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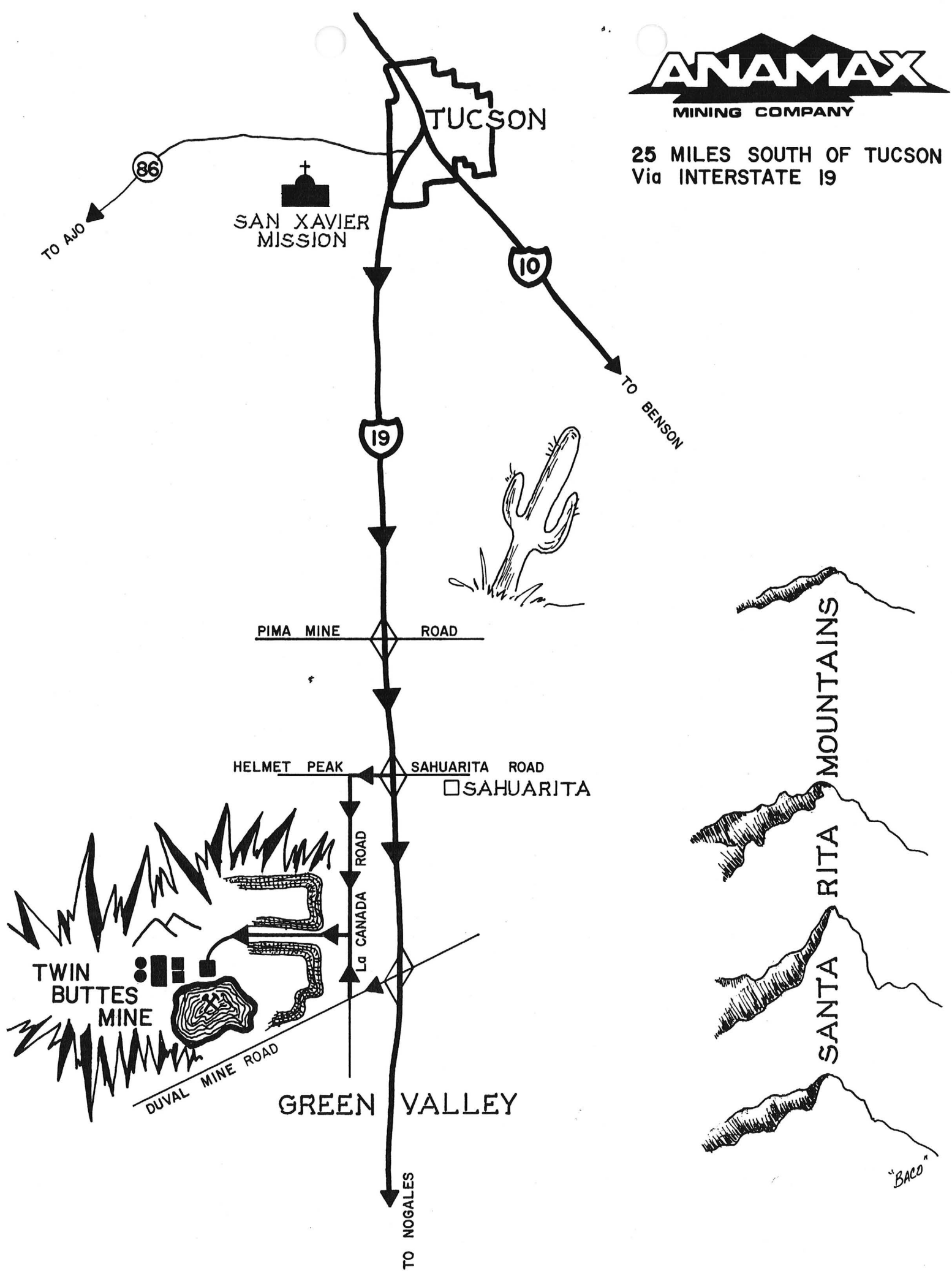

ANAMAX
MINING COMPANY
25 MILES SOUTH OF TUCSON
Via INTERSTATE 19
TUCSON
86
TO AJO
SAN XAVIER MISSION
10
TO BENSON
19
PIMA MINE ROAD
HELMET PEAK
SAHUARITA ROAD
SAHUARITA
ROAD
La CANADA
TWIN BUTTES MINE
DUVAL MINE ROAD
GREEN VALLEY
TO NOGALES
SANTA RITA MOUNTAINS
"BACO"

THE TWIN BUTTES STORY

Copper mining in the Pima Mining District of southern Arizona had its beginnings in the 1870s when prospectors found rich outcrops of copper ore.

The original Twin Buttes village got its name from the two nearby peaks that overlooked the mining area. However, it wasn't long until the rich, easy-to-mine pockets of ore were mined out and the village abandoned.

In the early 1900s, the copper mines near Twin Buttes enjoyed a brief return to productivity. Copper prices were good; optimism was high to the degree that a railroad line was built from Tucson to service the area. This rebirth of mining activity was short lived, however, and it was not until the 1950s that new interest was shown in the mining district. Modern-day prospectors, geologists and engineers, armed with the most up-to-date tools for divining the secrets of the earth, began an intensive exploration of the district, hoping to find areas of mineralization suitable for mining.

In 1963, The Anaconda Company exercised an option on the properties of the Banner Mining Company and started a massive exploration project. After four years of development, Anaconda produced the first copper concentrate from the Twin Buttes mines in 1969. In 1973, Anamax Mining Company was formed when The Anaconda Company and AMAX Arizona, Inc. signed agreements that created a 50-50 partnership to operate and expand the Twin Buttes Mine. The agreement included the acquisition by AMAX of the Banner Mining Company.

The Anamax Twin Buttes operation is an open pit copper mine. To reach the relatively low-grade copper ore lying deep below the surface, 500 to 800 feet of waste material, mostly sand and gravel, had to be removed. Since the project began in 1965, more than a billion tons of material have been moved. This initial stripping was done with scrapers, belt conveyors and dump trucks.

Using modern mining methods, Anamax engineers make use of computers to assist them in pit design. Core samples from various holes are assayed and the results computerized. From this data the engineers determine the configuration of the pit. Current design calls for the pit to be 1¾ miles long, 1¼ miles wide and 1700 feet deep, with the sides sloping downward in a series of 40- and 50-foot benches.

Once the ore and rock have been loosened and fractured by daily blasting, electric power shovels load it onto 100- and 170-ton end-dump trucks. These trucks carry the ore and waste to one of three crushers in the pit, which reduce it to a size that can be carried on five-feet-wide conveyor belts, up and out of the pit to various processing points or waste piles.

Two distinct types of copper ore are mined at Twin Buttes — oxide ore, which is principally chrysocolla, and sulfide ore, which is principally chalcopyrite.

The oxide ore goes through a leaching and electrowinning process which results in finished sheets of copper called cathodes, each 36 inches by 44 inches and weighing about 140 pounds. The cathodes are 99.9 per cent pure copper — a finished product ready for fabrication. One hundred tons of cathode can be produced each day in this process.

The sulfide ore goes through crushing and grinding processes, then is mixed with water and ground into a mud-like substance called slurry. The slurry is mixed with chemical reagents, and, through a flotation process, copper concentrate is produced. Dried to a black powder, the concentrate is shipped to copper smelters for further refining.

Important by-products are extracted before each final process — uranium from the oxide ore and molybdenum from the sulfide ore.

All of this complex operation is designed to mine ore that averages less than seven-tenths of one per cent copper, or less than 14 pounds of copper per ton.

Approximately 1600 persons currently are employed by Anamax. G. R. Wyman is president.

THE GEOLOGY OF THE TWIN BUTTES MINERALIZED ZONE

The Twin Buttes mine has been developed in a copper-molybdenum orebody that exists within a more widespread altered and mineralized zone. Sulfide mineralization, alteration and intrusion occurred within this zone, which was developed around a Laramide-age mineralization center. Paleozoic and Mesozoic sediments and intrusive rocks of Laramide age and older have been mineralized and altered within the Twin Buttes zone. After sulfide mineralization, erosion and oxidation of the upper part of the mineralized zone took place, and the orebody was covered with several hundred feet of alluvial overburden.

A wide variety of rock types occur in the Twin Buttes zone. Beneath the post mineralization overburden: altered, gently folded quartzose, Mesozoic sediments and volcanics overlie altered, folded, steeply dipping Paleozoic sediments. Near the center of the mineralized zone is a northwest-trending intrusive complex, portions of which have been dated at 58 million years. The geometry of the various rock units is portrayed in plan and section on Figures 1, 2, and 3.

The sediments and intrusive rocks in the mine area are variously altered. The carbonate-rich sediments have often been altered to a number of calcium-magnesium-iron silicates including garnet, diopside, wollastonite, actinolite and serpentine. Quartzose sediments, volcanics and earlier intrusive have been altered to assemblages that include: quartz-biotite-orthoclase, quartz-sericite, and chlorite-epidote. The alteration products present at any particular place depend on the original rock composition and on proximity and access to the mineralization center.

Beneath the zone of oxidation: copper, iron and molybdenum sulfide minerals occur as disseminations and within and adjacent to veins, often with quartz and anhydrite. Pyrite and chalcopyrite are by far the most abundant sulfide minerals in the orebody. Chalcocite, sphalerite and molybdenite are common, and bornite, galena and pyrrhotite occur in significant amounts. The sulfide concentrate at Twin Buttes usually contains several ounces per ton silver. Gold content is negligible. Small amounts of the tungsten bearing minerals, powellite and scheelite, occur throughout the orebody.

Higher grade copper mineralization occurs in altered carbonate rocks, and the adjacent quartzose sediments, volcanics and intrusives usually have significantly lower values. Areas of better grade mineralization are separated by low grade intrusives and are segmented by northeast-trending, near-vertical faults that have predominately post mineralization movement. The two largest of these late faults, the Twin Buttes Fault and the East End Fault (Figure 1), have southeast-side-down movement measured in thousands of feet.

A few to several hundred feet of oxidized bedrock occur above the sulfide orebody, and a generally thin zone of secondary chalcocite has formed directly beneath the oxide zone. The most common products of this oxidation and supergene alteration are: numerous clay minerals, chrysocolla, copper-manganese-iron wad, native copper, pyrolusite and a variety of yellow, brown and red iron oxides. Uranium values of a few parts per million are common in copper oxide ore.

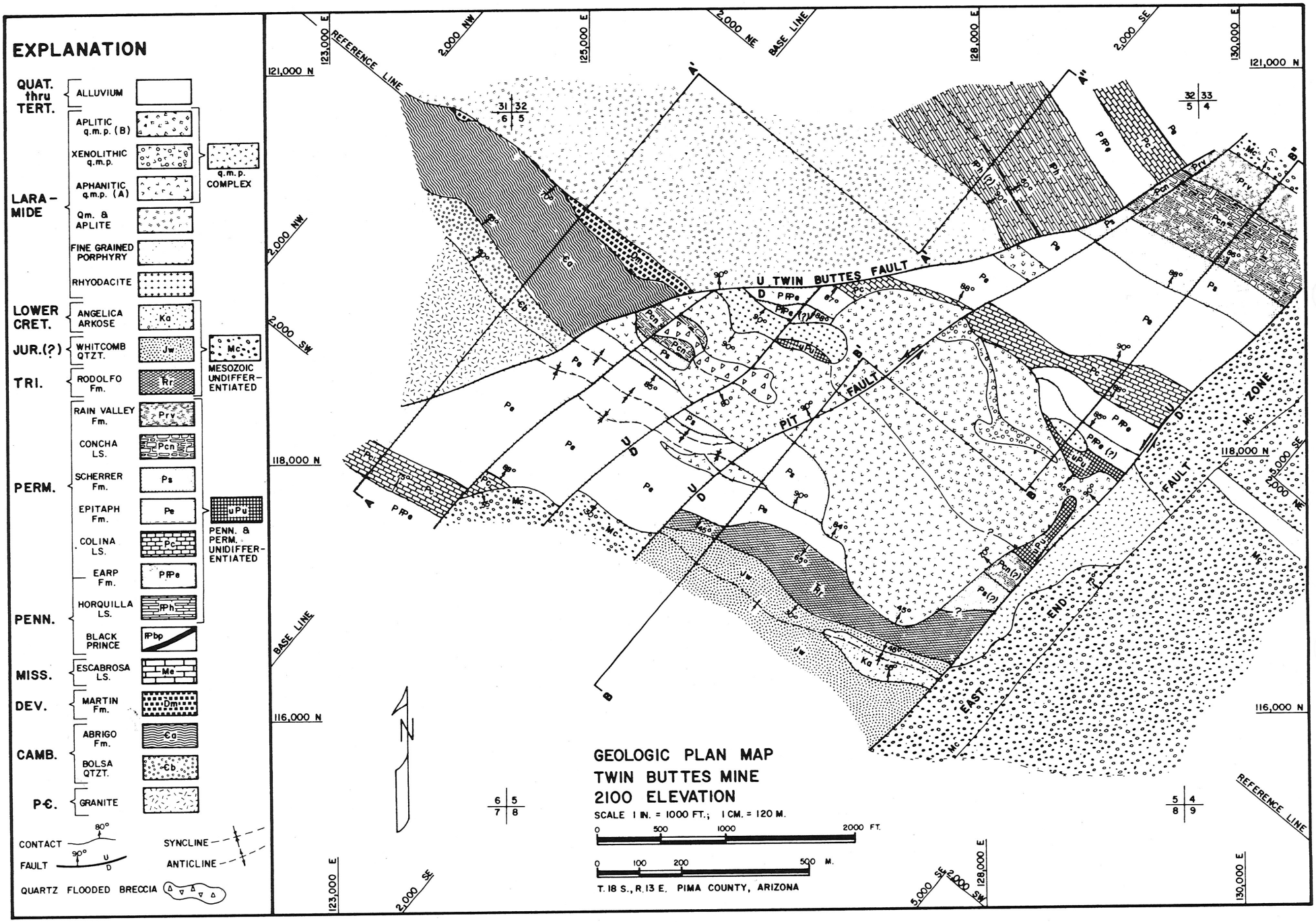

EXPLANATION
QUAT. thru TERT.
ALLUVIUM
LARAMIDE
APLITIC q.m.p. (B)
XENOLITHIC q.m.p.
APHANITIC q.m.p. (A)
q.m.p. COMPLEX
Qm. & APLITE
FINE GRAINED PORPHYRY
RHYODACITE
LOWER CRET.
ANGELICA ARKOSE
Ka
JUR.(?)
WHITCOMB QTZT.
Jw
Mc
MESOZOIC UNDIFFERENTIATED
TRI.
RODOLFO Fm.
Tr
PERM.
RAIN VALLEY Fm.
Prv
CONCHA LS.
Pcn
SCHERRER Fm.
Ps
EPITAPH Fm.
Pe
uPu
PENN. & PERM. UNDIFFERENTIATED
COLINA LS.
Pc
EARP Fm.
PPe
PENN.
HORQUILLA LS.
PPh
BLACK PRINCE
PPbp
MISS.
ESCABROSA LS.
Me
DEV.
MARTIN Fm.
Dm
CAMB.
ABRIGO Fm.
Ca
BOLSA QTZT.
Cb
P-C.
GRANITE
CONTACT
FAULT
SYNCLINE
ANTICLINE
QUARTZ FLOODED BRECCIA
REFERENCE LINE
BASE LINE
123,000 E
125,000 E
128,000 E
130,000 E
121,000 N
118,000 N
116,000 N
2,000 NW
2,000 NE
2,000 SW
2,000 SE
5,000 SE
U TWIN BUTTES FAULT
PIT FAULT
U D ZONE
END FAULT
EAST
GEOLOGIC PLAN MAP
TWIN BUTTES MINE
2100 ELEVATION
SCALE 1 IN. = 1000 FT.; 1 CM. = 120 M.
0 500 1000 2000 FT.
0 100 200 500 M.
T. 18 S., R. 13 E. PIMA COUNTY, ARIZONA

Figure 1

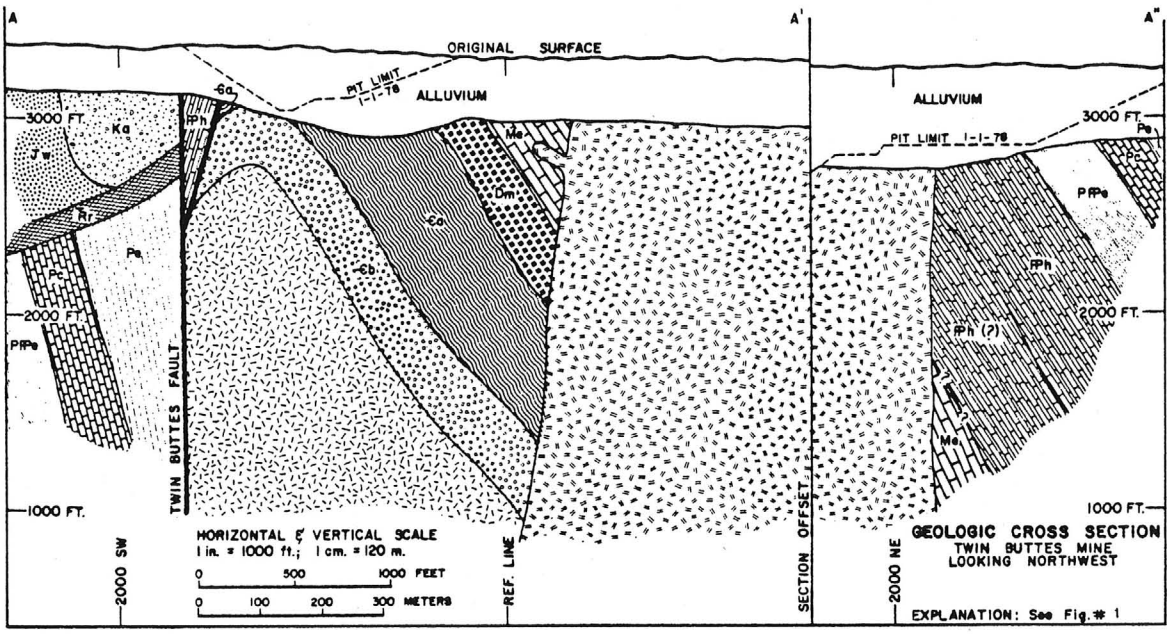


Figure 2

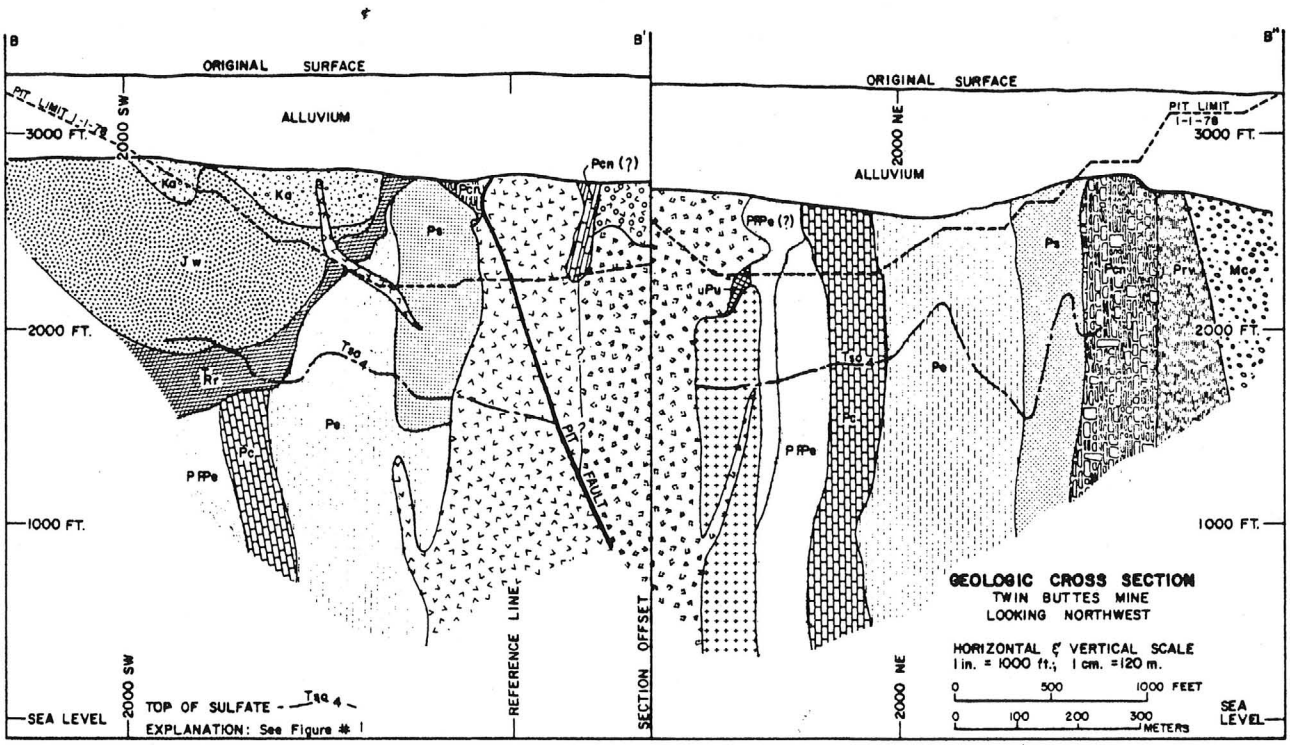
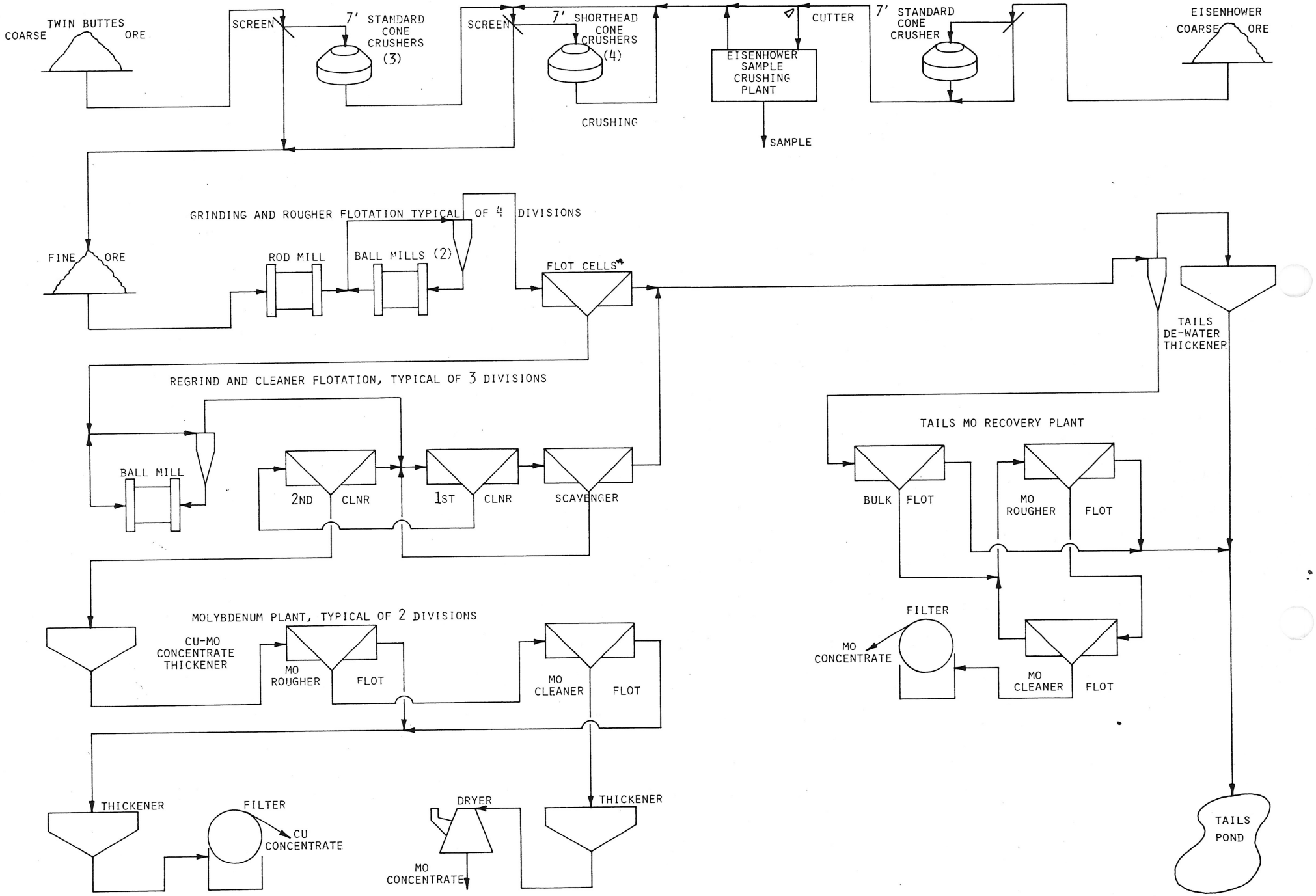


Figure 3


TWIN BUTTES
COARSE ORE
SCREEN
7' STANDARD CONE CRUSHERS (3)
SCREEN
7' SHORTHEAD CONE CRUSHERS (4)
CRUSHING
CUTTER
EISENHOWER SAMPLE CRUSHING PLANT
SAMPLE
7' STANDARD CONE CRUSHER
EISENHOWER
COARSE ORE
GRINDING AND ROUGHER FLOTATION TYPICAL OF 4 DIVISIONS
FINE ORE
ROD MILL
BALL MILLS (2)
FLOT CELLS
TAILS DE-WATER THICKENER
REGRIND AND CLEANER FLOTATION, TYPICAL OF 3 DIVISIONS
BALL MILL
2ND CLNR
1ST CLNR
SCAVENGER
TAILS MO RECOVERY PLANT
BULK FLOT
MO ROUGHER FLOT
FILTER
MO CONCENTRATE
MO CLEANER FLOT
MOLYBDENUM PLANT, TYPICAL OF 2 DIVISIONS
CU-MO CONCENTRATE THICKENER
MO ROUGHER FLOT
MO CLEANER FLOT
THICKENER
FILTER
CU CONCENTRATE
DRYER
MO CONCENTRATE
THICKENER
TAILS POND

ANAMAX MINING COMPANY — TWIN BUTTES
SULFIDE PLANT

In the fall of 1969 the Sulfide Plant was placed into operation. The original plant processed 30,000 tons of ore per day but an expansion in 1974 raised the capacity to 40,000 tons. Ore from the Twin Buttes pit is supplemented by ore from the Eisenhower mine. The Eisenhower Mining Company, a partnership between Anamax and ASARCO Inc., was formed in 1976. Fourteen thousand tons per day of ore are transported from the Eisenhower mine to Twin Buttes by means of a 6.4 mile Cable Belt conveyor.

CRUSHING PLANT

There are two coarse ore storage piles, one for Twin Buttes ores and the second for Eisenhower ores. The ore in the Eisenhower stockpile is drawn from the bottom of the pile using feeders and conveyors and is sent to a single Symonds standard crusher (7'). After crushing, the ore is sampled in a sampling plant and then sent to join Twin Buttes ore for further crushing. Ore from the Twin Buttes stockpile is sent to three Symonds standard crushers (7') and then is crushed a second time, along with the Eisenhower ores, in four Symonds shorthead crushers (7'). Vibrating screens are used for product size control with the final product from the Crushing plant being one-half inch in size. This is stored prior to grinding in the Concentrator.

CONCENTRATOR

To liberate the desired copper sulfide mineral (chalcopyrite) from the host rock, the crushed ore is sent to four grinding divisions. Each division consists of a rod mill (14' diameter), the discharge of which is split to two ball mills (14'6" diameter). The product size from the four division grinding sections is fine at 0.008 inches or 65 mesh when it is sent to the flotation section.

In the flotation machines (10') a froth is formed by adding air and reagents. The desired copper sulfide mineral is selectively brought into the froth and separated from host rock. The host rock remains in the flotation cell as a tailing. This is done once in the four rougher flotation sections, ground a second time in a regrind ball mill (7'6" diameter), and floated two additional times in the three cleaner sections. The final copper concentrate from the cleaning section is sent to the Molybdenum Plant for further processing.

MOLYBDENUM PLANT

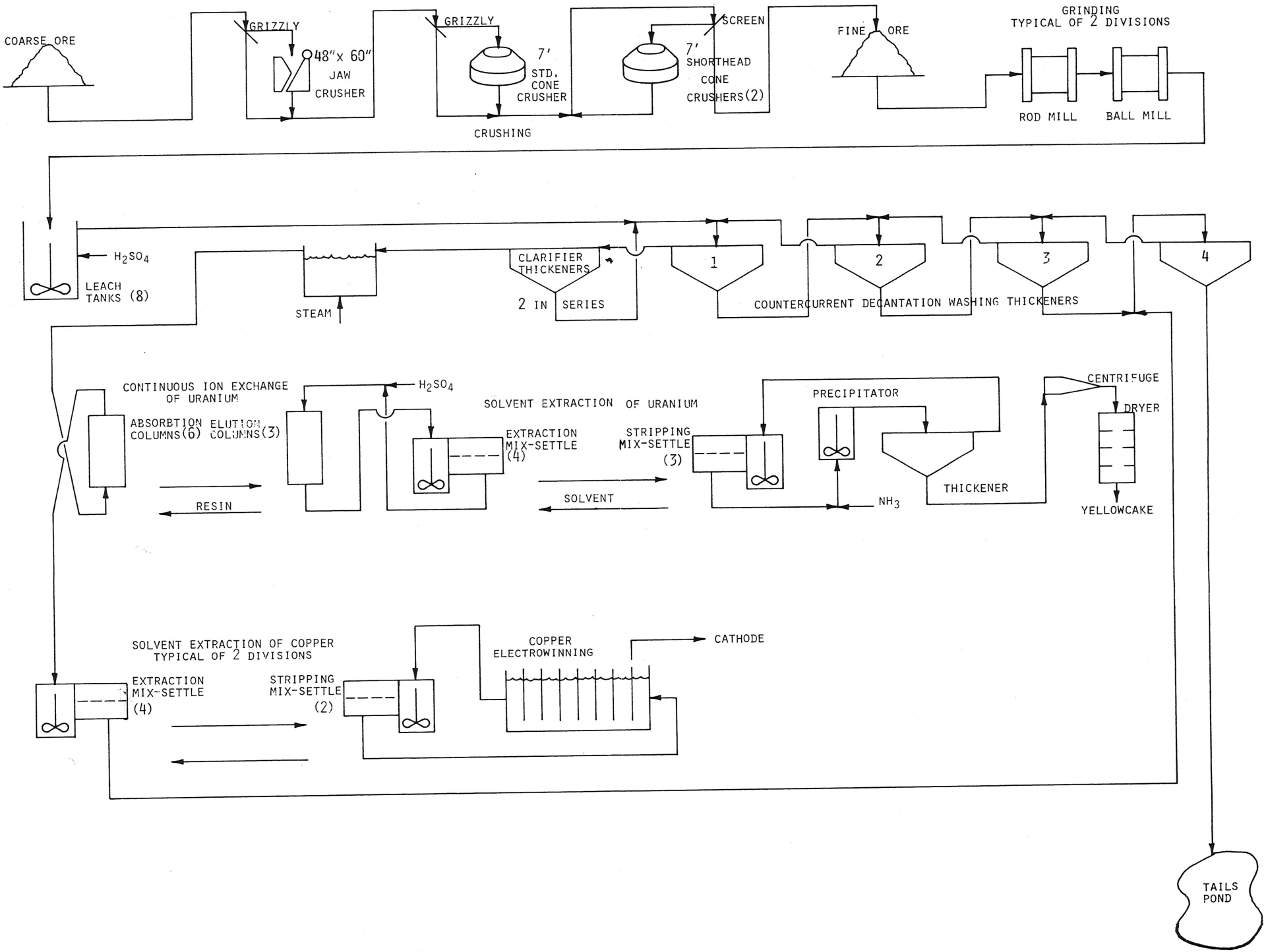
In the Concentrator, molybdenum sulfide (molybdenite) floats together with the copper sulfides. In the Molybdenum Plant, additional reagents are added which allow the molybdenum sulfides to float in the flotation machines (48") but the copper sulfides remain in the machines as tailings. There are two divisions, each consisting of the first stage rougher flotation and seven stages of cleaner flotation. The final molybdenum product from the cleaner section is dried and placed in 55-gallon drums and sold to consumers. Most molybdenum is used in making alloy steels.

FILTER PLANT

The copper sulfides or tailing from the Molybdenum Plant are partially dewatered in thickeners (130') and then further dewatered using three drum filters (12' x 18'). The final copper sulfide product has less than 12 percent moisture and is shipped by rail elsewhere for copper smelting.

TAILING TREATMENT PLANT

The tailing from the Concentrator still retains minor amounts of molybdenum sulfide which are recovered at the Tailing Treatment Plant. The tailing from the Concentrator is first passed through cyclones (26") to separate the coarse from the slime fractions. The coarse material is then floated for molybdenum using two large bulk flotation machines (1,000 $ft.^3$). The concentrate from these machines is sent to one stage molybdenum rougher and six stages of molybdenum cleaner flotation. The final product is filtered and barreled in 55-gallon drums for shipment to consumers.


COARSE ORE
GRIZZLY
48"x 60" JAW CRUSHER
GRIZZLY
7' STD. CONE CRUSHER
CRUSHING
SCREEN
7' SHORTHEAD CONE CRUSHERS(2)
FINE ORE
GRINDING
TYPICAL OF 2 DIVISIONS
ROD MILL
BALL MILL
H_2SO_4
LEACH TANKS (8)
STEAM
CLARIFIER THICKENERS
2 IN SERIES
1
2
3
4
COUNTERCURRENT DECANTATION WASHING THICKENERS
CONTINUOUS ION EXCHANGE OF URANIUM
ABSORBTION ELUTION
COLUMNS(6) COLUMNS(3)
RESIN
H_2SO_4
SOLVENT EXTRACTION OF URANIUM
EXTRACTION MIX-SETTLE (4)
STRIPPING MIX-SETTLE (3)
SOLVENT
PRECIPITATOR
NH_3
THICKENER
CENTRIFUGE
DRYER
YELLOWCAKE
SOLVENT EXTRACTION OF COPPER
TYPICAL OF 2 DIVISIONS
EXTRACTION MIX-SETTLE (4)
STRIPPING MIX-SETTLE (2)
COPPER ELECTROWINNING
CATHODE
TAILS POND

ANAMAX MINING COMPANY — TWIN BUTTES
OXIDE PLANT

In 1975 the Oxide Plant was placed into operation. All oxide copper ores are from the Twin Buttes open pit and are normally stockpiled before being processed by the plant. To leach the copper from the ore requires large quantities of sulfuric acid (1,000 tons per day). While leaching copper into solution small quantities of uranium are also leached into solution. A plant to extract this uranium was placed into operation in 1980.

CRUSHING PLANT — GRINDING AND LEACHING

The ore is moved by truck from stockpile and is first crushed in a jaw crusher (48" x 60"). The crushed material is then sent to one Symonds standard cone crusher (7') and two Symonds shorthead crushers (7') for further size reduction. After screening, the ore is one-half inch in size and is placed in storage prior to grinding and leaching.

There are two grinding sets consisting of one rod mill (11½" x 18½") and followed by one ball mill (12½" x 30'). The ore is ground very fine and is .008 inches (65 mesh) in size. The ground ore is sent to eight large agitated leach tanks (30' diameter) where the ore is mixed with sulfuric acid and the oxide copper mineral (chrysocolla) is leached and the copper and uranium go into solution. The material from the leach circuit is sent to the countercurrent decantation circuit.

COUNTERCURRENT DECANTATION — COPPER SOLVENT EXTRACTION

To clarify and separate the pregnant copper bearing solution from the leached solids, four 400-foot diameter thickeners are used. The clear solution overflows from the thickeners and flows countercurrent to the solids flow which finally discharges to the tailing ponds. The pregnant copper solution flows through two additional 400-foot diameter thickeners for additional clarification prior to going to the copper solvent extraction circuit.

The copper solution from the last clarifier passes through the Uranium Plant where uranium is extracted and then proceeds to the copper solvent extraction circuit. In the solvent extraction circuit the contained copper is concentrated and purified before going to the Electrowinning Plant. To accomplish this there are two solvent extraction trains of mixers and settlers. There are four extraction stages in each where copper is extracted into a kerosene phase with an extractant leaving behind undesired metals. There are two stripping stages where copper is stripped from the kerosene phase and placed back into solution in a purified form. This solution proceeds to the Electrowinning Plant where the copper is electrolytically deposited in a pure form.

ELECTROWINNING PLANT

The copper in the strong and purified solution is first deposited electrolytically onto titanium sheets for one day. After one day the thin pure sheets of copper are removed from the titanium blanks and placed back into the electrolytic cells where additional copper is electrolytically deposited onto it for an additional seven days. The pure copper (cathode copper at 99.9 percent purity) is removed from the electrolytic cells, washed and prepared for shipment. Because of the purity of the copper it is shipped to manufacturers who produce copper products.

URANIUM PLANT

As copper is leached into solution so are small quantities of uranium. Prior to the copper solvent extraction stage the solution is passed through uranium extraction columns. The six, 12-foot diameter absorption columns have small organic beads that selectively absorb uranium from the solution as it passes through the columns. Once a portion of the resin is loaded with uranium it is sent to one of three 6-foot diameter elution columns where the uranium is stripped from the beads using strong sulfuric acid. The beads are then reused.

The uranium contained in the sulfuric acid solution is strengthened and purified by using a single solvent extraction train. This train consists of four extraction stages, one scrubbing stage, and three stripping stages. Ammonia is added to the strong uranium solution and a yellow precipitate is formed (ammonium diuranate or yellow cake). The yellow cake precipitate is thickened, centrifuged, dried in a 4-hearth dryer and placed in 55-gallon drums for shipment.

ANAMAX MINING COMPANY — TWIN BUTTES

GENERAL FEATURES, Continued

Blast Hole Data:

Blast Hole Spacing	25 ft. minimum centers
Hole pattern	Staggered
Bench height	40 ft.
Hole depth	47 ft.
Hole diameter	12¼ in.
Explosive used:	Ammonium nitrate + diesel fuel, slurry (wet holes)
Primers	C-3 14 oz.
Shot size	Minimum size + 50 holes
Delays	25 MS and 42 MS between rows
Type blast	Free face preferred
Burden blast	Few
Explosive — lbs./hole	Ave. 1000# slurry
Rock broken — tons/lb. of explosive	3.27

MAJOR EQUIPMENT

Loading Equipment

End Dump Trucks (Electric):		38	Unit Rig	100 ton	190 tons	1000
		21	Wabco	100 ton	190 tons	1000
		2	Unit Rig	170 ton	270 tons	1600
		2	Wabco	170 ton	270 tons	1600
Shovels (Electric):		3	Marian 191M	15 cu. yd.		
		1	P&H 1900B	10 cu. yd.		
		2	P&H 2100B	15 cu. yd.		
		3	P&H 2100BL	15 cu. yd.		
Rubber-Tired Front End Loaders		1	Dart D600	15 cu. yd.		
		1	Cat 992	10 cu. yd.		
		4	Cat 988	6 cu. yd.		
		1	Cat 950	3½ cu. yd.		
		2	Cat 930	2¼ cu. yd.		

Support Equipment

Tractor Dozers	Crawler	7	Cat D-9G	
	Crawler	2	Cat D-8, Side Room	
	Rubber Tired	8	Cat 834	
Road Graders		5	Cat #16	
		1	Cat 120	
Water Trucks		5	Cat 660	500 to 12,000 gal. ea.
		2	Cat 779	8000 gal. ea.
Scrapers		2	Cat 660B	54 cu. yd.
Drills		4	Bucyrus Erie 60R	(diesel)
		2	Gardner Denver 120	
Powder Trucks		2		
Primary Crusher		3	Nordberg 54" x 80"	5000 tons/hour

TWIN BUTTES MINE

Stripping at Twin Buttes Mine started in July 1965, and to date more than 1,309,000,000 tons of ore and waste have been mined. At present, the pit is over 7,300 feet long, 5,600 feet wide and 1,200 feet deep. The planned rock slopes in the pit are 26.5° to 45° with the alluvium slopes at 53°. Benches above the 2800 level are 50 feet high and below the 2800 level, the benches are 40 feet high. There are more than 25 miles of haul roads, which are maintained at a minimum width of 100 feet and maximum grade of 10 per cent.

The in-pit crushing and conveying system handles 50 per cent of all the pit material. The three crushers are Nordberg 54" X 80" gyratory crushers rated at 5000 tons per hour each. The belt system is over 72,000 feet long using a 60-inch belt, with a maximum grade of 25 per cent.

All drilling is 12-1/4" holes with spacing a minimum of 25 foot centers. The pattern is staggered with the hole depth being 47 feet for the 40 foot bench. Blasting is done using ammonium nitrate base blasting agents. The power factor averages 3.27 tons/lb. with most shot being over 50 holes and free face blasting preferred. The present drilling equipment consists of 4 Bucyrus Erie 60R drills and 2*Gardner Denver 120 drills; all drills are diesel electric type.

The loading and hauling is done with trucks and shovels, with 50 per cent of the material being hauled to the conveyor system, and 50 per cent of the waste material being hauled directly to the dumps. The shovels are all electric and consist of 3 Marion 191M 15 yard capacity, 1 P&H 1900B 10 yard capacity, 2 P&H 2100 B 15 yard capacity, 3 P&H 2100BL 15 yard capacity and 1 B.E. 395-B 34 yard capacity. The truck fleet is all electric drive trucks: 38 Unit Rig 100 tons, 20 Wabco 100 tons, 2 Unit Rig 170 tons and 2 Wabco 170 tons.

Other support equipment consists of: 9 front end loaders, 9 crawler tractors, 8 rubber-lined tractors, 6 motor graders, 7 water trucks and 2 scrapers.

ANAMAX
MINING COMPANY

Revised/1-1-82

ANAMAX MINING COMPANY - TWIN BUTTES

January 1, 1982

GENERAL FEATURES

Date Pit Started:	July 1965
Present Dimensions:	Length = 7,300' Width = 7,000' Depth = 1,220'

Total Tons To Date (January 1, 1982)

Waste	1,143,024,253
Copper Mineralized Rock (stockpiled and mill feed)	166,002,915
Total	1,309,027,168

Production: (Based on 1982 budget)

Rock Mined	45,500 WST/shift
Sulfide Mill	
Ore Milling Rate	
Twin Buttes Ore	30,300 DST/day
Eisenhower Ore	13,700 DST/day
Copper Produced in Concentrate	
Twin Buttes Ore	65,212 tons/year
Eisenhower Ore	29,516 tons/year
Molybdenum Produced in Concentrate	
Twin Buttes Ore	1,433 tons/year
Eisenhower Ore	287 tons/year
Oxide Mill	
Ore Milling Rate	9,701 DST/day
Copper Cathode Produced	32,930 tons/year
Uranium (U_3O_8) Produced	118 tons/year

Haul Roads:

Maintained = +25 miles
Width = at least 100 feet
Grade = Maximum 10%

Weather Data:

Hot and dry +22° to +120°
Average rainfall ± 10.5" year
No snow.

Wall Slopes and Bench Detail:

Planned rock slope = 26.5° to 45°
Planned alluvium slope = 53°
Bench height:
Above 2800 level = 50 feet
Below 2800 level = 40 feet

Manpower

Salary	403
Hourly	948
Total	1,351

ANAMAX MINING COMPANY - TWIN BUTTES

GENERAL FEATURES, Continued

Blast Hole Data:

Blast Hole Spacing	25 ft. minimum centers
Hole pattern	Staggered
Bench height	40 ft. rock/50 ft. alluvium
Hole depth	47 ft. rock/53 ft. alluvium
Hole diameter	12-1/4"
Explosive used:	Ammonium nitrate + diesel fuel, slurry (wet holes)
Shot size	Minimum size + 50 holes
Type blast	Free face preferred
Burden blast	Few
Explosive - lbs./hole	Ave.1000# slurry
Rock broken - tons/lb. of explosive	3.27

MAJOR EQUIPMENT

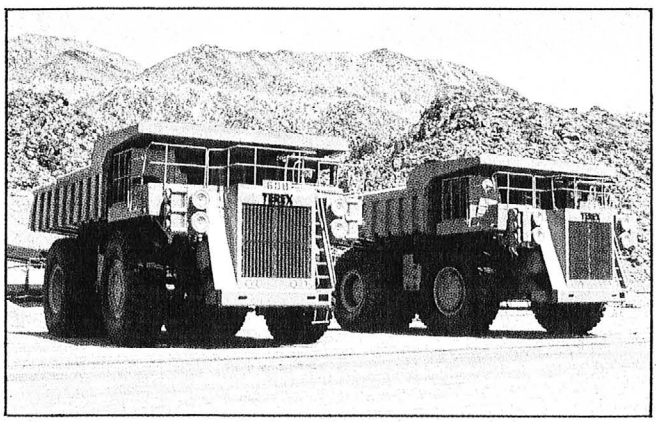
Loading Equipment

End Dump Trucks (Electric):		38 Unit Rig	100 ton
		20 Wabco	100 ton
		2 Unit Rig	170 ton
		2 Wabco	170 ton
Shovels (Electric):		1 Bucyrus Erie 395B	34 cu. yd.
		3 Marian 191M	15 cu. yd.
		1 P&H 1900B	10 cu. yd.
		2 P&H 2100B	15 cu. yd.
		3 P&H 2100 BL	15 cu. yd.
Rubber-Tired Front End Loaders		1 Dart D600	15 cu. yd.
		1 L800	12 cu. yd.
		4 Cat 988	6 cu. yd.
		1 Cat 950	3-1/2 cu. yd.
		2 Cat 930	2-1/4 cu. yd.

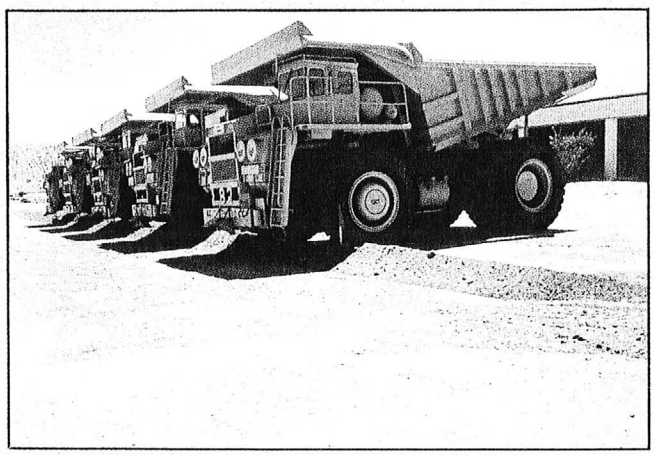
Support Equipment

Tractor Dozers	Crawler	7 Cat D-9G	
	Crawler	2 Cat D-8, Side Boom	
	Rubber Tired	8 Cat 834	
Road Graders		5 Cat #16	
		1 Cat 120	
Water Trucks		5 Cat 660	500 to 12,000 gal. ea.
		2 Cat 779	8,000 gal. ea.
Scrapers		2 Cat 660B	54 cu. yd.
Drills		4 Bucyrus Erie 60R	
		2 Gardner Denver 120	
Primary Crusher		3 Nordberg 54" X 80"	5,000 tons/hour

HAULAGE TRUCKS



9 Terex 33-15 and 6 Terex 33-15B 170 ton rear dump trucks. Detroit Diesel 16V 149T1 engine; GM generator with 2 GM traction motors; tire size 36.00 x 51 58 PR.



5 Wabco 120B 120 ton rear dump trucks. Detroit Diesel 12V 149T1 engine, GE 772 wheel motors; tire size 27.00 x 49 42 PR.

18 KW Dart 110 ton rear dump trucks. Detroit Diesel 12V 149T1 engine, Allison DP8960 or 8961 6-speed transmission with electric shift; tire size 27.00 x 49 42 PR.

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Terex 33-15 & 33-15B 170 Ton Haulage Trucks

Location: Kaiser Steel's Iron Ore Mine — *Eagle Mountain, California*

ID#	s/n	ENGINE HOURS	MAIN GENERATOR HOURS	AUXILIARY GENERATOR HOURS	G.M. TRACTION MOTOR, R-H HOURS	G.M. TRACTION MOTOR, L-H HOURS
Model-3315						
601	C2339	2,377.7	11,743.9	11,743.9	4,722.1	3,079.5
602	C2340	3,965.5	3,965.5	29.1	5,884.8	6,013.4
603	C2341	1,957.7	2,735.1	3,149.4	11,224.7	11,224.7
604	C2342	2,304.0	2,304.0	2,304.0	711.8	3,276.8
605	C2343	3,402.7	17,073.1	3,233.1	8,399.6	8,399.6
606	C2344	307.7	307.7	307.7	158.1	446.1
607	C2345	1,067.9	1,067.9	1,067.9	1,067.9	1,067.9
608	C2346	1,729.3	7,557.8	2,475.4	404.7	404.7
609	C2349	4,152.6	4,270.3	4,270.3	101.8	101.8
Model-3315B						
610	C2400	3,864.1	3,864.1	994.7	1,535.1	1,535.1
611	C2401	11,945.3	11,945.3	329.6	2,148.1	4,318.4
612	C2402	6,496.0	11,126.1	504.3	5,917.4	5,917.4
613	C2403	5,718.7	19,454.3	1,779.7	215.0	00.0
614	C2404	787.7	787.7	787.7	113.5	35.4
615	C2405	1,590.3	1,590.3	44.7	8,530.2	10,025.6

WABCO 120B Haulage Trucks

Location: Anamax Twin Buttes Mine — ***Green Valley, Arizona***

ID#	s/n	ENGINE HOURS	RT. WHEEL ARM/MOTOR HOURS	LF WHEEL ARM/MOTOR HOURS	GENERATOR HOURS
N52	GF53888AFE5BS	2,958	10,197	8,240	5,475
N87	GF 5097AFE5X	2,872	3,267	4,828	4,828
N92	*GF 5102AFE5X	4,651	3,337	310	5,000
N94	GF5354AFE5BP	5,562	3,796	4,956	11,359
N98	GF5381AFE5BP	---	12,916	8,327	10,068

*GF5102AFE5X has Unit Rig gear sets w/Reliance wheel motors and G.E. electrics

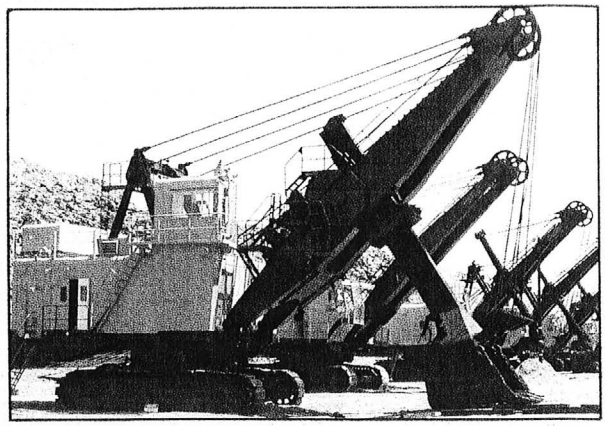
K.W. Dart 110 Ton Rear Dump Trucks

Location: Kaiser Steel's Iron Ore Mine — ***Eagle Mountain, California***

ID#	s/n	ENGINE HOURS	TRANS HOURS	DIFF HOURS
	MODEL D2771:			
442	67106-2	3,950	3,740	16,072
453	68183	7,781	5,408	1,638
454	68184	8,947	145	6,723
455	68185	6,539	5,542	9,246
456	68186	3,703	8,476	1,925
457	68187	8,455	9,078	14,109
458	68188	5.469	1.319	5.517
	MODEL D2772:			
468	70133	3,155	3,155	1,119
469	70134	4,026	14,833	3,971
472	70137	5,522	6,607	6,344
473	70138	4,410	10,848	1,048
480	70211	8,826	3,510	606
483	70214	2,127	904	9,615
484	70215	7,975	1,933	8,898
487	70218	5,903	4,717	2,162
488	70219	4,258	1,858	3,159
489	70220	1,741	7,539	11,861
490	70221	4,262	1,300	353

ELECTRIC SHOVELS

25 shovels: bucket capacities ranging from 3.5 cu yards to 18 cu yards.



SHOVELS

ID#	Make	s/n	Year	Type	Size	Powered
Kaiser Steel's Iron Ore Mine		**Eagle Mountain, California**				
39	P & H	39975	1976	2300	18 yd	electric
38	Marion	23008	1973	192M	17 yd	electric
35	Bucyrus Erie	129537	1965	280B	12 yd	electric
32	Bucyrus Erie	11853	1957	190B	8 yd	electric
30	Bucyrus Erie	117901	1957	190B	8 yd	electric
29	Bucyrus Erie	125749	1965	280B	12 yd	electric
28	Bucyrus Erie	125748	1965	280B	12 yd	electric
27	Bucyrus Erie	124487	1965	280B	12 yd	electric
37	Bucyrus Erie	89334	1954	150B	6 yd	electric
25	Bucyrus Erie	110873	1954	150B	6 yd	electric
Anamax Twin Buttes Mine		**Green Valley, Arizona**				
S13	P & H	35550	1973	2100BL	15 yd	electric
S12	P & H	34720	1972	2100BL	15 yd	electric
S10	P & H	30880	1969	2100B	15 yd	electric
S09	P & H	30870	1969	2100B	15 yd	electric
S08	Marion	22841	1968	191M	15 yd	electric
S07	Marion	22825	1967	191M	15 yd	electric
S06	Marion	22824	1967	191M	15 yd	electric
S11	P & H	30040	1968	1900B	10 yd	electric
S04	Northwest	26706-46509B	1975	180D	5 yd	diesel
Stelco's Griffith Iron Ore Mine		**Red Lake, Ontario, Canada**				
06	Bucyrus Erie	136005	1975	150B	6½ yd	electric
05	Bucyrus Erie	133914	1973	150B	6½ yd	electric
03	Bucyrus Erie	127932	1966	150B	6½ yd	electric
02	Bucyrus Erie	127905	1966	150B	6½ yd	electric
01	Bucyrus Erie	127904	1966	150B	6½ yd	electric
04	Bucyrus Erie	100504	1958	150B	6½ yd	electric

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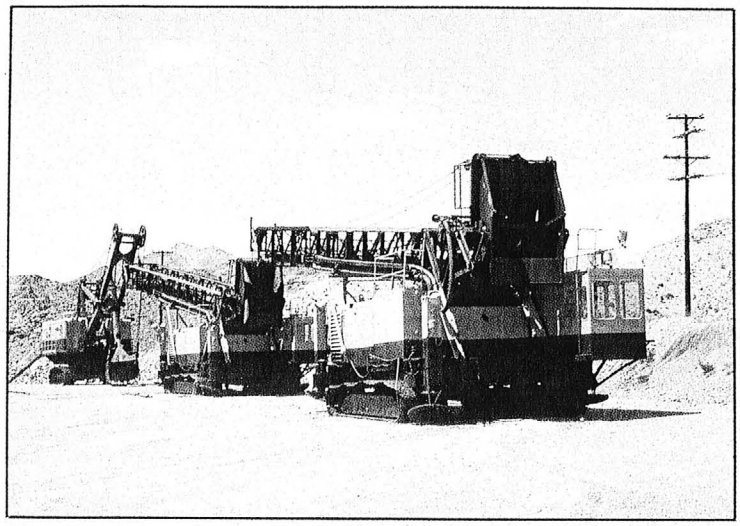
ELECTRIC AND DIESEL/ ELECTRIC DRILLS



15 Blast hole rotary drills

DRILLS

ID#	Make	Year	s/n	Type	Powered	Total Hrs	Date of Last Major Overhaul
Location: ***Kaiser Steel's Iron Ore Mine***				***Eagle Mountain, California***			
2037	Bucyrus Erie	1974	134750	60R	electric	24,755	1979
2036	Bucyrus Erie	1973	133772	60R	electric	32,190	1979
2035	Bucyrus Erie	1972	133107	60R	electric	36,358	1978
2034	Bucyrus Erie	1972	133103	60R	electric	38,001	1978
Location: ***Anamax Twin Buttes Mine***				***Green Valley, Arizona***			
S58	Gardner-Denver	1975	1027	GD-120	diesel/electric	12,782	original
S57	Gardner-Denver	1975	1026	GD-120	diesel/electric	11,309	original
S56	Bucyrus Erie	1973	134519	60R	diesel/electric	20,888	12/80
S55	Bucyrus Erie	1972	133295	60R	diesel/electric	23,303	12/79
S51	Bucyrus Erie	1967	129269	60R	diesel/electric	11,951	original
S50	Bucyrus Erie	1967	128751	60R	diesel/electric	37,003	11/81
Location: ***Stelco's Griffith Iron Ore Mine***				***Red Lake, Ontario, Canada***			
	Atlas Copco	1981	BRE-1072A	ROC-810H	diesel		
	Gardner-Denver	1973	1007	GD120	electric		
	Gardner-Denver	1972	1003	GD120	electric		
	Bucyrus Erie	1966	128689	45R	electric		
	Bucyrus Erie	1965	127928	40R	electric		

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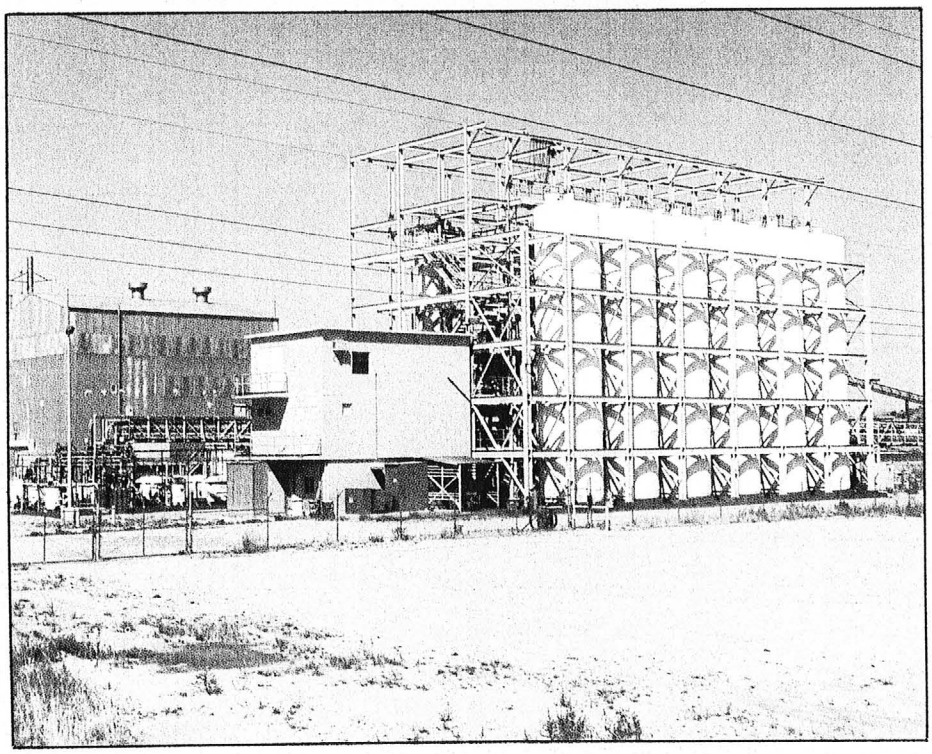
Uranium Plant

Anamax Twin Buttes Mine
Green Valley, Arizona



The uranium plant was designed for 7000 gph flow rate with 6-10 ppm U_3O_8 feed grades. The solution is passed through a resin ion exchange section consisting of six absorption columns, three elution columns and transfer vessels for moving resin. Each absorption column has five compartments, four of which contain 200 cu ft of resin each. The resin is advanced to the elution column when it becomes loaded and a fresh eluted batch of resin is introduced at the top of the column.

The pregnant solution from the resin ion exchange is then fed into a solvent extraction section consisting of four extraction mixer settlers, one scrub mixer settler and three stripper mixer settlers.

The pregnant solution from solvent extraction is then fed into a two stage

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precipitation tank. The precipitated yellow cake is then dewatered in a thickener and fed into a centrifuge and dried in a four hearth dryer and loaded into barrels.

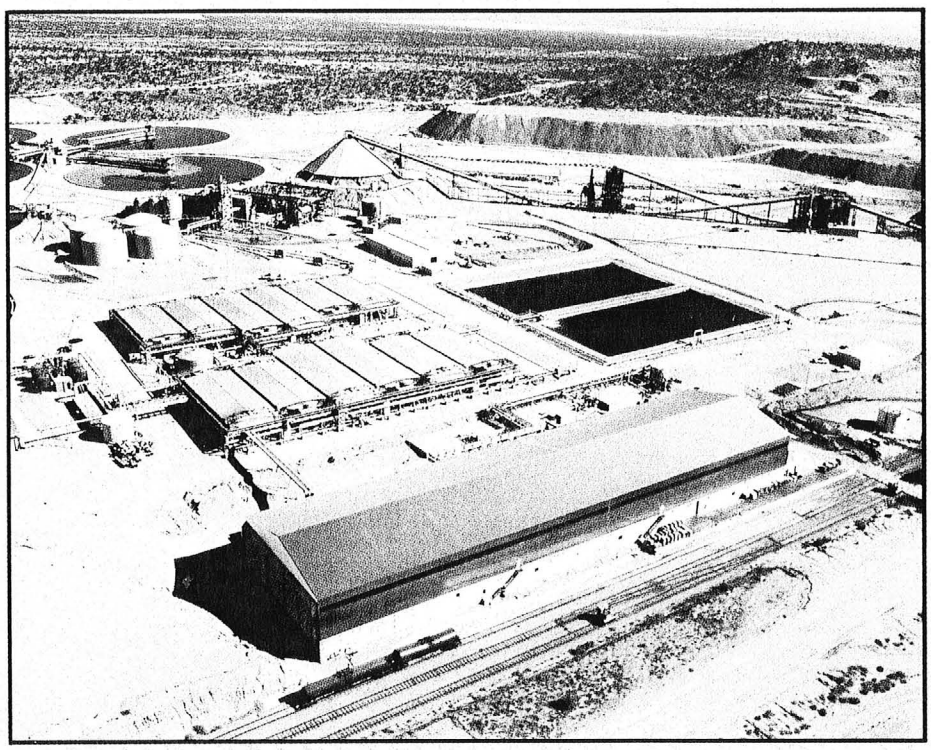
Total design production of the plant was 500 pounds/day.

Equipment:

6 - absorption columns, 12' diameter, 53' high, constructed from FRP with ⅛" thick corrosion liner of ATLac 382-4010A Bisphenol polyester resin. The columns contain 5 chambers separated by conical baffles and inverted weirs.
3 - Elution Columns, 6' diameter, 50'6" high constructed from FRP with ⅛" thick corrosion liner of ATLac 382-4010A Bisphenol polyester resin with structural laminate made of Isophthalic Ash Load 7532.
3 - Measuring chambers, 8' diameter, 10' high constructed of 316 SS with a design working pressure of 50 PSI. There are 2 inspection windows, 3"x8" each.
3 - Rinse chambers, 8' diameter, 8' high constructed of 316 SS with a design working pressure of 50 PSI.
1 - Barren Surge Tank, 10' diameter, 15' high, FRP construction with corrosion liner of ATLac 4010A resin.
1 - Tails Waste Tank, 10' diameter, 10' high constructed of FRP with corrosion line of ATLas 4010A resin.
1 - Scrub Waste Tank, 2' diameter, 2' high, FRP construction with corrosion layer of ATLac 4010A resin.
1 - Raffinate tank, 10' diameter, 10' high, FRP construction with corrosion layer of ATLac 4010A resin.
1 - Raffinate Transfer Tank, 4' diameter, 4'6" high, FRP construction with corrosion layer of 4010A resin.
1 - Pregnant Eluant Tank, 20' diameter by 18' high, FRP construction with corrosion layer of ATLac 4010A resin.
1 - Barren Eluant Tank, 20' diameter, 15' high, FRP construction with corrosion layer of ATLas 4010A resin.
1 - Dilute Acid Tank, 10' diameter, 15' high, FRP construction with corrosion layer of ATLas 4010A resin.
1 - Acid Wash Waste Tank, 20' diameter, 15' high, FRP construction with corrosion layer of ATLac 4010A resin.
1 - Decision Tank, 10' diameter, 10' high, FRP construction with corrosion layer of ATLac 4010A resin.
1 - Barren Strip Tank, 6' diameter, 4.5' high, FRP construction with corrosion layer of ATLac 4010A resin.
1 - Barren Organic Tank, 6' diameter, 6' high, FRP construction with corrosion layer of ATLac 4010A resin.
1 - Pregnant Solution Tank, 6' diameter, 5.5' high, FRP construction with corrosion layer of ATLac 4010A resin.
1 - IPAC Series 3000 master controller, 32K EPOM-24K RAM, 3 serial ports, 1- series 3000 master controller, 32K EPROM, 24K RAM, 6 serial ports, 2 analog to digital converters with model 100 Teleray terminal, and Techtron model 951 floppy disk drive.
2 - Durco Mark II, 1½x1x8 horizontal pump. Durimet 20 construction with 2hp 3/60/460, 1800 rpm motor.
2 - Galigher model 1.5 SSSA2100x48" vertical pump with 2hp 460/3/60, 1800 rpm motor.
5 - Galigher model 2.5 SSSA100x60" vertical pump with 3hp 460/3/60, 1800 rpm motor.
2 - Galigher model 2.5 SSSA100x60" vertical pumps with 5hp 460/3/60, 1800 rpm motors.
1 - Galigher model 2.5 SSSA100x48" vertical pump with 5hp 460/3/60, 1800 rpm motor.
1 - Galigher model 2.5 SSST400x132" vertical pump with 3hp, 460/3/60, 1800 rpm motor.
1 - Galigher model 2.5 SSST400x132" vertical pump with 7.5p, 460/3/60, 1800 rpm motor.
1 - Galigher model 2.4 SSST400x132" vertical pump with 10hp, 460/3/60, 1800 rpm motor.
12 - Durco Mark II, 6x4x13A/10.5 horizontal pumps, material CD4M, with 30hp, 460/3/60, 1800 rpm motors.
3 - Durco Mark II, 3x2x10 horizontal pumps, material CD4M, with 15hp, 460/3/60, 1800 rpm motors.
1 - Durco Mark II 4x3x10 horizontal pumps, material CD4M with 15hp, 460/3/60, 1800 rpm motor.
2 - Allis Chalmers, 4x3x8.5 CSO horizontal pumps with 3hp, 460/3/60, 1800 rpm motors.
2 - Allis Chalmers, 6x4x13 series 2000 pump with 40hp, 460/3/60, 1800 rpm motors.
2 - Allis Chalmers, 1.5x1x8 CSO pump with 3hp, 460/3/60, 1800 rpm motors.
2 - Allis Chalmers 1.5x1x6 CSO pumps with 1hp, 460/3/60 1800 rpm motors.
1 - Allis Chalmers 1.5x1x6 CSO pump with 1.5hp, 460/3/60, 1800 rpm motor.
2 - Hazleton 10' diameter DN model VS vertical pumps, 316SS construction with 200hp, 460/3/60, 1800 rpm motors.
1 - Robbins & Meyer Moyno pump, model 3L6-SSQ with 316 SS case and screw and Reeve variable speed 2 hp motor.
1 - Robbins & Meyer Moyno pump model 2FGJ6-SSR with 316 SS case & screw and Reeves variable speed 2hp motor.
1 - SX Plant (complete) consisting of 4-6' wide, 24' long extraction settlers with pump mixers, 3-4' wide, 10'9" long stripper settlers with pump mixer and 1-4' wide x 10'9" long scrub settler with pump mixer. All wetted parts FRP construction.
1 - Door Oliver, 10' diameter thickener mechanism type AA. All mechanism wetted parts 316 SS. Tank is 9'6" total center depth FRP construction.
1 - Door Oliver Mercobowl Centrifuge, model 9L. All wetted parts 316 SS with 15hp, 460/3/60, 1800 rpm drive motor.
1 - Mine & Smelter Skinner, 4 hearth dryer, propane fired, with rabble arms advance, wet 315 SS scrubber.
1 - Barrel Loadout system including conveyor and Leeweight series 5000 scale with electronic printer.
1 - Ducon wet scrubber size 36 ULO-Y model 1VHE fabricated 316 SS with 25hp 460/3/60, 1800 rpm motor.

OXIDE PLANT

Anamax Twin Buttes Mine
Green Valley, Arizona



This 10,000 DST per day oxide plant was opened in August of 1975 and operated until October 1985.

It consists of three facilities:

I. Crushing
II. Grinding, Leaching and Thickening
III. Copper Solvent Extraction and Electrowinning

These will be outlined separately in detail.

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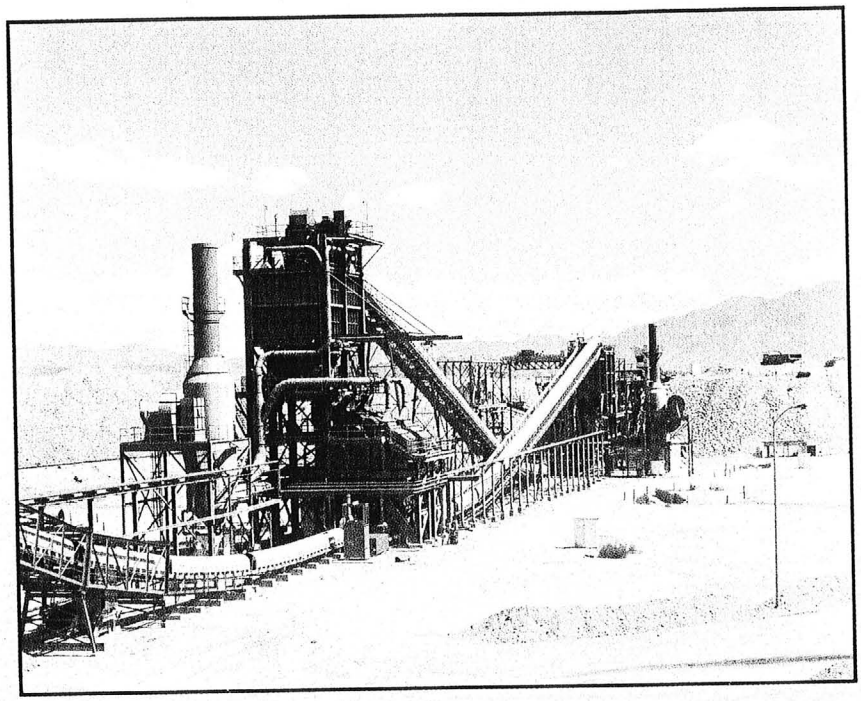
I. Crushing



The Oxide crushing unit was designed to process either mine run ore or product from the primary crushers at a rate of 1000 tons per hour. The ore is fed into a 200 ton dump pocket, reclaimed by a pan feeder into a 48"x60" jaw crusher, then separated by a vibrating grizzly with the oversize passing through a 7' standard cone crusher. The recombined ore from the grizzly undersize and the standard crusher plus the short head crusher product was separated by two 8x20 screens with the oversize reporting to two 7' shorthead crushers and the undersize fed into the fine ore storage stockpile.

Equipment:

1 - Stephens-Adamson steel pan feeder. 60" widex34' centers. Capacity 300 tons per hour minimum to 1200 tons per hour. Automatic farval lube system. Variable speed drive Falk Sunstrand hydrostatic drive system model 25 PU displacement pump, C-FPG608 power unit and MH-187-G4-LSHT hydraulic motor rated 48hp.

1 - Allis Chalmers model 4860-A-1 jaw crusher 48'x60' single swing double toggle type. s/n B54901 with 200 hp 460/3/60, 1800 rpm motor.

1 - Simplicity model 1216AX single deck, 4 bearing scalping screen 6x16. Automatic lube system with a 40hp 460/3/6, 1800 rpm drive. s/n 1616-1216 AX-134.

2 - Simplicity model 1216AX double deck, 4 bearing, vibrating screen. Automatic lube system with a 50hp, 460/3/60, 1800 rpm motor. s/n 2820-1216AX-135 & 136.

1 - Symons 7' heavy duty standard cone crusher, coarse bowl, all steel construction, equipped with duckworth wedge type bowl clamping system, automatic lubrication and oil cooling system with 300hp, 4000/3/6, 705 rpm drive s/n 7762.

2 - Symons 7' heavy duty short head cone crushers, fine bowl, all steel construction, equipped with duckworth wedge type bowl clamping system, automatic lubrication and oil cooling system with 300hp, 4000/3/60, 705 rpm motor. s/n 7763 and 7764.

1 - Conveyor 48" wide by 36' long, horizontal, fabric belting, 35° troughing idlers. Designed to handle 100 tons per hour with 5hp, 460/3/60, 1800 rpm motor and 1215J24 Falk shaft mounted reducer.

1 - Conveyor 48" wide by 243' long, 49' of lift, fabric belting, 35° troughing and impact idlers. Designed to handle 1220 tons per hour with 4000/3/60, 1800 rpm wound rotor motor and Falk 2110Y2 parallel shaft reducer.

1 - Conveyor 48" wide by 452' long, 86' of lift, fabric belting, 35° troughing and impact idlers, designed to handle 2000 tons per hour with 250hp, 4000/3/60, 1800 rpm wound rotor motor and Falk 2150Y2 parallel shaft reducer.

1 - Conveyor 36" wide by 404' long, 54' of lift, fabric belting, 35° troughing and impact idlers. Designed to handle 780 tons per hour with 100hp, 4000/3/60, 1800 rpm wound rotor motor and Falk 2110Y2 parallel shaft reducer.

1 - Conveyor 36" by 555' long, 112' of lift, fabric belting, 35° troughing and impact idlers, designed to handle 1220 tons per hour, with 200hp, 4000/3/60, 1800 rpm wound motor and Falk 2130Y2 parallel shaft reducer.

1 - Ducon size 66, type UW-4, model III Dynamic scrubber, complete with structural support system, exhaust stack and 40hp, 1800 rpm drive.

1 - Ducon size 120, type US-4, model III Dynamic scrubber, complete with structural support system, exhaust stack, and 150hp, 1200 rpm drive.

1 - Ducon size 144, type UW-4, model III Dynamic scrubber, complete with structural support system, exhaust stack and 250hp, 1200 rpm drive.

1 - Ducon size 102, type UW-4, model III Dynamic scrubber, complete with structural support system, exhaust stack and 100hp, 1200 rpm motor.

1 - Dings No. 5 high intensity, oil cooled, stationary overhead magnet 48" wide x 54" long, with model 85612N 7.5KW Silicon rectifier.

1 - Dings No. 4 high intensity, oil cooled, stationary overhead magnet 48" wide x 52" long, with model 85611N, 5.0KW Silicon rectifier.

1 - Tectron model 4500A Tramp metal detector for 36" wide conveyor s/n 269.

1 - Tectron model 8000 Tramp metal detector for a 48" wide conveyor s/n B309.

1 - Ramsey Vey-R-Weigh conveyor scale system complete with Totalizer, load call, weigh bridge for a 48" conveyor.

1 - Kranco overhead traveling bridge crane. 20 ton capacity, pendant operated. 49' available lift, span 30'0". s/n 6900 type TRC D.

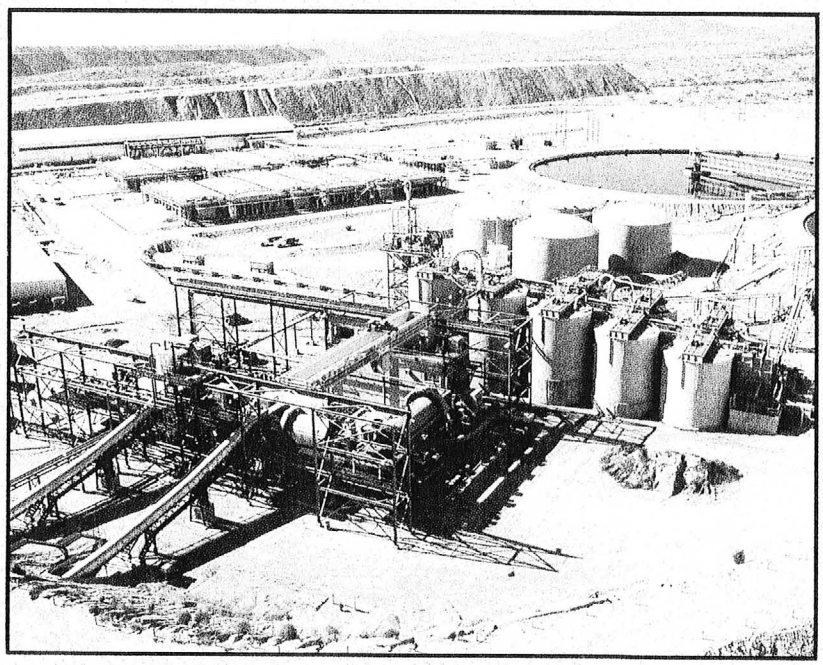
1 - Kranco overhead Traveling bridge crane. 20 Ton capacity, pendant operated. 56' available lift. Span 43'0". s/n 6899 Type TRE D.

2 - Ash 4x3 horizontal slurry pump frame A-135, with 5hp, 460/3/60, 1800 rpm motor.

2 - Ash 6x4 horizontal slurry pump frame B-6-5 rubber lined, with 15hp, 460/3/60, 1800 rpm motor.

2 - Ash 4x3 horizontal slurry pump frame A-135, rubber lined with 7.5hp, 460/3/60, 1800 rpm motor.

II. Grinding, Leaching and Thickening



Oxide ore is reclaimed by belt feeders from fine ore storage and milled in two parallel trains consisting of an 11.5x18' rod mill feeding a 12.5x30' ball mill in an open circuit wet grinding. The ball mill discharge is pumped to an overflow leach tank circuit where the ore is leached with concentrated H_2SO_4 acid. The slurry is then pumped to a train of four thickener countercurrent decantation for liquid solid separation. The pregnant solution is sent through two clarifiers and to the SX plant and the thickened solids are pumped to tails. The plant was designed to mill 10,000 DST per day.

Equipment:

4 - Reclaim conveyors, 48" fabric belting on a slide frame, 34.5' length shaft centers with a Falk Sunstrand variable speed hydrostatic drive system with model A-FPG power unit and model MH 373 LSHT hydraulic motor.

6 - Reclaim conveyors, 48" fabric belts on a slide frame. Length 34.5' shaft center with a Falk 102-120F2 speed reducer and 10hp, 460/3/60, 1800 rpm motor.

6 - Reclaim conveyor, 48" fabric belts on a slide frame. Length 34/5' shaft center with a Falk 102-120F2 speed reducer and 10hp, 460/3/60, 1800 rpm motor.

2 - Rod Mill Feed conveyors, 36" wide by 305' long fabric belting, 35° troughing idler with a Falk 2415J25 shaft mounted reducer and 20hp, 460/3/60, 1800 rpm motor. Ramsey Vey-R-Weigh model 40-15AS scale.

2 - Marcy Rod mill 11.5' diameter by 18' long O'flow type mill with scoop feeder. Shell is 2" thick. Falk gear helical, 229 Teeth, 20" face, 1.25 D.P. Pinion helical, 19 teeth, 20" face, 1.25 D.P.. Motor 1250hp, 4000/3/60, 720 rpm. Falk 116OYFN1 speed reducer. s/n 2998 & 2999.

2 - Marcy Ball mill 12.5' diameter by 30' long O'flow type mill with drum scoop feeder. Shell is 2" thick. Mill is metal lined. Falk gear helical, 236 teeth, 27" face, 1.007 D.P. Pinion helical 23 teeth, 27" face, 1.007 D.P.. Motor 3000hp, 4000/3/60, 720 rpm Falk 1195YFN1 speed reducer. s/ns 3001 & 3002.

1 - Falk inching device consisting of a Falk 211OYB4-A speed reducer with 20 hp, 460/3/60, 1800 rpm motor. Output shaft to mate with both oxide rod and ball mill speed reducers.

2 - ASH, 8"x6" frame BC-6-5, rubber lined, horizontal slurry pump with 60hp, 460/3/60, 1800 rpm motor.

2 - ASH, 8"x6" frame BC-6-5, rubber lined, horizontal slurry pump with Borg Warner model 265 variable speed drive with 60hp, 460/3/60, 1800 rpm flanged motor.

2 - ASH, 8"x8" frame C-6-5 rubber lined, horizontal slurry pumps with 25hp, 460/3/60, 1800 rpm motor.

3 - ASH, 10"x8", frame C-6-5, rubber lined, horizontal slurry pumps with 316 SS shaft sleeves and stuffing boxes. 75hp, 460/3/60, 1800 rpm motors.

1 - ASH 8"x8", frame C-6-5, rubber lined, horizontal slurry pump with 316SS shaft sleeve and staffing box. 100hp, 460/3/60, 1800 rpm motor.

1 - ASH 8"x8", frame C-6-5, rubber lined, horizontal slurry pump with 316SS shaft sleeve and stuffing box. Borg Warner model 465 H variable speed drive with Flange mounted 100hp, 460/3/60, 1800 rpm motor.

6 - ASH, 10"x10", frame CD-6-5, rubber lined, horizontal slurry pumps with 316 SS shaft sleeves and stuffing boxes. Borg Warner model 465 H variable speed drives with Flange mounted 100hp, 460/3/60, 1800 rpm motors.

2 - ASH, 10"x10", frame CD-6-5, rubber lined, horizontal slurry pumps with 316 SS shafts sleeves and stuffing boxes. Borg Warner model 465 H variable speed drives with Flange mounted 125hp, 460/3/60, 1800 rpm motors.

6 - Hazleton, 12" FN type US 8' long vertical pumps. All wetted parts 316 SS with 100hp, 460/3/60, 1800 rpm motors.

2 - Hazleton, 12" FN, type VS, 8' long vertical pumps. All wetted parts 316 SS with 125hp, 460/3/60, 1800 rpm motors.

2 - Portable rod chargers, complete with motors, drives and electrical controls.

1 - Kranco bridge crane with enclosed cab. Type TRE-BG, capacity 20 tons, span - 90'0", 55' available lift. s/n 6901.

8 - Leach tanks, 30' diameter by 30' high, rubber lined. Mild steel construction.

8 - Leach tank agitators complete with Denver #18 gear reducers, rubber covered 8' diameter. 6 bladed impellor and rubber covered, 19' shaft, with 75hp, 460/3/60, 1200 rpm motor.

5 - Dorr-Oliver thickeners, type 216 S-2 mechanism, 400' diameter, 25'6" depth at centerwell. All wetted parts 316SS. Two long rake arms and 2 stub arms.

1 - Dorr-Oliver thickener, type 122-S2 mechanism, 400' diameter, 28'7" depth at center well, all wetted parts 316SS. Two long rake arms and 2 stub arms.

1 - Denver model 50" XHH automatic sampler with timer, cast iron sample cutter.

1 - Denver model 50" XHH automatic sampler with timer, 316SS wetted parts.

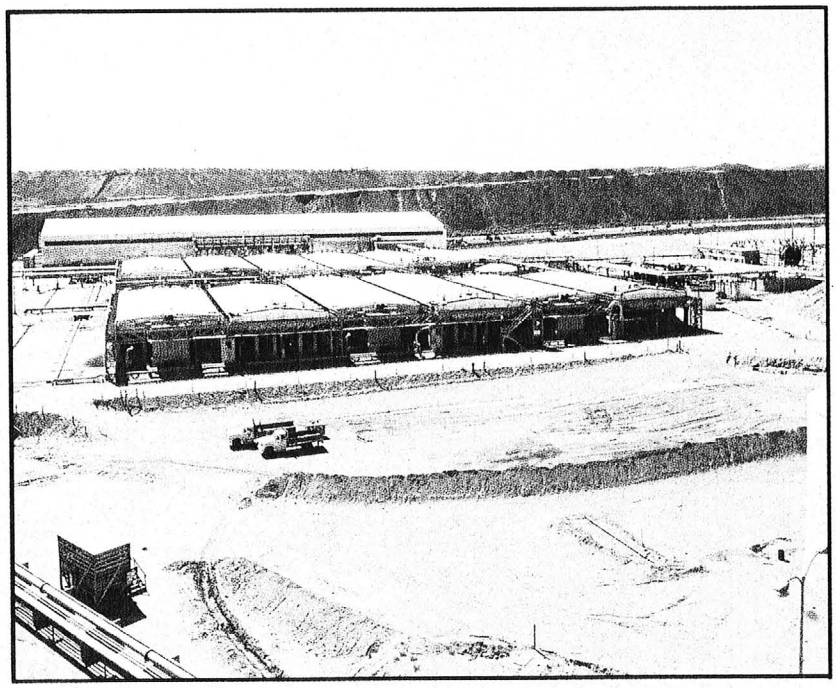
1 - Denver wet slurry continuous vezin sampler, complete and self contained with cast iron cutter.

1 - Denver wet slurry continuous vezin sampler, complete and self contained with 316SS wetted parts.

5 - Wright 5 ton speedway hoist with 21' of lift at 15 FPM single speed with motorized trolley set to operate on circular track.

5 - Wright 5 ton speedway hoists with 49' lift at 21 FPM single speed - operate with plain trolleys.

III. Copper Solvent Extraction and Electrowinning



Copper Solvent Extraction

The copper bearing solution is split into two streams of 3000 to 3300 gpm each for counter current copper extraction in two parallel trains of mixer settlers. Each train consists of four extraction and two stripping stages.

Mixer settlers are of a standard Davey Powergas gravity design. A square mixing box 15'x15' contains a draft tube through which the phases are introduced into the eye of the turbine. The dispersion exits the top of the tank through a hole around the turbine shaft which prevents air entrainment from the dispersion air interface.

All wetted parts of the mixer settlers are 316 stainless steel construction.

Equipment:

8 each - Settler tanks, 45ft wide by 110ft long. Picket fences at both ends, all wetted parts 316SS.

4 each - Settler tank 45ft wide by 140ft long. Picket fences at both ends, all wetted parts 316SS.

12 each - Chemineer model 9-HTDA-100 high torque pump mixer with 100 H.P. 3 phase, 460 volt, 1775 RPM motor. 8' diameter enclosed impellor all shaft and impeller 316SS.

1 each - Loaded organic storage and surge tank 120,000 gal capacity, all 316SS construction.

1 each - Loaded organic storage and surge tank 100,000 gal capacity, all 316SS construction.

1 each - Diluent storage tank 58,000 gal capacity, mild steel const.

2 each - Worthington model 10FRB-182 horizontal centrifugal pump, all wetted parts 316SS, with 50 H.P., 3 phase, 460 volt, 1780 RPM motor.

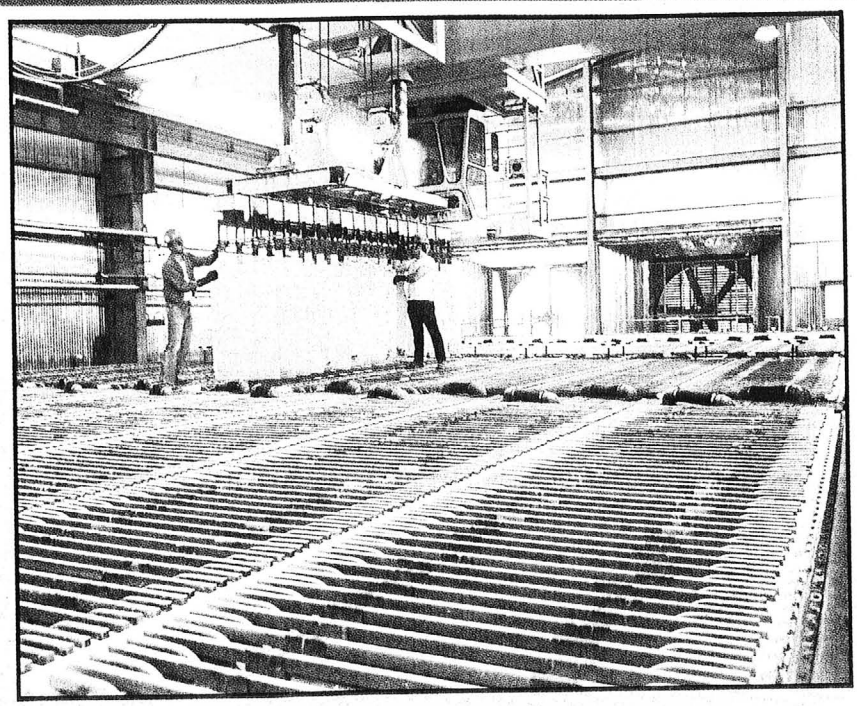
2 each - Barret-Haentjen vertical pump model 10DN with 11'-0" shaft. 316SS construction with 200 H.P. 3 phase 460 volt 1780 RPM motor.

1 each - Barret-Haentjen vertical pump model 10DN with 11'-0" shaft all wetted parts 316SS, with 200 H.P. 3 phase 460 volt, 1200 RPM motor.

1 each - Barret-Haentjen vertical pump model 10DN with 11'-0" shaft, all wetted parts 316SS, with 200 H.P. 3 PH 460 volt, 1200 RPM motor and Borg-Warner variable speed drive model 687V.

2 each - Barret-Haentjen vertical pump model 5BN with 11'-0" shaft, all wetted parts 316SS, with 15 H.P. 3 phase 460 volt, 1780 RPM motor.

1 each - Delaval centrifuge type BRPX 207SGV-19-60/4183-24. Worm wheel shaft 1700 to 1800 RPM. All wetted parts 316SS with 10 H.P. 3 phase, 460 volt 1750 RPM motor frame 215T.



Electrowinning

The tank house consists of 216 concrete cells lined with PVC paraliners. Each cell contains 51 cathode and 52 anodes on 4" centers. The anodes are a cast lead calcium alloy. Starter sheets are prepared on titanium blanks. The cathodes are approximately 3'x4'. There are three recirculation systems in the tank house all fed from the common reservoir. Each recirculation system contains eight sections of nine cells each, and each has a transformer/rectifier for a nominal capacity of 120 tons per day.

The tank house is 100 ft. wide by 400ft. long. Steel construction with 316SS corrugated sheeting on walls and roof. Both cranes are on the same rails and cover the entire tank house cells and sheet preparation area. All piping is either PVC lined mild steel, 316 stainless steel, or polythene.

Equipment:

1 each - Electrolyte feed reservoir 210,000 gallon capacity, PVC lined concrete construction.

2 each - Barret-Haentjen vertical pumps model 10DN with 7'3" shaft. All wetted parts 316SS. 100 H.P. motor. 3 phase 460 volt, 1780 RPM TEFC, frame 405T.

1 each - Barret-Haentjen vertical pump, model 10D with 11'0" shaft. All wetted parts 316SS. 100 H.P. motor 3 phase, 460 volt, 1780 RPM. TEFC, frame 405T.

3 each - Barret-Haentjen vertical pump, model 8CN with 7'3" shaft. All wetted parts 316SS. 50 H.P. motor, 3 phase 460 volt, 1780 RPM TEFC, frame 326T.

3 each - Barret-Haentjen vertical pump, model 5BN with 7'10" shaft. All wetted parts 316SS. 100 H.P. motor, 3 phase 460 volts, 1780 RPM TEFC.

1 each - General Electric transformer/rectifier rated input 3 phase, 416 KV 60 HZ. Rated output 25 to 170 volt, 25000 AMP maximum current.

2 each - General Electric transformer/rectifier rated input 3 phase, 416 KV, 60 HZ. Rated output 90 to 170 volt, 25000 maximum current.

2 each - P&H overhead traveling bridge crane, enclosed cab, stiff leg type, 11 ton capacity - 101 ft. 10 in. span.

5 each - Cathode and starting sheet bales with 17 pairs of hooks.

1 each - General Conveyor cathode unloader. Hydraulic operated. Quadrant type.

1 each - Interlakes semi-automatic starting sheet preparation machine with bolster loading system, embossing rolls, sheet accumulator.

1 each - Interlake 48" slitter to trim ends and cut sheet to 28" width.

1 each - Interlake loop slitter to cut 4" strips for loops.

30 each - Starter sheet storage bolsters, 153 sheet capacity.

3 each - Cathode wash tanks 316SS construction.

1 each - Maren manually operated hydraulic vertical scrap baler. Model 2048 complete with hydraulic power pack with 5 H.P. 3 phase 460 volt motor.

1 each - Toledo platform scale model 2151, 9280 lb capacity, with electronic printer.

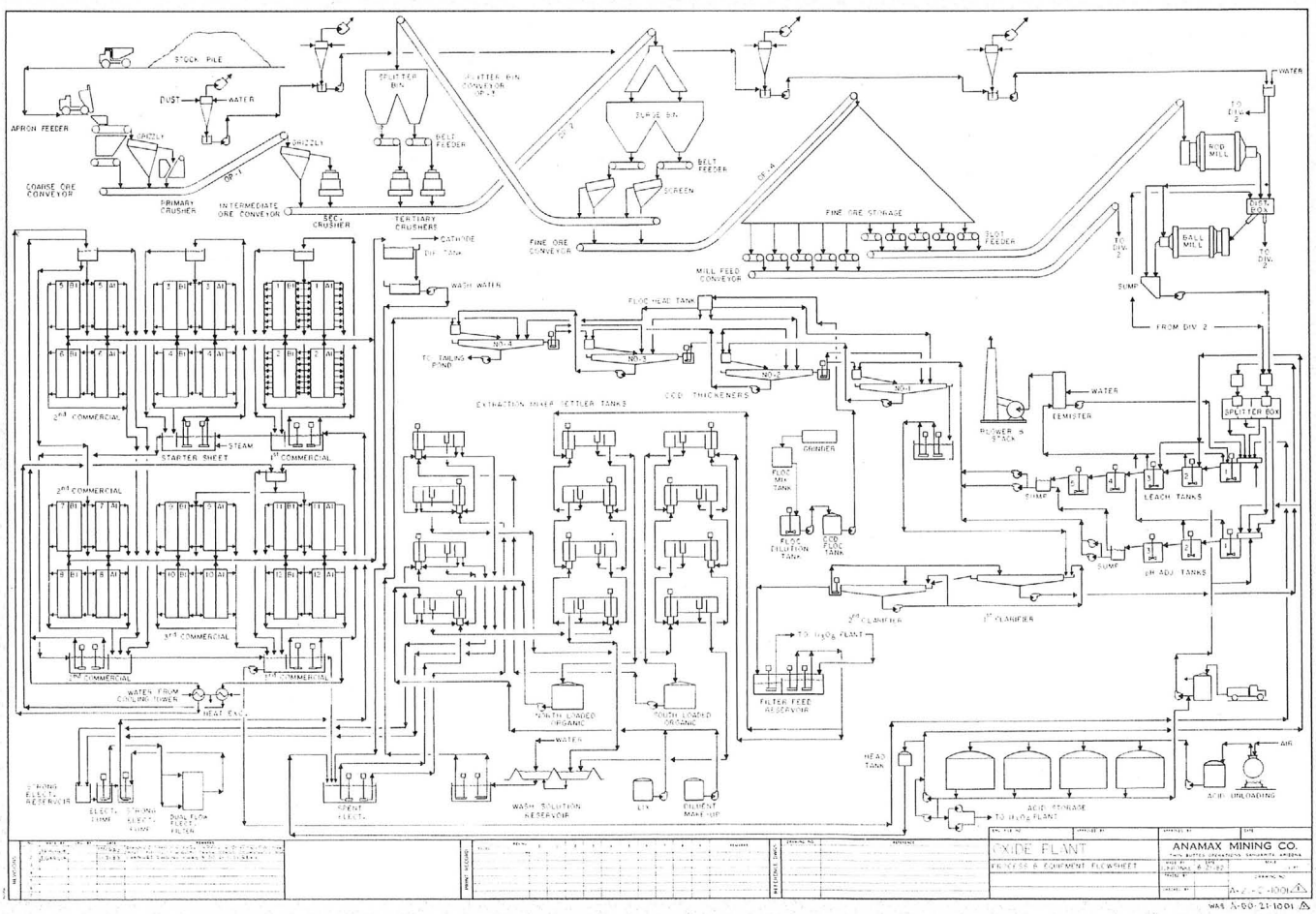
2 each - Tranter "Supercharge" model S-8-HP-125 plate and frame heat exchangers. 125 plates each 316SS construction. 2 pass arrangement.

3 each - Pearless vertical pumps size 10x10x16½ with 75 H.P. 3 phase 230/460 volt motor frame 365T P16 1775 RPM.

1 each - Worthington custom V horizontal pump size 6x5x17 with 75 H.P. 3 phase 460 volt, 1775 RPM motor frame 365T.

1 each - CE Natco filtration system size 10' dualflow including pipe and accessories for operation and blowdown. Vessel is 120' diameter by 12'6" high all wetted parts 316SS construction including piping and valving.

1 each - Strong electrolyte reservoir 172,000 gallon capacity. PVC lined concrete construction.

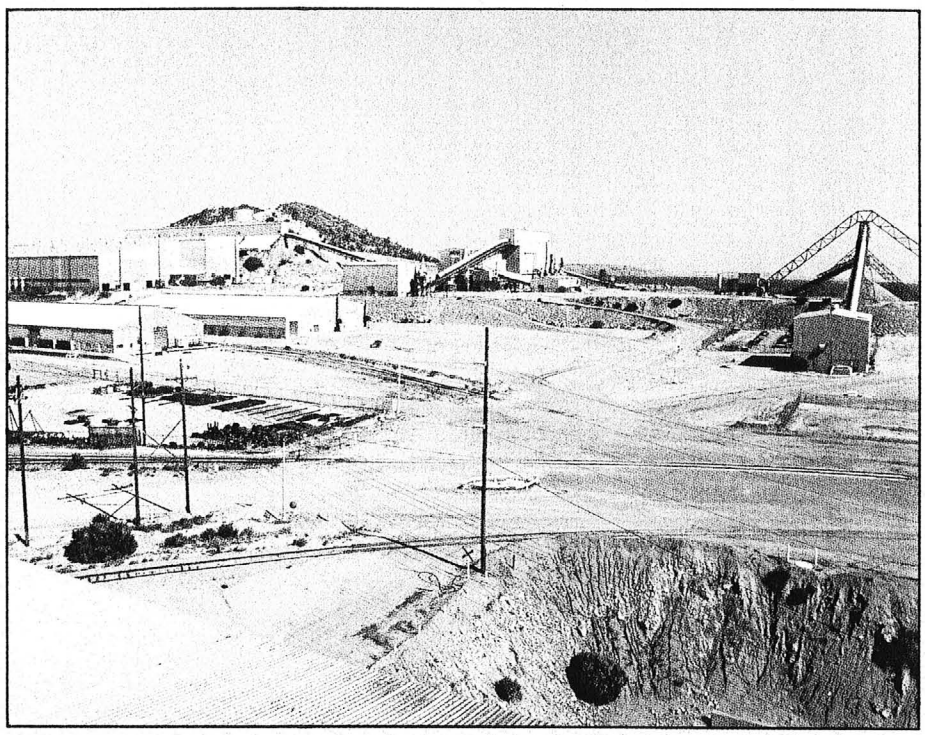


WAS A-DD-21-1001

Oxide Plant Flowsheet

SULFIDE CONCENTRATOR PLANT

Anamax Twin Buttes Mine
Green Valley, Arizona



This 44,000 DST per day sulfide plant was completed in December of 1969 and processed ore through July of 1983.

It consists of three facilities:

I. Concentrator (Mills, Flotation, Thickeners)
II. Molybdenum Plant
III. Filtration

These will be outlined separately in detail.

PARK CORPORATION
MINE EQUIPMENT DIVISION
P.O. BOX 1488 GREEN VALLEY, ARIZONA 85622 (602) 648-1630

I. Concentrator

This 44,000 ton per day concentrator consists of four milling divisions, each of which draw their rod mill feed from beneath the fine ore storage bin.

Each division consists of a rod mill and two ball mills, two cyclone feed pumps and four Krebs D-26 cyclones.

Flotation consists of 14 rows of rougher cells, three regrind mills, three sets of nine Krebs D15B cyclones and six rows of cleaner and scavenger cells. There are three 120' rougher concentrate thickeners.

The concentrator sends its tails to two 400' thickeners which each have eight D26B cyclones. The concentrator is fed to the molybdenum plant to remove moly and then goes to the filter plant.

Equipment:

12 - Belt feeders, 52" wide x 55' long. Belt changeout 110' plus splice. Drive is 15hp, 3 phase, 460 volt, 900 rpm motor with Louis Allis adjusto-speed eddy current clutch drive, frame # 364D 910. Speed reducer Western gear frame size 8312, ratio 210.1 to 1.

6 - Belt feeders 48" wide x 59' long. Fabric belt change out 124' plus splice. Drive is 15hp, 3 phase 460 volt, 1800 rpm Louis Allis Adjusto-speed model 9053. Speed reducer is Falk 2110Y3-C, ratio 291.2 to 1.

2 - Belt conveyor 36" wide x 52' long fabric belt change out 111' plus splice. Drive is 7.5hp, 3 phase, 460 volt RPM motor with Falk 7EZ3-06AG reducer.

3 - Belt conveyors, 36" wide x 253' long, fabric belt changeout 532' plus splice. 10hp, 3 phase, 460 volt, 1750 rpm motor with speed reducer Western 10BM52. Scale Ramsey model 10-11 Vey-R-Weigh.

6 - Belt conveyors, 24" wide x 122' long fabric belt changeout 282' plus splice. 1½hp, 3 phase, 460 volt, 1750 rpm motor with Westen 1.5 BM33 speed reducer. Scale Merrick model E.

1 - Belt conveyor, 36" wide x 211' long. Fabric belt changeout 457' plus splice. Drive 20hp, 3 phase, 460 volt, 1760 rpm motor. Falk model 2315T25 reducer.

1 - Belt conveyor, 18" wide x 115' long, fabric belt 236' changeout. 2hp, 3 phase, 460 volt, 1730 rpm motor with straight line model 1.5 BM 3339 reducer. Ramsey model 40-15 belt scale and totalizer.

1 - Belt conveyor, 18" wide x 88' long, fabric belt 180' changeout 1½hp, 3 phase, 460 volt, 1730 rpm motor with straight line model 1.5 BM 3339.

24 - Eriez model 110AH1-V1 vibrator feeder, suspension mounting, 36" wide x 96" long. Feed rate 20 to 35 TPH. Solid State AC operated SCR control.

6 - Allis Chalmers ball mills. 14.5' diameter x 28' long. O'flow type with scoop feeder. Rubber lined hoods and shell. Shell 2" thick A1S1 1020 steel. Central lubrication system. Ring gear-321T, 1.25 D.P., 31" face split single helical 6°-30' angle cast steel, pinions 23T, 1.25 D.P., 31" face, single helical 6°-30' angle with 3,000hp, 3 phase, 4000 volt, 720 rpm synchronous motors. Falk 1180 FN1 single reducer. s/ns A94521, A94518, A91522, A94520, A94523 and A94519.

3 - Allis Chalmers Rod mills 14' diameter x 18.5' long O'flow type with drum-scoop feeder. Shell 1 piece 1¾" thick A1S11020 steel. Trunnion bearings 64" diameter x 34" long bronze bushed. Ring gear 323T-32" face 1.2" DP single helical 6°-30' angle cast steel split. Pinion 22T, 32" face 1.2" D.P. single helical 6°30' angle. Central lube system with 2000 hp, 4000 volt, 720 rpm synchronous motor and Falk 1180YF1 single reduction reducer 720/183. s/ns A 94517, A 94516, B 00479.

2 - Marcy Ball mills. 14.5' diameter x 23.5' long O'flow type mill with combination drum scoop feeder. Shell 2 pieces 2" thick A283C steel. Trunnion bearings 85"x26" bronze bushed. Ring gear 236T, face 27", 1.0070 D.P. single helical split, reversible. Pinion 22T face 27", 1.0070 D.P. single helical. Central lube system with 3000HP 3 phase, 4000 volt, 720 rpm synchronous motor. Faik 1191YFN1 single reduction 4.563 ratio reducer. s/ns 2895 and 2896.

1 - Marcy Rod mill, 14' diameter by 18.5' long O'flow type mill with combination drum scoop feeder. Shell 2" thick A2836 steel. Trunnion bearings 85"x26" bronze bushed. Ring gear 289T, face 32", 1.25 D.P. single helical, split, reversible. Pinion 25T, face 32", 1.25 D.P. single helical. 2000hp, 3 phase, 4000 volt, 720 rpm synchronous motor. Falk 30.8x20.62 21S single reduction 4.7037 reducer. s/n 2894.

9 - Warman series A 12"x14" slurry pump. All wetted parts rubber lined, with 200hp, 3 phase, 460 volt, 1175 rpm motor.

1 - Krebs D26B cyclones with high pressure gum rubber liners, victaulic grooved inlet and O'flow connections.

9 - Krebs D15B cyclones with high pressure gum rubber liners, victaulic grooved inlet and O'flow connections.

32 - Denver model 300 DR flotation machine with 30hp, 3 phase, 460 volt, 1180 rpm motors. Each machine consists of a single spindle and 300 cu ft nominal volume.

18 - Galigher 12 cell flotation machines. Each cell consists of a single Galigher 120 agitair spindle with a 20hp, 3 phase, 460 volt, 1200 RPM motor for each 2 cells.

18 - Galigher 16 cell flotation machines. Each cell consists of a single Galigher 120 agitair spindle with a 20hp, 3 phase, 460 volt, 1200 rpm motor for each 2 cells.

18 - Galigher 20 cell flotation machines. Each cell consists of a single Galigher 120 agitair spindle with a 20hp, 3 phase, 460 volt, 1200 rpm motor for each 2 cells.

4 - Westinghouse #2169-1 heavy duty pressure blower single stage SWS1 arrangement. Capacity 40,000 CFM @ 2.25 PSIG with 600hp, 3 phase, 4000 volt, 1800 RPM motor.

2 - Bayley type H, size 80 fans arrangement #8, with 75hp, 460/3/60, 1750 RPM motor.

3 - Marcy Regrind mills 7.5' diameter x 23' long O'flow type ball mill with combination drum scoop feeder shell 1" thick ASTMA-283-C steel Ring gear 307T, 14" face, 2.4 DP, 5° helix angle. Pinion 21T, 14" face 2.4 D.P., 5° helix angle. Trunnion bearings 32" diameter x 19" long bronze bushed. Drive is 500hp, 720rpm, 4000/3/60 synchronous motor with Falk single reduction reducer 4.13:1.

2 - Eimco thickeners. 120' diameter, 14' center depth, sloped bottom with 8.1" side wall height. Eimco type EX extra duty mechanism with 2 long rake arms, 2 stub arms, steel construction.

2 - Eimco thickeners. 100' diameter, 12' center depth, sloped bottom 6' side wall height. Eimco type CX heavy duty mechanism, 2 long rake and 2 stub arms, steel construction.

1 - P&H overhead 15/5 ton capacity, box girder type cab controlled traveling crane. Span 90'-6¾", lift main and aux. hoist 50', s/n CHL 22323.

1 - P&H overhead 50/5 ton capacity, box girder type cab controlled traveling crane. Span 82'0", lift main and aux. hoist 62', s/n CL22322.

1 - P&H overhead 17 ton capacity, box girder type cab and radio controlled traveling crane. Span 82'0" lift 62', s/n CH24335.

1 - P&H overhead 5 ton capacity box girder type cab controlled traveling crane. Span 88'-7½", lift 57', s/n CHL 22326.

9 - ASH C-6-5 rubber lined slurry pumps 10"x8" with 30hp 3/460/60, 1780 rpm motors.

2 - ASH D12-5 rubber lined slurry pumps 14"x12" with 50hp 3/460/60, 1170 rpm motors.

3 - ASH C12-5 rubber lined slurry pumps 14"x12" with 100hp 3/460/60, 1770 rpm motors.

2 - Eimco thickeners, 100' diameter, 12' center depth, sloped bottom 6'2" side wall height. Eimco type CX heavy duty mechanism. 2 long rake arms, 2 stub arms, steel construction.

32 - Denver 300 DR machines with 30hp, 3 phase, 460 volt, 1180 rpm motors.

Arrangement of 1 left hand and 1 right hand bank of 16 cells each. Each cell consists of single spindle and 300 cu.ft. nominal area. Each bank arranged with feed box, 4 cells, junction box, 6 cells, junction box, 6 cells and discharge box.

864 - Galigher 120 Agitar machines with one 20hp, 3 phase, 460 volt, 1200 RPM motor for each 2 cells. Each 2 cell area is 10'x10'x2' with 12 inches of weir bar.

There are 18 banks of cells with O'flow from both sides. Each bank is arranged with feed box, 12 cell area, divider, 16 cell area, divider, 20 cell area and discharge box.

II. Molybdenum Plant

The Molybdenum Plant was designed to process 1200 tons per day of CuMo concentrate and produce up to 20 tons per day of MoS_2. The circuit consists of two parallel trains of conditioning, rougher flotation and up to seven cleaner cells. Additionally, there is an insoluble flotation circuit, two thickeners, two spray dryers and a dry handling and packaging system.

III. Filtration

The Sulfide concentrate is stored and thickened in two 100' thickeners, then fed into three drum filters. These are installed outdoors and designed to operate 24 hours per day on an 85% availability. Maximum output was designed at 50 tons per hour with the feed slurry at 58% solids, 120°F temperature, 1.85 SG. The screen size is 325 mesh. Ph to be 7 plus.

The filter cake was 10% moisture by weight by the use of 80 PSI steam.

The plant includes concentrate handling and rail car loading systems. It was put into operation in 1976 and operated until 1983.

Equipment:

2 - EIMCO 100' diameter thickeners with 12' center depth, sloped bottom, 6'2" sidewall height. Designed at 600 STPD dry solids. Eimco type CX heavy duty mechanism.

1 - Agitated storage tank, size 24' high, 20' diameter. Capacity 200 tons of solid at 58% solids. Denver #15 gear box and agitator with 75hp 460/3/60, 120 rpm drive.

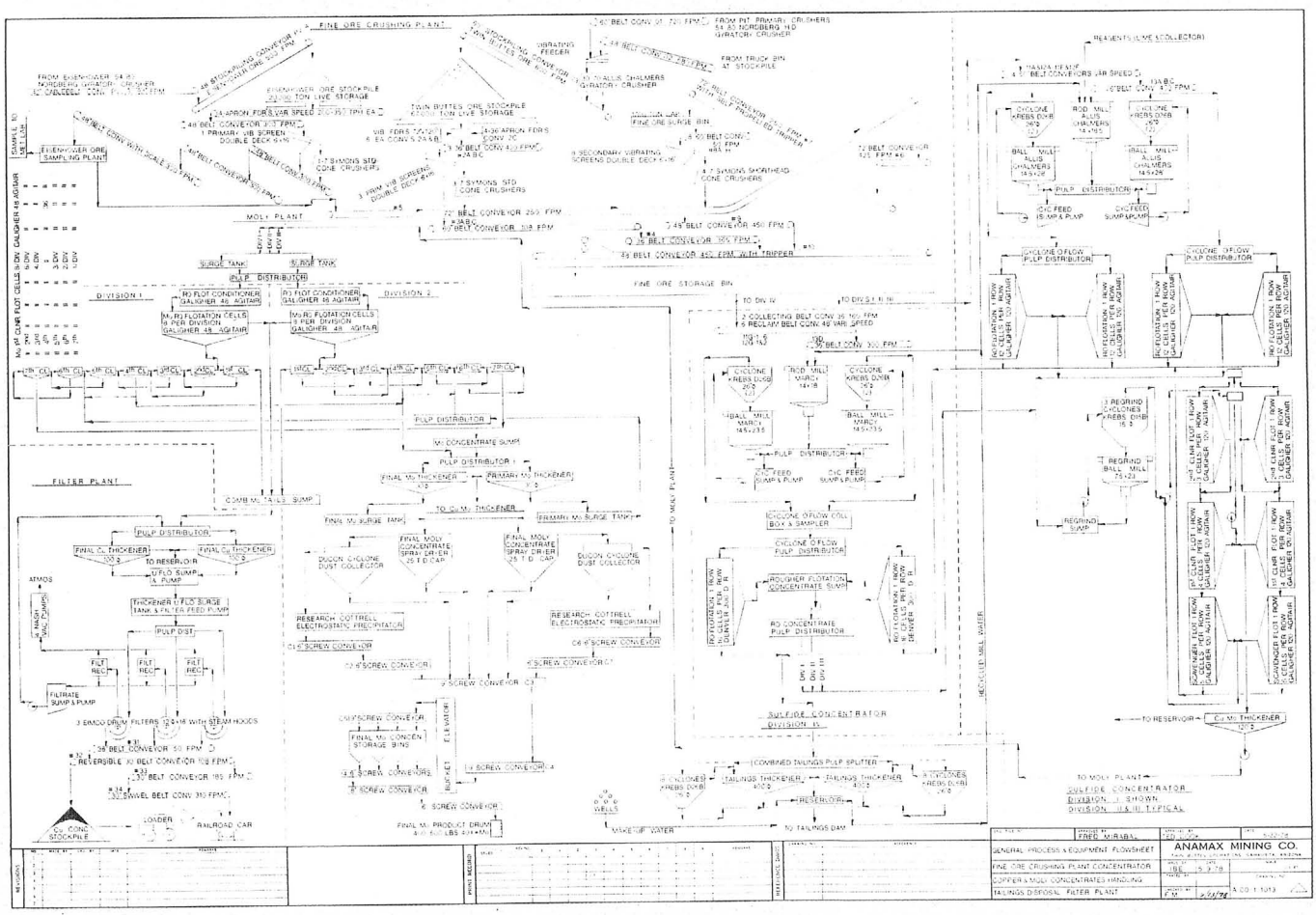
2 - Wilfley 6x4 model K sand pump complete with 40hp, 460/3/60, 1800 rpm motors.

1 - Denver H.D. motorized pulp distributor, 4' diameter, 3 compartment type EA with ¾hp motor.

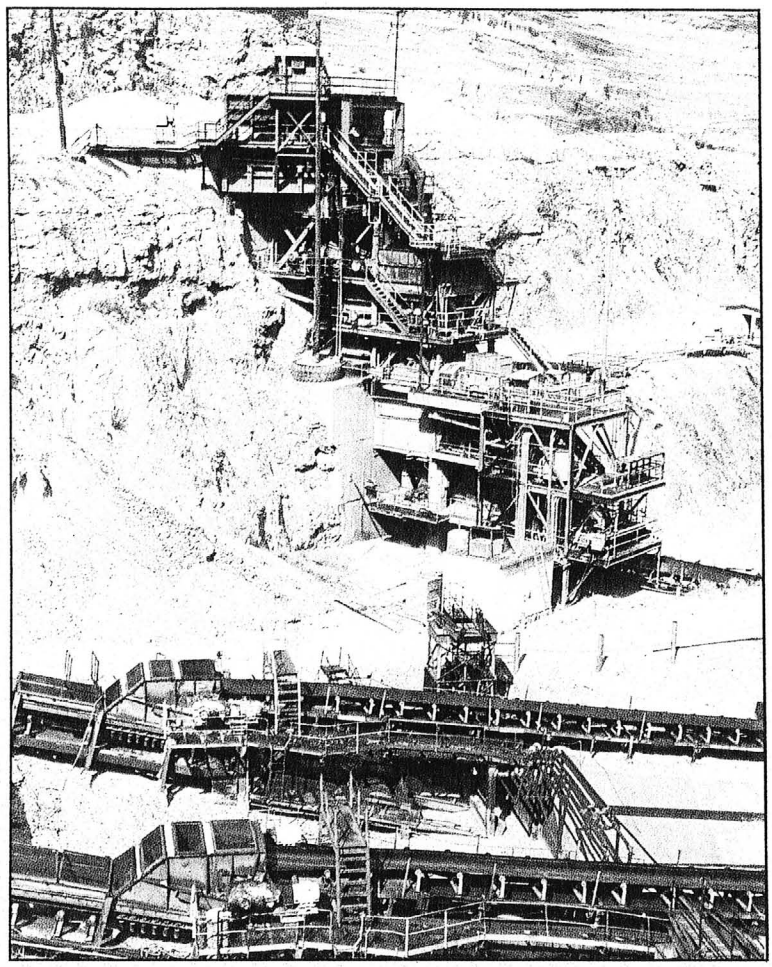
3 - EIMCO rotary scraper drum filters, 12' diameter by 18' drum length, double valve, complete with tank, tank agitator. 316SS screen and Reeves varispeed motor drive, size 343, 5hp, 3/460/60. s/ns 81517-01-AR, 81517-01-BR, 81517-01-BR.

4 - Nash model 6003 vacuum pumps, cast iron construction, rotor speed 312 rpm, volume 4000 CFM at 23.5 in. of Hg. with 300hp 4000/3/60, 1200 induction motor. s/ns 76U3810, 7643809, 76U3808, 76U4048.
3 - Vacuum receivers, 72" diameter by 84" height, complete with flanged connection.
1 - Galigher model 2.5 SA300x48 rubber lined sump pump with 3hp 460/3/60, 1800 rpm motor.
1 - Roots model RASE60-710, rotary lobe-type blower, 632 CFM at 3500' elevation, 10 PSI discharge with 50hp, 460/3/60, 1800 rpm motor.
3 - Galigher model 3.5 SA2100x60 rubber lined sump pump with 40hp, 460/3/60, 1800rpm motor.
1 - Conveyor 36' wide by 103' long fabric belt, 35° idler with Falk type J shaft mounted size 1215-J14 speed reducer and 5hp 460/3/60, 1800rpm motor.
1 - Conveyor-Transfer shuttle 30" wide by 81' long, fabric belt, 20° idlers, Falk shaft mounted model 1215J24 speed reducer and 3hp 460/3/60, 1800rpm reversing motor.
1 - Conveyor-Loadout station 30" wide by 53' long, inclined 10°. Falk shaft mounted model 1215J14 speed reducer and 5hp, 460/3/60, 1800rpm motor.
1 - Conveyor-Sloughing carloader 30" wide with 20° idlers.
1 - Wright monorail hoist, 8 ton capacity, model L36G10 with Chester model 1312-8 hand geared trolley.
1 - Robbin & Mayer bridge crane, 10,000 pound capacity, 20' span, 54'2" lift.
1 - Ramsey model 10-20-1 belt scale including model 40-20 electronic totalizer.
1 - Howe Richardson model 31000 railcar scale 410,000 pound capacity s/n 6012219, with Toledo model 8132 readout and printer.

Sulfide Concentrator Plant Flowsheet



CRUSHERS



PARK CORPORATION
MINE EQUIPMENT DIVISION
P.O. BOX 1488 GREEN VALLEY, ARIZONA 85622 (602) 648-1630

Anamax Twin Buttes Mine
Green Valley, Arizona

East Primary Crusher

The following is a list of major components that are intergral to the operation of the East Primary Crusher.

1. **Crusher -** Nordberg size 54/80 gyratory crusher, s/n GY 485. The crusher is a top suspended model equipped with a complete lubrication system and oil cooling system. G.E. 500 H.P., 4000V motor, V-belt drive.
2. Apron Feeder - 84"x19'10" manganese steel. 100 H.P. Falk 75CB3-12A1 gear reducer and motor.
3. Miscellaneous - Electrical switchgear, controls, panels and other electrical apparatus.

North and South Primary Crushers

The following is a list of major components that are intergral to the operation of the North and South Primary Crushing facilities. These two units operate independently of each other and are located several hundred feet apart midway down in the Twin Buttes Pit. Since both units are identical, major components belonging to *one* facility are listed for convenience (although two of each item are on hand).

1. **Crusher**
   A) Nordberg size 54/80 gyratory crusher, s/ns 428 or 429. The crusher is hydroset equipped with a mainshaft position indicator, complete lubrication system with oil cooling system with make up water supplied from an outside source.

   The crusher drive motor is a General Electric, 500 hp, 700 rpm, 4000V unit connected to the countershaft via 17 ea E-390 drive belts.
2. Primary feeder to crusher
   A) Hewitt-Robbins 96"x264" style 2E-13 Eliptex grizzly vibrator feeder. The feeder is driven by a Toshiba 125 hp Frame 505 UZ - A.C. variable frequency motor connected to the Feeder via a Spicer driveline.
3. Secondary take away feeder
   A) Hewitt-Robbins 72"x192", style E-13 Eliptex vibrating feeder. The feeder is driven by a Toshiba 50 H.P., frame 404T - A.C. variable frequency motor connected to the feeder via a Spicer driveline.
4. Miscellaneous - Electrical switchgear, controls, panels and other electrical apparatus

Secondary Crusher

The secondary crushing plant is located inside a 100' long x 40' wide x 60' high structural steel building. Immediately adjacent is a 60' long x 30' wide x 60' high surge bin that contained live ore storage. These two connected units are located on a partially covered two story concrete foundation which also houses live storage for the secondary feeders, lubrication, cooling systems and the secondary feeders themselves.

The following is a list of major components that are intregral to the secondary crushing plant.

1. **Crushers:** 2 ea Allis-Chalmers Superior size 30/70 gyratory crushers, s/ns A-92212 and A-92211. These two units are equipped with hydrosets, mainshaft position indicators, complete lubrication, oil cooling systems and positive displacement air systems for the floating ring areas. The crusher drive motors are Westinghouse 400 hp, 500 rpm, 4000 V motors direct coupled to the crushers via a Falk clutch type coupling.
2. Primary feeders: 2 ea Hewitt-Robbins 72" x 285", style 2E-13 Eliptex vibrating grizzly feeders. These two units are each driven by a 75 hp Toshiba 900 rpm variable frequency drive motor and Emerson control unit. These motors are coupled to the feeders via Spicer heavy duty drive lines.
3. Secondary feeders: 2 ea Simplicity 74" x 168" pan feeders. These two units are each driven by a 40 hp Allis Chalmers, 1750 rpm motor, V-belt connected to the feeder. These two feeders have independent lubrication and cooling systems located nearby.

4. Miscellaneous equipment:
   A: P&H bridge crane with a 50 ton capacity main hoist and 5 ton capacity aux. hoist.
   B: Otis 5,000 lb. capacity elevator that services all levels.
   C: Electrical room contains Westinghouse, Clark and Emerson panels for distributing 4160 V, 480 V, 220 V and 110 V service.
   D: Dust Collector: Wheelabrator screw type conveyor and baghouse type service all levels.

Palo Verde Crusher

The following is a list of major components that are integral to the Palo Verde crusher and take away feeder.

1) Nordberg size 54/80 gyratory crusher, s/n GY518. This unit is hydroset equipped with a mainshaft position indicator, complete lubrication system and oil cooling system with make up water supplied from an outside source. The crusher drive motor is a General Electric 500 hp, 705 rpm, 4,000 V unit is V-belt driven.
2) NICO 72" x 20' long heavy duty apron feeder. This unit is powered by a self-contained Falk fluid drive and enclosed gear box, model #60VCVF-GA242414.
3) Miscellaneous
   A) Self-contained hydraulically operated rock grapple.
   B) Electrical - Electrical switchgear, controls, panels and other electrical apparatus.

Portable Crushing Sample Plant

The sample plant consists of:

Pioneer Primary crushing plant manufactured by Missouri-Rogers, s/n 2584, complete with the following:
   a. Missouri-Rogers vibrating grizzly feeder
   b. Feeder dozer trap with wing walls
   c. Pioneer 20"x36" primary jaw crusher with new rebuilt plates
   d. Tandem walking beam axle assembly with total of (8) tires
   e. Product conveyor, approx 36"x25'
   f. King pin attachment
   g. 440 V electric starters for electric starters for electric power on vibrating feeder and delivery conveyor

Additional materials added to plant:

1. Rogers machine works jaw crusher; 24" length, 16" wide, 8" throat opening
2. Rotary sample splitter
3. 2 cutter hammers, size 4, FVWR, 3 pole, 3 phase open type contractor with 120 V magnetic coil

Kaiser Steel's Eagle Mountain Iron Ore Mine Eagle Mountain, California

Symons 7' Cone Crushers

1-7' Shorthead extra heavy duty cone crusher sn 7458.
Fine bowl with medium cavity design liner, standard eccentric throw, water chambertype/grease sealed, hydraulic adjustment rams and cylinder lockposts, belt driven with external main frame pins, packaged lube system. Unit driven by a Westinghouse, 350hp frame 686.5-D, 4160V, 46amp, 1.15 service factor, 711 rpm style 19B1014 motor, s/n 25-64.

1-7′ Standary heavy duty cone crusher s/n 7280.
Extra coarse bowl with medium cavity design liner, standard eccentric throw, air sealed, hydraulic adjustment rams and cylinder lockposts, belt driven with internal main frame pins. Package lube system. Unit driven by a Westinghouse 300hp, frame CS3A, 4160V, 38 amp, 1.15 service factor, 695 rpm motor, s/n 2-3B1081.

1-7′ Standard heavy duty cone crusher s/n 7399.
Extra coarse bowl with medium cavity design liner, standard eccentric throw, air sealed, hydraulic adjustment rams and cylinder lockposts, belt driven with internal main frame pins. Package lube system. Unit driven by a Westinghouse 300hp, frame CS3A, 4160V, 38 amp, 1.15 service factor, 695 rpm motor, s/n 63V1081.

1-7′ Short head heavy duty cone crusher s/n 7279.
Coarse bowl with medium cavity design liner, standard eccentric throw, air sealed, hydraulic adjustment rams and cylinder lockposts, belt driven with internal main frame pins. Package lube system. Unit driven by a Westinghouse 300hp frame C53A, 4160V, 38 amp, 1.15 service factor, 702 rpm motor, s/n 1674P667.

1-7′ Short head heavy duty cone crusher s/n 7401.
Coarse bowl with medium cavity design liner, standard eccentric throw, air sealed, hydraulic adjustment rams and cylinder lockposts, belt driven with internal main frame pins. Package lube system. Unit driven by a Westinghouse 300hp frame C53A, 4160V, 38 amp, 1.15 service factor, 695 rpm motor, s/n 53V1081.

1-7′ Short head heavy duty cone crusher s/n 7400.
Coarse bowl with medium cavity design liner, standard eccentric throw, air sealed, hydraulic adjustment rams and cylinder lockposts, belt driven with internal main frame pins. Package lube system. Unit driven by a Westinghouse 300hp frame C53A, 4160V, 38 amp, 1.15 service factor, 695 rpm motor, s/n 3-3V1081.

1-7′ Short head heavy duty cone crusher s/n 7402.
Coarse bowl with medium cavity design liner, standard eccentric throw, air sealed, hydraulic adjustment rams and cylinder lockposts, belt driven with internal main frame pins. Package lube system. Unit driven by a Westinghouse 300hp frame C53A, 4160V, 38 amp, 1.15 service factor, 695 rpm motor, s/n 4-3V-1081.

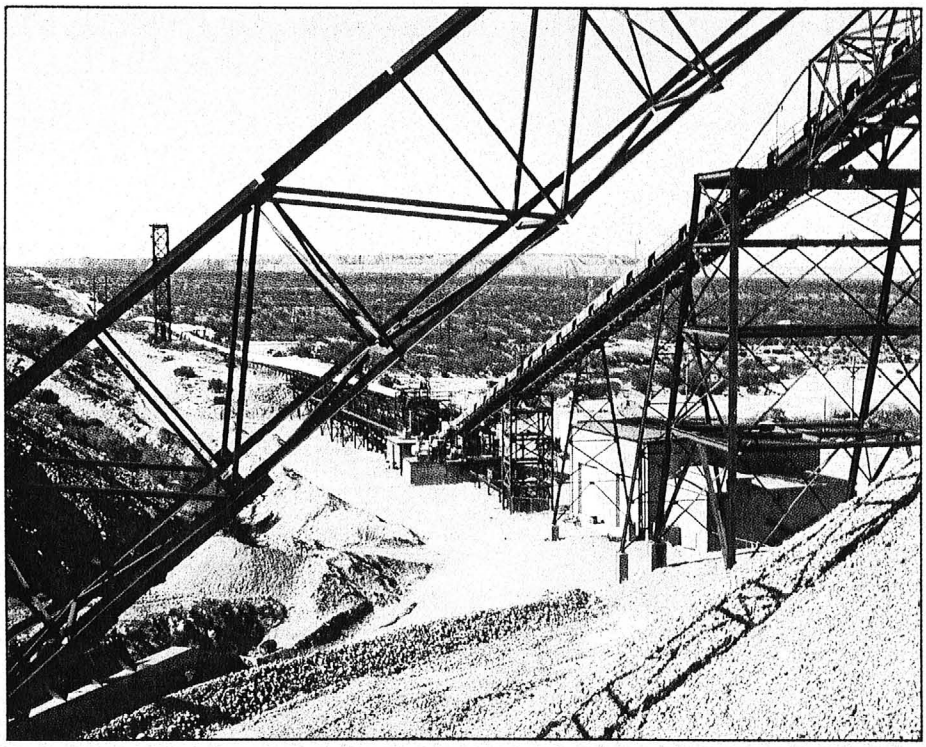
Anamax Twin Buttes Mine
Green Valley, Arizona
Symons 2′ Cone Crushers

1 - 2′ Symons standard cone crusher - s/n E-2514, coarse bowl with coarse cavity design liner, standard eccentric throw, standard seal, adjustment capscrew type bowl clamping system, duckworth-windlass bowl adjustment system, belt driven with internal main frame pins, package lube system. Unit is driven by a Westinghouse 30 hp mill and chemical type, 900 rpm, 460 V motor.

1 - 2′ Symons shorthead cone crusher - s/n E-2515, coarse bowl with fine cavity design liner, standard eccentric throw, standard seal, adjustment capscrew type bowl clamping system, duckworth-windlass bowl adjustment system, belt driven with internal main frame pins, package lube system. Unit is driven by a Westinghouse 30 hp mill and chemical type, 900 rpm, 460 V motor.

CONVEYORS

Anamax Twin Buttes Mine
Green Valley, Arizona



The following are descriptions of conveyor systems available either as complete units or on a piece by piece basis.

Cable Belt, Ltd. Conveyor System (42″ wide; 6.4 miles long)

The unique feature of this system is the separation of the driving (tension) medium from the material carrying medium. In conventional systems, the belt must be capable of performing both functions. Since wire ropes provide the driving tension, only tension sufficient to prevent folding need be applied to the belt itself.

Additional advantages over conventional conveyor systems include:

1. Single drive. One of the principal advantages of the cable belt system is that long belts can be driven from a single drive station, even when major changes in belt direction occur along the route. Only one drive is required for the Anamax system, which includes one 60° bend. Conventional systems would have required several drive stations, increasing system complexity and decreasing availability.

PARK CORPORATION
MINE EQUIPMENT DIVISION
P.O. BOX 1488 GREEN VALLEY, ARIZONA 85622 (602) 648-1630

2. Lower power consumption. The cable belt system, with its widely spaced pulleys, has approximately half the number of bearings of a conventional system. The belt is also lighter and is not continuously flexed by troughing idlers. All of these factors reduce system drag, and therefore the power to drive the system. Anamax estimates that the cable belt system uses 30% less power than a similar conventional system.
3. Maintenance simplicity. Having fewer components, the cable belt system requires less maintenance. The most maintenance-prone components, the rope support pulleys, are easily changed and repaired. The light belt is easier to install, and can be shipped in longer lengths, necessitating fewer splices.
4. Resistance to ripping. On a long conveyor system, long belt rips are a very real danger. Belting for the cable belt system is virtually rip-proof because of the transverse stiffeners and low tension belt splices.
5. Belt splices. Conventional high tension belting requires high tension splices. Even under ideal conditions, high tension splices take at least three shifts to repair because of the vulcanizing required. The cable belt low tension splices consist of opposing wire clips on the two sections of belt to be joined, which are held together by a short length of small diameter wire rope. Under good conditions, the belt can be spliced in an hour.
6. Ease of alignment. A high-tension belt with 40 to 50 splices and variable loads would be very difficult to keep aligned. Poor alignment leads to belt edge damage, tension cable deterioration and belt failure. The cable belt system does not require belt alignment since the belt is loosely attached to the wire ropes, which are kept in alignment by rope support pulleys.
7. Low spillage. Since the belt in the cable belt system does not pass over idlers, the material is carried smoothly with little tendency to spill off the belt or create dust, especially at transfer points.
8. Proven reliability. Although unfamiliar in the U.S., numerous cable belt systems are at work around the world, in contrast to several other prototype nonconventional systems.

General Description:

The conveyor is a 1.07 m (42 in) wide cable belt, 9910 m (32,513 ft) from head drum (pully) to tail drum. The system is designed to carry 1800 tonnes (2,000 short tons) of copper ore per hour at a speed of 251 m (824 ft) per minute. Two 41 cm (1.6 in) type 6x19 Lang lay wire ropes in endless loops run the entire length of the conveyor. These ropes support the belt, and are driven by a single drive unit at the head end.

The belt is made of DuPont Nordel hydrocarbon rubber, which was selected because of its resistance to cracking and checking in the desert environment. The original belt is stiffened laterally by 0.5x1.3 cm (0.2x0.5 in) spring steel straps spaced approximately 8 cm (3 in) apart. The thickness and spacing of these straps determine the troughing of the belt under load; with no load, the felt is flat.

The belt on the short leg of the conveyor has been replaced with a "strapless" belt, which uses a mesh of steel wire and synthetic fibers molded into the Nordel.

Two continuous vee grooves are located near the edges of the belt on both top and bottom. The ropes ride in the bottom grooves on the ore carrying trip and in the top grooves on the return trip. The bottom grooves are located about 19 cm (7.5 in) in from the edges of the belt where they form a small "lip" which helps to prevent spillage.

Rope support pulleys - The rope support pulleys are 30 cm (12 in) in diameter and are lined with a polyurethane tread. These pulleys are designed for easy removal, repair and replacement. Two polyurethane-lined half rims are bolted to the cast-iron pulley hub containing ball bearings. When the tread is worn, half rims can be removed and replaced with new or relined half rims.

Rope support pulleys are placed in pairs on both sides of the belt at each linestand. In the Anamax system, linestands are spaced approximately 5 m (16.5 ft) apart. Pulley pairs are generally placed at every third linestand to support the return ropes.

Linestands - The linestands consist of welded rectangular frames which completely surround the belt. The linestands support cross arms which in turn support the pulleys. The cross arms can be adjusted to align the pulleys with the rope.

The linestands are bolted to cylindrical cast-in-place concrete foundations. These foundations are 46 cm (18 in) in diameter and extend a minimum of 1.1 m (3.5 ft) into the ground. The foundation tops are generally 15 to 46 cm (0.15 to 1.5 ft) above ground level. High linestand foundations are used on bridge approaches and at minor washes and defiles.

The conveyor cover is supported on purlins which run between linestands.

Angle station - One of the more ingenious features of the system is a 60° angle bend located some 827 m (2700 ft) from the loadng point. Here, the driving ropes and material flow change direction. The belt itself consists of two separate sections which do not make the bend.

At the angle station, the incoming belt is lifted off the driving ropes by a series of small idlers which fit into the vee grooves. The belt then passes around a head pulley, spilling its load into a chute, and around a tension pulley. A third pulley directs the belt back toward the loading point. The belt is then lowered onto the return ropes. The outgoing belt picks up the material from the chute and carries it to the final discharge point some 9083 m (29,800 ft) distant.

Once the incoming belt has been lifted off the driving ropes, the ropes are directed away from the belt and around the bend by the large diameter pulleys. The ropes are then aligned with the vee grooves in the outgoing belt, and the belt is lowered onto them after it passes the loading chute. The return ropes are treated similarly, so that one pair of ropes drives both sections of belt.

Rope tension system - Near the head end of the conveyor, the driving ropes are tensioned by a system which ensures that both ropes receive the same tension in spite of differential stretch or differing rope lengths. Forty seven tonnes (52 tons) of steel supported in a tension tower 30m (100 ft) tall provide tension to two rope tension bogies. The rope tension bogies carry large diameter pulleys which transmit the tension to the driving ropes. These bogies travel on tracks 107 m (350 ft) long, one on either side of the conveyor, thereby allowing rope stretch to be taken up independently.

Drive unit - Two 1120 kw (1500 hp) electric motors are directly coupled to the triple reduction gear box, which drives the ropes through two Koepe friction wheels. The motors are of the wound rotor type, with a liquid rheostat unit for controlling conveyor speed during start-up. The starting cycle takes approximately seven minutes. The drive is designed so that a fully loaded conveyor can be started and unloaded with one motor, and can be operated at half capacity (900 tonnes (1000 tons) per hour) on one motor.

The system was in operation from January of 1979 through July 1983.

Cable Belt, Ltd. Conveyor Specifications:

Conveyor length	9910 m (32,513 ft)
Difference in elevation between terminals	15 m (50 ft)
*Rated design capacity	1814 tonnes/hr (2000 short tons/hr)
Conveyor belt loading at rated design capacity	121 kg/m (81 lb/ft)
Material	Copper ore
Material density	1762 kg/cu m (110 lb/cu ft)
Material lump size	-15 cm (-6 in)
Daily operating time	14 hours
Annual tonnage	4,536,000 tonnes (5,000,000 short tons)
Belt width	1.07 m (42 in)
Conveyor speed	251 m/min (825 ft/min)
Rope diameter	41 cm (1.6 in)
Rope specifications	British Ropes No. 431
Factor of safety of rope at rated design capacity	3.3:1
Rated motor power	2x1120 kw (2x1500 hp)
Drive unit Koepe wheel diameter	3 m (10 ft)
Rope tension pulley diameter	1.93 m (6.33 ft)
Approximate linestand spacing	5 m (16.5 ft)
Rope support pulley diameter	30.5 cm (12 in)

**Rated design capacity is an average over the conveyor length, with the feed rates controlled to within plus or minus 10%.*

Additional Conveyor Systems Available:

Stacking conveyor - The overland conveyor discharges through a bin onto a conventional 1.2 m (49 in) wide by 142 m (500 ft) long stacking conveyor at the Twin Buttes end. This conveyor places the ore on a 18,000 tonne (20,000 ton) live stockpile which allows surge capacity between the conveying system and the concentrating plant.

West Conveying System - Southside in Pit

1. P-1S Conveyor
   A. Rubber - 1700′ PIW steel cable belting, 60″
   B. Length - 145′, no lift
   C. Drive Gearbox - Jones 14 SMDBH, 90 HP, 18,683 to 1 ratio
   D. Drive Motor - 100 HP, 1800 RPM sq. cage motor 1 each
   E. Idlers - H.R. 7″ troughing idlers, 35° on 48″ centers returns are H/R. 7″ flat on 120″ centers
   F. P-1S is magnet equipped
2. P-2S Conveyor
   A. Rubber - 1700 PIW steel cable belting, 60″
   B. Length - 168′, 22′ lift
   C. Drive Gearboxes - 2 ea Jones 14SMDBH, 90 HP, 1750 RPM
   D. Drive Motors - 2 ea Westinghouse 125 HP, 1750 RPM
   E. Holdback Capability - each gearbox is equipped with Formsprag high speed holdback
   F. Idlers - H.R. 7″ troughing idlers, 35° on 48″ centers
   G. P-2S is metal detector equipped

3. R-1S Conveyor
   A. Rubber - 3750 PIW steel cable belting, 60″
   B. Length - 2517′ with 607′ lift
   C. Drive Gearboxes - 4 ea Jones 72DP, 1116 HP 38.75 to 1 ratio
   D. Drive Motors - 4 ea Westinghouse 1250 HP 1750 RPM
   E. Holdback Capability - each gearbox equipped with Formspring high speed holdback
   F. Idlers - H.R. 7″ troughing idlers, 35° on 48″ centers
4. R-2S Conveyor
   A. Rubber - 1700 PIW steel cable belting, 60″
   B. Length - 1887 with 99′ lift
   C. Drive Gearbox - Jones 72DP, 38.75 to 1 ratio
   D. Drive Motor - Westinghouse 1250 HP, 1750 RPM
   E. Holdback Capability - gearbox is equipped with Formsprag high speed holdback.
   F. Idlers - H.R. 7″ troughing idlers, 35° on 48″ centers
   G. R-2S is load scale equipped

West Conveying System - Sulfide and Oxide Conveyors

1. O-1 Conveyor
   A. Rubber: 1700 PIW steel cable belting, 60″
   B. Length: 3907′ with 6′ lift
   C. Drive Gearboxes: 2 ea 400 HP, Jones 24D, 23.47 to 1 ratio
   D. Drive Motors: 2 ea 400 HP Westinghouse motors, 1750rpm
   E. Idlers: H.R. 7″ troughing rollers, 35° on 48″ centers, flat returns on 120″ centers
   F. O-1 conveyor is equipped with a B.F. Goodrich rip detection system.
2. SP-1 Conveyor
   A. Rubber: 1700 PIW steel cable belting, 60″
   B. Length: 1240′ with 12′ lift
   C. Drive Gearbox: 400hp Jones 24D with 23.47 to 1 ratio
   D. Drive Motor: 400hp Westinghouse, 1800 rpm
   E. Idlers: H.R. 7″, 35° troughing idlers, 35° on 48″ centers, returns on 120″ centers
   F. SP-1 conveyor is connected to a truck bin capable of loading 120T trucks

West Conveying System - Overburden System

1. W-1 Conveyor
   A. Rubber - 3750 PIW steel cable belting, 60″
   B. Length - 3,039′ with 190′ lift
   C. Drive Gearboxes - 2 ea Foote Jones 2 amps-405A, 1939hp, 25,56 to 1 ratio
   D. Drive Motors - 2 ea Westinghouse 1250hp, 1750rpm
   E. Holdback Capability - each gearbox is equipped with Formsprag highspeed holdback
   F. Idlers - H.R. 7″ troughing idlers, 35° on 48″ centers, flat returns on 120″ centers
2. W-2A Conveyor
   A. Rubber - 1700 PIW steel cable belting, 60″
   B. Length - 131′ with 11′ lift
   C. Drive Gearboxes - 2ea Jones 14 SMDBH, 90hp, 18.683 to 1 ratio
   D. Drive Motors - 2 ea Westinghouse 125 hp, 1750 rpm
   E. Holdback Capability - each gearbox is equipped with Formsprag high speed holdback
   F. Idlers - H.R. 7″ troughing idlers, 35° on 36″ centers, flat returns on 120″ centers
   G. W-2A is equipped with a truck bin for use with trucks when shifting W-3
3. W-2B Conveyor
   A. Rubber - 3750 PIW steel cable belting, 60″
   B. Length - 321′ with 9′ lift
   C. Drive Gearbox - Jones 22 SMDBH, 400hp, 18.05 to 1 ratio
   D. Drive Motor - Westinghouse, 400hp, 1750rpm
   E. Idlers - H.R. 7″ troughing idlers, 35°, on 36″ centers, flat returns on 120″ centers
4. W-3 Conveyor
   A. Rubber - 1700 PIW steel cable belting, 60″
   B. Length - 2425′ with 25′ lift
   C. Drive Gearbox - Jones 22SMDBH, 400hp, 18.05 to 1 ratio
   D. Drive Motor - Westinghouse 400hp, 1750rpm
   E. Idlers - H.R. 7″ troughing idlers, 35° on 48″ centers, flat returns on 120″ centers
   F. W-3 Conveyor is equipped with a traveling tripper and is also shiftable

5. W-4 Stacker
   Hewitt Robbin design with Manitowoc crawler model 3900-W base
   A. Rubber - 1700 PIW 60" steel cable belting, 60"
   B. Length - 200' with 36' lift
   C. Drive Gearbox - Jones 22SMDBH, 400hp, 18.05 to 1 ratio with a Formsprag high speed holdback
   D. Drive motor - Westinghouse, 400hp, 1750 rpm
   E. Idlers - H.R. 7" troughing and return idlers
   F. W-4 conveyor stacker is a self propelled crawler stacker capable of moving 31 FPM in either direction

West Conveying System - Northside in Pit

1. P-1N Conveyor
   A. Rubber - 800 PIW steel cable belting, 60"
   B. Length - 145", no lift
   C. Drive Gearbox - Jones 14 SMDBH, 90 HP, 18,683 to 1 ratio
   D. Drive Motor - 100 HP, 1800 RPM sq. cage motor
   E. Idlers - H.R. 7" troughing idlers, 35° on 48" centers returns are H.R. 7" flat on 120" centers
   F. P-1N is magnet equipped
2. P-2N Conveyor
   A. Rubber - 1700 PIW steel cable belting, 60"
   B. Length - 168' with 22' lift
   C. Drive Gearboxes - 2 ea Jones 14SMDBH, 90 HP, 18,683 to 1.
   D. Drive Motors - 2 ea Westinghouse, 125 HP, 1750 RPM
   E. Holdback Capability - each gearbox is equipped with: Formsprag high speed holdback
   F. Idlers - H.R. 7" troughing idlers, 35° on 48" centers
   G. P-2N is metal detector equipped
3. R-1N Conveyor
   A. Rubber - Goodyear 3750 PIW steel cable belting, 60"
   B. Length - 2517' with 60" lift
   C. Drive Gearboxes - 4 ea Jones 72DP, 1116 HP 38.75 to 1 ratio
   D. Drive Motors - 4 ea Westinghouse 1250 HP 1750 RPM
   E. Holdback Capability - each gearbox equipped with Formspring high speed holdback.
   F. Idlers - H.R. 7" troughing idlers, 35° on 48" centers
4. R-2N Conveyor
   A. Rubber - 1700 PIW steel cable belting, 60"
   B. Length - 1887' with 99' lift
   C. Drive Gearbox - Jones 72DP, 38.75 to 1 ratio
   D. Drive Motor - Westinghouse 1250 HP, 1750 RPM
   E. Holdback Capability - gearbox is equipped with Formsprag high speed holdback

East Conveying System

1. R-3 Conveyor
   A. Rubber - 1700 PIW steel cable belting, 60"
   B. Length - 793' with 196' lift
   C. Drive Gearboxes - 2 ea Falk 2185Y2-B-700 H.P. each - 31.07 to 1 ratio
   D. Drive Motors - 2 ea Westinghouse 700 H.P. sq. cage motor
   E. Soft start capability - equipped with American standard Gyrol size 231 on each drive motor
   F. Holdback Capability - 2 ea Marland one way clutch backstop model BC 135 MA
   G. Idlers - S.A. 7" diameter, 35° and 45° on 36" centers - returns are frame mounted 10° on 120" centers
   H. R-3 conveyor includes scale, magnet and metal detector
2. C Conveyor
   A. Rubber - Goodyear 3750 PIW steel cable belting, 60"
   B. Length - 2216' with 515' lift
   C. Drive Gearboxes - 4 ea Falk model 2215Y2S, 1257 H.P. 30.812 to 1 ratio
   D. Drive Motors - 4 ea General Electric 1250 H.P., frame 63545S; 4000V, 1775 RPM motors
   E. Holdback Capability - 4 ea Marland BC-60M backstops
   F. Idlers - S.A. 7" diameter, 45° on 48" centers, S.A., chaintype V-returns on 120" centers
   G. Conveyor has 4 ea 500 ton feed hoppers equipped with G.E. 40 H.P. motor, 1750 RPM, 72" x 14' apronfeeders; Falk gearbox, 8C302A4, 40 H.P. 38.45 to 1

2. Lower power consumption. The cable belt system, with its widely spaced pulleys, has approximately half the number of bearings of a conventional system. The belt is also lighter and is not continuously flexed by troughing idlers. All of these factors reduce system drag, and therefore the power to drive the system. Anamax estimates that the cable belt system uses 30% less power than a similar conventional system.
3. Maintenance simplicity. Having fewer components, the cable belt system requires less maintenance. The most maintenance-prone components, the rope support pulleys, are easily changed and repaired. The light belt is easier to install, and can be shipped in longer lengths, necessitating fewer splices.
4. Resistance to ripping. On a long conveyor system, long belt rips are a very real danger. Belting for the cable belt system is virtually rip-proof because of the transverse stiffeners and low tension belt splices.
5. Belt splices. Conventional high tension belting requires high tension splices. Even under ideal conditions, high tension splices take at least three shifts to repair because of the vulcanizing required. The cable belt low tension splices consist of opposing wire clips on the two sections of belt to be joined, which are held together by a short length of small diameter wire rope. Under good conditions, the belt can be spliced in an hour.
6. Ease of alignment. A high-tension belt with 40 to 50 splices and variable loads would be very difficult to keep aligned. Poor alignment leads to belt edge damage, tension cable deterioration and belt failure. The cable belt system does not require belt alignment since the belt is loosely attached to the wire ropes, which are kept in alignment by rope support pulleys.
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General Description:

The conveyor is a 1.07 m (42 in) wide cable belt, 9910 m (32,513 ft) from head drum (pully) to tail drum. The system is designed to carry 1800 tonnes (2,000 short tons) of copper ore per hour at a speed of 251 m (824 ft) per minute. Two 41 cm (1.6 in) type 6x19 Lang lay wire ropes in endless loops run the entire length of the conveyor. These ropes support the belt, and are driven by a single drive unit at the head end.

The belt is made of DuPont Nordel hydrocarbon rubber, which was selected because of its resistance to cracking and checking in the desert environment. The original belt is stiffened laterally by 0.5x1.3 cm (0.2x0.5 in) spring steel straps spaced approximately 8 cm (3 in) apart. The thickness and spacing of these straps determine the troughing of the belt under load; with no load, the felt is flat.

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Two continuous vee grooves are located near the edges of the belt on both top and bottom. The ropes ride in the bottom grooves on the ore carrying trip and in the top grooves on the return trip. The bottom grooves are located about 19 cm (7.5 in) in from the edges of the belt where they form a small "lip" which helps to prevent spillage.

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Linestands - The linestands consist of welded rectangular frames which completely surround the belt. The linestands support cross arms which in turn support the pulleys. The cross arms can be adjusted to align the pulleys with the rope.

The linestands are bolted to cylindrical cast-in-place concrete foundations. These foundations are 46 cm (18 in) in diameter and extend a minimum of 1.1 m (3.5 ft) into the ground. The foundation tops are generally 15 to 46 cm (0.15 to 1.5 ft) above ground level. High linestand foundations are used on bridge approaches and at minor washes and defiles.

The conveyor cover is supported on purlins which run between linestands.

Angle station - One of the more ingenious features of the system is a 60° angle bend located some 827 m (2700 ft) from the loadng point. Here, the driving ropes and material flow change direction. The belt itself consists of two separate sections which do not make the bend.

At the angle station, the incoming belt is lifted off the driving ropes by a series of small idlers which fit into the vee grooves. The belt then passes around a head pulley, spilling its load into a chute, and around a tension pulley. A third pulley directs the belt back toward the loading point. The belt is then lowered onto the return ropes. The outgoing belt picks up the material from the chute and carries it to the final discharge point some 9083 m (29,800 ft) distant.

TWIN BUTTES MINE

Stripping at Twin Buttes Mine started in July 1965, and to date more than 1,309,000,000 tons of ore and waste have been mined. At present, the pit is over 7,300 feet long, 5,600 feet wide and 1,200 feet deep. The planned rock slopes in the pit are 26.5° to 45° with the alluvium slopes at 53°. Benches above the 2800 level are 50 feet high and below the 2800 level, the benches are 40 feet high. There are more than 25 miles of haul roads, which are maintained at a minimum width of 100 feet and maximum grade of 10 per cent.

The in-pit crushing and conveying system handles 50 per cent of all the pit material. The three crushers are Nordberg 54" X 80" gyratory crushers rated at 5000 tons per hour each. The belt system is over 72,000 feet long using a 60-inch belt, with a maximum grade of 25 per cent.

All drilling is 12-1/4" holes with spacing a minimum of 25 foot centers. The pattern is staggered with the hole depth being 47 feet for the 40 foot bench. Blasting is done using ammonium nitrate base blasting agents. The power factor averages 3.27 tons/lb. with most shot being over 50 holes and free face blasting preferred. The present drilling equipment consists of 4 Bucyrus Erie 60R drills and 2 Gardner Denver 120 drills; all drills are diesel electric type.

The loading and hauling is done with trucks and shovels, with 50 per cent of the material being hauled to the conveyor system, and 50 per cent of the waste material being hauled directly to the dumps. The shovels are all electric and consist of 3 Marion 191M 15 yard capacity, 1 P&H 1900B 10 yard capacity, 2 P&H 2100 B 15 yard capacity, 3 P&H 2100BL 15 yard capacity and 1 B.E. 395-B 34 yard capacity. The truck fleet is all electric drive trucks: 38 Unit Rig 100 tons, 20 Wabco 100 tons, 2 Unit Rig 170 tons and 2 Wabco 170 tons.

Other support equipment consists of: 9 front end loaders, 9 crawler tractors, 8 rubber-lined tractors, 6 motor graders, 7 water trucks and 2 scrapers.

ANAMAX
MINING COMPANY

Revised/1-1-82

ANAMAX MINING COMPANY - TWIN BUTTES

January 1, 1982

GENERAL FEATURES

Date Pit Started:	July 1965
Present Dimensions:	Length = 7,300' Width = 7,000' Depth = 1,220'

Total Tons To Date (January 1, 1982)

Waste	1,143,024,253
Copper Mineralized Rock (stockpiled and mill feed)	166,002,915
Total	1,309,027,168

Production: (Based on 1982 budget)

Rock Mined	45,500 WST/shift
Sulfide Mill	
Ore Milling Rate	
Twin Buttes Ore	30,300 DST/day
Eisenhower Ore	13,700 DST/day
Copper Produced in Concentrate	
Twin Buttes Ore	65,212 tons/year
Eisenhower Ore	29,516 tons/year
Molybdenum Produced in Concentrate	
Twin Buttes Ore	1,433 tons/year
Eisenhower Ore	287 tons/year
Oxide Mill	
Ore Milling Rate	9,701 DST/day
Copper Cathode Produced	32,930 tons/year
Uranium (U_3O_8) Produced	118 tons/year

Haul Roads:	Maintained = +25 miles Width = at least 100 feet Grade = Maximum 10%
Weather Data:	Hot and dry +22° to +120° Average rainfall ± 10.5" year No snow.

Wall Slopes and Bench Detail:

Planned rock slope = 26.5° to 45°
Planned alluvium slope = 53°
Bench height:
Above 2800 level = 50 feet
Below 2800 level = 40 feet

Manpower

Salary	403
Hourly	948
Total	1,351

ANAMAX MINING COMPANY - TWIN BUTTES

GENERAL FEATURES, Continued

Blast Hole Data:

Blast Hole Spacing	25 ft. minimum centers
Hole pattern	Staggered
Bench height	40 ft. rock/50 ft. alluvium
Hole depth	47 ft. rock/53 ft. alluvium
Hole diameter	12-1/4"
Explosive used:	Ammonium nitrate + diesel fuel, slurry (wet holes)
Shot size	Minimum size + 50 holes
Type blast	Free face preferred
Burden blast	Few
Explosive - lbs./hole	Ave.1000# slurry
Rock broken - tons/lb. of explosive	3.27

MAJOR EQUIPMENT

Loading Equipment

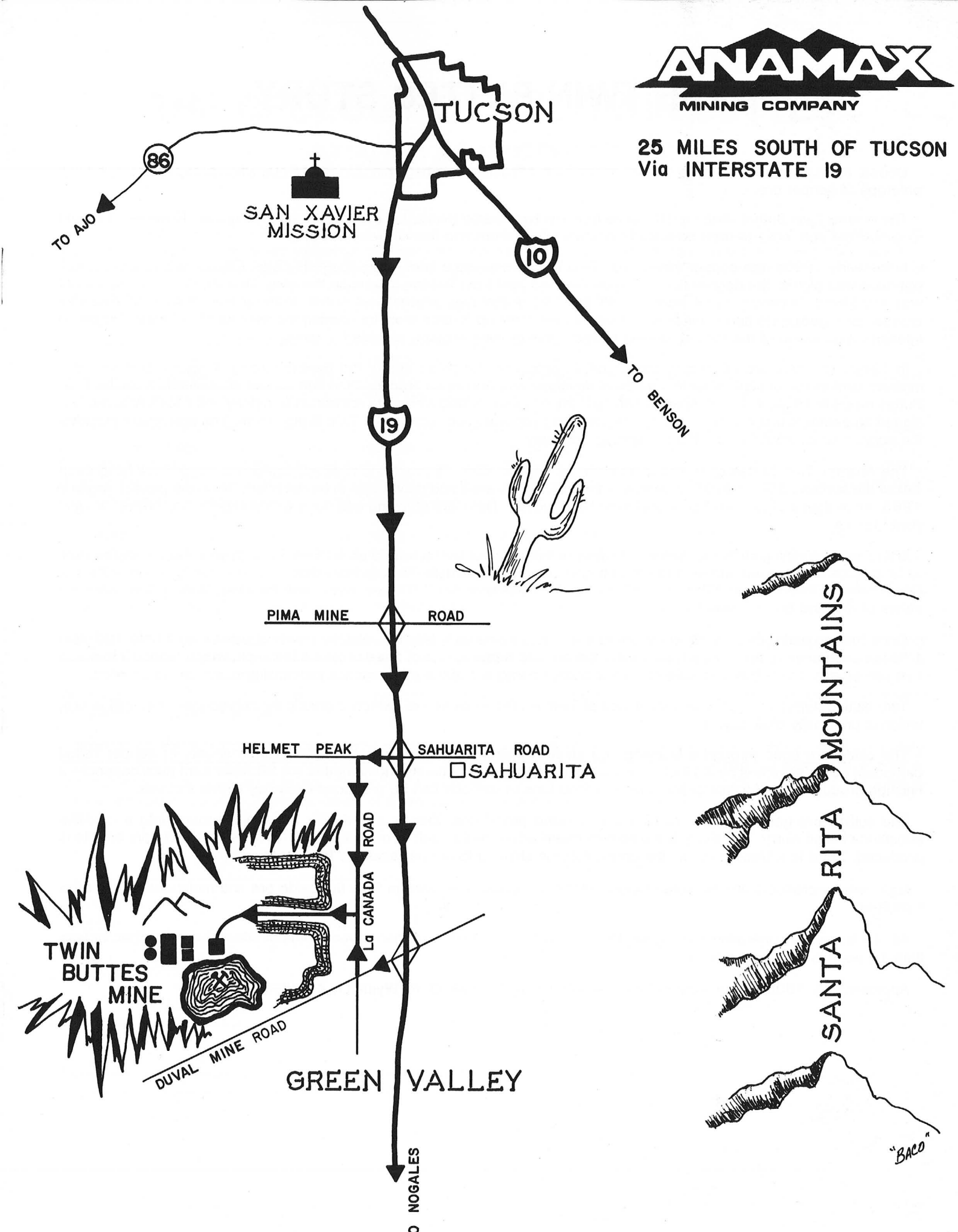
End Dump Trucks (Electric):		38 Unit Rig	100 ton
		20 Wabco	100 ton
		2 Unit Rig	170 ton
		2 Wabco	170 ton
Shovels (Electric):		1 Bucyrus Erie 395B	34 cu. yd.
		3 Marian 191M	15 cu. yd.
		1 P&H 1900B	10 cu. yd.
		2 P&H 2100B	15 cu. yd.
		3 P&H 2100 BL	15 cu. yd.
Rubber-Tired Front End Loaders		1 Dart D600	15 cu. yd.
		1 L800	12 cu. yd.
		4 Cat 988	6 cu. yd.
		1 Cat 950	3-1/2 cu. yd.
		2 Cat 930	2-1/4 cu. yd.

Support Equipment

Tractor Dozers	Crawler	7 Cat D-9G	
	Crawler	2 Cat D-8, Side Boom	
	Rubber Tired	8 Cat 834	
Road Graders		5 Cat #16	
		1 Cat 120	
Water Trucks		5 Cat 660	500 to 12,000 gal. ea.
		2 Cat 779	8,000 gal. ea.
Scrapers		2 Cat 660B	54 cu. yd.
Drills		4 Bucyrus Erie 60R	
		2 Gardner Denver 120	
Primary Crusher		3 Nordberg 54" X 80"	5,000 tons/hour

ANAMAX
MINING COMPANY

25 MILES SOUTH OF TUCSON
Via INTERSTATE 19



THE TWIN BUTTES STORY

Copper mining in the Pima Mining District of southern Arizona had its beginnings in the 1870s when prospectors found rich outcrops of copper ore.

The original Twin Buttes village got its name from the two nearby peaks that overlooked the mining area. However, it wasn't long until the rich, easy-to-mine pockets of ore were mined out and the village abandoned.

In the early 1900s, the copper mines near Twin Buttes enjoyed a brief return to productivity. Copper prices were good; optimism was high to the degree that a railroad line was built from Tucson to service the area. This rebirth of mining activity was short lived, however, and it was not until the 1950s that new interest was shown in the mining district. Modern-day prospectors, geologists and engineers, armed with the most up-to-date tools for divining the secrets of the earth, began an intensive exploration of the district, hoping to find areas of mineralization suitable for mining.

In 1963, The Anaconda Company exercised an option on the properties of the Banner Mining Company and started a massive exploration project. After four years of development, Anaconda produced the first copper concentrate from the Twin Buttes mines in 1969. In 1973, Anamax Mining Company was formed when The Anaconda Company and AMAX Arizona, Inc. signed agreements that created a 50-50 partnership to operate and expand the Twin Buttes Mine. The agreement included the acquisition by AMAX of the Banner Mining Company.

The Anamax Twin Buttes operation is an open pit copper mine. To reach the relatively low-grade copper ore lying deep below the surface, 500 to 800 feet of waste material, mostly sand and gravel, had to be removed. Since the project began in 1965, more than a billion tons of material have been moved. This initial stripping was done with scrapers, belt conveyors and dump trucks.

Using modern mining methods, Anamax engineers make use of computers to assist them in pit design. Core samples from various holes are assayed and the results computerized. From this data the engineers determine the configuration of the pit. Current design calls for the pit to be 1¾ miles long, 1¼ miles wide and 1700 feet deep, with the sides sloping downward in a series of 40- and 50-foot benches.

Once the ore and rock have been loosened and fractured by daily blasting, electric power shovels load it onto 100- and 170-ton end-dump trucks. These trucks carry the ore and waste to one of three crushers in the pit, which reduce it to a size that can be carried on five-feet-wide conveyor belts, up and out of the pit to various processing points or waste piles.

Two distinct types of copper ore are mined at Twin Buttes — oxide ore, which is principally chrysocolla, and sulfide ore, which is principally chalcopyrite.

The oxide ore goes through a leaching and electrowinning process which results in finished sheets of copper called cathodes, each 36 inches by 44 inches and weighing about 140 pounds. The cathodes are 99.9 per cent pure copper — a finished product ready for fabrication. One hundred tons of cathode can be produced each day in this process.

The sulfide ore goes through crushing and grinding processes, then is mixed with water and ground into a mud-like substance called slurry. The slurry is mixed with chemical reagents, and, through a flotation process, copper concentrate is produced. Dried to a black powder, the concentrate is shipped to copper smelters for further refining.

Important by-products are extracted before each final process — uranium from the oxide ore and molybdenum from the sulfide ore.

All of this complex operation is designed to mine ore that averages less than seven-tenths of one per cent copper, or less than 14 pounds of copper per ton.

Approximately 1600 persons currently are employed by Anamax. G. R. Wyman is president.

THE GEOLOGY OF THE TWIN BUTTES MINERALIZED ZONE

The Twin Buttes mine has been developed in a copper-molybdenum orebody that exists within a more widespread altered and mineralized zone. Sulfide mineralization, alteration and intrusion occurred within this zone, which was developed around a Laramide-age mineralization center. Paleozoic and Mesozoic sediments and intrusive rocks of Laramide age and older have been mineralized and altered within the Twin Buttes zone. After sulfide mineralization, erosion and oxidation of the upper part of the mineralized zone took place, and the orebody was covered with several hundred feet of alluvial overburden.

A wide variety of rock types occur in the Twin Buttes zone. Beneath the post mineralization overburden: altered, gently folded quartzose, Mesozoic sediments and volcanics overlie altered, folded, steeply dipping Paleozoic sediments. Near the center of the mineralized zone is a northwest-trending intrusive complex, portions of which have been dated at 58 million years. The geometry of the various rock units is portrayed in plan and section on Figures 1, 2, and 3.

The sediments and intrusive rocks in the mine area are variously altered. The carbonate-rich sediments have often been altered to a number of calcium-magnesium-iron silicates including garnet, diopside, wollastonite, actinolite and serpentine. Quartzose sediments, volcanics and earlier intrusive have been altered to assemblages that include: quartz-biotite-orthoclase, quartz-sericite, and chlorite-epidote. The alteration products present at any particular place depend on the original rock composition and on proximity and access to the mineralization center.

Beneath the zone of oxidation: copper, iron and molybdenum sulfide minerals occur as disseminations and within and adjacent to veins, often with quartz and anhydrite. Pyrite and chalcopyrite are by far the most abundant sulfide minerals in the orebody. Chalcocite, sphalerite and molybdenite are common, and bornite, galena and pyrrhotite occur in significant amounts. The sulfide concentrate at Twin Buttes usually contains several ounces per ton silver. Gold content is negligible. Small amounts of the tungsten bearing minerals, powellite and scheelite, occur throughout the orebody.

Higher grade copper mineralization occurs in altered carbonate rocks, and the adjacent quartzose sediments, volcanics and intrusives usually have significantly lower values. Areas of better grade mineralization are separated by low grade intrusives and are segmented by northeast-trending, near-vertical faults that have predominately post mineralization movement. The two largest of these late faults, the Twin Buttes Fault and the East End Fault (Figure 1), have southeast-side-down movement measured in thousands of feet.

A few to several hundred feet of oxidized bedrock occur above the sulfide orebody, and a generally thin zone of secondary chalcocite has formed directly beneath the oxide zone. The most common products of this oxidation and supergene alteration are: numerous clay minerals, chrysocolla, copper-manganese-iron wad, native copper, pyrolusite and a variety of yellow, brown and red iron oxides. Uranium values of a few parts per million are common in copper oxide ore.

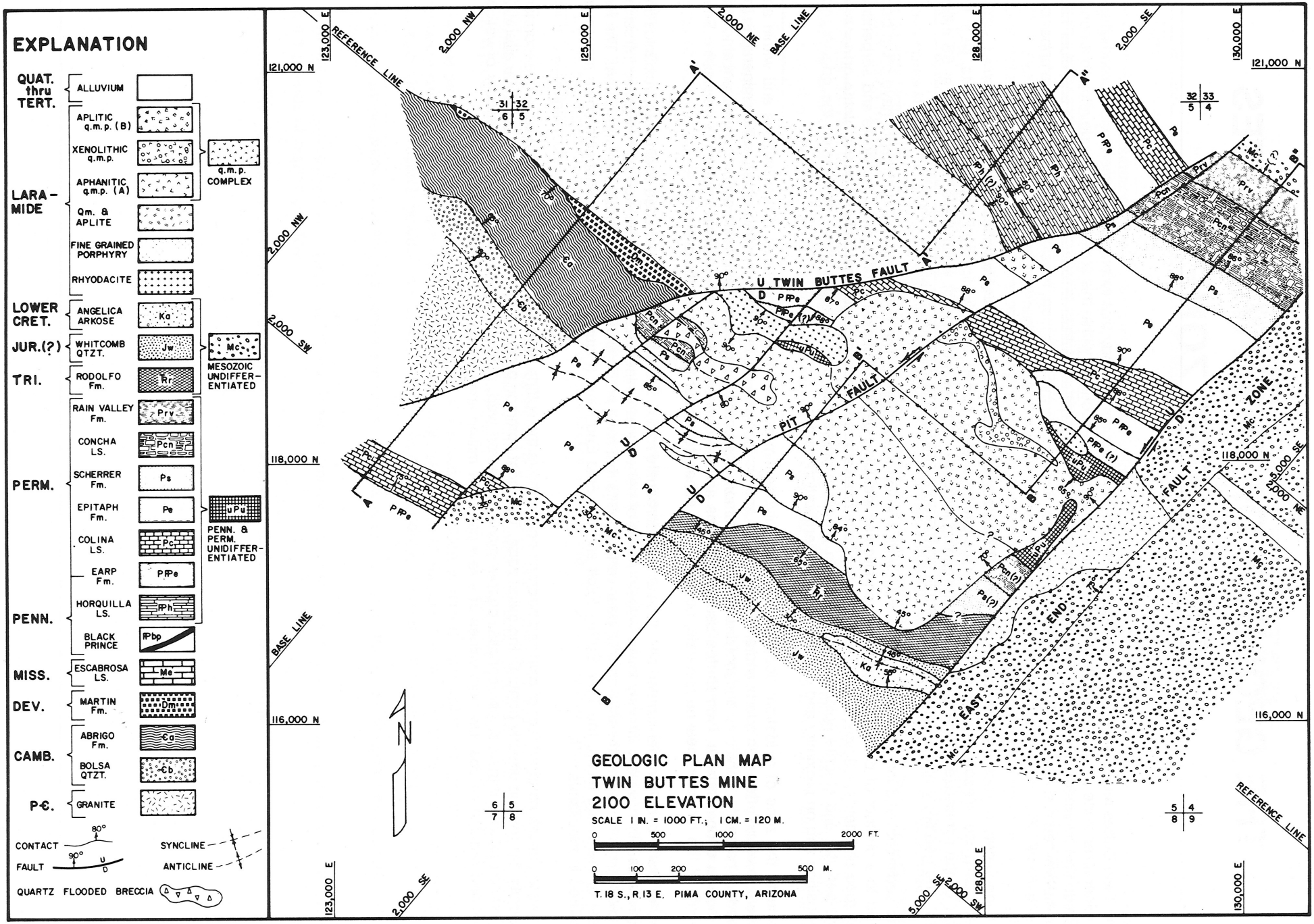

EXPLANATION
QUAT. thru TERT.
ALLUVIUM
APLITIC q.m.p. (B)
XENOLITHIC q.m.p.
APHANITIC q.m.p. (A)
q.m.p. COMPLEX
LARAMIDE
Qm. & APLITE
FINE GRAINED PORPHYRY
RHYODACITE
LOWER CRET.
ANGELICA ARKOSE
JUR.(?)
WHITCOMB QTZT.
MESOZOIC UNDIFFERENTIATED
TRI.
RODOLFO Fm.
RAIN VALLEY Fm.
CONCHA LS.
PERM.
SCHERRER Fm.
EPITAPH Fm.
PENN. & PERM. UNIDIFFERENTIATED
COLINA LS.
EARP Fm.
PENN.
HORQUILLA LS.
BLACK PRINCE
MISS.
ESCABROSA LS.
DEV.
MARTIN Fm.
CAMB.
ABRIGO Fm.
BOLSA QTZT.
P-C.
GRANITE
CONTACT
FAULT
SYNCLINE
ANTICLINE
QUARTZ FLOODED BRECCIA
REFERENCE LINE
BASE LINE
2,000 NW
2,000 NE
2,000 SE
2,000 SW
123,000 E
125,000 E
128,000 E
130,000 E
121,000 N
118,000 N
116,000 N
U TWIN BUTTES FAULT
PIT FAULT
D ZONE
END FAULT
EAST
GEOLOGIC PLAN MAP
TWIN BUTTES MINE
2100 ELEVATION
SCALE 1 IN. = 1000 FT.; 1 CM. = 120 M.
0 500 1000 2000 FT.
0 100 200 500 M.
T. 18 S., R. 13 E. PIMA COUNTY, ARIZONA

Figure 1

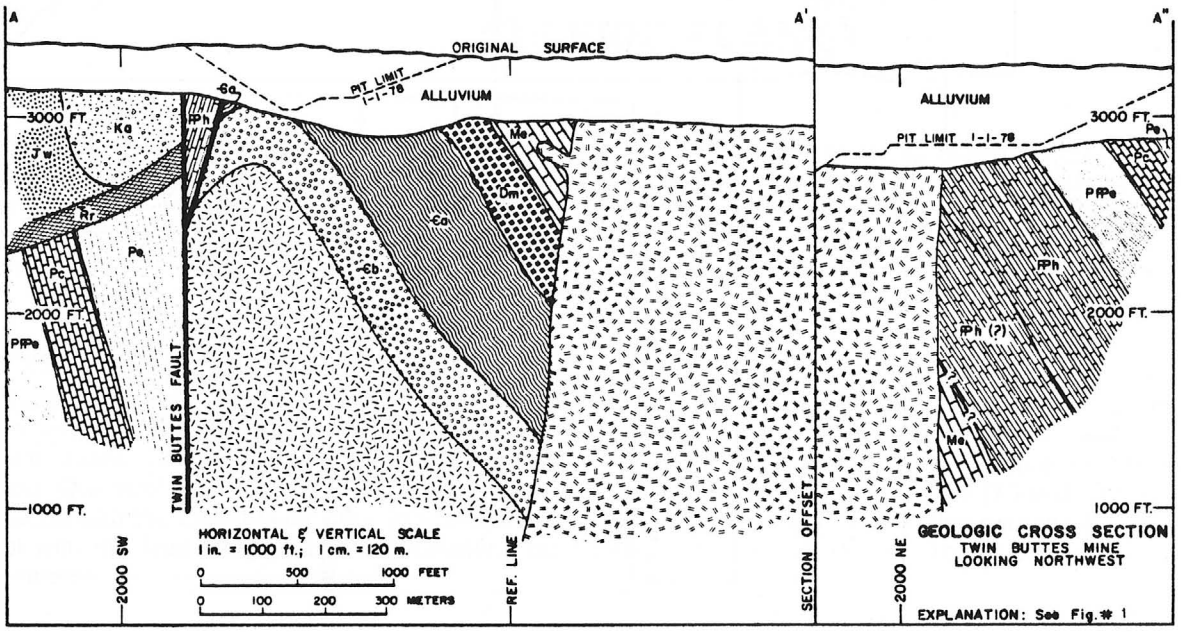


Figure 2

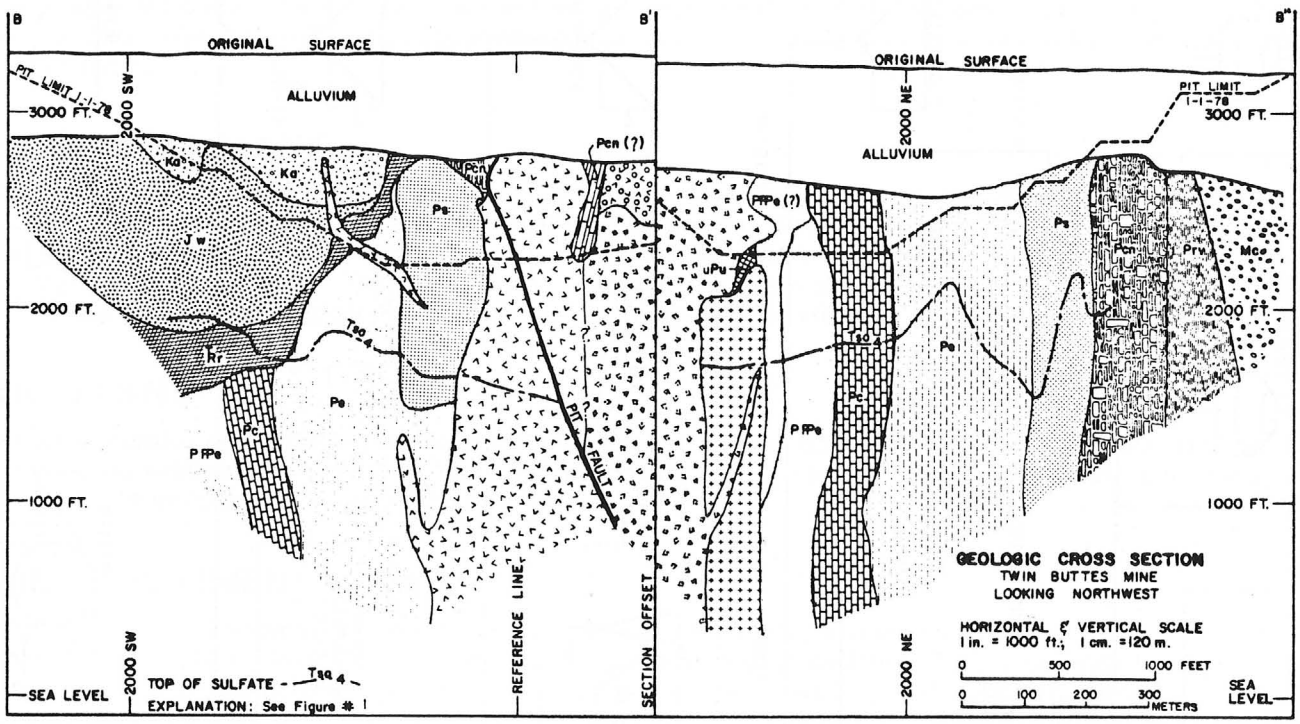
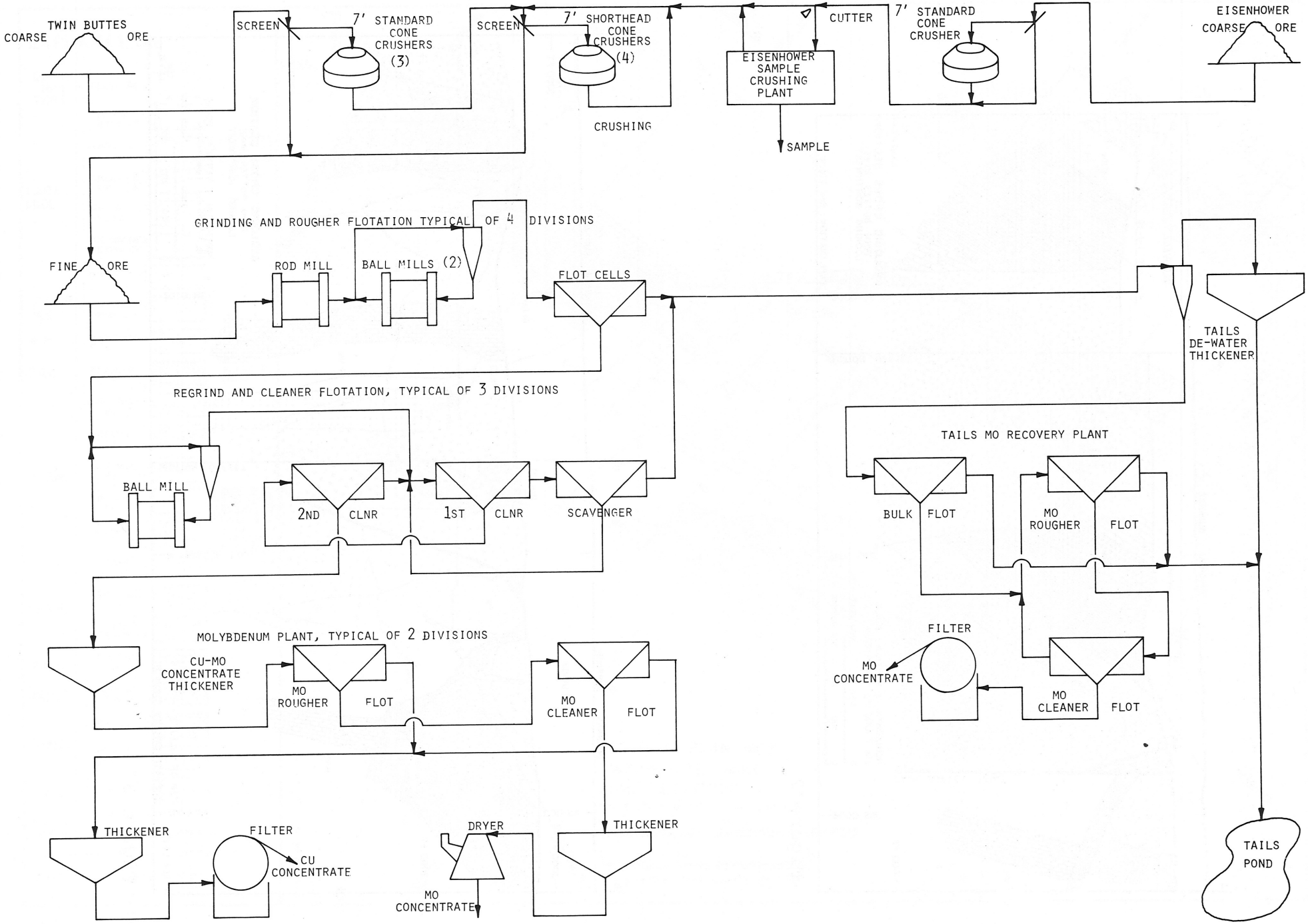


Figure 3


TWIN BUTTES
COARSE ORE
SCREEN
7' STANDARD CONE CRUSHERS (3)
SCREEN
7' SHORTHEAD CONE CRUSHERS (4)
CRUSHING
CUTTER
EISENHOWER SAMPLE CRUSHING PLANT
SAMPLE
7' STANDARD CONE CRUSHER
EISENHOWER
COARSE ORE
GRINDING AND ROUGHER FLOTATION TYPICAL OF 4 DIVISIONS
FINE ORE
ROD MILL
BALL MILLS (2)
FLOT CELLS
TAILS DE-WATER THICKENER
REGRIND AND CLEANER FLOTATION, TYPICAL OF 3 DIVISIONS
BALL MILL
2ND CLNR
1ST CLNR
SCAVENGER
TAILS MO RECOVERY PLANT
BULK FLOT
MO ROUGHER FLOT
FILTER
MO CONCENTRATE
MO CLEANER FLOT
MOLYBDENUM PLANT, TYPICAL OF 2 DIVISIONS
CU-MO CONCENTRATE THICKENER
MO ROUGHER FLOT
MO CLEANER FLOT
THICKENER
FILTER
CU CONCENTRATE
DRYER
MO CONCENTRATE
THICKENER
TAILS POND

ANAMAX MINING COMPANY — TWIN BUTTES
SULFIDE PLANT

In the fall of 1969 the Sulfide Plant was placed into operation. The original plant processed 30,000 tons of ore per day but an expansion in 1974 raised the capacity to 40,000 tons. Ore from the Twin Buttes pit is supplemented by ore from the Eisenhower mine. The Eisenhower Mining Company, a partnership between Anamax and ASARCO Inc., was formed in 1976. Fourteen thousand tons per day of ore are transported from the Eisenhower mine to Twin Buttes by means of a 6.4 mile Cable Belt conveyor.

CRUSHING PLANT

There are two coarse ore storage piles, one for Twin Buttes ores and the second for Eisenhower ores. The ore in the Eisenhower stockpile is drawn from the bottom of the pile using feeders and conveyors and is sent to a single Symonds standard crusher (7'). After crushing, the ore is sampled in a sampling plant and then sent to join Twin Buttes ore for further crushing. Ore from the Twin Buttes stockpile is sent to three Symonds standard crushers (7') and then is crushed a second time, along with the Eisenhower ores, in four Symonds shorthead crushers (7'). Vibrating screens are used for product size control with the final product from the Crushing plant being one-half inch in size. This is stored prior to grinding in the Concentrator.

CONCENTRATOR

To liberate the desired copper sulfide mineral (chalcopyrite) from the host rock, the crushed ore is sent to four grinding divisions. Each division consists of a rod mill (14' diameter), the discharge of which is split to two ball mills (14'6" diameter). The product size from the four division grinding sections is fine at 0.008 inches or 65 mesh when it is sent to the flotation section.

In the flotation machines (10') a froth is formed by adding air and reagents. The desired copper sulfide mineral is selectively brought into the froth and separated from host rock. The host rock remains in the flotation cell as a tailing. This is done once in the four rougher flotation sections, ground a second time in a regrind ball mill (7'6" diameter), and floated two additional times in the three cleaner sections. The final copper concentrate from the cleaning section is sent to the Molybdenum Plant for further processing.

MOLYBDENUM PLANT

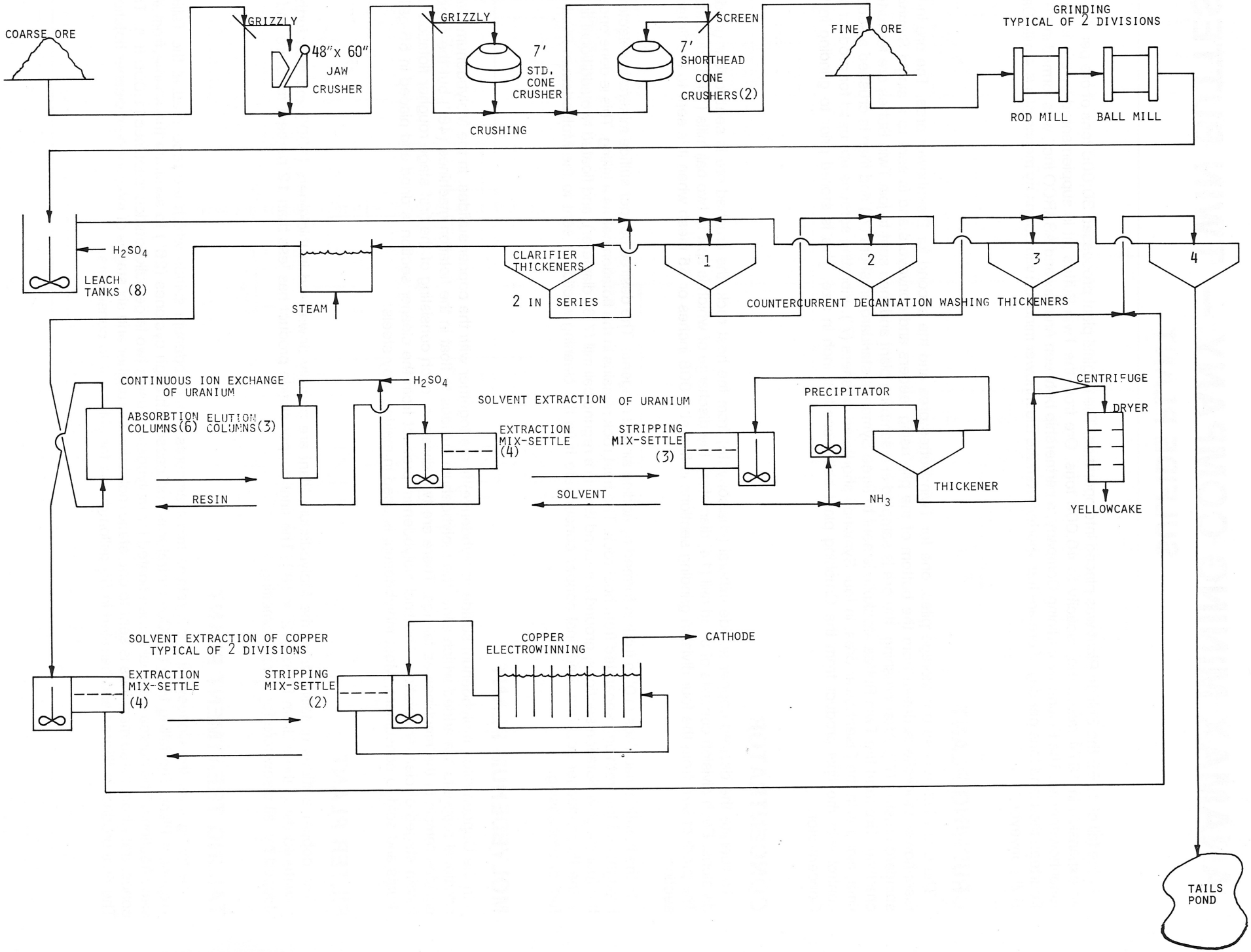
In the Concentrator, molybdenum sulfide (molybdenite) floats together with the copper sulfides. In the Molybdenum Plant, additional reagents are added which allow the molybdenum sulfides to float in the flotation machines (48") but the copper sulfides remain in the machines as tailings. There are two divisions, each consisting of the first stage rougher flotation and seven stages of cleaner flotation. The final molybdenum product from the cleaner section is dried and placed in 55-gallon drums and sold to consumers. Most molybdenum is used in making alloy steels.

FILTER PLANT

The copper sulfides or tailing from the Molybdenum Plant are partially dewatered in thickeners (130') and then further dewatered using three drum filters (12' x 18'). The final copper sulfide product has less than 12 percent moisture and is shipped by rail elsewhere for copper smelting.

TAILING TREATMENT PLANT

The tailing from the Concentrator still retains minor amounts of molybdenum sulfide which are recovered at the Tailing Treatment Plant. The tailing from the Concentrator is first passed through cyclones (26") to separate the coarse from the slime fractions. The coarse material is then floated for molybdenum using two large bulk flotation machines (1,000 $ft.^3$). The concentrate from these machines is sent to one stage molybdenum rougher and six stages of molybdenum cleaner flotation. The final product is filtered and barreled in 55-gallon drums for shipment to consumers.


COARSE ORE
GRIZZLY
48"x 60" JAW CRUSHER
GRIZZLY
7' STD. CONE CRUSHER
CRUSHING
SCREEN
7' SHORTHEAD CONE CRUSHERS(2)
FINE ORE
GRINDING TYPICAL OF 2 DIVISIONS
ROD MILL
BALL MILL
H_2SO_4
LEACH TANKS (8)
STEAM
CLARIFIER THICKENERS
2 IN SERIES
1
2
3
4
COUNTERCURRENT DECANTATION WASHING THICKENERS
CONTINUOUS ION EXCHANGE OF URANIUM
ABSORBTION COLUMNS(6)
ELUTION COLUMNS(3)
RESIN
H_2SO_4
SOLVENT EXTRACTION OF URANIUM
EXTRACTION MIX-SETTLE (4)
STRIPPING MIX-SETTLE (3)
SOLVENT
PRECIPITATOR
NH_3
THICKENER
CENTRIFUGE
DRYER
YELLOWCAKE
SOLVENT EXTRACTION OF COPPER TYPICAL OF 2 DIVISIONS
EXTRACTION MIX-SETTLE (4)
STRIPPING MIX-SETTLE (2)
COPPER ELECTROWINNING
CATHODE
TAILS POND

ANAMAX MINING COMPANY — TWIN BUTTES
OXIDE PLANT

In 1975 the Oxide Plant was placed into operation. All oxide copper ores are from the Twin Buttes open pit and are normally stockpiled before being processed by the plant. To leach the copper from the ore requires large quantities of sulfuric acid (1,000 tons per day). While leaching copper into solution small quantities of uranium are also leached into solution. A plant to extract this uranium was placed into operation in 1980.

CRUSHING PLANT — GRINDING AND LEACHING

The ore is moved by truck from stockpile and is first crushed in a jaw crusher (48" x 60"). The crushed material is then sent to one Symonds standard cone crusher (7') and two Symonds shorthead crushers (7') for further size reduction. After screening, the ore is one-half inch in size and is placed in storage prior to grinding and leaching.

There are two grinding sets consisting of one rod mill (11½" x 18½") and followed by one ball mill (12½" x 30'). The ore is ground very fine and is .008 inches (65 mesh) in size. The ground ore is sent to eight large agitated leach tanks (30' diameter) where the ore is mixed with sulfuric acid and the oxide copper mineral (chrysocolla) is leached and the copper and uranium go into solution. The material from the leach circuit is sent to the countercurrent decantation circuit.

COUNTERCURRENT DECANTATION — COPPER SOLVENT EXTRACTION

To clarify and separate the pregnant copper bearing solution from the leached solids, four 400-foot diameter thickeners are used. The clear solution overflows from the thickeners and flows countercurrent to the solids flow which finally discharges to the tailing ponds. The pregnant copper solution flows through two additional 400-foot diameter thickeners for additional clarification prior to going to the copper solvent extraction circuit.

The copper solution from the last clarifier passes through the Uranium Plant where uranium is extracted and then proceeds to the copper solvent extraction circuit. In the solvent extraction circuit the contained copper is concentrated and purified before going to the Electrowinning Plant. To accomplish this there are two solvent extraction trains of mixers and settlers. There are four extraction stages in each where copper is extracted into a kerosene phase with an extractant leaving behind undesired metals. There are two stripping stages where copper is stripped from the kerosene phase and placed back into solution in a purified form. This solution proceeds to the Electrowinning Plant where the copper is electrolytically deposited in a pure form.

ELECTROWINNING PLANT

The copper in the strong and purified solution is first deposited electrolytically onto titanium sheets for one day. After one day the thin pure sheets of copper are removed from the titanium blanks and placed back into the electrolytic cells where additional copper is electrolytically deposited onto it for an additional seven days. The pure copper (cathode copper at 99.9 percent purity) is removed from the electrolytic cells, washed and prepared for shipment. Because of the purity of the copper it is shipped to manufacturers who produce copper products.

URANIUM PLANT

As copper is leached into solution so are small quantities of uranium. Prior to the copper solvent extraction stage the solution is passed through uranium extraction columns. The six, 12-foot diameter absorption columns have small organic beads that selectively absorb uranium from the solution as it passes through the columns. Once a portion of the resin is loaded with uranium it is sent to one of three 6-foot diameter elution columns where the uranium is stripped from the beads using strong sulfuric acid. The beads are then reused.

The uranium contained in the sulfuric acid solution is strengthened and purified by using a single solvent extraction train. This train consists of four extraction stages, one scrubbing stage, and three stripping stages. Ammonia is added to the strong uranium solution and a yellow precipitate is formed (ammonium diuranate or yellow cake). The yellow cake precipitate is thickened, centrifuged, dried in a 4-hearth dryer and placed in 55-gallon drums for shipment.

TWIN BUTTES MINE

Stripping at Twin Buttes Mine started in July 1965, and to date more than 1,240,000,000 tons of ore and waste have been mined. At present, the pit is over 7,300 feet long, 5,600 feet wide and 1,200 feet deep. The planned rock slopes in the pit are 26.5° to 45° with the alluvium slopes at 53°. Benches above the 2800 level are 50 feet high and below the 2800 level, the benches are 40 feet high. There are more than 25 miles of haul roads, which are maintained at a minimum width of 100 feet and maximum grade of 10 per cent.

The in-pit crushing and conveying system handles 85 per cent of all the pit material. The three crushers are Nordberg 54" x 80" gyratory crushers rated at 5000 tons per hour each. The belt system is over 72,000 feet long using a 60-inch belt, with a maximum grade of 25 per cent.

All drilling is 12¼" holes with spacing a minimum of 25 foot centers. The pattern is staggered with the hole depth being 47 feet for the 40 foot bench. Blasting is done using ammonium nitrate base blasting agents with 25 M.S. and 42 M.S. delays. The power factor averages 3.27 tons/lb. with most shot being over 50 holes and free face blasting preferred. The present drilling equipment consists of 4 Bucyrus Erie 60R drills and 2 Gardner Denver 120 drills; all drills are diesel electric type.

The loading and hauling is done with trucks and shovels, with 85 per cent of the material being hauled to the conveyor system, and 15 per cent of the waste material being hauled directly to the dumps. The shovels are all electric and consist of 3 Marion 191M 15 yard capacity, 1 P&H 1900B 10 yard capacity, and P&H 2100 B 15 yard capacity, and 3 P&H 2100BL 15 yard capacity. The truck fleet is all electric drive trucks: 38 Unit Rig 100 tons, 21 Wabco 100 tons, 2 Unit Rig 170 tons and 2 Wabco 170 tons.

Other support equipment consists of: 9 front end loaders, 9 crawler tractors, 8 rubber-lined tractors, 6 motor graders, 7 water trucks and 2 scrapers.

CABLE BELT
TECHNICAL DATA

Conveyor Length	33,512 ft.
Belt Width	42 in.
Conveyor Speed	800 F.P.M.
Actual Conveyor Speed	830 ft./sec. (Measured)
Conveyor Inspection Speed	233 F.P.M.
Rated Motor Horsepower	(2) — 1500 Total 3000 hp
Drive Unit Rating	Continuous
Average Capacity	2000 s/tons per hour
Rated Peak Capacity	2200 s/tons per hour
Material	Copper Ore
Material Weight	110 lbs. per cu. ft.
Material — Size	Minus 6 in.
Material — % of Largest Lumps	30%
Rope Size	1.6 in. diameter
Rope — Safety Factor at Average Capacity	3.3:1
Drive Unit Size	16
Drive Unit Koepe Wheel Diameter	120 in.
Rope Tension Sheave Diameter	76 in.
Line Pulley — Diameter	12 in.
Linestand Pitch — Approximate	15 ft. 6 in.
Return Linestand Pitch — Approximate	46 ft. 6 in.
Type of Discharge	Head Discharge
Special Features	Angle Transfer Unit
Earthworks	19,000 cu. yds.
Total Concrete	2000 cu. yds.
Main Tension Tower — Height	101 ft.
Main Tension Counterweight	34 tons
Rope Tension	9 ton (each rope)
Belt Tension	1000 lbs.
Rope Tension Track Travel	453 ft.
Total Number of Linestands	2164
Total Poly-Pulleys	13,000 ±

ANAMAX MINING COMPANY — TWIN BUTTES

August 1, 1980

GENERAL FEATURES

Date Pit Started: July 1965

Present Dimensions:
Length = 7,300'
Width = 5,600'
Depth = 1,220'

Total Tons To Date (To August 1, 1980)

Waste	1,092,476,682
Copper Mineralized Rock (stockpiled and mill feed)	150,905,638
Total	1,243,382,320

Production: (Based on 1980 budget)

Rock Mined	58,000 WST/shift
Sulfide Mill	
Ore Milling Rate	
Twin Buttes Ore	27,000 DST/day
Eisenhower Ore	13,700 DST/day
Copper Produced in Concentrate	
Twin Buttes Ore	88,674 tons/year
Eisenhower Ore	32,130 tons/year
Molybdenum Produced in Concentrate	
Twin Buttes Ore	1,816 tons/year
Eisenhower Ore	585 tons/year
Oxide Mill	
Ore Milling Rate	9,593 DST/day
Copper Cathode Produced	35,435 tons/year
Uranium (U_3O_8) Produced	72 tons/year

Haul Roads:
Maintained = +25 miles
Width = at least 100 feet
Grade = Maximum 10%

Weather Data:
Hot and dry +22° to +120°
Average rainfall ± 10.5" year
No snow.

Wall Slopes and Bench Detail:
Planned rock slope = 26.5° to 45°
Planned alluvium slope = 53°
Bench height:
Above 2800 level = 50 feet
Below 2800 level = 40 feet

Manpower

Salary	454
Hourly	1,081
Total	1,535

ANAMAX MINING COMPANY — TWIN BUTTES

GENERAL FEATURES, Continued

Blast Hole Data:

Blast Hole Spacing	25 ft. minimum centers
Hole pattern	Staggered
Bench height	40 ft.
Hole depth	47 ft.
Hole diameter	12¼ in.
Explosive used:	Ammonium nitrate + diesel fuel, slurry (wet holes)
Primers	C-3 14 oz.
Shot size	Minimum size + 50 holes
Delays	25 MS and 42 MS between rows
Type blast	Free face preferred
Burden blast	Few
Explosive — lbs./hole	Ave. 1000# slurry
Rock broken — tons/lb. of explosive	3.27

MAJOR EQUIPMENT

Loading Equipment

End Dump Trucks (Electric):		38	Unit Rig	100 ton	190 tons	1000
		21	Wabco	100 ton	190 tons	1000
		2	Unit Rig	170 ton	270 tons	1600
		2	Wabco	170 ton	270 tons	1600
Shovels (Electric):		3	Marian 191M	15 cu. yd.		
		1	P&H 1900B	10 cu. yd.		
		2	P&H 2100B	15 cu. yd.		
		3	P&H 2100BL	15 cu. yd.		
Rubber-Tired Front End Loaders		1	Dart D600	15 cu. yd.		
		1	Cat 992	10 cu. yd.		
		4	Cat 988	6 cu. yd.		
		1	Cat 950	3½ cu. yd.		
		2	Cat 930	2¼ cu. yd.		

Support Equipment

Tractor Dozers	Crawler	7	Cat D-9G	
	Crawler	2	Cat D-8, Side Room	
	Rubber Tired	8	Cat 834	
Road Graders		5	Cat #16	
		1	Cat 120	
Water Trucks		5	Cat 660	500 to 12,000 gal. ea.
		2	Cat 779	8000 gal. ea.
Scrapers		2	Cat 660B	54 cu. yd.
Drills		4	Bucyrus Erie 60R	(diesel)
		2	Gardner Denver 120	
Powder Trucks		2		
Primary Crusher		3	Nordberg 54" x 80"	5000 tons/hour