Magnetic Field Effect of Three phase Double Circuit 220 kV Transmission line on Human Health

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Electricity being one of the most important part of our life which is used to power domestic as well as commercial appliance’s, Industrial equipment’s and many other devices making our life easier. Nowadays most of the offices & industries are equipped with state of the art electrical and electronic devices ranging from desktop computers to sophisticated manufacturing processes that are highly dependent on the continuous power supply. Electricity being generated at the generating stations in huge amount through fossil fuels, renewable energy sources (RES). This electrical energy is transferred from generating stations to the demand centres through long distant transmission lines. Transmission of electrical energy is carried out at High Voltage (HV), Extra high voltage (EHV) and Ultra High Voltage (UHV) AC/DC transmission levels and gets consumed at domestic and commercial level. With the increasing voltage level in order to achieve bulk power transfer through these transmission lines the impact of such high voltage levels on Environment needed careful attention. Generation of magnetic fields form these transmission lines due to the load current flowing in the conductors within the vicinity of the humans can be dangerous and alarming to the health related issues leading to ill mental conditions and leukaemia. The research is carried out to study the effect of these magnetic fields on the human health generated through a 220 kV Transmission line situated in the vicinity of Engineering college, Banswara to determine the occupational hazard arising due to a highly electromagnetic working Environment.

**Keywords- HV, EHV, UHV, Transmission line, Magnetic Field effect, Occupational Hazard.**

**INTRODUCTION**

Modernization with upgraded infrastructure made Indian power transmission system a huge power delivery network spreading all borders within the country for continuity of reliable power supply. As per the CEA report India has 425071 circuit-km's of Power transmission lines including 220 kV, 400 kV, 765 kV, ± 500 kV (DC) and ± 800 kV (DC) Transmission lines as on March 2020. The high voltage gradient on the conductors brought problem related to exposure form electromagnetic field (EMF) from power frequency voltage level. EMF Exposure that is invisible and produced by AC transmission lines as Electric fields which are produced by the Voltage gradient on the conductor surface and Magnetic fields which are produced due to changing load current on conductors, within vicinity of the mankind was observed from a long time. Magnetic field basically the energy reservoir with the energy density of \( e = B^2 / 2 \mu \) (Joules/m²) known to influence human body tissues. These Power Frequency alternating Magnetic Fields induces flow of weak electric currents in the body due to electrical conductivity of tissues (about 0.1 to 0.2 Siemen/meter). Magnetic field exposure of above 3 milli-Gauss(mG) may be considered harmful to the human health as per World Health Organisation (WHO). Adverse effects may lead to ill human health and can pose health Hazards such as cancer, Lymphoma, Brain damage etc.

**1.1 Magnetic Fields from electrical Devices and appliances:**

Magnetic fields can originate from electrical appliances such as Xerox machines, computers, fluorescent lights, video display terminals such as used in offices, color television, air conditioners, ceiling fans, battery chargers, drills, power saws, washing machines, irons, sewing machines, blender, mixer, coffee maker, microwave oven etc. These Magnetic fields are often much stronger which are produced due to both high and low frequency devices.

Workers may be exposed to some or many of these devices at the occupation, government office workers may be exposed to magnetic fields due to the Xerox machines and computers form 08:00 AM to 05:00 PM with a mean 9.1 milli-Gauss(mG) of radiation.