Electrical Notes & Articles

Sharing Abstracts,Notes on various Electrical Engineering Topics.

Effects of High Voltage Transmission Lines on Humans and Plants

FEBRUARY 17, 2012 30 COMMENTS
(HTTP://ELECTRICALNOTES.WORDPRESS.COM/2012/02/17/EFFECTS-OF-HIGH-VOLTAGE-TRANSMISSION-LINES-ON-HUMANS-AND-PLANTS/#COMMENTS)

(http://electricalnotes.files.wordpress.com/2012/02/untitled.png)

Introduction:

By increasing population of the world, towns are expanding, many buildings construct near high voltage overhead power transmission lines. The increase of power demand has increased the need for transmitting huge amount of power over long distances. Large transmission lines configurations with high voltage and current levels generate large values of electric and magnetic fields stresses which affect the human being and the nearby objects located at ground surfaces. This needs to be investigating the effects of electromagnetic fields near the transmission lines on human health.

The electricity system produces extremely low frequency electromagnetic field which comes under Non ionizing radiations which can cause health effects. Apart from human effect, the electrostatic coupling & electromagnetic interference of high voltage transmission lines have impact on plants and telecommunication equipments mainly operating in frequency range below UHF.

IS Power Line EMF safe? This is the controversy Discussion directly eludes on Government Regulation policy and Power Company. There are lots of supporting documents and research paper in favor and criticize this arguments.

What is The Electric and Magnetic fields:

- Electric and magnetic fields, often referred to as electromagnetic fields or EMF, occur naturally and as a result of the Power generation, Power Transmission, Power distribution and use of electric power.

- EMF is fields of force and is created by electric voltage and current. They occur around electrical devices or whenever power lines are energized.
- **Electric fields** are due to voltage so they are present in electrical appliances and cords whenever the electric cord to an appliance is plugged into an outlet (even if the appliance is turned off).
- Electric fields (E) exist whenever a (+) or (-) electrical charge is present. They exert forces on other charges within the field. Any electrical wire that is charged will produce an electric field (i.e. Electric field produces charging of bodies, discharge currents, biological effects and sparks). This field exists even when there is no current flowing. The higher the voltage, the stronger is electric field at any given distance from the wire.
- The strength of the electric field is typically measured in volts per meter (V/m) or in kilovolts per meter (kV/m). Electric fields are weakened by objects like trees, buildings, and vehicles. Burying power lines can eliminate human exposure to electric fields from this source.
- **Magnetic fields** result from the motion of the electric charge or current, such as when there is current flowing through a power line or when an appliance is plugged in and turned on. Appliances which are plugged in but not turned on do not produce magnetic fields.
- Magnetic field lines run in circles around the conductor (i.e. produces magnetic induction on objects and induced currents inside human and animal (or any other conducting) bodies causing possible health effects and a multitude of interference problems). The higher the current, the greater the strength of the magnetic field.
- Magnetic fields are typically measured in tesla (T) or more commonly, in gauss (G) and milli gauss (mG). One tesla equals 10,000 gauss and one gauss equals 1,000 milli gauss.
- The strength of an EMF decreases significantly with increasing distance from the source.
- The Strength of an electric field is proportional to the voltage of the source. Thus, the electric fields beneath high voltage transmission lines far exceed those below the lower voltage distribution lines. The magnetic field strength, by contrast, is proportional to the current in the lines, so that a low voltage distribution line with a high current load may produce a magnetic field that is as high as those produced by some high voltage transmission lines.
- In fact, electric distribution systems account for a far higher proportion of the population's exposure to magnetic fields than the larger and more visible high voltage transmission lines.
- **Electrical field:** the part of the EMF that can easily be shielded.
- **Magnetic field:** part of the EMF that can penetrate stone, steel and human flesh. In fact, when it comes to magnetic fields, human flesh and bone has the same penetrability as air!
- **Both fields are invisible and perfectly silent:** People who live in an area with electric power, some level of artificial EMF is surrounding them.
- The magnetic field strength produced from a transmission line is proportional to: load current, phase to phase spacing, and the inverse square of the distance from the line.
- Many previous works studied the effect of different parameters on the produced magnetic field such as: the distance from the line, the conductor height, line shielding and transmission line configuration and compaction.

Electric and Magnetic Field (EMF) Effects

- Extremely high voltages in EHV lines cause electrostatic effects, where as short circuit currents & line loading currents are responsible for electromagnetic effects. The effect of these electrostatic fields is

seen prominent with living things like humans, plants, animals along with vehicles, fences & buried pipes under & close to these lines.

1) EMF Effects Human beings:

- The human body is a composed of some biological materials like blood, bone, brain, lungs, muscle, skin etc. The permeability of human body is equals to permeability of air but within a human body has different electromagnetic values at a certain frequency for different material.
- The human body contains free electric charges (largely in ion-rich fluids such as blood and lymph) that move in response to forces exerted by charges on and currents flowing in nearby power lines. The processes that produce these body currents are called **electric and magnetic induction.**
- In electric induction, charges on a power line attract or repel free charges within the body. Since body fluids are good conductors of electricity, charges in the body move to its surface under the influence of this electric force. For example, a positively charged overhead transmission line induces negative charges to flow to the surfaces on the upper part of the body. Since the charge on power lines alternates from positive to negative many times each second, the charges induced on the body surface alternate also. Negative charges induced on the upper part of the body one instant flow into the lower part of the body the next instant. Thus, **power-frequency electric fields induce currents in the body (Eddy Current) as well as charges on its surface.**
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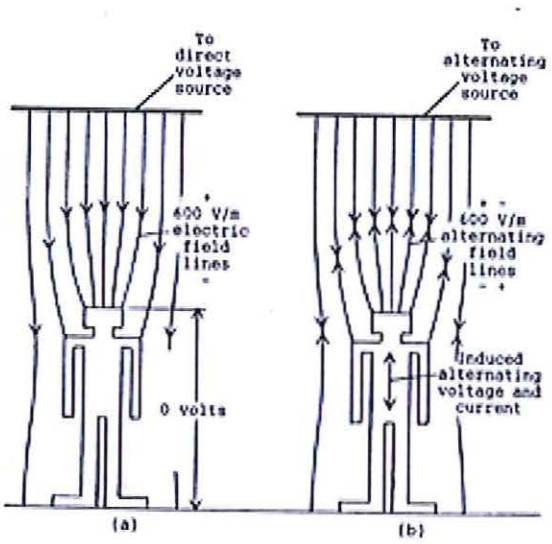

(http://electricalnotes.files.wordpress.com/2012/02/13.png)The currents induced in the body by magnetic fields are greatest near the periphery of the body and smallest at the center of the body.

- It is believed that, the magnetic field might induce a voltage in the tissue of human body which causes a current to flow through it due to its conductivity of around them.
- The magnetic field has influence on tissues in the human body. These influences may be beneficial or harmful depending upon its nature.
- The magnitude of surface charge and internal body currents that are induced by any given source of power-frequency fields depends on many factors. These include the magnitude of the charges and currents in the source, the distance of the body from the source, the presence of other objects that might

shield or concentrate the field, and body posture, shape, and orientation. **For this reason the surface charges and currents which a given field induces are very different for different Human and animals.**

- When a person who is isolated from ground by some insulating material comes in close proximity to an overhead transmission line, an electrostatic field is set in the body of human being, having a resistance of about 2000 ohms.
- When the same person touches a grounded object, it will discharge through his body causing a large amount of discharge current to flow through the body. Discharge currents from 50-60 Hz electromagnetic fields are weaker than natural currents in the body, such as those from the electrical activity of the brain and heart.
- For human beings the limit for undisturbed field is 15 kV/m, R.M.S., to experience possible shock. When designing a transmission lines this limit is not crossed, in addition to this proper care has been taken in order to keep minimum clearance between transmission lines.
- According to research and publications put out by the World Health Organization(WHO), EMF such as those from power lines, can also cause:

Short term Health Problem

1. Headaches.
2. Fatigue
3. Anxiety
4. Insomnia
5. Prickling and/or burning skin
6. Rashes
7. Muscle pain

Long term Health Problem:

- Following serious health Problems may be arise due to EMF effects on human Body.

(1) Risk of damaging DNA.

- Our body acts like an energy wave broadcaster and receiver, incorporating and responding to EMFs. In fact, scientific research has demonstrated that every cell in your body may have its own EMF, helping to regulate important functions and keep you healthy.
- Strong, artificial EMFs like those from power lines can scramble and interfere with your body's natural EMF, harming everything from your sleep cycles and stress levels to your immune response and DNA!

(2) Risk of Cancer

- After hundreds of international studies, the evidence linking EMFs to cancers and other health problems is loud and clear. High Voltage power lines are the most obvious and dangerous culprits, but

the same EMFs exist in gradually decreasing levels all along the grid, from substations to transformers to homes.

(3) Risk of Leukemia:

- Researchers found that children living within 650 feet of power lines had a 70% greater risk for leukemia than children living 2,000 feet away or more.(As per British Medical Journal, June, 2005).

(4) Risk of Neurodegenerative disease:

- "Several studies have identified occupational exposure to extremely low-frequency electromagnetic fields (EMF) as a potential risk factor for neuro degenerative disease."(As per Epidemiology, 2003 Jul; 14(4):413-9).

(5) Risk of Miscarriage:

- There is "strong prospective evidence that prenatal maximum magnetic field exposure above a certain level (possibly around 16 mG) may be associated with miscarriage risk." (As per Epidemiology, 2002 Jan; 13(1):9-20)

2) EMF Effects on Animals

- Many researchers are studying the effect of Electrostatic field on animals. In order to do so they keeps the cages of animals under high Electrostatic field of about 30 kV/m. The results of these Experiments are shocking as animals (are kept below high Electrostatic field their body acquires a charge & when they try to drink water, a spark usually jumps from their nose to the grounded Pipe) like hens are unable to pick up grain because of chattering of their beaks which also affects their growth.

3) EMF Effects on Plant Life

- Most of the areas in agricultural and forest lands where high power transmission lines pass. The voltage level of high power transmission Lines are 400KV, 230KV, 110KV, 66KV etc. The electromagnetic field from high power transmission lines affects the growth of plants.
- Gradually increases or decreases and reaches to maximum current or minimum current and thereafter it starts to fall down to lowest current or raises to maximum current or a constant current. Again the current, it evinces with little fluctuations till the next day morning.
- Current in Power transmission lines varies according to Load (it depending upon the amount of electricity consumed by the consumers). Hence the effect of EMF (due to current flowing in the power lines) upon the growth of plants under the high power transmission lines remains unaltered throughout the year.
- From various practically study it was found that the response of the crop to EMF from 110 KV and 230 KV Power lines showed variations among themselves. Based on the results the growth characteristics

like shoot length, root length, leaf area, leaf fresh weight, specific leaf weight, shoot/root ratio, total biomass content and total water content of the four crop plants were reduced significantly over the control plants.

- Similar trend were observed in the biochemical characteristics like chlorophyll.
- Reduced growth and physiological parameter was primarily due to the effect of reduced cell division and cell enlargement. Further the growth was stunted which may be due to poor action of hormones responsible for cell division and cell enlargement.
- The bio-chemical changes produced in this plant due to EMF stress quite obvious and it affects the production leading to economic loss.
- It is concluded that the reduced growth parameter shown in the crop plants would indicates that the EMF has exerted a stress on that plants and this EMF stress was quite obvious and it affects the production leading to economic loss. So further research activities are needed to safe guard plants from EMF stress.

4) EMF Effects on Vehicles parked near Line

- When a vehicle is parked under high voltage transmission line an electrostatic field is developed in it. When a person who is grounded touches it a discharge current flows through the human being. In order to avoid this parking lots are located below the transmission lines the recommended clearance is 17 m for 345 kV and 20 m for 400 kV lines.

5) EMF Effects on Pipe Line/Fence/Cables:

- A fence, irrigation pipe, pipeline, electrical distribution line forms a conducting loops when it is grounded at both ends. The earth forms the other portion of the loop. The magnetic field from a transmission line can induce a current to flow in such a loop if it is oriented parallel to the line. If only one end of the fence is grounded, then an induced voltage appears across the open end of the loop. The possibility for a shock exists if a person closes the loop at the open end by contacting both the ground and the conductor.
- For fences, buried cables, and pipe lines proper care has been taken to prevent them from charging due to Electrostatic field. When using pipelines which are more than 3 km in length & 15 cm in Diameter they must be buried at least 30 laterally from the line center.

6) EMF Effects on Maintenance Worker:

- For providing continuous and uninterrupted supply of electric power to consumers maintenance operations of power lines are often performed with systems energized or live.

- This is live line maintenance or hot line maintenance. The electric fields and magnetic fields associated with these power lines may affect the health of live line workers. Its electric field and current densities affect the health of humans and cause several diseases by affecting majority parts of the human body. These electric field and current densities affects humans of all stages and causes short term diseases in them and sometimes death also.

Contradiction of EMF Effect on Human Health:

- There are two reasons why electromagnetic fields associated with power systems could pose no threat to human health.
- First, The EMF from power lines and appliances are of extremely low frequency and low energy. They are non-ionizing and are markedly different in frequency from ionizing radiation such as X-rays and gamma rays. As a comparison, transmission lines have a low frequency of 60Hz while television transmitters have higher frequencies in the 55 to 890 MHZ range. Microwaves have even higher frequencies, 1,000 MHZ and above. Ionizing radiation, such as X-rays and gamma rays, has frequencies above 1015 Hz. The energy from higher-frequency fields is absorbed more readily by biological material. Microwaves can be absorbed by water in body tissues and cause heating which can be harmful, depending upon the degree of heating that occurs. X-rays have so much energy that they can ionize (form charged particles) and break up molecules of genetic material (DNA) and no genetic material, leading to cell death or mutation. In contrast, extremely low frequency EMF does not have enough energy to heat body tissues or cause ionization.
- Second, all cells in the body maintain large natural electric fields across their outer membranes. These naturally occurring fields are at least 100 times more intense than those that can be induced by exposure to common power-frequency fields. However, despite the low energy of power-frequency fields and the very small perturbations that they make to the natural fields within the body.
- When an external agent such as an ELF fields lightly perturbs a process in the cell, other processes may compensate for it so that there is no overall disturbance to the organism. Some perturbations may be within the ranges of disturbances that a system can experience and still function properly.
- During Research on health effects of electric and magnetic fields, it has come forward that electric field intensity exposure of about 1-10 mv/m in tissue interact with cells but not proved to be harmful. But strong fields cause harmful effects when their magnitude exceeds stimulation thresholds for neural tissues (central nervous system and brain), muscle and heart

Surface Current Density(mA/m2)	Health Effect
<1	Absence of any established effects.
1 To 10	Minor biological effects.
10 To 100	Well established effects(a) Visual effect.(b) Possible nervous system effect
100 To 1000	Changes in central nervous System
>1000	Ventricular Fibrillation (Heart Condition 0. Health hazards.

- In India it is stipulated that electric field intensity should not exceed 4.16 kV/m and magnetic field intensity should not exceed 100μT in public areas.
- Even when effect is demonstrated consistently on the cellular level in laboratory experiments, it is hard to predict whether and how they will affect the whole organism. Processes at the individual cell level are integrated through complex mechanisms in the animal.

Mitigation of EMF Effect of Transmission Line:

1) Line shielding:

- There are two basic 60-Hz magnetic field mitigation (reduction) methods: passive and active.
- Passive magnetic field mitigation includes rigid magnetic shielding with ferromagnetic and highly conductive materials, and the use of passive shield wires installed near transmission lines that generate opposing cancellation fields from electromagnetic induction.
- Active magnetic field mitigation uses electronic feedback to sense a varying 60-Hz magnetic field, then generates a proportionally opposing (nulling) cancellation field within a defined area (room or building) surrounded by cancellation coils. Ideally, when the two opposing 180-degree out- of-phase magnetic fields of equal magnitude intersect, the resultant magnetic field is completely cancelled (nullified). This technology has been successfully applied in both residential and commercial environments to mitigate magnetic fields from overhead transmission and distribution lines, and underground residential distribution (URD) lines.

2) Line Configuration and Compaction

- Line compaction means that, bringing the conductors close together keeping the minimum (safe) phase -to-phase spacing constant. Keeping all the parameters the same and the only variable is the phase-to-phase spacing. The magnetic field is proportional to the dimensions of the phase-to-phase spacing.
- Other studies showed that, increasing the distance between phases by increasing the height of the central phase conductor above the level of the other phase conductors leads to the reduction of the peak value of the magnetic field.
- Reducing the phase-to-phase distance, leads to the decrease of the magnetic field. This reduction between phases is limited by the electrical insulation level between phases.
- (A) For single circuit lines, compaction causes a great reduction to the maximum magnetic field values. This reduction of magnetic field allows for lower conductor heights above the ground. This leads to transmit the same power on shorter towers. This gives a great reduction of the tower cost.
- (B) For double circuit lines, some studies showed that, the use of optimum phase arrangement causes a drastic reduction to the maximum magnetic field values for both conventional and compact lines i.e. with vertical conductor

3) Grounding:

- Induced currents are always present in electric fields under transmission lines and will be present. However, there must be a policy to ground metal objects, such as fences, that are located on the right-of -way. The grounding eliminates these objects as sources of induced current and voltage shocks. Multiple grounding points are used to provide redundant paths for induced current flow and mitigate nuisance shocks.

4) Providing Right of Way(R.O.W):

- Overhead transmission systems required strips of land to be designed as right-of-ways (R.O.W.). These strips of land are usually evaluated to decrease the effects of the energized line including magnetic and electric field effects.

5) Maintaining Proper Clearance:

- Unlike fences or buildings, mobile objects such as vehicles and farm machinery cannot be grounded permanently. Limiting the possibility of induced currents from such objects to persons is accomplished by maintaining proper clearances for above-ground conductors tend to limit field strengths to levels that do not represent a hazard or nuisance.
- Limiting access area by increasing conductor clearances in areas where large vehicles could be present.

Conclusion:

- Based on the review and analysis and other research projects it is of the opinion that there is no conclusive and convincing evidence that exposure to extremely low frequency EMF emanated from nearby high voltage Transmission lines is causally associated with an increased incidence of cancer or other detrimental health effects in humans. Even if it is assumed that there is an increased risk of cancer as implied in some epidemiological studies, the empirical relative risk appears to be fairly small in magnitude and the observed association appears to be tenuous. Although the possibility is still remain about the verse effect on health by EMF.

References:

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- Electrical Engineering Department, Shoubra, Benha University, Cairo, Egypt- Nagat Mohamed Kamel Abdel-Gawad.
- Madurai Kamaraj University-S. Somasekaran.
- Electrical Engineering Department at King Fahd University of Petroleum & Minerals- J. M. Bakhashwain, M. H. Shwehdi, U. M. Johar and A. A. AL-Naim.
- Dept. of Electrical Engineering. College of Engineering – University of Tikrit-Iraq- Ghanim Thiab Hasan, Kamil Jadu Ali, Mahmood Ali Ahmed.

About Jignesh.Parmar

Jignesh Parmar has completed his B.E(Electrical) from Gujarat University. He has more than 11 years experience in Power Transmission-Power Distribution-Electrical energy theft detection-Electrical Maintenance-Electrical Projects(Planning-Designing-coordination-Execution). He is Presently associate with one of the leading business group as a Assistant Manager at Ahmedabad,India. He is Freelancer Programmer of Advance Excel and design useful Excel Sheets of Electrical Engineering as per IS,NEC,IEC,IEEE codes. He is technical Author for "Electrical Mirror" and "Electrical India" Magazines. He

is Technical Blogger and Familiar with English, Hindi, Gujarati, French languages. He wants to Share his experience & knowledge and help technical enthusiasts to find suitable solutions and updating themselves on various Engineering Topics.

30 Responses to *Effects of High Voltage Transmission Lines on Humans and Plants*

moses says:
February 18, 2012 at 10:39 am
Thanks for the info, man

Reply
Mohd saood Khan says:
February 18, 2012 at 10:51 am
It needs more discussions & debates……

Reply
prakash chandra says:
February 22, 2012 at 5:15 pm
sir i am dooing my final year project on optimal location of interline power flow controller (ipfc) ,i am facing problem in design of IPFC controller in matlab simulation .if you having some idea about this topis then please help me .

Reply
theja says:
March 17, 2012 at 5:53 pm
very good article.An eye opener to everybody

Reply
Pushpinder Asthir says:
March 24, 2012 at 3:35 pm
It is an intersting article.But than we also need Transmission lines for the development and any large development that benefits mass population always effects some small portion of population.

Reply
suren says:
May 11, 2012 at 11:17 am
sir,
We are construction a g+ 3 upper floor building adjoining the 400KV NTPC line in bangalore,
Pl inform at what level we may have induction & danger to life,
what is the minimum clearence required form over head line to bulding.
answers may also be mailed to my mail is surend26@rocketmail.com

Reply
balasubramani says:
December 2, 2012 at 4:54 pm

sir i got a plot for house construction 10m from the overhead lines it will make any problem in future by legaly & safety and howmany meters clearence need from the OHLINES in india

Reply

Syed Rizwan says:
May 15, 2012 at 1:48 pm
Sir i would want to know your views on the Ultra high voltage transmission line being built by China having a length of 2,210 Km. Waiting for your blog on this topic .

Reply

Sandeep Beniwal says:
August 9, 2012 at 4:37 am
sir i would to know that when a new tower established on a field then what the payment made by power grid or the company who is establishing that tender tower. If the quality of irrigation on that area is very good. please reply me ASAP

Reply

shiraz says:
September 11, 2012 at 3:10 am
nice work
Shirazul Islam

Reply

karen says:
October 6, 2012 at 11:30 pm
Thank you for your clear, current info. we are considering a purchase of a home within 60 meters of 30 towers of hi voltage electric transmission lines. Would you live there? or want your family to live in this home?

thanks so,
karen

Reply

eli says:
October 11, 2012 at 3:33 am
I'm in a similar situation, but I want to buy the house is 350 meters from high voltage antennas, do you think that is bad for the health?

Thank you so much.

Eli

Reply

Bharat Bhushan says:
November 22, 2012 at 11:16 am
Hi , This is very good info indeed ,

I am trying to buy a home in builder society and there is high voltage line passing over it.The distance of flat I am looking is 10 mtrs away from line.Will that not effect health in any mean.

Please advise

Bharat.leo@gmail.com

Reply

hemant kharat says:

December 17, 2012 at 10:14 am

sir please tell me what are distance of electrical overhead tower line of 400 kv and living home its urgent please????

Reply

Jignesh.Parmar says:

December 17, 2012 at 6:02 pm

Refer Post of "Electrical Safety Distance Part 1 to 6" of this Blog

Reply

RAVI says:

January 14, 2013 at 4:26 am

we r planing to buy agriculture land of 20 acers. in between the high tension line and one high line pole is thare. is it safe to health for humans and plants? how much distance should maintain from the line hight and long?

Reply

mary kwan says:

January 24, 2013 at 4:52 am

Sir,

Thank you so much for yr helpful article. I am thinking about buying a flat in Hong Kong, it is 2/F on the building and the ground level is for stores and an electricity (maybe transforming) substation which seems to supply electricity for the complex. Is it safe, will there be radiation harmful for humans? Urgently needing your advice.

Reply

Guillermo Ferrando says:

March 19, 2013 at 1:05 pm

Hello: I need to find any article or reference about of the EMF effects on steel bridges. In a case, I need install a 33 KV electrical line over a steel bridge, but I think that is an dangerous situation for the people, vehicles and the steel of structure, because the electrical induced currents on the steel is (for me) of uncertain effects....Thank you. Guillermo

Reply

iman says:

March 28, 2013 at 9:45 am

al salam alaikm I'M a physics teacher, and graduate student, my thesis is about, the risk of high voltage transformers on human health, can you help me, all my thanks and God bless you. ,

Reply

shaneel says:

April 19, 2013 at 5:10 am

can any body tell me what is distance working on a live transmission lines of different voltages....

Reply

Jignesh.Parmar says:

April 20, 2013 at 5:58 pm

Review old post of this Blog

Reply

N.S.DUHAN says:

May 12, 2013 at 7:43 am

Sir, we r running a mild steel galvanized pipe mfg.co. We have a electronic weighing bridge of 80 m.t. cap. A high voltage (H.T.LINE) is going on the bridge. There is a big variation on weight. We called so many experts. But result is zero. Is it possible, that due to H.T. Line there is any effect on weighing bridge load cells.There r6 load cells in the bridge. If it is possible what r the remedies for this .Please suggest.
Thanks.

Reply

A Tierney says:

June 14, 2013 at 11:09 pm

Am I in any danger? I live in a 12 unit apt building with all the wires and boxes for cable, electricity, and phone serving it attached to my outside bedroom wall. I can sometimes hear a loud hum in the wires and have called the utility to do something about it. My neighborhood is a dense urban DC area.

My bed is within 3 feet of these wires and boxes. Is there any way to measure the strength of the electromagnetic field I am sleeping in? What distance mitigates the impact of this field?

My neighbor of 12 years, who lived below me with her bedroom in the same configuration, recently died of a lung disease. I have lived here for 9 years. I was recently diagnosed with a spot on my lung. Any advice you can offer would be appreciated.

ETN

Reply

suryabhan singh says:

August 14, 2013 at 3:27 pm

recently i purchased a house in mumbai later on i find a high tension cable over head wire passing around 80 to 90 meter away from my building is it safe pls suggest

Reply

Dr. Aung Ze Ya says:

September 5, 2013 at 8:25 am

Your document is very effective to us.
Thank you.

Reply

Charlie says:

September 15, 2013 at 2:55 pm

I have booked an apartment and yet to take possession. The distance between the flat and HT Line is 18Meters away. Is it advisable to proceed?

Reply

Bhagyaman Chettri says:

October 8, 2013 at 2:23 am

Sir Please advise me that what is that safe distance between high tension line 400kv and humam

Reply

Jignesh.Parmar says:
October 8, 2013 at 3:01 pm
Already given in the Blog

Reply

othman hasnaoui says:
November 4, 2013 at 9:05 pm
dear sir
I'm a phd student, my research is about the EMF Effects Human and plants and i want to know if there are a scientific studies who demonstrate if really there is a damage for human and plants.
Plz let me know

Reply

Peter Yougha says:
November 5, 2013 at 9:07 am
I'm a MSc GIS student, I am researching on effect on overhead power transmission lines near residential buildings in UK. I need contribution on EMF radiation from the power lines to the environment.

Reply