

# Appendix A

## Electric and Magnetic Fields

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The California Public Utilities Commission (CPUC) and the California Department of Health Services (CDHS) have not concluded that exposure to magnetic fields from utility electric facilities is a health hazard. Many reports have concluded that the potential for health effects associated with electric and magnetic field (EMF) exposure is too speculative to allow the evaluation of impacts or the preparation of mitigation measures. EMF is a term used to describe electric and magnetic fields that are created by electric voltage (electric field) and electric current (magnetic field). Power frequency EMF is a natural consequence of electrical circuits, and can be either directly measured using the appropriate measuring instruments or calculated using appropriate information. EMFs are present wherever electricity flows: around appliances and power lines, in offices, schools, and homes. Electric fields are invisible lines of force, created by voltage, and are shielded by most materials. Units of measure are volts per meter (V/m). Magnetic fields are invisible lines of force, created by electric current and are not shielded by most materials, such as lead, soil and concrete. Units of measure are Gauss (G) or milliGauss (mG, 1/1000 of a Gauss). Electric and magnetic field strengths diminish with distance. These fields are low energy, extremely low frequency fields, and should not be confused with high energy or ionizing radiation such as X-rays and gamma rays.

### Possible Health Effects

The possible effects of EMF on human health have come under scientific scrutiny. Concern about EMF originally focused on electric fields; however, much of the recent research has focused on magnetic fields. Uncertainty exists as to what characteristics of magnetic field exposure need to be considered to assess human exposure effects. Among the characteristics considered are field intensity, transients, harmonics, and changes in intensity over time. These characteristics may vary from power lines to appliances to home wiring, and this may create different types of exposures. The exposure most often considered is intensity or magnitude of the field.

There is a consensus among the medical and scientific communities that there is insufficient evidence to conclude that EMF causes adverse health effects. Neither the medical nor scientific communities have been able to provide any foundation upon which regulatory bodies could establish a standard or level of exposure that is known to be either safe or harmful. Laboratory experiments have shown that magnetic fields can cause biologic changes in living cells, but scientists are not sure whether any risk to human health can be associated with them. Some studies have suggested an association between surrogate measures of magnetic fields and certain cancers while others have not.

## California Public Utilities Commission Summary

### Background

On January 15, 1991, the CPUC initiated an investigation to consider its role in mitigating the health effects, if any, of electric and magnetic fields from utility facilities and power lines. A working group of interested parties, called the California EMF Consensus Group, was created by the CPUC to advise it on this issue. It consisted of 17 stakeholders representing citizens groups, consumer groups, environmental groups, State agencies, unions, and utilities. The Consensus Group was charged to 1) consider a balanced set of facts and concerns; 2) define near-term research objectives; and 3) develop interim policies and procedures to guide the electric utilities in educating their customers, reducing EMF, and responding to potential health concerns. The Consensus Group's fact-finding process was open to the public, and its report incorporated concerns expressed by the public. Its recommendations were filed with the Commission in March of 1992. In August of 2004, the CPUC opened an Order Instituting Rulemaking to update the Commission's policies and procedures related to electric and magnetic fields emanating from regulated utility facilities. The final decision was issued in D.06-01-042.

### Findings

Based on the work of the Consensus Group, written testimony, and evidentiary hearings, the CPUC issued its decision (D.06-01-042) to address public concern about possible EMF health effects from electric utility facilities. The conclusions and findings included the following:

- The body of scientific evidence continues to evolve. However, it is recognized that public concern and scientific uncertainty remain regarding the potential health effects of EMF exposure.
- It is not appropriate to adopt any specific numerical standard in association with EMF until we have a firm scientific basis for adopting any particular value.

### Interim Policies

The CPUC's decision specifically requires seven measures. One of these measures that is applicable to the Proposed Project is as follows:

- No-cost and low-cost steps to reduce EMF. In response to a situation of scientific uncertainty and public concern, the CPUC felt it appropriate for utilities to take no-cost and low-cost measures where feasible to reduce exposure from new or upgraded utility facilities. It directs that no-cost mitigation measures be undertaken, and that low-cost options be implemented through the project certification process. Four percent of total project budgeted cost is the benchmark in developing EMF mitigation guidelines, and mitigation measures should achieve some noticeable reductions.

The CPUC will continue to monitor these issues. If new information develops in the future, the CPUC may amend its decision to reflect new scientific evidence.

### Exemption Criteria

The CPUC agreed that "Utility management should have reasonable latitude to deviate and modify their guidelines as conditions warrant and as new EMF information is received. However,

if the EMF guidelines are to be truly used as guidelines, the utilities should incorporate criteria which justify exempting specific types of projects from the guidelines."

PacifiCorp will use the following guidelines to determine those specific types of projects that will be exempt from no/low cost field reduction:

- Operation, repair, maintenance replacement or minor alteration of existing structures: facilities or equipment.
- Restoration or rehabilitation of deteriorated or damaged structures, facilities or equipment to meet current standards of public safety.
- Addition of safety devices.
- Replacement or reconstruction of existing structures and facilities on the same site and for the same purpose as the replaced structure or facility.
- Emergency restoration projects.
- Re-conductoring projects except when structures are reframed or reconfigured.
- Projects located on land under the jurisdiction of the Forest Service, Bureau of Land Management or other governmental agency.
- Privately owned tree farms.
- Agricultural land within the Williamson Act.
- Areas not suited to residential/commercial development. Such areas might include steep slopes, areas subject to flooding or areas without access to public facilities.

The intent of the exemption criteria is to exclude two types of projects. The first type of projects are those that either replace or make minor additions or modifications to existing facilities. This will include pole replacements or relocations less than 2,000 feet in length. Those projects where more than 2,000 feet of line is relocated or reconstructed or where the circuit is reinsulated or reconfigured should be considered for low cost magnetic field management techniques.

The second type projects are those located in undeveloped areas.

## **EMF Reduction**

PacifiCorp will use the following Guidelines in the application of no and low cost steps to reduce magnetic field strengths:

- PacifiCorp will take low cost steps to reduce fields from new and upgraded facilities in accordance with CPUC decision D.06-01-042 on EMF.
- No cost measures will be implemented when available and practical.
- Mitigation measures should not compromise the reliability, operation, safety or maintenance of the system.
- Total cost of mitigation measures should not exceed four percent of the total cost of the Proposed Project.
- Mitigation measures should have a noticeable reduction in the magnetic field level approximately 15 percent or more.

PacifiCorp's no-cost/low-cost mitigation option is to extend the proposed fence line on the southwest side of the substation to the edge of the proposed property line, which would restrict public access from the area where the 69 kV circuit would drop into the substation.