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R. V. KIRKHAM

UTAH MINES LTD.

ISLAND COPPER FACTS

The Company

The Island Copper Mine is owned by Utah Mines Ltd. Utah is an investor owned corporation with its Head Office in San Francisco. At present, Utah derives more than 80% of its income from mining interests. It has mines or interests in mining operations in Arizona, New Mexico, Utah in the United States, in Peru, Australia and of course Canada.

Utah has been operating in Canada since the mid-1950's. Its Canadian operations currently are centred in Port Hardy, British Columbia, location of the Island Copper Mine and Vancouver, where exploration and certain administrative offices are maintained.

Utah's previous Canadian experience included construction of Vancouver's Burrard Building and construction of a large potash mining operation at Esterhazy, Saskatchewan.

Exploration

The original claims were staked by G. Milbourne, a B.C. porspector. In January 1966, Utah entered into an option agreement with Mr. Milbourne. During the rest of 1966 up to May 1969, diamond drilling and other exploratory work was carried out to evaluate the ore body. In July 1969, a little over two years after the first diamond drill hole was collared, the company gave the go ahead and committed themselves to an investment in excess of $70,000,000 for development of the mine.

Ore Body

The Island Copper orebody is estimated to contain 280,000,000 tons of ore, averaging 0.52% copper and 0.027% molybdenite. The main ore minerals are - chalcopyrite and molybdenite. The size of the orebody is approximately 5,000 feet long by a maximum width of 1,200 feet.

The Mine

The Island Copper Mine is worked in forty foot benches and will ultimately be 7,500 feet long, 3,500 feet wide and 1,000 feet deep. The lowest bench is presently the 960 level which is forty feet below sea level.

Drilling is performed by three Bucyrus Erie 9 and 7/8 inch drills; two 60R electrics and one 45R diesel and electric. Holes in rock are drilled eight feet below grade and holes in glacial till are drilled to grade.

The blasting agent is ammonium nitrate with fuel oil in bulk and packaged form provided by Canadian Industries Limited. Wet holes are pumped where possible and where not possible packaged AN/FO is used. Very minor amounts of packaged slurry are used in difficult situations.

Blasting times are at noon on Monday, Wednesday and Fridays, to minimize the effects on production operations.

Loading is done by four 15 cubic yard P & H 2100 electric shovels. One of these is the 2100 BL with the lower propel system and the others are the 2100B.

For the hauling operation, 23 Unit Rig M120, 120 ton haul trucks with electric wheel drive carry the load.

Auxiliary equipment includes four D-8 dozers, four D-9 dozers, one 824B rubber tired dozer, one Michigan 280 rubber tired dozer, two Cat 14E graders, one Cat 16E grader, one Cat 980 loader and two Mack 35 ton dump units.

The mine is operated 24 hours a day, seven days a week with four rotating crews. Average production is presently in excess of 106,000 tons per day.

Primary Crusher

One Allis Chalmers superior gyratory, size 54" by 74". Sufficient capacity to crush 3,000 tons per hour to -9". The product is screened into +4" and -4" fractions and stockpiled. Three draw points per mill draw rock so it can be blended for optimum grinding in mill.

Concentrator

Designed for 33,000 T.P.D. Input - copper concentrate produced is approximately 650 T.P.D. A molybdenite concentrate is also being produced. See simplified flow sheet.

- Autogenous Mills

  Six Hardinge 32' diameter by 14' long mills. They are run at 11.0 R.P.M., which is approximately 72% of critical speed, the speed at which the ore would centrifuge rather than tumble. The load is controlled by the power consumed by the two 3,000 H.P. drive motors. Lifters changed approximately every two weeks.

- Copper Rougher Flotation

  140 Wemco 300 cubic foot cells used. 20 minute retention time.

- Other Copper Flotation

  50 Galigher 100 cubic foot cleaner cells
  16 Galigher 50 cubic foot recleaner cells
  28 Wemco 300 cubic foot scavenger.

- Moly Feed & Copper Conc. Thickeners

  One each - 100 ft. diameter.

- Tailings Thickeners

  2 x 375 ft. diameter.

- Final Copper Conc. Processing

  From thickener to 2 disc filters and from there to driers, capacity up to 1,000 T.P.D. Moisture reduced to 5%, concentrate then stored in "Teepee" building which has capacity of 37,000 tons.

- Molybdenite Circuit

  Similar to copper. Copper concentrate processed by depressing copper and floating off molybdenite. Coal, or rather specifically, hydrocarbons, are removed also. Molybdenite concentrates are loaded into steel drums for shipment.

- Disposal of Tailings

  Tailings are placed at the bottom of Rupert Inlet which is over 500' in depth.

- Laboratory

  Modern apparatus such as Atomic Absorption Spectrophotometers are employed to Assay mine and mill samples on a 24 hour, 7 day a week basis. Also, the Environmental program is carried out by this department.

ENVIRONMENTAL MONITORING PROGRAM

Utah Mines initiated an environmental water sampling program in late 1969 before any construction started at the site. A biological consulting firm was retained to do a chemical and biological assessment of Rupert Inlet and adjacent waters. The first surveys were conducted in early 1970.

In January 1971 a permit was issued to Utah by the Provincial Pollution Control Branch permitting discharge of the tailings from the copper - molybdenum concentrator into Rupert Inlet via a submerged outfall system. The effluent is diluted 1:1 with seawater before discharge in a pipe located 800 feet offshore at a depth of 150 feet below the surface of the water.

One of the conditions of the permit required Utah to carry out an extensive program of monitoring the receiving waters (Rupert & Holberg Inlets and Quatsino Sound) and the streams flowing into Rupert Inlet. The permit also required that Utah retain an independent agency to assist in setting up of the program, establishing procedures for sampling and analytical work, and preparation of annual reports on the results of the program acceptable to the Pollution Control Board.

Utah selected a team of scientists from the Universities of British Columbia and Victoria to carry out the functions of the independent agency. This team, which is directed by J.B. Evans, head of the U.B.C. Department of Mineral Engineering, consists of oceanographers, marine biologists, ecologists, chemists, geologists, metallurgists, and mining engineers. The independent agency revised the existing monitoring program to include a wider scope in an attempt to cover all parameters which could be affected by the mill effluent.

The revised program was developed and monitoring commenced in March of 1971. Information gathered since that time in conjunction with surveys which had been earried out by Utah prior to the issuance of the Permit, have provided the baseline information against which to compare present and future conditions of the receiving waters.

Monitoring of the inlet waters is carried out on a periodic basis and includes measurement of the following major parameters:

(1) physical characteristics of the inlet bottom including seismic profiles, bottom photography, dredging and coring of the bottom for sediment analysis.

(2) physical characteristics of the receiving waters including temperature, turbidity, and colour.

(3) meteorological characteristics - state of surface water and weather.

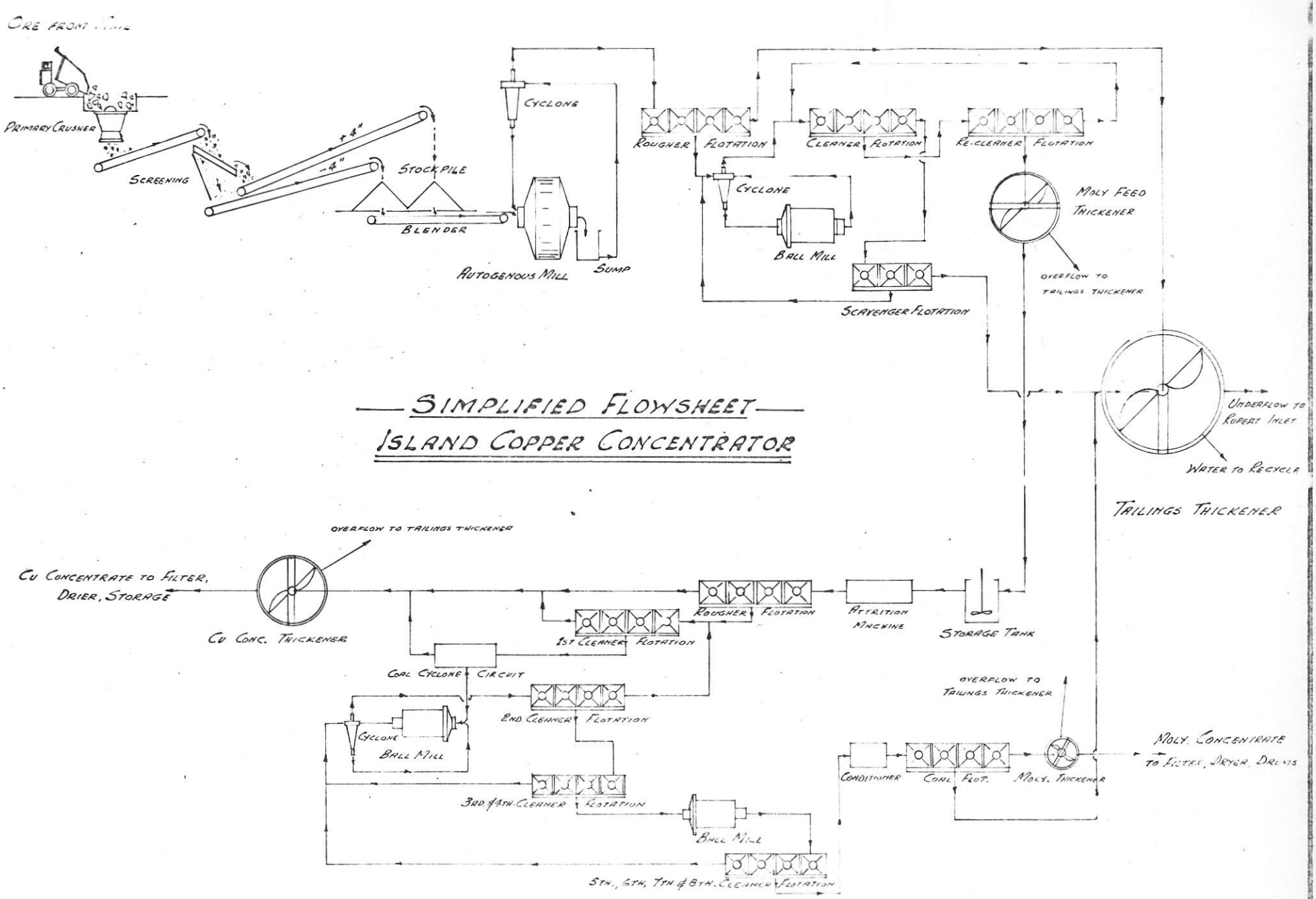
(4) chemical characteristics of receiving waters ineluding measurement of dissolved oxygen, salinity, alkalinity, and heavy metal content.

(5) biological characteristics including measurement of the organisms on the bottom in the deep part of the inlet, marine life on the bottom in the shallow intertidal areas, collection and measurement of plankton, and collection of crabs and fish for measurement of numbers, size, and heavy metal content.

Many of these same parameters are also periodically measured in a number of the fresh water streams flowing into Rupert Inlet.

The effluent is monitored daily for heavy metals, pH, solids, volumes, etcetera. Bi-weekly bio-assays are conducted on the final effluent.

Utah has chemists and marine biologists who carry ont a major portion of the data collection and analytical work relating to the physical, chemical, and biological parameters measured. The various parameters measured are overseen by the scientists from the independent agency. A biological consultant has been retained to assist Utah when necessary.


ORE FROM MINE
PRIMARY CRUSHER
SCREENING
+4"
-4"
STOCKPILE
BLENDER
CYCLONE
AUTOGENOUS MILL
SUMP
ROUGHER FLOTATION
CLEANER FLOTATION
RE-CLEANER FLOTATION
CYCLONE
BALL MILL
SCAVENGER FLOTATION
MOLY FEED THICKENER
OVERFLOW TO TAILINGS THICKENER
UNDERFLOW TO RUPERT INLET
WATER TO RECYCLE
TAILINGS THICKENER
SIMPLIFIED FLOWSHEET
ISLAND COPPER CONCENTRATOR
OVERFLOW TO TAILINGS THICKENER
CU CONCENTRATE TO FILTER, DRIER, STORAGE
CU CONC. THICKENER
ROUGHER FLOTATION
1ST CLEANER FLOTATION
ATTRITION MACHINE
STORAGE TANK
COAL CYCLONE CIRCUIT
2ND. CLEANER FLOTATION
CYCLONE
BALL MILL
3RD. & 4TH. CLEANER FLOTATION
BALL MILL
5TH., 6TH, 7TH & 8TH. CLEANER FLOTATION
OVERFLOW TO TAILINGS THICKENER
CONDITIONER
COAL FLOT.
MOLY. THICKENER
MOLY. CONCENTRATE TO FILTER, DRYER, DRUMS

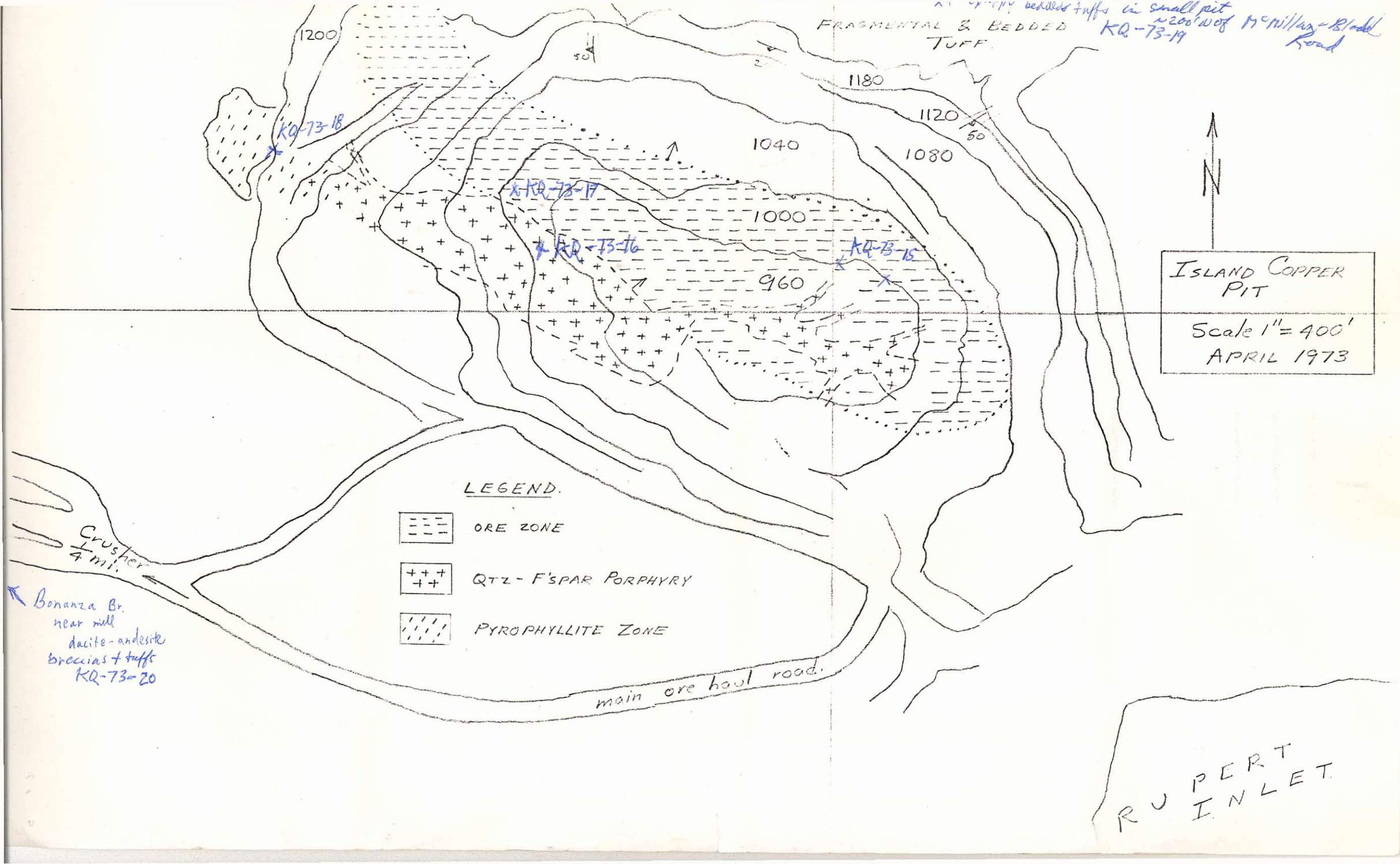
Mine Geology

The pit axis trends west-northwest, reflecting the trend of the orebody and the dike-like body of quartz feldspar porphyry, both of which dip northward. The ore zone is adjacent to the porphyry. Over 75% of the ore is in altered fragmental and bedded tuff of andesitic composition and the remainder in porphyry. The ore minerals, almost entirely chalcopyrite and molybdenite, are largely confined to a dense fine network of intersecting fracture surfaces.

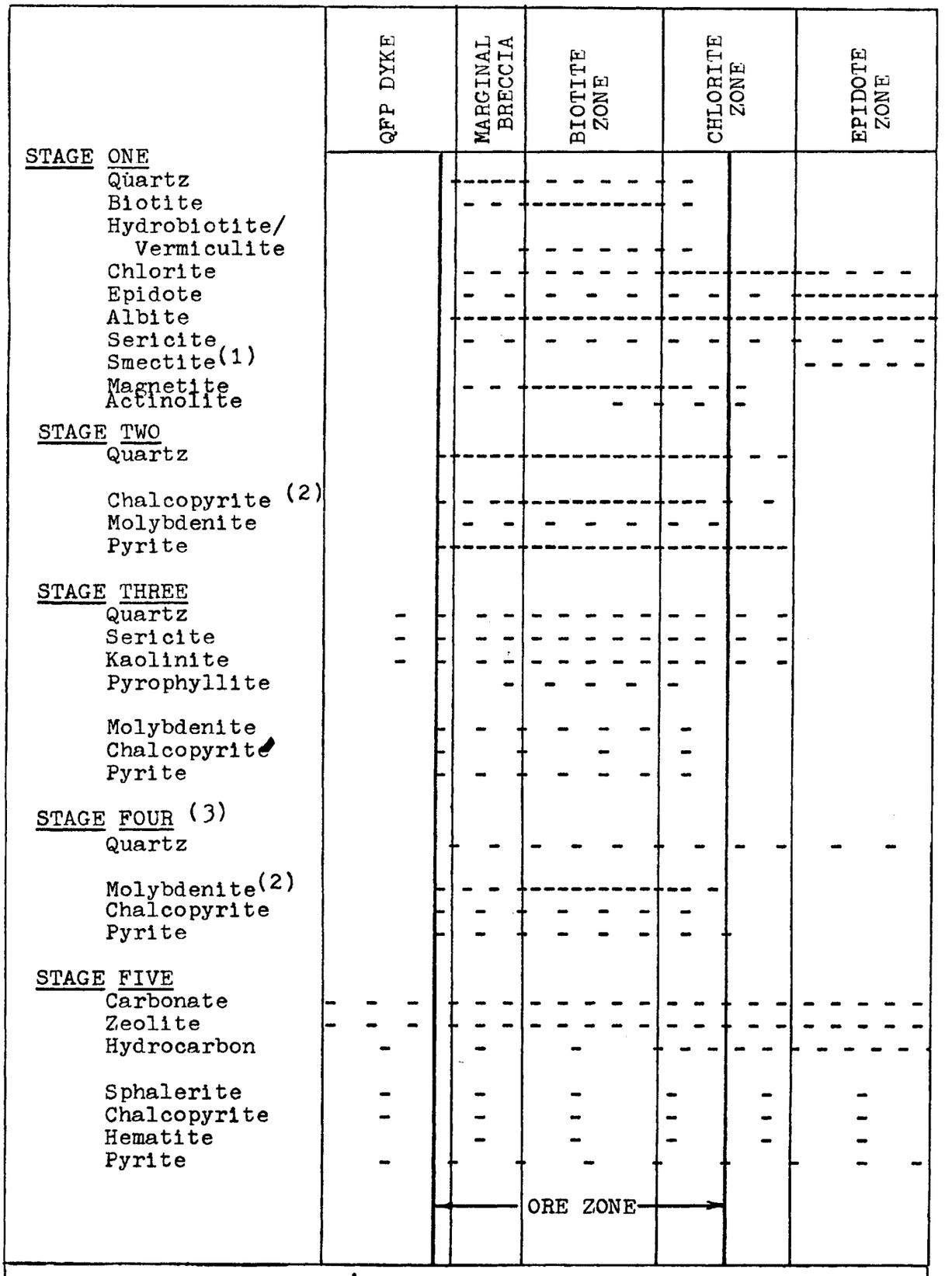
The orebody seems to plunge gently at either end, reaching maximum dimensions within the designed pit limit, of 5000 feet long, 1200 feet wide. Although it will be mined to 1000 feet deep, mineralization continues below that level.

Near the west end of the present pit, the porphyry dike is brecciated and replaced by a large mass of pyrophyllite and quartz, containing the rare blue mineral, dumortierite.

The attached plan shows the main geological elements in the pit, while the table indicates the relation between alteration and ore mineralization.


1200
1180
1120
1080
1040
1000
960
50
50
FRAGMENTAL & BEDDED TUFF
KQ-73-18
KQ-73-17
KQ-73-16
KQ-73-15
KQ-73-19
≈200' W of McMillan-Bloedel Road
N
ISLAND COPPER PIT
Scale 1" = 400'
APRIL 1973
LEGEND.
ORE ZONE
QTZ - F'SPAR PORPHYRY
PYROPHYLLITE ZONE
Crusher ¼ mi.
Bonanza Br. near mill dacite-andesite breccias & tuffs KQ-73-20
main ore haul road.
RUPERT INLET

RELATIONS BETWEEN ALTERATION MINERALS AND SULPHIDE (ORE) MINERALS IN THE HANGING-WALL (NORTH-EAST SIDE) OF THE QFP DYKE



SYMBOLS

----- Always Present

- - - Often Present

- - Occasionally Present

NOTES

1. This is probably a saponite (Mg- Montmorillite)
2. This stage of sulphide mineralization is the major contribution to the ore.
3. The exact age relations between the barren quartz veins and the sulphides on slip surfaces have not been established.
4. The pyrophyllite-dumortierite breccia is tentatively placed in Stage Three.

D.G.C.