

Q. What is EMF?

A. Electric and magnetic fields (EMF) are invisible lines of force that are present wherever electricity flows — around appliances and power lines, and in offices, schools and homes. **Electric fields** are created by voltage and shielded by most materials, such as lead, soil and concrete. **Magnetic fields** are created by current and are **not** shielded by most materials. Both electric and magnetic field strengths diminish with **distance**.

These fields are low energy, extremely low frequency fields. They are not to be confused with high energy or ionizing radiation such as x-rays and gamma rays.

Q. Why is EMF a Concern?

A. In recent years, concerns have been raised about the possible link of exposure to EMF and adverse health conditions. Some EMF studies have reported a weak association between **estimates of** exposure to magnetic fields and certain types of cancer. However, other studies have reported no effects. Laboratory experiments have shown that exposure levels typically well above those normally found in residences can produce changes in cells, but there is little or no evidence that these changes constitute a health risk.

Q. What Has Been the Focus of Research—Electric Fields or Magnetic Fields?

A. Questions about possible health risks from exposure to EMF first arose in the 1960s and 1970s, when research focused on electric fields. Overall, studies of electric fields have found no evidence of biologic changes that could lead to adverse health effects.

The focus of EMF research shifted to magnetic fields in the late 1970s. Since then, a large body of research has been completed, including studies examining patterns and possible causes of diseases in human populations, and studies investigating whether exposure to power-frequency magnetic fields produces biologic effects in laboratory animals and cells and, if so, through what biologic and biophysical mechanisms.

Q. What Conclusions Have the Experts Drawn?

A. Hundreds of studies on this subject have been conducted throughout the world, with results that are often hard to interpret and sometimes conflicting. A number of internationally recognized scientific organizations and independent regulatory advisory groups have conducted scientific reviews of the EMF research literature.

Without exception, these major reviews have reported that the body of data, as large as it is, does not demonstrate that exposure to power-frequency magnetic fields causes cancer or other health risks, although the possibility cannot be dismissed. Most reviews recommend further research, and, appropriately, research is ongoing worldwide.

Q. Have State or Federal Exposure Standards Been Established?

A. There are no California or Federal standards regulating environmental levels of magnetic field exposure. The panels of experts charged with recommending exposure limits for electric and/or magnetic fields have concluded that no meaningful experimental data exists on which to base standards or limits to which the public is exposed.

Q. What is SDG&E Doing?

A. SDG&E is committed to providing safe, reliable and environmentally sound gas and electric service for its customers, as well as a safe work place for its employees. We share the concerns of our customers and employees over the possibility that electric and/or magnetic fields (EMF) might adversely affect health. Until research and the scientific community can provide greater direction, SDG&E will continue its efforts to inform the public and support on-going research through the following measures:

- Maintaining an EMF Center staffed with informed representatives available to talk with customers and employees about EMF issues.
- Conducting free home and office magnetic field measurements for customers requesting this service.
- Providing objective EMF health literature to the public and notifying customers of research milestones as this information becomes available.
- Educating employees on EMF issues.
- Supporting, funding and monitoring EMF research.
- Implementing low-cost and no-cost mitigation measures, where appropriate, to minimize EMF associated with new construction projects.
- Participating in communication forums and regulatory proceedings to remain current on all EMF related issues.

Q. What is the current level of magnetic field at the edge of the transmission right-of-way (ROW)?

A. There is no way to determine a single numeric level of magnetic field strength at the transmission ROW. Magnetic field strength at the edge of the ROW will vary based on the proximity of transmission lines and other electric facilities, the configuration of the lines, and the amount of electric current carried by those lines at any given time, which will increase or decrease as customer demand for energy increases or decreases. Configuration of the transmission lines can be a factor as magnetic fields from different sources can counteract each other, resulting in lower field strength. Additionally, magnetic field levels at any given location often are dependent on the fields from other sources.

Note that the California Public Utilities Commission (CPUC) has affirmed in two decisions that health risks have not been demonstrated and setting numeric exposure limits is inappropriate.

Q. What is the current level of magnetic field at the property line of the San Juan Capistrano Substation?

A. Similar to the transmission ROW, there is no way to determine a single numeric level of magnetic field strength at the substation property line. Typically, magnetic fields associated with the substation equipment weaken over distance to values at the property lines similar to those measured in homes. However, field values at the property lines often are dependent on the magnetic fields from other sources, including, but not limited to, power lines entering, exiting or near the substation. Additionally, the field strength at the substation property line often is less than the edge of the transmission ROW due to the cancelling effects between the different sources of magnetic fields within the substation.

Q. Will the magnetic field levels go up or down once the proposed project is built?

A. While we have no specific numbers to offer concerning the levels, it is expected that the cancellation effect from the new phase arrangement, in addition to the increased voltage, will lower the magnetic fields compared with existing levels, for an equivalent amount of power.

All other things being equal, magnetic fields from power lines will increase or decrease as customer demand for energy increases or decreases, affecting the amount of current carried by the lines and substations.

In constructing new or upgraded transmission lines and substation projects, SDG&E adheres to CPUC EMF policy to take reasonable no- or low-cost steps to minimize public EMF exposure to magnetic fields.

Additionally, the proposed project would increase the voltage of the power lines entering the substation. Increasing voltage actually reduces the amount of current required to deliver the same amount of power. Since magnetic fields are created by current, the magnetic field values resulting from the proposed project would be lower if all other conditions are the same.

Q. If the magnetic field level goes up, how much will it increase?

A. As noted in a previous question, magnetic fields from power lines will increase or decrease as customer demand for energy increases or decreases. There is no reliable way to predict customer demand at a given time, and therefore no way to predict magnetic field values.

Q. Would an increased level of magnetic field be a health risk to those living near the San Juan Capistrano Substation and those living near the power lines?

A. Hundreds of studies on this subject have been done throughout the world, with results that are often hard to interpret and sometimes conflicting. A number of internationally recognized scientific organizations and independent regulatory advisory groups have conducted scientific reviews of the EMF research literature.

Without exception, these major reviews have reported that the body of data, as large as it is, does not demonstrate that exposure to power-frequency magnetic fields causes cancer or other health risks, although the possibility cannot be dismissed. Most reviews recommend further research, and, appropriately, research is ongoing worldwide.

Q. What effect does changing the voltage from 138 kV to 230 kV have on magnetic fields?

A. Increasing voltage actually reduces the amount of current required to accommodate the same customer demand. Since magnetic fields are created by current, the resulting magnetic field values would be lower if all other conditions are the same.

Q. What regulations govern EMF?

The CPUC regulates EMF for investor-owned utilities in California through its authority over power line health and safety. They have determined that the only regulation of EMF warranted by the science is to require utilities to employ, where applicable, low- and no-cost measures on new and upgraded power lines and substations. In a 1993 decision, the CPUC also directed the utilities to inform customers and employees about potential EMF health effects and provide free EMF measurements.

In 2006, the CPUC issued a decision updating its EMF policy. This decision reaffirmed that state and federal public health regulatory agencies have not established a direct link between exposure to EMF and human health effects. The decision directed that (1) use of numeric exposure limits was not appropriate in setting utility design guidelines to address EMF, and (2) existing "no-cost and low-cost" EMF policy should be continued for new and upgraded transmission line and substation projects.



SDG&E adheres to all applicable provisions of this CPUC decision. This decision can be viewed at http://www.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/53181.htm.

Though there are no federal regulations for EMF, federal health authorities recommend that cost-effective, preventive measures combined with public education about reducing exposure are appropriate to address public EMF exposures. In its 1999 Report to Congress, the National Institute of Environmental Health Sciences (NIEHS) stated: "the conclusion of this report is insufficient to warrant aggressive regulatory concern." This document can be viewed at http://www.niehs.nih.gov/health/assets/docs_f_o/health_effects_from_exposure_to_powerline_frequency_electric_and_magnetic_fields.pdf.

Q. How does SDG&E consider schools along the route of the proposed project?

A. SDG&E adheres to CPUC EMF policy which places schools at the top of its prioritization of land use categories in determining how magnetic field reduction costs are to be applied. Additionally, SDG&E makes every effort to oblige the California Department of Education (CDE) policy requiring new or modernized school properties to meet these minimum setback distances from the edge of easement of transmission lines to the usable portions of the school site:

Line Voltage	Overhead Line	Underground Line
50-133 kV (interpreted by CDE up to <200 kV)	100 feet	25 feet
220-230 kV	150 feet	37.5 feet

This policy can be viewed at <http://www.cde.ca.gov/ls/fa/sf/powerlinesetback.asp>.