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Review of the geology and the distribution of phosphorus in the Lillebukt Alkaline Complex, and adjacent areas, Stjernøy Northern Norway

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REPORT

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Title:
Review of the geology and the distribution of phosphorus in the Lillebukt Alkaline Complex, and adjacent areas, Stjernøy Northern Norway

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Summary:

This report gives an overview of the geology, the history of investigations and all previous data (now in digital form) on the distribution of P_2O_5 and apatite in the Lillebukt Alkaline Complex (LAC) and some selected adjacent areas. The LAC is situated on the southern central part of the island Stjernøy in the Altafjord 45 km NW of Alta. The complex comprises an area of about 13 km^2 where the main rocks: hornblende clinopyroxenite, alkali syenite and carbonatite occur in a crudely concentric pattern. In addition, large intrusions of nepheline syenite occur in the southern part of the complex. All these rocks are post-dated by nepheline syenite pegmatites and by several generations of mafic dykes. We have a data set of 330 bulk rock analyses. The bulk of the samples are from the carbonatite and the hornblende clinopyroxenite, the two rocks units in which significant contents of apatite are found. The carbonatites (218 analyses) have an average P_2O_5 content of 2.33%, with a maximum value of 6.45%, but only 23 samples have levels above 6% P_2O_5. The pyroxenites (56 analyses) have an average P_2O_5 content of 2.35 and a maximum value of 13.49%. 4 samples have P_2O_5 above 8%. All our data combined give an average P_2O_5 of 2.38% equal to 5.62 weight % of apatite. In well-exposed and well-sampled areas of about 300x300 meters, the spatial distribution of samples gives an average P_2O_5 of 3.00% and 2.93% in the carbonatite and pyroxenite respectively. The contents of heavy metals such as As and Cd are below their detection limits of 10ppm.

Sampling along the east side of Sørfjorden and east and west of Simavik, shows that the rocks here are very low in P_2O_5.

The Pollen carbonatite has an average P_2O_5 (73 analysis) of 2.83%

We believe that our dataset is sufficiently large and representative that it gives accurate information on the P_2O_5 and apatite contents of the relevant rocks on Stjernøy.

A CD with the total analytical data is included together with this report

Keywords:	Nepheline syenite	Mineral deposit
Industrial minerals	Carbonatite	Alkaline rocks
Apatite	Pyroxenite	

Executive summary

Objective: To investigate the potential of economic mineralizations of apatite in the Lillebukt alkaline complex, Stjernøy,

Work done: Compilation of all relevant historical data. Ten days of fieldwork involving NGU staff The aim was on sampling apatite potential rocks in selected areas.

Analysis of samples and compilation with existing data.

Findings: Sizeable ground with potential economic apatite grade could not be located, mainly due to low grade. No more fieldwork is advised.

Chemical analysis of apatite concentrate is preparation and will be reported separately in due course.

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ENCLOSURE

Geological map of the Lillebukt Alkaline Complex
CD rom with this report and the analytical data in digital form

1. Introduction

This report is a compilation and review of the results from investigations of the Lillebukt Alkaline Complex (LAC) and surrounding areas on Stjernøy Northern Norway. We review data collected by various people from 1951 up to the 1980s, and presents a compilation of our own data from 1992 to 2009. The work has, during these years, been sponsored or directly financed by a number of organizations which include:

The Geological Survey of Norway
Landsdelsutvalget for Nord Norge og Namdalen
Finnmark fylkeskommune
Finnmarkseiendom (FeFo)
Yara International

Logistical supported has been provided by North Cape Minerals (NCM, Lillebukt Stjernøy) This report gives a quite detailed review of the geology, but emphasis is put on the occurrence of apatite and variation in the distribution of phosphorus. The content of this report, its layout, and conclusions have been reviewed and approved by our contact person at Yara international, (Tore Vrålstad). In accordance with his wishes we have not written any discussions on mining or economic aspects. A CD with the total analytical data is included together with this report. In 2009 two persons from NGU staff and Tore Vrålstad did 8 days of fieldwork on the island.

When converting from weight % P_2O_5 to weight % apatite we use the following relationship throughout this report.

$$\text{Apatite} = P_2O_5 \times 2.3595$$

2. Geographical setting

The LAC is situated on the southern central part of Stjernøy, situated in Altafjord, about 45 km NW of Alta. The island of Stjernøy has a very rough topography with steep mountain sides down to the sea with steep peaks up to about 1000 m. a.s.l. In addition the the internal part of the island is dissected by several deep valleys that are difficult to traverse to the sea. However, apart from the steep ascent from the sea, most of the LAC is fairly easily accessible. (Figure 1).The LAC has a surface dimension of about 6 x 2 km^2 (Figure 2 and 3) and can be followed from Lillebukt in the south to the central part of Finndalen in the north. The easiest access is either by helicopter, or by making arrangements with NCM for transport to the top of Nabbaren, from which there is an easy walk downhill to the central part of the complex. It can also be accessed by walking northwards from Lillebukt through a narrow valley; 1.5-2 hours walk from sea level to the central part of the complex.

Figure 1 Panorama over the central part of the Lillebukt Alkaline Complex, to the right is the lake Saravann, the central part of the picture, just to the left of the lake is the high-grade apatite area of the carbonatite, see Figure 15 and 16.

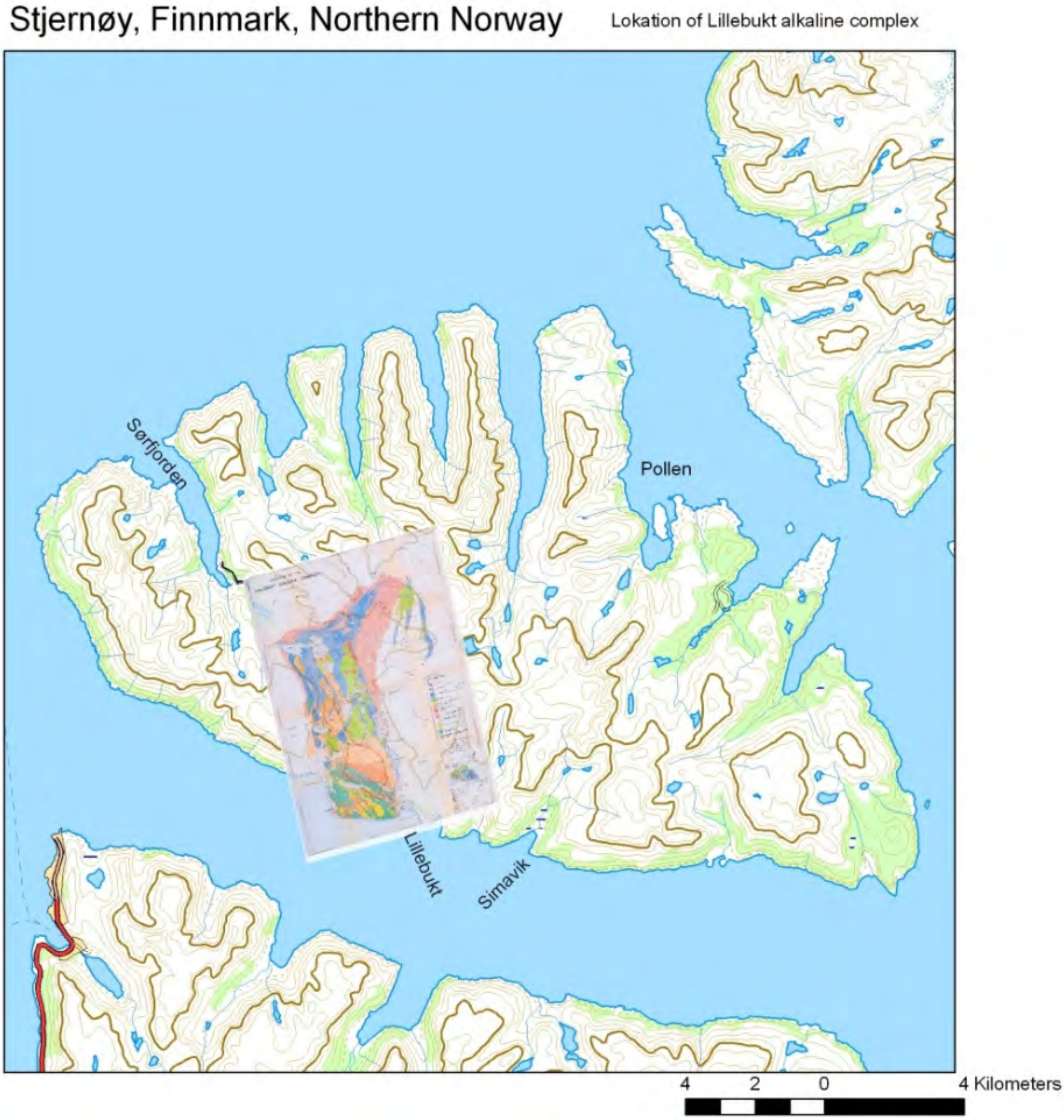


Figure 2 Map of Stjernøy, with the location of the Lillebukt alkaline Complex (see also map enclosure)

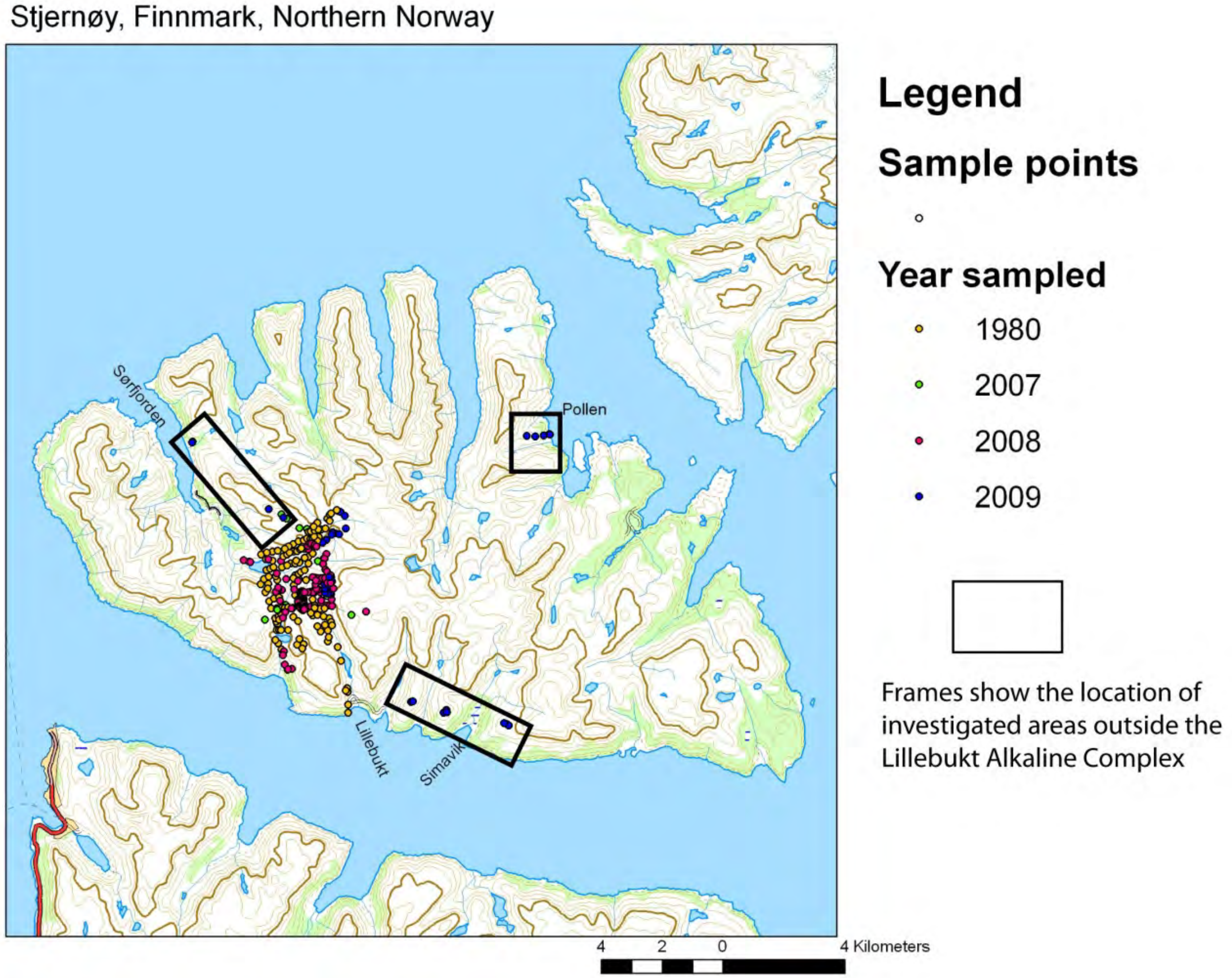


Figure 3 Map showing the sampling points and investigated areas outside Lillebukt Alkaline Complex

2.1 North Cape Minerals nepheline syenite production

Several companies and now North Cape Minerals have, since the beginning of the 1960s had a mine in active production (Fig 4). The focus of the operation is a nepheline syenite body comprising the central part of the mountain Nabbaren. The nepheline syenite is currently being produced from an open pit at the top of Nabbaren. The nepheline syenite is upgraded through several steps of magnetic separation, in which mafic minerals are removed. The final product is a K-feldspar- and nepheline-enriched product used as raw material in the glass and ceramic industries.

Figure 4 North Cape Minerals nepheline syenite factory, with Mount Nabberen in the background

3. History of investigations and compilation of older data

This report comprises and compiles data from many different sources from 1951 up to the present.

The earliest descriptions of the rocks from the LAC were published by Strand (1951). Strand visited the area and sampled outcropping carbonatite in the Finndalen valley, east and north of Gammevann (Figure 5).

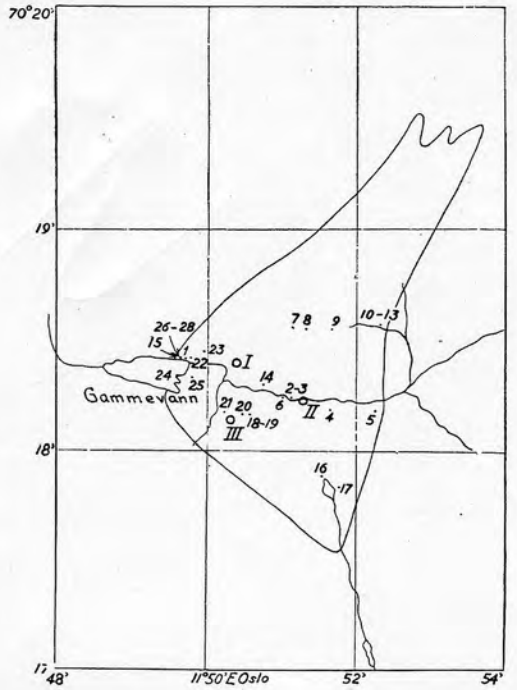
He published modal content and the first chemical analysis of the carbonatite Table 1 and 2.

Table 1 Modal composition carbonatite rocks (data from Strand 1951)

Sample	3	4	15	13	28	5	9	19
Calcite	75.3	62.8	56.2	56	34.4	52.2	45.5	44
Biotite	20.5	24.3	29.7	32.7		14.4	42	36.4
Hornblende						24	2	
Albite		0.8		3.4	2.4		6.5	9.4
Nepheline			2.5		4			
Apatite	3.8	10.8	7.4	4.2	4	6.7	2.4	6.1
Opaque	0.4	1.3	4.2	3.7	3.2	2.7	1.6	4.1
Sample	**22**	**26**	**12**	**23**	**10**	**25**	**Average**	
Calcite	43.6	42.5	41.6	40	31.9	23.5	**46.4**	
Biotite	41.9	54.8	50.1	50.2	53.8	39.9	**37.7**	
Hornblende							**13.0**	
Albite		0.5			6		**4.1**	
Nepheline	8.1					35	**12.4**	
Apatite	1.4	1.8	7.1	2.8	2.5	1.1	**4.4**	
Opaque	5	0.4	1.2	7	5.8	0.5	**2.9**	

Table 2 Average chemical composition of 7 samples from the carbonate (data from Strand 1951).

Average of 7 samples	
SiO_2	18.93
TiO_2	2.76
Al_2O_3	8.81
Fe_2O_3	3.37
FeO	13.67
MnO	0.32
MgO	4.05
CaO	22.47
BaO	0.6
Na_2O	0.44
K_2O	4.54
P_2O_5	1.91
CO_2	16.27
S	0.25
F	0.12
H_2O-	0.23
H_2O+	1.24



Kartskisse over søvittfeltet i Fjellfinndalen.
I—III. Lokaliteter for store prøver uttatt etter anvisning av statsgeolog Poulsen, 1—28. lokaliteter for forfatterens håndstykker.

Sketch-map of the sövite area in Fjellfinndalen.
I—III and 1—28, localitites of samples.

Figure 5 Map showing the sample localities for samples listed in Table 1 from Strand (1951).

Table 2 shows that Strand found an average apatite content of 4.5 wt % in the carbonatite.

Heier (1961) made a general overview of the different rock types in the Lillebukt area, He presented the first geological map and chemical analyses of different rock types with special emphasis on the nepheline syenite. He also presented the first mineral analysis of apatite (Table 3)

Table 3 Composition of apatite from the carbonatite (data from Heier 1961).

Element	Wt%
Cl	0,06
H_2O	0,00
CO_2	0,60
Refractive index No	1,642

This corresponds to an apatite end member shown in Table 4.

Table 4 Apatite end members calculated from Table 3 (data from Heier 1961), see also Table 3.

	Apatite end members
Cl-apatite	1%
CO_2- apatite	10%
Oxyapatite	71%
F-apatite	18%

Elkem-Spigerverket carried out exploration for apatite on Stjernøy in late 1976, including stream-sediment geochemistry and bedrock sampling. Apart from a brief unpublished report (Berthold 1976) no other information is publically available today. During this work the apatite-rich pyroxenite on the eastern margin of the LAC was found. Berthold (1976) reports the following apatite content in the pyroxenite (Table 5).

Table 5 Apatite contents of the pyroxenite on the eastern margin of Lillebukt alkaline complex (based on XRF P_2O_5 analyses Berthold 1976).

Sample	Wt% apatite
14001	4
14002	6
14003	14
14004	20
14005	17
14006	8
14009	11
14010	8
14011	24
14012	27
14013	11
14013	6
14015	8
14016	9
14033	8
average	12

In the early 1980s, professor Brian Robins of the University of Bergen supervised a series of students who investigated the LAC and the Pollen carbonatite (Bruland 1980, Skogen 1980, Kjøsnes 1981, Strand 1981 Robins & Tysseland 1983). The geological map (Enclosure no. 1) and our knowledge of the geology of the LAC are largely based on the results of these workers. We have digitalized all relevant analytical data including 133 bulk rock analyses of the carbonatite from Strand (1981). He also presented a mineral analysis of apatite. (Table 6).

Table 6 Mineral analysis of apatite, compiled from Strand 1981, location of sample unknown.

	Average apatite
CaO	55.09
FeO	0.18
MgO	0.08
MnO	0.05
Na_2O	0.39
SrO	0.67
Ce_2O3	0.31
SiO_2	0.05
P_2O5	41.22
SO_3	0.03
F	1.66
Sum	99.73
Sr	4391
Ba	1146
Y	219
La	546
Ce	1011
Pr	254
Nd	1187
Sm	216
Gd	113
Dy	64
Ho	21
Er	57
Yb	3.5

In 1985 Renate Cadow, started a Ph.D. study on the apatite mineralization in the pyroxenites of the LAC. The study was unfortunately never completed and no results or data are available.

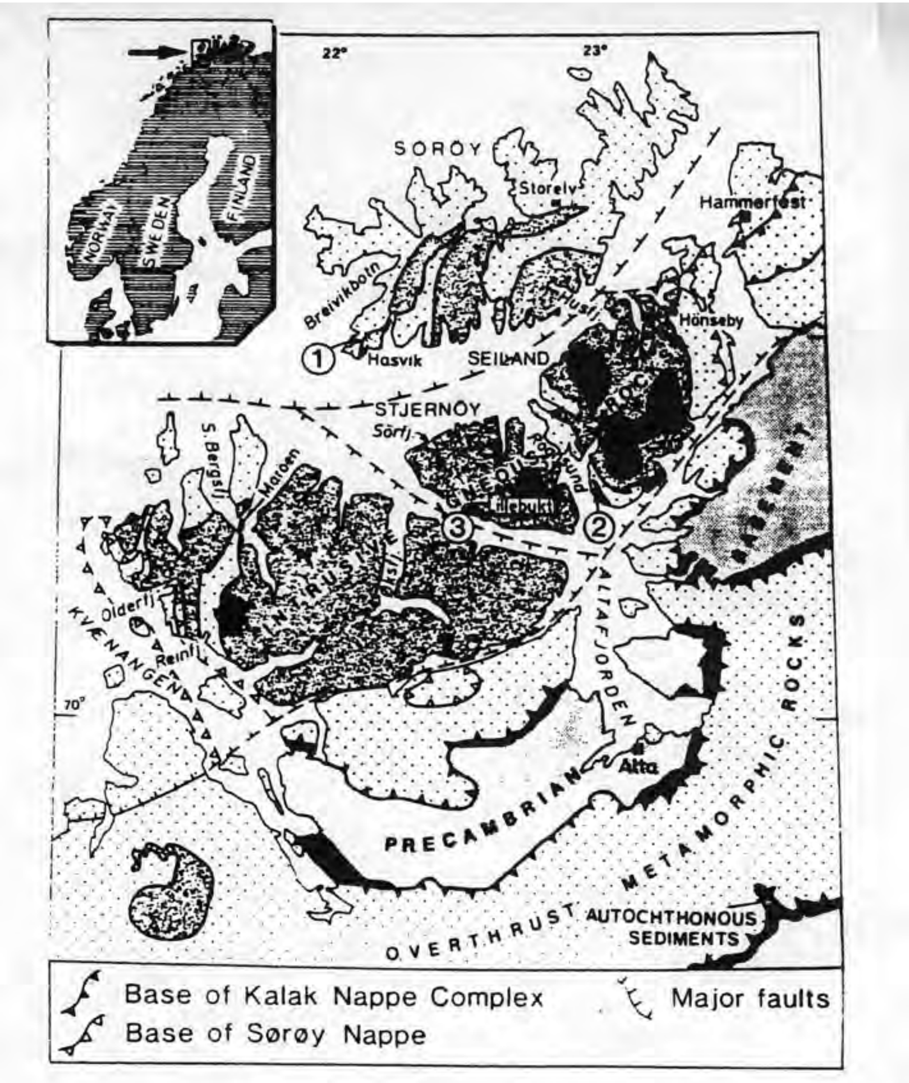
In the early 1990s the carbonatite of the LAC got renewed interest as fertilizer in organic farming (Gautneb & Bakken 1995, Bakken et al. 1997 a and b). Dust and tailings from the nepheline syenite production and crushed carbonatite were tested as fertilizer both in greenhouses and in outdoor growth experiments. The results can be summarized as follows: In short term greenhouse experiments the carbonatite gave a crop yield of about 40% of that of KCl fertilizer and a comparable crop yield when compared to KCl in a 3-year outdoor growth experiment.

With the large increase in the price of rock phosphate and DAP (Di-ammonium-phosphate) that occurred internationally from 2006 until the middle of 2008, scientists from NGU and UMB (Norwegian University of Life Science) started to investigate the economical potential of the LAC again. With financial support from the Government Property Administration of Finnmark (FeFo) field work and sampling was done in 2007 and 2008 and these results are included in this report. In 2009 NGU started a one-year cooperation with Yara International to investigate particular targets within the LAC and adjacent areas for their resources of apatite.

4. Geological setting and field description

The LAC is part of the Seiland Igneous Province and Robins (1996) gives the most up to date and comprehensive geological review.

The Seiland Igneous Province (Figure 6) is part of the Sørøy Nappe of the Kalak Nappe Complex (KNC) which constitutes the Middle Allochthon of the Caledonides of Northern Norway. The KNC were thrust from the WNW into its present position above early Paleoproterozoic basement rocks or late Precambrian to Cambrian sediments during scandian orogeny (Roberts & Gee 1985).



Simplified geological map showing the main features of the Seiland Province. Numbers refer to 1. Hasvik Gabbronorite; 2. Rognsund Intrusion; 3. Lillebukt Alkaline Complex. Ultramafic complexes are in black.

Figure 6 Geological map of the Seiland Igneous Province (Robins 1996)

The magmatic evolution of the Seiland Igneous Province was prolonged and included intrusion of numerous gabbroic plutons, calc-alkaline intrusions, ultramafic complexes nepheline syenite and syenite alkaline rocks, carbonatites and swarms of mafic dykes.

Syenite rocks, carbonatites and mafic dykes are clearly the youngest igneous rocks in the province. They are believed to be related to nephelinitc magmatism. Field relationships at the LAC and elsewhere demonstrate that nepheline syenite pegmatites represent the latest phase of magmatic activity. The alkaline magmatism has been dated by U-Pb on zircons to 531+/-2 and 523+/-2 Ma (Pedersen et al. 1989).

The alkaline rocks of Seiland Igneous province all have a miaskitic (as defined by Sørensen 1974) chemistry (Robins 1996), i.e. they have molecular proportions of (the agpaitic index AI):

$$AI = \frac{Na_2O + K_2O}{Al_2O_3} < 1$$

This is an important chemical feature and results in the rocks being corundum normative, contrary to rocks with AI > 1 which are acmite normative. Miaskitic alkaline rocks are generally low in REE (Sørensen 1974).

4.1 The Lillebukt Alkaline Complex (LAC)

The LAC occupies a N-S elongated area of about 13 km^2 (Heier 1961, Robins 1996). The main rock types includes hornblende clinopyroxenites, syenites and carbonatites occur in a crudely concentric pattern (see map enclosure). Carbonatites form the core of the complex and are surrounded by, and intrudes hornblende clinopyroxenite in the northern part and nepheline syenites and minor alkali syenites in the southern part of the complex. The intrusive sequence of the rocks is: Perthositic syenite (oldest), hornblende clinopyroxenite, syenite and nepheline syenite and carbonatites. The latter are postdated by syenite and nepheline syenite pegmatite dykes. All these rocks are pre- and post-dated by mafic dykes. The host rocks that makes up large part of Stjernøy are metagabbros. Locally intense metasomatic alteration during intrusion led to the formation of fenites.

4.1.1 <u>The Carbonatites</u>

The mineralogy and petrochemistry of the carbonatites were investigated by Strand (1981). The carbonatites of the complex has, in general, the composition of silico-carbonatitite with about 40% of strontian calcite. Biotite is the main mafic minerals but in areas hornblende may be dominant and has led to the mappable distinction between biotite carbonatite and hornblende carbonatite (see map enclosure). Nepheline, feldspar and apatite are common constituents but have an irregular distribution. The former two are most common near the contacts of nepheline syenites and xenoliths of nepheline syenite pegmatites (Figure 7 and 8). Fe-Ti oxides are common locally. The carbonatite was investigated with respect to Th, U and REE by Heier (1962) and Gautneb (2007) but no enhanced content of REE minerals or radioactive elements have been detected

The mineralogical and chemical variations of the carbonatite result from many processes, including metasomatic reaction with the country rock, fractional crystallization, accumulation of liquidus minerals and lastly, mechanical redistribution and recrystallization during syn- and postmagmatic deformation and metamorphism (Strand 1981).

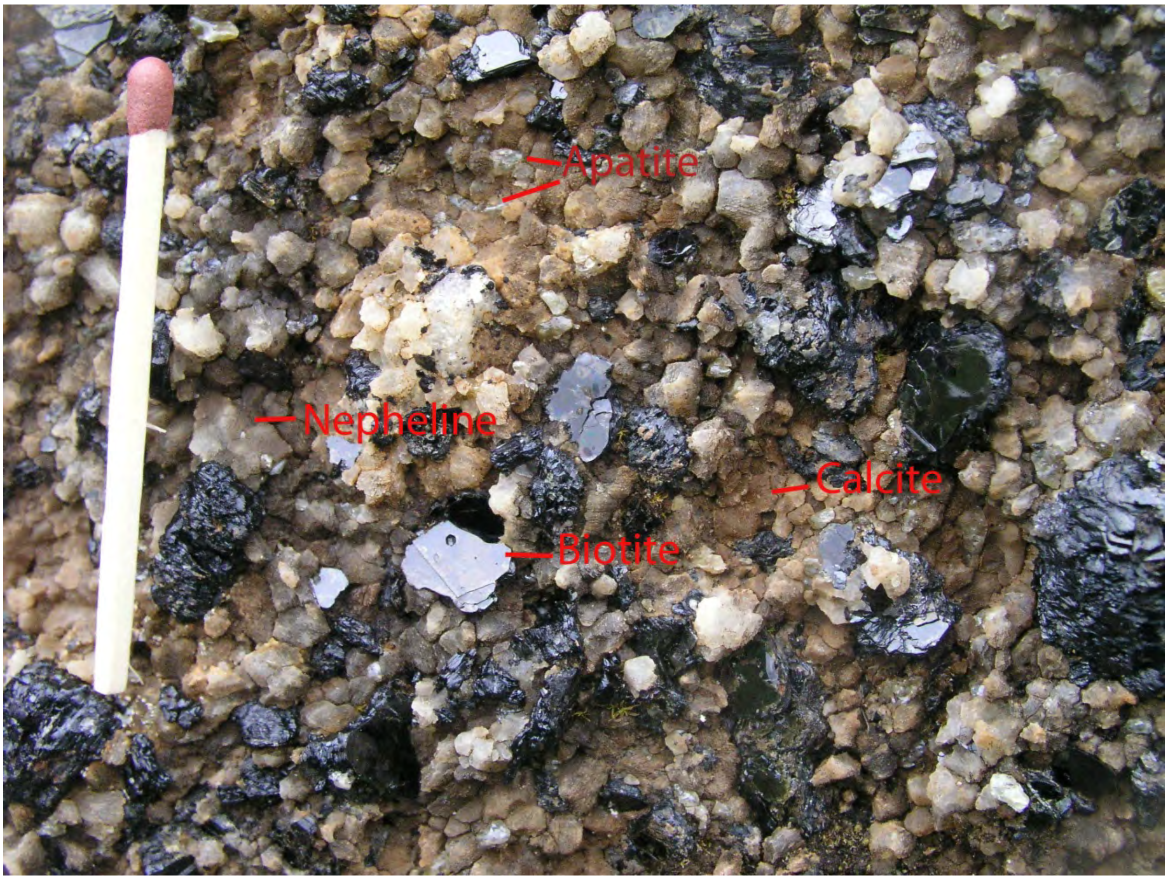


Figure 7 Close-up picture of carbonatite, with the main minerals indicated


Figure 8 Banded carbonatite, with inclusions of deformed dykes.

4.1.2 Apatite-rich hornblende clinopyroxenites

On the northern and eastern margin of the complex there is an area of hornblende clinopyroxenites (in this report pyroxenite or alkali pyroxenite, for simplicity, when appropriate). According to Kjøsnes (1981) and Robins (1996) they form a 50-600 meter wide and 11 km long belt of subparallell and steeply dipping coarse-grained to pegmatitic dykes. Individual dykes are, in general, 50-100 cm wide and are separated by screens of gabbroic host rocks that are fenetized. Fenetized gabbro makes up about 40% of the rock volume in this zone (Robins 1996). Dykes up to 10 m wide have been observed. They lack chilled margin and commonly show an inward directed comb-structure growth of clinopyroxene and hornblende up to 50 cm large, as well as up to 10 cm large skeletal apatite crystals (Robins 1996).

These rocks can be unusually rich in apatite, as already observed by Berthold (1976) and were one of the targets of the 2009 Yara/NGU investigations (Figure 9 and 10). Apatite contents up 32 wt% have been detected. However, due to the large variation of the apatite mineralization and the variable amount of fenetized gabbroic screens between the apatite-rich dykes the aerial extent and volume of economic apatite mineralization is very difficult to estimate. Kjøsnes (1981) showed that the pyroxenites of the LAC have a mineralogy identical to jacupirangites (nepheline-bearing clinopyroxenites). The term alkali pyroxenites was used in his descriptions and he presents the following average composition (Table 7).

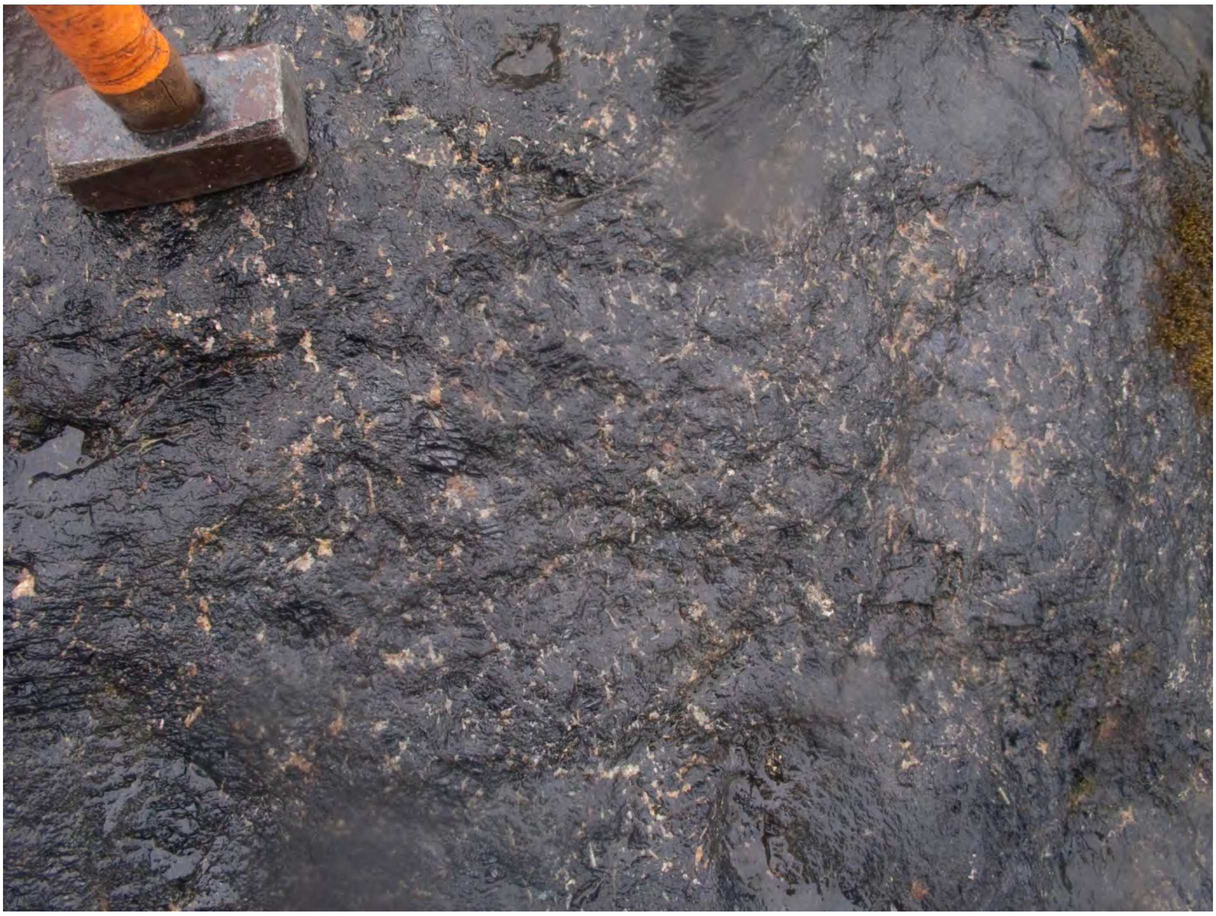


Figure 9 Outcrop of unusually apatite-rich pyroxenite (all white is apatite)

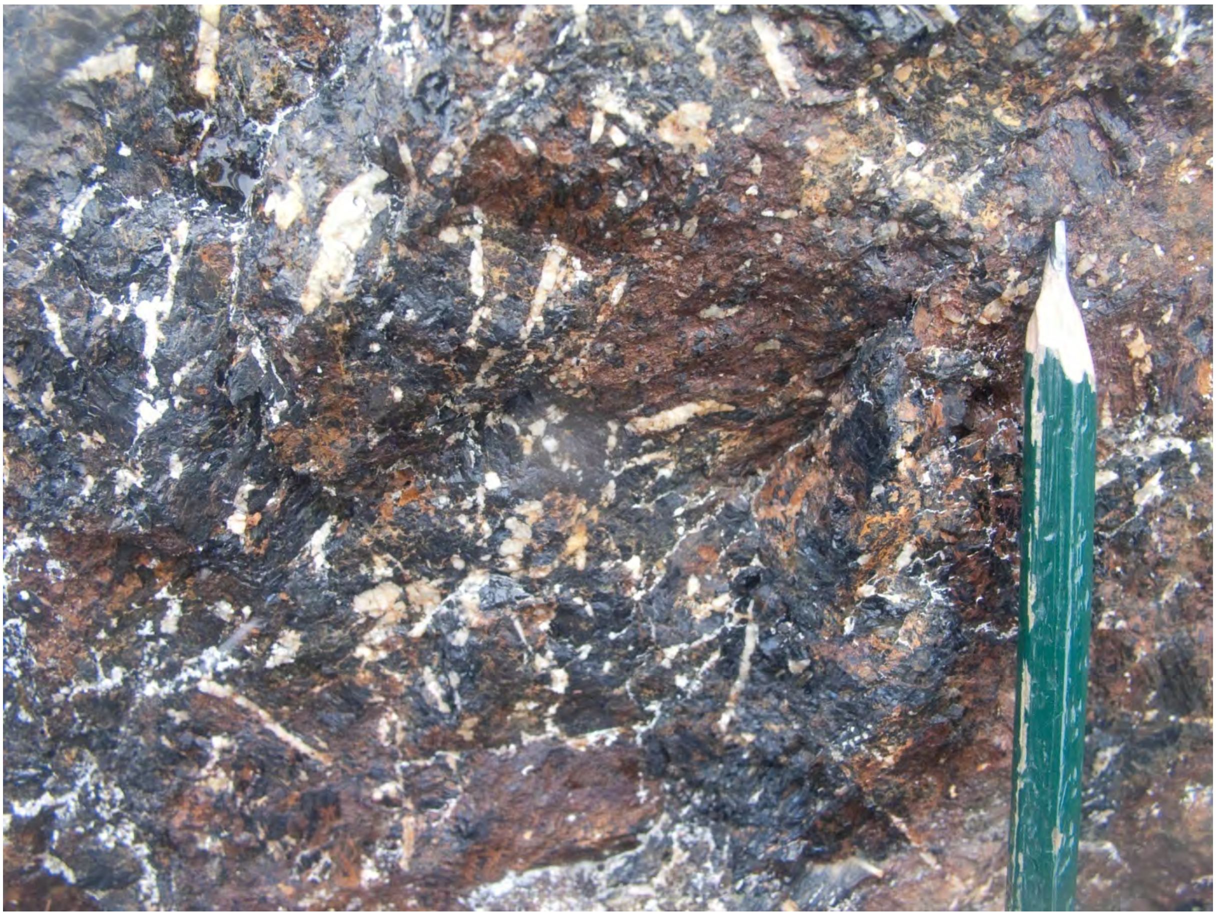


Figure 10 Close up picture of a very apatite-rich pyroxenite

Table 7 Average composition hornblende (alkali) pyroxenite according to Kjøsnes (1981)

SiO_2	Al_2O_3	TiO_2	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	MnO	P_2O_5	H_2O
36.02	11.7	2.84	8.88	8.72	8.58	16.77	1.05	1.18	0.26	2.64	0.66

Kjøsnes concluded, based on the comparison between the composition of nephelinites, their crystallization sequence, texture and mechanism of emplacement, that the alkali pyroxenites originated from fractional crystallization of an olivine-nephelinitc magma that was depleted in alkalies and enriched in P_2O_5 and H_2O. Crystallization of pyroxenes, amphiboles, Fe-Ti oxides and apatite took place on the walls of dykes; thus the alkali pyroxenites can be regarded as cumulates.

4.1.3 Fenitization (CO2- and alkali-metasomatism)

The fenitization and metasomatic reactions between the mafic rocks and carbonatites was studied in detail by Kjøsnes (1981) and according to him; depending on the rock types, pyroxenites, nepheline-syenites or carbonatites and their mutual contact with each other or country rock, each case led to the formation of fenites of individual character. Again depending on rock type the dominating process was eighter CO_2- or alkali-metasomatism or both. Thus Kjøsnes (1981) found that fenitization in the LAC was not restricted only to carbonatites, but involved also other rock types such as pyroxenites and nepheline syenites.

This is supported by work elsewhere (Le Bas 1977, Robins & Tysseland 1983) If we exclude the fenites formed in xenoliths we have the following occurrences of fenites in the LAC:

a) Dark mafic veinss throughout the nepheline syenite gneiss
b) Area north and south of Saravann in which hornblende clinopyroxenites are intensively intruded by carbonatite
c) Screens separating hornblende clinopyroxenite dykes throughout the area mapped as alkaline pyroxenite (see map enclosure)
d) Fenites associated with nepheline syenite, in the southern part of the complex.

Only the fenites in association b and c occur in areas that have been the target for our investigation of the apatite potential.

Fenites associated with pyroxenites are distinguished from unaffected pyroxenites by being granular, medium- to coarse-grained banded dark rocks, whereas the unaffected pyroxenites are coarse-grained to pegmatitic and highly variable in modal composition. The pyroxenites are, in addition, much more weathered and the fenites stand out in the landscape. The fenites show little remnants of the original texture. At well exposed localities, the changes in the rock due to fenitization are clearly visible (Figure 11) but most often overburden make the distinction between fenite and country rock less obvious (Kjøsnes 1981).

4.1.4 Mineralogical and chemical changes during fenitization

According to Kjøsnes (1981) the most characteristic feature during fenitization of gabbro, is the disappearance of plagioclase. Typical modal compositions in surrounding gabbro are 50% plagioclase, 25 % clinopyroxene and 15 % amphibole. During fenitization this is converted to a rock comprising 90% pyroxenes + amphiboles and about 10% of Fe-Ti oxides (Kjøsnes 1981)
Fenitiaztion of the layered mafic rocks surrounding the LAC result in the following changes in chemistry:

Si: a distinct but highly variable reduction,
Al: distinct reduction and decrease in variability, thus a homogenization occurs
Ti: a marked increase and lowered variability
Mg: this is the element which displays the most significant increase, due to its presence both in pyroxenes and amphiboles
Ca: Increases
Na: decreases, due to breakdown of plagioclase
K: shows a small increase
P: increases during fenitization. this has been attributed to high activity of P_2O_5 in the fenitizing fluids

In areas where the carbonatites are in well exposed contacts with its country rocks (north and south of Saravann and where minor carbonatite intrusions occur elsewhere). The following changes in chemistry are observed (Kjøsnes 1981):
Si, Al and Na show a marked decrease, Ti Fe, Ca and P show higher concentrations than the unaffected layered mafic rocks. The changes in major elements reflect the differences in mineralogy between carbonatites and silicate rocks. Mineralogically, fenitization associated with carbonatite intrusion is associated with a pervasive decomposition of plagioclase, with removal of Si, Al and Na, and formation of clinopyroxene and amphibole (Kjøsnes 1981).

Figure 11 Carbonatite veins(light colour) intruding into gabbro resulting in formation of fenite (dark color) with a clear contact to gabbro (grey colour).

4.2 Deformation

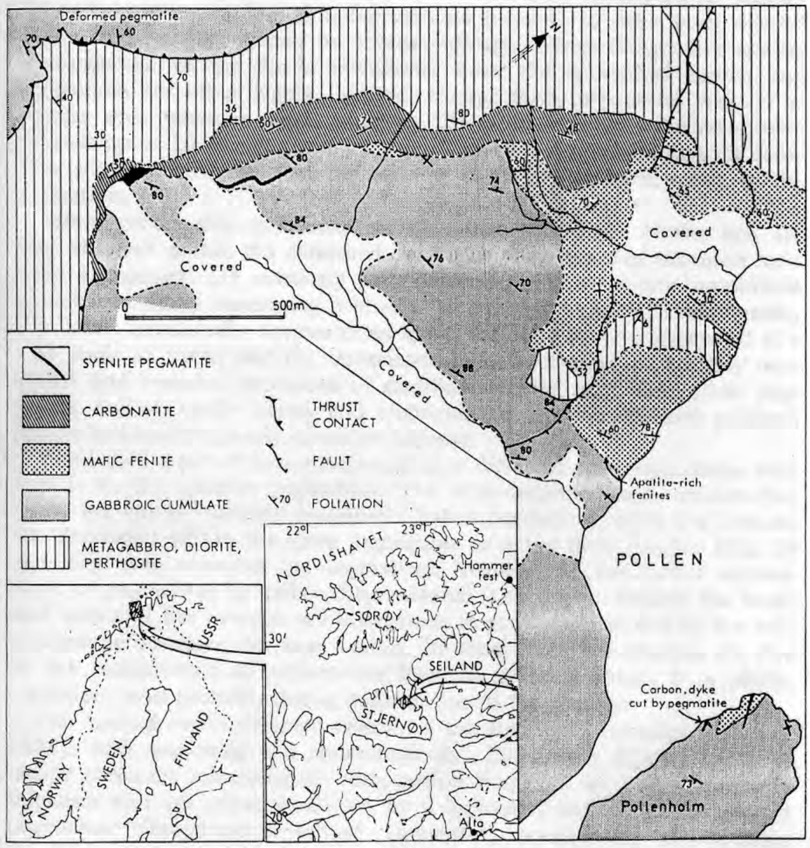
The deformation of the LAC is strong and hetrogenously distributed. The nepheline syenite shows a strong foliation. The fenites and gabbros show a strong tectonic fabric associated with intense folding folding. The carbonatite is strongly deformed and locally folded, as indicated by bands of variable biotite contents, numerous tectonic inclusions and deformation of cross-cutting dykes. The carbonatite has undergone at least two phases of folding (Robins 1996). The hornblende clinopyroxenites are the least deformed rocks. Skogen (1980) interpreted the LAC as initially representing an alkaline ring complex (See Fitton & Upton 1987 for review). Our data does not permit any detailed discussion of the deformation and tectonic development of the LAC.

4.3 Areas outside the LAC

The area comprising the LAC is defined by Robins (1996) as being that included on the map enclosure. We have sampled rocks to the immediate north and east of this complex. These rocks will be included when we discuss the chemistry of the LAC. In addition we selected three adjacent areas marked in Fig 2. The Pollen carbonatite, and Sørfjorden in northern Stjernøy and the Simavik area in southern Stjernøy

4.3.1 The Pollen Carbonatite

The geology of the Pollen Carbonatite has been described by Robins & Tysseland (1983) and a geological map is shown on Figure12. The Pollen carbonatite is a sheet-like body with a length of about 1600 m and a surface exposure of up to 200 m width. Intense deformation has led to a pronounced banding with mafic and calcite-rich layers as well as numerous xenoliths. The present contact to the country rock must therefore be regarded as tectonic. The carbonatite is associated with gabbroic cumulates and very inhomogeneous fenites (Figure 13).The chemistry of our samples of Pollen rocks is discussed in chapter 5.4.



The location and geology of the Pollen Carbonatite—Fenite Complex, Stjernøy, Norway.

Figure 12 Geological map of the Pollen carbonatite (Robins & Tysseland 1983)

Figure 13 Xenolith-rich carbonatite vein intruding into fenitized mafic rocks along the shore at Pollen

4.3.2 Sørfjorden

The area called Sørfjorden is shown on Figure 2. It lies to the north of LAC and northwards along the eastern side of Sørfjorden.

We made a sampling traverse in this area and found a variety of gabbros, some very olivine-rich, and different types of pyroxenites. The pyroxenites were often pegmatitic, with up to 10-15 cm large crystals of clinopyroxene. All samples show low grades of P_2O_5. The chemistry is summarized in chapter 5.3. There is no indication that this area has a potential as an apatite resource.

4.3.3 Simavik area

This area comprises three mountains, one east and two west of Simavik, on the southern part of Stjernøy (Figure 3).

This area comprises pyroxenites and different varieties of gabbro and peridotite including dunite. We sampled a selection of rocks, none with any visible apatite. Significant amounts of Fe-Ti oxides were found in many samples.

The chemistry of the rocks is described in chapter 5.5.

There is no indication that this area has a potential as apatite resource.

5. Analytical results

5.1 Analytical data and methods

Analytical data are compiled from the following sources:

1) Digitalized sampling map of Strand (1981) with 133 XRF analyses.
2) Data collected from several periods of investigation including:
    a) 1990 -1993 (Gautneb & Bakken 1995)
    b) 2007-2008, which were financially supported by FeFo. The samples were collected as hand specimens, dust drilling with portable a Pioneer drill and by blasting out up to 1 ton of rock and homogenization of this material
    c) 2009 investigations supported by Yara International.

All together 330 bulk rock analyses from the LAC and adjacent areas have been conducted.

Since our database represents a compilation of data collected over a large time span and analyzed at different labsoratories there is a difference in the number of trace elements analyzed for the different batches.

Strand (1981) analyzed his samples using standard XRF techniques at the University of Bergen. The 2007 and 2008 data was analyzed by XRF and the facilities of NGU. The 2009 data was analyzed by Acme Lab, Vancouver Canada, using ICP and LECO (Acme package 4a). For the samples collected by NGU we used duplicates and international standards for quality checking. Such control is not available for the Strand (1981) data.

133 sample points from Strand (1981) was transferred manually from his sample map to a digital map, which calculated UTM coordinates This transfer may result in an error of up to maximum 200-300 meters both in the X and Y directions.

A CD with the total analytical data is included together with this report.

Based on their location, we divided the samples into the following sub-areas(see discussions in chapter 4 and Figure 3):

Subarea no:

1 The LAC proper (see map enclosure)
2 Area immediately adjacent to the LAC on the north and east sides
3 The Sørfjorden area
4 The Pollen area
5 The Simavik area

The distribution of the samples and the locations of the subareas are shown on Figure 3. 90 % of the samples were taken from subarea 1. The others represent reconnaissance type of sampling. In detail one sees that in some areas there is a very irregular distribution of sampling points, due to overburden and steep, inaccessible areas.

5.2 Lillebukt alkaline complex, chemical variations with emphasis on the distribution of phosphorus

This chapter will discuss the chemical variation of the rocks and their average composition. Since sampling has not been done with the goal of discussing the petrogenetic evolution of the rocks, discussions are focused on the variation in phosphorus contents. In accordance with the main litholigies in the LAC and adjacent areas the rocks are divided into the following main groups:

1) Nepheline syenite
2) Pyroxenite
3) Carbonatite with biotite and/or hornblende
4) Fenites
5) Gabbros

Due to the nature of the mode of formation of the rocks and the metasomatic processes a large, overlapping chemical variation between the rocks types can be expected.

The chemical variations in the rocks are summarized in Table 8, 9 and 10 with the apatite-rich carbonatite and pyroxenites in Table 8. Histograms and the main statistical data are shown in Figure 14.

Unless otherwise stated the content of apatite and calcite are always calculated from the analysed values of P_2O_5 and CO_2 with these conversion factors:

Apatite = P_2O_5 x 2.3595
Calcite = CO_2 x 2.2748

The chemistry of the rocks can be summarized as follows:

The carbonatites show the CO_2 content varying from 2.5 to 37.81 with an average of 17.63 %, equal to a calculated calcite content from 5.12 to 86,01 with an average of 40.10%. The content of P_2O_5 varies from 0.45 to 6.45 with an average of 2.33, which is equal to calculated apatite contents from 1.06 % to 15,22%, with an average of 5.50%. The carbonatites are enriched in the alkali earth elements (Ba, Sr) and the light rare earth elements (LREE ,La Ce Nd). Undesired toxic metals such as As and Cd are all below their detection limits (<10ppm)

The pyroxenites can be quite calcitic with a maximum measured CO_2 content equal to 8.29 %, which equals 18,85 % calcite, but the average calcite is only 1.27 %. The P_2O_5 content varies from 0.21% to 13.49% with an average of 3.24%. These values correspond to apatite contents from 0.50% to 31.82% and with average of 7.64%.

Nepheline syenites (mainly late crosscutting dykes) were sampled when they occurred along our traverses. They all have a low contents of CO_2 and P_2O_5, the latter with values from 0.016 to 0.823 with an average of .013% P_2O_5. This is equal to a variation in apatite content from 0.047% to 0.87% with an average of 0.31%.

The fenites show a very large spread in values variation as expected from their mode of formation as metasomatically altered rocks. The apatite content varies from 1.4% to 3.56%, with an average of 2.48%. Similar, to the carbonatites the fenites show an extreme enrichment in alkali earth elements and LREE, with >1% of Ba and 0.07% of Ce and almost 0.6% of Sr.

The gabbros have compositions that are more undersaturated in SiO_2 that what what was anticipated. This due to the fact that rocks which in the field have classified as gabbros, may be transitional to what, petrographically, should be classified as pyroxenites or dunites. Some samples may also been influenced by metasomatism from fenitizating fluids. This is evident from the CO_2 variations in the gabbros which corresponds to calcite contents that varies from 0 to 6.23%. The apatite content vary from 0.07 to 5.64 with an average of 1.72% apatite.

Figure 14 shows histograms for the P_2O_5 distributions in the sample collection, with individual plots for the carbonatites and the pyroxenites. The samples with the highest grade represent single rock samples.

Table 8 Chemical variation of the carbonatites and hornblende clinopyroxenites

	Carbonatites		n= 216		Pyroxenites		n= 79	
Sample	$\bar{X}$	max	min	median	$\bar{X}$	max	min	median
SiO_2	19.36	45.30	1.59	18.82	36.17	44.57	27.40	36.51
Al_2O_3	7.65	23.06	1.75	7.40	10.91	14.80	6.45	11.37
Fe_2O_3	9.70	25.90	0.94	7.46	15.31	32.00	8.17	13.45
TiO_2	2.61	8.79	0.55	2.69	2.87	5.29	1.80	2.64
MgO	3.75	8.68	0.79	3.63	9.00	13.90	3.56	9.18
CaO	25.05	48.00	5.28	24.19	17.78	28.26	1.10	17.60
Na_2O	1.12	13.52	0.00	0.65	1.50	3.36	0.82	1.42
K2O	2.74	5.87	0.45	2.87	1.42	5.91	0.08	1.30
MnO	0.33	0.50	0.12	0.34	0.20	0.39	0.11	0.17
P_2O_5	2.33	6.45	0.45	1.97	3.24	13.49	0.21	3.00
LOI	16.43	34.30	2.18	17.10	0.98	7.66	-0.01	0.80
SUM	86.79	99.63	67.76	82.97	98.96	100.31	97.05	98.86
S	0.07	0.35	-0.02	0.06	0.11	0.85	-0.02	0.03
CO_2	17.63	37.81	2.25	17.71	0.56	8.29	-0.26	0.33
Ag	-9	31	-10	-10	-8	20	-10	-10
As	-3	3	-10	1	-9	11	-10	-10
Ba	4510	15600	793	3785	864	4860	167	657
Cd	-10	-10	-10	-10	-10	-10	-10	-10
Ce	521	1040	66	524	180	435	38	162
Co	31	55	6	28	52	105	30	51
Cr	1	68	-4	-4	35	266	-4	12
Cu	11	34	-2	8	68	306	-2	49
Ga	12	19	2	12	16	25	9	15
La	315	640	79	306	74	227	19	66
Mo	2	5	-1	2	2	4	-1	2
Nb	74	257	0	67	60	362	12	46
Nd	242	440	37	245	82	196	-10	81
Ni	1	82	-20	-2	17	142	-20	3
Pb	-3	17	-3	-3	3	35	-3	-3
Rb	142	300	3	155	37	185	3	15
Sb	-15	-15	-15	-15	-15	-15	-15	-15
Sc	4	25	-5	6	28	61	-5	26
Sn	-10	14	-10	-10	-10	-10	-10	-10
Sr	4582	8590	1510	4424	604	1860	224	550
Th	11	24	-4	12	7	21	-4	8
U	13	26	3	13	0	12	-2	-2
V	89	223	11	84	424	831	126	364
W	-4	6	-5	-5	-5	-5	-5	-5
Y	71	143	20	70	29	76	8	27
Zn	152	246	35	150	81	222	38	77
Zr	94	388	15	46	249	600	17	225

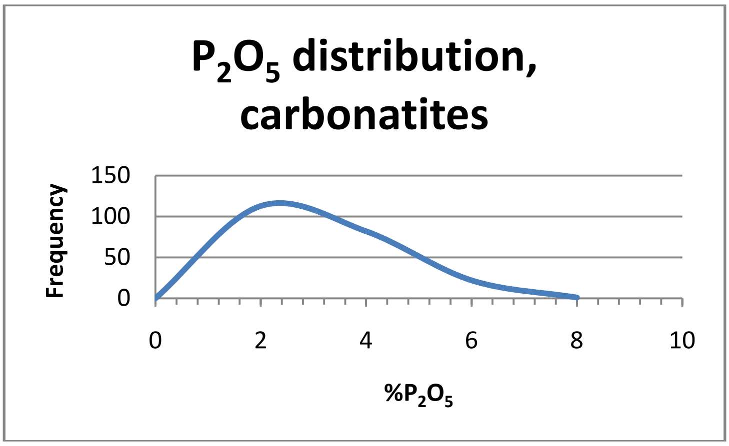
- Negative values are below detection limits,

Table 9 Chemical variation of nepheline syenites and fenites

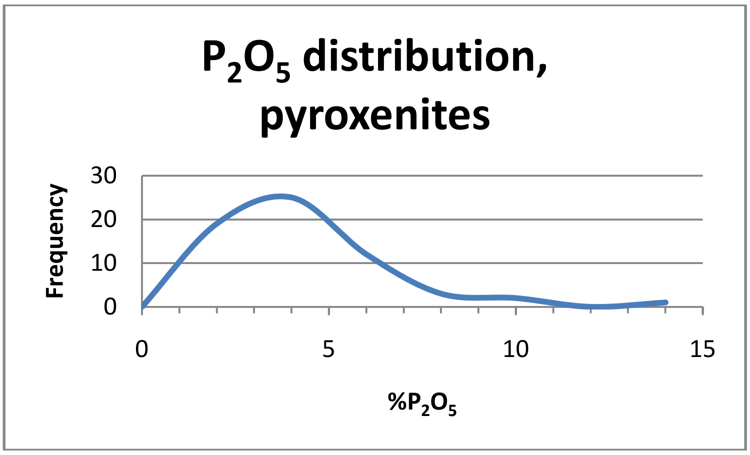
	Nepheline syenites	n= 5			Fenites	n= 5		
Sample	X̄	max	min	median	X̄	max	min	median
SiO_2	57.22	61.40	54.00	58.10	21.48	28.50	14.70	22.40
Al_2O_3	20.76	23.40	18.40	20.80	9.21	14.90	3.88	8.55
Fe_2O_3	4.53	6.01	3.50	4.52	15.32	18.00	8.32	17.00
TiO_2	0.76	1.00	0.63	0.73	2.92	3.87	1.12	3.11
MgO	0.65	0.94	0.21	0.70	2.73	3.37	2.06	2.79
CaO	0.93	1.81	0.50	0.88	20.78	37.42	9.17	19.20
Na_2O	9.45	11.10	8.19	9.29	2.17	4.90	0.67	1.53
K_2O	3.45	4.71	1.98	3.56	2.68	4.08	0.54	3.52
MnO	0.07	0.09	0.05	0.06	0.29	0.33	0.26	0.29
P_2O_5	0.13	0.37	0.02	0.09	1.05	1.51	0.59	1.06
LOI	1.06	2.01	0.27	0.82	19.45	34.00	9.55	13.90
SUM	99.01	99.93	97.88	98.96	92.65	98.34	71.83	97.76
S	-0.01	0.02	-0.02	-0.02	0.11	0.18	0.03	0.12
CO_2	0.96	1.70	0.51	0.92	16.23	27.25	9.75	13.96
Ag	-10	-10	-10	-10	-10	-10	-10	-10
As	-10	-10	-10	-10	-10	-10	-10	-10
Ba	3362	6190	1770	2010	6261	10600	856	8010
Cd	-10	-10	-10	-10	-10	-10	-10	-10
Ce	14	62	-20	24	545	719	426	518
Co	8	11	5	8	36	43	29	37
Cr	-1	5	-4	-4	4	10	-4	6
Cu	2	7	-2	4	21	34	12	20
Ga	17	24	13	17	12	14	10	13
La	10	34	-10	14	301	429	231	273
Mo	0	2	-1	-1	3	4	2	2
Nb	39	68	14	43	113	153	73	119
Nd	-4	19	-10	-10	181	233	134	179
Ni	-2	-2	-2	-2	-4	6	-20	-2
Pb	-3	-3	-3	-3	-3	-3	-3	-3
Rb	69	74	60	72	142	218	38	156
Sb	-15	-15	-15	-15	-15	-15	-15	-15
Sc	-5	-5	-5	-5	5	9	-5	6
Sn	-10	-10	-10	-10	-10	-10	-10	-10
Sr	2470	3910	1130	1990	5066	5930	4130	5110
Th	0	6	-4	-4	9	12	7	9
U	7	11	4	6	12	15	10	12
V	25	33	15	26	112	183	44	111
W	-2	8	-5	-5	-2	6	-5	-5
Y	5	12	1	4	77	124	54	67
Zn	46	60	30	48	179	268	138	155
Zr	32	48	13	36	98	193	41	95

Table 10 Chemical variation of the gabbros

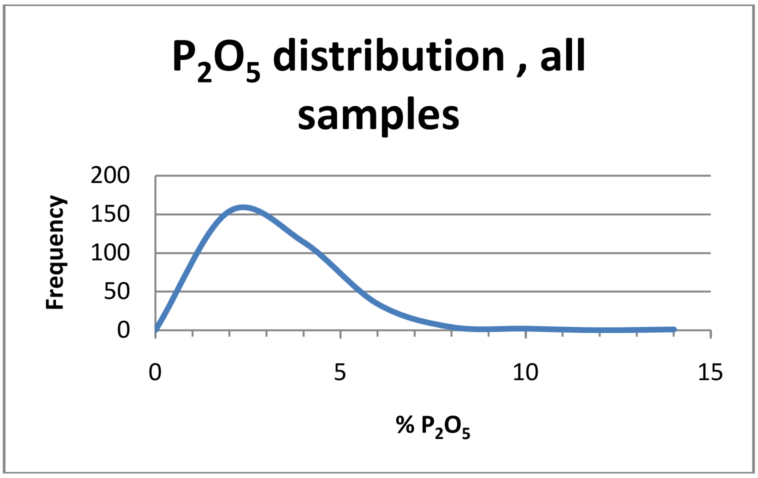
	Gabbros		n = 17	
Sample	X̄	max	min	median
SiO_2	38.87	46.30	32.20	40.11
Al_2O_3	11.34	14.70	7.33	11.45
Fe_2O_3	13.35	25.30	5.59	11.62
TiO_2	2.93	4.81	1.70	2.87
MgO	11.42	19.80	5.06	11.35
CaO	15.37	19.90	12.00	15.40
Na_2O	1.36	2.53	0.69	1.31
K_2O	2.10	3.84	0.38	2.02
MnO	0.17	0.37	0.08	0.14
P_2O_5	1.33	3.97	0.05	0.24
LOI	0.85	2.39	0.10	0.69
SUM	99.01	99.65	98.26	99.03
S	0.02	0.16	-0.02	0.00
CO_2	0.65	2.74	0.00	0.41
Ag	-10	-10	-10	-10
As	-10	-10	-10	-10
Ba	1482	4010	378	1095
Cd	-10	-10	-10	-10
Ce	135	453	22	80
Co	53	72	39	52
Cr	107	659	-4	17
Cu	89	371	3	57
Ga	12	19	7	13
La	53	197	-10	31
Mo	2	3	1	2
Nb	48	151	20	38
Nd	57	190	-10	40
Ni	101	354	-2	61
Pb	6	39	-3	-3
Rb	62	157	8	23
Sb	-15	-15	-15	-15
Sc	44	75	16	49
Sn	-10	-10	-10	-10
Sr	484	1940	140	379
Th	2	21	-4	-4
U	-1	5	-2	-2
V	321	609	86	307
W	-4	6	-5	-5
Y	24	57	8	20
Zn	63	191	25	42
Zr	182	411	67	150



$\%P_2O_5$	Frequency
0	0
2	113
4	82
6	22
8	1
Average	2.33
Max	6.45
Min	0.45
Median	1.97
Stdev.	1.15



$\%P_2O_5$	Frequency
0	0
2	19
4	25
6	12
8	3
10	2
12	0
14	1
Average	3.24
Max	13.49
Min	0.21
Median	3.00
Stdev	3.00



$\%P_2O_5$	Frequency
0	0
2	154
4	114
6	34
8	4
10	2
12	0
14	1
Average	2.38
Max	13.49
Min	0.02
Median	2.01
Stdev	1.60

Figure 14 Histograms and statistical data for the P_2O_5 distribution Stjernøy rocks

5.2.1 Spatial chemical variation

Figure15 shows the spatial distribution of P_2O_5 derived by applying geosoft Target for ArcGis In the carbonatite there is a high-grade area that stretches from south of lake Saravann and northwards for about 3 km. NE of lake Saravann there are several high-grade areas, mainly in pyroxenites on the eastern rim of the Lillebukt complex. Areas with nepheline syenite and fenite are generally of low grade. The area to the north side of the contoured map, gives the impression that the sampling stopped too early. This is an artifact of kriging[1]
This area is outside the LAC, and the descriptions given above show that they contain low levels of P_2O_5

[1] Kriging is a statistical method that can be used for widely and uneven scattered sampling points on an irregular surface. It uses linear regression techniques, where the properties of an unsampled location is estimated from the values from its neighbouring locations. See Davis (2002) for a general description of this method.

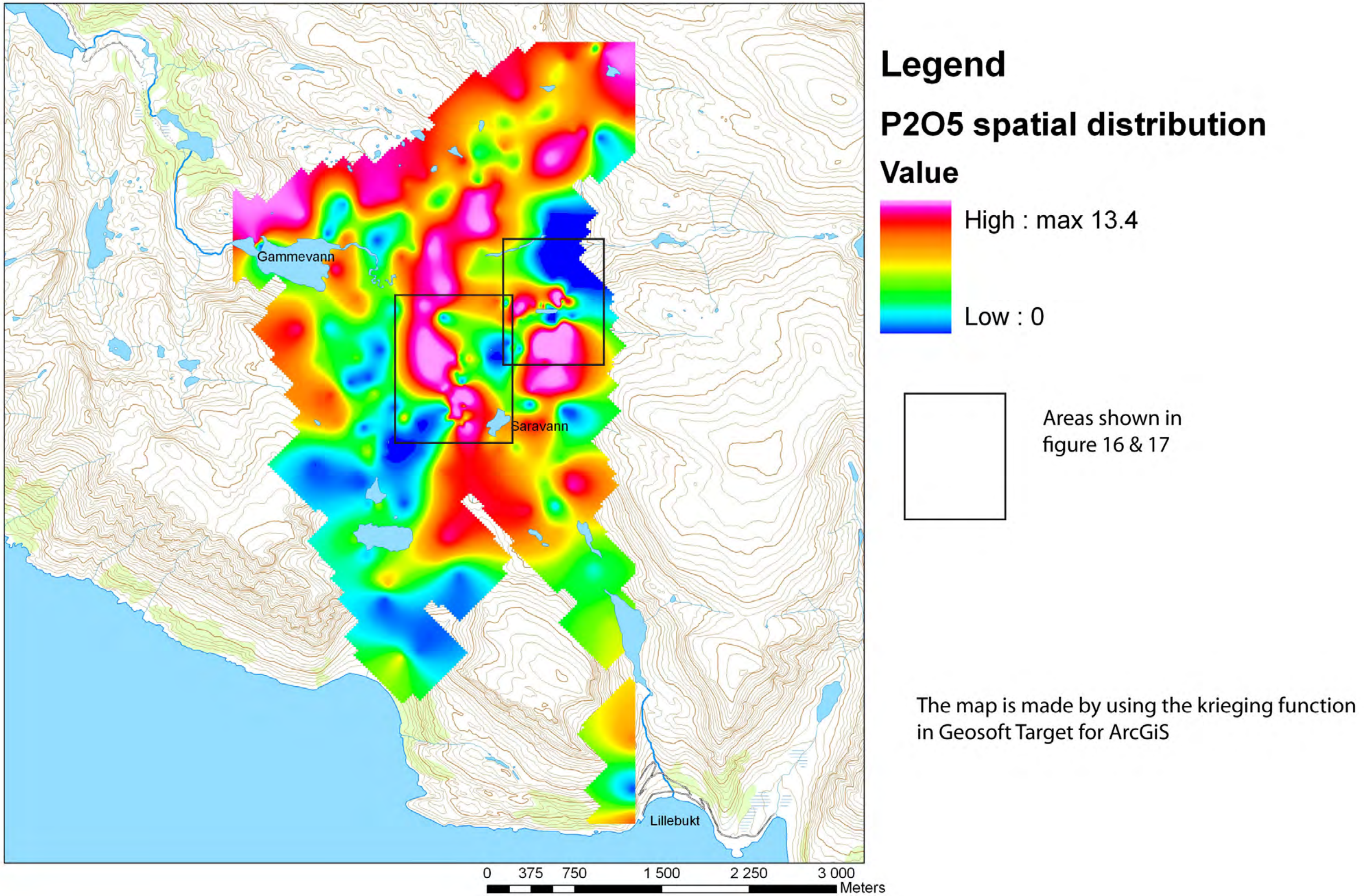


Figure 15 Spatial distribution of P_2O_5: the area along the northern edge of map is outside the LAC (see text for discussion)

The spatial distribution can be illustrated in more detail by selecting two areas, one in carbonatite and one in pyroxenite, where detailed sampling has been conducted in an area that are fairly easy accessible.

The first area is shown on Fig 16. It lies about 200 north west of Saravann. This is a well-exposed area suitable and consisting only of carbonatite (it is also shown on the picture in Figure 1). The variation in P_2O_5 is large, from almost 0.092 to 6.46% P_2O_5,with an average of 3.00 %. This value corresponds to apatite contents that vary from 0.22 to 15.24%. the average is 7.07%.

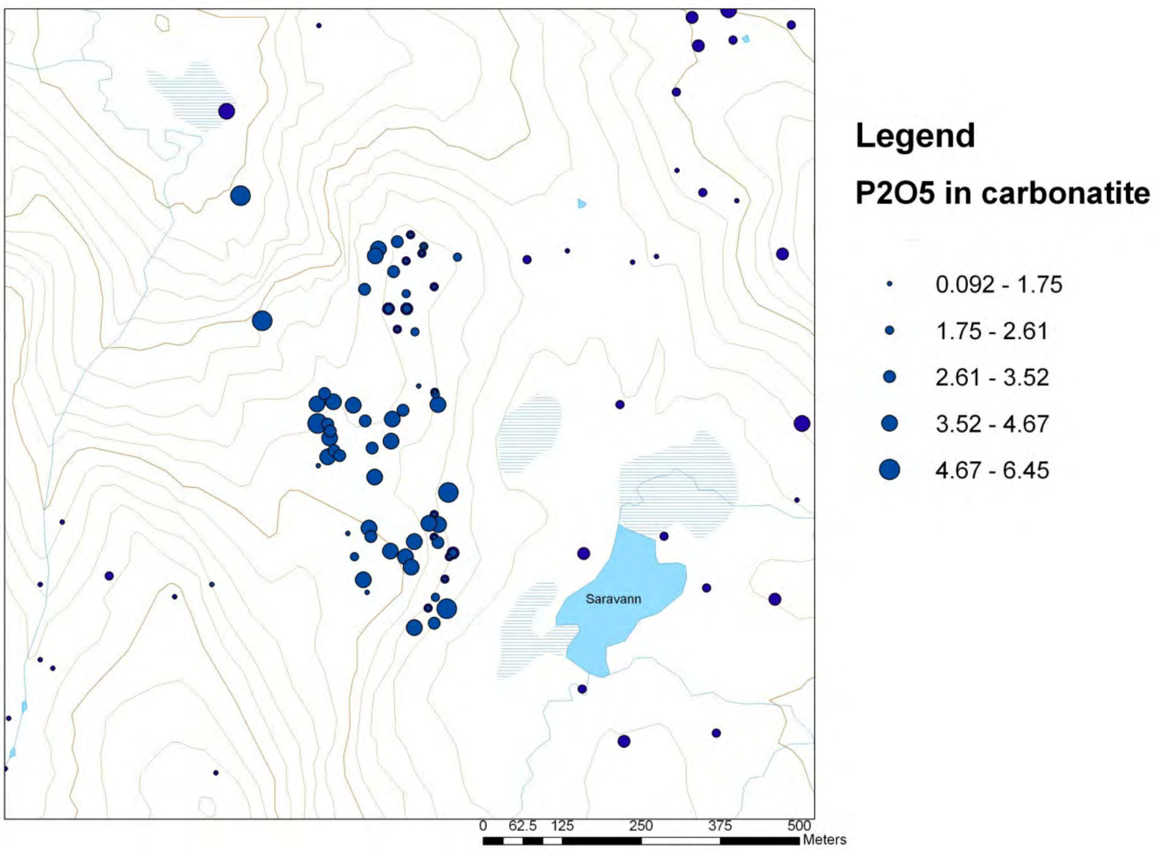


Figure 16 The distribution of P_2O_5 in carbonatite in the area north west of Saravann.

Similarly in an area NE of lake Saravann, where several outcrops of apatite-rich pyroxenite are found, detailed sampling was also conducted (Figure17). The rocks show a large "nugget type" of variation, from almost 0 to about 8 % P_2O_5 within distances of < 30 m. This rapid variation over short distances is, due too rapid alternations between apatite rich pyroxenite dykes and apatite poor fenite screens. If we select all samples taken within Figure 17 the will yield an of 2.93 % P_2O_5. This is probably a realistic grade within an area of 300x300 meters of the pyroxenite,

Both these areas show similar averages of 3.00 and 2.93 % P_2O_5. It is probably realistic to believe that an average grade of about 3% P_2O_5 or about 7% apatite can be achieved over areas of about 300x300 m^2. Neither in the carbonatite nor in the pyroxenite is it possible to find areas of any significant size (> 300 x 300 meters) where the grade is higher than 10% apatite.

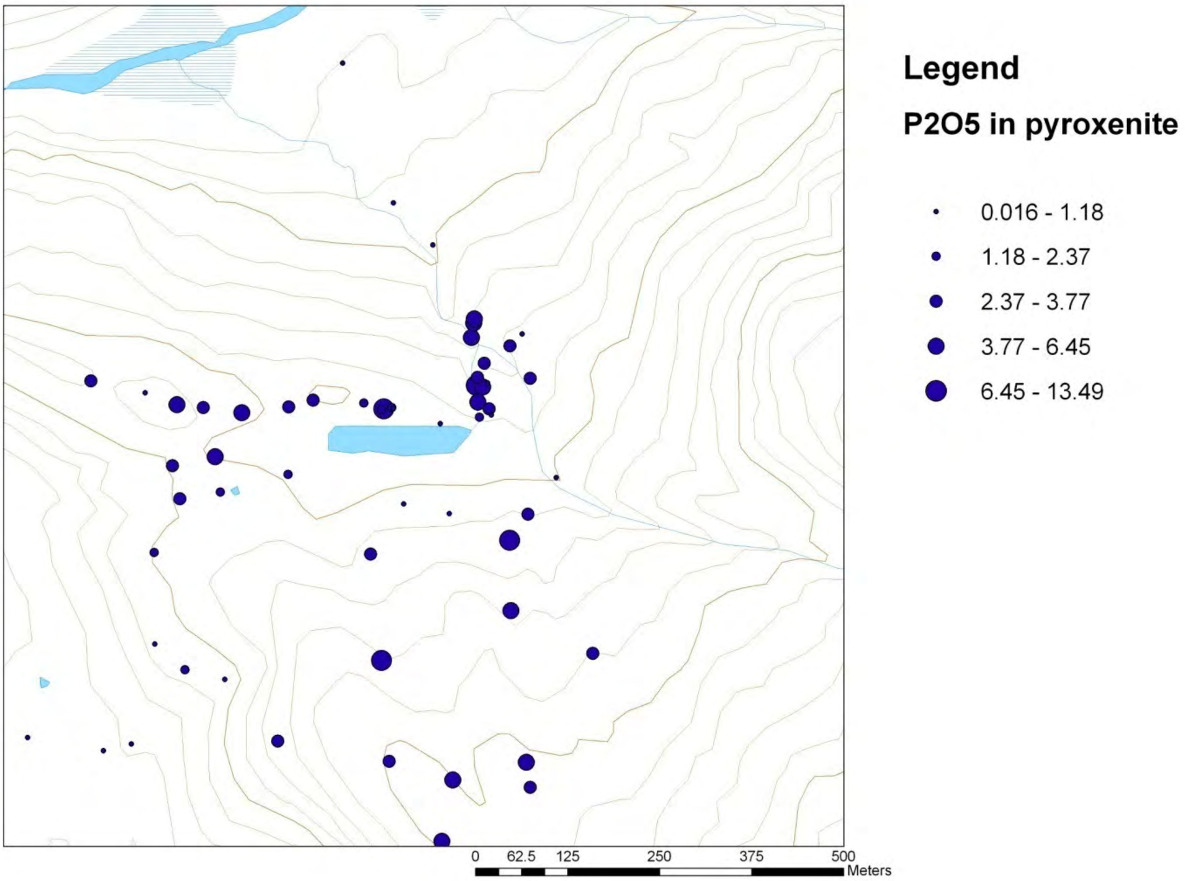


Figure 17 Spatial variation of P_2O_5 in a detailed sampled area of pyroxenite, average P_2O_5 of all samples on this map is 2.93% P_2O_5.

5.3 The Sørfjorden area, chemical variation with emphasis on distribution of phosphorus

A traverse was made from the northern end of the LAC and northwards along the mountain ridge on the eastern side of Sørfjord (Figure 3). The analyses are shown in Table 11. All rocks can be classified as pyroxenites, and all have very low values of P_2O_5, the highest being 1.06%. This corresponds to an apatite content of 2.50%.

There was found no indication of rocks that contain elevated amount of apatite outside the pyroxenite dyke swarm described in chapter 4.1.2. Our observations do not permit any further description of this difference.

5.4 The Pollen area, chemical variation with emphasis on distribution of phosphorus

In Table 12 are compiled all chemical data including analyses published by Robins & Tysseland (1983). The analyses from Robins & Tysseland (1983) are average values from a total of 73 bulk rock analyses. The highest values of P_2O_5 found in the fenite-pyroxenite complex and the carbonatite body from Robins & Tysseland, are 2.37% and 2.83 % respectively. This corresponds to apatite contents of 5.59% and 6.68%. We believe that this gives representative values for the apatite contents in the Pollen alkaline complex

5.5 The Simavik area, chemical variation with emphasis on distribution of phosphorus

The mountains east and west of Simavik comprises occurrences of ultramafic rocks. Their content of P_2O_5 content in the rocks were not known. Samples were collected on reconnaissance basis and the results are shown in Table 13. The rocks have the composition of pyroxenite/peridotite. Many of the samples show a visible content of Fe-Ti oxides, and thus contain a fairly high amount if Fe_2O_3 and TiO_2 (Table 13). The P_2O_5 contents are low $< 0.3\%$ in all samples.

Table 11 Chemical analysis of samples from the Sørfjorden traverse.

Sample	hg1-07	hg2-07	hg3-07	HG13-09	HG14-09	HG15-09	HG16-09
Rock	pyroxenite	pyroxenite	pyroxenite	pyroxenite	pyroxenite	pyroxenite	pyroxenite
SiO_2	39.6	40.2	37.2	41.67	40.67	38.58	36.7
Al_2O_3	11.2	5.66	4.31	20.89	14.32	14.39	15.33
Fe_2O_3	15.6	18.9	12.8	10.69	8.57	14.32	17.47
TiO_2	3.51	1.77	0.973	1.93	1.48	2.25	2.54
MgO	10.7	21.3	28	4.57	15.08	12.32	12.71
CaO	16.6	10.4	10	12.66	16.63	15.95	13.63
Na_2O	1.33	0.75	0.5	2.98	0.85	0.7	0.78
K_2O	0.538	0.259	0.781	1.29	0.32	0.06	0.09
MnO	0.167	0.273	0.226	0.15	0.12	0.18	0.19
P_2O_5	0.09	0.049	0.306	1.06	0.13	0.04	0.02
LOI	0.356	0	3.6	1.4	1.3	0.8	0.1
SUM	99.69	99.56	98.69	97.89	98.17	98.79	99.46
CO_2	-	-	-	1.69	0.70	0.81	0.26
Ag	16	11	12				
As	-10	-10	-10				
Ba	387	207	1050	1169	109	28	50
Cd	-10	-10	-10				
Ce	65	29	92				
Co	61.7	100	99.4				
Cr	37.3	1620	3650				
Cu	66.8	61.1	8.5				
Ga	18.6	10.4	8.8				
La	21	-10	53				
Nb	19.6	12.8	22.1	101	14	-5	5
Nd	33	15	35				
Ni	43.9	306	673	28	233	111	118
Pb	20.4	18.4	19.1				
Rb	9.4	5.6	40.3				
Sb	-15	-15	-15				
Sc	27.6	29.5	14.7	10	77	54	43
Sn	-10	-10	-10				
Sr	324	195	732	2682	153	129	203
Th	-4	-4	-4				
U	5.2	5.5	4.7				
V	550	234	103				
Y	16.9	7.2	14.3	21	15	14	12
Zn	51.4	63.2	75.4				
Zr	92.1	34.7	35.5	85	66	36	36
Cl	-0.05	-0.05	-0.05				
F	-0.1	-0.1	-0.1				
S	-0.02	0.08	-0.02				

Table 12 Chemical analyses from the Pollen carbonatite complex comprising data from Robins & Tysseland (1983) and samples collected in 2009.

Sample	HG17-09	HG19-09	HG29-09	HG18-09	HG20-09	BR avg. Carb.	BR avg. Gabbro	BR avg. Fenite
Rock type	pyroxenite	Fenite pyroxenite	Fenite pyroxenite	Carbonatite	Fenite/ pyroxenite	Carbonatite	Gabbro	Fenite
SiO_2	46.59	36.53	29.6	33.95	14.7	24.75	44.36	35.91
Al_2O_3	22.53	11.48	9.26	9.74	3.88	3.92	20.55	1039
FeO						4.86	5.11	10.55
Fe_2O_3	5.57	21.9	16.92	20.46	8.32	3.24	2.8	5.43
TiO_2	0.47	3.4	2.55	4.41	1.12	0.78	0.95	2.54
MgO	6.61	6.18	5.49	5.98	2.79	3.59	8.59	7.51
CaO	15.04	12.1	19.47	13.61	37.42	32.57	13.9	17.39
Na_2O	2.09	2.68	2.57	3.14	1.26	0.68	2.18	1.78
K_2O	0.18	1.54	1.53	1.23	0.54	0.4	0.27	1.18
MnO	0.09	0.43	0.34	0.42	0.29	0.33	0.16	0.32
P_2O_5	0.03	2.37	1.69	1.55	1.51	2.83	0.09	1.72
LOI	0.5	0.8	9.8	4.9	27.1			
SUM	99.2	98.61	89.42	94.49	71.83	101.14	99.10	99.77
CO2	0.11	0.37	9.79	3.81	27.25	22.19	0.01	5.32
Ba	80	932	1411	793	856	1072	208	867
Cd								
Ce						422	23	163
Co						18		
Cr						24	204	178
Cu						3	49	19
Ga								
La						314	8	112
Mo								
Nb	-5	255	184	154	73	23	10	67
Nd						210	11	92
Ni	51	34	31	-20	-20	59	426	188
Pb								
Rb						3	7	11
Sc	28	13	15	25	5			
Sn								
Sr	636	1098	2514	1510	5800	4397	540	1156
V						62	170	230
W								
Y	5	59	67	49	124	62	5	23
Zn						38	32	
Zr	20	255	185	53	95	182	47	189

*The analysis from Robins & Tysseland (1982), with initials BR represent averages of17 carbonatite, 25 gabbro and 31 fenite samples. Negative values are below detection limit.

Table 13 Chemical analysis of samples from the Simavik area

Sample	HG43-09	HG44-09	HG45-09	HG46-09	HG47-09	HG48-09	HG49-09	HG50-09
Description	Pyroxenite	Pyroxenite	Pyroxenite	Pyroxenite	Pyroxenite	Pyroxenite	Pyroxenite	Pyroxenite
SiO_2	38.75	37.42	43.76	37.81	32.28	35.1	38.3	33.22
Al_2O_3	11.44	13.94	10.64	16.84	11.9	10.51	15.02	11.81
Fe_2O_3	17.68	15.5	8.58	17.01	25.09	22.95	14.66	24.02
TiO_2	3.48	2.83	2.16	4.62	4.35	4.87	5.54	5.39
MgO	9.17	11.23	11.71	8.03	10.53	9.11	10.53	9.37
CaO	16.05	13.51	20.28	11.09	13.75	15.37	10.47	12.94
Na_2O	1.33	2.27	0.85	2.37	0.63	0.83	2.45	1.29
K_2O	0.38	1.32	0.14	0.81	0.11	0.12	1.3	0.49
MnO	0.22	0.2	0.13	0.16	0.21	0.22	0.16	0.22
P_2O_5	0.26	0.03	0.06	0.05	0.02	0.04	0.1	0.17
LOI	0.9	1.3	1.3	0.7	0.7	0.5	0.9	0.6
SUM	98.76	98.25	98.31	98.79	98.87	99.12	98.53	98.92
CO_2	0.15	0.37	0.29	0.11	0.29	0.11	0.15	0.29
Ba	246	126	61	540	52	85	931	332
Nb	22	11	-5	30	-5	-5	47	23
Ni	38	113	120	28	69	29	45	69
Sc	31	51	82	27	43	42	35	44
Sr	367	239	197	1166	125	192	1044	422
Y	28	19	22	17	16	17	23	18
Zr	113	64	77	48	52	58	52	55

6. Petrography of selected rocks

The petrographic descriptions are limited to rocks where significant levels of P_2O_5 are found, namely the carbonatites and pyroxenites.

6.1 Carbonatite

Apart from large crystals of biotite, the carbonatites are fairly homogenous rocks. The dominant minerals are calcite, biotite, nepheline, apatite and Fe-Ti oxides. Crystal sizes vary from 0.1 mm 2-3 mm, with some large biotite crystals that can be several cm long (Figure 18). The grain boundaries of the calcite crystals are straight, giving the rock a granoblastic texture indicating that the calcite has been totally re-crystallized during a metamorphic overprint. The crystal size of the individual apatite grains varies from 0.1 to about 1 mm in length. The apatite grains are homogenous and without any inclusions. They show an undulating extinction, indicative of deformation.

The modal vol% estimations made by Strand (1951), see Table 1, appear to give a representative overview of the mineral content of the carbonatite, with an average apatite content of 4.4 vol%. Strand (1981) reports that the carbonatite contains from 2 to 6 vol% apatite.

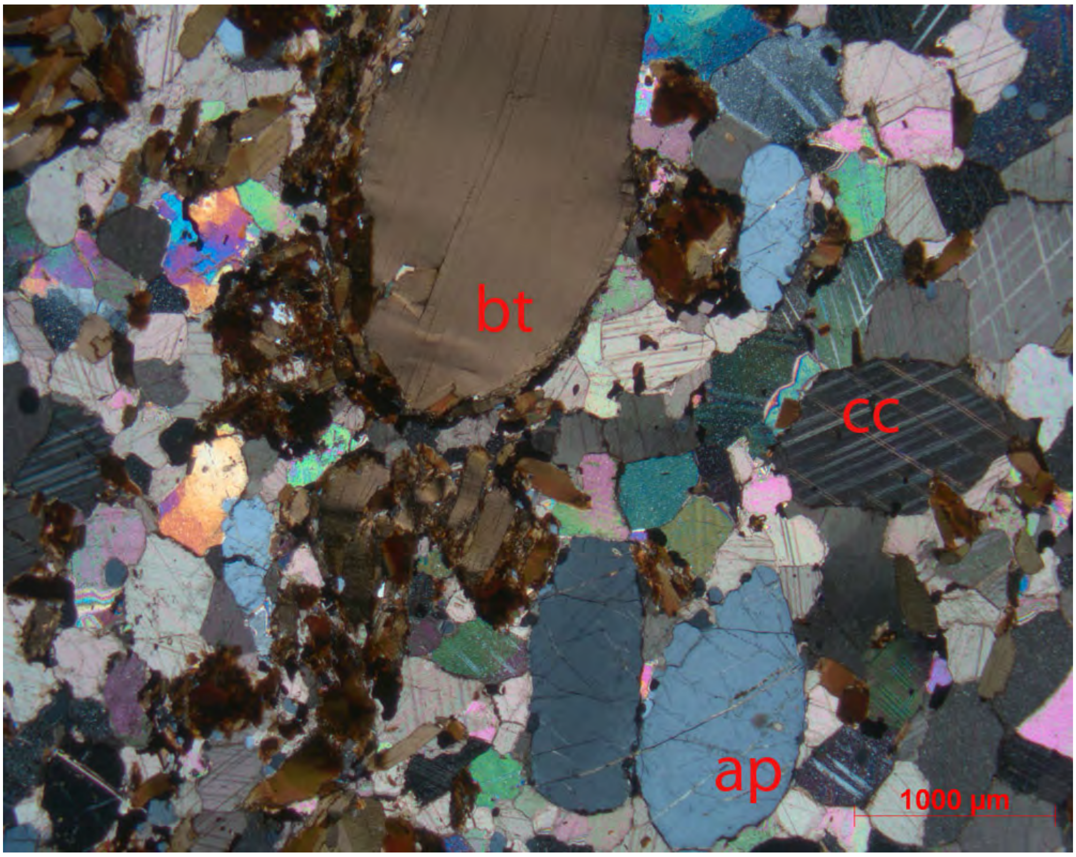


Figure 18 Microphotograph of carbonatite, with the important minerals marked, bt= biotite, cc= calcite and ap= apatite

6.2 Pyroxenite

The pyroxenites, particularly the non-fenitized varieties are very coarse grained rocks, commonly with a crystal size of several cm on average. The grain boundaries are irregular and fresh non-fenetized varieties show less signs of being recrystallised compared to the carbonatites.

The dominant minerals are colourless clinopyroxene, brown hornblende, apatite and locally significant amounts of Fe-Ti oxides. The amount of hornblende can be equal to the amount of clinopyroxene, and the term hornblende clinopyroxenite would be the accurate rock name.

Systematic measurements of the modal mineral content has not been done by previous workers nor by us. The rock is too coarse grained to give a precise measurement of the modal proportions from a standard thin section.

From our chemical analyses it is possible to give an estimate of the vol% of apatite from the following relationship (Hutchison 1975):

$$volume\ \%\ apatite = \frac{weight\ \%\ apatite}{1.265}$$

Thus the calculated volume % of apatite is 20% less than the calculated weight %, if other parameters are kept equal.

The mutual relationship between apatite and other minerals shows that the crystallization of apatite took place throughout all stages of cooling, except for the very latest stages where Fe-Ti oxides crystallized. Later deformation has given the apatite an undulating extinction.

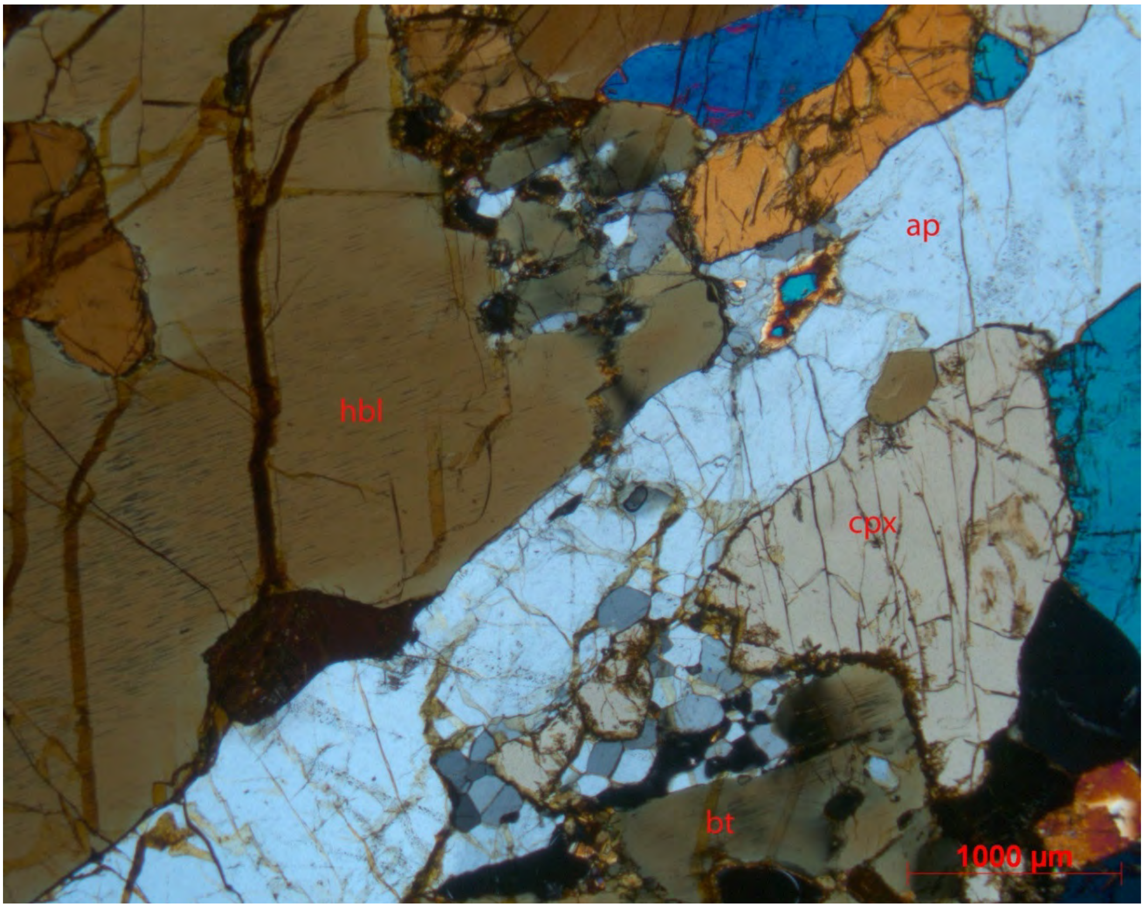


Figure 19 Microphotograph of pyroxenite, with the main minerals marked. Note the large apatite crystal crossing the photo from upper right to lower left, hbl= hornblende, cpx= clinopyroxene, bt= biotite, ap = apatite.

Our petrographical examinations conclude that the apatite occurs with a grain size and purity that meet the requirements for beneficiation, but the grades are lower than apatite ore mined today.

7. Concluding remarks

This report presents an overview of all investigations done on the LAC. It comprises a compilation of all data presently available, regarding the content and distribution of phosphorus and apatite, including 330 bulk chemical analyses.

Two rock types within and adjacent to the LAC contain P_2O_5 in significant amounts. These are the carbonatites which makes up the core of the complex, and hornblende clinopyroxenite dykes that occur along the eastern margin of the complex.

Combining all analyses an average P_2O_5 content of 2.38 %, can be calculated with a maximum value of 13.49 %. However of 330 samples only 7 have contents higher than 8%.

Samples of the carbonatite gives an average of 2.33 % P_2O_5. However, within a well-exposed and densely sampled area of about 300 x 300 meters an average of 3.0% P_2O_5 can be determined.

Correspondingly, for the hornblende clinopyroxenite the average P_2O_5 content is 3.24 %, with a maximum value of 13.49%. Only 6 samples have contents over 8 %.

Samples taken from a densely sampled area of pyroxenite measuring of 300 x 300 meters give an average of 2.93% P_2O_5.

The LAC appear to be only area on Stjernøy where the contents of P_2O_5 reach interesting levels.

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GEOLOGY OF THE
LILLEBUKT ALKALINE COMPLEX

Geological map made by students at the University of Bergen, 1979-1981. Tor Bruland, Kåre Kjøsnes, Øystein Mjelde , Jan Helge Skogen og Tor Strand.

This spread sheet contain the data used in the NGU report 2009.060

The data is compiled from many sources and the reader should refer to the text for the source of data

the coordinates are UTM with zone 34N

Sample	Sampler	UTMX	UTMY	year	Description	Rock_code	sub area	SiO2	Al2O3	FeO	Fe2O3	TiO2	MgO	CaO	Na2O	K2O	MnO	P2O5	LOI	SUM	TC	CO2
42738	hg	559666	7800302	2008	drill dust nepheline syenite	1	1	61,4	19,2		3,5	0,654	0,697	0,904	8,19	3,43	0,052	0,113	0,818	98,958	0,2831	1,037307
42743	hg	559647	7799825	2008	drill dust nepheline syenite	1	1	54,2	23,4		3,94	0,626	0,697	0,502	11,1	3,56	0,052	0,064	1,39	99,531	0,1688	0,6185
42745	hg	559506	7799834	2008	drill dust nepheline syenite	1	1	54	22		4,52	0,725	0,724	1,81	10,1	3,58	0,09	0,37	2,01	99,929	0,4643	1,701242
42804	hg	559189	7799294	2008	drill dust nepheline syenite	1	1	58,4	18,4		6,01	0,998	0,937	0,882	9,29	1,98	0,067	0,092	0,823	97,879	0,252	0,923353
08-016	mh	558586	7799906	2008	nepheline syenite	1	1	58,1	20,8		4,68	0,773	0,213	0,555	8,56	4,71	0,064	0,016	0,271	98,742	0,139	0,509718
Ak3-07	ak	560069	7799693	2007	Pyroxenite	2	1	33,4	11,1		12,5	2,16	8,75	21,3	1,35	1,3	0,145	6,39	0,795	99,19	-	-
hg4-07	hg	559400	7801900	2007	pyroxesenite	2	1	34,3	9,12		22,8	3,12	6,9	19,4	1,01	0,211	0,259	1,97	0,542	99,632	-	-
hg6-07	hg	559955	7800924	2007	pyroxesenite	2	1	37,1	14,7		13	2,71	11,6	13,6	1,91	2,31	0,153	1,54	0,414	99,037	-	-
hg7-07	hg	559761	7800215	2007	pyroxesenite	2	1	31,7	8,69		22,8	3,49	7,18	18,5	1,22	0,814	0,272	4,06	0,621	99,347	-	-
42721	hg	559532	7799355	2008	drill dust pyroksenite	2	1	34,6	8,71		20,6	3,69	7,54	18,8	1,2	0,627	0,231	2,62	0,89	99,508	-0,07	-0,25649
42728	hg	560120	7800269	2008	drill dust pyroksenite	2	1	38,5	12,4		12,1	2,52	10,6	17,6	1,6	1,55	0,152	2,12	0,601	99,743	0,08089	0,296389
42729	hg	560067	7800260	2008	drill dust pyroksenite	2	1	43	10,4		8,17	2,22	13,9	15,6	1,01	2,88	0,112	0,279	0,737	98,308	0,2106	0,771659
42730	hg	560003	7800281	2008	drill dust pyroksenite	2	1	41,6	12,1		10,2	2,51	12,2	16,2	1,15	2,24	0,131	0,248	0,601	99,18	0,0987	0,361647
42731	hg	560003	7800281	2008	drill dust pyroksenite	2	1	40,5	12,4		11,6	2,55	11,2	16,1	1,5	1,64	0,143	0,324	0,666	98,623	0,1221	0,447387
42732	hg	559963	7800288	2008	drill dust pyroksenite	2	1	38,5	11,8		13,8	2,44	9,28	17,6	1,51	1,26	0,169	1,29	0,701	98,35	0,1509	0,552913
42734	hg	559861	7800283	2008	drill dust pyroksenite	2	1	33,7	10,4		21,3	3,32	7,53	16,7	1,46	1,14	0,25	2,55	0,906	99,256	0,1217	0,445921
42735	hg	559797	7800275	2008	drill dust pyroksenite	2	1	30,3	6,45		24,2	3,61	6,11	21,4	0,91	0,077	0,274	4,96	0,909	99,2	-0,07	-0,25649
42736	hg	559745	7800282	2008	drill dust pyroksenite	2	1	33,8	6,54		20,7	5,29	6,39	21,1	1,06	0,217	0,284	3,49	0,84	99,711	0,1358	0,497585
42737	hg	559709	7800286	2008	drill dust pyroksenite	2	1	33,5	7,73		21,9	3,66	6,62	19,7	1,35	0,534	0,295	4,01	0,908	100,207	0,1031	0,377769
42739	hg	559592	7800318	2008	drill dust pyroksenite	2	1	34,6	9,54		16,6	2,47	3,56	14,7	3,25	3,45	0,35	2,57	7,66	98,75	2,262	8,288194
42741	hg	559713	7800158	2008	drill dust pyroksenite	2	1	29,2	7,77		29,1	4,08	6,2	16,7	1,14	0,654	0,328	3,09	1,2	99,462	0,1125	0,412211
42744	hg	559609	7799816	2008	drill dust pyroksenite	2	1	41,6	14,8		21,9	3,22	4,84	1,1	3,36	5,91	0,23	0,84	1,58	99,38	-0,07	-0,25649
Ak4-07	ak	559846	7799829	2008	pyroxesenite	2	1	27,4	7,78		32	4,61	6,21	16	1,02	0,496	0,275	2,99	1	99,781	-	-
hg12-08	hg	559869	7799440	2008	pyroxesenite	2	1	39,4	11,7		14,3	3,27	10,4	14	2,63	1,57	0,272	0,97	0,631	99,143	-0,07	0
hg13-08	hg	559869	7799440	2008	pyroxesenite	2	1	40,7	11,5		13,5	3,09	10,5	15,5	1,96	1,5	0,212	0,334	0,605	99,401	0,1321	0,484415
hg15-08	hg	559774	7799913	2008	pyroxesenite	2	1	38	8,66		14,7	2,91	7,97	19,2	1,95	1,02	0,323	0,788	3,68	99,201	1,028	3,76971
hg17-08	hg	559679	7799961	2008	pyroxesenite	2	1	39,5	11,9		9,54	3,29	12,6	12,5	2,09	3,95	0,175	0,214	3,07	98,829	0,678	2,486249
hg18-08	hg	560062	7799385	2008	pyroxesenite	2	1	34,6	9,16		22,2	3,37	7,32	17,6	1,26	0,687	0,263	1,99	0,778	99,228	0,09834	0,360616
hg19-08	hg	560154	7799387	2008	pyroxesenite	2	1	39,2	13,1		11,3	2,63	11,2	16,5	1,53	1,73	0,132	0,902	0,952	99,176	0,1414	0,518519
hg20-08	hg	560233	7799371	2008	pyroxesenite	2	1	39,8	12,8		12,7	2,77	11,5	14,1	1,43	2,64	0,185	0,434	0,406	98,765	0,07944	0,291309
hg2-08	hg	559987	7800279	2008	pyroxesenite	2	1	39,7	10,9		11,3	2,14	9,81	20,4	1,3	0,893	0,145	2,37	0,459	99,417	0,1078	0,395306
hg21-08	hg	560210	7799595	2008	pyroxesenite	2	1	33,8	9,58		20,8	3,05	7,27	19,5	1,03	0,452	0,21	2,55	0,313	98,555	-0,07	0
hg22-08	hg	560215	7799590	2008	pyroxesenite	2	1	27,8	7,46		28,7	3,74	5,81	20,1	0,82	0,171	0,267	4,94	-0,005	99,803	-0,07	0
hg23-08	hg	560189	7799766	2008	pyroxesenite	2	1	36,4	12,1		15,3	2,55	8,59	17,6	1,58	1,48	0,185	3	0,639	99,424	-0,07	0
hg27-08	hg	560017	7800151	2008	pyroxesenite	2	1	41,2	9,38		14	2,11	8,44	21,5	1	0,204	0,16	0,975	0,914	99,883	-0,07	0
hg28-08	hg	559860	7800191	2008	pyroxesenite	2	1	37,6	13,3		16	3,02	9,56	13,9	1,95	2,08	0,218	1,44	0,457	99,525	0,1033	0,378805
hg29-08	hg	559768	7800167	2008	pyroxesenite	2	1	38,1	12,4		15,2	3,09	9,67	15,3	1,72	1,91	0,223	1,52	0,447	99,58	-0,07	0
hg5-08	hg	557517	7800836	2008	pyroxesenite	2	1	31,8	12,2		19,4	4,08	8,63	15,6	1,51	1,24	0,185	3,88	0,357	98,882	-0,07	0
HG1-09	hg	560428,6	7802495	2009	pyroxenenite	2	1	38,97	11,39		14,96	2,6	9,5	16,67	1,75	1,43	0,21	1,28	0,7	98,76	0,1	0,366703
HG2-09	hg	560513	7802459,5	2009	pyroxenenite	2	1	35,3	13,13		13,11	2,62	10,13	17,01	1,68	1,85	0,15	3,85	0,6	98,83	0,06	0,220022
HG3-09	hg	560646,2	7802335,8	2009	pyroxenenite	2	1	35,18	13,28		11,8	2,55	10,48	17,39	1,69	1,89	0,15	4,14	0,9	98,55	0,04	0,146681
HG4-09	hg	560676,9	7801916,2	2009	pyroxenenite	2	1	36,57	8,21		19,58	3,95	7,2	18,99	1,32	0,35	0,3	2,58	0,5	99,05	0,09	0,330033
hg6-09	hg	560328,6	7801766,7	2009	pyroxenenite	2	1	38,24	9,45		15,3	3,9	9,01	18,05	1,3	0,33	0,32	3,6	0,5	99,5	1,05	3,850385
hg7-09	hg	560241,8	7801793,6	2009	pyroxenenite	2	1	39,64	13,4		10,55	2,84	12,6	13,05	1,2	3,05	0,12	2,35	0,8	98,8	0,04	0,146681
hg8-09	hg	560210,3	7801712,8	2009	pyroxenenite	2	1	36,44	8,32		18,32	3,97	7,18	17,23	1,35	0,31	0,3	3,63	0,5	97,05	0,09	0,330033
hg9-09	hg	560034,3	7801543,2	2009	pyroxenenite	2	1	39,16	12,02		12,3	2,64	12,3	13,36	1,25	2,53	0,15	4,6	0,8	100,31	0,08	0,293363
hg10-09	hg	559914,6	7801444,8	2009	pyroxenenite	2	1	37,12	9,36		19,2	3,9	8,61	16,54	1,4	0,32	0,39	2,9	0,5	99,74	0,1	0,366703
HG12-09	hg	559989,9	7800280,4	2009	pyroxenenite	2	1	32,16	10,86		12,24	2,03	8,79	21,72	1,55	1,29	0,14	7,7	1	98,48	0,04	0,146681
HG21-09	hg	560161,3	7800101,9	2009	Pyroxenite	2	1	31,37	9,68		10,96	2,01	7,86	24,51	1,21	1	0,14	9,63	1,1	98,37	0,11	0,403374
HG22-09	hg	560162,8	7800006,2	2009	Pyroxenite	2	1	34,58	12,8		12,58	2,44	10,03	17,72	1,59	1,79	0,13	4,59	1,2	98,25	0,09	0,330033
HG23-09	hg	560183,9	7799800,4	2009	Pyroxenite	2	1	34,67	12,84		13,62	2,73	9,47	17,62	1,61	1,78	0,16	4,28	0,7	98,78	0,07	0,256692
HG24-09	hg	560083,9	7799776,3	2009	Pyroxenite	2	1	36,03	11,85		13,4	2,44	9,41	18,15	1,52	1,67	0,17	3,88	1	98,52	0,1	0,366703
HG25-09	hg	559997,4	7799801,6	2009	Pyroxenite	2	1	35,99	11,8		16,67	2,86	8,37	16,77	1,58	1,53	0,21	2,71	1	98,49	0,13	0,476714
HG26-09	hg	559986,8	7799938,5	2009	Pyroxenite	2	1	27,98	8,14		10,62	1,8	6,72	28,26	0,99	0,75	0,14	13,49	0,6	98,89	0,04	0,146681
HG28-09	hg	559972	7800083	2009	Pyroxenite	2	1	37,61	12,13		10,72	2,6	10,98	17,92	1,37	1,96	0,14	3,09	0,9	98,52	0,06	0,220022
HG30-09	hg	560136,3	7800272,1	2009	Pyroxenite	2	1	44,57	14,62		11,32	2,58	7,63	11,76	2,96	2,44	0,17	0,62	0,5	98,67	0,05	0,183352
HG31-09	hg	560133,1	7800280,4	2009	Pyroxenite	2	1	37,3	13,46		11,95	2,66	10,97	16,13	1,73	1,91	0,15	2,44	0,8	98,7	0,06	0,220022
HG32-09	hg	560118,1	7800289,3	2009	Pyroxenite	2	1	35,72	10,02		10,82	2,06	9,05	22,79	1,22	0,87	0,14	6,03	0,8	98,72	0,06	0,220022
HG33-09	hg	560115,6	7800312,1	2009	Pyroxenite	2	1	30,37	11,92		12,07	2,21	9,22	20,25	1,55	1,89	0,13	8,71	1,1	98,32	0,09	0,330033
HG34-09	hg	560117,5	7800323,1	2009	Pyroxenite	2	1	38,18	10,77		10,92	2,2	9,56	21,11	1,26	0,91	0,15	3,69	0,8	98,75	0,09	0,330033
HG35-09	hg	560124,5	7800309,9	2009	Pyroxenite	2	1	33,58	13,5		14,07	2,46	9,86	16,3	1,71	2,1	0,16	4,56	1,1	98,3	0,1	0,366703
HG37-09	hg	560126,8	7800342,2	2009	Pyroxenite	2	1	36,77	11,35		11,71	2,3	9,73	20,4	1,11	0,96	0,18	3,22	1,8	97,73	0,18	0,660066
HG38-09	hg	560109	7800376,9	2009	Pyroxenite	2	1	33,69	11,83		11,94	2,28	9,8	20,04	1,46	1,57	0,14	5,98	0,7	98,73	0,06	0,220022
HG39-09	hg	560112,1	7800396,8	2009	Pyroxenite	2	1	36,69	10,52		11,49	2,15	9,14	22,24	1,12	0,76	0,13	4,33	1	98,57	0,04	0,146681
HG40-09	hg	560113	7800402,3	2009	Pyroxenite	2	1	38,43	9,56		10,05	2,04	9,38	23,08	1,07	0,45	0,13	4,03	1,3	98,22	0,03	0,110011
HG41-09	hg	560161,8	7800365,9	2009	Pyroxenite	2	1	36,39	11,77		12,44	2,44	9,96	18,85	1,46	1,26	0,13	3,47	1,4	98,17	0,06	0,220022
HG42-09	hg	560189	7800321,6	2009	Pyroxenite	2	1	38,66	9,63		10,56	2,14	9,08	22,82	1,28	0,46	0,15	3,7	1,1	98,48	0,07	0,256692
hg8-07	hg	558018	7798924	2007	gabbro	6	1	44	4,26		6,99	0,976	26,2	13,6	0,36	0,294	0,113	0,101	2,99	99,884	-	-
k8	ts	559443,4	7800769,3	1980	amfibole carbonatite	3	1	19,76	5,45	9,86	7,4	2,98	3,65	27,78	1	0,66	0,32	1,72		80,58		17,96
k9	ts	560750,8	7795857,4	1980	biotite/amfibole carbonatite	3	1	15,72	3,41	1,97	2,99	0,55	2,12	38,95	0,65	1,29	0,23	2,44		70,32		28,28
10d	ts	558218,8	7799286,5	1980	biotite/amfibole carbonatite	3	1	13,72	4,83	5,8	9,65	1,76	2,22	32,79	0,19	0,85	0,42	2,25		74,48		23,18
10e	ts	558417,4	7799299,7	1980	biotite/amfibole carbonatite	3	1	17,77	10,1	11,17	6,75	2,99	2,41	22,7	1,53	2,97	0,41	1,48		80,28		15,98
11d	ts	558165,8	7799524,8	1980	biotite/amfibole carbonatite	3	1	1,59	5,67	5,54	11,79	1,77	3,21	38	0,34	1,17	0,45	2,58		72,11		25,82
12d	ts	558036,7	7799819,4	1980	biotite/amfibole carbonatite	3	1	12,72	3,73	6,98	10,82	2,04	4,31	31,9	0,2	1,05	0,43	1,69		75,87		22,28
13d	ts	557877,8	7800086,4	1980	biotite/amfibole carbonatite	3	1	11,38	4,63	4,36	6,93	1,29	2,57	35,77	0,39	1,16	0,34	3,1		71,92		25,51
16n	ts	558867,5	7800769,3	1980	biotite/amfibole carbonatite	3	1	20,18	8,7	7,7	15,11	3,41	3,02	20,42	1,64	1,57	0,42	1,59		83,76		13,87
17o	ts	558960,2	7801153,2	1980	biotite/amfibole carbonatite	3	1	24,76	7,34	10,04	5,92	3,93	5,73	21,4	1,88	0,99	0,43	1,86		84,28		13,32
17t	ts	559321	7801255,9	1980	biotite/amfibole carbonatite	3	1	16,8	7,01	9,2	7,27	2,95	3,61	26,85	1,43	0,99	0,4	3,3		79,81		17,71
17v	ts	559595,7	7801328,7	1980	biotite/amfibole carbonatite	3	1	20,4	5,78	8,91	7,21	2,68	4,48	25,69	0,64	1,49	0,43	3		80,71		16,93
18f	ts	557901	7801067,2	1980	amfibole carbonatite	3	1	13,27	6,33	4,79	9,24	1,87	4,95	32,58	0,39	0,75	0,31	4,4		78,88		19,53
18h	ts	558268,4	7801159,9	1980	biotite carbonatite	3	1	39,01	13,72	8,38	4,85	2,8	4,7	10,39	4,27	2,39	0,27	1,1		91,88		5,78
18q	ts	558956,9	7801398,2	1980	biotite/amfibole carbonatite	3	1	18,5	5,38	6,59	6,46	1,56	5,21	29,69	0,84	1,18	0,33	3		78,74		19,61
18r	ts	559125,7	7801490,9	1980	amfibole carbonatite	3	1	20,16	6,8	7,2	9,77	2	5,7	27,66	0,74	0,93	0,35	2,04		83,35		14,94
18x	ts	559678,4	7801610	1980	amfibole carbonatite	3	1	20,51	6,4	10,35	9,76	3,59	4,93	22,9	1,89	0,84	0,38	1,87		83,42		14,6
18y	ts	559794,3	7801643,1	1980	amfibole carbonatite	3	1	22,69	7,28	11,99	7,71	3,46	5,74	22,95	0,8	0,92	0,34	1,87		85,75		12,62
19z	ts	559877	7801888	1980	biotite carbonatite	3	1	23,89	9,25	8,95	8,37	3,03	3,77	19,73	1,96	2,25	0,34	1,79		83,33		14,42
19æ	ts	560005	7801924	1980	amfibole carbonatite	3	1	23,35	7,17	11,74	7,98	3,39	5,06	22,94	0,77	0,82	0,36	1,63		85,21		12,85
20z	ts	559751,3	7802106,5	1980	amfibole carbonatite	3	1	19,4	5,22	8,39	4,34	2	4,01	29,52	0,94	1,09	0,38	3,36		78,65		19,48
20ø	ts	560065,7	7802248,8	1980	biotite/amfibole carbonatite	3	1	19,2	6,86	10,49	6,95	3,3	5,01	23,83	0,77	2,19	0,41	1,8		80,81		16,72
3p	ts	560092,2	7798214,1	1980	biotite/amfibole carbonatite	3	1	19,68	10,56	3,73	2,02	1,15	3,74	29,1	3,04	1,6	0,19	1,95		76,76		20,36
4h	ts	559076	7798094,9	1980	amfibole carbonatite	3	1	20,45	8,56	10,55	6,69	3,48	3,66	23,8	0,44	2,1	0,36	1,98		82,07		16,01
5o	ts	559857,2	7798531,8	1980	biotite/amfibole carbonatite	3	1	14,84	4,92	4,34	7,51	1,47	4,07	34,2	0,25	0,66	0,23	2,92		75,41		21,89
6o	ts	559747,9	7798700,6	1980	biotite/amfibole carbonatite	3	1	19,44	6,3	5,63	3,95	1,63	5,82	30,55	0,45	2,32	0,3	2,42		78,81		20,02
6r	ts	560131,9	7798968,7	1980	amfibole carbonatite	3	1	14,14	4,77	7,31	12,63	2,56	4,05	29,84	0,24	0,6	0,38	1,55		78,07		20,2
7o	ts	559595,7	7799058,1	1980	pyroxene carbonatite	3	1	17,28	5,48	5,74	4,56	1,81	3,83	32,72	0,49	2,12	0,27	2,46		76,76		21,81
7p	ts	559741,3	7799071,3	1980	biotite/amfibole carbonatite	3	1	10,81	4,62	6,34	7,53	1,67	4,27	34,39	0,94	1,16	0,39	1,67		73,79		23,78
7q	ts	559939,9	7799028,3	1980	amfibole carbonatite	3	1	13,64	4,03	6,44	8,92	1,66	3,3	33,34	0,64	0,72	0,36	2,05		75,1		22,64
8q	ts	559834	7799283,2	1980	biotite/amfibole carbonatite	3	1	11,87	4,36	6,2	6,68	1,81	3,34	35,38	0,11	1,62	0,29	2,82		74,48		23,91
8r	ts	559976,3	7799289,8	1980	biotite/amfibole carbonatite	3	1	17,63	6,16	5,99	8,12	1,58	4,29	29,45	0,98	1,15	0,28	2,78		78,41		19,97
9h	ts	558672,2	7799187,2	1980	biotite/amfibole carbonatite	3	1	26,05	9,79	11,48	9,08	3,59	4,29	16,24	1,19	3,01	0,36	1,04		86,12		10,84
k1	ts	560740,9	7796542,6	1980	biotite/amfibole carbonatite	3	1	18,95	6,96	4,8	2,96	1,46	3,4	31,74	1,23	1,75	0,26	2,24		75,75		21,89
k25	ts	560194,8	7798839,6	1980	amfibole carbonatite	3	1	15,45	6,14	6,41	7,78	1,55	2,69	31,74	0,6	0,68	0,34	2,83		76,21		21,96
k26	ts	560227,9	7798730,4	1980	amfibole carbonatite	3	1	12,43	3,72	4,86	7,19	1,19	3,78	35,63	0,59	0,53	0,33	3,46		73,71		24,37
k28	ts	559658,6	7799382,5	1980	biotite/amfibole carbonatite	3	1	17,38	7,13	6,62	6,23	1,69	4,4	28,39	1,52	2	0,34	1,68		77,38		19,76
k29	ts	559589,1	7799591	1980	biotite/amfibole carbonatite	3	1	16,59	6,95	8,6	6,26	2,09	5,19	28,71	0,62	1,66	0,38	1,45		78,5		19,02
k48	ts	558424	7798760,2	1980	biotite/amfibole carbonatite	3	1	27,78	9,66	14,11	5,08	3,44	3,85	17,18	2,24	2,02	0,34	0,98		86,68		11,21
k50	ts	558437,2	7801186,3	1980	biotite/amfibole carbonatite	3	1	15,01	4,52	6,66	10,11	1,82	3,62	32,16	0,11	0,6	0,33	3,63		78,57		20,86
k63	ts	560145,1	7802368	1980	biotite/amfibole carbonatite	3	1	19,82	7,7	7,88	9,24	3,05	5,73	21,62	1,07	2,44	0,38	1,86		80,79		16,74
k64	ts	560191,5	7802420,9	1980	biotite/amfibole carbonatite	3	1	23,91	7,71	10,15	6,86	3,2	5,51	21,93	0,71	1,81	0,29	2,85		84,93		13,66
k65	ts	560376,8	7802523,5	1980	biotite/amfibole carbonatite	3	1	18,64	8,14	9,19	7,31	2,88	4,08	23,75	0,67	2,84	0,37	2,4		80,27		17,55
ak5-07	ak	558707	7799405	2007	amfibole carbonatite	3	1	45,3	21		7,68	0,976	0,865	5,28	7,69	5,8	0,118	0,53	3,85	99,089	-	-
hg507	hg	559756	7800854	2007	amfibole carbonatite	3	1	17,9	6,96		17,7	3,5	4,03	23,8	0,63	3,76	0,307	1,87	17,4	97,857	-	-
08-035	mh	558768	7797273	2008	amfibole carbonatite	3	1	16,9	9,59		14,5	3,08	2,48	24,9	2,62	2,84	0,341	1,89	16,9	96,041	5,01	18,37184
hg16-08	hg	559720	7799926	2008	amfibole carbonatite	3	1	18,3	6,73		17,7	3,39	3,44	24,9	1,36	2,47	0,402	1,92	17,6	98,212	5,209	19,10158
hg7-08	hg	558550	7800847	2008	amfibole carbonatite	3	1	33,9	14,5		14,7	2,49	1,91	11,7	3,04	4,86	0,259	0,839	9,19	97,388	2,652	9,724972
10f	ts	558579,6	7799306,3	1980	biotite carbonatite	4	1	24,9	10,64	15,34	4,75	3,16	4,23	15,45	0,92	3,85	0,38	1,33		84,95		11,7
10g	ts	558672,2	7799306,3	1980	biotite carbonatite	4	1	20,65	9,68	15,08	5,55	3,42	3,69	17,66	0,76	4,2	0,39	1,16		82,24		14,08
10h	ts	558781,5	7799319,6	1980	biotite carbonatite	4	1	16,57	8,77	12,64	6,27	3,02	3,18	23,02	0,48	3,73	0,39	2,06		80,13		16,81
10l	ts	559191,9	7799395,7	1980	biotite carbonatite	4	1	15,91	8,56	10,54	3,65	2,12	3,84	27,07	0,51	3,51	0,34	3,66		79,71		18,86
10m	ts	559317,7	7799452	1980	biotite carbonatite	4	1	12,32	5,34	6,17	3,93	1,59	5,31	33,48	0,18	2,12	0,19	5,32		75,95		21,24
10n	ts	559301,1	7799372,5	1980	biotite carbonatite	4	1	19,11	6,54	9,68	2,98	1,9	4,68	26,75	0,42	3,2	0,24	3,04		78,54		19,87
11e	ts	558314,8	7799617,5	1980	biotite carbonatite	4	1	28,55	10,88	12,74	6,87	3,05	3,76	14,19	2,23	2,99	0,32	1,02		86,6		10,34
11f	ts	558483,6	7799657,2	1980	biotite carbonatite	4	1	28,83	16,46	10,92	4,23	2,78	3,01	12,23	3,84	4,26	0,32	0,76		87,64		9,22
11l	ts	559023,1	7799723,4	1980	biotite carbonatite	4	1	15,23	6,29	8,96	3,21	2,02	4,53	30,46	0,3	2,82	0,23	5,5		79,55		19,17
11m	ts	559185,3	7799773	1980	biotite carbonatite	4	1	16,69	5,62	7,7	4,03	2,01	4,69	28,98	0,36	2,79	0,27	2,91		76,05		21,74
12k	ts	558966,8	7800054,4	1980	biotite carbonatite	4	1	16,26	5,2	7,42	4,95	1,79	4,94	29,73	0	2,58	0,29	4,49		77,65		20,04
12l	ts	559033	7800236,4	1980	biotite carbonatite	4	1	13,75	7,1	7,85	3,02	1,73	3,45	30,81	0,35	2,43	0,26	3,38		74,13		23,44
12m	ts	559129	7800276,1	1980	biotite carbonatite	4	1	16,52	7,15	8,53	5,12	2,28	2,73	28,26	0,63	2,54	0,42	2,87		77,05		19,83
13e	ts	558132,7	7800094,1	1980	biotite/amfibole carbonatite	4	1	22,35	8,7	7,78	6,83	2,64	6,35	24,15	0,95	1,5	0,34	1,26		82,85		14,65
13l	ts	559016,5	7800378,7	1980	biotite carbonatite	4	1	16,18	5,42	8,64	3,28	1,87	5,35	28,68	0,27	2,02	0,25	3,03		74,99		22,81
13m	ts	559122,4	7800435	1980	biotite carbonatite	4	1	13,49	7,11	7,88	4,27	2,06	4,05	30,42	0,35	2,82	0,31	5,17		77,93		19,96
13n	ts	559205,1	7800494,6	1980	biotite carbonatite	4	1	17,04	8,14	10,19	3,83	2,65	5,07	25,56	0,53	3,43	0,24	3,35		80,03		17,9
14h	ts	558420,7	7800229,8	1980	biotite carbonatite	4	1	20,06	8,99	15,01	4,77	2,92	3,44	19,64	0,2	4,11	0,33	2,02		81,49		15,41
15e	ts	557990,4	7800262,9	1980	biotite carbonatite	4	1	17,04	7,69	13,14	4,11	2,79	4,55	23,94	0,32	3,67	0,4	1,81		79,46		17,79
15f	ts	558146	7800335,7	1980	biotite carbonatite	4	1	18,73	6,76	12,92	4,41	3,02	4,14	23,97	0,32	2,91	0,34	1,77		79,29		17,37
15h	ts	558377,7	7800348,9	1980	biotite carbonatite	4	1	18,14	8,48	13,46	4,19	2,74	3,01	23,08	0,34	3,78	0,5	2,34		80,06		16,94
16f	ts	558076,5	7800554,2	1980	biotite carbonatite	4	1	20,16	8,48	13,68	5,67	2,92	2,82	20,61	0,53	3,75	0,41	1,7		80,73		15,93
16g	ts	558189	7800593,9	1980	biotite carbonatite	4	1	14,98	5,58	9,14	3,48	2,03	4,07	29,93	0,19	1,81	0,35	3,31		74,87		21,95

Sample	Ag	As	Ba	Cd	Ce	Co	Cr	Cu	Ga	La	Mo	Nb	Nd	Ni	Pb	Rb	Sb	Sc	Sn	Sr	Th	U	V	W	Y	Zn	Zr	Cl	F	S
42738	-10	-10	4920	-10	-20	8,8	4	7,1	12,6	-10	-1	22,7	-10	-2	-3	65,7	-15	-5	-10	3910	6,2	11	32,8	7,6	3	43,8	43,1	-0,05	-0,1	0,02
42743	-10	-10	2010	-10	24	6,7	-4	-2	19	14	2	43,3	-10	-2	-3	71,6	-15	-5	-10	1130	-4	3,5	29,9	-5	3,8	47,6	13,3	0,051	-0,1	-0,02
42745	-10	-10	1920	-10	62	8,3	4,9	-2	16,5	34	-1	46,5	19	-2	-3	73,3	-15	-5	-10	1410	-4	3,8	26	-5	11,9	48,2	20	-0,05	-0,1	-0,02
42804	-10	-10	1770	-10	26	11,3	-4	4,5	23,7	21	-1	67,5	-10	-2	-3	59,8	-15	-5	-10	1990	-4	5,5	21,9	-5	5,3	59,5	47,6	-0,05	-0,1	-0,02
08-016	-10	-10	6190	-10	-20	5,3	-4	3,7	12,8	-10	-1	13,8	-10	-2	-3	74,1	-15	-5	-10	3910	4,9	9,8	14,9	-5	1,4	29,6	35,8	-0,05	-0,1	-0,02
Ak3-07	-10	-10	594	-10	281	36,1	14,9	41,1	15,6	127	-1	41,6	130	4,8	18,9	17,1	-15	-5	-10	709	10,3	8,6	296	-5	32,7	42,8	203	-0,05	-0,1	0,065
hg4-07	16	-10	186	-10	185	32,7	30	37,8	23,2	67	1,2	26,2	91	3,3	18,5	6,2	-15	-5	-10	362	7,6	8,7	547	-5	23,4	76,3	340	-0,05	-0,1	0,09
hg6-07	-10	-10	931	-10	124	54,8	17,1	22,4	17,2	39	-1	72,4	61	30,6	19,1	26	-15	23,4	-10	611	-4	6,4	328	-5	19,6	54,1	183	-0,05	-0,1	-0,02
hg7-07	16	10	432	-10	291	30,4	14,2	23	20,7	123	-1	43,4	126	-2	18,8	13,5	-15	-5	-10	582	13,8	10,4	515	-5	30,2	81,3	340	-0,05	-0,1	0,115
42721	-10	-10	432	-10	177	71,2	5,5	219	16,2	66	2,1	35,6	89	3,1	-3	10	-15	20,1	-10	462	8,6	-2	520	-5	27,3	89,9	367	-0,05	-0,1	0,388
42728	-10	-10	785	-10	122	54,2	206	59,7	12,7	52	1,6	50,4	66	38,8	-3	19,8	-15	40,7	-10	506	5	-2	313	-5	23	46	193	-0,05	-0,1	-0,02
42729	-10	-10	2340	-10	42	47,8	64	126	9,3	20	1,7	37,2	22	142	-3	129	-15	61,1	-10	224	-4	-2	225	-5	11,4	38,7	126	-0,05	-0,1	0,043
42730	-10	-10	1850	-10	38	54,7	27,9	64,7	11,7	20	1,5	35,2	24	78,3	-3	87,3	-15	54,4	-10	252	-4	-2	292	-5	14,4	43,3	181	-0,05	-0,1	-0,02
42731	-10	-10	902	-10	66	56,8	20,2	216	13	19	1,3	46,5	44	74,9	-3	31,2	-15	49,4	-10	337	-4	-2	322	-5	17,3	46,2	223	-0,05	-0,1	0,026
42732	-10	-10	659	-10	122	55	5,6	74,9	14,2	41	1,5	43,2	62	7,7	-3	14,9	-15	29,7	-10	432	5,3	-2	330	-5	21,5	48,6	292	-0,05	-0,1	0,049
42734	-10	-10	622	-10	200	60,2	-4	141	16,3	86	1,9	54,3	89	-2	-3	16	-15	22,3	-10	507	8,8	-2	505	-5	26,9	96	287	-0,05	-0,1	0,224
42735	-10	-10	167	-10	345	105	-4	306	17,3	132	1,8	25,1	156	-2	-3	3,2	-15	20,5	-10	449	16,1	2,5	660	-5	38,8	115	392	-0,05	-0,1	0,664
42736	-10	-10	267	-10	400	60,9	-4	67	15,3	159	2	362	196	-2	-3	5	-15	15,5	-10	433	20,8	2,3	573	-5	57	94,9	549	-0,05	-0,1	0,161
42737	-10	-10	403	-10	339	73,7	-4	69,6	16,5	143	1,5	102	155	-2	-3	8,9	-15	15,4	-10	480	18,5	-2	534	-5	41,5	93	443	-0,05	-0,1	0,21
42739	-10	-10	3850	-10	435	35,5	9,1	47,8	12,5	227	2	68,6	163	4,2	-3	140	-15	12,6	-10	1860	8,3	4,5	170	-5	76,3	208	132	-0,05	-0,1	0,03
42741	-10	-10	434	-10	268	92,6	-4	147	18,5	97	2	66,2	114	-2	-3	9,3	-15	13,9	-10	422	14,4	-2	718	-5	32,6	151	361	-0,05	-0,1	0,849
42744	-10	-10	4130	-10	67	47,4	4,6	59,1	20,7	25	2,2	216	-10	2,1	-3	171	-15	-5	-10	561	-4	-2	126	-5	8,4	222	17,3	-0,05	-0,1	0,145
Ak4-07	20	11	278	-10	224	33,4	4,2	34,4	25,2	79	1,7	55	99	-2	19,4	10,5	-15	-5	-10	347	15,8	12,4	817	-5	24,5	96,5	376	-0,05	-0,1	0,396
hg12-08	-10	-10	818	-10	161	49,3	205	14,6	15,1	73	1,7	116	71	74,4	-3	13,5	-15	44,9	-10	402	10,8	-2	370	-5	27,3	84,1	385	-0,05	-0,1	-0,02
hg13-08	-10	-10	994	-10	93	47,9	266	-2	14,9	33	2,2	63,5	43	75,6	-3	36,3	-15	55	-10	374	5,3	-2	321	-5	18,5	80,5	296	-0,05	-0,1	-0,02
hg15-08	-10	-10	701	-10	297	36,2	42	4,5	16,6	139	2,2	156	113	9	-3	14,7	-15	22,9	-10	749	12,5	-2	369	-5	36,7	95,7	600	-0,05	-0,1	-0,02
hg17-08	-10	-10	4860	-10	87	51,1	83	-2	11	61	4	46,2	16	106	-3	185	-15	53,3	-10	628	5,2	2	246	-5	16,7	75,2	229	-0,05	-0,1	-0,02
hg18-08	-10	-10	492	-10	180	38,4	6,9	29,1	17,3	69	1,5	42,5	85	-2	-3	9,1	-15	19,2	-10	430	9,5	-2	605	-5	25,7	77,6	372	-0,05	-0,1	0,074
hg19-08	-10	-10	822	-10	86	57,6	34,6	87	12,5	37	1,3	41,8	49	72,9	-3	20	-15	43,5	-10	448	-4	-2	318	-5	18,7	38,7	180	-0,05	-0,1	0,03
hg20-08	-10	-10	2440	-10	61	63,1	62,4	39,9	12	19	1,4	66,5	27	93,1	-3	105	-15	41,3	-10	343	-4	-2	322	-5	16,3	65,7	200	-0,05	-0,1	0,027
hg2-08	-10	-10	479	-10	150	42,7	6,6	39,9	12,7	66	1,4	28,9	79	5,5	35,1	10,8	-15	32,2	-10	433	5,6	-2	296	-5	24,6	38,2	242	-0,05	-0,1	-0,02
hg21-08	-10	-10	353	-10	162	46,4	-4	62,3	16,5	61	1,7	26,4	81	-2	-3	7,5	-15	26	-10	405	8,2	-2	546	-5	26,6	62,7	291	-0,05	-0,1	0,028
hg22-08	-10	-10	235	-10	253	38,1	6,7	49,1	19	102	2,3	21,3	117	-2	-3	5,4	-15	21,7	-10	412	11,2	2,4	831	-5	32,3	104	258	-0,05	-0,1	0,034
hg23-08	-10	-10	734	-10	173	48,3	4,6	49,4	14,1	66	1,6	51	82	-2	-3	16,5	-15	21,8	-10	558	8	-2	354	-5	26,9	59,2	252	-0,05	-0,1	0,03
hg27-08	-10	-10	170	-10	84	37,1	14,6	62,1	14,3	35	1,9	12	51	-2	-3	3,8	-15	25,9	-10	253	5	-2	314	-5	19	38,5	348	-0,05	-0,1	0,151
hg28-08	-10	-10	892	-10	129	58	11,8	12,5	14,5	47	2,2	79,6	71	4,9	-3	23,3	-15	27,1	-10	562	6,8	-2	367	-5	22,7	77,1	277	-0,05	-0,1	-0,02
hg29-08	-10	-10	896	-10	140	56,6	15,5	17,4	14,9	57	1,2	75,8	67	23,8	-3	27,3	-15	37,5	-10	514	6,8	-2	364	-5	22,3	78,5	285	-0,05	-0,1	-0,02
hg5-08	-10	-10	931	-10	173	50,7	7,5	8,8	14,2	69	1,9	39,7	84	-2	33,9	13,7	-15	22,7	-10	672	-4	-2	577	-5	33,3	60	86,4	-0,05	-0,1	-0,02
HG1-09			730									59		30				37		527					20		270			
HG2-09			819									59		23				27		763					30		176			
HG3-09			781									60		29				35		774					30		161			
HG4-09			236									36		-20				24		541					36		208			
hg6-09			233									39		-20				22		540					35		210			
hg7-09			864									44		120				61		380					33		159			
hg8-09			456									31		25				50		532					32		186			
hg9-09			654									52		102				40		400					18		125			
hg10-09			357									36		-20				38		390					22		212			
HG12-09			531									43		-20				22		823					39		189			
HG21-09			488									43		-20				21		971					48		212			
HG22-09			802									58		-20				26		777					28		163			
HG23-09			707									68		-20				23		773					30		200			
HG24-09			679									61		-20				24		649					27		248			
HG25-09			624									76		-20				18		625					25		322			
HG26-09			301									31		-20				19		1122					61		205			
HG28-09			1116									47		54				40		589					24		221			
HG30-09			2493									142		41				28		1807					29		348			
HG31-09			722									59		42				41		695					24		198			
HG32-09			350									35		-20				27		690					35		231			
HG33-09			745									60		-20				25		1007					39		151			
HG34-09			377									35		-20				29		578					27		256			
HG35-09			959									71		-20				22		814					30		171			
HG37-09			440									34		22				28		696					25		214			
HG38-09			678									59		21				26		863					35		189			
HG39-09			352									25		-20				26		603					29		226			
HG40-09			193									21		26				35		534					31		250			
HG41-09			571									44		-20				31		650					27		182			
HG42-09			223									23		38				27		614					32		250			
hg8-07	-10	-10	233	-10	33	62,2	1910	11,6	7	-10	-1	13,6	12	402	19,7	10,8	-15	62,4	-10	108	-4	2,2	109	-5	5,5	25,4	63,6	-0,05	-0,1	-0,02
k8		0,47	1390		586					440		43	299			3				4962					72					
k9		0,23	1623		558					440		0	229			32				6536					66					
10d		1,29	2549		719					530		91	346			45				4463					71					
10e		1,81	7767		600					400		53	300			147				7050					76					
11d		0,93	2724		708					515		41	320			50				5124					66					
12d		0,73	3320		670					492		83	290			50				4566					60					
13d		1,4	3134		837					635		21	390			80				4518					78					
16n		0,93	4734		534					325		61	284			40				6088					58					
17o		1,54	2139		526					354		257	258			42				3428					65					
17t		1,52	2303		536					356		54	295			36				4206					61					
17v		1,16	3465		66					395		71	318			80				4883					87					
18f		0,73	1295		581					444		59	304			12				3432					79					
18h		1,32	3606		293					204		67	153			92				3892					43					
18q		0,81	2192		532					360		64	266			27				3464					56					
18r		1,02	1529		448					330		46	209			20				2898					43					
18x		1,14	2369		516					355		76	279			15				3328					54					
18y		0,78	1309		450					284		68	240			11				4208					54					
19z		1,16	4380		330					220		76	180			123				3844					46					
19æ		1,14	1299		451					258		65	225			7				4058					66					
20z		0,86	2524		549					360		56	301			35				4763					73					
20ø		1,17	4503		527					360		71	282			126				4924					76					
3p		2	1814		536					414		31	238			57				4006					63					
4h		0,79	3894		433					255		46	220			65				4643					64					
5o		1,87	994		625					475		44	306			3				4126					74					
6o		0,31	2063		503					348		24	233			114				3666					51					
6r		0,91	1469		521					360		136	224			5				3773					57					
7o		0,51	2722		454					333		73	224			96				3632					60					
7p		1,24	3164		682					500		66	321			60				5033					66					
7q		1,05	2199		702					505		36	320			20				5183					66					
8q		0,47	3425		680					522		62	312			93				4249					64					
8r		0,82	1678		533					400		26	253			25				3464					52					
9h		1,39	7374		517					345		86	252			135				5268					60					
k1		1,37	1837		519					360		75	245			84				5118					60					
k25		0,88	1848		701					512		44	325			15				4248					63					
k26		0,96	1905		628					438		0	300			8				4334					70					
k28		1,61	3999		621					410		49	276			120				4883					54					
k29		1,41	3029		594					415		86	288			80				4418					60					
k48		0,84	4564		491					325		76	261			60				4883					48					
k50		0,68	1494		622					452		52	289			11				3592					59					
k63		1,23	4947		587					294		65	254			156				4238					67					
k64		0,93	2895		287					153		89	154			96				2564					59					
k65		1	4389		413					247		62	218			171				4613					77					
ak5-07	28	-10	7900	-10	150	6,1	-4	4,1	16,2	87	-1	61,7	40	-2	8,9	144	-15	-5	14	3210	-4	12,3	21,3	-5	20,2	61,5	14,6	-0,05	-0,1	0,021
hg507	31	-10	6130	-10	511	28,2	16,4	8,8	15	255	-1	99,3	186	3,5	6,2	215	-15	-5	-10	4530	4,9	21,3	123	-5	69	147	23,4	-0,05	-0,1	0,082
08-035	-10	-10	11900	-10	1040	25,9	-4	23,4	4,2	640	5,1	87,5	299	-2	-3	124	-15	6,5	-10	8590	20,2	23,7	186	-5	113	163	98,6	-0,05	-0,1	0,315
hg16-08	-10	-10	4720	-10	758	37,2	5,1	24,4	8,7	399	1,8	127	271	-2	-3	107	-15	9,8	-10	4650	13,3	12,9	207	-5	90,3	157	115	-0,05	-0,1	-0,02
hg7-08	-10	-10	11600	-10	393	23,2	-4	10,7	9,8	218	-1	86,5	109	-2	-3	181	-15	-5	-10	7550	15,2	20	49	-5	51,1	132	65,3	-0,05	-0,1	0,022
10f		1,44	8842		506					356		104	256			203				5956					60					
10g		1,4	11471		650					464		84	324			223				6360					73					
10h		1,35	1504		370					267		38	243			189				3705					60					
10l		0,57	6234		508					331		53	226			203				6784					89					
10m		1,97	2100		337					244		21	195			187				3828					60					
10n		0,8	1792		428					291		0	277			153				3681					70					
11e		1,28	7893		444					291		88	213			147				5930					64					
11f		1,49	8548		406					282		74	200			189				4292					58					
11l		0,46	1913		382					256		20	249			174				3754					70					
11m		1,22	2920		364					228		32	217			199				4036					72					
12k		1,38	3551		556					368		35	317			136				4708					85					
12l		1,42	2716		452					280		5	267			194				3966					77					
12m		1,93	2763		450					272		0	240			172				4360					75					
13e		1,43	3303		529					364		131	243			42				4184					52					
13l		1,26	2859		368					236		59	229			198				3740					71					
13m		1,19	2403		387					236		7	238			176				3872					68					
13n		0,97	4013		405					242		29	237			257				4000					61					
14h		1,59	5649		475					300		83	226			252				5708					77					
15e		0,17	6612		506					306		71	260			222				5360					79					
15f		1,59	7173		530					348		41	291			168				6326					71					
15h		1,48	5947		519					313		76	274			210				5728					76					
16f		1,54	7503		503					336		77	260			222				6614					75					
16g		1,45	5586		672					452		0	337			150				7505					95					

16h	ts	558304,8	7800646,8	1980	biotite carbonatite	4	1	15,66	6,08	11,77	5,78	3,02	4,29	25,27	0,41	2,76	0,36	2,23		77,63		19,25		1,38	7341		625					386		41	339			198				6056					83					
16k	ts	558582,9	7800646,8	1980	biotite carbonatite	4	1	23,71	7,89	12,42	10,84	3,47	3,3	17,74	1,91	1,52	0,43	1,35		84,58		12,64		1,63	3730		468					308		116	251			51				4572					47					
16m	ts	558755	7800709,7	1980	biotite carbonatite	4	1	9,95	3,06	3,78	4,03	1,01	3,06	38,83	0,08	1,07	0,29	2,6		67,76		29,36		1,9	1656		512					316		8	292			103				5132					78					
16o	ts	559023,1	7800766	1980	biotite carbonatite	4	1	25,31	9,35	10,49	4,27	2,38	5,17	19,83	0,99	4,06	0,23	4,84		86,92		11,23		1,12	2984		295					155		41	185			245				2638					56					
16p	ts	559152,2	7800795,8	1980	biotite carbonatite	4	1	10,3	5,85	5,26	3,17	1,26	3,1	35,23	0,22	1,59	0,38	2,96		69,32		28,14		1,55	2092		467					290		0	255			140				4726					83					
16q	ts	559049,8	7800869	1980	biotite carbonatite	4	1	13,96	6,81	7,42	4,95	1,79	4,21	30,83	0,24	2,68	0,31	3,97		77,17		20,47		1,56	2269		402					245		16	254			195				3153					73					
16t	ts	559453,4	7800981,1	1980	biotite carbonatite	4	1	11,89	5,77	3,17	6,32	1,25	2,73	35,64	0,29	0,98	0,39	5,71		74,14		21,71		3,05	2069		785					535		0	440			75				5258					135					
16u	ts	559589,1	7801100,3	1980	biotite carbonatite	4	1	16,23	7,38	9,29	9	3,17	3,97	24,72	0,44	2,65	0,34	2,17		79,36		18,09		1,36	4544		491					316		96	269			127				4068					67					
17g	ts	558056,6	7800905	1980	biotite carbonatite	4	1	17,25	8,79	13	7,32	3,51	2,9	22,06	0,84	2,72	0,4	1,7		80,49		16,4		1,2	8314		673					575		51	360			135				6093					71					
17h	ts	558278,4	7800865,3	1980	biotite carbonatite	4	1	17,16	9,03	12,35	4,15	2,6	3,63	24,76	0,34	3,44	0,35	2,43		80,24		16,87		1,02	8804		567					380		46	305			190				5748					63					
17l	ts	558629,2	7800994,4	1980	biotite carbonatite	4	1	20,6	6,99	12,67	4,92	2,75	3,71	22,97	0,53	3,03	0,4	1,45		80,02		17,08		1,33	6135		506					330		71	258			174				5906					82					
17m	ts	558748,4	7801057,3	1980	biotite carbonatite	4	1	18,76	6,86	13,75	6,34	3,38	3,83	22,03	0,19	2,4	0,4	1,42		79,36		17,53		1,34	7959		550					384		67	277			112				5656					66					
17n	ts	558834,4	7801130,1	1980	biotite carbonatite	4	1	19,39	8,82	12,92	4,8	3	4,19	21,94	0,35	3,48	0,32	2,42		81,63		15,3		1,43	7383		565					354		71	304			204				5174					69					
17q	ts	559082,7	7801179,7	1980	biotite carbonatite	4	1	24,62	9,09	11,45	4,84	2,5	2,9	19,67	1,61	2,99	0,39	1,42		81,48		15,48		1,6	5283		451					312		47	222			186				5792					70					
17r	ts	559175,3	7801232,7	1980	biotite carbonatite	4	1	19,93	7,3	12,06	5,22	2,76	4,17	22,39	0,11	3,31	0,37	1,77		79,39		17,36		1,62	6933		500					366		71	252			174				5600					79					
17s	ts	559225	7801272,4	1980	biotite carbonatite	4	1	18,84	7,44	12,1	5,09	2,83	4,67	22,67	0,59	3,08	0,37	1,84		79,52		17,69		1,17	6267		563					348		53	306			186				6032					81					
17u	ts	559413,6	7801322,1	1980	biotite carbonatite	4	1	20,1	8,3	12,2	6,69	3,12	3,36	20,84	0,91	3	0,37	2,1		80,99		16,36		1,24	6127		428					276		59	234			160				4456					58					
17x	ts	559743	7801519	1980	biotite carbonatite	4	1	19,22	6,64	9,47	6,03	2,59	5,63	24,23	0,53	2,73	0,35	1,57		78,99		18,94		0,93	4799		497					315		41	236			150				3328					65					
18g	ts	558079,8	7801123,5	1980	biotite/amfibole carbonatite	4	1	15,44	4,56	7,85	9,37	1,89	3,91	31,61	0,46	0,75	0,42	1,7		77,96		20,26		0,88	2094		570					400		51	271			25				3993					60					
18p	ts	558801,3	7801328,7	1980	biotite/amfibole carbonatite	4	1	16,65	7,09	7,67	9,09	1,84	3,99	28,32	1,19	0,72	0,38	2,46		79,4		18,49		1,03	1815		618					456		51	283			20				3164					49					
18s	ts	559297,8	7801530,6	1980	biotite carbonatite	4	1	17,52	5,96	7,12	5,15	1,92	3,87	28,86	1,25	2,12	0,37	2,87		77,01		20,72		1,26	3615		611					404		5	330			120				5582					94					
18t	ts	559403,7	7801586,8	1980	biotite carbonatite	4	1	20,46	8,76	8,28	3,81	2,21	6,31	23,91	1,73	2,76	0,34	1,36		79,93		17,42		1,47	3933		506					312		59	228			138				4502					70					
18u	ts	559506,3	7801583,5	1980	biotite carbonatite	4	1	18,85	9,02	13,18	4,92	3,11	3,21	22,01	0,38	3,51	0,37	1,56		80,12		16,86		1,39	7569		600					300		89	262			192				5198					70					
18v	ts	559592,4	7801613,3	1980	biotite carbonatite	4	1	23,92	8,61	13,28	4,7	2,88	4,86	18,82	0,51	3,14	0,36	1,59		82,67		14,13		1,87	5975		423					292		112	218			163				3984					60					
18w	ts	559637,7	7801651,6	1980	biotite carbonatite	4	1	14,75	7,73	11,2	6,68	3,03	3,34	25,27	0,33	2,86	0,49	2,37		78,05		18,73		1,61	6318		644					422		47	325			156				5671					86					
19v	ts	559443,4	7801808,6	1980	biotite carbonatite	4	1	23,84	8,62	11,66	5,05	2,76	4,29	20,43	1,38	2,67	0,35	1,82		82,87		14,82		1,15	4077		411					244		65	205			138				4112					59					
19w	ts	559536,1	7801828,5	1980	biotite carbonatite	4	1	17,28	8,55	11,52	7,08	3,15	3,27	22,73	0,71	3,37	0,36	1,9		79,92		17,31		1,28	5831		515					376		55	273			164				5416					73					
19x	ts	559648,7	7801858,3	1980	biotite carbonatite	4	1	19,79	7,16	11,546	4,41	2,65	4,54	23,52	0,19	2,93	0,36	1,63		78,726		18,3		1,36	6169		505					340		41	259			160				5823					75					
19y	ts	559781	7801891,4	1980	biotite carbonatite	4	1	20,21	8,37	10,73	5,6	2,86	5,77	21,56	0,76	3,1	0,3	1,94		81,2		16,23		1,42	5040		387					244		88	215			195				3192					61					
4b	ts	558559,7	7797936	1980	biotite carbonatite	4	1	17,77	8,75	11,96	4,93	2,66	3,3	23,17	0,48	3,51	0,35	1,83		78,71		18,28		1,52	6577		511					308		67	276			217				4845					80					
4i	ts	559291,2	7798121,4	1980	biotite carbonatite	4	1	20,32	6,62	6,09	6,39	2,32	6,013	26,26	0,29	2,4	0,35	1,79		78,843		18,33		1,6	3499		547					375		56	248			110				4333					65					
4q	ts	560112	7798346,5	1980	biotite carbonatite	4	1	17	7,91	4,98	1,77	1,05	3,27	31,6	2,28	2,01	0,24	2,01		74,12		23,76		1,1	2007		565					412		23	259			96				4986					64					
5c	ts	558463,7	7798147,9	1980	biotite carbonatite	4	1	22,32	8,59	15,24	6,15	3,3	3,1	18,85	0,66	3,44	0,39	1,18		83,22		14,27		1,28	9844		561					402		94	276			168				7394					72					
5i	ts	559158,8	7798290,2	1980	biotite carbonatite	4	1	18,34	8,25	10,73	4,27	3,15	3,75	24,55	0,89	2,69	0,32	3,18		80,12		16,79		1,29	8924		608					390		51	337			125				5153					83					
5q	ts	560083,5	7798563,7	1980	biotite carbonatite	4	1	21,52	10,53	6,45	2,08	1,52	3,56	25,01	2,62	3,13	0,31	1,22		77,95		19,46		1,5	3810		484					354		56	223			123				3843					68					
6c	ts	558367,7	7798260,4	1980	biotite carbonatite	4	1	22,59	8,1	11,58	4,71	2,7	3,41	21,95	0,97	2,92	0,39	1,65		80,97		16,69		0,72	5114		516					378		71	272			160				4690					70					
6q	ts	559999,5	7798747	1980	biotite carbonatite	4	1	9,18	4,46	3,94	9,96	1,63	3,8	34,55	0	1,66	0,3	1,65		71,13		27,11		0,61	3242		593					443		56	264			93				4717					59					
7d	ts	558414,1	7798581,5	1980	biotite carbonatite	4	1	21	9,44	13,64	5,48	2,89	2,82	19,4	0,64	4,05	0,43	1,33		81,12		15,36		1,73	8204		538					350		91	288			240				5548					71					
7e	ts	558483,6	7798578,2	1980	biotite carbonatite	4	1	22,97	9,11	14,87	5,03	2,68	3,77	18	0,55	4,14	0,37	1,16		82,65		13,84		1,86	7760		440					261		116	220			238				4940					75					
7f	ts	558549,8	7798581,5	1980	biotite carbonatite	4	1	20,2	8,09	11,74	5,16	2,56	4,25	24,32	0,69	2,39	0,32	1,79		81,51		15,98		1,07	5058		520					282		74	279			112				5874					70					
8f	ts	558400,8	7798852,9	1980	biotite carbonatite	4	1	23,2	10,22	14,18	5,82	3,16	2,99	16,95	1,01	4,12	0,34	1,08		83,07		13,45		1,68	8733		467					298		83	239			204				5240					61					
8k	ts	558950,3	7799008,4	1980	biotite carbonatite	4	1	19,89	8,19	12,71	3,52	2,96	4,29	21,57	0,49	3,57	0,3	1,09		78,58		18,06		1,65	8364		456					270		71	250			140				5178					66					
8n	ts	559529,5	7799140,8	1980	biotite carbonatite	4	1	21,73	8,59	9,22	5,51	2,73	5,35	21,97	1,31	2,75	0,35	1,77		81,28		16,1		1,37	5111		521					356		75	248			144				3984					67					
9f	ts	558367,7	7798968,7	1980	biotite carbonatite	4	1	23,2	8,9	12,1	4,47	2,86	4,66	19,57	0,69	3,33	0,39	1,32		81,49		15,79		1,22	6136		402					257		81	186			188				5209					69					
9i	ts	558943,6	7799306,3	1980	biotite carbonatite	4	1	19,2	9,6	13,54	4,86	3,2	3,87	20,82	0,48	4,09	0,34	0,91		80,91		16,2		1,54	6620		373					208		106	183			184				3656					68					
k19	ts	559297,2	7799607,4	1980	biotite carbonatite	4	1	20,46	7,68	11,83	3,61	2,44	3,92	23,41	0,34	3,57	0,28	2,17		79,71		18,29		0,81	3760		382					252		71	221			198				4214					66					
k2	ts	560717,7	7796671,7	1980	biotite carbonatite	4	1	20,95	12,82	4,52	2,31	1,02	4,38	24,3	4,31	2,35	0,21	2,06		79,23		17,4		2,57	1716		407					288		14	199			105				3627					46					
k23	ts	560525,8	7797568,7	1980	biotite/amfibole carbonatite	4	1	29,46	9,21	7,52	4,71	2,23	8,68	19,38	0,62	3,53	0,33	1,75		87,42		10,26		1,41	4539		336					210		91	154			215				1998					39					
k24	ts	560406,6	7798025,4	1980	biotite carbonatite	4	1	20,01	8,06	7,3	4,5	2,13	7,89	25,03	0,32	3,23	0,33	1,35		80,15		17,47		1,25	4544		423					390		56	201			210				3518					48					
k27	ts	559652	7799309,6	1980	biotite/amfibole carbonatite	4	1	11,88	6,93	7,09	6,67	1,87	4,29	31,1	0,2	2,45	0,4	2,24		75,12		23,02		0,7	4012		620					428		67	277			150				4290					65					
k3	ts	560674,7	7796592,2	1980	biotite carbonatite	4	1	14,53	11,84	2,8	1,4	0,85	2,32	33,13	3,62	1,39	0,26	2,08		74,22		22,57		2,39	1323		475					350		8	221			46				4122					62					
k31	ts	559366,7	7800230,3	1980	biotite carbonatite	4	1	17,32	7,21	12,06	3,24	3,24	4,47	24,18	0,35	2,91	0,36	1,94		77,28		19,35		1,01	10523		753					575		19	375			155				7700					96					
k36	ts	558947	7800289,4	1980	biotite carbonatite	4	1	12,88	5,31	4,32	5,49	1,37	2,85	34,62	0,12	1,68	0,31	4,52		73,47		23,42		2,15	2176		531					324		0	300			146				4630					87					
k38	ts	559327,6	7800554,2	1980	biotite carbonatite	4	1	17,14	6,17	10,27	4,64	2,8	3,56	26,47	0,39	2,74	0,34	1,75		76,27		20,27		1,46	7839		638					425		29	341			141				7580					86					
k4	ts	560747,5	7796122,2	1980	biotite carbonatite	4	1	29,46	23,06	3,37	0,94	1,24	3,39	10,52	13,52	3,9	0,13	0,45		89,98		7,73		1,8	1636		170					186		75	82			102				1774					22					
k41	ts	558784,8	7798578,2	1980	biotite carbonatite	4	1	18,98	6,86	11,92	5,21	3,04	4,62	23,68	0,39	2,68	0,35	0,92		78,65		18,8		1,65	5374		410					240		86	235			135				4173					60					
k43	ts	559112,5	7798869,4	1980	biotite carbonatite	4	1	23,42	9,49	14,8	6,65	3,6	3,63	16,76	0,56	3,36	0,32	2,46		85,05		11,5		0,61	15600		593					400		88	318			154				7082					65					
k49	ts	558473,6	7799025	1980	biotite carbonatite	4	1	17,47	8,12	12,56	6,23	3,02	2,89	22,76	0,53	2,96	0,38	1,81		78,73		17,55		2,04	7113		534					372		59	284			198				5522					100					
k51	ts	558622,6	7799094,5	1980	biotite carbonatite	4	1	27,37	12,7	15,59	3,38	3,14	3,27	12,99	1,81	4,42	0,32	0,7		85,69		11,04		1,37	9559		402					254		84	200			215				5308					51					
k52	ts	558493,5	7798922,4	1980	biotite carbonatite	4	1	19,03	8,64	14,22	5,79	3,34	3,11	20,75	0,56	3,52	0,33	1,47		80,76		15,86		1,35	9713		629					440		74	307			180				6014					78					
k53	ts	558616,9	7799014,8	1980	biotite carbonatite	4	1	23,91	10,87	14,47	6,33	3,7	3,28	17,19	2,56	2,88	0,48	1,07		86,74		10,9		1,09	5436		491					312		128	265			95				3948					51					
k54	ts	558516,7	7799154,1	1980	biotite carbonatite	4	1	18,21	8,17	13,93	4,93	3,22	2,5	22,16	0,55	3,48	0,39	1,53		79,07		17,64		1,31	8236		527					342		53	282			203				7050					74					
k55	ts	558440,5	7799230,2	1980	biotite carbonatite	4	1	15,56	9	15,23	8,83	4,59	2,97	19,63	0,55	3,35	0,47	0,98		81,16		15,38		1,4	10763		460					310		67	245			182				5783					57					
k58	ts	558678,9	7801245,9	1980	amfibole carbonatite	4	1	13,41	6,06	2,04	11,92	1,48	3,22	34,51	0,56	0,61	0,38	3,64		77,83		20,67		0,77	1288		569					392		48	279			11				3320					54					
k59	ts	558116,2	7799951,8	1980	biotite carbonatite	4	1	21,22	7,99	13,89	6,12	3,32	3,82	19,17	0,11	3,26	0,35	1,57		80,82		15,59		1,69	8781		589					402		71	301			204				5912					85					
k60	ts	560141,8	7802159,1	1980	biotite carbonatite	4	1	22,12	9,18	16,43	11,43	8,79	2,9	11,81	0,89	3,58	0,3	1,99		89,42		10,09		1,08	7605		346					208		113	181			210				3854					54					
k61	ts	559625,5	7801977,4	1980	biotite carbonatite	4	1	20,75	8,3	10,26	5,12	2,8	4,05	22,71	1,12	2,65	0,35	1,95		80,06		16,99		1,54	5212		477					312		72	256			155				5364					69					
k62	ts	559321	7800961,3	1980	biotite carbonatite	4	1	12,53	4,07	1,4	4,82	0,77	1,85	38,22	0,54	0,45	0,37	3,62		68,64		27,97		2,45	1639		606					370		0	346			70				4908					103					
42715	hg	559446	7801233	2008	drill dust carbonatite	4	1	10,6	3,59		9,48	1,59	3,36	36,7	0,36	2,36	0,208	4,21	25	97,458	7,635	27,9754	-10	-10	1930	-10	561	24,4	-4	-2	8,3	267	1,5	21,7	244	2,4	-3	154	-15	-5	-10	3760	12,9	12,4	83,8	-5	83,4	101	35,8	-0,05	-0,1	0,131
42716	hg	559418	7801347	2008	drill dust carbonatite,	4	1	18,1	7,59		20,7	3,79	3,1	21,7	0,48	4,14	0,355	1,42	16,5	97,875	4,95	18,1373	-10	-10	10000	-10	633	37,4	-4	15,5	8,2	303	1,4	136	208	-2	-3	214	-15	6,2	-10	5490	13,2	15,5	83	-5	82,1	188	40,5	-0,05	-0,1	0,064
42717	hg	559487	7801434	2008	drill dust carbonatite	4	1	15,5	4,43		19	3,07	3,44	28,5	1	2,04	0,304	2,02	18,6	97,904	5,868	21,50094	-10	-10	1940	-10	547	38,1	-4	17,5	11	257	1,8	67,2	223	-2	-3	117	-15	-5	-10	3900	10,9	12	155	-5	74,2	165	132	-0,05	-0,1	0,349
42718	hg	559549	7801415	2008	drill dust carbonatite,	4	1	18,1	6,49		15,7	3,14	3,58	26,8	1,1	2,83	0,324	2,44	18,3	98,804	6,057	22,19345	-10	-10	5020	-10	642	34,5	-4	12,7	9,1	313	1,6	102	238	-2	-3	173	-15	9,6	-10	4480	12,9	13,2	126	-5	82,7	132	106	-0,05	-0,1	0,038
42719	hg	559649	7801373	2008	drill dust carbonatite	4	1	17,1	6,36		18,9	3,19	3,28	25	0,71	3,52	0,377	2,13	17,5	98,067	5,595	20,50064	-10	-10	5730	-10	735	35,6	6,7	21,1	9,8	374	1,9	103	267	5,2	-3	208	-15	7,5	-10	5470	14,1	16,3	125	5,5	88,1	170	40,5	-0,05	-0,1	0,245
42720	hg	559719	7801323	2008	drill dust carbonatite	4	1	16,5	6,33		17,3	3,36	3,46	26,3	0,94	2,92	0,324	2,01	18,4	97,844	5,767	21,13086	-10	-10	4860	-10	668	34,3	-4	10,8	8,8	326	2	96,9	250	-2	-3	140	-15	7,2	-10	4700	13	15,2	137	5,2	84,4	148	82,7	-0,05	-0,1	0,22
42742	hg	559678	7800085	2008	drill dust carbonatite,	4	1	22,3	8,62		14,7	2,37	3,32	22,5	2,11	3,01	0,331	1,73	15,8	96,791	5,183	18,99103	-10	-10	5110	-10	672	37,6	8,6	30,4	9,1	374	1,3	86	239	6	-3	111	-15	8,9	-10	4850	12,5	15,1	207	-5	83	140	65,6	-0,05	-0,1	0,14
42746	hg	559442	7799820	2008	drill dust carbonatite,	4	1	21,1	6,92		21,5	3,6	2,58	24,6	1,62	0,973	0,36	1,59	12,6	97,443	4,295	15,73731	-10	-10	1660	-10	870	41,8	-4	30,1	14	465	2,3	138	331	-2	-3	41,3	-15	9	-10	7250	18,3	20	72	-5	90,3	158	277	-0,05	-0,1	0,249
42748	hg	559279	7799841	2008	drill dust carbonatite,	4	1	27,7	8,71		21,5	4,01	4,49	17,5	2,64	1,85	0,413	1,88	7,96	98,653	2,376	8,705902	-10	-10	2980	-10	524	44,6	12,4	22,1	14,6	249	1,7	154	213	11,6	-3	52	-15	15,4	-10	3640	12	10,4	112	-5	66,5	181	264	-0,05	-0,1	0,096
42749	hg	559279	7799841	2008	drill dust carbonatite,	4	1	24,3	8,41		21,1	3,58	2,9	20,4	2,53	1,85	0,407	1,24	11,6	98,317	3,322	12,17214	-10	-10	5260	-10	749	38,1	-4	23,3	14	384	1,9	159	278	-2	-3	59,3	-15	8,1	-10	6060	17,3	16,6	53,1	-5	80,5	179	262	-0,05	-0,1	0,122
42750	hg	559258	7799859	2008	drill dust carbonatite,	4	1	22,3	8,6		20,2	3,58	3,63	19,3	0,74	5,11	0,344	1,63	13,2	98,634	3,763	13,78801	-10	-10	5810	-10	394	41,9	-4	12,7	15,4	179	1,7	109	147	-2	-3	261	-15	-5	-10	3420	8,2	8,7	69,8	-5	64,7	211	33,4	-0,05	-0,1	0,085
42751	hg	559237	7799848	2008	drill dust carbonatite,	4	1	22	8,41		18,7	3,33	4,06	20,3	0,78	4,71	0,317	2,95	12,6	98,157	3,62	13,26404	-10	-10	4860	-10	481	40,8	-4	17,9	14,8	222	2,4	107	182	4,8	-3	224	-15	7,5	-10	3530	9,9	10,3	95,4	-5	71,6	190	51,5	-0,05	-0,1	0,103
42752	hg	559207	7799837	2008	drill dust carbonatite,	4	1	20,2	7,61		13,2	2,34	2,74	26,8	1,15	3,57	0,304	4,32	16,8	99,034	4,766	17,4631	-10	-10	3450	-10	584	27,6	-4	4,9	10,7	266	1,5	104	235	-2	-3	190	-15	6,9	-10	4220	11,5	12,6	81,5	-5	95,4	150	31,3	-0,05	-0,1	-0,02
42753	hg	559202	7799826	2008	drill dust carbonatite,	4	1	16,8	6,41		11,6	2,14	3,5	29,8	0,85	3,36	0,212	4,11	18,6	97,382	5,467	20,03163	-10	-10	2760	-10	521	25,3	-4	4,8	12,6	250	1,5	54,2	227	-2	-3	195	-15	5,7	-10	3760	11,3	11,7	89	-5	87,3	122	92,1	-0,05	-0,1	0,028
42754	hg	559231	7799801	2008	drill dust carbonatite,	4	1	19	7,3		13,5	2,38	2,8	27	0,98	3,74	0,277	3,4	17,6	97,977	5,038	18,45974	-10	-10	3440	-10	588	26,7	-4	6,5	11,6	269	1,4	97,3	228	-2	-3	199	-15	-5	-10	4390	11,4	13,1	62,7	-5	88,8	147	33,2	-0,05	-0,1	-0,02
42755	hg	559251	7799818	2008	drill dust carbonatite,	4	1	23	8,64		19,1	3,63	2,88	20,2	1,48	3,97	0,355	1,66	14,1	99,015	4,094	15,00083	-10	-10	4940	-10	527	36,3	-4	18,9	14,5	247	2,2	131	192	-2	-3	181	-15	-5	-10	4210	9,9	12,3	66,8	-5	75,5	191	69,4	-0,05	-0,1	0,115
42756	hg	559276	7799830	2008	drill dust carbonatite,	4	1	28,3	9,68		22,2	3,89	3,62	16,7	2,48	2,1	0,428	1,46	7,44	98,298	2,221	8,137966	-10	-10	5270	-10	563	45,1	6,2	28,1	15,3	287	2,4	167	216	-2	-3	67,8	-15	10,2	-10	4280	15,7	12,4	85,6	-5	69,4	189	259	-0,05	-0,1	0,165
42757	hg	559295	7799777	2008	drill dust carbonatite,	4	1	30,4	8,88		22,7	3,19	3,85	17	2,79	1,49	0,434	1,45	6,58	98,764	1,881	6,892172	-10	-10	2320	-10	485	41,7	-4	33,4	16,1	235	2,8	206	203	-2	-3	39,3	-15	12,1	-10	3220	11	9,1	86,6	-5	64,7	184	354	0,055	-0,1	0,142
42758	hg	559252	7799742	2008	drill dust carbonatite,	4	1	23,2	8,83		15,1	2,62	3,01	22,8	1,36	4,22	0,283	2,61	15,6	99,633	4,27	15,64571	-10	-10	3920	-10	384	31	-4	4,4	13,7	176	1,7	122	153	-2	-3	211	-15	5,8	-10	3650	9,1	11,3	76,5	-5	73	170	31,9	-0,05	-0,1	0,021
42759	hg	559251	7799766	2008	drill dust carbonatite,	4	1	28,1	10,3		15,8	2,66	3,05	17,8	2,32	4,12	0,264	2,35	12	98,764	3,281	12,02191	-10	-10	4330	-10	378	30	-4	5,4	15	177	1,4	97,8	155	-2	-3	212	-15	5,9	-10	3500	8	11,2	62	-5	58,6	165	35,8	-0,05	-0,1	-0,02
42760	hg	559223	7799742	2008	drill dust carbonatite,	4	1	28,3	8,44		23	3,66	4,8	15,9	2,47	2,65	0,372	2,58	6,35	98,522	1,962	7,188964	-10	-10	2300	-10	310	44,6	10,4	25,9	17,3	130	1,6	160	142	4,4	-3	103	-15	12,5	-10	1950	7,7	6,4	122	-5	49,9	206	299	-0,05	-0,1	0,185
42761	hg	559237	7799710	2008	drill dust carbonatite,	4	1	21	7,28		23,7	4,42	2,99	20,3	1,35	2,92	0,416	1,35	13,1	98,826	3,564	13,05885	-10	-10	4950	-10	513	42,5	-4	24,2	14,3	238	2,6	171	186	-2	-3	131	-15	5,4	-10	4280	11,4	12,2	63,8	-5	70,4	211	178	-0,05	-0,1	0,031
42762	hg	559265	7799706	2008	drill dust carbonatite,	4	1	20,9	8,07		20,5	3,75	3,82	19,9	0,55	4,75	0,336	1,98	14	98,556	3,892	14,26068	-10	-10	6950	-10	398	42,1	-4	11,1	15,7	174	1,8	109	140	-2	-3	242	-15	-5	-10	3720	9,7	12,2	87,3	-5	64,1	208	31	-0,05	-0,1	0,06
42763	hg	559271	7799620	2008	drill dust carbonatite,	4	1	22,6	7,44		25,9	4,3	2,96	19,1	1,94	2,02	0,454	1,11	11,1	98,924	3,213	11,77275	-10	-10	4410	-10	524	43	7,1	25,2	14,8	256	2,7	188	209	-2	-3	75,9	-15	11	-10	4270	9,1	12,7	67,8	-5	67,1	227	237	-0,05	-0,1	0,056
42764	hg	559296	7799610	2008	drill dust carbonatite,	4	1	4,64	1,75		4,35	0,601	0,791	48	0,4	0,685	0,318	1,21	34,3	97,045	10,32	37,81351	-10	-10	1430	-10	958	11	-4	12,3	2,2	499	1	20,2	397	2,2	-3	70,7	-15	-5	-10	8250	23,8	25,8	11,3	5,7	143	34,6	77,2	-0,05	-0,1	0,032
42765	hg	559301	7799591	2008	drill dust carbonatite,	4	1	17,3	7,42		11,1	1,88	2,21	29,7	1,59	3,28	0,276	4,37	19,4	98,526	5,354	19,61759	-10	-10	2890	-10	653	21,2	-4	-2	10	316	1,3	82,7	258	-2	-3	164	-15	8,6	-10	4840	14,8	15,8	50,8	-5	100	121	41,1	-0,05	-0,1	-0,02
42766	hg	559246	7799582	2008	drill dust carbonatite,	4	1	15,8	6,02		12	2,22	3,52	30,2	0,57	3,58	0,224	3,52	20,8	98,454	5,808	21,28109	-10	-10	2650	-10	566	26,5	-4	2,7	12,3	262	1,2	57,2	233	-2	-3	206	-15	6,1	-10	4160	10,7	13,7	93,3	-5	83,5	126	26,4	-0,05	-0,1	0,067
42767	hg	559229	7799568	2008	drill dust carbonatite,	4	1	13	5,09		12,4	3,5	3,46	32,1	0,42	3,09	0,22	3,62	21,4	98,3	6,173	22,61849	-10	-10	2470	-10	558	23,9	-4	-2	11	269	1,4	71,2	233	-2	-3	195	-15	7,7	-10	4040	10,8	12,9	107	-5	83,7	122	27	-0,05	-0,1	0,027
42768	hg	559227	7799533	2008	drill dust carbonatite,	4	1	14,4	5,54		11,1	2,28	3,65	31,8	0,5	3,33	0,186	4,08	21,4	98,266	5,796	21,23712	-10	-10	2670	-10	573	27,6	-4	2,8	11,1	261	1,4	42,9	246	-2	-3	210	-15	7,1	-10	4060	10,8	13,2	88,3	-5	86	119	25,3	-0,05	-0,1	0,029
42769	hg	559186	7799565	2008	drill dust carbonatite,	4	1	17,2	6,75		14,1	2,64	4,47	26,9	0,34	4,21	0,195	2,83	18,9	98,535	5,134	18,81149	-10	-10	4020	-10	424	33	-4	-2	13,6	204	1,6	61,8	176	-2	-3	263	-15	6,9	-10	3600	8,7	12	98,8	-5	69,7	144	23,7	-0,05	-0,1	0,022
42770	hg	559167	7799590	2008	drill dust carbonatite,	4	1	10,8	4,05		8,12	1,46	2,64	38,7	0,44	2,36	0,197	3,89	25	97,657	7,382	27,04839	-10	-10	2490	-10	651	17,4	-4	-2	7,1	296	1,1	34,6	280	-2	-3	156	-15	5,1	-10	5120	13,3	16,9	49,6	-5	98,3	76,9	34,7	-0,05	-0,1	0,041
42773	hg	559197	7799522	2008	drill dust carbonatite,	4	1	13,7	5,31		11,1	2,09	3,46	33,2	0,41	3,25	0,201	3,26	22,2	98,181	6,337	23,2194	-10	-10	2950	-10	582	23,8	-4	-2	10	266	1,4	51,7	241	-2	-3	200	-15	-5	-10	4400	11,6	15	72,7	-5	83,9	106	29	-0,05	-0,1	0,055
42775	hg	559201	7799476	2008	drill dust carbonatite,	4	1	11,1	4,11		8,71	1,49	3,06	37,1	0,39	2,37	0,194	4,54	25,2	98,264	6,728	24,65206	-10	-10	2010	-10	612	22,9	4,3	-2	8,6	295	1,2	26,7	258	-2	-3	164	-15	5,2	-10	4320	13,8	14,6	64,4	-5	95,9	91,3	28,8	-0,05	-0,1	-0,02
42776	hg	559146	7799510	2008	drill dust carbonatite,	4	1	15,8	5,91		12,6	2,15	3,92	29,7	0,44	3,69	0,23	2,82	21,2	98,46	5,7175	20,94949	-10	-10	2630	-10	448	26	-4	2,3	13,3	209	1,5	57,5	189	-2	-3	222	-15	5,4	-10	3970	9,6	11	101	-5	76,3	141	20,9	-0,05	-0,1	0,03
42777	hg	559127	7799508	2008	drill dust carbonatite,	4	1	13,4	4,87		9,17	1,44	2,35	35,4	0,86	2,37	0,272	3,82	24,5	98,452	6,747	24,72168	-10	-10	1940	-10	644	16,4	-4	4,8	9,9	320	1,2	55,3	275	-2	-3	147	-15	-5	-10	5130	15,6	15,5	59,1	-5	99,5	101	57,3	-0,05	-0,1	0,027
42779	hg	559131	7799549	2008	drill dust carbonatite,	4	1	20,4	7,03		17,2	2,92	4,29	23,3	1,2	3,76	0,306	2,74	15,6	98,746	4,275	15,66403	-10	-10	2750	-10	437	37	4,3	11,7	14,9	190	1,7	94,7	183	5	-3	179	-15	8,7	-10	3230	9,7	8,8	104	-5	68	176	189	-0,05	-0,1	0,104
42782	hg	559136	7799595	2008	drill dust carbonatite,	4	1	13	4,73		10,4	1,87	3,16	34	0,39	2,74	0,223	4,67	22,4	97,583	6,036	22,11651	-10	-10	2630	-10	557	23	-4	-2	10,9	254	1,1	41,4	243	-2	-3	192	-15	8,2	-10	4350	12,4	12,9	85,7	-5	93,4	118	29,9	-0,05	-0,1	-0,02
42783	hg	559122	7799608	2008	drill dust carbonatite,	4	1	10,5	3,91		8,95	1,41	2,79	37,7	0,32	2,39	0,22	3,43	26,6	98,22	7,342	26,90182	-10	-10	1930	-10	649	20,8	8,7	2,6	8,6	327	1,2	30,5	270	2,3	-3	160	-15	-5	-10	5130	13,7	14,8	65,9	-5	97,5	94,4	33,9	-0,05	-0,1	0,069
42784	hg	559110	7799592	2008	drill dust carbonatite,	4	1	14,3	5,29		11,6	1,94	3,23	32,1	0,55	3,08	0,254	3,98	21,8	98,124	5,926	21,71346	-10	-10	2240	-10	575	24	-4	6	11,5	280	1,3	51,7	245	2	-3	190	-15	-5	-10	4340	11,9	13,6	78,7	-5	89,1	127	24,5	-0,05	-0,1	0,121
42785	hg	559111	7799561	2008	drill dust carbonatite,	4	1	12,7	4,79		10,9	1,79	3,01	34,2	0,31	2,93	0,221	6,45	20,6	97,901	5,529	20,25881	-10	-10	2280	-10	610	23,7	-4	3,6	11,1	282	1,2	49,6	252	-2	-3	185	-15	5,2	-10	4280	13,4	12,9	83,9	-5	98,5	124	46,5	-0,05	-0,1	-0,02
42786	hg	559127	7799560	2008	drill dust carbonatite,	4	1	9,39	3,45		7,06	1,1	2,1	39,7	0,48	1,9	0,223	3,06	29	97,463	8,032	29,43005	-10	-10	1600	-10	651	17,3	6,4	-2	7,5	315	1,4	32,9	275	-2	-3	128	-15	-5	-10	5470	15,2	17	49,2	-5	102	76,4	56,4	-0,05	-0,1	0,057
42787	hg	559130	7799538	2008	drill dust carbonatite,	4	1	9,49	3,55		8,16	1,26	2,19	39,3	0,34	2,08	0,241	3,69	27,8	98,101	7,623	27,93143	-10	-10	1770	-10	692	17,3	-4	4,8	7,8	336	1,4	36	282	2,2	-3	137	-15	-5	-10	5290	15,8	16,2	53,6	5,3	104	84,9	56,3	-0,05	-0,1	0,024
42788	hg	559137	7799518	2008	drill dust carbonatite,	4	1	16,9	5,66		6,98	1,1	1,88	34,2	1,81	1,95	0,209	2,9	24,6	98,189	6,757	24,75832	-10	-10	1620	-10	562	13,6	-4	3,1	9,3	278	1,4	31,8	234	-2	-3	122	-15	-5	-10	4750	13,1	13,2	45,1	-5	91	78,3	42,2	-0,05	-0,1	-0,02
42791	hg	559112	7799494	2008	drill dust carbonatite,	4	1	28,2	11,8		19,8	3,17	2,16	14,6	3,64	3,01	0,352	1,01	10,2	97,942	2,713	9,940703	-10	-10	7960	-10	564	32,7	-4	22,6	15,7	295	2,7	151	191	-2	-3	100	-15	6,9	-10	5710	14,4	15,1	46,2	-5	64,3	173	278	-0,05	-0,1	0,029
42793	hg	559195	7799382	2008	drill dust carbonatite,	4	1	13,8	5,28		11,8	2,24	3,52	32	0,4	3,29	0,207	3,47	22,2	98,207	6,052	22,17513	-10	-10	2760	-10	539	26,4	-4	-2	11,6	261	1,5	42,3	223	-2	-3	203	-15	7	-10	4200	11,3	11,6	101	-5	83,4	130	31	-0,05	-0,1	0,069
42794	hg	559226	7799359	2008	drill dust carbonatite,	4	1	14	5,31		11,6	2,07	3,84	32,1	0,44	3,28	0,205	4,46	21	98,305	5,807	21,27743	-10	-10	2520	-10	546	26,9	-4	3,8	11,7	260	1,5	43,6	242	-2	-3	209	-15	-5	-10	4080	12,1	10,5	85,5	-5	84	123	31,1	-0,05	-0,1	0,144
42799	hg	559159	7799387	2008	drill dust carbonatite,	4	1	32,6	13,9		16,2	2,61	1,68	12,9	4,79	3,28	0,293	0,894	9,23	98,377	2,689	9,852765	-10	-10	7970	-10	477	27,1	-4	19,7	13,1	258	1,6	131	167	-2	-3	88,8	-15	5,8	-10	5620	14	16	39,9	-5	57,5	147	155	-0,05	-0,1	0,085
42800	hg	559169	7799350	2008	drill dust carbonatite,	4	1	35,2	10,6		21,7	3,8	5,99	12,5	3,36	1,6	0,367	2,08	2,18	99,377	0,6132	2,246826	-10	-10	2180	-10	348	54,7	19	30,8	18,5	149	2,4	136	137	26,1	-3	33,4	-15	14,4	-10	2160	13,1	5,7	143	-5	53,2	188	342	0,059	-0,1	0,137
42802	hg	559183	7799314	2008	drill dust carbonatite,	4	1	13,7	5,17		11	1,81	2,9	33	0,63	2,9	0,283	3,81	23	98,203	6,436	23,58215	-10	-10	2360	-10	595	21,5	-4	3,6	11,7	267	1,2	68,4	247	-2	-3	180	-15	-5	-10	4720	15,3	14,6	78,2	-5	92,1	125	35,6	-0,05	-0,1	0,074
42805	hg	559250	7799350	2008	drill dust carbonatite,	4	1	12,2	4,64		9,44	1,75	3,24	35,4	0,41	2,8	0,192	4,44	23,9	98,412	6,676	24,46153	-10	-10	2330	-10	613	23,6	-4	2,8	9,5	282	1,1	33,2	261	-2	-3	180	-15	-5	-10	4430	13,2	14,3	69,2	-5	92,3	102	27,6	-0,05	-0,1	0,101
42806	hg	559259	7799334	2008	drill dust carbonatite,	4	1	14	5,36		10,8	1,99	3,55	32,5	0,47	3,17	0,22	4,12	22,3	98,48	6,138	22,49025	-10	-10	2700	-10	586	28,1	6,8	4,5	10,9	275	1,2	45,7	244	-2	-3	193	-15	6,2	-10	4450	12,7	14,5	79,1	-5	89,9	113	27,1	-0,05	-0,1	0,034
42807	hg	559264	7799374	2008	drill dust carbonatite,	4	1	13,9	5,33		11	2,06	3,64	32,3	0,39	3,16	0,209	3,77	22,3	98,059	6,227	22,81635	-10	-10	2660	-10	551	26,3	-4	3	11	258	1,4	46,5	230	-2	-3	200	-15	5,4	-10	4300	12	13,9	81,1	-5	86	115	31,4	-0,05	-0,1	0,118
42809	hg	559287	7799403	2008	drill dust carbonatite,	4	1	14,7	5,58		11,5	2,05	2,85	31,9	0,75	2,93	0,267	3,63	21,9	98,057	6,118	22,41696	-10	-10	2910	-10	646	25,6	-4	8,8	10	310	1,2	58,5	270	2	-3	164	-15	5,7	-10	4900	13,6	15,4	66,6	-5	96,2	113	67	-0,05	-0,1	0,126
42810	hg	559295	7799381	2008	drill dust carbonatite,	4	1	18,3	6,61		17,7	3,38	2,98	25,3	1,14	3,04	0,347	1,75	17,9	98,447	4,98	18,24722	-10	-10	3230	-10	519	38,7	-4	16,4	10,9	242	1,9	103	204	3	-3	143	-15	5,5	-10	4600	11,3	14,6	74,5	-5	77,4	171	57	-0,05	-0,1	0,151
42811	hg	559302	7799401	2008	drill dust carbonatite,	4	1	14,4	5,48		12,2	2	3,05	31,8	0,63	3,05	0,274	4,09	21,1	98,074	5,936	21,7501	-10	-10	2420	-10	617	27,3	-4	12,4	10,2	278	1,6	56,7	257	-2	-3	168	-15	5,3	-10	4600	14,1	14,2	77,4	-5	92,6	125	34,3	-0,05	-0,1	0,198
42812	hg	559295	7799417	2008	drill dust carbonatite,	4	1	24	8,66		22,7	4,66	4,08	17	1,69	3,29	0,38	1,64	9,96	98,06	2,956	10,83108	-10	-10	8720	-10	435	47,6	5,6	25,1	11,6	194	2,2	151	164	4,5	-3	119	-15	10	-10	3200	9,5	8,9	117	-5	58,8	210	189	-0,05	-0,1	0,151
42815	hg	559319	7799350	2008	drill dust carbonatite,	4	1	30,2	10,9		16,9	2,83	3,38	15,3	2,39	4,51	0,254	1,75	10,7	99,114	2,764	10,12757	-10	-10	3570	-10	295	31,5	-4	9,2	19,1	133	1,8	105	114	-2	-3	207	-15	7	-10	2740	6,9	7,5	96,8	-5	50,6	198	24,8	-0,05	-0,1	0,025
42816	hg	559325	7799356	2008	drill dust carbonatite,	4	1	15,4	5,74		11,6	1,91	2,6	31,9	0,77	2,97	0,265	2,59	23,1	98,845	6,346	23,25238	-10	-10	2410	-10	619	25,3	8,2	5,8	10,7	293	1,5	66	249	2,6	-3	164	-15	5,2	-10	5010	13,4	15,5	71,1	-5	93,1	131	34,7	-0,05	-0,1	0,027
42817	hg	559312	7799315	2008	drill dust carbonatite,	4	1	27,6	8,28		22,4	3,75	4,12	17	2,44	2,42	0,424	1,63	8,57	98,634	2,489	9,119945	-10	-10	3070	-10	366	43,2	4,1	22	15,8	161	1,4	224	157	5,1	-3	74,9	-15	12,7	-10	2830	8,7	6,7	104	-5	54,9	203	388	-0,05	-0,1	0,101
42819	hg	559297	7799286	2008	drill dust carbonatite,	4	1	26,7	8,44		17,6	2,74	6,29	18,2	1,74	3,85	0,332	2,33	10,6	98,822	2,938	10,76513	-10	-10	2410	-10	368	40,7	68,1	8	15,7	170	1,6	123	150	81,8	-3	181	-15	12,1	-10	2510	8,3	7,4	143	-5	56,8	198	166	-0,05	-0,1	0,074
42820	hg	559286	7799269	2008	drill dust carbonatite,	4	1	23,5	7,66		17,5	2,92	3,73	21,2	1,78	3,48	0,33	1,62	14,3	98,02	4	14,6564	-10	-10	2620	-10	419	34,8	12,9	14,3	15,7	186	1,5	132	171	8,4	-3	150	-15	10,2	-10	3280	8,6	9,9	117	-5	66	175	231	-0,05	-0,1	0,146
42822	hg	559264	7799238	2008	drill dust carbonatite,	4	1	17,3	6,51		12,7	2,13	3,81	28,6	0,77	3,62	0,259	4,15	18,9	98,749	5,319	19,48935	-10	-10	2530	-10	547	26,5	5,5	3,7	13,2	260	1,5	70,6	224	-2	-3	206	-15	5,9	-10	4090	12	12,9	88	-5	80,5	145	50,2	-0,05	-0,1	0,1
42823	hg	559295	7799245	2008	drill dust carbonatite,	4	1	19,9	7,63		15,5	2,82	3,13	24,5	0,97	3,71	0,291	3,24	16,6	98,291	4,495	16,47013	-10	-10	4590	-10	520	33,6	-4	15,8	12,8	247	1,4	104	207	-2	-3	188	-15	-5	-10	3960	11,6	12,2	76,1	5	87,3	170	44,9	-0,05	-0,1	0,034
42824	hg	559315	7799268	2008	drill dust carbonatite,	4	1	16	6,11		14,4	2,31	3,24	29,1	0,44	3,75	0,311	5,3	17,8	98,761	4,843	17,74524	-10	-10	2790	-10	643	27,2	-4	3,5	12,2	297	1,3	88,7	271	-2	-3	204	-15	7	-10	4200	13,8	13,1	83	-5	97,2	168	35,2	-0,05	-0,1	0,075
08-017A	mh	558461	7799905	2008	biotite carbonatite	4	1	22	8,2		18,9	3,42	3,57	20,2	0,78	4,62	0,316	1,66	14,9	98,566	4,0805	14,96333	-10	-10	6360	-10	375	29	44,5	6,8	14	166	1,4	125	139	8	-3	244	-15	6,7	-10	3920	7,6	10,3	87,6	5,6	65,1	191	65,3	-0,05	-0,1	0,047
08-017B	mh	558461	7799905	2008	biotite carbonatite	4	1	29,1	17,7		14,4	2,58	1,97	11,6	5,51	4,72	0,228	0,65	9,3	97,758	2,549	9,347268	-10	-10	11500	-10	387	23,8	-4	6,8	11,4	235	1,2	97,3	113	-2	-3	157	-15	-5	-10	4710	8,1	12	43	-5	49,5	126	35	-0,05	-0,1	0,052
08-018	mh	558383	7799830	2008	biotite carbonatite	4	1	20,7	8,19		20,6	3,42	2,98	20,2	0,44	4,98	0,428	1,65	14,7	98,288	4,021	14,74514	-10	-10	7640	-10	492	24,3	-4	3,4	13,4	225	1,7	161	177	-2	-3	243	-15	-5	-10	4890	8,3	12,2	85,3	5,2	86,7	246	40,7	-0,05	-0,1	0,037
08-019	mh	558523	7799535	2008	biotite carbonatite	4	1	18,8	7,48		17,7	2,89	2,64	23,9	0,57	4,22	0,384	1,81	17,9	98,294	4,974	18,23982	-10	-10	6950	-10	698	28,2	4	12,5	9,7	363	1,2	113	239	2,2	-3	214	-15	-5	-10	6090	12,1	16,6	93,5	-5	98,5	156	52,5	-0,05	-0,1	0,026
08-024	mh	558885	7799287	2008	biotite carbonatite	4	1	31	10,5		22,9	4,12	5,55	10,7	1,98	4,7	0,324	1,01	6,09	98,874	1,533	5,621562	-10	-10	4480	-10	181	46,5	19,7	9,3	17,4	79	1,9	193	60	36,2	17,1	173	-15	10,6	-10	1720	4	2,6	223	-5	34,6	241	217	-0,05	-0,1	-0,02
08-025	mh	558692	7799174	2008	amfibole carbonatite	4	1	28,4	9,31		22,9	3,86	3,11	16,3	2,41	2,22	0,4	0,732	9,18	98,822	2,662	9,761643	-10	-10	4040	-10	520	41,6	7,8	33,7	16,6	259	1,9	166	199	-2	-3	84,1	-15	8,3	-10	4320	7,8	10,7	84,4	-5	60,7	243	268	-0,05	-0,1	-0,02
08-027	mh	558465	7799984	2008	biotite carbonatite	4	1	21	8,26		18,6	3,23	4,24	20,9	0,43	4,99	0,256	1,23	15,3	98,436	4,361	15,99193	-10	-10	5830	-10	361	30,5	-4	4,1	13,4	187	1,8	83,5	123	-2	-3	270	-15	-5	-10	3600	6,6	10,1	130	-5	57,9	188	28,4	-0,05	-0,1	0,104

08-036	mh	558673	7797446	2008	amfibole carbonatite	4	1	18,7	8,17		23,3	5,09	3,02	20	0,66	3,55	0,419	1,17	14	98,079	3,922	14,3821	-10	-10	15200	-10	702	40,4	-4	18,4	8,9	400	2,2	152	189	-2	-3	173	-15	5,8	-10	5940	11,4	15	99,4	-5	79,9	230	98,3	-0,05	-0,1	0,026
08-038	mh	558644	7797880	2008	biotite carbonatite	4	1	18,7	7,32		17,4	2,8	3,17	24,2	0,43	4,44	0,329	1,98	17,3	98,069	-	-	-10	-10	5920	-10	531	27,3	-4	4,3	9,9	265	1,5	120	191	-2	-3	248	-15	5,2	-10	4450	7,1	12,2	117	-5	78	167	28,3	-0,05	-0,1	0,078
hg10-08	hg	558989	7799921	2008	biotite carbonatite	4	1	15,9	5,89		11,3	2,26	3,84	30,1	0,62	2,98	0,215	5,23	20,4	98,735	5,929	21,74184	-10	-10	2580	-10	635	29,5	-4	6,2	11,5	294	1,3	52,2	272	-2	-3	189	-15	6,9	-10	3740	10,5	11,6	90,1	-5	95,9	122	58,7	-0,05	-0,1	0,03
hg11-08	hg	559113	7800190	2008	biotite carbonatite	4	1	25,4	9,37		15,9	2,88	5,43	17,9	1,13	5,12	0,145	0,98	14	98,255	3,997	14,65713	-10	-10	3870	-10	239	35,4	-4	-2	17,1	118	1,6	63,9	90	-2	-3	300	-15	-5	-10	2450	4,2	6,7	111	-5	43,1	167	24,1	-0,05	-0,1	0,021
hg6-08	hg	558125	7800902	2008	biotite carbonatite	4	1	45,1	17,3		9,28	1,68	1,63	6,76	4,41	5,87	0,154	0,716	5,23	98,13	1,402	5,141181	-10	-10	9920	-10	172	15,9	9,5	11,6	8,6	98	-1	54,8	37	5	-3	145	-15	-5	-10	4630	8	11,5	48,7	-5	26,5	72,8	42,1	-0,05	-0,1	-0,02
hg8-08	hg	558416	7800445	2008	biotite carbonatite	4	1	20,3	7,87		19,4	3,15	3,37	21,6	0,35	4,96	0,322	1,71	15,6	98,632	4,641	17,0187	-10	-10	5640	-10	506	30,2	10,5	6,1	12,5	228	1,4	128	176	-2	-3	250	-15	-5	-10	4450	7,1	13,3	74,7	-5	73,3	189	29,9	-0,05	-0,1	0,057
hg9-08	hg	558722	7800252	2008	biotite carbonatite	4	1	31,6	10,7		24,9	4,08	3,89	13	2,98	1,67	0,394	1,28	4,58	99,074	1,369	5,020169	-10	-10	3950	-10	487	44,7	-4	21	18	259	2,6	192	206	-2	-3	32,9	-15	8,7	-10	3290	11,3	8,9	79	-5	61	193	324	-0,05	-0,1	-0,02
k21	ts	559254,8	7797972,5	1980	amfibole carbonatite	3	1	19,9	7,27	6,48	16,53	3,32	4,04	23,24	1,03	1,11	0,46	1,05		84,43		14,37		0,85	2692		482					364		80	231			19				3974					64					
08-021	mh	558612	7798983	2008	Fenitic gneiss	5	1	18,1	7,73		18	3,11	2,14	9,17	0,67	3,98	0,264	0,591	34	97,755	2,658	9,746975	-10	-10	10600	-10	444	39,7	-4	18,6	13,5	231	2,3	153	141	-2	-3	218	-15	6,4	-10	4130	6,5	9,7	70,6	-5	54,4	268	41	-0,05	-0,1	0,027
08-033	mh	558910	7797306	2008	Fenitic gneiss	5	1	22,4	8,55		17	3,87	3,37	25,1	1,53	1,28	0,275	1,06	13,9	98,335	3,982	14,60213	-10	-10	2480	-10	592	43,3	4,2	33,5	13,3	307	2	96,3	233	-2	-3	38,2	-15	7,5	-10	5110	10,2	14,1	152	-5	67,1	142	193	-0,05	-0,1	0,149
08-034	mh	558784	7797287	2008	Fenitic gneiss	5	1	23,7	11		16	3,55	3,3	19,2	2,47	3,52	0,327	1,37	12,7	97,137	3,634	13,326	-10	-10	9360	-10	719	33,4	10,3	21,6	9,5	429	4,3	119	217	5,8	-3	144	-15	8,9	-10	5930	12,3	15,3	183	5,9	84,3	167	117	-0,05	-0,1	0,182
08-037	mh	558614	7797763	2008	gneis	5	1	28,5	14,9		17,3	2,94	2,06	13	4,9	4,08	0,289	0,696	9,55	98,215	-	-	-10	-10	8010	-10	426	29,2	6,9	11,5	12	238	2,2	126	134	-2	-3	167	-15	-5	-10	4360	6,9	10,7	43,7	-5	53,6	138	46,2	-0,05	-0,1	0,092
42722	hg	560042	7801087	2008	gabbro	6	1	43,3	7,67		8,45	1,7	19,8	12,3	0,71	2,45	0,139	0,052	2,39	98,961	0,09657	0,353842	-10	-10	1770	-10	22	65	518	57,4	7	14	1,2	20,8	13	353	3,9	102	-15	57,6	-10	169	-4	-2	169	-5	8,6	40,9	86,1	-0,05	-0,1	0,021
42723	hg	559976	7800926	2008	gabbro	6	1	39,4	14,7		9,26	3,06	13,8	12	1,33	3,48	0,088	0,057	1,35	98,525	0,3072	1,125612	-10	-10	2860	-10	41	62,7	10,9	371	11,2	-10	1,6	38,7	11	141	-3	110	-15	50,7	-10	350	-4	-2	296	-5	14,1	41,5	117	-0,05	-0,1	-0,02
42724	hg	559934	7800750	2008	gabbro	6	1	41,4	12,9		8,99	2,57	13,5	14,2	1,07	3,16	0,111	0,071	0,924	98,896	0,20215	0,740698	-10	-10	2910	-10	31	50,8	25,2	55,8	10,4	-10	1,2	38,1	15	136	-3	121	-15	60,7	-10	271	-4	-2	273	-5	13,3	41,8	142	-0,05	-0,1	-0,02
42725	hg	560003	7800560	2008	gabbro	6	1	42,8	10,7		7,89	2,91	14,4	14,6	0,78	3,7	0,091	0,24	0,822	98,933	0,1927	0,706072	-10	-10	2340	-10	25	50	368	52,8	9,3	15	1,2	23,8	10	147	3,9	134	-15	60,8	-10	148	-4	-2	248	-5	10	33,4	159	-0,05	-0,1	-0,02
42726	hg	560057	7800503	2008	gabbro	6	1	41,8	11,2		8,88	2,45	12,3	17,6	0,9	2,11	0,112	0,198	0,707	98,257	0,1416	0,518837	-10	-10	2020	-10	35	50,2	29	183	10,7	15	1,3	21,7	13	86,9	-3	91,9	-15	56,4	-10	212	-4	-2	262	-5	12,9	35,9	158	-0,05	-0,1	0,063
42727	hg	560178	7800382	2008	gabbro	6	1	41,6	12,2		7,64	2,34	14,7	13,4	0,81	3,84	0,084	0,05	1,88	98,544	0,7469	2,736716	-10	-10	4010	-10	25	52,8	50,5	12,5	8,8	13	1,6	25,7	-10	167	3,8	157	-15	52,4	-10	166	-4	-2	233	-5	9,4	32	107	-0,05	-0,1	-0,02
42733	hg	559894	7800292	2008	gabbro	6	1	35,5	12,7		13,6	2,91	9,63	16,7	1,78	1,93	0,166	3,77	0,533	99,219	0,1211	0,443723	-10	-10	776	-10	226	57,3	5,2	60,2	13	75	1,4	58,4	101	15,7	-3	20,9	-15	29	-10	644	10,2	-2	338	-5	29,4	56,1	218	-0,05	-0,1	-0,02
42740	hg	559703	7800203	2008	gabbro	6	1	32,7	7,33		25,3	3,61	6,52	18,4	1,19	0,382	0,32	2,69	0,651	99,093	0,1653	0,605676	-10	-10	378	-10	282	72	-4	79,9	17,1	111	2	48,7	120	-2	-3	8,1	-15	15,9	-10	406	14,2	-2	609	-5	32,6	114	411	-0,05	-0,1	0,097
42747	hg	559332	7799824	2008	gabbro	6	1	35,6	10,6		23,9	3,64	5,06	13	2,53	1,45	0,373	2,08	0,357	98,59	0,3598	1,318343	-10	-10	1170	-10	339	53,8	4,6	32,8	18,8	131	2,8	151	151	2,1	-3	19,7	-15	16,2	-10	1940	6,4	4,5	86,4	5,7	56,5	191	354	-0,05	-0,1	0,155
hg1-08	hg	560001	7800282	2008	gabbro	6	1	40,9	10,5		11,9	2,42	9,53	19,9	1,42	0,753	0,152	1,49	0,68	99,645	0,10435	0,382655	-10	-10	399	-10	113	43	21,3	65,9	14,1	49	1,7	28,7	57	12,1	37,1	9,3	-15	30,3	-10	355	6,4	-2	328	-5	20,4	40,6	323	-0,05	-0,1	-0,02
hg14-08	hg	559877	7799561	2008	gabbro	6	1	32,2	10		22,6	3,22	6,59	16,8	1,86	1,23	0,346	3,97	0,285	99,101	0,1022	0,374771	-10	-10	918	-10	453	49,9	15,6	10,3	16,9	197	2,3	72,1	190	-2	-3	19,8	-15	16,1	-10	641	21,4	2,4	540	-5	52,1	118	350	0,054	-0,1	-0,02
hg26-08	hg	560079	7800138	2008	gabbro	6	1	46,3	8,23		5,59	1,84	15,7	17,1	0,69	2,63	0,083	0,066	0,571	98,8	0,09881	0,36234	-10	-10	2450	-10	23	38,6	659	3,1	6,8	19	1,3	21	-10	195	4,4	130	-15	74,8	-10	140	-4	-2	179	-5	8,4	25,2	67	-0,05	-0,1	-0,02
hg4-08	hg	557542	7800810	2008	gabbro	6	1	40,2	11,7		13,6	2,96	10,4	17	1,28	0,729	0,133	0,06	1,37	99,432	0,1039	0,381005	-10	-10	533	-10	49	46,1	18,8	350	13,1	13	1,8	20,1	25	34,3	39,4	8,9	-15	46,5	-10	300	-4	-2	394	-5	20,3	31,5	115	-0,05	-0,1	0,063
HG5-09	hg	560461,6	7801731,7	2009	gabbro	6	1	40,37	13,9		9,71	2,82	13,79	13,3	1,29	3,04	0,11	0,16	0,8	98,49	0,06	0,220022			563									47		157				72		402					13		115			
hg11-09	hg	560224,4	7800186,8	2009	gabbro	6	1	40,01	13,7		11,34	2,5	13,45	13,9	1,33	2,7	0,14	0,23	0,8	99,3	0,3	1,10011			786									45		354				65		420					31		163			
hg24-08	hg	560274	7799948	2008	gabbro	6	1	33	9,45		21,7	4,81	8,52	16,2	1,58	0,78	0,227	3,13	0,104	99,501	0,09055	0,33205	-10	-10	518	-10	111	53,1	-4	7,8	15,2	42	1,7	29,2	55	-2	-3	12,1	-15	31,7	-10	477	-4	-2	520	-5	29,4	72,8	73,3	-0,05	-0,1	0,021
hg25-08	hg	560186	7800137	2008	gabbro	6	1	37,1	13,2		12,6	2,63	10,4	16,6	1,62	1,92	0,14	2,63	0,633	99,473	-0,07	0	-10	-10	1020	-10	163	46,5	-4	57,7	13,5	72	1,5	60,2	69	18,3	-3	19,9	-15	31,8	-10	573	7,1	-2	335	-5	26,3	47,8	192	-0,05	-0,1	0,038
hg3-08	hg	557331	7800875	2008	gabbro pegmatitic	6	1	35,5	13,5		17,4	4,33	7,51	13,6	2,28	1,58	0,273	2,95	0,439	99,362	-0,07	0	-10	-10	1250	-10	224	54,3	-4	26,2	12,4	99	1,9	111	94	-2	31	25,3	-15	23,8	-10	1090	6,8	3,4	318	-5	43,8	87,2	120	0,064	-0,1	0,022
HG36-09	hg	560131,1	7800315,7	2009	Fenite pyroxenite	7	1	40,13	13,15		10,21	2,9	13,21	13,52	1,02	3,49	0,12	0,5	1	98,25	0,04	0,146681			2740									46		102				51		310					12		149			
hg9-07	hg	558431	7799244	2007	dunite	8	1	43,9	10,4		14,6	0,982	20	7,46	1,79	0,225	0,192	0,106	0	99,655	-	-	-10	-10	96	-10	-20	92,9	975	45,7	15,3	-10	-1	7	-10	587	18,4	6,1	-15	18	-10	171	-4	3,8	146	-5	12,4	92,3	44	-0,05	-0,1	0,048
hg1-07	hg	558560	7802388	2007	pyroxesenite	2	2	39,6	11,2		15,6	3,51	10,7	16,6	1,33	0,538	0,167	0,09	0,356	99,691	-	-	16	-10	387	-10	65	61,7	37,3	66,8	18,6	21	-1	19,6	33	43,9	20,4	9,4	-15	27,6	-10	324	-4	5,2	550	-5	16,9	51,4	92,1	-0,05	-0,1	-0,02
hg2-07	hg	558738	7802236	2007	pyroxesenite	2	2	40,2	5,66		18,9	1,77	21,3	10,4	0,75	0,259	0,273	0,049	0	99,561	-	-	11	-10	207	-10	29	100	1620	61,1	10,4	-10	-1	12,8	15	306	18,4	5,6	-15	29,5	-10	195	-4	5,5	234	-5	7,2	63,2	34,7	-0,05	-0,1	0,08
hg3-07	hg	559154	7801938	2007	pyroxesenite	2	2	37,2	4,31		12,8	0,973	28	10	0,5	0,781	0,226	0,306	3,6	98,696	-	-	12	-10	1050	-10	92	99,4	3650	8,5	8,8	53	-1	22,1	35	673	19,1	40,3	-15	14,7	-10	732	-4	4,7	103	-5	14,3	75,4	35,5	-0,05	-0,1	-0,02
HG13-09	hg	558631,8	7802270,3	2009	pyroxenite	2	2	41,67	20,89		10,69	1,93	4,57	12,66	2,98	1,29	0,15	1,06	1,4	97,89	0,46	1,686835			1169									101		28				10		2682					21		85			
HG14-09	hg	558152,7	7802551,4	2009	pyroxenite	2	2	40,67	14,32		8,57	1,48	15,08	16,63	0,85	0,32	0,12	0,13	1,3	98,17	0,19	0,696736			109									14		233				77		153					15		66			
HG15-09	hg	555649,7	7804773,3	2009	pyroxenite	2	2	38,58	14,39		14,32	2,25	12,32	15,95	0,7	0,06	0,18	0,04	0,8	98,79	0,22	0,806747			28									-5		111				54		129					14		36			
HG16-09	hg	555627,6	7804745	2009	pyroxenite	2	2	36,7	15,33		17,47	2,54	12,71	13,63	0,78	0,09	0,19	0,02	0,1	99,46	0,07	0,256692			50									5		118				43		203					12		36			
Ak1-07	ak	560866	7799079	2007	gabbro	6	3	39,8	14,2		19,5	4,36	7,45	12,2	1,98	0,15	0,194	0,071	0,332	100,237	-	-	-10	11	394	-10	-20	60,9	32,6	68,5	19,6	-10	-1	3,5	-10	30,3	19,4	5	-15	26,8	-10	550	-4	7,2	592	-5	7,4	76,2	19,3	-0,05	-0,1	0,192
08-043	mh	561345	7799190	2008	gabbro	6	3	31,2	5,55		28,5	11	11,8	10,1	0,69	0,05	0,352	0,027	-0,976	98,293	-	-	-10	-10	392	-10	34	93,4	-4	32,8	12,8	-10	1,6	16,4	-10	-2	36,1	2,2	-15	44,1	-10	184	-4	-2	643	-5	9,8	181	31,4	-0,05	-0,1	-0,02
HG17-09	hg	566618,5	7804953	2009	pyroksenite	2	4	46,59	22,53		5,57	0,47	6,61	15,04	2,09	0,18	0,09	0,03	0,5	99,2	0,03	0,110011			80									-5		51				28		636					5		20			
HG19-09	hg	567184,6	7804977,1	2009	Fenitic pyroxenite	2	4	36,53	11,48		21,9	3,4	6,18	12,1	2,68	1,54	0,43	2,37	0,8	98,61	0,1	0,366703			932									255		34				13		1098					59		255			
HG29-09	hg	567363,4	7805021,1	2009	Pyroxenite	2	4	29,6	9,26		16,92	2,55	5,49	19,47	2,57	1,53	0,34	1,69	9,8	89,42	2,67	9,790979			1411									184		31				15		2514					67		185			
HG18-09	hg	566904,4	7804940,5	2009	biotite carbonatite	4	4	33,95	9,74		20,46	4,41	5,98	13,61	3,14	1,23	0,42	1,55	4,9	94,49	1,04	3,813715			793									154		-20				25		1510					49		53			
HG20-09	hg	567376	7805004,4	2009	Fenitic gneiss	5	4	14,7	3,88		8,32	1,12	2,79	37,42	1,26	0,54	0,29	1,51	27,1	71,83	7,43	27,24606			856									73		-20				5		5800					124		95			
HG43-09	hg	565975,7	7795490	2009	Pyroxenite	2	5	38,75	11,44		17,68	3,48	9,17	16,05	1,33	0,38	0,22	0,26	0,9	98,76	0,04	0,146681			246									22		38				31		367					28		113			
HG44-09	hg	566036,3	7795452,2	2009	Pyroxenite	2	5	37,42	13,94		15,5	2,83	11,23	13,51	2,27	1,32	0,2	0,03	1,3	98,25	0,1	0,366703			126									11		113				51		239					19		64			
HG45-09	hg	565876	7795524,2	2009	Pyroxenite	2	5	43,76	10,64		8,58	2,16	11,71	20,28	0,85	0,14	0,13	0,06	1,3	98,31	0,08	0,293363			61									-5		120				82		197					22		77			
HG46-09	hg	563896,6	7795870,1	2009	Pyroxenite	2	5	37,81	16,84		17,01	4,62	8,03	11,09	2,37	0,81	0,16	0,05	0,7	98,79	0,03	0,110011			540									30		28				27		1166					17		48			
HG47-09	hg	563978,6	7795954,8	2009	Pyroxenite	2	5	32,28	11,9		25,09	4,35	10,53	13,75	0,63	0,11	0,21	0,02	0,7	98,87	0,08	0,293363			52									-5		69				43		125					16		52			
HG48-09	hg	564005,2	7795886,8	2009	Pyroxenite	2	5	35,1	10,51		22,95	4,87	9,11	15,37	0,83	0,12	0,22	0,04	0,5	99,12	0,03	0,110011			85									-5		29				42		192					17		58			
HG49-09	hg	562817,6	7796222,2	2009	Pyroxenite	2	5	38,3	15,02		14,66	5,54	10,53	10,47	2,45	1,3	0,16	0,1	0,9	98,53	0,04	0,146681			931									47		45				35		1044					23		52			
HG50-09	hg	562885,4	7796243,8	2009	Pyroxenite	2	5	33,22	11,81		24,02	5,39	9,37	12,94	1,29	0,49	0,22	0,17	0,6	98,92	0,08	0,293363			332									23		69				44		422					18		55			

Rock_code	Rock_type
1	Nephelinesyenite
2	Pyroksenite
3	Karbonatite with hornblende
4	Karbonatite with biotite
5	Gneis
6	Gabbro
7	Fenite