



ATOMIC ENERGY COUNCIL

NON-IONIZING RADIATION PROTECTION: FREQUENTLY ASKED QUESTIONS ABOUT RADIATION SAFETY IN HIGH VOLTAGE POWER TRANSMISSION LINES

1. INTRODUCTION

As the world becomes increasingly dependent on electricity, high voltage power transmission lines have become a common sight in many communities. While these power lines are essential for delivering electricity to homes and businesses, concerns have been raised about the potential impact the radiation they emit has on human health and the environment. This document provides answers to frequently asked questions about high voltage power transmission lines and the potential health and environmental impacts associated with their operation. The answers are based on the latest scientific research and the guidelines established by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), an independent organization that provides guidance on the safe use of non-ionizing radiation.

2. FREQUENTLY ASKED QUESTIONS

1. Do high voltage power transmission lines emit radiation?

Yes, high voltage power transmission lines do emit radiation. However, the radiation emitted by power lines is non-ionizing radiation, which means that it does not have enough energy to directly damage cells or tissues in the body.

The radiation emitted by power lines is mainly in the form of extremely low-frequency electromagnetic fields (ELF-EMF), which are produced by the flow of electricity through the power lines. These fields are also produced by electrical appliances and other electrical systems, including the wiring in buildings.

The strength of these fields depends on the voltage, the current, the configuration of the wires, and the distance from the source. The electric field is measured in volts per meter (V/m) and the magnetic field is measured in microtesla (μT) or milligauss (mG).

2. How close is too close to live or work near high voltage power lines?

The distance at which a person is exposed to electromagnetic fields from high voltage power lines is the main factor that determines the level of exposure. The strength of extremely low-frequency electromagnetic fields decreases rapidly with increasing distance from the source, so the further away you are from the power line, the lower your exposure will be.

In general, living or working very close to high voltage power lines may result in higher exposure to electromagnetic fields, which could potentially increase the risk of some health effects. However, it is important to note that most people living near power lines are exposed to electromagnetic fields levels that are well below the AEC exposure limits. According to these guidelines, the general public and the workers at should not be exposed to electric fields above 5 kV/m and magnetic fields above 200 μT for longterm exposure. For occupational exposure, the limits are 10 kV/m and 1000 μT respectively. These limits are based on the prevention of acute effects such as nerve stimulation, muscle contraction, and magnetophosphenes (flashes of light in the eyes).

3. What is the major concern for a person living close to a high voltage power transmission line?

The major concern for a person living close to a high voltage power transmission line is the possible exposure to extremely low frequency (ELF) magnetic fields above the exposure limit of 200 μT for the general public. This could happen if the person lives or works very close to the wires or near a substation where the current is high.

Exposure to such high magnetic fields could cause acute effects such as nerve stimulation and muscle contraction.

However, these effects are unlikely to occur under normal circumstances, as most people do not spend long periods of time very close to high voltage power transmission lines or substations. Moreover, these effects are reversible and do not cause permanent damage. The other concern for a person living close to a high voltage power transmission line is the possible association between ELF magnetic fields and childhood leukemia. Some epidemiological studies have suggested that children who live near power lines or other sources of ELF magnetic fields have a slightly increased risk of developing leukemia. However, this association is weak, inconsistent, and not supported by experimental or mechanistic evidence. Therefore, experts consider that there is no causal link between ELF magnetic fields and childhood leukemia but recommends further research to clarify this issue.

4. What are the health effects associated with exposure to radiation from high voltage power transmission lines?

The scientific evidence on the health effects of exposure to ELF-EMF is still limited and inconclusive. Some studies have reported a possible association between ELF-EMF exposure and an increased risk of childhood leukemia, brain tumors, and other cancers. Other studies have not found any evidence of a link between ELF-EMF exposure and these health outcomes. ICNIRP recommends exposure limits for ELF-EMF that are designed to prevent any adverse health effects.

5. Are there any regulations in place to limit radiation exposure from high voltage power transmission lines? Who sets these regulations? How often are the regulations updated? How are the regulations enforced?

Yes, there are regulations in place to limit radiation exposure from high voltage power transmission lines. In most countries, the regulations are set by national or regional regulatory bodies, such as the Federal Communications Commission (FCC) in the United States or the International Commission on Non-Ionizing Radiation Protection (ICNIRP) in Europe. In Uganda, the regulations are set by the Atomic Energy Council (AEC). The regulations establish exposure limits for ELF-EMF based on the latest scientific evidence on the potential health effects of this type of radiation.

The regulations are enforced through various mechanisms, including monitoring of radiation levels and inspections of facilities to ensure compliance with exposure limits.

6. What is the acceptable level of radiation exposure from high voltage power lines?

In Uganda, the acceptable level of radiation exposure from high voltage power lines is determined by exposure limits set in the regulations developed by the Council. These exposure limits are based on the latest scientific evidence on the potential health effects of ELF-EMF exposure as described in the ICNIRP guidelines.

The exposure limits for ELF-EMF that are designed to protect public health. The limits are expressed in terms of electric and magnetic field strengths, and they depend on the frequency of the radiation and the duration of exposure. For frequencies below 100 kHz, the exposure limit for the general public is 100 microtesla (μT) for the magnetic field and 5 kilovolts per meter (kV/m) for the electric field. For occupational

exposure, the limit for magnetic fields is higher at 500 μ T. It is important to note that most people living near power lines are exposed to ELF-EMF levels that are well below the exposure limits.

7. How do companies ensure that their power transmission lines are operating within safe radiation limits?

Companies that operate high voltage power transmission lines have a responsibility to ensure that their facilities are operating within safe radiation limits. This is typically achieved through regular monitoring of the electromagnetic fields (EMF) generated by the power lines. Monitoring can be done using handheld meters or more sophisticated equipment installed at the site. In addition to monitoring, companies may also conduct periodic risk assessments to identify any potential health risks associated with the power lines.

Companies may also implement engineering controls, such as shielding or re-routing of power lines, to reduce EMF levels where necessary. It is also important for companies to educate their employees and the public about the potential risks associated with EMF exposure and to encourage safe practices when working near power lines.

8. Are children more susceptible to the health effects of radiation exposure from high voltage power lines?

There is some evidence to suggest that children may be more susceptible to the potential health effects of radiation exposure from high voltage power lines. This is because their bodies are still developing and may be more sensitive to environmental factors. However, the evidence on this issue is still limited and inconclusive.

AEC has established exposure limits for ELF-EMF that are designed to protect all members of the population, including children. These exposure limits are based on the latest scientific evidence on the potential health effects of ELF-EMF exposure as developed by the ICNIRP.

9. How does the distance from a high voltage power transmission line affect the potential health risks of radiation exposure?

The potential health risks of radiation exposure from high voltage power transmission lines decrease with increasing distance from the power lines. This is because the intensity of the electromagnetic fields (EMF) generated by the power lines decreases rapidly with distance.

The exact distance at which the potential health risks become negligible will depend on several factors, including the strength of the power line, the duration and frequency of exposure, and the sensitivity of the individual. However, generally, the closer a person is to a high voltage power transmission line, the higher their exposure to EMF and the greater the potential health risks.

Exposure limits for ELF-EMF are designed to protect public health and assume that people are not in direct contact with the source of the radiation. Therefore, it is generally recommended that people maintain a safe distance from high voltage power transmission lines to reduce their exposure to EMF.

10. How can I protect myself from radiation exposure from high voltage power lines?

To protect yourself from radiation exposure from high voltage power lines, it is recommended that you maintain a safe distance from the power lines. The exact distance at which you should maintain will depend on several factors, including the strength of the power line, the duration and frequency of exposure, and the sensitivity of the individual. In general, however, maintaining a distance of at least 40m from high voltage power lines is recommended.

It is also recommended that you limit the amount of time you spend near high voltage power lines, particularly if you are engaged in activities that may increase your exposure, such as farming, residence, office, or construction work.

11. What do I do if I suspect that I have been exposed to high levels of radiation from high voltage power lines?

If you suspect that you have been exposed to high levels of radiation from high voltage power lines, it is important that you seek medical advice. Symptoms of radiation exposure may include skin irritation, headaches, nausea, and dizziness. In severe cases, radiation exposure can lead to long-term health effects such as cancer.

Your doctor may recommend tests to determine the extent of your exposure and to monitor your health going forward. It is important that you inform your doctor of any potential exposure to high voltage power lines so that they can take appropriate action.

12. How do companies balance the need for power transmission with potential health concerns for the public and the environment?

Companies that operate high voltage power transmission lines have a responsibility to balance the need for power transmission with potential health concerns for the public and the environment. This can be achieved through several measures, including regular monitoring of electromagnetic fields (EMF), implementing engineering controls to reduce EMF levels where necessary, and educating employees and the public about the potential risks associated with EMF exposure.

Companies may also conduct risk assessments to identify potential health and environmental risks associated with their operations and to develop strategies to mitigate these risks. In addition, companies may be subject to regulatory requirements designed to protect public health and the environment.

13. What are the potential environmental impacts of high voltage power transmission lines?

High voltage power transmission lines can have several potential environmental impacts, including visual impacts on the landscape, and radiation-related impacts on wildlife and habitats. To minimize these impacts, companies are required to comply with environmental regulations and to implement measures to mitigate the potential environmental impacts of their operations. For example, power transmission companies are required to conduct environmental impact assessments before constructing new power transmission lines, to use alternative routing or construction techniques to minimize impacts, and to conduct habitat restoration or mitigation measures.

14. Can high voltage power lines affect the quality of drinking water?

There is currently no evidence to suggest that high voltage power lines have any direct effect on the quality of drinking water. While electromagnetic fields (EMF) can induce electrical currents in conductive materials, such as metals or water, the levels of EMF associated with power transmission lines are generally too low to cause any significant effects on water quality.

Companies that operate high voltage power transmission lines are required to comply with environmental regulations that address water quality and may be required to conduct environmental impact assessments to identify potential impacts on water resources.

15. Can living near a high voltage power transmission line increase the risk of developing cancer?

There is currently no conclusive evidence to suggest that living near a high voltage power transmission line increases the risk of developing cancer. However, some studies have suggested a possible link between exposure to electromagnetic fields (EMF) from power transmission lines and an increased risk of childhood leukemia. Other studies have not found a consistent association.

16. What steps can individuals take to reduce their exposure to radiation from high voltage power transmission lines?

To reduce exposure to radiation from high voltage power transmission lines, individuals can take several steps, including:

- Maintaining a safe distance from power transmission lines, ideally several hundred feet
- Limiting the amount of time spent near power transmission lines
- Educating themselves and their families about the potential risks associated with EMF exposure

It is also important to note that exposure to EMF from high voltage power transmission lines is just one of many sources of EMF in our daily lives, including sources such as mobile phones, household appliances, and Wi-Fi routers. Therefore, individuals may also consider reducing their overall exposure to EMF by limiting their use of these devices and taking other steps to reduce their exposure to EMF in their daily lives.

17. Can exposure to radiation from high voltage power transmission lines cause any immediate health effects?

Exposure to radiation from high voltage power transmission lines is not known to cause any immediate health effects. Electromagnetic fields associated with power transmission lines are non-ionizing radiation, which means that they do not have enough energy to cause direct damage to DNA or other biological molecules.

However, exposure to high levels of EMF can cause heat stress, which can lead to symptoms such as headaches, dizziness, and nausea. In addition, there have been some reports of other symptoms, such as fatigue and sleep disturbances, that may be associated with long-term exposure to low levels of EMF. The scientific evidence regarding these potential effects is still under debate, and more research is needed to better understand the potential health effects of exposure to EMF.

18. What factors can impact the amount of radiation emitted by high voltage power transmission lines?

The amount of radiation emitted by high voltage power transmission lines can be influenced by several factors, including the amount of power being transmitted, the voltage of the power lines, the configuration of the power lines (e.g., whether they are overhead or underground), and the distance between the power lines and nearby objects.

19. Can exposure to radiation from high voltage power transmission lines cause genetic mutations or birth defects?

The scientific evidence regarding the potential health effects of exposure to electromagnetic fields from high voltage power transmission lines is still under debate. While some studies have suggested a possible link between long-term exposure to high levels of EMF and an increased risk of certain types of cancer, there is currently no evidence to suggest that exposure to EMF from power lines can cause genetic mutations or birth defects. The electromagnetic fields (EMF) associated with power transmission lines are generally considered to be non-ionizing radiation, which means that they do not have enough energy to cause direct damage to DNA or other biological molecules.

20. Can electromagnetic radiation from high voltage power transmission lines interfere with electronic devices and equipment?

Electromagnetic fields (EMF) associated with high voltage power transmission lines can interfere with electronic devices and equipment. The strength of the EMF decreases rapidly with distance from the power lines, so devices located farther away are less likely to be affected. However, devices located very close to the power lines (within a few meters) may experience interference, which can manifest as static on audio equipment, flickering on video screens, or other types of signal disruption. This is because electromagnetic fields (EMF) can induce electrical currents in conductive materials, such as wires and circuit boards, which can cause unwanted signals or noise in electronic devices.

21. Can radiation from high voltage power lines affect my fertility or pregnancy?

The scientific evidence regarding the potential effects of exposure to electromagnetic fields (EMF) from high voltage power transmission lines on fertility and pregnancy is still under debate. While some studies have suggested a possible link between longterm exposure to high levels of EMF and reduced fertility or an increased risk of pregnancy complications, other studies have not found any association between EMF exposure and these outcomes. The electromagnetic fields (EMF) associated with power transmission lines are generally considered to be non-ionizing radiation, which means that they do not have enough energy to cause direct damage to DNA or other biological molecules.