

ANALYSIS OF POPULATION MAGNETIC FIELD EXPOSURE

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Abstract— It is believed that electromagnetic radiation generated from various sources like mobile phones, transmission lines and many more could be a threat to Human Health. Researchers have carried out researches to prove such claims.

This Study was carried out to show the magnitude of Magnetic Field generated by 330kV and 132kV Transmission Lines between 0-100meters from the Tower in GRA, Benin City. Also, the weekly study of the behavioral activities of people resident or trading (Traders/mechanics) along these lines for 3months was also undertaken.

The Data obtained were juxtaposed with the international standard requirement to propose the possible effects of the Fields as listed.

Index Terms— Earthing Leakage Failure, EMF Radiation, Transmission Lines, Telecommunication Mast, Average Magnetic Field, Magnetic Field Distribution.

I. INTRODUCTION

Background Of Study

Electricity basically is the study of the electrical properties of matter and the utilization for the benefits to man. Electricity is an important facility which is required to power

Electrical/Electronic Equipments for daily domestic, Occupational and recreational activities, Wolfe, M.S., (1998). It is important to know that in as much as these equipments do facilitate our processes and works; they also pose some hazards and threats to our health, IRPA 1987.

The severity of the effect depends on how long we are exposed to such hazards and how cautious we are around field. This include; Earthing Leakage Failure, Electromagnetic Field radiation etc.

Electrical /Electronic Hazard that which is of great concern to man, more and more every day is the exposure to Electromagnetic Field (EMF)s generated from various sources like mobile phones, transmission lines, Telecommunication Mast, and many more, NHMRC 1987.

II. AVERAGE MAGNETIC FIELD MEASUREMENT

Datas from magnetic field measurements were collated and the average Magnetic field at the various structures and locations of measurement are presented.

Table 1.1 indicates the Average Magnetic field at 1m above the Ground. This is the average Magnetic Field that cuts across the individuals at a height 1m from the ground.

	Nos. of Persons	Location	Location on (x,y)	B(μ T) at 8am	B(μ T) at 10am	B(μ T) at 12 noon	B(μ T) at 2pm	B(μ T) at 4pm	B(μ T) at 6pm	Avg. B(μ T) at 1m	Durati on hrs	Avg time	Rate of Exposure
Mechanic shop 1	3	Under T11	0,0	0.88	0.91	0.9	0.91	0.9	0.9	0.90	9-11hrs	8	0.11
Shop 1	2	Under T11	10,0	0.85	0.9	0.93	0.91	0.91	0.9	0.90	8-12hrs	10	0.09
Painter 1	2	Under T11	25,0	0.4	0.45	0.55	0.6	0.6	0.55	0.53	7-8hrs	7	0.08
Bar 1	2	Under T11	40,0	0.63	0.6	0.6	0.6	0.57	0.6	0.60	2-3hrs	6	0.10
shop 2	1	Under T11	110,0	4.3	4.8	4.7	4.8	4.1	4.5	4.53	6-10hrs	8	0.56
tailor 1	2	Under T11	310,0	10	10	10	10	10	10	10.0	10-18hrs	9	1.11
Mechanic Shop 2,	3	Btw T11 & 33kV Line	0,9	0.83	0.9	0.96	0.91	0.9	0.9	0.90		10	0.09

Mechanic Shop 3	4	Btw T11 & 33kV Line	20,9	0.8	0.82	0.77	0.76	0.76	0.79	0.78	3-4hrs	9	0.09
Painter 2	2	Btw T11 & 33kV Line	40,9	0.78	0.79	0.76	0.78	0.85	0.79	0.79		8	0.10
Painter 3	1	Btw T11 & 33kV Line	65,9	7.9	7.8	8.2	8	7.5	7.9	7.88	8-12hrs	8	0.99
Shop 4	1	Btw T11 & 33kV Line	415,9	10	10	10	10	10	10	10.00		11	0.91
Shop 3	2	Btw T11 & 33kV Line	495,9	10	10	10	10	10	10	10.00		8	1.25
Carpenter	3	Btw T11 & 33kV Line	490,9	10	10	10	10	10	10	10.00		8	1.25
Mechanic Shop 4	4	Btw T11 & 33kV Line	0,15.2	10	10	10	10	10	10	10.00	3-4hrs	9	1.11
Bar 2	3	Btw T11 & 33kV Line	50, 15.2	10	10	10	10	10	10	10.00		6	1.67
Car Wash	5	Btw T11 & 33kV Line	65, 15.2	10	10	10	10	10	10	10.00		8	1.25
Bar 3	3	Btw T11 & 33kV Line	95,33.4	10	10	10	10	10	10	10.00		7	1.43
Church 1	20	Btw T11 & 33kV Line	100,33.4	10	10	10	10	10	10	10.00		0.5	20.00
Bakery	5	Btw T11 & 33kV Line	295,33.4	10	10	10	10	10	10	10.00	7-8hrs	10	1.00
Mouder	4	Btw T11 & 33kV Line	375,33.4	10	10	10	10	10	10	10.00	7-8hrs	7	1.43
Welder	3	Btw T11 & 33kV Line	491,33.4	10	10	10	10	10	10	10.00	7-8hrs	7	1.43
Painter 4	2	Btw T11 & 33kV Line	495,33.4	10	10	10	10	10	10	10.00	7-8hrs	6	1.67
Barber's Shop	2	Btw T11 & 33kV Line	43,33.4	10	10	10	10	10	10	10.00		10	1.00
Church 2 (Residence)	4	Btw T11 & 33kV Line	120,33.4	10	10	10	10	10	10	10.00		10	1.00
House 1	15	Btw T11 & 33kV Line	235,33.4	10	10	10	10	10	10	10.00		15	0.67

House 2	18	Btw T11 & 33kV Line	275, 33.4	10	10	10	10	10	10	10.00		16	0.63
church 3		Btw T11 & 33kV Line	255,33.4	10	10	10	10	10		8.33			
Palm Kernel shop	4	Btw T11 & 33kV Line	300, 33.4	10	10	10	10	10	10	10.00		7	1.43
Restaurant & Bar	5	Under T12	0, 65.4	1.9	1.7	1.6	1.7	1.8	1.7	1.73		12	0.14

Table 1.1 Average magnetic field measurement at 1m above the ground

III. MAGNETIC FIELD DISTRIBUTION ACROSS THE MESH LINE (VICINITY UNDER THE CONDUCTORS)

Figure 1.1 shows the magnetic field distribution of the data presented in Table 1.1. it indicates the magnetic field distribution across the Mesh Lines (vicinity under the Conductors) with respect to Y plane for specific areas. These areas are places where houses and temporary structures are situated.

The Figure shows the average Magnetic field the Population is exposed to at their various Shop or Houses as a result of overlapping Magnetic Field close by lines.

It can be seen that People with shops and Houses very close to the 33kV Lines and the sag end of the Transmission lines are exposed to very High Magnetic Field Greater than 10 microTesla.

Figure 1.1 shows the magnetic field distribution across the mesh line (vicinity under the Conductors) at 40 meters intervals along the X plane. Each figure (Fig 1.1 a – Fig 1.1k) shows the varying Magnetic field distribution across Mesh Line.

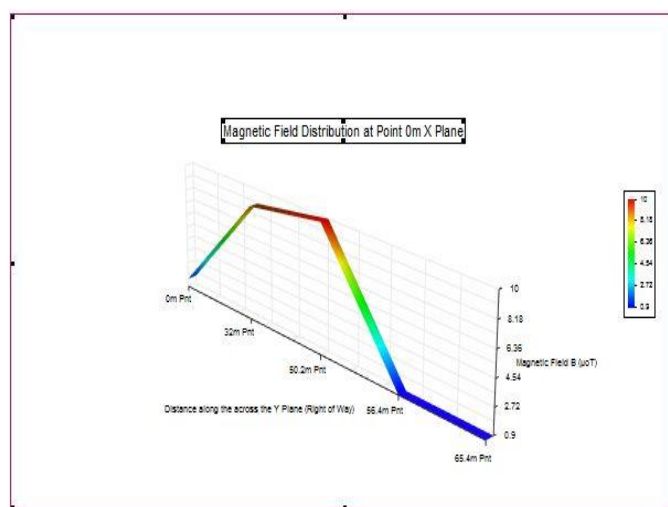


Fig 1.1a Magnetic Field Distribution at 0m x-axis

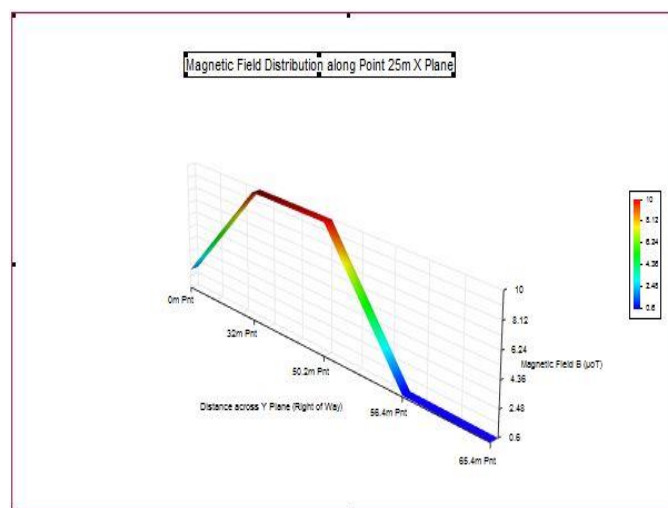
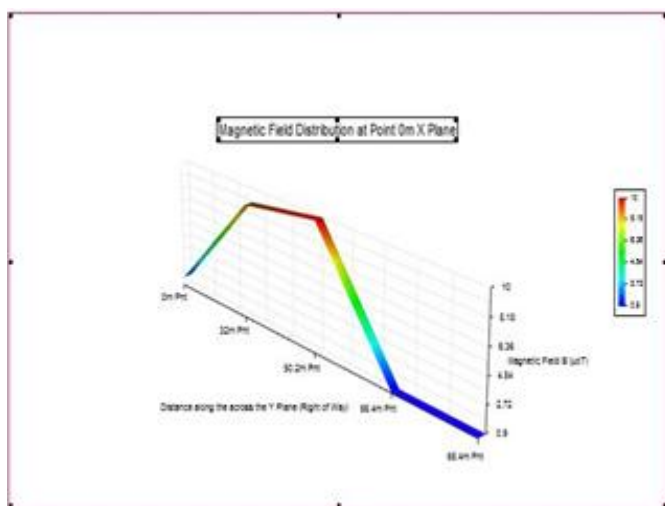


Fig 1.1b Magnetic Field Distribution at 25m x-axis



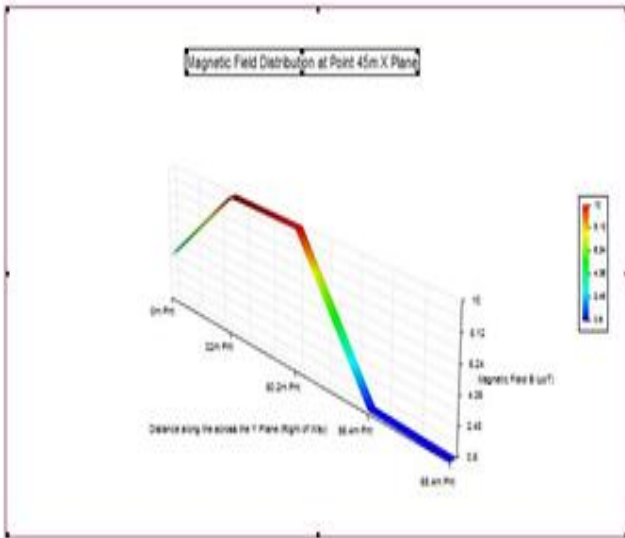


Fig 1.1c Magnetic Field Distribution at 45m x-axis

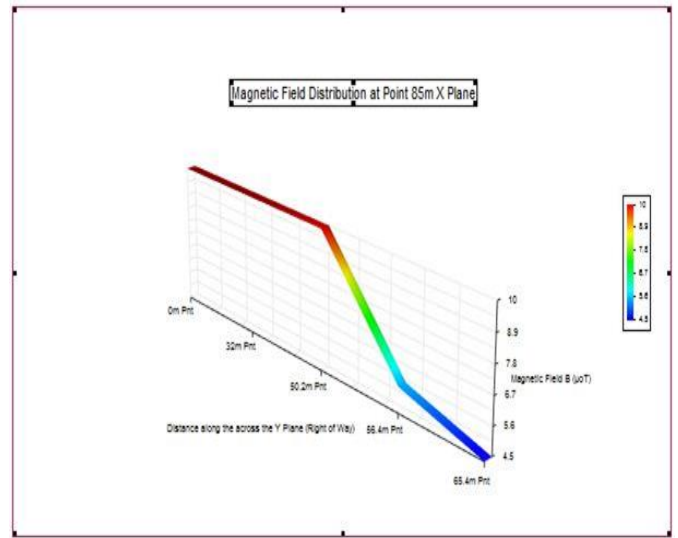


Fig 1.1e Magnetic Field Distribution at 85m x-axis

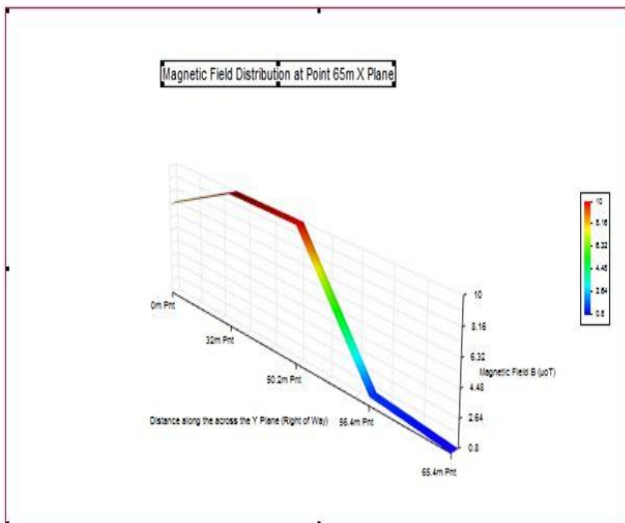


Fig 1.1d Magnetic Field Distribution at 65m x-axis

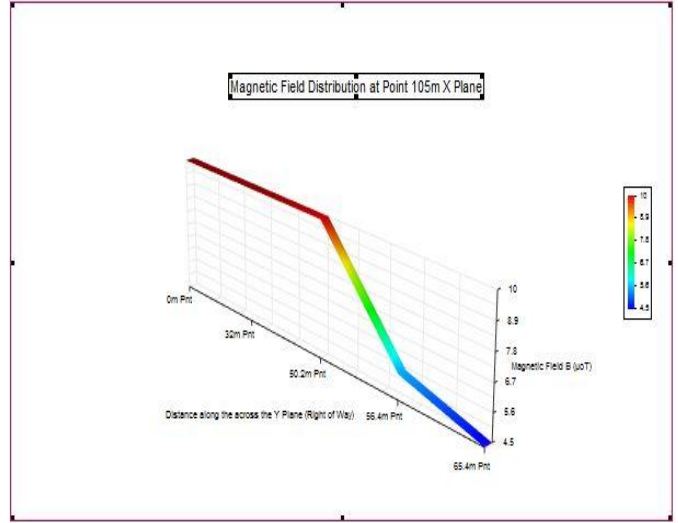


Fig 1.1f Magnetic Field Distribution at 105m x-axis

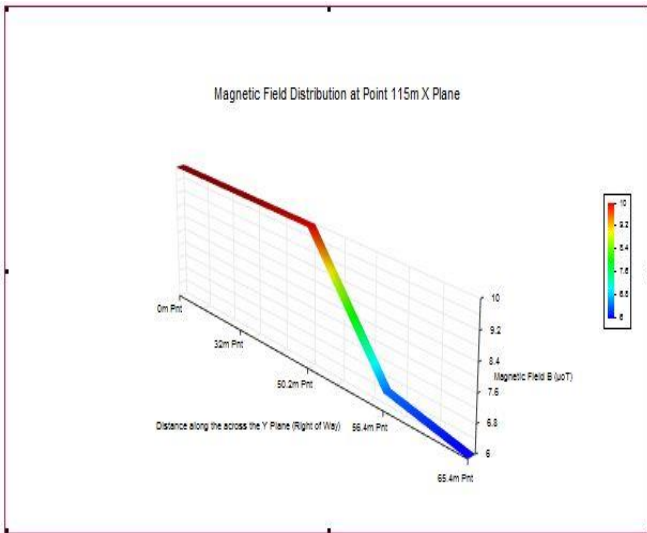


Fig 1.1g Magnetic Field Distribution at 115m x-axis

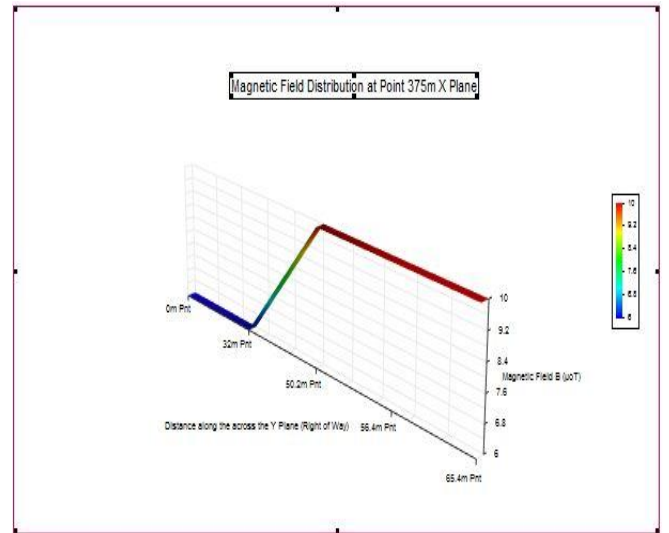


Fig 1.1i Magnetic Field Distribution at 375m x-axis

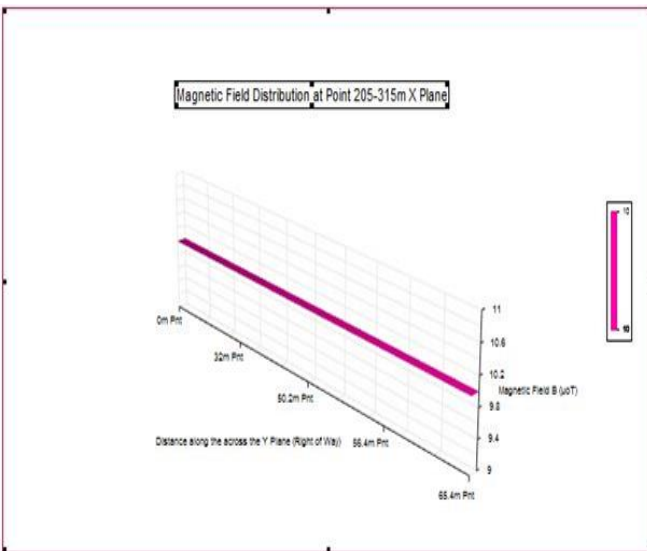


Fig 1.1h Magnetic Field Distribution at 205-315m x-axis

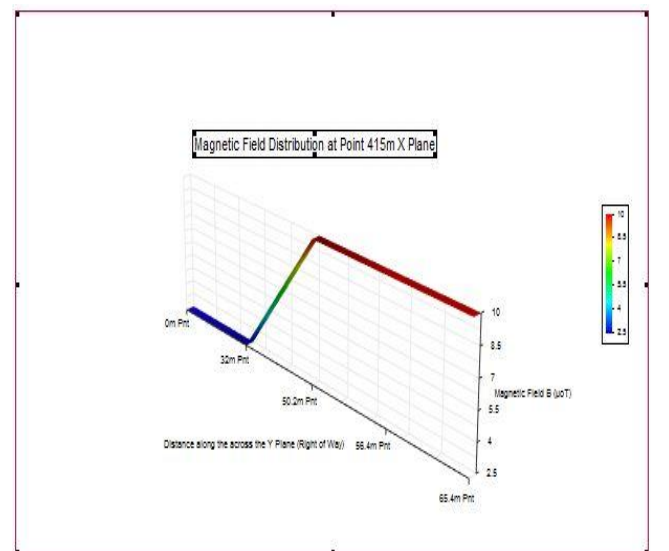


Fig 1.1j Magnetic Field Distribution at 415m x-axis

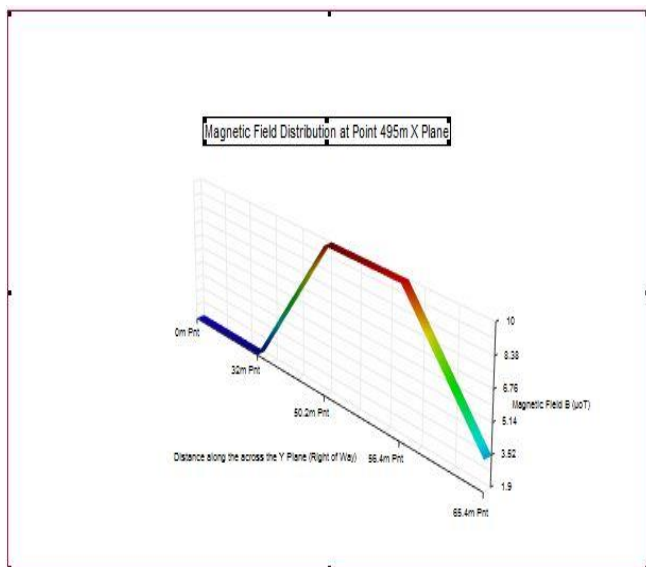


Fig 1.1k Magnetic Field Distribution at 495m x-axis

IV. RECOMMENDATIONS

- a) Law enforcement task force should be set up to monitor and prosecute anyone who is found wanting to erect buildings at near to or under the high voltage power lines.
- b) Proper Land survey should be carried out before erecting structures to ensure buildings do not encroach into the right of way of transmission line network.
- c) National orientation bodies should carry out nationwide orientation on public health risk on prolong stay within the vicinity of magnetic field set up in the region of space of high voltage power lines.

V. CONCLUSION

This work dwelled on the EMF radiation at under power transmission lines and analysis of data duration of stay by comparing results with the Occupational exposure limits.

The results, point out the risk the public may be exposed to , living at near transmission lines, hence this research.

From the work it can be concluded that:

- a) Humans exposed to EMF radiation at values slightly above allowable limits by living at near to or under high voltage power lines would end up having serious health issues soon or later.
- b) The transmission company Right of Way should be secured by enacting and enforcing necessary prohibiting laws.

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