

**TECHNICAL REPORT FOR THE GEOLOGY AND COPPER POTENTIAL
OF THE PROSPECTING LICENSE AT MULENGA AREA.**

**CLIENT: TANGA SURVEYOR AND EXPLORATION LIMITED
P.O. BOX , DAR ES SALAAM, TANZANIA**

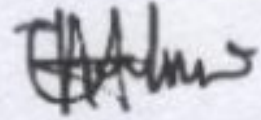
By:
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JULY 2014

DATE AND SIGNATURE PAGE

Dated effective:
July, 2014

Signature:



Signed: Machumu M. Godfrey
Geologist (BSc Applied Geology)

1.0 INTRODUCTION

This report was prepared to give a technical overview and establish a preliminary resource estimation of the copper mineralization at the Mulenga property area and **TANGA SURVEYOR AND EXPLORATION** of P.O. Box Dar Es Salaam - Tanzania has 100% interest in the property. The present report was prepared by MACHUMU GODFREY of P.O. Box 1966, Dodoma under the request of **TANGA SURVEYOR AND EXPLORATION (TSE)** of P.O. Box Dar Es Salaam - Tanzania.

The author was accomplished a site visit to the property area on 11 July to 20 July 2014, also during site visit works that were conducted are geological investigation of copper occurrences and delineation lithologies and structures related to copper mineralization, establish a preliminary resource estimation, finally to produce a technical geological report of the area under the license.

The works involved during the geological survey were includes the study of geological set-up and types of rock formation (petro-genesis) and sample collection for laboratory investigation and examine the geomorphological features related to occurrences of copper mineralization in the property area.

In addition to the site visit, the author carried out a study of all relevant parts of the available literature and documented results concerning the project. The reader is referred to these data sources, which are outlined in the "Sources of Information" section of this report, for further detail on the project.

1.1 CONDITIONS AND DISCLAIMER

The author disclaims any loss or damage that can result from utilization of this report without carrying independent decisions. The Company has to use this information as guideline on making decisions.

1.2 OBJECTIVE OF GOLD EXPLORATION

Mapping exploration program is the first program to be undertaken, so that is successful aims to establishment of a new copper/or delineation of existing copper mine into previous unexplored area.

The main objective of this exploration program is to delineate the nature, location and the extent of copper mineralization/or occurrence and to identify geological feature that favours formation of copper mineralization.

Basically, the exploration program was based on the following concepts:-

- ❖ To delineate zones of copper mineralization, establish possible extension of concealed ore bodies.
- ❖ Carry out geological survey to examine the geo-morphological features related to availability of potential occurrences of copper in PL located at Mlenga village - Tambi, Mpwapwa/ kilosa Districts.
- ❖ Carry out laboratory analytical works to testify the distribution of copper mineralization in the property area.
- ❖ Carry out economic evaluation of copper and to establish preliminary resource estimation and as well as to provide technical and professional recommendations and follow up detailed investigations.

1.3 SOURCE OF INFORMATION

The present report is relied, on technical reports available at GST, maps, published reports, Prospecting licenses (PL) and public information as outlined in the references at the conclusion of this report. Several sections from reports authored by other consultants have been directly quoted or summarized in this report, and are so indicated where appropriate.

1.4 PROPERTY DESCRIPTION AND LOCATION

The property area is owned by **TANGA SURVEYOR AND EXPLORATION** by 100% and total area of the PL is 96.91 square kilometre. The prospect areas details are summarized in table 1.

Table 1: summary of details of PMLs

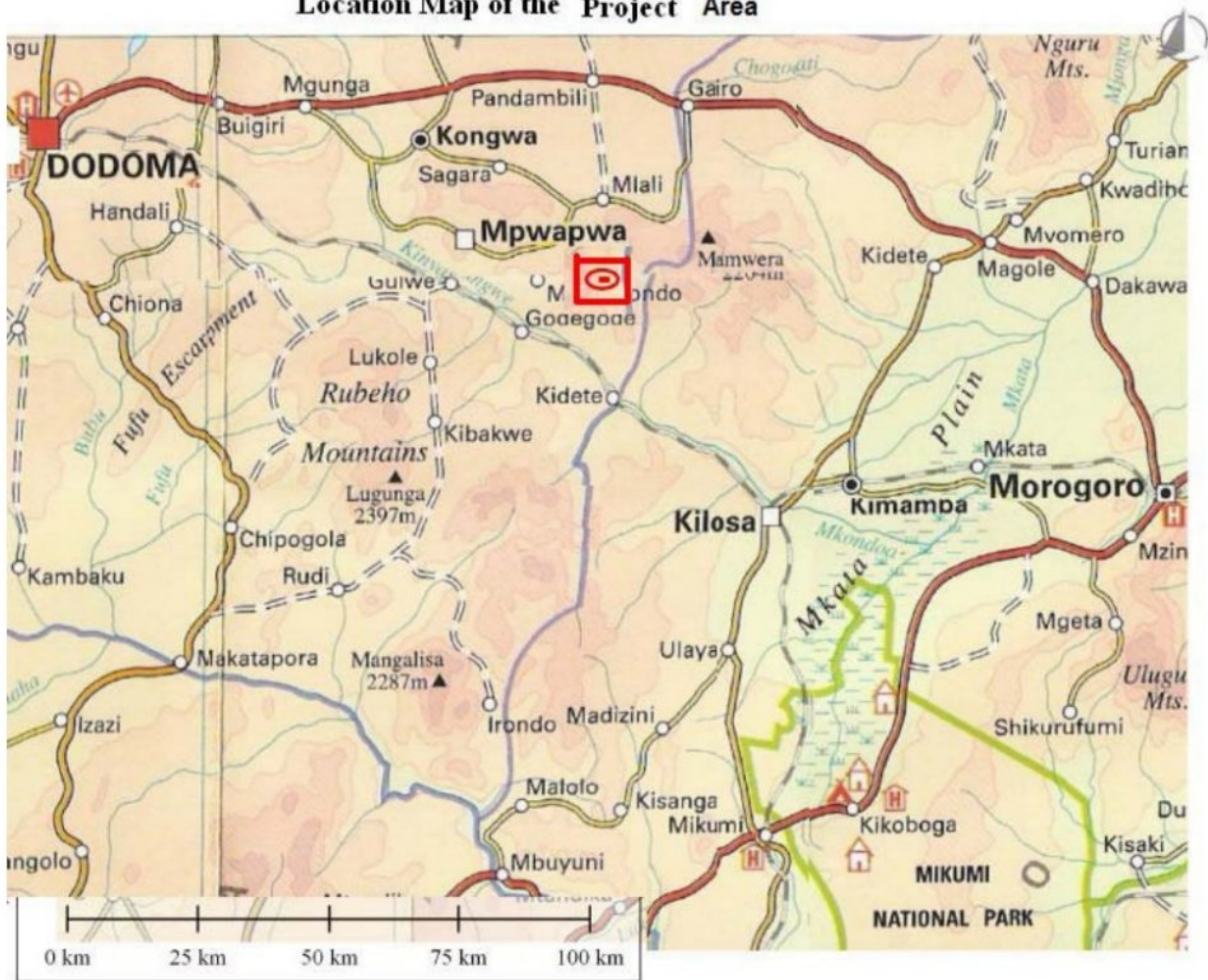
Owner	PL no.	Area	PL status		
			Grant date	Expire date	Mineral claim
TANGA SURVEYOR AND EXPLORATION	PL 002311	96.91sq km			Copper

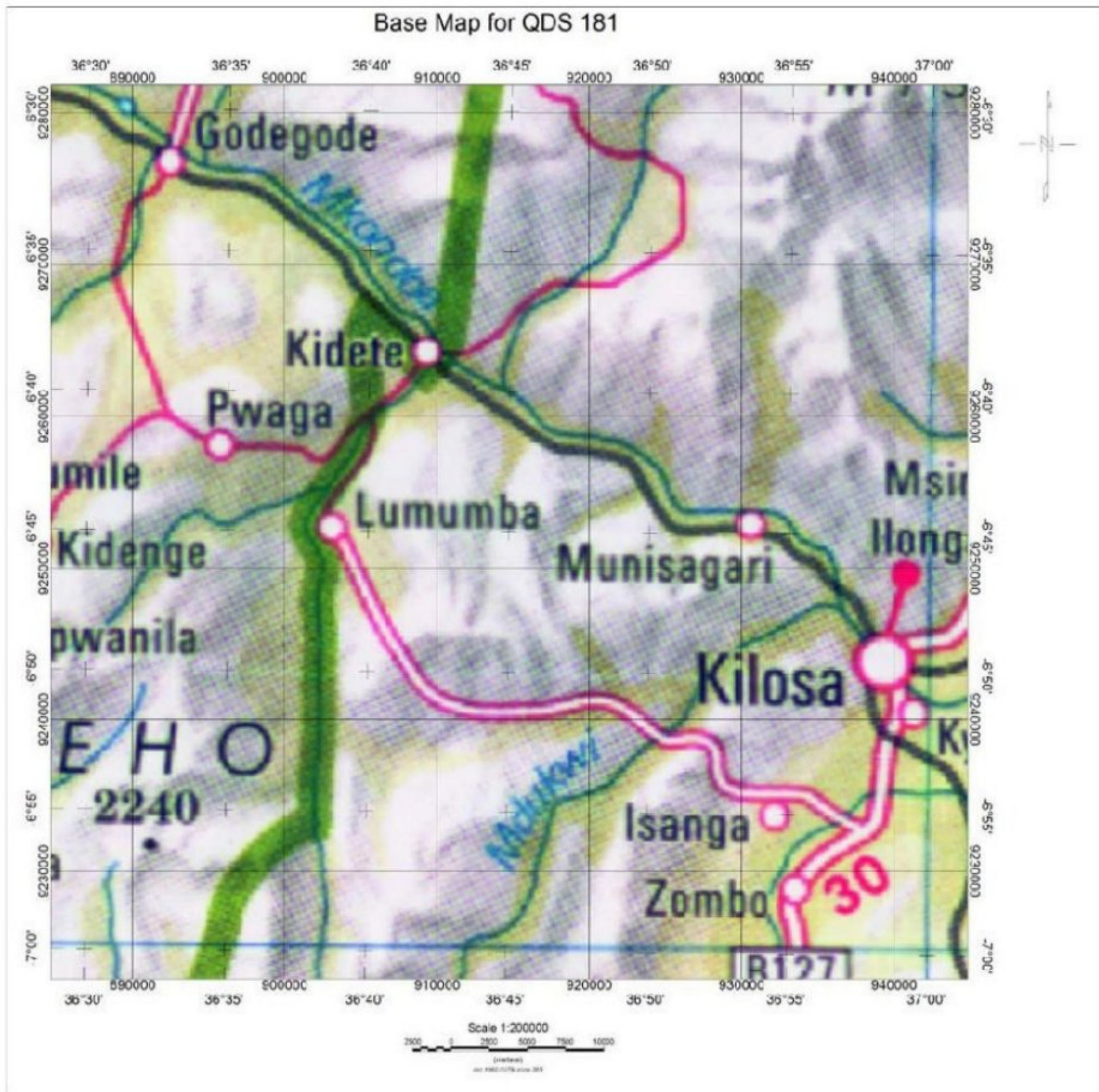
1.5 LOCATION, AND ACCESSIBILITY

The prospecting License area is located at Tambi village in Quarter Degree Sheet (QDS) 181/ in Mpwapa and Kilosa Districts, based in Dodoma and Morogoro Region, Tanzania. The property covers an area of 96.91 km² and is defined by the following geographical coordinates as presented below and the coordinates are in ARC 1960 projection (table 2).

Corner point	Latitudes			Longitudes		
	Deg	Min	Sec	Deg	Min	Sec
A:	06	30	41.20	36	37	03.33
B:	06	30	41.20	36	45	00.0
C:	06	34	20.00	36	45	00.0
D:	06	34	20.00	36	37	03.33

Location Map of the Project Area





1.6 TOPOGRAPHY, VEGETATION, DRAINAGE AND CLIMATE

The property areas is situated in Mpwapa and Kilosa districts which is tropical with high temperature in the lowland and cool in highlands and during the winter period the temperature range from 24C – 30C, low wind speed and humidity of the air.

The mean annual rainfall varies from over 2000 mm to as little as 200 mm. The principal rainfall season commence from November to mid-May. Apart from the tally grass covered Mng'alisa plain the vegetation is dominantly miombo woodland, but locally dense vegetation and scrub give

rise to thicket. Loam sand and sandy loam are prominent soil textures. In flat lowlands with poor drainage, Mbuga soils, rich in clays and organic matter, are common (Atlas of Tanzania 1976).

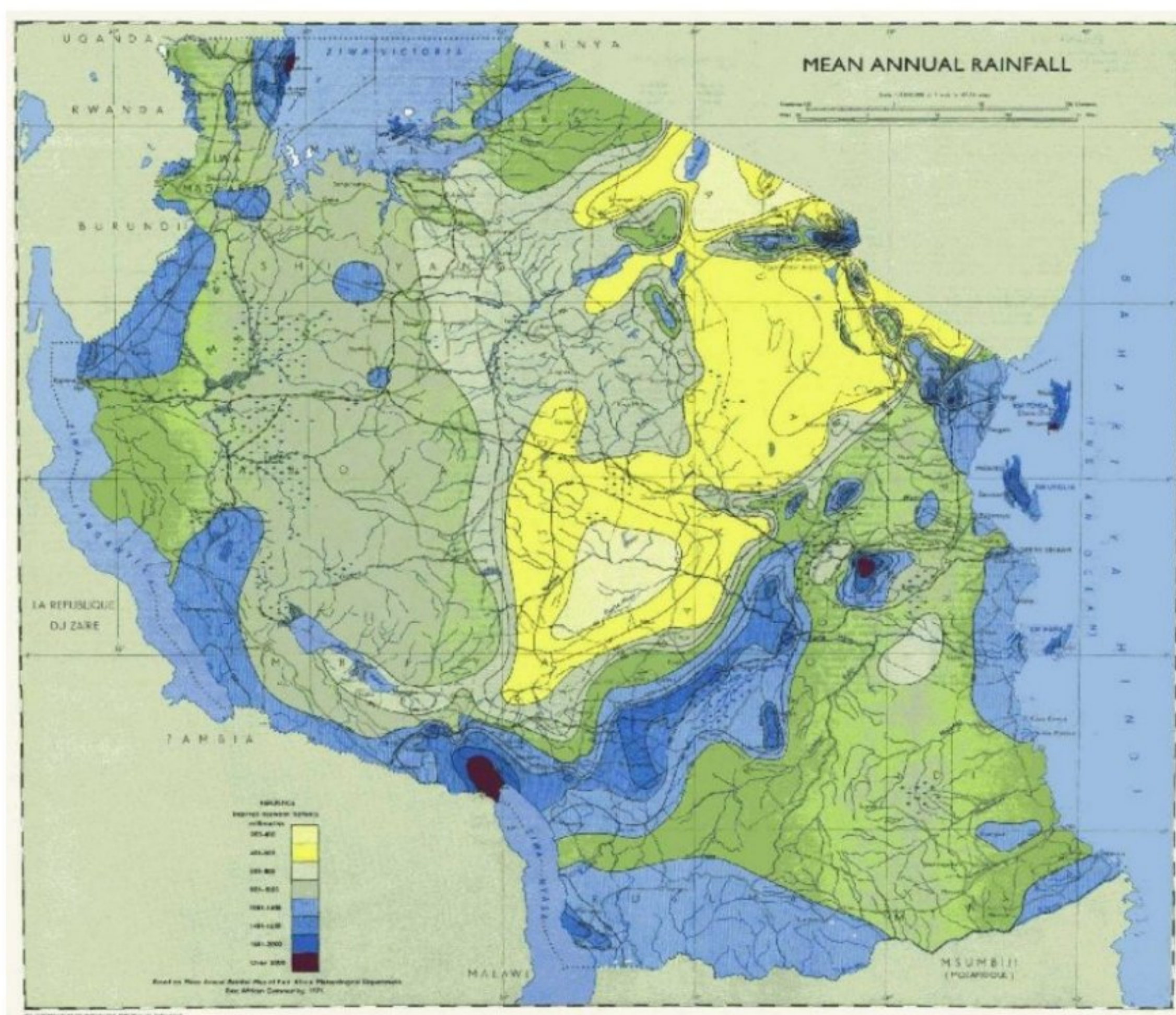


Fig 2: Mean annual rainfall (Atlas of Tanzania 1976).

1.7 HISTORICAL BACKGROUND

This section of the report describes the material that is historical in nature and as such much of the terminology used may not be in keeping with modern or current usage. In particular, copper mineralization

classifications or categories and related terms may not be considered appropriate or acceptable under current rules and regulations. However, the context of the source material has been kept intact to ensure historical accuracy and the reader is cautioned not to rely on historical information as necessarily relevant or appropriate under current circumstances.

The potentiality of the area is discussed based on the previous regional geological mapping carried out by the Geological survey of Tanzania during the year 1963 by P.M.H.Fozzard. Geosurvey International in 1976 – 1980 carried out airborne geophysical survey countrywide. The survey that comprised magnetic, radiometric and electromagnetic methods covering the entire country. Lines spacing were 1 km and tie lines 10 km while flight height was 120 m and flight direction was E – W. The Regional data processing and interpretation by Geosurvey International and as well as Uranerzbergbau delineate copper anomalous areas potential for follow up by further work.

Interest was first generated in the Mulenga hill area when mapping and field investigations by J.K Whittingham, 1959, incorporating information by N.W Eades, 1939 and B.N Temperley(QDS 181) describe copper occurrence in the prospect area; followed by artisanal miners which were mine several pits sunk into rusty zones. The investigation resulted in variation of values ranging from 1.55% up to 25% copper from sample obtained along the mafic complex which trend NW-SE.

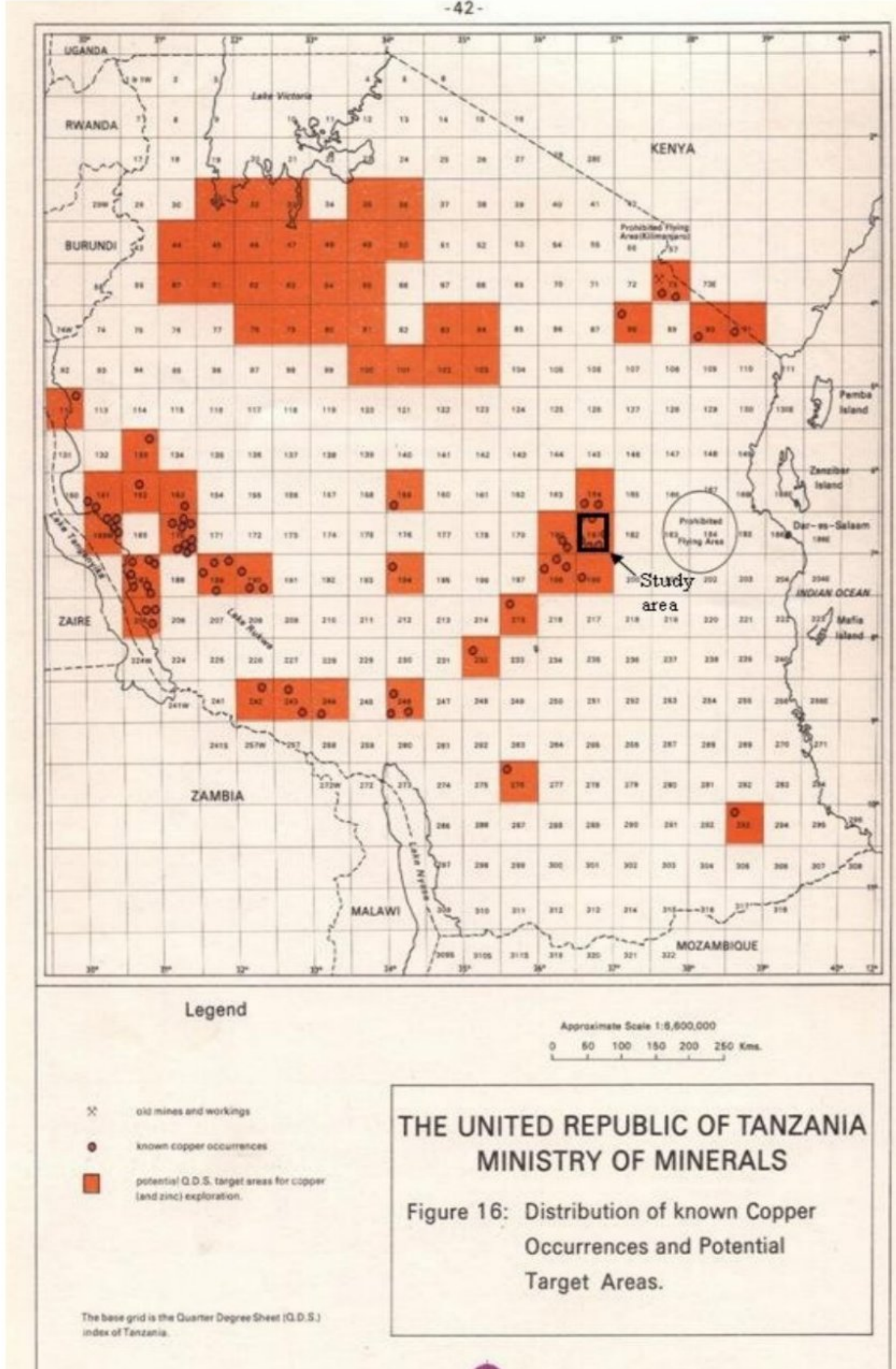


FIGURE 1: Distribution of known copper occurrences and potential targets (after Geosurvey International, 1980)

2.0 GEOLOGY

2.1 MINERAL OCCURRENCE: - COPPER OXIDE ORE

General Geology description of the country:-

In Tanzania Dodoman Greenbelt area with archean rocks of Tanzanian Craton and part to Usagaran belt .As per the geological map Tanzania Craton is bounded by the Ubendian Paleoproterozoic Terrane which is in the direction of N-W to S-W. The archean Tanzanian Craton is generally group together with the Coongo Craton to form central Africa Craton .The term supersedes older names such as Tanganyika shield .The Tanzania Craton is typical granites green stone terrain composed of extensive granitoids and generally narrow arcuate belt of greenstones.

These comprise the Dodoman, Nyanzin and Kavirondaian super groups. Most central part of the country is underlain by the Tanzania Archean Craton composed high of metamorphic terrain. And eclaves of amphibolite to granulite facies metamorphites in migmatitic granite terrain and green stone.

These green stone Sedimentary terrain has host of world class giant gold deposits and associated deposits like Copper ore The Craton formations intruded by a number of diamondiferous kimberlitic volcanic pipes and it is in Archean Craton green belt zone.

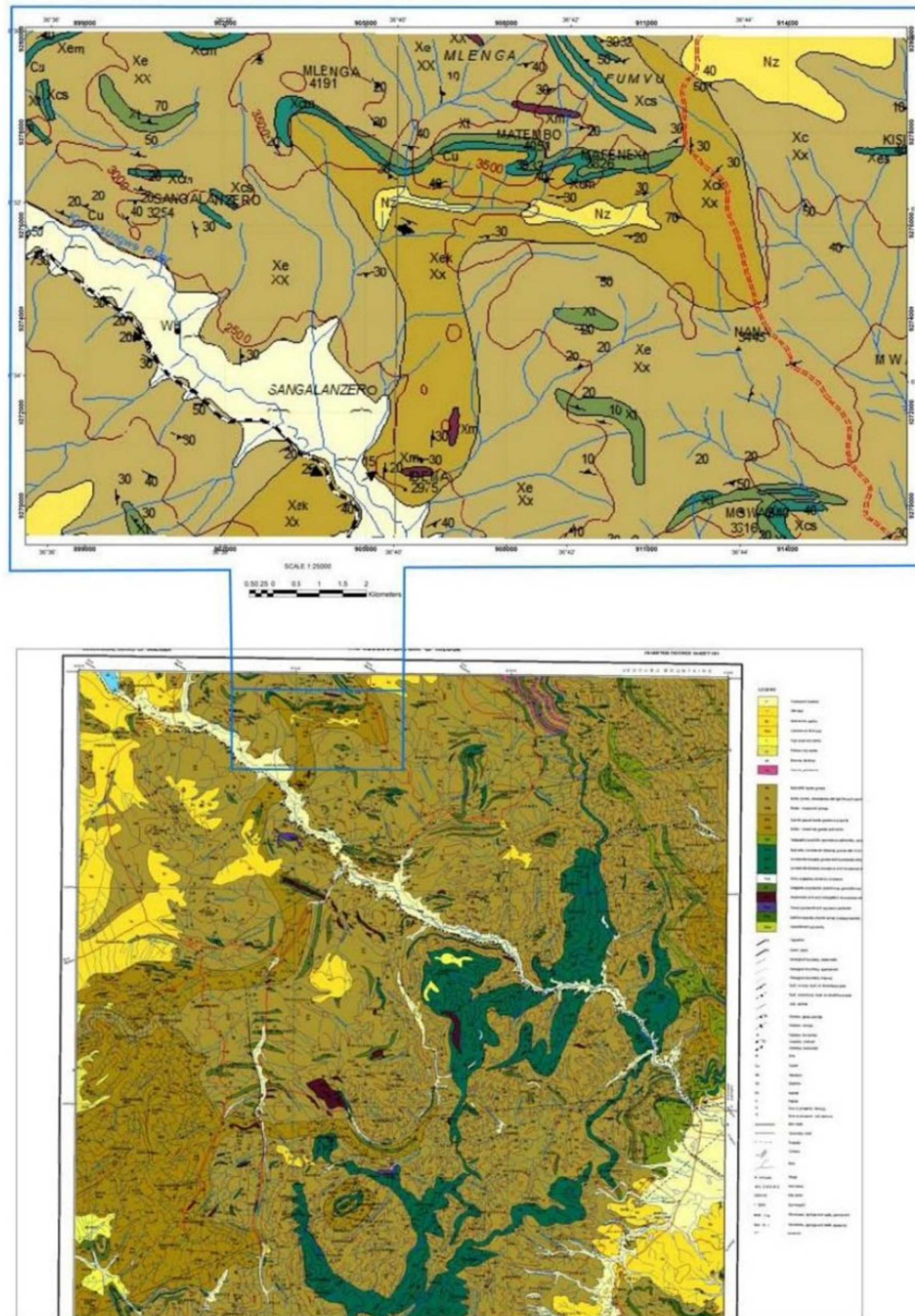


FIGURE 3: GEOLOGICAL MAP LOCATING THE LICENSES AREA

2.2 THE GEOLOGY OF KILOSA AREA

The area is composed of metamorphic which are derived from sedimentary and igneous rocks and igneous rock of Precambrian age where high grade metamorphic rocks occupy most of the area. On account of their high grade of metamorphism, they are provisionally assigned to the Dodoman (previously) termed "Granitoid Shield" and the Usagaran.

The principal rock types for that cover about 98% of the area is migmatitic biotite gneiss, which generally comprise quartz, oligoclase, microcline, and biotite. The Usagaran Massif there are crystalline rocks of variable metamorphic grade characterised by granular texture and linear structures. They are thought to consist mainly of Usagaran rocks which have undergone modification during orogenic movement.

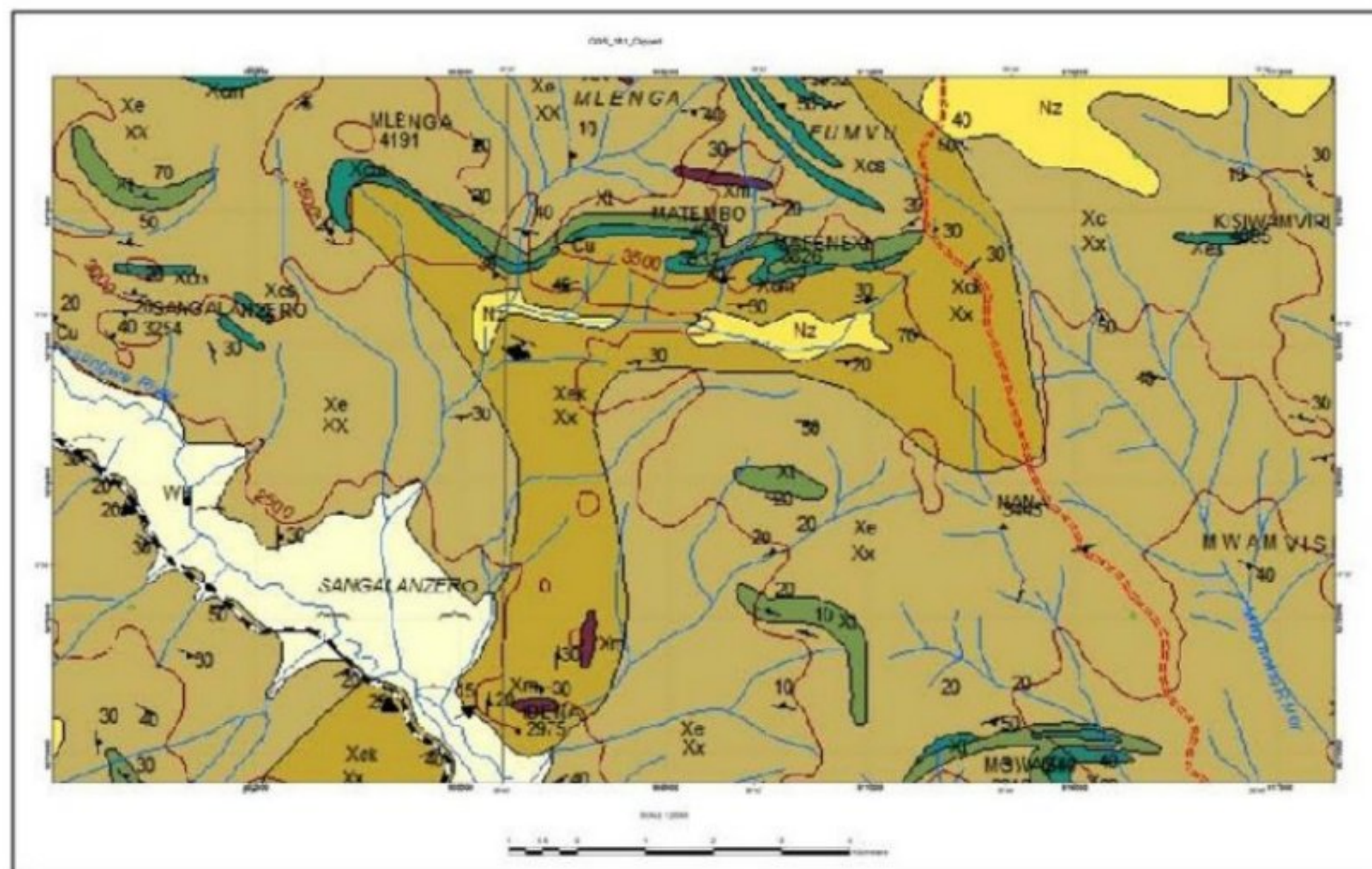


Fig: Local geology of the PL area

2.3 STRUCTURE

Two major structural trends are observed in the Kilosa area which are anticline and syncline and fault. A expansive anticline structure is

observed crosses the center of the area, the axis striking south-east along the Kinyasungwe-Mkondoa valley and pitching south-east. The south-western side of Kiboriani- Ukaguru synclinal complex cuts across the north-east corner of the area.

The fault along the Lumuma valley is lying between Kidete and Msowero is throughout derived from Precambrian origin, as shown by presence of sheared epidotized pegmatite and vermiculite schist which are typically of Precambrian fault and shears. In the rocks of Usagaran and Kilosa series, the trend is usually north-east or north, evidently established after the easterly trend. Holmes (1951) attributed these trends to the Dodoma orogeny and the Mozambique orogeny respectively and states that from the altitude of the deformed of the Dodoman rocks, it is clear that the Mozambique belt has been uplifted relative to its foreland. What is probably the front of the Mozambique Belt west of Kilosa is indicated by the occurrence of a series of zone of intense shearing marked by the development of epidotized pegmatite and vermiculite schist structures.

The geology of the concession area as described by Whittingham (1959) comprises of Kilosa series and Usagaran formation. These rocks are mainly comprising of hornblende diopside gneiss and hornblende diopside quartzite-metacalcereous, migmatitic hornblende-diopside gneiss with microcline and migmatitic-biotite-gneiss, biotite gneiss some times garnet and kyanite rocks, with sheared granular quartz veins and occasional granulites. Quartz and pegmatite veins and pegmatite are observed within the area.

Copper mineralization in the area is associated with biotite gneiss some times garnet and kyanite rocks, with sheared granular quartz veins and occasional granulites as shown in plotting licenses in the geological map QDS 181 below.

3.0 METHODOLOGY

The areas of interest were investigated on foot by zig zag traversing. The property area was traversed on foot from west to east and south to north and the location of outcroppings recorded using a hand-held GPS unit. General locations of the property area of investigation are shown on Figure 4. Descriptions of all outcrops encountered were prepared. While the geological mapping was being completed selected samples were collected for submission for laboratory preparation and for follow-up lithogeochemistry.

3.1 MINERALIZATION

The known and reported mineralization in the area is associated with quartzite vein in the plagioclase amphibolite dikes. Malachite and Azurite occur as disseminations and as stringers in the mafic and ultramafic units. Malachite is the predominant ore of copper found in this area. Other ore minerals which are found in sub-ordinate amounts included chrysocolla, azurite and chalcopyrite in some places. The minerals found in association with copper ore include quartz, hematite and magnetite.

Malachite is bright green in color with pale green streak. It shows silky, vitreous, or dull luster.

Chrysocolla is sky-blue to turquoise blue in color with white streak. It shows botryoidally and spherulitic structures. Azurite shows an azure-blue color with a light blue streak.

3.2 ORIGIN OF COPPER ORES

The copper mineralization is of the nature of the scattered and sporadic occurrences of steeply plunging narrow lenticular wide vein approximately 1-6m and impersistent stringers and veins of copper ore. The available evidence indicates that the ore deposit at Mulunga copper deposit was formed originally as an epigenetic sulphide deposit formed under hydrothermal conditions. The presence of relict sulphide minerals such as pyrite and chalcopyrite, and the constant association of the mineralization

with quartz veins the association of mineralization with acidic rocks and rocks of low grade metamorphism and the absence of Pyrrhotite-pentlandite group of minerals support the contention that mineralization took place under hydrothermal conditions. The weathering of the sulphide deposit under the climatic conditions prevalent at the site of mineralization resulted mainly in malachite.

The observation denotes that malachite can directly form at the expense of chalcopyrite rule out any possibility of solutions rich in copper migration to a level below the water table and result in the precipitation of secondary copper sulphides. It is therefore expected that the copper deposit which is represented mainly by malachite can only give way to the primary copper sulphide ore depth.

It is expected that the grade of the ore body will gradually decrease as one trace the ore body from the oxidized ore to the primary sulphide ore. It is believed that no genetic relationship exists between copper mineralization and pegmatites although in many cases they are spatially related. The close relationship between copper ores and pegmatites can be explained on the assumption that when the rock formations were subjected to faulting and fracturing to give way to the upward migration of copper-bearing solutions, the brittle pegmatites are the first among the rock formations to yield to such movements Martin et al., [17] explained the hydrothermal model, in which stated that most of the metals were derived from deep seated sources, transported upward by hydrothermal fluids and precipitated by thermo -chemical reduction of sulfate due to interaction with the sulfur bearing organic matter and the pyrite.

3.3 STRUCTURE OF THE COPPER ORE IN THE AREA :-

During the site visit made on mid May this year and mapping of the area, the copper ore body physically observed in different trenches according to the strike and dip of the ore body the observed number of vein are to be 5 (five) and the area which managed to map and pit test which the samples were analysed by GST Laboratory cover almost one-third only the rest

was not mapped due to rain season. This area will be the first explored area and the mine can be open in this area as shown in the enclosed plan no- The observed GPS readings of the ore body are superimposed on QDS map No- the strike direction and dip direction are tallied with the general strata strike direction of geological Quarter Degree survey Map (QDS)

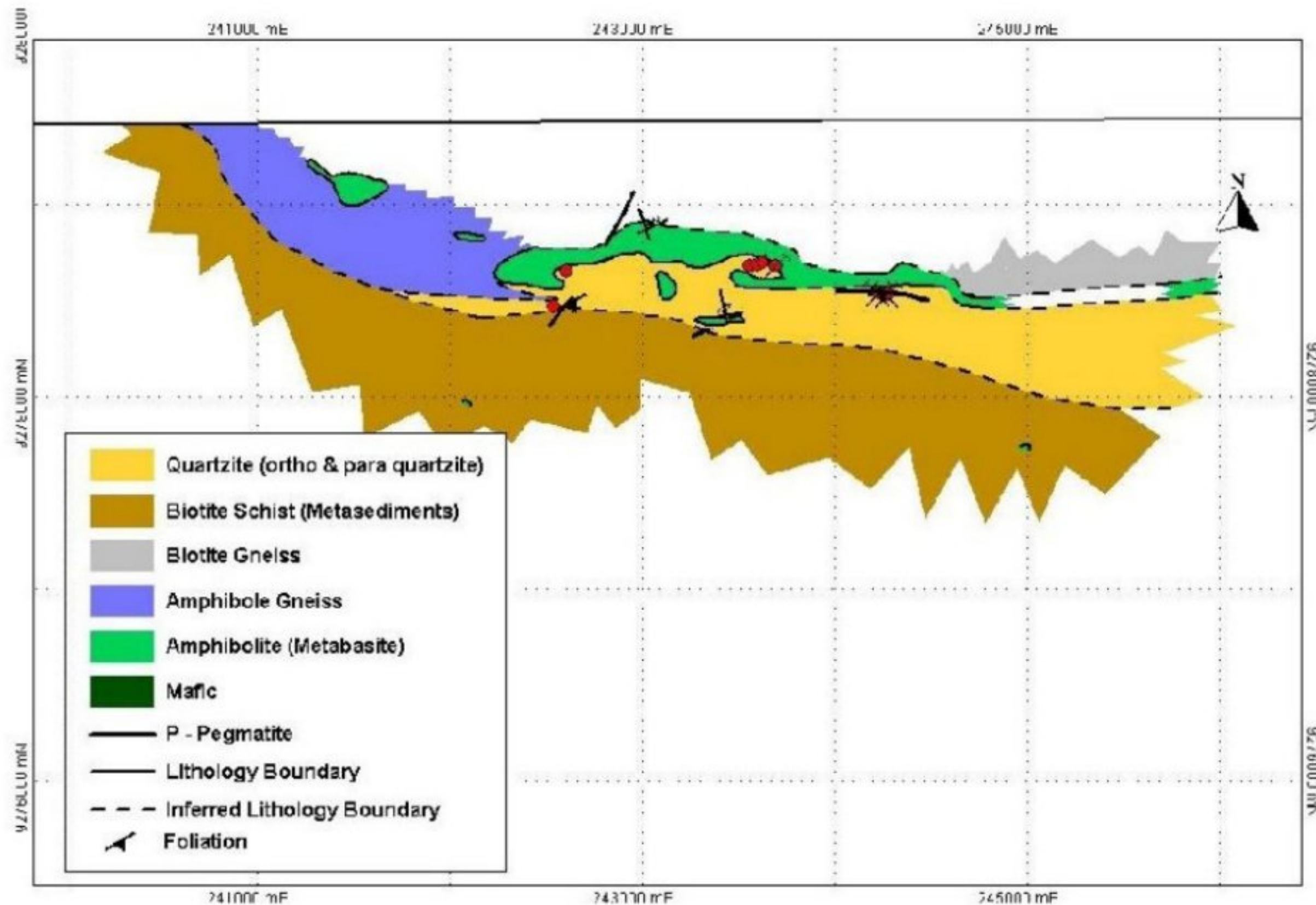


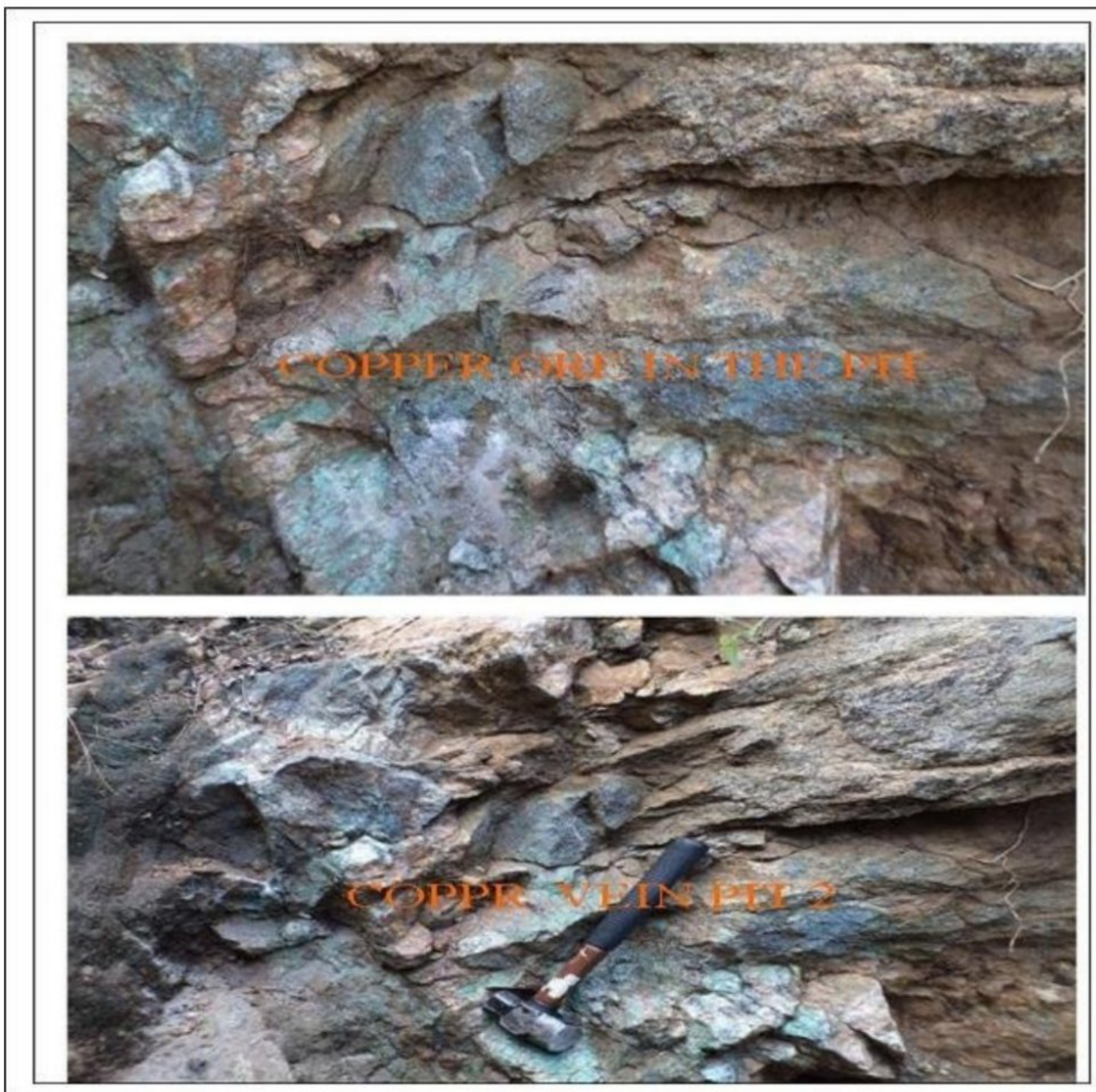
Fig : geological map on the East – West structure, Mlenga Hill Copper Property

The photographs of the ore body given below.

Description of test pit no-1:-

The pit/trench which is not shown by photo is located NW of the block and its length 5.5m and width is 3,6m and depth is 3.2m in the middle in this pit the local people are excavating the copper ore and dispatching to the local buyers in this pit the ore thickness is observed 0.9m ,full dip is 71Degrees and direction of the dip is N 58 Deg. E.

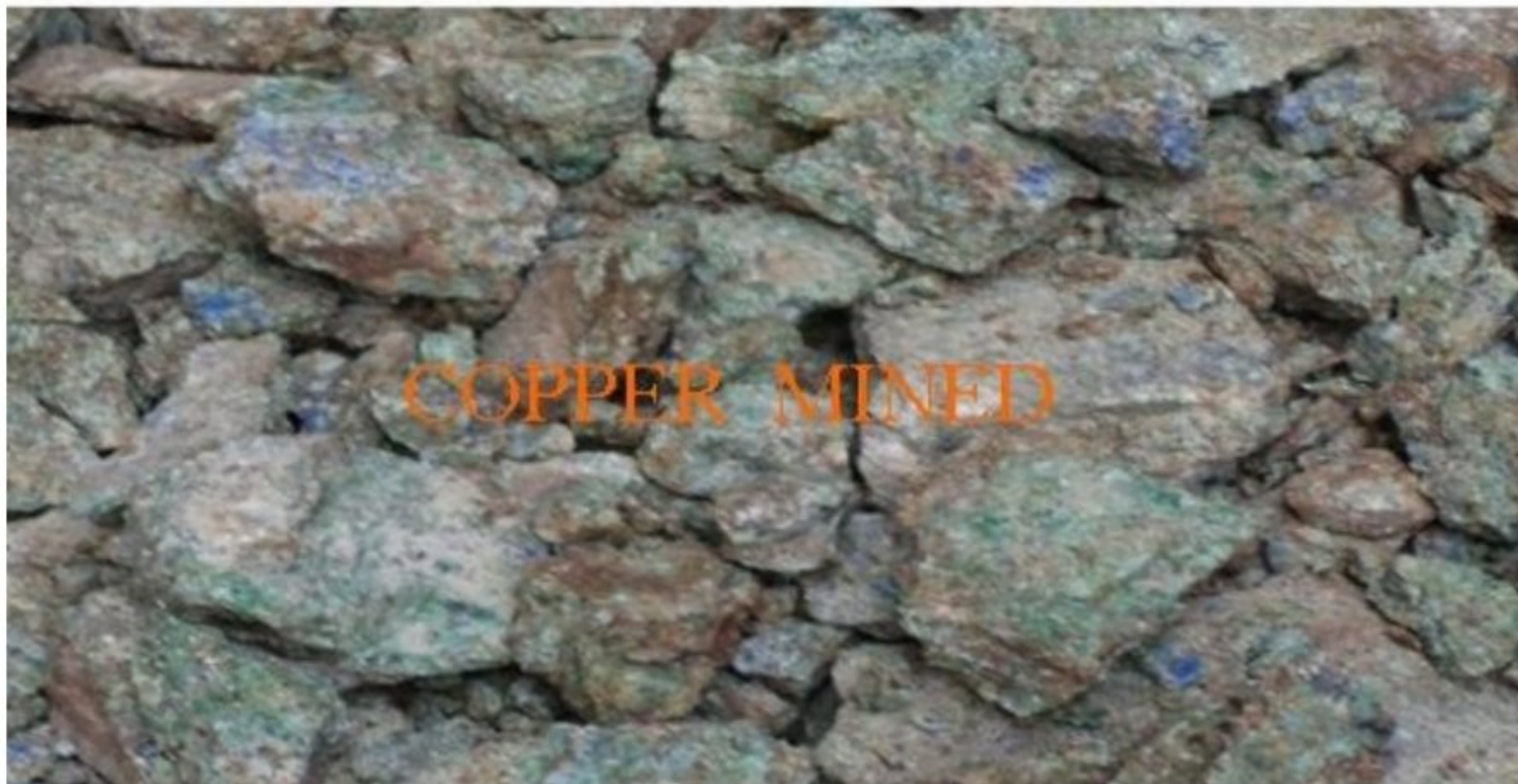
The photograph of the pit-2 is shown below



Description of test pit No-2:-

This pit/trench is located NW of the PL and its length 24m and width is 2.2 m and depth is 3m. (This trench is excavated in the strike direction of the ore body). In this trench the shallow depth loose copper ore already excavated by the Local people. In this pit the ore thickness is observed 1.2m, in the bottom of the trench full dip is 70Degrees and direction of the dip is E 54 Deg. W.

The photograph of the pit-3 is shown below



Description of test pit No-3:-

This pit/trench is located SW of the block and its length 9.5m and width is 5.6 m and depth is 6.5 m in the middle in this pit the loose copper ore already excavated by the Local people. In this pit the ore thickness is observed 1.0 m, full dip is 72Degrees and direction of the dip is E 58 Deg. W. It is characterized by schist gneiss with quartz and feldspar bearing malachite ore of copper.

The photograph of the pit-4 is shown below



Photo of pit no 4

Description of test pit No-4:-

This pit/trench is located SE of the block and its length 4.5m and width is 3 m and depth is 10m in the middle in this pit the loose copper ore is under excavation by the Local people. In this pit the ore thickness is observed 0.9 m, full dip is 84Degrees and direction of the dip is N 55 Deg. E.



Photography showing mineralized copper veins from pit no 4



Photo of extracted copper ore from pit 1

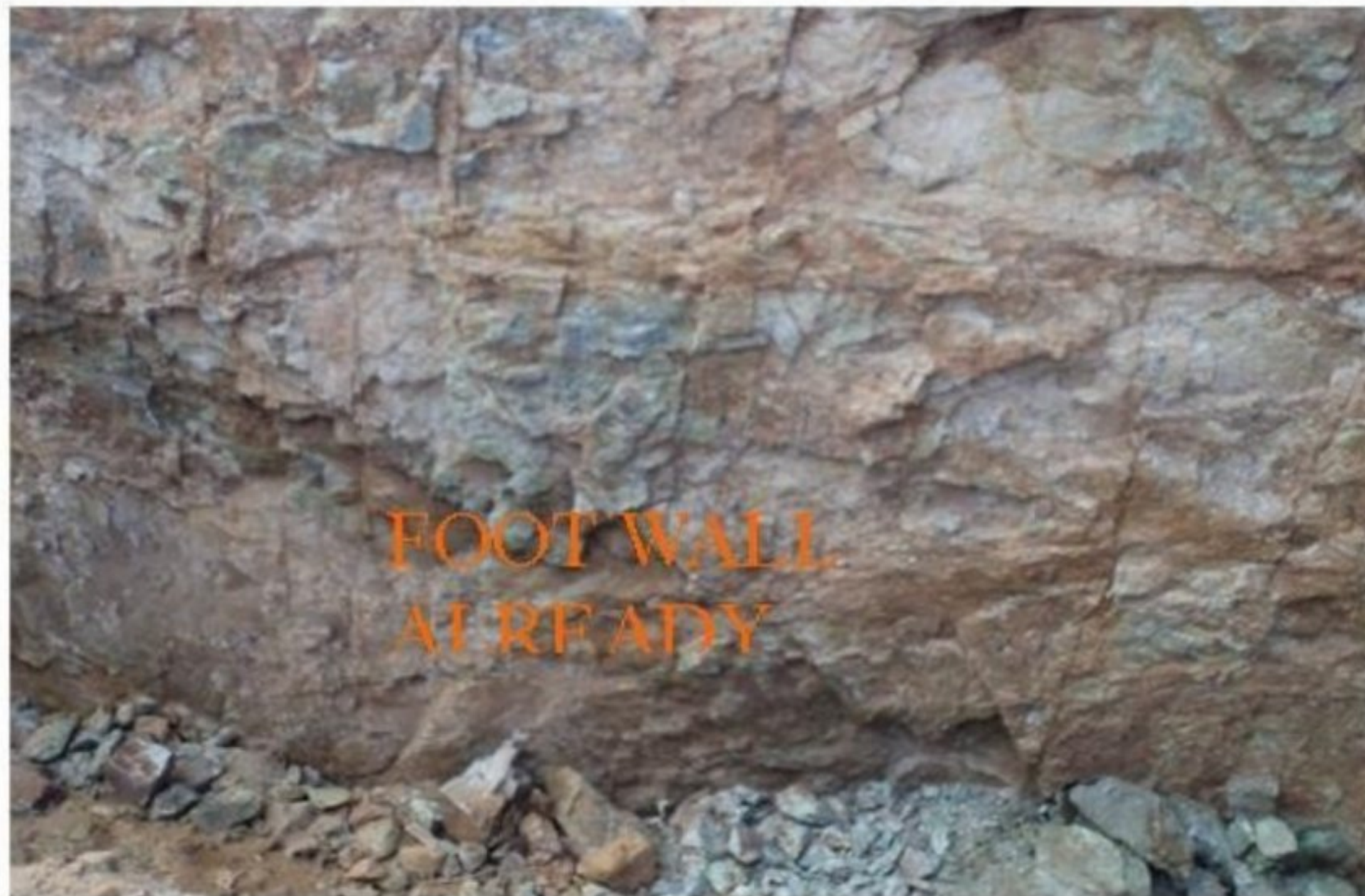


Photo of copper ore from Tambi copper mine

Description of test pit No-5:-

The pit/trench not shown is located SE of the block and its length 4m and width is 2.2 m and depth is 2m. (This trench is excavated in the strike direction of the ore body). In this trench the shallow depth loose copper ore already excavated by the Local people. In this pit the ore thickness is observed 1.2m, in the bottom of the trench full dip is 82Degrees and direction of the dip is N 54 Deg. E.

The existing test pits available in the block and their location GPS coordinates are furnished below

TEST PIT	Latitude			Longitude			Cu %
PIT NO.	DEG	MIN	SEC	DEG	MIN	SEC	
PIT - 1	06	31	14.8	36	40	54.3	5.87
PIT - 2	06	31	15.0	36	40	54.6	22.65
PIT - 3	06	31	19.6	36	41	15.2	12.07
PIT - 4	06	31	20.1	36	41	16.4	8.16
PIT - 5	06	31	17.7	36	41	36.2	3.89

Table 2: shows pit No, pit coordinates and pit Copper concentration

3.4 THE GEOPHYSICAL DATA OF THE LICENSES AREA

Figure 4 below airborne magnetic map for QDS 181 locating the licenses area. The map shows the low and high magnetic anomalies. The copper mineralization in magnetic map is associated with high magnetic intensity values due to hydrothermal alteration. Therefore, the high magnetic

values in the centre of the plotting licenses in red colour are potential area for prospecting the copper mineralization in the area. The high anomaly value is extending much at the centre of the licenses area. The high magnetic value in the area is attributed by hydrothermal alteration zone due to demagnetisation of the country rocks. The high magnetic anomaly which cover 95% of the prospect, it correlates approximately with hornblende diopside gneiss and hornblende diopside quartzite-metacalcereous, migmatitic hornblende-diopside gneiss with microcline and migmatitic-biotite-gneiss, biotite gneiss some times garnet and kyanite rocks in the geological map of the area (Figure 3). These rocks are markable to be potential for copper mineralization in the area.

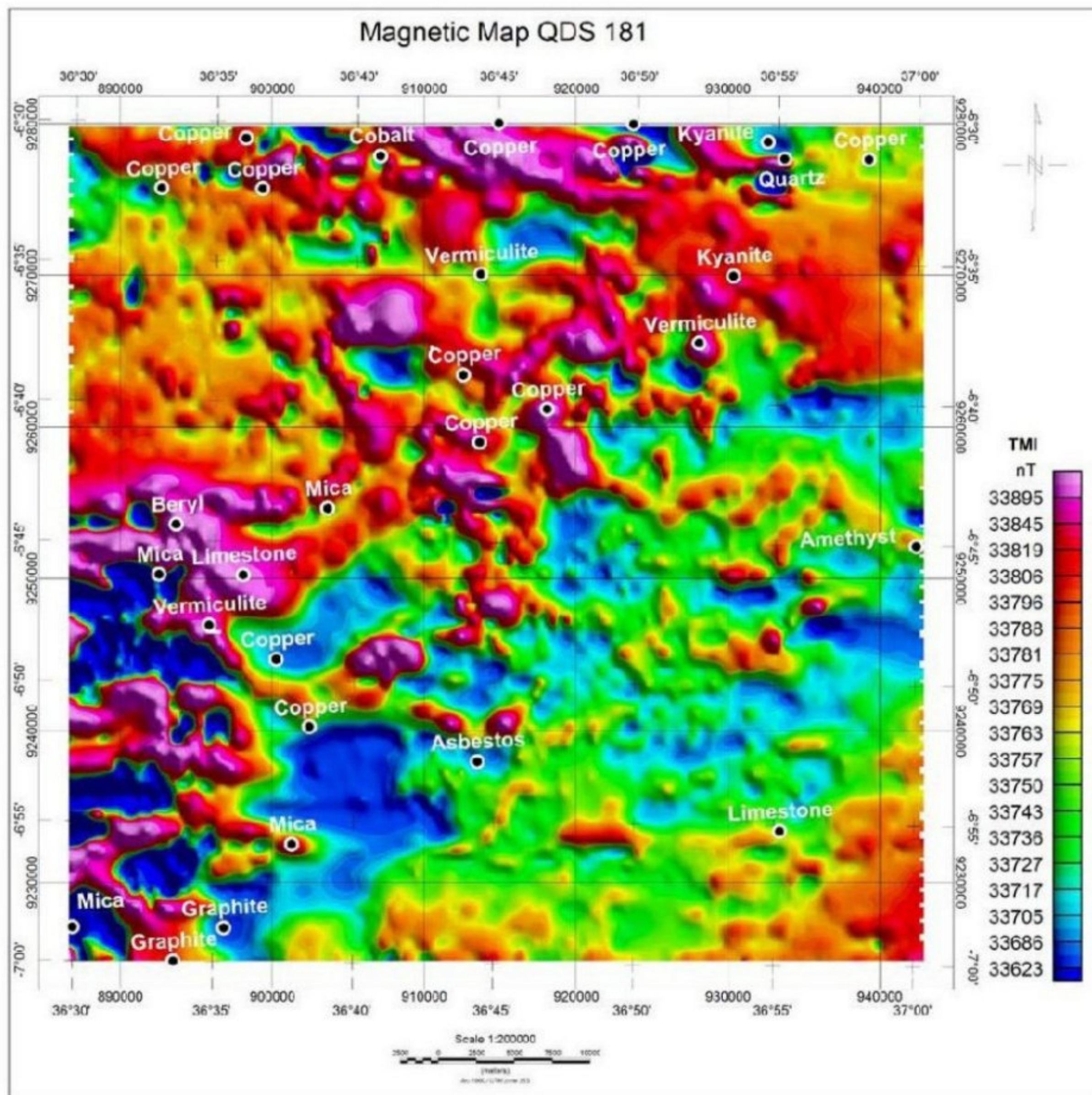


FIGURE 4: MAGNETIC MAP LOCATING THE LICENSES AREA

3.4 ASSESSMENT OF THE COPPER POTENTIAL OF THE LICENSE AREAS

The copper potential in QDS 181-Kilosa is an extension of the mineralized belts from QDS 164 (Kilosa) trending NE-SW towards QDS 244 Mbeya – Makongolosi (figure 5). Another mineralization trends is NW-SE which is within the Mpanda Mineral Field (MMF).

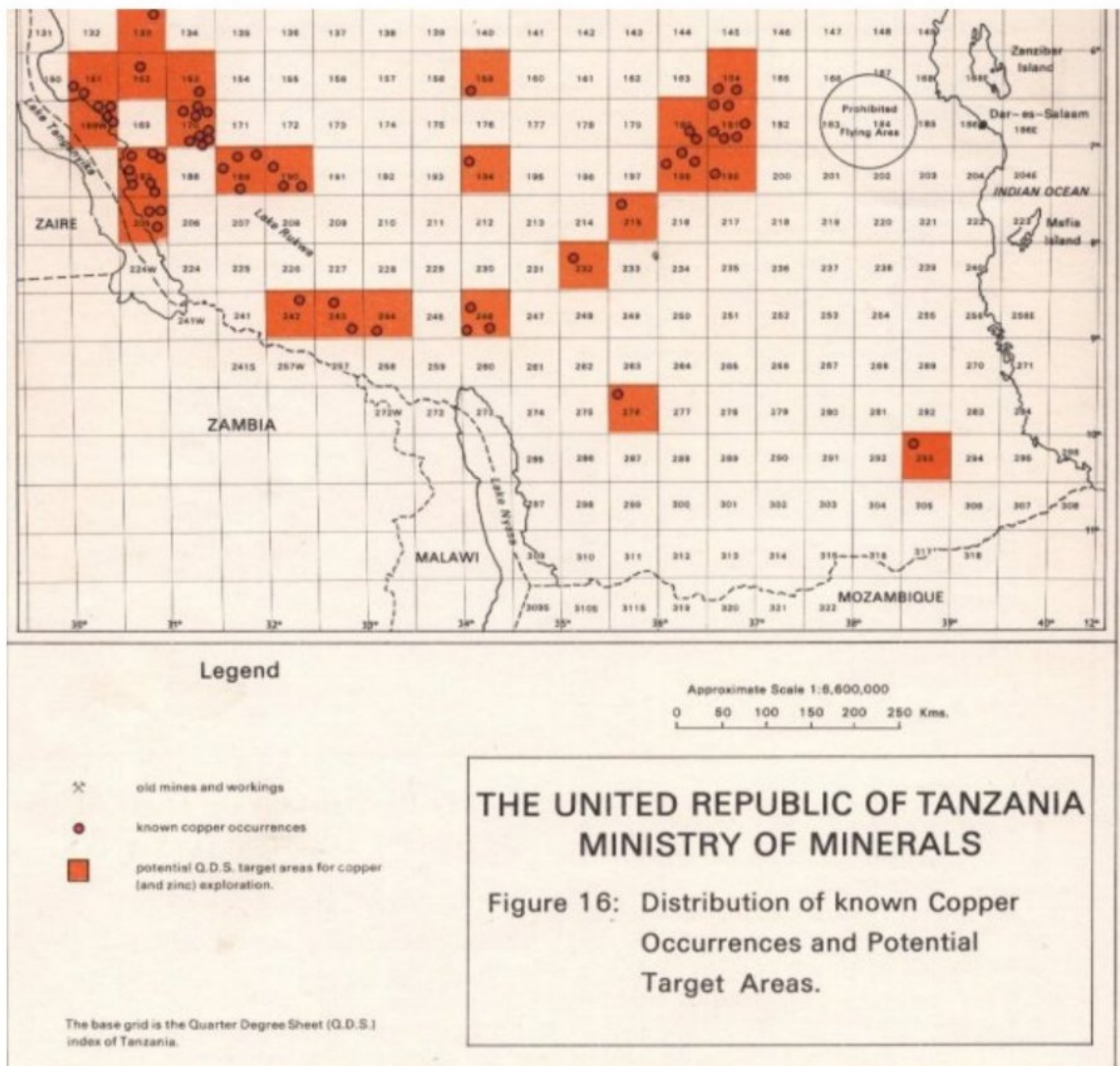


FIGURE 5: LOCATION OF INTEREST RELATED TO COPPER POTENTIAL

3.5 EXPLORATION OF THE COPPER ORE BLOCK

The general practice of copper ore exploration in Tanzania with test pits only. As the copper veins in this area almost all are outcrop to surface in the hills. People of the nearby villages are having the attitude of identification of footwall and hanging wall rocks formations of the vein and they usually going on digging of copper ore at the different places on the mountains. during the surface area mapping it is observed that ,the number of small pit are visible in the entire block only some of them were considered as ore proving test pits. During this type of mining operations they were excavated the ore up to loose in the vein and they have sold it

to local buyers. This type of practice is continued from science 20Years in that country.

The test pit type of exploration is cheaper than the bore drilling in this area as the area is hilly terrain and ore is almost all in vertical formation (70 to 73degrees).

3.6 COPPER ORE RESERVES ESTIMATION AND LIFE SPAIN AT MULENGA PROPERTY AREA.

The reserves in the Mulenga Copper deposit is estimated up to the certain patch an extent of 53Ha, where the test pits available and 100m distance of influence has been considered to be as proved reserves beyond another 100m distance as inferred reserves only from there 200m offset distance as indicated reserves.

The 5 pits and trenches of proved Copper veins are identified in the field and total proved reserves calculation as fallows

The estimation carried here has taken in consideration the following parameters.

- Total length of 5 copper veins in proved area (Total from east to west veins)=**2193m**
- **Total area= (2193X5251)m**
- The average thickness of copper vein in total= 5.15 m
- The average depth of copper vein considered to be 30m
- The specific gravity of copper ore =2.3
- Therefore the volume of ore = $11,515,443 \times 5.15 \times 30 \times 2.3 = 4,092,012,670$ **Tones**
- After 30% of geological losses the copper reserves are $4,092,012,670 \times 0.70 =$ **2,864,408,869 Tons of proved reserves of copper ore**
- **Working capacity of the company.**

Daily excavated Tonnage = 2,000 MT/day (20 Lories of 10 MT)

Annual extraction depending on daily production of 2,000 MT x 182.5 days/year = 365,000 MT/year.

3.7 SPAN OF THE PROPERTY

Life span = calculated geometrical Reserve of Copper ore/ Annual extraction (based on 182.5 working days a year)= **2,864,408,869/365,000 = 8.2 yrs.** Under the above estimation the property is expected to last for **8.2 years**. This period of time can be extended by increasing the mineable depth. This will depend entirely on the market price of the Copper ore, financial inputs and advancement mining technology

In this block It is proposed in phase-1, **30** No's of test pit for further exploration and, in phase -2 50 No's of test pits are proposed.

3.8 THE COPPER ORE ANALYSIS REPORT

GEOLOGICAL SURVEY OF TANZANIA [GST]



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903

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In reply please quote:

P.O.BOX

DODOMA

Date

Chemical Laboratory
Report of Chemical Analyses.

Page(s): No of pages 1.

Consignment number: 2015E0009

Client; **ISMAIL A. KIHAGA** ,

Address: P. O .BOX **42192 DAR ES SALAAM** .

Sample type: Rock: X Soil: Water: Other:

Method Short description of the methods used
code

SXW 01 Pressed powder without binder.

Analytical results:

Sample No.	Al ₂ O ₃ ; %	SiO ₂ ; %	Fe ₂ O ₃ ; %	MnO; %	Na ₂ O; %	CaO; %	MgO; %	K ₂ O; %	TiO ₂ ; %	P ₂ O ₅ ; %
PIT 1	0.70	85.78	1.17	0.01	2.17	0.06	1.30	0.12	0.04	0.15
PIT 2	-	78.25	0.33	0.06	1.29	0.19	0.65	0.06	0.02	0.10
PIT 3	-	78.12	3.06	0.01	2.12	1.55	1.31	0.76	0.42	0.12
PIT4	-	85.93	2.10	0.01	1.39	2.83	0.86	0.14	0.10	0.15
PIT5	1.41	78.23	4.54	0.04	2.38	1.01	1.11	6.76	0.84	0.12
Sample No.	As; ppm	Ba; ppm	Cl; ppm	Co; ppm	Cr; ppm	Cu; %	Ga; ppm	Mo; ppm	Nb; ppm	Ni ; ppm
PIT 1	8.72	0.0	153.2	23.7	137.3	5.87	30.8	2.65	15.8	0.0
PIT 2	21.0	78.0	1.87	123.	8.66	22.6	0.00	0.00	21.5	125.2
PIT 3	3.14	105.24	21.21	112.3	1.17	12.0	0.00	0.00	14.28	106.24
PIT4	4.96	168.98	293.58	120.41	0.28	8.16	30.64	0.00	25.21	3698.9
PIT5	41.4	0.00	177.0	17.1	0.01	3.89	46.1	0.00	12.1	230.4

Sample No.	S %	Rb; ppm	Ta; ppm	V; ppm	Sr; ppm	Zn; %	Zr; ppm	Sc; ppm		
PIT 1	0.18	36.3 3	2.59	154. 29	526.6 4	481. 16	14.7 3	37.6 2		
PIT 2	0.16	0.00	12.36	214. 32	45.63	15.9 7	19.4 5	45.6 5		
PIT 3	0.16	36.2 5	14.80	321. 45	9.25	15.3 4	53.2 4	17.9 8		
PIT4	0.24	9.61	2.36	246. 22	46.48	150. 58	15.1 5	44.8 9		
PIT5	0.21	39.7 1	16.50	229. 03	592.8 6	8145 .2	0.00	15.0 6		

NOTE: The above report applies only to the sample received and not necessarily to any other similar material from the same source

Analysed by: NSHANGE

Date: 13/05/2013

Approved by: KISAKA

For Chief Executive

The shown samples were collected from the pits and surface ore outcrops And sent for analysis. The samples from PIT no. 2, 3 and 4 are representing the good ore quality and The sample no PIT no 1 and 5 are poor grade samples and are also Collected from surface weathered ore and are extracted from shallow depth trenches from the above and general copper ore grade nature is high grade in depth ore and low grade in surface weathered ore.

The average market grade in Tanzania is 10% and above of copper in Copper ore.

4.0 SOURCES OF INFORMATION

1. Geosurvey International G.m.b.H (1976-1980).
2. J.F. Harris, summary of the geology of Tanganyika-part IV: Economic Geology
3. Magnetic map QDS 181
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7. Whittingham, 1959. Quarter Degree Sheet 181