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Request to Intervene in PUC Docket No. 55067

The following information must be submitted by the person requesting to intervene in this proceeding. This completed form will be provided to all parties in this docket. **If you DO NOT want to be an intervenor, but still want to file comments, please complete the "Comments" page.**

For USPS, send one copy to:

Public Utility Commission of Texas
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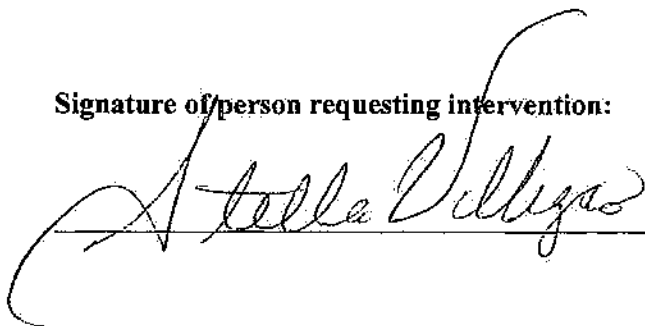
I am requesting to intervene in this proceeding. As an INTERVENOR, I understand the following:

- I am a party to the case;
- I am required to respond to all discovery requests from other parties in the case;
- If I file testimony, I may be cross-examined in the hearing;
- If I file any documents in the case, I will have to provide a copy of that document to every other party in the case; and
- I acknowledge that I am bound by the Procedural Rules of the Public Utility Commission of Texas (PUC) and the State Office of Administrative Hearings (SOAH).

Please check one of the following:

- ☒ I own property with a habitable structure located near one or more of the utility's proposed routes for a transmission line.
- ☐ One or more of the utility's proposed routes would cross my property.
- ☐ Other. Please describe and provide comments. You may attach a separate page, if necessary.

Signature of person requesting intervention:



Date: 7.20.2023

Effective: April 8, 2020

Public Utility Commission of Texas Central Records
Transmissionprojects@oncor.com

Date: July 20, 2023

Subject: Ramhorn Hill - Dunham 345 KV Transmission Line Project

As a resident of Hardeman Estate in City of Justin it concerns me a great deal that there can be a potential Transmission line/transformer in our subdivision. **This Transmission line/transformer will effect me because this is my primary residence and I have an autoimmune disease and am scared for my health, as well as my neighbors who are like family to me.** WE as neighbors watch out for each other and help one another. Many elder on my block have health issues. **As homeowners we need to disclose on the Seller's Disclosure the Transmission line/transformer and many buyer's in my 20 years will not likely purchase a home based on these powerful Transmission line/transformer due to the affects it can have on their families health issues.** The residents of the City of Justin are families with young children and many Senior Residence. Our town is a small quiet town, yes, we our growing but this Transmission line/transformer install can be consider in rural areas and that is my suggestion. **We are a dense population and this will impact many with health problems and take away our quality of life.** I have read several articles on the impact a transformer can have on one's health and it is not Encore's right to take our health and quality of life away. I strongly urge you to look for other locations and save our community. We are (Human beings) who want to continue to live a healthy, peaceful life in our small town of Justin, TX.

In summary the impact can be devastating to the community these reasons.

1. **This will have a very negative impact on the health of these families** (attached is an article on power lines and transformers: Health effects and safe distance. The Power Grid health affects? Transformer can impact our health and studies have linked low-frequency radiation with miscarriages, leukemia, skin cancer, multiple sclerosis, etc. Due to their connection with childhood leukemia, magnetic fields have be classified as "possible carcinogens" in 1998 by the National Environmental Health

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/ [LOW FREQUENCY RADIATION \(/electromagnetic-radiation/low-frequency-electromagnetic-fields\)](#)
/ [Power lines and transformers](#)

Power lines and transformers: Health effects and safe distance

Michael Kagelidis, MSc Mechanical Engineer (NTUA), Building Biology Practitioner (IBE)



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How much radiation do power lines, high voltage pylons and transformers emit? Which levels of electric and magnetic fields cause effects on human health and when are exceeded? Which source is the most common cause of elevated magnetic fields (not what you would imagine...)? What are the safe distances?



1. How does the electricity grid work? ([/electromagnetic-radiation/low-frequency-electromagnetic-fields/power-lines-and-transformers#how-does-the-electricity-grid-work](#))
2. What kind of radiation do cables and transformers emit? ([/electromagnetic-radiation/low-frequency-electromagnetic-fields/power-lines-and-transformers#what-kind-of-radiation-do-cables-and-transformers-emit](#))
3. Why has our electromagnetic burden from the electricity network increased? ([/electromagnetic-radiation/low-frequency-electromagnetic-fields/power-lines-and-transformers#why-has-our-electromagnetic-burden-from-the-electricity-network-increased](#))
4. Does radiation from the power grid affect human health? ([/electromagnetic-radiation/low-frequency-electromagnetic-fields/power-lines-and-transformers#does-radiation-from-the-power-grid-affect-human-health](#))
5. What are the safe limits of exposure to low frequency magnetic fields? ([/electromagnetic-radiation/low-frequency-electromagnetic-fields/power-lines-and-transformers#what-are-the-safe-limits-of-exposure-to-low-frequency-magnetic-fields](#))
6. What is the safe distance from high voltage power lines? ([/electromagnetic-radiation/low-frequency-electromagnetic-fields/power-lines-and-transformers#what-is-the-safe-distance-from-high-voltage-power-lines](#))
7. How to measure the radiation from power lines and transformers? ([/electromagnetic-radiation/low-frequency-electromagnetic-fields/power-lines-and-transformers#how-to-measure-the-radiation-from-power-lines-and-transformers](#))

How does the electricity grid work?

Electricity is transferred from power plants via high voltage lines (100-500kV) to substations. There, the high voltage is reduced by transformers and the electricity is transferred to medium voltage power lines (20-40kV). Again, the medium voltage is reduced by transformers and the electricity is then transferred to low voltage power lines (110-480V) which finally bring it to our buildings electricity meter. From there it goes into our individual electrical panel and the cables in our walls, lights, wall outlets and electrical equipment.

What kind of radiation do cables and transformers emit?

All the conductive parts of the electrical network produce electric AC fields because they are under voltage and AC magnetic fields because current flows through them. The alternating current (AC) is called that, because the electrons in the live conductors switch direction of their movement 50-60 times per second (frequency 50Hz in Europe, 60Hz in USA).

Electric fields

Electric fields are blocked by various grounded conductive objects such as trees, most building materials etc.

Elevated electric fields are usually recorded **outdoors** only, near high or medium voltage lines.

The cables of high voltage lines are electric field sources and not the pylons - pillars (radiation values are actually lower near the pillars where the cables have the higher distance from the ground).

Power cables located inside the walls and electrical appliances are the most common source of electric fields in interior areas, not the outside power lines. Faults in cable insulation or faulty connections (eg. not grounding a circuit) may lead to elevated prices for your electricity.



Magnetic fields

Magnetic fields penetrate most building materials.

Elevated magnetic fields are usually recorded near high and medium voltage power lines. Also near low voltage power cables, especially in densely populated areas (eg. in 1st and 2nd floor apartments that are near overhead power lines or in underground and ground floor apartments when the power lines are underground).

According to statistics, the **most common cause of high values of radiation** resulting from magnetic fields are **low voltage power lines** that bring electricity to every house. Only 23% of these values are due to high voltage lines.

This is because the magnetic fields depend on the amount of electricity that flows through the cables (ampere) and not on the voltage ($\text{Watt} = \text{Volt} * \text{Ampere}$). The low voltage cables can be overloaded **particularly in densely populated areas**. Moreover, the low voltage cables are usually found closer to residencies (high voltage cables usually have a minimum distance of 20 meters).

Transformers / substations only create locally elevated magnetic fields, which show their effects within a small distance (typically <5 m). However, the low or medium voltage cables starting from the transformers create elevated magnetic fields due to the large amount of current flowing through them. In houses located far away from the transformer the magnetic fields of low-voltage cables are lower, since most power has been distributed to the house closest to the transformer.

You can reduce your exposure to magnetic fields from cables and transformers by increasing your distance from them.

Magnetic shielding materials are made from metal alloys (not lead!) with very high magnetic permeability, but are also very expensive (> 150 euros / m²) among other peculiarities. Their



placement is certainly not recommended without the prior measurement of magnetic fields.

The reduction of magnetic fields is possible, if the power lines are underground or if they are transferred to a more distant point (eg. on the opposite side of the road). Although such solutions are not common you can contact your local power company and ask them if they can move the cables away.

Are underground power lines safer compared to overhead power lines?

In underground cables the electric fields are minimal because they are grounded and the magnetic fields decrease more rapidly because the cables have a smaller distance between them.

However, because the underground lines are not obvious and are often closer to high-use areas, they can cause high levels of magnetic fields on the ground floor or basement apartments or shops, in yards, gardens, pavements etc.

Why has our electromagnetic burden from the electricity network increased?

1. Because of the major expansion of the electricity network, which has multiplied the report points for electromagnetic radiation.
2. Because of higher power consumption, which means that the existing power lines emit greater magnetic fields.
3. Because the radiation emitted by cables today has a more aggravating waveform. The extensive use of electronic non-linear load devices such as fluorescent lamps, AC adapters, dimmer electronic switches, inverter air conditioners, plasma TVs, photovoltaic systems etc. results in the deformation of the plain sinusoidal signal of 50-60Hz mains with high frequency harmonics. This phenomenon is called "Dirty Electricity" because it causes overheating of the neutral conductor and premature aging of equipment. Some scientists believe that the new waveform of the power grid is particularly burdensome for humans [3] .

Does radiation from the power grid affect human health?

According to the guide of the International Commission on Non-Ionizing Radiation [4] , our interaction with the alternating electric field causes electric charges to flow in the human body and the reorientation of electric dipoles in the tissues. While magnetic fields cause electrical currents stimulating the nerve, muscle and sensory cells.

It has been said that low frequency radiation at low intensities does not contain enough energy (photons) and therefore our body can't distinguish them from the natural electromagnetic waves produced by the body (thermal noise).

But research since 1977 (Adey and Bawin) has shown that organisms can react to exogenous electromagnetic signals of a very low intensity and experience an even greater reaction to them than from stronger signals.

The explanation of the phenomenon of cell amplification of an exogenous signal won Gilbert and Rodbell the Nobel Prize in 1994. The G proteins integrate multiple signals from outside the cell and activate various cell amplification systems. Because of these a single photon of electromagnetic energy is sufficient to start massive calcium entry into the cells, activating several biological functions [5].

Recent research

Most studies that have taken place are addressing magnetic fields which are emitted from power lines, transformers and other sources.

Studies have linked low-frequency radiation with miscarriages, leukemia, skin cancer, multiple sclerosis, etc.

Due to their connection with childhood leukemia, magnetic fields have been classified as "possible carcinogens" in 1998 by the National Environmental Health Institute, USA (NIEHS) [6] and in 2001 by the International Agency for Research on Cancer (IARC) of the World Health Organization [7].

"Very recently, new research is suggesting that nearly all the human plagues which emerged in the twentieth century, like common acute lymphoblastic leukemia in children, female breast cancer, malignant melanoma and asthma, can be tied to some facet of our use of electricity. There is an urgent need for governments and individuals to take steps to minimize community and personal EMF exposures." **Samuel Milham MD, MPH, Medical epidemiologist in occupational epidemiology.** [8]

Childhood leukemia

A study by Ahlbom [10] recorded a statistical doubling of childhood leukemia in children exposed to average daily magnetic field values greater than 400nT.

Other research (Greenland [11]) recorded a doubling of leukemia with even lower average exposure > 300nT (values > 300nT are not at all unusual in densely populated areas because of overloaded low voltage cables!)

Study of 2005 (Draper [12]) recorded a 70% increase in childhood leukemia when raised <200 meters from high voltage cables and a 23% increase when raised <600 meters from the cables.

Since magnetic fields in the range of > 200m from high voltage cables are unlikely to be elevated (at least because of high voltage cables), it is likely that the increased leukemia is due to other phenomena, such as ionization of the micro particles in the atmosphere.

High electric fields around the high voltage lines charge micro particles in the air (Corona Ions Effect) increasing the likelihood of adhesion to the skin and lungs [13] .The problem can be significant in areas with high atmospheric pollution (e.g. next to busy roads, in factories, where crops are sprayed). The charged particles can travel in the air for up to 5 km.

Research at the University of Bristol [14] showed that the presence of high levels of low-frequency electric fields, such as near high voltage cables, increased the accumulation of radon particles by up to 18 times. Elevated radon levels are associated with lung cancer (you can easily measure the radon levels in your area by buying a radon meter (/electromagnetic-field-radiation-meters/radioactivity-ionizing-radiation-meters)).



Melanoma

A study from 2003 (Tynes [15]) concluded that there is evidence to link exposure to magnetic fields with malignant melanoma.

Neurodegenerative diseases

An analysis from 2008 (Garcia [16]) showed a significantly increased risk of Alzheimer depending on exposure to electric and magnetic fields.

Other research (Feychting [17]) concluded that exposure to low frequency electromagnetic fields *"increases the risk of early-onset Alzheimer's disease" and "may represent a late-acting influence in the disease process"*.

A link to increased risk of amyotrophic lateral sclerosis (ALS or disease of Lou Gehrig) has been shown in studies by Håkansson [18] and Ahlbom [19]. This disease is a progressive neurodegenerative disease that affects the nerve cells in the brain and spinal cord, causing muscular weakness, disability and eventually death.

Childhood obesity

A recent study [20] states that *"Maternal exposure to high magnetic fields during pregnancy may be a new and previously unknown factor contributing to the world-wide epidemic of childhood obesity/overweight."*

Childhood asthma

A link to a 15% increase in childhood asthma cases per 100nT increase in the exposure of the mother to magnetic fields was shown in a 2011 study [21].

Miscarriages

At least two studies have linked exposure of pregnant women to elevated magnetic fields with miscarriages during pregnancy [22] , [23].

What are the safe limits of exposure to low frequency magnetic fields?

In most countries legislation issues safe limits based only on the heating of tissue. Many scientists consider this tactic outdated due to the recent surge in sources and new scientific data.

In recent years various scientific institutions have proposed new, much lower exposure limits which are based on non-thermal effects of radiation that appear to lead to health consequences. More about the safe levels of exposure to artificial radiation.. (/electromagnetic-field-radiation-meters/safe-exposure-limits)

Most recommended exposure limits in recent years suggest that our daily average exposure should not exceed 10 Volt / m for electric fields and 200 nT for magnetic fields. Current values sadly not only exceed near high voltage cables but often also near low voltage cables, transformers, electrical panels and various electrical appliances.

What is the safe distance from high voltage power lines?

In most countries legislation permits a safe minimum distance for residencies form high voltage lines of around 200-25 meters.

However the proposed limits for exposure to electromagnetic radiation can be exceeded over longer distances.

Elevated electric field values can be recorded at a distance of > 200 meters. However because these fields are blocked by various grounded conductive objects such as trees, most building materials etc. we can record low electric fields even in smaller distances.

The consequences of the emitted magnetic fields dependent on electric loads of specific power lines, the spacing between the current carrying conductors etc. It is most likely that just below and next to high-voltage lines is you will find magnetic field values many times higher than the recommended safe limits and averages (70nT in Europe and 110 in the USA according to the World Health Organization). 200 meters is a good safe distance, which usually ensures values corresponding to the population average. Depending on the loads served by each line you can record normal levels of magnetic fields even 50 meters or less from the cables.

How to measure the radiation from power lines and transformers?

High voltage lines emit high electric fields, but because they are grounded by most building materials (exception: wooden houses) they usually do not enter the interior of buildings and measuring them is more meaningful outdoors.

Magnetic fields on the other hand penetrate all areas since they are unaffected by most building materials.

You can measure low frequency electric and magnetic fields with a low frequency radiation meter (/electromagnetic-field-radiation-meters/low-frequency-meters). (/~homebiology/metrisis-aktinovolias/xamilon-sixnotiton)

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