High voltage direct current (HVDC) transmission lines offer significant electrical, economic, and environmental advantages for the transport of electricity over long distances. HVDC is a well-established technology with decades of safe and reliable operation across the world. HVDC is particularly well-suited to transport large amounts of renewable power generated in remote areas over long distances to demand centers. Currently, there are more than 20 HVDC transmission facilities in the United States and more than 35 across the North American electric grid.

**STATIC ELECTRIC AND MAGNETIC FIELDS**

The electric and magnetic fields produced by direct current (DC) lines are referred to as static fields because their sources, voltage and current, do not alternate over time. Thus, DC fields are qualitatively different in nature than the alternating current (AC) electric and magnetic fields (often called EMF) produced by AC transmission lines. While AC EMF can cause the induction of currents or voltages in nearby objects, this does not occur with DC fields. DC electric and magnetic fields are identical to those found in the natural environment.\(^1\)\(^,*\)

**Static Electric Fields**

Static electric fields occur as a result of voltage. Natural sources of static electric fields include the electric fields produced by the charge on a body after shuffling across a carpet or the “static cling” found on clothing.\(^2\)

**Static Magnetic Fields**

Static magnetic fields result from the flow of DC electricity. The steady flow of currents in the Earth’s core produces the static “geomagnetic” field that causes a compass to point north. Common sources of static magnetic fields much stronger than those associated with DC transmission lines include permanent magnets, battery-powered appliances (e.g., telephones, electric tooth brushes, hearing aids, laptops, etc.) and some electrified railway systems.\(^3\)

---

\(*\) DC transmission lines are not connected to AC distribution systems. Therefore, they are not sources of AC voltages on farm or building equipment that can cause disturbances to livestock (i.e., stray voltage).
CORONA PHENOMENA

Corona refers to the partial electrical breakdown of the air surrounding points on the transmission line conductor surface by the electric field. This breakdown results in the release of small amounts of energy that may be detected near the line as audible noise and "static" on radio and analog television receivers. The US Environmental Protection Agency (EPA) and the Institute of Electrical and Electronic Engineers (IEEE) have established guidelines for the production of such noise and static, which are met in the design and construction of a HVDC transmission line.

Corona also creates air ions, which are molecules that have temporarily gained or lost electrons. Air ions also occur as a result of geologic, atmospheric, weather-related and combustion phenomena. Some air ions from DC transmission lines remain in the air for seconds before contacting an opposite charge or transferring charge to aerosol particles. Air ions and charges on aerosols collectively are called "space charge," and their presence adds to the static electric field of a DC transmission line. Space charge has been studied for over one hundred years.

No health agencies have proposed exposure limits for space charge or confirmed any health risks from this natural phenomenon.

ELECTRONIC DEVICES

The static fields of DC transmission lines are too weak to affect the operation of implanted medical devices such as cardiac pacemakers. As already noted, the corona from DC transmission lines can produce AM radio and analog TV picture signal interference. This interference is typically limited to within approximately 100 feet of the transmission line. Due to right-of-way requirements, such noise interference has not been a significant issue for most landowners. Cellular telephones, GPS receivers and other electronic equipment are used near existing DC transmission lines without issue. Thus, the possibility of interference with the operation of such devices is unlikely.

REFERENCES


CONTACT US

1001 McKinney, Suite 700, Houston, TX 77002
Tel 832.319.6310
Fax 832.319.6311
www.cleanlineenergy.com