CHAPTER 5 KUGE-LWALA AREA

5-1 General geology

In the area of Wasaki Peninsula, to the west of the town of Homa Bay, ijolite and carbonatite bodies are known to be distributed at several localities. The Kuge-Lwala Area located at the southwestern end of the peninsula includes small carbonatite bodies at Kuge Hill and Lwala.

The body at Kuge Hill is a cone-sheet of carbonatite, close to which a ferrocarbonatite dyke occurs. The cone-sheet seems to represent a top of an intrusive, so that a massive body may be expected at the depths. The ferrocarbonatite dyke is 30 to 40 m wide and more than 450 m long in a N-S direction dipping to the west.

The body at Lwala is mainly comprises ferruginous breccias, which contain carbonatitic fragments. It is observed in an area of about 0.3 km^2.

5-2 Results of geological survey

(1) Geology

The geology in the area comprises basement Nyanzian metabasalt, Tertiary volcanics, carbonatites, ferruginous breccias and Quarternary surfical deposits.

The Tertiary volcanics are subdevided into nephelinite pyroclastics (T-vn), melanephelinite (T-vm), porphyritic phonolite (T-vp) and phonolitic nephelinite (T-vpn).

The carbonatites are subdevided into alvikite (Ca) and ferrocarbonatite.

The geological plan and cross sections in the area are presented in Fig. II-5-1. The generalized columnar section in the area is shown in Fig. II-5-2.

(2) Geological structures

The Nyanzian metabasalt near the top of the Kuge Hill is presumed to have been elevated by about 60m, in comparison with the surrounding eroded surfaces, caused by an intrusive activity of alvikite and ferrocarbonatite. The elevated portion has a circular structure ranging from 500 to 600m across in diameter and comprises a core of the metabasalt enclosed by alvikite and ferrocarbonatite in semi-circular occurrence outwards from the core. The structure is, though much smaller in scale, similar to that around the top of the North Ruri Hill. No carbonatite is observed in southern half of this area, what may suggest that a carbonatite cone sheet was out of a reach to the ground surface.

In summary, it may be presumed that the Kuge Area represents the upper-most part of a carbonatite cone sheet and a massive circular carbonatite cone sheet occurs at depth.

Two sectors, Kuge and Lwala were investigated in this area.

Generalized geological columnar sections are presented in Fig. II-2-2.

Kuge Sector

The sector involves a rolling hill at Kuge and the peripheral flats. The geology of the sector comprises basement Nyanzian Metabasalt, alvikite and ferrocarbonatite. The main structure of carbonatite is semi-circular, opening at the southwest of the Hill.

The geological plan and profiles of the sector are shown in Figs. II-5-4 and II-5-6.

The main body of the ferrocarbonatite unit is distributed in eastern marginal part of the sector trending in N-S direction. The body strikes NNW-SSE to N-S and dips 60° to 80° westerly. The unit is 60m maximum wide and 700m long and comprises a group of several dykes.

There are two small bodies besides the main body, which trend in N-S direction parallel to the alvikites nearby.

The ferrocarbonatites are supposed to be of the latest product of carbonatite activity in the sector as they have intruded the alvikites.

The rocks are strongly stained by iron oxide and show such colours as dark brown, dark greyish brown, brown and reddish brown. The rocks are rich in iron and are determined as carbonate rocks because they show a bubbling reaction to diluted hydrochloric acid.

A sample (Kuge-A) of ferrocarbonatite collected in northeastern part of the Kuge Hill was microscopically examined and the results are presented in Apx 4 and Apx 10. The rock microscopically comprises mainly carbonate minerals, barite and goethite with accessary bastnaésite and mica.

Lwala Sector

This sector is situated in a rolling plain and there is no circular domal structure, which is very common in the areas of carbonatite of Homa Bay.

The geology of the sector comprises basement Nyanzian metabasalt, carbonatitic rocks and phonolitic rocks.

The geological plan is shown in Fig. II-5-5.

Carbonatitic rocks are classified into alvikite, alvikite breccia, ferrocarbonatite and ferruginous breccia. Among these subunits, ferruginous breccia is the main target in the area.

The unit is estimated to be widely distributed in the northern part of sector, but the distribution is not necessarily clear due to a poor distribution of outcrops.

The original structure of the rocks is not clear because of strong weathering and stainings by iron oxide. The rocks are generally brown, dark brown and reddish brown, and comprise iron rich matrix and various breccias. Breccias of the rocks are usually less than 2 cm in size and metabasalt, ferrocarbonatite, alvikite and biotite bearing volcanic rocks are the main constituents of the rocks. The amounts and proportions of breccias are variable.

The rocks, which occur in an exploration trench, located in the northeast part of sector and the periphery, have undergone silicification.

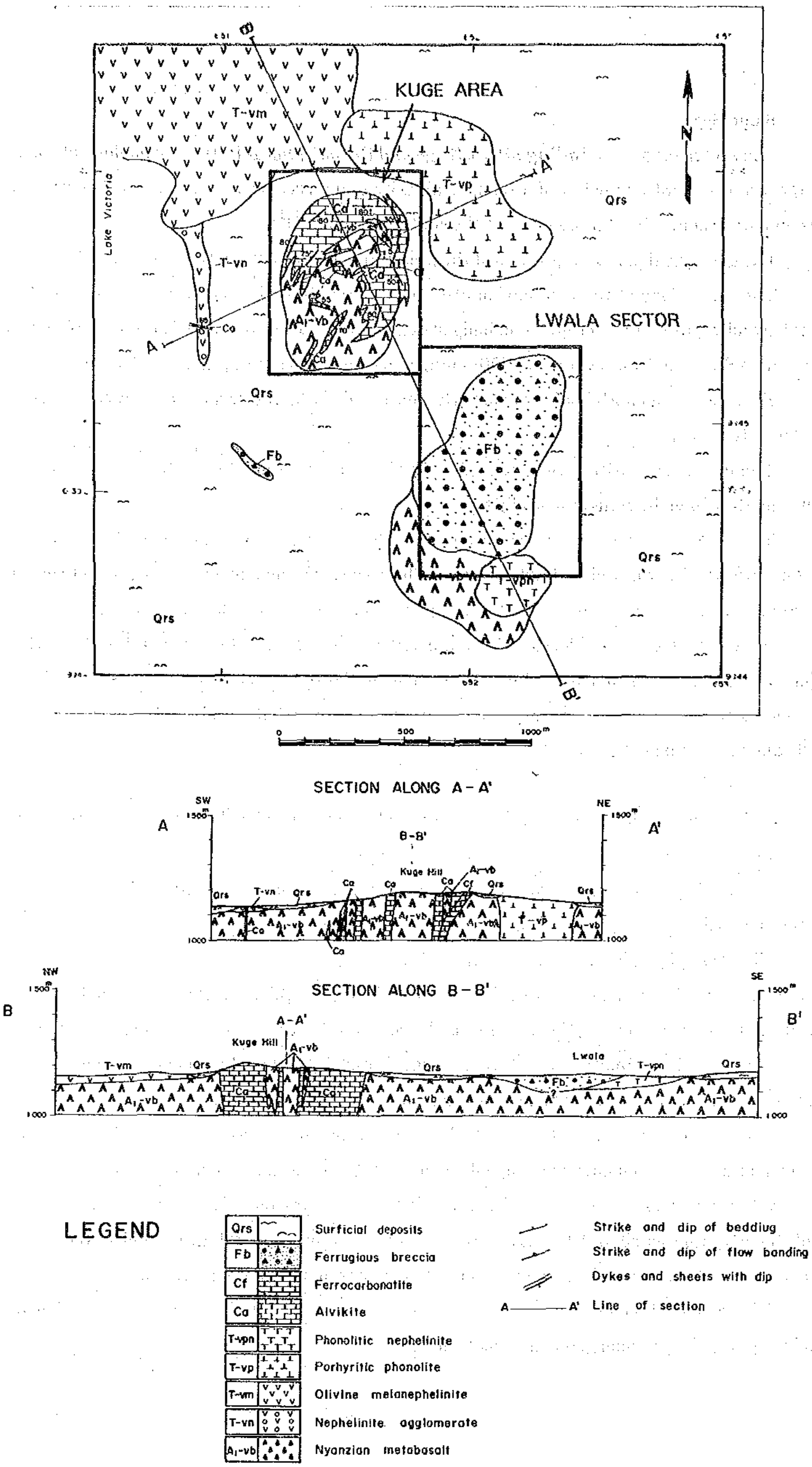


Fig. II-5-1 Geological Map of the Kuge – Lwala Area

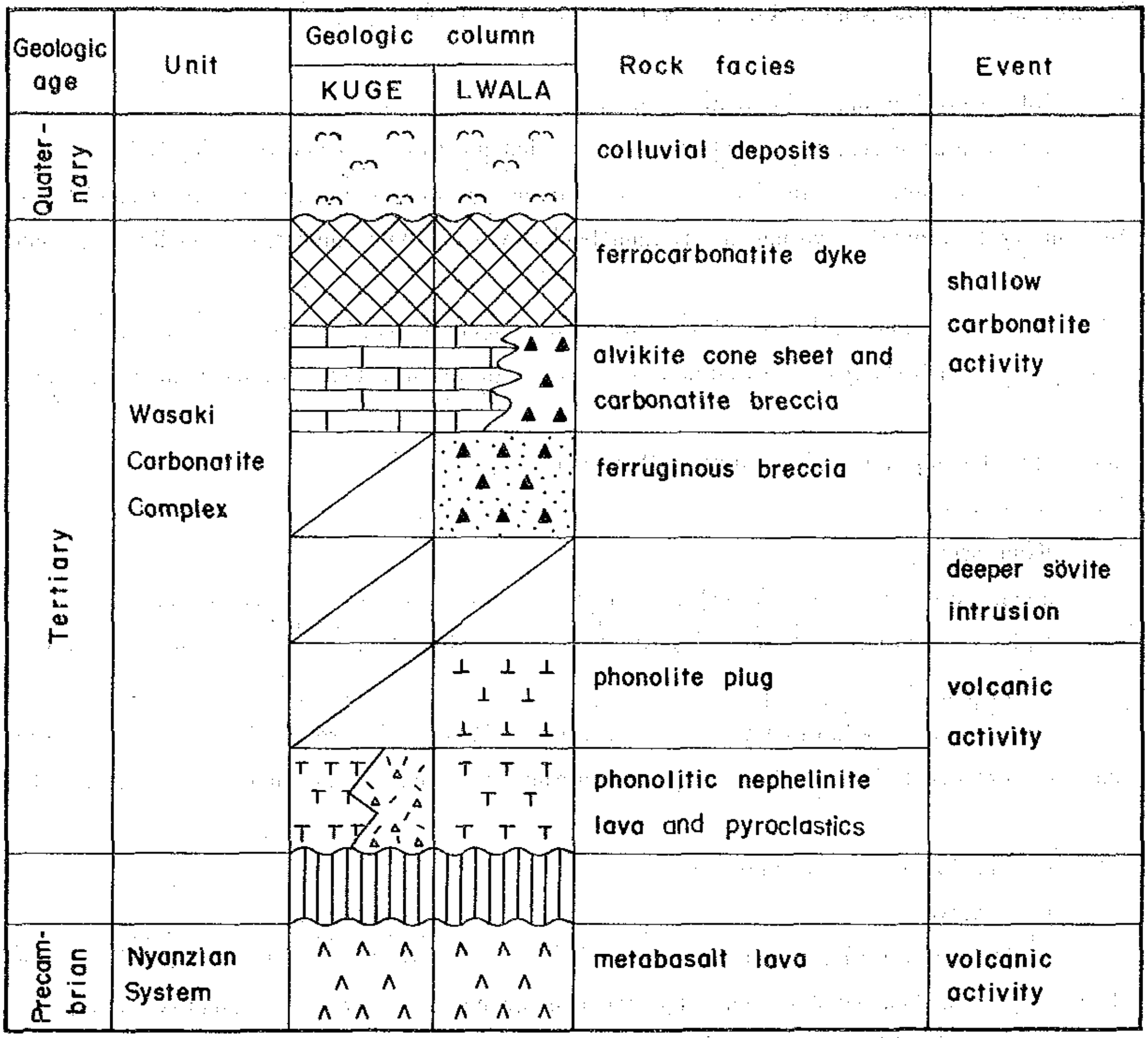


Fig. II–5–2 Generalized Columnar Section of the Kuge – Lwala Area

5-3 Results of geochemical survey (Semi-detailed survey)

(1) Sampling

Rock samples totaling 51 including 26 in Kuge carbonatite body, 2 in ferruginous breccia at Lwala and 25 around Kuge and Lwala, were collected in this area.

(2) Interpretations of geochemical anomaly

Interpretation results of geochemical anomalies in the area are shown in Fig. II-5-3.

The 20 to 40% of the total samples show anomalous values of some elements except P and Sr, and highly anomalous values are frequently observed for the elements, such as Ba, Y, Th and Eu.

The area, where highly anomalous values are concentrated, is in the ferrocarbonatite zone in Kuge carbonatite body (Kuge anomaly) and in ferruginous breccia at Lwala (Lwala anomaly).

5-4 Results of geochemical survey (Phase II)

(1) Sampling

Kuge Sector

Seventeen survey lines (A to Q) at an interval of 50 metres were allocated in N-S direction and samples were collected at 50 metres intervals on each line. Total number of samples is 126.

Lwala Sector

Nineteen survey lines (A to S) in an interval of 50 metres were allocated in N-S direction and samples were collected at 50 metres intervals on leach line. Total number of samples is 140.

(2) Interpretations of geochemical anomaly

Kuge Sector

By the examination of geochemical anomalies, it has turned out that anomalous zone of REE, Ba, Y, and Th are distributed in two areas; eastern and southwestern marginal zones of the sector. The anomalous zone of the eastern marginal zone is concordant with a distribution of ferrocarbonatite dykes, the southwestern one is situated in a distribution zone of carbonatite floats on a basement rock occurrence.

The anomalous zone of eastern one is considered to be a potential target area for REE by comprehensive interpretation of the results by both of geology and geochemistry (Fig. II-5-4).

Lwala Sector

Major anomalous zones of REE, Ba, Y and Th are distributed in the northern part of sector, where ferruginous breccias and small ferrocarbonatite occur (Fig. II-5-5).

Chondrite-normalized REE patterns show the low contents of REE, particularly of LREE in ferrocarbonatites in the sector.

The anomalous zone covering the ferruginous breccias in the northern part of sector is considered to be unlikely deserved to further follow-up explorations in Phase III.

(3) Discussion

Kuge Sector

There is a group of ferrocarbonatite dykes, which forms a body of 600 m long and 60 m wide maximum in eastern part of the Kuge Hill.

Strong geochemical anomalies of Y, Th, La+Ce+Nd, Eu and Yb were revealed in a zone covering the body, and the rocks are rich in Nd in comparison with other sectors.

The large size of the body and the strong geochemical anomalies suggest an occurrence of a potential mineralized zone of REE and Y.

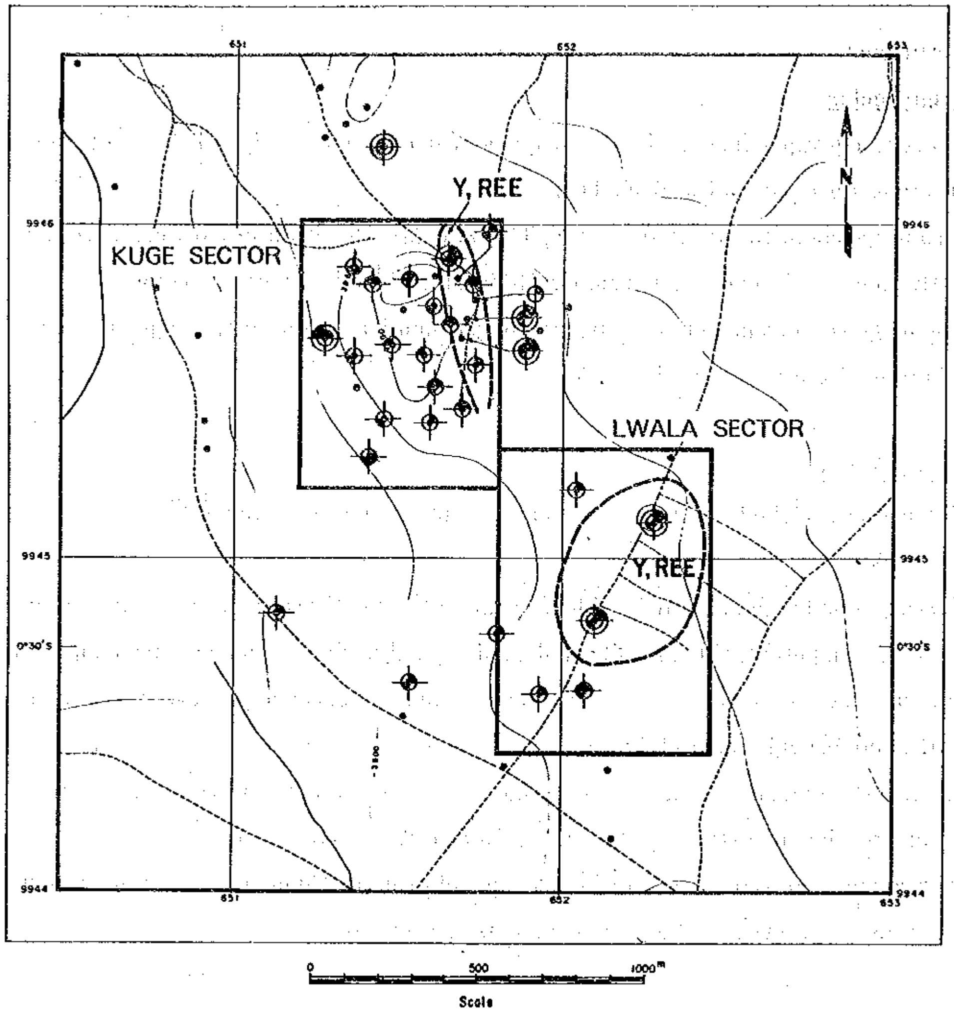
Lwala Sector

The geology of the sector comprises basement Nyanzian metaasalt, carbonatitic rocks and phonolitic rocks.

Ferruginous breccias, which widely occur in the northern part of the area and have been expected to be of a potential target for REE and Y by the Phase I survey, are considered to be of thin effusive facies of carbonatites. The rocks comprise breccias of ferrocarbonatite, alvikite, metabasalt, and ferruginous matrix.

Main geochemical anomalies of Y, La+ Ce+ Nd and Eu were revealed in the zone of ferruginous breccias in northern part of the sector. But the scale is very small.

It is considered that the sector is not a target area for Phase III, based on that the contents of REE and the thickness of ferruginous breccias are very low.



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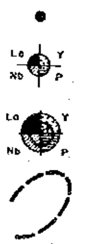


Non anomalous sample

Anomalous sample
(≧ m+1S , <m+2S)

Highly anomalous sample
(≧ m +2S)

Geochemicaly anomalous zone
(Target area)

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–5–3 Geochemical Interpretation Map of the Kuge – Lwala Area

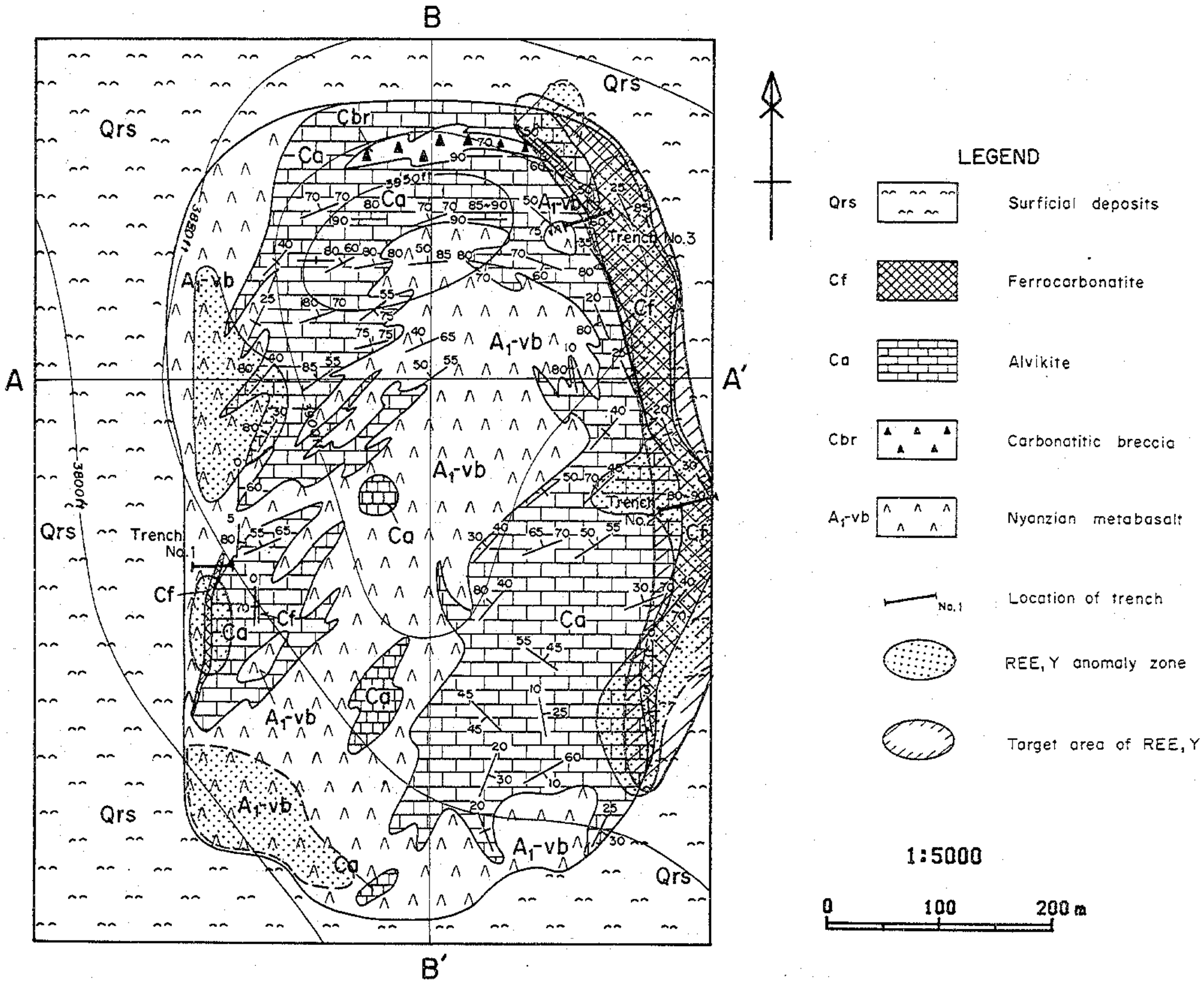


Fig. II–5–4 Geochemical Interpretation Map of the Kuge Sector

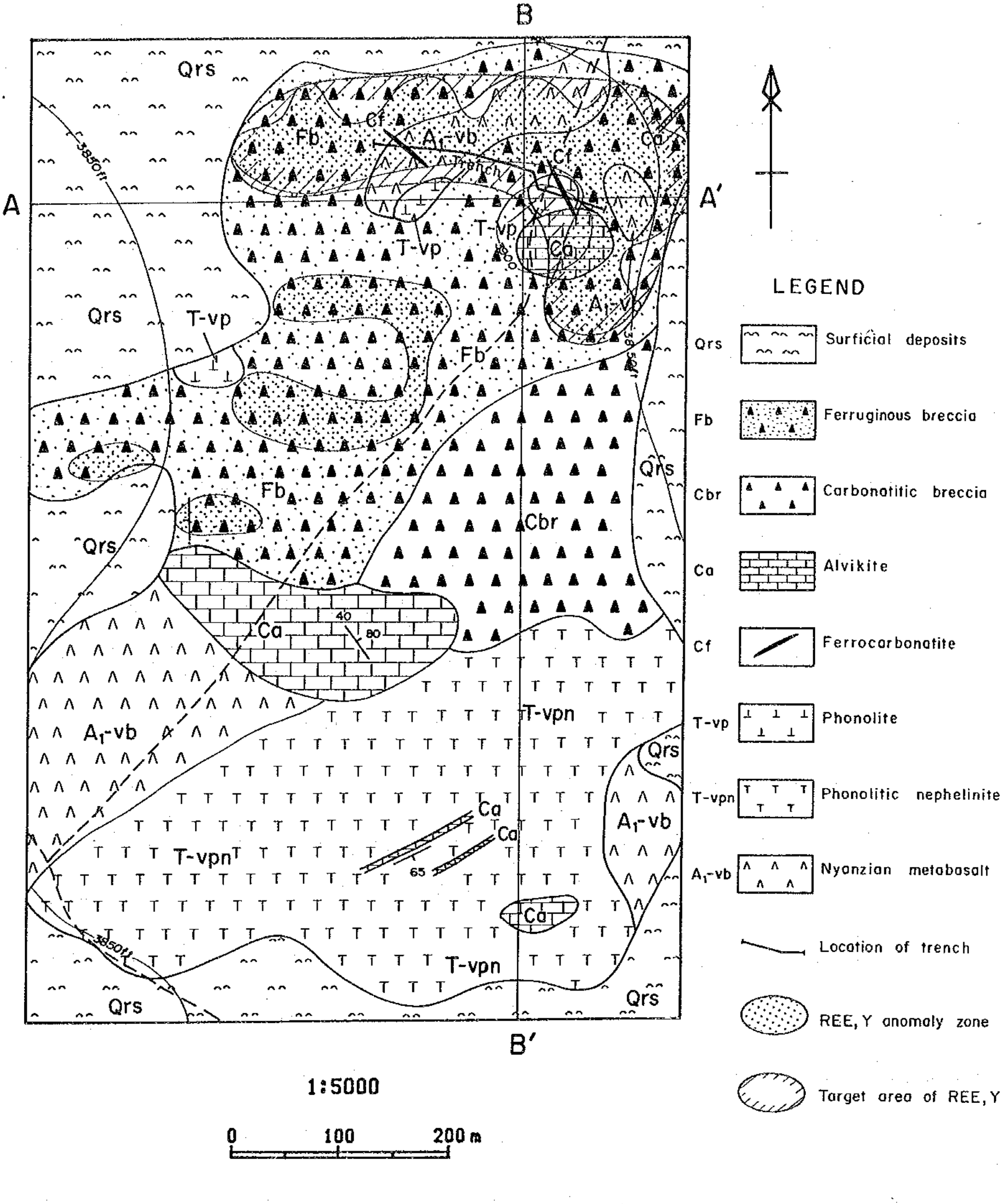


Fig. II–5–5 Geochemical Interpretation Map of the Lwala Sector

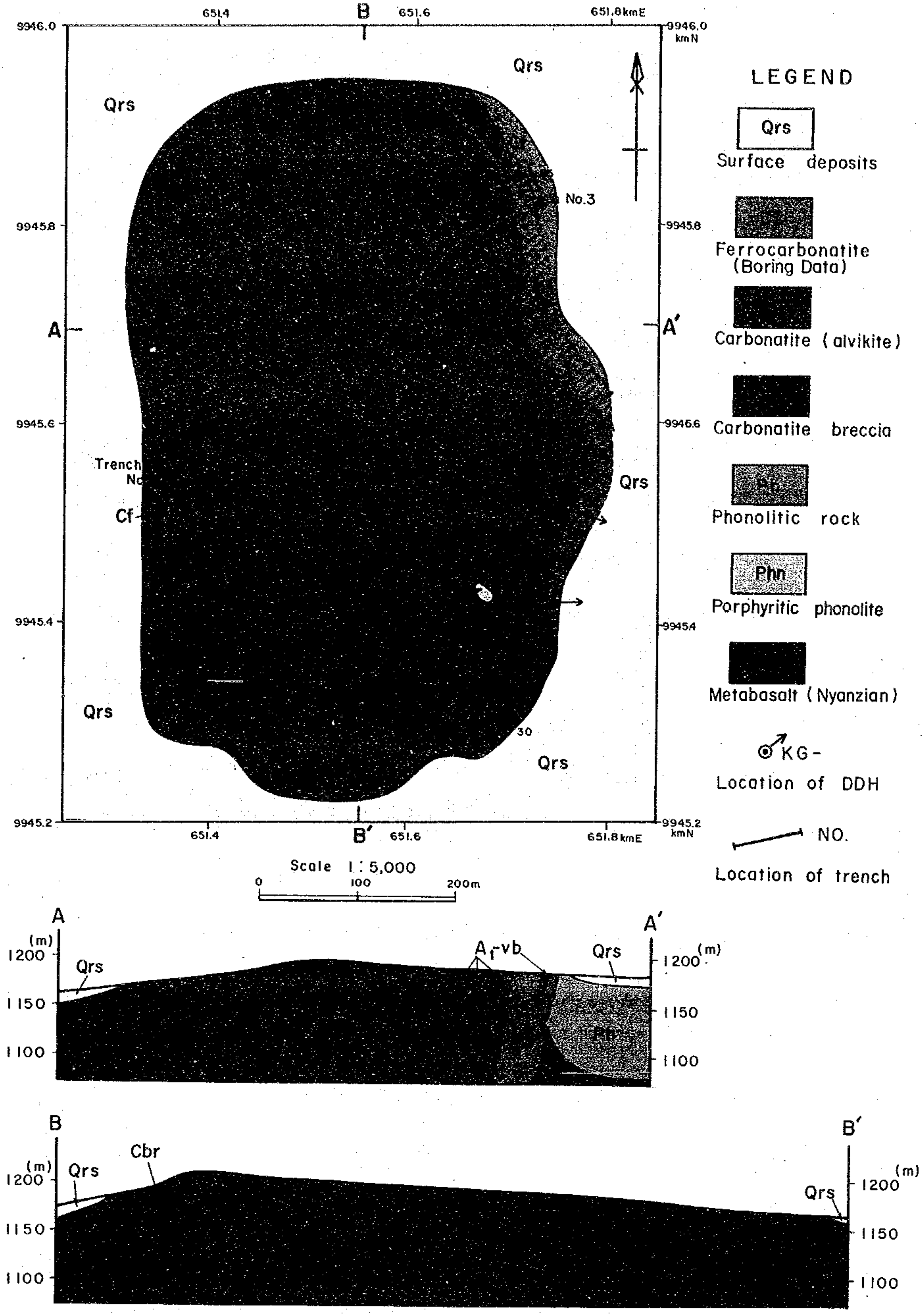


Fig. II–5–6 Geological Map of the Kuge Hill

5-5 Results of diamond drill exploration and mineralization

(1) Outline

Diamond drill operations, to investigate the group of ferrocarbonatite dyke, located in the eastern end of the Kuge Hill Carbonatite body, were implemented by the 1989 programme.

Six (6) diamond drill holes, 60 metres deep each, 360 metres in total, were operated.

Diamond drills holes were allocated ca. linearly north-south directionally, having 100 metre-intervals. Hole azimuths were established to achieve perpendicular intersections to the dyke and also hole angles were set up to be 50 degrees declined against westerly dipping dyke.

Detailed examinations of drill cores by unaided eye were carefully made to summarize the drill core logs on a scale of 1:200. Required number of samples of ores and rocks were collected to be sent to laboratory tests. Mineralized portions of the drill cores were chemically analysed at an every intersected portion of ores. The 81 samples were chemically analyzed. The geological cross sections with drill hole logs projections, on a scale of 1:1,000, were delineated after geological compilations of surface mappings and drill logs. The results of the chemical analyses of ores were applied to the estimations of inferred geological ore reserves and grades.

Locations of drill hole sites are shown in Fig. II-5-7, locations in details, site altitudes and depths of each hole are tabulated in Table II-5-1.

Table II-5-1 Location of diamond drill holes, Kuge-Lwala Area

DDH No.	UTM Coordination		Elevation, metre	Hole bearing, degree from GN	Hole declination, degree	Hole depth, drilled, metre
	X (mE)	Y (mN)				
KG-1	651,650	9,945,895	1,185	40°	−50°	60.10
KG-2	651,695	9,945,805	1,185	70°	−50°	60.10
KG-3	651,702	9,945,710	1,183	70°	−50°	60.10
KG-4	651,764	9,945,620	1,183	70°	−50°	60.10
KG-5	651,759	9,945,518	1,190	110°	−50°	60.10
KG-6	651,735	9,945,420	1,184	90°	−50°	60.10

(2) Geology observed in drill holes

Geological cross-sections, including geological logs by each diamond drill, are shown in Fig. II-5-8. Ferrocarbonititic dykes, selected for the targets of diamond drill works are composed of ferrocarbonatite and also of carbonatite, which shows an intermediate facies of ferrocarbonatite and alvikite, and include metabasalt of basement rock and phonolitic rock, which had preceded carbonatite intrusions. The dyke shows an occurrence of intrusive bodies at the contact of Kuge Hill Carbonatite Complex and outer phonolitic volcanic rock. They are estimated to be of the latest product related to the carbonatite activities.

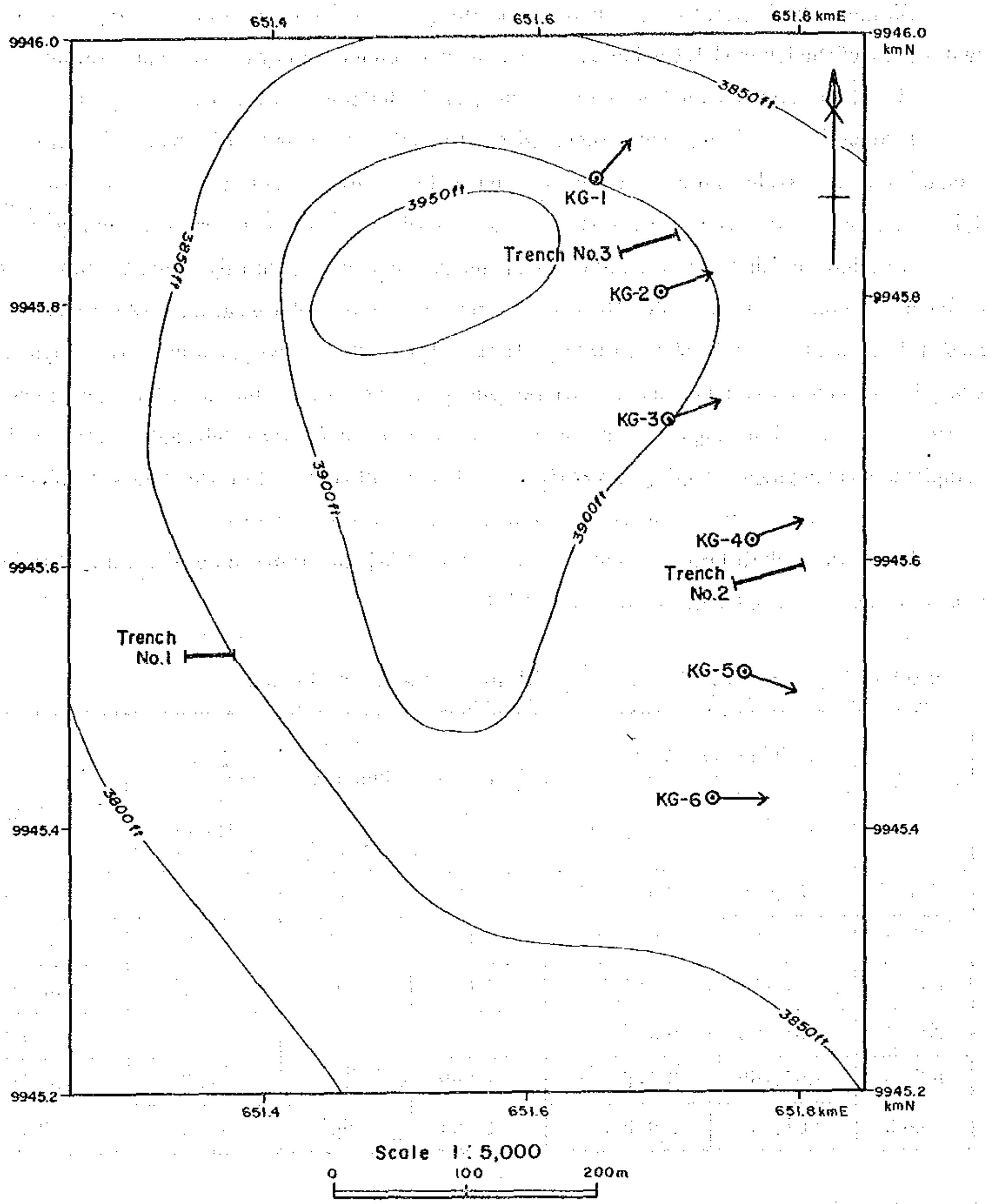


Fig. II–5–7 Location Map of the Drilling Sites in the Kuge Hill

Carbonatite, which carries an intermediate facies of ferrocarbonatite and alvikite, characteristically shows banded textures and is somewhat less pale coloured than ferrocarbonatite. However, chemical disparities of carbonatite, the above, and ferrocarbonatite are not remarkable in connection with the results of geochemistry of whole rock analysis and REE contents. Apparent disparities of both rocks are presumed to be caused by the differences of the orders of intrusive activities and the degree of oxydation by weathering.

The results of analytical geochemistry of the dykes, as shown in the following section, 5-6, are approximate to those of the primary mineralized zone in Buru Hill. The dykes are distributed along the hill foot of gentle eastern slope, from where the weathered earthy materials should be topographically prone to be removed outward from the in-situ sites of carbonititic dykes. It is, consequently, presumed that the in-situ sites of dykes have not been provided under the topographical condition, where weathered soils and lateritic materials should have been residually accumulated. It is also presumed that the dykes have not been subjected to supergene enrichment, resultant in having an REE concentration, which is approximate to that of the primary concentration of REE.

5-6 Results of chemical analysis of ores

Sampling and chemical analysis

The 81 ore samples, intersected by diamond drill, were collected and were chemically analysed for the 8 REE of lanthanum (La), cerium (Ce), neodymium (Nd), samarium (Sm), europium (Eu), telbium (Tb), ytterbium (Tb) and lutecium (Lu) and the related 7 elements of phosphorus (P), barium (Ba), strontium (Sr), neobium (Nb), yttrium (Y), uranium (U) and thorium (Th), totally for 15 elements. The methods of chemical analysis and accuracy are identical with those for the samples of Buru Hill cores.

Statistic values of chemical analysis informations

The statistic values of the chemical analysis informations on 81 ore samples are shown in Table II-5-2.

The average values of the chemical contents of the elements show approximately a half of those of the mineralized zone in the Buru Hill body and approximately two third of those of the primary zone in the Buru Hill body, estimated to be considerably low-graded. They are, however, fairly higher than those of ferrocarbonatite body samples collected by the ground surface geochemistry of the first-year work (Phase I), i.e., 1.35 times of LREE (La+Ce+Nd): 0.98 percent). It, consequently, shows that the average values of the chemical contents of the elements are higher in the occasions of drill core than of ground surface specimen, however, is still on the considerably low-graded level.

Chemical grade of mineralized zone

The weighted average values, [The sum of (Content × Width) / The sum of Width], of the chemical contents of the elements in ores by individual drill hole are shown in Table II-5-3. The 10 samples of low-graded section, deeper than 17.70 metres depth of the Hole KG-4, were omitted from the processing. Chemical grades of ores on cross sections, including each drill hole, are shown in Fig. II-5-9. An obvious REE-mineralization in ferrocarbonatite dyke is observed in the continuous section of massive ferrocarbonatite of Hole KG-2, where mineralized zone is some 30 metres wide (an apparent width : 32.9 metres), chemical grades of which are (La+Ce+Nd): 2.1 percent. (Sm+Eu+Tb): 200 ppm and (Yb+Lu): 15 ppm.

A remarkable mineralization of LREE is also observed in Holes KG-1 and KG-3, operated on both sides of Hole KG-2, where LREE content shows 1.6 percent, respectively. The mineralization in Hole KG-1 is hosted in a swarm of ferrocarbonatite dykelets, 15 metres apparently wide by a hole-intersection, meanwhile, the mineralization is laterally debilitated in short distance. In Hole KG-3, an interposition of unmineralized rock, basement rock or phonolite and etc., some 20 metres wide, is situated, so that an overall average grade of ferrocarbonatite dyke body is low-gradedly estimated to be of LREE : 1.16 percent, considerably low. In Hole KG-4, the mineralized zone, while a weak mineralization in lower section of the hole is excluded, shows LREE : 1.48 percent in the 18 metre-width. In Hole KG-5, a weak mineralization, LREE : 1.26 percent, is observed in a wide ferrocarbonatite dyke body, meanwhile, a similar grade of mineralization is also observed in Hole KG-6, where the width of ferrocarbonatite dyke body is of some 14 metres wide and the mineralization is considered to be likely terminated.

It is, therefore, summarized that the concentration grade of REE in the Kuge Hill area, which is to be compared with that in the oxydized zone of the Buru Hill area, is limitedly defined in narrow area in the vicinity of the hole site KG-2 and in its limited extension northerly and southerly, respectively, and is also estimated to be considerably lower-graded than that of the oxydized zone of the Buru Hill area. A remarkable mineralization of P, Nb, Y, Ba and etc., associated with REE, is unobserved in Kuge Hill area.

Table II–5–2 Summary of Statistics of Analysis of Drill Core Samples

Component	Unit	No. of sample	Maximum	Minimum	Mean(m)	Standard deviation	m − 2σ	m − σ	m + σ	m + 2σ
P	PPM	81	15850	732	3338.1	0.337	706.8	1536.0	7254.6	15766.0
BA	%	81	10.60	0.21	2.787	0.3374	0.589	1.281	6.062	13.184
SR	PPM	81	4010	675	1579.8	0.172	714.8	1062.6	2348.7	3491.9
NB	PPM	81	1500	78	454.4	0.238	151.9	262.7	785.8	1359.0
Y	PPM	81	1250	71	239.5	0.226	84.4	142.2	403.4	679.4
U	PPM	81	32.6	1.6	8.85	0.265	2.61	4.80	16.30	30.04
TH	PPM	81	2893.0	81.0	527.29	0.357	101.64	231.51	1200.98	2735.38
LA	%	81	2.460	0.008	0.2746	0.5819	0.0188	0.0719	1.0487	4.0045
CE	%	81	2.13	0.02	0.542	0.3811	0.094	0.225	1.303	3.133
ND	%	81	0.41	0.01	0.163	0.3222	0.037	0.077	0.342	0.717
SM	PPM	81	349.0	19.4	133.93	0.225	47.53	79.79	224.80	377.34
EU	PPM	81	91.6	6.6	39.49	0.218	14.45	23.89	65.28	107.92
TB	PPM	81	43.0	2.6	10.04	0.219	3.66	6.06	16.63	27.54
YB	PPM	81	65.5	3.3	11.56	0.272	3.30	6.18	21.66	40.55
LU	PPM	81	9.5	0.4	1.87	0.227	0.66	1.11	3.16	5.32

Table II–5–3 Average Value of Elements and Components by Drill Hole

DDH No.	Number of Samples	Total length Analyzed (m)	P (ppm)	Ba (%)	Sr (ppm)	Nb (ppm)	Y (ppm)	U (ppm)	Th (ppm)	La (ppm)	Ce (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Tb (ppm)	Yb (ppm)	Lu (ppm)	La+Ce+Nd (ppm)	Sm+Eu+Tb (ppm)	Yb+Lu (ppm)
KG-1	11	14.90	5191.1	3.747	2441.1	559.6	202.0	18.14	894.04	5961.7	7681.2	2361.1	194.15	58.25	11.86	7.39	1.76	16004.0	264.26	9.15
KG-2	13	32.90	4906.4	4.320	2108.4	410.4	331.6	11.49	476.71	8562.9	10507.3	2069.6	140.01	47.62	13.63	13.41	2.13	21139.8	201.26	15.54
KG-3	16	41.95	5471.4	3.618	1374.2	699.5	436.3	8.38	777.23	5480.1	8799.4	2319.9	179.50	56.73	17.38	21.30	3.10	16599,4	253.61	24.40
KG-4	6	18.10	6284.5	4.341	2093.5	546.1	241.0	8.90	841.91	5437.0	7561.9	1887.3	141.18	37.20	9.39	14.80	2.24	14886.2	187.77	17.04
KG-5	18	51.50	3511.3	3.458	1782.4	563.4	209.7	8.03	502.29	4462.6	6502.4	1680.8	113.58	29.20	8.36	12.09	2.05	12645.8	151.14	14.14
KG-6	7	14.40	1991.4	4.086	1306.6	476.5	241.1	6.75	248.68	4448.9	5968.4	1599.3	103.71	31.45	7.47	11.14	1.70	12016.6	142.63	12.84
Total	71	173.75	4555.7	3.828	1795.0	558.0	292.7	9.62	611.78	5713.6	7982.5	1977.8	143.47	42.85	11.87	14.36	2.28	15674.0	198.19	16.64

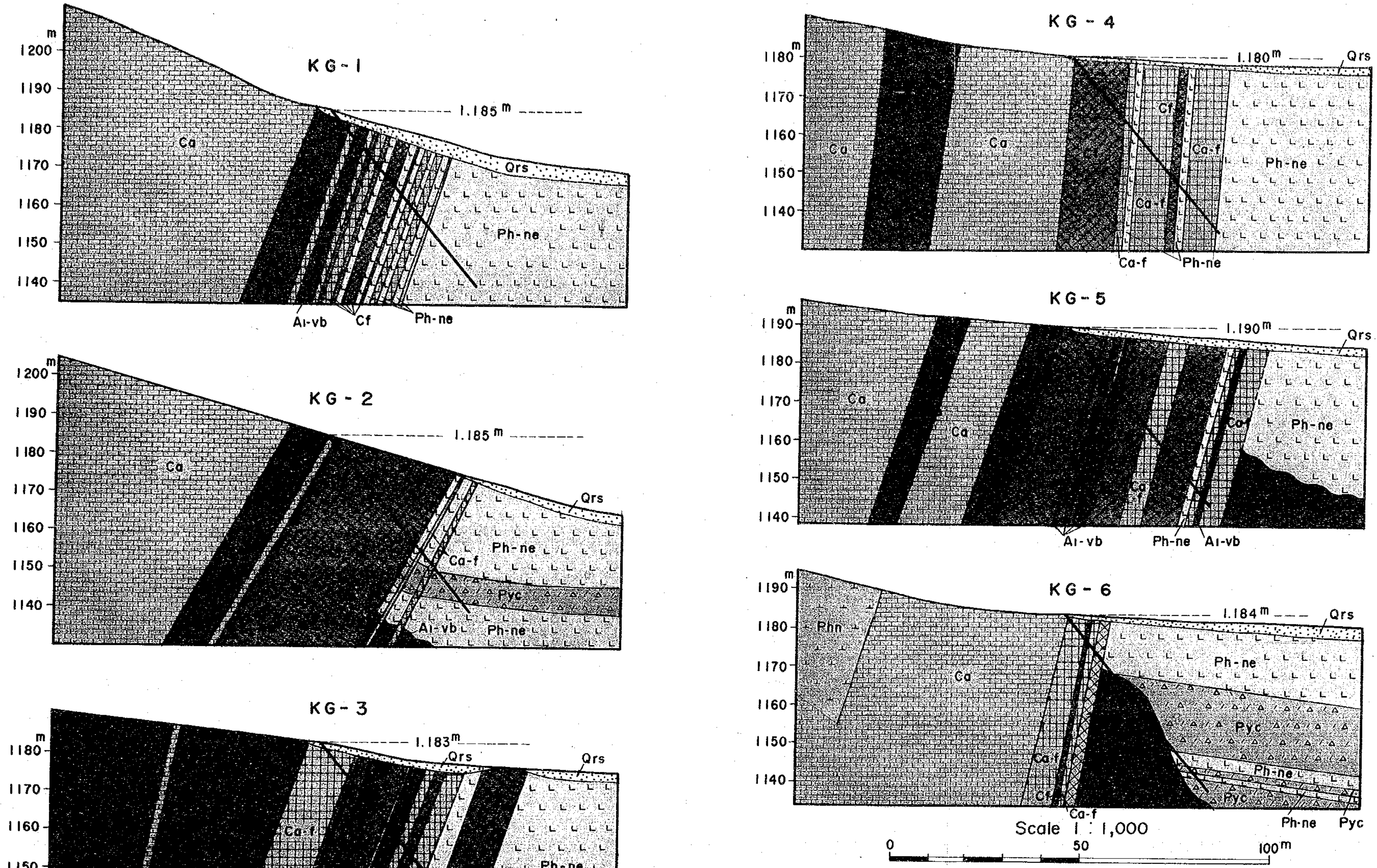


Fig. II-5-8 Geological Sections along Drill Hole, Kuge Hill

Abbreviations

Qrs : Colluvial deposits, Ca : Alvikite, Cf : Ferrocarbonatite
Ca-f : Alvikite to Ferrocarbonatite (middle type)
Ph-ne: Phonolitic nephelinite, Pyc : lapilli tuff
Al-vb: Metabasalt (Nyanzian System), Phn : Phonolite

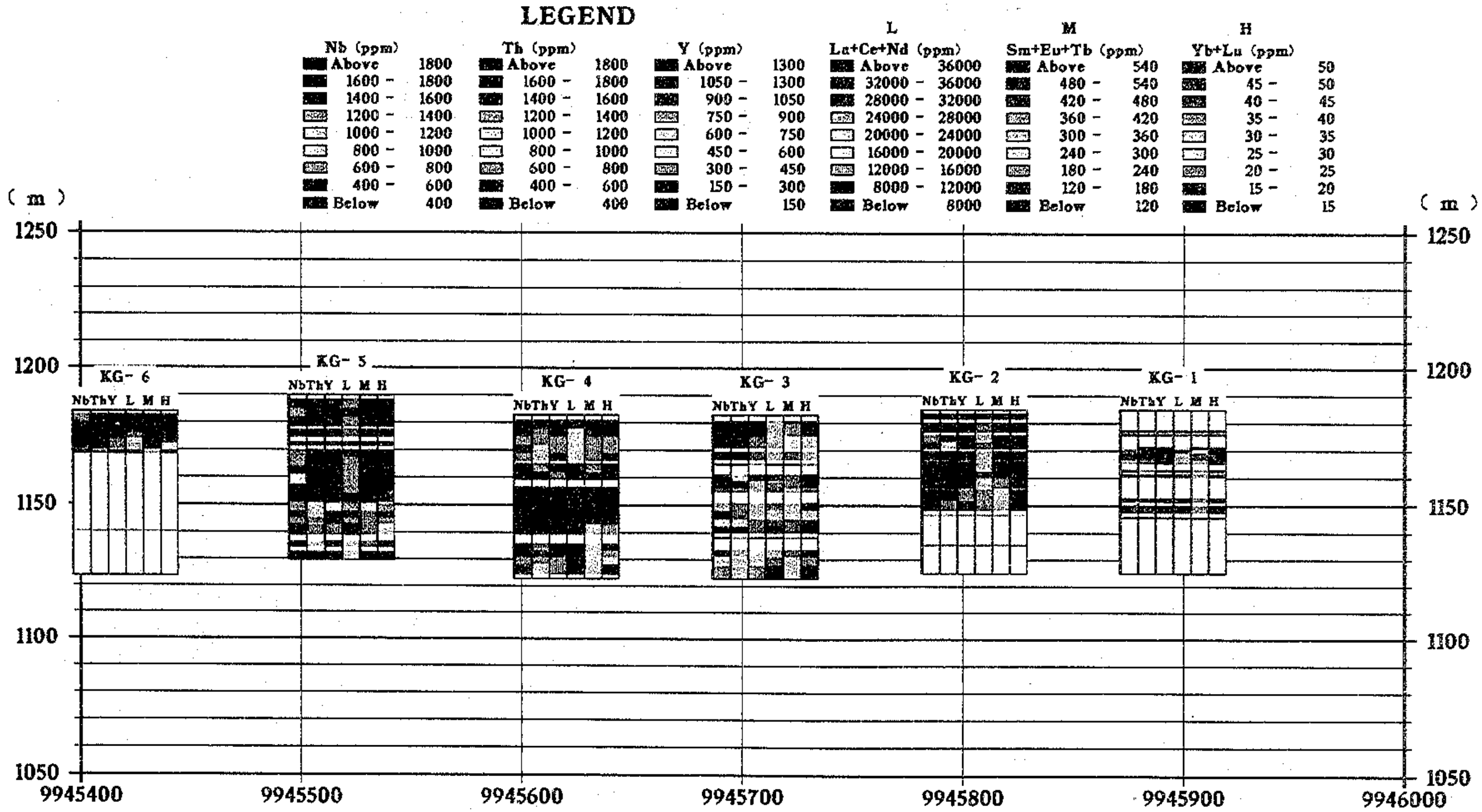


Fig. II-5-9 Assay Cross Section along Drill Hole, Kuge Hill

CHAPTER 6 NGOU-KUWOR AREA and UGONGO-UYI-KIYANYA-SOKOLO AREA

6-1 General geology

The areas are located in Wasaki Peninsular to the north of Ruri Hills. A number of carbonatite bodies are exposed in Sokolo, Uyi and Ugongo areas along the coast of Homa Bay and in Kiyaya area inside the peninsular, and form the Wasaki carbonatite complex. A carbonatite body of a small size is also exposed in Ngou-Kuwor area in western side of the peninsula.

6-2 Results of geological survey

(1) Geology

The geological plan and profiles are presented in Fig. II-6-1.

The geology in the areas comprises basement metavolcanics, fenitized basement rocks, ijolite-nepheline syenite, fenitized volcanics, carbonatitic pyroclastics, sövite, alvikite, ferrocarbonatite, melanephelinite, porphyritic phonolite, phonolite and surface deposits.

(2) Geological structure

The carbonatite-alkaline plutonic complex intruded during a period of pre-Miocene in northeastern part of the Wasaki peninsula, including Sokolo and Uyi areas, and resulted in a formation of domal up-lift and fenitization of the basement according to LeBus (1977), who studied the carbonatites in this area in detail. After the intrusions of the complex, phonolite volcanisms initiated in Miocene and was consecutive until Pliocene. Phonolite lavas and dykes covered or intruded the pre-Miocene carbonatite. The carbonatite in Sokolo cap forms a nearly vertical cylindrical body which intruded in late Miocene.

6-3 Results of geochemical survey

(1) Sampling

In Sokolo area, 94 rock samples were collected at lake sides outcrop in northeast end of the area and hills in southwest part of the area.

In Ngou-Kuwar, 15 rock samples were collected along a route in the central part.

(2) Interpretations of geochemical anomalies

Fig. II-6-2 show an interpretation result of geochemical anomaly in the area.

In Ugongo-Kuwor area, only one alvikite sample has an anomaly of P, but none of any other elements.

In Sokolo area, there are some carbonatite samples which have anomalous values of some elements, the number of samples which have highly anomalous values, are only 8. Among these 8 samples, three samples are interested in their analytical values.

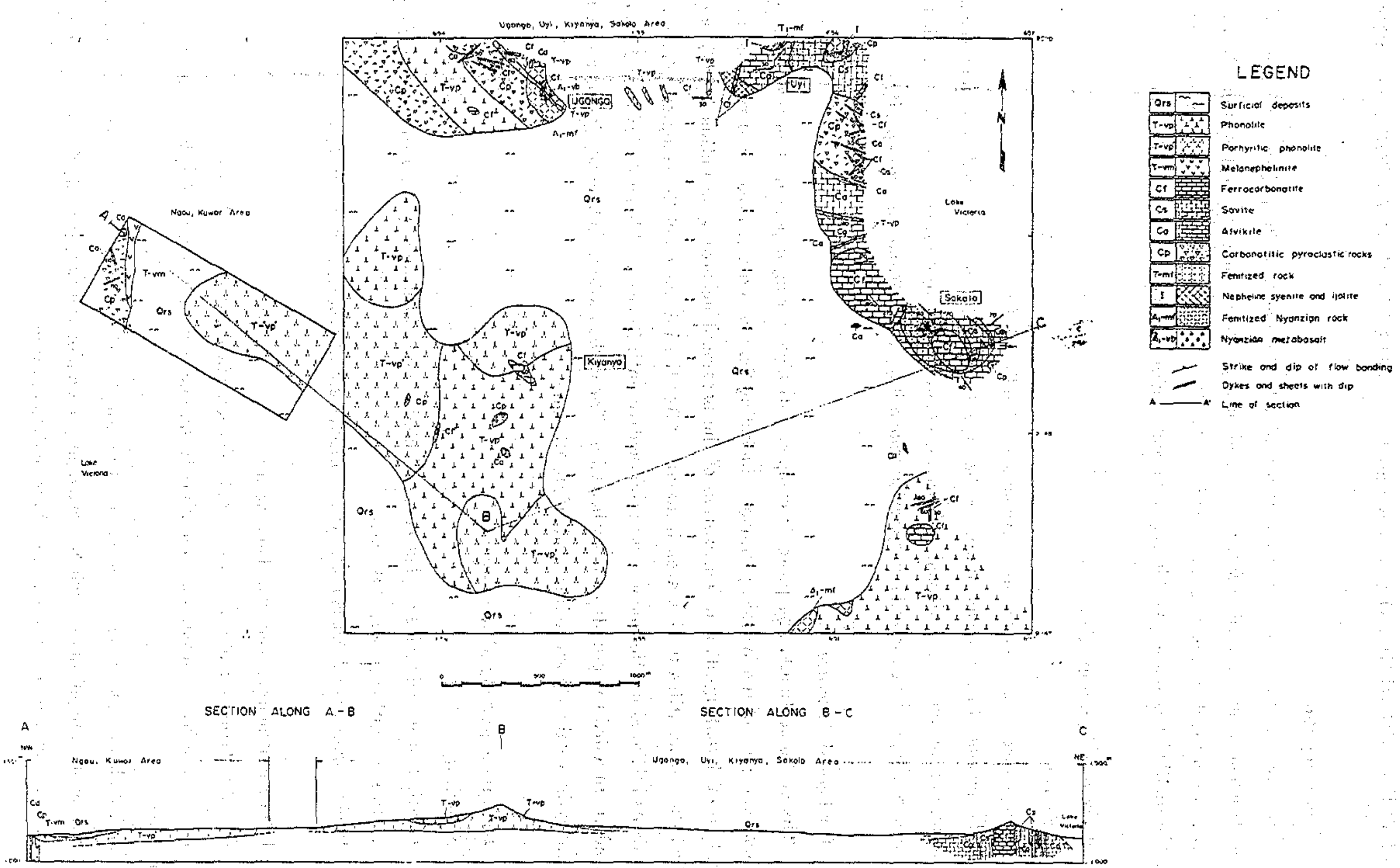
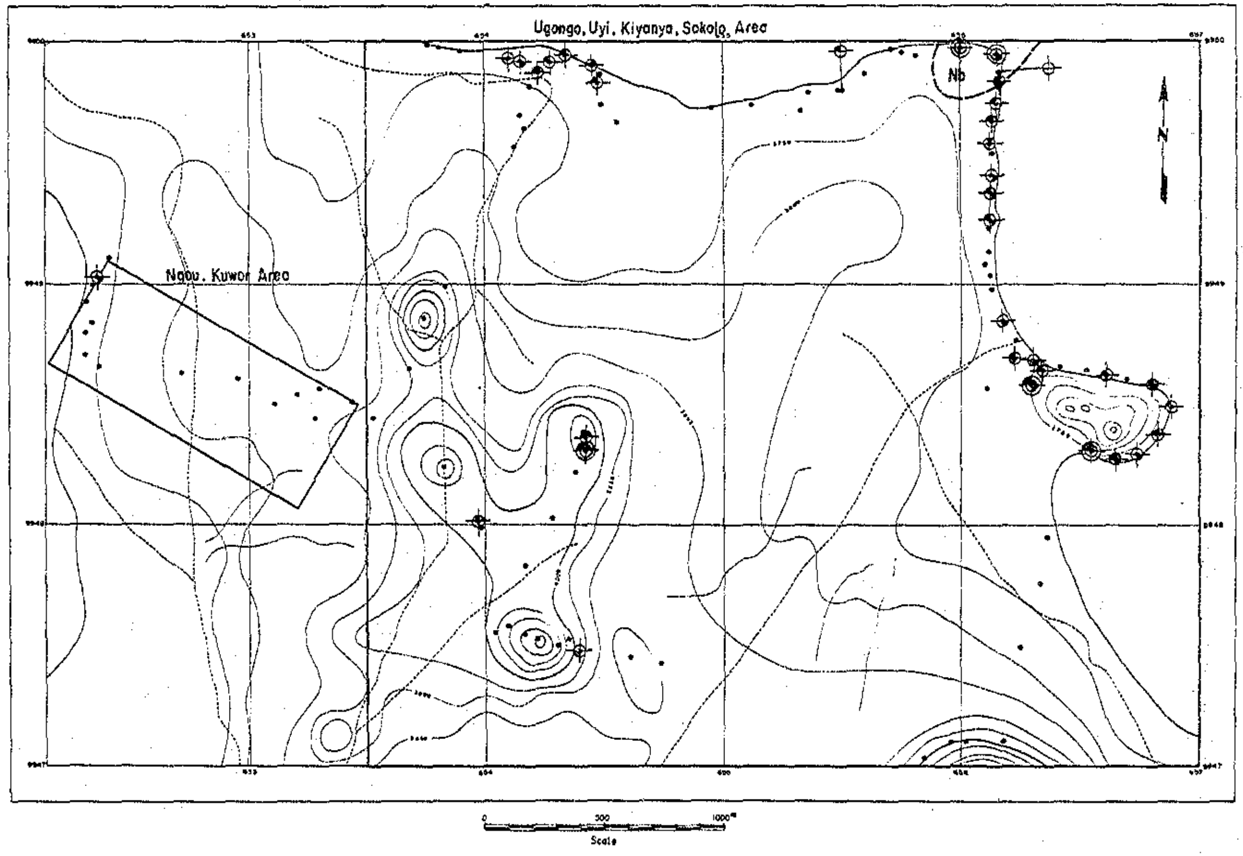


Fig. II-6-1 Geological Map of the Ugou – Kuwor Area and Ugongo–Uyi–Kiyanya–Sokolo Area



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 %	≧ 061 , < 217	≧ 217

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–6–2 Geochemical Interpretation Map of the Ugou – Kuwor Area and Ugongo–Uyi–Kiyanya–Sokolo Area

A sample of ferrocarbonatite collected at the lake side to the west of Sokolo Point, shows high contents of LREE. But adjacent samples do not show any highly anomalous values for any elements, resulting in to form none of anomaly.

Two samples, collected at the northeast end of the lake side, are of sövite and fenite respectively. They show very high contents of Nb (5,500 ppm), though their contnts of REE are very low. The fact that the adjacent two samples do not have any anomalous values of Nb, indicate a limitedly local mineralization of Nb at the locations of above two samples.

6-4 Mineralization

None of distinct anomaly in the area was revealed by geological and geochemical survey, however, several samples of carbonatites or fenite have highly anomalous values of LREE or Nb.

The area is unlikely estimated to warrant a further exploration programme.

CHAPTER 7 HOMA MOUNTAIN AREA

7-1 General geology

The Homa Mountain, situated in a land bulging out from the southern coast of Winam Gulf, has a flat topped profile and is one of the outstanding features in the area of Lake Victoria.

The mountain is formed of a carbonatite-alkaline rock complex of largest size in Homa Bay area.

7-2 Results of geological survey

(1) Geology

The geological plan and profiles of the area are presented in Fig. II-7-1.

The geologic units, which are shown in the geological plan, are as follows:

Nyanzian metavolcanics, intensely shattered Nyanzian volcanics with well-developed carbonatite vein network, Nyanzian metavolcanics intruded by numerous carbonatite dykes, Carbonatite breccias, Sövite, Alvikite, Ferrocarbonatite, Phonolite, Calcareous pyroclastics, Sandstone and Sandstone-Conglomerate alternation, Surficial deposits, Quartz veins and Iron ore.

The carbonatite complex at Ndiru Hill which is a prospect in this area, occurs in an area of about 300m x 500m, surrounded by so-called calcrete and soil on the lower flat. The succession of the intrusion of the carbonatites estimated from a distribution etc. is interpreted to be in the order of sövite, alvikite and ferrocarbonatite,. The geological sketch map of an area of about 400m x 300m, where the current grid-sampling ws carreid out, is presented in Fig. II-7-2.

(2) 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 composed of carbonatite-ijlite complex in southeastern part of the 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 oval area and is composed of the major structural element of the cone sheet complex.

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

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

These circular cliffs correspond to the contact of carbonatite and Nyanzian metavolcanics.

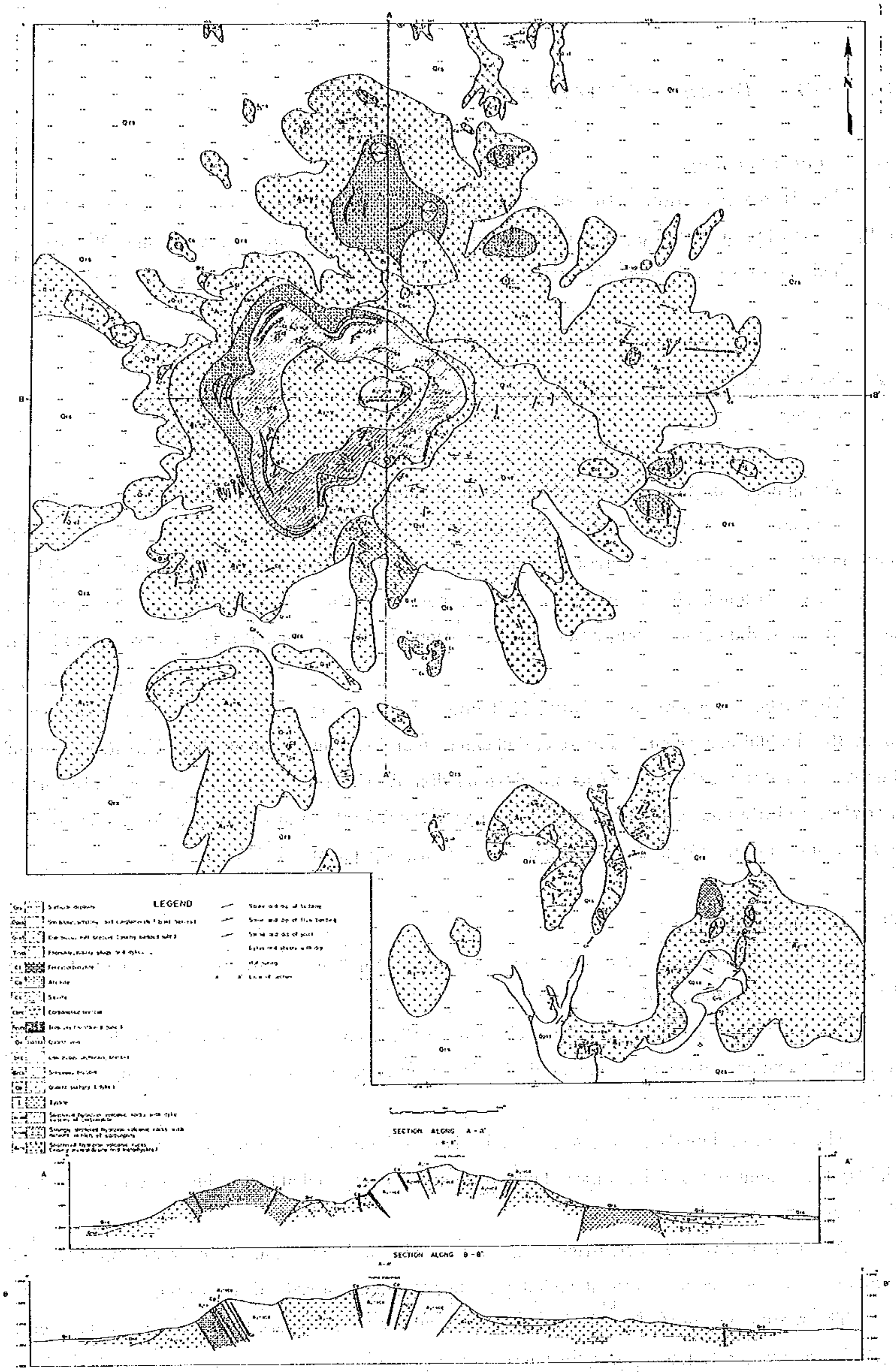


Fig. II–7–1 Geological Map of the Homa Mountain Area

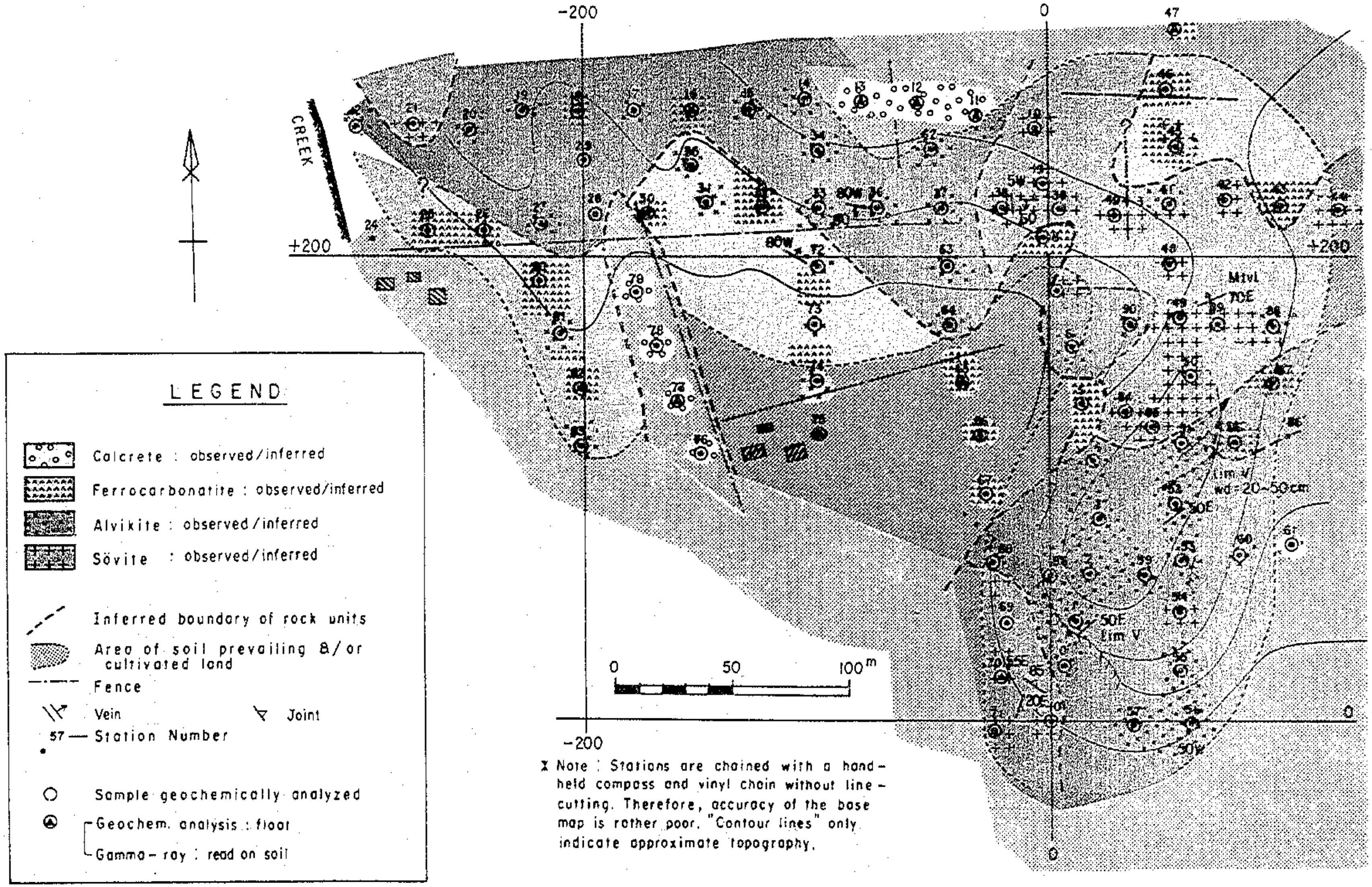


Fig. II–7–2　　Geological Map of the Ndiru Hill Prospect

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 carbonatite are very similar to those in North Ruri Hill, and suggest that the current level of erosion stays still in a relatively higher altitude of carbonatite complex.

The carbonatites adjacent to ijolites in Ndiru Hill and a group of carbonatite dykes in the southeastern part of this area are presumed to be of relatively deeper facies estimated by a distribution of sövite.

(3) Mineralization

Two types of mineralizations except carbonatite-related one, Quartz vein and Iron ore, are observed in the area.

Quartz Veins (Qv)

There are three quartz veins, intersect Nyanzian metavolcanics, 2.5 to 3.3km east of the top of the Homa Mountain.

The largest of three is more than 5 m wide and runs in the direction of N85°W.

The vein is estimated by a distribution of quartz floats that extend for a distance of approximately 500m along its strike.

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

The quartz of these veins are white, hard and microcrystalline, and contains white aduralia in part. Druses are also observed occasionally.

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

The results indicate that a certain measure of gold-silver mineralization is associated with these veins. Potential appraisal of gold and silver, which is not included in the main objective of the current work, is also considered to be noteworthy for future exploration programming in the area.

Iron Ore (Ore)

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

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

Magnetite and hematite, associated with a small quantity of mica are identified in a porous ore.

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

The iron ores are considered to have been formed by a replacement of decomposed rocks by iron, according to LeBas (1977).

7-3 Results of geochemical survey

(1) Sampling

The 486 rock samples were collected in the area, except Ndiru Hill-Prospect, where grid sampling was conducted. They consist mainly of carbonatitic rocks, subordinately with 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 estimate a vertical variation of REE contents.

In Ndiru Hill Prospect, situated in southern part of the Homa Main Carbonatite Complex, 90 rock-chip samples were collected on a 50m-grid with a 25m-internval.

(2) Intrpretations of geochemical anomaly

Interpretation results of geochemical anomalies in the area of Homa Mountain proper is shown in Fig. II-7-3.

Samples, which show highly anomalous values of some elements, ocuupy only 1 to 3% of all, although 15 to 20% of all show anomalous values of certain elements. These highly anomalous samples are sporadic in the area and do not form distinct concentrated zones.

In Ndiru Hill prospect, REE, Y and Nb are concentrated along the periphery of the latest ferrocarbonatite, as shown in Fig. II-7-4, however, REE and Y are much lower than in Buru Hill. The deep portions are considered to be unprospective, since the mineralization of deeper facies has already been exposed on the ground surface, and a secondary enrichment can not be expected.

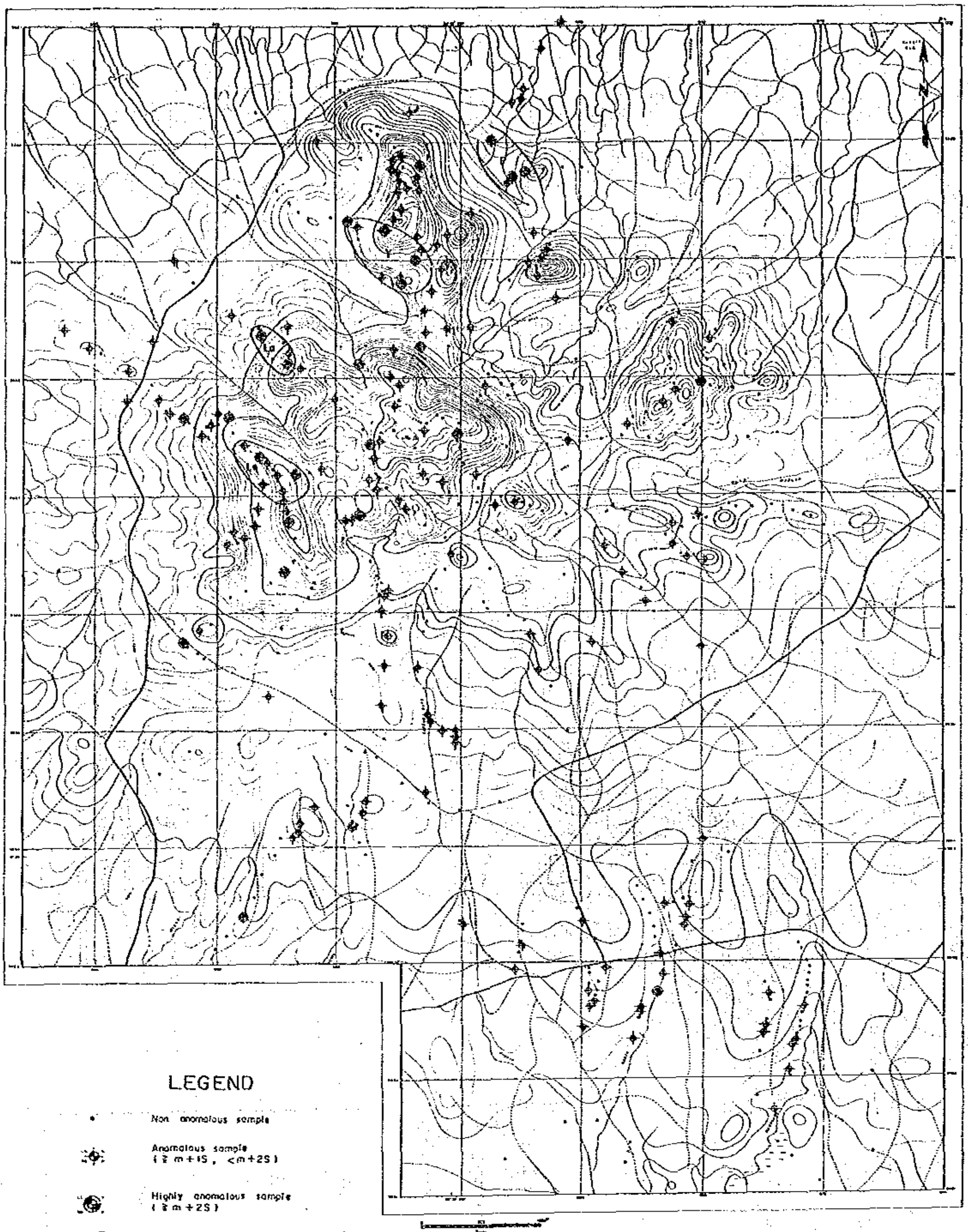
7-4 Mineralization

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

Carbonatites in the area occur mainly in the forms massive body (Ndiru Hill), dyke, veinlet network, small massive alvikite and rarely as ferrocarbonatite.

Through the geochemical survey, a prominent anomaly deserved to furhter exploration is unlikely revealed.

The area, where gold bearing quartz veins occur, is estimated to be warranted for the 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 %	≧ 051 , < .217	≧ 217

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–7–3 Geochemical Interpretation Map of the Homa Mountain Area

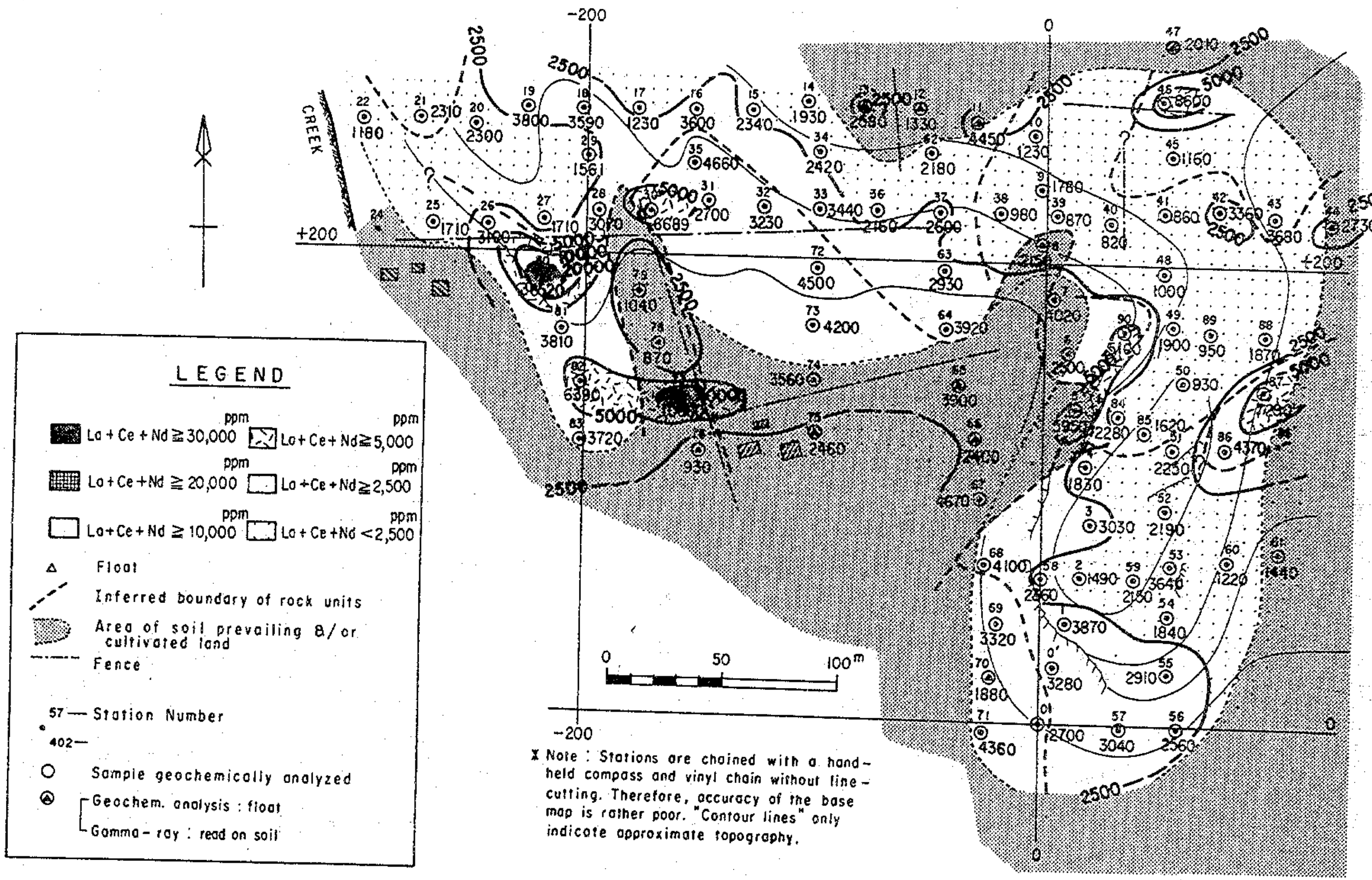


Fig. II–7–4 Geochemical Map (La + Ce + Nd) of the Ndiru Hill Prospect

CHAPTER 8 BURU HILL AREA

8-1 General geology

The Buru Hill Area is situated in eastern region of the Kavirondo Rift, east-northeast to south-southwest or east-west directional, and traverses a basement rock area in western Kenya.

The Kavirondo Rift, regarded as one of the branch from the Kenya Rift Valley, is characterized by an alkaline rock occurrence represented by a carbonatite-alkaline plutonic rock activity and also by a nepheline bearing volcanic rock activity.

The eastern province of the Kavirondo Rift occupies an extensive volcanic rock area of nephelinite-basalt, which is geologically successive to the Kenya Rift Valley. Tindred volcanic rock is situated in north-eastern portion of the Buru Hill Area, jointly with Kericho phonolite towards south.

The Tindred volcano is geologically characterized by having both volcanic activities of Rift Valley type and alkaline volcanic type of Kavirondo Rift and is associated with carbonatites in its parasite volcano, the Legetet Hill. The Buru Hill is located on a south-western extension of an alignment connecting the centre of Tindred volcano and Legeted Hill and is considered to be having a possible geological relation to the Tindred volcano.

The Buru Hill, intrudes into gneiss with a 100 square kilometres extent and has an area of 0.4 square kilometre, is observed as a small hill of jutting inlier in the vicinity of the geological boundary of Tindred and Kericho volcanos. Surroundings of the Buru Hill are mostly composed of granitoid gneiss and are geologically correlated to the Mozambique metamorphic rocks.

8-2 Results of geological survey

(1) Geology

Geological Column, Geological Map and Geological Cross Sections of Buru Hill Area are shown in Figures II-8-1, II-8-2 and II-8-3 to II-8-4. General geology in the area is composed of gneiss of basement, fenitized rock, siliceous breccias, carbonititic rock, ore veins, volcanic rock, lateritic rock, surface weathered rock and etc.. Among these units, carbonatitic rocks and related rocks are shown below.

<u>Carbonatite</u>

Carbonatite is observed in two small exposures located in the top and southern foot of the Buru Hill. It is pale greyish, fine and is associated with a small amount of magnetite (corresponds to alvikite).

Carbonatite is frequently discernible in diamond drill cores. Detaile are described below in

Age	Unit	Geologic column	Rock facies	Event
Quaternary			alluvial deposits gravel, sand, silt	
			colluvial deposits	
?			laterite and earthy rock with secondary enrichment	lateritization
?	Buru Hill Carbonatite		siliceous ore dyke, vein and brecciated dyke	carbonatite activity and Nb, Y, REE mineralization 22 Ma. (K-Ar dating) doming and brecciation
Tertiary			ferruginous ore vein	
			ferrocarbonatite dyke and vein	
			alvikite cone sheet	
			sövite massive intrusive	
			siliceous breccia plug or dyke	
			phonolite plug or dyke	volcanic activiy
			nephelinite plug or dyke	
?			sheared gneiss	shearing
?	Mozambique Metamorphic Rocks		granitoid gneiss	metamorphism
Precambrian			amphibole gneiss amphibole bearing gneiss	

Fig. II–8–1 Geological Columnar Section of the Buru Hill Area

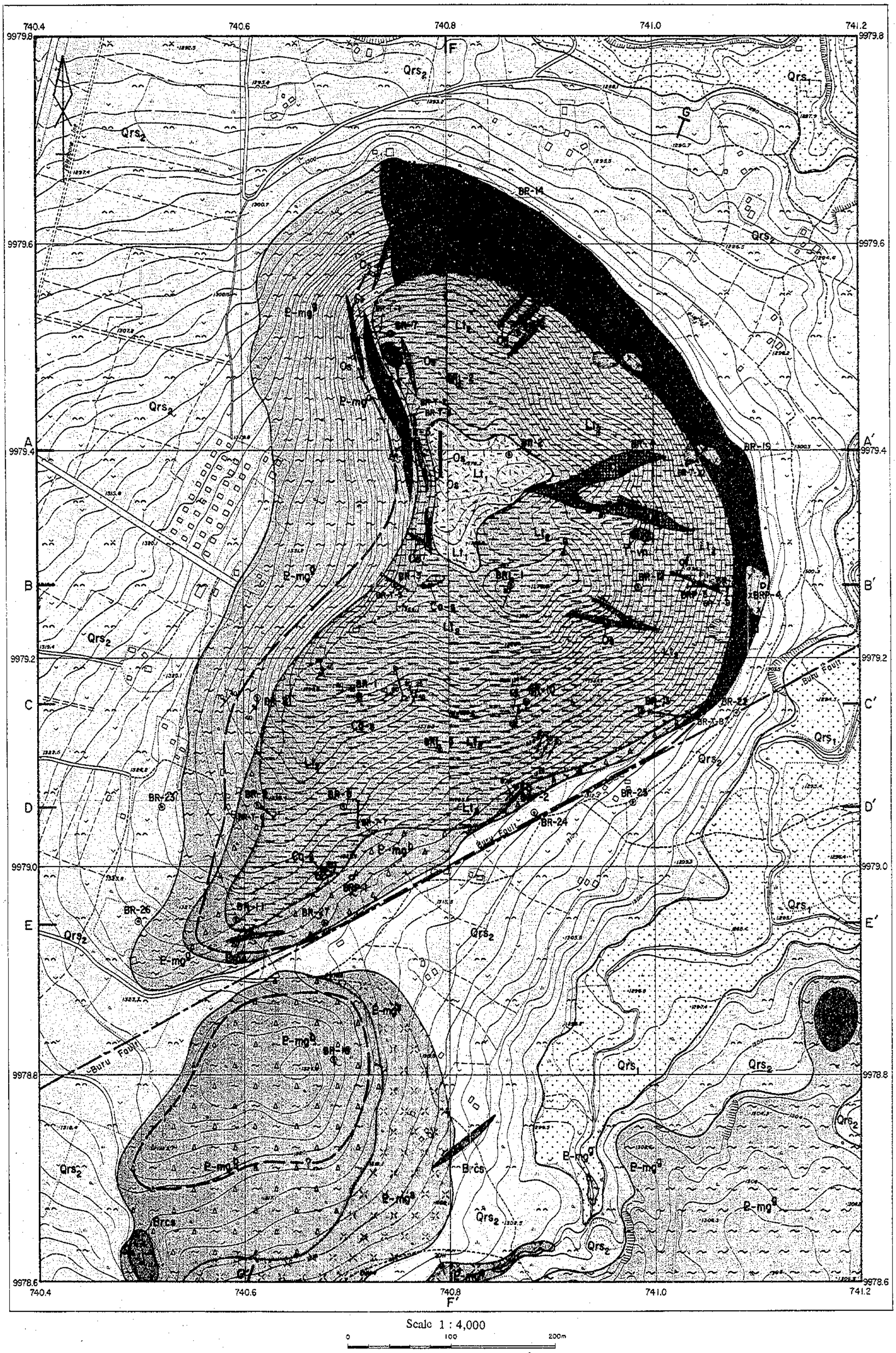


Fig. II–8–2 Geological Map of the Buru Hill Area

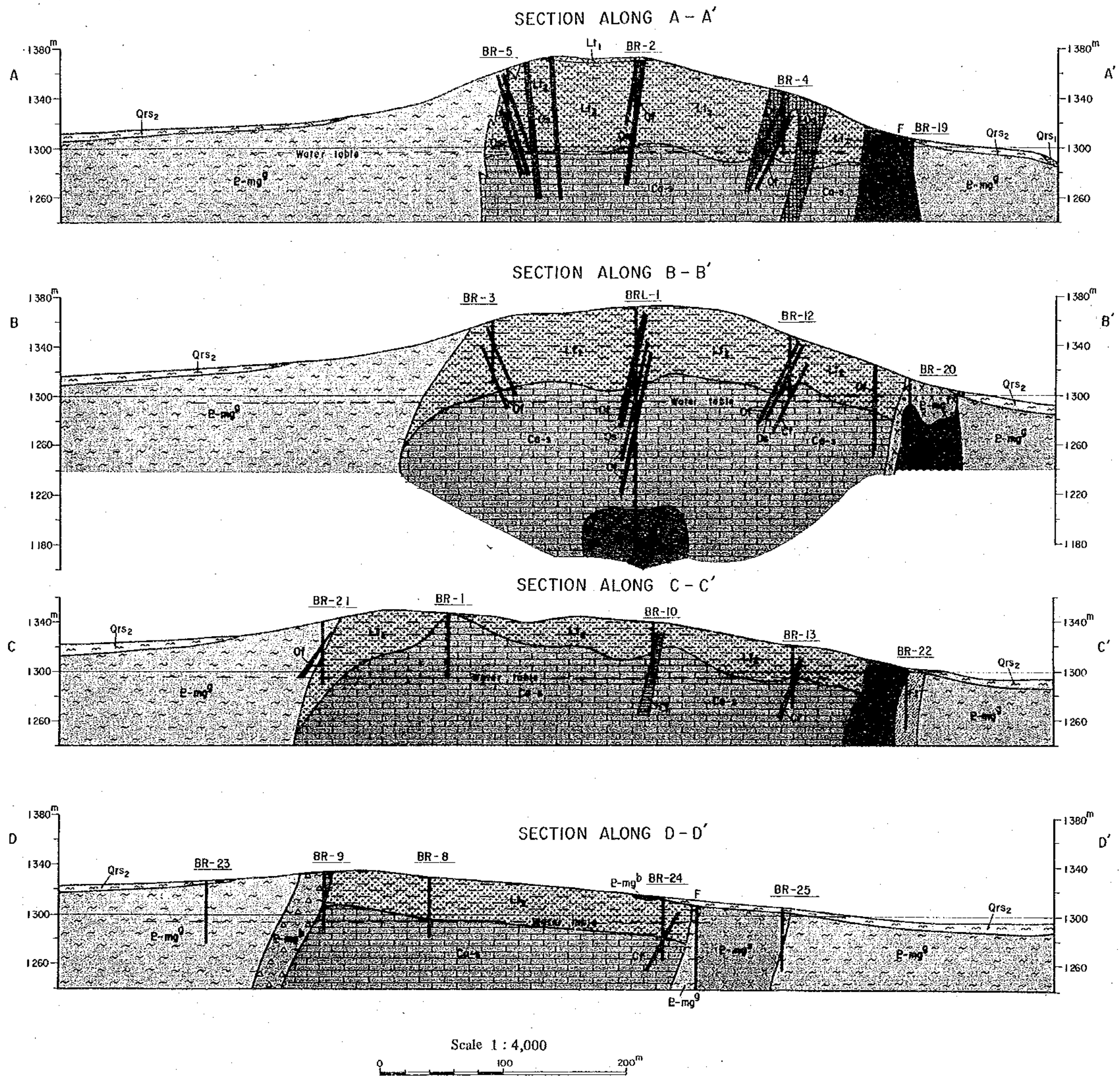


Fig. II–8–3 Geological Sections of the Buru Hill Area – (1)

LEGEND

Qrs1	Alluvium
Qrs2	Colluviul deposits
Lt1	Laterite (hard crust, carbonatite origin)
Lt2	Laterite and earthy rock (carbonatite origin)
T-vp	Phonolite
T-vn	Nephelinite, Melanephelinite
Os	Siliceous ore (dyke, vein)
Of	Ferruginous ore (vein)
Cf	Ferrocarbonatite
Ca-s	Carbonatite (alvikite, sövite)
Brcs	Siliceous breccia (dyke, plug)
P-mgf	Fenitized rock (original rock : gneiss or intrusive rock)
P-mgb	Brecciated, silicified gneiss
P-mgs	Sheared gneiss
P-mgg	Granitoid gneiss
P-mga	Amphibole gneiss, amphibole bearing gneiss
	Mineralized zone (Plane)
	Secondary enriched zone (Section)
	Strike and dip of foliation
	Strike and dip of vein
	Fault (infered)
	Water table
	Lower limit of strongly weathered zone
BR- BRL-	Location of DDH site (BRL-1,2,3 BR-1 to BR-27)
BR-P-	Location of Pit (BR-P-1 to BR-P-5)
BR-T-	Location of Trench (BR-T-1 to BR-T-10)
	Portal (inclined shaft)
A–A'	Line of section

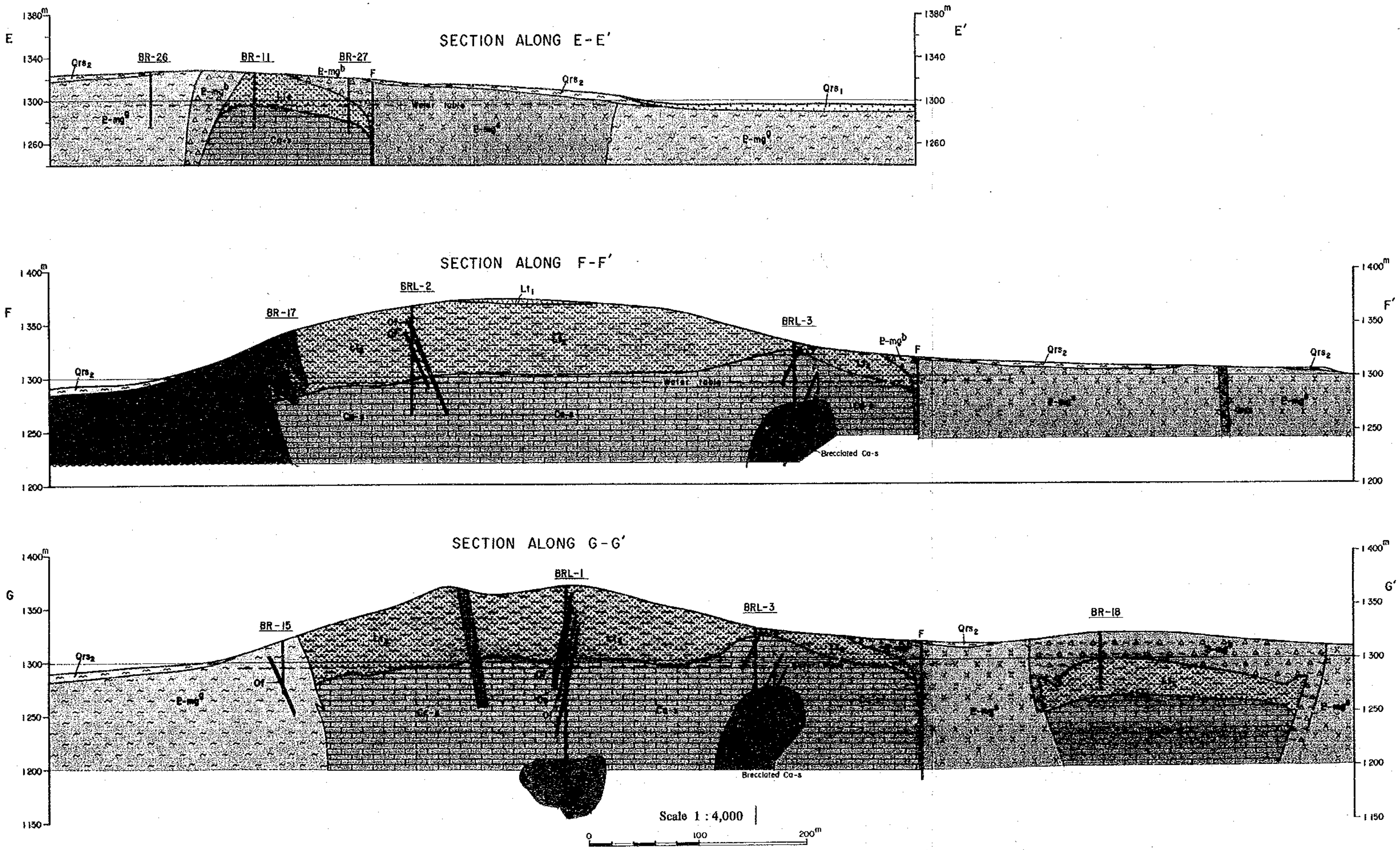


Fig. II–8–4 Geological Sections of the Buru Hill Area – (2)

Ferrocarbonatite

Ferrocarbonatite is discernible in diamond drill cores. Details are described below in 4-5-3 and 4-5-4.

Ferruginous veins

Ferruginous veins are obseved mostly in lateritic rocks and also in surrondings of gneiss, with random directional behaviours of veins and mostly networks, making mineralized zones and are of less than 10 centimetres wide mostly, less than several ten centimetres in some occasion and 1 metre wide in maximum.

The most frequent occurrence of ferruginous veins is observed in the area from diamond drill hole BR-1 toward old inclined-shaft working, where several veins, having a 10 centimetres width each, are observed at an every 1 square metre segment. Details are shown in 8-2-(3).

Siliceous ore

Abundant occurrences of siliceous ore as dikes are observed in a northern half of the Buru Hill. It is very hard and shows an occurence of a small rise in general, while, two small jutting ridges near to hole site BR-4 are conspicuous. Details are shown in 8-2-(3).

Laterite and earthy rock

Laterite and earthy rock are widely observed in the area from mid-hillside toward the crest of the Buru Hill. They are brown, pale brown, weathered and are associated with abundant iron oxides. An identification of the primary rock by naked eye is hardly possible. Networks of fine iron oxide veins, by which a gentle jutting topography is represented, are well developed in the area. Posolitic layer, overlain by thin humic soil layer, is rich in iron content, dark brown, ten to several ten centimetres thick and is underlain by extremely weathered earthy rock, several to more than ten metres thick, partially argillaceous, which is intersected by diamond drill holes.

Chemical analysis and microscopic examination show that rock is carbonatite in origin.

(2) Geological structure

The Buru Hill is a dome-shaped hill, formed by an intrusion of carbonatite. It consists of two bodies, those are the main body occupying a central portion of the survey area and the small subsurface body situated to the south. They are separated by a fault north by northeast-south by southwest directional.

The main carbonatite body of the Buru Hill is intensely weathered in the section from ground surface toward the elevation of ground water table, by what the body is lateritized or leached and is underlain by the unweathered massive body. It generally shows an oval-shaped extension on a plane and is considered by the drill results to be steeply dipping in a cylinder-like form. The effect of erosion against the main body is considered to be relatively in advanced stage due to that the peculiar brecciation structure, located in the upper-most portion of the intrusive body and/or in overlying rock - intruded rock, that is of gneiss in the area -, is limitedly observed in southern portion of the body.

Based on the form of brecciated zone in gneiss on ground surface, the subsurface small intrusive carbonatite body, distributed in southern portion of the main body, is considered to show a circular form on a plane.

Gneiss, the basement rock, essentially has a geological structure of a north-southerly trend. However, it shows a dome-up structure, circumscribing the intrusion rim of carbonatite, where it is tilted toward the outside of carbonatite body. The above structure is particularly observed in western portion of the body, while none in southern portion. These are considered to be caused by a disparity of geological resistivity against an erosion between granitoid gneiss in western side, amphibole bearing gneiss in northern to eastern side and brecciated gneiss in southern side.

(3) Mineralization

The mineralizations in the Buru Hill Area are divided into two types of category, i.e., the primary mineralizations and the supergene enrichment.

1. Primary mineralizations

Primary mineralizations are devided into five (5) types of category, i.e, carbonatite, ferrocarbonatite, calcareous iron ore veins, manganiferrous iron ore veins and siliceous iron ore veins.

Carbonatite: Unweathered carbonatites usually occur below the ground water table in the mineralized zone of the Buru Hill. However, unweathered or slightly weathered massive bodies also occur in a zone above the water table, especially in the south half of the main Buru Hill (around the drill sites BRL-1, BRL-3 and BR-1). This may reflect local differences of fracture abundances which are of possible passes of ground water, main cause of weathering.

Carbonatite is mainly composed of carbonate minerals, associated with barite, fluorite, magnetite, and a small amount of REE minerals and pyrochlore.

Ferrocarbonatite: Ferrocarbonatite generally shows an occurrence of dykes, several ten centimetres to several metres wide usually, ten metres wide in maximum, in the form of intersections into carbonatite massive body and of overlying weathered product from carbonatite. Ferrocarbonatite is also generally observed having a geological association with calcareous and/or manganiferrous iron-oxide veins, however, shows less frequent occurrences than those with iron-oxide vein mentioned above. A massive unweathered carbonatite mass mainly occur in a lower portion than ground water table, however, the association of ferrocarbonatite with the carbonatite in the zone is very rare. Then it is inferred that ferrocarbonatite may likely show a concentrated occurrence in an upper portion of the massive carbonatite body.

Ferrocarbonatite is generally fine to medium-grained, brown to reddish brown in an oxidized zone, majorly composed of carbonate minerals, rich in iron-mineral contents and is easly distinguished from iron-oxide ore by showing a carbonaceous character.

Ferrocarbonatite more or less shows a vesicular facies compared with carbonatite.

Calcareous iron ore vein: Calcareous iron ore veins are observed in many drill cores in the mineralized zone. They occur usually five metres wide in maximum in the forms of veins, several ten centimetres to several metres wide or of networks less than ten centimetres wide. It is considered that calcareous iron ore veins occur in the forms of irregular swarms of veins and/or networks, and intesect into carbonatite through the fissures, which were formed during the course of the carbonatite intrusion. It is usually variegated such as dark brown, reddish brown. brownish orange-coloured, dark grey and etc., and is also visicular, hard and dense mostly. Iron minerals are mostly altered to goethitic limonite by weathering.

Manganiferrous iron ore vein: Manganiferrous iron ore veins show similar occurrences to those of calcareous iron ore veins. Manganiferrous iron ore is distinguished from calcareous iron ore by showing a peculiar black appearance, however, it is frequently made hard by discolouring of the former. A whole rock chemical analysis properly offers a definitive resolution to produce a clear distinction between them.

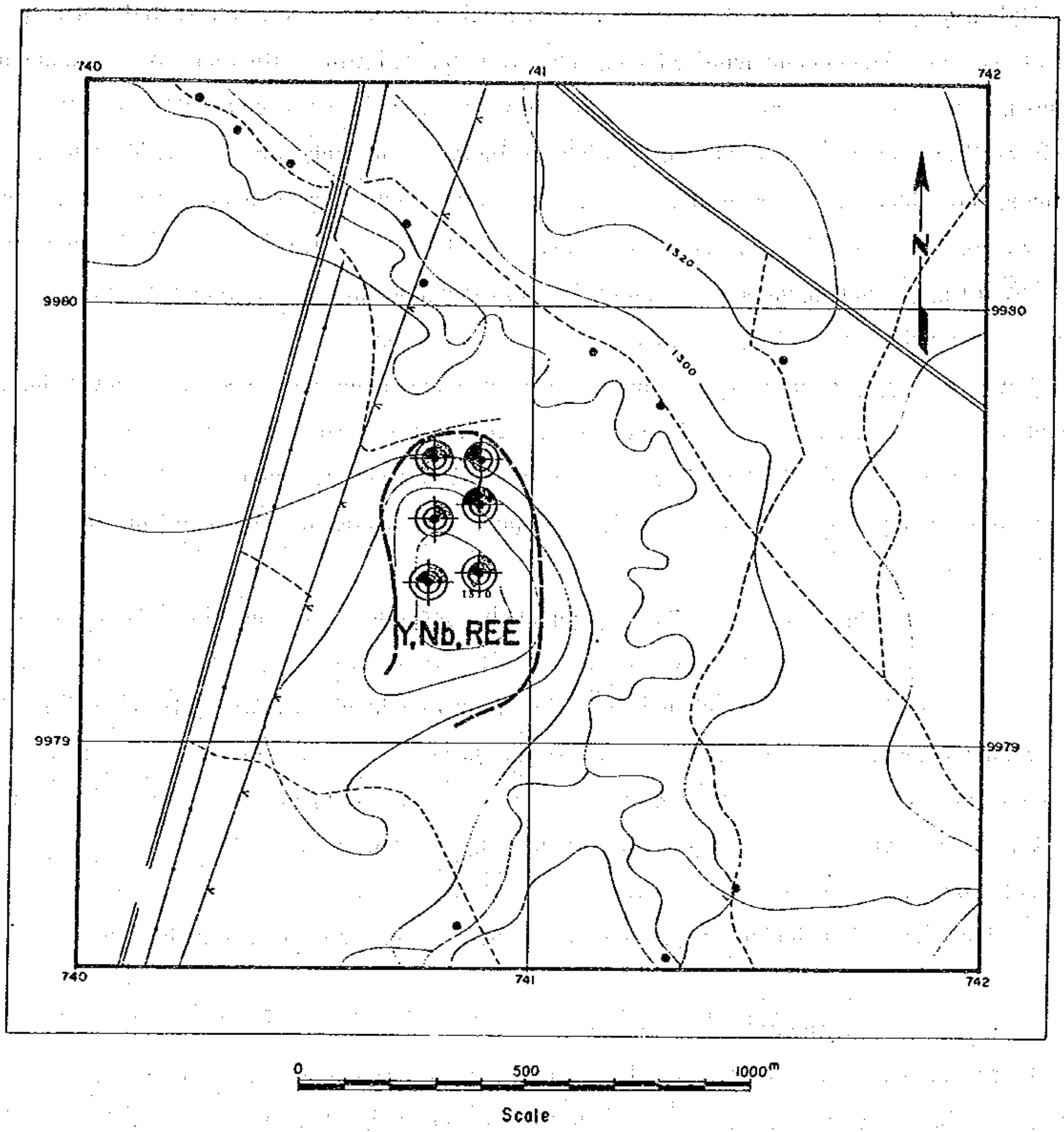
Siliceous iron ore vein: Siliceous iron ore veins are abundantly observed in the diamond drill cores carried out in mid to northern portions of theBuru Hill Area, where siliceous iron ore dykes of relatively large size are observed on the ground surface in the area. Siliceous ore vein usually shows one to several metres wide, less than ten metres wide in maximum. An occurrence of siliceous ore vein, estimated to have an apparent width of twenty metres, at the hole mouth of the BR-4, is considered to be a group of veins of one to five metres wide.

Siliceous ore veins show pale grey, brownish orange-coloured, dark grey and are dense and hard by microcrystalline characters, mostly composed of quartz and iron minerals.

2. Surpergene enrichment

Carbonatitic rocks related to the primary mineralization have been subjected to weathering above the ground water table. On the surface of the Hill, they occur as oxidized iron rich rock, lateritic rock, porous rock, soil and clayey rocks. They show various colours depending on types and quantity of contained iron oxide; brown, reddish brown, khaki etc. with yellowish white part, where transparent minerals occupy. Abundant iron oxide occur as irregularly reticulated veins, disseminations, gossan, and sometimes even as residual massive magnetite. Some of oxidized rock show an appearance similar to that of leached cap of sulfide ore deposits. Iron rich oxidized rocks contain abundant goethite, which is interpreted to be derived from magnetite or iron rich carbonate minerals.

Based on the results of chemical analysis and microscopic examination, they are carbonatite in origin, and have a supergene enrichment of Nb, Y and REE.



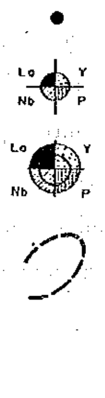
LEGEND

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.



Non anomalous sample

Anomalous sample (≧ m + 1S , < m + 2S)

Highly anomalous sample (≧ m + 2S)

Geochemicaly anomalous zone (Target area)

Fig. II–8–5 Geochemical Interpretation Map of the Buru Hill Area

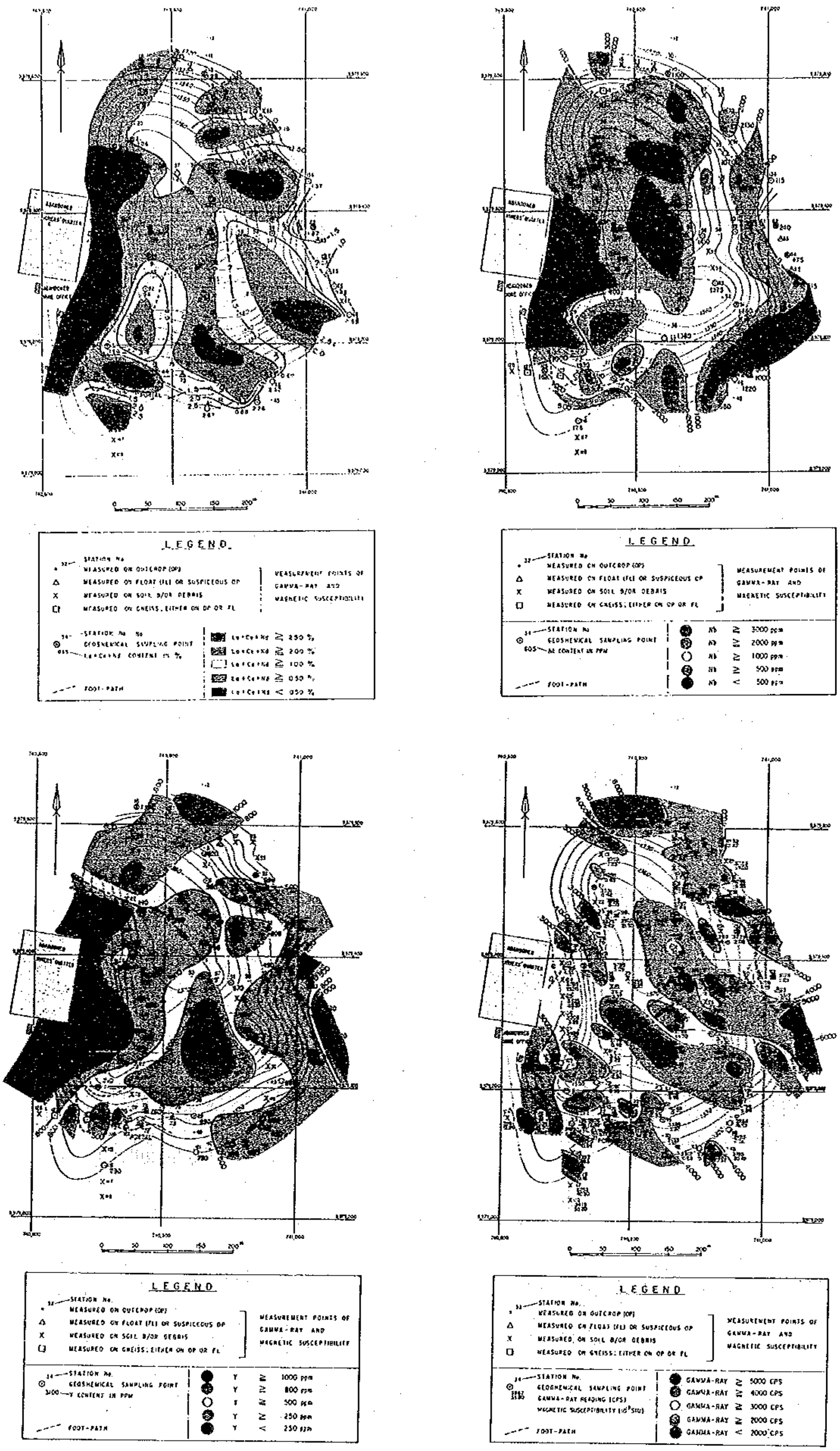


Fig. II–8–6 Geochemical Interpretation Map of the Mineralized Zone in the Buru Hill Area

8-3 Results of geochemical survey (Semi-detailed survey)

(1) Sampling

Geochemical research works in the Buru Hill area were implemented in the 1st-year programme, 1987, to mainly cover an area of the REE-mineralized zone associated with Buru Hill carbonatite body on grid-patterns, supported by supplementary work in the periphery of the body. The forty-nine (49) rock and ore samples were collected for the former purpose, twelve (12) were for the latter. The total gamma-ray intensity determinations were also implemented jointly with the geochemical works.

(2) Examinations of the results of the survey

Based on the statistical value of the geochemistry, processed on 47 specimen, while two specimen of unmineralized gneiss were excluded, the whole area of Buru Hill itself provides a geochemical anomalous zone of REE and yttrium on the threshold of m+2s value of the 47 specimen, as shown in Fig. II-8-5. It is noted that three components, those are Nb, Y and La+Ce+Nd, are relatively high to encourage an interests in an economic potential.

The geochemical values of Nb, Y and La+Ce+Nd, and the total gamma ray intensity are shown in Figure II-8-6.

The major results are summarized below:

i) Nb, Y and La+Ce+Nd show different anomalous showings of distribution, mostly separately.

ii) The anomalous zone of Nb, Y and La+Ce+Nd are obscure on ground surface in western side of the Buru Hill.

iii) Nd and La+Ce+Nd show a little common behaviour of geochemical anomaly showing, semicircular-opened toward west, however, of different spatial showing of highly concentrated anomaly.

iv) Y shows an entirely separated behaviour of geochemical anomaly showing from Y and La+Ce+Nd, highly concentrated in three localities, extending northeasterly-southwesterly.

v) The distribution of total gamma-ray intensity extends northwesterly-southeasterly, covering the whole Buru Hill itself by a gamma-ray anomaly of more than 3,000 counts per second, 15 times of the background value.

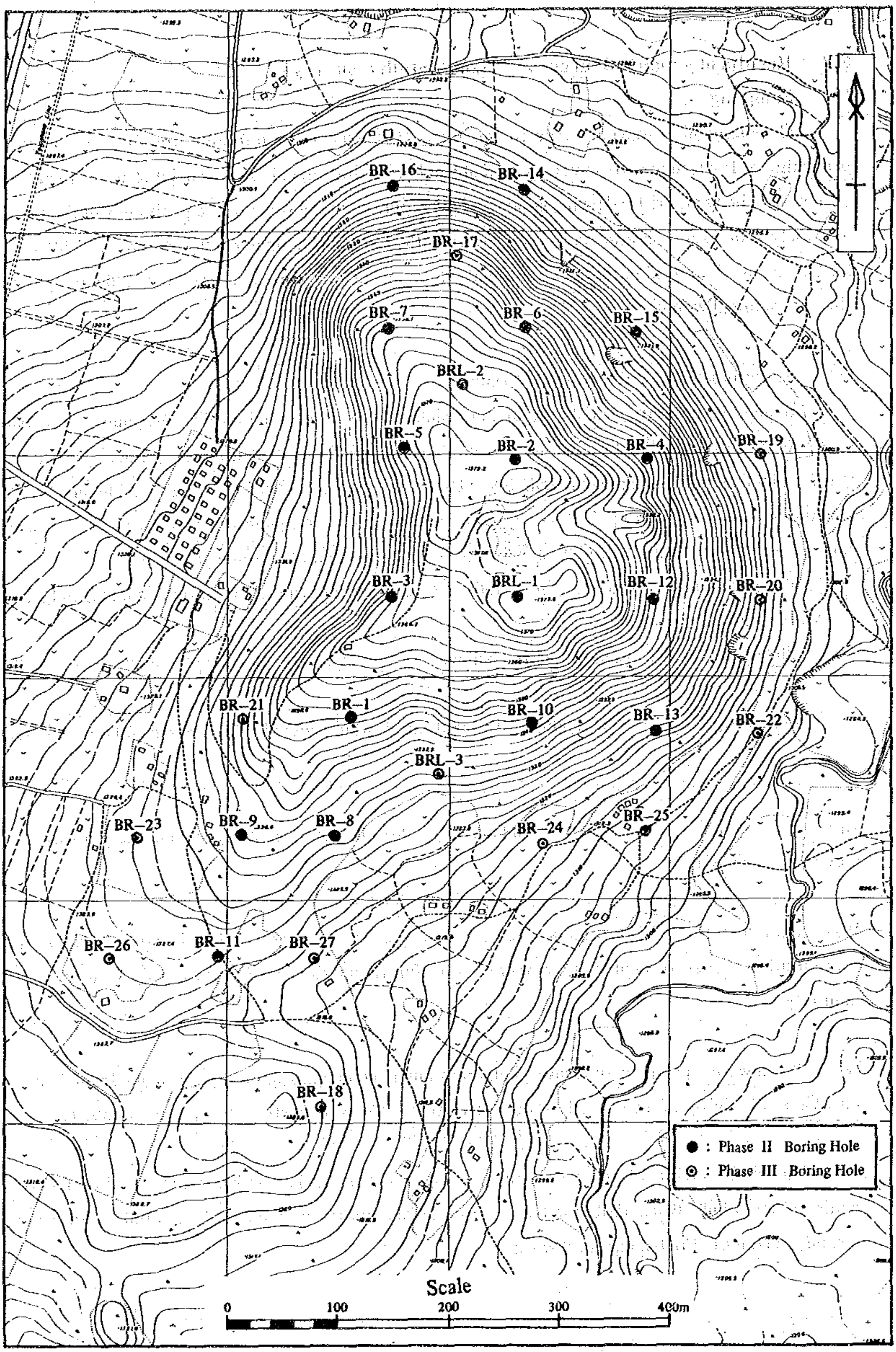


Fig. II–8–7 Location Map of the Drilling Sites in the Buru Hill Area

(3) Discussion

Based on the results of chemical analysis of the 17 elements for the 47 specimen in Buru Hill area, the REE show extremely higher values than those in any other area, however, every REE is less contained than the economical standard value. The LREE show relatively high contents, the arithmetic average value of La+Ce+Nd is of 1.31 percent, including the highest value of 3.98 percent. Nb and Y show relatively low values on ground surface, 0.11 percent in average and 0.48 percent the highest of Nb, and 0.06 percent in average and 0.31 percent the highest of Y, however, they might be possibly somehow concentrated in deep underground under the reduction condition, what enhances an encouragement to warrant further exploration works.

Phosphorus, barium, strontium, thorium and uranium are estimated to be unlikely selected for a future target of exploration, based on current interpretations of their chemical contents showing as far as currently observed and of geology and geochemistry in the area.

8-4 Results of diamond drill exploration and mineralization

(1) Outline

Diamond drill exploration works in Buru Hill area, by thirty (30) vertical holes, 1,750 metres in total, composed of 50 metres × 27 holes, 100 metres × 2 holes and 200metres × 1 hole, were implemented during the term from 1988 to 1989 in the 2nd- and 3rd-year programmes. Locations of drill hole sites are shown in Fig. II-8-7, locations in details, site altitudes and depths of each hole are tabulated in Table II-8-1.

Detailed examinations of drill cores by unaided eye were carefully made to summarize the drill hole core logs on a scale of 1:200. Required number of samples of minerals and rocks were collected to be sent to laboratory tests. Mineralized portions of the drill cores were chemically analysed at an every intersected portion of ores. The 302 samples were chemically analyzed. The geological cross sections with drill hole logs projections, on a scale of 1:1,000, were delineated after geological compilations of surface mappings and drill logs. The results of the chemical analyses of ores were applied to the estimations of inferred geological ore reserves and grades.

(2) Sampling, chemical analysis and statistical interpretations of chemical contents

The 372 ore samples, intersected by the current diamond drill works, were collected to be chemically analysed.

Eight (8) rare earths elements, lanthanum (La), cerium (Ce), neodymium (Nd), samarium (Sm), europium (Eu), telbium (Tb), ytterbium (Yb) and lutecium (Lu), and other related eight (8) elements gold (Au) in 2nd-year work only, phosphorus (P) in 3rd-year work only, barium (Ba), strontium (Sr), niobium (Nb), yttrium (Y), uranium (U) and thorium (Th) were chemically analysed. Chemical analyses of Ore Grade-percent-unit was applied to barium and LREE (La, Ce, Nd), which are contained in high concentration, and Trace Level-parts per million-unit was applied to the other elements.

Table II-8-1 Location of diamond drill holes, Buru Hill Area

Phase II

DDH Number	UTM Coordination		Site elevation above sea level (m)	Hole depth (m)
	X (mE)	Y (mN)		
2nd-Year				
BRL-1	E740,860	N9,979,271	1,373.0	200.10
BR-1	E740,712	N9,979,164	1,350.0	50.40
BR-2	E740,860	N9,979,395	1,372.5	50.10
BR-3	E740,748	N9,979,271	1,361.0	50.40
BR-4	E740,978	N9,979,395	1,346.0	50.50
BR-5	E740,758	N9,979,406	1,366.0	50.40
BR-6	E740,868	N9,979,515	1,349.0	50.10
BR-7	E740,745	N9,979,514	1,360.0	50.40
BR-8	E740,697	N9,979,057	1,331.5	50.40
BR-9	E740,613	N9,979,058	1,335.5	50.40
BR-10	E740,873	N9,979,159	1,342.0	50.40
BR-11	E740,592	N9,978,949	1,326.5	50.30
BR-12	E740,984	N9,979,268	1,347.5	50.40
BR-13	E740,986	N9,979,150	1,321.0	50.40
BR-14	E740,868	N9,979,637	1,307.0	50.30
BR-15	E740,968	N9,979,510	1,318.0	50.30
BR-16	E740,650	N9,979,639	1,315.7	50.40

Phase III

DDH Number	UTM Coordination		Elevation above sea level (m)	Hole depth (m)
	X (mE)	Y (mN)		
3rd-Year				
BRL-2	E740,812	N9,979,463	1,365.5	100.50
BRL-3	E740,791	N9,979,113	1,332.5	100.70
BR-17	E740,807	N9,979,577	1,340.5	50.20
BR-18	E740,687	N9,978,815	1,324.0	52.50
BR-19	E741,082	N9,979,397	1,308.0	50.10
BR-20	E741,083	N9,979,266	1,312.0	50.20
BR-21	E740,613	N9,979,163	1,340.0	50.10
BR-22	E741,080	N9,979,148	1,303.5	50.10
BR-23	E740,520	N9,979,057	1,328.0	50.20
BR-24	E740,882	N9,979,051	1,315.0	50.50
BR-25	E740,979	N9,979,061	1,308.0	50.10
BR-26	E740,496	N9,978,948	1,326.0	50.40
BR-27	E740,678	N9,978,946	1,320.0	50.10

Various statistical processing were applied to the chemical content values of the elements to clarify the chemical behaviours of the elements in mineralized zones.