3.17 Electrical Interference and Hazards

Electrical interference and electrical hazard impacts would result from the implementation of the proposed TRTP. These impacts would result from interference with radio, television, communications, or electronic equipment (Federal Communication Commission regulations, Section 15.25); induced currents or shock hazards to the public which would not be in compliance with applicable regulations, including CPUC General Order No. 95 (Rules for Overhead Electric Line Construction); interference with cardiac pacemakers; the introduction of hazards related to wind or earthquakes; and/or the Project failing to comply with applicable guidelines including CPUC General Order No. 95 and National Electrical Safety Code (NESC) requirements. These electrical interference and hazard impacts have been fully characterized and analyzed in the Draft EIR/EIS, with minor revisions provided in the Final EIR (October 2009). These impacts have not changed as a result of the changes in SCE’s Proposed Project (Alternative 2) or the changed conditions resulting from the Station Fire, which were analyzed in the Supplemental Draft EIS (April 2010). As such, the impact analysis for electrical interference and hazards has not been reproduced in this Final EIS.

Summarized below are the Project-related electrical interference and electrical hazard impacts identified in the Final EIR, and the mitigation measures recommended to reduce those impacts.

**Impact EIH-1: The Project would cause radio, television, communications, or electronic equipment interference.**

Electric and magnetic fields from power lines occur at a frequency level that is substantially below the frequency range of communications systems and do not typically pose interference problems for communication equipment, as can be seen from the proliferation of cell phone arrays that are mounted directly on transmission line structures. Corona or gap discharges related to high frequency radio and television interference impacts are dependent upon several factors, including the strength of broadcast signals and are anticipated to be very localized if it occurs. Individual sources of adverse radio/television interference impacts can be located and corrected on the power lines. Conversely, magnetic field interference with electronic equipment such as computer monitors can be corrected through the use of software, shielding, or changes at the monitor location.

To reduce the potential impacts of radio, television, communications, or electronic interference from the operation of Alternatives 2 through 7 to the extent feasible, Mitigation Measures EIH-1a (Limit the conductor surface electric gradient) and EIH-1b (Document and resolve electronic interference complaints) would be implemented.

As underground transmission systems do not generate corona and audible noise, the underground portions of Alternative 5 (Partial Underground Alternative) and Alternative 7 (66-kV Subtransmission Alternative) would not contribute to any field-related interference. Under the No Project/Action Alternative, construction and operation methods associated with other transmission projects would be similar to those identified for Alternatives 2 through 7, and therefore, similar electrical interference impacts would occur.

**Recommended Mitigation Measures**

**EIH-1a Limit the conductor surface electric gradient.** As part of the design and construction process for the Project, SCE shall limit the conductor surface electric gradient in accordance with the Institute of Electrical and Electronic Engineers Radio Noise Design Guide.
EIH-1b  Document and resolve electronic interference complaints. After energizing the transmission line, SCE shall respond to, document, and resolve radio/television/electronic equipment interference complaints received. These records shall be made available to the CPUC for review upon request. All unresolved disputes shall be referred by SCE to the CPUC for resolution.

Impact EIH-2: The Project would cause induced currents and shock hazards in joint use corridors.

Induced currents and voltages on conducting objects near the proposed transmission lines for Alternatives 2, 3, 4, 5, 6, and 7 represent a substantial impact that can be avoided if the conducting objects are properly grounded. Mitigation Measure EIH-2 (Implement grounding measures) would ensure conducting objects are properly grounded for Alternatives 2 through 7. For the underground portion of Alternative 5 (Partial Underground Alternative) and Alternative 7 (66-kV Subtransmission Alternative), the transmission cables or enclosures are effectively grounded, meaning that there would not be induced current or shock hazard impacts where the line is placed underground.

Under the No Project/Action Alternative, construction and operation methods associated with other transmission projects would be similar to those identified for Alternatives 2 through 7, and therefore, similar electrical hazard impacts would occur.

Recommended Mitigation Measure

EIH-2  Implement grounding measures. As part of the siting and construction process for the Project, SCE shall identify objects (such as fences, metal buildings, and pipelines) within and near the ROW that have the potential for induced voltages and shall implement electrical grounding of metallic objects in accordance with SCE’s standards. The identification of objects shall document the threshold electric field strength and metallic object size at which grounding becomes necessary. SCE shall install all necessary grounding measures prior to energizing the transmission lines. Thirty days prior to energizing the lines, SCE shall notify in writing, subject to the review and approval of the CPUC, all property owners within and adjacent to the Project ROW of the date the line is to be energized. The written notice shall provide a contact person and telephone number for answering questions regarding the line and guidelines on what activities should be limited or restricted within the ROW. SCE shall respond to and document complaints received and the responsive action taken. These records shall be made available to the CPUC for review upon request. All unresolved disputes shall be deferred by SCE to the CPUC for resolution.

The written notice shall describe the nature and operation of the lines, and SCE’s responsibilities with respect to grounding all conducting objects. In addition, the notice shall describe the property owner’s responsibilities with respect to notification for any new objects, which may require grounding and guidelines for maintaining the safety of the ROW.

Impact EIH-3: Project operation would result in electric fields that would affect cardiac pacemakers.

The function of some pacemakers could be altered by exposure to electric fields that would be generated in the immediate vicinity of Alternatives 2, 3, 4, 5, 6, or 7 (i.e., adjacent to the transmission line ROW), potentially resulting in inaccurate detections by the pacemaker of normal cardiac signals or resulting in inappropriate behavior, until the field strength would be reduced by the individual leaving the immediate area. However, the biological consequences of transient, reversible pacemaker malfunction are mostly benign because most modern units revert to a fixed-rate pacing mode, which is life-sustaining (EPRI,
1997). There are, however, exceptions, which include: individuals that are completely dependent on their pacemakers for maintaining all cardiac rhythms; individuals whose pacemakers function in inhibited modes, where field interference could severely compromise cardiovascular function; and individuals with compromised coronary circulation who are prone to episodes of reduced cardiac blood flow (EPRI, 1997). Such episodes that would occur at the same time that the pacing becomes fixed-rate or irregular are dangerous, because these individuals would be more easily triggered into ventricular fibrillation (EPRI, 1997). The precise coincidence of an individual being exposed to high electric fields within a transmission line ROW and a biological need of that individual for the full function of his/her pacemaker would appear, in general, to be a rare event (EPRI, 1997). However, given the data available, the probability of such a coincidence to occur cannot be estimated. Clear exceptions to this conclusion are individuals who are completely dependent on a pacemaker for all cardiac rhythms (EPRI, 1997).

Given the rarity of an exposure event to occur simultaneously with a biological need for full function pacemakers, it would be unlikely that the electric field generated from the transmission lines proposed under Alternatives 2 through 7 would cause harmful interference to the operations of cardiac pacemakers. For the underground portion of Alternative 5 (Partial Underground Alternative) and Alternative 7 (66-kV Subtransmission Alternative), there would not be any impacts related to interference with cardiac pacemakers as the electric field from the transmission line is effectively blocked where the line is placed underground.

**Recommended Mitigation Measures**

None recommended.

**Impact EIH-4: Project structures would be affected by wind and earthquakes.**

**Wind.** Transmission line structures used to support overhead transmission lines must meet the requirements of the California Public Utilities Commission, General Order No. 95, Rules for Overhead Electric Line Construction. This design code and the NESC include loading requirements related to wind conditions. Transmission support structures are designed to withstand different combinations of loading conditions including extreme winds. These design requirements include use of safety factors that consider the type of loading as well as the type of material used (e.g., wood, steel or concrete). Failures of transmission line support structures are extremely rare and are typically the result of anomalous loading conditions such as tornadoes or ice storms. Alternatives 2, 3, 4, 5, 6, and 7 would be constructed on steel lattice towers or tubular steel poles; failure would be extremely unlikely.

**Earthquake.** Overhead transmission lines consist of a system of support structures and interconnecting wire that is inherently flexible. Industry experience has demonstrated that under earthquake conditions structure and member vibrations generally do not occur or cause design problems. Overhead transmission lines are designed for dynamic loading under variable wind conditions that generally exceed earthquake loads. The potential risk of an earthquake to cause transmission line structures to threaten public safety would be minimal.

**Recommended Mitigation Measures**

None recommended.