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PRESENTED AT THE ANNUAL MEETING OF THE ARIZONA CONFERENCE SME
DECEMBER 5, 1994

Geology and Mineralization of the Carlota Copper Project

Globe - Miami Mining District
Gila County, Arizona

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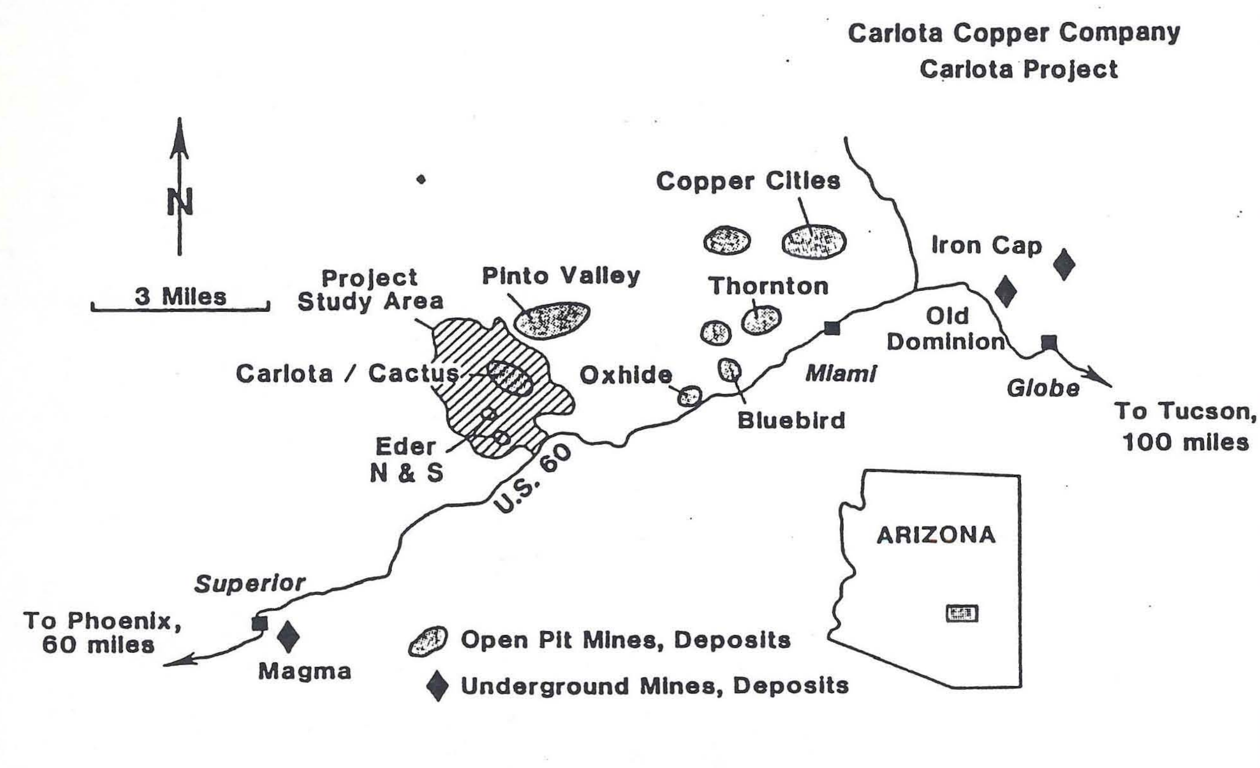


Globe-Miami Copper Mining District, Arizona

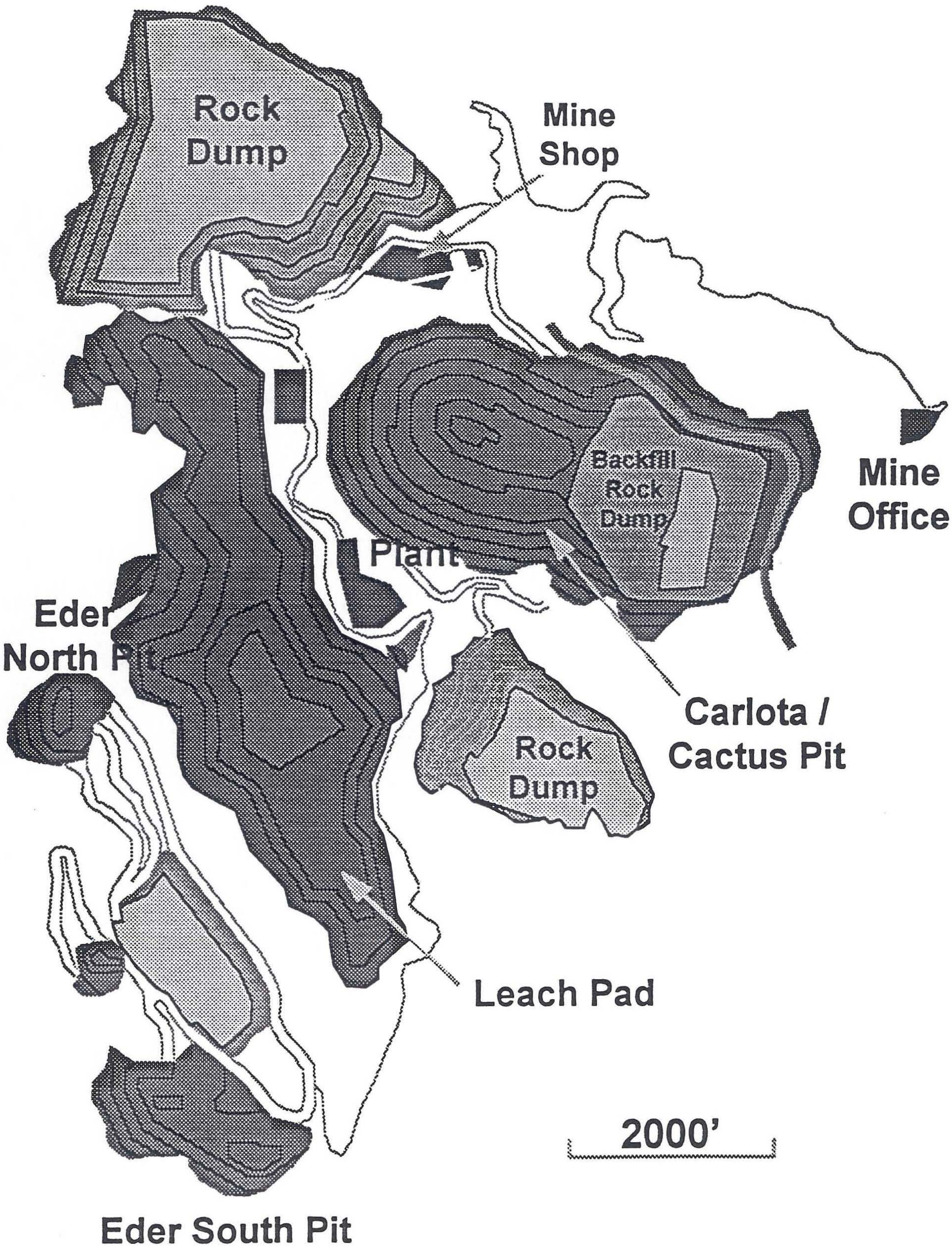
Project Highlights

- 106 million ton reserve at 0.45% Cu
- 20,000 tpd ore - 49,000 tpd waste
- 18 year project life
- 33,000 tons copper per year
- Cash cost of $0.58 per pound copper
- 290 employees

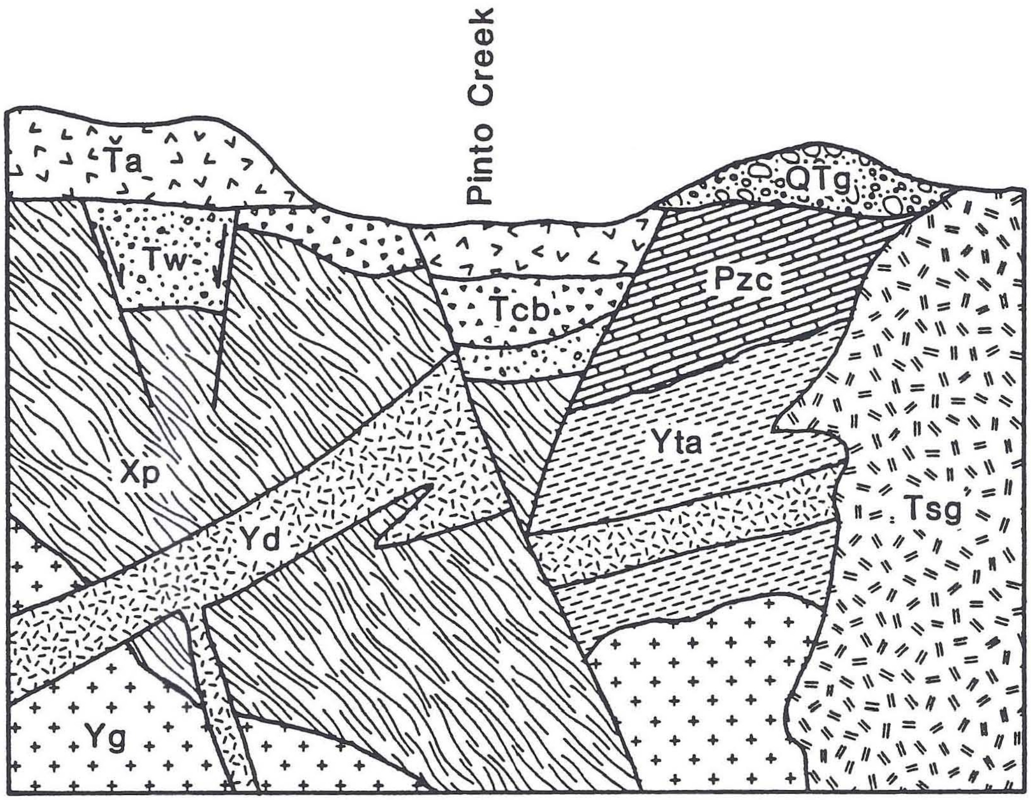
Project History and Schedule

1/89	Acquire Carlota Property
3/90	Lease Cactus Property
11/90	Purchase Eder Property
8/91	Cambior Acquires Westmont Mining
2/92	Plan of Operations Submitted to USFS
3/93	Purchase Cactus Property
12/94	Draft EIS Issued by USFS ?
7/95	Record of Decision-Start of Construction ?
7/96	Commercial Copper Production ?

Carlota Copper Project
Site Plan



Carlota Copper Company
Carlota Project



Schematic Geologic Section

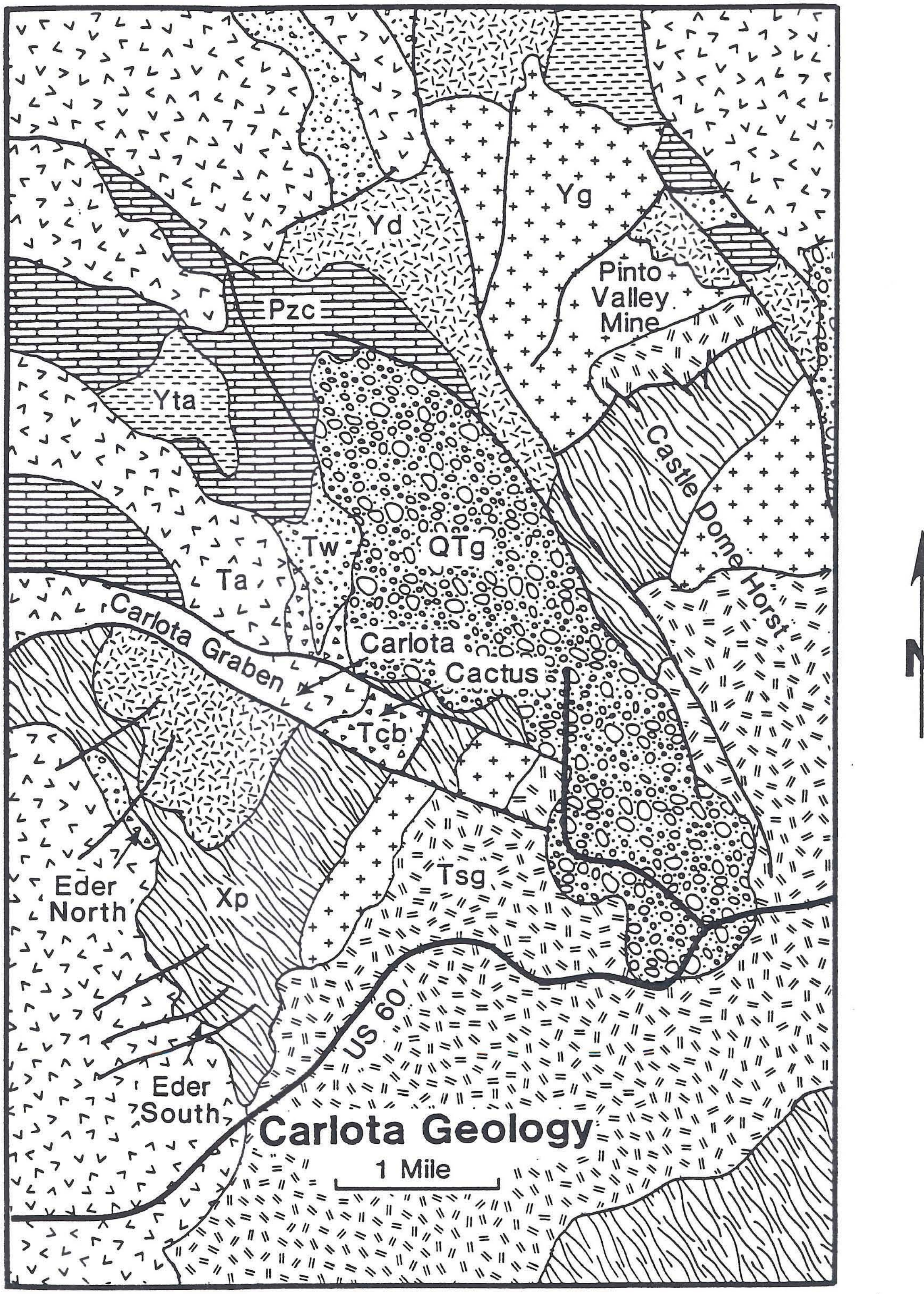
Quaternary
- Qtg — Gila Conglomerate

Tertiary
- Ta — Apache Leap Tuff
- Tcb — Cactus Breccia
- Tw — Whitetail Conglomerate
- Tsg — Schultze Granite

Paleozoic
- Pzc — Sedimentary (Carbonate) Rocks, Undiff.

Middle Proterozoic
- Yd — Diabase
- Yta — Troy Quartzite, Apache Group
- Yg — Granitic Rocks, Undiff.

Early Proterozoic
- Xp — Pinal Schist



Carlota Copper Company
Carlota Project

Rock Avalanche Deposits

- Sheet or tongue-like geometry - can be large
- Individual blocks to tens of meters - often monolithologic
- Typically matrix poor - sand size fragments
- Clasts intensely fractured - "crackle breccia"
- Clasts angular to subangular
- Clast / block contacts often sheared

after Yarnold and Lombard, 1989

Predominant Minable Ore Types

	Mtons	Grade % Cu
Breccia - oxide	51	.38
Breccia - mixed	24	.58
	75	.44
Schist - oxide	16	.30
Dacite - oxide	6	.40
Kelly - oxide	9	.77
Total	106	.45

Copper Minerals

- **Oxide**

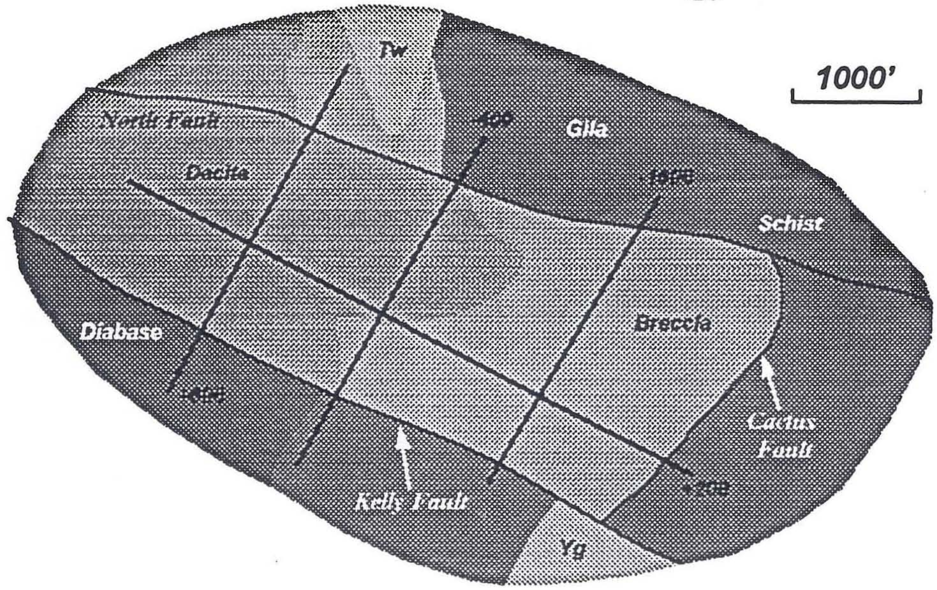
  Blue Chrysocolla - Several Phases
  Black Chrysocolla
  Chrysocolla - Clay
  Malachite
  Neotocite - Copper Wad
  Cu - Bearing Hematite

Copper Minerals

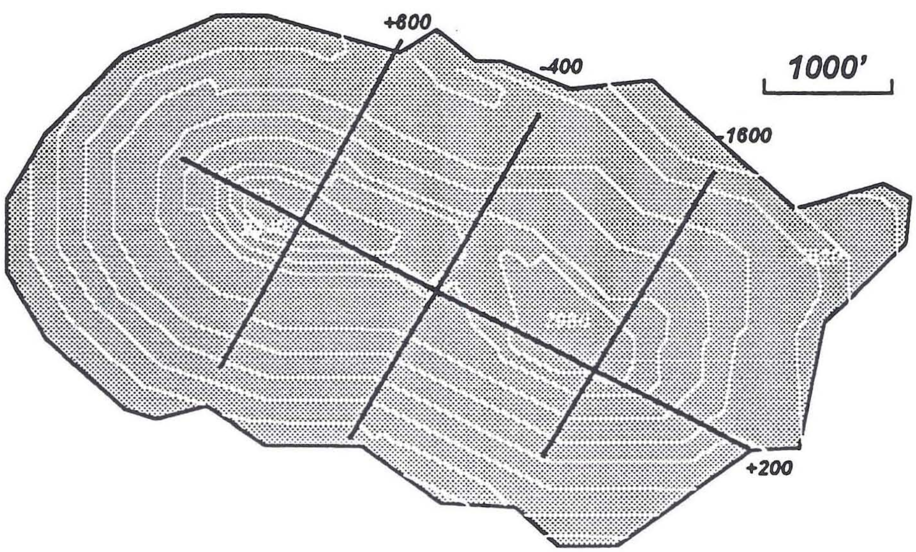
- **Sulfide**

  Chalcocite
  Covellite
  Chalcopyrite

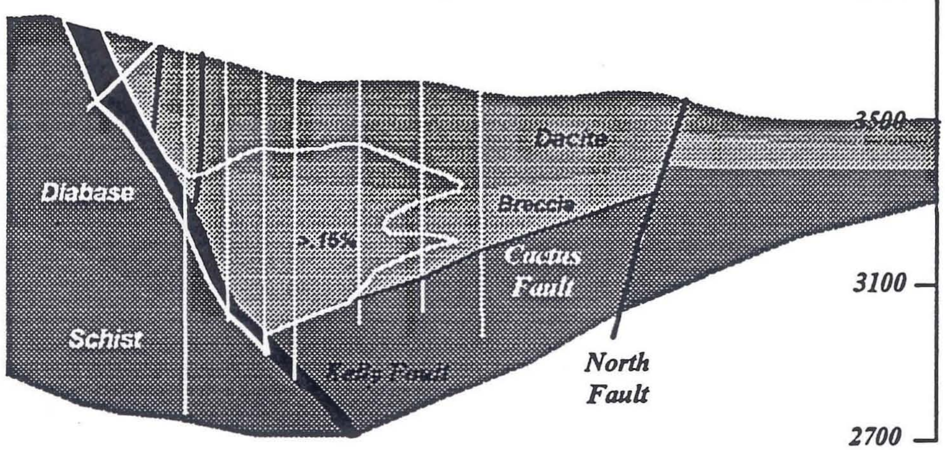
Carlota / Cactus Geology



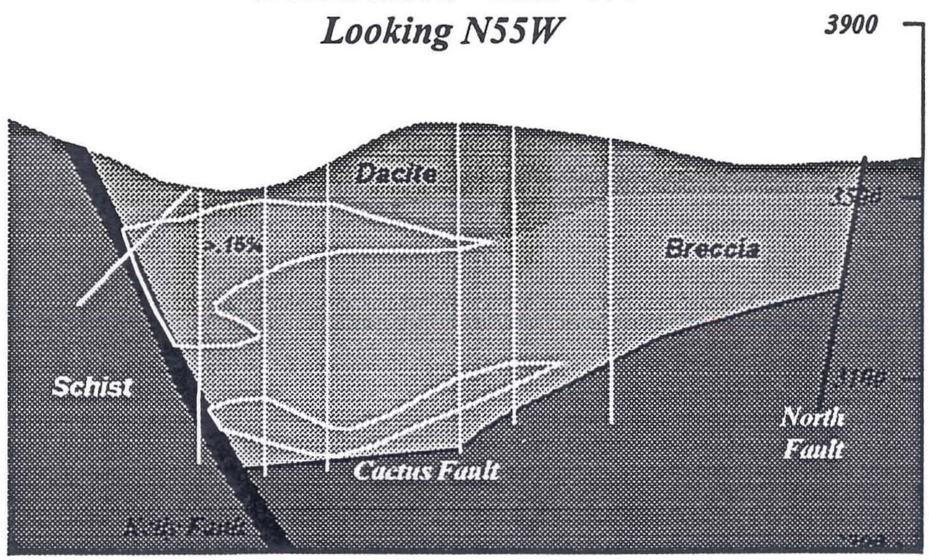
Carlota / Cactus Pit Plan



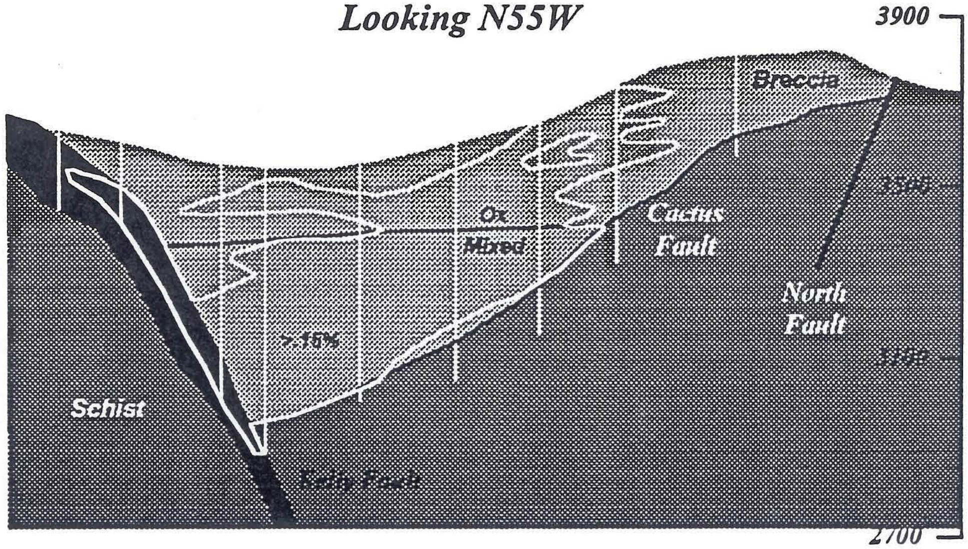
Cross Section - Line 600
Looking N55W



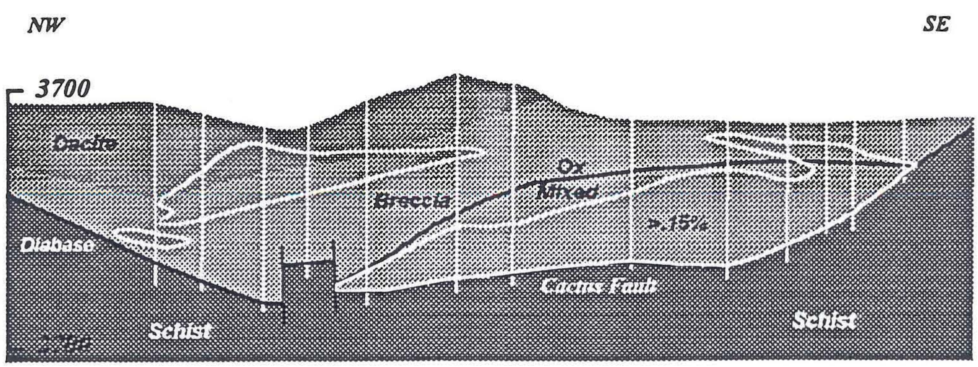
Cross Section - Line -400
Looking N55W

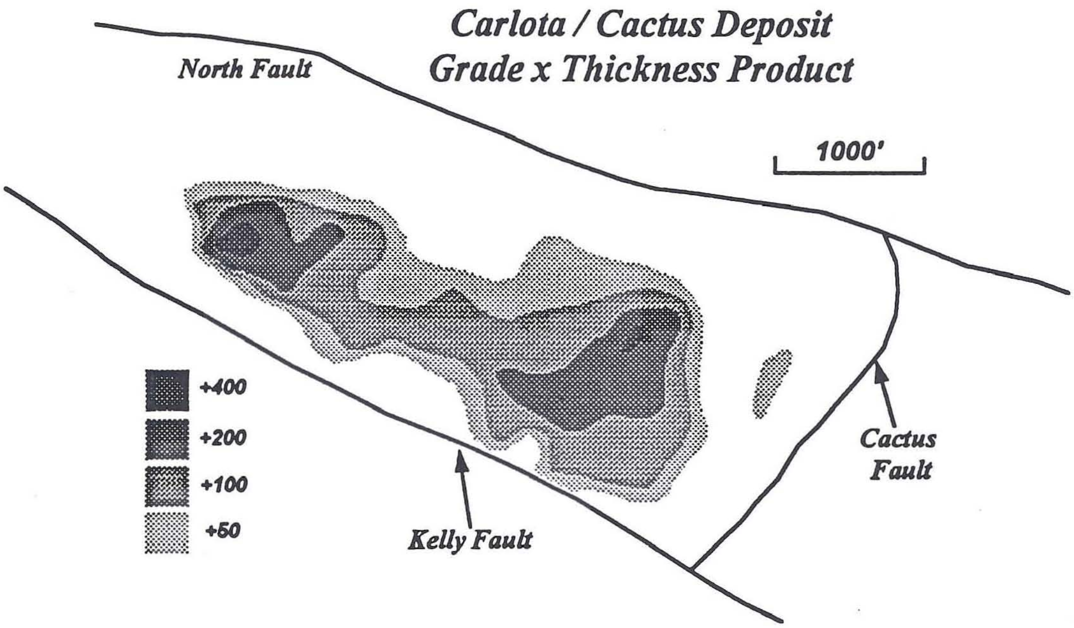


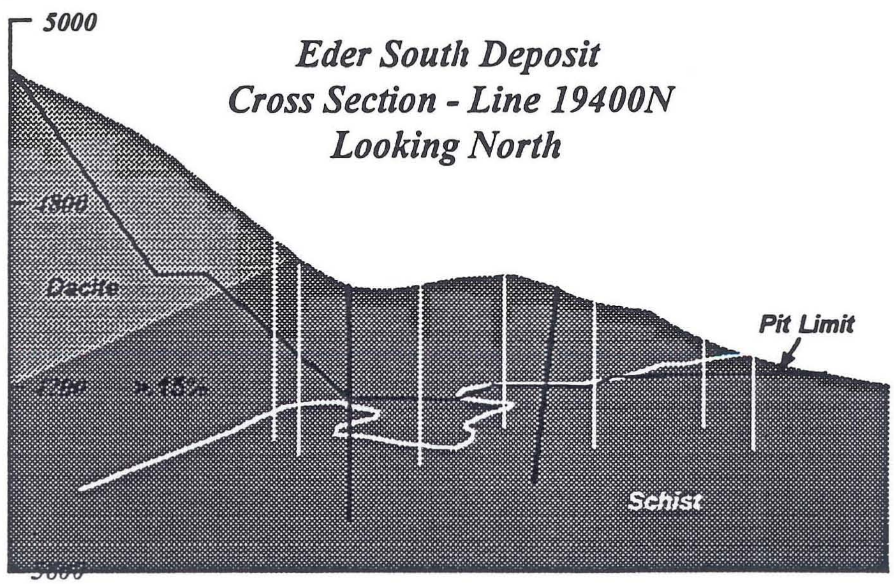
Cross Section - Line -1600
Looking N55W

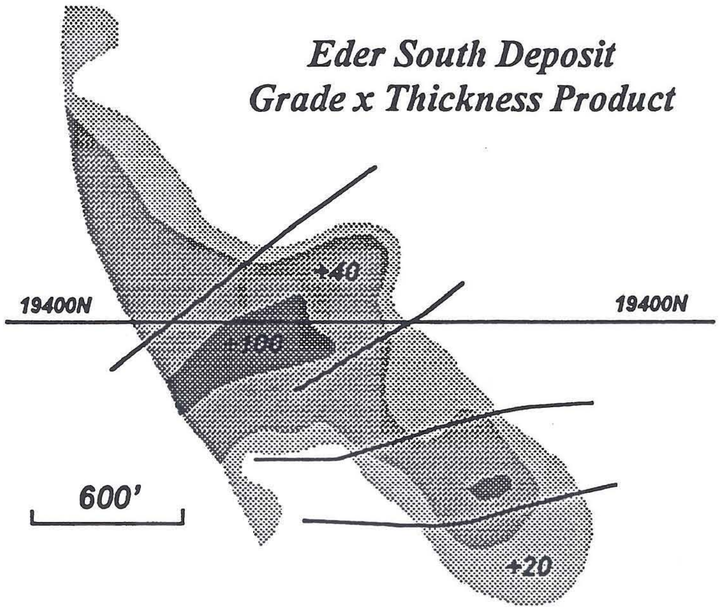


Long Section - Line 200
Looking N35E




Carlota / Cactus Deposit
Grade x Thickness Product
North Fault
1000'
+400
+200
+100
+50
Kelly Fault
Cactus Fault


5000
Eder South Deposit
Cross Section - Line 19400N
Looking North
Dacite
Pit Limit
Schist

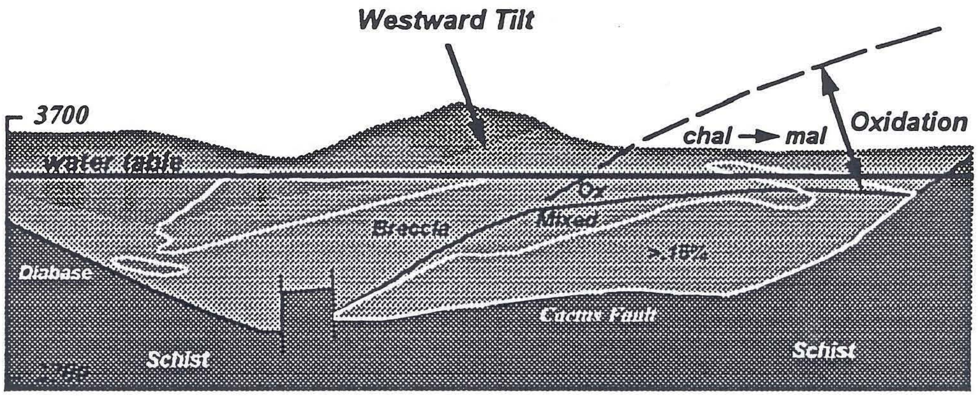


Proposed Genesis

Time	Geology	Mineralization
60 Ma	Schultze Granite	Hypogene, Alter.
30-35 Ma	Whitetail Cgl.	
20-30 Ma	Cactus Breccia	Weathering, Oxid.
20 Ma	A.L. Dacite	
10-20 Ma	Horst/Graben	Oxide/Sulfide
0-10 Ma	Tilting, Uplift	Supergene Enrich.

Long Section - Line 200
Looking N35E

NW *SE*



Exotic Copper Deposits

Area	Locality	Primary Source
Arizona	Carlota Project	Pinto Valley
	Black Copper	Copper Cities
	Copper Giant	Ajo
	Copper Butte	Ray
	Emerald Isle	Mineral Park
New Mexico	Southern Star	Tyrone
Chile	La Exotica	Chuquicamata
	El Tesoro	?

Summary

The Carlota Project Copper Deposits are "Exotic" in origin and are a result of the complex interplay of Tectonics, Sedimentation, Weathering, and Hydrology within a Tertiary - Age Porphyry Copper District

Ore Reserves

	(MTons)	Grade (% Cu)	Waste (ktons)
Carlota/Cactus			
oxide	63.3	0.44	
mixed	23.6	0.58	
Total	86.9	0.48	189.1
Eder S. (oxide)	16.3	0.30	11.4
Eder N. (oxide)	3.2	0.30	6.4
Total	106.4	0.45	206.9

Mining Highlights

- **20,000 T/day Ore**
- **49,000 T/day Waste**
- **Average Strip Ratio 2.0 : 1**
- **42 Degree Pit Slope Avg.**
- **3 Pits, 4 Waste Dumps**
- **17 cu yd Shovels**
- **150T Haul Trucks**

GEOLOGY AND MINERALIZATION

The Globe-Miami District is one of the largest in Arizona in terms of mineral production and has enjoyed a long and colorful history. Most of the Globe-Miami Mining District, including the area encompassing the Carlota Project, has been described by N.P. Peterson in U.S. Geological Survey Professional Paper 342, 1962. For this study, Peterson geologically mapped approximately 125 square miles, covering the entire district, and described most of the significant mineral deposits, including the Carlota, Cactus, and Eder deposits. Other significant studies authored or co-authored by Peterson within the region include a study of the Castle Dome Mine area (U.S. Geological Survey Bulletin 971, 1951) and the geology of the Pinal Ranch quadrangle (U.S. Geological Survey Bulletin 1141-H, 1963). Other important studies of the area include those of F.L. Ransome, namely, U.S. Geological Survey Professional Papers 12 and 115. These studies have done an excellent job of describing the geology and mineralization of the area on a regional basis. They have also provided the framework for more detailed mapping within the more immediate project area. In most cases, the mapping of Peterson (1962) was found to be quite accurate, however, owing to the published scale of this mapping (1"=2000'), much detail was necessarily left out. To provide a sound basis to better evaluate the geology and mineral potential of the Carlota Project area, the entire area was geologically mapped at scales of 1"=200' or 1"=500' by Dale Armstrong, a Tucson-based consulting geologist familiar with the geology of Central Arizona.

Regional Geology and Mineralization

Extensive exposures of Precambrian rocks (primarily Proterozoic-age Pinal schist, Lost Gulch Quartz Monzonite, and diabase) underlie the entire district. Isolated exposures of Paleozoic sedimentary rocks are found predominately north of a generally east-west trending linear zone, which has appeared to localize most of the significant copper deposits in the district. Various phases of the Laramide-age Schultze Granite are found generally to the south of this linear zone. Along this mineralized zone, border phases of the Schultze Granite predominate, and copper mineralization is found both within the altered mineralizing intrusive as well as adjacent wallrock, which is predominantly Pinal Schist. Extensive areas of Miocene Apache Leap Tuff (20 Ma) and Gila Conglomerate (3-10 Ma) cover much of the older rocks and could potentially conceal additional mineralized areas.

Copper mineralization is similar to other porphyry copper deposits in the Southwest and is typically disseminated in nature and originally consisted of chalcopyrite and pyrite. Two periods of weathering and related supergene enrichment have oxidized the pyrite and chalcopyrite, leached out the copper values, and deposited the copper as an enriched blanket with chalcocite as the predominant copper-bearing mineral. Open-pit operations have often mined through the approximately 150- to 200-foot thick enrichment blanket, and mining is now frequently within the unenriched lower-grade primary or hypogene ores.

Project Geology and Mineralization

Description of Rock Types

Significant rock types in the area of the Carlota-Cactus-Eder deposits range from Precambrian to Recent in age and include (from oldest to youngest): Pinal Schist, Lost Gulch Quartz Monzonite, clastic rocks of the Apache Group and diabase all of Proterozoic age, Paleozoic calcareous rocks, early Tertiary or Laramide (60 Ma) Schultze Granite, Mid-Tertiary Whitetail Conglomerate (30 Ma), an informally defined unit referred to as Cactus Breccia (the primary host for mineralization at the Carlota/Cactus deposits), Apache Leap Tuff of Early Miocene age (17-20 Ma), Gila Conglomerate (3-10 Ma), and Recent unconsolidated alluvial deposits

The Pinal Schist is a variable unit but consists primarily of a quartz-sericite or quartz-muscovite schist. The amount of mafic minerals varies quite a bit, as does the texture, ranging from the predominant schist to coarsely granular gneiss. Where altered, the schist is often little affected except for a "bleached" appearance. The schist is the main host rock for mineralization at the Eder South deposit. The schist has been locally intruded by the Lost Gulch Quartz Monzonite, the primary host rock for the Pinto Valley deposit, and massive brown-to-black diabase, which appears as sill-like intrusives. Scattered exposures of Paleozoic carbonate rocks are preserved north of the Kelly Fault. Exposures of Schultze Granite in the Carlota area are generally lacking but are noted at the Pinto Valley deposit and at the south end of the Eder claims. The Schultze Granite is the "mineralizer" in the Globe-Miami District and hosts ore in many of the deposits near Miami. It does not appear to have any direct genetic significance, however, to the copper mineralization within the Carlota Project area.

Remnants of the basin and/or channel-filling Whitetail Conglomerate are preserved locally in the Carlota Project area. The Whitetail is up to several hundred or more feet thick in the area and is comprised predominantly of poorly stratified sand-to-cobble-sized diabase and limestone fragments. A thick volcanic ash unit near the top of the unit has been dated at approximately 30 Ma. The Whitetail does not appear to be mineralized in the project area.

At least locally, the Cactus Breccia was deposited directly on top of the Whitetail Conglomerate. Like the Whitetail, the informally defined Cactus Breccia was deposited in small, evolving basins or filling channels incised into older units. The unit is named after exposures of breccia at the Cactus deposit, which Peterson (1962) mistakenly mapped as brecciated Pinal Schist.

The Cactus Breccia is composed primarily of variably altered quartz-muscovite schist clasts derived from the Pinal Schist. Other clasts are thought to be derived from altered Lost Gulch Quartz Monzonite, Shultze Granite, and quartzite units of the Apache Group. The breccia is clearly of sedimentary origin and likely represents megabreccia or subaerial landslide deposits not unlike similar units in Arizona deposited during this time (20-30 Ma). Limonite coating on clasts and limonite disseminated within clay matrix impart a characteristic red color to the breccia. Clast sizes are variable and range from house-size boulders down to sand-size fragments. The breccia is typically chaotic and unsorted, with clasts generally quite angular. Based on the relative proportion of clay/sand matrix to clasts, the breccia has locally been subdivided into matrix-rich and matrix-poor varieties. Elongated clasts and vague bedding layers showing specific clast lithologies, as well as internal shearing, suggest a crude layering in the deposit dipping moderately to the northeast. Preserved thickness of the breccia exceeds 600 feet.

Depositionally overlying the Cactus Breccia is the Apache Leap Tuff. The tuff is generally dacitic in composition and brown in color, often exhibiting crude generally subhorizontal layering. The tuff is generally welded and often is relatively fresh in appearance. An approximately 10-foot-thick black vitrophyric zone is often present near the base of the tuff. A thin ash layer is also present locally near the base of the tuff. The tuff is a significant ore host in the Carlota area. The Gila Conglomerate is present in the northeastern part of the area and locally appears to be weakly mineralized. These poorly-sorted alluvial fan deposits record a period of erosion deposition and uplift predating the current period of tectonic activity.

3.2.2 Structure

The structure of the Carlota area is largely a record of Tertiary extensional tectonics. The north-trending Castle Dome Horst, hosting the Pinto Valley Mine, and the northwest-trending Carlota Graben are the two most significant structural features which, in concert, led to the localization of the Carlota/Cactus deposit

Uplift of the Castle Dome Horst was accommodated by at least several thousand feet of vertical movement along the boundary fault which defines the east and west limits of the Pinto Valley deposit. Uplift was most likely initiated in the mid-Tertiary, probably after deposition of the Whitetail Conglomerate, and continued intermittently through the Tertiary. Erosion and mass wasting from the uplifted block led to the deposition of the Cactus Breccia, which was deposited in local, probably subsiding, basins peripheral to the horst. Movement along the Cactus Fault, a low-angle feature which underlies the entire Cactus Breccia unit within the area of the Carlota Graben and separates it from the underlying Precambrian rocks, was initiated during and shortly after deposition of the breccia. The Cactus Fault is marked by a zone of crushed and "gougy" rock, 4- to 10-feet thick. Within the graben, the breccia appears to have been rotated moderately to the northeast. The eastern limit of the Cactus deposit is defined by the outcrop of the Cactus Fault within this graben.

Movement along the Kelly Fault zone, the south-bounding fault of the Carlota Graben, was likely initiated after the emplacement of the breccia in this area. Movement of at least several thousand feet of combined oblique slip is based largely upon the absence of both breccia and dacite to the south of the fault. There appears to be lesser movement on a parallel fault (North Fault) defining the graben to the north. Cactus Breccia and the contact with overlying dacite have been preserved in the graben, whereas these features have been largely eroded away outside the graben. The Carlota Graben is typically 1,200- to 1,500-feet wide and can be traced for over

7,500 feet along the length of the Kelly Fault. Westward tilting of some 15- to 25-degrees of the regional tectonic block west of the Carlota Dome Horst is suggested by the westward dip of the Apache Leap-Pinal Schist contact in the Eder area.

3.2.3 Mineralization

Based on the visual examination of surface exposures, drill core and cuttings, and associated petrographic work, copper mineralization at the Carlota-Cactus-Eder deposits is exotic in origin, supergene in nature, and broadly similar in aspect between the deposits. While chrysocolla is the dominant ore mineral in all the deposits, significant amounts of chalcocite and malachite are present at Cactus. The fracture-filling nature of the copper minerals results in excellent metallurgical characteristics.

The Cactus Breccia is the primary host rock for mineralization at the Carlota/Cactus and Eder North deposits. At Carlota, mineralization in the dacite overlying the Cactus Breccia is important, as is mineralization along approximately 3,300 feet of the Kelly Fault, which bounds the Cactus and Carlota deposits to the south. Kelly Fault mineralization is hosted in brecciated diabase (northwest segment) and Pinal Schist (southeast segment). Mineralization at the Eder South deposit is hosted within fractured and brecciated Pinal Schist.

Chrysocolla, which can vary between the more typical blue color and a black, manganiferous and iron-oxide variety, is generally present filling and lining fractures within brecciated rocks of the Kelly Fault, Pinal Schist, and Apache Leap dacite, as well as larger clasts in the Cactus Breccia. Within the Cactus Breccia, chrysocolla can also be found rimming clasts, filling vugs and open spaces, and locally replacing clay matrix. In the dacite, chrysocolla can also be found filling or lining vugs or crystal cavities and replacing altered feldspar phenocrysts. Occasionally associated with chrysocolla and generally sharing the same habits are black copper pitch and/or neotocite (Cu-, Mg-, Fe-oxide). Malachite is locally abundant in the eastern portion of the Cactus deposit and sporadically along the Kelly Fault. In the Cactus deposit, malachite appears to be related to oxidized chalcocite mineralization, is generally found as veinlets within breccia clasts along with iron oxides and pyrite, and is typically present within a local transition zone between underlying chalcocite mineralization and overlying chrysocolla mineralization. Within the Cactus Breccia, copper-bearing clays and copper-bearing iron oxides (hematite) can locally contain significant amounts of copper. The only significant copper sulfide mineral identified is chalcocite, where it is restricted to the lower parts of the Cactus deposit. The chalcocite is commonly found rimming or partially to totally actively replacing pyrite, which is often found as veinlets or individual grains within breccia clasts.

Paragentic relationships among the various copper oxide minerals have been elucidated based on petrographic examinations. At least three probably closely-spaced periods of chrysocolla deposition have been noted with and without intervening periods of authigeonic montmorillonite-type clay deposition. Where noted, malachite usually precedes chrysocolla deposition, and occasionally chrysocolla has been noted replacing earlier formed malachite. Chalcocite is generally never seen in contact with chrysocolla, whereas malachite altering from and replacing chalcocite is fairly common at the Cactus deposit.

Form of Deposits

The form or distribution of significant copper mineralization at the Carlota Project is for the most part determined by results from drilling. As such, the following discussion will rely heavily on drill-generated information which has been used to generate a number of geologic and assay sections through each of the deposits as well as other graphic products.

Carlota/Cactus Area

The Carlota and Cactus deposits will be discussed together because they are not only adjacent to each other, but share many common attributes and are intimately related. For this discussion, the Cactus deposit is defined as being east of Pinto Creek with Carlota lying to the west of Pinto Creek.

Outcropping mineralization at Carlota is restricted to local exposures along the Kelly Fault. The distribution of the more significant mineralization hosted in the lower part of the dacite and within the Cactus Breccia is known only through drilling. Mineralization at Cactus does outcrop and is predominantly hosted within the Cactus Breccia, within the Kelly Fault, and locally within the dacite. Only oxide-type mineralization is found in outcrops while the sulfide-rich mineralization at Cactus is known only from drilling.

The Kelly Fault defines the southern limit of mineralization at both the Carlota and Cactus deposits and contains exclusively oxide mineralization over widths of from 10 to 70 feet with typical grades of 0.6- to 1.0-percent copper. Mineralization at both deposits is generally floored by the low-angle Cactus Fault which separates overlying, potentially mineralized Cactus Breccia from underlying, generally barren Pinal Schist. Mineralization at both deposits appears to be strongest (>0.50 percent total copper) adjacent to or in closer proximity to the Kelly Fault with diminishing intensity farther away from the fault. However, significant mineralization may be present up to 1,000 feet or more from the fault. Proximity to the eastern, up-dip limit of the Cactus Fault also appears favorable for better grade mineralization. At the Carlota property, mineralization and the favorable breccia both thin out going to the west. Relatively lean mineralization is present (> 0.10- to 0.35-percent total copper) in a central area between the two deposits. Along the length of the two deposits, significant mineralization is noted for roughly 3,600 feet. The form of the Carlota/Cactus deposit is well illustrated in Figure 3-3, a contoured grade x thickness product map derived from drill-hole intercepts (100 feet thickness at 1 percent copper=100).

The envelope of significant mineralization at the Carlota and Cactus deposits can be up to 600-feet and 400-feet thick, respectively, near the Kelly Fault where the preserved thickness of the breccia is greatest, but generally diminishes as the breccia thins going to the north away from this fault. At Carlota, the top of the mineralized zone is generally within the lower part of the dacite, is relatively flat, and is apparently related to the present groundwater table. Mineralization is most often persistent and highest in grade along the dacite-Cactus Breccia contact. Within the breccia, higher-grade mineralization is also often noted near the Cactus Fault contact. Dacite-hosted mineralization at Cactus is relatively minor, due in part to its small areal distribution and location above the present ground water table.

Mineralization at Carlota is entirely of oxide-type, with the oxide-sulfide interface generally rising in elevation to the east on the Cactus property. Over much of the Cactus deposit, the oxide-sulfide boundary (n.s. copper %/total copper % <50%) mimics the current groundwater table and is as close as 50 feet to the surface. Sulfide mineralization (chalcocite) is generally quite uniform and consistent in tenor, often grading about 0.70-percent copper but with multipercent grades often present immediately below the oxide-sulfide boundary. Oxide mineralization at Cactus is more erratic in distribution and grade, commonly with a relatively thin mineralized zone (<100 feet) near the surface and separated by a relatively barren zone from a deeper mixed-oxide-sulfide or sulfide-mineralized zone. Surface mineralization at Cactus is generally present as chrysocolla which appears to have formed after preexisting malachite. Malachite is the most common oxide mineral from immediately below the surface to the oxide-sulfide boundary and locally below.

Eder North and South Areas

Mineralization at Eder South is present mainly as chrysocolla along fractures within the Pinal Schist. No sulfide mineralization, including pyrite, has been found at Eder South; the rocks appear to be thoroughly oxidized. Extensive faulting, generally along northeast trends, has created sufficient fracturing and brecciation in the Pinal Schist so as to localize the deposit. Significant (>.15 percent) near-surface copper mineralization at Eder South is present over an area measuring roughly 2,400 feet (north-south) by at least 1,000 feet (east-west). Mineralization often extends from the surface to depths of roughly 200 to 300 feet with the bottom of mineralization at approximately the 4,200-foot elevation. The western portion of the deposit is overlain by essentially barren Apache Leap Dacite. The eastern edge of mineralization is defined by erosion. Mineralization is known to extend at least 1,000 feet west of the outcropping zone under the dacite "cap," but an economic limit is imposed by topography rising steeply in this direction. Mineralization to the north and south appears to diminish gradually, perhaps related to a lack of faulting and ground preparation. Near the south end of the deposit, mineralization appears to increase along the east-west trending structural/intrusive boundary of

Schultze Granite and then diminishes within the granite farther to the south. Figure 3-4 is a grade x thickness map of the Eder South deposit illustrating the northeast-southwest trending control to the mineralization. Drawing 3-6 is a representative cross section through the deposit.

At the Eder North deposit, mineralization is hosted within Cactus Breccia, which apparently infills a northeast-southwest trending channel carved into underlying Pinal Schist and Whitetail Conglomerate. The north and south limits of the deposit are poorly defined, but the deposit is known to extend for roughly 1,000 feet, across the channel trend with the breccia appearing to thin, and the grade diminishing away from the axis of the channel. The eastern limit is defined by erosion, while the western limit is also poorly defined, but is known to extend for over 1,300 feet down-dip from the outcrop and under the overlying essentially barren Apache Leap Dacite. An economic limit, however, is imposed in this direction, owing to the westwardly dip (20 to 30 degrees) of the breccia into the steep dacite ridge. Significant mineralization appears to be generally in the more basal part of the breccia and can be over 200-feet thick.

3.4 Origin of the Deposits

The genesis of the Carlota/Cactus and Eder copper deposits is thought to be a result of the following significant events: 1) Local intrusions of Laramide-age (60 Ma) Schultze Granite altered and mineralized Pinal Schist and Lost Gulch Quartz Monzonite wall rocks and deposited concentric zones of hypogene sulfide mineralization at depth in the Pinto Valley area; 2) Relatively stable conditions persisted until deposition of the Whitetail Conglomerate (30 Ma); 3) Following this, significant mid-Tertiary tectonic activity with related uplift and block faulting affected the area, and a portion of the altered and weakly mineralized schist overlying the Pinto Valley deposit was shed as landslide or megabreccia deposits (Cactus Breccia) into adjacent basins; 4) Low-angle faulting (Cactus Fault) and continued graben development largely preserved the Cactus Breccia within the Carlota Graben from subsequent erosion; 5) The emplacement of the welded ash flow sheet of the Apache Leap Tuff (20 Ma) then covered most of the region from Superior to Globe; 6) Continued tectonic movement led to uplift of the Castle Dome Horst containing the Pinto Valley deposit, with related movement along the Kelly Fault. Copper was leached by surface water and groundwater from the uplifted Pinto Valley deposit and copper-rich solutions moved downgradient into the adjacent Carlota Graben; 7) Downward and lateral flow of copper-bearing solutions along the Kelly Fault and Cactus Fault was important and mineralized the Cactus Breccia and dacite as well as the Kelly Fault. Where pre-existing sulfides (pyrite) in breccia clasts were oxidized prior to the introduction of the copper-bearing solutions (Carlota deposit), only oxide-copper minerals, principally chrysocolla, were formed. Where residual sulfides were still present (Cactus deposit) chalcocite was formed as a replacement of pyrite; 8) Deposition of the Gila Conglomerate (3-10 Ma) and subsequent rejuvenation of the topography along with moderate warping and westward tilting complete the history of the Carlota area. Erosion, oxidation, and redistribution of copper minerals related to the latest tectonic movements continue, both above and below the present water table.

HMC
staff
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D.B
(file) GILA
CARLOTA
CACTUS (f) GILA

CARLOTA COPPER COMPANY

October 2, 1997

Mr. Mason Coggin
Director
Arizona Department of Mines
1502 W. Washington
Phoenix, AZ 85007

RE: Carlota Copper Project, Miami, Arizona

Dear Mason:

The Carlota Copper Project has moved to the next stage in the NEPA process. Since the final Environmental Impact Statement and Record of Decision were published on July 29, 1997, the 45-day appeal period ended on September 15, 1997. As of that date, appeals were filed with the Forest Service on the Record of Decision by the following five appellants:

- Citizens for the Preservation of Powers Gulch and Pinto Creek (Deborah Ham, Don Zobel, Donna Goodale, Ken Kilpatrick)
- The Sierra Club (Grand Canyon Chapter), the Maricopa Audubon Society, and the Southwest Center for Biological Diversity
- Mineral Policy Center (one-page appeal incorporating the Citizens' appeal)
- American Rivers (one-page appeal incorporating the Citizens' appeal)
- L.W. Hardy, Richard G. Amado, Lupe Gaona, and the heirs of John V. Bustamante, Jr. (This appeal is actually a mining claim conflict which should be resolved in another forum.)

After the September 15 appeal deadline, the Forest Service had 15 days in which to meet with the appellants to try to work out a compromise on the issues. These meetings were held on Monday, September 29 and were non-productive. The opponents were not willing to discuss compromise issues, but seemed to be gathering ammunition for a future court action. Also beginning on September 15 is the 45-day period in which the Forest Service must respond to the appeals--this period ends on October 31, 1997.

Felicia Marcus (the EPA Region IX Administrator), other EPA officials, and Colonel Robert Davis (Corps of Engineers) visited the Carlota site on September 5. The EPA is still reviewing the EIS, and discussions are continuing with them regarding their areas of concern, including mitigation measures. Another meeting among the EPA, Forest Service, Corps of Engineers, and Carlota was held on October 1 in Los Angeles. We remain hopeful that a compromise can be reached that will be satisfactory to both Carlota and the EPA.

On a positive note, Cambior USA (parent of Carlota Copper Company) recently received the Bureau of Land Management's **Health of the Land Award** for its work at the site of the Valdez Creek placer mine in Alaska. This award was presented by Pat Shea, BLM director, and is a national award that recognizes individuals and groups who have made use of federally-managed lands in the US and done an exemplary job in restoring them to their natural state. The enclosed photographs show the results of Cambior's reclamation efforts.

The **Health of the Land Award** reflects Cambior's commitment to protect and preserve the environment. We intend to maintain the same commitment at Carlota, from construction to closure, and strongly believe that the Carlota Copper Project has been well planned and will be a successful operation in all aspects.

I will continue to keep you informed on Carlota's progress toward becoming a producing copper mine.

Sincerely,

Sherry Ellebracht

Sherry Ellebracht
Government and Public Affairs

Enclosure

CARLOTA COPPER COMPANY

March 13, 1997

The Honorable Fife Symington
Governor
State of Arizona
1700 W. Washington
Phoenix, AZ 85007

RE: Carlota Copper Project

Dear Governor Symington:

We certainly appreciate your continued support of the Carlota Copper Project in the Globe-Miami area. The publication for the Final Environmental Impact Statement is now set for sometime in April. Air visibility issues appear to be the last remaining obstacle to completing the EIS.

As an update on remediation measures to which Carlota has committed, enclosed is a brochure that we recently produced. In addition, I have included information on Cambior's recent reclamation projects at two closed mining sites: Valdez Creek in Alaska and Solbec in Québec.

The enclosed video is a program about the Carlota project which was produced by the public television station in Tucson. If you have not been to the site, the footage gives a good perspective of the location and terrain of the project.

Again, if you need additional information on the project, please feel free to contact me.

Sincerely,

Sherry Ellebracht

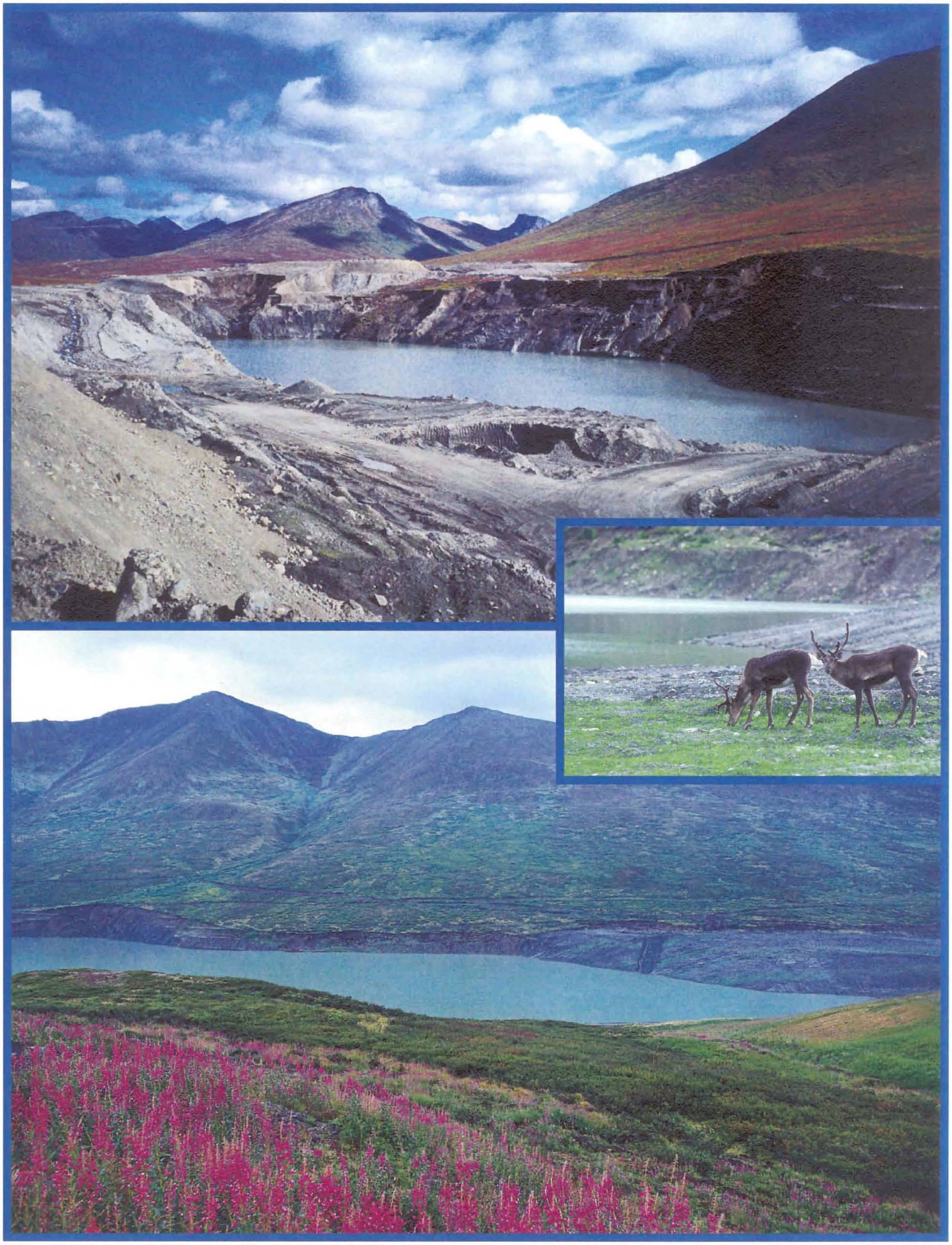
Sherry Ellebracht
Government and Public Affairs

Enclosures

cc: H. Mason Coggins

Carlota Copper Company

8101 East Prentice Avenue, Suite 800, Englewood, Colorado 80111
303-694-4936 Fax 303-773-0733



Valdez Creek Placer during mining operations and immediately following the successful reclamation of the site.

ENVIRONMENTAL POLICY OF CAMBIOR INC.

Cambior Inc. is committed to promoting the sustainable development of environmental resources, which entails protecting human health and the natural environment as well as maintaining a prosperous economy. In addition to complying with regulatory requirements, Cambior will diligently apply technically proven and economically feasible measures to improve the protection of the environment in its exploration, mining, ore processing, manufacturing and site closure activities. Cambior undertakes to:

CORPORATE PRIORITY Recognize environmental management as a corporate priority and establish policies, programs and procedures for conducting business in an environmentally-sound manner.

INTEGRATED MANAGEMENT Integrate the environmental policies, programs and procedures into all activities of the organization.

ENVIRONMENTAL MANAGEMENT Monitor the performance of environmental programs and management systems to ensure compliance with governmental and corporate requirements.

CONTINUAL IMPROVEMENT Establish an ongoing program of review and improvement of environmental policy performance, taking into account technical and economic developments, scientific knowledge and the environmental effects of operations.

EFFICIENCY Develop, design and operate its facilities to attain an efficient use of energy, resources and materials.

RISK MANAGEMENT Identify, assess and manage environmental risks.

INCIDENT MANAGEMENT Develop, maintain and test emergency response plans to ensure the protection of the environment, workers and the public. Such emergency response plans shall include the requirement to notify the directors of the company as soon as possible of any incident which is significant for the company or the environment.

RESEARCH Support research to advance general knowledge of the mining industry's impact on the environment and reduce its harmful effects by implementing advanced practices and technologies.

TECHNOLOGY TRANSFER Contribute to the dissemination of environmentally-sound technology and management methods.

PUBLIC POLICY Work with government and the public to develop effective, valid and equitable measures to protect the environment based on sound scientific data.

CONTRACTORS AND SUPPLIERS Require contractors to comply with applicable legislative and company environmental requirements and work with suppliers to identify opportunities to improve environmental performance.

COMMUNICATIONS Encourage dialogue on and be responsive to the concerns of employees and the public with respect to environmental issues.

EMPLOYEES Ensure that employees understand and are able to fulfil their environmental responsibilities.

TERMINATION OF OPERATIONS Reclaim sites in compliance with applicable laws and site-specific criteria by following a preestablished work plan and schedule.

(Adopted November 1, 1995)

SOLBEC, QUÉBEC

When it purchased and merged the assets of the Sullivan Mining Company, Cambior Inc. inherited an abandoned mining site about 225 km (140 miles) southeast of Montréal in the Canadian province of Québec.

The Solbec mine produced copper and zinc from sulfide ores before it ceased operations in 1972. When Cambior assumed ownership in 1987, the company became responsible for reclaiming the site and correcting the environmental impact of the 2.5 million cubic metres or 4.2 million tonnes of flotation tailings that had been previously placed into a nearby pond.

At the time, the Solbec tailings pond posed a high potential risk to the environment because the sampling of runoff water indicated the existence of acid mine drainage. After studying the situation, Cambior in conjunction with the Québec Ministry of Natural Resources determined that the optimal solution from both an environmental and economic perspective was to flood the tailings pond.

Experiments to test the flooding solution were conducted by Cambior between 1989 and 1993. In 1994, the tailings pond was covered with a layer of ground limestone and flooding was achieved with the construction of two small dams. The pond filled to the high water mark and the first overflow of water was evacuated in February 1996.

Ongoing testing to monitor the quality of the water cover and groundwater associated with the tailings pond continued during reclamation and is still active. Monitoring includes an evaluation of the viability and level of activity of the micro-organisms that act as catalysts in the oxidation process that causes the acid mine drainage.

After seven sampling campaigns comprising at least 50 samples each and covering more than ten parameters per survey, the effectiveness of the solution is readily apparent. The pH level of the water in the pond is near neutral and the anomalous concentrations of iron, zinc and copper are declining. Public health officials have confirmed that the pond water is safe for human consumption.

Since 1994, Cambior has spent US $3.4 million to reclaim the Solbec mining site and tailings pond. In collaboration with the local municipality, it plans to turn the pond and surrounding area into a nature interpretation centre that will be open to the public.

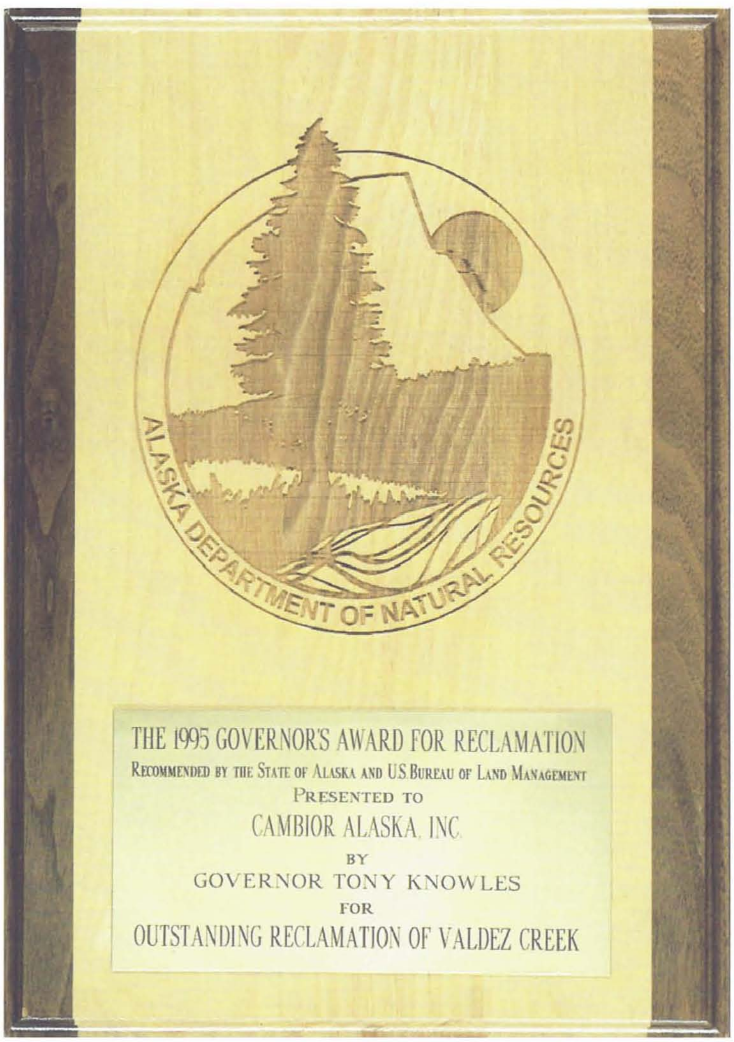
(Next page) Advertisement illustrating the successful reclamation of the Solbec mine site in Québec that appears in the March 1997 edition of *Mining Environmental Management*.

VALDEZ CREEK, ALASKA

When Cambior Inc. purchased the assets of the Sullivan Mining Company in 1987, it acquired an operating gold mine at Valdez Creek in the state of Alaska about 250 km (155 miles) north of Anchorage.

Cambior operated the Valdez Creek Placer until the end of 1995 when closure and site rehabilitation were completed.

For its efforts, the company received the 1995 Governor's Award for Reclamation, as recommended by the State of Alaska and the US Bureau of Land Management.



The 1995 Governor's Award for Reclamation presented to Cambior Alaska, Inc.

The Governor's Award was given in recognition of the outstanding quality of the reclamation work done. Cambior was specifically praised for its "careful attention to minimizing the potential for future erosional degradation, while providing an excellent growth medium for rapid recolonization by local plant species".

Mining activities at Valdez Creek were concentrated along the creekbed from which the operation takes its name. Cambior reclaimed the site by infilling, landscaping and reseeding both the tailings pond and waste dump, by flooding the open pit mine to create a lake more than one km long and by recontouring and rebuilding the creekbed to follow its original course. The new configuration blends well with the surrounding valley and has become a habitat for wildlife.

The total cost of the reclamation work was over US $2 million.

CAMBIOR

ENVIRONMENTAL AND RECLAMATION PROGRAMS

Cambior Inc. is an international diversified gold producer based in Canada with operations in both North and South America. It has a 100% interest in the Carlota Copper Project in the Globe-Miami Mining District of Arizona.

Cambior practices environmentally-sound mining operations that promote sustainable development, a prosperous economy and the protection of human health and the natural environment. The company has implemented a comprehensive environmental management system with policies that adhere to stringent North American standards of prevention, detection and intervention.

As an effective measure of its commitment, Cambior conducts environmental audits at all of its operating sites on an annual basis. Environmental coordinators at each mine ensure the strict application of environmental policies and procedures. Environmental assessments are conducted at all exploration projects and abandoned properties, as well.

In 1996, the environmental training program for each Cambior employee emphasized individual responsibility and continual improvement of environmentally-related performance. All employees are required to understand and adhere to the company's environmental policies.

Cambior participates in joint committees with senior levels of government to discuss environmental programs and regulations. It also conducts research projects with various organizations, including universities and industry associations, that share its commitment to a clean and healthy environment.

In 1996, Cambior achieved 99.9% compliance with effluent regulations at all of its Canadian operations and 100% compliance at its largest gold mine, Omai, in Guyana, South America.

Cambior has gained respect within the mining industry and among the general public in both the United States and Canada for the recent reclamation of two closed mining sites: Valdez Creek in Alaska and Solbec in Québec.

The Valdez Creek Placer received the Alaska Governor's Award for Reclamation after the mine was closed in 1995. The rehabilitation of the Solbec mine site was successfully completed in 1996.

In late 1996, Cambior initiated a program to update and adjust its environmental management system for company-wide certification under the 14000 series of environmental guidelines established by the International Standards Organization (ISO).

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT CONDITIONS FOR THE CARLOTA COPPER PROJECT, GILA AND PINAL COUNTIES, ARIZONA

SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

May 1, 2001

U.S. Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, California 94105

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EXECUTIVE SUMMARY

BACKGROUND

The Carlota Copper Company has proposed to construct, operate, and reclaim the Carlota Copper Project, an open-pit copper mine and associated processing facilities, located approximately 6 miles west of Miami, Arizona. The proposed mine is located on lands administered by the Globe Ranger District of the Tonto National Forest and private land.

An Environmental Impact Statement (EIS) was prepared for the project. The Lead Agency for the Carlota Copper Project EIS was the United States Forest Service (USFS), Tonto National Forest, with the Army Corps of Engineers (Corps) and the Arizona Department of Environmental Quality (ADEQ) as cooperating agencies. The EIS was prepared to address regulatory requirements of the federal permitting agencies, pursuant to the National Environmental Protection Act (NEPA). The USFS issued a Final EIS in July 1997. The Corps issued a Supplemental Environmental Assessment (EA) in January 1998 for the Carlota Copper Project to address additional Corps regulatory responsibilities identified under Section 404 of the Clean Water Act (CWA).

The Carlota Copper Company has applied for an NPDES permit from the United States Environmental Protection Agency (EPA). On July 24, 2000, EPA public noticed the adoption of the 1997 Final EIS and the 1998 Corps EA for issuance of the NPDES permit. Subsequently, two permit conditions were withdrawn by EPA.

This Environmental Assessment (EA) has been prepared to further analyze and document environmental consequences associated with two NPDES permit conditions under NEPA:

> A permit condition that a partial reclamation be conducted of an inactive mine (the Gibson Mine) located south of the proposed Carlota Mine.
>
> A permit condition allowing periodic discharges of ground water from a developed wellfield into Waters of the United States.

The partial reclamation of the Gibson mine was included offset potential loadings of dissolved copper into Pinto Creek. Two alternatives are analyzed in this EA:

> No Action Alternative

Proposed Action Alternative

No Action Alternative

Under the No Action Alternative, the two specified conditions would not be included in an NPDES permit. The proposed partial reclamation of the Gibson mine would not be conducted and periodic discharges of ground water from a developed wellfield into Waters of the United States would not be allowed.

The No Action/No Project alternative for the Carlota Copper Project was addressed in the previous EIS and EA and is not discussed in this EA.

Proposed Action Alternative

The Proposed Action Alternative, within the context of this EA, is composed of the implementation of two NPDES permit conditions.

Partial Reclamation of the Gibson Mine

The Gibson Mine is located 6 miles west-southwest of Miami, Arizona in Gila County on the watershed divide between the Pinto Creek and Mineral Creek drainages and covers a total area of approximately 320 acres (WRA, 1993).

The Gibson Mine produced copper ore, mostly oxides, from 1908 to 1919, with sporadic production continuing through 1930 (ADEQ, 1995). Leaching of low-grade ore was conducted in the 1960s and 1970s by installation of a leach pad, process ponds and an iron-precipitation recovery system. The site was subleased by Lodestar Minerals, Inc. in 1988 who rebuilt the ponds, and reestablished the leach pad and copper recovery system (ADEQ, 1995). The site is currently abandoned with the leach pad, and two process ponds remaining on the Pinto Creek side of the divide and abandoned *in situ* leaching operations on the Mineral Creek side of the divide. On the Pinto Creek side of the divide, the leach pad consists of approximately 20,000 tons of ore that contains copper oxide and sulfide minerals (Mining & Environmental Consultants, Inc., 1993a).

The partial reclamation of the Gibson mine as described by Carlota Copper Company (1999) includes:

- Removal of the PLS pond located at the toe of the leach pad;
- Removal of the raffinate pond located south-southeast of the leach pad;
- Excavation and relocation of the leach pad material away from the immediate drainage and configuring it to minimize drainage and runoff.

- Covering the removed leach pad material with non-mineralized local fill and soil;
- Prevent runoff from the upper watershed from coming in contact with the relocated leached material and cover.

Local fill and soil for capping the disposed leach pad material would be obtained from the proposed disposal site and, if required, from a disturbed area of clean fill located immediately south of the raffinate pond. Prior to removal of the ponds, any existing solution and rainwater in the process ponds would be pumped out and disposed of at an approved off-site disposal facility. Pond liners, and associated piping from the leach pad and ponds would also be disposed of at an approved off-site disposal facility. A conceptual drawing of the existing leach pad, process ponds, the iron-precipitation process system, and the location of the proposed disposal area is provided in Figure 2-2 of the main text.

Periodic Discharges of Ground Water to Waters of the United States

A water supply wellfield would be developed to provide supplemental water for the Carlota Copper Project, as described in Chapter 2, Section 2.1.1.4 of the Final EIS (USFS, 1997). The wellfield would be developed in a defined area along Haunted Canyon and Pinto Creek. Figure 2-3 of the main text depicts the location of the water supply wellfield and the location of test wells that were installed to characterize aquifer production and ground water quality, and to evaluate impacts. The Final EIS identified potential reductions to stream base flows in Haunted Canyon and Pinto Creek as a result of pumping in this wellfield. These impacts are described in Chapter 3, Section 3.3.2.1, and as a result, mitigation measures were defined in Chapter 3, Section 3.15 of the 1997 Final EIS. These mitigation measures are:

- Conduct additional aquifer and wellfield testing during the mine construction phase but prior to wellfield production for operating the mine.

- Implement a wellfield mitigation program to offset potential flow reductions in Haunted Canyon and Pinto Creek and to maintain aquatic and riparian resources at pre-project levels. Streamflow would be augmented with ground water pumped from the wellfield, or with water from other suitable sources(s) approved by the USFS and other appropriate agencies.

- Implement measures, as necessary to ensure that the water discharged to supplement stream flow meets applicable Arizona water quality standards.

The wellfield mitigation program is described in Appendix E of the 1997 Final EIS. Under this program, stream flow in Haunted Canyon and Pinto Creek would be continuously monitored at defined points of compliance. Pumped water from the wellfield would be discharged to Haunted Canyon to augment stream flow, should stream flows fall below monthly minimum flow values specified in the plan. The mitigation plan also specifies resource maintenance flow levels (i.e., well discharge rates) that are required to prevent impacts to downstream riparian and aquatic resources by month. The plan further specifies the maximum discharge rates that can be used for augmentation.

The mitigation plan identifies four approximate locations for discharge of mitigation water:

- Powers Gulch above its confluence with Haunted Canyon;
- Haunted Canyon below its confluence with Powers Gulch;
- Haunted Canyon above ambient water quality monitoring station HC-2; and
- Pinto Creek near ambient water quality monitoring station AMW-23.

A system of above-ground, temporary, flexible and moveable piping will be used to maximize the effectiveness of mitigation measures.

ENVIRONMENTAL CONSEQUENCES

This EA describes and compares the environmental consequences of the No Action Alternative and the Proposed Action Alternative. Another objective of the EA is to determine whether the benefits of the Proposed Action outweigh its potential impacts. Measures to reduce impacts are proposed, as necessary. The following discussion summarizes the impacts of the two alternatives by impact area and then presents a summary table for comparison. Detailed discussions are provided in the body of the text.

Climate, Air Quality, Visibility and Odor

The No Action Alternative would not impact climate, air quality, visibility or odor.

The Proposed Action Alternative would result in emissions of fugitive dust, particulate matter less than 10 microns in diameter (PM_{10}), nitrogen oxide compounds (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), and volatile organic compounds (VOCs) during construction operations associated with the partial reclamation of the Gibson mine. These emissions would be temporary, localized and insignificant relative to air quality standards associated with health effects, visibility and long range goals for air quality improvement.

Geology and Soils

The No Action Alternative would not impact soils or geology.

The Proposed Action would remove and relocate the leach pad materials at the Gibson mine and would involve the construction of a surface cap. The approximate area of the proposed relocation site is approximately 0.5 acre. Soil and geologic values would not be significantly impacted. Discharges of ground water under the conditions specified by the wellfield mitigation program would occur during low flow periods, which would substantially limit the potential for erosion.

Water Quality

The No Action Alternative would continue to result in adverse impacts to water quality, riparian vegetation, wetlands, and Waters of the U.S. because contaminant concentrations would not be reduced by the partial reclamation of the Gibson Mine and because stream flows would not be augmented in Haunted Canyon, Powers Gulch, or Pinto Creek.

Both components of the Proposed Action Alternative are designed to mitigate water quality impacts in terms of contaminant concentrations and stream flows and would have a beneficial impact. The temperature of the discharge of wellfield bedrock ground water would not produce a significant adverse impact to ambient surface water temperature.

Wellfield mitigation measure WR-4 included in the Final EIS states that any water discharged to Haunted Canyon or Pinto Creek from wellfield mitigation pumping would have to meet applicable Arizona surface water quality standards, including temperature. Because the wellfield discharge points are referenced as individual point source discharges on the cover page of the Carlota NPDES permit, surface water quality standards for temperature apply at the point of discharge to Haunted Canyon or Pinto Creek.

Discharge or instream temperature monitoring were not included in the wellfield monitoring requirements of the NPDES permit and they presently are not included in the Carlota Wellfield Mitigation Program, dated July 27, 1997. In a letter dated March 27, 2001, EPA requested that the USFS, in cooperation with the Carlota Copper Co., amend the Wellfield Mitigation Program to include temperature monitoring. The USFS concurred with EPA's request in a letter dated April 17, 2001. In this letter, Tonto National Forest agreed to amend the workplan prepared for additional wellfield and aquifer testing as required by mitigation measure WR-2 in the Final EIS to include continuous and concurrent water temperature monitoring of the wellfield mitigation discharges and ambient stream water during testing of the wellfield program; daily water temperature measurement of wellfield mitigation discharges and ambient instream water during testing of a mitigation measure; and revision of the Ground and Surface Water Monitoring Plan to include daily or weekly water temperature measurements of mitigation discharges and instream flows during periods of wellfield mitigation discharges.

Ground Water

The No Action Alternative would not result in impacts to existing ground water resources. The Proposed Alternative would reestablish historic drainage pathways across the Gibson mine site, but these changes in site hydrology would not be expected to significantly impact existing ground water conditions or hydrogeology. Implementation of the wellfield discharge program, which was designed to address ground water drawdown impacts on surface waters, would not be expected to adversely impact ground water resources.

Vegetation and Wetlands

The No Action Alternative will not impact vegetation, wetlands, or Waters of the U.S. at the Gibson Mine site. However, the No Action Alternative would allow adverse impacts to continue downstream on vegetation, wetlands, and Waters of the U.S. through unrestricted loading of dissolved copper and other contaminants to the Gibson Mine tributary and Pinto Creek.

The Proposed Action Alternative is not expected to adversely impact wetlands, Waters of the U.S., and vegetation at the Gibson Mine site in a significant manner. Removal of the PLS pond, raffinate pond, and heap leach pad would not disturb existing vegetation because no vegetation exists in these areas and material disposal areas would be capped with non-mineralized local soil. Some vegetation could be adversely impacted around the edges of the disposal area and around the borrow pit. Heavy brush will need to be cleared around the perimeter of the disposal site, the width of the cleared area would be approximately 10 feet. Additionally, a temporary road would need to be constructed between the leach pad and the proposed disposal area. Road construction would require clearing of scrub oak and juniper along the road alignment between the leach pad and proposed disposal area, a distance of approximately 120 feet. Reseeding of the cap has not been proposed; however, some establishment of vegetation could occur over time on the surface cap from natural recruitment.

Pipelines from the wellfield would be placed on the ground. Some minor and inconsequential disturbance of local vegetation would be expected.

Wildlife and Threatened and Endangered (T&E) Species

The No Action Alternative may directly and indirectly impact wildlife, wildlife habitat, aquatic species, and T&E and other special status species in Haunted Canyon, Powers Gulch, and Pinto Creek due to unrestricted loading of dissolved copper and other contaminants to the Gibson Mine tributary and Pinto Creek. Potential direct and indirect impacts to special status species may arise from lowered baseflows in Haunted Canyon, Powers Gulch, and Pinto Creek and continued degradation of water quality in Pinto Creek. Lowered baseflows could directly impact the Maricopa tiger beetle, Arizona toad, and lowland leopard frog by reducing available habitat for foraging and breeding. The Arizona toad is susceptible to continued degradation of water quality if partial reclamation of the Gibson Mine site does not occur. The yellow-billed cuckoo and common black-hawk could also be indirectly impacted by the No Action Alternative if lower baseflows decrease the acreage of riparian habitat adjacent to the impacted streams.

The Proposed Action Alternative would mitigate potential impacts to special status species by addressing water quality issues and stream flow requirements. Partial reclamation of the Gibson Mine site would not directly or indirectly impact the Arizona agave (*Agave arizonica*) and Arizona hedgehog cactus (*Echinocereus triglochidiatus* var. *arizonicus*) or other special status species. A site visit to the Gibson Mine site on December 12, 2000 by the U.S. Forest Service and representatives from Carlota Copper Company determined that these plant species do not occur at the Gibson Mine site.

Cultural Resources

The No Action Alternative would not impact any prehistoric or historic cultural resources at the Gibson Mine site.

The Proposed Action Alternative would not produce a significant adverse impact to historic archaeological site AZ V:9:423 (ASM). This site is outside of the boundary of the proposed relocation site for the leach pad material and will be avoided during reclamation activities. Precautionary measures will be taken to ensure that adverse impacts do not occur; these measures have been accepted by EPA as stated in correspondence to the State Historic Preservation Office. The State Historic Preservation Office concurred with these measures.

Land Use

Neither alternative is expected to have a significant impact on land use because the primary use (mining) will not change. Impacts to current land use at the Gibson Mine site would not be expected by partial reclamation activities. Implementation of the wellfield mitigation program would not cause significant impacts to current land uses of recreation and grazing.

Hazardous Materials

The No Action Alternative will allow the leach pad, PLS pond, and raffinate pond at the Gibson Mine site to remain in place. The process ponds would continue to collect rainwater and leachate from the leach pad. These ponds would continue to pose a threat to the environment in the event that the geotextile liners fail or the ponds overflow during a severe precipitation event. The leach pad would remain exposed to the environment and pollutants will continue to be mobilized by wind, rain and runoff.

The Proposed Action Alternative would remove the leach pad, PLS pond, and raffinate pond. The mineralized materials associated with the leach pad would be relocated away from the Gibson Mine tributary and capped with non-mineralized local soil to minimize the potential for pollutants to be mobilized by wind or rain. The process ponds would be pumped out, deconstructed, and all materials would be disposed of at an approved disposal facility. By removing or covering these potential sources of pollutants, the Proposed Alternative would have a positive impact on water quality downstream from the site.

Noise

The No Action Alternative would not cause ambient noise levels to increase.

The Proposed Alternative would result in temporary increases in ambient noise levels during construction, hauling and earthmoving operations. These impacts would be temporary and would be considered insignificant relative to mining operations, which have occurred on the site in the past.

Visual Resources

The No Action Alternative will have no impact on visual aesthetic resources.

The Proposed Action Alternative will result in minor adverse visual impacts during the construction period while making some improvement at the Gibson mine site. Pipelines used for conveyance of ground water to surface water discharge locations may be visible. Within the site area, these disturbances would not be considered substantial.

Socioeconomics

Neither of the alternatives would have an impact on the economic and social conditions in the project area or Gila County.

Recreation

Neither of the alternatives would have a significant impact on outdoor recreation. The Gibson Mine is located on private property and is not developed or suitable for recreation.

Wilderness and Wild and Scenic Rivers

The No Action Alternative could potentially jeopardize the qualities that make an 8-mile perennial section of Pinto Creek, located several miles downstream of the mining project, eligible for a "Scenic" designation. The segment is eligible for inclusion based on scenic, riparian, and ecological values, all of which could be impaired by contaminant loads and by not allowing stream flow augmentation, as specified by the wellfield mitigation plan of the 1997 Final EIS.

The Proposed Action Alternative would protect Pinto Creek.

Transportation

The transport of contaminated materials from the Gibson Mine site to an off-site disposal facility would pose a risk for spills. However, this risk would be quite low and would be sufficiently mitigated by standard practices for hiring and supervising qualified and experienced contractors for this type of work.

Summary Comparison

The findings of the EA indicate that Proposed Action Alternative, inclusion of two conditions, would present some minor environmental impacts that were not described in the previous EIS and EA. However, it appears that these impacts would be offset by the intended benefits of the conditions. Table ES-1 provides a summary of adverse and positive impacts for major resource areas.

Table ES-1. Summary Comparison of Beneficial and Adverse Impacts of the Proposed Action

Primary Resource Area	Beneficial Impacts Relative to the No Action Alternative	Adverse Impacts	Significance of Impacts	Proposed Mitigation Measures
Climate, Air Quality, Visibility and Odor		Fugitive dust and vehicle emissions could impact PM_{10} concentrations, air quality and visibility.	Temporary, localized and insignificant, relative to air quality standards.	None.
Water Resources, Wildlife, and Threatened & Endangered Species	Reduced contaminant loadings to Pinto Creek from reclamation activities at the Gibson Mine site.		Positive Impact. Beneficial to Pinto Creek water quality, aquatic life, and Waters of the U.S.	None Required
		Potential temperature impacts to surface water from the discharge of ground water.	No significant adverse impact because discharge is required to meet applicable Arizona water quality standards.	Revise USFS Ground Water and Surface Water Monitoring Plan to include monitoring for ground and surface water temperature. NPDES permit requires AZ water quality standards, including temperature to be met at point of discharge.
	Maintenance of minimum surface water flows in Powers Gulch and Pinto Creek by implementation of the wellfield mitigation program.		Positive Impact. Mitigation of potential impacts to aquatic resources, riparian vegetation, protected species, and proposed Wild & Scenic River designation.	
Vegetation and Wetlands		Disturbance of vegetation from partial reclamation activities at the Gibson Mine site.	Minor.	None.

Table ES-1. Summary Comparison of Beneficial and Adverse Impacts of the Proposed Action

Primary Resource Area	Beneficial Impacts Relative to the No Action Alternative	Adverse Impacts	Significance of Impacts	Proposed Mitigation Measures
		Potential disturbance of vegetation from construction of pipelines from wellfield area to surface water discharge points.	Minor and Insignificant.	None.
	Maintenance of minimum surface water flows in Powers Gulch and Pinto Creek by implementation of the wellfield mitigation program.		Positive impact. Maintenance of flows would prevent degradation of the riparian corridor from decreased base flows.	
Cultural Resources		No impacts.		
Transportation		Potential spill of contaminated materials during transfer from Gibson Mine to approved off-site disposal location.	Minor.	None.
Noise		Ambient noise levels would increase during partial reclamation activities at the Gibson Mine site.	Temporary, Localized and Insignificant	None.
Visual Resources		Aesthetic impacts during partial reclamation activities at the Gibson Mine site.	Temporary, Localized and Insignificant	
		Pipelines from wellfield area to surface water discharge points could be visible	Insignificant.	

Table ES-1. Summary Comparison of Beneficial and Adverse Impacts of the Proposed Action

Primary Resource Area	Beneficial Impacts Relative to the No Action Alternative	Adverse Impacts	Significance of Impacts	Proposed Mitigation Measures
Wilderness, Wild & Scenic Rivers, Recreation, Land Use, Geology and Soils, Socioeconomics		No impacts.		

1.0 PURPOSE AND NEED FOR PROPOSED ACTION

1.1 BACKGROUND

The Carlota Copper Company has proposed to construct, operate, and reclaim the Carlota Copper Project, an open-pit copper mine and associated processing facilities located approximately 6 miles west-southwest of Miami, Arizona. The proposed mine is located partly on lands administered by the Globe Ranger District of the Tonto National Forest and partly on private land.

The proposed project would use conventional open-pit mining techniques, such as blasting, truck hauling from the pit to the crusher, and conveyor or truck transport from the crusher to a leach pad to extract copper ore. Acid leaching and solvent extraction/electrowinning would be used to beneficiate the ore to produce copper metal. The project would produce an estimated 900 million pounds of copper. Mining activities would be conducted for approximately 15 years and ore leaching and solution processing would continue for an additional 5 years. Mine closure would be completed in 2 to 3 years following the end of operations and reclamation.

Two mineralized zones, the Carlota and Cactus deposits, would be mined from a single pit referred to as the Carlota Cactus pit. Smaller mineralized zones would be mined from three smaller pits termed the North, Middle and South Eder pits during the latter half of the project. A diversion would be constructed to reroute an intermittent reach of Pinto Creek around the Carlota Cactus pit. Mine rock (i.e., waste rock) would be taken from this pit and deposited in the Main mine rock disposal area located northwest of the Carlota Cactus pit and in the Cactus Southwest mine rock disposal area located south of the pit. In addition, mine rock would be used to partially backfill the Carlota Cactus pit. Mine rock from the three Eder pits would be hauled to the Eder mine rock disposal area located between the Eder North and South pits.

Processing facilities would consist of crushers, a heap-leach pad, and a solvent-extraction/electrowinning (SX/EW) plant. The heap leach pad would be located in the Powers Gulch drainage. Surface runoff from areas up-gradient of the leach pad would be rerouted around the facility via an inlet control structure and a diversion channel. Ore processing would include curing the material with sulfuric acid and leaching it to produce a copper-bearing solution. Pregnant (copper-bearing) leach solution would be collected in internal ponds and then piped to the SX/EW plant for copper recovery.

The water supply requirements for the project would average 590 gallons per minute (gpm). The proposed water sources would consist of a maximum of five ground water supply wells in the Pinto Creek drainage and dewatering wells around the pits.

Additional facilities for the proposed action would include access and haul roads, power lines, an equipment maintenance shop and warehouse, office and laboratory buildings, water, fuel and reagent tanks, and sewage treatment/disposal systems.

An Environmental Impact Statement (EIS) for the proposed Carlota Copper Project was prepared to address regulatory requirements of the federal permitting agencies, pursuant to the National Environmental Protection Act (NEPA). The lead agency for preparation of the Carlota Copper Project EIS was the United States Forest Service (USFS), Tonto National Forest. The Army Corps of Engineers (Corps) and the Arizona Department of Environmental Quality (ADEQ) served as cooperating agencies. The USFS issued a Final EIS in July 1997. In January 1998, the Corps issued a Supplemental Environmental Assessment (EA) to address additional Corps regulatory responsibilities that were identified under Section 404 of the Clean Water Act (CWA).

1.2 Purpose and Need for Action

The Carlota Copper Company has applied for an NPDES permit from EPA. On July 24, 2000, EPA public noticed the adoption of the 1997 Final EIS and the 1998 Corps EA for issuance of the NPDES permit. Subsequently, two permit conditions were withdrawn by EPA.

This Environmental Assessment (EA) has been prepared to further analyze and document environmental consequences associated with the two NPDES permit conditions that were withdrawn.

> A permit condition that a partial reclamation be conducted of an inactive mine (the Gibson Mine) located south of the proposed Carlota Mine.
>
> A permit condition allowing periodic discharges of ground water from a developed wellfield into Waters of the United States.

This EA was prepared in compliance with Council of Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508) using EPA regulations (40 CFR Part 6) as guidance.

The environmental analyses of the proposed Carlota Mine project contained in the Final EIS and Supplemental EA (USACE, 1998) are incorporated into this document by reference.

1.3 Scope of this Environmental Assessment

This Environmental Assessment analyzes and documents the environmental consequences associated with two NPDES permit conditions that were not addressed in the 1997 Final EIS or the 1998 Supplemental EA. The characteristics of these conditions are described in Section 2. The scope and purpose of this EA are to determine whether the benefits of the permit conditions outweigh any resulting impacts, with and without the consideration of further measures to reduce those impacts.

The following general topics are included in the scope of this EA:

- Physical Environment;
- Biological Environment;
- Cultural Environment; and
- Cumulative Impacts.

In preparing this EA, EPA examined various federal laws and Executive Orders (EOs) in accordance with 40 CFR 6.300. These laws and EOs are:

National Natural Landmarks - The Secretary of the Interior is authorized to designate areas as National Natural Landmarks for listing on the National Registry of Natural Landmarks pursuant to the Historic Act of 1935, 16 U.S. Code (USC) 461 *et seq*.. In conducting the environmental review of the proposed action, EPA is required to consider the existence and location of natural landmarks, using information provided by the National Park Service (NPS) pursuant to 36 CFR 62.6(d).

No natural landmarks listed on the National Registry of Natural Landmarks were identified within the project area.

Historical, Architectural, Archeological, and Cultural Sites - If an EPA action affects any property with historic, architectural, archeological, or cultural value that is listed on or eligible for listing on the National Register of Historic Places, the responsible official is required to comply with the procedures for consultation and comment promulgated by the Advisory Council on Historic Preservation (ACHP) in compliance with Section 106 USC 470, and EO 11593.

Environmental consequences for cultural resources for this project are addressed in Section 3.3. Consultations with the Arizona State Museum and the State Historic Preservation Office, including concurrence with proposed precautionary measures, are included in Appendix B.

Historic, Prehistoric, and Archeological Data - The Archeological and Historic Preservation Act (AHPA) of 1974, 16 USC 469 *et seq.* provides for the preservation of cultural resources, if an EPA activity may cause irreparable loss or destruction of significant scientific, prehistoric, or archeological data. In accordance with the AHPA, the responsible official or the Secretary of the Interior is authorized to undertake data recovery and preservation activities.

Environmental consequences for cultural resources for this project are addressed in Section 3.3. Consultations with the Arizona State Museum (ASM) and the Arizona State Historic Preservation Office (ASHPO) are included in Appendix B.

Wetlands Protection - EO 11990, "Protection of Wetlands" of 1977, requires federal agencies conducting certain activities to avoid, to the extent possible, adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands, if a practicable alternative exists. Discharge of dredge or fill material into wetlands and other Waters of the U.S. is also regulated under Section 404 of the Clean Water Act.

Environmental consequences for wetland resources for this project are addressed in Section 3.2.1.

Floodplain Management - EO 11988, "Floodplain Management" of 1977, requires federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid, to the extent possible, any adverse effects associated with the direct and indirect development of a floodplain.

Environmental consequences for water resources are addressed in Section 3.1.3.

Important Farmlands - EPA Policy to Protect Environmentally Significant Agricultural Lands requires EPA to consider the protection of the nations' significant/important agricultural lands from irreversible conversion to uses that result in their loss as an environmental or essential food production resource. Moreover, the Farmland Protection Policy Act (FPPA), 7 USC 4201 *et seq.*, and the U.S. Department of Agriculture's (USDA) implementing procedures require federal agencies to evaluate the adverse effects of their actions on prime and unique farmland, including farmland of statewide and local importance.

The proposed action does not involve conversion of, or otherwise affect, prime, unique, or important farmland.

Coastal Zone Management Act - The Coastal Zone Management Act (CZMA), 16 USC 1451 *et seq.*, requires that federal agencies in coastal areas be consistent with approved State Coastal Zone Management Programs, to the maximum extent possible. If an EPA action may affect a coastal zone area, the responsible official is required to assess the impact of the action on the coastal zone.

The proposed action does not affect a coastal zone area.

Coastal Barrier Resources Act - The Coastal Barrier Resources Act (CBRA), 16 USC 3501 *et seq.*, generally prohibits new federal expenditures and financial assistance for development within the Coastal Barrier Resources System (CBRS) and therefore protects ecologically sensitive U.S. coastal barriers.

The proposed action does not affect any coastal barriers.

Wild and Scenic Rivers - The Wild and Scenic Rivers Act (WSRA), 16 USC 271 *et seq.*, establishes requirements applicable to water resource projects affecting wild, scenic, or recreational rivers within the National Wild and Scenic Rivers System, as well as rivers designated on the National Rivers Inventory.

Environmental consequences for Wild and Scenic River Systems are addressed in Section 3.3.8.

Fish and Wildlife Protection - The Fish and Wildlife Coordination Act (FWCA), 16 USC 661 *et seq.*, requires federal agencies involved in actions that will result in the control or structural modification of any natural stream or body of water for any purpose, to take action to protect the fish and wildlife resources that may be affected by the action.

Environmental consequences for wildlife and aquatic resources are addressed in Section 3.2.2.

Endangered Species Protection - The Endangered Species Act (ESA), 16 USC 1536 *et seq.*, prohibits agencies from jeopardizing threatened or endangered species or adversely modifying habitats essential to their survival.

Environmental consequences associated with Threatened and Endangered Species (T&E) are addressed in Section 3.2.2. Consultation with the U.S. Fish and Wildlife Service (USFWS) for this project is included in Appendix B.

Wilderness Protection - The Wilderness Act (WA), 16 USC 1131 *et seq.*, establishes a system of National Wilderness Areas. The WA establishes a policy for protecting this system by generally prohibiting motorized equipment, structures, installations, roads, commercial enterprises, aircraft landings, and mechanical transport.

No wilderness areas occur within the project area.

Air Quality - The Clean Air Act (CAA) requires federal actions to conform to any state implementation plan approved or promulgated under Section 110 of the Act. For EPA actions, the applicable conformity requirements specified in 40 CFR Part 51, Subpart W; 40 CFR Part 93, Subpart B; and the applicable state implementation plan must be met. Under the Federal Rule on General Conformity, 40 CFR Part 93, a conformity determination is required only when emissions occur in a non-attainment area.

Environmental consequences associated with air quality are addressed in Section 3.1.1.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The Carlota Copper Company has applied for an NPDES permit for the Carlota Copper Project. The NPDES permit contains two special permit conditions (EPA, 2000b) that are the subject of this analysis. One special condition is intended to offset potential discharges of dissolved copper into Pinto Creek by specifying partial reclamation of the abandoned Gibson Mine site. The second special condition would allow discharges of ground water into Waters of the United States in order to maintain base-flow conditions downstream. EPA developed and analyzed two alternatives for this project:

1. No Action
2. Proposed Action: Issuance of the NPDES permit with the two specified special permit conditions.

A third alternative that would utilize the proposed mine pit to provide an offset for potential discharges was developed but eliminated from detailed analysis. These alternatives are described below.

2.1 No Action Alternative

Under the No Action Alternative, EPA would not issue an NPDES permit to Carlota Copper Company with the two specified special conditions. Consequently, the proposed partial reclamation of the Gibson mine would not be conducted and the permit would not allow periodic discharges of ground water from a developed wellfield into Waters of the United States.

2.2 Proposed Action Alternative

Under this alternative, EPA would issue an NPDES permit to Carlota Copper Company under conditions and effluent limits specified by the permit. Part I.A.11 of the permit specifies two special conditions that would be implemented by the Proposed Action Alternative as described below.

2.2.1 Description of the Partial Reclamation of the Gibson Mine

EPA established a special NPDES permit condition requiring Carlota Copper to conduct a partial reclamation of the inactive Gibson Mine before a discharge is allowed from the Carlota Mine (EPA, 2000b). Part I.A.11.a of the permit states:

> "As described in Parts I.A.1.a & b of this permit, the Permittee must perform reclamation work which will result in a reduction in copper loadings into Pinto Creek from upstream sources which are equal or greater than the projected copper loadings expected through permitted discharges. The reclamation activities

required under this permit, as proposed by the Permittee in a letter to EPA dated November 29, 1999, are listed below:

i. Remove the "PLS pond," located at the toe of the leach area, from the Gibson mine.
ii. Remove the "Raffinate pond," located to the east of the leach area, from the Gibson mine.
iii. Relocate the leached material from the leach pad to an area immediately northeast of the shop and configure it to minimize drainage.
iv. Cover the newly removed leach material with non-mineralized local material.
v. Configure drainage so as to be diverted away from the new location of the leached material."

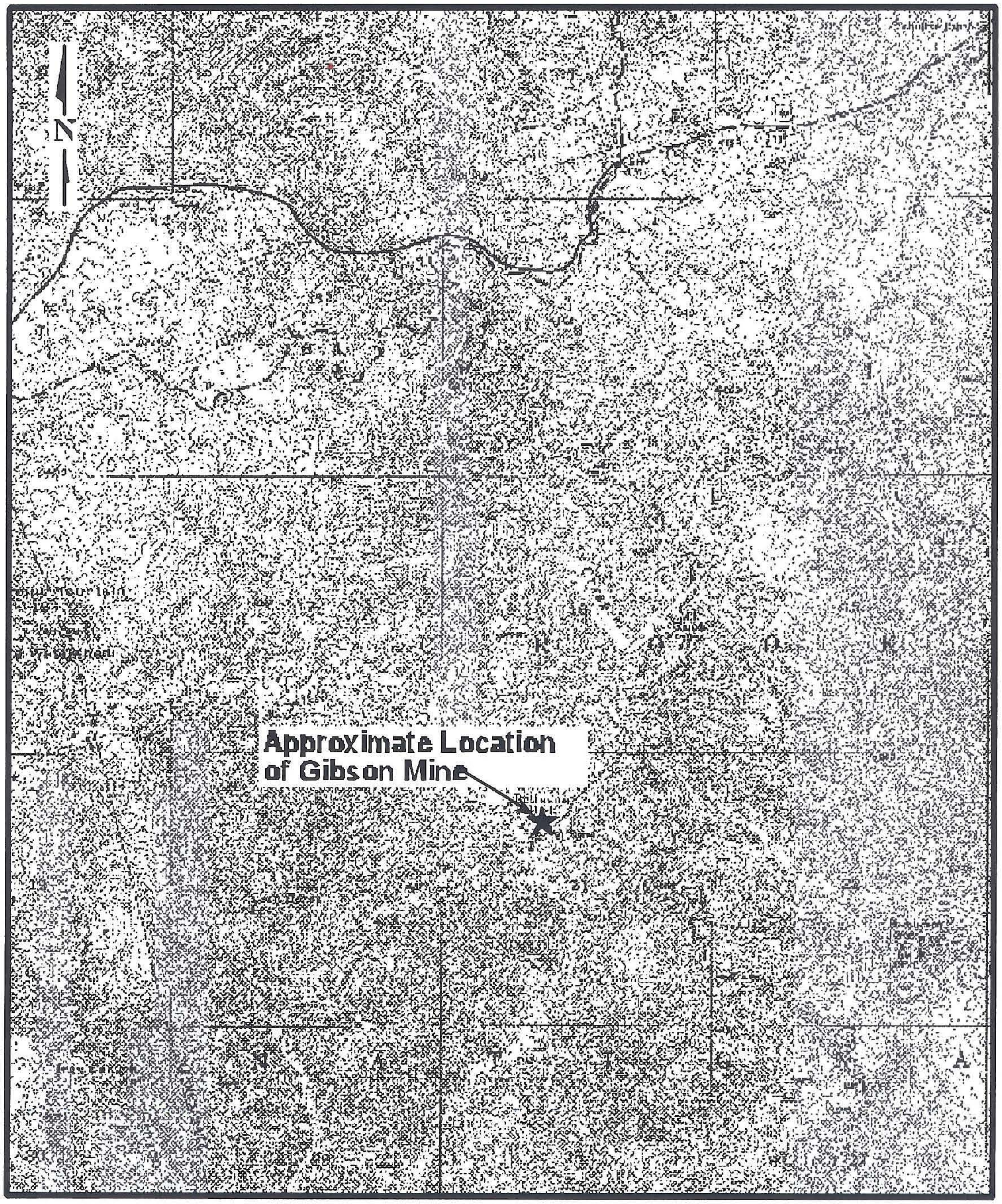
The Gibson Mine site is located six miles west-southwest of Miami, Arizona in Gila County on the watershed divide between the Pinto Creek and Mineral Creek drainages (Figure 2-1). The portion of the site that is in the Pinto Creek drainage is situated south (upstream) of the proposed Carlota Mine project. Descriptions of the Gibson Mine area and of mining activities that occurred there are contained in reports by SHB AGRA, Inc. (1993), WRA (1993), and ADEQ (1995). The reclamation activities that Carlota Copper has agreed to conduct at the Gibson Mine site are described in Carlota Copper Company (1999).

The Gibson Mine site, which covers a total area of approximately 320 acres (WRA, 1993), is situated entirely on private land. The mine occurs in Township 1 South, Range 14 East, Section 21 (Gila and Salt River baseline and meridian). It is depicted on the U.S. Geological Survey 7.5' quadrangle series topographic map for Pinal Ranch (1979), Gila County, Arizona.

The Gibson Mine produced copper ore, mostly oxidized, from 1908 to 1919, with sporadic production continuing through 1930 (ADEQ, 1995). Leaching of low-grade ore was conducted in the 1960s and 1970s by installation of a leach pad, process ponds and iron-precipitation recovery system. The site was subleased by Lodestar Minerals, Inc. in 1988 who rebuilt the ponds and reestablished the leach pad and copper recovery system (ADEQ, 1995). The site is currently abandoned, with the leach pad and two process ponds remaining on the Pinto Creek side of the divide and abandoned *in situ* leaching operations present on the Mineral Creek side of the divide.

The leach pad consists of approximately 20,000 tons of ore that contains copper oxide and sulfide minerals (Mining & Environmental Consultants, Inc., 1993a). The ore rests on an asphalt liner. During operation, a "barren" solution of dilute acid was applied to the ore pile to extract copper. Copper-bearing ("pregnant") leach solution was collected in the pregnant leach solution pond (PLS), located below and east of the leach pad. This pond is 62 feet by 44.5 feet by 3.4 feet deep with a volume of 60,200 gallons (SHB AGRA, Inc.,1993). The pregnant solution was passed through an iron precipitation launder to remove copper from solution. The resulting "barren" leach solution was cycled to the raffinate pond for reapplication to the ore pile. The raffinate pond, located south-southeast of the leach pad, is 88 feet by 61 feet by 5.2 feet deep with a volume of 160,800 gallons (SHB AGRA, 1993). Both ponds are lined with a geotextile material.

As described above, the proposed reclamation actions include removal of the PLS and raffinate ponds; excavation, relocation and contouring of the ore materials on the leach pad; covering of the removed ore materials; and contouring of the upper watershed to divert storm runoff away from the ore materials in their new location.



Source: 1:24,000 Scale USGS
Topographic Map
Pinal Ranch, Arizona 1948
Photo Inspected 1975

0 .5 1
Scale in Miles

Figure 2-1
Approximate Location of Gibson Mine

Figure 2-2 is a schematic drawing of a portion of the Gibson Mine site that shows the locations of the existing leach pad, process ponds, iron-precipitation process system, and proposed disposal area. Carlota Copper proposes to obtain fill and soil for capping the disposed leach pad material from the proposed disposal site and if required, from a disturbed area of clean fill located immediately east of the raffinate pond. Prior to removal of the ponds, any contained solution or rainwater would be pumped out and disposed of off-site. Pond liners and associated piping from the leach pad and ponds also would be disposed of off-site.

2.2.2 Description of Periodic Discharges of Ground Water to Waters of the United States

A water supply wellfield would be developed to provide supplemental water for the Carlota Copper Project, as described in Chapter 2, Section 2.1.1.4 of the Final EIS. The wellfield would be developed in a defined area along Haunted Canyon and Pinto Creek. Figure 2-3 depicts the proposed location of the water supply wellfield and the location of test wells installed to characterize aquifer production and ground water quality and evaluate impacts. The Final EIS identified a potential reduction in stream base flows in Haunted Canyon and Pinto Creek as an impact that would occur as a result of pumping in this wellfield. These impacts were described in Chapter 3, Section 3.3.2.1 of the Final EIS. Mitigation measures defined in Chapter 3, Section 3.15 included:

i. Conduct additional aquifer and wellfield testing during the mine construction phase but prior to wellfield production during mine operations.

ii. Implement a wellfield mitigation program to offset potential flow reductions in Haunted Canyon and Pinto Creek and to maintain aquatic and riparian resources at pre-project levels. Stream flows would be augmented with ground water pumped from the wellfield, or with water from other suitable sources(s) approved by the USFS and other appropriate agencies.

iii. Implement measures, as necessary, to ensure that water discharged to supplement stream flows meet applicable Arizona water quality standards.

The wellfield mitigation program is described in Appendix E of the Final EIS. Under this program, stream flow in Haunted Canyon and Pinto Creek would be continuously monitored at defined points of compliance. Pumped water from the wellfield would be discharged to Haunted Canyon to augment stream flow, should stream flows fall below monthly minimum flow values specified in the plan. The mitigation plan also specifies resource maintenance flow levels (i.e., well discharge rates) that are required to prevent impacts to downstream riparian and aquatic resources by month. The plan further specifies the maximum discharge rates that can be used for augmentation.

The mitigation plan identifies four approximate locations for discharge of mitigation water (see Figure 2-3):

i. Powers Gulch above its confluence with Haunted Canyon;
ii. Haunted Canyon below its confluence with Powers Gulch;
iii. Haunted Canyon above ambient water quality monitoring station HC-2; and
iv. Pinto Creek near ambient water quality monitoring station AMW-23.

EPA established a special NPDES permit condition requiring Carlota Copper to implement various elements of it wellfield mitigation program (EPA, 2000b). Part I.A.11.b of the permit states:

> "The following conditions apply to discharges resulting from the operation of the Carlota Wellfield Mitigation Program (outfall 008):
>
> v. All discharges shall be conducted in accordance with the Wellfield Mitigation Program approved by the U.S. Forest Service on July 27, 1997 and any amendments thereto.
> vi. The Permittee will collect and analyze discrete samples, as defined in Part I.E.1, from the wellfield discharges and the receiving stream, on a quarterly basis, for the parameters listed in Table 1 of this permit. The location and number of such samples shall be in accordance with the approved Wellfield Mitigation Program and any amendments thereto.
> vii. All sampling and analysis shall be conducted according to test procedures approved under 40 CFR Part 136 and Section B of this permit. For all metals, sampling results will be reported in terms of both total recoverable and dissolved metals.
> viii. All discharges into Pinto Creek must meet the requirements set forth in Part I.A.2. All discharges into Powers Gulch and/or Haunted Canyon must meet the requirements set forth in Part I.A.3.
> ix. If a discharge sampling result exceeds Arizona's water quality standards for the receiving stream, as of the date of permit issuance, as set forth in A.A.C. R18-11-109, the permittee shall accelerate sampling and analysis under Part I.A.11.b.ii above to monthly for the parameters found in exceedance. If none of the next three monthly sample results exceed the applicable standards, the permittee may return to the quarterly testing frequency for that parameter. If any one of the next three monthly sample results exceeds applicable standards, EPA may reopen the permit in accordance with Part I.A.10.a and impose numeric water quality limitations for those parameters exceeding standards.

x. Reporting:

(1) All results from the wellfield monitoring shall be reported on the Discharge Monitoring Reports (DMRs) as required in Section B.1 of this permit.

(2) After a minimum of eight quarterly sample have been collected and analyzed from the wellfield and receiving water, the Permittee may prepare a report which:

- tabulates the wellfield and instream monitoring results including the method/laboratory detection limits and appropriate surface water quality standard; and
- provides an assessment of the impacts, if any, on the water quality in Pinto Creek.
- Based on the assessment, the Permittee may recommend a reduction or elimination of continued wellfield monitoring on a parameter specific basis.

vii. EPA and ADEQ will review the report and determine whether the permit should be reopened and modified to reduce or eliminate any of the Wellfield Mitigation Program monitoring requirements on a parameter specific basis."

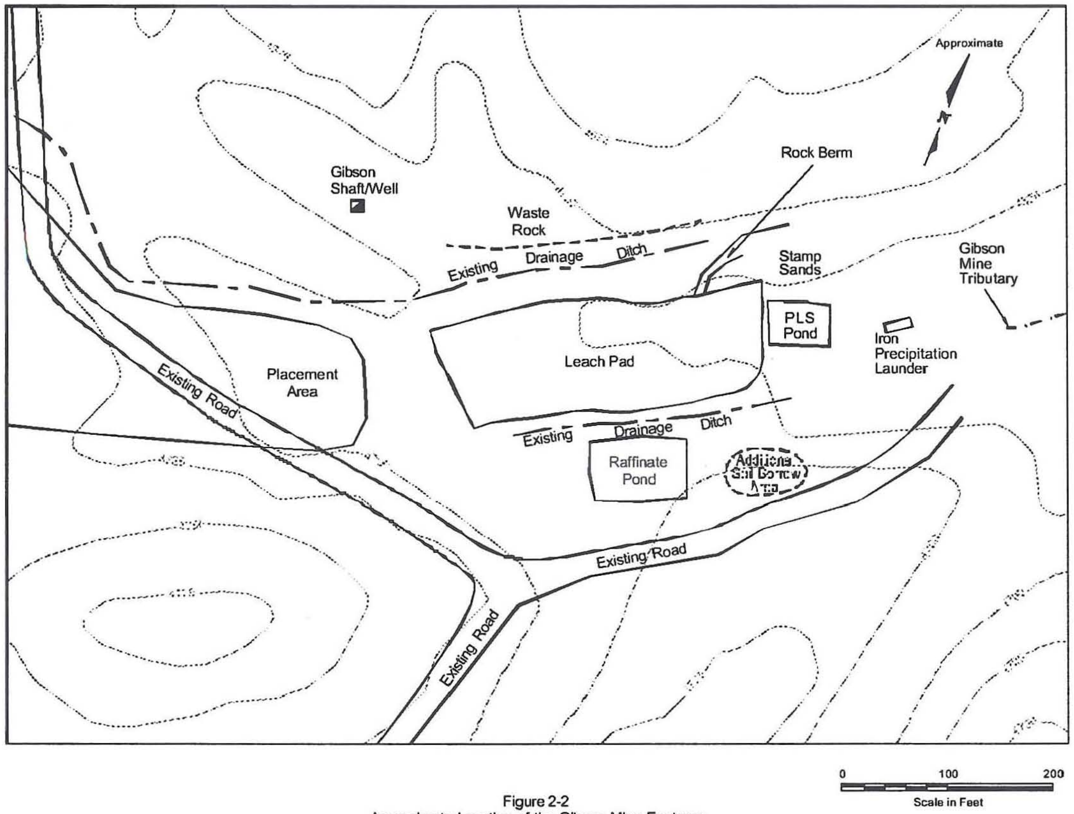


Figure 2-2
Approximate Location of the Gibson Mine Features
and Leach Pad Relocation Area

DEPARTMENT OF MINES AND MINERAL RESOURCES
1502 W. Washington
Phoenix, Arizona 85007
Ph: (602) 255-3795

INVOICE

Invoice Number 003

Date: **June 18, 2001**

Sold to: **Arizona Mining Association** **Attention: Larry McBiles**

**Q

Quantity		Description	Unit Price	Total
Gem Guides Books				
75	ea	Let's Go Rock Collecting ISBN#0-06-445170-4	2.772	207.90
40	ea	DK Handbook Rocks & Minerals ISBN# 1-56458-061-X	10.612	424.48
75	ea	Roadside Geology of Arizona ISBN# 0-87842-147-5	10.08	756.00
40	ea	DK Pockets Rocks & Minerals ISBN#1-56458-663-4	3.058	155.68
20	ea	I Am A Rock ISBN# 059037222X	1.756	44.69
20	ea	Let's Go Rock Collecting ISBN# 0-06-445170-4	2.772	55.44
35	ea	Be Your Own Rock & Mineral Expert ISBN # 0-8069-9580-7	8.372	293.02
30	ea	Golden Guide to Geology SBN# 1582381437	3.0586	116.76
		Shipping Invoice #2043087 & #204524		63.42
KIDS CAN PRESS				
50	ea	Mining by June Drake, #1550745085	6.475	323.75
		Shipping		23.78
TREASURE CHEST BOOKS				
30	ea	Everybody Needs a Rock	3.47	104.10
		Shipping		3.97
SUB TOTAL				2,572.99
SALES TAX 6.1%				156.96
TOTAL				**2,729.95**

Please send remittance to address above, attention Ann Turney

THANKS.

CARLOTA (FILE), GILA Co.

CARLOTA COPPER COMPANY

PLAN OF OPERATIONS
CARLOTA COPPER PROJECT
GILA AND PINAL COUNTIES, ARIZONA

Carlota Copper Company
Miami, Arizona

Submitted to:

USDA Forest Service
Tonto National Forest
Globe Ranger District
Globe, Arizona

FEBRUARY, 1992

CARLOTA COPPER COMPANY

CARLOTA COPPER PROJECT
PLAN OF OPERATIONS

FEBRUARY 1992

Filed With:

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CARLOTA COPPER COMPANY
PLAN OF OPERATIONS

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CARLOTA COPPER PROJECT
PLAN OF OPERATIONS

1.0 GENERAL INFORMATION

The Carlota Project is located at the western edge of the Globe-Miami Mining District, approximately six miles west of Miami, Arizona, straddling the Gila-Pinal county line as shown on Figure 1-1. The project is immediately southwest of Magma Copper Company's Pinto Valley Mine. It is being developed by Carlota Copper Company (Carlota Copper) on a portion of 3,500 acres of patented mining claims and fee land. Most of this area is on federal lands administered by the US Forest Service. The Project Study Area and base topography are shown on Figure 1-2. Approximately 1,254 acres will be affected by project facilities.

The project is being developed to mine and process copper ore from the Carlota and Cactus orebodies, which lie along Pinto Creek and will be mined in a single open pit, and the smaller Eder North and Eder South orebodies in Powers Gulch which will be mined as individual pits. Approximately 54 million tons of oxide ore will be mined from the three pits. In addition, approximately 127 million tons of unmineralized or uneconomic mine rock will also be removed, for a total of 181 million tons of total material. Copper will be extracted from the ore using heap leach technology, and will be processed through a solvent extraction (SX) and electrowinning (EW) plant.

The Cactus and Carlota orebodies have been extensively explored by Carlota Copper and other companies. Underground development and mining was undertaken in the 1904-1929 period. Ore was also produced from a small open pit on the Carlota deposit during World War II.

Carlota Copper began acquiring the property in 1988, and has been conducting studies and tests to confirm the viability of the project with today's technology and economic conditions. Carlota Copper plans to start construction as soon as the required permits have been obtained, and to begin production about one year thereafter. A target date for production start-up is the first quarter of 1994.

The facilities and systems to be developed for the project include:

- Three open pits
- Mine rock dump areas
- Crushing plant
- Belt conveyors to transport crushed ore to the heap leach pad area

- A stacking conveyor system to transport and place crushed ore on the heap leach pad

- A heap leach pad where copper is leached from the ore

- An SX-EW plant to produce copper cathodes

Also included are utilities and ancillary facilities such as:

- Water wells

- Mine equipment maintenance shop and warehouse

- Solution ponds, pumping and distribution systems

- Office and laboratory building

- Water and fuel storage tanks

- Process and potable water distribution systems

- Sulfuric acid, organic and reagent storage tanks

- Steam generation system

- Fire protection systems

- Roads, drainage structures and diversion channels

- Electric substations and electric power distribution system

- Sewage treatment/disposal systems

Figure 1-3 is a site plan for the project.

The climate at the site is semi-arid with moderate precipitation and a high evaporation rate. The average annual precipitation and evaporation are about 20 in and 70 in respectively. Temperatures range from 15° to 105°F. This area is subject to occasional flash floods when storms of significant magnitude produce high runoff within a very short duration. The 100-year, 24-hour rainfall for this area is 6.6 in.

Studies currently being funded by Carlota Copper include:

(a) groundwater hydrology baseline by Erroll Montgomery and Associates, Inc. (hydrogeological consultants),

(b) surface water hydrology, preliminary stream diversion alternative and channel design by Simons, Li and Associates, Inc. (civil engineering consultants),

(c) geotechnical/geochemical characterization of the leach pad and mine rock dump areas by Knight Piesold and Company (geotechnical consultants), and

(d) archaeological survey of the project area by SWCA, Inc. (environmental consultants).

1.1 GEOLOGY OF THE ORE DEPOSIT

In the area of the Carlota and Cactus deposits, the primary rock unit present is Precambrian Pinal Schist, which has been locally intruded by a somewhat younger diabase. Rocks of Tertiary age are represented by the Cactus Breccia and overlying dacitic ash-flow tuffs. The area is bounded on the east by the Schultze Granite.

A schematic geologic section through the Carlota/Cactus area is shown on Figure 1-4, with surface geology of the same area shown on Figure 1-5.

Figures 1-6, 1-7 and 1-8 are geologic sections through the Cactus and Carlota orebodies. The Carlota ore is all oxide-type with mineralization present, primarily as chrysocolla. Mineralizing solutions migrated along the Kelly fault and permeated the Cactus Breccia and brecciated rocks of the fault itself. The ore zone is 300 to 400 ft in thickness and contains zones with copper grades in excess of one percent.

The Cactus deposit consists of a leached (oxide) capping, again primarily chrysocolla, over a chalcocite (sulfide) blanket. Mineralization in both the Carlota and Cactus deposits is bounded at depth by a low-angle fault separating Cactus Breccia from unmineralized Pinal Schist.

The Eder orebodies (see Figures 1-9 and 1-10) are both relatively small deposits of oxide mineralization hosted within Cactus Breccia (Eder North) or Pinal Schist (Eder South).

Only the oxide ores, consisting of the Carlota and Eder orebodies, and the upper portion of the Cactus orebody, are to be mined.

1.2 MINING

The orebodies will be mined using conventional open pit mining techniques and mining equipment. The planned ore mining rate is five million tons per year. Mine rock and alluvium will be mined at an average rate over the life of the mine of about 14 million tons per year.

The Carlota and Cactus orebodies lie close together and will be mined in a single pit. The Carlota/Cactus pit measures approximately 4200 ft by 2200 ft in plan with the bottom of the pit reaching the 2900 ft elevation, which is approximately 600 ft below the existing level of Pinto Creek. It contains 40 million tons of ore and 114 million tons of mine rock. The Eder orebodies will be mined as separate pits. The two Eder pits together contain an additional 14 million tons of ore and 13 million tons of mine rock. The mining schedule for the three pits provides for an 11 year mine life.

Initial ore mining efforts will concentrate on the Eder South pit, with the emphasis shifting to the Carlota/Cactus pit in the second year of production. As presently planned, the Eder North pit will be mined toward the end of the life of the mine.

Ore will be hauled by truck from the pits to an adjacent crushing plant and conveyed to the leach pad, or hauled directly from the pits to the pad. A single crushing plant is planned to serve all pits. This plant and associated conveyors will be relocated as needed. Mine rock from the Carlota/Cactus pit will be hauled to the main mine rock dump, north of the pit. Mine rock from the two Eder pits will be hauled to a mine rock dump located between them.

1.3 CRUSHING

As required, ore will be crushed to approximately minus-6-in size at the crushing plant prior to being conveyed to the leach pad. The nominal capacity of the plant is five million tons per year.

1.4 LEACHING

The leach pad will be located in Powers Gulch, as shown on Figure 1-3, and will have sufficient capacity for at least the total 54 million tons of ore from the three pits.

Crushed ore will be "cured" with a strong sulfuric acid solution and allowed to rest in the heap for a minimum of three days.

After curing, the ore will then be leached using raffinate (barren solution) recirculated from the plant, producing pregnant (copper bearing) leach solution (PLS).

1.5 SOLVENT EXTRACTION (SX) - ELECTROWINNING (EW)

High quality copper cathodes will be produced in the SX-EW plant. In the SX section, copper is extracted from the PLS and concentrated in the electrolyte feed to the EW tankhouse.

The EW tankhouse is designed for direct copper plating on to stainless steel blanks. The tankhouse is provided with a bridge crane to harvest cathodes, and a cathode stripping machine.

Figures 1-11 and 1-12 are schematic flowsheets for the project.

1.6 RECLAMATION

The objective of the reclamation program is to minimize public safety hazards, ensure long-term protection of the environment and return the site to the planned long-term land use of livestock grazing and wildlife habitat.

With input from appropriate agencies, a reclamation and closure plan will be developed which accommodates the Forest Service and satisfies any negotiated or statutory federal, state or local requirements. The plan will include, but may not be limited to: rinsing the leach pad to remove residual copper-bearing solution; grading the top surfaces of the leach pad, covering the surfaces with soil according to the soil salvage plan and preparing these surfaces for revegetation. Other planned procedures include removing all buildings, equipment and foundations; stabilizing and restricting access to the pits; re-contouring roads, building sites and other disturbed areas, protecting of natural stream channels and permanent diversion channels at strategic points to ensure long-term stability and reconstructing any displaced stock water ponds.

1.7 PROPOSED SCHEDULE

Construction is scheduled to begin on receipt of required federal and state permits. The target date is July, 1993. Pre-stripping of the orebodies is scheduled to begin in November, 1993, followed by ore mining in January, 1994. Production of copper cathodes is scheduled for March, 1994. Mine closure will begin in 2005 and be complete within approximately two years.

2.0 PRINCIPALS

Carlota Copper Company (Carlota Copper), formerly Westmont Mining Inc., currently maintains it head office at 4949 South Syracuse Street, Suite 4200, Denver, Colorado 80237, (303) 694-4936. Mr. Duane Bollig is the Project Manager.

Carlota Copper is a wholly-owned subsidiary of Cambior, Inc., a major Canadian-based gold producer with interests in nine mines in production or under development. Cambior, Inc.'s head office is in Montreal, Quebec, Canada, and is a publicly-traded company with shares traded on the Toronto and Montreal Stock Exchanges.

2.1 FIELD REPRESENTATIVE

Carlota Copper is in the process of establishing a permanently staffed office in the Globe-Miami area. Ms. Kathy Whitman, Environmental Coordinator for the project, is Carlota Copper's designated field representative for the project and she resides in the Globe-Miami area. She can be contacted at PO Box 1009, Miami, Arizona 85539. In addition, Mr. Fred Brost of Mining and Environmental Consultants, Inc., 2338 W. Royal Palm, Suite E, Phoenix, Arizona 85021, (602) 995-2272 is acting as lead environmental coordinator and permitting agent for the project on behalf of Carlota Copper.

2.2 PROPERTY DESCRIPTION

Within the area of the Carlota project, Carlota Copper owns or has under lease a total of 178 unpatented claims, 23 patented claims, and 12 acres of fee ground, comprising total acreage of 3,570 total acres. Of the unpatented claims, 146 are owned by Carlota Copper, 12 are under lease from Mr. Sherwood B. Owens, and 20 are under lease from Magma Copper under two separate lease agreements.

Figure 2-1 is a property map of the project area showing the areas of patented and unpatented mining claims and their ownership status.

There are no other lessors, assignors, or agents involved with the project, and Carlota Copper is the sole operator of the project.

3.0 PROPERTY OWNERSHIP

A complete listing of claim names, recordation information, and legal description of the claims and other properties comprising the project is presented in Appendix A. This table also includes property ownership information for the various claim groups not owned by Carlota Copper.

Mine service roads will be approximately 24-ft wide and will have smaller berms along the outside edge. Service roads will be used for light vehicle traffic between mine facilities. Mine service roads will be built similar to the mine access road but may not be gravel-surfaced.

4.1.2 Road Use and Maintenance

The access road will be used by all types of vehicles which operate legally on federal highways. Table 4-1 is a listing of the anticipated usage by vehicle type and frequency.

Table 4-1
ACCESS ROAD USAGE

Vehicle Type	Estimated Frequency* (Vehicles per day)
Passenger cars and trucks	100
Passenger busses	Occasional
Light delivery trucks	5
Heavy delivery trucks	2
Tanker trucks	11
Equipment transporters	Occasional
Mobile cranes	Occasional

*Round trips

Passenger cars and trucks will be used by mine workers, vendors and other visitors. Passenger busses will be used for occasional group tours. Light and heavy delivery trucks, including tractor-trailer rigs, will be used to deliver supplies and spare parts. Tanker trucks will be used for delivery of bulk liquids, principally fuels and sulfuric acid. Copper cathodes will be transported from the mine on flat-bed trucks.

Equipment transporters (low-boys) will be used to transport heavy equipment to and from the operation. Items typically transported will include tracked equipment, disassembled off-road trucks, front-end loaders, large excavators, crushers and heavy components. Large mobile cranes will be called to the mine for occasional heavy lifts.

Roads will be graded as necessary for proper maintenance. Gravel will be replaced on the access road as needed to maintain a smooth all-weather surface for heavy truck traffic.

Table 4-2
SURFACE DISTURBANCE FOR MINE FACILITIES

Facility	Approximate Acres Disturbed
Access Road	21
Open Pits	
Carlota/Cactus	273
Eder South	53
Eder North	40
Mine Rock Dumps	
Main	335
Eder	66
Mine Shop	10
Administration Office and Parking Area	6
External Haul and Service Roads	208
Carlota/Cactus Haul Roads and Conveyor Corridor	85
Eder Haul Road	109
Eder Access Road	18
SX-EW Plant and Raffinate Pond	22
Leach Pad	161
Water Retention Dam Upstream of Leach Pad	16
Solution Ponds	
Pregnant Solution	7
Overflow	9
Powers Gulch Diversion	9
Interceptor Ditches	5
Powerlines and Pipelines	5
Water Storage Tank and Distribution System	2
TOTAL	1254

Note: Acres disturbed are pre-reclamation maximums, including cut and fill slopes, margins and associated facilities.

4.2.1 Open Pits

Three pits are required to recover the copper resource:

1. The Carlota/Cactus Pit, approximately 4500-ft long and 2000-ft wide, located along Pinto Creek. The elevation of the pit bottom of the Carlota orebody is approximately 2900 ft, and that of the Cactus orebody is approximately 3275 ft.

2. The Eder South Pit, approximately 1500-ft long and 1000-ft wide, located on the west side of Powers Gulch. The pit bottom elevation is approximately 4150 ft.

3. The Eder North Pit, approximately 1200-ft long and 1000-ft wide, also located on the west side of Powers Gulch. The pit bottom elevation is approximately 3850 ft.

The pit walls have been designed using an average inter-ramp slope of 45 degrees. The intent is to use a slope as steep as is practical to minimize both the amount of mine rock to be removed and the disturbed area. Pit benches have been designed to maximize the recovery of ore while minimizing the removal of unmineralized mine rock. The total amount of ore and mine rock that is planned to be removed by the project is presented in Table 4-3.

Table 4-3
Total Ore and Mine Rock Tonnages by Pit
(millions of short tons)

Pit	Oxide Ore	Mine Rock	Total
Carlota/Cactus	40	114	154
Eder North	4	7	11
Eder South	10	6	16
	54	127	181

4.2.2 Leach Pad and Ponds

To hold the planned tonnage of ore, the leach pad will be approximately 3000-ft long and 2200-ft wide, and will be built to a height of 300 ft, which is the practical maximum for the liner systems being considered. Filling the pad to the maximum height minimizes the surface disturbance required. The ore heap on the pad will be built at a 2:1 overall slope to ensure stability under the anticipated operating conditions. The leach pad has been designed to contain at least 55 million tons of ore.

The final design for the leach pad liner is subject to approval by the Arizona Department of Environment Quality (ADEQ) under the provisions of the Aquifer Protection Permit Program. Present planning calls for a single synthetic liner over a prepared and compacted sub-grade. Areas lacking sufficient soil for proper liner installation will be covered with at least six in of reworked soil or soil-like material prior to installation of the liner.

The leach pad will be built in stages, beginning in the pre-production period, and will be reclaimed at the end of active operations.

The pregnant leach solution (PLS) pond and overflow pond will be located north (down gradient) of the pad. Preliminary studies indicate that the PLS pond should be designed to contain 15 million gallons. The pond will be lined with double synthetic liners and will have a leakage control and recovery system. The PLS pond will be connected by a weir or spillway to an overflow pond with a capacity of 28 million gallons. This combination allows for 12 hours working storage at a PLS flow rate of 4000 gpm (2.9 million gallons), plus 12.1 million gallons for pad drain-down (during power failures, etc.) or precipitation runoff, in the PLS pond, plus an additional 28 million gallons for drain-down and/or runoff in the overflow pond. A summary of the pond storage volumes is presented in Table 4-4.

Table 4-4
PLS and Overflow Pond Volumes

	PLS	Overflow (Millions of gallons)	Total
Working storage, 12 hr. @ 4000 gpm	2.9	0	2.9
Drain-down, 30 hr. @ 4000 gpm	7.2	0	7.2
Design storm runoff	4.9	28	32.9
TOTAL	15.0	28	43.0

The design storm is the 100-year, 24-hour storm, with a runoff coefficient of 0.6 as used by Simons, Li and Associates in their preliminary study. A detailed water balance will be done in the design phase of the project. Pond volumes could be adjusted as a result of this work.

A raffinate pond with a capacity of approximately 4.5 million gallons will be constructed downgradient from the plant as shown on Figure 1-3. All runoff from the plant, including spillage and precipitation, will flow by gravity into this pond. Sufficient freeboard will be provided to contain the design storm and the largest plant spill.

4.2.3 Mine Rock Dumps

Disturbance of the mine rock dump areas will be delayed until operationally necessary and will be progressively reclaimed when they are no longer subject to further disturbance. Dump volume is adequate to contain the planned tonnage of mine rock. Dump slopes will be built at the natural angle of repose (about 1.4:1) to minimize surface disturbance.

The main mine rock dump is located in the valley, north of the Carlota pit and west of Pinto Creek. This rock dump will contain all of the mine rock from the Carlota/Cactus pit, approximately 114 million tons. This dump will have several levels, with the highest level at an elevation of approximately 4050 ft.

The Eder area rock dump will contain the mine rock from both the Eder North and Eder South pits, approximately 13 million tons of material. The Eder dump will be located between the two pits on the slope on the west side of Powers Gulch. The top of the dump is at an elevation of approximately 4300 ft.

Figure 4-1, *Alternatives to Selected Project Features,* presents three additional areas that may be used for mine rock storage. Two of these areas are located in small valleys north and east of the Cactus pit area, and the third is located in Powers Gulch, southeast of the leach pad. These three mine rock areas are not intended to replace the main dump and Eder dump, but may be used in addition to the two larger dumps to provide areas within close proximity to the Carlota/Cactus pit that will result in short truck hauls for a portion of the mine rock. The viability of the use of these areas as rock dumps will be determined as part of the geotechnical review of the other mine rock dumps.

4.2.4 SX-EW Plant Area

This area will be disturbed at the beginning of construction. Upon completion of active operations, the plant facilities will be removed, and the land will be reclaimed.

The SX section will contain three mixer-settlers and associated piping. The size of these structures is dictated primarily by the PLS flow rate. While design is not complete, they will probably be HDPE or fiberglass lined concrete structures, with acid-resistant roofing material. The structures will be low to the ground with a maximum height of approximately eight feet. The area covered will be approximately 100 by 300 ft. All-around access will be provided for maintenance and inspection.

The EW tankhouse will be an engineered steel-frame structure on concrete foundations. The size of the tankhouse is dictated primarily by the planned cathode production rate. Housed

The mine office will be a frame or block building housing offices for mine management, supervisory, administrative and technical staff, along with an assembly/training area, communications equipment and storage. A parking area will be located adjacent to the building. The area required for the building and parking area will be approximately 100 ft by 100 ft.

The mine maintenance shop/warehouse will be an engineered steel structure on a concrete foundation. Space will be allocated for component replacement, maintenance, lubrication, welding, and minor steel fabrication. Major overhaul and repair of equipment and components will be done off site. Planned shop facilities include maintenance bays for large wheel and track equipment, a bay for small vehicles, and a welding/fabrication area. Warehouse space will also be provided. A vehicle wash area, lubricant storage, and materials storage areas will be located adjacent to the mine shop/warehouse. An approximately 300 ft by 600 ft pad will be provided for this facility and the necessary vehicle parking and maneuver areas.

The explosives storage area will contain a small barricaded magazine for high explosives and a container for bulk storage of ammonium nitrate blasting agent. These facilities will require an area approximately 100 ft by 100 ft, including space for truck parking. The explosives storage area will be located remotely from the main mine and plant facilities, and will be sited according to the applicable MSHA requirements.

4.2.7 Roads and Powerline Corridors

Mine haul roads will be 80- to 100-ft wide, while other access roads will be 24-ft wide. Where cut and fill are required for road construction, steep slopes will be used to minimize the disturbed areas. It is anticipated that cut slopes will be 0.5:1 in rock or consolidated alluvium, and 1.5:1 in soil. Fill slopes will be built at the natural angle of repose, about 1.4:1.

These corridors will be disturbed at the beginning of construction. Where appropriate, areas disturbed during powerline construction will be reclaimed after completion of construction. Upon completion of active operations, powerlines will be removed. Roads will be reclaimed when no longer needed for operations or at the end of the life of the project. Some roads may be left in place after closure if directed by the Forest Service.

4.2.8 Diversion Channels

The Cactus and Carlota orebodies will be mined in overlapping pits located along the present channel of Pinto Creek, requiring that a short segment of Pinto Creek be diverted into a new channel. In addition, the only suitable site with sufficient volume for the leach pad is along Powers Gulch, and will require that the ephemeral wash be diverted to a new channel. The Powers Gulch diversion will be constructed during the pre-production period. The Pinto Creek diversion will be constructed as the Carlota/Cactus Pit is developed.

Pinto Creek Diversion. Pinto Creek will be diverted through a channel constructed on wide benches along the east and north sides of the Cactus pit. The diversion channel will have approximately the same length (3900 ft) and average grade (0.018 ft/ft) as the original Pinto Creek channel through the pit area. The finished diversion channel will be constructed through bedrock or other stable material. The current preliminary design for this channel has been sized for the 500-year frequency storm of 10,100 cfs and associated sediment.

The option of utilizing a runoff detention dam across Pinto Creek upgradient of the pit to reduce the required cross-section of the diversion channel was examined. This is not a water-retention structure but is a detention structure designed to temporarily hold the runoff surges and release them at a controlled rate. The environmental and technical considerations, and questions regarding the ultimate disposition of the dam at the end of the life of the project, led to the rejection of this option.

Powers Gulch Diversion. The Powers Gulch diversion channel will run along the southwest side of the leach pad to a flume at the north end which will direct runoff back to the natural channel downstream of the pad and ponds. The design calls for a channel gradient of between two and three percent, which is approximately the same as that of the natural channel. An approximately 40-million gallon runoff collection pond will be built in Powers Gulch upgradient of the leach pad to raise the level of collected runoff to the level of the channel. This pond will also store surface water runoff, which will be used as process makeup water.

Interceptor Ditches. In order to protect surface water quality, runoff from undisturbed areas upgradient of project features may be intercepted by ditches and conveyed to major site drainages.

4.2.9 Water Use and Supply

The total steady-state make-up water requirements for the project will be approximately 750 gpm. A preliminary project water balance is presented in Figure 4-3. Since all process solutions will be recirculated, the primary water losses will be due to evaporation and ore wetting. Evaporation will be variable during the year as temperature and relative humidity change. The type of solution application system selected for the leach pad (sprinklers or emitters) will also impact evaporation. A value of 10 percent evaporation, consistent with the experience of near-by leaching operations, has been assumed.

The planned leaching flow rate will be 4000 gpm. Solution pumped to the leach pad will therefore be approximately:

$$\frac{4000gpm}{0.9}=4444gpm$$

The resulting evaporation will therefore be:

(4444 gpm) (0.10) = 444 gpm, use 445

The average precipitation for the site is 20 inches. Using a surface area of 13,500,000 ft^2 and a runoff coefficient of 0.5, the precipitation falling on the pad area would contribute:

$$(20'')(13{,}500{,}000ft^2)(0.5ROC)(\frac{1ft}{12''})(\frac{7.48gal}{ft^3})(\frac{1yr}{525{,}000\min})=160gpm$$

The net annual effect on the process water balance would be:

- 445 gpm evaporation + 160 gpm precipitation = a net loss of 285 gpm

Based on the available column leach data, 5-percent moisture addition is anticipated for ore wetting. An ore loading rate to the pad of 13,700 tons per day is planned. Ore wetting will therefore require:

$$(13{,}700\frac{tons}{day})(\frac{2000lbs}{1ton})(\frac{1gal}{8.34lb})(\frac{1day}{1440\text{min.}})(0.05)=114gpm,use115$$

Make-up water for miscellaneous plant activities such as reagent dilution and boiler requirements is estimated at 50 gpm. Road watering for dust control is estimated at 150 gpm. Dust control at the crushers is estimated at 100 gpm. Support facilities' requirements are estimated at 50 gpm.

Pit dewatering wells will be located along the periphery of the Carlota/Cactus Pit to minimize groundwater seepage into the pit. These wells will also be used to supply water to the project. Additional wells may be drilled if needed.

A fresh water tank will receive water from the wells. This tank will provide process and fire water for the operation. Make-up water for the raffinate pond, the curing acid system and other uses, will be tapped from the main process water header at the SX-EW plant. Water for the mine site will be supplied by the same system. A portion of the fresh water tank will be maintained as a fire protection reserve. Fire water pumps will provide water pressure to the fire suppression system at the SX-EW plant and maintenance shop area.

A potable water tank will be installed to provide drinking quality water and make-up water for the steam boiler.

4.3 PROJECT DESCRIPTION

The project is divided into two periods, the pre-production period, which begins when the necessary permits have been obtained, and the production period, which begins when copper is produced. Construction of mine facilities, removal of overburden and mine bench preparation will be done in the pre-production period. Approximately ten months will be required for these activities.

The target date for the start of the pre-production period is July, 1993. Production of copper cathodes will then begin during the first quarter of 1994.

4.3.1 Pre-production Period

Access road and powerline construction will begin early in the pre-production period. The areas on which mine facilities are to be constructed will be cleared of brush. Soil will be salvaged in accordance with a Soil Salvage Plan which will be developed.

Building and yard sites will be levelled and prepared for construction. Buildings will be constructed and equipment installed. Water wells and the water distribution system will be installed.

The first stage of the leach pad area will be cleared, grubbed and treated with an approved herbicide. It will then be graded to drain towards the drainage ditches and the pregnant solution pond before liner installation. Perforated plastic leachate collection pipes will be placed on top of the liner to maintain a low hydraulic head.

As part of the design process, additional geotechnical investigations are being done to resolve questions relating to foundation stability, heap slope stability, liner and soil permeability, construction materials and specifications, and quality control.

The PLS, overflow, and raffinate ponds will be built and lined as required. The Powers Gulch Diversion and miscellaneous small interceptor ditches will be constructed. Pumps and solution pipelines will be installed.

Initial mine benches and the initial haul roads and service roads will be constructed. Overburden and initial mine rock removal will also occur in the pre-production period. Approximately 1.2 million tons of material will be removed during this period and used for levelling of construction areas, road construction, or placed in the mine rock dumps.

4.3.2 Production Period

Mining. The planned life of the mine is 11 years. The mine will operate 24 hours per day, 365 days per year.

The orebodies will be mined using conventional open pit mining equipment consisting of rotary blasthole drills, front-shovel hydraulic excavators and haulage trucks, supported by a fleet of auxiliary equipment including front-end loaders, bulldozers, road graders and miscellaneous service vehicles. The total ore to be mined from the three pits is 54 million tons; the total mine rock is 127 million tons, giving a total of 181 million tons of material. A break-down of ore and mine rock for the three pits is shown in Table 4-4.

The in-situ bulk density of all rock types averages 12.5 cu ft per ton. Moisture content varies from about four to eight percent, depending on rainfall.

Ore will be mined at a nominal rate of five million tons per year and hauled to the crushing plant or directly to the leach pad. The mine rock mining rate will be a maximum of 14 million tons per year over the life of the mine (see Table 4-5).

To prepare the pit for sustained production, it will be necessary to remove an estimated 1.2 million tons of soil, alluvium and mine rock in the pre-production period. Soil will be stockpiled for later reclamation. The other materials will be used in construction or placed on the mine rock dump.

The design of the pit wall slopes will be based on a detailed slope design studies. Inter-ramp slopes will be approximately 45 degrees. An 80 to 100 ft wide, eight percent gradient haul road ramp will be designed into the pit.

The pits will be developed in phases. Mine rock will be excavated ahead of mining in sufficient quantities and from locations to ensure the release of ore at the scheduled annual production rate.

Soil and vegetation will be removed by dozers and loaders as required. Larger trees, very few of which are present in the pit area, will be salvaged for firewood or pushed into a pile along with brush and burned. Soil and small plants will be placed in soil stockpiles for later revegetation of disturbed areas.

Drill patterns will be laid out in accordance with a monthly mining plan. Rotary blast-hole drills will drill 8 to 12 in diameter holes to a typical depth of 45 to 50 ft. Dust shields and water will be used to control drilling dust. Drill cuttings will be sampled for copper content prior to loading the holes with explosives.

Blast holes will be loaded with an ammonium nitrate based blasting agent, plus a high explosive primer. Blasting will typically occur once a day or every other day, as dictated by operating schedules. Typically 30 to 60 holes will be initiated in each blast.

Blasting agents will be delivered in bulk to the blasthole by a blasting contractor. A bulk explosives storage facility will be set up at a barricaded area for use by the blasting contractor.

Loading will be done by hydraulic front-shovel excavator or front-end loader with a wheel dozer for bench cleanup. Hauling will be accomplished by a fleet of 85- or 120-ton end-dump trucks. Ore will be hauled to the primary crusher or directly to the leach pad. Mine rock will be hauled to the mine rock dump. Ten to 13 trucks (depending on the size selected) will be used initially for mining. As the haul distance increases due to deepening of the pit and a longer mine rock haul, additional trucks will be added.

Road graders and water trucks will be used on all haul roads to maintain a smooth, compacted surface and to control dust. Dozers will be used to build roads and berms, and to spread ore on the leach pad if required.

Table 4-5
Mine Production by Year

Year	Pits	Ore (k tons)	Mine Rock (k tons)	Total Material (k tons)
PP	Eder South, Carlota		1,200	1,200
1	Carlota/Cactus, Eder South	5,000	14,000	19,000
2	Carlota/Cactus	5,000	14,000	19,000
3	Carlota/Cactus, Eder South	5,000	14,000	19,000
4	Carlota/Cactus	5,000	14,000	19,000
5	Carlota/Cactus, Eder South	5,000	14,000	19,000
6	Carlota/Cactus, Eder South	5,000	14,000	19,000
7	Carlota/Cactus	5,000	14,000	19,000
8	Carlota/Cactus, Eder South	5,000	8,898	13,898
9	Carlota/Cactus, Eder North	5,000	8,916	13,916
10	Carlota/Cactus, Eder North	5,000	6,000	11,000
11	Carlota/Cactus, Eder North	4,462	3,985	4,874
	Total	54,462	126,999	181,461

PP = Pre-production Period

Service trucks, a mobile crane and forklift/tire manipulator will be used for fuelling, servicing and field repair of mine equipment. Pick-up trucks will be used to transport engineering, maintenance and supervisory personnel. Towable light stands with gasoline generators will provide light at remote locations for night operations.

Ore Crushing, Conveying and Stacking. The crushing and stacking flowsheet is shown in Figure 1-11. The crushing plant will operate on the same schedule as the mine, three eight hour shifts per day, seven days per week.

Run-of-mine ore is dumped into a hopper at the primary crusher. Water sprays will be used to reduce dust during dumping. The ore is fed to the primary crusher, crushed and conveyed on the overland conveyer to the crushed ore stockpile located near the leach pad. It is withdrawn from the stockpile by vibrating feeders and conveyed to an agglomeration unit for pre-treatment with acid and leaching aids, if necessary. After pre-treatment, the ore is conveyed to the leach pad distribution conveyors and radial arm stacker. Nominal leach pad ore size will be either run-of-mine (ore which has not been reduced in size by crushing) or minus six in.

Mine Rock Disposal. Approximately 127 million tons of mine rock will be disposed of over the life of the mine. The main mine rock dump site is immediately north of the Carlota/Cactus pit. The Eder mine rock dump is located between the Eder pits.

Mine rock will be hauled to the dump by haul truck and end-dumped over the dump crest. An overland conveyor/mobile stacker system might be used to transport and place mine rock on the dump at some future stage of mine development. A dozer will be used on the dump to maintain grade and to build a safety berm along the crest.

The areas planned for mine rock dump sites are steep and rocky. Access by equipment for the purpose of site preparation is not feasible. Therefore, mine rock will be dumped directly on to the surface.

Leaching. Ore will be stacked on the pad in 25 ft lifts. Side slopes of 2:1 will be maintained to ensure heap stability under operating conditions. The maximum heap height will be 300 ft.

Ore will be transported to the leach pad from the crushed ore stockpile by conveyor and will be transferred to a mobile stacking conveyor system. Ore will be placed on the pad directly from the mobile stacking conveyor. Dozers will be needed occasionally to level the top of the heap.

Haul trucks may be used to transport and place ore on the pad in addition to using the mobile stacking system. Current plans, however, call for use of the conveying/stacking system as much as possible.

The ore will be treated using two solutions. First, a curing solution containing concentrated sulfuric acid will be sprayed onto the ore in an agglomeration/pre-treatment unit or on the pad through the pad distribution lines in the case of the truck dumped ore. This solution will be prepared by injecting commercial-grade sulfuric acid into an on-line static mixer for mixing with raffinate (weakly acidic leach solution which is recirculated from the SX plant). Following curing, the ore will be leached with raffinate. The leach solution will be pumped from the raffinate pond through a main header along the leach pad and delivered to the surface of the heap through a piping network of laterals, and distributor lines. Sprinklers or emitters will be used to distribute the solution on the heap.

The planned leach solution application rate is approximately 0.0025 gpm/sq ft. Allowing for evaporation loss, the total raffinate feed rate will be approximately 4400 gpm. A pump station at the raffinate pond will be used to pump the leach solution.

The piping between the raffinate pond and the leach pads, including the headers, will be installed as permanent systems and will be designed to withstand the maximum pressure anticipated in each solution system. The remainder of the solution application piping will be installed as temporary systems and will be relocated when leaching of a pad section is complete. This system will be designed to withstand the operating pressure necessary to deliver the required flows to the sprinkling system. HDPE pipe will be utilized as much as practical for the solution application systems due to its flexibility and proven durability. A reasonable safety factor will be used in the design of all piping systems.

Solution which percolates through the heap will be collected by a network of perforated drain pipes in solution channels on top of the liner. The leachate will then flow to the external solution channels at the lower end of the pad area, which drain into the pregnant solution pond.

As fresh ore is stacked on the previously leached lifts, the solution passed through the fresh ore will continue to percolate through the lower lifts before reaching the under-drain system, causing additional leaching. A high recovery of the contained copper is thus achieved.

Solvent extraction. The pregnant solution is pumped from the pregnant solution pond to the solvent extraction plant at the design flow rate of 4,000 gpm.

The SX-EW plant schematic flowsheet is shown on Figure 1-12. The extraction circuit consists of two extraction mixer-settlers in series. Pregnant solution will be pumped to the first stage of extraction while the barren organic, from the organic surge tank, will be pumped to the second stage of extraction. The aqueous and organic flows between extraction stages will be by pump mixer. Raffinate (barren leach solution) will flow by gravity to the raffinate pond for redistribution to the leach pad. Loaded organic will be transferred by pump mixer to the stripping mixer-settler. The extraction mixer-setters will be sized for a combined aqueous and organic flow rate of 4,000 gpm.

Mixer and settler tanks are located outdoors, and covered. The organic phase is made up of approximately 12 percent active reagent and 88 percent kerosene which is used as a carrier.

Loaded organic is pumped from the extraction mixer settler to the stripping mixer tanks where loaded organic is contacted with lean electrolyte solution from the EW tank house. The two phases overflow into the settler tank for phase disengagement.

Rich electrolyte from the stripping settler tank flows by gravity to the filter feed tank. It is then pumped through the filter to remove entrained solids before reaching the EW tankhouse.

Electrowinning. The electrolyte feed is divided into two streams to service each of the two banks of cells, before being manifolded to each cell. In the cells, copper is plated on to blanks and the acid concentration increased by electrolysis. The plant is designed to produce cathode copper at the rate of approximately 24,500 tons per year.

Each EW cell is provided with anodes made of rolled lead-calcium-tin alloy. To prevent or limit the anode corrosion rate, cobalt sulfate will be maintained in the circulating electrolyte at a tenor of 80 to 100 ppm. A bleed stream from the lean electrolyte to the extraction mixer settlers will be used to control the levels of iron and chloride in the EW circuit.

Cathode blanks are made of 316L stainless steel plates. Copper will be plated on both sides of each cathode. Approximately 115 lbs will be deposited on each side in a seven-day growth cycle. Cathode pulling from cells will be scheduled five days a week. An overhead crane will be used to pull cathodes.

Cathodes pulled from the cells will be transported by the overhead crane to the cathode stripping machine. The cathode stripping machine washes cathodes with hot water, strips and stacks the cathodes. Copper stacks will be picked up by a forklift, strapped and weighed before transfer to the storage area outside the building.

4.4 MANPOWER

The manpower requirements are summarized in Table 4-6. Approximately 222 full-time employees will be required to man the project. The approximate break-down will be 26 salaried employees, including professional, supervisory and administrative staff; and 196 hourly employees, including equipment and plant operators, mechanics, tradesmen, craftsmen and laborers.

Table 4-6
Project Manpower

	Mine	Crushing & Conveying	Leaching	SX-EW	G&A	Total
Salaried	15	--	--	3	8	26
Hourly	126	32	16	22	--	196
	141	32	16	25	8	222

Project facilities will operate 24 hours per day, seven days per week, with three eight-hour shifts per day. All operating facilities will be manned on all shifts.

The company's policy is to use as much local talent as is available. The labor force will be recruited from local communities where possible.

4.5 EQUIPMENT AND VEHICLES

Mine and SX-EW plant operations are scheduled for 24 hours per day, 365 days per year. The operation of individual pieces of equipment will be scheduled to allow for maintenance and other down-time.

4.5.1 Mining

The initial equipment planned for the mine is listed below. As the pits deepen and haul distances increase, additional trucks and road maintenance equipment may be added as needed.

Item	Class or Size	Number
Major Mine Equipment:		
Blasthole Drill	60,000-lb pulldown	2
Hydraulic Shovel	11.3 cu yd or	3
	15.7 cu yd	2
Front-End Loader (backup)	13 cu yd	1
Haul Truck (rear dump)	85 t or	13
	120 t	10

Tracked Dozer	350-400 hp	3
Rubber-Tired Dozer	450 hp	1
Motor Grader	275 hp	2
Water Truck	20,000 gal	2
Air-Track Drill		1
Mine Support Equipment:		
Rubber-Tired Backhoe	1.5-3 cu yd	1
Anfo/Slurry Truck		1
Blasthole Stemming Tractor		1
Man Vans		2
Pick Ups		10
Ambulance		1
Maintenance Equipment:		
Fuel/Lube Truck		2
Flatbed w/Boom		1
Tire Handler		1
Mechanics Service Truck w/welder		2
Rough-Terrain Crane		1

4.5.2 Crushing and Conveying

The following major equipment is planned for the ore crushing and conveying system. A single re-locatable system will be used for both the Carlota/Cactus and Eder pits.

Item	Class or Size	Number
Grizzly	30 in	1
Ore hopper		1
Vibrating grizzly	6 in	1
Jaw crusher		1
Overland conveyor		1
Stockpile conveyor		1
Reclaim feeder		3
Reclaim conveyor		1
Reagent addition belt		1

Agglomeration belt	1
Distributor conveyor	Various
Radial stacker	1
Mobile by-pass feeder	1
Water and solution sprays	Various
Magnetometer	1
Compressor	1

4.5.3 Leaching

The following major equipment is planned for leaching and solution pumping:

Item	Number
PLS pump	2
Raffinate pump	2
Acid storage tank	1
Acid pump	1
In-line static mixer	1
Solution piping	1 Lot

4.5.4 SX-EW

The major items planned for equipment SX-EW are listed below:

Description	Approx. Number
SX	
Pumping Turbine	3
Mixing Agitator	6
Tank, Mixer-Settler	3
Pump, Crud Removal (air operated)	1
Centrifuge, Crud Removal	1
Solution Piping	1 Lot

<u>Plant Tank Farm</u>	1
	2
Tank, Filter Feed	1
Pump, Filter Feed (1 standby)	1
Filter, Electrolyte	1
Heat Exchanger, Electrolyte	3
Tank, Barren Organic	1
Pump, Barren Organic (1 standby)	2
Tank, Sulfuric Acid	1
Pump, Sulfuric Acid (1 standby)	1
Tank, Kerosene Storage	1
Pump, Kerosene Feed	1
Tank, Cobalt Sulfate	1
Pump, Cobalt Sulfate	2
Tank, Filter Back Wash	1
Pump, Filter Back Wash	1
Tank, Fuel Storage	1
Pump, Fuel Oil	3
Tank, Electrolyte Recirculation	3
Pump, Lean Electrolyte (1 standby)	1
Pump Electrolyte Recirculation (1 standby)	1
Compressor, Instrument Air w/Dryer and Receiver	1 Lot
Compressor Plant Air w/ Receiver	
Solution Piping	

<u>EW</u>	
	1
Boiler Package, including Boiler, Deaerator, Feed Pumps	1
Water Treatment Package including Pump	1
In-line Steam Heater	1
Overhead Crane	2
Electrowinning Cell Banks of 40 cells each	1
Automatic Cathode Stripping Machine	1
Weigh Scale (Stripped Cathodes)	1
Tank, Cathode Wash Water Holding	1
Circulating Pump, Wash Water	1
Forklift	4800
Cathode Blanks	4880
Anodes	1 Lot
Demisting Beads	1 Lot
Solution Piping	

5.0 ENVIRONMENTAL PROTECTIVE MEASURES

5.1 AIR QUALITY

The Carlota Copper Project, using a hydrometallurgical process to extract copper from the ore and to produce electrolytic copper cathodes, does not have any major sources of air pollution.

The principal emissions to the atmosphere from the project will be particulates from mining, hauling and waste dumping and to a lesser extent from crushing, screening and ore handling. In addition, minor quantities of volatile organic compounds will be released from the SX circuit, and minor quantities of sulfuric acid mist will be emitted from the EW building.

5.1.1 Site Clearing

During clearing and soil salvage operations, airborne dust will be controlled by sprinkling with water if necessary.

5.1.2 Mining, Hauling and Mine Rock Dumping

Dust shields and water will be used to control dust during drilling. Water will be used on mine roads to control dust. Chemical suppressants and binders will be used as necessary.

5.1.3 Crushing Plant

At the primary crusher, water sprays will be used to reduce dust during dumping and crushing. Dust suppression equipment will be used within the plant as required.

5.1.4 SX-EW

At the SX-EW facility, the primary potential for air pollution will be from evaporating kerosene and sulfuric acid mist. In the solvent extraction process, the organic phase is made up of approximately 12 percent active reagent and 88 percent kerosene. The kerosene is used as a diluent and to help in phase disengagement. Mixer and settler tanks will be covered, thereby minimizing kerosene evaporation.

Electrolyte containing about 170 grams per liter sulfuric acid will be used in the electrowinning cells in the tankhouse. Plastic beads floating on the electrolyte will be used to control the release of sulfuric acid mist. The atmosphere inside the tank house will be required to meet MSHA regulations.

5.2 WATER QUALITY

The leach pad and solution ponds; secondary containment structures at the SX-EW plant, the maintenance shop and fuel/lubricants storage area; and the sanitary waste treatment system will be designed to prevent impacts to groundwater. The primary potential impacts to surface waters will be from releases of process solutions due to containment overtopping or failure, excessive sediment loading from disturbed areas, transportation or pipeline spills.

5.2.1 Groundwater and Surface Water Protection Measures

The water-bearing hydrogeologic units in Pinto Valley in the vicinity of the proposed facility include floodplain alluvium and bedrock complex. Floodplain alluvium occurs along Pinto Creek and Powers Gulch, and consists of medium- to coarse-grained unconsolidated sediments. The floodplain alluvium ranges from a few tens of feet to several hundred feet in width; thickness of the alluvium ranges from a few feet to several tens of feet. The bedrock complex in the area consists of a wide range of metamorphic, igneous, and consolidated sedimentary rocks.

Groundwater occurs in the voids of the sediments that comprise the floodplain alluvium. The volume of groundwater stored in the floodplain alluvium is dependent on the porosity of the sediments and their vertical and areal extent. Porosity of the sediments probably is in the range of 30 to 40 percent. Because of the limited extent of floodplain alluvium, storage of groundwater in this unit is limited. The occurrence of groundwater in the bedrock complex is controlled by secondary porosity features, such as fractures and faults. Primary porosity is extremely small in the rocks of the bedrock complex and probably does not allow substantial storage or movement of groundwater. Movement occurs chiefly through the network of fractures present in the bedrock and is controlled by the size and extent of the individual fractures, and the continuity of the fracture system.

Groundwater enters the bedrock complex as infiltration from land surface during periods of above average rainfall and periods of snow melt. Movement of groundwater is from higher altitude areas in the mountains that form the valley margins to lower altitude areas along Pinto Creek, Powers Gulch, and tributary streams near the valley center. Depths to groundwater are largest near the drainage divide along valley margins and are smallest near the creeks. Groundwater generally drains from the bedrock complex to the floodplain alluvium, where it moves toward the north in the direction of flow of Pinto Creek.

The planned approach for the protection of groundwater quality will be to ensure that process solutions and other potential contaminants are fully contained, and that monitoring systems are provided to prove the effectiveness of these containments.

Surface water occurs in the project area primarily as ephemeral runoff from precipitation. The planned approach for protecting surface water quality is as follows:

(a) intercept surface runoff from undisturbed areas upstream of project facilities and divert this flow to natural drainage channels downstream,

(b) contain reagents, solutions fuels and other potential contaminants,

(c) collect runoff, overflow and seepage from process facilities and return any solution collected to the appropriate pond, and

(d) manage runoff from disturbed areas in a manner which insures that water quality downstream of project facilities will not be degraded.

Leach Pad. PLS seepage from the leach pad liner is the potential threat to water quality. PLS will be mildly acidic, containing about two grams per liter of free sulfuric acid, and will contain two to three grams per liter of copper, plus other leachable metals.

As indicated above, the pad site is underlain by a thin layer of alluvium over bedrock. A drilling program is being conducted in the pad area will more thoroughly define the characteristics of the alluvium and bedrock.

A single synthetic liner is planned over prepared and compacted soil sub-base as discussed in Section 4.2.2. A typical arrangement of the leach pad liner and collection system is presented in Figure 5-1. The potential for leaks or seepage from a liner is largely dependent upon the hydraulic head in the liner and the permeability of the layer immediately beneath the liner. The collection pipes planned for placement on top of the liner are designed to keep the hydraulic head to a minimum. The prepared and compacted soil layer under the liner is designed to have a low permeability.

The leach pad will have upgradient interceptor ditches to route storm water runoff from undisturbed areas to natural drainage channels. Precipitation which falls on the leach pad will report to the lined PLS pond. This pond, together with its overflow pond, will accommodate precipitation from the 100-year, 24-hour storm, in addition to providing sufficient capacity for process working storage and heap drain-down (see Section 4.2.2).

Process Solution Ponds. PLS and raffinate are the solutions of concern for water quality. The raffinate will be slightly more acidic than the PLS but will contain less than one gram per liter copper.

The PLS and raffinate ponds will employ a double synthetic liner with a leak detection/collection system. A geotextile drainage net will be placed between the upper and lower synthetic liners. Since the overflow pond will see only occasional use and any water which reports to the overflow pond will be returned to the process circuit as soon as possible, no synthetic liner is planned.

Surface runoff from undisturbed areas will be intercepted and diverted around the process solution ponds. Ample volume will be provided to accommodate runoff from the areas which drain into the ponds.

Pipelines. In addition to clean water, pipelines will carry PLS and raffinate between the plant, the leach pad and ponds, and ore treating solution to the reagent addition belt. Inside the SX-EW plant, pipelines will carry the aqueous and organic SX solutions, the electrolyte and other minor process streams.

Pipelines within the plant will be fully contained as discussed below. The pipelines between the solution ponds and the process plant, and the plant and the leach pad will be constructed of HDPE or other acid resistant pipe (as appropriate). Lines will be above-ground and will be inspected routinely to detect leaks. Line integrity will be tested using compressed air and water before placing the line in service.

Solvent Extraction (SX) Section. Within the SX section, the solutions of concern will be PLS, raffinate, organic solution, and electrolyte. The organic solution is a pure kerosene mixed with the oxime reagent, carrying up to approximately six grams per liter copper. The electrolyte solution contains up to 200 grams per liter sulfuric acid and 50 grams per liter copper, plus 80 to 100 grams-per-liter cobalt (as a stabilizer).

The SX section will be constructed with solution retention curbs, sumps and pumps to return spillage to process tanks. The pad, curbs and sumps will be treated to resist acid and other solutions as appropriate. Additional spill protection will be provided by the raffinate pond, which will be located downgradient.

Electrowinning (EW) Tankhouse. The only solution of concern in the EW tankhouse is electrolyte.

The EW tankhouse will be constructed on concrete foundations and floor. The floor will be protected from acid spills with an acid-proof coating. Spills and leakage from the electrowinning cells will be collected by a sloping floor into a central drain leading to a sump for gravity discharge into the raffinate pond. Additional emergency spill protection will also be provided by the raffinate pond, since the raffinate pond is located downgradient.

Tank Farms. The process tank farm will be located between the EW tankhouse and the SX section. It will be lower in elevation than the SX and EW areas to allow gravity flow from both.

The tank farm will contain all storage tanks associated with SX and EW, the electrolyte filter and the crud (solvent extraction residue) handling tank. The area will be paved, curbed and provided with a sump and pumps. The principal tanks within the tank farm are listed below.

(a) Sulfuric acid tank. Ninety-three percent sulfuric acid will be stored in a mild steel tank mounted on a treated concrete base. The area surrounding the acid tank will be paved and curbed and provided with a sump and pump. The containing volume of the curbed area will be at least equal to the tank volume. Concrete around the tank and acid transfer pump foundations will be protected with an acid proof coating.

A second acid tank will be located in the tank farm to supply make-up acid to the electrolyte system. This tank will be constructed similarly to the larger acid tank.

(b) Kerosene tank. Kerosene will be stored in a steel storage tank. The area surrounding the tank will be paved and curbed.

(c) Oxime reagent. Oxime reagent will be stored either in a tank or in drums. Secondary containment will be provided.

(d) Cobalt sulfate tank. Cobalt sulfate will be stored in either drums or a tank as an eight-percent solution. Secondary containment will be provided.

No. 2 diesel oil and unleaded gasoline will be stored in tanks located near the maintenance shop. All fuel tanks will be above ground, and will be vented as required by the appropriate state and federal agencies. Tanks will be enclosed in a curbed area with a volume greater than that of the largest tank as required under Clean Water Act (CWA) spill control regulations. A sump will be provided within the curbed area to allow for removal of spilled fuels or water. Fuel oil and gasoline will be dispensed using D.O.T. approved pumps equipped with flow meters.

Open Pits. Potential sources of water quality degradation include oil and fuel spills from mobile equipment, human wastes, and acid and soluble metals from the pit walls and broken rock.

Pit dewatering wells will be located outside the periphery of the Carlota/Cactus Pit to minimize groundwater seepage into the pit. The location of these wells will be defined in the detailed design phase of the project. Water from these wells will be used as process water. Groundwater which seeps into the pits will be collected in sumps and used as process water or allowed to evaporate.

Drill hole samples indicate that only oxidized material will be mined from the pits. The oxidized material is not be prone to acid-formation or leaching of constituents.

Portable toilet facilities will be provided in the pit for collection of human wastes.

The open pits will have diversion channels and interceptor ditches to collect and convey stream flow and surface runoff from undisturbed areas around the pits and discharge these flows to natural drainage channels. Precipitation which falls on disturbed areas of the pits will be collected in the pit sumps and used as process water or allowed to evaporate.

Maintenance Shop and Offices. The principal potential sources of water quality degradation are fuel, oil, lubricant and solvent spills, and human wastes.

Drainage from the maintenance shop, flammable liquids storage area and vehicle wash-down area will be passed through an oil/water separator and allowed to flow to the raffinate pond or an evaporation pond.

Used oils and solvents will be collected for recycling or disposal off site.

A treatment system will be constructed to receive sewage flows from the shop and offices. This treatment system will involve lined ponds for bacterial digestion, aeration and evaporation. Due to the relatively low precipitation and high evaporation at the site, the sewage treatment system will be non-discharging.

Mine Rock Dumps. Increased sediment loading in runoff is the main concern to surface water quality in the mine rock dump areas. Additionally, a potential source of groundwater quality degradation from mine rock dumps is acid and soluble constituents generated from contact of rock with natural waters. Sediment is the main concern to surface water quality.

Drill hole samples from the pit areas indicate that the mine rock is oxidized material which will not be prone to acid-formation nor leaching of constituents. As discussed below, quantitative characterization of mine rock materials is being conducted in accordance with the procedures specified by the Arizona Department of Environmental Quality.

As a result of the semi-arid climate and the generally low moisture content of the mine rock material, percolation through the dumps will be confined to a relatively thin zone near the surface, leaving most of the mine rock dump material dry. Precipitation falling on top of mine rock dumps is not expected to reach groundwater.

The mine rock dumps will have upgradient interceptor ditches to convey runoff from undisturbed areas to natural drainage channels. The tops of the mine rock dumps will be graded away from the crests to prevent runoff from flowing down the dump face.

Runoff from stormwater directly contacting mine rock dumps will be managed to prevent downstream degradation of water quality. Sediment is the primary water quality concern. Control structures may include straw bales, check dams, undulating topography and/or settling ponds.

Miscellaneous Disturbed Areas. The project involves numerous roads and other miscellaneous disturbed areas. To the extent feasible, these disturbed areas will have upgradient interceptor ditches to direct flows away from disturbed areas. A NPDES stormwater discharge permit will be obtained if required.

5.2.2 Monitoring

A monitoring program for surface water and groundwater is being developed for the project site and vicinity. This work includes the hydrogeologic characterization of the site and design of a monitoring system.

5.3 SOLID WASTES

Solid wastes which cannot be recycled, such as wood, paper, garbage, and used tires will be disposed of off site at permitted facilities.

5.4 SCENIC VALUES

The Forest Service Visual Quality Objective (VQO) class for the portion of the project area which lies essentially within the Pinto Creek watershed is Partial Retention (PR). The portion of the project area which lies essentially within the Powers Gulch watershed is Maximum Modification (MM).

The PR class allows for development activities to be evident but remain subordinate to the characteristic landscape. The MM class allows development activity to dominate the characteristic landscape but requires that it appear as a natural occurrence when viewed as background.

A study will be conducted to quantify the impact of project development on the scenic values of the area and a mitigation plan prepared. In general, the mitigation measures could include location of facilities in less sensitive visual areas where possible, painting of structures to blend with the background and reclamation of disturbed areas at the end of the life of the project.

5.5 FISH AND WILDLIFE

No major impact is anticipated to fish and wildlife. Studies will be conducted to determine if threatened, endangered or special-interest species are present and to determine if these species and other local species will be impacted by the project. If appropriate, a mitigation plan will be prepared.

5.6 CULTURAL RESOURCES

A number of historic and pre-historic sites are known to exist in the project area. The historic sites are primarily associated with mining and prospecting which occurred before 1940. The prehistoric sites are composed mainly of lithic and ceramic scatter, although a few dwelling sites are known.

A Class III archaeological survey of the project area is being conducted by archaeologists from SWCA, Inc. (environmental consultants). After the survey and inventory is completed, an evaluation will be made by the Forest Service to determine if any sites are considered significant. A research design will be prepared for the significant sites and submitted to the Forest Service and the State Historic Preservation Office for review. The sites will then be studied in accordance with an agreed plan and mitigation procedures proposed. On concurrence by the above-mentioned agencies, the sites will be mitigated.

5.7 HAZARDOUS SUBSTANCES

This section covers the transportation, handling, storage, use and disposal of those materials classified as hazardous substances under one or more of the following:

1) the Clean Water Act (CWA)
2) the Comprehensive Environmental Response
Compensation and Liability Act and Superfund Amendments and Reauthorization Act (CERCLA-SARA)
3) the Resource Conservation and Recovery Act (RCRA)
4) Title 49 CFR section 172
5) USC 42 section 241(b)(4)
6) ARS 49-243
7) ARS 49-201
8) Toxic Substances Control Act (TSCA)

The words "hazardous substances" are used to mean either hazardous substances or hazardous materials as defined in the referenced legislation.

A list of the hazardous substances as defined above to be used at the Carlota Copper Project, the approximate quantity to be used per day, the planned on-site storage and an estimate of the number of truck loads required is given in Table 5-1. Some substances are listed generically (i.e. oils, greases, lubricants; solvents; high explosives) since the exact chemical composition will depend on the brand and type selected. The transportation, handling, storage, use and disposal, however, will be the same regardless of the brand and type.

5.7.1 Transportation

All hazardous substances will be transported by commercial carriers or vendors in accordance with the requirements of Title 49 CFR and Title 28 ARS. Carriers will be licensed and inspected as required by the Arizona Department of Transportation (ADOT). Tanker trucks will be inspected and have a Certificate of Compliance issued by the Arizona Motor Vehicle Division. These permits, licenses and certificates are the responsibility of the carrier.

Hazardous wastes generated by the mining company will be packaged as required and shipped off site for recycling or disposal as appropriate. EPA Hazardous Waste Manifest forms will be prepared and submitted as required.

Title 49 CFR requires that all shipments of hazardous substances be properly identified and placarded. Shipping papers must be accessible and include information describing the

Table 5-1
HAZARDOUS SUBSTANCES
APPROXIMATE AVERAGE DAILY USAGE, DELIVERY FREQUENCY
AND ON-SITE STORAGE

Substance	Typical Daily Usage	Nominal Delivery Size	Approx. Delivery Frequency	Planned On-site Storage
Diesel Fuel	6,400 gal.	7,500 gal.	1/day	30,000 gal.
Gasoline	100 gal.	3,000 gal.	1/month	4,000 gal.
Oil, grease, lubricants	350 lbs.	As needed	1/week	5,000 lbs.
Solvents	10 gal.	As needed	1/month	300 gal.
Kerosene	1,000 gal.	7,500 gal.	1/week	10,000 gal.
Sulfuric Acid	240 tons	24 tons	10/day	3,400 tons
Oxime reagent	300 lbs.	As needed	1/month	10,000 lbs.
Cobalt sulfate	50 lbs.	As needed	1/month	1,500 lbs.
Ammonium nitrate	9 tons	24 tons	3/week	126 tons
High explosives	135 lbs.	As needed	1/month	5,000 lbs.

substance, immediate health hazards, fire and explosion risks, immediate precautions, fire fighting information, procedures for handling leaks or spills, first aid measures, and emergency response telephone numbers.

The company will develop a contingency plan for transportation accidents occurring on or near the project site. This plan will include notification of the local emergency response personnel (law enforcement, fire fighting, medical, as appropriate), and providing advice, personnel and equipment as appropriate to minimize the impact of the accident. In addition, the Chemical Manufacturers Association maintains the Chemical Transportation Emergency Center (CHEMTEC), which has a 24 hour "hot line" to provide information, advice and assistance in identification and mitigation at chemical emergency scenes.

Title 49 CFR requires that the carrier notify local emergency response personnel, the National Response Center (for discharge of reportable quantities of hazardous substances to navigable waters) and the US Department of Transportation in the event of an accident involving hazardous substances.

5.7.2 Handling

All hazardous substances will be handled in accordance with applicable MSHA or Occupational Safety and Health Administration (OSHA) regulations (Titles 30 and 29 CFR). The hazardous substances to be used at the mine (fuels, oils, lubricants, kerosene, packaged chemicals, ammonium nitrate) will be handled as recommended on the manufacturer's Material Safety Data Sheets (MSDS). High explosives and sulfuric acid will be handled only by specially trained personnel with appropriate protective and handling equipment.

All hazardous substances will be handled in a manner to avoid spills and areas in which hazardous materials are handled will be designed to contain spills. All spills will be cleaned up or neutralized and reported, if required, to National Response Commission (NRC), State Emergency Response Commission (SERC), and/or Local Emergency Planning Commission (LEPC).

5.7.3 Storage, Use and Disposal

Hazardous substances will be stored in accordance with applicable state and federal regulations. Conceptual storage plans for hazardous substances are outlined below. Almost all hazardous substances are consumed in mining or the leaching/SX-EW process.

Sulfuric acid. Sulfuric acid will be delivered as a 93 percent solution, which can be stored in mild steel tanks. The acid will be stored in covered above ground tanks and enclosed within an acid-proof impermeable secondary containment structure capable of containing the volume of the largest tank plus 10-percent. The containment structure will be equipped with a sump and pump to transfer spilled acid to the process or a tank. Limestone will be used to neutralize minor spills. The appropriate acid warning signs will be posted.

Sulfuric acid is used to leach the copper from the ore on the leach pad and as an electrolyte in the EW tankhouse. It interacts with the kerosene and oxime reagent in the SX mixer-settlers. Both the leaching and electrolyte solutions are circulated in closed loop systems. The acid in the leaching solution is consumed in the leaching process. Small amounts of acid mist are lost to the atmosphere from the EW cells.

Acid solution is sprayed or sprinkled onto the ore in a pretreatment process before it is placed on the leach pad. The ore is then leached to recover copper. The leach solution which percolates through the ore is collected on an impermeable liner and flows through lined channels to a double-lined collection pond. It is pumped from the pond to the SX-EW plant where the copper is extracted. The barren solution, or raffinate, flows to a double-lined raffinate pond, is refortified with acid and pumped back to the leach pad to leach the ore.

Piping for the acid solution, pregnant leach solution and raffinate will be HDPE or stainless steel. These materials were selected because of their acid resistance and high resistance to physical damage. Pipelines will be constructed such that leaks will report to one of the lined ponds. In the event of pump shut-down, solutions can be drained into one of the ponds.

Pipelines will be inspected daily for leaks. The ponds will be designed to comply with ARS 49-201 et. seq., ADEQ Rule R18-9-1 and guidance documents, and will include leak detection and monitoring systems as required. A downgradient pond is planned to prevent process solutions from leaving the project site.

Fuels and Kerosene. Fuels and kerosene will be stored in covered above-ground tanks designed for the purpose. The storage areas will be paved and surrounded by dikes to contain rainfall and spills. The volume of the containments will be at least as large as the largest tank plus 10 percent. A sump will be provided for collection of minor spills. Signs warning against smoking and open flames will be posted on or near the tanks.

Fuels will be dispensed to mobile equipment and vehicles using Department of Transportation-approved equipment. A portion of the normal preventive maintenance program will be devoted to detection and elimination of fuel leaks.

Kerosene is used as a diluent for the oxime reagent in the SX process. It is circulated in a closed loop system within the SX section. The kerosene is pumped from the kerosene tank to the SX mixer-settlers. After initial loading of the process tanks, additional kerosene is required as make-up primarily for evaporation losses. The storage tanks, process piping and SX equipment are located within a secondary containment structure with sumps and pumps. Spills will be collected and sent to the process or a tank as appropriate.

Oils, Greases, Lubricants and Solvents. These will be stored in closed drums or containers in a designated storage area. The appropriate warning signs will be posted.

Oils, greases and lubricants will be used for lubrication of mobile and stationary equipment. Used oils will be placed in drums or tanks and shipped off site for recycling or disposal.

Solvents will be used for cleaning and thinning. Used solvents will be placed in drums, sealed and shipped off site as hazardous waste for recycling or disposal, or will be removed from site by a solvent recycling contractor.

Explosives. High explosives will be stored in locked magazines with the proper barricading and stand-off distance from public roads and other facilities. Ammonium nitrate blasting agent will be stored in a silo or magazine. This material is primarily a fire hazard until mixed with fuel oil just prior to loading into a blast hole. Appropriate explosives signs and signs warning against smoking and open flames will be posted around the area.

Explosives are used for blasting in the open pit. Boosters and detonating cord are transported to the blast site by pick-up truck and loaded into the holes. Ammonium nitrate is transported to the site in a specialized explosives mixing truck. Fuel oil is added and mixed with the ammonium nitrate. An appropriate amount of the mixture is then loaded into the holes, the holes closed with drill cuttings, and the blast initiated. All of the explosive is normally consumed in the blast.

Cobalt Sulfate. This material is normally received as a solution. It will be stored in a tank within the tank farm secondary containment area.

Small amounts of cobalt sulfate are mixed with the electrolyte to control anode corrosion. The cobalt sulfate is consumed in the process.

Oxime Reagent. This material is normally received in bulk storage tanks or drums, and will be stored in a reagent storage area at the SX plant.

Oxime reagent is the active reagent in the SX process. It is mixed with kerosene and circulated within the SX section in a closed loop system. Small amounts of reagent are lost primarily to evaporation.

Miscellaneous. Any miscellaneous materials for disposal which are listed hazardous wastes or characteristic hazardous wastes under RCRA will be stored, labeled and disposed of as required by RCRA and ARS 49.

6.0 RECLAMATION PLAN

A general reclamation plan is provided below. The plan is expected to evolve into a final plan which integrates the requirements of the Forest Service, the Aquifer Protection Permit Closure Plan, and other specific permit conditions and commitments.

The primary goal of site reclamation is to return disturbed areas to a condition suited to the post-mine land use of wildlife habitat and livestock grazing. To this end, the sub-goals are: 1) to minimize or eliminate public safety hazards and; 2) to insure long term protection of the environment.

Reclamation activities are divided into two major categories: concurrent reclamation practices (those reclamation activities which are conducted during active mining), and final reclamation.

6.1 CONCURRENT RECLAMATION

- During the site preparation phase of the project, disturbed surfaces will be contoured to minimize erosion and provide adequate drainage. Sediment traps will be installed downstream of disturbed areas. New traps will be developed along with new areas of disturbance.

- Soil will be removed from the areas to be developed, stockpiled, stabilized and seeded as prescribed in the Soil Salvage Plan (to be developed) and the Revegetation Plan (see Appendix B).

- Construction sites and borrow pits will, if possible, be confined to areas to be covered or developed during the mine life.

- Runoff diversion ditches will be installed around disturbed areas and will be extended and rip-rapped as needed.

- During the life of the mine, areas no longer needed may be reclaimed. A literature search in conjunction with field trials will be conducted to determine those plant species which will be most suitable for revegetation of the various sites.

6.2 FINAL RECLAMATION

During closure of the mine, specific actions are planned for the various facilities, as discussed below.

6.2.1 Structures

All buildings and equipment will be removed. Foundations will either be removed and buried elsewhere on site or buried in place. Facilities areas will be recontoured to create a natural appearance and prevent erosion. Disturbed areas will be revegetated in accordance with the Revegetation Plan.

6.2.2 Leach Pad

Leached ore on the pad will be rinsed with neutralized raffinate and water using the existing distribution system. Drainage from the pad will be monitored until an effluent of acceptable pH is attained. Lime will be added if required. Drainage will be recirculated through the distribution system to evaporate the excess water. When the flow from the pad has decreased to less than the amount which can be evaporated from the ponds alone, recirculation will be stopped and the pad allowed to drain completely. The pad liner will be left in place.

The top of the ore on the pad will be recontoured to direct runoff away from the edges and create a "hummocky" surface with numerous small humps and hollows. This irregular surface will provide topographic cover for livestock and wildlife, and produce microclimates conducive to revegetation. The hollows will be designed to provide sufficient volume for runoff accumulation to prevent discharge to the slopes.

Available soil will be spread in a layer over the prepared surfaces. Contour line furrows will be created to act as minor water catchments to promote moisture retention. The pad will be revegetated in accordance with the Revegetation Plan.

6.2.3 Mine Rock Dump

The top surface of mine rock dumps at similar mines in Arizona is composed primarily of cobble to silt sized particles, with considerable decomposed and decomposing rock. These dumps have revegetated naturally to some extent with little or no surface preparation. This same condition is anticipated on the Carlota and the Eder dumps. Early in the life of the mine, field trials will be conducted to determine the best species for revegetation.

The final dump-top surface will be left in a hummocky condition as in the case of the heap, and for the same purposes. The dump areas will be revegetated as prescribed in the Revegetation Plan. The surface will be prepared by creating furrows two to three ft apart on contour to collect runoff and promote plant growth.

6.2.4 Roads, Conveyor Routes and Yards

Roads, with the exception of those in the pit and those designated for future use by the Forest Service, will be reclaimed. Road and conveyor route surfaces will be ripped, and any surfacing materials buried. These surfaces will be recontoured to present a natural appearance and prevent erosion, covered with soil and revegetated. Culverts and drainage structures will be removed or left in place as directed by the Forest Service.

6.2.5 Diversion Channels, Retention Ponds and Sediment Traps

The Pinto Creek and Powers Gulch diversions are designed to be left in place at the end of the life of the project. The need for additional work on these channels will be evaluated and undertaken before mine closure.

Other structures will be reclaimed or left in place as directed by the Forest Service. If reclamation is directed, channels, ponds and sediment traps will be recontoured and revegetated. Certain portions of strategic diversion ditches may require additional channel protective works such as gabions or boulder reinforcement. These areas will be identified prior to the end of the project life and these works completed.

6.2.6 Open Pits

Public access to the pits will be blocked by a substantial rock berm. A seven ft chain-link fence can be erected to provide additional protection against entry if directed by the Forest Service. Weather-proof "dangerous condition" signs, as required by state statute, will be posted at 200 ft intervals along the rock berm to provide notice to the public.

No revegetation of the benches or pit walls is planned. Pit walls and benches will fill with rubble from higher benches, gradually diminishing the terrace-like appearance. Since the Carlota/Cactus pit is located in a canyon and much of the pit is below the level of the natural ground surface, only portions of the pit will be visible except from specific vantage points. The pit bottoms can be expected to accumulate water from runoff and groundwater seepage after abandonment.

6.2.7 Pregnant Leach Solution and Raffinate Ponds

Water remaining in the ponds at the end of the life of the project will be allowed to evaporate. All structures and pipelines will be removed. Any silt or sediment remaining in the ponds will be left in place. The pond liners will be removed from the surrounding berms and pond sides and folded into the pond bottom. The ponds will then be backfilled with material from the surrounding berms or other suitable fill, recontoured, and revegetated in accordance with the Revegetation Plan.

6.2.8 Off-site Reclamation

No off-site reclamation is planned.

6.2.9 Post-Closure Monitoring

The company plans to conduct post-closure monitoring of water quality as a part of the required Aquifer Protection Permit Closure Plan.

APPENDIX A

CLAIMS OWNED BY CARLOTA COPPER COMPANY

Unpatented mining claims situated in Sections 25, 26, 35, and 36,
Township 1 North, Range 13 East, G&SRB&M,
Globe-Miami Mining District, Gila and Pinal Counties, Arizona

CLAIM NAMES AND NUMBERS

Name	Date Located	Date Recorded	County Recordation Docket	County Recordation Page	Date Filed w/BLM	BLM AMC Serial No.
Grizzly #1	7/18/89	7/24/89	774	120	9/1/89	298647
Amended		11/22/89	785	119	12/13/89	
Grizzly #2	7/18/89	7/24/89	774	123	9/1/89	298648
Amended		11/22/89	785	119	12/13/89	
Grizzly #3	7/18/89	7/24/89	774	126	9/1/89	298649
Amended		11/22/89	785	119	12/13/89	
Grizzly #4	7/18/89	7/24/89	774	129	9/1/89	298650
Amended		11/22/89	785	119	12/13/89	
Grizzly #5	7/18/89	7/24/89	774	132	9/1/89	298651
Amended		11/22/89	785	119	12/13/89	
Grizzly #6	7/18/89	7/24/89	774	135	9/1/89	298652
Amended		11/22/89	785	119	12/13/89	
Grizzly #7	7/18/89	7/24/89	774	138	9/1/89	298653
Amended		11/22/89	785	119	12/13/89	
Grizzly #8	7/18/89	7/24/89	774	141	9/1/89	298654
Amended		11/22/89	785	119	12/13/89	
Grizzly #9	7/18/89	7/24/89	774	144	9/1/89	298655
Amended		11/22/89	785	119	12/13/89	
Grizzly #10	7/18/89	7/24/89	774	147	9/1/89	298656
Amended		11/22/89	785	119	12/13/89	
Grizzly #11	7/18/89	7/24/89	774	150	9/1/89	298657
Amended		11/22/89	785	119	12/13/89	
Grizzly #12	7/18/89	7/24/89	774	153	9/1/89	298658
Amended		11/22/89	785	119	12/13/89	
Grizzly #13	7/18/89	7/24/89	774	156	9/1/89	298659
Amended		11/22/89	785	119	12/13/89	
Grizzly #14	7/18/89	7/24/89	774	159	9/1/89	298660
Amended		11/22/89	785	119	12/13/89	

Claims owned by Carlota Copper Company (continued):

Unpatented Mining Claims located in the Pinto Creek (Miami) Mining District,
in Sections 26, 27, 33, 34, 35, and 36, T1N, R13E,
and Sections 1, 2, 3, 4, 11, and 12, T1S, R13E G&SRB&M,
Gila and Pinal Counties, Arizona

Claim Name	Original Loc. Date	County	Original Recordation Book	Original Recordation Page	Amended Recordation Book	Amended Recordation Page	BLM AMC Serial No.
Tip Top	3/2/29	Pinal	45	142	648	830	52265
Tip Top #1	8/1/30	Pinal	46	275			52266
Tip Top 2	3/2/29	Pinal	45	144	648	831	52267
Tip Top 3	3/10/29	Pinal	45	145	48	832	52268
Tip Top #4	8/1/30	Pinal	46	301			52269
Eder #10	4/21/69	Pinal	569	819			52270
Eder #11	4/21/69	Pinal	569	820			52271
Eder #12	4/21/69	Pinal	569	821			52272
Eder #13	4/25/69	Pinal	569	818			52273
Eder 14	9/27/71	Pinal	645	51			52274
		Gila	308	309			
Eder 15	9/27/71	Pinal	645	52			52275
		Gila	308	310			
Eder 16	9/27/71	Pinal	645	53	721	95	52276
		Gila	308	311	348	10	
Eder 17	9/27/71	Pinal	645	54	721	96	52277
		Gila	308	312	348	9	
Eder 18	9/27/71	Pinal	710	228			52278
		Gila	308	313			
Eder 19	9/27/71	Pinal	710	229	721	715	52279
		Gila	308	314	348	275	
Eder 22	9/27/71	Pinal	645	56			52280
		Gila	308	317			
Eder #23	1/4/73	Pinal	691	416			52281
Eder 27	9/11/73	Pinal	720	440			52282
Eder 31	6/12/73	Pinal	710	923			52283
Eder 32	6/12/73	Pinal	710	924			52284
Eder 34	6/14/73	Pinal	710	926			52285
Eder 35	6/14/73	Pinal	710	927			52286
Eder 36	6/14/73	Pinal	710	928			52287
Eder 38	6/13/73	Pinal	710	930			52288
Eder 39	6/13/73	Pinal	710	931			52289
Eder 40	6/14/73	Pinal	710	932			52290
Eder 42	6/13/73	Pinal	710	934			52291
Eder 43	6/13/73	Pinal	710	935			52292
Eder 44	6/14/73	Pinal	710	936			52293
Eder 45	6/13/73	Pinal	710	937			52294
Eder 46	6/13/73	Pinal	710	938			52295
Eder 47	6/13/73	Pinal	710	939			52296

Claims owned by Carlota Copper Company (continued):

Claim Name	Original Loc. Date	County	Original Recordation Book	Original Recordation Page	Amended Recordation Book	Amended Recordation Page	BLM AMC Serial No.
Eder 48	6/13/73	Pinal	710	940	721	97	52297
Eder 49	6/12/73	Pinal	710	941			52298
Eder 50	6/12/73	Pinal	710	942			52299
Eder 51	6/12/73	Pinal	710	943			52300
Eder 52	6/12/73	Pinal	710	944			52301
Eder 53	6/12/73	Pinal	710	945			52302
Eder 54	6/13/73	Pinal	710	946			52303
		Gila	341	802			
Eder 55	6/13/73	Pinal	710	947			52304
		Gila	341	803			
Eder 56	6/13/73	Pinal	710	948			52305
		Gila	341	804			
Eder 57	6/12/73	Pinal	710	949	721	98	52306
		Gila	341	805	348	8	
Eder 59	6/14/73	Pinal	710	951			52307
		Gila	341	807			
Eder 62	9/7/73	Pinal	721	716			52308
Eder 63	9/7/73	Pinal	721	717			52309
		Gila	348	276			
Eder 64	9/7/73	Pinal	721	718			52310
		Gila	348	277			
Eder 65	9/7/73	Pinal	721	719			52311
		Gila	348	278			
Eder 66	9/7/73	Pinal	721	720			52312
		Gila	348	279			
Eder 67	9/7/73	Pinal	721	721			52313
		Gila	348	280			
Eder 68	9/7/73	Pinal	721	722			52314
		Gila	348	281			
Eder 69	9/7/73	Pinal	721	723			52315
		Gila	348	282			
Eder 70	9/24/73	Gila	348	283			52316
Ghost 16	12/29/66	Pinal	497	450			52317
Ghost 27	3/10/64	Pinal	387	137			52318
Ghost 28	5/18/64	Pinal	387	138			52319
Ghost 29	3/10/64	Pinal	387	139			52320
Ghost 30	5/18/64	Pinal	387	140			52321
Ghost 31	3/10/64	Pinal	387	141			52322
Ghost 32	12/29/66	Pinal	497	451			52323
Ghost 33	3/10/64	Pinal	387	142			52324
Ghost 34	5/4/64	Pinal	387	143			52325
Ghost 38	12/29/66	Pinal	497	452			52326
Ghost 40	12/29/66	Pinal	497	453			52327
Ghost 48	12/29/66	Pinal	497	455			52329
Ghost 50	12/29/66	Pinal	497	456			52330

Claims owned by Carlota Copper Company (continued):

Claim Name	Original Loc. Date	County	Original Recordation Book	Original Recordation Page	Amended Recordation Book	Amended Recordation Page	BLM AMC Serial No.
Ghost 61	3/12/64	Pinal	387	165			52331
Ghost 62	3/12/64	Pinal	387	166			52332
Ghost 63	3/12/64	Pinal	387	167			52333
Ghost 42	12/29/66	Pinal	497	454			52328
Ghost 64	3/12/64	Pinal	387	168			52334
Ghost 65	3/12/64	Pinal	387	169			52335
Ghost 66	3/12/64	Pinal	387	170			52336
Ghost 90	12/29/66	Pinal	497	457			52337
Ghost 91	12/29/66	Pinal	497	458			52338
Ghost 92	12/29/66	Pinal	497	459			52339
Ghost 93	3/16/64	Pinal	387	194			52340
Ghost 94	4/17/69	Pinal	569	798			52341
Ghost 95	3/16/64	Pinal	387	195			52342
Ghost 96	4/17/69	Pinal	569	799			52343
Ghost 97	3/16/64	Pinal	387	196			52344
Ghost 98	4/17/69	Pinal	569	800			52345
Ghost 99	3/16/64	Pinal	387	197			52346
Ghost 100	4/17/69	Pinal	569	801			52347
Ghost 101	3/16/64	Pinal	387	198			52348
Ghost 102	4/17/69	Pinal	569	802			52349
Ghost 104	4/17/69	Pinal	569	803			52350
Ghost 106	4/17/69	Pinal	569	804			52351
Ghost 108	4/17/69	Pinal	569	805			52352
Ghost 110	4/17/69	Pinal	569	806			52353
Ghost 112	4/17/69	Pinal	569	807			52354
Ghost 114	4/17/69	Pinal	569	808			52355
Ghost 116	4/17/69	Pinal	569	809			52356
Ghost 118	4/17/69	Pinal	569	810			52357
Ghost 121	4/17/69	Pinal	569	811			52358
Ghost 122	4/17/69	Pinal	569	812			52359
Ghost 123	4/17/69	Pinal	569	813			52360
Ghost 124	4/17/69	Pinal	569	814			52361
Ghost 125	4/17/69	Pinal	569	815			52362
Ghost 126	4/17/69	Pinal	569	816			52363
Ghost 127	4/17/69	Pinal	569	817			52364
Ghost 131	9/23/65	Pinal	429	515			52365
Ghost 132	9/23/65	Pinal	429	516			52366
Ghost 133	9/23/65	Pinal	429	517			52367
Ghost 134	9/23/65	Pinal	429	518			52368
Ghost 135	9/23/65	Pinal	429	519			52369
Ghost 136	9/23/65	Pinal	429	520			52370
Ghost 137	9/23/65	Pinal	429	521			52371

Claims owned by Carlota Copper Company (continued):

Claim Name	Original Loc. Date	County	Original Recordation Book	Original Recordation Page	Amended Recordation Book	Amended Recordation Page	BLM AMC Serial No.
Ghost 140	4/15/64	Pinal	387	209			52372
Ghost 141	4/15/64	Pinal	387	210			52373
Ghost 142	4/15/64	Pinal	387	211			52374
Ghost 143	4/15/64	Pinal	387	212			52375
Ghost 144	4/15/64	Pinal	387	213			52376
Rim Rock	12/15/15	Pinal			648	821	52377
		Gila	29	282			
Rim Rock 1	9/25/21	Pinal			648	822	52378
		Gila	36	230			
Rim Rock 2	9/25/21	Pinal			648	823	52379
		Gila	36	231			
Rim Rock 3	1/5/22	Pinal			648	824	52380
		Gila	36	370			
Rim Rock 4	7/16/22	Pinal			716	575	52381
		Gila	37	179			
Rim Rock #5	8/1/30	Pinal	46	304	721	93	52382
Annex #5	8/1/30	Pinal	46	305	721	92	52383
Annex 6	8/1/30	Pinal	46	306	648	818	52384
Annex 7	8/1/30	Pinal	46	306	721	94	52385
Cap 130	7/24/30	Pinal	46	311			52386
Cap 131	7/25/30	Pinal	46	311			52387
"Moon Rise"	2/15/1899	Gila	6	401			52388
Promoter	11/14/29	Gila	44	5	348	7	52389
Stars and Stripes	1/2/02	Gila	7	466	308	307	52390
Providence	7/1/28	Gila	40	444	309	649	52391
Sixty Four		Pinal	716	573			52392
Extension	1/1/12	Gila	22	356			
Eder 71	11/24/87	Gila	726	416			279919
Eder 72	11/24/87	Gila	726	419			279920
Eder 73	11/24/87	Gila	726	422			279921
		Pinal	1497	441			
Eder 74	11/24/87	Pinal	1497	443			279922
Eder 75	11/24/87	Pinal	1497	445			279923
Eder 76	11/24/87	Pinal	1497	447			279924

CLAIMS OWNED BY SHERWOOD B. OWENS, P.O. BOX 769, TUCSON, AZ 85702 AND UNDER LEASE BY CARLOTA COPPER COMPANY

Unpatented Mining Claims located in the Pinto Creek (Miami) Mining District, in Section 36, T1N, R13E, G&SRB&M, Gila County, Arizona

Name		Location Date	County Recordation Book	Page	BLM AMC Serial No.
Brewery		3/12/1892	4	145	39932
Clipper		1/20/1906	11	286	39933
Old Abe		9/1/39	48	70	39934
Thomas Jefferson		9/1/39	48	71	39935
Blue Jay Fraction		11/21/42	48	357	39936
Vat		11/25/59	112	344	39937
Lost Knife #1		5/23/59	100	416	39938
	Amended	3/17/68	230	418	
Lost Knife #2		10/28/59	108	133	39939
	Amended	3/17/68	230	415	
Manganese Cap		5/06/65	176	507	39940
	Amended	3/17/68	230	419	
Galena		5/06/65	176	508	39941
	Amended	3/17/68	230	416	
Dew		6/1/68	237	635	39942
Lad		6/1/68	237	636	39943

CLAIMS OWNED BY MAGMA COPPER COMPANY, P.O. BOX 100, MIAMI, AZ 85530 AND UNDER LEASE BY CARLOTA COPPER COMPANY

Unpatented Mining Claims located in the Pinto Creek (Miami) Mining District, in Section 36, T1N, R13E, G&SRB&M, Gila County, Arizona

Claim Name	Location Date	Recordation Book	Recordation Page	County BLM AMC Serial No.
Overside	6/17/59	102	43	27989
Crown Point Ext. No. 1	6/17/59	102	37	27990
Crown Point Ext. No. 2	6/17/59	102	38	27991
Old Abe	6/17/59	102	39	27992
Old Abe No. 1	6/17/59	102	41	27993

Unpatented mining claims situated in
Section 36, Township 1 North, Range 13 East;
Section 31, Township 1 North, Range 14 East;
Section 1, Township 1 South, Range 13 East;
and Section 6, Township 1 South, Range 14 East,
Gila and Salt River Meridian, Gila County, Arizona

Claim Name	Recorded Book/Docket	Page	BLM Serial No.
Lizard No. 27 (West ½)[1]	47	348	AMC 28018
Rejected No. 1	31	415	AMC 28020
Rejected No. 2	31	416	AMC 28019
Rejected No. 2 Amended	52	374	
Rejected No. 3	53	184	AMC 28016
Rejected No. 4	493	569	AMC 97634
Rejected No. 5	493	571	AMC 97635
Rejected No. 6	493	573	AMC 97636
Rejected No. 7	493	575	AMC 97637
Rejected No. 8	493	577	AMC 97638
Rejected No. 9	493	579	AMC 97639
Rejected No. 10	493	581	AMC 97640
Rejected No. 11	493	583	AMC 97641
Rejected No. 12	493	585	AMC 97642
Rejected No. 13	493	587	AMC 97643

[1] The west one-half of the Lizard No. 27 is defined as being the portion of said claim that lies north and west of a line equal distance from the respective end lines of the claim and parallel with said end lines.

Claims owned by Magma Copper Company and leased by Carlota Copper Company (continued):

Patented Mining Claims located in the Pinto Creek (Miami) Mining District, in Section 36, T1N, R13E, G&SRB&M, Gila County, Arizona

Claim Name	Mineral Survey No.	Patent No.
Lucky Charlie	2525	81193
Charlie No. 2	2525	81193
Red Wing	2676	167985
Alto	2676	167985
Pinto	2690	190563
Crown Point No. 1	2840	282165
Crown Point No. 5	2840	282165
Crown Point No. 6	2840	282165
Crown Point No. 8	2840	282165

Patented mining claims and fee property situated in
Section 36, Township 1 North, Range 13 East;
Section 31, Township 1 North, Range 14 East;
Section 1, Township 1 South, Range 13 East;
and Section 6, Township 1 South, Range 14 East,
Gila and Salt River Meridian, Gila County, Arizona

Patented Claims and Fee Property

Claim Name	Mineral Survey No.	Patent No.
Lost Coon	2667	282164
Wedge	2667	282164
Monroe Doctrine	2667	282164
Dan and Mac	2667	282164
Hal and Al	2667	282164
Greater Republick	2667	282164
Buick	3839	937557
Clare	3839	937557
Pine Tree	2667	282164
White Horse	2676	167985
Hobo	2676	167985

Claims owned by Magma Copper Company and leased by Carlota Copper Company (continued):

All of those portions of the following listed patented claims and patented Tract No. 40 (Patent No. 02-72-0067) situated south and west of a straight line between the northwest corner of the Lizard No. 27 unpatented claim (previously described) and the northeast corner of the Alto patented claim (Mineral Survey No. 2676, Patent No. 167985):

Claim Name	Mineral Survey No.	Patent No.
Virginia	2667	282164
Wonder	2667	282164
Tarmon	3836	934869

APPENDIX B

Revegetation Plan

In general, the proposed Revegetation Plan for disturbed areas includes soil salvage, surface preparation, soil replacement, seed bed preparation, and seeding. Not all of these activities will be applied to each disturbed area.

Stored soil reserves will be applied to disturbed areas based on the following priorities: 1) Leach Pad, 2) Facilities areas, 3) Ponds, and 4) Roads.

Soil Salvage and Storage

Prior to soil salvage, a soil salvage plan will be developed. Prior to disturbance, all soil materials slated for salvage will be removed, stockpiled and protected from wind and water erosion, and seeded.

Surface Preparation

Compacted areas of the leach pad, roads, ponds and diversion ditches will be ripped to a depth of 12 to 18 inches to increase water infiltration, decrease the potential for erosion, and enhance plant root penetration.

Soil Replacement

Following completion of the surface preparation, soil will be removed from storage and applied to the leach pad or other areas to be reclaimed. Stockpiled soil will be "budgeted" over the mine life and applied to a depth which will allow coverage of all areas planned for soil replacement.

Seed bed Preparation

Prior to seeding, the seed bed will be prepared as necessary to achieve a firm seed bed condition.

Literature Search and Vegetation Field Trials

Prior to revegetation, some plant species will be evaluated to determine if they are suitable for use in revegetation. In addition, a review of literature and visits to similar operations with successful reclamation will be conducted.

Seeding Methods

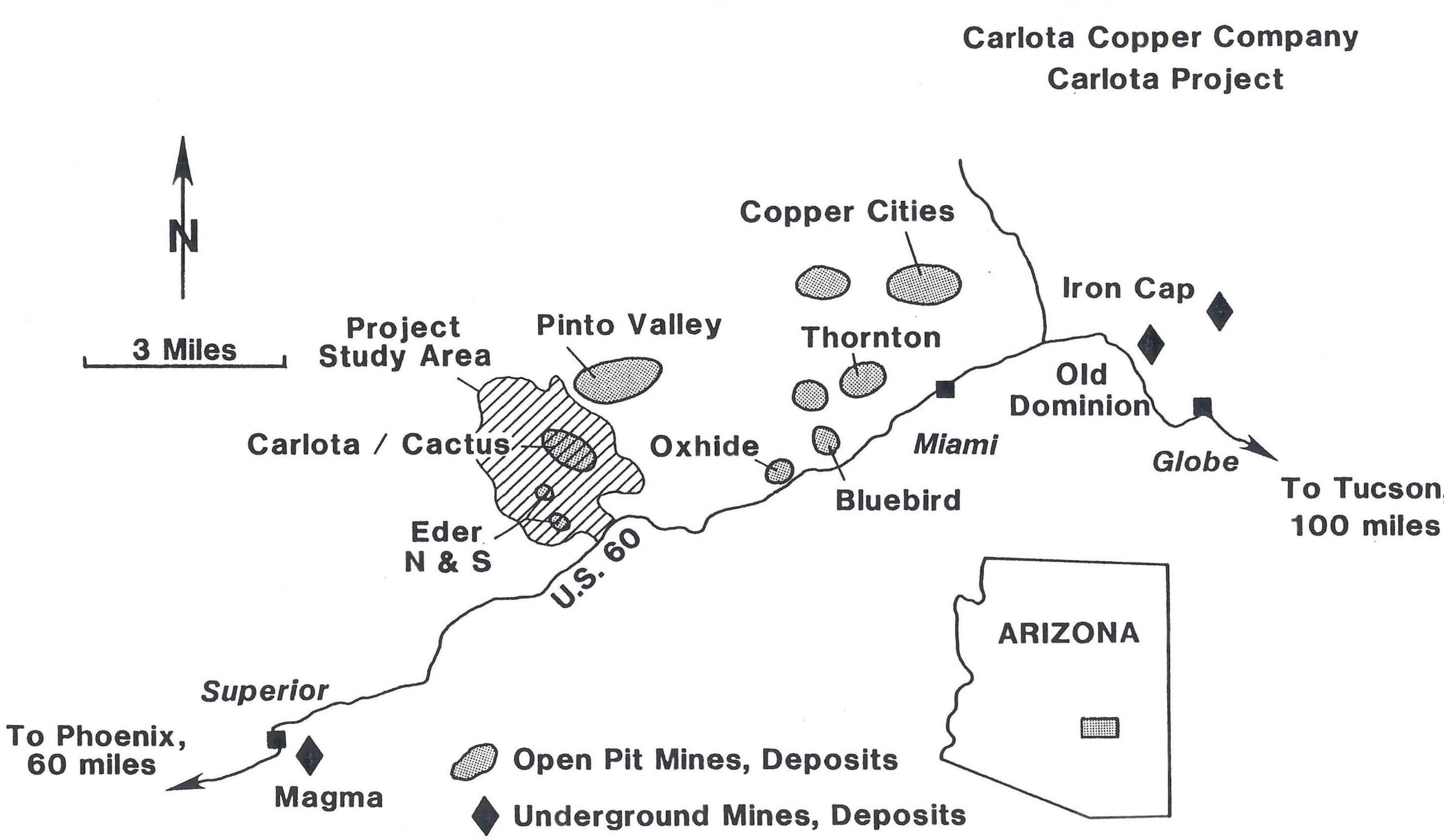
Areas scheduled for revegetation will either be drill or hydro- seeded. Some species may be broadcast seeded over drill or hydro-seed beds.

Schedule

Seeding will occur in the late spring-early summer period prior to onset of the summer rainy period.

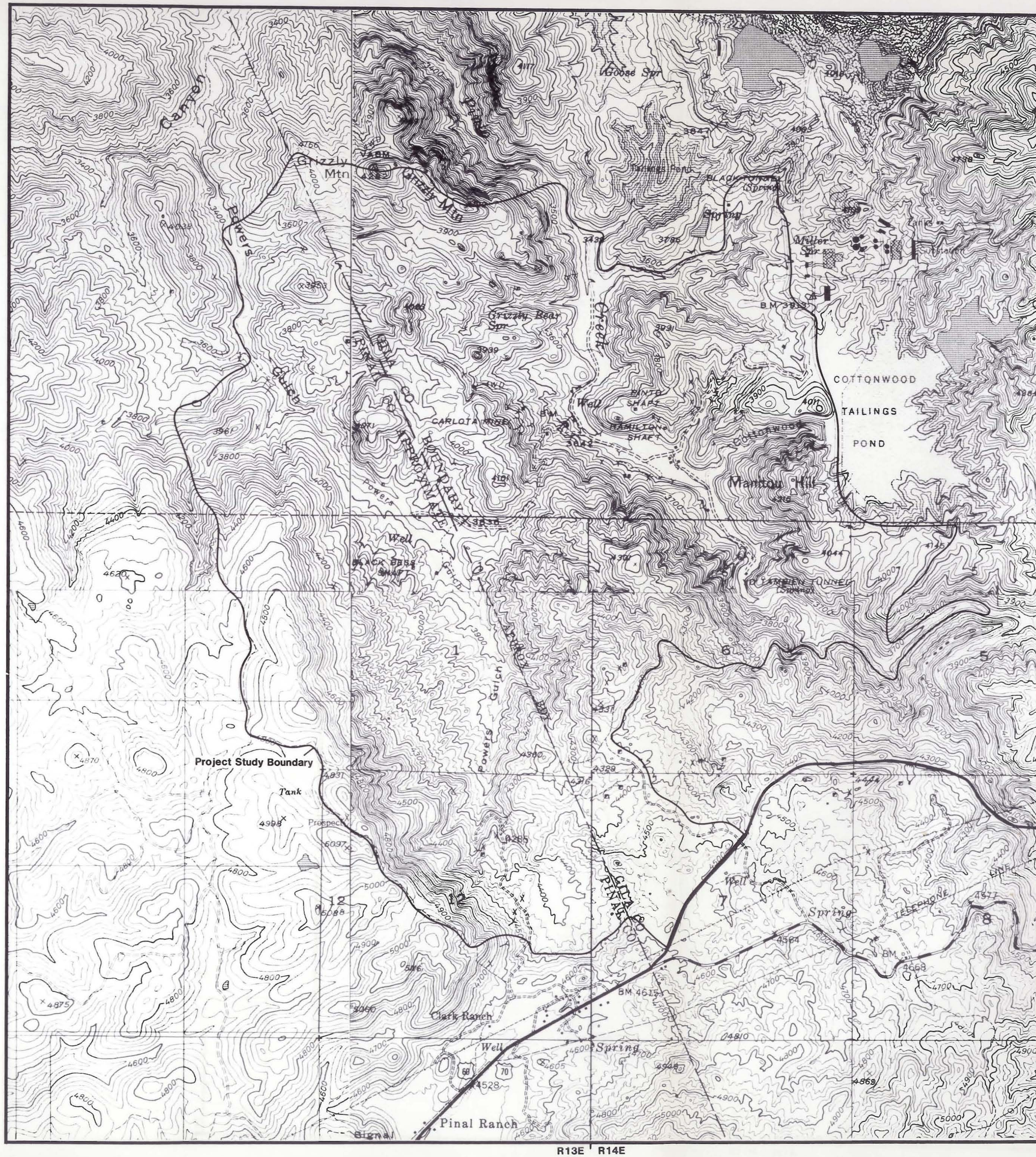
Management

Newly reclaimed areas will be protected from livestock grazing. Reclaimed areas will be monitored to determine revegetation success.



Globe-Miami Copper Mining District, Arizona

Figure 1-1



WESTMONT
MINING INC. 4949 So. Syracuse Street Suite 4200 Denver, CO 80237

COMPILED:
DRAFTED:
REVISED:

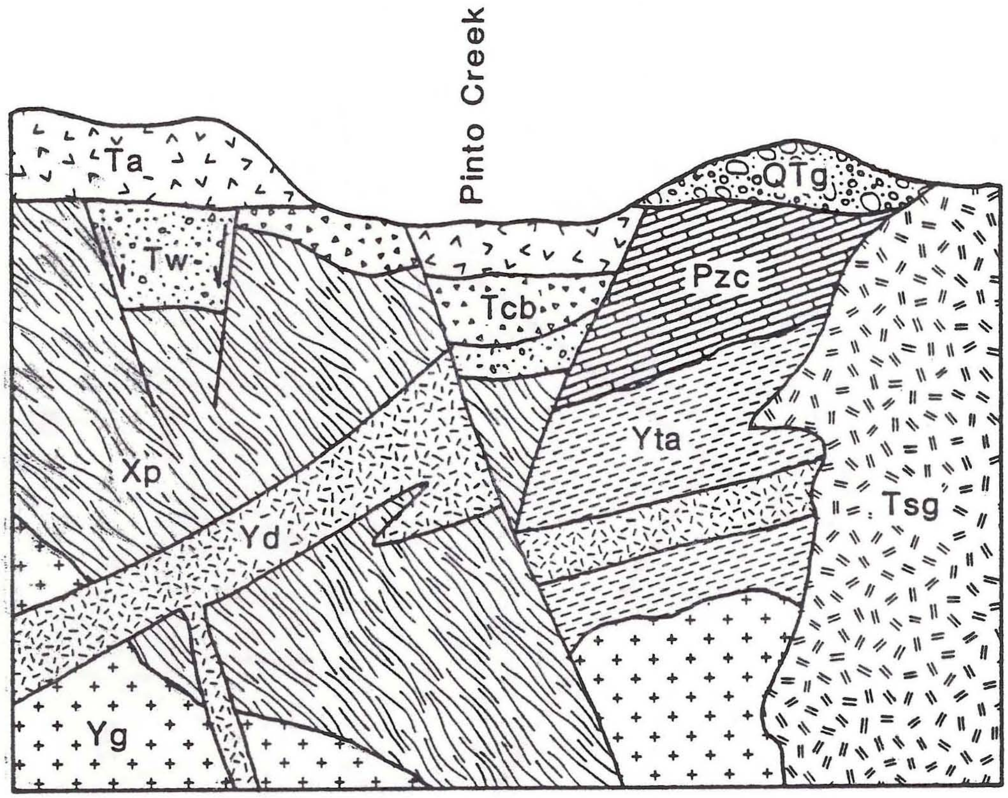
Gila & Pinal County, Arizona
Carlota Copper Project
Project Topography
with
Project Study Boundary

DATE: 10/24/91 SCALE: 1" = 1000' DWG. NO.:

Figure 1-2


Main Rock Dump 4050
Main Rock Dump 4000
Main Rock Dump 4000
Project Study Boundary
Magma Pinto Valley
Crusher
Overland Conveyor
Mine Shop/ Warehouse
Pinto Creek Diversion
Raffinate Pond
EW
SX
Plantsite
Overflow Pond
Carlota/Cactus Pit
PLS Pond
Pretreatment
Carlota Pit
Admin. Bld./ Parking
Leach Pad
Powers Gulch Diversion
Cactus Pit
Eder North Pit
Main Access Road
Eder Area Access Road
Eder Rock Dump 4300
Project Study Boundary
Eder South Pit
Gila County
Pinal County
US Hwy 60
N
0 500 1000 1500 2000
FEET 1"=500'
WESTMONT MINING INC.
Date
Gila/Pinal Counties Arizona
Carlota Copper Project
General Site Plan
Figure 1-3
Reference Number

Carlota Copper Company
Carlota Project

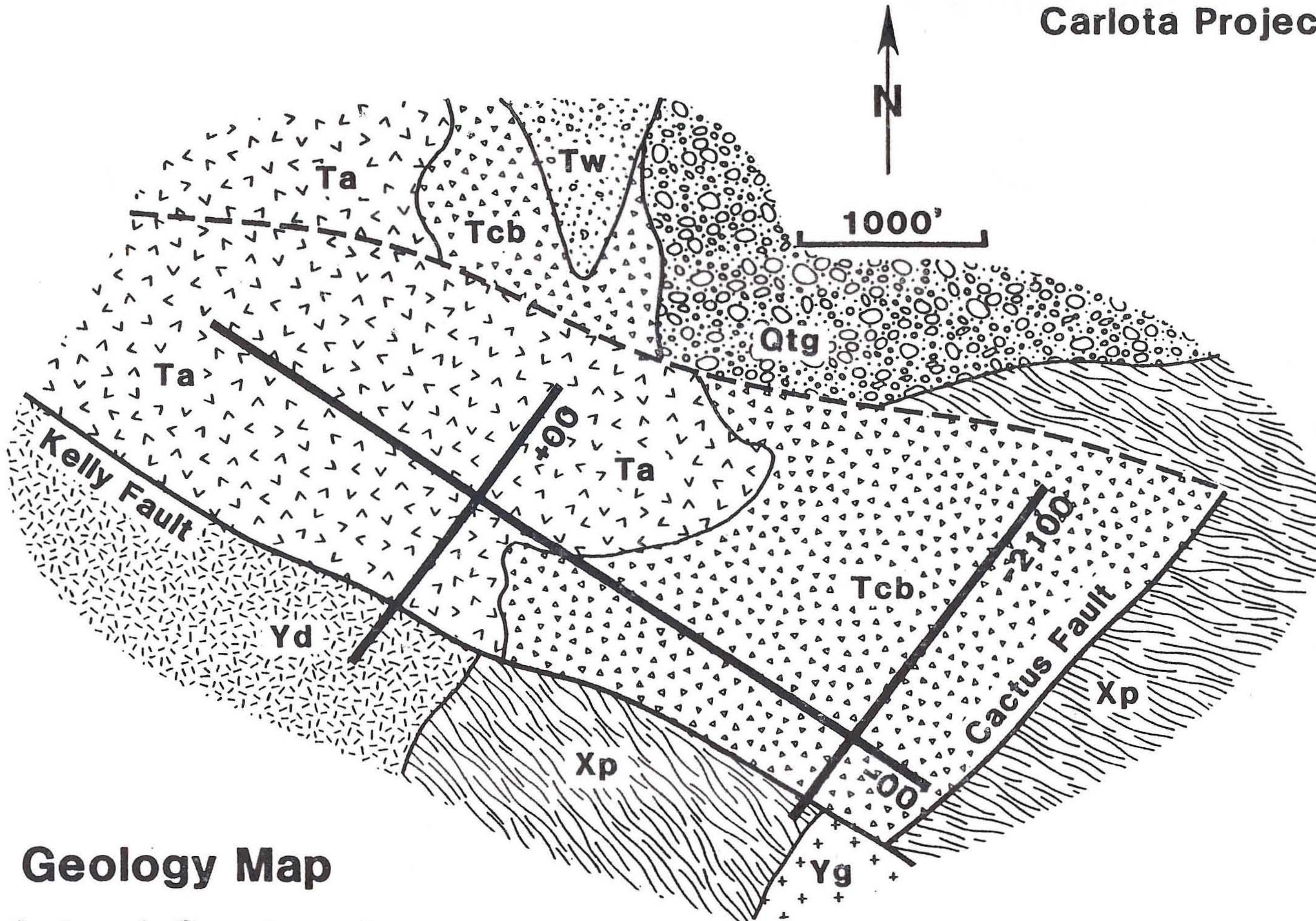


Schematic Geologic Section

Quaternary	Qtg	Gila Conglomerate
Tertiary	Ta	Apache Leap Tuff
Tertiary	Tcb	Cactus Breccia
Tertiary	Tw	Whitetail Conglomerate
Tertiary	Tsg	Schultze Granite
Paleozoic	Pzc	Sedimentary (Carbonate) Rocks, Undiff.
Middle Proterozoic	Yd	Diabase
Middle Proterozoic	Yta	Troy Quartzite, Apache Group
Middle Proterozoic	Yg	Granitic Rocks, Undiff.
Early Proterozoic	Xp	Pinal Schist

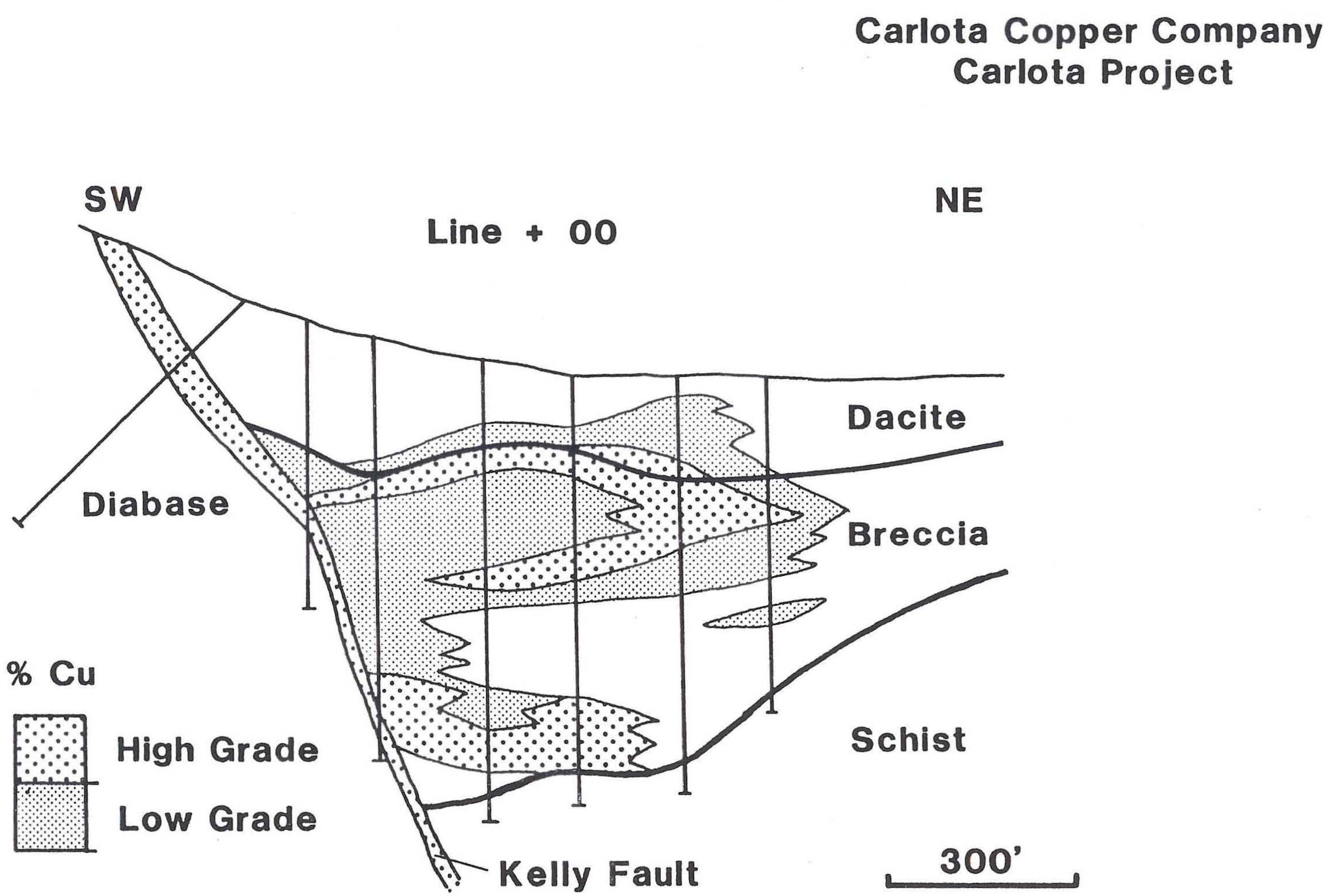
Figure 1-4

Carlota Copper Company
Carlota Project



Geology Map
Carlota / Cactus Area

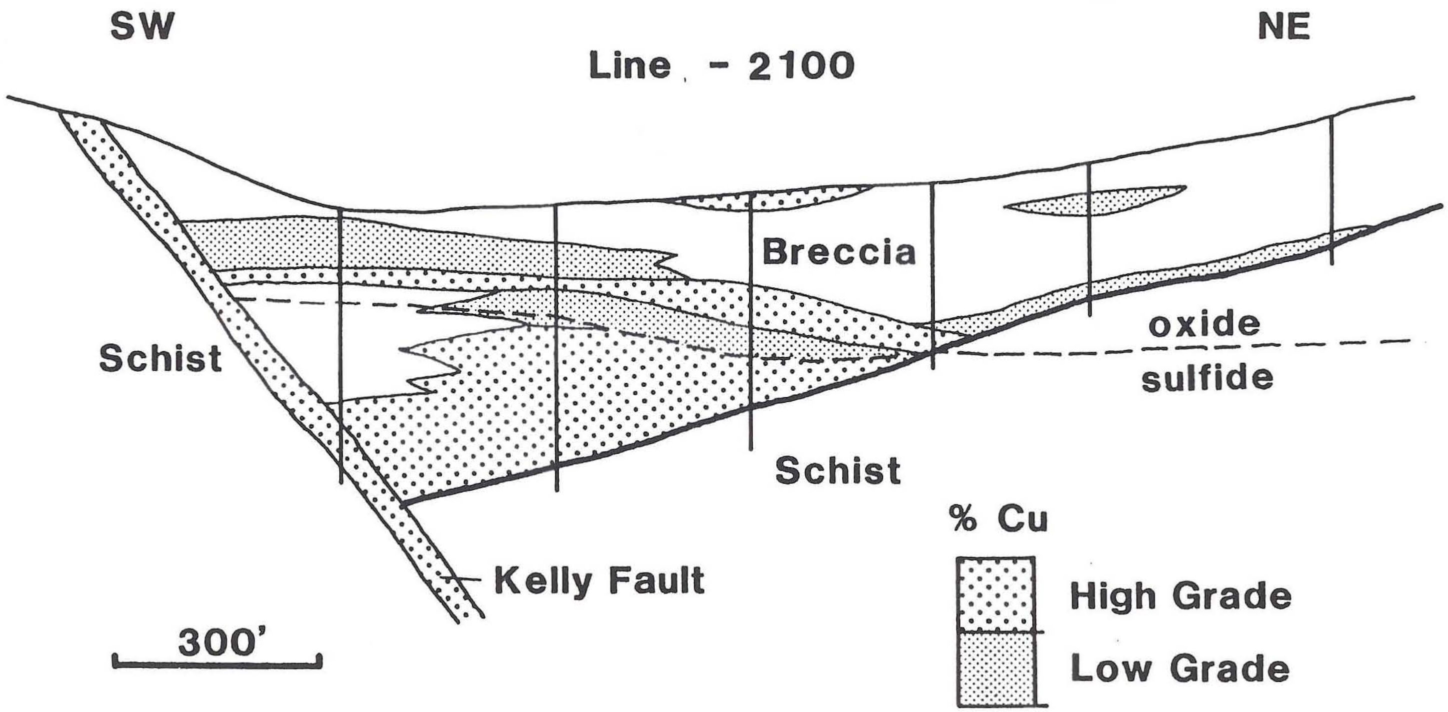
Figure 1-5



Cross Section along Line +00, Carlota Deposit

Figure 1-6

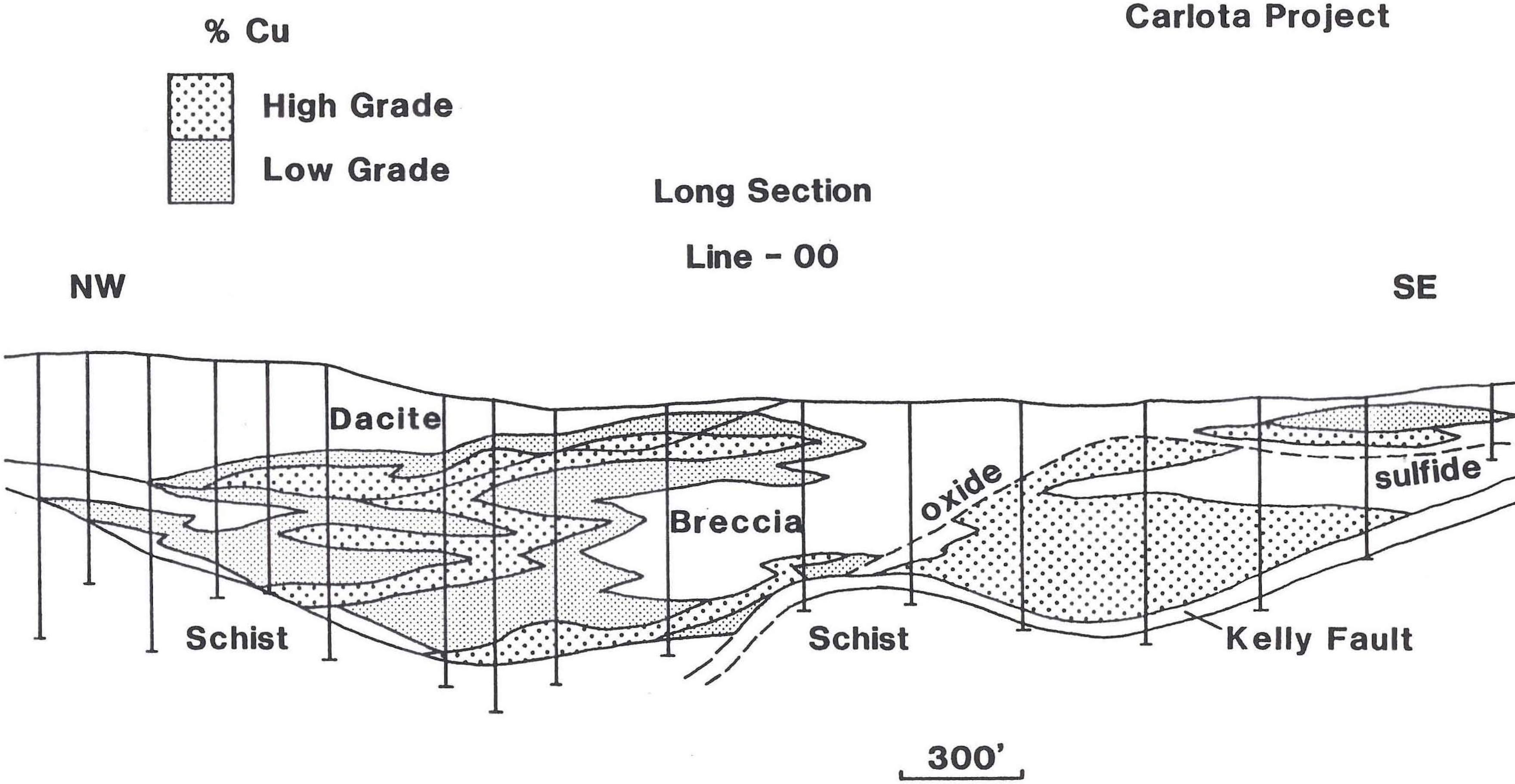
Carlota Copper Company
Carlota Project



Cross Section along Line -2100, Cactus Deposit

Figure 1-7

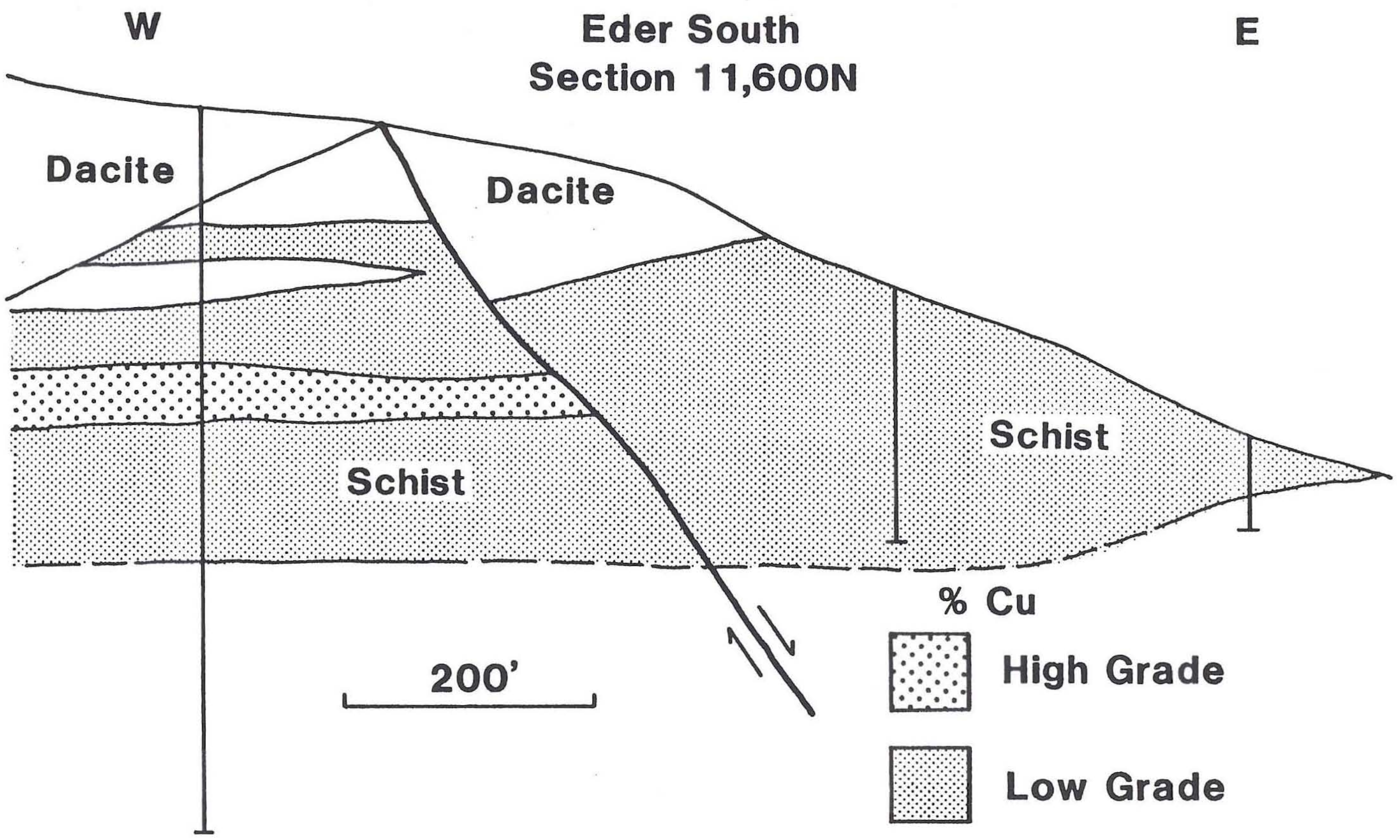
Carlota Copper Company
Carlota Project



Long Section along Line -00, Carlota/Cactus Deposit

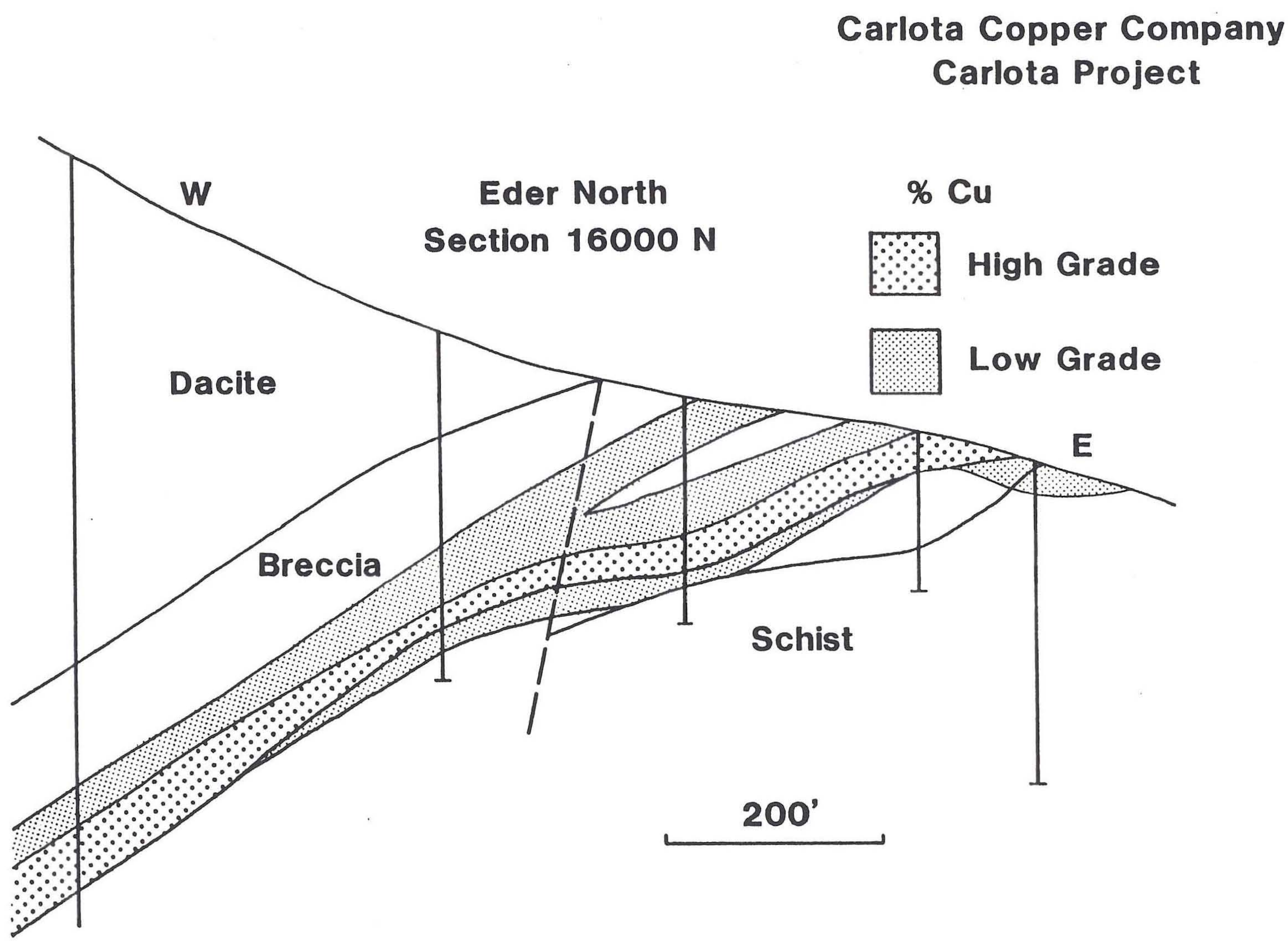
Figure 1-8

Carlota Copper Company
Carlota Project



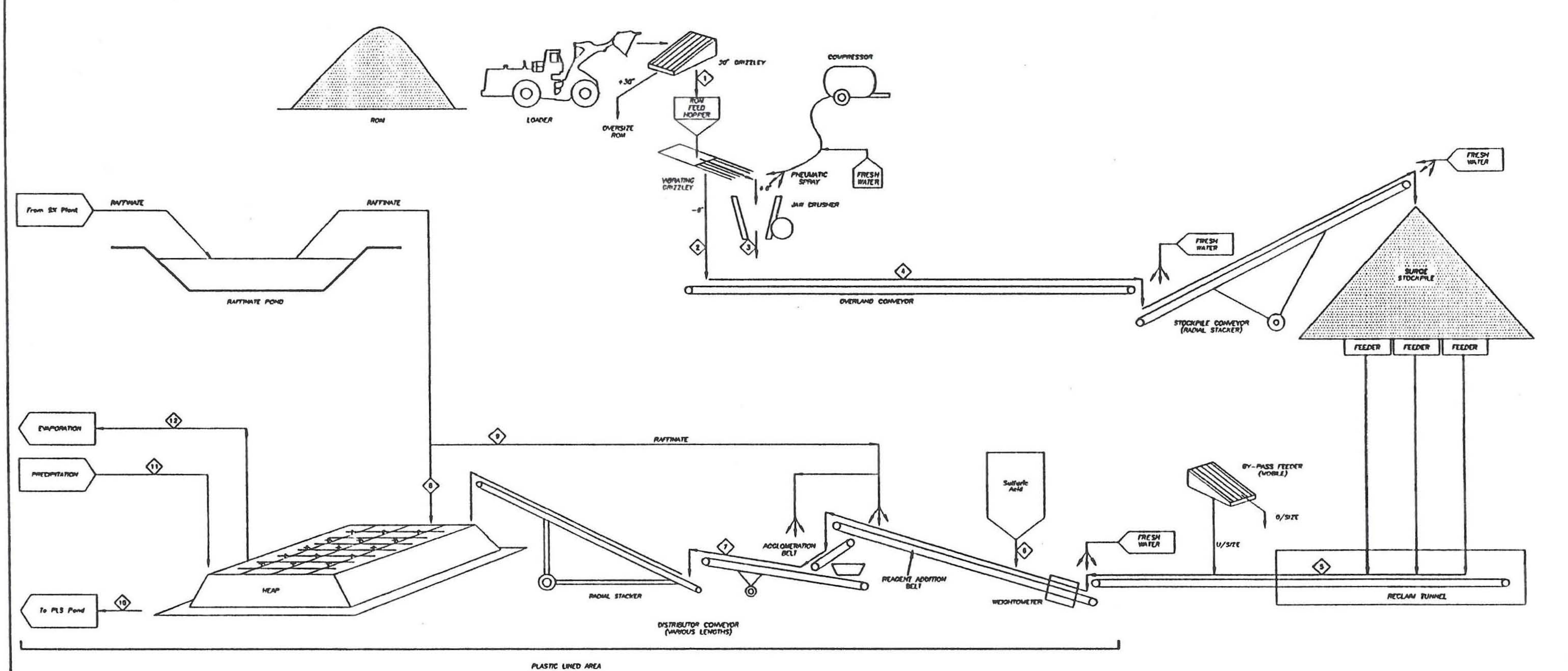
Cross Section along Line 11,600N , Eder South Deposit

Figure 1-9



Cross Section along Line 16,000N, Eder North Deposit

Figure 1-10



STREAM NUMBER		1	2	3	4	5	6	7	8	9	10	11	12
STREAM DESCRIPTION	UNITS	RUN OF MINE ORE	VIBRATING GRIZZLEY UNDERSIZE	CRUSHED JAW PRODUCT	FINAL CRUSHER PRODUCT	RECLAIMED ORE	SULFURIC ACID	AGGLOMERATE	RAFFINATE	RAFFINATE TO WET ORE	PLS	PRECIPITATION	EVAPORATION
SOLIDS FLOWRATE (AVG.)	TONS/HOUR												
LIQUIDS FLOWRATE (AVG.)	TONS/HOUR												
TOTAL DAILY SOLIDS	TONS/DAY												
TOTAL DAILY LIQUIDS	TONS/DAY												
MAXIMUM SOLIDS FLOWRATE (DESIGN)	TONS/HOUR												
MAXIMUM LIQUIDS FLOWRATE (DESIGN)	TONS/HOUR												

REFERENCE DRAWINGS

REVISIONS | DATE | BY | CHKD | APVD

PRINT RECORD

ENG. RECORD
DRAWN BY: R.C.A.
CHECKED BY:
MECH. CHK.
STRUCT. CHK.
ELECT. CHK.
PIPING CHK.
INSTR. CHK.
CIVIL CHK.
PROC. CHK.

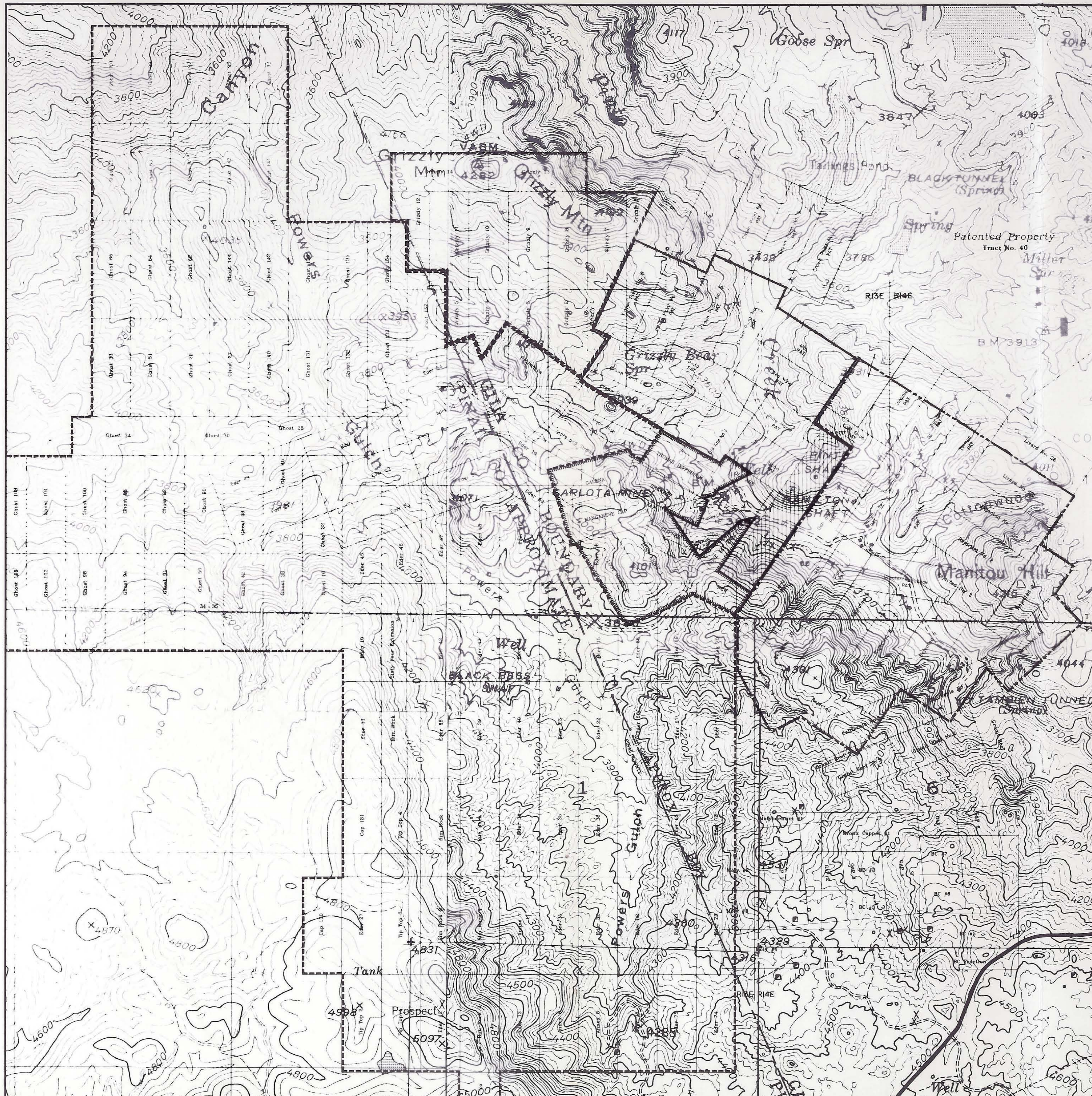
DRAWING STATUS
ISSUED | DATE
PRELIMINARY
FOR COMMENTS AND OR APPROVAL
APPROVED FOR CONSTRUCTION

PREPARED BY
CARLOTA COPPER COMPANY
6040 SOUTH SYRACUSE STREET
SUITE 4700
DENVER, CO 80237
PHONE (303) 694-4030

TITLE
Crushing & Stacking Circuit
350 Ton/Hour Capacity

CUSTOMER APPROVAL
DRAWING NUMBER
F 10
JOB NUMBER
SCALE
NONE

Figure 1-11



Westmont Mining Inc. Owned Claims

Magma Copper Co. Leased to Westmont 3/90

Area of Joint Operation with Magma

Sherwood Owens Leased to Westmont

Westmont Mining Inc. Cyprus Purchase

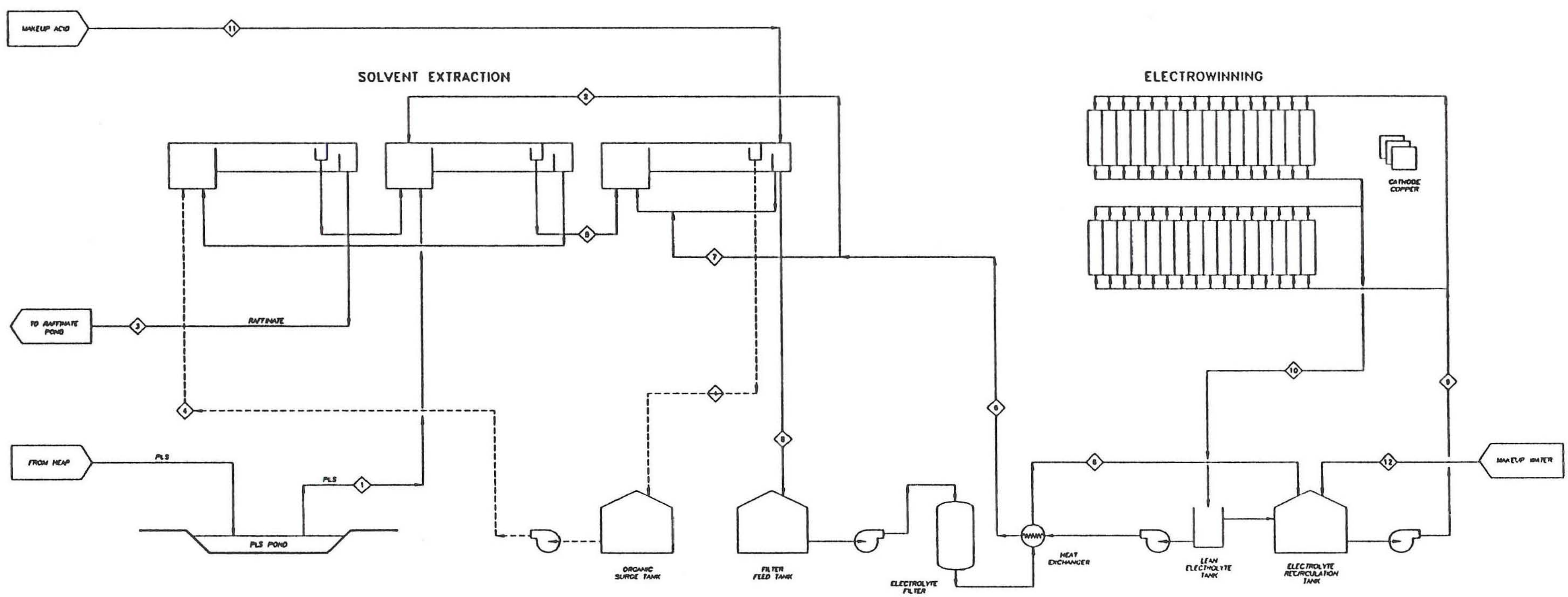
Magma Copper Co. Leased to Westmont 6/91

N

SCALE IN FEET
500 250 0 500 1000

WESTMONT
MINING INC.
Gila County, Arizona
Carlota Project
Claim Map
DATE: ?/22/91 SCALE: 1"=500'

Figure 2-1



STREAM NUMBER		1	2	3	4	5	6	7	8	9	10	11	12
STREAM DESCRIPTION	UNITS	PLS TO SX	ELECTROLYTE BLEED	RAFFINATE	BARREN ORGANIC	LOADED ORGANIC	LEAN ELECTROLYTE TO SX	LEAN ELECTROLYTE TO STRIPPING	RICH ELECTROLYTE	EW CELL FEED	EW CELL DISCHARGE	MAKEUP ACID	MAKEUP WATER
SOLIDS FLOWRATE (AVG.)	TONS/HOUR												
LIQUIDS FLOWRATE (AVG.)	TONS/HOUR												
TOTAL DAILY SOLIDS	TONS/DAY												
TOTAL DAILY LIQUIDS	TONS/DAY												
MAXIMUM SOLIDS FLOWRATE (DESIGN)	TONS/HOUR												
MAXIMUM LIQUIDS FLOWRATE (DESIGN)	TONS/HOUR												

REFERENCE DRAWINGS

REVISIONS | DATE | BY | CHKD | APVD

PRINT RECORD

ENG. RECORD	
DRAWN BY:	KCA
CHECKED BY:	
MECH. CHK.	
STRUCT. CHK.	
ELECT. CHK.	
PIPING CHK.	
INSTR. CHK.	
CIVIL CHK.	
PROC. CHK.	

DRAWING STATUS	
ISSUED	DATE
PRELIMINARY	
FOR COMMENTS AND OR APPROVAL	
APPROVED FOR CONSTRUCTION	

PREPARED BY

CARLOTA COPPER COMPANY

TITLE

SX-EW PROCESS FLOW DIAGRAM

CUSTOMER APPROVAL | DRAWING NUMBER | REVISION

JOB NUMBER | SCALE NONE | SHEET

Figure 1-12

- - - - Alternate Main Access Road

—— Power Corridor Alternatives

Alternate Site for Main Office and Mine Shop/Warehouse

Possible Sites for Additional/ Mine Rock Dumps

1000 500 0 1000 2000 FEET

WESTMONT
MINING INC. 4949 So. Syracuse Street Suite 4200 Denver, CO 80237

COMPILED:

DRAFTED:

REVISED:

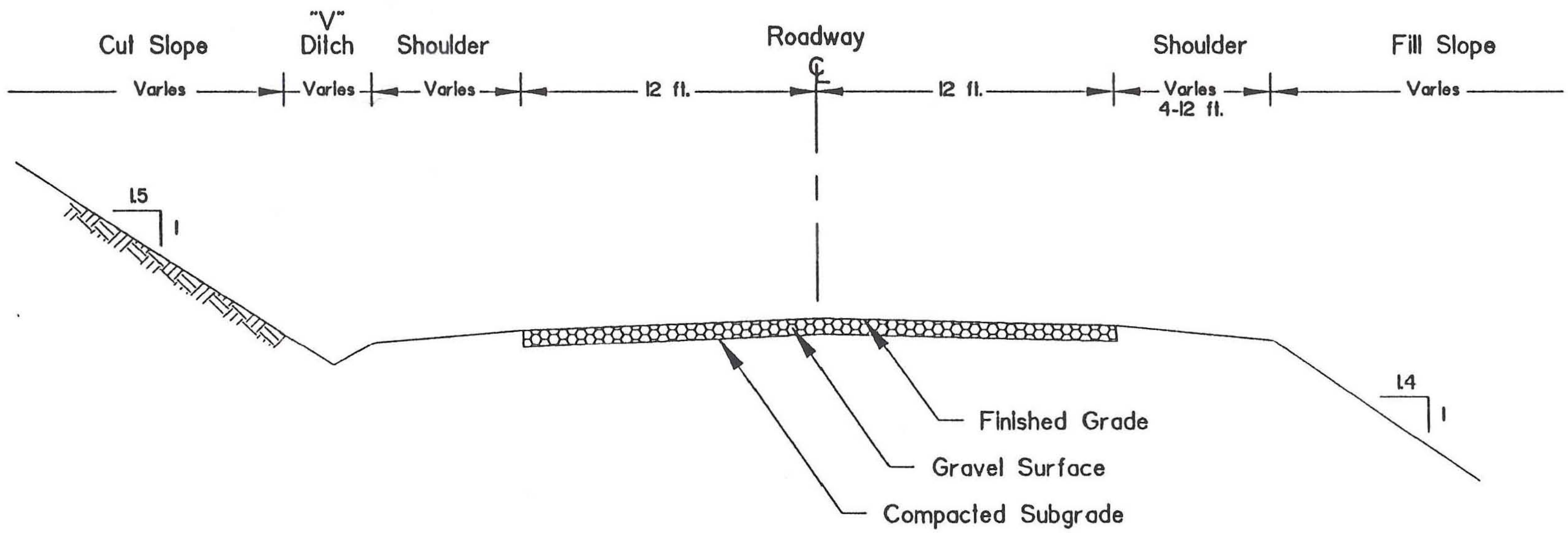
Gila & Pinal County, Arizona

Carlota Copper Project

Alternatives for Selected Project Features

Figure 4-1

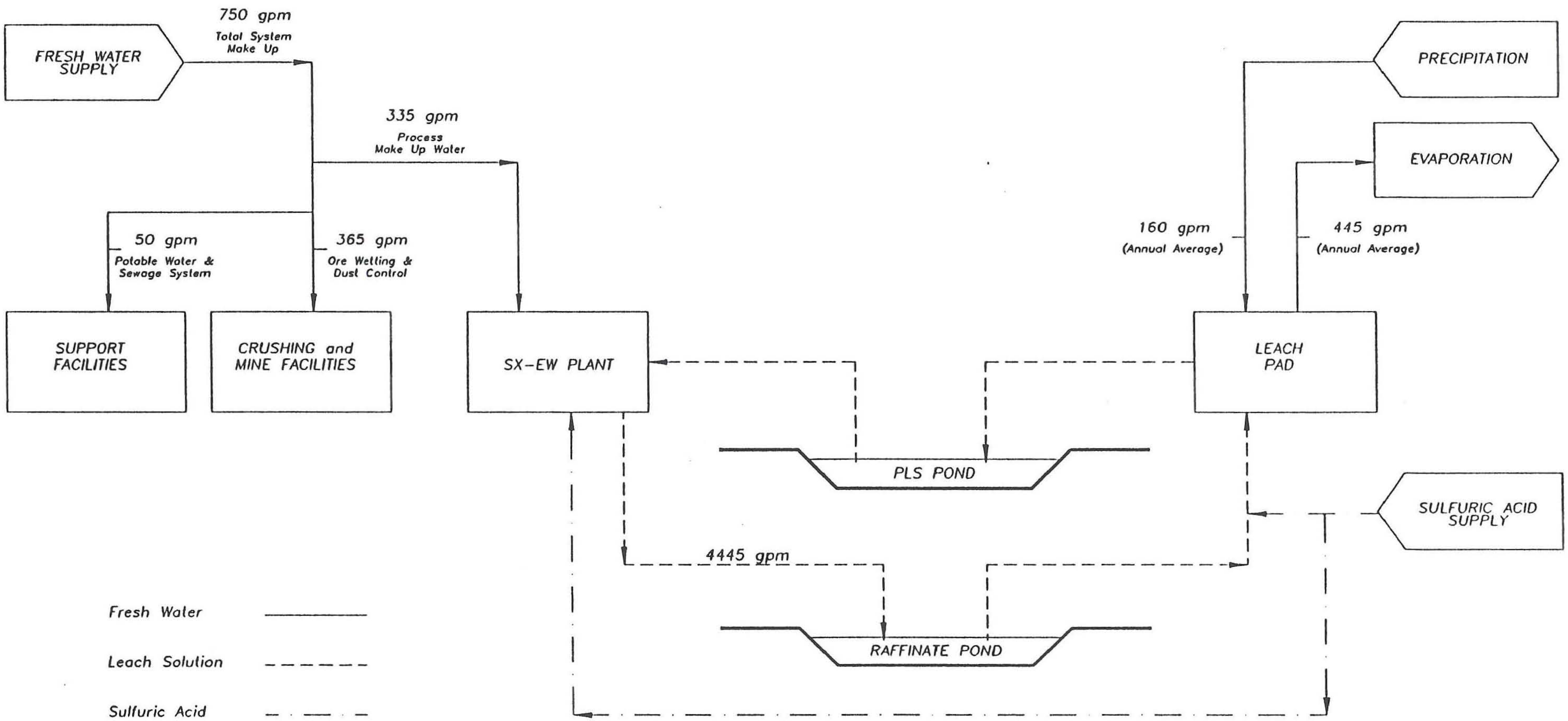
DATE: 10/24/91 SCALE: 1" = 1000' DWG. NO.:



Typical Access Road Cross Section

Carlota Copper Company
Carlota Project

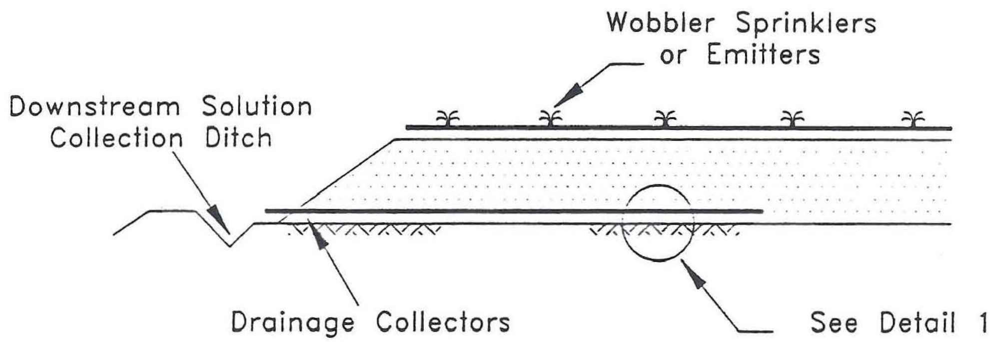
Figure 4-2



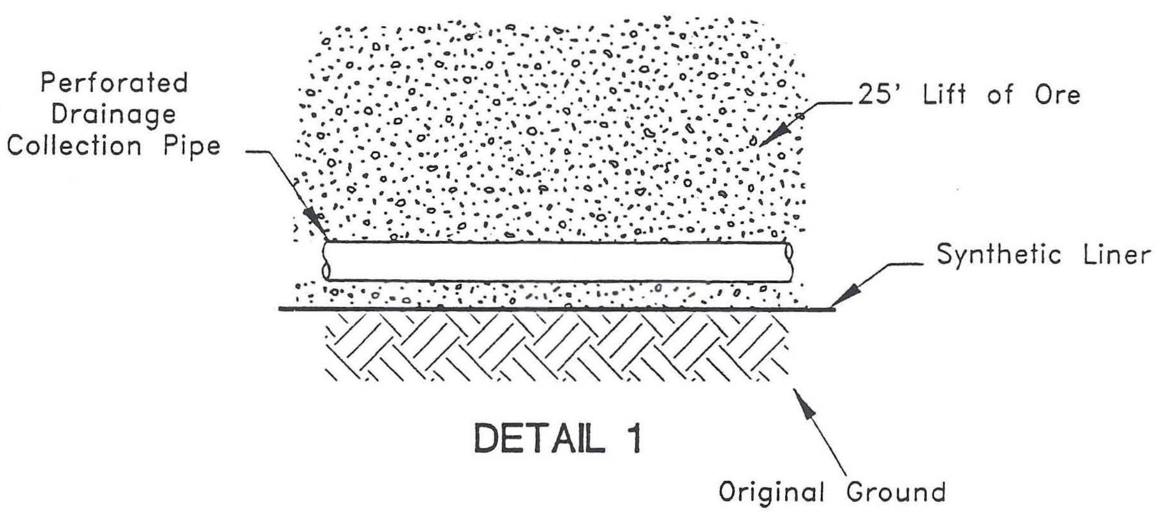
Carlota Copper Project
Schematic Water Balance

CARLOTA
COPPER COMPANY

Figure 4-3



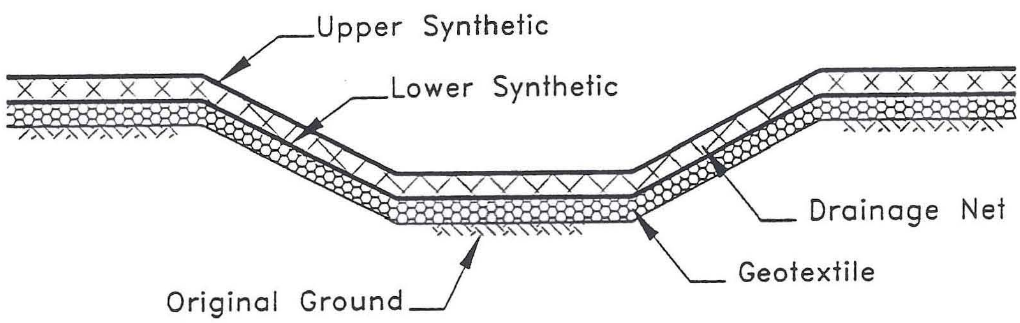
TYPICAL SECTION



DETAIL 1

CARLOTA COPPER PROJECT
TYPICAL LEACH PAD ARRANGEMENT

Figure 5-1



TYPICAL SECTION

CARLOTA COPPER PROJECT
TYPICAL POND SECTION

Figure 5-2

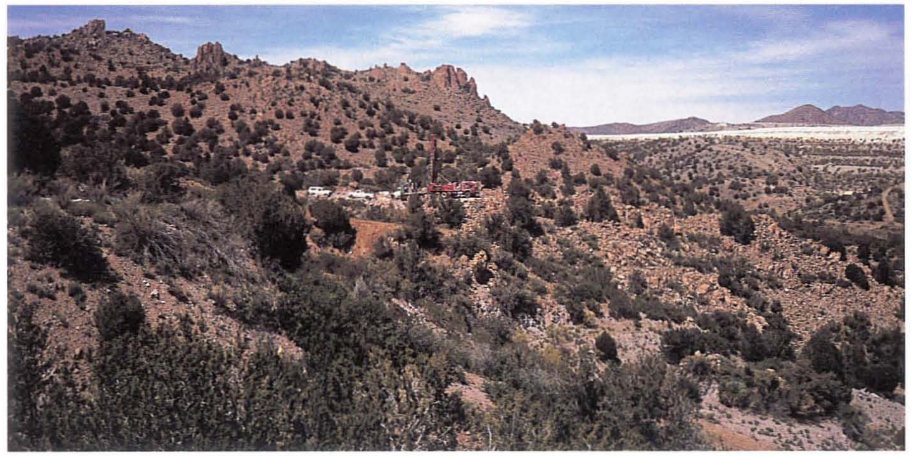
CARLOTA

COPPER COMPANY

Think…
about the
automobile you drive…
the computers
that you use…
the pipe for running
water in your home…
or the telephone
you rely on daily.
All of these luxuries
would not be possible
without copper!

CARLOTA COPPER COMPANY

Minerals are becoming increasingly important to society. Each year, every American uses an estimated 40,000 pounds of new minerals. Copper, which is used primarily in the building and construction industry, is often taken for granted. At Carlota Copper Company, we know that mining this invaluable mineral is necessary for our complex and technological society. Yet, we understand the greater importance of returning something when it is taken. That is why we are actively dedicated to the reclamation and restoration of our precious environment from which this mineral is extracted.

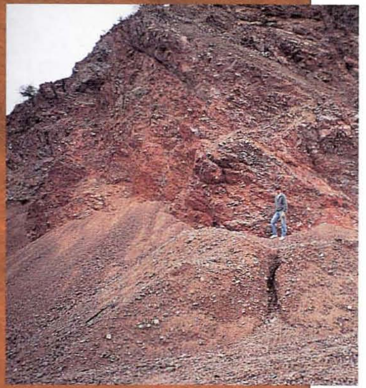


The Carlota site, looking north.

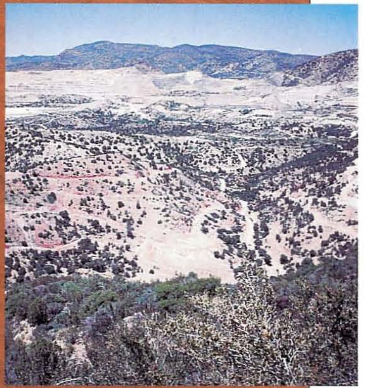
Copper-bearing specimen.

Copper Facts:

- *The average single-family home uses over 400 pounds of copper in its construction.*
- *There is more than 50 pounds of copper in a typical U.S. built automobile.*
- *Copper doorknobs are used to protect against the transfer of disease in hospitals.*



Carlota/Cactus deposit.



Carlota/Cactus area.

Copper Facts:

✦ *A Triton-class nuclear submarine uses about 200,000 pounds of copper in its construction.*

Carlota Copper Company is committed...

The Carlota Copper Company plans to construct, operate and reclaim an open-pit copper mining and processing operation in the Globe-Miami Mining District of Arizona. The Carlota Copper Project is located about six miles west of the town of Miami in east central Arizona. It lies within the Tonto National Forest on a property adjacent to the Pinto Valley Mine operation of BHP Copper.

Mining and exploration work within the Carlota Project area were of a sporadic and limited nature prior to the acquisition of the project property by Westmont Mining, Inc. in 1989. When the project was acquired by Cambior Inc. in August 1991, the company immediately initiated a program to expand reserves and develop the property.

Exploration and development in-fill drilling expanded the proven and probable reserves to approximately 106 million tons of copper ore and confirmed the economic viability of the project. These reserves are found in three deposits (Carlota/Cactus, Eder North and Eder South).

Since the submission of the original Plan of Operations in February 1992, the Carlota Copper Company has diligently pursued obtaining the necessary permits to begin its operations.

The National Environmental Policy Act (NEPA) requires that a thorough environmental assessment of the project area be completed in an Environmental Impact Statement (EIS). Since the NEPA process began in 1992, Carlota, the Forest Service and numerous consultants have generated thousands of pages of documentation on the environmental effects of the project.

Areas of Study Include:

- Air Resources
- Geology and Minerals
- Water Resources
- Biological Resources
- Cultural and Archaeological Resources
- Socioeconomics
- Land Use
- Recreation
- Wilderness and Wild and Scenic Rivers
- Visual Resources
- Noise
- Transportation
- Hazardous Material

To ensure protection of the environment, the following agencies have conducted studies and will issue the appropriate permits.

- U.S. Forest Service
- U.S. Army Corps of Engineers
- Environmental Protection Agency
- U.S. Fish and Wildlife Service
- Arizona Department of Environmental Quality
- Arizona Department of Water Resources

To date, Carlota has invested over $50 million in the project. In addition, Carlota has committed to the following mitigation measures...

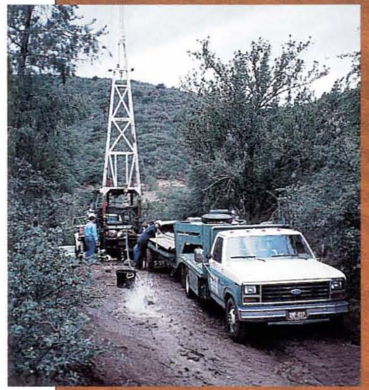
Committed to:
WATER SUPPLY & PROTECTION

- Pinto Creek Diversion:
  As part of the construction of a diversion channel, the existing Pinto Creek alluvium will be excavated and placed in the bottom of the diversion channel. Engineered structures will be built to maintain alluvial groundwater levels and to re-establish the aquatic habitat (riffle and pool structures) from the existing creek bed. The creek diversion channel will be lined to prevent loss of water to adjacent ground.

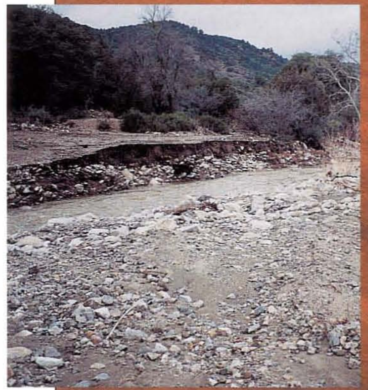
- Water Supply:
  If pumping from the project well field has any effect on Pinto Creek, Carlota has agreed to "put back" a specified amount of water to maintain the base flow.

- Downstream Effects:
  - Pinto Creek is an intermittent, seasonal stream, but extensive monitoring will be done to ensure that there are no discharges from the property that could affect areas downstream.
  - The project (through extensive modeling) has been properly designed to compensate for rain storms. Accepted engineering practice calls for projects of this type to design for a 100-year storm event. Carlota has instead designed the process ponds for the probable maximum flood, thereby adding yet another safety factor.
  - Sedimentation ponds are being designed for capacities above and beyond the requirements of the EPA regulation.

Pinto Creek, in the area of the project, is a dry creekbed for most of the year.



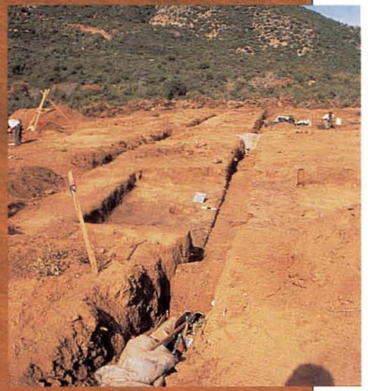
Pump test drilling.



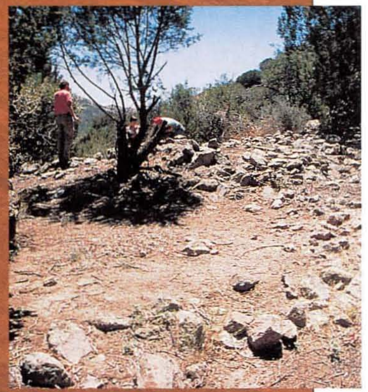
Pinto Creek at high flow.

Copper Facts:

✦ *Brass and bronze are probably the most well-known families of copper-base alloys. Brasses are mainly copper and zinc. Bronzes are mainly copper and tin.*



Prehistoric excavation.



Prehistoric site.

COMMITTED TO:
CULTURAL RESOURCE PROTECTION

The prehistoric and historic cultural setting of the Carlota Copper Project has been studied, and additional information compiled, to improve our understanding of the past. The prehistoric era covers the period up to 1500 A.D., whereas the historic era spans from 1500 A.D. to recent years. Fortunately, the project is located in a district where mining activities have been conducted since the 1870s. In our ongoing effort to protect the cultural heritage of the area, Carlota has...

- Carried out a field investigation and recovered artifacts from 43 prehistoric and historic sites at a cost of $1.4 million.
- Funded ethnographic research on the oral history of the Native American tribes that inhabit the region.

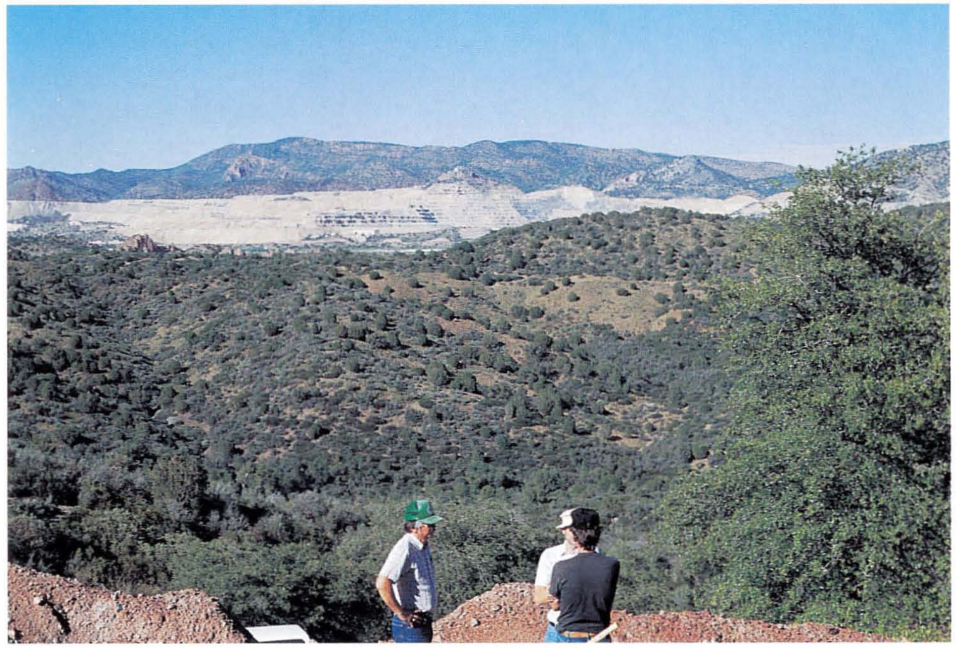
Historic mine shaft at the Carlota site.

C A R L O T A   C O P P E R   C O M P A N Y

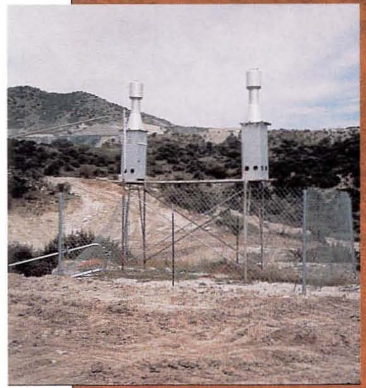
COMMITTED TO:
AIR & VISIBILITY RESOURCES

Carlota will control atmospheric emissions and protect the quality of the air with:

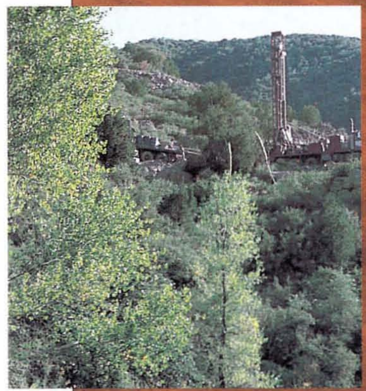
- Comprehensive air monitoring stations, including a plan which addresses a requirement of the recently proposed EPA air-quality regulations (PM 2.5 monitoring).
- Speed limits for haul trucks.
- Extensive dust suppression, by watering the haul roads.
- Production limits — both daily and yearly tonnage limitations.
- Installation of a dust collection system at the secondary crusher — the most significant source of particulates in the crushing/ conveying circuit.
- Use of low-sulphur diesel fuel.



Overlooking the Carlota site.



Air monitoring equipment.

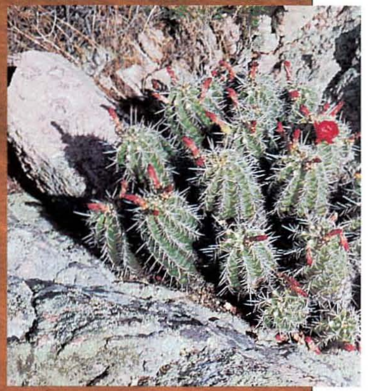


Drill site.

Copper Facts:

✦ *Copper is the standard benchmark for electrical conductivity. It conducts electrical current better than any other metal except silver.*

Committed to: Biological Issues



Hedgehog cactus.

"It is the Service's biological opinion that the Carlota Copper Project, as proposed, is not likely to jeopardize the continued existence of the lesser long-nosed bat or Arizona hedgehog cactus."

— U.S. Fish and Wildlife Service

Carlota is attentive to all biological issues at the project...

- Arizona Hedgehog Cactus:
  - The company has donated 22 mining claims (186 acres) to Forest Service control for use as preserved cactus habitat, even though the project will impact only 24 acres where the species exists.
  - Carlota is committed to an extensive conservation and replanting plan, even though the project will impact less than 200 plants.
  - In its study of this issue, Carlota's consultants conducted field surveys that confirmed or greatly expanded the habitat of the cactus well beyond the project area. These additional surveys were completed to confirm the initial Carlota baseline studies and to prepare the cactus conservation plan.

- Wetlands:
  As part of the Clean Water Act Section 404 Permit, Carlota has committed to creating on-site wetlands equal to three times the wetlands disturbance on the project.

- Riparian (Streambank Vegetation):
  Carlota is concerned about improving and preserving the plant population situated on the banks of the streams and has committed to:
  - Planting vegetation native to the area in the creek diversion channel. Carlota will spend approximately $1 million for mitigation measures alone (not including the cost of construction of the diversion channel itself).
  - Protecting, by building a fence around, a remote riparian area (20 miles from the project).
  - Donating funds to the city of Globe for a wildlife habitat within one of its parks.

Committed to: Community Involvement

The Carlota Copper Company appreciates the overwhelming support of the Globe-Miami and the greater Arizona communities.

- Hundreds of comments in support of the Draft EIS were received.

- Over 300 people attended the Air Quality Permit hearing and, of the individuals testifying, all were in favor of the project.

- Resolutions in support of the project (and for swift resolution of the issues) have been approved by:
  - Gila County Commissioners
  - City of Globe
  - Town of Miami

As residents of the area, Carlota Copper Company employees take an active role in the Globe-Miami community and participate in the following...

- Rotary Club
- Lion's Club
- Gila County Fair
- Southern Gila County Economic Development Council
- Chamber of Commerce
- Boy Scouts of America
- 4-H Club (by purchasing animals raised by industrious youngsters)
- March of Dimes
- United Fund
- People for the West
- Community Kids

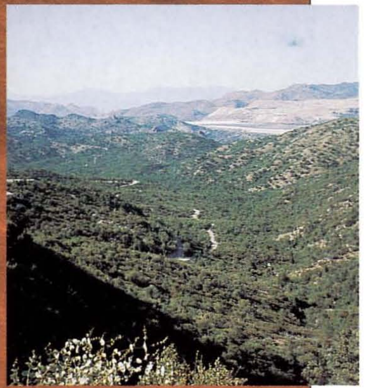
Apache Day held on main street of Globe, Arizona.

Gila County 4-H Club.

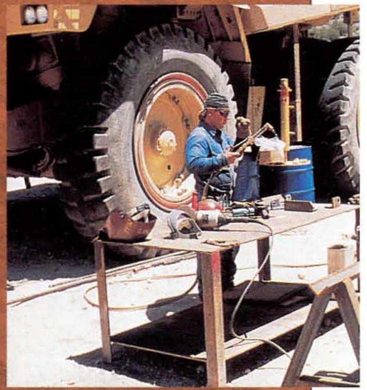
United Fund participants.

Copper Facts:

✦ *The Statue of Liberty contains 179,000 pounds of copper.*



Carlota site.

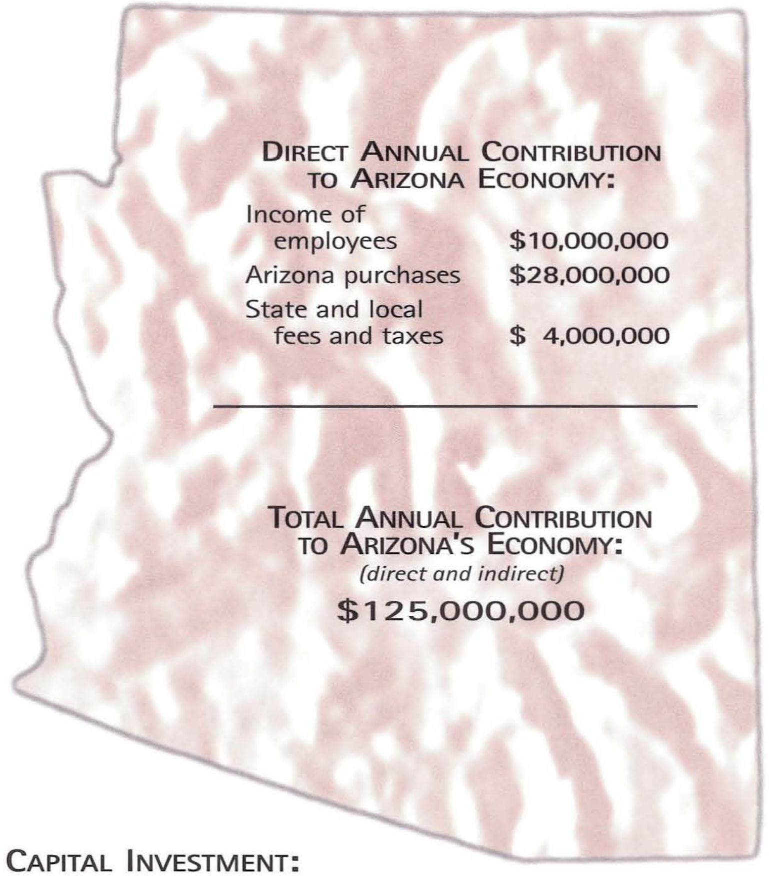


Equipment repair.

Committed to:
ECONOMIC IMPACT

Carlota will have a powerful economic impact on the Globe-Miami and greater Arizona communities...

- **Labor:**
  - 300 employees at the peak of production
  - 200 jobs during construction
  - Local hiring and training of employees from the Superior, San Carlos, Globe-Miami area
  - Every job in the mining industry generates 11 additional jobs in the economy at large
  - Mine life of 20 years



CAPITAL INVESTMENT:

Investment to date	$ 52,000,000
Pre production	$100,000,000
Mine life	$180,000,000

Committed to:
RECLAMATION

Carlota will return the disturbed areas to conditions suited to post-mining land uses, such as recreation, wildlife habitat, livestock grazing, and watershed protection. Carlota will execute its reclamation plans on both a continual basis during yearly operations as well as at the end of the project. At the forefront of Carlota's reclamation plans are protection of the environment and provisions for public safety...

- A detailed reclamation plan — the first of its kind — for the leach pad has been developed
- State-of-the-art technology will be used to ensure re-establishment of useful habitats for plants and animals. The final heap leach area, for example, will be covered by soil which will be re-contoured and seeded for use as grazing lands or wildlife habitat.
- The pit area will become a lake that will provide a habitat for wildlife.

Photo simulation of project reclamation.

"Environmental management is central to Carlota's way of doing business. It begins in the earliest stages of exploration and extends through every facet of development, operation, and reclamation. At Carlota, we are continually fine-tuning our policies and procedures to maintain a clean and healthy environment for current and future generations."

— Carlota Copper Company

CARLOTA COPPER COMPANY

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