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CYPRUS ANVIL MINING CORPORATION
INTRODUCTION TO THE FARO OREBODY,
MINING AND MILLING OPERATIONS

ADMINISTRATION
MAY 1, 1984

CYPRUS ANVIL MINING CORPORATION

(Latitude 62 22'N, Longitude 133 25'W, Elevation 4,000 ft.)

1. INTRODUCTION

The Faro orebody of Cyprus Anvil Mining Corporation is located east of Rose Mountain and northwest of Mount Mye of the Anvil Mountain range in east-central Yukon, and is approximately 193 km northeast of Whitehorse. Access to the town of Faro (9 km) and to the minesite (total of 27 km) is by an unpaved all weather road that cuts off from the Robert Campbell Highway (Highway 9), 174 km east of Carmacks. (see Illustration 1).

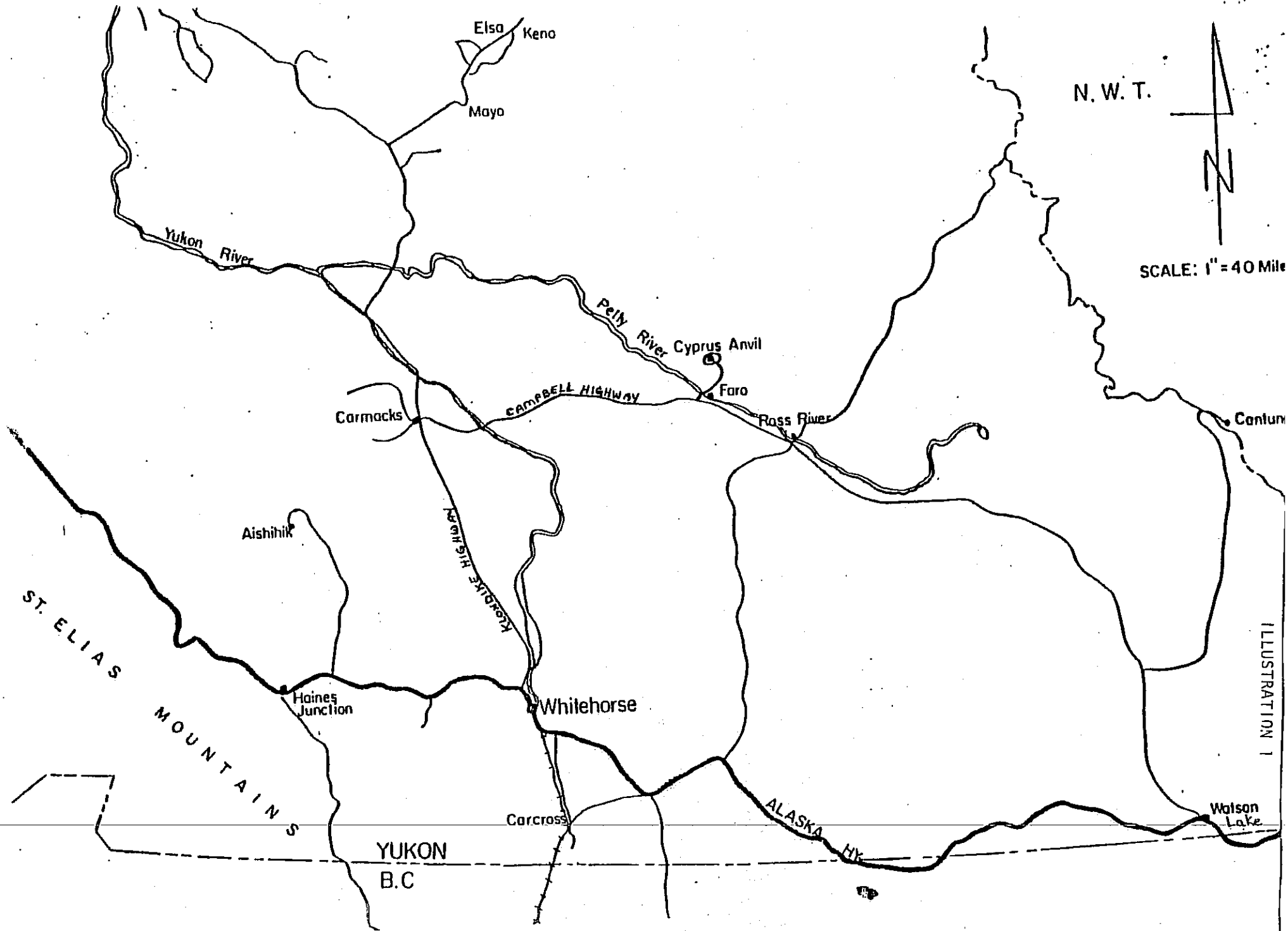
Cyprus Anvil employees are housed in Faro, 18 km from the minesite. Faro is the second largest community in the Yukon and, according to Yukon Health records, as of September 1983 had a population of 1,466. It is incorporated with Town status under the provisions of the Yukon Territory Municipal Ordinance and has an elected Council comprised of a mayor and four aldermen. Cyprus Anvil owns and rents 459 family dwelling units and a 32 unit bachelor apartment.

Located in the downtown area of Faro are the recreation centre, arena, Cottage Hospital, school (grades 1 - 12), hotel and movie theatre. A shopping centre houses a Sears catalogue outlet, jewelry store, beauty parlour, bank, post office, medical and dental clinics, Northern Canada Power office, grocery store, and the Municipal Office and Council Chambers. Adjacent to the shopping centre are located the Human Resources office, liquor store and territorial office. Various other facilities, such as a garage, R.C.M.P., travel agency/warehouse complex, tourist information booth, car wash etc. are located throughout the town. The community is served by live C.B.C. radio from Whitehorse and C.B.C. Northern television service. Four cable channels are also currently available.

In 1972, a 3,000 foot all weather gravel airstrip was built by the Department of Transportation to provide year round service. It was upgraded in 1976 to provide for passenger parking and a service prefabricated airport terminal building. Scheduled flights are provided to and from Whitehorse by a licenced carrier six days a week.

Water is supplied to the mine from the north fork of Rose Creek, pumped from an impounding area through a 1,900 m long, 60 cm diameter surface pipeline. During periods of low surface runoff, a 3,406,500,000 litres storage reservoir, fed by the south fork of Rose Creek, is used to control supply water. Daily consumption for the entire operation is 22,710,000 litres. Water is supplied to the town from two wells drilled approximately 91.5 m from the Pelly River. Daily municipal consumption is 1,650,000 litres.

Power for both the minesite and townsite is supplied by Northern Canada Power Commission principally from the Whitehorse Rapids generating plant via a 402 km, 138 KV powerline. A 5 megawatt emergency and peak load plant at Faro and a 2.5 megawatt plant at the minesite also contributes to the system. Consumption at the minesite in 1983 was 19,944,000 kilowatts and at the townsite, 9,872,200 kilowatts. Temperatures in the area range from -46 degrees C at mid winter minimum to +29 degrees C at summer maximum. Freezing conditions persist from mid-September until early May. Snowfall accounts for one half of the mean annual precipitation of 35 cm and the maximum snowfall cover ranges up to 127 cm in late March.



N. W. T.

SCALE: 1" = 40 Mile

ILLUSTRATION 1

II HISTORY

Occurrences of lead and zinc sulphides in the Vangorda Creek about 9 miles southeast of Faro deposit were first staked by A. Kulan and Associates in 1953. The property was optioned to Prospectors Airways and diamond drilling from 1953 to 1955 proved 9.4 million tons of 9% combined lead-zinc; this was later designated as the Vangorda deposit. Kerr Addison Mines of Toronto eventually acquired Prospectors Airways but depressed based metal prices, declining metal markets and the extreme remoteness of the area caused interest in the prospect to subside. Kerr Addison resumed exploration of the area in 1962 and by 1964 had drilled one anomaly resulted in the discovery of the Swim deposit (5 million tons of 10% combined lead-zinc, about five miles southeast of Vangorda).

In 1964, Dynasty Explorations commenced a detailed exploration program on several claim groups in the Swim-Vangorda-Rose Creek area. Encouraging geochemical results and reported occurrences of "float" in the Faro Creek bed led to the staking of the Faro group of claims. In 1965, Dynasty, in a joint-venture program with Cyprus Mines Corporation, intersected massive sulphides in a rotary hole on these claims, now known as Faro No. 2 deposit. Subsequent diamond drilling through two winters and two summers proved an economic orebody with reserves estimated at 63,473,000 tons, averaging 3.4% lead, 5.7% zinc and 1.02 oz/ton of silver.

By the fall of 1969, the project had been brought into commercial production, under the name of Anvil Mining Corporation, at a capital cost of \$63 million dollars for mine production equipment, concentrator and related plant service facilities and townsite. In addition, White Pass and Yukon Route spent an additional \$20 million on equipment related to hauling and handling the concentrate between Faro and Skagway. The federal government spent \$5 million on a new road link between Faro and Carmacks, and Northern Canada Power Commission invested \$6 million to upgrade facilities at the Whitehorse generating station and to construct a new power transmission line to the minesite and townsite.

An agreement was reached on May 15, 1979 between Cyprus Anvil Mining Corporation, Kerr Addison Mines Ltd., and Canadian Natural Resources Ltd., whereby Cyprus Anvil acquired all the mineral property interests of the respective companies in the Anvil District which include those of the Kerr Addison subsidiary, Vangorda Mines Ltd. The principal properties involved cover approximately 31 square kilometers in the heart of the known mineralized section of the District and include the Grum and Vangorda deposits, both of which contain significant amounts of ore mineable by conventional open pit methods.

The Grum deposit was discovered in 1973 by the late Dr. Aaro Aho of the A.E.X. Syndicate. A.E.X. Syndicate drilled 16 holes, totalling 4,000 meters, to July 1974 when Kerr Addison Mines Limited assumed control of the project and drilled a further 13,000 meters of surface diamond drill holes. This work included a deposit 1,680 meters long and 366 meters wide. Upon completion of this initial drilling phase, an extensive underground development program was initiated. Concurrent with the underground development, a further 24,000 meters of surface diamond drilling was carried out to complete the grid at 60 meter spacing.

In 1981 Hudson's Bay Oil and Gas purchased Cyprus Anvil from Standard Oil of Indiana, who had taken control of Cyprus Mines Corporation in 1979. In late 1981 Dome Petroleum Limited acquired the assets of Hudson's Bay Oil and Gas.

Worsening economy over the course of the summer of 1982 plus costs associated with the mine operations led to its initial closure of June 4, 1982 with subsequent extensions, to reopen again June 1983 under a limited stripping program. The mill is presently idle.

III REGIONAL GEOLOGY

Strataform, stratabound, massive pyritic lead-zinc-silver deposits in the Anvil Range occur in a polymetamorphic, polydeformational, volcano-sedimentary terrain of Lower Paleozoic age. The known sulfide deposits are restricted to one discreet stratigraphic unit within this deformed sequence on the southwest flank of the Anvil Arch. This arch is a megascopic, northwest/southwest trending, doubly plunging, asymmetric anticline with a Middle Cretaceous (90-95 million years) granitic core. Five major deposits - Faro, Grum, Vangorda, Dy, and Swim - formed contemporaneously with their enclosing host rocks and prior to the metamorphic and intrusive events.

A. Faro Deposits

Of the major deposits, only the Faro, with original geologic reserves of 63.4 million tons of (9.6% combined lead-zinc), is currently in production. The deposit is lenticular in plan and cross section (Illustration 2), with a 5,000 foot length; 1,600 foot width; and 150 foot average thickness. The Faro orebody consists of three zones offset by faulting. Zones 1 and 3 will be mined from the same pit while Zone 2 forms a completely separate mining unit.

The deposit is spatially related to a carbonaceous schist unit occurring at the contact between calci-silicate schists of the Vangorda Formation above, and pelitic schists of the Mt. Mye Formation below. The sulfide horizon, itself, consists of the following lithologies from stratigraphic top to bottom

- a. Barite bearing massive pyritic sulfides, base metal bearing.
- b. Massive pyritic sulfides, variably base metal bearing.
- c. Pyritic quartzites, generally base metal deficient.
- d. Sulfide bearing graphitic quartzite, variably base metal bearing.

A "white mica" alteration envelope surrounds the deposit and grades outwards into normal pelitic schists.

The Faro deposit has undergone two periods of regional dynamothermal metamorphism up to middle amphibolite facies grade followed by three post metamorphic brittle deformational events. It has been faulted into three segments (Zones 1, 2, and 3) and is intruded by hornblende-biotite-diorite dikes at its northwest end and along the fault separating Zones 1 and 3.

Average percentages of sulfide minerals in the Faro orebody are:

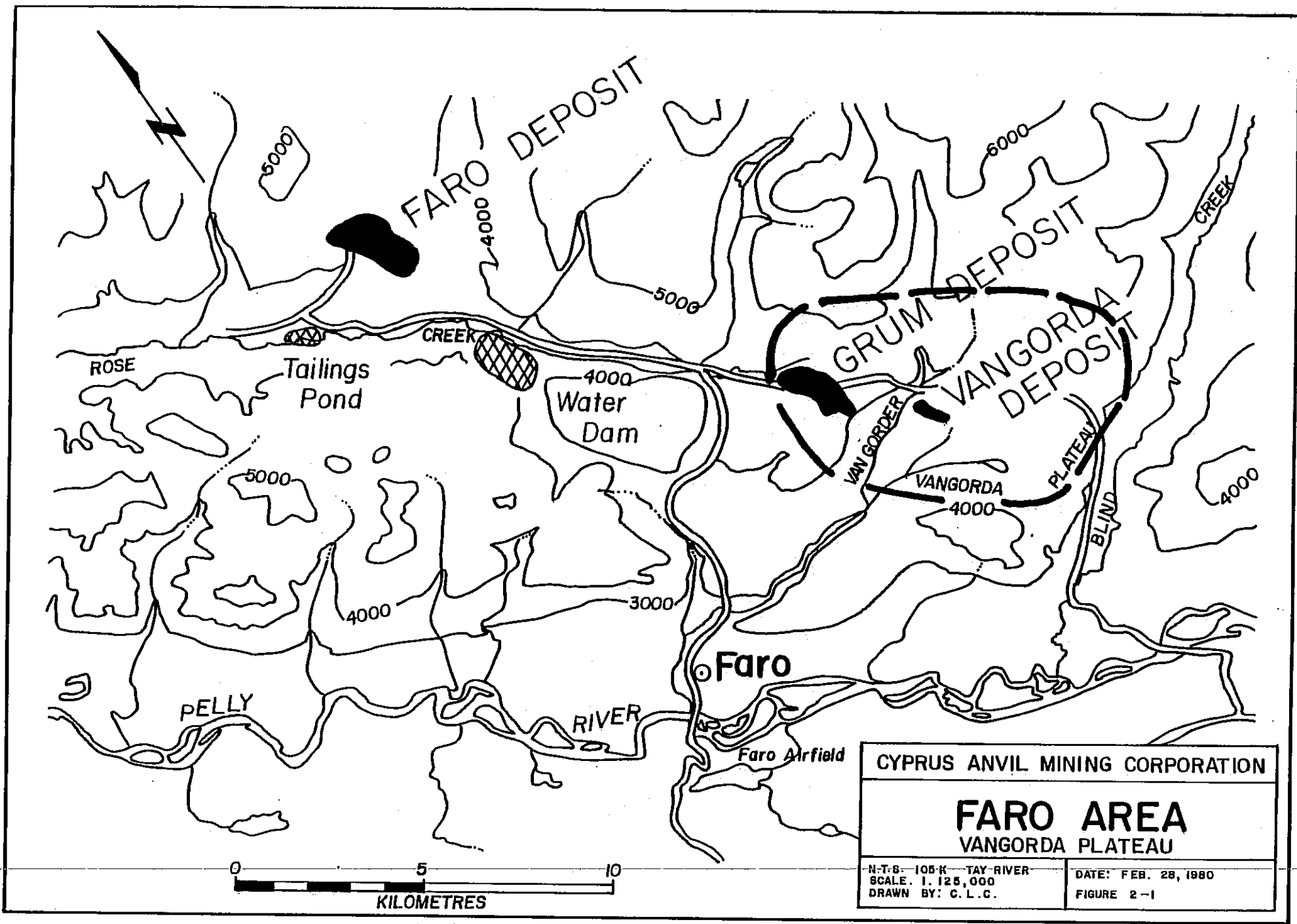
Pyrite	Fe_2	40%
Sphalerite	ZnS	10%
Galena	PbS	5%
Pyrrhotite	Fe_{1-x}	10%
Chalcopyrite	CuFeS_2	1%

Silver occurs as inclusions within the galena crystal lattice.

B. Vangorda Plateau Deposits

The Grum, Vangorda and Dy deposits of the Vangorda Plateau are spatially related to graphitic phyllites, occurring at the contact between calcareous pelitic phyllites of the Vangorda Formation above, and non-calcareous pelitic phyllites of the Mt. Mye Formation.

The stratigraphic distribution of the sulfide lithofacies is similar to the Faro deposit although the mineral grain size is generally smaller, reflecting the lower greenschist metamorphic grade.



IV PROPERTY OPERATION

A diagram of the surface layout of the Cyprus Anvil minesite is shown in Illustration 3.

The Administration Building, located outside the main gate, was completed in late 1979. This modern complex houses the Accounting, Environmental Control and Personnel Departments, as well as senior management offices. Most of the other offices are located in the warehouse/truck shop complex. An expansion, which was completed in 1977 provides the warehouse with 37,000 square feet of storage area which permits over 16,000 different items, valued at more than 12.7 million dollars, to be kept in inventory. The equipment maintenance shop area covers 34,000 square feet. There are eight haul truck bays, a welding shop, lube bay and steam bay, as well as a machine shop, carpenter shop, electrical shop and a gas bay for the repair of pickups and light trucks. Also encompassed in this complex is the mine dry and 13,000 square feet of office space for Engineering, Mine Mechanical and Purchasing Departments. The mill modification was completed in 1981 which expanded the flotation process and above this new complex are located the milling operational personnel.

The responsibility for the operation at Faro lies with the Resident Mine Manager. For simplicity, the departments can be classified as:

- Administration
- Mechanical, Mine Maintenance, Central Planning, Electrical
- Mine, Mine Operation
- Mill, Mill Operations, Mill Maintenance, Metallurgical, Heating Plant, Surface.
- Support Departments: Environmental Control, Accounting, Personnel, Engineering, Geology, Safety/Security, Purchasing and Warehouse, Housing Administration.

Cyprus Anvil's distribution of labour by department, as of May 1, 1984:

Administration	2
Mechanical	101
Mine	74
Mill	27
Support Departments	45
	=====
	249

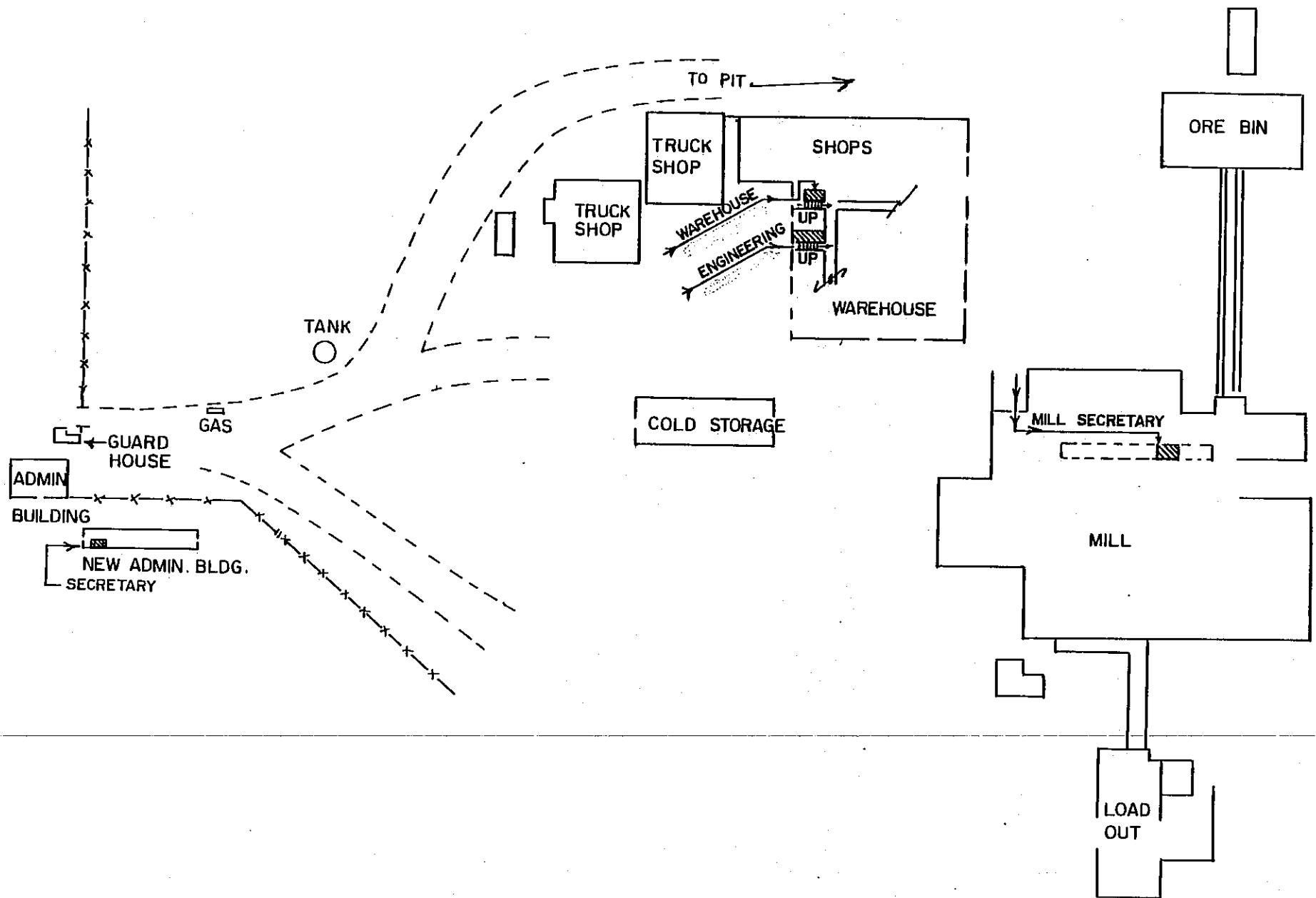


ILLUSTRATION 3

V MINING OPERATION

The mining operation at the Cyprus Anvil mine is currently conducted on a seven day per week, two shifts/day, under the direction of a General Foreman, Mine Operations, Senior Foreman, Drill and Blast Foreman and four Shift Foremen. Daily planned production is 20,500 yards per day for waste. Under this limited stripping operation no ore is mined and the concentrator is not in operation.

Some of the parameters of pit design and waste removal at the open pit are detailed below:

Pit Dimensions	Present Size	Ultimate Size
Length	4,700 feet	4,700 feet
Widths	2,300 feet	2,300 feet
Depth	710 feet	970 feet
Overburden bank slope (degrees)		26
Overall rock slope (degrees)		36.5 - 45
Working width (crest to toe) (min.)		300 feet
Bench interval height		40 feet (waste) 20 feet (ore)
Haulage distance to crusher (max.)		9,000 feet
Ramp gradient		8% (max.)
Blasthole spacing - ore		24'x24' and 22'x22'
- waste		23'x23', 25'x25' and 27'x27'
- alluvium		30'x30'
Subgrade drilling		6 feet
Powder factor lb./cu.yd.		0.97

Mine Production and Surface Equipment

Type	Using (Owned)	Description	Function
Shovels	2 (3)	2100BL Elec. 15 c.y. P&H	Loading
	0 (1)	Marion 191M 15 c.y.	Loading
Loaders	2 (2)	L-800 Diesel Elec. 10 c.y. Letourneau	Loading
Drilling	2 (2)	Marion M4, 9 7/8" rotary	Drilling
Trucks	2 (23)	Wabco diesel elect. 120Ton	Hauling
	8 (8)	Euclid diesel elec.	
	1 (1)	Komatsu D355 tractor	Road mtce
	1 (1)	B24B Caterpillar r.t. dozers	Shovel cleanup

2	(2)	16G Caterpillar graders	Road mtce
1	(1)	14G Caterpillar grader	Road mtce
1	(1)	Bantam 366 Koehrine backhoe	Ditch mtce
3	(3)	Ston Service truck with hiab	Pit mtce
1	(1)	115T truck crane P&H	Shovel mtce
1	(1)	40T crane P&H	Surface mtce
2	(2)	112DG crane Galion	Surface mtce
1	(1)	5T truck with port. steamer	Dewatering
	(1)	D8H Caterpillar tractor	
3	(3)	Mack trucks	Transport
1	(1)	60T lowboy	
1	(1)	Water truck converted 65T Dart truck)	Road mtce

Production Statistics

Pre-Production Stage (October 1967 - August 1969)

Alluvial overburden	1,052,000 bcy
Waste rock	4,850,000 bcy
Stockpiled ore	338,345 tons

Production Stage (September 1969 - December 1983)

Alluvial overburden	6,035,672 bcy
Waste rock	106,180,683 bcy
Mill feed	37,922,369 (2.8% Pb, 4.7% Zn)

Stripping Program (June 1, 1983 to May 1, 1984)

Waste rock	5,540,000 bcy
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Ore Stockpile Inventory (December 31, 1982)

Oxide stockpile	1,300,000 tonnes (2.9% Pb, 4.7% Zn)
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The purpose of the Mine Department is to ensure that sufficient ore is delivered to the mill on a daily basis for as long as there is ore in the ground. To attain this objective, about eight yards of waste rock must be removed to expose each yard of ore.

DRILLING

Holes of 9 7/8" in diameter are drilled to a depth of 45 or 25 feet on a pattern of 27'x27' in waste, and 22'x22' in ore. In the ore section, each hole is sampled and assayed to define which is ore and which is waste.

BLASTING

Holes are loaded with explosives in order to break the material. Ammonium Nitrate mixed with fuel (ANFO) is used in the drill holes and Powergel (waterproof slurry) is loaded in the wet holes where water cannot be pumped out. Blasts occur on an average of once per week.

The explosives are prepared and delivered to the drill holes by Canadian Industries Limited (CIL) and from that point on, the blasting crew takes over.

MINING OPERATIONS (contd)

LOADING

Shovels with a capacity of 15 yard buckets and a loader with a 12 yard bucket load the trucks.

Waste benches are usually mined on 40 foot and ore benches on 20 foot height.

HAULING

Two (2) 120 ton trucks and eight (8) 170 ton trucks haul waste and ore to the dumps or the crusher up a grade of 8%.

All machines are equipped with radios so instructions can easily be given and received.

VI MILLING OPERATION

Note: mill has been shutdown from June 4, 1982 to present

Initial operation of the 5,000 tonne per day concentrator began in September 1969. An expansion to the concentrator to increase capacity to 6,000 tonnes per day, and to enable the production of a mixed lead-zinc (bulk) concentrates was completed in 1970. A second expansion of the concentrator to increase capacity to 9,300 tonnes per day was undertaken in 1973. The new tertiary grinding and rougher-scavenger flotation sections went on-stream in December 1973. Other modifications to the cleaner flotation sections were completed in mid 1974. Further modification to expand the grinding, flotation and dewatering sections were completed in November 1981. Although the concentrator capacity has increased to 10,300 tonnes per day, the justification for the expansion were the metallurgical improvements associated with a finer grind and increased flotation capacity. The finer grind of the concentrates necessitated the modification to the dewatering sections.

MILLING OPERATION (contd)

Brief Process Description

The three most valuable components of the ore are lead (Pb), zinc (Zn) and silver (Ag) and most of the remainder (approximately 90%) is waste. The objective of the milling process is to selectively recover the Pb (plus Ag) and Zn, and discard the worthless waste material through the following series of processes.

A. Crushing

The open pit supplies ore to the crushing plant at a rate of 10,300 tonnes per day; here the rock is reduced in size from anywhere up to 54" to less than 3/4" in three stages of crushing. In the first stage of crushing, the primary crusher takes ore and reduces it to less than 6". This crushed rock is passed over the primary screens where the "fines" (ore that is less than 3/4") are removed and sent directly to the fine ore bins as rod mill feed. The oversize ore (greater than 3/4") is sent to the coarse ore bin where it is stored until drawn out as secondary crusher feed. When coarse ore is taken from the bin, it is passed through the secondary crusher in which it is reduced to less than 1 1/4". The secondary crusher discharges the crushed rock onto the secondary screens where size separation again takes place. The fine material is directed to the fine ore bins while the oversize material becomes the feed for the two tertiary crushers. Ore in the tertiary crushers is reduced to 3/8", all discharge from the tertiary crushers goes to the fine ore bins.

The fine ore bins have a combined capacity of 15,000 tonnes. The coarse ore bin has a capacity of 20,000 tonnes. Both crushing circuits can run independently: that is, the primary crushing circuit can be operated without the secondary/tertiary circuit running and vice versa.

B. Grinding

'A' grinding circuit consists of three nearly identical and parallel circuits, each consisting of one rod mill and one ball

mill along with their related cyclone classifiers and pumps. 'B' grinding circuit, installed during the 1981 modification consists of one large rod mill, a large secondary ball mill and a large tertiary ball mill and their related circuits. 'A' and 'B' grinding circuits operate independently of each other and the tonnage is roughly split between the two. The purpose of grinding is to reduce the size of the crushed ore until about 80% of it is less than 50 microns (1/20 of one millimeter).

In this process, the ore is drawn from the fine ore bins on a system of conveyor belts and fed into the rod mill, along with sufficient water to make a slurry of approximately 80% solids. As the rod mill revolves, the tumbling action of the rods grinds the rod mill feed into a rather sandy consistency. This rod mill discharge slurry flows into a pumpbox, from where it is pumped to a cyclone. A cyclone has no moving parts but the velocity of the feed and conical construction combine to set up a spinning action which effectively classifies the ore particles into two size groups. The coarse particles are forced out of the underflow of the cyclone while the fine particles are forced out of the top. The coarse material (cyclone underflow) becomes the ball mill feed and the cascading action of the balls in the ball mill provides a very efficient grinding medium for further size reduction of the coarser particles. The ball mill discharges into the same pumpbox as its accompanying rod mill and therefore, the particles are once again pumped through the same cyclone. Some of the particles will now be small enough to go out of the overflow of the cyclone, the remainder must repeat the ball mill cycle.

The fine particles forced out of the cyclone overflow, flow downstream into another pumpbox and are pumped into a cluster of cyclones called a cyclopac. The cyclopac overflow becomes flotation feed and the cyclopac underflow feeds into another ball mill. This ball mill discharges to the same pumpbox as the first cyclone overflow and so the closed circuit principle is used once again.

C. Flotation

Up to this point there has been no distinction made between Pb, Ag, Zn, and waste minerals. The objective has been to reduce the size of the material until the four components have been liberated from each other. Grinding provides liberation and thus the components can now be separated using a process called froth flotation.

The process of flotation involves chemical treatment of ore pulp to selectively induce certain mineral particles to attach themselves to air bubbles. The air bubbles carry the selected minerals to the surface of the pulp where a stabilized froth is formed. This froth is recovered thereby removing the selected minerals and leaving the remainder behind in the pulp. The type of chemical (reagent) used to induce this attachment of minerals to air bubbles is called a collector. Lime and soda ash are used to raise the pH of the pulp in order to ensure the best possible recovery of the desired mineral. Frother is added to form a stable froth, one which is strong enough to carry the minerals. One reagent used in the Pb flotation circuit, with due caution, is sodium cyanide. It is used as a depressant for some undesired minerals. Copper sulfate is used to activate the Zn mineral particles so that they do float. Ordinarily they do not have a strong affinity for the collector until they have been activated.

The flotation process is carried out in a series of flotation cells. Each cell contains an impeller, near the bottom of the cell, to stir the pulp and disperse as bubbles air which is forced in through a hollow shaft. The froth carrying the desired minerals is allowed to overflow the sides of the cell into a trough called a launder. The material which does not float and passes out of the cell in the pulp, is called the tailings. Since no process is 100% efficient some of the desired minerals end up in the tailings and some of the undesirable materials do float off in the concentrate.

The slurry passes through a number of cells. The first set of cells are called roughers and the final sets scavengers. To remove the undesirable materials from the concentrates (upgrade the concentrate), refloatation of the rougher concentrates is practiced. The Pb/Ag recovery circuit has three cleaning stages, as does the Zn circuit.

As was mentioned earlier, Zn particles generally will not float unless they are treated with copper sulphate therefore, the Pb is first floated off by the addition of suitable reagents in the Pb rougher and scavenger cells. The tails from the Pb scavengers contain waste and Zn particles and in order to activate the Zn, copper sulphate is added as the slurry is pumped to the Zn roughers. The Zn minerals float off in these cells while the tailings from this circuit is the final mill waste and flows into the tailings disposal system.

The final concentrates from each of the two flotation circuits should assay approximately 65% Pb and 51% Zn respectively. The final tails assay should be roughly 0.7% Zn and 0.4% Pb or lower.

D. Dewatering

The final Pb and Zn concentrates from flotation are in the form of slurries - about 25% solids by weight. They are fed into large circular tanks called thickeners in which the solids settle to the bottom and essentially clear water overflows the top. The solids are pulled into the centre discharge well by a raking mechanism. The thickened slurry (about 65% to 75% solids) is pumped up to a filter feed distributor and then directed to appropriate filters or storage tanks. Vacuum disc filters are used to produce a "cake" containing approximately 10% to 12% moisture. The filter discharge is introduced into coal fired rotating drum dryers where the moisture is further reduced to approximately 6%. The dried concentrates are transferred to the loadout shed via conveyor belts from where it is loaded into containers for shipment to the port of Skagway, Alaska.

E. Tailings Disposal

The waste material or tailings is a high volume product and requires a large disposal area. Large basins have been formed south of the mill by dikes, these are called tailings ponds. Tailings are gravity fed into the tailings pond; the solid material settles and is retained while the clear water seeps or is decanted into the local drainage system (Rose Creek).

Concentrator Operating Statistics
(For the year ending December 31, 1982-Five Months of Operation)

Total mill feed	1.64 million tonnes
Concentrate produced	58,900 tonnes of Pb 121,150 tonnes of Zn
Overall recoveries	74.3% Pb 51.5% Ag 76.4% Zn
Power consumption	42.44 KWH/ton of mill. feed
Grinding media	1.97 kg of steel/tonne milled
Reagent usages:	
Sodium cyanide	0.083 kg/tonne milled
Soda ash	0.81 kg/tonne milled
Lime	3.75 kg/tonne milled
Copper sulphate	0.67 kg/tonne milled
Collector (Sodium Isopropylxanthate)	0.33 kg/tonne milled
Lead Frother (Methylisobutyl Carbinol)	0.014 kg/tonne milled
Zinc Frother (DQW 1012)	0.002 kg/tonne milled
Flocculant	0.009 kg/tonne of conc. prod.