Assessment of Ambient Magnetic Field Exposure Emitted from Underground Transmission Lines in Some Areas of Riyadh

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Abstract The purpose of this work is to measure the magnetic field emitted from underground transmission lines and camper with international limit. The measurements of magnetic field were performed with the aid of TRIAXIAL ELF Magnetic Field Meter. The level of magnetic field were found in the range 1 to 197 with mean value of 51.6 ± 44.2 mG. The survey of magnetic field measurements revealed that the level of radiation dose found to be far below than the international standard dose limit for the public exposure set by the International Commission on Non-Ionizing Radiation Protection ICNIRP 830 mG.

Keywords: magnetic field, underground transmission lines, ICNIRP


1. Introduction

The transmission lines are one of the most important sources of a magnetic field. Recently, considerable people concern has arisen because of reports on adverse health effects due to Magnetic fields. Public interest to the potential link between human health effects and exposure to 60 Hz magnetic field has increased dramatically and concern continues to concentrate on electric power facilities. Owing to the vicinity of distribution facilities to housing zones, magnetic field exposures from distribution systems can be higher than those related with transmission lines. Moreover, measurements of magnetic fields at the earth's surface from inhumed distribution cables may be greater than those from overhead lines carrying the same currents because buried cables are closer to the measurement point than overhead lines. Numerous publications in the scientific literature have raised concern about the individual and public health impact of adverse non-ionizing radiation from electromagnetic field exposure emanating from certain power, electrical and wireless devices commonly found in the home, workplace, school and community. Modern epidemiological survey has proposed that magnetic fields exposures might be related to increased risk of leukemia (Fodderus et al., 1993) (Theriault et al., 1994), brain cancer (Savitz and Loomis, 1995), breast cancer (Coogan et al., 1996) (Sobel et al., 1995), and amyotrophic lateral sclerosis (Davanipour et al., 1997) (AL-rajhi, 2006). Though in vivo studies have indicated that no increase in either leukaemias or brain cancers from field exposures, such animal experiments have limitations as predictors of human carcinogenesis with environmental EMF (EMF RAPID Program, 1998). Epidemiological researches have proposed that exposure to magnetic fields greater than ICNIRP limit could double the relative risk of leukemia in childhood. However, a possible biological mechanism has not been created. Overall, the evidence for a carcinogenic effect is still too weak to influence exposure restrictions recommended by the Health Protection Agency. The survey of magnetic field measurements in current investigation has revealed that the level of radiation dose fall far below the standard dose limit for the public exposure set by the ICNIRP (AL-rajhi, 2008). Rely only on epidemiologic associations with leukaemia, a recent US government review classified ELF magnetic fields (MFs) as a 'possible carcinogen (Portier and Wolfe, 1998). This study deals with the survey of the magnetic field radiation emitted from underground transmission lines in north area of Riyadh.

2. Materials and Methods

2.1. Study Area

The study area is North region of Riyadh city, the capital city of the Kingdom of Saudi Arabia with an area of about 1554 km². It is located centrally in the Najd region and lies between latitude 34°–38° north and longitude 43°– 46° east (Figure 1).

2.2. Magnetic Fields Measurement

Magnetic fields radiation intensity produced from underground transmission lines measurements were performed with the aid of TRIAXIAL ELF Magnetic Field
Meter TM-192/TM-192D (detection range 0 – 500 mG) in 185 location around north area of Riyadh city. The instrument were previously calibrated to measure electromagnetic field radiation at different bandwidths down to 50Hz/60Hz. All measurements are taken at one meter above the ground from underground transmission line. Voltage of the transmission lines during the measurements was 127 V (AL-rajhi, 2008).

As of late, global endeavors to present efficient people health prevention against an electronic magnetic field have prompted an extent of national and universal rules. One of these organizations, for instance, International Commission on Non-Ionizing Radiation Protection (ICNIRP) and Institute of Electrical and Electronics Engineers IEEE that publish safety standards for exposure to electronic magnetic field (ICNIRP, 2002, 1998). The result of magnetic field level on the one meter above the ground from underground transmission line studied is characterized with high variation ranging from 1 to 197 mG with a mean of 51.6 ± 44.2 mG as shown in (Figure 2). The survey of magnetic field measurements revealed that the level of radiation dose far below the standard dose limit for the public exposure set by the ICNIRP 830 (ICNIRP, 1998). The results indicate that the high values of the dose have been measured within the area close to the underground transmission line while the low dose was recorded in an area far distance from the transmission line. However there are some areas far away from the underground transmission line showed high doses compared to nearby areas. This can be attributed to the depth at which the transmission line is buried in addition to the presence of net current. In this study the range of the magnetic field dose was higher than similar reported study range of 0.15 to 22.6 mG in the USA (George, 1994).

4. Conclusions
The levels of magnetic field measurement of the underground transmission line fall within acceptable levels recommended by International Commission on Non-Ionizing Radiation Protection.

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References