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File NORTH VAN. ISLAND

CANADIAN REFRACTORIES LTD.,
PRELIMINARY GEOLOGICAL EXAMINATION
FAIR HARBOUR PYROPHYLLITE OCCURRENCE

W. M. Sharp, P.Eng. October, 1971

October 5, 1971

Canadian Refractories Ltd.,
Box 160,
Abbotsford, B.C.

Attention: Mr. Derek Albon

Dear Sirs:

PRELIMINARY EXAMINATION REPORT - PROJECT 304-7
FAIR HARBOUR PYROPHYLLITE OCCURRENCE
Alberni Mining Division, Vancouver Island, B.C.

GENERAL

The writer examined this occurrence on September 27, 1971 - the gross day including the return trip from Vancouver to Fair Harbour via float plane on day-charter to the writer's client.

Prior to undertaking detailed mapping, the writer was conducted over the showings by Messrs. Stephens and Albon, during which time they provided relevant background information concerning the known features of the local geology and the characteristics and relative economic importance of the two principal types of 'pyrophyllite rock' exposed within the excavation.

Mr. Ray Lawrence, owner of the property, kindly assisted the writer in laying out a base-line for the geological mapping.

Dwg. No. P-1, accompanying this report, presents most of the detail covered in the following text. However, in view of the currently limited extent of exposures of the general pyrophyllite-bearing rock, the depicted strike-trends and the footwall and hangingwall limits of this material represent preliminary interpretations of the actual structural detail. On completion of the recommended bulldozer strip-exploration all exposures should be mapped in detail.

Fig. 1 details the recommended diamond-drill layouts.

The writer notes that he did not take time to examine the core from three (?) short holes previously drilled, as these only penetrate the currently well exposed cap-layer of hard, cherty 'pyrophyllite rock'.

LOCATION & ACCESS

Fair Harbour lies on the northwest coast of Vancouver Island, and within the Alberni Mining Division. By air and sea routes it lies about 200 and 300 miles, respectively, from Vancouver (or the mouth of the Fraser River). More locally, it is accessible by some 40-50 miles of gravel road from Zeballos - the latter point now being accessible by road from Tahsis and Gold River.

The Fair Harbour deposit of pyrophyllitic rock lies immediately east of the abandoned (Tahsis Co.) logging camp, with the current exposures situating only a few feet above sea-level. The considerable area of flat, low-lying ground adjacent to the deposit could provide the necessary space for a mining plant. This could be filled to the requisite elevation with local borrow-material and waste-rock from mining operations. Space for scow-docking and loading facilities close to the deposit should be available if, and when required.

GENERAL GEOLOGY

The general Fair Harbour area is underlain by relatively flat-lying strata of the regional Bonanza Formation of Upper Triassic to Lower Jurassic age.

These mainly consist of volcanic flow (lava sheets) and fragmental (tuff and breccia layers) rock types. They are predominantly andesitic in composition, but locally with minor, contrasting intercalations of more rhyolitic-dacitic (acid) or basaltic (basic) material.

GEOLOGY OF THE DEPOSIT

The composite band of pyrophyllite-bearing rock occurs within a general section of light and dark striped andesitic lavas with locally conspicuous flow-banding. Strikes and dips of the 'pyrophyllite rock' and enclosing andesites are generally similar; however, they locally differ where folding or faulting has occurred along their mutual contacts. The generalized strike of the assemblage is east-west; the composite dip is about 40° southward. At least three separate, cross-cutting diorite dykes occur within the exposed length of the showings.

Continued.....

In cross-section, the present exposures comprise, from hanging-wall to footwall: a thick section (cliffs) of relatively massive to thinly-striped (flow-banded) fresh andesites-slightly bleached and silicified near its contact with the cherty pyrophyllite rock; a 2' - 10'(+) band of hard cherty 'pyrophyllite rock; a 5' - 15' (+) thick band of softer, un-silicified pyrophyllite rock; a plus-20 foot thick section of bleached and siliceous-to-chloritic altered, banded andesites of generally doubtful (re: kaolin minerals) over-all composition. Presumeably, the latter-noted section is underlain by andesites similar to those occurring above the general pyrophyllite layer - but could contain bands of pyrophyllite-bearing rock.

The general section does not appear to have been seriously affected by faulting. One transversely-striking, vertically dipping fault between section-lines 1 + 75 and 2 + 00 effects an apparent left-hand, 5-foot displacement of the general pyrophyllite-rock band.

The cap-layer of pyrophyllite-rock consists of firm-to-hard pale gray to white material, with pale brown, gray, and bluish colour-mottling; when breathed on, the softer aggregates have a strongly argillic (clayey) odour. The hardest material is vitreous-white in appearance, and represents the most completely silicified (chert) component of this band.

The softer pyrophyllite rock, comprising the footwall section of the general band, has a distinctly greasy feel, and is of a predominantly pale watery-green colour with variable white, bluish, and pale brown mottling. The writer's information concerning its composition is of a very general nature, in that it might be said to consist of various hydrous aluminum silicates, which together give it its desired highly-refractory properties. Quite conceivably, it could have been produced by the chemical action of acidic hydrothermal solutions on a layer of trachytic or rhyolitic flow-banded lavas.

PRELIMINARY TONNAGE ESTIMATES

These are based on the currently-tentative delineation of the hard and soft bands of 'pyrophyllite-rock'.

(A) Hard Materials:

Probable minimum strike-length.....	400 ft.
Possible average normal-width (thickness).	8 ft.
Probable minimum dip-extent.....	100 ft.
Given tonnage-volume factor @ 2 T/c.y. =	13.5 Cu. Ft. per ton
Preliminary 'ore reserve' to 100' on dip..	24,000 tons

Continued.....

(B) Soft Material:
Probable min. strike-length..... 250 ft.
Probable average normal-width..... 12 ft.
Probable min. dip extent..... 100 ft.
Preliminary 'ore reserve to 100' on dip..... 22,000 tons

(C) Summary - Tonnage Potential:
For a reserve of 100,000 tons of the preferred (?) (B) rock above the 100 ft. dip-horizon (approx. 65' vert. depth), the writer estimates that a strike-length of 1,000 feet of material of the same average thickness would be required. Alternatively, a 500 ft. strike length on a similar bed with a 200 ft. dip-extent would provide this tonnage. Should stripping or drilling indicate general increases or decreases in the above dimensions of the layer, the above tonnage estimates would be proportionately increased or decreased.

MINING FACTORS

Cross-sections (Dwg. No. P-1) 1 + 50 and 2 + 50 indicate that the gross normal width of hard and soft pyrophyllite rock averages about 20 feet. This, on a 40°-dipping layer, provides a horizontal (mining-floor) width of 30 ft.-plus. Also, the related floor-to-roof (hanging-wall) clearance is such that Air-trac drills and 5-8 cu. yd. trucks (or equivalent rubber-tired load-and-haul units) could be employed in mining the deposit - if the hard and/or soft material comprise a 20 ft. normal-width. The tentative mining plan, contingent on the existence of a strong hangingwall requiring only intermittent support, would entail the provision of open ramp or tunnel-decline access from the 'ends' of the deposit on grades ranging between 10-20%.

The pyrophyllite 'bed' outcrops at approximately 50-100 ft. south of the shore-line of the adjacent tidal flats, and at about 4-15 ft. above water-level (noon, September 27th). This situation could create a water problem at depth within a mine opening - particularly during high-tide periods. However the footwall andesite formation appears to be relatively 'tight', so excessive seepage would not be expected from this direction.

If detailed examination discloses a significant degree of fracturing within the footwall section, consideration would have to be given to damming off the excavation by means of blankets and/or dykes of compacted impervious (clayey) fill - supplemented, where necessary, by grouting within an appropriate pattern of drill holes. In any case, it is probable that both the mining and transport of the material would be restricted to the summer months for obvious reasons of cost and efficiency.

Continued.....

In the writer's opinion, there appears to be a moderately good possibility that 100,000 tons of the softer 'pyrophyllite rock' might be delineated by systematic exploration of the current exposures and their strike and dip extensions.

Estimated General Mining Costs:

(a) Surface preparation, installation of plant..	$0.50 - $ 1.00 per ton
(b) Pre-mining development.....	$0.50 - $ 0.75 per ton
(c) Mining and local transportation.....	$3.00 - $ 4.00 per ton
(d) Scow transport and stockpiling.....	$3.00 - $ 3.50 per ton
(e) General.....	$0.50 - $ 0.75 per ton
TOTAL.....	$7.50 - $10.00 per ton

A more detailed cost estimate would be contingent on a full delineation of the extent and geometry of the deposit and more detailed analyses of possible mining methods. It is quite possible that the general economics of the deposit would warrant serious consideration of contract-mining possibilities - thus obviating the necessity of a capital investment for mining plant.

Mr. Fulton of Seaspan kindly provided the necessary data on towing costs.

RECOMMENDED PRELIMINARY EXPLORATION

These are essentially directed towards proving up the requisite 100,000-ton reserve metallurgically-suitable 'pyrophyllite rock'. For reasons of economy and possible contingency, the general program is layed out in sequential fashion:

STAGE I

A. Explore the tentatively-delineated pyrophyllite-bearing zone and its probable strike-extensions over a gross length of at least 1000 feet by 'dozer-stripping methods - followed by more thorough stripping and ripping of better mineralized intervals over a width of 40-50 feet.

B. Wash down (pump) bedrock exposures and map and sample.

Continued.....

C. If gross strike-length of mineable pyrophyllite rock totals 500 ft. or less, excavate hanging-wall diamond drill stations preparatory to drill-exploration of dip-extensions; these should be located at not over 100-foot strike-intervals and located to permit cross-sectional drilling (gen. ref. Fig. 1).

STAGE II

A. Explore possible down-dip extensions of the mineralization, at the 50 and 100-foot dip-horizons, by B.Q.-size wire-line diamond drill holes. Provide for one or two additional holes in footwall of deposit for general exploration and deep pumping (water-flow) tests.

B. Log and sample all drill cores and determine economic feasibility of a mining operation.

ESTIMATED COSTS

STAGE I

(A)	D-8 ripper-dozer - 5 days @ $300. incl. ferry charges....	$1,500.
(B)	General allowance.....	750.
(C)	5 drill stations at $300. each, gross cost.....	1,500.
(D)	Provision for omissions, contingencies, & overhead.....	750.
	TOTAL, STAGE I.....	$4,500.

STAGE II

(A)	Estimate 1200 lin. ft. @ $13. per ft. - gross cost.....	$15,600.
	Provision for pumping-out tests.....	250.
(B)	Minimum provision.....	1,000.
(C)	Provision for omissions, contingencies, & overhead.....	2,500.
	TOTAL, STAGE II.....	$19,350.

Respectfully submitted,

W. M. Sharp

W. M. Sharp, P. Eng.

Ph.

D. Meyer

Research

Fair Harbour

~~replacement of ...~~

muscovite

* pyrophyllite – 'kurr props'

Sericite

Dumortierite.

– Delineate H. W. zone

Set up drilling program

Cost – for 100,000 T.

Discuss mining costs feasibility & prob

old take...

log camp at Fair Harbour. deserted

sleep bag only

take along Island Copper samples

Brian Stephens $125.00 →

Dumortierite $100.00 →

(Kaolin Group —)

Pyrophyllite

~~Mining~~ Feasibility

Explor. Costs for 100,000 tons. etc.

last week in Sept.

Oct 5/71

Mr. Fulton, (nice guy, very helpful.)

Seaspan Towing –

3000 – 3500 T scow-loads @ 300 mi.

@ 2.50 – $3.00 per ton w. poss 25¢ reduction if can fit into another contract & take advantage of a back-haul situation.

TEL: BUS. 987-5322
RES: 987-9520

WILLIAM M. SHARP, P.ENG.
CONSULTING GEOLOGICAL ENGINEER

171 WEST ESPLANADE
NORTH VANCOUVER, B.C.

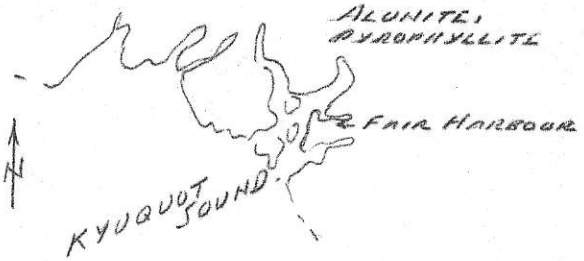
OCT. 6/71

DEAR BRIAN & DEREK:

WITH THIS, PLEASE FIND DUPLICATE REPORTS ON THE FAIR HARBOUR PYROPHYLLITE, ETC. PROSPECT.

AS THIS ASSIGNMENT WAS SOMEWHAT OF A DIVERSION FROM MY USUAL ROUTINE, I HOPE THE REPORT PROVIDES THE INFORMATION YOU REQUIRE. HOWEVER, IF YOU FEEL THAT I HAVE OMITTED ANY ESSENTIAL DETAIL, OR HAVE BEEN OVERLY BRIEF WITH CERTAIN ASPECTS PLEASE FEEL FREE TO HOLLER!

WHILE CHECKING MY MINERAL MAPS I NOTED THAT ANOTHER PYROPHYLLITE (PLUS ALUNITE) OCCURRENCE IS SHOWN ON THE WEST SHORE OF THE NORTH ARM OF KYUQUOT SOUND AT 10(?) MI. DISTANCE± N.W. OF FAIR HARBOUR. PROBABLY YOU HAVE ALREADY CHECKED THIS ONE OUT, AS IT APPEARS TO HAVE BEEN KNOWN FOR UPWARD OF 20 YEARS:



SO -- THANKS FOR AN INTERESTING DAY AND A VERY TASTY SALMON - MY FAMILY SURE ENJOYED IT!

HOPING TO SEE YOU AT THE C.I.M. CONVENTION,

BEST REGARDS.

Bill Sharp.

ENCL.

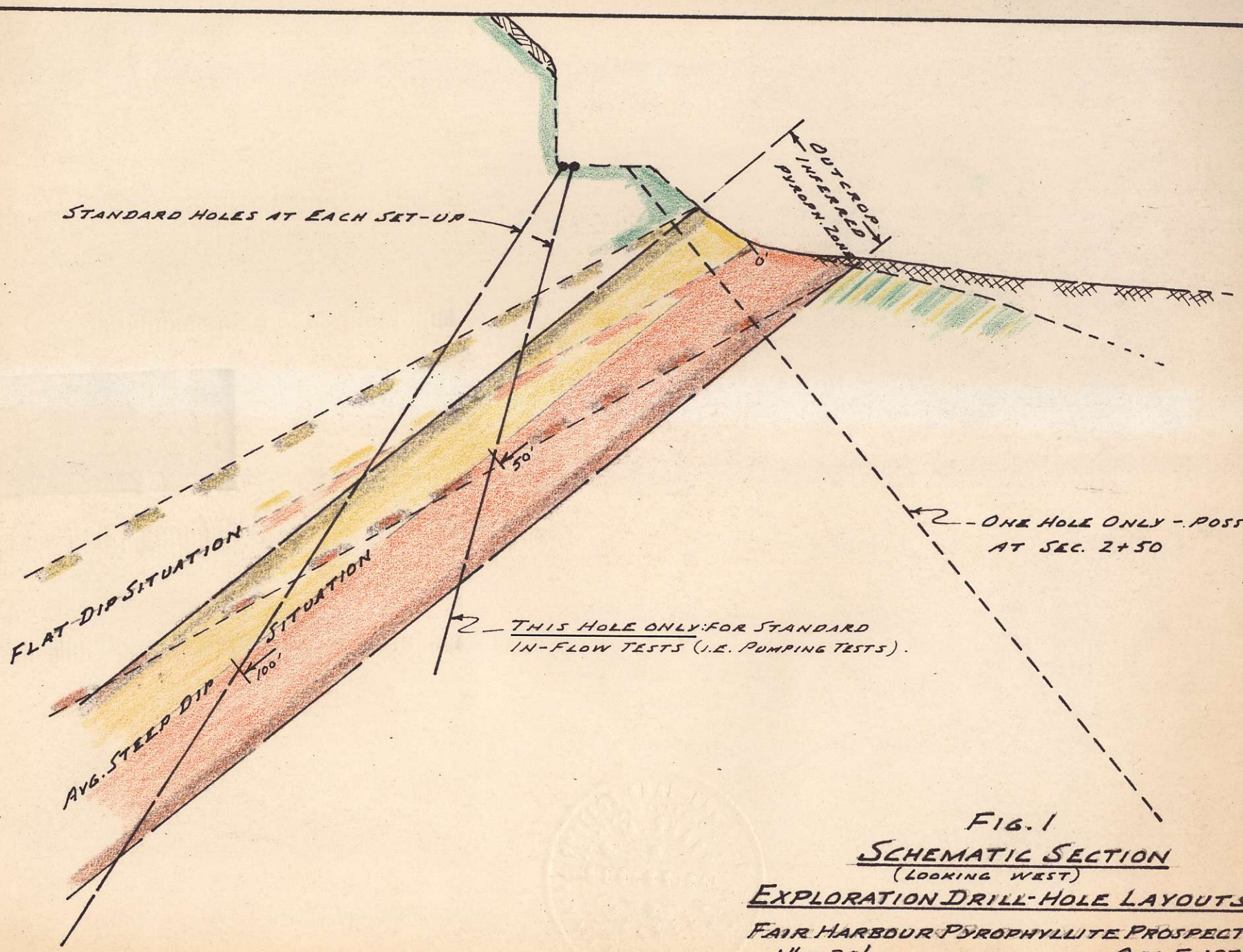


FIG. 1

SCHEMATIC SECTION

(LOOKING WEST)

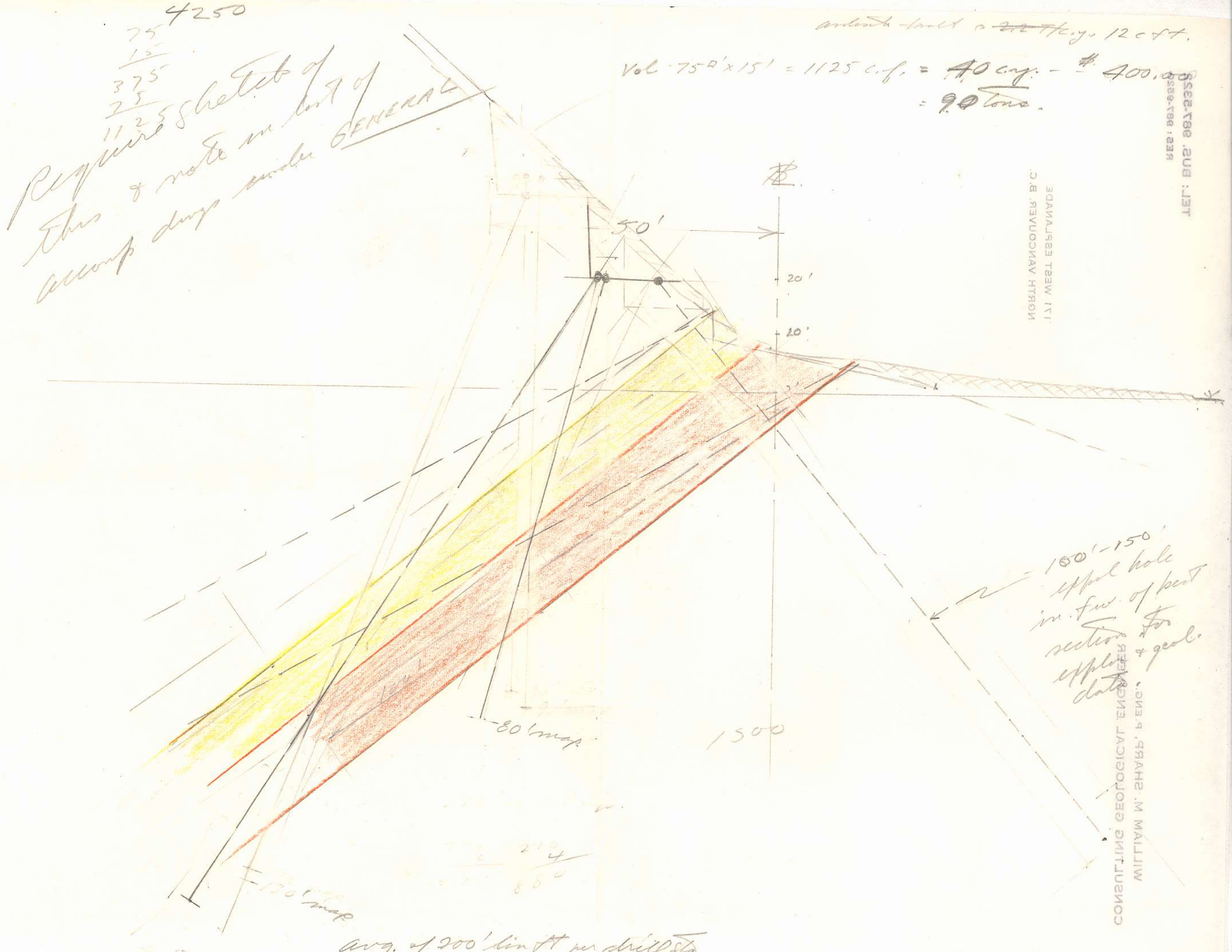
EXPLORATION DRILL-HOLE LAYOUTS

FAIR HARBOUR PYROPHYLLITE PROSPECT

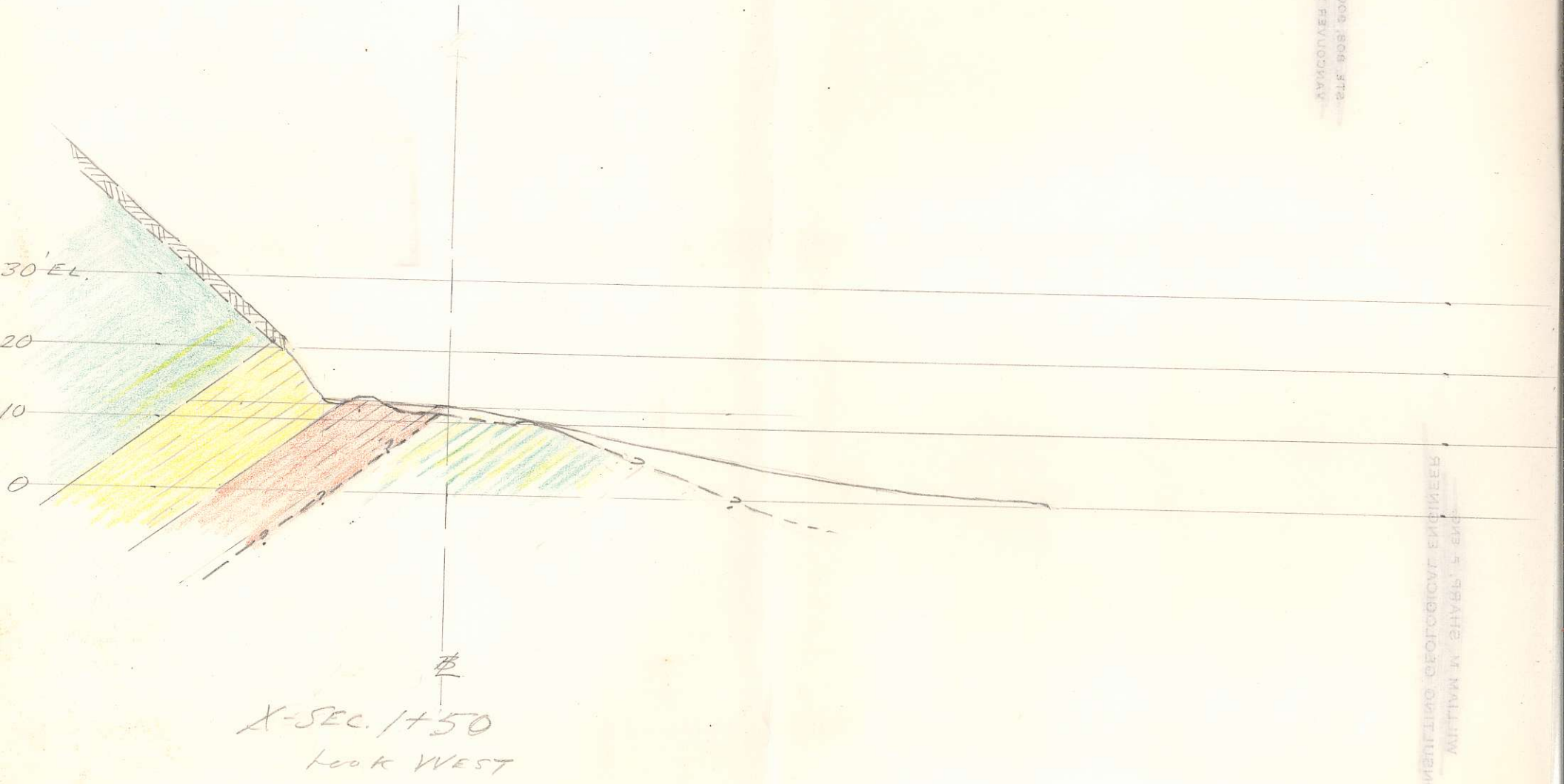
1" = 20'

OCT. 5, 1971

W.M. SHARP, P. ENG.

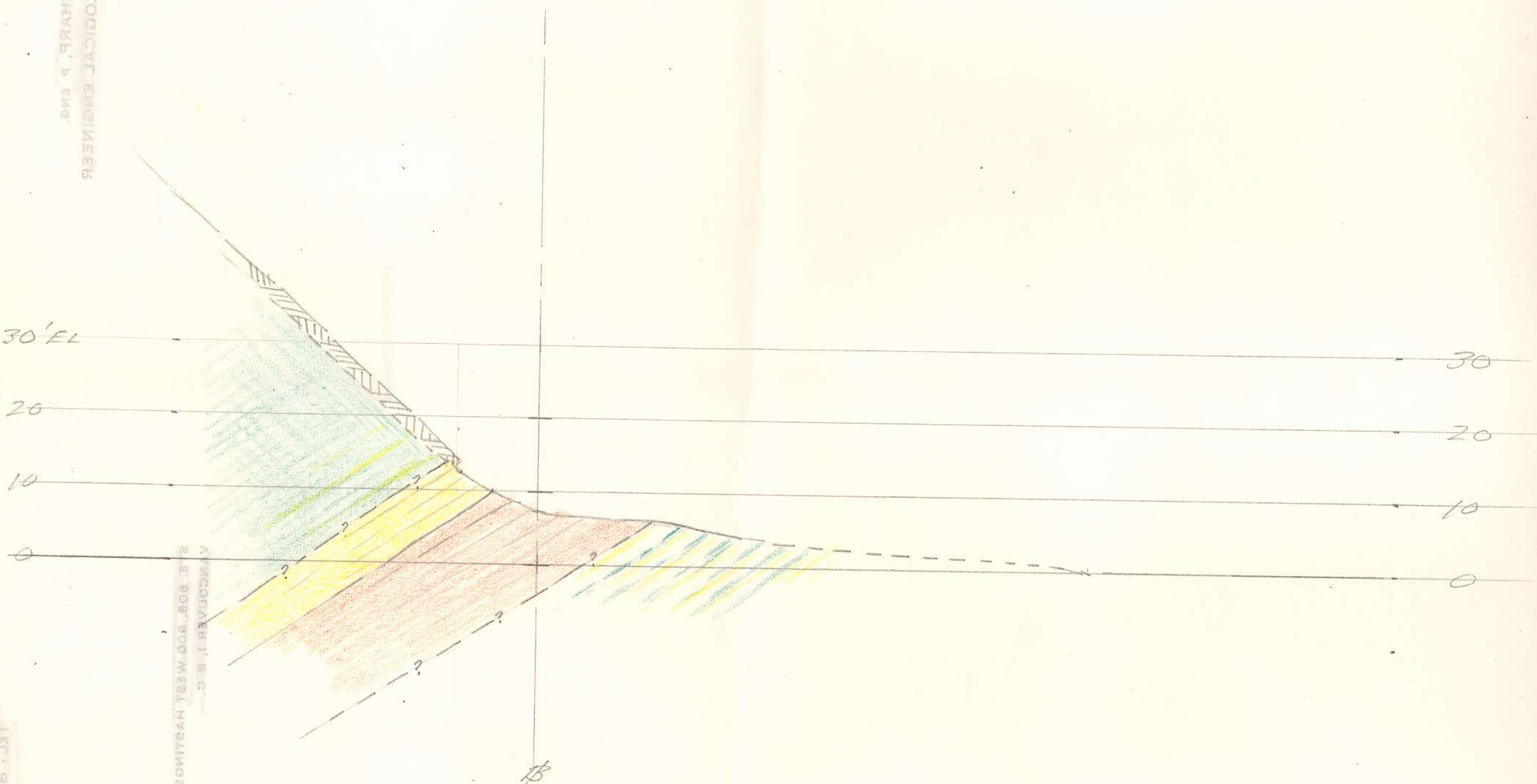


4250
75
15
375
75
1125
Require sketch of this & note in list of accomp. dwgs under GENERAL
Vol. 75'x15' = 1125 c.f. = 40 c.y. - $400.00
= 90 tons.
50'
20'
20'
80' max
150' max
1500
150'-150' effect hole in f.w. of pit section for explor. data & geol.
avg. of 200' lin ft per drill sta

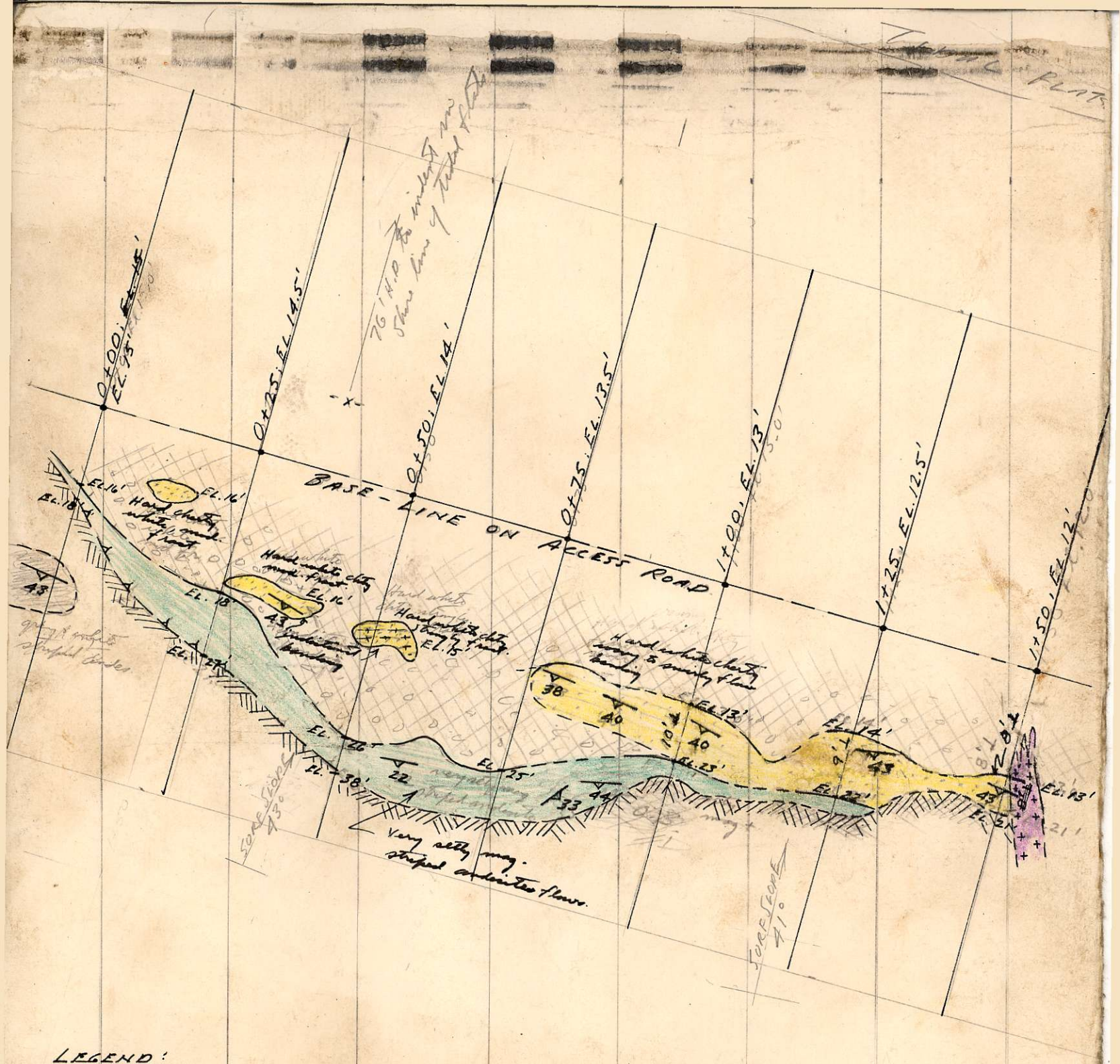


X-SEC. 1+50

LOOK WEST



X-SEC. 2+50
LOOK WEST

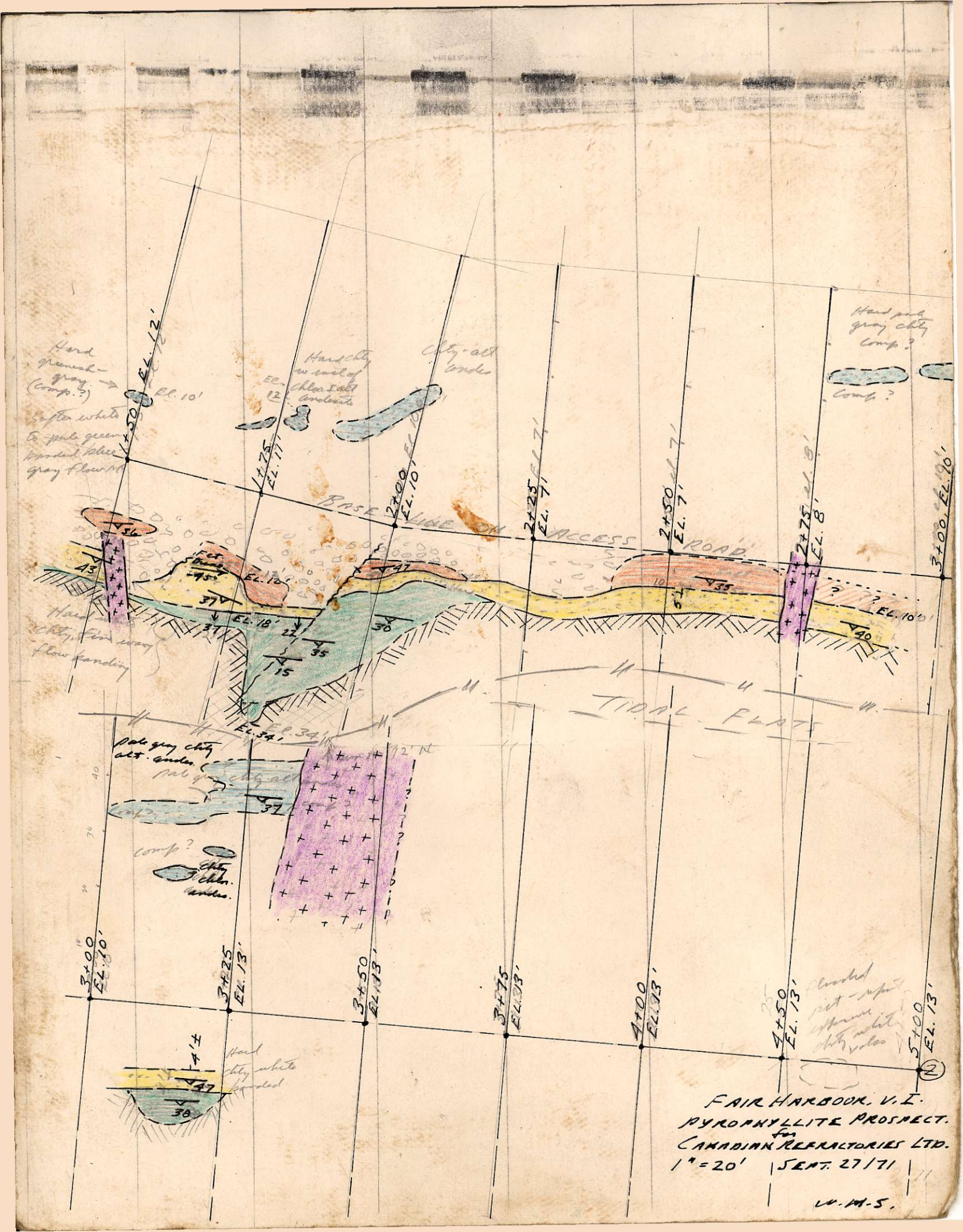


LEGEND:

1. FLOW BANDS
   JOINTS & MINOR SLIP FRACTS -
2. HARD CHERTY ALT. VOLCANICS (SILIC. FELDSPATHIC FLOWS) w/ H. AL2O3 MINERALS
3. SOFT, ALT., PYROPHYLLITIC &/or FELDSPATHIC VOLC FLOWS
4. PARTLY ALT. FELDSPATH. AND/OR CHERTY-FELD FLOWS - PYRITE
5. REGIONAL BONANZA ANDESITIC to BASALTIC FLOWS
6. edge of overburden up-slope of deposit
   Broken rock cover over Uprooted Zone

FAIR HARBOUR V.I.
PYROPHYLLITE PROSPECT
for
CANADIAN REFRACTORIES LTD
1" = 20', SEPT. 27/71 (WET MES.

(1)



FAIR HARBOUR, V.I.
PYROPHYLLITE PROSPECT.
for
CANADIAN REFRACTORIES LTD.
1" = 20' | SEPT. 27/71

W. M-S.

LEGEND

- Soft, Bleached & Altererred Feldspathic Flow Rocks - Containing Pyrophyllite, Var. Kaolin Minerals, Sericite (?) Etc. = "F.W. Band"
- Hard, Bleached & Cherty - Alt. Feldspathic - Rhyolitic (?) Flow Rocks w. Subordinate Hydrous Alum. - Silicate & Sericite = "H.W. Band"
- Regional (Bonanza Group) Andesitic - Basaltic Flow Rocks.
- Variably Bleached & Silicified Andesitic - Basaltic Flows (& Tuffs?) Minor Alteration Constituents Not Identified.
- Dioritic Intrusives (Dykes)
- Attitude of Flow-Bands. Attitude of Fractures.
- Overburden: Mineral Soil, Organic Mat'l. & Rubble
- Cover - Layer of Broken (Excavated) Rock

TIDAL FLATS

BASE-LINE ON ROAD & BENCH

0+00 El. 15'
0+25 El. 14.5'
0+50 El. 14'
0+75 El. 13.5'
1+00 El. 13'
1+25 El. 13.5'
1+50 El. 14'
1+75 El. 11'
2+00 El. 10'
2+25 El. 9'
2+50 El. 7'
2+75 El. 8'
3+00 El. 10'
3+25 El. 13'
3+50 El. 13'
3+75 El. 13'
4+00 El. 13'
4+25 El. 13'
4+50 El. 13'
4+75 El. 13'

MODERATELY FRACTURED

STRONGLY FRACT.

STRIPED GRAY & WHITE FLOWS.

GROUND SLOPE APPROX 45°

SLIGHTLY MAGNETIC

MINOR FRACTURING

HARD, CHERTY WITH SOFTER CHLORITIC INCLUSIONS.

FOOTWALL

H.W.

SLOPE 45°

LIGHT-TO-DARK BANDED. VERY SLIGHTLY MAGNETIC

PALE GRAY CHERTY-ALTERED.

FLOODED PIT: REPORTEDLY IN CHERTY WHITE CAP-LAYER.

34° APPROX.

TIDAL FLATS

X-SEC. 1+50
(LOOK WEST)

EL. 20'
EL. 10'
EL. 0'

X-SEC. 2+50
(LOOK WEST)

EL. 20'
EL. 10'
EL. 0'

inches
centimetres
This reference scale bar has been added to the original image. It will be of the same ratio as the original image so it can be used as a reference for the original size.

W. M. SHARP, P.Eng. — CONSULTING GEOLOGICAL ENGINEER, NORTH VANCOUVER, B.C.

CANADIAN REFRACTORIES LTD.

FAIR HARBOUR PYROPHYLLITE PROSPECT

PRELIMINARY

GEOLOGICAL PLAN & CROSS-SECTIONS

Scale:	Dwn. by: W.M.S.	Revision:	Dwg. No.
1 IN. = 20 FT.	Date: OCT. 2, 1971		D-1