GEOLOGICAL REPORT ON IRON DEPOSIT IN MVOMERO, MOROGORO REGION

Prepared For: I.K ANDERSEN CONTRACTOR LIMITED

May, 2021

EXECUTIVE SUMMARY

The project area is located at Mvomero district in Morogoro region in the vicinity of Mangae village almost 128km SW of Morogoro town. The concession encompasses 196 PML's which is equivalent to 848 hectares. It is easily accessible through ground travel via Morogoro-Iringa main road. Geologically it lies between two Proterozoic belts, the Pan-African Mozambique belt to the east and Usagaran to the west. The rocks are well exposed entirely describing the geology of Uluguru block. In broad perspective some areas the rocks overlay garnet biotite gneiss and basic granulites. They are faintly banded with granular texture composed of quartz, microcline, oligoclase and garnet. Other minerals include iron ore, apatite, rutile and mica. Project area is characterized by complex deformation and metamorphism with some rock exposures outcropping sporadically mostly to the east. The area is dominated by hornblende gneiss and garnet hornblende granulite, a metamorphosed basic igneous intrusion (Figure. 2). The rock is outcropping as single band or small individual intrusion with mafic segregations. It is medium grained equigranular containing hornblende, sphene, diopside, scarpolite and iron ore.

Rock samples were collected from the project area to analyse for iron content and other elements. The analysis results reveal iron content is clinching at 32.13%Fe which is economically acceptable standard though other countries reaches up to 55%. Other important chemical properties revealed from laboratory important chemical properties such as SiO_2/Al_2O_3 ratio >1, Mn<2%, Cr<1% and Zn<10.1% (Appendix 1) guarantees acceptable range of iron ore.

The nature of the iron ore minerals and associated minerals decides the method of beneficiation to be adopted. Magnetite-bearing iron formations are generally conducive to beneficiation by low intensity magnetic separation.

It is recommended to conduct detailed work even some few drill holes to ravel more information for understanding consistence of the ore depth wise.

CONTENTS

1. INTRODUCTION

1.1 Concession Background

The project license area is located at Mvomero district, Morogoro region which is legally owned 100% by I. K. Andersen Contractors Limited. The total concession consists of 96 primary mining licenses equivalent to 848.48 hectares.

Tanzania is endowed with different valued elements, Iron being among the widely distributed. Various forms of iron including oxides and silicates have been disseminated in different localities in the country including Morogoro.

Geologically the property falls within complex deformation and metamorphism settings characterized by Quartzo feldspathic garnet granulites gneisses with well-defined mafic segregations.

The concession has shown a significant amount of iron ore characterized by iron oxide-Fe_2O_3, Silica-SiO_2, titanium oxide-TiO_2, and aluminium-Al_2O_3 in various proportions. Iron oxide minerals may occur in many geological materials but ore characterisation is essential in determining the process mineralogy of potential iron ores which in turn has significant implications in the development of an iron ores mine. This is because there are maximum acceptable levels for the common contaminants in iron ores, although in general condition, contaminants should be kept as low as possible and sometimes requirement vary from customer to customer. At present the acceptable economic standard iron concentration in iron ore is 32%Fe, though in some countries it reaches up to 55%Fe (Mruma et al., 2015).

1.2 Location and Accessibility

The lease is bounded by nine corner coordinates located (Table 1) within Mangae village about 128 Km SW of Morogoro town (Figure. 1). It falls within Uluguru high land and Mkata plain at the junction of Usagaran and Mozambique belts. It is easily accessible through ground travel as it is cross cutting Morogoro-Iringa main road.

Table 1: Geographical Corner Coordinated for project Licenses.

Corner	Latitude	Longitude
1	6 deg. 58 min. 29 sec. S	37 deg. 15 min. 1 sec. E
2	6 deg. 58 min. 28 sec. S	37 deg. 17 min. 15 sec. E
3	6 deg. 57 min. 33 sec. S	37 deg. 17 min. 20 sec. E
4	6 deg. 57 min. 33 sec. S	37 deg. 17 min. 44 sec. E
5	6 deg. 58 min. 58 sec. S	37 deg. 17 min. 36 sec. E
6	6 deg. 59 min. 22 sec. S	37 deg. 18 min. 10 sec. E
7	6 deg. 59 min. 45 sec. S	37 deg. 18 min. 31 sec. E
8	6 deg. 59 min. 41 sec. S	37 deg. 16 min. 13 sec. E
9	6 deg. 59 min. 1 sec. S	37 deg. 15 min. 28 sec. E

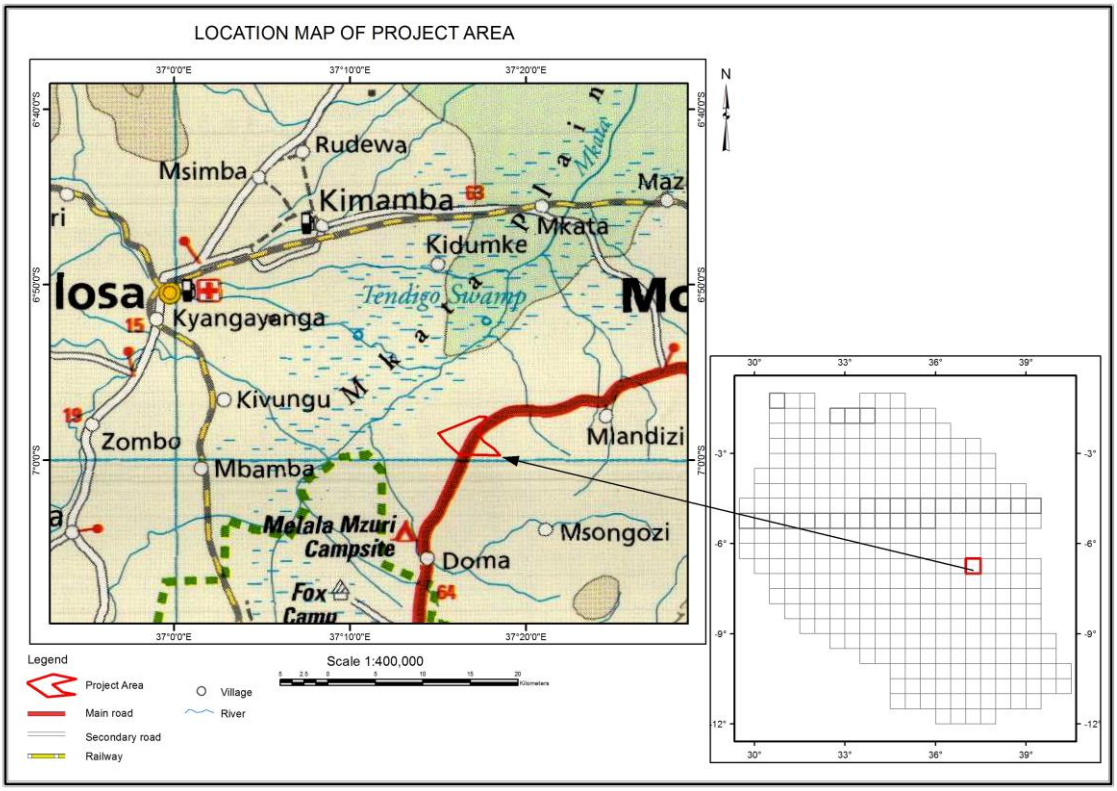


Figure 1: Location of Project area at Mangae, Mvomero District

2. GEOLOGICAL SETTING

2.1 Regional Geology

The project area is within the Pan-African Mozambique belt to the east and Usagaran to the west, which is the orogenic belt resulted from orogenic activities that happened in the Neo Proterozoic time. The Precambrian geology of the area is described by reference unit of gneiss and granulite of Uluguru block (Fozzard, 1963). The area is almost located between Wami drainage basin about two kilometres from Mkata River which is fault bound and Uluguru Mountain high to the east. The plain is dark colored with high clay content and mbuga soil rarely be difficult to distinguish from alluvial deposits. The rocks are well exposed entirely describing the geology of Uluguru block (Fozzard, 1963). The area is dominated by Quartzo feldspathic garnet granulites generally more resistance to weathering than the basic rocks which tend to cap the mountains. In some areas particularly Mnamata the rocks overlay garnet biotite gneiss and basic granulites. They are faintly banded with granular texture composed of quartz, microcline, oligoclase and garnet. Other minerals include iron ore, apatite, rutile and mica (Fozzard, 1963).

Group of rocks including quartzo feldspathic gneiss and granulites, garnet biotite gneiss and amphibolite are generally poorly exposed except along stream sections and when they are not horizontal or shallow dipping and a good section is obtained across strike, these rocks show great variations and repititions (Fozzard, 1963).

Far to the east where most of the rocks are well exposed there is evidence of gentle refolding and large scale positioned recumbent folds. Lineation and joints are well developed NE and NW being the main trends. The Uluguru block characterized by granulite and refolding is possibly terminated to the NW by fault striking roughly NNE near the edge of Mkata plain (Fozzard, 1963).

2.2 Property Geology

The geological setting of project area is characterized by complex deformation and metamorphism with some rock exposures outcropping sporadically mostly to the east and residual soils and swamp to the west (Appendix 6.2). The area is dominated by hornblende gneiss and garnet hornblende granulite, a metamorphosed basic igneous intrusion (Fig. 2). The rock is outcropping as single band or small individual intrusion with mafic segregations. It is medium grained equigranular containing hornblende, sphene, diopside, scarpolite and iron ore with grey to brownish colour (Figure. 3). Many of the host rocks surrounding the

deposits have been pervasively altered. The iron ores is massive ore bodies in excess of 100 m thick.

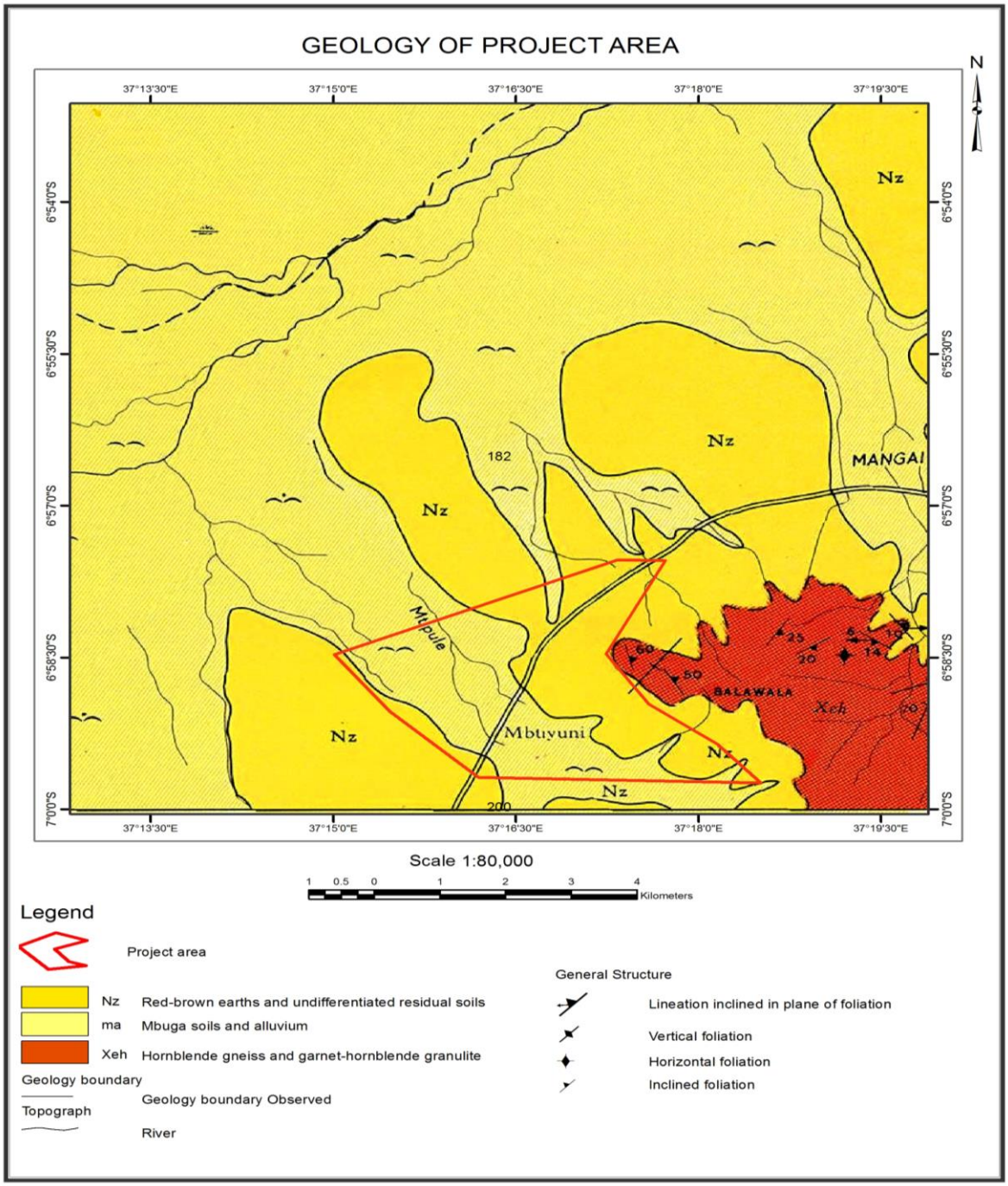


Figure 2: Geology of the project area bounded by red box.

Figure 3: Location of the project area showing iron ore deposit.

3. DATA ANALYSIS

Two rock samples were collected for laboratory analysis purposely to look into rock chemistry and iron content. The analysed data has revealed that the samples were composed of iron oxide-Fe_2O_3 (45.98), Silica-SiO_2 (21.72), titanium oxide-TiO_2 (11.96) and aluminium-Al_2O_3 (5.56) as displayed in appendix 1. The results portray a significant amount of iron clinching at 32.13%Fe. The iron ore proportionalities as revealed from the laboratory results has guaranteed important chemical properties such as SiO_2/Al_2O_3 ratio >1, Mn<2%, Cr<1% and Zn<10.1% (Appendix 6.1) which is acceptable range for iron ore. This defines important stage towards the determination of process mineralogy in the development of iron ore mine.

4. CONCLUSION AND RECOMMENDATION

The nature of the iron ore minerals and associated minerals decides the method of beneficiation to be adopted. Magnetite-bearing iron formations are generally conducive to beneficiation by low intensity magnetic separation at reasonable cost. As long as alumina and silica phases are not too fine grained and the ore is composed of magnetite/hematite with some quartz grains the magnetic route is the most effective means of beneficiation.

Detailed studies may be conducted including some few drill holes to ravel more information depth wise and consistence of the ore.

5. REFERENCE

Johnson, R. C., Scott, G. W., and Lukey, H. M., 2007, Implications of Mineralogy, Grain Size and Texture on Liberation and Pellet Quality of Great Lakes Iron Ore, Iron Ore Conference: Perth, Western Australia.

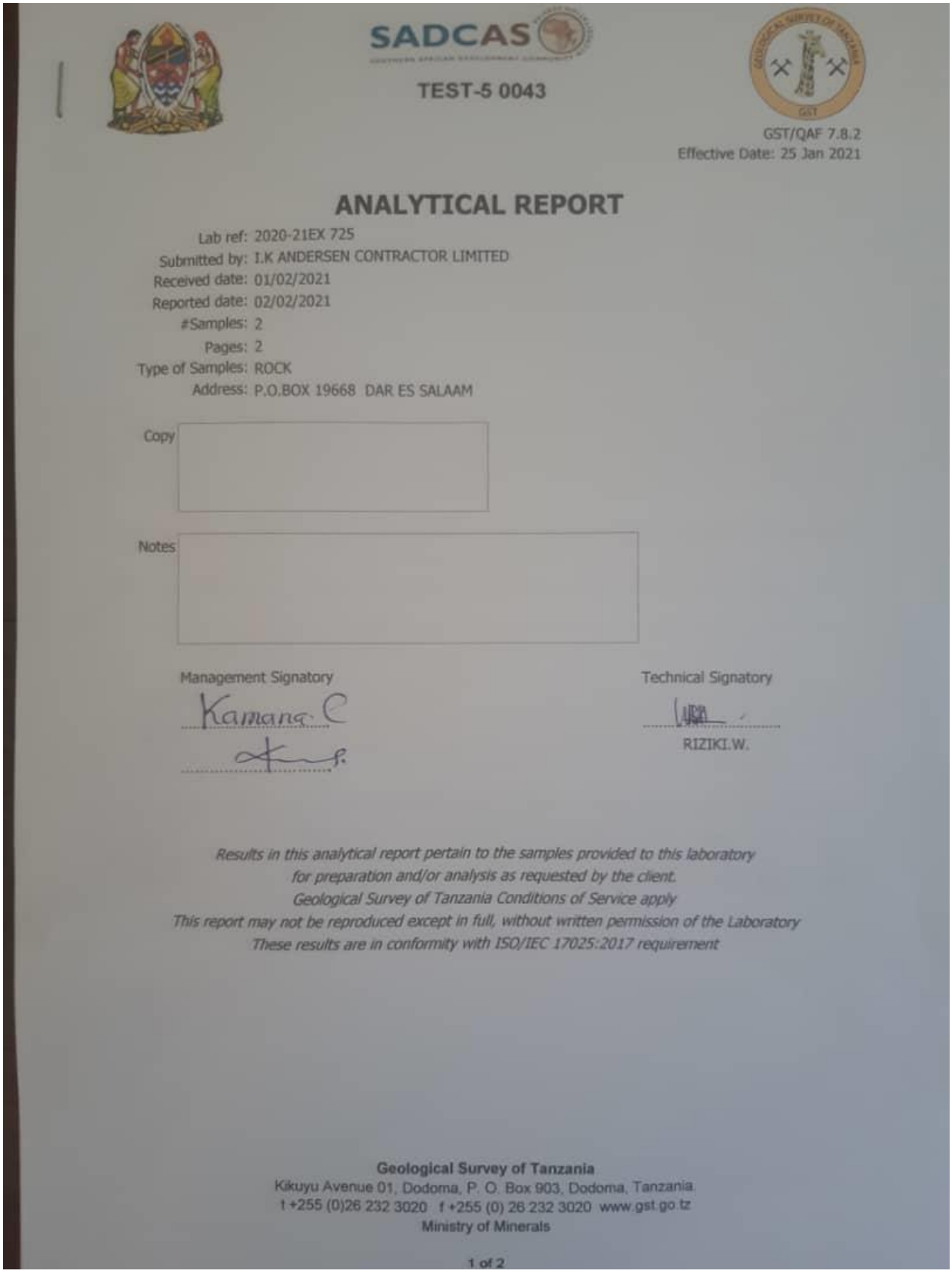
Rao, D. S., Kumar, T. V. V., Rao, S. S., Prabhakar, S., and Raju, G. B., 2009, Mineralogy and Geochemistry of A Low Grade Iron Ore Sample from Bellary-257 Hospet Sector, India and their Implications on Beneficiation: Journal of Minerals & Materials Characterization & Engineering, v. 8, p. 115-132.

Fozzard, P. M. (1963). *Geology of Kimamba-QDS 182*. Dodoma: Geological Survey of Tanzania.

Mruma, A. L. (2015). *Minerogenic Map of Tanzania*. Dodoma: Geological Survey of Tanzania.

6. APPENDICES

6.1 Laboratory result



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TEST-5 0043

GST/QAF 7.8.2
Effective Date: 25 Jan 2021

ANALYTICAL REPORT

Lab ref: 2020-21EX 725
Submitted by: I.K ANDERSEN CONTRACTOR LIMITED
Received date: 01/02/2021
Reported date: 02/02/2021
#Samples: 2
Pages: 2
Type of Samples: ROCK
Address: P.O.BOX 19668 DAR ES SALAAM

Copy

Notes

Management Signatory

Technical Signatory

RIZIKI.W.

Results in this analytical report pertain to the samples provided to this laboratory for preparation and/or analysis as requested by the client.
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TEST-5 0043

GST/QAF 7.8.2
Effective Date: 25 Jan 2021

ANALYTICAL REPORT

Lab Ref: 2020-21EX 725
Submitted by: I.K ANDERSEN CONTRACTOR LIMITED
Received date: 01/02/2021
Reported date: 02/02/2021
Type of Samples: ROCK
Sample condition: DRY
Samples: 2

Sample ID	SiO_2	Fe_2O_3	Al_2O_3	CaO	SO_3	P_2O_5	K_2O	MnO	TiO_2	MgO	Fe
yaliyovunjwa 01	21.72	45.98	5.56	6.70	0.41	3.07	0.25	0.41	11.96	2.35	32.13
yasiyovunjwa 02	26.29	39.48	6.83	7.80	0.47	3.03	0.25	0.38	10.83	2.20	27.59
Method Code	*XRF01*	*XRF01*	*XRF01*	*XRF01*	*XRF01*	*XRF01*	*XRF01*	*XRF01*	*XRF01*	*XRF01*	*XRF01*
Units	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*	*%*
Detection Limit	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*	*0.01*
METHOD	*GST*	*GST*	*GST*	*GST*	*GST*	*GST*	*GST*	*GST*	*GST*	*GST*	*GST*

Sample ID	Cr	V	Ba	Cs	Te	Ag	Nb	Zn	Cu	Co	Sr
yaliyovunjwa 01	628	1923	471	110	140	8	16	332	42	837	247
yasiyovunjwa 02	540	1537	506	95	142	5	16	268	58	393	294
Method Code	*XRF01*	*XRF01*	*XRF01*	*XRF01*	*XRF01*	*XRF01*	*XRF01*	*XRF01*	*XRF01*	*XRF01*	*XRF01*
Units	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*	*ppm*
Detection Limit	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*
METHOD	*GST*	*GST*	*GST*	*GST*	*GST*	*GST*	*GST*	*GST*	*GST*	*GST*	*GST*

- not analysed | -- element not determined | I.S. insufficient sample | L.N.R. listed not received | * Accredited

Management Signatory

Technical Signatory

6.2 Field outcrop observation


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