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Énergie et Ressources naturelles
Québec

REPORT ON THE 1990 EXPLORATION PROGRAM

ON THE

KIPAWA YTTRIUM-ZIRCONIUM PROPERTY, QUEBEC

Prepared for

UNOCAL CANADA LTD.

AND

MOLYCORP INC.

BY

J.F. ALLAN MINERAL CONSULTANTS LTD.

CALGARY, ALBERTA

MARCH 1991

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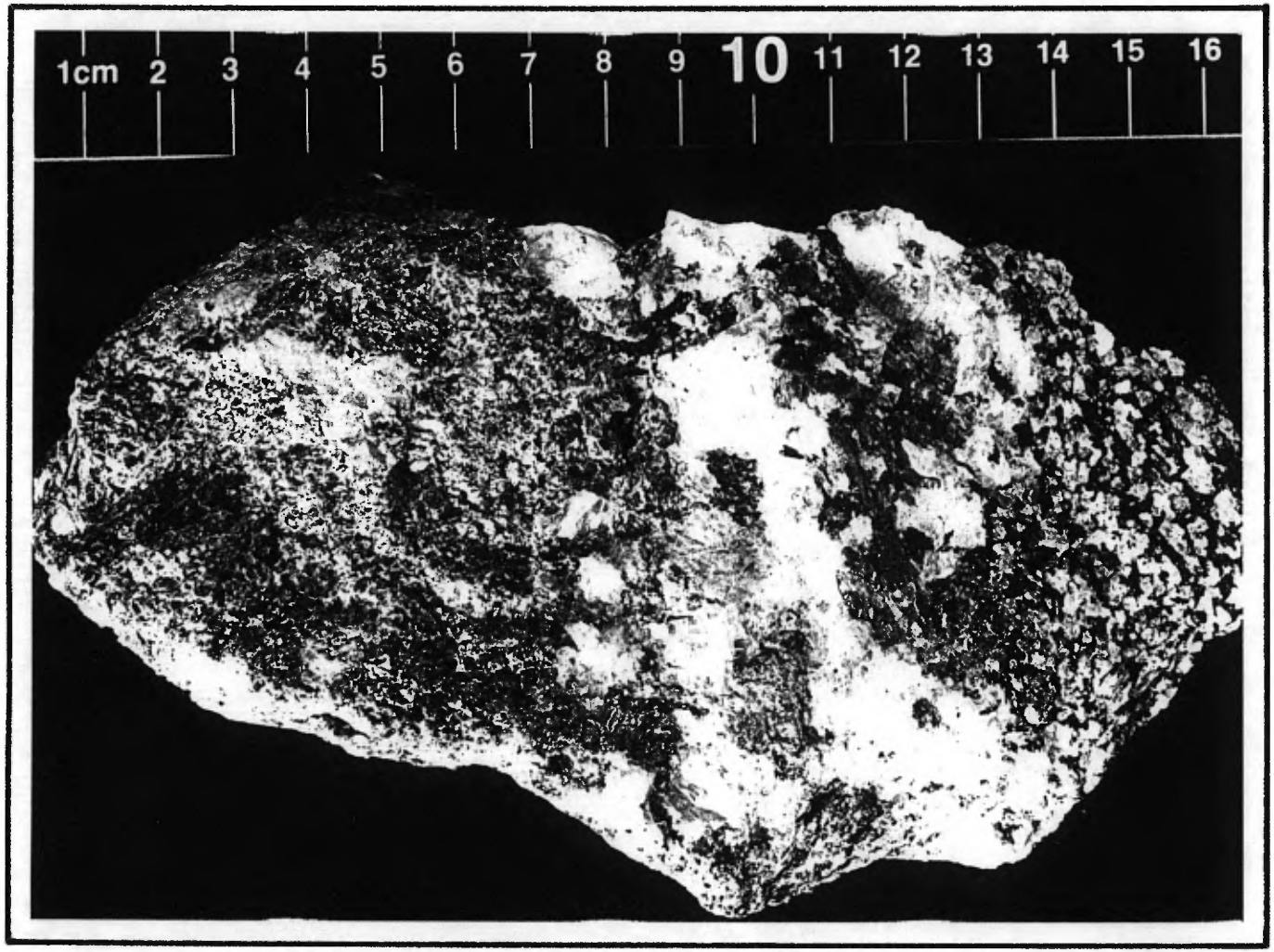

FRONTISPIECE : PINK EUDIALYTE AND HONEY BROWN MOSANDRITE IN SYENITE GNEISS

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I SUMMARY

The Kipawa yttrium-zirconium property is located in the Province of Quebec about 90 km northeast of North Bay, Ontario. Yttrium-zirconium mineralization occurs in an elongate, regionally metamorphosed and deformed peralkaline complex in Precambrian Grenville terrain. The mineralized zone is coincident with a radiometric anomaly and discontinuous yttrium and zirconium soil anomalies.

Exploration by Unocal Canada to the end of 1989, had indicated a significant zone (Main Zone) of +0.10% Y_2O_3 mineralization on the Kipawa property, some of which could probably be mined by open pit methods. Also, prospecting of airborne radiometric anomalies elsewhere in the Kipawa complex had resulted in the discovery of a number of boulders containing significant yttrium. A cobble of massive britholite assaying 5.0% Y_2O_3 was discovered in a strong airborne radiometric anomaly about 3 km southeast of the main mineralized zone. This area was considered to be particularly attractive for additional exploration.

The 1990 exploration programs consisted of four phases; backhoe trenching, prospecting, bulk sampling for preliminary metallurgical testing, and 1531 metres of diamond drilling in 27 holes. The purpose of this program was to outline a potentially open pittable yttrium resource in the Main Zone, to obtain representative samples for preliminary metallurgical testing, to locate and test the source of the high grade britholite boulder southeast of the Main Zone (PB Zone), and to prospect in more detail other priority radiometric anomalies in the southern part of the Kipawa complex. This program, which commenced on June 2nd and finished on October 10th, was staffed by contractors under the overall supervision of J.F. Allan. Expenditures totalled $497,000 (Cdn.)

The Main Zone as defined by +0.10% Y_2O_3 values is 1300 metres long and 10 to 80 metres wide. The zone strikes northwest and dips 20-35 degrees to the southwest. It occurs at the structural base of the peralkaline complex in syenite gneiss and calc-silicate rocks and is conformable with both the footwall contact of the complex and the layering and gneissocity in the enclosing rocks.

Minerals of economic interest are eudialyte (sodium-zirconium silicate), mosandrite (sodium-titanium silicate), britholite (calcium-silica phosphate), and a few other uncommon zirconium and titanium silicate minerals. The best and most continuous yttrium values occur in the upper part of the syenite gneiss unit in areas containing eudialyte, mosandrite and minor britholite. Yttrium values occur in britholite in calc-silicate rocks and in mosandrite in syenitic rocks in the lower part of the syenite unit. Both the yttrium-bearing minerals and yttrium values are erratic in this part of the unit. Zirconium values are generally more uniformly distributed than yttrium values. A peralkaline granite gneiss phase of the complex intrudes the syenite gneiss and possibly cuts it, and the mineralization, off near the southern boundary of the mineralized zone.

Diamond drilling has indicated a possible open pittable yttrium resource of 1,260,000 metric tons grading 0.15% Y_2O_3 and 0.96% ZrO_2 in the western part of the Main Zone (West Main Zone) with a higher grade block containing 786,000 metric tons grading 0.18% Y_2O_3 and 0.95% ZrO_2. External waste: ore ratio for the higher grade block is approximately 0.5:1. A resource of 1,000,000 metric tons grading 0.14% Y_2O_3 and 1.17% ZrO_2 has been inferred by drilling in the eastern part of the Main Zone (East Main Zone). Although most of this tonnage is probably available to open pit mining, potential mineable resources were not calculated because of the

wide drill hole spacing in this area. Both zones remain open toward the central portion of the Main Zone and, to a limited extent, down dip.

Significant assay intervals from backhoe trenches in the West Main Zone ranged from 0.15% Y_2O_3 and 1.03% ZrO_2 over 24 metres to 0.32% Y_2O_3 and 1.03% ZrO_2 over 62 metres. Significant intervals in two trenches in the East Main Zone graded 0.12% Y_2O_3 and 1.39% ZrO_2 over 12 metres and 0.31% Y_2O_3 and 1.12% ZrO_2 over 26 metres. Trenches in the central part of the Main Zone, which was not drilled in 1990, had significant assay intervals varying from 0.14% Y_2O_3 and 1.25% ZrO_2 over 8 metres to 0.14% Y_2O_3 and 1.22% ZrO_2 over 28 metres. Two holes drilled in this part of the zone in 1988 had intersections of 0.14% Y_2O_3 and 0.87% ZrO_2 over 13 metres and 0.16% Y_2O_3 and 0.72% ZrO_2 over 8 metres.

Two bulk samples were taken from backhoe trenches in the West Main Zone; three from the central part of the Main Zone, and one from the East Main Zone. Two of the samples are stored in North Bay and four were shipped to Mountain States International in Arizona for preliminary metallurgical testing. Three of these samples, 90 KBS-1 from eudialyte and mosandrite mineralization in the West Main Zone, 90 KBS-2 from eudialyte-mosandrite-britholite mineralization in the East Main Zone and 90 KBS-5 from mosandrite mineralization in the central part of the Main Zone are currently being tested.

A fairly thick calc-silicate unit with anomalous yttrium values was intersected in two drill holes in the PB Zone, however, no high grade values comparable to the grade of the cobble of massive britholite were intersected in these holes. The best intersection assayed 0.14% Y_2O_3 and 0.83% ZrO_2 over 7.6 metres including a section grading 0.17% Y_2O_3 and 0.65% ZrO_2 over 3.1 metres.

The discovery of calc-silicate and syenite boulders along the interpreted footwall contact of the Kipawa peralkaline complex between the Main Zone and the west shore of Sairs Lake suggests that the syenite and calc-silicate rocks, which host yttrium mineralization in the Main and PB Zones, extend from the Main Zone to Sairs Lake. A few of the boulders also contain significant yttrium suggesting that these rock units are mineralized, at least locally, over this distance.

Additional rock samples were collected and analyzed for major elements, trace elements, and a few for individual lanthanides, to better characterize the chemistry and petrognessis of the alkaline rocks at Kipawa.

II CONCLUSIONS

The 1990 program was successful in outlining a significant near surface yttrium resource in the western and eastern portions of the Main Zone.

The West Main Zone is still open to the south and to a limited extent to the southeast and the East Main Zone is open to the west and northwest.

Although the West and East Main Zones could possibly be upgraded somewhat (possibly to the 0.20% to 0.22% Y_2O_3 range) by more drilling, it is unlikely that economically mineable tonnages grading over 0.25% Y_2O_3 are present in the Main Zone.

Significant assay intervals in some of the trenches in the West Main Zone are higher than the average drill hole intersections in this zone. This is probably because the trenches were excavated in gently dipping mafic syenite/pyroxenite, the most favourable host rock for eudialyte and mosandrite, for much of their length whereas the drill holes were drilled almost perpendicular to this formation.

The West Main Zone contains, in addition to the main yttrium-bearing minerals eudialyte and mosandrite, other yttrium-bearing minerals such as hiortdahlite and miserite. The abundance of these minerals is difficult to determine as they cannot be readily identified in drill core. Britholite is more abundant in the East Main Zone.

As yttrium grades are, in detail, fairly erratic and the relative proportion of the main yttrium-bearing minerals quite variable in the deposit, a maximum drill hole spacing of 15 metres would probably be required to prove up the yttrium resource for feasibility purposes.

The deposit has some characteristics that may be favourable for physical upgrading to produce a yttrium concentrate. All the major yttrium-bearing minerals are usually medium-grained, euhedral, well crystalized minerals in a friable host rock, consequently, they could probably be liberated fairly easily by coarse crushing and grinding. The minerals appear in general, to be very pure and unaltered with little replacement by, or intergrowth with, other minerals, therefore each mineral type should respond uniformly to whatever processes might be developed to physically concentrate them.

The possibility of by-product recovery can probably not be determined until a yttrium recovery process is decided upon. Depending on the process, zirconium and other lanthanides might be potential by-products.

The KR Zone is too small to be economic and the PB Zone is of no further interest as it comes to surface under the Kipawa River.

Favourable yttrium host rocks and additional yttrium zones probably occur along the footwall of the Kipawa peralkaline complex between the Main Zone and Sairs Lake, however, exploration for these zones will be difficult as the favourable formations generally underlie low ground covered by glacial overburden.

Major-element chemical analyses of the 1990 rock samples generally support the rock classifications used in the field. The syenite gneiss is an agpaitic alkaline rock, a common host rock for agpaitic minerals such as eudialyte and mosandrite. The peralkaline granite gneiss is somewhat less alkaline and therefore less likely to host concentrations of yttrium-bearing agpaitic minerals.

III RECOMMENDATIONS

1. As the potential tonnage and grade of the Kipawa deposit is now known within certain limits, the biggest unknown is the deposit's amenability to processing. No further work should be conducted on the property until results from the current preliminary metallurgical testing are available and assessed.

2. Sections of peralkaline granite gneiss containing unidentified yttrium minerals in Holes 90 KU-15, 16 and 26 should be split and assayed. The possibility of extending the West Main Zone to the southwest would be greatly increased if these sections returned significant yttrium values.

3. Check assays on the 1990 drill core should be conducted by another commercial laboratory.

4. All drill hole data should be computerized and the resource calculations in the report, which were calculated manually, verified.

5. Before any additional drilling is done on the property a mineralogical and petrographic study should be completed on available core specimens. This study should be directed toward providing a practical description of rocks and minerals at Kipawa that can be used by the field geologists for future core logging and field mapping. Relative proportions of the main yttrium-bearing minerals, and their variability, within each mappable rock unit should also be determined. An understanding of yttrium mineral

abundances and distribution is required to assess the applicability of preliminary metallurgical test results to the deposit as a whole or to specific portions of the deposit.

6. Access to the property remains a problem. If the deposit is of sufficient interest to warrant a diamond drilling program to prove up reserves for purposes of a production decision, then an access road should be built from the nearest all weather logging road to the campsite on Sheffield Lake before the drilling program is started. A road built for purposes of servicing a drill program would probably cost about $150,000 (Cdn.). The best time to build this road would be in the late summer or early fall.

7. Mineral claims covering the favourable rock units between the Main Zone and Sairs Lake should be maintained in good standing for as long as possible.

IV INTRODUCTION

General Statement

The Kipawa Yttrium-Zirconium Property is located in Western Quebec in a metamorphosed and folded peralkaline complex intrusive into metamorphic gneisses of the Grenville Terrain. The property was first examined and staked by Unocal Canada in 1985. Unocal conducted exploration programs on the property in 1987, 1988, 1989 and in 1990. This report deals primarily with the results of the 1990 exploration program.

Location and Access

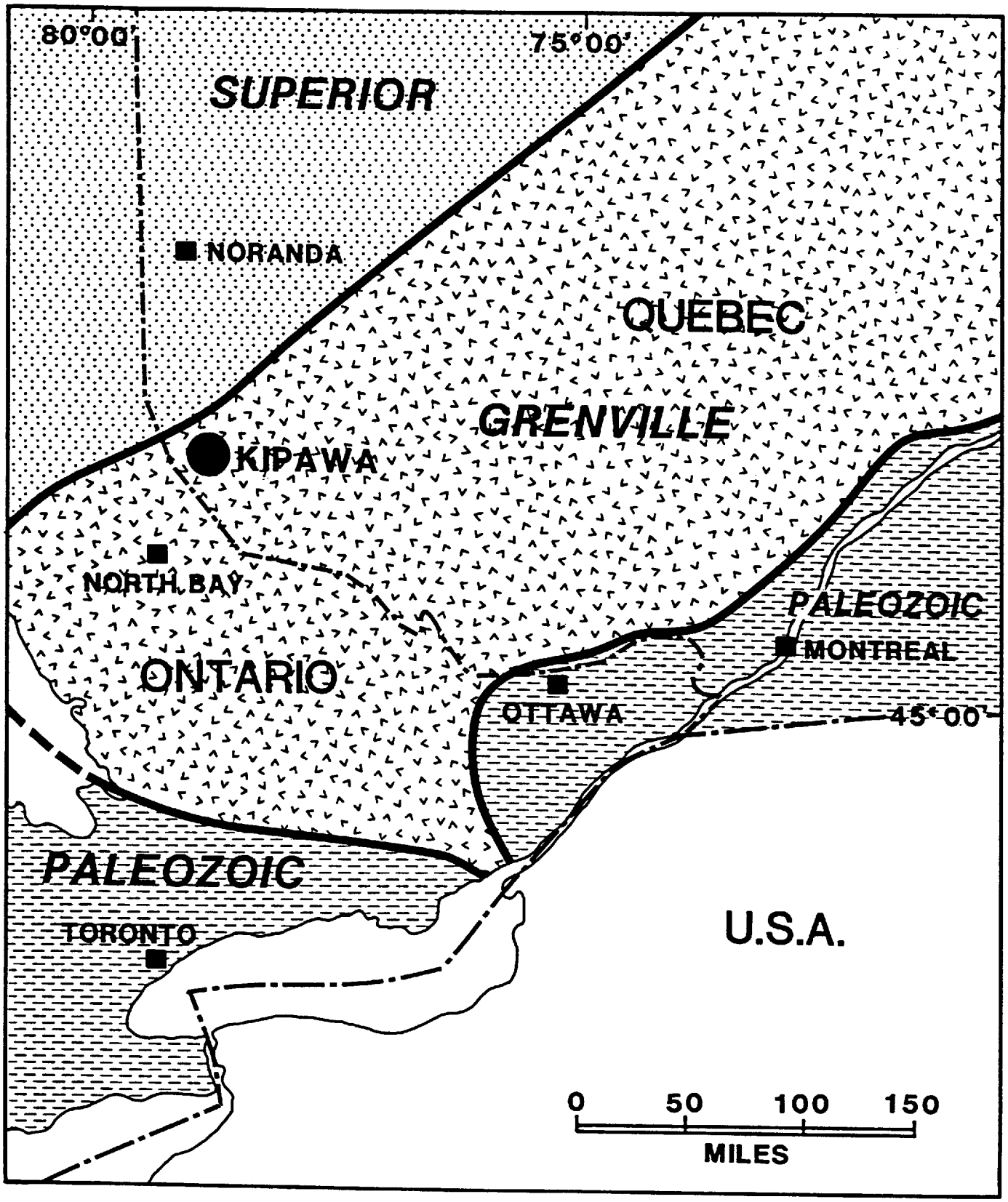
The property is located in Villedieu township, Quebec, 37 km east of the village of Kipawa and about 90 km northeast of North Bay, Ontario (Figures 1 and 2).

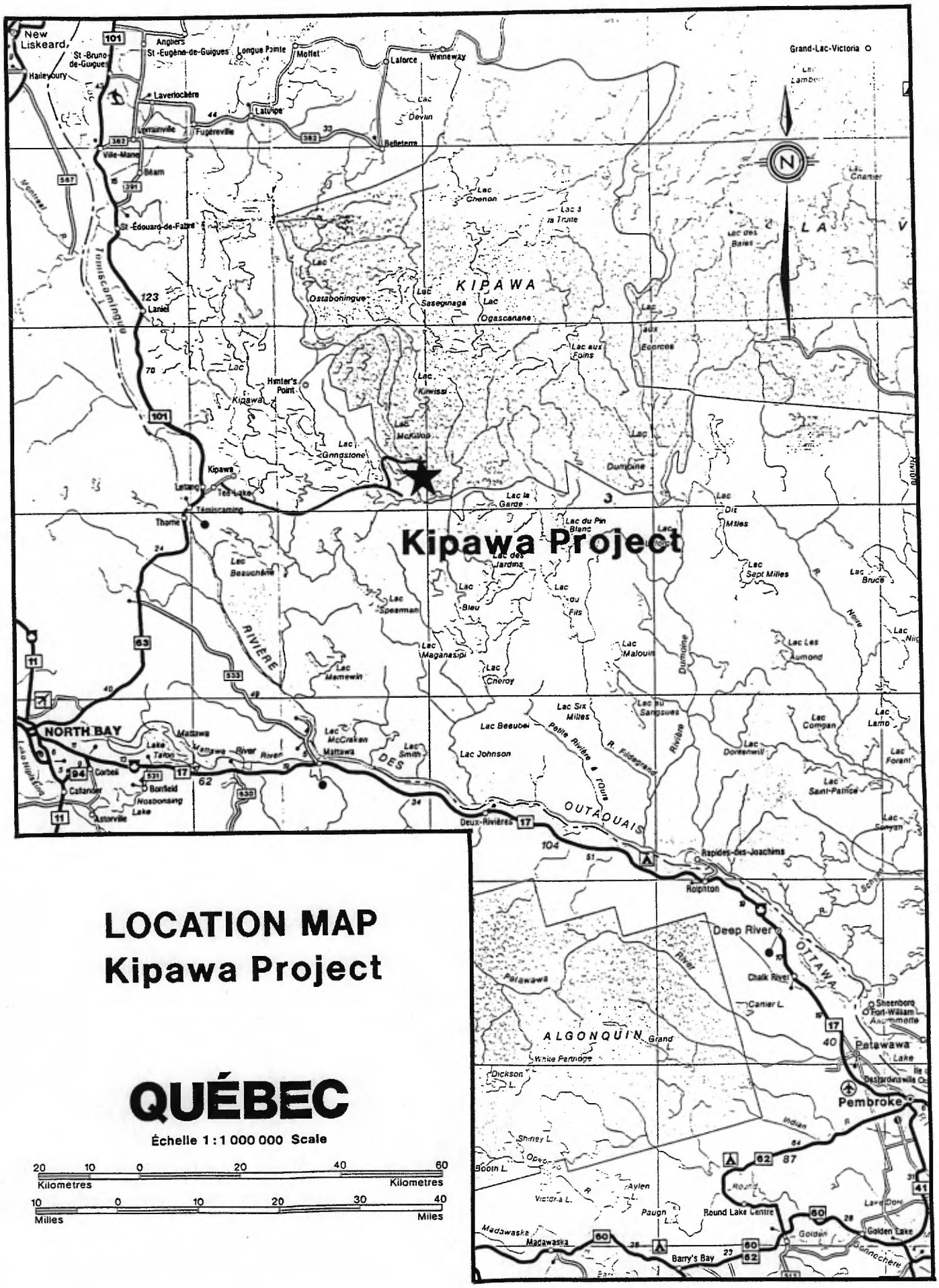
North Bay is the nearest large town to Kipawa. It has a population of about 40,000 and is connected to the larger metropolitan centres in Ontario by a good highway, railway and scheduled airline service. Temiscaming, the nearest town in Quebec, is a small pulp and paper town. Groceries, fuel and limited services and supplies may be obtained in this town.

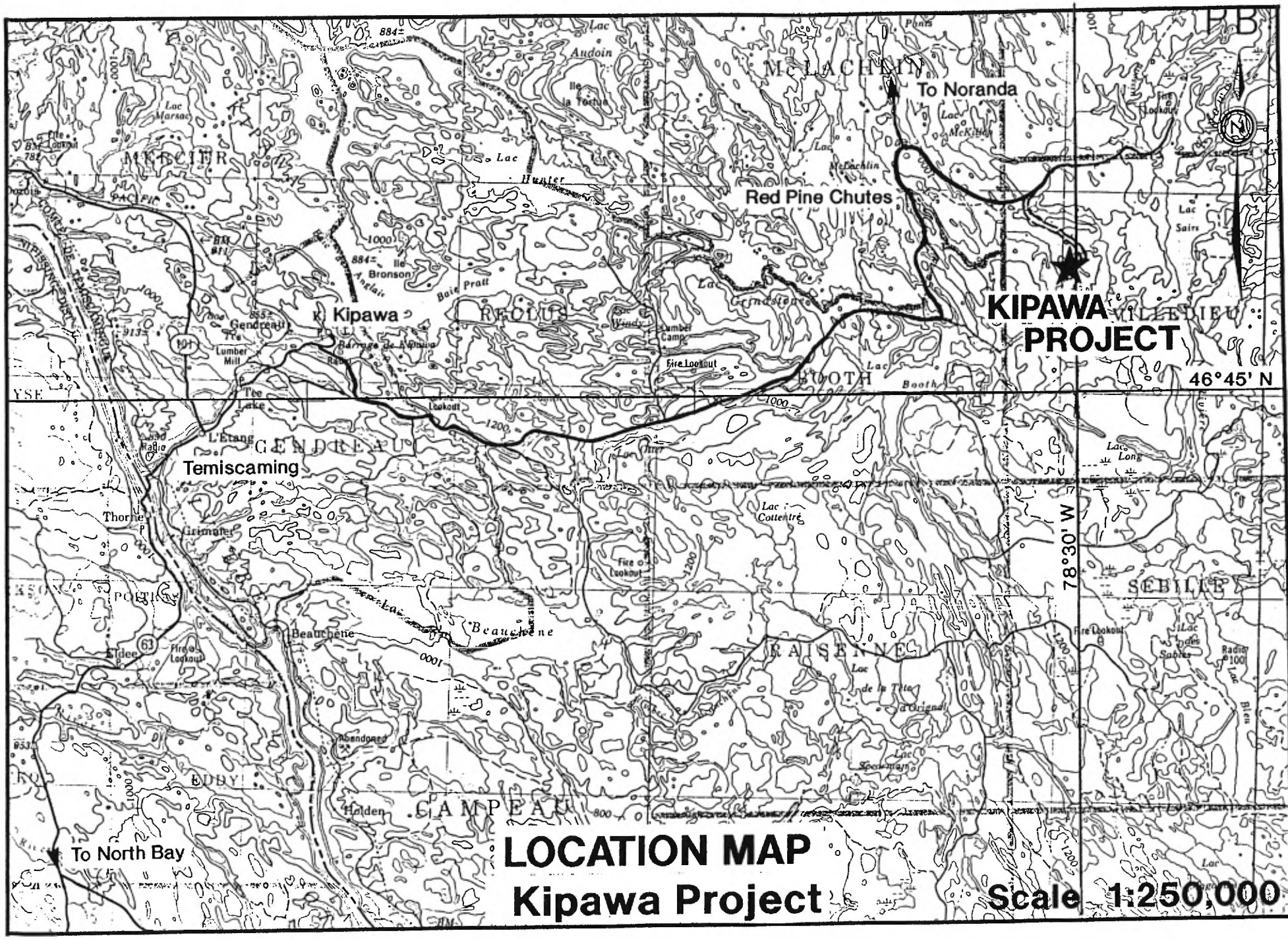
The towns of North Bay and Temiscaming and the village of Kipawa are connected by a good paved road.

A gravel logging road passes fairly close to the property (Figure 3). This road can be reached by taking a gravel road (Maniwaki), which branches from the Temiscaming-Kipawa road about

LOCATION MAP
KIPAWA PROPERTY
UNOCAL CANADA LIMITED




Kipawa Project
LOCATION MAP
Kipawa Project
QUÉBEC
Échelle 1 : 1 000 000 Scale
Kilometres
Miles
New Liskeard
Haileybury
Témiscaming
Kipawa
Thorne
NORTH BAY
Mattawa
Deux-Rivières
Rapides-des-Joachims
Deep River
Chalk River
Petawawa
Pembroke
Round Lake Centre
Barry's Bay
Madawaska
Golden Lake
KIPAWA
ALGONQUIN
OUTAQUAIS
OTTAWA
RIVIÈRE
Grand-Lac-Victoria


To Noranda
Red Pine Chutes
KIPAWA
PROJECT
46°45' N
78°30' W
Kipawa
Temiscaming
To North Bay
LOCATION MAP
Kipawa Project
Scale 1:250,000

1 km from Kipawa, for 36.4 km to a secondary gravel road which branches to the north from the Maniwaki Road. This road crosses the Kipawa River at Red Pine Chutes and intersects the main logging road about 11.2 km north of the Maniwaki Road. A skidder trail into the property branches from the main logging road about 7.9 km east of the secondary road junction at the west end of a gravel pit near kilometer post 103. Total distance on gravel roads from Temiscaming to the skidder road turnoff is 55.5 km.

The skidder trail starts at the main logging road, passes over the ridge containing the Main Zone, and ends at the exploration campsite on Sheffield Lake, a distance of approximately 7 km. It is only passable to tracked vehicles (muskeg tractors, bulldozers etc.), skidders and ATV's.

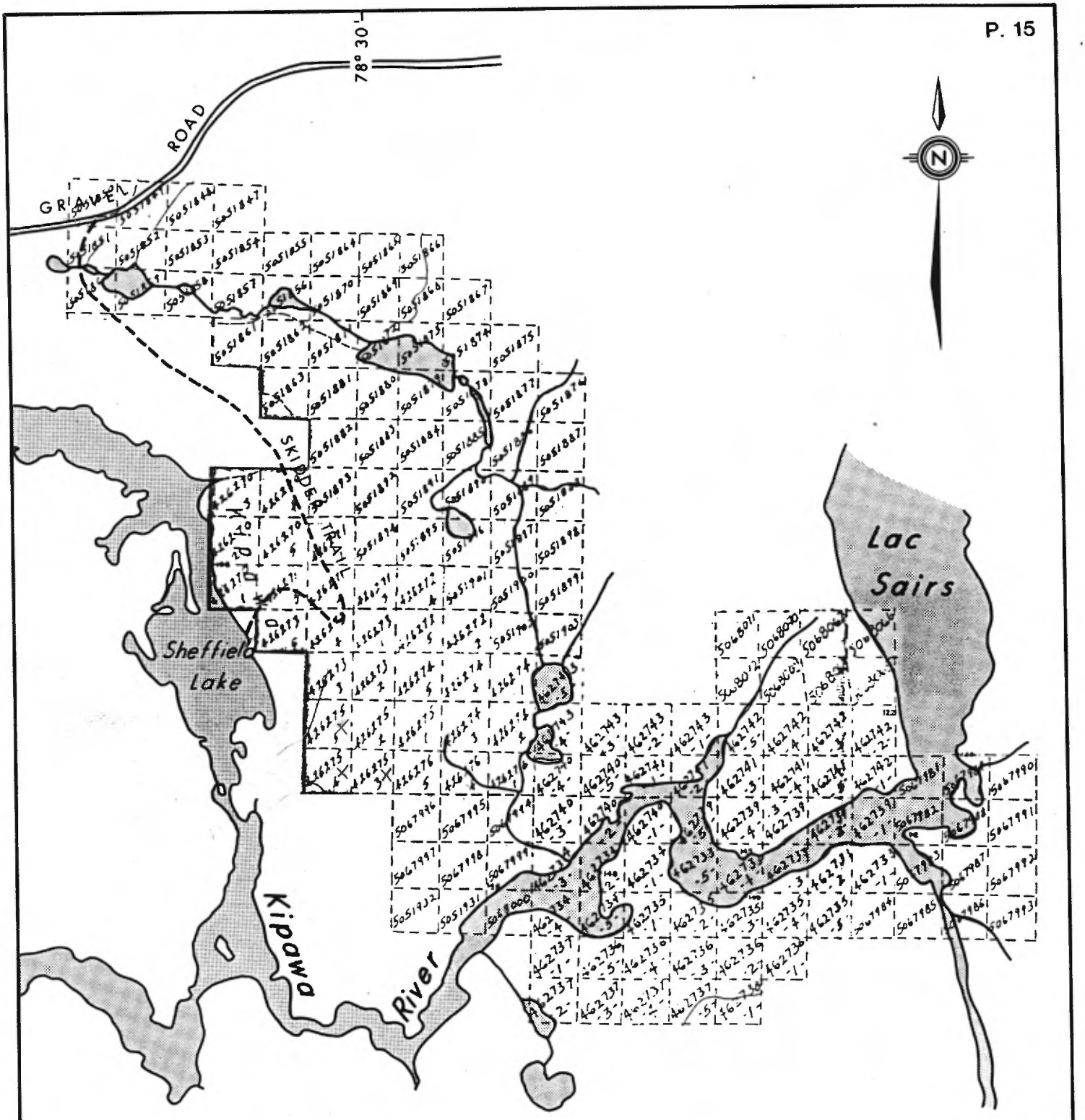
The property is also accessible by boat from Red Pine Chutes.

Small float equipped aircraft can also land on Sheffield Lake.

Property

The property consist of a 168 contiguous full-size mineral claims covering approximately 2,688 hectares (6,640 acres) (Figure 4). All claims are owned 100% by Unocal Canada Limited.

The location of the main block of mineral claims (Figure 6) was established by a compass and topofil (measuring string) survey after they were staked. The remaining claims were staked by compass and topofil but were not measured after staking, consequently, they are not as accurately located as the claims in the main block.



UNOCAL	**KIPAWA PROPERTY**
AUTHOR J. ALLAN	**CLAIM MAP**
DATE FEB., 1991	**VILLEDIEU TOWNSHIP, QUEBEC**
SCALE 1 : 50,000	
CONTOUR INTERVAL	
DRAWN BY M. A. P.	
APPROVED	
UNOCAL CANADA LIMITED CALGARY ALBERTA	FILE NO. 4
	N.T.S. NO.

Eligible expenditures from the 1990 exploration program will be filed on the key claims at Kipawa after this report is written, so that these claims will remain in good standing for another few years. A memo will be written on the status of these claims after this work is filed.

Exploration History

After uranium was discovered in 1957 in quartzites at Hunter's point, 32 km to the northwest, Hollinger Quebec Exploration Co. Ltd. acquired ground along the east side of the Sheffield Lake as a potential uranium property. In 1958 they drilled 13 short holes to test the radiometric anomalies that they outlined on the ground. No assays or other surveys were recorded in the assessment files, however, the presence of eucolite and britholite was noted in their drill logs and it appears that assays for rare earths and niobium were done at this time.

In 1969 and 1970 Sturdy Mines Ltd. acquired and worked this ground in conjunction with other claims in the area for a joint venture which included Talisman Ltd. Mines and Imperial Oil Enterprises Ltd. They drilled 16 holes on the same anomalously radioactive zones as Hollinger, but again no assays were submitted with the drill logs to the government assessment files. They obtained very little uranium and found that most of the radioactivity resulted from thorite.

Sturdy's logs do not mention any type of yttrium or zirconium mineralization but they frequently note intersections of "rhodonite" and associated "sphene" plus a brown radioactive mineral. These minerals were probably eudialyte, mosandrite and britholite or thorite. In addition to the drilling, Sturdy Mines conducted detailed scintillometer surveys, geological mapping, rock

trenching and sampling. Dr. Gittins, a mineralogist at the University of Toronto, was employed by Sturdy Mines to examine the property and drill core. Apparently he identified 20 "very rare earth minerals" and suspected the occurrence of 13 others. Sturdy concluded that the radioactivity was "due chiefly to rare earth minerals and extremely rare earth minerals, a great many of which contained substantial amounts of thorium, yttrium, lanthanum, zirconium and niobium," and that the radioactive areas may be large patches rather than one continuous band.

In addition to the above exploration work, a number of mineralogists have written papers on many of the exotic and rare minerals found on the property; e.g. vlasovite (Gittins et al - 1973), agrellite (Gittins et al - 1976), hiortdahlite (Aarden, H.M., and Gittins, J. - 1976), eudialyte and eucolite (Hicks, W.D. - 1959), gittensite (Ansell et al - 1980), gaidonnayite (Roberts, C.C. and Bonardi, M. - 1983) and miserite (Berry, L.G. et al - 1972).

In 1985 Unocal staked the main showings on the east side of Sheffield Lake and J. Allan, A. Knox, R. Sherer and A. Mariano, guided by Dr. Gittins conducted a two-day examination of these showings and radioactive areas (Knox, A.W. - 1986). Yttrium, zirconium and cerium values as high as 1.27% Y_2O_3, 8.0% ZrO_2 and 1.9% Ce were obtained in some samples. As a result of this work the property was recommended for a more detailed evaluation of its yttrium-zirconium-lanthanide potential.

Unocal staked additional claims in 1987 to cover the KR Zone, another radioactive zone about 4 km S.E. of the main showings that had been drilled in 1978. Also in 1987 Unocal conducted a detailed exploration program consisting of geological mapping, rock chip sampling, ground radiometric and magnetic surveys, and a soil geochemical survey for yttrium and zirconium

over the Sheffield Lake occurrences (Main Zone) and briefly examined the KR Zone. This program was staffed by Marc Gidluck and Alex Knox, Project Geologists for Unocal. Results from this work were encouraging and a drilling program was recommended.

A drilling program consisting of 980 metres in 12 holes was conducted on the Main Zone in the fall of 1988. Alex Knox was the Project Geologist. Results were again considered to be encouraging as significant yttrium and zirconium mineralization were intersected over a strike length of 1250 metres in the Main Zone. Intersections ranged from 0.10% Y_2O_3 over 5 metres to 0.18% Y_2O_3 over 25 metres with most intersections averaging around 0.12% to 0.15% Y_2O_3 over 8 to 12 metres.

More claims were staked to protect possible plant sites, tailings disposal areas etc. in 1989. Also in 1989 Unocal conducted a combined airborne radiometric-magnetic-VLF survey over the Kipawa peralkaline complex and metasediments adjacent to the complex. This survey was conducted by Aerodat under the supervision of Marc Gidluck. Gidluck also conducted some follow-up ground prospecting on radiometric anomalies located by this survey. As a result of this prospecting he discovered a number of radioactive boulders with anomalous yttrium and two small "potato size" cobbles consisting of massive britholite, one of which assayed 5% Y_2O_3, on a peninsula on the south shore of the Kipawa River.

Tony Mariano was contracted to conduct a mineralogical study of the yttrium-bearing minerals in composites from the 1988 drill core as a basis for future metallurgical test work. He completed this study in January 1990.

Unocal/Molycorp decided in early 1990 to conduct another field program to determine the tonnage and grade of possible yttrium resources in the Main Zone, especially potentially open pittable resources, and to assess the source of the high grade britholite boulders discovered in 1989. Other priority targets from the 1989 airborne geophysical survey were also to be followed up.

1990 Exploration Program

Purpose

Molycorp Inc., a Unocal company, decided in early 1990 to further explore the Kipawa Yttrium-Zirconium Property and other yttrium-zirconium exploration targets previously identified in the peralkaline intrusive complex hosting the Kipawa deposit to:

a) Determine the size and grade of the yttrium-zirconium resource in the Main Zone by surface trenching, geological mapping, sampling and diamond drilling with emphasis on determining how much of the resource might be potentially available to open pit mining;

b) Determine the possible economic viability of this resource by testing bulk samples from the main yttrium-bearing mineralogical assemblages in the Main Zone and by conducting a preliminary review of possible capital, operating, environmental and other costs for a mining operation on the property;

c) Evaluate other exploration targets for yttrium and zirconium previously identified by Unocal in and near the Kipawa peralkaline complex by surface prospecting and sampling and,

d) Evaluate the significance of the high grade yttrium boulders found previously by Unocal about 2 km southeast of the Main Zone and drill the source of these boulders if considered significant.

Operations

The 1990 exploration program at Kipawa was conducted in four phases as follows:

1. Backhoe trenching, geological mapping and sampling of the trenches and additional mapping and sampling in Unocal's main claim block.

2. Prospecting and sampling of other target areas previously identified by Unocal in the Kipawa peralkaline complex.

3. Bulk sampling of the Main mineralized zone.

4. Diamond drilling of the Main Zone and the PB Zone, a zone of radioactive yttrium-bearing boulders about 2 km southeast of the Main Zone.

A total of 1412 lineal metres of trenching in 13 trenches was completed during Phase 1 by a Hitachi backhoe. About 90% of the length of each trench was excavated to bedrock. The trenches were dug perpendicular to the strike of the Main Zone between grid lines 11+00 E and 26+00 E. The trenches were then washed with hoses connected to a pressure pump and geologically mapped at a scale of 1:200. A radiometric profile was also produced for each trench. Channel samples were cut across mineralized and/or anomalously radioactive sections in the trenches with two diamond saws. (338) samples were collected for assay from 663 lineal metres of saw-cut channels.

Additional mapping and rock sampling were also conducted within Unocal's main claim block during the trenching program.

This program commenced on June 2nd and was completed on July 6th.

A crew working from a separate fly camp conducted follow-up prospecting (Phase 2) on other exploration targets in the Kipawa peralkaline complex outside of the Main Zone during the trenching program. Eight (8) claims were staked to cover radioactive boulders discovered during this phase on the west side of Sairs Lake. Prospecting was conducted during the same period as Phase 1.

Six (6) bulk samples were collected from six (6) locations within the trenches for preliminary metallurgical testing from August 17th to August 28th (Phase 3). These samples weighed between 300 and 700 lbs. each. Twenty-two (22) claims were also

staked to cover radioactive boulders discovered during Phase 2 east of the KR Zone and to cover the possible westerly extension of the PB boulder zone.

A diamond drilling program consisting of 1074 metres in 22 holes in the Main Zone and 457 metres in 5 holes in the PB Zone was completed during the period September 11th to October 13th (Phase 4). The drill was moved in and out of the PB Zone by helicopter.

Testing of bulk samples and a preliminary technical and economic review of a potential mining operation at Kipawa are being conducted under the direction of Molycorp's Los Angeles office. Results of these studies are outside the scope of this report.

A more detailed description of operations on the 1990 exploration program is provided in Appendix III.

Personnel

The program was conducted entirely by contractors to Unocal Canada Limited.

Mr. Gerard Meusy was project geologist for the trenching and drilling programs. Alex Knox conducted the Phase 2 prospecting program and J.F. Allan planned and managed all phases of the 1990 program.

Exploration Services from Rouyn, Quebec, supplied technicians, labourers and exploration equipment for all phases of the program. They also supplied and operated

the exploration camp during the trenching program. Mr. Ed Chartre, Mr. Pierre Gervais and Mr. Alain Broussard of Exploration Services, were involved in all phases of the 1990 program.

The drilling program was conducted by Forage Hosking Inc. of Rouyn, Quebec, and the helicopter used to move the drill from the PB Zone was contracted from Wilson's Helicopters (Heli-Trans) of Etibicoke, Ontario. Float-equipped aircraft from Air Kipawa were used to mobilize and demobilize the exploration fly camp and periodically for supply trips from the town of Kipawa to the fly camp and the main Kipawa camp on Sheffield Lake. All analytical work was conducted by Bondar-Clegg Laboratories in Ottawa, Ontario.

Cost

The cost of the program including a 5% head office charge is summarized as follows:

1.	Trenching	$137,600 (AFE 90L0002)
2.	Prospecting	$46,900 (AFE 90L0003)
3.	Bulk Sampling	$24,500 (AFE 90L0004)
4.	Drilling	$287,900 (AFE 90L0005)

The cost of data compilation, interpretation and the preparation of all maps, sections and reports for all phases of the program are included in drilling costs. A more detailed breakdown of these costs is shown on Table 1.

Report

This report is meant to be a fairly comprehensive report on the geology, yttrium mineralization and yttrium resources on the Kipawa property. Besides discussing the 1990 program and its results in some detail, the report also includes data on geology and mineralization from Unocal's previous exploration programs on the property. The reader is, however, referred to specific reports on previous programs listed under References for details of these programs.

TABLE : 1

EXPENDITURE SUMMARY - 1990 EXPLORATION PROGRAM

AFE	*M90L0002*	*M90L0003*	*M90L0004*	**M90L0005*
Project Management	16,700	1,700	7,500	66,000
Geology				
. G. Meusy	17,500			16,800
A. Knox		19,250		
Expenses				
Allan, Meusy, Knox	5,350	4,600	2,900	7,600
Contract Labour	36,350	5,800	3,950	13,500
Equipment Rental/Repair	30,800	4,100	3,550	10,250
Fuel, Materials and Supplies	5,600	1,200	400	1,300
Project Rental Vehicles	1,400		450	1,360
Aircraft	4,900	1,950		12,450
Camp Accommodation	2,350		725	4,400
Blasting			1,550	
Assay	5,700	3,100	300	14,400
Claim Staking/Land Cost		2,350	1,000	(est.) 500
Stumpage Cost	(est.) 950			(est.) 1,500
Shipping/Storage	2,800	100	1,000	1,500
Drafting/Reproduction/Typing	650	500		20,100
Drilling				102,500
SUB TOTAL	**131,100**	**44,700**	**23,300**	**274,200**
+ 5% Overhead	**6,500**	**2,200**	**1,200**	**13,700**
TOTAL	**137,600**	**46,900**	**24,500**	**287,900**

TOTAL 1990 EXPLORATION: $496,900

* Includes Data Compilation, Interpretation and Final Report Preparation for all Exploration Phases.

V REGIONAL GEOLOGY

General Statement

Yttrium and zirconium mineralization occur in a gneissic peralkaline complex on the Kipawa property.

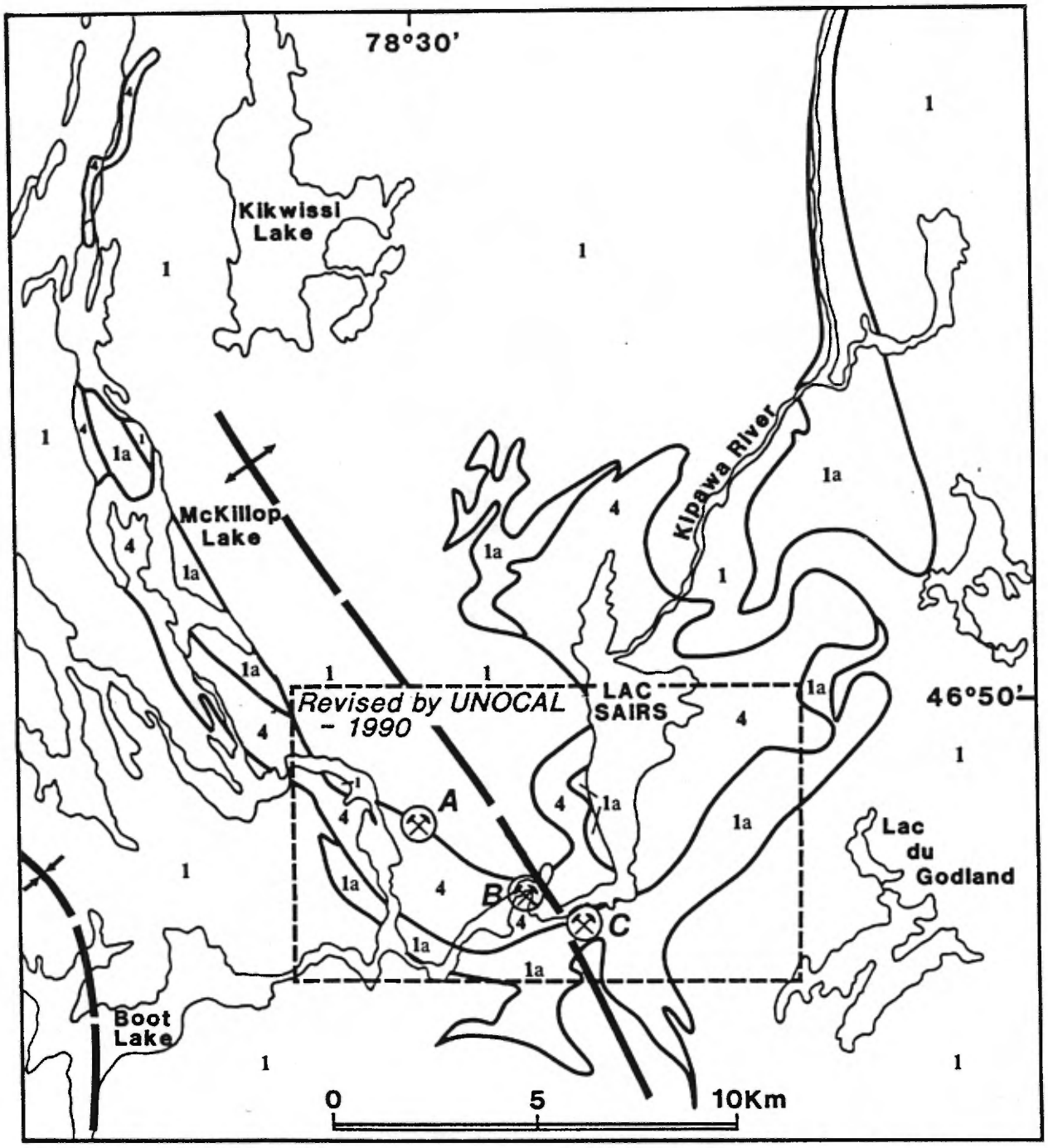
Kipawa Peralkaline Complex

The peralkaline complex is elongate and has been metamorphosed and folded into an irregular horse-shoe shaped body around a major southeast plunging anticline (Figure 5). The complex is a fairly linear northwest trending body on the west limb of the anticline where it gradually thickens from an narrow sill-like body in the northwest to a wider possibly laccolithic shaped body in the southeast near the nose of the fold. The complex appears to have a more irregular shape on the east limb of the anticline, however, the location of lithologic contacts are not well known in this area because of the lack of outcrop and detailed study. The complex may have been at least 50 km long and up to 3 km wide before folding and metamorphism. The outline of the southern portion of the complex in Figure 5 is based on observations from Unocal's field work. The outline of the complex outside of this area is taken from a regional geological compilation map produced by Tremblay-Clark and Kish in 1978.

Tremblay-Clark and Kish identified three principal facies in the complex; a syenitic-monzonitic facies, a banded mafic gneiss facies and a peralkaline granite facies with the peralkaline facies

REGIONAL GEOLOGY OF THE KIPAWA DISTRICT

AFTER: P.TREMBLAY-CLARK
L.KISH 1973



4 – KIPAWA ALKALIC COMPLEX

1a – PARAGNEISS (QUARTZITE, MUSCOVITE GNEISS)

1 – GRANITE GNEISS

⚒ – MAIN YTTRIUM–ZIRCONIUM OCCURRENCES, KIPAWA PROPERTY

A – MAIN ZONE
B – PB ZONE
C – KR ZONE

the most abundant. Biotite is more abundant than hornblende and pyroxene in the granitic phase.

Rocks from the complex have been dated at 900 m.y. (muscovite) and 1290 m.y. (nepheline) by the potassium-argon method (Aarden and Gittins - 1974). The age of regional metamorphism accompanying the Grenville orogeny is thought to be about 1050 m.y. as based on Rb-Sr and U-Pb zircon age determinations elsewhere in the Grenville province (R.F. Emslie - 1970).

The complex intrudes Grenville Precambrian rocks which have been sub-divided into two major units by Tremblay-Clark and Kish; a paragneiss unit consisting of quartzite, muscovite gneiss and minor marble and a quartzofeldspathic gneiss unit.

1990 Project Area

All of the significantly anomalous yttrium and zirconium mineralization in the three main yttrium-zirconium zones discovered to date, Main, PB and KR Zones, occur in the southern portion of the complex. This is the portion of the complex that has been studied and prospected by Unocal.

In this area the peralkaline complex is composed primarily of an orange granitic unit. It is generally a pale orange, medium grained, sugary textured, weakly foliated quartz syenite with 15% mafic minerals, most often amphibole but sometimes biotite and pyroxene. It is usually crumbly on weathered surface. The unit typically contains narrow layers and zones of quartz-feldspar pegmatite and narrow laminae of coarse-grained amphibole and pyroxene, both of

which are often radioactive. The unit can vary from fine to coarse-grained and locally becomes moderately foliated. Quartz varies from almost nil to 40%, although quartz is extremely difficult to distinguish from feldspar in the field as both are often transparent, glassy minerals.

A narrow unit composed of light to medium grey syenite gneiss and calc-silicate rocks occurs along the footwall of the peralkaline complex from the north end of Sheffield Lake southeasterly to the Kipawa River. It is up to 90 metres thick near Sheffield Lake. This unit contains the two best yttrium-zirconium zones; the Main and PB Zones. Scattered boulders of grey syenite gneiss and calc-silicate rocks found west of the southwest shore of Sairs Lake may indicate that this unit continues around the nose of the anticline and thence northeasterly along the complex contact (Figure 6). This hypothesis is quite speculative, however, as the distribution of rock types and location of rock contacts are not well known in this area.

A fresh massive dark green fine-grained gabbroic rock with diabasic texture was observed in three outcrops at the top of Baldy Hill. This rock type appears to be a sill-like body capping the top of the hill.

In the areas mapped and prospected by Unocal, the paragneiss or metasedimentary unit (1a) is composed primarily of biotite-feldspar and quartz-biotite-feldspar gneisses and minor quartzite, impure calcareous rocks and marble. The quartzofeldspathic gneiss unit (1) is a feldspar-quartz-biotite gneiss which is often crumbly weathering near its contacts with the complex. In drill core, this unit is a hard pink quartz-feldspar gneiss with 5-10% mafic minerals, primarily biotite. Minor amphibole (and pyroxene) may be present in the gneiss near its contact with the complex.

The quartzofeldspathic gneisses can be difficult to differentiate from the peralkaline complex in the field as both generally have crumbly outcrops and a gneissic texture. Also the differentiation of rock types on the basis of their quartz content in hand specimens is difficult. The gneisses in the alkalic complex can, however, be distinguished geochemically; the sum of Y+Ce+La is greater than 300 ppm for the rocks of the alkalic complex and <150 ppm for the quartzofeldspathic gneiss. Zirconium is also enriched in the alkalic rocks (Tremblay-Clark and Kish - 1972).

External contacts of the complex appear to have gentle to moderate dips. Tremblay-Clark and Kish postulated that the alkalic complex has a sill-like shape. The footwall contact of the western portion of the complex, between Sheffield Lake and the Kipawa River to the south, dips 30-35° to the southwest. It dips 30° to the south in the PB Zone. The footwall contact of the complex is sharp in drill core. Foliation in the footwall rocks and in the lower syenite/calc-silicate unit of the complex are generally parallel to the footwall contact. Foliations and lineations in the peralkaline granite phase are more variable.

An open synclinal fold plunging gently to the southeast has been mapped within the peralkaline complex on Baldy Hill. Diabasic gabbro, which outcrops on the top of the hill, appears to occupy the core of this fold.

VI REGIONAL GEOPHYSICS

Radiometrics

The two main yttrium-zirconium zones, the Main Zone and the PB Zone, are marked by strong airborne radiometric anomalies (Gidluck, 1989). Both zones show up very strongly on the thorium channel of the airborne spectrometer.

The Main Zone is ideally located for an airborne radiometric survey as it is situated on the crest of a ridge with scattered outcrop and very thin overburden.

The source of the airborne radiometric anomaly over the PB Zone was not anomalous radioactivity in bedrock but numerous radioactive boulders at surface and anomalous radioactivity in glacial overburden within the zone.

The KR Zone showed up as only a small, very weak airborne radiometric anomaly; possibly because it is narrow, is on the side of a hill, dips into the hill, and has no glacial dispersion train.

Numerous low order radiometric anomalies were also outlined elsewhere in the survey area. Regional geology and the thorium and thorium to total count ratio maps were used to priority rate these anomalies. Coincident thorium and thorium to total count ratio anomalies within the peralkaline complex or near its contacts in the metasediments were considered to be targets

warranting ground follow-up. Radioactive boulders with anomalous yttrium and zirconium values were found in some of these anomalies.

Magnetics

Major regional geologic trends are visible on the total field and calculated vertical magnetic gradient maps (Gidluck, 1989). The major regional anticlinal structure can be identified on both magnetic maps. Although the important footwall contact of the alkalic complex can not be located accurately on the magnetic maps, magnetic trends, which are known to parallel the contact in the drill areas, can be used to assist in interpreting the possible projection of this contact away from the drill areas and around the regional fold structure.

The peralkaline complex does not appear to have any diagnostic magnetic signature.

An obvious N-NW trending linear magnetic high crossing the survey area can be seen on both magnetic maps. This magnetic linear passes just west of the west shore of Sairs Lake and crosses the Kipawa River just east of the KR Zone. This linear may represent a major geologic feature which might have some genetic relationship to the peralkaline complex.

The main radiometric anomalies and major magnetic trends in the area prospected and studied by Unocal in 1990 are shown on Figure 6.

VII MAIN ZONE

Introduction

The Main Zone is located on a low northwest trending ridge immediately east of Sheffield Lake. The zone as defined by anomalous zirconium and yttrium values and associated anomalous radioactivity is about 1400 metres long and 10 to 100 metres wide, strikes northwest and dips 20-35 degrees to the southwest (Figure 7). It occurs at the structural base of the Kipawa peralkaline complex in syenite gneiss and calc-silicate rocks, and is conformable with both the footwall contact of the complex and the layering and gneissocity in the enclosing rocks.

Geology

Rock Types

General Statement

Four major rock units have been mapped in the Main Zone; peralkaline granite gneiss, syenite gneiss, calc-silicates and basement gneiss.

The peralkaline granite gneiss, syenite gneiss and calc-silicates are considered to be part of the Kipawa peralkaline complex. The calc-silicates and syenites are interlayered and are henceforth considered to be one unit termed the calc-silicate/syenite unit.

A total of 17 rock types were mapped by Gerard Meusy on detailed 1:200 scale trench maps.

Basement Gneiss

The lowermost unit, the basement gneiss, consist primarily of a pink quartz-feldspar gneiss. Based on megascopic hand specimen and drill core examination, this rock type is composed of plagioclase (70%), K feldspar (5%), quartz (15-20%), amphibole (4%) and biotite (3%). It is exposed in only a few outcrops near the contact of the complex and at the north end of Trench 11. It is fairly easily recognized in drill core (Photo 1).

A brown variety of this rock has been identified by Meusy and Knox in drill core and by Meusy in Trenches 3, 7, 8,10 and 11. It varies from 2-13 metres thick in drill core and occurs along the basement gneiss-peralkaline complex contact. It appears to have a lower quartz content and a higher mafic content than the pink gneiss and was logged by Knox in 1988 as a monzonite gneiss (Photo 2).

Both the pink and brown gneisses have been shown as basement gneiss on the maps and sections accompanying this report. The contact between the basement gneiss and rocks of the peralkaline complex dips 25-35° to the southwest and is fairly sharp. (Photos 3,4 and 5).

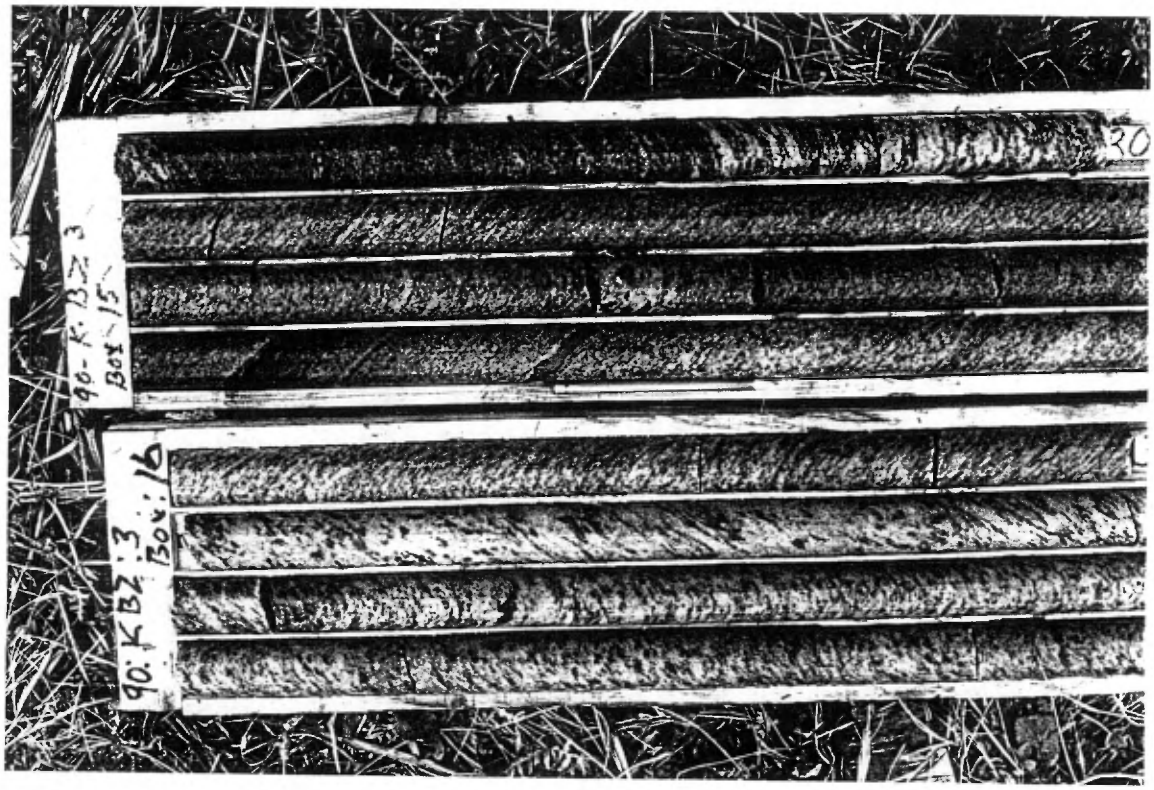


Photo 1: Orange-Pink Basement Gneiss - Grey Syenite Contact.
90KBZ-03, 97.6 m

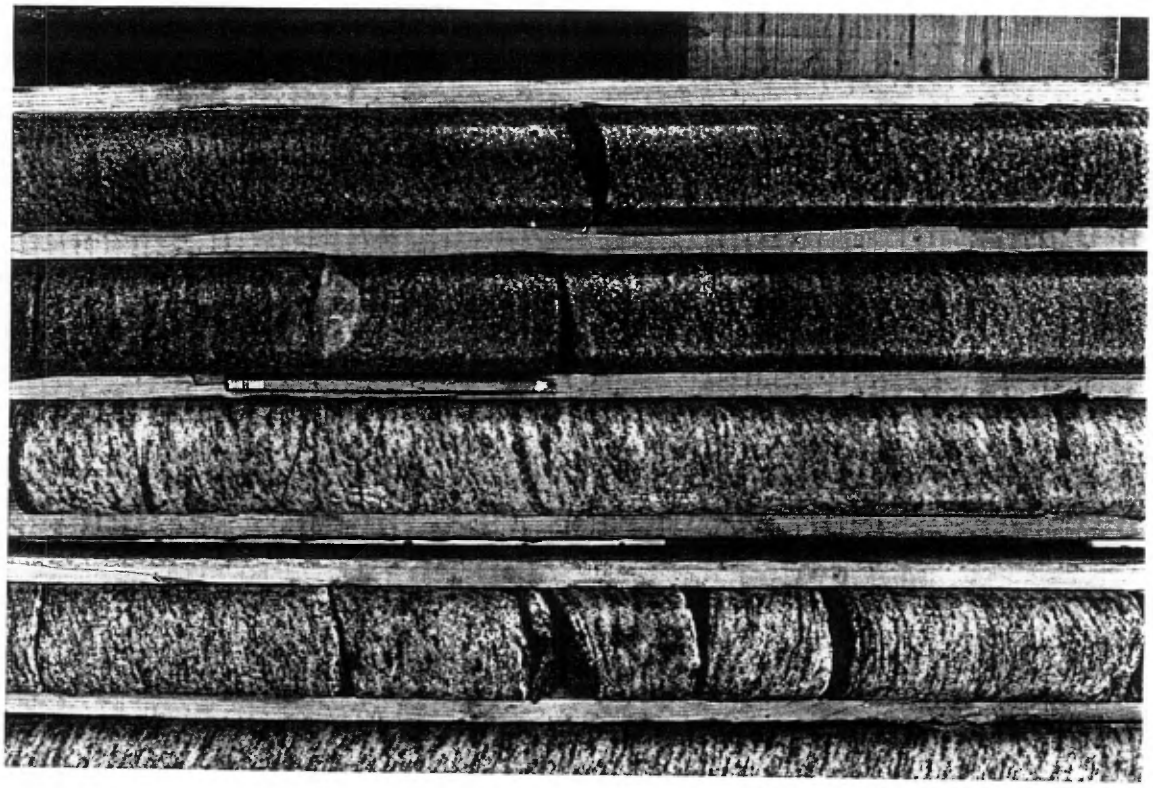


Photo 2: Grey-Brown and Pink Basement
Gneiss. 88KU-07.

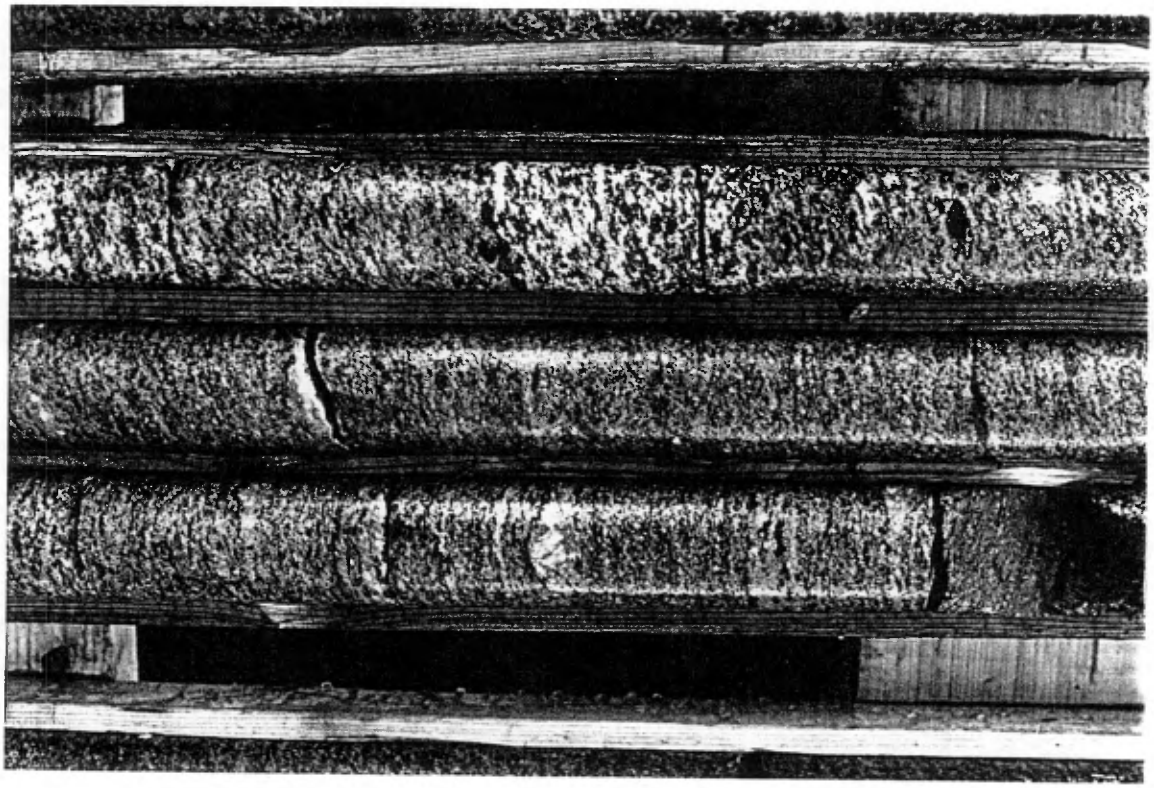


Photo 3: Syenite and Grey-Brown Basement Gneiss Contact. 88KU-07

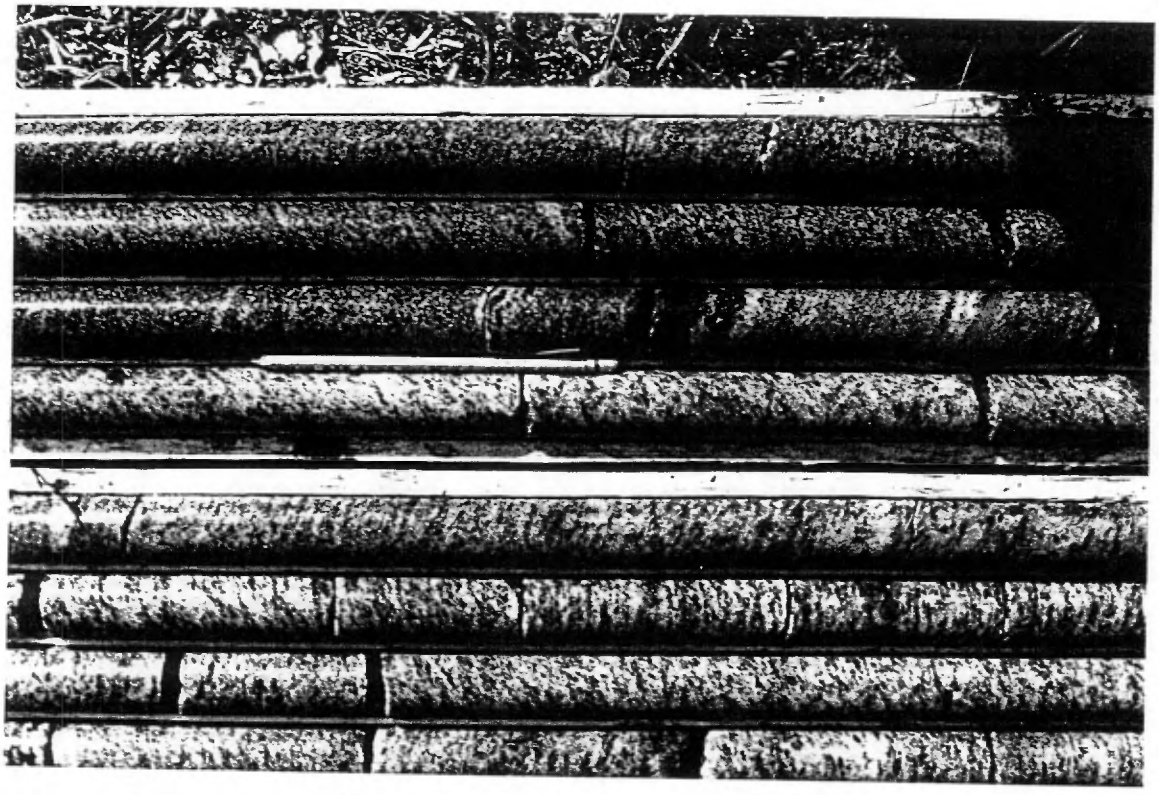


Photo 4: Syenite and Pink Basement Gneiss Contact. 90KBZ-04, 58.3 m.

Photo 5: Syenite/Calc-Silicate Unit - Basement Gneiss Contact. Trench 7

Photo 6: Basement Gneiss. Trench 11

Calc-Silicates

Four main calc-silicate rock types were mapped by Meusy in the trenches; dark green massive rock, silver-grey pyroxenite, grass green rock and calcite marble. Meusy also mapped a calcite-diopside-feldspar rock in Trench 2 at its intersection with Trench 4 (Photo 7). He did not recognize this rock type elsewhere in the Main Zone, although it may be more common than reported as it is easily confused with some of the syenitic rocks. This rock type was logged as dark green rock in the 1990 drill core and has been included with the dark green rock on the maps and sections.

i) *Silver-grey pyroxenite* is a rock unit name retained from the 1988 drilling program, however, in 1990 the silver-grey pyroxenes were identified in the field as amphiboles, probably tremolite, and thus the rock is actually an amphibolite. The rock is a silver-grey colour on well-polished weathered surfaces and in drill core. On a freshly broken surface the rock is a mosaic of greenish-black to bluish-grey stout amphiboles in a light grey to white feldspar groundmass. It may contain minor phlogopite and common accessories are mosandrite and purple fluorite. It is a very common rock type (Photos 8 and 9).

ii) *The dark green rock* is fine to medium-grained and massive, it typically contains dark green pyroxene (65%), plagioclase (30-35%) and accessory zircon and sphene (Photo 11). The calcite-diopside-feldspar facies of the dark green rock, noted previously, was also observed in a few 1990 drill holes. The typical composition of this rock is pyroxene (30-35%), biotite (15-20%), feldspar

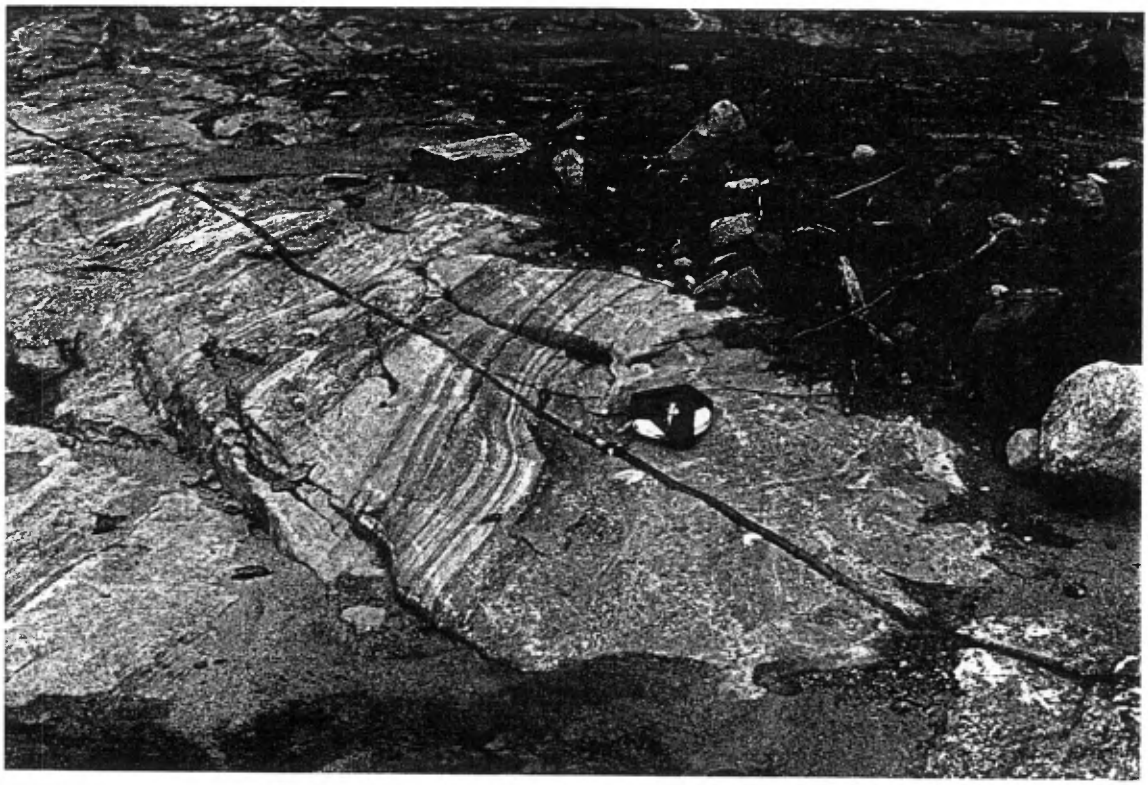


Photo 7: Mafic Syenite/Pyroxenite - Banded Calc-Silicate Rock Contact. Trench 2.

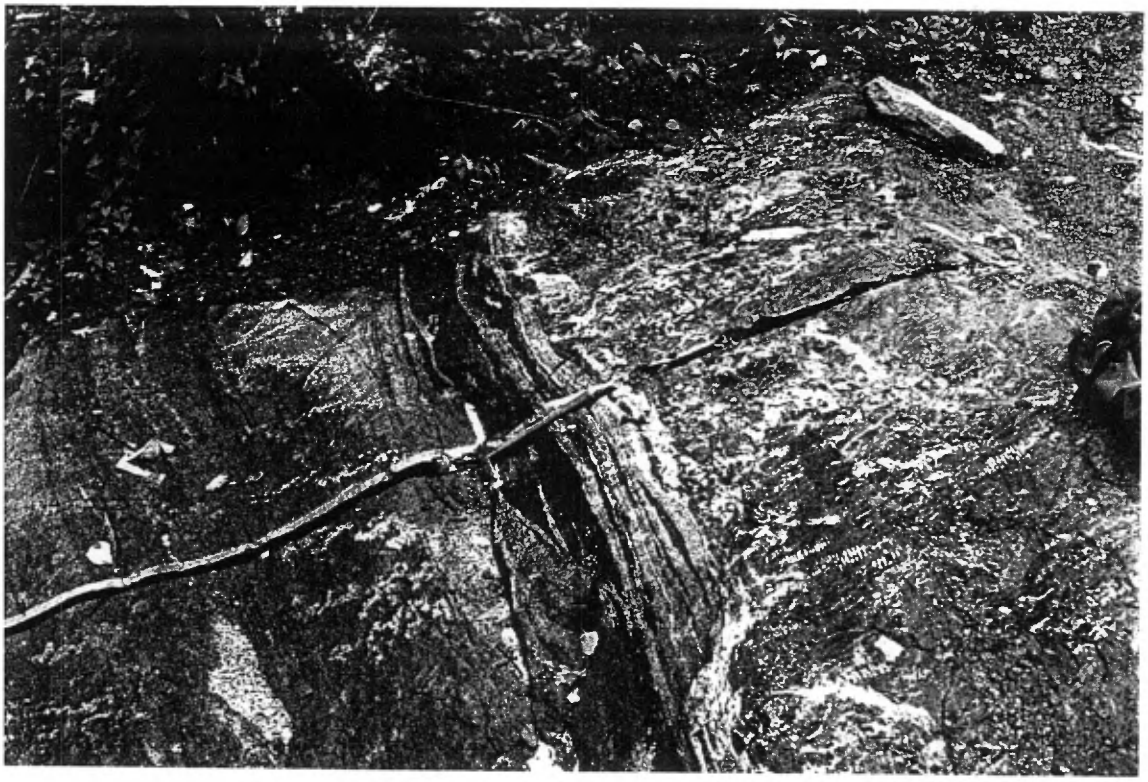


Photo 8: C.g. Silver-Grey Pyroxenite-Leucocratic Syenite Contact. Black Layer Is Amphibolite. Trench 3.

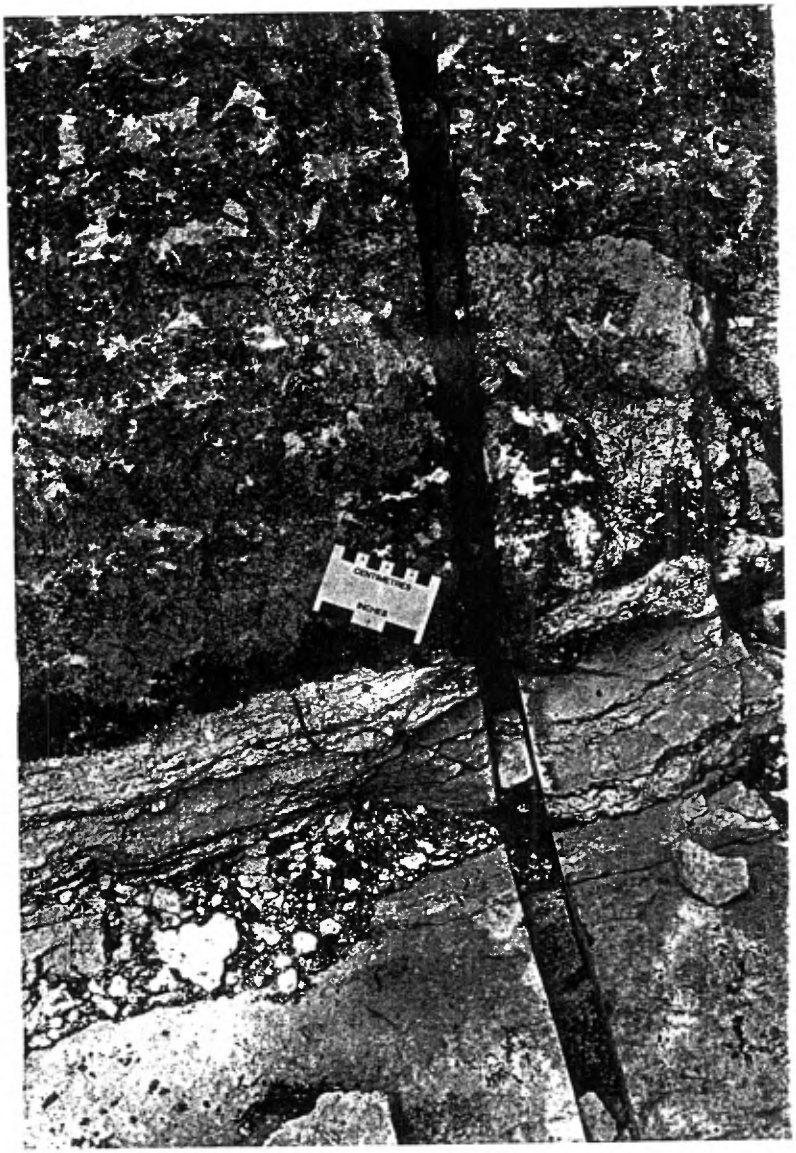


Photo 9: Same Contact as Photo 8 in Trench 8.

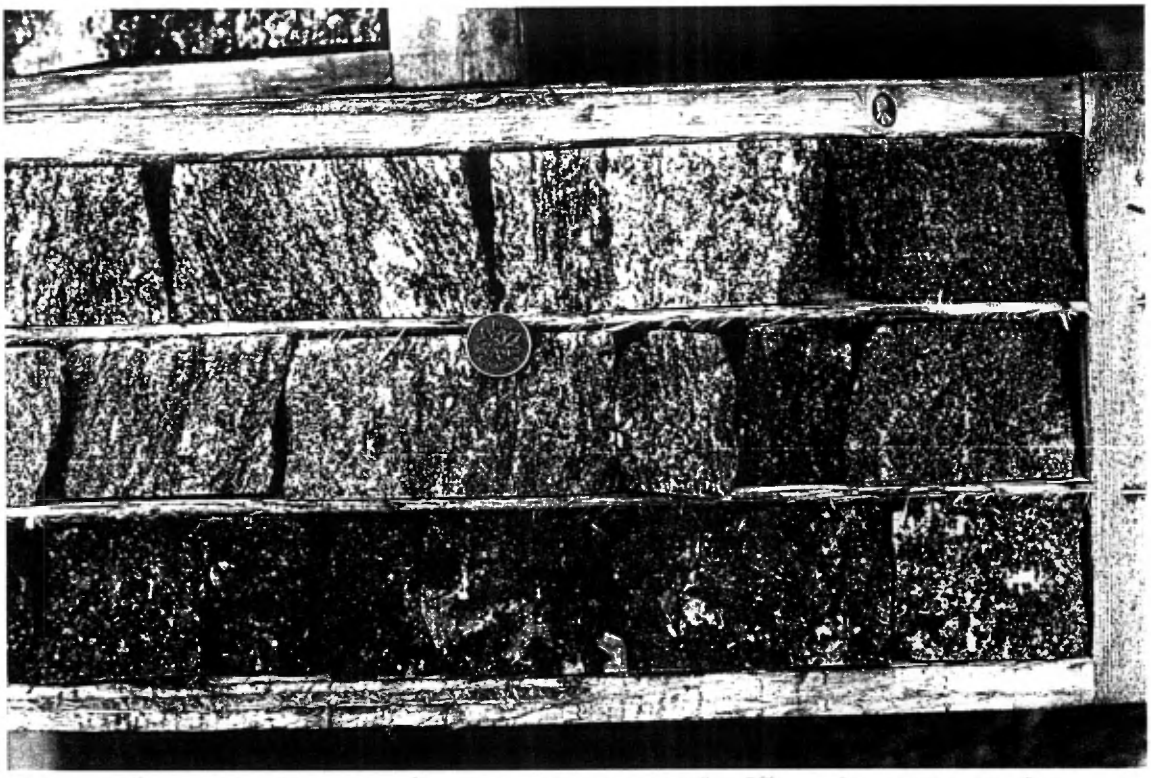


Photo 10: F.g. Syenite, Grass Green Rock, Silver-Grey Pyroxenite
90-KU-28, 5.8-8.8 m

(40-45%), minor graphite, fluorite, trace galena and in one drill hole, significant disseminated pyrite.

iii) *The grass green rock* is grass green to pistachio green in colour, fine grained, granular and very friable. The main constituent of this rock is a grass green mineral tentatively identified in the field as diopside. Phlogopite may be locally abundant and the most common accessory mineral is pink zircon. Minor accessories include fluorite and calcite. In some specimens the grass green diopside shows a pronounced lineation. This rock type is fairly common in the Main Zone (Photo 10).

iv) Outcrops of the *calcite-marble* rock type tend to weather as depressions as seen in Trench 3 (Photo 12). When pure, the rock is buff, medium grained and massive, containing 80-90% calcite (Photo 13). However, it usually contains significant amounts of phlogopite (amber) and chondrodite (orange-yellow). Fine grained pale emerald green varieties may contain up to 10-15% of a light olive green translucent mineral tentatively identified in the field as forsterite. The marble may also contain up to 10% diopside and a few percent purple fluorite. Calcite marble occurs in Trenches 3, 7, 8, 10 and 11, in all 1988 drill holes and in the deepest 1990 drill holes.

Syenite Gneiss

Muesy mapped four (4) syenite rock types in the trenches: leucocratic syenite, mesocratic syenite, mafic syenite/black pyroxenite and augen syenite gneiss. Rare

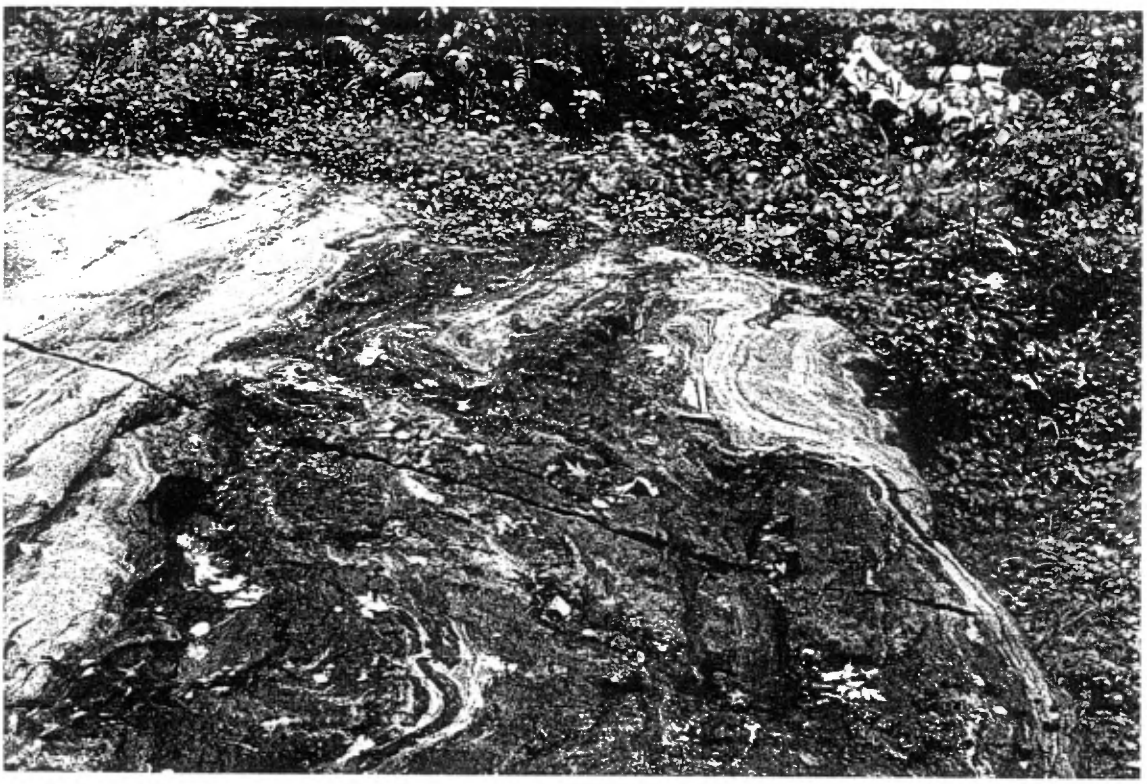


Photo 11: Dark Green Rock and Light Grey Syenite Gneiss. Trench 3.

Photo 12: Calcite-Marble. Trench 3. Note Recessive Weathering

small leucocratic syenite pegmatite bodies are also included in this unit (Photos 16 and 17). As contacts between the leucocratic syenite and mesocratic syenite are extremely gradational and a distinction between the two rock types very subjective, both rock types were combined into one unit on the maps and sections.

i) *The leucocratic syenite* is a white to pale grey, fine to medium grained, weakly to moderately foliated rock. The rock is composed of over 90% white feldspar; probably sodic plagioclase. Mafic minerals are usually amphibole but pyroxene may be present.

ii) *The mesocratic syenite* is typically medium grey, medium grained and often displays a prominent lineation due to the alignment of acicular mafic minerals. Average composition is 60-75% sodic plagioclase and 15-35% mafic minerals including both amphibole and pyroxene. "Creamy stubby" accessory minerals may be quite common. This is the most common rock type in the calc-silicate/syenite unit.

iii) *Mafic syenites and black pyroxenites* generally occur together therefore they have not been differentiated in the mapping. Both rocks are mafic, massive and primarily composed of black to dark green subhedral stubby pyroxene. Grain size varies from medium in the mafic syenite to coarse to very coarse (up to 2cm) in the black pyroxenite (Photo 14). Typical composition of the mafic syenite is black pyroxene (50-60%) and sodic plagioclase (35-45%). Eudialyte, mosandrite and miserite are common accessory minerals in both rock types. Pyrite is sometimes present.

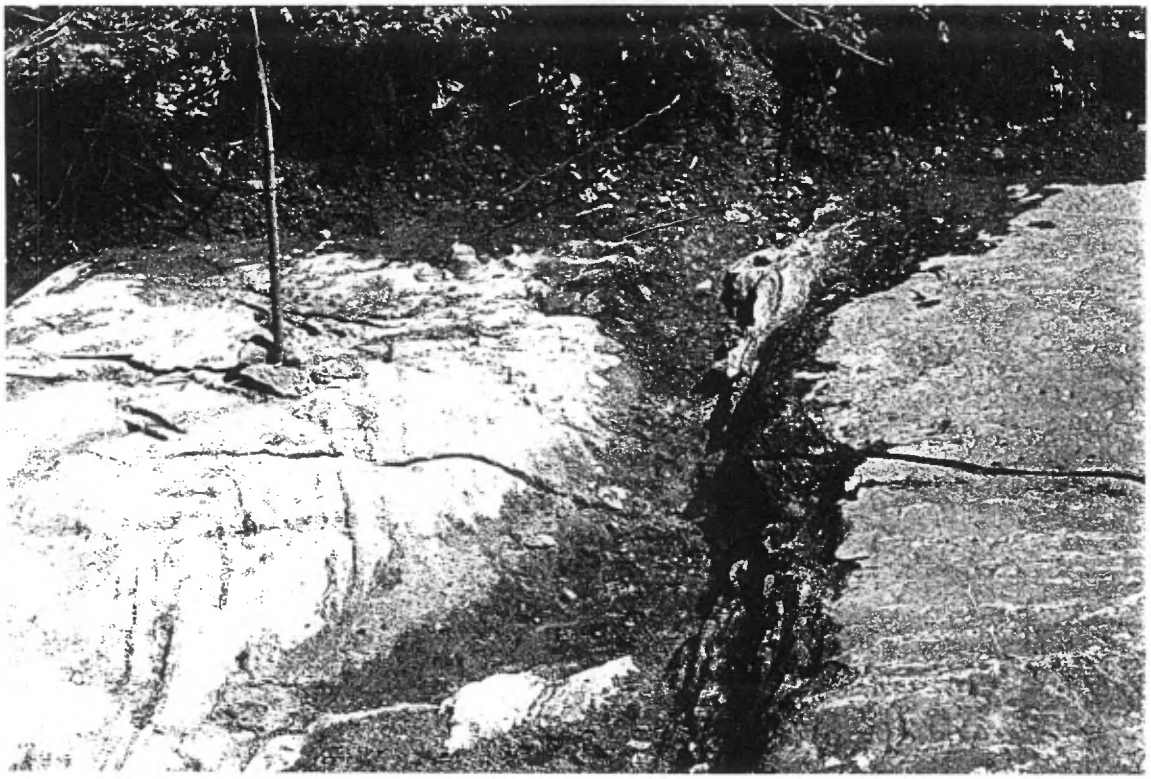


Photo 13: Calcite-Marble. Trench 11.

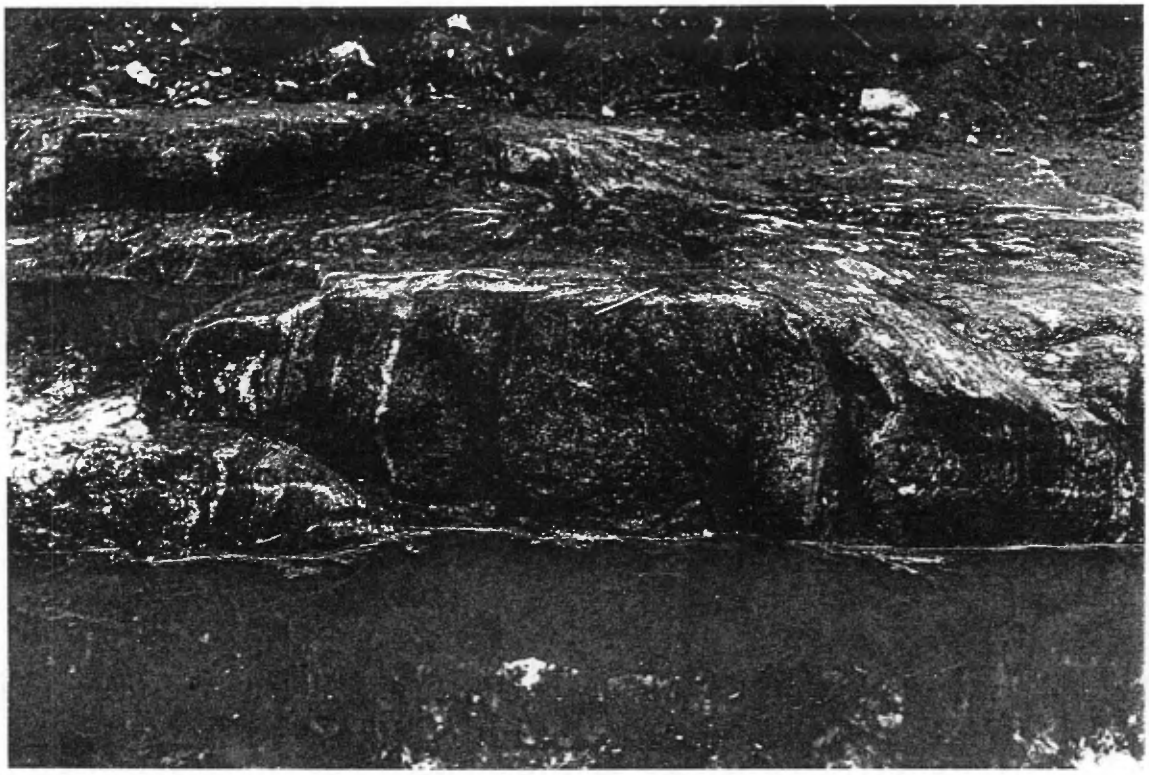


Photo 14: Pyroxenite Lens At North End of
Trench 1. Note Steep Dips.

iv) *The augen syenite gneiss* is very characteristic both in outcrop and core (Photo 15). The diagnostic features are the remarkably thin, pervasive, often contorted foliation and the presence of biotite. Centimetric feldspar augen are also diagnostic but scarce, hence maybe altogether missing in a hand specimen. Also characteristic but not always present are fine amphibole needles up to 7-10mm long. Typically outcrops are rusty weathering due to the iron released during alteration of the biotite. The type specimen contains plagioclase (58%), amphibole (25%), biotite (15%) and quartz (2%).

A small body of leucocratic syenite pegmatite occurs at surface in the Specimen Pit near Trench 1 (Photo 16). This pegmatite, which consists primarily of coarse grained albite and dark green to black pyroxene, contains extremely large crystals of agrellite, eudialyte and other exotic minerals and is the main source of exotic mineral specimens from Kipawa. It is the only pegmatite of this type that is large enough to be mapped.

Peralkaline Granite Gneiss

This rock type comprises the upper unit in the Main Zone and is the most abundant rock type on the property. Typically it is a light grey to orange grey weakly foliated rock consisting of prominent orange feldspar crystals, light grey quartz grains and lineated amphibole and pyroxene mafic minerals. Grain size varies from 1mm to 8mm and quartz content from 5-20%. A characteristic specimen is composed of plagioclase (55%), orthoclase (10%), pyroxene and amphibole (20%) and quartz (15%).

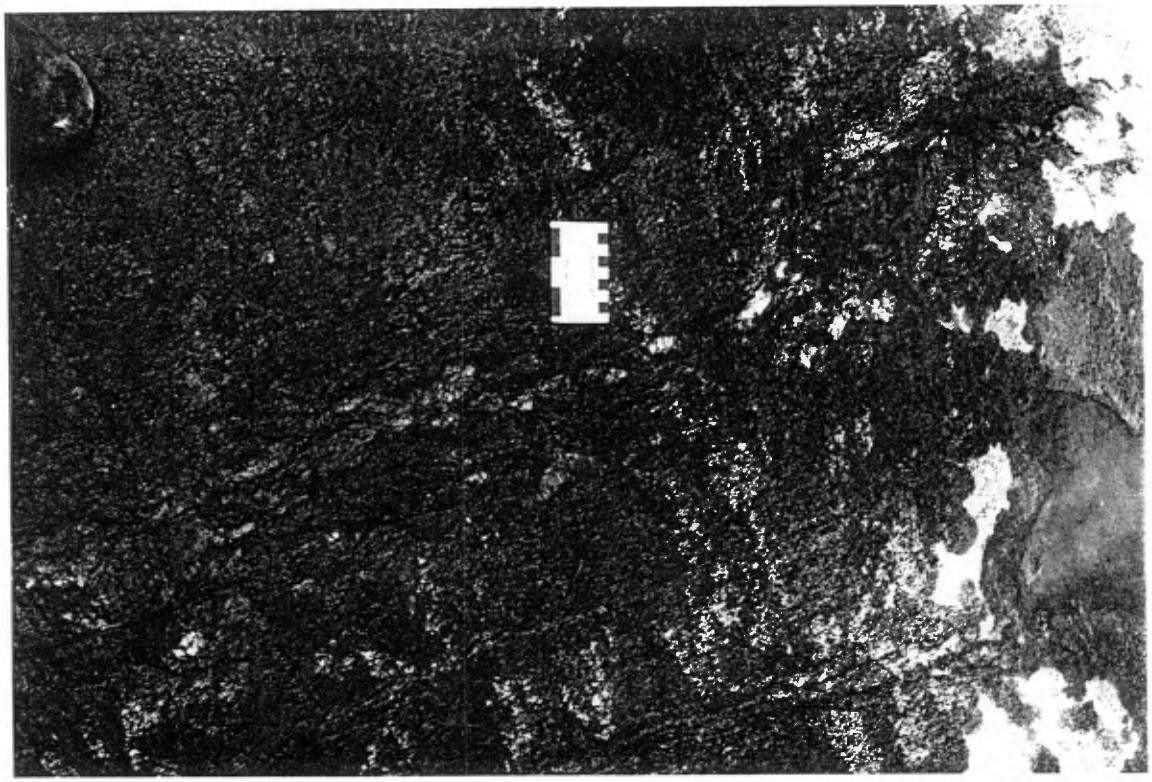


Photo 15: Augen Syenite Gneiss. Trench 12.

Photo 16: Syenite Pegmatite In Specimen Pit. Near Trench 1.

Photo 17: Syenite Gneiss with Pegmatitic Clots, Streaks and Lenses. Trench 1.

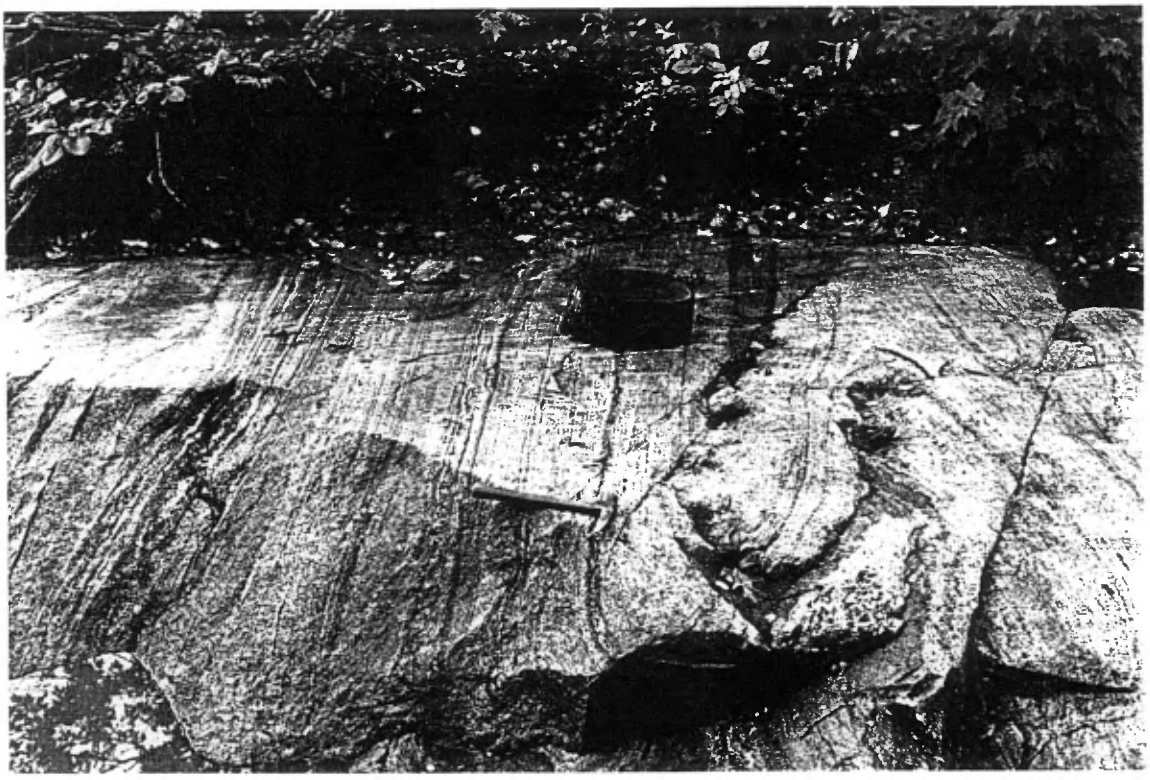


Photo 18: Peralkaline Granite Gneiss. Trench 3.

Mafic minerals are sometimes concentrated in elongated clots giving a streaky appearance to the rock. Extremely large flesh-pink feldspar crystals are locally present and quartz may be concentrated in sugary textured clots and laminae (Photos 18-23). A sugary textured quartz-rich phase that locally looks like quartzite was mapped in Trench 7, the westernmost trench in the Main Zone. In drill core the large feldspar crystals are extremely fractured and often have crushed rims (mortar texture).

Pegmatitic patches consisting of extremely coarse grained feldspar and pyroxene were also noted in the trenches and in drill core. A large outcrop of pegmatite was mapped near the bottom of Baldy Hill at 23+00 E, 5+80 S. Extremely large euhedral flesh-pink perthitic feldspar crystals up to 10cm long occur in this outcrop.

Small vugs, some of which are lined by tiny euhedral crystals (cockscomb texture) were noted in the peralkaline granite gneiss in short sections of drill core from a few holes in the southwest portion of the West Main Zone.

Cataclastic texture consisting of broken feldspar crystals, microbrecciation and incipient mylonitization was noted in drill core from holes 30, 32 and 33 in the East Main Zone. Broken crystals are hematized and some of the crushed rock matrix contains cream to white waxy minerals (possibly "creamy stubbies") in the cataclastic zones (Photos 24 and 25).

Reddish brown hematite staining is more abundant in the peralkaline granite gneiss in the southeast part of the Main Zone. Scattered hematite veinlets also occur locally in this area.

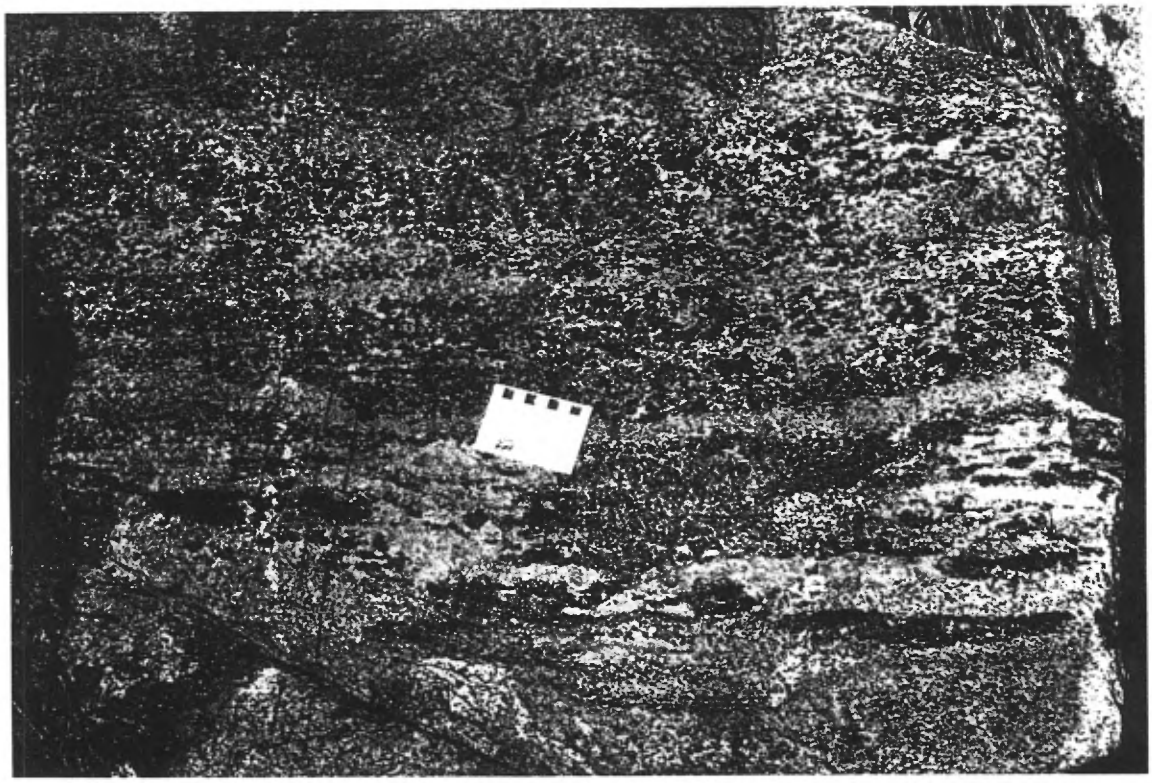


Photo 19: Peralkaline Granite Gneiss. Trench 3

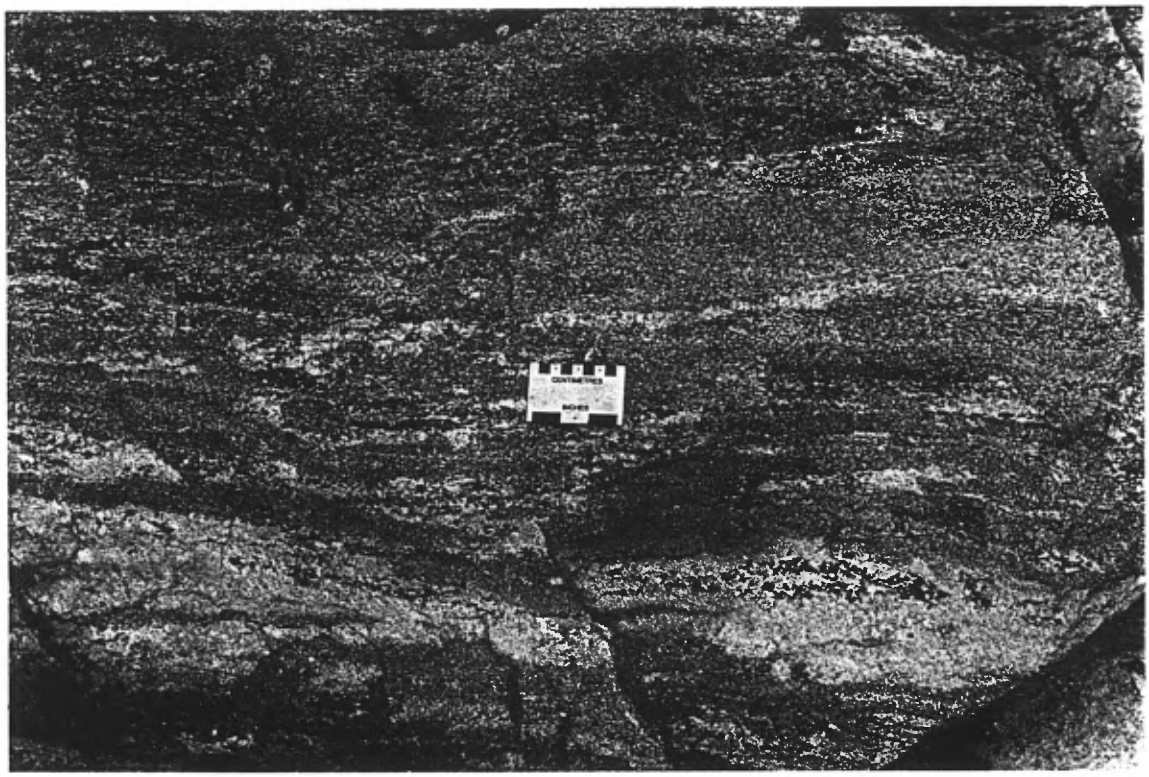


Photo 20: Peralkaline Granite Gneiss. Trench 6.

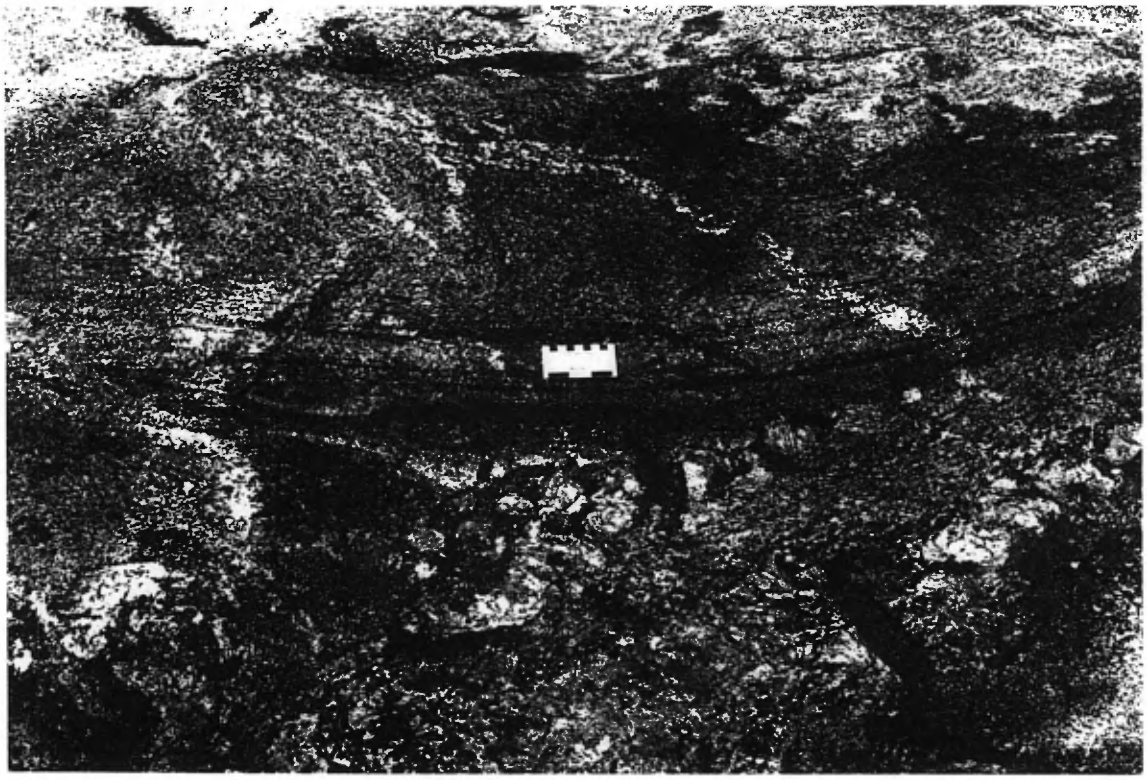


Photo 21: Peralkaline Granite Gneiss. Trench 4.

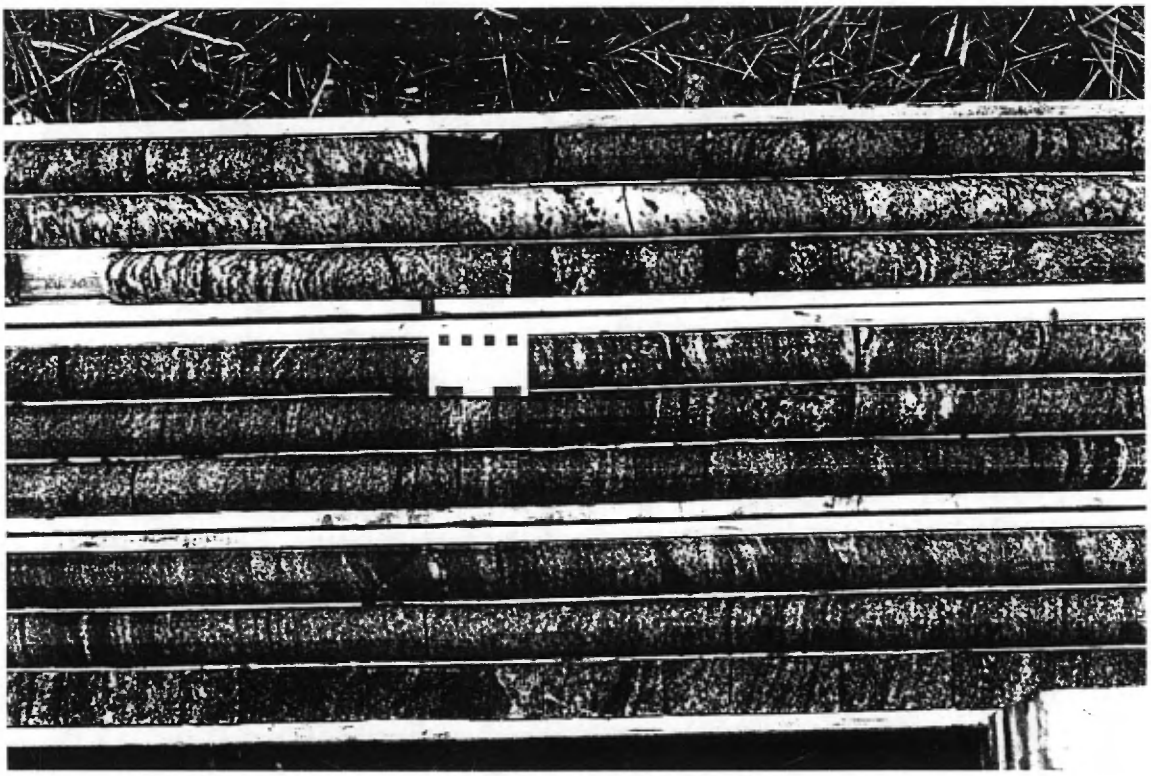


Photo 22: Peralkaline Granite Gneiss. Note Orange Coloured Weathered Intervals Near Top.
90-KU-26, 2.4-11.3 m.

Photo 23: Peralkaline Granite Gneiss
90KU-16, 29.6 - 40.0 m

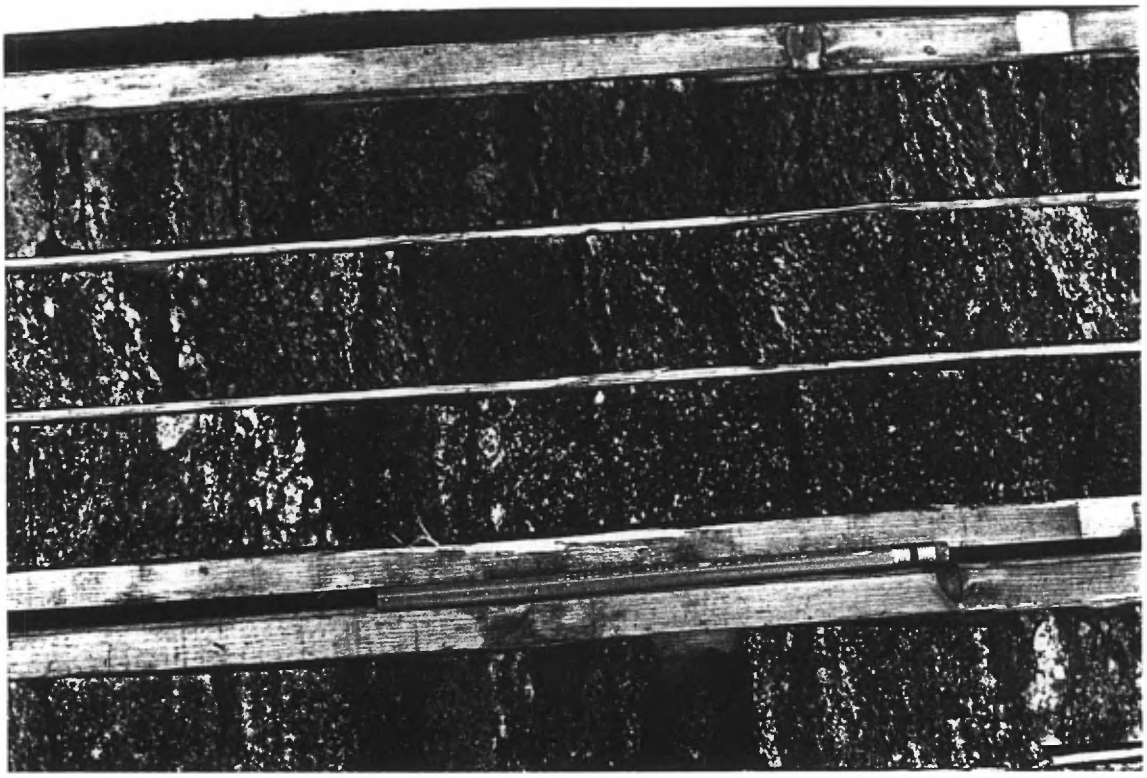


Photo 24: Hematization, Mylonitization and
Microbrecciation In Peralkaline Granite Gneiss.
90KU-32, 26.5 - 30.5 m

Photo 25: "Creamy Stubbies" In Mylonitized Zone.
90KU-32, 26.5 - 30.5 m.

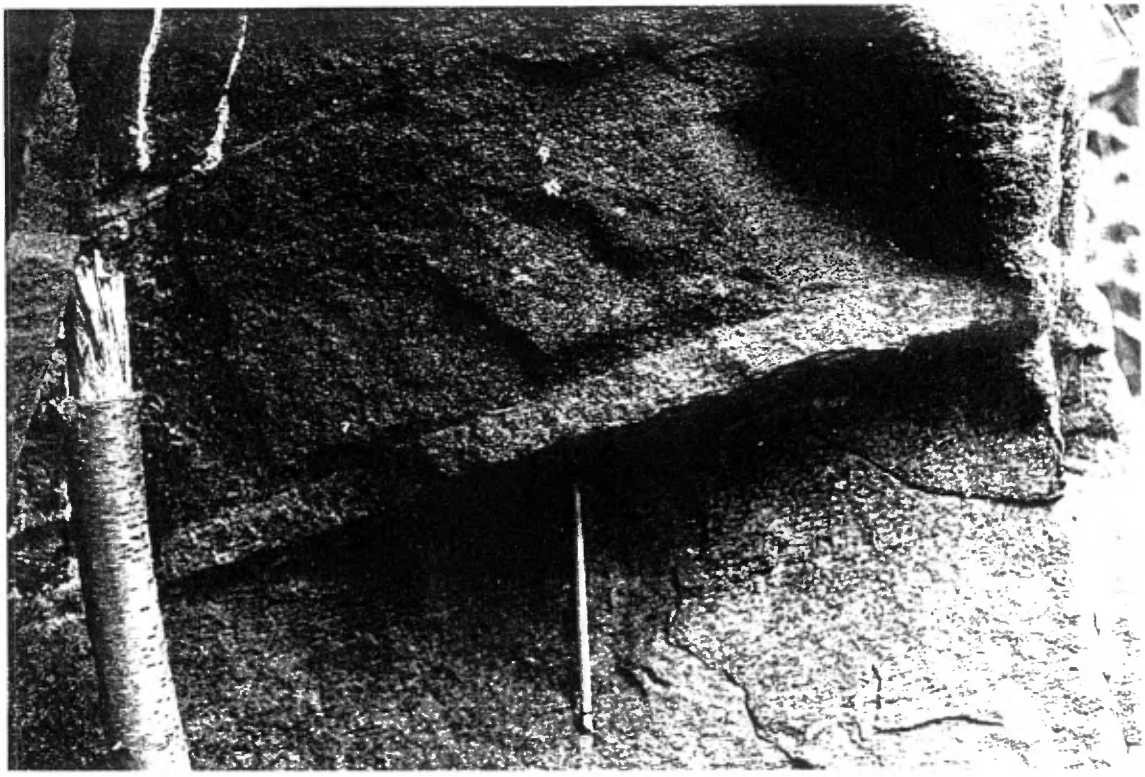


Photo 26: Dark Grey Mica-Rich Layer In
Peralkaline Granite Gneiss. Baldy Hill.

Narrow layers of dark grey to black micaceous rock (biotite schist) with excellent foliation have been mapped in the peralkaline granite gneiss unit. These layers, which vary from <1 metre to 20 metres thick, have sharp contacts and appear to be fairly continuous laterally. One fairly continuous layer has been mapped in the trenches about 10-30 metres south of the peralkaline granite contact. Other micaceous layers were seen on Baldy Hill (Photo 26).

Stratigraphic Relationships in the Calc-Silicate/Syenite Gneiss Unit

Calc-silicates occur as irregular layers, lenses and pods in syenite gneiss between the underlying basement gneiss and the overlying peralkaline granite gneiss.

Specific calc-silicate rock types appear to occur at certain stratigraphic levels in the section although more detailed study is required to confirm this interpretation.

One to three distinct layers of calcite-marble have been exposed in trenches and intersected in drill holes in the lower part of the calc-silicate/syenite unit along the length of the Main Zone. Individual layers are difficult to correlate between trenches and from hole to hole as they appear to pinch and swell along strike.

The dark green calc-silicate rock is often found immediately above the calcite-marble and intimately associated with the grass green rock. The calcite-diopside-feldspar facies of this rock type occurs discontinuously immediately below the mafic

syenite/black pyroxenite unit. The grass green unit and the silver grey pyroxenite unit occur mainly in the upper part of the calc-silicate/syenite unit.

Leucocratic and mesocratic syenite gneisses are the most common rock type in the unit and occur throughout the section. They are interlayered and sometimes complexly interfolded on a small scale with the calc-silicate rocks (Photo 27).

The mafic syenite/pyroxenite rock type occurs near the top of the unit. It is the main host rock for eudialyte and exposures of this rock type are most abundant in the West Main Zone. This rock type appears to narrow into two and sometimes three discontinuous layers toward the southeast. Although thinner than in the West Main Zone, it is also the major host rock for eudialyte in the East Main Zone.

An augen syenite gneiss formation occurs in the upper portion of the calc-silicate/syenite unit below the mafic syenite/pyroxenite formation. It is a good marker horizon in the eastern part of the West Main Zone.

Overall, calc-silicates are more abundant in the lower portion of the calc-silicate/syenite unit. A somewhat hypothetical boundary has been drawn between the lower calc-silicate dominant part of the calc-silicate/syenite unit and the upper syenite dominant part of this unit. This boundary, which is shown on the maps and sections, coincides with the top of the uppermost marble-calcite formation in a number of trenches. The yttrium-bearing mineral assemblage, as discussed in a later section, also changes from the syenite dominant to calc-silicate dominant portion of the calc-silicate/syenite unit across this interpretational boundary (Figure 8).

Microfilm

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PRÉSENTES PAGES STANDARDS

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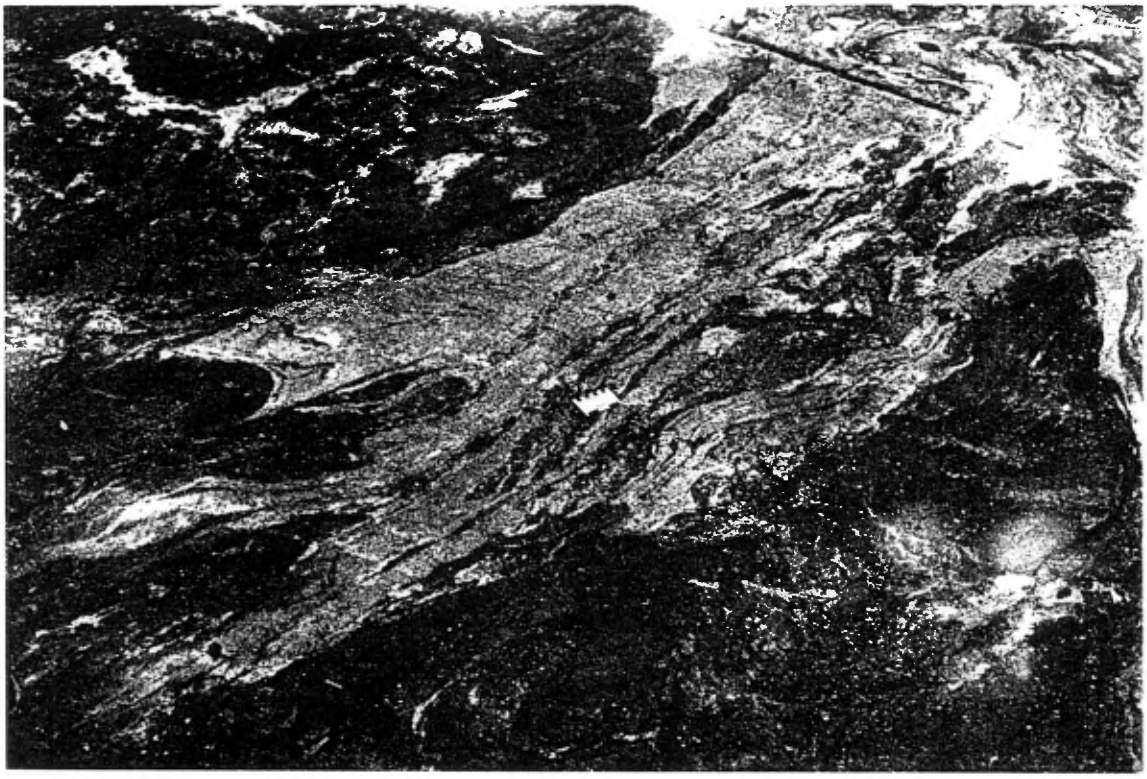


Photo 27: Swirly Contorted Layers of
Syenite In Dark Green Rock. Trench 8.

Photo 28: Anticlinal Fold Structure In Syenite Gneiss. Trench 1.

Structure

The footwall contact of the peralkaline complex strikes northwest and dips 25-35° to the southwest in the Main Zone. The main rock types in the calc-silicate syenite unit are generally conformable with the basement contact. Foliation in the basement gneiss and foliation and lithologic contacts in the calc-silicate/syenite unit are parallel with the basement contact although foliation attitudes are quite variable in contorted and folded layers in this unit.

The upper part of the calc-silicate/syenite unit has been folded into broad open flexures in the West Main Zone (Photos 28 and 29). As the trenches are cut on a slope that is almost a dip slope, the traces of foliation in the bottom of the trenches gives one the impression that the folding is much more severe and complicated than it really is. The axes of these flexures tend to parallel the curving peralkaline granite/syenite gneiss contact in the West Main Zone and plunge gently to the northwest and southeast.

A narrow, poorly defined, west trending, structurally anomalous zone characterized by steep dips and coarse grained agrellite-eudialyte-miserite veins, is exposed in the upper part of Trench 2 and Trench 4. This zone may pass through the northern portion of Trench 1 and the Specimen Pit where steep dips have been measured (Photo 14). This zone may represent a zone of intense deformation in which metamorphic pegmatites such as the pegmatite in the Specimen Pit and the coarser grained vein-like concentrations of eudialyte, agrellite and miserite were produced.

Photo 29: Flexure In Peralkaline Granite Gneiss. Trench 1.

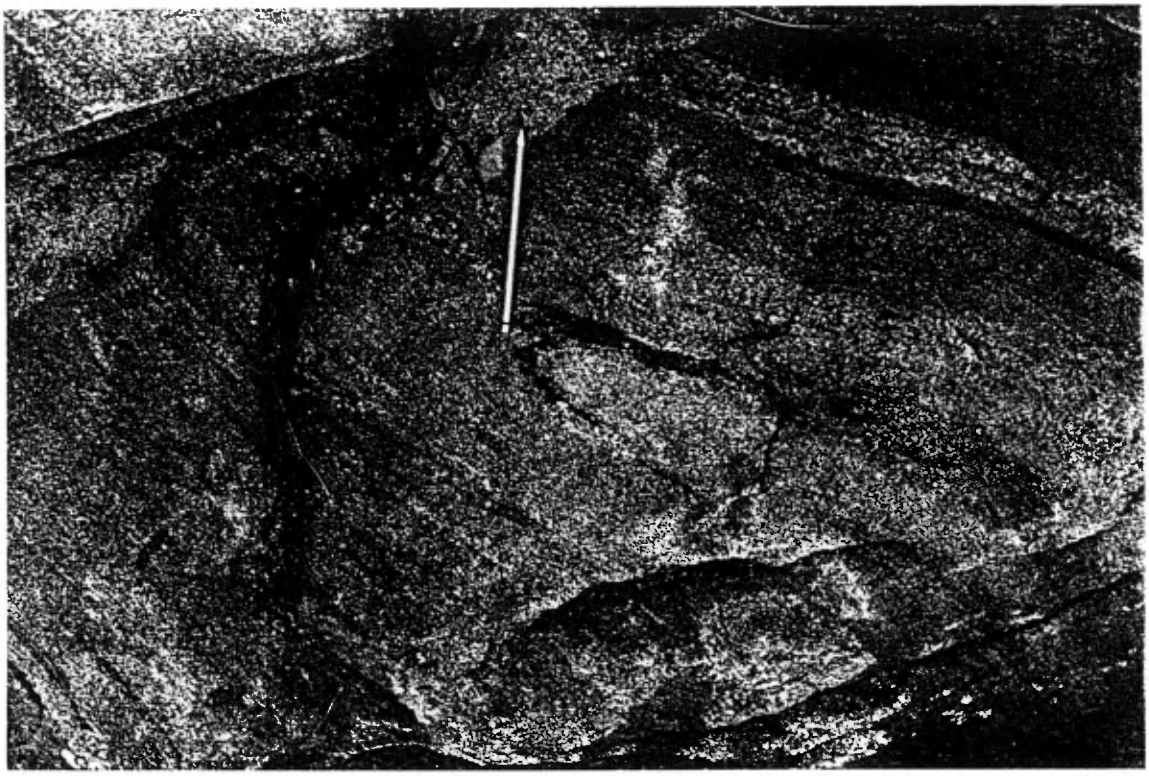


Photo 30: Isoclinal Fold. Trench 1.

A few small scale, similar isoclinal folds were noted in Trenches 1, 3, 5, 6, 8 and 12. These folds appear to be intralayer shear folds of small amplitude (<1 metre to a few metres) which do not affect the overall strike and dip of the major rock formations (Photo 30). Meusy has speculated that the Main Zone may be a large recumbent fold whose axis strikes northwest and is nearly horizontal (see Figure 12). He bases this hypothesis on the observation that the north end of the Main Zone is thick, bulgy and abrupt and the southern edge is thin, stringy and gradational. Also he notes that erratic strikes and dips can be observed along the north contact whereas attitudes are gentle and conformable along the south contact. Although his observations are valid there is no documented repetition of stratigraphy in the drill holes that might support his hypothesis.

Meusy noted abrupt changes of attitude in the foliation within a given rock type, or between two different rocks types in conformable contact, in some places in the trenches. Where this abrupt change takes place between green rock and syenite, it may be explained by the intrusion of syenite into the calc-silicates, resulting in the incorporation and rotation of calc-silicate xenoliths in the syenite.

Meusy also noted the lack of brittle deformation such as flexures, faults, breccia zones etc. in the rocks of the Main Zone during his trench mapping.

Drag folds were mapped in the basement gneiss near its contact with the peralkaline complex in Trenches 10 and 11 (Photo 32). A possible explanation for these folds is that they were produced by fault movement, possibly thrust faulting, along the basement-peralkaline complex contact. There is, however, no evidence of faulting along this contact in drill holes or in surface exposures.

FIGURE 12

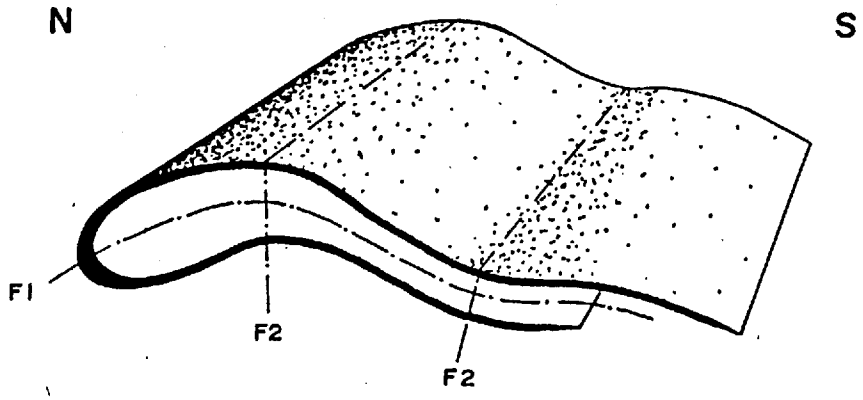


Diagram showing the possible structure of the Main Zone

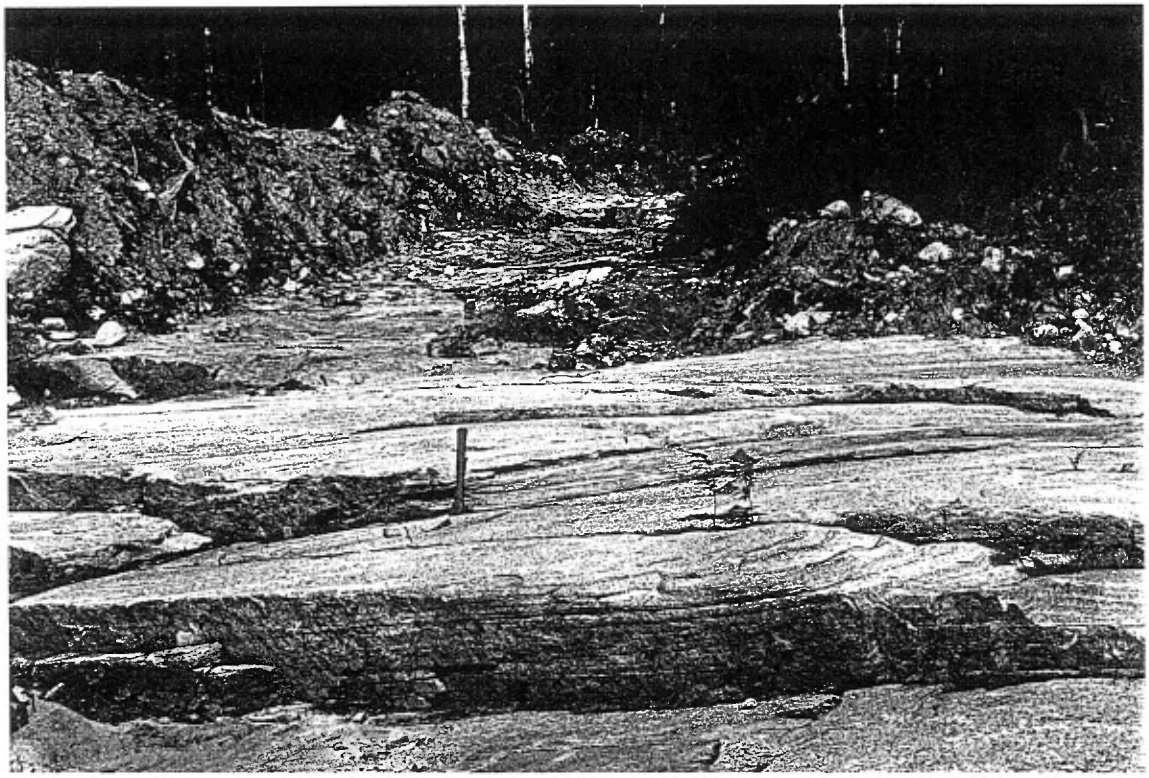


Photo 31: Gently Dipping Foliation In Peralkaline Granite Gneiss. Trench 1.

Photo 32: Drag Fold In Basement Gneiss. Trench 11

It appears that significant deformation has occurred within certain rock formations in the calc-silicate/syenite unit. Although the contacts of these formations are generally parallel to the regional strike and dip, they are severely contorted internally. The mafic syenite-pyroxenite formation in contact with the peralkaline granite gneiss is also often severely contorted and the black pyroxenite often occurs as boudinaged lenticular bodies within it (Photo 33). The augen syenite gneiss probably represents a zone of movement and shearing in the calc-silicate/syenite unit. The major intraformation deformations described above occurred prior to the period of gentle folding observed in the West Main Zone.

The shape of the peralkaline granite gneiss in the Main Zone is still uncertain. This unit conformably overlies the calc-silicate/syenite unit at surface (Photos 31 and 34). However, peralkaline granite rocks were intersected in the calc-silicate/syenite unit at depth in the drill holes. It appears that these rocks have intruded the calc-silicate/syenite unit as sill-like offshoots from a more massive discordant peralkaline granite body south of the Main Zone (Figure 8). If this is the case, then the calc-silicate/syenite unit will terminate to the south against this intrusion.

The peralkaline granite contact at the east end of the East Main Zone truncates the upper "syenite dominant" portion of the calc-silicate/syenite unit at surface. The lower "calc-silicate dominant" part of this unit continues, however, to the southeast and at depth below the peralkaline granite as indicated in hole 30.

Foliations in the peralkaline granite unit as represented by streaky clots and fine laminae of mafic minerals and mineral lineations is more random than in the syenite unit. Locally, the

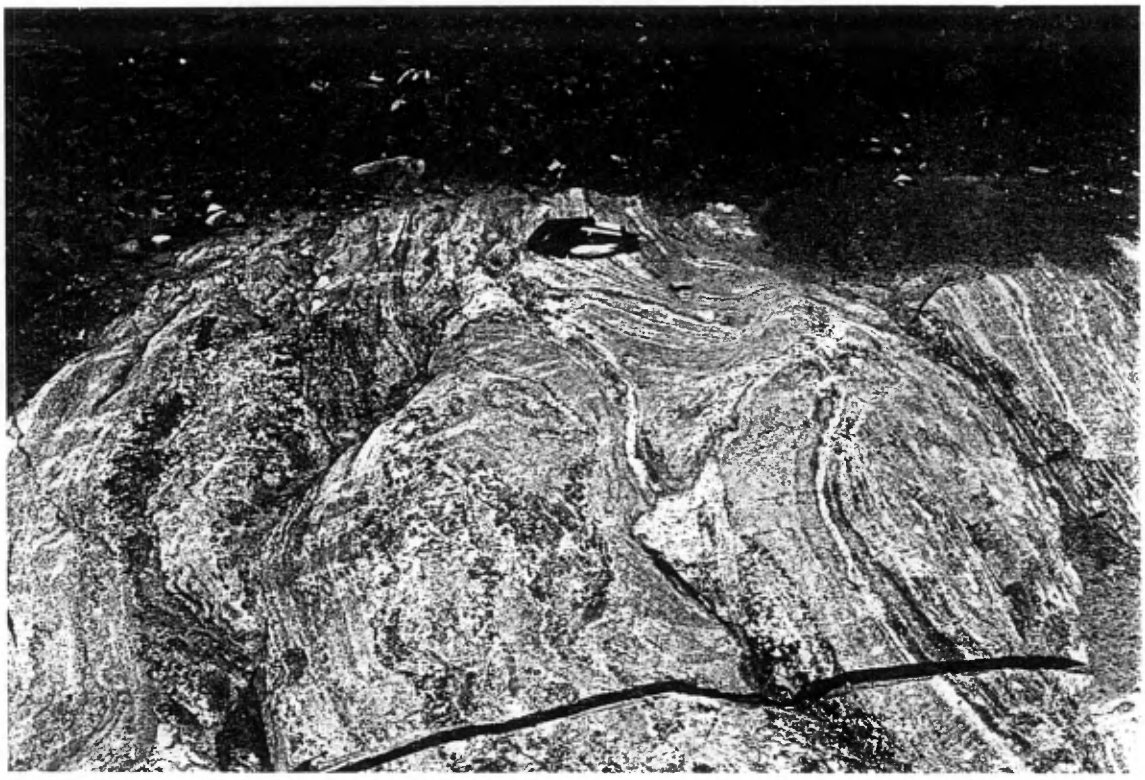


Photo 33: Folding and Boundinaging In Mafic Syenite/Pyroxenite Layer. Trench 3.

Photo 34: Pralkaline Granite Gneiss - Mafic Syenite/Pyroxenite Contact. Trench 8.

streaky clots and fine laminae define small-scale fold structures which appear to have no lateral or vertical continuity. It is possible therefore that some of this crude mineral layering or segregation in the peralkaline granite unit is a primary magmatic cumulate texture (Photos 35, 36 and 37). The peralkaline granite unit, as exposed on Baldy Hill, appears to be composed of layers of slightly differing composition with a noticeable increase in quartz toward the top of the hill. This may also indicate that in situ differentiation has occurred in this unit; possibly through crystal settling.

The presence of cataclastic textures, crushed and augen-shaped feldspar crystals, stretched vugs and metamorphic foliation in the mafic phases, indicate that the peralkaline granite unit has also been metamorphosed.

Mineralogy

A list of major rock-forming, accessory and erotic minerals identified at Kipawa appears in Table 2. Minerals containing yttrium have an asterisk.

Main Rock-forming Minerals

The main criteria that is used in the field in distinguishing between the peralkaline granite, syenite and basement gneiss units is quartz content. It is extremely difficult to tell quartz from albite in the field as both are transparent glassy minerals. Therefore the distinction between syenite, quartz syenite and granite is difficult.

Rocks may also be distinguished by the presence, absence or concentrations of other major rock forming and accessory minerals. For example, soda amphiboles and

TABLE 2

TABLE OF MINERALS ON THE KIPAWA CLAIMS

modified after Sherer - 1986

1. Essential Minerals

Albite	$Na\ Al\ Si_3O_8$	Arvedsonite	$Na_3\ Fe_4\ Al(OH)_2\ Si_8O_{22}$
Microcline	$K\ Al\ Si_3O_8$	Forsterite	$Mg_2\ SiO_4$
Plagioclase	$(Na,Ca)\ Al(Al,Si)\ Si_2O_8$	Phlogopite	$K\ Mg_3Si_3Al\ O_{10}\ (F,OH)_2$
Aegirine	$Na\ Fe\ Si_2O_6$	Quartz	SiO_2
Augite	$(Ca,Na)(Mg,Fe,Al,Ti)(Si,Al)_2O_6$	Calcite	$CaCO_3$
Diopside (Salite)	$Ca\ Mg\ Si_2O_6$	Dolomite	$CaMg(CO_3)_2$

2. Accessory Minerals

Biotite	$K(Mg,Fe)_3(Al,Fe)Si_3O_{10}(OH,F)_2$	Gittinsite	$CaZrSi_2O_7$
Apatite	$(Ca,Ce)_5(PO_4)_3F$	Vlasovite	$Na_2Zr\ Si_4O_{11}$
Zircon	$ZrSiO_4$	Dalyite	$K_2ZrSi_6O_{15}$
*Fluorite	$(Ca,Y)F_2$	*Hiortdahlite	$(Ca,Na)_{13}Zr_3Si_9(O,OH,F)_{33}$
Sphene	$CaTiSiO_5$	*Agrellite	$Na(Ca,Y)_2Si_4O_{10}F$
Nepheline	$(Na,K)AlSiO_4$	*Miserite	$K\ Ca_5\ Si_8\ O_{22}(OH)F$
Apophyllite	$K\ F\ Ca_4(Si_2O_5).8H_2O$	*Mosandrite	$(Na,Ca)_3Ti\ (SiO_4)_2F$
Chondrodite	$(Mg,Fe)5\ (SiO_4)_2(F,OH)_2$	*Thorite	$ThSiO_4$
*Eudialyte	$Na_2Ca_2ZrSi_6O_{17}(OH,Cl)_2$	*Britholite	$(Y,Ce,Ca)_5(SiO_4,PO_4)_3(OH,F)$

3. Minor Accessory Minerals

Pyrochlore	$(Na,Ca)_2Nb_2O_6(OH,F)$	Gaidonnayite	$(Na,K)_2Zr\ Si_3O_9.H_2O$
*Keilhauite	$(Y,Ca)(Al,Ti)O(SiO_4)$	Pyrite	FeS_2
*Unnamed Ti Silicates	Ti,Si,Ca,LLn,Y,Al,Pb,Nb,Zr,U	Pyrrhotite	$Fe_{1-x}S$
Carbocernaite	$(Ce,Na,Sr,Ca)CO_3$	Sphalerite	$(Zn,Fe)S$
Bastnasite	$CeCO_3F$	Galena	PbS
Parisite	$Ce_2Ca(CO_3)_3F_2$	Magnetite	Fe_3O_4
Th-Monazite	$CePO_4$	Hematite	Fe_2O_3
Pectolite	$NaCa_2Si_3O_8(OH)$	Graphite	C
		*Allanite	$(Y,Ce,Ca)_2(Fe,Al,Mg)_3(SiO_4)(Si_2O_7)O(OH)$

*Minerals containing yttrium

Photo 35: Peralkaline Granite Gneiss. Baldy Hill

Photo 36: Close-Up of Photo 35

Photo 37: Typical Orange Peralkaline Granite Gneiss. Baldy Hill.

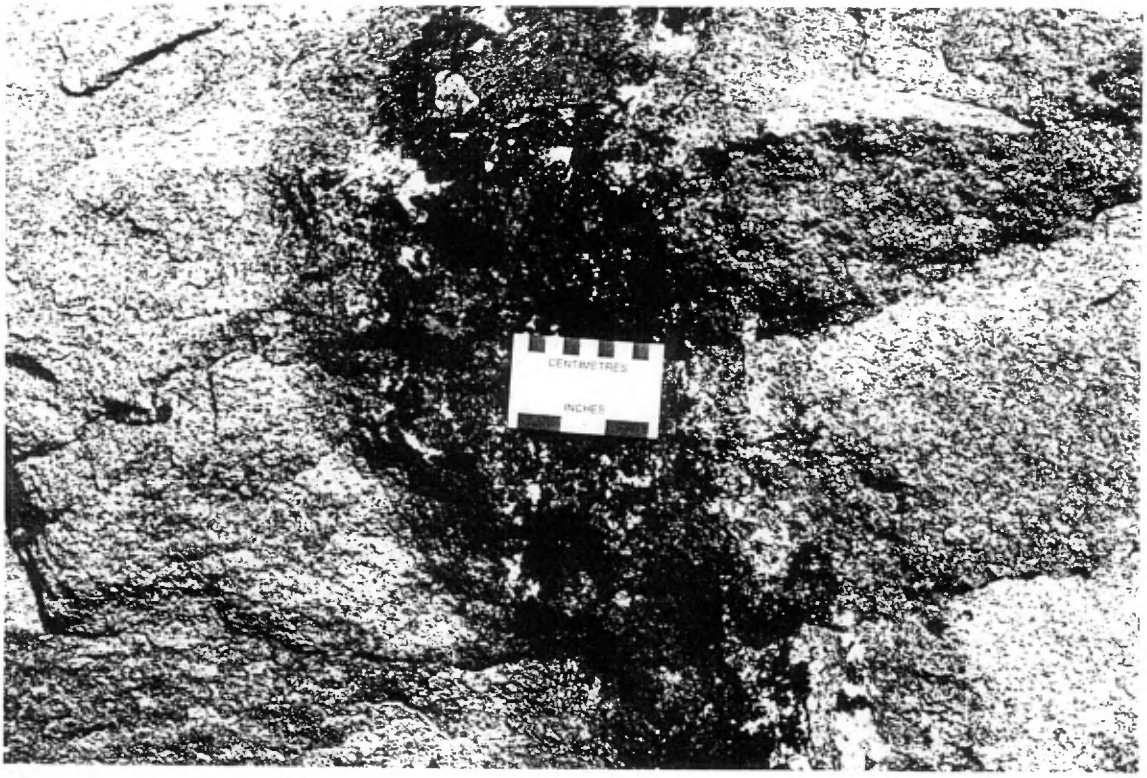


Photo 38: Pegmatite Dyke In Pink Peralkaline Granite Gneiss. Baldy Hill. Assay Sample 13976.

pyroxenes occur in alkalic syenites and granitic rocks, diopside and phlogopite mica in some of the calc-silicate rocks and non-sodic mafic minerals in the basement gneiss. Sodic feldspar and microcline are characteristic of the alkalic rocks. Nepheline is locally present in the syenite and calcite may also be present in the syenite and as a major constituent of some of the calc-silicate rocks.

The concentration of biotite may also be indicative of certain rock types; biotite is more abundant in the basement gneisses and possibly in the peralkaline granite gneiss than in the syenite gneiss. Also biotite-rich and tremolite (richterite?)-bearing rocks in the calc-silicate/syenite unit are probably calc-silicate rocks. Olivine and serpentine, although quite rare, may also occur in the calc-silicate rocks.

Accessory and exotic minerals are abundant in the calc-silicate/syenite unit and in the peralkaline granite near its contact with this unit. These minerals are very rare to absent in the basement gneiss.

Many of the characteristic minerals cannot, however, be identified with any degree of confidence in the field, therefore, they cannot be used as reliable criteria for field mapping. Other secondary, less diagnostic megascopic features such as the overall colour and texture of the rock, relative proportion of mafic and felsic minerals and, more subtly, colour of the feldspars and relative proportion of the main mafic mineral types (biotite, amphibole and pyroxenes) are more commonly used in the field to distinguish rock types. These megascopic features can be used with some degree of confidence to map thick rock units, however, thin syenitic, granitic and basement gneiss units are impossible to tell apart without the aid of petrographic techniques i.e.

thin section examination, staining techniques etc. Down-the-hole radiometric logs can also be used to assist in distinguishing certain rock units. For example, the basement gneiss is always radiometrically flat and the peralkaline granite usually has a low radiometric response (Figure 50).

A number of mineralogical and petrographic studies have been conducted on the Kipawa rocks by Unocal and Molycorp (Johnson 1988, Mariano 1965 & 1990, and Sherer 1986 & 1990). However, none of these studies have produced petrographic descriptions of rock types or descriptions of accessory, exotic and yttrium-bearing minerals that can be used directly by the field geologist for field mapping, core logging and mineral identification.

Accessory and Exotic Minerals

As noted in a preceding section, accessory and exotic minerals are concentrated in the calc-silicate/syenite unit and in the peralkaline granite near its contact with this unit.

The most common accessory minerals in the Main Zone are zircon, "creamy stubbies," fluorite, apatite and thorite and the main yttrium bearing minerals; eudialyte, mosandrite and britholite.

Zircon is abundant as small pink-coloured grains and large euhedral crystals in the calc-silicates and syenite and, to a lesser extent, in the peralkaline granite unit (Photo 41).

The "creamy stubby" minerals (Photos 39 and 40), which occur mainly in certain syenite units and in the peralkaline granite near its contact with the calc-silicate/syenite unit, appear to be altered vlasovite consisting of a complex intergrowth of vlasovite, gittensite, zircon and quartz (G. Van Velthuizer, Canadian Museum of Nature, 1990) (Photo 42). Mariano also reported seeing gittensite replacing vlasovite in this mineral.

Purple fluorite and apatite are present in all rocks in the calc-silicate/syenite unit. Purple fluorite is very abundant locally, however the distribution of apatite is more difficult to determine as it is difficult to identify megascopically. It is suspected that apatite may be most abundant in the calc-silicate rocks. Fluorite, although present, is a rare accessory mineral in the peralkaline granite.

Thorite occurs in the calc-silicate/syenite unit and to a lesser extent in the peralkaline granite near its contact with this unit. Coarse euhedral brown and chalky white thorite crystals occur in the most radioactive intervals in the upper portion of the calc-silicate/syenite unit (Photo 43). Thorite also occurs in the hematized cataclastic zone in the peralkaline granite gneiss in the East Main Zone. It appears to be somewhat more abundant in the eastern portion of the Main Zone.

Some rare unidentified thorium minerals are also suspected to occur at Kipawa. G. Van Velthuizer has seen evidence of an unidentified thorium-yttrium-carbonate mineral (personal communication) and P.L. Roeder (September 1989) reported an unknown calcium-thorium-silicate mineral ($CaThSi_4O_{11}$) (referenced in a report by A.N. Mariano, 1990).

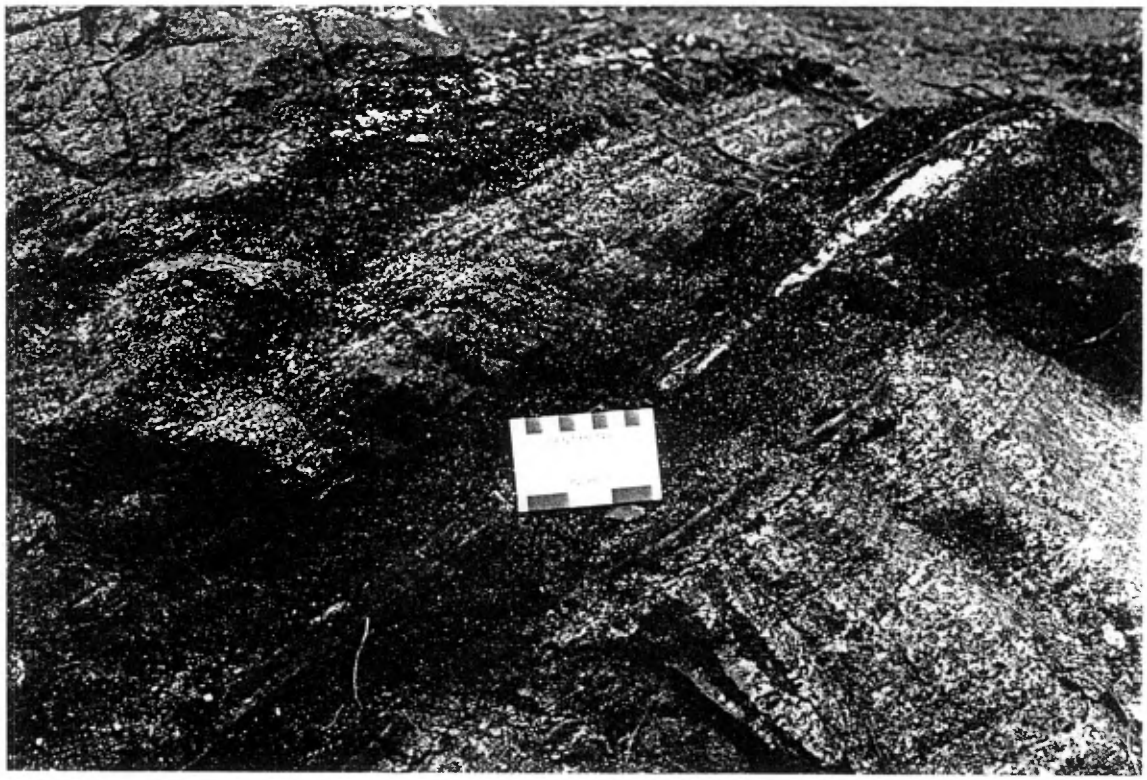


Photo 39: Biotite - Rich Layers In Syenite
Gneiss With Abundant "Creamy Stubbies". Trench 8.

Photo 40: "Creamy Stubbies" In Peralkaline
Granite Gneiss. Trench 4.

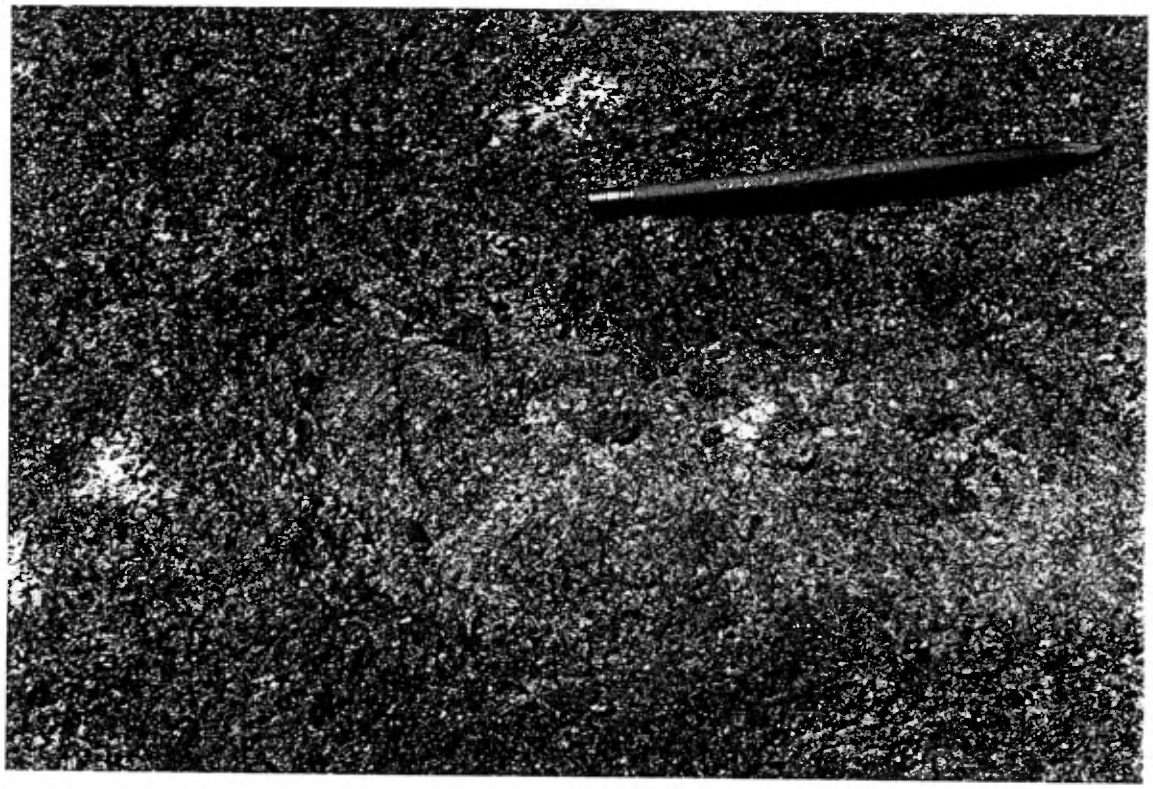


Photo 41: Coarse Zircons In Syenite Gneiss.
Trench 10.

Photo 42: Electron-Microprobe. Mixture of Gittensite (Light Grey), Zircon (White), Vlasovite (Dark Grey), Quartz (Black), In a "Creamy Stubby" Mineral.

Photo 43: Coarse Euhedral Brown and
Chalky White Thorite. Trench 13.

Photo 44: Patchy Segregations of Agrellite
In Syenite Gneiss. Trench 6.

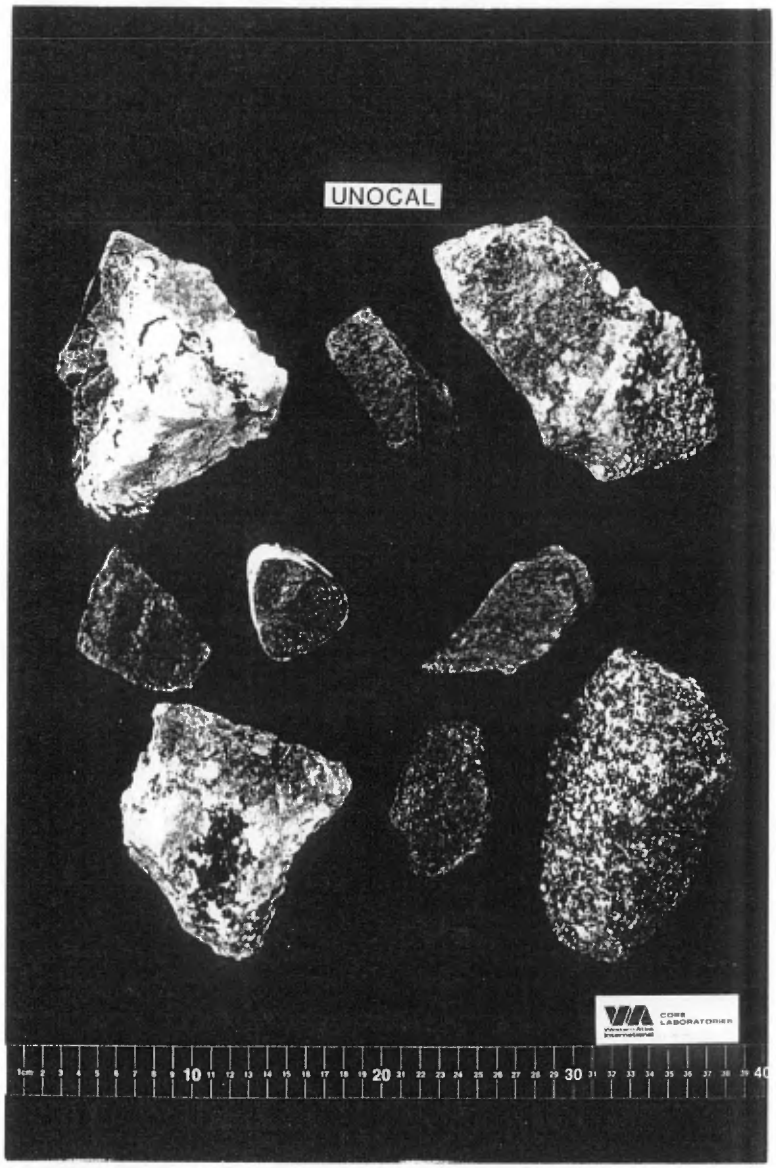
Yttrium-bearing minerals will be discussed in the next section.

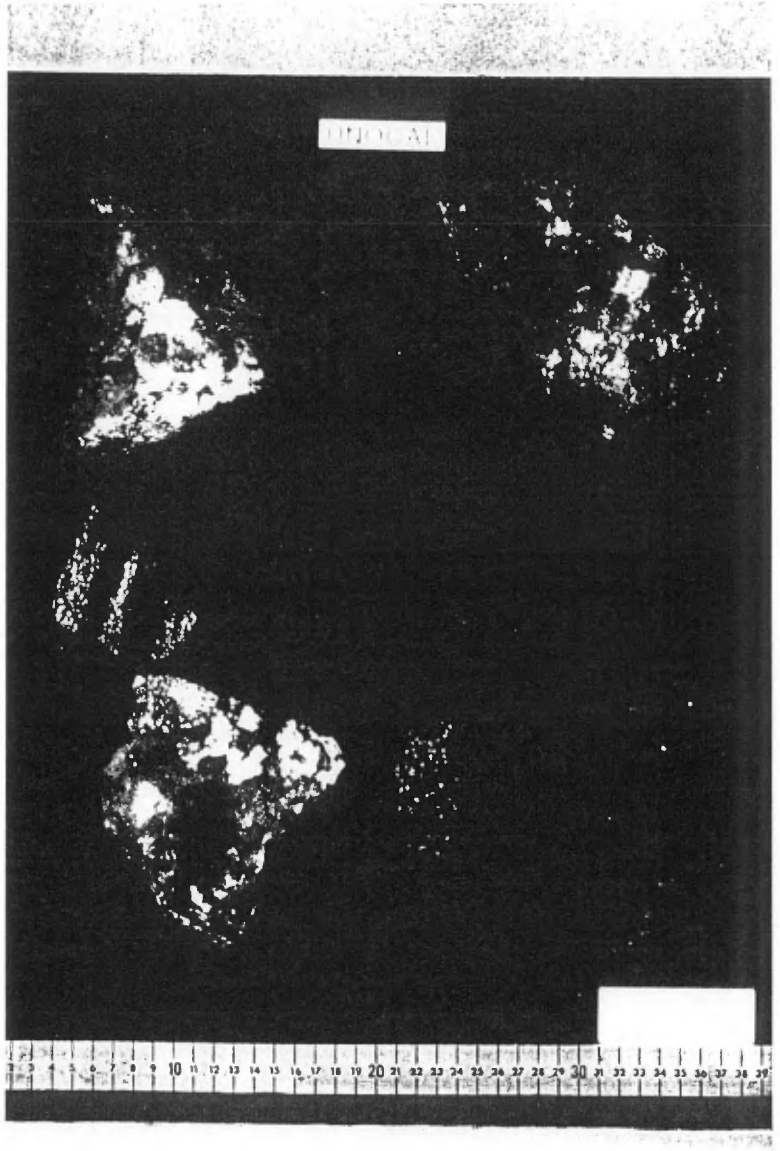
Unaltered vlasovite and agrellite are other fairly abundant accessory minerals in the Main Zone (Photo 44). Vlasovite is usually a transparent straw-coloured mineral with pronounced fractures (cleavage lines?) on its crystal faces and agrellite is a fibrous white to grayish or greenish white mineral with a pearly lustre and a woody appearance on weathered surface. Agrellite is often intergrown with a blue-grey mineral identified as pectolite. Vlasovite and agrellite appear to be more abundant in the western part of the Main Zone.

Finely disseminated graphite is locally abundant in the calc-silicate/syenite unit. Other fairly rare accessory minerals tentatively identified during mapping and core logging are gittensite, sphene, galena and pyrite. An unidentified soft clayey anhedral turquoise-blue mineral was observed in core from a few holes in the West Main Zone. Accessory minerals reported in previous petrographic/mineralogical studies but not identified in the field include pyrochlore, monazite, bastnasite, allanite and dalyite.

As pointed out by both Sherer and Mariano, many of the accessory minerals at Kipawa yield distinctive colours under cathodluminesence that allow their identification and distribution to be rapidly determined. Some accessory minerals also fluoresce under short wave ultraviolet light (Photos 45 and 46). Zircon fluoresces bright yellow, gittensite bright green, agrellite pinkish red, vlasovite pale yellow, hiorthalite pale yellow and calcite red.

Thorite, britholite and zircon are radioactive minerals.





Mineralized Kipawa Samples

Photo 45: White Light

Photo 46: Short Wave Ultraviolet

Yttrium Minerals

Yttrium occurs mainly in zirconium and titanium silicate and phosphate minerals in the Main Zone. The main yttrium-bearing minerals occur as accessory rock-forming minerals in the calc-silicate/syenite unit.

The main yttrium-bearing minerals are the mosandrite family (Na, Ti silicates), eudialyte (Na, Zr silicate), and britholite (Ca, SiO_4 phosphate). The mosandrite family of minerals includes rinkite, rinkolite (the same composition as mosandrite), sphene (Ca, Ti, SiO_5) and possibly other minor unidentified species.

Mosandrite occurs generally as buff-coloured lath-like crystals (Photo 47). It occurs primarily in the mafic syenites and pyroxenite. Concentrations also occur in calc-silicate rocks in the upper portion of the calc-silicate/syenite unit.

Sphene occurs as rare lemon yellow wedge-shaped crystals in some of the calc-silicate units in the West Main Zone. Its distribution appears to have an inverse relationship to the distribution of mosandrite in that sphene is more abundant southeast of the Main Zone where mosandrite is very rare.

Eudialyte occurs as red to pink equant crystals and crystal aggregates. It occurs exclusively in syenites of the calc-silicate/syenite unit and primarily in the mafic syenite and pyroxenites.

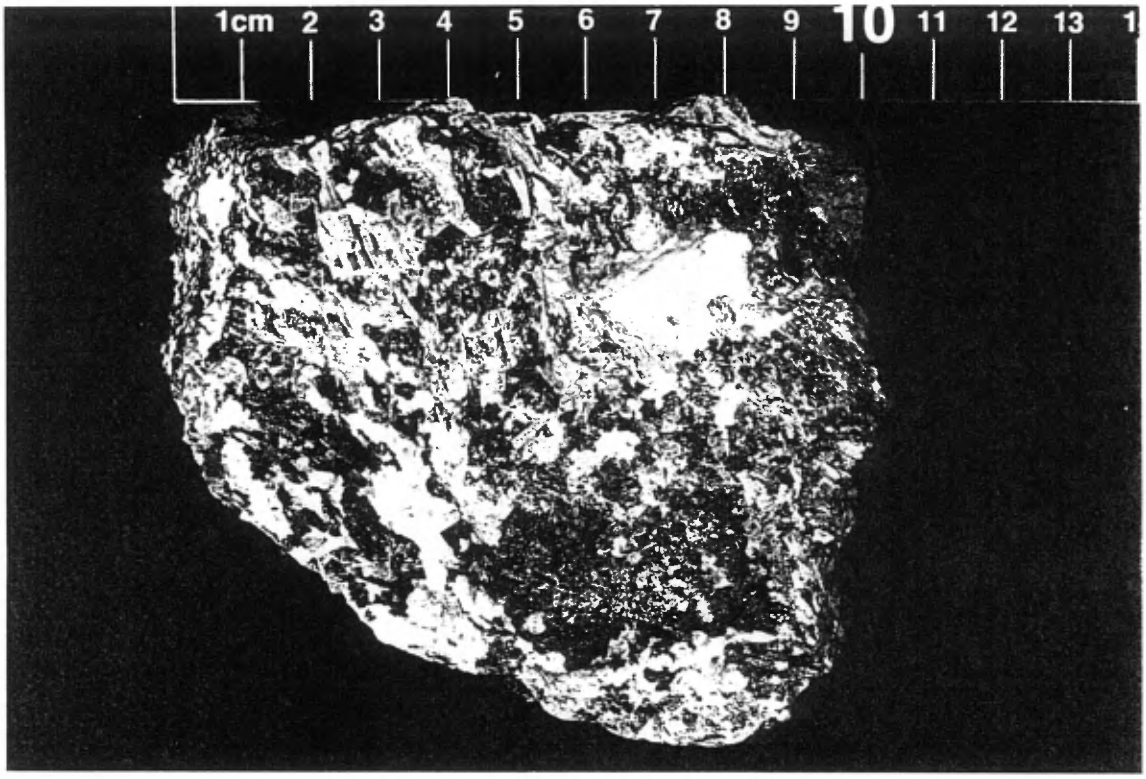


Photo 47: Buff Coloured Mosandrite Laths
In C.g. Mafic Syenite. West Main Zone.

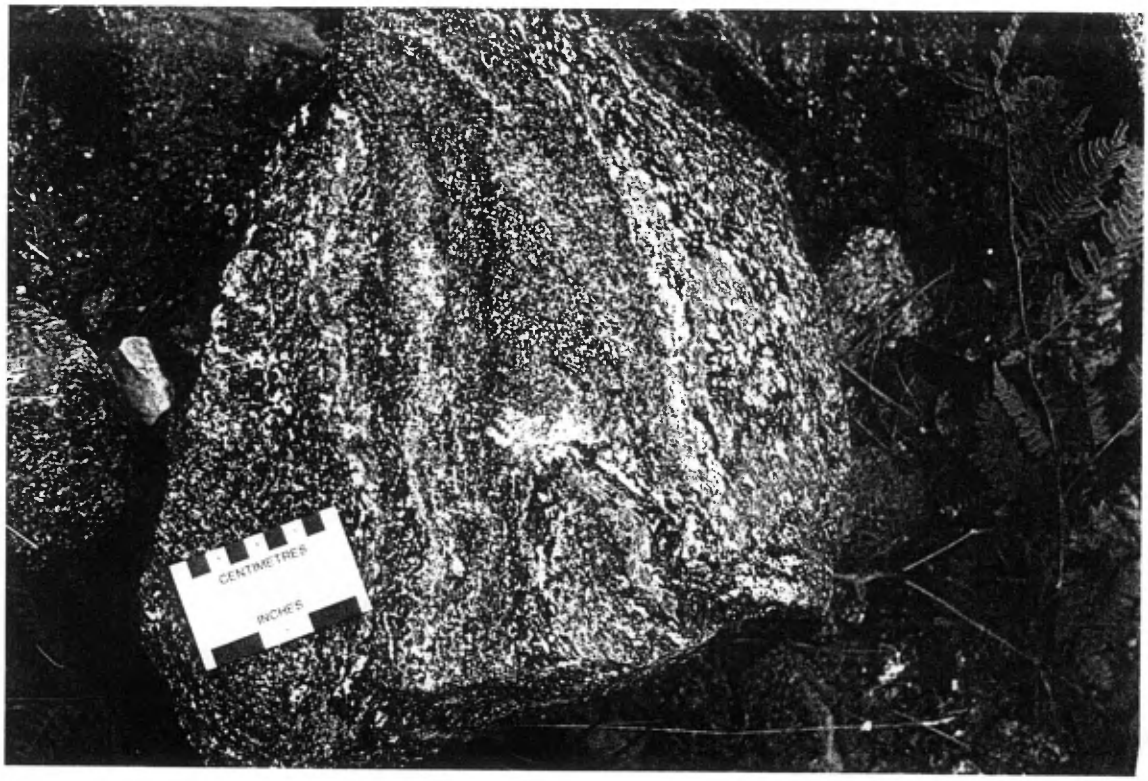


Photo 48: Streaky Segregations of
Eudialyte In Mafic Syenite Gneiss. West Main Zone.

Eudialyte and mosandrite both occur as disseminated grains and as clusters of crystals in lensey felsic segregations in the syenite gneisses, (Photo 48), as larger crystals in the coarse-grained syenite and pyroxenites (Photo 52 and 53) and more rarely as extremely coarse-grained crystals and clusters of crystals in pegmatitic pods and lenses in the syenite (Photo 16). The grain size of both eudialyte and mosandrite vary according to the grain size of the host rock. Eudialyte also occurs as coarse crystals in vein-like segregations with coarse-grained agrellite, feldspar and miserite in the West Main Zone (Photos 49, 50, 51).

Britholite occurs as brown vitreous grains and dark brown patchy aggregates (Photo 54) in calc-silicate rocks and as rarer isolated grains in syenite. Britholite and mosandrite often occur together in the grass green calc-silicate rock type.

The minerals hiortdahlite (Ca,Na,Zr silicate) and miserite, (Ca,K,Na,Al silicate) carry significant yttrium, however, they are much less abundant than the major yttrium minerals. These minerals are concentrated mainly in the West Main Zone in syenite.

Hiortdahlite is a light yellowish-grey to yellowish-brown tabular shaped mineral with a greasy lustre (Photo 55).

Miserite is a wine to reddish-brown coloured translucent mineral which occurs as prisms with prominent cleavage striations (Mariano, 1990). Although generally darker in colour than eudialyte, it looks like eudialyte in drill core and has probably been mistakenly identified as eudialyte in some holes. Coarse crystals of mauve miserite occur in the vein-like segregations of coarse grained eudialyte in Trench 2 (Photo 49).

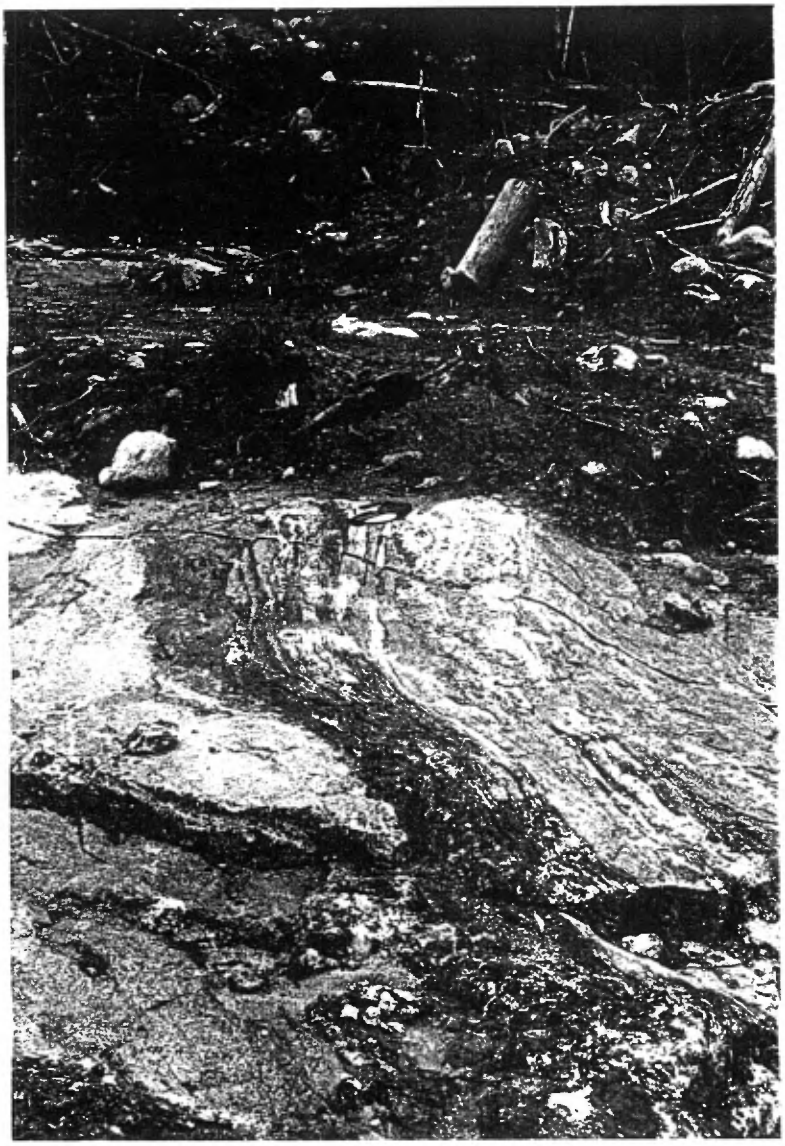


Photo 49: C.g. Vein-like Segregation of Agrellite And Eudialyte In Mafic Syenite. Trench 2.

Photo 50: C.g. Segregations of White to Buff Chalky Agrellite And Pink Eudialyte. Trench 2.

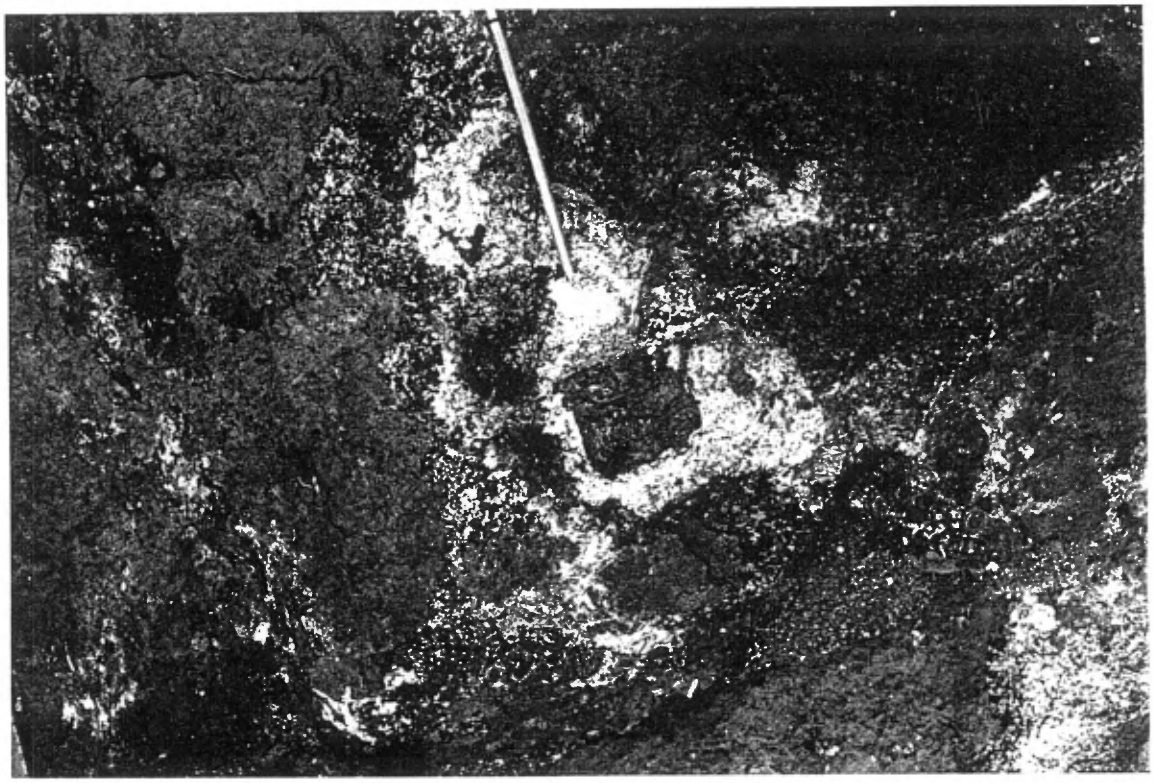


Photo 51: Large Red Eudialyte Crystal In
Chalky White Agrellite. Trench 2.

Photo 52: Concentrations of C.g. Pink Eudialyte
Paralleling Foliation In Mafic Syenite. Trench 2.

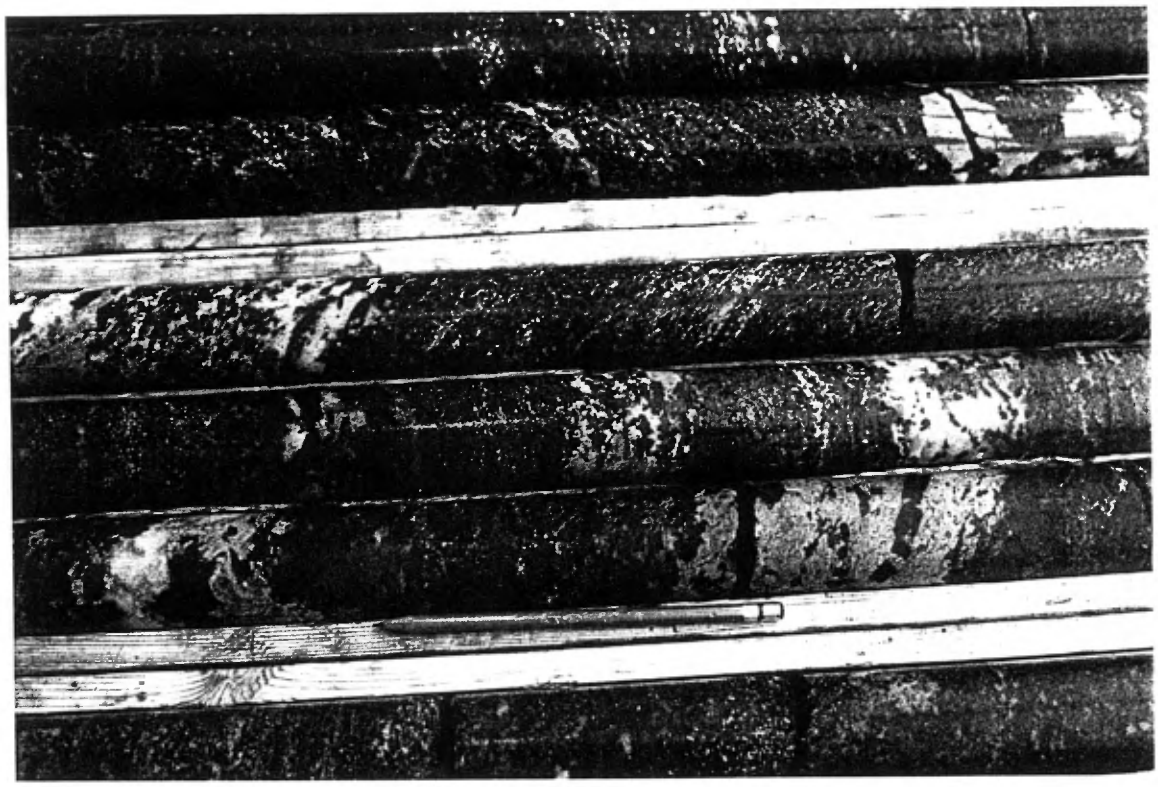


Photo 53: C.g. Pink Eudialyte with Dark Brown
And Chalky White Thorite.
90KU-33, 23.5 - 28.0 m

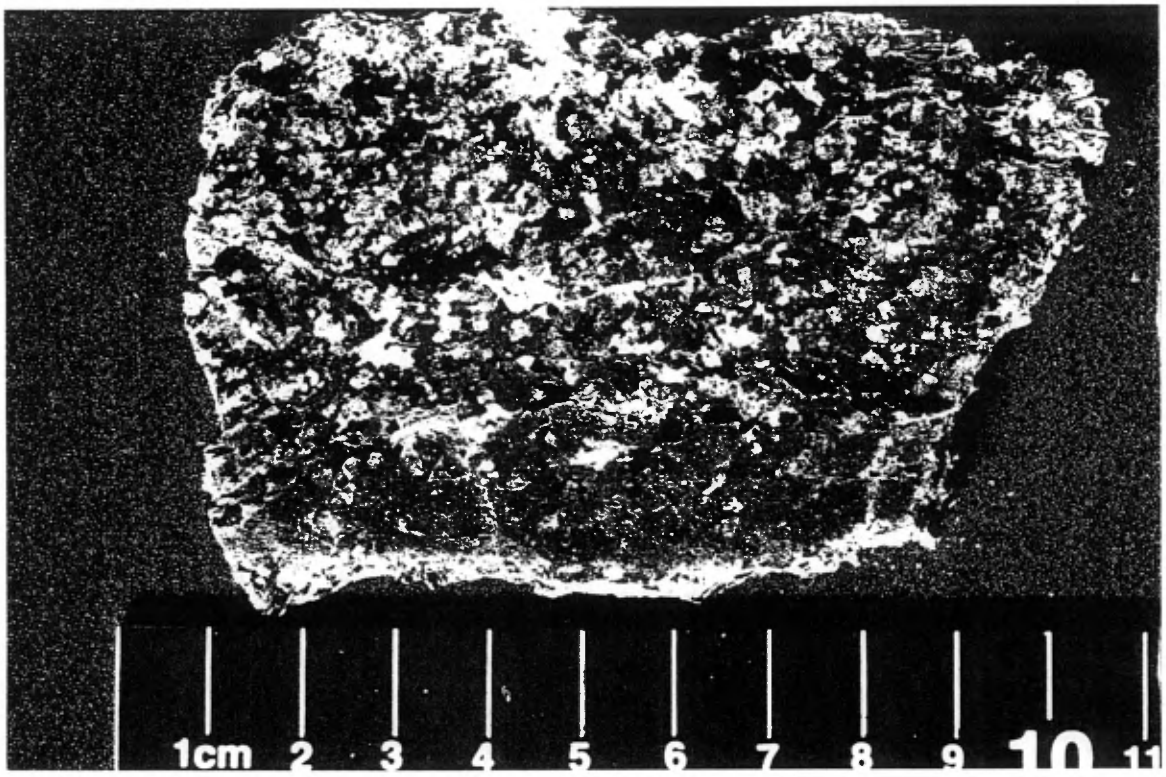


Photo 54: Dark Brown Patchy Aggregates of
Britholite In Calc-Silicate. Near Trench 10.

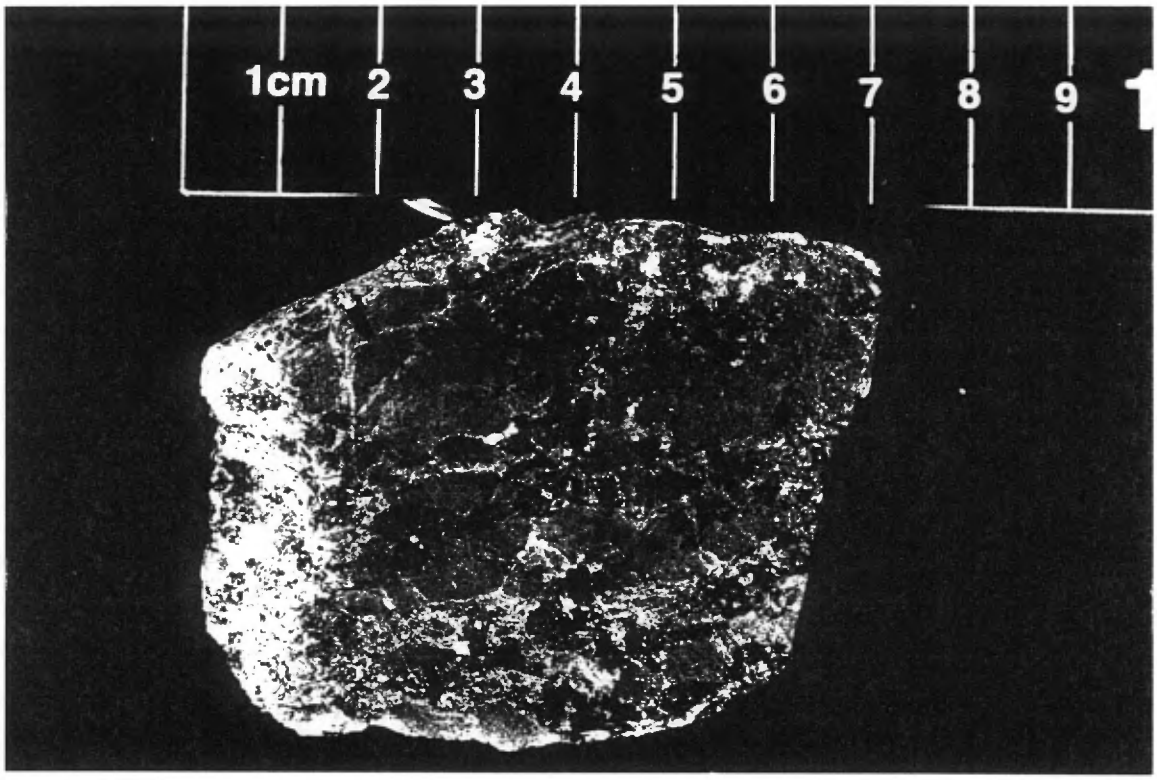


Photo 55: C.g. Subhedral Dull Orangey Hiortdahlite In Mafic Syenite. West Main Zone.

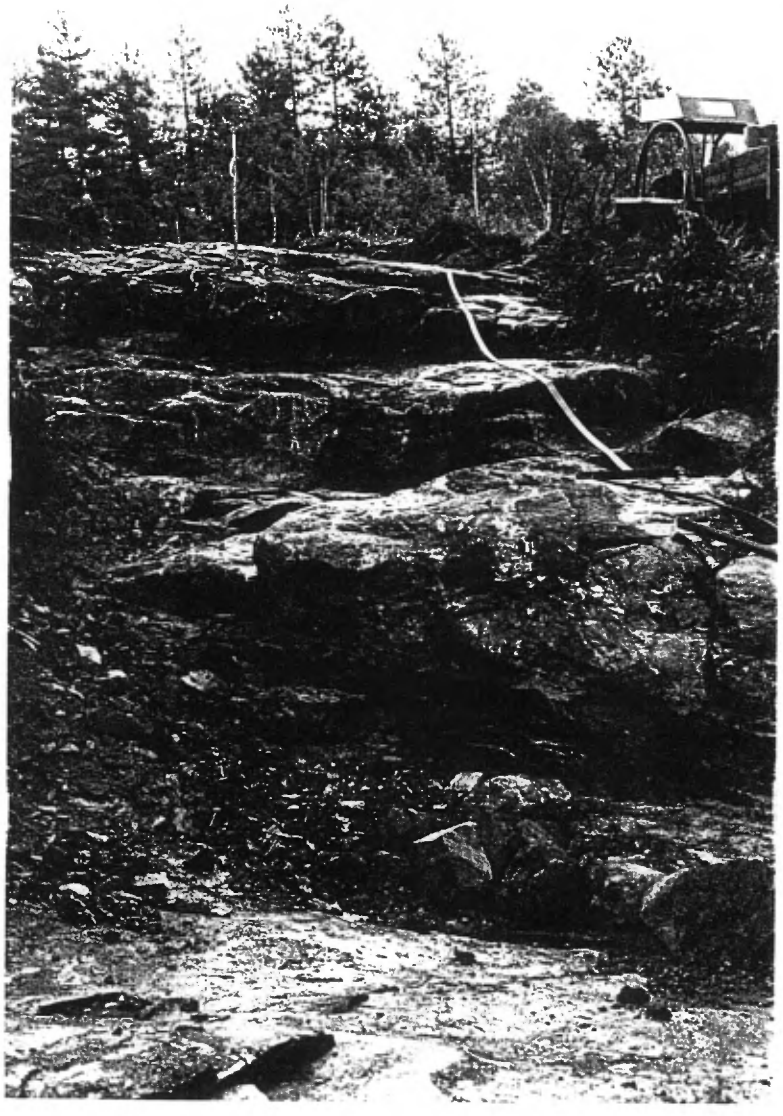


Photo 56: Gently Dipping Mafic Syenite/Pyroxenite In Trench 2.

Apatite and fluorite are other lanthanite-bearing minerals in the Main Zone that probably carry some yttrium.

Agrellite carries some lanthanites but it is mainly light lanthanite enriched.

Thorite, zircon, vlasovite and gittensite are low in lanthanides and yttrium.

Chemical and physical characteristics of the yttrium-bearing minerals in the Main Zone are tabulated in Table 3.

Chondrite normalized distribution plots for the lanthanide elements in eudialyte, mosandrite, britholite, hiortdahlite and apatite are shown in Figures 13 and 14.

Zirconium Minerals

The main zirconium-bearing minerals at Kipawa are zircon, vlasovite, eudialyte and gittensite. Most of the zirconium probably occurs in zircon and vlasovite.

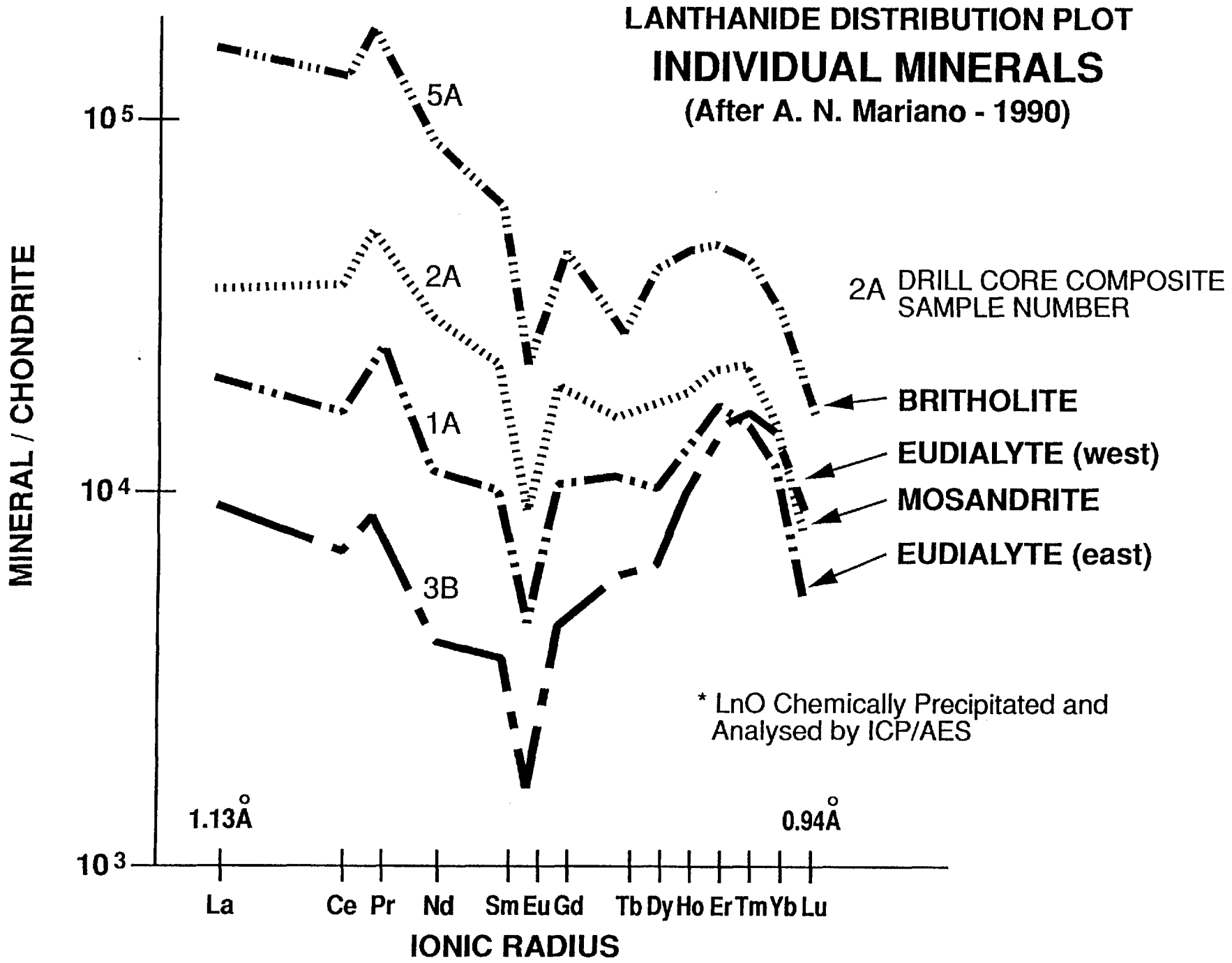
As discussed under the section on accessory and exotic minerals, zircon is abundant in the syenite/calc-silicate unit. The "creamy stubby" minerals which occur in certain syenite layers and in the peralkaline granite also probably carry a considerable amount of zirconium. These minerals appear to be a complex intergrowth of vlasovite, gittensite, zircon and quartz (Photo 42).

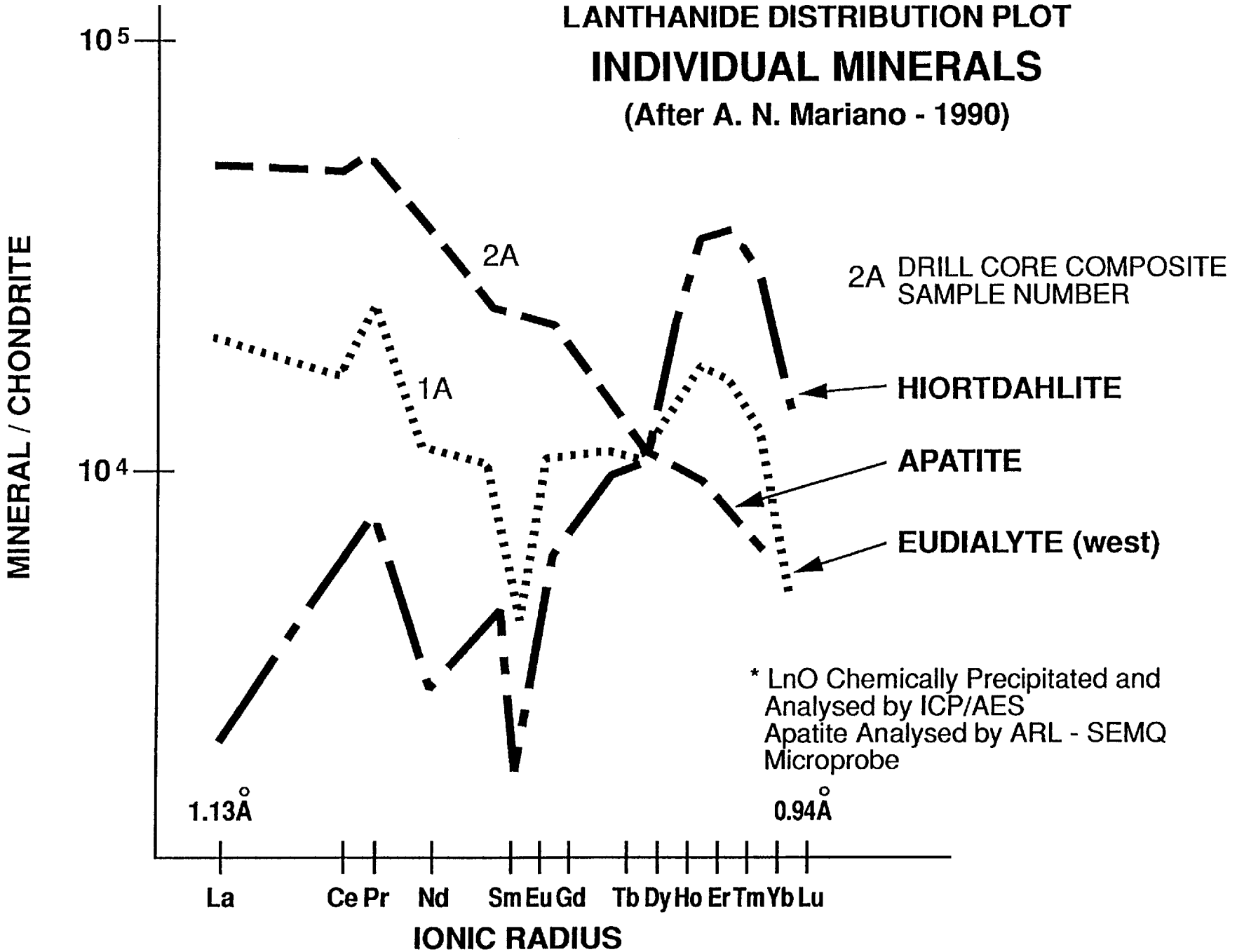
YTTRIUM-BEARING MINERALS - MAIN ZONE

MINERAL	COMPOSITION	CRYSTAL SYSTEM	SPECIFIC GRAVITY	HARDNESS	LANTHANIDE CONTENT WT% Y_2O_3	LANTHANIDE CONTENT WT%<REO (INCL. Y_2O_3)
Major						
Eudialyte	$Na_2 Ca_2 Zr Si_6 O_{17}(OH,Cl)_2$	Trigonal	2.7-3.0	5-5½	2.0-4.0%	5.0-9.2%
					◂◂ *4 Samples* ▸▸	
Mosandrite incl. Rinkite and Rinkolite	$(Na,Ca)_3 Ti(Si O_4)_2 F$	Monoclinic	2.9-3.5	5	1.1-9.2%	N.A.*
					◂◂ *12 Samples* ▸▸	
Britholite	$Ca_5(SiO_4 PO_4)_3(OH,F)$	Hexagonal	3.9	5	0.8-15.5%	3.8-54.5%
					◂◂ *6 Samples* ▸▸	
Locally Significant						
Hiortdahlite	$(Ca,Na)_{13} Zr_3 Si_9(O,OH,F)_{33}$	Triclinic	3.3	5½	3.2-4.0%	6.5-7.9%
					◂◂ *2 Samples* ▸▸	
Miserite	$K Ca_5 Si_8 O_{22}(OH)F$	Triclinic	2.8-2.9	5½-6	2.5-5.0%	7.5%
					◂◂ *2 Samples* ▸▸	
Minor						
Apatite	$Ca_5 (PO_4)_3 F$	Hexagonal	3.3	5	0.7-1.9%	6.7-14.4%
					◂◂ *4 Samples* ▸▸	
Fluorite	$Ca F_2$	Cubic	3.2	4	Heavy Lanthanide Enriched	3.8%
Agrellite	$Na Ca_2 Si_4 O_{10} F$	Triclinic	2.9	5½	1.4%	N.A.*
					◂◂ *1 Sample* ▸▸	
Sphene	$Ca Ti Si O_5$	Monoclinic	3.4-3.5	5-5½	0-0.4%	1.1-1.2%
					◂◂ *1 Sample* ▸▸	

*Not Available

March 1, 1991
JT4


LANTHANIDE DISTRIBUTION PLOT
INDIVIDUAL MINERALS
(After A. N. Mariano - 1990)
MINERAL / CHONDRITE
10 5
10 4
10 3
5A
2A
1A
3B
2A DRILL CORE COMPOSITE SAMPLE NUMBER
BRITHOLITE
EUDIALYTE (west)
MOSANDRITE
EUDIALYTE (east)
* LnO Chemically Precipitated and Analysed by ICP/AES
1.13Å
0.94Å
La
Ce Pr Nd
Sm Eu Gd
Tb Dy Ho Er Tm Yb Lu
IONIC RADIUS


LANTHANIDE DISTRIBUTION PLOT
INDIVIDUAL MINERALS
(After A. N. Mariano - 1990)
MINERAL / CHONDRITE
10 5
10 4
2A
1A
2A DRILL CORE COMPOSITE SAMPLE NUMBER
HIORTDAHLITE
APATITE
EUDIALYTE (west)
* LnO Chemically Precipitated and Analysed by ICP/AES
Apatite Analysed by ARL - SEMQ Microprobe
1.13Å
0.94Å
La Ce Pr Nd Sm Eu Gd Tb Dy Ho Er Tm Yb Lu
IONIC RADIUS

Some of the zirconium is carried in eudialyte wherever it is present and in unaltered vlasovite in the calc-silicate/syenite unit.

Gittensite carries zirconium, however, it is a fairly rare mineral. It occurs as chalky-grey fibrous to radiating masses in round pods intimately associated with apophyllite, eudialyte and vlasovite. It appears to be an alteration product of these minerals.

Eudialyte and possibly gittensite may be leachable in weak acid solutions and vlasovite and the "creamy stubby" minerals partially leachable. Zirconium might therefore be recovered by acid leaching of yttrium concentrates containing these minerals.

Chemical and physical characteristics of the zirconium-bearing minerals in the Main Zone are tabulated in Table 4.

1990 Trenching, Bulk Sampling and Drilling Program

The purpose of the trenching program was to determine the width and continuity of the yttrium zone or zones at surface. Bulk samples were collected in the trenches from the main yttrium-bearing mineralogical assemblages for preliminary metallurgical testing. A preliminary measure of the tonnage and grade of the yttrium resource potentially available for open-pit mining was obtained from diamond drilling. A detailed summary of these operations may be found in Appendix III.

ZIRCONIUM-BEARING MINERALS - MAIN ZONE

MINERAL	*COMPOSITION*	*CRYSTAL SYSTEM*	*SPECIFIC GRAVITY*	*HARDNESS*
Major				
Zircon	$Zr\ Si\ O_4$	Tetragonal	4.6-4.7	7½
Vlasovite	$Na_2\ Zr\ Si_4\ O_{11}$	Monoclinic	3.0	6
Eudialyte	$Na_2\ Ca_2\ Zr\ Si_6\ O_{17}(OH,Cl)_2$	Trigonal	2.7-3.0	5-5½
Minor				
Gittensite	$Ca\ Zr\ Si_2\ O_7$	Monoclinic	3.6	--

A reasonably continuous zone of +0.10% Y_2O_3 about 1400 metres long was exposed by the backhoe trenches between grid lines 11+50E and 25+50E (Figure 9). This zone varies from 12 to 90 metres wide at surface and averages about 20 metres wide.

Trench sample maps and assay data sheets are located in Appendix II. Trench assay samples are continuous saw-cut channel samples from bedrock exposed in the bottom of the trenches. Sample lengths are 2 metres unless otherwise noted on the trench maps and all samples were analyzed for yttrium and zirconium.

Four bulk samples weighing between 700-800 lbs. each and two smaller bulk samples weighing between 300-500 lbs. each were collected from the Main Zone (Figure 9). The four larger bulk samples (Samples 90 KBS-1, 2, 3 and 5) were shipped to Bondar-Clegg's laboratory in Ottawa for crushing and from there to Mountain States R&D International Inc. in Vail, Arizona for testing. The two smaller samples (90 KBS-4 and 6) and the percussion drill hole samples from these sites are stored in Unocal's rented storage space in North Bay, Ontario.

Bulk Sample 1 was taken from Trench 2 in the West Main Zone, Sample 2 from Trench 8 in the East Main Zone, Samples 3 and 5 from the Main Zone in Trench 11, Sample 4 from a high zirconium, low yttrium zone in Trench 11 and Sample 6 from the West Main Zone in Trench 6. Samples 1, 2 and 6 were taken in a zone with visible eudialyte, Sample 3 from a britholite-mosandrite zone and Sample 5 from a mosandrite zone.

Analytical data for the bulk samples are discussed in the next section.

Results from the 1988 drilling program and the 1990 surface trenching program suggested that the best, and probably most continuous, yttrium mineralization occurs in the upper portion of the calc-silicate/syenite unit in the northwestern and southeastern parts of the Main Zone. These areas also coincide with the best surface occurrences of eudialyte. As the best host rock for yttrium mineralization, the mafic syenite/black pyroxenite, occurs at surface and has a gentle dip in the northwestern part of the Main Zone (West Main Zone), vertical holes were drilled to test this area. Drill holes were short so that a maximum number could be drilled to test the most favourable upper syenite dominant portion of the calc-silicate/syenite complex. Only a few holes penetrated into the lower calc-silicate dominant part of this unit as previous drilling and surface trenching suggest that yttrium is quite erratic in this sequence.

The favourable rock units in the southeastern part of the Main Zone (East Main Zone) dip somewhat more steeply to the southwest, therefore drill holes were inclined at -50 to -60° to the north in this area.

Drill hole locations, directions and completion dates for the Main Zone are listed in Table 5. A total of 807 metres in 17 holes recovering NQ size (2 1/2 inches) core were drilled in the West Main Zone and 267 metres in five NQ core holes in the East Main Zone.

Locations of the drill holes were surveyed by tape and compass from the base line. Drill hole elevations were interpreted from topographic contours surveyed during the drilling program.

TABLE : 5

DRILLING SUMMARY - MAIN ZONE

HOLE	GRID CO-ORDINATES		ELEV (m)	AZIM	INCL	DEPTH (m)	DATE COMPLETED
West Main Zone							
88-KU-1	13+91E	0+64S	340	39°	-60°	102.7	Sept. 29/88
88-KU-2	13+46E	0+92S	328	39°	-60°	90.5	Oct. 1/88
88-KU-3	12+73E	0+53S	331	39°	-55°	84.4	Oct. 2/88
88-KU-4	12+27E	0+50S	327	39°	-60°	72.2	Oct. 3/88
88-KU-5	14+78E	0+08N	364	39°	-45°	80.8	Oct. 5/88
88-KU-11	14+36E	0+65S	346	39°	-60°	100.0	Oct. 15/88
88-KU-12	12+75E	1+11S	324	39°	-60°	90.5	Oct. 16/88
90-KU-13	13+91E	0+00N	350	-	-90°	46.0	Sept. 26/90
90-KU-14	13+93E	0+32S	345	-	-90°	49.1	Sept. 27/90
90-KU-15	13+95E	0+69S	339	-	-90°	59.4	Sept. 28/90
90-KU-16	13+54E	1+00S	326	-	-90°	46.0	Sept. 28/90
90-KU-17	13+42E	0+52S	335	-	-90°	46.0	Sept. 30/90
90-KU-18	13+48E	0+11S	340	-	-90°	46.0	Oct. 1/90
90-KU-19	12+80E	0+08S	331	-	-90°	46.0	Oct. 1/90
90-KU-20	12+82E	0+62S	329	-	-90°	46.0	Oct. 2/90
90-KU-21	12+27E	0+75S	327	-	-90°	46.0	Oct. 2/90
90-KU-22	12+27E	0+05S	329	-	-90°	46.0	Oct. 3/90
90-KU-23	13+89E	0+33N	348	-	-90°	38.1	Oct. 3/90
90-KU-24	14+36E	0+22N	358	-	-90°	38.1	Oct. 4/90
90-KU-25	14+37E	0+18S	355	-	-90°	58.2	Oct. 4/90
90-KU-26	14+46E	0+71S	346	-	-90°	53.9	Oct. 5/90
90-KU-27	14+78E	0+05N	364	-	-90°	53.3	Oct. 6/90
90-KU-28	14+77E	0+46N	363	-	-90°	43.0	Oct. 6/90
90-Ku-29	15+49E	0+18N	366	39°	-60°	45.7	Oct. 7/90

TOTAL WEST MAIN ZONE: 1,427.9 m IN 24 HOLES

TABLE : 5 *Continued .../*

DRILLING SUMMARY - MAIN ZONE

HOLE	GRID CO-ORDINATES		ELEV (m)	AZIM	INCL	DEPTH (m)	DATE COMPLETED
Central Main Zone							
88-KU-6	19+00E	0+59N	378	39°	-45°	68.2	Oct. 7/88
88-KU-10	20+94E	0+00N	377	39°	-60°	81.4	Oct. 12/88
East Main Zone							
88-KU-7	22+58E	0+80N	382	39°	-50°	63.1	Oct. 9/88
88-KU-8	24+55E	0+82N	380	84°	-45°	62.5	Oct. 9/88
88-KU-9	22+54E	0+04S	371	39°	-60°	84.0	Oct. 10/88
90-KU-30	25+79E	0+19N	359	39°	-60°	49.7	Oct. 8/90
90-KU-31	25+30E	0+20N	366	39°	-60°	55.8	Oct. 8/90
90-KU-32	24+60E	0+30N	372	39°	-60°	49.7	Oct. 9/90
90-KU-33	24+05E	0+33N	375	39°	-60°	49.7	Oct. 9/90
90-KU-34	23+38E	0+34N	377	39°	-50°	61.9	Oct. 10/90

TOTAL CENTRAL AND EAST MAIN ZONES: 626.0 m IN 10 HOLES

It was determined from previous programs that anomalous yttrium values are invariably associated with anomalous radioactivity (although the reverse may not be true), therefore all anomalously radioactive core intervals were split and assayed. Sample lengths are five (5) feet in each major rock unit although the last sample interval before a major geological contact may have been increased or decreased to end at the contact.

All split core samples were assayed for yttrium and zirconium.

Chemical Analysis

Nearly all analytical work was conducted by Bondar-Clegg Laboratories in Ottawa. All analytical data for 1990 and some of the analyses from previous years, are appended in Appendix II.

Assay samples were crushed to 100% passing 1/4 inch with 65-75% passing ten (10) mesh. The sample was then passed through a Jones riffle to obtain a 250-300 gram portion or split, which was then pulverized to 95-99% passing 150 mesh. The remaining crushed sample was stored as reject. Approximately 5-7 grams of the pulverized sample were taken for assay; the remainder is stored as pulp. The sample was assayed for yttrium and zirconium by XRF. Analytical techniques for yttrium and zirconium and other elements are summarized by Bondar-Clegg on the first page of all assay reports. These pages are included with assay data sheets in Appendix II.

Bondar-Clegg's program of standards and checks include analyzing a duplicate of a sample, analyzing a blank and analyzing a standard every twenty or so samples. As analytical values for yttrium and zirconium at Kipawa are higher than normal standards, Bondar-Clegg has had to use a Strange Lake sample as a standard for our samples. Although the matrices of the Strange Lake and Kipawa samples may not be identical, the analysts at Bondar-Clegg said that the Strange Lake sample was satisfactory as a standard for Kipawa.

The detection limits for some trace elements analyzed by neutron activation such as tin, barium, rubidium and to some extent tantalum, are very high in samples containing high thorium, uranium and rare earth elements.

No samples from the 1990 program have as yet been sent to other laboratories for check analysis.

Analytical data for the samples used for preliminary metallurgical test work are tabulated in Table 7. The bulk samples are represented by three analyses:

a) Average assays of the channel samples taken in the bottom of the trench over the bulk sample site. Sometimes one channel sample covered the bulk sample site and sometimes the bulk sample site included parts of two or three channel samples.

TABLE : 7

ANALYTICAL DATA
SAMPLES FOR INITIAL METALLURGICAL TESTING

BULK SAMPLE	ASSAY SURFACE CHANNEL SAMPLES*	ASSAY PERCUSSION BLAST HOLE SAMPLES**	ASSAY BULK SAMPLES***
1	0.66% Y_2O_3 / 1.99% ZrO_2	0.65% Y_2O_3	0.47% Y_2O_3 / 0.92% ZrO_2
2	0.42% Y_2O_3 / 1.40% ZrO_2	0.28% Y_2O_3	0.22% Y_2O_3 / 0.28% ZrO_2
3	0.18% Y_2O_3 / 0.62% ZrO_2	0.13% Y_2O_3	0.22% Y_2O_3 / 0.19% ZrO_2
4	0.01% Y_2O_3 / +2.70% ZrO_2	--	--
5	0.26% Y_2O_3 / 1.28% ZrO_2	0.48% Y_2O_3	0.46% Y_2O_3 / 0.28% ZrO_2
6	0.20% Y_2O_3 / 0.97% ZrO_2	--	--

DRILL CORE COMPOSITES	INTERVAL (m)	ASSAY* Y_2O_3	ASSAY* ZrO_2
Hole 17	9.8 - 14.3	0.16%	1.32%
Hole 21	11.3 - 15.8	0.19%	1.31%
Hole 27	15.2 - 20.3	0.19%	1.06%

* *Analysis by Bondar-Clegg*
** *Analysis by Molycorp (Louviers)*
*** *Analysis by Mountain States R&D*

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b) Assay of percussion blast holes drilled at the bulk sample site. Samples were taken from the 12-20 blast holes drilled at each site. The samples from each site were mixed and assayed.

c) Assay of the bulk sample.

Bondar-Clegg analyzed the channel samples, Molycorp (Louviers) the blast hole samples and Mountain States R&D International, the bulk sample. One noticeable difference in these assays is the big difference in the zirconium values obtained by Bondar-Clegg in the channel samples and by Mountain States in the bulk samples.

Bulk samples 4 and 6 were not assayed as they were not used for test work; they and the blast hole samples from these sites are stored in North Bay.

Three 10 lb. composite drill core samples were prepared by Bondar-Clegg in Ottawa and sent to Mountain States R&D International in mid-February for additional metallurgical test work. These samples are more representative of the average grade of the West Main Zone than the bulk samples.

A sample (8562) containing an unknown coarse grained dull brown opaque mineral from peralkaline granite gneiss in Hole 90 KU-15 and a sample (8563) containing pale pink to orangey-red to brownish-orange vitreous equant grains in peralkaline granite gneiss in Hole 90 KU-26 were sent for analysis at the end of the drilling program. Sample 8562 assayed 7017 ppm Y and sample 8563 assayed 7897 ppm Y. These minerals were noted during core logging in the vuggy sections of the peralkaline

granite gneiss in holes 90 KU-15, 16 and 26 on the southwestern boundary of the West Main Zone. As the core was not anomalously radioactive in these areas and as the dull brown and orange-red vitreous minerals were not identifiable as yttrium minerals, these sections of the core were not split for assay.

Six drill core composites were prepared by Bondar-Clegg from the 1990 drill core samples and one composite from trench samples for whole rock and trace elements analysis. Five composites were also analyzed for lanthanide elements. Data on these samples is tabulated in Table 8 and the analyses are appended in Appendix II. In all samples, except one, yttrium values are higher for the composites than for the average of the individual samples.

Chip samples from the calcite marble, peralkaline granite gneiss and basement gneiss were collected from a number of trenches for whole rock and trace elements analysis. Data on these samples appears in Table 10 and the analyses are in Appendix II. Analytical results for these samples are discussed in Section XI.

Other rock samples from the Kipawa property were also assayed for Y, Zr, Ce, Nb and Th or for major and/or trace elements. These samples are itemized in Tables 9 and 10 and their analytical sheets are in Appendix II.

TABLE 8: 1990 DRILL CORE COMPOSITES

ASSAY SAMPLE NUMBER	SAMPLES IN COMPOSITE *	DRILL HOLE/TRENCH	INTERVAL (m)	LENGTH (m)	ROCK TYPE	Analysis (ppm)** Composite		Individual Samples (Average)	
						Y	Zr	Y	Zr
90KBZ-2	6626-6629	90KBZ-02 (PB Zone)	84-91	7	Quartz-Syenite	215	6805	234	6625
90KBZ-3	6632-6639	90KBZ-03 (PB Zone)	51-63	12	Amphibolite/Syenite	503	8809	484	8310
90KBZ-4	6644-6650 & 6676-6685	90KBZ-04 (PB Zone)	17-43	26	Calc-Silicate	842	6656	801	6193
90KU-13	6724-6735	90KU-13 (West Main Zone)	2-20	18	Syenite/Pyroxenite	2137	8065	1714	7985
90KU-25	11952-11963	90KU-25 (West Main Zone)	7-25	18	Syenite/Proxenite	1674	6844	1438	6615
90KU-33	15175-15187	90KU-33 (East Main Zone)	22-40	18	Syenite/Peralk. Granite	1602	10498	1405	10570
90KTR-7	15178-15726	Trench 7 (West Main Zone)	O+OIN-O+18N	17	Calc-Silicate	1565	8300	965***	10057

* Equal Portions Taken from Each Sample to Prepare Composite

** Samples also analysed for major and trace elements Samples KBZ-4, KU-13, 25, 33 and KTR-7 analysed for rare earth elements.

*** Includes one high sample (5137 ppm Y)

TABLE 9: SPECIAL 1990 ANALYTICAL SAMPLES - ASSAY

SAMPLE NUMBER FIELD	ASSAY	SOURCE*	ROCK TYPE (Accessory Minerals)	LOCATION	ANALYSES Y	Zr	Ce	Nb	Th
Hole 90KU-30	8560	Core	Mylonitized Peralkaline Granite.	14 m	75	>20,000	130	58	46
Hole 90KU-30	8561	Core	(light grey translucent grains)	14.5 m	53	>20,000	70	87	31
Hole 90KU-15	8562	Core	Peralkaline Granite (brown translucent mineral)	48.8 m	7017	>20,000	1480	750	14
Hole 90KU-26	8563	Core	Peralkaline Granite	37.5 m	7897	>20000	2450	657	64
JAK-41	13992	O/C	Mafic Syenite (Radio)	Main Grid	49	332	61	24	5
JAK-42	13993	O/C	Mafic Syenite (Radio)	23 + 20E	89	162	59	51	7
JAK-43	13994	O/C	Peralkaline Granite	4 + 60S	41	431	100	24	9
JAP-7	13996	Bld	Meloncratic Syenite	Boulder Field	1834	8412	2980	124	3690
JAP-6	8551	Bld	Meloncratic Syenite	Next to PB Zone	131	5733	120	20	696
Jap-2a	13998	Bld	Melanocratic Syenite	PB Zone	482	>20000	440	94	1460
JAP-2b	13999	Bld	Calc-silicate	PB Zone	3216	15389	2770	122	1650
JAP-4	14000	Bld	Melanocratic Syenite	PB Zone	212	4143	150	42	262
JAP-5	13997	Bld	Melanocratic Syenite	PB Zone	3804	4951	2540	330	188
B-1-5	8553	Bld	Peralkaline Granite	Lac Sairs	1379	6020	3420	584	1130
JAP-12a	8554	O/C	Feld-biot-qtz Gneiss	KR Zone	993	1060	270	524	733
JAP-12b	8555	O/C	Feld-biotite qtz Gneiss ± Syenite **	KR Zone	1775	2762	430	475	1020
JAP-13a	8556	O/C	Biotite rock (Zircon)	KR Zone	1592	>20000	19800	429	1620
JAP-13d	8557	O/C	Feld rock (Zircon)	KR Zone	721	4280	6700	184	505
JAP-13e	8558	O/C	Feld rock ** hem	KR Zone	321	279	3050	32	203

* O/C - outcrop Bld - Boulder

** Contains reddish brown resinous mineral

TABLE 9: SPECIAL 1990 ANALYTICAL SAMPLES - ASSAY

SAMPLE NO.		SOURCE*	ROCK TYPE	LOCATION	ANALYSES (ppm)				
FIELD	ASSAY		(Accessory Minerals)		Y	Zr	Ce	Nb	Th
JAP-14	8559	O/C	Biot-feld Gneiss (zircon)	KR Zone	2762	8870	1580	1046	530
90AKR-4	8564	O/C	Syenite (Zircon-Thorite?)	KR Zone	376	>20000	130	1680	39
90AKR-7	8565	O/C	Biot-feld Gneiss **	KR Zone	560	1727	260	75	590
90AKR-5	8566	O/C	Syenite (± graphite, pyrite)	KR Zone	342	7582	230	328	45
JAP-15d	11452	O/C	Syenite (zircon)	KR Zone	314	>20000	105	1810	39
JAP-15e	11453	O/C	Syenite **	KR Zone	261	>20000	130	2541	38
JAP-15c	11454	O/C	Biot-feld-qtz Gneiss **	KR Zone	326	>20000	320	4187	73

* O/C - Outcrop
** Contains reddish brown resinous mineral

TABLE 10: SPECIAL 1990 ANALYTICAL SAMPLES - TRACE ELEMENT AND WHOLE ROCK

SAMPLE NUMBER		SOURCE*	ROCK TYPE	LOCATION	ANALYTICAL PACKAGE**
FIELD	ASSAY		(Accessory Minerals)		
--	8572	O/C	Biot.Schist (Peralk.Gran)	Trench 12	TE + WR
--	8573	O/C	Peralk.Gran.	Trench 12	TE + WR
--	8574	O/C	Peralk Gran.	Trench 7	TE + WR
--	8575	O/C	Peralk.Gran.	Trench 3	TE + WR
--	8001	O/C	Peralk.Gran.	Trench 9 (N)	TE + WR
--	8002	O/C	Peralk.Gran.	Trench 9 (S)	TE + WR
--	8570	O/C	Peralk.Gran.	Trench 5	TE + WR
JAK-20a	8571	O/C	Peralk.Gran.	2+25S 3+85E	TE + WR
JAK-32	8003	O/C	Peralk.Gran.	1+00S 30+20E	TE + WR
JAK-37	8005	O/C	Quartz Syenite	Baldy Hill	TE + WR
JAK-34	8006	O/C	Peralk Gran.	Baldy Hill	TE + WR
JAK-48	11455	O/C	Peralk.Gran.	Baldy Hill	TE + WR
JAK-48(a)	13976	O/C	Pegmatite (dull brick red mineral	Baldy Hill	TE
--	8013	O/C	Basement Gneiss	Trench 8	TE + WR
--	8014	O/C	Basement Gneiss	Trench 10	TE + WR
--	8015	O/C	Basement Gneiss	Trench 7	TE + WR
--	8016	O/C	Basement Gneiss	Trench 3	TE + WR
JAK-20b	8017	O/C	Basement Gneiss	0+50N 7+05E	TE + WR
JAK-3	8012	O/C	Basement Gneiss	2+25N 28+90E	TE + WR
JAK-8	8007	O/C	Diabasic Gabbro	Baldy Hill	TE + WR
90APB-1	8008	O/C	Peralk.Gran	Near PB Zone	TE + WR
B-340	8019	Bld	Meso.Syenite (dull reddish brown grns)	Boulder Field next to PB Zone	TE + WR
B-400	8020	Bld	Meso.Syenite (reddish brn.grns. + creamy stubbies)		TE + WR
JAP-8	13978	Bld	Meso.Syenite		TE + WR
JAP-3	13977	Bld	Meso.Syenite	PB Zone	TE
90AKR-6	13985	O/C	Syenite (reddish-brn. transl.min)	KR Zone	TE
90AKR-1	8009	O/C	Peralk.Gran	KR Zone	TE + WR

* O/C - outcrop Bld - boulder

** TE - Trace Element WR - Whole Rock CARB - Carbonatite

TABLE 10: SPECIAL 1990 ANALYTICAL SAMPLES - TRACE ELEMENT AND WHOLE ROCK

SAMPLE NUMBER		SOURCE*	ROCK TYPE	LOCATION	ANALYTICAL PACKAGE**
FIELD	ASSAY		(Accessory Minerals)		
B-2-21	8010	Bld	Peralk.Granite	Lac Sairs	TE + WR
B-1-1	8011	Bld	Peralk.Granite	Lac Sairs	TE + WR
B-2-18	13982	Bld	Peralk Granite (black vitreous min.)	Lac Sairs	TE
B-2-4	13983	Bld	Melan.Peralk.Gran.	Lac Sairs	TE
B-2-22	13979	Bld	Calc-Silicate	Lac Sairs	TE
B-1-07	13980	Bld	Calc-Silicate	Lac Sairs	TE
B-2-14	13981	Bld	Pyroxene Syenite (Dk.brown shiny min)	Lac Sairs	TE
B-1-9	13984	O/C	Melan Syenite	Lac Sairs	TE
--	8022	O/C	Limestone	Trench 8	CARB
--	8023	O/C	Limestone	Trench 11	CARB
JAP-1	8024	Bld	Calc-silicate	PB Zone	CARB
B-1-7	8025	Bld	Calc-silicate	Lac Sairs	CARB

* O/C - outcrop Bld - boulder
** TE - Trace Element WR - Whole Rock CARB - Carbonatite

Yttrium-Zirconium Resources

Yttrium and zirconium resource calculations for the West Main and the East Main Zones are shown on appended maps and sections and are summarized in Tables 11 and 12. All yttrium drill hole intersections are listed in Table 6. Although a ball park estimate of the yttrium-zirconium resource in the central part of the Main Zone might be made with available data, more drilling must be completed before resources can be calculated realistically for this part of the zone.

Two types of significant assay intervals have been shown on the drill holes and trenches; a continuously mineralized interval and a discontinuously mineralized interval. A continuously mineralized interval was calculated using the follow rigid parameters:

a) cut-off grade = 0.10% Y_2O_3;

b) a minimum length of 10 ft. or 3.0 metres above cut-off grade;

c) no lengths greater than 10 ft. or 3.0 metres in any interval below cut-off grade.

A discontinuously mineralized interval is an interval that would average over 0.10% Y_2O_3 and that would probably have to be mined in an open-pit mining operation. It may include intervals longer than 10 ft. or 3.0 metres below cut-off grade. This interval, which was fairly subjectively determined, was used for the +0.10% Y_2O_3 resource calculations.

High assays were not cut in calculating significant mineralized intervals.

TABLE : 11

RESOURCE CALCULATIONS - WEST MAIN ZONE

SECTION	BLOCK	AREA m^2	LENGTH m	VOLUME m^3	METRIC TONS (Volume X 2.8)	GRADE % Y_2O_3 /% ZrO_2
14+78E	I	758	34	25,700	72,000	0.10/1.14
	Ia*	239	34	8,100	22,700*	0.16/0.99
	II	518	34	17,600	49,000	0.11/1.20
	III	169	34	5,700	16,000	0.20/0.96
	IV	578	34	19,600	54,900	0.15/1.13

**Part of Block I*

+0.10% Y_2O_3 Block: 192,000 M. Tons @ 0.12% Y_2O_3/1.14% ZrO_2
Higher-Grade Block: 93,600 M. Tons @ 0.16% Y_2O_3/1.07% ZrO_2

14+37E	I	498	41	20,400	57,100	0.12/1.28
	II	1236	41	50,670	141,800	0.14/1.00
	III	499	41	20,400	57,100	0.13/1.10
	IV	90	41	3,600	10,000	0.23/0.57
	Ia*	179	41	7,300	20,400*	0.23/1.03
	IIa*	638	41	26,100	73,000*	0.18/0.89
	IIIa*	269	41	11,000	30,800*	0.19/1.15

**Parts of Blocks I, II and III*

+0.10% Y_2O_3 Block: 266,000 M. Tons @ 0.13% Y_2O_3/1.06% ZrO_2
Higher-Grade Block: 134,200 M. Tons @ 0.19% Y_2O_3/0.95% ZrO_2

13+88E	I	765	46	35,100	98,000	0.19/0.85
	II	818	46	37,600	105,300	0.23/1.04
	III	358	46	16,400	46,100	0.08/0.97
	IV	308	46	14,100	39,500	0.11/1.15

+0.10% Y_2O_3 Block: 288,900 M. Tons @ 0.17% Y_2O_3/0.98% ZrO_2
Higher-Grade Block: 203,300 M. Tons @ 0.21% Y_2O_3/0.94% ZrO_2

13+44E	I	517	52	26,800	75,200	0.12/0.60
	II	582	52	30,200	84,700	0.14/1.01
	III	131	52	6,800	19,000	0.13/0.96
	IV	60	52	3,100	8,700	0.12/1.29

+0.10% y_2O_3 Block: 187,600 M. Tons @ 13%/Y_2O_3/0.85% ZrO_2
Higher-Grade Block: 84,700 M. Tons @ 14% Y_2O_3/1.01% ZrO_2

TABLE : /Continued

RESOURCE CALCULATIONS - WEST MAIN ZONE

Continued...

SECTION	BLOCK	AREA m^2	LENGTH m	VOLUME m^3	METRIC TONS (Volume X 2.8	GRADE % Y_2O_3 /% ZrO_2
12+76E	I	914	60	54,800	153,500	0.19/0.78
	II	529	60	31,700	68,800	0.16/0.98
	III	208	60	12,400	34,900	0.10/0.75
		+0.10% Y_2O_3 Block: 257,200 M. Tons @ 0.17% Y_2O_3/0.83% ZrO_2				
		Higher-Grade Block: 222,300 M. Tons @ 0.18% Y_2O_3/0.84% ZrO_2				
12+26E	I	179	40	7,100	20,000	0.24/1.24
	II	208	40	8,300	23,000	0.13/1.02
	III	248	40	9,900	27,700	0.17/1.23
		+0.10% Y_2O_3 Block: 70,700 M. Tons @ 0.17% Y_2O_3/1.16% ZrO_2				
		Higher-Grade Block: 47,700 M. Tons @ 0.19% Y_2O_3/1.23% ZrO_2				

TOTAL +0.10% Y_2O_3 Block: 1,260,000 M. Tons @ 0.15% Y_2O_3/0.96% ZrO_2

TOTAL Higher-Grade Block: 785,800 M. Tons @ 0.18% Y_2O_3/0.95% ZrO_2

RESOURCE CALCULATIONS - EAST MAIN ZONE

SECTION	BLOCK	AREA m^2	LENGTH m	VOLUME m^3	METRIC TONS (Volume X 2.8)	GRADE % Y_2O_3 /% ZrO_2
22+57E	AI	214	53	11,300	31,600	0.14/1.26
	AII	1121	53	59,400	166,300	0.15/1.11
	AIII	126	53	6,600	18,400	0.12/1.39
	Block A (+0.10% Y_2O_3): 216,300 M. Tons @ 0.14% Y_2O_3/1.15% ZrO_2					
23+38E	AI	478	74	35,300	99,000	0.13/1.12
	AII	273	74	20,200	56,500	0.12/1.39
	BI	692	74	51,200	143,300	0.12/1.06
	Block A (+0.10% Y_2O_3): 155,500 M. Tons @ 0.12% Y_2O_3/1.21% ZrO_2					
	Block B (+0.10% Y_2O_3): 143,300 M. Tons @ 0.12% Y_2O_3/1.06% ZrO_2					
24+05E	BI	946	58	54,800	153,400	0.18/1.42
	Block B (+0.10% Y_2O_3): 153,400 M. Tons @ 0.18% Y_2O_3/1.42% ZrO_2					
24+60E	BI	546	75*	40,900	114,600	0.12/1.45
	BII	1073	75*	80,400	225,300	0.18/0.96

**Length reduced to compensate for shorter width on east side of Blocks*

Block B (+0.10% Y_2O_3): 339,900 M. Tons @ 0.16%/Y_2O_3/1.12% ZrO_2

TOTAL BLOCK A (+0.10% Y_2O_3): 371,800 M. Tons @ 0.13% Y_2O_3/1.17% ZrO_2

TOTAL BLOCK B (+0.10% Y_2O_3): 636,600 M. Tons @ 0.15% Y_2O_3/1.17% ZrO_2

A factor of 1.27 was used to convert elemental yttrium analyses to Y_2O_3 and 1.35 to convert elemental zirconium analyses to ZrO_2.

The boundaries of significantly mineralized blocks were drawn on drill sections to conform as much as possible to the geology. These blocks were then assumed to project uniformly halfway to the next drill section. Blocks were projected a maximum of 15 metres beyond the outside or bounding drill holes in the drill areas. The volume of individual resource blocks were calculated by multiplying the area of the block on section, as measured by a planimeter, by the projected horizontal length of the block. A specific gravity of 2.8 was used to calculate the tonnages of the block. As the smaller resource blocks are represented by one drill hole, the grade of the block is the grade of the drill hole. Grades of the larger blocks were calculated as follows:

$$\frac{\Sigma \text{ Grade X Tonnage of smaller blocks}}{\text{Tonnage of larger blocks}}$$

The resources calculated for the West Main Zone are classified as drill indicated resources while those of the East Main Zone are drill inferred resources because of the wider drill hole spacing in this zone. The following resources have been calculated for the West and East Main Zones:

West Main Zone:

- +0.10% Y_2O_3 Block; 1,260,000 metric tons grading 0.15% Y_2O_3 and 0.96% ZrO_2.
- Higher Grade Block within the +0.10% Y_2O_3 block; 786,000 metric tons grading 0.18% Y_2O_3 and 0.95% ZrO_2.

East Main Zone:

- Block A (+0.10% Y_2O_3); 372,000 metric tons grading 0.13% Y_2O_3 and 1.17% ZrO_2.
- Block B (+0.10% Y_2O_3); 637,000 metric tons grading 0.15% Y_2O_3 and 1.17% ZrO_2.

Total East Main Zone:

1,009,000 metric tons grading 0.14% Y_2O_3 and 1.17% ZrO_2.

An approximate calculation of waste that would have to be removed outside of the ore blocks (external waste) for an open pit in the higher grade area of the West Main Zone was made (Table 13). The technique used in calculating waste was the same as that used in calculating the ore blocks. A slightly lower specific gravity for waste (2.7) than ore (2.8) was used as a very small proportion of the waste is unconsolidated overburden. From this calculation it appears that the external waste to ore ratio in a potential open pit in the higher grade block would be roughly 0.5:1.

Discussion

The main geological parameters that determine the economic viability of a yttrium deposit at Kipawa are the tonnage, grade and geometry of the deposit, yttrium and gangue mineralogy and potential by-product credits.

Most of the significant mineralized intervals in holes drilled to date in the Main Zone range from 0.14% to 0.23% Y_2O_3 with a few short sections over 0.30% Y_2O_3 (Table 6). Assays from the trenches are somewhat higher than the drill holes in the West Main

TABLE: 13

EXTERNAL WASTE WITHIN POSSIBLE OPEN PIT ON HIGHER GRADE BLOCK WEST MAIN ZONE

SECTION	AREA m^2	LENGTH m	VOLUME m^3	METRIC TONS (Volume X 2.7)
14+78E	1120	34	38,000	102,800
14+37E	1240	41	50,800	137,300
13+88E	258	46	11,900	32,000
13+44E	268	52	13,900	38,000
12+76E	169	60	10,100	28,000
12+26E	468	40	18,700	50,500
		TOTAL M. TONS:		*389,500*

EXTERNAL WASTE: ORE RATIO IN HIGHER GRADE PIT:

389,000 M. TONS WASTE TO 785,800 M. TONS ORE = 0.5:1

Zone. This may be because some of the trenches were excavated in a fairly thin, gently dipping pyroxenite for much of their length (Photo 56). Pyroxenite is the best host rock for eudialyte and it carries the best yttrium values.

Based on the grade of the longer significant mineralized intervals in the holes drilled to date, and the observation that higher grade mineralization (>0.25% Y_2O_3) is quite discontinuous or poddy in the Main Zone, it is unlikely that economically mineable tonnages grading over 0.25% Y_2O_3 are present in the Main Zone. It is possible that the East and West Main Zones could be somewhat upgraded with more drilling; possibly as high as 0.20-0.22% Y_2O_3. However, any significantly higher grade sections in these zones are probably small and discontinuous. There is potentially enough tonnage for a viable deposit in the Main Zone and much of the tonnage indicated to date is amenable to open-pit mining.

The West Main Zone is still open to the south and to a limited extent to the southwest and the East Main Zone is open to the west and northwest. How far the zones continue in these directions and how much of the extra tonnage might be available to open-pit mining depends mainly on the configuration of the peralkaline granite-syenite contact. If the main peralkaline granite cuts off the syenite immediately grid south of our southernmost holes, then not much additional tonnage will be found in this direction (Figure 8). However, additional tonnages might be found in the central part of the Main Zone, south of the surface peralkaline-syenite contact, if the syenites are not cut off at depth by this contact. Whether these tonnages, if present, will be available for open-pit mining, will depend on the steepness of the southwest dip of this contact.

The most continuous yttrium mineralization appears to occur in the upper part of the calc-silicate/syenite unit, which consist primarily of syenites with a few lensey calc-silicate layers. Calc-silicates become somewhat more abundant to the east in the upper part of this unit. Eudialyte and mosandrite are the main yttrium-bearing minerals in the syenites, and mosandrite and britholite in the calc-silicates, in the upper part of the calc-silicate/syenite unit (Figure 8). Britholite is the main yttrium mineral in the lower part of the calc-silicate/syenite unit and occurs primarily in calc-silicate rocks. Yttrium mineralization appears to be more erratic in the lower part of this unit.

Eudialyte occurs in the West Main Zone and in the East Main Zone, but appears to be extremely rare to absent between 18+50E and 22+00E in the Main Zone. It may, however, occur at depth south of the peralkaline granite-syenite contact in this area if the syenites are not cut off to the south by the peralkaline granites.

The concentration of eudialyte appears to be much more erratic than yttrium grades in the East and West Main Zones. This is probably because a fairly high percentage of yttrium is contained in mosandrite. Also, the minerals hiortdahlite and miserite, which also carry yttrium, are present in the West Main Zone. Britholite is present in very minor amounts in the West Main Zone but is more abundant in the East Main Zone; possibly because there are more calc-silicate rocks in the upper part of the syenite/calc-silicate unit in this area.

High yttrium values were obtained in red hematitic sections in the peralkaline granite gneiss in Hole 32 (4.6 metres grading 0.16% Y_2O_3) and Hole 33 (4.6 metres grading

0.14% Y_2O_3) in the East Main Zone. No yttrium minerals were megascopically identified in these sections.

Current metallurgical testing is directed toward producing a physically upgraded yttrium concentrate that can be chemically processed economically to recover yttrium. If these tests are successful in producing an economic, physically upgraded concentrate from the test samples, then one would have to determine the percentage recovery of both yttrium and the main yttrium-bearing minerals in the physical concentrate from the test material in order to determine how applicable the test results would be to the deposit as a whole. It is therefore important to have a good understanding of the distribution and concentration of the yttrium-bearing minerals, recovered by the physical upgrading process, throughout the deposit.

The deposit has some characteristics that may be favourable for physical upgrading to produce a yttrium concentrate. All the major yttrium-bearing minerals are usually medium-grained, euhedral, well- crystalized minerals in a friable host rock, consequently, they could probably be liberated fairly easily by coarse crushing and grinding. The minerals appear, in general, to be very pure and unaltered with little replacement by, or intergrowth with, other minerals, therefore each mineral type should respond uniformly to whatever processes might be developed to physically concentrate them.

The possibility of by-product recovery can probably not be determined until a yttrium recovery process is decided upon. Depending on the process, zirconium and other lanthanides might be potential by-products.

As yttrium grades are fairly erratic, as indicated by the large variation of values in significant intersections, and the relative proportion of the main yttrium-bearing minerals quite variable in the deposit, I would estimate that a maximum drill hole spacing of 15 metres will be required to prove up the yttrium resource for feasibility purposes.

VIII PB ZONE

Introduction

The PB Zone is located about 2.5 km southeast of the Main Zone. It is represented on surface by a concentration of radioactive calc-silicate cobbles and boulders, some of which carry abundant britholite with high yttrium values (Photo 57). Peralkaline granitic rocks outcrop on a ridge about 100 metres southeast of the main concentration of yttrium-bearing boulders (Photo 58). These are the only outcrops in the immediate area.

Five diamond drill holes totalling 457 metres were drilled in 1990 to locate the source of yttrium-rich boulders in this zone (Table 14). It was assumed that the radioactive yttrium-bearing boulders were indicative of the bedrock directly below and that they had not moved far from their source. This was supported by the presence of a radiometric anomaly coincident with the boulder train. As most of the yttrium-bearing boulders were calc-silicates it was thought that their source was a northeasterly-striking southeast-dipping calc-silicate unit located directly below the boulder train.

The first hole was drilled to the northwest to undercut the southern end of the boulder train (Figure 42). This hole intersected only peralkaline granitic rocks. The second hole was drilled below the boulder train about 70 metres northeast of the first hole. This hole also intersected peralkaline granitic rocks, however, some anomalous radioactivity was recorded near the bottom of the hole. The third hole was also drilled below the boulder train about 90 metres

TABLE : 14

DRILLING SUMMARY - PB ZONE

HOLE	*GRID CO-ORDINATES*	*ELEV (m)*	*AZIM*	*INCL*	*DEPTH (m)*	*DATE COMPLETED*
90-KBZ-1	1+00E 0+35S	288	322°	-60°	91.6	Sept. 14/90
80-KBZ-2	1+60E 0+00N	282	322°	-50°	102.7	Sept. 16/90
90-KBZ-3	2+50E 0+30N	283	322°	-50°	105.1	Sept. 18/90
90-KBZ-4	3+00E 0+50N	281	009°	-50°	76.5	Sept. 19/90
90-KBZ-5	3+00E 0+50N	281	322°	-50°	81.4	Sept. 20/90

TOTAL PB ZONE: 457.3m IN 5 HOLES

northeast of the second hole. It intersected peralkaline granitic and syenitic rocks with a very narrow marble layer before entering rocks identical to the basement gneiss unit in the Main Zone. More radioactivity was recorded in this hole.

The airborne magnetic maps, produced by Unocal's airborne survey in 1989, were reviewed as the third hole was being completed and a subtle east-west magnetic trend was observed just north of the drill area. It was then postulated that the basement gneiss contact intersected in the third hole has an east-west strike and a southerly dip. The fourth hole, which was collared near the north end of the boulder train about 70 metres northeast of third hole, was drilled to the north to test this hypothesis. Syenite, a thick section of locally mineralized calc-silicate rocks, and the basement gneiss were intersected in this hole (Photos 61 and 62). As the drill could not be moved further north or west because of the Kipawa River, the fifth hole was drilled to the northwest from the same site as the fourth hole. This hole intersected the same rock formations as the fourth hole.

Although two of the five drill holes intersected the calc-silicate unit, which was probably the source of the high grade boulders, yttrium values are much lower in the drill holes than in the high grade boulders.

It was determined from the drill holes that the basement gneiss contact strikes nearly east-west and dips 25-30° south. The calc-silicate formation is probably conformable with the basement gneiss contact, therefore it probably has a similar strike and dip. Most of this formation comes to surface below the Kipawa River immediately north of the drill area. The source area for the high grade yttrium boulders probably lies below the Kipawa River, as shown on Figure 42. The high-grade boulders would have been plucked by the glacier from this source area and

deposited as a boulder train down the ice direction from this area. The boulder train closely parallels the regional ice direction. Some of the mineralized material was also broken down by the glacier and deposited as finer grained sandy material with the mineralized boulders and cobbles. This finer-grained material is responsible for the radiometric anomaly coincident with the boulder train.

The stratigraphy in the PB Zone is somewhat similar to the Main Zone in that calc-silicate and syenite formations overlie the basement gneiss, which are in turn are overlain by peralkaline granitic rocks (Figure 48). Some slight textural and mineralogical differences in the complex rocks were, however, noted in the PB Zone.

Rock Types

Meusy logged four main rock units in drill core from the PB Zone:

i) peralkaline granite;

ii) syenite;

iii) calc-silicate rocks;

iv) basement gneiss.

He further subdivided the syenitic rocks into orange quartz syenite, grey biotite syenite and mesocratic syenite; the calc-silicate rocks into green amphibolite, silver-grey pyroxenite, green rock and calcite marble; and the basement rocks into brown and pink quartz-feldspar gneisses.

The peralkaline granite has a prominent orange colour and is usually coarse-grained and crudely foliated to massive. Quartz varies from 5-10%. A common variant is a rock logged as

feldspar rock which contains about 95% sodic plagioclase. The radiometric background is generally low in peralkaline granite. It outcrops on the ridge to the east of the drill area.

The most common syenitic rock type intersected in the drilling is a grey biotite syenite which is somewhat similar to the medium-grained mesocratic syenite in the Main Zone except biotite instead of amphibole is the most common mafic mineral. Variations include a lucocratic facies and porphyroblastic facies with about 5% 1-3 mm orange feldspar porphyroblasts. Finely disseminated pyrite may be locally present and small graphite flecks are very common in all facies. Unlike the mesocratic syenite in the Main Zone, the grey biotite syenite is devoid of any exotic minerals and as a result, has a low to flat radiometric signature on gamma logs.

The mesocratic syenite is similar to the mesocratic syenite in the Main Zone. It is medium greenish-grey, medium-grained and moderately foliated with 15-25% amphibole. It is locally hematized and may contain minor exotic accessory minerals ("creamy stubbies") and graphite (Photo 59). Its radiometric signature is moderate and spiky with peaks up to 500 cps.

The orange quartz syenite is a fairly uncommon rock (Photo 60). It is fine to medium-grained, moderately foliated and has a pinkish colour when dry and orange when wet. Quartz is hard to detect and its percentage difficult to estimate. Most of the orange colour in the rock is due to a partial hematization of feldspar.

Green amphibolite is more common than in the Main Zone, therefore it has been logged as a separate rock type in the PB Zone. It is dark green on a fresh break and medium greyish-green on the core surface. It is coarse-grained, massive and slightly carbonated. It is composed mainly of fibrous amphibole (possibly actinolite or richterite), 10-15% plagioclase

and 5% interstitial calcite. The rock is often mineralized with "creamy stubby" minerals, zircon, sphene and may contain britholite. Since it is often mineralized, the green amphibolite has a high radiometric background.

The remaining rock types; the silver-grey pyroxenite, green rock, calcite marble and the two varieties of basement gneiss, are similar to previously described rock types in the Main Zone.

Structure

The detailed structure of the PB Zone is not known because of the lack of outcrop.

The contact between the basement gneiss and the rocks of the Kipawa complex, as calculated from drill holes, strikes about 110° and dips about 28° to the south. As the calc-silicate and syenite formations are generally conformable with the basement contact in the Main Zone, it is assumed that these units have the same strike and dip in the PB Zone as the basement contact. Although the strike of the foliation in the outcrops of peralkaline granitic rock to the east of the drill area are often quite variable, dips vary from 15-20° to the south.

Drilling Results

Drill hole data is summarized in Table 14 and the significant drill intersections in Table 6.

BQ core (1 7/16 inch diameter) was recovered from the holes in the PB Zone. Core recovery averaged over 95%. Assay sample lengths were routinely 5 feet, unless shortened or

lengthened to terminate at a major geological contact. All holes were probed inside the drill rods with a Mount Sophris down-the-hole radiometric instrument.

All the significant yttrium mineralization in the PB Zone occurs in calc-silicate rocks. The best hole, Hole 4, intersected a thick section of anomalously radioactive calc-silicates with yttrium mineralization (Figure 46). The best assay interval averaged 0.12% Y_2O_3 and 0.78% ZrO_2 over 18 metres of which 7.6 metres graded 0.14% Y_2O_3 and 0.83% ZrO_2. Hole 5 also intersected a thick sequence of calc-silicates, however, grades were somewhat lower than in Hole 4 (Figure 47). The best interval averaged 0.11% Y_2O_3 and 1.14% ZrO_2 over 7.1 metres.

Two short 1.5 metre sections grading 0.13% Y_2O_3/1.19% ZrO_2 and 0.20% Y_2O_3/1.43% ZrO_2 were intersected in syenitic rocks of possible calc-silicate origin in Hole 3 (Figure 45).

Two types of mineralization were recognized by Meusy in the calc-silicate rocks; a) "creamy stubbies," yellow sphene, minor hematite, fluorite and pyrite, a few grains of britholite and possibly some thorite in green amphibolite and b) yellow sphene, minor fluorite, zircon and thorite and some pale brown acicular crystals of mosandrite in silver-grey pyroxenite. Britholite appears to be the most common yttrium-bearing mineral. Some yttrium is also present in mosandrite and possibly in sphene.

A few narrow bands of "creamy stubby" minerals were noted in the overlying syenitic rocks. However, no yttrium minerals were observed in, nor any significant yttrium assays received from, these rocks.

Discussion

Although the calc-silicate unit from which the high-grade yttrium boulders were derived was intersected in two drill holes, no high-grade yttrium values were obtained in these holes. As most of this unit surfaces beneath the Kipawa River and thus could not be mined by open-pit methods, no further drilling was conducted.

The calc-silicate unit in the PB Zone is very similar to the calc-silicates in the Main Zone. Britholite is the dominant yttrium mineral in the lower calc-silicate unit in the Main Zone, but it appears to be erratic and discontinuous. It is therefore possible that the origin of the PB Zone boulders is a small zone of massive to semi-massive britholite in the calc-silicate rocks.

The calc-silicate unit still offers, however, an attractive exploration target outside of the PB Zone. The calc-silicate formations intersected in the PB Zone are probably an extension of the calc-silicates in the Main Zone and these formations are likely continuous between the two zones. Numerous radioactive syenite boulders which may indicate the presence of yttrium mineralization in the underlying calc-silicates occur immediately west of the PB Zone. Also calc-silicate boulders, some with significant yttrium values, have been found both east and west of the PB zone.

Although the britholite mineralization discovered to date in the lower calc-silicate formations has been generally discontinuous and poddy, there is still a possibility of locating a significant yttrium deposit in these formations. Britholite does not have to be as concentrated as the other

yttrium-bearing minerals to yield a significant deposit, as it generally contains more yttrium than the other yttrium minerals.

IX 1990 KIPAWA PROSPECTING PROGRAM

The prospecting program conducted by Alex Knox was directed toward prospecting radiometric anomalies outlined by Unocal's 1989 airborne geophysical survey and following up radioactive and mineralized boulders discovered by Gidluck in 1989 immediately after the survey was flown.

The results of this program are summarized in an August 1990 report by A. Knox titled *1990 Kipawa Prospecting Program, Weekly Reports.*

The main results of this work were; the discovery of mineralized calc-silicate and syenite boulders in an airborne radiometric anomaly just west of the southwest shore of Lac Sairs, near some radioactive boulders discovered by Gidluck in 1989; delineation of a high-grade yttrium boulder train in the PB Zone; and the discovery and delineation of a radioactive syenite boulder field, termed the PS Zone, immediately west of the PB Zone (Figure 6). Nine claims, contiguous with Unocal's previous claims, were staked to cover the radioactive and mineralized boulders just west of Sairs Lake. The PB and PS Zones were discovered on claims already held by Unocal. Other isolated boulders with anomalous to significant yttrium values were also discovered by Knox to the east and south of the KR Zone. The source of these boulders is not known.

Locations and assay values of boulders discovered by Knox with significant yttrium values outside of the main boulder fields in the PB and PS Zones, are plotted on Figure 6. Some of these boulders were later submitted by Allan for trace element and whole rock analyses.

These samples are tabulated in Table 10 and their analyses are reported on appended laboratory analytical sheets. Very high cerium and yttrium values were obtained from a few radioactive syenite boulders just west of Sairs Lake. Two samples analyzed 42,000 and 46,000 ppm Ce. A dark brown shiny resinous mineral, possibly britholite, was observed in both samples. They are also characterized by fairly intense hematite and manganese staining. A few high cerium values (up to 20,000 ppm Ce) were also obtained from the KR Zone. As noted by Knox, a few niobium values greater than 1000 ppm (up to 4000 ppm) were received from samples collected from the Kipawa complex east of the PB Zone.

X KR ZONE

The KR Zone is represented by a long, narrow, fairly continuous anomalous radioactive zone trending east-northeast. It is located on the northwest facing slope of a low tree and bush covered ridge along the south side of the Kipawa River, immediately west of the junction of the Garden River and the Kipawa River. The Zone, as defined by anomalous surface radioactivity, is about 800 metres long (Figure 49).

The radioactive zone was first discovered and hand-trenched in 1969. Nuspar Resources optioned the property for its uranium potential and drilled seven diamond drill holes in 1978 and three in 1979. They also cut a bulldozer trench across the central part of the zone. They obtained values as high as 0.34% Y_2O_3 over 1.1 ft., 0.5% CeO_2 over 1.1 ft. and 0.64% Nb_2O_5 over 1 ft. from this drilling. Unocal staked this zone in 1967.

Although generally covered by a thin layer of glacial sediment and boulders, the radioactive zone is exposed in a few outcrops, one bulldozer trench and a number of hand-dug pits over its 800 metre length. It is up to 3 metres wide in a couple of the trenches.

Anomalous radioactivity occurs in pink to flesh-coloured syenitic rock in metasediments consisting primarily of fine to coarse-grained biotite-feldspar and quartz-biotite-feldspar gneisses with local clots and lenses of white quartz. A thin calcareous unit occurs in the metasediments in a trench at the east end of the zone. In detail, the syenites appear to occur in two or three narrow (1-2 metres wide) sill-like bodies. These bodies are conformable with the foliation and layering in the paragneisses and have gradational contacts with the gneisses.

Syenite bodies contain streaky clots of black biotite and locally large feldspar crystals and euhedral zircons. The most intense radioactivity occurs in streaky clots of coarse biotite in the syenite. The syenite in the bulldozer trench near the central part of the zone is a light, buff, porcellaneous rock with disseminated graphite and/or pyrite.

The paragneisses strike NNE and dip steeply to the south. They have a vertical dip in the eastern end of the radioactive zone.

Peralkaline granitic rocks of the Kipawa complex occur immediately to the northwest of the radioactive zone. These rocks outcrop on shoals in the Kipawa River and on the south shore of the Kipawa River, near the eastern end of the KR Zone. Foliation and mineralogical layering strikes westerly and dips gently to the south (Photo 64). These foliation attitudes suggest that the upper contact of the peralkaline complex dips gently beneath the paragneisses.

The radioactive zone occurs in paragneisses which appear to be immediately above the hanging wall contact of the underlying peralkaline intrusion. The narrow sill-like syenite bodies hosting the anomalous radioactivity are possibly dyke-like off-shoots from this underlying intrusion. The gradational contacts between the sill-like syenite bodies and the enclosing paragneiss suggests that these bodies might be, at least in part, a product of syenitic alteration along a zone of weakness in the paragneisses above the underlying intrusion. Because of its narrow width and fairly low assay values for yttrium from grab-samples, this zone has little potential for a significant lanthanide resource. An effort should, however, be made to locate and examine Nuspar's drill core for possible yttrium-bearing minerals, and possibly assay some of the core for yttrium, as these drill holes appear to have tested the radioactive zone over most of its strike length.

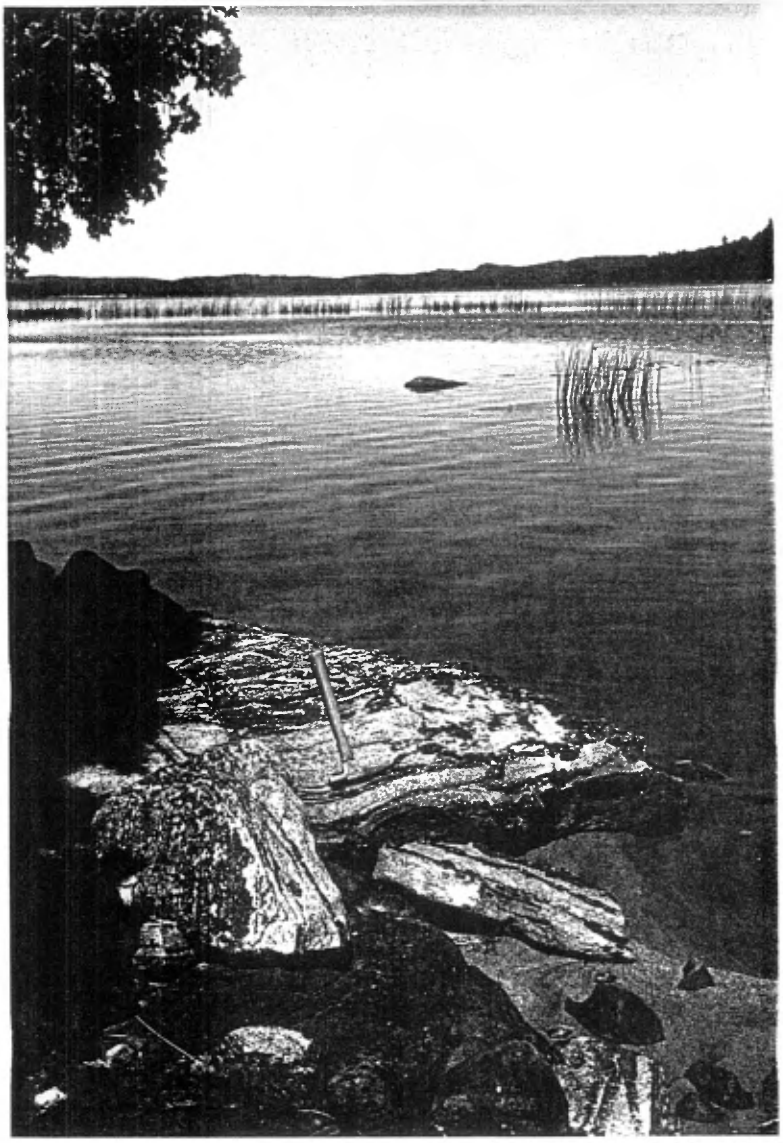


Photo 63: Outcrop of Calcite Marble with Calc-silicate layers West Shore of Sairs Lake.

Photo 64: Outcrop of Peralkaline Granite Gneiss, Kipawa River, KR Zone.

From a regional point of view, this zone indicates that anomalous radioactivity and possibly associated yttrium and zirconium mineralization can occur on the hanging wall as well as the footwall contact of the Kipawa complex. Knox reported lensey granite and syenite sills with gradational contacts in the paragneisses on the southeast shore of Sairs Lake. These sills, which appear to be similar to the syenite in the KR Zone, carry anomalous yttrium, zirconium, cerium and niobium values.

XI
CHEMISTRY AND PETROGENESIS OF THE KIPAWA PERALKALINE COMPLEX IN THE MINERALIZED ZONE

Introduction

A number of chemical ratios are used to classify and compare alkaline and peralkaline rocks. The most important ratio used in classifying these rocks is the agpaitic ratio or coefficient. This ratio is a measure of the alkalinity of the alkaline rocks and is used to classify these rocks into two major groups with characteristic mineralogy and trace element contents. The agpaitic ratio or coefficient is defined by the formula:

$$\frac{Na_2O + K_2O}{Al_2O_3}$$

Rocks with agpaitic coefficients greater than one are termed agpaitic alkaline rocks and those with less than one are termed miaskitic rocks.

The presence or absence of free quartz is also important in rock classification. Alkaline rocks containing free quartz (oversaturated) are termed peralkaline rocks.

The agpaitic rocks are dominated by sodium-bearing minerals such as arfvedsonite, aegirine, sodalite, eudialyte etc. The miaskitic rocks are richer in calcium-bearing minerals such as apatite, titanite (sphene), fluorite and calcite. Iron is higher in the agpaitic rocks. Numerous soda titanium silicate minerals are present in agpaitic rocks whereas ilmenite and titanite (sphene) is the only titanium silicate mineral in miaskitic rocks. Agpaitic rocks are characterized by higher Cl, F and S.

Peralkaline granitic rocks contain potash feldspar, albite, quartz, aegirine and arfvedsonite-riebeckite as the principal minerals. Two types of perthite are usually present, an earlier low albite-orthoclase perthite and a later low albite microcline perthite. Fluorine and to a lesser extent chlorine are important minor elements in these rocks.

The agpaitic and peralkaline rocks are enriched in high field strength elements such as yttrium, lanthanides and zirconium, and volatiles.

A number of trace element ratios may also be used to further classify and compare the alkaline rocks.

Kipawa Peralkaline Complex

The Kipawa peralkaline complex has been divided into two main units in the mineralized area; a peralkaline granite gneiss unit and a syenite gneiss unit. Calc-silicate rocks are intimately associated with the syenite gneiss.

Analytical data for samples from the peralkaline complex and the calc-silicates in the mineralized area are presented in Tables 15 and 16.

The agpaitic ratio for the peralkaline granite gneiss ranges from 0.80 to 1.02 and averaged 0.94. This indicates that the peralkaline granite gneiss is, according to Sorenson's (1974) classification, an intermediate type of alkaline rock between the agpaitic and miaskitic groups. This would suggest that the peralkaline granite was not sufficiently alkaline for the yttrium-

TABLE 15: WHOLE ROCK ANALYSES (%)

SAMPLE	SiO_2	TiO_2	Al_2O_3	Fe_2O_{3*}	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	LOI**
Peralkaline Granite											
8573	64.70	0.51	12.00	8.25	0.17	0.52	1.00	6.80	4.56	0.20	<0.05
8574	77.50	0.73	7.49	5.22	0.20	0.11	0.44	5.13	2.50	0.15	0.14
8575	67.50	0.36	13.20	6.25	0.14	0.17	0.78	6.32	4.16	0.10	<0.05
8001	69.50	0.46	10.40	7.27	0.22	0.30	0.72	6.50	3.35	0.12	<0.05
8002	69.70	0.35	10.50	6.63	0.23	0.39	0.80	5.95	3.93	0.06	0.30
8570	67.00	0.52	10.40	8.48	0.16	0.19	0.82	6.21	4.14	0.16	<0.05
Syenite											
90KU-13	59.30	0.67	10.20	9.42	0.39	2.67	4.35	8.00	3.41	0.05	1.13
90KU-25	57.60	0.65	9.51	9.36	0.43	3.82	6.15	7.21	2.92	0.18	1.05
90KU-33	59.10	0.51	7.51	9.83	0.77	3.54	5.71	6.77	2.73	0.33	1.23
Calc-Silicate											
90KBZ-4	50.00	0.66	5.57	6.08	0.24	12.80	12.80	4.06	2.16	0.36	4.48
90KTR-7	54.60	0.29	4.64	4.75	0.30	14.50	11.20	4.32	2.08	0.19	1.43
Basement Gneiss											
8013	63.50	0.99	11.40	9.37	0.20	0.84	1.68	5.44	4.38	0.37	<0.05
8014	70.90	0.45	11.60	4.54	0.11	0.24	0.52	4.60	4.90	0.15	<0.05
8015	64.70	0.37	11.50	9.40	0.19	0.34	1.11	6.84	3.57	0.20	<0.05
8016	66.20	0.40	10.00	9.24	0.15	0.54	2.27	6.23	3.64	0.25	<0.05

* Total Iron ** Loss on Ignition

TABLE 16: TRACE ELEMENT ANALYSES (ppm)

SAMPLE	Rb	Sn	Ba	Ce	Hf	Ta	Th	U	Zn	Pb	Sr	Zr	Nb	Y	Li	Be	V
Peralkaline Granite																	
8573	360	<200	140	180	67	2	10	4	20	26	41	3544	40	102	229	7	5
8574	290	<200	<100	130	170	9	1110	48	21	245	26	11551	35	218	41	3	2
8575	240	<200	190	490	34	2	25	4	18	37	40	1674	27	121	149	5	3
8001	360	<200	<100	88	120	1	4	6	18	166	56	8219	8	94	320	5	2
8002	380	<200	<100	60	48	1	108	7	18	44	13	2416	17	60	83	11	5
8570	270	<200	400	150	94	<1	7	4	20	37	61	5602	20	71	146	6	4
Syenite																	
90KU-13	530	<200	440	2790	150	30	424	65	401	330	148	8065	172	2137	209	9	19
90KU-25	470	<200	690	2240	110	28	301	41	231	273	165	6844	162	1674	291	11	20
90KU-33	390	<200	<230	1880	190	36	880	65	127	471	120	10498	172	1602	221	10	17
Calc-Silicate																	
90KBZ-4	620	<200	640	1460	140	26	222	50	176	250	147	6656	180	842	371	18	31
90KTR-7	470	<200	<310	2920	130	49	473	87	115	356	62	8300	363	1565	280	21	13
Basement Gneiss																	
8013	270	<200	260	240	26	<1	12	2	41	19	109	1208	25	91	217	5	25
8014	150	<200	210	240	17	<1	11	3	19	14	37	817	36	42	62	2	8
8015	140	<200	100	160	19	<1	16	2	27	66	36	944	10	65	217	5	4
8016	240	<200	<100	130	110	1	6	5	12	16	25	6965	23	94	56	4	5

bearing sodium silicate minerals such as eudialyte to crystalize. Also the yttrium-bearing calcium zirconium silicate minerals such as mosandrite may not have formed because of the low calcium content.

The agpaitic ratio for the syenite ranges from 1.06 to 1.26 and averages 1.11 which places it in the agpaitic group. Agpaitic minerals such as eudialyte would be expected in this rock type with concentrations in the later crystalizing pegmatitic phases such as pyroxenite and felsic pegmatites.

The syenite has a higher calcium and magnesium content than normal agpaitic syenites. This may be due to the partial assimilation of the calc-silicate rocks. The higher than normal calcium content of the syenite may be responsible for the crystallization of the major yttrium-bearing mineral mosandrite (calcium titanium silicate) and other accessary calcium silicate minerals such as gittinsite, hirotdahlite, miserite, sphene and agrellite.

As noted before sphene often occurs in areas where mosandrite is minor or absent. Possibly sphene rather than mosandrite crystalizes in areas of lower alkalinity in the syenite.

Fluorite and to a lesser extent apatite is present in the syenite. Concentrations of yttrium and certain agpaitic minerals in an alkaline system is possibly due in part to the presence of significant amounts of fluorine.

Iron is abundant in both the peralkaline granite and syenite. Local hematite staining also suggests that some, if not most, of the iron is in the ferric state. This is typical of alkaline rocks.

As would be expected the calc-silicate rocks have a much higher content of calcium, magnesium and phosphate and lower silica and aluminum than the syenite and peralkaline granite. The calc-silicates are composed of minerals typical of agpaitic alkaline rocks such as soda pyroxenes, soda amphiboles and albite, and minerals typical of calc-silicates such as diopside, phlogopite, tremolite, chondrodite, biotite and calcite. Apatite and fluorite are common accessory minerals. The major yttrium-bearing mineral is britholite, a member of the apatite family.

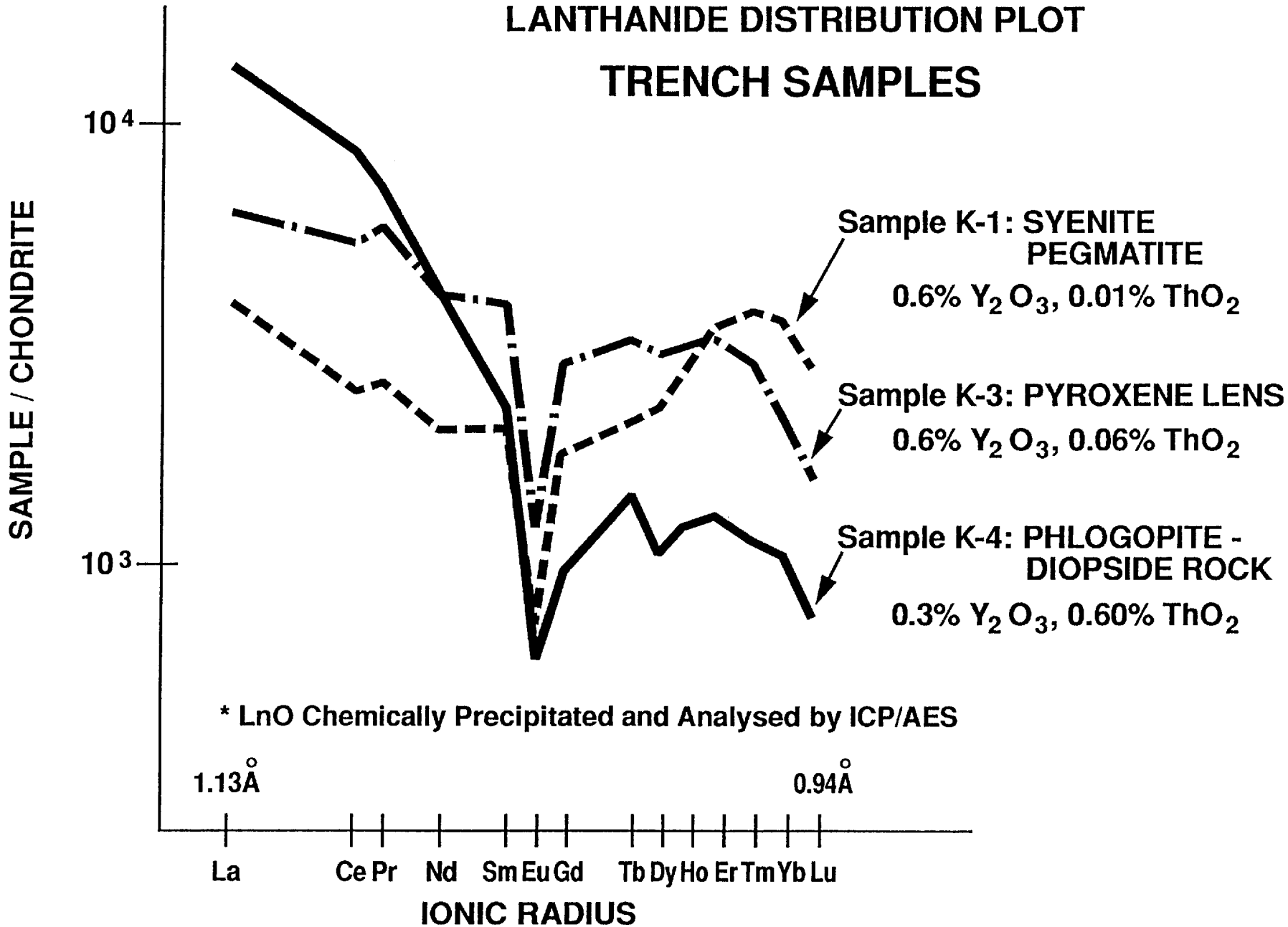
The mineralized syenite unit of the Kipawa peralkaline complex contains much higher concentrations of zirconium, yttrium and thorium and somewhat higher concentrations of cerium, tantalum and lithium than normal alkaline syenites. Strontium appears to be somewhat lower than in normal alkaline syenites and niobium is lower at Kipawa than in many other mineralized peralkaline complexes. The Nb:Ta ratio in the mineralized Kipawa syenites is 5-6:1 compared to 10-12:1 in average nepheline syenites. Niobium generally substitutes in the crystal structures of Ti and Zr-bearing minerals in agpaitic rocks rather than forming separate niobium minerals such as pyrochlore. The Zr:Hf ratio in the syenite ranges from 53:1 to 62:1 compared to a range of 31:1 to 70:1 in nepheline syenites. The Ce:Y ratio in the mineralized syenite is 1.2-1.4:1 and in the calc-silicate rocks it is 1.7-1.9:1. The main yttrium-bearing mineral in the calc-silicates is britholite which has a higher content of cerium and light lanthanides than the other major yttrium-bearing minerals. Also apatite, which is enriched in light lanthanides is more abundant in the calc-silicates. These two minerals probably account for the higher Ce:Y ratio in the calc-silicate rocks.

Samples were collected in 1987 from a mineralized calc-silicate rock and from mineralized felsic pegmatitic and pyroxenitic phases of the syenite for lanthanide distribution analysis. All

samples had negative europium anomalies. The calc-silicate rock showed an enrichment in light lanthanides, the pegmatite sample is slightly enriched in heavy lanthanides and the pyroxenite is more enriched in the middle lanthanides (Figure 52).

The Th:U ratio in the syenite varies from 6.5:1 to 13.5:1 and in the calc-silicate from 4.4:1 to 5.4:1.

Lithium is probably substituting in amphibole, pyroxene and mica rather than occurring as separate lithium minerals.


LANTHANIDE DISTRIBUTION PLOT
TRENCH SAMPLES
SAMPLE / CHONDRITE
10 4
10 3
Sample K-1: SYENITE PEGMATITE
0.6% Y2 O3, 0.01% ThO2
Sample K-3: PYROXENE LENS
0.6% Y2 O3, 0.06% ThO2
Sample K-4: PHLOGOPITE - DIOPSIDE ROCK
0.3% Y2 O3, 0.60% ThO2
* LnO Chemically Precipitated and Analysed by ICP/AES
1.13Å
0.94Å
La Ce Pr Nd Sm Eu Gd Tb Dy Ho Er Tm Yb Lu
IONIC RADIUS

Age Relationships

Field relations suggest that the peralkaline granite intrudes the syenite. The relationship between the calc-silicates and syenite is, however, somewhat contradictory. Most of the field relationships indicate that the calc-silicate rocks are xenoliths or inclusions in the syenite suggesting that the syenite intruded and partially assimilated an older calcareous unit. The origin of this calcareous unit or units is, however, enigmatic. If it were a metasedimentary unit why are they no other recognizable metasedimentary rocks associated with these calcareous rocks? Also, why is the calcareous unit, which is locally very thin, so persistent along the footwall of the peralkaline complex? In one drill hole in the PB Zone a very narrow band of calcite marble occurs within syenite (Photo 65). It is difficult to visualize that the syenite is intrusive into the calcite marble in this location. If the calcite marble is later than the syenite then it could be a carbonatite intrusion. If this is true then there may be two ages of calc-silicate rocks at Kipawa; one pre-syenite and one post-syenite.

In an attempt to clarify the origin of the calcite marble two samples from calcite marble formations in Trenches 8 and 11 were analyzed to determine whether these marbles have a trace element pattern similar to carbonatites. The marbles have very high concentrations of fluorine (15,000 and 20,000 ppm) and magnesium (11 and 16%). They also have somewhat higher amounts of Sr (85 and 147 ppm), Y (79 and 120 ppm), Ce (120 and 160 ppm) and Ba (280 and 810 ppm) than normal limestones although the strontium values (85 and 147 ppm) are very low for a carbonatite. An intense zone of biotitization (glimmerite) and hematite is sometimes developed at the contact between the calcite marble and the syenite (Photo 66). Although these alteration zones are often found at the contacts of carbonatites they may also

have been produced by the intrusion of the agpaitic syenites into limestones of sedimentary origin.

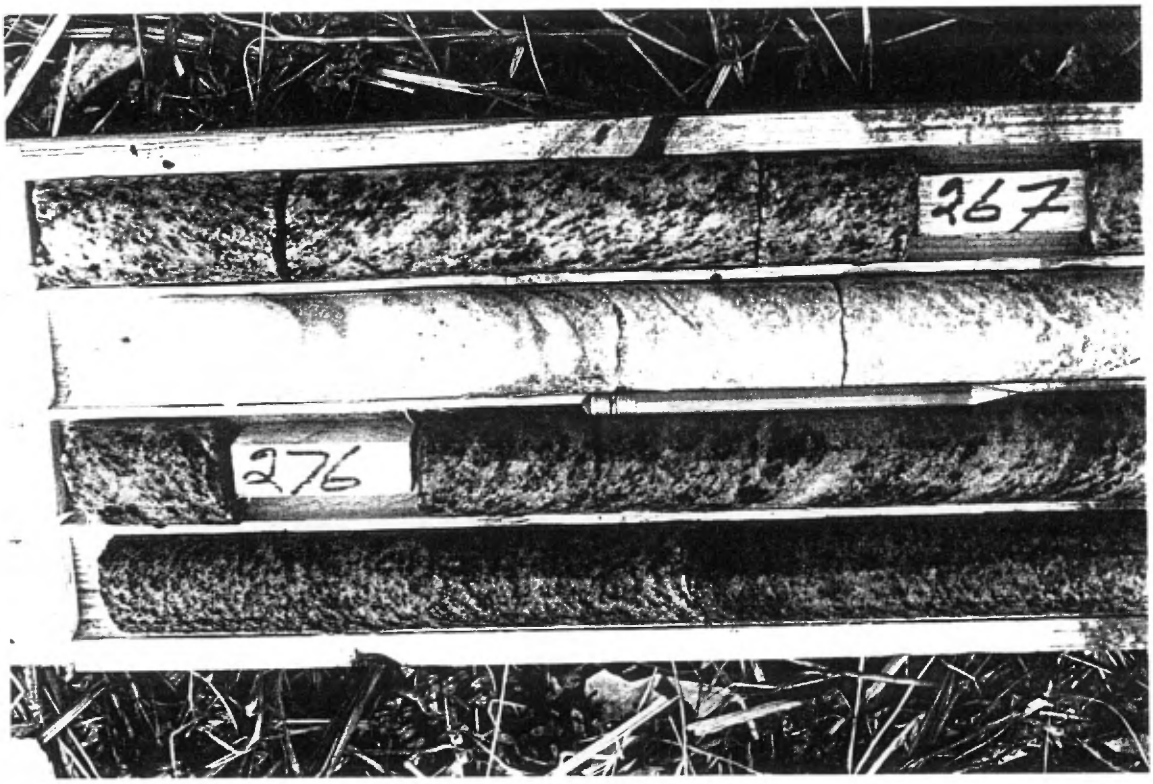


Photo 65: Calcite Marble in Syenite Gneiss.
90KBZ-03, 82.4 - 83.0 m.

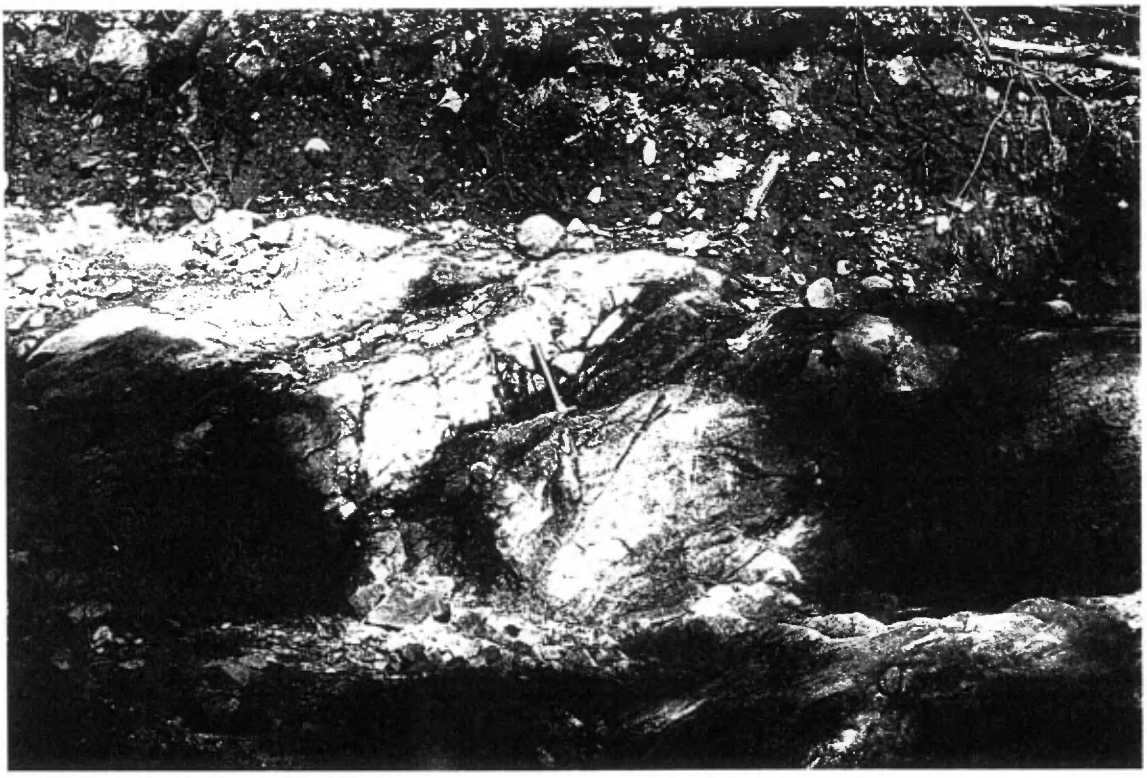


Photo 66: Reddish Brown Hematite Stain on
Hanging Wall of Calcite Marble. Trench 8.

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APPENDIX II

ANALYSES

KIPAWA PROPERTY

MER - SYSTÈMES
DE GESTION DES LOIS
QUÉBEC

'91 ABR -3 14:17

ENERGIE ET RESSOURCES - SECTEUR MINES
REÇU
20 MAR 1991
BUREAU RÉGIONAL
ROUYN-NORANDA

Ministère de l'Énergie et des Ressources
Division des données géoscientifiques
DATE 20 Août 1991
NO G.M. 050480

APPENDIX II

A. Special 1990 Analytical Samples

B. 1990 Drill Core Samples

C. 1990 Trench Samples

D. 1990 Samples; Prospecting Program

E. Composite Samples; 1988 Drill Core

F. 1988 Drill Core Samples

G. 1987 Bulk Samples

H. 1987 Surface Rock Samples

I. 1985 Surface Rock Samples

TABLE : 6

SIGNIFICANT DRILL HOLE INTERSECTIONS

DRILL HOLE	INTERVAL (m)			LENGTH (m)	CONTINUOUS MINERALIZATION % Y_2O_3	CONTINUOUS MINERALIZATION % ZrO_2	DISCONTINUOUS MINERALIZATION % Y_2O_3	DISCONTINUOUS MINERALIZATION % ZrO_2
				Continued/....				
	28.5	-	30.6	2.1			0.10	1.04
88-KU-10	33.4	-	41.8	8.4	0.16	0.72		
	74.4	-	76.2	1.8			0.24	0.13
East Main Zone								
88-KU-7	9.0	-	11.4	2.4			0.30	0.87
	19.5	-	36.4	16.9	0.15	1.11		
88-KU-8	2.0	-	27.1	25.1	0.18	0.96		
	41.2	-	43.1	1.9			0.10	0.65
88-KU-9	27.3	-	32.0	4.7			0.09	0.77
	36.6	-	40.3	3.7	0.14	1.26		
90-KU-30		----------	Nil	----------				
90-KU-31	51.8	-	53.3	1.5			0.10	0.54
90-KU-32	16.7	-	19.3	2.6			0.24	0.78
	26.0	-	30.6	4.6	0.16	1.73		
	16.7	-	30.6	13.9			0.12	1.45
90-KU-37	17.4	-	18.9	1.5			0.13	0.96
	22.0	-	40.5	18.5	0.18	1.42		
90-KU-34	20.2	-	21.9	1.7			0.57	0.80
	29.6	-	31.1	1.5			0.22	1.29
	20.2	-	38.7	18.5			0.12	1.06
	44.3	-	48.9	4.6	0.22	0.97		
	44.3	-	54.1	9.8			0.13	1.12
PB Zone								
90-KBZ-1		----------	Nil	----------				
90-KBZ-2		----------	Nil	----------				
90-KBZ-3	54.0	-	55.5	1.5			0.13	1.19
	61.6	-	63.1	1.5			0.20	1.43
90-KBZ-4	18.9	-	26.5	7.6	0.14	0.83		
	32.6	-	35.7	3.1	0.17	0.65		
	17.4	-	35.7	18.3			0.12	0.78
	41.8	-	43.5	1.5			0.11	1.57
	47.9	-	50.9	3.0	0.16	0.73		
90-KBZ-5	22.4	-	23.5	1.1			0.12	1.54
	26.5	-	28.0	1.5			0.22	1.20
	22.4	-	29.6	7.2			0.11	1.14
	41.8	-	43.7	1.9			0.12	0.57
	52.3	-	54.0	1.7			0.14	0.87
	52.3	-	58.2	5.9			0.07	0.40

TABLE : 6

SIGNIFICANT DRILL HOLE INTERSECTIONS

DRILL HOLE	INTERVAL (m)			LENGTH (m)	CONTINUOUS MINERALIZATION % Y_2O_3	CONTINUOUS MINERALIZATION % ZrO_2	DISCONTINUOUS MINERALIZATION % Y_2O_3	DISCONTINUOUS MINERALIZATION % ZrO_2
West Main Zone								
88-KU-1	8.4	-	24.8	16.4			0.08	0.97
	35.3	-	40.5	5.2	0.19	1.74		
	49.0	-	55.2	6.2	0.14	1.07		
88-KU-2	5.9	-	8.6	2.7			0.13	0.96
	17.3	-	19.2	1.9			0.10	0.15
	77.0	-	82.1	5.1	0.10	1.23		
88-KU-3	3.1	-	21.0	17.9	0.16	0.98		
88-KU-4	1.6	-	6.0	4.4	0.13	1.02		
	18.4	-	21.0	2.6			0.12	1.44
88-KU-5	17.2	-	19.6	2.4			0.20	0.96
	29.0	-	32.7	3.7	0.13	0.89		
	39.0	-	47.0	8.0	0.14	1.46		
	39.0	-	55.1	16.1			0.12	1.20
88-KU-11	16.2	-	35.4	19.2			0.13	1.10
	23.5	-	32.4	8.9	0.19	1.15		
	41.8	-	49.4	7.6			0.09	1.39
	57.1	-	58.8	1.7			0.14	0.54
	81.8	-	83.3	1.5			0.12	1.95
	87.9	-	91.8	3.9	0.20	0.96		
88-KU-12	26.4	-	30.8	4.4	0.12	0.90		
90-KU-13	1.5	-	26.5	25.0	0.19	0.85		
	23.5	-	26.5	3.0	0.13	0.95		
	40.2	-	41.7	1.5			0.22	1.21
90-KU-14	2.1	-	14.3	12.2	0.32	1.19		
	20.1	-	31.1	11.0	0.23	0.94		
	2.1	-	31.1	29.0			0.23	1.04
90-KU-15	8.5	-	14.3	5.8	0.17	1.08		
	20.4	-	21.9	1.5			0.23	1.44
	8.5	-	23.5	15.0			0.11	1.15
	35.8	-	37.7	1.9			0.15	0.14
90-KU-16	8.2	-	9.7	1.5			0.12	1.29
	15.8	-	17.3	1.5			0.11	0.89
90-KU-17	3.7	-	15.8	12.1	0.14	1.01		
90-KU-18	3.7	-	8.2	4.5	0.16	0.98		
	15.8	-	17.3	1.5			0.22	0.90
	3.7	-	17.4	13.7			0.12	0.60
	23.5	-	25.0	1.5			0.16	2.45
	40.2	-	41.7	1.5			0.16	0.87
	44.8	-	46.0	1.2			0.10	1.85
90-KU-19	1.5	-	9.8	8.3	0.43	0.77		

TABLE 17: SPECIAL 1990 ANALYTICAL PACKAGES

I. ASSAY: Yttrium, Zirconium, Cerium, Thorium, Niobium

II. TRACE ELEMENT: Yttrium, Zirconium, Cerium, Thorium, Uranium, Tin, Lithium, Niobium, Beryllium, Strontium, Barium, Rubidium, Hafnium, Tantalum, Lead, Zinc, Vanadium

III. TRACE ELEMENT & WHOLE ROCK: Trace Elements in II + SiO_2, TiO_2, Al_2O_3, Fe_2O_3, MnO, MgO, CaO, Na_2O, K_2O, P_2O_5, LOI

IV. RARE EARTH ELEMENTS: 14 Rare Earth Elements + Sc.

V. CARBONATITE: Yttrium, Cerium, Lanthanum, Barium, Strontium, Fluorine, Zirconium, Magnesium, Titanium, Uranium, Thorium, PO_4

A

SPECIAL 1990 ANALYTICAL SAMPLES

ondar-Clegg & Company Ltd.
4420 Canotek Road
Ottawa Ontario
K1J 9G2
(613) 749-2220 Telex 053-3233

BONDAR-CLEGG

Geochemical Lab Report

REPORT: 090-43604.0 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: J. ALLEN
DATE PRINTED: 30-JAN-91

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Ce	Cerium	26	10 PPM		Neutron Activation
2	Th	Thorium	26	0.5 PPM		Neutron Activation
3	Nb	Niobium	26	1 PPM		X-Ray Fluorescence
4	Y	Yttrium	26	1 PPM		X-Ray Fluorescence

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
ROCK	26	-200	26	Crush,Pulverize -200	26

REMARKS: SAMPLE 13995 WAS NOT REC'D.
HIGH U CAUSES INTERFERENCE ON CE.

REPORT COPIES TO: MR. J.F. ALLAN
FAX:403-268-0507

INVOICE TO: MR. J.F. ALLAN

Bondar-Clegg & Company Ltd.
5430 Canotek Road
Ottawa, Ontario
K1J 9G2
(613) 749-2220 Telex 053-3233

BONDAR-CLEGG

Geochemical Lab Report

REPORT: 090-43604.0

DATE PRINTED: 30-JAN-91
PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Ce PPM	Th PPM	Nb PPM	Y PPM
8551		120	696.0	20	131
8553		3420	1130.0	584	1379
8554		270	733.0	524	993
8555		430	1020.0	475	1775
8556		19800	1620.0	429	1592
8557		6700	505.0	184	721
8558		3050	203.0	32	321
8559		1580	530.0	1046	2762
8560		130	46.0	58	75
8561		70	31.0	87	53
8562		1480	14.0	750	7017
8563		2450	63.6	657	7897
8564		130	39.0	1680	376
8565		260	590.0	75	560
8566		230	45.0	328	342
11452		105	39.0	1810	314
11453		130	38.0	2541	261
11454		320	73.3	4187	326
13992		61	4.7	24	49
13993		59	7.3	51	89
13994		100	8.7	24	41
13996		2980	3690.0	124	1834
13997		2540	188.0	330	3804
13998		440	1460.0	94	482
13999		2770	1650.0	122	3216
14060		150	262.0	42	212

Bondar-Clegg & Company Ltd.
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Ottawa, Ontario
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BONDAR-CLEGG

Geochemical Lab Report

REPORT: 090-43604.1 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: J. ALLEN
DATE PRINTED: 8-FEB-91

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Zr	Zirconium	26	1 PPM		X-Ray Fluorescence

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
PREPARED PULP	26	AS RECEIVED	26	As Received, No SP	26

REPORT COPIES TO: MR. J.F. ALLAN
FAX:403-268-0507

INVOICE TO: MR. J.F. ALLAN

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Geochemical Lab Report

REPORT: 090-43604.1

DATE PRINTED: 8-FEB-91
PROJECT: NONE PAGE 1

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM
8551		5733
8553		6020
8554		1060
8555		2762
8556		>20000
8557		4280
8558		279
8559		8870
8560		>20000
8561		>20000
8562		>20000
8563		>20000
8564		>20000
8565		1727
8566		7582
11452		>20000
11453		>20000
11454		>20000
13992		332
13993		162
13994		431
13996		8412
13997		4951
13998		>20000
13999		15389
14000		4143

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Geochemical Lab Report

REPORT: 090-43607.0 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: J. ALLEN
DATE PRINTED: 8-FEB-91

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
OTHER	7	OTHER	7	Other Sample Prep 1	7

REMARKS: OTHER PREP REFERS TO COMPOSITING.

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ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	SiO2	Silica (SiO2)	7	0.01 PCT	Borate Fusion	DC Plasma
2	TiO2	Titanium (TiO2)	7	0.01 PCT	Borate Fusion	DC Plasma
3	Al2O3	Alumina (Al2O3)	7	0.01 PCT	Borate Fusion	DC Plasma
4	Fe2O3*	Total Iron (Fe2O3*)	7	0.01 PCT	Borate Fusion	DC Plasma
5	MnO	Manganese (MnO)	7	0.01 PCT	Borate Fusion	DC Plasma
6	MgO	Magnesium (MgO)	7	0.01 PCT	Borate Fusion	DC Plasma
7	CaO	Calcium (CaO)	7	0.01 PCT	Borate Fusion	DC Plasma
8	Na2O	Sodium (Na2O)	7	0.01 PCT	Borate Fusion	DC Plasma
9	K2O	Potassium (K2O)	7	0.01 PCT	Borate Fusion	DC Plasma
10	P2O5	Phosphorous (P2O5)	7	0.01 PCT	Borate Fusion	DC Plasma
11	Rb	Rubidium	7	10 PPM		Neutron Activation
12	LOI	Loss on Ignition	7	0.05 PCT		Gravimetric
13	Total	Whole Rock Total	7	0.01 PCT		
14	Sn	Tin	7	200 PPM		Neutron Activation
15	Ba	Barium	7	100 PPM		Neutron Activation
16	Ce	Cerium	7	10 PPM		Neutron Activation
17	Hf	Hafnium	7	2 PPM		Neutron Activation
18	Ta	Tantalum	7	1 PPM		Neutron Activation
19	Th	Thorium	7	0.5 PPM		Neutron Activation
20	U	Uranium	7	0.5 PPM		Neutron Activation
21	WT	Test Weight	7	0.01 g		
22	V	Vanadium	7	1 PPM	HCL-HNO3, (3:1)	Atomic Absorption
23	Zn	Zinc	7	1 PPM	HCL-HNO3, (3:1)	Atomic Absorption
24	Pb	Lead	7	2 PPM	HCL-HNO3, (3:1)	Atomic Absorption
25	Sr	Strontium	7	1 PPM		X-Ray Fluorescence
26	Zr	Zirconium	7	1 PPM		X-Ray Fluorescence
27	Nb	Niobium	7	1 PPM		X-Ray Fluorescence
28	Y	Yttrium	7	1 PPM		X-Ray Fluorescence
29	Li	Lithium	7	1 PPM	Hf-HClO4-HNO3-HCl	Atomic Absorption
30	Be	Beryllium	7	0.5 PPM	Hf-H2SO4-HCl	Atomic Absorption

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Geochemical Lab Report

REPORT: 090-43607.0

DATE PRINTED: 8-FEB-91
PROJECT: NONE PAGE 1A

SAMPLE NUMBER	ELEMENT UNITS	SiO2 PCT	TiO2 PCT	Al2O3 PCT	Fe2O3* PCT	MnO PCT	MgO PCT	CaO PCT	Na2O PCT	K2O PCT	P2O5 PCT	Rb PPM
90KBZ-2		64.30	0.51	9.21	9.80	0.36	1.20	2.24	6.76	3.71	0.14	450
90KBZ-3		65.20	0.52	8.10	7.60	0.22	3.84	3.79	5.86	2.91	0.23	450
90KBZ-4		50.00	0.66	5.57	6.08	0.24	12.80	12.80	4.06	2.16	0.36	620
90KU-13		59.30	0.67	10.20	9.42	0.39	2.67	4.35	8.00	3.14	0.05	530
90KU-25		57.60	0.65	9.51	9.36	0.43	3.82	6.15	7.21	2.92	0.18	470
90KU-33		59.10	0.51	7.51	9.83	0.77	3.54	5.71	6.77	2.73	0.33	390
90KTR-7		54.60	0.29	4.64	4.75	0.30	14.50	11.20	4.32	2.08	0.19	470

DBH core composites.

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Geochemical Lab Report

REPORT: 090-43607.0

DATE PRINTED: 8-FEB-91

PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	LOI PCT	Total PCT	Sn PPM	Ba PPM	Ce PPM	Hf PPM	Ta PPM	Th PPM	U PPM	WT g	V PPM
90KBZ-2		0.84	99.07	<200	<100	550	120	4	65.7	17.0	9.26	13
90KBZ-3		0.65	98.92	<200	<100	720	160	12	204.0	23.0	12.41	20
90KBZ-4		4.48	99.21	<200	640	1460	140	26	222.0	50.0	10.76	31
90KU-13		1.13	99.32	<200	440	2790	150	30	424.0	65.1	10.19	19
90KU-25		1.05	98.88	<200	690	2240	110	28	301.0	41.0	10.34	20
90KU-33		1.23	98.03	<200	<230	1880	190	36	880.0	65.0	13.14	17
90KTR-7		1.43	98.30	<200	<310	2920	130	49	473.0	86.9	10.47	13

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Geochemical Lab Report

REPORT: G90-43607.0

DATE PRINTED: 8-FEB-91
PROJECT: NONE PAGE 1C

SAMPLE NUMBER	ELEMENT UNITS	Zn PPM	Pb PPM	Sr PPM	Zr PPM	Nb PPM	Y PPM	Li PPM	Be PPM
90KBZ-2		122	282	52	6805	26	215	203	5.2
90KBZ-3		117	115	47	8809	63	503	233	7.9
90KBZ-4		176	250	147	6656	180	842	371	17.8
90KU-13		401	330	148	8065	172	2137	209	8.7
90KU-25		231	273	165	6844	162	1674	291	11.5
90KU-33		127	471	120	10498	172	1602	221	10.2
90KTR-7		115	356	62	8300	363	1565	280	21.3

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Geochemical Lab Report

REPORT: 090-43607.1 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: J. ALLEN
DATE PRINTED: 25-FEB-91

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Sc	Scandium	5	0.05 PPM		Neutron Activation
2	La	Lanthanum	5	1 PPM		Neutron Activation
3	Ce	Cerium	5	5 PPM		Neutron Activation
4	Pr	Praseodymium	5	50 PPM		Neutron Activation
5	Nd	Neodymium	5	10.0 PPM		Neutron Activation
6	Sm	Samarium	5	0 PPM		Neutron Activation
7	Eu	Europium	5	1.0 PPM		Neutron Activation
8	Gd	Gadolinium	5	200 PPM		Neutron Activation
9	Tb	Terbium	5	1.0 PPM		Neutron Activation
10	Dy	Dysprosium	5	1 PPM		Neutron Activation
11	Ho	Holmium	5	1 PPM		Neutron Activation
12	Er	Erbium	5	100 PPM		Neutron Activation
13	Tm	Thulium	5	1.0 PPM		Neutron Activation
14	Yb	Ytterbium	5	0.5 PPM		Neutron Activation
15	Lu	Lutetium	5	0.1 PPM		Neutron Activation
16	Th	Thorium	5	0.5 PPM		Neutron Activation
17	U	Uranium	5	1 PPM		Neutron Activation

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
PREPARED PULP	5	AS RECEIVED	5	As Received, No SP	5

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PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Sc PPM	La PPM	Ce PPM	Pr PPM	Nd PPM	Sm PPM	Eu PPM	Gd PPM	Tb PPM	Dy PPM	Ho PPM
90KBZ-4		5.34	589	966	79	354.0	99	14.6	<200	19.1	129	32
90KU-13		6.42	1040	1750	124	590.0	195	29.6	<200	35.9	204	52
90KU-25		6.40	848	1400	161	700.0	172	25.8	<200	33.0	171	54
90KU-33		3.85	672	1100	122	546.0	145	22.4	<200	30.7	185	56
90KTR-7		1.71	806	1870	198	810.0	195	27.3	<200	35.0	227	61

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PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Er PPM	Tm PPM	Yb PPM	Lu PPM	Th PPM	U PPM
90KBZ-4		<100	9.7	80.3	13.4	190.0	33
90KU-13		170	19.1	128.0	16.9	336.0	38
90KU-25		170	22.3	115.0	15.1	257.0	26
90KU-33		147	25.4	136.0	18.9	722.0	40
90KTR-7		169	27.7	131.0	17.6	409.0	57

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Geochemical Lab Report

DATE PRINTED: 25-FEB-91

REPORT: 090-43607.1

PROJECT: NONE

STANDARD NAME	ELEMENT UNITS	Er PPM	Tm PPM	Yb PPM	Lu PPM	Th PPM	U PPM
Number of Analyses		-	-	-	-	-	-
Mean Value		-	-	-	-	-	-
Standard Deviation		-	-	-	-	-	-
Accepted Value		-	-	-	-	-	-
Number of Analyses		-	-	-	-	-	-
Mean Value		-	-	-	-	-	-
Standard Deviation		-	-	-	-	-	-
Accepted Value		-	-	-	-	-	-

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DATE PRINTED: 25-FEB-91
PROJECT: NONE

STANDARD NAME	ELEMENT UNITS	Sc PPM	La PPM	Ce PPM	Pr PPM	Nd PPM	Sm PPM	Eu PPM	Gd PPM	Tb PPM	Dy PPM	Ho PPM
Number of Analyses		-	-	-	-	-	-	-	-	-	-	-
Mean Value		-	-	-	-	-	-	-	-	-	-	-
Standard Deviation		-	-	-	-	-	-	-	-	-	-	-
Accepted Value		-	-	-	-	-	-	-	-	-	-	-
Number of Analyses		-	-	-	-	-	-	-	-	-	-	-
Mean Value		-	-	-	-	-	-	-	-	-	-	-
Standard Deviation		-	-	-	-	-	-	-	-	-	-	-
Accepted Value		-	-	-	-	-	-	-	-	-	-	-

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Geochemical Lab Report

REPORT: 090-43606.0 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: J. ALLEN
DATE PRINTED: 23-JAN-91

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Ba	Barium	5	100 PPM		Neutron Activation
2	La	Lanthanum	5	5 PPM		Neutron Activation
3	Ce	Cerium	5	10 PPM		Neutron Activation
4	Th	Thorium	5	0.5 PPM		Neutron Activation
5	U	Uranium	5	0.5 PPM		Neutron Activation
6	F	Fluoride	5	20 PPM	NA2CO3-KNO3 FUSION	Specific Ion
7	Mg	Magnesium	5	0.01 PCT	Borate Fusion	DC Plasma
8	Ti	Titanium	5	0.01 PCT	Borate Fusion	DC Plasma
9	Sr	Strontium	5	1 PPM		X-Ray Fluorescence
10	Zr	Zirconium	5	1 PPM		X-Ray Fluorescence
11	Y	Yttrium	5	1 PPM		X-Ray Fluorescence
12	PO4	PO4	5	PCT		

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
ROCK	5	-200	5	Crush,Pulverize -200	5

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Geochemical Lab Report

REPORT: 090-43606.0

DATE PRINTED: 23-JAN-91
PROJECT: NONE PAGE 1

SAMPLE NUMBER	ELEMENT UNITS	Ba PPM	La PPM	Ce PPM	Th PPM	U PPM	F PPM	Mg PCT	Ti PCT	Sr PPM	Zr PPM	Y PPM	P04 PCT
11451		250	14	33	68.2	3.2	>20000	5.57	0.18	653	63	71	0.14
8022		280	80	160	12.0	3.4	15260	11.20	0.02	147	96	119	0.02
8023		810	69	120	0.6	0.8	>20000	15.80	0.03	85	18	79	0.01
8024		<250	6580	15500	3900.0	81.8	4010	7.11	0.02	247	93	8576	0.55
8025		<100	300	900	12.0	22.0	9965	9.95	0.10	133	172	237	0.08

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Geochemical Lab Report

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PROJECT: NONE

STANDARD NAME / ELEMENT UNITS	Ba PPM	La PPM	Ce PPM	Th PPM	U PPM	F PPM	Mg PCT	Ti PCT	Sr PPM	Zr PPM	Y PPM	P04 PCT
Number of Analyses	-	-	-	-	-	-	-	-	-	-	-	-
Mean Value	-	-	-	-	-	-	-	-	-	-	-	-
Standard Deviation	-	-	-	-	-	-	-	-	-	-	-	-
Accepted Value	-	-	-	-	-	-	-	-	-	-	-	-
Number of Analyses	-	-	-	-	-	-	-	-	-	-	-	-
Mean Value	-	-	-	-	-	-	-	-	-	-	-	-
Standard Deviation	-	-	-	-	-	-	-	-	-	-	-	-
Accepted Value	-	-	-	-	-	-	-	-	120	60	30	-
BCC CHEMICAL BLANK	-	-	-	-	-	<20	<0.01	<0.01	-	-	-	-
Number of Analyses	-	-	-	-	-	1	1	1	-	-	-	-
Mean Value	-	-	-	-	-	10.0	0.005	0.005	-	-	-	-
Standard Deviation	-	-	-	-	-	-	-	-	-	-	-	-
Accepted Value	-	-	-	-	-	-	-	-	-	-	-	-
BCC Standard GS89-3	430	8	26	3.1	1.2	345	-	-	-	-	-	-
Number of Analyses	1	1	1	1	1	1	-	-	-	-	-	-
Mean Value	430.0	8.2	26.0	3.10	1.20	345.0	-	-	-	-	-	-
Standard Deviation	-	-	-	-	-	-	-	-	-	-	-	-
Accepted Value	-	-	-	-	-	-	-	-	-	-	-	-
CANMET SO-3 REF STD	-	-	-	-	-	-	5.23	0.20	-	-	-	-
Number of Analyses	-	-	-	-	-	-	1	1	-	-	-	-
Mean Value	-	-	-	-	-	-	5.230	0.200	-	-	-	-
Standard Deviation	-	-	-	-	-	-	-	-	-	-	-	-
Accepted Value	-	-	-	-	-	-	-	-	-	-	-	-
BCC Rock Std 1989	-	-	-	-	-	-	2.11	0.55	-	-	-	-
Number of Analyses	-	-	-	-	-	-	1	1	-	-	-	-
Mean Value	-	-	-	-	-	-	2.110	0.550	-	-	-	-
Standard Deviation	-	-	-	-	-	-	-	-	-	-	-	-
Accepted Value	-	-	-	-	-	-	-	-	-	-	-	-
BCC ROCK PULP 1989-1	-	-	-	-	-	401	-	-	-	-	18	-
Number of Analyses	-	-	-	-	-	1	-	-	-	-	1	-
Mean Value	-	-	-	-	-	401.0	-	-	-	-	18.0	-
Standard Deviation	-	-	-	-	-	-	-	-	-	-	-	-
Accepted Value	-	-	-	-	1.3	420	-	-	220	80	10	-
BCC HIGH XRF STD	-	-	-	-	-	-	-	-	275	157	127	-
Number of Analyses	-	-	-	-	-	-	-	-	1	1	1	-
Mean Value	-	-	-	-	-	-	-	-	275.0	157.0	127.0	-
Standard Deviation	-	-	-	-	-	-	-	-	-	-	-	-
Accepted Value	-	-	-	-	-	-	-	-	-	-	-	-

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Geochemical Lab Report

REPORT: 090-43606.0

DATE PRINTED: 23-JAN-91
PROJECT: NONE PAGE 3

SAMPLE NUMBER	ELEMENT UNITS	Ba PPM	La PPM	Ce PPM	Th PPM	U PPM	F PPM	Mg PCT	Ti PCT	Sr PPM	Zr PPM	Y PPM	PO4 PCT
11451		250	14	33	68.2	3.2	>20000	5.57	0.18	653	63	71	0.14
Duplicate							>20000	5.47	0.17				0.14

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Geochemical Lab Report

REPORT: 090-43605.2 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: J. ALLEN
DATE PRINTED: 22-JAN-91

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	SiO2	Silica (SiO2)	28	0.01 PCT	Borate Fusion	DC Plasma
2	TiO2	Titanium (TiO2)	28	0.01 PCT	Borate Fusion	DC Plasma
3	Al2O3	Alumina (Al2O3)	28	0.01 PCT	Borate Fusion	DC Plasma
4	Fe2O3*	Total Iron (Fe2O3*)	28	0.01 PCT	Borate Fusion	DC Plasma
5	MnO	Manganese (MnO)	28	0.01 PCT	Borate Fusion	DC Plasma
6	MgO	Magnesium (MgO)	28	0.01 PCT	Borate Fusion	DC Plasma
7	CaO	Calcium (CaO)	28	0.01 PCT	Borate Fusion	DC Plasma
8	Na2O	Sodium (Na2O)	28	0.01 PCT	Borate Fusion	DC Plasma
9	K2O	Potassium (K2O)	28	0.01 PCT	Borate Fusion	DC Plasma
10	P2O5	Phosphorous (P2O5)	28	0.01 PCT	Borate Fusion	DC Plasma
11	LOI	Loss on Ignition	28	0.05 PCT		Gravimetric
12	Total	Whole Rock Total	28	0.01 PCT		

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
PREPARED PULP	28	AS RECEIVED	28	As Received, No SP	28

REPORT COPIES TO: MR. J.F. ALLAN
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Geochemical Lab Report

REPORT: 090-43605.2

DATE PRINTED: 22-JAN-91
PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	SiO2 PCT	TiO2 PCT	Al2O3 PCT	Fe2O3* PCT	MnO PCT	MgO PCT	CaO PCT	Na2O PCT	K2O PCT	P2O5 PCT	LOI PCT	Total PCT
8001		69.50	0.46	10.40	7.27	0.22	0.30	0.72	6.50	3.35	0.12	<0.05	98.84
8002		69.70	0.35	10.50	6.63	0.23	0.39	0.80	5.95	3.93	0.06	0.30	98.84
8003		63.70	0.36	15.20	6.32	0.13	0.15	0.89	8.20	4.14	0.03	<0.05	99.12
8005		44.90	4.17	14.30	16.70	0.22	4.31	7.17	3.91	1.71	1.10	0.34	98.83
8006		64.10	0.21	16.60	4.21	0.08	0.24	1.15	7.54	4.67	0.14	0.15	99.09
8007		47.20	2.82	15.40	14.30	0.21	5.40	7.42	3.94	1.22	0.50	<0.05	98.41
8008		75.70	0.37	11.30	2.30	0.07	0.19	0.27	3.72	4.92	0.15	<0.05	98.99
8009		74.90	0.43	11.00	2.66	0.08	0.20	0.19	3.83	4.90	0.39	0.14	98.73
8010		75.90	0.36	10.60	2.44	0.08	0.16	0.19	3.57	5.01	0.10	0.19	98.61
8011		72.80	0.43	11.70	2.65	0.07	0.34	0.57	3.98	5.00	0.15	0.30	97.98
8012		63.90	0.38	14.50	6.05	0.14	0.36	1.13	6.76	4.66	0.30	<0.05	98.18
8013		63.50	0.99	11.40	9.37	0.20	0.84	1.68	5.44	4.38	0.37	<0.05	98.17
8014		70.90	0.45	11.60	4.54	0.11	0.24	0.52	4.60	4.90	0.15	<0.05	98.01
8015		64.70	0.37	11.50	9.40	0.19	0.34	1.11	6.84	3.57	0.20	<0.05	98.22
8016		66.20	0.40	10.00	9.24	0.15	0.54	2.27	6.23	3.64	0.25	<0.05	98.92
8017		72.80	0.44	11.60	2.83	0.08	0.26	0.34	4.26	4.79	0.20	0.24	97.84
8019		69.30	0.54	5.56	10.70	0.29	0.63	2.99	5.56	2.73	0.20	<0.05	98.50
8020		70.50	0.49	7.29	9.43	0.13	0.13	0.83	5.83	3.09	0.22	0.15	98.09
8568		45.80	0.26	12.90	1.02	0.07	1.24	17.20	7.00	0.10	0.34	13.33	99.26
8569		64.40	0.28	17.30	1.48	0.03	2.46	1.25	8.78	0.34	0.15	2.30	98.77
8570		67.00	0.52	10.40	8.48	0.16	0.19	0.82	6.21	4.14	0.16	<0.05	98.08
8571		62.70	0.39	12.90	9.02	0.17	0.24	1.52	7.98	3.35	0.26	<0.05	98.53
8572		45.50	3.86	15.20	15.10	0.21	3.72	5.50	4.45	2.90	0.92	2.19	99.55
8573		64.70	0.51	12.00	8.25	0.17	0.52	1.00	6.80	4.56	0.20	<0.05	98.71
8574		77.50	0.73	7.49	5.22	0.20	0.11	0.44	5.13	2.50	0.15	0.14	99.61
8575		67.50	0.36	13.20	6.25	0.14	0.17	0.78	6.32	4.16	0.10	<0.05	98.98
11455		75.90	0.31	12.20	1.86	0.06	0.21	0.35	3.76	5.03	0.12	0.14	99.94
13978		60.20	0.66	10.80	9.66	0.25	2.50	3.78	8.13	2.70	0.18	0.29	99.15

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Geochemical Lab Report

REPORT: 090-43605.2

DATE PRINTED: 22-JAN-91
PROJECT: NONE

STANDARD NAME / ELEMENT / UNITS	SiO2 PCT	TiO2 PCT	Al2O3 PCT	Fe2O3* PCT	MnO PCT	MgO PCT	CaO PCT	Na2O PCT	K2O PCT	P2O5 PCT	LOI PCT	Total PCT
CANMET SO-3 REF STD	34.20	0.33	5.93	2.20	0.07	8.50	21.00	1.03	1.42	0.16	-	74.84
Number of Analyses	1	1	1	1	1	1	1	1	1	1	-	1
Mean Value	34.200	0.330	5.930	2.200	0.070	8.500	21.000	1.030	1.420	0.160	-	74.840
Standard Deviation	-	-	-	-	-	-	-	-	-	-	-	-
Accepted Value	33.72	0.33	5.80	2.22	0.07	8.42	20.71	1.01	1.40	0.11	-	-
BCC LOW LOI STD 1986	-	-	-	-	-	-	-	-	-	-	2.90	-
Number of Analyses	-	-	-	-	-	-	-	-	-	-	1	1
Mean Value	-	-	-	-	-	-	-	-	-	-	2.900	2.900
Standard Deviation	-	-	-	-	-	-	-	-	-	-	-	-
Accepted Value	-	-	-	-	-	-	-	-	-	-	3.08	-
BCC Rock Std 1989	60.40	0.91	12.40	7.02	0.09	3.48	6.01	1.42	2.23	0.28	-	94.24
Number of Analyses	1	1	1	1	1	1	1	1	1	1	-	1
Mean Value	60.400	0.910	12.400	7.020	0.090	3.480	6.010	1.420	2.230	0.280	-	94.240
Standard Deviation	-	-	-	-	-	-	-	-	-	-	-	-
Accepted Value	60.40	0.90	12.10	6.90	0.09	3.50	5.90	1.30	2.10	0.19	5.00	-
BCC CHEMICAL BLANK	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-
Number of Analyses	1	1	1	1	1	1	1	1	1	1	-	-
Mean Value	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	-	-
Standard Deviation	-	-	-	-	-	-	-	-	-	-	-	-
Accepted Value	-	-	-	-	-	-	-	-	-	-	-	-
BCC HI LOI STD 1983	-	-	-	-	-	-	-	-	-	-	33.55	-
Number of Analyses	-	-	-	-	-	-	-	-	-	-	1	1
Mean Value	-	-	-	-	-	-	-	-	-	-	33.550	33.550
Standard Deviation	-	-	-	-	-	-	-	-	-	-	-	-
Accepted Value	-	-	-	-	-	-	-	-	-	-	34.25	-

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Geochemical Lab Report

REPORT: 090-43605.2

DATE PRINTED: 22-JAN-91
PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	SiO2 PCT	TiO2 PCT	Al2O3 PCT	Fe2O3* PCT	MnO PCT	MgO PCT	CaO PCT	Na2O PCT	K2O PCT	P2O5 PCT	LOI PCT	Total PCT
8001		69.50	0.46	10.40	7.27	0.22	0.30	0.72	6.50	3.35	0.12	<0.05	98.84
Duplicate		69.20	0.46	10.10	7.32	0.21	0.27	0.68	6.33	3.34	0.11	<0.05	
8011		72.80	0.43	11.70	2.65	0.07	0.34	0.57	3.98	5.00	0.15	0.30	97.98
Duplicate		72.40	0.44	11.90	2.76	0.07	0.34	0.60	4.05	5.25	0.22	0.10	
8020		70.50	0.49	7.29	9.43	0.13	0.13	0.83	5.83	3.09	0.22	0.15	98.09
Duplicate		71.00	0.49	7.18	9.40	0.13	0.13	0.82	5.95	3.12	0.24	0.15	
8569		64.40	0.28	17.30	1.48	0.03	2.46	1.25	8.78	0.34	0.15	2.30	98.77
Prep Duplicate		64.80	0.26	17.50	1.52	0.03	2.47	1.28	8.81	0.33	0.13	2.27	

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Geochemical Lab Report

REPORT: 090-43605.0 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: J. ALLEN
DATE PRINTED: 24-JAN-91

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
ROCK	42	-200	42	Crush,Pulverize -200	42

REMARKS: ELEVATED DETECTION LIMITS ARE DUE TO VERY HIGH
LEVELS OF U AND TH.
NEUTRON ACTIVATION RESULTS SHOULD BE TAKEN AS
SEMI-QUANTITATIVE DUE TO VERY HIGH LEVELS OF
RARE EARTH ELEMENTS AND U AND TH.

REPORT COPIES TO: MR. J.F. ALLAN
FAX:403-268-0507

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Trace Elements
for True Elements
True elements

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...Cranstock Road
...Ontario
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Geochemical Lab Report

REPORT: 090-43605.0 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: J. ALLEN
DATE PRINTED: 24-JAN-91

ORDER		ELEMENT	NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Rb	Rubidium	42	10 PPM		Neutron Activation
2	Sn	Tin	42	200 PPM		Neutron Activation
3	Ba	Barium	42	100 PPM		Neutron Activation
4	Ce	Cerium	42	10 PPM		Neutron Activation
5	Hf	Hafnium	42	2 PPM		Neutron Activation
6	Ta	Tantalum	42	1 PPM		Neutron Activation
7	Th	Thorium	42	0.5 PPM		Neutron Activation
8	U	Uranium	42	0.5 PPM		Neutron Activation
9	WT	Test Weight	42	0.01 g		
10	Zn	Zinc	42	1 PPM	HCL-HNO3, (3:1)	Atomic Absorption
11	Pb	Lead	42	2 PPM	HCL-HNO3, (3:1)	Atomic Absorption
12	Sr	Strontium	42	1 PPM		X-Ray Fluorescence
13	Zr	Zirconium	42	1 PPM		X-Ray Fluorescence
14	Nb	Niobium	42	1 PPM		X-Ray Fluorescence
15	Y	Yttrium	42	1 PPM		X-Ray Fluorescence
16	V	Vanadium	42	1 PPM	HCL-HNO3, (3:1)	Atomic Absorption

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Geochemical Lab Report

REPORT: 090-43605.0

DATE PRINTED: 24-JAN-91
PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Rb PPM	Sn PPM	Ba PPM	Ce PPM	Hf PPM	Ta PPM	Th PPM	U PPM	WT g	Zn PPM	Pb PPM
8001		360	<200	<100	88	120	1	4.4	6.5	8.15	18	166
8002		380	<200	<100	60	48	1	108.0	7.1	8.13	18	44
8003		190	<200	140	22	13	<1	<0.5	<0.5	7.69	11	5
8005		34	<200	1000	92	6	3	2.9	1.0	8.90	128	7
8006		150	<200	560	120	9	<1	1.6	<0.5	7.93	21	7
8007		19	<200	790	66	5	2	2.3	0.8	9.62	31	4
8008		170	<200	160	74	5	<1	5.8	1.0	10.48	101	4
8009		140	<200	<100	200	9	1	7.1	1.0	9.33	23	4
8010		190	<200	<100	120	14	<1	6.4	2.1	9.31	21	4
8011		150	<200	270	160	13	2	18.0	3.4	9.49	120	4
8012		150	<200	430	160	18	2	2.9	1.5	8.61	17	7
8013		270	<200	260	240	26	<1	12.0	1.9	9.83	41	19
8014		150	<200	210	240	17	<1	11.0	2.9	10.18	19	14
8015		140	<200	100	160	19	<1	16.0	1.6	11.05	27	66
8016		240	<200	<100	130	110	1	5.7	5.0	11.91	12	16
8017		200	<200	150	30	16	1	5.3	2.6	10.27	62	3
8019		440	<200	<100	190	328	2	1220.0	44.0	10.75	24	138
8020		300	<200	<100	40	331	4	673.0	54.9	10.91	11	364
8568		<10	<200	<100	180	9	<1	37.0	49.0	9.56	12	20
8569		<10	<200	<480	130	8	2	48.0	146.0	6.67	24	13200
8570		270	<200	400	150	94	<1	7.5	3.9	9.57	20	37
8571		160	<200	170	150	18	1	3.6	2.0	9.48	19	2
8572		210	<200	650	430	7	3	46.0	5.2	7.67	138	70
8573		360	<200	140	180	67	2	10.0	4.5	11.53	20	26
8574		290	<200	<100	130	170	9	1110.0	48.0	8.40	21	245
8575		240	<200	190	490	34	2	25.0	3.7	9.28	18	37
14455		160	<200	<100	130	3	<1	7.0	0.6	8.70	86	4
13976		87	<2100	890	4540	<5	2	96.9	41.0	9.59	660	60
13977		<74	<1200	<3300	9220	1160	850	3350.0	1090.0	13.10	40	175
13978		300	<200	<100	840	95	17	315.0	41.0	10.53	70	216
13979		59	<200	<100	1340	3	1	254.0	19.0	10.43	67	40
13980		<41	<570	<2400	12100	16	10	683.0	762.0	10.40	800	148
13981		<160	<2900	<890	45800	83	<6	3350.0	402.0	13.43	375	347
13982		<130	<1500	<680	42600	28	<5	1760.0	147.0	11.14	213	125
13983		53	<630	<240	13600	77	20	884.0	47.0	10.12	50	152
13984		34	<200	<610	1700	39	3	1970.0	189.0	9.22	103	125
13985		130	<1300	<320	27400	23	<3	2650.0	100.0	7.48	206	106
13986		<10	<200	<100	220	8	1	62.0	47.0	8.75	4	9
13987		<10	<200	<300	180	6	1	40.0	91.6	5.98	8	22
13988		<10	<1100	<3500	130	8	2	48.0	1050.0	7.45	50	63

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Geochemical Lab Report

REPORT: 090-43605.0

DATE PRINTED: 24-JAN-91
PROJECT: NONE PAGE 18

SAMPLE NUMBER	ELEMENT UNITS	Sr PPM	Zr PPM	Nb PPM	Y PPM	V PPM
8001		56	8219	8	94	2
8002		13	2416	17	60	5
8003		30	622	2	24	2
8005		494	214	28	37	87
8006		68	434	11	91	2
8007		648	156	26	24	125
8008		26	143	19	23	11
8009		9	394	18	43	4
8010		23	720	12	35	5
8011		78	528	27	56	12
8012		51	863	84	81	2
8013		109	1208	25	91	25
8014		37	817	36	42	8
8015		36	944	10	65	4
8016		25	6965	23	94	5
8017		37	683	38	41	5
8019		14	19320	8	103	2
8020		17	>20000	1	37	4
8568		478	270	28	49	32
8569		26	298	27	33	32
8570		61	5602	20	71	4
8571		40	639	18	96	1
8572		392	232	35	184	120
8573		41	3544	40	102	5
8574		26	11551	35	218	2
8575		40	1674	27	121	3
14455		9	118	13	27	7
13976		446	6	89	14190	48
13977		84	>20000	2323	4627	5
13978		55	6081	148	539	5
13979		64	82	57	851	18
13980		86	1064	1051	452	12
13981		186	783	86	11534	52
13982		241	105	<1	2755	82
13983		212	3123	285	1283	7
13984		25	4412	72	41	4
13985		383	238	2	3979	116
13986		43	441	49	39	38
13987		28	238	31	42	44
13988		165	245	54	123	64

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...2220 Telex 053-3233

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Geochemical Lab Report

REPORT: 090-43605.0

DATE PRINTED: 24-JAN-91

PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Rb PPM	Sn PPM	Ba PPM	Ce PPM	Hf PPM	Ta PPM	Th PPM	U PPM	WT g	Zn PPM	Pb PPM
13989		30	<200	<1500	210	10	2	58.9	447.0	9.47	7	211
13990		<24	<1100	<3800	<160	5	2	26.0	1130.0	6.99	22	101

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Geochemical Lab Report

REPORT: 090-43605.0

DATE PRINTED: 24-JAN-91
PROJECT: NONE PAGE 28

SAMPLE NUMBER	ELEMENT UNITS	Sr PPM	Zr PPM	Nb PPM	Y PPM	V PPM
13989		59	395	38	99	79
13990		51	292	15	166	17

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BONDAR-CLEGG

Geochemical Lab Report

REPORT: 090-43605.1 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: J. ALLEN
DATE PRINTED: 23-JAN-91

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Li	Lithium	42	1 PPM	Hf-HClO4-HNO3-HCl	Atomic Absorption
2	Be	Beryllium	42	0.5 PPM	Hf-HClO4-HNO3-HCl	Atomic Absorption

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
PREPARED PULP	42	AS RECEIVED	42	As Received, No SP	42

REMARKS: INVOICED UNDER 090-43605.0

REPORT COPIES TO: MR. J.F. ALLAN
FAX:403-268-0507

INVOICE TO: MR. J.F. ALLAN

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Geochemical Lab Report

REPORT: 090-43605.1

DATE PRINTED: 23-JAN-91
PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Li PPM	Be PPM	SAMPLE NUMBER	ELEMENT UNITS	Li PPM	Be PPM
8001		320	4.6	13989		18	0.7
8002		83	10.6	13990		55	2.7
8003		109	3.8				
8005		43	0.5				
8006		53	2.6				
8007		6	<0.5				
8008		32	1.4				
8009		35	1.0				
8010		27	1.2				
8011		25	1.1				
8012		74	3.8				
8013		217	5.1				
8014		62	2.0				
8015		217	4.9				
8016		56	4.2				
8017		54	1.5				
8019		19	7.0				
8020		13	5.9				
8568		7	<0.5				
8569		12	1.1				
8570		146	5.6				
8571		152	4.6				
8572		308	5.8				
8573		229	6.8				
8574		41	3.4				
8575		149	5.0				
14455		24	0.5				
13976		240	102.2				
13977		38	17.0				
13978		138	12.7				
13979		136	22.3				
13980		85	404.0				
13981		15	12.1				
13982		13	8.1				
13983		106	4.3				
13984		201	27.7				
13985		143	16.4				
13986		7	0.6				
13987		13	0.7				
13988		35	2.5				

B

1990 DRILL CORE SAMPLES

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BONDAR-CLEGG

Geochemical Lab Report

REPORT: 090-42867.0 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: J. ALLEN
DATE PRINTED: 14-NOV-90

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Zr	Zirconium	100	1 PPM		X-Ray Fluorescence
2	Y	Yttrium	100	1 PPM		X-Ray Fluorescence

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
DRILL CORE	100	-200	100	Crush,Pulverize -200	100

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INVOICE TO: MR. J.F. ALLAN

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Geochemical Lab Report

REPORT: 090-42741.0

DATE PRINTED: 15-OCT-90
PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
6626		9501	97	6691		3014	447
6627		6771	112	6692		1409	97
6628		5173	471	6693		4893	156
6629		5058	257	6694		8892	165
6630		2620	156	6695		11400	935
6631		15132	290	6696		16215	395
6632		3965	330	6697		5666	513
6633		12163	97	6698		8862	1710
6634		8809	1011	6699		15150	700
6635		6024	233	6700		646	293
6636		4850	108	6701		321	369
6637		5711	45	6702		1240	461
6638		14338	445	6703		1535	413
6639		10624	1600	6704		487	654
6640		1134	369	6705		412	218
6641		11474	49	6706		91	29
6642		4549	26	6707		37	26
6643		15099	240	6708		4225	944
6644		7286	672	6709		11253	115
6645		6450	1275	6710		6470	389
6646		14772	1312	6711		3553	441
6647		3610	1022	6712		2827	38
6648		2937	1150	6713		2607	172
6649		3121	945	6714		7381	269
6650		8553	584	6715		6445	1124
6676		9713	393	6716		3082	599
6677		3278	736	6717		51	22
6678		189	410	6718		8494	688
6679		319	1201	6719		274	39
6680		9384	1457	6720		286	132
6681		4063	481				
6682		10030	192				
6683		4749	496				
6684		5211	390				
6685		11611	899				
6686		2848	580				
6687		179	23				
6688		1235	37				
6689		5215	1250				
6690		6526	1319				

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REPORT: 090-42802.0

DATE PRINTED: 29-OCT-90
PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
6721		1737	83	11711		15565	459
6722		1197	63	11712		6691	780
6723		12891	4347	11713		1573	103
6724		11131	2979	11714		3420	328
6725		9693	5134	11715		10022	904
6726		7559	1246	11716		6170	1515
6727		9140	190	11717		4902	2136
6728		5051	1614	11718		5110	1052
6729		10672	2913	11719		10965	3449
6730		6253	938	11720		4922	2577
6731		5639	1430	11721		6754	1357
6732		10810	1137	11722		8003	645
6733		3924	1385	11723		13957	262
6734		7429	787	11724		9163	227
6735		8519	817	11725		5555	217
6736		12653	331	11726		11730	55
6737		11949	165	11727		13869	215
6738		9971	862	11728		6300	112
6739		4163	1187	11729		7160	89
6740		4681	260	11730		9129	2081
6741		7609	720	11731		6407	2040
6742		5119	500	11732		9242	718
6743		14977	130	11733		7314	565
6744		12135	198	11734		12287	260
6745		8390	542	11735		6367	200
6746		11484	542	11736		5468	502
6747		8140	170	11737		8377	307
6748		6686	299	11738		10682	1833
6749		9027	1747	11739		10089	637
6750		12549	261	11740		8506	330
11701		3317	322	11741		2452	167
11702		6794	546	11742		1709	137
11703		7304	1021	11743		1231	1433
11704		11705	4115	11744		1561	980
11705		4421	2253	11745		10118	120
11706		10250	4876	11746		5386	223
11707		8405	4759	11747		12684	85
11708		13920	688	11748		8183	208
11709		7693	1103	11749		9576	921
11710		7138	1531	11750		19393	115

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PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
11751		4606	77	11791		6471	98
11752		12584	124	11792		11429	534
11753		11423	319	11793		9716	293
11754		6566	856	11794		18155	1282
11755		4625	389	11795		7669	459
11756		1651	131	11796		9513	248
11757		4598	235	11797		19304	128
11758		1888	164	11798		5529	120
11759		1281	81	11799		571	66
11760		6451	378	11800		377	95
11761		1612	248	11801		291	133
11762		5745	580	11802		10776	578
11763		14188	503	11803		11058	216
11764		>20000	297				
11765		9032	1158				
11766		7641	1331				
11767		5811	914				
11768		4586	391				
11769		10935	1858				
11770		9598	952				
11771		8734	1194				
11772		3787	1128				
11773		1867	481				
11774		18295	710				
11775		3516	485				
11776		1231	131				
11777		696	89				
11778		2413	70				
11779		1778	657				
11780		932	529				
11781		9031	1651				
11782		8981	1175				
11783		3824	1037				
11784		1211	319				
11785		3244	437				
11786		891	509				
11787		1382	769				
11788		5015	631				
11789		6683	1776				
11790		13546	207				

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PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
11804		8064	460	11844		7829	543
11805		6461	1233	11845		2318	575
11806		14674	158	11846		2148	368
11807		6572	213	11847		975	346
11808		13681	829	11848		1692	257
11809		9231	3980	11849		597	383
11810		5903	3312	11850		805	115
11811		4964	4731	11851		1029	122
11812		3148	3524	11852		8954	405
11813		8978	3833	11853		2373	1141
11814		5415	1312	11854		3638	609
11815		18942	430	11855		11968	435
11816		12568	391	11856		11775	1331
11817		4941	478	11857		743	230
11818		2538	321	11858		11850	1345
11819		9920	2016	11859		9469	2421
11820		11933	498	11860		8791	1638
11821		18339	235	11861		11016	479
11822		19034	452	11862		6565	1147
11823		11785	403	11863		12590	360
11824		5240	506	11864		11408	549
11825		11822	1766	11865		13008	80
11826		3462	1121	11866		1281	395
11827		2103	1638	11867		1844	4092
11828		7587	737	11868		7264	1023
11829		19516	222	11869		14235	1391
11830		4815	120	11870		12649	252
11831		13859	275	11871		16336	86
11832		9222	920	11872		4820	437
11833		8714	1046	11873		1238	177
11834		1193	140	11874		361	720
11835		7068	58	11875		4526	180
11836		11291	57	11876		14745	165
11837		5357	90	11877		16758	323
11838		11807	118	11878		15631	183
11839		10813	279	11879		13627	88
11840		5866	376	11880		6835	276
11841		4699	667	11881		1010	6654
11842		7172	1955	11882		9894	800
11843		5899	138	11883		12730	222

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SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
11884		6739	169				
11885		4421	240				
11886		5793	350				
11887		10508	437				
11888		11889	1075				
11889		9990	55				
11890		10952	75				
11891		11086	77				
11892		9978	514				
11893		9780	463				
11894		5804	284				
11895		5985	568				
11896		7192	166				
11897		10312	144				
11898		>20000	27				
11899		>20000	65				
11900		>20000	194				

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PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
11901		19332	475	11941		1965	360
11902		8217	1484	11942		>20000	2227
11903		14377	1278	11943		>20000	1273
11904		4623	533	11944		>20000	680
11905		5428	597	11945		13456	1113
11906		1655	354	11946		10847	866
11907		1080	269	11947		17996	396
11908		428	300	11948		8988	67
11909		645	494	11949		9296	73
11910		1105	382	11950		10185	51
11911		5673	1336	11951		9313	42
11912		14137	425	11952		9685	1425
11913		17677	233	11953		4371	2885
11914		9223	202	11954		7560	3245
11915		15701	403	11955		10092	930
11916		5441	1440	11956		4518	938
11917		7091	1130	11957		3032	852
11918		7212	90	11958		5701	1208
11919		16833	290	11959		1157	298
11920		7185	86	11960		10193	1847
11921		7877	38	11961		6347	1157
11922		12969	60	11962		9795	1162
11923		8454	1921	11963		6933	1319
11924		8669	2490	11964		10694	621
11925		6907	1528	11965		6888	263
11926		15251	364	11966		1780	594
11927		13032	434	11967		6452	1669
11928		5066	562	11968		4977	45
11929		6035	801	11969		6360	368
11930		5605	1429	11970		11871	1213
11931		12602	623	11971		9690	1086
11932		17616	52	11972		15856	748
11933		18081	49	11973		7994	420
11934		14923	75	11974		3648	980
11935		11601	120	11975		12647	665
11936		14339	117	11976		11950	127
11937		11856	169	11977		>20000	379
11938		13613	56	11978		4654	1960
11939		>20000	423	11979		1403	326
11940		5853	821	11980		15002	283

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SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
11981		13320	150				
11982		14479	70				
11983		6535	80				
11984		5791	1340				
11985		4885	2303				
11986		1850	1716				
11987		18282	504				
11988		5875	173				
11989		7709	85				
11990		4255	57				
11991		4948	140				
11992		8759	95				
11993		5205	40				
11994		6446	101				
11995		9332	2425				
11996		10073	2190				
11997		8279	1240				
11998		5256	1275				
11999		10501	909				
12000		13239	747				

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DATE PRINTED: 15-NOV-90
PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
15051		10238	191	15091		7427	2190
15052		12556	480	15092		7672	888
15053		11660	4029	15093		17767	285
15054		8558	693	15094		6490	319
15055		4565	448	15095		9557	538
15056		6638	1418	15096		11056	792
15057		6109	517	15097		6524	145
15058		5850	548	15098		10335	180
15059		6648	1028	15099		5093	368
15060		5484	1477	15100		4209	1071
15061		18942	221	15101		11697	391
15062		15130	161	15102		6166	700
15063		12690	440	15103		6178	544
15064		10211	569	15104		5741	603
15065		2644	601	15105		8377	238
15066		1172	260	15106		11893	173
15067		11384	121	15107		14548	78
15068		8979	427	15108		11841	120
15069		12042	1659	15109		>20000	526
15070		9492	1374	15110		6988	876
15071		9823	502	15111		>20000	788
15072		6175	1303	15112		8430	107
15073		682	1154	15113		13610	555
15074		8308	2113	15114		>20000	58
15075		6820	1093	15115		9888	401
15076		8594	463	15116		4591	955
15077		11632	706	15117		338	453
15078		9795	959	15118		245	150
15079		19605	138	15119		6808	590
15080		15828	271	15120		7311	84
15081		12436	99	15121		1153	80
15082		12095	428	15122		6752	88
15083		12021	423	15123		4743	179
15084		14210	1372	15124		10556	587
15085		11758	706	15125		9926	289
15086		2223	437	15126		12013	222
15087		782	516	15127		3496	344
15088		639	320	15128		2066	355
15089		512	277	15129		4023	166
15090		3358	685	15130		4307	688

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SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
15131		12312	212	15171		6867	118
15132		942	90	15172		7141	1021
15133		11490	252	15173		3196	106
15134		2410	134	15174		7391	369
15135		6268	261	15175		9044	1615
15136		6039	276	15176		9581	1109
15137		5898	639	15177		7105	760
15138		4890	601	15178		13476	2397
15139		9113	406	15179		9744	1518
15140		13409	44	15180		7123	2538
15141		5212	14	15181		8327	1625
15142		5743	184	15182		8628	1428
15143		7281	297	15183		6846	955
15144		10217	490	15184		9969	1131
15145		4854	161	15185		>20000	869
15146		4005	832	15186		13386	1418
15147		9277	333	15187		14188	902
15148		5897	249	15188		13599	278
15149		4976	164	15189		7572	174
15150		6386	1322	15190		2657	29
15151		5091	2509	15191		5937	4508
15152		6914	653	15192		9043	348
15153		11553	357	15193		10086	659
15154		10331	697	15194		6151	549
15155		7042	457	15195		5725	508
15156		17887	583	15196		5399	351
15157		16906	885	15197		9607	1734
15158		11071	1473	15198		6149	257
15159		10505	1325	15199		5896	674
15160		4375	311	15200		13538	462
15161		7629	615	15201		13178	297
15162		10156	173	15202		3684	665
15163		>20000	248	15203		15149	99
15164		>20000	173	15204		9876	3190
15165		11789	440	15205		6838	1371
15166		12479	320	15206		5177	777
15167		4352	204	15207		15369	234
15168		5265	134	15208		10869	549
15169		7211	124	15209		6586	488
15170		4316	172	15210		2489	576

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REPORT: 090-42868.0

DATE PRINTED: 15-NOV-90
PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
15211		7164	274				
15212		13017	46				

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Geochemical Lab Report

REPORT: 090-42228.0 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: KIPAWA

SUBMITTED BY: G. MEUSY
DATE PRINTED: 7-AUG-90

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Zr	Zirconium	123	1 PPM		X-Ray Fluorescence
2	Y	Yttrium	123	1 PPM		X-Ray Fluorescence

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
ROCK	123	-200	123	Crush,Pulverize -200	123

REPORT COPIES TO: MR. J.F. ALLAN
FAX:403-268-0507

INVOICE TO: MR. J.F. ALLAN

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DATE PRINTED: 7-AUG-90

REPORT: 090-42228.0

PROJECT: KIPAWA

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
15501		12832	85	15723		7620	266
15502		12711	121	15724		8023	995
15503		5581	818	15725		8900	132
15504		7306	361	15726		10200	77
15505		14194	322	15727		16791	287
15506		14232	938	15728		17089	93
15507		11861	77	15729		19103	82
15508		4923	1008	15730		>20000	78
15509		4249	1204	15731		>20000	228
15510		6495	1535	15732		>20000	111
15511		18827	460	15733		15508	81
15512		8112	2756	15734		17646	147
15513		9153	1894	15735		10196	255
15514		17021	122	15736		8204	309
15515		9068	984	15737		7955	152
15516		4626	392	15738		9987	96
15517		1631	201	15739		8887	75
15518		12664	1080	15740		6938	975
15519		9734	1255	15741		8073	1369
15520		11723	1860	15742		10831	894
15521		8739	1131	15743		11526	2234
15522		7598	167	15744		7407	1196
15523		13024	119	15745		4362	406
15524		13333	975	15746		4639	841
15525		16293	86	15747		5594	953
15526		9859	42	15748		7248	1617
15527		16465	69	15749		5921	1297
15528		482	1549	15750		5259	1434
15529		14096	118	15751		8182	1184
15530		6544	93	15752		14711	393
15531		6737	218	15753		14540	1775
15532		6987	140	15754		7646	1128
15533		9637	172	15755		5448	1094
15534		9033	296	15756		1941	828
15535		16274	326	15757		2756	2170
15536		13384	174	15758		13605	4577
15537		7240	96	15759		4554	327
15538		8921	128	15760		4168	937
15721		5112	1429	15781		5995	3040
15722		12016	209	15782		6377	2006

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Geochemical Lab Report

DATE PRINTED: 7-AUG-90

REPORT: 090-42228.0

PROJECT: KIPAWA

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
15783		5584	2732	15823		4072	1983
15784		8909	1103	15824		3305	2132
15785		7502	1678	15825		14080	4045
15786		8607	3821				
15787		5385	2560				
15788		5414	3173				
15789		10364	2136				
15790		826	630				
15791		1990	639				
15792		4167	282				
15793		11194	2460				
15794		14742	2760				
15795		17567	6713				
15796		12878	4329				
15797		4436	2009				
15798		14472	5385				
15799		7563	1650				
15800		2731	3731				
15801		4278	2747				
15802		2017	480				
15803		12564	3117				
15804		15413	3768				
15805		15808	2419				
15806		7199	3673				
15807		8417	2855				
15808		10127	2273				
15809		11344	2887				
15810		3961	1688				
15811		8436	3565				
15812		7676	1976				
15813		7978	2332				
15814		9218	4499				
15815		9354	4161				
15816		3549	4370				
15817		4511	1820				
15818		5027	1909				
15819		2190	1762				
15820		8232	4138				
15821		5885	1677				
15822		8241	3090				

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Invoice 015507. Paid

Geochemical Lab Report

DATE PRINTED: 26-JUL-90

REPORT: 090-42144.0

PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
15701		1349	77
15702		12830	249
15703		13464	79
15704		8688	156
15705		8456	88
15706		4965	59
15707		10749	133
15708		10346	206
15709		16781	473
15710		8225	87
15711		14037	1308
15712		19520	204
15713		18826	102
15714		9197	168
15715		11089	121
15716		12176	437
15717		10019	488
15718		236	5137
15719		11539	699
15720		10055	327
15761		7218	249
15762		7419	567
15763		10620	87
15764		>20000	262
15765		4607	75
15766		7529	528
15767		6016	314
15768		12717	279
15769		2632	327
15770		1753	376
15771		3333	660
15772		9023	427
15773		12397	978
15774		7165	709
15775		10448	959
15776		4678	2598
15777		1132	3185
15778		5461	3229
15779		8758	1670
15780		4795	251

40 samples

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Geochemical Lab Report

DATE PRINTED: 8-AUG-90

REPORT: 090-42229.0

PROJECT: KIPAWA PAGE 1

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
6276		7852	2748	6316		11771	450
6277		8058	1469	6317		13061	235
6278		6486	875	6318		>20000	299
6279		7330	3802	6319		>20000	219
6280		8740	1446	6320		8113	188
6281		6636	1496	6321		8018	363
6282		6832	911	6322		5879	205
6283		5653	1306	6323		13693	62
6284		6496	1061	6324		11313	1411
6285		8317	1422	6325		7140	557
6286		8753	1143	6326		8456	180
6287		15092	3303	6327		8806	158
6288		17414	2150	6328		6667	152
6289		16691	4149	6329		5813	1158
6290		9337	3059	6330		13671	139
6291		12902	1909	6331		15310	218
6292		8707	91	6332		6288	448
6293		11246	108	6333		5226	197
6294		9832	92	6334		7214	315
6295		10780	89	6335		17890	589
6296		11779	92	6336		7685	139
6297		10247	88	6337		5377	220
6298		6619	82	6338		4585	163
6299		10772	91	6339		1983	149
6300		6937	60	6340		7959	716
6301		9011	89	6341		12571	749
6302		4606	106	6342		2938	551
6303		11288	1189	6343		5452	3455
6304		10295	799	6344		7940	1527
6305		12147	3260	6345		11330	381
6306		6018	1827	6346		11151	2946
6307		10968	303	6347		19246	3436
6308		12053	1212	6348		1551	3290
6309		10932	1209	6349		3384	1665
6310		15065	5216	6350		5159	1984
6311		5015	2210	6351		2479	2329
6312		7381	2068	6352		3537	1643
6313		6990	1182	6353		5709	499
6314		6799	802	6354		14295	6637
6315		3094	550	6355		15308	3000

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Geochemical Lab Report

DATE PRINTED: 8-AUG-90

REPORT: 090-42229.0

PROJECT: KIPAWA

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
6356		10690	2056	6396		8113	2302
6357		3911	404	6397		395	568
6358		1896	490	6398		1484	980
6359		6253	1257	6399		8016	965
6360		6572	1015	6400		9521	2053
6361		6016	540	6401		9499	1303
6362		11311	219	6402		7055	912
6363		8299	185	6403		10716	1661
6364		10709	150	6404		8421	184
6365		8679	103	6405		10127	254
6366		10123	236	6406		>20000	654
6367		2695	317	6407		>20000	223
6368		10790	124	6408		>20000	336
6369		13164	47	6409		13659	360
6370		14073	62	6410		18016	321
6371		>20000	106	6411		18119	312
6372		12493	218	6412		>20000	154
6373		13241	783	6413		>20000	222
6374		13882	529	6414		>20000	319
6375		10687	194	6415		4091	365
6376		8480	399	6416		99	144
6377		12231	908	6417		4691	274
6378		3350	2878	6418		327	901
6379		2008	387	6419		5101	114
6380		6941	210	6420		7915	623
6381		7845	221	6421		1945	2923
6382		12710	228	6422		2255	227
6383		13805	176	6423		5910	907
6384		14347	232	6424		3427	154
6385		11792	191	6425		5871	40
6386		5083	392	6426		12410	37
6387		4111	499	6427		8595	447
6388		5236	229	6428		15400	39
6389		12022	191	6429		14564	58
6390		10192	281	6430		5916	401
6391		14666	185	6431		6970	260
6392		11551	601	6432		6924	115
6393		>20000	816	6433		8503	831
6394		3931	582	6434		13861	1165
6395		2665	679	6435		6237	453

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Geochemical Lab Report

DATE PRINTED: 8-AUG-90

REPORT: 090-42229.0

PROJECT: KIPAWA

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
6436		4790	863				
6437		11851	397				
6438		13904	104				
6439		13889	847				
6440		>20000	1334				
6441		5700	1178				
6442		10242	237				
6443		13683	295				
6444		14407	109				
6445		11006	1519				
6446		4778	1258				
6447		10355	778				
6448		11126	937				
6449		5000	204				
6450		6542	82				

D

1990 SAMPLES; PROSPECTING PROGRAM

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Geochemical Lab Report

REPORT: 090-42079.0 (COMPLETE)

REFERENCE INFO: KIPAWA PROSPECTING

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: A. KNOX
DATE PRINTED: 6-JUL-90

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Zr	Zirconium	20	1 PPM		X-Ray Fluorescence
2	Nb	Niobium	20	1 PPM		X-Ray Fluorescence
3	Y	Yttrium	20	1 PPM		X-Ray Fluorescence
4	Ce	Cerium	20	10 PPM		X-Ray Fluorescence

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
ROCK	20	-200	20	Crush,Pulverize -200	20

REPORT COPIES TO: MR. J.F. ALLAN

INVOICE TO: MR. J.F. ALLAN

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Geochemical Lab Report

DATE PRINTED: 6-JUL-90

REPORT: 090-42079.0

PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Nb PPM	Y PPM	Ce PPM
90KKR-01		283	70	94	42
90KKR-02		3418	442	1050	2577
90KKR-03		4137	1011	1404	3785
90KKR-04		2316	333	729	665
90KKR-05		1200	829	575	4844
90KKR-06		6333	28	904	1874
90KKR-07		6525	90	2050	3876
90KKR-08		5743	267	1323	8307
90KKR-09		740	411	134	929
90KKR-10		453	242	2651	6241
90KKR-11		115	115	5182	>20000
90KKR-12		407	24	1574	>20000
90KKR-13		71	82	832	1314
90KKR-14		848	95	425	6978
90KKR-15		124	78	632	2852
90KKR-16		1429	98	519	456
90KKR-17		<1	75	11402	>20000
90KKR-18		8615	59	1400	15637
90KKR-19		>20000	49	1620	1012
90KKR-20		315	26	57	171

20 samples.
Invoice 0155406
Paid

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Geochemical Lab Report

REPORT: 090-42128.0

DATE PRINTED: 9-JUL-90

PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Nb PPM	Y PPM	Ce PPM
90KKR-21		7303	474	1054	3084
90KKR-22		1879	385	128	471
90KKR-23		7854	260	404	1216
90KKR-24		>20000	31	1002	2989
90KKR-25		6785	53	91	389
90KKR-26		583	16	48	31
90KKR-27		3848	65	790	438
90KKR-28		8488	5	24	54
90KKR-29		9746	<1	43	32
90KKR-30		14131	<1	53	316
90KKR-31		309	286	6296	7337
90KKR-32		4635	569	448	1005
90KKR-33		653	323	1057	3864
90KKR-34		10152	2133	1147	849
90KKR-35		>20000	346	313	2379
90KKR-36		>20000	46	193	1680
90KKR-37		7047	616	541	1225
90KKR-38		1274	500	768	425
90KKR-39		9114	5956	3803	2604
90KKR-40		1813	2230	1117	145
90KKR-41		3374	358	1034	6597
90KKR-42		13586	1503	697	1289
90KKR-43		2720	728	208	348

23 Samples
Invoice 015541 4
Paid

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Geochemical Lab Report

PS | PB ZONE BOULDERS

DATE PRINTED: 3-AUG-90

REPORT: 090-42230.0

PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	Ce PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	Ce PPM
90-KKR-44		10395	94	408	90-KKR-83		>20000	179	161
90-KKR-45		197	1754	9224	90-KKR-84		>20000	9039	17880
90-KKR-46		5761	10443	13737	90-KKR-85		15201	2097	3975
90-KKR-47		351	10841	>20000	90-KKR-86		16961	430	457
90-KKR-48		9412	338	671	90-KKR-87		13313	305	422
90-KKR-49		70	7950	11848	90-KKR-88		531	6793	13110
90-KKR-50		32	8251	10324	90-KKR-89		14300	10072	>20000
90-KKR-51		6524	4122	7300	90-KKR-90		4722	301	1096
90-KKR-52		18264	10392	>20000	90-KKR-91		57	6625	7330
90-KKR-53		953	11982	>20000	90-KKR-92		1127	358	496
90-KKR-54		5889	290	1187	90-KKR-93		35	7403	8625
90-KKR-55		1668	2002	1430	90-KKR-94		1023	357	798
90-KKR-55A		7025	989	1236	90-KKR-95A		>20000	2932	5285
90-KKR-56		1888	3581	5942	90-KKR-95B		9495	3043	7275
90-KKR-57		15627	3782	9103	90-KKR-96		97	6800	9457
90-KKR-58		3988	5578	10690	90-KKR-97		2199	7013	>20000
90-KKR-59		14	9756	13355	90-KKR-98		181	6673	9146
90-KKR-60		1378	2809	4493	90-KKR-99		1422	9791	>20000
90-KKR-61		4811	201	443	90-KKR-100		6488	3336	4439
90-KKR-62		10728	83	494	90-KKR-101		>20000	133	240
90-KKR-63		9477	96	171	90-KKR-102		>20000	3325	2598
90-KKR-64		614	410	1871	90-KKR-103		10930	1236	1050
90-KKR-65		585	115	286	90-KKR-104		1015	9779	18410
90-KKR-66		>20000	91	<10	90-KKR-105		13608	1182	2547
90-KKR-67		6449	60	333	90-KKR-106		5659	11389	>20000
90-KKR-68		>20000	141	248	90-KKR-107		6415	11366	>20000
90-KKR-69		1776	3057	6826	90-KKR-108		2266	8514	>20000
90-KKR-70		8129	70	1005	90-KKR-109		56	7345	9902
90-KKR-71		8343	2866	1712	90-KKR-110		13104	10780	>20000
90-KKR-72		>20000	221	850	90-KKR-111		9356	348	2475
90-KKR-73		15364	33	103	90-KKR-112		8093	154	489
90-KKR-74		8907	40	684	90-KKR-113		>20000	299	475
90-KKR-75		>20000	168	229	90-KKR-114		8692	117	235
90-KKR-76		11581	99	485	90-KKR-115		>20000	50	365
90-KKR-77		16322	59	197	90-KKR-116		1973	42	54
90-KKR-78		8439	86	203	90-KKR-117		4137	56	65
90-KKR-79		>20000	267	99	90-KKR-118		5962	2745	4020
90-KKR-80		7247	70	555					
90-KKR-81		>20000	72	86					
90-KKR-82		371	5284	6953					

E

COMPOSITE SAMPLES; 1988 DRILL CORE

Memorandum

UNOCAL 76

1990 January 25

TO: J.F. Allan

FROM: M.J. Gidluck

SUBJECT:
Composited Drill Core Samples
from Kipawa, Quebec

Attached are two memos (Gidluck, June 23/89 and Sherer, June 7/89) and a map which document the drill samples and their location comprising the five bulk samples (numbered 1 to 5) composited for mineralogical studies.

Note that four, 2.5 Kg bags (lettered A,B,C and D) of each composite were prepared by Bondar Clegg laboratories. One bag from each composite was sent to Mariano, leaving three of each remaining at the laboratory.

MJG:bmp
Enclosures

Unocal Canada Limited
150 - 6th Avenue S.W., Box 3
Calgary, Alberta T2P 2K6
Telephone (403) 268-0176
FAX (403) 268-0507

UNOCAL 76

Fax: (613) 749-7170

1989 June 23

Mining Department

Bondar-Clegg Laboratories
Ottawa, Ontario

Dear Gui Archanbault:

Attached is a list of reject samples for the 1988 drill core which we wish to have composited into five bulk composites as discussed earlier today. The indicated amounts on this list should be weighed and extracted from each reject sample, composited and then thoroughly homogenized. If you do not have an adequate mechanical devise for the homogenization process, please use a "roll and cone" method.

Once each composite has been homogenized, split-out and bag four, 2.5 kg samples from each. The bags of Composite 1, for instance, should be labelled 88 Composite 1A, 88 Composite 1B, etc. You will then hold the bags for further instruction. Please document the exact procedures you use for the entire compositing operation and forward them with your invoice once the job has been completed.

In addition, please also take a small sample from each of the five homogenized composite samples and analyse it for Y, Zr, Th, U, Ce, Ti and P. Use the same analytical techniques as in 1988 for the Y, Zr, Th, U and Ce, XRF for Ti and your single element "specific technique" for P.

If you have any questions, please call me at (403) 268-0235.

Yours truly,

M.J. Gidluck
Senior Exploration Geologist

MJG/pl
Attach.

REJECT SAMPLES TO BE COMPOSITED

	Sample No.	Weight Kg
Composite Sample 1		
Hole 88-KU-03	4979	1.27
	4980	1.09
	4981	1.63
	4982	0.91
	4983	1.34
	4984	1.41
	4985	1.19
	4986	1.89
	4987	2.50
	4988	1.45
	4989	2.19
	4990	1.41
Hole 88-KU-11	4846	1.53
	4847	1.06
	4848	1.01
	4849	1.17
	4850	1.11
	8226	0.98
	8227	0.75
	8228	1.44
	8229	1.24
		34.57
Composite Sample 2		
Hole 88-KU-06	6811	1.49
	6812	0.84
	6813	1.33
	6814	1.15
	6815	1.24
	9545	1.06
	9546	0.94
	6816	1.26
	6817	1.21
	9547	0.87
	6818	1.34
	6819	0.84
	6820	1.34
	6821	0.87
		15.81

/...2

	Sample No.	Weight Kg
Composite Sample 3		
Hole 88-KU-08	4520	1.09
	4521	0.91
	9559	0.95
	9560	0.94
	4522	1.30
	9561	1.60
	4523	1.29
	4524	1.39
	4525	1.11
	4851	1.74
	4852	1.24
	4853	0.93
	4854	1.01
	4855	1.41
	4856	1.49
	4857	1.46
	4858	1.26
	4859	1.44
	4860	1.38
	4861	1.37
		25.30
Composite Sample 4		
Hole 88-KU-01	4906	0.60
	9509	0.75
	4907	0.76
	4908	0.89
	4909	0.73
	4910	1.09
	4911	0.95
	4912	0.75
	4918	0.69
	9506	1.44
	9507	0.82
	4919	0.88
	4920	0.84
	4921	1.00
	4922	0.91

/...3

	Sample No.	Weight Kg
Hole 88-KU-05	9532	0.90
	9533	1.17
	4833	0.89
	6794	1.11
	6795	0.82
	6796	1.23
	9530	1.20
	9531	0.95
	6797	1.17
		22.54
Composite Sample 5		
Hole 88-KU-07	6850	1.49
	4501	1.04
	4502	0.90
	4503	1.20
	4504	1.41
	4505	1.39
	4506	1.50
	4507	1.45
	4508	1.27
	4509	0.87
	4510	1.34
	4511	1.71
	4512	1.11
	4513	1.25
	4514	1.33
	4515	0.59
	4516	1.29
		21.14

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BONDAR-CLEGG

Geochemical Lab Report

REPORT: 089-51848.2 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: M.J. GIDLUCK
DATE PRINTED: 28-FEB-90

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	P	Phosphorous	5	0.01 PCT	Borate Fusion	DC Plasma
2	Ti	Titanium	5	0.01 PCT		X-Ray Fluorescence
3	Zr	Zirconium	5	1 PPM		X-Ray Fluorescence
4	Th	Thorium	5	1 PPM		X-Ray Fluorescence
5	U	Uranium	5	1 PPM		X-Ray Fluorescence
6	Y	Yttrium	5	1 PPM		X-Ray Fluorescence
7	Ce	Cerium	5	10 PPM		X-Ray Fluorescence

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
PREPARED PULP	5	AS RECEIVED	5	As Received, No SP	5

REPORT COPIES TO: M.J. GIDLUCK

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Geochemical Lab Report

REPORT: 089-51848.2

DATE PRINTED: 28-FEB-90
PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	P PCT	Ti PCT	Zr PPM	Th PPM	U PPM	Y PPM	Ce PPM	Ce: Y	Th: U
88-COMP-1		0.16	0.32	7862	166	18	1290	2328	1.8 : 1	9.22 : 1
88-COMP-2		0.16	0.36	7041	248	30	1215	1790	1.5 : 1	8.3 : 1
88-COMP-3		0.10	0.27	7548	1327	95	1435	1832	1.3 : 1	14.0 : 1
88-COMP-4		0.12	0.41	11818	482	35	1141	1656	1.4 : 1	13.8 : 1
88-COMP-5		0.10	0.23	9583	219	29	1255	1736	1.4 : 1	7.55 : 1

Reanalysis of Drill Core Composites

F

1988 DRILL CORE SAMPLES

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Geochemical Lab Report

File: Kipawa Yttrium

REPORT: 088-53554.0 (COMPLETE)

REFERENCE INFO: ~~Geochem~~ Tech: Analytical 1988

CLIENT: UNOCAL CANADA LIMITED
PROJECT: KIPAWA YTTRIUM

SUBMITTED BY: A. KNOX
DATE PRINTED: 31-OCT-88

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Zr	Zirconium	135	1 PPM		X-Ray Fluorescence
2	Y	Yttrium	135	1 PPM		X-Ray Fluorescence
3	Ce	Cerium	135	10 PPM		X-Ray Fluorescence

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
~~DRILL CORE~~	~~135~~	~~-200~~	~~135~~	~~Crush,Pulverize -200~~	~~135~~

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Geochemical Lab Report

REPORT: 088-53454.0

PROJECT: KIPAWA YTTRIUM PAGE 2

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	Ce PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	Ce PPM
4866		6480	707	580	8256		12814	511	720
4867		2388	1050	1020	8257		5318	818	846
4868		12507	168	92	8258		4328	290	347
4869		>20000	271	247	8259		6219	340	318
4870		7068	417	402	8260		5312	113	167
4871		14235	703	1135	8261		11262	489	674
4872		4973	529	701	8262		2606	339	523
4873		6850	218	362	8263		521	759	1050
4874		2505	261	788	8264		3976	801	2372
4875		8183	941	921	8265		7798	1149	1223
8226		10619	1700	2423	8266		7833	408	553
8227		17112	464	655	8267		11643	1225	1338
8228		6798	1453	2647	8268		2439	391	590
8229		7742	1729	2618	8269		7297	1240	911
8230		7567	1810	2423	8270		7028	148	151
8231		5580	673	1623	8271		1596	389	665
8232		4093	676	991	8272		7758	226	263
8233		4968	599	637	8273		13969	116	306
8234		4392	307	577	8274		9071	294	490
8235		2940	151	248	8275		1610	49	117
8236		7388	34	113	8976		5006	127	362
8237		>20000	61	<10	8977		3519	843	1134
8238		8349	910	2381	8978		13423	417	139
8239		4928	383	1506	8979		8811	183	271
8240		7778	885	2335	8980		8849	45	242
8241		8614	340	335	8981		383	204	216
8242		16571	1040	1203	8982		9625	763	590
8243		10301	925	723	8983		7555	262	354
8244		17569	108	198					
8245		3699	1718	3070					
8246		7854	331	695					
8247		7378	185	318					
8248		7107	126	193					
8249		14960	406	526					
8250		13778	1761	1219					
8251		11389	60	202					
8252		8646	595	909					
8253		1096	2709	2771					
8254		13047	2956	3175					
8255		997	1770	1620					

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Geochemical Lab Report

REPORT: 088-53454.0

PROJECT: KIPAWA YTTRIUM PAGE 1

SAMPLE NUMBER	ELEMENT UNITS ASSAY SAMPLE NO.	Zr PPM	Y PPM	Ce PPM	SAMPLE NUMBER	ELEMENT UNITS ASSAY SAMPLE NO.	Zr PPM	Y PPM	Ce PPM
88-KED-01	8801	11133	704	737	88-KED-41	8841	7929	182	299
88-KED-02	8802	2483	444	762	88-KED-42	8842	11343	360	431
88-KED-03	8803	3131	978	848	4826		15628	73	58
88-KED-04	8804	5599	766	969	4827		16511	75	36
88-KED-05	8805	10009	404	519	4828		10861	73	<10
88-KED-06	8806	2910	1123	1706	4829		16217	90	<10
88-KED-07	8807	5643	42	66	4830		>20000	95	<10
88-KED-08	8808	>20000	2316	1503	4831		10093	97	223
88-KED-09	8809	6368	362	686	4832		4923	406	521
88-KED-10	8810	12719	381	376	4833		>20000	2040	1797
88-KED-11	8811	17179	94	321	4834		7748	469	658
88-KED-12	8812	11543	76	194	4835		6304	577	946
88-KED-13	8813	3940	1459	1913	4836		6771	602	655
88-KED-14	8814	4702	868	918	4837		14363	303	548
88-KED-15	8815	5837	304	606	4838		13670	774	936
88-KED-16	8816	13836	305	304	4839		11203	308	318
88-KED-17	8817	14749	113	143	4840		>20000	67	1043
88-KED-18	8818	13919	205	370	4841		6672	502	791
88-KED-19	8819	2333	369	580	4842		6831	2058	1625
88-KED-20	8820	6933	144	236	4843		5256	338	682
88-KED-21	8821	12687	42	45	4844		4533	548	2308
88-KED-22	8822	17361	33	17	4845		5862	569	1475
88-KED-23	8823	14351	235	129	4846		6084	839	1126
88-KED-24	8824	7204	3034	1770	4847		9931	1605	2290
88-KED-25	8825	7941	1123	782	4848		8111	1444	2528
88-KED-26	8826	1912	241	550	4849		2844	747	1865
88-KED-27	8827	886	429	1350	4850		13170	3320	3601
88-KED-28	8828	2912	876	3083	4853		11229	2310	1951
88-KED-29	8829	5083	4620	7134	4854		5862	412	985
88-KED-30	8830	3656	1324	2491	4855		4861	139	503
88-KED-31	8831	15320	174	686	4856		15064	3690	2393
88-KED-32	8832	10053	535	3189	4857		10407	2462	1994
88-KED-33	8833	12103	218	283	4858		7702	1286	1609
88-KED-34	8834	8217	576	542	4859		2835	810	1195
88-KED-35	8835	>20000	420	256	4860		4718	520	481
88-KED-36	8836	1373	209	210	4861		5783	1940	1938
88-KED-37	8837	9743	284	295	4862		6256	635	529
88-KED-38	8838	11064	256	103	4863		3784	2485	4136
88-KED-39	8839	2325	456	916	4864		7369	1253	2585
88-KED-40	8840	8255	412	358	4865		9401	351	244

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Geochemical Lab Report

REPORT: 088-53354.0

PROJECT: KIPAWA YTTRIUM PAGE 2

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	Ce PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	Ce PPM
6796		12613	2102	2642	6836		6582	370	843
6797		4619	1497	1431	6837		5834	127	315
6798		2206	537	772	6838		4614	168	218
6799		5106	2934	3437	6839		9414	248	345
6800		2032	558	680	6840		10190	410	702
6801		>20000	465	409	6841		2264	312	2731
6802		>20000	473	215	6842		548	153	421
6803		15162	576	435	6843		6210	995	1321
6804		6070	288	318	6844		4082	417	730
6805		10820	203	174	6845		9394	4959	3106
6806		3951	260	389	6846		11086	119	108
6807		12555	213	344	6847		>20000	91	<10
6808		8693	912	1130	6848		14884	57	40
6809		14636	390	383	6849		13344	139	161
6810		2532	506	770	6850		8909	863	1951
6811		2505	1064	1209					
6812		10837	1088	1420					
6813		2180	757	877					
6814		5177	1291	1725					
6815		3207	883	987					
6816		6688	1459	2255					
6817		8426	2005	2695					
6818		8720	446	750					
6819		4880	527	1797					
6820		6104	1888	2127					
6821		6986	2782	2917					
6822		13901	455	565					
6823		6324	749	2570					
6824		8931	297	719					
6825		14881	278	624					
6826		10657	560	814					
6827		6745	472	430					
6828		5658	729	956					
6829		10508	140	187					
6830		13837	150	285					
6831		11019	235	644					
6832		16946	601	675					
6833		12169	2903	2817					
6834		3667	269	1094					
6835		9093	172	685					

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Geochemical Lab Report

REPORT: 088-53354.0

PROJECT: KIPAWA YTTRIUM PAGE 1

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	Ce PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	Ce PPM
4501		2154	532	692	6756		12206	813	915
4502		7126	962	1194	6757		4311	588	1504
4503		7181	313	1112	6758		1571	121	257
4504		7319	816	2349	6759		2310	470	669
4505		7585	1839	1624	6760		5320	280	338
4506		14158	247	411	6761		12859	547	325
4507		15404	2012	1000	6762		8497	1337	791
4508		5758	1195	1658	6763		12873	333	239
4509		11350	2053	1925	6764		>20000	131	52
4510		10654	1922	2013	6765		19540	73	470
4511		8516	382	615	6766		6166	125	358
4512		10318	727	547	6767		5060	356	622
4513		3425	2319	2925	6768		9261	781	813
4514		362	2188	2539	6769		1008	226	568
4515		17729	303	278	6770		6646	142	391
4516		5471	1383	1556	6771		4135	110	77
4517		12406	333	534	6772		1346	115	296
4518		13100	192	487	6773		6727	552	595
4519		13768	69	409	6774		14818	143	128
4520		15534	1221	1754	6775		11943	192	478
4521		1776	544	814	6776		11485	132	228
4522		5618	1534	1993	6777		11856	117	273
4523		7848	1811	3024	6778		10931	231	117
4524		6162	2046	2377	6779		15226	28	43
4525		4072	761	772	6780		8104	58	470
4651		9333	2460	2192	6781		5675	21	143
4852		6403	1621	1389	6782		6927	1410	1445
4993		8694	750	2356	6783		16836	2590	1718
4994		7561	463	763	6784		3608	1118	1730
4995		7083	157	290	6785		1739	403	776
4996		6209	410	537	6786		16932	355	527
4997		15140	530	555	6787		7718	646	928
4998		>20000	54	117	6788		5896	314	811
4999		10493	31	73	6789		4969	147	519
5000		13986	194	197	6790		7869	1256	1644
6751		13402	462	431	6791		1602	409	983
6752		7744	1530	2404	6792		7365	2065	2752
6753		5661	819	1034	6793		7903	758	1036
6754		4449	565	840	6794		13551	995	1984
6755		9425	1344	1495	6795		1158	502	775

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Geochemical Lab Report

REPORT: 088-53295.0

PROJECT: KIPAWA YTTRIUM PAGE 1

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	Ce PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	Ce PPM
4876		>20000	78	193	4916		9598	299	697
4877		12195	88	232	4917		14143	217	1572
4878		2960	130	56	4918		8302	855	1458
4879		2338	62	<10	4919		12254	501	1769
4880		6468	256	102	4920		9294	431	2218
4881		6523	117	144	4921		2979	1168	3032
4882		4484	243	360	4922		1993	716	714
4883		10013	994	1158	4923		13740	178	542
4884		14035	1054	1033	4924		18082	131	217
4885		12743	217	566	4925		15440	42	<10
4886		4889	272	841	4926		19444	438	796
4887		4280	754	1437	4927		9492	331	253
4888		7681	1314	2854	4928		>20000	93	62
4889		3719	420	812	4929		9745	132	21
4890		3807	624	1630	4930		9587	172	124
4891		5116	209	818	4931		6883	296	187
4892		7570	1071	1005	4932		1459	217	170
4893		5680	426	654	4933		10388	176	427
4894		4627	249	586	4934		13232	167	148
4895		4433	104	465	4935		9498	299	181
4896		8020	487	848	4936		15098	252	183
4897		11676	194	738	4937		9994	62	23
4898		6581	1120	1699	4938		8580	28	49
4899		10017	1458	2315	4939		5748	74	110
4900		5991	959	3070	4940		15140	85	<10
4901		7411	1317	2425	4941		11265	49	<10
4902		8632	492	1365	4942		8015	67	33
4903		17536	220	190	4943		9846	517	866
4904		10242	158	100	4944		8887	426	499
4905		>20000	109	157	4945		12121	319	359
4906		15107	3955	2586	4946		11904	316	371
4907		11592	971	1727	4947		5597	449	558
4908		14762	904	914	4948		7414	1881	1624
4909		8811	1101	1359	4949		>20000	235	154
4910		7083	1610	1916	4950		3553	318	585
4911		14799	1273	1077	4951		802	599	2212
4912		18247	2800	1922	4952		1541	637	1222
4913		15902	188	479	4953		5649	606	1527
4914		15198	145	327	4954		5971	280	405
4915		>20000	163	996	4955		8556	364	407

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Geochemical Lab Report

REPORT: 088-53295.0

PROJECT: KIPAWA YTTRIUM PAGE 2

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	Ce PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	Ce PPM
4956		7890	625	599					
4957		890	451	752					
4958		3921	126	125					
4959		10652	128	86					
4960		8152	413	285					
4961		7150	383	503					
4962		9567	263	626					
4963		6130	601	1388					
4964		3535	1263	1811					
4965		15255	802	1521					
4966		10223	514	962					
4967		6257	742	1030					
4968		6223	886	1088					
4969		13671	1301	2117					
4970		17432	448	409					
4971		10512	378	1485					
4972		10695	1162	1863					
4973		6730	174	584					
4974		6277	1921	1655					
4975		1661	658	1037					
4976		7729	870	1119					
4977		11115	977	1177					
4978		6600	1781	3100					
4979		5293	1095	2249					
4980		13413	1197	1580					
4981		5544	1039	2259					
4982		4610	924	2393					
4983		8367	1796	2865					
4984		4943	1170	2403					
4985		4254	1452	2581					
4986		12037	2338	2406					
4987		1947	646	2030					
4988		11524	1639	2324					
4989		4849	748	1104					
4990		>20000	571	1147					
4991		>20000	243	223					
4992		2699	238	271					

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Geochemical Lab Report

REPORT: 088-54301.0 | PROJECT: KIPAWA YTTRIUM | PAGE 2

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
9581		5444	151				
9582		1691	354				
9583		13333	230				
9584		13385	156				
9585		15506	293				
9586		5385	495				
9587		5154	90				
9588		4531	462				
9589		2620	175				
9590		10940	143				
9591		1085	327				
9592		609	264				
9593		3443	255				
9594		2256	463				
9595		2553	119				
9596		262	476				

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Geochemical Lab Report

REPORT: 088-54301.0 | PROJECT: KIPAWA YTTRIUM | PAGE 1

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM	SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Y PPM
9501		11963	191	9541		5416	443
9502		8217	218	9542		5757	23
9503		12057	177	9543		10364	37
9504		2502	428	9544		9313	828
9505		1964	411	9545		5027	430
9506		11802	2522	9546		10574	1340
9507		7271	556	9547		14569	174
9508		10251	190	9548		5474	90
9509		14272	286	9549		7147	21
9510		1869	409	9550		5545	132
9511		1932	559	9551		10969	98
9512		8141	599	9552		9661	458
9513		11113	128	9553		9876	562
9514		6225	633	9554		8905	418
9515		125	117	9555		1598	427
9516		14485	119	9556		7788	434
9517		>20000	118	9557		15055	334
9518		12358	257	9558		930	632
9519		12430	176	9559		3725	1317
9520		5500	339	9560		2677	482
9521		6759	275	9561		6223	1125
9522		1801	95	9562		251	87
9523		7371	102	9563		171	77
9524		3899	114	9564		4915	294
9525		2174	55	9565		3324	69
9526		8194	230	9566		1049	33
9527		10645	177	9567		5695	557
9528		8390	200	9568		5131	404
9529		4815	191	9569		188	574
9530		4033	1018	9570		7657	639
9531		3657	435	9571		2510	561
9532		18002	1317	9572		9764	94
9533		>20000	114	9573		9685	814
9534		3511	677	9574		6343	571
9535		721	471	9575		11035	262
9536		1326	581	9576		3697	288
9537		692	416	9577		11511	256
9538		3635	177	9578		1438	1762
9539		10424	594	9579		535	2128
9540		5080	612	9580		5081	420

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Geochemical Lab Report

REPORT: 089-51847.0 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: M.F. GIDLUCK
DATE PRINTED: 18-JUL-89

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Th	Thorium	135	1 PPM		X-Ray Fluorescence
2	U	Uranium	135	1 PPM		X-Ray Fluorescence

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
PREPARED PULP	135	AS RECEIVED	135	As Received, No SP	135

REPORT COPIES TO: M.J. GIDLUCK

INVOICE TO: M.J. GIDLUCK

ondar-Clegg & Company Ltd.
5420 Canotek Road
Ottawa, Ontario
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(613) 749-2220 Telex 053-3233

BONDAR-CLEGG

Geochemical Lab Report

REPORT: 089-51847.0

PROJECT: NONE

SAMPLE NUMBER	ELEMENT UNITS	Th PPM	U PPM	SAMPLE NUMBER	ELEMENT UNITS	Th PPM	U PPM
	ASSAY SAMPLE NO.						
88-KED-03	8803	70	6	4875		183	12
88-KED-06	8806	334	18	4883		2254	81
88-KED-08	8808	309	28	4884		30	22
88-KED-13	8813	171	24	4888		212	18
88-KED-14	8814	167	50	4892		41	9
88-KED-24	8824	131	23	4898		113	16
88-KED-25	8825	56	37	4899		71	25
88-KED-28	8828	267	36	4900		41	15
88-KED-29	8829	572	98	4901		253	18
88-KED-30	8830	2866	115	4906		692	47
4502		276	32	4907		1465	61
4504		338	23	4908		408	34
4505		62	33	4909		33	11
4507		451	30	4910		134	23
4508		120	32	4911		217	30
4509		158	28	4912		807	47
4510		460	39	4918		290	21
4513		334	29	4919		889	46
4514		446	35	4920		1234	53
4516		58	25	4921		4236	171
4520		114	14	4948		141	37
4522		124	32	4951		132	8
4523		353	40	4964		186	87
4524		353	78	4965		2088	101
4833		710	57	4968		269	33
4842		134	19	4969		93	33
4847		121	20	4972		332	19
4848		169	19	4974		40	14
4850		226	20	4976		63	15
4851		254	96	4977		390	31
4852		48	34	4978		392	28
4853		73	40	4979		115	13
4856		3106	147	4980		215	27
4857		2437	156	4981		91	14
4858		684	48	4982		122	16
4859		168	20	4983		182	28
4861		13948	630	4984		211	33
4863		861	82	4985		197	32
4864		315	26	4986		59	10
4867		97	19	4988		199	23

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Geochemical Lab Report

REPORT: 089-51847.0 | PROJECT: NONE |

SAMPLE NUMBER	ELEMENT UNITS	Th PPM	U PPM	SAMPLE NUMBER	ELEMENT UNITS	Th PPM	U PPM
6752		1676	34	8264		257	32
6755		234	20	8265		68	3
6756		218	27	8267		222	16
6762		1956	60	8269		27	2
6782		214	53	8977		156	122
6783		178	91	9506		409	33
6784		260	34	9530		113	24
6790		75	31	9532		461	53
6792		79	18	9544		131	17
6794		636	37	9546		1090	43
6796		205	36	9559		155	15
6797		60	14	9561		55	26
6799		207	43	9573		268	22
6808		394	48	9578		150	26
6811		149	29	9579		94	24
6812		97	23				
6814		119	17				
6815		52	11				
6816		1011	54				
6817		928	53				
6820		89	45				
6821		202	51				
6833		403	115				
6843		238	43				
6845		130	33				
6850		230	42				
8226		387	27				
8228		431	38				
8229		608	36				
8230		43	9				
8238		634	37				
8240		665	38				
8242		519	39				
8243		400	27				
8245		1144	52				
8250		791	69				
8253		450	40				
8254		261	22				
8255		101	5				
8257		63	14				

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1987 BULK SAMPLES

Memorandum

UNOCAL 76

1990 March 05

TO: J.F. Allan

FROM: A.W. Knox

SUBJECT:
Lanthanide Standards

Introduction

In early 1988 considerable difficulties were encountered in trying to get accurate, low detection limit complete lanthanide distribution analysis done at Canadian commercial labs. The labs complained that the high values of total LnO, Zr, and the actinides (U,Th) produced interferences which precluded accurate analysis. As well, the labs complained about the lack of suitable laboratory analytical standards which contain high values of these elements. To alleviate these problems it was decided to produce four standards rich in these elements, have the four standards accurately analyzed and then submit them for analysis to various Canadian labs as tests to see who could produce the most accurate analysis.

Sample Selection

Four samples were selected for analysis. Three of these came from the Kipawa yttrium property in western Quebec and one from the Dead Horse Creek yttrium property in north-central Ontario. All four samples had been collected as metallurgical bulk samples and all were tested in this manner (Gidluck, 1988).

The material which remained after an aliquot was taken for metallurgical testing was completely ground to -200 mesh and thoroughly homogenized.

The geology of the three Kipawa samples has been discussed (Gidluck 1990, attached). In Sample K-1, eudialyte is the main yttrium bearing phase. Total LnO, Y and Zr are high, whereas U and Th are relatively low. In Sample K-3 mosandrite is the dominant yttriferous phase. The Zr content is significantly lower but U and Th are higher. Sample K-4 is dominated by britholite. This sample is low in Zr, high in U, Th and the light LnO.

Sample DC-2 comes from a trench near the west subcomplex of the Dead Horse Creek diatreme . The sample is strongly hematized, silicified, and is very strongly radioactive and highly deformed. Compared with the Kipawa samples it is low in Y and total LnO but very high in Zr, U, Th and Be.

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Analysis

For accurate initial analysis of the samples, Molycorp, Louviers, was selected. They analyzed a split of the sample by Direct Current Plasma - Mass Spectrometry (DCP-MS) preceded by an extraction which separated the LnO plus Y from the sample.

The results are as follows:

	K-1	K-3	K-4	DC-2
Y	5300	5120	2280	350
La	1280	2130	4600	-
Ce	2280	4640	7820	-
Pr	330	660	830	-
Nd	1200	2490	2490	-
Sm	340	690	430	-
Eu	50	85	45	-
Gd	430	690	260	-
Tb	85	170	70	-
Dy	870	1050	350	60
Ho	175	260	85	-
Er	700	700	260	45
Tm	90	90	35	-
Yb	700	440	180	45
Lu	90	55	25	-
Th	60	530	1760	175

Lanthanide distribution curves are presented in Appendix 2.

Test Analyses

Identical samples of the four standards were sent to the following labs who analyzed the samples by the following methods:

Bondar-Clegg and Co. (Vancouver)	ICP
	NAA
Acme Labs (Vancouver)	DCP-MS
Activation Labs Ltd. (Toronto)	NAA

These were blind tests with no information given on the samples except that they were 'special' samples.

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J.F. Allan
1990 March 05

SAMPLE K-1

	Bondar-Clegg NAA	Bondar-Clegg ICP	Acme	Activation	Bondar-Clegg XRF	Molycorp
Y		6100	5368	5800	6600	5300
La	1390	1200	985	1400	1400	1280
Ce	2600	3500	2002	2400	2400	2280
Pr	250	300	150			330
Nd	940	1600	1060	1200		1200
Sm	350	450	316	290		340
Eu	52	60	38	47		50
Gd	ND	450	202			430
Tb	108	150	73	110		85
Dy	840	1100	475			870
Ho	210	250	123			175
Er	1140	650	517			700
Tm	ND	120	86			90
Yb	670	1100	653	800		700
Lu	103	120	70	120		90
U	2150		24	26		
Th	5300	95	62	62		60
Sc	3.2	3.0				
Zr			14973			

....4

SAMPLE K-3

	Bondar-Clegg			Acme	Activation	Molycorp
	NAA	ICP	XRF			
Y		6900	5500	4986	5600	5120
La	2300	2100	2300	1513	2000	2130
Ce	5000	5900	4600	3658	4000	4640
Pr	500	700		305		6600
Nd	2100	3500		2170	2100	2490
Sm	700	1000		550	530	690
Eu	90	100		64	75	85
Gd	ND	900		330		690
Tb	152	200		99	160	170
Dy	960	1300		587		1050
Ho	240	200		132		260
Er	1020	700		451		700
Tm	110	100		64		90
Yb	450	700		431	464	440
Lu	59	70		40	63	55
U	71			69	80	
Th	590	800		517	500	530
Sc	2.2	3.0				

....5

J.F. Allan
1990 March 05

SAMPLE K-4

		Bondar-Clegg	
	NAA	ICP	XRF
Y			
La	5200		
Ce	8400	9000	
Pr	560		
Nd	2000		
Sm	420		
Eu	46		
Gd	ND		
Tb	62		
Dy	360	800	
Ho	90		
Er	390	300	
Tm	50		
Yb	220		
Lu	29		
U	166		
Th	2000		
Sc	3.1		

AWK:bmp
Enclosure

A.K.Wong

Memorandum

UNOCAL 76

1990 February 16

TO: A.W. Knox

FROM: M.J. Gidluck

SUBJECT:
Kipawa Bulk Samples
Analyzed for Lanthanides

Three samples, K-1, K-3, and K-4 were selected from homogenized portions of 50 pound bulk samples and submitted to four laboratories for complete lanthanide analysis.

Sample K-1 from Trench #1 is a eudialyte-agrellite-pyroxene-feldspar pegmatite which, in addition to these minerals, contains fairly abundant fluorite, lesser amounts of mosandrite and zircon, and traces of gittinsite, galena and vlasovite. Minor amounts of other accessory minerals have also been reported from this location by other workers. Composite and channel samples from this trench have returned 5549-6341 ppm Y, 16,854->20,000 ppm Zr and 2254-3010 ppm Ce.

Sample K-3 from Trench #2c is a shallow dipping amphibolite-pyroxenite lense comprised of 75%-80% black mafic grains and interstitial white feldspar with possibly 1%-2% quartz. Within the white felsic matrix is a tan coloured translucent accessory mineral, possibly mosandrite. A four inch thick seam containing about 25% eudialyte and 2%-3% amber translucent mineral, possibly vlasovite or britholite, occurs at the bottom of the trench and was included in the bulk sample. A channel sample taken vertically from one wall of the trench produced 1614 ppm Y, 2547 ppm Zr and 1672 ppm Ce.

Sample K-4 from Trench #3 is a phlogopite-diopside rock containing bands enriched with up to 20% coarse brown grains of britholite. Several white felsic lenses containing long needle-like prisims of mosandrite plus fluorite and a multi-coloured mauve to yellow mineral (apatite?) were included in the sample. A minor amount of small unidentified red-brown grains were also observed in this sample.

MJG:bmp
cc: J.F. Allan

Alex

Molycorp, Inc.
A Unocal Company
P.O. Box 37
Louviers, Colorado 80131
Telephone (303) 798-8355

UNOCAL

MOLYCORP

September 7, 1988

Alex Knox
Unocal Canada Limited
335 8th Avenue SW
P.O. Box 999
Calgary, Alberta T2P 2K6

Dear Alex,

Enclosed are our final results on the four samples that you submitted. I am sorry that we took so long to get your results, but we have been very busy these last two years.

The procedure that we use for low concentration of LnO's, is to start with a gravimetric determination for total LnO. From the total LnO precipitate, the LnO distribution is analyzed by the ICP/AES procedure. This eliminates the sample matrix to an LnO matrix which we are accustom to handling. Note that the gravimetric LnO values are higher than the addition of the individual LnO elements. This is due to using Ca as an aid to quantitate low LnO concentration, with no attempt to quantitatively separate CaO from the LnO elements. The gravimetric LnO precipitate contain 0.1-0.2% CaO (semiquant ICP/AES determination).

All values are reported on the 'as received' basis. If you have any problems or questions please feel free to contact me.

Sincerely,

Miller Arnold
Chief Chemist

MLA/dm

Sample No.	88-K-1	88-K-3	88-K-4	88-DC-Z
La2O3	0.153%	0.245%	0.540%	<0.005%
CeO2	0.275%	0.593%	0.960%	<0.005%
Pr6O11	0.036%	0.081%	0.100%	<0.005%
Nd2O3	0.144%	0.291%	0.286%	<0.005%
Sm2O3	0.044%	0.082%	0.049%	<0.005%
Eu2O3	0.006%	0.010%	0.005%	<0.002%
Gd2O3	0.051%	0.084%	0.028%	<0.005%
Tb4O7	0.012%	0.018%	0.008%	<0.005%
Dy2O3	0.095%	0.121%	0.043%	0.007%
Ho2O3	0.023%	0.025%	0.010%	<0.005%
Er2O3	0.080%	0.075%	0.030%	0.005%
Tm2O3	0.013%	0.010%	0.004%	<0.002%
Yb2O3	0.082%	0.053%	0.024%	0.005%
Lu2O3	0.010%	0.006%	0.003%	<0.002%
Y2O3	0.664%	0.648%	0.287%	0.045%
ThO2	0.007%	0.061%	0.654%	0.022%
LnO	(1.695%)	(2.402%)	(3.031%)	(0.074%)
LnO*	1.82%	2.67%	3.23%	

*gravimetric

H

1987 SURFACE ROCK SAMPLES

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BONDAR-CLEGG

Geochemical Lab Report

REPORT: 017-5071 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: M. GIDLUCK
DATE PRINTED: 16-NOV-87

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Zr	Zirconium	42	1 PPM		X-Ray Fluorescence
2	Nb	Niobium	42	1 PPM		X-Ray Fluorescence
3	Th	Thorium	42	1 PPM		X-Ray Fluorescence
4	Y	Yttrium	42	1 PPM		X-Ray Fluorescence
5	Ce	Cerium	42	10 PPM		X-Ray Fluorescence
6	Ufl	Uranium,fluorometric	42	0.1 PPM	HNO3	Fluorometric

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
ROCK	42	-200	42	CRUSH,PULVERIZE -200	42

REMARKS: < Means Less Than

SAMPLE	ESTIMATES
MG-4	27400 PPM
XGR-002	29100 PPM
XGR-004	52000 PPM

REPORT COPIES TO: M.J. GIDLUCK

INVOICE TO: M.J. GIDLUCK

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BONDAR-CLEGG

Geochemical Lab Report

REPORT: 017-5071

PROJECT: NONE PAGE 1

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Nb PPM	Th PPM	Y PPM	Ce PPM	Ufl PPM
MG-1		10103	4	7	45	226	1.8
MG-2		10646	556	860	4921	2975	91.0
MG-3		9008	401	571	1044	144	40.0
MG-4		>20000	<1	22	88	135	4.8
MG-5		12915	18	3719	353	536	55.0
MG-9		5057	66	88	1101	1283	12.4
MG-10A		2700	26	23	122	548	2.6
MG-10B		8780	108	104	1250	2026	21.0
MG-12		9170	66	46	191	472	4.4
MG-15		9218	17	34	284	317	6.5
MG-16		6529	121	1326	1352	1859	26.0
MG-18		275	23	324	95	499	11.6
MG-19		3132	74	1483	923	5107	74.0
MG-20		424	<1	4736	13036	19393	90.0
MG-24		8554	24	471	301	657	11.3
MG-25		8624	240	791	2950	1426	34.0
MG-26		12451	22	61	230	205	8.4
MG-29A		920	197	77	430	597	5.9
MG-30		10151	<1	44	102	87	2.1
MG-31		9610	600	1395	1913	2914	65.0
MG-38		191	3	4	48	141	1.5
MG-42		3197	57	142	623	2778	8.0
MG-44		9076	6	18	325	455	4.4
MG-46		3815	444	132	3258	2756	68.0
MG-49		3058	6	59	57	102	1.9
MG-52		9834	35	166	118	379	7.8
MG-53		9145	37	51	240	189	3.8
MG-54		7273	437	1227	2479	3155	44.0
KKR-1		14398	269	1632	3532	3104	57.0
KKR-2		5289	61	109	757	1831	10.5
XGR-001		15287	2093	50	288	420	102.0
XGR-002		>20000	1733	42	247	308	44.0
XGR-003		>20000	4294	45	337	212	19.0
XGR-004		604	83	14	40	60	2.1
XGR-005		265	27	11	32	<10	0.8
XGR-006		9619	35	1755	1665	15648	1.4
XGR-007		18696	262	377	1017	4996	13.3
XGR-008		3982	1667	657	799	1735	52.0
XGR-009		2325	644	290	1013	2349	17.0
XGR-010		1174	337	426	961	622	1.3

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BONDAR-CLEGG

Geochemical Lab Report

REPORT: 017-5871 | PROJECT: NONE | PAGE 2

SAMPLE NUMBER	ELEMENT UNITS	Zr PPM	Nb PPM	Th PPM	Y PPM	Ce PPM	Ufl PPM
XGR-011		296	28	25	67	167	2.2
XGR-012		105	24	144	2776	2772	2.7

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BONDAR-CLEGG

Geochemical Lab Report

REPORT: 017-5872 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: M. GIDLUCK
DATE PRINTED: 14-DEC-87

ORDER		ELEMENT	NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Pb	Lead	64	2 PPM	HCl-HNO3, (1:3)	Atomic Absorption
2	Be	Beryllium	64	0.5 PPM	Hf-H2SO4-HCl	Atomic Absorption
3	Zr	Zirconium	64	1 PPM		X-Ray Fluorescence
4	Nb	Niobium	64	1 PPM		X-Ray Fluorescence
5	Th	Thorium	64	1 PPM		X-Ray Fluorescence
6	Y	Yttrium	64	1 PPM		X-Ray Fluorescence
7	Ce	Cerium	64	10 PPM		X-Ray Fluorescence
8	Sc	Scandium	64	0.1 PPM		Neutron Activation
9	Ufl	Uranium,fluorometric	64	0.1 PPM	HNO3	Fluorometric

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
ROCK	64	-200	64	CRUSH,PULVERIZE -200	64

REMARKS: SAMPLE 87KGR-10 27800 PPM TH.
SAMPLE 87KWR-07 44000 PPM ZR.
SAMPLE 87KWR-10 33200 PPM ZR.
SAMPLE 87KWR-17 31200 PPM ZR.
SAMPLE 87KWR-19 29400 PPM ZR.
SAMPLE 87KWR-20 33200 PPM ZR.
SAMPLE 87KGR-07 33100 PPM ZR. ≈ 4.5%
SAMPLE 87KGR-09 64000 PPM ZR. ≈ 8%
SAMPLE 87KGR-20 20600 PPM ZR.
SAMPLE 87KGR-37 24100 PPM ZR.

REPORT COPIES TO: M.J. GIDLUCK

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BONDAR-CLEGG

Geochemical Lab Report

REPORT: 017-5872 | PROJECT: NONE | PAGE 1

SAMPLE NUMBER	ELEMENT UNITS	Pb PPM	Be PPM	Zr PPM	Nb PPM	Th PPM	Y PPM	Ce PPM	Sc PPM	Ufl PPM
87KWR-01		173	21.0	2873	45	320	277	903	5.2	17.7
87KWR-02		139	24.0	11206	34	438	134	322	3.7	13.2
87KWR-03		147	34.5	19038	3	1669	237	292	2.5	36.0
87KWR-04		99	25.0	3206	52	111	83	85	15.1	19.0
87KWR-05		201	26.0	14601	20	2596	382	1055	3.2	44.0
87KWR-06		105	31.5	11939	41	2301	775	1795	1.9	30.0
87KWR-07		316	4.0	>20000	<1	41	102	<10	0.5	10.8
87KWR-08		320	9.0	19458	<1	423	58	<10	0.5	10.4
87KWR-09		357	9.0	16791	<1	1268	40	<10	0.5	16.4
87KWR-10		352	9.0	>20000	<1	256	107	<10	1.3	16.0
87KWR-11		170	43.0	9876	210	173	1252	1272	1.2	23.0
87KWR-12		431	18.0	1800	130	665	2268	4047	3.2	65.0
87KWR-13		331	15.0	1644	402	1220	4971	7969	2.1	118.0
87KWR-14		175	13.5	1743	319	351	3164	3209	3.2	55.0
87KWR-15		304	13.5	3767	219	143	1799	2247	2.6	32.0
87KWR-16		1670	22.0	7587	232	5557	1107	3782	3.7	100.0
87KWR-17		715	17.0	>20000	120	10339	1542	5632	2.4	188.0
87KWR-18		47	17.0	1675	21	298	125	437	3.8	8.8
87KWR-19		116	35.5	>20000	<1	91	126	233	2.7	5.6
87KWR-20		141	34.0	>20000	<1	120	79	223	3.5	5.8
87KWR-21		106	25.0	6778	2	221	37	46	2.2	6.0
87KWR-22		192	18.0	8041	11	923	58	206	2.8	15.2
87KWR-23		298	13.0	8729	8	2044	51	200	1.2	35.0
87KWR-24		263	15.0	7913	7	861	57	95	3.7	9.7
87KWR-25		454	15.5	10128	14	2639	30	252	1.9	36.0
87KWR-26		308	18.5	8929	14	2329	49	322	1.4	32.0
87KWR-27		256	20.0	13116	1	1591	49	116	3.6	25.0
87KGR-01		179	28.5	4270	154	169	213	547	2.1	4.6
87KGR-02		234	38.0	1903	227	138	350	514	10.8	7.7
87KGR-03		449	17.5	2710	355	4125	7983	16219	1.9	178.0
87KGR-04		747	42.5	5150	176	4135	6582	13400	1.7	95.0
87KGR-05		361	32.0	7863	102	277	1153	1832	2.6	31.0
87KGR-06		1001	39.0	16854	574	279	5549	2938	2.5	16.3
87KGR-07		593	38.0	>20000	701	39	6341	2254	2.9	14.6
87KGR-08		65	24.0	8646	304	159	2303	2494	1.6	43.5
87KGR-09		136	20.5	>20000	2	4153	390	500	0.3	38.0
87KGR-10		2880	27.0	17101	12	>20000	815	1297	2.9	187.0
87KGR-11		186	58.0	1372	108	2143	2989	5376	3.2	114.0
87KGR-12		150	32.0	1055	64	1402	1098	2962	3.3	59.0
87KGR-13		840	29.5	15308	307	1811	1409	1454	3.0	37.0

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Geochemical Lab Report

REPORT: 017-5872 | PROJECT: NONE |

SAMPLE NUMBER	ELEMENT UNITS	Pb PPM	Be PPM	Zr PPM	Nb PPM	Th PPM	Y PPM	Ce PPM	Sc PPM	Ufl PPM
87KGR-14		405	27.5	4652	234	110	2808	1708	1.5	21.0
87KGR-15		217	13.5	2547	232	249	1614	1672	2.7	42.0
87KGR-16		333	28.0	12428	109	1623	553	977	2.0	40.0
87KGR-17		550	17.0	19433	8	1820	137	105	1.4	48.0
87KGR-18		120	15.5	8856	31	2861	142	361	3.6	67.0
87KGR-19		79	16.0	13509	14	455	76	33	2.5	9.0
87KGR-20		96	6.5	>20000	<1	362	96	305	1.6	5.2
87KGR-21		48	24.0	5191	164	380	585	466	6.0	15.8
87KGR-22		17	21.0	10622	112	208	289	505	3.7	9.7
87KGR-23		495	34.0	2632	28	1917	2505	4262	0.8	38.0
87KGR-24		491	37.5	7148	104	3391	5503	7637	0.7	118.0
87KGR-25		383	15.0	13325	259	2557	466	1131	7.2	58.5
87KGR-26		215	10.0	12292	31	229	106	228	1.2	10.7
87KGR-27		364	14.5	15910	34	2980	214	275	3.4	63.0
87KGR-28		303	14.0	14037	42	512	165	178	2.3	14.7
87KGR-29		413	13.5	15043	41	1459	209	233	1.8	40.0
87KGR-30		155	25.0	224	68	1210	5982	5359	4.6	23.0
87KGR-31		305	22.0	141	111	1342	10460	9520	3.9	27.0
87KGR-32		412	19.0	144	91	2344	7280	7524	1.7	35.0
87KGR-33		134	38.0	13608	267	1750	2198	3595	1.4	80.0
87KGR-34		234	23.0	4080	143	887	1387	2743	1.3	40.0
87KGR-35		168	20.0	1534	25	299	382	1163	1.1	8.4
87KGR-36		345	26.0	14305	139	1985	1712	4036	0.9	89.0
87KGR-37		550	16.0	>20000	142	4976	2390	2352	1.2	114.0

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Geochemical Lab Report

RT: 008-00161.2 (COMPLETE)

REFERENCE INFO:

NT: UNOCAL CANADA LIMITED
JECT: NONE

SUBMITTED BY: M. GIDLUCK
DATE PRINTED: 1-FEB-88

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Co	Cobalt	6	1 PPM	HCl-HNO3, (1:3)	Atomic Absorption
2	Ni	Nickel	6	2 PPM	HCl-HNO3, (1:3)	Atomic Absorption
3	Cu	Copper	6	1 PPM	HCl-HNO3, (1:3)	Atomic Absorption
4	Zn	Zinc	6	1 PPM	HCl-HNO3, (1:3)	Atomic Absorption
5	Mo	Molybdenum	6	1 PPM	HCl-HNO3, (1:3)	Atomic Absorption
6	Ag	Silver	6	0.1 PPM	HCl-HNO3, (1:3)	Atomic Absorption
7	Cd	Cadmium	6	0.2 PPM	HCl-HNO3, (1:3)	Atomic Absorption
8	Pb	Lead	6	2 PPM	HCl-HNO3, (1:3)	Atomic Absorption
9	V	Vanadium	6	2 PPM		X-Ray Fluorescence
10	Sn	Tin	6	1 PPM		X-Ray Fluorescence
11	Sb	Antimony	6	1 PPM		X-Ray Fluorescence
12	Ba	Barium	6	15 PPM		X-Ray Fluorescence

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
PREPARED PULP	6	-200	6	As Received, No SP	6

REMARKS: PULPS FROM 017-5871 AND 017-5872.
< MEANS LESS THAN.

REPORT COPIES TO: M.J. GIDLUCK

INVOICE TO: M.J. GIDLUCK

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Geochemical Lab Report

CLIENT: 088-00161.2

PROJECT: NONE PAGE 1

SAMPLE #	ELEMENT	Co	Ni	Cu	Zn	Mo	Ag	Cd	Pb	V	Sn	Sb	Ba
	UNITS	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM
[illegible]GR-6		<1	<2	2	73	3	0.2	1.2	907	<2	62	<1	673
[illegible]GR-11		1	2	1	158	1	<0.1	<0.2	190	<2	30	<1	933
[illegible]GR-31		5	3	10	101	2	0.5	<0.2	311	4	8	<1	2927
[illegible]GR-4		3	4	1	48	1	0.1	0.5	8	32	<1	<1	1423
[illegible]GR-6		6	5	5	352	3	<0.1	1.2	158	21	12	<1	1016
[illegible]GR-9		13	12	7	329	1	0.1	<0.2	55	149	<1	<1	1277

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Geochemical Lab Report

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FEB 11 1988

REPORT: 008-00161.1 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: M. GIDLOCK
DATE PRINTED: 2-FEB-88

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	SiO2	Silica (SiO2)	6	0.01 PCT	Borate Fusion	DC Plasma
2	TiO2	Titanium (TiO2)	6	0.01 PCT	Borate Fusion	DC Plasma
3	Al2O3	Alumina (Al2O3)	6	0.01 PCT	Borate Fusion	DC Plasma
4	Fe2O3A	Total Iron (Fe2O3*)	6	0.01 PCT	Borate Fusion	DC Plasma
5	MnO	Manganese (MnO)	6	0.01 PCT	Borate Fusion	DC Plasma
6	MgO	Magnesium (MgO)	6	0.01 PCT	Borate Fusion	DC Plasma
7	CaO	Calcium (CaO)	6	0.01 PCT	Borate Fusion	DC Plasma
8	Na2O	Sodium (Na2O)	6	0.01 PCT	Borate Fusion	DC Plasma
9	K2O	Potassium (K2O)	6	0.01 PCT	Borate Fusion	DC Plasma
10	P2O5	Phosphorous (P2O5)	6	0.01 PCT	Borate Fusion	DC Plasma
11	LOI	Loss on Ignition	6	0.01 PCT		Gravimetric
12	Total	Whole Rock Total	6	0.01 PCT		
13	Li	Lithium	6	1 PPM	Hf-HClO4-HNO3-HCl	Atomic Absorption
14	Se	Selenium	6	1 PPM		X-Ray Fluorescence
15	Rb	Rubidium	6	1 PPM		X-Ray Fluorescence
16	Zr	Zirconium	6	1 PPM		X-Ray Fluorescence
17	Nb	Niobium	6	1 PPM		X-Ray Fluorescence
18	Y	Yttrium	6	1 PPM		X-Ray Fluorescence
19	Ta	Tantalum	6	3 PPM		X-Ray Fluorescence

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Geochemical Lab Report

REPORT: 008-00161.1 (COMPLETE)

REFERENCE INFO:

CLIENT: UNOCAL CANADA LIMITED
PROJECT: NONE

SUBMITTED BY: M. GIDLUCK
DATE PRINTED: 2-FEB-88

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
PREPARED PULP	6	-200	6	As Received, No SP	6

REMARKS: PULPS FROM 017-5871 AND 017-5872.
< MEANS LESS THAN.

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Geochemical Lab Report

REPORT: 088-00161.1 | PROJECT: NONE | PAGE 1A

SAMPLE NUMBER	ELEMENT UNITS	SiO2 PCT	TiO2 PCT	Al2O3 PCT	Fe2O3x PCT	MnO PCT	MgO PCT	CaO PCT	Na2O PCT	K2O PCT	P2O5 PCT	LOI PCT
KGR-6	Dark Trach 3	59.20	0.24	9.26	5.00	0.49	2.06	8.32	7.20	4.65	0.16	1.60
KGR-11		52.40	0.26	5.96	2.72	0.28	15.90	17.10	2.53	2.01	0.27	1.15
KGR-31	? Pink Gneiss	46.90	0.52	5.73	3.22	0.14	15.90	19.20	0.50	2.27	1.03	2.70
XGR-4		65.20	0.46	16.80	2.90	0.06	0.35	2.44	4.81	3.70	0.22	0.40
XGR-6	Trach 4	57.80	0.58	15.50	9.89	0.65	0.39	6.94	3.16	1.40	0.10	2.00
XGR-9	Trachyte Gneiss	56.50	1.02	15.90	10.30	0.29	2.97	0.89	5.62	4.05	0.19	0.70

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Geochemical Lab Report

REPORT: GSS-00161.1 | PROJECT: NONE | PAGE 13

SAMPLE NUMBER	ELEMENT UNITS	Total PCT	Li PPM	Se PPM	Rb PPM	Zr PPM	Nb PPM	Y PPM	Ta PPM	
KGR-6		98.18	134	1	421	15059	585	5496	16	36:1
KGR-11		100.58	643	<1	365	1379	164	2064	9	18:1
KGR-31		98.11	42	1	221	130	128	10355	<3	42:1
XGR-4		97.34	17	<1	112	612	84	40	<3	
XGR-6		98.49	86	5	50	8589	132	1637	14	28:1
XGR-9		98.43	246	<1	243	2483	670	1004	15	9:1 44:1

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Geochemical Lab Report

...: 033-00158.0 (COMPLETE)

REFERENCE INFO:

...: UNOCAL CANADA LIMITED
...: NONE

SUBMITTED BY: M. GIDLOCK
DATE PRINTED: 23-FEB-88

ORDER	ELEMENT		NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Na	Sodium	25	0.05 PCT		Neutron Activation
2	Sc	Scandium	25	0.5 PPM		Neutron Activation
3	Cr	Chromium	25	50 PPM		Neutron Activation
4	Fe	Iron	25	0.5 PCT		Neutron Activation
5	Co	Cobalt	25	10 PPM		Neutron Activation
6	Ni	Nickel	25	50 PPM		Neutron Activation
7	Zn	Zinc	25	200 PPM		Neutron Activation
8	As	Arsenic	25	1 PPM		Neutron Activation
9	Se	Selenium	25	10 PPM		Neutron Activation
10	Br	Bromine	25	1 PPM		Neutron Activation
11	Rb	Rubidium	25	10 PPM		Neutron Activation
12	Zr	Zirconium	25	500 PPM		Neutron Activation
13	Mo	Molybdenum	25	2 PPM		Neutron Activation
14	Ag	Silver	25	5 PPM		Neutron Activation
15	Cd	Cadmium	25	10 PPM		Neutron Activation
16	Sn	Tin	25	200 PPM		Neutron Activation
17	Sb	Antimony	25	0.2 PPM		Neutron Activation
18	Te	Tellurium	25	20 PPM		Neutron Activation
19	Cs	Cesium	25	1 PPM		Neutron Activation
20	Ba	Barium	25	100 PPM		Neutron Activation
21	La	Lanthanum	25	5 PPM		Neutron Activation
22	Ce	Cerium	25	10 PPM		Neutron Activation
23	Sm	Samarium	25	0.1 PPM		Neutron Activation
24	Eu	Europium	25	2 PPM		Neutron Activation
25	Tb	Terbium	25	1 PPM		Neutron Activation
26	Yb	Ytterbium	25	5 PPM		Neutron Activation
27	Lu	Lutetium	25	0.5 PPM		Neutron Activation
28	Hf	Hafnium	25	2 PPM		Neutron Activation
29	Ta	Tantalum	25	1 PPM		Neutron Activation
30	W	Tungsten	25	2 PPM		Neutron Activation
31	Ir	Iridium	25	100 PPB		Neutron Activation
32	Au	Gold	25	5 PPB		Neutron Activation
33	Th	Thorium	25	0.5 PPM		Neutron Activation
34	U	Uranium	25	0.5 PPM		Neutron Activation
35	WT	Test Weight	25	0.01 g		

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Geochemical Lab Report

JOB: 880 00158.0 (COMPLETE)

REFERENCE INFO:

ATTN: UNOCAL CANADA LIMITED
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SUBMITTED BY: M. GIDLOCK
DATE PRINTED: 23-FEB-88

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
PREPARED PULP	36	-200	36	As Received, No SP	36

REMARKS: PULPS FROM 017-5871,017-5871.
HIGH REE CONTENT.
ELEVATED DETECTION LIMITS ARE DUE TO EXTREMELY HIGH La,Hf,V,Th,Yb,Yb,ETC. AND TO LONG DECAY REQUIRED FOR ANALYSIS.
~~RESULTS FOR SAMPLE NOS TO ARE NOT AVAILABLE~~
DUE TO HIGH Th.
Na RESULTS ARE NOT AVAILABLE DUE TO LONG DECAY.
< MEANS LESS THAN

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Geochemical Lab Report

...: BBB-00150.0 | PROJECT: NONE | PAGE 1A

...	ELEMENT	Na	Sc	Cr	Fe	Co	Ni	Zn	As	Se	Br	Nb	Zr
...	UNITS	PCT	PPM	PPM	PCT	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM
...16		<0.05	4.9	<240	3.8	<10	<50	1100	<130	<10	<35	670	<15000
...30		<0.05	0.9	150	5.8	<10	<50	<200	<47	<10	<13	300	15000
...31		<0.05	2.6	<160	3.3	<10	<67	990	<600	<43	<170	230	<18000
...34		<0.05	2.3	<200	3.4	<10	<61	440	<850	<27	<170	310	<13000
...R 3		<0.05	<2.2	<640	3.1	<20	<140	<930	<2100	<72	<420	93	<20000
...R-4		<0.05	4.1	<620	2.9	<10	<110	<740	<1700	<62	<340	560	<10000
... 5		<0.05	3.4	<140	5.7	<10	<50	620	<79	<10	<22	520	<10000
...R-7		<0.05	4.5	180	4.3	<10	<77	<200	<1000	<30	<210	500	<30000
...R 10													
...R 12		<0.05	4.6	<160	3.1	<10	<50	610	<110	<10	<30	1220	<3400
...13		<0.05	4.3	<180	9.2	<10	<54	880	<730	<31	<150	340	<25000
...R 15		<0.05	3.8	<110	5.6	<10	<50	1400	<107	<10	<25	480	<5100
...R-30		<0.05	4.7	<270	2.9	<24	<97	<510	<1300	<40	<260	390	<3700
...R 32		<0.05	2.2	<400	1.8	<24	<99	<620	<1600	<49	<300	450	<4000
...R-34		<0.05	2.0	<170	3.7	<18	<50	690	<110	<10	<30	760	<7800
...R 35		<0.05	1.4	<62	4.7	<10	<50	490	<138	<10	<28	3770	2600
...R 36		<0.05	1.8	<220	4.8	<10	<61	340	<290	<26	<180	350	<26000
...R 37		<0.05	1.3	<250	7.9	<10	<69	760	<1000	<50	<210	140	<37000
...R 1		<0.05	5.9	<75	4.5	<10	53	600	<70	<10	<18	610	<4400
...R 11		<0.05	1.8	<96	7.6	<10	<50	640	<120	<21	<32	510	<14000
...R-25		<0.05	4.2	<63	17.0	<10	<50	710	<97	<10	<26	460	<17000
...R 3		<0.05	4.5	<140	10.0	<10	<110	<200	<440	<490	<110	100	<88100
...R 7		<0.05	8.1	<300	7.9	<10	<50	370	<220	<31	<56	240	<43000
...R 8		<0.05	6.9	<250	12.0	<27	<50	690	<150	<24	<38	490	<9200
...R-10		<0.05	10.0	<280	7.2	<29	54	530	<110	<10	<27	330	3200
...R 12		<0.05	12.0	<210	4.9	<10	<50	<200	<130	<10	<34	190	1700

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Geochemical Lab Report

UNITS: 038-00158.0 | PROJECT: NONE | PAGE 18

SAMPLE	ELEMENT	Mo	Ag	Cd	Sn	Sb	Te	Cs	Ba	La	Ce	Sm	Eu
NO.	UNITS	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM
[illegible] 16		<25	<5	<89	<1200	<0.6	<95	4	2300	1610	<2090	247.0	20
[illegible]-30		<5	<5	<34	<200	0.4	<20	<1	<100	110	<200	26.0	<2
[illegible] 31		<60	<14	<320	<2400	<2.1	<120	<2	<250	2010	<2990	480.0	43
[illegible] 34		<59	<12	<320	<2000	<1.6	<130	8	<580	2650	<3390	441.0	44
[illegible]-9		<140	<28	<790	<15000	<5.1	<440	<5	<980	19800	<21100	2330.0	231
[illegible]-4		<120	<26	<640	<10000	<4.9	<270	23	<490	10200	<15100	1740.0	170
[illegible]-5		<8	<5	<55	<1200	0.2	<20	3	<100	830	<1510	196.0	18
[illegible]-7		<50	<16	<390	<3900	<0.9	<150	14	<300	1610	<1900	288.0	40
[illegible]-10													
[illegible]-12		<18	<5	<75	<1200	<0.8	<77	77	1300	2970	<3080	303.0	24
[illegible]-13		<57	<11	<280	<1400	<1.3	<120	6	<270	943	<930	198.0	16
[illegible]-15		<10	<5	<65	<1700	0.9	<20	2	330	657	<1330	257.0	26
[illegible]-30		<75	<16	<490	<6800	<2.6	<190	34	3200	5800	<8570	1070.0	100
[illegible]-33		<96	<18	<570	<9800	<3.0	<220	35	1500	7430	<10600	1410.0	130
[illegible]-34		<16	<5	<73	<1300	0.9	<46	16	670	2150	<3240	296.0	27
[illegible]-35		<17	<5	<67	<200	2.1	<42	124	380	687	<1010	88.2	7
[illegible]-36		<64	<12	<330	<3300	<2.5	<140	<2	<260	2530	<4040	601.0	54
[illegible]-37		<100	<13	<390	<2900	<2.4	<310	<2	<290	1510	<1730	505.0	39
[illegible]-1		<9	<5	<44	<450	<0.2	<20	5	2500	519	<700	87.0	7
[illegible]-11		<11	<5	<78	<1400	<0.4	<44	5	260	400	<910	162.0	15
[illegible]-25		<25	<5	<64	540	<1.1	<120	2	110	270	<180	74.4	<2
[illegible]-3		<200	<26	<280	<500	<4.2	<1700	<4	<610	1490	<730	<150.0	9
[illegible]-7		<23	<5	<140	<2200	<1.2	<120	8	1100	9750	<12300	687.0	53
[illegible]-8		<39	<5	<91	1300	<0.5	<310	20	<380	1560	<1990	154.0	16
[illegible]-10		<13	<5	<65	<560	<0.4	<20	21	840	1330	<1270	105.0	12
[illegible] 12		<12	<5	<83	<2300	0.8	<45	9	2500	3640	<4420	407.0	39

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Geochemical Lab Report

: GRJ-00158.0 | PROJECT: NONE | PAGE 10

ELEMENT	Tb	Yb	Lu	Hf	Ta	W	Ir	Au	Th	U	WT
UNITS	PPM	PPM	PPM	PPM	PPM	PPM	PPB	PPB	PPM	PPM	g
16	52	250	<34.0	231	12	<540	<100	<51	2170.0	85.3	14.20
30	5	14	2.4	257	<1	<170	<100	<17	56.1	5.4	14.62
31	90	230	<34.0	422	87	<4500	<100	<160	1720.0	220.0	14.54
54	111	270	<32.0	250	55	<4400	<100	<120	1630.0	201.0	14.22
3	564	758	<74.3	73	35	<11000	<320	<390	6420.0	532.0	13.78
4	400	755	<76.0	212	20	<8700	<250	<320	5400.0	212.0	11.93
6	43	150	<22.0	200	11	<340	<100	<23	305.0	46.0	12.13
7	153	838	<115.0	610	119	<5200	<100	<130	33.0	32.0	13.62
10											
12	40	140	<16.0	36	7	<460	<100	<45	1790.0	103.0	12.22
13	48	290	<44.0	462	69	<3500	<100	<130	1940.0	63.8	13.90
15	65	130	<16.0	67	29	<440	<100	<26	301.0	61.4	12.13
30	277	548	<61.1	13	2	<6900	<100	<180	1680.0	24.0	9.47
32	365	720	<75.6	<7	4	<8000	<220	<210	3150.0	71.9	11.57
34	55	150	<19.0	100	19	<490	<100	<31	1110.0	80.3	11.22
35	15	41	6.0	40	3	<370	<100	<37	353.0	10.0	8.05
36	115	200	<27.0	442	38	<4500	<100	<130	2050.0	124.0	14.39
37	116	380	<44.0	541	37	<5100	<100	<210	5330.0	188.0	14.16
1	15	38	<5.2	69	9	<290	<100	<23	405.0	27.0	12.44
11	46	140	<19.0	225	50	<530	<100	<38	240.0	38.0	11.48
25	2	89	<8.3	314	7	<350	<100	<46	3420.0	62.4	14.98
2	6	110	<40.0	1100	938	<1900	<100	<140	107.0	2910.0	11.29
7	88	200	<26.0	749	72	<890	<100	<58	922.0	254.0	11.45
8	49	190	<21.0	170	59	<640	<100	<48	1030.0	412.0	10.29
10	29	160	20.0	56	13	<460	<100	<34	775.0	16.0	10.45
12	92	250	20.0	6	1	<610	<100	50	237.0	8.9	13.71

I

1985 SURFACE ROCK SAMPLES

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RT: 025-2190 (COMPLETE)

REFERENCE INFO:

ENT: UNION OIL COMPANY OF CANADA LTD.
JECT: KIPAWA YTTRIUM

SUBMITTED BY: A. KNOX
DATE PRINTED: 14-NOV-85

ORDER	ELEMENT	NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	V Vanadium	3	2 PPM	MULT ACID TOT DIG	Atomic Absorption

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
R ROCK OR BED ROCK	3	2 -150	3	AS RECEIVED, NO SP	3

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INVOICE TO: MR. A. W. KNOX

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NOV 19 1985
FILE: Kipawa Yttrium
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T: 025-2190

PROJECT: KIPAWA YTTRIUM PAGE 1

LE	ELEMENT	V
SP	UNITS	PPM
	KKR-2	30
	KKR-5	19
	KKR-9	17

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FILE: Kipawa Yttrium Geochemical M85-002

REPORT: 125-2190 (COMPLETE)

REFERENCE INFO:

CLIENT: UNION OIL COMPANY OF CANADA LTD.
PROJECT: KIPAWA YTTRIUM

SUBMITTED BY: A. KNOX
DATE PRINTED: 4-SEP-85

ORDER	ELEMENT	NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Ufl Uranium,fluorometric	13	0.2 PPM	HNO3	Fluorometric
2	Be Beryllium	13	0.5 PPM	MULT ACID TOT DIG	Atomic Absorption
3	Zr Zirconium	13	5 PPM		X-RAY Fluorescence
4	Zr SQ Zirconium Semi-Quant	7	0.1 PCT		X-RAY Fluorescence
5	Ce Cerium	13	5 PPM		X-RAY Fluorescence
6	Ce Cerium Semi-quant	1	1.0 PCT		X-RAY Fluorescence
7	Y Yttrium	13	5 PPM		X-RAY Fluorescence
8	Y Yttrium Semi-quant	1	1.0 PCT		X-RAY Fluorescence
9	Th Thorium	13	1 PPM		X-RAY Fluorescence

SAMPLE TYPES	NUMBER	SIZE FRACTIONS	NUMBER	SAMPLE PREPARATIONS	NUMBER
R ROCK OR BED ROCK	13	2 -150	13	CRUSH,PULVERIZE -150	13

NOTES: = indicates SEE OBS REMARKS

REMARKS: Y - INTERFERENCE NOTED DUE TO Zr.

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REPORT: 125-2190

PROJECT: KIPAWA YTTRIUM PAGE 1

SAMPLE NUMBER	ELEMENT UNITS	Ufl PPM	Be PPM	Zr PPM	Zr SQ PCT	Ce PPM	Ce PCT	Y PPM	Y PCT	Th PPM
R2 85 KKR-1		57.0	51.0	>10000	1.2	800		1650		2401
R2 85 KKR-3		20.0	26.0	>10000	1.2	340		540		425
R2 85 KKR-4		89.0	55.0	950		5600		1330		1278
R2 85 KKR-6		75.0	24.0	>10000	1.2	970		1200		3363
R2 85 KKR-7		220.0	29.0	230		>10000	1.9	10000		6897
R2 85 KKR-8		350.0	35.0	>10000	5.9	1000		800=		>20000
R2 85 KKR-10		76.0	37.0	>10000	1.0	1800		3100		480
R2 85 KKR-11		78.0	20.0	>10000	1.7	1700		5700		2238
R2 85 KKR-12		52.0	48.0	8200		4300		6700		178
R2 85 KKR-13		32.0	32.0	>10000	4.5	3800		>10000	1.4	86
R2 85 KKR-14		38.0	14.0	8100		7800		1900		538
R2 85 KKR-15		15.0	32.0	7700		215		400		60
R2 85 KKR-16		1.0	17.0	1000		160		135		20

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FILE: Kipawa Yttrium Geochemical M#55002

REPORT: 225-2190 (COMPLETE)

REFERENCE INFO:

CLIENT: UNION SILICA COMPANY OF CANADA LTD.

SUBMITTED BY: As-KNOX
DATE PRINTED: 5-SEP-85

ORDER	ELEMENT	NUMBER OF ANALYSES	LOWER DETECTION LIMIT	EXTRACTION	METHOD
1	Al203 Alumina (Al203)	3	0.01 PCT	MULT ACID TOT DIG	D.C. Plasma
2	CaO Calcium (CaO)	3	0.01 PCT	MULT ACID TOT DIG	D.C. Plasma
3	Fe203t Total Iron (Fe203)	3	0.01 PCT	MULT ACID TOT DIG	D.C. Plasma
4	K2O Potassium (K2O)	3	0.01 PCT	MULT ACID TOT DIG	D.C. Plasma
5	MgO Magnesium (MgO)	3	0.01 PCT	MULT ACID TOT DIG	D.C. Plasma
6	MnO Manganese (MnO)	3	0.01 PCT	MULT ACID TOT DIG	D.C. Plasma
7	Na2O Sodium (Na2O)	3	0.01 PCT	MULT ACID TOT DIG	D.C. Plasma
8	SiO2 Silica (SiO2)	3	0.01 PCT	MULT ACID TOT DIG	D.C. Plasma
9	TiO2 Titanium (TiO2)	3	0.01 PCT	MULT ACID TOT DIG	D.C. Plasma
10	Ufl Uranium,fluorometric	3	0.2 PPM	HNO3	Fluorometric
11	Totals WHOLE ROCK TOTALS	3	0.01 PCT		
12	Li Lithium	3	1 PPM	HF-H2SO4-HCL	Atomic Absorption
13	Rb Rubidium	3	5 PPM		X-RAY Fluorescence
14	Sr Strontium	3	5 PPM		X-RAY Fluorescence
15	Zr Zirconium	3	5 PPM		X-RAY Fluorescence
16	Zr SQ Zirconium Semi-Quant	1	0.1 PCT		X-RAY Fluorescence
17	Nb Niobium	1	5 PPM		X-RAY Fluorescence
18	La Lanthanum	3	5 PPM		X-RAY Fluorescence
19	Ce Cerium	3	5 PPM		X-RAY Fluorescence
20	Y Yttrium	3	5 PPM		X-RAY Fluorescence
21	Th Thorium	3	1 PPM		X-RAY Fluorescence
22	Ta Tantalum	3	3 PPM		X-RAY Fluorescence

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Geochemical Lab Report

PROJECT: 225-2190

PROJECT: KIPAWA YTTRIUM PAGE 1A

SAMPLE #	ELEMENT UNITS	Al2O3 PCT	CaO PCT	Fe2O3* PCT	K2O PCT	MgO PCT	MnO PCT	Na2O PCT	SiO2 PCT	TiO2 PCT	Ufl PPM	Totals PCT		Li PPM
85 KKR-2		5.00	10.30	11.30	1.90	5.80	0.70	5.40	53.20	0.60	47.0	95.30	97.52	249
85 KKR-5		9.80	5.20	6.50	3.10	6.70	0.19	6.00	57.00	0.35	6.0	96.12	96.51	1035
85 KKR-9		8.90	3.40	13.60	3.20	0.95	0.35	6.40	56.30	0.75	53.0	94.10	95.46	142

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REPORT: 225-2190 | PROJECT: KIPAWA YTTRIUM | PAGE 18

SAMPLE NUMBER	ELEMENT UNITS	Rb PPM	Sr PPM	Zr PPM	Zr SG PCT	Nb PPM	La PPM	Ce PPM	Y PPM	Th PPM	Ta PPM
92 85 KKR-2		280*	175	>10000	1.2	*	355	765	1500*	1170	29
92 85 KKR-5		245	87	1950		11	195	390	225	110	7
92 85 KKR-9		470*	110	8650		*	230	500	780*	1940	14

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Geochemical Lab Report

REPORT: 325-2190

PROJECT: KIPAWA YTTRIUM PAGE 1B

SAMPLE NUMBER	ELEMENT UNITS	P2O5 PCT	LOI PCT	
85 KKR-2		0.25	0.85	1.1 + 97.52 = 98.62
85 KKR-5		0.63	0.65	1.28 + 96.81 = 98.09
85 KKR-9		0.12	0.13	0.25 + 95.66 = 95.91

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REPORT: 325-2190

PROJECT: KIPAWA YTTRIUM PAGE 1A

SAMPLE NUMBER	ELEMENT UNITS	Cu PPM	Pb PPM	Zn PPM	Mo PPM	Ag PPM	Ni PPM	Co PPM	Cd PPM	Ba PPM	Sb PPM	Sn PPM	Cs PPM
[illegible] 85 KKR-2		1	300	40	1	<0.2	4	<1	0.2	180	<2	200	<5
[illegible] 85 KKR-5		2	210	120	6	<0.2	2	<1	0.2	280	<2	94	<5
[illegible] 85 KKR-9		6	560	63	17	<0.2	2	<1	0.4	180	<2	265	<5

APPENDIX III

OPERATIONS REPORT

1990 EXPLORATION PROGRAM

KIPAWA YTTRIUM-ZIRCONIUM PROPERTY, QUEBEC

Prepared for

UNOCAL CANADA LTD.

AND

MOLYCORP INC.

BY

J.F. ALLAN MINERAL CONSULTANTS LTD.

CALGARY, ALBERTA

MARCH 1991

91 APR -3

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DE GESTION DES LOIS
QUÉBEC

ENERGIE ET RESSOURCES - SECTEUR MINES
REÇU
20 MAR 1991
BUREAU RÉGIONAL
ROUYN-NORANDA

Ministère de l'Énergie et des Ressources
Division des données géoscientifiques
DATE 20 AOUT 1991
NO G.M. 050480

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INTRODUCTION

Molycorp Inc. decided in early 1990 to continue exploration on the Kipawa yttrium-zirconium property and to explore other exploration targets previously identified in the alkalic intrusive complex hosting the Kipawa deposit.

The 1990 Kipawa program was conducted in four phases:

a) Trenching, channel sampling and geological mapping of the Main Zone at Kipawa.

b) Prospecting and sampling of other target areas previously identified by Unocal in the Kipawa peralkaline complex.

c) Bulk sampling of the Main Zone.

d) Diamond drilling of the Main Zone and PB Zone, a new yttrium-zirconium zone discovered by Unocal in 1989 and subsequently better defined by surface prospecting in 1990.

This report describes in some detail the operations on these phases.

PHASE 1 - TRENCHING

The trenching program in the Main Zone, which commenced on June 2nd, was staffed by four labourers and a cook from Exploration Services, an exploration service company based in Rouyn-Noranda, Quebec, and a contract geologist, Gerard Meusy, from Ottawa. The program was supervised by J.F. Allan.

An Hitachi UH-O7 backhoe with a one cubic yard bucket was contracted by Exploration Services from Framboise, a company in Rouyn, to dig the trenches. The backhoe and a Bombardier muskeg tractor, which was used to haul fuel, equipment and field supplies, were walked into the property over a skidder trail from the nearest serviceable truck road, a distance of 7.5 km. The exploration camp was mobilized from, and demobilized to, Kipawa by fixed-wing aircraft and the camp was serviced from Temiscaming by truck to Red Pine Chutes and by boat from there to the camp.

Trench sites were located and the trees over the trench sites were cut down and sawn into short lengths. Three men were needed to shovel dirt from the bedrock surface as the backhoe advanced. In this way, the backhoe did not get too far ahead of the clean-up crew in the event that it had to be called back to remove excess dirt that might still remain in depressions in the bedrock surface. Dirt from the trench was piled along one side of the trench so that it could be easily filled in later with a small bulldozer. Trenches averaged about 6 metres wide. The trenches were then washed by the labourers and geologically mapped at a scale of 1:200 by the contract geologist. A radiometric profile was also produced for each trench. Washing was conducted with fire hoses connected to a Homelite 2.5" pressure pump operating at 90 PSI.

Excessive distance to a water supply necessitated two stage pumping for some of the trenches. Mapping procedures were the same as those commonly used to map underground mine workings. In preparation for mapping, turning points were established in each trench and tied into the existing grid system.

After the mapping was completed the geologist marked intervals for sampling with a paint bomb in the bottom of the trench. A suite of representative hand-specimens were also collected during the mapping phase. Two Stihl quick-cut diamond saws were used to cut channel samples 1.5" wide by 1.5" deep. The samples were then chipped out of the saw cuts with a cold chisel and hammer and bagged. Except for a few exceptions, individual samples were 2 metres in length. The geologist placed assay tags in the sample bags at the sample sites and tied the bags. The samples were packed for shipping at the camp and sent to Bondar-Clegg in Ottawa for yttrium and zirconium analysis.

Trenching was very successful in exposing bedrock as overburden was generally thin in the trenched area. Three trenches, 9, 12 and 13 could not be completed to their proposed length because of thick overburden. Thirteen trenches, ranging from 83 to 157 metres in length and totalling 1,412 lineal metres, were excavated between grid lines 11+00E and 26+00E in 15 days. 663 lineal metres of channel samples, totalling 338 individual samples were collected for assay from the trenches. Two crews were used to sample the trenches. One sampling crew, consisting of 2 men, was able to cut and bag 34 samples (68 metres) per day.

During the trenching program, J.F. Allan prospected for outcrops and re-mapped and sampled other known outcrops around the margins of the Main Zone to obtain a better understanding of the geological setting of the mineralization in the Main Zone. He also reconnaissance mapped

the trenches to verify the more general geological observations and interpretations of the contract geologist. Dave Partridge, a mining engineer with Molycorp, visited the Kipawa property on June 26th to view the location of, and access to, the property prior to preparing a memo on the possible economics of a mining operation on the property.

A topographic survey of the northwestern portion of the Main Zone was also conducted by Allan and Meusy along grid lines using a hand-held Abney level and a chain.

This program was completed on July 5th and the camp moved out on July 6th.

PHOTO 1: KIPAWA TRENCHING CAMP

PHOTO 2: BACKHOE EXCAVATING TRENCH 3

PHOTO 3: TRENCH 3 BEFORE WASHING

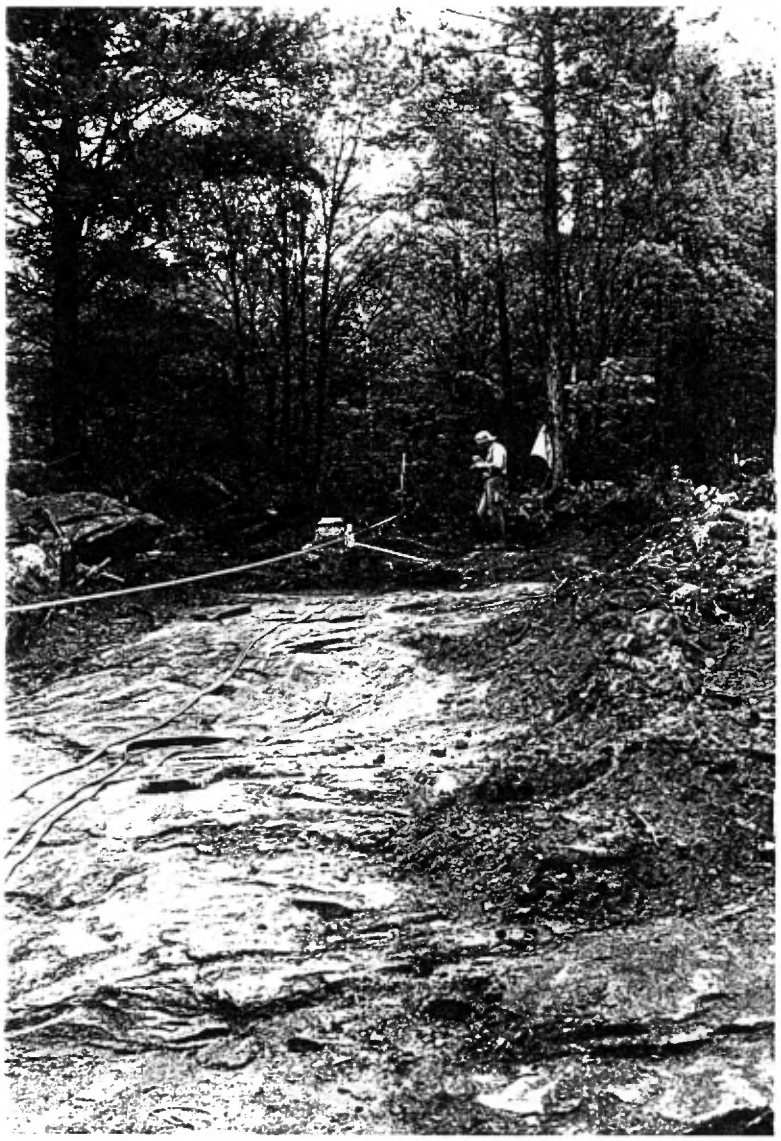

PHOTO 4: MAPPING, TRENCH 2

PHOTO 5: CUTTING A CHANNEL SAMPLE, TRENCH 6

PHOTO 6: CHANNEL SAMPLING, TRENCH 6

PHOTO 7: SKIDDER ROAD, MAIN ZONE

PHOTO 8: FULL SAMPLE BAGS AT 2 METER INTERVALS, TRENCH 7

PHOTO 9: TRENCH 12

PHASE II - PROSPECTING

Alex Knox was contracted to conduct follow-up prospecting on other exploration targets in the Kipawa peralkaline complex under the overall supervision of J.F. Allan. Knox's field assistant was contracted from Exploration Services. Knox conducted his exploration from a fly camp located on the Kipawa River near Sairs Lake and from Unocal's trenching camp on Sheffield Lake. Knox used a boat and motor rented from Air Kipawa for transportation. His fly camp was mobilized from, and demobilized to, Kipawa by fixed-wing aircraft.

The prospecting program started on June 2nd and terminated on July 6th. During the period, Knox prospected airborne radiometric anomalies outlined by Unocal in 1989 around the margins and within the Kipawa peralkaline complex in the Sheffield Lake-Sairs Lake-Kipawa River area. He also conducted more detailed prospecting around a cobble of massive britholite discovered near the Kipawa River by Marc Gidluck in the fall of 1989.

Eight additional claims were staked by Exploration Services personnel to cover the location of a number of radioactive boulders discovered by Knox in the Sairs Lake area. These claims tie on to Unocal's main claim block.

Two small grids, consisting of two baselines and a number of crosslines were cut by an Exploration Services crew from the trenching program over the britholite discovery (PB Zone) and an adjacent field of radioactive syenite boulders (PS Zone) about 4 km southeast of the Sheffield Lake campsite. This grid was used by Knox to map the location of radioactive boulders in these areas.

PHASE III - BULK SAMPLING

Two exploration technicians were contracted from Exploration Services to collect six bulk samples from the Main Zone at Kipawa under the onsite supervision of J.F. Allan during the period August 17th to August 28th.

Allan and the technicians rented a cabin at McKenzie Camp, about 14 km from the Main Zone on the Kipawa property, and commuted daily from the camp to the property by boat. Six bulk sample sites were marked on bedrock in the bottom of the trenches and two gas pluggers (Cobras) were used to drill blast holes. The blast holes varied from 0.6 to 1 metre deep and were spaced about 0.5 metres apart. Rock chips from each blast hole were collected and shipped to Molycorp in Denver for assay. An explosives expert was hired from Temiscaming (Earl's Blasting) to load and blast the bulk sample holes. Holes were loaded with 50% forcite and blasted electrically. About two cases of dynamite were used for the bulk samples.

Blasted rock was loaded into double fibre grain sacks. Each sack was loaded with 50-90 lbs. of rock. Eleven sacks of rock were collected at each of the four main bulk sample sites and five sacks from each of the two other bulk sample sites.

A three-wheeled all-terrain Honda motorbike and trailer were used to haul the bulk sample bags from the sample sites to the campsite on Sheffield Lake. Sacks containing the four bulk samples to be tested were taken by boat to Red Pine Chutes, by truck to Temiscaming and then shipped by commercial truck line to Bondar-Clegg Laboratories in Ottawa. The samples

were crushed to -2 inches by Bondar-Clegg, loaded into metal pails and shipped to Mountain States R&D in Vail, Arizona for metallurgical testing.

Sacks containing the two other bulk samples were stored on the property until the end of the fall drilling program and then moved to storage in North Bay.

Twenty-two additional mineral claims were also staked during this phase to cover the western strike extension of a possible yttrium zone represented by the britholite boulder train on the Kipawa River and to cover radioactive boulders with anomalous yttrium values discovered by Knox in June, east of the KR Zone. These claims adjoin Unocal's main Kipawa claim block.

A helicopter pad was also cut in the britholite boulder zone in preparation for drilling in the fall.

PHOTO 10: DRILLING BULK SAMPLES SITE 3, TRENCH 11

PHOTO 11: DRILLING BULK SAMPLE SITE 2, TRENCH 8

PHOTO 12: DRILLING BULK SAMPLE, SITE 1 TRENCH 2

PHOTO 13: LOADING DYNAMITE INTO PLUGGER HOLES, BULK SAMPLE SITE 1

PHOTO 14: PERCUSSION SAMPLES FROM PLUGGER HOLES, BULK SAMPLE SITE a

PHOTO 15: LOADING DYNAMITE IN PLUGGER HOLES, BULK SAMPLE SITE 3

PHOTO 16:
BLASTING
BULK SAMPLE
SITE 1

PHOTO 17:
BULK SAMPLE
SITE 1
AFTER BLAST

PHOTO 18:
BLASTING
BULK SAMPLE
SITE 5,
TRENCH 11

PHOTO 19:
BULK SAMPLE
SITES 3 AND 5
AFTER BLAST

PHASE IV - DRILLING

General

A contract for a minimum of 4,000 feet of diamond drilling was awarded to Forage Hoskings Inc. of Rouyn, Quebec, on September 4th.

The drilling crew consisted of two runners, one of which was a runner-foreman, two helpers and a cook. The drill operated on two 12-hour shifts, seven days a week.

Other personnel contracted for the program included two exploration technicians from Exploration Services in Rouyn and a contract geologist, Gerard Meusy. The project was supervised by J.F. Allan.

Unocal's contract personnel stayed at the drill camp and were charged on a per meal basis by the drill contractor.

An office tent, core logging tent, hydraulic core splitter, chain saws and a canoe were rented from Exploration Services. A drill hole radiometric logging unit was rented from Uranerz Mining in Saskatoon.

One diamond drill and the drilling camp were mobilized from Rouyn-Noranda to the property from September 6th to 11th. A wide pad D-6 Caterpillar was contracted from Hoskings for six days to improve the skidder road into the property and to assist the drillers in moving their drill camp, consisting of two sleeping shacks and one cook-shack on skids, into the Sheffield Lake

campsite. Before being moved to the property, the drill, a Boyle's Brothers Model 27A, was dismantled for helicopter transport into parts weighing a maximum of 1200 lbs. in Rouyn. It was then trucked to the beginning of the skidder road. Other equipment and supplies shipped from Rouyn included fuel, drill rods, core boxes, water lines, pumps, a generator for the camp, a mobile metal sloop-mounted drill shack, a metal sloop for moving drill rods, two boats, and two skidders, including a large 450 Timberjack.

The drill, drilling equipment, fuel and core boxes were flown by Hughes 500D helicopter to the first drill site in the britholite boulder zone (PB Zone) on September 11th. The water pump was flown to a site on the Kipawa River near the first drill site. A 14 ft. aluminum boat with a 30 HP motor, to service the drill in this zone, was also slung by helicopter over the rapids (Chutes Enragees) on the Kipawa River.

The drill was assembled on the first drill site and the first hole was collared on September 12th. The drillers commuted between the drill camp, Sheffield Lake and the PB Zone by two boats, one located below the rapids and the other above the rapids.

Five holes, totalling 457 metres, were drilled from four sites in the PB Zone. Production averaged 57.5 metres per day. As the terrain was fairly flat and the moves short, the drill was moved between sites by the drill winch. The first move was the most difficult and took about twelve hours to complete. The last move, which was done at night, went much more smoothly and took five hours to complete.

Two contract personnel from Exploration Services cleared trees for the drill moves and drill sites in the PB Zone, assisted with the drill moves, moved the drill core from the PB Zone to

camp by boat and split the drill core. They also cut all felled trees into short lengths as required by Forestry regulations.

A number of drill rods were broken when the hard basement gneiss was intersected. Apparently the drill was twisted off-line by the pressure required to penetrate these hard rocks and as a result the rod string was sheared near the top of the hole. Better anchoring of the drill to the ground during the initial set-up would probably have prevented this problem.

The drill was disassembled on the last site and the helicopter returned on September 21st to move the drill and equipment from the PB Zone to the Main Zone. The drill crew took a three-day break and then returned to reassemble the drill in a mobile drilling unit on September 24th. The first hole was collared in the Main Zone on September 25th.

Drilling in the Main Zone was conducted by the mobile drilling unit which was moved by skidder. Drill sites and drill access roads were also prepared by skidder. A wheeled skidder was found to be more suitable for moving the drill than a bulldozer, as large boulders, which are numerous on the property, are extremely hard on the tracks of a bulldozer and occasionally the track is knocked off by a boulder. (Photo 25).

Water for drilling was obtained from the two sumps excavated by the backhoe during the trenching program.

A CB radio was set up for communication between the camp and the drill when the drill moved to the Main Zone. The driller could then call the geologist just before the hole was completed. The driller would take an acid test as soon as the hole was finished to measure the inclination

at the bottom of the hole. This test would be completed about the time the geologist arrived at the drill to radiometrically log the hole. This procedure minimized the stand-by time for the drill and drill crew.

After a number of drilling problems, including numerous equipment break-downs, many due to carelessness and poor drilling practice by one drilling crew, an unacceptable amount of ground core in one hole, and careless core handling procedures by one of the drill helpers, we had a meeting on the property on September 30th with Michel Bourque, one of the senior people in Hosking's drilling. He agreed to replace one of the drilling crews and put a senior non-drilling foreman on the property for the remainder of the job. Drilling production improved noticeably after this change was made.

Twenty-two holes, totalling 1074 metres were drilled in the Main Zone between September 25th and October 10th. Production averaged 57.5 metres per day during the first eight days and 80.4 metres per day for the last eight days. Hole penetration rates were high in the calc-silicate/syenite unit and lower in the peralkaline gneiss and basement gneiss units. The amount of drilling footage obtained from drill bits was also much less in the harder rock.

Proposed drill holes were located and marked in the field by J.F. Allan. Stakes marking the backsite (one stake) and foresite (two stakes) for inclined holes were also placed. Holes varied from vertical to -50° in inclination and from 38-100 metres in length.

BQ core was recovered from holes in the PB Zone and NQ core from holes in the Main Zone. Core recoveries, except for one bad drilling shift, were generally good - averaging about 98%.

An acid test was taken at the bottom of every hole, except one, to measure its inclination and all holes, except one, were radiometrically logged inside the drill pipe with a hand- cranked Mount Sophris 1000-C drill hole radiometric logging unit with a standard G375 probe. One acid test failed because of poor acid and a faulty cork and one hole could not be radiometrically logged because of a dead battery in the radiometric logging unit.

As it was assumed that the azimuth of the inclined drill holes would not deviate very much down hole, because of their short length and relatively thin overburden, no down- the-hole directional surveys, such as a tropari survey, were conducted.

Drill hole casing was pulled just before the drill moved to a new location. All drill holes were marked by a wooden post inserted into the collar of the drill hole. A metal tag, labelled with the hole number, was attached to the post.

All felled trees at the drill sites and along drill access roads were cut into short lengths by the technicians.

J.F. Allan and a technician conducted a topographic survey with a chain and hand-held Abney level in the southeast portion of the Main Zone, near the end of the drilling program, on grid lines cut and brushed out by the technicians.

The weather during the drilling program was quite wet; it rained on twelve days (part or most of each day) out of thirty days and snowed one morning (October 9th).

Drilling was completed on October 10th and the drill and drill camp were moved from the property on October 11th and 12th.

Core Handling

The drill core was set out in core boxes by the drill helper. As the drillers were using 10 ft. rods and a 10 ft. core barrel, all depths were recorded in feet. A wooden block was placed in the core box at the end of every core run (generally 10 ft.) and labeled with the depth in feet. The core was logged and sampled in the field in feet and these measurements were later converted to metres. All drill hole depths reported by the drillers were measured from the top of the casing, which ranged from 0.5 to 2 metres above ground surface. All other down-the-hole data e.g. directional surveys and radiometric logs, had to be calibrated to this reference point.

All drill core was geologically logged and the radioactivity measured with a hand-held SPP-2NF scintillometer by Gerard Meusy. J.F. Allan also check-logged the core in a more cursory manner.

Meusy marked the intervals for sampling on the core. The core was then split by a technician with a hydraulic core splitter and the split samples were bagged, labeled and packed in pails for shipment to the assay laboratory. The drill core was sampled in 5 ft. (1.56 metres) lengths except at main lithologic contacts where the sample interval was adjusted to start and end at the contact. After splitting the core, the technician attached a dynotape metal tag, labeled with hole number, core box number and footage interval, to each core box and packed the boxes so that they could be transported from the property without any core loss.

The drill core was transported to North Bay at the end of the program in a 5-ton rental truck. Both this drill core and drill core from the 1988 drilling program are stored in a rented mini-storage shed in North Bay (Photo 44). Pulps and rejects of all assay samples from the 1990 Kipawa programs are stored in Bondar-Clegg's laboratory in Ottawa.

Initial Data Interpretation

Drill holes were plotted on 1:500 scale maps and sections in the PB Zone and West Main Zone and on a 1:1000 scale map and sections in the East Main Zone immediately after they were logged. Geological interpretations were updated on a hole-by-hole basis on these maps and sections. The locations of proposed holes were sometimes changed on the basis of the geological interpretation made on these working maps and sections.

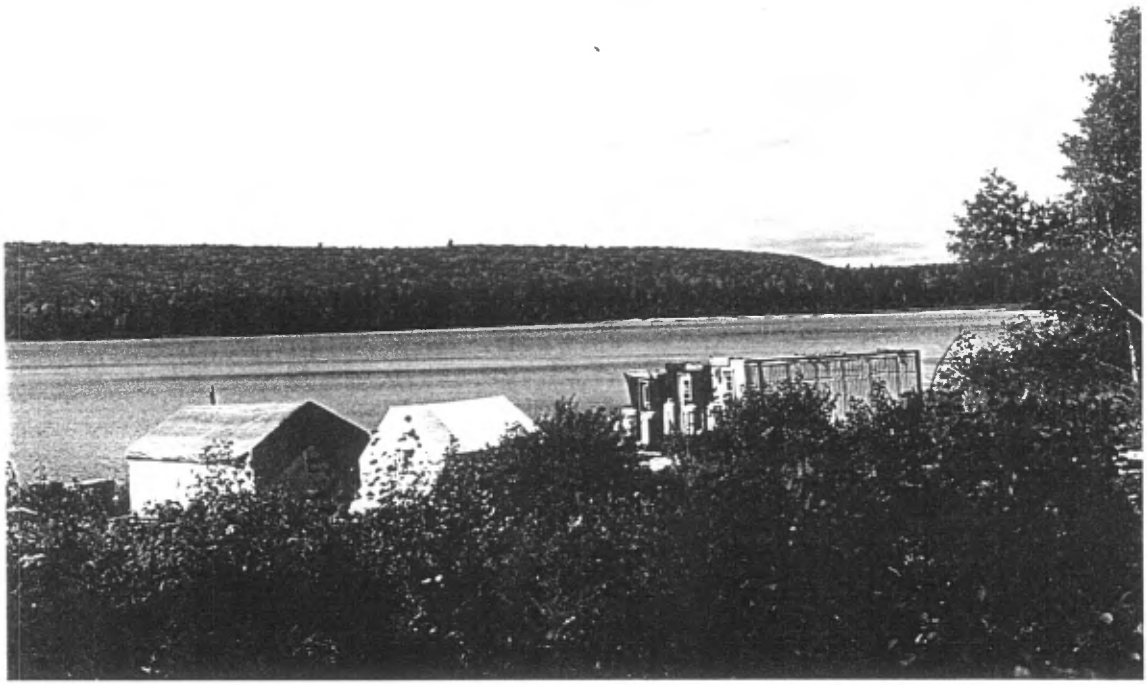

PHOTO 20: KIPAWA DRILL CAMP

PHOTO 21: COOK SHACK AND SLEEPING SHACK

PHOTO 22: CORE TENT AND OFFICE TENT

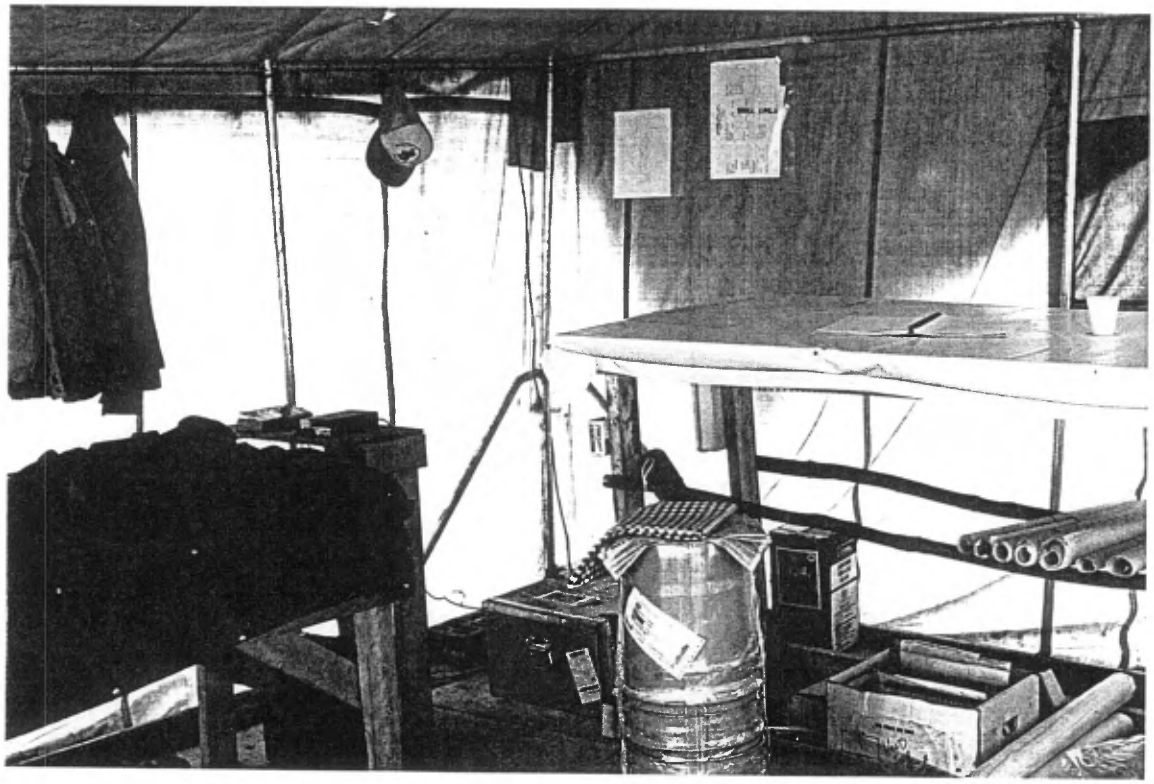

PHOTO 23: INSIDE OFFICE TENT. NOTE CB
RADIO TO COMMUNICATE WITH DRILL AT HEAD OF BED

PHOTO: 24
UPGRADING
SKIDDER ROAD
INTO DRILL
AREA

PHOTO 25:
REPAIRING
THROWN TRACK
ON D-6 WIDE
PAD CATERPILLAR

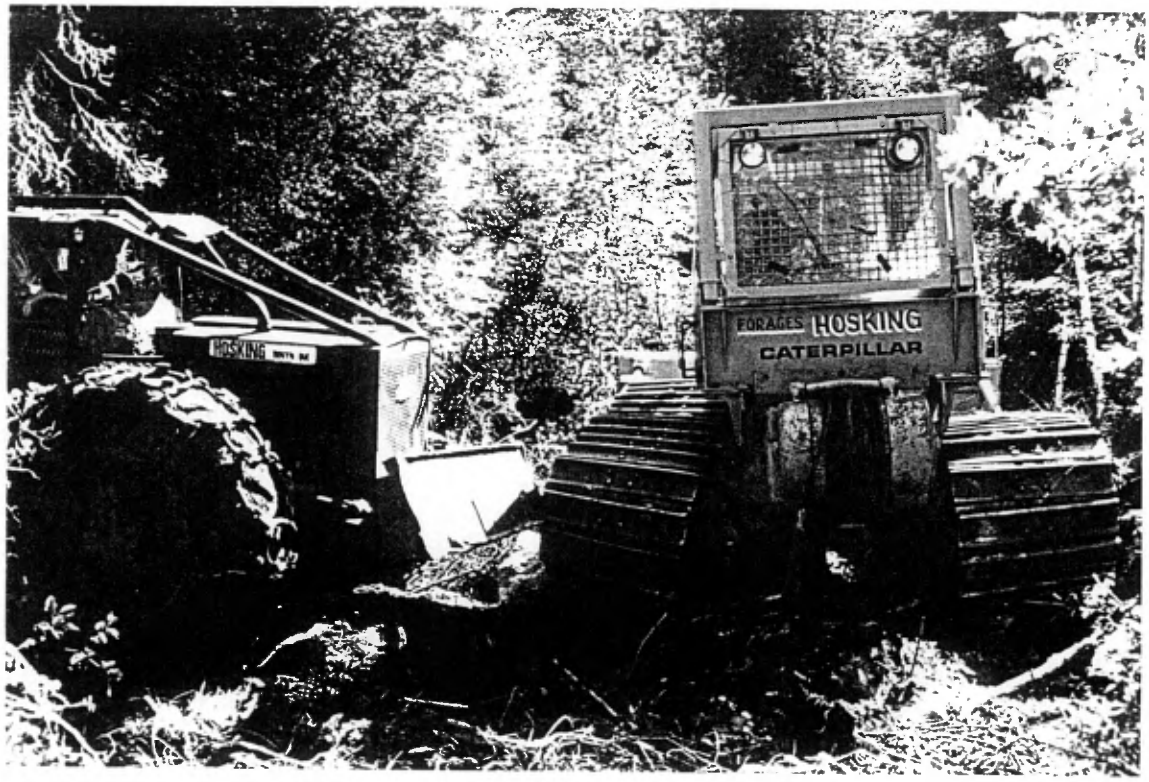

PHOTO 26: HUGHES 500D HELICOPTER USED TO SLING DRILL TO PB ZONE

PHOTO 27: BOYLES 27A DIAMOND DRILL DISASSEMBLED FOR SLINGING

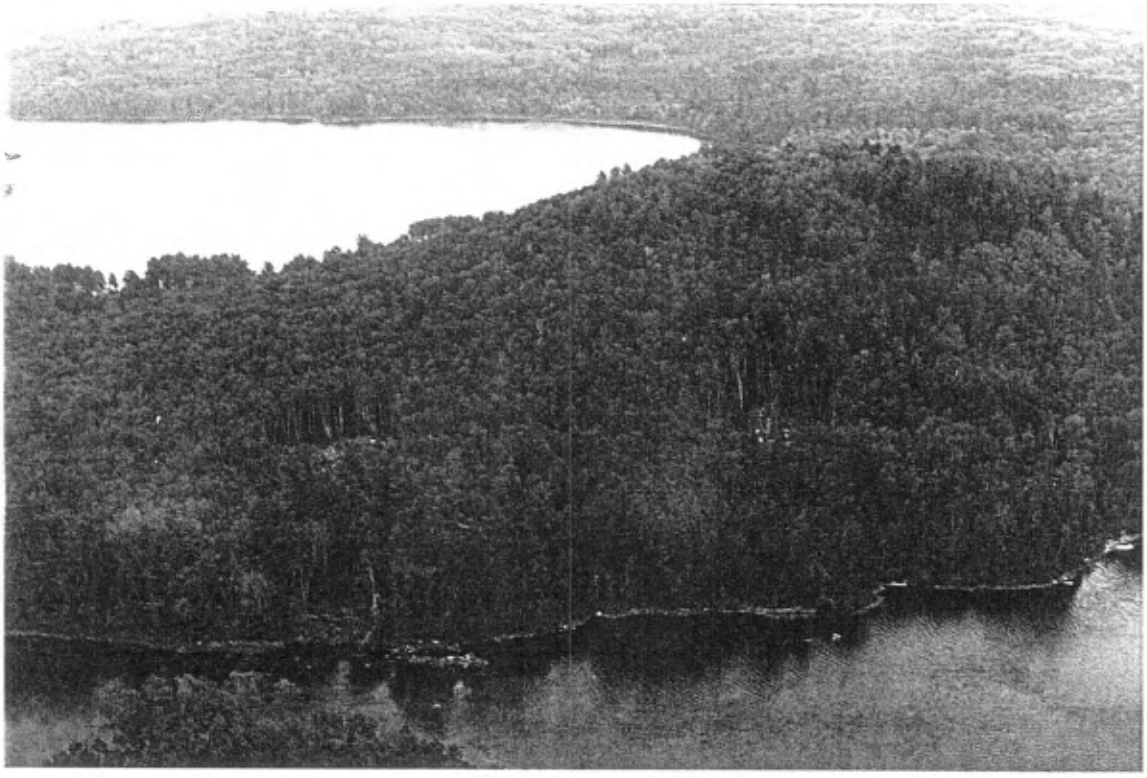

PHOTO 28: PB ZONE DRILL AREA LOOKING SOUTH.
DRILL SITE 1 ON RIGHT AND KIPAWA RIVER AT BOTTOM OF PHOTO

PHOTO 29: PB ZONE DRILL AREA LOOKING NORTH. DRILL SITE 1 ON LEFT
AND FIRST RAPIDS ON KIPAWA RIVER AT TOP OF PHOTO

PHOTO 30:
SLINGING DRILL
BASE FROM
GRAVEL PIT TO
PB ZONE

PHOTO 31:
ASSEMBLING DRILL
AT DRILL SITE 1,
PB ZONE

PHOTO 32:
SLINGING
DRILL PARTS
INTO SITE 1,
PB ZONE

PHOTO 33:
DRILL ASSEMBLED
ON SITE 1,
PB ZONE

PHOTO 34: DRILL SETUP, HOLE 1 PB ZONE

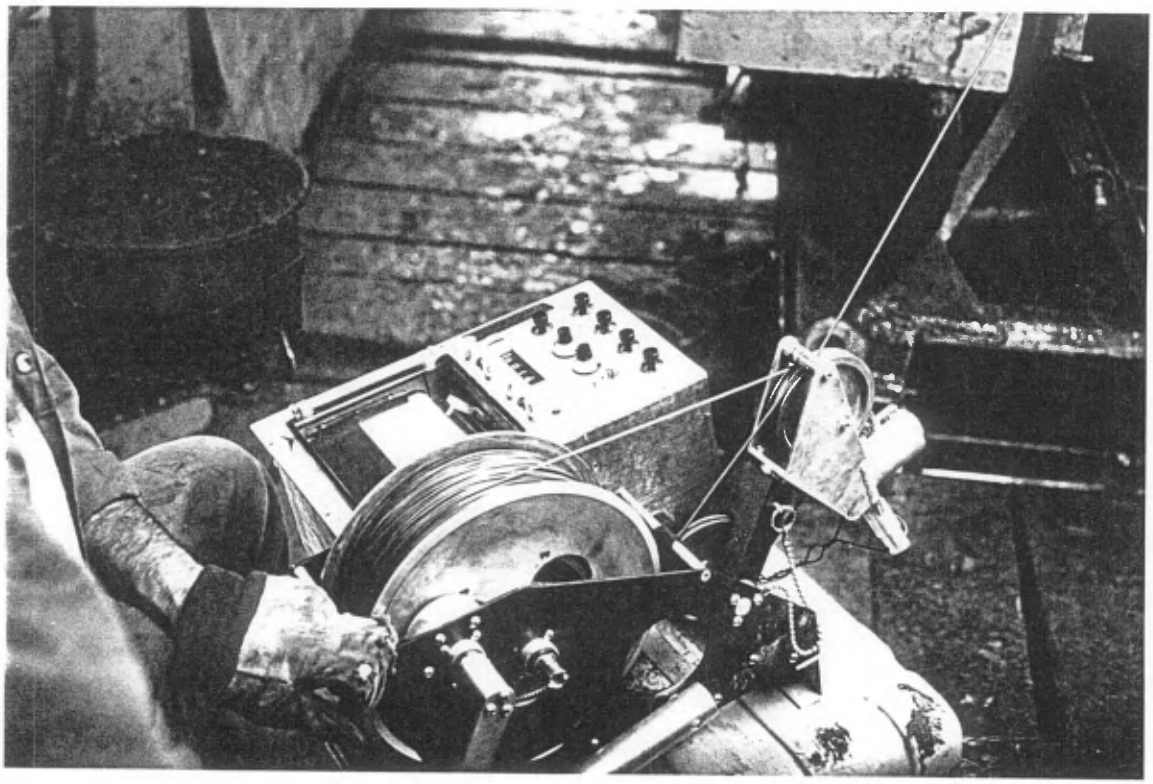

PHOTO 35: MOUNT SOPHRIS MODEL 1000C DRILL HOLE RADIOMETRIC LOGGING UNIT

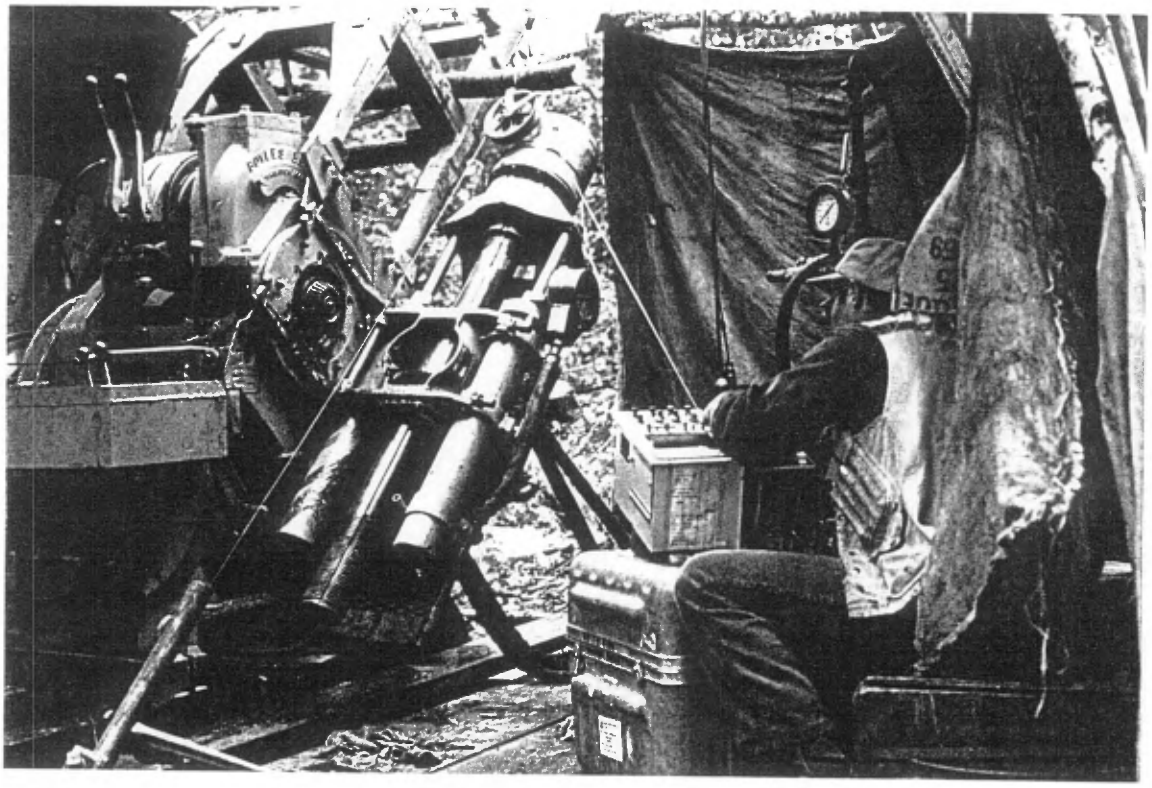

PHOTO 36: RADIOMETRIC LOGGING IN HOLE 2, PB ZONE

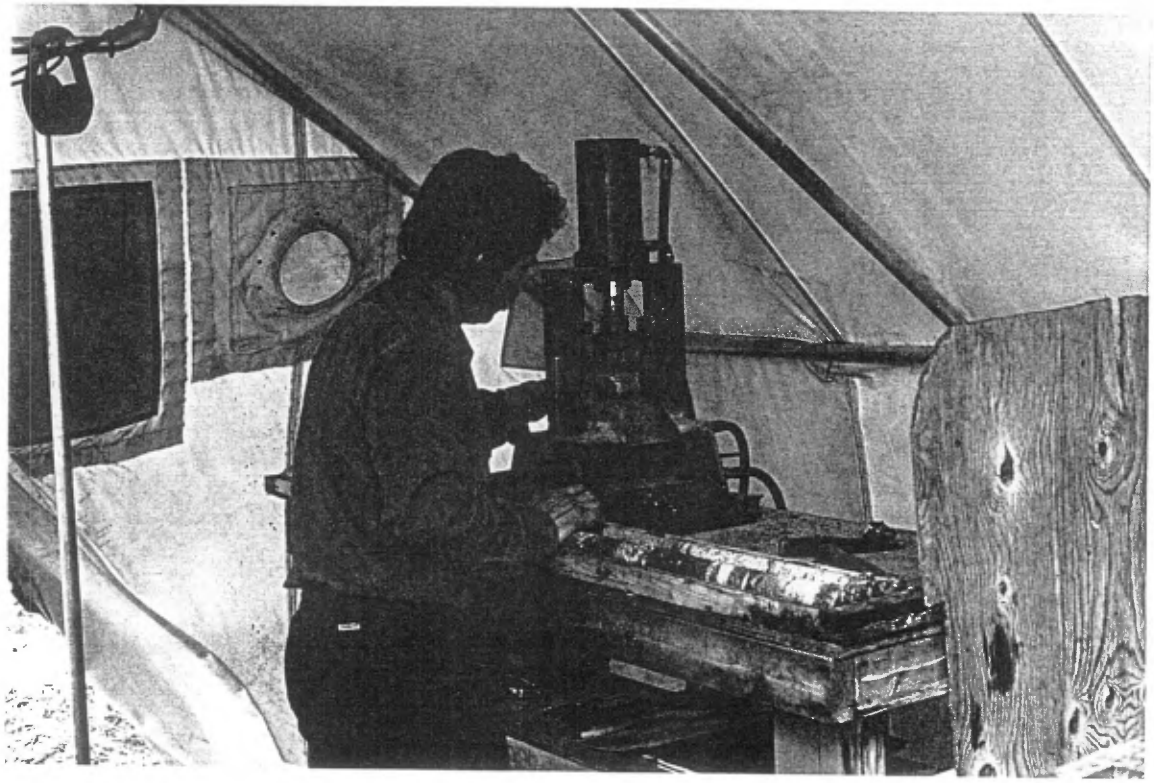

PHOTO 37: SPLITTING DRILL CORE WITH HYDRAULIC CORE SPLITTER

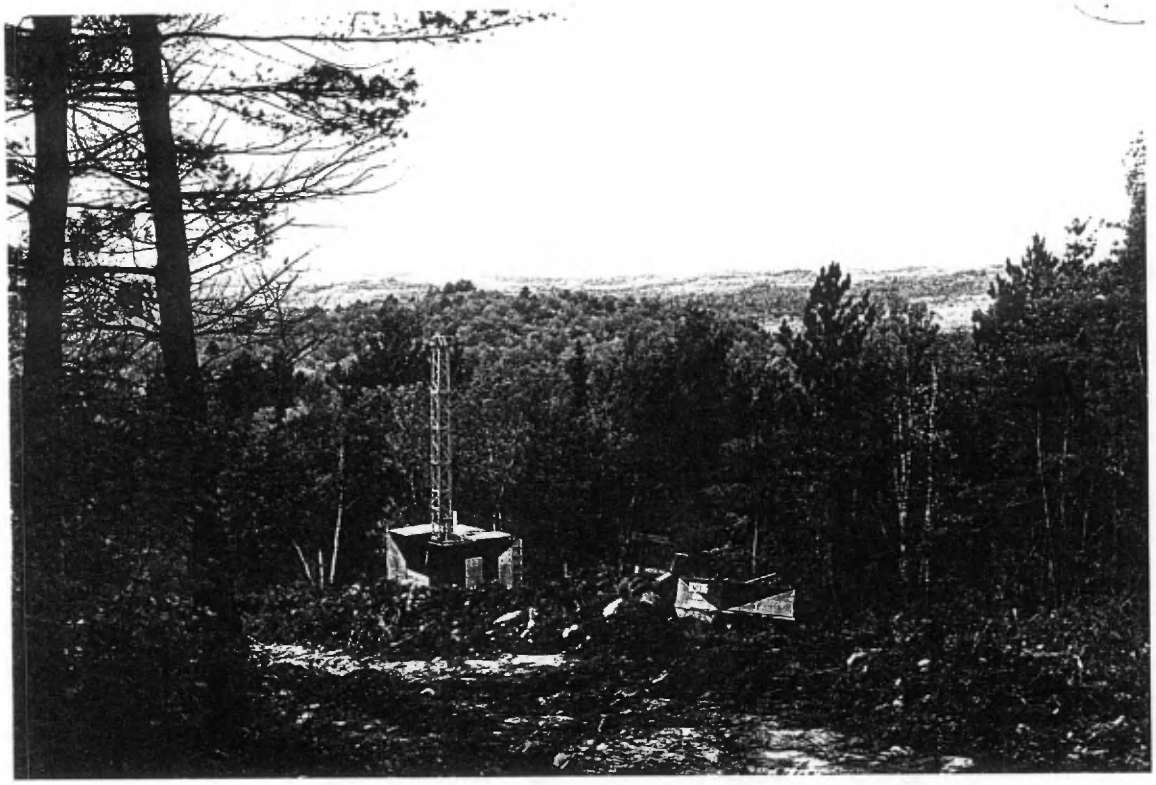

PHOTO 38: DRILL SITE 13, WEST MAIN ZONE

PHOTO 39:
DRILL SITE 31,
EAST MAIN ZONE

PHOTO 40: DAY SHIFT RUNNER

PHOTO 41: DAY SHIFT HELPER ON DRILL MAST CHECKING WATER SWIVEL AT TOP OF RODS

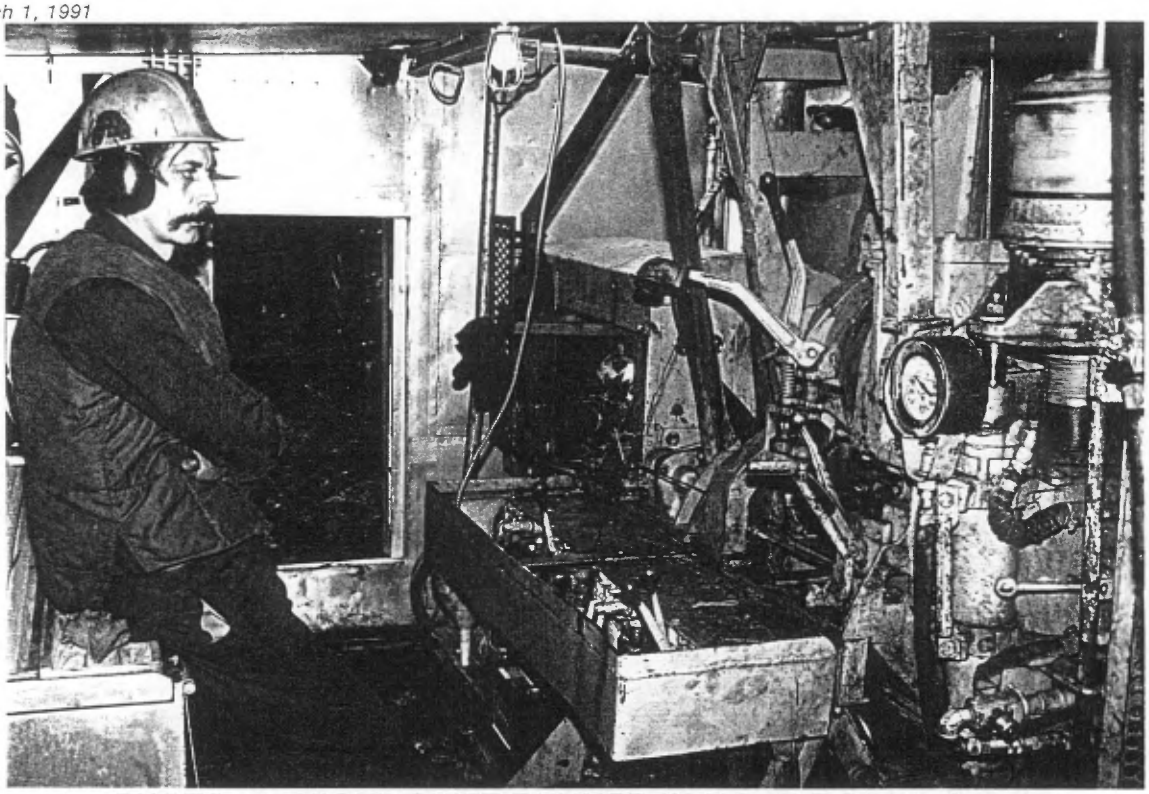

PHOTO 42: NIGHT SHIFT RUNNER IN MOBILE DRILL SHACK

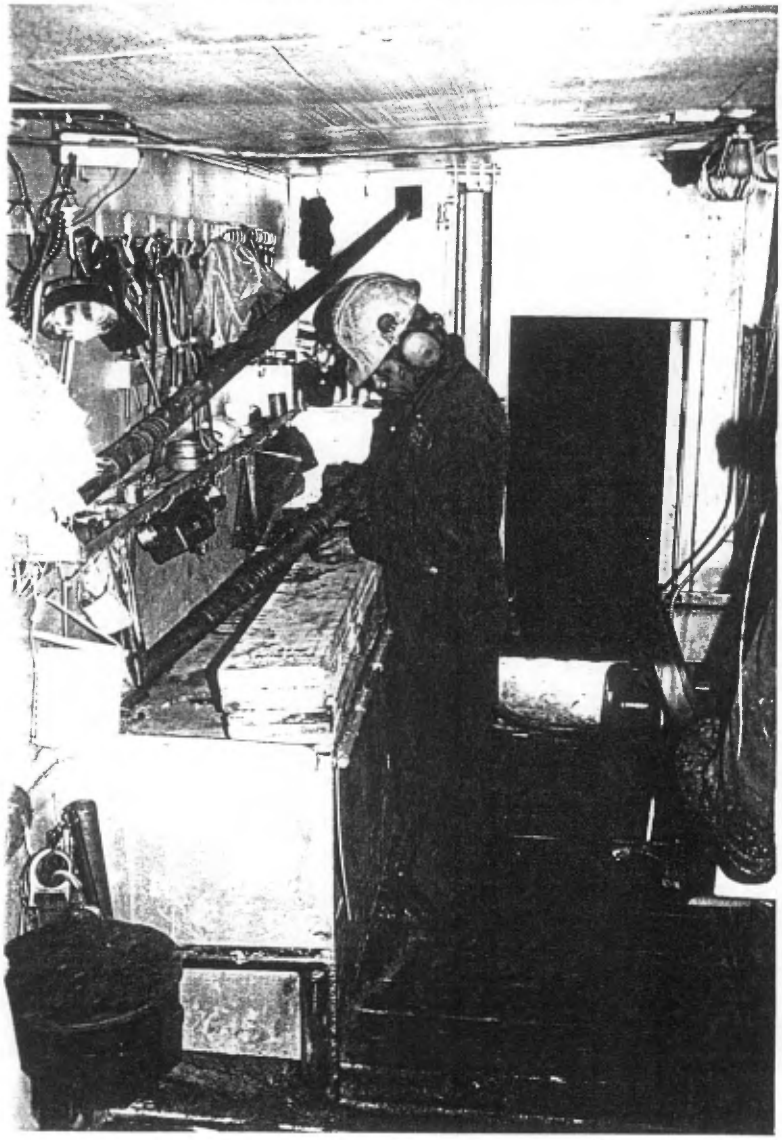

PHOTO 43: NIGHT SHIFT HELPER STARING TO TAKE CORE OUT OF CORE BARREL

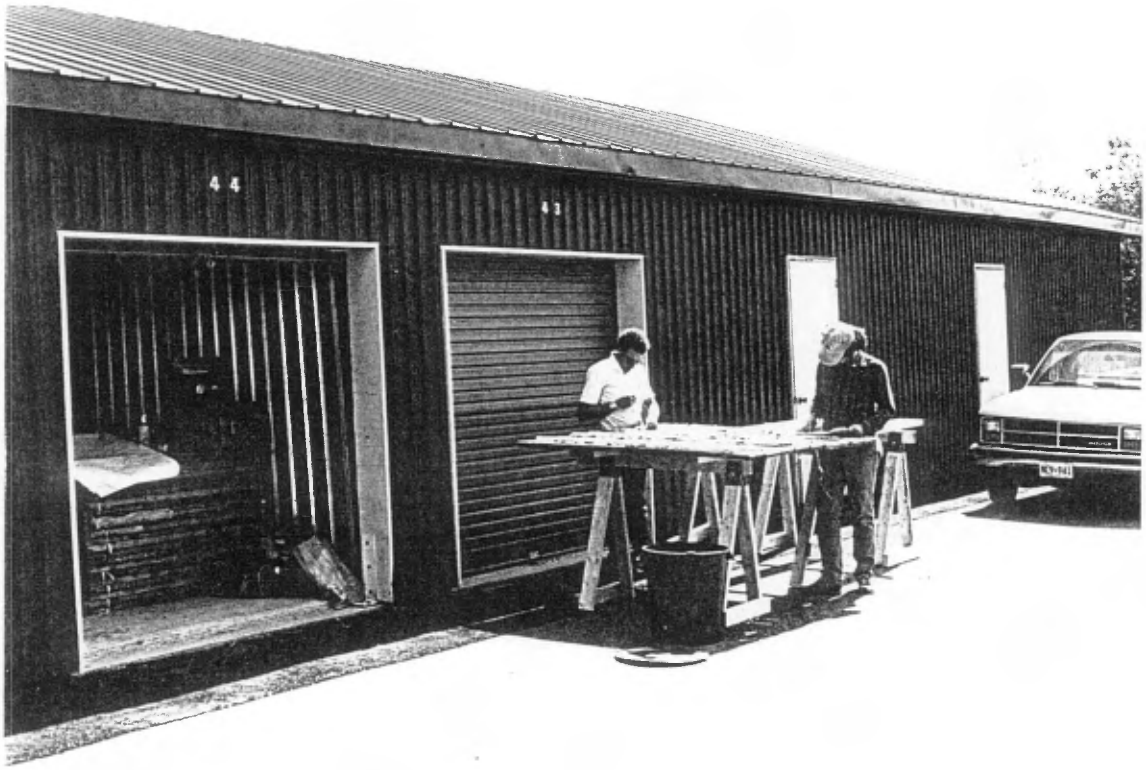

PHOTO 44: STORAGE UNIT FOR KIPAWA DRILL CORE

IN NORTH BAY, ONTARIO

REPORTS

Gerard Meusy prepared a detailed set of trench maps and a short report at the end of the trenching program and a preliminary set of maps and sections and a short report at the end of the drilling program.

J.F. Allan integrated and reinterpreted all the technical data developed by the 1990 exploration program and by previous exploration programs and geological studies, calculated the potential yttrium-zirconium resource available for open pit mining and prepared a comprehensive technical report on the property (March, 1991).

Drill core logs and assay data for 1990 are currently being typed and put into computer processible form by J.H. Reedman and Associates Ltd. in Winnipeg.

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Kipawa PROJECT

LOGGED BY G.X. MEUSY

DATE October 10, 1990

COLLAR:

COORDINATES 0+34 N
23+38E

ELEVATION 377.5 m

BEARING 039

INCLINATION -50°

HOLE LENGTH 61.87 m (203')

LENGTH OF HOLE IN OVERBURDEN 1.22 m (4')

LENGTH OF CASING 1.22 m (4')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	61.87 m	—	-46°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0 - 60.0 m	Mt Sopris 1000 C

DATUM:

HOLE DEPTH: COLLAR+ 0.91 m (3')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.91 m (3')

GEOPHYSICAL: COLLAR+ -0-

HOLE NUMBER 90-KU-34

NUMBER OF PAGES 4

DATE STARTED October 9, 1990 - 21:00

DATE COMPLETED October 10, 1990 - 13:00

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

'91 ABR -3 14:16
MER - SYSTÈMES DE GESTION DES LOIS QUÉBEC

ENERGIE ET RESSOURCES - SECTEUR MINES
REÇU
20 MAR 1991
BUREAU RÉGIONAL ROUYN-NORANDA

Ministère de l'Énergie et des Ressources
Division des données géoscientifiques
DATE 20 AOUT 1991
NO G.M. 050480

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.

MINING EXPLORATION

Hole No. 90-KU-34

Page 1 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	1.22	OVERBURDEN (4' CASING)
1.22	20.21	PERALKALIC GRANITE GNEISS
(4.0)	(66.3)	Typical "hanging-wall granite", beige in the first meter, then grey, hard, medium to coarse-grained, crudely foliated ("streaky"), about 15% mafic (amphibole and pyroxene). Core angle generally 65 to 70° TCA.
		(6.55 - 6.80) = biotitite band at 60° TCA on upper contact, 45° TCA on lower contact.
		(15.85 - 16.34) = large white feldspar bands 70° TCA.
20.21	21.95	BLACK PYROXENITE
(66.3)	(72.0)	Typical greyish to greenish polished surface and black fresh break, coarse-grained (5-8 mm), massive, 80% pyroxene.
		(20.21 - 20.63) = Mafic Syenite, m.g., 50% mafic, foliated at 70°, 4% "Creamy Stubbies", 2% eudialyte.
		(20.63 - 21.94) = Pyroxenite, strongly radioactive and well mineralized:
		20.8 to 21.3 = maximum 2,000 cps SPB2 - Up to 17% light brown on polished surface, dark greasy brown when broken, britholite as interstitial material in the pyroxenite. Also 5% pale pink zircon. Trace galena-

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Y ppm	ASSAY Zr ppm
15190	61.3-66.3	5.0	100	29	2657
15191	66.3-72	5.7	97	4508	5937
15192	72-77	5.0	97	348	9043
15193	77-82	5.0	98	659	10086
15194	82-87	5.0	98	549	6151
15195	87-92	5.0	98	508	5725
15196	92-97	5.0	98	351	5393
15197	97-102	5.0	100	1734	9607
15198	102-107	5.0	100	257	6149
15199	107-112	5.0	98	674	5896

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-KK-34
Page 2 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)	ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS
		21.64 to 21.95 = maximum 1,000 cps SPP 2 - still some brithholite, finely disseminated grains and wispy stringers, about 4% in all.			
21.95	26.97	MESOCRATIC SYENITE			
(72.0)	(88.5)	Dark greenish grey, m.g., 25 to 30% mafic, poorly foliated to weakly banded, core angle erratic, 30° TCA at 25 m and back to 70° TCA around 26.5 m. Large, centimetric, euhedral brown thorite ±tals at 25.7 (500 cps) and from 26.1 to 26.3 (700 cps SPP 2). Very coarse feldspar - pyroxene patch from 25.3 to 25.8 m.			
26.97	28.04	BLACK PYROXENITE			
(88.5)	(92.0)	Quite green on polished core surface, black inside - Strongly radioactive from 89.0 to 90.2, due to large euhedral thorite ±tals up to 8 x 15 mm, culminating at 27.5 with a 4 cm band of 80% yellowish to brown euhedral thorite crystals at 80° TCA. Maximum radioactivity 2,500 cps from 27.43 to 27.49 m.			
28.04	35.93	MESOCRATIC SYENITE			
(92.0)	(117.9)	Similar to (21.95 - 26.97) in grain size, colour and mafic contents. Core angle variable from 45 to 60° TCA. Lower contact at 55° TCA.			

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY U ppm	ASSAY Zr ppm
15200	112 - 117.9	5.9	98	462	13538
15201	117.9 - 122	4.1		297	13178
15202	122 - 127	5.0		665	36894

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG
UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-K11-34
Page 3 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION (Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution))	ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS
		(29.78 - 30.85) = mineralized and radioactive pyroxenite. Maximum radioactivity 2,000 cps SPP 2 at 30.8m. Mineralization is mostly c.g. thorite, but some eudialyte (~4%) and vlasovite (?) are also present.			
		(34.44 - 34.62) = radioactive zone, maximum 1,000 cps SPP 2, narrow band of m.g. thorite and 2% eudialyte at 45° TCA.			
		(35.66 - 35.94) = lower contact zone, good banding at 42° TCA, 8% eudialyte, maximum radioactivity 500 cps SPP2 - Tr. graphite - lower contact fairly sharp at 55° TCA.			
35.93	44.26	PERALKALIC GRANITE GNEISS			
(117.9)	(145.2)	Very hard, light grey to nearly white, poorly foliated to somewhat banded, up to 30% visible quartz, both in small grains in the rock and in 1 cm bands. About 15% mafic, mostly amphibole. Still 2-3% "Creamy Stubbies".			
44.26	47.18	BLACK PYROXENITE			
(145.2)	(154.8)	Typical, dark green on core, black on fresh break, c.g., massive, 80% pyroxene. Minor radioactivity at 45.4 to 45.6 (300 cps SPP2)			

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
15203	140.2-145.2	5.0	100	99	15149
15204	145.2-150	4.8	100	3190	9876
15205	150-154.8	4.8	100	1371	6838
15206	154.8-160.3	5.5	98	777	5177

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG
UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-KH-34
Page 4 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION — Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		and from 46.54 to 46.63 (200 cps) - About 1% eudialyte near upper contact, which is sharp at 80° TCA.
47.18	54.07	CALC-SILICATE ZONE
(154.8)	(177.4)	Very heterogeneous, alternating bands of Green Rock, Silver Grey Pyroxenite, Calcite-Diopside-Feldspar Rock and Peralkalic Granite Gneiss. Appears to be the "normal" calc-silicate package "flooded" by the granite gneiss. Core angle generally at 90° TCA.
		(47.18 - 47.52) = Granite Gneiss (hard)
		(47.52 - 47.85) = Green Rock and 25 cm massive calcite -
		(47.85 - 48.86) = Mixture of 30% SGP, 30% Green Rock, 40% grey diopside - calcite - feldspar rock.
		(48.86 - 51.45) = Granite Gneiss (hard)
		(51.45 - 52.15) = Green Rock
		(52.15 - 53.15) = Granite Gneiss (hard)
		(53.15 - 54.07) = Green Rock.
54.07	61.78	PERALKALIC GRANITE GNEISS
(177.4)	(202.7)	Similar to (35.93 - 44.26). Strong radioactive zone (Maximum 1,600 cps SPP 2) at 56.7, with large euhedral brown thorite stals up to 3cm.
61.78	61.87	CALCITE MARBLE
(202.7)	(203)	Typical pale lime-green, m.g., massive, 80% calcite, minor phlogopite.
61.87		END OF HOLE

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
15207	160.3-165	4.7	98	234	15369
15208	165-168.8	3.8	98	549	10869
15209	168.8-174.4	5.6	100	488	6586
15210	174.4-177.4	3.0	100	576	2489
15211	177.4-182	4.6	100	274	7146
15212	182-187	5.0	100	46	13017

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Kipawa PROJECT

LOGGED BY G. X. MEUSY

DATE

DRILL COLLAR:

COORDINATES 0+33 N
24+05 E

ELEVATION 375.5 m

BEARING 039

INCLINATION −60°

HOLE LENGTH 49.68 m (163')

LENGTH OF HOLE IN OVERBURDEN 1.22 m (4')

LENGTH OF CASING 1.22 m (4')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	49.68 m	—	−61°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma		0 - 48.3 m	MtSopris 1000 C

DATUM:

HOLE DEPTH: COLLAR+ 0.76m (2.5')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.76 m (2.5')

GEOPHYSICAL: COLLAR+ Ø

HOLE NUMBER 90-KU-33

NUMBER OF PAGES 4

DATE STARTED October 9, 1990 - 08:00

DATE COMPLETED October 9, 1990 - 17:30

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

ENERGIE ET RESSOURCES - SECTEUR MINES
REÇU
20 MAR 1991
BUREAU RÉGIONAL
ROUYN-

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.

MINING EXPLORATION

Hole No. 90-KU-33
Page 1 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION — Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	1.22	OVERBURDEN (4' CASING)
1.22	14.20	PERALKALIC GRANITE GNEISS
1)	(46.6)	Typical "hanging wall rock"; grey to beige, m-g, leucocratic, crudely foliated. Core angle 75° TCA (10.36 - 10.58) = biotitite band at 80° TCA.
14.20	17.28	BLACK PYROXENITE / MAFIC SYENITE
(46.6)	(56.7)	Dark green polished surface, black on fresh break, c-g., massive, 75% pyroxene, 20% feldspar, 5% accessories including graphite, sphene, zircon and possibly mosandrite. (16.52 - 16.61) = minor radioactive zone, max 450 cps SPP2, minor Green Rock inclusion, syenite.
17.28	20.76	MESOCRATIC SYENITE
(56.7)	(68.1)	Dark greenish grey, m-g, poorly foliated - Core angle 55° - Overall 25 to 30% amphibole. A few "Creamy stubbies" bands, overall < 1%.
20.76	27.83	MESOCRATIC SYENITE / PYROXENITE / EUDIALYTE ZONE
(68.1)	(91.3)	Somewhat mixed, heterogeneous section with 45% Green Pyroxenite, 40% Mesocratic Syenite, 6% c-g. eudialyte, 2% Ilvaite and 2% other exotic accessory minerals.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ppm Zr
15169	41.6 - 46.6	5.0		124	7211
15170	46.6 - 52	5.4		172	4316
15171	52 - 57	5.0		118	6867
15172	57 - 62	5.0		1021	7141
15173	62 - 67	5.0		106	3196
15174	67 - 72	5.0		369	7391
15175	72 - 77	5.0		1615	9044
15176	77 - 82	5.0		1109	9581
15177	82 - 87	5.0		760	7105
15178	87 - 91.3	4.3		2397	13476
15179	91.3 - 97	5.7		1518	9744
15180	97 - 102	5.0		2538	7123
15181	102 - 107	5.0		1625	8327

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG
UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-KU-33
Page 2 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)	ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS
		(20.75 - 21.03) = White feldspathic band with 10% graphite and minor eudialyte at lower contact.			
		(21.03 - 22.25) = Mesocratic Syenite, 30% mafic, 2% disseminated "creamy stubbies", tr. m.g. eudialyte. Core angle 70° TCA.			
		(22.25 - 24.69) = Heavily mineralized, strongly radioactive zone. Mostly c.g. Black Pyroxenite (~ 80%), minor mafic syenite. About 7% eudialyte, mostly c.g., 3% brown c.g. thorite, 3% c.s., possibly some mosandrite and hiortdahlite as well. Maximum radioactivity at 22.3 to 22.6 (1,800 cps SPP 2 on core), from 22.9 to 23.2 m (max 700 cps SPP 2). Core angle 40° TCA.			
		(24.69 - 25.60) = Mesocratic Syenite, 30-40 % mafic, core angle 45° to 65°, somewhat wavy. Only mineralization is ~ 2% "creamy stubbies".			
		(25.60 - 27.83) = Heavily mineralized, strongly radioactive zone. About 12 - 15 % c.g. pink eudialyte, 4 - 5% c.g. brown thorite xtals (up to 2 cm long, 1 cm wide), 2% "creamy stubbies", 2% other brownish accessories (mosandrite ? britholite ?) Maximum radioactivity 25.6 to 25.8 (1,500 cps), 25.9 to 26.0 (1,000 cps SSP 2) and 26.6 to 26.8 m (1,500 cps SPP 2), all due to c.g. brown thorite.			

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
15182	107-109	2.0		1428	8628
15183	109-114	5.0		955	6846
15184	114-118	4.0		1131	9969
15185	118-123	5.0		869	720,000
15186	123-128	5.0		1418	13386
15187	128-133	5.0		902	14188
15188	133-137.6	4.6		278	13593
15189	137.6-143	5.4		174	7572

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.

MINING EXPLORATION

Hole No. 90-KU-33

Page 3 of 4

PROJECT: _____

INTERVAL in METERS FROM	INTERVAL in METERS TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		From 27.25 to 27.37 is a noteworthy band of massive eudialyte at 55° TCA, with 10% c.g. thorite ± fols in it.
27.83	33.22	MESOCRATIC SYENITE
(91.3)	(109.0)	Dark greenish grey, m.g., 25 to 30% mafic, poorly foliated – enough to see the swirly nature of the foliation – core angle 0 to 60° TCA with a few reversals – Spotty radioactivity and mineralization – Radioactive zones at 29.08 m (500 cps), at 29.50 m (600 cps), at 31.03 m (400 cps) and from 31.9 to 32.1 m (400 cps SPP 2) – Overall 2 to 3% m.g. to c.g. pink eudialyte, minor c.s., possibly also trace pectolite, agrellite and hiortdahlite – (32.52 - 33.22) = pyroxenite, 5% eudialyte at upper contact.
33.22	35.87	PERALKALIC GRANITE GNEISS
(109.0)	(117.7)	Transition zone from syenitic to granitic rocks. Hard, greenish grey, m.g., 25% mafic, weakly foliated to banded, core angle 65°, 2% "creamy stubbies" bands – Minor radioactivity 33.34 to 33.44 m (250 cps SPP 2) –

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	ASSAY SAMPLE INTERVAL	ASSAY SAMPLE THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.

MINING EXPLORATION

Hole No. 90-KII-33

Page 4 of 4

PROJECT: _____

INTERVAL in METERS FROM	INTERVAL in METERS TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
35.87	41.94	HEMATITIC GRANITE GNEISS
(117.7)	(137.6)	Same unit as encountered in 90-KII-32- Extremely hard (silicified ?), 25-35% quartz, 5 % hematite - Cataclastic rock, almost a mylonite, overall pink to brownish red - Core angle 70°. Spotty radioactivity at 36.64 - 36.79 (400 cps), 37.43 - 37.61 (300 cps) 38.2 to 38.3 (650 cps SPP 2) and from 39.2 to 39.4 (300 cps SPP 2) - "Creamy Stubbies" abundant throughout.
41.94	49.68	PERALKALIC GRANITE GNEISS
(137.6)	(163.0)	Typical, light grey to almost white, very hard, poorly foliated, 5 to 10% mafic - Core angle 70 to 75° TCA.
		(47.24 - 47.43) = biotitite band, 85° TCA.
49.68		END OF HOLE
163.0		

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	ASSAY SAMPLE INTERVAL	ASSAY SAMPLE THICKNESS	CORE REC'Y %	ASSAY

ENERGIE ET RESSOURCES - SECTEUR MINES
REÇU
20 MAR 1991
BUREAU REGIONAL ROUYN-NORANDA

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G. X. MEUSY

DATE

RILL COLLAR:

COORDINATES 0+30 N
24 +60 E

ELEVATION 372.5 m

BEARING 039

INCLINATION -60°

HOLE LENGTH 49.68 m (163')

LENGTH OF HOLE IN OVERBURDEN 3.04 m (10')

LENGTH OF CASING 3.04 m (10')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	49.68 m	—	-59°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0-48.5 m	Mt Sopris 1000C

DATUM:

HOLE DEPTH: COLLAR+ 0.81 (2.6')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.81 (2.6')

GEOPHYSICAL: COLLAR+ Ø

HOLE NUMBER 90-KU-32

NUMBER OF PAGES 3

DATE STARTED October 8, 1990- 20:00

DATE COMPLETED October 9, 1990- 03:30 am

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG
UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-KU-32
Page 1 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	3.05	OVERBURDEN (10' CASING)
3.05	16.73	PERALKALIC GRANITE GNEISS
(10.0)	(54.9)	Overall grey, medium-grained with large orange feldspathic bands and sections - Foliation is crude to well developed, core angle fairly constant at 75 to 80° TCA - Medium-grained sections are usually leucocratic to mesocratic with 15% amphibole > pyroxene, while coarse-grained ones are leucocratic with 7% pyroxene clots - Large orange perthitic feldspar appear throughout - Lower contact sharp at 85° TCA - (10.06 - 10.42) = "biotitite" band at 90° TCA, 80% mica, convolute internal folding.
16.73	19.26	BLACK PYROXENITE
(54.9)	(63.2)	Typical, dark green polished surface, black fresh break, massive, coarse-grained (5 to 10 mm, exceptionally several cm on large, dark green pyroxene), 80% pyroxene, 15% interstitial feldspar, 5% exotic accessories (beige and dark red, not eudialyte) - High radiometric background (~ 100 cps SPP 2 in the box) - A few inclusions of very swirly syenitic material - (18.32 - 18.65) = radioactive zone, max. 400 cps SPP 2 10% greenish-beige mineral in anhedral patches, possibly some mosandrite as well.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
15149	49.9-54.9	5.0	100	164	4976
15150	54.9-58.9	4.0	100	1322	6386
15151	58.9-63.2	4.3	100	2509	5091
15152	63.2-67	3.8	100	653	6914
15153	67-72	5.0	96	357	11553
15154	72.75.1	3.1	94	697	10331
15155	75.1-80.4	5.3	96	457	7042
15156	80.4-85.4	5.0	98	583	17887
15157	85.4-90.4	5.0	98	885	16906

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-39 = 5.85 - 5.94 m = Peralkalic Granite Gneiss

GRAPHIC LOG LEGEND:

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG
UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-KU-32
Page 2 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(18.90 - 19.26) = 10% interstitial non-magnetic sulfide (pyrite or arsenopyrite, dull bronzy yellow) as a matrix to the m.g. pyroxenite — as seen in the Main Zone Black Pyroxenite. Lower contact fairly sharp at 64° TCA.
19.26	22.89	MESOCRATIC SYENITE
(63.2)	(75.1)	Greenish grey, medium-grained, foliated at 65° TCA. Starts out as a Malic Syenite (45% pyroxene-amphibole) and grades into a typical Mesocratic Syenite around 20 m.
		(20.02 - 20.12) = Strong radioactive zone, maximum 1,550 cps SPP 2 on core, due to a few dark brown centimetric subhedral thorite xtals. Also ~1% galena.
		(20.90 - 21.21) = 7% pinkish-beige "Creamy Stubbies".
22.89	24.50	PERALKALIC GRANITE GNEISS
(75.1)	(80.4)	Fairly typical - grey, hard, leucocratic, medium-grained, crudely foliated at 70° TCA.
24.50	43.10	HEMATITIC GRANITE GNEISS
(80.4)	(141.4)	Very peculiar unit, somewhat reminiscent of the "Red Syenite Gneiss" previously intersected in 88-KU-10 on line 2100 E, near the "Thorite Pit".

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
15158	90.4 - 95.4	5.0	100	1473	11071
15159	95.4 - 100.4	5.0	100	1325	10505
15160	100.4 - 105.4	5.0	100	311	4375
15161	105.4 - 110.4	5.0	100	615	7629
15162	110.4 - 115.4	5.0	100	173	10156
15163	115.4 - 120.4	5.0	100	248	720,000
15164	120.4 - 125.4	5.0	100	173	720,000
15165	125.4 - 130.4	5.0	100	446	11789
15166	130.4 - 135.4	5.0	100	320	12479
15167	135.4 - 140.4	5.0	100	204	4352
15168	140.4 - 145.4	5.0	100	134	5265

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-40 = 19.17 - 19.26 m = Sulfide rich Black Pyroxenite

GRAPHIC LOG LEGEND:

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG
UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-KU-32
Page 3 of 3

PROJECT: _____

INTERVAL in METERS FROM	INTERVAL in METERS TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		Overall, the rock is hard and has a definite brownish-red hue, although some sections remain grey. The colour is due to 2 to 4% earthy hematite, up to 5% locally in narrow (20-30 cm) bands. The hematite is either dispersed in the rock as ≤ 1 mm specks or in very short, wispy veinlets sometimes seen cutting across the foliation at a low angle? Overall the rock appears to have been mylonitized and altered. Some of the feldspars are zoned, other broken, and an incipient flaser-like texture is sometimes apparent. Overall 15-20% visible quartz, 20% white, zoned feldspar, 15% mafic, 45% "normal" grey feldspar.
		(25.40 - 25.48) = radioactive zone, maximum 500 cps SPP2
		(26.18 - 26.70) = radioactive zone, maximum 300 cps SPP2 Both above zones in a fg., massive, beige, leucocratic section.
		(28.96 - 29.26) = spotty radioactivity (200 cps SPP2), swirly foliation.
43.10	49.68	PERALKALIC GRANITE GNEISS
(141.4)	(163.0)	Grey, a few orange c.g. sections, generally hard and medium-grained, crudely foliated at 75° TCH, 10-15% mafic.
49.68		END OF HOLE

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS								ASSAY SAMPLE NO.	ASSAY SAMPLE INTERVAL	ASSAY SAMPLE THICKNESS	CORE REC'Y %	ASSAY			

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-41 = 38.43 - 38.53 m = Hematitic Peralk. Granite Gneiss

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G.X.MELISY

DATE October 9, 1990

DRILL COLLAR:

COORDINATES 0 + 20 N
25 + 30 E

ELEVATION 366 m

BEARING 039

INCLINATION -60°

HOLE LENGTH 55.78 (183')

LENGTH OF HOLE IN OVERBURDEN 1.83 m (6')

LENGTH OF CASING 1.83 m (6')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	55.78 m	—	-58°30'

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0 - 54.4m	Mt Sopris 1000 C

DATUM:

HOLE DEPTH: COLLAR+ 0.91 (3')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.91 (3')

GEOPHYSICAL: COLLAR+ ϕ

HOLE NUMBER 90-KU-31

NUMBER OF PAGES 3

DATE STARTED October 8, 1990 - 06:00 am

DATE COMPLETED October 8, 1990 - 16:00

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG
UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-KU-31
Page 1 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	1.83	OVERBURDEN (6' CASING)
1.83	6.40	PERALKALIC GRANITE
(6.0)	(21.0)	Beige to orangey, medium-grained, poorly foliated to very weakly banded, leucocratic with 10 to 15% amphibole > pyroxene - Hard, competent, at least 10% white quartz, some v.c. feldspar - Core angle 75°-80° TCA.
6.40	7.01	BLACK PYROXENITE
(21.0)	(23.0)	Very typical, dark green polished surface, black fresh break, coarse (5-10 mm), massive, 80% pyroxene, 15% interstitial feldspar, 5% accessory minerals including brownish-red mineral (NOT eudialyte), zircon, "creamy stubbies" and graphite.
7.01	14.26	MESOCRATIC SYENITE
(23.0)	(46.8)	Greenish grey, medium-grained, 15 to 20% mafic, mostly green amphibole, foliated at 75 to 80° TCA -
		(10.18 - 10.30) = narrow band of c.g. Black pyroxenite with very weak radioactive zone (100 cps SPP2) in syenite at lower contact.
		Lower contact of the unit sharp at 80° TCA.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Y ppm	ASSAY Zr ppm
15134	16 - 21	5.0	100	134	2410
15135	21-23	2.0	100	261	6268
15136	23-27	4.0	98	276	6039
15137	27-32	5.0	100	639	5898
15138	32-37	5.0	100	601	4890
15139	37-42	5.0	98	406	9113
15140	42-46.8	4.8	98	44	13409
15141	46.8-51.8	5.0	100	14	5212

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KII-31
Page 2 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)	ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS
14.26	47.24	ORANGE PERALKALIC GRANITE			
(46.8)	(155.0)	Strong orange to pinkish tint, although some sections are dominantly grey - Colour is due to 1) hematite staining and 2) about 2% large 2-3 cm orange feldspar anhedra, bands and patches. The rock is generally medium-grained (with scarce coarse-grained sections), very poorly foliated to somewhat banded - Core angle 70 to 90° TCA throughout - Overall 10-15% quartz, some in 0.5 cm bands, and around 12% mafic - (amphibole dominant) Hematite content, hence intensity of the orange colour, stronger from 14.26 to about 36.5 m.			
47.24	55.78	MESOCRATIC SYENITE / CALCITE-DIOPSIDE-FELDSPAR ROCK			
(155.0)	(183.0)	Mixed zone similar to the one encountered in 90-KII-30 from 35.11 to 41.82 m: greenish grey m-g. mesocratic syenite with 16% grey, equant, medium to coarse-grained (2 to 4 mm) calcite-diopside-feldspar rock and 1% Green Rock. (47.24 - 47.55) = mesocratic syenite, core angle 80° TCA. (47.55 - 48.37) = grey calcite-diopside-feldspar rock, 50% calcite, 20% phlogopite, massive-			

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Y ppm	ASSAY Zr ppm
15142	150-155	5	100	184	5743
15143	155-160	5	99	297	7281
15144	160-165	5	99	490	10217
15145	165-170	5	97	161	4854
15146	170-175	5	97	832	4005
15147	175-180	5	99	333	9277
15148	180-183	3	99	249	5897

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-31
Page 3 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(48.37 - 52.52) = mostly mesocratic syenite, 25% mafic, core angle 75° TCA - Extremely radioactive zone from 48.7 to 49.2 - Maximum 5,000 cps SSP2 on core from 48.9 to 49.0: 15% altered thorite in euhedral, zoned crystals 2 to 8 mm across, brownish-grey core and creamy periphery - Spotty radioactivity (200 - 250 cps) from there to 50.0 m.
		(52.52 - 52.94) = grey calcite - diopside - feldspar rock, massive, 60% calcite, 10% phlogopite - Minor radioactive zone near lower contact, maximum 250 cps SSP2 from 52.9 to 53.0 m.
		(52.94 - 55.11) = mesocratic syenite, 30% mafic, core angle 65° TCA, changing to 45° TCA near lower contact, which is sharp at 45° TCA
		(55.11 - 55.78) = Green Rock - Typical dark green, fine-grained with zircon and sphene as accessories - Last 15 cm back into grey calcite - diopside - feldspar rock. Core angle 45° TCA.
55.78		END OF HOLE

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	ASSAY SAMPLE INTERVAL	ASSAY SAMPLE THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G.X. MEUSY

DATE October 8, 1990

DRILL COLLAR:

COORDINATES 0+19 N
25+79 E

ELEVATION 358.8 m

BEARING 039

INCLINATION −60°

HOLE LENGTH 49.68 m (163')

LENGTH OF HOLE IN OVERBURDEN 2.44 m (8')

LENGTH OF CASING 2.44 m (8')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	49.68 m	—	-55°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	48.40 m	0 - 48.4 m	Mt Sopris 1000 C

DATUM:

HOLE DEPTH: COLLAR+ 0.60 m (2')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.60 m (2')

GEOPHYSICAL: COLLAR+ Ø

HOLE NUMBER 90-KU-30

NUMBER OF PAGES 4

DATE STARTED October 7, 1990 - 16:00

DATE COMPLETED October 8, 1990 - 00:00

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: (

DATE:

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-30
Page 1 of 4

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	2.44	OVERBURDEN (8' CASING)
2.44	5.49	MESOCRATIC SYENITE
0)	(18.0)	Dark to medium greenish-grey, medium-grained (2 to 4 mm), homogeneous and almost equigranular. Poorly foliated at 80 to 90° TCA. Lower contact sharp at 80° TCA, interbanding over ~ 30 cm. Overall mesocratic with 25 to 30 % green amphibole. (2.90 - 3.05) = mafic syenite, 50 % black pyroxene, radioactive zone, maximum 200 cps SPP 2 on core.
5.49	33.77	PERALKALIC GRANITE GNEISS (ORANGE)
(18.0)	(110.8)	Distinct orange hue due to: 1) Orangey feldspar centimetric phenocrystals and ill-defined bands and 2) hematitic alteration localized in narrow (< 1cm) "creamy stubbies" bands and large individual crystals and patches. Overall medium-grained with a few coarse-grained sections. Crudely foliated to somewhat banded, core angle generally 70° TCA. Hard, but not as hard as the P.G.G. in the Main Zone: very little visible quartz in the m.g. section = the quartz is concentrated in 0.5 cm stringers or in the 1-3 cm orange

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
15119	8 - 13	5.0	66 *	590	6808
15120	13 - 18	5.0	98	84	7311
15121	18 - 23	5.0	100	80	1153

LOST CORE (INTERVAL, LENGTH): 1.7' missing at beginning of hole, core and of casing off 8' to 13'

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-36 = 23.01 - 23.10 m = Peralk. Granite Gneiss

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KK-30
Page 2 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		feldspathic bands, so that overall, the quartz content of the unit is around 10% only. Accessory minerals include tr. graphite, fluorite, "creamy stubbies" and hematite.
33.77	35.11	BLACK PYROXENITE
(110.8)	(115.2)	Typically black on a fresh break, dark greenish grey on a polished surface. Coarse-grained (4 to 8 mm), massive, equant. About 80% pyroxene and 20% interstitial feldspar. 3% dark brownish red accessory mineral and 2% zircon, 1% graphite near upper contact. Both contacts sharp, upper at 55° TCA, lower at 70° TCA.
35.11	41.82	MESOCRATIC SYENITE / CALCITE-DIOPSIDE-FELDSPAR ROCK
(115.2)	(137.2)	Mixed zone, transitional to the calc-silicate rocks. Dominated by typical mesocratic syenite (15 to 20% amphibole), with 15% bands of grey, medium-grained, equant calcite-diopside-feldspar rock and 10% Green Rock. Banding generally clear-cut at 70-75° TCA.
		(35.42 - 36.21) = mesocratic syenite, core angle 60° TCA
		(36.21 - 36.97) = Green Rock, heavy phlogopite on contact, followed by calcite-diopside-feldspar rock, 65° TCA.
		(36.97 - 38.04) = mesocratic syenite, core angle 60° TCA
		(38.04 - 38.49) = Grey calcite-diopside-feldspar rock, 50% calcite

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
15122	107-110.8	3.8	100	88	6752
15123	110.8-115.2	4.4	98	179	4743
15124	115.2-122	6.8	98	587	10556
15125	122-127	5.0	98	289	9926
15126	127-132	5.0	100	222	12013
15127	132-137	5.0	100	344	3496
15128	137-142	5.0	100	355	2066
15129	142-147	5.0	98	166	4023
15130	147-152	5.0	98	688	4307
15131	152-155.4	3.4	98	212	12312
15132	155.4-158.2	2.8	99	90	942
15133	158.2-163	4.8	99	252	11490

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-38
Page 3 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(38.49 - 38.71) = radioactive zone, maximum 400 cps SPP2, much hematite and reddish "stubbies" (fluorite?)
		(38.71 - 39.81) = mesocratic syenite, core angle 75° TCA
		(39.81 - 40.93) = Green Rock, dark green, f.g., massive.
		(40.93 - 41.82) = mesocratic syenite, core angle 75° TCA.
41.82	42.37	CALCITE MARBLE
(137.2)	(139.0)	Very typical of the marbles at the east end of the grid = zoned, white in center, banded with 10% bright yellow chondrodite, grading into greenish diopsidic zones and finally dark green, phlogopitic contact zones. Upper contact at 45°, lower at 70° TCA. Trace fluorite
42.37	47.37	MESOCRATIC SYENITE
(139.0)	(155.4)	Similar to (35.11 - 41.82) with still some calc-silicate bands intermixed within the syenite:
		(42.37 - 42.80) = Green Rock, accessory sphene & zircon.
		(42.80 - 44.16) = mesocratic syenite, core angle 70° TCA.
		(44.16 - 44.44) = grey Calcite - diopside - feldspar Rock.
		(44.44 - 45.32) = mesocratic syenite, core angle 80° TCA.
		(45.32 - 46.33) = grey Calcite - diopside - feldspar Rock with radioactive zone on upper contact: maximum 450 cps SPP2, much hematite, from 45.32 to 45.60 m.
		(47.09 - 47.36) = biotite-rich bands at 90° TCA.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-37 = 38.16 - 38.28 m = Calcite-diopside-felds. rock
KU-38 = 42.03 - 42.12 m = Calcite Marble

GRAPHIC LOG LEGEND:

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-30
Page 4 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
47.37	48.22	PEGMATITE
(155.4)	(158.2)	Huge pink, perthitic feldspar with 7% dark green pyroxene clots.
48.22	49.68	PERALKALIC GRANITE GNEISS
(158.2)	(163.0)	Greyish to orangey-beige, medium to coarse-grained, somewhat banded, 10% malic, some pegmatitic sections in the last 50 cm. 10% quartz in 5 mm bands, accessory pink zircon. Banding at 75° TCA.
49.68		END OF HOLE.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G. X. MEUSY

DATE October 7, 1990

DRILL COLLAR:

COORDINATES 0+18 N
15+49 E

ELEVATION 366 m

BEARING 039

INCLINATION −60°

HOLE LENGTH 45.72 m (150.0')

LENGTH OF HOLE IN OVERBURDEN 2.44 m (8')

LENGTH OF CASING 2.44 m (8')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	45.72 m	—	−58°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0 - 44.3 m	Mt Sopris 1000C

DATUM:

HOLE DEPTH: COLLAR+ 0.20 m

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.20 m

GEOPHYSICAL: COLLAR+ Ø

HOLE NUMBER 90-KU-29

NUMBER OF PAGES 3

DATE STARTED October 6, 1990 - 17:00

DATE COMPLETED October 7, 1990 - 04:45

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.

MINING EXPLORATION

Hole No. 90-KU-29

Page 1 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION — Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	2.44	OVERBURDEN (8' CASING)
2.44	15.03	PERALKALIC GRANITE GNEISS
(8.0)	(49.3)	Hard, light grey to beige, medium to fine-grained, 20% visible quartz, 5 to 10% mafic, massive to very weakly foliated, no exotics. The first 3m or so have a beige colour characteristic of the Peralkalic Granite, but lack it typical "cloudy" texture.
		(9.39 - 10.18) = biotitite, typical, 75-80% fg. biotite, band cutting the core at 90° TCA
15.03	19.23	GREEN ROCK
(49.3)	(63.1)	Typical, medium pistachio to dark green, fine-grained massive, mixed in with 20% mesocratic syenite, 15% Silver Grey Pyroxenite and 10% Phlogopite rock. Upper contact sharp at 75° TCA, lower also sharp at 80° TCA. Minor spotty radioactivity (max 300 cps SPP2) from 15.5 to 15.8 and at 18.2 m.
		(18.93 - 19.23) = SGP, 5% purple fluorite, 2% monazite.
19.23	21.00	MESOCRATIC SYENITE
(63.1)	(68.9)	Typical, greenish grey on polished surface, medium-grained, 20% mafic (amphibole & pyroxene), poorly foliated at 90° TCA.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
15097	44.3-49.3	5.0	100	145	6524
15098	49.3-52	2.7	98	180	10335
15099	52-57	5.0	98	368	5093
15100	57-62	5.0	100	1071	4209
15101	62-67	5.0	100	391	11697
15102	67-72	5.0	100	700	6166
15103	72-77	5.0	100	544	6178
15104	77-82	5.0	96	603	5744
15105	82-87	5.0	96	238	8377
15106	87-92	5.0	90	173	11893

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

KU-32 = 9.75 - 9.85 m = Biotitite in P-G-G

KU-33 = 19.66 - 19.76 m = Mesocratic Syenite!

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.

MINING EXPLORATION

Hole No. 90-KU-27

Page 2 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION — Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
21.00	25.66	AUGEN SYENITE GNEISS
(68.9)	(84.2)	Typical, 5% white centimetric feldspar augens, 20% long, acicular, sometimes curved, amphibole, 2% biotite, excellent foliation at 80 to 90° TCA.
25.66	32.52	MESOCRATIC SYENITE
(84.2)	(106.7)	Similar to (19.23 - 21.00) until 27.9, then grades into an almost leucocratic syenite with only 12-15% mafic. Unknown ink blue to violet, very hard (~7) amorphous mineral at 26.64 - 26.70 m. possibly chert or chalcedony ?. Radioactive zones (Maximum 500 cps SPP 2) from 29.17 to 29.41 and from 32.40 to 32.52 (Up to 600 cps SPP 2) near lower contact.
32.52	34.14	BLACK PYROXENITE
(106.7)	(112.0)	Black, massive, m.g. to c.g. (3 - 5 mm), 90% pyroxene, somewhat friable, micaceous at lower contact, 2% zircon, 2% brownish red mineral (NOT eudialyte). Crumbly core, partly ground 32.6 - 32.9 m. Upper contact broken, lower at 70° TCA.
34.14	36.18	MESOCRATIC SYENITE
(112.0)	(118.7)	Similar to (19.23 - 21.00), core angle 45° TCA.
36.18	37.34	BIOTITE - FELDSPAR - FLUORITE ROCK (?)
(118.7)	(122.5)	Overall dark brown colour, massive, mottled, jumble looking, fine to medium-grained,

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ppm Zr
15107	92 - 97	5.0	90	78	14548
15108	97-102	5.0	99	120	11841
15109	102-107	5.0	99	526	720,000
15110	107 - 112	5.0	99	876	6988
15111	112-117	5.0	99	788	720,000
15112	117 - 122	5.0	95	107	8430
15113	122- 127	5.0	95	555	13610
15114	127-132	5.0	98	58	720,000
15115	132-137	5.0	98	401	9888
15116	137-142	5.0	97	955	4591
15117	142-147	5.0	97	453	338
15118	147-150	3.0	94	150	245

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-321 = 26.6 - 26.7 m = Unknown hard violet mineral.

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.

MINING EXPLORATION

Hole No. 90-KV-29

Page 3 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)	ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS	ASSAY SAMPLE NO.	ASSAY SAMPLE INTERVAL	ASSAY SAMPLE THICKNESS	CORE REC'Y %	ASSAY
		50% biotite, 30% feldspar, 20% purple fluorite. Reminiscent of mafic fluorite-rich rock zone in south end of trench T-95-1. Both contacts sharp, upper at 75°, lower very wavy, irregularly folded at ~ 45° TCA. Minor radioactivity (250 cps SPP 2) near upper contact-								
37.34	41.27	MESOCRATIC SYENITE								
(122.5)	(135.4)	Greenish grey, m-g, very poorly foliated, 20% mafic, core angle 20 to 45°, with a reversal between 39.0 and 40.0 m.								
		(37.73 - 37.95) = minor radioactive zone, 250 cps SPP 2								
		(39.17 - 41.00) = semi-continuous radioactive zone, maximum 400 cps SPP 2 in the foliation reversal region -								
41.27	45.72	GREEN ROCK								
(135.4)	(150.0)	Typical, medium pistachio to dark green, fine-grained, massive, 15% white feldspar in patches and ill-defined bands, 10% phlogopite. Upper contact sharp at 47° TCA with heavy phlogopite-								
45.72		END OF HOLE								

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-35 = 36.6 - 36.7 = (Biotite-Feldspar-Fluorite Rock).

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G.X. Mercy

DATE

DRILL COLLAR:

COORDINATES 0+46 N
14+77 E

ELEVATION 363 m

BEARING —

INCLINATION -90°

HOLE LENGTH 42.98 m (141')

LENGTH OF HOLE IN OVERBURDEN 1.22 m (4')

LENGTH OF CASING 1.22 m (4')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	42.98 m	—	-89°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma		0-42.0m	MH Sapris 1990C

DATUM:

HOLE DEPTH: COLLAR+ 0.30 m

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.30 m

GEOPHYSICAL: COLLAR+ 0.30 m

HOLE NUMBER 90-KH-28

NUMBER OF PAGES 3

DATE STARTED October 6, 1990 - 06:00 am

DATE COMPLETED October 6, 1990 - 11:00 am

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.

MINING EXPLORATION

Hole No. 90-KII-28

Page 1 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	1.22	OVERBURDEN (4" CASING)
1.22	1.92	BLACK PYROXENITE (MINERALIZED ZONE)
(4.0)	(6.3)	Dark green to greyish, black on fresh break, 50 % c.g. pyroxene (8 mm), massive, strongly radioactive with ~ 1 % disseminated thorite - Maximum radioactivity 700 cps SPP 2 at 1.52 m. Overall 2-3 % finely disseminated monazite -
1.92	2.56	GREEN ROCK
(6.3)	(8.4)	Medium pistachio green, fine-grained, massive, 30 % SGP mixed in - 5 % c.g. light brown monazite in feldspar veinlet at 2.4m. Sharp lower contact at 40° TCA.
2.56	5.61	MAFIC SYENITE
(8.4)	(18.4)	Dark green, m.g. to c.g, 30 to 45 % mafic (mostly amphibole), core angle around 45° - About 25 % mixed in c.g. Black Pyroxenite bands - Last 0.90 m of the section shows well developed augen texture and 25 - 30 % long acicular amphibole.
5.61	9.94	GREEN ROCK
(18.4)	(32.6)	Typical, pistachio green, f.g., dense, massive with 10 % bluish amphibole, grading in and out of Silver Grey Pyroxenite -
		(5.61 - 6.19) = Silver Grey Pyroxenite
		(6.19 - 8.08) Green Rock, 15 % phlogopite, 20 % amphibole

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
15069	4 - 7	3.0	97	1659	12042
15070	7 - 12	5.0	94	1374	9492
15071	12 - 17	5.0	94	502	9823
15072	17 - 22	5.0	100	1303	6175
15073	22 - 27	5.0	100	1154	682
15074	27 - 32	5.0	96	2113	8308
15075	32 - 37	5.0	96	1093	6820
15076	37 - 42	5.0	98	463	8594
15077	42 - 47	5.0	98	706	11632
15078	47 - 52	5.0	98	959	9795
15079	52 - 57	5.0	98	138	19605
15080	57 - 62	5.0	100	271	15828
15081	62 - 67	5.0	100	99	12436
15082	67 - 72	5.0	100	428	12095
15083	72 - 77	5.0	100	423	12021
15084	77 - 82	5.0	97	1372	14210

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.

MINING EXPLORATION

Hole No. 90-KV-28

Page 2 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(8.08 - 9.30) = Dark Green, minor radioactivity (250 cps), banding at 63° TCA, 2-3% "Creamy Stubbies" - (9.30 - 9.94) = 4% eudialyte in ill-defined bands and blotches. Thorite on fracture (joint?) at 9.85, maximum radioactivity 300 cps - SPP 2 on core.
9.94	14.75	AUGEN SYENITE GNEISS
(32.6)	(48.4)	Fairly typical, good augen texture to 12.0 m 25-30% long acicular amphibole, core angle 65° TCA, slightly swirly foliation around 35.0 - 36.0 -
14.75	17.98	MESOCRATIC SYENITE
(48H)	(59.0)	Light greenish grey, m.g., 15% mafic, weakly foliated at 60° TCA, steepening to 45° near lower contact which is at 15° TCA. (17.37 - 17.50) = strong radioactivity, maximum 1,000 cps SPP 2 on core, 4% zoned altered thorite ⊼tals (up to 6 mm, euhedral), creamy core with rusty brown periphery.
17.98	22.77	GREEN ROCK
(59.0)	(74.7)	Heterogeneous zone, dark green with SGP and mesocratic syenite bands mixed in, 2-3% pink zircon, very irregular foliation, core angle 20 to 80° TCA. Thorite ⊼tal 5 mm on one side of the core at 22.3, radioactivity up to 250 cps SPP 2 -

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
15085	82-87	5.0	97	706	11758
15086	87-92	5.0	97	437	2223
15087	92-97	5.0	97	516	782
15088	97-102	5.0	99	320	639
15089	102-107	5.0	99	277	512
15090	107-112	5.0	100	685	3358
15091	112-117	5.0	100	2190	7427
15092	117-122	5.0	100	888	7672
15093	122-127	5.0	100	285	17767
15094	127-132	5.0	96	319	6490
15095	132-137	5.0	96	538	9557
15096	137-141	4.0	100	792	11056

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.

MINING EXPLORATION

Hole No. 90-KV-28
Page 3 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Structure, & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
22.77	29.87	MESOCRATIC SYENITE
(74.7)	(98.0)	Dark greenish grey, m.g., 30% mafic, poorly foliated to somewhat banded at 25° TCA.
29.87	34.60	GREEN ROCK
(98.0)	(113.5)	Dark green, f.g., dense, massive, locally micaceous (25% m.g. phlogopite) - Upper contact sharp at 35° TCA, lower at 45° TCA.
		(33.68 - 34.60) = spotty radioactivity, maximum 250 cps SPP 2, some feldspathic patches, 2-3% small (1-3 mm) pink zircon, faintly banded at 47° TCA -
34.60	38.00	MESOCRATIC SYENITE
(113.5)	(124.7)	Similar to (22.77 - 29.87), more mafic (40%) from 35.5 to 36.5 - Core angle 65° TCA.
38.00	39.75	GREEN ROCK / SILVER GREY PYROXENITE
(124.7)	(130.4)	Similar to (29.87 - 34.60), with typical SGP from 38.00 to 38.71. Core angle 65° - Phlogopitic bands 38.71 to 39.75 m.
39.75	41.73	MESOCRATIC SYENITE
(130.4)	(136.9)	Typical greenish grey, m.g., 15% mafic, core angle 70° TCA - 5% "Creamy Stubbies"
41.73	42.98	SILVER GREY PYROXENITE
		Typical, m.g. to c.g. (3-5 mm), massive, equigranular.
42.98		END OF HOLE

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

NATURAL RESOURCES - SECTEUR MINES
REÇU
20 MAR 1991
CANADA

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Kipawa PROJECT

LOGGED BY G.X. MEUSY

DATE October 6, 1990

DRILL COLLAR:

COORDINATES 0+05 N
14+78 E

ELEVATION 364.3 m

BEARING —

INCLINATION -90°

HOLE LENGTH 53.34 m (175')

ENGTH OF HOLE IN OVERBURDEN 1.83 m (6')

LENGTH OF CASING 1.83 m (6')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	53.34 m	—	-87°30'

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0 - 52.5 m	PH Sapric 1990C

DATUM:

HOLE DEPTH: COLLAR+ 0.30 m

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.30 m

GEOPHYSICAL: COLLAR+ 0.30 m

HOLE NUMBER 90 - KM - 27

NUMBER OF PAGES 5

DATE STARTED October 5, 1990 - 16:00

DATE COMPLETED October 6, 1990 - 02:30 am

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

ENERGIE ET RESSOURCES - SECTEUR MINES
REÇU
20 MAR 1991
BUREAU RÉGIONAL
ROUYN-NORANDA

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-27
Page 1 of 5

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	1.83	OVERBURDEN (6" casing)
1.83	2.62	PERALKALIC GRANITE
(6.0)	(8.6)	Yellowish to beige, "cloudy" texture, 25% mafic, rather massive, lower contact at 50° TCA.
2.62	13.72	PERALKALIC GRANITE GNEISS
(8.6)	(45.0)	Hard, grey, poorly foliated, m.g., 10 to 15% mafic (mostly amphibole), core angle around 45° TCA.
		(5.33 - 5.91) = biotite schist band, core angle 47° to 50°.
		(7.74 - 7.98) = radioactive zone, max. 600 cps SPP2 on core, finely disseminated altered thorite.
		(10.30 - 10.67) = 12% finely disseminated "Creamy Stubbies", minor radioactivity (350 cps SPP 2) at 10.36 m.
		(11.37 - 11.86) = radioactive zone, max. 500 cps SPP 2 at 38.0, finely disseminated altered thorite and "Creamy Stubbies" at 80 to 90° TCA.
		(13.01 - 13.72) = radioactive contact zone, maximum 300 cps SPP 2. Broken core at lower contact.
13.72	20.30	BLACK PYROXENITE / MINERALIZED ZONE
(45.0	(66.6)	Unusually strongly radioactive zone of coarse-grained Black Pyroxenite, massive, fairly equant (0.5 to 10 mm, exceptionally 1.5 cm). Overall 75% dark green to black pyroxene, 15% interstitial feldspar and 10% mineralization, as follows:

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
11991	25.4 - 30	4.6	100	140	4948
11992	30 - 35	5.0	100	95	8759
11993	35 - 40	5.0	100	40	5205
11994	40 - 45	5.0	92	101	6446
11995	45 - 50	5.0	100	2425	9332
11996	50 - 55	5.0	95	2190	10073
11997	55 - 60	5.0	100	1240	8279
11998	60 - 66.6	6.6	90	1275	5256

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-27
Page 2 of 5

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(13.72 - 14.33) = 7% c.g. (5 to 15 mm) eudialyte, 3% f.g. (3 to 4 mm long) mosandrite, possibly some agrellite as well - Tr. thorite, radioactivity around 400 cps SPP 2 on core.
		(14.33 - 14.63) = strongly radioactive zone, maximum 1,650 cps SPP 2 on core. 7% pale yellowish brown f.g. mosandrite, 3% creamy altered thorite, 2% eudialyte, trace fluorite.
		(14.63 - 15.48) = mafic syenite, dark green, crudely foliated at 55° TCA, radioactivity around 500 cps, still ~ 3-4% mosandrite.
		(15.48 - 17.46) = massive c.g. pyroxenite, minor intercalated Green Rock, 5% disseminated eudialyte, 2% mosandrite, < 1% altered thorite - Radioactivity consistently above 500 cps, maximum 700 cps SPP 2 on core at 16.28 m.
		(17.46 - 18.59) = mesocratic syenite, 20% mafic, foliated at 65 to 70° TCA, consistently high radiometry, around 400 cps - Some v.f.g. mosandrite.
		(18.59 - 20.30) = c.g., massive, equant Black Pyroxenite, 3% m.g. eudialyte, 3% mosandrite, 1% altered thorite - Maximum radioactivity 1,600 cps SPP 2 on core at 19.50 - (m.g. thorite ± tufs cluster) - Lower contact fairly sharp at 57° TCA.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ppm Zr
11999	66.6 - 72	5.4	100	909	10501
12000	72.0 - 77	5.0	100	747	13239
15051	77 - 82	5.0	96	191	10238
15052	82 - 87	5.0	96	480	12556
15053	87 - 92	5.0	100	4029	11660
15054	92 - 97	5.0	100	693	8558
15055	97 - 102	5.0	98	448	4565
15056	102 - 107	5.0	98	1418	6638
15057	107 - 112	5.0	94	517	6109
15058	112 - 117	5.0	94	548	5850
15059	117 - 122	5.0	98	1028	6648
15060	122 - 127	5.0	98	1477	5484
15061	127 - 132	5.0	98	221	18942
15062	132 - 137	5.0	98	161	15130
15063	137 - 142	5.0	98	440	12690
15064	142 - 147	5.0	98	569	10214
15065	147 - 152	5.0	98	601	26444

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-31 = 14.46 - 14.55 m = Mineralized Black Pyroxenite

GRAPHIC LOG LEGEND:

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 70-KIL-27
Page 3 of 5

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION (Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution))
20.30 (66.6)	24.41 (80.1)	MESOCRATIC SYENITE Medium to dark greenish grey, medium-grained, foliated to lineated, 25 to 30 % mafic, core angle assumed 70° TCA. Overall 2%- fig. "Creamy stubbies". (21.12 - 21.34) = 15 % m-g. to c-g. equigranular in feldspathic band cutting core at 55° TCA.
24.41 (80.1)	25.73 (84.4)	AUGEN SYENITE GNEISS Typical, 2-3% centimetric white feldspar eyes molded around by amphibole laminae- Minor biotite- Core angle 70° TCA.
25.73 (84.4)	26.03 (85.4)	BLACK PYROXENITE Black, c-g., massive, no apparent mineralization, much broken core -
26.03 (85.4)	28.83 (94.6)	MESOCRATIC SYENITE Similar to (20.30 - 24.41), core angle 75° TCA. Minor radioactive zones at 26.8 (350 cps SPP2) and 27.3 m (390 cps SPP2) - Lower contact change at 60° TCA.
28.83 (94.6)	33.44 (109.7)	AUGEN SYENITE GNEISS Similar to (24.41 - 25.73), good augen texture, core angle 70° TCA, 25% long amphibole, 5% biotite- Swirly foliation around 32.6 m. Lower contact at 65° TCA.

LOST CORE (INTERVAL, LENGTH):

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

ASSAY SAMPLE NO.	ASSAY SAMPLE INTERVAL	ASSAY SAMPLE THICKNESS	CORE REC'Y %	ASSAY ppm U	ASSAY ppm Zr
15066	152-157	5.0	98	260	1172
15067	157-162	5.0	98	121	11384
15068	162-167	5.0	100	427	8979

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KV-27
Page 4 of 5

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
33.44	42.58	MESOCRATIC SYENITE
(109.7)	(139.7)	Medium to dark greenish grey, medium grained, foliated at 60° TCA, overall 20% mafic, mostly amphibole, with finer grained sections at 30-35% mafic, and slightly coarser grained sections at 15% mafic.
		(36.88 - 37.70) = grey pyroxenite band at 65° TCA with 7% eudialyte on both contacts. Minor radioactive zone (maximum 350 cps SPP2) from 37.22 to 37.49 m.
42.58	47.24	GREEN ROCK
(139.7)	(155.0)	Typical, medium to dark green, fg, dense, massive, 3% accessory pink zircon, 10% white feldspar patches and bands with locally a few grains of eudialyte. Upper contact at 40° TCA, lower at 0-10° TCA, weaving in and out of the core from 47.2 to 47.5 m.
		(44.71 - 45.11) = 4% c.g. nasaundrite.
		(46.94 - 47.24) = 20-30 % phlogopite near lower contact.
47.24	51.69	MESOCRATIC SYENITE
(155.0)	(169.6)	Similar to (33.44 - 42.50), core angle from 10° in the first 1.5 m, to 70° TCA overwards. Lower contact at 55° TCA.
		(49.83 - 49.96) = minor radioactive zone, maximum 500 cps,

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G.X. MEUSY

DATE October 5, 1990

DRILL COLLAR:

COORDINATES 0+71 S
14+46 E

ELEVATION 346.2 m

BEARING —

INCLINATION -90°

HOLE LENGTH 53.95 m (177')

LENGTH OF HOLE IN OVERBURDEN 2.44 m (8')

LENGTH OF CASING 2.44 m (8')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	53.95	—	-86°30'

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0 - 53.0	Mt Sopris 1990C

DATUM:

HOLE DEPTH: COLLAR+ 3.5' (1.06 m)

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 3.5' (1.06 m)

GEOPHYSICAL: COLLAR+ Ø

HOLE NUMBER 90-KU-26

NUMBER OF PAGES 3

DATE STARTED October 4, 1990 - 20:00

DATE COMPLETED October 5th, 1990 - 10:00

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-26
Page 1 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	2.44	OVERBURDEN (8' Casing)
2.44	5.79	PERALKALIC GRANITE
(8.0)	(19.0)	Overall greyish beige, "cloudy" aspect with black pyroxene molded around 2.3 cm feldspathic ovoid aggregates which define a very crude foliation more or less at 70 - 80° TCA - Overall 15-20% mafic, very homogeneous, exactly as seen in south end of trench T-90-4-
5.79	17.10	PERALKALIC GRANITE GNEISS
(19.0)	(56.1)	Typical, hard, grey, medium-grained, crudely foliated, leucocratic with 10 to 15% amphibole & pyroxene, core angle 70° TCA.
17.10	21.58	BLACK PYROXENITE, MINERALIZED ZONE
(56.1)	(70.8)	Very typical, dark green to greyish green polished surface, black fresh break, massive, coarse-grained (5 to 10 mm pyroxene, exceptionally 1-2 cm) - overall 80% pyroxene, 20% interstitial feldspar, well mineralized -
		(17.10 - 17.37) = malic syenite, core angle 55°, 5% diss. eudialyte bands -
		(17.37 - 17.68) = extremely radioactive zone, maximum 9,000 cps SPP2 on core at 17.5 m on a large

LOST CORE (INTERVAL, LENGTH):

ROCK TYPE | METERS DOWN HOLE | GRAPHIC LOGS

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-30 = 5.30 - 5.40 m = Peralkalic Granite

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ppm Zr
11982	46.1 - 51.1	5.0	100	70	14478
11983	51.1 - 56.1	5.0	100	80	6535
11984	56.1 - 61.1	5.0	100	1340	5791
11985	61.1 - 66.1	5.0	100	2303	4885
11986	66.1 - 70.8	4.7	100	1716	1850
11987	70.8 - 75.8	5.0	100	504	18282
11988	75.8 - 80.8	5.0	100	173	5875
11989	80.8 - 86.8	6.0	100	85	7709
11990	86.8 - 91.8	5.0	100	57	4255

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KV-26
Page 2 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		brown, anhedral thorite crystals.
		(17.68 - 18.65) = homogeneous, massive c.g. Black Pyroxenite, 10% c.g. eudialyte, some thorite, minor mosandrite.
		(18.65 - 18.75) = 15% altered thorite ("creamy" colour) xtals, strong radioactivity, max. 4,000 cps SPP2.
		(18.75 - 20.79) = 20% interstitial feldspar in the Black Pyroxenite, 5% c.g. eudialyte
		(20.79 - 21.58) = sulfide-rich zone, overall 15% pyrite as interstitial matrix, grains and blebs.
21.58	26.46	MESOCRATIC SYENITE
(70.8)	(86.8)	Medium to dark greenish grey, medium-grained, crudely foliated at 55° TCA, overall 20-25% mafic, mostly green amphibole.
		(21.58 - 23.29) = 5% "creamy stubbies", eudialyte-rich band at 60° TCA (mostly in feldspar) at lower contact.
		(23.29 - 24.26) = "augen syenite gneiss", 20% acicular amphibole, core angle 50° TCA.
		(24.26 - 26.46) = "normal" mesocratic syenite, 20% mafic, core angle 55° TCA. Lower contact fairly well defined at 60° TCA.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

ENERGIE ET RESSOURCES · SECTEUR MINES
REÇU
20 MAR 1991
BUREAU RÉGIONAL
ROUYN-NORANDA

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KV-26
Page 3 of 3

PROJECT: _____

INTERVAL in METERS FROM	INTERVAL in METERS TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
26.46 (86.8)	53.95 (177.1)	PERALKALIC GRANITE GNEISS Typically hard, grey, medium-grained, leucocratic (10-15% mafic), poorly foliated to somewhat banded. Radiometrically "dead", dull-slightly vuggy, more mafic, 50.8 - 51.2 m-Core angle at bottom of hole 65° TCA.
53.95 (177.1)		END OF HOLE

ROCK TYPE | METERS DOWN HOLE | GRAPHIC LOGS

ASSAY SAMPLE NO.	ASSAY SAMPLE INTERVAL	ASSAY SAMPLE THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G.X. MEUSY

DATE October 4, 1990

DRILL COLLAR:

COORDINATES 0+18 S
14+27 E

ELEVATION 355.2 m

BEARING —

INCLINATION - 90°

HOLE LENGTH 58.22 m (191')

LENGTH OF HOLE IN OVERBURDEN 0.61 m (2')

LENGTH OF CASING 0.61 m (2')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	58.22 (191')	—	- 87°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0 - 57.4 m	MF Sopris 1000 C

DATUM:

HOLE DEPTH: COLLAR+ 0.60 m

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.60 m

GEOPHYSICAL: COLLAR+ 0.60 m

HOLE NUMBER 90 - KU - 25

NUMBER OF PAGES 5

DATE STARTED October 4, 1990 - 07:00

DATE COMPLETED October 4, 1990 - 13:30

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

ENERGIE ET RESSOURCES - SECTEUR MINES
REÇU
20 MAR 1991
BUREAU RÉGIONAL
ROUYN-NORANDA

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KV-27
Page 5 of 5

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		due to 7% f.g. orange-brown sphene xtals occ. as joint at 70° TCA.
51.69	53.34	PERALKALIC GRANITE GNEISS
(169.6)	(175.0)	Hard, light grey, crudely foliated, 10 to 15% mafic, core angle 50° TCA.
53.34		END OF HOLE

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY : _____
DATE : _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-KU-29
Page 1 of 5

PROJECT : _____

INTERVAL IN METERS FROM	TO	DESCRIPTION Colour, Texture, Mineralogy, Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)	ROCK TYPE
0	0.61	OVERBURDEN (2" CASING)	
0.61	7.07	MESOCRATIC SYENITE	
(2.0)	(23.2)	Medium to dark greenish grey, medium-grained (mafics are locally coarse-grained), crudely foliated, 25-30 % mafic (pyroxene + amphibole), core angle 45 to 55° TCA.	
		(4.88 - 5.15) = minor radioactive zone, max 350 cps SPP 2.	
		(5.58 - 5.67) = narrow m.g. pyroxenite band, radioactivity 350 cps.	
		(5.67 - 7.07) = more mafic, up to 40% - Strong radioactivity at 6.77 m (max 500 cps SPP2) and on lower contact (400 cps SPP 2).	
7.07	11.12	BLACK PYROXENITE / MINERALIZED ZONE	
(23.2)	(36.5)	Dark green to greenish grey polished surface; black fresh break, massive, coarse-grained (5-12 mm), high radioactive background (~ 100 cps). Well mineralized throughout with 4% c.g. eudialyte, minor agrellite, mosandrite. Radioactive zones at 7.71 (500 cps), 9.91 to 10.03 (250 cps SPP 2 on core).	
		(8.81 - 8.93) = Bluish "pectolite" seams, very tough, with minor agrellite and eudialyte. Core angle = 55° TCA	
11.12	12.56	MAFIC SYENITE	
(36.5)	(41.2)	Dark greenish grey, m.g., fairly well foliated, up to 50-60% mafic, core angle 65° TCA.	

METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY 4 ppm	ASSAY Zr ppm
11948	2-7	5.0	80	67	8988
11949	7-12	5.0	99	73	9296
11950	12-17	5.0	99	51	10185
11951	17-22	5.0	100	42	9313
11952	22-27	5.0	100	1425	9685
11953	27-32	5.0	100	2885	4371
11954	32-37	5.0	100	3245	7560
11955	37-42	5.0	98	930	10092
11956	42-47	5.0	98	938	4518
11957	47-52	5.0	100	852	3032
11958	52-57	5.0	100	1208	5701
11959	57-62	5.0	98	298	1157
11960	62-67	5.0	98	1847	10193
11961	67-72	5.0	97	1157	6347
11962	72-77	5.0	97	1162	9795
11963	77-82	5.0	100	1319	6933

LOST CORE (INTERVAL, LENGTH) :

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-29 - 8.84 - 8.94 m = Pectolite in Black Pyroxenite

GRAPHIC LOG LEGEND:

LOGGED BY : _____

DATE : _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.

MINING EXPLORATION

Hole No. 90-KH-25

Page 2 of 5

PROJECT : _____

INTERVAL IN METERS FROM	TO	DESCRIPTION (Colour, Texture, Mineralogy, Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution))
12.56	14.90	GREEN ROCK
(41.2)	(48.9)	Typically medium to dark green, fine-grained, massive, a few white feldspar patches. Upper contact sharp at 60° TCA, lower also sharp at 75° TCA. Some bluish amphibole and phlogopite in the last 1 m – Accessory fluorite & tr. graphite.
14.90	23.10	MESOCRATIC SYENITE
(48.9)	(75.8)	Medium to dark greenish grey, m.g., well foliated to somewhat banded. Core angle around 65° TCA. (14.90 – 15.57) = 5% eudialyte, 5% "creamy stubbies", about 30 to 40% mafic. Radioactive zone (300 cps) at 15.45 m. (15.57 – 18.90) = Very mafic "Dark Green Rock", well foliated at 65° TCA, some "augen" of feldspar. (18.90 – 21.79) = "Augen Syenite Gneiss" (amphibole + biotite). Vlasovite at 61.7, minor eudialyte at 71.5.
23.10	25.60	BLACK PYROXENITE
(75.8)	(84.0)	Dark greenish grey to black, massive, coarse-grained, well mineralized with 4% eudialyte, 2% mosandrite, minor "creamy stubbies". Upper contact "wavy" at 0 to 60° TCA, then follows the core axis, then at 70° TCA at 23.6 m. Minor radioactive zone (max. 250 cps) from 23.59 to 23.77 (eud, mos, agr, minor thorite).

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Y ppm	ASSAY Zr ppm
11964	82-86.5	4.5	100	621	10694
11965	86.5-92	5.5	100	263	6888
11966	92-97	5.0	100	594	1780
11967	97-102	5.0	98	1669	6452
11968	102-107	5.0	98	45	4977
11969	107-112	5.0	100	368	6360
11970	112-117	5.0	100	1213	11871
11971	117-122	5.0	100	1086	9690
11972	122-127	5.0	100	748	15856
11973	127-132	5.0	100	420	7994
11974	132-137	5.0	100	980	36488
11975	137-140	3.0	100	665	12647

LOST CORE (INTERVAL, LENGTH) :

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY : _____
DATE : _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-KU-25
Page 3 of 5

PROJECT : _____

INTERVAL IN METERS FROM	INTERVAL IN METERS TO	DESCRIPTION Colour, Texture, Mineralogy, Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
25.60	33.41	MAFIC SYENITE / MESOCRATIC SYENITE
(84.0)	(109.6)	Overall dark green colour, fine to medium-grained, 20 to 70 % mafic, very irregular, swirly foliation, mostly parallel to core axis.
		(25.60 - 27.80) = Mesocratic Syenite, 25% mafic, core angle 35° TCA. Strong radioactive zone (600 cps SPP 2) from 85.7 to 86.7, followed by feldspathic section with large blasovite xtal (4 cm), minor eudialyte, nosandite and trace fluorite.
		(27.80 - 30.33) = zone of extremely deformed foliation, core angle 0 to 20° TCA, mostly fine-grained mafic syenite and f.g. pyroxenite, a few micaceous sections.
		(30.33 - 30.48) = radioactive zone, maximum 350 cps SPP 2, associated with a 5 cm thick "vein like" band of eudialyte and "creamy stubbies" cutting the core at 15-20° TCA.
		(33.28 - 33.41) = radioactive zone on lower contact, maximum 500 cps SPP 2 - contact strong at 45° TCA.
33.41	35.39	MESOCRATIC SYENITE
(109.6)	(116.1)	Similar to (14.90 - 23.10). Core angle around 40-45° TCA. Minor eudialyte 33.8 to 33.9 and from 35.1 to 35.3, the latter section being associated with a minor radioactive zone (300 cps).

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS						

ASSAY SAMPLE NO.	ASSAY SAMPLE INTERVAL	ASSAY SAMPLE THICKNESS	CORE REC'Y %	ASSAY			

LOST CORE (INTERVAL, LENGTH) :

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE) :

GRAPHIC LOG LEGEND :

		(37.52 - 39.01) = Green Rock, 30% SGP, accessory zircon. Good radioactive zone from 37.7 to 37.9, maximum 800 cps SPP 2 on core, associated with disseminated thorite, minor mosandrite and eudialyte (or miserite ??).
39.01	40.39	MESOCRATIC SYENITE
(128.0)	(132.5)	Typical, 15% mafic, core angle 60° TCA, tr. eudialyte from 39.14 to 39.62 m
40.39	42.67	GREEN ROCK / BLACK PYROXENITE
(132.5)	(140.0)	Well mineralized, mixed section with 80% typical Green Rock and 20% very coarse Black Pegmatite

LOGGED BY : _____
DATE : _____

DIAMOND DRILL

UNION OIL COMPANY OF CANADA
MINING EXPLORATION

Hole No. 90-KK-25
Page 4 of 5

PROJECT : _____

INTERVAL IN METERS FROM	INTERVAL IN METERS TO	DESCRIPTION Colour, Texture, Mineralogy, Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)	ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS
35.39	39.01	GREEN ROCK / SILVER GREY PYROXENITE			
(116.1)	(128.0)	Mixed zone, 20% SGP, 40% Meso. Syen. and 40% typical Green Rock - Well mineralized throughout, as detailed below:			
		(35.39 - 36.15) = well mineralized pyroxenite, 5% eudialyte, 2% mosandrite, trace thorite with radioactive zone from 35.4 to 35.7 (300 cps) -			
		(36.15 - 37.52) = mesocratic syenite, not mineralized, core angle assumed 60° TCA.			
		(37.52 - 39.01) = Green Rock, 30% SGP, accessory zircon. Good radioactive zone from 37.7 to 37.9, maximum 800 cps SPP 2 on core, associated with disseminated thorite, minor mosandrite and eudialyte (or miserite ??) -			
39.01	40.39	MESOCRATIC SYENITE			
(128.0)	(132.5)	Typical, 15% mafic, core angle 60° TCA, tr. eudialyte from 39.14 to 39.62 m			
40.39	42.67	GREEN ROCK / BLACK PYROXENITE			
(132.5)	(140.0)	Well mineralized, mixed section with 80% typical Green Rock and 20% very coarse Black Pyroxenite -			
		(40.39 - 40.84) = Black Pyroxenite, pyroxene up to 6-8 cm, 2-3% interstitial eudialyte			
		(40.84 - 42.67) = Green Rock, accessory fg. pink zircon -			

ASSAY SAMPLE NO.	ASSAY SAMPLE INTERVAL	ASSAY SAMPLE THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH) :

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE) :

GRAPHIC LOG LEGEND :

LOGGED BY : _____
DATE : _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-KII-23
Page 5 of 5

PROJECT : _____

INTERVAL IN METERS FROM	INTERVAL IN METERS TO	DESCRIPTION Colour, Texture, Mineralogy, Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
42.67	48.83	MESOCRATIC SYENITE
(140.0)	(160.2)	Medium greenish grey, medium-grained, crudely foliated at 45° TCA; lower contact sharp at 60° TCA. Minor radioactive zone at 48.04 to 48.12, maximum 350 cps SPP2 on core. Rock harder than "typical" syenite, contains some quartz (~ 5% ?).
48.83	50.35	GREEN ROCK
(160.2)	(165.2)	Typical, medium to dark green, f.g., dense, m/c to 20% bluish amphibole and 10% pink zircon, minor sphene. Narrow bands of SGP from 49.44 to 49.86 and 50.44 to 50.78. Spotty radioactivity (150 cps) from 49.8 to 50.14 m.
50.35	53.16	PHLOGOPITE - DIOPSIDE - CALCITE MARBLE
(165.2)	(174.4)	Dirty greyish green, mottled, impure, medium to coarse-grained, 25% diopside, 20% phlogopite, 50% calcite, 5% chondrodite-fluorite and other impurities.
53.16	54.25	GREEN ROCK
(174.4)	(178.0)	Similar to (48.83 - 50.35), 40% SGP.
54.25	58.22	PERALKALIC GRANITE GNEISS
(178.0)	(191.0)	Grey, medium-grained, crudely foliated ("streaky"), 15% mafic, core angle 35 to 40° TCA.
58.22		END OF HOLE

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %
11976	155.2 - 160.2	5.0	100
11977	160.2 - 165.2	5.0	100
11978	165.2 - 170.2	5.0	100
11979	170.2 - 174.4	4.2	100
11980	174.4 - 178	3.6	100
11981	178 - 183	5.0	100

ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G.X. Mercy

DATE October 4, 1990

DRILL COLLAR:

COORDINATES 0+22 N
14+36 E

ELEVATION 358m

BEARING —

INCLINATION −90°

HOLE LENGTH 38.1 m (125')

LENGTH OF HOLE IN OVERBURDEN 1.83 m (6.0')

LENGTH OF CASING 1.83 m (6.0')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	38.1 m	—	−89°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0 - 36.9 m	Mt Sopris 1000C

DATUM:

HOLE DEPTH: COLLAR+ 0.82 m (2.7')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.82 m (2.7)

GEOPHYSICAL: COLLAR+ ∅

HOLE NUMBER 90-KK-24

NUMBER OF PAGES 3

DATE STARTED October 3, 1990 - 21:00

DATE COMPLETED October 4, 1990 - 01:00

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY : _____

DATE : _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.

MINING EXPLORATION

Hole No. 90-KU-24

Page 1 of 3

PROJECT : _____

INTERVAL IN METERS FROM	TO	DESCRIPTION Colour, Texture, Mineralogy, Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	1.83	OVERBURDEN (6' Casing)
1.83	2.62	MESOCRATIC SYENITE
(6.0)	(8.6)	Dark greenish grey, medium to coarse-grained (mafic 4-8 mm; some clots up to 1 cm), poorly foliated, 25 to 35 % amphibole - Mineralized with 2-4% "creamy stubbies", some (?) mosandrite -
2.62	3.11	SILVER GREY PYROXENITE
(8.6)	(10.2)	Dark green to greenish grey polished surfaces, dark green to black on fresh break, massive, coarse-grained (4 to 10 mm), 50 to 65 % amphibole, 25% interstitial feldspar, 6 % m.g. eudialyte, 4% mosandrite - Both contacts broken.
3.11	4.72	GREEN ROCK
(10.2)	(15.5)	Dark green with a pale apple green section of granular diopside rock, fine-grained, dense, rather massive, up to 10-15% bluish amphibole - Minor, sharp, radioactive zone at 4.05m: 400 cps SPP2 -
4.72	8.17	MESOCRATIC SYENITE
(15.5)	(26.8)	Typical greenish grey, medium-grained, poorly foliated at 90° TCA, 15% amphibole - Lower contact: sharp at 55° with about 5 cm semi-massive, subhedral, bright red eudialyte -
8.17	12.56	AUGEN SYENITE GNEISS
(26.8)	(41.2)	Very typical rock type as observed in the trenches - Coarse-grained, very well foliated with about

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS		ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ppm Zr
				11923	6.0-8.6	2.6	96	1921	8454
				11924	8.6-10.2	1.6	94	2490	8669
				11925	10.2-15.5	5.3	79	1528	6907
				11926	15.5-20.5	5.0	100	364	15251
				11927	20.5-26.8	6.3	84	434	13032
				11928	26.8-32	5.2	100	562	5066
				11929	32-37	5.0	100	801	6035
				11930	37-42	5.0	98	1429	5605
				11931	42-47	5.0	98	623	12602
				11932	47-52	5.0	99	52	17616
				11933	52-57	5.0	99	49	18081
				11934	57-62	5.0	100	75	14923
				11935	62-67	5.0	100	120	11601
				11936	67-72	5.0	100	117	14339
				11937	72-77	5.0	100	169	11856
				11938	77-82	5.0	100	56	13613

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY : _____
DATE : _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-KU-24
Page 2 of 3

PROJECT : _____

INTERVAL IN METERS FROM	TO	DESCRIPTION (Colour, Texture, Mineralogy, Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution))
		15% long, acicular (1 mm x 1.5 to 2.0 cm) green amphibole and 5% dark brown to black biotite, incipient augen texture with centimetric feldspar augens - swirly foliation, deformed zone, core angle varies from 40 to 80° TCA.
12.56 (41.2)	26.52 (87.0)	MESOCRATIC SYENITE Typically greenish gray, medium-grained, weakly foliated, 15% mafic (amphibole & pyroxene), core angle generally 65° TCA. Minor radioactive zones on fine-grained, more mafic bands with "creamy stubbies" at 14.6 (300 cps SPP 2), 14.9 (250 cps SPP 2), 15.2 (200 cps SPP 2) and at 17.6 m (250 cps SPP 2). Heavy "Creamy stubbies" - 5 to 7% - from 20.4 to 21.3 m. (12.56 - 13.05) = well mineralized, 10% eudialyte, some vlasovite, core banded at 60° TCA.
26.52 (87.0)	31.21 (102.4)	BLACK PYROXENITE / MINERALIZED ZONE Overall dark green to bluish grey on polished surface, black on a fresh break, massive, coarse to very coarse (pyroxenes 5 to 10 mm, exceptionally up to 5 cm, good sheen). About 75% black pyroxene, 15% angular, white interstitial feldspar, and 10% mineralization consisting of eudialyte > eg mosandrite > soft pale, turquoise blue unidentified mineral and minor agrellite.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY 4 ppm	ASSAY Zr ppm
11939	82-87	5.0	100	423	>20,000
11940	87-92	5.0	100	821	5853
11941	92-97	5.0	100	360	1965
11942	97-102.4	5.4	100	2227	>20,000
11943	102.4-107.3	4.9	100	1273	>20,000
11944	107.3-112	4.7	100	680	>20,000
11945	112-117	5.0	100	1113	13456
11946	117-121	4.0	100	866	10847
11947	121-125	4.0	100	396	17996

LOST CORE (INTERVAL, LENGTH) :

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-27 = 9.70 - 9.80 m = Augen Syenite Gneiss
KU-28 = 30.20 - 30.30 m = Mineralized Black Pyroxenite

GRAPHIC LOG LEGEND:

LOGGED BY : _____
DATE : _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-RH-24
Page 3 of 3

PROJECT : _____

INTERVAL IN METERS FROM	TO	DESCRIPTION (Colour, Texture, Mineralogy, Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution))	ROCK TYPE
		Narrow, strong radioactive zones at 29.6 (200 cps), and 30.8 (300 cps) - Agrellite - feldspar - eudialyte "vein" almost parallel to core from 30.1 to 30.6 m, strong radioactivity (500 cps SPP 2) at 30.6, followed by swirly, fine-grained pyroxenite, as mapped in central part of Trench 2.	
31.21	36.33	MESOCRATIC SYENITE	
(102.4)	(119.2)	Greenish grey, medium-grained, 20% mafic, weakly foliated at 45-60° TCA.	
		(32.30 - 32.70) = Fine-grained, mafic band with strong radioactivity, maxima 500 cps at 32.3 and at 32.6 m - Core angle 40-45° TCA.	
36.33	38.10	GREEN ROCK	
(119.2)	(125.0)	Starts with 0.5 m of typical Silver Grey Pyroxenite, followed by 0.5 m of pure white feldspar with long-bladed green pyroxene and finally typical fg., dense, massive green rock. About 7% pink zircon 37.3 to 37.9 m.	
		(36.3 - 36.7 m) = radioactive zone, maximum 500 cps SPP 2 at 36.5 m.	
38.10		END OF HOLE	

METERS DOWN HOLE	GRAPHIC LOGS	ASSAY SAMPLE NO.	ASSAY SAMPLE INTERVAL	ASSAY SAMPLE THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH) :

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G.X. Mercy

DATE October 4, 1990

DRILL COLLAR:

COORDINATES 0+33 N
13+89 E

ELEVATION 348.5 m

BEARING —

INCLINATION -90°

HOLE LENGTH 38.1 m (125')

LENGTH OF HOLE IN OVERBURDEN 1.22 m (4')

LENGTH OF CASING 1.22 m (4')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE N/Q

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	38.1	—	-89°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0 - 37.1 m	Mt Sopris 1000 C

DATUM:

HOLE DEPTH: COLLAR+ 0.90 m

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.90 m

GEOPHYSICAL: COLLAR+ ø

HOLE NUMBER 90-KU-23

NUMBER OF PAGES 3

DATE STARTED October 3, 1990 - 12:00 noon

DATE COMPLETED October 3, 1990 - 17:00

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY : _____
DATE : _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-KU-23
Page 1 of 3

PROJECT : _____

INTERVAL IN METERS FROM	TO	DESCRIPTION Colour, Texture, Mineralogy, Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)	ROCK TYPE
0	1.22	OVERBURDEN (4" Casing)	
1.22	6.86	MESOCRATIC SYENITE	
(4.0)	(22.5)	Medium greenish grey, medium-grained, crudely foliated, 15 to 20 % mafic (amphibole and pyroxene), about 30 to 40 % mafic in the last 2 m. Core angle generally around 50 - 55° TCA. Lower contact sharp at 50° TCA.	
		(4.27 - 4.36) = minor radioactivity (200 cps SPP 2) associated with narrow band of m.g. pyroxenite.	
		(4.97 - 5.15) = minor radioactivity (200 cps SPP 2 on core) with band of long-bladed green pyroxenite with about 20 % interstitial feldspar.	
6.86	8.75	SILVER GREY PYROXENITE	
(22.5)	(28.7)	Fairly typical although somewhat heterogeneous: Silvery grey to green polished surface, dark green on a fresh break, coarse to very coarse-grained (5 to 12 mm, exceptionally 3 cm), massive, about 30 % "Green Rock" and "grass green mineral" mixed in as bands and matrix. Overall 10% purple fluorite and 4% pale brown mosandrite, concentrated in the contact zones. Minor radioactivity near upper contact (200 - 250 cps SPP 2) - Lower contact fairly sharp at 60° with 5% mosandrite and minor radioactivity up to 300 cps SPP 2.	

METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Y ppm	ASSAY Zr ppm
11898	4.0 - 7.0	3.0	90	27	>20,000
11899	7.0 - 12.0	5.0	96	65	20,000
11900	12 - 17	5.0	96	194	>20,000
11901	17 - 22	5.0	98	475	19332
11902	22 - 27	5.0	98	1484	8217
11903	27-32	5.0	100	1278	14370
11904	32-37	5.0	100	533	4623
11905	37 - 42	5.0	100	597	5428
11906	42-47	5.0	100	354	1655
11907	47-52	5.0	100	269	1080
11908	52-57	5.0	100	300	428
11909	57 - 62	5.0	100	494	645
11910	62 - 67	5.0	100	382	1105
11911	67-72	5.0	100	1336	5673
11912	72-77	5.0	100	425	14137
11913	77-82	5.0	96	233	17677
11914	82-87	5.0	96	202	9223

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-25 = 7.56 - 7.66 m = Silver Grey Pyroxenite with fluorite

GRAPHIC LOG LEGEND:

LOGGED BY : _____
DATE : _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-KU-23
Page 2 of 3

PROJECT : _____

INTERVAL IN METERS FROM	TO	DESCRIPTION (Colour, Texture, Mineralogy, Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution))
8.75	10.12	MESOCRATIC SYENITE
(28.7)	(33.2)	Dark greenish grey, medium-grained, 30 to 35% mafic, crudely foliated at 70° TCA - About 2% "Creamy Stubbies" throughout.
10.12	21.46	GREEN ROCK
(33.2)	(70.4)	Medium pistachio green to dark green, fine-grained, dense, massive, phlogopitic - Overall 10 to 15% phlogopite, 2 to 4% interstitial calcite, a few large feldspar patches. Upper contact broken, lower at 64° TCA.
		(20.66 - 20.79) = minor radioactive zone, max 250 cps SRP 2 on core, 1-2% pink zircon, 5% feldspar patches, other unknown exotics - Also one centimetric blob of britholite, visible only on split core!
1.46	28.25	MESOCRATIC SYENITE
(70.4)	(92.7)	Medium greenish grey, medium-grained, crudely foliated at 70° TCA, 20% mafic.
		(24.14 - 25.48) = S.G.P. and Green Rock mixed zone, very heterogeneous, swirley foliation, 20 to 45° TCA, 1-2% m.g. pink zircon.

ROCK TYPE

METERS DOWN HOLE

GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Y ppm	ASSAY Zr ppm
11915	87 - 92	5.0	96	403	15701
11916	92 - 97	5.0	96	1440	5441
11917	97 - 102	5.0	100	1130	7091
11918	102 - 107	5.0	100	90	7212
11919	107 - 112	5.0	100	290	16833
11920	112 - 117	5.0	100	86	7185
11921	117 - 122	5.0	100	38	7877
11922	122 - 125	3.0	100	60	12969

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-26 : 20.66 - 20.78 m = Mineralized (?) Green Rock

GRAPHIC LOG LEGEND:

LOGGED BY : _____
DATE : _____

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Hole No. 90-KU-23
Page 3 of 3

PROJECT : _____

INTERVAL IN METERS FROM	TO	DESCRIPTION Colour, Texture, Mineralogy, Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)	ROCK TYPE
28.25	32.37	CALC-SILICATE ZONE	
(92.7)	(106.2)	Mixed section with Silver Grey Pyroxenite, Green Rock and interlayered Mesocratic Syenite. All rock types are fairly typical.	
		(28.25 - 30.11) = Silver Grey Pyroxenite, c.g., equant, typical - Well mineralized with 5% pale brown Mossandrite (0.7 x 4 mm lathes) and an unknown brownish red mineral, 29.56 to 30.11 m.	
		(30.11 - 30.69) = Mesocratic Syenite, 15% mafic, core angle 60° TCA.	
		(30.69 - 32.37) - Green Rock, typical, dark green, a few feldspathic 2 mm veinlets almost parallel to the core axis. Lower contact at 60° TCA.	
32.37	38.10	MESOCRATIC SYENITE	
(106.2)	(125.0)	Medium greenish-grey, medium-grained, crudely foliated, core angle 50°.	
		(32.37 - 33.44) = about 7-8% finely disseminated "Creamy Stubbies".	
		(33.83 - 34.53) = nodular, almost augen-like section, core angle 30°.	
38.10		END OF HOLE	

METERS DOWN HOLE	GRAPHIC LOGS	ASSAY SAMPLE NO.	ASSAY SAMPLE INTERVAL	ASSAY SAMPLE THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G.X. MEUSY

DATE October 4, 1990

DRILL COLLAR:

COORDINATES 0+05 S
12+27 E

ELEVATION 329.5 m.

BEARING —

INCLINATION -90°

HOLE LENGTH 46.02 m (151')

LENGTH OF HOLE IN OVERBURDEN 1.22 m (4')

LENGTH OF CASING 1.22 m (4')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	46.02	—	-87°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0-45.0 m	Mt Sopris 1000C

DATUM:

HOLE DEPTH: COLLAR+ 0.3 (1')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.3 (1')

GEOPHYSICAL: COLLAR+ Ø

HOLE NUMBER 90-KH-22

NUMBER OF PAGES 4

DATE STARTED October 3, 1990 - 01:00

DATE COMPLETED October 3, 1990 - 08:00

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KM-22
Page 1 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	1.22	OVERBURDEN (4' Casing)
1.22 (4.0)	4.57 (15.0)	BLACK PYROXENITE / MAFIC SYENITE Dominant green colour on polished surfaces, dark green to black on a fresh break. Generally massive, coarse-grained, heterogeneous, as below: (1.22 - 1.98) = Silver Grey Pyroxenite grading into Black Pyroxenite, strongly mineralized in the last 0.3m with 8% eudialyte, 5% mosandrite, 2% exotics - Strong radioactive zone, maximum 550 cps SPP2 on core from 1.80 to 1.89 m. (1.98 - 3.05) = Mafic Syenite, 50% amphibole, medium-grained, crudely foliated at 50° TCA - Tr mosandrite (3.05 - 3.72) = Green Rock (20%) and Black Pyroxenite (80%) Minor radioactive zone (Max 200 cps SPP2) from 3.05 to 3.17 m - Trace mosandrite. (3.72 - 4.17) = Medium-grained Silver Grey Pyroxenite - (4.17 - 4.57) = Mafic Syenite, 10% eudialyte, 4% mosan-drite, core angle 55° TCA -
4.57 (13.0)	7.74 (25.4)	LEUCOCRATIC SYENITE Light grey to greenish grey, medium-grained, overall 10% mafic (amphibole and pyroxene), crudely foliated at 45° TCA. Gradational lower contact over ~25 cm (Progressive increase in mafic content and "Green Rock"

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY U ppm	ASSAY Zr ppm
11867	4.0-6.5	2.5	92	4092	1844
11868	6.5-10.0	3.5	71*	1023	7264
11869	10.0-15.0	5.0	92	1391	14235
11870	15.0-20	5.0	98	252	12649
11871	20-25	5.0	100	86	16336
11872	25-30	5.0	100	437	4820
11873	30-35	5.0	100	177	1238
11874	35-40	5.0	100	720	361
11875	40-45	5.0	100	180	4526
11876	45-50	5.0	100	165	14745
11877	50-55	5.0	100	323	16758
11878	55-60	5.0	100	183	15631
11879	60-63.3	5.3	92	88	13627
11880	63.3-70	4.7	100	276	6835
11881	70-75	5.0	100	654	1010
11882	75-77.1	2.1	98	800	9894

LOST CORE (INTERVAL, LENGTH):

* 4.0 - 10.0 = 1' missing, probably spread out over the whole interval (Broken Core)

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

LOGGED BY: _____
DATE: _____

Hole No. 87-KV-22
Page 2 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION (Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution))
7.74	9.69	SILVER GREY PYROXENITE (?)
(25.4)	(31.8)	Silver Grey on a polished surface with good sheen, black on fresh break. Extremely coarse-grained (8 to 10 cm long sections of massive grey amphibole) from 7.9 to 8.5, medium-grained otherwise. About 20% angular white feldspar interstitial to the amphibole in the v.c.g. section, none otherwise. Overall 4% eudialyte, 1% mosandrite, 1% zircon. Green rock on one side of the core from 7.74 to 8.05 m.
9.69	14.11	GREEN ROCK
(31.8)	(46.3)	Typical medium grass green to dark green, dense, massive, fine-grained, trace interstitial carbonate. Minor radioactive zone (max. 400 cps SPP 2) near lower contact, from 13.8 to 13.9 m. Lower contact irregular, some feldspar bands at 50° TCA.
14.11	19.90	MESOCRATIC SYENITE
(46.3)	(65.3)	Greenish grey, medium-grained, 20% mafic, crudely foliated. (14.63 - 14.75) = minor radioactivity, max 300 cps SPP 2. 2% "Creamy Stubbies", core angle 50° TCA. (14.97 - 17.16) = continuous zone of high radioactivity, maximum 500 cps SPP 2 at 15.2 core

LOST CORE (INTERVAL, LENGTH):

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Au ppm	ASSAY Zr ppm
11883	77.1-81	3.9	98	222	12730
11884	81-86	5.0	100	169	6739
11885	86-91	5.0	100	240	4421
11886	91-96	5.0	98	350	5793
11887	96-101	5.0	100	437	10508
11888	101-106	5.0	96	1075	11889
11889	106-111	5.0	98	55	9990
11890	111-116	5.0	98	75	10952
11891	116-121	5.0	100	77	11086
11892	121-126	5.0	100	514	9978
11893	126-131	5.0	100	463	9780
11894	131-136	5.0	100	284	5804
11895	136-141	5.0	98	568	5985
11896	141-146	5.0	98	166	7192
11897	146-151	5.0	98	144	10312

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KV-22
Page 3 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		450 cps SPP 2 at 16.82 m.
19.90	21.34	GREEN ROCK / SILVER GREY PYROXENITE
(65.3)	(70.0)	Mixed, somewhat banded section with 60% dark, fine-grained Green Rock, 20% SGP and 10% coarse calcite patches, minor Mesocratic Syenite bands. Accessory zircon in the Green Rock. Upper contact sharp at 65° TCA, lower also sharp at 40° TCA.
21.34	23.50	PHLOGOPITE - DIOPSIDE - CALCITE MARBLE
(70.0)	(77.1)	Heterogeneous, crudely banded with Green Rock and Phlogopite Rock sections. The marble itself is pale lime-green, mottled, with 20% diopside, 10% phlogopite, 65% calcite and 5% combined britholite and fluorite. Crude banding at 50° TCA. (21.79 - 22.68) = strongly radioactive zone, maximum 1,250 cps at 22.25 m, rest of the zone around 800 to 1,000 cps SPP 2 on core. Up to 10% britholite in small (1-2 mm), rounded brown grains with resinous luster.
23.50	46.02	MESOCRATIC SYENITE
(77.1)	(151.0)	Fairly typical medium greenish grey, m.g., crudely foliated to weakly banded, 10 to 20% mafic, core angle around 60° TCA. Upper contact sharp at 70° TCA, irregular. Several narrow bands with up to 7% "Creamy Stubbies".

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KV-22
Page 4 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(26.49 - 26.61) = brown biotitite band at 65° TCA
		(31.61 - 32.49) = m-g. green pyroxenite band at 50°
		(36.42 - 36.64) = c-g. black pyroxenite band at 70° TCA
		(44.07 - 44.29) = c-g. black pyroxenite band at 65° TCA
		(45.20 - 45.72) = m-g. to c-g. Silver Grey pyroxenite band at 80° TCA -
46.02		END OF HOLE

ROCK TYPE | METERS DOWN HOLE | GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G.X. Mercy

DATE October 3, 1990

DRILL COLLAR:

COORDINATES 0+75 S
12+27 E

ELEVATION 327 m

BEARING —

INCLINATION -90°

HOLE LENGTH 46.02 m (151')

LENGTH OF HOLE IN OVERBURDEN 1.22 m (4')

LENGTH OF CASING 1.22 m (4')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	46.02 m	—	-89°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0 - 45.0 m	MT Sopris 1000C

DATUM:

HOLE DEPTH: COLLAR+ 0.61 m (2')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.61 m (2')

GEOPHYSICAL: COLLAR+ Ø

HOLE NUMBER 90-KU-21

NUMBER OF PAGES 2

DATE STARTED October 2, 1990 - 08:00

DATE COMPLETED October 2, 1990 - 21:30

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-21
Page 1 of 2

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION — Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	1.22	OVERBURDEN (4" Casing)
1.22	10.42	PERALKALIC GRANITE GNEISS
(1.22)	(34.2)	white to light grey, fine to medium-grained, hard, massive to poorly foliated ("streaky"), leucocratic (2 to 12% mafic, both amphibole and pyroxene), overall 15-20% quartz, with some sections up to 30%. No exotics, no radioactivity.
		(1.22 - 2.96) = fine-grained (< 1mm), massive, mesocratic rock with 15% amphibole, no visible quartz.
		(2.96 - 7.01) = mostly white, coarse-grained felsic facies with 30% grey quartz, 10% dark green pyroxene clots (8 - 15 mm), 60% white feldspar. Intrusive contact phase ? Minor fg. syenitic band included between 4.3 and 5.2 m.
		(7.01 - 10.42) = typical peralkalic Granite Gneiss, crudely foliated at 45° TCA. Still about 20% quartz.
10.42	20.09	MESOCRATIC SYENITE
(34.2)	(65.9)	Generally medium greenish grey, medium-grained, moderately foliated, mesocratic with 15 to 20% mafic, amphibole and pyroxene. Some visible quartz locally (max 3%). Core angle usually around 45° TCA. Upper contact fairly sharp at 40° TCA, lower contact also sharp at 60° TCA.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm	ASSAY ppm
11856	27 - 32	5.0	100	1331	11775
11857	32 - 34.2	2.2	100	230	743
11858	34.2 - 37	2.8	100	1345	11850
11859	37 - 42	5.0	100	2421	9469
11860	42 - 47	5.0	100	1638	8791
11861	47 - 52	5.0	100	479	11061
11862	52 - 57	5.0	100	1147	6565
11863	57 - 62	5.0	100	360	12590
11864	62 - 65.9	3.9	100	549	11408
11865	65.9 - 70.9	5.0	100	80	13008

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-21
Page 2 of 2

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION (Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution))
		(10.67 - 13.87) = About 5% disseminated brownish red mineral (possibly altered eudialyte, in aggregates up to 1 cm, with individual crystals at 1 to 2 mm. Minor radioactive zones at 10.67 to 10.85 (250 cps SPP2), 11.58 to 11.83 (150 cps) and 12.50 to 12.68 m (150 cps SPP 2 on core). Core angle of the bands of red mineral 45-50°.
		(13.87 - 17.74) = Typical, dark Mesocratic Syenite. Minor radioactive zones at 14.93 to 15.42 (Max 200 cps), 16.92 to 17.04 (Max 200 cps SPP 2), generally associated with narrow bands of "Creamy Stubbies" at 45-50° TCA.
		(17.74 - 18.13) = A few narrow bands of m.g. pyroxenite
		(18.41 - 18.50) = Beautiful vlasovite crystals, in 2-3 cm aggregates, partially altered along cleavages.
		(19.75 - 20.01') = massive medium-grained Black Pyroxenite band at 60° TCA, 3-4% "Creamy Stubbies"
79	46.02	PERALKALIC GRANITE GNEISS
(65.9)	(151.0)	Overall light grey with a subtle bluish hue, very hard, leucocratic to mesocratic with 10 to 20% mafics, mostly amphibole, poorly foliated ("streaky foliation") to weakly banded at 65° TCA, a few orangey feldspar "cloudy bands" in the last 20'. Very homogeneous and "dull".
46.02		END OF HOLE

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY 4 ppm	ASSAY 5 ppm
11866	70.9-75.9	0	100	395	1281

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU 23 = 11.86 to 11.95 = Red mineral in Meso. Syen.
KU 24 = 18.44 to 18.50 = Vlasovite in Meso. Syen.

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G. X. MEUSY

DATE October 2, 1990

DRILL COLLAR:

COORDINATES 0+62.5 S
12+82 E

ELEVATION 329 m

BEARING —

INCLINATION −90°

HOLE LENGTH 46.02 m (151')

LENGTH OF HOLE IN OVERBURDEN 1.52 m (5')

LENGTH OF CASING 1.52 m (5')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test			−90°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0 - 45.1 m	Mt Sopris 1000 C

DATUM:

HOLE DEPTH: COLLAR+ 0.30 m (1')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.30 m

GEOPHYSICAL: COLLAR+ ø

HOLE NUMBER 90 - KU - 20

NUMBER OF PAGES 2

DATE STARTED October 1, 1990 - 19:00

DATE COMPLETED October 2, 1990 - 06:00

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-20
Page 1 of 2

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION (Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution))
0	1.52	OVERBURDEN (5' Casing)
1.52	6.10	MAFIC SYENITE
(5.0)	(20.0)	Dark green, medium to coarse-grained (4 to 6 mm) with a few very coarse-grained narrow sections of massive pyroxenite. Generally well foliated to weakly banded, a few sections with augen-like texture. Overall 60% mafic. Core angle around 50-55° TCA.
		(1.52 - 2.13) = a few narrow (1 to 2 cm) bands of black m.g. to c.g. pyroxenite at 50° TCA.
		(3.35 - 4.57) = augen-like texture, 4% "Creamy Stubbies", trace (< 1%) eudialyte.
		(4.57 - 5.76) = well lineated, mesocratic syenite, 30 to 40% amphibole, core angle 55° TCA, 1% c.s.
		(5.76 - 6.10) = black to grey, medium-grained (4 mm) pyroxenite, massive, 50% equant pyroxene, 45% interstitial white feldspar, 5% c.g. eudialyte, minor mosandrite and agrellite on upper contact at 40-50° TCA. Sharp lower contact at 70° TCA.
6.10	12.01	MESOCRATIC SYENITE
(20.0)	(39.4)	Medium greenish-grey, medium-grained, homogeneous, fairly well foliated at 68° TCA - Mesocratic with 20-25% mafic, mostly greenish acicular amphibole, some leucocratic sections.
		(8.93 - 9.36) = leucocratic band, about 5% mafic overall, some bands are hololeucocratic. Core angle 55°. Trace fine-grained eudialyte.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Y ppm	ASSAY Zr ppm
11839	5 - 7	2.0	99	279	10813
11840	7 - 12	5.0	100	376	5866
11841	12 - 17	5.0	100	667	4699
11842	17 - 22	5.0	100	1955	7172
11843	22 - 27	5.0	100	138	5899
11844	27 - 32	5.0	100	543	7829
11845	32 - 37	5.0	100	575	2318
11846	37 - 39.4	2.4	100	368	2148
11847	39.4 - 42	2.6	100	346	975
11848	42 - 47	5.0	100	257	1692
11849	47 - 52	5.0	100	383	597
11850	52. 57	5.0	100	115	805
11851	57 - 62	5.0	100	122	1029
11852	62. 67	5.0	100	405	8954
11853	67 - 72	5.0	98	1141	2373
11854	72 - 77	5.0	98	609	3638

ENERGIE ET RESSOURCES - SECTEUR MINES
REÇU
20 MAR 1991
BUREAU RÉGIONAL ROUYN-NORANDA

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU 19 = 5.76 to 5.86 - Mineralized contact of Black Pyroxenite

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KV-20
Page 2 of 2

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION: Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		possibly some vlasovite at 8.27 m (see Geological Sample) (6.34 - 6.52) = radioactive zone, maximum 500 cps SPP2 on core - Narrow m-g. pyroxenite band with ~1% chocolate brown mineral and a hairline fracture parallel to core with reddish, possibly hematitic, material.
12.01	46.02	PERALKALIC GRANITE GNEISS
(39.4)	(151.0)	Typically grey, medium-grained, leucocratic with 5 to 10% mafic (amphibole & pyroxene), poorly foliated (massive to "streaky") no exotics -
		(12.0 - 17.49) = leucocratic (< 5% c-g. mafic clots), white to light greyish-beige, massive to vaguely banded, hard, 25% quartz, 5% mafic, 70% feldspar. Possibly an intrusive contact zone.
		(20.27 - 20.48) = narrow, contorted band of syenitic material, radioactivity 150 cps SPP 2 on core -
		(21.43 - 22.34) = syenite band, mesocratic, poorly foliated, f-g to m-g., 1% beige f-g. exotic accessories - Upper contact ~80° TCA, lower at 65° TCA.
		(29.78 - 29.93) = huge "blob" of massive graphite associated with quartz, long-bladed green pyroxene and an unknown brownish-beige mineral.
		(33.65 - 33.80) = minor radioactive zone, max. 200 cps SPP2, 10% f-g. "creamy stubbies", core angle 67° TCA.
46.02 (151.0)		END OF HOLE

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
11855	108.8 - 111.8	3'	100	435	11968

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KV-20 = 8.23 to 8.33 - Meso. Syenite w nepheline (?)
KV-21 = 15.0 to 15.1m = Felsic Zone in PGG.

GRAPHIC LOG LEGEND:
KV-22 = 29.8 to 29.9 = Graphite in P.G.G.

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KITAWA PROJECT

LOGGED BY G.X. MEUSY

DATE October 2, 1990

DRILL COLLAR:

COORDINATES 0+08.5 S
12+80 E

ELEVATION 331.5 m

BEARING —

INCLINATION -90°

HOLE LENGTH 46.02 m (151')

LENGTH OF HOLE IN OVERBURDEN 1.52 m (5')

LENGTH OF CASING 1.52 m (5')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	46.02 m	—	-88°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0 - 45.0 m	MT Sopris 1000 C

DATUM:

HOLE DEPTH: COLLAR+ 1.52 m

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 1.52 m

GEOPHYSICAL: COLLAR+ 0

HOLE NUMBER 90-KU-19

NUMBER OF PAGES 4

DATE STARTED October 1, 1990 - 09:30

DATE COMPLETED October 1, 1990 - 15:00

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 87 - KV - 19
Page 1 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	1.52	OVERBURDEN (5' Casing)
1.52	4.36	BLACK PYROXENITE (?)
(5.0)	(14.3)	Dark bluish-grey to green on polished surface, black (pyroxene), white (feldspar) and pink (eudialyte) on fresh break. Massive, equant, course-grained (5 to 8 mm). 70% dark green to black pyroxene, 20% interstitial feldspar, 7% pale red, a.g. to c.g. eudialyte, 3% mosandrite and other exotics. Minor agrellite.
		(2.56 - 2.71) = minor radioactive zone, maximum 350 cps.
		(2.71 - 2.96) = agrellite - eudialyte "vein" at 45° TCA.
4.36	7.32	MAFIC SYENITE
(14.3)	(24.0)	Dark green, fine-grained, poorly foliated to vaguely lineated, locally crudely banded ("cloudy"). At least 60% mafic, a few inclusions of "Green Rock" - Very irregular core angle due to swirly, contorted foliation with many small folds and reversals. Core angle 0 to 40° TCA. Upper contact sharp at 40° TCA, ill-defined lower contact. Minor accessory zircon.
7.32	8.38	GREEN AMPHIBOLITE (?)
(24.0)	(27.5)	Pale green on a fresh break, pale greyish green polished surface, course-grained (4-6 mm), similar in texture to the "Silver Grey Syenite", but different color - Massive, 80% amphibole.
		(7.31 - 7.59) = semi-massive mineralization, 50% course to very coarse eudialyte, some agrellite - Britholite in KU-14

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
11809	5.0-7.0	2.0	95	3980	9231
11810	7 - 12	5.0	98	3312	5903
11811	12-17	5.0	98	4731	4964
11812	17-22	5.0	97	3524	3148
11813	22-27	5.0	97	3833	8978
11814	27-32	5.0	100	1312	5415
11815	32-37	5.0	100	430	18942
11816	37-42	5.0	100	391	12568
11817	42-47	5.0	100	478	4941
11818	47-52	5.0	100	321	2538
11819	52-57	5.0	100	2016	9920
11820	57-62	5.0	100	498	11933
11821	62-67	5.0	100	235	18339
11822	67-72	5.0	100	452	19034
11823	72-77	5.0	98	403	11785
11824	77-82	5.0	100	506	5240

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU 13 = 3.23 - 3.35 m - Black Pyroxenite
KU 14 = 7.65 - 7.75 m - Green Amphibolite

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-19
Page 2 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
8.38	11.70	MESOCRATIC SYENITE
(27.5)	(38.4)	Greenish grey, medium-grained, moderately foliated, 20% mafic, a few narrow bands of pyroxenite - Core angle generally at 60° TCA.
		(8.38 - 9.14) = 30% "Green Rock" inclusions, well mineralized with 4-5% eudialyte-
		(10.58 - 11.28) = radioactive zone, maximum at 36.9 with 800 cps SPP 2 on core - About 2% scattered orange thorite (?) xtals (~ 1x5 mm) and at least 5% very finely disseminated "Creamy Stubbies" - Trace pale purple fluorite - Core angle 60°
11.70	17.31	GREEN ROCK
(38.4)	(56.8)	Typical, medium to dark green, dense, massive and fine-grained - About 2% pink zircon throughout, a few clots of interstitial feldspar -
		(12.71 - 12.95) = Silver Grey Pyroxenite band.
		(13.41 - 13.68) = Silver Grey Pyroxenite band.
		(15.79 - 15.85) = minor radioactivity, 300 cps SPP 2 - A few concentrations of pale brown, subhedral unknown mineral -
17.31	23.74	MESOCRATIC SYENITE
(56.8)	(77.9)	Typical, medium greenish-grey, medium-grained, rather well foliated, locally poorly banded - Mesocratic with 15-20% mafic - Core angle generally 47° TCA - Minor radioactive zones at 17.68 (400 cps), 17.92 (400 cps) and 19.05 m (300 cps SPP2 on core) -

LOST CORE (INTERVAL, LENGTH):

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-15 = 11.0 - 11.1 m - Thorite in Mesocratic Syenite
KU-16 = 15.5 - 15.6 m - (?) mineral in Green Rock

GRAPHIC LOG LEGEND:

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
11825	82-87	5.0	100	1766	11822
11826	87-92	5.0	100	1121	3462
11827	92-97	5.0	100	1638	2103
11828	97-102	5.0	100	737	7587
11829	102-107	5.0	100	222	19516
11830	107-112	5.0	98	120	4815
11831	112-117	5.0	98	275	13859
11832	117-122	5.0	100	920	9222
11833	122-127	5.0	100	1046	8714
11834	127-132	5.0	95	140	1193
11835	132-137	5.0	95	58	7068
11836	137-142	5.0	90	57	11291
11837	142-147	5.0	90	90	5357
11838	147-151	4.0	100	118	11807

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KV-17
Page 3 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION — Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(20.79 - 22.25) = about 5% fg. to m.g. "Creamy Stubbies" in 3-5 cm bands at 60° TCA.
		(23.10 - 23.74) = about 50% Silver Grey Pyroxenite mixed in with the syenite - Also 10% m.g. phlogopite and 1-2% sulfide (pyrite ?).
23.74	24.57	PHLOGOPITE - CALCITE MARBLE
(77.9)	(80.6)	Dirty lime-green, medium-grained, massive - About 15% phlogopite, 25% diopside and 60% calcite - Upper contact at 65° TCA, lower irregular.
24.57	26.00	MESOCRATIC SYENITE
(80.6)	(85.3)	Grey, medium-grained, banded at 42° TCA, only 15% mafic content.
26.00	29.84	DIOPSIDE ROCK
(85.3)	(97.9)	Symmetrical section starting with 40 cm of typical Green Rock, followed by 30 cm of Silver Grey Pyroxenite, then into the pale apple green, granular diopside rock, back into 30 cm of Silver Grey Pyroxenite and about 20 cm of Green Rock at the lower contact, which is at 62° TCA. The pale green diopside rock itself consists of 90% granular, translucent diopside, 8% calcite and 2% accessories - The rock is extremely friable, soft. Several carbonate bands with up to 50% c.g. grey calcite are also present.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KV-17 = 24.6 - 24.7m - Phlogopite Calcite Marble
KV-18 = 27.1 - 27.2m - Diopside Rock

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KV-19
Page 4 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(26.00 - 26.06) = Strong radioactive zone on contact, with a maximum of 500 cps SPP2 on core. 4% zircon, 1% sphene, 2% exotics.
00 84	46.02	MESOCRATIC SYENITE
(97.9)	(151.0)	Fairly typical, medium greenish-grey, medium grained, foliated to weakly banded, 20% mafic, mostly amphibole. Fairly constant core angle around 60 - 65° TCA. About 1% "Creamy Stubbies" bands throughout.
		(31.09 - 32.61) = at least 5% fg. "Creamy Stubbies"
		(36.18 — 36.42) = Silver Grey Pyroxenite band, 75° TCA, maximum radioactivity 200 cps SPP2.
		(34.75 — 34.90) = Biotitite band at 63° TCA
		(37.15 - 38.46) = Silver Grey Pyroxenite, typical. Minor radioactivity (200 cps SPP2) at upper contact.
46.02		END OF HOLE

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G.X. MEUSY

DATE October 1, 1990

DRILL COLLAR:

COORDINATES 0+11.5 S
13+48 E

ELEVATION 340.5 m

BEARING — N/A

INCLINATION -90°

HOLE LENGTH 46.02 m (151')

LENGTH OF HOLE IN OVERBURDEN 1.22 m (4')

LENGTH OF CASING 1.22 m (4')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	(151')	—	-89°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma		0 - 45.2 m	Mt Sopris Lowe

DATUM:

HOLE DEPTH: COLLAR+ 1.22 m (4')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 1.22 m (4')

GEOPHYSICAL: COLLAR+ Ø

HOLE NUMBER 90-KU-18

NUMBER OF PAGES 5

DATE STARTED September 30, 1990, 17:30

DATE COMPLETED October 1, 1990, 04:30

DRILL CONTRACTOR Hosking

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: G.X. Mersy
DATE: October 1, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KV-18
Page 1 of 5

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION (Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution))
0	1.22	OVERBURDEN (4" Casing)
1.22	4.21	GREEN ROCK / GREEN PYROXENITE
(4.21)	(13.8)	Overall pistachio green to dark green colour, generally fine-grained and massive, except in the zones of green pyroxenite which are very coarse-grained (2-3 cm). About 75% "grass green mineral" (diopside ?), 15% blue-grey amphibole, 5% interstial calcite, 4% purple fluorite, 1% vlasovite (large xtals, partially altered, at 3.35).
4.21	6.74	MAFIC SYENITE
(13.8)	(22.1)	Dark greyish green, crudely foliated or lineated, fine to medium-grained, 50% mafic (mostly acicular amphibole), core angle 60° TCA. Upper contact broken, lower at 40° TCA.
		(4.21 - 4.39) = minor radioactive zone, max 150 cps at contact, about 30% medium-grained greyish green pyroxenite in 5 cm bands, 4% m-g. eudialyte
6.74	7.10	BLACK PYROXENITE
(22.1)	(23.3)	Dark green polished surface, almost black on a fresh break. Massive, coarse-grained (5-8 mm), trace mosandrite - fluorite - calcite. Upper contact very sharp at 35° TCA, lower one at 52°, also sharp.
7.10	8.35	MAFIC SYENITE
(23.3)	(27.4)	Similar to (4.21 - 6.74 m), lower contact at 70° TCA.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Y ppm	ASSAY Zr ppm
11779	4 - 7	3	99	657	1778
11780	7 - 12	5	100	529	932
11781	12 - 17	5	100	1651	9031
11782	17 - 22	5	100	1175	8981
11783	22 - 27	5	100	1037	3824
11784	27 - 32	5	96	319	1211
11785	32 - 37	5	96	437	3244
11786	37 - 42	5	100	509	891
11787	42 - 47	5	100	769	1382
11788	47 - 52	5	100	631	5015
11789	52 - 57	5	99	1776	6683
11790	57 - 62	5	98	207	13546
11791	62 - 67	5	100	98	647
11792	67 - 72	5	100	534	11429
11793	72 - 77	5	100	293	9716

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KV-15
Page 2 of 5

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION — Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
8.35	14.23	DARK GREEN ROCK
(27.4)	(46.7)	Rare rock type, previously observed only in Trench T-90-2 with Black Pyroxenite. Dark Green, fine-grained, massive, dense, homogeneous. Consists of a very fine-grained (0.5 mm) assemblage of feldspar (40%), black mafics (30%) and green mafics (30%). Locally contains up to 10-15% mica. A faint foliation is sometimes visible, where a few feldspathic bands occur. Core angle is 57° TCA. The lower contact is gradational over ~ 1m.
14.23	16.43	MESOCRATIC SYENITE
(46.7)	(53.9)	Medium greenish grey, medium-grained, about 20 to 25% green amphibole, well foliated to weakly banded. Core angle 50° TCA. Sharp lower contact at 60° TCA.
13	17.04	BLACK PYROXENITE / AGRELLITE "VEIN"
(53.9)	(55.7)	Clean-cut with sharp contacts, upper at 60° TCA, lower at 50° TCA. About 80% massive, e.g., black pyroxenite and 20% = vein material" at upper contact, with 80% agrellite, 5% eudialyte (2 to 10 mm), 15% pyroxene.
17.04	20.57	MESOCRATIC SYENITE
(55.9)	(67.5)	Similar to (14.23 - 16.43) except as below: (17.04 - 17.46) = weakly radioactive, mineralized section. Maximum radioactivity = 200 cps SPP2 at 57.3'. Overall 1% mg. eudialyte, 2% "Creamy Stubbies".

ROCK TYPE | METERS DOWN HOLE | GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Y ppm	ASSAY Zr ppm
11794	77-82	5	100	1282	18155
11795	82-87	5	100	459	7669
11796	87-92	5	100	248	9513
11797	92-97	5	100	128	19304
11798	97-102	5	100	120	5529
11799	102-107	5	100	66	571
11800	107-112	5	100	95	377
11801	112-117	5	100	133	291
11802	117-122	5	100	578	10776
11803	122-127	5	100	216	11058
11804	127-132	5	100	460	8064
11805	132-137	5	100	1233	6461
11806	137-142	5	100	158	14674
11807	142-147	5	100	213	6572
11808	147-151	4	100	829	13681

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KV-9 = 11.19 - 11.28 m: Dark Green Rock
KV-10 = 16.46' - 16.56 m: Agrellite (eudialyte "vein"

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KV-18
Page 3 of 5

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
20.57	21.09	BLACK PYROXENITE
(67.5)	(69.2)	Dark green to black, massive, 75% very coarse (5 to 15 mm) black pyroxene, 20% feldspar, 4% "Creamy Stubbies" and 1% eudialyte. Both contacts sharp, upper at 70° TCA, lower at 60° TCA - Radioactivity, max. 450 cps SPP2 at 69.2'.
21.09	23.56	MESOCRATIC SYENITE
(69.2)	(77.3)	Similar to (14.23 - 16.43) - Core angle 40 to 50° TCA. (22.89 - 23.13) = Radioactive zone, max 500 cps SPP2, about 2% "Creamy Stubbies", trace thorite and possibly hiortdahlite (?).
23.56	25.36	GREEN ROCK
(77.3)	(83.2)	Typical green green colour, mottled with bluish-grey amphibole and pinkish zircon - Fine-grained, massive - Overall 30% amphibole, 8% zircon (up to 9 mm) - Upper contact sharp at 52° TCA, lower ill-defined. (23.56 - 23.80) = Radioactive, mineralized contact zone - Max. Rad 600 cps SPP 2 at 23.71m. Some ochre to rusty brown thorite xtals, 5% zircon, other unidentified exotic minerals -
25.36	30.21	MESOCRATIC SYENITE
(83.2)	(99.1)	Fairly typical, medium greenish grey, medium-grained, foliated to lineated, 15 to 20% mafic, core angle 75 to 90° TCA - Trace "Creamy Stubbies"

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KV-18
Page 4 of 5

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
30.21	35.81	DARK GREEN ROCK
(99.1)	(117.5)	Quite similar to (8.35 - 14.23), except more micaceous (up to 25% f.g. to m.g. phlogopite, particularly near upper contact). Highly variable foliation, from 20° TCA at 108' to 50° TCA at 117'. Up to 15% finely disseminated sulfide (pyrite or arsenopyrite ?), tr. graphite, from 34.08 to 34.44 m.
35.81	37.28	GREEN PYROXENITE
(117.5)	(122.3)	Medium green mottled with white, coarse to very coarse, jumble looking section. Slightly vuggy. 60% very coarse, bladed (up to 1x5 cm) green pyroxene, 26% large, irregular, white feldspar patches, 3% zircon, 3% graphite in large flecks and patches up to 1.5 cm, 2% yellow sphene and 2% very soft (< 2) pale turquoise blue-green mineral (?) interstitial to the pyroxene. Finally, about 4% eudialyte, partially altered.
37.28	38.50	MESOCRATIC SYENITE
(122.3)	(126.3)	Similar to (25.36 - 30.21) - Core angle 60° - About 2% " Creamy Stubbies ".
38.50	39.38	GREEN ROCK
(126.3)	(129.2)	Typical, medium grass green, fine-grained, dense, some scattered bluish amphibole. (39.14 - 39.38) = slightly radioactive zone, max 150 cps ?

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KV-11 = 34.2 to 34.3 m - Dark Green Rock with pyrite.
KV-12 = 37.0 to 37.1 m - Turquoise-Blue Mineral

GRAPHIC LOG LEGEND:

LOGGED. BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-18
Page 5 of 5

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		5% vlasovite in beautiful, large (15 mm), euhedral xtals, almost perfectly glassy.
39.38	41.03	PHLOGOPITE - CALCITE MARBLE
2)	(134.6)	Pale lime green to dirty white, mottled, medium-grained, massive, up to 15% granular diopside, 10% m.g. phlogopite and 5% chondrodite. Upper contact broken, lower at 60° TCA.
41.03	46.02	MESOCRATIC SYENITE
(134.6)	(151.0)	Fairly typical, medium greenish grey, medium-grained, well foliated at 75° TCA. "Biotite schist" band at 75° TCA from 44.20 to 44.32 m.
46.02		END OF HOLE
(151.0)		

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G. X. MEUSY

DATE September 30, 1990

DRILL COLLAR:

COORDINATES 0+52 S
13+42 E

ELEVATION 334.6 m

BEARING — N/A

INCLINATION -90°

HOLE LENGTH 46.02 m (151')

LENGTH OF HOLE IN OVERBURDEN 1.22 m (4.0')

LENGTH OF CASING 1.22 m (4.0')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	46.02 m	—	-89° 30'

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0 - 45.1 m	MPH Sphris 1000C

DATUM:

HOLE DEPTH: COLLAR+ 1.10 m (3.6')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 1.10 m (3.6')

GEOPHYSICAL: COLLAR+ ϕ

HOLE NUMBER 90-KU-17

NUMBER OF PAGES 3

DATE STARTED September 29, 1990

DATE COMPLETED September 30, 12:00 noon

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: G. MEUSY
DATE: Sept 30, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-17
Page 1 of 3

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	1.22	OVERBURDEN (4' Casing)
1.22	1.52	BLACK PYROXENITE
)	(5.0)	Black on a fresh break, dark green mottled with white on a polished surface. Massive, coarse-grained (mode around 5 mm), 75% almost equant pyroxene, 20% interstitial feldspar, 5% exotic accessories: eudialyte, miserite, fluorite, all fine to medium-grained. Trace carbonate.
1.52	19.90	MESOCRATIC SYENITE
(5.0)	(65.3)	Overall greenish tint, in marked contrast with underlying grey peralkalic granite gneiss, particularly noticeable on dry core. Generally medium-grained, moderately foliated to weakly banded, mesocratic with 15-20% mafic, mostly amphibole. Lower contact sharp and well defined at 68° TCA.
		(6.10 - 6.65) = Narrow bands of black pyroxenite at 60-65° TCA with approximately 2% finely disseminated eudialyte and 3% "creamy stubbies" - Slightly radioactive (~ 150 cps SPP2)
		(6.65 - 10.39) = Mesocratic Syenite, core angle 75 to 90°, about 1% disseminated eudialyte throughout.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Y ppm	ASSAY Zr ppm
11763	4.0 - 7.0	3'	95	503	14188
11764	7 - 12	5'	100	297	>20,000
11765	12 - 17	5'	100	1158	9132
11766	17 - 22	5'	98	1331	7641
11767	22 - 27	5'	98	914	5811
11768	27-32	5'	100	391	4586
11769	32-37	5'	100	1858	10935
11770	37-42	5'	100	952	9598
11771	42-47	5'	100	1194	8734
11772	47-52	5'	100	1128	3787
11773	52 - 57	5'	100	481	1867
11774	57-62	5'	100	710	18295
11775	62-65.3	3.3'	100	485	3516
11776	65.3-67	1.2'	100	131	1231
11777	67 - 72	5'	100	89	696

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-6 = 1.43 to 1.53 m - Black Pyroxenite

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-17
Page 2 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(10.39 – 11.58) = Radioactive Zone, Maxima 300 cps at 10.52' and 11.46m. About 25% Green Pyroxenite. Well mineralized with about 5% eudialyte, 2% mosanitrite, 1% "Creamy Stubbies". Upper contact at 70°, lower at 52°, both highlighted by c.g. pyroxenite bands.
		(11.58 – 16.31) = Mesocratic Syenite, 25-30% mafic, homogeneous, core angle 80 – 90° TCA, a few (< 1%) eudialyte grains.
		(16.31 – 18.17) = Section rich in exotic accessories, overall 7% "creamy stubbies", 0.5 – 1.0 mm in size. Core angle 50 – 53° TCA.
		(18.17 – 19.90) = Mesocratic Syenite, core angle 50° TCA.
90	46.02	PERALKALIC GRANITE GNEISS
(650)	(1510)	Generally grey, medium-grained, crudely foliated ("streaky foliation"), hard, leucocratic with 3 to 10% mafic, mostly acicular amphibole.
		(19.90 – 23.47) = Very felsic, white feldspar with 3% c.g. (5-8 mm) dark green pyroxene clots and at least 5% visible grey quartz. Grades into "normal" granite gneiss over 2 m.
		(29.57 – 31.09) = Broken core, several fractures at 15° TCA

LOST CORE (INTERVAL, LENGTH):

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS
	10.39	
	11.58	

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-7 = 18.68 – 18.78 m = Mesocratic Syenite

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Y ppm	ASSAY Zr ppm
11778	72.77	5'	100	70	2413

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-17
Page 3 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(32.31 – 33.83) = Somewhat banded section, alternating medium-grained mesocratic and coarse-grained leucocratic, a few bands (1-2 cm) of pyroxenite, < 1% "creasing stubbies". Core angle 60 to 65° TCA.
		(36.58 – 46.02) = Very homogeneous, about 10% mafic, core angle 80° TCA.
151.0		END OF HOLE

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

ÉNERGIE ET RESSOURCES - SECTEUR
REÇU
20 MAR 1991
BUREAU
ROUYN

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-8 : 23.38 - 23.47m — Pegmatic G.G. (Felsic Contact Zone)

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G.X. Messy

DATE September 29, 1990

ILL COLLAR:

COORDINATES 1+00 S
13+54 E

ELEVATION 326.5 m

BEARING N/A

INCLINATION -90°

HOLE LENGTH 46.02 m (151.0')

NGTH OF HOLE IN OVERBURDEN 1.83 m (6.0')

LENGTH OF CASING 1.83 m (6.0')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	46.02	—	86°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma		0 - 44.9 m	Mt Sopris 1000

DATUM:

HOLE DEPTH: COLLAR+ 1.07 m

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 1.07 m

GEOPHYSICAL: COLLAR+ Ø

HOLE NUMBER 90-KU-16

NUMBER OF PAGES 2

DATE STARTED September 28, 1990 (06:00)

DATE COMPLETED September 28, 1990 - (21:55)

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: G.X. Mercy
DATE: Sept 29, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-16
Page 1 of 2

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION — Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	1.83	OVERBURDEN (6' Casing)
1.83	6.89	PERALKALIC GRANITE GNEISS
)	(22.6)	Light grey, fine to medium-grained, hard, leucocratic with 7 to 10% mafic (amphibole & pyroxene). The fine-grained sections are more leucocratic than the medium-grained ones. Gradely foliated to weakly banded, core angle 75-80° TCA. A few "Creamy Stubbies" narrow bands in the last 40 cm.
6.89	21.88	MESOCRATIC SYENITE
(22.6)	(71.8)	Greenish grey, medium-grained, moderately to well foliated, locally lineated, core angle generally 65 to 75° TCA.
		(8.23 - 8.35) = minor radioactive zone, max. 500 cps SPP2, about 4% "Creamy Stubbies", a few chocolate brown thorite xtals (~3 mm), trace arsenopyrite.
		(9.30 - 10.06) = overall 4% very finely disseminated "Creamy Stubbies" in bands and irregular sections, core angle 60-65° TCA.
		(10.36 - 11.28) = ground core - No recovery.
		(13.96 - 14.78) = overall 2% beige "creamy stubbies", core angle 68° TCA.
		(15.24 - 15.48) = minor radioactive zone, max. 200 cps SPP2

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Y ppm	ASSAY Zr ppm
11745	6-12	6	91	120	10118
11746	12-17	5	91	223	5386
11747	17-22.6	5.6	99	85	12684
11748	22.6-27	4.4	99	208	8183
11749	27-32	5'	99	921	9576
11750	32-37	5'	42 *	115	19393
11751	37-42	5'	100	77	4606
11752	42-47	5'	100	124	12584
11753	47-52	5'	100	319	11423
11754	52-57	5'	100	856	6566
11755	57-62	5'	90	389	4625
11756	62-67	5'	56 **	131	1651

LOST CORE (INTERVAL, LENGTH): * 10.36 - 11.28 m = ground-core

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-4 = 14.6 - 14.7 m - Creamy Stubbies in Syenite

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KV-16
Page 2 of 2

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION — Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(16.67 - 16.82) = minor radioactive zone, max. 250 cps SPP2. A few fractures of open joints at 20° TCA.
		(19.38 - 20.24) = Ground Core
21.88	46.02	PERALKALIC GRANITE
(71.8)	(151.0)	Light grey banded with pinkish - orange and spotted with large, dark green mafic clots. Overall about 15% feldspathic bands (around 20 - 30 cm wide), 5 to 10% mafic (either in large centimetric clots or in medium-grained "streaks") and up to 15-20% quartz. Core angle generally around 65-70° TCA.
		(32.10 - 32.22) = minor radioactive zone, max. 200 cps SPP 2. Narrow syenitic band with up to 2% fg. "creamy stubbies".
46.02		END OF HOLE.

NOTE: Measured core recovery in this hole.

7' to 17'	= 9.1'	67 - 77	= 9.6'
17 to 27	= 9.9'	77 - 82	= 4.6'
27 to 37	= 7.1' (2.2' G.C.)	82 - 92	= 9.3'
37 to 47	= 10.0'	92 - 97	= 4.9'
47 to 57	= 10.0'	97 - 107	= 10.0
57 to 67	= 7.0' (2' G.C.)	107 - 117	= 10.0
		117 - 151	= 34.0

LOST CORE (INTERVAL, LENGTH): ** 63.6 - 66.4 = Ground Core
19.38 - 20.24 m

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
11757	67-72	5'	96	235	4598
11758	72-77	5'	96	164	1888
11759	77-82	5'	92	81	1281
11760	82-87	5'	93	378	6451
11761	87-92	5'	93	248	1612
11762	102-107	5'	100	580	5745

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KV-5 = 32.61 - 32.74 m - Rock. Granite

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Kipawa PROJECT

LOGGED BY G. X. Meusy

DATE September 28, 1990

ILL COLLAR:

COORDINATES 0+69 S
13+95 E

ELEVATION 338.8 m

BEARING N/A

INCLINATION -90°

HOLE LENGTH 59.44 m (195')

NGTH OF HOLE IN OVERBURDEN 2.44 m (8')

LENGTH OF CASING 2.44 m (8')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	59.44	—	- 88°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0 - 58.2 m	Mt Sopris 1000

DATUM:

HOLE DEPTH: COLLAR+ 0.99 m (39")

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.99 m (39")

GEOPHYSICAL: COLLAR+ 0

HOLE NUMBER 90-KU-15

NUMBER OF PAGES 3

DATE STARTED September 27, 1990

DATE COMPLETED September 28, 1990

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: G.X. MEUSY
DATE: September 28, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-15
Page 1 of 3

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION (Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution))
0	2.44	OVERBURDEN (8' Casing)
2.44 (8.0')	8.50 (27.9)	PERALKALIC GRANITE GNEISS Greenish grey wet, light grey to white dry, mottled with dark green - Fine-grained felsic matrix and medium-grained (2.5 mm) mafics - Hard, leucocratic, 5 to 10 % amphibole, at least 7% visible quartz - Crudely foliated to weakly banded locally - Core angle 75° TCA - A few narrow bands of "Creamy Stubbies", less than 1% overall - (4.39 - 4.63) = minor radioactive zone (Max = 400 cps), possibly a syenitic material band at 80° TCA, with 1% very finely disseminated eudialyte and 2% "Creamy Stubbies"
50 (27.9)	9.91 (32.5)	BLACK PYROXENITE Dark green polished surface, black on fresh break, massive, coarse to very coarse-grained (5 mm to 1 cm, exceptionally 2-3 cm) - Higher radiometric background and well mineralized throughout : (8.50 - 8.69) = 3-4% finely disseminated "Creamy Stubbies" (8.69 - 9.54) = 2% monazite, possibly also some hiortdahlite - (9.54 - 9.63) = Radioactive Zone, maximum 450 cps SPP2 (9.63 - 9.72) = About 20 % interstitial sulfide (arsenopyrite?) as a matrix of the medium grained pyroxenite

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS	ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Y ppm	ASSAY Zr ppm
			11726	8.5 - 12	3.5'	100	55	11730
			11727	12 - 17	5'	99	215	13869
			11728	17 - 22	5'	100	112	6300
			11729	22 - 27.9	5.9'	90	89	7160
			11730	27.9 - 32.5	4.6'	100	2081	9129
			11731	32.5 - 37	4.5'	100	2040	6407
			11732	37 - 42	5'	100	718	9242
			11733	42 - 47	5'	100	565	7314
			11734	47 - 52	5'	100	260	12287
			11735	52 - 57	5'	100	200	6367
			11736	57 - 62	5'	100	502	5468
			11737	62 - 67	5'	98	307	8377
			11738	67 - 72	5'	100	1833	10682
			11739	72 - 77	5'	100	637	10080
			11740	77 - 80	3'	100'	330	8506

LOST CORE (INTERVAL, LENGTH):
Between 17 and 27', .5' missing -

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KU-1 = 5.76 to 5.86 - Peralkalic Granite Gneiss
KU-2 = 9.63 to 9.73 - Sulfide-rich Black Pyroxenite

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-15
Page 3 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(24.38 - 28.28) = Coarsely and irregularly banded section, large centimetric feldspar bands and cloudy masses, pyroxene clots, interbanded with normal granite - Contact zone (?).
		(28.28 - 35.75) = Normal granite-gneiss, fine to medium-grained, 5 to 8% amphibole (pyroxene), streaky foliation at 65° TCA. One narrow biotitite band (4 cm) at 29.93 m.
35.75	37.67	MESOCRATIC SYENITE
(117.3)	(123.6)	Greenish, medium-grained, poorly foliated, 25 to 30% mafic, about 4% "Creamy Stubbies" throughout - Upper contact irregular, lower one fairly sharp at 40° TCA.
37.67	59.44	PERALKALIC GRANITE GNEISS
(123.6)	(195.0)	Similar to (24.38 - 35.75 m), diagnostic features are hardness, grey tint and leucocratic nature - At least 10% visible grey quartz-biotite-rich bands (brown, 80% f.g. to m.g. biotite) at 41.45, 41.54 and from 41.94 to 42.15 m, core angle 60° TCA.
		(41.15 - 41.60) = narrow syenitic band, ~1% eudialyte-
		(46.02 - 49.22) = course feldspathic section, blotchy, vuggy, mineralized with pale brown mineral (?) in last 60 cm.
		(52.97 - 53.64) = same as above -
59.44		END OF HOLE

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Y ppm	ASSAY Zr ppm
11743	117.3 - 120.3	3'		1433	1231
11744	120.3 - 123.6	3.3'		980	1587

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

ENERGIE ET RESSOURCES SECTEUR MINES
REÇU
20 MAR 1991
BUREAU RÉGIONAL ROUYN-NORANDA

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G.X. MEUSY

DATE September 27, 1990

ILL COLLAR:

COORDINATES 0+32 S
13+93 E

ELEVATION 344.5 m

BEARING N/A

INCLINATION -90°

HOLE LENGTH 49.07 m (161')

LENGTH OF HOLE IN OVERBURDEN 1.22 m (4')

LENGTH OF CASING 1.22 m (4')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test		—	-90°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma		0 - 48.1 m	Mt Sopris 1000

DATUM:

HOLE DEPTH: COLLAR+ 1.19 m

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 1.19 m

GEOPHYSICAL: COLLAR+ Ø

HOLE NUMBER 90-KV-14

NUMBER OF PAGES 3

DATE STARTED September 26, 1990

DATE COMPLETED September 27, 1990

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: G. MEUSY
DATE: SEPT 27, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-14
Page 1 of 3

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	1.22	OVERBURDEN (4' Casing)
1.22	3.35	MESOCRATIC SYENITE
(5')	(11.0)	Light to medium grey, medium-grained, well foliated, 15% amphibole, core angle 52° TCA - A few centimetric bands of 5 to 7% "Creamy Stubbies" - Weakly radioactive zone (Max 300 cps SPP 2) from 1.98 to 2.04 m.
3.35	9.63	BLACK PYROXENITE
(11.0)	(31.6)	Medium green on polished surface, dark green to black on fresh break, coarse to very coarse-grained (5 to 10 mm, exceptionally up to 3 cm), massive, 80% sodic green pyroxene, 10% interstitial Feldspar and 10% mineralization as described below:
		(3.35 - 5.06) = About 5% m.g. to c.g. eudialyte, somewhat banded, core angle 55 to 60° TCA. Radioactive Zone, Max 500 cps, at 4.08 m.
		(5.06 - 5.24) = Agrellite - feldspar - eudialyte "vein", 30% c.g. eudialyte.
		(5.24 - 8.47) = About 8% disseminated eudialyte, possibly minor mosandrite - Weak radioactive zone, Max 350 cps, at 7.19 m, 2-3% brown, Latk-shape crystals of mosandrite -
		(8.47 - 9.63) = Agrellite - feldspar - eudialyte "vein", 8% very coarse-grained (1-3 cm) eudialyte, 4% fine-grained mosandrite, minor rosovite & miserite.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY 4 ppm	ASSAY Zr ppm.
11702	4.8 - 7.0	2.2	95	546	6794
11703	7 - 12	5	96	1021	7304
11704	12 - 17	5	100	4115	11705
11705	17 - 22	5	97	2253	4421
11706	22 - 27	5	97	4876	10250
11707	27 - 32	5	100	4759	8405
11708	32 - 37	5	100	688	13920
11709	37 - 42	5	100	1103	7693
11710	42 - 47	5	100	1531	7138
11711	47 - 52	5	100	459	15565
11712	52 - 57	5	98	780	6691
11713	57 - 62	5	100	103	1573

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 20-KU-14
Page 2 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		Strong radioactive zone, max. 650 cps, from 8.84 to 8.93 and weak zone, max. 300 cps SPP2, from 8.56 to 8.69 m - Lower contact always at 50° TCA, with subhedral eudialyte.
9.63	26.79	MESOCRATIC SYENITE
(31.6)	(87.9)	Overall medium to dark greyish green colour, medium-grained, crudely foliated. 25 to 35 % mafic (mostly acicular amphibole), core angle generally around 65°, except as noted below-
		(9.63 - 9.97) = mafic syenite, 5% disseminated, medium-grained eudialyte, core angle 55° TCA.
		(12.40 - 13.35) = Silver Grey Pyroxenite band, 2% m-g. mosandrite near contacts, tr. purple fluorite-
		(13.35 - 14.48) = less than 1% disseminated eudialyte, core angle 75-80° TCA.
		(16.85 - 17.16) = Very coarse green pyroxenite, trace purple fluorite, narrow bands of "creamy stubbies"-
		(17.16 - 20.51) = swirly foliation, highly contorted.
		(20.51 - 20.57) = 4% pale brown mosandrite band, 75° TCA.
		(21.64 - 21.88) = 10% c-g. eudialyte, minor miserite, followed by 3-5 % m-g. graphite.
		(21.88 - 25.39) = swirly foliation, highly contorted zone with interference small folds, foliation reversals, augen-like textured sections- A few blebs and stringers of arsenopyrite at 24.66 m.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Au	ppm Ag
11714	62-67	5'	100	328	3420
11715	67-72	5'	100	904	10022
11716	72-77	5'	100	1515	6170
11717	77-82	5'	100	2136	4902
11718	82-87	5'	100	1052	5110
11719	87-92	5'	100	3449	10965
11720	92-97	5'	100	2577	4972
11721	97-102	5'	100	1357	6754
11722	102-107	5'	98	645	8003
11723	107-112	5'	100	262	13957
11724	112-117	5'	99	227	9163
11725	117-122	5'	100	217	5555

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-14
Page 3 of 3

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
26.79	32.74	GREEN ROCK / MESOCRATIC SYENITE
(87.9)	(107.4)	Overall grass-green to dark green colour. Green Rock is massive with about 30 % coarse to very-coarse bluish-amphibole, intermixed syenite is 15-20 % mafic and foliated at 55° TCA.
		(26.79 - 28.83) = Green Rock, strongly mineralized - Semi-massive eudialyte seam from 27.19 to 27.28, max radioactivity 750 cps SPP 2 - Minor mosandrite - Also, 40 % eudialyte (one side of the core only) between 28.35 and 28.53 m, max. radioactivity 250 cps SPP 2.
		(28.83 - 32.74) = Mesocratic Syenite, about 2% m.g. disse-minated eudialyte throughout. Minor radioactive zone (350 cps SPP 2) from 32.06 to 32.16 m. Lower contact fairly sharp at 63° TCA.
32.74	49.07	PERALKALIC GRANITE GNEISS
(107.4)	(161.0)	Light grey wet, almost white dry, hard, leucocratic (5 to 10 % amphibole), fine to medium-grained, crudely foliated ("streaky"), 7 to 10 % quartz, low rad. blight (80-100 cps) - Core angle 70-80° TCA.
		(34.32 - 34.72) = minor radioactive zone, max 250 cps, about 2% fg. "creamy stubbies" -
49.07		END OF HOLE

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G. X. MEUSY

DATE SEPT 26, 1990

DRILL COLLAR:

COORDINATES 0+00 N
13+91 E

ELEVATION 350.5 m

BEARING N/A

INCLINATION -90°

HOLE LENGTH 46.02 m (151')

LENGTH OF HOLE IN OVERBURDEN 1.52 m (5')

LENGTH OF CASING 1.52 m (5')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE NQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	46.02'	N/A	-88°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma	—	0 - 44.8 m	mt Sopris 1000

DATUM:

HOLE DEPTH: COLLAR+ 1.25 m

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 1.25 m

GEOPHYSICAL: COLLAR+ 0

HOLE NUMBER 90-KU-13

NUMBER OF PAGES 4

DATE STARTED SEPT 25, 1990

DATE COMPLETED SEPT 26, 1990

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: G. Mercy
DATE: SEP 26, 1991

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-13
Page 1 of 4

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	1.52 (5.0')	Overburden (5' Casing)
1.52	5.21	BLACK PYROXENITE
(5')	(17.1')	Medium to dark green on a polished surface, dark green to black on a fresh break. Coarse grained (5 to 10 mm), massive, 60-80% pyroxene, 15-20% interstitial feldspar. Well mineralized throughout, as detailed below. High radiometric background, around 200 cps SPP 2.
		(1.52 - 2.74) = Medium to coarse-grained, minor syenitic bands at 25° TCA at beginning of sub-section and steepening to 56° TCA at the end. About 2% diss. eudialyte.
		(2.74 - 5.21) = Typical massive, coarse pyroxenite. Overall 4-6 % eudialyte, concentrated near lower contact - 20 cm band of 10% finely disseminated eudialyte at 35° TCA from 4.78 to 4.98 m. Narrow radioactive zone (max 450 cps) at 4.05 m. Minor purple fluorite, mosandrite 4.72 to 5.18 m.
5.21	9.20	MESOCRATIC SYENITE
(17.1')	(30.2')	Heterogeneous section, overall green to greenish grey, core angle 35° TCA to 65° TCA. Generally medium-grained, crudely foliated. Upper contact at 70° TCA, lower contact irregular.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY U ppm	ASSAY Zr ppm
6723	5 to 7	2	75	4347	12891
6724	7 - 12	5	100	2979	11131
6725	12 - 17	5	100	5134	9693
6726	17 - 22	5	97	1246	7559
6727	22 - 27	5	97	190	9140
6728	27 - 32	5	100	1614	5051
6729	32 - 37	5	100	2913	10672
6730	37 - 42	5	100	938	6253
6731	42 - 47	5	98	1430	5639
6732	47 - 52	5	100	1137	10810
6733	52 - 57	5	100	1385	3924
6734	57 - 62	5	100	787	7429
6735	62 - 67	5	99	817	8519
6736	67 - 72'	5'	100	331	12653
6737	72 - 77'	5'	100	165	11949

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-13
Page 2 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION — Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(5.21 - 6.16) = Mesocratic Syenite, lineated, 20 - 25% green amphibole - Minor radioactive zone (max 500 cps) from 5.64 to 5.70, 3% "creamy stubbies" in bands at 25° TCA.
		(6.16 - 7.16) = Finer-grained syenite with ~50% "Green Rock" mixed in.
		(7.16 - 9.20) = Mesocratic Syenite, well lineated at 65° TCA - About 3% eudialyte and 2% "creamy stubbies" from 7.77 to 8.74 m.
9.20	11.03	AGRELLITE - FELDSPAR "VEIN"
(30.2)	(36.2)	Jumble looking, very heterogeneous, both contacts unconformable, 25% large light grey feldspar, 5% beige agrellite, 2% coarse-grained eudialyte at lower contact, 2-3% micrantite (1 x 8 mm pale brown laths) at upper contact, 1% "creamy stubbies" and about 65% dark green, fine-grained "matrix". Tr. Graphite - Max Radioactivity (2,000 cps ±) at 10.82 m.
11.03	24.51	MESOCRATIC SYENITE
(36.2)	(80.4)	Relatively homogeneous, medium greenish grey, medium-grained, lineated at 40-45° TCA, overall 20% mafic, mostly amphibole.
		(11.03 - 12.71) = Augen texture, 1-2 cm feldspar augen, well foliated at 55° TCA. About 7-8% "creamy stubbies" 9.05 - 9.26 m

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ppm Zr
6738	77-82	5'	100	862	9971
6739	82-87	5'	100	1187	4163
6740	87-92	5'	100	260	4681
6741	92-97'	5'	100	720	7609
6742	97-102	5'	100	500	5119
6743	102-107	5'	100	130	14977
6744	107-112	5'	100	198	12135
6745	112-117	5'	100	542	8390
6746	117-122	5'	100	542	11484
6747	122-127	5'	96	170	8140
6748	127-132	5'	100	299	6686
6749	132-137	5'	96	1747	9027
6750	137-142	5'	100	261	12549
11701	142-145	3'	100	322	3317

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KU-13
Page 3 of 4

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(14.26 - 15.18) = Black pyroxenite, vuggy, 5% calcite, 10% very coarse feldspar, large (6 cm) partially altered vesuvite crystal at 15.18
		(20.30 - 20.48) : About 5% m.g. to c.g. eudialyte in narrow pyroxenite band at 35° TCA.
		(24.02 - 24.51) = Medium-grained pyroxenite, 3% eudialyte
24.51	25.60	FELDSPAR ROCK (PEGMATITE ?)
(80.4)	(84.0)	Light grey, massive, 90% perthitic feldspar, 5% aegerine, 5% eudialyte, concentrated from 25.02 to 25.45 (40% c.g. eudialyte) Upper contact at 10° TCA, lower at 15° TCA.
25.60	29.69	GREEN ROCK
(84.0)	(97.4)	Typical, medium to dark green, massive, dense, fine-grained, less than 1% zircon as accessories.
		(28.25 - 29.08) = Mesocratic Syenite band, 35° TCA.
29.69	34.50	MESOCRATIC SYENITE
(97.4)	(113.2)	Medium greenish grey, medium-grained, well lineated to crudely foliated.
		(31.33 - 31.39) = Radioactive zone, max. 500 cps SPP2, less than 1% stout, 1x2 mm, orange subhedral (thorite ?) crystals - Core angle 55° TCA.
		(31.70 - 34.50) = Leucocratic (10-15% mafic), coarse-grained syenite. Core Angle 55° TCA -

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS							

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY			

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90 - KV - 13
Page 4 of 41

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
34.50	43.16	GREEN ROCK
(113.2)	(141.6)	Medium green, fine-grained, dense, massive, 10% coarse-grained phlogopite bands, 2% accessory pink zircon.
		(34.50 - 35.66) = 10 to 12% coarse to very coarse bluish amphibole in the Green Rock.
		(36.76 - 37.03) = strongly radioactive zone (Max. 1,500 cps SPP 2) at 5°(?) TCA with up to 20% coarse to very coarse-grained zircon (2 to 15 mm) (one side of the core only).
		(42.06 - 42.36) = minor radioactive zone, max 250 cps.
43.16	44.20	SILVER GREY PYROXENITE
(141.6)	(145.0)	Very typical, overall bluish-grey colour, massive, coarse-grained (8 mm), except near contacts (4 mm). Upper contact very sharp but irregular. Lower contact at 50° TCA. Minor radioactivity (300 cps) at 43.62 - 43.74 m.
44.20	46.02	CALCITE - CHONDRODITE MARBLE
(145.0)	(151.0)	Typical, massive, medium-grained, beige, 80% calcite, up to 15% orange chondrodite, 5% phlogopite.
46.02		END OF HOLE.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS							

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY			

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KITAWA PROJECT

LOGGED BY G-X. MEUSY

DATE September 21, 1990

ILL COLLAR:

COORDINATES 0+50N
3+00E

ELEVATION 280.6 m

BEARING 322°

INCLINATION -50°

HOLE LENGTH 81.38 m (267')

LENGTH OF HOLE IN OVERBURDEN 8.23 m (27')

LENGTH OF CASING 9.75 m (32')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE BQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	81.38 m	N/A	-45°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma		0 to 79.7 m	Mt. Sopris 1000

DATUM:

HOLE DEPTH: COLLAR+ 0.98 m (3.2')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.98 m (3.2')

GEOPHYSICAL: COLLAR+ Ø

HOLE NUMBER 90-KBZ-05

NUMBER OF PAGES 5

DATE STARTED Sept 19, 1990

DATE COMPLETED Sept 20, 1990

DRILL CONTRACTOR HOSKING

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

ENERGIE ET RESSOURCES - SECTEUR MI...
REÇU
20 MAR 1991
BUREAU D... ROUY...

LOGGED BY: _____
DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KB2-05
Page 1 of 5

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	8.23	Overburden (9.75 m Casing)
8.23	22.43	GREY BIOTITE SYENITE
(17.0)	(73.6)	Medium greenish grey, medium to coarse-grained (2 mm, some mafic clots up to 5 mm), crudely foliated, 20 to 25 % mafic overall, mostly amphibole with little biotite. Core angle variable, from 0° at 12.2 to 45° TCA at 21.6. Lower contact at 55° TCA.
		(9.20 - 11.13) Dark green amphibolite band, massive, coarse-grained, 60% coarse (8 mm) pyroxene, mineralized from 10.0 to 11.1 with 1% yellow sphene and some thorite. Max Rad = 500 cps SPP 2.
		(18.29 - 18.75) Dark green amphibolite, 3% coarse pink zircon on lower contact.
22.43	43.65	CALC-SILICATE COMPLEX
(73.6)	(143.2)	Dominant green colour, mixture of "Green Rock", "Phlogopite Rock", "Calcite Marble", minor "Silver Grey Pyroxenite" and interlayered syenite. Some sections of broken and crumbly core. Several narrow radioactive zones as described below. Core angle variable, generally around 50°. Lower contact at 55° TCA.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm U	ASSAY ppm Zr.
6693	30-35	5'	100	156	4893
6694	35-37	2'	95	165	8892.

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KB2-05
Page 2 of 5

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(22.43 - 29.26) Silver Grey Pyroxenite grading into Green Rock and Phlogopite Rock, minor interlayered syenite. Overall 50% coarse to very coarse bluish-grey amphibole (5 to 10 mm, exceptionally 5 cm), 20% diopside, 20% phlogopite, 6% interstitial calcite and 4% accessories (sphene, zircon). Local weak thorite mineralization (22.74 to 23.16, 26.97 to 27.92 and 29.17 to 29.26). A few wasandrite acicular crystals at 22.9 and 25.5 m.
		(29.26 - 36.55) Green Rock, very typical, dark green, fine-grained, dense, massive to weakly foliated. About 1% interstitial calcite and 5% phlogopite in bands about 30 cm long. Core angle generally at 55-60° TCA. Accessory yellow sphene (< 1%).
		(36.55 - 42.25) Calcite Marble - Typical pale lime green colour, medium-grained, weakly banded with various shades of yellow and green. About 10% phlogopite and 5% chondrodite in the contact zones.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr.
6695	73.6 - 77	3.4	100	835	11400
6696	77 - 82	5	99	395	16215
6697	82 - 87	5	98	513	5666
6698	87 - 92	5	98	1710	8862
6699	92 - 97	5	88	700	15150
6700	97 - 102	5	100	293	646
6701	102 - 107	5	100	369	321
6702	107 - 112	5	100	461	1240
6703	112 - 117	5	100	413	1535
6704	117 - 122	5	100	654	487
6705	122 - 127	5	100	218	412
6706	127 - 132	5	100	29	91
6707	132 - 137	5	100	26	37
6708	137 - 143.2	6.2	100	944	4225
6709	143.2 - 147	3.8	92	115	11253
6710	147 - 152	5	100	389	6470
6711	152 - 157	5	82	441	3553

LOST CORE (INTERVAL, LENGTH): 92 to 97 = 0.6' lost
152 to 157 = 0.8' lost

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KB2-05
Page 3 of 5

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(42.25 - 43.65) Green Rock / Phlogopite Rock, grading into the underlying syenite. Core angle 47° TCA.
43.65	52.30	MESOCRATIC SYENITE
(143.2)	(171.6)	Medium greenish-grey, medium-grained, weakly foliated to somewhat banded, about 15% mafic (amphibole) overall. Core angle generally 55° TCA.
		(46.21 - 47.03) Silver Green Pyroxenite band, typical, upper contact at 63° TCA, lower contact at 35°.
		(50.90 - 51.21) Slightly hematized zone, Max. Rad = 200 cps SPP 2.
		(52.18 - 52.30) Slightly hematized contact zone, Max Rad = 150 cps SPP 2.
52.30	58.22	CALC-SILICATE COMPLEX (Lower Section)
(171.6)	(191.0)	Similar to main section from 22.43 to 43.65, less extensive.
		(52.30 - 53.92) Green Rock, about 20% coarse bluish-grey amphibole, 75% diopside, 5% accessories (purple fluorite, sphene, zircon, possibly mosandrite) - Lower contact at 55° TCA.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ppm Zr
6712	157-162	5	98	38	2827
6713	162-167	5	100	172	2607
6714	167-171.6	4.6	100	269	7381
6715	171.6-177	5.4	93	1124	6445
6716	177-182	5	96	599	3082
6717	182-187	5	100	22	51
6718	187-191	4	99	688	8494
6719	191-196	5	94	39	274
6720	196-201	5	100	132	286
6721	201-206	5	86	83	1737
6722	206-212.1	6.1	100	63	1197

LOST CORE (INTERVAL, LENGTH): 171.6 to 177.0 = 0.4' missing
197.0 to 207.0 = 0.7' missing

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KBZ-05
Page 4 of 5

PROJECT: _____

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(53.92 - 55.02) Mesocratic Syenite, a few mafic narrow sections, weak radioactivity (150 cps SPP 2) at 54.25 m.
		(55.02 - 57.00) Calcite Marble - Buff to pale lime green, 90% calcite, 10% phlogopite near upper contact - A few hairline fractures at 10° TCA with dark green alteration selvages. Upper contact at 40° TCA, lower contact broken.
		(57.00 - 58.22) Greek Rock - similar to (52.30 - 53.92) with a narrow band of Calcite marble from 57.6 to 58.0 m. Radioactive zone (max 350 cps SPP2) from 57.4 to 57.61 m.
22	64.65	MESOCRATIC SYENITE
(191.0)	(212.1)	Greenish grey, coarse-grained, streaky foliation, core angle 55° TCA. Coarse, almost pegmatitic section with large perthitic feldspar and hematite blotches from 59.47 to 60.72 m.
64.65	68.76	BROWN QUARTZ-FELDSPAR GNEISS
(212.1)	(225.6)	Greenish grey, fine-grained, homogeneous, about 10% mafic, 5% quartz, core angle 53° TCA.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: _____

DATE: _____

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KBZ-05
Page 5 of 5

PROJECT: _____

INTERVAL in METERS FROM	INTERVAL in METERS TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
68.76	81.38	PINK QUARTZ - FELDSPAR GNEISS (Basement)
(225.6)	(267.0)	Pink to brownish, hard, fine-grained, leucocratic (5-8 % mafic), well foliated, core angle 55° TCA, fairly homogeneous - Mafic minerals are fine-grained, mostly amphibole. Greenish from 70.10 to 72.0, slightly hematitized 75.3 to 77.4 m. Ovoids, about 15% quartz.
81.38		END OF HOLE

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	ASSAY SAMPLE INTERVAL	ASSAY SAMPLE THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Kipawa PROJECT.

LOGGED BY G. Meusy

DATE September 20, 1990

DRILL COLLAR:

COORDINATES 0+50N
3+00E

ELEVATION 280.6

BEARING 009°

INCLINATION -50°

HOLE LENGTH 76.50 m (251')

LENGTH OF HOLE IN OVERBURDEN 8.23 m (27')

LENGTH OF CASING 9.75 m (32')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE BQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	76.50 m		-45°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
NO GAMMA LOG FOR THIS HOLE			
(Batteries Completely Discharged On Logger)			

DATUM:

HOLE DEPTH: COLLAR+ 0.98 m (3.2')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 0.98 m (3.2')

GEOPHYSICAL: COLLAR+ N/A

HOLE NUMBER 90-KBZ-04

NUMBER OF PAGES 4

DATE STARTED September 18, 1990

DATE COMPLETED September 19, 1990

DRILL CONTRACTOR Hoskings

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

ENERGIE ET RESSOURCES - SECTEUR MINES
REÇU
20 MAR 1991
BUREAU RÉGIONAL ROUYN-NOR

LOGGED BY: G. Mercy
DATE: Sept. 19, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KB2-04
Page 1 of 4

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION — Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	8.23	Overburden (9.75 m Casing)
8.23	16.95	GREY BIOTITE SYENITE
(27.0)	(55.6)	Medium to dark greenish grey, medium to coarse-grained, crudely foliated, 25 to 30% mafic (mostly amphibole with minor biotite). Somewhat altered and deformed with a few sections of pinkish feldspar rock and mafic clots. Core angle generally at 60-70° TCA. Lower contact at 65° TCA.
16.95	43.34	CALC-SILICATE COMPLEX
(55.6)	(142.2)	Overall green colour, consists of alternating bands and irregular masses of "Green Rock", "Silver Grey Pyroxenite", "Calcite Marble", "Phlogopite Rock" and interlayered syenite. Core is soft, crumbly, broken up. Many short radioactive zones as described below. Core angle variable, but generally around 65° TCA. Radioactive background relatively high, around 50 cps.
		(16.95 - 22.07) "Green Rock" with minor "Silver Grey Pyroxenite". Grass green, fine to medium-grained, massive. Overall 45% "grass green mineral" (diopside ?), 35% bluish amphibole (3-5 mm), 10% phlogopite,

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY Au ppm	ASSAY Zn ppm
6643	55.6-57	1.4'	100	240	15099
6644	57-62	5	98	672	7286
6645	62-67	5	99	1275	6450
6646	67-72	5	100	1312	14772
6647	72-77	5	100	1022	3610
6648	77-82	5	100	1150	2937
6649	82-87	5	96	945	3121
6650	87-92	5	100	584	8553
6676	92-97	5	100	393	9713
6677	97-102	5	100	736	3278

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KB2 11 : 21.24 to 21.34 m "Green Rock"
(69.7 to 70.0')

GRAPHIC LOG LEGEND:

LOGGED BY: GXH
DATE: July 19, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KBZ-D
Page 2 of 4

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION (Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution))
		5% "granular diopside", 5% interstitial calcite, 3% purple fluorite, 2% hematite and accessory minerals: zircon, sphene and thorite (?). The first foot of the section is "Silver Grey Pyroxenite" with 80% coarse-grained bluish amphibole - Strongly radioactive zone (Max 2,000 cps SPP 2) at 19.20 - 19.29, with fine-grained zircon, sphene and one large (2 x 3.5 cm) thorite crystal - Minor radioactive zones (max 350 cps) at 19.99, 20.42 to 20.60 and at 21.64 m.
		(22.06 - 23.47) Calcite - chondrodite - phlogopite marble White mottled with up to 20% orange chondrodite and 15% grey-brown phlogopite, 75% calcite -
		(23.47 - 31.24) Green Rock / Phlogopite Rock Similar to (16.95 - 22.07) but with about 50% phlogopite concentrated in bands about 30 cm long - Phlogopite is amber to brownish, about 5 mm across - Minor radioactivity (~200 cps) from 24.38 to 25.15 and at 26.82 m. This latter zone displays about 1% pale brown acicular mosandrite -

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Y	ASSAY ppm Zr
6678	102 - 107	5	100	410	189
6679	107 - 112	5	95	1201	319
6680	112 - 117	5	95	1457	9384
6681	117 - 122	5	100	481	4063
6682	122 - 127	5	100	192	10836
6683	127 - 132	5	100	496	4749
6684	132 - 137	5	100	390	5211
6685	137 - 142.2	5.2	100	899	11611
6686	142.2 - 147	4.8	94	580	2848
6687	147 - 152	5	100	23	179
6688	152 - 157	5	100	37	1235
6689	157 - 162	5	93	1250	5215
6690	162 - 167	5	93	1319	6526
6691	167 - 172	5	98	447	3014
6692	172 - 177	5	100	97	1409

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KBZ 13 = 26.76 to 26.85 m (Mosandrite)
(87.8 to 88.1')

GRAPHIC LOG LEGEND:

LOGGED BY: GXM
DATE: Sept 20, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KBZ-041
Page 3 of 4

PROJECT:

INTERVAL in METERS FROM	INTERVAL in METERS TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(31.24 - 33.31) Calcite Marble - Typical pale lime green colour, medium-grained, massive, 80% calcite, 15% pale green diopside, 3% phlogopite, 2% chondrodite - Upper contact at 55° TCA.
		(33.31 - 36.33) Green Rock - Similar to (16.95 - 22.07) About 3% pink zircon (3-4 mm) from 34.14 to 34.26 m.
		(36.33 - 39.26) Mesocratic Syenite, 25% mafic, somewhat banded, 1% "creamy stubbies" and sphene - Core angle at 63° TCA.
		(39.26 - 43.34) Silver Grey Pyroxenite - Typically bluish-grey on cut surface, dark greenish grey on a fresh break, massive, medium to coarse-grained (4 to 8 mm), 80% fibrous amphibole, fr. int. calcite, minor " grass green mineral "patches. Trace sphene and possibly mosandrite. Minor mesocratic syenite (41.51 - 41.76). Lower contact at 60° TCA.
43.34 (142.2)	48.13 (157.9)	MESOCRATIC SYENITE Medium greenish grey, medium-grained, moderately foliated at 50° TCA, 15% amphibole, no biotite.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	ASSAY SAMPLE INTERVAL	ASSAY SAMPLE THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KBZ 12 = 32.70 to 32.80 - Calcite Marble
KBZ 14 = 39.80 to 39.90 - Silver Grey Pyroxenite

GRAPHIC LOG LEGEND:

LOGGED BY: GXM
DATE: Sept 20, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KB2-04
Page 4 of 4

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
48.13	51.27	CALC-SILICATE COMPLEX
(157.9)	(168.2)	Similar to main section of calc-silicate, although less extensive. Upper contact at 70° TCA, lower at 75° TCA.
		(48.13 - 49.56) = mixed zone with silvn Grey Pyroxenite, Green Rock and mesocratic Syenite. Hematized radioactive zone from 49.19 to 49.35 m (Max 400 cps).
		(49.56 - 49.90) Calcite Marble band, 60° TCA.
		(49.90 - 51.27) Green Rock, 40% phlogopite.
51.27	53.43	MESOCRATIC SYENITE
(168.2)	(175.3)	Streaky foliation, greenish, coarse grained, 15-20 % mafic, core angle 55°. Coarse graphite fleck (6 mm) at 52.20 m.
.43	58.31	BROWN QUARTZ-FELDSPAR GNEISS
(175.3)	(191.3)	Greenish with brown patches, fine-grained, 7 % mafic, 5 % quartz, crudely foliated at 55° TCA
58.31	76.50	PINK QUARTZ-FELDSPAR GNEISS (Basement)
(191.3)	(251.0)	Pink to pale orange, leucocratic (5% amphibole), 15-20 % quartz, hard, foliated at 60-64° TCA, and at 85° TCA in the last 3 m.
76.50		END OF HOLE

ROCK TYPE | METERS DOWN HOLE | GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KB2 15 = 53.86 to 53.95 Brown Q-F- Gneiss
(176.7 to 177.17)

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G.X. Mellsy

DATE Sept. 18-19, 1990

DRILL COLLAR:

COORDINATES 0+30N
2+50E

ELEVATION 282.8 m

BEARING 322°

INCLINATION -50°

HOLE LENGTH 105.16 m (345')

LENGTH OF HOLE IN OVERBURDEN 11.28 m (37')

LENGTH OF CASING 12.80 m (42')

CASING PULLED ☑

LEFT IN HOLE ☐

CORE SIZE BQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	105.16 m	—	-45°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma		0 to 103.5 m	Mt. Sopris 1000

DATUM:

HOLE DEPTH: COLLAR+ 1.37 m (4.5')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 1.37 m

GEOPHYSICAL: COLLAR+ Ø

(Relog at Collar - 1m)

HOLE NUMBER 90-KBZ-03

NUMBER OF PAGES 5

DATE STARTED September 16, 1990

DATE COMPLETED September 18, 1990

DRILL CONTRACTOR Hoskins

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: G.X. Mercy
DATE: Sept 17, 1995

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KBZ-05
Page 1 of 5

PROJECT: Kipawa

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	11.28	Overburden (42' casing)
11.28	50.23	GREY BIOTITE SYENITE
(37)	(164.8)	Light grey to greenish grey, medium to coarse-grained (2 to 7 mm), crudely foliated, leucocratic (10 to 15% mafic, mostly amphibole, minor biotite), with some mesocratic sections which are usually biotite-rich (up to 30%) and some felsic sections (feldspar and/or quartz). Highly variable core angle, from 0 to 50° TCA. Highly heterogeneous.
		(11.28 - 14.14) About 10% amphibole, 5% biotite concentrated in 3-5 cm bands, core angle 50° TCA.
		(14.14 - 14.97) Feldspar rock, greenish, granular, massive, 3 to 5% coarse dark green amphibole clots with a few specks of pyrite.
		(14.97 - 22.86) Leucocratic syenite, 10% amphibole, core angle 0 to 15° TCA (Half the core is syenite, other is feldspar rock, lengthwise).
		(22.86 - 24.14) Yellowish, altered syenite, fractured.
		(24.14 - 27.80) Leucocratic syenite, heterogeneous, coarse-grained, large feldspar locally.
		(27.80 - 28.86) Mesocratic, 30% biotite, trace graphite, 5% interstitial calcite.
		(28.86 - 33.04) Leucocratic syenite with 25% feldspar rock in poorly defined narrow bands.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: G. Mewby
DATE: Sept 17, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KBZ-05
Page 2 of 5

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION (Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution))
		(33.04 - 33.56) Biotite-rich band similar to (27.80 - 28.86) upper contact at 67° TCA, lower contact at 20° TCA. About 5 % interstitial calcite.
		(33.56 - 39.32) Leucocratic syenite, core angle 45° TCA, massive pinkish brown feldspar 37.95 - 38.22 with 2% greyish zircon a/c to 5 mm. A few hematitic fractures (1 to 3 mm) at 15° TCA.
		(39.32 - 39.78) White quartz band, a few flecks of graphite. Core angle 45°.
		(39.78 - 50.23) Leucocratic to mesocratic syenite with 12% pinkish feldspar rock bands from 41.0 to 41.30 and from 43.9 to 44.8. Core angle 30 to 45°. Minor hematite staining.
.23	52.43	GREEN AMPHIBOLITE
(164.8)	(172.0)	Overall dark green colour, mottled, massive, medium to coarse-grained (3 to 5 mm). Upper contact at 70° TCA, lower at 40°.
		(50.23 - 51.05) = Mineralized with coarse-grained yellow sphene (~1 cm), purple fluorite, hematite. About 2% "creamy stubbies", minor zircon. Max RA = 450 ups SSP 2 at 50.29 m = narrow (1 cm) band of moderate hematization at 55° TCA.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Cu	ASSAY ppm Zn
6631	164.8 - 167	2.2'	100	290	16132
6632	167 - 172	5'	100	330	3965
6633	172 - 177	5'	100	97	12163
6634	177 - 182	5'	100	1011	8809
6635	182 - 187	5'	100	233	6024
6636	187 - 192	5'	100	108	4850

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KBZ 6 = 33.22 to 33.35 (biotite-calcite rock)
KBZ 7 = 51.87 to 52.00 (Green Amphibolite)

GRAPHIC LOG LEGEND:

LOGGED BY: G. Mercy
DATE: Sept 18, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. KBZ-05
Page 3 of 5

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
52.43	55.02	MESOCRATIC SYENITE
(172.0)	(180.5)	Grey, medium-grained, moderately foliated, about 15% mafic (mostly amphibole). Core angle 45 to 55° TCA. Weakly hematized locally.
55.02	57.27	GREEN AMPHIBOLITE
(180.5)	(187.9)	Similar to Unit from 50.23 to 52.43 with minor syenitic bands, core angle 55° TCA. Both contact zones are mineralized: (55.02 - 55.47) = 2% coarse-grained yellow euhedral sphene, 1 to 2% fine-grained "creamy stubbies", some hematite, fluorite, tr. pyrite. Max AA = 300 cps. A few grains of brithalite at 55.11 m. (57.0 - 57.27) = 1% fine-grained sphene, minor hematite. Max AA = 220 cps SPP2.
57.27	59.86	MESOCRATIC SYENITE
(187.9)	(196.4)	Similar to Unit from 52.43 to 55.02 m. Core angle 45 to 50° TCA. Weak, spotty hematization.
59.86	63.22	GREEN AMPHIBOLITE
(196.4)	(207.4)	Somewhat similar to Unit from 50.23 to 52.43, more heterogeneous. Contains 30% syenite bands cutting the core at 50° TCA. Lower contact weakly mineralized, < 1% sphene. AA ~ 90 cps.

LOST CORE (INTERVAL, LENGTH): 192.0 - 197.0 = 0.5' missing

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY PPM Y	ASSAY PPM Zr
6637	192 - 197	5	90	45	571
6638	197 - 202	5	100	445	1433B
6639	202 - 207	5	100	1600	10624

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

LOGGED BY: G. Mercy
DATE: Sept 18, 1990

Hole No. KB2 - 0[illegible]
Page 4 of 5

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION (Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution))
		(61.23 - 63.21') = Lower contact zone, well mineralized. 1 to 2 % medium to coarse - grained sphene, moderate to strong hematization max. radioactivity = 150 cps, 61.9 to 62.2 m. Core angle 55° TCA.
63.22 (207.4)	70.93 (232.7)	PEGMATITE Very light beige to pinkish, hard, massive, coarse to very coarse - grained (1 to 8 cm perthitic feldspar) - 60% white & orangey feldspar, 30% quartz, 3% coarse pyroxene clots, 7% large perthitic feldspar.
70.93 (232.7)	82.36 (270.2)	GREY BIOTITE SYENITE Medium greenish grey, medium - grained, moderately to crudely foliated, leucocratic to mesocratic (10 to 20% mafic) - Lower contact at 50° TCA with coarse pyroxene and 2% pink zircon -
		(71.66 - 72.12) = mafic band, 50% biotite, 35° TCA, 1% interstitial calcite, trace purple fluorite -
		(74.80 - 75.07) = strongly radioactive zone, hematitic possibly due to rusty brown thorite, minor "creamy stubbies". Core angle 45° Max Rad = 3,000 cps SSR2.

LOST CORE (INTERVAL, LENGTH):

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KB2 8 = 65.23 to 65.35 (Pegmatite)
(214.0 to 214.4')

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm 4	ASSAY ppm 25
6640	242-247	5'	98	369	1134
6641	247-252	5'	100	49	11474
6642	252-257	5'	100	26	4548

GRAPHIC LOG LEGEND:

LOGGED BY: G.X. Mercy
DATE: Sept 19, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. KBZ - 03
Page 5 of 5

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		(75.71 - 75.96) = very weakly hematized zone at 44° TCA, max RA = 250 cps SBS2.
36	83.03	CALCITE MARBLE
(270.2)	(272.4)	Pale apple green to white, medium-grained, massive to slightly banded, 90% calcite, 10% phlogopite, trace purple fluorite. Upper contact 40° TCA, lower at 30° TCA
83.03	90.95	GREY BIOTITE SYENITE
(272.4)	(298.4)	Similar to (70.93 to 82.36), except as noted below. Core angle generally at 50 to 60° TCA.
		(87.48 - 90.95) = augen-like texture, feldspar grains concentrated in ill-defined, "cloudy" augen about 0.8 x 2 cm. 15% amphibole. Core angle 45 to 50° TCA.
90.95	97.63	BROWN QUARTZ-FELDSPAR GNEISS
97.63	105.16	PINK QUARTZ-FELDSPAR GNEISS ("Basement")
(320.3)	(345.10)	Pink to orangey, generally fine-grained (~ 1mm) quartz-feldspar assemblage with 4-5 mm long mafic streaks. Leucocratic with 5% amphibole, 20% quartz and 75% feldspar. Pink colour partly due to spotty hematization (limitization?). Contact at 44° TCA.
105.16		END OF HOLE

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KBZ 9 = 88.97 to 89.06 (Augen-like syenite)
KBZ 10 = 102.72 to 102.82 (Basement Rock)

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

KIPAWA PROJECT

LOGGED BY G. X. MEUSY

DATE September 17, 1990

DRILL COLLAR:

COORDINATES 0+00.5N
1+60.5 E

ELEVATION 282.1 m

BEARING 322°

INCLINATION -50°

HOLE LENGTH 102.72 m (337')

LENGTH OF HOLE IN OVERBURDEN 10.36 m (34')

LENGTH OF CASING 10.36 m (34')

CASING PULLED [X]

LEFT IN HOLE [ ]

CORE SIZE BQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	102.72 – No	etch mark	(void test)

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma		0 to 101.5 m	Mt. Sopris 1000

DATUM:

HOLE DEPTH: COLLAR+ 1.52 m (5')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 1.52 m (5')

GEOPHYSICAL: COLLAR+ Ø

HOLE NUMBER 90 - KBZ - 02

NUMBER OF PAGES 4

DATE STARTED Sept. 15, 1990

DATE COMPLETED Sept 16, 1990

DRILL CONTRACTOR Hosking

SIGNIFICANT ASSAY DATA:

INTERVAL	THICKNESS	ASSAY

LOGGED BY: GXM
DATE: Sept 17, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KBZ-02
Page 1 of 4

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	10.36	Overburden
10.36	24.26	GREY BIOTITE SYENITE
(34.0)	(79.6)	Overall grey to greenish grey colour, medium to coarse-grained (3.5 mm), crudely foliated, heterogeneous, mesocratic (25 to 30% mafic, mostly biotite with minor amphibole). Core angle of foliation highly variable (0 to 55° TCA). Lower contact gradational and somewhat arbitrary.
		(10.36 - 13.93) = 15% mafic (amphibole), poorly foliated (0 to 45° TCA), fairly homogeneous.
		(13.93 - 15.48) = felsic section, massive pinkish to grey feldspar mixed with leucocratic syenite bands, highly contorted, wavy foliation which reverses itself between 14.9 and 15.2 m.
		(15.48 - 24.26) = coarse-grained, heterogeneous, crudely foliated (streaky, cloudy foliation), 30% mafic, mostly coarse biotite. About 5% altered feldspar from 18.5 to 19.1, and 2-3% pale green chlorite in biotite-rich zones.
24.26	29.44	PORPHYROBLASTIC BIOTITE SYENITE
(79.6)	(96.6)	Greenish-grey background with about 5% orange feldspar porphyroblasts. The syenite is medium-grained, except for the feldspar porphyroblasts which are 1 to 3 cm in size. Main mafic constituent is biotite, minor amphibole & chlorite.

ROCK TYPE | METERS DOWN HOLE | GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KBZ 3 = 19.38 to 19.51 m (63.6 to 64.0')
KBZ 4 = 24.47 to 24.63 m (80.3 to 80.8')

GRAPHIC LOG LEGEND:

LOGGED BY: GXM
DATE: Sept 17, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KBZ-02
Page 2 of 4

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		Crude foliation at 50 to 70° TCA. Minor zircon as accessory mineral.
29.44	40.96	GREY AMPHIBOLE SYENITE
(96.6)	(134.4)	Grey, medium-grained, well foliated, 10 to 15% mafic (acicular amphibole), fairly homogeneous, core angle 45° throughout, except near lower contact which is at 10-20° TCA. Minor biotite and trace accesory zircon.
40.96	43.71	FELDSPAR ROCK
(134.4)	(143.4)	Pale green to somewhat brownish, massive, medium-grained, granular in places, contains 3 to 5% coarse-grained (8 mm) biotite, 2% coarse amphibole and < 1% zircon. Sharp upper contact (10° TCA), gradational lower contact.
43.71	51.45	GREY BIOTITE SYENITE
(143.4)	(168.8)	Fairly similar to unit at beginning of the hole from 10.36 to 24.26. Grey to greenish grey, medium to coarse-grained (2 to 5 mm), crudely foliated to massive, heterogeneous, mesocratic (~ 15% mafic, amphibole and biotite, minor chlorite). Core angle 40 to 60° TCA. Minor graphite (< 1% fine-grained).

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KBZ 5 = 41.42 to 41.51 m. (135.9 to 136.2')

GRAPHIC LOG LEGEND:

LOGGED BY: GXM
DATE: Sept 17, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-RD2-02
Page 3 of 4

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
51.45	54.80	FELDSPAR ROCK
(168.8)	(179.8)	Similar to 40.96 - 43.71, pale green to pinkish, 5% dark green coarse (3cm) pyroxene clots.
80	65.11	GREY BIOTITE SYENITE
(179.8)	(213.6)	Similar to unit from 43.71 to 51.45. Grey to greenish grey, medium to coarse-grained, crudely foliated, mesocratic (15% mafic, mostly amphibole > biotite) - Core angle 45°.
65.11	72.11	FELDSPAR ROCK
(213.6)	(236.6)	Pale green granular feldspar (4 mm) and pink massive feldspar (very coarse, > 5 cm) with about 5% coarse green amphibole clots and minor syenite - About 1% disseminated graphite (1 to 2 mm flecks), some hematite - Lower contact at 30° TCA.
12.11	84.43	GREY SYENITE
(236.6)	(277.0)	Grey to greenish grey, medium-grained, moderately to crudely foliated, mesocratic with 15% mafic, mostly amphibole - Core angle 60°.
84.43	90.62	ORANGE (QUARTZ) SYENITE
(277.0)	(297.3)	Pinkish to orangey grey due to the presence of 5.8% orange feldspar and hematite staining - Medium-grained, foliated to weakly banded - Core angle 55-60° TCA.

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY ppm Ag	ppm Au
6626	277-282	5'	100	97	950
6627	282-287	5'	100	112	677
6628	287-292	5'	100	47	593
6629	292-297	5'	100	257	3058
6630	297-302	5'	100	156	2620

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

LOGGED BY: GXM
DATE: Sept 17, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KDZ-02
Page 4 of 4

PROJECT:

INTERVAL in METERS FROM	TO	DESCRIPTION (Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution))	ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS
		This unit has a higher radiometric background than enclosing rocks (~ 50 cps SPP 2 as opposed to 35-40 cps) - Mesocratic, 15 to 20 % mafic, mostly amphibole. Very finely disseminated exotics ("creamy stubbies") throughout, particularly 84.43 to 84.89, 85.34 to 85.71, 86.57 to 86.87 - Finely disseminated graphite throughout			
		(89.40 - 89.73) Radioactive zone (120 cps SPP 2) moderately hematized, about 1% pale yellow accessories 89.60 - 89.64 (Sphene ?)	Core angle ~ 60° TCA.		
		(89.73 - 90.62) Coarse, 30-40 % mafic, heterogeneous			
90.62	102.72	GREY BIOTITE SYENITE			
(297.3)	(337.0)	Grey to pale greenish grey, medium-grained with minor fine-grained narrow seiliions, moderately to poorly foliated - Leucocratic to mesocratic (average ~ 10-15 % mafic, amphibole > biotite) - Locally graphitic - Core angle 40° to 60° TCA - Less than 1% very finely disseminated "creamy stubbies" from 97.6 to 99.4 m.			
102.72		END OF HOLE			
(337.0)					

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND:

DIAMOND DRILL LOG

UNION OIL COMPANY OF CANADA LTD.
MINING EXPLORATION

Kipawa PROJECT

LOGGED BY G.X. MEUSY

DATE SEPT 14, 1990

'ILL COLLAR:

COORDINATES 0+35.3S
1+00E

ELEVATION 288.1 m

BEARING 322°

INCLINATION -60°

HOLE LENGTH 91.59 m (300.5')

NGTH OF HOLE
IN OVERBURDEN 10.97 m (36')

LENGTH OF CASING 12.80 m (42')

CASING PULLED [X]

LEFT IN HOLE [ ]

CORE SIZE BQ

DOWN THE HOLE SURVEYS:

DIRECTIONAL:

INSTRUMENT	FOOTAGE	AZIMUTH	INCLINATION
Acid Test	91.44 (300')	—	-55°

GEOPHYSICAL

TYPE	INTERVAL OPEN HOLE	INTERVAL INSIDE PIPE	INSTRUMENT LOGGING CO.
Gamma		0 to 90.45 m	Mount Sopris 1000

DATUM:

HOLE DEPTH: COLLAR+ 1.04 (3.4')

DOWN THE HOLE SURVEYS

DIRECTIONAL: COLLAR+ 1.04 (3.4')

GEOPHYSICAL: COLLAR+ Ø

HOLE NUMBER 90 - KBZ - 01

NUMBER OF PAGES 3

DATE STARTED SEPT 13, 1990

DATE COMPLETED SEPT 14, 1990

DRILL CONTRACTOR Forage Hosking Inc.

SIGNIFICANT ASSAY DATA: None

INTERVAL	THICKNESS	ASSAY

LOGGED BY: G.X. Massy
DATE: Sept 14, 1990

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90-KB2-01
Page 1 of 3

PROJECT: Kipawa

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
0	10.97	Overburden
10.97	33.68	GREY SYENITE
)	(110.5)	Dominantly medium-grey, fine-grained, poorly foliated, leucocratic (5-10% acicular mafic minerals) - Mostly grey plagioclase, 1% visible quartz - Trace pyrite.
		(10.97 - 19.75) Mostly fine-grained, massive, (36.0 - 64.8) a few medium-grained crudely foliated (streaky) narrow sections, where foliation is at 65 to 70° TCA.
		(19.75 - 33.68) Mostly medium-grained, more (64.8 - 110.5) mafic (10%), core angle 60° - Micaceous sections 20.63 - 20.88 with 60 to 70% biotite and 3% interstitial calcite - A few fine-grained sections with < 1% very finely disseminated graphite -
33.68	90.74	ORANGE QUARTZ SYENITE
(110.5)	(297.7)	Dominantly orangey grey due to the presence of 5% orange feldspar - Medium-grained, mesocratic (15 to 20% acicular amphibole),

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

ENERGIE ET RESSOURCES, SECTEUR MINES
REÇU
20 MAR 1991
BUREAU RÉGIONAL ROUYN-NORANDA

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KB2 1 = 29.34 to 29.44 m (96.25 to 96.60')

GRAPHIC LOG LEGEND:

LOGGED BY: G. Mewis
DATE: Sept 14 / 90

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90 - KB2 - 01
Page 2 of 3

PROJECT: Kipawa

INTERVAL in METERS FROM	TO	DESCRIPTION Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		generally moderately foliated with minor weakly banded sections - Some visible quartz, perhaps 2 to 3% overall.
		(33.68 - 43.28) Mostly dark grey, 25-35 % mafic, crudely foliated - Core angle 75°-
		(43.28 - 69.10) Medium to coarse-grained, crudely foliated (streaky foliation), 15 to 20 % mafic, definite strong orange tint- Core angle 75°- About 4% fine-grained "creamy stubbies" exotic minerals between 61.84 and 62.05 m.
		(69.10 - 81.59) Very homogeneous, medium-grained, evenly foliated orange syenite, 15 % mafic (acicular amphibole) - Core angle 50°.
		(81.59 - 84.73) Banded section, 1 to 5 mm alternating mafic (biotite rich) and felsic (mostly grey to white feldspar) bands - Core angle 48 to 54° TCA
		(84.73 - 85.04) Mafic section, 85 % coarse-grained dark green amphibole, 10 % interstitial feldspar and 5 % pink zircon-

ROCK TYPE	METERS DOWN HOLE	GRAPHIC LOGS

ASSAY SAMPLE NO.	INTERVAL	THICKNESS	CORE REC'Y %	ASSAY

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):
KB2 2 = 75.53 to 75.64 m (orange Syen)
(247.8 to 248.15')

GRAPHIC LOG LEGEND:

LOGGED BY: G. Mercy
DATE: Sept 14/90

DIAMOND DRILL LOG

UNOCAL CANADA LIMITED
MINING EXPLORATION

Hole No. 90 - KBZ - 01
Page 3 of 3

PROJECT: Kipawa

INTERVAL in METERS FROM	TO	DESCRIPTION — Rock Type, Colour, Texture, Mineralogy, Contact Relationships, Internal Structure & Veining, Alteration, Economic Minerals (Type, Abundance, Texture, Distribution)
		Foliation at 50° TCA.
		(85.04 - 90.74) Homogeneous medium-grained orange syenite similar to (69.10 - 81.59 m). About 10 % very fine-grained exotics ("creamy stubbies") from 85.04 to 85.5 m. Narrow mafic section similar to (84.73 - 85.04) from 86.62 to 86.76 m.
90.74 (297.7')	91.59 (300.5')	ORANGE GRANITOID (PERALKALIC GRANITE ?) Orange colour prominent, coarse-grained, crudely foliated to massive. Up to 5 % grey quartz with 5 % amphibole, 70 % pink to orange feldspar (K-Spar ?), 18 % grey plagioclase and 2 % finely disseminated graphite.
91.59 (300.5')		END OF HOLE

ROCK TYPE | METERS DOWN HOLE | GRAPHIC LOGS

ASSAY SAMPLE: NO. | INTERVAL | THICKNESS | CORE REC'Y % | ASSAY

ENERGIE ET RESSOURCES - SECTEUR MINES
REÇU
20 MAR 2001

LOST CORE (INTERVAL, LENGTH):

GEOLOGICAL SAMPLES (SAMPLE No., METERAGE):

GRAPHIC LOG LEGEND: