mineralized zones of quartz ore veining, are envisaged to effectively conduct to a potential possibility to represent geochemical anomalous zones of significance in the Area.

Three elements, such as copper, lead and zinc, are estimated to be preferentially employed as the indicators for further works by the following bases:

Copper and zinc	:	Quartz veins occurrences, associated with copper and zinc minerals, are observed in the Area. The samples with anomalous values of copper and zinc by possible mineralization influences were collected by the current work.
Lead	:	Quartz ore veins occurrenes, associated with lead mineralization, are observed in the Area by the current work.

A part of copper-lead anomalous zones, which is estimated to have possibly been causedly shown by the occurrences of ferruginous concretions, is to be carefully examined to necessarily distinguish it from those by the ore mineralization occurrence. Wall rock alteration occurrences by ore mineralization in the Area are estimated by the current geological and diamond drill works to be extremely limited in close vicinity to quartz veinings or to be little. Thus, an effective applicability of soil-geochemistry in Mkangombe Area is unlikely envisaged to be practically favourable.

2-4-4 Ore mineralization and results of diamond drill explortaion

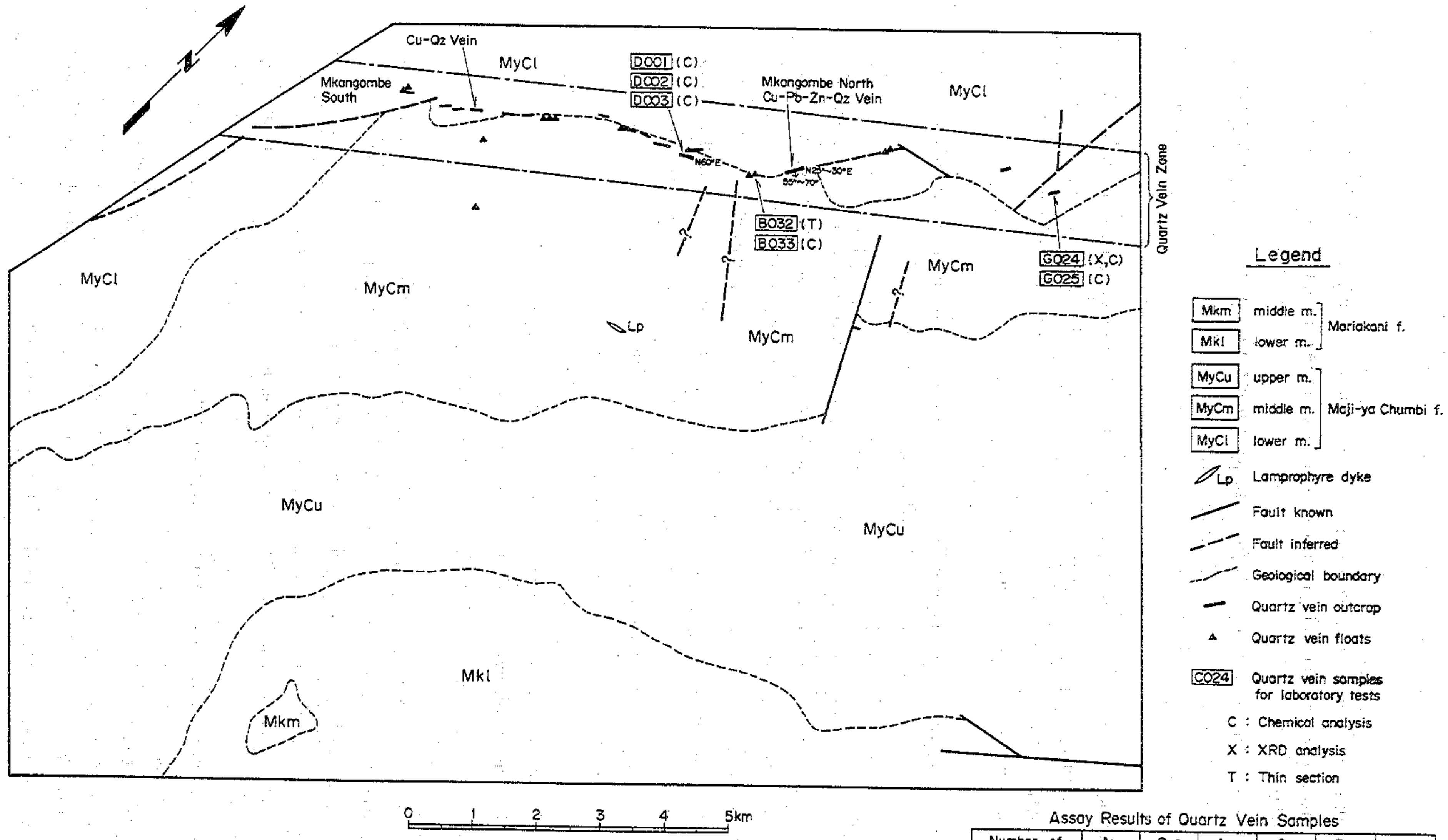
(1) Outline of mineral showing and mineralized zone

The localities of mineral showing and mineralized zone in Mkangombe Area are shown in Figure 2-4-3.

Mkangombe North and Mkangombe South Ore Showings have ever been known in the Area. It has been shown by the current works that Mkangombe North Ore Showing is composed of copper, lead and zinc ore veins associated with quartz, to have been formed under structural controls by faulting, meanwhile, the 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.

(i) 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



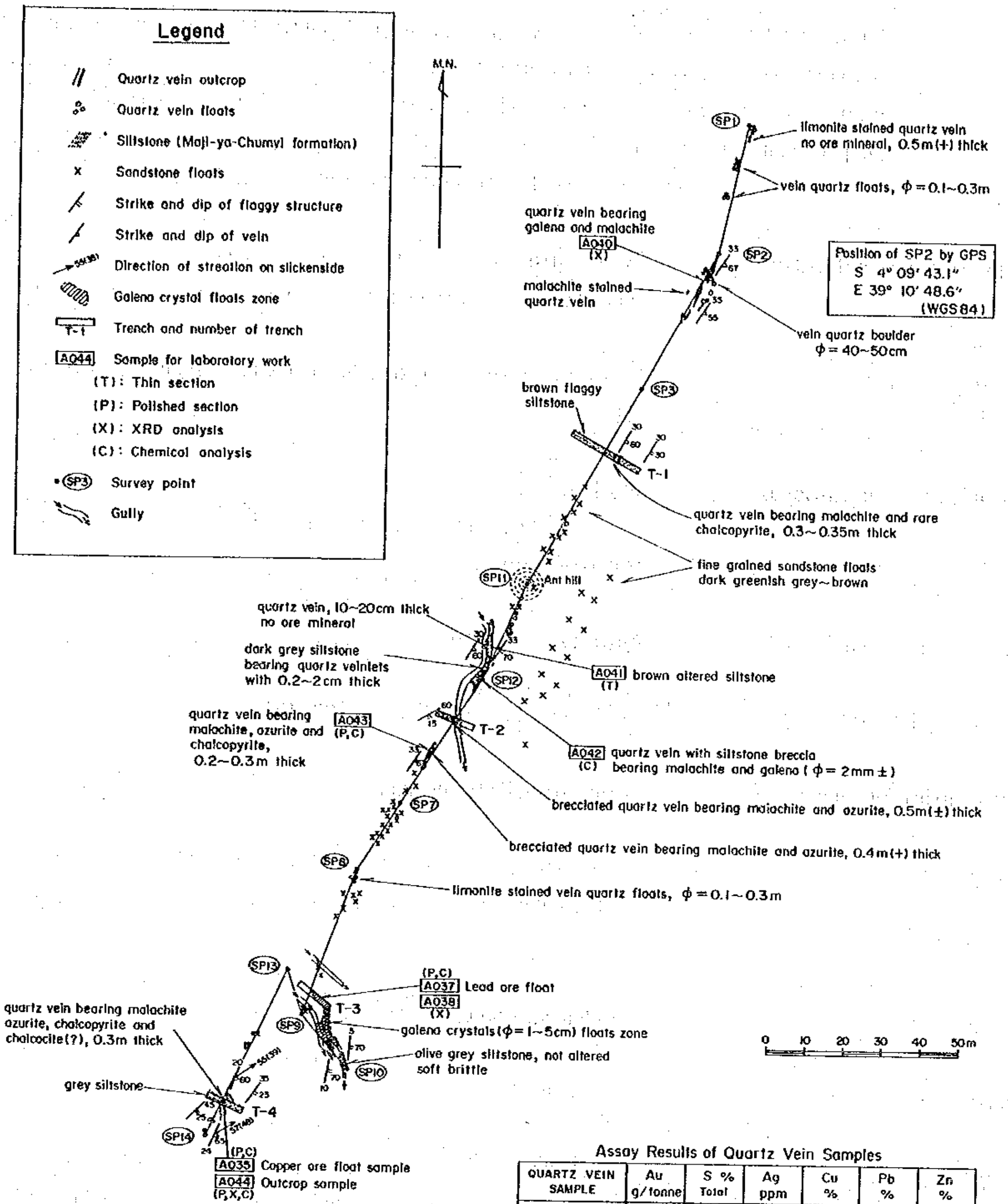
Assay Results of Quartz Vein Samples

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 2-4-3 Quartz Vein Zone in the Mkangombe Area

Project. Figure 2-4-4 shows a general distribution of outcrops of quartz-ore veins in the showing, while, Figure 2-4-5 shows geological cross-sectional delineations of four pits walls, implemented in four locations in the showing area. The outlined generals of Mkangombe North Ore Showing 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	:	Mudstone (MyCl), Maji-ya-Chumvi Formation
Hydrothermal alteration	:	Obscure
Faulting	:	Wall rock is generally brecciated and argillized to form an association of distinct slickensides with ore veins. Wall rock fracture is generally more intense in hanging wall side, 0.5 to 2 metres wide.
Chemical values of ore	:	Results of chemical assay of ore are shown in the Table on Figure 2-4-4. Precious metals content is low.



Assay Results of Quartz Vein Samples

QUARTZ VEIN SAMPLE	Au g/tonne	S % Total	Ag ppm	Cu %	Pb %	Zn %
A035	< 0.07	0.214	20	> 3.00	0.120	0.743
A037	< 0.07	9.42	12	0.109	> 3.00	0.003
A042	< 0.07	0.050	4	0.491	0.095	1.980
A043	< 0.07	0.101	4	0.290	0.063	1.135
A044	< 0.07	0.147	8	2.97	0.043	0.376

Figure 2-4-4 Geological Sketch of the Mkangombe North Mineral Showing

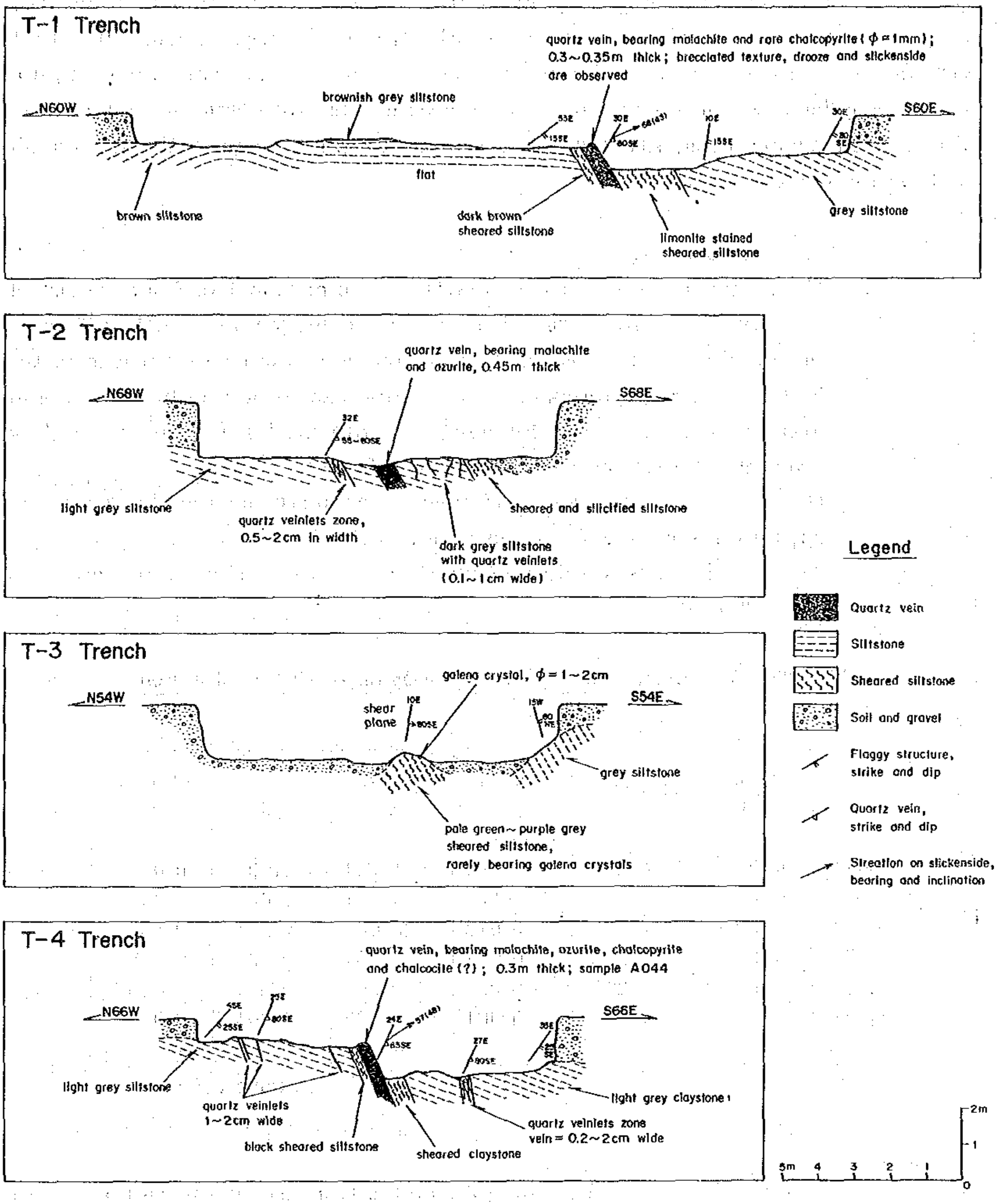


Figure 2-4-5 Geological Section of Trenches in the Mkangombe North Mineral Showing

Galena is observed not only in quartz ore veins, but also in fractured clayey materials in a form of relatively large crystal grains, 0.5 to 5 centimetres diameter, in association with calcite on hanging wall. Such crystal grains of galena, which are presumed to be accumulated by weathering apart from the in-situ occurrences, are also observed in the place near to the trench pit T-3 by the current works.

(ii) Other ore showing

More than ten outcrops of quartz ore veins and five floats zones of vein quartz, which are estimated to be moved very little off from the in-situ occurrences, have been found by the current works in the N 45° E-directional zone connecting the Mkangombe North and Mkangombe South Ore Showings, to overall form a quartz veining mineralized zone, as shown in Figure 2-4-3.

Quartz veins in outcrops and floats are mostly barren, however, are sparsely disseminated by copper mineral.

The chemical assay values of quartz ore veins specimens are shwon in Table 2-4-1.

Table 2-4-1 Results of Chemical Analysis of Quartz Ore Vein

	Gold g/T	Silver g/T	Copper %	Lead %	Zinc %	Sulphur %
B033	< 0.07	< 2	< 0.001	< 0.001	0.001	0.007
D001	< 0.07	< 2	< 0.001	0.001	0.002	0.007
D002	< 0.07	< 2	0.072	0.001	0.245	0.166
D003	< 0.07	< 2	0.004	< 0.001	0.005	0.009
G024	< 0.07	< 2	0.009	0.004	0.024	0.023
G025	< 0.07	< 2	0.001	0.002	0.004	0.013

g/T : gramme per ton

% : percent

Chemical assay values of gold and silver are in the range of less than detection limit, while, those of base metals could show a response of weak mineralization. Any showing of concentration of ore minerals of economic significance in the zone is unavailable in the field.

(2) Results of diamond drill exploration

(i) Outline

General extensive occurrences of quartz ore veinings and locations of diamond drill sites in Mkangombe North Ore Showing are show in Figure 2-4-6, meanwhile, geological cross-sections with drill hole logs are in Figure 2-4-7, specifications of diamond drill operation are in Table 2-4-2.

Two diamond drill holes, 201.65 m deep in total, were operated by the current programme. Hole MJKM-8 has been targeted on scouting up deep underground extension of galena-associated fracture zone and quartz veins occurrence on footwall side of that, meanwhile, Hole MJKM-9 has been targeted on those of copper-quartz ore veining mineralization, most noticeable among them.

Table 2-4-2 DDH in Mkangombe Area

Hole number	Hole direction	Hole depression	Site elevation above sea level in metre	Hole depth in metre
MJKM-8	N63° W	-65°	218.0	100.65
MJKM-9	N63° W	-65°	214.0	100.60

(ii) Geology by drill hole

General geology by Holes MJKM-8 and -9 are chiefly comprized of overburden soils and Maji-ya-Chumvi Formation. Occurrences of base metal ore veins are observed in fault fracture zones in Maji-ya-Chumvi Formation.

Maji-ya-Chumbi Formation is consistently comprised of bedded-structured mudstone beds, dark gray, toward the depth of about 80 m deep, then, is replaced beyond that by bedded-structured fine-grained sandstone beds, gray.

Brecciations and fine veining/networks of quartz, calcite, pyrite and etc. are chiefly observed in fault fracture zones. Ore mineralizations are observed in the zones, the above, subjected to intense fracturing and partial silicification.

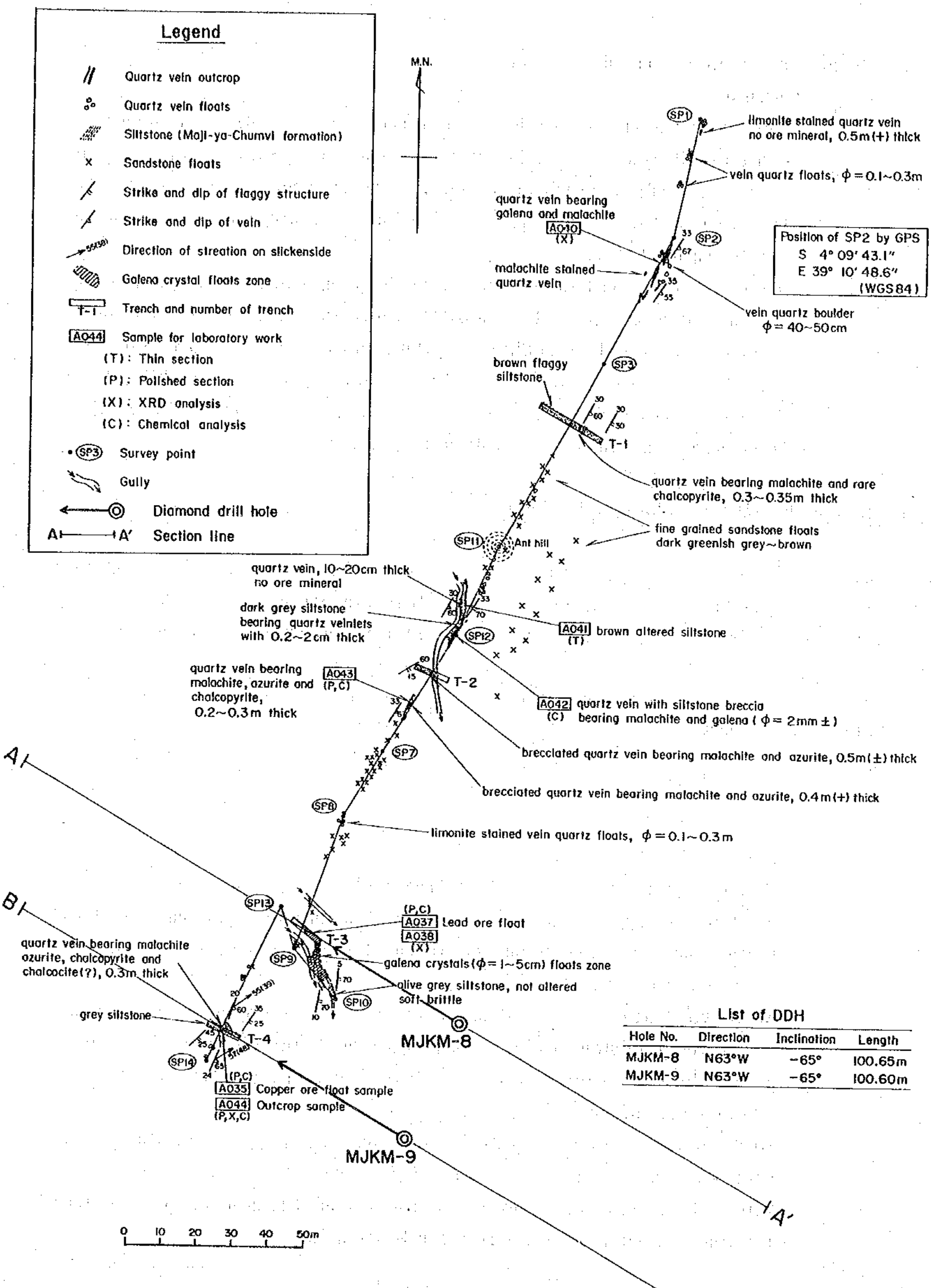


Figure 2-4-6 Location Map of the Drill Holes, Mkangombe North Mineral Showing

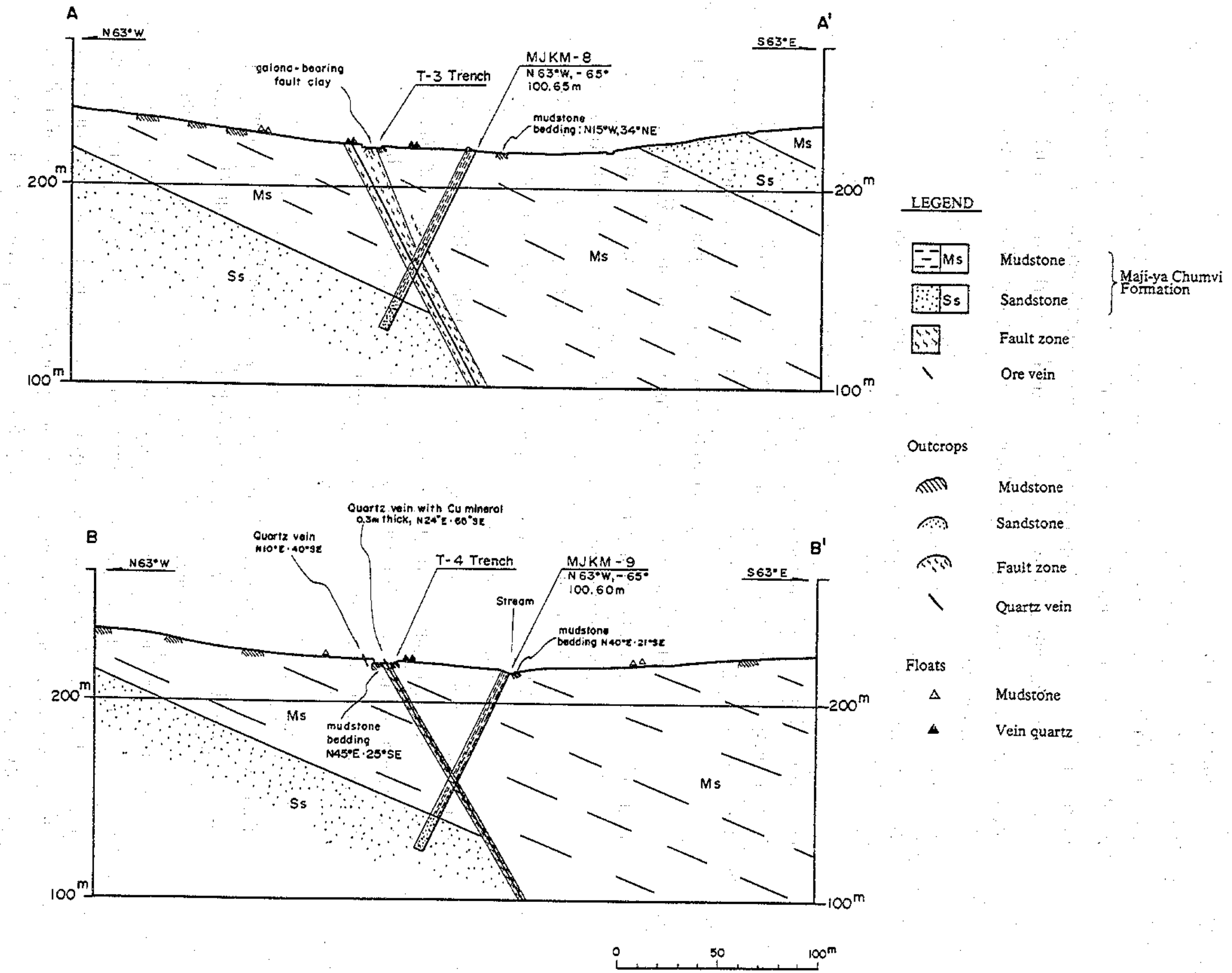


Figure 2–4–7 Geological Sections along the Drill Holes, Mkangombe Area

Weathered zones are limitedly developed to reach to unweathered zones from ground surface within a range of about 8 m.

(iii) Ore mineralization

Hole MJKM-8

An ore vein intersection has been made at the depth of 66.10 m - 66.40 m. General occurrence of ore vein is shown below. Galena-associated clay zone and quartz veins with considerable thickness on ground surface, which have been the targets of the drill work, were not encountered. Figure 2-4-8 shows a geological sketch of the ore-vein-intersection.

Ore vein intersection depth : 66.10 m - 66.40 m.

Ore vein intersection angle : 52° at hanging wall and
54° at footwall,
53° in average.

Ore vein width : 24 cm approximately.

Dip of ore vein : Estimated to be of about 63° south-eastward.

Occurrence : Chiefly composed of massive sphalerite, brown, minorly associated with pyrite and rock crystal grains, and with less than 10 % volume of mudstone breccias.

Wall rock : Barely altered enough to be associated with intense brecciation in upward and downward portions, about 1 m wide each from the ore vein. Quartz veins, less than 3 cm wide, and pyrite fine veins, less than 3 mm wide, are observed.

An occurrence of sphalerite-calcite ore vein, more than 2.5 cm wide, intersected by 50° - angle, is observed at the depth of 74.38 m. Some ten grains of sphalerite, 1 mm to 10 mm long, are observed in minor association with chalcopyrite and pyrite.

Hole MJKM-9

Two ore veins intersections have been made as follows: 1. Sphalerite-quartz ore vein at the depth of 60.51 m - 60.71 m and 2. Chalcopyrite-quartz ore vein at the depth of 61.39 m - 61.65 m. General occurrences of ore veins are shown below. The ore veins by the Hole are of the type of quartz ore vein, different from that in Hole MJKM-8. Copper mineral-quarz ore mineralization, observed in the previous trench prospect T-4 on ground surface is estimated to be collated with the ore vein 2, the above. Figure 2-4-9 shows a

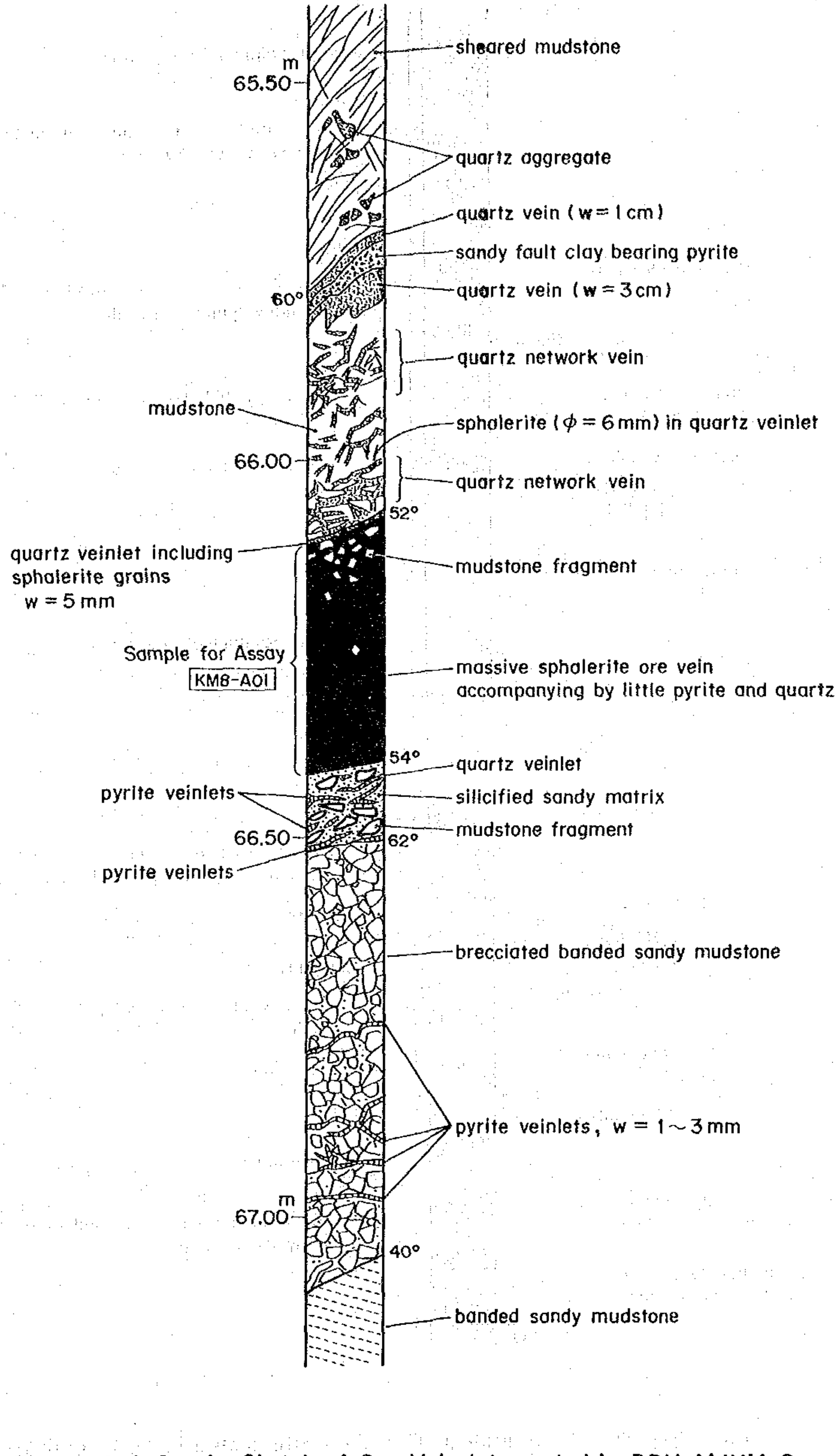


Figure 2-4-8 A Sketch of Ore Vein intersected in DDH MJKM-8

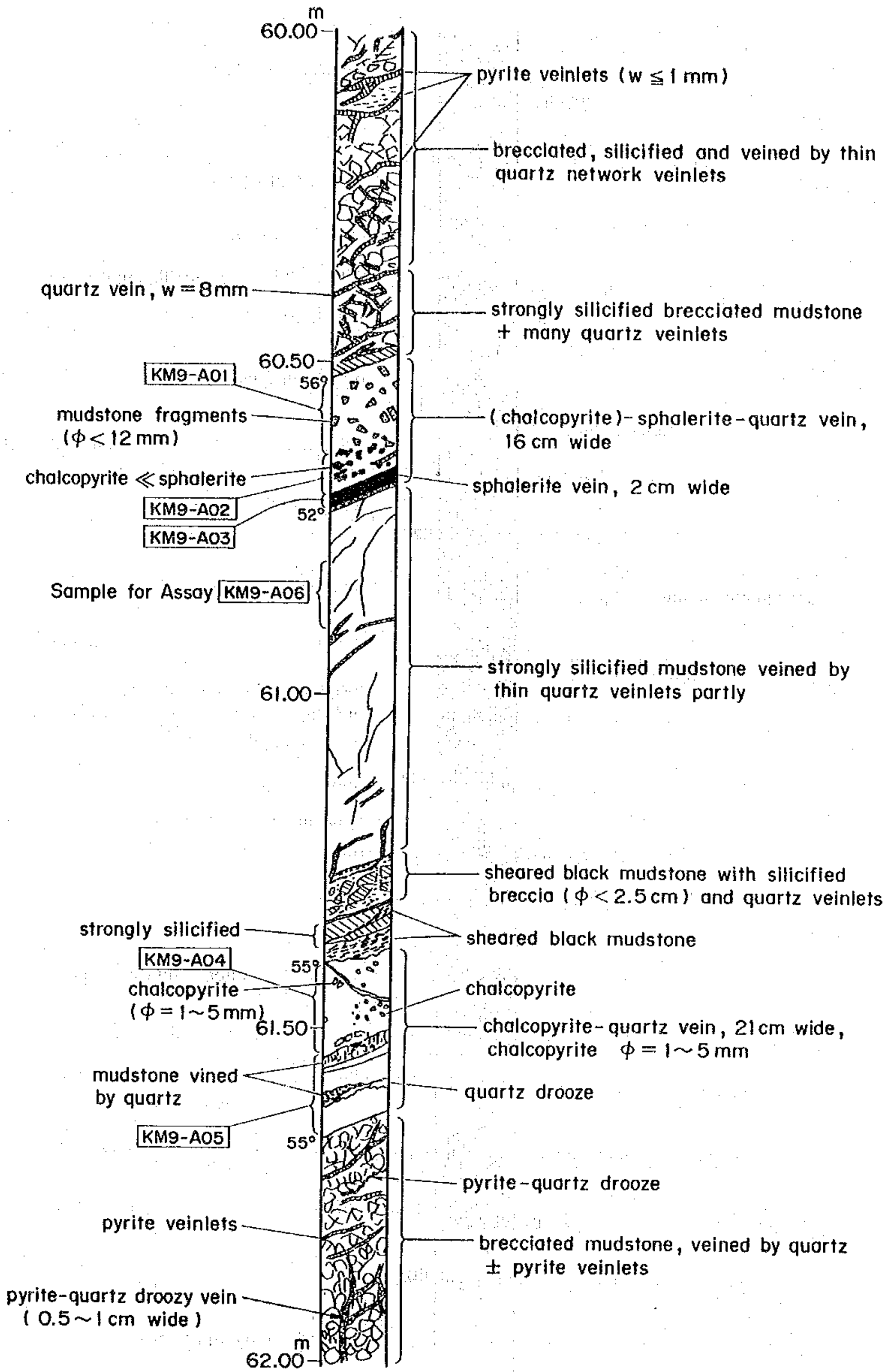


Figure 2-4-9 A Sketch of Ore Vein Intersected in DDH MJKM-9

geological sketch of the ore-vein-intersections.

1. Sphalerite-quartz ore vein

   Ore vein intersection depth : 60.51 m - 60.71 m.

   Ore vein intersection angle : 56° at hanging wall and
52° at footwall,
54° in average.

   Ore vein width : 16 cm approximately.

   Dip of ore vein : Estimated to be of about 60° south-eastward.

   Occurrence : Sphalerite is generally concentrated on footwall side of quartz vein. The part, 2 cm wide from footwall, consists of massive sphalerite, meanwhile, the following part, 4 cm wide toward hanging wall from the above, consists of sparsely sphalerite-disseminated quartz vein. Remaining part of ore vein is comprised of quartz with mudstone breccias. Sphalerite is minorly associated with chalcopyrite.

   Wall rock : Hanging wall of ore vein, about 0.5 m wide, is intensely brecciated, where quartz fine veins, less than 8 mm wide, and pyrite fine veins, less than 1 mm wide, are observed. Footwall geology is of intensely silicified rock to be turned to the wall rock of the ore vein 2, the above.

2. Chalcopyrite-quartz ore vein

   Ore vein intersection depth : 61.39 m - 61.65 m.

   Ore vein intersection angle : 55° at hanging wall and
55° at footwall,
55° in average.

   Ore vein width : 21 cm approximately.

   Dip of ore vein : Estimated to be of about 60° south-eastward.

   Occurrence : Chalcopyrite, 1 mm to 5 mm long, is disseminatedly observed, about 8 cm wide, at hanging wall side of quartz veins.

   Wall rock : Hanging wall of ore vein, about 1.5 m wide, is intensely brecciated, where quartz fine veins, less than 1 cm wide, and pyrite fine veins, less than 2 mm wide, are observed.

An occurrence of networks of quartz fine veins, 1 mm to 10 mm wide, minorly associated with some ten grains of chalcopyrite, less than 1 mm long, is observed at the depth of 72.06 m - 72.20 m.

(iv) Results of chemical assay of ore

Chemical assay results of the ore specimens, intersected by the Hole, are shown in Table 2-4-3. High values of zinc are remarkably shown, meanwhile, low values of copper are also shown. Low contents of gold, silver and lead are barely shown. The intersected ore vein by Hole MJKM-8, as high as 59.1 percent zinc, shows that the vein is most entirely composed of sphalerite itself.

Table 2-4-3 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	4.41	<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	60.80-60.90	0.003	0.001	0.300	<0.017	<2	0.01

(iii) Interpretation

Mineral occurrences of base metals-quartz ore veining have been targeted on by the current programme in Mkangombe Area. The results of chemical assay of ores show an insignificant showing of the association of precious metal with the quartz veining mineralization. Geological informations of the occurrences and modes of mineralization in the Area have limitedly been available. It is to be noted that 1. an elucidation of the mineral occurrence in Mkangombe North Ore Showing and 2. an new discovery of quartz veining mineralized zones nearby the Showing have been accomplished by the current Project Works.

It has been shown by the results of diamond drill exploration works by the current third-yead programme in Mkangombe Area that the mineral occurrences in deep underground have been revealed with more encouragements of 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 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 veins in the zone.

The current programme works in Mkangombe Area are to be recognized to have initially provided a springboard of the exploration activity of base metal mineral in the Area. Implementations of consecutive further works, to follow-up the exploration work results of significance by the current works, are likely evaluated to be deserved to warrant.

Two drill holes have been operated in Mkangombe North Ore Showing by the current programme to establish a limited coverage of scouting exploration activity for the entire extension of the Showing. Implementations of further diamond drill operations with reasonable scale and quantity to cover an entire extension of ore mineralization are to be required.

Implementations of consecutive detailed geological reconnaissance works in quartz veining mineralized zone are to be required to fulfill the coverage by those mapping in the areas, where detailed works have never been carried out. Those works are to be expected to could specify additional targets of trench pit prospects or diamond operations to conduct to a new reveal of additional ore mineralization occurrence.

Previous mineral exploration activities nearby the Project Area are considered to have been prone to be emphasizedly implemented targeted on lead-barite ore mineralization in coastal areas. In one view, the exploration results by the current works in Mkangombe Area are likely evaluated to could provide a fostering encouragement for the future exploration activities of base metal ore mineralization in inland areas.

2-5 Mrima-Jombo Area, Semi-Detailed and Detailed Works

2-5-1 Outline of works

Semi-detailed works of geological reconnaissance and geochemical exploration were carried out in the second-year programme, 1991, meanwhile, Detailed works of geochemical exploration were consecutively implemented in the third-year programme, 1992.

Semi-detailed works consist of geological reconnaissance works of an 88.9 km extension, soil geochemistry by 262 specimens in an area of 100 sq. km.

Detailed works consist of geological reconnaissance works of a 60 km extension, soil geochemistry by 600 specimens in an area of 6 sq. km. Detailed works, operated in Kiruku Hill and Nguluku Hill districts, were targeted for the research of niobium-rare earths elements mineralizations, since geochemical anomalous zones of those have been specified in agglomerate bodies in Kiruku Hill by the second-year works. An extension of the mineralization was examined in Kiruku Hill area, while, a mineral potential was examined in Nguluku Hill area. Soil specimens of geochemistry were collected on grid manner at 100 metres spacings.

2-5-2 Results of geological research

(1) General geology

Geological map and geological cross-sections in Mrima-Jombo Area are shown in Figure 2-5-1.

General geology in the Area chiefly consists of the sediments of Triassic to Jurassic ages, igneous rocks of Cretaceous age and the unconsolidated sediments of Tertiary to Quaternary ages. Triassic to Jurassic sediments are chiefly comprised of sandstone beds. Igneous rocks are widely observed in the form of intrusives of alkaline rocks of varied type. Unconsolidated sediments are observed to be of Tertiary sediments and of colluvial, residual and alluvial sediments of Quaternary age.

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

The Upper Member of Maji-ya-Chumvi Formation (MyCu) is widely observed from south-western to north-eastern parts in the Area and is chiefly composed of sandstone beds, correlated to be of Lower Triassic age and intercalated by shale beds. Sandstone beds show gray to dark gray and fine-grained with local development of thin-bedded flaggy texture.

(ii) Mariakani Formation (Mkl)

Distributions of the Lower Member of Mariakani Formation (Mkl) are

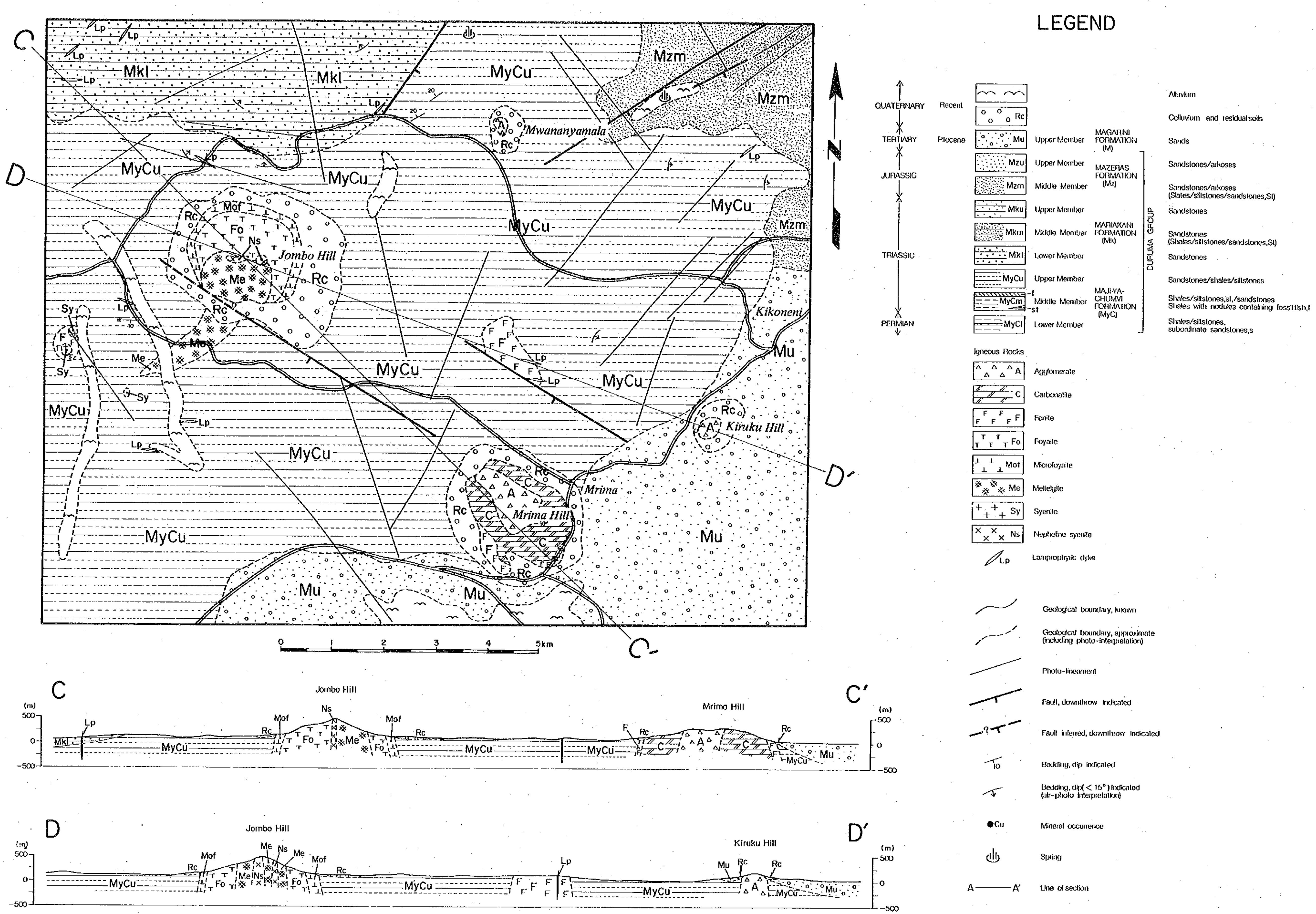


Figure 2–5–1 Geological Map of the Mrima-Jombo Area

observed in north-western margin of the Area. The Member is chiefly composed of sandstone beds, brownish gray by weathering, very-fine-grained to fine-grained, compact and massive with locally developed weak lamina textures.

(iii) Mazeras Formation (Mzm)

The Middle Member of Mazeras Formation (Mzm) of middle Jurassic age is extended to cover north-eastern corner of the Area, being composed of arkose massive sandstone beds with a development of cross-limina textures.

(iv) Magarini Formation (Mu)

The Upper Member of Magarini Formation (Mu) of Pliocene-Neogene age is extended to cover south-eastern part of the Area to overlie Maji-ya-Chumvi and Mazeras Formations, being chiefly composed of unconsolidated sand beds, poor-sorted and creamy white.

(v) Igneous rocks

Varied occurrences of alkaline igneous rock bodies, which are in the form of intrusives into the sediments of Mesozoic age, are observed in the Area, such as alkaline rock complex, intruded by carbonatite and vent agglomerate in Mrima Hill, alkaline rock complex in Jombo Hill, agglomerate, estimated to have been formed close to the former craters, in Kiruku Hill and Nguluku Hill, fenites in Kikonde, and syenites forming small hills or hilly region 1.5 km north-westward from Henzamwenye. Outlines of respective rocks and intrusives are stated below:

a) <u>Mrima Hill Body</u>

Mrima Hill Body is geologically composed of carbonatite, agglomerate, fenitized sediments and talus sediment of the above rocks and weathered carbonatite soil.

- Carbonatite (C)

Carbonatite, which forms Mrima Hill itself, is mostly composed of calcite, that occupies more than 90 percent of the whole mineral components, and is sparsely associated with plagioclase and opaque minerals. Agglomerate spatially occupies a central part of the body nearby the crest of the Hill and is extended on northwestern slope of the Hill. Sövite, biotite-carbonatite and dolomitic carbonatite are observed in surroundings of agglomerate body.

- Fenitized sediments (F)

  Fenitized sandstone and siltstone, formed by a carbonatite intrusion in marginal vicinity of Mrima Hill Body is observed in south-western and south-eastern parts of the body.

- Talus sediment (Rc)

  Talus sediment and siltstone, formed by the weathered products of hill-forming carbonatite and agglomerate, is observed in marginal part of the Mrima Hill Body.

- Soils by weathering of carbonatite

  There are two types of soils; one is pisolitic, reddish brown and limonitic, the other is kaolinitic and grayish white. Pyrochlore, barite and manganese montmorillonite are associated with the former. The latter is characterized by carrying hematite. The soils are observed in small basins formed at the crest of Mrima Hill, i.e., in depressions related to the karst topography formed at the top of the carbonatite body. Niobium ore bodies are considered to have been formed in weathered soils by concentration and secondary enrichment of pyrochlore.

  Secondary minerals formed by rock weathering are shown below:

  > limonite, manganese oxide minerals (cryptomelane, pyrolusite and etc.), kaolinite, montmorillonite, gorceixite, florencite, etc.

b) Jombo Hill Body

Jombo Hill Body is of alkaline rock complex, with which micro-foyaite having a ring-wise marginal facies in outer-most part and foyaite-melteigite having a hybrid facies inside of the above are associated. Nepheline syenite is also observed in central part of the body.

- Micro-foyaite

  Fine-grained, relatively homogeneous in general. Euhedral orthoclase and nepheline are frequent. Forms an outer-most marginal facies of the Jombo Hill body and small hills in general.

- Foyaite

Shows a horse-shoe-like distribution circumscribing northern and northeastern to eastern slope of the hill body. Shows a frequent rock facies variation, medium- to coarse-grained associated with reddish-brown nepheline and orthoclase, 5 to 20 mm long, and/or microperthite.

- Melteigite

Occupies an area of southern part of Jombo Hill. Medium- to coarse-grained, dark gray to black, associated with euhedral hornblende, nepheline and pyroxene, 0.5 to 5 mm long. Shows a frequent rock facies variation, as same as foyaite.

Xenoliths of sandstone fragments of Maji-ya-Chumbi Formation are associated with that in southern slope of the Hill to form small occurrences of hybrid rock by hybridism. Lamprophyric rock bodies with relatively low contents of nepheline are extended in southern part from the hill body.

- Nepheline syenite

Observed in two locations at the crest of the body. Considered to be an intrusion at the later stage of the igneous activity. Discriminated by having a peculiar rock colour due to pale brown nepheline and greenish gray feldspar. Hard, homogeneous and medium- to coarse-grained, majorly composed of euhedral nepheline, 2 to 5 millimetres long, alkali feldspar (clinoperthite) and pyroxene (monoclinic pyroxene). Quantitataive ratio of these minerals shows 50 to 55 percent, 35 to 40 percent and 3 to 7 percent, respectively.

c) <u>Associated intrusive rock bodies</u>

Kiruku Body in eastern part of the area and Nguluku Body in northern central are considered to be of vents by igneous activities of alkaline rock and are composed of so-called "agglomerate". The bodies are elliptical on plane projection, meanwhile, Kiruku Hill Body shows 750 m NE long by 400 m NW long and Nguluku Hill Body shows 230 m NS long by 150 m EW long, approximately.

Agglomerate in Kiruku Hill is subjected to such alterations, as silicification, argillization and etc., while, rock facies of that is partly not clear by weathering and resultant staining by iron-manganese minerals. Breccias, mostly lapillis in size, mostly consist of sandstone and fine-grained hypabyssal to plutonic rock. Carbonitization is observed under a microscope, while, feldspathoid, dolomite, siderite, apatite, barite and etc. are observed as clastic minerals.

Agglomerate in Nguluku Hill is pinkish brown and compact, associated with abundant breccias, smaller than lapilli in size, of shale and sandstone. The agglomerate is mostly fresh by unaided eye and unlikely be altered or weathered, however, is subjected to carbonitization of varied degrees under a microscope. Quartz, feldspathoid, calcite, dolomite, ankerite, barite, apatite, pyrite and etc., are observed as clastic minerals.

Several syenite intrusive bodies, being partly accompanied by fenitized sandstone, occur in a area of 3.5 km to 4 km southwest of Jombo Hill. The syenite is gray, compact and medium-grained, and is microscopically composed of plagioclase, 2 to 6 millimetres long, alkali feldspar, 2 to 5 millimetres long and hornblende, having a quantitataive ratio of 40 to 60 percent, 35 to 50 percent and 2 to 8 percent, respectively.

A hilly land, extended northwesterly-southeasterly and located 2.5 km north of Mrima Hill, is composed of fenitized sandstone with abundant small dykes of syenite (Caswell, P.V., 1953).

Numerous alkaline intrusive bodies, observed in the area, are enumerated to be of lamprophyric dykes, such as sannite, camptonite, monchiquite and etc..

(2) Geological structure

The general geological structure of Mesozoic sediments in the Area is interpreted to show ESE-WNW to ENE-WSW trending with gentle dipping toward north in north-western part of the Area, while, NNE to SSW trending with gentle dipping toward east in eastern part. Magarini Formation is estimated to be of generally flat sedimetns.

Two types of fault, ESE to WNW and ENE to WSW directional, which show an accordant representation with lineaments on air photographs, are developed in the Area. Lamprophyric dykes show such trends, as N60° W, N75° W, N40° E and etc., which are also directionally accordant mostly with faults and lineaments shown on air photographs.

2-5-3 Results of geochemical exploration works-Semi-detailed Works

(1) Specimens and indicator elements

262 soil specimens were collected at 300 metres to 400 metres spacings concurrently with the progresses of geological mapping. 21 elements, such as gold, barium, strontium, niobium, yttrium, uranium, thorium, lanthanum, cerium, neodymium, samarium, europium, terbium, ytterbium, lutetium, copper, lead, zinc, iron, manganese and phosphorus were assayed for a major objective of the exploration of carbonatite bodies with niobium, rare earths elements, and precious and base metal elements.

(2) Interpretations of geochemical anomalies

The localities of geochemical anomalies in the Area are shown in Figure 2-5-2.

The general geochemical characteristics of anomalous showings of the respective indicators and pathfinders examined by the current works are stated below:

Areal representations of the anomalous values of the elements, chemically analysed by the current works in the Area, provide a particularly characteristic features that most of anomalous values of the elements, other than copper, are collectively observed in the vicinity of Mrima Hill and/or in Kiruku Hill. The distribution of those anomalous values of the elements, other than copper, are estimated to have been eventually influenced under an unique geological situation in Mrima and Kiruku Hills, i.e., primary accumulation of the elements in carbonatite and agglomerate bodies or secondary concentration of those in weathered overburden soils. The occurrences of iron and manganese oxide concretions, in which an accumulation of precious and base metallic elements have been reported, are abundantly observed. The accumulation of the elements in accordance with the progress of the formation of those concretions could play a role to enhance an opportunity to reveal geochemical anomalies.

Copper-anomalous zones, separately observed from those of other elements, are observed in southern part of Jombo Hill. Geochemical relations of those to geology and mineralization are still obscure, however, possibly be inferred to have been accumulated in accordance with forming progresses of ferruginous concretions.

(3) Interpretation

Geochemical anomalies of most of the elements, other than copper, by the Semi-detailed works, are collectively observed in the vicinity of Mrima Hill and Kiruku Hill to be causedly shown in connection with the occurrences of carbonatite and agglomerate bodies. Mineralized zones of nioibum and rare earths elements in association with carbonatite bodies in Mrima Hill have ever been noticeable, while the mineralization of similar type to the above is also observed in silicified agglomerate body in Kiruku Hill.

Geochemical anomalies of gold, lead and zinc, which are collectively observed in the vicinity of Mrima Hill and Kiruku Hill, are estimated to have been causedly formed by a primary accumulation of the elements in carbonatite and agglomerate bodies and a secondary concentration in ferro-manganiferous concretions in weathered soils. Copper anomalies in the Area, which are estimated to have been shown in possible connection with a forming of ferruginous concretions, are separately represented from those of the other base metallic elements.

2-5-4 Results of geochemical exploration works-Detailed Works

(1) Specimens and indicator elements

Detailed geochemical works were carried out in Kiriku Hill and Nguluku Hill areas.

600 soil specimens were collected on a grid of 100 metres spacing, mean-while, 400 specimens were in Kiruku Hill area and 200 in Nguluku Hill area.

Such 18 elements, as gold, barium, strontium, niobium, yttrium, uranium, thorium, lanthanum, cerium, neodymium, samarium, europium, terbium, ytterbium, lutetium, iron, manganese and phosphorus were assayed for indicator elements to clarify an extent of niobium/rare earths elements mineralization occurrence in the areas.

Geological map in Kiruku Hill and Nguluku Hill areas is shown in Figure 2-5-3.

(2) Examination of geochemical anomaly

Geochemical anomalous values of niobium and rare earths elements (REE) are solely shown in Kiruku Hill area. Representations of the geochemical anomalous zones in Kiruku Hill are shown in Figure 2-5-4.

Geochemical anomalous zones in Kiruku Hill area are shown in such two locations, as referred to in this report as in (Kiruku) Hill Crest anomaly and in Northeastern Ridge (from Kiruku Hill crest) anomaly. The respective anomalies are represented by following indicator elements.

<u>Indicator elements shown in Hill Crest anomaly:</u>

Gold, niobium, yttrium, throium, terbium, ytterbium, lutetium, europium

<u>Indicator elements shown in Northeastern Ridge anomaly:</u>

Barium, strontium, uranium, lanthanum, cerium, neodymium, manganese,

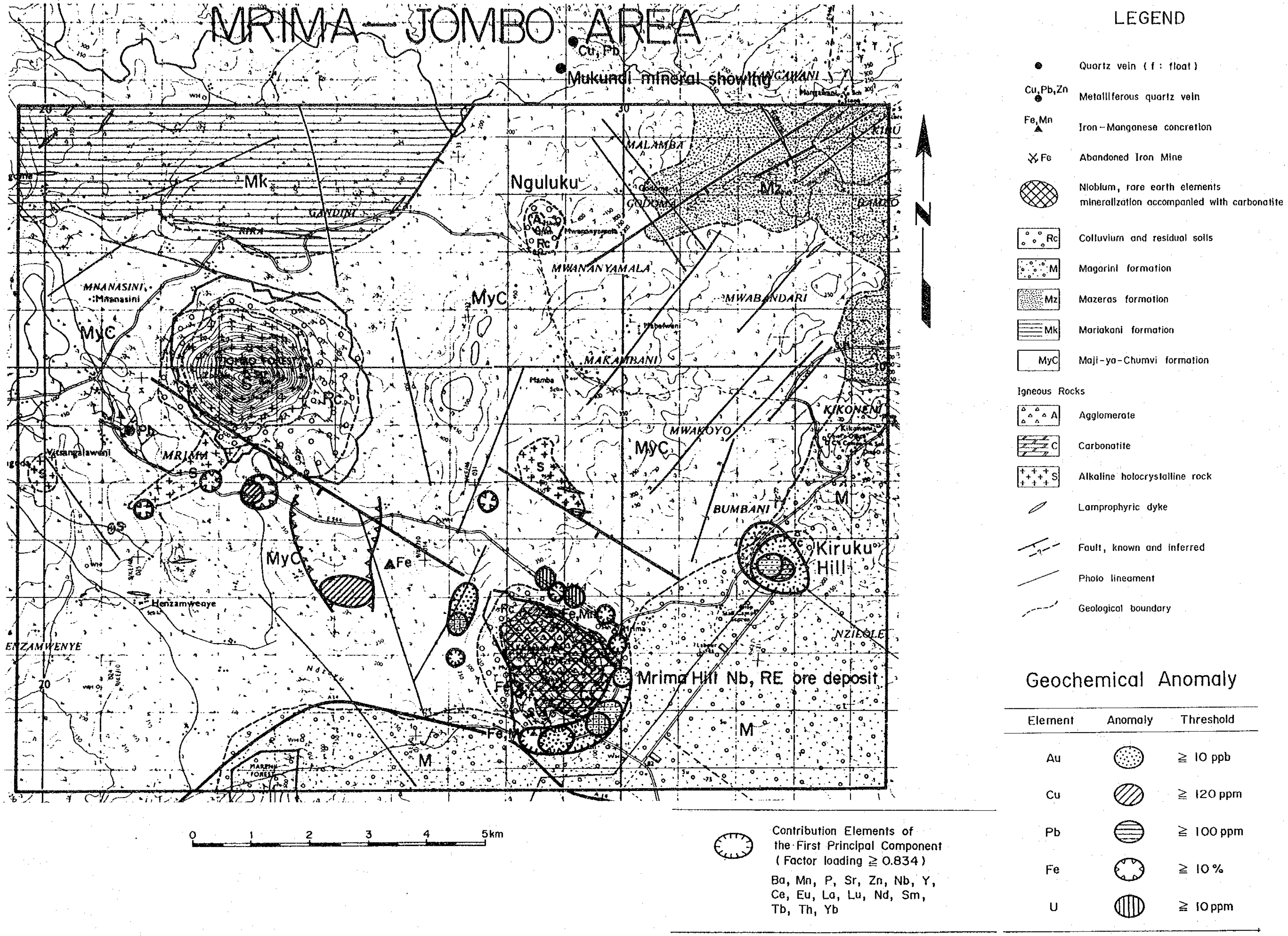


Figure 2–5–2 Geochemical Interpretation Map of the Mrima-Jombo Area

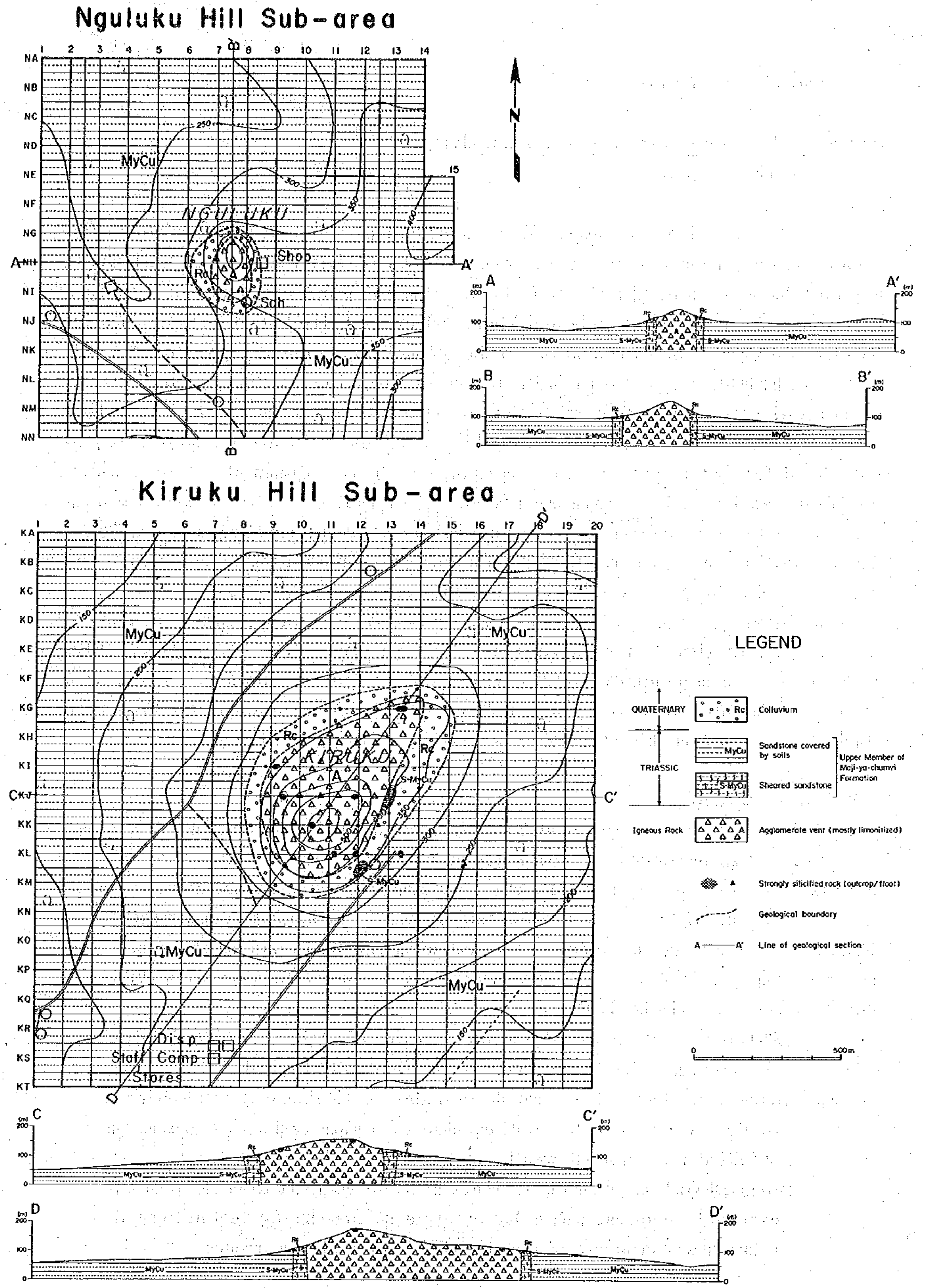


Figure 2–5–3 Geological Map of the Kiruku Hill and Nguluku Hill Sub-Area

phosphorus, (iron)

Indicator elements shown in either anomaly:
Samarium, (iron)

Hill Crest and Northeastern Ridge geochemical anomalies are shown in the areas, which are occupied by the occurrences of silicified rock. Hill Crest anomaly is well-coincidingly shown with the gological extension of silicified rock zone, 150 m to 250 m wide and about 800 m long, NW-SE directional nearby Kiruku Hill crest. The extension of Northeastern Ridge anomaly, possibly NW-SE to WNW-ESE directional with still uncertain directional extent, is inferred to be coincidently distributed with that of silicified rock in northeast of Hill crest. Mineralizations of niobium and REE in Kiruku Hill are likely inferred to have been formed in progressive accordance with hydrothermal activity, which could be estimated to have activated silicification. This estimation is considered to be supported by the chemical assay results of rocks in the area. Thus, the direct genetical relation of niobium-REE mineralization to agglomerate occurrence in the area is inferred to be limited.

The general extensions of Hill Crest and Northeastern Ridge geochemical anomalies and silicified rock zone nearby Hill crest, NW-SE to WNW-ESE directional, are coincidently shown with those of fault occurrences in the area to likely offer an assumption that niobium-REE mineralization could have been formed under a possible structural control by faulting activities.

(3) Interpretation

Niobium and rare earths elements (REE) mineralizations in Kiruku Hill area are estimated to be associated with silicified rock, however, the extension and ore grade of those in the area are likely estimated to be smaller and lower than those in Mrima Hill, which are associated with carbonatite occurrence. Followings are estimated geological and technological disadvantages in general concerning to the niobium-REE mineralizations occurrence, associated with silicified rock, in Kiruku Hill area.

1. Extension of mineralizations, controlled by silicified rock occurrence, is likely estimated to be eventually limited.
2. General development of possible secondary enrichment by weathering is likely estimated to be confined due to highly resistive features of silicified rock against weathering.
3. Silicified rock is generally fine-grained and compact to could pose an eventual technical difficulty of mineral processing technology in relation to characters of niobium-REE minerals occurrence.

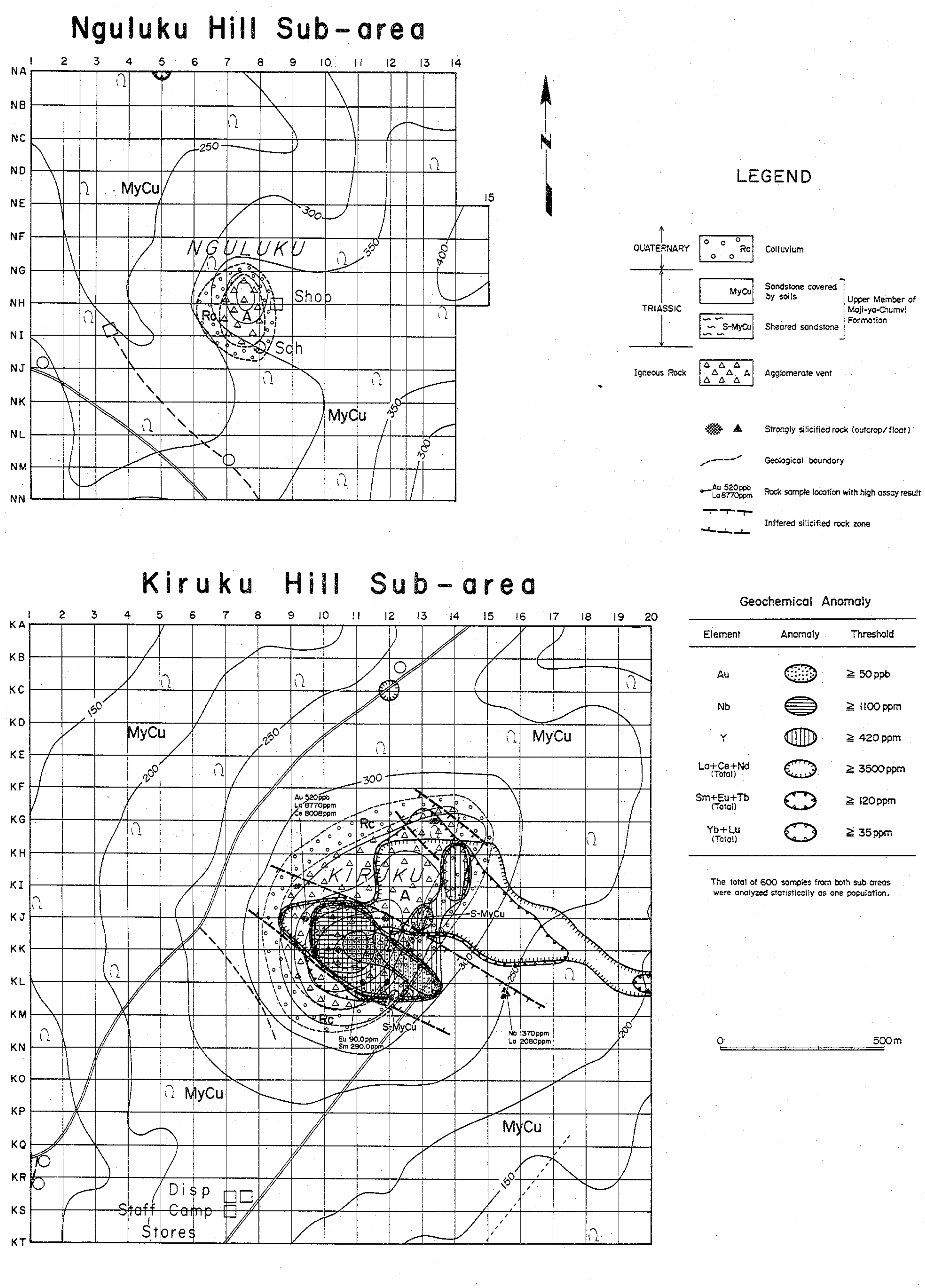


Figure 2-5-4 Geochemical Interpretation Map of the Kiruku Hill and Nguluku Hill Sub-area

By the results of the current works, niobium and REE mineralizations of economical significance in Kiruku Hill area are unlikely evaluated to be encouragingly potential. However, an occurrence of considerable accumulation of precious and base metals in the area, associated with niobium and REE, is likely estimated to have causedly been formed by hydrothermal activity. Those are likely evaluated to offer an potential possibility, which has not been in a provisional ground of a concept in the course of the second-year works, of an occurrence of hydrothermal mineralization of precious and base metals in the area to be further carefully studied.

2-5-5 Ore mineralization

(1) Outline of mineral showing and mineralized zone

The localities of mineral occurrences in Mrima-Jombo Area are shown in Figure 2-5-1.

Mineral occurrence and ore showing, ever known in the Are, are stated below:

(i) Carbonatite ore body in Mrima Hill

Carbonatite ore body in Mrima Hill has been noted as the resources of significance of iron and manganese, and/or gold, silver, lead, further of niobium, rare earths elements (REE) and thorium in recent years. Carbonatite ore bodies in Mrima Hill are of residual deposits type and are estimated to have been formed by the geological enrichment after weathering of primary pyrochlore, monazite, secondarily formed gorceixite and etc.. Geological generals of ore bodies, elucidated by the previous research works, are summarized below:

- Occurrence of ore bodies

  Ore bodies in Mrima Hill occur to cover superficial depressions of carbonatite body, formed by weathering, as the filling materials of karstic lay. General thickness of the bodies varies in the range of several feet to several hundreds feet. Ore bodies, themselves, are kaolinitic and/or limonitic-manganiferous.

- Ore minerals

  Niobium : pyrochlore
  REE : gorceixite, pyrochlore, monazite, florencite
  Thorium : pyrochlore, gorceixite, apatite

- Ore reserves and ore grade by existing reports

  Refer to Table 2-5-1.

Table 2-5-1 Ore Reserves of Carbonatite Ore Body, Mrima Hill

		by Mines and Geological Department	by Anglo-American Corporation of South Africa Ltd.		by Mines and Geological Department	
Ore Reserves	Year calculated	1955	1957		1960	
	Depth	Top 20 ft. of soil	30 ft. below surface	30 to 100 ft. below surface	30 ft. below surface	same as left (high grade ore)
	Reserves	30 million tons	55 million tons	50 million tons	41.8 million tons	4.93 million tons
	Grade	0.72% Nb_2O_5	0.67% Nb_2O_5	0.70% Nb_2O_5	0.67% Nb_2O_5	1.15% Nb_2O_5

(ii) Ore showing of niobium and rare earths elements in Kiruku Hill

The ore showing of niobium and rare earths elements in Kiruku Hill has been eluciated by soil geochemistry of the Semi-detailed works of the second-year programme, and the extension of the mineral occurrences and genetic relations of those to geology and geological structure have been studied by the third-year works.

Niobium and rare earths elements (REE) mineralizations in Kiruku Hill are estimated to be associated with silicified rock occurrences.

Two silicified rock zones are knwon in Kiruku Hill area. The larger occurrence of silicified rock, to be referred to in this report as Hill Crest Silicified Rock Zone, is extended to occupy the Kiruku Hill crest, meanwhile, the smaller occurrence of that to be referred to in this report as Northeastern Ridge Silicified Rock Zone, is extended to occupy a ridge, about 500 m apart northeasterly from the Hill crest.

Hill Crest Silicified Rock Zone, 150 m to 250 m wide, about 800 m long and NW-SE directional, is extended to traverse the occurrence of agglomerate and sandstone beds. The general directional extension of Northeastern Ridge Silicified Rock Zone is limitedly known by showing in a single occurrence, about 40 m long, in a site along the traverse line KG of the current work. Both of the silicified rock zones are compact and hard, associated with limonite, hematite, black manganese oxide mineral and etc., and are intensely altered to carry little showing of original texture. A rock specimen shows to carry barite of less than 20 % volume of the whole under a microscope. Occurrence of sulphide mineral is not discernible due to progressive oxydation.

Table 2-5-2 shows chemical assay results of rock specimens. Gold, barium, iron, manganese, niobium, yttrium and REE are likely estimated to have been accumulated in silicified rock and limonitic concretion. Such an accumulation of the elements as above is not shown in agglomerate body in Nguluku Hill, where silicification is likely absent.

(iii) Ore showing of iron and manganese

Concretions of iron-manganese oxide minerals, several millimetres to some ten centimetres diameter, are observed in lateritic soils on the hill slopes of Mrima Hill. Geological and economical investigations and research works on the above concretions have ever been implemented since the discovery in 1919 by various private sectors or public organizations. The major mineral compositions of the concretions have been reported to be of pyrolusite, psilomelane, hematite, limonite, barite and etc., while, a concentration of gold, silver, copper, lead, zinc and etc. has also been reported. Chemical assay values of major metals by Caswell, 1953 are shown below:

MnO_2	:	30.51 - 60.80	%	by 4 specimens
MnO	:	4.38 - 6.60	%	by 3 specimens
Fe_2O_3	:	8.20 - 45.20	%	by 4 specimens
Cu	:	0.02	%	by 1 specimen
Pb	:	0.04	%	by 1 specimen
Zn	:	0.21	%	by 1 specimen
Au	:	0.8	g/T	by average of 3 specimens
Ag	:	5.6	g/T	by average of 4 specimens

g/T : gramme per ton
% : percent

Field reconnaisance of the concretions occurrence and chemical assay of two speciments were carried out by the current works. The chemical assaya values are shown in Table 2-5-3.

Table 2-5-2 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 2-5-3 Results of Chemical Analysis of Iron-manganese Concretions

Sample No.	Gold g/T	Silver g/T	Iron %	Manganese %	Copper %	Lead %	Zinc %
F009	< 0.07	76	30.0	> 3.00	0.006	0.014	1.015
H010	< 0.07	< 2	35.9	0.098	0.005	0.004	0.007

g/T : gramme per ton
% : percent

A concentration of iron and manganese, and of silver and zinc is observed in the above results. The concentration of iron and manganese is estimated to have been formed by the weathering of carbonatite body. Sedimentary rocks and/or subsurface lead-zinc-barite ore mineralization occurrence are likely presumed to be one of the responsible materials of consideration that estimates a derivative source of precious and base metals.

(iv) Other ore showing

Two types of ore showing, shown below, have ever been reported, however, those have not yet been specified by the current works.

Gold : An extraordinary instance of occurrence of electrums in nepheline syenite in Jombo Hill was reported in 1893, however, was estimated to be less promising economically for future considerations by Caswell, 1953.

Lead : An occurrence of sparse galena-disseminated mineralization in Maji-ya-Chumvi Formation in western Mrima was reported by Caswell 1953, however, was estimated to be of less economical.

(2) Interpretation

The major mineral showings in the Area are specified to be of the following three types of occurrences.

1) Niobium and rare earths elements mineralization associated with carbonatite and/or silicified rock
2) Mineral showings of precious and base metallic elements

3) Mineral showings of iron and manganese

The current works have been implemented for the objectives to establish a geological elucidation of mineral occurrence of type 1), the above, and to scout up a showing of mineralization of type 2), the above.

By the results of the current soil-geochemical exploration works, it has been shown that geochemical anomalous zones of niobium and rare earths elements (REE) have distintively revealed in the vicinity of ever-known carbonatite plug occurrence in Mrima Hill. Small geochemical anomalous zones of those have also been shown nearby silicified agglomerate body in Kiruku Hill. Geochemical anomalous zones of those have not yet been shown in agglomerate body in Nguluku Hill in central-northern part of the project area.

Niobium and REE mineralization in Kiruku Hill, associated with the occurrence of silicified rock is likely evaluated to be disadvantageous in accordance with the following characters.

1. Extension of mineralizations, controlled by silicified rock occurrence, is likely estimated to be eventually limited.
2. General development of possible secondary enrichment by weathering is likely estimated to be confined due to highly resistive features of silicified rock against weathering.
3. Silicified rock is generally fine-grained and compact to could pose an eventual technical difficulty of mineral processing technology in relation to characters of niobium-REE minerals occurrence.

Niobium and REE mineralizations in Kiruku Hill area are likely estimated to have been formed by a different process of genesis from that in Mrima Hill, where the mineralizations are estimated to causedly been formed by weathering of carbonatite plug. The extent and ore grade of those mineralizations in Kiruku Hill are likely evaluated to be smaller and lower than those in ever-known Mrima Hill, therefore, further exploration works in Kiruku Hill are unlikely evaluated to be deserved to warrant. Niobium and REE mineralizations in Kiruku Hill area are possibly estimated to have been uniquely formed in connection with silicifiation. Implementations of academic research works on an eludiation of mode of occurrence of niobium-REE minerals and secondary enrichment are considered to be interestedly required in future.

The occurrence of electrum and galena in connection with precious and base metallic mineralization has ever been reported by Caswell, 1953, however, the prospect has been evaluated to be of less promising. An accumulative occurrence of precious and base metals in Kiruku Hill area, in association with niobium and

REE, revealedly shown by the current soil-geochemistry, is considered to could pose a geological potential of an occurrence of hydrothermal mineralization of those metals. Regional research works of the extensions and relations to geology and geological structure of hydrothermal activity in the area are considered to be one of research themes, which could lead to a possibility to specify hydrothermal ore mineral occurrence of varied type.

PART Ⅲ CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 1. OUTLINED SURVEY AREA

1-1 Conclusions

In the entire Mombasa Project Area, that covers an area of 9,000 sq.km, the major ore mineralizations are to be of 1. lead-zinc-barite ore veins mineralizations, represented by the Kinagoni mine, 2. copper-lead-zinc-quartz ore veins mineralizations, represented by Mkangombe North Ore Showing and 3. niobium/rare earths elements mineralizations, represented by Mrima Hill.

The type 1, the above, is of low-temperature-formed hydrothermal ore veins mineralization, which is widely observed from north toward south in the Area in such ore showings, as Vitengeni, Kinagoni, Changombe, Mwachi River, Lunga Lunga and etc.. Lead-barite ore bodies in Kinagoni and Vitengeni are currently in mining operations.

The type 2, the above, is of NNE-SSW-extended base metals-quartz ore veins mineralizations, which are estimated to have been formed under a structural control by the faults with nearly identical strike value. Three mineralization occurrences, such as Mkangombe North, Mkangombe South and Mkundi, have ever been known. The mineralized zone with quartz veinings, more than 10 km long, in which Mkangombe North Ore Showing occurs, is likely evaluated to be deserved to warrant further mineral exploration works, by which a thorough accomplishment by detailed work coverage for an entire extension of the zone should be made.

Mineralizations of the type 3, the above, are observed by the current works not only in carbonatite plugs in Mrima Hill, but also in silicified rock in Kiruku Hill. Mrima Hill mineralization, for which a number of exploration works and feasibility studies have ever been carried out, has not yet been in commercial operation due to the technical difficulties related to mineral processing technology.

Niobium/rare earths element mineralization in Kiruku Hill is reported in the following CHAPTER 2.

1-2 Recommendations

Recommendations in the Outlined Survey Area in this section are confined to those for the area, which have not been selected for Semi-detailed and Detailed Work areas.

Consecutive implementations of geological and geochemical research works are recommended in the geochemical anomalous zones, which have been shown by the current first-year programme in Vitengeni environs, where polymetallic geochemical anomalies have been shown, and in the south of Vitengeni, where geochemical gold anomalies have been shown.

Further future works in the areas, which have not been selected for the current Semi-detailed and Detailed Works, are unlikely evaluated to be deserved to warrant.

CHAPTER 2. SEMI-DETAILED AND DETAILED SURVEY AREAS

2-1 Ganze Area (Semi-detailed survey)

2-1-1 Conclusions

Occurrences of lead-zinc-barite ore veining mineraliztion in Mazeras Formation under a wide development of Karroo-Jurassic Fault have been expected to be promising in the Area. However, an occurrence of barite ore floats was observed in a single spot by the current geological reconnaissance. Geochemical anomalies, which are overlappedly shown by anomalous values of barium and sulphur, are scatteredly shown to be barely related to the behaviour of such heavy metal element, as lead and zinc. Thus, Ganze Area is unlikely evaluated to be potential of the occurrence of ore mineralization of significance.

2-1-2 Recommendations

Implementations of future exploration works in Ganze Area are unlikely evaluated to be deserved to warrant as the exploration results by geological and geochemical research works have shown a limited possibility of potential occurrence of lead-zinc-barite ore veins mineralization.

2-2 Jibana (Semi-detailed and Detailed surveys)

2-2-1 Conclusions

Jibana Area is situated at the north of the Kinagoni mine, which is currently in mining operation. An occurrence of lead-zinc-barite ore veining mineralizations has been estimated to could be potentially extended into Jibana Area. The occurrence of Jibana Mineralized Zone, about 100 m wide and about 2 km long, consists of a discontinuous extension of gossanous materials and weakly altered sandstone, has been revealed in the west of Jibana Village by the current geological reconnaissance work. Chemical assay results on four specimens of the gossanous material have shown a limited contents of precious and base metals. Three diamond drill holes, 450 m deep in total, were operated by the current programme because that the Jibana Mineralized Zone is situated nearby Karroo-Jurassic Fault, which is inferred to be genetically related to the areal mineralization and also geochemical lead anomalies of 84 to 142 ppm, which are inferred to be an influenced showing by the areal mineralization, have been revealed in a part of the zone.

The results of diamond drill operation show that the underground extensions of gossanous materials and geochemical lead anomalies on ground surface, which have been targeted by diamond drill works, are likely 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.

The results of soil - geochemistry have represented lead and zinc anomalies, inferred to have been shown by an accumulation of those, associated with ferruginous concretions in overburden soils of limestone beds of Kambe Formation, copper anomalies, which could be influencedly revealed by the occurrence of shale beds with relatively high content of copper in Mtomkuu Formation, and overlappedly shown barium - sulphur anomalies, north - southerly extended, in sandstone beds of Middle Member of Mazeras Formation. The former two anomalies are inferred to unlikely be influencedly shown directly by the mineralization occurrence, meanwhile, a relation between geochemical anomaly showing and mineralization occurrence is still obscure.

2-2-2 Recommendations

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

Occurrences of pyrite - disseminated 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 have a relation to ore mineralization, then, the Area is evaluated to could still pose a considerable geological potential of mineral occurrences. Implementations of steady further examinations 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.

2-3 Ribe Area (Semi - detailed and Detailed Surveys)

2-3-1 Conclusions

Ribe Area is situated at directly southwestern proximity of the Kinagoni lead mine, currently in mining operation, and includes Changombe Ore Showing, ever known, and Ribe Mineralized Zone, newly discovered by the current work. Ribe Area is likely evaluated to be reasonably potential of the occurrence of ore veining mineralization on the bases of following geological features.

i) NE-SW directional faults, which are estimated to have geological relations of significance to the forming of lead-zinc-barite ore veining mineralization, are well-developed in the Area.

ii) NW-SE directional faults, which intersect to NE-SW directional faults, are also well-developed. Those frequent fault intersections are widely observed in the Area to likly provide a favourable field of the activities of mobilizations of hydrothermal mineralizing materials.

iii) Common strike/dip values of the sediment bedding in the entire Project Area usually show NE/gentle dip toward SE. However, 64 percent of the strike/dip values in the total show to be deviated from the commonness to provide a geological assumption that a geological disturbance in the Area could be considerably intense.

iv) Regionally, Ribe Area and further toward the Kinagoni mining district is situated at a geologically unique field, where the geological structure of NS trend, dominantly observed in northern Project Area, and that of NE-SW trend, dominantly observed in southern Project Area, show a geological encounter.

Chemical assay results of altered rock specimens in Ribe Mineralized Zone generally show limited values of the accumulation of metallic elements of geological significance.

Soil-geochemistry results show silver anomalies of 0.2 to 3.3 ppm, lead anomalies of 88 to 718 ppm and zinc anomalies of 766 ppm in Changombe North and Changombe South Ore Showings.

One diamond drill hole, 150 m deep, was operated in Chiume Hill Mineralized Zone, meanwhile, three holes, 450 m deep in total, were in Ribe Mineralized Zone.

Chiume Hill Mineralized Zone is likely evaluated by the results of the current drill works that the Zone could not 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 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 sphalerite, galena and etc..

2-3-2 Recommendations

Implementations of consecutive exploration works in Chiume Hill Mineralized Zone and nearby are unlikely evaluated to 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 unlikely evaluated to 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 necessarily exclude unpromising barren silicified zones from the future drill exploration targets.

2-4 Mkangombe Area (Semi-detailed and Detailed Surveys)

2-4-1 Conclusions

Mkangombe North Ore Showing, which is inferred to have been formed under a structural control by faultings, is comprised of copper - lead - zinc - quartz ore veining mineralizations. The Showing shows a strike/dip value of N25° - 30° E/55° - 70° SE, more than 300 m long and 0.2 m to 1.5 m wide. An occurrence of precious metals in the showing is limitedly observed.

Abundant occurrences of outcrops and floats of quartz veining ore, extended N45° E directionally to connect Mkangombe North and Mkangombe South Ore Showings, are widely observed to form a quartz veining ore mineralized zone, more than 10 km long.

Soil - geochemical anomalies in the Area are scatteredly shown to provide an inference of the showing of limited connection with mineralization occurrence. Those are inferred to have been caused partly by a localization of wall rock alteration in the Showings and partly by inevitable allocations of sampling site of soil - geochemistry with considerably long spacing.

Two diamond drill holes, 200 m deep in total, were operated in Mkangombe North Ore Showing.

It has been shown by the results of diamond drill exploration works that the mineral occurrences in deep underground have been revealed with more encouragements of 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 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 veins in the zone.

2-4-2 Recommendations

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 a coverage by those mapping in the areas, where detailed work have limitedly 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 likely considered to be deserved to warrant.

2-5 Mrima-Jombo Area (Semi-detailed and Detailed Surveys)

2-5-1 Conclusions

Three types of mineralization, as shown below, are observed in Mrima-Jombo Area.

i) Niobium and rare earths elements (REE) mineral showing, associated with carbonatite plugs.

ii) Mineral showing of precious and base metals.

iii) Mineral showing of iron and manganese.

The current works have been carried out for the objectives of the eluciation of mineral occurrence extensions of the type 1, the above, and of the scouting up of the mineralization of type 2, the above.

It has been shown by the results of soil-geochemistry that geochemical anomalous zones of significance of niobium and REE were shown nearby the carbonatite plugs in Mrima Hill, where niobium-REE mineralizations have ever been known, meanwhile, those of small scale were also shown in Kiruku Hill.

Geochemical anomalous zones in Kiruku Hill area are shown in two locations, namely, in Kiruku Hill crest and in north-eastern ridge of the 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. Mineralizations of niobium and REE in Kiruku Hill area are possibly inferred to have been formed in association with 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, a direct connection to the above is likely reassumed currently to be poor or unfounded.

The general extent and quality of niobium-REE mineralizations in Kiruku Hill is likely 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 that the former is associated with silicified rocks, while, the latter is with carbonatite bodies.

Geochemical anomalous zones of significance of niobium and REE have never been shown in Nguluku Hill area. The occurrence of electrum and galena are reported by Caswell, 1953, however, those have never been selected for an encouraging target of mineral exploration in the vicinity.

2-5-2 Recommendations

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 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 in 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 lead to a possibility to specify hydrothermal ore mineral occurrences of varied types.

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