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QUESNEL NICKEL PROSPECT
Sovereign Creek Area, B.C.

Report for:
Cyprus Exploration Corporation Limited

FINDLAY CONSULTANTS LIMITED
Morrisburg, Ontario

September 10, 1971

CONTENTS

Illustrations

TABLES

TITLE Property Examination Report and Preliminary Regional Evaluation Report

PROJECT Quesnel Nickel Prospect (Trifaux Property), Sovereign Creek Area, B.C. (Project No. 71010)

COMPANY Cyprus Exploration Corporation Limited

DATE September 10, 1971

SUMMARY

The Quesnel nickel prospect comprises 78 claims (SOVEREIGN CLAIMS) owned by R. Trifaux Sr. of Calgary, and located about 30 miles east of Quesnel B.C. and about 11 miles south of the Quesnel-Barkerville road.

The claims cover an ultramafic intrusion(s) that appears to have characteristics atypical of most Cordilleran alpine-type peridotites. The intrusion (or intrusions) is poorly exposed, but in at least one area serpentinized dunite contains finely-disseminated metallics that are probably mainly sulphides, but may also include an iron-nickel alloy phase. Positive identification of the latter has not yet been made.

Grab samples collected during the present work assayed up to 0.2 per cent nickel. Samples collected by the owner, containing greater amounts of visible sulphides assayed up to 0.26 per cent (reported). Separation studies commissioned by the owner reportedly yielded up to 54 per cent nickel recovery from -200 mesh magnetic fractions. Cold acid extractable nickel tests conducted on 4 grab samples collected during the present work, indicate that about $\frac{1}{2}$ the total nickel is fixed in sulphides or Fe/Ni alloy. This is consistent with the results of the owner's separation tests.

A cursory study of available geologic and aeromagnetic maps of this and adjacent areas suggests the probability that additional ultramafic intrusions are present in the district.

Subject to certain qualifications, the property and the district are recommended for exploration.

INTRODUCTION

The Quesnel (Sovereign Creek) nickel prospect was examined August 14, 1971, in company with the owner of the property, Mr. R. Trifaux Sr. of 1724B-37th Ave. S.W., Calgary. Time was limited, and the examination was restricted to visits to the most accessible outcrop areas.

CLAIMS

The property consists of 78 claims (Sovereign Claims) reported by the owner to be in good standing. Details of claim ownership, anniversary dates, work performed etc. have not been confirmed. Based on claims traversed during the field examination, the staking appears to have been competently and legally done.

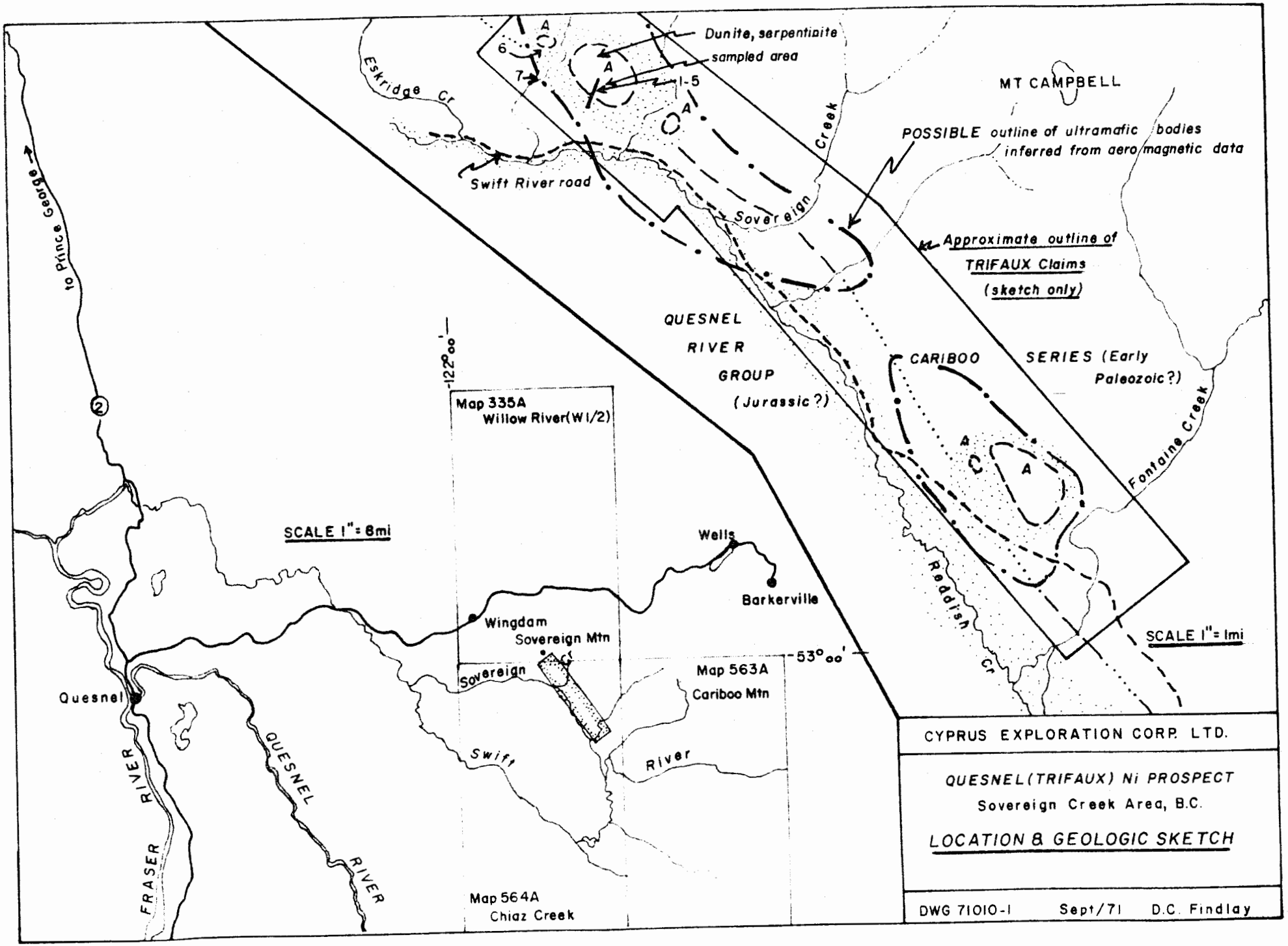
LOCATION AND ACCESS

The property lies 30 miles east of Quesnel in the northwest sector of N.T.S. reference 93A/13 (Swift River). The geographic coordinates of the approximate centre of the property are: 53-58 N; 121-50 W.

The prospect is reached via the Swift River Forestry Access road which leaves the Quesnel-Barkerville road at approximately mile 24 (from Quesnel). The claims lie immediately northeast of, and parallel to, the Swift River road between about mile 11 and mile 16 (Eskridge Creek and Fontaine Creek).

TOPOGRAPHY

The Sovereign Claims lie along the southwest flank of a discontinuous, northwest-trending wooded ridge that marks the approximate west boundary of the Cariboo Mountains block in this area. The nearest prominent topographic features are Sovereign Mountain (elev. 5496') lying about one mile north of the north claim boundary, and Mt. Campbell (elev. about 5300') about 1½ miles east of the property. Slopes are gentle to moderate and the area is fairly heavily timbered (mainly pine). Outcrop is sporadic and is probably limited mainly to slope-crest areas and gulley exposures.


Dunite, serpentinite
sampled area
1-5
6
7
A
MT CAMPBELL
POSSIBLE outline of ultramafic bodies
inferred from aero magnetic data
Eskridge Cr
Swift River road
Sovereign Creek
Approximate outline of
TRIFAUX Claims
(sketch only)
to Prince George
QUESNEL
RIVER
GROUP
(Jurassic?)
CARIBOO SERIES (Early Paleozoic?)
Fontaine Creek
Reddish Cr
-122°00'
Map 335A
Willow River(W1/2)
SCALE 1"= 8mi
SCALE 1"= 1mi
Wells
Barkerville
Wingdam
Sovereign Mtn
-53°00'
Sovereign
Map 563A
Cariboo Mtn
Quesnel
Swift
River
FRASER RIVER
QUESNEL RIVER
Map 564A
Chiaz Creek
CYPRUS EXPLORATION CORP. LTD.
QUESNEL(TRIFAUX) Ni PROSPECT
Sovereign Creek Area, B.C.
LOCATION & GEOLOGIC SKETCH
DWG 71010-1 Sept/71 D.C. Findlay

REGIONAL GEOLOGY

The Sovereign Creek property lies mainly in the northeast sector of Geological Survey of Canada Chiaz Creek map-area (Lang, 1940a). A few of the northernmost claims extend onto Willow River (West Half) map-area (Hanson, 1938). The property area lies adjacent to a major northwest-trending regional contact between the Proterozoic/Early Paleozoic Cariboo Series (quartzite, quartz-sericite schist, argillite) and Jurassic(?) and sedimentary/and volcanic rocks of the Quesnel River group (shale, argillite, sandstone, basalt, flow-breccia, tuff). Along and near this contact a number of apparently isolated bodies described as 'amphibolite and other basic rocks' occur. One or more of these comprise the Sovereign Creek ultramafic pluton(s). Examination of (published) geology to the southeast, along the trend of the regional contact, shows that other similar 'amphibolite' bodies have been mapped adjacent to the contact (Lang, 1940b). These features are clearly revealed by aeromagnetic data of Geological Survey of Canada Geophysics Paper 1534 (Swift River). They appear to have a magnetic relief up to 1,000 gammas, contrasting sharply with the rather featureless magnetic background of the district.

The 'amphibolites' were designated as 'probably Jurassic' in age by Lang (1940a, 1940b); however he noted that they were nowhere seen to cut Jurassic(?) rocks of the Quesnel River Group. In the Chiaz Creek and Cariboo Mountain (Lang, 1940b) areas the basic rocks clearly seem to lie on the Proterozoic/Paleozoic side of the regional contact line. As discussed in a following section, the possibility that the 'basic rocks' are intrusive into older Paleozoic/Proterozoic sediments could be significant from the point of view of assessing their potential as hosts for nickel occurrences.

LOCAL GEOLOGY

The meagre local geologic features are shown on DWG 71010-1. The 'basic rocks' were indicated by Lang (1940a) as comprising two separate outcrop areas about 4 miles apart. Trifaux (owner) states that the northern-most body extends at least as far southeast as Sovereign Creek and he speculates that the entire ridge may be underlain by a single intrusion $4\frac{1}{2}$ to 5 miles long and $\frac{1}{2}$ to 1 mile wide. This assumption is not supported

by the aeromagnetic data (Geophysics Paper 1534) which suggests that at least two bodies may be present, each about 3 miles long by a mile or so wide.

The main exposure area of the northernmost intrusion was examined, from just above the Swift River road about 1 mile east of Eskridge Creek, to the limit of outcrop on the ridge, about ½ mile northeast of the road. In this area discontinuous outcrop of grey-to dark brown-weathering, greenish serpentinized ultramafic rock occurs. The typical rock is massive, moderately to strongly-serpentinized dunite, occasionally showing faint outlines of relict pyroxene on broken surfaces. Notably, no outcrops observed showed the knobby-weathering, poikilitic (pyroxene) textures typical of most Cordilleran alpine-type peridotites. Toward the road (and presumably toward the south-west margin of the intrusion), the dunite becomes a lighter green in colour, more dense and cohesive, and contains brownish carbonate (siderite?) alteration patches, giving the rock a 'pseudo-porphyritic' appearance. The changes in colour and 'toughness' of the dunite are typical characteristics of marginal interstitial enrichment in pyroxene (now altered to tremolite-actinolite-serpentine matte) in ultramafic rocks, but this interpretation cannot be confirmed without microscope work.

In the area examined, the ultramafic contact is not exposed; however, at one locality the enclosing rocks outcrop in a creek bed within a few hundred feet of the nearest ultramafic exposures. The country rock here is a much sheared and altered (chlorite-sericite-epidote), greenish white, coarse chaotic conglomerate, probably containing much original mafic material.[1] Downstream (west) the rock grades to a quartz-bearing grit within a few hundred feet. Presumably these strata are part of the Paleozoic/Proterozoic Cariboo Series, although conglomerate and grit are not specifically noted in this assemblage by Lang (1940a).

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[1] This could be a breccia zone. The strong shearing and chlorite-sericite alteration tends to obscure the original structure of the rock; however, in at least one water-polished exposure it looks conglomeritic.

MINERALIZATION

Most ultramafic outcrops examined contain very fine, sporadically-distributed metallics. Binocular microscope study suggests that 2 metallic phases (excluding magnetite and chromite) may be present; one is finely-distributed sulphide, probably pyrrhotite (with or without pentlandite). A second, much less common form consists of tiny flecks of yellowish metallic material, as yet unidentified. Based on cursory examination, sulphides are not visibly uniformly-distributed - in several outcrops local zones a few square feet in area contain easily-visible disseminated sulphides (less than 1 per cent); elsewhere metallics are not visible to the naked eye. However, a binocular microscope examination of apparently-barren samples usually reveals a few flecks of metallics.

The enclosing conglomerate(?) contains easily-visible patches of fine sulphides, probably pyrrhotite. Although the visible sulphide content is appreciably greater than in the ultramafic rocks, based on one assay, nickel content is lower (see following section).

SAMPLING AND ANALYTICAL WORK

Six grab samples of ultramafic material and one sample of country rock were assayed for nickel and reference copper. The ultramafic samples were chosen to be geographically representative of the limited exposure area of the part of the intrusion examined, but they were not selected so as to necessarily emphasize areas of more obvious visible disseminated sulphides. Thus, the assay results are probably on the conservative side.

The seven analyses of this work were done originally by the Whitehorse Assay Office. The results appeared low, in comparison with assays obtained by the owner (Trifaux) from Coast-Eldridge, Vancouver. Accordingly, four of the original samples were re-submitted to Bondar-Clegg and Company, Ottawa for check assays. The various results are given in Table I.

TABLE I / Comparison of nickel assays, Whitehorse Assay Office and Bondar-Clegg and Company, Ottawa.

Sample No.	Rock Type	Whitehorse Assay Off		Bondar-Clegg
		Cu (per cent)	Ni (per cent)	Ni (per cent)
QN71-1	dunite	0.02	0.16	0.19
-2	dunite	0.02	0.17	0.20
-3	dunite	0.02	0.17	
-4	pxdn (talus)[1]	0.02	0.15	
-5	pxdn (talus)[1]	0.02	0.12	0.20
-6	pxdn	0.02	0.16	0.18
-7	cong.	0.02	0.11	

[1]samples from talus blocks of marginal ultramafic material (pyroxene dunite?) from base of exposure ridge.

Mr R. Trifaux (owner) has submitted a list of 17 undocumented grab sample assays with nickel values ranging from 0.15 to 0.26 per cent and an arithmetic mean of 0.22 per cent. Dr. O.R. Eckstrand, Geological Survey, Ottawa is in possession of several samples shipped to him by Trifaux. These samples have been examined and if they are representative of material that Trifaux has had assayed, they contain more visible metallics than the assays given in this report.

The rangesin nickel values noted above are typical of the silicate (olivine) nickel content of almost any ultramafic rock. However the owner (Trifaux) has had a preliminary metallurgical (separation) study conducted by Ferromagnetic Laboratories, Montreal. This study indicated that up to 54 per cent of the total rock nickel was recoverable in -200 mesh grind magnetic separations - indicating that about half the nickel is in non-silicate (sulphide, Fe/Ni alloy, magnetite, etc.) matrix. As a preliminary test of this conclusion, the samples assayed by Bondar-Clegg (Table I, above) were also run for acid (cold) extractable nickel. The results are given in Table II.

TABLE II / Comparison of total (rock) nickel and acid-soluble nickel, Bondar-Clegg samples

Sample No.	Total Ni (per cent)	Acid-soluble Ni (ppm)	(per cent)
QN71-1	0.19	1200	(0.12)
-2	0.20	1300	(0.13)
-5	0.20	1100	(0.11)
-6	0.18	610	(0.06)

Table II indicates that in three out of the four samples here tested, more than one half the total nickel is in non-silicate matrix, results which tend to confirm the preliminary separation studies commissioned by the owner.

DISCUSSION

The preliminary data assembled in this report suggest that the Quesnel nickel prospect is of some potential interest. Although the visible sulphide (metallic) content of the ultramafic rocks (where examined) is totally unspectacular (and in many instances, invisible) the preliminary analytical work suggests that about one half the total nickel in the rocks may be present in recoverable form - a situation that is atypical of most Cordilleran ultramafic intrusions.

Obviously a total nickel content of 0.2 per cent, regardless of tonnage, is at present not of economic interest. However, there are four factors that should be considered in the assessment of this prospect/area:

i) the body is poorly-exposed and the samples assayed represent a very small part of the intrusion(s);

ii) the megascopic suggestion that there may be some subtle primary lithological differentiation in the intrusion(s) raises the possibility that sympathetic variation in the nickel content of the rocks may be present also - i.e. in other (buried) parts of the pluton(s) nickel content might be higher (or lower);

iii) the absence of poikilitic textures in the ultramafic mass (in the limited area examined) suggests that the body is not a typical Cordilleran alpine-type peridotite. Since the latter are, to date,

notoriously poor exploration targets for nickel, any ultramafic intrusion that does not have (superficially at least) alpine-type characteristics is worth a close look;

iv) the regional setting of this intrusion(s) and probably other nearby ones in an apparently-restricted (laterally) zone bordering a major geotectonic element of the central Cordillera (junction zone between the INTERMONTANE and OMINECA tectonic belts) and their apparent occurence within older Paleozoic and/or Proterozoic rocks, suggests the possibility (as in iii) above) that this may represent an atypical Cordilleran ultramafic environment in an age as well as litholigic sense. Most Cordilleran ultramafic intrusions are Mesozoic or Late Paleozoic in age and most of them contain little non-silicate nickel; conversely, most nickeliferous intrusions outside the Cordillera are Proterozoic or Archean in age. Thus, following the argument of iii) above, any ultramafic environment of the Cordillera that may possibly be older than the typical alpine-type environment is clearly worthy of attention:

In the context of point i) above it is of interest to examine the situation of the Dumont (Quebec) nickel deposit. The Dumont deposit occurs in a serpentinized, non-poikilitic peridotite/dunite that is about 4½ miles long and ½ mile wide. It is apparently a tabular-shaped mass, with essentially parallel basal and roof contacts, dipping north. There is apparently little evidence of primary (lithological) variation in the main ultramafic mass. The 'background' nickel content of the ultramafic body is .25 to .3 per cent, only about ¼ of which is apparently in recoverable form. Near the centre of the mass are three parallel zones with (to date) maximum widths of about 100 feet, in which the nickel content increases to .5 per cent and recoverable nickel apparently increases to about 50 per cent or slightly greater. Although there obviously has been a 'sulphide differentiation' process of some form involved here, there is no corresponding evidence of primary lithological differentiation in the host rock[1].

In spite of newspaper accounts to the contrary (e.g. 'Impressive Tonnages Indicated By Dumont Nickel Drilling' - Northern Miner, March 25, 1971) it seems evident that only the central 'high grade' zones running about .5 per cent nickel constitute 'ore' since the critical factor is the amount of recoverable nickel present, rather than the total nickel content. It remains

1 see ii) p.7.

to be demonstrated, however, that this 'ore' can be mined at a profit. At the present time it is probably safest to consider Dumont-type deposits as 'futures'.

The Dumont situation can serve to place prospects such as the Quesnel property here discussed in a more realistic prospective, and the critical factors can be summarized by two points:

i) in an ultramafic mass carrying fairly constant background nickel (.2 to .3 per cent), a significant proportion of which is in recoverable (non-silicate matrix) form, the 'ore' zone may constitute only a very small fraction of the nickeliferous mass. In a poorly-exposed body, it could easily be missed. Thus, the key to adequate evaluation of this type of occurrence is probably a thorough and high-density sampling program, including sub-overburden sampling;

ii) assuming that the conditions of a Dumont-type deposit could be duplicated in the Cordillera (Chromex?, Giant Mascott extension?) it remains to be demonstrated whether this type of deposit is viable, even under ideal conditions of extraction:

The conclusions and recommendations set out in the following sections should be evaluated with the points discussed in the foregoing section in mind.

CONCLUSIONS

1. The Quesnel (Sovereign Creek) nickel prospect shows sufficient preliminary indications of being an atypical Cordilleran nickeliferous ultramafic body to warrant further work.

2. The regional geologic and tectonic setting of the prospect area suggests the likelyhood of additional ultramafic intrusions being present in the district, and the region deserves consideration as a primary exploration target area for nickel.

RECOMMENDATIONS

1. A 'holding' option agreement with Trifaux (owner) is recommended, preferably on a basis that will allow additional evaluation work on the prospect without extensive committment of funds.

2. Additional analytical work on such sample material as is on hand

should be done this winter. This should include: a) polished section examinations in an attempt to isolate and identify the metallic phases present; b) thin section studies to determine the textural and mineralogical characteristics of the host rock. It is possible that Mines Branch, Department of Energy, Mines and Resources, Ottawa, might undertake preliminary metallurgical and petrographic studies, but it is uncertain whether or not sufficient sample material is on ahnd for this.

3. The property should be gridded (initially on 800-foot line spacing), geologically mapped, and surface-sampled on a density pattern consistent with geological variations and outcrop density. Initially, 2 or 3 sample profiles should be run across the axis of the intrusion(s) with sample spacing as close as practical to 100-foot intervals. Concurrently, a nickel soil-geochemistry orientation program should be conducted on one or more areas of the intrusion(s) where bedrock sampling control will be available. It is possible that some of the initial orientation-sampling could be done this fall, but it should not be done without accurate geologic control.

4. It seems doubtful that any geophysical techniques would provide useful data at this stage, and expenditure of funds on geophysical programs is not recommended.

5. Data accumulated from 1. through 3. above should be assessed and evaluated prior to any further committment.

6. Concurrent with 2. above, available geologic and geophysical data on this general part of the OMINECA belt front should be assembled and compiled with a view toward isolating and investigating other possible ultramafic intrusions of the region. Consideration could be given to a regional nickel stream-silt geochemistry program, designed on the basis of office compilation of the above data.

Morrisburg, Ontario
September 10, 1971

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