Short Note

EFFECTS OF ELECTROMAGNETIC FIELDS (EMF) NEAR HIGH VOLTAGE TRANSMISSION LINE: A CASE STUDY

M. Quamruzzaman[1], Munima Haque[1], Farruk Ahmed[2], Md. Shabab Zaman[3]

[1]Dept. of EEE, Southeast University
[2]Dept. of EEE, Independent University, Bangladesh
[3]Dept. of EEE, World University of Bangladesh
email: mqzaman60@gmail.com, munima.haque@gmail.com

BACKGROUND

A non-Government organization in Bangladesh with about 30 employees rented a 6 storied building for its office in Dhaka. Soon after moving to this building several employees complained of headache, uneasy feelings and depression. It was reported that people working in 2nd and 3rd floors had greater complains than people from 1st and 4th floors. It was observed that an 11 kV power transmission line passed beside the building at the height of the 2nd floor at a distance of about 8 ft. People whose seating were nearest to the 11 kV line had greater complains than people in distant positions on the same floor. This prompted us to carry out a detailed investigation into the magnitudes of magnetic field present at different locations in the building.

METHODS

To investigate the magnetic field, a detector from the Magnetic Science International U.S.A., model: MSI-200 was used (MSI, 2007). The sitting arrangement for the office staff was arranged in three rows, near the front window side near to which the 11kV line passed, in the middle of the room and at the rear end of the room. The magnetic fields were measured for locations at each of these seats. The same procedure was followed for each floor of the building and also for the balconies.

OBSERVATIONS AND RESULTS

The results of the measurement of magnetic fields at different positions are given in Table 1.

From the data (Radiation field) obtained from different floors of the office building, it is clear that on the side of the 11kV power line, 2nd floor has the highest magnetic field followed by 3rd floor, 1st floor, 4th floor and 5th floor respectively.With distance from the 11kV line the field values decreased sharply as can be seen from the values at the middle and at the opposite sides of the room.

After the measurements, the staff sitting in the 2nd and 3rd floor on the side of the 11 kV line were moved to places with lower magnetic fields. Staff in the 1st and 4th floors were allowed to remain in their previous places.After a few weeks on verbal enquiry it was found that most of the complains of headache and uneasy feelings of the staff was gone.

Table 1. Magnetic Fieldat different locations of the office building, roadside window of the 2nd floor being closest to the 11KV power line.

Floor	Staff seat No./Location	Magnetic Field (mG)		
		Road Side Window	Middle of the Room	Wall side of the Room
1st Floor	1	16.8	9.6	3.4
	2	17.3	9.4	5.6
2nd Floor	3	48.9	19.4	8.6
	4	24.4	-	-
	5	41.9	-	-
	6	-	-	7.2
	7	42.0	-	17.4
	8	-	-	-
	9	-	6.0	-
3rd Floor	10	-	-	-
	11	32.6	14.7	7.5
	12	27.0	-	17.0
	13	-	6.0	-
	14	28.8	18.9	-
	15	-	-	-
	16	-	-	7.2
4th Floor	17	15.2	-	6.8
	Balcony-Front side	14.7	-	8.4
	Corner Room-Front	15.2	-	5.7
	Balcony-Backside	-	-	1.2
5th Floor	18	7.4	-	6.0

DISCUSSIONS

Electrification in all countries has progressively increased the mean level of extremely low frequency electromagnetic fields (ELF-EMF) to which populations are exposed; these human made electric and magnetic fields (typically 25 V/m and 2.5 mG or 0.25 μT) are substantially above the naturally occurring ambient electric and magnetic fields of 10^{-4} V/m and 10^{-13} T respectively (Wertheimer 1979, Milham 1982). There have been considerable concern and controversy recently about the effects on health from the increasing exposure of populations to various sources of EMF, known as Non-Ionizing Radiation. It is generally accepted that EMFs can exert biological effects (Wertheimer 1979, Fernie 2005). As the industrialization and the technological revolution continues in modern societies, an unprecedented increase in the number and diversity of electromagnetic field (EMF) sources have taken place. While these devices have made our life richer, safer and easier, they have been accompanied by concerns about possible health risks due to their EMF emissions. High voltage transmission line is also a prime concern in this respect.

For quite sometime many individuals have reported a variety of health problems that are related to exposure to EMF throughout the world (Repacholi 2003, Bowman 1988). While some individuals report mild symptoms and react by avoiding the field as much as they can, others are so severely affected that they cease to work. Reported sensitivity to EMF has been generally termed "electromagnetic hypersensitivity" (EHS) and is characterized by a variety of non-specific symptoms, which afflicts individuals, attribute to exposure to EMF. The symptoms most commonly experienced include dermatological symptoms (redness, tingling, and burning sensations) as well as neurasthenic and vegetative symptoms (fatigue, tiredness, concentration difficulties, dizziness, nausea, heart palpitation, and digestive disturbances). The collection of symptoms is not part of any recognized syndrome (WHO 2004).

The means of data collection in the present work was simply verbal reporting by the staff. It is rather qualitative and was chosen for this preliminary study in Bangladesh. However, the fact that persons sitting near the 11kV line made the health complains seems reasonable enough as the magnetic field was quite high there compared to the other seating locations. This work justifies further studies to be taken up in Bangladesh in order to study the electric and magnetic fields in buildings which are close to high voltage power lines and advise people to avoid such exposures.

One good piece of information came out of this work – adverse effect on human health due to exposure to EMF for short periods (in this specific case study it was 2-3 months exposure period) may be reversible, as the unpleasant symptoms of the affected personnel went away after they were moved away from the high field area. However, permanent adverse effects of long time exposure to EMF radiation cannot be ruled out and it is advisable not to allow people living under or near high voltage power transmission lines.

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