(2) Previous Work

A series of geological mapping at a scale of 1 to 125,000 has been completed by Saggerson(1952)and McCall(1958).

A large volume of detailed data have been published as the result of the LeBas's research wrok(1977).

A preliminary investigation was carried out by a Finnish Team to evaluate phosphate and niobate resources for possible exploitation.

The team investigated in detail a small carbonatite body at the Ndiru Hill at the southern foot-hill of the Homa Mountain.

This year's work also includes an investigation of the Ndiru Hill for rare-earths and other commodities.

The results of the work at the Ndiru Hill will be described in the following section 2-10.

(3) Geology

(A) General geology

The geological plan and profiles of the project area are presented in Fig.II-2-9-1 and Plate-13.

The geologic units,which are adopted in the geological plan,are discribed below.

Nyanzian Metavolcanic(A1-v)

This unit,being the basement of this area is distributed near the top of Homa Mountain and spreads widely southwards to the foot-hill,

The rocks composing the unit are brown,greyish brown or greenish brown volcanics which are generally fine-grained and compact but locally porphyritic in texture.

The volcanics comprise primarily rhyolite,dacite and andesite in this area,though it is difficult in many cases to distinguish original rock types due to severe alteration.

The unit appears to have undergone intense tectonic stress which shattered the rocks into fragments often forming belt of float concentration on outcrops.

Intensely Shattered Nyanzian Volcanics with well-developed Carbonatite Vein Network(A1-vcv)

This unit crops out widely on steep slopes to the west and north of the main carbonatite cone sheet,and also forms a steep hill about 2km north of the top of the Homa Mountain.

A small hill at the southern foot-hill of the Homa Mountain is composed of this unit as well.

The unit is characterized by intensely shattered metavolcanics of the Nyanzian System with dense development of irregular network of carbonatite veins.

The majority of carbonatite veins consist of fine to microcrystalline alvikite,but some veins are composed primarity of ferrocarbonatites and others are comcentrated by iron oxides

The unit occupies the shattered zone of the main carbonatite cone sheet of the Homa Mountain at the contact to the intruded rocks.

Other isolated distribution of the unit may suggest centres of individual carbonatite intrusions.

Nyanzian Metavolcanics Intruded by Numerous Carbonatite Dykes(A1-vcd)

This unit is distributed mostly on and around the top of the Homa Mountain and is characterized by numerous carbonatite dykes intruding the metavolcanics in a concentric pattern.

Other limIted distributions of the unit are located at 2 places,1.7 and 2.3km north of the top of the Mountain.

The carbonatite dykes range in their width from about 10cm to several metres.

Some dykes which exceed several meters in their width are distinguished in the geological map.

These dykes are arranged at intervals ranging from several meters to several tens meters.

Most of them are of alvikite but some are of ferrocarbonatite dykes of which are relatively abundant in the northwestern part.

The unit changes gradually into the units A1-v and A1-vcv.

Ijolite(I)

This unit occupies a 800m long and 600m wide area approximately 1.5km south of the top of the Mountain.According to LeBas(1977),the unit may extend further 1000m to the east under a thin cover of surficial deposits.

Several other localities of limited extention are also known in the southeastern part of the area.

The unit of the above major locality comprises grey,coarse grained and holocrystalline rocks containing abundant nepheline 5 to 10mm across and sporadic aegirine.

A rock sample(100233G)of this type was collected at a locality approximately 1.3km south of the top of the Mountain and submitted to microscopic observation and chemical analysis.The results of the observstion and the analysis are given in APX-3 and APX-8,together with its normative composition in APX-8a.

The normative composition is plotted on the LeBas's triangular diagrams(APX-8b)for alkaline plutonic rocks.

The rocks of the minor localities,grey and fine grained are megascopically identified to be microijolite.

Siliceous Breccias(Bres)

This unit is distributed in contact with a small body of ijolite at the southern end of the area.

The rocks of the unit comprise grey to grey-brown, hard and intensely silicified breccias which contain anuglar fragments of the Nyanzian metavolcanics several to several tens centimeters across.

Ochreous Calcareous Breccias(Brc)

This unit has a limited distribution at the southeasthern foot-hill of the Mountain and in the vicinity.

The rocks of the unit contain greenish grey,angular fragments of the Nyanzian metavolcanics in orcher coloured calcareous and tuffaceous matrices.

Angular fragments of carbonatite are also contained in some occurrences in the southern part.

Carbonatitic Breccias(Cbrc)

This unit is distributed along the northwestern and northern margin of the main carbonatite cone sheet of the Homa Mountain.

The rocks of the unit, in the most part, contain early equal amounts of alvikite and ferrocarbonatite angular fragments with a subordinate amount of accidental fragments.

Those in the northern marginal zone contain primarily alvikite angular fragments.

The matrices are invariably composed of calcareous materials.

Sovite(Cs)

This unit, being uncommon among the carbonatite facies in this area, is distributed in a part of the Ndiru Hill(see 2-10)and forms sheets of limited extentions intruding the Nyanzian metavolcanics in the southern and southeastern parts of the area.

The sheets consist of light brown rocks containing medium to coarse grained minerals of carbonates and are cut across by narrow veinlets of fine to very fine grained alvikite.

Alvikite(Ca)

This unit, being the most common among the carbonatite facies in this area, occurs primarily in a form of sheets with widths usually ranging from several tens centimeters to several tens metres, occasionally up to 100m, and rarely forms stocks.

The unit is dominated within the main carbonatite cone sheet of the Homa Mountain.

The largest body of the unit is the Ndiru Hill carbonatite complex(see 2-10).Other than the Ndiru Hill complex, no sizable massive body has been located in the aera.

The rocks are grey, light brown or milky white in colour and fine to very fine grained, and consists primarily of carbonates with subordinate accessory minerals such as magnetite and apatite which are megascopically identified.

Ferrocarbonatite(Cf)

The unit forms sheets which ranges from several tens centimetres to sevearl tens meters in width, and is distributed scatteringly in most parts of this area though its occurrences are much less common than the alvikite unit's.

Its distribution is relatively concentrated in the northwestern part of the main carbonatite cone sheet of the Homa Mountain.

The rocks of this unit, consisting primarily of carbonates, are brown to dark brown in colour and rich in iron.

Abundant iron oxides are produced due to decompsition of ferrous minerals by weathering, in general.

Magnetite is identified by in fresh rocks but is mostly turned into goethite.

This unit includes a peculiar facies which is extremely concentrated in iron and looks almost like iron ores.

A rock sample(100490G)of this unit was collected at a locality approximately 2.4km north of the top of the Homa Mountain.

Under the microscope, dolomite predominate calcite as shown in APX-2 and 3.

According to the results of the chemical analysis(APX-8), the sample contain approximately 20% of total iron(Fe2O3 equivalent)

Phonolite(T-vp)

This unit forms a circular volcanic neck approximately 500m across in diameter, located about 1.4km north of the top of the Homa Mountain.

Other than this volcanic neck, the unit have been identified at 10 localities around the foot-hills of the Homa Mountain and in the southern part of this area, and occurs mostly as volcanic neck but partly as lavas.

The rocks are grey to greenish grey in colour and vitreous with or without phenocrysts.

Phenocrysts, when observed, are nepheline, potash feldspar and biotite.

Calcareous Pyroclastics(Q-vf)

The unit is distributed mostly on the gentle slopes of the eastern and southeastern foot-hills of the Homa Mountain and at a number of localities in the peripheral area of the Mountain.

The rocks are light brown to brown in colour and vary in their facies from tuffs to volcanic breccias, matrices of which consist of calcareous and tuffaceous materials.

Arenaeous tuffs with prominent beddings are often interbedded with the pyroclastics.

The pyroclastics contain angular fragments of variable kinds such as metavolcanics, ijolite, carbonatite, phonolite and others.

In general, they are mostly of rocks occurring in the vicinity.

Zonal facies chang from coarse grained to fine grained pyroclastics are observed centering several small hills on gentle slopes of the south-eastern foot-hills of the Homa Mountain.

These hills are believed to have been centers of individual volcanic activites which have erupted the pyroclastics.

These volcanic activities are of Plio-Pleistocene in age and a part of the pyroclastics is correlated to the lacustrine deposits of the Lake-Victoria according to LeBas(1977).

Sandstones and Sandstone-Conglomerate Alternation(Qpss)

This unit is distributed at the southern end of this area and comprises clastic rocks.

The rocks are light brown, light grey or light yellow in colour and are well developed with beddings.

The stratigraphically upper portion consists mainly of calcareous sandstones and the lower portion of alternations of calcareous sandstones and pebble to gravel conglomerates.

This unit is believed to be lacustrine deposits(Bala Series)of middle to late Pleistocene age(LeBas 1977).

Surficial Deposits(Qrs)

This unit is distributed widely around the Homa Mountain and comprises gravels, sands containing gravels, sands and soils.

Calcareous crusts are formed on part of the unit.

Quartz Veins(Qv)

There are observed 3 quartz veins intersecting the Nyanzaian metavolcanics 2.5 to 3.3km east of the top of the Homa Mountain.

The largest of the three is 5m(+) wide and runs in the direction of N85 W.

The vein is estimated to continue for a distance of approximately 500malong its strike judging from distribution of quartz floats.

The other two veins are very minor in scale with width less than several tens centimeters.

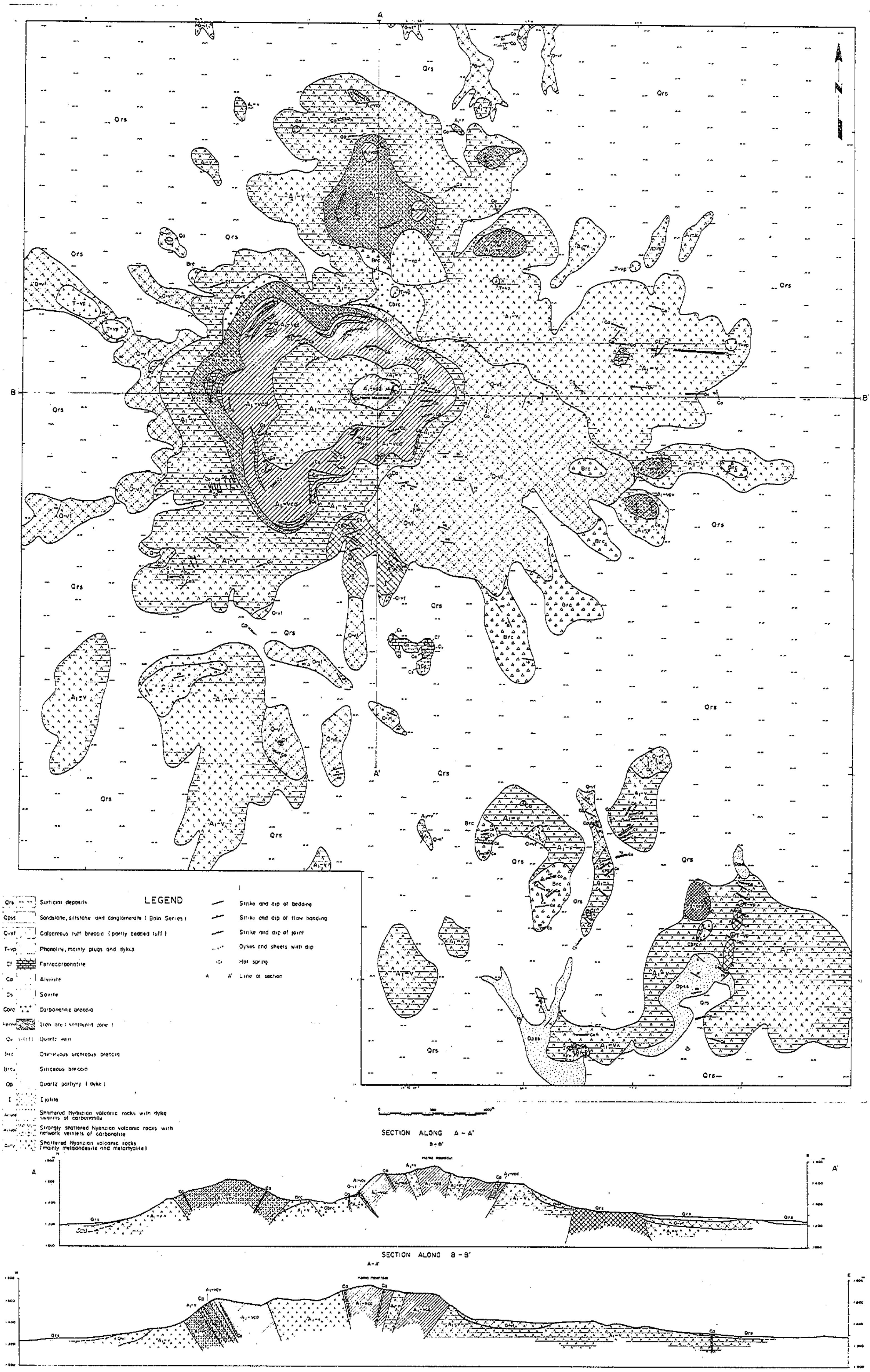


Fig.II-2-9-1 Geological Map of the Homa Mountain Area

The qaurtz forming these viens are white,hard and microcrystalline, and contains white aduralia in part.Druses are also observed occasionally.

The assay results of the samples of the quartz veins are shown in the following table III-1-1.

The results indicate gold-silver mineralization associated with these viens.

Iron Ore(Ore)

An iron ore body is located about 500m south of the road C-19 running east-westery in the southeastern part of this area and occupies an area approximately 350m long and 200m wide.

Numerous porous balls of iron ores,which are dark grey to reddish brown in colour and range from 0.5 to 50cm in diameter,are mixed with soils of this location.

A sample of the iron ore has been microscopically examined and the result is shown in APX-3 and APX-6.

The result indicate that the ores consist of magnetite and hematite with a minor amount of ? biotite.

These iron ores are believed to have been formed by replacement of decomposed rocks by iron,according to LeBas(1977).

(B) Geological Structure

The Homa Mountain is a cone sheet complex comprising a number of carbonatite cone sheets of large and small scales.

Most of the carbonatite-alkaline rocks,except those composing the carbonatite-ijolite complex in the southeastern part of this area,is distributed in an oval area approximately 6km long in the NE-SW direction and 5km wide.

The main carbonatite cone sheet of the Homa Mountain,the largest of all,is located slightly to the southwest of the center of the oval area and composes the major structural element of the cone sheet complex.

A series of intrusive activities of these cone sheets have resulted in domal uplifting of the Nyazian metavolcanics to an elevation 500m above the surrounding ground.

The main cone sheet of the Homa Mountain,where its structures are well exhibited,is encircled by cliffs steeply standing out above the surrounding ground.

These eircular cliffs correspond to the contact between the carbonatite and the Nyanzian metavolcanics.

The inside of the cone sheet,2.5km across in diameter,has a concentric structure in plan and it is well observed in the field that the carbonatite sheets dip 40-60 towards the center of the cone.

Modes of occurrences of various facies of the carbonatite are very much similar to those in the North Rurii Hill,and suggest that the present level of erosion stays still in a relatively upper part of the carbonatite complex.

The carbonatites adjacent to the ijolites in the Ndiru Hill(see the following section)and a group of carbonatite dykes in the southeastern part of this area are presumed to be of relatively deeper facies judging from distribution of sovite.

(4) Geochemical Survey

(A) Sampling

486 rock samples were collected in the area. They consist mainly of carbonatitic rocks with subordinate volcanic rocks of the Tertiary to Quarternary and Nyanzian metavolcanic rocks.

In addition to the rock samples, 5 soil samples were collected at a pit excavated by Finland survey team to know vertical variation of contents for REE.

(B) Satistical Values and the Characteristic

The summary of the assay results of rock and soil samples are listed in Table II-2-9-4-1 and II-2-9-4-2 respectively.

Means for each elements of rock samples in the area are slightly lower in Sr and Nb, and 5 to 30% higher in other elements especially in REE than that of the samples of all the areas excluding Buru Hill and Ndiru Hill prospects.

Maximum values for some elements of the rock samples, Ba (80,700 ppm), Sr (11,800 ppm), Nb (12,000 ppm) and Sm (4,920 ppm) are also that of the samples of all the areas.

Analytical results of soil samples do not show any secondary enrichment from rock to soil. Vertical variation of each elements in 2 m depth, on the other hand, are as follows; Ba : increase, P and Sr; no change, Nb, U, Th and REE: decrease.

(C) Interpretation of Geochemical Anomalies

Interpretation results of geochemical anomalies in the area is shown in Plate 23 and Fig. II-1-9-2.

Samples which have highly anomalous values for some elements are only 1 to 3% of all, though 15 to 20% of all have anomalous values for certain

TABLE II-2-9-4-1 SUMMARY OF STATISTICS OF GEOCHEMICAL ANALYSIS-HOMA MTN AREA-

Element	Unit	No. of Sample	Max.	Min.	Mean (m)	Number of samples ≥ m+1s	≥ m+2s	Remark
P	%	486	3.68	6.00	0.18	65	7	
Ba	ppm	486	80700	60.0	3140	107	6	
Sr	ppm	486	11800	20.0	948	67	2	
Nb	ppm	486	12000	2.50	138	61	4	
Y	ppm	486	910	2.50	67.5	66	9	
U	ppm	486	187					
Th	ppm	486	1370	0.50	27.0	68	10	
La	ppm	486	10700	0.50	212	67	11	
Ce	ppm	486	16100	0.50	335	80	14	
Nd	ppm	486	2200	0.00	124	94	2	
Sm	ppm	486	4920	0.40	18.2	95	4	
Eu	ppm	486	76.3	0.05	5.36	94	2	
Gd	ppm	486	50					
Tb	ppm	486	18.5	0.05	1.98	73	0	
Tm	ppm	486	14					
Yb	ppm	486	51.3	0.05	3.02	65	10	
Lu	ppm	486	13.6	0.05	0.57	51	12	

*1: Standard deviation in logarithmic scale.
* : 90 samples from Ndiru Hill Prospect are excluded.

TABLE II-2-9-4-2 SUMMARY OF STATISTICS OF GEOCHEMICAL ANALYSIS(SOIL) HOMA MT AREA

Element	Unit	No. of Sample	Max.	Min.	Mean (m)	St.dev (S)*1	m+1s	m+2s	Remark
P	%	5	0.86	0.50	0.68	0.10	0.85	1.07	
Ba	ppm	5	1610	940	1220	0.09	1500	1850	
Sr	ppm	5	834	454	624	0.11	796	1020	
Nb	ppm	5	365	190	246	0.12	323	424	
Y	ppm	5	64.0	32.0	42.4	0.12	56.0	73.9	
U	ppm	5	9						
Th	ppm	5	23.0	6.00	9.14	0.25	16.2	28.7	
La	ppm	5	601	117	193	0.30	383	759	
Ce	ppm	5	1140	151	368	0.38	890	2160	
Nd	ppm	5	133	38.0	58.0	0.21	94.9	155	
Sm	ppm	5	16.7	7.10	9.66	0.14	13.5	18.8	
Eu	ppm	5	4.50	2.30	2.96	0.11	3.81	4.91	
Gd	ppm	5	--						
Tb	ppm	5	2.50	0.70	1.35	0.23	2.28	3.83	
Tm	ppm	5	1						
Yb	ppm	5	2.80	0.00	1.50	0.19	2.30	3.52	
Lu	ppm	5	0.50	0.20	0.26	0.18	0.39	0.59	

*1: Standard deviation in logarithmic scale.
* : Calculated for the samples within this area.

elements. These highly anomalous samples are sporadic in the area, and do not form distinct concentrated zones.

Two anomalies, though they are very small, were detected at 1.5 km west and 1.7 km north of the top of Homa Mountain. The former includes follownig, highly anomalous samples.

Sample No.	Nb	Y	La	Ce	Nd	Sm	Eu
99627G	93	76	4660	7000	1100	48.7	11.6
99632G	7	145	4730	7000	1300	77.0	23.2

(ppm)

The latter includes following highly anomalous samples.

Sample No.	Nb	Y	La	Ce	Nd	Sm	Eu
99595G	885	370	464	867	398	57.7	25.1
99608G	1600	500	249	808	1650	103.0	41.6

(ppm)

These small anomalies show different concentration of element.
Two samples which have maximum value for Nb or Sm are listed below.

Sample No.	Nb	Y	La	Ce	Nd	Sm	Eu
99890G	12,000	140	473	879	382	60.3	20.5
100190G	88	390	4130	6200	900	4920	46.4

(ppm)

The sample (99890G) was taken from alvikite occurring at 1.5 km west of the peak of Homa Mountain, and the sample (100190G) was taken from meta-volcanic rock irregularly intruded by carbonatitic veinlets at the point of 450 m east of the peak of Homa Mountain. These two samples are not accompanied with other anomalous or highly anomalous samples.

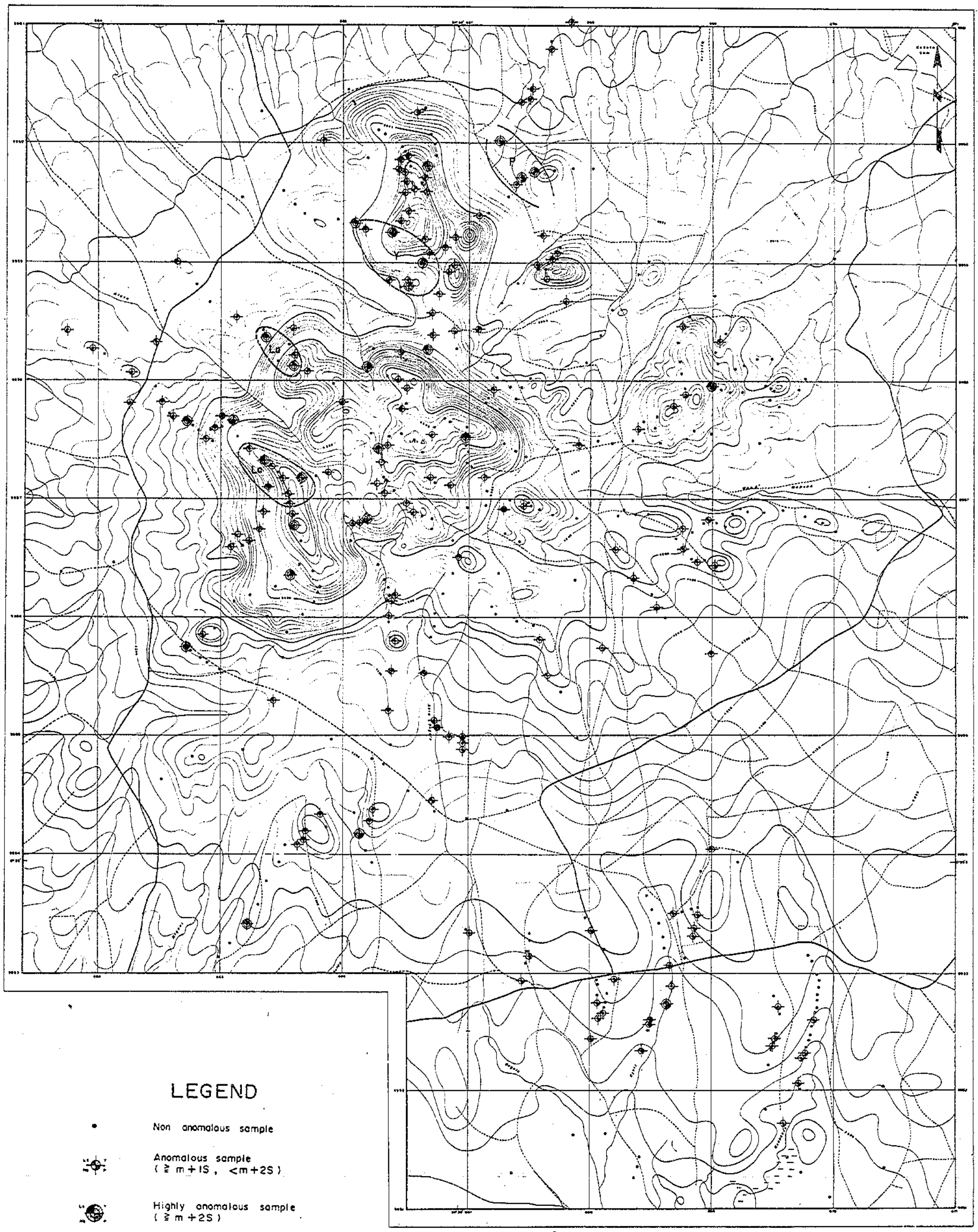
(5) Discussion

The carbonatite complex of the Homa Mountain is one of the largest carbonatite complexies in all the survey areas.

Carbonatites in the area occur mainly as dyke, network veinlet, small massive alvikite and rarely as ferrocarbonatite.

Through geochemical survey, prominent anomaly suitable for further exploration was not found. But it may be needed to pay some caution to the presence of two samples which have high contents for Nb or Sm.

The area where gold bearing quartz veins occur is thought to be worthwhile for follow up survey.



LEGEND

- Non anomalous sample
- Anomalous sample (≧ m+1S , <m+2S)
- Highly anomalous sample (≧ m+2S)
- Geochemicaly anomalous zone
- Soil sample

Classification

Element	Anomalous, ≧ m+1S, <m+2S	Highly anomalous ≧ m + 2S
La ppm	≧ 767 , < 3,300	≧ 3,300
Y ppm	≧ 148 , < 344	≧ 344
Nb ppm	≧ 620 , < 2,600	≧ 2,600
P %	≧ 0.61 , < 2.17	≧ 2.17

m : mean , S : standard deviation

Figures are of 1325 rock samples from all the Semi-detailed Survey Areas other than the grid-sampled areas in the Buru and Ndiru Hills.

Fig. II-2-9-2 Geochemical Interpretation Map of the Homa Mountain Area

2-10 Ndiru Hill prospect Homa Mountain area

It was decided to re-study the prospect, after the reports by the Finnish team[Idman and Mulaha(1986) and Mulaha(1986)] had been reviewd. For, the reports describe that (i) there is mineralization with a maximum grade of 0.77% Nb2O5, and (ii) the area of over 0.25% Nb2O5 is fairly wide, and (iii) no chemical analysis for REE is available.

The trial measurement of gamma-ray on the first day revealed that high readings(over 1000cps;5 times as high as background value read at the Base Camp at Homa Bay) covered a wide area. Therefore, it was decided to carry on further detailed sampling, and 90 grid-samples were collected.

It is a matter for regret that the result is rather negative.

(1) Geographical background

The prospect is in Homa Mountain area, which is described in 2-9. It is easily accessed:Up to a point about 1km from Gogo Secondary shool, it can be reached by a 4-wheel-drive vehicle through a dirt track, hence it is necessary to walk up for about 1km. Up to the Gogo school, one can easily drive via unpaved all-weather road D-219.

(2) Previous works

In a period between April 1984 and July 1985, the area including the prospect was explored by a Finnish Team for apatite and niobium. Anomalies were located by a reconnaissance-type geochemical survey, and subsequently a grid-sampling was carried out in the present Ndiru Hill prospect.

The result was;(i) the grades of both P and Nb are low, and (ii) the higher grade parts are local. However,No analysis was made for REE and Y.

(3) Geology

The carbonatite complex at Ndiru Hill occurs in an area of about 300m x 500m, being surrounded by so-called calcrete and soil on the lower flat. The succession of the intrusion of the carbonatites is interpreted to be in the order of sovite,alvikite and ferro-carbonatite, judged from distribution etc. However, sometimes it is fairly difficult to distinguish ferro-carbonatite from limonite-stained alvikite in the field.The geological sketch map of an area of about 400m x 300m, where the present grid-sampling was carried out is presented in Fig.II-10-1. The description of the microscopcal observation is made in (8), (9), and (10) in APPENDIX-3.

(A) Sovite

White,holocrystalline and coarse-grained. Large crystals(up to 1cm) of apatite are sporadically observed in places. It is often disseminated with magnetite, and also penetrated by veinlets(up to 20 cm) of magnetite,limonite, carbonates and limonitized ferro-carbonatite. There seems to be a tendency that the sovite contains more apaptite and less barite than other two. The iron content is much lower except the places where magnetite is concentrated.

(B) Alvikite

Light brownish to brownish grey, fine, compact, and holocrystalline. As mentioned above, a limonite stained one is difficult to distinguish from ferro-carbonatites. It seems that alvikite contains less iron and barite, compared with ferro-carbonatite.

(C) Ferro-carbonatite

Brownish to dark brownish, fine, compact, and holocrystalline. In some thin sections, a mineral that resembles ankerite or siderite is observed. Generally,it is high in iron content, indicating around 10% as Fe2O3. It also contains a fair amount of barite. Reticular veinlets of this rock are abundantly observed in sovite. The distribution of Nb,Y,and REE seems to be closely related with this rock.

(D) Calcrete

The rock is observeed at the lower flat places surrounding the hill. It contains various sorts and sizes of angular fragments such as carbonatites, ijolites, and metamorphic rocks of the basement. These fragments are cemented with dark brownish calcareous soft matrix. There is a possibility that this can be correlated with the Calcareous pyroclastic rocks in 2-9 Homa Mountain Area.

(4) Radiometric survey

Total gamma-ray intensity was measured at each geochemical sampling point. The highest reading of 90 points is 6985cps, and mean is 1230 cps. The statistical values are shown in TABLE II-2-10-1 and their areal distribution is illustrated in Fig.II-2-10-2,respectively.

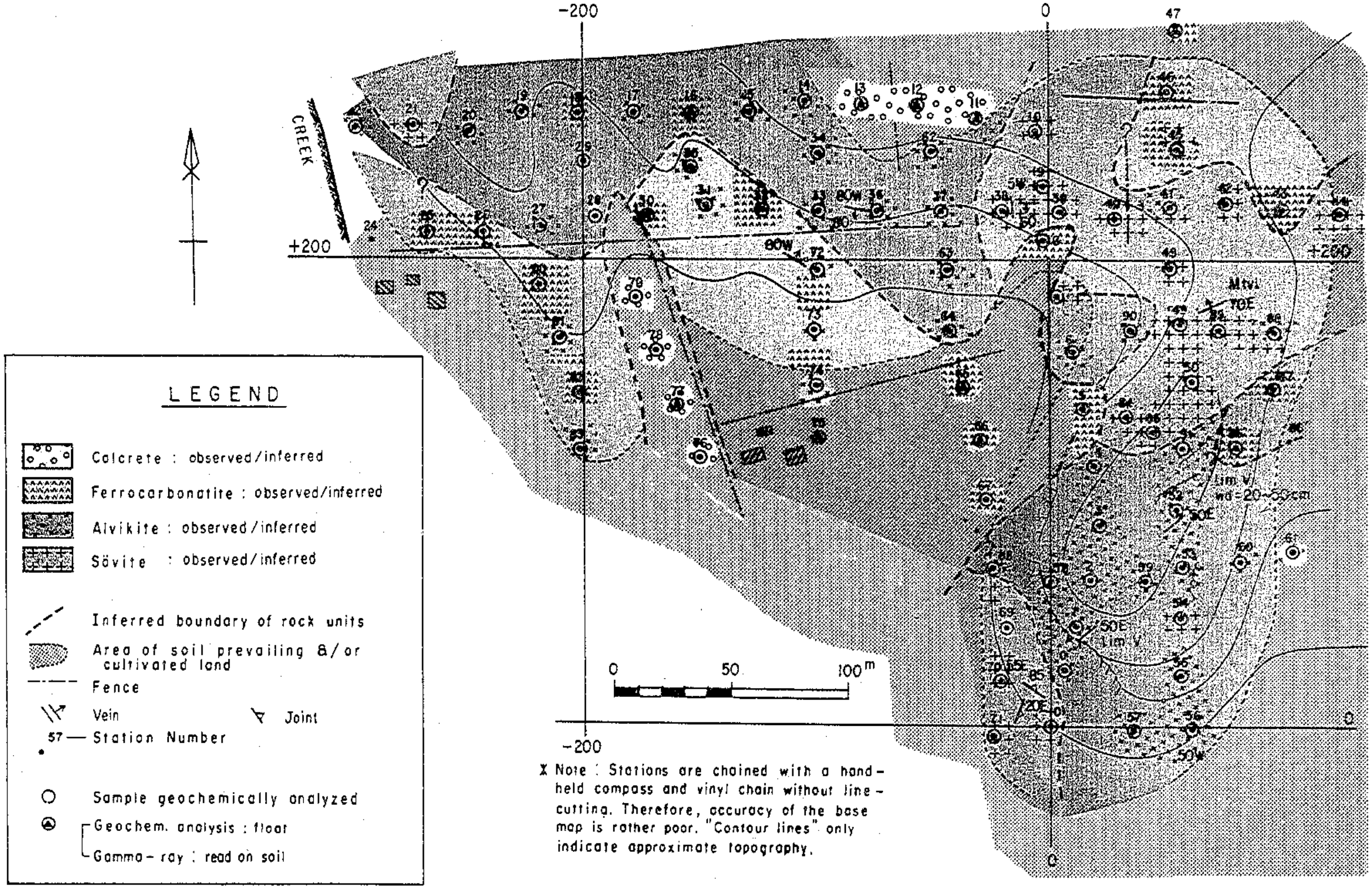


Fig.II-2-10-1 Geological Map of the Ndiru Hill Prospect

The higher intensity parts(>2000cps) occur at 3 spots in the ferro-carbonatite near to its boundary. 3 other single points of high intensity that occur within the alvikite and sovite areas in geological map(Fig.II-2-10-1) are all located close to limonite or ferrocabonatite veins. These facts indicate a strong relationship between radioactivity and ferro-carbonatite or limonite.

As it is described later, gamma-ray intensity shows moderate corration with Th(0.53), Sm(0.41), and Eu(0.40). On the other hand, it shows virtually no correlation with Nb(-0.02)

(5) Geochemical survey

90 rock-chip samples were collected on a-25m interval on a 50m-grid.

The sample locations were plotted in a sketch map that wss surveyed by a simple chaining with a hand-held compass and a vinyl chain, taking the Station-0 as the origin tentatively.

The results of chmical analysis are tabulated in APPENDIX-13. In the list, the columns for coordnates are not filled up for Ndiru Hill, since the sampled area has not been tied with any existing triangular station.

(A) Univariate statistical analysis

The summary of the univariate statistical analysis is shown in TABLE II-2-10-1. Although the highest value of Nb reaches 0.82% as Nb, its mean is as low as 362ppm. indicating that the Nb value fractuates a great deal.

It is interesting that the means of most LREE to MREE and Th are almost the same level with "Mean + 1SD" of "ALL AREAS" conincidentally. These elements are under-lined in TABLE II-2-10-1.

Maps showing the DISTRIBUTION OF CONTENT of 3 major compositions are attached in this report; Nb(Fig.II-2-10-3), Y(Fig.II-2-10-4), and La+Ce+Nd (Fig.II-2-10-5). These maps indicate that all these COMPOSITIONS are concentrated along the periphery of the ferro-carbonatite(FCB). However, it is also observed that Nb is concentrated at the outermost from FCB in sovite, whereas Y and "La+Ce+Nd" are concentrated rather at the inner side of FCB. It is interpreted that Nb is concentrated locally, probably being controlled by fracture system.

It is also obvious from the Figures and TABLE that the concentration levels of the 3 major compositions are approximately 1/3 of those of Buru Hill.

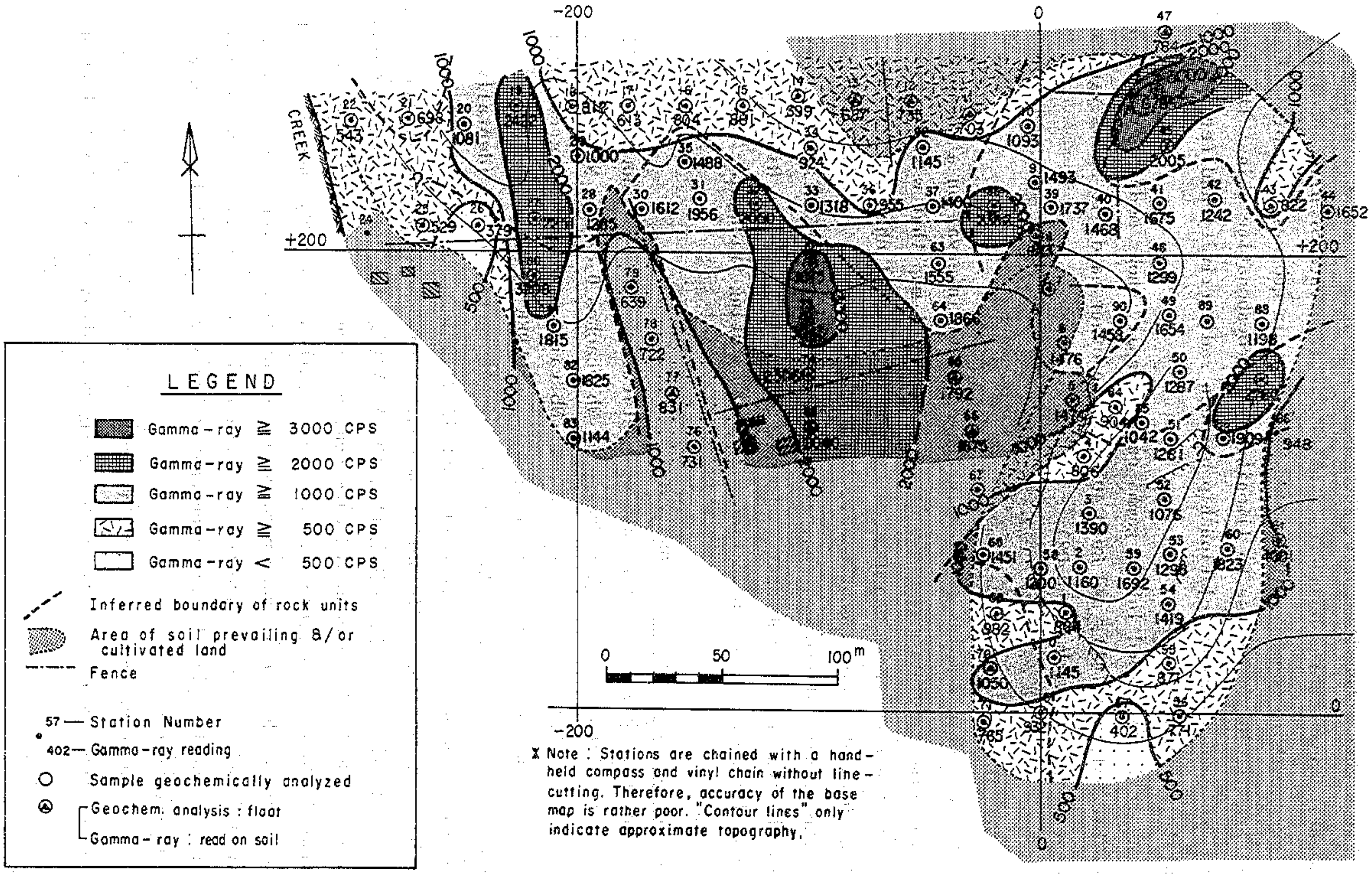


Fig.II-2-10-2 Distribution of γ-Ray Readings —Ndiru Hill Prospect

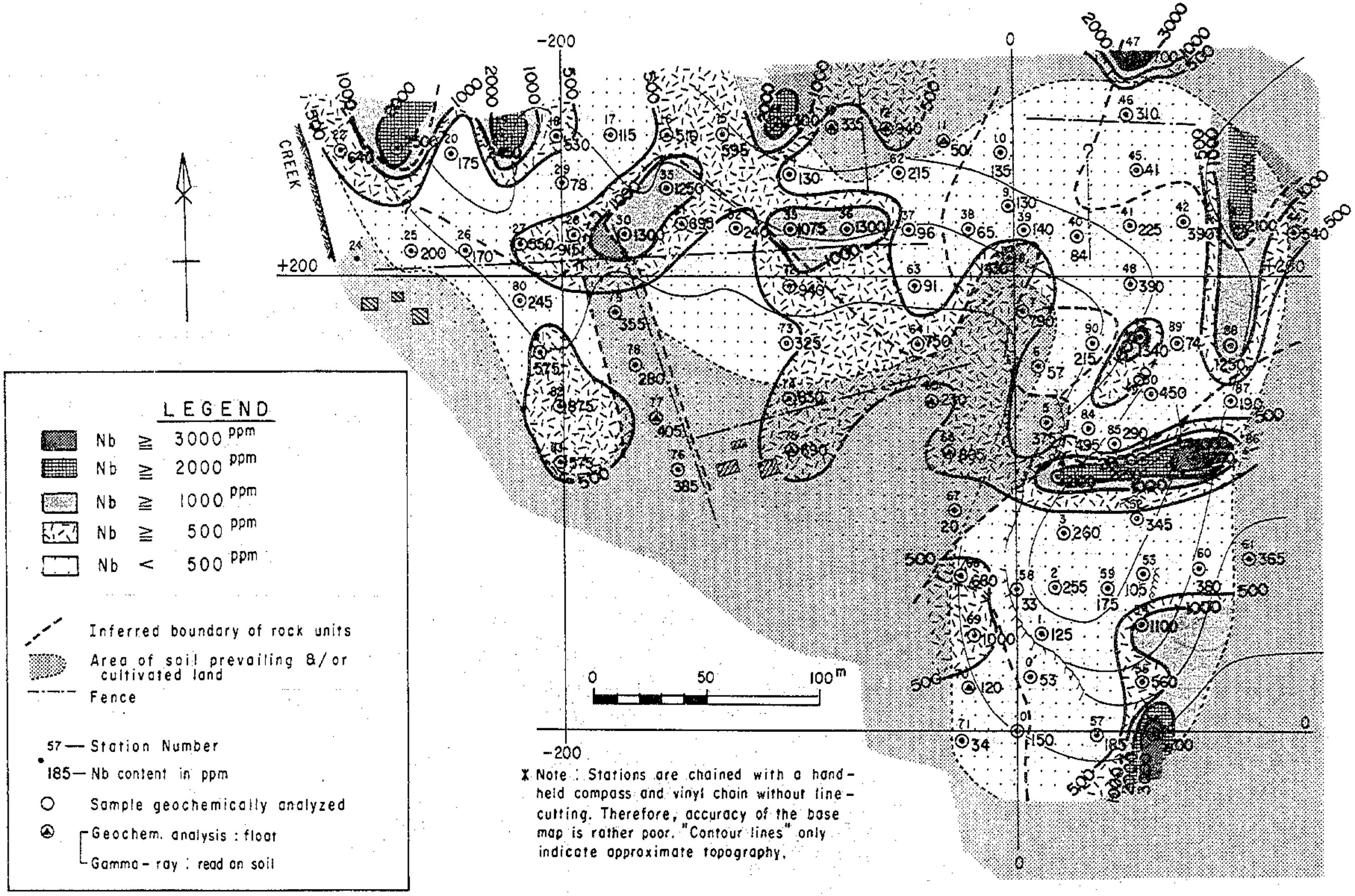


Fig.II-2-10-3 Distribution of Nb Contents —Ndiru Hill Prospect

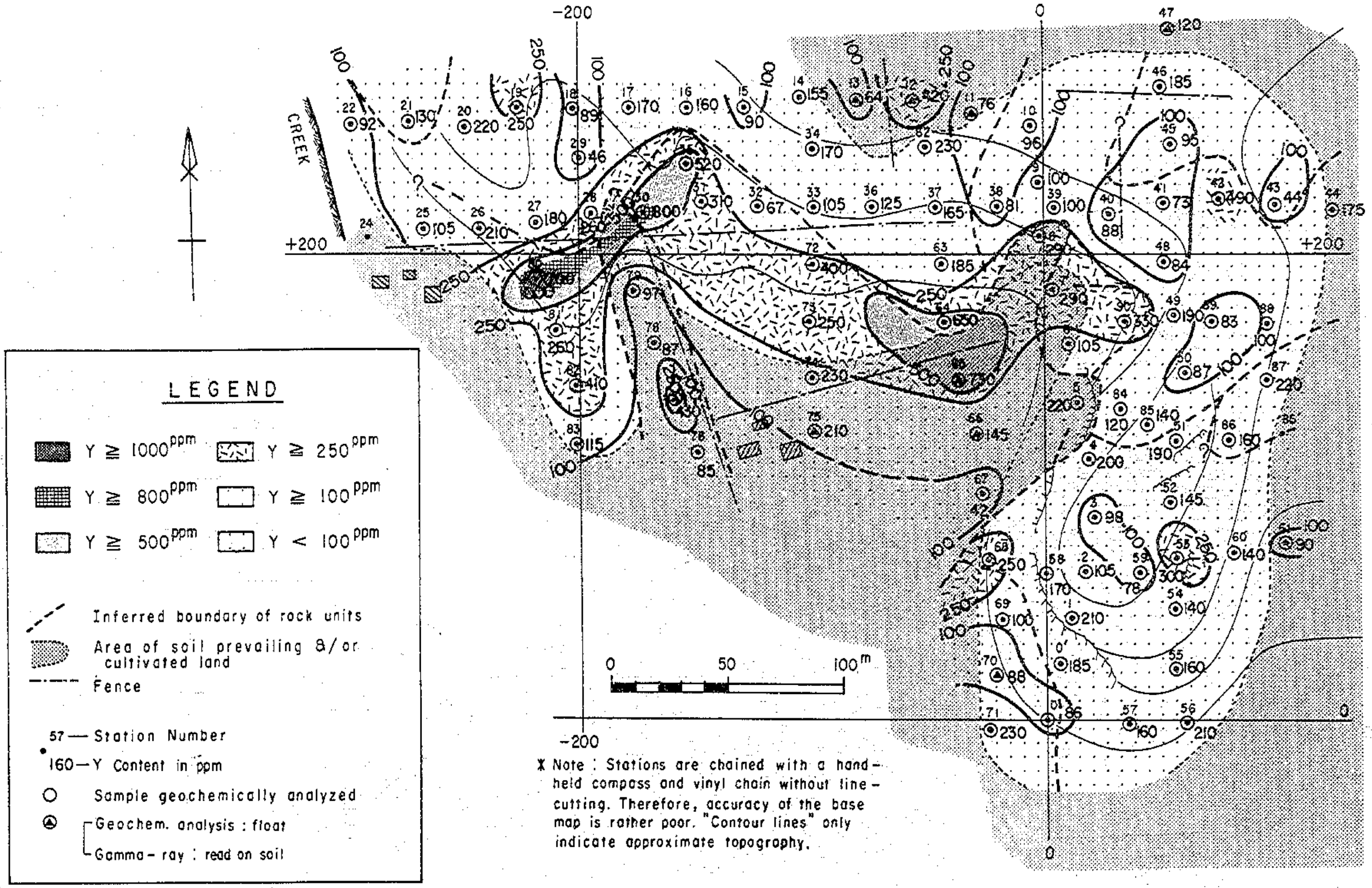


Fig. II-2-10-4 Distribution of Y Contents —Ndiru Hill Prospect

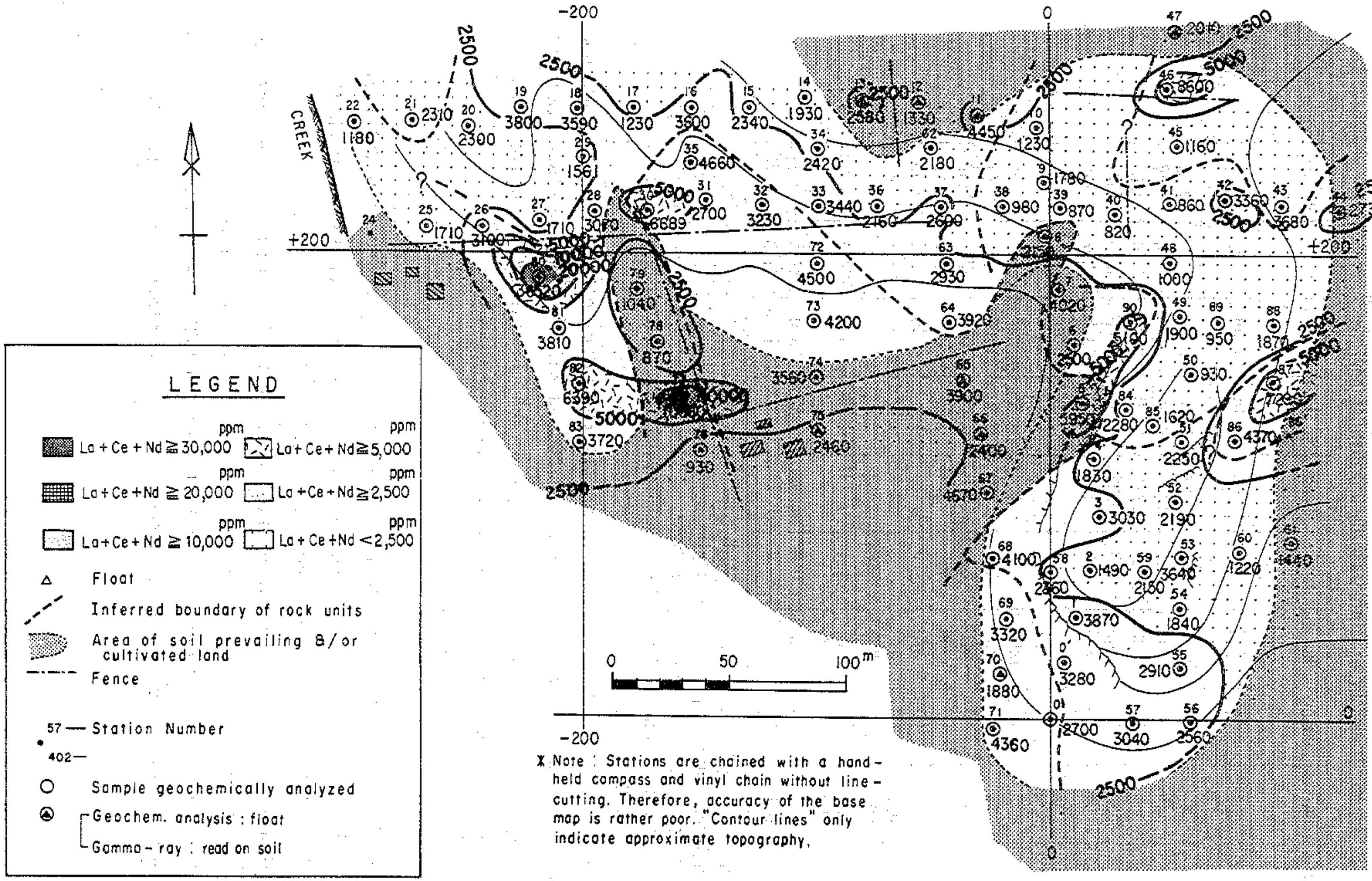


Fig.II-2-10-5 Distribution of Combined La,Ce and Nd Contents—Ndiru Hill Prospect

TABLE II-2-10-1 SUMMARY OF STATISTICS OF GEOCHEMICAL ANALYSIS—NDIRU HILL—

Item or Element	Unit	Number	Max.	Min.	Mean (m)	St.dev (S)*1	m+1s	m+2s	Remark *3
γ-ray	cps	90	6785	402	1260	0.20	2000	3190	
P	%	90	2.22	0.051	0.372	0.40	0.93	2.36	0.61
Ba	ppm	90	18340	610	4330	0.34	9473	20700	7370
Sr	ppm	90	12590	331	1790	0.29	3490	6740	3260
Nb	ppm	90	8200	20	368	0.52	1220	4040	620
Y	ppm	90	1700	42	159	0.29	310	597	148
U	ppm	58*2	67	<1					
Th	ppm	90	1200	5	114	0.43	307	841	95
La	ppm	90	14720	190	700	0.30	1400	2780	767
Ce	ppm	90	20800	390	1370	0.29	2670	5240	1240
Nd	ppm	90	1200	100	378	0.26	688	1230	450
Sm	ppm	90	370	20	80	0.26	146	271	56
Eu	ppm	90	170	5	22.3	0.29	43	84.2	16.8
Gd	ppm	32*2	680	<50					
Tb	ppm	90	100	1.1	7.19	0.33	15.4	32.6	5.94
Tm	ppm	60*2	38	<1					
Yb	ppm	90	48	0.2	5.97	0.40	15.0	37.5	7.72
Lu	ppm	90	4	0	0.79	0.37	1.85	4.33	1.23

*1: Standard deviation in logarithmic scale.
*2: Samples higher than detection limit.
*3: "Mean +1 Standard Deviation for 1325 samples from "All Areas". Note that the means of most of Y,Th and REE of Ndiru Hill are the same level to them.

"Correlation analysis"

The correlation coefficients of all the pairs of 14 elements and gamma ray readings were computed and the scattered diagrams were printed out. The former are tabulated in TABLE II-2-10-2, but the latter are omitted to attach, as the number of diagrams is too huge.

Findings are as follow:

i) Y shows fairly strong correlation with most of REE(0.61-0.75), except Nd(0.47) and Lu(0.53). Y also indicates moderate correlation with Th (0.57), Ba(0.51), P(0.46) and gamma-ray(0.32).

ii) Gamma-ray shows some correlation with Th(0.53), Sm(0.41), and Eu(0.40) and coefficients of the order of 0.3 for Y, La, Ce and Tb.

iii) Ba shows correlations of 0.4 to 0.65 with REE except HREE , Y, and Th. This may imply the presence of Ba-bearing pyrochlore such as Pandite.

"Chondrite-normalized abuncances of the REE"

Chondrite -normalized patterns of the REE of 10 selected samples from 4 rock- types are illustrated in Fig.II-2-10-6. The rock types are sovite (SO), alvikite(AV), ferro-carbonatite(FC), and calcrete(CL).

An obvious difference is observed among 3 cabonatites:

i) For the lightest element La, abundances are: FC> AV> SO.

ii) For the heavier elements such as Yb and Lu, the tendency of abundances seem to changes to: AV> SO> FC.

iii) For Y, which is included in the diagram for reference, the relationship is similar to ii). is observed.

(B) Principal component analysis

The results of the 1st(Z1) to 4th(Z4) principal components are tabulated in TABLE II-2-10-3. Scores of the four components are plotted in plans, and "Iso-score" contour are drawn in the same way as ordinary univariate analysis.

The scores are classified as "ANOMALOUS" and "HIGHLY ANOMLOUS" using "M+1SD" and "M+2SD" as thresholds, respectively. These maps are compared with other factors. However, it has only become obvious that their tendency is quite the same with that of the univariate analysis. Therefore, the maps are omitted to be attached to the report. It is quite interesting,however, that the the higher scores of the 4th principal component, which is interpreted to represent an ealier mineralization, as mentioned in iv) below, are distributed along the periphery of FC, in almost the same position with those of the 1st. This may imply the superimposition of mineralization through the same conduit.

The characteristics of each principal component is briefly described below.

i) Contribution of the 1st principal component is 49%, and foctor loadings of Ba, Th, and all the REE excpet Yb, Lu, are -0.72 to -0.93. This may represents a later-stage mineralization that brought pyrochlore group.

ii) Contribution of the 2nd is 11.5%, and following factor loadings are relatively prominent; P(-0.58), Sr(-0.53), Yb(-0.57), and Lu(-0.57).

iii)Contribution of the 3rd is 8.6%. Although facotor loadings of gamma-ray (0.54) and Sr(0.64) are positive, that of Nb(-0.62) is negative.

iv) Contribution of the 4th is 6.8% and it is almost decided by gamma-ray (0.61%) and Nb(0.52%). This component possibly represent the ealier stage Nb mineralization.

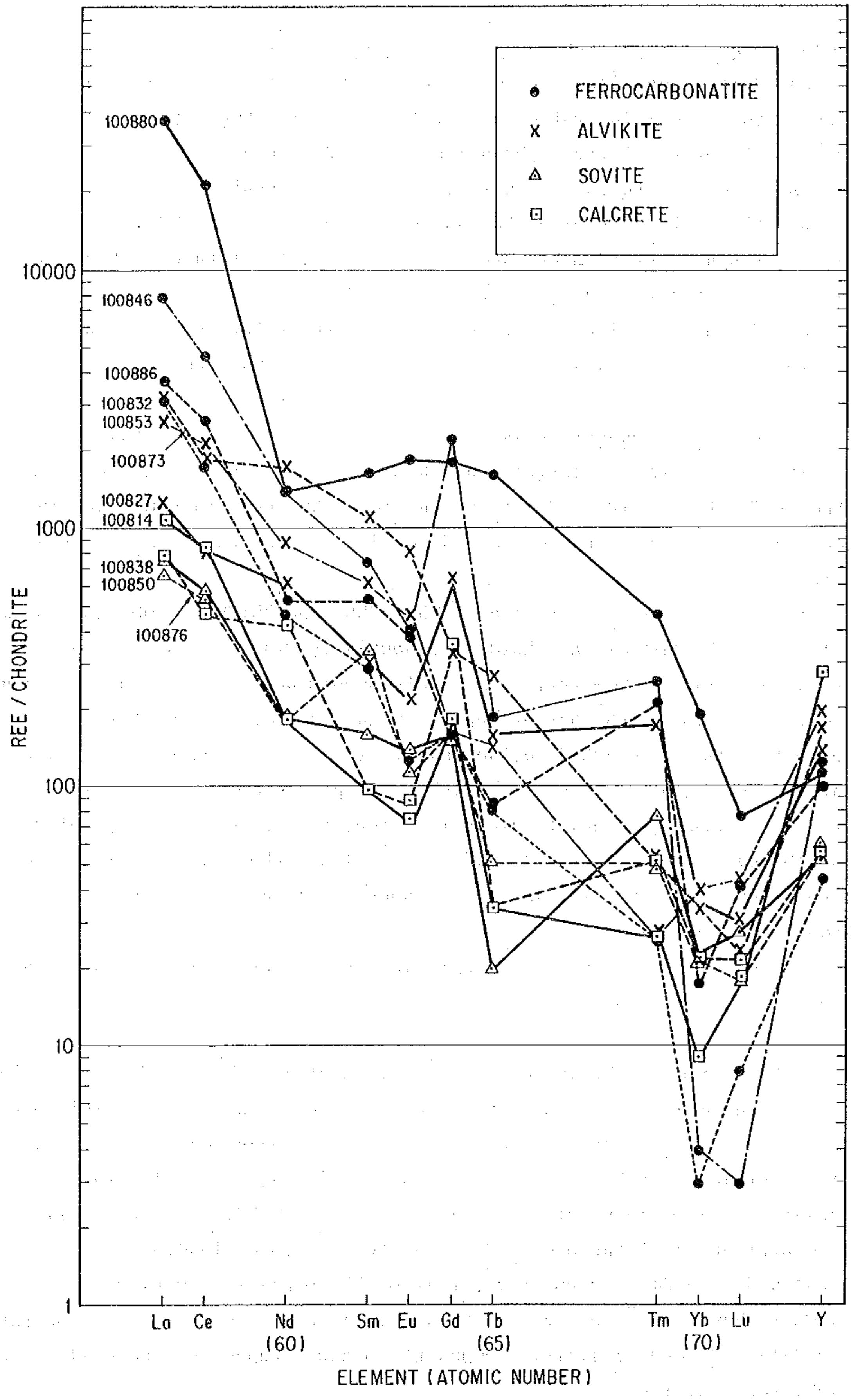


Fig. II-2-10-6 Chondrite-normalized abundances of the REE—Ndiru Hill Prospect

(6) Discussion

i) MEANs of Y, LREE and MREE of this prospect are appoximately the same levels to ANOMALOUS VALUEs(M+1SD) for ALL AREAS. However, they are all about 1/3 to 1/4 of MEANs of Buru Hill.

ii) The highest value of Nb of this prospect is relatively high(8200ppm) compared with other areas, though its MEAN is fairly low(368 ppm). This suggests the large fluctuation of Nb contents. For reference, ANOMALOUS VALUE for ALL AREAS is 620ppm, and MEAN of Buru Hill is 688ppm.

This fact and its areal distribution as well as its occurrence suggest that the higher grade Nb likely occurs very locally, being controlled by fracture systems.

iii) Only elements that indicate higher means than Buru Hill are P(Ndiru: 0.37%> Buru:0.20%) and Sr(Ndiru:1790ppm> Buru: 1100ppm). These may be the elements related with the earlier sovite activity.

iv) Relatively higer parts of Nb, Y, Th, and REE are all distributed along the periphery of the ferro-carbonatite(FC). Though in the plots of analytical values themselves HIGHs of Nb occur in sovite area, outer from FC compared with other elements, in the plots of scores of the principal component analysis, ANOMALOUS of the 4th that may represent Nb mineralization and the 1st that may represent REE occur overlapped in the same position. These suggest that (a) all these Nb, Th, Y, and REE may belong to a series of mineralization related with the activities of FC, (b) both the earlier mineralization of Nb(probably with most of magnetite) and the later one of Y and REE might have occurred through the same conduit, and (c) sovite might have only played a role of a host for these meraization.

v) Integrating those mentioned above, it is concluded that (a) the mineralization of either Y, Th, REE or Nb that occurs near the surface can not be justified for further exploration, as the grades are low.(b) the depths seem to be neither prospective, since no secondary enrichment can little expected and the primary zoning of primary minerals also little expected as the potential deeper facies of a mineralization sequence has already been exposed at the surface here.

TABLE II-2-10-2 CORRELATION COEFFICIENTS —NDIRU HILL PROSPECT(GRID SAMPLES)

	γ-ray	P	Ba	Sr	Nb	Y	Th	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu
γ-ray	1.000														
P	0.125	1.000													
Ba	0.180	0.265	1.000												
Sr	0.089	0.284	-0.271	1.000											
Nb	-0.023	0.117	0.240	-0.148	1.000										
Y	0.320	0.464	0.505	-0.152	0.246	1.000									
Th	0.534	0.391	0.410	-0.061	0.321	0.566	1.000								
La	0.312	0.272	0.651	-0.190	0.062	0.616	0.520	1.000							
Ce	0.343	0.370	0.615	-0.054	0.060	0.631	0.543	0.920	1.000						
Nd	0.270	0.191	0.546	-0.123	0.103	0.469	0.382	0.659	0.640	1.000					
Sm	0.414	0.318	0.658	-0.170	0.224	0.702	0.579	0.778	0.823	0.737	1.000				
Eu	0.403	0.342	0.608	-0.125	0.226	0.737	0.569	0.722	0.758	0.704	0.942	1.000			
Tb	0.372	0.403	0.576	-0.113	0.184	0.752	0.623	0.697	0.732	0.575	0.821	0.796	1.000		
Yb	0.068	0.441	0.241	0.101	0.197	0.661	0.456	0.333	0.352	0.292	0.473	0.521	0.544	1.000	
Lu	0.054	0.420	0.242	0.011	0.166	0.526	0.390	0.285	0.326	0.146	0.339	0.387	0.447	0.606	1.000

TABLE II-2-10-3 SUMMARY OF PRINCIPAL COMPONENT ANALYSIS—NDIRU HILL PROSPECT

Princip. Compo.	Unit	Number	Max.	Min.	Mean (m)	St.dev (S)*1	m+2s	Remark
Z1	Score	90	4.64	-9.74	0.00	2.70	5.40	
Z2	Score	90	4.98	-2.36	0.00	1.31	2.62	
Z3	Score	90	2.60	-2.71	0.00	1.14	2.28	
Z4	Score	90	2.04	-2.94	-0.00	1.01	2.02	

2-11 Buru Hill

This area was selected as one of the Semi-detailed Survey areas for the Phase-1, as floats of high grades rare-earths(La:4000 to 12000ppm, Ce: 8400 to 10100ppm) had been collected by MMAJ during its ground-truth reconnaissance for the technical development project for the remote-sensing imagery interpretation(MMAJ:1981).

(1) Location and infra-structure

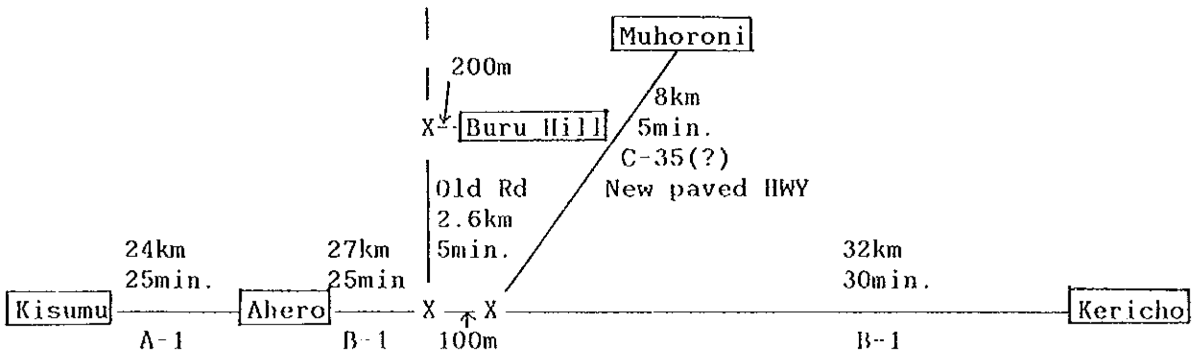
The Buru Hill area is located in the Kericho District of the Rift Valley Province, some 46km ESE of Kisumu the capital city of the Nyanza province and some 24km NNW of Kericho the center of the district(Fig.1 and 2).

The area is covered by the 1/50000 Quadrangle map Sheet 117/1 Muhoroni; the coordinates of its four corners in the UTM Grid system are shown below as well as their approximate longitudes and latitudes.

COODINATES OF THE BURU HILL AREA

UTM	X Longitude	Y Latitude
1	740.0 35-Deg 9'22.3"E	9980.5 0-Deg 10'35.7"S
2	740.0 35-Deg 9'22.3"E	9978.5 0-deg 11'40.5"S
3	742.0 35-Deg 10'27.3'E	9978.5 0-Deg 11'40.5"S
4	742.0 35-Deg 10' 7.3"E	9980.5 0-Deg 10'35.7"S

The area is easily accessed from Kisumu and Kericho via asphalted national highways and unpaved old Kisumu-Kericho road.



About 5.5km from the area is a township of Muhoroni,where a modern refinery of East Africa Sugar Industry Ltd is located and a railroad station exists.

The area that includes Buru Hill is situated in the eastern corner of the Kavirond Rift,and consisits of low reliefed rolling hills. Almost all the flat lands in the area are being utilized as sugar cane plantation and other plants.

The Buru Hill is a discrete hill with a relief of about 40m from the surrounding flat. The hill is partly covered by a thorny bush,but is partly open grass land. There is virtually no cultivated land on the hill,whereas the surrounding flats are completely utilized as farming grounds. On top of the hill(sl 1370m),there are a few small pits from which local people are taking weathered oxidized rocks as housing blocks.At the western foot there is a ruin of the former mining office,and its adjadjacent ground,which is now being cultivated,is considered to have been the miners' quarter as there are some 40 houses arranged in grid are recognized in an air photo taken in 1957. Along the eastern and northern edges of the hill the Raragegwit River,a perennial stream, flows.

Two exsiting high tension power lines are along the old Kisumu-Kericho road that runs several handreds meters west of the hill.

As a whole,the ifrastructure of the area is quite favourable

(2) Previous works

According to Binge(1962),the history of the works in the area by the time when Gold Fields Ltd(NCGF) came into the prospect is as follows.

Shackleton(1951) noted the outcrop,and interpreted that it might be a gossanous capping above a sulphide body.

R.B.Taylor first found the hill to be radio-active in 1954.

In 1955,an exclusive prospecting licence(EPL) was granted to G.G. Smallwood over an area of 9.5 square miles on the southwest side of Muhoroni including Buru Hill.

In June 1956,NCGF acquired an option to purchase the EPL from Smallwood,and carried out various exploration works until the option terminated on the 31st May,1958(Cluver,1958). The works carried out by NCGF is summarized in Table II-2-11-1.

TABLE II-2-11-1 Summary of Exploration Works by New Consolidated Gold Fields Ltd. between 1956 and 1958

Organization &/or Authors	Purpose	Period	Works carried out	Summary of result and/or recommendation	References and/or remarks
New Consolidated Gold Fields Ltd.	Exploration for Nb: Option to purchase the E.P.L. for £50,000	From: 1st June,'56 To: 31st May '58	* Airborne scintillometer survey(July 1956). * Re-establishment of a camp. * Topographical mapping(1/2000 and 1/10000). * Geological mapping(1/2000 and 1/10000) * Radiometric survey(compiled on 1/5000) * Surface sampling(116 chips) * Pitting(70 pits;up to 15ft mostly 5-6ft deep 261 channel samples taken) * Diamond drilling(2 holes approx.500ft each)	* Buru Hill is a carbonatite intrusive into the fractured zone of the granite gneiss of the Basement System. * The surface is covered with a hard skin of lateritic material that is ferruginous or manganiferous in places. * The material below the skin is composed of deeply weathered soils or soft weathered rocks. * DDHs intersected sovite at depths.	* Cluver,A.F.(1958): Buru Hill E.P.L.110,Kericho District, Kenya. Unpublished internal report of New Consolidated Gold Fields Ltd. * No attatched maps available. * Neither conclusion nor recommendation of the author is described in the report. * New Consolidated Gold Fields Ltd. did not excercise the option and terminated the work, according to the report.
			* Of 378 surface and channel samples; 69-- examined for mineral content.	* magnetite,hematite,calcite,siderite, quartz,clay,barite,monazite,pyrocholore, zircon,rutile,fluorite,mica,and a particle of goled and a beryl fragment identified.	
			22-- examined spectrographically----------	* Nb,P,Th.La,Pb,V,Zn,Ag,Ce,Y,Cu.Mo,Be,Bi and Li are showed to be present.	
			212- chemically analysed------------------	* Nb varies from 0.02 tO 0.55% Nb2O5 with the majority between 0.05 and 0.15%. A number in range 2-4%(max.6.52%) total REEs.	
			268- tested for U equivalent--------------	* A high percentage of the samples:around 1.1lb/st(max. 2.37). 80-90% of radioactive material is Th.	
			* All the core from 2 DDHs(451 samples) 451-tested for Nb2O5----------------------	* Intersections listed in the report range from 0.18 tO 0.61% Nb2O5.	
			56-tested for U equivalent---------------	* No result described in the report.	
			24-percentage rare earths----------------	* No result described in the report.	
			9-analySed for Th content---------------	* No result described in the report.	
			9-fresh unoxidized core examined mineralogically-----------------------	* Calc.,rhodochr.,sid.,bar.,act.,mt.,fluor., pyroch.,ap.,kaol.,py.,biot. were identified	

Although Cluver described that NCGF had not excercised the option,an inclined shaft,which must have been excavated later as it was not in his report,is found during the present study at the southern foot of the hill. It has not so far been clear yet for us who excavated the shaft. According to the local people the(mining?) operation was carried out up to around 1963,and 12 whitemen engineers and some 300 laborers were at work. It is desirable for the interpretation and future exploration planning of the prospect to find mining record,any other documents or maps on the operation.

Binge(1962) describes that the concentrates obtained from the rock contain pyrochlore and manazite,and suggests that the hill has a possibibly of being a volcanic vent related with carbonatites based on the Taylor's discovery and a chemical analysis(CaO:13.57%,P2O5:1.45%.REEs:2.90%,ThO2: 0.10%,Nb2O5:0.50%).

(3) Geology(PL-14)

The area is almost completely covered by cultivated lands and only very few outcrops are observed in limited areas,so that it is very difficult to draw an exact geological map.

According to Geology of the Kericho Area(Binge,1962) and its attached geological map, the present project area comprises "Undifferentiated granitoid gneisses" of the Basement System(the Mozanmbique Metamorphic Rocks of today) and "Vent agglomerates containing monazite and pyrochlore" intruding the former. The latter forms Buru Hill itself.

The present study has revealed the presence of three new rock types other than above two. That is to say,phonolite,pegmatite veins and a dolerite dyke.

(A) Granitoid gneiss

The rock is considered to distribute widely in the area. It is greyish white,siliceous,and usually contains little mafic minerals. Gneissose structure is obvious and it generally trends in a NS direction,dipping 60 to 70 degrees W. At the foot of the hill and an outcrop about 500m south of the hill,there occurs brecciated and silicified gneiss,which is fairly intensively affected by hematite,goethite and some black mineral,in similarway to the "ore".

The petrography of a sample is described in APPENDIX-3(101079G) and the result of chemical anaylysis is listed in APPENDIX-8 as well as its NORM(APPENDIX-8a). The NORM is plotted in the "Quartz syenite" field close to the line between "Granite"field(APPENDIX 8B).

(B) Pegmatite vein

White coarse pegmatitic veins are observed in places, as well as some siliceous parts and/or quartz veins. Most of them are considered to be of segregation nature's. They seem to strike in a NS direction as well.

(C) Dolerite dyke

A medium grained, dark coloured dolerite dyke is found in the granitoid gneiss near the northwestern corner of the project area. It likely strikes in a NS direction.

(D) Phonolite

Dark greenish grey phonolite with possible nepheline or sanidine phenocrysts is observed to expose at the southern border of the area. Floats of the rock are confirmed to distribute in three localities that are lined to the north from the outcrop on an approximately 250 to 400m spacing.

This may be a dyke intruding the gneiss and might be related with carbonatitic rocks that occurs in drill holes by NCGF.

(E) "Vent agglomerate containing monazite and pyrochlore"

According to 1/50000 Geological Map Kericho, the whole hillock of Buru Hill consists of this rock. The rock is mineralized and extremely oxidized, and is the major objective of the present study. Therefore, it will be described as an independent item in the next (4)"Mineralization".

(F) Carbonatites

Cluver(1958) describes that sovite occurs at depths in both two drill holes and that even on the surface there are small exposures of weathered carbonatite at a number of points. However, we could locate neither outcrop nor float of calcareous rocks during the surface sampling. He also mentions that sovite in drill holes sometimes occurs with remnants of basement, or as brecciated, and that fluorite is fairly common in many places.

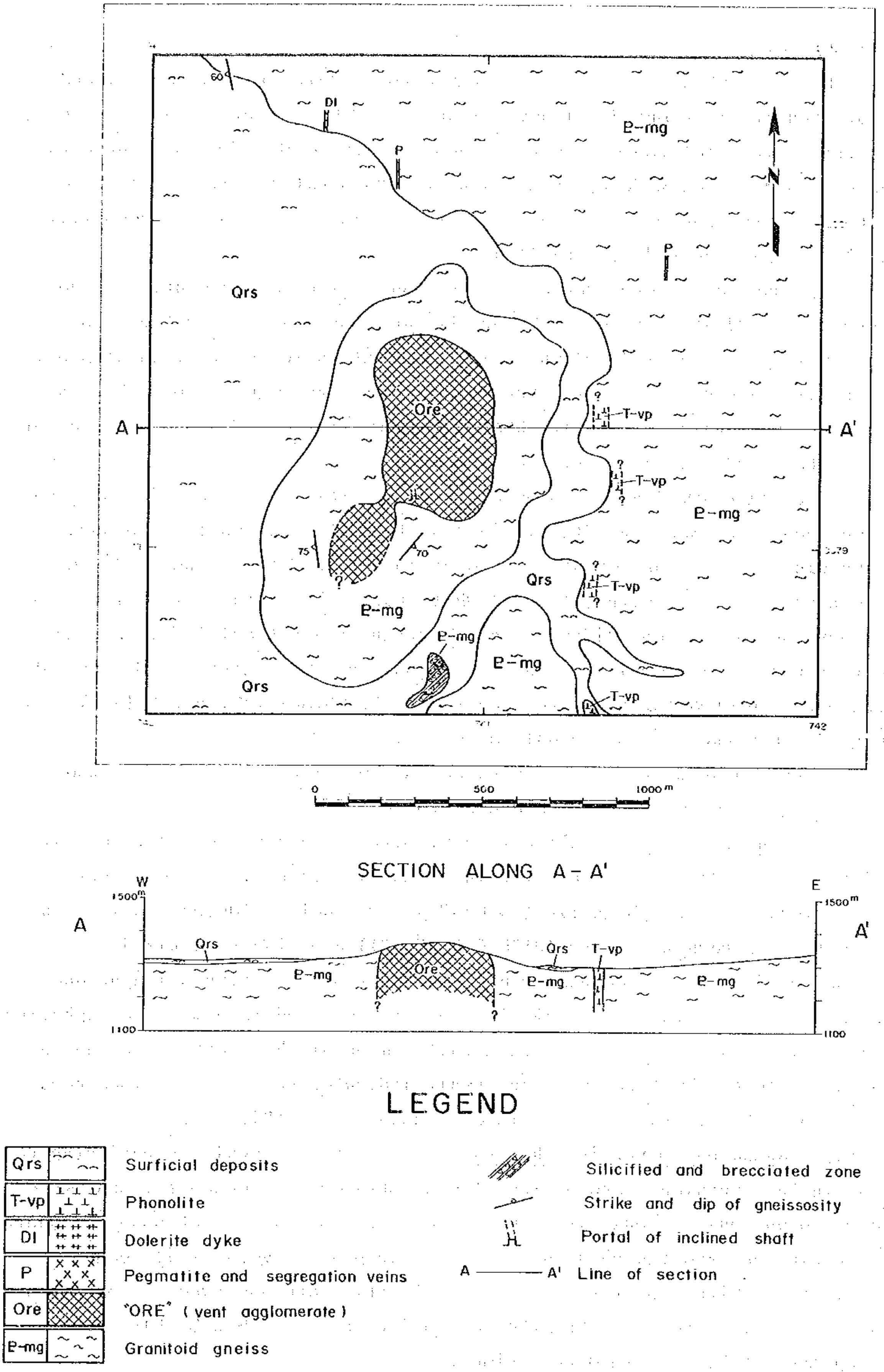


Fig. II-2-11-1 Geological Map of the Buru Hill Area

(4) Mineralization

On the surface of the hill(500m x 350m x 40m), outcrops and floats are sporadically distributed. Almost all these visible rocks on the surface are weathered materials,which are with abundant iron oxides but without carbonates minerals. Hereafter,these weathered and miralized rocks will be denoted as "Ore" for convenience'sake. The Ore is considered to be equivalent to "Vent agglomerate" by Binge(1962).

Although only "Ore" can be seen on the surface at present,it is not sure what kind of rocks occur below the soil covered part,as there is a possibility that only "Ore",which is resistant to weathering,has been able to remain on the surface as outcrops or floats. For,Cluver describes,based on the data obtained from pits,that deeply weathered soils and rocks occur below the hard lateritic skin on the surface.

The Ore resembles macroscopically rocks from leached capping of a sulfide deposit as Shackleton(1951) interpreted. It shows various colours depending on types and quantity of contained iron oxides;brown,reddish brown,wine red etc. with yellowish white parts where transparent minerals occupy. Abundant iron oxides occur as irregularly reticulated veins,impregnation,gossan,and somtimes even as residual massive magnetite. Six out of ten analyzed Ores contain more than 25% as Fe2O3(max.72%. APPENDIX-8). The brecciated structure is commonly observed.

Constituent minerals that have so far been identified by the studies including the previous studies are as follows.

(A) Opaque minerals: Goethite is pervasively abundant. Hematite,occasionally appears. Magnetite locally remains and in places it concentrates even to form massive ore. Maghemite(101079G:X=ray & polish.100097G:polish) and rare titaniferous magnetite(101055G & RN-401) are also recognized. These limonite,hematite,and maghemite are considdered to be alteration products from magnetite. Fine grains of electrum are observed in a massive magnetite sample(101071G). A vein of black metallic mineral that looks like manganese oxide is tested by X-ray,but the result indicates that it comprises hematite,dolomite,fluorite and suspiceous anhydrite(RN-401).

(B) Transparent minerals other than rare-earths minerals: Fluorite(up to 55% in thin sections) and barite (up to 30%) occur abundantly. Apatite occurs ubiquitously,though its absolute content is usually not so high. Quartz,chalcedony and amorphous silica occur in places. Very small amount of biotite,dolomite,anhydrite(X-ray RN-401),rutile are observed in some thin sections. Siderite,rhodochrosite,actinolite are described by Cluver,though they can not be confirmed this time .

(C) Rare-earths minerals: Pyrochlore[(Na,Ca)2Nb2O6(O,OH,F)] is recognized in some polished sections(100094G,100097G,101071G). Bastnaesite[(Ce,La)(CO3)F] is identified by X-ray in a single specimen(101079G). Monazite[(Ce, La, Nd)(PO4)] can not be confirmed by present study,though it is described by both Cluver(1958) and Binge(1962). It may occur as very fine grains like spherulites,or earthy secondary monazite. There is also a possibility that some supergene phosphate minerals such as gorceixite[BaAl3H(PO4)2(OH)6] etc.occur,being judged from occurrences of Ores and results of chemical analysis. For more exact mineral identification,further mineralogical examination is required.

(D) Vesicles: In some thin sections abundant vesicles are observed. These might represent sites of carbonates that were leached out during the supergene and/or hypogene alteration.

The results of the bulk assay of of 10 samples are shown in APPENDIX-8 and summary of the results of geochemical analysis are listed in TALBE II-2-11-1. In the latter,[Mean+2 Standard Deviations] for 1325 samples from all the Semi-detailed areas except Buru Hill and Ndiru Hill are shown as well. It is interesting that the Means for Ba,Y,Th,La,Ce,Yb,and Lu of Buru Hill are very close to [Mean+2 Standard Deviations] of the "All the Areas".

TABLE II-2-11-2 SUMMARY OF GEOCHEMICAL ANALYSIS —BURU HILL PROSPECT—

Item or Element	Unit	Number	Max.	Min.	Mean (m)	St.dev (S)*1	m+1s	m+2s	m+2s of All
γ-ray	cps	47	7610	997	3730	0.14	5150	7190	
Mag,Sus.	10 SIU	47	181	0.025	1.47	0.78	8.86	53.59	
P	%	47	8.85	0.01	0.20	0.57	0.88	2.69	2.17
Ba	ppm	47	46900	3610	20700	0.23	35100	53600	23600
Sr	ppm	47	6290	214	1100	0.32	2300	4890	9820
Nb	ppm	47	4800	100	688	0.42	1810	4824	2600
Y	ppm	47	3100	140	516	0.28	983	1860	344
U	ppm								
Th	ppm	47	1520	40	479	0.30	956	1900	440
La	ppm	47	19500	440	3150	0.41	8100	20500	3360
Ce	ppm	47	20000	660	4960	0.37	11600	23400	5460
Nd	ppm	47	2700	250	1330	0.24	2310	4110	2090
Sm	ppm	47	410	19	162	0.25	288	524	206
Eu	ppm	47	110	6	44	0.25	78.2	141	56.9
Gd	ppm								
Tb	ppm	47	50	2.9	14.3	0.24	24.9	43.3	18.6
Tm	ppm								
Yb	ppm	47	100	4.0	19.1	0.29	37.2	74.0	22.1
Lu	ppm	47	16	0.8	2.88	0.27	5.36	9.83	2.97

*1: Standard deviation in logarithmic scale.
* "m+2s of All": Figures for m+2s of 1325 samples from all the Semi-detailed Survey areas other than other the grid-sampled areas in the Buru and Ndiru Hills.

The antilog averages of 3 major "elements " for 47 Ore samples(excluding 2 gneiss samples) are 1.31% La+Ce+Nd(Max.3.98%),1071ppm Nb,and 637 ppm Y. The distributions of these elements are shown in Fig.II-2-11-4,5,and 6,and furhter description is made in (6).

The assay result for Nb205 of cores from the DDHs intersections by NCGF ranges from 0.18% to 0.61%(TABLE II-2-11-1),but no assay results for REEs are available.

(5) Gamma-ray and magnetic susceptibility

The measurements were carried out on a 25m interval along lines that were roughly spaced on a 100m-grid. They were done even at a site where there is no outcrop. The results are plotted in Fig.II-2-11-3 and the relationship retween readings of Gamma-ray and Magnetic susceptibility is shown in a scattered diagram(Fig.II-2-11-3).

The findings are as follows.

i) Whole the hillock shows very strong anomalous radioactivity more than 3000cps,which is about 15 times as high as the background.

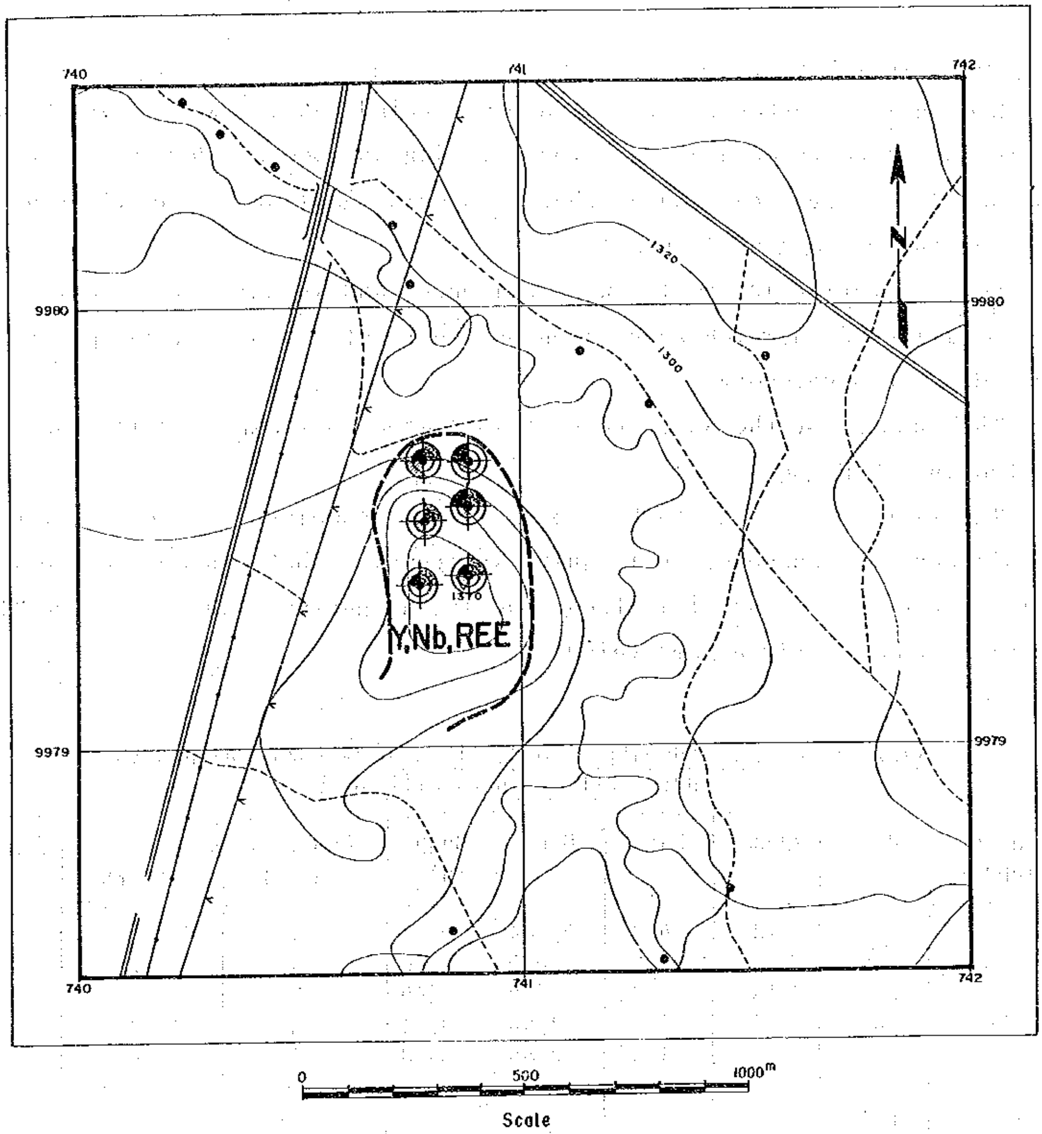
ii) The gamm-ray distribution seems to show a NW-SE trend.

iii) The magnetic susceptibility reflects the amount of magnetite and,the measurements on soils are obviously higher than those on outcrops, possibly due to the concentration of magnetite grains in soils.

iv) There is no correlation at all between gamma-ray and magnetic susceptibility.

v) Gneisses show very low readings for both gamma-ray(<3000cps) and magnetic susceptibility(<0.1).

The relationship of the two with chemical constituents will be discussed in next the next section (6).



LEGEND

Classification

Element	Anomalous, ≧ m+1S, <m+2S	Highly anomalous ≧ m + 2S
La ppm	≧ 767 , < 3,300	≧ 3,300
Y ppm	≧ 148 , < 344	≧ 344
Nb ppm	≧ 620 , < 2,600	≧ 2,600
P %	≧ 0.61 , < 2.17	≧ 2.17

m : mean , S : standard deviation

Figures are of 1325 rock samples from all the Semi-detailed Survey Areas other than the grid-sampled areas in the Buru and Ndiru Hills.

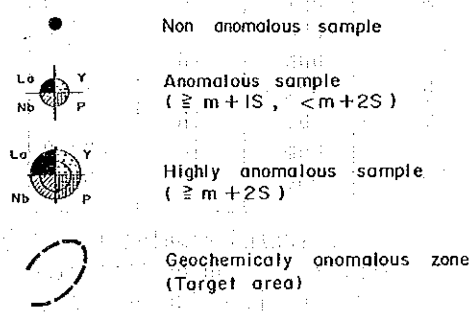


Fig. II-2-11-1A Geochemical Interpretation Map of the Buru Hill Area

(6) Geochemical Survey

Geochemical survey for the area was carried out in two different ways. One is so-called reconnaissance type sampling as same as that in other Semi-dailed Survey areas, and another is a grid-sampling in the limited area covering the hillock of Buru Hill.

For the former, 12 samples were collected and 18 samples including 6 from hillock area, which were taken on the first day on a wide spacing, are treated as this category.

The summary of the assay results is listed in TABLE II-2-11-3, and plotted in Plate-24.

The results indicate that almost all the anomalous samples are from the hillock area. However, it is quite interesting that a sample collected from the brecciated and silicified zone in the gneiss located 50 m south of the hill shows fairly higher values.

TABLE II-2-11-3 Summary of Statistics of Geochemical Analysis
Outer part of Buru Hill AREA

Item or Element	Unit	Number	Max.	Min.	Mean (m)	Number of samples *1		Remark
						≥m+1s	≥m+2s	
P	%	18	0.37	0.004	0.03	0	0	
Ba	ppm	18	46900	40.0	2640	6	0	
Sr	ppm	18	3230	22.0	440	0	0	
Nb	ppm	18	3700	2.50	37.1	3	1	
Y	ppm	18	1100	2.50	65.8	6	0	
U	ppm	18						
Th	ppm	18	1520	2.00	26.3	4	2	
La	ppm	18	13520	2.00	115	3	3	
Ce	ppm	18	16700	4.00	186	4	2	
Nd	ppm	18	2700	0.00	61.6	3	3	
Sm	ppm	18	310	0.20	10.8	6	0	
Eu	ppm	18	84.0	0.20	3.22	5	1	
Gd	ppm	18						
Tb	ppm	18	30.0	0.05	0.97	4	2	
Tm	ppm	18						
Yb	ppm	18	37.0	0.05	2.01	4	2	
Lu	ppm	18	5.30	0.05	0.41	5	1	

*: Six selected samples form the grid-sampled hillock area are included.
*1: Number of samples that exceed m+1s and m+2s for 1325 samples from all the Semi-detailed Survey areas.

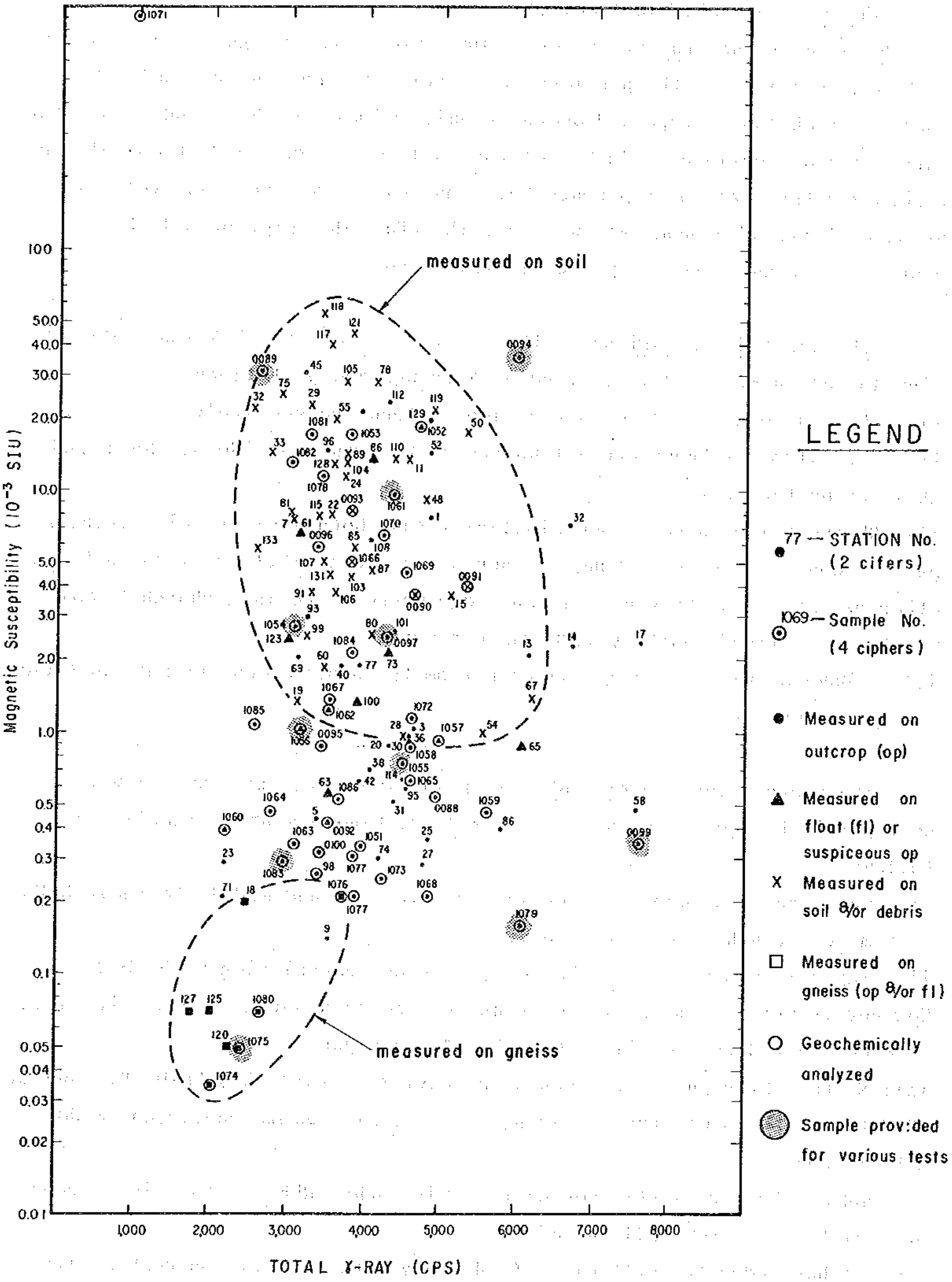


Fig. II-2-11-2 Scattered Diagram of the Total γ-Ray vs. Magnetic Susceptibility—Buru Hill Prospect

From hereafter,the grid-samples are to be treated.

(A) Univariate statistical analysis

Summary of the statistics for 47 Ore samples except gneiss are shown in TABLE II-2-11-2 in the previous section(4). As seen in the table,the whole hillock can be regarded as an anomaly for most of REEs and Y,when the thresholds are defined as "m+2s" of the "All the areas". And it may also be recognized that only 3 components Nb,Y,and "La+Ce+Nd" are relatively high or potentially of economical interest. Therefore description will be concentated to these three componets in this report.

The areal distributions of the major 3 components,Nb,Y,and La+Ce+Nd are plotted in Fig.II-2-11-4,5,and 6. Findings are as follows.

i) Three have different deistribution patterns respectively.

ii) The values of these are all barren at the western side of the hllock, at least on the surface.

iii) Nb and La+Ce+Nd have some similarity that both show in half circular pattern open to the west,though higher areas are a little shifted each other except on on the southwestern ridge where there is a church,towards which the inclined shaft by NCGF was excavated.

iv) Y have a quite different pattern from the others,showing a NE-SW trend and some 3 centers.

The coorelation coefficients among 14 elements,gamma-ray,and magnetic susceptibility are shown in TABLE II-2-11-4. Findings are summarized as follows.

i) Gamma-ray has moderate correlation with Y,Th,and middle to heavy REEs from Eu through Lu(0.41 to 0.51).

ii) Magnetic susceptibility has only moderate correlation with Nb(0.412). However,if original magnetite contents before demagnetization by alteration were considered,the coefficient might show a higher figure.

iii) Y has very high coefficents with heavy REEs Tb(0.832),Yb(0.781) and Lu (0.828). It shows moderate figures(0.4-0.55) with gamma-ray,Th,and middle REEs Sm and Eu.

iv) La and Ce have little correlation with other REE,and this is a prominent difference from "All AREAS".

v) Nb has moderate coefficients(0.4) only with magnetic susceptibility and P,and this is also quite different from the "All AREAS",in which Nb has moderate values with Ba,Th,and almost all REEs.

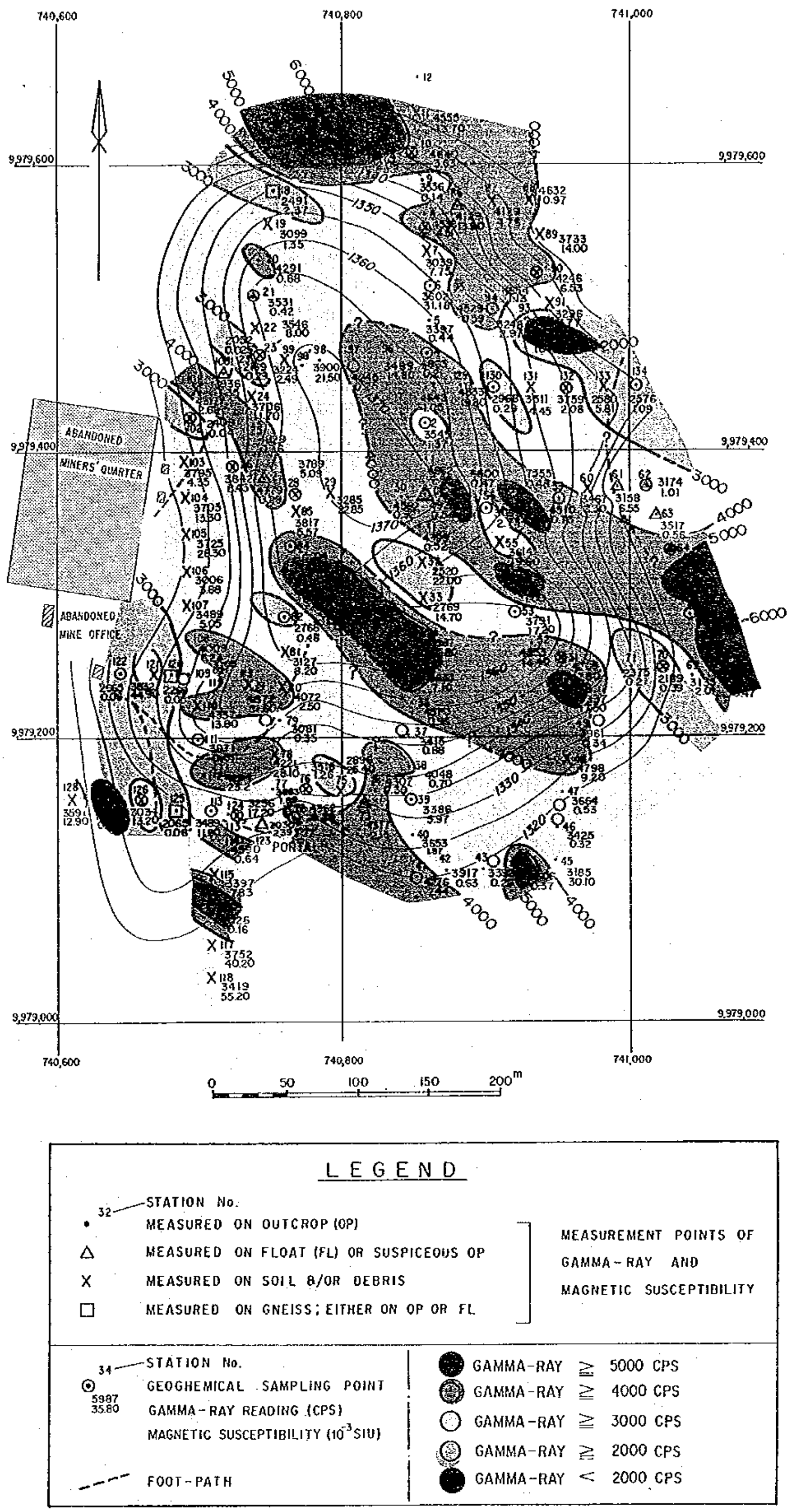


Fig. II-2-11-3 Distribution of γ-Ray Readings —Buru Hill Prospect

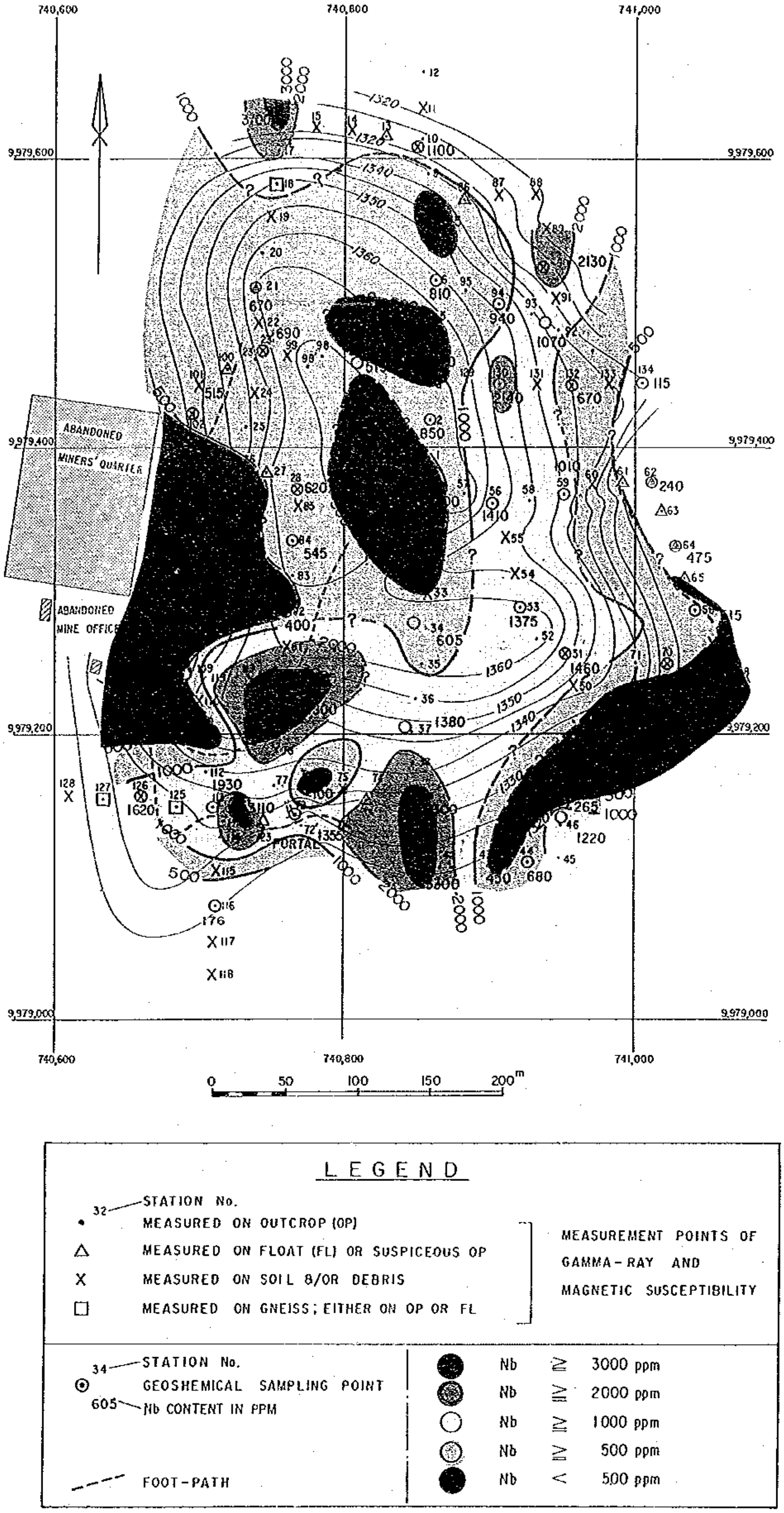


Fig.II-2-11-4 Distribution of Nb Contents —Buru Hill Prospect

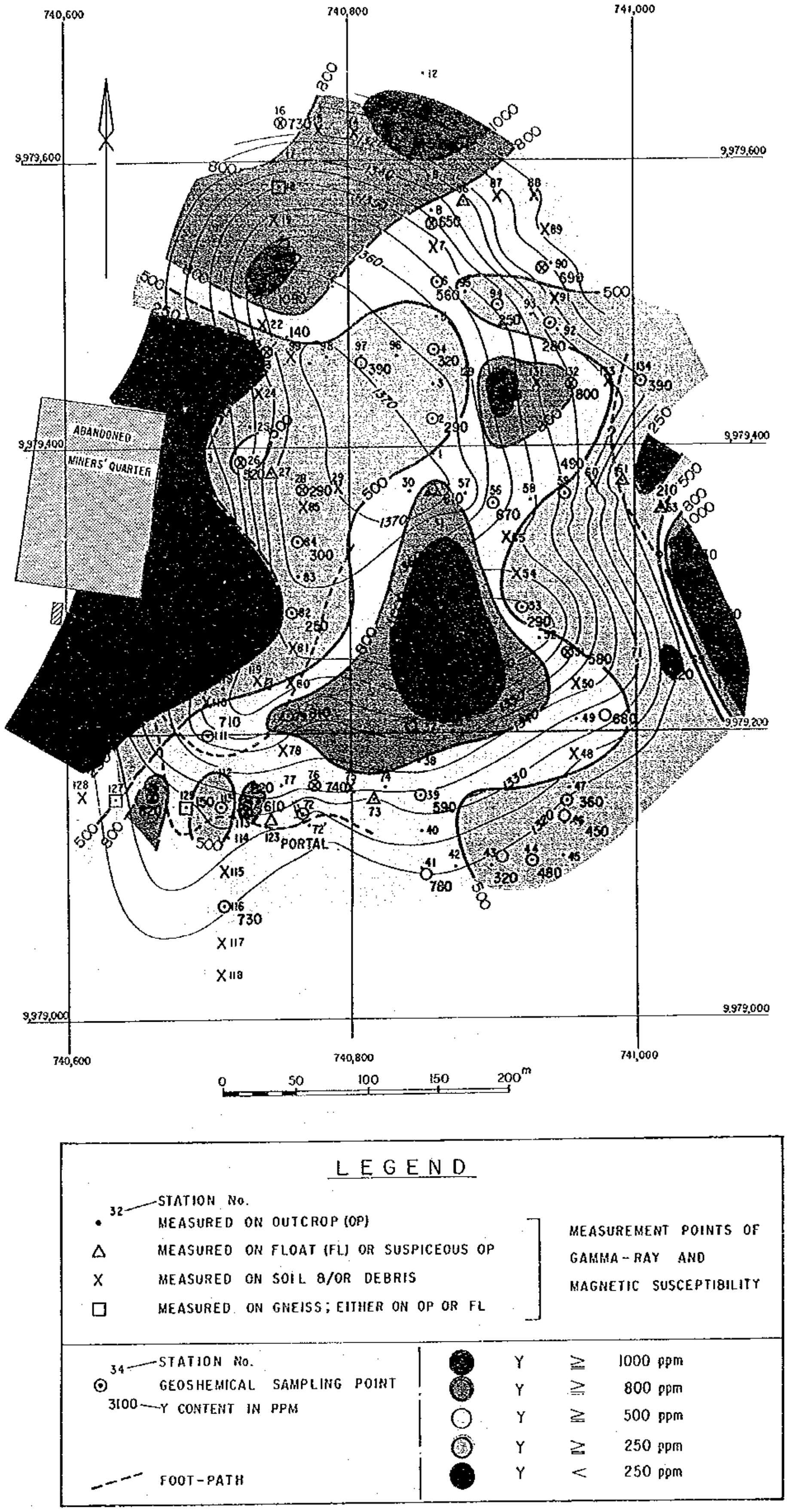


Fig. II-2-11-5 Distribution of Y-Contents —Buru Hill Prospect

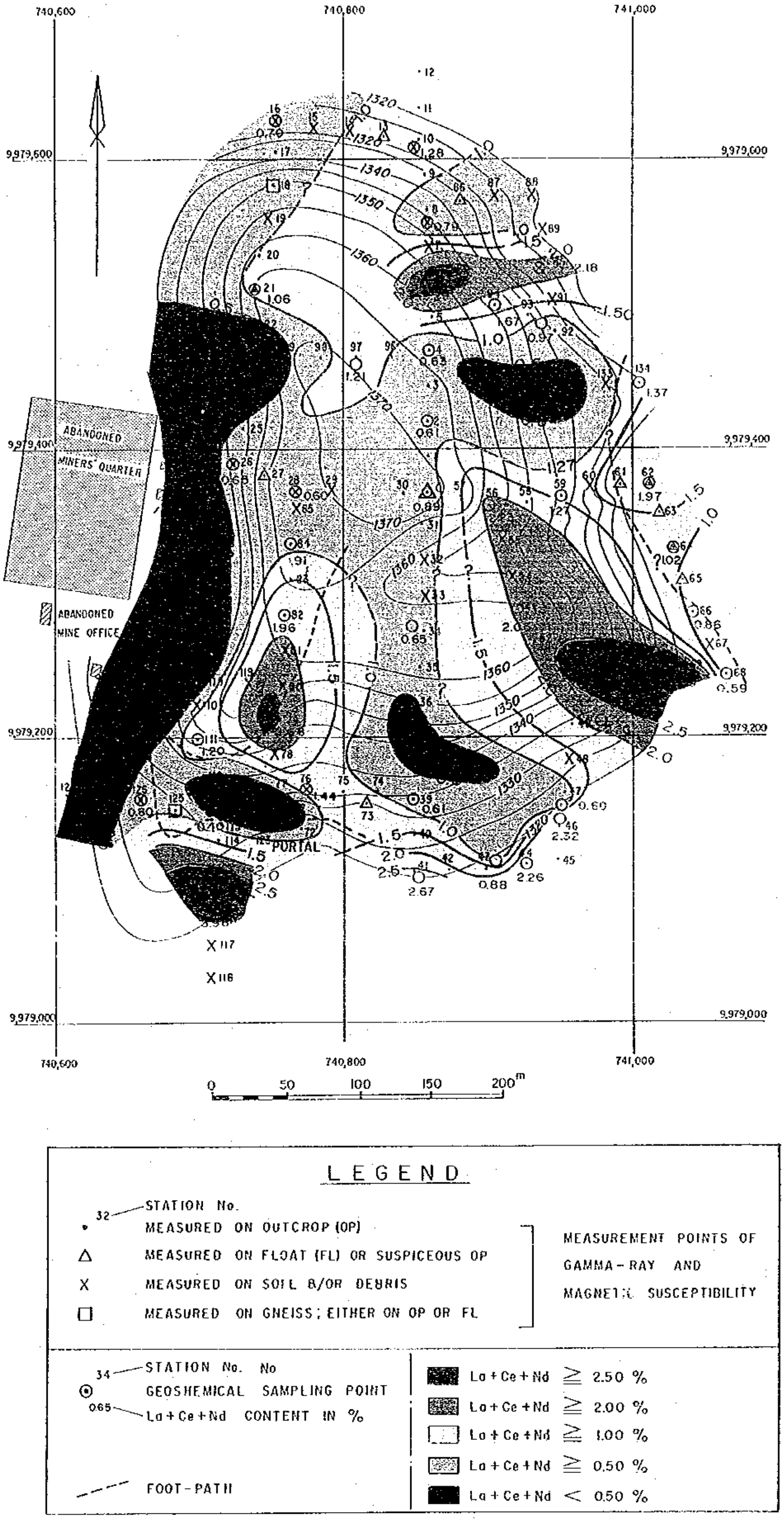


Fig.II-2-11-6 Distribution of Combined La, Ce and Nd Contents—Buru Hill Prospect

TABLE-II-2-11-4 CORRELATION COEFFICIENTS —BURU HILL(GRID-SAMPLES)

	γ-ray	Mag,Susc	P	Ba	Sr	Nb	Y	Th	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu
γ-ray	1.000															
Mag,Susc	-0.132	1.000														
P	0.114	0.333	1.000													
Ba	0.162	0.164	0.139	1.000												
Sr	0.017	0.134	0.547	0.263	1.000											
Nb	-0.081	0.414	0.409	0.180	0.140	1.000										
Y	0.464	0.191	0.241	0.419	0.272	0.132	1.000									
Th	0.430	0.073	-0.026	0.266	-0.125	0.169	0.490	1.000								
La	0.101	0.031	-0.001	0.457	0.399	-0.040	0.070	-0.064	1.000							
Ce	0.119	0.070	-0.033	0.499	0.320	-0.006	0.047	0.107	0.933	1.000						
Nd	0.284	0.207	-0.067	0.532	0.089	-0.104	0.253	0.426	0.564	0.736	1.000					
Sm	0.402	0.175	-0.094	0.389	-0.041	-0.112	0.520	0.724	0.060	0.227	0.633	1.000				
Eu	0.467	0.132	0.024	0.397	0.018	0.004	0.548	0.585	0.206	0.347	0.707	0.651	1.000			
Tb	0.502	0.239	0.212	0.348	0.162	0.141	0.832	0.710	-0.033	0.029	0.394	0.623	0.693	1.000		
Yb	0.484	0.128	0.269	0.288	0.229	0.0004	0.781	0.449	-0.027	-0.007	0.234	0.502	0.574	0.731	1.000	
Lu	0.405	0.172	0.219	0.273	0.227	-0.018	0.828	0.337	0.030	-0.018	0.298	0.454	0.534	0.748	0.781	1.000

TABLE II-2-11-5 SUMMARY OF PRINCIPAL COMPONET ANALYSIS--BURU HILL (47 GRID-SAMPLES)

Prin-cipal Compo.	EIGEN Value	Cont-ribu-tion	Cumm. Cont-ribut.	Item	γ-ray	Mag.	P	Ba	Sr	Nb	Y	Th	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu	
1	5.866	0.367	0.37	Eigen vector	0.240	0.104	0.089	0.238	0.104	0.039	0.343	0.280	0.144	0.151	0.278	0.311	0.340	0.362	0.322	0.314	
				Factor loading	0.582	0.251	0.214	0.576	0.235	0.093	0.831	0.678	0.277	0.365	0.673	0.752	0.823	0.877	0.780	0.761	
				Contribution	0.339	0.063	0.046	0.331	0.064	0.009	0.691	0.459	0.077	0.133	0.453	0.566	0.678	0.770	0.608	0.580	
2	2.670	0.167	0.53	Eigen vector	0.090	-0.006	0.073	-0.260	-0.171	0.046	0.180	0.122	-0.538	-0.552	-0.346	0.013	-0.038	0.201	0.215	0.196	
				Factpr loading	0.147	-0.010	0.119	-0.425	-0.279	0.076	0.295	0.200	-0.879	-0.901	-0.565	0.020	-0.062	0.329	0.352	0.320	
				Contribution	0.022	-0.000	0.014	0.181	0.078	0.006	0.087	0.040	0.773	0.813	0.319	0.000	0.004	0.108	0.124	0.102	
3	2.153	0.135	0.67	Eigen vector	0.146	-0.335	-0.545	-0.103	-0.458	-0.418	-0.112	0.187	-0.065	0.009	0.173	0.238	0.164	-0.017	-0.060	-0.075	
				Factpr loading	0.214	-0.492	-0.800	-0.152	-0.672	-0.613	-0.164	0.275	-0.095	0.013	0.254	0.349	0.240	-0.025	-0.088	-0.110	
				Contribution	0.046	0.242	0.640	0.023	0.451	0.376	0.027	0.075	0.009	0.000	0.065	0.122	0.058	0.001	0.008	0.012	
4	1.353	0.085	0.75	Eigen vector	-0.239	0.494	-0.076	0.087	-0.369	0.481	-0.148	0.302	-0.172	-0.015	0.159	0.175	0.100	0.042	-0.223	-0.240	
				Factpr loading	-0.278	0.575	-0.088	0.102	-0.429	0.560	-0.172	0.351	-0.200	-0.018	0.185	0.203	0.117	0.049	-0.260	-0.280	
				Contribution	0.077	0.330	0.008	0.010	0.184	0.313	0.030	0.123	0.040	0.000	0.034	0.041	0.014	0.002	0.067	0.078	

Chondrite Normalization patterns of REEs for 12 samples that are examined by various tests are illustrated in Fig.II-2-11-7, and compared with other areas and other rock types in Figs.III-1-1 and III-1-2.

As number of elements chemically analyzed are fairly large,the principal component analysis was carried out. However,it has become clear that the analysis is not so useful in the case of Buru Hill,as (1) number of samples are rather small(47), (2) REEs belong to an intimate group and behave similarly, (3) Buru Hill itself is already an anomaly and there is little motive to utilized the principal component analysis in order to locate target areas.

Summary of the principal component analysis of major first four components is listed in TABLE II-2-11-5. The cumulative contribution of the four is 75%. Findings are as follows. .

i) The first principal component Z1 represents 36.7% of the total amount of information on the analytical data. This is stromgly affected by the values of Y(factor loading 0.83) and middle to heavy REEs from Sm through Lu(0.75 to 0.88),and moderately by Th,Nd,gamma-ray and Ba(0.58 to 0.68). It is interesting that in this pospect, Y and heavy REEs are differenly behave from light REEs La and Ce, which are in the same component with other REEs in the case of "All the areas".

ii) The second,Z2 represents 16.7%,and is decided mainly by the values of La(-0.88),Ce(-0.90) and Nd(-0.57). This componet may represent the secondary concentration of light REEs in the oxidized zone by the supergene alteration.

iii) The third,Z3 represents 13.5% and is decided mainly by P(-0.8), Sr(-0.67), Nb(-0.61), and Mgnetic susceptibility(-0.49).

iv) The fourth,Z4 represents 8.5% and is decided by magnetic susceptibility(0.57) and Nb(0.56). This likely represents the mineralization of magnetite and Nb bearing minerals.

The scores of the four principal components of each station were plotted in plans and "Iso-score curves" were drawn. Statistical analysis for the scores was carried out in the same way for analytical data, in order to delineate ANOMALOUS zones.
However,these are not attached to this report,since the results have returned almost the same to those of the univariate analysis of Nb,Y,and La+Ce+Nd.

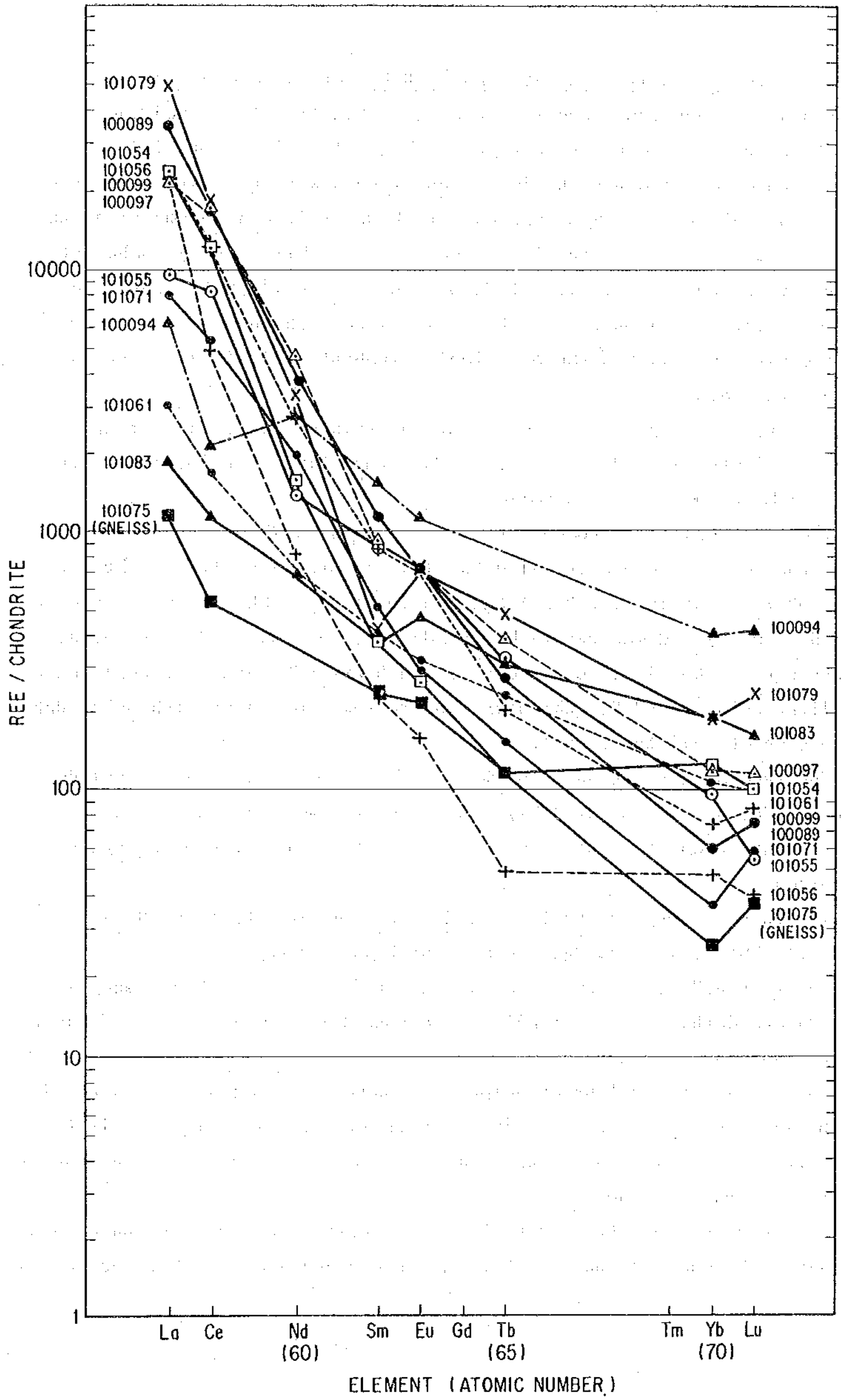


Fig.II-2-11-7 Chondrite-normalized abundances of the REE—Buru Hill Prospect

(7) Discussion

Integrating all the results that have been revealed up to date,discussion is made as follows.

i) The mineralization at Buru Hill is considered to be related with carbonatites that intruded into the granitoid gneiss,although little carbonate minerals are recognized at the surface. For,sovite is described to occur at depths in DDHs by NCGF,and the Chondrite normalized REEs patterns imply the origin of carbonatite related mineralization. Lack of carbonates at the surface may partly be attributed to the heavy leaching by weathering.

ii) The Ores that can be seen at the surface are extremely oxidized to show an appearance similar to the leached cap of a sulfide deposite.The ores contain abundant goethite,which is interpreted to be derived from magnetite from its occurrence. This occurrence suggests that there is a possibility that light REEs such as La and Ce may be concentrated in the oxidized zone,whereas some elements such as Nb,Y,etc might be concentrated at depths,where a reduced condition is expected.

iii) The chemical analysis of the 47 surface samples for 17 elements has revealed that there is no element that reaches a currently economic grade. The elements of relatively higher grades are light REEs; the antilog arithmetic averages of La+Ce+Nd is 1.31%e(Max=3,98%). On the other hands,Nb and Y are considered to be prospective,though the grades of the surface samples are not so high(Nb:Av.=0.11%, Max =0.48%. Y:Av.=0.06%,Max.=0.31%) from the reason mentioned above.

Other elements such as P,Ba,Sr,Th,U etc. are considered by fur the less prospective,being judged from both present content levels,and geochemical and geological interpretations.

2-12 Legetet Hill Area

The Legetet Hill is a parasitic Hill of the Tindret Volcano, one of large scale stratavolcanos in the West Kenya, and is located in the south-western piedmont of the volcano.

The Tindret volcano is mostly composed of volcanic materials produced by basalt-nephelinite activities and belongs to the Kenya Rift valley type rather than to the carbonatite-nephelinite type. However, carbonatite nephelinite type volcanisms have also taken place in a series of the Legetet Volcanos, because carbonatites are found in the Legetet Hill, the parasitic volcano.

(1) Geographical Background

(A) Location and Access

The Legetet Area is located in the northeastern part of the project area, approximately 55 km to the east of Kisumu or 25 km to the north northwest of Kericho and occupies an area of 30 sq.km, 6 km long in the N-S direction and 5 km wide in the E-W direction, which belongs largely to the Kisumu district, Nyanza province, and partly to the Kericho district, the Rift Valley pronvince in the northeastern corner.

The area is easy to access, with the National highway B-27 available along the southern border of the area, running parallel to the railway between Nairobi and Kisumu. Koru, the major town in the general area, is located in the southeastern part of the semi-detailed survey area and is reached by take the C-27 for a distance of 2 km off the B-27. The Legetet Hill is surrounded by sugar came fields where a number of tracks and trails are constructed for agriculture.

It takes about 40 minutes by car for a distance of approximately 40 km to reach this area from Kericho, the major city in the province of Rift Valley.

(B) Topography

The Lagetet Hill is a table top hill, 3 km long in the east-west and 1 km wide in the north-south, with appreciably steep hill sides and a flat top elongated in the east-west direction. Its top reaches 1,680 m in an elevation above sea level or 400 m above the surrounding plains. Its foot-hill areas, with very gentle slopes, continue northwards to the extensive foot plains of the Tindred Volcano and grade eastwards, southwards and westwards into the surrounding plain. The foot hill areas are extensively cultivated for sugar canes.

(2) Previous Work

Those who noted carbonatites in the Legetet Hill for the first time are LeBas and Dixon (1965). The previous work to them regarded all the carbonate rocks around the Legetet Hill as limestones. The explanatory note, "Geology of the Kericho Area (Binge, 1962)", for the 1 to 125,000 defines the carbonates as the locustrine deposits of early Miocane age.

Since the work by LeBas and Dixon, the carbonates have been regarded as carbonatite and studied petrologically and geochemically.

Investigations of the so-called "limestones" around the Legetet Hill for a possible cement industry were carried out in 1940s and 1970s several times each. Theuri (1987) put together all past data and concluded that a sufficient reserve of limestone would be expected for a cement industry in this area but with insufficient data, it would be necessary to confirm the reserve by drilling for an appropriate evaluation.

Another work is a series of investigations for industrial minerals carried out by the Finnish Geological Survey and the Mines and Geological Department of Kenya during the periods from 1981 to 1987 as a part of the technical co-operation scheme between the Governments of Finland and the Republic of Kenya. A detailed investigations (Alviola et. al. 1985) including drilling were done to evaluate the suitability of the limestones in this area for cement raw materials.

(3) Geology

The geological plan and cross section of this area are presented in PL-15 and Fig. II-2-12-1. The geology of this area consists of gneissic rocks of the Precambrian basement, tuffs, carbonatitic volcanics and the Tindret Volcanics of Miocene, and the Quarternary formations. These rocks are hereunder described according to the classification adopted in the geological maps.

Granitoid gneisses (P-mg): There are two small outcrops of gneissic rocks in the southwestern part of this area Binge (1962) correlated the gneissic rocks to the Basement Series (called the Mozambique Metamorphics presently).

Tuffs (Tmvf): The tuffs are distributed extensively in this area, and are light brown, light grey or occasionally reddish brown, and well-developed with beddings. There are 2 kinds of tuffs, calcarous and non-calcarous, which alternate with each other in some occurrences. Thin beds of fine to medium grained conglomerates containing fragments of gneissic rocks are often interbedded and developed with graded beddings. The tuffs are correlated to the Koru formation of Miocene and indicate the K-Ar ages of 19.5 to 19.6 Ma (Pickford et. al., 1981).

Carbonatitic Volcanics: The carbonatitic volcanics are devided into the carbonatitic pyroclastics (T-vfb), carbonatitic lavas (T-vc) and carbonatitic stratified tuffs (T-vfc).

Carbonatitic Pyroclastics: The carbonatitic pyroclastics are distributed, forming tiny hills, in the northeastern and northern piedmonts of the Legetet Hill and in the northern end and the north eastern part of this area. These rocks are light grey, grey or light brown, and contain a considerable amount of carbonatite fragments. These facies are variable from tuffs to volcanic breccias, though the volcanic breccias are most predominated as a whole. The angular fragments are of carbonatites such as alvikite and sovite and of basement gneissic rocks which are extremely altered. The matrices consist of powderly fragments of carbonatite and gneissic rocks, and of carbonatitic ashes, and characteristically contain a considerable amount of magnetite.

Those pyroclastics which are distributed in the northeastern and eastern piedmont of the Legetit Hill are being mined as row materials for building blocks and quick limes. The northeastern one is most actively being operated at the present time and has a mining area of 2,500 m round where the rocks are well exposed. In this mining site, coarse and fine grained facies are complicately mixed, and contain abundant carbonized fragments of plants. This occurrence suggests that the rocks may have deposited as pyroclastic flows.

Two samples (1010476G and 99759G) collected in the northeastern piedmont of the Legetet Hill and the northeastern part of this area are examined under the microscope and submitted for the chemical analysis. The results are shown in APX-2 and APX-9 respectively. The rare earth contents and their pattern in order of atomic numbers are typically of carbonatite.

Carbonatite Lavas (T-vc): The carbonatite lavas are distributed in a very limited area in the northern part of this area. The rocks are light brown and fine grained, compact and hard. Fine grained carbonates and a minor amount of magnetite are megascopically identified.

Bedded Carbonatitic Tuffs (T-vfc): The carbonatitic layered tuffs are distributed in an area 1,200 m long in the E-W and 500 m wide in the N-S in the northern piedmont of the Legetet Hill. The rocks consists of light brown sandy tuffs and grey tuffs containing carbonized fragments of plants. These two facies, both calcareous, alternate with each other.

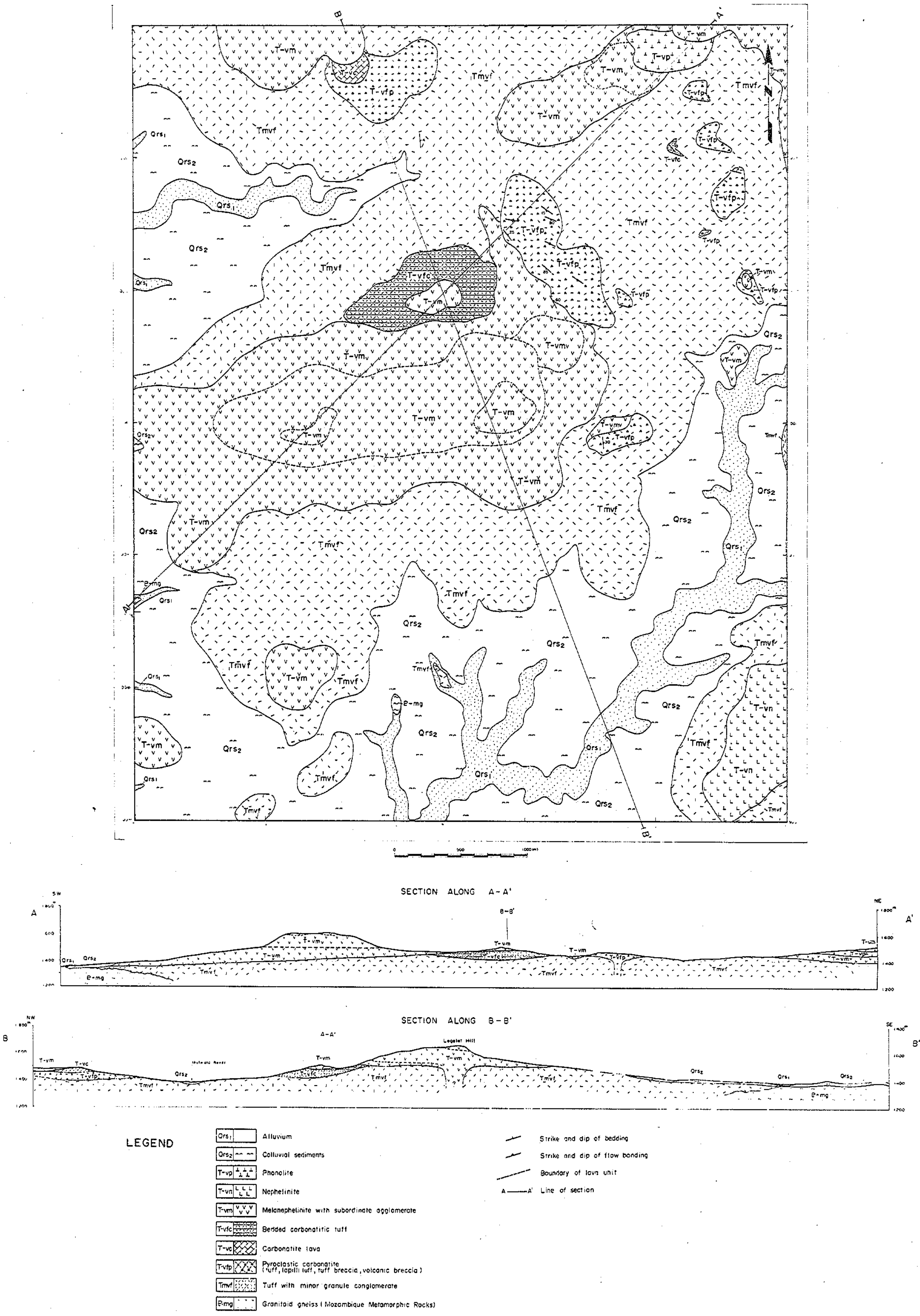


Fig. II-2-12-1 Geological Map of the Legetet Hill Area

Graded bedding are well developed and fine conglomerate beds, containing mostly carbonatite fragments, are often interbedded.

The rocks are horizontally deposited and estimated at 80 m in thickness from their relation with the overlying and underlying units.

Tindret Volcanics: The Tindret volcanics comprises melanepherinite (T-vm), nephelinite (T-vn) and phonolite (T-vp).

Melanephelinite (T-vm): The melanephelinite constitues the whole mass of the Legetet Hill and also is distributed around the area for the semi-detailed survey. The rocks are dark grey or dark brown and fine grained compact, and consist of two kinds; porphyritic and aphanitic types. Pyroxene and nepheline phenocrysts are megascopically observed in the prophyritic type.

Sample (99743G) of fresh melanephelinite collected on the top of the Legetet Hill are examined under the microscope and submitted for the chemical analysis. The results are shown in APX-3 and APX-8 respectively. Its normative composition and plot on the diagram for the classification of the alkaline volcanic rocks are presented respectively in APX-8a and APX-8b. The result of the K-Ar age determination of this sample (APX-10) indicates 10.7 Ma which is correlated to the early stage of or a preceding activity to the Tindret Volcanism with the results of the K-Ar age determination ranging from 5.6 to 9.9 Ma according to Pickford et. al. (1981).

Nephelinite (T-vn): The nephelinite is distributed in the southeaster corner of this area. The rocks are grey or dark grey, fine grained and vitreous.

Phenolite (T-vp): The phonolite is distributed in a very limited area in the northeastern part of this area. The rocks are blueish grey and porphyritic. Phenocrysts of potash feldspar and pyroxene are megascopically observed.

Quarternary Formation (Colluvial sediments; Qrs2, Alluvials; Q-Sl): The colluvial sediments are developed on the gentle slopes of the outskirt of the Legetet Hill in the Western, central eastern and southern part of this area. The alluvials are distributed along rivers and creeks.

(B) Geological Structures

All the carbonatitic rocks in the Legetet Hill area, different fro those in the other areas for the semi-detailed survey, show extrusive or post extrusion sedimentary facies. The melanephelinite distributes ovarlying these carbonatitic rocks. The occurrence suggests that the melanephelinite in the centre of the Legetet Hill may have formed a lava dome originally.

(4) Geochemical Survey

(A) Sampling

116 rock samples were collected for geochemical use in this area. Among them, 61 samples are carbonatitic rocks, and other 55 include non carbonatitic tuff and rephelinite-phonolitic rocks.

(B) Statistical Values and the Characteristic

The summary of assay results and the statistics are shown in the Table II-2-12-4-1.

TALBE II-2-12-4-1 SUMMARY OF STATISTICS OF GEOCHEMICAL ANALYSIS-LEGETET HILL-

Element	Unit	No of sample	Max.	Min.	Mean (m)	Number of samples ≧ m+1s	≧ m+2s	Remarks *1
P	%	116	1.45	0.006	0.35	19	0	0.55
Ba	ppm	116	26600	20.0	1790	3	1	3423
Sr	ppm	116	6470	11.0	1930	30	0	3696
Nb	ppm	116	3800	2.50	204	6	1	457
Y	ppm	116	750	2.50	73.5	25	2	160
U	ppm	116	17					
Th	ppm	116	119	0.50	16.8	2	0	41
La	ppm	116	3730	0.50	194	4	2	568
Ce	ppm	116	7190	2.00	335	4	1	918
Nd	ppm	116	1880	2.00	127	5	0	322
Sm	ppm	116	245	0.05	16.9	4	1	41.6
Eu	ppm	116	72.4	0.25	6.20	10	2	14.9
Gd	ppm	116	50					
Tb	ppm	116	28.0	0.05	2.03	7	1	5.2
Tm	ppm	116	10					
Yb	ppm	116	46.7	0.05	3.52	27	2	9.1
Lu	ppm	116	7.30	0.05	0.56	15	2	1.3

*1: Arithmetic averages of carbonatitic rocks in antilogarithmic scale.

Means for each elements of rock samples in the area are almost same as that of 1325 samples in all semi-detailed survey area.

Chondrite-normalized abundances of the REE of carbonatitic rocks in the area are plotted in Fig. II-2-12-2. As seen in the figure, the pattern and contents of REE are almost same as alvikite or sovite in the all semi-detailed survey areas except Buru Hill and Ndiru Hill prospects, indicating that the "calcareous rocks" in the area are carbonatite in origin.

(C) Interpretation of Geochemical Anomaly

Interpretation result of geochemical anomalies in the area is presented in Plate 25 and Fig. II-2-12-3.

Samples which have anomalous values for certain elements such as P, Sr, Y, Eu, Yb and Lu are limited in areas of carbonatitic rocks. And then samples which have highly anomalous values for some elements are only following three samples.

Sample No.	Nb	Y	La	Ce	Nd	Sm	Eu
100742G	185	82	186	369	128	21.5	67.0
101040G	190	630	3500	2900	1025	124.5	39.7
101043G	3800	750	3730	7190	1880	245.0	72.4

(ppm)

The first one (100742G) has highly anomalous value for Eu, but contigious samples have not show any highly anomalous value to form an anomaly.

The latter two samples were from carbonatitic pyroclastics occurring values in the northeast piedmont of the Legetet Hill. They have highly anomalous for L-MREE and Y, but they are not accompanied by any other anomalous or highly anomalous samples to form an anomaly.

(5) Discussion

So called "calcareous rocks" in the area were turned out to be carbonatite through the geological and geochemical survey.

An anomaly for Y and L-MREE was found in an area which was thought to be one of the eruption center of carbonatitic rocks in the area, but the areal extent is too small to form an anomaly zone for further exploration.

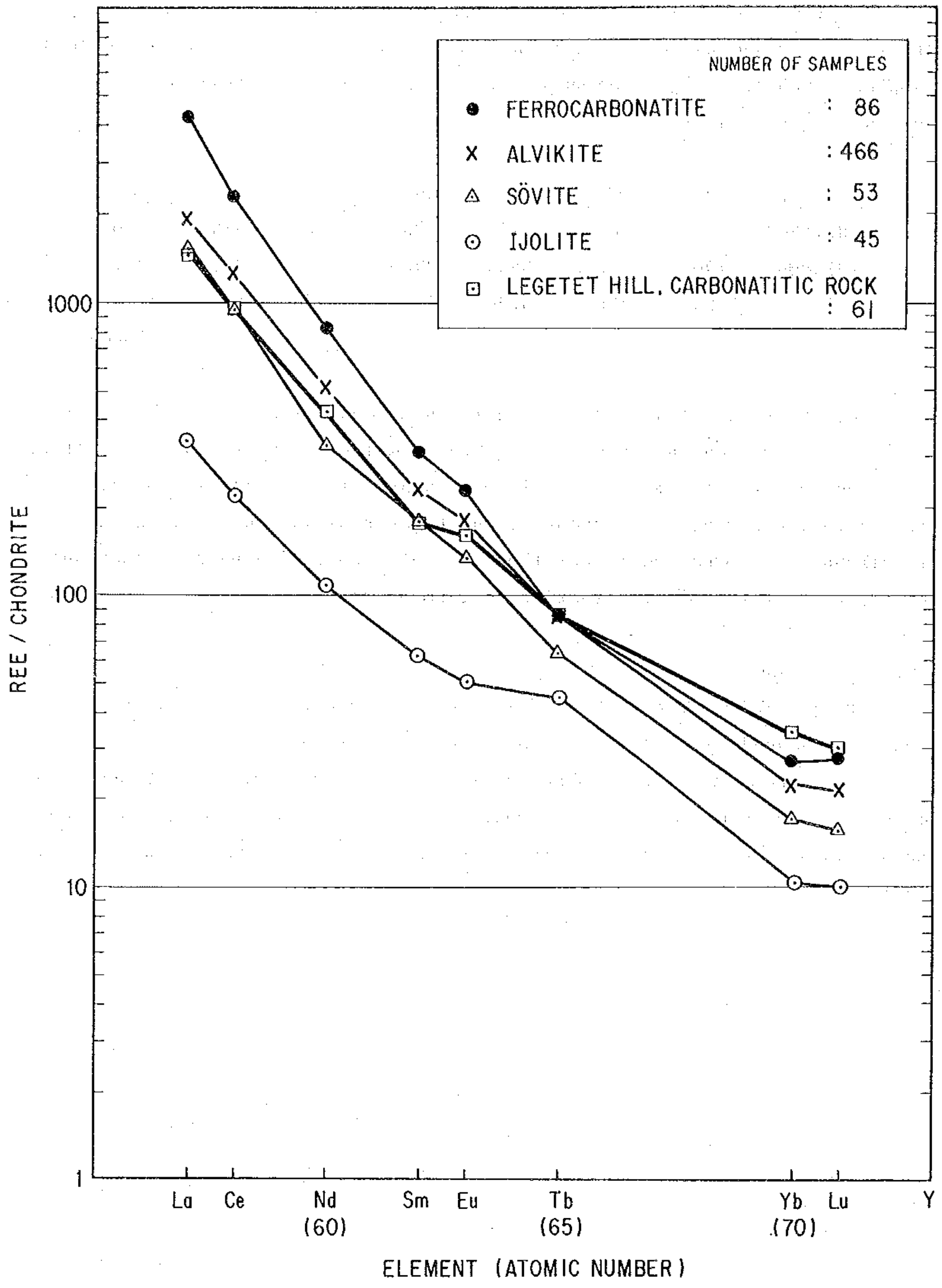
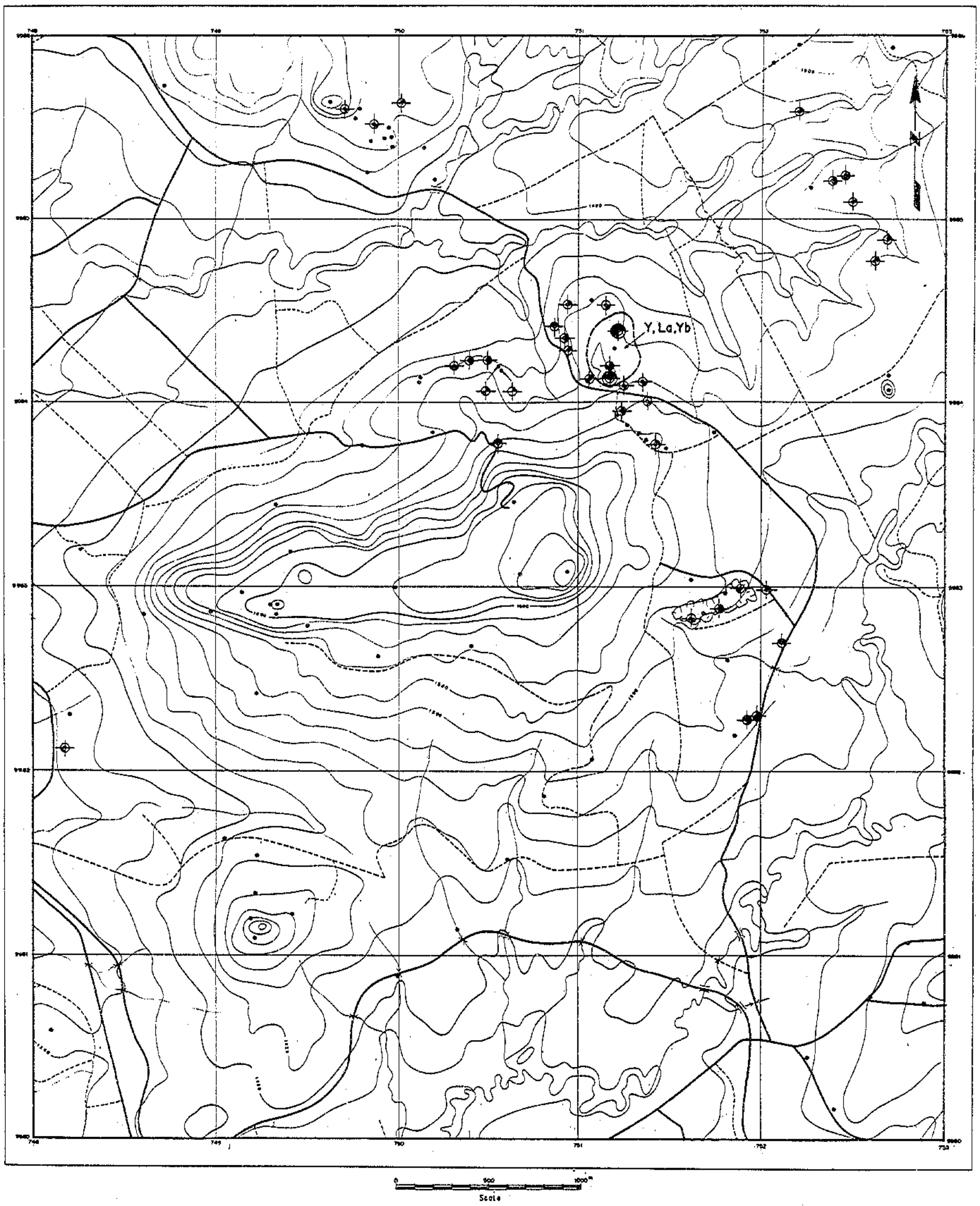


Fig.II-2-12-2 Chondrite-normalized abundances of the REE of Carbonatitic Rocks in the Legetet Hill Area



LEGEND

- Non anomalous sample
- Anomalous sample (≧ m + 1S , < m + 2S)
- Highly anomalous sample (≧ m + 2S)
- Geochemicaly anomalous zone

Classification

Element	Anomalous, ≧ m+1S, <m+2S	Highly anomalous ≧ m + 2S
La ppm	≧ 767 , < 3,300	≧ 3,300
Y ppm	≧ 148 , < 344	≧ 344
Nb ppm	≧ 620 , < 2,600	≧ 2,600
P %	≧ 0.61 , < 2.17	≧ 2.17

m : mean , S : standard deviation

Figures are of 1325 rock samples from all the Semi-detailed Survey Areas other than the grid-sampled areas in the Buru and Ndiru Hills.

Fig. II-2-12-3 Geochemical Interpretation Map of the Legetet Hill Area