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GEOLOGICAL REPORT

McCART TOWNSHIP PROPERTY

PORCUPINE MINING DIVISION

2.15377

February, 1994

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D. R. Pyke

CONTENTS

Table 1 Geochemical and Whole Rock Analyses

Photos

Photomicrographs

1 - Pillow basalt, spinifex texture. P-60-92

2 - Basaltic komatiite, spinifex texture. P-62-92

3 - Serpentinized dunite, cumulate texture. P-35-92

3a- Same, polarized light

4 - Reflected light. Pyrrhotite, chalcopyrite in dunite. P-36-92

5 - Reflected light. Net-textured sulphides. P-35-92

6 - Reflected light. Net-textured sulphides rimming cumulate olivine grains. P-35-92

7 - Enlargement of photo 6. Location of analysed grains A and B.

Backscattered Electron Images

8 - Chromite grain totally enclosed in serpentinized olivine grain. Analyses 9-11. P-35-92

9 - Chromite grains in intimate association with net-textured sulphides. Analyses 1-2, 6-8 P-35-92

10 - Enlargement of photo 9. Analyses 3-5, 12-14

11 - Net-textured sulphides interstitial to cumulate olivine. Analyses 15, 16. P-35-92

12 - Chromite grains with ferritchromite rims. Analyses 15-17. P-35-92

13 - Euhedral chromite grain with thin ferritchromite rim. Analysis 19. P-35-92

14 - Altered chromite grains with net textured sulphides. Analyses 22-24 P-49-92

15 - Composite chromite grains with chrome-rich magnetite margins. Analyses 34-39 P-48-92

16 - Chromite grain with wide magnetite rim. P-48-92

17 - Fine chromite grains with thin ferritchromite rims. Analyses 50-52. P-54-92

18 - Chromite with ferrichromite rim. Analyses 62-67. P-25-92

19 - Chromite grains in komatiitic basalt. P-46-92

20 - Chromite in komatiitic basalt. Analyses 85-88. P-46-92

21 - Chromite grain with chrome-rich magnetite rim. Analyses 90-94. P-46A-92

22 - Intergrown pyrrhotite and nickel sulphide. Analysis 95. P-46A

23 - Chromite rimmed by chromite-rich magnetite. Analyses 96-109. P-46A-92

Geological Report
McCart Township Property and Area

Introduction

The property and general area for which the present survey was conducted is in Concessions 5 and 6 of McCart Township and the northwestern part of adjacent Calvert Township, located approximately 35 miles northeast of Timmins and 4 miles west of Iroquois Falls (Figure 1).

The area is easily accessible. An all weather road extends from Highway 11 along the Concession 4-5 boundary in McCart and Calvert Townships.

Currently, the OPAP recipients (Cunnison, Pyke, Raine) hold the mining rights to 28 claim units in McCart Township (Figure 2a,b), Concessions 5 and 6, many of which form part of this present survey.

Previous Work

The geology of McCart Township has been compiled by Satterly (1953) at a scale of 1 inch = 1/4 mile.

Nickel mineralization has been known to occur in the north part of McCart Township since 1916 (Baker, 1917), when samples from the Don O'Connor property in Lot 7, Conc 5 reportedly contained up to 3 percent nickel.

A review of the MNDM assessment files indicates much of the exploration in the region was conducted during the 1950's and 1960's with considerable emphasis placed on the search for asbestos. An extensive area of outcrop in Lots 6 and 7, Conc 5, was the focus of much of this work, as attested to by numerous old trenches in the exposed ultramafic rocks.

In 1950, the Arrow Timber Company (Calstock Exploration and

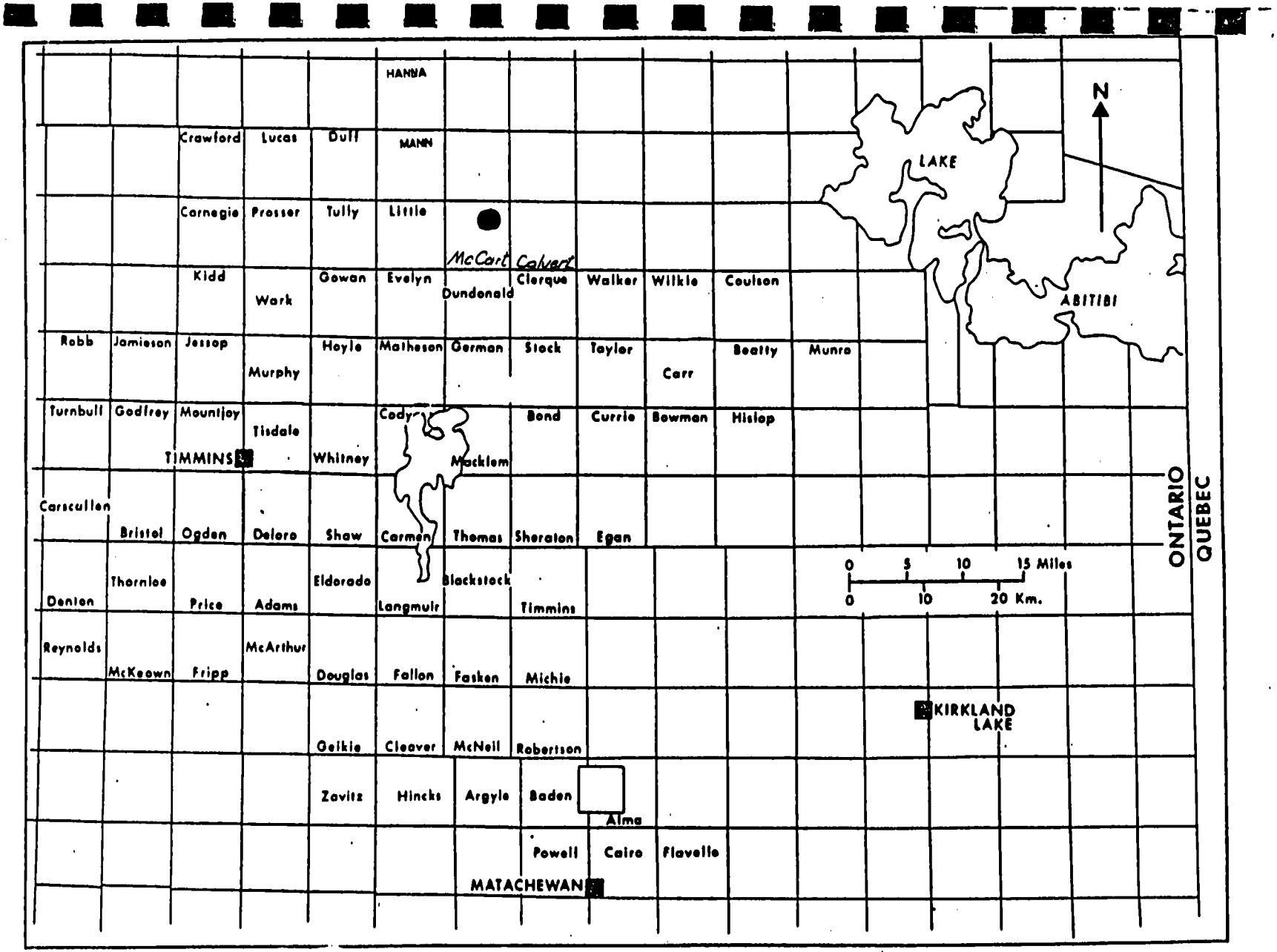


Figure 1: Location of McCart Township Property

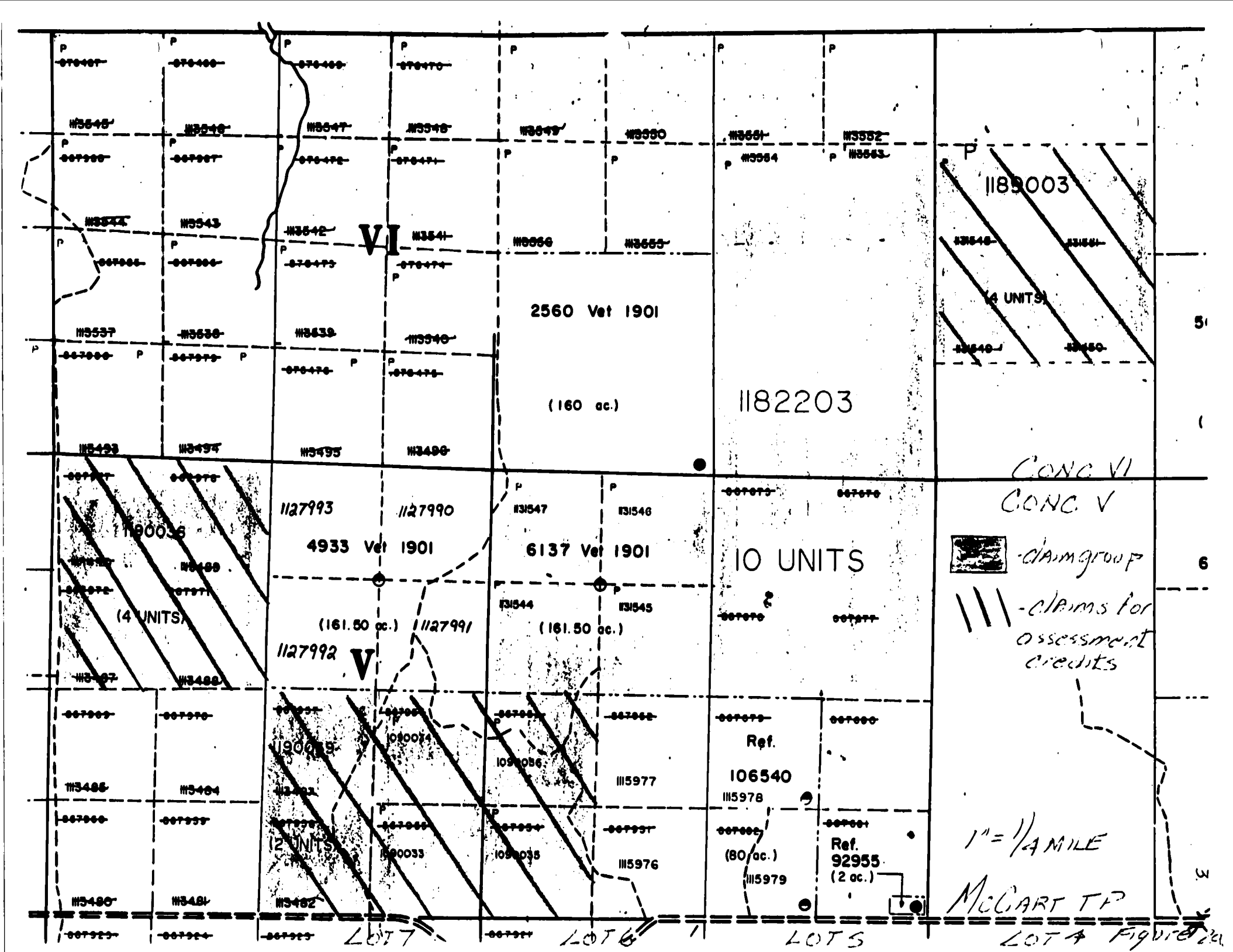

VI
2560 Vet 1901
(160 ac.)
1182203
1189003
(4 UNITS)
CONC VI
CONC V
- claim group
- claims for assessment credits
1127993
1127990
4933 Vet 1901
6137 Vet 1901
10 UNITS
(4 UNITS)
(161.50 ac.)
1127991
1127992
V
Ref.
106540
Ref.
92955
(2 ac.)
(80 ac.)
12 UNITS
1" = 1/4 MILE
McCART TP
LOT 7
LOT 6
LOT 5
LOT 4

Figure 2a

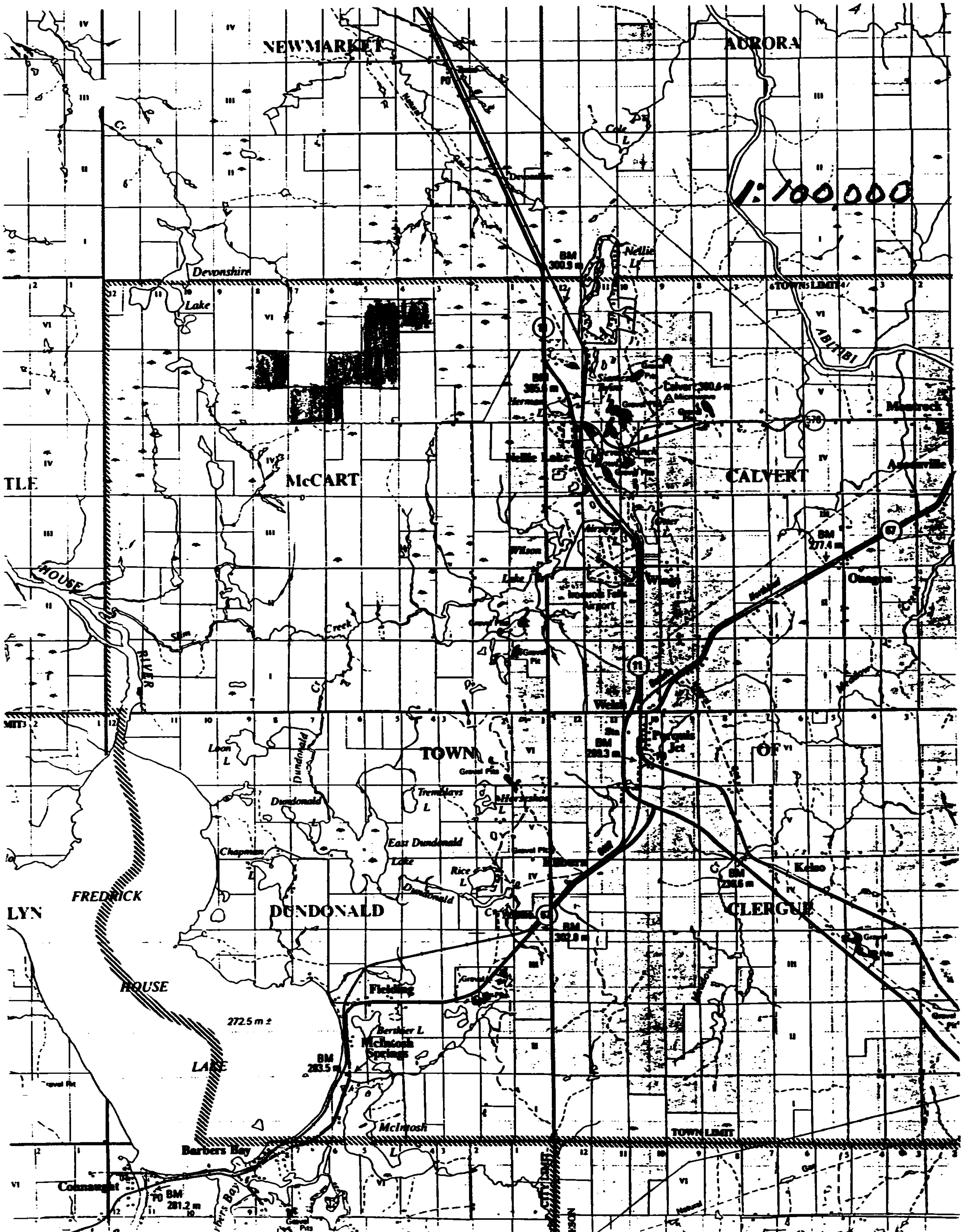

NEWMARKET
AURORA
1:100,000
Cole L
Devonshire
Devonshire Lake
Nellie L
TOWN LIMIT
ABITIBI
Herman L
Nellie Lake
McCART
CALVERT
Monteith
Ansonville
Wilson Lake
Iroquois Falls Airport
Onagon
HOUSE RIVER
Slim Creek
Welsh
Porquis Jct
TOWN OF
Loon L
Dundonald L
Tremblays L
Horseshoe L
East Dundonald Lake
Chapman L
Rice L
Kelso
FREDRICK HOUSE LAKE
DUNDONALD
CLERGUE
Fielding
Bershier L
McIntosh Springs
272.5 m ±
McIntosh
Barbers Bay
Connaught
CITY LIMIT
TOWN LIMIT

Figure 2B

Development Company) mapped much of the outcrop area in Lots 6 and 7, and conducted a magnetic survey over this as well as the immediate surrounding claims. The subsequent drilling of 7 diamond drill holes were designed to test both for asbestos fibre and the potential down dip extension of the mineralization reported by Baker (1917).

In 1950, Dominion Gulf Company held a large group of claims extending from Mann Township, through Newmarket Township into the northeast part of McCart Township. Although the property was devoid of outcrop, Dominion Gulf mapped the outcrop areas in north McCart Township to gain insite into the potential structures and alteration which may be present on their claim group.

In 1950, Quebec Asbestos drilled one hole at the volcanic-ultramafic contact in Lot 5, Concession 5.

In 1957, Nortoba Nickel Explorations Limited conducted magnetic and resistivity surveys over eight claims in Lots 6 and 7, Conc 5; one hole was drilled at the dunite-mafic volcanic contact near the Concession 4-5 boundary in Lot 6.

In 1961, Union Mining Corporation drilled 2 diamond drill holes; one hole (UMC-2) was spotted to intersect the previously reported nickel mineralization in Lot 7.

In 1965, O'Brien Gold Mines Limited conducted a magnetic and vertical loop EM survey over nine claims in Lots 7 and 8, Concs 4 and 5. One conductor was subsequently tested and intersected graphitic sediments with minor sulphides.

In 1969, E. Fento drilled a short hole in the NE1/4, Lot 5, Conc 5 and intersected gabbro.

In 1986, Angela Developments Ltd flew an airborne magnetic and VLF survey over large parts of McCart, Newmarket, Mann, Little and Dundonald townships. No follow-up work was undertaken.

In 1988, the Ontario Geological Survey (OGS, 1988) flew a combined magnetic - electromagnetic survey of the Timmins area, which included McCart Township.

In 1990 and 1991, geological mapping, magnetic and VLF surveys were undertaken on eight claims in Lots 6 and 7, Conc 5 and on four claims in Lot 4, Conc 6, by the current OPAP recipients.

Present Survey

A total of nine days were spent in the area. Seven days were spent mapping and prospecting a large outcrop area in McCart Township, principally confined to Lots 4 thru 7, Conc 5. Two days were spent examining outcrops in Concessions 5 and 6 in Calvert Township.

As the original nickel showing in the S1/2 of Lot 7, Conc 5, reported on by Baker (1917), remains one of the main areas of interest on the property, a more detailed examination was undertaken. Mineralized ultramafic rocks along and proximal to the contact with basaltic komatiites were sampled. Also, samples of the ultramafics were taken up to 400m north of the contact, primarily to compare the composition of the spinels in the mineralized versus non-mineralized dunitic rocks. In addition, the location of the VLF anomaly associated with the mineralized contact zone was checked, as were some of the previous structural determinations.

Mapping and prospecting were continued further east into the large outcrop areas of Lots 5 and 4, which are contiguous with the previous OPAP mapping of 1990-91.

A cursory examination of outcrops in the north part of Calvert Township was undertaken to help provide continuity of the geology in the general McCart-Calvert area with the thought to potential mineralization.

Regional Geology

The property is located near the southeast end of a large gabbroic-ultramafic complex that extends approximately 15 miles to the northwest (Pyke et al, 1973). The complex appears to be largely sill-like in nature, having been emplaced within relatively flat lying komatiitic and tholeiitic lavas. To date, exploration work within the region has largely been confined to the northwestern portion of the complex where some interesting, yet sub-economic nickel-copper values and anomalous platinum and palladium values are reported from diamond drilling (Shklanka, 1969). Here, at the Zevely Prospect in Mann Township, nickel-copper assays are reported from a 72 foot wide zone occuring at an intrusive peridotite-volcanic contact. Locally, up to five foot sections contained 15 percent sulphides (pyrrhotite and chalcopyrite) that assayed as high as 6 percent copper and 5 percent nickel with anomalous platinum values (0.05 ounces/ton). The general area of the current property in McCart Township is considered to have good potential for Ni-Cu-Pt-Pd mineralization, even though the assays taken in the course of the present surveys have not been encouraging.

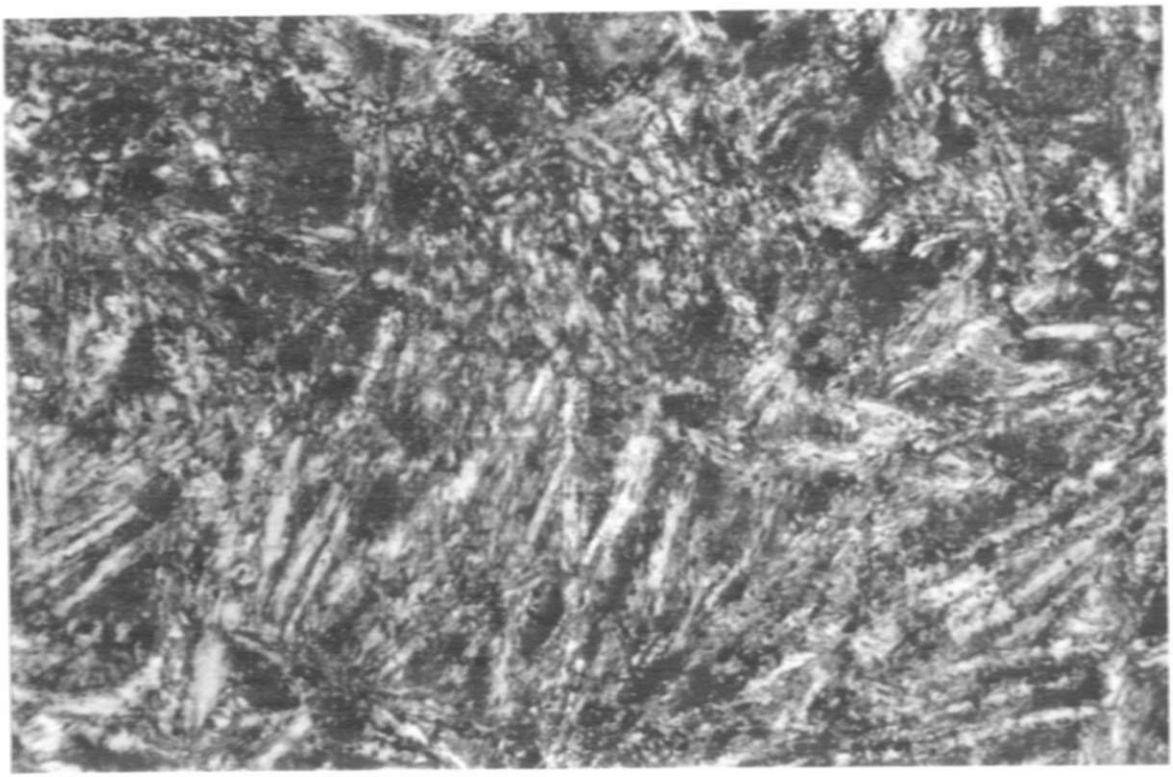
Map 2 presents a regional overview of the area which was examined both during 1992 and as parts of previous OPAP grants. The main structure appears to be anticlinal, the axial trace of which trends easterly through Concession 5 of McCart and Calvert Townships. Basaltic komatiites and Mg-tholeiites dominate the volcanic assemblage in north central McCart Township, whereas Fe-tholeiites occupy the nose area of the fold in extensive outcrops in NW Calvert Township and the north limb of the anticline in NE McCart Township.

Property Geology

The main property area (Map1), is underlain by magnesium-rich volcanic

Photo 1. Photomicrograph from pillowed vesicular basalt. Contains pale green actiolitic hornblende with suggestion of skeletal pyroxene texture. Sample P-60-92. Photo length - 3mm.

Photo 2. Photomicrograph from pillowed polysutured basaltic komatiite. Possible fine plumose spinifex texture, which in part may represent a devitrified glass. Sample P-62-92. Photo length - 1.5mm



flows of basaltic komatiite to Mg-tholeiite in composition and large sill-like intrusions of ultramafic rocks (dunite-peridotite) and minor gabbro.

Although virtually all the analyses of the volcanic rocks, both from this and previous years, are indicative of an Mg-tholeiite composition, the field evidence suggests a strong komatiitic affinty. This is largely based on the observation that many of the flows display a well developed polygonal jointing or polysuturing on the weathered surface, which has been demonstrated elsewhere to be almost soley confined to volcanic rocks of the komatiitic suite. In addition, nearly all the analyses have been from the pillowed portion of the flows whereas the lower, massive basal portion is commonly quite tremolitic and indicative of a komatiitic composition. Sample P-46-92 (Table 1) is an analysis from a tremolitic basal portion of a flow and lies well within the komatiitic field (Figure 3). Thin sections of the polysutured pillows contain up to 70-80 percent very pale green to colorless tremolitic-actinolite, some of which appears to pseudomorph skeletal grains of plumose pyroxene spinifex (Photos 1 and 2); a texture diagnostic of basaltic komatiites.

Individual flows generally vary from 10 to 30 meters in thickness, but may be up to 80+ meters thick. All the flows dip north, and are typically massive, fine-to medium grained, medium grey green weathering and medium to dark green grey fresh. In the northern part of the area (Map 1) many of the flows contain a distinctive variolitic-type structure or what has been termed a ball-structure (OPAP report/91). Individual "balls" vary from 0.5 to 30 cm in size, average 2-3cm, and appear to be confined to a particular stratigraphic sequence of flows, which on a regional scale may prove to be of assistance in stratigraphic correlations.

The ultramafic intrusive rocks appear to be largely of dunitic parentage, now altered to serpentinite, and are commonly massive,

TABLE 1

-DEC-92 REPORT 21406 REF.FILE 13849-S7 PAGE 2 OF 4

Geochemical Analyses

SAMPLE	AG PPM	CD PPM	PB PPM	PT-1AT PPB	PD-1AT PPB	AU-1AT PPB	CO PPM	NI PPM	CU PPM	ZN PPM	MO PPM
P-35-92	<.5	<1	<2	<10	16	30	259	1810	426	49.3	3
P-37-92	<.5	<1	<2	<10	17	17	287	1880	332	41.2	3
P-38-92	<.5	<1	<2	11	20	12	278	1950	367	46.7	2
P-41-92	<.5	<1	<2	22	39	6	216	2590	211	26.2	1
P-43-92	<.5	<1	<2	13	27	2	162	1820	134	28.5	1
P-44-92	<.5	1	<2	<10	23	2	99	1090	84.4	30.7	<1
P-45-92	<.5	<1	<2	11	12	<1	70	314	91.5	132	1
P-49-92	<.5	<1	<2	21	18	<1	131	1470	70.6	17.6	<1
P-50-92	<.5	1	<2	<10	20	<1	87	1230	48.6	23.0	<1
P-53-92	<.5	<1	<2	<10	1	2	31	34	59.5	37.4	2
P-58-92	<.5	<1	<2	10	8	1	14	19	119	24.5	1
P-63-92	<.5	<1	<2	<10	5	<1	16	55	118	15.4	<1
P-64-92	.6	<1	<2	<10	5	6	39	48	69.7	30.8	2
P-65-92	<.5	<1	<2	<10	<1	18	131	35	50.8	49.5	3
P-20-92	--	--	--	--	--	--	--	--	--	--	--
P-23-92	--	--	--	--	--	--	--	--	--	--	--
P-24-92	--	--	--	--	--	--	--	--	--	--	--
P-46-92	--	--	--	--	--	--	--	--	--	--	--
P-59-92	--	--	--	--	--	--	--	--	--	--	--

XRF - WHOLE ROCK ANALYSIS 16-DEC-92 REPORT 21406 REFERENCE FILE 13849 PAGE 3 of 4

SAMPLE \ %	SIO2	AL2O3	CAO	MGO	NA2O	K2O	FE2O3	MNO	TIO2	P2O5	CR2O3	LOI	SUM
P-20-92	51.9	13.1	11.3	7.55	1.35	.26	10.8	.16	.670	.07	.06	1.90	99.2
P-23-92	52.6	6.42	14.3	13.8	1.12	.15	9.79	.20	.396	.04	.26	1.05	100.1
P-24-92	49.7	15.2	9.47	9.59	2.62	.57	9.57	.17	.442	.05	.05	1.90	99.4
P-46-92	46.9	8.03	7.26	18.5	<.01	.03	12.3	.20	.489	.05	.28	4.95	99.0
P-59-92	51.8	12.8	11.2	8.53	1.61	.15	11.8	.21	.681	.07	.06	1.25	100.2

XRF W.R.A. SUMS INCLUDE ALL ELEMENTS DETERMINED. FOR SUMMATION, ELEMENTS ARE CALCULATED AS OXIDES

3 ..SSAY PERFORMED ON 30 GRAM ALIQUOT
3 - ASSAY PERFORMED ON 30 GRAM ALIQUOT

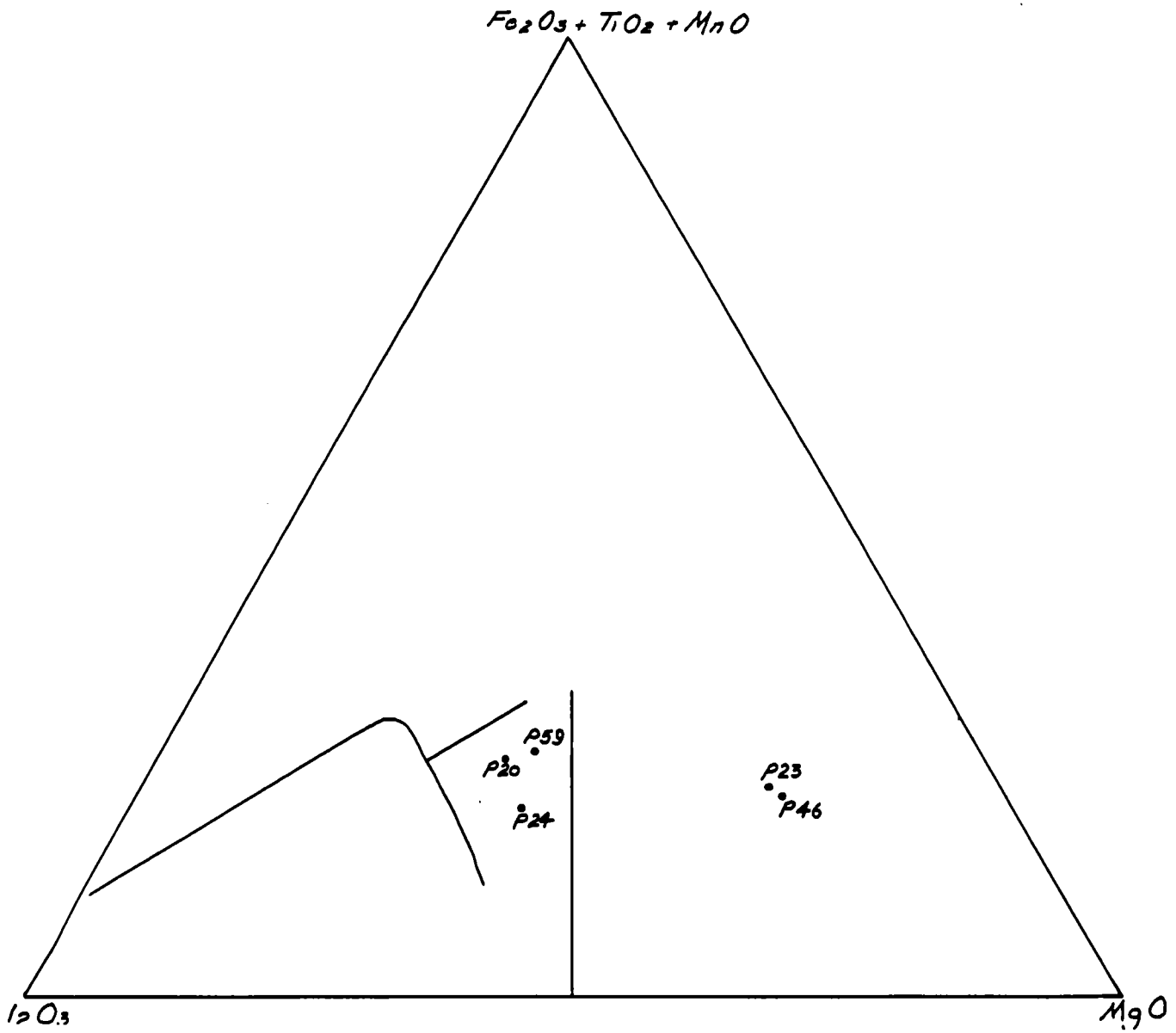

$Fe_2O_3 + TiO_2 + MnO$
P59
P20
P24
P23
P46
Al_2O_3
MgO

Photo 3a. Photomicrograph of serpentinized dunite showing the tightly packed cumulate olivine texture. Sample P-35-92. Photo length - 3mm.

Photo 3b. Same - Polarized light.

orange brown weathering and dark blue-black or locally medium green on fresh surfaces. Irregular fracturing and local development of asbestos fibre is common. A thin section of a typical ultramafic is shown in Photo 3, and seen to consist of closely packed grains of what where formerly olivine, now altered to serpentine, minor talc and lesser chlorite; 1-2 percent opaques consisting of iron and/or chrome spinels along with minor sulphide is common.

A thick, steeply south dipping sill-like body of gabbro, intrusive into basaltic komatiites, forms a large exposure in the NE corner of the area (Map 1). The gabbro is massive, fine to medium grained, and consists of approximately equal proportions of actinotitic- hornblende and plagioclase. There is a general coarsening of the grain size from south (2-3mm) to north (5-7mm) across the gabbro, although local variations both in grain size and color index throughout the intrusion suggests an internal layering. Irregular pods of "rhyolitic" appearing material along the north contact may form part of a felsic differentiate of the gabbro. Figure 4 gives a more detailed distribution of the samples at the south margin of the gabbro with the underlying komatiite and dunite.

An anticlinal axis in the south part of the area (Map 1) forms one of the main structures on the property. Both the anticline and the syncline immediately south are strongly overturned to the south. The volcanics immediately north of the anticlinal axis are near horizontal to shallow north dipping and become strongly foliated to sheared at the contact with the ultramafics to the north. Graphitic metasediments with nodular pyrite outcrop in the trench area of sample P-45-92, and are interpreted to lie along the anticlinal axis which coincides with an east trending airborne INPUT anomaly (OGS, 1988). A previously outlined VLF conductor (OPAP report/90) confirmed the presence of the anomaly extending east from the graphitic sediments exposed in the trench.

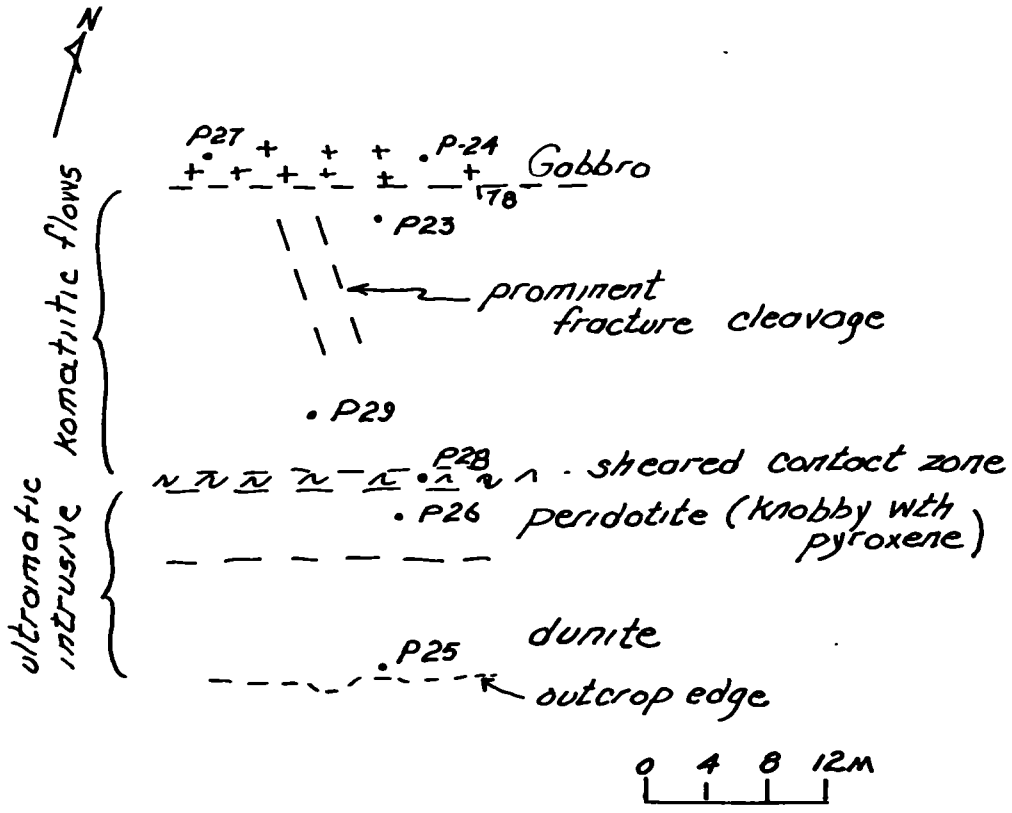


Figure 4: Sketch map showing sample locations at south margin of gabbro, Lot 5 Conc 6, McCart TP.

Mineralization

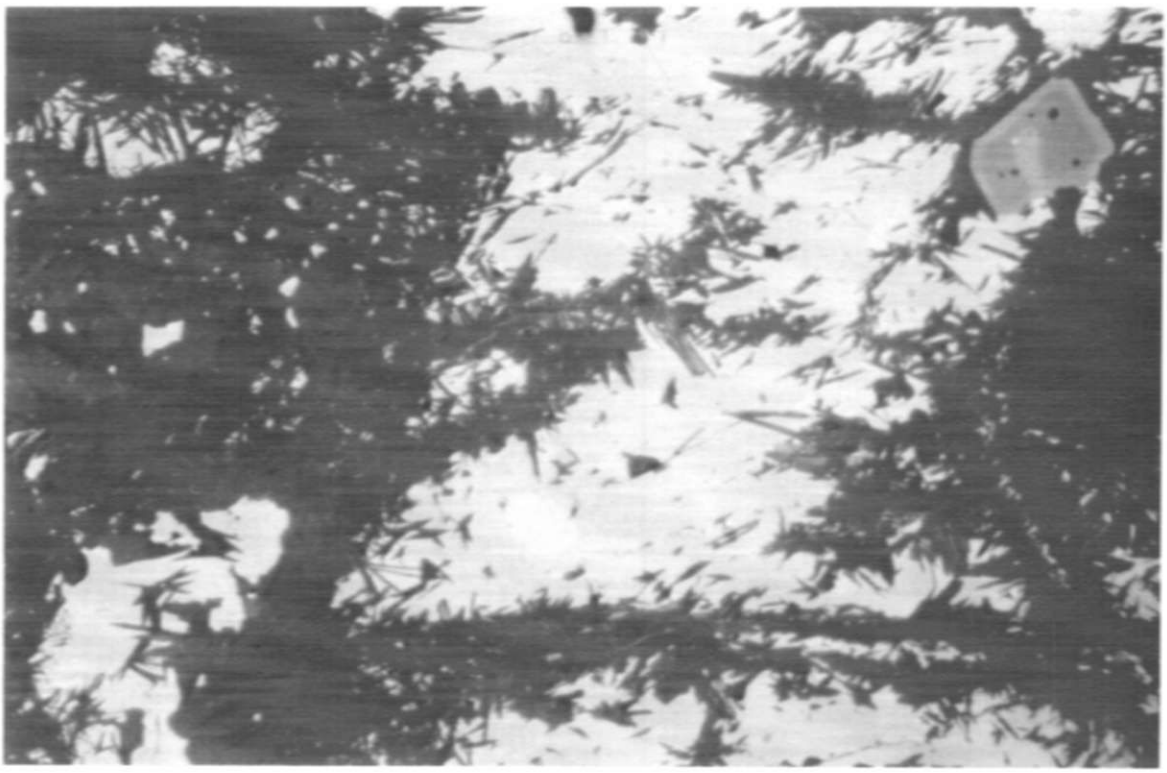
Sulphide mineralization occurs at the base of the dunite along the northeast trending contact with the volcanics on claim 1090036. A number of old trenches, partially flooded and overgrown, attest to previous exploration work along the zone in which nickel mineralization was reported by Baker (1917). The sulphides locally appear to occur over a width of up to 3-4 meters, but the general poor exposure along the zone and the infilling of the trenches with water precludes any reliable estimate. The sulphides consist dominantly of pyrrhotite with minor chalcopyrite and pentlandite (Photo 4) and occur as fine disseminations forming 2-5 percent of the rock or more commonly as an interlocking net textured sulphide (Photos 5) forming up to 15-25 percent of the rock over widths up to 0.5m. Net textured sulphides, although most common along the contact zone, are also present as isolated lenses up to 100m north of the contact.

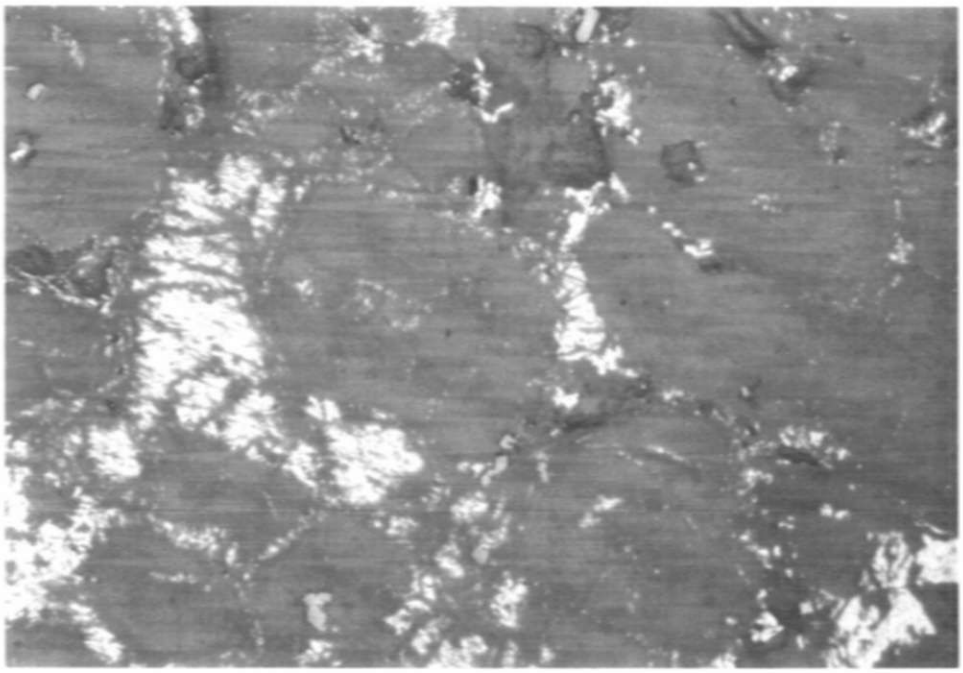
A number of mineralized grab samples taken from the old trenches and some of the outcrop areas were analysed for Cu-Ni-Zn-Pt-Pd-Au-Ag-Co-Mo-Cd-Pb (Table 1). No anomalous values of significance were obtained. However, this was not totally unexpected as the property had formerly been held by other Companies.

In order to more fully assess the potential for komatiite-hosted nickel sulphide mineralization occuring on the property, a suite of samples were collected for electron microprobe analysis of chromite spinels. The samples were taken from 1) the sulphide bearing zone (in the dunite) near the dunite-volcanic contact, 2) from weakly mineralized to non-mineralized dunite occurring at some distance (to 300 meters) north from the contact zone, and 3) from massive, foliated basaltic komatiite flows occurring immediately south of the intrusive-volcanic contact. In addition, one sample of intrusive dunite (P-25-92) was obtained from the

Photo 4. Photomicrograph, reflected light. Shows pyrrhotite (very light grey) with blebs of chalcopyrite (pale yellow). Not visible in photo are small flames of pentlandite in the pyrrhotite. Spinel in upper right corner with Mg-rich core and Fe- rich rim. Sample P-36-92. Photo length - 0.8mm.

Photo 5. Photomicrograph, reflected light. Shows net textured sulphides within cumulate olivine. Minor steel grey spinels. Sample P-35-92. Photo length - 3mm





very northeast corner of the property, approximately 1.5 kms. northeast of the mineralized intrusive-volcanic contact. Limited research directed toward chromite spinels within ultramafic rocks suggests that those associated with economic or potentially economic nickel deposits differ from those which are barren (Groves et al, 1977). The data suggests a difference in the zinc content; chromites associated with ultramafic rocks that host nickel deposits contain higher zinc concentrations than those which are not.

Microprobe Analyses and Results

A total of 109 electron microprobe analyses of chromite grains were obtained from nine selected samples. Sample descriptions and locations of the nine samples analysed are presented in Appendix B. Analytical results of the microprobe analyses are given in Appendix C.

The chromite spinels were analyzed using the JEOL JXA-8600 Superprobe in the Department of Geological Sciences, University of Western Ontario. Analytical conditions were: accelerating voltage 15 kV, and a beam current of 3 nA. Smithsonian chromite was used as a standard. The ZAF correction program, obtained from the distributor, was utilized to "reduce" data. Elements determined include Si, Ti, Al, FeO (total), Mn, Mg, Cr, Ni and Zn. All elements are reported as oxides.

As most of the chromite grains are zoned, a number of analyses were done on individual grains. The zoning is manifested by a relatively dark grey core zone which is enriched in Mg and Cr and depleted in Fe, Ti and Mn relative to a lighter grey margin of ferritchromite (eg Photos 9, 10 12). Fine borders of magnetite may rim the ferritchromite (Photo 18) margins . At least some of the grains suggest there is a two stage development of the zoning rather than there being a continuum in the crystallization history. One of the better grains to suggest a dichotomy is illustrated in

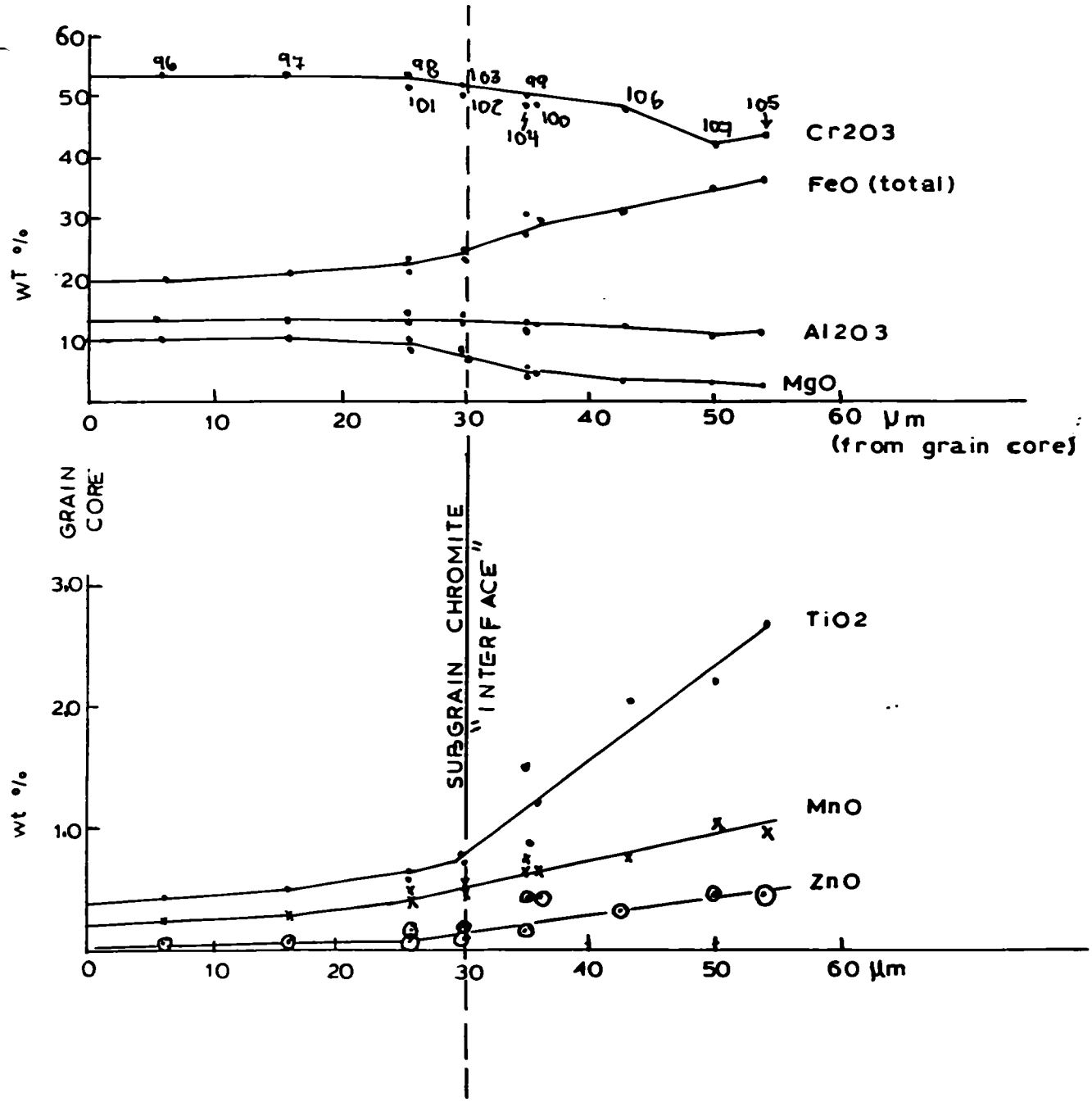


Figure 5 Core to rim compositional variation of zoned chromite grain in sample P-46A-92 Note the depletion in Cr and Mg at the subgrain interface and the increase in Fe, Ti, Mn and Zn.

Photo 23, from sample P-46A-92, and corresponds to analyses 96-107 (Appendix C). Close inspection of Photo 23 reveals a somewhat concentric fracturing approximately mid-way from the centre of the grain, which corresponds to a zonal change from dark to lighter grey. Figure 5 is a plot of the analyses from core to rim and it is evident there is an abrupt change in concentration of many elements at the subgrain interface, which would tend to support a two stage development; - perhaps a pre- and post intrusive period of growth. Interestingly, the zinc content increases notably in the outer rim, in spite of the sample location being far removed from the area of known sulphide mineralization.

Discrimination diagrams in Figures 6 and 7 which plot the chemical composition of the chromites Al203 vs Cr203 and Ti02 vs Cr203, readily distinguishes the ultramafics as being of komatiitic parentage.

The zinc content in the chromites varies from nil to 1.74 percent, with concentrations tending to increase outward from the core of a grain. Whether the zinc is an original magmatic component or possibly due to contamination during ascent or emplacement of the magma is still problematical (Groves, et al 1977). Nevertheless, from studies of nickel sulphide ores in Western Australia it is apparent that anomalously high Zn contents (> 0.5% Zn) in chromites are a useful indicator for potentially mineralized ultramafic sequences. From the preliminary data from the chromites in McCart Township, over 40% of the analyses gave zinc values greater than 0.5 percent. One of the most anomalous samples was near the base of a basaltic komatiite flow near the anticlinal axis at the south end of claim 1090036. Interestingly this is near the airborne INPUT and VLF conductor (OPAP/91 report) that appear coincident with the fold axis.

Conclusions and Recommendations

Time constraints have been such that it has been impossible to

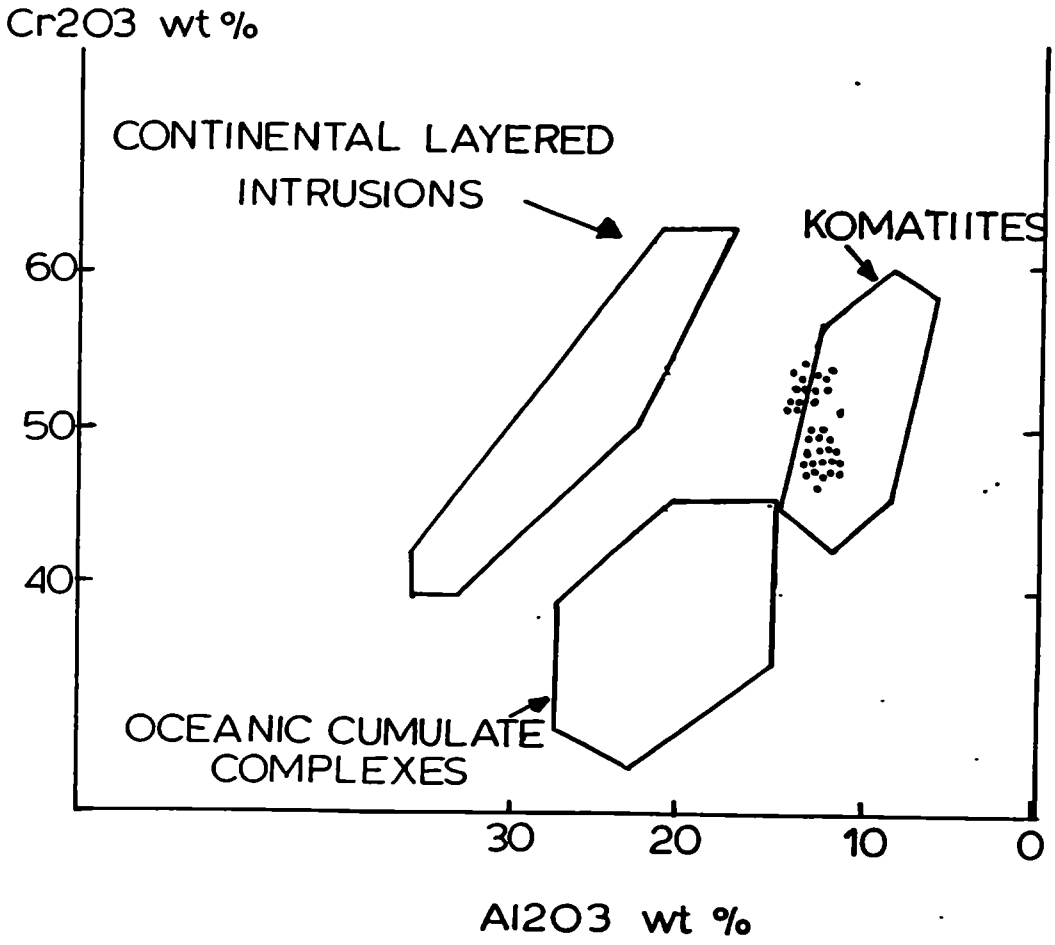


Figure No. 6

Cr2O3 vs. Al2O3 diagram for chromites from McCart Township illustrating the komatiitic affinity of the cores to grains. Discrimination diagram from Zhou and Kerrich (1992).

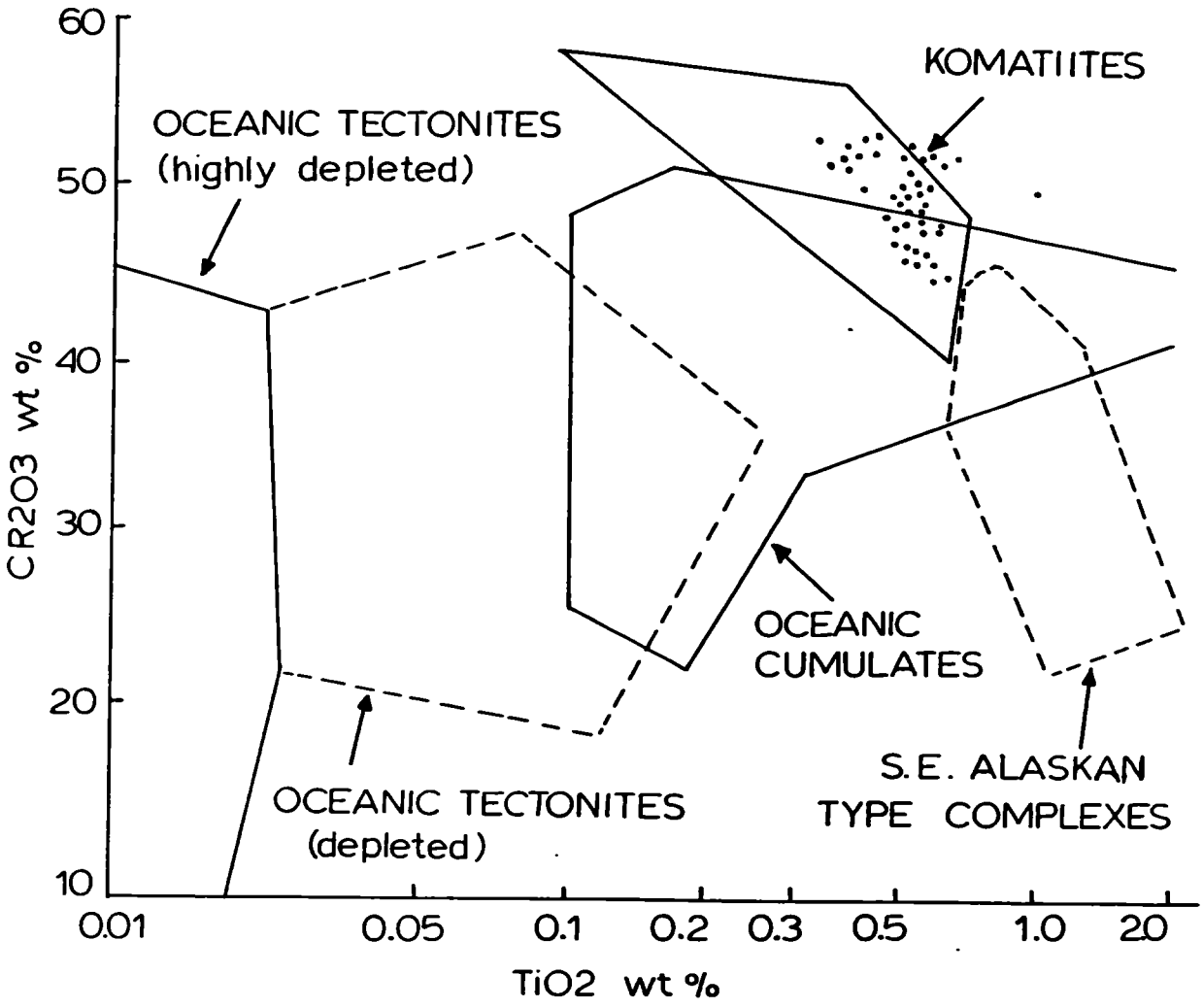
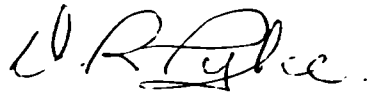


Figure No. 7 (6)

Cr2O3 vs. TiO2 diagram for chromites from McCart property showing relationships to different types of Ultramafic rocks.
(Herbert 1982, Jan and Windley, 1990).
(Zhou and Kerrich, 1992).

thoroughly scrutinize all the analytical data that has been generated through this study, in particular, with reference as to a how it relates to the igneous textures, composition, metamorphism, alteration and structures both within the ultramafics and surrounding komatiitic flows. That anomalous zinc concentrations do occur in the ultramafic rocks is encouraging, but further study of the data in conjunction with the petrography- petrology of the rocks is recommended before any concrete conclusions can be set out.



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APPENDIX A

LIST OF ALL SAMPLES TAKEN FOR THE MCCCART TOWNSHIP PROJECT

Sample Description (Thin Section - Polished Section - Geochemical)

P-20-92 Basalt, massive, medium grained, medium grey weathering and fresh. Plagioclase 40%, acicular pyroxene (actinolite) 60%.

P-21-92 Same, massive basalt, 60% green to colorless actinolite, 30-35 % plagioclase. Actinolite to 7mm, average 2-3mm.

P23-92 Peridotitic komatiite. Composed essentially of a fine matte of pale green actinolite, averages 0.5mm in grain size.

P-24-92 Gabbro, massive, equal proportions pale green actinolite and saussuritized plagioclase; 0.5-1mm grain size.

P-25-92 Dunite, massive, orange brown weathering. Olivine (1-1.5mm) is only partially altered (40-50%) to serpentine-talc-chlorite remainder is primary olivine.

P-26-92 Peridotite, massive, orange brown weathering "pebbly" textured surface. In thin section, 80% serpentine after olivine and 15-20% talc after pyroxene to 3mm.

P-27-92 Gabbro, massive, 60% light green actinolite, 30% twinned, recrystallized albitic plagioclase. Numerous (to 1cm), narrow felsic veins, largely of saussuritized plagioclase, confined to gabbro near south contact.

P-28-92 Peridotitic komatiite, strongly foliated base of a flow. Serpentine (35%), tremolite (30%), chlorite (8%), opaques (7%)

P-29-92 Peridotitic komatiite, massive, consisting essentially of 100% fine grained (0.5mm) colorless to pale green tremolite - tremolitic actinolite.

P-32-92 Gabbro, massive, medium grained (2-3mm), 50% light to medium green pleochroic actinolite, 45% weakly saussuritized plagioclase (An30-40), 5% opaques.

P33-92 Basaltic komatiite, pillowed, polysutured, consisting of fine grained (0.3-1mm) tremolitic actinolite (90%), 6% chlorite, 3% pumpellyite, and 1% magnetite and chrome spinel.

P35 to 38-92 (inclusive) - Samples of massive, black dunite, containing 15 to 25 % net textured sulphides (mainly pyrrhotite with traces of pentlandite and chalcopyrite). Olivine forms tightly packed grains (1-1.5mm) altered to serpentine.

P-39-92 Massive, fine grained, serpentinized peridotite, containing 65% serpentine after olivine (1mm), 20% talc after pyroxene and lesser olivine, 7% chlorite, 4% sulphide (almost wholly po), 2% oxide (spinel).

P40 to 44-92 (inclusive) - Serpentinized dunite-peridotite, massive, dark green to black, rusty weathering. Contains 10-20% net textured sulphides (po, trace cp), 5-8% oxide (spinel), and 70-75% former olivine (minor pyroxene?) grains to 1mm and now altered to serpentine, lesser talc and minor chlorite.

P-46-92 Basaltic komatiite, strongly foliated to schistose (from massive (non-pillowed) base of flow). Consists of approximately 85% tremolite, 15% chlorite.

P-46A-92 Dunite, tightly packed olivine grains (1mm) altered to serpentine and minor talc-chlorite. Opaques 5% (1% po, 4% oxide).

P49-92 Dunite, rusty weathering, massive, 3-4% net textured sulphide (po) within tightly packed olivine grains (1mm) altered to serpentine and minor talc. Minor (1%) oxide (spinel).

P-50-92 Same

P51-92 Dunite, massive, 85% olivine (0.7-1mm) altered to serpentine, 10% pyrocene (1-2mm) in part altered to talc and serpentine, 1% sulphide (po), 1-2% oxide (spinel).

P-53-92 Basaltic komatiite, tremolitic, foliated, massive base of flow; 1-2% fine disseminated po. In thin section, 70% tremolitic-actinolite, 25% feldspar, 3-5% opaques.

P54-92 Dunite, serpentinized, 1% fine disseminated sulphide. Approximately 45% serpentine, 35% talc, 15% chlorite, 4% oxide (spinel), 1% po. Olivine pseudomorphs average 1mm.

P56-92 Basalt, massive, one meter from base of flow, tremolitic. In thin section, pale green to colorless, shreddy actinolite (80%) varies from 0.2-1.5mm, averages 0.7mm. Minor, 10-15%, interstitial albitic plagioclase, 2-3% chlorite, minor leucoxene.

P57-92 Basalt, pillowed, light-medium green; 70% pale green actinolite, 25-30% albitic plagioclase, 1-2% opaques, minor clinozoisite-epidote.

P59-92 Basalt, pillowed, medium grey green, 65% pale green actinolite laths (0.6mm) - suggestion of radiating and plumose skeletal pseudomorphs ofpyroxene spinfex, 25-35% albitic plagioclase.

P60-92 Basalt, pillowed, light to medium grey green. Approximately 60% pale actinolitic hornblende and 35-40% saussuritized plagioclase. Some actinolite textures suggestive of pyroxene spinifex.

P62-92 Basaltic komatiite, pillowed. In thin section, 30% of slide consists of a very finely -ruled appearing brown matte with irregular wavy undulatory extinction, that strongly ressembles a pyroxene spinifex texture.

P63-92 Quartz vein, sheared, minor rust.

P64-92 Basalt, pillowed, fine grained, medium grey green, minor (2-3%) po+py.

P65-92 Basalt, pillowed dark green, amygdaloidal. Sample very sulphidic (30-40% py) and occurs within and interstitial to pillow rim.

P67-92 Basalt, massive, fine-medium grained medium-dark green; possibly a gabbro. In thin section contain approx 40% medium green actinolite and 60% plagioclase (An40), opaques 2-3%, average grain size 1mm.

APPENDIX B

SAMPLE DESCRIPTIONS AND PHOTOGRAPHS FROM NINE SAMPLES FOR WHICH CHROMITES ANALYSED IN MCCART TOWNSHIP

Microprobe Semple P-35-92

(Microprobe Analyses Nos. 1 - 19)

Sample Location: Map 1, Claim 1096035, Line 525 East, 625 North

Sample Description

P-35-92 is a "highly sacked" intrusive, cumulate textured dunite, sampled near the basal contact of the dunite with underlying mafic to ultramafic volcanic flows. The flows are largely komatiitic to tholeiitic in composition; a graphitic horizon, bearing up to 30% nodular pyrite, occurs within the volcanic succession, in proximity to the volcanic - intrusive contact (see Map 1).

Petrographic Description

0.5 - 3.0 mm olivine grains, now pseudomorphed by serpentine, comprise 75 - 90% of the rock. The sample exhibits well defined net-textured sulphides (largely pyrrhotite with enclosed fine "wormy" pentlandite and pyrite flames) occurring interstitial to serpentinized olivine grains. Fine, anhedral blebs of chalcopyrite also occur within the more massive pyrrhotite interstitial to the olivines.

Sulphides comprise 5 - 20% of the "net textured" interstices between pseudomorphed olivine grains, along with minor variable amounts of fine-grained tale and tremolite.

Chromite (spinels) occur as 1) rare discrete euhedral to subhedral grains completely enclosed within cumulate olivine crystals, and 2) as irregular clusters of grains clearly rimming and interstitial to olivine, in intimate association with sulphides. Textural relationships and mineral geochemistry clearly indicate that the "intra-olivine" chromite spinels and the cores of the "interstitial chromite spinels" are both magmatic in origin and of komatiitic affinity (see Figures 5 and 6).

Area "A" of reflected light photomicrographs Nos. 6 & 7 corresponds to analyses of spinels occurring interstitial to cumulate olivine grains (analysis Nos. 1-8 and 12- 14), the subhedral spinel grain indicated in area "B" corresponds to microprobe analysis Nos. 9-11.

Microprobe Analysis Descriptions -Sample P-35-92

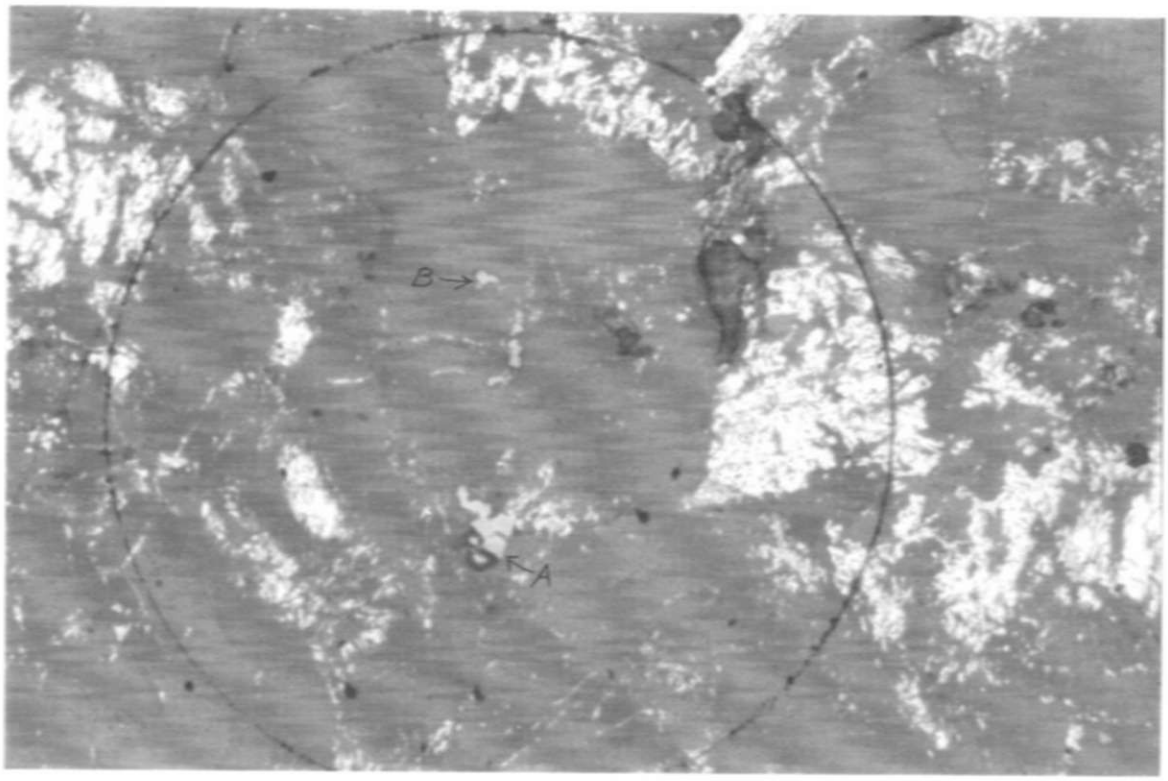
Analysis 1 - 0.05 mm diameter subhedral chromite grain with sharply defined ferrit-chromite rim - analysis of grain core (see microprobe photomicrograph No. 9).

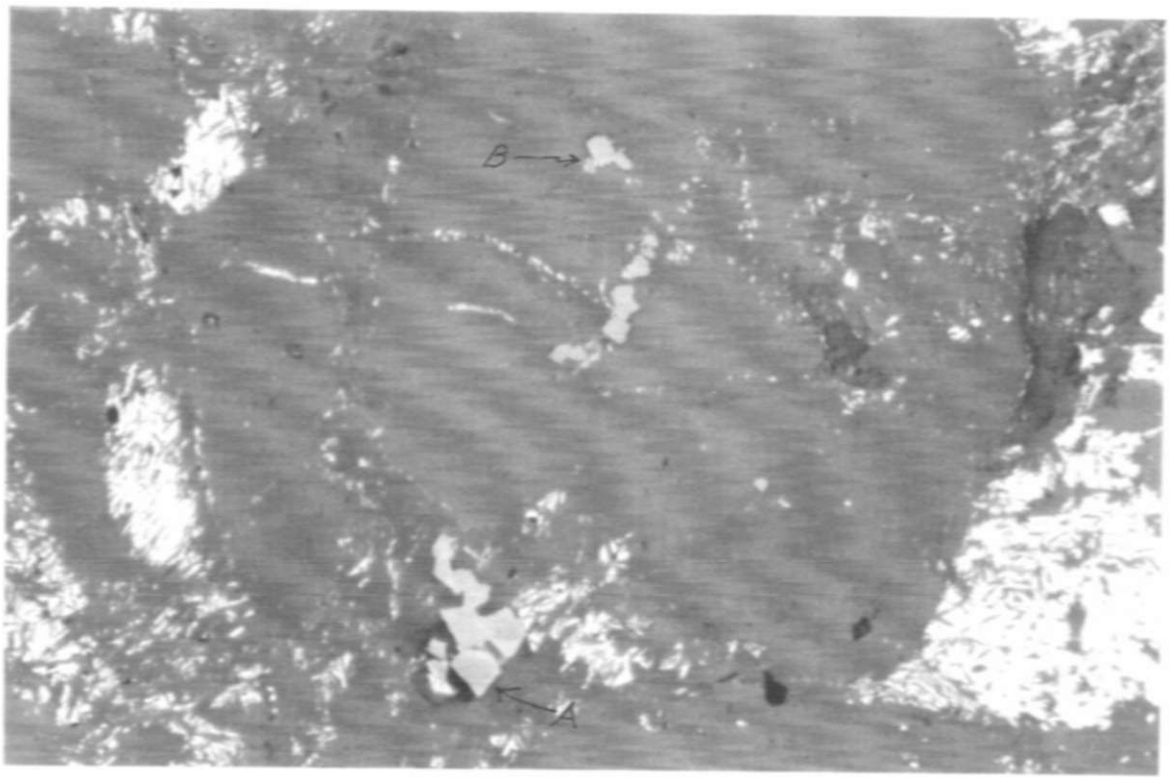
Photomicrograph No. 6 - Sample P-35-92

Reflected light photomicrograph showing "net-textured sulphides rimming cumulate olivine crystals. Chromite grains analyzed from "Spot A", associated with sulphides, are shown in photographs Nos. 9 and 10. The chromite grain at "Spot B", completely enclosed within serpentinized olivine, is shown on Photograph No. 8. Length of photo is 3.0 mm.

Photomicrograph No. 7 - Sample P-35-92

Enlargement of reflected light photomicrograph No. 6, showing net-textured sulphides and location of analyzed spinel grains "A" and "B". Length of photo is 1.55 mm.


B
A


B
A

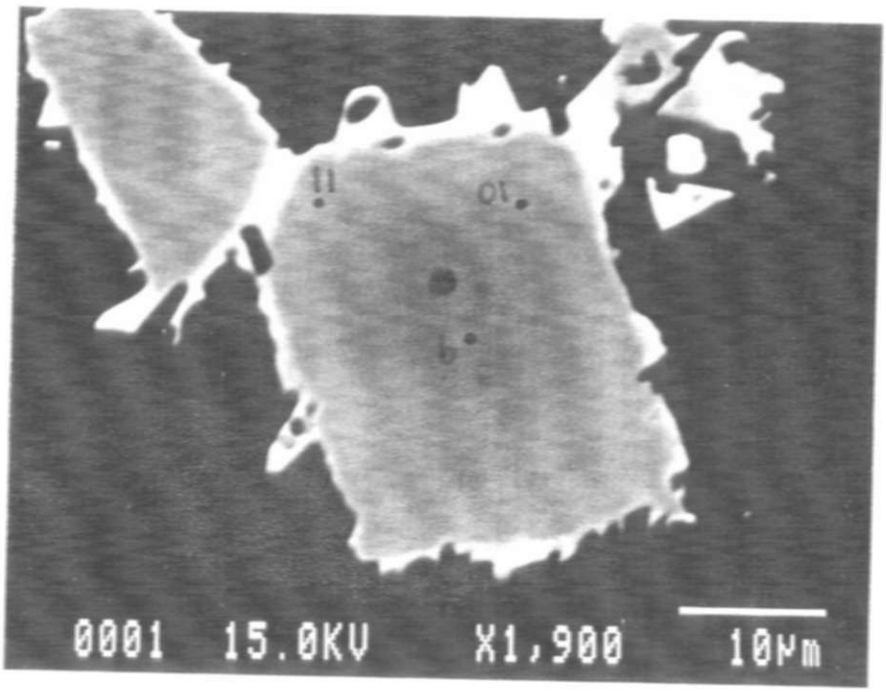
Photograph No. 8 Sample P-35-92

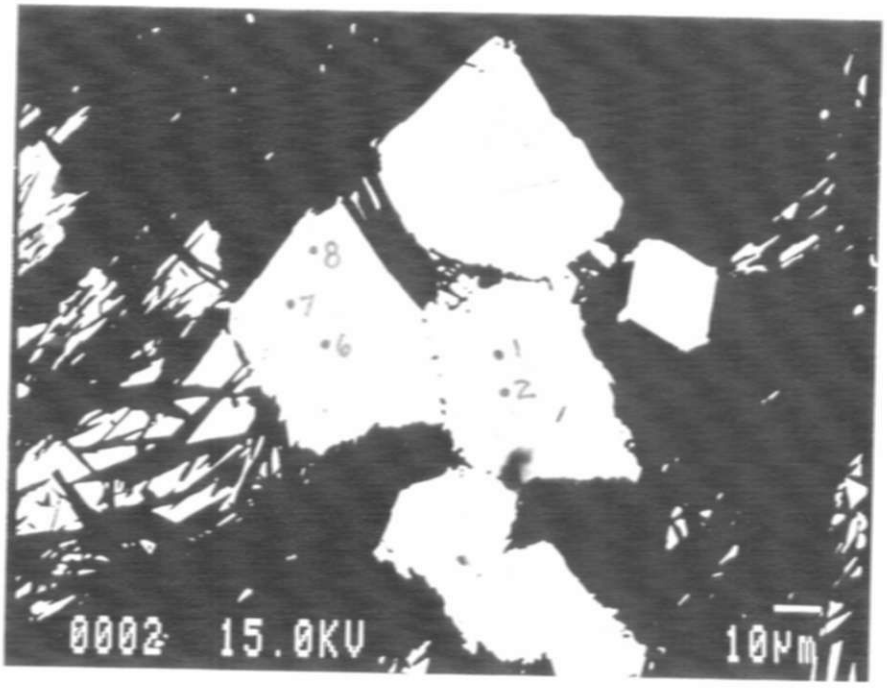
Backscattered electron image of 30 micron chromite grain totally enclosed within serpentinized olivine crystal. Location of grain is indicated by arrow "B" on Microphotographs Nos. 6 and 7. (Analyses 9 - 11). Grain is subhedral, diffusely zoned, with a very ragged magnetite rim.

Photograph No. 9 Sample P-35-92

Backscattered electron image of chromite grains occurring in intimate association with "net-textured" sulphides, intercumulate to serpentinized olivine grains. (Location of grains is indicated by Arrow A on Microphotographs No. 6 and 7.

(Analyses 1-2, 6-8). Note wide ferrite chromite rims on visually unzoned chromite grains and very anhedral morphology of chromite grain interior. The very bright material surrounding the spinels is pyrrhotite with minor chalcopyrite and with minor amounts of an unknown nickel sulphide.


11
10
b
0001 15.0KV X1,900 10µm

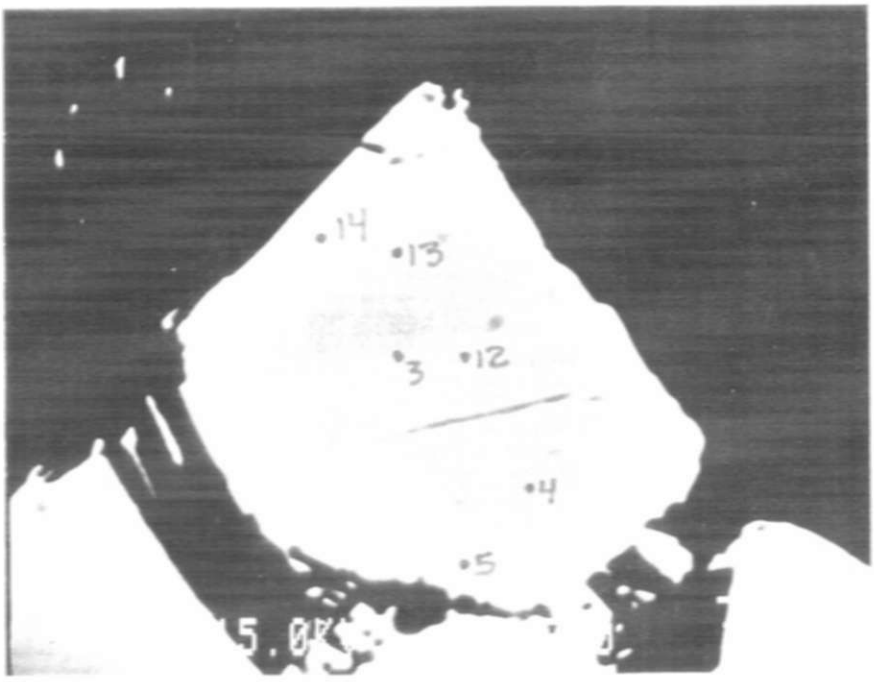

8
7
6
1
2
0002 15.0KV 10µm

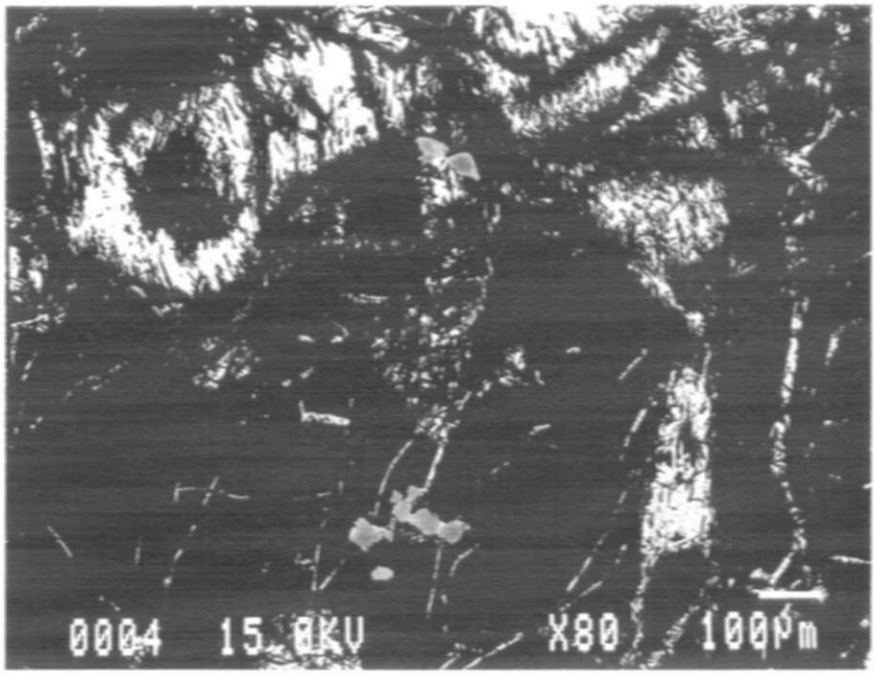
Photograph No, 10 Sample P-35-92

Enlarged backscattered image of upper chromite grains shown in Photograph No. 9. (Analyses 3-5, 12-14). Note wide ferritchromite rims and lack of visual zon ation within chromite grains.

Photograph No. 11 Sample P-35-92

Backscattered electron image showing occurrence of net-textured sulphides (bright grey) interstitial to cumulate-textured, now serpentinized olivine grains (black). Spinel analyses 15 and 16 (photo No. 12) are from upper central area of olivine grain.


14
13
3
12
4
5

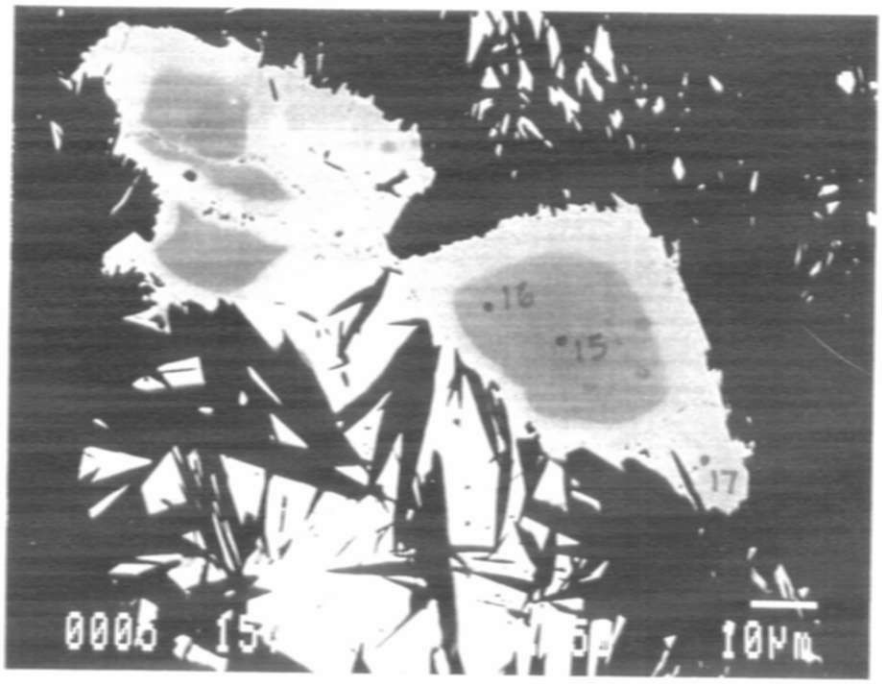

0004 15.0KV X80 100µm

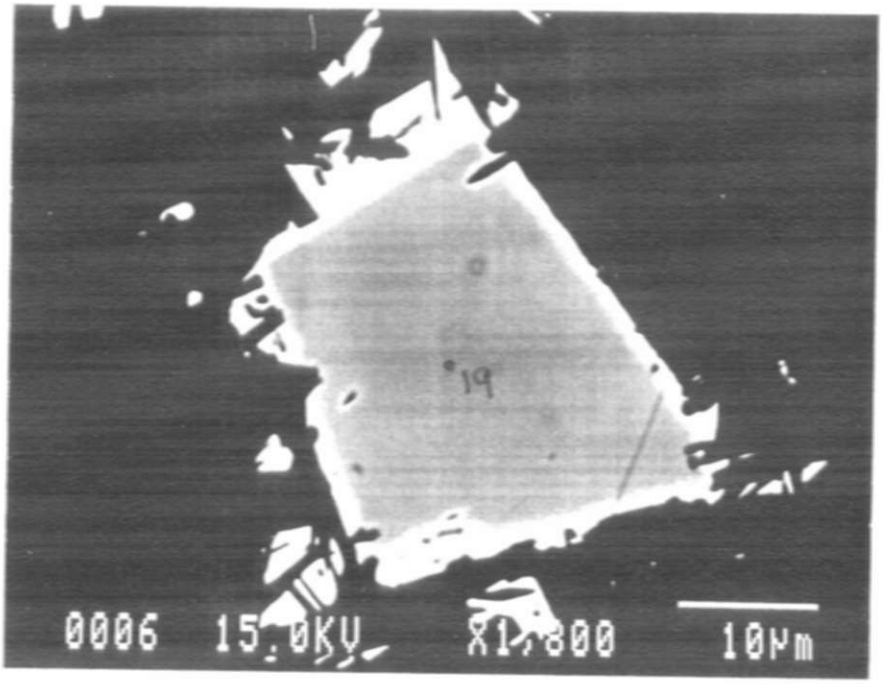
Photograph No. 12 Sample P-35-92

Backscattered electron image of anhedral, strongly fractured and embayed chromite grains with wide ferritchromite rimms. Chromite grains are intimately associated with sulphides (bright grey and angular on photograph.) (Analyses 15-17).

Photograph No. 13 Sample P-35-92

Backscattered electron image of euhedral chromite grain with thin ferritchromite rim. (Analysis No. 19). Associated with sulphides.





Picture #6 Dec. 7/92

Analysis 2- Duplicate analysis of No. 1 - moved over 10 microns, (analysis of grain core).

Analysis 3- See microprobe photgraph No. 10, which is a blow-up of portions of the upper central portions of microprobe photograph No. 9. (upper central portions of picture.) Analysis is of core of chromite grain .

Analysis 4 - see microprobe photograph No.10; outer rim or chromite grain, near to chromite-ferritchromite rim border.

Analysis 5 - see microprobe photograph No.10; ferritchromite rim on chromite grain.

Analysis 6 - see microprobe photograph No. 9, core of chromite grain.

Analysis 7 - see microprobe photograph No. 9, outer margin ofchromite grain.

Analysis 8 - ferritchromite rim on chromite grain (see microprobe photograph No. 9.)

Analysis 9- core of chromite grain completely enclosed within cumulate textured olivine crystal. (See microprobe Photograph No.8.)

Analysis 10 - outer margin of same chromite grain .

Analysis 11- outer margin of same chromite grain.

Analysis 12- mid-interior of chromite grain (see microprobe photographs No. 9 and No.10.)

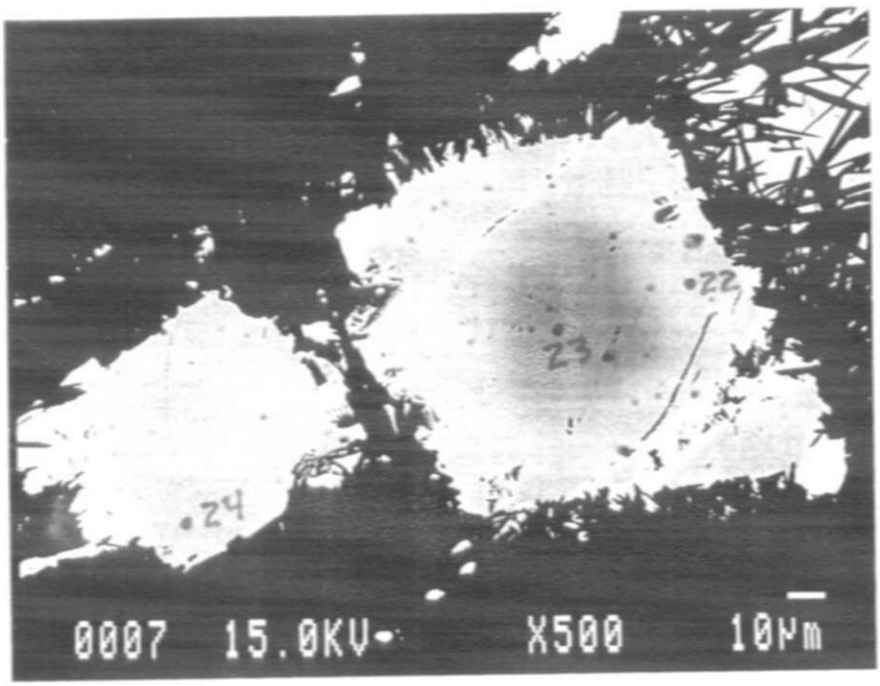
Analysis 13- margin of same chromite grain.

Analysis 14 - ferritchromite rim enclosing chromite grain

Analysis 15- (see microprobe photograph No.12). Core of chromite grain. Grain of spinel occurs interstitially to cumulate olivine and is associated with sulphides and chlorite-tremolite.

Photograph No. 14 Sample P-49-92

Backscattered electron image of 60 micron altered chromite grains associated with intercumulate "net-textured" sulphides (Analyses No. 22 - 24). Grains are fractured, with fractures containing chrome-rich magnetite.


22
23
24
0007 15.0KV X500 10µm

Analysis 16 - (see microprobe photograph No.12). Outer margin of chromite grain, near border with ferrit-chromite rim.

Analysis 17- ferrit-chromite rim , analysis from same grain as that of no. 16.

Analysis 18- Errata - bad analysis.

Analysis 19- Core of 0.7 mm. chromite grain , rimmed by minor magnetite and by sulphides. (See microprobe photograph No.13.)

Micorobe Sample P-49-92

(Microprobe analyses Nos. 20 - 26)

Sample Location: Map 1, Claim 1090034, Line 250E, 600 North

Sample Description

P-49-92 is an intrusive, cumulate-textured dunite, rusty weathering, sampled approximately 150 metres northwest of the intrusive-volcanic contact.

Petrographic Descriptions

This sample is very similar to P-35-92. It is a serpentinized, cumulate textured dunite with 3 - 5% "net-textured" sulphides (pyrrhotite + pyrite + pentlandite) occurring interstitially to cumulate olivine grains. Chromite spinels occur as 1) euhedral to subhedral grains enclosed within olivine and 2) as subhedral grain clusters interstitial to cumulate olivine, associated with sulphides, chlorite, serpentine and talc.

Microprobe Analysis Descriptions

Analysis 20 - core of spinel (chromite) grain, interstitial to olivine and associated with sulphides.

Analysis 21 - core of chromite grain interstitial to cumulate olivine and associated with sulphides.

Analysis 22 - (see microprobe photograph No.14). Lighter, outer margin of zoned chromite grain.

Analysis 23 - (see microprobe photograph No.14) Darker core of same chromite grain.

Analysis 24 - (see microprobe photograph No.14). Outer margin of adjacent, finer grained chromite crystal.

Analysis 25 - Core of 20 micron subhedral chromite grain, intersitsial to olivine grains and associated with sulphides. No apparent zoning. Very thin, ragged, ferritchromite rim on chromite grain.

Analysis 26 - Duplicate analysis of No. 25 - core of chromite grain.

Analysis 27 - Chrome -rich magnetite rim on chromite grain; magnetite rim is very corroded.

Analysis 28 - Subhedral chromite spinel with 10-20 micron wide ragged magnetite rim. No visible internal zoning of spinels. Analysis from midway between core and rim of chromite grain.

Analysis 29- 0.07 mm, fractured chromite grain - with ragged ferritchromite rim. Occurs interstitially to olivine grains, associated with sulphides.

Analysis 30 - 30 micron, anhedral, embayed spinel; core of altereed grain; no internal zoning.

Analysis 31 - Anhedral, 25 micron diameter embayed spinel; brighter no internal zoning; very thin magnetite rim on grain.

Analysis 32 - 30 micron subhedral spinel, occurs interstitial to olivine and is associated with 1-3% sulphides. Thin ferritchromite rim on grain.

Analysis 33 - 40 micron subhedral spinel, no internal zoning, rimmed by ferritchromite. Occurs interstitial to olivine and is associated with 5% "net-textured" pyrrhotite plus pyrite

Microprobe Sample P-48-92

(Microprobe Analyses Nos. 34 - 44)

Sample Location: Map 1, Claim 1090034, Line 200E, 750 North

Sample Description

Sample P-48-92 is a very massive, fine grained dunite, dark blue black in colour. Displays a fine grained well preserved cumulate texture with little or no observable sulphides. Olivine is now replaced by serpentine and very minor talc. Contains 2-4% chromite, almost entirely occurring interstitially to olivine.

Microprobe Analysis Descriptions P-48-92

Analyses Nos. 34 - 39 - see analysis locations on microprobe photograph No.15.

Analysis 40 - Spot 3; analysis from highly fractured 200 micron sized spinel grain with very well developed chrome rich magnetitie rim. Magnetite also fills fractures in grain. Analysis is of darker core.

Analysis 41 - same grain as above, but analysis is of paler outer grey margin of chromite grain.

Analysis 42 - center of a 120 micron subhedral chromite grain.

Analysis 43 - center of a 100 micron euhedral chromite grain with thick chrome rich magnetite rim.

Microprobe Sample P-54-92

(Microprobe Analyses Nos. 44 - 56)

Sample Location: Map 1, Claim 1090034, Line 250E, 420 North

Sample Description

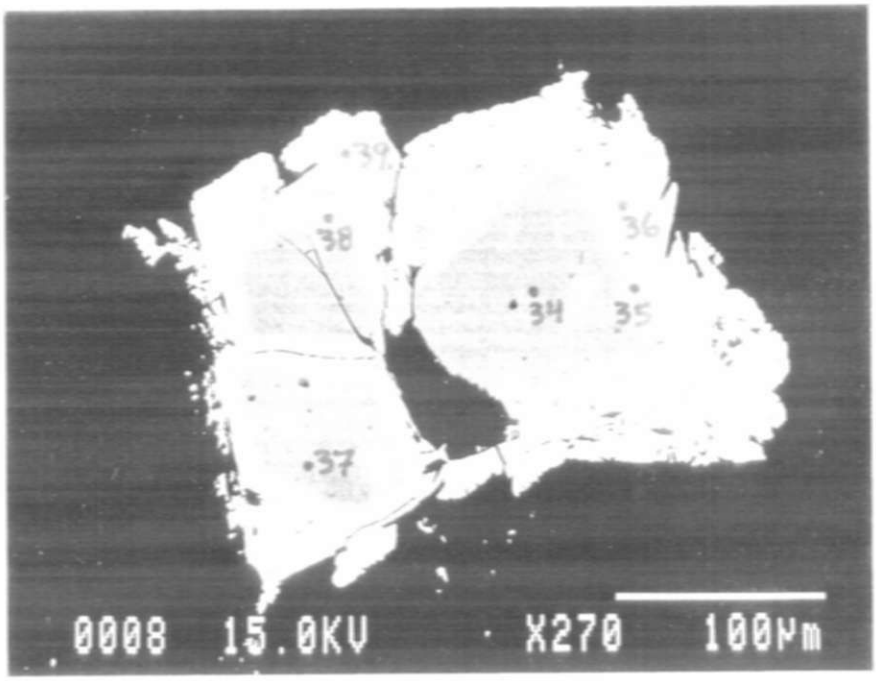
P-54-92 is a massive peridotite, blue black in colour and containing approximately 45% 1 mm. size olivine grains, now altered to serpentine and lesser chlorite 40% talc and minor carbonate occur, largely corroding

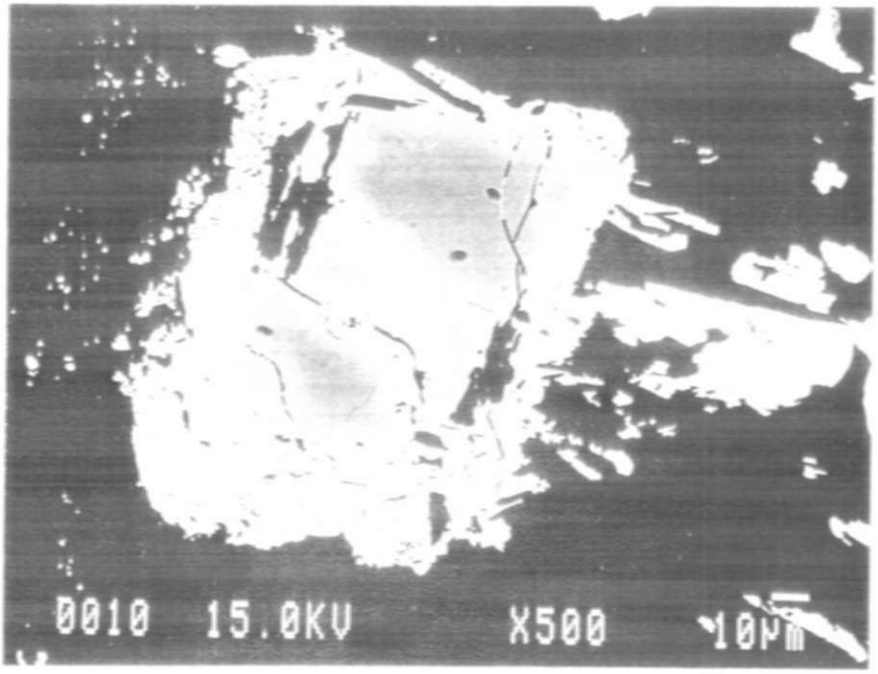
Photograph No. 15 - Sample P-48-92

Backscattered electron image of composite chromite grains with very wide, chrome-rich magnetite margins (analyses 34 -39). Note partial replacement of chromite by magnetite.

Photograph No. 16 - Sample P-48-92

Backscattered electron image of highly fractured, "zoned" chromite grain with wide magnetite rim. Note replacement of chromite by magnetite along fractures.


39
38
36
34
35
37
0008 15.0KV X270 100µm


0010 15.0KV X500 10µm

and replacing remnant clinopyroxene grains (3-5% remaining). 2-3% subhedral interstitial chromite grains (to 0.6 mm in size) and common very fine whispy bands of magnetite surrounding olivines. Sample contains up to 1-2% very fine disseminated pyrrhotite (weakly nickelliferous)

Microprobe Analysis Descriptions - Sample P-54-92

Analysis 44 - 70 micron diamond shaped euhedral spinel with thin magnetitie rim Analysis of paler outer zone of chromite grain.

Analyses 45 - 49 - analyses of dark cores to three different chromite grains.

Analyses 50 - 52 (See microprobe photograph No.17 for location of grain analysis).

Analysis 53 - spot 2. 50 micron subhedral chromite - zoning occurs within the grain but is diffuse and gradational. Analysis of darker core.

Analysis 54 - same grain as 53, but enalysis of outer rim.

Analysis 55 - Darker core of adjacent chromite grain - grain ;shows similar diffuse zoning.

Analysis 56 - same grain as 55, but analysis of paler outer rim of grain.

Microprobe Sample P-25-92

(Microprobe Analyses Nos. 57 - 67)

Sample Location: Map 1, northeast corner of the property.

Sample Description

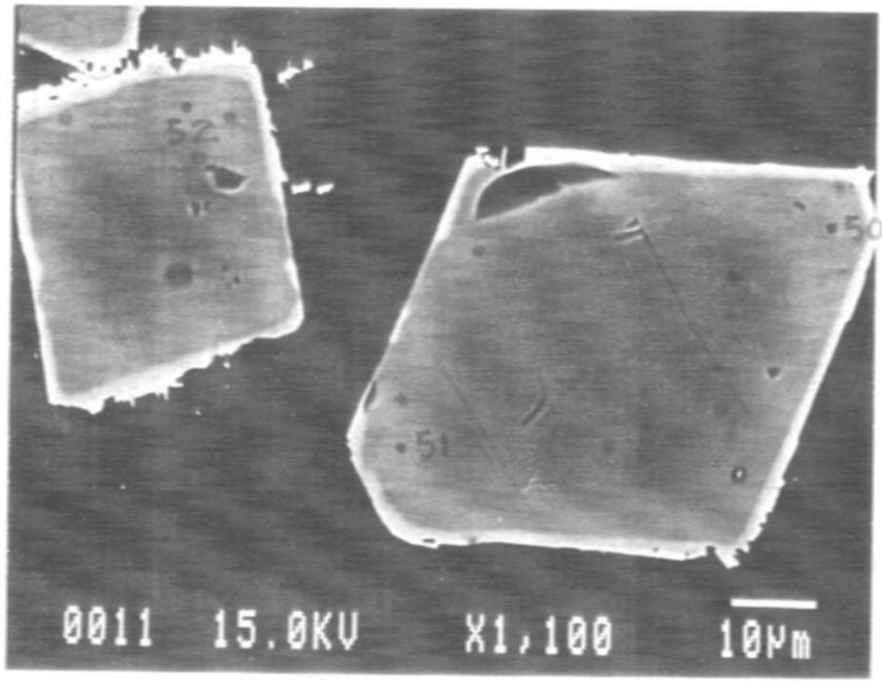
Sample P-25-92 is a massive dunite, orange brown weathering. Consists of tightly packed olivine grains, averaging 1.0 - 1..5 mm. Much of the olivine is primary, with alteration to serpentine and chlorite being confined to grain margins and fractures. 3% chromite as interstitial euhedral to subhedral grains to 0.1 mm in size. Trace (less than one percent) fine relict clinopyroxene.

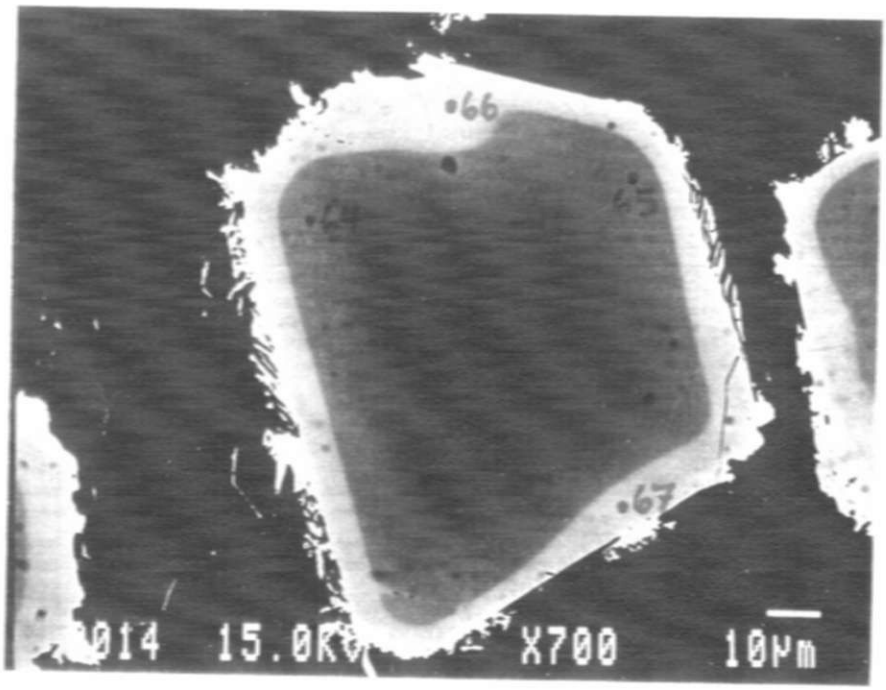
Photograph No. 17 Sample P-54-92

Backscattered electon image of fine grained, diffusely zoned, euhedral chromites with very thin ferritchromite rims., completely enclosed within silicates. (Analysis Nos. 50 -52).

Photograph No. 18 Sample P-25-92

Backscattered electron image of subhedral, zoned, 100 micron chromite grain with 5 micron ferritchromite rim. (Analayses Nos. 62-67). Fine grained magnetite forms "whispy" borders to ferritchromite rims.


52
50
51
0011 15.0KV X1,100 10µm


66
67
014 15.0KV X700 10µm

Microprobe Analysis Descriptions Sample P-25-92

Analysis 57- spot 1 200 micron subhedral spinel, possibly weakly zoned. Analysis is of darker core.

Analysis 58 - spot 1, same grain as analysis 57, but analysis of slightly paler outer zone of grain.

Analysis 59 - same grain, another analysis of diffuse paler rim.

Analysis 60 - spot 1, 150 micron euhedral, diffusely zoned chromite grain with 15 micron ferritchromite rim. Analysis is of darker grain core.

Analysis 61 - same grain, but analysis of paler diffuse outer margin.

Analyses 62 - 67 (see microprobe photograph No 16 for location of analyses). Analyses are from a diffusely zoned chromite grain rimmed by 10 microns of ferritchromite.

Microprobe Sample P-51-92

(Microprobe Analyses Nos. 68 - 78)

Sample Location: Map 1, Claim 1090034, Line 150E, 510N.

Sample Description

P-51-92 is a massive peridotite consisting of 75% olivine (1 mm) altered to serpentine and 15% interstitial clinopyroxene, largely unaltered. 2% fine grained interstitial sulphides (largely pyrrhotite). 1-2 percent fine grained (0.04 mm) chromite occurs interstitial to olivine, and as rare included grains within olivine and pyroxene.

Microprobe Analysis Descriptions - Sample P-51-92

Analysis 68- spot 1, 45 micron chromite grain with 2-4 micron magnetite rim Analysis is of grain core. Grain demonstrates no visible zoning

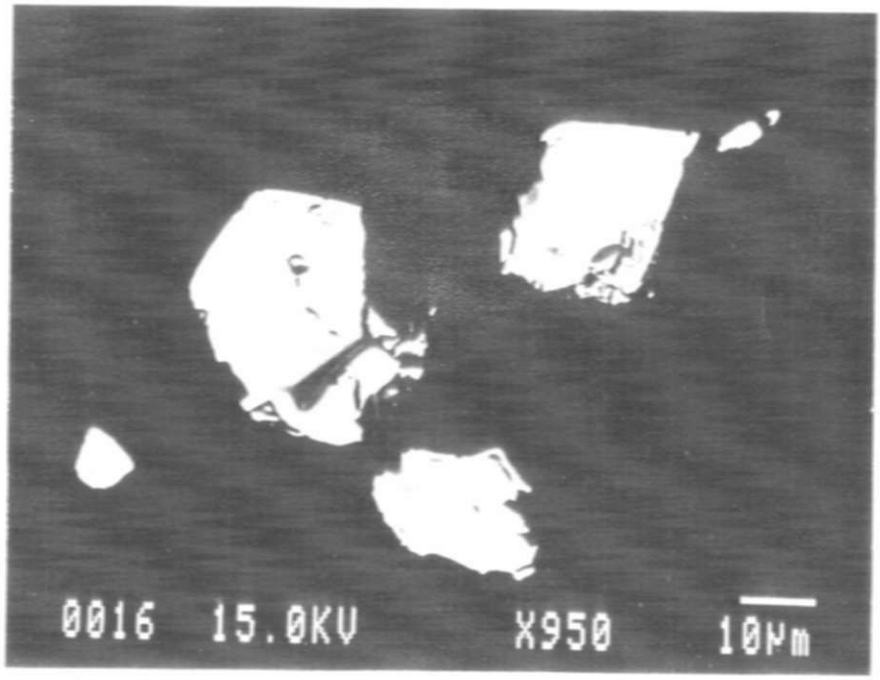
Analysis 69 - same grain, but analysis from grain margin, close to magnetite rim.

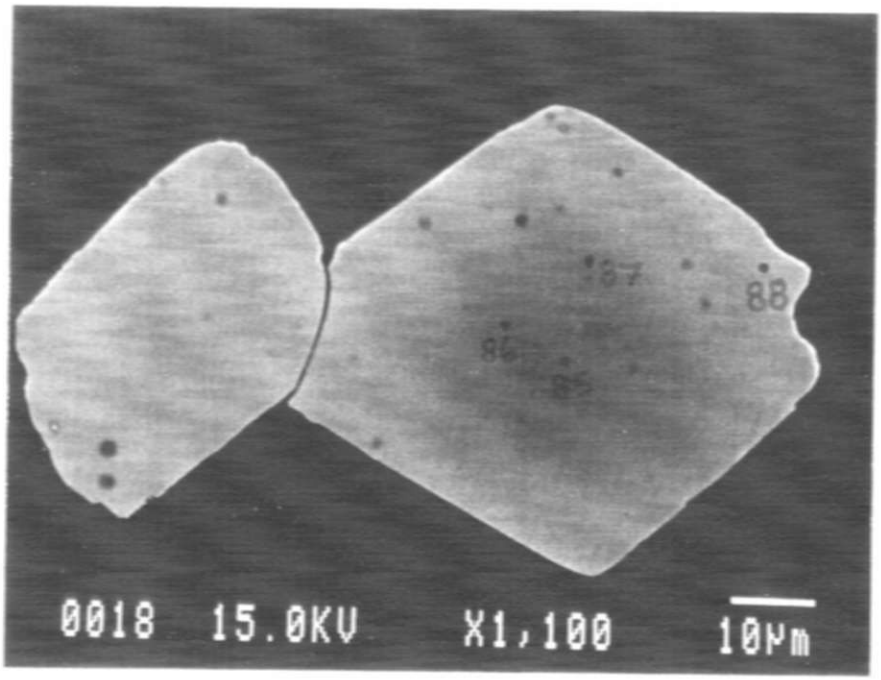
Photograph No. 19 Sample P-46-92

Backscattered electron image of very fine grained euhedral to subhedral chromite grains within foliated basaltic komatiitic basal flows. Note substantial corrossion of grain margins.

Photomicrograph No. 20 Sample P-46-92

Backscattered electron image of diffusely zoned, euhedral chromite crystals within foliated basaltic komatiite. Notice lack of magnetite/ferritchromite rims on grains (Analysis Nos. 85-88).


0016 15.0KV X950 10µm


0018 15.0KV X1,100 10µm

Analysis 70 - spot 1, analysis of adjacent, unzoned, 45 micron chromite grain. Analysis from core of grain.

Analysis 71 - same grain, but analysis from close to outer margin of the grain.

Analysis 72 - spot 2, diamond shaped 100 micron unzoned chromite grain with 5-10 micron magnetite rim. Chromite grain is completely enclosed within altered olivine. Analysis of of core of grain.

Analysis 73 - same grain; analysis is from within 5 microns of outer magnetite rim.

Analysis 74 - same grain, analysis from near outer grain margin.

Analysis 75 - spot 3, 80 micron euhedral, unzoned chromite grain with thin magnetite rim. Grain is enclosed within silicates. Analysis is of grain core.

Analysis 76 - same grain, but analysis of near to outer grain margin

Analysis 77 - spot 3, anhedral, unzoned chromite with very ragged outline. Grain occurs interstital to olivine and is intimately associated with pyrrhotite and pyrite. Analysis is of grain core.

Analysis 78 - same grain, but analysis from near to outer grain margin.

Microprobe Sample P-46-92

(Microprobe Analyses Nos 79 - 88)

Sample Location: Map 1, Claim 1090036, Line 480E, 450N

Sample Description

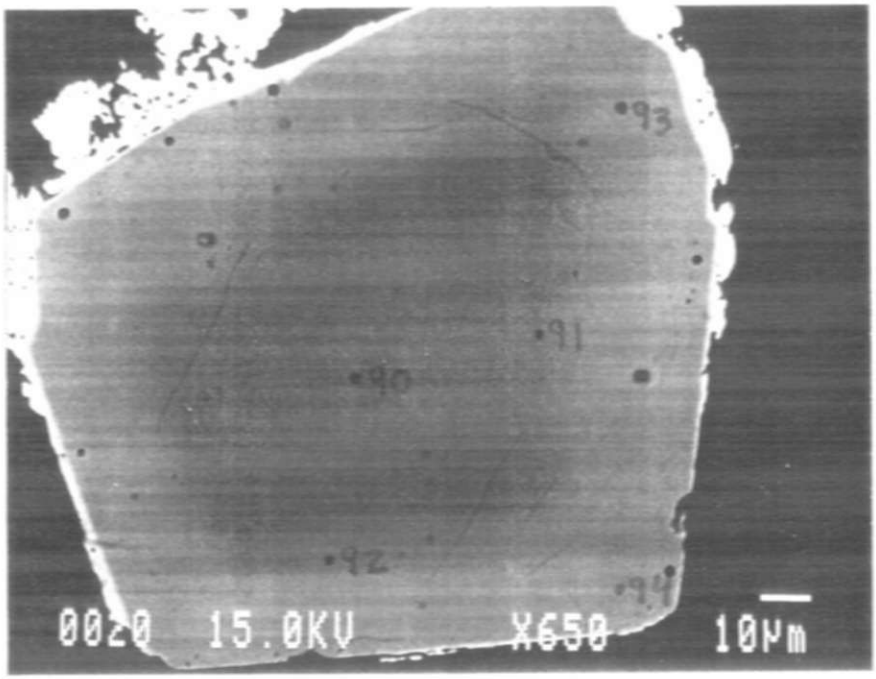
Sample P-46-92 is a basaltic komatiite, strongly foliated to schistose. Sample is from massive (non-pillowed) base of flow. Mineralogy consists of equant (0.7 - 2.0 mm) colourless tremolite grains in a fine grained felty tremolitic matrix with lesser (15%) patches of interwoven chlorite. Less than one percent chrome spinels occur as fine (0.01 - 0.05) disseminated grains.

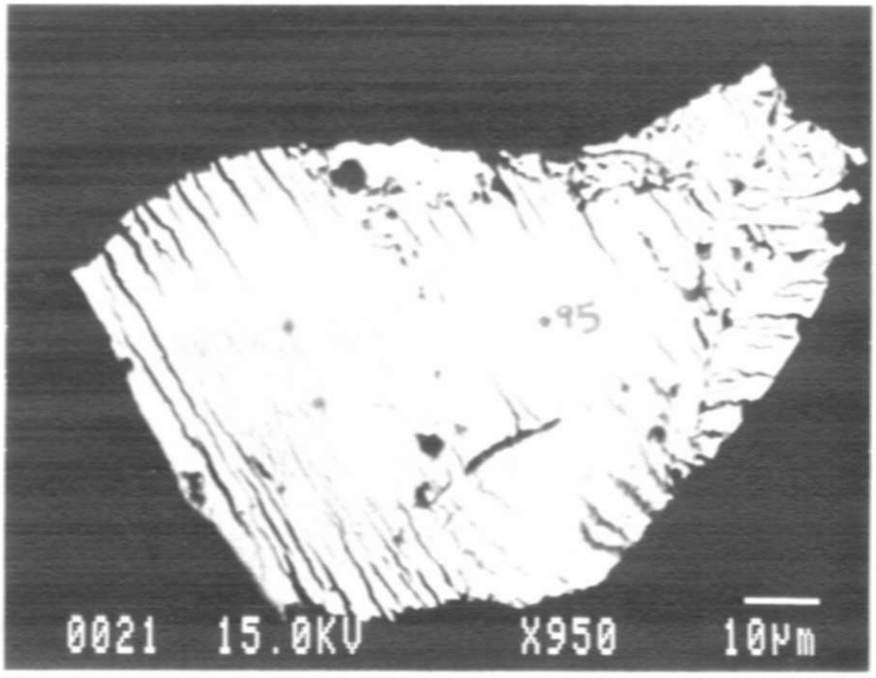
Photomicrograph No. 21 Sample P46A-92

Backscattered electron image of diffusely zoned, subhedral chromite grain with thin, ragged chrome-rich magnetite rim. (Analyses 90 -94). Note concentric fractures roughly outlining darker core of chromite grain.

Photomicrograph No. 22 Sample P-46A-92

Backscattered electron image of 120 micron, anhedral bleb of intergrown pyrrhotite and unknown nickel sulphide mineral. (Analysis No. 95.). Analysis indicated 87.15 NiO in sample.


93
91
90
92
94
0020 15.0KV X650 10µm


95
0021 15.0KV X950 10µm

Microprobe Analysis Descriptions Sample P-46-92

Analysis 79- spot 1, centre of 25 micron chromite grain. Grain is unzoned and totally lacks an enclosing magnetite rim. (See microprobe photograph No. 16).

Analysis 80 - same grain, but analysis from within 4 microns of grain edge.

Analysis 81 - center of adjacent rectangular, 20 micron unzoned chromite grain. No magnetite rim present on grain.

Analysis 82 - spot 1. Analysis of core of 35 micron subhedral, unzoned chromite grain, lacking a magnetite rim.

Analysis 83 - spot 1. Analysis of core of 40 micron subhedral, unzoned chromite grain, lacking a magnetite rim

Analysis 84 - spot 3. Analysis of core of square 25 micron, unzoned chromite grain, lacking a magnetite rim.

Analyses 85 - 88 - Analyses from a zoned, 50 micron euhedral chromite grain, lacking magnetite rim. (see microprobe photograph No. 20 for location of analyses.)

Microprobe Sample P-46A-92

(Microprobe Analyses Nos. 89 - 109)

Sample Location: Map 1, Claim 1090036, Line 425E, 800N

Sample Description

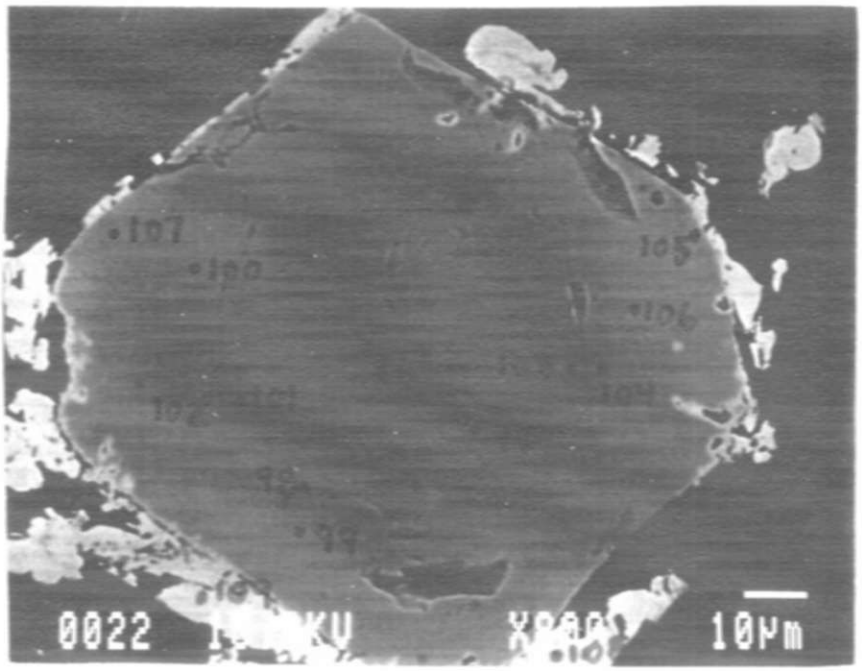
P-46A-92 is a massive dunite, consisting of tightly packed olivine grains (average 1 mm) altered to serpentine and minor talc. Abundant chromite (5%) occurs as interstitial subhedral grains to 0.5 mm and fine (0.01 mm) trains, all rimmed by magnetite. No visible sulphides in section.

Microprobe Analysis Descriptions - P-46A-92

Analysis 89 - spot 4, zoned 100 micron chromite grain rimmed by

Microphotograph No. 23 Sample P46A-92

Backscattered electron image of 150 micron, euhedral chromite grain, rimmied by chromite-rich magnetitite. (Analyses 96 - 109). Note concentric fractures roughly enclosing darker core of chromite grain.


0022
10µm

magnetite. Analysis is from pale, outer rim of grain.

Analyses 90 - 94 - (see Microprobe Photograph No. 21 for location of analyses. Zoned, subhedral 150 micron chromite grain with thin, ragged magnetite rim. Note roughly concentric fractures occurring around margin of the darker grain core.

Analysis 95 - (see Microprobe Photograph No 22 for location of analysis) Analysis is of a 130 micron, anhedral sulphide grain showing intergrowth of pyrrhotite and an unknown nickel sulphide.

Analyses 96 - 109 - (see Microprobe Photograph No. 23 for location of analysis) Euhedral 120 micron zoned chromite grain with an irregular rim of chrome-rich magnetite Note concentric fractures roughly enclosing the darker grain core. Analyses 108 and 109 are of the chrome rich magnetite rim.

APPENDIX C

MICROPROBE ANALYSES OF CHROMITE GRAINS

MCCART TOWNSHIP PROPERTY

SPINELS. DECEMBER 7, 1992

	1	2	3	4	5	6	7	8	9	10
SIO2	.02	.03	.05	.09	.04	.08	.04	.09	.03	.06
TIO2	.53	.56	.54	.67	1.19	.58	.58	1.00	.49	.53
A2O3	12.94	13.09	12.42	11.83	.26	12.19	12.07	.17	13.44	13.32
C2O3	49.47	48.67	47.69	45.83	26.25	46.67	46.90	22.73	48.60	47.67
FEO	26.65	27.38	34.85	34.49	65.98	34.40	35.24	68.19	26.75	28.86
MNO	.43	.48	1.46	1.40	1.05	1.34	1.46	1.01	.61	.97
MGO	8.52	8.40	2.12	1.31	.09	2.09	1.77	.09	8.29	6.26
ZNO	.24	.00	.71	1.74	.59	1.11	1.33	.38	.08	.14
SUM	98.80	98.61	99.84	97.36	95.45	98.46	99.39	93.66	98.29	97.81
* RECALCULATED ANALYSIS - MAGNETITE-ULVOSPINEL BASIS *										
F2O3	6.64	7.05	6.18	6.19	39.14	6.35	6.83	42.05	6.52	6.00
FEO	20.66	21.03	29.28	28.92	30.72	28.68	29.08	30.30	20.87	23.46
TOTL	99.46	99.31	100.45	97.97	99.33	99.09	100.07	97.83	98.94	98.40
USP	1.39	1.50	1.58	2.12	3.57	1.81	1.66	3.27	1.33	1.56
* RECALCULATED ANALYSIS - ILMENITE-HEMATITE BASIS *										
F2O3	10.52	11.18	9.87	10.07	59.96	10.21	10.88	64.20	10.32	9.61
FEO	17.17	17.31	25.96	25.42	11.96	25.21	25.44	10.35	17.46	20.20
TOTL	99.84	99.72	100.82	98.36	101.39	99.47	100.47	100.02	99.31	98.76
ROMB	1.33	1.43	1.50	2.01	2.75	1.72	1.58	2.47	1.27	1.49

MOL PROPS	RO2	RO	R2O3	TITLE
1	.70	50.00	49.30	"SAMPLE P-35-92, ANALYSIS 1"
2	.75	50.00	49.25	"SAMPLE P-35-92, ANALYSIS 2"
3	.79	50.00	49.21	"SAMPLE P-35-92, ANALYSIS 3"
4	1.06	50.00	48.94	"SAMPLE P-35-92, ANALYSIS 4"
5	1.78	50.00	48.22	"SAMPLE P-35-92, ANALYSIS 5"
6	.90	50.00	49.10	"SAMPLE P-35-92, ANALYSIS 6"
7	.83	50.00	49.17	"SAMPLE P-35-92, ANALYSIS 7"
8	1.63	50.00	48.37	"SAMPLE P-35-92, ANALYSIS 8"
9	.66	50.00	49.34	"SAMPLE P-35-92, ANALYSIS 9"
10	.78	50.00	49.22	"SAMPLE P-35-92, ANALYSIS 10"

	11	12	13	14	15	16	17	18	19	20
SIO2	.04	.04	.06	.07	.03	.03	.06	.04	.03	.00
TIO2	.55	.57	.61	1.07	.79	1.51	.97	.00	.68	2.68
A2O3	12.90	12.44	11.88	.22	17.47	16.84	.21	.01	14.81	10.03
C2O3	46.95	46.01	46.01	23.52	39.54	35.38	28.01	.00	45.69	41.39
FEO	31.80	33.03	35.83	65.72	35.52	38.16	63.30	.37	29.90	38.95
MNO	1.27	1.50	1.54	.96	1.23	1.60	1.12	.00	.90	1.02
MGO	3.47	1.96	1.42	.09	3.73	1.57	.10	.03	6.68	.89
ZNO	.59	.77	1.61	.52	.64	1.92	.70	.00	.03	.94
SUM	97.57	96.32	98.96	92.17	98.95	97.01	94.47	.45	98.72	95.90
* RECALCULATED ANALYSIS - MAGNETITE-ULVOSPINEL BASIS *										
F2O3	5.49	5.24	7.39	39.92	8.50	9.54	36.97	.24	6.97	8.10
FEO	26.85	28.31	29.18	29.76	27.86	29.56	30.00	.16	23.62	31.65
TOTL	98.11	96.84	99.69	96.13	99.79	97.96	98.13	.47	99.41	96.70
USP	1.58	1.68	1.82	3.45	2.10	4.07	3.05	29.56	1.81	7.37
* RECALCULATED ANALYSIS - ILMENITE-HEMATITE BASIS *										
F2O3	8.84	8.49	11.77	61.04	13.58	15.86	56.50	.41	11.17	14.83
FEO	23.83	25.38	25.23	10.73	23.29	23.87	12.40	.00	19.84	25.59
TOTL	98.45	97.16	100.13	98.22	100.30	98.58	100.07	.49	99.83	97.37
ROMB	1.51	1.61	1.72	2.63	1.97	3.75	2.37	20.00	1.72	6.75

SPINELS, DECEMBER 7, 1992

MOL PROPS	RO2	RO	R2O3	TITLE
11	.79	50.00	49.21	"SAMPLE P-35-92, ANALYSIS 11"
12	.84	50.00	49.16	"SAMPLE P-35-92, ANALYSIS 12"
13	.91	50.00	49.09	"SAMPLE P-35-92, ANALYSIS 13"
14	1.73	50.00	48.27	"SAMPLE P-35-92, ANALYSIS 14"
15	1.05	50.00	48.95	"SAMPLE P-35-92, ANALYSIS 15"
16	2.03	50.00	47.97	"SAMPLE P-35-92, ANALYSIS 16"
17	1.52	50.00	48.48	"SAMPLE P-35-92, ANALYSIS 17"
18	14.78	50.00	35.22	"SAMPLE P-35-92, ANALYSIS 18"
19	.90	50.00	49.10	"SAMPLE P-35-92, ANALYSIS 19"
20	3.69	50.00	46.31	"SAMPLE P-49-92, ANALYSIS 20"

	21	22	23	24	25	26	27	28	29	30
SIO2	.03	.03	.01	.04	.04	.04	.08	.07	.01	.04
TIO2	1.25	3.42	.53	3.14	1.47	2.25	.22	1.07	3.87	2.53
A2O3	11.85	9.10	13.21	9.03	13.10	11.83	.01	10.95	9.19	10.15
C2O3	49.02	42.54	49.57	45.68	41.28	44.75	3.96	46.94	40.33	42.48
FEO	33.71	38.31	25.72	36.78	38.64	33.30	87.69	34.49	41.62	39.18
MNO	.93	.99	.53	.96	.87	.88	.11	1.11	1.41	1.31
MGO	1.92	.94	8.14	1.05	1.06	1.64	.06	1.43	.96	1.04
ZNO	.78	.80	.09	.83	1.01	.89	.04	.91	.84	1.05
SUM	99.49	96.13	97.80	97.51	97.47	95.58	92.17	96.97	98.23	97.78
* RECALCULATED ANALYSIS - MAGNETITE-ULVOSPINEL BASIS *										
F2O3	3.64	6.62	5.27	4.93	8.01	3.16	63.25	5.16	9.60	8.44
FEO	30.43	32.34	20.97	32.34	31.43	30.45	30.71	29.84	32.97	31.57
TOTL	99.85	96.79	98.32	98.00	98.26	95.89	98.44	97.48	99.18	98.62
USP	3.38	9.54	1.37	8.69	4.06	6.28	.96	3.14	10.47	6.96
* RECALCULATED ANALYSIS - ILMENITE-HEMATITE BASIS *										
F2O3	6.75	13.39	8.45	10.58	13.53	7.04	95.21	8.90	18.28	15.24
FEO	27.63	26.25	18.10	27.25	26.45	26.96	1.92	26.47	25.15	25.45
TOTL	100.16	97.46	98.64	98.56	98.81	96.28	101.60	97.85	100.04	99.29
ROMB	3.25	8.72	1.32	8.07	3.78	5.96	.65	2.99	9.37	6.38

MOL PROPS	RO2	RO	R2O3	TITLE
21	1.69	50.00	48.31	"SAMPLE P-49-92, ANALYSIS 21"
22	4.77	50.00	45.23	"SAMPLE P-49-92, ANALYSIS 22"
23	.69	50.00	49.31	"SAMPLE P-49-92, ANALYSIS 23"
24	4.34	50.00	45.66	"SAMPLE P-49-92, ANALYSIS 24"
25	2.03	50.00	47.97	"SAMPLE P-49-92, ANALYSIS 25"
26	3.14	50.00	46.86	"SAMPLE P-49-92, ANALYSIS 26"
27	.48	50.00	49.52	"SAMPLE P-43-92, ANALYSIS 27"
28	1.57	50.00	48.43	"SAMPLE P-43-92, ANALYSIS 28"
29	5.23	50.00	44.77	"SAMPLE P-43-92, ANALYSIS 29"
30	3.48	50.00	46.52	"SAMPLE P-43-92, ANALYSIS 30"

SPINELS, DECEMBER 7, 1992

	31	32	33	34	35	36	37	38	39	40
SIO2	.05	.05	.03	.00	.00	.09	.01	.00	.06	.00
TIO2	1.38	2.29	2.16	.47	.69	.45	.43	.83	.43	.38
A2O3	5.81	9.65	11.02	13.74	15.10	.02	13.88	15.96	.02	13.70
C2O3	34.14	44.28	40.89	51.88	45.20	.77	51.95	44.72	1.52	52.59
FEO	49.75	37.12	37.87	18.41	27.58	86.64	20.20	28.41	88.03	18.71
MNO	1.41	1.24	1.33	.32	.63	.45	.38	.68	.50	.34
MGO	.46	.97	.92	12.13	7.03	.40	12.18	6.09	.48	12.23
ZNO	.65	.92	1.15	.02	.05	.14	.00	.33	.01	.00
SUM	93.65	96.52	95.37	96.97	96.28	88.96	99.03	97.02	91.05	97.95
* RECALCULATED ANALYSIS - MAGNETITE-ULVOSPINEL BASIS *										
F2O3	22.01	6.62	8.01	3.94	5.58	64.03	5.30	4.71	64.94	4.19
FEO	29.92	31.15	30.66	14.86	22.55	28.95	15.43	24.17	29.53	14.94
TOTL	95.83	97.18	96.16	97.36	96.83	95.31	99.55	97.49	97.49	98.36
USP	4.14	6.45	6.05	1.16	1.77	1.72	1.07	2.12	1.51	.93
* RECALCULATED ANALYSIS - ILMENITE-HEMATITE BASIS *										
F2O3	34.45	12.28	14.21	6.37	9.06	96.62	8.39	7.90	97.91	6.66
FEO	18.71	26.05	25.07	12.67	19.41	-.40	12.64	21.30	-.18	12.71
TOTL	97.06	97.74	96.78	97.60	97.18	98.53	99.86	97.80	100.75	98.61
ROMB	3.51	5.99	5.58	1.13	1.69	1.15	1.03	2.03	1.01	.90

MOL PROPS	RO2	RO	R2O3	TITLE
31	2.07	50.00	47.93	"SAMPLE P-43-92, ANALYSIS 31"
32	3.23	50.00	46.77	"SAMPLE P-43-92, ANALYSIS 32"
33	3.03	50.00	46.97	"SAMPLE P-43-92, ANALYSIS 33"
34	.58	50.00	49.42	"SAMPLE P-43-92, ANALYSIS 34"
35	.88	50.00	49.12	"SAMPLE P-48-92, ANALYSIS 35"
36	.86	50.00	49.14	"SAMPLE P-48-92, ANALYSIS 36"
37	.54	50.00	49.46	"SAMPLE P-48-92, ANALYSIS 37"
38	1.06	50.00	48.94	"SAMPLE P-48-92, ANALYSIS 38"
39	.75	50.00	49.25	"SAMPLE P-48-92, ANALYSIS 39"
40	.47	50.00	49.53	"SAMPLE P-48-92, ANALYSIS 40"

	41	42	43	44	45	46	47	48	49	50
SIO2	.01	.00	.00	.05	.04	.06	.04	.05	.04	.06
TIO2	.41	.43	.40	.85	.57	.52	.57	.53	.51	.77
A2O3	13.15	13.81	13.87	10.36	11.91	11.36	12.15	12.18	11.71	9.95
C2O3	49.27	51.62	52.24	43.99	47.73	46.62	48.11	49.45	48.27	44.16
FEO	27.95	18.17	18.48	36.27	27.90	30.15	27.60	26.87	27.80	35.38
MNO	.76	.24	.30	1.51	.44	.75	.35	.31	.40	1.64
MGO	6.19	12.51	13.25	1.47	8.42	6.38	8.24	8.55	8.30	1.31
ZNO	.10	.00	.07	1.32	.11	.00	.00	.01	.12	1.00
SUM	97.84	96.78	98.61	95.82	97.12	95.84	97.06	97.95	97.15	94.27
* RECALCULATED ANALYSIS - MAGNETITE-ULVOSPINEL BASIS *										
F2O3	4.83	4.30	5.38	8.76	8.42	8.26	7.56	6.96	8.16	8.03
FEO	23.60	14.30	13.63	28.38	20.32	22.71	20.79	20.60	20.45	28.15
TOTL	98.32	97.21	99.14	96.69	97.95	96.66	97.81	98.64	97.96	95.07
USP	1.08	1.06	.97	2.51	1.59	1.57	1.59	1.51	1.44	2.37
* RECALCULATED ANALYSIS - ILMENITE-HEMATITE BASIS *										
F2O3	7.66	6.87	8.47	14.06	13.25	12.99	11.96	11.03	12.80	12.89
FEO	21.05	11.98	10.85	23.60	15.96	18.45	16.82	16.93	16.27	23.77
TOTL	98.60	97.46	99.45	97.21	98.43	97.13	98.25	99.04	98.42	95.55
ROMB	1.05	1.03	.93	2.34	1.50	1.48	1.50	1.43	1.36	2.22

SPINELS, DECEMBER 7, 1992

MOL PROPS	RO2	RO	R2O3	TITLE
41	.54	50.00	49.46	"SAMPLE P-48-92, ANALYSIS 41"
42	.53	50.00	49.47	"SAMPLE P-48-92, ANALYSIS 42"
43	.48	50.00	49.52	"SAMPLE P-48-92, ANALYSIS 43"
44	1.25	50.00	48.75	"SAMPLE P-48-92, ANALYSIS 44"
45	.79	50.00	49.21	"SAMPLE P-54-92, ANALYSIS 45"
46	.79	50.00	49.21	"SAMPLE P-54-92, ANALYSIS 46"
47	.79	50.00	49.21	"SAMPLE P-54-92, ANALYSIS 47"
48	.75	50.00	49.25	"SAMPLE P-54-92, ANALYSIS 48"
49	.72	50.00	49.28	"SAMPLE P-54-92, ANALYSIS 49"
50	1.18	50.00	48.82	"SAMPLE P-54-92, ANALYSIS 50"

	51	52	53	54	55	56	57	58	59	60
SIO2	.09	.07	.01	.07	.03	.11	.01	.04	.06	.01
TIO2	.65	.81	.59	.61	.55	.58	.50	.58	.80	.49
A2O3	10.81	10.37	11.50	.31	11.18	.23	13.00	11.52	11.38	13.23
C2O3	45.18	44.81	46.18	21.86	45.47	22.43	47.98	45.30	44.67	47.61
FEO	35.05	35.11	33.33	67.30	36.93	66.89	29.89	35.86	36.73	28.13
MNO	1.13	1.56	1.16	1.00	1.54	1.00	.44	.69	.80	.39
MGO	3.02	1.60	4.14	.07	2.01	.07	6.77	2.64	2.38	7.06
ZNO	.47	1.06	.14	.38	.31	.58	.00	.60	.67	.04
SUM	96.40	95.39	97.05	91.60	98.02	91.89	98.59	97.23	97.49	96.96
* RECALCULATED ANALYSIS - MAGNETITE-ULVOSPINEL BASIS *										
F2O3	8.61	7.67	8.13	42.15	8.82	41.79	7.13	8.23	8.63	6.22
FEO	27.29	28.20	26.00	29.33	28.99	29.24	23.46	28.44	28.96	22.52
TOTL	97.25	96.15	97.86	95.78	98.89	96.03	99.30	98.05	98.34	97.58
USP	2.06	2.48	1.59	2.10	1.57	2.16	1.30	1.68	2.34	1.29
* RECALCULATED ANALYSIS - ILMENITE-HEMATITE BASIS *										
F2O3	13.68	12.41	12.80	63.92	13.81	63.41	11.21	12.98	13.82	9.84
FEO	22.72	23.93	21.80	9.71	24.49	9.77	19.79	24.17	24.28	19.27
TOTL	97.76	96.62	98.32	97.93	99.39	98.17	99.70	98.52	98.86	97.93
ROMB	1.93	2.33	1.50	1.58	1.47	1.63	1.24	1.58	2.19	1.23

MOL PROPS	RO2	RO	R2O3	TITLE
51	1.03	50.00	48.97	"SAMPLE P-54-92, ANALYSIS 51"
52	1.24	50.00	48.76	"SAMPLE P-54-92, ANALYSIS 52"
53	.79	50.00	49.21	"SAMPLE P-54-92, ANALYSIS 53"
54	1.05	50.00	48.95	"SAMPLE P-54-92, ANALYSIS 54"
55	.78	50.00	49.22	"SAMPLE P-54-92, ANALYSIS 55"
56	1.08	50.00	48.92	"SAMPLE P-54-92, ANALYSIS 56"
57	.65	50.00	49.35	"SAMPLE P-54-92, ANALYSIS 57"
58	.84	50.00	49.16	"SAMPLE P-25-92, ANALYSIS 58"
59	1.17	50.00	48.83	"SAMPLE P-25-92, ANALYSIS 59"
60	.64	50.00	49.36	"SAMPLE P-25-92, ANALYSIS 60"

SPINELS, DECEMBER 7, 1992

	61	62	63	64	65	66	67	68	69	70
SIO2	.02	.06	.01	.05	.00	.05	.04	.00	.01	.03
TIO2	.58	.53	.52	.82	.82	2.54	2.82	1.30	1.82	.50
A2O3	11.48	13.11	13.24	11.45	11.13	.35	.28	9.81	11.46	11.59
C2O3	45.46	48.12	48.20	44.33	44.42	32.70	27.74	46.72	38.95	47.42
FEO	37.31	26.54	27.76	35.43	37.20	55.40	62.59	33.72	40.74	30.60
MNO	.66	.41	.40	.72	.72	1.22	.75	.64	1.68	.39
MGO	2.53	8.05	8.03	2.42	2.12	.56	.57	5.51	2.54	6.93
ZNO	.66	.11	.00	.57	.66	.31	.21	.05	.92	.09
SUM	98.70	96.93	98.16	95.79	97.07	93.13	95.00	97.75	98.12	97.55
* RECALCULATED ANALYSIS - MAGNETITE-ULVOSPINEL BASIS *										
F2O3	9.18	6.16	6.96	7.67	8.86	27.76	34.09	9.54	13.32	8.79
FEO	29.04	20.99	21.49	28.52	29.22	30.39	31.87	25.12	28.74	22.69
TOTL	99.61	97.54	98.85	96.55	97.95	95.88	98.38	98.70	99.44	98.42
USP	1.59	1.55	1.34	2.40	2.20	7.67	8.27	3.39	4.83	1.39
* RECALCULATED ANALYSIS - ILMENITE-HEMATITE BASIS *										
F2O3	14.37	9.84	10.97	12.38	14.11	44.24	54.01	15.61	21.81	13.72
FEO	24.36	17.67	17.88	24.27	24.49	15.54	13.93	19.65	21.09	18.24
TOTL	100.12	97.91	99.25	97.02	98.47	97.51	100.35	99.30	100.28	98.91
ROMB	1.49	1.48	1.28	2.25	2.05	6.17	6.42	3.14	4.34	1.30

MOL PROPS	RO2	RO	R2O3	TITLE
61	.80	50.00	49.20	"SAMPLE P-25-92, ANALYSIS 61 "
62	.78	50.00	49.22	"SAMPLE P-25-92, ANALYSIS 62 "
63	.67	50.00	49.33	"SAMPLE P-25-92, ANALYSIS 63 "
64	1.20	50.00	48.80	"SAMPLE P-25-92, ANALYSIS 64 "
65	1.10	50.00	48.90	"SAMPLE P-25-92, ANALYSIS 65 "
66	3.84	50.00	46.16	"SAMPLE P-25-92, ANALYSIS 66 "
67	4.13	50.00	45.87	"SAMPLE P-25-92, ANALYSIS 67 "
68	1.70	50.00	48.30	"SAMPLE P-25-92, ANALYSIS 68 "
69	2.41	50.00	47.59	"SAMPLE P-51-92, ANALYSIS 69"
70	.69	50.00	49.31	"SAMPLE P-51-92, ANALYSIS 70"

	71	72	73	74	75	76	77	78	79	80
SIO2	.06	.00	.00	.01	.04	.02	.00	.06	.07	.10
TIO2	.55	.67	.69	.69	.71	.77	3.42	2.73	.63	.61
A2O3	12.07	12.48	12.44	12.45	12.01	12.32	6.42	3.39	12.23	12.08
C2O3	45.35	47.74	48.06	46.33	47.47	45.80	30.64	28.81	44.65	45.26
FEO	34.10	29.29	29.56	31.22	32.74	32.21	52.66	55.97	36.83	36.26
MNO	.77	.31	.33	.66	.57	.51	2.47	2.49	1.48	1.58
MGO	4.81	7.57	7.72	6.17	6.02	5.85	1.17	.50	.93	.81
ZNO	.29	.05	.08	.07	.01	.15	.60	.56	.93	1.51
SUM	98.00	98.11	98.88	97.60	99.57	97.63	97.38	94.51	97.75	98.21
* RECALCULATED ANALYSIS - MAGNETITE-ULVOSPINEL BASIS *										
F2O3	9.35	7.83	8.14	8.15	8.72	8.53	24.14	28.72	7.24	6.95
FEO	25.68	22.24	22.23	23.88	24.89	24.53	30.91	30.09	30.31	30.00
TOTL	98.93	98.89	99.69	98.41	100.43	98.47	99.77	97.36	98.47	98.90
USP	1.63	1.70	1.73	1.81	1.93	2.05	9.33	8.03	1.93	1.98
* RECALCULATED ANALYSIS - ILMENITE-HEMATITE BASIS *										
F2O3	14.65	12.41	12.90	12.92	13.84	13.58	39.62	45.89	11.58	11.17
FEO	20.90	18.11	17.94	19.58	20.27	19.97	16.97	14.63	26.40	26.20
TOTL	99.45	99.34	100.16	98.88	100.94	98.98	101.31	99.06	98.90	99.32
ROMB	1.53	1.60	1.64	1.70	1.81	1.93	7.70	6.44	1.83	1.88

SPINELS, DECEMBER 7, 1992

MOL PROPS	RO2	RO	R2O3	TITLE
71	.82	50.00	49.18	"SAMPLE P-51-92, ANALYSIS 71"
72	.85	50.00	49.15	"SAMPLE P-51-92, ANALYSIS 72"
73	.87	50.00	49.13	"SAMPLE P-51-92, ANALYSIS 73"
74	.90	50.00	49.10	"SAMPLE P-51-92, ANALYSIS 74"
75	.97	50.00	49.03	"SAMPLE P-51-92, ANALYSIS 75"
76	1.03	50.00	48.97	"SAMPLE P-51-92, ANALYSIS 76"
77	4.67	50.00	45.33	"SAMPLE P-51-92, ANALYSIS 77"
78	4.01	50.00	45.99	"SAMPLE P-51-92, ANALYSIS 78"
79	.97	50.00	49.03	"SAMPLE P-51-92, ANALYSIS 79"
80	.99	50.00	49.01	"SAMPLE P-46-92, ANALYSIS 80"

	81	82	83	84	85	86	87	88	89	90
SIO2	.07	.08	.10	.05	.07	.08	.06	.05	.04	.03
TIO2	.60	.50	.48	.54	.37	.40	.59	.60	1.52	.44
A2O3	12.10	10.70	10.33	11.44	11.22	10.39	12.36	11.82	13.07	13.39
C2O3	43.29	46.83	47.50	45.03	51.20	50.64	47.04	46.20	49.09	54.01
FEO	37.36	34.88	35.98	36.11	24.78	30.00	29.33	34.78	29.63	20.08
MNO	1.73	1.52	1.36	1.37	.31	.88	.74	1.34	.85	.29
MGO	.55	1.28	1.14	.50	10.00	5.12	6.76	1.40	4.69	10.64
ZNO	1.44	.90	.51	1.18	.00	.10	.16	.98	.41	.01
SUM	97.14	96.69	97.40	96.22	97.95	97.61	97.04	97.17	99.30	98.89
* RECALCULATED ANALYSIS - MAGNETITE-ULVOSPINEL BASIS *										
F2O3	8.23	6.46	6.66	6.65	7.38	5.87	7.49	6.02	2.94	2.60
FEO	29.94	29.06	29.98	30.11	18.13	24.71	22.58	29.36	26.98	17.74
TOTL	97.96	97.33	98.06	96.88	98.68	98.19	97.78	97.77	99.59	99.15
USP	1.87	1.65	1.66	1.66	1.16	1.33	1.72	1.79	4.02	1.18
* RECALCULATED ANALYSIS - ILMENITE-HEMATITE BASIS *										
F2O3	13.04	10.29	10.61	10.59	11.54	9.31	11.90	9.69	5.97	4.38
FEO	25.61	25.61	26.42	26.57	14.39	21.61	18.61	26.05	24.25	16.13
TOTL	98.43	97.71	98.45	97.27	99.09	98.53	98.22	98.13	99.89	99.32
ROMB	1.76	1.56	1.57	1.57	1.10	1.27	1.63	1.71	3.87	1.15

MOL PROPS	RO2	RO	R2O3	TITLE
81	.94	50.00	49.06	"SAMPLE P-46-92, ANALYSIS 81"
82	.82	50.00	49.18	"SAMPLE P-46-92, ANALYSIS 82"
83	.83	50.00	49.17	"SAMPLE P-46-92, ANALYSIS 83"
84	.83	50.00	49.17	"SAMPLE P-46-92, ANALYSIS 84"
85	.58	50.00	49.42	"SAMPLE P-46-92, ANALYSIS 85"
86	.66	50.00	49.34	"SAMPLE P-46-92, ANALYSIS 86"
87	.86	50.00	49.14	"SAMPLE P-46-92, ANALYSIS 87"
88	.90	50.00	49.10	"SAMPLE P-46-92, ANALYSIS 88"
89	2.01	50.00	47.99	"SAMPLE P-46-92, ANALYSIS 89"
90	.59	50.00	49.41	"SAMPLE P-46A-92, ANALYSIS 90"

SPINELS, DECEMBER 7, 1992

	91	92	93	94	95	96	97	98	99	100
SIO2	.02	.05	.00	.00	.10	.06	.09	.04	.00	.02
TIO2	.72	.72	1.57	2.45	.14	.45	.51	.68	1.51	1.22
A2O3	13.09	13.46	12.52	12.84	.02	13.39	13.22	13.05	12.77	12.65
C2O3	52.14	52.50	48.68	46.54	.04	53.54	53.54	52.53	49.10	49.77
FEO	24.86	22.44	31.10	30.04	4.54	20.13	21.10	23.54	30.14	29.25
MNO	.52	.53	.81	.89	.09	.27	.30	.52	.75	.68
MGO	7.86	8.90	3.91	3.95	.06	10.54	10.46	8.27	4.51	4.62
ZNO	.05	.04	.43	.50	.20	.05	.05	.07	.44	.44
SUM	99.26	98.64	99.02	97.21	5.19	98.43	99.27	98.70	99.22	98.65
* RECALCULATED ANALYSIS - MAGNETITE-ULVOSPINEL BASIS *										
F2O3	3.13	2.34	3.41	2.20	3.25	2.62	3.21	2.61	3.26	2.87
FEO	22.04	20.33	28.03	28.06	1.61	17.77	18.21	21.19	27.20	26.66
TOTL	99.57	98.87	99.36	97.43	5.51	98.69	99.59	98.96	99.54	98.93
USP	1.87	1.96	4.06	6.43	14.09	1.31	1.55	1.84	3.88	3.22
* RECALCULATED ANALYSIS - ILMENITE-HEMATITE BASIS *										
F2O3	5.44	4.29	6.69	5.74	5.15	4.45	5.44	4.64	6.39	5.55
FEO	19.96	18.57	25.08	24.87	-.10	16.12	16.20	19.36	24.38	24.25
TOTL	99.80	99.07	99.68	97.78	5.70	98.87	99.81	99.16	99.85	99.20
ROMB	1.81	1.91	3.89	6.15	9.45	1.28	1.50	1.79	3.73	3.11

MOL PROPS	RO2	RO	R2O3	TITLE
91	.93	50.00	49.07	"SAMPLE P-46A-92, ANALYSIS 91"
92	.98	50.00	49.02	"SAMPLE P-46A-92, ANALYSIS 92"
93	2.03	50.00	47.97	"SAMPLE P-46A-92, ANALYSIS 93"
94	3.22	50.00	46.78	"SAMPLE P-46A-92, ANALYSIS 94"
95	7.05	50.00	42.95	"SAMPLE P-46A-92, ANALYSIS 95"
96	.65	50.00	49.35	"SAMPLE P-46A-92, ANALYSIS 96"
97	.77	50.00	49.23	"SAMPLE P-46A-92, ANALYSIS 97"
98	.92	50.00	49.08	"SAMPLE P-46A-92, ANALYSIS 98"
99	1.94	50.00	48.06	"SAMPLE P-46A-92, ANALYSIS 99
100	1.61	50.00	48.39	"SAMPLE P-46A-92, ANALYSIS 100

	101	102	103	104	105	106	107	108	109
SIO2	.05	.08	.06	.04	.01	.04	.04	.05	.14
TIO2	.56	.77	.69	.86	3.21	2.09	2.23	.14	.16
A2O3	13.51	13.02	13.01	12.88	11.27	12.31	10.50	.01	.02
C2O3	53.60	52.30	52.62	50.39	44.02	48.41	42.93	1.02	1.00
FEO	21.70	24.02	24.62	26.76	35.68	30.91	34.90	89.64	91.85
MNO	.34	.46	.50	.62	.95	.75	1.07	.27	.23
MGO	10.31	8.29	8.18	5.56	2.89	3.52	3.15	.18	.13
ZNO	.00	.09	.11	.12	.39	.33	.47	.04	.00
SUM	100.07	99.03	99.79	97.23	98.42	98.36	99.29	91.35	93.53
* RECALCULATED ANALYSIS - MAGNETITE-ULVOSPINEL BASIS *									
F2O3	3.28	2.86	3.24	2.12	5.62	2.09	2.24	66.16	67.49
FEO	18.74	21.44	21.70	24.85	30.62	29.03	32.89	30.03	31.05
TOTL	100.40	99.31	100.11	97.44	98.98	98.57	99.51	97.91	100.22
USP	1.53	2.19	1.91	2.37	8.48	5.60	16.45	.61	1.00
* RECALCULATED ANALYSIS - ILMENITE-HEMATITE BASIS *									
F2O3	5.55	5.17	5.63	4.09	11.64	5.27	9.63	99.45	101.58
FEO	16.70	19.36	19.55	23.07	25.19	26.16	26.23	.05	.33
TOTL	100.62	99.54	100.35	97.64	99.57	98.88	100.24	101.21	103.60
ROMB	1.49	2.13	1.86	2.31	7.86	5.37	15.00	.41	.67

SPINELS, DECEMBER 7, 1992

MOL PROPS	RO2	RO	R2O3	TITLE
101	.76	50.00	49.24	"SAMPLE P-46A-92, ANALYSIS 101"
102	1.10	50.00	48.90	"SAMPLE P-46A-92, ANALYSIS 102"
103	.96	50.00	49.04	"SAMPLE P-46A-92, ANALYSIS 103"
104	1.18	50.00	48.82	"SAMPLE P-46A-92, ANALYSIS 104"
105	4.24	50.00	45.76	"SAMPLE P-46A-92, ANALYSIS 105"
106	2.80	50.00	47.20	"SAMPLE P-46A-92, ANALYSIS 106"
107	8.22	50.00	41.78	"SAMPLE P-46A-92, ANALYSIS 107"
108	.30	50.00	49.70	"SAMPLE P-46A-92, ANALYSIS 108"
109	.50	50.00	49.50	"SAMPLE P-46A-92, ANALYSIS 109"

Ministry of Northern Development and Mines
Ontario

Report of Work Conducted After Recording Claim

Mining Act

M.N.

Transaction Number
W9460.00006

Personal information collected on this form is obtained under the authority of the Mining Act. This information will be used for correspondence. Questions about this collection should be directed to the Provincial Manager, Mining Lands, Ministry of Northern Development and Mines, Fourth Floor, 159 Cedar Street Sudbury, Ontario, P3E 6A5, telephone (705) 670-7264.

Instructions: - Please type or print and submit in duplicate.
- Refer to the Mir
Recorder.
- A separate cop
- Technical repor
- A sketch, show

2.15377 ... work or consult the Mining

42A15SW0051 2.15377 MCCART

900 m.

Recorded Holder(s)
D.R. Pyke ; K.M. Cunnison

Client No. 184975 123055

Address
31 DeLair Cres. Thornhill, Ont. L3T 2M3

Telephone No.
905-731-1913

Mining Division
Porcupine

Township/Area
McCart

M or G Plan No.
G-3541

Dates Work Performed From: Sept 19/92 To: Jan 29/93

Work Performed (Check One Work Group Only)

	Work Group	Type
	Geotechnical Survey	Geological/Geochemical
	Physical Work, Including Drilling	
	Rehabilitation	
	Other Authorized Work	
	Assays	
	Assignment from Reserve	

RECEIVED
APR 07 1994
MINING LANDS BRANCH

RECORDED
MAR - 2 1994
Receipt

Total Assessment Work Claimed on the Attached Statement of Costs $ 13,455.00

Note: The Minister may reject for assessment work credit all or part of the assessment work submitted if the recorded holder cannot verify expenditures claimed in the statement of costs within 30 days of a request for verification.

Persons and Survey Company Who Performed the Work (Give Name and Address of Author of Report)

Name	Address
K.M. Cunnison	Apt 707, 510 Proudfoot Lane, London Ont N6H 1W4
D.R. Pyke	31 DeLair Cres Thornhill Ont L3T 2M3

(attach a schedule if necessary)

Certification of Beneficial Interest * See Note No. 1 on reverse side

I certify that at the time the work was performed, the claims covered in this work report were recorded in the current holder's name or held under a beneficial interest by the current recorded holder.

Date: Feb 29/94

Recorded Holder or Agent (Signature): D.R. Pyke

Certification of Work Report

I certify that I have a personal knowledge of the facts set forth in this Work report, having performed the work or witnessed same during and/or after its completion and annexed report is true.

Name and Address of Person Certifying
D.R. Pyke 31 DeLair Cres, Thornhill Ont L3T 2M3

Telephone No.: 905-731-1913

Date: Feb 29/94

Certified By (Signature): D.R. Pyke

For Office Use Only

Total Value Cr. Recorded	Date Recorded	Mining Recorder
$13,455.00	March 2nd 94	S White
	Deemed Approval Date: May 31st 94	Date Approved
	Date Notice for Amendments Sent	

RECEIVED
MAR 8 1994
PORCUPINE MINING DIVISION

0241 (03/91)

0841 (2/91)

Work Report Number for Applying Reserve	Claim Number (see Note 2)	Number of Claim Units	Value of Assessment Work Done on this Claim	Value Applied to this Claim	Value Assigned from this Claim	Reserve: Work to be Claimed at a Future Date
	10900033	1	0	$1200		
	10900034	1	$1664	$1200	$464	
	10900035	1	0	$1200		
	10900036	1	$9941	$1200	$8741	
	1189003	4	0	$2005		
	1182203	10	$1850	$1850	0	
	1190036	4	0	$3200		
	1190039	2	0	$1600		
Total Number of Claims	Total Value Work Done	Total Value Work Applied			Total Assigned From	Total Reserve
	$13,455	$13,455			$9205	

RECORDED
MAR - 2 1994
Receipt _____

RECEIVED
MAR 3 1994
MINING DIVISION

Credits you are claiming in this report may be cut back. In order to minimize the adverse effects on your mining claims, please indicate from which claims you wish to priorize the deletion of credits. Please mark (✓) one of the following:

1. ☐ Credits are to be cut back starting with the claim listed last, working backwards.
2. ☐ Credits are to be cut back equally over all claims contained in this report of work.
3. ☑ Credits are to be cut back ~~as prioritized on the attached appendix~~. from claim 1189003 first DRP.

In the event that you have not specified your choice of priority, option one will be implemented.

Note 1: Examples of beneficial interest are unrecorded transfers, option agreements, memorandum of agreements, etc., with respec to the mining claims.

Note 2: If work has been performed on patented or leased land, please complete the following:

I certify that the recorded holder had a beneficial interest in the patented or leased land at the time the work was performed.	Signature	Date

Ministry of Northern Development and Mines

Ontario

Mir ... du Développement du Nord et des mines

Statement of Costs for Assessment Credit

État des coûts aux fins du crédit d'évaluation

Mining Act/Loi sur les mines

Transaction No./N° de transaction: W9460.00028

Personal information collected on this form is obtained under the authority of the Mining Act. This information will be used to maintain a record and ongoing status of the mining claim(s). Questions about this collection should be directed to the Provincial Manager, Minings Lands, Ministry of Northern Development and Mines, 4th Floor, 159 Cedar Street, Sudbury, Ontario P3E 6A5, telephone (705) 670-7284.

Les renseignements personnels contenus dans la présente formule sont recueillis en vertu de la Loi sur les mines et serviront à tenir à jour un registre des concessions minières. Adresser toute question sur la collecte de ces renseignements au chef provincial des terrains miniers, ministère du Développement du Nord et des Mines, 159, rue Cedar, 4e étage, Sudbury (Ontario) P3E 6A5, téléphone (705) 670-7284.

1. Direct Costs/Coûts directs

Type	Description	Amount Montant	Totals Total global
Wages Salaires 37 MAN DAYS	Labour Main-d'oeuvre	$ 11,100	
	Field Supervision Supervision sur le terrain		$ 11,100
Contractor's and Consultant's Fees Droits de l'entrepreneur et de l'expert-conseil	Type Thin + polished sections	$ 655.11	
	Geochemistry	628.62	
	Microprobe	216.00	
	Drafting	381.99	$ 1881
Supplies Used Fournitures utilisées	Type POSTAGE	29.34	
	photo reprod	78.17	
	MAP reprod	42.78	
	batteries (VLF)	5.74	$ 156
Equipment Rental Location de matériel	Type		
	Total Direct Costs / Total des coûts directs		$ 13,137

2. Indirect Costs/Coûts indirects

** Note: When claiming Rehabilitation work indirect costs are not allowable as assessment work.
Pour le remboursement des travaux de réhabilitation, les coûts indirects ne sont pas admissibles en tant que travaux d'évaluation.

Type	Description	Amount Montant	Totals Total global
Transportation Transport	Type Truck	$ 198	
	660 km @ 30¢/km		
	RECORDED		
	MAR - 2 1994		
	Receipt		$ 198
Food and Lodging Nourriture et hébergement	6 MAN DAYS @ 20/DAY	$ 120	$ 120
Mobilization and Demobilization Mobilisation et démobilisation			$ ~~318~~ DNP
	Sub Total of Indirect Costs / Total partiel des coûts indirects		$ 318
Amount Allowable (not greater than 20% of Direct Costs) / Montant admissible (n'excédant pas 20 % des coûts directs)			$
Total Value of Assessment Credit (Total of Direct and Allowable Indirect costs) / Valeur totale du crédit d'évaluation (Total des coûts directs et indirects admissibles)			$ 13,455

Note: The recorded holder will be required to verify expenditures claimed in this statement of costs within 30 days of a request for verification. If verification is not made, the Minister may reject for assessment work all or part of the assessment work submitted.

Note : Le titulaire enregistré sera tenu de vérifier les dépenses demandées dans le présent état des coûts dans les 30 jours suivant une demande à cet effet. Si la vérification n'est pas effectuée, le ministre peut rejeter tout ou une partie des travaux d'évaluation présentés.

...iling Discounts

. Work filed within two years of completion is claimed at 100% of the above Total Value of Assessment Credit.

. Work filed three, four or five years after completion is claimed at 50% of the above Total Value of Assessment Credit. See calculations below:

...otal Value of Assessment Credit		Total Assessment Claimed
.	× 0.50 =	

Remises pour dépôt

1. Les travaux déposés dans les deux ans suivant leur achèvement sont remboursés à 100 % de la valeur totale susmentionnée du crédit d'évaluation.

2. Les travaux déposés trois, quatre ou cinq ans après leur achèvement sont remboursés à 50 % de la valeur totale du crédit d'évaluation susmentionné. Voir les calculs ci-dessous.

Valeur totale du crédit d'évaluation		Évaluation totale demandée
	× 0,50 =	

RECEIVED
MAR 2 1994
12:30 (P)
PORCUPINE MINING DIVISION

...ertification Verifying Statement of Costs

...hereby certify:

...at the amounts shown are as accurate as possible and these costs ...ere incurred while conducting assessment work on the lands shown ...n the accompanying Report of Work form.

...at as Recorded Holder / Agent (Recorded Holder, Agent, Position in Company) I am authorized ... make this certification

Attestation de l'état des coûts

J'atteste par la présente :

que les montants indiqués sont le plus ... que ces dépenses ont été engagées pour effectuer les travaux d'évaluation sur les terrains indiqués dans la formule de rapport de travail ci-joint.

Et qu'à titre de _____ (titulaire enregistré, représentant, poste occupé dans la compagnie) je suis autorisé à faire cette attestation.

Signature	Date
D. R. Cooke	Feb 29/94

...12 (04/91)

Nota : Dans cette formule, lorsqu'il désigne des personnes, le masculin est utilisé au sens neutre.

Ontario

Ministry of Northern Development and Mines

Ministère du Développement du Nord et des Mines

Geoscience Approvals Office
933 Ramsey Lake Road
6th Floor
Sudbury, Ontario
P3E 6B5

Telephone: (705) 670-5853
Fax: (705) 670-5863

Our File: 2.15377
Transaction #: W9460.00028

May 3, 1994

Mining Recorder
Ministry of Northern
Development and Mines
60 Wilson Avenue
1st Floor
Timmins, Ontario
P4N 2S7

Dear Sir:

RE: Approval of Assessment Work on mining claims 1090033 et al. in McCart Township.

The assessment credits for Geology, section 12 of the Mining Act Regulations, as listed on the original Report of Work, have been approved as of **May 2, 1994.**

Please indicate this approval on the claim record sheets.

If you have any questions concerning this submission please contact Dale Messenger at 670-5858.

Yours sincerely,

Ron C. Gashinski
Senior Manager, Mining Lands Section
Mining and Land Management Branch
Mines and Minerals Division

DEM/ls
Enclosures:

cc: Assessment Files Office
Toronto, Ontario

Resident Geologist
Timmins, Ontario

NOTE

LOT AND CONCESSION LINES SHOWN HEREON ARE PROJECTED FROM THE BEST INFORMATION AVAILABLE, BUT THEIR TRUE POSITION IS NOT GUARANTEED.

FOR LEGAL AND SURVEY PURPOSES CONSULT THE ORIGINAL SURVEY PLANS AND FIELD NOTES OF RECORD IN THE DEPARTMENT OF LANDS AND FORESTS, TORONTO.

ACREAGES SHOWN IN RESPECT OF PATENTED LOTS ARE IN ACCORDANCE WITH AREA GRANTED.

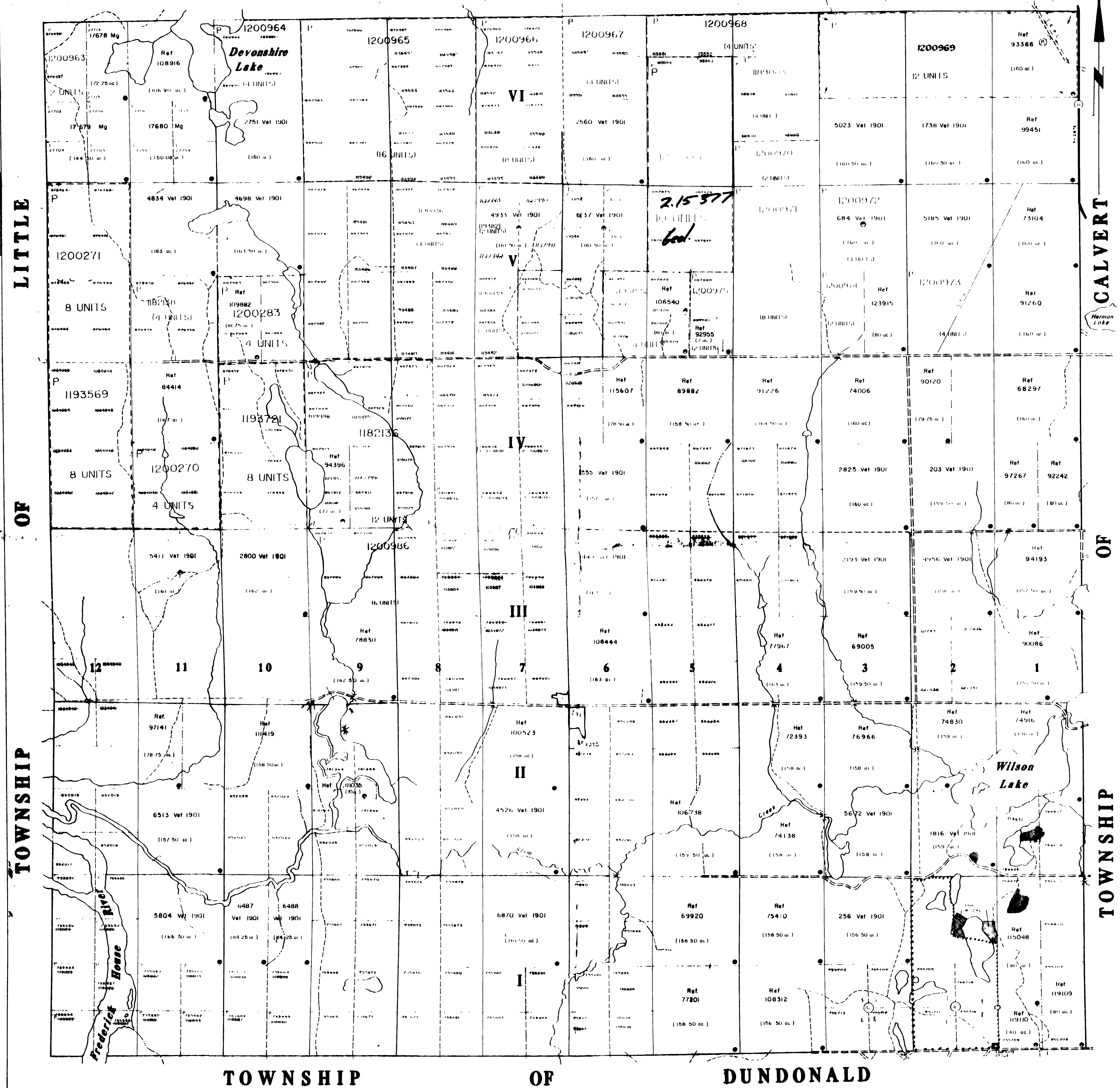
AREAS WITHDRAWN FROM DISPOSITION

M.R.O. – MINING RIGHTS ONLY
S.R.O. – SURFACE RIGHTS ONLY
M.+S. – MINING AND SURFACE RIGHTS

PROPOSED – S.R.O 71/84

THE INFORMATION THAT APPEARS ON THIS MAP HAS BEEN COMPILED FROM VARIOUS SOURCES, AND ACCURACY IS NOT GUARANTEED. THOSE WISHING TO STAKE MINING CLAIMS SHOULD CONSULT WITH THE MINING RECORDER, MINISTRY OF NORTHERN DEVELOPMENT AND MINES, FOR ADDITIONAL INFORMATION ON THE STATUS OF THE LANDS SHOWN HEREON

200



TOPOGRAPHY

LAKES, RIVERS, ETC, FROM FOREST RESOURCES INVENTORY SHEETS Nº 486804 AND 487804

SURVEYS

TOWNSHIP OF McCART SUBDIVIDED BY A D. GRIFFIN, O L S, 1904 FIELD NOTE BOOK 1553

WEST LIMIT OF McCART TOWNSHIP (SEE LITTLE TWP) SURVEY BY J W FITZGERALD, O L S, 1904 FIELD NOTE BOOK 1402.

EAST LIMIT OF McCART TOWNSHIP (SEE CALVERT TWP) SURVEY BY ALEXANDER BAIRD, O L S, 1904 FIELD NOTE BOOK 1009

THIRD MERIDIAN (EAST LIMIT OF McCART TWP) BY WILLIAM GALBRAITH, O L S., 1904 FIELD NOTE BOOK 2363

BASE LINE (SOUTH LIMIT OF McCART TWP) BY T J PATTEN, O L S, 1903 FIELD NOTE BOOK 2460

LEGEND

HIGHWAY AND ROUTE No
OTHER ROADS
TRAILS
SURVEYED LINES
TOWNSHIPS BASE LINES ETC
LOTS MINING CLAIMS PARCELS ETC
UNSURVEYED LINES
LOT LINES
PARCEL BOUNDARY
MINING CLAIMS ETC
RAILWAY AND RIGHT OF WAY
UTILITY LINES
NON PERENNIAL STREAM
FLOODING OR FLOODING RIGHTS
SUBDIVISION OR COMPOSITE PLAN
RESERVATIONS
ORIGINAL SHORELINE
MARSH OR MUSKEG
MINES
TRAVERSE MONUMENT

DISPOSITION OF CROWN LANDS

TYPE OF DOCUMENT	SYMBOL
PATENT SURFACE & MINING RIGHTS	●
SURFACE RIGHTS ONLY	◐
MINING RIGHTS ONLY	◑
LEASE SURFACE & MINING RIGHTS	■
SURFACE RIGHTS ONLY	◘
MINING RIGHTS ONLY	◙
LICENCE OF OCCUPATION	▼
ORDER IN COUNCIL	OC
RESERVATION	(R)
CANCELLED	⊗
SAND & GRAVEL	(S)
L. U. P.	✱

NOTE MINING RIGHTS IN PARCELS PATENTED PRIOR TO MAY 6 1913 VESTED IN ORIGINAL PATENTEE BY THE PUBLIC LANDS ACT R.S.O 1970 CHAP 380 SEC 63 SUBSEC 1

SCALE 1 INCH - 20 CHAINS

TOWNSHIP

McCART

M.N.R ADMINISTRATIVE DISTRICT
COCHRANE

MINING DIVISION
PORCUPINE

LAND TITLES / REGISTRY DIVISION
COCHRANE

Ministry of Natural Resources — Ministry of Northern Development and Mines — Ontario

Date	Number
JULY 1986	G-3541

TOWNSHIP OF LITTLE
TOWNSHIP OF CALVERT
TOWNSHIP OF DUNDONALD
Devonshire Lake
Wilson Lake
Herman Lake
I
II
III
IV
V
VI
12
11
10
9
8
7
6
5
4
3
2
1
1200963
1200964
1200965
1200966
1200967
1200968
1200969
1200970
1200971
1200972
1200973
1200974
1200975
1200283
1200270
1193569
1193721
1182136
1182138
1189003
1182203
1190036
1190039
1193822
4 UNITS
8 UNITS
12 UNITS
10 UNITS
TOPOGRAPHY
LAKES, RIVERS, ETC., FROM FOREST RESOURCES INVENTORY SHEETS Nº 488604 AND 487804
SURVEYS
TOWNSHIP OF McCART SUBDIVIDED BY A.D. GRIFFIN, O.L.S., 1904. FIELD NOTE BOOK 1639.
WEST LIMIT OF McCART TOWNSHIP (SEE LITTLE TWP.) SURVEY BY J.W. FITZGERALD, O.L.S., 1904. FIELD NOTE BOOK 1402.
EAST LIMIT OF McCART TOWNSHIP (SEE CALVERT TWP) SURVEY BY ALEXANDER BAIRD, O.L.S., 1904. FIELD NOTE BOOK 1009.
THIRD MERIDIAN (EAST LIMIT OF McCART TWP) BY WILLIAM GALBRAITH, O.L.S., 1904. FIELD NOTE BOOK 2363.
BASE LINE (SOUTH LIMIT OF McCART TWP) BY T.J PATTEN, O.L.S., 1903. FIELD NOTE BOOK 2480.
PORCUPINE MINING DIVISION
LEGEND
HIGHWAY AND ROUTE No
OTHER ROADS
TRAILS
SURVEYED LINES
TOWNSHIPS, BASE LINES, ETC
LOTS, MINING CLAIMS, PARCELS, ETC
UNSURVEYED LINES
RAILWAY AND RIGHT OF WAY
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MINING RIGHTS ONLY
LICENCE OF OCCUPATION
ORDER-IN-COUNCIL
RESERVATION
CANCELLED
SAND & GRAVEL
Ski trails within boundary
SCALE 1 INCH - 20 CHAINS
METRES
TOWNSHIP
McCART
M.N.R. ADMINISTRATIVE DISTRICT
COCHRANE
MINING DIVISION
PORCUPINE
LAND TITLES / REGISTRY DIVISION
COCHRANE
Ministry of Northern Development and Mines
Ontario

NEWMARKET TP

AURORA TP

McCART TP

CALVERT TP

9 8 7 6 5 4 3 2 1

12 11 10 9 8 7

CONC 6

CONC 5

CONC 4

CALSTOCK No 2

CALSTOCK No 1

DOM GULF No 1

DOM GULF No 2

P65

P64

P67

INCO No 6253

INCO No 6251

No 3

No 5

No 4

No 6

OFFNAIO No 1

QUEBEC ASBESTOS

O'BRIEN 66-1

NORTOBA

UMC

UMC - UNION MINING CORP

M1

M2

1a

1b

2

4

0 500 1000 1500m

Scale 1 : 20,000

LEGEND

ARCHEAN

- 4 Diabase
- 3 Gabbro
- 2 Ultramafic intrusive rocks
- 1 Mafic volcanic rocks
  - 1a - Basaltic komatiites-magnesium tholeiites
  - 1b - Iron tholeiites

Note: prefix "M" denotes interpretation from magnetic data

SYMBOLS

- Area of outcrop
- Facing direction of pillows
- Geologic contact
- Fault/shear zone
- Anticlinal axis
- Synclinal axis
- Diamond drill hole
- Shaft
- • P60 Sample location

2.15377

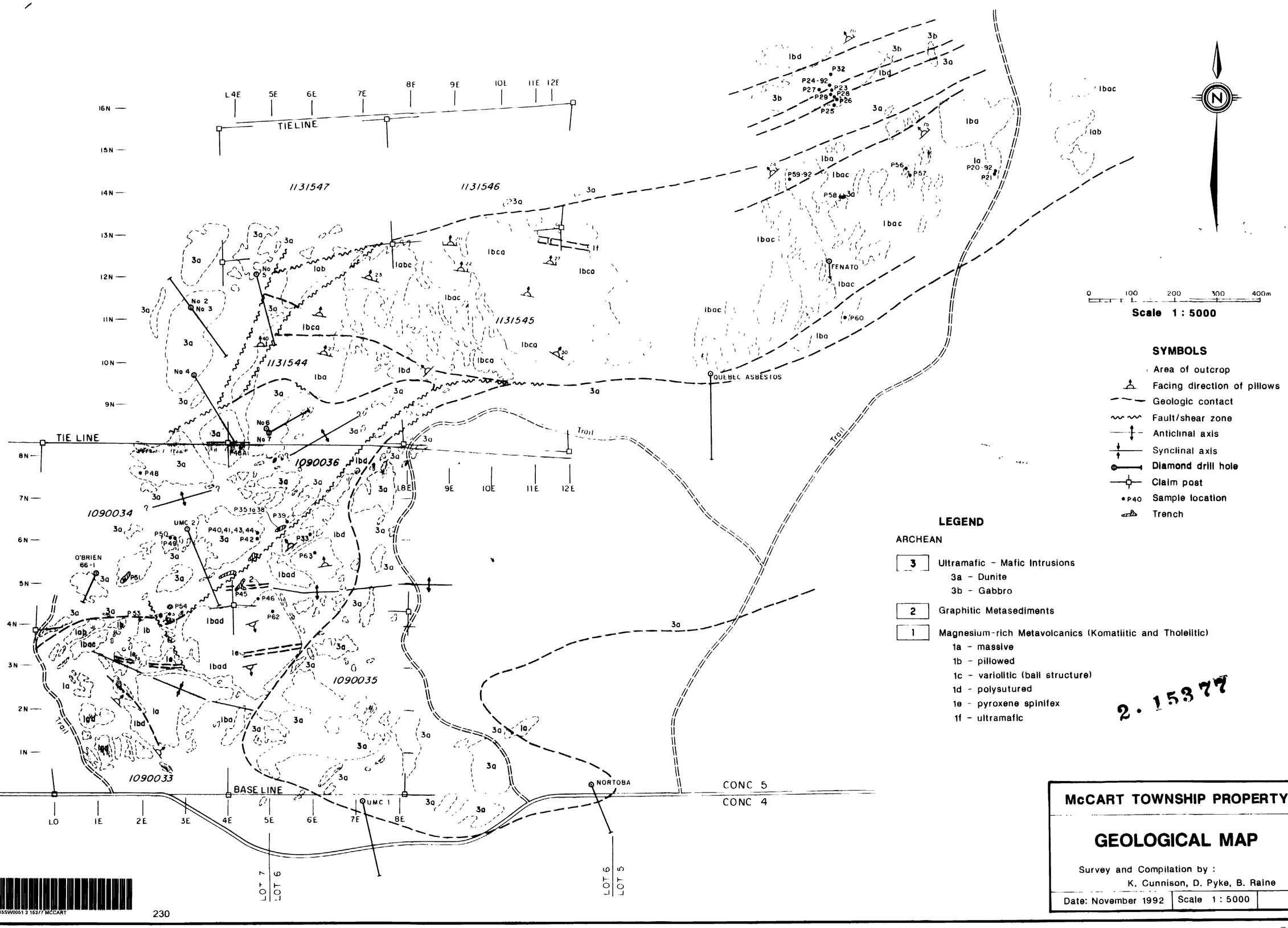
McCART - CALVERT TOWNSHIPS

GEOLOGICAL MAP

Survey and Compilation by :
K. Cunnison, D. Pyke, B. Raine

Date: November 1992 | Scale 1 : 20,000

D.R. Pyke



2.15377

42A15SW0051 2 15377 MCCART

230

McCART TOWNSHIP PROPERTY

GEOLOGICAL MAP

Survey and Compilation by :
K. Cunnison, D. Pyke, B. Raine

Date: November 1992 | Scale 1 : 5000