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GEOLOGICAL, GEOPHYSICAL, DRILLING REPORT

NEP CLAIM GROUP
Osoyoos Mining Division

NTS 82E/4E
49°01.6', 119°35.5'W

September 1986

for

Operator: Nepheline Resorce Limited

Owner : Richard Addison

GEOLOGICAL BRANCH
ASSESSMENT REPORT

15,783

by

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FILMED

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NEP CLAIM GROUP
Osoyoos Mining Division

A Nepheline Syenite Prospect
NTS 82-E/4
49°2'N, 119°35'W

INTRODUCTION

At the request of Nepheline Resources Ltd., I examined the NEP claim group between May 20th and 24th, 1986. Previously, on November 13th, 1985, I had made a preliminary examination of the property. The purpose of the study was to map in detail the geology of the nepheline syenite and surrounding rocks, and to make a preliminary tonnage estimate of the deposit. The field examination was followed by a petrographic examination of 53 thin sections to determine the mineralogy of the deposit, in particular with reference to mineral zonation, which might be important in terms of separation of Fe-bearing minerals. Eleven large grab samples were collected for whole rock analysis. A diamond-drill program was carried out to begin to confirm the tonnage estimate based on geological data. A total of 294 m (967 ft.) of drilling was completed in three holes.

Nepheline syenite is sought in large quantity by the glass industry, and to a lesser extent by the ceramic industry. It is finding increasing use as a filler in many other industrial products, including paint, plastic, paper, and foam. In the glass industry, it is preferred to feldspar because of its lower melting temperature (because of its higher content of alkalis), which reduces fuel consumption and lengthens the life of refractory liners in furnaces.

Indusmin, at Blue Mountain, Ontario, is the only producer of nepheline syenite in Canada, and few others exist in the world. A source of nepheline syenite in Western Canada would be in a favorable position to supply markets in Western U.S.A. and Canada, as well as the Pacific Rim countries.

LOCATION AND ACCESS (see Figure 1)

The deposit outcrops at elevations between 970 and 1228 m. on top of and along the eastern flank of a broad ridge 10 km. west of the town of Osoyoos in south-central B.C. Access by road from the junction of Highways 3 and 97 just north of Osoyoos is as follows:

1) west on Hwy 3 for 6.6 km; left turn up paved road into Osoyoos Estates housing development.
2) at 1.7 km., just past the end of pavement, left turn onto a gravel road leading to Blue Lake and Kilpoola Lake.
3) at 5.4 km., follow road straight ahead, just ahead keep to the right fork, and at 0.9 km. keep to the left one.
4) at 0.7 km. from last fork, sharp right turn up winding road.

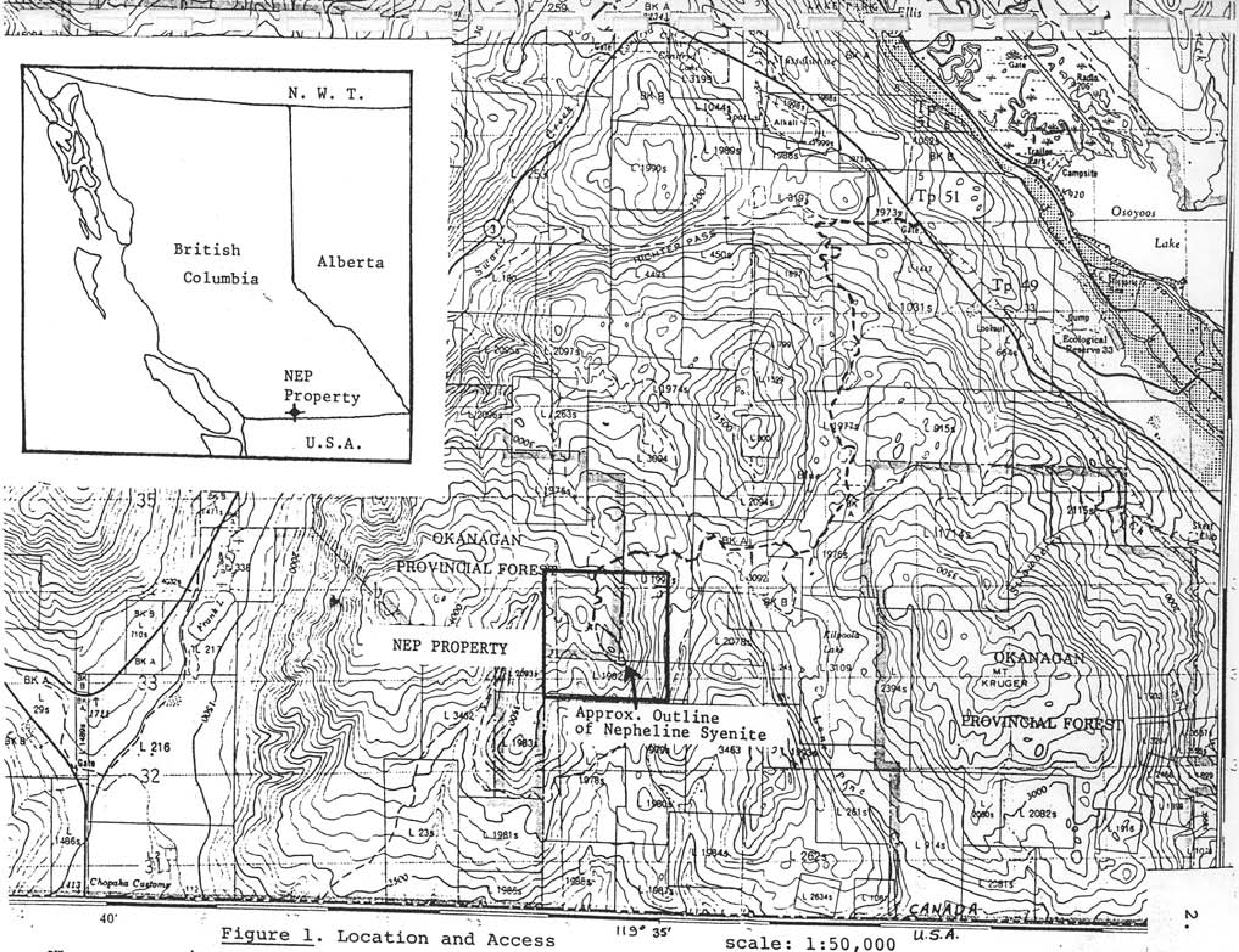


Figure 1. Location and Access scale: 1:50,000

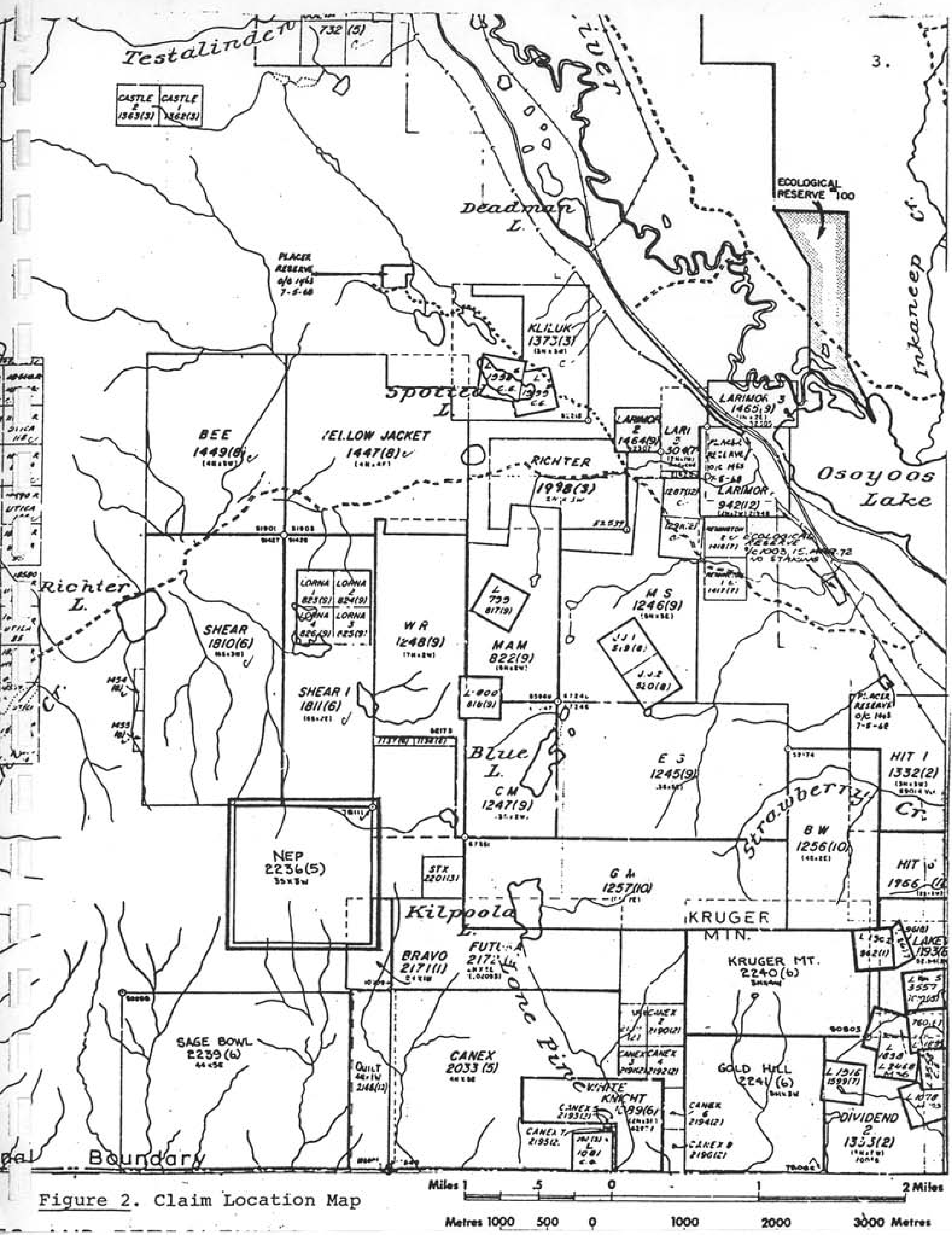


Figure 2. Claim Location Map

5) at 2.05 km., left turn at junction, continue on narrow road which climbs to the top of the ridge in the middle of the property (this is main road on property map - Figure 4).

CLAIM DATA (see Figure 2)

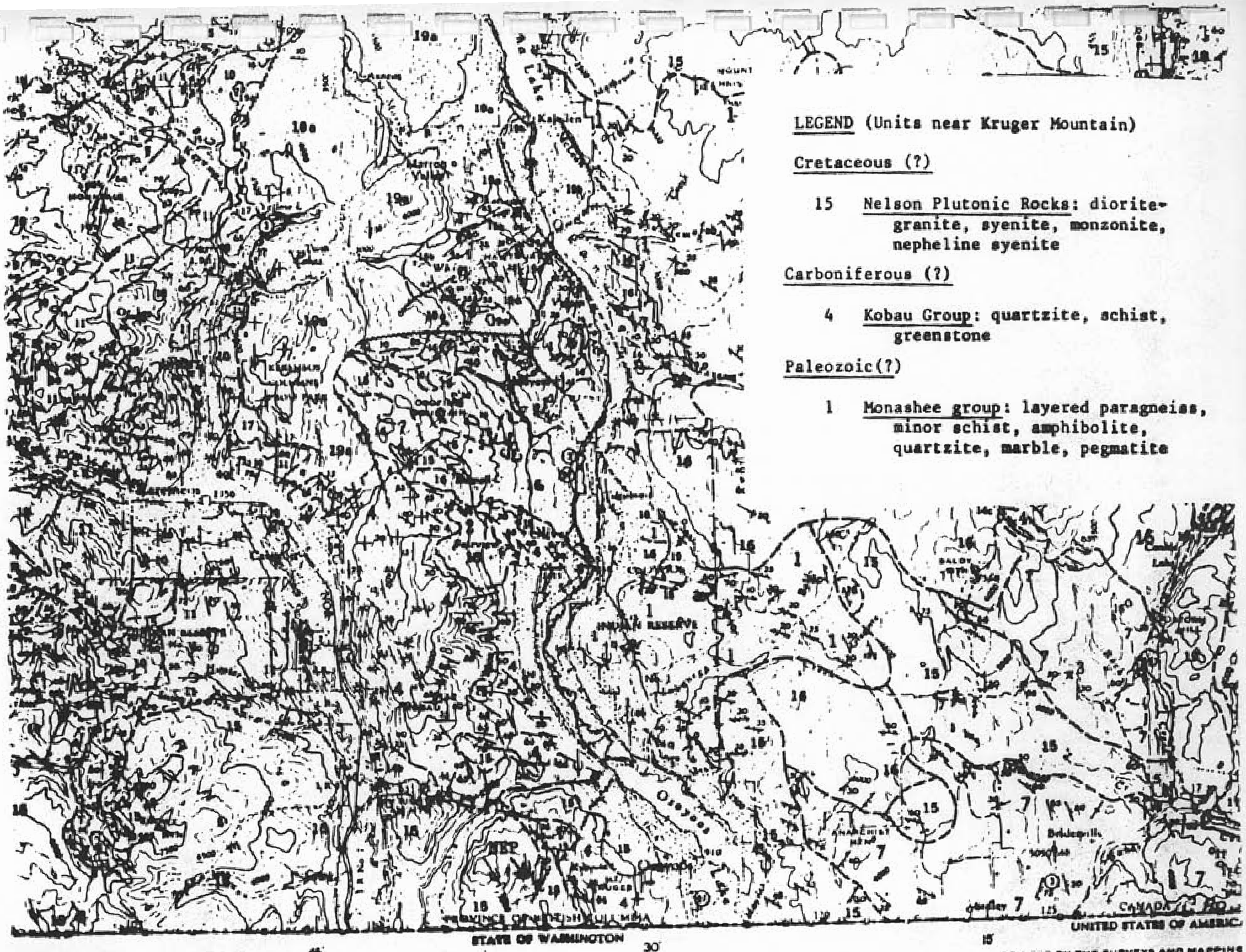
The NEP claim block is a 3 x 3 block staked by Walter Bonin on May 24, 1985, and in good standing [Claim No. 2236(5)]. The northeast corner bears the mining tag number 78111.

TOPOGRAPHY and VEGETATION

Semi-arid, sage- and grass-covered highland valleys to the south rise abruptly to prominent, barren cliffs and sparsely forested ridges to the north. Further north, outcrop decreases in abundance; vegetation is dominated by a thin to moderate coniferous forest, from which the largest trees have been removed by logging. Still further north, outcrop is minimal in a gently northerly sloping region covered by a moderate coniferous forest.

EXPLORATION HISTORY

1963	Aug. 29: Buck 1-3 claims staked by Ken Butler; nepheline syenite was sampled and analysed by B.C. Research Council and by International Minerals and Chemical Corp. Beneficiation methods were tested by the Minerals Resource Branch, Dept. of Energy, Ottawa.
1971	Sept. 10: claims lapsed
1972	Mar. 29: Buck 1-4 claims staked by Bethlehem. Several small pits were blasted and sampled for chemical analysis and metallurgical study. Geological mapping was done by J.R. Bellamy (only part of his report is available, and is not of much value).
1984	May: claims staked by Denis Atkinson.
1985	May 24: NEP claims staked by Walter Bonin, ownership transferred to Okanogan Nepheline.



LEGEND (Units near Kruger Mountain)

Cretaceous (?)

15 **Nelson Plutonic Rocks**: diorite-granite, syenite, monzonite, nepheline syenite

Carboniferous (?)

4 **Kobau Group**: quartzite, schist, greenstone

Paleozoic(?)

1 **Monashee group**: layered paragneiss, minor schist, amphibolite, quartzite, marble, pegmatite

PUBLISHED, 1961
COPIES OF THIS MAP MAY BE OBTAINED FROM THE DIRECTOR, GEOLOGICAL SURVEY OF CANADA, OTTAWA

MAP 15-1961

PRINTED BY THE SURVEYS AND MAPPING

REGIONAL GEOLOGY (see Figure 3)

Bostock (1929-1930) prepared Keremeos Map 341A at a scale of 1:63,360. Little (1961) published the geology of Kettle River (West Half) as G.S.C. Map 15-1961.

Between Osoyoos and the Similkameen valley to the west, Little mapped two major units, the Kobau group and the Nelson intrusions. The Carboniferous? Kobau group consists of metamorphosed siliceous sediments and intermediate volcanic rocks. They strike north-south and dip moderately to locally steeply to the west. Further north the unit is more complexly folded. A major fault along the Okanogan Valley juxtaposes these rocks against tightly contorted paragneiss of the Early Paleozoic Monashee group. In the latter unit, axial planes of isoclinal folds generally are relatively flat-lying.

The Kobau group rocks are intruded by plutons and batholiths of Jurassic to Cretaceous age (Nelson intrusions). An earlier nepheline syenite to syenite unit forms sills in the Kobau group. Later plutonic rocks include diorite and quartz monzonite; some of these show a moderate to prominent penetrative foliation. The rocks of the Kobau group show moderate contact metasomatism or metamorphism along the borders of the Nelson intrusions.

North of the map area is a large basin of Tertiary volcanic rocks, described as the Penticton Tertiary Outlier by Church, 1979. A few minor stocks and dikes of dacite porphyry in the map area may belong to this unit.

DETAILED GEOLOGY (see Figure 4, inside back cover)

Kobau group rocks (Unit 1) include metamorphosed intermediate to basic volcanic rocks, and fine grained clastic to cherty metasedimentary rocks. Three main subunits form mappable zones, and may indicate a stratigraphic sequence.

To the east (at the base? of the section) is subunit 1b, a finely laminated, generally lensy metasedimentary-exhalative rock dominated by pale green to grey lenses and beds of chert, generally less than 7 mm. in thickness. These are separated by thinner beds and seams of mafic-rich material dominated by hornblende or biotite/chlorite. Locally, especially along the base of the Eastern sill of nepheline syenite, subunit 1b grades into subunit 1a, a dark green to black amphibolite consisting of similar material to that in the mafic-rich zones of subunit 1b. Grain size and abundance of hornblende increases towards the border of the nepheline syenite sill, suggesting a contact metamorphic halo in the hornblende hornfels metamorphic facies.

Above the Eastern sill, and mainly at the southern end of the area is subunit 1d, a porphyritic meta-dacite to meta-andesite, with abundant plagioclase phenocrysts less than 1 mm. across in an extremely fine grained groundmass. It commonly shows a hornfelsic texture. Above (to the west) and to the north, subunit 1d grades into subunit 1c.

Subunit 1c is a very fine grained siltstone to tuffaceous siltstone of intermediate composition. Variations in texture reflect original variations and variations due to different degrees of metamorphism. Locally the subunit is gneissic (subunit lcg), with a moderate segregation of felsic and mafic minerals into wispy lenses. In the field, some of the rocks are difficult to distinguish from finer grained varieties of nepheline syenite. Between East and Main sills, subunit lc commonly is silicified, with a hornfelsic texture (subunit lch), and locally contains abundant, extremely fine grained, disseminated pyrite.

Rocks of the Kobau group are intruded by at least three ages of plutonic rocks, which in the absence of radiometric dates, are grouped as Jurassic-Cretaceous. The oldest consists of sills of nepheline syenite and lesser syenite (Kruger alkalic rocks) (Unit 2). This was intruded by plutons of medium to coarse grained diorite and much less gabbro (Unit 3). Younger plutonic rocks consist of small stocks and dikes of mozonite and pegmatite (Unit 4).

The Kruger alkalic rocks form sills mainly conformable to foliation in themselves and in the Kobau group rocks. Four main sills are designated East, Main, South, and Northwest.

The sills, particularly the larger two (Main and East), have a very fine to fine grained border zone (subunit 2a), which grades inwards into a fine to medium grained zone (subunit 2b). This in turn grades inwards to a medium to coarse grained core (subunit 2c) with local pegmatite patches. In East sill towards the north, white to bluish grey nepheline syenite (mainly subunit 2b) appears to grade into cream-colored to pink syenite (subunit 2d) with decreasing content of nepheline and increasing content of plagioclase. Thin section study of a few samples from this region show that many of the rocks classified as syenite in the field actually are nepheline syenite. Further work must be done to determine the northern limit of nepheline syenite in the East sill.

Near the base of East sill is an unusual zone exposed in two outcrops. It is characterized by unfoliated, coarse to pegmatitic K-feldspar with interstitial mafic minerals, and lesser plagioclase and nepheline. The larger occurrence is a 4-meter wide band parallel to foliation in surrounding rocks of subunit 2a. The smaller is a 2-meter wide outcrop which grades upwards into subunit 2b. The unusual texture of these rocks (designated subunit 2p) may have formed by settling of early-formed crystals from the nepheline syenite magma.

At the south end of the property at the top of the East sill and locally at the north end of South sill are zones of nepheline syenite with an unusual lensy texture (subunit 2e). These contain lenses parallel to foliation of leucocratic nepheline syenite enclosed in a very fine grained groundmass of melanocratic (mafic-rich) nepheline syenite. Lenses range up to a few cm. long and 1 cm. wide.

Much of the nepheline syenite and syenite is porphyritic, with 5 to 20 per cent phenocrysts of K-feldspar and 2 to 5 per cent phenocrysts and clots of mafic minerals. K-feldspar phenocrysts commonly have an elongated prismatic habit, with lengths averaging 1 to 3 cm.

Much of the western and extreme southeastern parts of the property are underlain by a medium to locally coarse grained diorite to gabbroic diorite (over 50 per cent mafic minerals).

Most common is a massive to weakly foliated diorite (subunit 3a), with 30 to 40 per cent mafic minerals, and a medium to locally coarse grain size. Near the eastern contact of the main body is a zone of coarser grained gabbroic diorite to gabbro (subunit 3c). Along the western part of the property, subunit 3a grades into a mottled, porphyritic diorite (subunit 3b), with a moderate foliation parallel to the regional trend.

Scattered through the area are small plugs and dikes of massive to slightly foliated monzonite intruding rocks of Units 1 and 3. Subunit 4a is very fine to fine grained and commonly leucocratic. Subunit 4b is fine to medium grained wtih 10 to 30 per cent mafic minerals. Subunit 4c is a mainly leucocratic pegmatite.

A few scattered outcrops consist of dacite porphyry (Unit 5), with abundant plagioclase phenocrysts and lesser, smaller hornblende phenocrysts in an unfoliated groundmass of extremely fine grained feldspars, ragged amphibole, and abundant secondary epidote. In one outcrop, a dike of Unit 5 cuts foliation in Unit 1. In another, a body of Unit 5 up to 3 m. across occurs along a fault in Unit 2. Contact relations in other outcrops are unclear. On the basis of the crosscutting nature of this unit, it is correlated with the Tertiary volcanic rocks to the north.

STRUCTURE

All units (except Unit 5) are more or less penetrated by a regional foliation, which trends north-south and dips moderately to steeply westward. Foliation is most intense in subunit 1b, and in parts of subunits 1c, 2a, and 3b. It is weak to absent in most of subunits 2c, 3a, 3c, and Unit 4.

In the Kruger sills are several zones of moderate to intense cataclastic deformation, in which originally coarser grained rocks are smeared out along foliation, and coarser crystals are deformed and partly recrystallized to extremely fine grained aggregates. This type of deformation is most common in subunit 2a. The sheared zones commonly have a darker grey color than the adjacent, less strongly sheared rocks.

Several late faults cut the region. Some show slight, left-lateral offset of the Kruger sills. A major topographic depression trends north-south along the west side of the main ridge in Main sill; however, offset along this structure appears to be small.

The geology is compatible with the presence of two large faults trending northeastward, with left-lateral offset of from 200 to over 1000 m. One would offset Northwest sill from the north end of Main sill. The other would offset the contact of Units 1 and 3 at the southeast corner of the property. This is the major fault shown at the southeast corner of the property on the regional map (Figure 3).

PETROLOGY OF NEPHELINE SYENITE/SYENITE

Thin section analysis of 53 samples show three main types of nepheline syenite, characterized by different assemblages of mafic minerals. These are as follows:

1) Hornblende zone	abundant hornblende, porphyroblasts of almandine garnet, minor aegirine-augite, biotite, and granular aggregates of grossularite-almandine-andradite garnet.
2) Aegirine-augite zone	moderately abundant aegirine-augite, mainly in cores of mafic clots, moderately abundant hornblende, biotite, and both types of garnet
3) Biotite zone	abundant biotite, both types of garnet, lesser hornblende, minor aegirine-augite.

The hornblende zone is characterized by a finer grain size and lower mafic content than the other two zones. Almost all samples from subunit 2a are from the hornblende zone. Other than that, no obvious correlation exists between textural types as distinguished in the field and mineralogical zones from thin section studies.

Modal analyses of the main zones of nepheline syenite are listed in Table 1, with individual analyses in Appendix 1. As well, for comparison, modal anlayses for corresponding mineralogical zones in the Blue Mountain nepheline syenite are presented in Table 1. A detailed description of the mode of occurrence of each mineral is given in Appendix 2.

Textures of nepheline syenite and syenite are mainly metamorphic, with relic primary features preserved in some mafic clots and possibly as some K-feldspar phenocrysts. However, probably many of the latter are metamorphic porphyroblasts, as suggested by their common orientation within the foliation plane, and locally by a strong lineation produced by parallel orientation of the porphyroblasts in the foliation plane. The latter feature is most prominent in subunit 2a. Many mafic clots, especially in subunit 2c, contain early-formed, magmatic aegirine-augite phenocrysts, rimmed by hornblende and/or biotite/garnet-b. Much of the hornblende may be primary magmatic overgrowths on and replacements of aegirine-augite. Biotite/garnet-b overgrowths and garnet-a porphyroblasts are of metamorphic origin.

CHEMICAL ANALYSES

During the June magnetometer survey, large grab samples were collected from outcrops along survey lines and nearby. Eleven were analysed for major elements. Three samples were from subunit 2a and eight were from subunit 2b/2d. Average results from the two subunits are shown in Table 3, individual analyses are in Appendix 3, and sample locations are on Figure 4.

Table 3. Average Chemical Analyses (values in % except Ba in ppm)

Zone	No. of analyses	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	MnO	Ba	LOI
2a	3	56.1	21.22	3.27	0.4	2.4	6.0	8.6	0.4	0.09	0.11	1010	0.8
2b/2d	8	53.8	19.44	5.56	1.3	4.5	4.3	7.8	0.5	0.27	0.14	1660	1.7

Comparison with chemical analyses from modal analyses (Table 2) suggests that K-feldspar contains a higher content of Na than used in calculations from modal analyses, and that the mafic content was underestimated in the modal analyses.

Table 1 Modal Analyses of Mineralogical Zones (including comparison with major zones in the Blue Mountain body)

Zone	K-feld Ø	K-feld gm	Nep	Alb	Mafic Ø	Mafic tot	A-a	Hbl	Bio	Garnet a	Garnet b	Sph	Apa	Opq	Epi
Kruger sills															
Hblde	3	63	17	7	2	10	0.1	6.0	0.5	2.5	0.4	0.4	0.05	0.1	0.05
Biot	7	53	13	10	5	17	0.2	2.0	7.5	3.5	3.0	0.6	0.1	++	+
Aeg-A	5	55	15	8	4	17	2.0	5.5	3.0	3.5	3.0	0.5	0.1	+	-
2p	-	50	7	12		30	2.0	10.0	7.0	8.0	3.0	0.2	0.1	-	++
2e	-	70	17	1		12	-	-	7.5	3.3	0.1	0.9	-	0.2	-
Blue Mountain body (from Payne, 1968)															
Hblde	-	23	25	48	-	4	0.2	3.0	0.2	0.2	-	-	-	0.4	-
Biot	-	19	24	52	-	4	-	-	2.7	-	(Mu 0.7, Ct 0.1)			0.5	-

Abbreviations

K-feld - K-feldspar (microcline)
Nep - nepheline
Alb - albite (plagioclase)
A-a - aegirine-augite
Hbl - hornblende
Bio - biotite
Garnet a - almandine? prophyroblasts
Garnet b - grossularite-andradite-almandine aggregates
Sph - sphene
Apa - apatite
Opq - opaque (mostly magnetite in Blue Mountain)
Epi - epidote
Mu - muscovite
Ct - calcite

Ø - phenocrysts, mafic crystal aggregates
gm - non-porphyritic K-feldspar
tot - total (including crystal aggregates)

++ - minor
\+ - trace
\- - absent

Table 2 Chemical Analyses from Modal Analyses
(including comparison with Blue Mountain body)

Zone	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	TiO_2	H_2O	Total Alkali
Kruger sills										
Hblde	59.6	21.0	3.0	0.26	1.0	3.6	11.6	0.15	0.12	15.2
Biot	58.5	20.1	4.7	0.74	1.3	3.3	11.4	0.25	0.33	14.7
Aeg-A	58.7	20.4	4.0	0.68	2.2	3.3	10.9	0.20	0.22	14.2
Blue Mountain body (from Payne, 1968)										
Hblde	58.8	23.2	2.2*	0.04*	0.77*	9.2*	5.1*	0.00*	0.3	14.3
Biot	59.4	23.0	2.0*	0.03*	0.55*	9.2*	4.6*	0.00*	0.4	13.8

Notes:

1. Total Fe reported as Fe_2O_3
2. * denotes values from spectrographic analysis (they agree very closely with those from modal analyses, but are considered more accurate)
3. Much lower content of Mg and Ti, lower content of Fe, Ca, and K; higher content of Na and Al in Blue Mountain body. These reflect lower content of mafic minerals, higher abundances of nepheline and albite (plagioclase) in the Blue Mountain body.

MAGNETOMETER SURVEYS

Two reconnaissance magnetometer surveys were conducted on the property, one by John Payne on May 24th, and the other by Bob Chaplin on June 5th and 6th. The purpose was to determine if geological units had a characteristic magnetic response, which could be used to trace geological units into areas of no outcrop. The May survey included four lines with station spacing of 10 meters along lines. The June survey included five lines with station spacing of 20 meters along lines. Results of the surveys are shown in Figure 5.

The surveys agree in general, and indicate that different units have different magnetic responses, with most geological contacts between units marked by a sharp break in magnetic response. Correlation between lines and between surveys is not as sharp as along lines, possibly because of an overall increase in magnetite content towards the south end of the property.

Values from different units and subunits are listed in Table 3, with Unit 2 divided into two subunits, one including rocks along the top (southwest) of sills and the northern end of Main sill (mainly from subunits 2a and 2b), and the other including rocks in the cores and lower parts of sills, and from the southern end of Main sill (mainly subunits 2c and 2b).

Table 4. Values and Ranges of Magnetic Response of Rock Units

Rock unit	Average (gammas)	Frequency distribution in '00's of gammas									
		0-3	3-5	5-7	7-9	9-11	11-13	13-15	15-19	19-25	25-40
2top	380	6	21	8	10	2	-	-	-	-	-
2bot	1000	-	-	4	8	-	1	3	4	-	-
1	1420	-	2	8	10	13	13	15	25	23	1
3	1950	-	-	3	6	3	4	2	6	17	8

On the basis of the responses in areas of abundant outcrop, the magnetometer survey results were used to extend geological boundaries to the north into areas of little to no outcrop. As well, the location and shape of some boundaries were somewhat refined.

The survey was done with a Scintrex MF-2 magnetometer, measuring the vertical component of the magnetic field. Values are relative to a base station, rather than being the absolute values of the vertical component of the earth's magnetic field. Corrections were made only by tying in lines to stations on the base line and to the base station during the course of the survey. Because these corrections were minimal relative to the variations in the readings between stations, no further corrections were considered to be necessary.

DIAMOND DRILLING

To begin to confirm tonnage estimates based on surface geology data, a diamond drilling program was undertaken, using NQ core (6 cm diameter). The original purpose was to drill one hole up to 300 m in length through the Main Sill. Due to drilling problems, the hole could not be completed to the desired depth, and in all, three holes were drilled. Locations, orientations, and depths of holes are shown in Figure 4 and Table 5.

Following are brief summary logs of the holes. Detailed logs are in Appendix 4.

Hole	Interval	Rock Type and symbol (Figure 4)
86-1	0.0-3.65 m	Casing
	3.65-13.7	Nepheline Syenite (2c)
	13.7-17.1	Kobau group meta-siltstone (lc)
	17.1-24.4	Nepheline Syenite (2c)
	24.4-28.1	Kobau group meta-siltstone (lc)
	28.1-53.6	Nepheline Syenite (2c)
	53.6-53.9	Fault, chlorite alteration
	53.9-61.8	Nepheline Syenite (2c)
	61.8-64.9	Kobau group meta-siltstone (lc)
	64.9-71.0	Nepheline Syenite (2c)
	71.0-72.0	Andesite dike (5)
	72.0-77.0	Nepheline Syenite (2c)
	77.0-77.9	Kobau group meta-siltstone (lc)
	77.9-84.5	Nepheline Syenite (2b)
	84.5-105.9	Kobau group meta-siltstone (lc)
	105.9-111.7	Nepheline Syenite (2b)
	111.7-116.0	Andesite dike (5)
	116.0-125.5	Nepheline Syenite (2b)
	125.5-127.2	Andesite dike (5)
	127.2-131.0	Nepheline Syenite (2b)
	131.0-134.0	Andesite dike (5)
	134.0-139.2	Nepheline Syenite (2b)
	139.2-141.9	Kobau group meta-siltstone (lc)
	141.9-148.1	Nepheline syenite (2b)
	148.1-152.5	Kobau group meta-siltstone (lc)
86-2	0.0-4.0	Casing
	4.0-9.1	Nepheline syenite (2a)
	9.1-28.1	Nepheline syenite (2b)
	28.1-43.6	Kobau group meta-siltstone, meta-andesite (lc,ld)
	43.6-79.3	Nepheline syenite (2c)
86-3	0.0-10.7	Nepheline syenite (2c)
	10.7-14.3	Kobau group meta-andesite/dacite (ld)
	14.3-25.9	Nepheline syenite (2b)
	25.9-63.1	Nepheline syenite (2c)

The drill hole results agree generally with the surface geology, indicating that the Main sill extends to a depth of at least 150 m. They also show that within the nepheline syenite sills are discrete lenses of Kobau group metamorphic rocks and minor dikes of andesite. These might cause some problems during mining; however, they are distinct, and could be separated as waste blocks without much problem.

Table 5. Diamond Drill Hole Data

Hole No.	Coordinates N	E	Azimuth	Declination	Length (m)
86-1	5433494	310454	060°	-60°	152.5
86-2	5433614	310426	060°	-60°	79.3
86-3	5433614	310426	240°	-60°	63.1

Note: No dip angle measurements made down holes.

PRELIMINARY TONNAGE ESTIMATES

The Main and East sills are targets for development of quarries. Based on a mining depth of about twice the width of the sills, and a specific gravity of the rock of 2.65, the following tonnages are present in the two sills.

Table 6. Preliminary Tonnage Estimates in Main and East Sills

Sill	length	width	depth	volume	metric tons
Main	340 m	80 m	160 m	$4.35 \times 10^6 m^3$	11.5×10^6
East*	700 m	60 m	120 m	$5.0 \times 10^6 m^3$	13.2×10^6
Total tonnage					25×10^6

Allowing for 20% dilution because of inclusions of Kobau group rocks and andesite dikes, this yields a tonnage of nepheline syenite of

20×10^6 metric tons

* values for East Sill are for the area outlined by subunits 2a, 2b, and 2c (Figure 4). The thin section study indicates that nepheline syenite extends at least a few hundred meters further north.

CORE STORAGE

The drill core is stored on the back porch of the Osoyoos Hotel at the junction of Highways 3 and 97 just north of Osoyoos, B.C.

Note: Because of the industrial mineral application of the product, no assays were carried out.

METALLURGICAL FACTORS

A critical factor in the economic feasibility of nepheline syenite for the glass and ceramic industries is the content of iron in the final product. This depends on the original iron content of the rock, and the extent to which the iron-bearing minerals can be removed from the rock by simple methods. In the Kruger sills, these minerals are hornblende, biotite, aegirine-augite, and garnet. The standard method of removal of iron-bearing phases is a high-intensity, dry magnetic separation in a series of stages, with grinding of material between stages. The purpose is to produce a product composed of grains and aggregates of felspars and nepheline, with a minimal amount of intergrowths of iron-bearing phases, such that the Fe_2O_3 content is less than 0.1 per cent for high quality glass, and below 0.25 per cent for lower quality glass.

The texture of the rock is an important guide to evaluation of the suitability of a raw material to yield a desired product low in iron.

The Blue Mountain nepheline syenite has a very low content of iron-bearing minerals (generally less than 3 per cent). It is a medium to coarse grained rock showing a variety of mineralogical zones, in part similar to those of the Kruger sills. At Blue Mountain, the biotite zone has yielded a much better product than the hornblende zone, because biotite is more coarsely intergrown with feldspars than hornblende, and hence more readily separable.

The Kruger sills have a higher content of mafic minerals than the Blue Mountain body. The hornblende zone averages 10 per cent and the biotite and aegirine-augite zones average 17 per cent. The Kruger rock generally is finer grained than that at Blue Mountain. These factors would suggest that separation of iron-bearing minerals from the Kruger deposit would not be as complete as for the Blue Mountain body. However, a moderate amount of the mafic minerals in the Kruger deposit are concentrated in clots, which should separate relatively easily from the felsic minerals. Also, a moderate amount of the felsic material is in K-feldspar phenocrysts and in felsic aggregates, both of which are relatively free of mafic minerals. Thus, although a larger amount of the raw material will be rejected in purification of the material, the quality of the final product is expected to be low enough in iron for some economic applications.

Metallurgical tests are necessary on the different types of nepheline syenite to determine whether or not a sufficiently clean separation of iron can be attained to produce a marketable product.

CONCLUSIONS

1. The Kruger nepheline syenite consists of two large sills (Main and East) and two much smaller sills (South and Northwest).
2. Preliminary estimates of tonnage available for quarrying are 11.5 x 10^6 in Main sill and 13.2 x 10^6 in the southern half of East sill. The northern half of East sill is not included because it is uncertain how much of it is nepheline syenite and how much of it is syenite; the latter is not as desirable as nepheline syenite because syenite contains lower alumina and alkalis.
3. The Kruger nepheline syenite contains lower alumina, and higher alkalis and iron than the Blue Mountain nepheline syenite, the major Canadian source of this material. The K/Na ratio of the Kruger deposit is much higher than that at Blue Mountain.
4. The Kruger deposit contains rocks of three different mineralogical zones (based on mafic mineral abundances). The zones are defined as hornblende, biotite, and aegirine-augite. The margins of the sills commonly are much finer grained than the cores, and also have a much lower mafic-mineral content. These factors and other textural features may be significant in the separation of iron-bearing minerals.
5. The body has sufficient size and is of appropriate chemical composition and texture that further work is warranted to examine its economic feasibility.

RECOMMENDATIONS

The next stage of exploration should include the following:

1) Detailed geological mapping within the deposit to attempt to outline mineralogical zones more accurately, and to determine the northern extent of nepheline syenite in the East sill. This will involve follow-up thin section analysis, which will also be useful in determination of textures.
2) Bulk sampling of the different mineralogical zones of nepheline syenite for metallurgical testing to determine the optimum materials and extraction methods to obtain a product with as low an iron content as possible. Extraction methods should be those amenable for use in normal milling activity, preferably dry, high-intensity magnetic separation in a staged program, with grinding between stages.

The cost of such a program is estimated at $45,000.

John G Payne

John G. Payne

September 1986

John G Payne

John G Payne

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CERTIFICATE of ENGINEER

I, John G. Payne, do hereby certify that:

1. I am a consulting geological engineer.
2. I graduated from Queen's University in Kingston, Ontario in 1961 with a BSc in Geological Engineering. I received a PhD in Geochemistry from McMaster University, Hamilton, Ontario, in 1966.
3. I have practiced geology since graduation from university for 20 years, mainly in the North American Cordillera.
4. My report is based on a 5-day field examination of the NEP property, plus follow-up laboratory examination of thin sections from the property. The examination took place in May and June, 1986. Other studies included in the report include magnetometer surveying, chemical analysis, and diamond drilling. These were completed in the summer of 1986.
5. I am a Fellow of the Geological Association of Canada.
6. My address is 877 Old Lilloet Road, North Vancouver, B.C., V7J 2H6.
7. I am under contract for this report to Nepheline Resources Limited, 700 - 675 West Hastings Street, Vancouver, B.C.
8. I have no direct or indirect interest in the NEP claim block or in Nepheline Resources Limited.
9. This report may be used by Nepheline Resources Limited in a Statement of Material Facts or Prospectus for public financing.

Dated at North Vancouver, B.C., September 29th, 1986.

John G. Payne

APPENDIX 1 - Modal Analyses

Sample	Field Class	K-feld		Nep	Alb	Mafic		Aug	Hbl	Bio	Garnet		Sph	Apa	Opq	Epi	Ct	Cc	Mu	Sd	Fl
		Ø	gm			Ø	Tot				a	b									
Hornblende Zone																					
114	2c	17	48	17	12	7	16	0.5	8.	1.5	4.	1.5	0.7	0.1	+	0.05			+		
116	2c	7	52	15	8	7	18	0.3	10.	2.	4.	1.5	0.5	0.05							
147	2a	-	64	15	10	2	11	0.1	7.	0.2	3.	0.4	0.3	0.05		0.05					
184	2a	5	70	15	6	2	9	-	6.5	0.3	1.3	0.2	0.4	0.05	0.1						
186	2b	2	64	17	8	2	9	-	6.5	0.4	1.2	0.4	0.4	++	0.1	++	++		++		
239	2a	8	62	17	5	-	8	-	5.	0.1	2.5	++	0.5	0.05	0.2	0.05			++		+
247	2a	4	59	22	7	2	8	++	5.	0.1	2.5	++	0.3	++	0.1	+	+	+	+		
255	2a*	0.3	64	17	10	3	9	-	5.	0.3	3.	0.4	0.2	0.1							+
258	2a*	1	66	18	5	2	9	-	6.5	0.3	1.3	0.2	0.4	0.05	0.1	++		0.1			+
260	2a**	1	70	13	7	3	10	0.3	4.	0.3	4.	0.2	0.5	+	+	0.1	0.1	0.1			
311	2b	2	50	18	20	1	9	-	6.	0.3	2.	0.2	0.6	0.1	++			++			+
335	2b	2	56	20	12	2	10	0.5	8.	++	1.0	-	0.6	-	+	+	++	+			
338	2a**	4	61	14½	12	1½	9½	0.1	6.	1.2	1.0	0.7	0.2	++	0.05	0.2		1.5			+
327	2b	3	61	20	6	3	10	+	6.	1.0	2.	0.4	0.4	0.05		0.05		0.3		0.7	
342a	2c	5	63	17	6	3	9	-	5.	0.3	2.5	0.2	0.4	0.1	+	0.3		0.3			+
353	2b*	5	57	14	12	3	12	0.4	7.5	0.8	2.3	0.3	0.4	0.1	0.05	0.2	++	++	++		
356	2a**	0.5	72	13	7	1	8	-	5.	1.2	1.2	0.1	0.2	0.05	0.5	0.2			+		
357	2b	4	66	14	6	3	9½	0.3	5.5	0.6	2.	0.2	0.3	0.1	0.3	0.2	++	0.4	+		
372	2a*	-	68	17	3	2	12	0.1	8.	0.5	3.	0.5	0.2	++							
460	2a*	0.5	67	15	7½	2½	10	0.1	7.	0.8	1.3	0.5	0.2	0.1	1.0			0.5	++		
465	2b	-	65	25	2	1	10	-	6.	1.0	2.5	0.3	0.3	++	0.1			1.0			

Abbreviations: K-feld - K-feldspar (microcline), Ø - phenocrysts, gm - groundmass, Nep - nepheline, Alb - albite, Tot - total, A-A - aegirine-augite, Hbl - hornblende, Bio - biotite, Garnet a - phenocrysts, Garnet b - extremely fine grained aggregates, Sph - sphene, Apa- apatite,

APPENDIX 1 (continued)

Sam-ple	Field Class	K-feld ø	K-feld gm	Nep	Alb	Mafic ø	Mafic tot	Aug	Hbl	Bio	Garnet a	Garnet b	Sph	Apa	Opq	Epi	Ct	Cc	Mu	Sd	Fl
<u>Aegirine-Augite Zone</u>																					
17a	2b*	4	63	8	8	4	17	0.8	3.	6.	4.	2.6	0.5	0.1	+	+					
44	2c	-	56	25	1	2	16½	14	+	+	+	-	0.3	++	2.0						
141	2c	8	53	17	5	4	17	1.0	7.	2.	4.	3.	0.5	++				++	0.1		
159	2b	1½	51	17	12	4	18	2.	5.	3.	6.	2.	0.4	0.1	++						
281	2b	10	42	15	17	3	17	1.0	7.	2.5	4.	0.4	2.0	0.1				++			
324	2b	5	54	15	6	3	20	2.	7.	4.	4.	3.	0.3	++	++					0.1	
341	2c	2	55	18	8	4	18	2.5	8.5	0.2	3.5	2.5	0.7	++		+	++				
342b	2c	5	53	12	12	7	19	2.5	6.	2.	5.	3.	0.5	+		0.1	0.5		++		
345	2c	5	59	14	5	4	17	1.5	4.5	3.	4.	3.	1.0	0.5	+	++		0.2			
349	2c	5	54	17	6	4	18	1.5	9.5	1.	2.5	3.	0.6	0.1		+					
370	2c	15	46	17	5	6	17	3.	6.	2.	2.	4.	0.4	0.1				0.3	++		
371	2c*	8	53	17	5	5	17½	2.5	2.5	5.	2.	5.	0.5	0.1	+			++			+
376	2b**	7	60	13	5	5	15	3.	5.	2.	2.	2.	0.8	0.1	+	0.1	+	++			
386#	2b*	7	48	12	15	3	17	2.	2.	6.5	3.	3.	0.5	++	0.05						
396	2b	3	59	12	8	2	17	2.	3.	5.	6.	1.	0.2	++	++						
314#	2c	15	41	15	10	9	19	0.4	6.5	4.	4.	2.5	1.3	0.15	+	0.15					

intermediate between aegirine-augite zone and biotite zone

Cataclastic deformation

*	moderate
**	strong
***	intense

+	trace
++	minor

APPENDIX 1 (continued)

Sample	Field Class	K-feld		Nep	Alb	Mafic		Aug	Hbl	Bio	Garnet		Sph	Apa	Opq	Epi	Ct	Cc	Mu	Sd	Fl
		Ø	gm			Ø	tot				a	b									
	<u>Biotite Zone</u>																				
46	2c	8	48	17	10	5	18	0.2	1.0	9.	3.	4.	0.5	0.1		0.3			+		
140a	2c**	4	54	12	12	7	18	0.2	2.	8.	4.	3.	0.8	++	++	+			+		
140b	2b***	10	48	5?	20	3	17	-	-	10.	3.	3.5	0.4	0.05				++			
156	2b*	4	54	7	18	6	18	0.3	3.	7.	4.2	2.5	1.0	++	++						
240	2c*	7	58	12	7	5	16	0.3	2.	7.	4.	2.	0.5	0.1	+			++	++		
262	2a*	0.5	73	12	7	0.2	5	-	++	2.5	2.0	0.1	0.1	++	0.7	0.3		0.3			
302	2b	7	53	10	12	5	18	0.2	-	10.	3.	5.	0.5	0.05	+	+					
314#	2c	15	41	15	10	9	19	0.4	6.5	4.	4.	2.5	1.3	0.15	+	0.15					
364	2b	3	68	14	5	0.5	10	0.1	1.0	5.	0.2	3.	0.3	0.1	1.0	0.2	+	3.0	1.5		
368	2c	10	45	17	10	7	18	0.2	1.0	9.5	4.	3.	0.2	0.1				1.0	0.1		
374	2c	12	54	15	5	4	14	0.3	3.	5.	2.	3.	0.8	0.2	+	++		0.2	+		
386#	2b*	7	48	12	15	3	17	2.	2.	6.5	3.	3.	0.5	++	0.05						
	<u>Cumulus Zone</u>																				
303	2p	-	50	7	12		30	2.	10.	7.	8.	3.	0.2	0.1		++		++	++		
	<u>Lensy Zone</u>																				
52	2e	-	75	17	1	-	7	-	-	5.	1.5	0.05	0.3	-	0.1		0.2	1.5			
436	2e	-	65	16	1	-	18	-	-	11.	5.	0.1	1.5	-	0.2		++				
	<u>Other samples</u>																				
58	2b	-	70	15	7	2	8	0.3	2.0	1.5	0.1	2.5	0.1	++	2.0		0.2				
203	2d	-	30	-	53	-	16	6.	7.	+	-	-	+	0.4	2.0	0.5					

APPENDIX 2

Mode of Occurrence of Minerals in Nepheline Syenite

This is a general petrographic description of the mode of occurrence of minerals in the nepheline syenite and associated syenite.

1. K-feldspar

K-feldspar occurs in two distinct modes. It forms conspicuous, elongated, euhedral prismatic phenocrysts up to a few cm long (average 1-2 cm). These occur in well over half the outcrops of nepheline syenite, and locally are as abundant as 20% of the rock, particularly in the coarse grained cores of the sills. The phenocrysts commonly are slightly to moderately perthitic, with irregular, wispy lenses of albite in subparallel orientation parallel to a major crystallographic direction in the host. As well, phenocrysts contain irregular, equant patches up to 0.2 mm in average size of nepheline, with local coarser patches up to 0.5 mm across.

K-feldspar also occurs in the groundmass as anhedral, commonly elongated grains, whose size ranges from very fine in Unit 2a, up to about 1 mm long in Unit 2c. All K-feldspar is microcline.

2. Nepheline

Nepheline forms anhedral grains, commonly interstitial in part to K-feldspar. In most rocks they are of similar grain size to groundmass K-feldspar, but locally nepheline forms coarser grains up to 1.5 mm across. Nepheline is variably altered to at least three different secondary assemblages. Weak alteration is mainly to hydronepheline. This type of alteration locally is intense, such that little nepheline remains. Other samples are slightly to locally moderately altered in patches to very fine to fine grained cancrinite and generally lesser very fine grained muscovite. In samples cut by veinlets of zeolite (up to 2 mm in width), nepheline is strongly altered to extremely fine to very fine grained aggregates of zeolite of undetermined composition.

3. Albite

In nepheline syenite, albite mainly occurs as irregular patches of very fine to fine grains interstitial to coarser grains of K-feldspar. In samples with more abundant albite (and possibly oligoclase), the plagioclase forms a few coarser, subhedral grains. In syenite, plagioclase (oligoclase?) forms moderately abundant subhedral coarser grains surrounded by a finer grained aggregate of plagioclase and K-feldspar. Albite is fresh. It also occurs in perthitic intergrowths with K-feldspar in phenocrysts as described above.

4. Mafic minerals

In coarser grained samples, mafic minerals form moderately abundant clusters of grains in patches up to a few mm across. These are in part primary and in part metamorphic in mineralogy and texture. Mafic grains also are scattered through the groundmass of the rock, mainly as finer single grains and aggregates of a few grains.

5. Aegirine-augite

Aegirine-augite occurs mainly as subhedral to anhedral prismatic grains from 1 to 2 mm in size in cores of mafic clusters. The mineral is pale green in color with weak pleochroism. It commonly is rimmed and partly replaced by aggregates of hornblende (possibly of primary magmatic origin), and it and hornblende are replaced in some samples by irregular, extremely fine to very fine grained intergrowths of biotite and garnet-b.

In a few samples, aegirine-augite is the most abundant mafic mineral; in these it commonly occurs as irregular, anhedral very fine to fine grains scattered through the rock. Composition of the pyroxene in these samples may be closer to augite.

6. Hornblende

Hornblende forms rims on aegirine-augite as described above, and also forms scattered phenocrysts and clusters of crystals with no core of pyroxene. Pleochroism is strong from medium yellowish green to dark green. Hornblende also forms moderately abundant, anhedral very fine to fine grains scattered through the groundmass.

7. Biotite

Biotite occurs mainly in mafic clusters, generally intergrown with minor to abundant garnet-b, and commonly replacing hornblende and/or pyroxene. In a few samples biotite is the dominant mafic mineral; in some of these it appears to be of primary origin,being scattered through the rock. In others it is mainly in mafic clusters, and is of metamorphic origin. Pleochroism is mainly from light to dark brown to orangish brown.

8. Garnet-a

Garnet-a forms metamorphic porphyroblasts averaging 1-2 mm in size, with minor to abundant intergrown K-feldspar. Garnet-a generally is free of mafic inclusions or intergrowths. It is medium orange in thin section, suggesting a composition of almandine. It is common in all mineralogical zones.

9. Garnet-b

Garnet-b forms extremely fine grained, metamorphic aggregates alone or with coarser porphyroblasts of biotite, replacing primary aegirine-augite and hornblende. Replacement is very irregular within a thin section, grading from only slight replacement in some mafic clusters to almost complete replacement in others. Garnet-b is pale orange to neutral in thin section, and locally gradational to garnet-a; it is probably intermediate among grossularite, almandine, and andradite. It is abundant in all zones except the hornblende zone.

10. Sphene

Sphene occurs in mafic clusters, with scattered mafic grains and alone as anhedral to euhedral, equant to elongated grains averaging 0.1-0.5 mm in size, with coarser grained rocks containing grains up to 1 mm across. It is relatively uniform in abundance throughout the nepheline syenite, being slightly less abundant in the hornblende zone.

11. Apatite

Apatite forms anhedral to subhedral, equant to slightly prismatic grains, moderately concentrated in mafic clusters.

12. Opaque

Opaque occurs in two main modes. In coarser grained rocks it forms grains from 0.1-0.3 mm in size intergrown with hornblende and lesser biotite or aegirine-augite in mafic clusters. In finer grained rocks, it forms extremely fine, anhedral disseminated grains and concentrations of grains, mainly unassociated with mafic grains. The low magnetic response of the finer grained rocks su-gests that the opaque mineral in them is hematite. The higher magnetic response of the coarser grained rocks suggests that the opaque mineral is partly magnetite. Some opaque grains are rimmed by thin overgrowths of sphene this suggests that the opaque mineral is ilmenite. Intergrowths of oxide phases is probable.

13. Epidote

Epidote is present sporadically throughout the nepheline syenite, being most abundant and ubiquitous in the hornblende zone. It forms anhedral to subhedral, slightly elongated porphyroblasts up to 0.3 mm in size. It also occurs as anhedral grains associated with mafic clusters.

14. Calcite

Calcite is present in a few samples as interstitial, anhedral very fine grains. It is most abundant in the hornblende zone and in the lensy zone.

15. Cancrinite

Cancrinite forms very fine to locally fine grained, anhedral aggregates and single grains replacing nepheline in all mineralogical zones.

16. Muscovite

Muscovite occurs with cancrinite as a secondary replacement of nepheline. It is less abundant than cancrinite, but almost as widespread. Grain size is mainly less than 0.1 mm.

17. Sodalite

Sodalite occurs in a very few samples as anhedral grains up to 0.5 mm in size. It is distinguished by its isotropic character and higher R.I. than fluorite. Sodalite is colorless in thin section.

18. Fluorite

Fluorite is moderately widespread in the hornblende zone and rare in other zones. It forms irregular interstitial patches of very fine to locally fine grain size. It is characterized by a variable color, with purple patches of varying intensity of color scattered through a colorless background.

ACME ANALYTICAL LABORATORIES LTD. 852 E.HASTINGS ST.VANCOUVER B.C. V6A 1R6 PHONE 253-3158 DATA LINE 251-1011

WHOLE ROCK ICP ANALYSIS

A .1000 GRAM SAMPLE IS FUSED WITH .60 GRAM OF $LiBO_2$ AND IS DISSOLVED IN 50 MLS 5% HNO_3. SAMPLE TYPE: ROCK CHIPS

DATE RECEIVED: JUNE 21 1986 DATE REPORT MAILED: June 27/86 ASSAYER. D. Toye. DEAN TOYE. CERTIFIED B.C. ASSAYER.

NEPHELINE RESOURCES FILE # 86-1103 PAGE 1

SAMPLE#	SiO_2 %	Al_2O_3 %	Fe_2O_3 %	MgO %	CaO %	Na_2O %	K_2O %	TiO_2 %	P_2O_5 %	MnO %	Cr_2O_3 %	Ba PPM	Loi %	Sum
5-13	55.88	21.24	3.62	.45	2.42	5.90	8.45	.40	.09	.11	.01	1614	.9	99.78
5-14	56.19	21.12	3.51	.43	2.34	6.10	8.65	.41	.08	.11	.01	632	.8	99.87
5-27	54.03	19.54	5.53	1.29	4.42	4.40	7.85	.53	.26	.13	.01	1708	1.5	99.82
5-29	53.94	19.34	5.59	1.29	4.55	4.00	7.85	.54	.27	.14	.01	1751	1.9	99.76
5-31	54.65	20.24	4.68	.92	3.66	4.90	8.05	.47	.18	.13	.01	1243	1.7	99.83
5-33	54.09	19.43	5.37	1.23	4.42	4.25	7.65	.52	.26	.14	.01	1700	2.1	99.80
4-2D-NE	53.68	19.05	6.07	1.48	5.13	4.00	7.60	.59	.33	.14	.01	1759	1.4	99.82
4-2D-E	54.13	19.51	5.64	1.33	4.67	4.25	7.75	.55	.28	.13	.01	1723	1.3	99.88
6-5	53.55	19.31	5.77	1.39	4.76	4.25	7.75	.56	.29	.14	.01	1844	1.7	99.84
6-7	53.63	19.07	5.84	1.43	4.81	4.05	7.50	.56	.30	.14	.01	1700	2.0	99.67
6-8	56.13	21.30	3.59	.45	2.48	5.90	8.55	.40	.09	.12	.01	781	.7	99.87
STD SO-4	67.31	10.43	3.47	.98	1.65	1.40	2.15	.55	.22	.07	.02	773	11.4	99.80

APPENDIX 4

DRILL CORE LOG.

Company Nephéline Resources Property NEP Scale 1:500 Hole No. 86-1 p. 1/3

Started -	Bearing - 060°	Lat.- 5433494	Collar El.- 1180 m	Logged by: John Payne
Completed -	Angle - -60°	Dep.- 310454	Bottom El. 1048 m	Size of core: NQ
Driller -	Length 152.5 m	Location -	Level -	Survey data: none

Remarks:

Interval (-) From	To	Recovery M.	%	Core/S	Description of Unit	L	S	M	Description of Mineralization	Sample No.	Interval From	To	Assays				
0	3.65				casing												
3.65	13.7				nepheline syenite (2c), coarse grained, minor K-feldspar phenocrysts up to 2.5 cm long	●											
13.7	17.1				meta-siltstone, sheared, + chlorite (1c)	▨											
17.1	24.4				nepheline syenite (2c) as before	●											
24.4	28.1				meta-siltstone, less sheared than before (1c)	▨											
28.1					nepheline syenite (2c)	●											
						●	—		53.6-53.9 fault, chlorite								
61.8	64.9				meta-siltstone (1c), fine chloritic	▨	X		broken core								
64.9	71.0				nepheline syenite (2c)	●											

DRILL CORE LOG.

Company Nepheline Resources
Property NEP
Scale 1:500
Hole No. 86-1 p. 2/3

Started -	Bearing -	Lat.-	Collar El.-	Logged by:	Remarks:
Completed -	Angle -	Dep.-	Bottom El.	Size of core:	
Driller -	Length	Location -	Level -	Survey data:	

	Interval		Recovery		Core∠S	Description of Unit (L = Lithology, S = Structure, M = Mineralization)	L	S	M	Description of Mineralization	Sample No.	Interval		Assays				
	From	To	M.	%								From	To					
70	70.0	72.0				Andesite dike												
	72.0	77.0				nepheline syenite (2c)												
	77.0	77.9				meta-siltstone (1c)												
80	77.9	84.5				nepheline syenite (2b) fine to medium grained, a few K-feldspar phenocrysts												
	84.5	105.9				meta-siltstone (1c)												
90										broken core, numerous slips 89-92								
100																		
										broken core 105.5-109.5								
	105.9	111.7				nepheline syenite (2b) bluish grey												
110																		
	111.7	116.0				andesite dike, hornblende/pyroxene phenocrysts												
120	116.0	125.5				nepheline syenite (2b) A (andesite dike 118.9 – 119.2)				scattered veins calcite, quartz, + alteration halos thru all nepheline syenite intervals to end of hole								
	125.5	127.2				andesite dike (5)												
130	127.2	131.0				nepheline syenite (2b) (andesite dike 128.6-129.2)												
	131.0	134.0				andesite dike (5)				broken core, minor gouge in dike								
140	134.0	139.2				nepheline syenite (2b), scattered K-feldspar phenocrysts up to 2cm long												
	139.2	141.9				meta-siltstone (1c)				broken core, slips								

DRILL CORE LOG.

Company Nepheline Resources Property NEP Scale 1:500 Hole No. 86-1 p. 3/3

Started -	Bearing -	Lat.-	Collar El.-	Logged by:
Completed -	Angle -	Dep.-	Bottom El.	Size of core:
Driller -	Length	Location -	Level -	Survey data:

Remarks:

L = Lithology
S = Structure
M = Mineralization

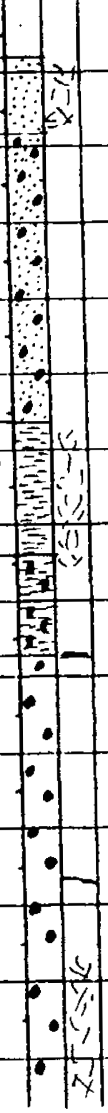
Interval From	To	Recovery M.	%	Core∠S	Description of Unit	L	S	M	Description of Mineralization	Sample No.	Interval From	To	Assays			
140																
141.9	148.1				nepheline syenite (2b), grey											
									broken core, slips							
148.1	152.5				meta-siltstone (1c)											
					E.O.H.											

DRILL CORE LOG.

Company: Nepheline Resources
Property: NEP
Scale: 1:500
Hole No.: 86-2 p. 1/2

Started -	Bearing - 060°	Lat.- 5433614	Collar El.- 1170 m	Logged by: John Payne	Remarks:
Completed -	Angle - -60°	Dep.- 310426	Bottom El. 1101 m	Size of core: NQ	
Driller -	Length 79.3 m	Location -	Level -	Survey data: none	

L = Lithology
S = Structure
M = Mineralization



Interval From	Interval To	Recovery M.	Recovery %	Core∠S	Description of Unit	Description of Mineralization	Sample No.	Interval From	Interval To	Assays				
0	4.0				casing									
4.0	9.1				nepheline syenite (2a) dark grey	broken core								
9.1	28.1				nepheline syenite (2b) light grey									
28.1	37.4	40			metasiltstone (1c), meta-andesite (1d)	broken core								
37.4	43.6				meta-andesite (1d) plagioclase phenocrysts in chloritic groundmass	fault, 0.4m wide, abundant iron oxide								
43.6	79.3				nepheline syenite (2c), grey, medium grained	58.5 - fault broken core								

DRILL CORE LOG.

Company Nepheline Resources
Property NEP
Scale 1:500
Hole No. 86-2 p.2/2

Started -	Bearing -	Lat.-	Collar El.-	Logged by:
Completed -	Angle -	Dep.-	Bottom El.	Size of core:
Driller -	Length	Location -	Level -	Survey data:

Remarks:

	Interval		Recovery			Core∠S	Description of Unit L = Lithology S = Structure M = Mineralization	L	S	M	Description of Mineralization	Sample No.	Interval		Assays				
	From	To		M.	%								From	To					
70	43.6	79.3					*nepheline syenite (2c)*	●											
80					23			●			very poor recovery								
							E.O.H												

DRILL CORE LOG.

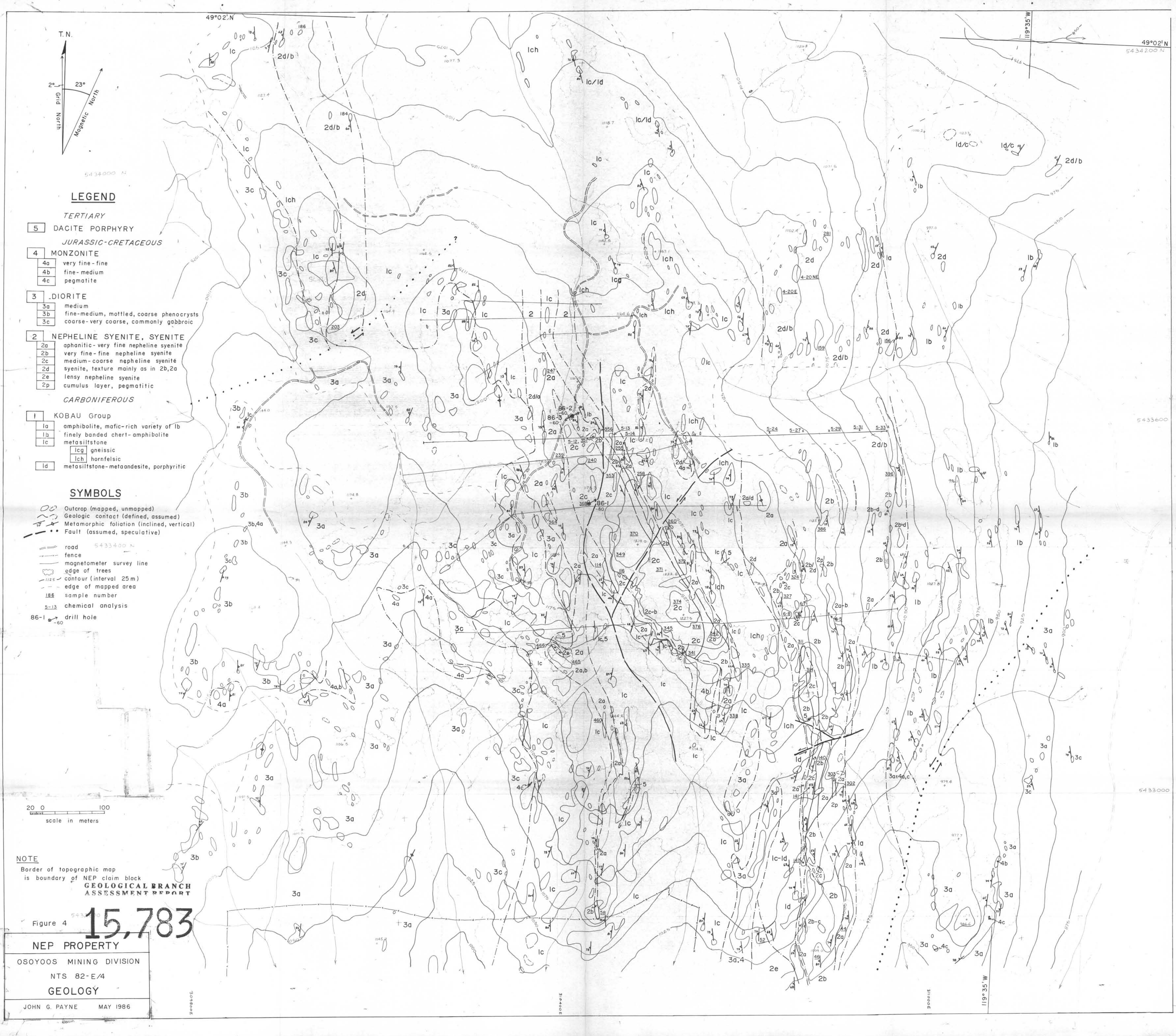
Company Nepheline Resources
Property NEP
Scale 1:500
Hole No. 86-3 p. 1/1

Started -	Bearing - 240°	Lat.- 5433614	Collar El.- 1170 m	Logged by: John Payne		Remarks:
Completed -	Angle - -60°	Dep.- 310426	Bottom El. 1115 m	Size of core: NQ		
Driller -	Length 63.1 m	Location -	Level -	Survey data: none		

L = Lithology
S = Structure
M = Mineralization

Interval From	Interval To	Recovery M.	Recovery %	Core∠S	Description of Unit	L	S	M	Description of Mineralization	Sample No.	Interval From	Interval To	Assays				
0.0	10.7				nepheline syenite (2c)	●											
10.7	14.3				meta-andesite/dacite (1d), plagioclase phenocrysts up to 1mm	▨											
14.3	25.9				nepheline syenite (2b), medium grained	●											
25.9	63.1				nepheline syenite (2c) coarse gr.	●			minor chlorite slips								
					32.2-33.4 K-feldspar phenocrysts	●											
						●	V		broken core								
					E.O.H.												

10
20
30
40
50
60
70



LEGEND

TERTIARY

5	DACITE PORPHYRY

JURASSIC-CRETACEOUS

4	MONZONITE
4a	very fine - fine
4b	fine - medium
4c	pegmatite
3	DIORITE
3a	medium
3b	fine-medium, mottled, coarse phenocrysts
3c	coarse - very coarse, commonly gabbroic
2	NEPHELINE SYENITE, SYENITE
2a	aphanitic - very fine nepheline syenite
2b	very fine - fine nepheline syenite
2c	medium - coarse nepheline syenite
2d	syenite, texture mainly as in 2b,2a
2e	lensy nepheline syenite
2p	cumulus layer, pegmatitic

CARBONIFEROUS

1	KOBAU Group
1a	amphibolite, mafic-rich variety of 1b
1b	finely banded chert-amphibolite
1c	metasiltstone
1cg	gneissic
1ch	hornfelsic
1d	metasiltstone-metaandesite, porphyritic

SYMBOLS

⬭	Outcrop (mapped, unmapped)
∼	Geologic contact (defined, assumed)
70	Metamorphic foliation (inclined, vertical)
— ••	Fault (assumed, speculative)
═	road
-x-	fence
—	magnetometer survey line
	edge of trees
1125	contour (interval 25 m)
- -	edge of mapped area
186	sample number
5-13	chemical analysis
86-1 -60	drill hole

NOTE

Border of topographic map
is boundary of NEP claim block

GEOLOGICAL BRANCH
ASSESSMENT REPORT

15,783

Figure 4

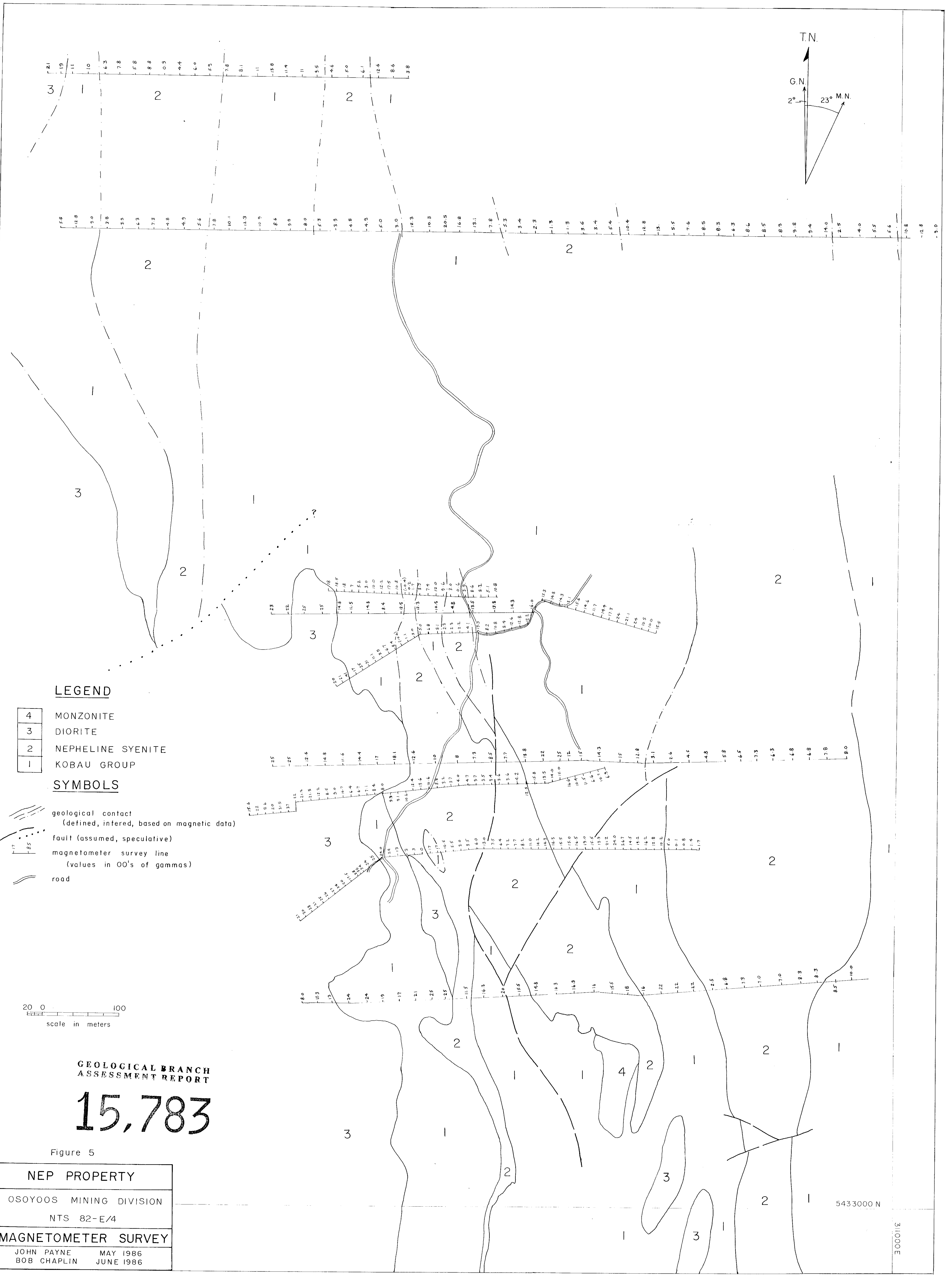
NEP PROPERTY

OSOYOOS MINING DIVISION

NTS 82-E/4

GEOLOGY

JOHN G. PAYNE MAY 1986



LEGEND

4	MONZONITE
3	DIORITE
2	NEPHELINE SYENITE
1	KOBAU GROUP

SYMBOLS

geological contact (defined, infered, based on magnetic data)

fault (assumed, speculative)

magnetometer survey line (values in 00's of gammas)

road

GEOLOGICAL BRANCH
ASSESSMENT REPORT

15,783

Figure 5

NEP PROPERTY

OSOYOOS MINING DIVISION

NTS 82-E/4

MAGNETOMETER SURVEY

JOHN PAYNE	MAY 1986
BOB CHAPLIN	JUNE 1986