prepared for Arizona Sonoran Copper Company; (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 07, 2024.
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 1.12, 1.15, 13, 17, 25.6, 25.8, 25.14.1.2, 25.14.1.3, 25.14.1.8, 25.14.2.2, 25.14.2.4, 26.3, 26.5, and 26.7 of the Technical Report.
9. I have had prior involvement with the property that is the subject of the Technical Report. In 2020 I was part of a confidential Due Diligence team that reviewed the project for a potential buyer.
10. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
11. I 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.
12. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Dated this 23 day of August, 2024.

“signed”
Signature of Qualified Person

Laurie Tahija
Print Name of Qualified Person

CERTIFICATE OF QUALIFIED PERSON

Gordon Zurowski

I, Gordon Zurowski, P.Eng., do hereby certify that:

1. I am Principal Mine Engineer with AGP Mining Consultants Inc., with a business address at #246-132K Commerce Park Drive, Barrie, Ontario, L4N 0Z7, Canada.

2. I graduated with a B.Sc. in Geological Engineering in 1988 from the University of Saskatchewan.

3. I am a member in good standing of the Professional Engineers of Ontario (#100077750).

4. I have practiced my profession in the mining industry continuously since graduation. My relevant experience includes 30 years in mineral resource and reserve estimations, preliminary economic analysis, prefeasibility and feasibility studies.in Canada, the United States, Central and South America, Europe, Asia and Africa.

5. I have read the definition of “Qualified Person” set out in National Instrument 43-101 (“NI 43-101”) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “Qualified Person” for the purposes of NI 43-101.

6. I am a contributing author for the preparation of the technical report titled “Cactus Mine Project NI 43-101 Preliminary Economic Assessment” (the “Technical Report”), dated effective August 07, 2024, prepared for Arizona Sonoran Copper Company; and am responsible for Sections 1.14, 16.1, 16.2, 16.4-16.8, 21.1.1, 21.2.1, 25.7, 25.14.1.5, 25.14.1.6, 25.14.1.7, 25.14.2.3, 26.4, and 27. I visited the project site on January 24, 2023.

7. I have had prior involvement with the property that is the subject of the Technical Report. I was involved with the “Cactus Mine Project NI 43-101 Technical Report and Pre-Feasibility Study, Arizona United State of America (March 28,2024) as a contributing author with AGP Mining Consultants Inc.

8. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

9. I am independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101.

10. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

11. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Signed and dated this 22nd day of August 2024.

“Signed”
Signature of Qualified Person

Gordon Zurowski, P.Eng
Print Name of Qualified Person

CERTIFICATE OF QUALIFIED PERSON

Allan L. Schappert

I, Allan L. Schappert, CPG, SME-RM, do hereby certify that:

1. I am the Principal Resource Geologist of:

   ALS Geol Resources, LLC.
   711 S. Sean Drive,
   Chandler, AZ 85224

2. I graduated with a BSc. Geology from Lakehead University in Ontario, Canada in 1979.

3. I am a Certified Professional Geologist (CPG #11758) in good standing in the American Institute of Professional Geologists (AIGP) and a Registered Member (RM #04164071) of the Society for Mining, Metallurgy & Exploration (SME).

4. I have worked as mine and resource geologist for a total of 45 years. My experience includes mine production mapping, grade control, mine production reconciliation, exploration and definition drill planning and interpretation, resource estimation and reporting.

5. I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

6. I am the principal author for the preparation of the technical report titled "Cactus Mine Project NI 43-101 Preliminary Economic Assessment" (the "Technical Report"), dated effective August 07, 2024, prepared for Arizona Sonoran Copper Company; and am responsible for Sections 1.2, 1.3, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11, 1.13, 1.14, 1.21, 1.23, 2.2, 2.5, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 6, 7, 8, 9, 10, 11, 12, 14, 23, 25.2, 25.3, 25.4, 25.5, 25.14.1.1, 25.14.1.4, 25.14.2.1, 26.2, 26.6 and 27. I have visited the project site on Jun 24, 2024.

7. I have prior involvement with the property that is the subject of the Technical Report. I have acted as a consulting geologist and QP for prior versions of the technical report and several associated press releases.

8. I have monitored and reviewed geology work and drilling results at the project since ASCU acquired the property in 2019. I also have made several QP visits to Skyline Labs in Tucson, Arizona, which is the sole assay lab used by ASCU

9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

10. I am independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101.

11. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

12. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Signed and dated this 13 day of August 2024

.

Allan L Schappert

Signature of Qualified Person

Allan L Schappert

Print Name of Qualified Person

CERTIFICATE OF QUALIFIED PERSON

R. Douglas Bartlett

I, R. Douglas Bartlett, CPG, RG, do hereby certify that:

1. I am employed as a Principal Hydrogeologist with Geologic Associates, Inc., with an office address of:

   Geo-Logic Associates
   8777 N. Gainey Center Dr., Suite 250,
   Scottsdale, AZ 85258

2. I graduated from Colorado State University with a Bachelor of Science degree in Geology in 1977 and a Master of Science degree in Geology in 1984.

3. I am a Registered Geologist in good standing in Arizona (RG 25059). I am also a Certified Professional Geologist with the American Institute of Professional Geologists (CPG No. 8433).

4. I have practiced my profession as a geologist/hydrogeologist for a total of 47 years. My experience includes assessing groundwater supplies for mining properties in the southwestern U.S. I have been directly involved in hydrogeologic studies at numerous mines in the Southwest U.S. including Freeport McMoRan mines in Morenci, Safford, Sierrita, Bisbee, Bagdad, Arizona, and Henderson, Colorado as well as Equinox Gold at Castle Mountain in California; Mountain Pass mine, California; and others throughout the western U.S.

5. I have read the definition of “Qualified Person” set out in National Instrument 43-101 (“NI 43-101”) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “Qualified Person” for the purposes of NI 43-101.

6. I am the principal author for the preparation of the technical report titled “Cactus Mine Project NI 43-101 Preliminary Economic Assessment” (the “Technical Report”), dated effective August 07, 2024, prepared for Arizona Sonoran Copper Company; and am responsible for Sections 1.4, 1.18, 2.3.4, 3.2, 4.7, 4.8, 4.9, 5, 16.3, 20, 25.10, 25.14.1.10, 25.14.2.6, 26.9 and 27. I have visited the project site on Apr 11, 2023.

7. I am independent of the Company as independence is defined in Section 1.5 of NI 43-101.

8. I participated in conducting an environmental due diligence assessment of the Cactus Mine for Tembo Capital in 2020.

9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

10. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

11. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Signed and dated this 23 day of August 2024.

Signed
Signature of Qualified Person

R. Douglas Bartlett
Print Name of Qualified Person

CERTIFICATE OF QUALIFIED PERSON

James L. Sorensen

I, James L. Sorensen, FAusIMM, do hereby certify that:

1. I am currently the Director, Metals & Minerals of:

   Samuel Engineering, Inc.
   8450 E. Crescent Parkway, Suite 200
   Greenwood Village, Colorado 80111

2. I graduated with a Bachelor of Science degree in Metallurgical Engineering from the University of Arizona in 1981.

3. I am a Fellow member of The Australasian Institute of Mining & Metallurgy ("FAusIMM") Registration No.221286. in good standing since May 2004 in the International Branch.

4. I have worked as a Metallurgical Engineer and Consultant in various project and operating capacities for a total of 40 years. My experience includes four projects over the past 3 years related to the application of the Nuton™ Technology for which my QP responsibilities specifically apply to in the work cited in Section 6 below.

5. I have read the definition of “Qualified Person” set out in Canadian National Instrument 43-101 (“NI 43-101”) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “Qualified Person” for the purposes of NI 43-101.

6. I am a contributing author for the preparation of the technical report titled “Cactus Mine Project NI 43-101 Preliminary Economic Assessment” (the “Technical Report”), dated effective August 07, 2024, prepared for Arizona Sonoran Copper Company; and am responsible specifically for the relevant parts of the Cover Page, Section 2.3 and Section 25.14.2.9 only. I have visited the project site on multiple occasions since December 2019 with the last visit on August 31, 2023.

7. I have prior involvement with the property that is the subject of the Technical Report. I have been involved with the Cactus Mine Project since December 2019 including consulting and Technical Report Qualified Person responsibilities. Prior Technical Reports for the Cactus Mine and associated properties I have been involved with are:

   I. Preliminary Economic Assessment, Samuel Engineering, Effective Date: March 1, 2020, Prepared for Elim Mining Inc.
   II. Mineral Resource Estimate and Technical Report, Stantec, Effective Date: 10 November 2022, Prepared for Arizona Sonora Copper Company, Inc.
   III. Preliminary Economic Assessment, Stantec, Effective Date: 31 August 2021, Prepared for Arizona Sonora Copper Company, Inc.
   IV. Cactus Mine Project NI 43-101 Technical Report and Pre-feasibility Study, Ausenco Engineering South USA Inc., Effective Date: February 21, 2024, Prepared for Arizona Sonora Copper Company, Inc.

8. I have had additional involvement with the project and collaboration with the Client related to permitting information and documentation for the subject project described in the Technical Reports in Section 7 above.

9. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

10. I am independent of the issuer applying all of the tests in Section 1.5 of National Instrument 43-101

11. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form in my area of responsibility described in Section 6.

12. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Signed and dated this 21 day of August 2024.

“signed”
Signature of Qualified Person

James L. Sorensen FAusIMM
Print Name of Qualified Person