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December 13, 1995

MINERALOGICAL CHARACTERIZATION OF CORE SAMPLES FROM DDH KL95-6, CREEK DEPOSIT, KISKITTO LAKE

DECLARATION

I Raymond E. Healy, President of Minoretek hereby declare that I am a graduate with a B.Sc.(Gen.) and M.Sc.(Geol.), that I am a member of the Mineralogical Association of Canada and the Metallurgical Society of the American Institute of Mining and Metallurgical Engineers, and have ten years consulting experience in process mineralogy. I also declare that I have no financial interest, either directly or indirectly, in the company for which this report was prepared, or in the property investigated.

This report refers to the samples as received from the client, Gossan Resources.

Researched By	Jeff Young & Raymond E. Healy
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Date	December 13, 1995

SUMMARY

A mineralogical investigation has been done on core samples from the Creek Ti-V oxide deposit, Kiskitto Lake, Manitoba. A blend sample was prepared from these samples and contains approximately 7 wt% ilmenite, and consists of coarse aggregates of granular ilmenite disseminated in a silicate matrix of amphibole, pyroxene, plagioclase feldspar and apatite.

Ilmenite, which contains 28.8% Ti (48.1% TiO_2), comprises almost 40% of the oxide minerals at the Creek deposit. Magnetite comprises almost 60% of the oxide minerals and there are trace amounts of zincian hercynite. Ilmenite accounts for approximately 88% of the Ti in the Creek deposit, and the remaining 12% occurs principally in the matrix amphibole edenitic hornblende, as well as trace amounts in magnetite and pyroxene. Although the abundance of biotite is low and was not determined, locally biotite may be a significant Ti-carrier. Ilmenite has lower Ti contents than ilmenite from Pipestone Lake, whereas the V contents of ilmenite are higher than at Pipestone Lake. Ilmenite contains approximately 0.37 wt.% Mg (and 0.40 wt% Ca+Mg+Cr), and is thus suitable for upgrading to synthetic rutile. The relatively low abundances of the sulfides in the blend sample indicates that an ilmenite concentrate is likely to have a low sulfur content. The abundance of apatite indicates an assay of 1.14% P, which is significant as P is a possible process contaminant. The coarse grain size and smooth, non-interpenetrating grain boundaries of apatite should yield high liberations and the potential for rejection at reasonable grinds.

Ilmenite is medium- to coarse-grained, with the grain size distribution defined by 80% passing 330μm, which should yield ilmenite liberations of 97% at a grind defined by 95% passing 150 mesh (i.e., 104μm), or liberations of 98% at a grind defined by 95% passing 325 mesh (i.e., 44μm). Because magnetic separation is likely to be one of the primary methods of concentration, and has a lower size limit beyond which concentration by gravity is inefficient, the grain size of ilmenite is the only significant constraint on processing of the ore. The economics of the cost of grinding to finer grind sizes, and the decreasing amounts of additional ilmenite liberated and recovered at these finer grinds, will delimit the optimum grind of the ore.

No compositional data or textural features were observed that would indicate the ore from the Creek deposit will prove significantly more difficult to process than ore from the main zone or north contact zone, Pipestone Lake. Ilmenite in the Creek deposit does not exhibit the fine-grained, vermicular and lamellar intergrowths with magnetite that are pervasive in the main zone, Pipestone Lake. It is predicted that for similar grind sizes, ilmenite from the Creek deposit should achieve similar liberations as ilmenite from the north contact zone, Pipestone Lake. The potential for similar ilmenite liberations suggest a similar grade/recovery relationship for ore from the Creek deposit. However, the occurrence of approximately 11% of the Ti in the matrix silicates, depresses the maximum Ti recovery to approximately 88% at reasonable concentrate grades.

INTRODUCTION

Healy (1995) conducted a cursory mineralogical examination of two samples from 167' and 487' depth in drillhole KL95-2 of the Kiskitto Lake Ti-V oxide deposit, near Cross Lake, Manitoba.

Seven core samples from the drillhole KL95-6 of the Creek deposit, Kiskitto Lake have been submitted to Minoretek for mineralogical characterization. The samples actually constitute subsamples of the assay samples taken at regular intervals down through the intersection of an oxide-bearing gabbro between 123.5' and 438' in the upper part of the drillhole. Sample KL-BLND1 was generated by blending and crushing approximately 40 grams of each of the seven samples, and preparing a polished section from the +10 mesh, -7 mesh fraction. This procedure allowed preparation of a representative polished section, but without significantly affecting the observable grain sizes of the minerals, or causing loss of textural information. All analyses were done on the section of the blend ore, with the exception of petrographic examinations of polished sections of samples KL-1045, KL-1055, KL-1065 and KL-1070. The latter was done in order to observe any textural variation with depth.

The objectives of the study are to: **(1)** identify and determine the composition of all Ti-bearing minerals; **(2)** determine the quantities, sizes and shapes of the Ti-bearing minerals; **(3)** determine the mineralogical deportment of Ti and V; **(4)** document all mineralogical characteristics that may have an affect on any forthcoming metallurgical testwork of the ores.

TABLE 1. SAMPLES FROM UPPER PART OF DDH KL95-6, KISKITTO LAKE.

Sample	Number	DDH	Footage
1.	KL-1043	K-6	148' - 158'
2.	KL-1045B	K-6	192'
3.	KL-1050	K-6	198' - 208'
4.	KL-1055	K-6	248' - 258'
5.	KL-1060	K-6	298' - 308'
6.	KL-1065	K-6	348' - 358'
7.	KL-1070	K-6	398' - 408'
8.	KL-BLND1	K-6	Blend Ore

Note: Sample KL-BLND1 produced by blending approx. 40 grams of each of samples 1 to 7.

ANALYSIS

Electron Microprobe Analysis

Electron microprobe analysis (EMPA) was done using the Cameca SX-50 at the U of M, to determine the chemical composition of the oxides ilmenite and magnetite in the ore. The analyses of ilmenite and magnetite were done using program **JYILM**, which uses the wavelength dispersive system (WDS), a stationary point beam with 15 kV accelerating voltage, 20 nA beam current, and with counting times on the peaks and backgrounds of 20 and 10 seconds, respectively (See Table 2). Routine data reduction, including full matrix (PAP) corrections, was done using the WDSACQ software package. A total of 27 compositions of ilmenite, and 20 compositions of magnetite were acquired, and the data are compiled in Appendix A. Mean compositions are given in Table 3.

Pyroxene, apatite, biotite and amphibole were observed during the petrographic examination, and these were subsequently analyzed because of their potential affect on the metallurgical tests (i.e., P contaminant) and/or economic significance (i.e., Ti deportment). The analyses were done using programs **JYAMP** and **PUPHOS**, which employ the WDS, a stationary point beam with 15 kV accelerating voltage, 20 nA beam current, and with counting times on the peaks and backgrounds of 20 and 10 seconds, respectively (See Table 2). Routine data reduction, including full matrix (PAP) corrections, was done using the WDSACQ software package. A total of 6 compositions of amphibole, 5 compositions of pyroxene, 6 compositions of apatite, and 5 composition of biotite were acquired, and the data are compiled in Appendix A. Mean compositions are given in Table 4.

TABLE 2. OPERATING CONDITIONS FOR ELECTRON MICROPROBE ANALYSIS USING PROGRAMS JYILM, JYAMP, AND PUPHOS

PRGM	Minerals	Elements	Conditions and Standards
JYILM	Ilmenite Magnetite	Al, Fe, Ca, Mg, Mn, Ti, Cr, Ni, Si, V, Zn.	Point Beam; 15 kV and 20 nA. 20 secs Pks; 10 secs Bkgs. Al: Kα; TAP; Spinel Std. Fe: Kα; LIF; Magnetite Std. Ca: Kα; PET; Diopside Std. Mg: Kα; TAP; Spinel Std. Mn: Kα; LIF; Spessartine Std. Ti: Kα; PET; Ilmenite Std. Cr: Kα; PET; Chromite Std. Ni: Kα; LIF; Ni_2Si Std. Si: Kα; PET; Diopside Std. V: Kα; LIF; VP_2O_7 Std. Zn: Kα; LIF; Sphalerite Std.
JYAMP	Amphibole Pyroxene Biotite	Na, Mg, Al, Fe, Mn, Ti, Ca, Si, K, F, Cl.	Point Beam; 15 kV and 20 nA. 20 secs Pks; 10 secs Bkgs. Na: Kα; TAP; Albite Std. Fe: Kα; LIF; Fayalite Std. Ca: Kα; PET; Diopside Std. Mg; Kα; TAP; Olivine Std. Mn; Kα; LIF; Spessartine Std. Si; Kα; PET; Diopside Std. Al; Kα; TAP; Kyanite Std. Ti; Kα; LIF; Sphene Std. K; Kα; PET; Orthoclase Std. F; Kα; TAP; Fluor-Riebeckite Std. Cl; Kα; PET; Tugtupite Std.
PUPHOS	Apatite	F, Mn, Ca, Na, Fe, P, Al, Zn, K, Mg, Ba, Cl, Si, Nd, Sr, Y, Sc, Ce, La.	Point Beam; 15kv and 20 nA. 20 secs Pks; 10 secs Bkgs. F; Kα; TAP; Apatite Std. Mn; Kα; LIF; Spessartine Std. Ca; Kα; PET; Apatite Std. Na; Kα; TAP; Albite Std. Fe; Kα; LIF; Almandine Std. P; Kα; PET: Apatite Std. Al; Kα; TAP; Pyrope Std. Zn; Lα; LIF; Gahnite Std. K; Kα; PET; Orthoclase Std. Mg; Kα; TAP; Olivine Std. Ba; Lβ; LIF; BaNaNbO Std. Cl; Lα; PET; Tugtupite Std. Si; Kα; TAP; Diopside Std. Nd; Lα; LIF; Monazite Std. Sr; Lα; PET; $SrTiO_3$ Y; Mβ; TAP; Synthetic Y-Garnet Std. Sc; Mα; LIF; $NaScSi_2O_6$ Std. Ce; Mβ; PET: Monazite Std. La; Mβ; PET; Monazite Std.

Image Analysis

The image analysis was done using the MP-IBAS-IAS[1] at the University of Manitoba (U. of M) on a single polished section of the blend ore KL-BLND1. The image analysis macro **kiskito1.mcr** was developed (modification of the macro **pipesto2.mcr**; *Healy* 1994), specifically for the image analysis of samples from Kiskitto Lake. The macro measures the mineral quantities, and these are determined by measuring the surface area of each of the detected minerals. The surface areas of each of the minerals yield relative areal fractions, and are normalized to area%, which is equivalent to volume%. The macro discriminated (i.e., detected) the minerals or mineral groups: **(1)** quartz; **(2)** feldspar; **(3)** hercynite; **(4)** amphibole (incl. biotite); **(5)** pyroxene; **(6)** apatite; **(7)** ilmenite; **(8)** magnetite; **(9)** sulfides; and **(10)** monazite.

The grain size is determined by measuring the surface area of the grain, and using the square root of the area as the diameter. This 'equivalent square diameter' (or 'equivalent edge length of a square') gives sizes that compare closely with sieve size analysis (*Petruk* 1978). In addition, the feature measurements Area, Minimum Diameter (Dmin), Maximum Diameter (Dmax), Width and Perimeter were determined for each detected mineral. The shape factors DMin, Aspect Ratio, Formfactor and Roundness were calculated from these feature measurements. The feret diameter in the X- and Y-direction (i.e., FeretX and FeretY, respectively) are also measures of grain size, but these measurements are sensitive to orientation, and are a less accurate measure of grain size, especially for foliated samples.

Prior to the size analysis, a grain reconstruction routine was used to separate grains of ilmenite from one another within otherwise undifferentiated masses or aggregates of ilmenite. This allows measurement of the grain size of ilmenite, and not simply the size of polycrystalline masses of ilmenite. Because the macro uses a magnification of x100, grains coarser than 900μm are truncated by the field margin, and give observed sizes that are finer than actual sizes. Indeed, the observed grain sizes are preferentially truncated as they progressively approach the width of field (i.e., maximum observed diameters), resulting in fining of the coarse tail of the size distributions. Other stereological effects cause the observed sizes to be finer than the actual sizes, and these can be corrected by theoretical or empirical corrections, such as those of *Petruk* (1978). Because samples are usually compared on the basis of sizes determined by a single technique, absolute (or corrected) sizes are usually unecessary, whereas relative sizes are adequate. Ideally however, size data determined by image analysis should be corrected to absolute sizes, in order to permit direct correlation of mineralogical and metallurgical data.

The mineral quantities data are given in Table 5, the size data for ilmenite are given in Table 6, whereas the remaining size data are compiled and plotted in Appendix B. The size data for the silicate species, and the shape factors for all minerals were not processed or evaluated, but have been archived on disk.

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1 MP-IBAS-IAS denotes the specific configuration of the electron microprobe (MP) with the IBAS image analyser (IBAS) into an integrated image analysis system (IAS), exclusive of the other image generating peripherals (i.e., the scanning electron microscope (SEM), the light optical microscope, the cathodo-luminescence microscope and the photographic macro stand).

PETROGRAPHY

Petrographic descriptions were done on polished sections of samples KL-1045, KL-1055, KL-1065, KL-1070, and the blend sample KL-BLND1. The following petrographic description is a composite description from observations made in both reflected and transmitted light.

Recent geological mapping by Manitoba Energy & Mines indicates that most of the mafic rocks in the Kiskitto Lake area are metagabbros and tectonized metagabbros (*S. Jobin-Bevans,* pers. comm. 1995). The petrographic examination identified hypersthene (i.e., orthorhombic pyroxene), which is a diagnostic mineral in mafic rocks that have been subjected to granulite facies metamorphism (*Winkler* 1979), and thus these rocks can be identified as mafic granulites. However, relict igneous textures appear to have been preserved, and confirm that these rocks are metamorphosed gabbros or metagabbros.

The blend sample (i.e., KL-BLND1) contains approximately 18.5 wt% disseminated Fe-Ti-V oxide minerals, predominantly magnetite and ilmenite. The blend sample also contains major amounts of plagioclase feldspar, amphibole (i.e., edenitic hornblende), pyroxene (i.e., hypersthene), and apatite, and minor amounts of sulfides (i.e., pyrrhotite, pyrite, chalcopyrite and pentlandite), quartz, zincian hercynite, biotite and monazite (See Table 5).

Ilmenite ($FeTiO_3$)

The blend sample contains 7.24 wt% ilmenite, which occurs as medium- to coarse-grained, largely inclusion-free, granular grains that occur in irregularly shaped aggregates, or as subhedral grains disseminated within localized areas of the silicate matrix. The ilmenite is preferentially associated with amphibole and pyroxene. The granular ilmenite have curved to straight grain boundaries that generally terminate at triple junctions in a mosaic texture that is characteristic of annealling. Ilmenite also occurs as a symplectic intergrowth with zincian hercynite within lamellae in magnetite, and at the contacts between grains of ilmenite and magnetite. These textural variants comprise a small proportion of the ilmenite, and volumetrically are relatively insignificant.The grain size distribution of ilmenite in KL-BLND1 is defined by 80% passing 330μm (See Table 6).

Magnetite (Fe_3O_4)

The blend sample contains 11.44 wt% magnetite, which occurs as medium- to coarse-grained, granular mosaic grains that occur in irregularly shaped aggregates or as fine-grained, subhedral grains disseminated in the silicate matrix. Magnetite commonly forms fine-grained aggregates infilling along fractures and grain boundaries between silicates, and as disseminated inclusions in pyroxene and amphibole. Although this textural variant of magnetite is common, volumetrically it is relative insignificant. Variation in the magnetic response of the samples indicates that the magnetite content decreases "down hole". The grain size distribution of magnetite in KL-BLND1 is defined by 80% passing 430μm (See Appendix B).

Hercynite ($FeAlSi_2O_4$)

The blend sample contains 0.24 wt% hercynite, which occurs as: **(1)** fine-grained, discrete grains in the interstitial spaces between silicate and/or oxide grains, and commonly forming inclusions within the margins of oxides; **(2)** as a symplectic intergrowth with ilmenite within lamellae in magnetite, and at the contacts between grains of ilmenite and magnetite; and **(3)** as extremely fine (i.e., sub-micron) lats that have exsolved along three crystallographically controlled orientations in magnetite. The grain size distribution of hercynite in KL-BLND1 is defined by 80% passing 63μm (See Appendix B).

Apatite ($Ca_5(PO_4)_3$)

The blend sample contains 6.18 wt% apatite, which occurs as medium- to coarse-grained, subhedral, granular grains with smooth grain boundaries, that are associated with mafic or oxide minerals. Apatite is generally concentrated in areas with abundant mafic minerals, but is mostly absent in areas that are largely feldspathic. Apatite rarely occurs as grains within aggregates of oxide minerals. It is noteworthy that apatite occurred in abundance in all sections examined. The grain size distribution of apatite in KL-BLND1 is defined by 80% passing 285μm (See Appendix B).

Sulfides

The blend sample contains 0.77 wt% sulfides, consisting largely of pyrrhotite and pyrite, and lesser chalcopyrite, sphalerite and pentlandite. Pyrrhotite occurs as fine- to medium-grained, granular grains that occur in the interstices of the silicates matrix and/or spatially associated with oxide grains. Pyrrhotite also occurs as rare, fine-grained inclusions in magnetite. Chalcopyrite occurs as fine- to medium-grained equant to lenticular grains associated with pyrrhotite, whereas pentlandite occurs as relatively rare flames in pyrrhotite. Sphalerite occurs along grain boundaries and fractures in the silicate matrix. The grain size distribution of sulfides in KL-BLND1 is defined by 80% passing 200μm (See Appendix B).

Biotite

Biotite occurs disseminated in the silicate matrix, or concentrated in aggregates of biotite grains that form rims on coarse aggregates of plagioclase. Although biotite was not discriminated from amphibole during image analysis, it comprises <1% of the samples examined petrographically. Thus, biotite only contributes a small proportion to the measured quantities of amphibole. Interestingly, although the plagioclase aggregates and their associated biotite rims were only observed in KL-1045, surface mapping by Manitoba Energy & Mines in 1995 suggests that these aggregates comprise up to 10% of some outcrops (*S. Jobin-Bevans*, pers. comm. 1995). Thus, biotite may locally constitute a major mineral.

MINERAL CHEMISTRY

The compositions of the Ti-bearing minerals and several other minerals of interest in the KL-BLND1 blend sample are tabulated in Appendix A, whereas the corresponding mean compositions are tabulated in Tables 3 and 4. Backscattered electron (BSE) images of the blend ore sample are given in Figures 2 to 11.

Ilmenite

A total of 27 microprobe compositions were acquired and are compiled in Appendix A, whilst the mean composition is given in Table 3. Although ideal ilmenite contains 31.6 wt% Ti and 40.0 at% cations (i.e., 2 metal atoms per formula unit of 5 atoms: $FeTiO_3$), the mean Ti content of ilmenite in the Creek deposit (i.e., KL-BLND1) is 28.79 wt% Ti. It is apparent from Figure 1, that the ilmenite compositions form a tight cluster immediately adjacent to the ideal ilmenite composition, with slight Ti and cation deficiencies. This deviation may be due to a minor component of hematite in solid solution in ilmenite, as was suspected in ilmenite from the north contact zone, Pipestone Lake (*Healy* 1994). The mean Ti content is similar to that of other ilmenites from Kiskitto Lake (i.e., 29.29 wt% Ti; *Healy* 1995). Interestingly, the mean Ti content of ilmenite is less than that of ilmenite from the north contact and main zones, Pipestone Lake (i.e., 30.1 wt% Ti; *Healy* 1994, and 30.6 wt% Ti; *Healy* 1993). The mean V content of ilmenite is 0.25 wt% V, which is similar to that of other ilmenites from Kiskitto Lake (i.e., 0.22 wt% V; *Healy* 1995). In contrast, the mean V content of ilmenite is significantly higher than that of ilmenite from the north contact zone, Pipestone Lake (i.e., 0.14 wt% V; *Healy* 1994), but is similar to the mean V content of ilmenite in the main zone, Pipestone Lake (i.e., 0.27 wt% V; *Healy* 1993). Ilmenite contains a mean Ca content of 0.01 wt% Ca, and a Mg content of 0.37 wt% Mg (See Table 3), indicating that the ilmenite is suitable for upgrading to synthetic rutile (*Battle et al.* 1993).

Magnetite

A total of 20 microprobe compositions were acquired and are compiled in Appendix A, whilst the mean composition is given in Table 3. Although ideal magnetite contains 72.4 wt% Fe, the mean Fe content of magnetite in the Creek deposit (i.e., KL-BLND1) is 71.76 wt% Fe. It is apparent from Figure 1, that the magnetite compositions form a relatively long, narrow cluster between 42 at% and 45 at% cations. Nonetheless, the mean magnetite composition contains 42.9 at% cations, and thus conforms with 42.9 at% cations for ideal magnetite (i.e., 3 metal atoms per formula unit of 7 atoms: Fe_3O_4). The mean Ti and V contents of magnetite are 0.10 wt% Ti and 0.58 wt% V, respectively, which indicate different Ti contents, but similar V contents to other magnetites from Kiskitto Lake (i.e., 0.24 wt% Ti and 0.55 wt% V; *Healy* 1995). Furthermore, this mean composition is different with that of magnetite in the main zone, Pipestone Lake (i.e., 0.13 wt% Ti and 1.13 wt% V; *Healy* 1993). The concentration of V in magnetite is more than twice that in ilmenite, and is consistent with the preferential partitioning of V into magnetite.

Amphibole

A total of 6 microprobe compositions were acquired and are compiled in Appendix A, whilst the mean composition is given in Table 4. The compositions of the amphibole, which comprises a significant proportion of the silicate matrix at the Creek deposit (i.e., KL-BLND1), correspond to the calcic amphibole edenitic hornblende, according to the classification scheme of *Hawthorne* (1983). The edenitic hornblende is Fe-, Al- and alkali-poor, Mg- and Si-rich relative to the ferro-paragsite in the north contact zone, Pipestone Lake (*Healy* 1994). Importantly, the edenitic hornblende contains a mean Ti content of 1.16 wt% Ti, which is significantly greater than the Ti content of the ferro-pargasite that occurs in the north contact zone, Pipestone Lake (i.e., 0.29 wt% Ti; *Healy* 1994). Although amphibole is less abundant at the Creek deposit, Kiskitto Lake than at the north contact zone, Pipestone Lake, the edenitic hornblende is nonetheless a significant Ti-carrier (See Table 5).

Pyroxene

A total of 5 microprobe compositions were acquired and are compiled in Appendix A, whilst the mean composition is given in Table 4. The composition of the pyroxene, which comprises almost 20 wt% of the mafic granulite at the Creek deposit, Kiskitto Lake, is a subcalcic orthopyroxene containing subequal proportions of Fe and Mg cations (See Table 4), and thus corresponds to hypersthene. The hypersthene has a mean Ti content of 0.016 wt% Ti, and is therefore a relatively insignificant Ti-carrier in the Creek deposit.

TABLE 3. MEAN COMPOSITIONS (IN Wt%) OF OXIDE MINERALS

Element	Creek Deposit, Kiskitto Lake		North Contact Zone, Pipestone Lake
	Ilmenite KL-BLND1 (N=27)	Magnetite KL-BLND1 (N=20)	Ilmenite Diss. & Ms. Ore (N = 69)
Al	0.01	0.25	0.01
Fe	37.83	71.76	36.62
Ca	0.01	0.01	0.04
Mg	0.37	0.03	0.05
Ti	**28.79**	**0.10**	**30.11**
Si	0.02	0.01	0.01
Mn	0.42	0.02	0.80
V	**0.25**	**0.58**	**0.14**
Cr	0.01	0.02	0.01
Zn	0.02	0.01	0.03
Ni	0.01	0.02	0.02
O	32.27	27.18	32.16
Total	100.00	100.00	100.00

Note: Oxygen calculated by difference (total = 100.00).

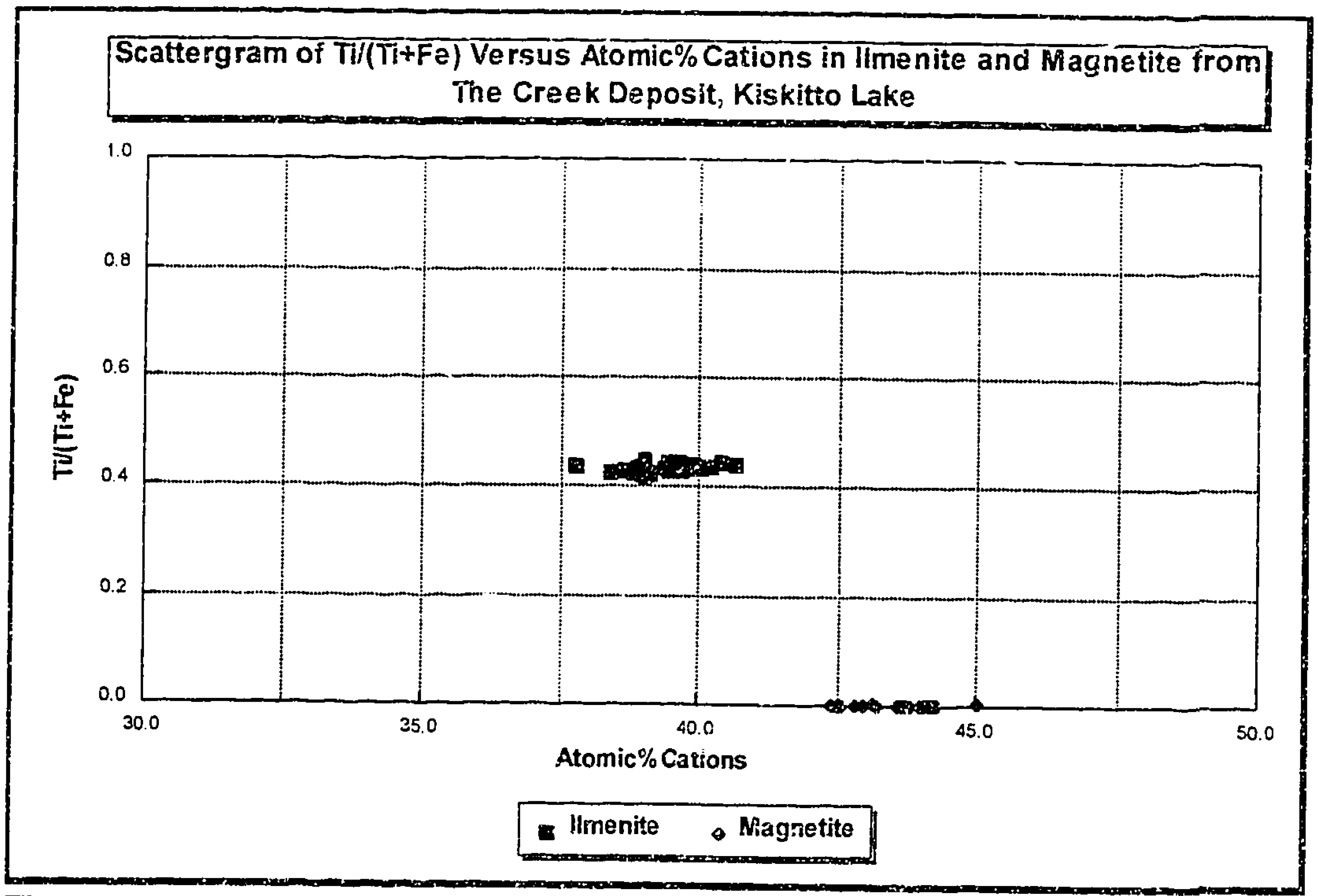

Figure 1. Scattergram of (Ti/(Ti+Fe)) Versus Atomic% Cations in Ilmenite and Magnetite in the Creek Deposit, Kiskitto Lake.

Apatite

A total of 6 microprobe compositions were acquired and are compiled in Appendix A, whilst the mean composition is given in Table 4. The mean composition of the apatite is close to that of ideal apatite, consisting of 39.9 wt% Ca and 18.6 wt% P. However, these compositions are F-rich containing 2.68 wt% F. Because these compositions contain significant concentrations of F, the prefix "fluor" is applied, and the apatite is correctly termed fluor-apatite.

Biotite

A total of 6 microprobe compositions were acquired and are compiled in Appendix A, whilst the mean composition is given in Table 4. The mean Ti content of biotite is 2.99 wt% Ti, which is significantly greater than the Ti content of the edenitic hornblende (i.e., 1.16 versus 2.99 wt% Ti). The abundance of biotite was not determined during image analysis, and was included in the observed quantities of edenitic hornblende. However, biotite may be locally abundant, and therefore a significant Ti-carrier locally.

TABLE 4. MEAN COMPOSITIONS (IN Wt%) OF MINERALS OF INTEREST

Element	Edenitic Hornblende (N = 6)	Hypersthene (N = 5)	Apatite (N = 6)	Biotite (N = 6)
Na	0.96	0.00	0.00	0.04
Fe	13.20	22.33	0.09	13.79
K	1.22	0.00	0.01	8.11
Mg	5.84	10.53	0.00	6.91
Mn	0.11	0.49	0.02	**0.06**
Ca	8.21	0.37	39.85	0.00
Al	6.11	0.59	0.00	7.49
Ti	**1.16**	**0.02**		**2.99**
Si	19.52	23.56	0.03	16.61
F	0.21	0.03	2.68	0.40
Cl	0.10	0.00	0.16	0.13
P				
Y			18.56	
Nd			0.00	
Ce			0.02	
La			0.08	
Zn			0.05	
Ba			0.03	
Sr			0.04	
Sc			0.06	
O		40.98	0.00	37.57
Total	39.85	98.90	41.14	94.08
	96.47		102.80	

Notes:
1. Missing data (i.e., blanks) denotes not analyzed.
2. Oxygen calculated by stoichiometry, and compositions calculated anhydrously (i.e., w[illegible]r-free).
3. Low totals for edenitic hornblende and biotite due to undetermined H_2O.

MINERALOGICAL DEPORTMENT OF Ti and V

In order to rigorously evaluate the behaviour of Ti during processing (from chemical assays) and predict the optimum recovery of Ti, the exact mineralogical deportment of Ti must be accurately determined. The occurrence of several Ti-bearing minerals in the blend sample demonstrates the need to determine the distribution of Ti amongst the host minerals. By integrating the mineral quantities and mineral compositional data, a precise determination of the mineralogical deportment of Ti, and hence the fractional Ti assay attributable to each mineral can be acquired. The data are given in Table 5.

The Ti assay of KL-BLND1 as calculated from mineralogy is 2.36 wt% Ti, which corresponds to 3.94% TiO_2. Although chemical assays are not available for KL-BLND1, the calculated TiO_2 assay is similar to the inferred assay of 4.20 wt% TiO_2 for the Creek Deposit (*Gossan Resources* 1995). The Ti assay value is significantly lower than the normal range in TiO_2 grades for the disseminated ore type, north contact zone, Pipestone Lake (i.e., 7-10% TiO_2; *J.Campbell*, pers. comm. 1994). In so much as the TiO_2 assay of the blend sample is similar to the inferred assay for the Creek deposit, the blend sample is considered representative.

The fractional Ti assays attributable to each mineral in the samples are given in column 5 of Table 5 (i.e., % Ti), whereas the percentage of the Ti assay attributable to each mineral (i.e., mineralogical deportment of Ti) is given in column 6 of Table 5 (i.e., % of Ti). It is apparent from Table 5 that ilmenite accounts for 88.4% of the Ti in the blend sample. The matrix edenitic hornblende accounts for the bulk of the remaining Ti (i.e., 10.96% of the Ti) in the blend sample, whereas only minor amounts of Ti are attributable to magnetite (i.e., 0.50% of the Ti) and hypersthene (i.e., 0.13% of the Ti).

Biotite is the only other significant Ti-bearing mineral (i.e., 2.99 wt% Ti), but was not discriminated (from edenitic hornblende) during image analysis, and so the actual abundance of biotite is unknown. Because biotite was included as amphibole during image analysis, its higher Ti assay was obscured by that of amphibole. Hence, the fractional assay attributable to amphibole (including biotite) is actually higher than determined (i.e., 10.96% of the Ti). Interestingly, where biotite is locally abundant, and hence a significant Ti-carrier, the fractional Ti assay attributable to ilmenite decreases.

Because of the relatively high abundance and V content, magnetite accounts for 78.5% of the V at the Creek deposit, Kiskitto Lake. Ilmenite at the Creek deposit accounts for 21.5% of the V. In the absence of magnetite in the north contact zone, Pipestone Lake, ilmenite accounts for approximately 99.5% of the V (*Healy* 1994). The precise mineralogical deportment of V (distribution amongst all possible V-bearing minerals) is unknown, because edenitic hornblende and hypersthene were not analyzed for V.

TABLE 5. MINERAL QUANTITIES (IN Wt%) AND MINERALOGICAL DEPORTMENT OF Ti IN THE KL-BLND1 SAMPLE

Mineral		Wt%	Ti Content	% Ti	% of Ti
Quartz		0.371	0.000	0.000	0.000
Feldspar		32.420	0.000	0.000	0.000
Amphibole		22.370	1.155	0.258	10.960
Apatite		6.180	0.000	0.000	0.000
Ilmenite		7.240	28.787	2.084	**88.430**
Magnetite		11.440	0.102	0.012	0.050
Monazite		0.007	0.000	0.000	0.000
Pyroxene		18.980	0.016	0.003	0.013
Sulfides		0.769	0.000	0.000	0.000
Hercynite		0.238	0.000	0.000	0.000
Total		100.000		2.357	100.000
		Wt.%	V Content	%V	% of V
Quartz		0.371	0.000	0.000	0.000
Feldspar		32.420	0.000	0.000	0.000
Amphibole		22.370	0.000	0.000	0.000
Apatite		6.180	0.000	0.000	0.000
Ilmenite		7.240	0.249	0.018	**21.460**
Magnetite		11.440	0.575	0.066	**78.310**
Monazite		0.007	0.000	0.000	0.000
Pyroxene		18.980	0.000	0.000	0.000
Sulfides		0.769	0.000	0.000	0.000
Hercynite		0.238	0.000	0.000	0.000
Total		100.000		**0.084**	100.000

Note: Ti assays for KL-BLND1 calculated from mineralogy is 2.36% Ti, and corresponds to 3.94% TiO_2.

Figure 2. Medium- to coarse-grained granular ilmenite (light grey) with associated pyrrhotite and lesser chalcopyrite (white). Matrix consists of plagioclase (blackish grey), amphibole (dark grey), apatite and pyroxene (medium-grey). Note amphibole forms rounded inclusion in ilmenite. BSE. Mag = 100x (Horizontal width = 890μm).

Figure 3. Coarse-grained ilmenite (grey) containing inclusions of magnetite (light grey) on the grain margins. Note pyrite (white) inclusions in magnetite. Matrix consists of amphibole (dark grey), apatite and pyroxene (medium grey). BSE. Mag = 100x (Horizontal width = 890μm).

Figure 4. Coarse-grained magnetite (light grey) containing oriented lats of hercynite, and lamellae of ilmenite (grey) and hercynite. Note fine interstitial filling of magnetite in matrix, which consists of plagioclase (blackish grey), amphibole (dark grey), and apatite (medium grey). Note chalcopyrite inclusion (white) in pyrrhotite (grey white) at centre left. Epoxy mounting medium (black) at bottom of field. BSE. Mag = 50x (Horizontal width = 1780μm).

Figure 5. Detail of Figure 4. Coarse-grained magnetite (light grey) containing oriented lats of hercynite (in three crystallographic directions), and lamellae of ilmenite (grey) with very fine symplectic hercynite. Note blebs of hercynite on margins of magnetite adjacent to plagioclase (blackish grey) and apatite (medium grey) at centre left. Note amphibole (dark grey) at bottom right. BSE. Mag. = 100x (Horizontal width = 890μm).

Figure 6. Coarse-grained granular ilmenite (grey) and magnetite (light grey), with associated pyrrhotite (grey white) and pentlandite (white). Matrix consists of plagioclase (blackish grey) and amphibole (dark grey). BSE. Mag = 50x (Horizontal width = 1780μm).

Figure 7. Coarse-grained granular ilmenite (grey) and magnetite (light grey). Note abundance of fine magnetite infilling interstitial spaces and fractures in matrix of plagioclase (blackish grey: lower left), amphibole (dark grey: top left & lower right), and pyroxene and apatite (medium grey). BSE. Mag = 100x (Horizontal width = 890μm).

Figure 8. Coarse-grained granular magnetite (light grey) containing oriented lats of hercynite and lamella of ilmenite and hercynite. Note associated pyrite (white). Matrix consists of plagioclase (blackish grey) and pyroxene (medium grey). BSE. Mag. = 50x (Horizontal width = 1780μm).

Figure 9. Coarse-grained granular ilmenite (grey) with lesser magnetite (light grey) and associated pyrite (white). Matrix consists of plagioclase (blackish grey), amphibole (dark grey) and coarse rounded apatite (medium grey). BSE. Mag = 50x (Horizontal width = 1780μm).

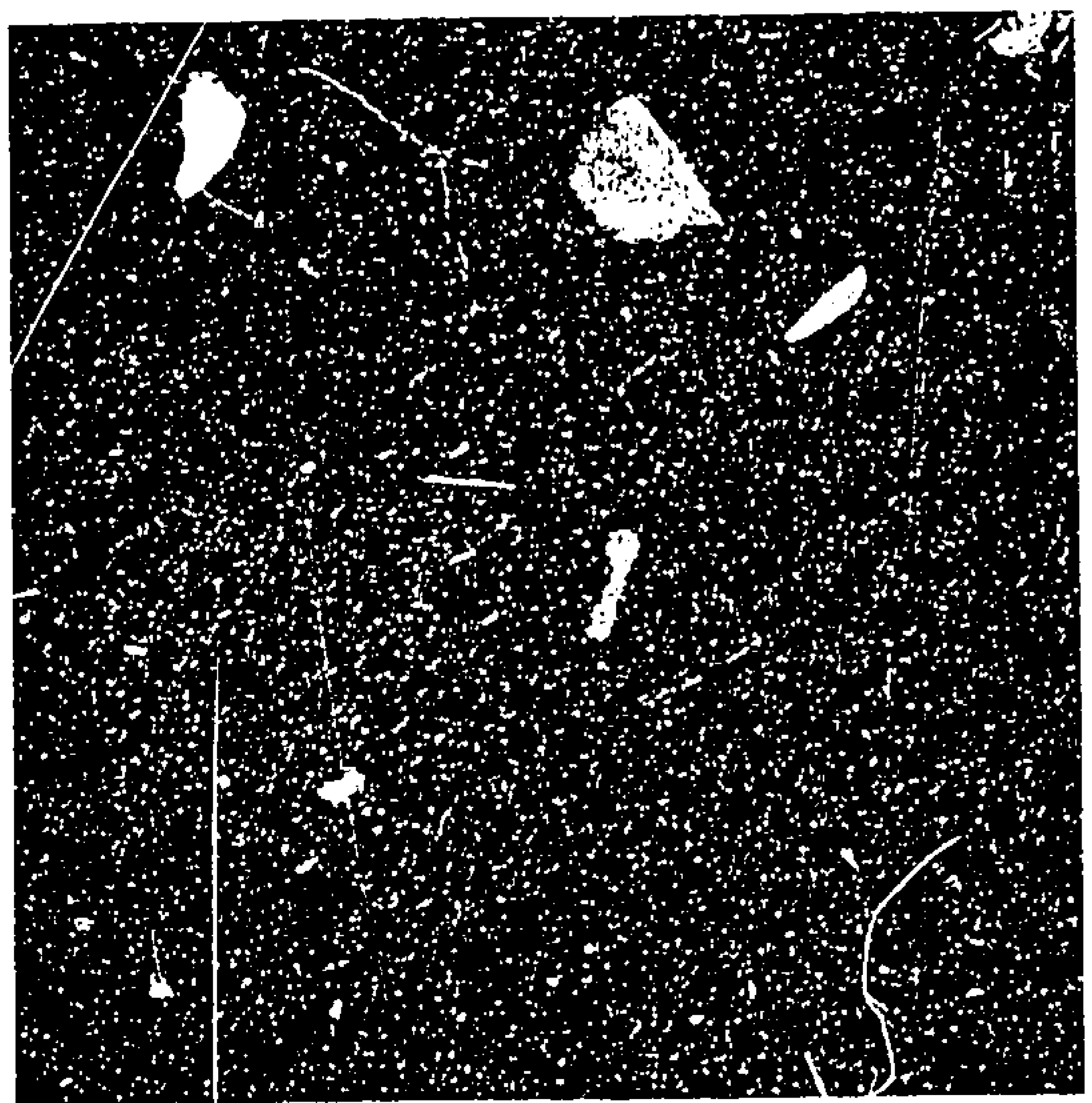

Figure 10. Finely disseminated ilmenite (grey) in amphibole (dark grey). Plagioclase (blackish grey) at top centre and right. Note pyrrhotite (grey white) with inclusion of chalcopyrite (white) at top left. BSE. Mag = 75x (Horizontal width = 1195μm).

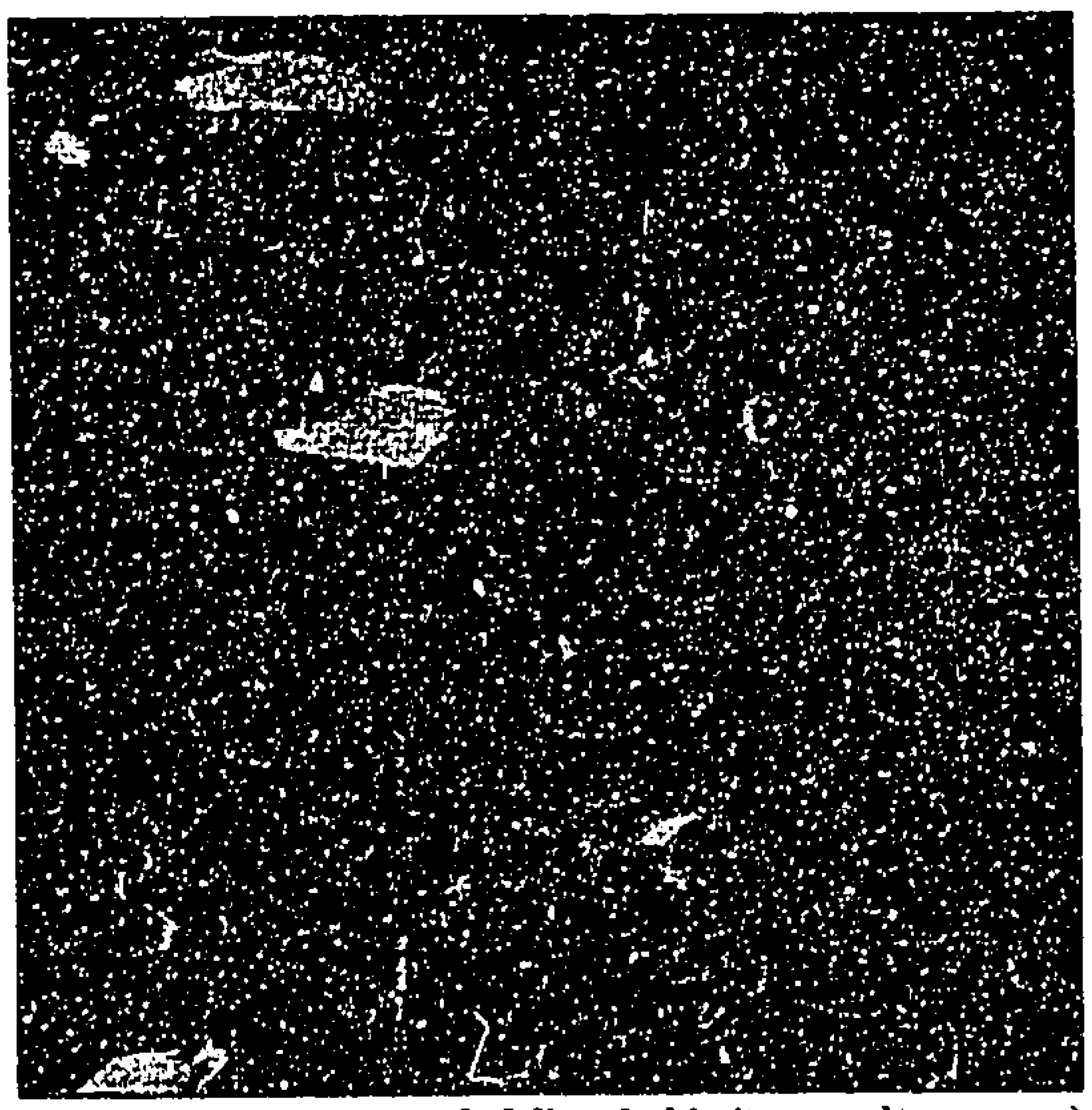

Figure 11. Aggregate of foliated biotite (medium grey) forming rim on plagioclase (blackish grey). Apatite (medium grey) with associated fine-grained monazite (white) at extreme centre right. Ilmenite (grey) occurs as medium-grained diseminations, and magnetite (light grey) occurs as fracture-fillings at lower centre. BSE. Mag = 70x (Horizontal width = 1280μm).

GRAIN SIZE OF ILMENITE

The grain size distributions of ilmenite in the KL-BLND1 sample from the Creek deposit, Kiskitto Lake, three samples from the north contact zone (i.e., PSL-1, PSL-2 and PSL-3; *Healy* 1994) and two samples from the main zone (i.e., Pipe-4 and Pipe-15; *Healy* 1993), Pipestone Lake are given in Table 6, and plotted in Figures 12 and 13. The grain size is given as the square diameter in Figure 12, and as Feret diameter in Figure 13, where the latter is a less accurate measure of size, and is provided for comparison only. From Table 6, it is apparent that the grain size of ilmenite in the KL-BLND1 sample is defined by 80% passing 330μm. By comparison, the grain size of ilmenite is defined by 80% passing 470μm in the massive ore, and varies from 80% passing 300μm to 380μm in the disseminated ore of the north contact zone, Pipestone Lake. Because the grain size of ilmenite as determined by image analysis undergoes truncation of the coarse tail of the distribution, these sizes can be considered minimum sizes. Nonetheless, the grain size of ilmenite at the Creek deposit, Kiskitto Lake falls within the observed range in grain size of ilmenite in the disseminated ore of the north contact zone, Pipestone Lake.

The attainment of reasonable concentrate/grade relationships is contingent upon obtaining high liberations at the optimum range in particle size for the separation technique. Because liberation is a function of grain and grind size, the grain size is a critical constraint on the processing of the ore. The specific gravities of ilmenite and ferro-pargasite in the north contact zone, Pipestone Lake are similar, such that gravity separation has proven ineffective in the processing of these ores (*R. Gunter*, pers. comm. 1994). Low intensity magnetic (LIM) separation is the primary separation technique used in the metallurgical testwork done on ore from the main zone, Pipestone Lake (*Jena et al.* 1995). Thus, the size data for ilmenite in the Creek deposit are evaluated with reference to LIM separation.

Assuming 325 mesh (i.e., 44μm) is the lower size threshold for LIM separation (*Wills* 1985), approximately 4% of the ilmenite in the Creek deposit ore is finer than 44μm (See Fig. 12), and is thus not amenable to LIM separation. According to the liberation model of *Petruk* (1976) 96% and 98% of the ilmenite in the Creek deposit would be liberated at grinds defined by 95% passing 150 mesh (i.e., 104μm) and 325 mesh (i.e., 44μm), respectively. By comparison, 92% and 97% of the ilmenite in the disseminated ore of the north contact zone, Pipestone Lake would be liberated at the same grinds, respectively. Because the size data is uncorrected for truncation and other stereological effects, the observed sizes are considered minimum sizes. Truncation and other stereological effects typically cause the observed sizes to be approximately one Tyler mesh size class finer than the actual sizes. In addition, the observed sizes of ilmenite are a measure of the grain size, and not the size of coarser aggregates or masses of ilmenite. Thus, ilmenite liberations at the above grind sizes are likely to be more favourable than indicated.

In summary, the grain size of ilmenite in the Creek deposit, Kiskitto Lake is coarser than that in the main zone, similar to that in the disseminated ore of the north contact zone, and finer than that in the massive ore of the north contact zone, Pipestone Lake (See Fig. 2; *Healy* 1993, 1994).

TABLE 6. CUMULATIVE GRAIN SIZE DISTRIBUTIONS OF ILMENITE IN KL-BLND1, KISKITTO LAKE AND THE MAIN AND NORTH CONTACT ZONES, PIPESTONE LAKE.

Tyler Mesh Sq. Diam.	Plotting Point	KL-BLND1	PSL-1	PSL-2	PSL-3	Pipe-4	Pipe-15
3.4	2.4	0.00	0.01	0.01	0.01	0.12	0.13
4.8	4.1	0.03	0.05	0.04	0.02	0.30	0.26
6.7	5.75	0.10	0.18	0.14	0.03	0.58	0.51
9.5	8.1	0.20	0.39	0.24	0.04	1.31	1.16
13.4	11.45	0.31	0.76	0.62	0.07	2.27	2.51
19	16.2	0.58	1.34	1.16	0.11	3.94	4.67
26.9	22.95	0.94	2.57	2.40	0.17	6.35	9.16
38	32.45	1.89	4.52	4.18	0.25	9.42	14.77
53	45.5	3.41	7.41	5.80	0.37	13.69	22.94
74	63.5	5.09	11.51	8.83	0.64	20.90	36.79
104	89	9.03	15.82	14.47	0.98	27.31	59.47
147	125.5	12.73	21.23	26.80	1.60	37.39	73.52
208	177.5	31.13	32.33	34.19	4.31	45.01	91.16
295	251.5	62.00	41.15	57.13	6.56	79.71	91.16
417	356	85.73	75.46	100.00	14.65	100.00	100.00
	495	100.00	100.00	100.00	100.00	100.00	100.00

Tyler Mesh FeretX	Plotting Point	KL-BLND1	PSL-1	PSL-2	PSL-3	Pipe-4	Pipe-15
3.4	2.4	0.00	0.01	0.01	0.01	0.04	0.05
4.8	4.1	0.03	0.05	0.04	0.02	0.16	0.16
6.7	5.75	0.10	0.1	0.07	0.03	0.31	0.28
9.5	8.1	0.20	0.19	0.12	0.03	0.7	0.69
13.4	11.45	0.31	0.52	0.45	0.06	1.27	1.33
19	16.2	0.58	0.93	0.84	0.08	2.41	2.58
26.9	22.95	0.94	1.66	1.57	0.12	3.83	4.97
38	32.45	1.89	2.88	2.41	0.17	5.71	8.02
53	45.5	3.41	5.2	3.72	0.26	9.57	13.49
74	63.5	5.09	7.62	5.49	0.4	13.56	21.62
104	89	9.03	11.3	8.66	0.71	21.24	34.78
147	125.5	12.73	15.5	13.76	1.11	27.88	50.21
208	177.5	31.13	21.4	27.4	2.48	36.22	65.76
295	251.5	62.00	35.3	36.64	4.4	40.68	77.97
417	356	85.73	41.2	55.51	8.23	62.93	88.81
	495	100.00	100.00	100.00	100.00	100.00	100.00

Notes:
1. Data given as percent less than or passing Tyler mesh size classes.
2. North Contact Zone, Pipestone Lake: PSL-1, PSL-2 (Disseminated Ore), and PSL-3 (Massive Ore).
3. Main Zone, Pipestone Lake: Pipe-4 and Pipe-15.

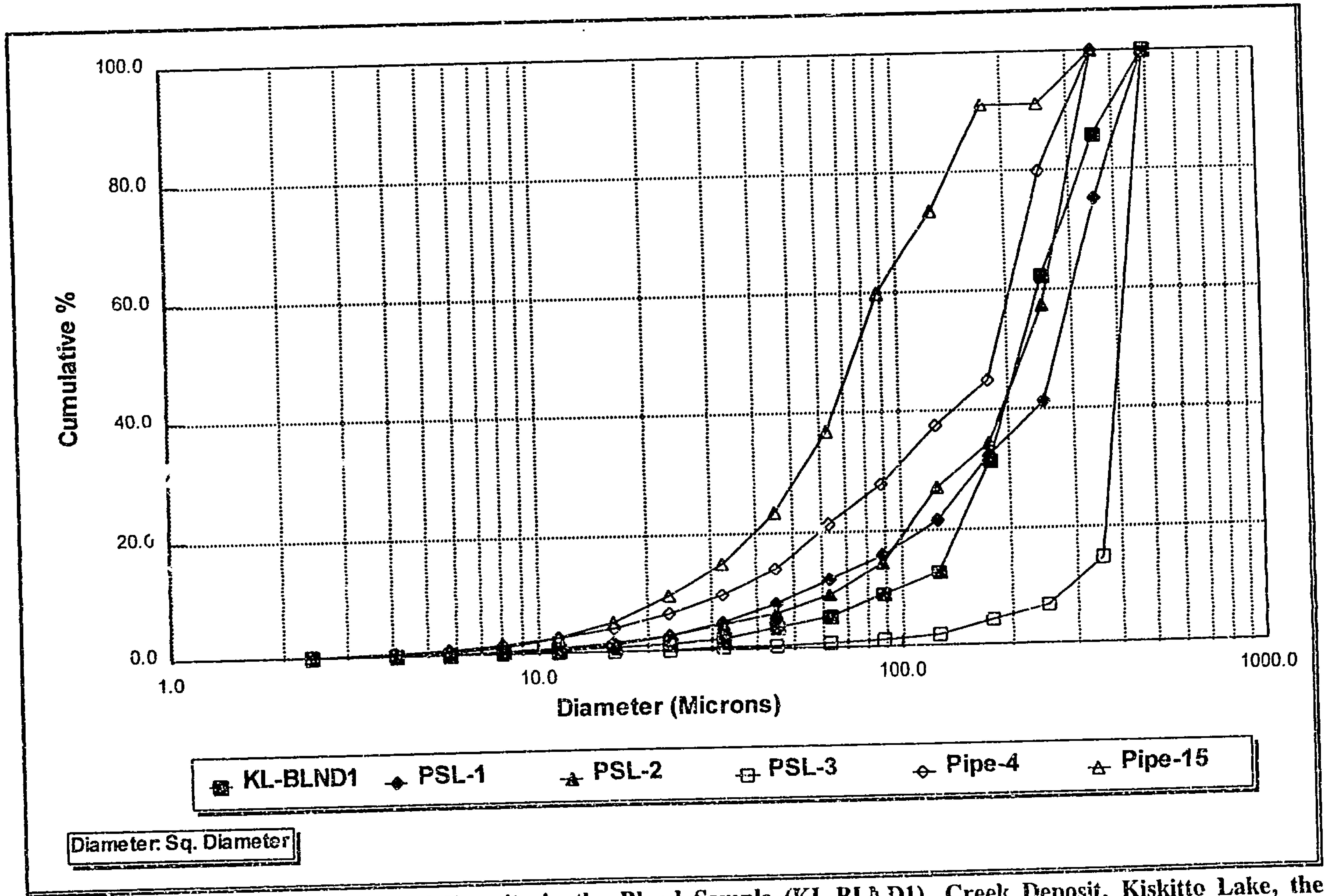

Figure 12. Grain Size Curves of Ilmenite in the Blend Sample (KL-BLND1), Creek Deposit, Kiskitto Lake, the Disseminated (PSL-1 and PSL-2) and Massive (PSL-3) Ores, North Contact Zone, and Massive Ores, Main Zone (Pipe-4 and Pipe-15), Pipestone Lake. Data given in Square diameter.

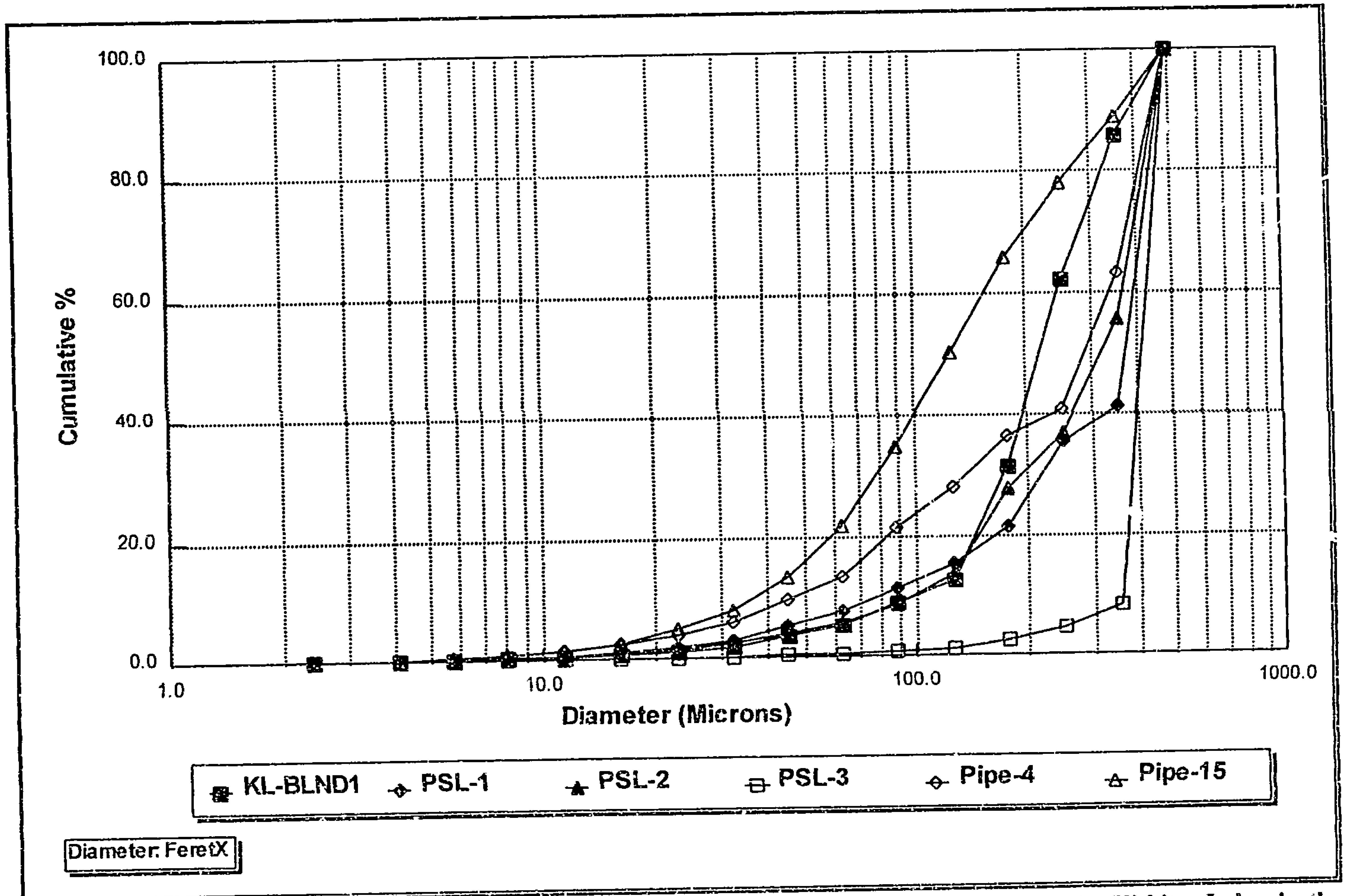

Figure 13. Grain Size Curves of Ilmenite in the Blend Sample (KL-BLND1), Creek Deposit, Kiskitto Lake, in the disseminated (PSL-1 and PSL-2) and Massive (PSL-3) Ores, North Contact Zone, and Massive Ores, Main Zone (Pipe-4 and Pipe-15), Pipestone Lake. Data given as FeretX Diameter.

CONCLUSIONS

1. Ilmenite comprises almost 40% of the oxide minerals in the blend sample. Magnetite comprises approximately 60% of the oxide minerals, and zincian hercynite which occurs in trace abundances, comprises the remainder of the oxides.

2. Ilmenite accounts for approximately 88% of the Ti in the blend sample, and the bulk of the remaining 12% occurs in the matrix amphibole, termed edenitic hornblende. However, biotite contains a significant Ti content (i.e., 2.99 wt% Ti), and locally may be a significant Ti-carrier.

3. Ilmenite is Ti-poor compared to ilmenite from the north contact zone, Pipestone Lake (i.e., 28.8 versus 30.1 wt% Ti). However, the V contents of ilmenite are higher than those of ilmenite from the north contact zone Pipestone Lake (i.e., 0.25 versus 0.14 wt% V).

4. Ilmenite exhibits a Ti-poor composition (i.e., 28.8 wt% Ti, or 48.1 wt% TiO_2), and contains 0.37 wt.% Mg, and 0.40 wt% Ca+Mg+Cr. The ilmenite is significantly more contaminated than ilmenites from the north contact zone, Pipestone Lake (i.e., 0.10 wt% Ca+Mg+Cr). Nonetheless, the Mg content is much less than 1 wt% Mg, and is therefore suitable for upgrading to synthetic rutile.

5. Minor amounts of the sulfides pyrrhotite, pyrite, chalcopyrite, sphalerite and pentlandite were observed in the blend sample. The dominant sulfide pyrrhotite occurs most commonly in the interstitial spaces between grains in the silicate matrix or oxides, and is likely to be liberated from ilmenite at reasonable grind sizes. Thus, a low sulfur ilmenite concentrate should be readily attainable.

6. Apatite contains 18.6% P, and is present in significant abundance (i.e., 6.18 wt%) in the blend sample. The P assay of the blend sample calculated from mineralogy is 1.15 wt% P. Thus, P in apatite is significant as a possible process contaminant. Although, apatite can contain low levels of the radionuclides U and Th, none were observed.

7 The mean grain size of ilmenite in the blend sample is 80% passing 330μm, which should yield ilmenite liberations of 98% at a grind defined by 95% passing 325 mesh (i.e., 44μm), or liberations of 97% at a grind defined by 95% passing 150 mesh (i.e., 104μm). The optimum grind of the ore will be principally governed by two competing economic factors: **(1)** the progressively decreasing amounts of additional ilmenite liberated and recovered with finer grind sizes; and **(2)** the cost of grinding to progressively finer grind sizes.

8. No compositional data or textural features were observed that would indicate the oxides from the Creek deposit, Kiskitto Lake will prove significantly more difficult to process than ore from the disseminated ore of the north contact zone, Pipestone Lake. The potential for high ilmenite liberations, and the simplicity of the oxide assemblage (i.e., ilmenite and magnetite) suggest similar grade/recovery relationships for ilmenite from the Creek deposit, as ilmenite from the north contact zone, Pipestone Lake. However, the occurrence of approximately 11% of the Ti in the matrix amphibole, depresses the maximum Ti recovery to approximately 88% at reasonable concentrate grades, and thus does affect the grade/recovery relationships. In addition, the occurrence of significant amounts of apatite is a possible process contaminant. However, unlike at the north contact zone, Pipestone Lake, bastnaesite is absent at the Creek deposit, Kiskitto Lake.

9. Although the blend sample is considered representative of the sample suite, the applicability of these results is contingent upon the representivity of the sample suite, which should be confirmed prior to major process decisions. Furthermore, it is recommended that future mineralogical studies, intended to complement or guide metallurgical testwork, should be done on a representative subsample of the bulk sample being subjected to metallurgical testing.

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APPENDIX A. CHEMICAL COMPOSITIONS (MICROPROBE DATA) OF THE MINERALS OF INTEREST

TABLE 1A. COMPOSITIONS OF ILMENITE (IN WT%)

	Al	Fe	Ca	Mg	Ti	Si	Mn	V	Cr	Zn	Ni	O
1	0.000	36.601	0.016	0.217	29.819	0.000	0.511	0.180	0.000	0.053	0.049	32.555
2	0.001	37.038	0.000	0.000	28.673	0.003	0.429	0.237	0.018	0.000	0.000	33.600
3	0.046	37.149	0.039	0.327	28.826	0.173	0.537	0.217	0.000	0.003	0.000	32.684
4	0.019	37.191	0.004	0.343	29.558	0.061	0.563	0.272	0.000	0.000	0.000	31.989
5	0.000	37.287	0.005	0.320	29.532	0.000	0.475	0.220	0.000	0.000	0.000	32.160
6	0.000	37.470	0.070	0.412	30.041	0.009	0.388	0.220	0.000	0.000	0.035	31.356
7	0.045	37.523	0.001	0.464	29.279	0.156	0.352	0.254	0.012	0.102	0.000	31.812
8	0.000	37.553	0.126	0.401	28.470	0.009	0.372	0.293	0.002	0.058	0.010	32.706
9	0.017	37.633	0.000	0.386	28.686	0.000	0.406	0.239	0.000	0.057	0.004	32.572
10	0.011	37.669	0.004	0.414	28.246	0.006	0.420	0.330	0.000	0.000	0.000	32.901
11	0.000	37.719	0.000	0.479	29.080	0.000	0.405	0.274	0.000	0.000	0.016	32.026
12	0.014	37.800	0.011	0.431	28.781	0.000	0.420	0.257	0.011	0.017	0.000	32.259
13	0.008	37.804	0.011	0.457	29.193	0.000	0.360	0.265	0.034	0.000	0.000	31.851
14	0.032	37.852	0.000	0.325	29.361	0.137	0.515	0.234	0.000	0.000	0.038	31.506
15	0.000	37.910	0.008	0.365	28.871	0.000	0.406	0.219	0.038	0.097	0.016	32.072
16	0.004	37.988	0.002	0.333	28.337	0.000	0.429	0.248	0.027	0.000	0.003	32.629
17	0.005	37.995	0.000	0.438	28.089	0.019	0.403	0.221	0.017	0.000	0.045	32.768
18	0.000	38.038	0.008	0.382	27.917	0.000	0.302	0.218	0.000	0.000	0.018	33.117
19	0.000	38.080	0.000	0.408	29.737	0.000	0.381	0.295	0.000	0.000	0.000	31.099
20	0.000	38.183	0.006	0.415	28.554	0.005	0.373	0.275	0.021	0.000	0.000	32.168
21	0.000	38.205	0.000	0.454	28.856	0.000	0.353	0.228	0.028	0.006	0.000	31.870
22	0.000	38.260	0.043	0.468	27.920	0.000	0.385	0.264	0.000	0.000	0.031	32.629
23	0.006	38.348	0.011	0.339	28.040	0.000	0.517	0.231	0.037	0.071	0.000	32.400
24	0.000	38.355	0.000	0.378	28.812	0.000	0.272	0.245	0.018	0.000	0.002	31.919
25	0.000	38.355	0.005	0.330	29.005	0.000	0.449	0.219	0.000	0.000	0.056	31.581
26	0.000	38.571	0.021	0.314	27.948	0.000	0.403	0.303	0.000	0.000	0.035	32.406
27	0.000	38.761	0.000	0.390	27.618	0.000	0.404	0.242	0.032	0.000	0.030	32.523
Max	0.046	38.761	0.126	0.479	30.041	0.173	0.563	0.330	0.038	0.102	0.056	33.600
Min	0.000	36.601	0.000	0.000	27.618	0.000	0.272	0.180	0.000	0.000	0.000	31.099
Mean	0.008	37.827	0.014	0.370	28.787	0.021	0.416	0.249	0.011	0.017	0.014	32.265
Std.Dev.	0.013	0.492	0.027	0.094	0.635	0.049	0.067	0.033	0.014	0.031	0.018	0.550

TABLE 1B. COMPOSITIONS OF ILMENITE (IN WT% OXIDES)

	Al_2O_3	FeO	CaO	MgO	TiO_2	SiO_2	MnO	V_2O_3	Cr_2O_3	ZnO	NiO	Total
1	0.000	47.215	0.022	0.360	49.798	0.000	0.659	0.529	0.000	0.061	0.062	98.707
2	0.004	47.779	0.000	0.000	47.884	0.006	0.553	0.697	0.053	0.000	0.000	96.976
3	0.174	47.922	0.055	0.543	48.139	0.370	0.693	0.638	0.000	0.000	0.000	98.534
4	0.072	47.975	0.006	0.569	49.362	0.131	0.726	0.800	0.000	0.000	0.000	99.642
5	0.000	48.100	0.007	0.531	49.318	0.000	0.613	0.647	0.000	0.000	0.000	99.216
6	0.000	48.336	0.098	0.684	50.168	0.019	0.501	0.647	0.000	0.043	0.044	100.541
7	0.170	48.405	0.001	0.770	48.896	0.334	0.454	0.747	0.035	0.000	0.000	99.812
8	0.000	48.443	0.176	0.666	47.545	0.019	0.480	0.861	0.006	0.012	0.013	98.222
9	0.064	48.547	0.000	0.641	47.906	0.000	0.524	0.703	0.000	0.005	0.005	98.394
10	0.042	48.593	0.006	0.687	47.171	0.013	0.542	0.970	0.000	0.000	0.000	98.023
11	0.000	48.658	0.000	0.795	48.564	0.000	0.522	0.806	0.000	0.020	0.020	99.384
12	0.053	48.762	0.015	0.715	48.064	0.000	0.542	0.756	0.032	0.000	0.000	98.940
13	0.030	48.767	0.015	0.759	48.752	0.000	0.464	0.838	0.099	0.000	0.000	99.725
14	0.121	48.629	0.000	0.540	49.033	0.293	0.664	0.688	0.000	0.047	0.048	100.263
15	0.000	48.904	0.011	0.606	48.215	0.000	0.524	0.644	0.111	0.020	0.020	99.054
16	0.015	49.005	0.003	0.553	47.323	0.000	0.553	0.729	0.079	0.004	0.004	98.267
17	0.019	49.014	0.000	0.727	46.909	0.041	0.520	0.650	0.050	0.056	0.057	98.041
18	0.000	49.069	0.011	0.634	46.621	0.000	0.390	0.641	0.000	0.022	0.023	97.411
19	0.000	49.123	0.000	0.677	49.661	0.000	0.491	0.867	0.000	0.000	0.000	100.820
20	0.000	49.256	0.008	0.689	47.685	0.011	0.481	0.809	0.061	0.000	0.000	99.000
21	0.000	49.284	0.000	0.754	48.190	0.000	0.455	0.670	0.082	0.000	0.000	99.435
22	0.000	49.355	0.060	0.777	46.626	0.000	0.497	0.776	0.000	0.038	0.039	98.170
23	0.023	49.469	0.015	0.563	46.827	0.000	0.667	0.879	0.108	0.000	0.000	98.351
24	0.000	49.478	0.000	0.627	48.116	0.000	0.351	0.720	0.053	0.002	0.003	99.350
25	0.000	49.478	0.007	0.548	48.438	0.000	0.579	0.644	0.000	0.069	0.071	99.835
26	0.000	49.757	0.029	0.521	46.673	0.000	0.520	0.891	0.000	0.043	0.044	98.479
27	0.000	50.002	0.000	0.647	46.122	0.000	0.521	0.711	0.093	0.037	0.038	98.173
Max	0.174	50.002	0.176	0.795	50.168	0.370	0.726	0.970	0.111	0.069	0.071	100.820
Min	0.000	47.215	0.000	0.000	46.122	0.000	0.351	0.529	0.000	0.000	0.000	96.976
Mean	0.029	48.797	0.020	0.614	48.074	0.046	0.537	0.732	0.032	0.018	0.018	98.917
Std.Dev.	0.050	0.625	0.038	0.155	1.060	0.105	0.087	0.097	0.039	0.022	0.023	0.908

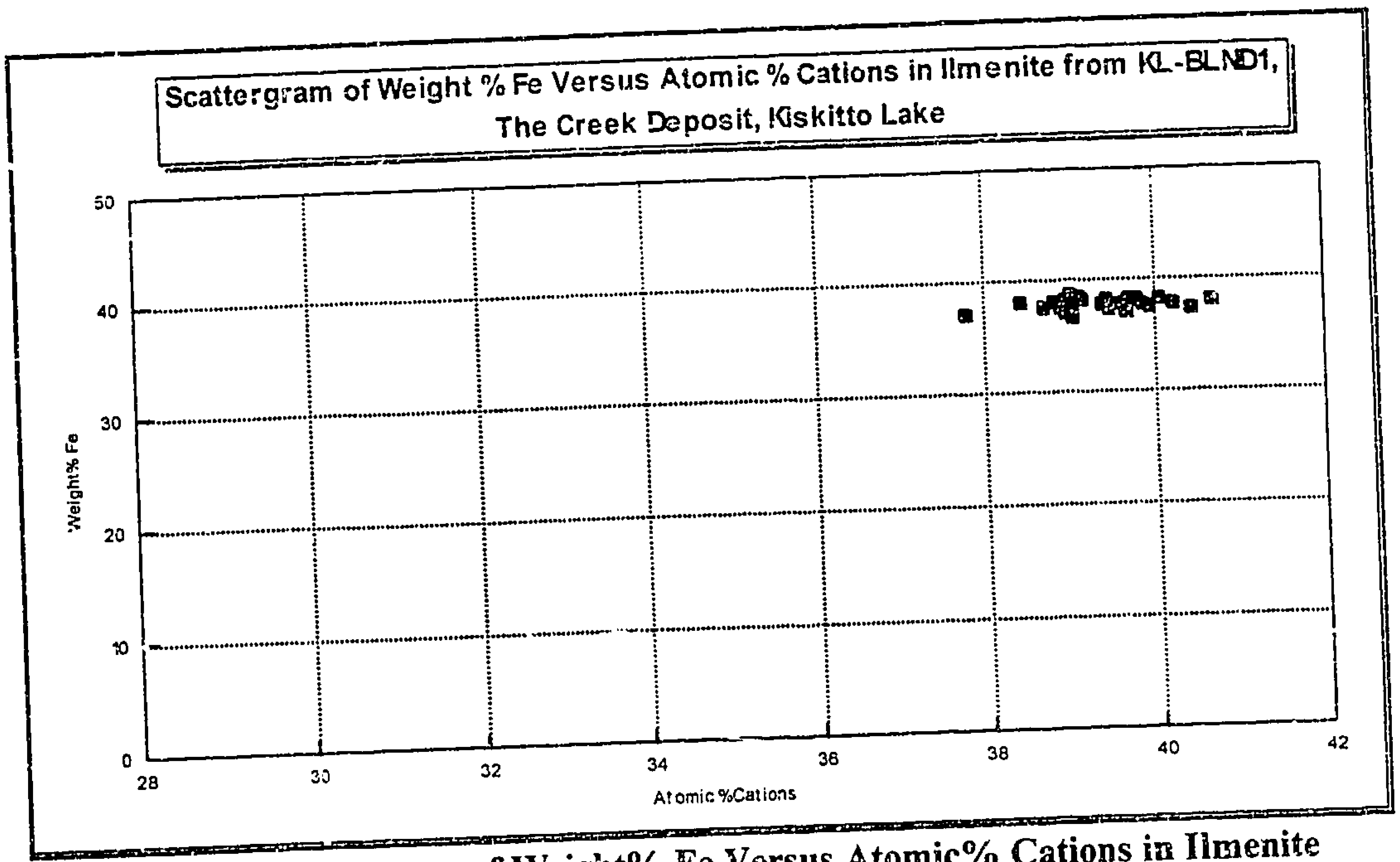

Figure 1. **Scattergram of Weight% Fe Versus Atomic% Cations in Ilmenite from the Creek Deposit, Kiskitto Lake.**

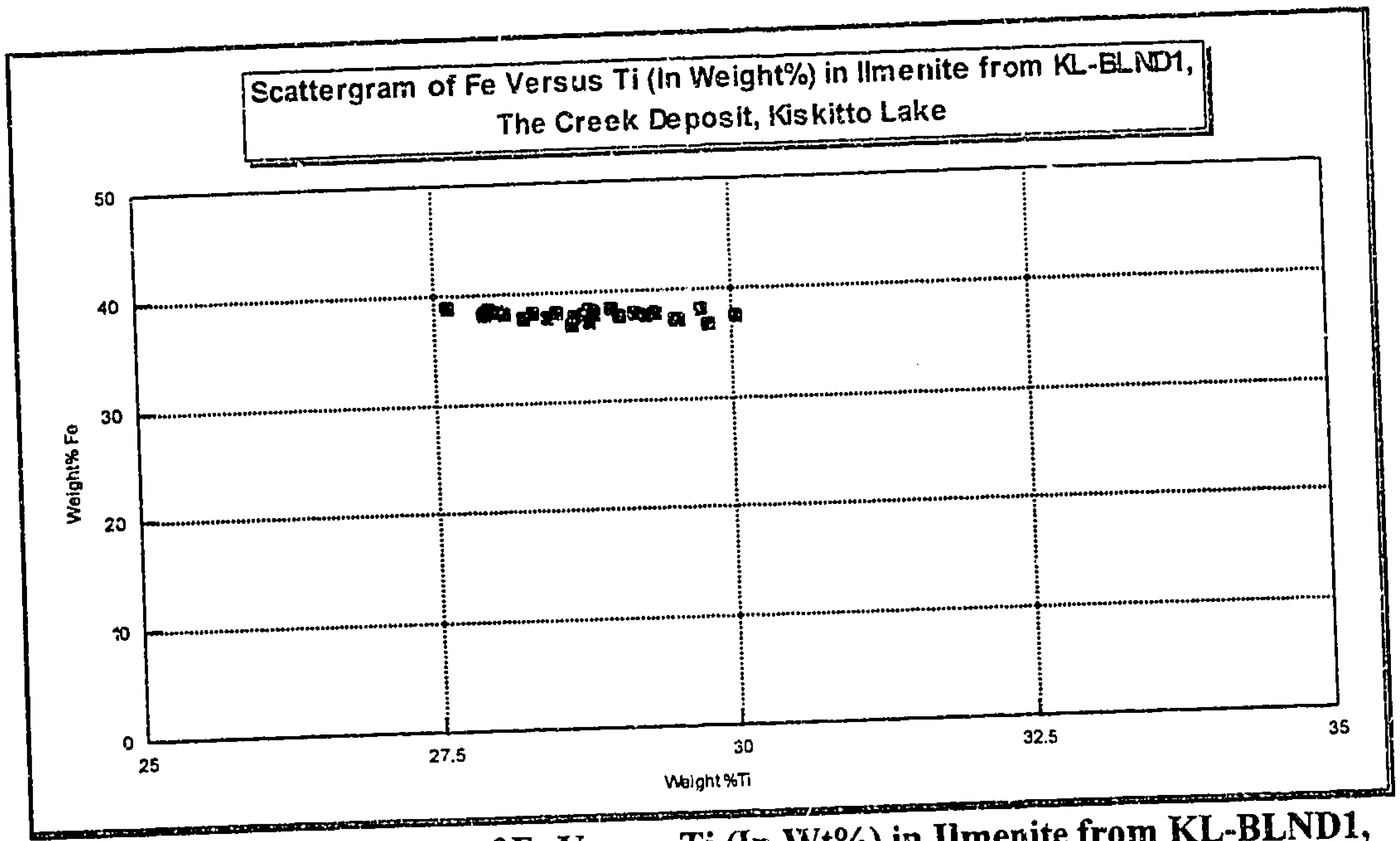

Figure 2. **Scattergram of Fe Versus Ti (In Wt%) in Ilmenite from KL-BLND1, Creek Deposit, Kiskitto Lake.**

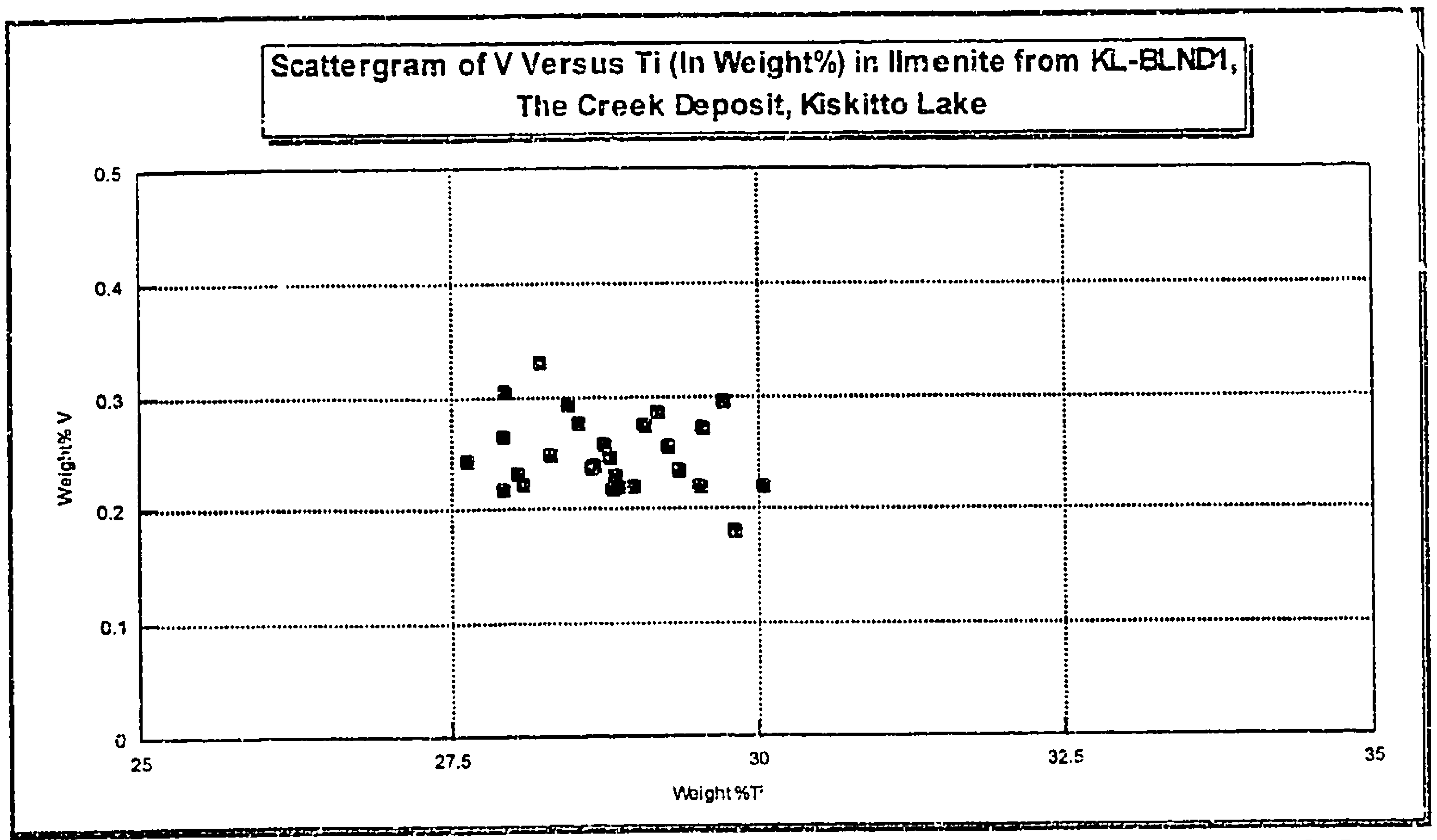

Figure 3. Scattergram of V Versus Ti (In Wt%) in Ilmenite from KL-BLND1, Creek Deposit, Kiskitto Lake.

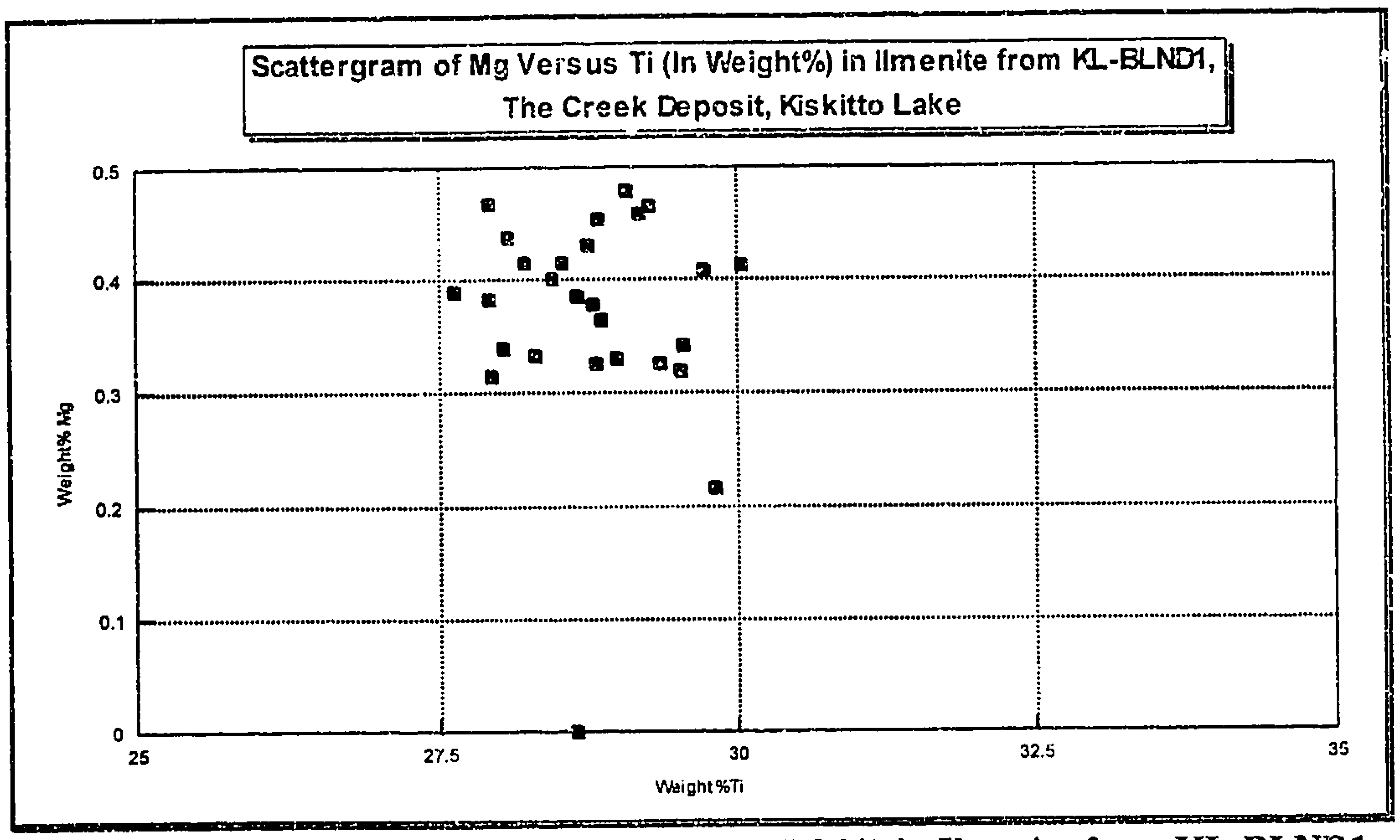

Figure 4. Scattergram of Mg Versus Ti (in Wt%) in Ilmenite from KL-BLND1, Creek Deposit, Kiskitto Lake.

TABLE 2A. COMPOSITIONS OF MAGNETITE (IN WT%)

	Al	Fe	Ca	Mg	Ti	Si	Mn	V	Cr	Zn	Ni	O
KL-M6	0.362	70.913	0.009	0.039	0.070	0.002	0.018	0.504	0.065	0.000	0.000	28.017
KL-M7	0.187	70.989	0.006	0.026	0.000	0.023	0.003	0.584	0.023	0.042	0.000	28.115
KL-M9	0.168	70.990	0.000	0.015	0.060	0.007	0.024	0.722	0.000	0.000	0.000	28.014
KL-M18	0.257	71.193	0.006	0.047	0.068	0.007	0.062	0.501	0.025	0.076	0.007	27.751
KL-M16	0.175	71.193	0.000	0.021	0.023	0.007	0.030	0.542	0.034	0.004	0.000	27.971
KL-M19	0.549	71.326	0.004	0.107	0.051	0.018	0.000	0.580	0.067	0.000	0.047	27.249
KL-M10	0.203	71.380	0.012	0.003	0.114	0.010	0.024	0.592	0.000	0.000	0.028	27.635
KL-M1	0.122	71.644	0.036	0.007	0.231	0.008	0.045	0.420	0.024	0.000	0.000	27.462
KL-M20	0.354	71.763	0.000	0.033	0.133	0.000	0.027	0.619	0.005	0.070	0.000	26.996
KL-M14	0.289	71.784	0.016	0.043	0.188	0.000	0.000	0.577	0.000	0.000	0.000	27.102
KL-M2	0.173	71.898	0.091	0.027	0.000	0.054	0.015	0.307	0.017	0.000	0.000	27.419
KL-M4	0.229	71.947	0.000	0.019	0.121	0.022	0.036	0.561	0.028	0.027	0.000	27.009
KL-M3	0.388	71.986	0.015	0.031	0.085	0.000	0.000	0.738	0.044	0.000	0.075	26.636
KL-M12	0.237	72.125	0.005	0.024	0.105	0.000	0.023	0.631	0.025	0.002	0.008	26.815
KL-M11	0.214	72.174	0.009	0.002	0.123	0.016	0.035	0.620	0.000	0.054	0.055	26.699
KL-M21	0.257	72.202	0.000	0.012	0.136	0.024	0.000	0.587	0.031	0.000	0.062	26.690
KL-M5	0.160	72.318	0.004	0.005	0.073	0.014	0.000	0.648	0.000	0.000	0.056	26.722
KL-M13	0.195	72.442	0.000	0.007	0.084	0.016	0.018	0.534	0.025	0.000	0.046	26.635
KL-M17	0.254	72.461	0.020	0.035	0.000	0.005	0.004	0.600	0.000	0.000	0.000	26.620
KL-M15	0.288	72.547	0.004	0.010	0.382	0.017	0.025	0.634	0.030	0.001	0.055	26.007
Max	0.549	72.547	0.091	0.107	0.382	0.054	0.062	0.738	0.067	0.076	0.075	28.115
Min	0.122	70.913	0.000	0.002	0.000	0.000	0.000	0.307	0.000	0.000	0.000	26.007
Mean	0.253	71.764	0.012	0.026	0.102	0.012	0.019	0.575	0.022	0.014	0.022	27.178
Std.Dev.	0.097	0.519	0.020	0.023	0.087	0.012	0.017	0.093	0.020	0.025	0.027	0.580

TABLE 2B. COMPOSITIONS OF MAGNETITE (IN WT% OXIDE)

	Al_2O_3	FeO	CaO	MgO	TiO_2	SiO_2	MnO	V_2O_3	Cr_2O_3	ZnO	NiO	Total
KL-M6	1.368	91.478	0.013	0.065	0.117	0.004	0.023	1.482	0.190	0.000	0.000	94.739
KL-M7	0.707	91.576	0.011	0.043	0.000	0.049	0.004	1.717	0.067	0.000	0.000	94.174
KL-M8	0.635	91.577	0.000	0.025	0.100	0.015	0.031	2.123	0.000	0.000	0.000	94.506
KL-M9	0.971	91.839	0.008	0.078	0.114	0.015	0.080	1.473	0.073	0.009	0.009	94.669
KL-M18	0.662	91.839	0.000	0.035	0.038	0.015	0.039	1.593	0.099	0.000	0.000	94.320
KL-M16	2.075	92.011	0.006	0.178	0.085	0.039	0.000	1.705	0.196	0.058	0.060	96.411
KL-M19	0.767	92.080	0.017	0.005	0.190	0.021	0.031	1.740	0.000	0.035	0.036	94.923
KL-M10	0.461	92.421	0.050	0.012	0.386	0.017	0.058	1.235	0.070	0.000	0.000	94.710
KL-M1	1.338	92.574	0.000	0.055	0.222	0.000	0.035	1.820	0.015	0.000	0.000	96.059
KL-M20	1.092	92.601	0.022	0.071	0.314	0.000	0.000	1.696	0.000	0.000	0.000	95.798
KL-M14	0.654	92.748	0.127	0.045	0.000	0.116	0.019	0.903	0.050	0.000	0.000	94.662
KL-M2	0.866	92.812	0.000	0.032	0.202	0.047	0.046	1.649	0.082	0.000	0.000	95.735
KL-M4	1.467	92.862	0.021	0.051	0.142	0.000	0.000	2.170	0.128	0.093	0.095	97.029
KL-M3	0.896	93.041	0.007	0.040	0.175	0.000	0.030	1.855	0.073	0.010	0.010	96.137
KL-M12	0.809	93.104	0.013	0.003	0.205	0.034	0.045	1.823	0.000	0.068	0.070	96.175
KL-M11	0.971	93.141	0.000	0.020	0.227	0.051	0.000	1.726	0.091	0.077	0.079	96.382
KL-M21	0.605	93.290	0.006	0.008	0.122	0.030	0.000	1.905	0.000	0.069	0.071	96.[illegible]6
KL-M5	0.737	93.450	0.000	0.012	0.140	0.034	0.023	1.570	0.073	0.057	0.058	96.155
KL-M13	0.960	93.475	0.028	0.058	0.000	0.011	0.005	1.764	0.000	0.000	0.000	96.301
KL-M17	1.089	93.586	0.006	0.017	0.638	0.036	0.032	1.864	0.088	0.068	0.070	97.493
Max	2.075	93.586	0.127	0.178	0.638	0.116	0.080	2.170	0.196	0.093	0.095	97.493
Min	0.461	91.478	0.000	0.003	0.000	0.000	0.000	0.903	0.000	0.000	0.000	94.174
Mean	[illegible]957	92.575	0.017	0.043	0.171	0.027	0.025	1.691	0.065	0.027	0.028	9[illegible]4
Std.Dev.	0.367	0.669	0.028	0.038	0.145	0.026	0.022	0.275	0.058	0.033	0.034	0.9[illegible]

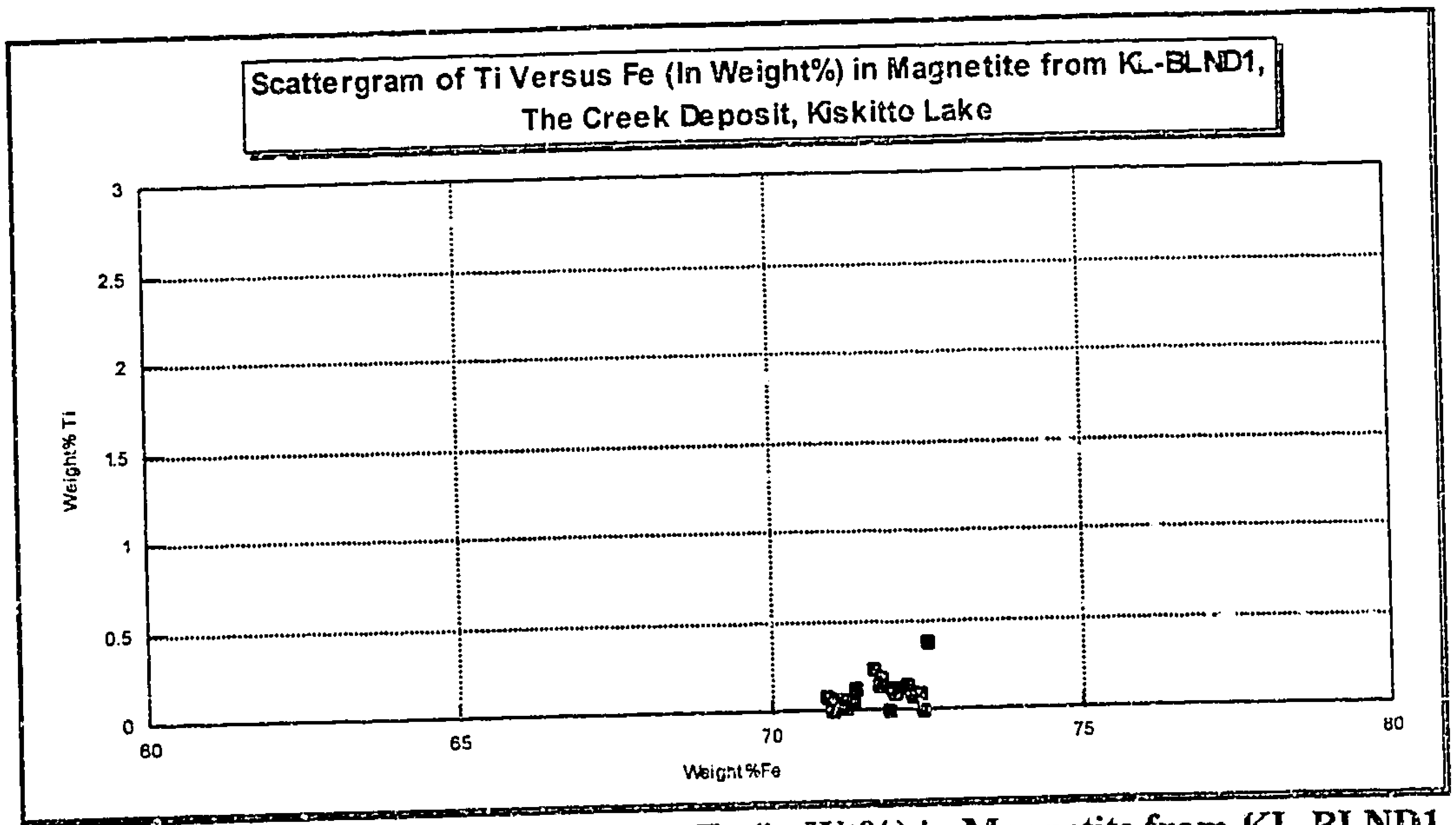

Figure 5. Scattergram of Ti Versus Fe (in Wt%) in Magnetite from KL-BLND1, Creek Deposit, Kiskitto Lake.

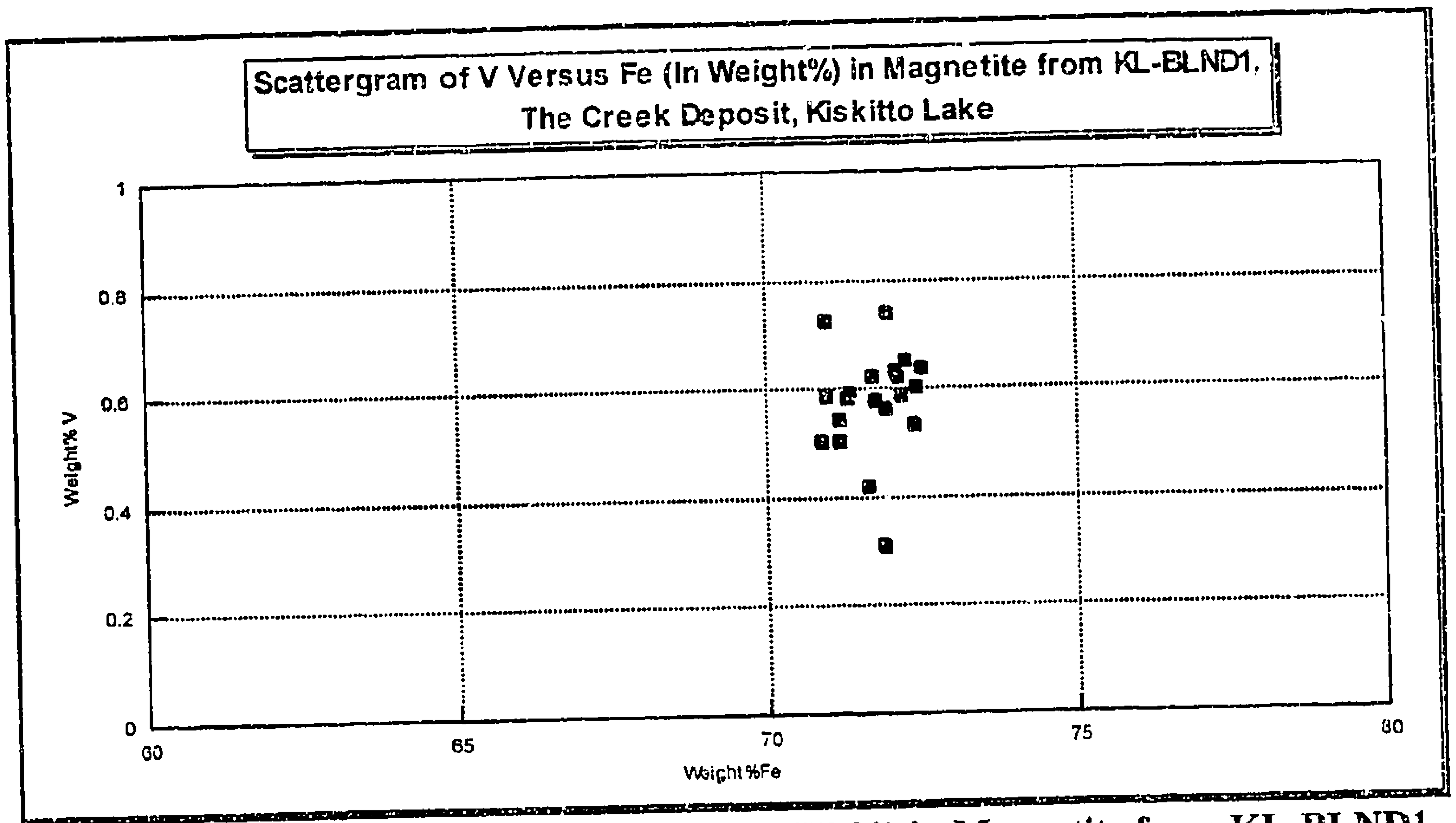

Figure 6. Scattergram of V Versus Fe (in Wt%) in Magnetite from KL-BLND1, Creek Deposit, Kiskitto Lake.

TABLE 3A. COMPOSITIONS OF AMPHIBOLE (IN WT%)

	Na	Fe	K	Mg	Mn	Ca	Al	Ti	Si	F	Cl	O	Total
KL-AM1	0.945	13.077	1.412	5.891	0.147	8.224	6.377	1.126	19.330	0.267	0.068	39.885	96.749
KL-AM2	0.895	13.411	1.393	5.623	0.072	8.124	6.085	1.267	19.344	0.126	0.144	39.615	96.100
KL-AM3	0.949	13.476	1.419	5.687	0.130	8.190	5.964	1.248	19.553	0.183	0.156	39.833	96.788
KL-AM5	1.022	13.192	0.933	5.897	0.113	8.255	5.916	1.074	19.723	0.260	0.057	39.861	96.303
KL-AM6	0.996	12.849	0.964	6.076	0.090	8.247	6.195	1.061	19.629	0.190	0.060	40.029	96.386
Max	1.022	13.476	1.419	6.076	0.147	8.255	6.377	1.267	19.723	0.267	0.156	40.029	96.788
Min	0.895	12.849	0.933	5.623	0.072	8.124	5.916	1.061	19.330	0.126	0.057	39.615	96.100
Mean	0.961	13.201	1.224	5.835	0.110	8.208	6.108	1.155	19.516	0.205	0.097	39.845	96.465
Std.Dev.	0.044	0.228	0.225	0.162	0.027	0.048	0.166	0.087	0.156	0.053	0.044	0.133	0.265

TABLE 3B. COMPOSITIONS OF AMPHIBOLE (IN WT% OXIDE)

	Na_2O	FeO	K_2O	MgO	MnO	CaO	Al_2O_3	TiO_2	SiO_2	F	Cl	Total
KL-AM1	1.276	15.869	1.694	9.779	0.190	11.514	12.053	1.880	41.366	0.267	0.068	96.956
KL-AM2	1.208	17.300	1.672	9.334	0.093	11.374	11.503	2.116	41.396	0.126	0.144	96.265
KL-AM3	1.281	17.384	1.703	9.440	0.168	11.466	11.272	2.084	41.843	0.183	0.156	96.981
KL-AM5	1.380	17.018	1.120	9.789	0.146	11.557	11.181	1.794	42.207	0.260	0.057	96.508
KL-AM6	1.345	16.575	1.157	10.086	0.116	11.546	11.709	1.772	42.006	0.190	0.060	96.561
Max	1.380	17.384	1.703	10.086	0.190	11.557	12.053	2.116	42.207	0.267	0.156	96.981
Min	1.208	16.575	1.120	9.334	0.093	11.374	11.181	1.772	41.366	0.126	0.057	96.265
Mean	1.298	17.029	1.469	9.686	0.142	11.491	11.543	1.929	41.764	0.205	0.097	96.654
Std.Dev.	0.059	0.294	0.271	0.270	0.035	0.067	0.314	0.144	0.333	0.053	0.044	0.275

TABLE 4A. COMPOSITIONS OF PYROXENE (IN WT%)

	Na	Fe	K	Mg	Mn	Ca	Al	Ti	Si	F	Cl	O	Total
KL-P1	0.000	22.376	0.000	10.612	0.511	0.383	0.645	0.052	23.510	0.000	0.002	41.088	99.179
KL-P2	0.000	22.348	0.002	10.499	0.473	0.387	0.603	0.000	23.695	0.030	0.009	41.121	99.167
KL-P3	0.000	22.533	0.008	10.434	0.457	0.386	0.558	0.009	23.575	0.073	0.003	40.939	98.975
KL-P4	0.000	22.251	0.000	10.382	0.500	0.386	0.560	0.007	23.456	0.055	0.000	40.709	98.306
KL-P5	0.000	22.150	0.006	10.736	0.505	0.284	0.564	0.010	23.570	0.000	0.000	41.034	98.859
Max	0.000	22.533	0.008	10.736	0.511	0.387	0.645	0.052	23.695	0.073	0.009	41.121	99.179
Min	0.000	22.150	0.000	10.382	0.457	0.284	0.558	0.000	23.456	0.000	0.000	40.709	98.306
Mean	0.000	22.332	0.003	10.533	0.489	0.365	0.586	0.016	23.561	0.032	0.003	40.978	98.897
Std.Dev.	0.000	0.128	0.003	0.127	0.021	0.041	0.034	0.019	0.080	0.029	0.003	0.148	0.319

TABLE 4B. COMPOSITIONS OF PYROXENE (IN WT% OXIDE)

	Na_2O	FeO	K_2O	MgO	MnO	CaO	Al_2O_3	TiO_2	SiO_2	F	Cl	Total
KL-P1	0.000	28.865	0.000	17.616	0.659	0.536	1.219	0.087	50.311	0.267	0.068	99.629
KL-P2	0.000	28.829	0.002	17.428	0.610	0.542	1.140	0.000	50.707	0.126	0.144	99.529
KL-P3	0.000	29.068	0.010	17.320	0.590	0.540	1.055	0.015	50.451	0.183	0.156	99.397
KL-P4	0.000	28.704	0.000	17.234	0.645	0.540	1.058	0.012	50.196	0.260	0.057	98.706
KL-P5	0.000	28.574	0.007	17.822	0.651	0.398	1.066	0.017	50.440	0.190	0.060	99.224
Max	0.000	29.068	0.010	17.822	0.659	0.542	1.219	0.087	50.707	0.267	0.156	99.629
Min	0.000	28.574	0.000	17.234	0.590	0.398	1.055	0.000	50.196	0.126	0.057	98.706
Mean	0.000	28.808	0.004	17.484	0.631	0.511	1.108	0.026	50.421	0.205	0.097	99.295
Std.Dev.	0.000	0.165	0.004	0.212	0.027	0.057	0.064	0.031	0.171	0.053	0.044	0.324

TABLE 5A. COMPOSITIONS OF BIOTITE (IN WT%)

	Na	Fe	K	Mg	Mn	Ca	Al	Ti	Si	F	Cl	O	Total
KL-BIO	0.007	14.000	8.145	6.627	0.057	0.000	7.628	3.007	16.393	0.395	0.125	37.332	93.716
KI45-B1	0.014	14.106	8.197	6.720	0.101	0.000	7.440	3.015	16.535	0.432	0.133	37.431	94.125
KI45-B2	0.127	14.000	7.775	6.843	0.055	0.006	7.302	3.101	16.609	0.281	0.142	37.505	93.747
KI45-B3	0.012	13.652	8.241	6.911	0.013	0.000	7.683	2.830	16.626	0.500	0.130	37.579	94.177
KI45-B4	0.014	13.178	8.197	7.434	0.049	0.000	7.411	2.989	16.876	0.398	0.113	37.986	94.644
Max	0.127	14.106	8.241	7.434	0.101	0.006	7.683	3.101	16.876	0.500	0.142	37.986	94.644
Min	0.007	13.178	7.775	6.627	0.013	0.000	7.302	2.830	16.393	0.281	0.113	37.332	93.716
Mean	0.035	13.787	8.111	6.907	0.055	0.001	7.493	2.938	16.608	0.401	0.129	37.567	94.032
Std.Dev.	0.046	0.341	0.171	0.281	0.028	0.002	0.142	0.088	0.157	0.071	0.010	0.225	0.338

TABLE 5B. COMPOSITIONS OF BIOTITE (IN WT% OXIDES)

	Na_2O	FeO	K_2O	MgO	MnO	CaO	Al_2O_3	TiO_2	SiO_2	F	Cl	Total
KL-BIO	0.009	18.060	9.774	11.001	0.074	0.000	14.417	5.022	35.081	0.267	0.068	93.772
KI45-B1	0.019	18.148	9.874	11.142	0.130	0.000	14.057	5.029	35.372	0.432	0.133	94.337
KI45-B2	0.172	18.011	9.366	11.346	0.071	0.008	13.797	5.173	35.531	0.281	0.142	93.897
KI45-B3	0.017	17.563	9.927	11.460	0.017	0.000	14.517	4.720	35.567	0.500	0.130	94.417
KI45-B4	0.019	16.953	9.874	12.327	0.063	0.000	14.002	4.986	36.103	0.398	0.113	94.837
Max	0.172	16.148	9.927	12.327	0.130	0.008	14.517	5.173	36.103	0.500	0.142	94.837
Min	0.009	16.953	9.366	11.001	0.017	0.000	13.797	4.720	35.081	0.267	0.068	93.772
Mean	0.047	17.747	9.763	11.455	0.071	0.002	14.158	4.986	35.531	0.376	0.117	94.252
Std.Dev.	0.062	0.446	0.205	0.464	0.036	0.003	0.269	0.148	0.334	0.089	0.026	0.383

TABLE 6B. COMPOSITIONS OF APATITE (IN WT%)

	F	Mn	Ca	Na	Fe	P	Al	Zn	K	Mg	Ba	Cl	Si	Nd	Sr	Y	Sc	Ce	La	O	Total
KLAP1	2.329	0.040	39.945	0.000	0.137	18.642	0.000	0.063	0.015	0.000	0.019	0.109	0.028	0.000	0.051	0.000	0.000	0.052	0.049	41.154	102.634
KLAP2	2.752	0.015	39.769	0.000	0.071	18.723	0.004	0.000	0.005	0.000	0.000	0.212	0.030	0.000	0.051	0.003	0.000	0.085	0.068	41.359	103.149
KLAP3	2.419	0.019	40.242	0.000	0.105	18.300	0.000	0.000	0.005	0.000	0.000	0.162	0.033	0.014	0.124	0.000	0.000	0.115	0.038	40.876	102.453
KLAP4	2.759	0.009	39.741	0.005	0.114	18.646	0.000	0.019	0.000	0.000	0.019	0.148	0.010	0.008	0.034	0.000	0.000	0.034	0.050	41.214	102.810
KLAP5	2.896	0.000	39.616	0.000	0.054	18.337	0.000	0.033	0.006	0.000	0.000	0.166	0.033	0.044	0.036	0.017	0.000	0.117	0.070	40.862	102.287
KLAP6	2.918	0.016	39.793	0.000	0.06[illegible]	18.683	0.000	0.038	0.000	0.000	0.174	0.154	0.025	0.040	0.076	0.000	0.000	0.066	0.000	41.387	103.436
Max	2.918	0.040	40.242	0.005	0.137	18.723	0.004	0.063	0.015	0.000	0.174	0.212	0.033	0.044	0.124	0.017	0.000	0.117	0.070	41.387	103.436
Min	2.329	0.000	39.616	0.000	0.054	18.300	0.000	0.000	0.000	0.000	0.000	0.109	0.010	0.000	0.034	0.000	0.000	0.034	0.000	40.862	102.287
Mean	2.679	0.017	39.851	0.001	0.091	18.555	0.001	0.026	0.005	0.000	0.035	0.159	0.027	0.018	0.052	0.003	0.000	0.078	0.046	41.142	102.795
S. Dev.	0.226	0.012	0.200	0.002	0.030	0.170	0.001	0.022	0.005	0.000	0.063	0.030	0.008	0.018	0.031	0.006	0.000	0.031	0.023	0.209	0.395

TABLE 6B. COMPOSITIONS OF APATITE (IN WT% OXIDES)

	F_2O	MnO	CaO	Na_2O	FeO	P_2O_5	Al_2O_3	ZnO	K_2O	MgO	BaO	Cl_2O	SiO2	Nd_2O_3	SrO	Y_2O_3	Sc_2O_3	Ce_2O_3	La_2O_3	Total
KLAP1	3.309	0.052	55.890	0.000	0.177	42.715	0.000	0.079	0.018	0.000	0.022	0.134	0.060	0.000	0.060	0.000	0.000	0.061	0.057	102.634
KLAP2	3.911	0.019	55.644	0.000	0.091	42.699	0.007	0.000	0.006	0.000	0.000	0.260	0.065	0.000	0.060	0.004	0.000	0.100	0.080	103.149
KLAP3	3.437	0.025	56.306	0.000	0.135	41.932	0.000	0.000	0.006	0.000	0.000	0.199	0.071	0.017	0.146	0.000	0.000	0.134	0.014	102.453
KLAP4	3.921	0.012	55.605	0.006	0.146	42.723	0.000	0.024	0.000	0.000	0.022	0.181	0.022	0.009	0.040	0.000	0.000	0.040	0.058	102.810
KLAP5	4.115	0.000	55.430	0.000	0.069	42.016	0.000	0.041	0.007	0.000	0.000	0.203	0.070	0.052	0.043	0.021	0.000	0.137	0.082	102.287
KLAP6	4.147	0.020	55.677	0.000	0.085	42.809	0.000	0.047	0.000	0.000	0.194	0.189	0.054	0.047	0.089	0.000	0.000	0.077	0.000	103.436
Max	4.147	0.052	56.306	0.006	0.177	42.899	0.007	0.079	0.018	0.000	0.194	0.260	0.071	0.052	0.146	[illegible]	0.000	0.137	0.082	103.436
Min	3.309	0.000	55.430	0.000	0.069	41.932	0.000	0.000	0.000	0.000	0.000	0.134	0.022	0.000	0.040	0.000	0.000	0.040	0.000	102.287
Mean	3.807	0.021	55.759	0.001	0.117	42.516	0.001	0.032	0.005	0.000	0.040	0.194	0.057	0.021	0.073	0.004	0.000	0.092	0.054	102.795
S.Dev.	0.321	0.016	0.279	0.002	0.038	0.389	0.003	0.028	0.006	0.000	0.070	0.037	0.017	0.021	0.036	0.008	0.000	0.036	0.027	0.395

APPENDIX B. IMAGE ANALYSIS DATA

TABLE 1. GRAIN SIZE DISTRIBUTIONS OF THE MINERALS OF INTEREST IN KL-BLND1

Diameter (Microns)	Plotting Point	Ilmenite	Edenitic Hornblende	Apatite	Feldspar	Hercynite	Magnetite	Monazite	Hypersthene	Quartz	Pyrite
3.40	2.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4.80	4.10	0.0	0.0	0.1	0.0	4.1	0.2	9.7	0.0	0.2	0.0
6.70	5.75	0.1	0.0	0.3	0.0	9.9	0.5	31.5	0.0	0.7	0.1
9.50	8.10	0.2	0.1	0.7	0.1	18.9	1.0	63.8	0.0	1.8	0.2
13.40	11.45	0.3	0.2	1.3	0.4	29.9	1.5	79.6	0.1	5.5	0.2
19.00	16.20	0.6	0.6	2.1	0.7	38.7	2.0	100.0	0.2	17.5	1.2
26.90	22.95	0.9	1.0	2.6	0.9	50.1	2.6	100.0	0.4	39.4	1.8
38.00	32.45	1.9	1.4	3.1	1.1	60.0	3.6	100.0	0.6	58.2	3.2
53.00	45.50	3.4	2.2	3.7	1.3	62.9	5.0	100.0	1.0	77.9	10.0
74.00	63.50	5.1	3.5	6.1	1.8	82.1	6.5	100.0	1.7	86.9	22.4
104.00	89.00	9.0	6.6	8.2	2.8	100.0	8.1	100.0	4.0	86.9	35.8
147.00	125.50	12.7	10.5	18.3	4.1	100.0	14.2	100.0	5.7	100.0	70.0
208.00	177.50	31.1	15.4	43.4	8.0	100.0	22.8	100.0	10.0	100.0	70.0
295.00	251.50	62.0	25.6	68.3	12.1	100.0	42.7	100.0	25.9	100.0	100.0
417.00	356.00	85.7	44.1	100.0	23.1	100.0	56.1	100.0	45.9	100.0	100.0
>417.00	495.00	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

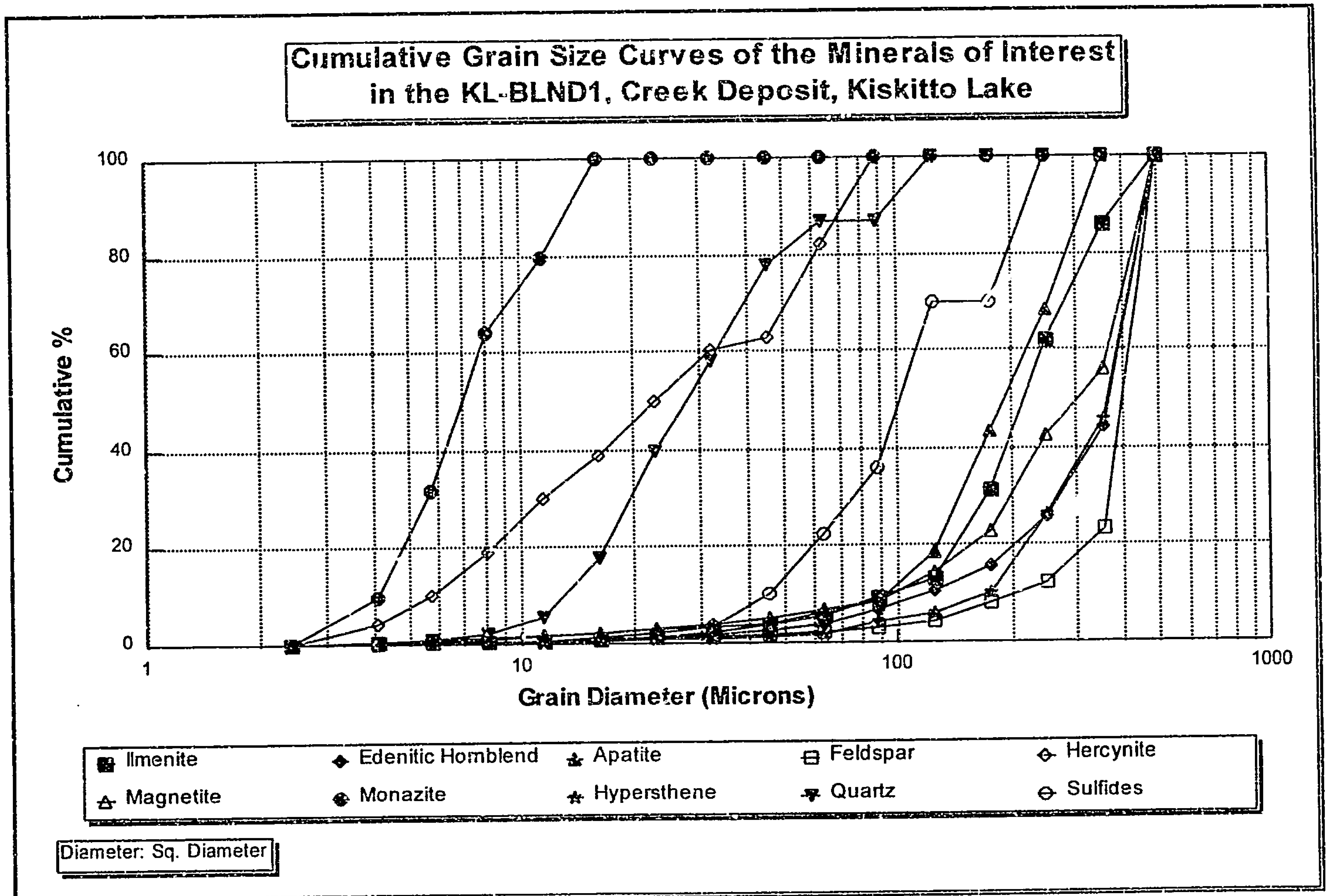

Figure 1. **Grain Size Distributions of the Minerals Analysed using Image Analysis in Sample KL-BLND1, Creek Deposit, Kiskitto Lake. Data is given as Square Diameter.**

NOTES

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73001

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RECORDING OFFICE
MINES
WINNIPEG, MAN.

'96 APR 29 AM 11 05

Report on the Mineral Exploration of Permit #131, located at Kiskitto Lake, Manitoba under the Mineral Exploration Incentive Programme.

NTS 63J7-63J8

J.W. Campbell, P.Eng.

March 28,1996

Introduction

This report is based on exploration work covering Permit #131 in the Kiskitto Lake area, Manitoba during the period of December 1, 1995 to March 1, 1996.
The exploration covered the drilling, logging, sampling and assaying of 3 drill holes; KL-96-11, KL-96-12 and KL-96-13, and the mineralogical study from core samples of Drill hole KL-96-6.

Property Location and Access

Permit #131, 100% owned by Gossan Resources Limited is 11 kilometers wide by 44 kilometers long covering most of the north side of Kiskitto Lake, Manitoba, which is located approximately 30 kilometers north of Lake Winnipeg.
During winter months, the lake can be accessed by plowing the existing gravel road 20 kilometers, south of the airport near the Jenpeg dam on the Nelson River, north of Lake Winnipeg. Reaching Kiskitto Lake requires a 9 hour automobile drive from Winnipeg, or a 3.5 hour drive from Thompson, Manitoba. The 3 holes drilled in January and February total 2018 feet (615 meters) were located on the Kis west prospect on Kiskitto Lake ice, 18 kilometers southwest from the road entrance at the northeast end of the lake. The mineralogical study taken was of hole KL-95-6, which was drilled on the Creek deposit, located near the centre of the property on the creek draining Kiskitto Lake to the north.

Mineralogical

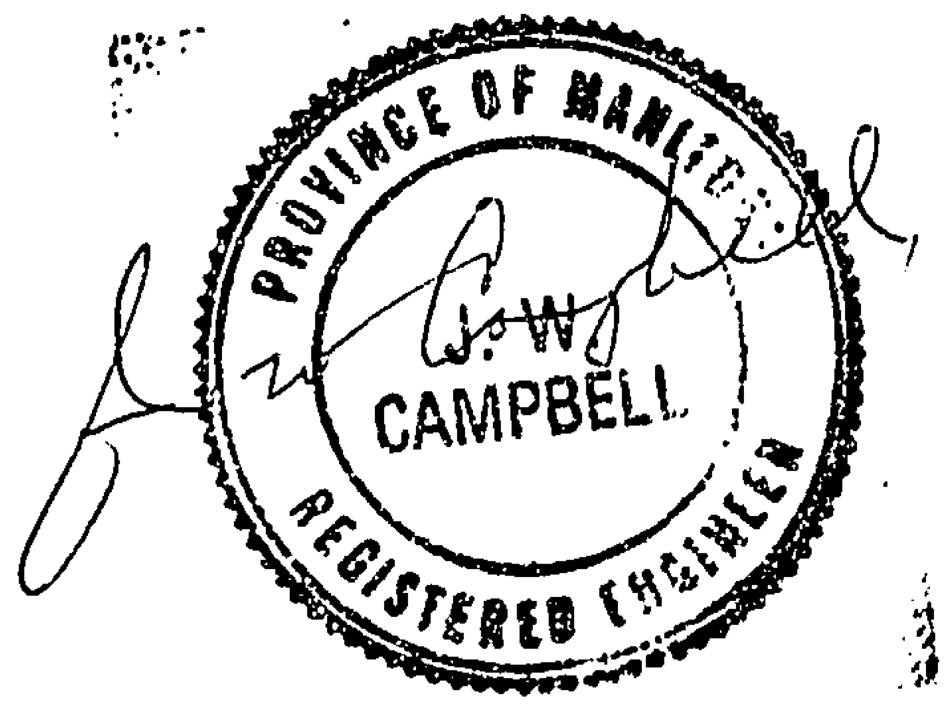
The mineralogical study was carried out on a number of 1 inch length core from selected equidistant samples 5 meters apart from hole KL-95-6. The enclosed report was completed by R. Healy of Minortek, located in Winnipeg, Manitoba.

Drilling

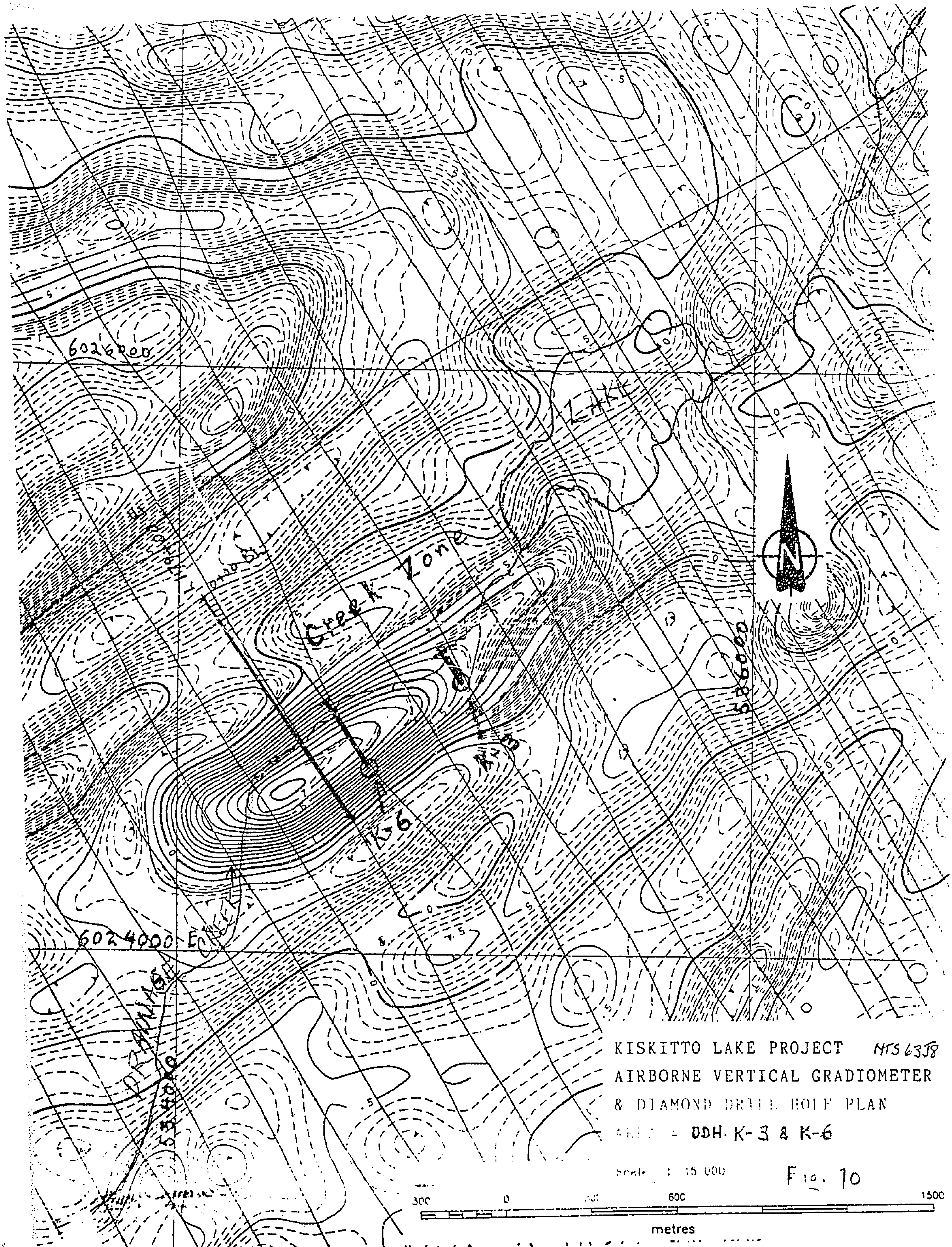
The 3 drill holes; KL-96-11, KL-96-12 and KL-96-13, started January 8, 1996, and were completed by February 10, 1996. Total drilling was 2018 feet (615 meters), Geologist Lou Chastko, Prospector David Meek, and the author spotted the drill holes. The holes were logged by Dr. David Peck and Dr. Peter Theyer of Energy and Mines Manitoba, Charles Mcleod of Wabowden, Manitoba, and the author. Kenora Soil and Drilling carried out the drilling, and Tom McIvor of Cross Lake, Manitoba plowed the road to the drill sites. X-Ral Laboratories and Activation Laboratories of Toronto and Ancaster, Ontario assayed the samples from the split core.
The core from the 3 holes is currently stored at the core storage building in Thompson, and is being supervised by the Energy and Mines, Manitoba. All assay results and logs were completed by February 28, 1996. The winter season was the coldest on record, and a slowed drilling progress resulted. Enclosed are 3 logs of the drill holes:

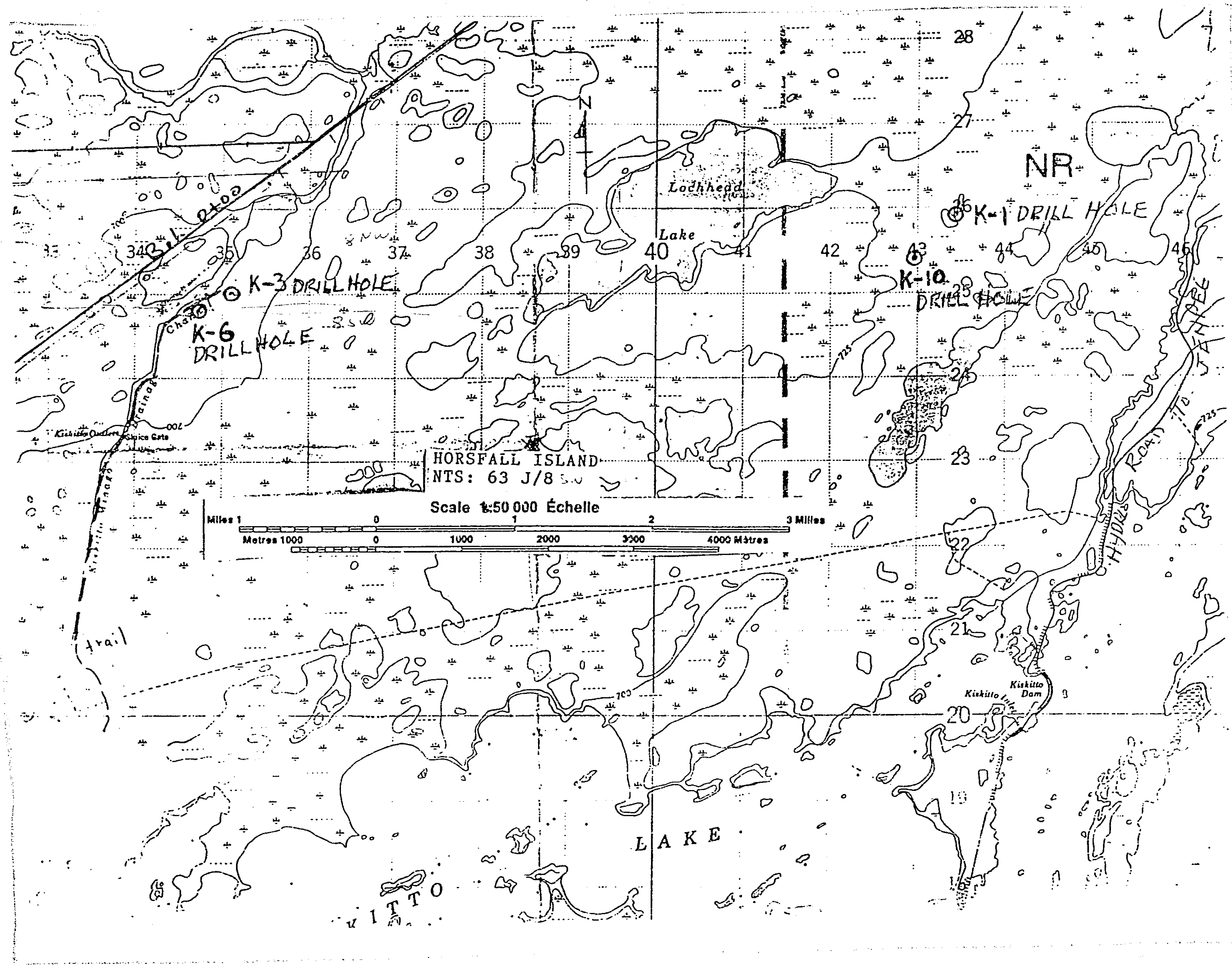
Results

Drill holes KL-96-11 and KL-96-12 intersected 250 foot (76 meters) widths of 2% to 3% Titanium Dioxide (TiO_2). Drill hole KL-96-13 intersected a minimum of 100 feet (30 meters) assaying 4.5% TiO_2. Overall 200 to 300 foot (61 to 91 meters) wide zones of TiO_2, averaging 2.5% to 3.0% TiO_2, .20% Vanadium ($V_{2}0_{5}$), and 20% to 25% Iron (Fe_2O_3). These results may be expected in all holes as a minimum, with the most westerly hole, KL-95-13 having an increased TiO_2 grade, as noted above. Individual sections of 3 to 10 foot (.91 to 3 meters) widths of 35% to 50% Fe_2O_3 was intersected in hole KL-96-12 with grades of $V_{2}0_{5}$ up to .61% and TiO_2 up to 7.10%.
These occasional higher grade samples of Iron, Titanium, and Vanadium within a continuous lower grade (up to 400 foot (122 meter) intersections) of these minerals at the Kis west and Creek deposits, all occur within the Kiskitto anorthosite synclinal basin. These finding make it imperative that the other anomalous magnetic zones be tested. There is a minimum of 4 major airborne magnetic anomalous zones to be explored, and 5 other anomalous areas that are less magnetic but no less capable of containing significant levels of TiO_2.

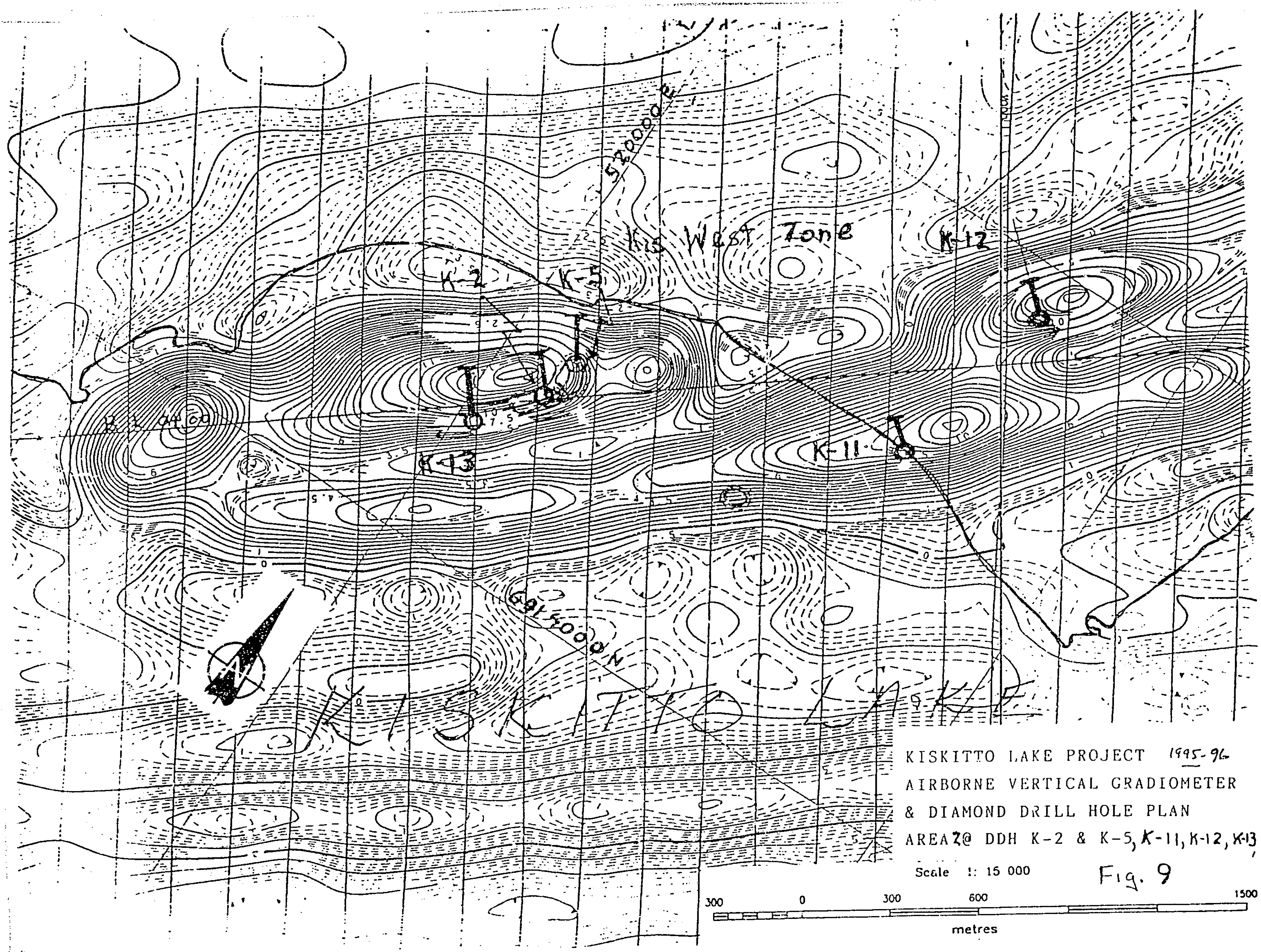


J.W. Campbell, P.Eng.
March 28,1996


KISKITTO LAKE PROJECT NTS 63J8
AIRBORNE VERTICAL GRADIOMETER
& DIAMOND DRILL HOLE PLAN
DDH. K-3 & K-6
Scale 1:15 000
Fig. 10
600
1500
metres
6026000
6024000 E
Creek Zone
LAKE
K-6
N



NR
K-1 DRILL HOLE
K-10
DRILL HOLE
K-3 DRILL HOLE
K-6
DRILL HOLE
Lochhead
Lake
HORSFALL ISLAND
NTS: 63 J/8
Scale 1:50 000 Échelle
Miles 1
0
1
2
3 Miles
Metres 1000
0
1000
2000
3000
4000 Mètres
HYDRO ROAD
trail
Kiskitto Dam
Kiskitto Inlet
Kiskitto Outlet
Sluice Gate
LAKE
KITTO



KISKITTO LAKE PROJECT 1995-96
AIRBORNE VERTICAL GRADIOMETER
& DIAMOND DRILL HOLE PLAN
AREA Z@ DDH K-2 & K-5, K-11, K-12, K-13
Scale 1: 15 000
Fig. 9

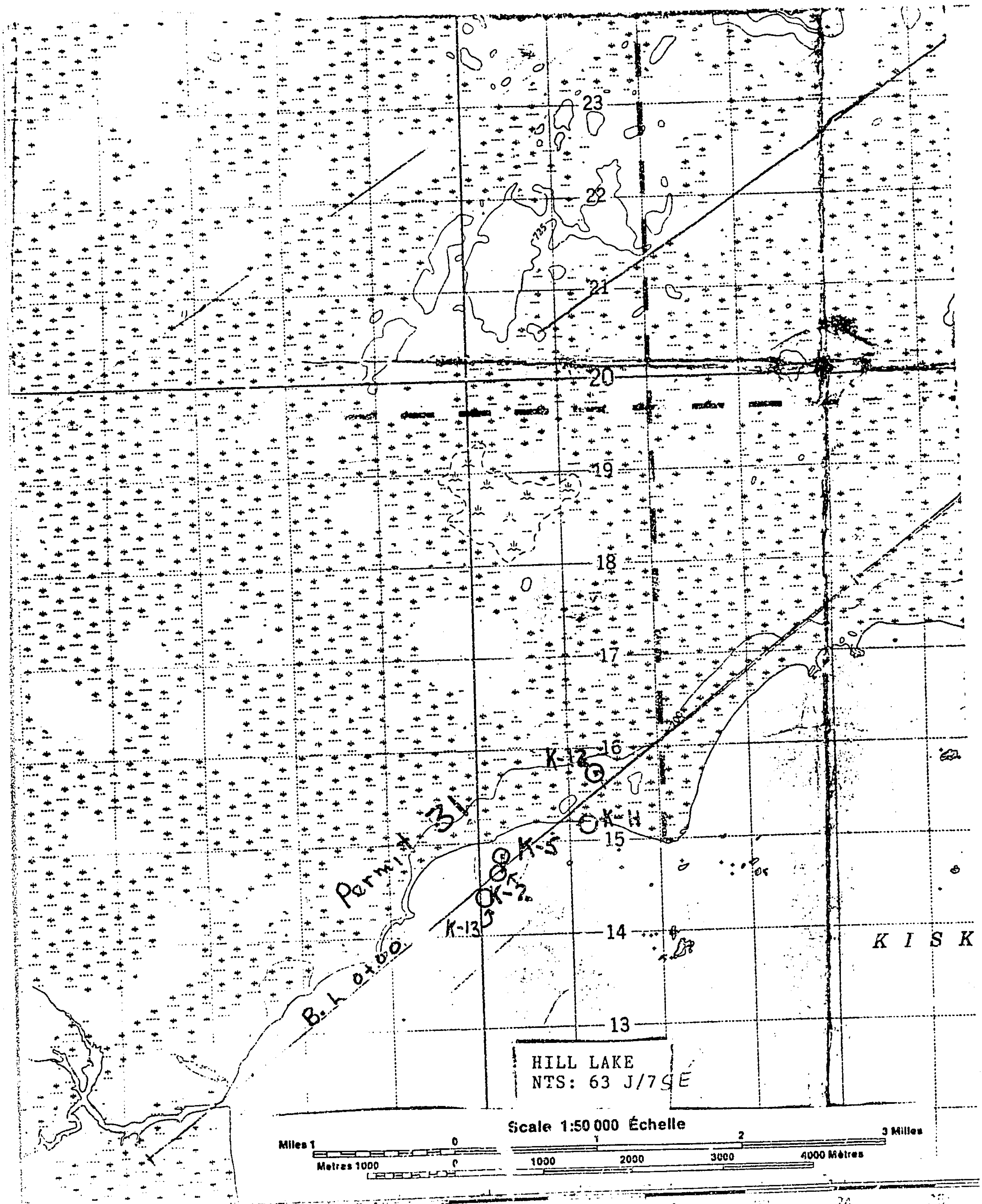


Fig. 6

HILL LAKE

Information concerning bench marks and horizontal survey monuments can be obtained from Geodetic Survey, Surveys and Mapping Branch, Ottawa.

CONVERSION SCALE FOR ELEVATIONS

Pour tout renseignement concernant les re... levés géodésiques, Direction des levés

ÉCHELLE DE CONVERSION

GOSSAN RESOURCES LIMITED

1995/96 EXPLORATION EXPENSES

KISKITTO PROJECT

DATE	AMOUNT	PAYEE	DIAMOND DRILLING	GEOLOGY	ROAD BUILDING	ASSAYING
Dec 19/95	3,744.81	Minoretek		3,744.81		
Dec 22/95	4,370.51	L. C. Chastko		4,370.51		
Dec 28/95	654.75	X–RAL Labs				654.75
Dec 30/95	20,000.00	Kenora Soil & Drilling	20,000.00			
Jan 11/96	625.00	Activation Labs				625.00
Jan 24/96	1,607.00	Activation Labs				1,607.00
Jan 26/96	530.04	Norseman Exploration		530.04		
Feb 5/96	2,212.41	Jim Campbell Explorations		2,212.41		
Feb 6/96	800.00	Charles McLeod			800.00	
Feb 14/96	3,500.00	Tom McIvor			3,500.00	
Feb 19/96	6,218.59	Jim Campbell Explorations		6,218.59		
Feb 24/95	20,792.00	Kenora Soil & Drilling	20,792.00			
Feb 29/95	408.00	X–RAL Labs				408.00
Mar 4/96	272.00	X–RAL Labs				272.00
Mar 6/96	847.50	Activation Labs				847.50
Mar 11/96	280.50	X–RAL Labs				280.50
	66,863.11		40,792.00	17,076.36	4,300.00	4,694.75

7300/

DIAMOND DRILL RECORD

LOGGED BY D.C. Peck (signature) DATE LOGGED: January 31, February 1, 1996 73001

ASSISTED BY: James Campbell & Charles McLeod

PROPERTY: KISKITTO LAKE, "KIS ANOMALY"

D.D.H. No. KL-96-11 PAGE 1

LATITUDE 2+60 S BEARING OF HOLE Grid NW + 10° to the West STARTED

CLAIM No. Permit #131

DEPARTURE 13+00 East DIP OF HOLE -45° COMPLETED

N — DIRECTION AND DISTANCE FROM NE. CLAIM POST

ELEVATION DIP TESTS DEPTH 504'

Layering & gneissic banding/foliation, where present, 40→30° to core axis

FOOTAGE FROM	FOOTAGE TO	core "BQ" DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MODE % Hb+Px	MODE % OXIDES	MODE % Bt	MODE % Qtz	SULF
0	38'	CASING										
38.0'	41.0'	Gabbro, oxide-bearing (15%)										
		- glomeroporphyritic f.g. gabbro; strongly rextallized plag,					50	35	15	?	NIL	Tr Py
N.B.	"Gabbro"	glomeroporphs of plag up to 1cm diameter										
refers to Hb - gabbro,	norite and Hb-	- f.g. dissem. magnetite ± ilmenite	11A	39.3	41.0	1.7'	Au + 3	3 pkg.	+ Ti/V/Fe			
and Hb- (all gr	Norite" anulite	- f.g. pyrite, dissem or along fractures										
grados	rx.)	- massive, consistent texture										
		- Hb forms black oikocrysts up to 1cm long										
		(- analysis for PGE, S, Ti)										
41.0'	47.3'	Gabbro and leucogabbro, oxide-bearing (15%)				from	50	35	15	NIL	NIL	
		- modally graded & sized-graded layer; becomes slightly coarser and				to	70	20	10	NIL	NIL	
		more plag-rich down section										
		- weakly poikilitic (Hb) and glomeroporphyritic (plag)										
		- v fresh, glassy plag, unaltered										
		- massive (no foliation); oxides are f.g.- m.g. & dissem.										
		- mafic minerals include interstitial dark green Hb (commonly as										
		oikocrysts enclosing plag or hypersthene) and pink to tan equant,										

med. gr. hypersthene (up to 15% of mode)

- plag up to 1cm long, generally 3-6mm

DIAMOND DRILL RECORD

LOGGED BY DCP

D.D.H. No. KL-96-11 PAGE 2

PROPERTY KISKITTO LAKE, "KIS ANOMALY"

LATITUDE ____ BEARING OF HOLE ____ STARTED ____ CLAIM No. ____

DEPARTURE ____ DIP OF HOLE ____ COMPLETED ____ DIRECTION AND DISTANCE FROM NE. CLAIM POST

ELEVATION ____ DIP TESTS ____ DEPTH ____

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	Hb+Px	OXIDES	Bt	Qts	SUL
47.3'	54.5'	Gabbro, oxide-bearing (10-15%)				from	40	40	15	5	NIL	TR
		- medium to coarse-gr. gabbro layer, grades into leucogabbro 'zones',				to	65	25	10	NIL	NIL	TR
		weakly poikilitic										
		- oxides form equant to rhombic idiomorphic xtals dissem. evenly										
		through matrix and intergrown with Hb a/o hypersthene										
		- max. gr. size of plag = 1cm, of Hb=1cm (oikocrysts)										
		- 1st appearance of biotite, occurs as f.g. alteration product after										
		Hb ± hypersthene										
		- tr. f.g. dissem. pyrite										
54.5'	54.9'	Leucororite, oxide-bearing										
		- thin m.g. plag + hypersthene band with diffuse lower and upper					70	15	15	TR	NIL	
		contact with surrounding gabbro - this is a 'phase' layer contact										
		(Hb disappears); layering at 40° TCA										
		- oxides are m.g. + irregular, partially enclose hypersthene which is										
		also m.g.; plag is m.g. + rextallized										
		- see both Mt and ilmenite - intergrown or as separate grains										
		- Mt is jet black, ilmenite is granular and purplish-black										

DIAMOND DRILL RECORD

LOGGED BY DCP

D.D.H. No. KL-96-11 PAGE 3

PROPERTY KISKITTO LAKE, "KIS ANOMALY"

CLAIM No. ______

LATITUDE ______ BEARING OF HOLE ______ STARTED ______

DEPARTURE ______ DIP OF HOLE ______ COMPLETED ______

DIRECTION AND DISTANCE FROM NE. CLAIM POST

ELEVATION ______ DIP TESTS ______ DEPTH ______

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MODE % Hb+Px	MODE % OXIDES	MODE % Bt	MODE % Qts	SULF
54.9'	62.0'	Gabbro, oxide-bearing (10-15%)				from	50	30	15	5	NIL	
		- glomeroporphyritic (plag) m.g. → c.g. "gabbro" (Hb norite) with				to	60	30	10	TR	NIL	
		10-15% dissem f.g.-m.g. magnetite + ilmenite										
		- mafic minerals include dark green Hb, (<20%) tan to pink hypersthene										
		(<10-20%) and minor Biotite (<5%)										
		- plag is v fresh, m.g.-c.g. (up to 1cm long) and commonly forms										
		clusters of xtals (ovoidal to irregular) up to 3cm in diameter										
		- oxides are idiomorphic and evenly distributed										
		- tr. f.g. pyrite on fractures (rare fractures at 45° TCA)										
		- not foliated										
62.0'	63.0'	Fault Zone/Shear Zone in Gabbro					50	35	<5	10	NIL	=1% cpy ± Po ± Py
		- foliated and sheared c.g. gabbro; shearing at 30-40° TCA					*assay for Au-Cu-Ni-Pt-Pd-S*					
		- strong Hb+Bt+sericite alteration; trace to 2% f.g. to m.g.	12A	62.0	63.0	1.0'	Au + 3B pkg					
		cpy ± Po ± Py along main fracture in this sheared interval										
		- magnetism much lower in this zone than in overlying gabbro layers										

DIAMOND DRILL RECORD

LOGGED BY DCP

PROPERTY KISKITTO LAKE, "KIS ANOMALY"

D.D.H. No. KL-96-11 PAGE 4

LATITUDE ____ BEARING OF HOLE ____ STARTED ____ CLAIM No. ____

DEPARTURE ____ DIP OF HOLE ____ COMPLETED ____ DIRECTION AND DISTANCE FROM NE. CLAIM POST

ELEVATION ____ DIP TESTS ____ DEPTH ____

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % ~~ASSAY~~ PLAG	Hb+Px	OXIDES	Bt	Qts	SULF
63.0'	65.0'	Qtz (Hb) Gabbro, oxide-bearing (15%)					40	30	15	5-15%	</>10	-
		- recrystallized, poikilitic Hb gabbro with increasing amounts of										
		granophyre down the section (<1 to 10%)										
		- local Bt - alteration along fractures at 40° TCA										
		- hypersthene is very altered to grey-coloured amphibole?										
65.0'	66.6'	Pegmatite/Granophyre										
		- abrupt contact, top and bottom, with gabbros					50	10	<5	Tr-2%	35	Tr apy
		- contact at 20° TCA to 5° TCA										
		- Very c.g. mixture of bluish grey qtz, grey plag and soft, black	13A	65.0	66.6	1.6'	Au + 33 pkg					
		(jet black) c.g. altered Hb or Px (now replaced by f.g. green-black										
		serpentine) (bastite?) - (greasy)										
		- tr. very f.g. arsenopyrite (?) replacing (?) qtz ± plag - silver										
		colour										
		- thin 1cm - 2cm band of serpentinized c.g. Hb/Px at bottom part of										
		this interval										
66.6'	84.6'	Gabbro + Leucogabbro, oxide-bearing				from	40	45	10	5	-	Tr. cpy +py
		- modally and grain size graded layer of c.g.-m.g. gabbro and lesser leucogabbro, locally porphyritic (plag) and glomeroporphyritic				to	65	20	10	5	-	Tr. cpy

*Assay for Cu-Ni-Pt-Pd-Au-S

DIAMOND DRILL RECORD

LOGGED BY DCP

PROPERTY : KISKITTO LAKE, "KIS ANOMALY"

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LATITUDE ______ BEARING OF HOLE ______ STARTED ______ CLAIM No. ______

DEPARTURE ______ DIP OF HOLE ______ COMPLETED ______ DIRECTION AND DISTANCE FROM NE. CLAIM POST

ELEVATION ______ DIP TESTS ______ DEPTH ______

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % ASSAY PLAG	Hb+Px	OXIDES	Bt	Qts	SUL
66.5' (Continued)	84.6'	- oxides → f.g.-m.g., dissem Mt+Ilmenite, consistent size and										
		abundance (≈10%)	14A	77.0'	81.0'	4.0'	Au + 3B; Ti/V/Fe					
		- layer becomes finer-grained and more plag-rich down section to 81.0';										
		81.0' → 84.6' becomes slightly coarser gr. downhole										
		- tr. f.g. dissem cpy + py (<<1%)										
		- layering and weak to moderate foliation at 20° TCA										
		- c.g. granophyre bands up to 5cm wide from 67'-69'										
		- no hypersthene seen → all Hb and lesser Bt (mafics)										
84.6'	84.9'	Granophyre band, c.g. (<5% oxides)					60	-	<5	<5	30	-
		- band approximately 9cm wide and at 10° TCA										
		- grey to blue qtz (c.g.), grey, white and reddish, c.g., (Fe-stained)										
		plag, m.g.-f.g. Mt ± ilmenite										
84.9'	95.6'	Gabbro, oxide-bearing (10-15%)				from	50	25	10	5	-	-
		- c.g. gabbro grading downhole to melagabbro (c.g.)		Downhole		to	35	50	10	5	-	-
		- granophyre (local harrisitic plag) (m.g.) bands at 90.4' (1cm wide,										
		c.g., 25° TCA) and 90.8'-91.4' (10cm wide, oxide-bearing; 10% c.g.										
		clotty Mt)										

- gabbro is locally porphyritic or glomeroporphyritic
- oxides disseminated, m.g. → f.g., intergrown with Hb (No hypersthene)

DIAMOND DRILL RECORD

LOGGED BY DCP

PROPERTY KISKITTO LAKE, "KIS ANOMALY"

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LATITUDE ______ BEARING OF HOLE ______ STARTED ______ CLAIM No. ______

DEPARTURE ______ DIP OF HOLE ______ COMPLETED ______ DIRECTION AND DISTANCE FROM

ELEVATION ______ DIP TESTS ______ DEPTH ______ NE. CLAIM POST

N

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MODE % Hb+Px	~~ASSAY~~ OXIDES	Bt	Qtz	SULF
95.6'	278.4'	Gabbro/leucogabbro and granophyre, oxide-bearing (10-20%)			gabbro	from	35	50	10	5	-	-
		- modally and grain sill graded thick layer of gabbro → leucogabbro		leucogabbro		to	75	10	10	5	-	-
		that becomes more plag and Bt-rich downsection; start of interval is										
		c.g. massive to porphyritic (weakly glomeroporphyritic) gabbro		granophyre		from	40	<5	10	<5	40	-
		(none or minor) which very gradually changes to m.g.; massive,				to	50	<5	30	<5	10	-
		even-grained leucogabbro at approximately 258'										
		- within this gradual size and modal variation are smaller-scale										
		(decimeter-scale) modal variations (gabbro-leucogabbro or gabbro-										
		melagabbro)										
		- no hypersthene seen except for <10% relict hypersthene below										
		approximate 250' (locally); Hb (2types) and lesser Bt comprise mafic										
		silicate assemblage										
		- "granophyre" grades to anorthosite (m.g.) ± 10% qtz + Mt; in some										
		layers, bands very abundant, generally <1cm to 30cm wide, ∥ fol'n										
		and at 10-20° TCA; granophyre is c.g. - m.g. oxide (Mt ± ilmenite)										
		-bearing (up to 30%, generally 10-15%); commonly contains <10% Bt+Hb										
		- granophyre bands at 95.6' - 98.3'; 108.0'-108.5'; 113.6'-120.2';										

140'-141'; 167.2'-167.5'; 169.2'-170.2'; 202'-204' (brecciated);
212.3'-212.5'; 220.8'-221'; 231'-235.5' (gphyre + gabbro); 246.6'-247.5';
250.8'-252'; 256.5'-256.8'

DIAMOND DRILL RECORD

LOGGED BY DCP

PROPERTY KISKITTO LAKE, "KIS ANOMALY"

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LATITUDE ____ BEARING OF HOLE ____ STARTED ____

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DEPARTURE ____ DIP OF HOLE ____ COMPLETED ____

N — DIRECTION AND DISTANCE FROM NE. CLAIM POST

ELEVATION ____ DIP TESTS ____ DEPTH ____

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	ASSAY
95.6'	278.4'	Continued - SAMPLES	15A	103'	108'	5.0'	Au + 33/Ti/V/Fe
			10A	113.6'	120.2'	6.6'	Au + 33/Ti/V/Fe
		Gabbro	1A	120.6'	130.6'	10.0'	Ti/V/Fe
		Gabbro	2A	130.6'	140.6'	10.0'	Ti/V/Fe
		Granophyre	3A	140.6'	141.6'	1.0'	Au + 33/Ti/V/Fe
		Gabbro	4A	141.6'	151.6'	10.0'	Ti/V/Fe
		Gabbro	5A	151.6'	160.6'	9.0'	Ti/V/Fe
		Granophyre	6A	160.6'	161.6'	1.0'	Au + 33//Ti/V/Fe
			7A	161.6'	169.2'	7.6'	Ti/V/Fe
			8A	169.2'	170.2'	1.0'	Au + 33/Ti/V/Fe
			9A	170.2'	174.5'	4.3'	Ti/V/Fe
			16A	252.0'	262.0'	10.0'	Ti/V/Fe

DIAMOND DRILL RECORD

LOGGED BY: DCP

PROPERTY: KISKITTO LAKE, "KIS ANOMALY"

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LATITUDE ______ BEARING OF HOLE ______ STARTED ______

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DIRECTION AND DISTANCE FROM NE. CLAIM POST

ELEVATION ______ DIP TESTS ______ DEPTH ______

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % ~~ASSAY~~ PLAG	Hb+Px	OXIDES	Bt	Qts	SULI
278.4'	279.7'	Melagabbro, oxide-bearing (20%)				Mela-Gabbro	30	35	20	15	-	
		- f.g.-c.g. melagabbro - gabbro with thin, <3cm wide granophyre band										
		(278.9')	17A	278.4'	279.7'	1.3'	Ti/V/Fe					
		- oxides are dissem, m.g./f.g. to poikilitic (m.g.-c.g.)										
		- very strongly magnetic; higher than 'typical' oxide content										
		- strong Bt alteration and gr. size reduction adjacent to granophyre										
		vein (?)/band										
		- little or no hypersthene in this sample - Hb + Bt only										
279.7'	294.9'	Gabbro, oxide-bearing (approximate 15%)				Gabbro	45	35	<15	<5	-	-
		- size-graded layer with gr. size decreasing downsection from 4-5mm	18A	279.7'	289.7'	10.0'	Ti/V/Fe					
		(plag) at top to approximate 1-2mm at bottom of interval										
		- (suggests tops to NW; "down the hole")										
		- oxides are f.g.-m.g. and evenly disseminated										
		- massive, non-foliated, uniform texture										
		- hypersthene averages approximate 20% throughout section										
		- 1cm wide granophyre (m.g.) band at 292'										

DIAMOND DRILL RECORD

LOGGED BY DCP

PROPERTY KISKITTO LAKE, "KIS ANOMALY"

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LATITUDE BEARING OF HOLE STARTED

CLAIM No.

DEPARTURE DIP OF HOLE COMPLETED

DIRECTION AND DISTANCE FROM NE. CLAIM POST

ELEVATION DIP TESTS DEPTH

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % ASSAY PLAG	Hb+Px	OXIDES	Bt	Qts	SULF
294.9'	295.5'	Gabbro, oxide-bearing (<10%)					45	40	<10	<5	-	-
		- distinct coarser gr. gabbro layer which grades to top and bottom of										
		hole to finer gr. gabbro										
		- no hypersthene; replaced by Hn + Bt										
295.5'	300.5'	Gabbro, oxide-bearing (10%)					45	40	10	5	-	-
		- massive, m.g. gabbro layer										
		- dissem. f.g.-m.g. oxides (<1-2 mm)										
		- approximate 15-25% hypersthene										
		- slight coarsening down the hole										
300.5'	301.6'	Melagabbro, oxide-bearing (10%); m.g.					35	45	10	10		
301.6'	312'	Gabbro and Melagabbro, oxide-bearing (10-15%)			Gabbro	from	45	35	10	10		
		- m.g.-c.g. gabbro locally grading to melagabbro			Melagabbro	to	30	55	10	5		
		- granophyre bands at 305.5' (5cm wide, c.g.); 307.5 (2cm wide, c.g.);										
		309.6 (6cm) and 311.4'										
		- thin c.g. leucogabbro band (5cm) at 306.6'										
		- Bt replaces hypersthene around margins of granophyre bands										

DIAMOND DRILL RECORD

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PROPERTY KISKITTO LAKE, "KIS ANOMALY"

LATITUDE ______ BEARING OF HOLE ______ STARTED ______ CLAIM No. ______

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FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % ~~ASSAY~~ PLAG	Hb+Px	OXIDES	Bt	Qts	SUL
312'	316.6'	Gabbro, oxide-bearing (10%)			Gabbro	from	40	40	10	10	·	-
		- gr. size and modally graded layer with increasing % PLAG + hypersthene			Gabbro	to	50	35	10	5	-	-
		and decreasing gr. size, Hb% + Bt% downhole										
316.6'	318.5'	Gabbro, poikilitic, oxide-bearing			Gabbro	from	50	35	10	5	-	-
		- modally - graded m.g. gabbro layer with increasing % Hb oikocrysts			Melagabbro	to	30	50	10	10	-	-
		downhole (from 15 to 30%)										
		- hypersthene present from 317.2'-318.2' only										
		- dissem, f.g. Mt $\pm$ Ilmenite										
		- even-grained, massive (excluding oikocrysts up to 3cm wide) - top(?)										
		(10cm) of layer/bottom of interval) is melagabbro with sharp,										
		irregular contact with Mt-rich granophyre										
		- contains rare plag aggregates (to 3cm long)										
318.5'	319.8'	Granophyre, oxide-bearing (30%)			Granophyre		50	<<5	30	<5	15	1% cpy +Py ±Po
		- pegmatitic granophyre with abundant interstitial c.g. (1-3cm) Mt +										
		ilmenite as matrix to plag and blue-grey qtz - plag+qtz are myrmekitic	19A	318.5'	319.8'	1.3'						
		intergrowths or discrete grains - pyrite and lesser cpy $\pm$ Po occur										
		as f.g.-m.g. 'clots' intergrown with or on rims of Mt										

- could be a megacrystic anorthosite with secondary SiO_2 (exsolution?/metasomatism?)

DIAMOND DRILL RECORD

LOGGED BY DCP

PROPERTY: KISKITTO LAKE, "KIS ANOMALY"

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LATITUDE ____ BEARING OF HOLE ____ STARTED ____ CLAIM No. ____

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ELEVATION ____ DIP TESTS ____ DEPTH ____

Core Angle (layering/banding) approximate 30°

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % ~~ASSAY~~ PLAG	Hb+Px	OXIDES	Bt	Qts	SULF
319.8'	322.0'	(M.G.) Gabbro, oxide-bearing (10%) diffuse layer contacts (gr. size decreasing					45	40	10	5	-	-
		down hole)					45	40	10	5	-	-
322.0'	323.3'	(M.G.) Gabbro, oxide-bearing (10%) diffuse layer contacts (gr. size decreasing										
		down hole)										
323.3'	334.4'	Gabbro, oxide-bearing (10-15%)										
		- diabase/diorite, f.g., vein, at 329.8'-330.1'										
		- dissem. Mt/Ilmenite throughout; f.g.-m.g. equant xtals	20A	330.1'	334.4'	4.3'	50	30	15	<5	-	-
		- massive, except for occasional poikilitic zones with up to 10% c.g.										
		Hb oikocrysts										
		- average gr. size approximate 2-5mm (plag, Hb)										
		- % hypersthene:√ Hb vary antipathetically; max. 20% hypersthene										
334.4'	334.7'	C.G. (oxide-bearing) Granophyre					60	<5	10	<5	20	Tr.
		- 6cm wide at 90° TCA (unusual orientation)										
		- approximate 85% plag > qtz; 10% Mt ± Ilm; <5% Bt										
334.7'	340.0'	Gabbro, oxide-bearing (10%)			(Variable)		45	35	10	<10	-	-
		- m.g. with size increasing down holw (approximate 3mm - 6mm; plag)										
340.0'	342.8'	Granophyre, with minor gabbro										
		- approximate 3' wide c.g.-f.g. (gr. size decrease systematically down the hole) - <5% oxides - some Fe.- staining (orange) on plag; qtz is grey to blue, <1 to 5mm					40	Tr.	<5	<5	50	-

DIAMOND DRILL RECORD

LOGGED BY DCP

PROPERTY KISKITTO LAKE, "KIS ANOMALY"

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LATITUDE ____ BEARING OF HOLE ____ STARTED ____

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DIRECTION AND DISTANCE FROM NE. CLAIM POST

ELEVATION ____ DIP TESTS ____ DEPTH ____

Layering at 30-40° TCA

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % ~~ASSAY~~ PLAG	Hb+Px	OXIDES	Bt	Qts	SULF
342.8'	352'	Gabbro; Melagabbro, oxide-bearing (10-15%)				from	45	35	15	<5	-	
		- m.g. melagabbro and gabbro, weakly porphyritic, (plag-phenocrysts up				to	30	50	10	10	-	
		to 5mm long)										
		- local, rare, thin (<2cm) m.g. granophyre/plag-rich bands										
		- oxides are f.g. and disseminated evenly through interval										
		- gr. size appears to decrease gradually down hole										
		- hypersthene present in bottom 2' of interval										
352'	354'	Gabbro, oxide-bearing				from	45	35	10	<10	-	-
		- much coarser-grained gabbro → leucogabbro (gr. size + % plag generally				to	65	20	10	<5	-	-
		increases down the hole) than previous 100' of the core - plag up to										
		1.3cm										
		- oxides are m.g. (1-5mm) and disseminated										
		- hypersthene approximate 10%										
354'	361'	Melagabbro - Gabbro, oxide-bearing (10%)										
		- m.g. gabbro/melagabbro with f.g. dissem. oxides				Gabbro	30	50	10	10		
		- granophyre (m.g.) bands ca every foot (<5cm wide)	21A	354'	359'	5.0'	Ti/V/Fe					
		- no hypersthene										

DIAMOND DRILL RECORD

LOGGED BY DCP

PROPERTY KISKITTO LAKE, "KIS ANOMALY"

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LATITUDE ______ BEARING OF HOLE ______ STARTED ______

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DIRECTION AND DISTANCE FROM NE. CLAIM POST

ELEVATION ______ DIP TESTS ______ DEPTH ______

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	Hb+Px	OXIDES	Bt	Qts	SUL
361'	372.8'	Poikilitic Gabbro, oxide-bearing (10%)					50	30	10	<10	-	-
		- m.g. gabbro with <10 to 15% c.g. Hb+Mt±Bt oikocrysts; dissem. f.g.										
		oxides - little or no hypersthene										
372.8'	373.8'	Granophyre, c.g., oxide-bearing				Average	40	<5	10	10	40	
		- c.g. granophyre with Mt-rich (up to 35%) upper and lower contact and										
		Mt-poor (<5%) 'core'										
		- strong, 1cm-wide Bt alteration zone between adjacent gabbro and the										
		granophyre										
		- foliation and layer contact at 40° TCA										
373.8'	377'	Gabbro, oxide-bearing (10%)					45	35	10	10	-	-
		- even-textured, c.g. gabbro with dissem. f.g. oxides										
		- no hypersthene										
377'	378.3'	Granophyre (m.g.; "tonalitic") <5% oxides					40	-	<5	<5	50	-
378.3'	380.2'	Gabbro, oxide-bearing (10%)				Average	45	40	10	5	-	-
		- m.g. - c.g. gabbro with melagabbro at top of interval and 3 <2cm wide										
		granophyre (m.g.) bands at 30°-35° TCA; no hypersthene										

DIAMOND DRILL RECORD

LOGGED BY: DCP

PROPERTY: KISKITTO LAKE, "KIS ANOMALY"

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LATITUDE: BEARING OF HOLE: STARTED:

DEPARTURE: DIP OF HOLE: COMPLETED:

ELEVATION: DIP TESTS: DEPTH:

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DIRECTION AND DISTANCE FROM NE. CLAIM POST

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % ~~ASSAY~~ PLAG	Hb+Px	OXIDES	Bt	Qts	SUL
380.2'	484.5'	Poikilitic (hypersthene) Gabbro, oxide-bearing (10-15%) with lesser		Leucogabbro		from	65	20	10	<5	-	-
		Melagabbro, oxide-bearing, and minor granophyre banding		Poik Gabbro		to	50	35	10	<<5	-	-
		- m.g. hypersthene-bearing poikilitic gabbro with 10-15% c.g. (1-2cm)		Melagabbro		to	25	50	15	10	-	-
		Hb > Bt > Mt oikocrysts	22A	392'	397'	5.0'	Fe-Ti-V					
		- grades into thin zones/bands of non-poikilitic m.g.-c.g. gabbro and										
		melagabbro and rarely into c.g. leucogabbro										
		- consisted oxide content, 10-15% dissem. f.g.-m.g.	23A	466'	467'	1.0'	Au+33/Ti-V-Fe					
		- granophyre bands at 410' (5cm), 414' (8cm), 417' (30cm), 421' (2cm),										
		422.8' (4cm), 428' (3cm), 432.5' (5cm), 442' (2cm), 444' (5cm),										
		452' (3cm), 452.7' (6cm), 453.1' (8cm), 454.5' (20cm), 456' (12cm),										
		457.2' (5cm), 465'-467.5' (approximate 2 feet; some gabbro										
		inclusions?)										
		- hypersthene % varies inversely with Hb + Bt and is most abundant										
		in the poik gabbro and least in the melagabbro										

DIAMOND DRILL RECORD

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PROPERTY, KISKITTO LAKE, "KIS ANOMALY"

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FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	ASSAY					
484.5'	493'	Hematite-alteration in m.g. gabbro/melagabbro (<5% oxides)										
		- could be an altered alivine gabbro - strongly fol'd, pink-Fe stained										
		rounded plag(?), black serpentine replaces original mafic minerals	24A	484.5'	489.5'	5.0'	Au+33/Ti-V-Fe					
		MODE: Fe-stained plag: 40%; Mt-5%; Serpentine-45%										
		Fe-stain gradually disappears down hole into next unit										
		(same rock type?)										
493'	497'	Gabbro and Melagabbro, oxide-bearing (<10 to 40%)										Py
		- fault breccia from 494.5' to 496' (angular bx)										≃1%
		- systematic increase in Mt; very f.g. oxides intergrown with	26A	495.4'	497.0'	1.6'	Fe-Ti-V					
		serpentine ± Bt										
		- MODE: PL:<30; Mt+Ilm: 10-40%; Bt/Serpentine: 40-60%										
497'	504'	Gabbro; oxide-bearing (10-20%)										
		- m.g. equigranular; up to 15% hypersthene; f.g.-m.g. dissem. oxides	25A	502'	504'	2.0'	Au+33/Fe-Ti-V					Py
		+ 5% dissem. f.g. pyrite ± cpy throughout										≃5%
		✗ overall, Mt increase down hole, peaking at ver; bottom of hole										±cpy
		MODE: PL:45% Hb+Bt+Px:30%Mt+Ilm: 15-20% Pyrite: 5%										

END OF HOLE

Condensed log for DDH# KL-96-11, "KIS" Showing, Kiskitto Lake Complex. Prepared and logged by David C. Peck, Manitoba Energy and Mines, Thompson.

FOOTAGE			ASSAYS (GOSSAN)	ROCK TYPES		TEXTURAL FEATURES				
(Deepest Point)	Width (feet)	Layer#	Sample #	Principal Lithology	Subordinate Lithologies	Massive	Poikilitic	Porphyritic	Pegmatitic	Faulting
41.0	3.0	1	11a	Gabbro		0	0	1	0	0
47.3	6.3	2		Gabbro	Leucogabbro	0	1	1	0	0
54.5	7.2	3		Gabbro	Leucogabbro	0	1	0	0	0
54.9	0.4	4		Leucogabbro		1	0	0	0	0
62.0	7.1	5		Gabbro		0	0	1	0	0
63.0	1.0	6	12a	Gabbro		0	0	0	0	1
65.0	2.0	7		Quartz Gabbro	Granophyre (1)	0	1	0	0	0
66.6	1.6		13a	Granophyre		1	0	0	1	0
84.6	18.0	8	14a	Gabbro	Leucogabbro, granophyre (1)	0	0	0	0	0
84.9	0.3	9		Granophyre		1	0	0	0	0
95.6	10.7	10		Gabbro	Melagabbro, granophyre (1)	0	0	1	0	0
278.4	182.8	11	1a-10a, 15a,16a	Gabbro	Leucogabbro, granophyre (13)	0	0	1	0	0
279.7	1.3	12	17a	Melagabbro	Granophyre (1)	0	1	0	0	0
294.9	15.2	13	18a	Gabbro	Granophyre (1)	1	0	0	0	0
295.5	0.6	14		Gabbro		1	0	0	0	0
300.5	5.0	15		Gabbro		1	0	0	0	0
301.6	1.1	16		Melagabbro		1	0	0	0	0
312.0	10.4	17		Gabbro	Melagabbro, granophyre (3)	1	0	0	0	0
316.6	4.6	18		Gabbro		1	0	0	0	0
318.5	1.9	19		Gabbro	Melagabbro	1	1	0	0	0
319.8	1.3		19a	Granophyre		1	0	0	1	0
322.0	2.2	20		Gabbro		1	0	0	0	0
323.3	1.3	21		Gabbro		1	0	0	0	0
334.4	11.1	22	20a	Gabbro		1	1	0	0	0
334.7	0.3			Granophyre		1	0	0	1	0
340.0	5.3	23		Gabbro		1	0	0	0	0
342.8	2.8			Granophyre	Gabbro	1	0	0	0	0
352.0	9.2	24		Gabbro	Melagabbro	0	0	1	0	0
354.0	2.0	25		Gabbro	Leucogabbro	1	0	0	0	0
361.0	7.0	26	21a	Melagabbro	Gabbro (several)	1	0	0	0	0
372.8	11.8	27		Gabbro		1	1	0	0	0
373.8	1.0			Granophyre		1	0	0	1	0
377.0	3.2	28		Gabbro		1	0	0	0	0
378.3	1.3			Granophyre		1	0	0	0	0
380.2	1.9	29		Gabbro	Melagabbro	1	0	0	0	0
484.5	104.3	30	22a,23a	Gabbro	Melagabbro, granophyre (15)	1	1	0	0	0
493.0	8.5	31	24a	Gabbro	Melagabbro	1	0	0	0	1
497.0	4.0	32	26a	Gabbro	Melagabbro	1	0	0	0	1
504.0	7.0	33	25a	Gabbro		1	0	0	0	1
End of hole										

Explanatory notes:

(a) 0 indicates feature or minerals was not observed and 1 indicates feature or mineral was observed
(b)gabbro refers to any gabbroic rock with a ratio of plagioclase: mafic minerals (excluding oxides) between 65:35 and 35:65
(c) the observed mafic mineral assemblages (metamorphic) include hornblende +/- hypersthene +/- biotite.
(d) It was generally not possible to distinguish between ilmenite and magnetite in the core, however, most samples contain both, in approximately equal proportions
(e) Oxide minerals are generally evenly disseminated thoughout the core and show little variation with depth or rock type
(f) Tops deduced from graded layering, assuming grain size and hypersthene content decrease toward the tops of individual layers

Condensed log for DDH# KL-96-11, "KIS" Showing, Kiskitto Lake Complex (continued)
Page 2 of 2

IDENTIFICATION			LAYERING FEATURES			MINERALOGY				
Layer#	Width (feet)	Principal Lithology	Modally Graded	Size Graded	Tops	Oxide %	Pyrite %	Cpy %	Hypersthene	Remarks
1	3.0	Gabbro	0	0		15	0.1	0.0	0	
2	1.0	Gabbro	1	1	SSE	13	0.0	0.0	1	
3	1.0	Gabbro	0	0		13	0.1	0.0	1	
4	1.0	Leucogabbro	0	0		10	0.0	0.0	1	
5	1.0	Gabbro	0	0		13	0.1	0.0	1	
6	1.0	Gabbro	0	0		10	0.5	1.0	0	
7	1.0	Quartz Gabbro	0	0		15	0.0	0.0	0	
	-7.0	Granophyre	0	0		10	0.0	0.0	0	Trace arsenopyrite (?)
8	8.0	Gabbro	1	1	SSE	10	0.1	0.1	0	
9	1.0	Granophyre	0	0		5	0.0	0.0	0	
10	1.0	Gabbro	1	0	SSE	10	0.0	0.0	0	
11	1.0	Gabbro	1	1	SSE	10	0.0	0.0	1	Granophyre layers up to 3 feet thick
12	1.0	Melagabbro	0	0		20	0.0	0.0	0	
13	1.0	Gabbro	0	1	SSE	15	0.0	0.0	1	
14	1.0	Gabbro	0	0		10	0.0	0.0	0	
15	1.0	Gabbro	0	0		10	0.0	0.0	1	
16	1.0	Melagabbro	0	0		10	0.0	0.0	0	
17	1.0	Gabbro	0	0		10	0.0	0.0	1	
18	1.0	Gabbro	1	1	NNW (?)	10	0.0	0.0	1	
19	1.0	Gabbro	1	0	SSE	10	0.0	0.0	0	
	-19.0	Granophyre	0	0		30	0.5	0.5	0	
20	20.0	Gabbro	0	1	SSE	10	0.0	0.0	0	
21	1.0	Gabbro	0	1	SSE	10	0.0	0.0	0	
22	1.0	Gabbro	0	0		15	0.0	0.0	1	
	-22.0	Granophyre	0	0		10	0.1	0.0	0	
23	23.0	Gabbro	0	1	NNW (?)	10	0.0	0.0	0	
	-23.0	Granophyre	0	1	SSE	5	0.0	0.0	0	
24	24.0	Gabbro	0	1	SSE	13	0.0	0.0	1	
25	1.0	Gabbro	1	1	NNW (?)	10	0.0	0.0	1	
26	1.0	Melagabbro	0	0		10	0.0	0.0	0	
27	1.0	Gabbro	0	0		10	0.0	0.0	0	
	-27.0	Granophyre	0	0		15	0.0	0.0	0	
28	28.0	Gabbro	0	0		10	0.0	0.0	0	
	-28.0	Granophyre	0	0		5	0.0	0.0	0	
29	29.0	Gabbro	0	0		10	0.0	0.0	0	
30	1.0	Gabbro	0	0		13	0.0	0.0	1	
31	1.0	Gabbro	0	0		5	0.1	0.0	0	Intense hematite + serpentine alteration
32	1.0	Gabbro	1	0		25	1.0	0.0	0	Serpentinized, % oxide increases to base
33	1.0	Gabbro	1	0		15	9.0	1.0	1	Disseminated, fine-grained sulphides

Explanatory notes:
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(e) Oxide minerals are generally evenly disseminated thoughout the core and show little variation with depth or rocktype
(f) Tops deduced from graded layering, assuming grain size and hypersthene content decrease toward the tops of individual layers

Activation Laboratories Ltd. Work Order: 9889 Report: 9722

Sample description	U PPM	W PPM	TH PPM	LA PPM	CE PPM	ND PPM	SM PPM	EU PPM	TB PPM	YB PPM	LU PPM	Mass g
10A	2.3	<4	112	17	28	7	1.0	0.7	<0.5	0.5	0.13	40.91
11A	<0.5	<4	139	15	30	35	3.2	1.1	0.7	1.5	0.22	41.06
14A	<0.5	<4	145	13	27	21	2.5	0.9	<0.5	1.2	0.17	44.47
15A	<0.5	<4	186	12	26	8	2.5	0.9	<0.5	1.4	0.26	41.05
23A	<0.5	<4	<50	14	18	<5	0.9	0.7	<0.5	0.5	0.07	33.33
24A	1.0	<4	171	9	21	7	2.7	0.9	<0.5	1.2	0.22	38.07
25A	1.3	<4	253	6	7	7	1.1	0.4	<0.5	3.3	0.14	48.95
12A	<0.5	<4	128	19	35	16	3.4	1.0	<0.5	1.4	0.28	29.53
13A	<0.5	<4	<50	22	35	14	2.3	0.9	<0.5	0.6	0.13	34.25
1430	<0.5	<4	<50	<1	<3	<5	<0.1	<0.2	<0.5	<0.2	<0.05	39.85

Activation Laboratories Ltd. Work Order: 9889 Report: 9722B

SAMPLE #	Fe2O3 %	TiO2 %	V2O5 %
10A	7.33	0.58	0.03
11A	18.74	2.32	0.09
14A	14.72	1.65	0.07
15A	16.54	1.98	0.09
23A	5.79	0.67	0.03
24A	19.76	2.08	0.12
25A	36.04	4.58	0.30
1A	16.31	1.72	0.09
2A	15.57	1.55	0.09
3A	11.97	0.84	0.05
4A	15.32	1.46	0.08
5A	26.61	2.27	0.11
6A	16.75	1.79	0.10
7A	11.67	1.28	0.05
8A	16.73	1.59	0.09
9A	16.58	1.60	0.09
16A	16.66	1.56	0.10
17A	24.25	2.60	0.16
18A	22.62	1.66	0.14
19A	21.62	2.19	0.15
20A	21.64	2.46	0.14
21A	19.96	2.17	0.13
22A	32.89	4.31	0.28
26A	19.60	2.12	0.13

KL-96-11

DIAMOND DRILL RECORD

LOGGED BY David Peck — DATE LOGGED: Feb. 7, 8 - 1996 — 73001

ASSISTED By: JAMES CAMPBELL, CHARLES McLEOD

D.D.H. No. KL-96-12 PAGE 1

PROPERTY KISKITTO LAKE, 'KIS' ANOMALY

LATITUDE 1+50 North — BEARING OF HOLE 10° west of Grid North — STARTED Jan 30, 1996

CLAIM No. PERMIT 131 GOSSAN RESOURCES Ltd.

DEPARTURE 16+00 meters — DIP OF HOLE -45° — COMPLETED Feb 4, 1996

DIRECTION AND DISTANCE FROM NE. CLAIM POST

ELEVATION ______ DIP TESTS ______ DEPTH 757 FEET

FOOTAGE FROM	FOOTAGE TO	Core size "BQ" DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MAFICS*	OXIDES	LEUCOXENE	QTZ
0	11.6'	CASING					60	35	<5	—	—
11.6	17.1'	Gabbro (c.g.)									
		- Foliated at 70° TCA ; c.g., recrystallized, oxides									
		are f.g.-m.g. + disseminated ; plag → f.g. wormy plag + qtz									
		pseudomorphs (± sericite) ; 2 varieties of Hb present,									
		pale green cores with dark green to black rim ; bronze									
		mica (phlogopite) ≈ 10%									
17.1'	17.4'	Diorite (?) band (f.g.)					45	50	<5	—	—
		-8cm wide, f.g.-m.g. wormy intergrowth of plag (altered)									
		and biotite (phlogopite?) w minor olive-green Hb.									
17.4'	23.0'	Gabbro, minor leucogabbro (c.g.)					60	35	5→10	—	—
		- Foliated at 40° TCA ; oxides occur as fine-grained									
		intergrowths w Hb a/o Bt. or as rare coarse-grains up to 5mm.									
23.0'	24.3	Melagabbro, gabbro, leucogabbro (oxide-bearing) ; % oxide increases up; 1 c.g. Mt + Leucoxene-rich granophyric gabbro band at 17.5-19.1'				MELAGABBRO	60	30	>10	—	—
		- med. gr., strongly foliated ; alternating 5-10cm wide				LEUCOGABBRO	75	15	<10	—	—
		modal layers / bands w diffuse to abrupt contacts that									
		parallel fol'n and are at 40→50° TCA ; N.B. oxide % seems to have increased systematically + antipathetically w gr. size					from	11.6'	to ≈27'		

NOTES ON MINERALOGY
* MAFICS = Hornblende + Biotite ; PLAG generally pseudomorphed by fine-grained calcic myrmekite (plag + quartz)
* Generally 2 Hornblendes, seem to pseudomorph earlier blocky pyroxene and irregular, interstitial or poikilitic pyroxene
* QTZ intergrown with PLAG is not distinguished in the mode ; Biotite [illegible] bronze-coloured [illegible]

DIAMOND DRILL RECORD

LOGGED BY DCP

PROPERTY Kis

D.D.H. No. KL-96-12 PAGE 2

LATITUDE ______ BEARING OF HOLE ______ STARTED ______

CLAIM No. 131

DEPARTURE ______ DIP OF HOLE ______ COMPLETED ______

DIRECTION AND DISTANCE FROM NE. CLAIM POST

ELEVATION ______ DIP TESTS ______ DEPTH ______

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	~~ASSAY~~ MODE % PLAG	MAFICS	OXIDES	Leucoxene	QTZ	Sulp
24.3'	27.0'	Gabbro, oxide-bearing - strongly foliated at 45° TCA; med. gr., w ave. grain size decreasing down section (not systematically) - oxides are <1mm and evenly disseminated					45	45	10	–	–	
27.0	29.9'	Gabbroic gneiss				leucoGabbro	75	20	5			
		- banding involves f.g.-m.g. gabbro and coarser-grained leucogabbro; bands are 3cm → 30cm wide - numerous very f.g. bt-rich shear zones (<2cm wide) concentrated along leucogabbro/gabbro contacts - oxides are concentrated in finer grained, more mafic bands; banding and shearing at 45° TCA				~~Leuco~~Gabbro	35	55	10	–	–	
29.9	30.4'	Fault zone in leucogabbro - intense biotite alternation, some pseudotachylyte formed at top and base of fault zone, and slightly (10°) discordant to the foliation - trace f.g.-m.g. Pyrrhotite										TR Po:
30.4	34.5	Leucogabbro → gabbro → tonalite (silicified or contaminated gabbro?) with moderate faulting - foliated m.g. leucogabbro grading to f.g. gabbro w brittle faulting evident in 'in situ' pseudotachylyte breccia c irregular, anastomosing grey tachylytic vein surrounding flattened to angular; tonalitic section adjacent to felsic gneiss (@34.5' →)				see	27.0 →	29.9'				

DIAMOND DRILL RECORD

LOGGED BY DCP

PROPERTY KIS

D.D.H. No. KL-96-12 PAGE 3

LATITUDE

BEARING OF HOLE

STARTED

CLAIM No.

DEPARTURE

DIP OF HOLE

COMPLETED

DIRECTION AND DISTANCE FROM NE. CLAIM POST

ELEVATION

DIP TESTS

DEPTH

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MAFICS	OXIDES	LEUCX	QTZ
34.5	119.4'	Tonalitic to Granitic Gneiss and Diabase/Diorite					see thin sections				
		– ≈5% c.g. massive to foliated granite pegmatite veins/bands (late?)	98-96-01-1	56.8	57.0	0.2					
		– ≈ 40% f.g. diabase (locally w up to 25% magnetite) + rare m.g.	98-96-01-2	67.8	68.0	0.2	→ Diabase ē pseudotachylyte.				
		leucogabbro/diorite	98-96-01-3	78.0	78.3	0.3	→ Leucogabbro/diorite				
		– ≈ 55% m.g., foliated orange to grey granodiorite/tonalite	98-96-01-4	89.7	89.9	0.2	→ orange to grey tonalite/gdiorite				
		gneiss					→ pegmatite granitic				
		– gabbroic rocks (diabase + lgabbro) are commonly									
		separated from felsic bands by thin (<5cm)									
		grey pseudotachylyte and/or biotite vein/zone									
		– banding on scale of a few cm to tens of cm.									
		– oxide abundance is low, ave. <5%, higher in diabase (up to 10%)									
		– one narrow Mt-rich ~~...~~ 'band' of diabase at ≈ 105'					See thin sections & samples (major + traces) (over)				
119.4'	170.0'	Qtz diabase, diorite, tonalite, granophyre, gneissic									
		– granophyre is c.g. → pegmatitic; blue qtz, green to white plag → similar to KL-11 granophyre									
		– apparent marginal/transition zone incorporating chilled									
		contaminated products of mafic magmas (= f.g. qtz									
		diabase, diorite ± tonalite) and siliceous melts × 1st appearance of leucoxene → tan, f.g.-m.g., local Mt-inclusions									
		– generally <5 to <10% oxides									
		* CRITICAL OBSERVATION * – blue green granophyre bands do not occur in gneiss above this section (ie above 119.4									

– some of granitic gneiss in 34.5 → 119.4' (excluding pegmatites) could be older gneiss (pre-KL-G)

– % granophyre, modal qtz + gr. size increase more or less systematically down section from 119.4' to 170.0' ... sulphides

DIAMOND DRILL RECORD

LOGGED BY DCP

PROPERTY KIS

LATITUDE

DEPARTURE

ELEVATION

BEARING OF HOLE

DIP OF HOLE

DIP TESTS

STARTED

COMPLETED

DEPTH

D.D.H. No. KL-96-12 PAGE 4

CLAIM No. 131

N

DIRECTION AND DISTANCE FROM NE. CLAIM POST

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	PLAG	MAFICS	OXIDES (Mt-only)	LEUCX	QTZ
119.4	170.0'	CONT'D — M.G. Qtz Diabase & Granophyre/Tonalite (grading downwards)		127.3	128.4	1.1'	+	2	T. Sections	(top)	
		SAMPLING — F.C. Qtz Diabase		121.5'	123.2'	1.7'	+	1	T. Section		
		M.G. Homogeneous qtz gabbro		153.2	155.2	2.0'	+	1	T. Section		
		Mt-rich/Lx-rich c.g. gabbro; <30% granophyre bands (<1cm wide)		167.7	169.0	1.3'	+	1	T. Section		

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION
170.0'	332.3'	Layered gabbro, qtz gabbro, granophyre, qtz leucogabbro; oxide-bearing in rare melagabbros - homogeneous section of rhythmically-layered gabbro + lesser leucogabbro, most of which contains disseminated to blebs-like granophyre (bluish qtz + white to grey plagioclase); local discrete c.g. to pegmatitic granophyre bands/layers that are commonly several cm to tens of cm wide + are conformable, typically, to penetrative foliation + other layer contacts in rock → layering/banding/foliation are parallel and generally at 40-50° TCA. - similar to granophyre-rich section in KL-96-11 - % granophyre fairly consistent throughout; gr. size varies within layers (ie. graded layers) but on average, is similar throughout this interval - % oxides (f.g.-m.g. disseminated Mt + leucoxene) varies within layers but tends to increase towards base of this interval

Average/Typical Modes

SAMPLES		PLAG	MAFICS	OXIDES	LEUCX	QTZ
M.G.	Qtz Gabbro	20→40	30→50	5→10	10→20	<10
C.G.	Qtz L Gabbro	<50→70	<10→20	<10	<30	10-20
M.G. (rare)	Melagabbro	<30	50→60	10	<10-20	<10
C.G.	Granophyre	50-60	<10	<5	<5	30→40

* N.B. Most established of Ti mineral is leucoxene (most likely), hypersthene or apl... — assuming it is leucoxene in the oxides

DIAMOND DRILL RECORD

LOGGED BY DCP

D.D.H. No. KL96-12 PAGE 5

PROPERTY KIS

LATITUDE ______ BEARING OF HOLE ______ STARTED ______

DEPARTURE ______ DIP OF HOLE ______ COMPLETED ______

ELEVATION ______ DIP TESTS ______ DEPTH ______

CLAIM No. 131

N

DIRECTION AND DISTANCE FROM NE. CLAIM POST

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE ~~ASSAY~~ PLAG	MAFICS	OXIDES	LEUCX	QTZ
170.0	332.3'	CONTINUED – LAYERING Styles									
		① typical graded ~~rhythmic~~ layer comprises c.g. to v.c.g. qtz leucogabbro or									
		gabbro 'base' (toward top of hole) grading 'downhole' to m.g., locally f.g. qtz-gabbro or melagabbro ± up to 30% Mt + leucoxene									
		② Typical rhythmic textural/modal layering involves thick (several feet) m.g.									
		qtz gabbro ± 10-30% oxides, and thinner (<1-3') c.g. to porphyritic qtz leucogabbro ± less oxide									
		– N.B. – pseudotachylyte not present above ≈ 220'									
		– granophyre locally looks injected or vein-like but									
		generally conforms to layering/fol'n orientation									

DIAMOND DRILL RECORD

LOGGED BY DGP

PROPERTY KIS

D.D.H. No. KL-96-12 PAGE 6

LATITUDE ______ BEARING OF HOLE ______ STARTED ______

CLAIM No. 131

DEPARTURE ______ DIP OF HOLE ______ COMPLETED ______

DIRECTION AND DISTANCE FROM NE. CLAIM POST

ELEVATION ______ DIP TESTS ______ DEPTH ______

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MAFICS	OXIDES	LEUCX	QTZ	SULF
170.0'	332.3'	SAMPLING (c ROCK TYPE NAMES)		* 01-5 to 01-19 *		⇒ ALL ½ CORE SAMPLED						
		98-96-01-9: m.G., UNIFORM gabbro; equigranular	98-96-01-9	192.7	195.0	2.3'	50	25→30	10→15	<5	<5	TR.
		98-96-01-10: M.G.-C.G. gabbro/leucogabbro; leucoxene-rich	01-10	227.5	229.7	2.2'	50→60	10→20	10→15	10→15	<5	—
		98-96-01-11: part of 8" granophyre band, c.g., c large, c.g. poikilitic qtz	01-11	231.5	232.1	0.6'	50	<5	<10	<2	35	—
			01-12	243.0	244.9	1.9'	50	25	15	<5	<5	Tr
			01-13	244.9	247.0	2.1'	50	25	10-15	<5	<5	
			01-14	267.4	269.1	1.7	65	20	5	<5	<5	Tr
			01-15	292.6	294.5	1.9'	50	20	10	<5	<5	
			01-16	302.7	306.4	3.7	50	25	10	5	<5	
			01-17	310.	312.9	2.9'	40	40	10	5	<5	
			01-18	315.0	317.0	2.0'	50	20	10	10	<5	
			01-19	334.2	335.7	1.5'	65	<5	<5	<5	10	
		NB. - ALL SAMPLES (>04) - T. Section (1) + GEOCHEM = MAJORS, LOI, TRACES + S										
		- SAMPLES 01-2 to 4, T.S. only										
		- SAMPLES 01-11, 14, 16 ⇒ ASSAY for Au, Ag, Co, Ni, Cu, Pb, Zn, S										

DIAMOND DRILL RECORD

LOGGED BY DCP

PROPERTY KIS

LATITUDE

BEARING OF HOLE

STARTED

DEPARTURE

DIP OF HOLE

COMPLETED

ELEVATION

DIP TESTS

DEPTH

D.D.H. No. ~~[illegible]~~ KL-96-12 PAGE 7

CLAIM No. 131

N

DIRECTION AND DISTANCE FROM NE. CLAIM POST

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MAFICS	OXIDES	LEUCX	QTZ	SUL
332.3	485.5	Oxide-rich zone; m-scale modal + textural layering,		(1) semi-msv oxide in ~~leuco~~gabbro		Ave	20-30	<10-25	20-30	20-30	<5	?
		involving f.g. equigranular, isomodal semi-msv (~~40~~ → 60% oxides		~~semi-msv oxide in gabbro~~		~~Ave~~						
		oxides in gabbro and m.g. gabbro/leucogabbro c̄		(2) leucogabbro		Ave	50	<20	<5-15	<10-25	<5	–
		15-30% oxides (mainly leucoxene)										
		– minor massive oxides, 2 layers, at 467.0										
		to 468.7 (1.7') (minor granophyric gabbro bands										
		within, <10%) + at 470.7 → 472.7 (sharp ~~upper~~										
		contact at 472.7 into msv oxides, then gradual										
		decrease in ~~[illegible]~~ oxides down section to ≈ 50%										
		oxide + 50% plag, c̄ sharp contact at 472.7'										
		c̄ underlying leucogabbro)										
		– rare granophyric bands (mainly confined to 332 → 365)										
		– rare c.g. gabbro bands										
		– ≈ ~~25~~ → 30% of this interval is semi-msv										
		oxides, remainder is m.g.-c.g. oxide-bearing										
		leucogabbro c̄ ave. of 20-25% leucoxene + magnetite										

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FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MAFICS	OXIDES	LEUCX	QTZ	SULF
332.3	4855	SAMPLES FOR THIN SECTION – ENERGY & MINES	98-96-01-20	342.7	—	0.2	Granophyre					
(CONT'D)			01-21	352	—	"	m.g. (leuco)gabbro					
			01-22	361	—	"	m.g. gabbro					
			01-23	366.2	—	"	m.g. gabbro, 15% leucoxene					
			01-24	375	—	"	f.g. semi-massive oxide + leucoxene					
		* get some of pulps back from	01-25	381	—	"	f.g. semi-massive oxide + leucoxene					
		Gossan for MAJ/TRACE	01-26	391.5	—	"	"	"	"	"	"	
		– need to resample / relog this	01-27	396.5	—	"	"	"	"	"	"	
		interval.	01-28	401.5	—	"	m.g. gabbro ~ <15% mt + leuco					
			01-29	416.3	—	"	m.g. gabbro, <5% mt, <10% leuco					
		* N.B. – seems that % leucoxene + Mt	01-30	421.5	—	"	f.g. semi-msv Mt + lesser leucox					
		is ~ constant in semi-msv oxide (?)	01-31	430	—	"	"	"	"	"	"	
		layers but quite variable in m.g. gabbro/leucogabbro	01-32	4[illegible]6.5	—	"	m.g. gabbro, 10% Mt, <5% leucox					
		layers; no 'typical' mode for the m.g. gabbro/leucogabbro	01-33	450	—	"	f.g. semi-msv oxide + leuco.					
		layers; <15% to 30% mt + leucoxene,	01-34	463	—	"	m.g. gabbro ~ 10-15% leucox, 10% Mt					
		average = 20%.	01-35	471	—	"	m.g. gabbro, 10-15% mt, <5% leuco					
			01-36	478	—	"	m.g. gabbro, 15% leucox, <5% magn					

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FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	~~ASSAY~~ MODE % PLAG	MAFICS	OXIDES	LEUC	QTZ SULF
332.3	485.5	GOSSAN SAMPLING									
(CONT'D)		- for sample #'s & intervals, see									
		sample list, separate attachment									
		- Gossan samples are 10' composites									
		Sent to ACTLABS for Fe_2O_3-TiO_2-V_2O_5									

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FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MAFICS	OXIDES	LEUCX	QTZ	Su
485.5	494.0'	Gabbro, oxide - bearing					45	25	10	20	<5	–
		- m.g. - c.g. uniform gabbro ū weak foliation at										
		40° TCA.										
		- poikilitic intergrown pale green Hb, tan leucoxene,										
		magnetite + minor black to brown bt										
		- oxide + leucoxene are f.g. - m.g. + disseminated										
		evenly through this interval										
		- becomes distinctly more mafic at ≈ 493.6 → 494.0 (≈ 40% Hb + Bt)										
494.0	494.2'	Granophyre, c.g					55	<5	<5	<5	35	–
494.0	498.3	Gabbro, oxide - bearing										
		- as per 485 - 494 more mafic - rich from 494.0 → 494.5 (melagabbro)					45	20	10	20	TR	–
498.3	498.6	Granophyre, c.g, oxide - bearing ū 2ndary Mt (<1cm) vein at 85° TCA					50	<5	15	<5	30	–
498.6	507.0	Gabbro, oxide - bearing, poikilitic, m.g. → c.g.										
		- most mafic part from 498.3 → 498.8 (approaching										
		melagabbro) then fairly uniform mineralogy to										
		507.0' (see mode) - ave. ≈ 30% oxide + leucoxene for layer										
		- locally distinctive poikilitic texture ū Hb										

oikocrysts ± Mt/Leucoxene/Bt up to 2cm wide imparting a "spotted" appearance.

- oxide content ū consistent + reflect dissem. m.g. leucoxene + f.g. → m.g. Mt

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FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MAFICS	OXIDE	LEUCOX	QTZ
507.0	507.2	Leucoxene-rich band, possible c.g. base of underlying layer		507.0	507.2	0.2'	20	15	15	40	<10
507.2	513.3	Graded Layer, Leucogabbro (top) → Melagabbro (bottom)		leucogabbro		From	55	15	10	20	<1
		– thin m.g. granophyre band (10% oxides) at 513.0' → 513.1'		melagabbro		To	25	60	<10	<5	<1
		– uniform gr. size but systematic increase in Hb and Bt content down section with proportional decrease in plag + leucoxene									
		– lower contact (base of section) is abrupt with granophyre beneath									
		– upper contact (up section) is gradational into a c.g. to pegmatitic leucoxene + plag + Hb + Mt layer described above (507.0–507.2)									
513.3'	513.4	Granophyre, f.g.					60	<5	–	–	35
513.4	51[illegible]	Graded Layer, c.g. leucogabbro (top of section) → melagabbro (base of section) with irregular c.g. granophyre band at 514.3 – 514.4; melagabbro approaches pyroxenite in bottom 1" of section – mode + texture as per 507.2 → 513.3									

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FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	~~ASSAY~~ MODE % PLAG.	MAFICS	OXIDE	LEUCOX	QTZ
514.6	519.5'	Gabbro, oxide-bearing, poikilitic,			Ave.		50	20	10	20	<1
		- m.g. → c.g. gabbro, most mafic section is									
		from 518.8' → 519.6' (≈ 40-50% Hb)									
		- 2" granophyre band, m.g. c <10% oxide									
		+ mafics at 519.0 - 519.2.									
519.5'	534.0	Gabbro, poikilitic, oxide-bearing	(more typical)	From	Leucox-	rich	55	10	10	20	<1
		- c even-grained gabbro/leucogabbro c cryptic	(rare)	To	Mt-	rich	50	20	20	10	<1
		modal variation involving Magnetite + Leucoxene									
		which occur as med.-gr., weakly poikilitic									
		grains alw or independent of Hb + lesser Biotite									
		- local Leucoxene-rich bands can be slightly coarser									
		than average gr. size for this section; Mt-rich									
		bands/sections contain up to 20% Mt.									
		- some of Hb forms c.g., isolated oikocrysts up to 1cm									
		wide (dark green Hb)									
534.0	→	Abrupt grain size change; much coarser-grained									
		below 534.0'; c sharp boundary (at break in core)									

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FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MAFICS	OXIDE	LEUCOX	QUARTZ	SUL
534.0	569.0	Very coarse-grained gabbro, oxide-bearing				Average	45	30	5→10	<5	5→15	TR. to 0.5 Po, ± Cp
		- variable grain size, c̄ evidence of size-graded										
		layering within this section (not well developed)										
		- bottom 2' of section shows sharp decrease										
		in grain size to < 2mm										
		- nearly 'isomodal', i.e. mode is c̄ constant,										
		c̄ exception of anorthosite sections +										
		granophyre sections (< 15cm wide) at 542'-542.2',										
		(anorthosite + Mt), 543.5 → 543.7 (anorthosite + leucoxene										
		Leucoxene + Mt + Hb), 549.5 (5cm wide c.g. granophyre										
		band), 551.0' (10 cm wide v.c.g. leucogabbro) +	96-96-01-37									
		- plag replaced by pseudomorphs of f.g., myrmekitic	v.c.g. gabbro	563.6	566.3	2.7'	50	20	10	10	10	1% Po
		qtz-plag intergrowth.		MAJOR/TRACE ASSAY.								
		- local f.g. sulfides at margins of oxide or leucoxene										
		grains; disseminated + < 1% to trace only.										
		- difficult to distinguish pale green Hb from Tr leucoxene										
		* check TiO2 assays *, but more Hb than leucoxene										

in general.

- local c.g. granophyre forms matrix in many 1-2' sections; distinct bluish colour
- all minerals are on average > 5mm; 2 distinct amphiboles, one, pale-green replaces equant pyroxene?? second, dark green, is replacing ...

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FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MAFICS	OXIDES	LEUCOX	QUARTZ	SULF
564.0	573.3	Gabbro, oxide-bearing					50	35	5	5	5	—
		- variable gr. size, e.g., plag from <5mm to 3cm										
		- not systematic variation in gr. size; mode is constant										
573.7	574.4	Gabbro, pegmatitic, oxide-bearing					40	35	5	5	15	Tr po
		- ≈15-20% granophyre replacing v.c.g plag										
574.4	584.5	Gabbro, size-graded layers, oxide-bearing										
		- c.g. gabbro ē gr. size gradually increasing to pegmatite by 580.0,										
		then finer from 580.0 - 580.7 (still c.g.), another										
		pegmatite section at 580.7 - 581.3, then equigranular	98-96-01-38	580.7	582.6	1.9'	45	36	10	10-15	10	—
		c.g. gabbro to 583.2, then increasing gr. size to 584.1;	pegmatitic → c.g. gabbro gr. size decreases down section				MAJORS		TRACES	T.S.		
		Shearing + biotite alteration from 584.0 - 584.5;										
		- variable % magnetite + leucoxene, averages 5-15% Mt,										
		+ 10-20% leucoxene										
		- some granophyre 'patches'; irregular distribution & size,										
		generally < 5cm; * most plag in this interval										
		has been replaced by f.g. calcic(?) myrmekite										
584.5	592.2	Gabbro, oxide-bearing	98-96-21-39	590.7	591.9	1.2'	50	25	5-10	10-20	<5	.

- equigranular m.g. gabbro, foliated, variable biotite content (<1-10%), 10-25 Leucoxene plus magnetite; variable magnetite : leucoxene, generally Leucoxene > magnetite

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FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE PLAG	MAFICS	OXIDE	LEUCOX	QUARTZ	SUL
592.2	595.8	Massive to semi-massive oxide layer	GCSP-B24	592.2	595.8	3.6'	<5→80	<5	15→90	<5	TR	TR; 3%
		- sharp contact to gabbro above (previous section)	x-get pulp for									
		- start of interval is massive oxide ≈ 80-90%	majors/trace									
		m.g. magnetite + ilmenite; locally strongly foliated;										
		1-3% m.g. pyrite, dissem; magnetite > ilmenite,										
		but ratio is variable; grades down hole to										
		semi-msv (50% oxides, 593.6 → 594.2) to										
		dissem. (40% oxides at 594.2 to 15% oxides at										
		595.8) - little or no leucoxene in this section;										
		may be ilmenite is stable here.										
		- virtually no Hb or Bt in this section										
595.8	638.0	Gabbro, oxide-bearing		Average		—	50	20	10	15	<5	—
		- equigranular, foliated (at 40° TCA) m.g. gabbro,										
		with variable % oxides, % bt + % Hb.										
		- generally leucoxene > magnetite but local Mt-rich	98-96-01-40	604.3	606.4	2.1						
		sections		Majors/Traces/T.S.								
638.0	646.5	Gabbro, size graded layers, oxide-bearing		Average		→	40	20	15	15	5-10	TR; 1%; Po; Ap

- several size-graded, 1' to 3' long gabbro layers ≈ 20 → 40% leucoxene + gabbro; see over

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FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	PLAG	MAFICS	OXIDE	LEUCOX	QUARTZ
638.0	665.5	Continued . . .	98-96-01-42	638.3	639.9	1.6'	modally graded gabbro, increasing % Mt + Hb down section; decreasing L				
		- gr. size varies from c.g. (ave. 5-7mm) to	98-96-01-42	641.0	643.6	2.6'	Mt-rich section; 20% Mt,		10-15 % Lx	c.g. gabbro	
		v.c.g. (1-2cm) to rare pegmatite (2-3 cm)	98-96-01-43	643.6	647.0	3.4'	oxide c.g.	- poor to v.c.g.	section,	< 15 % Mt + Lx	
		- oxides are dissem + coarser in silicates									
665.5	676.2	Gabbro, oxide-bearing	98-96-01-44	669.0	671.6	2.6'	40	20	10	20-25	<5
		- equigranular, uniform f.g.-m.g. gabbro in local c.g. granophyre	M/T/TS								
		bands + irregular 'patches' at 667.0, 672.0, 672.7,									
		674.5 (all < 10 cm wide) at ≈ 45° TCA.	98-96-01-45	672.9	674.7	1.8	50	20	10	20	<5
		- f.g.-m.g. evenly disseminated leucox. + magnetite									
		- grades sharply into overlying + underlying layers in									
		contacts at ≈ 45° TCA ; fol'd.									
676.2	690.3	Gabbro, leucogabbro, oxide-bearing.									
		- variable foliation (some strong shearing) and mode;									
		- predominantly m.g. leucogabbro in < 15% oxide,									
		decimeter to cm-scale layering (modal), lenses									
		m.g. gabbro; minor m.g.-f.g. melagabbro (1 'layer'									
		or band at 689.5 - 690.0) ; only 1 c.g. gabbro section at									
		'top' of section from 676.2 → 676.7.									

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FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	~~ASSAY~~ MODE % PLAG	MAFICS	OXIDE	LEUCOX	QUARTZ	SUL
690.3		Massive and semi-massive oxides	B25	690.5	692.5	2.0	25	—	65	<10	—	—
	693.1	- m.g., equigranular, % oxide increases to middle										
		of layer from both base + top of section										
		- c̄ gradational top + lower contacts, %										
		oxide decreases abruptly over 10 cm to										
		≈ 15%										
		- Mt : Lx ≈ 5 : 1, some black oxide may be										
		ilmenite										
		- no Hb or Bt seen										
693.1	694.0	~~Gabbro,~~ Anorthosite, oxide-bearing, porphyritic					60	<1	15	25	—	TR Cp
		- porphyritic oxide/leucoxene-rich anorthosite										
		layer which grades abruptly 'up' into msv oxide										
		layer, + 'down' section into porphyritic										
		leucogabbro c̄ less leucoxene, f.g. → m.g.										
		- plag forms both phenocrysts and f.g.-m.g. 'matrix' xtals;										
		- oxides form oikocrysts and dissem. grains c̄										
		leucoxene > magnetite, in plag phenocrysts ≈ 30% ≈ 3mm → 1cm										
694.0	705.2	Leucogabbro, porphyritic, oxide-bearing, and m.g. gabbro, oxide-bearing	98-96-01-46	702.3	703.9	1.6	70	15	10	<5	—	—
		- phase contact at 694.0-694.5 (gradational) c̄ leucoxene disappearing + Hb appearing below this										

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694.0	~~[illegible]~~ 705.2	Continued.									
		- most of this section is c.g. – m.g. porphyritic leucogabbro w < 10 to ≈ 25% Hb + <5 → 15% Magnetite forming m.g. matrix c smallest matrix plag xtals (2nd stage) surrounding c.g. to v.c.g euhedral to subhedral plag phenocrysts ranging from <5mm to 2cm.									
		- well foliated at ≈ 40 → 50 T.C.A.									
		- minor leucoxene, m.g., disseminated is rarely developed									
		- modal + textural contact at 698.5 → 698.7 (abrupt but gradational) from porphyritic leucogabbro into m.g., equigranular gabbro <5% magnetite, 40% Hb, 5% Bt + 50% plag. which continues to 700.2'; 700.2' – 705.2' is similar porphyritic leucogabbro as per 694.0 → 698.5									

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FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MAFICS	OXIDES	LEUCOX	QTZ	SUL
705.2	712.7	Leucogabbro, massive to porphyritic, oxide-bearing – leucoxene re-appears as major oxide below 705.2; contact to overlying leucogabbro is marked by sharp decline in phenocryst % (plag) + reappearance of leucoxene. – centimetre to decimetre scale textural ± modal layering, indistinct, variable % plag phenocrysts + leucoxene : Hb + magnetite (these 3 minerals vary antipathetically)				Ave.	60	15	<10	15	—	—
712.7	714.3	Melagabbro and gabbro, oxide-bearing – melagabbro, m.g., at base + top, to coarser gabbro 'bed' from 713.7 → 714.1 – < 10% mt on average, << 2% leucoxene	last sample this hole ↓									
~~714.3~~ 714.3	737.2	Gabbro, oxide-bearing	98-96-01-47	715.8	718.6	2.8'	50	15	10	25	—	—
		– m.g., massive, equigranular, % Hb + Mt generally increase + % leucoxene generally decreases down section, ± some subtle modal layering (decimetre-scale) involving these phases throughout.				RANGE	40-50	10-25	10-15	10-15	—	—

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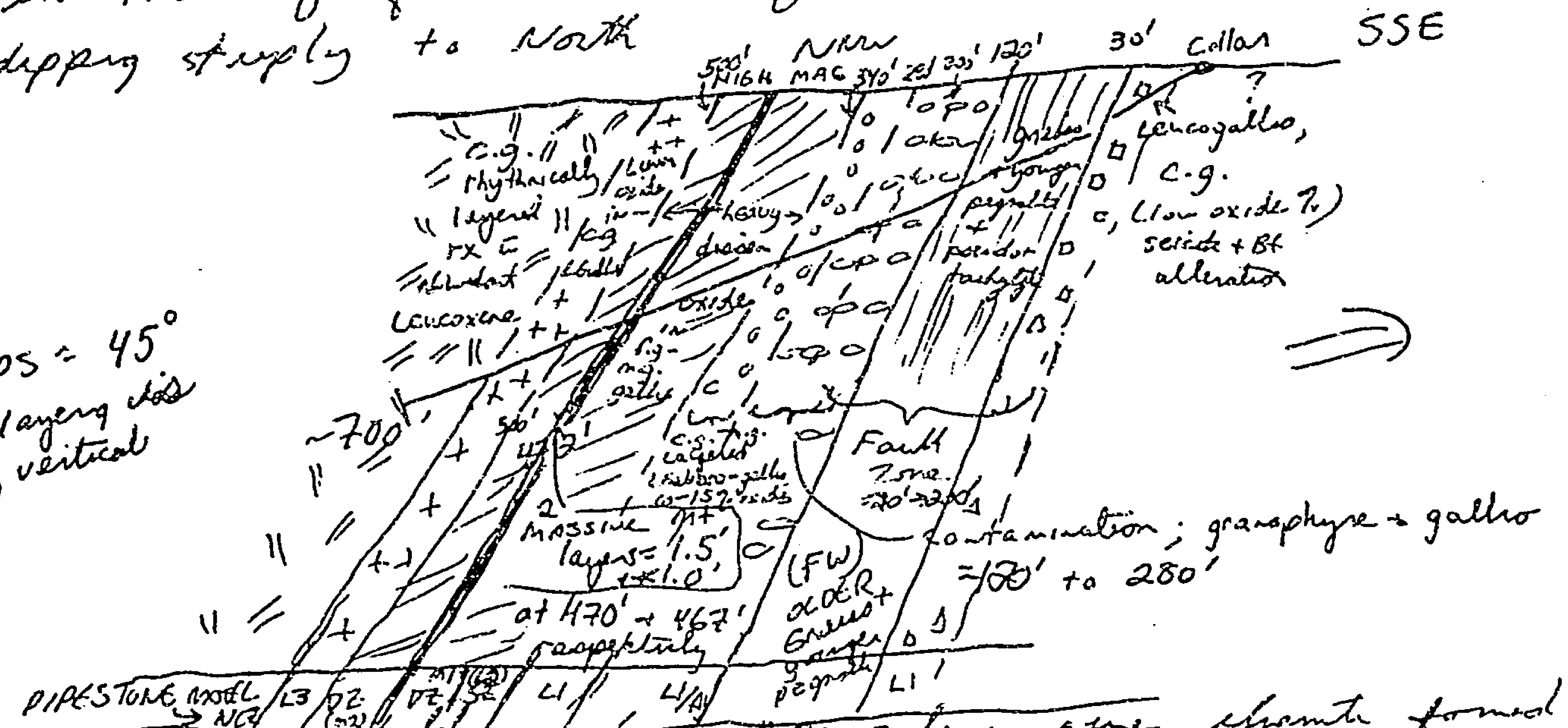
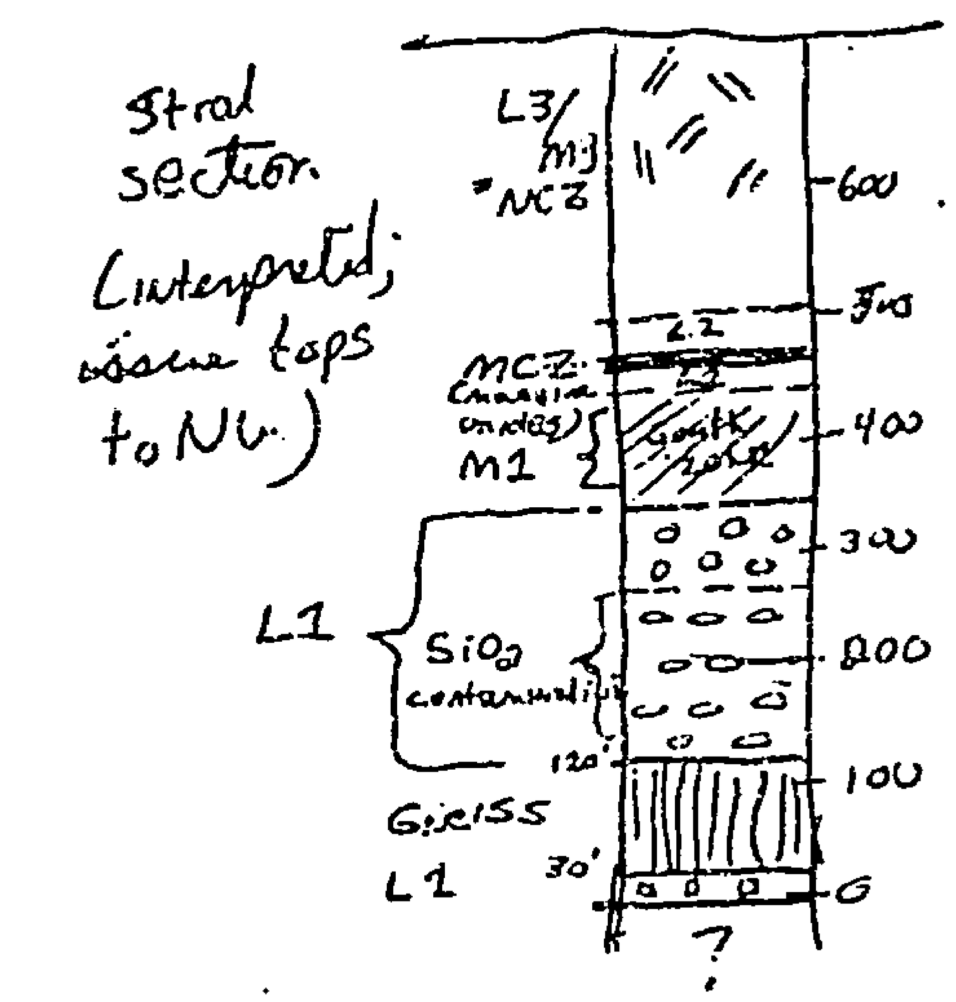
FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	~~ASSAY~~ MODE %: PLAG	MAFICS	OXIDES	LEUCOX	QUARTZ
737.2	E.OH.	Modal + GR. Size Layered gabbro and porphyritic leucogabbro			m.g.	Gabbro	45	30	10-15	<5	<5
	757'	- c̄ little leucoxene, generally <5%, most			porphyritic	Leuco Gabbro	60	15	5-10	5-15	<5-10
		abundant in c.g., porphyritic sections									
		- % plag : Hb + oxide + leucoxene is fairly constant									
		within gabbro + leucogabbro									
		- local leucox-rich zones < 15cm wide, in									
		porphyritic leucogabbro									
		- 737.2 → 736 ; c.g. - porphyritic leucogabbro									
		- 736 → 737.3 ; m.g. gabbro									
		- 737.3 - 741 ; alternating 10cm wide porph. lgabbro + m.g. msv gabbro									
		- 741 - 743 ; m.g. msv gabbro									
		743 - 755.5 ; c.g. , porphyritic leucogabbro									
		755.5 - 757 (E.O.H.) ; m.g. msv gabbro									

General Observations: KL-96-12

∴ – Leucoxene not present ~~[illegible]~~ above (up section) from lowest part of gneiss intersection – 1st appears at ≈ 119.4'; together w abundant pseudotachylite in & adjacent to gneiss intersection (brittle, high strain faulting) ⇒ suggests retrograde metamorphism and fluid metasomatism occurred in HW of fault & that fault zone followed gneiss/gabbro contact & was dipping steeply to North



DIPS ≈ 45°
∴ layering dips generally vertical



– Leucoxene is fine & probably replacing more or less pure ilmenite formed at granulite conditions
– See discrete magnetite & leucoxene grains co-existing in most sections in both stable
∴ Leucoxene: Mt ratio likely reflects ilmenite : Mt ratio
– this ratio seems highest at end of hole ⇒ in layered (Gabbro/Gabbro (melagabbro) Pxte
equivalent to NCZ? (PLAC)

This dip ~~may~~ of the layering is probably vertical

Energy and Mines   Mines Branch

59 Elizabeth Drive (Box 25)
Thompson, Manitoba, CANADA
R8N 1X4

(204) 677-6881
Toll Free: 1-800-442-0616

Hole KL-96-12

5B - not used - missing

Feb 7/96

From	to	Sample
339	344	1B
344	349	2B
349	359	3B
359	369	4B
369	379	~~5B~~ 6B
379	389	~~6B~~ 7B
389	399	~~7B~~ 8B
399	409	~~8B~~ 9B
409	419	B-10
419	424.5	B-11 (4.5')

Continued in memo book

Feb 8/96

Hole KL-96-12.
Continued Sampling

			~~Sample#~~ ~~B#~~
~~419~~	~~424.5~~	~~4.5'~~	
424.5	434.0	= 9.5' =	B12
434	444	10' =	B13
444	454	10'	B14
454	464	10'	B15
464	474	10'	B16
474	484	10'	B-17
484	494	10'	B-18
494	504	10	B-19
504	514	10'	B20
514	524	10'	B21
524	534	10	B22
534	544	10'	B23
592.2	595.8	3.6	B24
690.5	692.5	2.0	B25

XRAL LABORATORIES 20-Feb-96 REPORT ----- WORKORDER 7207 PAGE 1

SAMPLE	Footage	width	TIO2 % ICP 0.01	V2O5 % ICP 0.01	FE2O3 % ICP 0.01
B-1	339-344	5'	1.36	0.06	9.32
B-2	344-349	5'	3.64	0.16	24.1
B-3	349-359	10'	2.75	0.18	24.7
B-4	359-369	10'	2.10	0.14	18.8
B-6	369-379	10'	3.74	0.25	31.6
B-7	379-389	10'	3.21	0.23	29.2
B-8	389-399	10'	4.32	0.34	39.4
B-9	399-409	10'	1.43	0.11	14.3
B-10	409-419	10'	1.95	0.14	18.5
B-11	419-424.5	9.5'	4.22	0.34	39.8
B-12	424.5-434.0	9.5'	1.83	0.13	17.4
B-13	434-444	10'	1.76	0.13	16.7
B-14	444-454	10'	2.89	0.22	28.9
B-15	454-464	10'	1.75	0.13	17.1
B-16	464-474	10'	4.35	0.33	35.6
B-17	474-484	10'	2.04	0.14	18.4
B-18	484-494	10'	1.88	0.13	17.9
B-19	494-504	10'	1.99	0.14	18.8
B-20	504-514	10'	2.19	0.16	19.8
B-21	514-524	10'	2.20	0.15	19.8
B-22	524-534	10'	2.27	0.15	20.1
B-23	534-544	10'	2.44	0.15	20.1
B-24	592.2-595.8	3.6	7.10	0.50	54.8
B-25	590.5-692.5	2.0	6.95	0.61	58.1
D B-1			1.62	0.06	10.0
D B-14			2.97	0.23	27.4

≈ 80% oxide. MSV layers.

6

TOTAL P.02

XRAL LABORATORIES 22-Feb-96 REPORT ----- WORKORDER 7290 PAGE 1

SAMPLE	TIO2 % ICP 0.01	V2O5 % ICP 0.01	FE2O3 % ICP 0.01
C-1	4.81	0.15	21.9
C-2	5.38	0.16	23.2
C-3	5.95	0.16	24.0
C-4	5.11	0.13	20.6
C-5	3.51	0.13	20.5
C-6	3.37	0.13	20.8
C-7	5.03	0.22	28.5
C-8	4.93	0.23	29.8
C-11	4.92	0.22	30.3
C-12	4.85	0.21	28.6
C-13	5.30	0.22	30.5
C-14	4.31	0.18	25.3
D C-1	4.85	0.15	22.5

KL-96-13

DIAMOND DRILL RECORD

LOGGED BY Dave Peck
ASSISTED BY: JAMES CAMPBELL + PETER THEYER.
DATE LOGGED: Feb. 15, 1996 73001

PROPERTY Kiskitto Lake Property — KIS Anomaly

D.D.H. No. KL-96-13 PAGE 1

LATITUDE 250W / 0+25 S BEARING OF HOLE Grid North (@327°) TN STARTED Feb. 8

CLAIM No. PERMIT 131

DEPARTURE ______ DIP OF HOLE 45° COMPLETED Feb. 14

DIRECTION AND DISTANCE FROM NE. CLAIM POST

ELEVATION ______ DIP TESTS ______ DEPTH ______

FOOTAGE FROM	FOOTAGE TO	Core size "BQ" DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	ASSAY				
NOTES:		This log is very abbreviated + not as detailed as logs for KL-96-11 + KL-96-12. It is critical to establish whether the tan-coloured mineral that is present in most sections of this DDH is hypersthene or leucoxene = altered ilmenite. This recognition problem reflects the fact that these 2 minerals can have the same colour + grain size + shape, and that in these granulites or retrograded equivalents, the hypersthene that is definitely present is generally unaltered (ie., KL-96-6) and does not contain blebs, inclusions and exsolution lamellae of oxide (magnetite?) that is characteristic of the tan coloured phase observed in DDH # KL-96-12, and in most cases, in DDH # KL-96-13. Thin section work will confirm the composition of this mineral. A field / hand specimen recognition tool must be identified for future studies — suggest magnetic	C-1								

susceptibility meter or a chemical test for TiO_2.
For KL-12, tan mineral assumed to be leucoxene,
For KL-13, grain shape (equant) + size (coarser than Mt) suggest hypersthene. Very equivocal!

DIAMOND DRILL RECORD

LOGGED BY DCP

PROPERTY

LATITUDE | BEARING OF HOLE | STARTED

DEPARTURE | DIP OF HOLE | COMPLETED

ELEVATION | DIP TESTS | DEPTH

D.D.H. No. KL-96-13 PAGE 2.

CLAIM No.

DIRECTION AND DISTANCE FROM NE. CLAIM POST

*N.B. MAFICS INCLUDE Amphibole ± Biotite ± Chlorite
*TAN PHASE = Hypersthene or leucox...

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE: PLAG	MAFICS	OXIDES	TAN PHASE	QUARTZ	Sul
START of HOLE - 77.8'												
0.0'	77.8'	Collar/Casing										
77.8	86.5	Fault zone in gabbro → leucogabbro				AVE.	60	25	<10	<5	–	–
		– shearing and faulting at ≈ 10° TCA, quartz-calcite ± pyrite veins at 80.1' (1.5cm, 50° TCA), and 81.7' (5cm wide) – veins have ≈ 80% m.g.-c.g. white carbonate, 15% translucent m.g. quartz + 5% f.g. pyrite – pyrite occurs as seams up to 5mm wide on vein margins or as rare irregular to blebby aggregates up to 2cm wide in the vein. Minor f.g. black to green chlorite? serpentine? at vein margins in the seam between pyrite seams + main part of vein										
		– minor brecciation along fracturing at 80° TCA.										
		– <10% oxides throughout										
		– gabbro grades to leucogabbro; no distinct layering; plag shows ubiquitous replacement by pale green saussurite + white f.g. feldspar (albite?)										

DIAMOND DRILL RECORD

LOGGED BY DCP.

PROPERTY ____

LATITUDE ____ BEARING OF HOLE ____ STARTED ____

DEPARTURE ____ DIP OF HOLE ____ COMPLETED ____

ELEVATION ____ DIP TESTS ____ DEPTH ____

D.D.H. No. KL-96-13 PAGE 3.

CLAIM No. ____

N

DIRECTION AND DISTANCE FROM NE. CLAIM POST

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION
86.5	117'	Leucogabbro and gabbro, modally-graded, oxide-bearing
		- ~~several~~ one long modally-graded layer ~~s~~ of leucogabbro to
		oxide-rich gabbro, gr. size is fairly uniform (m.g.,
		plag ≈ 2-5mm) throughout, local m.g. - ~~f.~~ c.g.
		granophyric/myrmekite leucogabbro and
		anorthosite bands, 2cm-20cm wide, +
		consistently at 30-50° TCA.; these bands
		display either sharp, altered (biotite) contacts
		or diffuse, irregular but abrupt contacts.
		- <10% of section is represented by these leucocratic
		bands
		- modal grading in the leucogabbro - gabbro layers
		involves gradual, systematic increase in
		% oxides (Mt + Ilmenite) down section +
		corresponding decrease in ~~[illegible]~~ ?)
		~~and~~ plagioclase abundance; also, slight increase
		in grain size down section within individual layers
		~~scale of layering is~~
		- oxides are m.g., evenly disseminated + locally enclose plag crystals.

SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	PLAG	MAFICS	OXIDES	TAN	QUARTZ	SULF
				~~ASSAY~~ MODE %					
	≈91.0'	Leucogabbro		60	10	15	10-15	—	—
To	113'	Gabbro		50	15	25	10	—	—
typical	c.g. Leucogabbro band			75	~~5~~ <5	5	10	5	—

DIAMOND DRILL RECORD

LOGGED BY 'VCF

PROPERTY ______ D.D.H. No. ______ PAGE 4

LATITUDE ______ BEARING OF HOLE ______ STARTED ______ CLAIM No. ______

DEPARTURE ______ DIP OF HOLE ______ COMPLETED ______ DIRECTION AND DISTANCE FROM

ELEVATION ______ DIP TESTS ______ DEPTH ______ NE. CLAIM POST

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MAFICS	OXIDES	TAN	QUARTZ Sulf
117'	138.2	Leucogabbro/Gabbro, oxide-bearing				AVE.	50	15	30	5	—
		- probable continuation of modally graded layers									
		from 86.5' – 117'									
		- m.g. to c.g. (3-6mm plag) rock ē disseminated									
		m.g.-c.g. oxides forming ~~[illegible]~~ principal									
		dark-coloured mineral + ~~is~~ locally forms oikocrysts up to 1cm wide									
		- <5% m.g.-c.g. anorthositic bands at 45° TCA									
		- fairly uniform mode and grainsize, lower									
		oxide % from 131' → 136.5' (≈ 20% oxides)									
		- leucocratic bands locally ~~look~~ appear to have									
		been injected + rarely form veins that cut									
		across the foliation									
		- plag appears to be variably altered to myrmekite a/o									
		saussurite									
		- tan mineral (hypersthene) is most abundant in									
		the leucocratic bands.									
Ø											

DIAMOND DRILL RECORD

LOGGED BY DCP.

PROPERTY
LATITUDE | BEARING OF HOLE | STARTED
DEPARTURE | DIP OF HOLE | COMPLETED
ELEVATION | DIP TESTS | DEPTH

D.D.H. No. KL-96-13 PAGE 5
CLAIM No. 131
N — DIRECTION AND DISTANCE FROM NE. CLAIM POST

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MAFICS	OXIDES	TAN	QUARTZ	SUL
138.2	139.3	Pyroxenite, oxide-bearing (tops up section?)				AVE	<5	<5	10	80	2% (blue)	1?:
		- m.g.-c.g., grain-size graded										
		pyroxenite layer c̄ diffuse contact c̄ gabbro (oxide										
*		at 138.2' and sharp lower contact at 139.3' c̄	C9	138.0	139.4	- Assay for	Au +	PGE	via	Ni Sulfide		
Ref?		oxide-gabbro; upper contact at 45° TCA; lower contact at 80° TCA	Gossan							method		
		- gr. size increases down section in this layer				- obtain rejects + pulps for Royo?,						
		from ≈3mm at 138.2' to ≈1cm at 139.2', * magnetism of	oxide phase(s) increases from v. low at top to v. high at base of layer			traces, S at E. Minnes Lake						
		- coarse-gr., clotty, interstitial oxides form				- polished T. Section if grades						
		discontinuous matrix to equant, blocky to round,	* need to probe *			are good. (½ core retained)						
		tan hypersthene crystals; plag (c.g., anhedral), Hb										
		+ Bt form other matrix components										
		- oxides concentrated in upper + lower parts of this layer										
		- Bt is brown (golden) ⇒ likely phlogopite; locally replaces hypersthene										
		- lower 4 cm of layer is nearly massive f.g. oxide										
		* upon polishing, this section looks c̄ much like a pegmatoidal										
		pyroxenite reef; upper mt-rich seam, dissem., nearly										
		net-textured, interstitial Po + Py ± Pn (flames)										

* sulfides concentrated in upper 1cm of layer and lower (down section) 10 cm, where sulphide abundance reaches 5%; ave. sulphide % = 2% for section
- sample includes ≈ 2cm of underlying gabbro + 8cm of overlying gabbro.

DIAMOND DRILL RECORD

LOGGED BY DCP

PROPERTY

LATITUDE BEARING OF HOLE STARTED

DEPARTURE DIP OF HOLE COMPLETED

ELEVATION DIP TESTS DEPTH

D.D.H. No. KL-96-13 PAGE 6

CLAIM No. 131

N

DIRECTION AND DISTANCE FROM NE. CLAIM POST

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	MODE % PLAG	MAFICS	OXIDES	TAN PHASE	QUARTZ	SUL
139.3	163.8'	Leucogabbro, oxide-bearing					55-60	15	15-20	10	—	—
		- m.g. → c.g. leucogabbro w rare anorthositic/granophyric										
		bands, < 10cm wide, at ~~40~~ 50-80° TCA.										
		- dark green Hb clearly replacing from margins inwards the										
		tan mineral (hypersthene) which is locally poikilitically										
		enclosed by oxides.										
		- oxides evenly distributed, m.g. - c.g., locally form sideronitic										
		- uniform gr. size + mode; slight increase in oxide % down section										
163.8'	~~[illegible]~~ 170.2'	Leucogabbro, oxide-rich					55	10-15	25	5-10	—	—
		- m.g. → c.g. leucogabbro w grain size gradually increasing										
		down section; gr. size of plag increases from 3-5mm to 5→8mm										
		- consistent mode + oxide %; dissem., c.g. oxides										
		interstitial to euhedral, tabular plag.; fol'n (primary?) defined										
		by plag lathes at < 20° TCA. which is oblique to										
		shearing + fol'n involving mafic minerals which is < 45° TCA										
170		- local bt-rich alteration bands at contacts between										
		anorthositic layers/bands (≤5cm; 3 bands seen;										

at 163.8 → 164.2, 167.3 (2cm), 168.5 → 169.3).

- brecciation in 3rd band at 168.5 → 169.3, w subrounded anorthositic clasts in a biotite-rich matrix

DIAMOND DRILL RECORD

LOGGED BY DCY   Feb. 15

D.D.H. No. KL-96-13   PAGE 7

PROPERTY
LATITUDE   BEARING OF HOLE   STARTED
DEPARTURE   DIP OF HOLE   COMPLETED
ELEVATION   DIP TESTS   DEPTH

CLAIM No. 131

N

DIRECTION AND DISTANCE FROM NE. CLAIM POST

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION
170.3'	174.6'	Leucogabbro, anorthosite and oxide-bearing leuco gabbro
		- 4 plag-rich, oxide-poor (<5%) bands separated by
		oxide-bearing leucogabbro as per overlying section
174.6'	757.0'	Modally-graded leucogabbro, gabbro; oxide-bearing
	E.O.H.	- m.g. → c.g. modally layered (m-scale) leucogabbro
		and gabbro, average layer size is ≈ 3m,
		many layers are also grain size graded;
		- typically start of layer marked by anorthosite
		or leucogabbro 'band' with abrupt, sharp to diffuse
		contacts with adjacent layers, + having little
		oxides (<10%, typically <5%)
		- most layers have 'upper' (up-section) hypersthene*-
		rich, Hb + oxide-poor section, with % oxide,
		Hb + average grain size increasing down the
		section ∴ tops would appear to be ~~the~~
		up section on basis of gr. size but down section
		on basis of hypersthene abundance. * Equivocal * need detailed chemistry + petrography

SAMPLE No. / FOOTAGE / SAMPLE LENGTH	PLAG	MAFICS	OXIDES	TRN. PLLS	QUARTZ	SULF
Typical mode: Hypersthene-rich leucogabbro	55	<10	15	20	—	—
Oxide-rich leucogabbro	45	10-15	30	<10	—	—
Oxide-poor gabbro	60	15	<10	15	—	—
Anorthositic bands	70-75	<5	<5	5-10	<10	—
Diabase Dykes	45	40	10-15	—	?	—
PLAG-Hypersthene Pegmatite						
Melagabbro (rare)	30	60	15	<5	—	—

* local Py + Po ± Cpy, dissem., see next page; generally no visible sulphide

* max. oxide % seen in this drill core is ≈ 40% (in leuco-gabbro)

- no true geomorphic seen (ie. KL-96-11); most leucocratic bands are anorthositic, m.g. → c.g.

* likely hypersthene, some could be leucoxene

DIAMOND DRILL RECORD

LOGGED BY ______

PROPERTY ______

D.D.H. No. ______ PAGE 8 of 8

LATITUDE ______ BEARING OF HOLE ______ STARTED ______ CLAIM No. ______

DEPARTURE ______ DIP OF HOLE ______ COMPLETED ______ DIRECTION AND DISTANCE FROM

ELEVATION ______ DIP TESTS ______ DEPTH ______ NE. CLAIM POST

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION	SAMPLE No.	FOOTAGE FROM	FOOTAGE TO	SAMPLE LENGTH	ASSAY				
174.6	757.0	* ~~[illegible]~~ Atypical Features / Rock Types.									
		* get Gossan Sample #'s from attached list - 10' composites									
		for V_2O_5, TiO_2 + Fe_2O_3									
554.0	560'	f.g. diabase dyke, aphyric, magnetite-bearing, chilled margins									
593	595.5'	F.g. diabase dyke, magnetite-bearing, sharp, chilled contacts									
600.0	601.4'	" " " " " " " "									
607.6'	609.5	" " " " " " " "									
612.5	614.0	" " " " " " " "									
701.5	703	Breccia (fault) in m.g. anorthosite									
724.5'	726.5	- ≈ 1-3% disseminated f.g.-m.g. interstitial Po + Py + minor Cpy	C10	725	726.5	1.5'	Au assay only (certlabs)				
730'	737.5	F.g. quartzite; possible vein of quartz ± albite + sericite; sharp contacts at 45° TCA, could be approaching contact with felsic gneiss (more intense veining, contamination, brecciation)									
		* serpentinized altered fault zones up to 15cm wide at									
		637', 647', 657', 710, + many other <1cm serpentinized fractures between 500' + E.O.H.; locally carry 1-3% pyrite									
707	757	Most intense deformation is strong bt alteration + lowest oxide %, particularly									
		along (euzogabbro / anorthosite band) contacts; fol'n at 45° TCA.									
		- diabase band, f.g.-m.g., at ≈ 728' - 728.5' (coarser than underlying diabase).									
744	757	m.g., strongly foliated diorite w < 5% oxide + 5-15% blue qtz + < 20% mafic minerals on average (Bt + Hb). END OF LOG									

Hole KL-96-13

Feb. 15/96

Sample #	from E	Total
C-1	400' - 410	10'
C-2	410 - 420	10
C-3	420 - 430	10
C-4	430 - 440	10'
C-5	292 - 302	10'
C-6	302 - 312	10'
C-7	707 - 717	10
C-8	717' - 727	10'
C-9	138.0' - 139.4'	1.4' Au.
C-10	725 - 727	2.0' Au.
C-11	117 - 127	10.0'
C-12	127 - 136.5	9.5'
C-13	136.5 - 146.5	10'
C-14	146.5 - 156.5	10'

SAMPLE	FOOTAGE FROM	TO	WIDTH	TIO2 % ICP 0.01	V2O5 % ICP 0.01	FE2O3 % ICP 0.01
C-1	400'	410'	(10')	4.81	0.15	21.9
C-2	410'	420'	(10')	5.38	0.16	23.2
C-3	420'	430'	(10)	5.95	0.16	24.0
C-4	430'	440'	(10')	5.11	0.13	20.6
C-5	292'	302	(10')	3.51	0.13	20.5
C-6	302'	312'	(10)	3.37	0.13	20.8
C-7	707	717'	(10')	5.03	0.22	28.5
C-8	717	727'	(10)	4.93	0.23	29.8
C-11	117	127'	(10)	4.92	0.22	30.3
C-12	127	136.5	(9.5')	4.85	0.21	28.6
C-13	136.5	146.5'	(10')	5.30	0.22	30.5
C-14	146.5	156.5	(10')	4.31	0.18	25.3
D C-1				4.85	0.15	22.5

Drill Hole
KL-96-13

rechecking C-1 sample

Feb 23/96
Correct
[initials]