









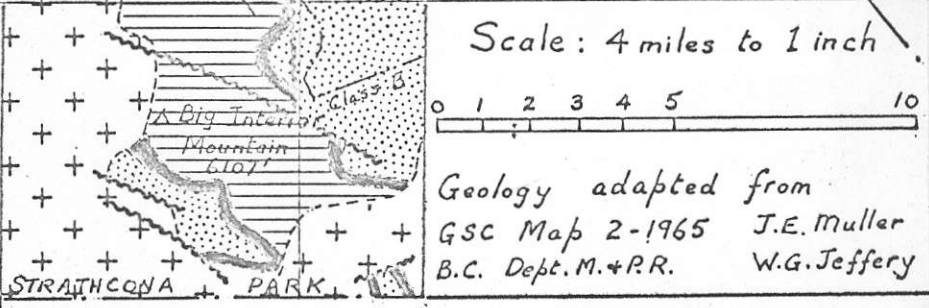


-  PLEISTOCENE AND RECENT
-  CRETACEOUS AND TERTIARY
-  NANAIMO GROUP, SOME INTRUSIVES
-  JURASSIC AND (?) CRETACEOUS
-  COAST INTRUSIONS
-  TRIASSIC AND (?) JURASSIC
-  VANCOUVER GROUP
-  PERMIAN AND (?) EARLIER
-  LIMESTONE
-  VOLCANIC ROCKS

802153



BUTTE LAKE AREA GEOLOGY

C.I.M.M. TOUR TO WESTERN MINES OCT. 1966

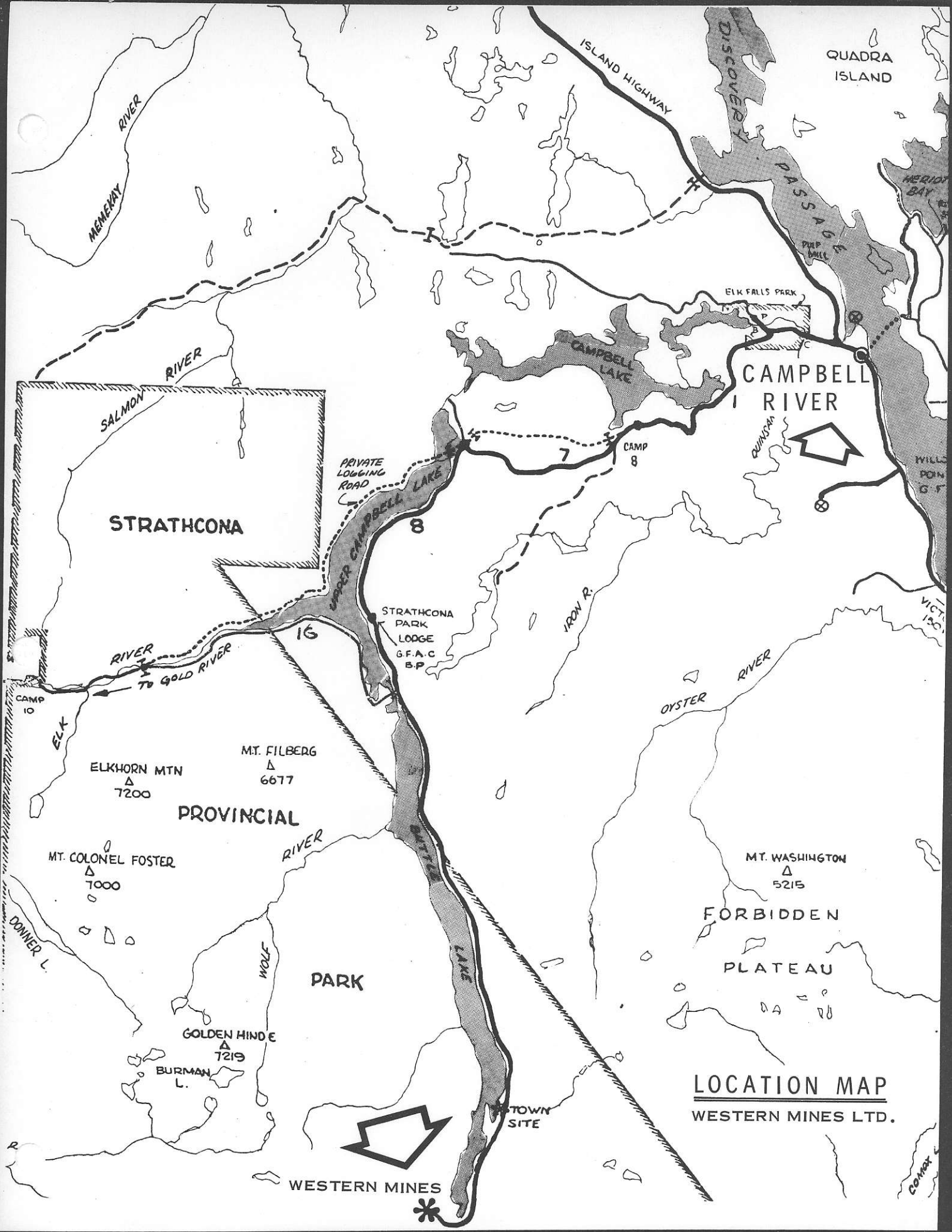
R.L.K.

WESTERN MINES LIMITED (N.P.L.)

THE CANADIAN INSTITUTE OF MINING AND METALLURGY

B. C. SECTION TOUR

OCTOBER 28, 1966.



STRATHCONA

PROVINCIAL

PARK

CAMPBELL RIVER

LOCATION MAP
WESTERN MINES LTD.

WESTERN MINES

TOWN SITE

MT. FILBERG
△
6677

ELKHORN MTN
△
7200

MT. COLONEL FOSTER
△
7000

GOLDEN HIND E
△
7219

MT. WASHINGTON
△
5215

FORBIDDEN
PLATEAU

BURMAN L.

DONNER L.

WOLF

IRON R.

OYSTER RIVER

ISLAND HIGHWAY

MEMENWAY RIVER

RIVER

SALMON RIVER

PRIVATE LOGGING ROAD

STRATHCONA PARK LODGE
G.F.A.C
B.P.

CAMPBELL LAKE

UPPER CAMPBELL LAKE

ELK FALLS PARK

PASSAGAYA

QUADRA ISLAND

HERIOT BAY

WILLO POINT G.F.

VICTORIA ISLAND

COMOX L.

CAMP 10

CAMP 8

16

8

7

WESTERN MINES



WESTERN MINES LIMITED (N.P.L.)

Western Mines Limited (N.P.L.) is a British Columbia Company incorporated in 1951. The Company operated a property near Ainsworth until 1959 when it was closed. This property remains inactive but is maintained in good standing. In 1961, the Company acquired the Lynx, Paramount and Price groups of mineral claims near the southern end of Buttle Lake in Strathcona Park and additional claims were located consolidating these three groups. Through the sale of treasury shares, approximately \$4,500,000 of risk capital was raised and spent on exploratory development of the Vancouver Island property. Ore reserves sufficient to justify production resulted from this work, and debt financing of \$11,000,000 was arranged in July of 1965 to bring the property into operation. This independent company under the direction of British Columbia business men has over five thousand (5,000) registered shareholders of whom seventy percent (70%) are in this province.

The mineral claims were located in 1918, and Crown-granted in 1924. Little work was done till Western Mines optioned the claims in 1961. The location of the Mine in a Provincial Park has created several problems in addition to those usually faced in bringing a property into production. The unusual requirements of a shipping terminal in Campbell River, a 22 mile road and a 4,500 H.P. Hydro Electric Plant have added to the task. The Concentrator and other plant buildings have been designed to blend with the Park setting and it is intended that in years to come the plant area will be a feature of the Park. Wright Engineers Limited of Vancouver have been responsible for the plant design.

The operation will employ about two hundred and fifty (250) men and arrangements have been made to provide suitable living accommodation for these men and their families in an industrial village at Sheppards Bay on Buttle Lake. Construction of this community is planned to begin this Fall.

THE MINE:

Exploration and development work to date has been centred in the Lynx zone where a substantial tonnage of ore has been outlined. The ore reserves established and the prospect of extension of the mineralized zones both laterally and in depth changed the Lynx zone from a prospect to a mine of substantial proportion.

The Mine is opened up by ten levels, three of which are surface adits. The remaining seven levels are served by an internal shaft.

ORE RESERVES:

Ore reserves at September 30th, 1965, were as follows:-

	<u>Tons</u>	<u>Gold oz/ton</u>	<u>Silver oz/ton</u>	<u>Copper %</u>	<u>Lead %</u>	<u>Zinc %</u>
<u>LYNX MINE</u>						
Proven Ore	690,000	0.07	2.85	2.38	1.11	10.80
Probable Ore	1,241,750	0.06	2.43	2.17	1.08	9.62
Broken ore	47,780	0.06	2.00	1.62	1.01	8.17
<u>PARAMOUNT MINE</u>						
Proven and Probable Ore	71,800	0.09	4.49	1.12	1.60	10.43
Broken Ore	2,650	0.01	3.75	0.60	1.25	8.00
TOTAL REASONABLY ASSURED ORE	2,053,980	0.06	2.64	2.19	1.10	10.01

Additional ore was developed during the past fiscal year and the new figures will be published in the Annual Report due in November.

SHAFT:

The shaft has four compartments in line: two skip compartments, one service compartment and a manway. At the present time only the service compartment and service hoist are in operation. A Nordberg hoist installed to handle the skips will be put into operation in the near future. The skips will be 2.8 ton side dump. Loading pockets have been installed at the 17 level horizon which will be connected to ore and waste pass raises designed to service the whole Mine. At the top of the shaft, separator pockets are provided for ore and waste. Trimming from the pockets to the surface at the 10 Level will be by 90 cu.ft. Granby cars.

PUMPING:

Two Mather & Platt 320 i.g.p.m. @ 1750 h.p. centrifugal pumps will handle waste water from the 17 Level to the surface at the 10 Level, a vertical lift of 1041 ft.

A unique feature of the pumping setup is that the elevation of the sump bottom is above that of the pump.

PUMPING - Cont'd.

The sump opening is off a raise which was driven from the pump chamber. Following development of the sump, the raise was sealed by a concrete plug. The pump line, drain-out line and a line connecting with a pump set up to pump out the bottom of the shaft all pass through this concrete plug. With this setup the pumps are self-primed and clean-out of sludge from the pump is accomplished by opening a valve on the drain-out line to transfer the sludge from the sump to a mine car designed for sludge transfer.

VENTILATION:

This is provided by an exhaust system through a 50,000 c.f.m. fan located at the top of a raise system which opens to the surface at the 8 Level portal. Provision has been made for installation of a second fan when this becomes necessary.

MINING:

Varying ground conditions and the general irregularity of the ore occurrence indicate that several mining methods will be used in the course of extraction. Above the 9 Level there is a large block of ore which has been developed for Long Hole Stopping. If this method proves satisfactory in this first try, it will be applied in other blocks where conditions permit. Cut and Fill mining using mill tailings for fill will be the primary method below the 10 Level with Conventional Shrinkage where ground conditions permit in the narrow ore section.

In the first phase of stope development every effort was made to utilize existing openings for production purposes. This led to some difficulties in establishing stopes. In developing the lower levels, layouts will be designed with production openings in mind.

Total underground crew will be about one hundred (100) men.

OPEN PIT:

In the Spring of 1965, a program of systematic diamond drilling on the 9 and 10 Levels was initiated to check the possibility of the occurrence of large ore blocks which might be mined by blast hole methods. The drill program resulted in finding a block of ore + 200,000 tons, located so close to the surface that a decision was made to mine it by Open Pit. Further, as diamond drilling continued into 1966 it became apparent that there is an additional + 200,000 tons which can be taken by extending the present Open Pit. More diamond drilling is required to determine the limits of this pit extension.

OPEN PIT - Cont'd.

In the first year of production approximately 75% of millfeed tonnage will come from the open pit with about 25% from stockpiles and underground stope development.

All work in the Open Pit is being done by outside contractors which assures a fixed cost per ton of ore or yard of waste rock and overburden removed.

Open Pit equipment consists of two Gardner-Denver air track drills with compressors, one 2-1/2 cu.yd. Northwest shovel, one 966 Caterpillar Loader and five 16 cu.yd. capacity Hayes & Kenworth trucks. When ore production from the pit commences, a 1-1/2 cu.yd. shovel will be used for separating ore and waste at the point of loading. Engineering control and supervision of excavation is done by Western Mines.

HYDRO POWER DEVELOPMENT:

The Hydro-Electric Generating Plant is located at the junction of Tennent Creek and Myra Creek, approximately one mile west of the Lynx Mine site. The initial installation is capable of providing a maximum of 3060 KW for the Lynx Mine-Mill-Plant complex. The catchment area, Tennent Lake, is 1.5 sq. miles, with drainage from a portion of the highlands, south of Myra Creek, rising from a small unnamed lake at about el. 3700' from which it drops about 425' to Tennent Lake at el. 3276'. The Long Term Mean Rainfall is 195 inches per annum and water storage provided by Tennent Lake itself is 3120 acre feet. The water consumption under maximum usage conditions will be about 1350 c.f.m. The intake consists of a submerged tunnel approx. 450' long at el. 3242' to permit approx. 30 ft. drawdown of present lake level. The penstock consists of 450' of 34" steel pipeline in the tunnel with a "Y" valved section for two - 24" lines. One 24" for the present line and the second for future additional capacity. The pipeline is made up of the following sections:

2074'	- 24"	Wood Stave - wire wound
3500'	- 24"	1/4" steel
2520'	- 24"	3/8" steel
1240'	- 24"	1/2" steel

The steel 40 ft. pipe sections are coupled by dresser couplings and welded miter sections. Tailwater elevation is 1156 ft. and the maximum Static-Head is 2130 ft. A coffer dam ten ft. high consisting of rock fill is located on Tennent Creek at Tennent Lake to provide extra water storage.

The Turbin was made by Gilbert Gilkes and Gordon Ltd., Kendal, England, with a 42-1/2" diameter Pelton Wheel cast in Switzerland. The rated output is 4500 B.H.P. at a speed of 900 r.p.m. The Synchronous Generator was made by Canadian General Electric. It is a 3600 KVA - 8 pole - 900 r.p.m. - 2400/4160 Volt - .85 P.F. - 3 Phase - 4 wire - 60 cycle-Open-Self-Ventilated Construction -

HYDRO POWER DEVELOPMENT - Cont'd.

with a direct connected Brushless Exciter Class A - and combined static exciter regulator. Power transmission to the Plant is by underground cable at 4160 volts.

CONCENTRATOR:

The concentrator equipment is housed in a timber building. The exterior of this building has been built of cedar shadow batten panels alternated with fibreglass and dipped corrugated steel to complement the park setting.

All of the concentrator equipment is new with the exception of the 9' x 9' ball mill.

The crushing and grinding flowsheet is conventional and simple, but the flotation circuits are complex and will require a good deal of care and attention.

The concentrates will be filtered and dried to about six percent (6%) moisture content. They will then be slushed up a ramp to trucks and transported to the Company ship loader at Campbell River.

It is expected that concentrates will contain in excess of 60% zinc in the zinc concentrates, 28% copper in the copper concentrate and 50% combined lead and zinc in the lead zinc concentrate. The latter is to be treated in one of the Imperial smelters.

Recoveries of 93.0% of the zinc, 94.0% of the copper, 93.0% of the lead, 70.0% of the silver and 79.0% of the gold are expected. Not all of these metals will be obtained in the premium concentrates but it will be the concentrator crew's objective to make these separations as clean as possible.

The concentrator staff and crew will consist of thirty (30) men.

OTHER PLANT BUILDINGS:

The shops, warehouse, changehouse, safety and first-aid rooms and the mine office have been incorporated in one functional building. The Assay Office, Bucking Room, Core House, Garage and Compressor House are separate buildings. The Administrative and Engineering offices are in temporary buildings and the erection of a General Office will be delayed until requirements are more clearly established.

All lumber required for construction has been cut at the site from timber removed from the plant site and from the road right-of-way. Over 3,500,000 F.B.M. have been produced to date.

GEOLOGY OF WESTERN MINES:A. ROCK TYPES:

The Lynx orebodies are enclosed by a variety of volcanic rocks. The primary rocks consist of andesite flows, massive tuffs and agglomerates. The secondary rocks derived from the primary rocks are green, buff, and grey schists. Some of the schists have remnant textures similar to those seen in the primary rocks.

The flow rocks are medium to dark green, mottled fine-grained and have the composition of pyroxene andesite with scattered feldspar and mafic phenocrysts. Jasper occurs as lenses and masses, such that it may originally have formed rare persistent beds, approximately three to six inches thick.

Massive tuff is mostly shades of green with a large range of fragment size and in places gradational bedding.

The agglomerates contain lithic fragments up to two feet across. A very distinctive type contains purple fragments in a dark-green matrix.

The schists are composed of chlorite, sericite, talc, other micaceous minerals and quartz and have varying degrees of foliation.

Various dikes can be observed underground ranging in composition from diabase to feldspar porphyry.

B. STRUCTURE:

The overall mine structure is a steeply dipping shear zone of schistose rocks with concordant discontinuous massive sulphide bodies contained within the zone. The shear zone trends northwest and averages 500 to 600 feet in width within the Lynx mine area. The orebodies occur in the southwest portion of the zone near the primary volcanic rocks.

The dip of the shear zone and of the volcanic rocks to the southwest averaged 70° between the 8th and 12th Levels (500 feet vertically) although in detail it ranges from vertical to 30° southwest.

The hanging wall rocks are massive or in places lightly sheared and the contact between them and the altered schistose rocks of the shear zone is either sharp or rapidly gradational. Masses of residual relatively unaltered volcanic rocks occur within the shear zone near the main hanging wall contact of the schistose rocks and the primary volcanics.

B. STRUCTURE - Cont'd.

Faults are widespread throughout the mine. Longitudinal faults occur parallel to the foliation and often contain mud gouge to several feet in thickness. Many of the orebodies are associated with these faults. Cross-faults cut the ore and locally displace it by apparent movements up to tens of feet. Low angle faults with evidence of thrusting are seen less commonly than the other faults.

Folds are apparent in the schists although they are not clearly visible underground. They are generally broad with relatively flat crests and plunge gently at 20° or less. Sulphide mineralization in places is concordant with these folds and is heaviest near their crests.

C. OREBODIES:

At the Lynx mine the ore occurs as massive sulphide bodies composed of pyrite, chalcopyrite, sphalerite and galena with minor bornite. The massive sulphide contacts are in some places well-defined, with an abrupt change from massive high-grade ore to wallrock schist. At other places, often within the same orebody, the massive sulphides grade into disseminated sulphides or a zone up to four feet wide of small erratic stringers of chalcopyrite.

Disseminated sulphide in the host schists occasionally is of ore grade.

The massive ore occurs in the form of discrete lenses, masses and vein-like bodies, contained by the altered host rocks and broadly concordant in attitude with the shear zone. The dimensions of the orebodies may vary considerably over short distances and continuity between widely spaced exposures is not assured. Ore widths are up to 100 feet (on fold crests) and some ore has a continuous length of 800 feet, though a number of the orebodies have strike and dip dimensions of the order of 100 feet. Sulphide situated adjacent to or near the main hanging wall of the shear zone is more consistent than in the orebodies farther from the hanging wall.

D. ORE MINERALS:

The ore minerals are dominantly chalcopyrite and sphalerite which, with pyrite, form massive medium to fine-grained sulphide aggregates. The sphalerite to chalcopyrite ratio is approximately 3:1. Galena and bornite can be seen in hand specimens in various places. In addition, microscopic examination of the ore has revealed small amounts of tennantite, covellite, digenite and stromeyerite.

The gangue consists mainly of quartz, chlorite, sericite and talc with calcite and barite. Barite is not widespread and tends to occur in pockets and lenses only in sulphide bodies.

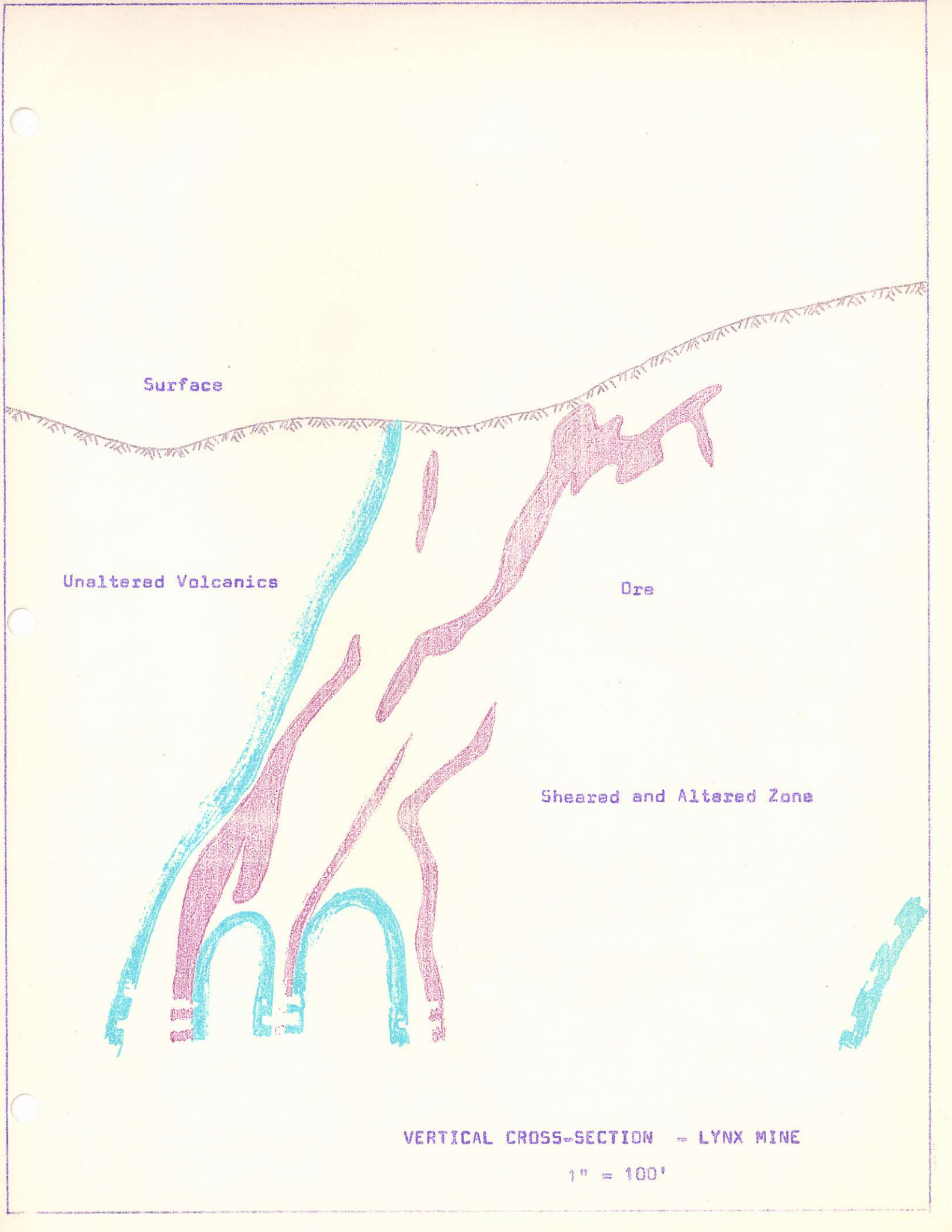
D. ORE MINERALS - Cont'd.

Pyrite forms an integral part of the orebodies, and is distributed throughout the other sulphides as angular grains, with a wide range of size. Apart from being a constituent of the ore, pyrite also occurs as discrete masses or dissemination by itself, or in places with sufficient disseminated chalcopyrite to be of ore grade.

The main texture of the ore is the pronounced banding of the sulphides. The bands are composed of sphalerite or chalcopyrite or pyrite, although pyrite may also be disseminated as an even granular constituent through ore that has sphalerite and chalcopyrite bands. Broadly, this banding in the sulphides is parallel to the adjacent schistosity. However, in places the banding cuts cleanly across the schistosity.

E. CLASSIFICATION AND ORIGIN:

The orebodies of the Lynx mine are massive sulphide deposits. One explanation of their origin is that they are replacement deposits in a favourable shear zone and that the ore is banded due to fluctuating concentration of metals and selective replacement of the schists and that depositional controls were structural where there tended to be zones of least pressure within the shear zone. The origin of the metals would then be at unknown depths, probably related to the granitic rocks that are exposed one or two miles to the west of the mine.



Surface

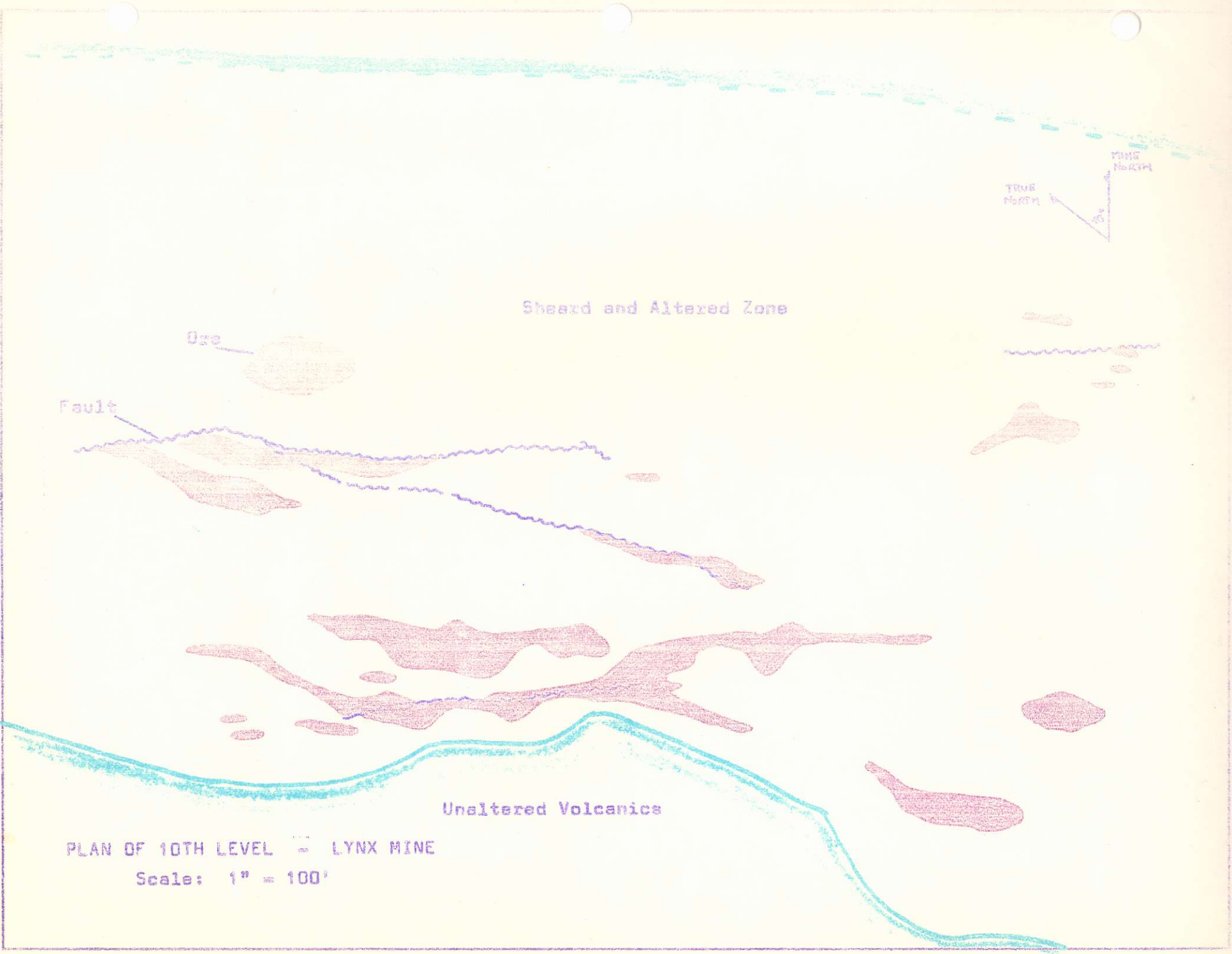
Unaltered Volcanics

Ore

Sheared and Altered Zone

VERTICAL CROSS-SECTION - LYNX MINE

1" = 100'



Sheard and Altered Zone

Ore

Fault



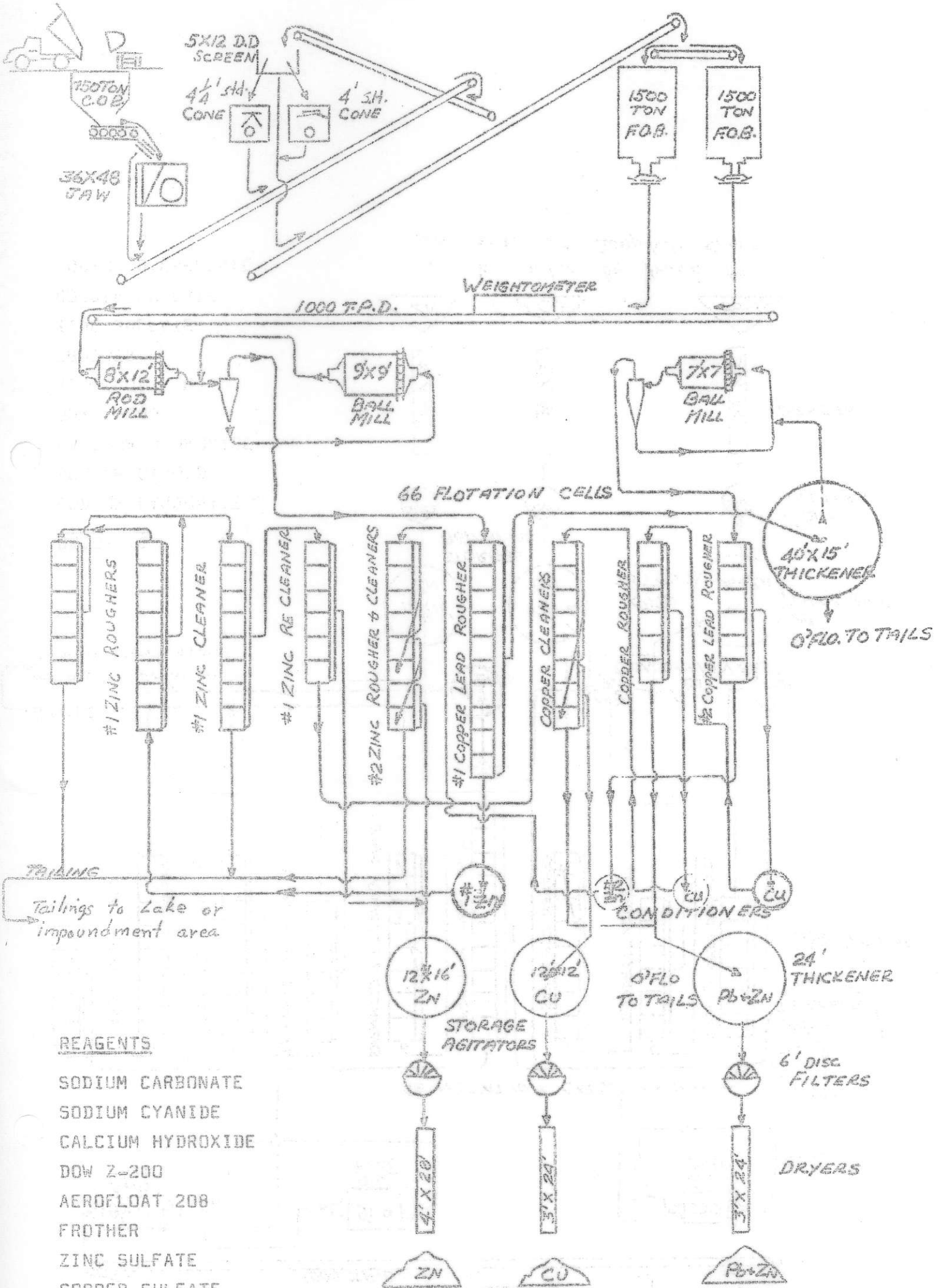
Unaltered Volcanics

PLAN OF 10TH LEVEL - LYNX MINE

Scale: 1" = 100'

WESTERN MINES CONCENTRATOR

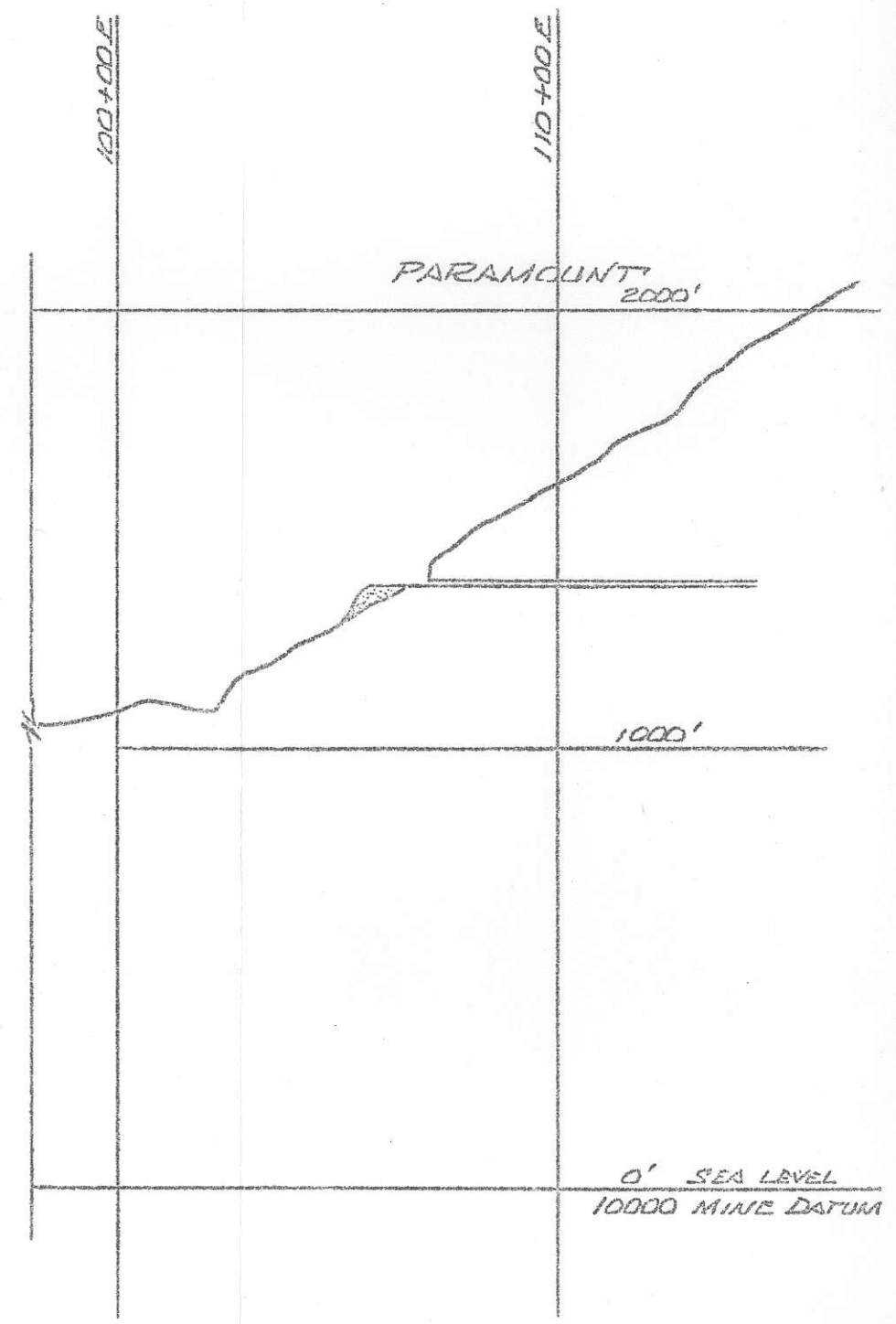
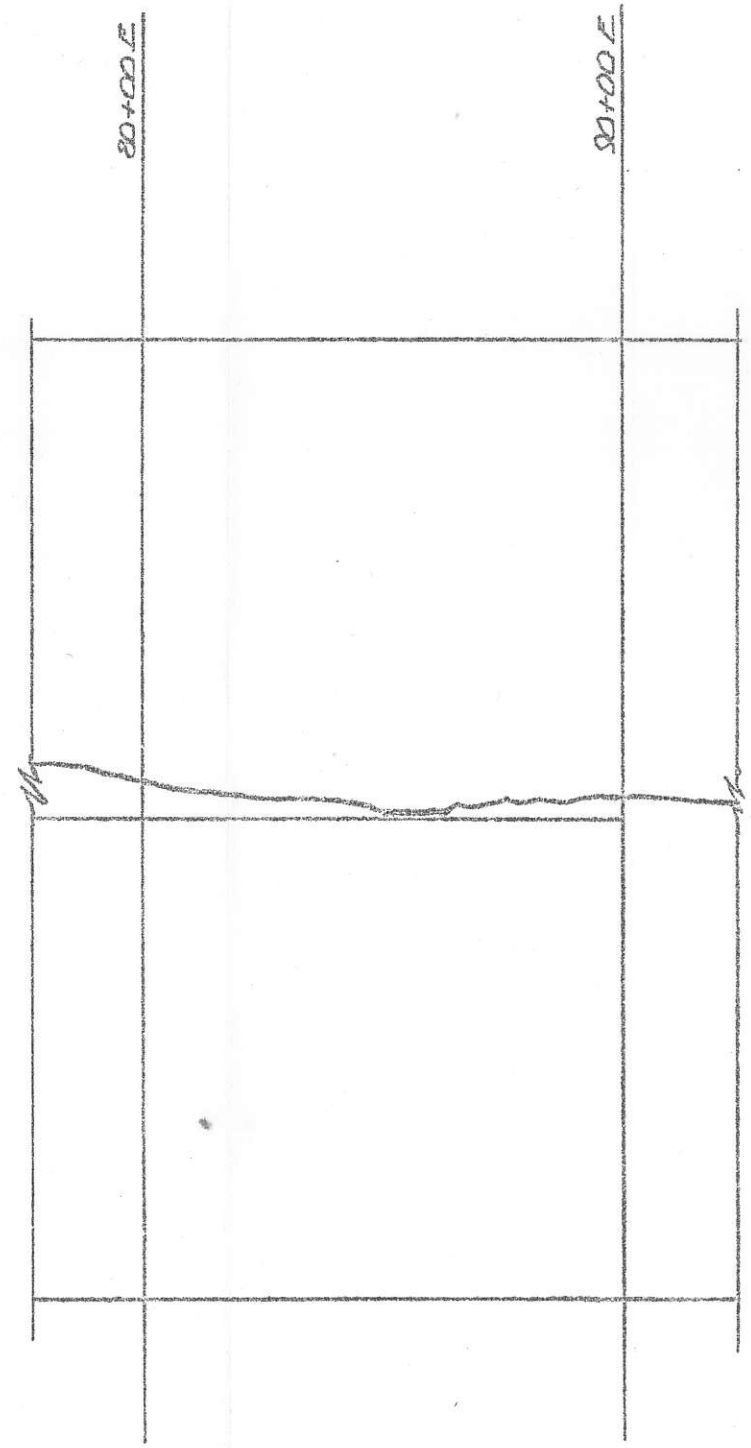
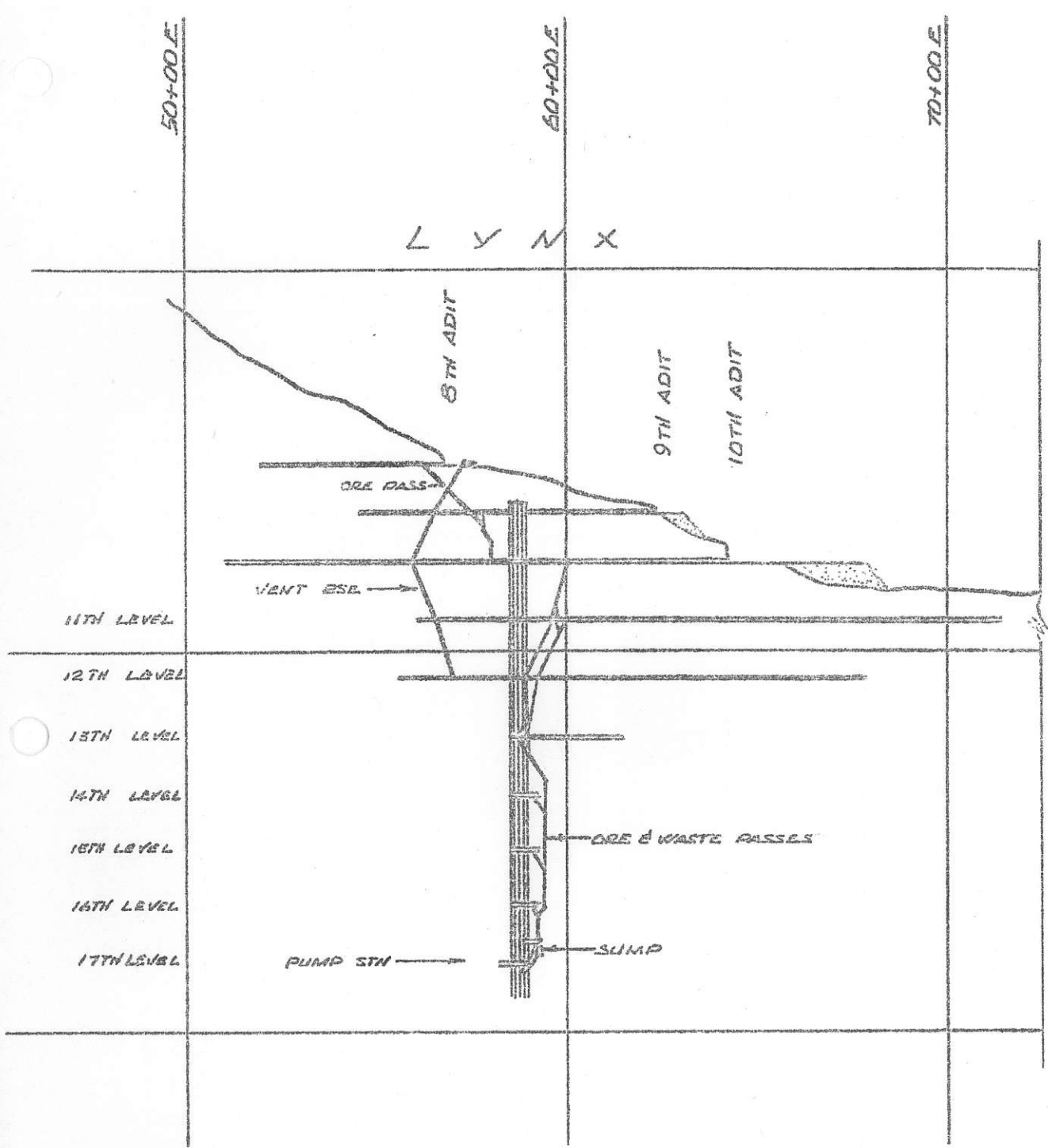
FLWSHEET - OCT. 1966



REAGENTS

- SODIUM CARBONATE
- SODIUM CYANIDE
- CALCIUM HYDROXIDE
- DOW Z-200
- AEROFLOAT 208
- FROTHER
- ZINC SULFATE
- COPPER SULFATE
- SODIUM DICHROMATE

Concs hauled by truck to shiploader at Campbell River.



WESTERN MINES LTD.
LONGITUDINAL 1" = 400'