

REPORT

ON

GEOLOGICAL AND GEOCHEMICAL
SURVEYS

ON

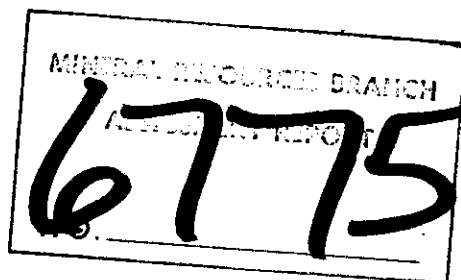
NANA, ROC MINERAL CLAIMS
KELOWNA, B. C.
50°01'N, 119°52'W
82L/4W and 82E/13W

FOR
"NAME CHANGE"

~~NICOLA COPPER MINES LTD.~~ BULLHEEK RESOURCES LTD.
630 - 510 West Hastings Street
VANCOUVER, B. C.
V6B 1L8

BY

GEAREX ENGINEERING



G. von Rosen, P.Eng.

December 7, 1977

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PLATES

Plate I Geology of Nana Roc Claim in back pocket

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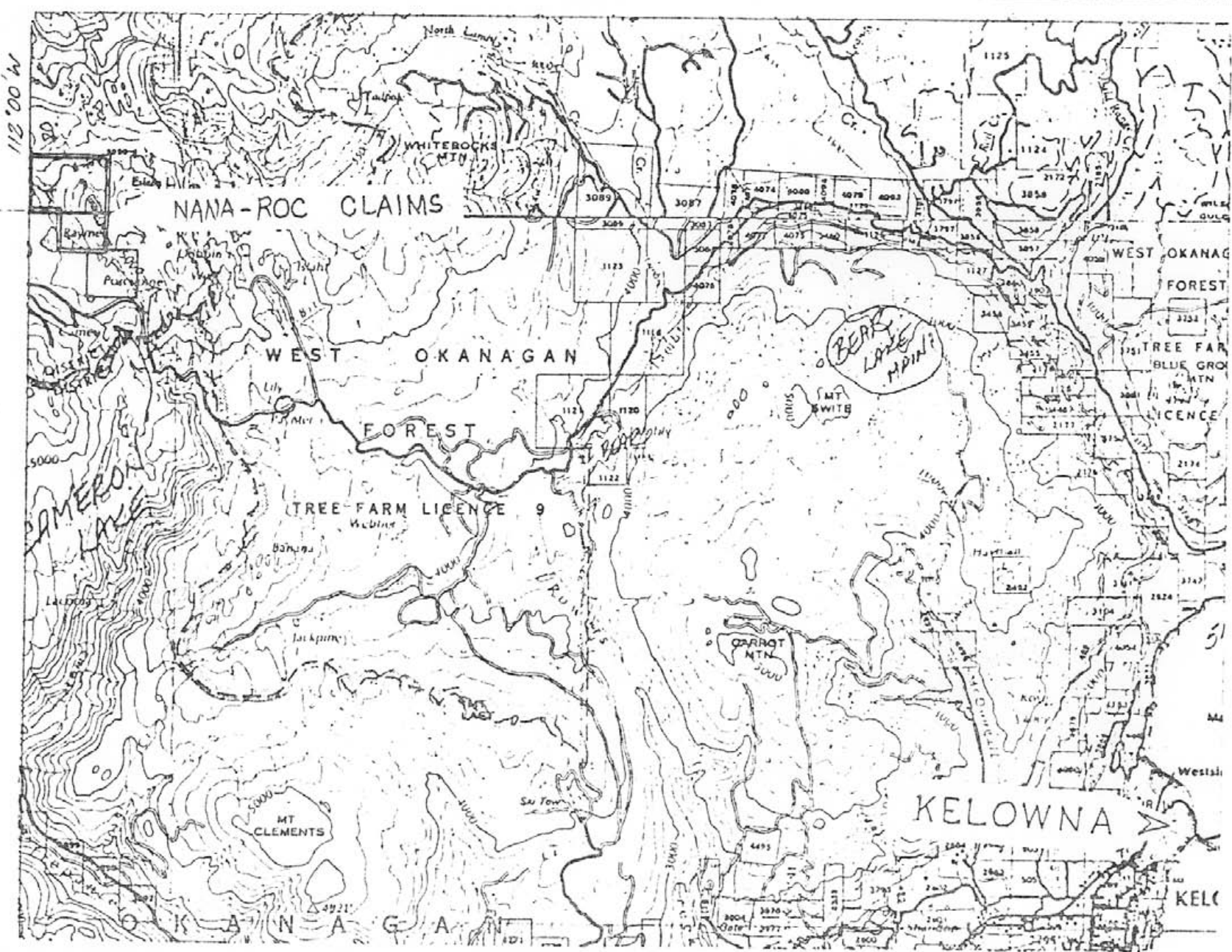
December 7, 1977

Nicola Copper Mines Ltd.
630 - 510 West Hastings Street
VANCOUVER, B. C.
V6B 1L8

Dear Sir:

SUMMARY

The Nana-Roc mineral claims cover a northwesterly trending sill of serpentized peridotite. Chromite exploration has delineated the outcrop area of the chrome-favourable host rock and confirmed the efficacy of soil chromite surveys. Further work is recommended using the recently found information to expand upon known chrome occurrences. The phased program would consist of Phase I mapping, trenching \$1,9000 and Phase II diamond drilling \$24,000.



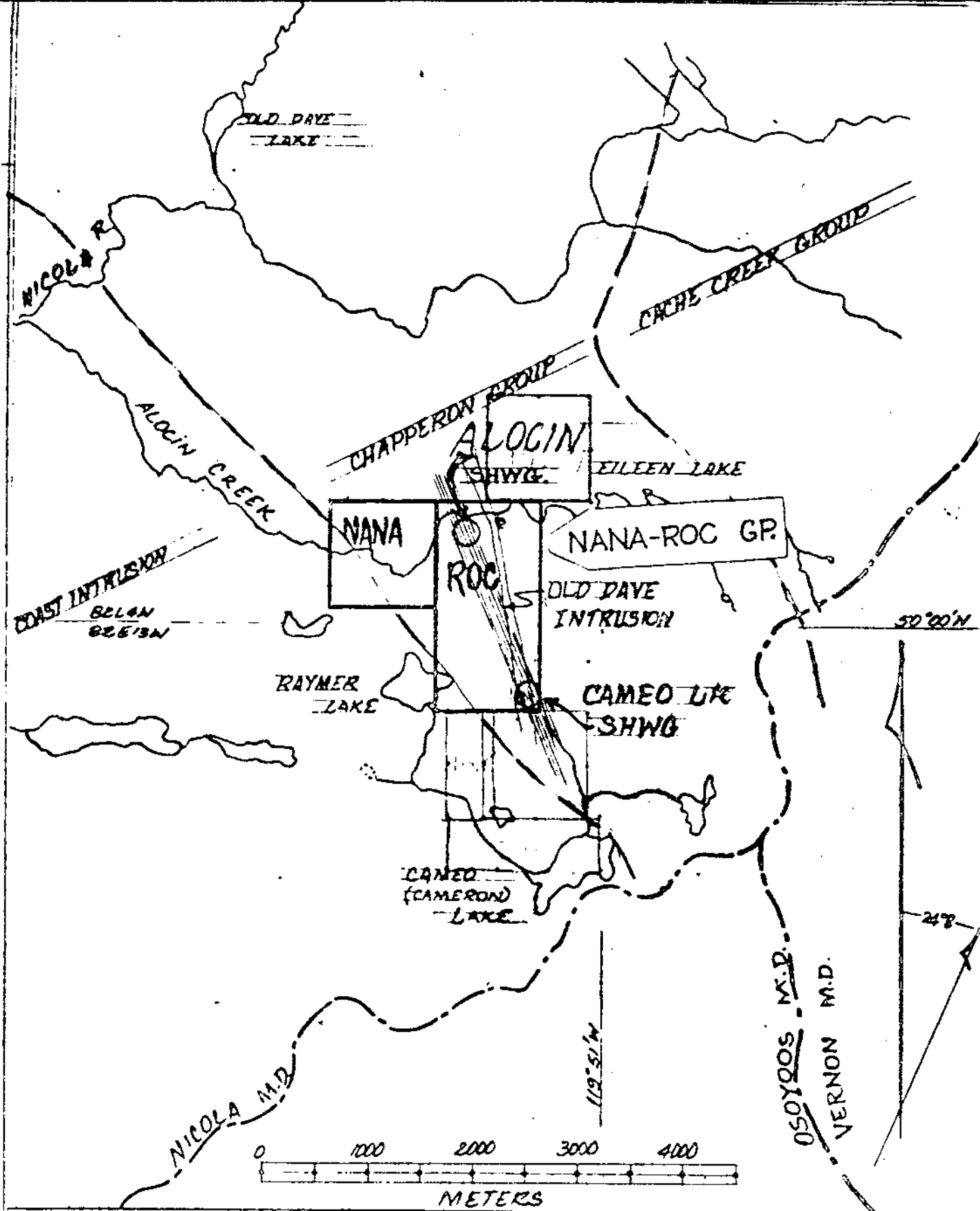
50° 00' N
118° 00' W



T 513

LOCATION MAP CHROME PROPERTY

Scale: 1:50,000
 0 1 2 3 4 5 6 7 8 9 10
 Kilometers
 0 1 2 3 4 5 6 7 8 9 10
 Miles



GEOLOGY FROM:
 D.S.L. MAP 1069A 1, VERNON
 BY: A.G. JONES

NICOLA COPPER MINES LTD (NPL)
CHROMITE PROPERTY
 BELOW B2E13W
 KELOWNA, B.C.

TO ACCOMPANY A REPORT BY
 GERHARD WYBESSE
 DEC 7th, 1979
 FIG 1B

LOCATION

49°59'N, 119°52'W, NTS 82E/13W. The property lies about 27 kilometers west of Kelowna bridge. To reach the claim by road, two-wheel drive transportation via 5 miles of paved west-shore road northerly from westside (Kelowna, B. C.) and then about 43 kilometers (27 miles) of very good gravel logging road to Cameo (also Cameron Lake) is used. There are numerous logging roads and trails through the claimed area.

CLAIMS

Nicola Copper Mines Ltd. owns by right of agreement title of 10 British Columbia staking units with the following particulars.

<u>Name</u>	<u>Units</u>	<u>Record No.</u>	<u>Anniversary</u>
Nana	4	266	June 17, 1978
Roc	8	269	June 23, 1978

Topography, Vegetation and Climate

The southern portion of Roc M. C. covers open burn country sloping to the south. Good outcrop exposures are to be found here. A forested ridge trends northerly through the center of ROC, rising to a crest and then falling into the Alocin Creek depression. Valleys paralleling the regional northwesterly grain of the topography tend to be swampy.

Precipitation in the area is moderate, the climate being that of the interface between moist coastal and dry interior. Snow pack remains until late spring due to the altitude.

HISTORY

Chromite discovery in this area was first described by Cairnes (1932). Stevenson (1941) describes the various showings in detail, and Jones (1959) expands on this by describing other subparallel ultramafic dikes. Trenches and test pits existing on the property at the present time appear to be the same ones Stevenson describes, in fact with the exception of some soil test pits on a picketed grid basis, the only work done on the property since pre-1941 seems to be the access road which extends the length of the property.

The property was staked recently as the "wolf" claim and subsequently dropped. This claim was restaked and the holdings were expanded to cover airmagnetic anomalies where they coincided with rock exposures.

Your company acquired the Nana-Roc claims this spring and proceeded to explore the chrome potential of the Nana-Roc claims.

GEOLOGY

The showing is well described by Cairnes in Vernon's memoir. The attached geological plan by the writer shows the layout of the pits. Cairnes (1932, p. 94A) writes:

"Interest in the Chrome-Vanadium group is centred chiefly on the occurrence of segregated chromite in a belt of serpentized peridotite which extends across Nicola valley in a general north 25° west direction. This belt was followed to the southeast of the river for over half a mile and in the opposite direction for about a mile and picked up again over a mile farther

northwest. In this total distance the belt maintains a remarkably straight course and apparently steep dip. On either side of Nicola river it has an observed width of about 400 feet and is doubtless somewhat wider, as its northeast contact is nowhere exposed. On the southwest side the belt is in contact with, and apparently intrudes, both granitic rocks and argillaceous sediments. In shape, structure and contact relations this belt resembles a broad dyke and such it is presumed to be."

"This chrome bearing dyke is composed mainly of dark green serpentine which commonly weathers a deep orange-red, but in places is coated instead with a thin, semi-transparent, whitish, talcose film. The serpentine has resulted from the alteration of an intrusive composed very largely of olivine. Microscopic studies reveal different stages of alteration ranging from those in which abundant small grains of olivine occur in a meshwork of serpentine to others in which no traces of unaltered olivine remain. Other minerals present include partly to completely altered crystals of pyroxene, talc, chlorite, magnetite, asbestos, chromite. The chromite is dark brown and almost opaque in thin section. It is an abundant constituent at one locality. At most other places the rock carries disseminated magnetite occurring either in crystals or in lumps and small, irregular streaks. At different places the serpentine was observed to contain small veinlets of cross fibre asbestos varying in thickness from that of a mere thread of 1/4 inch. Where shearing or slickensiding is pronounced, lenses of partly developed, slip-fibre asbestos have formed. In a comparatively narrow

steeply inclined belt of this sort, however, important deposits of asbestos are hardly to be expected. Small lumps and stringers of pearl grey, semi-transparent talc are abundantly scattered through some sections of the peridotite belt."

"The principal discovery was made less than 100 yards southeast of, and a few feet above, the left bank of the river, at a point nearly 450 feet from the southwest contact of the serpentine belt. Here a small segregation of high-grade chromite ore was discovered, apparently mostly dug out. It occurred in part as closely spaced kidneys of chromite 1/2 inch to one inch in diameter, and in part as a heavy dissemination of small, granular aggregates occupying up to 75 per cent or more of the rock volume. The enclosing rock is a dull green, massive, partly serpentinized dunite in which some further alteration to talc and chromiferous chlorite has occurred. Little or no magnetite appeared to be present. Though not of itself economically important, this discovery suggests the possibility of other occurrences in this serpentinized belt. Little clue is furnished as to where to look for such deposits. The rock in the belt is a type that under favourable conditions might prove a valuable source of both chromite and asbestos and, perhaps, rarer minerals such as platinum. The belt should, consequently, be followed in both directions and particular attention paid to it at places where it either widens materially or changes in its general structure or appearance."

Stevenson (1941) in his preliminary report on the "Chrome Ridge" describes the situation as follows:

"The topographic features of the immediate vicinity are two low, round topped hills separated by the westerly-flowing camp-creek. Both the elongation of the individual hills and the line joining the two hills, trend in a direction north 20 degrees west; this direction represents the trend of an underlying belt of serpentized rock. In relief, the northerly hill is 240 feet above the creek and the southerly one 500 feet above it. The slopes are gentle except for a few low bluffs on the east side of the south hill. Open woods of jack-pine and pine grass grow on the hills.

This occurrence consists of several small lenses of chromite, ranging from dimensions of 9 feet by 13 inches to 6 inches by 2 inches, in serpentized dunite. The dunite forms a belt approximately 600 feet in width that strikes north 25° west. The belt extends from Cameo Lake on the south to the north limit of the showings on this property, a total known distance of approximately 3-1/2 miles. Cairnes (1931,p.94) thinks that this belt comprises a steeply dipping dyke that intrudes both granitic rocks and argillaceous sediments. Weathered surfaces of the serpentine are a slightly reddish, buckskin colour, but freshly broken surfaces are dark olive-green to black. Mineralogically, the serpentized dunite consist chiefly of olivine; grains of magnetite and chromite occur disseminated through the mass. Short stringers of talc, up to 1/4 inch in width and some slip-fibre asbestos were noted.

The chromite occurs in disconnected lenses of mineral aggregates. In the smaller lenses the chromite is fairly massive and gangue is not abundant;

however, in the larger lenses the gangue increases and the chromite consists usually of scattered grains. At one place, No. 1 open-cut, much of the chromite occurs as smoothly-rounded 1/2 inch globules of chromite within the silicate gangue; this type of chromite has been called "grape" or "bean" by Johnstone (1936, p.422). In the largest (9' x 13") lens the chromite ranged from 25 to 75 percent of the lens matter. Assays taken across lens widths range from Chromite oxide (Cr_2O_3), 23.6 to 30.8 percent.

A chemical analysis of high-grade material carefully cleaned by the use of a magnet followed by separation in heavy liquids is shown under the heading CHROME - IRON ratios.

"The workings consist of open-cuts, small pits and surface strippings. In the vicinity of the workings the rock is well exposed and stripping of moss has sufficed for most of the prospecting.

For descriptive purposes, the position of the workings will be referred to the camp-cabin; approximately 100 feet north of the creek. The elevation of the cabin is approximately 4,630 feet and the elevations of the workings will be referred to this figure. There are two main groups of workings, one on a hill south from the cabin and a second group on a hill northerly from the cabin. Those on the southerly hill will be described first.

No. 1 working, elevation 4,630 feet and 300 feet south 12 degrees east from the cabin, is an open-cut that has been driven downwards on a 25° slope in a direction south 12° east for 18 feet to a 5 foot face. The floor of the cut exposes a lens of chromite, strike north 12° west, that measures

5 feet in length by 18 inches in width at its widest part. The proportion of chromite to gangue varies considerably. A sample taken across the 18 inch width assayed: Chromite oxide (Cr_2O_3), 23.6 percent.

No. 2 elevation of 4,650 feet, is 108 feet south 35° west from No. 1. It is a stripping that exposes three areas of chromite that measure 8 inches by 6 inches, 4 inches by 2 inches and 2 inches by 2 inches, respectfully.

No. 3 elevation of 4,665 feet and 240 feet south 25° west from No. 2, is a combined small pit and stripping. The south side of the pit exposes a lens, strike north 20° west of fairly massive chromite that measures 9 feet long by 13 inches wide in its widest part. A sample taken across a 12 inch width assayed: Chromic oxide (Cr_2O_3), 25.6 percent. At a point 4 feet southerly from this lens a second one, measuring 6 inches by 2 inches is exposed and, 3 feet southerly from this a third lens measuring 6 inches by 2 inches, is exposed.

No. 4, a small pit at an elevation of 4,670 feet, is 33 feet south 4° west from No. 3. The south side of this pit exposes a chromite lens 4 feet long by 1 foot wide. Within a radius of 10 feet, ten smaller lenses outcrop, the dimensions of these lenses are as follows: 12 inches by 2 inches, 3 feet by 6 inches, 2 feet by 1 foot, 18 inches by 6 inches, 8 inches by 4 inches and five others from 4 to 6 inches by 1 inch, in diameter. In general, these lenses strike north 20° west, paralleling the strike of serpentine belt.

No. 5, at an elevation of 4,630 feet and 70 feet south 20° east from No. 4, is a pit 4 feet in diameter by 3 feet deep. The south side of the pit exposes a vertical chromite lens, strike north 50° west, that is 5 feet

long by 18 inches wide and 3 feet in a vertical dimension. A sample taken across the 18 inch width assayed: Chromic oxide (Cr_2O_3), 30.8 percent.

No. 6 working is the result of a small amount of hammering at an exposure of two chromite nodules in the face of an easterly-facing bluff at a point 15 feet below its rim. This place, elevation 4,980 feet is 2,200 feet south 29° east from No. 5 working. One nodule of solid chromite measures 9 inches in diameter, and the other 4 inches above, measures 6 inches by 4 inches.

The workings on the hill northerly from the camp cabin consist of one open-cut and two small blasted areas. No chromite was seen in these workings. However, on the east side of the ridge at a point southerly from the workings, one small area of chromite, measuring 2 inches by 1 inch was seen.

Jones (1959, p. 154) further adds with the benefit of further mapping.

"The sedimentary rocks in which the peridotite dykes appear are members of the Chapperon group and extend as a narrow belt towards the northwest. Since Cairnés' report many other showings of the serpentized peridotite dykes (Old Dave intrusions) have been discovered along the belt. A little asbestos occurs in some of these rocks but no chromite segregations comparable to those of the Chrome-Vanadium claims have been seen. At the north end of the belt of Chapperon rocks the age of the peridotite dykes is indicated as pre-Cache Creek by the Salmon River unconformity. Ultramafic

rocks are known elsewhere in the map area but in every place they intrude rocks that are older than the Cache Creek group. The search for deposits in rocks of this type should therefore be confined to areas underlain by members of the Chapperon, Mount Ida, or Monashee groups.

DESCRIPTION: 1977 Exploration ProgramGrid

The northwesterly trending "dike", essentially the area of known chrome interest on the property, was known to consist of strongly magnetic ultra-mafic rocks. Hence the control grid had to be laid out with two subparallel baselines trending parallel with the "dike", eg. at 324° - 144° Azimuth. The end points of the baselines were 'picked' from topographic maps and compass bearings corrected 2-3 times during their 3000+ meter extent. Accurate slope chainage was established on these base lines with 5000 m.N. being the starting point at the Alocin Creek ford. (close to the Alocin creek chromite showing) A slope chained cross line "5000 N" was run from this 4000E Base line, exactly 1000 meters @ 234° Azimuth and 5000N 3000E was thereby established. The remainder of the grid was then put in using the loop method, with rule-of-thumb slope correction. Intercepts were recorded and the basic grid plan was constructed from this field information. A detail of 25 meter spaced lines and 15 meter stations was constructed over the Alocin showing.

Ground Magnetic Survey

Using a Scintrex MF 1 portable fluxgate magnetometer was used looping the lines and tying into base line stations. Readings, taken every 25 meters in "flat" magnetic terrain, were filled in along the edges of magnetic relief. Data was then time-corrected for drift and the values plotted and contoured. The Alocin showing was detailed. (cf. Crosby, December 1977)

Geochemical Survey

The total chrome prospective grid area was soil sampled using an army entrenching tool. The brown B layer was reached, where possible, and the

soil sample placed in a standard soil sample bag bearing the felt pen-written number of the station.

In order to judge the efficacy of chrome soil sample analysis a portion of the collected samples was analyzed, using the 80 mesh fraction. A major company collected samples over a traverse across the Alocin showing and analyzed both the 80 mesh, and the -80 + 30 fractions.

Geological Mapping

The mapping by the writer consisted of generally following outcrop areas and tying their boundaries down by the grid cross-line intercepts. Type specimens were taken, rock types described, and their boundaries mapped. Even more careful mapping was done in those areas where magnetic anomalies and their outcrop source were hidden by overburden, in the hope of finding "frost heaves" or other signs of near surface outcrops.

RESULTS: 1977 Exploration Program

Ground Magnetic Survey

A magnetic intensity ridge, with a 10,000+ gamma relief over the surrounding undulating (200 to 300 gamma) terrain, has readily outlined the magnetic rocks. Crosby (Dec. 1977) interprets the results in his report.

Geochemical Survey

The results, Figs. 2 and 3, show definite soil chromite content to coincide with the outcrop or near surface expression of the chromite bearing serpentinized peridotite and pyroxenite assemblages found in the "dike" or erstwhile "sill" which forms the "chrome ridge". Assaying of soils taken from the "granite" terrain, away from the ridge is expected to produce very low results in chrome, and certainly the coarser fraction of the soils should

MAGNETIC SURVEY

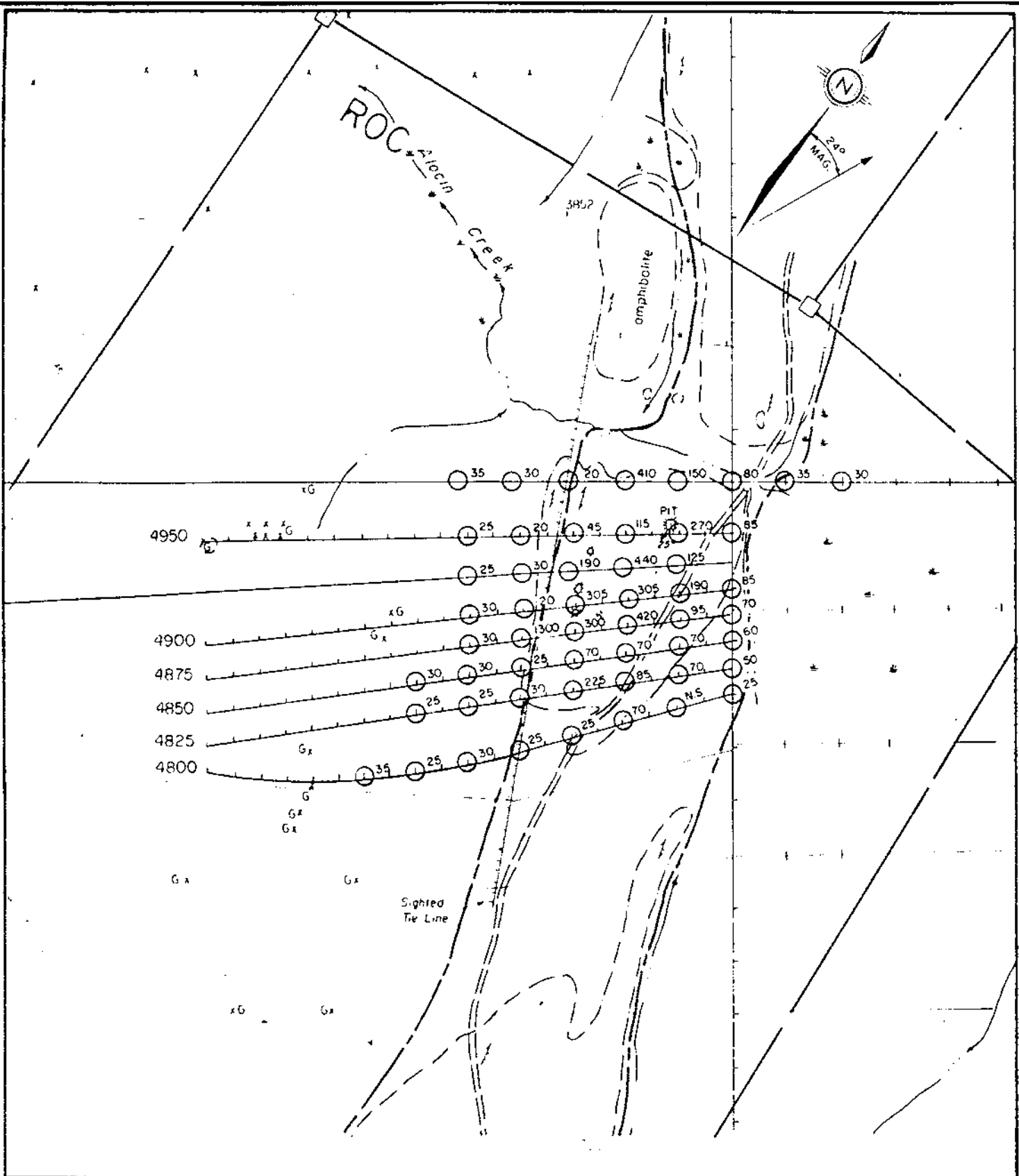
The magnetometer survey completed over portions of the ROC and NIC mineral claims has outlined in great detail the presence of a ultra-mafic "dike-like" intrusive located along the eastern edge of the claim group.

The observed magnetic anomaly measures about 1500 to up to 10,000 gammas above the magnetic background. The symmetry of the positive anomaly and the amplitude of the flanking negative suggests that its source is a steeply dipping basic rock extending vertically to at least 1000 feet.

Since chromite is found only in ultra basic rocks, the chromite potential in the area is limited to the rocks outlined by the magnetic survey.

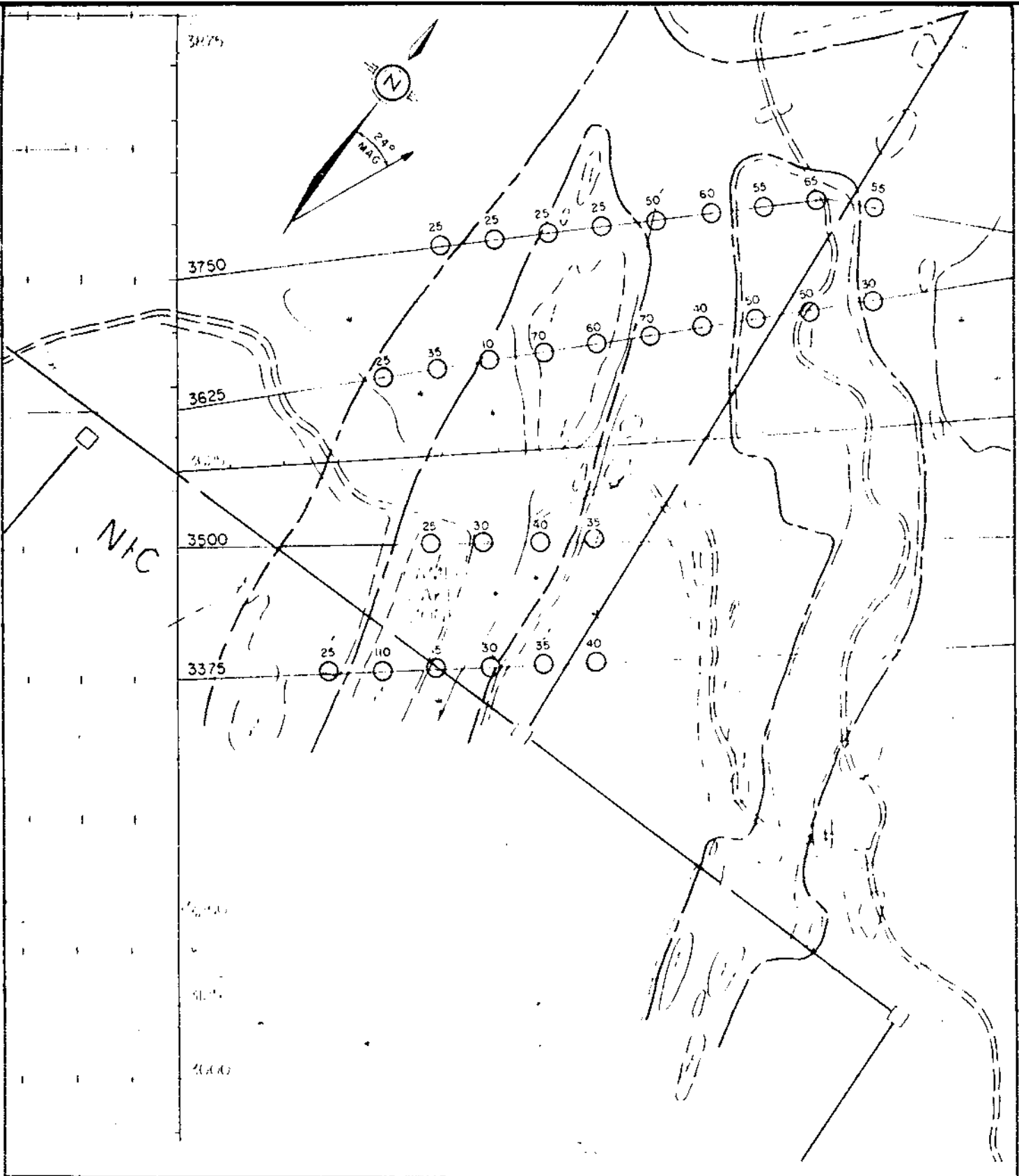
Respectfully submitted,

RICHARD O. CROSBY, P.Eng.



NICOLA COPPER MINES LTD. (NPL)
 SOIL CHROME CONTENT
 -80 MESH
 ALOCIN ZONE
 GEAREX ENGINEERING
 VANCOUVER, B.C.

FIGURE 3
 DEC. 1977



NICOLA COPPER MINES LTD. (NPL)
 SOIL CHROME CONTENT
 -80 MESH
 CAMEO ZONE

GEAREX ENGINEERING
 VANCOUVER, B.C.

FIGURE 4
 DEC. 1977

contain very locally derived chrome and thus show sharper anomaly curves. Following are comparative soil chrome analyses taken from fine and coarser soil fractions. The coarser fraction does contain less chrome, but whether the definition of relief is any better than the fine fraction is at present difficult to say because of the relatively high chrome content in all samples.

Chrome Content in Soils

<u>Station</u>	<u>Parts per Million Chromium</u>		<u>Ratio</u> <u>(-80)/(-80+30)</u>	
	<u>-80 mesh</u>	<u>-80 +30 mesh</u>		
0 + 00NE	430	50	8.6)
0 + 15	1050	490	2.1)
0 + 30	900	156	5.8)
0 + 45	225	64	3.5)
0 + 60	800	112	7.1)
0 + 75	1300	365	3.6)
0 + 90	1000	225	4.4)
1 + 05	1400	360	3.9)
1 + 20	950	128	7.4)
1 + 35	2000	220	9.1)
1 + 50	350	70	5.0)
1 + 65	590	108	5.8)
1 + 80	530	74	7.2)
1 + 95	400	62	6.5)

Arithmetic
average over
14 =
5.7

Note: analysis by Chemex Labs Ltd. #42414
perchloric acid extraction.

Geological Survey

The 1000 meter long, 250 meter wide outcrop of ultramafic rocks is now a strongly sheared, with scaly foliation parallel to the length, body of serpentine-rich rock which in several localities contains concentrations of chromite. Originally, as seen from less altered and sheared, coarser sections, the body of rock was a layered deposit. The layering, lensing in some cases, consists of banding parallel to the near vertical dip of

the rocks, of layers of different concentrations of pyroxene and olivine (figure 4). This situation reminds the author of gravity crystal segregation or fractionation. Furthermore, mapping suggests that this ultrabasic "dike" is actually a "sill" because it appears to lie parallel to the lithologic banding and foliation of the "country" Chapperon metamorphics. These now are in an up ended condition, dipping near vertically.

Contact relations of the sill, on a larger scale are sharp and definite, in detail however, they are definitely defined as slivers and lenses intruded between layers of foliation within the Chapperon "schists". This lensy occurrence follows from 30cm x 50cm lenses, and smaller, to 5 meter x 10 meter pods with a definitely lenticular outline.

Serpentine alteration is not the same everywhere; while some areas weather to a greenish blue, others take on a buff brown appearance.

Grain size of the ultrabasics is generally almost traplike, but in some areas pyroxene masses of 3mm crystal length can be found.

The grid area covers a slice of Chapperon metasediments, limestone, quartz mica schist, gneissic rocks, and well-foliated amphibolite which occurs in various grain sizes. The ultrabasic sills occur en echelon, subparallel, and branching in the south of the grid, and as a single large unit in the north.

Granitic intrusives occur to the west of the ultrabasics and appear to have a vertically foliated septum of amphibolite between them. As the "granites" acquire a foliated grain (parallel to the sill and the regional grain) and

also become gradationally darker (eg. closer in resemblance to foliated amphibolite), it is difficult to say that the sill does not touch or possibly, even intrude the "granites". The writer's impression is that the granites cut the assemblage of Chapperon and Old Dave intrusions, estimating from the regional geological map. Thus judging the Old Dave to be younger than the Chapperon but older than the "granites".

MINERALIZATION AND ASSAYS

Chromite occurs in various modes within the "sill". Nodular or "bean" chrome, also called "leopard" chrome, has been found in the main Alocin pit, (Stevenson's #5), 4.910N, 3.850E, as well as in more disseminated fashion at the Ford pit, Stevenson's #1 working, 4975N, 3960E.

Massive chromite, having no grain or crystal structure visible to the naked eye, has been worked in the main pit and vicinity, and in small pods and massive veins, elsewhere on the property, including the south Cameo bluff zone.

The Cameo Bluff zone contains distinctively layered, schlieren and disseminated, as well as globular chromite crystal aggregations, which in some cases cause the brown weathered surface of the dunite host rock to acquire a peppered black color.

Results of assays from the various sources, taken by different authors are summarized as follows:

TABLE OF ASSAYS

<u>Sample No.</u>	<u>Source</u>	<u>Location</u>	<u>Type</u>	<u>Cr %</u>	<u>Cr₂O₃%</u>
727	vR	Alocin M.P.	massive	26.37	38.54
728	vR	Alocin M.P.	nodular	24.18	35.13
729	vR	Alocin M.P.	asbestos	23.18	34.14
126.1	Pt	Alocin M.P.	3'E. Wall	2.23	3.26
126.2	Pt	Alocin M.P.	3'+Min. Zone	29.36	42.91
126.3	Pt	Alocin M.P.	3'W. Wall	0.53	0.77
No. 1	St.	Alocin #1	.5m x 1.5m	16.15	23.6
No. 3	St	Alocin #3	.3m x 2.7m	17.52	25.6
No. 5	St	Alocin M.P.	.5m x 1.5m	21.07	30.8
730	vR	Cameo	dissem.	0.80	1.17
731	vR	Cameo	vein, mass.	27.04	39.52
125.4	Pt	Cameo	dissem, 5.4m	0.85	1.24

Chrome: Iron Ratio

Ratios are here tabulated from different sources of samples "cleaned" of magnetite as noted:

	A	B	C	D
Cr ₂ O ₃	52.0 MET	47.6	31.81	39.52
Al ₂ O ₃	15.1	11.7	11.88	10.30
Ca O	0.3	0.97	0.31	nd
Mg O	12.8	16.06	19.92	nd
Mn O	0.21	nd	nd	nd
Ti O ₂	1.20	nd	nd	nd
Si O ₂	2.56	7.2	10.71	nd
Ni O	0.10	nd	nd	nd
Fe O	14.1	11.7	17.95	17.36
Fe ₂ O ₃	nd	nd	nd	24.82

Note:

- a) Analysis A, B, C, D is quoted from Stevenson, Dept. of Mines 1941, who took high grade material, carefully cleaned it by the use of a magnet followed by separation in heavy liquids and had it analyzed.

Note: cont'd

- b) Analysis B, was run by Chromasco (Canada) Ltd. from high grade material off the main Alocin pit.
- c) Analysis C, was run by Chromasco (Canada) Ltd. from high grade material from the South Cameo zone.
- d) Analysis D, is from a high grade sample taken at the South Cameo zone. This sample was not beneficiated at all, ie. the normal assay pulps were run to arrive at the chrome iron ratio.

U. S. NATIONAL STOCKPILE
PURCHASE SPECIFICATIONS

Grade	Cr:Fe	Cr ₂ O ₃	Fe(max)	SiO ₂ (max)	S(max)	MgO	P	CaO	Al ₂ O ₃
Metallurgical	3:1	>48%	-	≤ 8.0	0.08	-	0.04	-	-
Refractory	-	~31%	12%	≤ 6.0	-	?	-	1.0	-
Chemical	1.6:1	~44%	-	≤ 5.0	-	-	-	-	-

Handwritten notes:
 Metallurgical: *handwritten*
 Refractory: *handwritten*
 CaO: *1.0*
 Al₂O₃: *1.0*
 S(max): *0.08*
 P: *0.04*
 MgO: *?*
 Fe(max): *12%*
 Cr₂O₃: *48%*
 Cr:Fe: *3:1*
 SiO₂(max): *8.0*
 Chemical: *1.6:1*
 CaO: *1.0*
 Al₂O₃: *1.0*
 S(max): *0.08*
 P: *0.04*
 MgO: *?*
 Fe(max): *12%*
 Cr₂O₃: *44%*
 Cr:Fe: *1.6:1*
 SiO₂(max): *5.0*

CONCLUSIONS

"Chromite ridge" consists of a serpentinized peridotite pyroxenite sill termed Old Dave ultrabasics, which appear to intrude Chapperon metamorphic rocks between banding and foliation. Younger granitic intrusions cut the Chapperon - Old Dave assemblage.

Chromite in forms varying from disseminations of individual grains, to coalesced schlieren, to "blobs" and lenticles, to massive high grade lenses, containing a "bean" or "leopard" chrome, have been identified, test pitted and mapped.

The origin of the "sill" could be postulated as having formed in a quasi horizontal manner, by intrusion of semi plastic magma between metasediments, and fractional crystallization upon cooling, thereby causing the layering of olivine, pyroxene, chromite and magnetite crystals. Certain thicker sections of the dikes could therefore have denser and more voluminous segregations of chromite.

Exploration to date has outlined the sill via geology and magnetics. In those areas where outcrop is not bare, only stripping and trenching, or geochemical prospecting, indicate the tenor of chrome below the overburden. Geochemical sampling has proven successful, in delineating known mineralized areas.

Assays of samples taken from the newly-found Cameo zone, indicate the widespread occurrence of chromite in the area defined by the geochemical results of the test survey. The same applies to the Alocin zone, however not enough detail exploration has been carried out to actually delineate the chromite occurrences on surface and at depth.

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von Rosen, G., June 28, 1977, Chromite Potential: Nana, Roc Mineral Claims.

MAGNETIC SURVEY

The magnetometer survey completed over portions of the ROC and NIC mineral claims has outlined in great detail the presence of a ultra-mafic "dike-like" intrusive located along the eastern edge of the claim group.

The observed magnetic anomaly measures about 1500 to up to 10,000 gammas above the magnetic background. The symmetry of the positive anomaly and the amplitude of the flanking negative suggests that its source is a steeply dipping basic rock extending vertically to at least 1000 feet.

Since chromite is found only in ultra basic rocks, the chromite potential in the area is limited to the rocks outlined by the magnetic survey.

Respectfully submitted,

A handwritten signature in cursive script that reads "Richard O. Crosby". The signature is written in black ink and is positioned above the printed name.

RICHARD O. CROSBY, P.Eng.

ADDENDUM

The following revised cost estimate is based upon completion of the geochemical assaying. Results of this Survey are shown on Plate 2.

REVISED COST ESTIMATE FOR RECOMMENDED PROGRAM

Phase I

1. Finishing Geochemical Survey

a) Labour, etc.

b) Analysis

Completed

2. Rock Trenching

a) Labour \$12,000

b) Equipment rental 3,000

c) Geology 3,500

Total Phase I

\$18,500

Phase II

Diamond drilling targets based on geochemical results.

21 holes @ 50 meters

Total Phase II

63,000

Total Phase I & II

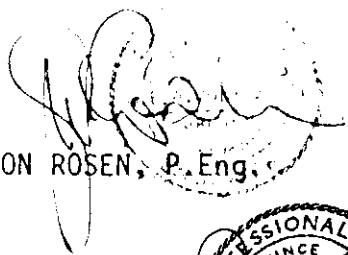
\$81,500

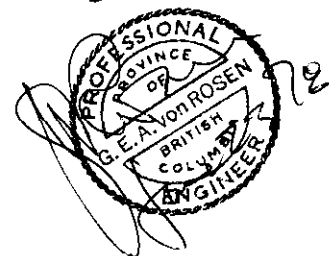
CERTIFICATE OF QUALIFICATIONS

I, Gerhard Ernst Alexander von Rosen, of the City of Mission, British Columbia, hereby certify as follows:

1. I am a consulting geologist with offices at 422 - 510 West Hastings Street, VANCOUVER, B. C. V6B 1L8
2. I am a registered Professional Engineer of British Columbia. I graduated from the University of British Columbia in 1962.
3. I have practiced my profession for fourteen years.
4. I have no direct or indirect interest nor do I expect to receive any in the mining property described in this report, or in the securities of Nicola Copper Mines Ltd. (N.P.L.)
5. I base this report on my personal examinations of the property as described under the heading: Description: 1977 Exploration Program and other sources listed in the references.
6. I consent to the use of this report in, or in connection with a Prospectus, or in a Statement of Material Facts.

DATED at the City of Vancouver, in the Province of British Columbia, this *7th* day of December, 1977.


GERHARD VON ROSEN, P. Eng.





NICOLA COPPER MINES LTD.
AM CAN NUCLEAR CORP. (SUBSIDIARY)

STE. 616, 510 WEST HASTINGS STREET, - VANCOUVER, B.C. - V6B 1L8 - (604) 681-3551

July 22, 1978

Cost Statement for Kelchrome Group mineral claims, Kelowna, B.C.

Grid. 44 Kilometers

Magnetometer Survey 44 Kilometers, 2000 Mag Readings

Geochemical Survey 880 Soil Samples.

Total Cost \$9863.44

Labour Costs.

Nick Rebelski July 31, -- Sept 8, 1977 39 days @ \$90.00/day = \$3510.00

Glenn Clark July 31, -- Aug 13, 1977 14 days @ \$55.00/day = \$770.00

Dan Pasche July 31, -- Aug 14, 1977 13 days @ \$55.00/day = \$715.00

R. Sheldrake Geophysicist, Aug 24/77 1 day @ \$300.00 = \$300.00

G. Von Rosen Geologist, Sept 1--3th, 7 days = \$1,775.00

Total \$7070.00

Food & Accomodation.

3 Men July 31 to Aug 14/77 15 days @ \$18.00/day = \$810.00

1 Man Aug 15 to Sept 8/77 24 days @ \$18.00/day = \$432.00

Tax \$ 6.44

Total 1,248.44

Transportation

Truck Rental, July 29 to Sept 10/77 \$512.36

Gasoline, Oil, etc \$148.23

Airfare \$66.81

Total \$727.40

Equipment Rental

Scintrex M.F.1 Magnetometer.

July 30, to Aug 14, /77 @ \$12.00 per day = \$180.00

Tax \$ 12.60

192.60

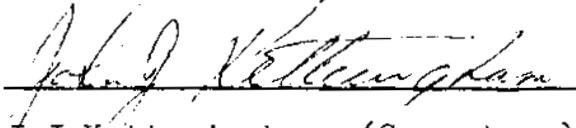
Cost of Report

Report by Gearex Engineering,

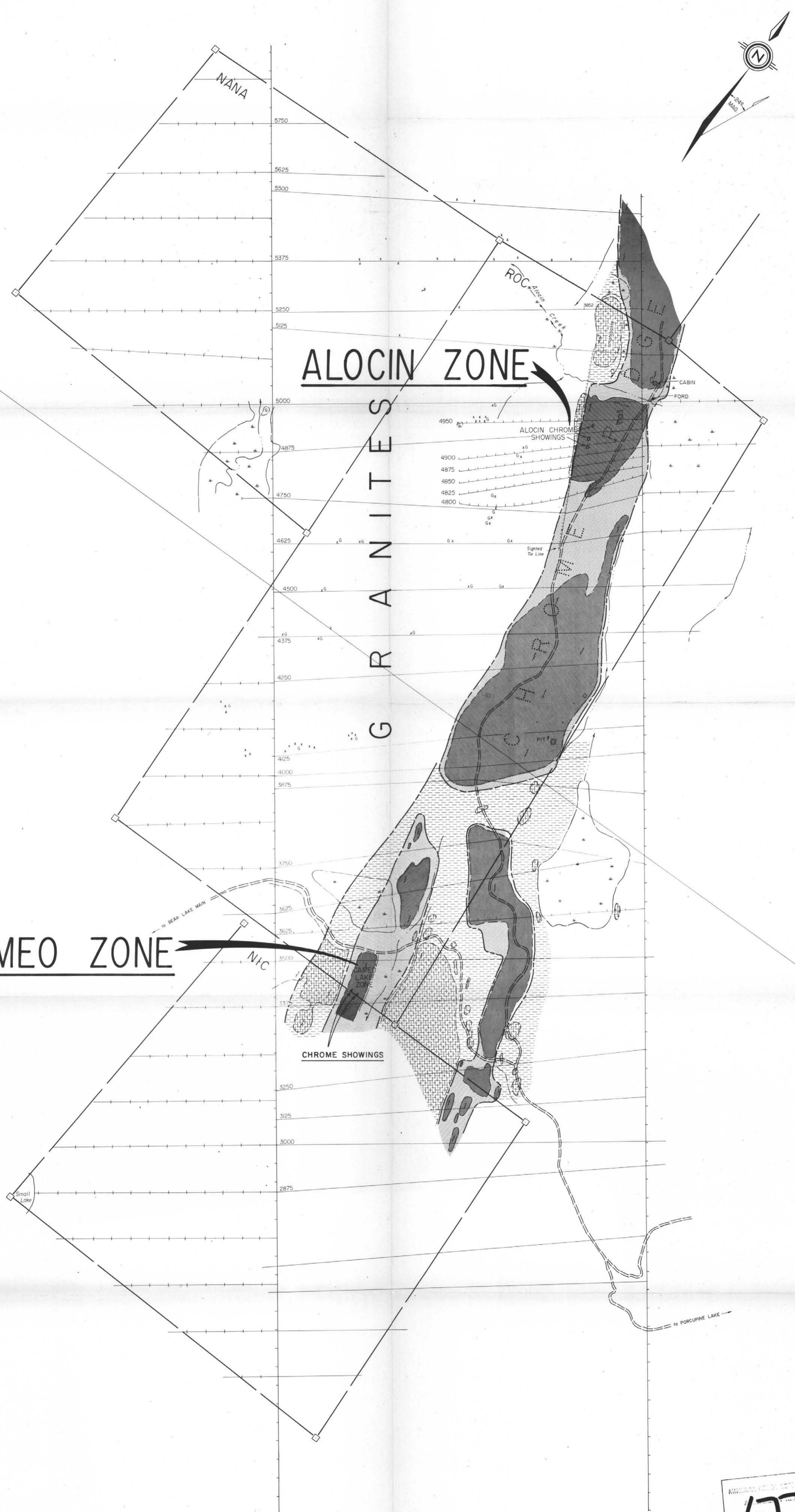
\$625.00

Total Cost

\$9863.44


J.J. Ketteringham (Secretary)

Buccaneer Resources Ltd

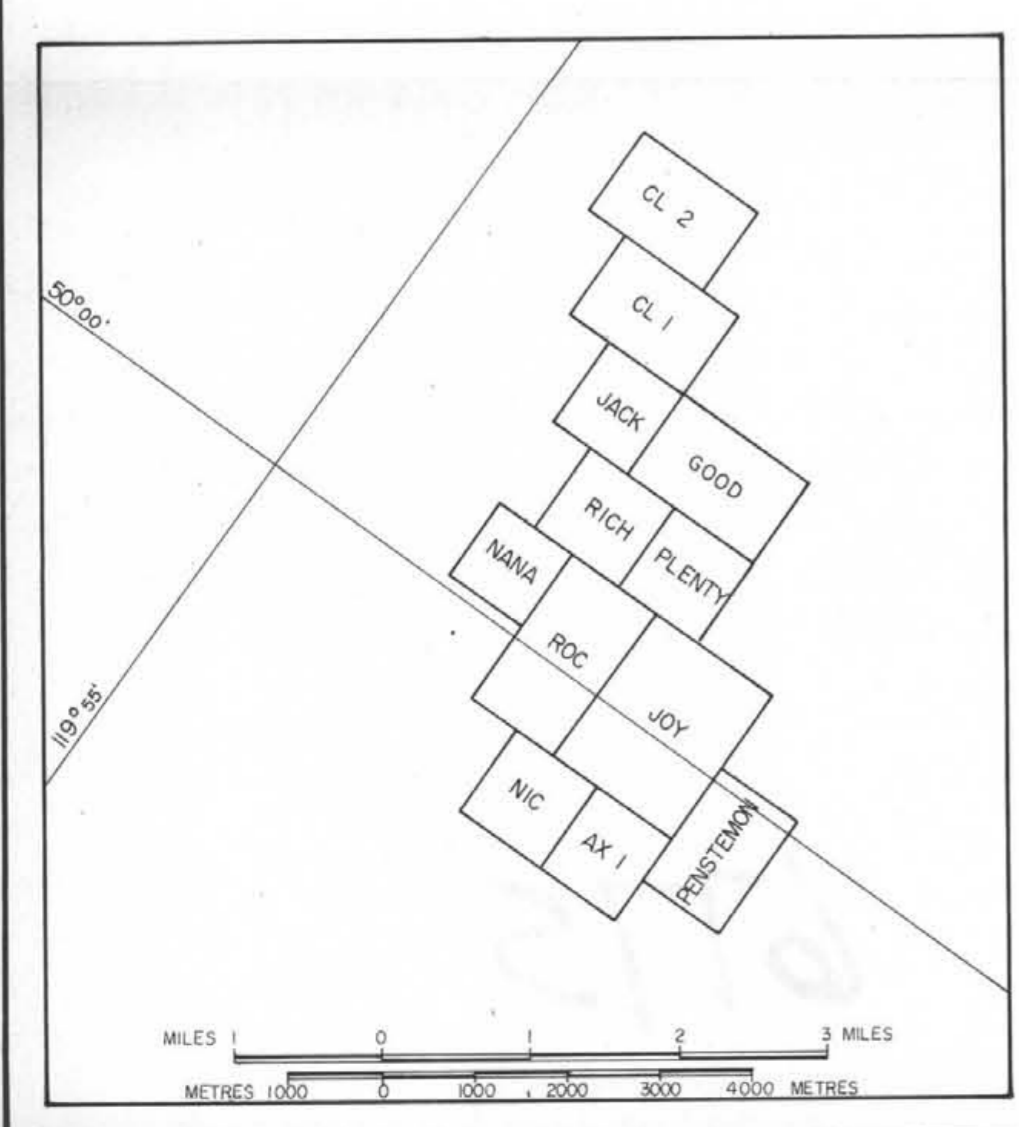


CAMEO ZONE

ALOCIN ZONE

GRANITES

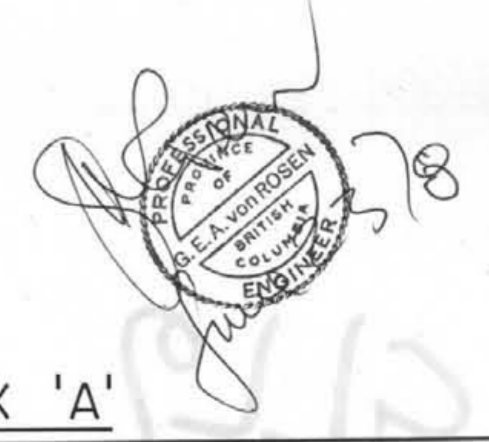
CHROME SHOWINGS



- LEGEND**
- outcrop area CHAPPERON - meta sediments
 - inferred CHAPPERON - meta sediments
 - outcrop area OLD DAVE - ultramafics
 - inferred OLD DAVE - ultramafics
 - GEOLOGICAL CONTACT
 - OUTCROP AREA
 - SWAMPY STREAM
 - SCHISTOSITY, DIP
 - x x OUTCROP GRANITE

To ACCOMPANY GEOLOGICAL, GEOCHEMICAL
REPORT ON NAN-ROC CLAIMS
KELOWNA B.C.
1977
G. von Rosen
P. Eng.
Dec 7, 1977.

MINERAL SURVEY OF CANADA
NO. 6775



APPENDIX 'A'

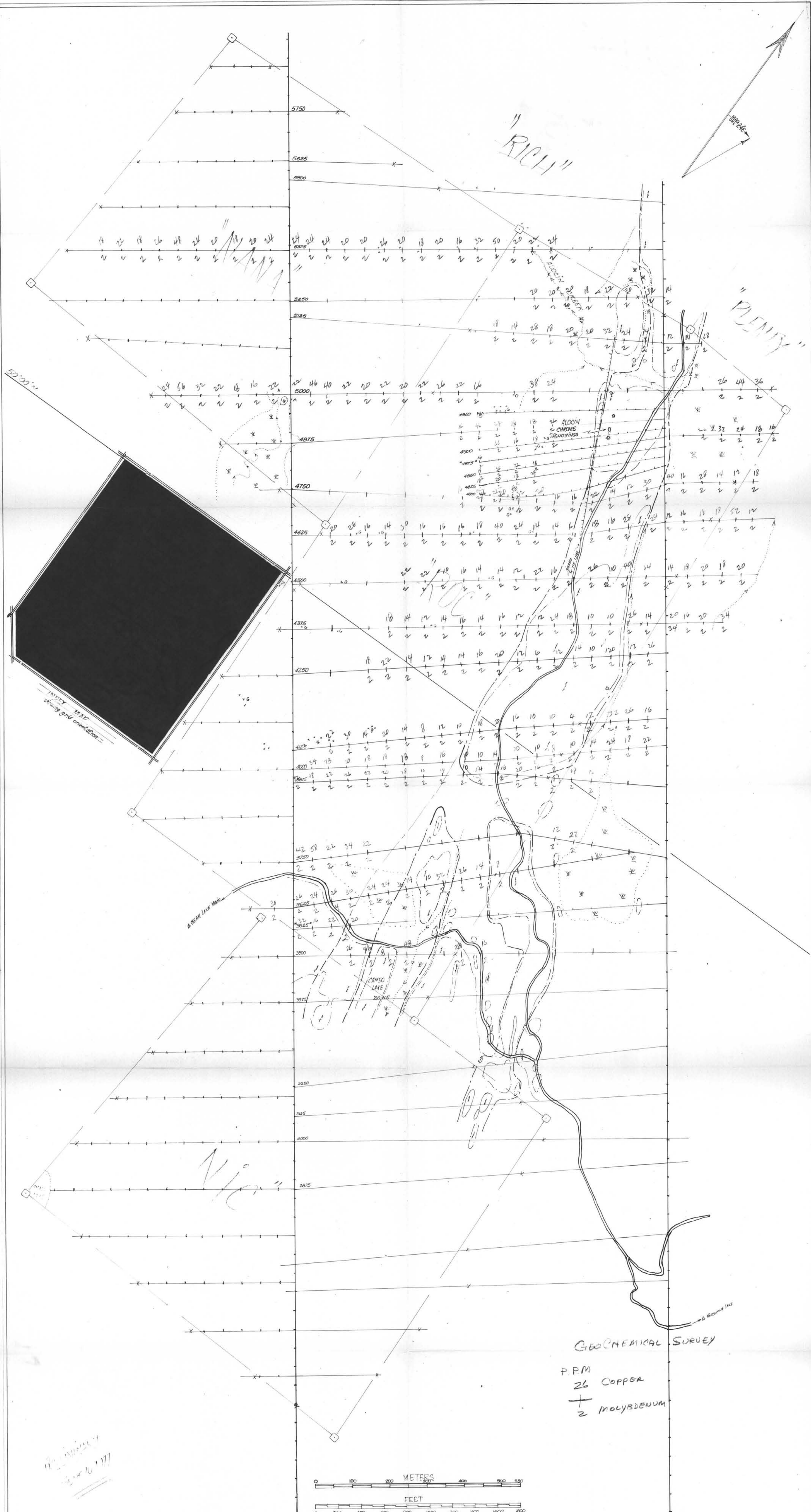
RICHARD O. CROSBY & ASSOCIATES LTD. VANCOUVER B.C.

GEOLOGY

NICOLA COPPER MINES LTD. (N.P.L.)
"NAN-ROC" CHROME PROPERTY
CAMEO LAKE, KELOWNA, B.C.

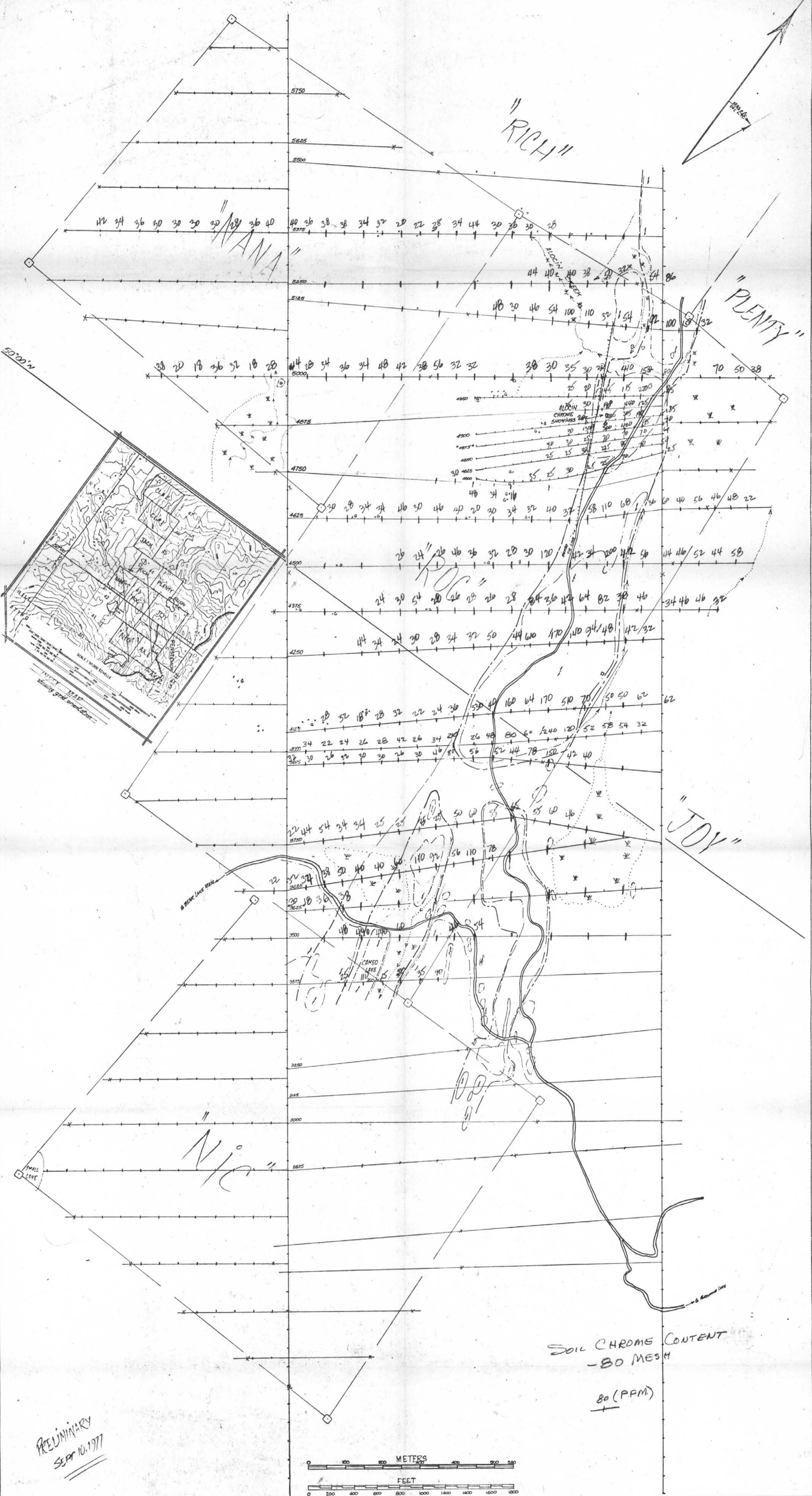
METRES 100 0 100 200 300 400 METRES
FEET 400 0 400 800 FEET

GEAREX ENGINEERING VANCOUVER, B.C. DATE December 1977 G. von Rosen

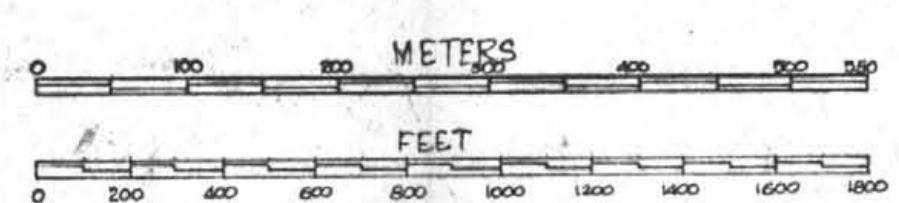


NICOLA COPPER MINES LTD (INC)
 "NANA-MO" CHROME PROPERTY
 CANE LAKE, KELLOWNA, B.C.
GEOLOGY
 PLAN OF GRID, ROADS & CLAIMS
 GEAREY ENGINEERING VANCOUVER, B.C.

MINERAL RECORD NO.
6775



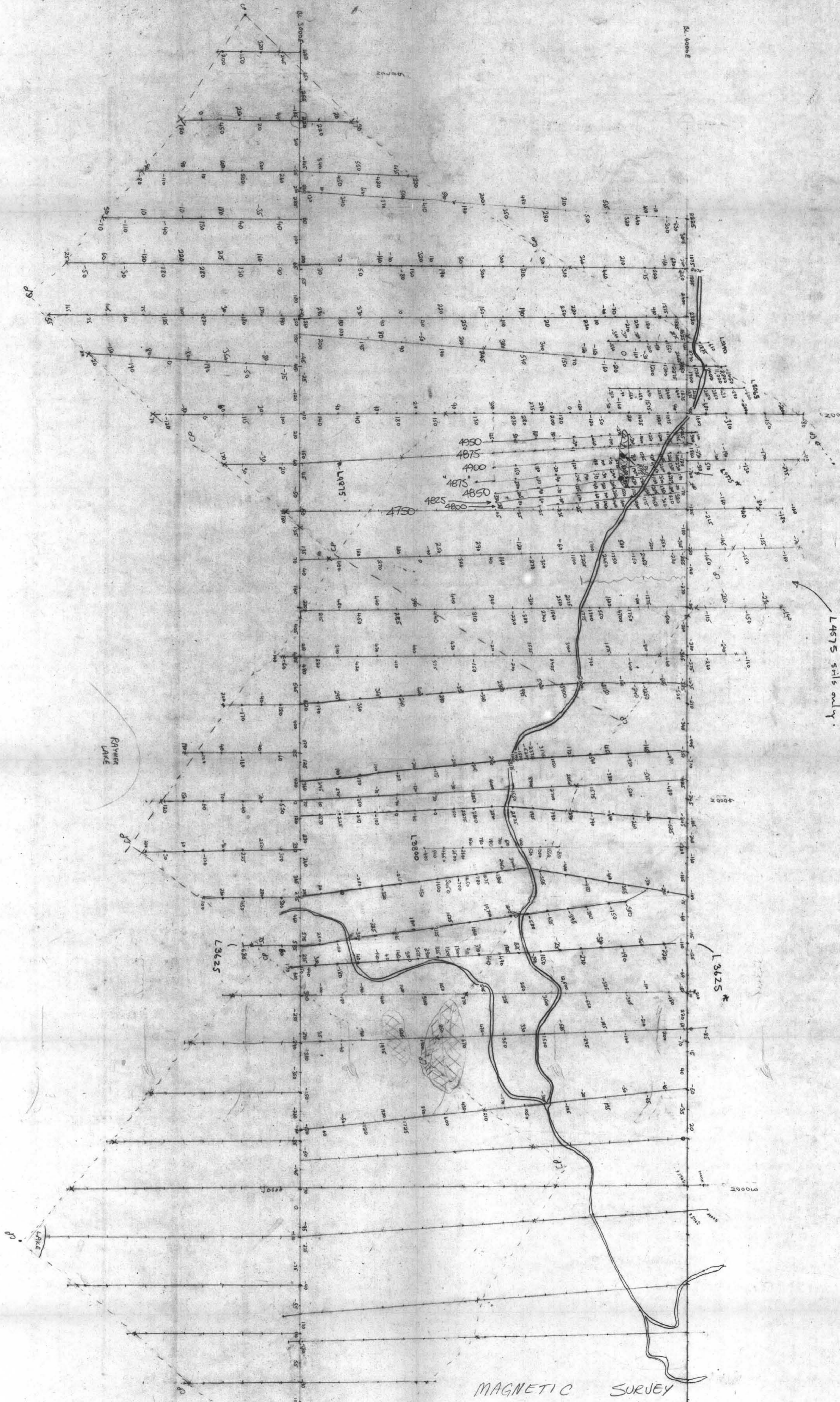
PRELIMINARY
SEPT 10, 1977



SOIL CHROME CONTENT
- 80 MESH
80 (PPM)

NICOLA COPPER MINES LTD (NCL)
"NANA-KOC" CHROME PROPERTY
CAMEO LAKE, KELOWNA, B.C.
GEOLOGY
PLAN OF GRID, ROADS & CLAIMS
GEAREX ENGINEERING, VANCOUVER, B.C.

6775
NO.



MAGNETIC SURVEY
 VALUE SHEET
 NAN-ROC PROPERTY
 CAMEO LAKE, B.C.
 DEC. 1977

MINERAL RECORDS BRANCH
 NO. **6775**

R.O. CROSBY, P.ENG.