environment that have formed Duruma Formation, chiefly composed of terrestrial sediments, could have been terminated. Fault movements, initiated before middle-Jurassic age, are estimated to have been reactivated in late-Cretaceous age in simultaneous connection with alkaline igneous rock activities, and are further inferred that those could have been reactivated again in Pliocene age prior to the sedimentation of Magarini Formation, which provides a genetical showing of an abrupt emergence of back-deeps and an intense erosion.

The Karroo-Jurassic Fault Zones are estimated to have provided the fields of lead-zinc-barite ore veining mineralizations of significance to represent major mineral occurrences of industrial significance in the Project Area.

1-4 Results of Geochemical Exploration Works

Geochemical exploration works in the Project Area by the current programme consist of stream sediments geochemistry and soil geochemistry. Stream sediment specimens were preparatively pan-concentrated in the sites for chemical assay.

1-4-1 Pan-concentrated stream sediments geochemistry

(1) Geochemical specimens and elements for chemical assay

Pan-concentrated stream sediments geochemistry has been implemented for an objective to establish an evaluation of regional mineral potentials in Mombasa Area. 100 pan-concentrated specimens were collected by a conventional placer gold panning technique in the sites nearby confluences of every major stream and tributary to cover the OUTLINED SURVEY WORK AREA of about 9,000 sq. km.

The 14 elements, such as gold, silver, copper, lead, zinc, barium, manganese, iron, sulphur, uranium, thorium, platinum, phosphorus and mercury were chemically assayed.

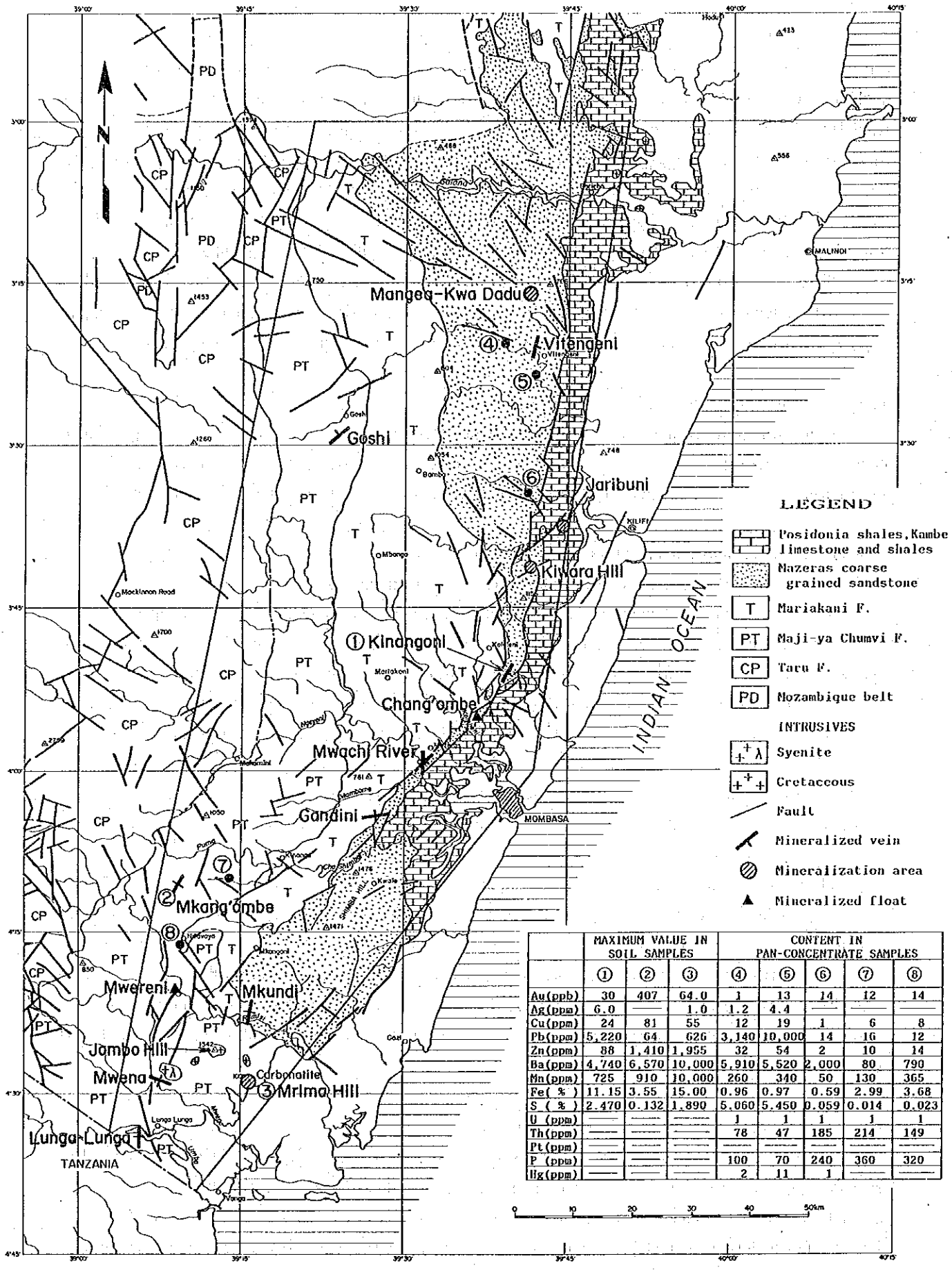
(2) Chemical assay

Specimens were sent to the laboratory of the Chemex Labs Ltd., Vancouver, Canada for chemical assays.

Univariate analysis was applied for the statistical interpretations of the geochemical values. Uranium has been exclued from the analysis because of the obtained respective content values of uranium of less than detection limit value, 10 ppm.

(3) Interpretations of geochemical anomalies

The results of pan-concentrated stream sediments geochemistry show that many of the geochemical anomalies of some elements among the above 14 are significantly obseraved in the proximity of the occurrences of Karroo-Jurassic Fault (see Figure 1-3). Gold, silver, lead, zinc and barium anomalies are



	MAXIMUM VALUE IN SOIL SAMPLES			CONTENT IN PAN-CONCENTRATE SAMPLES				
	①	②	③	④	⑤	⑥	⑦	⑧
Au(ppb)	30	407	64.0	1	13	14	12	14
Ag(ppm)	6.0	——	1.0	1.2	4.4	——	——	——
Cu(ppm)	24	81	55	12	19	1	6	8
Pb(ppm)	5,220	64	626	3,140	10,000	14	16	12
Zn(ppm)	88	1,410	1,955	32	54	2	10	14
Ba(ppm)	4,740	6,570	10,000	5,910	5,520	2,000	80	790
Mn(ppm)	725	910	10,000	260	340	50	130	365
Fe(%)	11.15	3.55	15.00	0.96	0.97	0.59	2.99	3.68
S (%)	2.470	0.132	1.890	5.060	5.450	0.059	0.014	0.023
U (ppm)	——	——	——	1	1	1	1	1
Th(ppm)	——	——	——	78	47	185	214	149
Pt(ppm)	——	——	——	——	——	——	——	——
P (ppm)	——	——	——	100	70	240	360	320
Hg(ppm)	——	——	——	2	11	1	——	——

Figure 1–3 Geological and Geochemical Interpretation Map of the Mombasa Area

particularly shown in the spots close to the ever-known mineralized zones of significance to pose a possible geochemical influence of the lead-zinc-silver-barite ore mineralization occurrences.

1-4-2 Soil geochemistry

(1) Specimens and assay elements

The total of 769 soil specimens were collected for chemical assay from five ore showing areas such as Mrima Hill-Jombo Hill, Kinagoni, Mkundi, Mkangombe and Mangea-Kwa Dadu.

Soil specimens were generally collected at the depth of 20 cm deep or more from ground surface, where humic gray soil was developed. Sampling spacings have been varied in the range of 50 m to 500 m in accordance with scale and extend of ore showing extensions. A fixed-spacing sampling, 50 m east-westerly and 100 m north-southerly, was carried out in Mkundi area.

The 9 elements such as gold, silver, copper, lead, zinc, barium, manganese, iron and sulphur were chemically assayed.

(2) Chemical assay and interpretation measures

Specimens were sent to the laboratory of the Chemex Labs Ltd., Vancouver, Canada for chemical assays.

Univariate analysis was applied for the statistical interpretations of the geochemical values. The specimens were initially separately distributed in accordance with the type of mineralization into such three groups as 1. Mrima Hill-Jombo Hill areas, 2. Kinagoni-Mkangombe-Mangea-Kwa Dadu areas, and 3. Mkundi area.

(3) Interpretations of geochemical anomalies

Remarkably high geochemical values of copper, lead, zinc, manganese, iron and sulphur were shown in Mrima Hill-Jombo Hill areas, meanwhile, an extremely high geochemical value of gold, 407 ppb, which may presumably implicate in a geochemical influence by gold mineralization occurrence, was shown in Mkangombe area. The common results of soil geochemistry in the areas, other than the above two, are unlikely evaluated to be encouraging.

1-5 Results of Geological Research of Ore Showings

Some 20 mineral occurrences in the Project Area were initially studied in reference to the existing informations to be followed up by an implementation of geological reconnaissance works, partly supported by supplementary geochemical research works in the 15 selected target areas on about 400 km of route extensions, totalling an area of 279 sq. km.

The locations of the ore showings in the Area are shown in Figure 1-4, while, the brief results by the works are shown in Table 1-1. The brief summary of the investigation results of ore showings by the works is as follows:

(i) The mineralization of ore showings in the Project Area is classified into such five types as of carbonatite ore type, of vein ore type, of dissemination-bedded ore type, of residual ore type and of detrital ore type.

(ii) Carbonatite ore mineralizations are observed in Mrima Hill. Intrusive carbonatite bodies have been subjected to heavy weathering to be widely enriched by a concentration of residual minerals, which contain niobium, rare earths elements, thorium and etc. and by secondarily formed minerals of these elements.
In the spectrum of ore vein mineralizations, lead-zinc-silver-quartz ore mineralizations are observed in the Kinagoni mine district and Changombe Ore Showing, while, lead-zinc-silver-calcite ore mineralizations are in Mwachi River (Tributary) area, while, barite-lead ore mineralizations are in the areas of Vitengeni, Lunga Lunga, Mwena, Gandini, Mwereni and Goshi.

(iii) Iron oxide mineralizations of residual type, that overlie limestone beds by filling up underlying depressions of karst topography by weathering, are observed in soils in Jaribuni area. Manganese oxide mineralizations of residual type are also observed in ground surface soils in Kiwana Hill area.
A detrital barite ore body, observed nearby the outcrops of barite vein ore bodies, is currently mine-operated in Goshi area.

(iv) Three mines are currently in mining operations in the Project Area, those are the Kinagoni lead-silver mine, the Jaribuni iron mine and the Goshi barite mine.
Pulverized barite ores from old dumps are currently produced in the Vitengeni mine.
Old workings of lead-barite ore are known in the Vitengeni mine district, while, of barite-witherite ore are in Lunga Lunga.

(v) Ore mineralizations and ore showings, observed in further north beyond Gandini, are extended northeasterly-southwesterly in parallel with the Karroo-Jurassic Fault Zone to be reached to Vitengeni. The

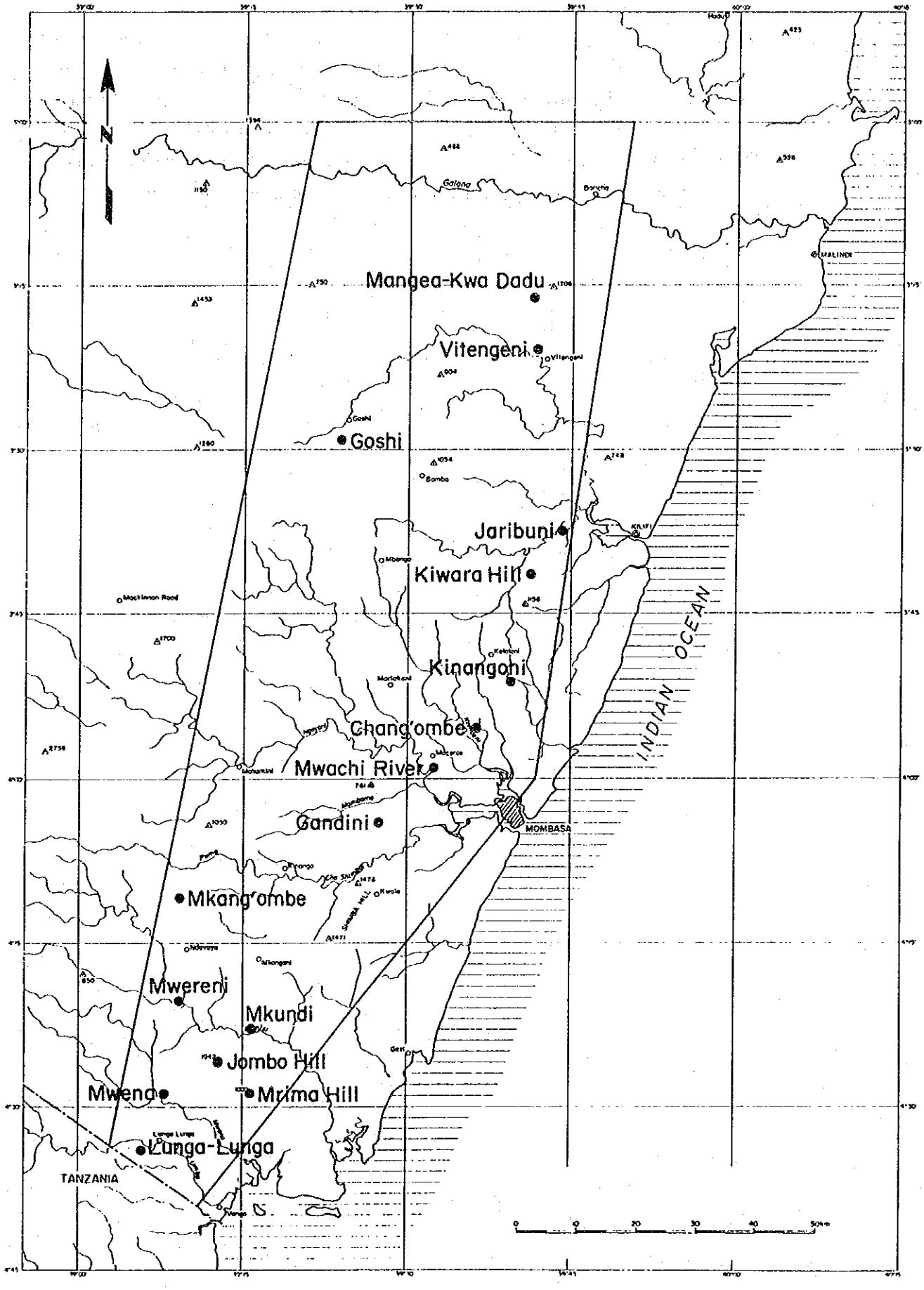


Figure 1–4 Map Showing Mineral Occurrences in the Mombasa Area

Zone in further south beyond Gandini is likely terminated to be discontinued, however, is possible to be pursued down to Mkundi. Meanwhile, the mineralized zone from Mwena upto Mwereni and Mkangombe is inferred to represent that of different occurrence, which is extended north by northeasterly - south by southwesterly, to be reached to Goshi in the north.

Table 1–1 Investigation Results of Mineral Occurrences

	Survey Area	Location			Administration	Metal of Minerals	Country Rock	Mineralization				Occurrence, etc.	Previous Work Research and Mining Activity
		Survey of Kenya, Map	UTM Co-ord. X	UTM Co-ord. Y				Type	Ore Minerals	Gangue Minerals	Alteration etc.		
1.	Mrimo Hill - Jombo Hill	(1:50,000) Msambweni & Ndavaya	5_{21} ⟆ 5_{33}	95_{13} ⟆ 95_{03}	Msambweni Division, Kwale District	Nb, REE, Th	Carbonatite in Sandstone of Maji ya Chumvi Formation	Carbonatite (Residual)	Pyrochlore, Gorciexite, Monazite, Apatite	–	Weathered, Enriched	Ferruginous and manganiferous residual deposit with an average thickness of several to several hundreds feet, occurs in the form of filling up depression of karst topography. Formed by weathering on the surface of carbonatite body. Ore minerals, such as pyrochlore, gorceixite, are discernible predominantly with minor monazite.	Exploration and ore reserve culculation were made during 1950s~1970s
2.	Kinangoni	Mazeras	5_{71} ⟆ 5_{75}	95_{76} ⟆ 95_{72}	Kaloleni Division, Kilifi District	Pb, Ag	Sandstone of Mazeras Formation	Vein (Stock work)	Galena, Anglesite, Sphalerite, Chalcopyrite, Ag-minerals	Quartz, Barite	Silicification, Argillization	Brecciation and mineralization are localized by a system of normal fault (hanging wall and foot-wall), bounding a fissure zone in sandstone of Mazeras Formation. Vein and Breccia (network) mineralization with argentiferous-galena, which is mainly replaced to anglesite, are predominant. Silber contained sulfide minerals, such as argentite, tetrahedrite, stromeyerite, jalpaite are identified.	Open cast and underground mining is being operated. Production: 120 ton Pb conc./month Grade: 60~70% Pb Workers: 150
3.	Vitengeni	Vitengeni	5_{76} ⟆ 5_{79}	95_{32} ⟆ 95_{27}	Kilifi District	Ba, (Pb)	Sandstone of Mazeras Formation	Vein	Barite, Galena, Sphalerite, Chalcopyrite	Quartz	Argillization, Silicification	Ore bodies are of lenticular-shaped veins, which are distribued as echelon veins. Barytes are main minerals with minor amount of sulfides, such as galena, shalerite. Dimension of each vein is 20~60 meters along strike and 40~120m along dip. Sulfide mineral contents are increased with the depth.	Open cast mining was suspended by in late 1980s. Barytes powder is being produced from old stockpiles.
4.	Jaribuni	Bamba	5_{81} ⟆ 5_{83}	96_{01} ⟆ 95_{95}	Kilifi District	Fe	Limestone of Kambe Formation	Residual	Hematite, (Limonite)	–	Weathered, Enriched	Residual iron ore deposit, which fills up depressions associated with karst topography, formed in surficial part of limestone of Kambe Formation In shallower depth, general granularity of iron ore shows fine. But in deeper depth, ore nodules are ligbly glomerated and clustered.	Mine is being operated Production: 180~220 ton/day Ore grade: More than 25% Fe Workers: 400~500
5.	Kiwara Hill	Bamba	5_{76} ⟆ 5_{78}	95_{95} ⟆ 95_{91}	Kaloleni Division, Kilifi District	Mn	Sandstone of Mazeras Formation	Residual	Pyrolusite, Cryptomelane, Hollandite	–	Weathered, Replaced, Enriched	Manganese oxide ores which replace sandstone of Mazeras formation are enriched by weathering. Ore is classified into three types, such as dissemination type, replacement types, massive type or nodule type.	Drilling and ore reserve culculation were carried out during 1960s.
6.	Goshi	Mapotea	5_{42} ⟆ 5_{46}	96_{17} ⟆ 96_{14}	Kilifi District	Ba	Sandstone of Maji ya Chumvi Formation	Vein, Eluvial	Barite,	Quartz	Argillization, Silicification & Weathered	Massive baryts vein deposit are pursuable 700 metres long as an echelon form. Barytes ore body is of an eluvial type formed by weathering. Barytes ore vein is currently being mined by open pit mining by man-powered hand digging.	Open cast mining had been carried out. Consecutive mining by man power has just started.
7.	Changómbe	Mazeras	5_{66} ⟆ 5_{68}	95_{69} ⟆ 95_{65}	Kaloleni Division, Kilifi District	Zn, Pb, Ag	Sandstone of Mazeras Formation	Vein & Stratiform	Sphalerite, Galena, Chalcopyrite	Quartz, Calcite, Barite	Silicification, Argillization	Float is sole traces of mineralization, which seemed to occur as quartz vein and network in sandstone of the Mazeras Formation. Limonitic floats are common in the north. Meanwhile, lateritic soil can be observed in the south.	Drilling had been made in 1960s.
8.	Mwachi River (Tributary)	Mazeras	5_{58} ⟆ 5_{62}	95_{62} ⟆ 95_{58}	Kwale District	Zn, Pb, Ag	Sandstone of Mazeras Formation	Vein & Stratiform	Sphalerite, Galena, Chalcopyrite	Calcite, Quartz	Silicification	Mineralization occurs as calcite vein and network with sphalerite and minor amount of galena. Four mineralized zones are specified along the tributary.	
9.	Mkundi	Msambweni & Ndavaya	5_{27} ⟆ 5_{32}	95_{17} ⟆ 95_{13}	Kwale District	Cu, Pb, Zn	Sandstone of Mariakani Formation	Vein	Galena, Sphalerite, Chalcopyrite, (Malachite)	Quartz, Barite	Silicification, Argillization	Mineralized quartz vein and network with intensely silicified envelops trunkate and displace lamprophyric dykes. Galena, chalcopyrite, malachite and pyrite occur in quartz veins in Mkundi North. In Mkundi South, silicified zones with quartz fineveins are observed. Hotsprings are active in these areas.	
10.	Lunga-Lunga	Vanga	$5_{09.5}$ ⟆ $5_{11.5}$	94_{96} ⟆ 94_{93}	Kwale District	Ba, (Pb)	Sandstone and Siltstone of Maji ya Chumvi Formation	Vein	Barite, Witherite, Galena, Sphalerite	Quartz	Argillization, Silicification	Massive barytes veins with minor amount of galena and sphalertie are distributed as echelon veins. Brecciated barytes vein with fragments, such as barytes, shale, sandstone, occur in veins and in hanging and foot wall rocks. Witherite and barytocalcite are firstly discernible.	Open cast mining had been done in 1980s. Several trenches are observed in Metreni area and near the Tanzanian Border.
11.	Mwena	Kwale	5_{13} ⟆ 5_{16}	95_{06} ⟆ 95_{03}	Kwale District	Ba	Sandstone of Maji ya Chumvi Formation	Vein	Barite	Quartz	Silicification, Argillization	Several thin barytes veins are observed. Each vein forms an echelon pattern with maximum length of 40 meters.	
12.	Gandini	Kwale	5_{51} ⟆ 5_{53}	95_{54} ⟆ 95_{51}	Kwale District	Ba	Sandstone of Mariakani Formation	Vein	Barite	Quartz	Silicification, Argillization	Several thin barytes veins are observed. Veins show a parallel distribution. But length of each vein is less than 10 meters.	
13.	Mwereni *estimated by floats	Ndavaya	5_{15} ⟆ 5_{18}	95_{22} ⟆ 95_{20}	Kwale District	Ba*, Pb*	Sandstone of Maji ya Chumvi Formation	Vein*	Barite*, Galena*	Quartz*	Unspecified	Floats of barytes and galena fragments have been collected. But mineral showing has not yet been specified. Mineralization observed in ore floats are of baryte veins with minor amount of galena.	
14.	Mkangómbe North (Kumbi) South ** estimated by floats	Glanze	5_{14} ⟆ 5_{21}	95_{41} ⟆ 95_{35}	Kwale District ditto	 ditto**	Siltstone of Maji ya Chumvi Formation ditto**	Vein ditto**	Malachite, Azurite	Quartz ditto**	Silicification ditto**	North (Kumbi) : Quartz vein and network specimen with green-Cu and blue-Cu have been collected from the showings. South : No mineralized showing is observed. Several floats suggest that the same type of mineralization to that in the Kumbi area occurs in this area.	
15.	Mangea-Kwa Dadu	Vitengeni	$5_{75.5}$ ⟆ $5_{77.5}$	96_{40} ⟆ 96_{36}	Kilifi District	Pb, Zn, Ag, Ba	Sandstone of Mazeras Formation	Vein	Galena	Quartz Barite	Silicification	Quartz vein network and limonitic gossan are distributed. One pin-hole grain of galena in a milky thin quartz vein, is observed. In southern area, barytes vein network specimen were collected.	Several trenches for exploration are observed in gossan area.

CHAPTER 2. SEMI-DETAILED and DETAILED SURVEY WORKS AREAS

2-1 Ganze Area, Semi-Detailed Works

2-1-1 Outline of works

Semi-detailed works, geological reconnaissance and geochemical exploration works, were promotedly implemented in the area in the second-year programme in 1991 after the completion of outlined survey work in the first-year programme to carry out geological reconnaissance works of a 140 km extension and soil geochemistry by 451 specimens in an area of 192 sq. km.

The semi-detailed survey works in Ganze area have been implemented in common measures with those in other 4 areas in the following sections.

Geological route mapping works were implemented by using topographical maps, 1 to 10,000 scale, which were enlarged from topographical maps of 1 to 50,000 scale, published by the Survey of Kenya. Mapping routes for geology were allocated to establish effective and sufficient traverses against the major geological structure in the Area. Route mapping works were also associated with sampling of representative rock specimens and geological sketching or recording photographing of significant outcrops.

Field works of geochemical exploration research, which were carried out in concurrent accordance with geological route mapping progresses, the above, were implemented by collecting samples of B-horizon soils on ground surface at the stations of every 300 metres spacing along the traversing direction against the major tectonic structure in the Area and of every 350 to 400 metres spacing along the parallel direction with that, the above.

2-1-2 Results of geological research

(1) General geology

Geological map and geological cross-sections in Ganze Area are shown in Figure 2-1-1. General geology in the Area majorly consists of the sediments of Triassic and Jurassic ages, which are stratigraphically divided into Mazeras Formation, Kambe Formation and Mtomkuu Formation in ascending order from west to eastward in the Area.

(i) Mazeras Formation (Mzl, Mzm)

Mazeras Formation is widely extended in the Area to cover some 80 percent of the entire Area and majorly consists of terrestrial sandstone beds. Lower and Middle Members of the Formation, which are correlated to be of Triassic and Jurassic age, are distributed in the Area.

Lower Member (Mzl) shows pale gray and majorly consists of medium-

to coarse-grained sandstone beds, rich in quartz. Cross laminas and grading structures are frequently observed.

Middle Member (Mzm) mainly consists of sandstone and siltstone beds. Sandstone shows pale gray to pale yellow and is mainly composed of medium- to coarse-grained beds. It shows some similar facies to the above Lower Member, being rich in quarz content and having cross lamina structure. Siltstone shows reddish brown to purplish with a granularity in the range of silt to very fine sand.

(ii) Kambe Formation (K)

Kambe Formation is distributed in eastern part of the Area to be extended north-southerly showing a width of 1.5 to 2 kilometres. It is of marine sedimentary limestone beds of Jurassic age. It shows pale gray to dark gray with having oolitic structure of varied dimension in central to southern parts of the Area, while being fine-grained and massive in northern part. Fossils of some molluscs are observed in several locations in the Area.

(iii) Mtomkuu Formation (Mtl, Mtm)

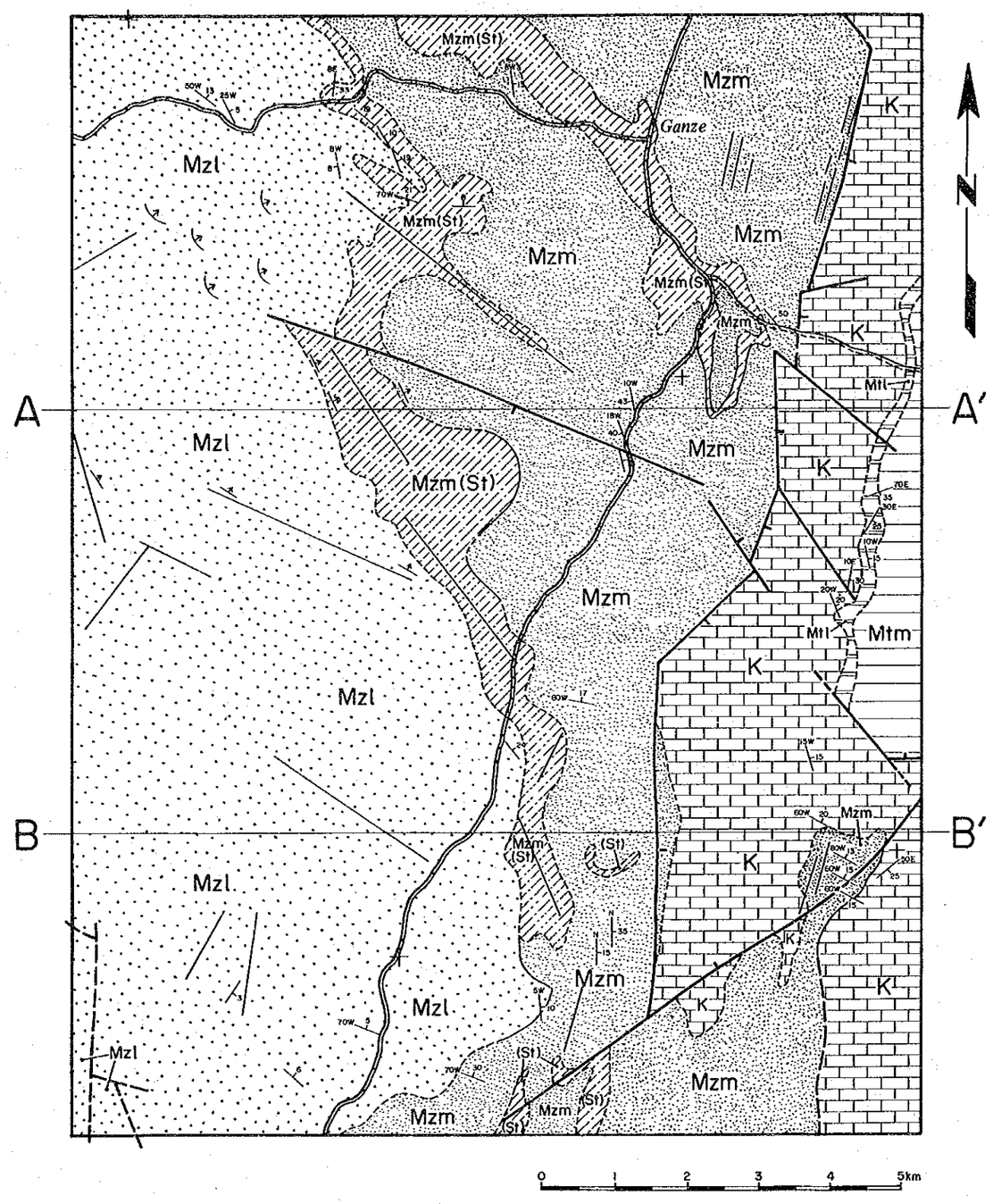
Mtomkuu Formation shows a distribution of slender extension, north-southerly, in eastern margin of the Area. It mainly consists of shale beds and is subdivided to be of Lower (Mtl) and Middle (Mtm) Members in the Area. It conformably overlies Kambe Formation and is correlated to be of Jurassic age.

Lower Member (Mtl) is mainly composed of alternations of thin-bedded shale and sandstone beds, which are intercalated by thin limestone, limy sandstone and/or conglomerate beds. It is featured by showing a frequent facies change.

Middle Member (Mtm) mainly consists of pale-brown shale beds with a consistent facies showing. Lamina structure and resultant fissility are well-developed in shale beds.

(2) Geological structure

Sedimentary beds in the Area are piled up by showing a general strike of NNW-SSE to NNE-SSW and gently dipping with several to less than 30 degrees easterly. Some of sandstone beds in the Area are found to apparently show a different behaviour of occurrence from the general structure, however, it is still obsure whether the difference could be naturally caused by faulting or folding or some geological malpractice resulted from an inevitable slip concerning to an interpretation of cross lamina and stratum bedding during the



LEGEND

CRETACEOUS	Mtu	Upper Member	MTOMKUU FORMATION (Mt)	Shales,subordinate limestones,l
	Mtm	Middle Member		Shales,subordinate limestones,l
	Mtl	Lower Member		Shales/siltstones/sandstones/limestones Sandstone,s; limestones,l
JURASSIC	K		KAMBE FORMATION	Limestones,(coral-rich,c; oolitic/pisolitic,o) subordinate shales/siltstones/sandstones
	Mzu	Upper Member	MAZERAS FORMATION (Mz)	Sandstones/arkoses
	Mzm	Middle Member		Sandstones/arkoses (Slates/siltstones/sandstones,St)
	Mzl	Lower Member		Sandstones/arkoses
TRIASSIC	Mku	Upper Member	MARIAKANI FORMATION (Mk)	Sandstones (Shales/siltstones/sandstones,St)
	Mkm	Middle Member		Sandstones
	Mkl	Lower Member		Sandstones

DURUMA GROUP

- Geological boundary, known
- Geological boundary, approximate (including photo-interpretation)
- Geological boundary, inferred
- Photo-lineament
- Fault, downthrow indicated
- Fault inferred, downthrow indicated
- Breccia, shear zone
- Bedding, dip indicated
- Bedding, dip (<15°) indicated (air-photo interpretation)
- Bedding, flat-lying
- Fe — Mineral occurrence
- Mine, working
- A——A' — Line of section

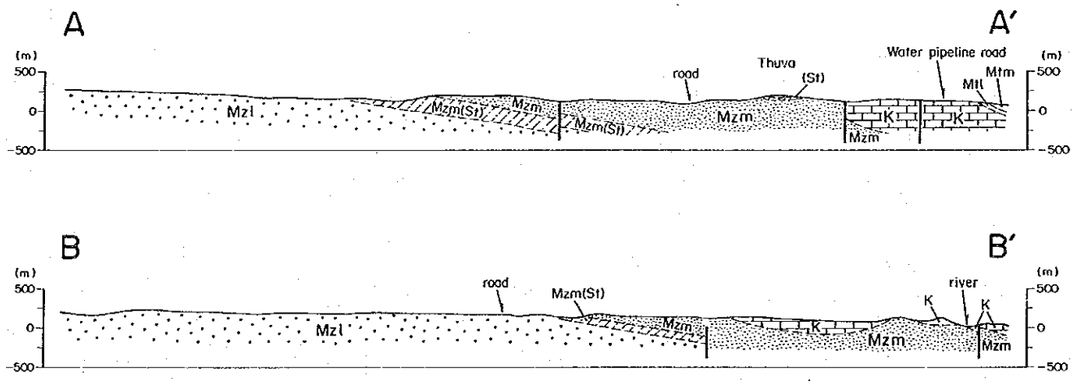


Figure 2–1–1 Geological Map of the Ganze Area

field working.

Normal faults, striking north-southerly approximately with dips easterly, are well-developed in the Area. A normal fault, which is considered to be a part of the Karroo-Jurassic Fault that widely runs nearly parallel to the general trend of beds and to the sea shore line in the Area, defines a direct demarcation of Mazeras and Kambe Formations. The major faults are considered to be genetically closely related to the forming of lead-zinc-barite ore vein mineralization in the Area. The major faults, the above, are dislocated by other faults system of later stage, NE-SW and NW-SE trends.

2-1-3 Result of geochemical exploration works

(1) Specimens and chemical assay elements

451 soil specimens were collected in the Area by the current works. Such eleven elements as gold, silver, copper, lead, zinc, barium, manganese, iron, arsenic, mercury and sulphur were assayed for a major objective of the exploration of lead-zinc-barite ore vein mineralizations.

(2) Chemical assay and interpretation measures

Soil specimens collected by field operations were sent to the laboratory of the Chemex Labs Ltd., Vancouver, Canada for chemical assays.

The univariate analysis and principal component analysis were implemented by the current works. The chemical values less than the detection limit values were excluded from the statistical treatments, while, the values higher than the detection limit values were treated as to be the upper detection values themselves. The elements, i.e., gold, silver and mercury were excluded from the statistical interpretations, since these elements mostly show the content values of less than the detection limit value.

Threshold values of the respective elements 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 occasion that

the cumulative frequency curve shows linear and the curve is estimated to be composed of a single population.

Criterion 3 : In the occasion of the element, when the most part of range of the assay values of the above element is shown by 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 number of samples. The 2.27 percent value itself designates the ratio of number of samples among that of samples, which shows the value of more than m + 2 σ in the normal population.

The entire chemical values of the specimens from such three areas as Ganze, Jibana and Ribe were collectively treated in an overall population, since these areas are situated under a similar geological circumstance and the mineralization type of exploration target is also identical to establish an evaluation of mineral potentials in an overall spectrum.

(3) Interpretations of geochemical anomalies

The representations of geochemical anomalies in Ganze Area are shown in Figure 2-1-2. Geochemically high values of iron and manganese are collectively shown to form geochemical anomalies, meanwhile, high values of the other elements are scatteredly observed. Geochemical anomalies of iron and manganese, considered to be in a close correlation, are superimposedly overlapped with the distributive occurrence of Kambe Formation in northern half of the Area. Occurrences of ferruginous concretions are observed in weathered soils of limestone beds, where the above geochemical anomalies are represented, to lead to an estimation that iron and manganese have been concentrated in accordance with the progressive forming of ferruginous concretions.

Overlapped showings of barium- and sulphur-anomaly are scatteredly shown in the Mazeras Formation-covering area to pose a possibility regarding to a possible genetical relation with an occurrence of barite mineralization.

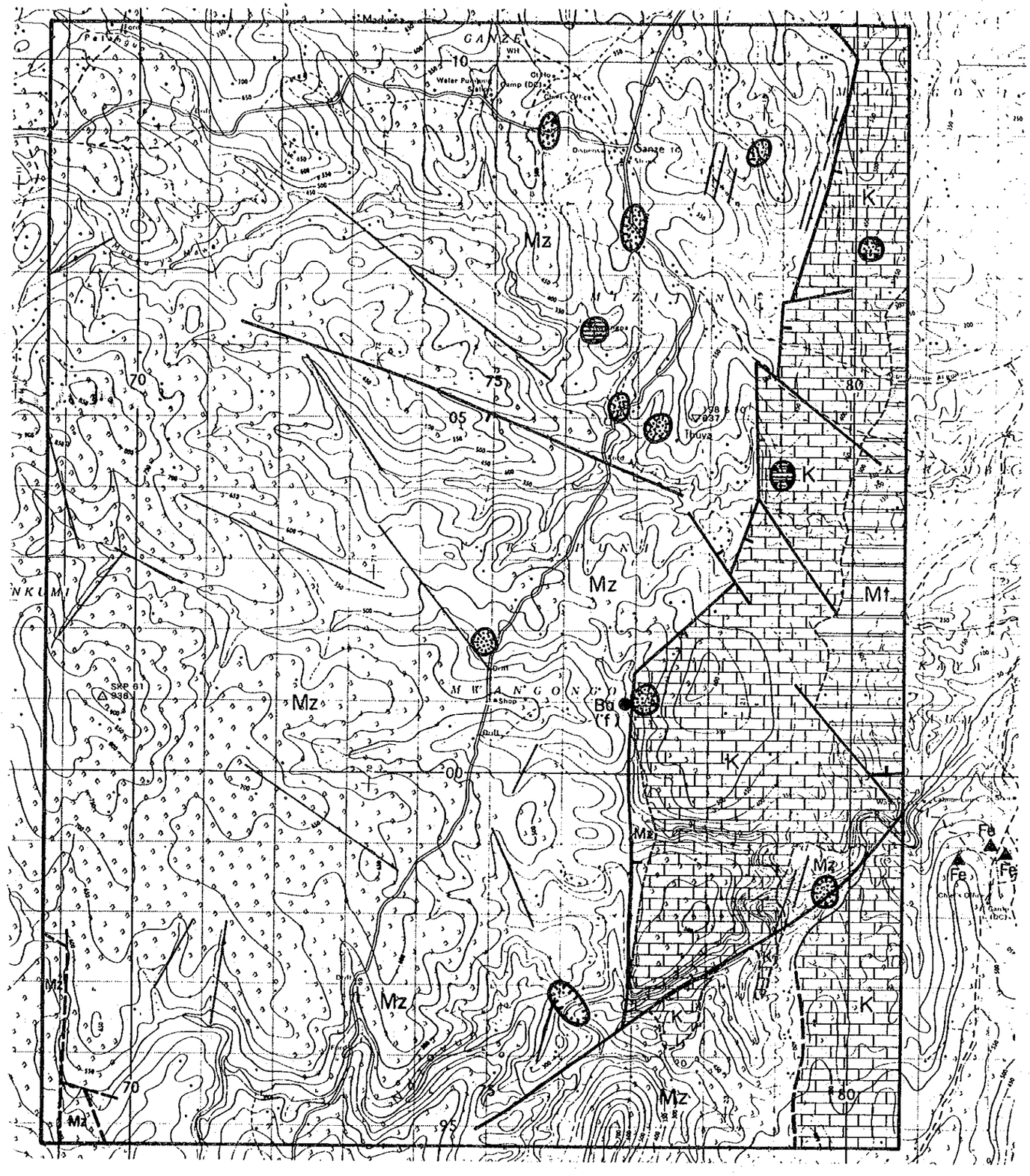
The elements, other than iron, manganese, barium and sulphur, are unlikely evaluated to show a behaviour of significance related to the ore mineralization.

2-1-4 Ore mineralization

(1) Ore showing and mineralized zone

The localities of mineral occurrences in Ganze area are shown in Figure 2-1-2.

Any of the remarkable ore showing has never been recognized yet in the Area. Some floats of barite ore were found by the current work in the vicinity



LEGEND

- Active mine (Kinagoni mine)
- Gossan
- Ba — Barite (f : float)
- Fe — Iron concretion
- Mt — Mtomkuu formation
- K — Kambe formation
- Mz — Mazeras formation
- Mk — Marlakani formation
- Fault, known and Inferred
- Photo lineament
- Breccia, shear zone
- Geological boundary

Geochemical Anomaly

Element	Anomaly	Threshold
Ag		≧ 0.2 ppm
Pb		≧ 80 ppm
Zn		≧ 600 ppm
Ba		≧ 1100 ppm
S		≧ 0.025 %

0 1 2 3 4 5km

Figure 2–1–2 Geochemical Interpretation Map of the Ganze Area

of the grid station 577-9601 on Topographical Map "Bamba", 1 : 50,000 scale, around where a north-southerly fault, that makes a demarcation of Mazeras and Kambe Formations, has been mapped up. This could suggest a possibility of an occurrence of lead-zinc-barite ore vein mineralization, closely related genetically to the fault occurrences, in the vicinities.

(2) Interpretation

Since the north-southerly faults, which provide the direct demarcations of Mazeras and Kambe Formations, and NNE-SSW-directional faults are well-developed in the Area, a potential of lead-zinc-barite vein ore mineralization in Mazeras Formation has long been expected, however, barite vein ore floats were found by the current reconnaissance work limitedly in a single location in the Area. The geochemical anomalous zones, overlappedly shown by barium- and sulphur-anomalous values, which could foster an expectation of an occurrence of barite ore mineralization, have been found by the current geochemical research work, however, those are scatteredly observed in the Area and are considered to provide an uncertain relation to the other type of mineralization of heavy metallic elements, such as lead and zinc. Those could unlikely lead to a concept that encourages a possible mineral potential for future considerations in Ganze Area.

2-2 Jibana Area, Semi-Detailed and Detailed Works

2-2-1 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 diamond drill exploration in Jibana Mineralized Zone were implemented in the third-year programme, 1992 in the Area.

Semi-detailed works consist of geological reconnaissance works of an 80.8 km extension and soil geochemistry by 260 specimens in an area of 100 sq. km.

Detailed works consist of diamond drill operations of three holes, totalling to a 450 metres extension, for a purpose to geologically scout up mineral occurrences in deep underground of the gossanous materials of Jibana Mineralized Zone and geochemical lead-anomalous showing.

2-2-2 Results of geological research

(1) General geology

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

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-southerly along the coast line in the Area.

(i) Mariakani Formation (Mku)

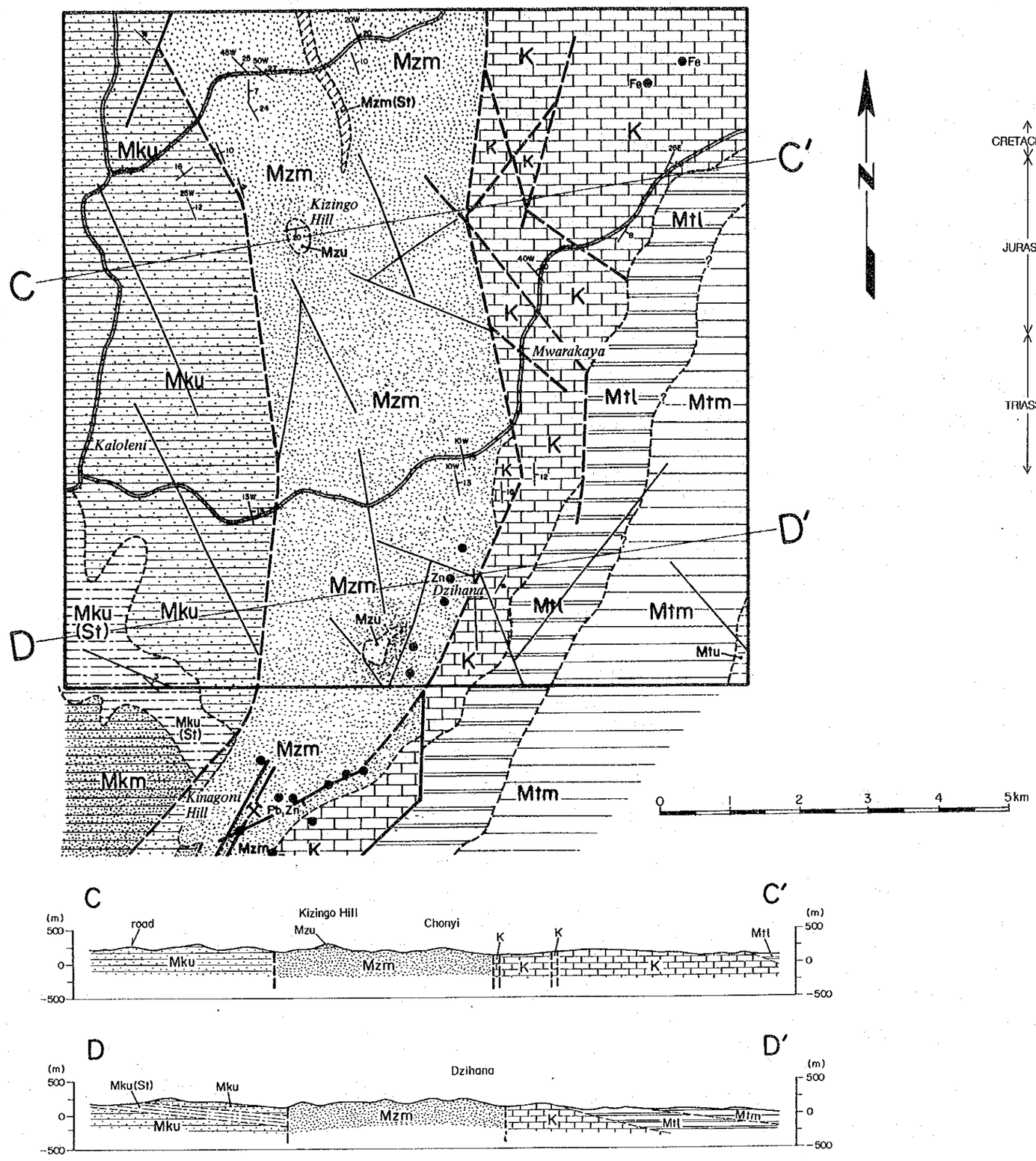
The Upper Member of Mariakani Formation is observed in the Area. The Member is distributed in western part of the Area, extending north-southerly with a width of 2 to 3 km and having a contact to the overlying Mazeras Formation by a possible fault. The Member majorly consists of sandstone and siltstone 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 is distributed in south-western end of the Area. The Member is correlated to be of Triassic age.

(ii) Mazeras Formation (Mzm, Mzu)

The Middle and Upper 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 an N-S directional fault to the underlying Marikani Formation and the overlying Kambe Formation.

Middle Member (Mzm) of Mazeras Formation is mainly composed of sandstone and siltstone 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 pebbles inclusions. It yields petrified woods in the upper most horizon of the Member in the vicinity of Kinango Hill. Several beds of siltstone 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. 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.



LEGEND

CRETACEOUS	Mtu	Upper Member		Shales,subordinate limestones,l
	Mtm	Middle Member	MTOMKUU FORMATION (Mt)	Shales,subordinate limestones,l
	Mtl	Lower Member		Shales/siltstones/sandstones/limestones Sandstone,s; limestones,l
JURASSIC	K		KAMBE FORMATION	Limestones,(coral-rich,c; oolitic/pisolitic,o) subordinate shales/siltstones/sandstones
	Mzu	Upper Member	MAZERAS FORMATION (Mz)	Sandstones/arkoses
	Mzm	Middle Member		Sandstones/arkoses (Slates/siltstones/sandstones,St)
	Mzl	Lower Member		Sandstones/arkoses
TRIASSIC	Mku	Upper Member	MARIAKANI FORMATION (Mk)	Sandstones (Shales/siltstones/sandstones,St)
	Mkm	Middle Member		Sandstones
	Mkl	Lower Member		Sandstones

DURUMA GROUP

- Geological boundary, known
- Geological boundary, approximate (including photo-interpretation)
- Geological boundary, inferred
- Photo-lineament
- Fault, downthrow indicated
- Fault inferred, downthrow indicated
- Breccia, shear zone
- Bedding, dip indicated
- Bedding, dip (<15°) indicated (air-photo interpretation)
- Bedding, flat-lying
- ●Fe Mineral occurrence
- Mine, working
- A——A' Line of section

Figure 2–2–1 Geological Map of the Jibana Area

(iii) 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.

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

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

Lower Member (Mtl) of Mtomkuu Formation is solely observed in a form of distribution of floats of weathered shale, 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 fissile, 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, however, the facies specifications by the current works have not yet been established.

(2) Geological structure

The sediments in the Area are chiefly 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 by an interpretation of air photographs.

2-2-3 Results of geochemical exploration works

(1) Specimens and indicator elements

260 soil specimens were collected in the Area.

Eleven elements, such as gold, silver, copper, lead, zinc, barium, manganese, iron, arsenic, mercury and sulphur were assayed for a major objective of the exploration of lead-zinc-barite ore vein mineralizations.

(2) Interpretations of geochemical anomalies

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

Geochemical anomalous zones of the six elements, such as copper, lead, zinc, iron, barium and sulphur, were studied.

Copper is estimated to be represented by an influence of concentrations of metallic elements into shale beds of Mtomkuu Formation, and lead, zinc and iron are estimated to be shown by an influence of concentrations of metallic elements in soils of weathered limestone beds of Kambe Formation, however, those are unlikely evaluated to be represented by an influence of lead-zinc-barite ore veining mineralization occurrence.

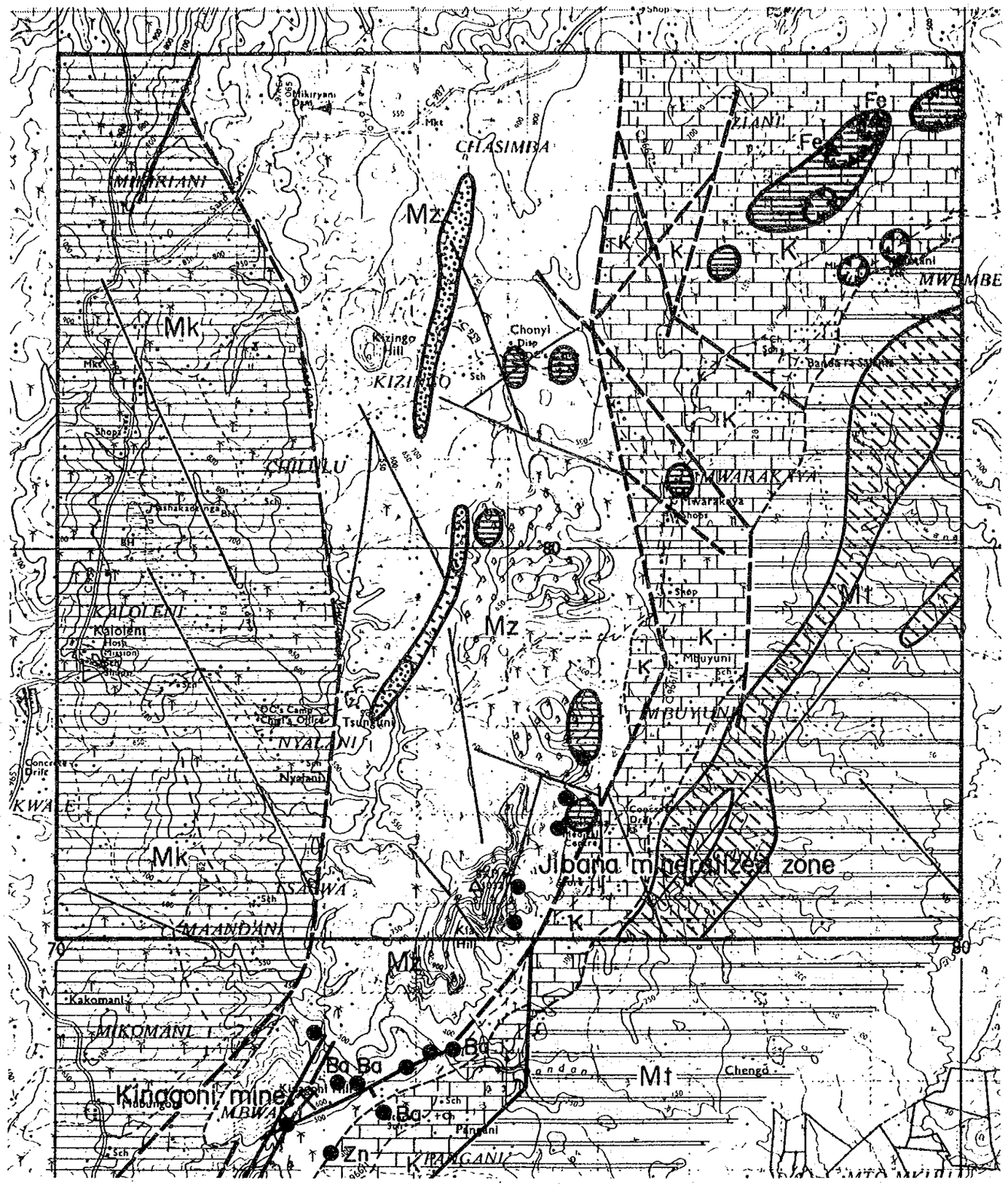
Anomalous zones of barium and sulphur, which are overlappedly shown, are possibly inferred to be represented by an influence of lead-zinc-barite ore mineralization occurrence, however, are unlikely evaluated to be positively deserved for the target of future exploration programme, since the concentrations of barium and sulphur show a separate behaviour from those of lead and zinc and geological ground surface showings of significance, such as gossans or wall rock alterations, have not yet been specified in the zones of barium- and sulphur-anomalous coverages.

Anomalous zones of lead, scatteredly observed in the Middle Member (Mzm) coverage of Mazeras Formation, are shown to cover the Jibana Mineralized Zone and nearby Karroo-Jurassic Fault, which are estimated to be related to the mineralization, and thus are estimated to be represented by an influence of lead-zinc-barite ore veining mineralization occurrences.

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

(1) Outlines of mineral showing and mineralized zone

Jibana Area is situated in the north of the Kinagoni lead mine, which is currently in mining operations. The occurrences of lead-zinc-barite mineralizations of the Kinagoni lead ore type are likely evaluated to be expectedly promising in the Area, since the geological structure that controls the occurrences of that type of mineralization is considered to be continuously extended into the Area.



LEGEND

- Active mine (Kinagoni mine)
- Gossan
- Ba — Barite (f : float)
- Fe — Iron concretion
- Mt — Mtomkuu formation
- K — Kambe formation
- Mz — Mazeras formation
- Mk — Mariakani formation
- Fault, known and inferred
- Photo lineament
- Breccia, shear zone
- Geological boundary

Geochemical Anomaly

Element	Anomaly	Threshold
Ag		≧ 0.2 ppm
Cu		≧ 66 ppm
Pb		≧ 80 ppm
Zn		≧ 600 ppm
Ba		≧ 1100 ppm
S		≧ 0.025 %

0 1 2 3 4 5km

Figure 2–2–2 Geochemical Interpretation Map of the Jibana Area

Occurrences of gossans have been specified by the current geological reconnaissance work in several locations in the west of Jibana Village.

(i) Jibana Mineralized Zone

Several occurrences of gossanous materials have been known on eastern slopes, underlain by Middle Member (Mzm) of Mazeras Formation, in the west of Jibana (Dzihana) Village. Limonite-hematite stained sandstone, limonitic concretions, and outcrops and floats of those brecciated aggregates are observed in the gossanous materials zones. Gossanous materials are discontinuously extended NNE-SSW directionally, about 100 m wide and about 2 km long, while, an area of the single spot of materials extent is in the range less than 80 m by 80 m. The discontinuous extension of the above gossanous materials is referred to as the "Jibana Mineralized Zone".

Overburden soils of the Zone and limonite stained sandstone specimens were collected for chemical assay by the second-year work of the current programme. Geochemical anomalous values of 84 to 142 ppm of lead were shown in the soil specimens, meanwhile, an accumulation of precious and base metal elements was not shown in the limonite stained sandstone specimens.

Jibana Mineralized Zone, located 300 to 400 m westward apart directly from the Karroo-Jurassic Fault, which provides a direct demarcation of Kambe and Mazeras Formations, shows soil-geochemical anomalous values, then, is likely evaluated to possibly provide a potential field of lead-zinc-barite ore veining mineralizations, which are estimated to be genetically related closely to Karroo-Jurassic Fault activities.

(ii) Others

An occurrence of ferruginous concretions, which are considered to be formed by a concentration of iron in soils of weathered limestone beds, is observed in superficial soils of Kambe Formation in north-eastern end of the Area. A chemical value of the concretion, sample-numbered A005, shows 27.3 percent of iron, 0.354 percent of manganese, 0.122 percent of lead and 0.094 percent of zinc. Concentration of manganese, lead and zinc is shown in accordance with that of iron. The spot was ever pointed out to be a geochemical anomalous zone of significance related to lead and zinc mineralization. It is also considered by the current work that a concentration of lead and zinc in the spot could be possibly caused

by a concentration of heavy metal elements in relation to a forming of ferruginous concretions in weathered residual soils on limestone beds coverage and could not directly be caused by vein ore mineralization.

(2) Results of diamond drill exploration

(i) Outline

Locations of Jibana drill operation sites and geolocal map of the site environs are shown in Figure 2-2-3, geological cross-sections with drill hole logs are shown in Figure 2-2-4, and specifications of drill operations are tabulated in Table 2-2-1.

Three holes, 451.40 m deep in total, targeted on scouting up lead-zinc-barite veining ore mineralization occurrences, were operated. The major targets of respective holes are stated as that Hole MJKM-1 was for a scout-up of deep underground extension of the geochemical lead anomaly of 142 ppm, Hole MJKM-2 was for that of gossanous materials extent, while, Hole MJKM-3 was for that of deep underground extension of the geochemical lead anomaly of 82 ppm and of gossanous materials extent.

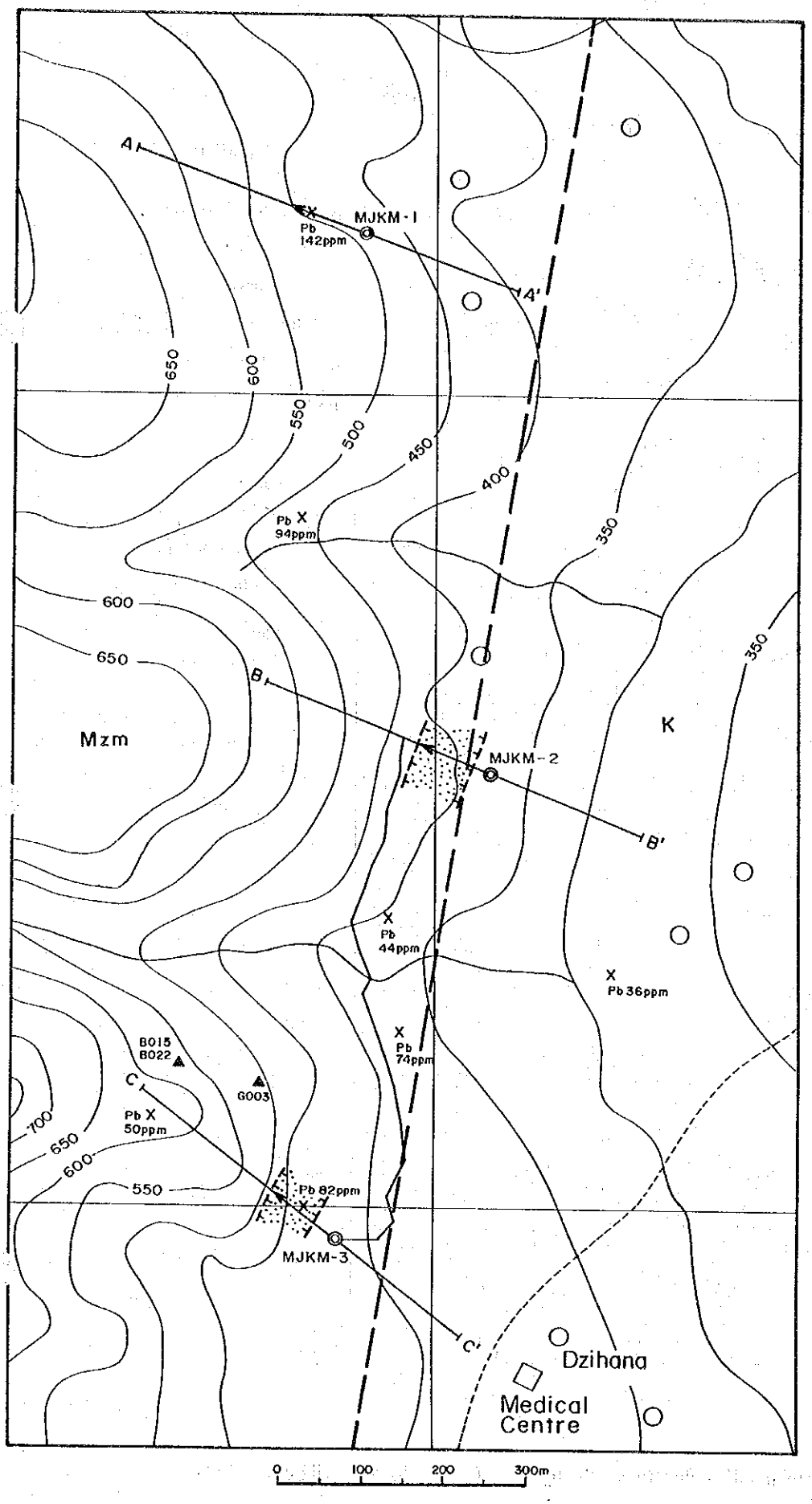
Three holes were westward-declinedly operated from eastern sides of the Jibana Mineralized Zone to establish possible right-angled intersections against the targets, as the Zone has been estimated to be extended NNE-SSW directionally and to be steeply dipping eastward.

Table 2-2-1 DDH in Jibana Area

Hole number	Hole direction	Hole depression	Site elevation above sea level in metre	Hole depth in metre
MJKM-1	N70 ° W	- 50 °	144.50	150.40
MJKM-2	N68 ° W	- 50 °	111.00	150.70
MJKM-3	N53 ° W	- 50 °	127.00	150.30

(ii) Geology by drill hole

Weathered residual soils, Kambe and Mazeras Formations and fault fracture zones were chiefly encountered by the three holes, meanwhile, Kambe Formation was solely by Hole MJKM-2 and fault



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	Ag	Cu	Pb	Zn	Fe	Mn
	ppm	ppm	%	%	%	%	%
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	0.177

Figure 2–2–3 Location Map of the Drill Holes, Jibana Area

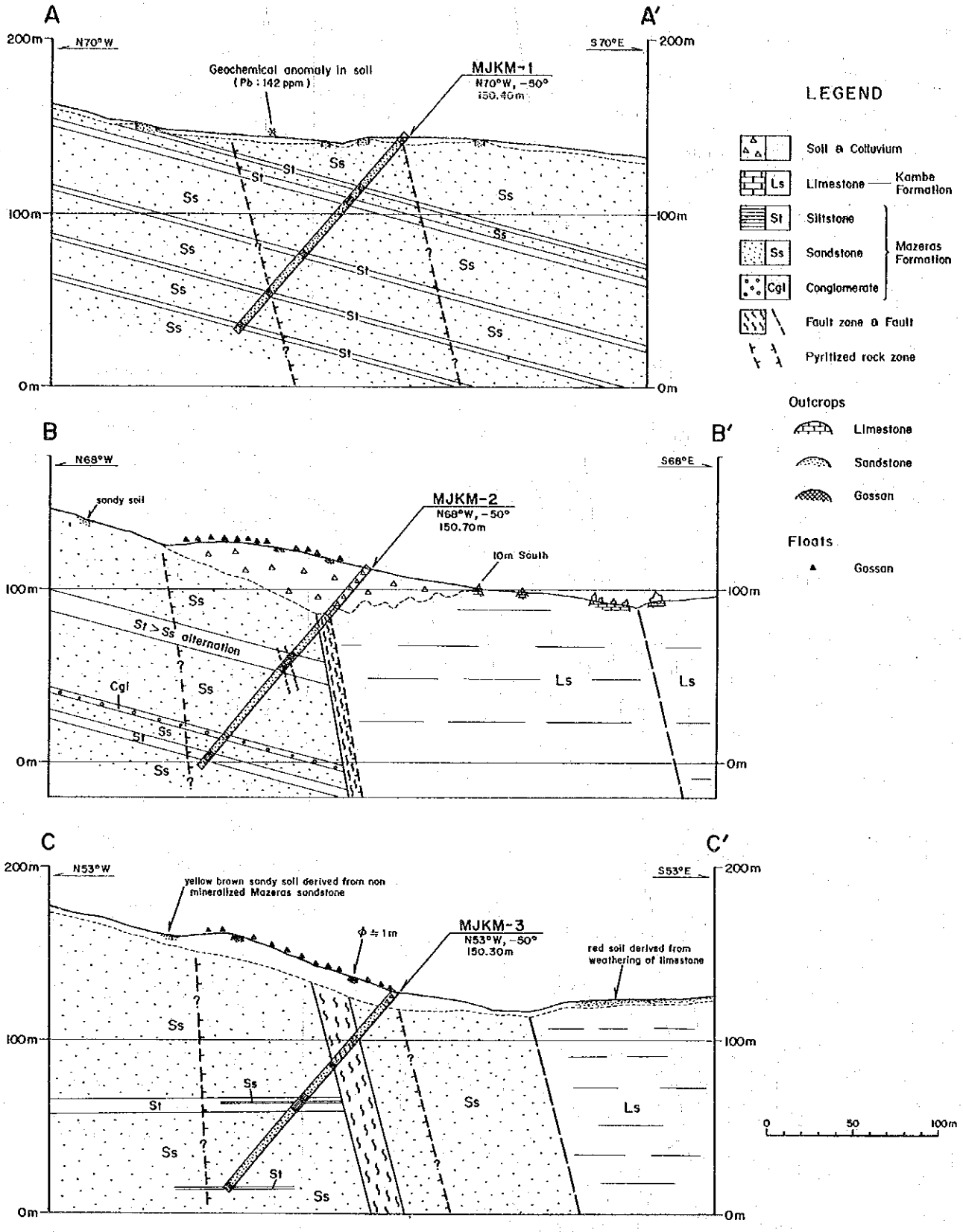


Figure 2-2-4 Geological Sections along the Drill Holes, Jibana Area

fracture zones were by Holes MJKM-2 and -3.

Weathered residual soils by Holes MJKM-2 and -3 are chiefly comprised of sandy silt beds, associated with hematite-stained sandstone pebbles and limonitic concretions, to form a part of gossanous materials extension.

Kambe Formation by the hole chiefly consists of gray limestone beds with breccia structure.

Mazeras Formation by the holes chiefly consists of sandstone beds, intercalated by siltstone and granule beds. Sandstone is fine- to coarse-grained, calcareous, mostly bedded-structured and partly massive. Pyrite disseminations and kaolinitization are widely observed. Six to ten intercalations of siltstone beds are greenish gray to dark gray, bedded-structured or massive and yield drill cores 0.2 m and upto 7.1 m long. Pyrite disseminations are partially observed. The fault fracture zone, observed in Hole MJKM-2, about 7 m thick, estimated to be of the proper Karroo-Jurassic Fault itself, which demarcates Kambe and Mazeras Formations, is comprised of pyrite-disseminated fault clay, dark gray, and intensely brecciated sandstone, light brown. Fault fracture zones by Hole MJKM-3 were encountered at the depths of 34.9 m - 39.0 m and 55.7 m - 57.6 m, chiefly comprised of fault clay, meanwhile, the section 39.0 m - 55.7 m in midway is chiefly comprised of weakly fractured sandstone beds. The fault fracture zones are mostly oxidized overall, however, pyrite-disseminations are observed in unoxidized parts.

(iii) Ore mineralization

Ore mineralization, observed in three holes, are stated below:

Hole MJKM-1: Pyrite-dissemination are widely observed in Mazeras Formation

Hole MJKM-2: Pyrite-disseminations are widely observed in fault fracture zones and in Mazeras Formation. Pyrite fine veins occurrences, 0.5 cm to 1 cm wide, are locally observed in sandstone beds of Mazeras Formation.

Hole MJKM-3: Pyrite dissemination are widely observed in Mazeras Formation.

(iv) Results of chemical assay of ore

Two ore specimens from Hole MJKM-3 in Jibana Area were studied.

The specimen, numbered as KM3-A01, collected at the depth of 46.50 m - 46.67 m of Hole MJKM-3, comprised of pyrite-disseminated fault clay, shows a chemical assay value of 0.121 percent of zinc and 2.60 percent of barium. The above result is likely evaluated to show an

occurrence of weak mineralization of zinc ore and barite in the fault fracture zone.

(3) Interpretation

The underground extensions of gossanous materials and geochemical lead anomalies on ground surface, which have been targeted by diamond drill works of the current programme, 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, then, those are evaluated to could produce irresponsibilities of the showing of underground occurrence of lead-zinc-barite ore veining mineralizations.

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 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 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 Works

2-3-1 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 diamond drill exploration were implemented in the third-year programme, 1992, in Ribe Ore Showing, newly found in 1991 and in Chiume Hill Ore Showing, respecified nearby the Project Area in 1991.

Semi-detailed works consist of geological reconnaissance worke of a 29.6 km

extension and soil geochemistry by 82 specimens in an area of 32 sq. km.

Detailed works consist of diamond drill operations of three holes, totalling to a 450 metres extension in Ribe Ore Showing and of one hole of a 150.20 meters extension in Chiume Hill Ore Showing, for a purpose to geologically scout up mineral occurrences in deep underground of the above respective Ore Showings.

2-3-2 Results of geological researach

(1) General geology

Geological map and geological cross-sections in Ribe Area are shown in Figure 2-3-1.

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 from northwest to southeast in the Area.

The significant differences of general geology in Ribe Area from that in Ganze and Jibana Areas are pointed out as shown below:

i) The general strike of major faults and sediments beddings are turned to NE-SW directionally in Ribe Area, whereas north-southerly in Ganze and Jibana Areas in general.

ii) Developments of faults are more significant in Ribe Area than those in Ganze and Jibana Areas.

iii) The general thickness of Kambe Formation are generally attenuated and are distributed discontinuously.

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

Mariakani Formation in the Area is divided into such three Members, as Lower (Mkl), Middle (Mkm) and Upper (Mku).

Lower Member (Mkl) of Mariakani Formation in the Area is limitedly 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 the existing geological informations.

Middle Member (Mkm) of Mariakani Formation in the Area is distributed in northwestern part of the Area and is chiefly 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 southern part of the Area and is chiefly composed of fine-grained sandstone beds. Lamina texture is well-developed in

sandstone and is white-micaceous.

(ii) 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. 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 unconformity and frequent faulting.

(iii) Kambe Formation (K)

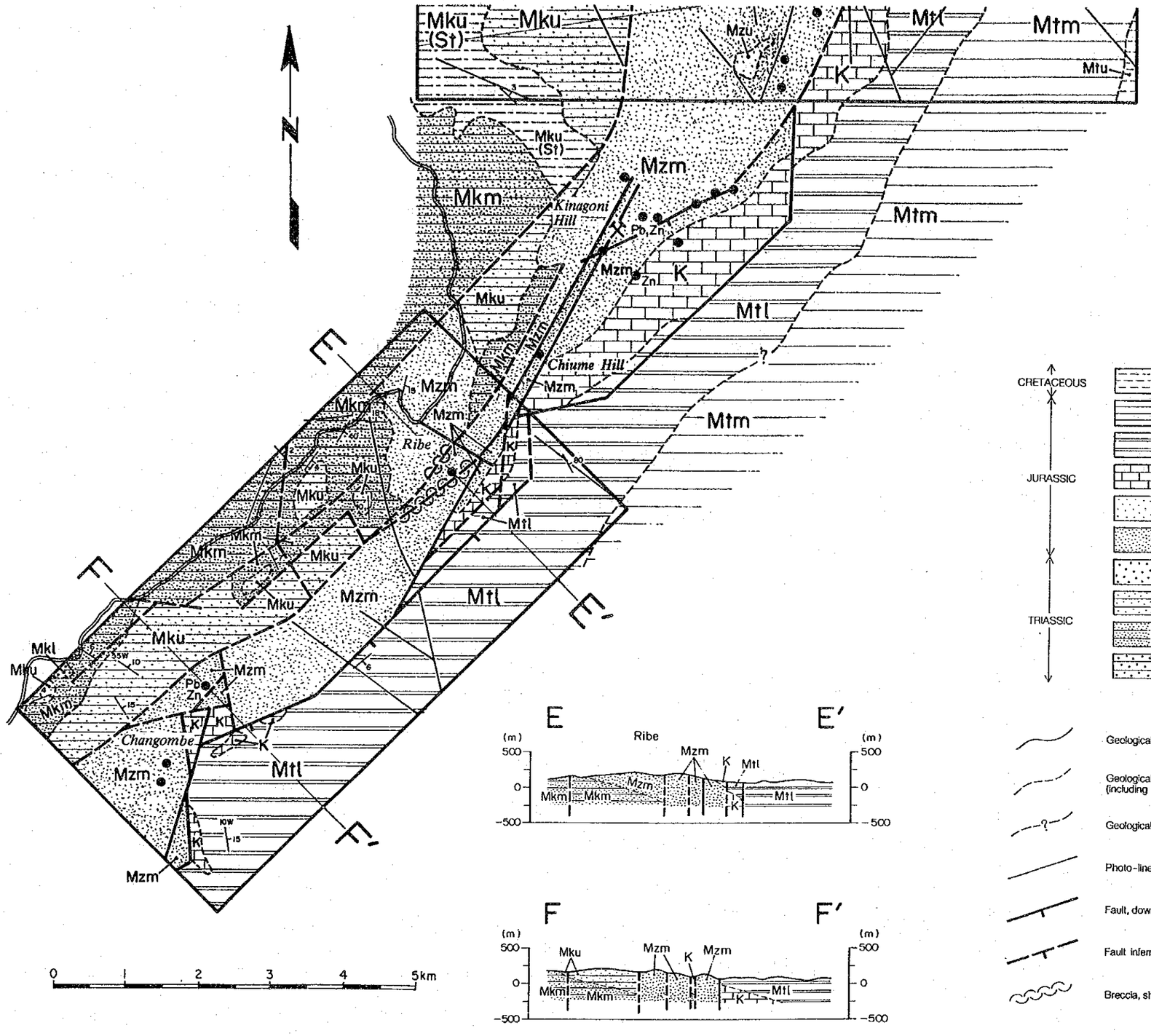
Kambe Formation in Ribe Area is composed of marine limestone beds and is limitedly distributed discontinuously by fault-caused dislocations. Limestone shows gray to dark gray, massive and compact and locally carries oolitic textures in fine-grained portions.

(iv) Mtomkuu Formation (Mtl)

The Lower Member of Mtomkuu Formation is distributed in Ribe Area. The Member is chiefly 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 to a geological correlation of the Member to being of Jurassic age.

(2) Geological structure

It is to be noticeable that the sediments in Ribe Area are remarkably dislocated by a development of fault activities of large scale, which causes 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. A block of sandstone beds of the Middle Member of Mazeras Formation, which is placed between faults of NE-SW direction, is subjected to mineralized alterations in several locations to lead to a possible geological consideration that the development of faulting, particularly with NE-SW direction, could provide one of possible prerequisite geological conditions to form a significant mineralization in the area.



LEGEND

CRETACEOUS	Mtu	Upper Member	MTOMKUU FORMATION (Mt)	Shales, subordinate limestones, l
	Mtm	Middle Member		Shales, subordinate limestones, l
	Mtl	Lower Member		Shales/siltstones/sandstones/limestones Sandstone, s; limestones, l
JURASSIC	K		KAMBE FORMATION	Limestones, (coral-rich, c; oolitic/pisolitic, o) subordinate shales/siltstones/sandstones
	Mzu	Upper Member	MAZERAS FORMATION (Mz)	Sandstones/arkoses
	Mzm	Middle Member		Sandstones/arkoses (Slates/siltstones/sandstones, Sl)
	Mzl	Lower Member		Sandstones/arkoses
TRIASSIC	Mku	Upper Member	MARIAKANI FORMATION (Mk)	Sandstones (Shales/siltstones/sandstones, St)
	Mkm	Middle Member		Sandstones
	Mkl	Lower Member		Sandstones

DURUMA GROUP

- Geological boundary, known
- Geological boundary, approximate (including photo-interpretation)
- Geological boundary, inferred
- Photo-lineament
- Fault, downthrow indicated
- Fault inferred, downthrow indicated
- Breccia, shear zone
- Bedding, dip indicated
- Bedding, dip (<15°) indicated (air-photo interpretation)
- Bedding, flat-lying
- Fe — Mineral occurrence
- Mine, working
- A——A' — Line of section

Figure 2–3–1 Geological Map of the Ribe Area

2-3-3 Results of geochemical exploration works

(1) Specimens and indicator elements

82 soil specimens were collected in the Area.

Eleven elements, such as gold, silver, copper, lead, zinc, barium, manganese, iron, arsenic, mercury and sulphur were assayed for a major objective of the exploration of lead-zinc-barite ore vein mineralizations.

(2) Interpretations of geochemical anomalies

The localities of geochemical anomalies in Ribe Area are shown in Figure 2-3-2.

Geochemical anomalous zones of the three elements, such as silver, copper and lead, were studied.

Copper anomalies are estimated to be represented by an influence of the occurrence of shale beds of Mtomkuu Formation, in which heavy metal elements are highly contained, meanwhile, silver and lead anomalies, which cover the occurrences of ever known Changombe North and Changombe South Mineral Showings, are by that of ore mineralization occurrences.

New specification of mineralization occurrence, other than the ever-known ones, was not achieved by the current geochemical exploration of the Semi-detailed work programme. That is presumably due to that the current works were carried out with on relatively long spacings, and collections of soil specimens nearby the Ribe Mineralized Zone were operated with some locational deviations from the major part of the Zone.

(3) Interpretations of geochemical anomalies

Eleven elements, such as gold, silver, copper, lead, zinc, barium, manganese, iron, arsenic, mercury and sulphur, have been used as the indicators and pathfinders for the soil geochemistry of lead-zinc-barite ore vein mineralization in northern three Areas, such as Ganze, Jibana and Ribe, by the current works. Followings are the summaries on the general geochemical applicabilities of the above indicators and pathfinders in the Areas.

Gold : Considered to be lesser affected by ore mineralization.

Silver : Considered to be affected by ore mineralization. Applicability should be more reliable by an improvement of the detection limit value of the existing 0.2 ppm.

Copper : Considered to be lesser affected by ore mineralization. Affected by occurrence of shale beds in Mtomkuu Formation with high contents of heavy metallic elements.

Lead	:	Considered to be affected by ore mineralization, and weathered soils of limestone beds in some occasion. Considered to be effective in the field with a lack of occurrence of limestone.
Zinc	:	Considered to be affected by occurrence of limestone bed in some occasion. An influence by ore mineralization is obscure.
Barium	:	Considered that an influence by ore mineralization is obscure.
Manganese	:	Considered to be lesser affected by ore mineralization, however, affected by occurrence of weathered soils of limestone beds in some occasion.
Iron	:	Considered to be lesser affected by ore mineralization, however, affected by occurrence of weathered soils of limestone beds in some occasion.
Arsenic	:	Considered to be lesser affected by ore mineralization.
Mercury	:	Considered to be lesser affected by ore mineralization.
Sulphur	:	Considered that an influence by ore mineralization is obscure.

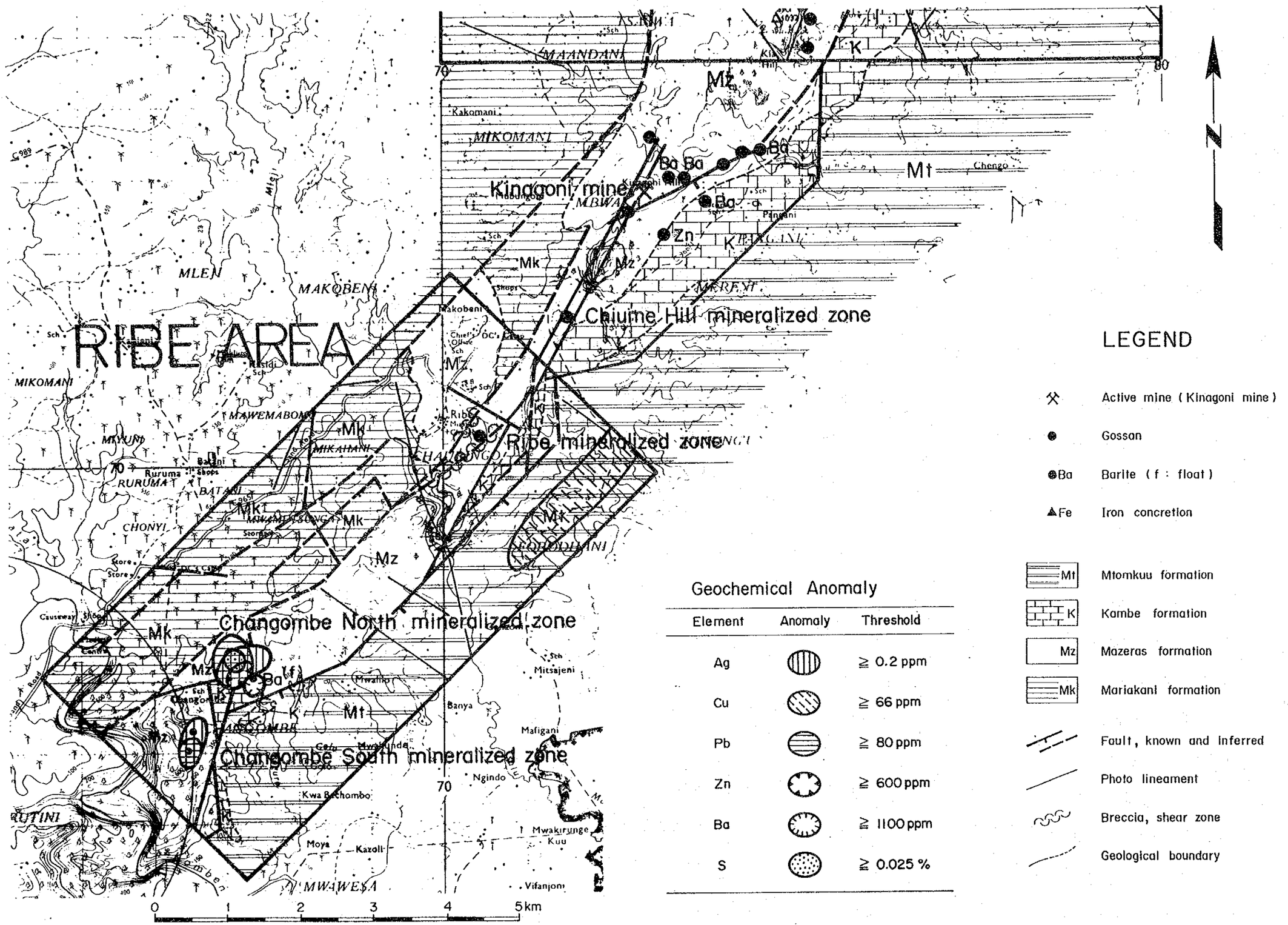
It is, consequently, concluded that silver and lead are considered to be effectively applicable for the selection of geochemical indicators and pathfinders in the Areas, inversely, zinc, barium and sulphur are inactive.

2-3-4 Ore mineralization and results of diamond drill exploration

(1) Outline of mineral showing and mineralized zone

The localities of mineral showing and minealized zone in Ribe Area are shown in Figure 2-3-3.

The occurrences of Changombe Ore Showings and Chiume Hill Mineralized Zone have been reported in existing informations and Ribe Mineralized Zone was newly discovered by the current field work. Ribe Area and environs are evaluated to be one of the areas with abundant occurrences of mineral showing and mineralized zone.



LEGEND

- Active mine (Kinagoni mine)
- Gossan
- Ba — Barite (f : float)
- Fe — Iron concretion
- Mt — Mtomkuu formation
- K — Kambe formation
- Mz — Mazeras formation
- Mk — Mariakani formation
- Fault, known and inferred
- Photo lineament
- Breccia, shear zone
- Geological boundary

Geochemical Anomaly

Element	Anomaly	Threshold
Ag		≧ 0.2 ppm
Cu		≧ 66 ppm
Pb		≧ 80 ppm
Zn		≧ 600 ppm
Ba		≧ 1100 ppm
S		≧ 0.025 %

Figure 2–3–2 Geochemical Interpretation Map of the Ribe Area

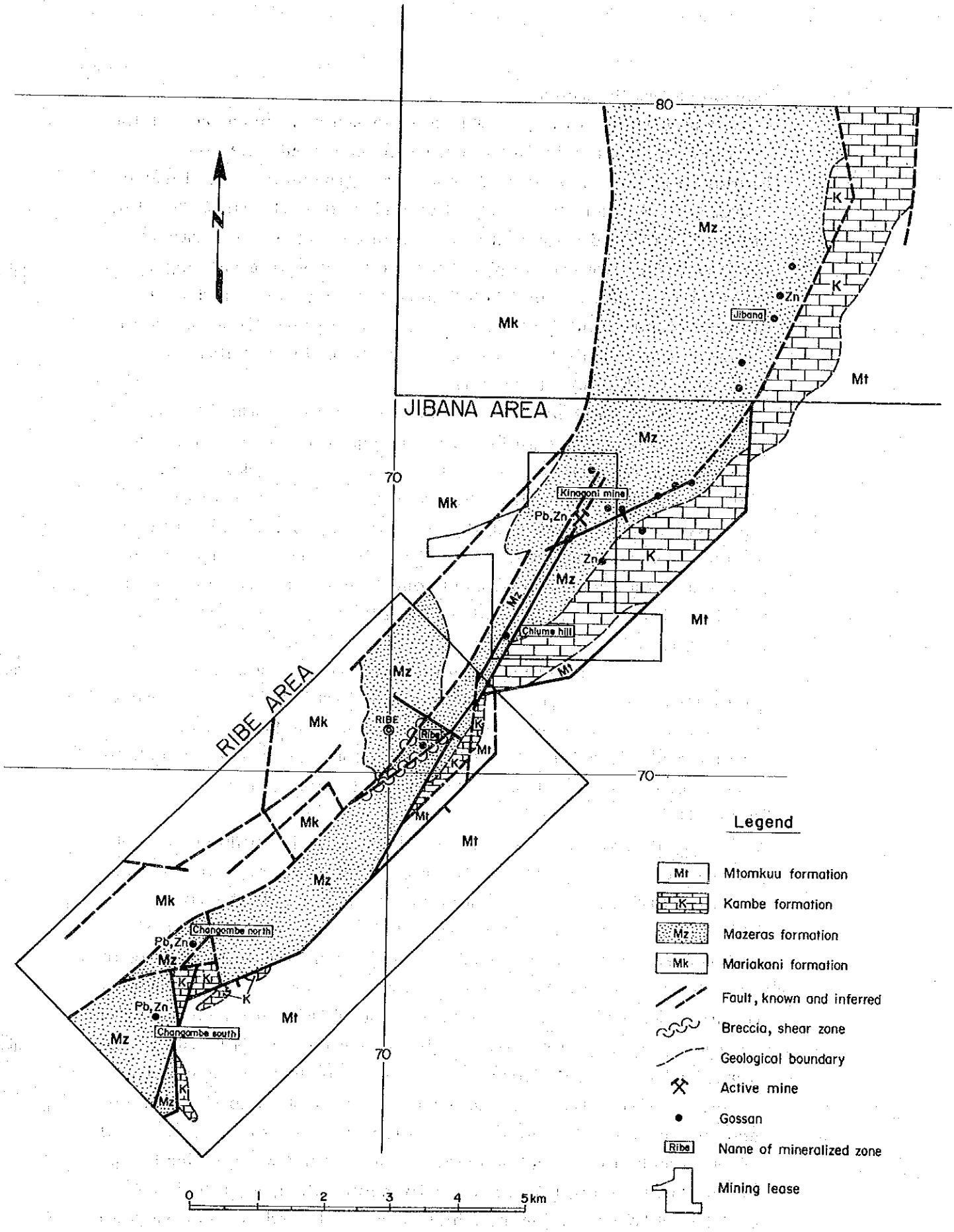


Figure 2-3-3 Mineralized Zones in the Ribe – Jibana Area

(i) Changombe Ore Showings

Changombe Ore Showings are located in south-western part of the Area, while, Changombe North and Changombe South are ever known. Exploration works of varied type, i.e., geochemical exploration works (in 1967 and 1977-1980), diamond drill works (in 1968-1970) and geoscientific documentations on geology and ore mineralization (in 1969-1970) were ever implemented for the above ore showings.

Inferred ore reserves of 430,000 long tons with ore grades of 3.1 percent of zinc and 0.84 percent of lead, were estimated by the previous diamond drill operations, the above, by 20 holes totalling 2,235 metres (Rainey, T.P., 1971).

Based on the results by the above and the current works, the type of mineralization of Changombe Ore Showings are considered to be of vein ore mineralization of quartz veins and networks, associated with galena and sphalerite majorly and a small quantity of pyrite and sparse chalcopyrite, and with quartz, calcite and barite as gangue minerals (Rainey, T.P., 1970). Wall rock of the mineralization is of coarse-grained sandstone beds of Mazeras Formation, partly intensely brecciated and altered by silicification and argillization.

Three samples of silicified, limonite-stained sandstone, associated with quartz fine veins from the Changombe North by the current works chemically show that less than 0.07 gramme of gold per ton, 2 to 80 grammes of silver per ton, 0.08 percent copper in maximum, 0.01 to 0.05 percent lead and 0.02 to 0.07 percent zinc.

(ii) Chiume Hill Mineralized Zone

Chiume Hill (Kalume Hill), Mineralized Zone is situated at about midway between Kinagoni Hill and Ribe Village. Water supply facilities to Mombasa are installed on the crest of the Hill.

Chiume Hill Mineralized Zone occupies the southern terminal of the mineralized zone, which extends from the Kinagoni mine district to Kaya Kambe and further south-westward. Extensive soil-geochemical research works, to cover an area from Jibana environs to Ribe environs, have ever been strenuously implemented in 1964-1967 by the Mines and Geological Department of Kenya to show geochemical lead anomalies in the area from the Kinagoni mine district to Kaya Kambe and furthermore. The zone is also situated at the southern terminal of the geochemical lead anomaly of more than 50 ppm lead. The geochemical anomalies are locatedly shown along an inferred fault of NNE-SSW extension and have been evaluated to represent an

geological genetical influence to an occurrence of lead-zinc-barite ore veining mineralizations along the fault.

Consecutive diamond drill works to follow-up the above soil-geochemistry have been operated to reveal the occurrences of lead-zinc ore mineralization upto Kaya Kambe, however, the operation coverage did not reach to Chiume Hill.

A fault runs in the eastern slope of Chiume Hill to provide such a geological setting that limestone beds of Kambe Formation occur in eastern side of the fault, while, sandstone beds of Middle Member of Mazeras Formation occur in western side of that. Outcrops and floats of gossanous materials, silicified, hematite-stained and very hard, are observed near by the Hill crest in western side of the above fault. Gossanous materials are extended in an area of about 100 m long north-southerly and about 30 m wide east-westerly, relatively limited.

(iii) Ribe Mineral Showing

Ribe Mineral Showing, newly discovered by the current second-year works, is situated on the hill crest, 0.5 km easterly from Ribe Village. The Showing has an extension of about 400 m long and 50 m to 80 m wide, NNW-SSE directionally. The showing is very closely situated to NE-SW-trending faults, which are considered to be closely related to the ore mineralization, as shown in Figure 2-3-3. Wall rock of the Showing is of sandstone beds of the Middle Member of Mazeras Formation. Wall rock is subjected to silicification and argillization to show a white appearance and is iron-oxide-stained. It is also partly brecciated intensely. General facies appearance of the Showing is noticeably similar to that of the Changombe North. Sericite and kaolinite were identified in altered rocks by X-ray powder diffraction. General occurrence of ore minerals in the Showing on ground surface is invisible by unaided eye after most-possible leaching by weathering. Chemical assay values of altered rock specimens of Ribe Mineral Showing are shown in Table 2-3-1. A small amount of plumbogummite, a secondary mineral, frequently observed in lead ore bodies, has been identified in altered rock by X-ray powder diffraction to likely show an associated occurrence of lead ore mineralization. Remarkable concentrations of ore minerals of economic significance are not discernible in the Showing.

Table 2-3-1 Results of Chemical Analysis of Altered Rocks in Ribe Mineral Showing

	Gold g/T	Silver g/T	Copper %	Lead %	Zinc %	Sulphur %
B043	< 0.07	< 2	0.002	0.006	0.004	0.229
B046	< 0.07	< 2	< 0.001	0.002	0.001	0.050
B048	< 0.07	2	< 0.001	0.002	< 0.001	0.028
B049	< 0.07	< 2	< 0.001	0.002	< 0.001	0.030
B050	< 0.07	< 2	< 0.001	0.001	< 0.001	0.038
G006	< 0.07	10	< 0.001	0.001	0.003	0.033

g/T : gramme per ton
% : percent

(iv) Others

An occurrence of ferruginous concretions, which are considered to have been formed by a concentration of iron in soils of weathered limestone beds, is observed in superficial soils of Kambe Formation in eastern end of the Area. A chemical value of a concretion, sample-numbered A005, shows 27.3 percent of iron, 0.354 percent of manganese, 0.122 percent of lead and 0.094 percent of zinc. Concentration of manganese, lead and zinc is shown in accordance with that of iron. The spot was ever pointed out to be a chemical anomalous zone of significance related to lead and zinc ores. It is also considered by the current work that a concentration of lead and zinc in the spot is possibly caused by a concentration of heavy metal elements in relation to a forming of ferruginous concretions in weathered residual soils of limestone beds coverage and could not be by vein ore mineralization directly.

A silicified rocks zone, about 300 m long and about 70 m wide, located on a ridge about 500 m west from Ribe Mineralized Zone, NNW-SSE directional, has been specified by the third-year work of the current programme in a progrocess of geological reconnaissace in the vicity of Ribe Mineralized Zone. Silicified rocks zone show a similar extension and scale to Ribe Mineralized Zone. Occurrences of ore minerals of significance have not yet been discernible by unaided eye.

(2) Results of diamond drill exploration

Four diamond drill holes, 602.90 m deep in total, were operated in Ribe Area, meanwhile, one hole, 152.20 m deep, was in Chiume Hill Mineralized Zone and three holes, 450.70 m deep in total, were in Ribe Mineralized Zone.

(i) Results of diamond drill exploration in Chiume Hill Mineralized Zone

a) Outline

Location of Chiume Hill Mineralized Zone drill operation site, geological map of the site environs and geological cross-section with drill hole log are shown in Figure 2-3-4, specifications of drill operation are tabulated in Table 2-3-2.

The drill hole was westward-declinedly operated from eastern hillfoot to establish a possible right-angled intersection against the target, deep underground, of hematite-stained sandstone beds on the crest of Chiume Hill.

Table 2-3-2 DDH in Chiume Hill Mineralized Zone

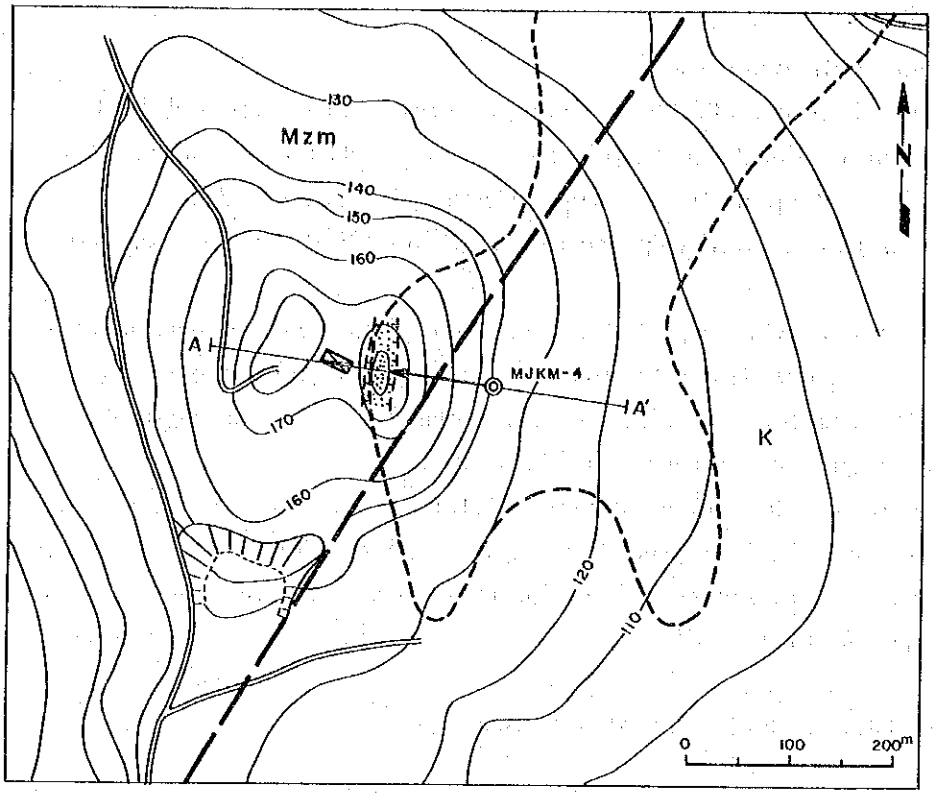
Hole number	Hole direction	Hole depression	Site elevation above sea level in metre	Hole depth in metre
MJKM-4	N82 ° W	- 50 °	140.5	152.20

b) Geology by drill hole

The occurrence of Karroo-Jurassic Fault was encountered at the depth of 65.4 m from ground surface, meanwhile, limestone beds of Kambe Formation are observed in upper section from the 65.4-m-depth, alternations of sandstone (dominant) and siltstone beds of Mazeras Formation are in lower section from the 65.4-m-depth. Fault fracture zones are developedly observed in both of Kambe and Mazeras Formations, meanwhile, those are at the 39.15 m - 48.80 m depth in Kambe Formation and at the 65.40 m - 79.20 m depth in Mazeras Formation.

The dip angle of Karroo-Jurassic Fault is estimated, in collation with surface geology, to be about 87 degrees eastward steeply.

Limestone beds of Kambe Formation are pale gray, massive and/or breccia-structured and are with variable facies to be associated with sand grains or fossil fragments, to be oolitic or pisolitic and

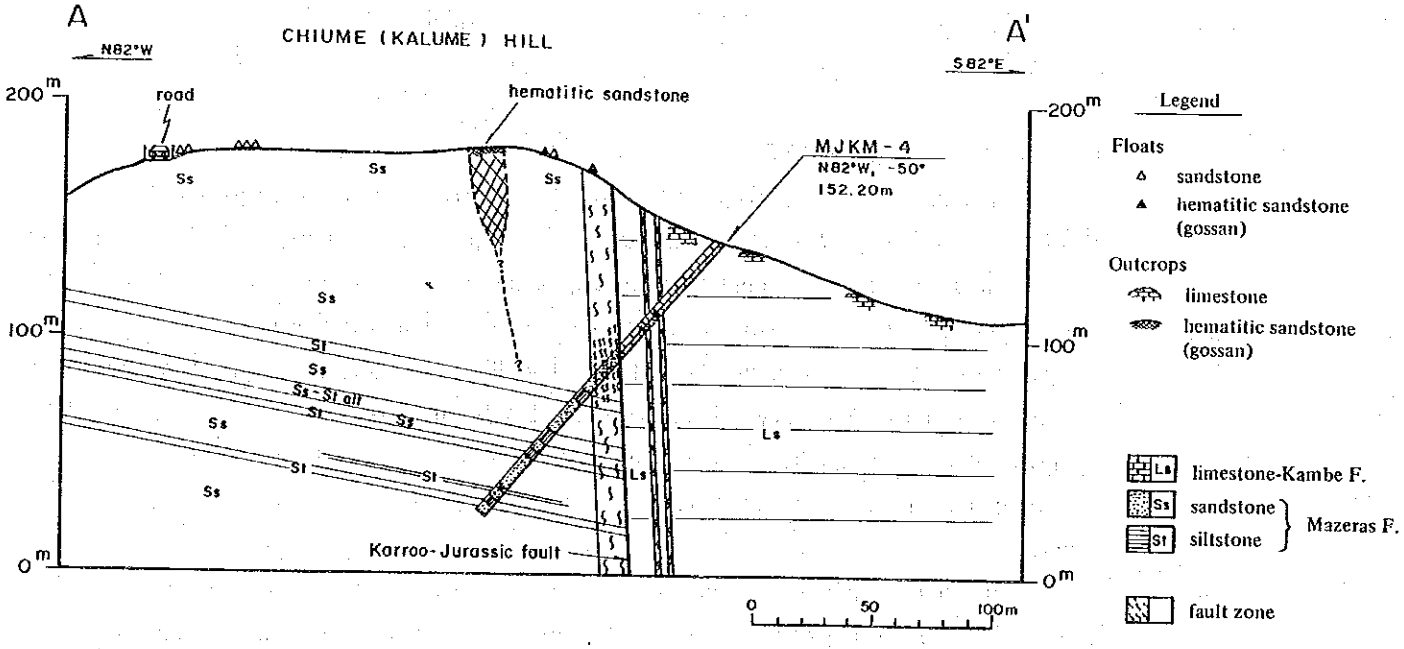


Legend

K	Kambe formation
Mzm	Middle member of Mazeras formation
	Interred fault
	Hematitic gossan zone
	Pb anomaly (> 50ppm) zone by soil geochemistry (MGD Data)
	Quarry
	Water booster station
	Diamond drill hole
A — A'	Section line

List of DDH

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



Legend

Floats
- sandstone
- hematitic sandstone (gossan)

Outcrops
- limestone
- hematitic sandstone (gossan)

- limestone-Kambe F.
- sandstone, siltstone — Mazeras F.
- fault zone

Figure 2–3–4 Location Map of the Drill Hole and Geological Section along the Drill Hole, Chiume Hill Mineralized Zone, Ribe Area

etc., with every some several-metre-thickness.

Mazeras Formation is comprised of alternations of fine-grained sandstone beds, bedded-structured and pale gray, and siltstone beds, bedded-structured and dark gray. Some of the sedements with Fraser bedding are intercalated.

c) Ore mineralization

The deep underground mineralized extension of the hematitized sandstone on the Chiume Hill crest is unlikely estimated to have been intersected by the hole. The hole progress is estimated to have made a sufficient intersection right below down the Zone, since the hole has been operated from the eastern site of the Zone, which is estimated to be dipping eastward steely. It is likely evaluated that the targeted deep underground extension of Chiume Hill Mineralized Zone could be possibly limitedly protracted as shown on ground surface in a form of discontinuous extension of outcrops and floats of ore showing.

No ore specimens were collected from the drill cores of the Hole.

(ii) Results of diamond drill exploration in Ribe Mineralized Zone

a) Outline

Three diamond drill holes, 450.70 m deep in total, were operated for an objective to scout up deep underground mineral occurrences of Ribe Mineralized Zone, which forms a ridge nearby sites. Drill holes were operated west-declinedly from eastern hillfoot to establish right-angled intersections to the targets.

Specifications of drill operation are tabulated in Table 2-3-3.

Table 2-3-3 DDH in Ribe Mineralized Zone

Hole number	Hole direction	Hole depression	Site elevation above sea level in metre	Hole depth in metre
MJKM-5	S75 ° W	- 50 °	157.5	150.50
MJKM-6	S75 ° W	- 50 °	138.0	150.10
MJKM-7	S75 ° W	- 50 °	114.5	150.10

b) Geology by drill hole

Locations of drill operation sites in Ribe Mineralized Zone and geological map of the site environs are shown in Figure 2-3-5, while, geological cross-sections with drill hole logs are in Figure 2-3-6.

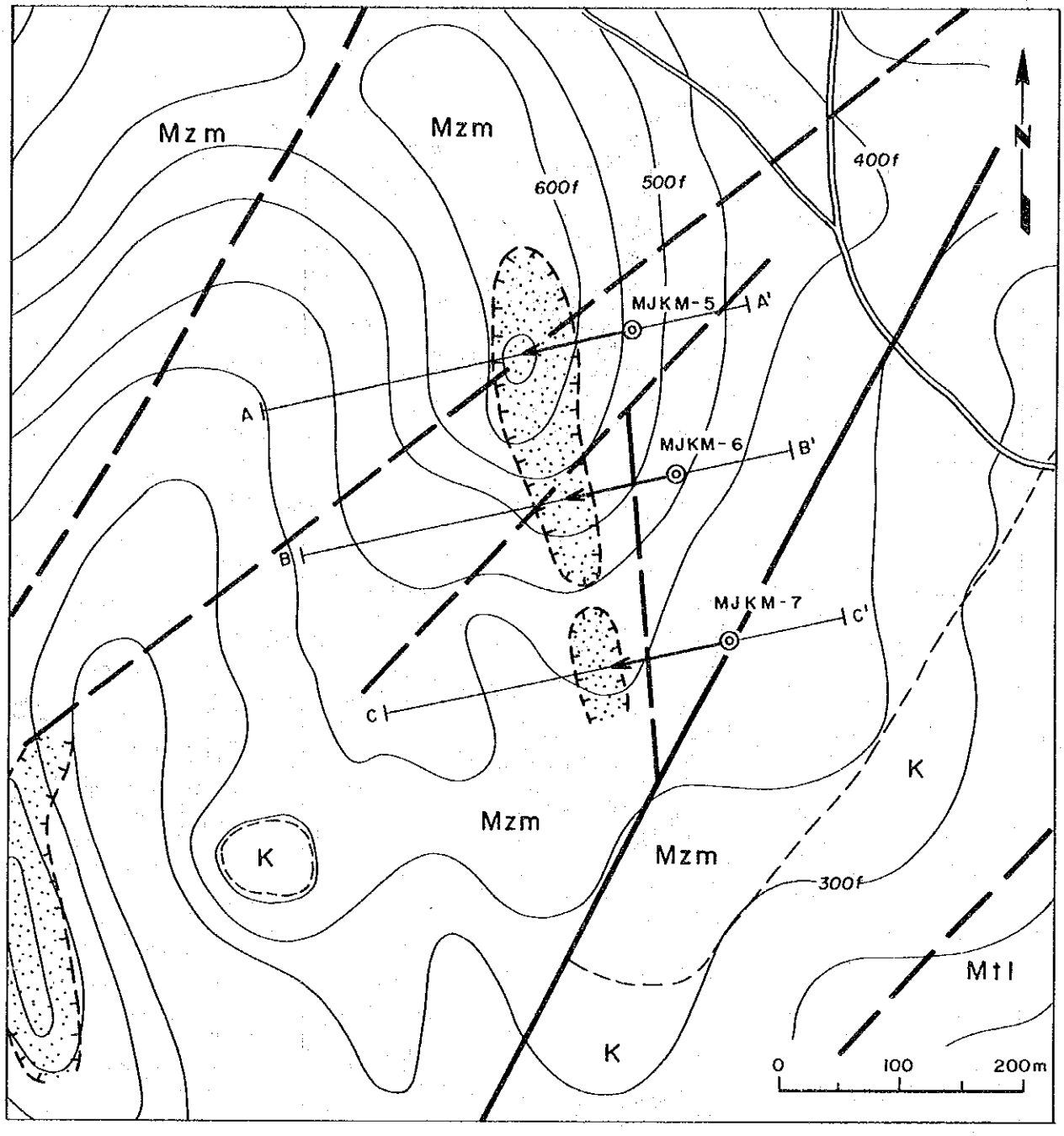
General geology by the current drill holes is chiefly comprised of talus sediments, Mazeras Formation and fault fracture zones.

Talus sediments are chiefly comprised of clay, silt and sand, associated with pebbles-boulders of limonite-stained and altered sandstone. Hole MJKM-5 shows the thickest occurrence of the talus sediments, about 25 m to 26 m thick.

Mazeras Formation chiefly consists of sandstone beds, intercalated by siltstone beds. The general facies of the Formation in Hole MJKM-5 is largely different from that in Holes MJKM-6 and -7. The facies of the Formation shown by Hole MJKM-5 is considered to be of the typical one to show that sandstone beds are variable to be fine- to coarse-grained, bedded-structured or massive, meanwhile, siltstone beds are also variable to be bedded-structured or massive and gray to dark gray. Occurrences of Fraser bedding, consists of fine alternations of silt laminas and fine-grained sandstone laminas, are also observed. Mazeras Formation, observed in Holes, MJKM-6 and -7, is estimated to show a transitional facies, which is generally observed nearby the boundary of Mazeras and Kambe Formations. The facies shows to be comprised of silty sandstone beds, extremely poor-sorted, associated with pebbles, and sandy siltstone beds, bedded-structured mostly, massive and dark-coloured. Mazeras Formation in hole MJKM-7, which is limitedly altered, chiefly consists of sandstone and siltstone beds, which yield marine-like fossils and are generally calcareous.

Silicification, pyrite dissemination and kaolinitization are observed in Mazeras Formation. Silicification is well-developed in the section of 53.2 m - 85.1 m depth in Hole MJKM-5. Silicification and pyrite dissemination are widely observed in Hole MJKM-6. Discontinuous pyrite disseminations are widely observed in Mazeras Formation of Hole MJKM-7, meanwhile, silicification with fine pyrite veinings is observed in about 5-m-section at the hole bottom.

Fault fracture zones are observed in Holes MJKM-5 and -6. The zone in Hole MJKM-5 is comprised of black clay, about 5 m thick, associated with sandstone breccias and with abundant pyrite



LEGEND

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

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

Figure 2–3–5 Location Map of the Drill Holes, Ribe Mineralized Zone, Ribe Area

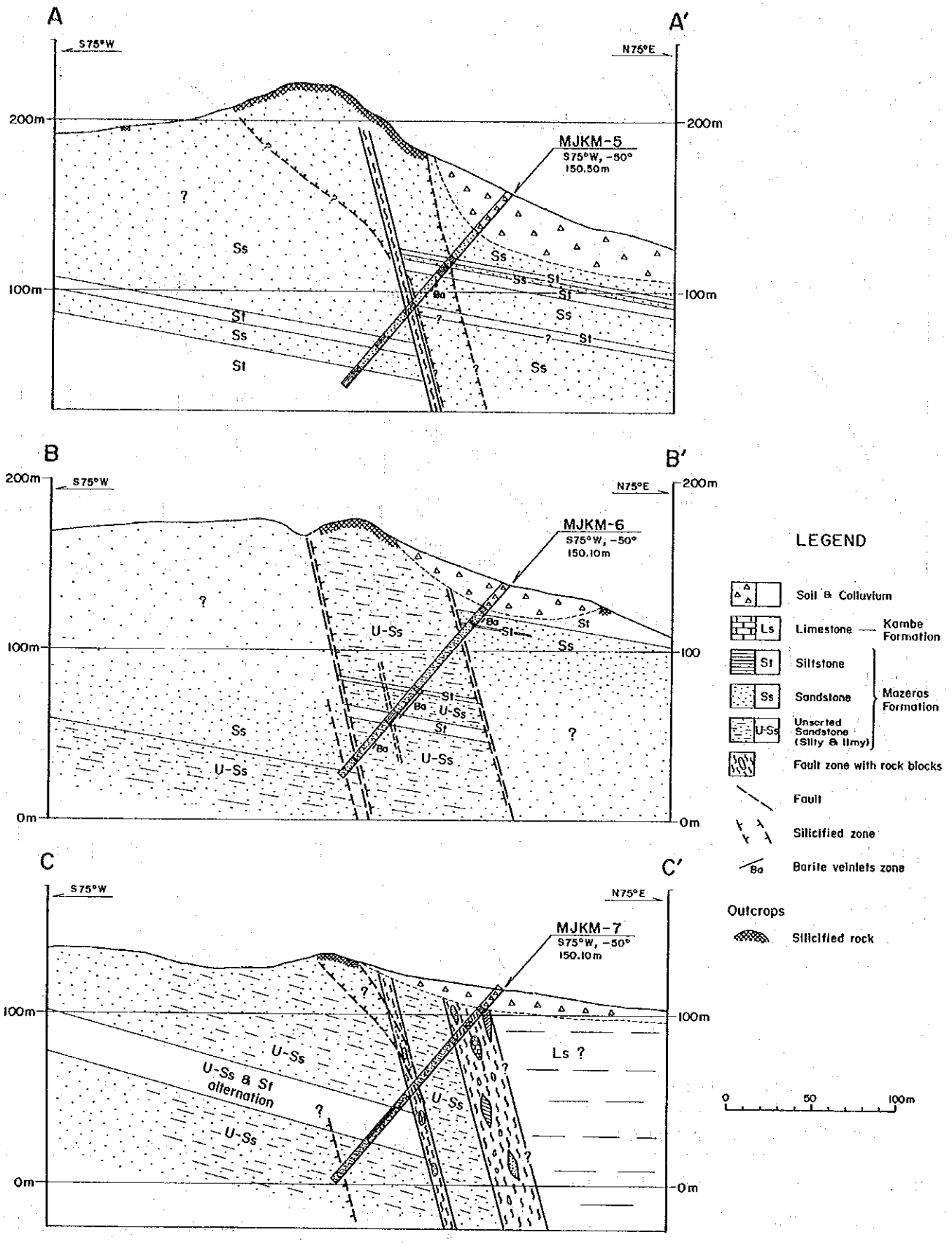


Figure 2-3-6 Geological Sections along the Drill Holes, Ribe Mineralized Zone, Ribe Area

disseminations. The fault fracture zone in Hole MJKM-7 at the depth of 15.4 m - 46.4 m is inferred to coincide with the occurrence of Karroo-Jurassic Fault, which demarcates the boundary of Kambe and Mazeras Formations. The zone is estimated to be more than 25 m wide, where cores of limestone, sandstone and siltstone blocks, cemented by fault clay, 1 m to 3 m thick, are observed. Pyrite disseminations are observed in unoxidized fault clay. The fault fracture zone in Hole MJKM-7 at the depth of 70.9 m - 84.0 m, comprised of fault clay with sandstone and limestone blocks, are observed in Mazeras Formation. The zone is widely pyrite-disseminated and partly silicified.

c) Ore mineralization

Hole MJKM-5

Several occurrences of fine veins of barite, less than 5 mm long, are observed in open cracks in silicified rock. Fine veins, 1 mm to 5 mm wide, of pyrite-quartz and pyrite-calcite are also observed in silicified rock and sandstone, directly below the fault. Additional minerals of significance have not yet been discernible by unaided eye.

Wall rock alterations of silicification, pyrite dissemination and kaolinitization are observed in upper section from the fault.

Geological collation of the drill core logs to surface geology is shown in Figure 2-3-6. Silicification is widely observed on ground surface, while, is likely limitedly shown inversely in underground to produce a funnel-like configurational occurrence.

Hole MJKM-6

Abundant disseminations of barite, less than 5 mm long, are observed in open cracks in silicified rock with a similarity to Hole MJKM-5. Barite disseminations are observed in fine veins, 1 mm to 3 mm wide, associated with pyrite and kaolin mineral. Additional minerals of significance have not yet been discernible by unaided eye.

Wall rock alterations of silicification, pyrite dissemination and kaolinitization are observed, meanwhile, kaolinitization is dominant in upper section from the 42.0-m-depth, silicification and pyrite dissemination are in lower part from that.

Hole MJKM-7

A single occurrence of barite dissemination, less than 3 mm long, and pyrite-kaolin mineral occurrences in cavities in silicified sandstone breccias at the depth of 50.30 m - 50.50 m are

observed. Additional minerals of significance have not yet been discernible by unaided eye.

Wall rock alterations of silicification, pyrite dissemination and kaolinitization are observed. Pyrite disseminations are commonly observed in fault fracture zones. Silicification and pyrite fine veinings to be a sole noticeable alteration in the Hole are observed in the section, 6.5 m thick, nearby the hole bottom.

d) Results of chemical assay of ore

31 ore specimens from Hole MJKM-5, 43 from Hole MJKM-6 and 16 from Hole MJKM-7 were collected for chemical assay. Those ore specimens chiefly consist of silicified rock with barite fine veins, and pyrite-disseminated silicified rock and fault clay.

Chemical assay results are likely evaluated to be generally discouraging to show abundant weak showings of barite mineralization in silicified rock, 0.1 to 0.6 percent barium, and a weak showing of zinc ore mineralization in fault clay in the specimen KM5-A29, 0.3 percent zinc.

(3) Interpretation

The general geological structural characters in Ribe Area, as shown below, have been clarified by the results of geological reconnaissance works in the first- and second-year programmes to establish a conclusion that the Ribe Area could be likely evaluated to be encourgedly potential of an occurrence of vein ore mineralizations. Thus, implementations of diamond drill operations have been conducted in the Area by the third-year programme.

i) Faults, NE-SW directional, which are estimated to be closely related to the forming of lead-zinc ore vein mineralizations, are well-developed in the Area.

ii) Faults, NW-SE directional, which show an intersecting behaviour to those, the above, are also well-developed around the Area. Ribe Area is considered to be situated at the location, where both of the above faults show a manner of frequent intersections to possibly provide a favourable field of hydrothermal ore solution movements.

iii) Statistical examinations of the strike/dip values of the sediment beddings in the Area show a remarkable geological disturbance, i.e., some 64 percent of the values out of the total shows being deviated from the general, which is to be striking NE-SW and gently dipping toward SE.

iv) The district from Ribe Area to the Kinagoni mining region is considered to be located under an unique geological situation, where an intersection of tectonic structures of N-S direction, dominant in northern part of the Project Area, and of NE-SW direction, dominant in southern part, is noticeably observed.

v) Mineral and mineral showing occurrences, ever-known and newly specified, are remarkably observed in the Area environs.

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. Implementations of consecutive future works in Chiume Hill Mineralized Zone are unlikely evaluated to be deserved to warrant.

Pyrite-disseminated silicified rock beds, which are estimated to represent dounward 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 evaluated that the Ribe Mineralized Zone could likely 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.. Implementations of consecutive further works in Ribe Mineralized Zone 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.

Changombe North and Changombe South Ore Showings are likely estimated to be excluded from a future consideration of mineral exploration programming, since the exploration works of diamond drill operations and etc. of considerable scale have ever been accomplished in the Showings.

2-4 Mkangombe Area, Semi-Detailed and Detailed Works

2-4-1 Outline of works

Semi-detailed works of geological reconnaissance and geochemical exploration and etc. were carried out in the second-year programme, 1991, meanwhile, Detailed works of diamond drill exploration were implemented in the third-year programme, 1992, in Mkangombe North Ore Showing in Mkangombe Area.

Semi-detailed works consist of geological reconnaissance works of a 147 km extension, soil geochemistry by 452 specimens in an area of 196 sq. km and four trenching prospects, extending 50 metres long.

Detailed works consist of diamond drill operations for a purpose of the explorations in deep underground of Mkangombe North Ore Showing, which is of quartz-base metallic ore veins, to be completed by two holes, totally extended 200 metres long.

2-4-2 Results of geological research

(1) General geology

Geological map and geological cross-sections in Mkangombe Area are shown in Figure 2-4-1.

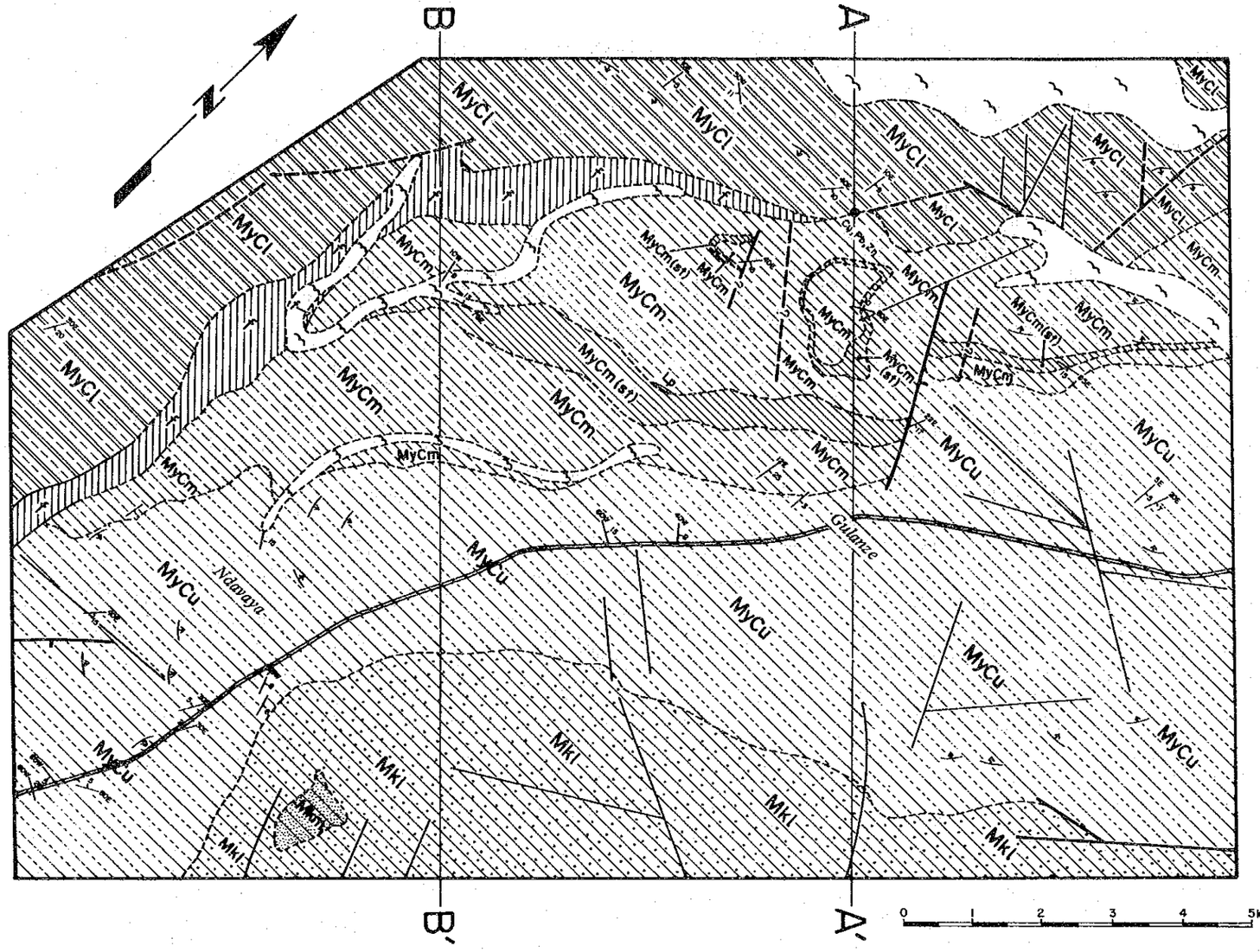
General geology in the Area chiefly consists of the sediments of Permian to Triassic ages, which are stratigraphically divided into Maji-ya-Chumvi and Mariakani Formations in ascending order from north-west toward south-east in the Area. The sediments are generally extended mostly north-east to south-west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

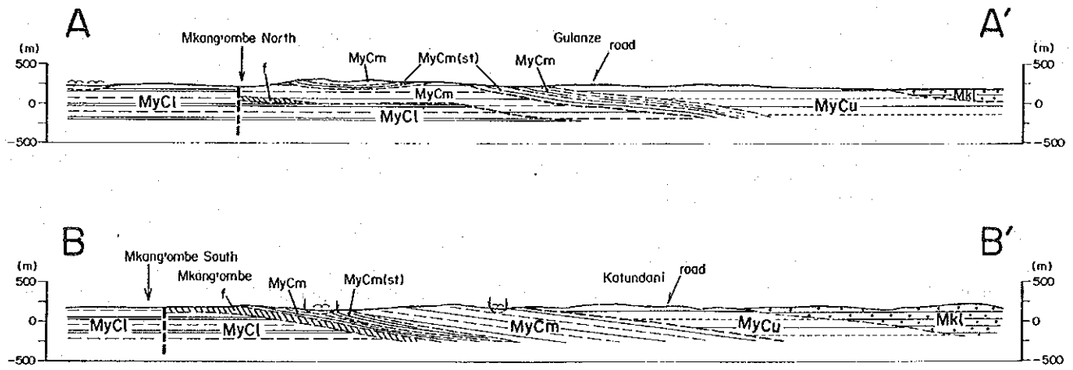
(i) Maji-ya-Chumvi Formation (MyCl, MyCm, MyCu)

Maji-ya-ChumviFormation is widely observed to cover a most part of the Area and is subdivided into Lower Member (MyCl), Middle Member (MyCm) and Upper Member (MyCu).

Lower Member (MyCl) of Maji-ya-Chumvi Formation chiefly consists of shale beds, correlated to be of Permian age and is extended 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 to show 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 chiefly consists of sandstone beds, which are frequently intercalated by shale beds, with a width of some 1 to 4 km, and are correlated to be of Triassic





LEGEND

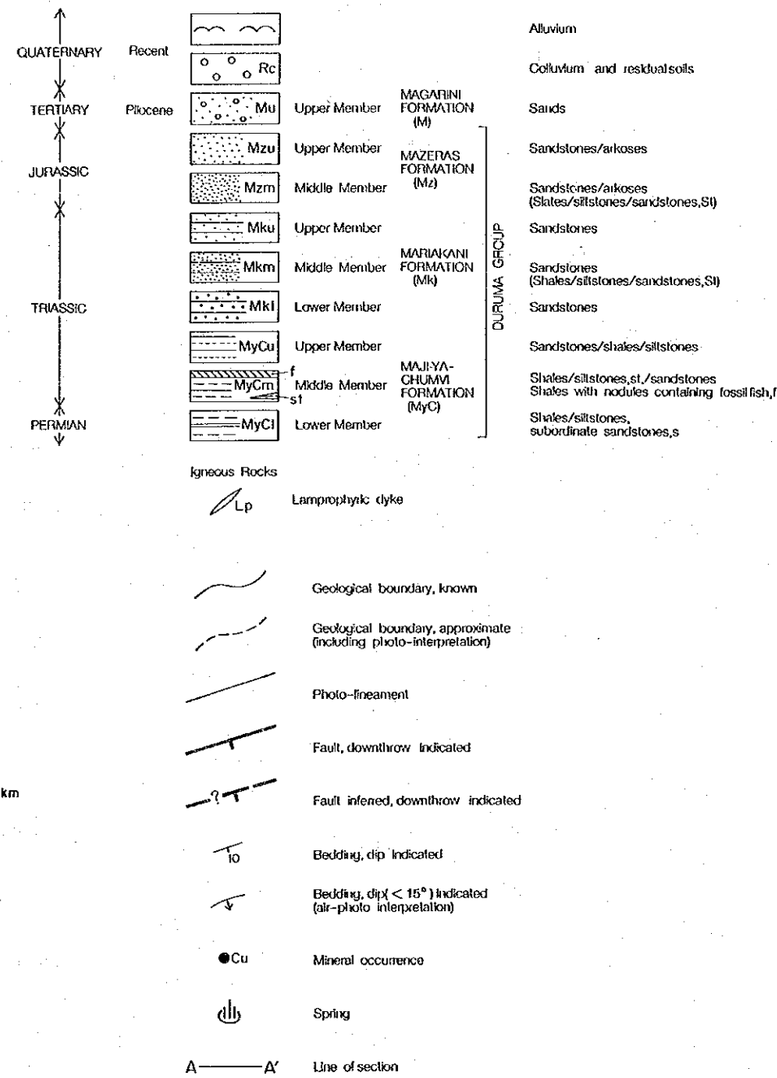


Figure 2–4–1 Geological Map of the Mkangombe Area

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 thin-bedded siliceous, micaceous portions and very-fine-grained sandstone beds.

Upper Member (MyCu) of Maji-ya-Chumvi Formation chiefly consists of sandstone beds, intercalated by a small quantity of thin shale beds and is correlated to be of Triassic age. It is extended 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.

(ii) Mariakani Formation (Mkl, Mkm)

Mariakani Formation is observed along the south-eastern end of the Area and is chiefly 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 chiefly 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 extended in the vicinity of hilly regions, about 2.5 km southeastward from Ndavaya Village. The Member chiefly consists of massive and fine-grained sandstone beds, yellowish. Sandstone beds in Middle Member are usually distinguished hardly from those in Lower Member.

(iii) Intrusive rock

Floats of lamprophyre, which are presumed to be moved very little off from its in-situ occurrence site, are observed in a single location in the Area. Lamprophyric intrusion in the Area is considered to be simultaneously activated to that observed in Mrima-Jombo Area and/or Mukundi environs, where its activities had

been widely erupted. Lamprophyre in the Area shows dark gray, fine-grained and compact. Microscopic examination shows that phenocrysts are of olivine and monoclinic pyroxene of less than 2 millimetres long and a groundmass is of monoclinic pyroxene and plagioclase, estimated to be of camptonitic composition.

(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.

2-4-3 Results of geochemical exploration works

(1) Specimens and indicator elements

452 soil specimens were collected concurrently with the progresses of geological route mapping in the Area.

Eleven elements, such as gold, silver, copper, lead, zinc, barium, manganese, iron, arsenic, mercury and sulphur were assayed for a major objective of the exploration of precious and base metallic ore veins.

(2) Interpretations of geochemical anomalies

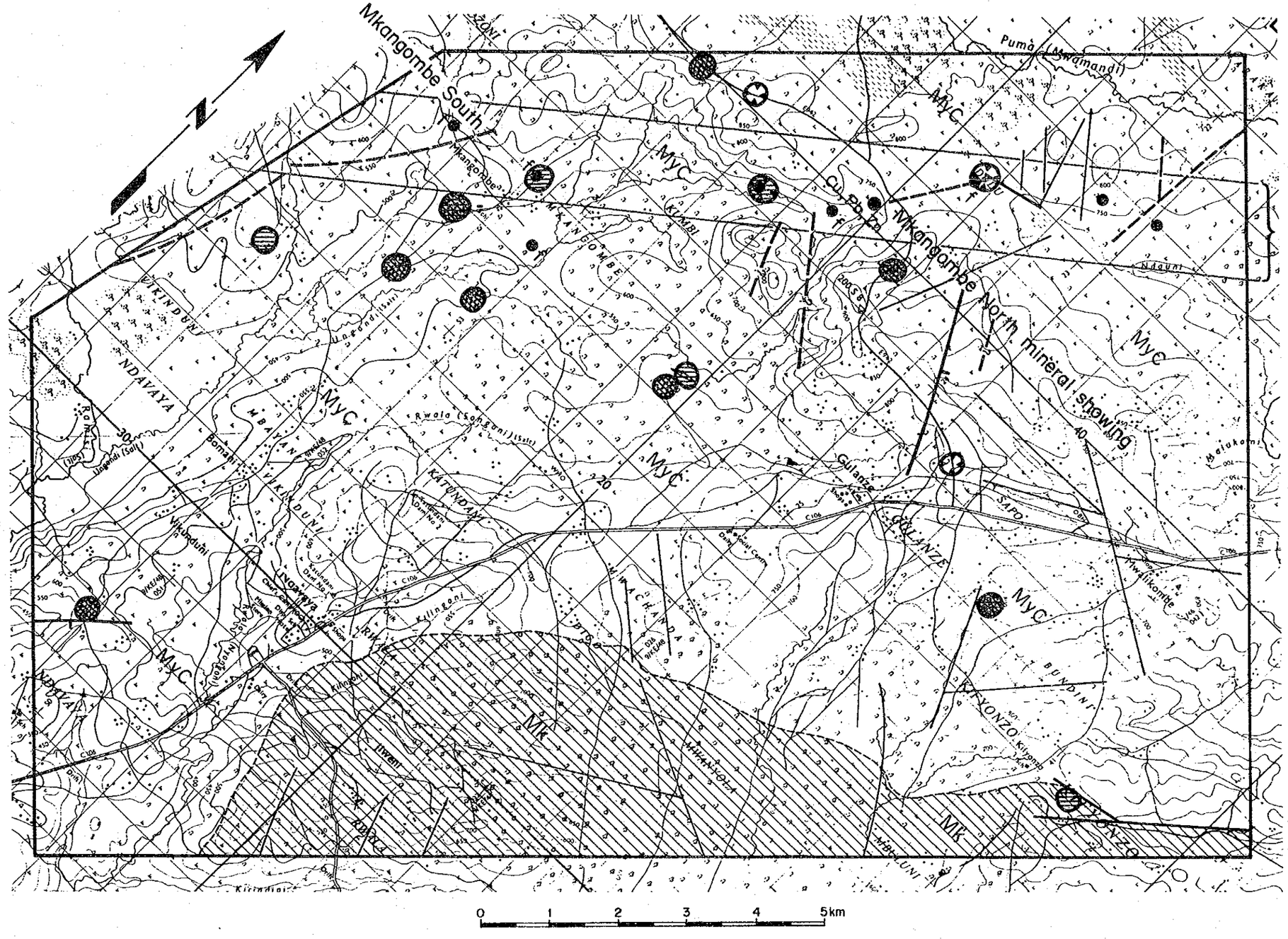
Areal representations of the geochemical anomalies of the respective elements in Mkangombe Area are shown in Figure 2-4-2.

The geochemically anomalous values of the respective indicator and pathfinder elements in Mkangombe Area are scatteredly observed overall to unlikely represent geochemical anomalous zones of significance.

Occurrences of the mineralized zones of quartz ore veins have been specified by the second-year works of the current programme in the Area. A couple of anomalous value of copper and zinc, to likely be under a possible geochemical influence of ore mineralization, is observed nearby the occurrences of the above quartz ore veins and quartz ore floats.

(3) Interpretation

The geochemical anomalous zones of significance in the Area, which are estimated to have been represented under a geochemical influence by a significant ore mineralization, have not yet been pointed out by the current works. Those are likely inferred to be significantly caused by limited occurrences of wall rock alterations to likely show less applicability of soil-geochemistry in the Area. However, further geochemical works, carried out on reconnaissance routes of short-ranged spacings in detailed scale in the



Mkangombe
Quartz Vein Zone

LEGEND

- Quartz vein (f : float)
- Cu, Pb, Zn — Metalliferous quartz vein
- Mk — Mariakani formation
- MyC — Maji-ya-Chumvi formation

Igneous Rocks

- Lamprophyric dyke
- Fault, known and inferred
- Photo lineament
- Geological boundary

Geochemical Anomaly

Element	Anomaly	Threshold
Cu		≧ 31 ppm
Pb		≧ 8 ppm
Zn		≧ 80 ppm

Figure 2–4–2 Geochemical Interpretation Map of the Mkangombe Area