PART II DETAILS OF SURVEY WORK

CHAPTER 1. JIBANA AREA

1-1 Measures of Survey Works

Three diamond drill holes, 451.40 metres deep in total, were operated by the current programme.

1-2 General Geology

General geology in Jibana Area is shown below in accordance with the geological reconnaissance results of the semi-detailed survey works in the second-year programme.

1-2-1 Summary of geology

Geological map and geological cross-sections in Jibana Area are shown in Figure II -1-1.

General geology in the Area majorly consists of the sediments of Triassic to Cretaceous ages, which are stratigraphically divided into Mariakani Formation, Mazeras Formation, Kambe Formation and Mtomkuu Formation in ascending order from west to eastward in the Area. These Formations are extendedly distributed north-south directionally along the sea shore line in the Area.

(1) Mariakani Formation (Mku)

The Upper Member of Mariakani Formation is observed in the Area. The Member is distributed in western part of the Area, extending north-south directionally with a width of 2 to 3 km and having a contact to the overlying Mazeras Formation by a possible fault. The Member majorly consists of sandstone and siltstone (Mku-St) beds. Sandstone shows pale gray to gray, fine- to coarse-grained with a local development of cross-lamina-dominated and micaceous facies, however, the former is less distinguished than that in the Mazeras Formation. Siltstone (Mku-St) is distributed in south-western end of the Area. The Member is correlated to be of Triassic age.

(2) Mazeras Formation (Mzm, Mzu)

The Middle (Mzm) and Upper (Mzu) Members of Mazeras Formation are observed in the Area, being majorly comprised of the Middle Member, which is locally overlain by the Upper Member in higher portions in altitude in the Area. The Formation is extendedly observed in central part of the Area, north-southerly, approximately 2.5 to 4 km wide, and has a contact by a north-southerly fault to the underlying Marikani Formation and the overlying Kambe Formation.
Middle Member (Mzm) of Mazeras Formation is mainly composed of sandstone and

siltstone (Mzm - St) beds. Sandstone shows pale gray to gray, coarse - grained and is dominated by cross lamina textures. It is frequently rich in quartz content with having mudstone breccias. It yields petrified woods in the upper - most horizon of the Member in the vicinity of Kinango Hill. Several beds of siltstone (Mzm - St) are observed along the National Road near Chasimba Hill in northern part of the Area, being greenish gray to bluish gray, very soft and brittle and several to several tens metres thick. Couples of relatively thicker beds are properly shown in the attached Geological Map. None of the occurrences of siltstone beds is known in central to southern parts of the Area.

Upper Member (Mzu) of Mazeras Formation is locally distributed in topographically high portions in the Area, i.e., in Kinango Hill, Kia Hill and etc., It shows a grayish white and coarse - grained sandstone beds occurrence in Kinango Hill.

(3) Kambe Formation (K)

Kambe Formation is composed of marine limestone beds, extended north - southerly. It is wider in north - eastern part of the Area, more than 4 km wide east - westerly than in southern part, less than 1 km wide. Limestone shows pale gray to gray, mainly being clastic or having an oolitic texture in central to northern parts of the Area and occasionally yields coral fossils. Limestone in southern part of the Area is mainly fine - grained and massive with a lack of showing of oolitic texture.

(4) Mtomkuu Formation (Mtl, Mtm, Mtu)

Mtomkuu Formation is distributed in eastern part of the Area, extended NNE - SSW directionally, and is divided into Lower (Mtl), Middle (Mtm) and Upper (Mtu) Members in ascending order from west to eastward in the Area.

Lower Member (Mtl) of Mtomkuu Formation is only observed in a extendedly zonal form of distribution of weathered floats, pale brown, in the Area to lead to an uncertainty whether having a similar occurrence to that in Ganze Area of a pile of sandstone and shale alternations.

Middle Member (Mtm) of Mtomkuu Formation in the Area is mainly composed of pale greenish gray shale beds, partly intercalated by very fine - grained sandstone beds. Shale beds of the Member are distinguishedly fissil, soft and brittle.

Upper Member (Mtu) of Mtomkuu Formation is locally distributed in south - eastern end of the Area. The Member is reportedly composed of shale beds mainly, associated with limestone beds intercalations, after the existing geological informations.

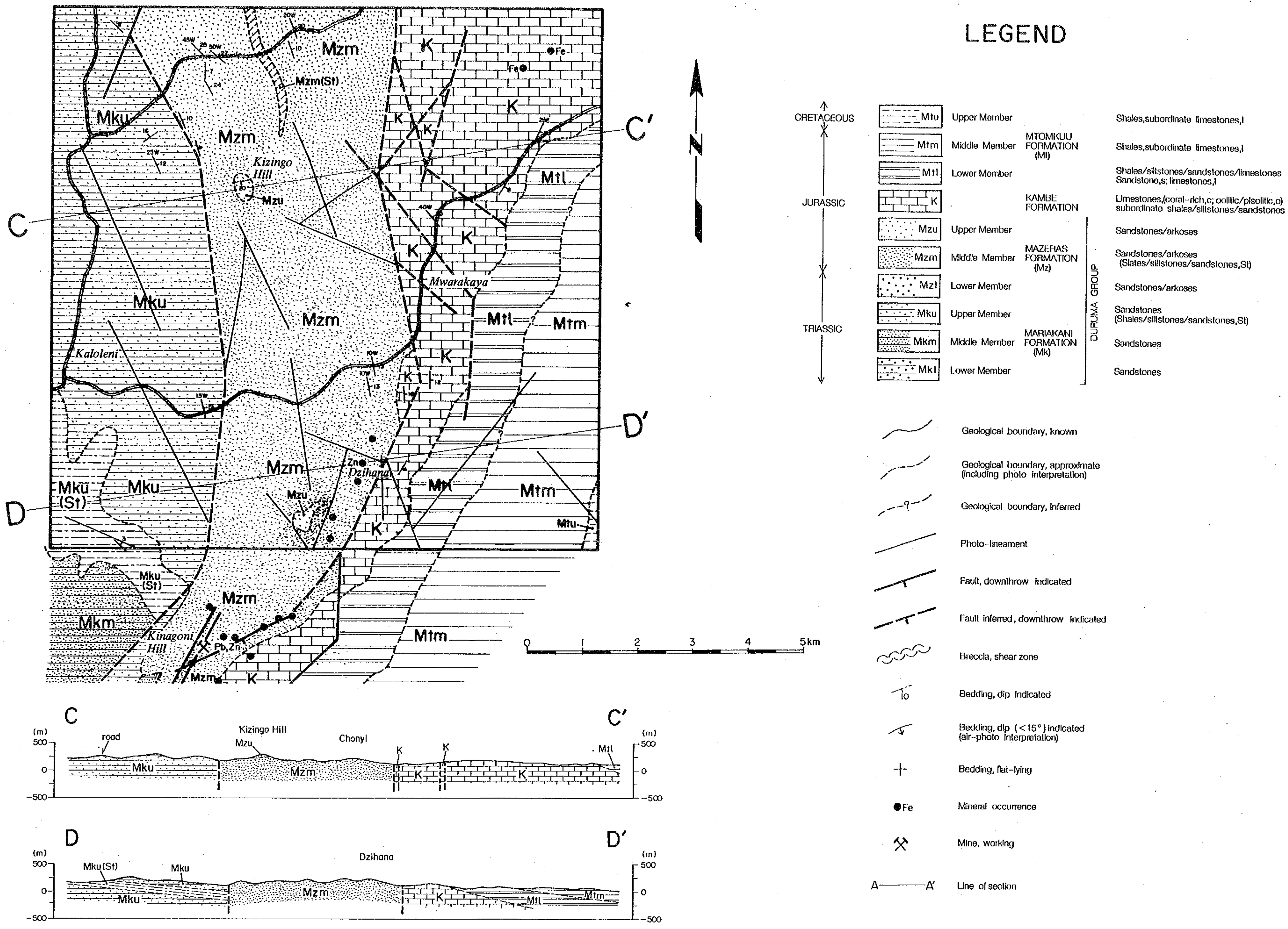


Figure II–1–1 Geological Map of the Jibana Area

1-2-2 Geological structure

The sediments in the Area is mainly distributed to show a general strike of NW-SE to NNE-SSW, mainly gently dipping 10 to 20 degrees toward east. Faults, mainly north-southerly, which frequently provide geological direct contacts of Mariakani, Mazeras and Kambe Formations, are abundantly estimated in the Area. A distinctive development of NNW-SSE-directional faults is represented, to be shown as lineaments, by an interpretation of air photographs.

1-2-3 Ore showing and mineralized zone

Jibana Mineralized Zone, which is one of the diamond drill targets of the current programme works, is evaluated to be solely remarkable in Jibana Area.

Jibana Mineralized Zone :

Several occurrences of gossanous materials have been reported on eastern hill slopes, underlain by the Middle Member (Mzm) of Mazeras Formation, westward from Jibana (Dzihana) Village. The gossanous materials are observed by the curent work to be mainly composed of limonite-stained sandstone, limonitic concretions and brecciated materials to form small exposures or floats. Gossanous materials are discontinuously extended, while, an unitary extension is estimated to be less than 80 metres by 80 metres. Intermittently discontinuous extensions of such gossanous materials overall form the Jibana Mineralized Zone, about 2 km long NNE-SSW directionally and some 100 metres wide in maximum.

Soil specimens and limonite-stained sandstone samples from the zone were chemically examined in the second-year work to show 84 ppm to 142 ppm of lead in three soil specimens, meanwhile, high concentration of precious and base metallic elements was not detected in limonite-stained sandstone samples.

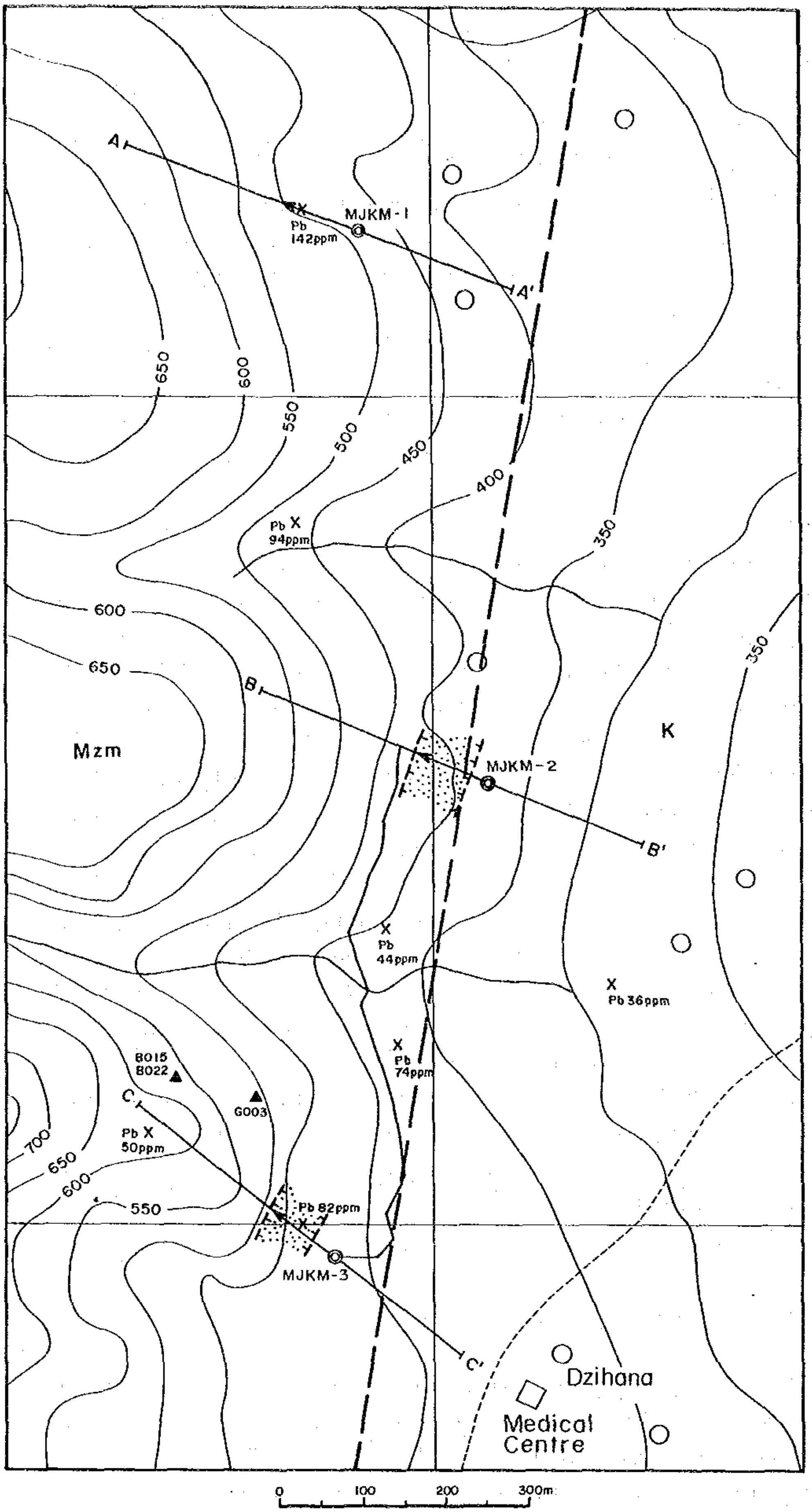
Jibana Mineralized zone has been evaluated to be promising of lead-zinc-barite ore veining mineralization occurrence, since that type of mineralization is estimated to be genetically related to a fault activity, while, the zone is located close to Karroo-Jurassic Fault, which demarcates Kambe and Mazeras Formations, or within a range 400 m westward apart from that, and geochemical lead anomalies have also been shown nearby the zone.

1-3 Results of Diamond Drill Exploration

1-3-1 Outline

Figure II-1-2 shows the locations of diamond drill sites in Jibana Area Project, while, Figure II-1-3 shows the geological cross-sections in accordance with drill core log sheets establishments.

Specifications of drill works are tabulated in Table II-1-1.



LEGEND

- K — Kambe formation
- Mzm — Middle member of Mazeras formation
- Inferred fault
- Gossan zone
- G003 — Analyzed gossan sample (Phase II)
- X — Soil sample location (Phase II)
- Diamond drill hole
- A—A' — Section line

List of DDH

Hole No.	Direction	Inclination	Length
MJKM-1	N70°W	−50°	150.40m
MJKM-2	N68°W	−50°	150.70m
MJKM-3	N53°W	−50°	150.30m

Result of the Chemical Analysis of Gossan Samples

Sample number	Au ppm	Ag ppm	Cu %	Pb %	Zn %	Fe %	Mn %
B015	<0.07	2	0.001	0.004	0.002	2.66	0.009
B022	<0.07	<2	0.001	0.007	0.002	3.19	0.001
G003	<0.07	2	0.010	0.037	0.135	31.9	0

Figure II-1-2 Location Map of the Drill Holes, Jibana Area

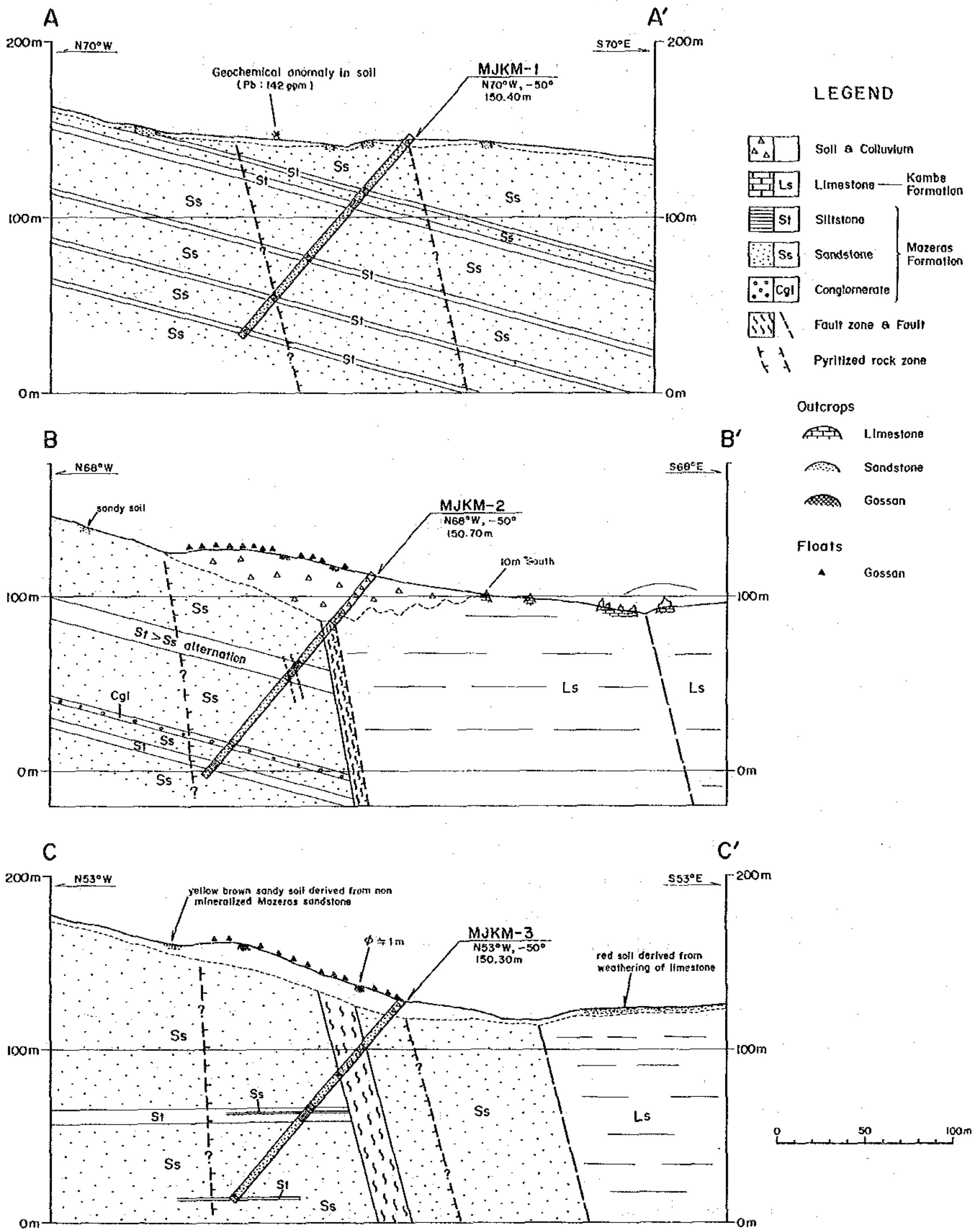


Figure II-1-3 Geological Sections along the Drill Holes, Jibana Area

Three diamond drill holes, totalling 451.40 metres deep, targeted on lead-zinc-barite ore veins mineralizations, were carried out as stated below:

Hole MJKM-1 : On deeper part underground of the lead-anomaly showing of 142 ppm.

Hole MJKM-2 : On deeper part underground of the gossanous material occurrence.

Hole MJKM-3 : On deeper part underground of the gossanous material occurrence and the lead-anomaly showing of 82 ppm.

Jibana Mineralized Zone is estimated to show a strike/dip extension of NNE-SSW/steep dipping eastward, consequently, declined hole operations from the eastern side of the zone were carried out to accomplish right-angled intersections against the zone.

Table II-1-1. DDH in Jibana Area

Hole number	Hole direction	Hole depression	Site evelation above sea level in metre	Hole depth in metre
MJKM-1	N 70° W	-50 °	144.50	150.40
MJKM-2	N 68° W	-50 °	111.00	150.70
MJKM-3	N 53° W	-50 °	127.00	150.30

1-3-2 Geology by drill works

(1) Hole MJKM-1

Geology by the drill work is shown below:

0 m - 6.3 m : Weathered residual soil

6.3 m - 150.4 m : Mazeras Formation

Weathered residual soil consists of reddish-brown sandy silt and medium-grained sand beds.

Mazeras Formation chiefly consists of sandstone beds, intercalated by siltstone beds. Sandstone beds are calcareous, widely bedded-structured and sometimes massive, while, granularity is medium-, fine- and coarse-grained in dominance order. Pyrite dissemination and kaolinitization are widely observed, however, those are weak in a part of fine-grained sandstone beds. Angles of bedded structure of the sediments, shown on drill cores surface by hole intersection, are in the range of 60° to 80° . Siltstone beds are greenish gray to dark gray, chiefly massive or bedded-structured. Seven intercalations of siltstone are observed. They severally produce drill cores 0.5 m long to 5.2 m long in maximum. Pyrite disseminations are observed in parts, however, none in other parts.

Downward boundary of weathered zone underground is clearly observed at the depth of 16.70 m deep to be followed by unweathered zone.

(2) Hole MJKM-2

Geology by the drill work is shown below:

0 m - 29.9 m	:	Weathered residual soil
29.9 m - 36.5 m	:	Kambe Formation
36.5 m - 45.9 m	:	Fault fracture zone
45.9 m - 150.7 m	:	Mazeras Formation

Weathered residual soil consists of sandy silt, associated with hematite-stained sandstone pebbles and limonitic concretions.

Kambe Formation consists of gray limestone beds with breccia structure. Several occurrences of cavity-filling materials, composed of sandy clay associated with limestone pebbles, were encountered at 30.5 m - 34.0 m. An unanticipated occurrence of Kambe Formation in Hole MJKM-2 has posed a required delineational revision, nearby the drill site area, of the running location of Karroo-Jurassic Fault, that makes a geological boundary of Kambe and Mazeras Formations, on the geological map, provided by the second-year work, to being that the running location of the above fault should be shiftedly delineated some 180 metres westward apart from that on the existing map.

Fault fracture zone consists of dark brown fault clay, pyrite disseminated, in upper 2.3 m-thick-segment and pale brown sandstone bed, intensely fractured, in lower 7.1 m-thick-segment. Fault clay is not subjected to oxydation, possibly being due to an aquiclude or impermeable feature.

Mazeras Formation consists of bedded sandstone beds, fine- to coarse-grained, and is intercalated by siltstone and minor fine conglomerate beds. Sandstone toward 62.9 m-depth is not calcareous by leaching after weathering, however, shows gray, bedded-formed and calcareous beyond 62.9 m-depth. Dark-coloured bands in sandstone are comprised of muscovite biotite, chlorite, pyrite and etc.. Bedded structures in drill cores are normally encountered by drill hole to be showing 60° to 74° angle-intersections. White kaolinitic clay as an intergranular material of sand grains is widely observed, while, pyrite dissemination is also widely common in unoxidized part. Thin beds or fine fragments of coaly black materials are observed in sandstone beds toward 100 m-depth. A thin coal seam, about 5 cm thick, is observed at 125.6 m-depth. Some ten intercalations of silstone beds are observed to be greenish gray, banded-formed or massive and pyrite disseminated widely. Siltstone in upper part is locally fractured, however, the beds are generally massive to severally produce drill cores 0.3 m long to 6.1 m long in maximum. Two sedimentary cycles of normal grading are observed at the depths of 65.5 m - 90.8 m and 90.8 m - 128.4

m in Mazeras Formation.

Downward boundary of weathered zone underground reaches to the depth of 63.8 m to be followed by unweathered zone, while, the segment from 58.5 m to 63.8 m forms a transitional zone.

(3) Hole MJKM-3

General geology by the drill work is shown below:

0 m - 10.6 m : Weathered residual soil

10.6 m - 150.3 m : Mazeras Formation

Fault fracture zone at : 34.9 m - 57.6 m

Weathered residual soil consists of sandy silt, associated with hematite-stained sandstone pebbles and limonitic concretions.

Mazeras Formation chiefly consists of fine- to coarse-grained sandstone beds and is intercalated by siltstone and fine conglomerate beds. Upper part of sandstone bed toward 67.2 m-depth is generally massive, fine- to coarse-grained and soft by weathering and argillization. Lower part of sandstone bed beyond 67.2 m-depth is with bedded structure, coarse-grained or medium-grained to fine-conglomeratic and pyrite disseminated or kaolinized by alteration. Intersectional angle on drill cores of banded structure is 50° to 60° in general. Six intercalations of siltstone beds are observed to be dark gray to dark greenish gray, banded-formed or massive and pyrite disseminated widely. The siltstone beds severally produce drill cores 0.2 m long to 7.1 m long in maximum.

Two fault fracture zones at the depths of 34.9 m - 39.0 m and 55.7 m - 57.6 m, which are comprized of fault clay, are observed. The intercalation of the above two zones, 39.0 m - 55.7 m, is comprised of weakly fractured sandstone beds. Fault fracture zones are almost thoroughly oxidized, however, locally pyrite disseminated in unoxidized parts.

Bed rocks observed in Hole MJKM-3 are subjected to weathering toward the depth of 72.8 m, while, the segment from 46.3 m to 72.8 m forms a transitional zone.

1-3-3 Mineralization

(1) Hole MJKM-1

Pyrite disseminations are widely observed in Mazeras Formation, however, ore mineralization of any scale and quality has never been encountered by Hole MJKM-1. Geochemical lead-anomalies on ground surface, revealed by the previous-year work are estimated to have possibly been represented by a concentration of heavy metallic elements into soils in accordance with a progress of weathering of pyrite-disseminated rocks, which are associated with minor content of heavy metallic elements. In an inferred view, the geochemical lead-anomalies in the Area could not be represented in respose to an occurrence underground of the targeted lead-zinc-barite ore mineralization.

(2) Hole MJKM-2

Pyrite disseminations are widely observed in fault fracture zone and in Mazeras Formation. Pyrite fine veins, 0.5 cm to 1 cm wide, are also limitedly observed in sandstone beds of Mazeras Formation with a lack of any ore mineral showing of geological and economical significance.

Gossanous materials on ground surface, which have been targeted by the current diamond drill exploration, are likely inferred to have been formed by continuous precipitations and accumulations of iron, in connection with progresses of weathering of clayey materials in fault fracture zones or rocks, associated with pyrite. Consequently, the gossanous materials, the above, are evaluated to likely be a product of residual limonitic sediments by weathering and to unlikely represent a weathered facies of lead-zinc-barite veins ore mineralization of initial expectations.

(3) Hole MJKM-3

Pyrite mineralization is solely observed with a lack of any ore mineral showing of geological and economical significance as similar to the result by Hole MJKM-2. Gossanous materials nearby the drill site is also likely inferred to have been formed by weathering of pyrite disseminated materials or rocks.

1-4 Chemical assay result of ore

Two ore specimens by Hole MJKM-3 were collected in Jibana Area.

Chemical assay results of those, numbered as KM3-A01 and -A02, are shown in Table II-1-2. KM3-A01, pyrite-disseminated fault clay specimen at the depth of 46.50 m - 46.67 m, with the value of 0.121 percent zinc and 2.60 percent barium, could show an occurrence of weak mineralization of zinc ore and barite in the fault zone.

Table II-1-2 Results of the Chemical Analysis of Drill Core Samples, Jibana Area

Sample No.	Hole No.	Depth (m)	Cu %	Pb %	Zn %	Au g/t	Ag ppm	Ba %
KM3-A01	MJKM-3	46.50-46.67	0.006	0.018	0.121	0.154	2	2.60
KM3-A02	MJKM-3	96.00-96.20	<0.001	0.003	0.011	0.069	<2	<0.01

1-5 Interpretation

A possible exdended underground showing of the gossanous materials and geochemical lead-anomalies, represented by the previous work on ground surface, which have been targeted by the current third-year drill programme, is inferredly considered to be of the occurrences of widely pyrite-disseminated fault fracture zones or sandstone/siltstone beds of Mazeras Formation. Gossanous materials and lead-anomalies, the above, are inferred to have been formed by residue and concentration of iron and/or heavy metallic elements in accordance with a progress of weathering of argillaceous materials and rocks associated with pyrite dissemination. In an inferred view, gossanous materials and lead-anomalies, the above, could be irresponsible to an underground occurrence of lead-zinc-barite ore mineralization.

Thus, the occurrences of pyrite-disseminated rocks in Jibana Area are possibly inferred that those could not be genetically related to the occurrence of lead-zinc-barite ore mineralization, however, Jibana Area is considered to be possibly evaluated to still be one of mineral-potential areas, since those pyrite-disseminated rocks are inferred to have been formed in connection with hydrothermal activities in the vicinity of Karroo-Jurassic Fault, which could have played a significant role in connection with the ore mineralization.

It is to be noted that geological identifiable distinction of weathered products between pyrite-disseminated materials and ore-mineralized materials would be significantly required in future works in the Area. Occurrences of silicification, mineralized fine veins, type of geochemical anomalies should be, therefore, carefully studied in the future course of detailed geological and geochemical research works prior to an establishment of diamond drill programming.

CHAPTER 2. RIBE AREA

2-1 Measures of Survey Works

Four diamond drill holes, 602.90 metres deep in total, comprise of three holes, 450.70 m deep in Ribe Mineralized Zone, and one hole, 152.20 m deep in Chiume Hill, were operated by the current programme.

2-2 General Geology

General geology in Ribe Area is shown below in accordance with the geological reconnaissance results of the semi-detailed survey works in the second-year programme.

2-2-1 Summary of geology

Geological map and geological cross-sections in Ribe Area are shown in Figure II -2-1.

General geology in Ribe Area majorly consists of the sediments of Triassic to Jurassic ages, which are stratigraphically divided into Mariakani Formation, Mazeras Formation, Kambe Formation and Mtomkuu Formation in ascending order, areally extended from north-west to south-east in the Area.

(1) Mariakani Formation (Mkl, Mkm, Mku)

Mariakani Formation inthe Area is divided into three Members, those are Lower, Middle and Upper.

Lower Member (Mkl) of Mariakani Formation in the Area is locally distributed in western end of the Area with providing a lack of rock exposures to lead to an unsuccessful elucidation of the rock facies by the current works, while a distribution of sandstone beds is reported in existing geological informations.

Middle Member (Mkm) of Mariakani Formation in the Area is distributed in northwestern part of the Area and is mainly composed of sandstone beds, pale gray and coarse- to fine-grained. Abundant muscovite fragments are frequently observed in sandstone.

Upper Member (Mku) of Mariakani Formation in the Area is distributed in western part of the Area and is mainly composed of fine-grained sandstone beds. Lamina texture is well-developed in sandstone and is white-micaceous.

(2) Mazeras Formation (Mzm)

The Middle Member of Mazeras Formation is observed in central part of the Area, extending NE-SW directionally and having a width of 1 to 2 km. The Member is composed solely of sandstone beds and has a lack of shale beds on ground surface. Granularity of the sandstone beds varies fine to coarse with a local development of lamina textures. Sandstone beds are subjected to intense hydrothermal alterations, such as limonitization, silicification and argillization. The Member is underlain by Mariakani Formation in forms of faulting and unconformity.

(3) Kambe Formation (K)

Kambe Formation in Ribe Area is composed of marine limestone beds and is locally distributed discontinuously by fault-caused dislocations. Limestone shows gray to dark gray, massive and compact and locally carries oolitic textures in fine-grained portions.

(4) Mtomkuu Formation (Mtl)

The Lower Member of Mtomkuu Formation (Mkl) is distributed in Ribe Area. The Member is mainly composed of shale beds, yellowish gray by a widespread weathering, with a distinguished development of lamina textures to provide a distinct fissility. Ammonite fossils were discovered by the current field works along the bank of Tsalu River, some 1 km westward from Ganzoni Village, to lead the geological correlation of the Member to being of Jurassic age.

2-2-2 Geological structure

It is to be noticeable that the sediments in Ribe Area have remarkably been dislocated by a developdment of fault activities of large scale, which could have caused a considerable diversification and a disturbance of bedding structure of sediments on ground surface from the normal behaviours of striking NE-SW directional and dipping toward SE. Faults of NE-SW direction are widely developed in Ribe Area to provide a geological structural control against the sediments to turn the sediments structures to be subject to the fault behaviours. Several blocks of sandstone beds of the Middle Member of Mazeras Formation, which have been placed between the faults of NE-SW direction, have been subjected to mineralized alterations to lead to a consideration that the development of faulting, particularly with NE-SW direction, could have provided a possible prerequisite geological condition to form a significant mineralization in the area.

2-2-3 Ore showing and mineralized zone

The localities of mineral occurrences in the Area are shown in Figure II-2-2.

The occurrences of Changombe Ore Showing and Chiume Hill Mineralized Zone have been reported in existing informations and Ribe Mineralized Zone was newly

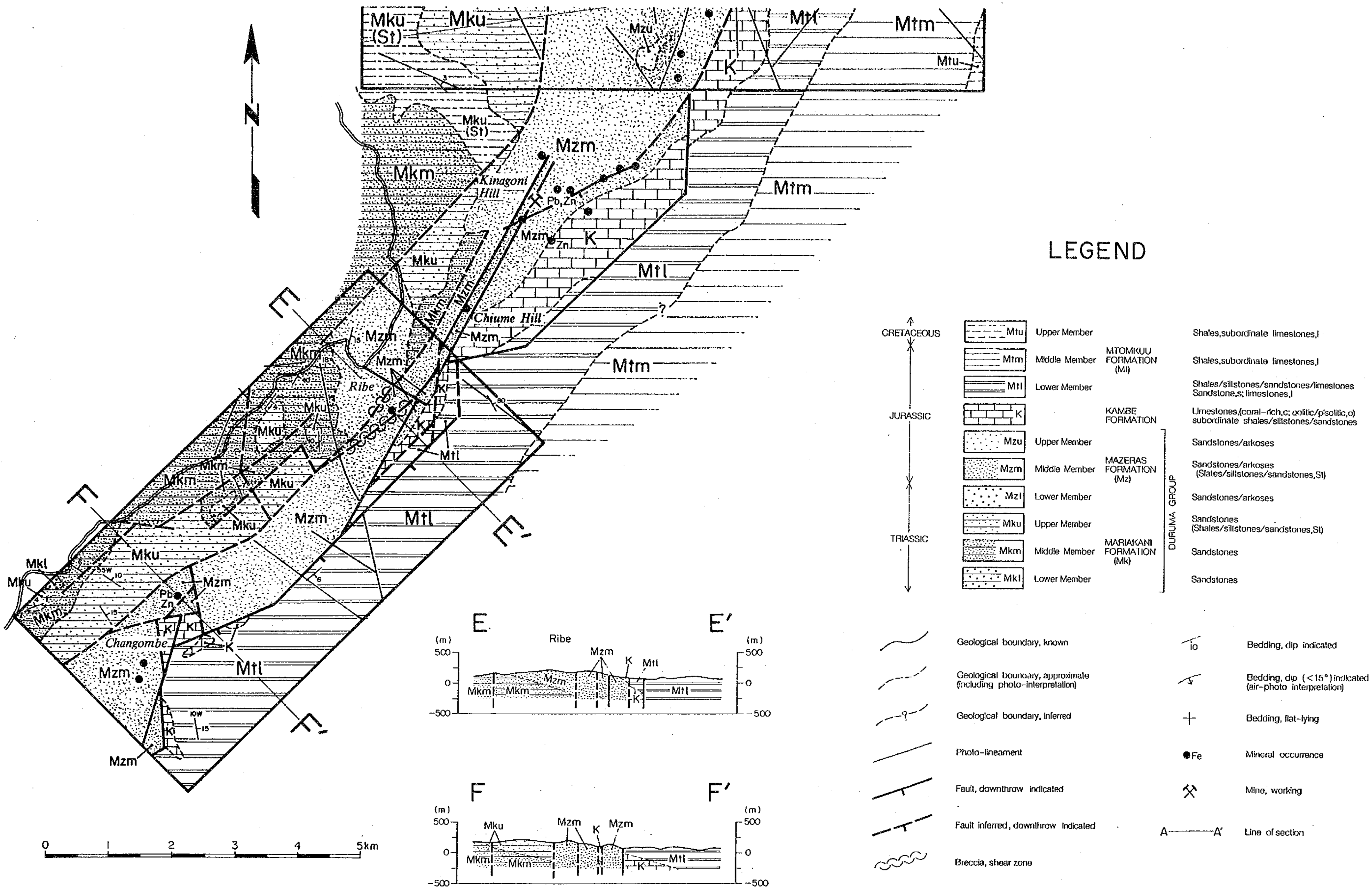


Figure II–2–1 Geological Map of the Ribe Area

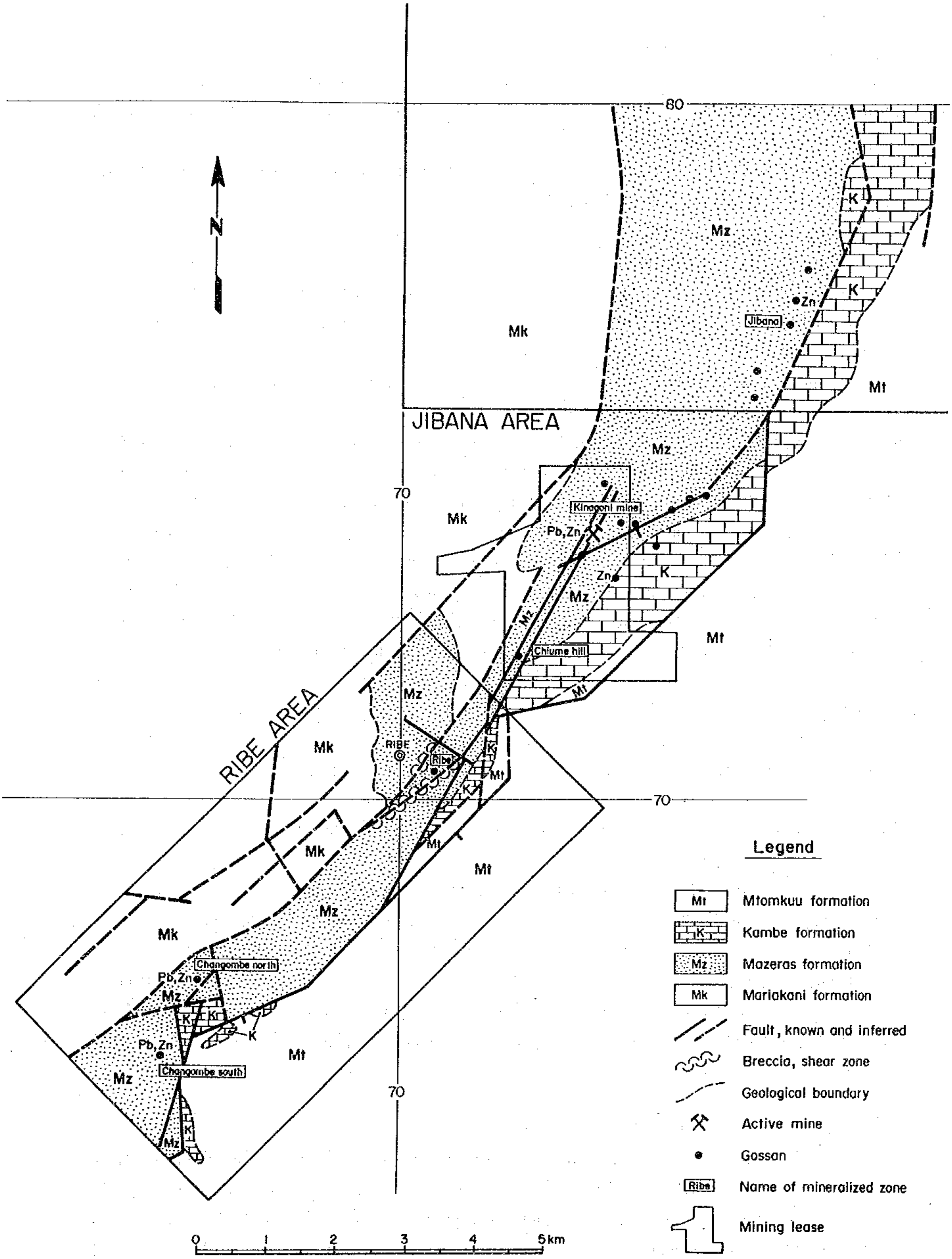


Figure II-2-2 Mineralized Zones in the Ribe－Jibana Area discovered by the second-year field work. An another new mineralized-silicified zone, located in the west of Ribe Mineralized Zone, has been discovered by the current third-year work.

Diamond drill exploration of the third-year programme has been targeted on Chiume Hill and Ribe Mineralized Zones.

(1) Chiume Hill Mineralized Zone

Chiume Hill (Kalume Hill) is situated on nearby midway of Kinagoni Hill and Ribe Village. Water supply facilities to Mombasa are installed on the crest of Chiume Hill.

Chiume Hill Mineralized Zone is situated at the southern end of the mineralized zone, which south-westerly extends from the Kinagoni mine district to Kaya Kambe. Soil-geochemical exploration works by the Mines and Geological Department have ever been extensively carried out in 1964-967 to cover an area from Jibana to Ribe environs. Chiume Hill Mineralized Zone is also located at the southern end of geochemical lead-anomalous zones, which cover an area from the Kinagoni Ore Bodies to Kaya Kambe and further beyond. The above lead-anomalies are coincidingly shown with the running occurrences of NNE-SSW-directional faults, thus, to lead to a geological consideration that the lead-anomales could be genetically related to the occurrences of lead-zinc-barite vein ore mineralization along the faults of similar type. Diamond drill exploration works by the Mines and Geological Department, to follow-up the results of the above geochemistry, have ever been implemented in 1968-1970 to cover an area to be reached to Kaya Kambe. Occurrences of lead-zinc mineralization were intersected by the above drill works, however, the exploration target areas have not been extented yet toward Chiume Hill Mineralized Zone.

A fault runs through the eastern slope of Chiume Hill to resultantly show an occurrence of limestone beds of Kambe Formation being in eastern side of the fault, while, sandstone beds of Middle Member of Mazeras Formation being in western side of that. Sandstone outcrops and floats, silicified and hematite-stained, are observed nearby the crest of Chiume Hill in western side of the fault. An areal extension of the above outcrops and floats is relatively small, about 100 metres long north-southerly and about 30 metres wide east-westerly.

(2) Ribe Mineralized Zone

Ribe Mineralized Zone, situated at the crest 0.5 km easterly from Ribe Village, consists of a silicified zone, which was newly discovered by the second-year programme work of the current project. The zone is extended NNW-SSE directionally and is about 400 metres long and 50 to 80 metres wide. The wall rock of the zone is of sandstone beds of Middle Member of Mazeras Formation, white, hydrothermally altered by silicification - argillization, iron - oxide - mineral - stained in mineralized parts and partly brecciated. These geological features are quite resembled to the altered rocks in Changombe North Ore Showing. Sericite and kaolinite were identified in argillaceously altered wall rock specimens by X - ray powder diffractometry in the second - year work. Ore minerals are not discernible by unaided eye in mineralized specimens, however, plumbogummite, which is common in secondary mineral of weathered lead ore, has been identified in small quantity by the above X - ray powder diffractometry. The occurence of plumbogummite has been estimated to encouragingly support a geological potential occurrence of lead - mineralization in the zone. Chemical assay values of the second - year work of the silicified wall rock specimens from the ground surface of the zone have shown insignificant results related to the mineral concentration of metallic elements of geological and economical significance.

(3) Others

A silicified zone, about 300 metres long and about 70 metres wide, has been newly discovered by the current third - year work. The zone is situated on a small hill, NNW - SSE directionally extended, about 500 metres south - westerly apart from the Ribe Mineralized Zone. The new zone has a similar scale and directional occurrence to that of Ribe Mineralized Zone. Mineral occurrences of geological and economical significance are still undiscernible by unaided eye.

2-3 Results of Diamond Drill Exploration

2-3-1 Outline

Four diamond drill holes, 602.90 metres deep in total, were carried out in Ribe Area. Three holes, 450.70 metres deep in total were in Ribe Mineralized Zone and one hole, 152.20 metres deep, was in Chiume Hill Mineralized Zone for a purpose to scout up mineralization occurrences deep underground of the respective zones.

Specifications of drill works are tabulated in Table Ⅱ -2-1.

Table Ⅱ -2-1 DDH in Ribe Area

Hole location	Hole number	Hole direction	Hole depression	Site elevation above sea level in metre	Hole depth in metre
Chiume Hill	MJKM-4	N 82 ° W	-50 °	140.5	152.20
Ribe	MJKM-5	S 75 ° W	-50 °	157.5	150.50
Ribe	MJKM-6	S 75 ° W	-50 °	138.0	150.10
Ribe	MJKM-7	S 75 ° W	-50 °	114.5	150.10

Chiume Hill Drill, a declined hole to intersect at right angle to a deeper underground extension of hematitized sandstone occurrence on the crest of Chiume Hill, was operated from eastern hillfoot toward west.

Ribe Drills were also declinedly operated to intersect at right angle to deeper underground extensions of the silicified zone, which forms a crest, of Ribe Mineralized Zone from eastern hillfoot toward west. Three hole sites were allocated at 120 to 145 metres spacings to be mostly parallel to the extension of the Zone.

2-3-2 Results of diamond drill work in Chiume Mineralized Zone

(1) Geology by drill works

The site location of Hole MJKM-4, geological map and cross-section in the site environs are shown in Figure II -2-3.

Geology of Hole MJKM-4 is shown below:

0 m - 2 m :	Overburden soil
2 m - 65.4 m :	Limestone beds, Kambe Formation.
65.4 m :	Karroo-Jurassic Fault
65.4 m - 152.2 m :	Sandstone beds of Mazeras Formation, intercalated by silt stone beds.

Fault fracture zones are observed at the depths of 39.15 m - 48.80 m in Kambe Formation and of 65.40 m - 79.20 m in Mazeras Formation. The dip angle of Karroo-Jurassic Fault is estimated to be of about 87 degress steeply toward east in accordance with a collation to surface geology.

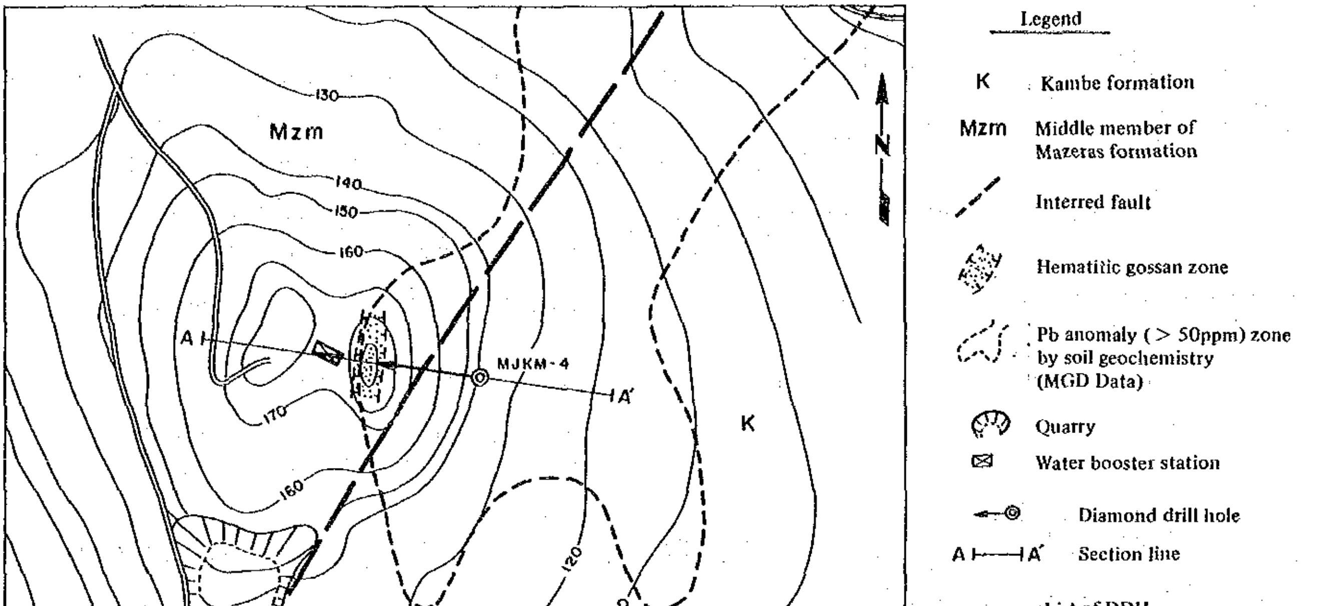
Limestone beds of Kambe Formation are pale gray and with such varied textures with several-metre-thick alternations as massive, fine-conglomeratic, associated with sand grains and fossil fragments, oolitic and/or pisolitic.

Mazeras Formation chiefly consists of pale-gray bedded fine-grained sandstone beds with some ten intercalations of bedded siltstone beds, dark gray and 0.3 to 5.4 metres thick each. Two beds with the Fraser bedding are observed. Fine-grained sediments are dominantly observed in Mazeras Formation with little medium- to coarse-grained ones.

The angles of bedded structure of the sediments shown on drill cores surface by hole intersections are generally in the range of 45° to 70° . Intergranular occurrences of white kaolinitic clay, estimated to have been formed by replacing feldspar grains, are widely observed, while, are still obscure whether to have been relatedly formed by mineralization alteration.

The downward boundary underground of oxydation is estimated to be at the depth of 65.5 metres deep.

(2) Mineralization



List of DDH

Hole No.	Direction	Inclination	Length
MJKM-4	N82°W	-50°	152.20m

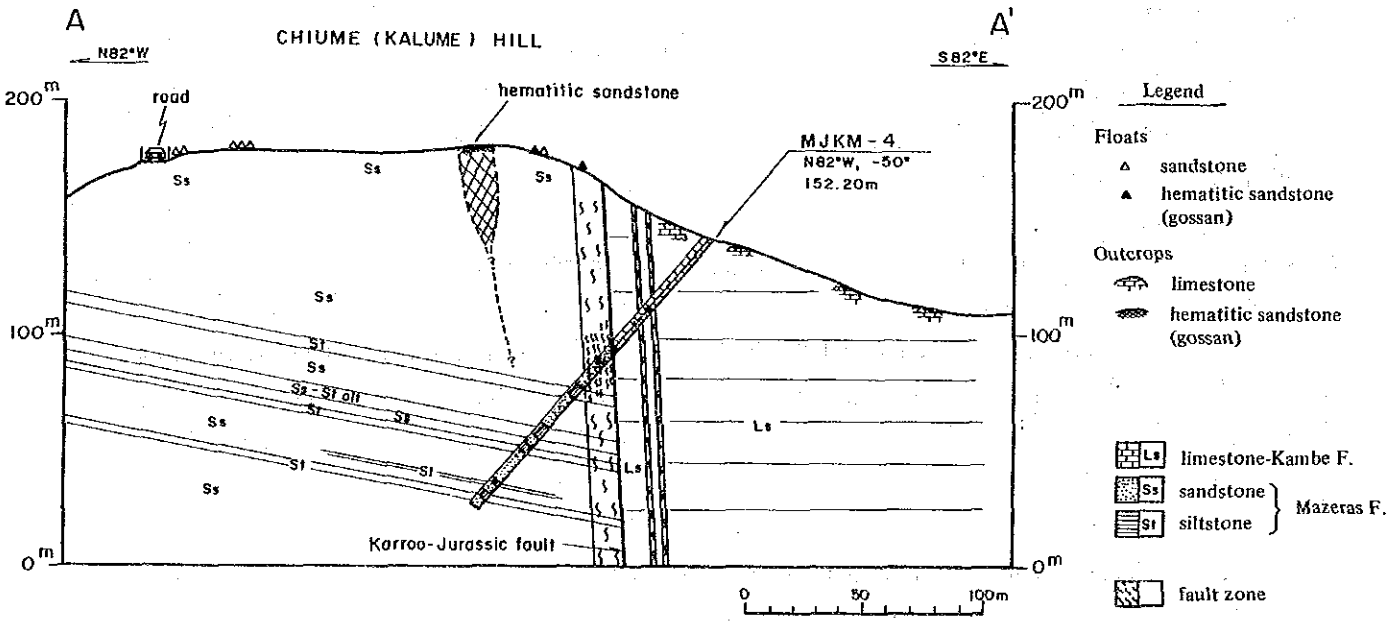


Figure II-2-3 Location Map of the Drill Hole and Geological Section along the Drill Hole, Chiume Hill Mineralized Zone, Ribe Area

The targeted downward extension underground of hematitized sandstone beds occurrence on the crest of Chiume Hill has unlikely been encountered by the hole. Such weak showings of mineralization as shown in the followings are observed by the current work that: pyrite disseminations in fault fracture zones in sandstone beds at the depths of 69.5 m - 70.2 m and 74.5 m - 78.5 m, and several occurrences of pyrite - calcite, pyrite - quartz fine veins, less than 7 millimetres wide.

(3) Chemical assay result of ore

Ore specimens were not collected from the Hole MJKM - 4 of the current work.

(4) Interpretation

The general dip of the mineralized zone in Chiume Hill is estimated in accordance with the results of geological research in the nearby environs to be steeply dipping toward east. The current drill programme, to carry out a declined hole with the depression of 50 degrees on the site location about 100 metres eastward apart from the targeted mineralized zone, has been operated to accomplish an intersection to the target right down deep underground below of the zone. A lack of an encounter with an encouraging mineralized part by the drill hole is likely evaluated to be resultant from having little geological extension of the zone downward underground as the zone is observed to be extended on ground surface in a form of discontinuous outcrops and floats of small scale.

The Chiume Hill Mineralized Zone is likely evaluated to be extended with little geological and economical significance on ground surface and in deep underground, then, a future programming, to be deserved to warrant a future work, is unlikely required.

2-3-3 Results of diamond drill work in Ribe Mineralized Zone

(1) Geology by drill work

The site locations of Holes MJKM - 5, - 6 and - 7 and geological map in sites environs are shown in Figure II - 2 - 4, while, geological cross - sections by the drill works are in Figure II - 2 - 5.

(i) Hole MJKM - 5

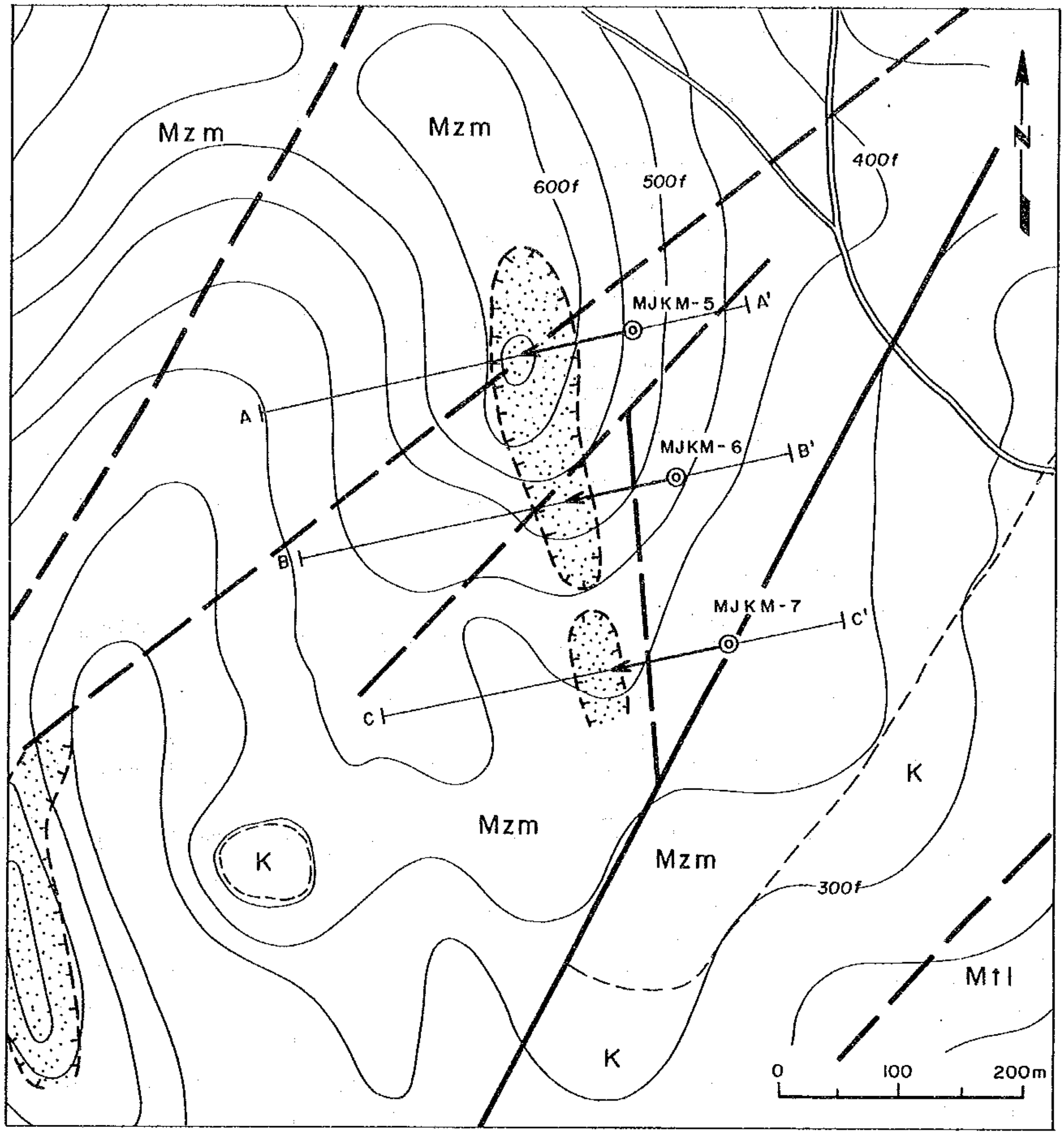
Geology of Hole MJKM - 5 is shown below:

0 m - 29.8 m : Talus sediments

29.8 m - 150.5 m : Mazeras Formation

88.5 m - 94.2 m : Fracture zones in Mazeras Formation

Talus sediments chiefly consist of sandy silt and clay, associated with



LEGEND

List of DDH

Hole No.	Direction	Inclination	Length
MJKM-5	S75°W	–50°	150.50m
MJKM-6	S75°W	–50°	150.10m
MJKM-7	S75°W	–50°	150.10m

Mtl Lower member of Mtomkuu formation

K Kambe formation

Mzm Middle member of Mazeras formation

Silicified zone

Fault

Geological boundary

Diamond drill hole

A ⊢—⊣ A' Section line

Figure II-2-4 Location Map of the Drill Holes, Ribe Mineralized Zone, Ribe Area

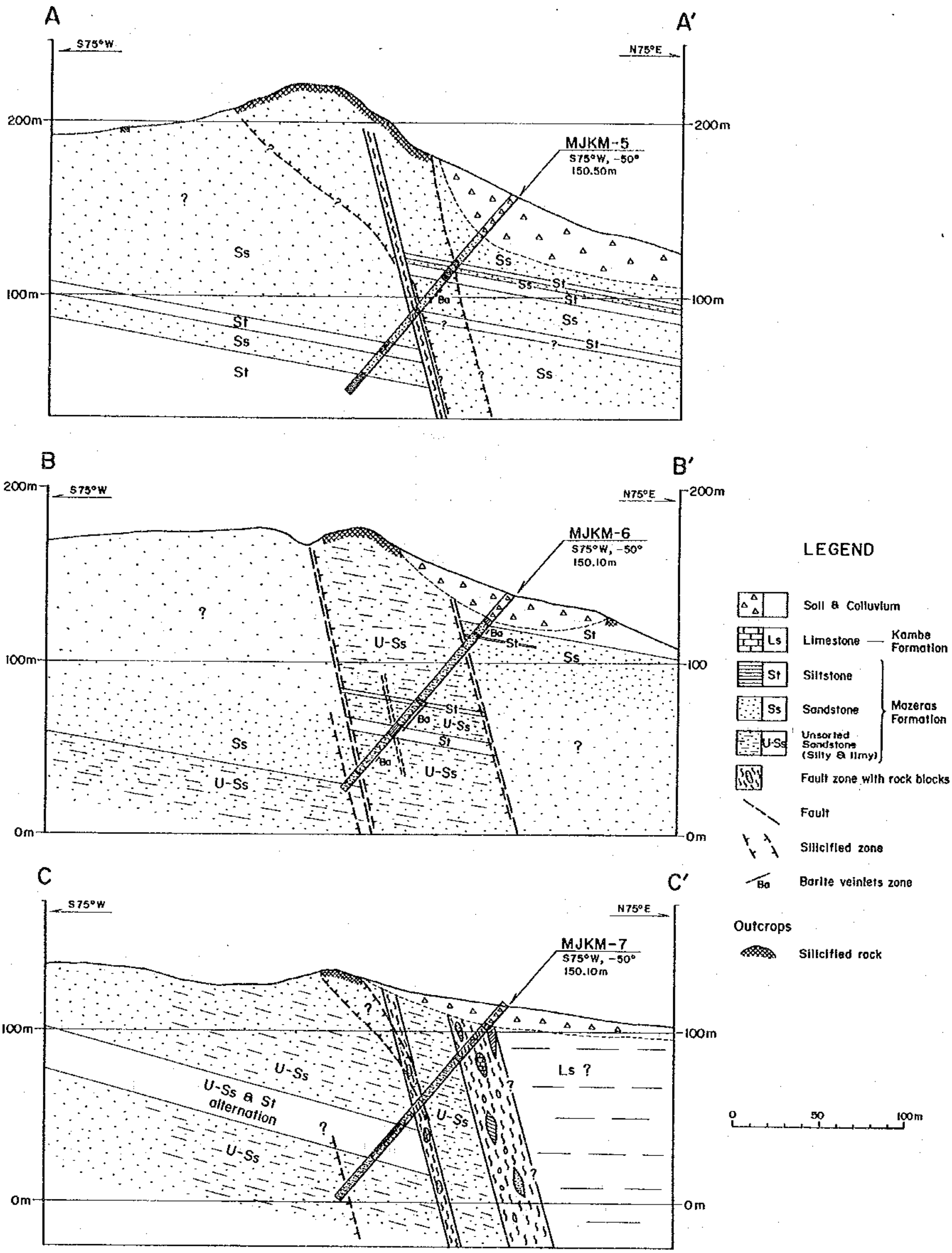


Figure II-2-5 Geological Sections along the Drill Holes, Ribe Mineralized Zone, Ribe Area pebbles of limonite-stained sandstone and silicified rock.

Mazeras Formation chiefly consists of sandstone beds, intercalated by about ten siltstone beds. A fault fracture zone is observed at the depth of 88.5 m - 94.2 m. Sandstone beds of the Formation occupied in upper part, i.e., in eastern part, of the fault fracture zone are chiefly massive, fine- to coarse-grained and are subjected to silicification, pyrite dissemination and kaolinitization. Siltstone beds in the upper part are chiefly gray to dark gray and massive, and disseminated by pyrite. Sediments in lower part, i.e., in western part of the fault zone are characterized by showing a development of bedded fine-grained facies. Sandstone beds of the Formation occupied in lower part are chiefly fine-grained and bedded with a lack of a development of alteration. Siltstone beds in lower part are bedded-structured and gray with a distinct development of laminas. Fraser bedding occurrences, which show fine alternations of silt laminas and sandstone laminas, are observed in deeper parts. Angles of bedded structure of the sediments shown on drill cores surface by hole intersections are generally in the range of 55 ° to 65° .

Fault fracture zones chiefly consist of black clay materials with abundant pyrite dissemination, associated with sandstone breccias. Patchy or fine-veined occurrences of kaolinitic white clay are observed in black clay. A distinct difference of the facies of Mazeras Formation, demarcated by the faulting as shown above, could show that a dislocation scale of the formation by the fault could be meaningfuly significant.

The downward demarcation underground of weathering is estimated to be at the depth of 84.1 m deep, meanwhile, the section at the depth between 81.0 m - 84.1 m forms a transitional zone.

(ii) Hole MJKM-6

Geology of Hole MJKM-6 is shown below:

0 m - 19.6 m : Talus sediments

19.6 m - 150.5 m : Mazeras Formation

Talus sediments chiefly consist of sandy clay and sand, associated with pebbles of limonite-stained and altered sandstone.

Mazeras Formation chiefly consists of sandstone beds, intercalated by siltstone beds. A distinctive difference of mode of alteration and degree of fracturing is demarcatedly observed at the depth of 42 metres. Mazeras Formation in upper part from the 42 m - depth consists of massive sandstone beds, fine- to coarse-grained, intercalated by two beds of siltstone, light gray. Kaolinitization is widely observed, while, local silicification in sandstone beds is discernible. Mazeras Formation in lower part from the 42 m - depth is subjected to alterations of varied type after fracturing to show a facies mode of re-consolidation of rock in a progressive development of fractured structure. Mazeras Formation in the lower part, which is subjected to alterations of varied type, is inferred to had originally been chiefly comprised of poor-sorted silty sandstone beds with breccias, intercalated by several siltstone beds units, alike those shown in Hole MJKM-7. The current appearance of the sediments is inferred to show a transitional facies nearby the boundary of Mazeras and Kambe Formations. Calcareous portion, alike shown in Hole MJKM-7, is not observed in the Hole due to wide development of alterations. Pebbles and fine-grained materials frequently carry a bedded structure to show angles of that, observed on drill cores by hole intersections, to be in the range of 40° to 70° . Silicification is widely observed in the part other than that of siltstone beds, while, pyrite dissemination and kaolinitization are discernible in overall part. The downward demarcation underground of weathering is estimated to be at the depth of 67.8 m deep, to be followed by unweathered zone.

(iii) Hole MJKM-7

Geology of Hole MJKM-7 is shown below:

0 m - 15.4 m : Talus sediments
15.4 m - 46.4 m : Fault fracture zone
46.4 m - 70.9 m : Mazeras Formation
70.9 m - 84.0 m : Fault fracture zone
84.0 m - 150.1 m : Mazeras Formation

Talus sediments chiefly consists of clay and silt, associated with pebbles of ferriginous manganese concretions, limonite-stained and altered sandstone.

Fault fracture zone at the depths of 15.4 m - 46.4 m is estimated to be a part of Karroo-Jurassic Fault, which demarcates the geological boundary of Kambe and Mazeras Formations. The fault fracture zone is encountered to show such an appearance in drill cores as being comprised of cores of limestone, sandstone and siltstone, 1.5 m to 6 m long severally, intercalated by fault clay cores, severally 1 m to 3 m long. Pyrite disseminations are observed in unweathered fault clay. Fault fracture zone at the depths of 70.9 m - 84.0 m, comprised of fault clay associated with blocks of sandstone and limestone, is observed in Mazeras Formation. The zone is widely disseminated by pyrite and is partly silicified.

Mazeras Formation chiefly consists of sandstone beds, intercalated by siltstone beds. Sandstone is pale gray to dark gray, highly limy and silty, poor-sorted to show fine- to coarse-grained or scatteredly carrying granules to pebbles. Shell-like fossils are observed at the depths of 120.70 m - 122.40 m and 127.30 m - 128.60 m. Siltstone is pale gray to gray, dark brown, black and etc., generally dark-coloured. Mostly bedded-structured or massive, sandy and limy. About 13 intercalatins of siltstone beds, 0.5 m to 3 m thick respectively, are observed, while, occurrences of those in fault fracture zone are not included in the above. The intercalations mostly occur at the depth of 92.70 m - 119.2 m.

Alteration in Mazeras Formation is noted to be shown in the forms of pyrite disseminations in the vicinity of fault fracture zones, and silicification-pyrite disseminations in association with pyrite fine veinings at the 6.5 m - section of the hole bottom.

The stratigraphical designation of the sediments in Hole MJKM-7, as being of Mazeras Formation, is based on that the sediments are observed in western side of Karroo-Jurassic Fault and that the sediments chiefly consist of sandstone beds. However, the facies of the sediments are likely remarkably different from that of typical Mazeras Formation as stated below:

1) The sediments are highly limy.
2) The sediments are highly poor-ported to likely be otherwise designated as breccia-bearing silty sandstone.
3) The sediments carry fossils of likely marine.

The features of the above 1) and 3) are common to Kambe Formation. Therefore, the sediments in Hole MJKM-7 are inferred to show a transional facies of rocks, which is reportedly extended nearby the contact of Kambe and Mazeras Formations.

(2) Mineralization

(i) Hole MJKM-5

Fine veins occurrences, composed of barite crystals, less than 5 millimetres long, are observed at the depths of 69.5 m - 70.8 m, 73.1 m - 73.7 m and 79.0 m - 79.1 m. Euhedral barite crystals are observed in open cracks in intensely silicified rocks to show to have been formed in the latest stage of a mineralization and alteration process. Pyrite-quartz fine veins, pyrite-calcite fine veins, 1 mm to 5 mm wide, are observed in silicified rocks and sandstone directly below faults, however, occurrences by unaided eye of minerals of significance have not yet been made.

Silicification, pyrite dissemination and kaolinitization are observed in connection with ore mineralization and alteration. These alterations are well-remarkable in the sections in upper part from the fault occurrence, while, silicification is discernible in sandstone beds at the depth of 53.2 m - 85.1 m, however, not in siltstone beds. Pyrite dissemination is intensely observed nearby the fault occurrence at the depth of 82.3 m - 94.7 m. Alteration is observed to be reduced beyond the depth of fault occurrence to merely show a discolouration of sandstone beds.

A depicted collation of surface geology and drill work results is shown in Figure Ⅱ - 2 - 5. Silicified zones are widely observed on ground surface, meanwhile, are likely attenuated to show a funnel - like form.

(ii) Hole MJKM - 6

Abundant occurrences of barite crystals, less than 5 millimetres long, in open cracks in silicified rocks are similarly observed to those in Hole MJKM - 5. Those are remarkably observed at the depths of 23.7 m - 27.0 m, 79.6 m - 101.6 m, 121.3 m - 125.0 m and etc.. Barite crystals commonly form fine veins, 1 to 3 millimetres wide, and are generally associated with pyrite and kaolin mineral. Occurrences by unaided eye of minerals of significance have not yet been made.

Silicification, pyrite dissemination and kaolinitization are observed in connection with ore mineralization and alteration. Kaolinitization is remarkably observed in the upper part from the 42.0 m - depth, while, silicification and pyrite dissemination are dominant beyond the 42.0 m - depth.

A depicted collation of surface geology and drill work results is shown in Figure Ⅱ - 2 - 5. A reasonable extension coincidence of rock occurrences is shown under a geological assumption that an eastern side of the outcrops of silicified rock could be covered by talus sediments.

(iii) Hole MJKM - 7

Mineralizations of barite, less than 3 mm long, associated with pyrite and kaolin mineral, filling up cavities in breccias of silicified sandstone bed, are observed at the depth of 50.3 m - 50.50 m, however, ore mineralization occurrence of significance is not discernible by unaided eye.

Alterations of silicification, pyrite dissemination and kaolinitization, in connection with ore mineralization, are observed. Pyrite disseminations are widely observed in fault fracture zones, while, silicification and pyrite fine veinings, which are estimated to be of the sole occurrence of distinct mineralization alteration of significance in the hole, are discernible in the 6.5 m - segment nearby the hole bottom. Pyrite fine veinings, the above, are marcasitic with botryoidal textures and 1.5 cm wide in maximum, dissociated with other ore mineral.

Geological cross - sectional collations of ground surface and drill hole geology are shown in Figure Ⅱ - 2 - 5. A downward extension underground of outcrops of silicified rock is not clearly observed, however, the extension is possibly inferred to be represented in weakly silicified rocks in fault fracture zone nearby the depth of 93 m, if the dip angle of the outcrops could generally be assumed to be easterly dipping. When if the downward extension of outcrops are inferred to be represented in the silicified rocks nearby the hole bottom, then, the general dip angle of the outcrops should be estimated to show westerly dipping, which could be uncommonly observed in mineralized zones in the Area. Figure II - 2 - 5 is tetatively delineated on a basis of the occasion of easterly dipping concerning to this issue, however, those are to be further examined.

(3) Chemical assay result of ore

31 ore specimens from Hole MJKM-5, 43 ore specimens from Hole MJKM-6 and 16 ore specimens from Hole MJKM-7 were collected for chemical assays. Table II -2-2 shows a part of the geochemical assay results of ore specimesn, in which weak mineralization occurrences have been discernible. Abundant showings of weak barite mineralization in silicified rock and a weak zinc ore mineralization showing in fault clay of the specimen KM5-A29 are to be remarked.

Table II -2-2 Results of the Chemical Analysis of Drill Core Samples, Ribe Area

Sample No.	Hole No.	Depth (m)	Cu %	Pb %	Zn %	Au g/t	Ag ppm	Ba %
KM5-A10	MJKM-5	73.00-73.20	<0.001	0.004	<0.001	<0.017	<2	0.11
KM5-A16	MJKM-5	79.00-79.20	0.002	0.016	0.005	<0.017	<2	0.50
KM5-A26	MJKM-5	89.00-89.20	0.001	0.007	0.023	<0.017	<2	0.26
KM5-A29	MJKM-5	92.00-92.20	0.001	0.014	0.308	<0.017	<2	<0.01
KM6-A09	MJKM-6	64.00-64.20	0.001	0.008	0.002	<0.017	<2	0.44
KM6-A10	MJKM-6	66.00-66.20	0.003	0.005	0.001	<0.017	<2	0.11
KM6-A11	MJKM-6	68.00-68.20	0.003	0.002	0.002	<0.017	<2	0.40
KM6-A12	MJKM-6	70.00-70.20	<0.001	0.003	0.015	<0.017	<2	0.60
KM6-A14	MJKM-6	74.00-74.20	<0.001	0.004	0.011	<0.017	<2	0.12
KM6-A19	MJKM-6	86.00-86.20	<0.001	0.002	0.006	<0.017	<2	0.17
KM6-A20	MJKM-6	88.00-88.20	<0.001	0.003	0.005	<0.017	<2	0.17
KM6-A21	MJKM-6	90.00-90.20	0.001	0.004	0.021	<0.017	<2	0.18
KM6-A24	MJKM-6	96.00-96.20	<0.001	0.004	0.008	<0.017	<2	0.18
KM6-A25	MJKM-6	98.00-98.20	<0.001	0.002	0.017	<0.017	<2	0.11
KM6-A35	MJKM-6	124.00-124.20	<0.001	0.003	0.020	<0.017	<2	0.26
KM6-A43	MJKM-6	148.00-148.20	<0.001	0.003	0.018	<0.017	<2	0.14

(4) Interpretation

The diamond drill exploration results by the current programme in Ribe

Mineralized Zone are noted by an establishment of encounters by the holes to pyrite disseminated silicified rocks, which are likely estiminated to be downward representations underground of silicified rock outcrops on ground surface, and to abundant fault fracture zones with intense pyrite disseminations. Barite fine veins, less than 5 mm wide, are frequently observed in open cracks in silicified rocks.

Fault fracturing occurrences, such wall rock alterations concerning to ore mineralization as silicification and pyrite disseminations, and barite fine veins occurrences, are likely evaluated that the Ribe Mineralized Zone could pose a geological possibility to provide a field of lead - zinc - barite ore veining mineralizations, however, the current situations are with a lack of economical significance of ore forming to be associated with lead - zinc ore minerals.

However, the Ribe Mineralized Zone environs are still likely evaluated to be one of the potentially promising targets of future mineral exploration, since silicified zones, where scrutinized examinations of mineral potentials have ever insufficiently made, are scatteredly known. In accordance with the experiences of the current works, the occurrences of ore minerals of economical significance are to be carefully studied in the progresses of detailed geological and geochemical future works, which are to be implemented prior to an establishment of future drill programmes, for an objective to necessarily exclude unpromising barren silicified zones from the future drill exploration targets.

CHAPTER 3. MKANGOMBE AREA

3-1 Measures of Survey Works

Two diamond drll holes, 201.25 metres deep in total, were operated by the current programme.

3-2 General Geology

General geology in Mkangombe Area is shown below in accordance with the geological reconnaissance results of the semi-detailed survey works in the second-year programme.

3-2-1 Summary of geology

Geological map and geological cross-sections in Mkangombe Area are shown in Figure II -3-1.

General geology in the Area majorly consists of the sediments of Permian to Triassic ages, which are stratigraphically divided into Maji-ya-Chumvi and Mariakani Formations in ascending order from north-west toward south-east in the Area. The sediments are generally extended mostly north-east to south-west directionally. Lamprophyre dyke is observed in a single location in the Area.

(1) Maji-ya-Chumvi Formation (MyCl, MyCm, MyCu)

Maji-ya-Chumvi Formation is widely observed to cover the most part of the Area and is subdivided dinto Lower Member (MyCl), mainly composed of shale beds, Middle Member (MyCm), mainly composed of sandstone beds and Upper Member (MyCu).

Lower Member (MyCl) of Maji-ya-Chumvi Formation mainly consists of shale beds, correlated to be of Permian age and is distributed along the north-western end of the Area, showing a 1.5 to 3 km width. Shale shows pale-gray to dark gray, bluish gray or greenish gray and etc., associated with a development of flaggy texture, which causes having a thinly fissile feature along laminas. Shale beds are locally intercalated by very fine-grained sandstone beds, 5-10 cm thick, and also locally show a sandy facies.

Middle Member (MyCm) of Maji-ya-Chumvi Formation mainly consists of sandstone beds, which are frequently intercalated by shale beds (f, MyCm-St), with a width of some 1 to 4 km, and are correlated to be of Triassic age. Sandstone shows greenish-gray, mainly fine- to very-fine-grained, with a development of distinct lamina texture, particularly with flaggy fissility in micaceous portions. Massive, compact and limy fine-grained sandstone beds are also observed in several locations. Shale shows yellowish gray, bluish gray or greenish gray and etc., with a development of flaggy texture. Shale also shows a varied change of facies by intercalations of siliceous and micaceous portions and very-fine-grained thin-bedded sandstone beds.

Upper Member (MyCu) of Maji-ya-Chumvi Formation mainly consists of sandstone beds, intercalated by a small quantity of thin shale beds and is correlated to be of Triassic age. It is distributed having a width of some 3 to 7 km. Sandstone shows greenish gray in unweathered portion, fine- to very-fine-grained, micaceous with a well-development of lamina texture. Intercalated shale shows yellowish gray in weathered portion, some several tens centimetres to several metres thick, and carries a well-development of flaggy texture.

(2) Mariakani Formation (Mkl, Mkm)

Mariakani Formation is observed along the south-eastern end of the Area and is mainly composed of sandstone beds. The Formation is divided into Lower (Mkl) and Middle (Mkm) Members, which are respectively correlated to be of Triassic age.

Lower Member (Mkl) occupies a main part of Mariakani Formation and mainly consists of fine-grained sandstone beds, yellowish gray by weathering on ground surface, while, with a poor development of lamina and bedding textures.

Middle Member (Mkm) is limitedly distributed in the vicinity of hilly regions, about 2.5 km estward from Ndavaya Village. The Member mainly consists of massive and fine-grained sandstone beds, yellowish. Middle Member is usually distinguished hardly from the Lower Member.

(3) Intrusive rock

An occurrence of lamprophyre dyke is observed in a single location in the Area. The lamprophyric intrusion is considered to be simultaneously activated to those abundantly observed in Mukundi and Mrima-Jombo Areas environs.

3-2-2 Geological structure

General geological structure of the sediments in the Area is dominated by showing a strike of NNE-SSW to NE-SW, dipping 5 to 15 degrees toward SE. Faults in the Area are represented by showing NNE-SSW and NW-SE directional, however, are limitedly developed to be less than 3 km long. It has been elucidated by the previous work that base metals ore veins associated with quartz in Mkangombe North Ore Showing have been formed along the fault, striking N25° to 30° E and dipping 55° to 70° toward SE.

3-2-3 Ore showing and mineralized zone

The localities of mineral occurrences in the Area are shown in Figure II-3-2.

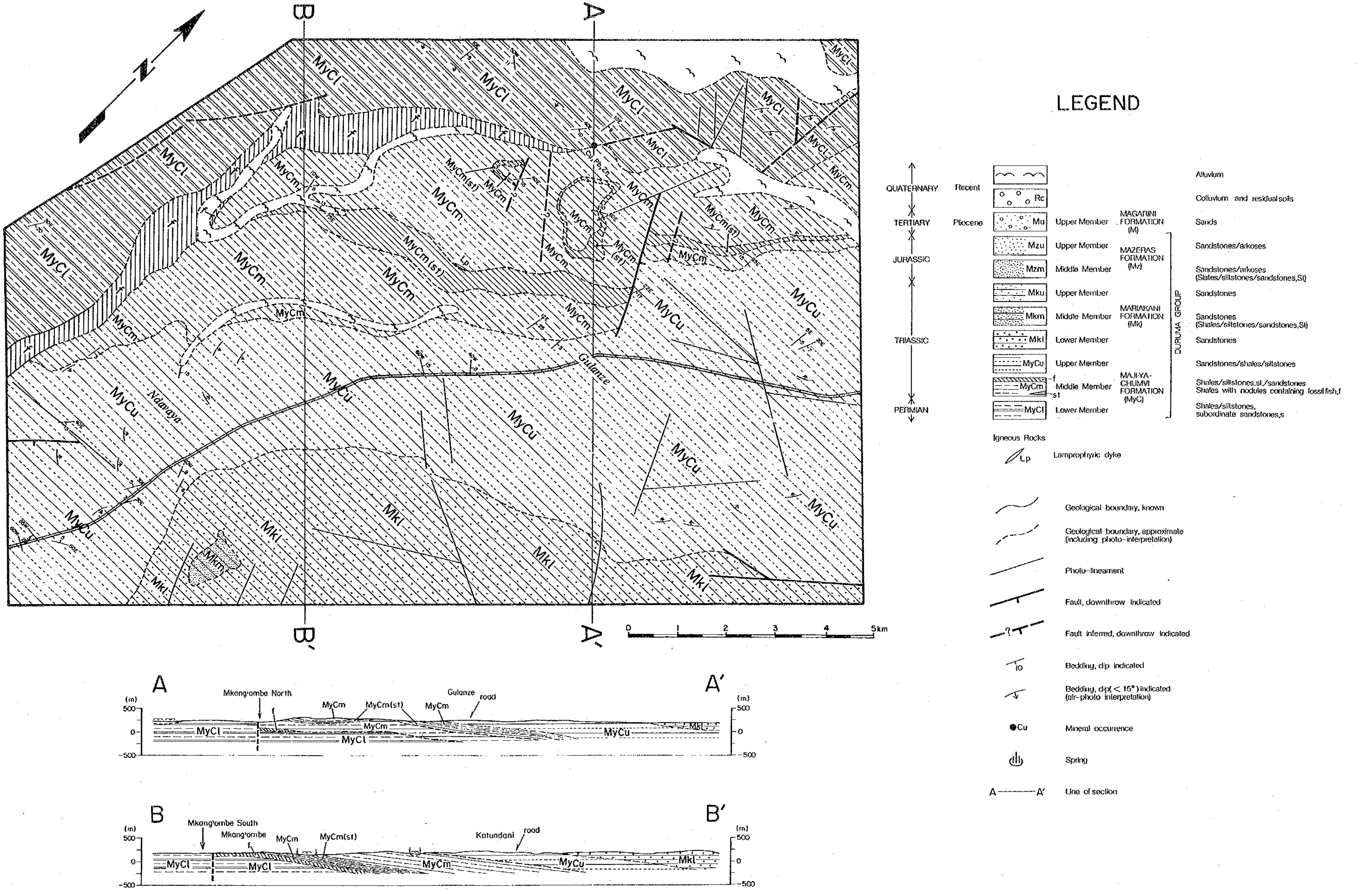
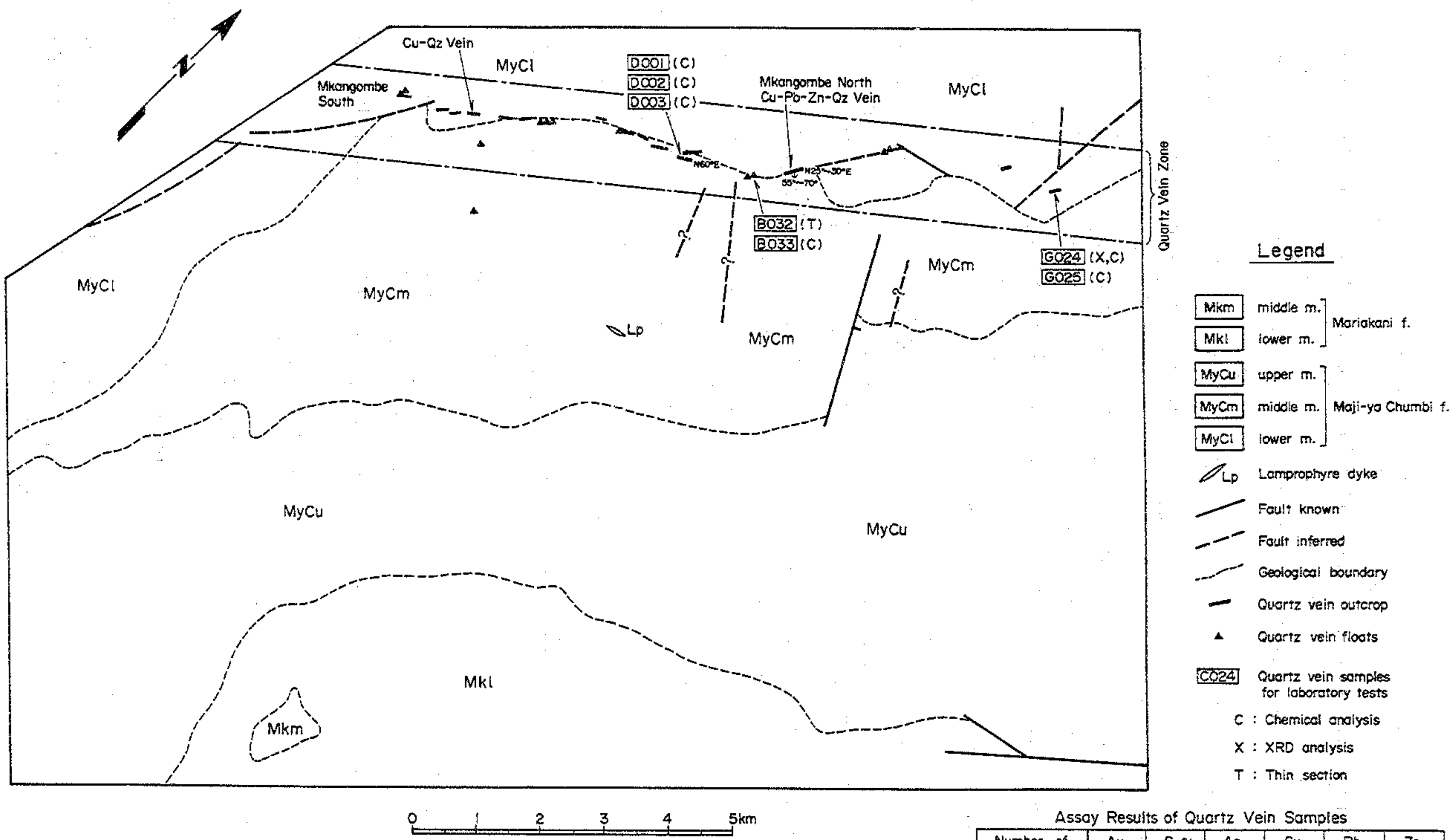


Figure II–3–1 Geological Map of the Mkangombe Area



Assay Results of Quartz Vein Samples

Number of Sample	Au g/tonne	S % Total	Ag ppm	Cu %	Pb %	Zn %
B033	< 0.07	0.007	< 2	< 0.001	< 0.001	0.001
D001	< 0.07	0.007	< 2	< 0.001	0.001	0.002
D002	< 0.07	0.166	< 2	0.072	0.001	0.245
D003	< 0.07	0.009	< 2	0.004	< 0.001	0.005
G024	< 0.07	0.023	< 2	0.009	0.004	0.024
G025	< 0.07	0.013	< 2	0.001	0.002	0.004

Figure II-3-2 Quartz Vein Zone in the Mkangombe Area

Mkangombe North and Mkangombe South Ore Showings have ever been known in the Area. It has been shown by the second-year work that Mkangombe North Ore Showing is composed of base metals ore veins associated with quartz, to have been formed under structural controls by faulting, meanwhile, two ore showings, Mkangombe North and Mkangombe South, are estimated to connectedly form an overall mineralized zone of N45° E direction, associated with quartz, having abundant outcrops and floats of vein quartz. Occurrences of copper minerals were found to be discernible in quartz veins of Mkangombe South Ore Showing by supplementary geological reconnaissance to the diamond drill works in the third-year programme, however, the copper mineral occurrence there are likely evaluated to be poorer than that in Mkangombe North Ore Showing.

Mkangombe North Ore Showing has been targeted by the diamond drill exploration works of the third-year programme.

Mkangombe North Ore Showing

Mkangombe North Ore Showing has attracted an attention by showing a remarkable geochemical anomaly of gold of 407 parts per billion in enveloping soils by the geochemistry, which was carried out during the course of a part of the first-year programme 1990 of the current Project. The outlined generals of Mkangombe North Ore Showing, elucidated by the second-year works, 1991, are stated below:

Type of mineralization	:	Base metals ore vein associated with quartz, structurally controlled by faulting
Primary ore mineral	:	Chalcopyrite, galena, sphalerite, pyrite, magnetite
Secondary ore mineral	:	Malachite, azurite, covellite, cerussite, hemimorphite, hematite, maghemite, goethite, lepidochrosite
Gangue mineral	:	Quartz, calcite
Strike/Dip of veins	:	N25° to 30° E/55° to 70° SE
Extension of ore vein	:	More than 300 metres
Vein width	:	More than 20 centimetres to 1.5 metres, associated with quartz fine veins network, several metres wide

Wall rock	:	Siltstone (MyCl), Maji-ya-Chumvi Formation
Hydrothermal alteration	:	Obscure
Faulting	:	Wall rock is generally brecciated and argillized by fracturing to form an association of distinct silckensides with ore veins. Wall rock fracture is generally more intense in hanging wall side, 0.5 to 2 metres wide.
Chemical values of ore	:	Copper-lead-zinc contents reach to the figure of percent in some specimen, however, precious metals content is barely none.

3-3 Results of Diamond Drill Exploration

3-3-1 Outline

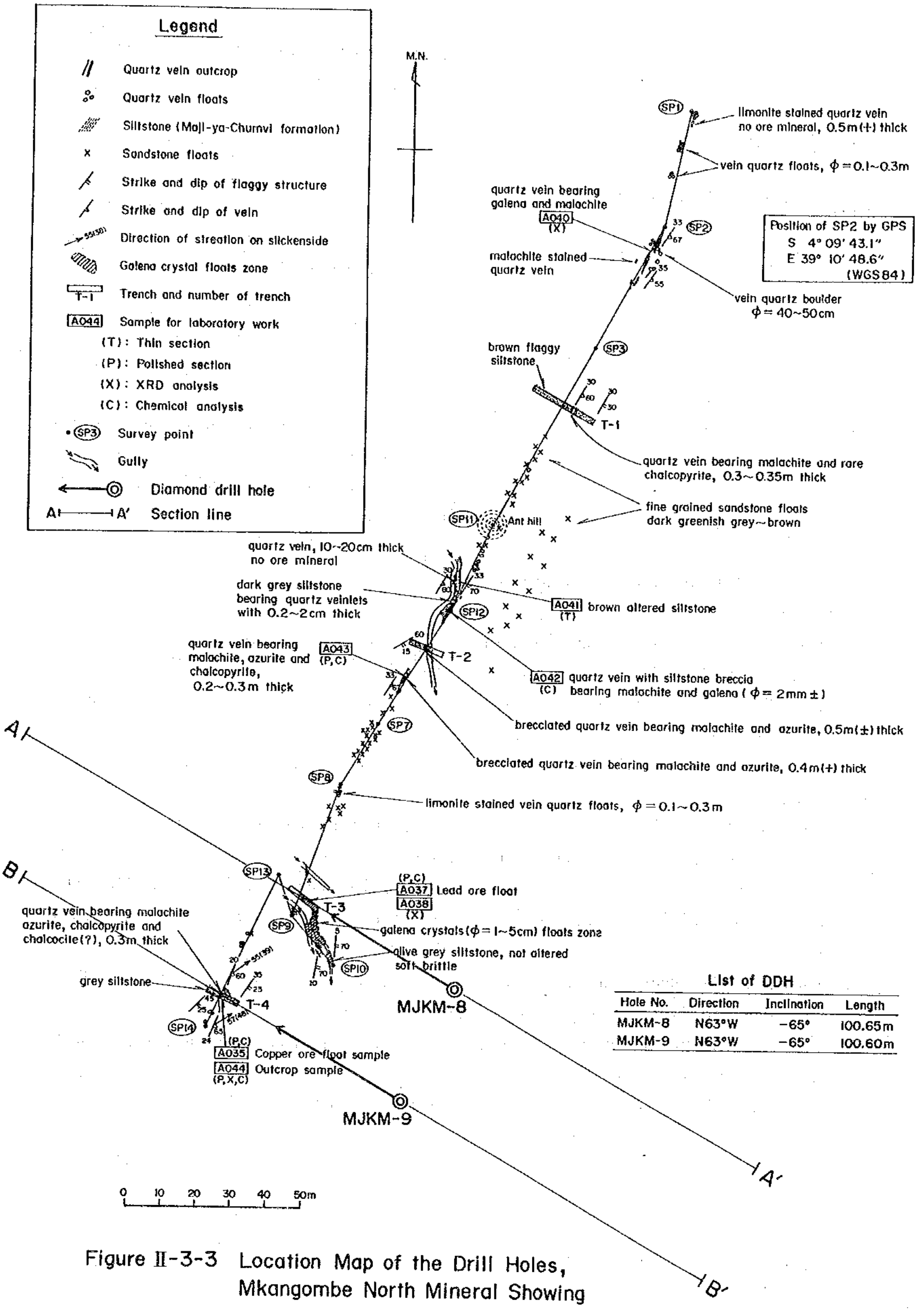
Figure II -3-3 shows the extensions of quartz ore veins in Mkangombe North Ore Showing and drill sites location by the current works in the Area, while, Figure II -3-4 shows geological cross-sections in accordance with drill core log sheets establishments.

Two diamond drill holes, 201.25 metres deep in total, were carried out in Mkangombe Area.

Hole MJKM-8 was targeted to scout up mineralization occurrences deep underground of the fractured zone, associated with galena, and further of quartz veins in footwall side of the zone in Mkangombe North Ore Showing. Hole MJKM-9 was targeted to scout up those deep underground of the copper-quartz ore veins showing with the highest remark on ground surface in the Showing.

Two declined holes, the above, were respectively operated by having N63° W azimuth direction and 65° depression to accomplish right-angle intersections to anticipated underground extensions of quartz veining mineralization with inferred dip of 60° - 70° .

Specifications of drill works are tabulated in Table II -3-1.



List of DDH

Hole No.	Direction	Inclination	Length
MJKM-8	N63°W	-65°	100.65m
MJKM-9	N63°W	-65°	100.60m

Figure II-3-3 Location Map of the Drill Holes, Mkangombe North Mineral Showing

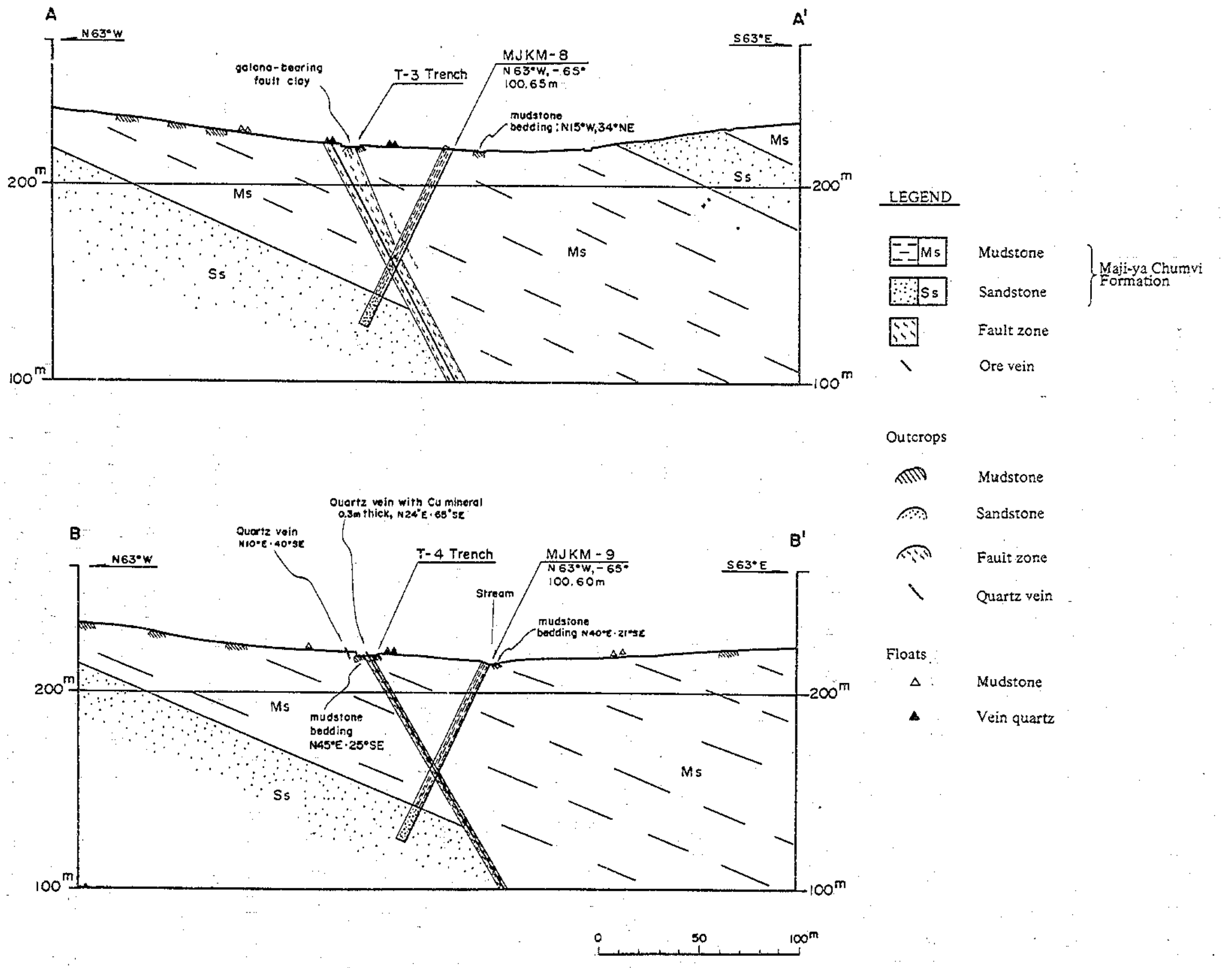


Figure II-3-4 Geological Sections along the Drill Holes, Mkangombe Area

Table II-3-1 DDH in Mkangombe Area

Hole number	Hole direction	Hole depression	Site elevation above sea level in metre	Hole depth in metre
MJKM-8	N 63 ° W	- 65 °	218.0	100.65
MJKM-9	N 63 ° W	- 65 °	214.0	100.60

3-3-2 Geology by drill works

(1) Hole MJKM-8

Geology by the drill work is shown below:

0 m - 2.0 m : Overburden soil
2.0 m - 100.65 m : Maji-ya-Chumvi Formation
60.15 m - 68.85 m : Fault fracture zone
66.10 m - 66.40 m : Sphalerite ore vein

Maji-ya-Chumvi Formation in the section of 2.0 m - 83.00 m chiefly consists of bedded mudstone beds, uniform and dark gray, meanwhile, that in the section of 83.00 m - 100.65 m turns to be chiefly comprised of bedded fine-grained sandstone beds, gray. Calcite fine veins are well-developed in mudstone beds. Angles of bedded structure of the sediments shown on drill cores surface by hole intersection are generally in the range of 52° to 80°. Alterations by mineralization are barely little in the Formation.

Fault fracture zone is associated with fine veins and net works of pyrite, quartz and calcite. The zone is notably brecciated, however, less argillized.

A sphalerite ore vein occurs in the fault fracture zone.

Downward boundary of weathered zone underground is at the depth of about 8 m, relatively shallow.

(2) Hole MJKM-9

Geology by the drill work, mostly similar to that in Hole MJKM-8, is shown below:

0 m - 0.5 m : Overburden soil
0.5 m - 100.50 m : Maji-ya-Chumvi Foramtion
59.8 m - 63.00 m : Fault fracture zone
60.51 m - 60.71 m : Sphalerite-quartz ore vein
61.39 m - 61.65 m : Chalcopyrite-quartz ore vein

Maji-ya-Chiumvi Formation in the section of 0.5 m - 80.30 m chiefly consists of bedded mudstone beds, uniform and dark gray, meanwhile, that in the

section of 80.30 m - 100.50 m turns to be chiefly comprised of bedded fine-grained sandstone beds, gray. Calcite fine veins are well-developed in mudstone beds. Angles of bedded structure of the sediments shown on drill cores surface by hole intersection are generally in the range of 62° to 90° .
Fault fracture zone is associated with fine veins and networks of pyrite, quartz and calcite. The zone is less argillized, however, brecciated.
Ore veins occur in the fault fracture zone. Silicifications are observed in the vicinity of ore vein occurrences.
Downward boundary of weathered zone underground is at the depth of about 5.5 m, relatively shallow.

3-3-3 Mineralization

(1) Hole MJKM-8

A sphalerite ore vein, at the depth of 66.10 m - 66.40 m was intersected by the Hole. The vein occurrence by the hole is shown below. Initially targeted fault clay zone, associated with galena, and quartz veins of considerable thickness on ground surface were unlikely encountered. Figure Ⅱ-3-5 shows a geological sketch of the ore-intersected part.

Intersection depth of ore vein	:	66.10 m - 66.40 m
Intersection angle by the hole	:	52° at hanging wall and 54° at foot wall, 53° in average
Vein wideth	:	24 cm, approximately
Dip of vein	:	Estimated to be about 63° toward SE
Occurrence	:	Chiefly composed of massive brown sphalerite, minorly associated with pyrite and rock-crystal grains. Associated with mudstone breccias, which occupy less than a 10 % -volume of the whole.
Wall rock	:	Alteration by mineralization is little. Intensely brecciated in the sections of about 1 metre width each up- and down-ward apart from the ore vein, where quartz fine veins, less than 3 cm wide, and pyrite fine veins, less than 3 mm wide, are well-developed.

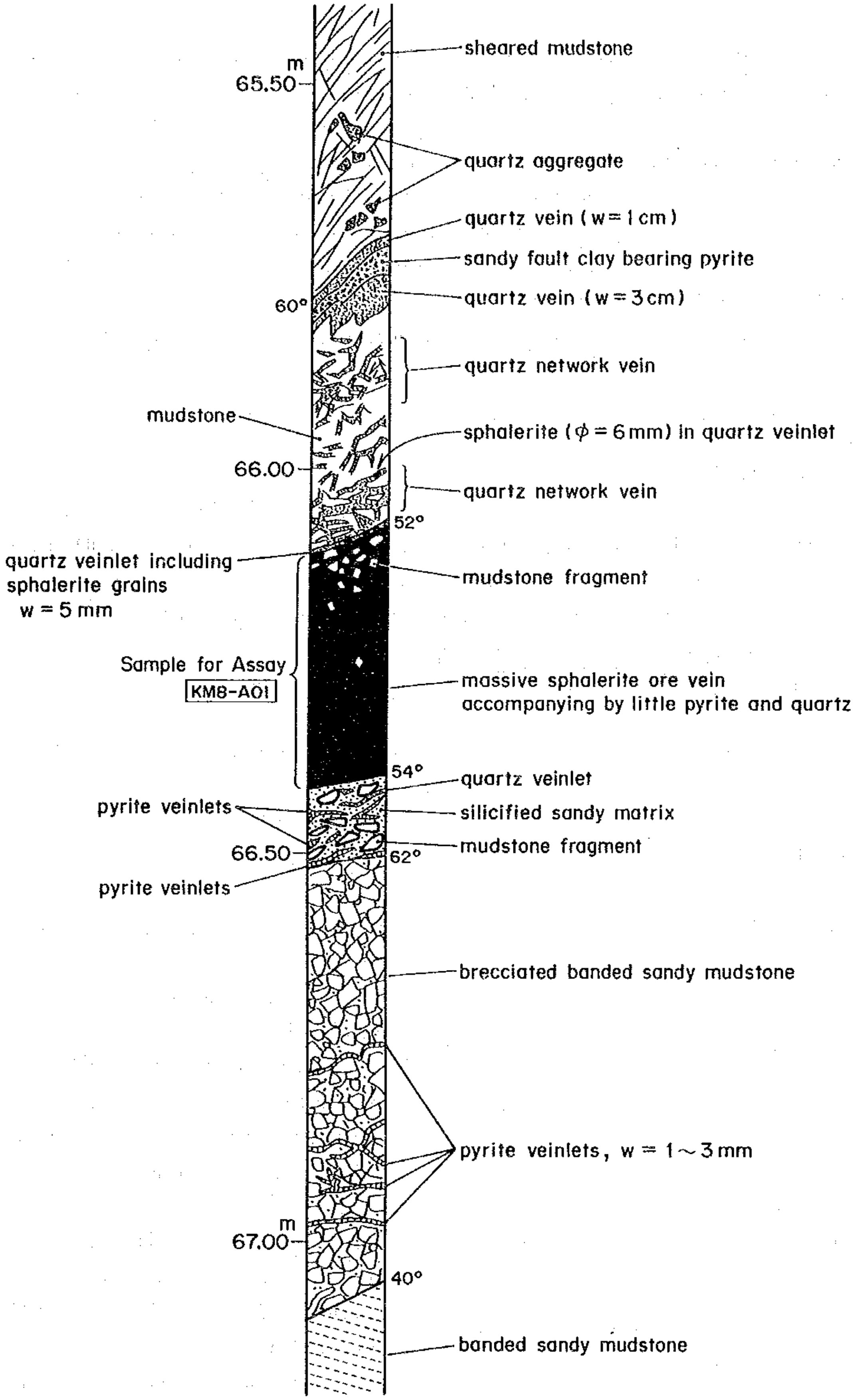


Figure II-3-5 A Sketch of Ore Vein intersected in DDH MJKM-8

A sphalerite-calcite vein is additionally observed at the depth of 74.38 m, more than 2.5 cm wide, intersected at the angle of 50 degrees. The vein carries some ten grains of sphalerite, 1 to 10 mm long, and is minorly associated with chalcopyrite and pyrite.

(2) Hole MJKM-9

Two ore veins were encountered as follows:

1. Sphalerite-quartz vein at the depth of 60.51 m - 60.71 m and 2. Chalcopyrite-quartz vein at the depth of 61.39 m - 61.65 m. The vein occurrences by the hole are shown below. The veins, associated with quartz gangue, are of a different type of mineralization from that observed in Hole MJMK-8. The chalcopyrite-quartz vein occurrence in 2, the above, is considered to be a downward extension of the copper mineral-quartz ore vein mineralization observed on ground surface and trench prospect T-4, operated by the previous work. Figure II-3-6 shows a geological sketch of the ore-intersected parts.

1. Sphalerite-quartz vein

Intersection depth of ore vein	:	60.51 m - 60.71 m
Intersection angle by the hole	:	56° at hanging wall and 52° at footwall, 54° in average
Vein width	:	16 cm, approximately
Dip of vein	:	Estimated to be about 60° toward SE
Occurrence	:	Sphalerite is concentrated in footwall side of the quartz vein. Massive-concentrated occurrence of sphalerite, 2 cm wide, is observed at the footwall of the vein, to be followed toward hanging wall side by the occurrence of disseminated sphalerite-quartz vein, 4 cm wide. Another part of the vein is comprised of quartz, associated with mudstone breccias. Sphalerite is minorly associated with chalcopyrite.
Wall rock	:	Intensely brecciated in the part, 0.5 m wide, of hanging wall side of the vein,

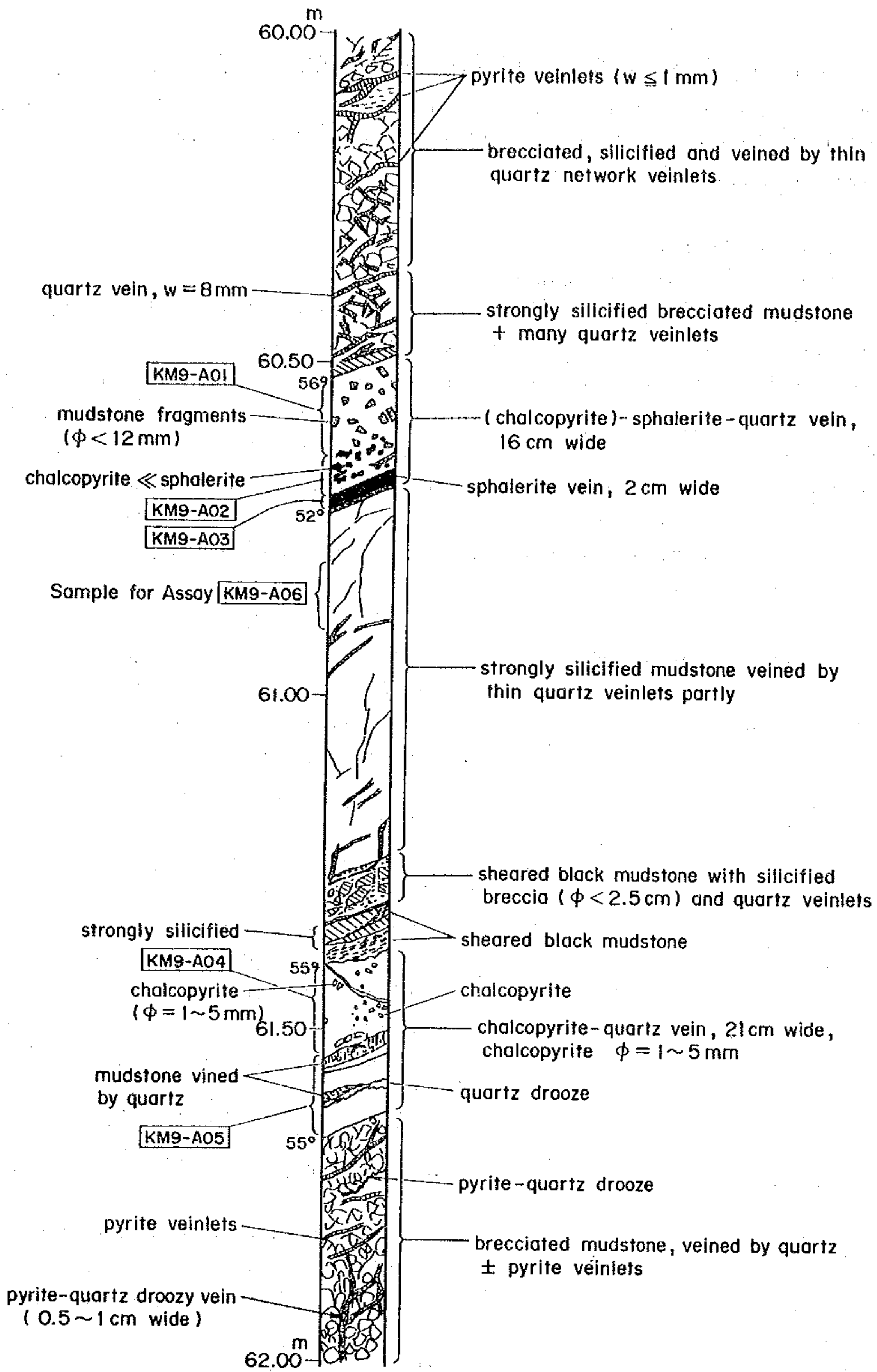


Figure II-3-6 A Sketch of Ore Vein intersected in DDH MJKM-9 where quartz fine vein, less than 8 mm wide, and pyrite fine veins, less than 1 mm wide, are well-developed. Footwall of the vein is comprised of intensely silicified mudstone to turnedly provide a field of the occurrence of ore vein, which is stated in the item 2, below.

2. Chalcopyrite-quartz vein

Intersection depth of ore vein	:	61.39 m - 61.65 m
Intersection angle by the hole	:	55° at hanging wall and 55° at footwall, 55° in average
Vein width	:	21 cm, approximately
Dip of vein	:	Estimated to be about 60° toward SE
Occurrence	:	Chalcopyrite, 1 mm to 5 mm long, is observed in a form of dissemination, 8 cm wide, in hanging wall side of the quartz vein
Wall rock	:	Intensely brecciated in the part, 1.5 m wide, of footwall side of the vein, where quartz fine veins, less than 1 cm wide, and pyrite fine veins, less than 2 mm wide, are well-developed.

Quartz vein networks, 1 mm to 10 mm wide, are observed at the depth of 72.06 m - 72. 20 m. The vein carries some ten grains of chalcopyrite, less than 1 mm long.

3-4 Chemical assay result of ore

Chemical assay results of the specimens of ore intersections are tabulated in Table II - 3 - 2. Mineralizations of zinc is remarkable, while, that of copper is weak, that of gold, silver and lead are barelly little. An intersected ore vein in Hole MJKM - 8 shows a high - graded value of 59.1 percent zinc, to be most - entirely composed of sphalerite itself.

Table II - 3 - 2 Results of the Chemical Analysis of Drill Core Samples, Mkangombe Area

Sample No.	Hole No.	Depth (m)	Cu %	Pb %	Zn %	Au g/t	ag ppm	Ba %
KM8 - A01	MJKM - 8	66.10 - 66.40	0.028	0.007	59.1	<0.017	4	0.01
KM8 - A02	MJKM - 8	74.37 - 74.40	0.007	0.001	4.1	<0.017	<2	<0.01
KM9 - A01	MJKM - 9	60.51 - 60.62	0.034	0.002	0.090	<0.017	<2	<0.01
KM9 - A02	MJKM - 9	60.62 - 60.69	0.024	0.002	11.60	<0.017	<2	<0.01
KM9 - A03	MJKM - 9	60.69 - 60.71	0.049	0.004	40.3	<0.017	8	<0.01
KM9 - A04	MJKM - 9	61.39 - 61.52	0.330	0.001	0.220	<0.017	<2	0.01
KM9 - A05	MJKM - 9	61.52 - 61.65	0.072	0.002	0.800	<0.017	<2	0.01
KM9 - A06	MJKM - 9	60.85 - 60.90	0.003	0.001	0.300	<0.017	<2	0.01

3-5 Interpretation

3-5-1 Mineral potential

It has been likely shown by the results of diamond drill exploration works by the current third - year programme in Mkangombe Area that the mineral occurrences in deep underground have been revealed with more encouragements of eventual mineral potential than those on ground surface to foster future prospects of mineral occurrences of significance. The occurrence of a massive sphalerite ore vein, 24 cm wide, encountered by Hole MJKM - 8, is evaluated to be an emboldening showing that furthers future mineral potential prospects of economical significance in the vicinity.

Two drill holes, implemented by the current programme, have been allocated about 30 metres apart, while, barely enough to establish an ore intensection to the depth about 60 metres below ground surface. It is to be reminded that the current diamond drill works have established a limited mineral exploration coverage in Mkangombe North Ore Showing area, while, additional future works with reseasonable scale and quantity are considered to be required.

A voluntary implementation, in the course of the current programme, of geological reconnaissance work by the Kenyan engineers in the vicinity of Mkangombe South Ore Showing has successfully lead to a new discovery of outcrops and floats of quartz ore veins, associated with copper minerals, to resultantly offer a mineral potential, associated with quartz veins.

3-5-2 Future work

An implementation of consecutive diamond drill exploration works for deeper portions underground of Mkangombe North Ore Showing to cover an entire extension of the showing is considered to be required. It shoud be noted in accordance with the exploration result by the Hole MJKM-8 that exploration drill works for deeper portions underground, which are covered by a mineral showing of limited geological significance on ground surface, could be eventually required with a prospect of any variable enrichment of mineral occurrence in consideration of an up- and down-ward variety of mineral showing in the Area.

A consecutive implementation of detailed geological reconnaissance works in the areas, where those works have insufficiently been carried out, is considered to be required to eventually decide future targets of trench pitting or diamond drills and potentially lead to a new discovery of mineral occurrence of significance.

The current programme works in Mkangombe Area are to be recognized to have initially provided a springboard of the exploration activity of base metal minerals in the inland area in the district of Mombasa, otherwise such past activities have been prone to be emphasizedly implemented targeted on lead-barite ore mineralizations in coastal areas. An implementation of consecutive future works for such objectives is considered to likely be deserved to warrant and those results are could be promisingly expected.

CHAPTER 4. MRIMA - JOMBO AREA

4-1 Measures of Survey Works

Detailed soil - geochemical works collecting 606 soil specimens, to cover an area of 6 square kilometres on a route extension of 60.0 kilometres long, were operated in Mrima - Jombo Area by the current programme. Soil specimens were collected on a grid mode of 100 m by 100 m from the B - horizon. Specimens were sieved after air - drying to prepare minus 80 - mesh fractional products for chemical assay to be sent to the laboratory of the Chemex Labs Limited, Vancouver, Canada. Topographical map of 1 to 5,000 scale, enlarged from the existing maps of 1 to 50,000 scale, were used for the geochemical works, which were supplemented by geological reconnaissance works.

4-2 Result of Geological Research

4-2-1 Geology

Figure II - 4 - 1 shows general geology and geological cross - sections in Kiruku and Nguluku aeas, the target areas in Mrima - Jombo Area.

General geology in the areas chiefly consists of Maji - ya - Chumvi Formation of Triassic age, agglomerate bodies - vent agglomerate - of Cretaceous age and colluvial sediments of Quaternary age. The extension of Magarini Formation of Tertiary age in the vicinity of Kiruku Hill, which has been shown in the geological map of the second - year - edition, has been revised by the current third - year work to be limitedly extended to be then mostly comprised of Maji - ya - Chumbi Formation. Details of the geological boundary of Magarini and Maji - ya - Chumvi Formations are still not cleared by the current work.

(1) Maji - ya - Chumvi Formation (MyCu)

The Upper Member (MyCu) of Maji - ya - Chumvi Formation is extended in the vicinity of agglomerate bodies in Kiruku Hill and Nguluku Hill. The Formation chiefly consists of sandstone beds, fine - to medium - grained. Sandstone beds, silicified and limonite - stained, associated with quartz fine veins and brecciated, are frequently observed in the vicinity of agglomerate bodies in Kiruku Hill. Brecciation of sandstone is estimated to have been caused by intrusions of agglometerate bodies. Brecciated zone in Kiruku Hill is estimated to be about 50 metres wide. Brecciated facies of sandstone beds is designatedly shown in the attached geological map as the term of S - MyCu. Brecciated facies of those is not observed yet in Nguluku Hill, however, the facies is inferredly shown in the geological cross - sections on the basis of the geological estimation that the type of agglomerate intrusions in Nguluku Hill could be identical to that in Kiruku Hill.

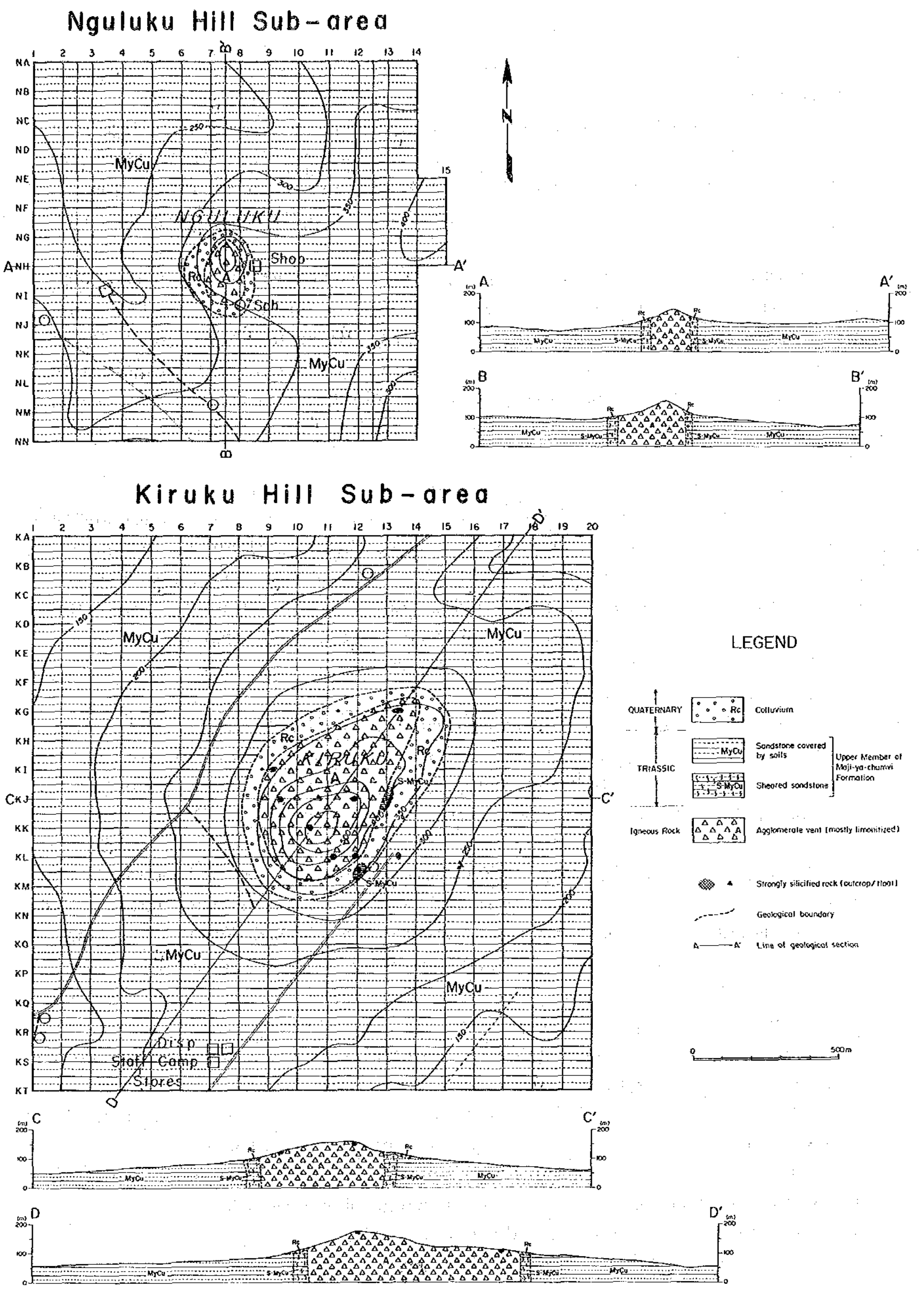


Figure II-4-1 Geological Map of the Kiruku Hill and Nguluku Hill Sub-Area

(2) Agglomerate (A)

Agglomerate bodies, estimated to be of vent type, are observed in the form of topographical protrusions of Kiruku Hill and Nguluku Hill. They are elliptical on plane projection, about 750 m NE-long and about 400 m NW-long in Kiruku Hill, while, about 230 m NS-long and about 150 m EW-long in Nguluku Hill.

Agglomerate body in Kiruku Hill has been subjected to silicification and argillization. Facies of the bodies are occasionally obscure after weathering and related iron-manganese mineral stainings. Breccia size is generally of lapilli, while, chiefly consists of sandstone, fine grained hypabyssal to plutonic igneous rocks. Under a microscope, agglomerate is carbonitized, while, feldspathoid, dolomite, siderite, apatite, barite and etc. are observed as clastic minerals.

Agglomerate body in Nguluku Hill is pinkish brown, compact and are associated with an abundant quantity of the breccias of shale and sandstone of smaller than lapilli size. The body is less weathered and altered to show a fresh appearance by unaided eye, however, is carbonitized in some degree by microscopic examination. Quartz, feldspathoid, calcite, dolomite, ankerite, barite, apatite, pyrite and etc. are observed as clastic minerals.

4-2-2 Geological structure

Mesozoic sediments in northwestern part of the Area are estimatedly extended striking WNW-ESE to ENE-WSE and gently dipping toward north, meanwhile, striking NNE-SSW and gently dipping toward east in eastern part.

Mariakani Formation is estimated to show a nearly flat geological structure.

Two systems of fault, WNW-ESE directional and ENE-WSW directional, are observed in the Area. Those are represented on air photograph lineaments.

Intrusions of lamprophyre dykes, N60° W-, N75° W- and N40° E-directional, similar-directionally extended to faults and lineaments, are observed.

4-2-3 Ore showing and mineralized zone

General occurrence and geological features of silicified agglomerate body in Kiruku Hill are stated in the section.

The occurrences of silicified rocks in Kiruku Hill have been known in the existing informations and in the second-year work report of the current programme. Details of the occurrence, such as extent and extension and etc., and geological relation of rocks to the showings of soil-geochemical anomalies have been revealed by the current third-year work.

The silicified rock zones are divided into two units. The one, the larger, is observed on the crest of Kiruku Hill to be referred to as "hill crest silicified rock zone" in the report, while, the other one, the smaller, is observed in north-eastern ridge, some 500 m apart from the hill crest, to be referred to as "northeastern silicified rock zone" in the report.

Hill crest silicified rock zone, some 150 m to 250 m wide, NW-SE directional and extended about 800 m long, is observed to traverse agglomerate and sandstone beds, while, further extension is obscure by a lack of exposure and float occurrence.

Northeastern silicified rock zone is observed, extended about 40 m long, in a single location along the traverse line KG of the current soil-geochemistry, however, further extent and extension are still obscure.

Silicified rock in both occurrences is compact and hard, associated with limonite, hematite and oxidized manganese minerals, black, so intensely altered that the original texture of rock is obscure. A thin-section specimen for microscopic examination, numbered G012, is composed of barite that occupies a 20 percent of the total volume of the section. Sulfide mineral is not discernible, possibly due to oxydation.

Results of whole rock chemical assay are shown in Table II-4-1. Gold, barium, iron, manganese, niobium, yttrium and rare earths elements are estimated to have been accumulated in silicified rock and limonitic concretion. Such an accumulation is not shown in agglomerate in Nguluku Hill, which is estimated to have never been subjected to silicification.

4-3 Results of Soil-geochemistry

4-3-1 Chemical assay and interpretation measures

General measures of chemical assay and detection limit values of the respective indicator elements are shown in Table II-4-2.

Univariate analysis and principal component analysis were implemented on the results of geochemical assay of respective indicator elements.

The total of 600 soil samples from Kiruku Hill and Nguluku Hill areas were collected to form a population for the statistic interpretations of soil geochemistry. This is based on that the above two areas are under a similar geological situation, having a common type of mineralization of exploration target, to lead to an appropriate establishment to future mineral potential evaluations in an overall category.

The assay values of the elements less than the detection limit value were excluded from the statistical interpretations, meanwhile, the values more than the detection upper limit value were designated to be of the upper limit value itself.

Table II-4-1 Result of the Chemical Analysis of Rock Samples

Sample No.	Au	Ba	Sr	U	Th	Fe	Mn	P
	ppb	ppm	ppm	ppm	ppm	%	ppm	ppm
A005 S	10	3870	463	8.9	243	7.11	>10000	1670
A013 S	35	2820	266	28.0	172	6.63	255	1660
E004 L	<5	7760	2600	92.0	184	>15.00	4990	8970
G010 S	<5	4190	389	8.9	321	13.05	8770	2350
G016 S	<5	2400	418	5.9	697	>15.00	4210	2460
H001 S	520	2830	597	7.1	201	6.65	1255	3440
H005 S	<5	>10000	1490	5.9	12	>15.00	>10000	2370
E006 A	<5	590	588	6.3	28	8.05	2280	>10000
E009 A	<5	770	606	7.4	26	6.07	1630	>10000
E013 A	<5	740	611	5.9	24	6.06	1550	>10000

Sample No.	Nb	Y	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
A005 S	150	220	2491	4044	782	99.0	30.0	8.5	17.0	2.40
A013 S	1370	220	2023	2849	903	113.0	34.0	11.0	15.0	1.80
E004 L	1150	580	2221	4088	>1000	276.0	85.0	28.0	39.0	5.20
G010 S	990	770	1655	2920	>1000	290.0	90.0	27.0	40.0	5.30
G016 S	710	620	2770	4425	>1000	186.0	55.0	21.0	44.0	6.00
H001 S	305	270	6844	8008	>1000	136.0	36.0	13.0	21.0	2.60
H005 S	5	95	187	234	158	41.0	17.0	6.8	13.0	1.70
E006 A	210	75	245	514	181	30.0	8.9	3.2	5.1	0.96
E009 A	200	70	254	513	190	28.0	8.9	3.0	4.6	0.66
E013 A	180	60	195	436	158	26.0	8.4	2.5	4.8	0.63

S : Silicified agglomerate taken from Kiruku Hill

L : Limonitic concretion taken from Kiruku Hill

A : Agglomerate taken from Nguluku Hill

Table Ⅱ-4-2 Analytical Procedures

Element	Unit	Description	Method	Detection Limit	Upper Limit
Au	ppb	Fuse 30g sample	FA-NAA	1	10000
Ba	ppm	-	ICP-AES	10	10000
Sr	ppm	-	ICP-AES	1	10000
Nb	ppm	-	XRF	5	10000
Y	ppm	-	XRF	5	10000
U	ppm	-	NAA	1	10000
Th	ppm	-	NAA	0.1	10000
La	ppm	-	NAA	1	10000
Ce	ppm	-	NAA	2	10000
Nd	ppm	-	NAA	5	1000
Sm	ppm	-	NAA	0.1	500
Eu	ppm	-	NAA	0.5	100
Tb	ppm	-	NAA	0.1	100
Yb	ppm	-	NAA	0.1	1000
Lu	ppm	-	NAA	0.1	500
Fe	%	-	ICP-AES	0.01	15.00
Mn	ppm	-	ICP-AES	5	10000
P	ppm	-	ICP-AES	10	10000

FA-NAA : Fusion Assay - Neutron Activation Analysis
ICP-AES : Inductively Coupled Plasma - Atomic Emission Spectrometry
XRF : Fusion, plasma array
NAA : Neutron Activation Analysis
\- : Not Specified

4-3-2 Univariate analysis

(1) Standard statistic values

Standard statistaic values in the Area are shown in Table II -4-3.

(2) Determinations of cumulative frequency distribution and threshold value

Threshold values were determined by the following criteria.

Criterion 1 : The cumulative frequency distribution of the composite population, i.e., geochemical anomaly plus background values, is partitioned into the cumulative frequency distribution of two single populations or more, then threshold values are determined by an establishment of the comparison and the collation between the composite standard curve and the obtained chemical values.

Criterion 2 : The $m + 2\sigma$ value,

where, m : average of chemical assay values,

σ : standard deviation

is determined to be of the threshold value in the occa-sion that the cumulative frequency curve shows linear and the partition into single populations is hardly made.

Criterion 3 : In the occasion of the element, when the most part of the assay values of the above element is shown to being under the detection limit, then the threshold value is determined by designating the minimum value among the high-content population of the element, which occupies a 2.27 percent among the entire nmber of samples. The 2.27 percent value itself designates the ratio of number of sample among that of samples, which shows the value of more than $2m + 2\sigma$ in the normal population.

Cumulative frequency distribution diagram and the subsequent diagram, in which single populations are partitioned, are shown in Figure II -4-2. Table II - 4-4 shows the threshold values and the applied criteria to determine the values.

4-3-3 Principal component analysis

(1) Correlation of indicator elements

Table II -4-5 shows the summary of correlation coefficients of the elements.

Every correlation coefficient shows a positive feature. Correlations among

Table II-4-3　Statistics of Geochemical Data

Element	Unit	Number of Samples	*	Max.	Min.	Mean (m)	Standard Deviation (σ)	m+2σ
Au	ppb	600	353	160	<1	8.0	0.424	56.3
Ba	ppm	〃	600	9970	20	419.2	0.525	4707.3
Sr	ppm	〃	600	1430	8	79.2	0.443	608.3
Nb	ppm	〃	600	1300	15	136.0	0.423	953.3
Y	ppm	〃	600	660	30	89.4	0.286	334.3
U	ppm	〃	596	310	<1	7.51	0.174	16.69
Th	ppm	〃	600	501	9	60.2	0.370	330.2
La	ppm	〃	600	6700	35	212.2	0.454	1717.9
Ce	ppm	〃	600	7020	66	285.6	0.334	1328.1
Nd	ppm	〃	600	2260	15	108.4	0.375	610.0
Sm	ppm	〃	600	271	3.5	18.54	0.352	93.85
Eu	ppm	〃	600	105	0.5	4.34	0.464	36.79
Tb	ppm	〃	600	25	0.4	2.50	0.328	11.30
Yb	ppm	〃	600	50	2.8	8.35	0.232	24.32
Lu	ppm	〃	600	7.2	0.3	1.26	0.216	3.42
Fe	%	〃	600	13.05	0.06	2.507	0.371	13.812
Mn	ppm	〃	600	9610	5	897.7	0.496	8809.5
P	ppm	〃	600	7310	30	79.2	0.373	2414.2

* : Number of samples over lower detection limits

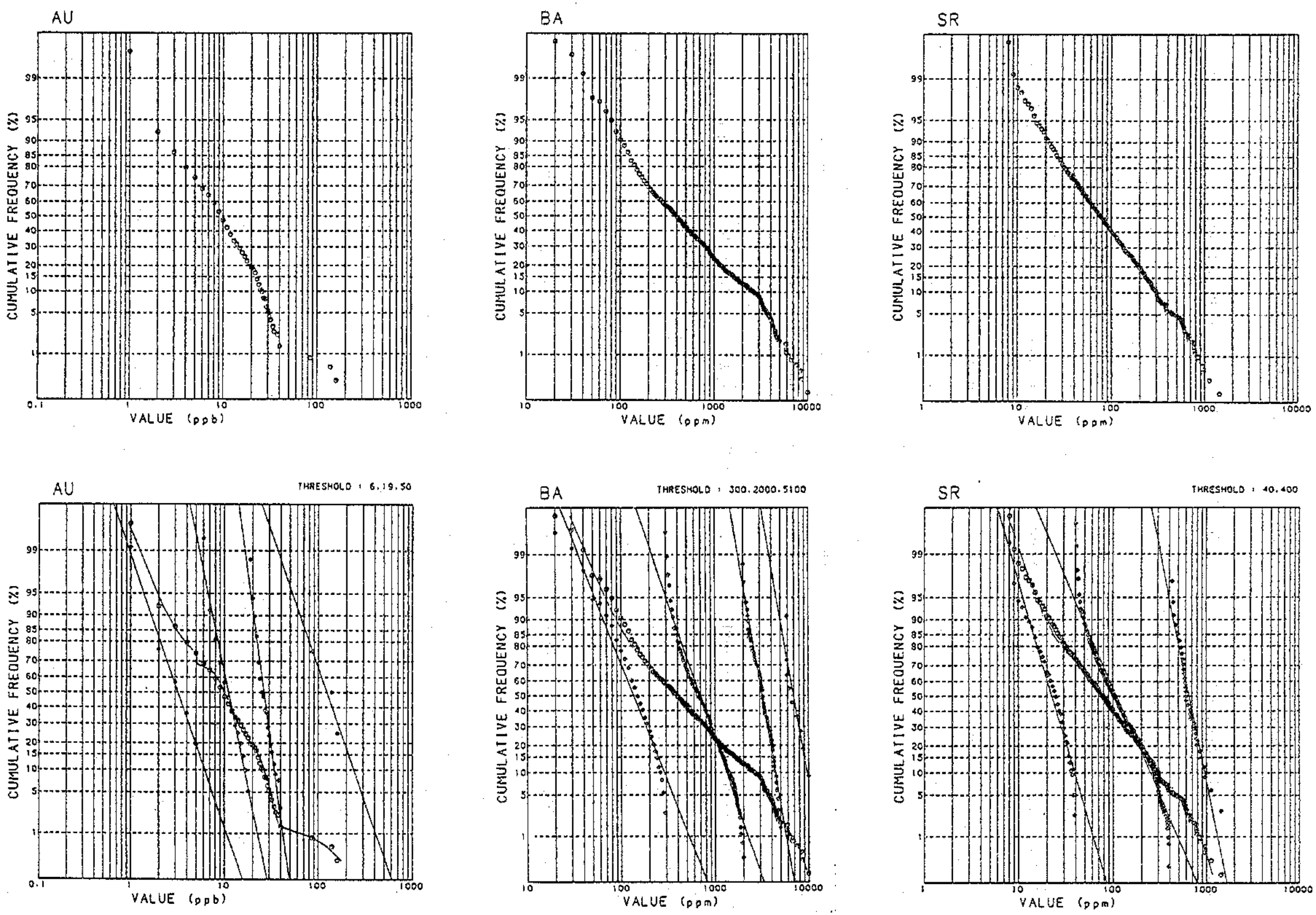


Figure II–4–2 (1) Cumulative Frequency Curves and Partition of Populations, Kiruku Hill and Nguluku Hill Sub-area

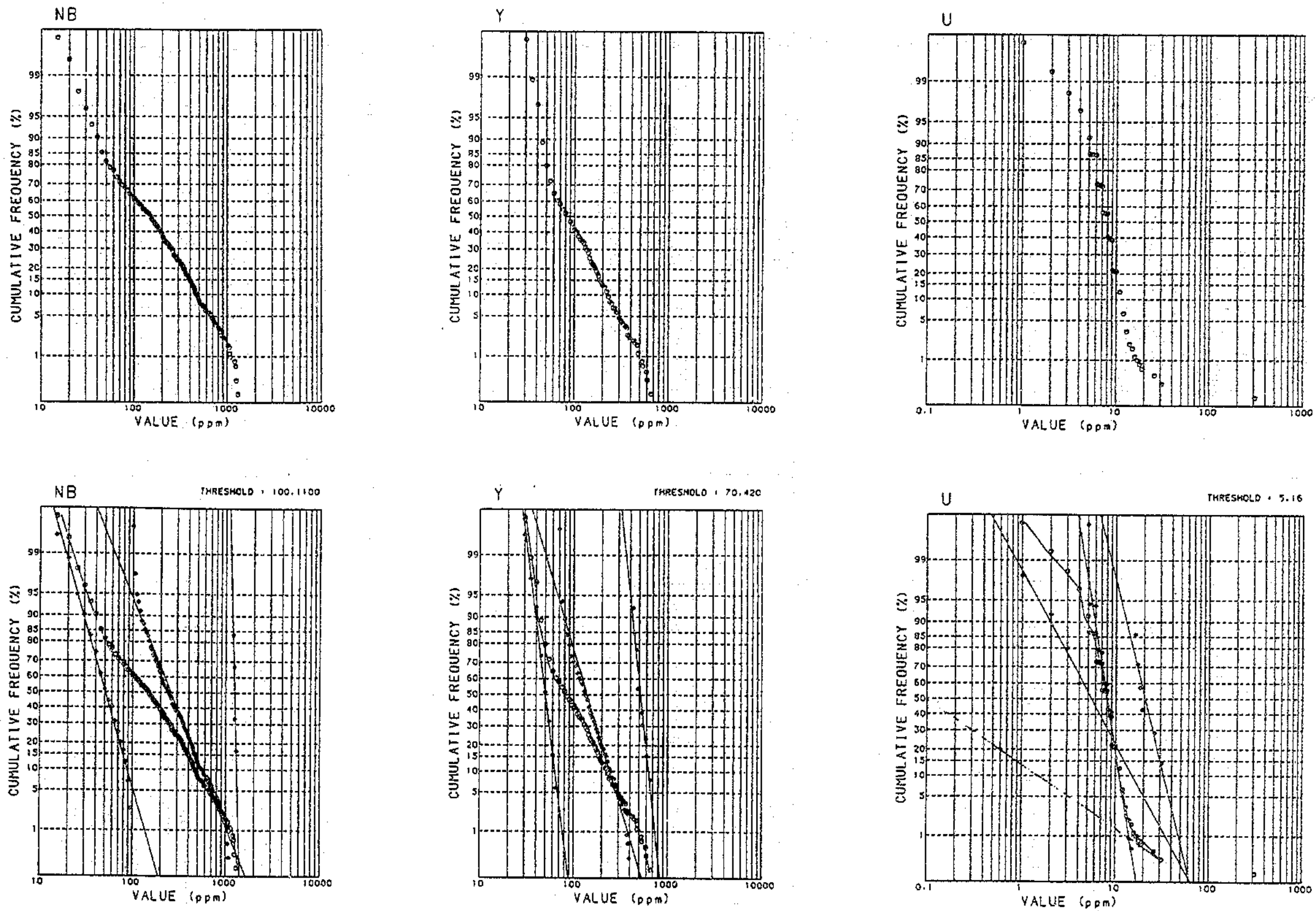


Figure II—4—2 (2) Cumulative Frequency Curves and Partition of Populations, Kiruku Hill and Nguluku Hill Sub-area

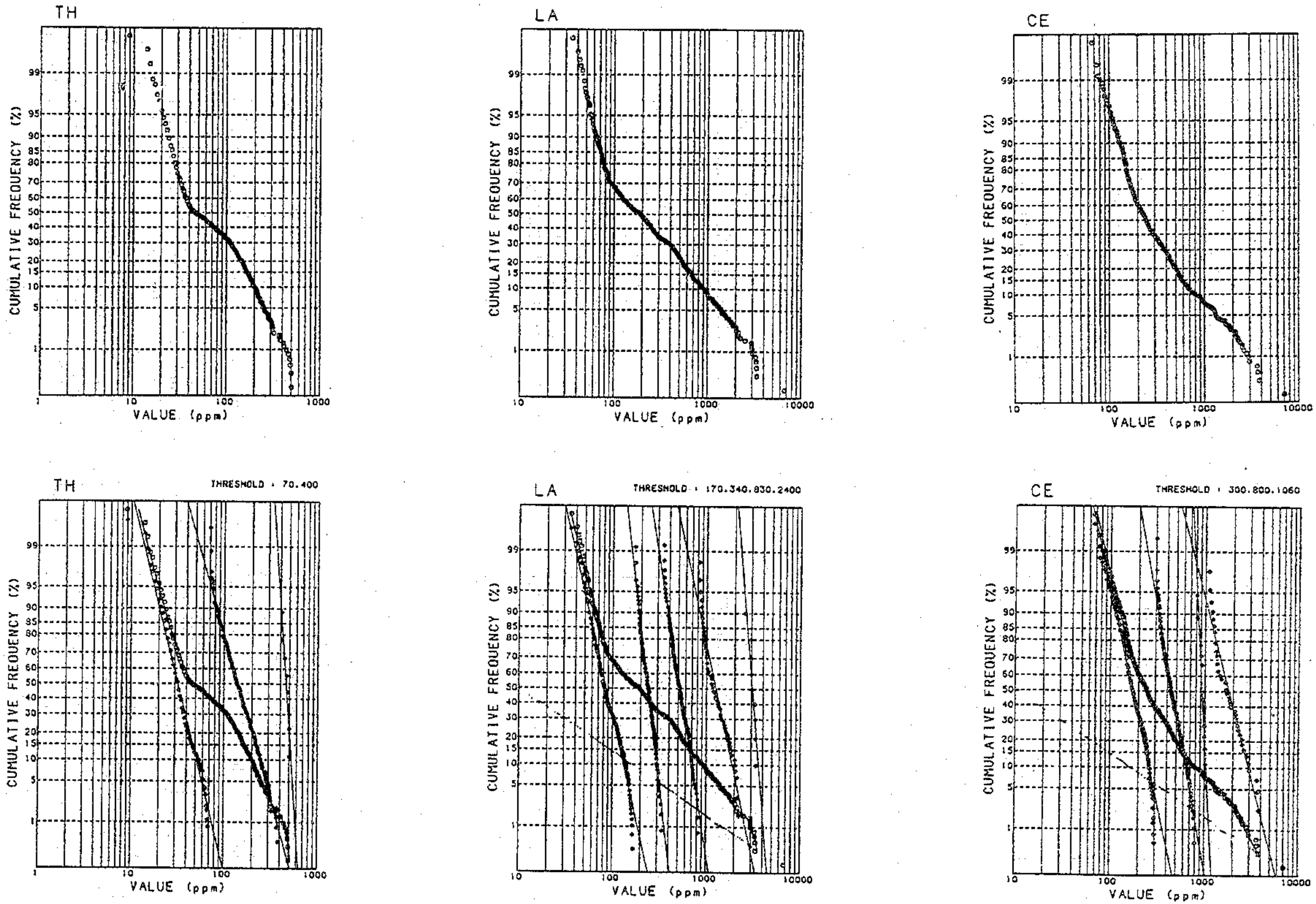


Figure II–4–2 (3) Cumulative Frequency Curves and Partition of Populations, Kiruku Hill and Nguluku Hill Sub-area

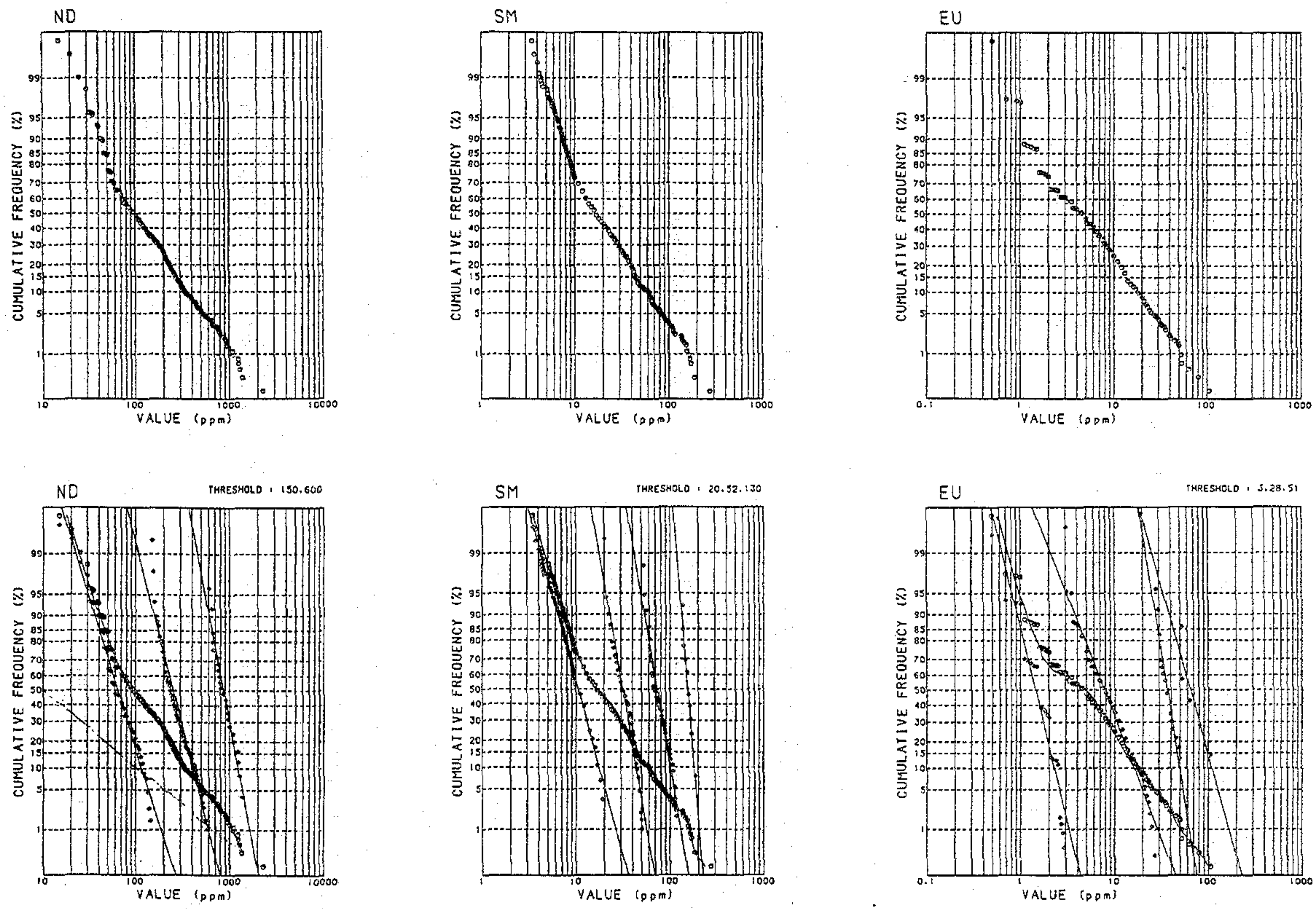


Figure II—4—2 (4) Cumulative Frequency Curves and Partition of Populations, Kiruku Hill and Nguluku Hill Sub-area

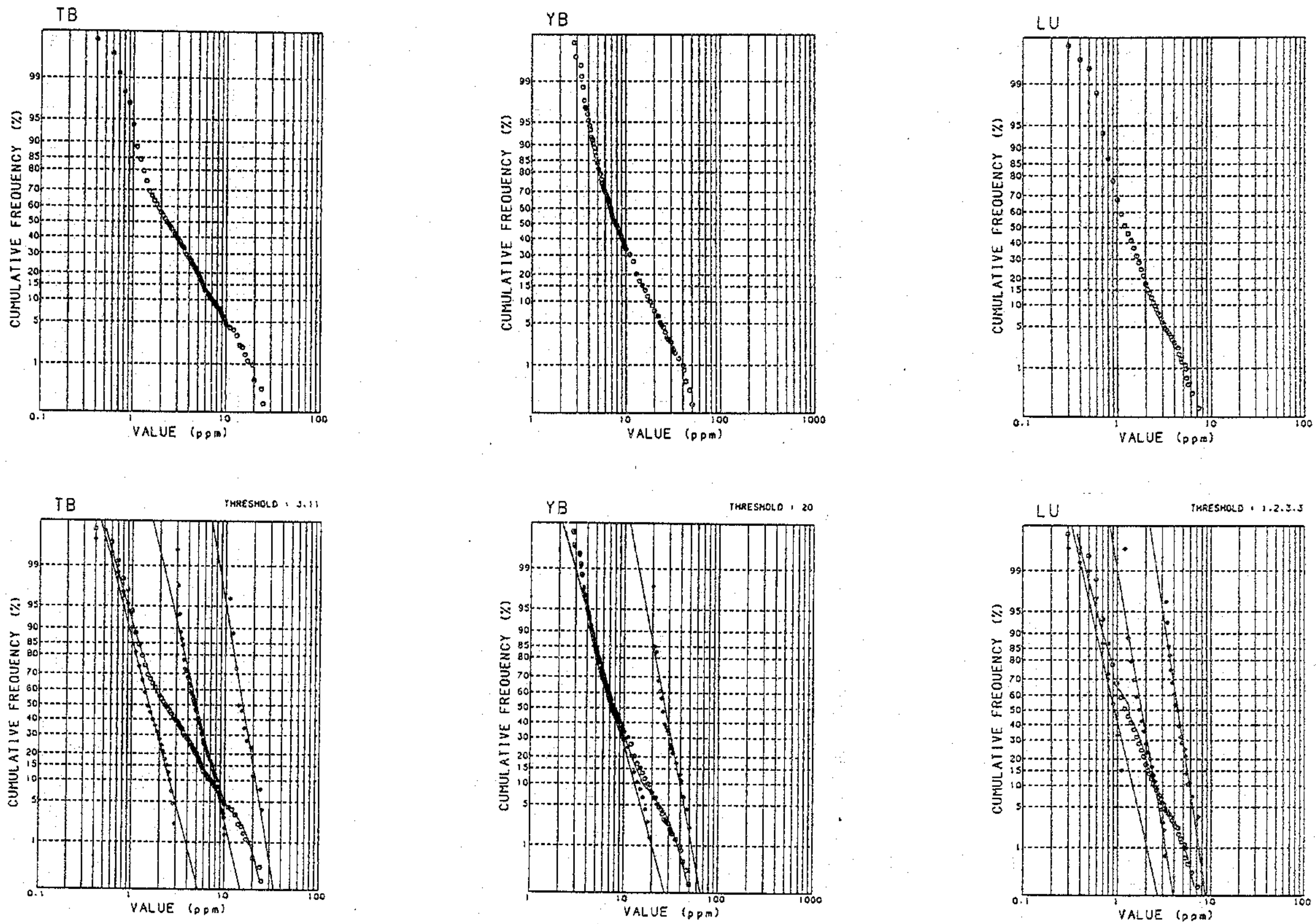


Figure II–4–2 (5) Cumulative Frequency Curves and Partition of Populations, Kiruku Hill and Nguluku Hill Sub-area

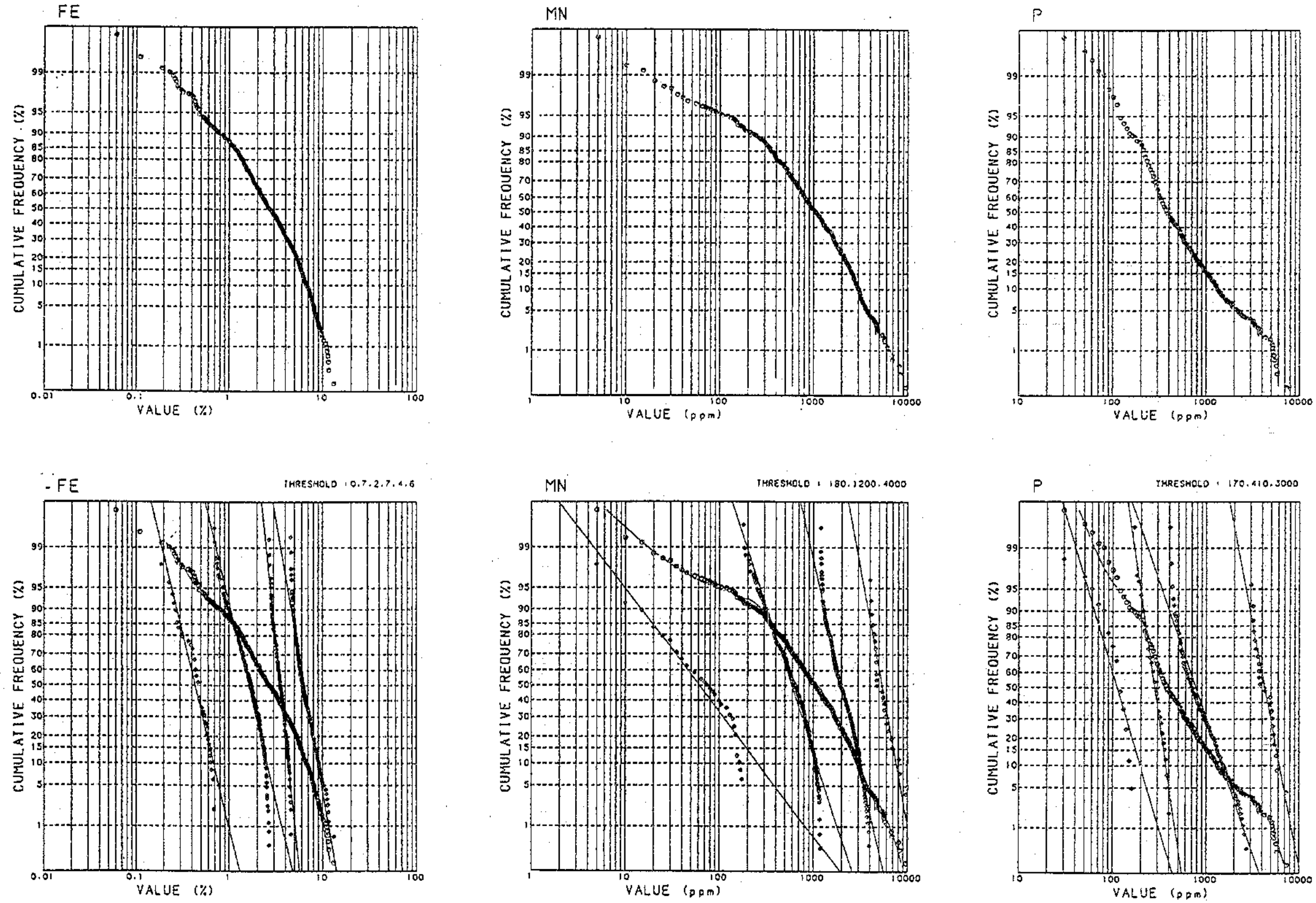


Figure II–4–2 (6) Cumulative Frequency Curves and Partition of Populations, Kiruku Hill and Nguluku Hill Sub-area

Table Ⅱ-4-4 Threshold and Number of Anomalous Samples

Element	Thresold	Number of Anomalous Samples			Ratio	Applied
		Kiruku H.	Nguluku H.	Total	(%)	Criterion
Au	50ppb	3	0	3	0.5	1
Ba	5100ppm	10	0	10	1.7	1
Sr	480ppm	13	16	29	4.8	1
Nb	1100ppm	5	0	5	0.8	1
Y	420ppm	12	0	12	2.0	1
U	16ppm	6	1	7	1.2	1
Th	400ppm	7	1	8	1.3	1
La	2400ppm	10	0	10	1.7	1
Ce	1060ppm	42	1	43	7.2	1
Nd	600ppm	25	0	25	4.2	1
Sm	130ppm	13	0	13	2.2	1
Eu	51ppm	6	0	6	1.0	1
Tb	11ppm	24	1	25	4.2	1
Yb	20ppm	44	1	45	7.5	1
Lu	3.3ppm	26	1	27	4.5	1
Fe	9.2%	13	1	14	2.3	3
Mn	4000ppm	25	0	25	4.2	1
P	4200ppm	3	8	11	1.8	1

Table Ⅱ-4-5 Correlation Coeficients

	Au	Ba	Fe	Mn	P	Sr	U	Nb	Th	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu	Y
Au	---	353	353	353	353	353	349	353	353	353	353	353	353	353	353	353	353	353
Ba	0.753	---	600	600	600	600	596	600	600	600	600	600	600	600	600	600	600	600
Fe	0.853	0.822	---	600	600	600	596	600	600	600	600	600	600	600	600	600	600	600
Mn	0.736	0.823	0.865	---	600	600	596	600	600	600	600	600	600	600	600	600	600	600
P	0.717	0.815	0.849	0.738	---	600	596	600	600	600	600	600	600	600	600	600	600	600
Sr	0.704	0.919	0.859	0.792	0.915	---	596	600	600	600	600	600	600	600	600	600	600	600
U	0.146	0.232	0.255	0.274	0.248	0.270	---	596	596	596	596	596	596	596	596	596	596	596
Nb	0.806	0.878	0.708	0.734	0.673	0.827	0.234	---	600	600	600	600	600	600	600	600	600	600
Th	0.843	0.826	0.707	0.740	0.588	0.706	0.372	0.877	---	600	600	600	600	600	600	600	600	600
La	0.780	0.877	0.782	0.781	0.704	0.803	0.290	0.908	0.932	---	600	600	600	600	600	600	600	600
Ce	0.752	0.878	0.807	0.772	0.805	0.836	0.364	0.838	0.865	0.930	---	600	600	600	600	600	600	600
Nd	0.806	0.895	0.833	0.802	0.804	0.849	0.331	0.883	0.895	0.966	0.969	---	600	600	600	600	600	600
Sm	0.821	0.897	0.832	0.797	0.806	0.849	0.311	0.877	0.895	0.955	0.966	0.991	---	600	600	600	600	600
Eu	0.844	0.918	0.860	0.831	0.802	0.879	0.299	0.901	0.880	0.938	0.933	0.968	0.967	---	600	600	600	600
Tb	0.848	0.890	0.811	0.791	0.765	0.828	0.343	0.889	0.914	0.943	0.946	0.972	0.978	0.964	---	600	600	600
Yb	0.794	0.800	0.701	0.732	0.615	0.704	0.424	0.837	0.918	0.884	0.872	0.888	0.891	0.872	0.927	---	600	600
Lu	0.734	0.761	0.646	0.703	0.567	0.661	0.434	0.807	0.894	0.838	0.832	0.846	0.848	0.835	0.890	0.932	---	600
Y	0.851	0.872	0.733	0.759	0.673	0.781	0.291	0.921	0.929	0.908	0.878	0.911	0.915	0.910	0.937	0.931	0.897	---

Right upper : Number of Samples calculated
Left bottom : Correlation Coeficients

the elements, other than uranium, are clearly shown to provide a value of more than 0.7 of the correlation coefficient. The correlations between niobium, yttrium, thorium and rare earths elements are clearly shown particularly to provide a value of more than 0.9 of the correlation coefficient in about a half of the total specimens. Uranium excludedly shows a weak correlation to other elements, while, the highest value of the correlation coefficient between uranium - lutetium shows 0.434.

(2) Principal component analysis

The results of principal component analysis are shown in Table Ⅱ-4-6.

Every element, other than uranium, shows high contribution ratios for the first principal component. Niobium, yttrium, rare earths elements, thorium and barium particularly provide the values of high contribution ratios of more than 0.8. The first principal component is evaluated to show a comprehensive concentration of the metallic elements, with niobium and rare earths elements. The distributions of high - scored specimens coincide with the extensions of geochemical anomalous zones stated in the following section. Then, the first principal component is evaluated to significantly show a concentration of the most of metallic elements, caused by silicification. The value of the contribution ratio of the first principal component is extremely high to be about 81 percent.

Relatively high values of the contribution ratio in the second and third components are designated by uranium, thus, the above components are estimated to be respondent to the geological behaviours of uranium in the Area. The second principal component shows a negative correlation to uranium, meanwhile, the third component shows a positive correlation. Relations between those and geology are still obscure.

The cumulative contribution ratio by first, second and third principal components shows a value reaching to 91.6 percent.

4-3-4 Interpretations of geochemical anomalies

Locational distributions of geochemical anomalies revealed by the current third - year works are shown in Figure Ⅱ-4-3 and attached PLs. 3, 4, 5 and 6.

Followings are the general showings of soil - geochemical anomalous values and etc., concerning to the respective indicator elements.

<u>Gold</u> : Three specimens show anomalous values, 160 ppb the highest. Anomalous values are collectively shown nearby crest of Kiruku Hill.

Table II-4-6 Summary of Principal Component Analysis

PRIN COMP	EIGEN VALUE	CONTRIB	CUM CONTRIB		Au	Ba	Fe	Mn	P	Sr	U	Nb	Th	La	Ce	Nd	Sm	Eu	Tb	Yb	Lu	Y
P 1	14.540	0.808	0.808	EIGENVECTOR	.227	.245	.228	.224	.214	.233	.092	.241	.242	.251	.250	.256	.256	.257	.257	.241	.231	.248
				FACTOR LOADING	.866	.933	.869	.854	.817	.887	.349	.918	.925	.956	.953	.978	.978	.978	.979	.919	.880	.947
				CONTRIBUTION	.750	.870	.755	.728	.667	.786	.122	.842	.855	.913	.909	.956	.956	.957	.959	.844	.775	.897
P 2	1.103	0.061	0.869	EIGENVECTOR	.123	.155	.272	.153	.342	.260	-.665	-.001	-.216	-.047	-.029	-.005	.008	.053	-.060	-.265	-.318	-.101
				FACTOR LOADING	.129	.163	.285	.160	.359	.273	-.698	-.001	-.226	-.049	-.030	-.005	.008	.056	-.063	-.278	-.334	-.107
				CONTRIBUTION	.017	.027	.081	.026	.129	.074	.487	.000	.051	.002	.001	.000	.000	.003	.004	.077	.111	.011
P 3	0.840	0.047	0.916	EIGENVECTOR	-.188	.039	.252	.167	.390	.269	.666	-.201	-.218	-.130	.059	-.005	-.024	-.008	-.067	-.142	-.150	-.218
				FACTOR LOADING	-.172	.035	.231	.153	.358	.247	.610	-.184	-.199	-.119	.054	-.004	-.022	-.007	-.061	-.130	-.137	-.200
				CONTRIBUTION	.030	.001	.053	.023	.128	.061	.372	.034	.040	.014	.003	.000	.000	.000	.004	.017	.019	.040
P 4	0.398	0.022	0.938	EIGENVECTOR	.576	-.218	.407	.410	-.104	-.255	.077	-.186	.116	-.178	-.243	-.164	-.143	-.054	-.051	.090	.072	.008
				FACTOR LOADING	.364	-.138	.257	.258	-.065	-.161	.048	-.117	.073	-.112	-.153	-.104	-.090	-.034	-.032	.057	.045	.005
				CONTRIBUTION	.132	.019	.066	.067	.004	.026	.002	.014	.005	.013	.024	.011	.008	.001	.001	.003	.002	.000
P 5	0.274	0.015	0.953	EIGENVECTOR	-.390	.321	-.066	.648	-.344	.152	-.017	.224	.040	.056	-.187	-.144	-.185	-.022	-.157	-.037	.072	.047
				FACTOR LOADING	-.204	.168	-.034	.339	-.180	.080	-.009	.117	.021	.029	-.098	-.075	-.097	-.012	-.082	-.019	.037	.025
				CONTRIBUTION	.042	.028	.001	.115	.032	.006	.000	.014	.000	.001	.010	.006	.009	.000	.007	.000	.001	.001
P 6	0.245	0.014	0.967	EIGENVECTOR	.334	.169	-.145	-.308	.131	.332	.189	.482	.054	-.221	-.329	-.250	-.232	-.059	-.103	-.039	-.052	.231
				FACTOR LOADING	.165	.083	-.072	-.152	.065	.164	.093	.239	.026	-.110	-.163	-.124	-.115	-.029	-.051	-.019	-.026	.114
				CONTRIBUTION	.027	.007	.005	.023	.004	.027	.009	.057	.001	.012	.027	.015	.013	.001	.003	.000	.001	.013

Barium : Ten specimens show anomalous values, 9970 ppm the highest. Anomalous values are collectively shown in Kiruku Hill, while, most of the anomalous values are shown nearby the ridge, some 500 m northeasterly apart from Hill crest.

Strontium : 29 specimens show anomalous values, 1430 ppm the highest. Anomalous values are almost equally seperatedly shown in number in Kiruku Hill and Nguluku Hill. Anomalous values in Kiruku Hill are shown mostly nearby the ridge, some 500 m north-easterly apart of Hill crest. Entire anomalous values in Nguluku Hill are surroundingly shown in the area of agglomerate body occurrence, respondently.

Niobium : Five specimens show anomalous values, 1300 ppm the highest. Entire anomalous values are shown in Kiruku Hill, mostly nearby the Hill crest.

Yttrium : 12 specimens show anomalous values, 660 ppm the highest. Entire anomalous values are shown in Kiruku Hill, mostly nearby the Hill crest.

Uranium : Seven specimens show anomalous values, 310 ppm the highest. Six specimens with those are in Kiruku Hill, while, one specimen with that is in Nguluku Hill. Four anomalous values in Kiruku Hill are collectively shown NW-SE directionally nearby the ridge some 500 m northeasterly apart from Hill crest.

Thorium : Eight specimens show anomalous values, 501 ppm the highest. Seven specimens with those are in Kiruku Hill, while, one specimen with that is in Nguluku Hill. In Kiruku Hill, five anomalous values are shown nearby the crest NW-SE directionally, while, two anomalous values, north-southerly extended, are nearby the ridge, about 500 m northeasterly apart from Hill crest.

Lanthanum : Ten specimens show anomalous values, 6700 ppm the highest. Entire anomalous values are shown in Kiruku Hill, while, eight anomalous values, NW-SE directional distinctively, are nearby the ridge some 500 m northeasterly apart from Hill crest.

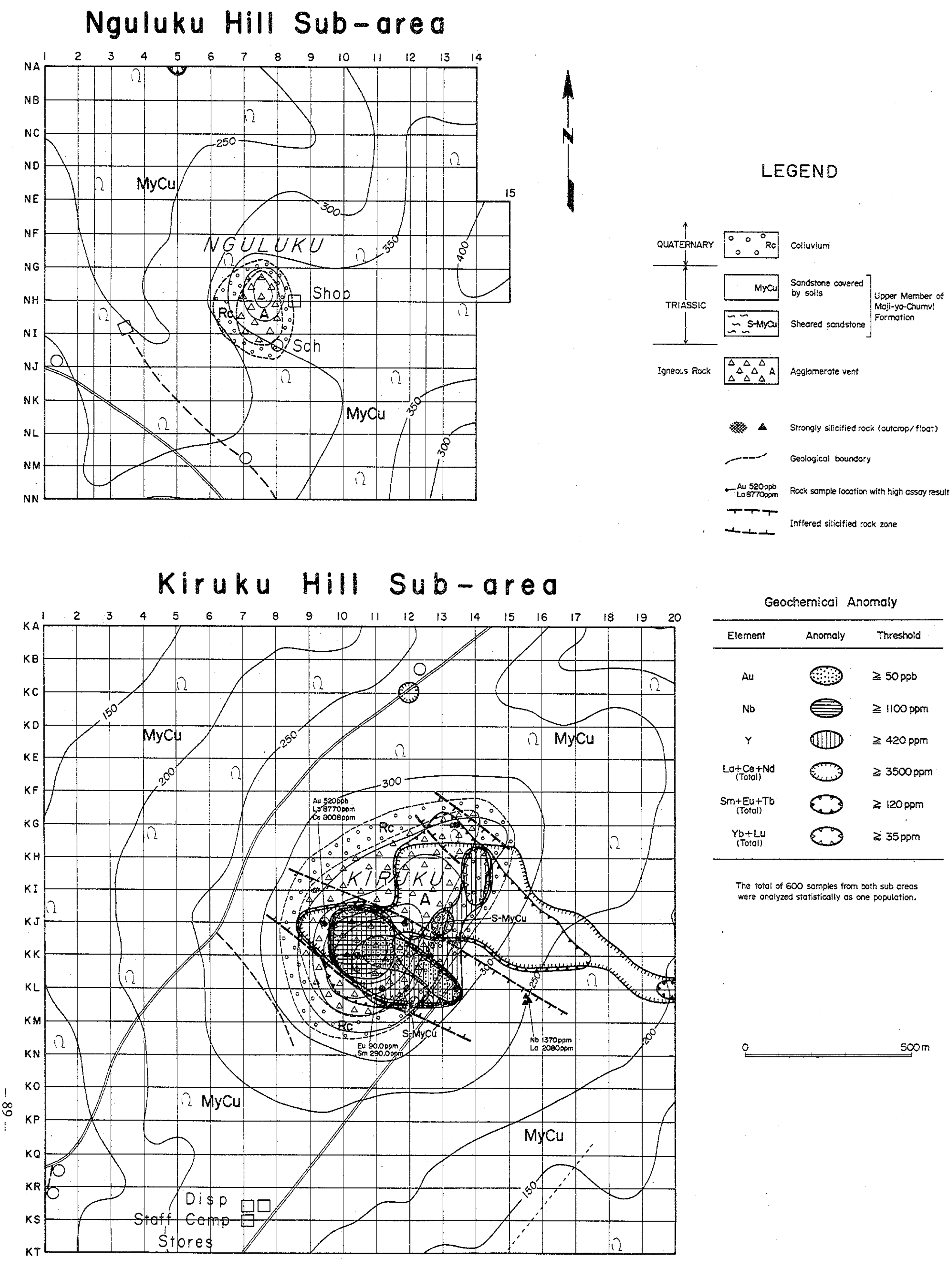


Figure II-4-3 Geochemical Interpretation Map of the Kiruku Hill and Nguluku Hill Sub-area

Cerium : 42 specimens show anomalous values, 7020 ppm the highest. 41 anomalous values are shown in Kiruku Hill, while, one anomalous value is in Nguluku Hill. The anomalous zones in Kiruku Hill are extended NW-SE or WNW-ESE directionally nearby Hill crest and nearby the ridge some 500 m northeasterly apart from Hill crest.

Neodymium : 25 specimens show anomalous values, 2260 ppm the highest. Entire anomalous specimens were collected from Kiruku Hill. Seven anomalous values are NW-SE directionally shown nearby Hill crest, while, 18 anomalous values are on the ridge, some 500 m north-easterly apart from Hill crest, to be protracted toward eastern slope WNW-ESE directionally.

Samarium : 13 specimens show anomalous values, 271 ppm the highest. Entire anomalous specimens were collected from Kiruku Hill. Six anomalous values are shown NW-SE directionaly nearby Hill crest, while, seven anomalous values are nearby the ridge some 500 m northeasterly apart from Hill crest to be extended NW-SE directionally toward eastern slope.

Europium : Six specimens show anomalous values, 105 ppm the highest. Entire anomalous specimens were collected from Kiruku Hill. Four anomalous values are shown NW-SE directionally nearby Hill crest, while, two anomalous values are separatedly shown nearby the ridge some 500 m northeasterly apart from Hill crest.

Terbium : 25 specimens show anomalous values, 25 ppm the highest. 24 anomalous values are in Kiruku Hill, while, one anomalous value is in Nguluku Hill. In Kiruku Hill, 12 anomalous values are shown nearby Hill crest, while, 12 anomalous values are shown NE-SE directionally nearby the ridge some 500 m northeasterly apart from Hill crest. Two anomalous zones, the above, are likely merged in midway.

Ytterbium : 45 specimens show anomalous values, 50 ppm the highest. 44 specimens with those were collected from Kiruku Hill, while, one specimen with that was from Nguluku Hill. Anomalous values in Kiruku Hill are widely shown to overlyingly cover Hill top and further toward eastern slope. Anomalous values with more than 40 ppm of ytterbium are chiefly shown nearby Hill crest.

Lutetium : 27 specimens show anomalous values, 7.2 ppm the highest. 26 specimens with those were collected from Kiruku Hill, while, one specimen with that was from Nguluku Hill. In Kiruku Hill, anomalous values are shown nearby Hill crest and nearby the ridge, some 500 m northeasterly apart from Hill crest, while, those are likely merged in midway. Highly anomalous values of more than 5 ppm Lu are chiefly shown nearby Hill crest.

Iron : 14 specimens show anomalous values, 13.05 percent is the highest. 13 specimens with those were collected from Kiruku Hill, while, one specimen with that was from Nguluku Hill. In Kiruku Hill, four anomalous values are shown nearby Hill crest, while, nine anomalous values, NW-SE directional, are nearby the ridge, some 500 m northeasterly apart from Hill crest.

Manganese : 25 specimens show anomalous values, 9,610 ppm the highest. Entire specimens with those were collected from Kiruku Hill. In Kiruku Hill, six anomalous values are shown NW-SE directionally nearby Hill crest, while, 17 anomalous values are similarly shown nearby the ridge, some 500 m northeasterly apart from Hill crest.

Phosphorus : 11 specimens show anomalous values, 7,310 ppm the highest. Three anomalous specimens were collected from Kiruku Hill, while, eight anomalous specimens were from Nguluku Hill. In Kiruku Hill, anomalous values are entirely shown nearby the ridge, some 500 m northeasterly apart from Hill crest. In Nguluku Hill, anomalous values are surroundingly shown in the area of agglomerate body occurrence, respondently.

Most of the geochemical anomalous values of the respective indicator elements by the current third-year works in Mrima-Jombo Area are extendedly shown in Kiruku Hill area, meanwhile, a part of the anomalous values of strontium and phosphorus is barely shown in Nguluku Hill area with ralatively remarkable concentration to surround the occurrence of agglomerate body providing a possible geochemical respondence.

The showings of geochemical anomalous values in Kiruku Hill area are properly shown in two locations, namely, nearby Hill crest and nearby the ridge, which is some 500 m northeasterly apart of the Hill crest. Some of the indicator elements are shown in either location of the above, while, another indicator elements are chiefly one-sided as shown below. The geochemical anomalous values shown nearby the Kiruku Hill crest is referred to as the "Hill Crest anomaly" in the report, while, those shown nearby the ridge some 500 m northeasterly apart from the Hill crest is referred to as the "Northeastern Ridge anomaly".

- Indicator elements, chiefly shown in Hill Crest anomaly
  : Gold, niobium, yttrium, thorium, terbium, ytterbium, lutetium, europium
- Indicator elements, chiefly shown in Northeastern Ridge anomaly
  : Barium, strontium, uranium, lanthanum, cerium, neodymium, manganese, phosphorus, (iron)
- Indicator elements, equally shown in either anomaly of the above
  : Samarium, (iron)

Geochemical anomalous zones in the areas are generally shown to be extended NW-SE directionally, while, WNW-ESE directionally in part.

Geochemical anomalous showings in Kiruku Hill area are estimated to have genetically been respondently shown to the geological occurrences of silicified rock zones, rather than those of agglomerate body, because of a coincident similarity of the directional extensional behaviours of the above showings and geology. It is inferred that the geochemical anomalous showing in the Hill Crest anomaly could have possibly been shown in genetical connection with the occurrences of silicified rock zones nearby Kiruku Hill crest, while, the showing in the Noreastern Ridge anomaly is also inferred to could have been shown in genetical connection with the occurrences of silicified rock zones nearby the northeastern ridge of Kiruku Hill crest. Those consideration are estimated to be supportd by the chemical assay results, shown in the above section, in which the indicator elements of significance are highly shown in silicified rock, rather than in agglomerate.

The major direction of silicified rock zones and geochemical anomalous zones, NW-SE and/or WNW-ESE, is coincidently observed with that of faults in the Area. The coincidence, the above, is estimated to provide a geological possibility that silicification in the Area, associated with an accumulation of niobium, rare earths elements and etc., could have taken place in connection with a part of hydrothermal activities along the faultings. Thus, the genesis of niobium and rare earths elements mineralization in Kiruku hill is possibly estimated to be significantly different from that in Mrima Hill.

4-4 Interpretation

4-4-1 Mineral potentials

It is possibly estimated by the current geological and geochemical research works of the third-year programme in Mrima-Jombo Area that niobium and rare earths elements (REE) mineralizations are associated with agglomerate body and sandstone beds, which have been subjected to silicification, in Kiruku Hill area, meanwhile, those mineralizations are limitedly observed in agglomerate body in Nguluku Hill area. Niobium and REE mineralizations in Mrima-Jombo Hill Area by the current programme are substantially noted to being that the above mineralizations are likely observed in close genetical relations to the occurrence of wall rock silicification, rather than to that of agglomerate bodies.

Niobium and REE ore mineralization in Mrima Hill is a type of residual deposit by weathering to have been formed by the weathering of carbonatite bodies to be enriched by the accumulation of pyrochlore, monazite and etc. and secondarily formed gorceixite. A quantitative comparison of niobium and REE contents in soils from Mrima Hill and Kiruku Hill was carried out by the current work for reference. The average content value by six specimens of niobium and REE in Mrima Hill soil shows higher than the maximum values of those in most of Kiruku Hill soil.

Niobium and REE mineralizations in Kiruku Hill is likely evaluated to show a smaller extent and lower quality than those in Mrima Hill. Those are likely inferred to be closely related to a type of the genesis of those mineralizations. Following are the disadvantages in connection with the Kiruku Hill mineralizations in comparison with those of other type.

1. Mineralization extension under a possible geological control by silicified rocks occurrence could be limited.
2. Mineralizations, associated with silicified rock, could be resistive to weathering effect to could cause a generally insufficient secondary enrichment effect.

3. Silicified rocks are very fine-grained, consequently, a difficulty of mineral processing technique, commonly caused by a refractory charactor of fine-grained ores, could be possibly posed in connection with the mode of occurrence of the minerals.

General mineral potentials of niobium and REE in Kiruku Hill are unlikely evaluated to be encouraging, however, the mineral occurrences of niobium and REE, possibly activated by hydrothermal process in the area, other than that with carbonatite activity, are to be geologically interested. This could pose a geological possibility of a forming of hydrothermal ore mineralization, associated with niobium, REE and precious and base metals, that has barely been discussed in the Area in the course of the previous works, to be further examined in future.

4-4-2 Result of soil geochemistry and mineralized zone

(1) Kiruku Hill area

Geochemical anomalous zones of niobium, REE and other indicator elements by the current soil-geochemistry have been represented in Kiruku Hill area. The anomalous zones are shown in such two locations, as nearby the crest of Kiruku Hill - the Hill Crest anomaly - and nearby the northeastern ridge some 500 m northeasterly apart from Kiruku Hill crest - the Northeastern Ridge anomaly -. Indicator elements chiefly shown in the respective anomalies are stated below:

- Indicator elements, chiefly shown in Hill Crest anomaly
  : Gold, niobium, yttrium, thorium, terbium, ytterbium, lutetium, europium
- Indicator elements, chiefly shown in Northeastern Ridge anomaly
  : Barium, strontium, uranium, lanthanum, cerium, neodymium, manganese, phosphorus, (iron)
- Indicator elements, equally shown in either anomaly of the above
  : Samarium, (iron)

Geochemical Hill Crest and Northeastern Ridge anomalies are estimated to be underlain by silicified rocks extension. The extension of the Hill Crest anomaly shows a directional distinct coincidence with that of silicified rock zones nearby the Hill crest. The extension of the Northeastern Ridge anomaly is estimated to show a similar coincidence with that of silicified rock zones nearby northeastern ridge, some 500 m northeasterly apart from Hill crest. The mineralizations of niobium and REE in Kiruku Hill area are possibly estimated to have been formed in connection with the process of wall rock silicification. Those are considered to be supported by the chemical assay results of rocks.

The geochemical anomalous zones and silicified zones nearby Kiruku Hill crest are shown to be extended NW-SE directionally. The NW-SE extensions show a directional general coincidence with those of faults in the area to pose a geological influential possibility of structural fault activities related to ore mineralization genesis in the area.

(2) Nguluku Hill area

Geochemical anomalous zone, to be related to niobium and REE mineralization, is unlikely shown by the current work in the area. Agglomerate body in Nguluku Hill, estimated to be of vent agglomerate, are less altered and fresh in comparison with that in Kiruku Hill and are unlikely evaluated to be encouraging for the occurrence of mineralization of significance.

4-4-3 Future work

Implementations of consecutive exploration works in Mrima-Jombo Area are likely evaluated to be limitedly required in future, since general extension and quality of niobium and rare earths elements mineralizations in Kiruku Hill, which are estimated to have possibly been formed by a different mode of genesis from that in Mrima Hill, are likely evaluated to be smaller than those in Mrima Hill, which are possibly estimated to have been formed by weathering of carbonatite bodies.

Implementations of research works for academic interests of the mode of occurrences of niobium and rare earths elements minerals and of secondary enrichment in silicified rocks are possibly required, since the mineralizations in Kiruku Hill, possibly associated with silicification, could pose a particular geological interests concerning to an unique field of mineralization. Regional research works of the extensions and relations to geology and geological structure of hydrothermal activity in the Area, that could have caused silicification to rocks, are considered to be one of research themes, which could eventually lead to a possibility to specify hydrothermal ore mineralization occurrences of varied types.

PART III CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 1. CONCLUSIONS

The general conclusions concerning to the Project Areas evaluations by the third-year works in 1992 are stated below:

(1) Jibana Area

The underground extensions of gossanous materials and geochemical lead anomalies on ground surface, which have been targeted by diamond drill works of the current third-year programme, are estimated to be geologically represented by the occurrences of pyrite disseminations in fault fracture zones and in sandstone and siltstone beds of Mazeras Formation. Gossanous materials and geochemical lead anomalies are inferred to have been formed in the processes of residues and precipitations of iron or heavy metallic elements decomposedly formed by weatherings of such fracture zone clay and rocks, associated with pyrite disseminations, as the above, then, those are likely evaluated to could produce irresponsibilities of showing of the underground occurrence of lead-zinc-barite ore veining mineralizations.

(2) Ribe Area

Chiume Hill Mineralized Zone is evaluated by the results of the current drill works that the Zone could unlikely provide a downward underground extension of geological significance as shown on ground surface in a form of discontinuous outcrops and floats of mineralized materials of small scale.

Pyrite-disseminated silicified rock beds, which are estimated to represent downward extensions of silicified rock outcrops on ground surface, and abundant fault fracture zones with intense pyrite disseminations have been encountered by the drill holes of the current programme in Ribe Mineralized Zone. Occurrences of barite fine veins, less than 5 mm wide, are observed by unaided eye in open cracks in silicified rocks. Fault fracturing occurences, such wall rock alterations concerning to ore mineralization as silicification and pyrite disseminations, and barite fine veins occurrences, are likely evaluated that the Ribe Mineralized Zone could pose a geological possibility to provide a field of lead-zinc-barite ore veining mineralizations, however, the current situations are with a lack of economical significance of ore forming to be associated with sphalerite, galena and etc..

(3) Mkangombe Area

It has been shown by the results of diamond drill exploration works by the current third-year programme in Mkangombe Area that the mineral occurrences in deep underground have been revealed with more encouragements of eventual mineral potential than those on ground surface to foster future prospects of mineral occurrences of significance. The occurrence of a massive sphalerite ore vein, 24 cm wide, encountered by Hole MJKM-8, is likely evaluated to be an emboldening showing that furthers future eventual mineral potential prospects of economical significance in the vicinity.

A new occurrence of outcrops and floats of quartz ore veins in the vicinity of Mkangombe South Ore Showing, associated with copper minerals, has been revealed by a geological reconnaissance work, carried out in accordance with the progress of drill works. The new occurrence is likely evaluated to offer a mineral potential, associated with quartz veining mineralized zone.

(4) Mrima-Jombo Area

Kiruku Hill area

Geochemical anomalies of niobium and rare earths elements (REE) were revealed in the area by the current third-year works. Those anomalies are shown in two locations, namely, nearby Kiruku Hill crest and nearby northeastern ridge from Kiruku Hill crest. Silicified rock beds are observed in the geochemical anomalous coverages. The geochemical anomalous zones are likely extended in superimposed accordance with distributions of silicified rocks. Mineralization of niobium and REE in Kiruku Hill area are possibly inferred to have been formed by rock silicifications as likely supported by the chemical assay results of rocks. Extensions of geochemical anomalous zones and silicified rock zones show a coincidence with those of faults in the area to lead to a geological inference that the mineralizations in the area have likely been formed under a structural control by faultings. Thus, the mineralizations in Kiruku Hill area of niobium and REE, associated with precious and base metallic elements, are likely estimated to have been formed in accordance with progresses of the formings of silicified rocks by hydrothermal activities, which could have taken place along the faults of NW-SE to WNW-ESE directions. The mineralizations have ever been possibly assumed initially by the second-year works to have been formed in connection with agglomerate activity, however, the direct connection the above is likely reassumed currently to be poor or unfounded.

The general extent and quality of niobium-REE mineralizations in Kiruku Hill is evaluated to be smaller than those in Mrima Hill. This could possibly be caused by a difference of geological genesis of the forming of mineralizations between the above two occurrences, namely, the former is associated with silicified rocks, while, the latter is with carbonatite bodies.

Nguluku Hill area

Geochemical anomalous zone, which is evaluated to be caused by niobium-REE mineralization, has never been revealed in Nguluku area.

CHAPTER 2. RECOMMENDATIONS

Based on the conclusions, stated above, implementations of follow works, to be deserved to warrant in future exploration programming, are recommended below:

(1) Jibana Area

Implementations of consecutive exploration works are currently evaluated to unlikely be deserved to warrant in Jibana Area.

Occurrences of pyrite-diseminated rocks in Jibana Area are unlikely estimated to be directly resposible to providing a showing of the occurrences of lead-zinc-barite ore veining mineralizations. Since, however, pyrite-disseminations, the above, are possibly inferred to have been formed by hydrothermal activities, which could have taken place nearby Karroo-Jurassic Fault, that could be related to ore mineralization, then, the Area is evaluated to could still pose a considerable geological potential of mineral occurrences. Implementations of steady further studies to specify new ore showing in the Area are considered to be required in future.

It is to be noted that geological identifiable distinction of weathered products between pyrite-disseminated materials and ore-mineralized materials would be significantly required in future works in the Area. Occurrences of silicification, mineralized fine veins, type of geochemical anomalies should be, therefore, carefully studied in the future course of detailed geological and geochemical research works prior to an establishment of diamond drill programming.

(2) Ribe Area

Implementations of consecutive exploration works in Chiume Hill Mineralized Zone and nearby are evaluated to unlikely be deserved to warrant since that the extensions of mineral occurrence of geological significance on ground surface and deep underground in the Zone have been revealed by the current works to be limited and little extended.

Implementations of consecutive exploration works in Ribe Mineralized Zone, where three diamond drill holes have been operated by the current works, are evaluated to unlikely be deserved to warrant. However, the Ribe Mineralized Zone environs are still evaluated to be one of the potentially promising targets of future mineral exploration to be required, since silicified zones, where scrutinized examinations of mineral potentials have ever insufficiently made, are scatteredly known. In accordance with the experiences of the current works, the occurrences of ore minerals of economical significance are to be carefully studied in the progresses of detailed geological and geochemical future works, which are to be implemented prior to an establishment of future drill programmes, for an objective to neccessarily exclude unpromising barren silicified zones from the future drill exploration targets.

(3) Mkangombe Area

Two drill holes, implemented by the current programme have been allocated about 30 metres apart, while, barely enough to establish an ore intensection to the depth about 60 metres below ground surface. It is to be reminded that the current diamond drill works have established a limited mineral exploration coverage in Mkangombe North Ore Showing area, then, additional future diamond drill works with reasonable scale and quantity are recommended to be consecutively implemented.

Implementations of consecutive detailed geological reconnaissance works in quartz veining mineralized zone are recommended to fulfill the coverage by those mapping in the areas, where detailed work have never been carried out. Those works are to be targeted to eventually decide further prospects of trench pitting or diamond drill and potentially lead to a new discovery of mineral occurrence of significance.

The current programme works in Mkangombe Area are to be recognized to have initially provided a springboard of the exploration activity of base metal minerals in the inland area in the district of Mombasa, otherwise such past activities have been prone to be emphasizedly implemented targeted on lead-barite ore mineralizations in coastal areas. Implementations of consecutive future works for such objectives are considered to likely be promisingly expected.

(4) Mrima-Jombo Area

Implementations of consecutive exploration works in Mrima-Jombo Area are likely evaluated to be limitedly required in future, since general extension and quality of niobium and rare earths elements mineralizations in Kiruku Hill, which are estimated to have possibly been formed by a different mode of genesis from that in Mrima Hill, are likely evaluated to be smaller than those in Mrima Hill, which are possibly estimated to have been formed by weathering of carbonatite bodies.

Implementations of research works for academic interests of the mode of occurences of niobium and rare earths elements minerals and of secondary enrichment in silicified rocks are possibly required, since the mineralizations in Kiruku Hill, possibly associated with silicification, could pose a particular geological interests concerning to an unique field of mineralization. Regional research works of the extensions and relations to geology and geological structure of hydrothermal activity in the Area, that could have caused silicification to rocks, are considered to be one of research themes, which could eventually lead to a possibility to specify hydrothermal ore mineralization occurrences of varied types.

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