ASSESSMENT OF EMF RADIATION LEVELS IN TANZANIA

Presented by:

THE COMMITTEE TO ASSESS EMF RADIATION LEVELS IN TANZANIA

PROGRESS REPORT FOR 2012-2013

NOVEMBER 2013

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CONTENTS

1 INTRODUCTION 1
2 PLANNED ACTIVITIES FOR THE YEAR 2012-13 3
3 IMPLEMENTATION OF PLANNED ACTIVITIES 3
3.1 Presentation of the work progress to TCRA and TAEC managements . . 3
3.2 Public Awareness on EMF Issues 4
3.3 EMF Measurements 5
3.4 Purchase Antenna (Probe) 5
3.5 Committee Meetings 5
3.6 Identification of Research Agenda in EMF Radiation Issues 5
3.7 Mobile Phone SAR Measurements 6
4 FINDINGS 6
4.1 Public Awareness 6
4.2 EMF Measurement Results 7
5 ACHIEVEMENTS 9
6 PLANNED ACTIVITIES FOR 2013/14 10
7 APPENDIX I 12

LIST OF FIGURES

Figure 1	Maximum E-field Measured for FM Band	7
Figure 2	Maximum E-field Measurement for VHF band	7
Figure 3	Maximum E-field Measurement for UHF TV band	8
Figure 4	Maximum E-field Measurement for GSM 900 frequency band .	8
Figure 5	Maximum E-field Measurement for GSM 1800 frequency band	8
Figure 6	Maximum E-field Measurement for UMTS frequency band . .	9

LIST OF TABLES

Table 1 Maximum exposure obtained in different districts 9
Table 2 Measured EMF Exposure Levels in Mwanza region 12
Table 3 Measured EMF Exposure Levels in Mbeya region 18
Table 4 Measured EMF Exposure Levels in North Pemba region 24
Table 5 Measured EMF Exposure Levels in South Pemba region 26

LIST OF ABBREVIATIONS

CENELEC	Comité Européen de Normalisation Électrotechnique
EMF	Electromagnetic Fields
FM	Frequency Modulation
GSM	Global System for Mobile Communication
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IEC	International Electrotechnical Commission
IEEE	Institute of Electric and Electronics Engineers
ITU	International Telecommunication Union
ITU-T	ITU-Telecommunication
MCST	Ministry of Communications Science and Technology
MoDANS	Ministry of Defense and National Service
MoU	Memorandum of Understanding
MW	Medium Wave
NEMC	National Environmental Management Council
RBW	Resolution Bandwidth
SAR	Specific Absorption Rate
SRM	Selective Radiation Meter
TAEC	Tanzania Atomic Energy Commission
TBS	Tanzania Bureau of Standards
TCRA	Tanzania Communications Regulatory Authority
UDOM	University of Dodoma
UDSM	University of Dar es Salaam
UHF	Ultra High Frequency
UMTS	Universal Mobile Telecommunications System

VHF Very High Frequency

ZBC Zanzibar Broadcasting Commission

EXECUTIVE SUMMARY

The Committee to assess electromagnetic field (EMF) radiation levels in Tanzania was formed following signing of Memorandum of Understanding (MoU) between the Tanzania Atomic Energy Commission (TAEC) and the Tanzania Communications Regulatory Authority (TCRA) on 4^{th} October, 2011 of which the first report was published in 2011/12.

This second report presents the implementation of the activities planned for 2012/13 and provides the plan for 2013/14. The implementation of the second year planned activities was preceded by the successful implementation of the first year (2011/2012) activities as described in the 2011/2012 implementation progress report [1]. The major achievements in the first year were:

i) Human capacity building through a workshop in which participants learned about EMF radiation safety levels and standards and how to measure EMF radiation levels using state of the art equipment at different frequencies. Participants from different Institutions also shared experiences.

ii) EMF radiation measurements were carried out in 3 mainland regions (Dar es Salaam, Dodoma and Arusha) and three regions in Zanzibar (Urban West, South Unguja, and North Unguja). A total of sixty four (64) measurement sites were covered. The Committee has established that EMF radiation levels at the 64 measured sites are well below the recommended ICNIRP [2, 3] guideline limits.

During the year 2012/13 the Committee planned to carry out the following activities:

i) Presentation of the committee activities to TAEC and TCRA management

ii) Conducting public awareness on EMF issues

iii) Carry out EMF measurement through TCRA zonal offices

iv) Conduct at least four working committee meetings per year

v) Identify research agenda on environmental and EMF radiation

vi) Measure SAR for mobile phones

The Committee's major achievements in 2012/13 include:

i) Public awareness on EMF radiation issues has increased due to several organized awareness programs, such as radio and TV programs, workshop to media.

ii) EMF levels measured in four regions (Mwanza, Mbeya, North Pemba and South Pemba) are well below the recommended ICNIRP [2, 3] guidelines. Hence, minimizing public concerns on the risk perception of EMF radiation.

The Committee has planned to carry out the following activities in the 2013/14 financial year. However, implementation shall be prioritized based on the availability of funds.

i) Presentation to TAEC and TCRA management

ii) Public awareness and education

iii) Continuation of EMF measurements

iv) Purchase of an antenna (probe) for measurement of RF radiations from MW radio band

v) Conduct at least four working committee meetings per year.

vi) Identification of research agenda on environment and EMF radiation.

vii) Conduct mobile phone SAR measurement

1 INTRODUCTION

The Committee to assess electromagnetic field (EMF) radiation levels in Tanzania was formed following signing of Memorandum of Understanding (MoU) between the Tanzania Atomic Energy Commission (TAEC) and the Tanzania Communications Regulatory Authority (TCRA) on 4^{th} October, 2011. The aim was to cooperate/collaborate in the non-ionizing radiations issues especially in regulatory control; inspections; standards; enforcement; research; training/workshops/seminars; public awareness; complains handling; public and environmental protection as well as in consultation/consultancy. The Committee includes members from TCRA, TAEC, academia from University of Dar es Salaam (UDSM) and University of Dodoma (UDOM), Zanzibar Broadcasting Commission (ZBC), National Environment Management Council (NEMC) and Ministry of Defense and National Services (MoDANS).

Among the activities of the Committee is to address public concern over possible adverse health effect due to EMF radiated from the increased number of mobile phone base stations, radio and TV stations and associated equipment. Since its establishment, the Committee has performed measurement of EMF radiation levels in different places and results have been made available to the public as per the International Telecommunications Union (ITU) recommendation [4–7] through TCRA and TAEC website, radio and TV programs.

The Committee is in its second year of implementation (2012/13) and this report presents the implementation of the activities planned for 2012/13 and provides the plan for 2013/14. The implementation of the second year planned activities was preceded by the successful implementation of the first year (2011/2012) activities as described in the 2011/2012 implementation progress report. In the first year of the implementation, the following were the major achievements:

i) The Committee organized a human capacity building workshop in which participants learned about EMF radiation safety levels and standards by different national and international organizations. Participants also learned how to measure

EMF radiation levels using state of the art NARDA equipment at different frequencies. The workshop also facilitated experiences sharing among participants from different institutions. During the workshop, the recommendations of the previous Committee were reviewed.

ii) The Committee has also been able to carry out EMF radiation measurements in 3 mainland regions (Dar es Salaam, Dodoma and Arusha) and three regions in Zanzibar (Urban West, South Unguja, and North Unguja). A total of sixty four (64) measurement sites were covered and the measurements database is available. The Committee has established that radiation levels at the 64 measured sites are well below the recommended ICNIRP [2, 3] guideline limits. The Committee could not measure Medium Wave (MW) band radio radiations because of the frequency limitation of the available antenna (Probe).

Based on the planned activities and what has been achieved for the first year of implementation, the implementation rate is 90%.

The planning for the 2012/13 activities was done based on the achievements made during the first year of implementation. This report therefore describes in details the 2012/13 planned activities, their implementation and achievements. The report also outlines the planned activities for 2013/14.

2 PLANNED ACTIVITIES FOR THE YEAR 2012-13

During 2012/13 the Committee had planned the following:-

(a) Present progress on the implementation of the committee activities to TAEC and TCRA management,

(b) Conduct public awareness on EMF issues;

  i) Publish measurement results in the TCRA and TAEC websites

  ii) Make presentation to members of Parliament and House of Representative

  iii) Conduct workshop to stake holders

  iv) Prepare and conduct TV and Radio programs

(c) Carry out EMF measurement through TCRA zonal offices

(d) Purchase antenna (probe) for measurement of radiations from MW radio band

(e) Conduct at least four working committee meetings per year

(f) Identify research agenda on environmental and EMF radiation

(g) Measure Specific Absorption Rate (SAR) for mobile phones

3 IMPLEMENTATION OF PLANNED ACTIVITIES

3.1 Presentation of the work progress to TCRA and TAEC managements

The progress of the committee work for 2011/12 was presented to the TCRA and TAEC managements on 5th and 27th September 2012 respectively. At the same time, the reports were also submitted to the respective managements. The progress for 2012/13 will be presented during 2013/14 financial year.

3.2 Public Awareness on EMF Issues

(a) Publish measurement results in the TCRA and TAEC websites

Measurement results of EMF radiation levels of FM radio, VHF TV, UHF TV, GSM 900/1800, UMTS at 78 locations in 4 regions (Mwanza, Mbeya, North Pemba and South Pemba) are in the process of being published by updating the existing measurement results on TCRA and TAEC websites. Based on the measurement results, it has been established that radiation levels at the four regions are well below the recommended ICNIRP [2, 3] guideline limits.

(b) Presentation to members of Parliament and House of Representative

This activity was not executed due to financial constraints. However, the committee is planning to conduct seminars to either Parliamentary Infrastructure Committee or Parliamentary Social Services Committee and House of Representative in the year 2013/14.

(c) Exhibitions during National festivals

This activity was successful carried out in the 2013 Agricultural Sector Exhibition - Nane Nane in Dodoma from 1^{st} to 8^{th} August 2013. Participated Committee members were able to provide education to the general public on issues related to radiation exposure, and to publicize results of the study of EMF measurements in public areas around the country.

(d) Workshop to Stakeholders

The Committee conducted four workshops as follows;

(i) Workshop to TCRA staff on 5^{th} September, 2012

(ii) Workshop to TAEC staff on 5^{th} October, 2012

(iii) Workshop to Media Editors and reporters in Dar es Salaam on 12^{th} March 2013.

(iv) Workshop to Media Editors and reporters in Zanzibar was held on 20^{th} May 2013.

(e) TV and Radio Programs for public awareness

The Committee conducted one radio program in Dar es Salaam and two TV programs: one in Dar es Salaam and one in Zanzibar on 13^{th} March and 21^{st} May 2013, respectively.

3.3 EMF Measurements

In 2012/13, EMF measurements were conducted in four regions i.e Mwanza, Mbeya, North Pemba and South Pemba as planned (one region for each quarter). Methods, conditions and equipment used in the measurements were the same as those described in the 2011/12 progress report [1].

3.4 Purchase Antenna (Probe)

The equipment for measuring radiations from MW radio band was not purchased due to financial constraints. However, the Committee recommends purchasing the antenna in the 2013/14 financial year.

3.5 Committee Meetings

All four meetings were conducted as planned. The objectives of the meetings include planning, analysis of measurement results, and review of committee work implementation and discussion of research agenda.

3.6 Identification of Research Agenda in EMF Radiation Issues

The following research agenda were identified:-

(i) Public awareness and social issues for EMF Radiation

(ii) Establishment of safety zones from communication towers

3.7 Mobile Phone SAR Measurements

Measurement of SAR of mobile phones will be carried out in 2013/14 financial year.

4 FINDINGS

4.1 Public Awareness

During appearance on the Radio,TV and workshops many questions were asked by audience. The committee was able to respond and educate the audience. However, it was noted that similar questions were frequently asked include the following:

(i) Does mobile phone radiation cause cancer?

(ii) Is there any health effect when you sleep with mobile phone?

(iii) Is there any health effect if you put mobile phone on the chest, mostly for women?

(iv) Is there any effect of living near mobile phone communication towers?

(v) Is there any relationship between the use of mobile phones and lightning strike?

(vi) Is there any relationship between erectile dysfunction and the use of mobile phones?

(vii) Is there any relationship between miscarriages and EMF exposure?

(viii) Does erection of mobile phone towers cause rain shortage?

(ix) Does mobile phone use causes sleep disorder?

(x) Which side of the head is safe to use mobile phone?

(xi) How to distinguish counterfeit phones from genuine one?

4.2 EMF Measurement Results

Measurements were done according to the methods indicated in the 2011/12 report [1]. Figures 1(a) and (b) show the measured EMF levels for FM frequency band. In Figure 1(a), maximum E-field levels obtained in the regions where measurements were carried out are compared. In Figure 1(b) these measured maximum values are compared against the EMF safety limit. It is clearly observed that the measured values of EMF levels are by far smaller than the safety level recommended by the ICNIRP guidelines [2, 3, 6–8].

Figures 1 to 6 show the results obtained for FM, VHF-TV, UHF-TV, GSM900, GSM1800 and UMTS frequency bands, respectively.

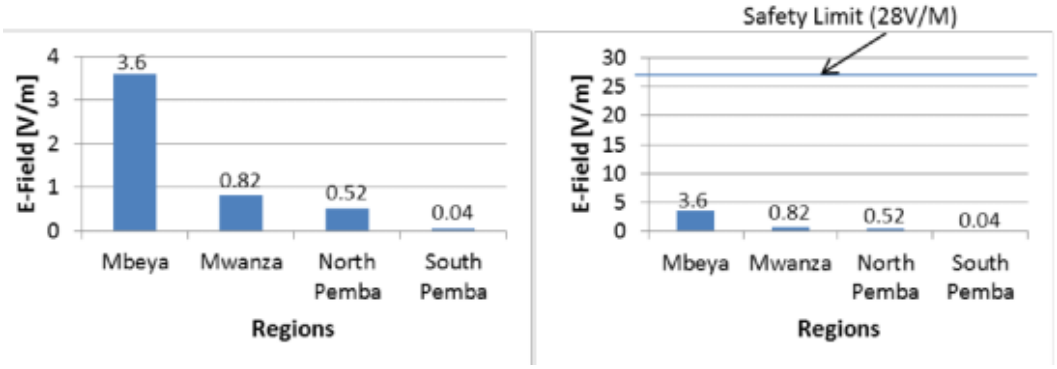

Figure 1: (a) Maximum E-field Measured in Different Districts at FM frequency Band, (b) Comparison between E-fields in (a) with the ICNIRP safety limit

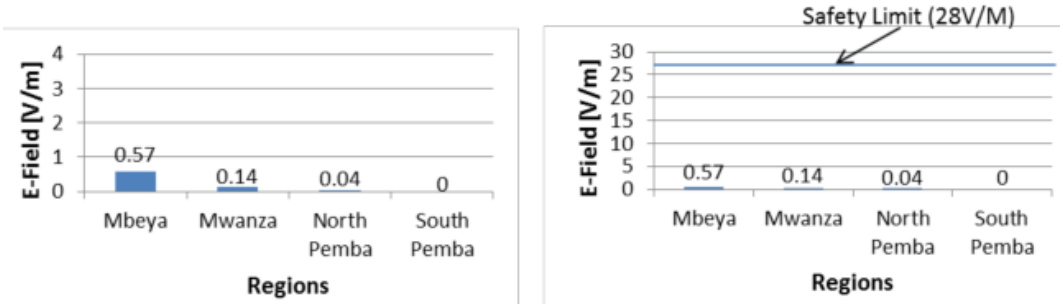

Figure 2: (a) Maximum E-field measured in different districts at VHF TV band, (b) Comparison between E-fields in (a) with the ICNIRP safety limit.

Table 1 summarizes maximum values measured in each band from different locations and the safety limit values recommended by the ICNIRP for the particular frequency band. Detailed measurements from the measured sites are attached as APPENDIX I.

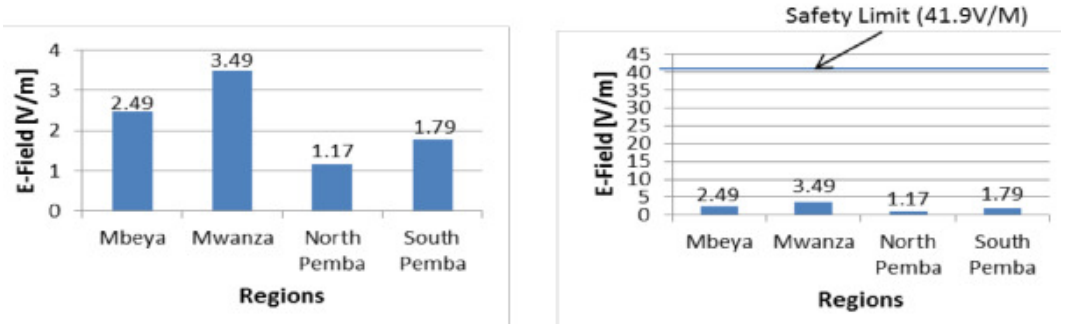

Figure 3: (a) Maximum E-field measured in different districts at UHF frequency band, (b) Comparison between E-fields in (a) with the ICNIRP safety limit.

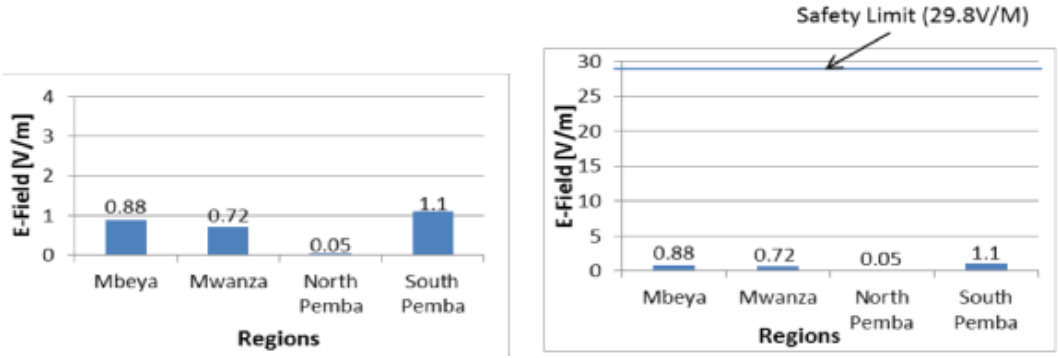

Figure 4: (a) Maximum E-field measured in different districts at GSM 900 frequency band, (b) Comparison between E-fields in (a) with the ICNIRP safety limit.

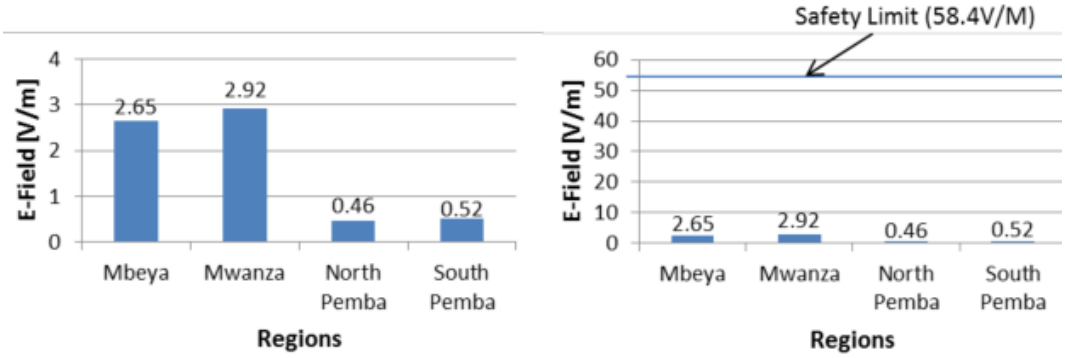

Figure 5: (a) Maximum E-field measured in different districts at GSM 1800 frequency band, (b) Comparison between E-fields in (a) with the ICNIRP safety limit.

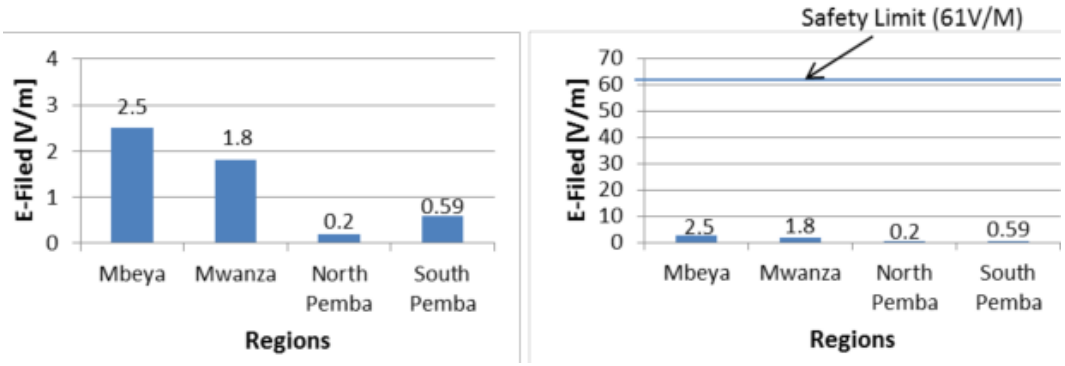

Figure 6: (a) Maximum E-field measured in different districts at UMTS frequency band, (b) Comparison between E-fields in (a) with the ICNIRP safety limit.

Table 1: Maximum exposure obtained in different districts

Frequency Band	Location of Maximum Exposure	Maximum Exposure [V/m]	ICNIRP Limit E-Field [V/m]
FM	City Center (Mbeya)	3.6	28
VHF-TV	Kessule Village (Mbeya)	0.57	28
UHF-TV	Gombani Stadium (South Pemba)	1.1	29.8
GSM 900	City Center (Mwanza)	3.49	41.9
GSM 1800	City Center (Mwanza)	2.92	58.4
UMTS	Kabwe, Mwanjelwa (Mbeya)	2.5	61

5 ACHIEVEMENTS

Public awareness on EMF radiation issues has increased due to several organized awareness programs, such as radio, TV and workshop. In addition, more EMF measurements carried out in Mwanza, Mbeya North Pemba and South Pemba has further established the fact that radiation levels are well below the recommended ICNIRP [2,3] guideline limits. Hence, minimizing public concerns on the risk perception of EMF radiation.

6 PLANNED ACTIVITIES FOR 2013/14

The committee has planned to carry out the following activities in 2013/14 financial year. However, implementation shall be prioritized based on the availability of funds. Some of these activities are continuous and others are new ones/emerging.

1. Presentation to TAEC and TCRA management
2. Public awareness and education
    i) Publish results in the TCRA and TAEC websites
    ii) Presentation to members of Parliaments and House of Representative
    iii) Exhibition to Nane-Nane and Saba Saba festivals
    iv) Workshop to stake holders
    v) TV and Radio programs
    vi) Brochures/fliers
3. Continuation of EMF measurement
4. Purchase of antenna (probe) for measurement of radiations from MW radio band
5. Conduct at least four working committee meetings per year.
6. Identification of research agendas on environment and EMF radiation.
7. Formulation of EMF regulations.
8. Conduct mobile phone SAR measurement

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[1] Assessment of EMF radiation levels in Tanzania, Report 2011/12. https://www.tcra.go.tz/images/documents/reports/EMF_Comittee_Progres_Report_2011-12-Final.pdf.

[2] ICNIRP Guidelines. ICNIRP Guidelines, “Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz)". *Health Phys. Soc.*, a.74(4):94–522, April 1998.

[3] ICNIRP 2009. ICNIRP Statement on the “Guidelines For Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz)". 97(3):257–258, September 2009.

[4] IEEE Standard. C95.1-2005 - IEEE Standard for Safety Levels With Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. pages 1 – 238, May 2006.

[5] ITU-T Recommendation K. 83. Monitoring field strength of the electromagnetic field. *ITU-T Recommendation K. 83*, March 2011.

[6] ITU-T Recommendation K.61. Guidance on measurement and numerical prediction of electromagnetic field for compliance with human exposure limits for telecommunication installations. *ITU-T Recommendation K.61*, Sept. 2003.

[7] ITU-T Recommendation K.91. Guidance for assessment, evaluation and monitoring of human exposure to radio frequency electromagnetic fields. *ITU-T Recommendation K.91*, May 2012.

[8] IEC62232. Determination of RF Fields in the vicinity of Mobile Communication Base Stations for the Purpose of Evaluating Human Exposure. *IEC62232 Ed. 2 CD,*, 2009.

7 APPENDIX I

EMF EXPOSURE LEVELS IN EACH LOCATION

Table 2: Measured EMF Exposure Levels in Mwanza region

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
MAGU	DISTRICT HQ	87 –108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.17	0.41
		1805 - 1880 (DL-GSM 1800)	0.21	0.36
		2110 - 2170 (DL -WCDMA)	0.04	0.07
	MARKETING CENTER	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.90	2.15
		1805 - 1880 (DL-GSM 1800)	0.35	0.60
		2110 - 2170 (DL -WCDMA)	0.05	0.08
	MWABASABI P/SCH	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.92	2.20
		1805 - 1880 (DL-GSM 1800)	0.94	1.61
		2110 - 2170 (DL -WCDMA)	0.05	0.08
	RAMADI CENTER	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	1.07	2.55
		1805 - 1880 (DL-GSM 1800)	0.79	1.35
		2110 - 2170 (DL -WCDMA)	0.05	0.08
	KISESA	87 - 108 (FM RADIO)	0.12	0.43
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.12	0.29
		1805 - 1880 (DL-GSM 1800)	0.10	0.17

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
		2110 - 2170 (DL -WCDMA)	0.04	0.07
KWIMBA	NGUDU D/COUNCIL	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.29	0.69
		1805 - 1880 (DL-GSM 1800)	0.23	0.39
		2110 - 2170 (DL -WCDMA)	0.04	0.07
	CCM FOOTBALL GROUND	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.20	0.48
		1805 - 1880 (DL-GSM 1800)	0.18	0.31
		2110 - 2170 (DL -WCDMA)	0.04	0.07
	HUNGUMALWA MNADANI	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.29	0.69
		1805 - 1880 (DL-GSM 1800)	0.03	0.05
		2110 - 2170 (DL -WCDMA)	0.04	0.07
MISUNGWI	TOWN CENTER	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.32	0.76
		1805 - 1880 (DL-GSM 1800)	0.16	0.27
		2110 - 2170 (DL -WCDMA)	0.04	0.07
	DISTRICT HQ	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.29	0.69
		1805 - 1880 (DL-GSM 1800)	0.22	0.38
		2110 - 2170 (DL -WCDMA)	0.04	0.07
	USAGARA	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
		930 - 960 (DL -GSM 900)	0.42	1.00
		1805 - 1880 (DL-GSM 1800)	0.46	0.79
		2110 - 2170 (DL -WCDMA)	0.04	0.07
SENGEREMA	PAMBALY P/SCH	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.90	2.15
		1805 - 1880 (DL-GSM 1800)	0.07	0.12
		2110 - 2170 (DL -WCDMA)	0.04	0.07
	IGOGO AREA	87 - 108 (FM RADIO)	0.10	0.36
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.07	0.17
		1805 - 1880 (DL-GSM 1800)	0.96	1.64
		2110 - 2170 (DL -WCDMA)	0.04	0.07
	DISTRICT HQ	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.39	0.93
		1805 - 1880 (DL-GSM 1800)	0.16	0.27
		2110 - 2170 (DL -WCDMA)	0.05	0.08
UKEREWE	TTCL AREA	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.70	1.67
		1805 - 1880 (DL-GSM 1800)	0.34	0.58
		2110 - 2170 (DL -WCDMA)	0.04	0.07
	HOSPITAL	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.06	0.20
		930 - 960 (DL -GSM 900)	0.17	0.41
		1805 - 1880 (DL-GSM 1800)	0.12	0.21
		2110 - 2170 (DL -WCDMA)	0.05	0.08
	MISSION STREET	87 - 108 (FM RADIO)	0.04	0.14

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.63	1.50
		1805 - 1880 (DL-GSM 1800)	0.16	0.27
		2110 - 2170 (DL -WCDMA)	0.04	0.07
ILEMELA	ILEMELA DISPENSARY	87 - 108 (FM RADIO)	0.11	0.39
		174 - 230 (VHF BAND TV)	0.07	0.25
		470 -790 (UHF BAND TV)	0.42	1.41
		930 - 960 (DL -GSM 900)	1.59	3.79
		1805 - 1880 (DL-GSM 1800)	0.81	1.39
		2110 - 2170 (DL -WCDMA)	0.26	0.43
	PASIASI-LUMALA AREA	87 - 108 (FM RADIO)	0.33	1.18
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.16	0.54
		930 - 960 (DL -GSM 900)	0.92	2.20
		1805 - 1880 (DL-GSM 1800)	0.94	1.61
		2110 - 2170 (DL -WCDMA)	1.09	1.79
	BWIRU SEC	87 - 108 (FM RADIO)	0.05	0.18
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.06	0.20
		930 - 960 (DL -GSM 900)	1.41	3.37
		1805 - 1880 (DL-GSM 1800)	1.14	1.95
		2110 - 2170 (DL -WCDMA)	0.44	0.72
	KIRUMBA STADIUM	87 - 108 (FM RADIO)	0.19	0.68
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.11	0.37
		930 - 960 (DL -GSM 900)	1.10	2.63
		1805 - 1880 (DL-GSM 1800)	1.23	2.11
		2110 - 2170 (DL -WCDMA)	0.58	0.95
	ISAMILO NYASHANA	87 - 108 (FM RADIO)	0.35	1.25
		174 - 230 (VHF BAND TV)	0.14	0.50
		470 -790 (UHF BAND TV)	0.41	1.38
		930 - 960 (DL -GSM 900)	2.41	5.75
		1805 - 1880 (DL-GSM 1800)	1.21	2.07

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
		2110 - 2170 (DL -WCDMA)	1.21	1.98
NYAMAGANA	NYERERE ROAD	87 - 108 (FM RADIO)	0.26	0.93
		174 - 230 (VHF BAND TV)	0.11	0.39
		470 -790 (UHF BAND TV)	0.23	0.77
		930 - 960 (DL -GSM 900)	2.48	5.92
		1805 - 1880 (DL-GSM 1800)	2.11	3.61
		2110 - 2170 (DL -WCDMA)	1.14	1.87
	BUGARIKA	87 - 108 (FM RADIO)	0.82	2.93
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.06	0.20
		930 - 960 (DL -GSM 900)	0.06	0.14
		1805 - 1880 (DL-GSM 1800)	0.05	0.09
		2110 - 2170 (DL -WCDMA)	0.05	0.08
	BUGANDO	87 - 108 (FM RADIO)	0.53	1.89
		174 - 230 (VHF BAND TV)	0.13	0.46
		470 -790 (UHF BAND TV)	0.72	2.42
		930 - 960 (DL -GSM 900)	1.63	3.89
		1805 - 1880 (DL-GSM 1800)	2.01	3.44
		2110 - 2170 (DL -WCDMA)	1.11	1.82
	BUHONGWA AREA	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.52	1.24
		1805 - 1880 (DL-GSM 1800)	0.19	0.33
		2110 - 2170 (DL -WCDMA)	0.22	0.36
	NYEGEZI BUS STAND	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.75	1.79
		1805 - 1880 (DL-GSM 1800)	0.31	0.53
		2110 - 2170 (DL -WCDMA)	0.41	0.67
	CAPRIPOINT-BOT AREA	87 - 108 (FM RADIO)	0.20	0.71
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.16	0.54

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
		930 - 960 (DL -GSM 900)	0.72	1.72
		1805 - 1880 (DL-GSM 1800)	0.38	0.65
		2110 - 2170 (DL -WCDMA)	0.35	0.57
	CITY CENTER	87 - 108 (FM RADIO)	0.12	0.43
		174 - 230 (VHF BAND TV)	0.07	0.25
		470 -790 (UHF BAND TV)	0.17	0.57
		930 - 960 (DL -GSM 900)	3.49	8.33
		1805 - 1880 (DL-GSM 1800)	2.92	5.00
		2110 - 2170 (DL -WCDMA)	1.80	2.95

Table 3: Measured EMF Exposure Levels in Mbeya region

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
MBEYA CITY	CITY CENTER	87 –108 (FM RADIO)	3.60	12.84
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.16
		930 - 960 (DL -GSM 900)	1.42	3.38
		1805 - 1880 (DL-GSM 1800)	1.11	1.90
		2110 - 2170 (DL -WCDMA)	1.17	1.91
	MAJENGO PRIMARY SCHOOL	87 - 108 (FM RADIO)	0.41	1.48
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.18
		930 - 960 (DL -GSM 900)	0.88	2.10
		1805 - 1880 (DL-GSM 1800)	0.59	1.02
		2110 - 2170 (DL -WCDMA)	0.07	0.11
	IYUNGA	87 - 108 (FM RADIO)	0.05	0.19
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.18
		930 - 960 (DL -GSM 900)	1.01	2.42
		1805 - 1880 (DL-GSM 1800)	2.65	4.54
		2110 - 2170 (DL -WCDMA)	0.49	0.81
	NEW FOREST	87 - 108 (FM RADIO)	0.12	0.43
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	1.22	2.90
		1805 - 1880 (DL-GSM 1800)	1.19	2.04
		2110 - 2170 (DL -WCDMA)	0.83	1.35
	KABWE, MWANJELWA	87 - 108 (FM RADIO)	0.12	0.44
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	1.39	3.33
		1805 - 1880 (DL-GSM 1800)	0.91	1.56
		2110 - 2170 (DL -WCDMA)	2.50	4.10
	MWAKIBIETE, IKULU PRIMAMRY SCHOOL	87 - 108 (FM RADIO)	0.10	0.34
		174 - 230 (VHF BAND TV)	0.05	0.17
		470 -790 (UHF BAND TV)	0.05	0.17

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
		930 - 960 (DL -GSM 900)	1.31	3.14
		1805 - 1880 (DL-GSM 1800)	0.90	1.55
		2110 - 2170 (DL -WCDMA)	1.03	1.69
	UYOLE JUNCTION	87 - 108 (FM RADIO)	0.26	0.93
		174 - 230 (VHF BAND TV)	0.04	0.16
		470 -790 (UHF BAND TV)	0.13	0.43
		930 - 960 (DL -GSM 900)	1.27	3.02
		1805 - 1880 (DL-GSM 1800)	1.52	2.60
		2110 - 2170 (DL -WCDMA)	1.16	1.91
	IGAWILO SECONDARY	87 - 108 (FM RADIO)	0.07	0.25
		174 - 230 (VHF BAND TV)	0.05	0.16
		470 -790 (UHF BAND TV)	0.12	0.39
		930 - 960 (DL -GSM 900)	0.23	0.55
		1805 - 1880 (DL-GSM 1800)	0.04	0.06
		2110 - 2170 (DL -WCDMA)	0.05	0.08
	ISYESYE	87 - 108 (FM RADIO)	0.21	0.76
		174 - 230 (VHF BAND TV)	0.05	0.17
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	2.49	5.94
		1805 - 1880 (DL-GSM 1800)	0.85	1.46
		2110 - 2170 (DL -WCDMA)	1.35	2.20
	KESULE VILLAGE	87 - 108 (FM RADIO)	1.00	3.57
		174 - 230 (VHF BAND TV)	0.57	2.03
		470 -790 (UHF BAND TV)	0.88	2.96
		930 - 960 (DL -GSM 900)	0.04	0.09
		1805 - 1880 (DL-GSM 1800)	0.03	0.06
		2110 - 2170 (DL -WCDMA)	0.04	0.07
MBEYA RURAL	INYALA	87 - 108 (FM RADIO)	0.06	0.20
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.06	0.21
		930 - 960 (DL -GSM 900)	0.63	1.51
		1805 - 1880 (DL-GSM 1800)	0.03	0.06
		2110 - 2170 (DL -WCDMA)	0.04	0.07
	MBALIZI	87 - 108 (FM RADIO)	0.04	0.14

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
		174 - 230 (VHF BAND TV)	0.04	0.16
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	1.27	3.04
		1805 - 1880 (DL-GSM 1800)	2.34	4.00
		2110 - 2170 (DL -WCDMA)	1.43	2.34
	SONGWE	87 - 108 (FM RADIO)	0.04	0.15
		174 - 230 (VHF BAND TV)	0.04	0.15
		470 -790 (UHF BAND TV)	0.06	0.19
		930 - 960 (DL -GSM 900)	0.81	1.92
		1805 - 1880 (DL-GSM 1800)	0.41	0.71
		2110 - 2170 (DL -WCDMA)	0.34	0.56
MBARALI	RUJEWA	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.53	1.26
		1805 - 1880 (DL-GSM 1800)	0.46	0.79
		2110 - 2170 (DL -WCDMA)	0.05	0.08
	CHIMALA	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.51	1.22
		1805 - 1880 (DL-GSM 1800)	0.19	0.33
		2110 - 2170 (DL -WCDMA)	0.05	0.07
	IGURUSI	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.51	1.21
		1805 - 1880 (DL-GSM 1800)	0.19	0.33
		2110 - 2170 (DL -WCDMA)	0.04	0.07
MBOZI	VWAWA, HALOLI PRIMARY SCHOOL	87 - 108 (FM RADIO)	0.04	0.13
		174 - 230 (VHF BAND TV)	0.04	0.13
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.47	1.12
		1805 - 1880 (DL-GSM 1800)	0.41	0.71

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
		2110 - 2170 (DL -WCDMA)	0.38	0.63
	MAHENJE PRIMARY SCHOOL	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.13
		470 -790 (UHF BAND TV)	0.05	0.16
		930 - 960 (DL -GSM 900)	0.14	0.33
		1805 - 1880 (DL-GSM 1800)	0.04	0.07
		2110 - 2170 (DL -WCDMA)	0.04	0.06
MOMBA	TUNDUMA, KILIMANJARO ROAD	87 - 108 (FM RADIO)	0.86	3.09
		174 - 230 (VHF BAND TV)	0.13	0.48
		470 -790 (UHF BAND TV)	0.06	0.19
		930 - 960 (DL -GSM 900)	0.05	0.12
		1805 - 1880 (DL-GSM 1800)	0.59	1.02
		2110 - 2170 (DL -WCDMA)	0.25	0.41
	TUNDUMA MAJENGO	87 - 108 (FM RADIO)	0.04	0.15
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.51	1.21
		1805 - 1880 (DL-GSM 1800)	0.57	0.98
		2110 - 2170 (DL -WCDMA)	0.12	0.19
	MPEMBA	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.74	1.77
		1805 - 1880 (DL-GSM 1800)	0.65	1.11
		2110 - 2170 (DL -WCDMA)	0.04	0.07
ILEJE	ISYONJE	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17
		930 - 960 (DL -GSM 900)	0.10	0.25
		1805 - 1880 (DL-GSM 1800)	0.04	0.06
		2110 - 2170 (DL -WCDMA)	0.04	0.07
	MSIA	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.17

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
		930 - 960 (DL -GSM 900)	0.10	0.23
		1805 - 1880 (DL-GSM 1800)	0.03	0.06
		2110 - 2170 (DL -WCDMA)	0.05	0.07
CHUNYA	CHUNYA	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.18
		930 - 960 (DL -GSM 900)	0.39	0.93
		1805 - 1880 (DL-GSM 1800)	0.54	0.92
		2110 - 2170 (DL -WCDMA)	0.05	0.07
	MAKONGOROSI	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.18
		930 - 960 (DL -GSM 900)	0.49	1.17
		1805 - 1880 (DL-GSM 1800)	0.42	0.72
		2110 - 2170 (DL -WCDMA)	0.05	0.08
	CHARANGWA	87 - 108 (FM RADIO)	0.04	0.13
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.06	0.20
		930 - 960 (DL -GSM 900)	0.37	0.88
		1805 - 1880 (DL-GSM 1800)	0.19	0.32
		2110 - 2170 (DL -WCDMA)	0.04	0.07
	MKWAJUNI	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.18
		930 - 960 (DL -GSM 900)	0.40	0.95
		1805 - 1880 (DL-GSM 1800)	0.12	0.21
		2110 - 2170 (DL -WCDMA)	0.05	0.08
RUNGWE	TUKUYU	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.15
		470 -790 (UHF BAND TV)	0.06	0.19
		930 - 960 (DL -GSM 900)	0.47	1.12
		1805 - 1880 (DL-GSM 1800)	0.27	0.46
		2110 - 2170 (DL -WCDMA)	0.05	0.08
	KIWIRA	87 - 108 (FM RADIO)	0.04	0.15

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.06	0.19
		930 - 960 (DL -GSM 900)	0.43	1.03
		1805 - 1880 (DL-GSM 1800)	0.35	0.59
		2110 - 2170 (DL -WCDMA)	0.05	0.08
KYELA	KYELA	87 - 108 (FM RADIO)	0.04	0.15
		174 - 230 (VHF BAND TV)	0.04	0.13
		470 -790 (UHF BAND TV)	0.01	0.05
		930 - 960 (DL -GSM 900)	0.48	1.14
		1805 - 1880 (DL-GSM 1800)	0.91	1.55
		2110 - 2170 (DL -WCDMA)	0.05	0.08
	KASUMULO	87 - 108 (FM RADIO)	0.04	0.15
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.18
		930 - 960 (DL -GSM 900)	0.67	1.60
		1805 - 1880 (DL-GSM 1800)	0.31	0.53
		2110 - 2170 (DL -WCDMA)	0.05	0.08
	IPINDA	87 - 108 (FM RADIO)	0.04	0.14
		174 - 230 (VHF BAND TV)	0.04	0.14
		470 -790 (UHF BAND TV)	0.05	0.18
		930 - 960 (DL -GSM 900)	0.26	0.62
		1805 - 1880 (DL-GSM 1800)	0.27	0.47
		2110 - 2170 (DL -WCDMA)	0.05	0.08

Table 4: Measured EMF Exposure Levels in North Pemba region

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
MICHEWENI	MICHEWENI P/SCHOOL	87 –108 (FM RADIO)	0.04	0.13
		174 - 230 (VHF BAND TV)	0.04	0.13
		470 -790 (UHF BAND TV)	0.05	0.16
		930 - 960 (DL -GSM 900)	0.63	1.50
		1805 - 1880 (DL-GSM 1800)	0.46	0.78
		2110 - 2170 (DL -WCDMA)	0.00	0.00
	KONDE VETA SCHOOL	87 - 108 (FM RADIO)	0.00	0.00
		174 - 230 (VHF BAND TV)	0.00	0.00
		470 -790 (UHF BAND TV)	0.00	0.00
		930 - 960 (DL -GSM 900)	0.905	2.16
		1805 - 1880 (DL-GSM 1800)	0.15	0.26
		2110 - 2170 (DL -WCDMA)	0.00	0.00
	KONDE-VILIMA VITATU	87 - 108 (FM RADIO)	0.00	0.00
		174 - 230 (VHF BAND TV)	0.00	0.00
		470 -790 (UHF BAND TV)	0.00	0.00
		930 - 960 (DL -GSM 900)	0.09	0.21
		1805 - 1880 (DL-GSM 1800)	0.14	0.24
		2110 - 2170 (DL -WCDMA)	0.00	0.00
WETE	OLE KYANGA AREA	87 - 108 (FM RADIO)	0.00	0.00
		174 - 230 (VHF BAND TV)	0.00	0.00
		470 -790 (UHF BAND TV)	0.00	0.00
		930 - 960 (DL -GSM 900)	0.35	0.84
		1805 - 1880 (DL-GSM 1800)	0.10	0.18
		2110 - 2170 (DL -WCDMA)	0.16	0.26
	MADENJANI	87 - 108 (FM RADIO)	0.00	0.00
		174 - 230 (VHF BAND TV)	0.00	0.00
		470 -790 (UHF BAND TV)	0.00	0.00
		930 - 960 (DL -GSM 900)	0.33	0.79
		1805 - 1880 (DL-GSM 1800)	0.27	0.46
		2110 - 2170 (DL -WCDMA)	0.20	0.33
	JADIDA P/SCHOOL	87 - 108 (FM RADIO)	0.00	0.00
		174 - 230 (VHF BAND TV)	0.00	0.00
		470 -790 (UHF BAND TV)	0.00	0.00

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
		930 - 960 (DL -GSM 900)	1.17	1.17
		1805 - 1880 (DL-GSM 1800)	0.30	0.52
		2110 - 2170 (DL -WCDMA)	0.16	0.26
	SELEMI AREA	87 - 108 (FM RADIO)	0.00	0.00
		174 - 230 (VHF BAND TV)	0.00	0.00
		470 -790 (UHF BAND TV)	0.00	0.00
		930 - 960 (DL -GSM 900)	0.74	1.76
		1805 - 1880 (DL-GSM 1800)	0.27	0.46
		2110 - 2170 (DL -WCDMA)	0.05	0.08
	BAHANASA	87 - 108 (FM RADIO)	0.00	0.00
		174 - 230 (VHF BAND TV)	0.00	0.00
		470 -790 (UHF BAND TV)	0.00	0.00
		930 - 960 (DL -GSM 900)	0.35	0.83
		1805 - 1880 (DL-GSM 1800)	0.12	0.21
		2110 - 2170 (DL -WCDMA)	0.0654	0.11

Table 5: Measured EMF Exposure Levels in South Pemba region

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
MKOANI	BANDARINI	87 –108 (FM RADIO)	0.00	0.00
		174 - 230 (VHF BAND TV)	0.00	0.00
		470 -790 (UHF BAND TV)	0.00	0.00
		930 - 960 (DL -GSM 900)	0.23	0.54
		1805 - 1880 (DL-GSM 1800)	0.04	0.06
		2110 - 2170 (DL -WCDMA)	0.04	0.06
	MAKOMBENI	87 - 108 (FM RADIO)	0.00	0.00
		174 - 230 (VHF BAND TV)	0.00	0.00
		470 -790 (UHF BAND TV)	0.00	0.00
		930 - 960 (DL -GSM 900)	0.46	1.10
		1805 - 1880 (DL-GSM 1800)	0.03	0.05
		2110 - 2170 (DL -WCDMA)	0.0424	0.07
	MKOANI-HOSPITAL	87 - 108 (FM RADIO)	0.00	0.00
		174 - 230 (VHF BAND TV)	0.00	0.00
		470 -790 (UHF BAND TV)	0.00	0.00
		930 - 960 (DL -GSM 900)	0.38	0.90
		1805 - 1880 (DL-GSM 1800)	0.26	0.44
		2110 - 2170 (DL -WCDMA)	0.08	0.14
	MKANYAGENI	87 - 108 (FM RADIO)	0.00	0.00
		174 - 230 (VHF BAND TV)	0.00	0.00
		470 -790 (UHF BAND TV)	0.00	0.00
		930 - 960 (DL -GSM 900)	0.73	1.74
		1805 - 1880 (DL-GSM 1800)	0.16	0.28
		2110 - 2170 (DL -WCDMA)	0.07	0.11
	MTAMBILE	87 - 108 (FM RADIO)	0.00	0.00
		174 - 230 (VHF BAND TV)	0.00	0.00
		470 -790 (UHF BAND TV)	0.00	0.00
		930 - 960 (DL -GSM 900)	0.33	0.79
		1805 - 1880 (DL-GSM 1800)	0.27	0.46
		2110 - 2170 (DL -WCDMA)	0.20	0.33
	GOMBANI STADIUM	87 - 108 (FM RADIO)	0.52	1.87
		174 - 230 (VHF BAND TV)	0.00	0.00
		470 -790 (UHF BAND TV)	1.104	3.70

DISTRICT	AREA	FREQUENCY BANDS (MHz)	AVERAGE (V/m)	ICNIRP [%]
		930 - 960 (DL -GSM 900)	0.09	0.22
		1805 - 1880 (DL-GSM 1800)	0.05	0.09
		2110 - 2170 (DL -WCDMA)	0.00	0.00
	FLETINI MA-CHOMANNE	87 - 108 (FM RADIO)	0.10	0.34
		174 - 230 (VHF BAND TV)	0.00	0.00
		470 -790 (UHF BAND TV)	0.11	0.37
		930 - 960 (DL -GSM 900)	0.50	1.19
		1805 - 1880 (DL-GSM 1800)	0.19	0.33
		2110 - 2170 (DL -WCDMA)	0.42	0.69
	SOKONI CHAKECHAKE	87 - 108 (FM RADIO)	0.43	1.52
		174 - 230 (VHF BAND TV)	0.00	0.00
		470 -790 (UHF BAND TV)	0.00	0.00
		930 - 960 (DL -GSM 900)	1.79	4.27
		1805 - 1880 (DL-GSM 1800)	0.52	0.901
		2110 - 2170 (DL -WCDMA)	0.59	0.96