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EVIDENCE OF EXPENDITURES INCURRED

SALARIES:

W. Dunn	4 days	@	$ 35/day	$ 140.00
W. Sharp	14 days	@	35/day	490.00
J. Tickner	15 days	@	450/mo	225.00
A. Potter	15 days	@	500/mo	250.00
				$ 1,105.00

LIVING EXPENSE:

40 man days	$ 375.00

HELICOPTER COSTS:

14 hrs. @ $130/hr.	$ 1,820.00
	$ 3,300.00

And I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the "Canada Evidence Act."

Declared before me at the

CITY of VANCOUVER in the

Province of British Columbia

this 4 DAY of FEBRUARY/19__ A.D.

W. Dunn

Wm. St. C. Dunn

Susan Mattey

SUB-MINING RECORDER

TEL.: BUS. 985-4616
RES. 987-9520

WILLIAM M. SHARP
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EXAMINATIONS
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161 PEMBERTON AVENUE,
NORTH VANCOUVER, B.C.

October 14, 1965

Silver Standard Mines Ltd.
808 - 602 West Hastings Street
Vancouver 2, B.C.

Attention: Messrs. A.C. Ritchie, P.Eng.
W. St.C. Dunn, P.Eng.

Dear Sirs:

This report summarizes my recent examination of your E & L Nickel - Copper property near Snippaker Creek, Iskut River district, ~~Skeena~~ Liard M.D.

The general geological aspects of the known mineralized areas, and the potential of adjacent geologically favourable areas have been given prior consideration; actual physical exploration accomplished to date is considered as being preliminary, or generally indicative.

The available geochemical data are summarized, but the current interpretations should be considered as preliminary, pending a fuller report of the writer's and Asarco's sampling.

The preliminary data provided by Mr. Dunn and others, together with the helpful assistance and cooperation given by Silver Standard, Asarco field crew, and others, is thankfully acknowledged.

Respectfully submitted,

W.M. Sharp

W.M. Sharp, P.Eng.

WMS/hb
encl.

REPORT

on

GEOLOGICAL INVESTIGATION

of the

E & L NICKEL – COPPER PROSPECT and VICINITY

near

Snippaker Creek, Iskut River District

LIARD

~~Skeena~~ Mining Division, B.C.

for

SILVER STANDARD MINES LTD.

Vancouver, B.C.

by

W.M. Sharp, P. Eng.

during

August – September, 1965

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SUMMARY and RECOMMENDATIONS

Iron-nickel-copper sulphide mineralization occurs within a major easterly unit of a generally E - W trending zone of intermittent gabbro intrusives occupying the upper regions of the claim group. These rocks intrude Jurassic argillites, greywackes, cherts, and tuffs. The gabbros are only fractionally exposed close to the south edge of the E & L glacier.

A petrographic study of specimens from various exposures of intrusive rock leads to the conclusion that all of these are of closely similar composition and genetically related, and that the intrusive rock-type alone has not been the determining factor in the localization of Ni-Cu mineralization. However, the sulphide mineralization appears intimately related to the general gabbro intrusive.

The Ni-Cu sulphide mineralization with hydrothermal alteration of the gabbro is evidently localized to zones of systematic, N.E.-trending cross-fracturing and associated chert-gabbro contact fracturing. The local pattern of the gabbro intrusions was, also, apparently determined by primary cross-fracturing, on the N.E. trend, within the wide, brittle, N.W. trending chert panel.

Diagnostic secondary minerals associated with hydrothermally-altered gabbro, and possible sulphide mineralization, include chlorite, prehnite, albite, ankerite, and, locally, interstitial quartz.

The indication that a deeply-penetrating fracture system has provided the principal control for mineralization enhances the general depth potential of the deposits.

The presently-delimited width of the composite mineral zone is slightly over 700 feet, and corresponds to the N.W. - S.E. extent of the favourable cross-fractured panel.

On the assumption that the depth of the favourable structural zone will at least equal the width, the current estimates are based on a mean depth of 700 feet.

Both to the east and west of the delimited mineral zones similar associations of chert, gabbro, cross-fracturing and, locally, altered gabbro provide favourable situations for lateral exploration.

The program of diamond drill core, and trench sampling conducted within the E & L N.W. sulphide zone allows a re-estimate of the total mineral potential within the currently-delimited zones. This is computed as follows:

Total Indicated Mineral Blocks:
1,771,000 tons @ 0.7% Ni and 0.6% Cu

Total Inferred Mineral Blocks:
1,316,000 tons of similar material.

The above grade figures are considered quite conservative by reason of the low core recovery within softer sulphide sections and also, the non-inclusion of higher-grade "rim" mineralization due to incomplete penetration of the full mineralized cross-section. The foregoing tonnage-grade estimates also, necessarily, include some mixing of both relatively high grade and marginal material which would be selectively mined.

Some additional engineering and preliminary exploratory work is suggested prior to initiating a major program of deep exploration. The following points are specifically recommended:

1. Establish basic survey control, and relocation geological stations and pertinent details on this base.

2. Drill at least one deep hole within the N.W. sulphide zone to check inferred depth extensions, and to provide additional geological information. Because of a possible deviation

from an assumed vertical plunge, it is suggested that the intersection be made at not over 300 feet of depth.

3. Excavate three additional sample trenches on the lower N.W. zone and three across the S.E. zone.

4. Drill short holes to test possible mineralization and geological features on exposures at Brunton sta.'s 16-17 and possible N.E. extensions.

5. Submit sample of heavy sulphides for spectrographic analysis, to check the possible minor metal content.

Respectfully submitted,

W.M. Sharp, P.Eng.

WMS/hb

INTRODUCTION

Authorization to proceed with the field work leading to this report was provided on June 8, 1965. With this, Mr. W. Dunn provided essential preliminary data, including plans, reports, maps, and air photos, and discussed the general features of the E & L mineralization, geology, and the field organization and facilities.

The writer's assignment was essentially for a detailed geological examination, with mapping, of the currently-indicated Ni-Cu zones of mineralization, possible local extensions of these, and general reconnaissance mapping, with local soil sampling and magnetometer investigations, of the claims group. In addition, the writer was to provide engineering direction of the concurrent program of diamond drilling and trenching.

The principal objective of the whole 1965 exploration program, including the general geological investigation and localized physical exploration, consisted of a general estimation of the depth potential of the exposed mineral zones. This estimate, together with the associated probabilities, would provide the basic data on which to plan a major program of deep exploration.

Time and weather restrictions prevented the examination of the reported mineralization near 11,000 N; 12,500 E, as requested by Mr. Dunn, and also of scheduled mapping of the geology of the lower rock exposures south of the principal mineralized areas.

The scheduled magnetometer surveys, which may not have been effective because of the interfering factors of deep snow- and ice-cover, steep to precipitous topography, and inherent features of the equipment were, incidentally, precluded by a shortage of fluid in the sharp A-3 magnetometer.

Field work relating to this report was accomplished during the general period of August 10 to September 3, 1965. Initial guidance and field assistance were provided by Messrs. J. Tickner and A. Potter of Silver Standard Mines Ltd., while geochemical services were provided by Mr. Roy Lammle and assistants of Asarco.

PROPERTY - Location, Access and Claims

The property is situated 70 miles N.N.W. of Stewart, B.C., and roughly 8 miles south of the Iskut River at a point midway between the mouths of tributary Forest Kerr, and Snippaker Creeks.

Access is by way of fixed-wing aircraft to the Unuk or Forest Kerr strips, or Tom McKay Lake, and thence by helicopter to the camp (El. 2750') on an easterly tributary ("E & L" Cr.) of Snippaker Creek. The claims extend along the south slope and summit of the glacier-capped ridges to the north of "E & L Creek". Elevations over the claim group range between 3200 and 6500 feet. The main showings lie within a 6150 - 5800 vertical interval.

The group consists of a block of 28 claims trending N.N.W., and including the main showings on the E & L No. 1 M.C., and the whole extent of the local gabbroic intrusives forming the host rocks for the areal Ni-Cu mineralization.

The two claims, E & L No.'s 1 and 2, were staked in 1958. Silver Standard field engineers staked the subsequent 26 claims during the past winter.

CAMP and FACILITIES

The summer tent-camp, consisting of a cook-tent, three tents for accommodation, and supplementary 'geochem.' and prospector's tents, is located close to 'E & L' creek. The Vancouver Island Helicopter's 'Bell G-3' machine and crew were based at this camp — providing transportation for Silver Standard and associated Asarco personnel — the latter being engaged on regional geochemical investigations.

Communication with Silver Standard's Anak: 'Base' and other field camps, other exploration groups, and with the supply and transportation centre at Stewart was by way of a small S & T Transceiver unit.

MAPPING PROCEDURES

Reconnaissance geological mapping was facilitated by the provision of 500-scale and 200-scale photo-topog maps. To supplement this a number of control or 'target' stations were established by Brunton-tape surveys extending outward from an arbitrary point-of-origin (cairn) at the N.W. showing. Consequently, local mapping points, or secondary traverse stations, could be determined from topographic map features, altimeter, compass resections on target stations, or by localized Brunton-tape surveys originating from resected points or assumed map stations.

The control provided by the 500-scale map was generally adequate; however the topographic detail was unreliable within the area of the ridge extending N.W. of the upper showings, and along the more westerly bluff-talus line southwest of the upper showings.

Control for detailed mapping was carried by normal Brunton-tape methods. Individual traverses were closed where feasible, and the position and elevation of traverse stations "balanced".

In the event that it is decided to proceed with deeper exploration, more precise survey control will be required. Tellurometric methods may be most adaptable in this area for establishing primary control points.

GENERAL GEOLOGY

G.S.C. Map 9 - 1957, "Stikine River Area" provides general regional geological information, but is locally inadequate and/or misleading.

The correlative geological unit occupying the northwesterly corner of Map 207A, and assumed projections along the generalized Cordilleran (NW) trend towards the E & L area, is classified as 'Hazelton Group', of Jurassic age. The typical assemblage is one consisting of andesitic flows, agglomerates, breccias, and tuffs. Individual units may be massive or layered. Related sedimentary units consist, typically, of argillite, quartzite, and greywacke.

The predominant geological unit shown on the S.E. corner of G.S.C. Map 311A (N.W. of 307A), and for an indefinite distance to the east of Snippaker Mt., consists of andesitic-to-basaltic flow — and pyroclastic rocks of Triassic age. Argillite, shale, quartzite, and limestone and, locally, greywacke form typical, somewhat localized sub-units within this group. This unit may extend eastward, or southeastward, as far as the E & L claims area.

Lithologic units exposed over the easterly half of the local map area (Dwg. No. 1) appear representative of typical 'Hazelton Group' andesitic tuffs and agglomerates. Those within the westerly half show lithologic similarities to typical sedimentary members of both the Jurassic and Triassic sections. From the foregoing it is inferred that the local lithologic section is essentially 'Lower Hazelton'.

No large bodies of intrusive rock, such as are depicted on Map 9-1957, were observed within the general locality of the E & L property. The irregular, somewhat disconnected east-westerly trending series of gabbroic intrusives forms the only significant intrusive occurrence within this area. As all visible exposures of these rocks occur closely adjacent to the 'E & L' glacier (Dwg. No. 1), and apparently continue for some distance under it, the actual areal extent of these rocks is unknown, but is probably considerably greater than that indicated on Dwg. No. 1.

Nickel-copper mineralization is closely associated with the gabbroic rocks, and is possibly genetically related to them.

The observed bodies of gabbro all occur within the wide section of thinly-bedded argillites, and cherts underlying the westerly half (Dwg. No. 1) of the map area. The apparent east-westerly trend of the gabbroic rocks markedly varies from the general N.W. formational trend of the intruded rocks. Within the argillite panel, marked deflections of N.W.-trending bedding units and the occurrence of sub-parallel fissibility, suggest forceful intrusion of the gabbros. Some marginal shaly rocks are strongly silicified. Within the brittle, apparently more competent chert panel the gabbro intrusions appear, in part, to have been structurally-controlled by cross-fracturing on northeasterly trends, and to a lesser extent by compliment-ary sets of northerly, to northwesterly-striking fractures. The resultant effect of this has been to produce rather distinct panels, or blocks ("islands") of chert separated and enclosed by gabbro.

PETROGRAPHY OF INTRUSIVES

Field examination of the various exposures of intrusive rock across the upper part of the map area (Dwg. No. 1) suggested that they were all of rather closely-similar composition — with perhaps some phasing or differentiation to produce a continuous suite, gradational from, say, pyroxene gabbro to, very locally, hornblende diorites. The gabbros in the immediate vicinity of the mineral showings appeared relatively more basic (by alteration) than exposures occurring outward from this assumed center.

With the objective of more accurately establishing the composition of various areas of intrusive rocks, making possible the delineation of certain of these as being of optimum composition for potential Ni - Cu mineralization, a suite of representative specimens was gathered. Eight particularly representative specimens were submitted to Dr. H.T. Carswell for petrographic study. The field location of these is shown on Dwgs. No. 1 (and No. 2) abbreviated reports of Dr. Carswell's determinations follow:

S - 2 Altered Diabase: Max. grain size 5 mm. 50% Plagioclase (An_{40}): The calcic variety remains as a few remnants in abundant albite; plag. very slightly zoned.
20% pyroxene (augite?)
15% chlorite
10% prehnite (secondary mineral)
2% orthoclase (?); 2% opaque grains; 2% carbonate (var. ankerite); 2% green hornblende; also white mica, epidote, limonite.

General: Altered; interstitial chlorite; euhedral to subophitic clinopyroxene occurs with f.gr. prehnite in the rock; plagioclase partly replaced by albite; chlorite, green hornblende, replace clinopyroxene; prehnite occurs as scattered f.gr. flakes, as small clusters, and in veinlets; -----.

The rock has a sodic feldspar, but is called a diabase because of its subophitic texture and the originally calcic composition of its plagioclase.

Field Ex. Minor dissem. pyrrhotite, pyrite, magnetite, weakly + HCl.

S-4 Altered Hornblende - Olivine Diabase: Max. gr.size 5 mm.

35% plagioclase; strong gradational normal zoning; An_{45} to An_{20}; albitized rims with sharp borders against calcic cores.
25% chlorite
10% brown hornblende; 1% green hornblende
5% carbonate (var. ank.)
5% olivine
5% epidote
5% quartz (as blebs)
2% clinopyroxene; 2% opaques; 1% prehnite;
2% apatite; 1% sphene (?); 1% orthoclase (?)
minor white mica.

General: plag. albitized in part (rims); chlorite has replaced hornblende in part; clinopyroxene occurs as remnants in chlorite; interstitial carbonate occurs with epidote; quartz has been strained.

Field Ex. Minor dissem. pyrite; sp. + HCl.

S-5 Fine-Grained Diabase: Max. grain size 0.5 mm.

40% chlorite
35% plagioclase; normal An_{70} to An_{20}; some sharp albite (sodic replace) rims
15% pigeonite
5% augite
5% opaque grains
1% carbonate; 1% limonite, 1% olivine

General: f.gr. interstitial pyroxene — chlorite; limonite and carbonate replace chlorite along cleavage to some extent, and carbonate replaces pyroxene in part; opaque grains are assoc. with pyrox. and chlorite.

Field Ex. Trace vis. pyrite; weak + HCl on fresh surf, strongly + HCl on fracture films.

S-8 Altered Diabase: Max. grain size 2 mm.

45% plagioclase and strongly altered; (strongly) zoned An_{60} to albite rim.
20% hornblende
10% chlorite
5% carbonate
5% orthoclase
5% opaque grains — assoc. limonite
5% quartz
5% prehnite.

General: minor apatite, white mica; dark argillic material; leucoxene; interstitial to round chlorite aggregates; sub-ophitic opaques; m.gr. round carbonate; albite and orthoclase partially rim plag., m.gr. quartz — some with fretted borders — appears to be of replacement origin; plag. cores strongly altered to v.f.gr. chlorite, clay (?), and white mica; prehnite occurs as f.gr. blades in a 1 mm veinlet; chlorite veinlets are also present; opaques are assoc. with carbonate, chlorite, and leucoxene (alt. of ilmenite).

Field Ex. Spots limonite only. Variably + HCl.

S-10 Hornblende - Olivine Diabase: Max. gr. 4 mm.

25% plagioclase — strongly zoned, normally and patchily; most calcic cores An_{50}; much plag. strongly albitized.
20% brown hornblende, 10% green hornblende
10% clinopyroxene (augite?)
15% chlorite
5% olivine
5% epidote
5% carbonate
5% quartz
1% opaques; 1% apatite; also white mica, sillimonite

General: chlorite replaces green hornblende/brown hornblende/pyroxene; carbonate as fine grains repl. amphiboles and pyroxenes; some quartz apparently of replacement origin; f.gr. epidote and v.f.gr. white mica replace plag. in part; marked albite rims on some plag., especially cores; some quartz interstitial (primary?), epidote assoc. with chlorite; f.gr. dissem. opaque grains are present; quartz has been strained.

Field Ex. Minor accessory pyrite in clots; + HCl on calcite clots.

S-11-A Altered Olivine Diabase: Max. gr. 5 mm.

(In estim. %'s, alteration counted as original minerals)

40% plagioclase — slightly and normally zoned, most is An_{95}.

25% Olivine

20% Augite

with above are white mica, kaolinite, antigorite, chlorite.

5% carbonate

1% biotite

3% opaques

1% limonite

General: stubby, anhedral m.gr. plag. occurs with interstitial to round olivine and pyrox. F.gr. opaques generally occur with antigorite — after olivine; rock partly crushed; --- chlorite replaces plag.; carbonate is f.gr. — prob. secondary; antigorite veins and replaces olivine.

Field Ex. Loc. pyrrhotite — chalcopyrite clots.

S-12 Olivine Diabase: Max. gr. size 5 mm.

35% plagioclase, normal gradational to oscillatory zoning — from An_{80}

30% clinopyroxine (augite?)

10% olivine

5% opaque grains

15% chlorite

1% biotite

5% carbonate

Minor zircons, blue-green amph., white mica.

General: f.gr. hornblende remnants partly altered to biotite/chlorite; biotite rims and veins pyroxene and olivine; chlorite as round, bladed aggregates and as fine veinlets; carbonate interstitial and as finer grains in plag.; --- many plag. crystals broken — note crushed zone containing much chlorite.

Field Ex. vis. sparse pyrite only.

S-14 Altered Olivine - Diabase; Max. gr. 5 mm.

25% plagioclase
20% clinopyroxene
20% chlorite
10% orthoclase
10% olivine
5% carbonate
2% prehnite
2% opaques

Minor apatite, zircon, white mica.

General: --- clinopyroxene crushed and replaced by round aggregates and veinlets of chlorite. Orthoclase prob. pseudomorphic after plag.; carbonate f.gr. dissem.-interstitial and in plag. An irregular veinlet of f.gr. anhedral prehnite crystals cuts the rock; ---

Field Ex. - some shear-crushing; trace of magnetite only.

Summary: H.T. Carswell:

(a) "Because these rocks have the same textures and general mineralogy, they are genetically related. There is a progression from minerals high on Bowan's reaction series (olivine, pyroxene, calcic plagioclase) to lower ones (more sodic plag., hornblende) with ample evidence of the appropriate replacements. Orthoclase, chlorite, quartz, carbonate, albite, prehnite, epidote, micas, etc., are probably related to very late magmatic solutions. Opaques are interstitial and therefore late."

(b) Degree of alteration from high-to-low in sequence, S-8, S-2, S-4, S-14, S-10, S-11-A, S-5, S-12.

Summary: R.M. Thompson:

Three samples, including mineralized and unmineralized gabbro from vicinity of the Ni-Cu showings:

Sample A - (altered unmineralized gabbro)

Hydrothermally-altered gabbro that has also been sheared and fractured. Consists of coarse phenocrysts of pyroxene, massive prehnite, chlorite plagioclase, and small amounts of extremely finely fibrous material, ---

The pyroxene phenocrysts are often broken and may be veined or rimmed by narrow selvages of the fibrous mineral. Prehnite, with numerous inclusions of the fibrous mineral, occurs in abundance ---.

Sample B - (altered, mineralized gabbro)

Typical gabbro with pyroxene and plagioclase showing ophitic texture; slight alteration to chlorite, prehnite, and the fibrous amphibole. The rock has been squeezed and deformed. The disseminated metallic minerals identified as chalcopyrite, pyrite, pyrrhotite, pentlandite, and magnetite; chalcopyrite grains fresh; pyrrhotite highly altered to limonite; pentlandite usually occurs at the edges of pyrrhotite grains, or at the boundary between pyrrhotite and chalcopyrite. In general, metallics surprisingly coarse.

Sample C - (strongly mineralized gabbro)

Polished surface shows about 60% sulphides disseminated in gangue; pyrrhotite areas up to ¾" x ½"; chalcopyrite appears as clean, irregularly shaped areas, sometimes attached to pyrrhotite, and occasionally as an intimate mixture with pyrrhotite. In places pyrrhotite highly altered and criss-crossed with veinlets and masses of limonite. Pentlandite and magnetite occur similarly as in Sample 'B'.

SUMMARY, PETROGRAPHIC STUDIES

With respect to the several occurrences of gabbro (diabase) shown on Dwg. No. 1, the compositions are strikingly similar, and all occurrences are assumed to be genetically related. The separate exposures may join to the north under the glacier, or at depth below the black shale cover.

Zones of alteration, characterized by occurrences of chlorite, prehnite, albite, minor carbonates and quartz, appear most pronounced where fracturing and shearing have occurred within the gabbro and, to a minor extent, within adjacent cherts.

Fe - Ni - Cu mineralization appears to be genetically related to the gabbro, but does not occur in distinctly peripheral or zonal segregations. Mineralization appears, instead, to have been structurally-controlled by systematic zones of fracturing within the gabbros and, very locally, the cherty wall rocks.

DETAILED GEOLOGY

The following is, in general, confined to detailed descriptions of certain geological features of the currently-defined mineral zones. These are illustrated by Dwg. No. 1.

The known zones of mineralization, as so far delimited, occur within the easterly part of the general zone of discontinuous gabbro intrusives trending east-westerly across the top of the map area (Dwg. No. 1). The easterly gabbro body, in itself of a somewhat composite structure, has an indicated length in excess of 2500 feet.

The easterly gabbro bodies intrude a relatively firm, brittle panel of cherty argillites and cherts. This panel has a general northwesterly trend, with moderate to steep southwesterly dips. The silicification, or cherty character of the generally thinly-bedded assemblage, appears quite uniform throughout all of the observed exposures, showing no appreciable differences in intensity by reason of relative proximities to the gabbro - chert contacts. The rather uniform silicification appears to be a primary, or at least a pre-intrusive feature of the panel, and not, apparently, caused by a release of silica from the intrusive magmas.

Gabbro-chert contacts are typically sharp and generally discordant. Within the local panel of cherty rocks at least, the intrusion of the gabbro appears to have been of a rather permissive nature, with no marked localized buckling of wall-rock bedding. The several relatively broad bedding flexures and warps that do exist — particularly within westerly parts of the chert panel — appear to have developed prior to intrusion. Very locally, as at the foot of the westerly bluffs, some tight flexures appear to have been caused by the injection of minor prongs of gabbro.

The irregularly-transverse panel-and-block pattern of gabbros and cherts, forming the general site of mineralization, appears to have developed by intrusion of the gabbros within, and along pre-existing zones of cross-jointing within the cherts. The northeasterly-trending system would appear to form the principal fracture-set, with northwesterly- to northerly-trending fractures forming the minor set. Both sets of fractures and gabbro-chert contacts, have near-vertical dips.

The presently-delimited areas of mineralization occur within two principal zones of altered gabbro. These are only partly exposed, due to overlapping and intervening covers of snow and ice, or talus. The two zones, designated as the "N.W." and "S.E." zones, are apparently separated by a N - S striking fault coinciding with the steep talus-filled draw below sta. 11. The N.W. and S.E. Gabbro bodies may be tenuously linked below the talus cover, and along and/or across the N - S fault, but insufficient trenching has been accomplished thus far to prove, or disprove this possibility.

Mineralization consists of disseminated pyrrhotite, pentlandite, and chalcopyrite, with minor pyrite and magnetite in hydrothermally-altered gabbro. Both alteration and mineralization appear to be structurally-controlled by fracturing — principally within the gabbro bodies. The principal, or controlling fracture set, striking N.E. or E - N.E., is essentially parallel to the principal chert-gabbro contact trend, with similar near-vertical dips. Locally, as at the northerly and westerly contacts of the N.W. gabbro body, closely - spaced, but relatively minor fracturing impinges acutely against the chert-gabbro contacts, with the higher-grade mineralization generally occurring towards the contacts, and becoming progressively leaner inward of them.

The inference that the local Fe - Ni - Cu sulphide mineralization is essentially hydrothermal, and controlled by fracturing rather than by simple marginal differentiation and segregation, is generally supported by field evidence. The Ni - Cu sulphide mineralization south of sta. 16 occurs along a N.E. fracture zone within the gabbro, and also at the local fracture - contact of chert and gabbro. In addition, hydrothermal alteration of the gabbro is most pronounced adjacent to this fracture zone. Also, mineralized fractures within the cherty wall rocks, as in the vicinity of sta's. 10, 11 and 17 offer further evidence of fracture control.

The general indication that mineralization is primarily controlled by systematic cross-fracturing traversing the gabbros, rather than by localized segregations of the ore-sulphides from a solidifying magma, substantially strengthens the probability that similar conditions of mineralization will continue to depths well below the lowest mapped exposure. Within the presently exposed 350-foot vertical range of surface exposures, there is no apparent change in the general character of mineralization or hydrothermal alteration of the gabbroic host rocks.

The presently-delimited horizontal "width" of the composite mineral zone, as measured from N.W. to S.E. normal to the strike of the controlling fracture system is slightly over 700 feet. Assuming a minimal 'square' cross-section for the above zone, the vertical dimension of the zone would also be in the range of 700 feet. Summarizing, mineralization of similar width and grade as that presently exposed should persist to a depth of at least 700 feet below the mean-elevation (6000') of the surface profile of the zone.

The general indication that local gabbros extend northeastward under the glacier, and that the pronounced N.E. controlling cross-fracture system extends northeastward and south-westward of the known mineral zone provide considerable lateral exploration potential. Locally, it appears that the northerly mineralized rim of the "N.W." zone will extend 200 feet north-eastward, under the snow field, to intersect the principal N - S fault zone. In addition, a N.E. extension of the S - E mineral zone is suggested by the occurrence of significant Ni - Cu miner-alization on cross-fracture zones traversing the gabbro within the sta. 16 - 17 locality.

The structural association of cherts and gabbros to the west of the N.W. sulphide zone provides a favourable situa-tion for the occurrence of similar mineralization in this direction. The occurrence of minor Fe - Cu mineralization (sta. 40) associated with a N.E.-trending fracturing and hydrothermally-altered gabbros within this area provides basic evidence of this potential.

The spatial arrangement of the individual mineralized zones, major and minor, is one suggesting a staggered, or en-echelon block pattern, in which individual elements are offset toi the right in going generally from west to east cross the mapped area (Dwg. No. 2). This rather generally-indicated pattern should be considered when planning extended exploration.

GEOCHEMICAL EXPLORATION

Data arising from this phase of the general investigation originate from extensive silt-sampling by the resident Asarco field crew, plus the writer's localized soil-sampling of the composite westerly gabbro zone. The currently-available data are plotted on Dwg. No. 1. Additional information, in the nature of rock-chip analyses, is pending.

The most significant areal (silt) anomaly occurs along the general drainage course originating from the N.W. zone - and possible westerly extensions. Its particular significance is due to the co-occurrence of 'H.M.' and 'Cu' indications. All other anomalies, silt and soil, are relatively negative with respect to copper.

Markedly H.M. — anomalous zones, as indicated by localized soil-sampling by the writer, occur below the gabbros occupying the upper westerly part of the map area. However, due to a general coincidence of black shale, no particular significance may be attached to them, at least until data arising from localized rock-chip analyses are available for comparative study.

DIAMOND DRILLING and TRENCHING:

Shallow trench and outcrop sampling accomplished in 1958, allowed a preliminary estimate of the average grade and tons per vertical foot of the inferred total extent of mineralization contained within the N.W. and S.E. zones. The recent program of diamond drill core and deeper trench sampling was undertaken, primarily, to provide samples of the more representative unweathered sulphides and, secondarily, to provide geological information which could not be obtained solely from surface investigations. In addition, assays of the above core and trench samples would permit a more accurate estimate of the grade and tonnage factors.

Difficulties encountered in drilling and coring the relatively soft, broken mineralized gabbro prevented completion of any of the drill holes to the scheduled depth, or of the completion of the full drilling program. This, in turn, restricted the amount of trenching accomplished. However, it is believed that the new information gained within the N.W. zone, at least, allows more accurate inferences concerning the potential of both zones. The following abbreviated drill-hole logs, together with the information contained in figs. I, II, and III summarize details and results from the combined drilling and trenching programs.

Assay results given in Figs. I, II, III include a value for 'Nickel Equivalent'. This figure = Ni % + ½ Cu % is presented as an arbitrary composite evaluation of the associated Ni-Cu content, in terms of Ni content alone. The purpose of this is to permit geological estimations of the general pattern of Ni-Cu mineralization, regardless of local variations in the ratio of the two. The following assays represent, consecutively, Ni%; Cu%, and "Nickel-Equivalent" %:

<u>D.D.H. #1</u> Ref. Figs. I, II, III

0 - 20.9' : altered gabbro; gen. sparse sulphides
Est. recovery - 90%
Av. assay 0 - 20' - 0.17; 0.12; 0.23

20.9 - 31.0'; altered gabbro; patchy visible pyrrhotite-chalcopyrite
Est. recovery - 40½%
Av. assay 20' - 31' - 0.28; 0.15; 0.35

Summary 0 - 31'; Core recovery 73.5%

<u>D.D.H. #2</u> Ref., as previous

0 - 9.2 : altered gb.; loc. fair pyrrh.-cpy.
9.2 - 10.2 : Dyke; unmineralized.
10.2 - 25.1 : altered gb., locally broken; dissem. sulphides.
25.1 - 40.2 : altered gb.; gen. broken; evenly-dissem. sulphides.

Summary - Av. assay 0 - 15' - 0.36; 0.25; 0.48
15 - 40.2' - 0.74; 0.61; 1.02
Core recovery 0 - 40.2' = 64%

D.D.H. #3 Ref. as previous

0 - 20.5	:	Soft, alt. gb.; locally min. large blebs pyrrh. - cpy.
22.5 - 25.0	:	Sand with frags. min. gb.
25.0 - 71.7	:	Firm to broken alt. gb.; considerably coarsely-disseminated sulphides.

Summary - Av. Assay 0 - 5' - 0.30; 0.36; 0.48
5 - 20' - 0.55; 0.39; 0.74
20 - 71.8' - 0.84; 0.73; 1.20
5' - 71.8' - 0.75; 0.63; 1.06
Core recovery 0 - 71.8' --- 75.5%

D.D.H. #4 Ref. as previous

0 - 20.5	:	c.gr. alt. gb.; firm to broken; fair to moderate dissem. sulphides.
20.5 - 23.4	:	f.gr. (chilled) alt. gb.; sp.min.
23.4 - 36.5	:	chert and minor brecciated gb. trace sulphides only.

Summary - Av. assay 0 - 20' - 0.59; 0.60; 0.89
20 - 25' - 0.14; 0.20; 0.24
25 - 30' - 0.01; 0.12; —
30 - 36.5' - tr. ; 0.05; —
Core recovery 0 - 36.5' = 87%

D.D.H. #5 Ref. as previous

0 - 32.1	:	variably fine- to c.gr. alt. gb.; gen. fair dissem. sulphides — loc. ox.
32.1 - 60	:	firm to broken c.gr. alt. gb.; fair to good coarse dissem. sulphides.
60 - 90.9	:	med. to f.gr. altered gabbro; all rather broken; fair dissem., to patchy massive pyrrh. - cpy.

Summary – Av. assays 0 – 30' – 0.63; 0.52; 0.89
30 – 60' – 0.57; 0.42; 0.78
60 – 90.9' – 2.05; 0.92; 2.51
0 – 90.9' – 1.20; 0.61; 1.50
Core recovery 0 – 90.9' = 67%
(Hole 'lost' @ 92' – 93')

D.D.H. #6 Ref. as previous
0 – 28.1' Gen. strongly-broken alt. gb. with considerable oxidation; fair pyrrh.-cpy. where recovered.
Summary– Av. assay 0 – 28.1' – 0.49; 0.37; 0.67
Core recovery 0 – 28.1' = 44.5%

D.D.H. #7 Ref. as previous
0 – 17' : mildly-alt. c.gr. gb.; gen. sp. min.
17 – 27' : alt. c.gr. gb.; loc. good patchy pyrrh – cpy.
27 – 53.9': strongly – alt. m.gr. gb.; gen. good pyrrh.-cpy. as large blebs and finer disseminations
Summary – Av. assay 0 – 20' – 0.91; 0.10; 0.24
20 – 30' – 0.51; 0.41; 0.71;
30 – 53.8' --0.79; 0.63; 1.10
20 – 53.8' – 0.71; 0.58; 1.00
Core recovery 0 – 53.8' = 72%
Hole stopped by freezing weather and lack of cement at time.

N.W. ZONE 1965 – E & L TRENCH SAMPLING – GEOLOGICAL CORRELATIONS.

TRENCH No	SAMPLE No.	SAMPLE LENGTH	ASSAYS Ni %	Cu %	LENGTH x Ni %	LENGTH x Cu %	WTD AVG Ni %	WTD AVG. Cu %	"TOTAL NICKEL EQUIVALENT"
No. 1.	79449	10.0	0.29	0.27	–	–			
"	50	10.0	0.35	0.33		20'–	.32	.30	".47"
"	(79476)	(4.0)	(0.15)	(0.16)		–	–	–	–
No. 2.	79477	14.0'	0.35	0.36		14'–	.35	.36	".53"
No. 3.	79441	10.0	0.58	0.68	5.8	6.8			
"	42	10.0	0.71	0.71	7.1	7.1			
"	43	14.0	0.27	0.20	3.8	2.8	34' .49	.49	".73"
No 4.	79430	10.0	2.05	1.50	20.5	15.0			
"	31	6.0	2.85	1.11	17.1	6.66	16' 2.35	1.35	"3.02"
"	(32)	(3.0)	(0.31)	(0.19)	–	–	–	–	
No. 5	79433	10.0	0.42	0.42	–	–			
"	34	10.0	0.64	0.59	–	–			
"	35	10.0	0.83	0.97	–	–			
"	36	10.0	0.32	0.60	–	–			
"	37	10.0	0.45	0.72	–	–			
"	38	10.0	0.63	0.90	–	–			
"	39	10.0	0.54	0.55	–	–			
"	40	6.0	0.49	0.71	–	–76'	.52	.65	".84"
No. 6	79444	10.0	0.24	0.30	–	–			
"	45	10.0	0.45	0.72	–	–			
	46	10.0	0.35	0.52	–	–			
	47	10.0	0.28	0.27	–	–			
	48	10.0	0.27	0.28	–	–50'	.32	.42	".53"

ARITHMETIC AVG. OF TRENCHES IN MINERALIZED GABBRO 0.64% Ni 0.60% Cu

WEIGHTED AVERAGE OF TRENCHES IN MINERALIZED GABBRO: 35% 0.58% Ni : 0.57% Cu "0.86"% Ni EQUIV.

FIGURE I.

[illegible]

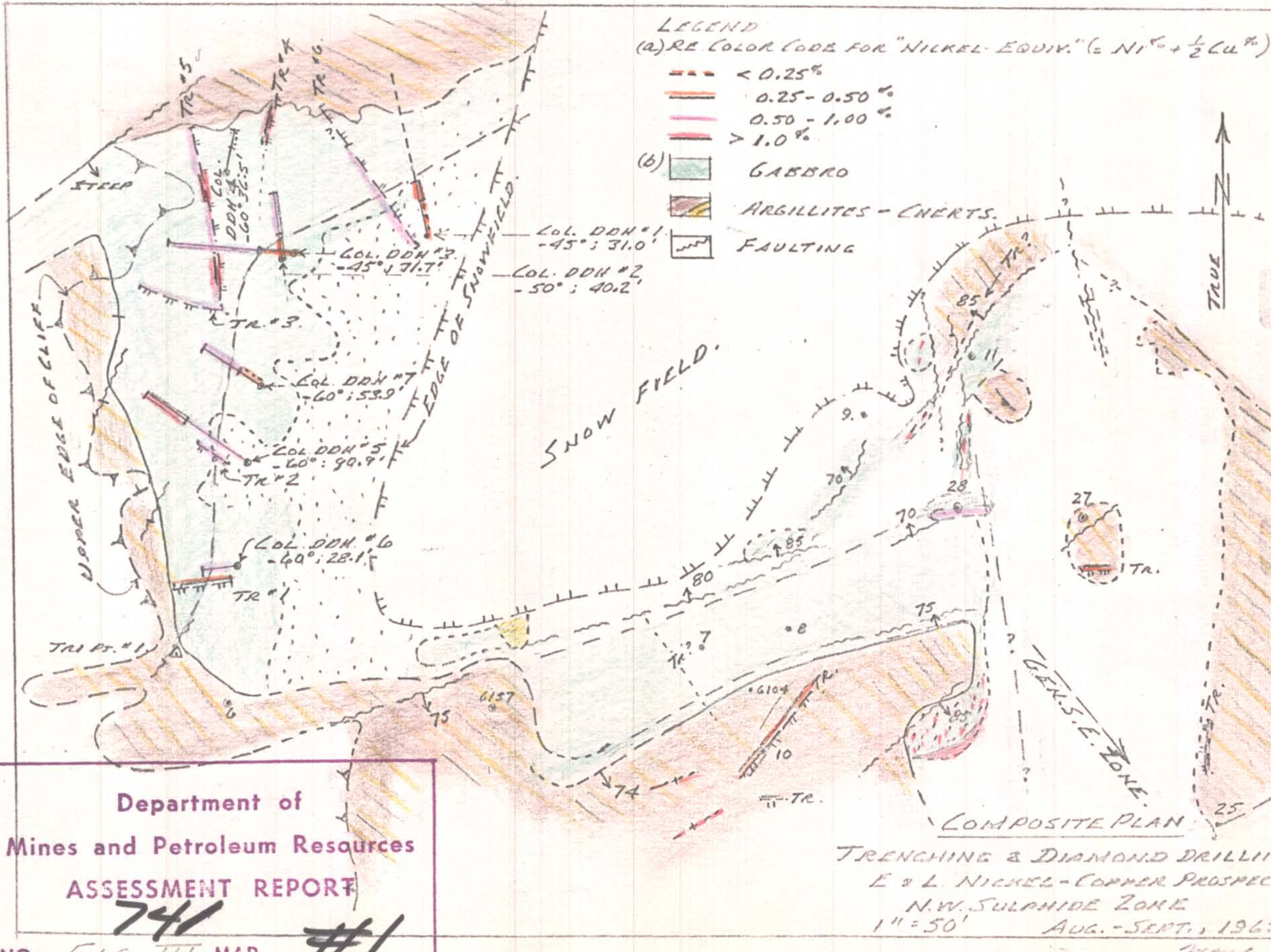
N.W. ZONE. 1965. E & L DIAMOND-DRILL CORE SAMPLING - GEOLOGICAL CORRELATIONS.

D.D.H. No.	SAMPLE NO.	SAMPLE LENGTH	ASSAYS Ni %	Cu %	INTERSECTION, HOR. LENGTH		WT'D. AVG. Ni %	WT'D. AVG. Cu %	"TOTAL NICKEL EQUIVALENT"
No. 1	79455-79456	20'-31' = 11.0'	PER LOG SHEETS.		-45°	7.8'	0.28	0.15	".35"
No. 2	79460-79463 INCL.	15'-40.2' = 25.2'		"	-50°	16.2'	0.74	0.61	"1.04"
No. 3	79458-79474 INCL.	5'-71.8' = 66.8'		"	-45°	48.0'	0.75	0.63	"1.06"
No. 4	79475; 79401-79403 INCL.	0'-20' = 20.0'		"	-60°	10.0'	0.59	0.60	".89"
No. 5	79407-79420 INCL.	0'-90.9' = 90.9'		"	-58°	77.0'	1.20	0.61	"1.50"
No. 6	79421-22	0-28.1=28.1'		"	-60°	14.0'	0.49	0.37	".67"
No. 7	79427-29 INCL.	20'-53.8' = 33.8'		"	-60°	16.9'	0.71	0.58	"1.00"

WEIGHTED AVERAGE CORE ASSAYS IN GEN. GABBRO ZONE OF MIN'L'N: 27.1' H.D. 0.83% Ni. 0.57% Cu "1.10%" Ni EQUIV.

FIGURE II.

W.M.A.


LEGEND
(a) RE COLOR CODE FOR "NICKEL-EQUIV." (= Ni% + ½ Cu%)
< 0.25%
0.25 - 0.50 %
0.50 - 1.00 %
> 1.0 %
(b) GABBRO
ARGILLITES - CHERTS.
FAULTING
TRUE N
STEEP
UPPER EDGE OF CLIFF
EDGE OF SNOWFIELD
SNOW FIELD.
COL. DDH #1 -45° ; 31.0'
COL. DDH #2 -50° ; 40.2'
COL. DDH #3 -45° ; 71.7'
COL. DDH #4 -60° ; 36.5'
COL. DDH #5 -60° ; 90.9'
COL. DDH #6 -40° ; 28.1'
COL. DDH #7 -60° ; 53.9'
TR. #1
TR #2
TR. #3
TR #5
TR #6
TRI PT. #1
GEN. S.E. ZONE
TR.
COMPOSITE PLAN
TRENCHING & DIAMOND DRILLING
E & L NICKEL-COPPER PROSPECT
N.W. SULPHIDE ZONE
1" = 50'
AUG.-SEPT., 1965

The location of sample trenches is shown on Fig. III; assays resulting from trench sampling are summarized in Fig. I.

Weather and personnel restrictions prevented completion of all trenching initially scheduled within the N.W. zone.

As the grade of mineralization within the "S.E." zone appeared approximately equivalent to that of the "N.W." zone — by reason of the general geological and mineralogical similarities, in conjunction with comparative data contained in the 1958 assay plan — trenching of this section was not considered absolutely essential for this preliminary evaluation.

PRELIMINARY MINERAL ESTIMATES

By reason of the fractional recoveries obtained within softer, higher-grade sulphide sections, and the non-completion of any of the drill holes to the proposed depth — or higher-grade rim-section of the mineralized zone, the resulting individual and average assays may be taken as conservative estimates. Bulk-sampling, or 'BX' wire-line core sampling are evidently required for more specific information.

The indicated rim-length of the N.W. mineral zone (Fig. III) is approximately 300 feet. The average width of 35 feet, as computed on Fig. I — "E & L Trench Sampling", is considered more nearly representative of the actual average drill-hole cross-section than the calculated 27.1 feet on Fig. II — on the basis of the incomplete cross-sectional penetration of the majority of the diamond-drill holes.

On the basis of the foregoing preliminary assumptions, estimates of the tonnage-grade potential of the principal E & L showings follow:

(A) General Data:

Average grade to nearest 0.1%

" 0.70% Ni; 0.60% Cu

Assumed vertical depth = 700 feet

Assumed vol.-ton factor = 10 c.f. per ton

(B) Indicated Blocks

(1) Upper N.W. Zone:

Area; 35' x 300' = 10,500 sq. ft.

Tonnage-factor = 1,050 tons per v.f.

Potential ... ... 735,000 tons

(2) Lower N.W. Zone:

Area; 30' x 200' = 6,000 sq. ft.

Tonnage-factor = 600 tons per v.f.

Potential ... ... 420,000 tons

(3) S.E. Zone (at 50% of total):

Area; 40' x 220' = 8,800 sq. ft.

Tonnage-factor = 880 tons per v.f.

Potential ... ... 616,000 tons

Total, indicated 1,771,000 tons

(C) <u>Inferred Blocks</u>

(1) S.E. Zone (at 50% of total) ... ... 616,000 tons

(2) Intermediate, N.W. - S.E. Zones:

Area; 50' x 200' = 10,000 sq.ft.

Tonnage-factor = 1,000 tons per v.f.

Potential ... ... 700,000 tons

Total, inferred 1,316,000 tons

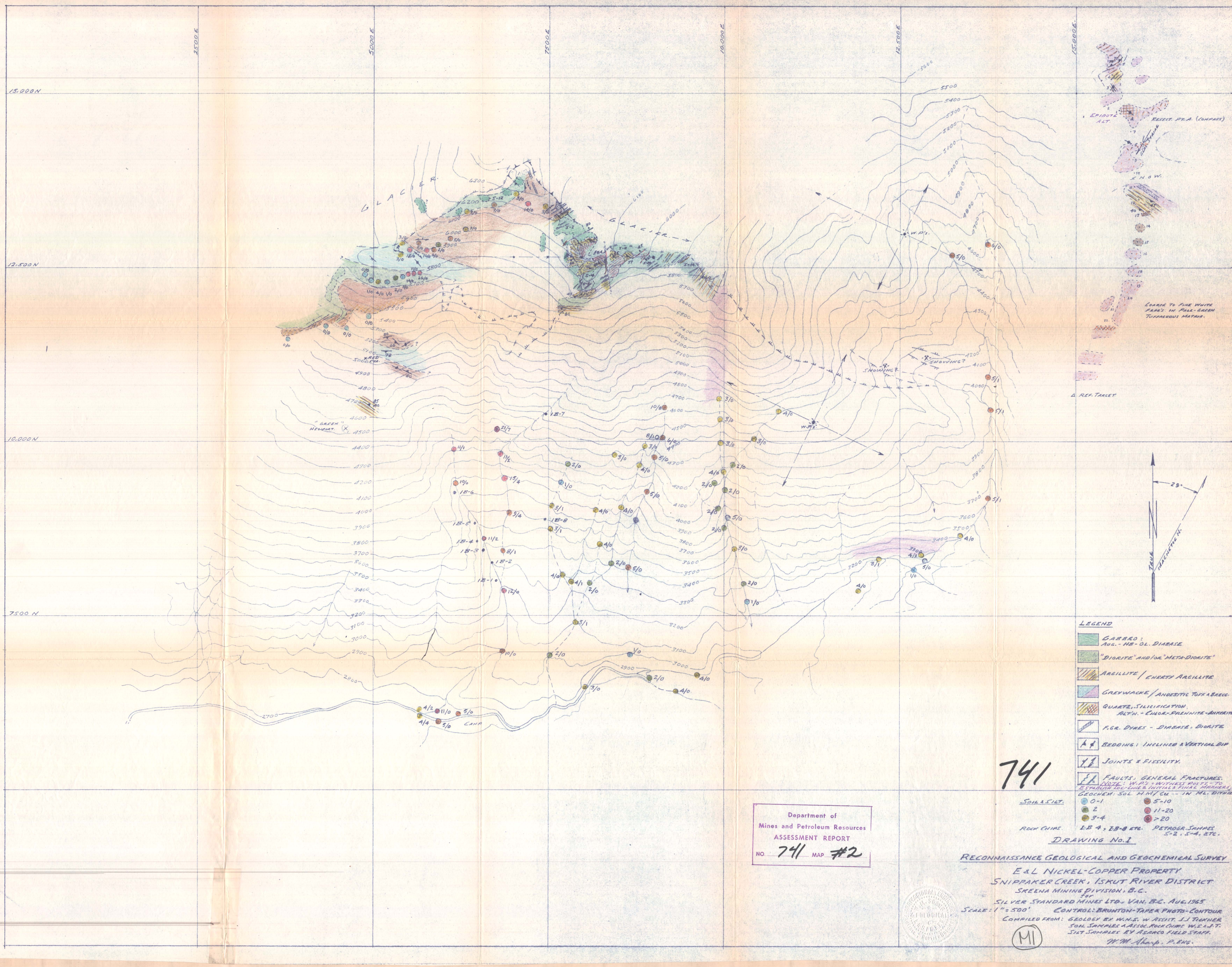
Total indicated and inferred 3,087,000 tons

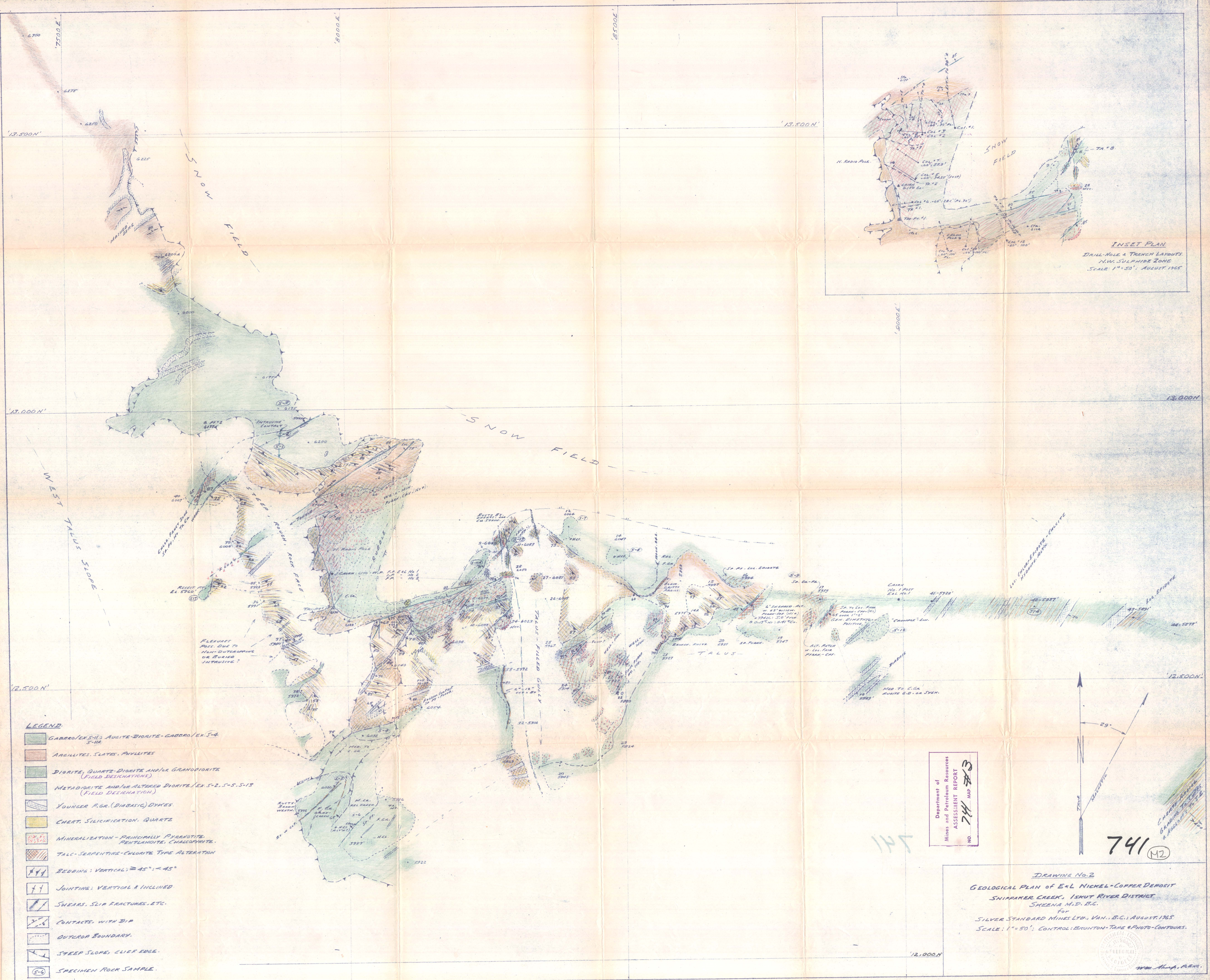
Respectfully submitted,

W.M. Sharp

W.M. Sharp
P. Eng.

WMS/hb


GLACIER
GLACIER
15,000 N
12,500 N
10,000 N
7500 N
2500 E
5000 E
7500 E
10,000 E
12,500 E
15,000 E
SHOWING?
SHOWING?
"GREEN" HELIPAT.
CAMP
LEGEND
GABBRO: AUG.-HB-OL. DIABASE.
"DIORITE" AND/OR "META-DIORITE"
ARGILLITE / CHERTY ARGILLITE
GREYWACKE / ANDESITIC TUFF & BRECC.
QUARTZ, SILICIFICATION, ALT'N. - CHLOR-PREHNITE-ANKERITE
F.GR. DYKES - DIABASE - DIORITE
BEDDING: INCLINED & VERTICAL DIP
JOINTS & FISSILITY.
FAULTS, GENERAL FRACTURES.
NOTE: W.P.'S = WITNESS POSTS - TO ESTABLISH LOC-LINE & INITIAL & FINAL MARKERS. (W.S.)
GEOCHEM: SOL. H.M/Cu -- IN ML. DITHZ
SOIL & SILT.
0-1
2
3-4
5-10
11-20
>20
ROCK CHIPS. I.B 4, I.B-8 ETC. PETROGR. SAMPES S-2, S-4, ETC.
741
DRAWING No. 1
RECONNAISSANCE GEOLOGICAL AND GEOCHEMICAL SURVEY
E&L NICKEL-COPPER PROPERTY
SNIPPAKER CREEK, ISKUT RIVER DISTRICT
SKEENA MINING DIVISION, B.C.
for
SILVER STANDARD MINES LTD. VAN. B.C. AUG. 1965
SCALE: 1" = 500'
CONTROL: BRUNTON-TAPE & PHOTO-CONTOUR
COMPILED FROM: GEOLOGY BY W.N.S. W ASSIST. J.J TICKNER
SOIL SAMPLES & ASSOC. ROCK CHIPS W.S. & J.T.
SILT SAMPLES BY ASARCO FIELD STAFF.
W.M. Sharp. P.ENG.
M1
Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 741 MAP #2



741 (M2)

DRAWING No. 2

GEOLOGICAL PLAN of E&L NICKEL-COPPER DEPOSIT
SNIPPAKER CREEK, ISKUT RIVER DISTRICT
SKEENA M.D. B.C.
for
SILVER STANDARD MINES LTD., VAN., B.C.; AUGUST, 1965
SCALE: 1" = 50'; CONTROL: BRUNTON-TAPE & PHOTO-CONTOURS.

W.M. Sharp, P.Eng.

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 741 MAP #4

LEGEND
W.P. = WITNESS POST, TO ESTABLISH PROJECTED LOCATION LINE AND INITIAL & FINAL LEGAL POINTS ON LINE

No 3
CLAIM MAP - E&L GROUP
(LIARD MINING DIVISION, B.C.)
held by
SILVER STANDARD MINES LTD. (N.P.L.)
SCALE: 1" = 500' DRAWN MARCH. 1966
REFS: - SKETCH PLAN OF GROUP @ 1" = 1000'
- DETAILED BRUNTON-TAPE CONTROL 1965
- 500-SCALE PHOTO-TOPOG. PLAN.
[signature] P.Eng.