

884684

KUTCHO CREEK PROJECT
COPPER - ZINC - SILVER DEPOSITS

STAGE I UP-DATE

Submitted by

SUMAC MINES LTD.

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Report Coordinated by

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approximately as follows:

- 1984-1985 Complete engineering and environmental studies
- 1985-1986 Obtain permits and financing
- 1987-1988 Construction and preproduction stripping
- 1989-2000 Production from Kutcho Zone open pit
- 2000 onward Production from underground, low grade stockpiles or new reserves.

A number of factors such as stalled joint venture negotiations, delayed access road construction or unfavourable metal market conditions could cause postponement of the development schedule outlined above.

The mining process will be by conventional techniques similar to other medium sized base metal operations now producing in British Columbia. For the first twelve years of operation, ore will be mined from the Kutcho Zone pit utilizing drills, shovels, trucks and bulldozers. The overall strip ratio is approximately seven tonnes of waste to one tonne of ore.

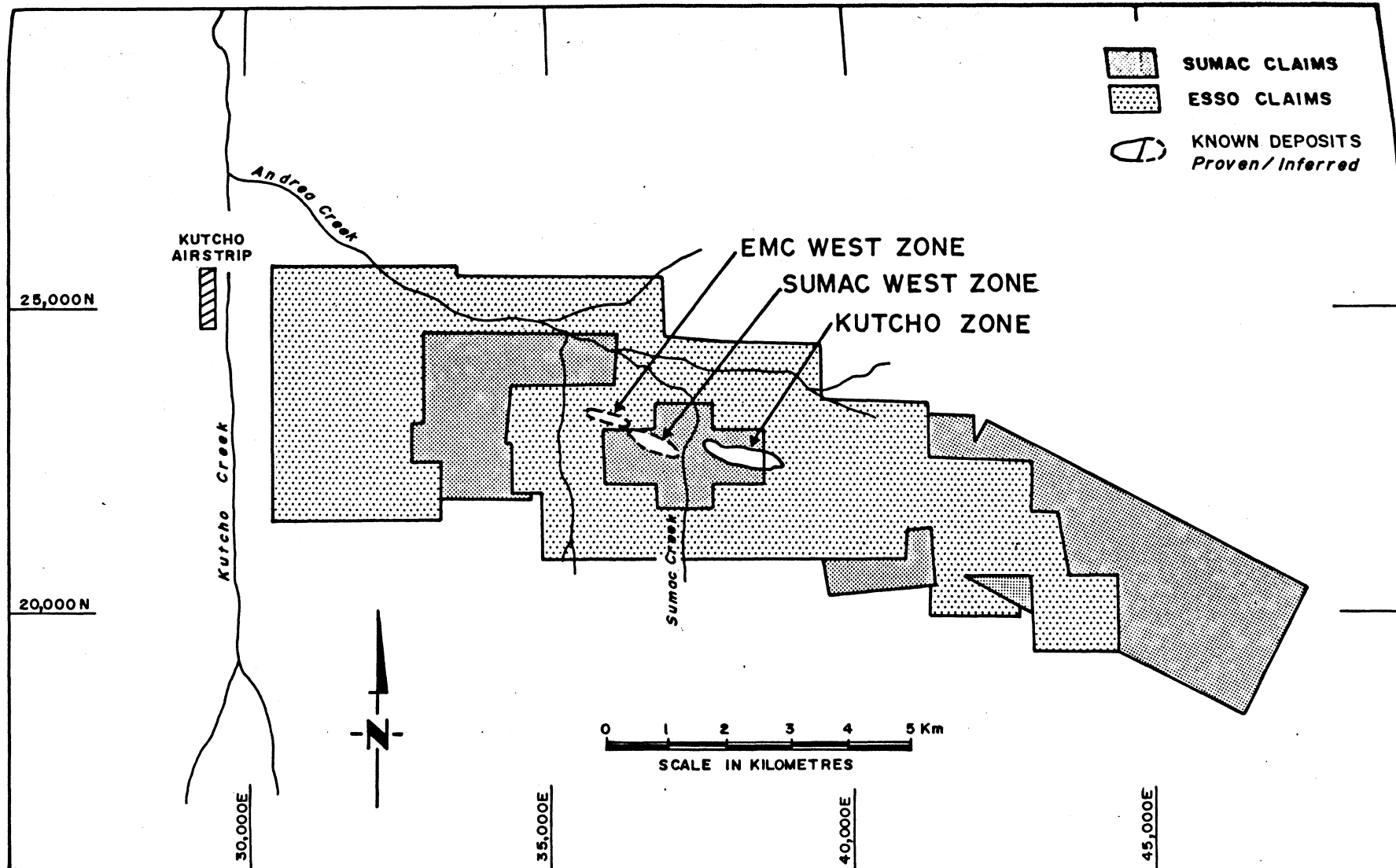
The principal facilities required include a concentrator rated at 4,000 tonnes of ore per day, a tailing disposal and water reclaim system, an on-site diesel power generating plant, water

The principal areas of work carried out by Sumac since 1979 are:

- (1) Slope stability engineering studies,
- (2) Completion of definition drilling in the Kutcho Zone deposit,
- (3) Underground bulk sampling,
- (4) Pilot plant scale metallurgical test work,
- (5) Acid generation tests,
- (6) Access road study, and
- (7) Preliminary hydro power investigation.

The deposits can be described as massive-sulphide stratabound deposits of volcanogenic origin. The principal minerals of economic importance are chalcopyrite, bornite and sphalerite and the currently defined open pit reserves are estimated at 17 million tonnes grading 1.51 percent copper, 2.16 percent zinc and 27.3 grams per tonne of silver. In addition, intersections of potential underground reserves have been encountered and the possibility of further discoveries is considered good. While underground potential has been assured, the current drill hole density is not sufficient to permit accurate estimates of the grade or configuration of the deposits.

Assuming that unforeseen delays are not experienced, the sequence of events as currently envisioned would be



CLAIM OWNERSHIP LOCATION MAP

The deposits are essentially obscured by nature. The one known exposure which Esso ultimately located remains snow covered for most of the field season. The discoveries in both cases were team efforts with exploration crews utilizing geochemistry, prospecting and geology to provide the encouragement necessary to carry out geophysical surveys and ultimately diamond drilling.

In 1973 both companies began extensive exploration programs which included geological mapping, airborne surveying, grid pattern geochemical surveying, ground geophysics and additional claim staking. Sumac established a tent camp on a tributary of Andrea Creek which has since become known as Sumac Creek. Esso set up its exploration camp two kilometres to the east on another tributary.

Access to the area was via float-equipped aircraft to Rainbow Lake and from there to the project site by helicopter. This means of access continued until 1977 following the construction of an airstrip in the Kutcho Creek valley ten kilometres to the west. The airstrip serves a number of operators in the area and provided a considerably reduced helicopter ferrying distance for Sumac. Up until the summer of 1982 all equipment and supplies were moved on site via helicopter with the exception of one winter tractor train delivery in 1974 and the occasional use of ski equipped aircraft.

Diamond drilling commenced in 1974 and confirmed the existence of copper-zinc-silver concentrations with ore potential. Exploration activity continued on an annual basis by both companies. During the 1970's Sumac completed the following work:

Geological mapping: 33.3 square kilometres

Geophysical surveys: 18.8 line-kms of induced potential

116.5 line-kms of charged potential

119.0 holes (28,710m) of down hole charged potential

Diamond drilling:

Kutcho zone - 57 holes, 10,088.9m

Sumac west zone- 12 holes, 4,298.3

W-KC claims - 1 hole, 427.8

E-KC claims - 2 holes, 301.1

Total 72 holes 15,116.1 metres

Metallurgical testing: 6 bench scale tests

During this period Esso carried out similar exploration activity including the completion of 80 diamond drill holes.

Helicopters were used for moving the drills and transporting personnel and equipment. Many of the drill sites are in open alpine areas and required little or no clearing while those in the scrub forest were cleared by hand.

Ground surveys have been done from lines spaced at approximately 120 metre intervals. The lines were cleared with axes and chain saws in the forested areas and merely marked with pickets in the open alpine portions.

During 1980 and 1981, Sumac continued definition drilling and commenced other work required for engineering design. More specifically, the principal work consisted of:

Geophysics: 13 holes (1829m) of down the hole
charged potential

Diamond drilling: Kutcho zone-48 holes, 6732.1m
W-KC claims-1 hole, 610.0m

Access road study: Participated in investigation
by Sumac, Esso, Brinco and the B.C.

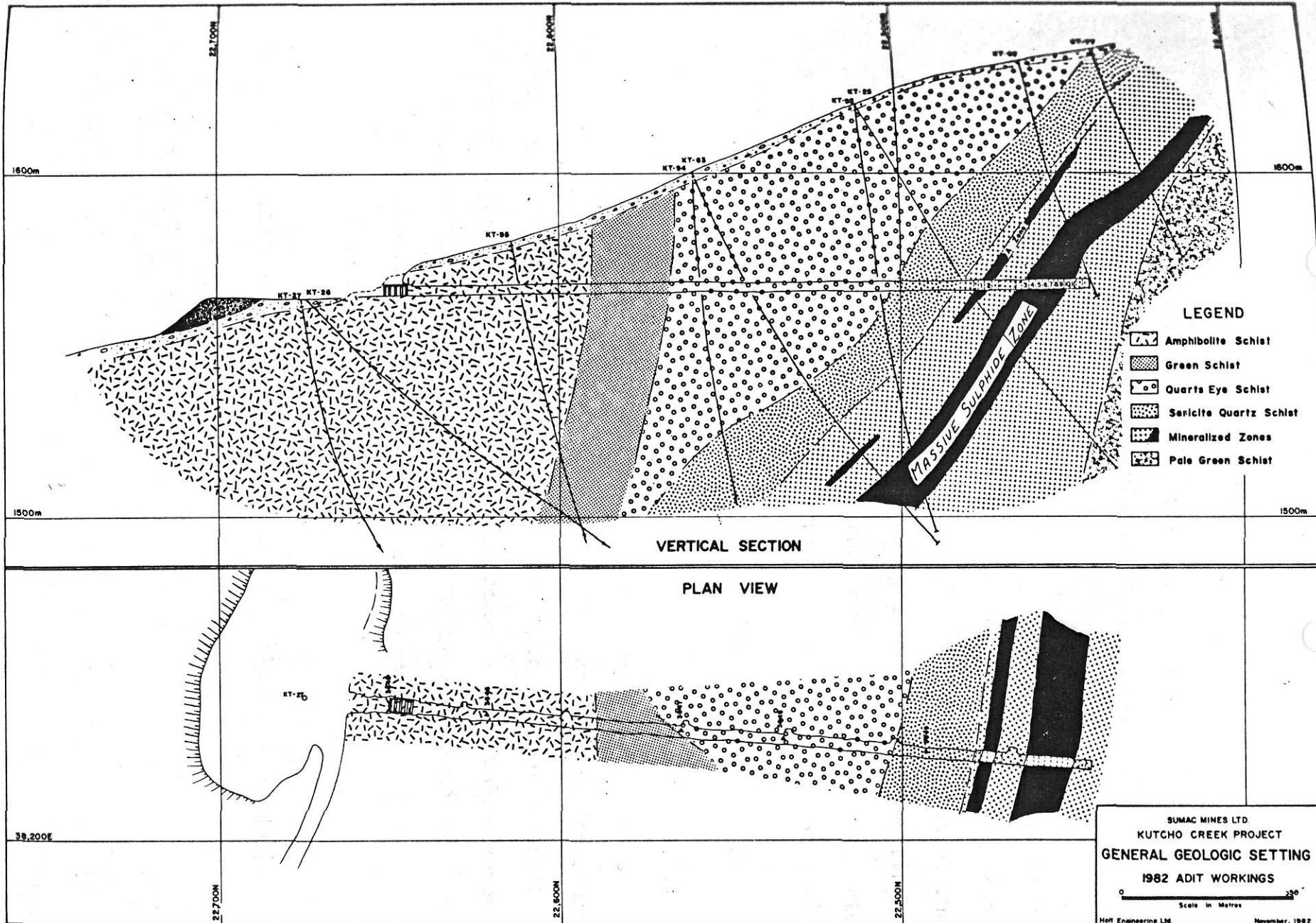
Ministry of Mines and Petroleum
Resources

Geotechnical study:commenced slope stability analysis
to guide open pit mine design

Metallurgical tests:completed 7th and 8th bench scale
tests which showed bulk
differential flotation superior
to straight differential flotation.

Following the 1981 field season, computerized engineering studies indicated that the confidence level of the Kutcho zone reserves was within acceptable limits for design planning. Therefore, it was concluded that further drilling of the zone was not necessary and the development stage of mine planning could commence.

During the 1982 field season an ambitious program of underground development, bulk sampling, continued pit slope stability studies and pilot plant scale metallurgical test work was undertaken by Sumac. To move the mining equipment and supplies on site and transport the 140 tonne bulk sample from the property, a 12 kilometre long access road was constructed connecting the Kutcho Creek airstrip with the camp and the



LEGEND

- Amphibolite Schist
- Green Schist
- Quartz Eye Schist
- Sericite Quartz Schist
- Mineralized Zones
- Pale Green Schist

VERTICAL SECTION

PLAN VIEW

SUMAC MINES LTD.
KUTCHO CREEK PROJECT
GENERAL GEOLOGIC SETTING
1982 ADIT WORKINGS
Scale in Metres
November, 1982

portal. A Caribou aircraft was utilized for transportation between the Kutcho Creek airstrip and Dease Lake.

The underground development program consisted of a 218 metre long line drive which crosscut the deposit 65 metres below surface. This excavation permitted visual examination of the deposit combined with detailed geologic mapping and sampling. A 140 tonne sample split of the ore was sent to Lakefield Research of Canada Ltd. in Ontario for pilot plant scale metallurgical test work.

The slope stability analysis was carried out under the direction of Golder Associates of Vancouver. It consisted in part of drilling holes in the area of the underground development so that piezometres could be set to record the ground water level drawdown that occurred as the development drift progressed in their direction. Drill cores were examined for geotechnical characteristics and water flow readings were recorded and analyzed.

Acid generation tests were carried out at B.C. Research and a preliminary hydro power potential study was done by Sigma Engineering Ltd. of Vancouver.

The project has progressed to the point of requiring a full scale engineering study to determine its feasibility, combined

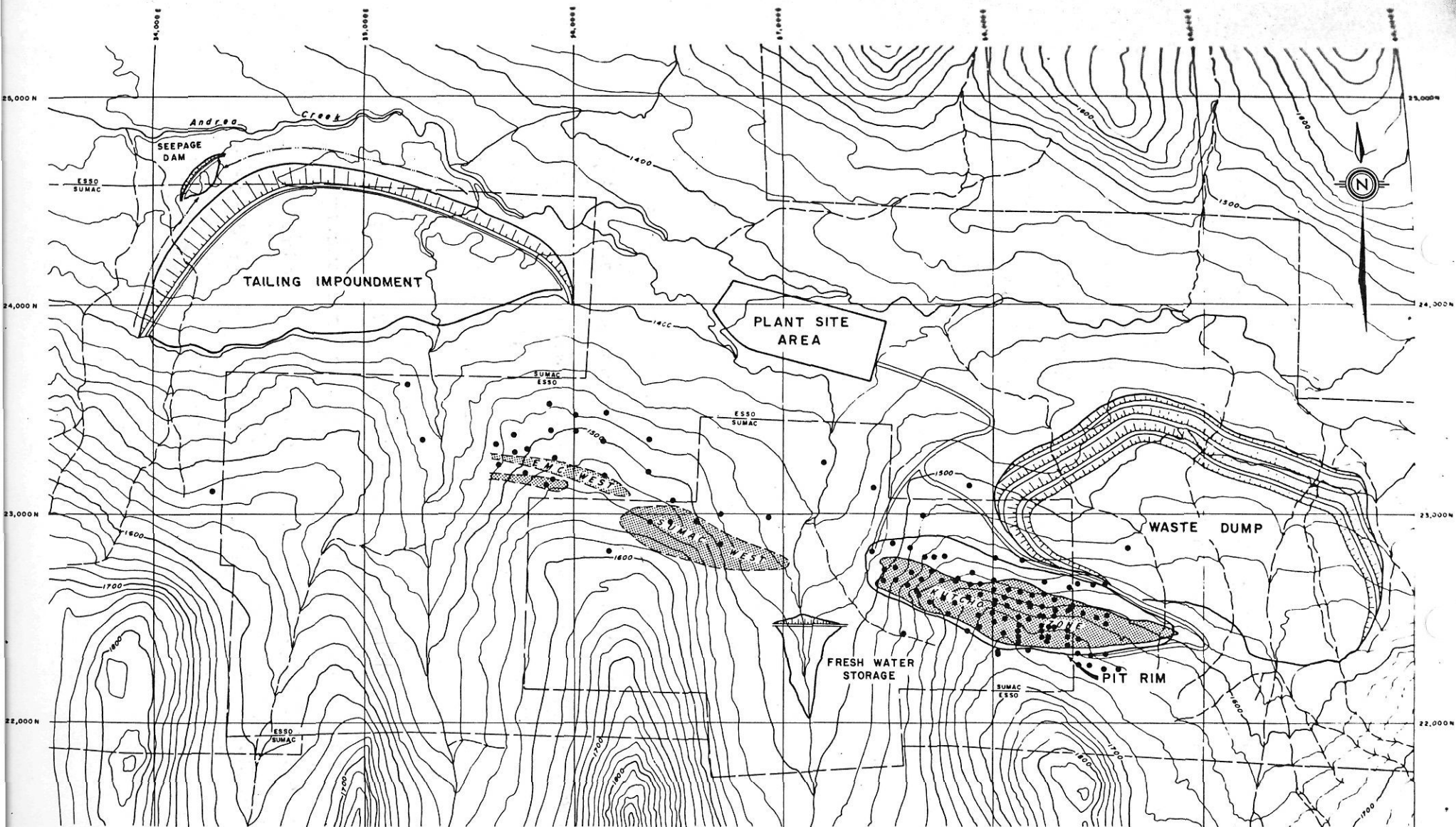
DESCRIPTION OF THE DEPOSITS

To date, three concentrations of sulphides have been discovered at Kutcho Creek. All of the deposits have similar geologic settings, occurring as irregular shaped, elongate lenses. They are grossly conformable to the regional trend, striking in a WNW-ESE direction and dipping to the north. They all consist primarily of massive pyrite with varying amounts of copper, zinc and silver. The first deposit discovered, which is near surface and mineable by open pit mining methods, has been designated the Kutcho Zone. A second small, deep, highgrade discovery is known as the EMC West Zone, while a third large, but low grade deposit is called the Sumac West Zone.

The Kutcho Zone has been tested by more than 150 diamond drill holes and has been penetrated by underground development. Its size, shape and metal content are well defined. Current mineable open pit reserves in the Kutcho Zone stand at:

17,000,000 tonnes at 1.51 % Cu,
2.16 % Zn, and
27.3 g/t Ag

Based on preliminary pit designs, the waste to ore ratio is approximately 7 to 1.



• Drill Hole Collar Locations

Note: Several drill collar locations have two or more drill holes at different dip angles, while some of the deep holes in the EMC West zone have as many as 5 wedged intersections off of a single drill hole.

KUTCHO CREEK PROJECT

DRILL HOLE LOCATION PLAN



Scale in Kilometres

The EMC West Zone is located approximated 500 metres below surface and will have to be mined by underground methods. It is smaller, higher grade and is currently not well defined. Preliminary reserve estimates are in the order of one and one half to two million tonnes.

The Sumac West Zone is located between the other two deposits. It displays most of the same general geologic characteristics as the ore zones, but is composed primarily of massive pyrite with minor economic sulphides. To date the deposit's potential has been tested with several diamond drill holes and has significant tonnage potential.

The potential for finding additional ore in this particular environment must be considered good. The deposits are classed as stratabound, massive-sulphide deposits of volcanogenic origin. Such deposits have a history of occurring in clusters around centres of volcanic activity.

The Kutcho ore zone is tabular to lenticular in shape with pinching and swelling along its length. It is conformable with regional layering and dips about 45 degrees to the north. The body is elongate extending 1500m along the strike and 300m down dip. It has a maximum thickness of 26m along the central part of the lens and tapers laterally into a thin disseminated

ENVIRONMENTAL AND
SOCIAL CONDITIONS

pyrite sequence at the margins.

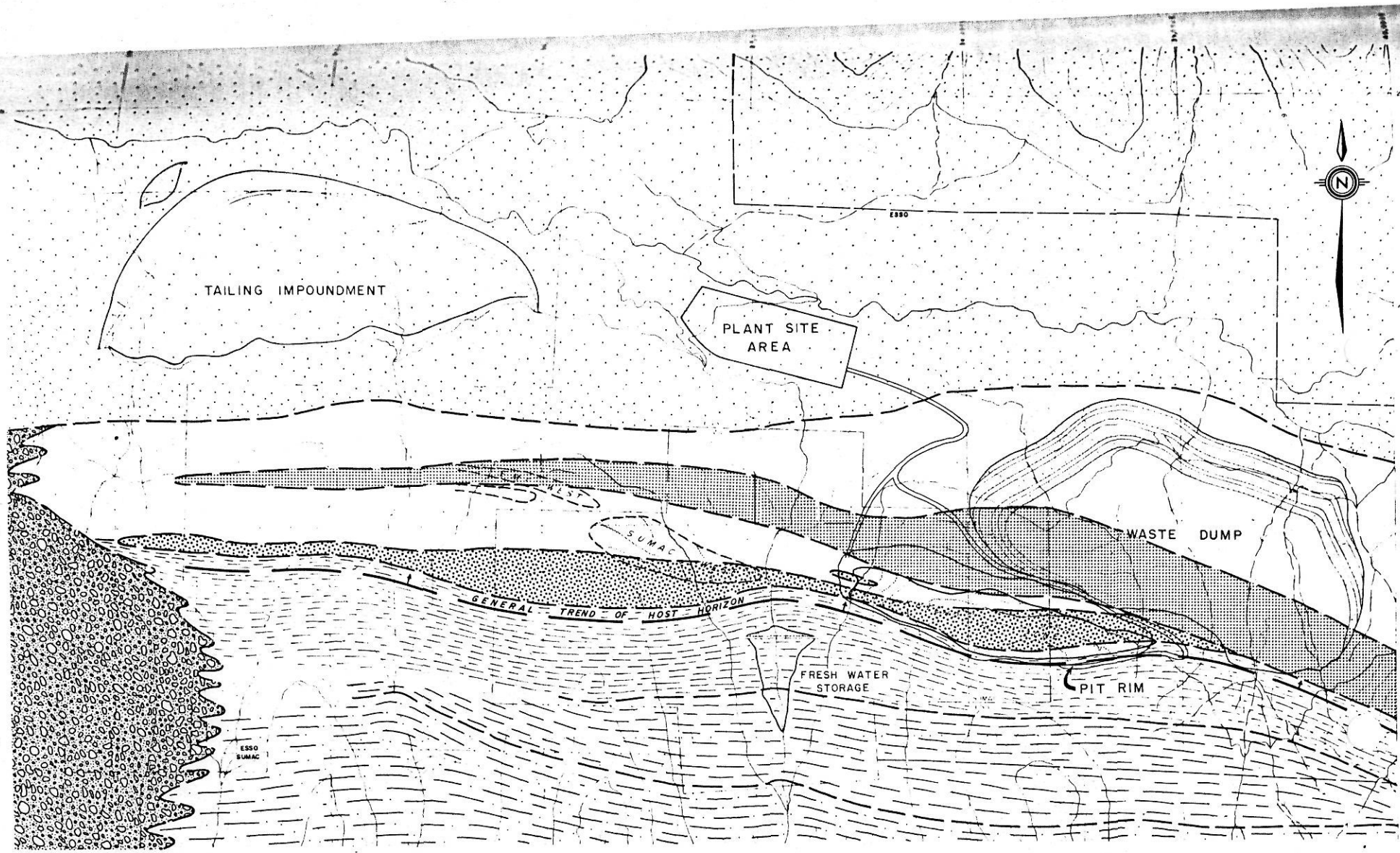
The orebody consists of a main massive sulphide lens, thin discontinuous hanging wall lenses and disseminated pyrite in the immediate footwall of the main lens. In some areas the entire zone makes ore while in most areas a layer of waste several metres thick separates hanging wall lenses from the main massive sulphide zone.

The main mineralized zone consists of 80 to 85 percent sulphides. The sulphides are predominantly pyrite with lesser amounts of sphalerite, chalcopyrite and bornite, minor chalcocite and trace amounts of tetrahedrite-tennantite, digenite and galena.

Gangue associated with the sulphides is predominantly carbonate, sericite and quartz.

Geologically, the host horizon containing the known deposits lies near a volcanic-sedimentary transition within a sequence of probable upper Triassic age. The geologic plan on the following page illustrates the general geologic setting relative to the planned facilities.

Faulting of any consequence within the ore horizon has not been detected. Of some concern, however, is the schistose nature of



INKIIN FORMATION

-  GRAYWACKE PHYLLITE
-  CONGLOMERITIC SCHIST

KUTCHO FORMATION

-  GREEN SCHIST
-  AMPHIBOLITIC SCHIST



QUARTZ EYE SCHIST



SERICITE QUARTZ SCHIST



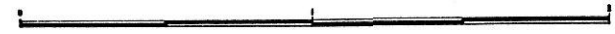
CHLORITE SERICITE QUARTZ SCHIST



BASIC GREEN SCHIST

KUTCHO CREEK PROJECT

GENERAL GEOLOGIC SETTING



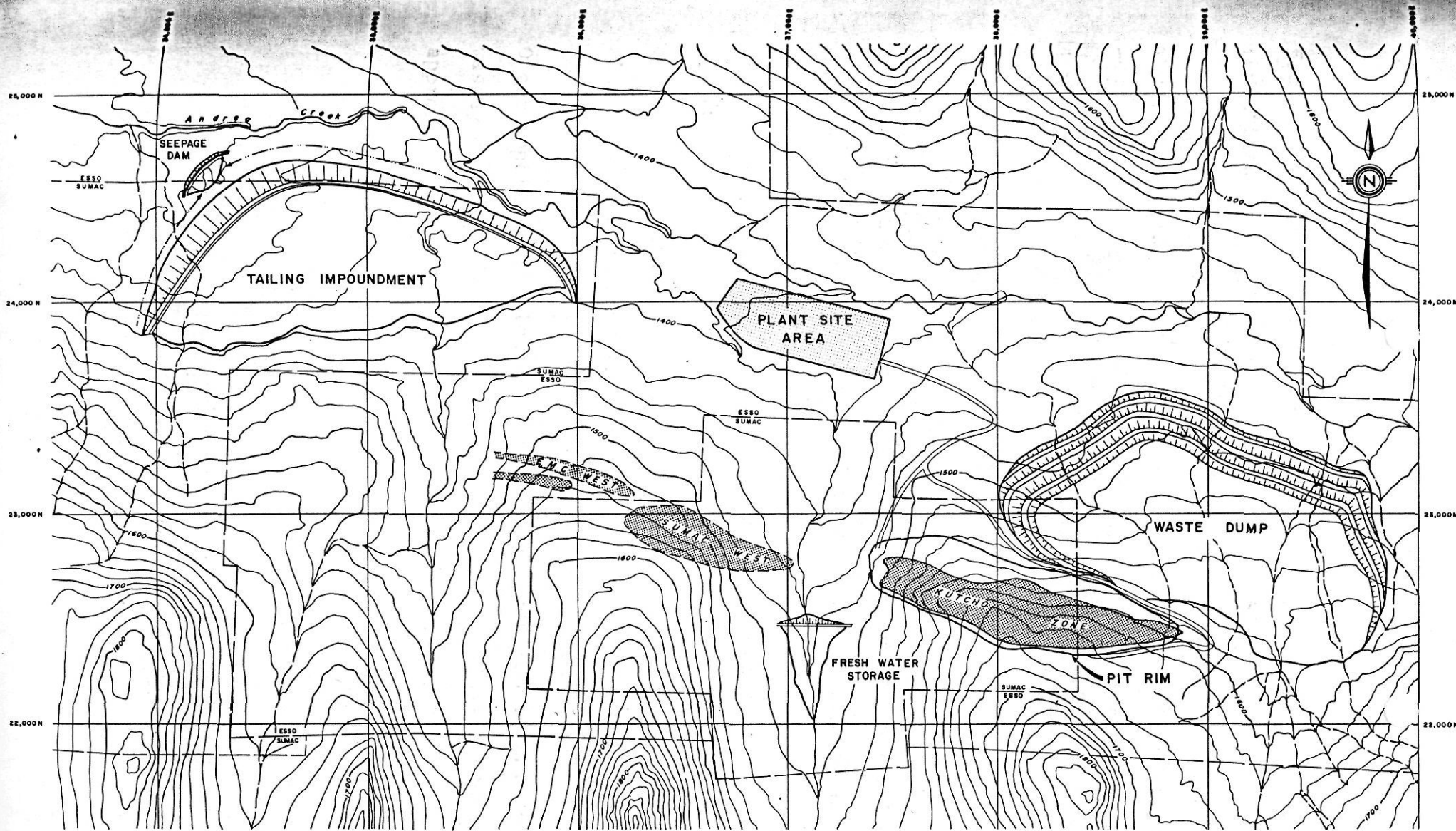
Scale in Kilometers

OPERATING PLAN

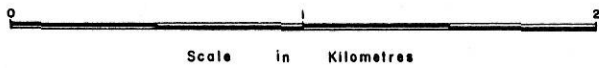
The proposed mining and concentrating plans are generally comparable to existing base metal operations in British Columbia. Production rates will be determined as part of the feasibility study but are expected to be approximately 4,000 tonnes of ore per day or 1,400,000 per annum. For comparative purposes this would place the project in the same general size range as Equity Silver and Afton Mines.

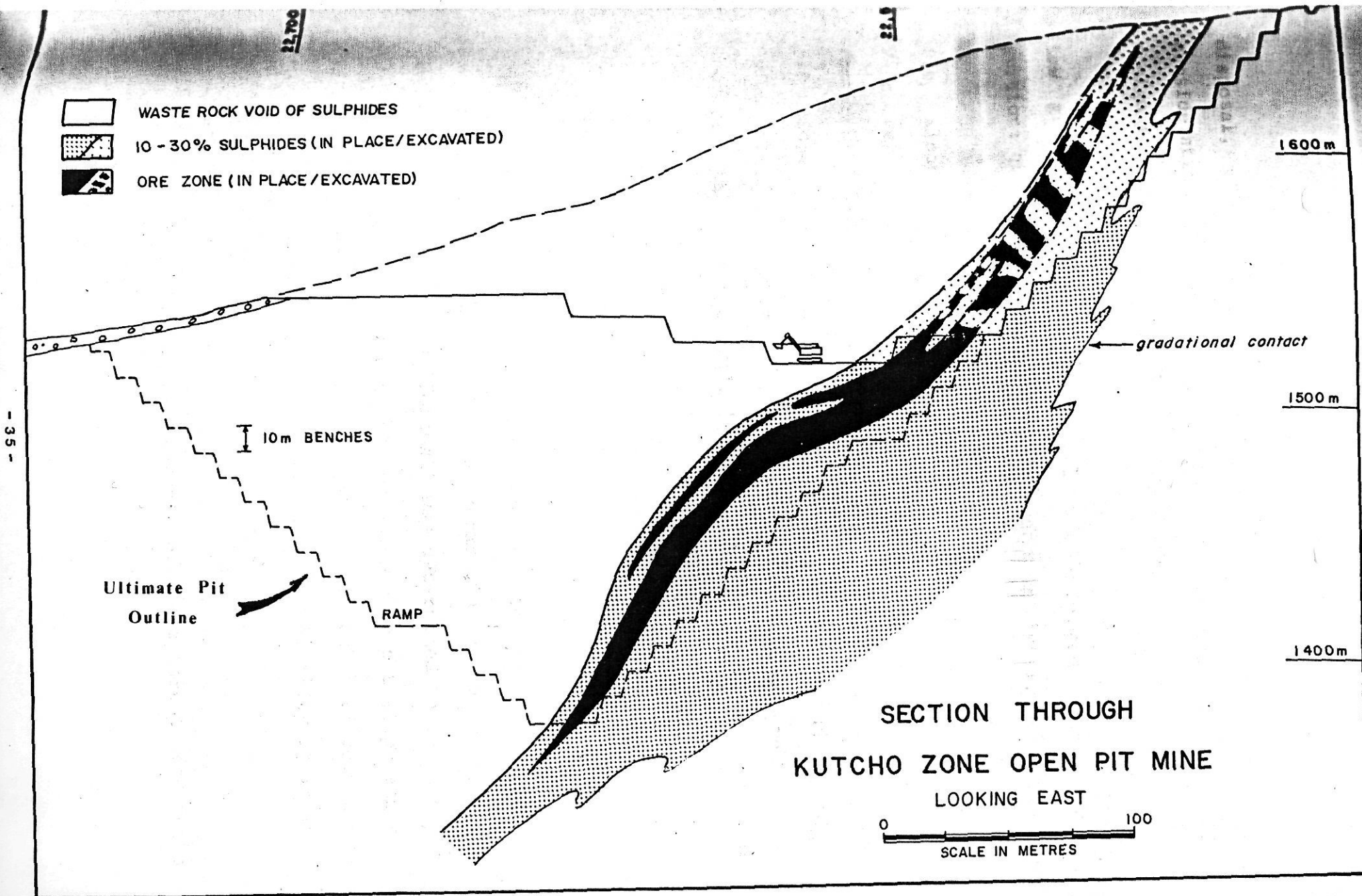
The current reserve estimate and reserve potential are primary considerations in selecting a production rate. Also important is the need for large scale efficiencies in order to repay the huge capital outlay required to commence base metal production in a remote area and to minimize the cutoff grade in order to maximize metal extraction. The need to eventually switch from open pit to underground mining methods and the lead time required to explore for new ore places limitations on increased production rates.

Based on the production rate of 4,000 tonnes of ore per day and the current reserve estimates, the operating life of the open pit mine would be 12 years. Onward production would come from the EMC West Zone, Sumac West Zone, new discoveries or low grade stockpiles.



KUTCHO CREEK PROJECT
GENERAL SITE ARRANGEMENT





PLAN VIEW

0 100 200 300 400 500 metres



Jumee Creek

Collar elev. 1435 m

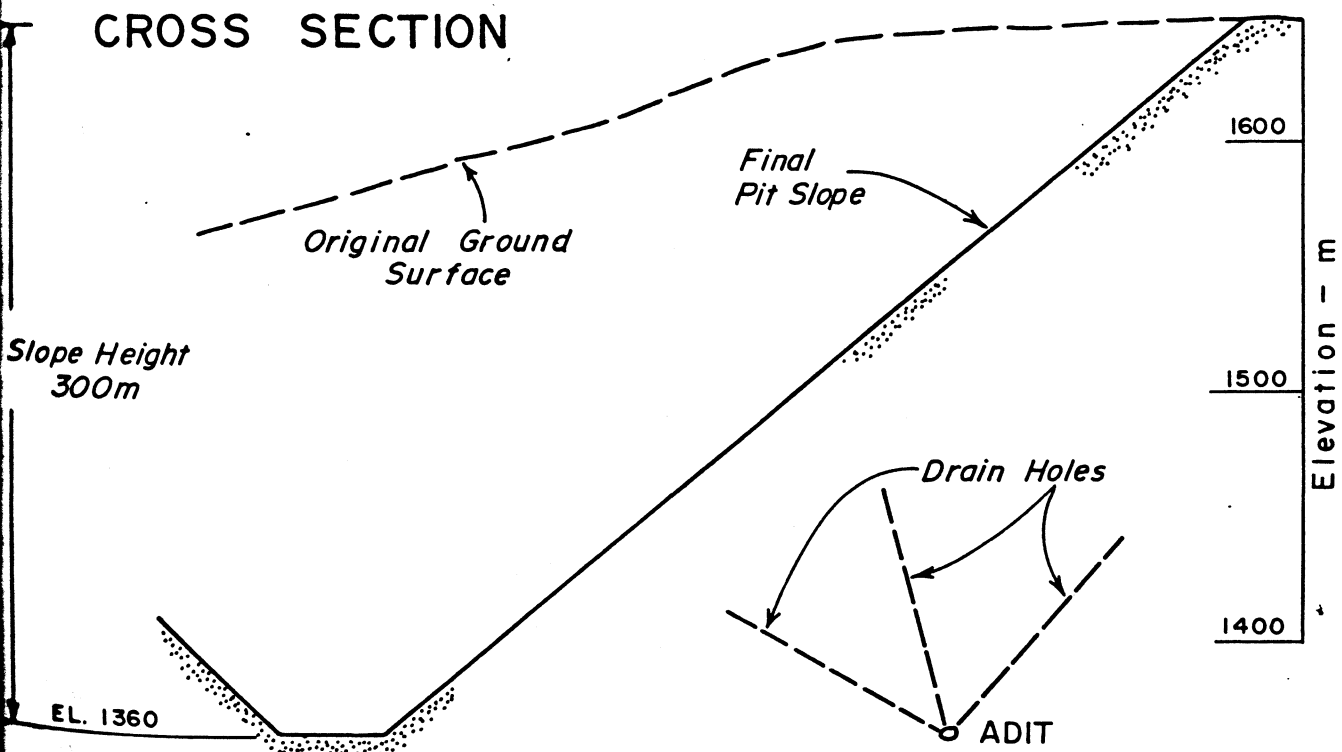
17% decline

Waste Dump

Ore Deposit Portal

1300 m Drift at 1360 elev., Drain holes on 150m centers

CROSS SECTION



NOTE: After Golder Associates

SOCIOECONOMIC CONSIDERATIONS

Some diversification and stabilization of the northern economic base would result from activities associated with the Kutcho Creek project. Although the permanent residence of the main work force would be located in one of the larger centres to the south, some employment associated primarily with the transportation and service sectors would occur in Stewart and Dease Lake.

Based on data provided by Statistics Canada, the 1981 census shows the population of the centres most likely to be directly affected by the project to be as follows:

Prince George	67,559
Smithers	4,570
Stewart	1,456
Dease Lake	237

As discussed in the section on employment, the permanent work force would likely be located in Prince George or Smithers and would commute to the job site on a "fly-in" rotational basis.

The employment created by the project will not cause dramatic expansion in any of the communities involved. It may provide indirect work for approximately 60 people in the trucking and