



EMF: ELECTRIC AND MAGNETIC FIELDS

WHAT IS EMF?

Electric and magnetic fields (EMF) are produced by electrical power and natural sources. For example, the earth is the largest single source of static magnetic fields. The human heart and brain produce magnetic fields.

Both electric and magnetic fields are created whenever there is a flow of electricity, and their strength diminishes within a short distance from the source.

The strength of the electric fields depends on the voltage, which is the pressure behind the flow of electricity. Electric fields are measured in volts per meter (V/m) or in kilovolts per meter (kV/m).

Magnetic fields are produced by current, which is the flow of electricity. Magnetic fields are measured in gauss (G) or in milligauss (mG).

WHAT ARE SOURCES OF EMF?

EMF is a part of our everyday lives. Electric and magnetic fields are present around most household appliances, electronics, power lines, and electric wiring.

Typical Exposure of 60Hz Magnetic Fields from Electric Appliances at Typical User Distance



Source: NIEHS EMRAPID Brochure (2002), EPRI Report 1021221 – “Magnetic Fields from Electrical Appliances and Devices” (2010)

DOES EMF CAUSE ADVERSE HEALTH IMPACTS?

For over 40 years there have been a great deal of scientific studies to determine whether EMF affects human health. Much of the scientific research examining potential health effects of long-term EMF exposure has focused on childhood leukemia and other cancers.

The World Health Organization (WHO) released a review of research on EMF and human health that was consistent with the findings of the National Institute of Environmental Health Sciences (NIEHS) and other national and international research reviews. The WHO report concluded that the cumulative evidence was not sufficient to indicate a causal relationship between EMF and any disease, including cancer.

THE WHO ADVISED THAT:

“...given the weakness of the evidence for a link between exposure to ELF magnetic fields and childhood leukemia, the benefits of exposure reduction on health are unclear.”

— *World Health Organization*

REFERENCE: [WHO – EXPOSURE TO EXTREMELY LOW FREQUENCY FIELDS](#)

ARE THERE GUIDELINES FOR EXPOSURE TO EMF?

Various EMF guidelines produced by national and world health organizations are designed to be protective against any adverse health effects. These guidelines recommend limitations of between 2,000 mG and 10,000 mG for continuous magnetic field exposure for the public.

The International Commission of Non-Ionizing Radiation Protection (ICNIRP) established a health-based guideline for public exposure to EMF at 2,000 mG.

WHAT ARE THE EXPECTED EMF LEVELS FOR MAYFLOWER WIND PROJECT?

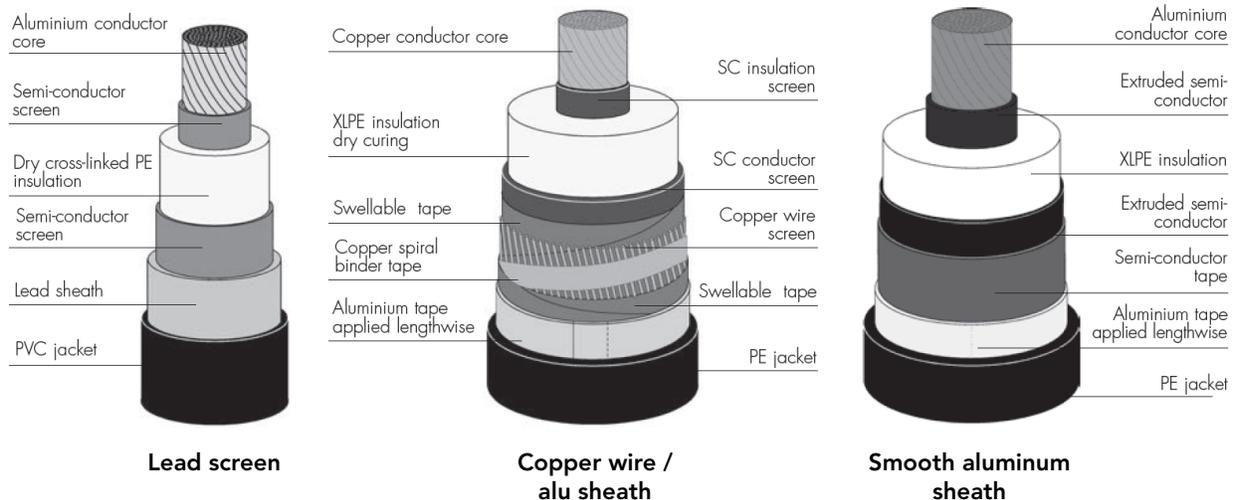
The extremely low magnetic field levels associated with the Mayflower Wind project will be substantially lower than the ICNIRP health-based guideline.

The types of power cables that will be used by Mayflower Wind do not produce any electric fields external to the cable due to the cable's metallic shield (also referred to as metallic sheath or screen). In the diagram below, three types of cables varying by metallic shield design are presented: lead sheath, copper wire and aluminum tape screen, and aluminum tape screen.

Mayflower Wind Expected Magnetic Field Levels vs. Health-Based Guideline

Magnetic Field (MF) Health-Based Guideline (ICNIRP)	2,000 mG
Directly above buried cables, in middle of beach	10 mG
Directly above buried cables, at edge of beach	10 mG
Directly above buried cable transition vault, in parking lot or street median	350 mG
Directly above buried cable duct bank, in roadway	500 mG

EMF Technical Memo, Prepared by Gradient. October 28, 2020 page 91 at <http://www.falmouthmass.us/DocumentCenter/View/8643/2020-11-09-P>



Example onshore cable types [Source: Nexans, 2012, 60-500 kV High Voltage Underground Power Cables (Brochure)]



WHERE CAN I FIND OUT MORE INFORMATION ABOUT EMF?

The following is a selection of leading scientific research:

World Health Organization

[International EMF Project Information Sheet](#)

Direct link: <https://www.who.int/health-topics/electromagnetic-fields>

The International Commission on Non-Ionizing Radiation Protection

[Guidelines for Limiting Exposure to Time-Varying EMF Fields](#)

Direct link: <https://www.icnirp.org/>

National Institute of Environmental Health Sciences (NIEHS)

[Electric and Magnetic Fields Associated with the Use of Electric Power](#)

Direct link: <https://www.niehs.nih.gov/health/topics/agents/emf/index.cfm>

National Cancer Institute

[EMF Fields and Cancer](#)

Direct link: <https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet>

European Commission – SCENIHR

[Opinion on Potential Health Effects of Exposure to EMF](#)

Direct link: https://ec.europa.eu/health/scientific_committees/consultations/public_consultations/scenihhr_consultation_19_en

Other

[Gradient EMF Technical Memo for Mayflower Wind, pages 89-120](#)

Direct link: <http://www.falmouthma.gov/DocumentCenter/View/8643/2020-11-09-P>

“Extensive research has been conducted into possible health effects of exposure to many parts of the frequency spectrum. All reviews conducted so far have indicated that exposures below the limits recommended in the International Commission on Non-Ionizing Radiation Protection (ICNIRP [1998]) EMF guidelines, covering the full frequency range from 0 - 300 GHz, do not produce any known adverse health effect.”

— *World Health Organization*

REFERENCE: WORLD HEALTH ORGANIZATION, ELECTROMAGNETIC FIELDS (EMF) RESEARCH, WWW.WHO.INT/PEH-EMF/RESEARCH/EN/

CONTACT INFORMATION

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