D.9 Public Health and Safety

This section addresses the environmental setting and impacts related to the construction and operation of the Proposed Project and alternatives involving the issues of environmental contamination and hazardous materials (Sections D.9.1 through D.9.5) and also addresses concerns about electric and magnetic fields and other electric field issues (Sections D.9.6 and D.9.7). Section D.9.8 presents the mitigation monitoring program for all topics covered in this section.

D.9.1 Environmental Setting for the Proposed Project – Contamination and Hazardous Materials

Sites with known hazardous waste contamination along or near the proposed transmission line route were identified to better define the areas where hazardous waste contamination may impact construction activities. The primary reason to define potentially hazardous sites is to protect worker health and safety and to minimize public exposure to hazardous materials during construction and waste handling. Where encountered, contaminated soil may qualify as hazardous waste, thus requiring handling and disposal according to local, State, and federal regulations.

D.9.1.1 Regional Overview

The proposed Miguel-Mission 230 kV #2 Project traverses land utilized for a variety of uses including: open-space recreation and preserve, residential housing, recreational, and commercial businesses. Existing and past land use activities are potential indicators of hazardous material storage and use. For example, many industrial sites, historic and current, are known to have soil or groundwater contamination by hazardous substances. Other hazardous materials sources include leaking underground tanks in commercial and rural areas, surface runoff from contaminated sites, and migration of contaminated groundwater plumes. A limited review of environmental databases, the California State Water Resources Control Board (SWRCB) Geotracker database, the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) databases, and San Diego County Department of Environmental Health tank permits indicates there are no hazardous material sites within the project right-of-way (ROW). However, there are a number of sites with underground storage tanks and leaking underground storage tanks in the vicinity of the Proposed Project.

D.9.1.2 Miguel Substation to Fanita Junction

The Miguel Substation to Fanita Junction segment of the proposed alignment traverses residential, recreational, commercial, and open-space land. South of I-8 the alignment passes through primarily undeveloped open space, rural residential, and suburban residential developments. The undeveloped open space consists primarily of hill and valley terrain covered with scrub brush and grasses. Residential areas crossed include parts of the communities of Jamacha, Cottonwood, El Cajon, and Lakeview. This portion of the alignment also passes adjacent to avocado groves just south of the intersection of I-8 and the Proposed Project ROW.

Between I-8 and the Los Coches Substation, the alignment passes through a mix of light industrial, commercial, and residential areas. Commercial properties are primarily located in the vicinity of the I-8 roadway. The alignment crosses north and west across undeveloped open space from just north of Los

Coches Substation, across the San Diego River Valley, to the southern extension of Rocky Lane, along the eastern edge of the community of Moreno. This portion skirts the southwestern edge of Lake Jennings, crosses undeveloped lands and commercial and residential developments near Lakeside, at the southern boundary of Louis A. Stelzer County Park. Continuing to the west, the alignment passes through the residential developments of the communities of Moreno, Eucalyptus Hills, and Santee. After crossing near the northern end of Santee Lakes, the alignment continues west into undeveloped open space (scrub brush and grasses) of MCAS Miramar for approximately one mile before reaching Fanita Junction.

Based on the information in SDG&E's PEA, the SWRCB's Geotracker database, and the San Diego County Department of Environmental Health, there are five underground storage tank (UST) sites located within 1,000 feet of the Proposed Project, as shown in Table D.9-1. The Helix Water District site is located in the transmission line pathway. These tank sites have no known contamination issues and would have only minor potential to environmentally impact the Proposed Project between Miguel Substation and Fanita Junction. A sixth site, the Olde Highway 80 7-Eleven site, has ongoing site remediation (cleanup and safe removal/disposal) for a leaking underground storage tank (LUST). It would also have minor potential to impact the Proposed Project since it is separated from the nearest proposed tower/pole location by greater than 1,000 feet, as well as the I-8 roadway.

Table D.9-1. Sites within 1,000 Feet of Alignment with Potential to Impact Environment

Site Name	Site Address	Comments
El Cajon Grading and Engineering	13831 Highway 8 Business, El Cajon	2 USTs, 4,000 gallon gasoline and 8,000 gallon diesel. Site located southwest of proposed tower location.
Lakeside Fire Protection	14008 Highway 8 Business, El Cajon	2 USTs closed by removal of tanks, Closed LUST. Site located southwest of proposed tower location.
Lake Jennings Arco	14039 Highway 8 Business, El Cajon	3 active USTs, 10,000 gallon diesel tank, and one each 10,000 gallon and 15,000 gallon gasoline tanks. Site located southwest of proposed tower location.
Helix Water District, Levy Treatment Facility	9738 Lake Jennings Park Road, Lakeside	1 active 10,000 gallon diesel UST. Tank slated to be replaced by aboveground storage tank (AST) by the middle of 2004 (Helix Water District, 2003).
Lakeside Poultry Ranch, Inc.	11138 Moreno Ave., Lakeside	3 fuel USTs closed by tank removal. 2 ASTs, 10,500 gallon diesel tank and 1,000 gallon gasoline tank.
7-Eleven Food Store #16439	14100 Olde Highway 80, El Cajon	LUST site located approximately 1,200 feet southeast of and across both Highway 8 and Interstate 8 from proposed tower location. Site undergoing remediation for gasoline leak. 3 gasoline USTs in operation.

Source: SWRCB Geotracker Database, 2003; San Diego DEH, 2003.

D.9.1.3 Fanita Junction to Mission Substation

From Fanita Junction to Mission Substation, the proposed alignment traverses residential, recreational, commercial, and open-space land. The route crosses State Route 52, open space uses within Mission Trails Regional Park, near the community of Terrasanta, and the northeastern portion of the Admiral Baker Golf Course. It then crosses Interstate 15 and traverses portions of Mission Valley before connecting with the Mission Substation. The Mission Substation is located near the top of a mesa adjacent to a residential area. Some commercial and industrial businesses are located south of the facility along Friars Road; however, these properties are at a lower elevation than the substation.

No new towers are proposed for this section of the alignment. As a result, there would only be minor ground disturbance along this segment. In addition, the general land use characteristics along this section of the alignment would also preclude potential impacts from contaminated and/or hazardous materials sites. Therefore, other than the survey for significantly contaminated sites along this segment of the alignment conducted for SDG&E's PEA, no further survey of hazardous material or environmental sites was conducted.

D.9.2 Applicable Regulations, Plans, and Standards – Contamination and Hazardous Materials

Hazardous substances are identified and defined by federal and State regulations for the purpose of protecting public health and the environment. Hazardous materials have certain chemical, physical or infectious properties that cause them to be considered hazardous. Hazardous substances are defined in the Federal CERCLA regulations [Section 101(14)] and also in the California Code of Regulations (CCR), Title 22, Chapter 11, Article 2, Section 66261.

D.9.2.1 Federal

The Federal Toxic Substances Control Act (1976) and the Resource Conservation and Recovery Act of 1976 (RCRA) established a program administered by the U.S. Environmental Protection Agency (EPA) for the regulation of the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA was amended in 1984 by the Hazardous and Solid Waste Act (HSWA), which affirmed and extended the "cradle to grave" system of regulating hazardous wastes. The use of certain techniques for the disposal of some hazardous wastes was specifically prohibited by HSWA.

CERCLA, commonly known as Superfund, was enacted by Congress on December 11, 1980. This law provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA established requirements concerning closed and abandoned hazardous waste sites; provided for liability of persons responsible for releases of hazardous waste at these sites; and established a trust fund to provide for cleanup when no responsible party could be identified. CERCLA also enabled the revision of the National Contingency Plan (NCP). The NCP provided the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, or contaminants. The NCP also established the National Priorities List (NPL), which is a list of contaminated sites warranting further investigation by the U.S. EPA. CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA) on October 17, 1986.

D.9.2.2 State

The California Hazardous Waste Control Law (HWCL) is administered by the California Environmental Protection Agency (Cal/EPA) to regulate hazardous wastes. While the HWCL is generally more stringent than RCRA, until the U.S. EPA approves the California program, both the state and federal laws apply in California. The HWCL lists 791 chemicals and about 300 common materials that may be hazardous; establishes criteria for identifying, packaging and labeling hazardous wastes; prescribes management controls; establishes permit requirements for treatment, storage, disposal and transportation; and identifies some wastes that cannot be disposed of in landfills.

The California Code of Regulations (CCR), Title 22, Chapter 11, Article 2, Section 66261 provides the following definition for hazardous substances:

> ***A hazardous material is a substance or combination of substances which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of or otherwise managed.***

According to CCR Title 22, substances having a characteristic of toxicity, ignitability, corrosivity, or reactivity are considered hazardous. Hazardous wastes are hazardous substances that no longer have a practical use, such as material that has been abandoned, discarded, spilled, or contaminated or is being stored prior to proper disposal.

Toxic substances may cause short-term or long-lasting health effects, ranging from temporary effects to permanent disability, or death. For example, toxic substances can cause eye or skin irritation, disorientation, headache, nausea, allergic reactions, acute poisoning, chronic illness, or other adverse health effects if human exposure exceeds certain levels (the level depends on the substance involved). Carcinogens (substances known to cause cancer) are a special class of toxic substances. Examples of toxic substances include most heavy metals, pesticides, and benzene (a carcinogenic component of gasoline). Ignitable substances are hazardous because of their flammable properties. Gasoline, hexane, and natural gas are examples of ignitable substances. Corrosive substances are chemically active and can damage other materials or cause severe burns upon contact. Examples include strong acids and bases such as sulfuric (battery) acid or lye. Reactive substances may cause explosions or generate gases or fumes. Explosives, pressurized canisters, and pure sodium metal (which reacts violently with water) are examples of reactive materials.

Other types of hazardous materials include radioactive and biohazardous materials. Radioactive materials and wastes contain radioisotopes, which are atoms with unstable nuclei that emit ionizing radiation to increase their stability. Radioactive waste mixed with chemical hazardous waste is referred to as "mixed wastes." Biohazardous materials and wastes include anything derived from living organisms. They may be contaminated with disease-causing agents, such as bacteria or viruses.

Soil that is excavated from a site containing hazardous materials would be a hazardous waste if it exceeded specific CCR Title 22 criteria. Remediation of hazardous wastes found at a site is required if excavation of these materials is performed; it may also be required if certain other activities are proposed. Even if soil or groundwater at a contaminated site does not have the characteristics required to be defined as hazardous wastes, remediation of the site may be required by regulatory agencies subject to jurisdictional authority. Cleanup requirements are determined on a case-by-case basis by the agency taking lead jurisdiction.

Hazardous Material Worker Safety

The California Occupational Safety and Health Administration (Cal/OSHA) is the primary agency responsible for worker safety in the handling and use of chemicals in the workplace. Cal/OSHA standards are generally more stringent than federal regulations. The employer is required to monitor worker exposure to listed hazardous substances and notify workers of exposure (8 CCR Sections 337-340). The regulations specify requirements for employee training, availability of safety equipment, accident-prevention programs, and hazardous substance exposure warnings.

D.9.2.3 Regional and Local

San Diego County

The San Diego County Department of Environmental Health (DEH), Hazardous Materials Division (HMD) is responsible for regulating hazardous materials business plans and chemical inventory, hazardous waste permitting, underground storage tanks, and risk management plans. The goal of HMD is to protect human health and the environment by ensuring that hazardous materials, hazardous waste, medical waste, and underground storage tanks are properly managed. To accomplish this goal, the HMD has several programs working with the regulated community and the public which include: the California Accidental Release Prevention Program; the Hazardous Incident Response Team; the Hazardous Materials Duty Desk; the Pollution Prevention Specialist; and the Underground Storage Tank Group.

The Land and Water Quality Division of DEH is responsible for administering the Site Assessment and Mitigation Program which oversees environmental investigations and remedial actions, primarily those related to underground storage tanks, to protect human health and water resources within San Diego County.

D.9.3 Environmental Impacts and Mitigation Measures – Contamination and Hazardous Materials

The principal environmental impacts involving hazardous waste are related to the mobilization of contaminants resulting in exposure of workers and the general public, e.g., excavation and handling of contaminated soil. Hazardous materials in the construction area may require special handling as hazardous waste can create an exposure risk to workers and the general public during excavation and transport. Contaminated soil exceeding regulatory limits for construction backfill would require onsite treatment or transport to offsite processing facilities. Contaminated soil removed from the construction area must be transported according to state and federal regulations and be replaced by import soil approved for backfill. Similar issues pertain to contaminated groundwater which may actually transport contamination from nearby sources to the Proposed Project alignment. Transport of any contaminated groundwater removed from the site would also need to follow federal and State regulations.

The PEA Chapters 4.6, 5.6, and 6.6 (Hazards and Hazardous Materials), and environmental databases provided by the Applicant and online, were reviewed to identify sites with known contamination and a potential to contaminate the project construction areas.

Distance from the alignment and physical barriers, such as roads or other facilities, provide a buffer that would restrict surface migration of contaminants from the source to the transmission line route. Active hazardous waste sites greater than 0.25 miles from the transmission line route, and specifically from tower locations, would have a low potential to cause hazardous substances along the transmission line route. Subsurface migration of contaminants within the unsaturated soil zone is predominantly vertically downward and is not likely to reach the transmission line route from buffered sites.

In addition to the specific sites identified in the environmental databases, it is possible that other sites could be discovered during construction of the project. Offsite migration of contamination, unauthorized dumping, or historic, unreported hazardous materials spills in commercial and light industrial areas could result in contamination of soils and/or groundwater in the vicinity of tower foundation excavations.

D.9.3.1 Definition and Use of Significance Criteria

An impact would be considered significant and require additional mitigation if project construction or operation would:

- Result in soil contamination, including flammable or toxic gases, at levels exceeding federal, State, or local hazardous waste limits established by 40 CFR Part 261 and Title 22 CCR 66261.21, 66261.22, 66261.23, and 66261.24;
- Result in mobilization of contaminants currently existing in the soil, creating potential pathways of exposure to humans or other sensitive receptors that would result in exposure to contaminants at levels that would be expected to be harmful; or
- Result in the presence of contaminated soils or groundwater within the project area, and as a result, expose workers and/or the public to contaminated or hazardous materials during transmission line construction activities, at levels in excess of those permitted by California Occupational Safety and Health Administration (Cal-OSHA) in CCR Title B and the Federal Occupational Safety and Health Administration (OSHA) in Title 29 CFR Part 1910.

D.9.3.2 Project Protocols

Six Project Protocols were proposed in SDG&E's PEA to reduce or eliminate impacts from hazardous material use and storage or existing environmental contamination along the alignment. As presented in Table D.9-2, all six Project Protocols address construction related impacts; only the portion of each PP pertinent to Hazardous Materials is presented in the table. For the purpose of this analysis, it is assumed that SDG&E has committed to implementation of the Project Protocols; the implementation of the Project Protocols (and any additional mitigation measures) would be monitored by the CPUC during construction. Water Quality and Hydrology Project Protocols identified in Table D.6-1 would also reduce impacts.

Table D.9-2. Project Protocols – Public Health and Safety

PP No.	Description
7	Prior to construction, all SDG&E, contractor, and subcontractor project personnel would receive training regarding the appropriate work practices necessary to effectively implement the Protocols and to comply with the applicable environmental laws and regulations including, without limitation, hazardous materials spill prevention and response measures, erosion control, dust suppression, and appropriate wildlife avoidance, impact minimization procedures, and Stormwater Pollution Prevention Plan (SWPPP) BMPs.
14	Littering is not allowed. Project personnel would not deposit or leave any food or waste in the project area, and no biodegradable or nonbiodegradable debris would remain in the right-of-way following completion of the project.
16	Hazardous materials would not be disposed of or released onto the ground, the underlying groundwater, or any surface water. Totally enclosed containment would be provided for all trash. All construction waste, including trash and litter, garbage, other solid waste, petroleum products and other potentially hazardous materials, would be removed to a hazardous waste facility permitted or otherwise authorized to treat, store, or dispose of such materials.
29	SDG&E, its contractors, subcontractors and their respective project personnel shall refer all environmental issues, including wildlife relocation, sick or dead wildlife, hazardous waste or questions about environmental impacts, to the onsite biological construction monitors.
32	A hazardous substance management, handling, storage, disposal, and emergency response plan would be prepared and implemented.
33	Hazardous material spill kits would be maintained onsite for small spills.

D.9.3.3 Proposed Miguel-Mission 230 kV #2 Project

Excavation would be limited to areas at and near transmission structures and at the Miguel and Mission Substations where new equipment for the 230 kV lines will be installed. No significant impacts from known existing environmentally contaminated sites are expected along the Proposed Project alignment. Although no known contamination has been documented along this alignment, unexpected soil and/or groundwater contamination could be encountered during excavation or grading near the sites listed in Table D.9-1, at the substations, or in other commercial or light industrial areas. Additionally, spills of hazardous materials, such as vehicle fuels and oils used and stored during construction activities, could occur.

Impact HZ-1: Previously Unknown Soil or Groundwater Contamination Could Be Encountered During Construction

Unexpected soil and or groundwater contamination could be encountered during grading or excavation. This could result in exposure of workers or the public to hazardous materials. This would be a potentially significant impact (Class II), mitigable through implementation of Mitigation Measure HZ-1a and the environmental training committed to by the Applicant in PP-7.

Mitigation Measure for Impact HZ-1, Previously Unknown Soil or Groundwater Contamination Could Be Encountered During Construction

HZ-1a Observation of soil for contamination. During trenching, grading, or excavation work for the Proposed Project, the contractor shall observe the exposed soil for visual evidence of contamination. If visual contamination indicators are observed during construction, the contractor shall stop work until the material is properly characterized and appropriate measures are taken to protect human health and the environment. The contractor shall comply with all local, State, and federal requirements for sampling and testing, and subsequent removal, transport, and disposal of hazardous materials. In the event contaminated groundwater is encountered, the contractor shall comply with all applicable regulations and permit requirements. This may include laboratory testing, treatment of contaminated groundwater, or other disposal options.

If contamination is observed, the contractor shall document the exact location of the contamination and shall immediately notify the CPUC's Environmental Monitor, describing proposed actions. These actions shall be consistent with the Hazardous Substance Control and Emergency Response Plan submitted per PP-32. A weekly report listing encounters with contaminated soils and describing actions taken shall be submitted to the CPUC.

Impact HZ-2: Potential Hazardous Substance Spills Could Occur During Construction

During construction, hazardous materials such as vehicle fuels, oils, and other vehicle maintenance fluids would be used and stored in construction staging yards. Spills of hazardous materials during construction activities could potentially cause soil or groundwater contamination. Improperly maintained equipment could leak fluids during construction operation and while parked, resulting in soil contamination. The following SDG&E Project Protocols would reduce this impact: PP-7 (Environmental Training), PP-16 (Hazardous Waste Containment), PP-32 (Hazardous Substance Control and Emergency Response Plan), and PP-33 (Small Spill Cleanup). In addition, Water Quality and Hydrology Project Protocols identified in Table D.6-1 would help reduce this impact. Without agency oversight of these efforts and plans, a potentially significant impact would occur. Implementation of Mitigation Measure HZ-2a is also recommended to ensure that impacts would be reduced to less than significant levels (Class II).

Mitigation Measure for Impact HZ-2, Potential Hazardous Substance Spills Could Occur During Construction

HZ-2a Review of training and response plan. The Environmental Training, and Hazardous Substance Control and Emergency Response Plan required by PP-7 and PP-32 shall be reviewed and approved by the CPUC and San Diego County Department of Environmental Health, Hazardous Materials Division.

Impact HZ-3: Release of Hazardous Materials Could Occur During Substation Operations

Minimal amounts of hazardous materials, consisting primarily of lubricating oils, are used at the substation locations. Improper use and storage of these materials could potentially result in spills or accidental releases causing environmental contamination. Soil or groundwater contamination could result from an accidental spill or release of hazardous materials at the substations during facility operation. This could potentially result in exposure of facility workers and the public to hazardous materials and environmental contamination. The following SDG&E Project Protocols would reduce this impact: PP-7 (Environmental Training) and PP-33 (Small Spill Cleanup). Without additional precautions and agency oversight, a potentially significant impact would occur. Implementation of Mitigation Measures HZ-3a and HZ-3b is recommended to ensure that impacts would be reduced to less than significant levels (Class II).

Mitigation Measures for Impact HZ-3, Release of Hazardous Materials Could Occur During Substation Operations

HZ-3a Preparation of plans. SDG&E shall prepare or update current Spill Prevention, Control, and Countermeasures plans for each substation as appropriate, as outlined in CFR Title 40, Part 112. SDG&E shall also update, as needed, and submit a revised Hazardous Materials Business Plan in accordance with Chapter 6.95 of the California Health and Safety Code and Title 22, California Code of Regulations. The plan and forms shall be submitted to the appropriate Certified Unified Protection Agency (CUPA). The substations shall be operated in compliance with all applicable federal, State, and local regulations.

HZ-3b Documentation of compliance. SDG&E shall implement PP-7 and PP-33 at the substations, and shall document compliance by (a) submitting to the CPUC an outline of the proposed Environmental Training Program for review and approval, and (b) providing a list of names of all operations personnel who have completed the training program.

D.9.3.4 Future 230 kV Circuit within Miguel-Mission ROW

Installing a second 230 kV circuit in a vacant position on the existing modified steel lattice tower structures between Miguel Substation and Fanita Junction would only result in impacts related to potential hazardous substance spills during construction (Impact HZ-2), a potentially significant mitigable (Class II) impact. Implementation of SDG&E PP-7, PP-16, PP-32, and PP-33, and Mitigation Measure HZ-2a would reduce the impact to less than significant levels (Class II).

D.9.4 Project Alternatives – Contamination and Hazardous Materials

D.9.4.1 Jamacha Valley 138 kV/69 kV Underground Alternative

Environmental Setting

This 3.5-mile underground alternative would follow Willow Glen Drive from where the existing ROW crosses Willow Glen Drive east to a point on the ROW located about 1,000 feet northwest of Singing Hills Memorial Park. This alternative is located almost entirely underground within Willow Glen Drive; at the intersection of Willow Glen Drive and Dehesa Road the alignment would transition back to overhead. From Dehesa Road, the alignment would turn northwest to rejoin the existing ROW. In general, this route is located east of and downhill from the Proposed Project alignment for this segment.

Land uses along this alternative are primarily rural residential, open space, and recreational (golf courses). Also located along this alignment is one industrial facility, Hansen Aggregates, which is a gravel quarrying operation.

A review of the SWRCB's Geotracker database and the U.S. EPA CERCLIS database indicate there are two sites, as shown in Table D.9-3, with minor potential to environmentally impact this alternative (SWRCB, 2003 and USEPA, 2004). Both these sites have an underground storage tank with no known soil contamination. Despite the close proximity of these tanks to the Jamacha Valley 138 kV/69 kV Underground Alternative alignment, because there is no known contamination, presence of the tanks would pose only a minor potential to impact the environment.

Table D.9-3. Sites within 1,000 Feet of the Jamacha Valley 138 kV/69 kV Underground Alternative with Potential to Impact Environment

Site Name	Site Address	Comments
Cottonwood at Rancho San Diego Golf Club	3121 Willow Glen Drive, El Cajon	UST site located east of Willow Glen Drive and slightly down-gradient.
Hansen Aggregates	2266 Willow Glen Drive, El Cajon	UST site located west of Willow Glen Drive and slightly upgradient.

Source: SWRCB Geotracker Database, 2004.

Environmental Impacts and Mitigation Measures

No known existing contaminated sites are located along this alignment, therefore the potential for known soil and groundwater contamination is less than significant. Although no known contamination has been documented along this alignment, unexpected soil and/or groundwater contamination could be encountered during trenching near the sites listed in Table D.9-3 (Impact HZ-1), resulting in a potentially significant but mitigable impact (Class II). Additionally, hazardous materials such as vehicle fuels and oils would be used and stored during construction activities. Spills or releases of these materials (Impact HZ-2) could result in a significant but mitigable impact (Class II). The combination of Mitigation Measures HZ-1a and HZ-2a, along with SDG&E PP-7, PP-16, PP-32, and PP-33 and Water Quality and Hydrology Project Protocols listed in Table D.6-1, would reduce impacts to less than significant levels.

Comparison to Proposed Project

The Jamacha Valley 138 kV/69 kV Underground Alternative, within Willow Glen Drive, is almost entirely underground within a paved roadway which would require significant trenching and soil disturbance. The comparable segment of the Proposed Project would require installation of 11 new structures, with excavation limited to the foundation area for each structure. Land use is similar along both alignments; however, no sites with potential environmental impact are located along the comparable segment of the Proposed Project alignment versus two sites with potential environmental impact along the Jamacha Valley 138 kV/69 kV Underground Alternative. The potential to encounter previously unknown contamination (Impact HZ-1) is greater along the Jamacha Valley 138 kV/69 kV Underground Alternative route. The potential for hazardous substance spills during construction (Impact HZ-2) would be the same for either alignment.

Comparison to Proposed Project with Future Circuit

No significant ground disturbance would occur by installing a future circuit on existing towers, therefore Impact HZ-1 would not result from construction activity. Impact HZ-2, potential hazardous substance spills during construction, would occur during any construction project to install new transmission lines and would be similar to the Proposed Project.

D.9.4.2 Jamacha Valley Overhead A Alternative

Environmental Setting

This alternative would consist of constructing new steel mono-poles for the 138 kV/69 kV circuits near the east edge of the existing ROW. As this alternative follows the same ROW, the environmental setting is identical to the Proposed Project. The sites listed in Table D.9-1 have minor potential to environmentally impact this alignment.

Environmental Impacts and Mitigation Measures

Excavation would be limited to areas at and near new pole structures along the Jamacha Valley portion of the alignment. No significant impacts from known existing environmentally contaminated sites are expected in this area. As with the Proposed Project, unexpected soil and/or groundwater contamination could be encountered during excavation or grading near the sites listed in Table D.9-1, resulting in a potentially significant but mitigable impact (Impact HZ-1, Class II). Additionally, hazardous materials such as vehicle fuels and oils would be used and stored during construction activities. Spill or release of these materials could result in a potentially significant but mitigable (Class II) impact (Impact HZ-2). These impacts would be reduced to less than significant levels with implementation of PP-7, PP-16, PP-32, and PP-33 and Water Quality and Hydrology Project Protocols listed in Table D.6-1, and Mitigation Measures HZ-1a and HZ-2a.

Comparison to Proposed Project

The Jamacha Valley Overhead A Alternative would construct two more new poles than the Proposed Project, resulting in a slightly greater amount of soil disturbance in the same general area. Impacts of the alternative would be similar due to their similar nature and alignment, both resulting in Impacts HZ-1, HZ-2, and HZ-3.

Comparison to Proposed Project with Future Circuit

No significant ground disturbance would occur by installing a future circuit on existing towers, resulting in no potential to encounter existing environmental contamination (Impact HZ-1) versus a minor potential to encounter environmental contamination during excavation for pole foundations for the Jamacha Valley Overhead A Alternative. Impact HZ-2, potential hazardous substance spills during construction, would occur during any construction project to install new transmission lines.

D.9.4.3 Jamacha Valley Overhead B Alternative

Environmental Setting

This alternative would consist of constructing new steel mono-poles for the 230 kV circuit at the center of the existing ROW between the existing lattice towers. Additionally, in Jamacha Valley 7 to 12 existing 138 kV/69 kV lattice towers would be removed and replaced with new steel mono-poles. As this alternative follows the same ROW, the environmental setting is identical to the Proposed Project. The sites listed in Table D.9-1 have minor potential to environmentally impact this alignment.

Environmental Impacts and Mitigation Measures

Excavation would be limited to areas at and near new pole structures along the Jamacha Valley portion of the alignment. No significant impacts from known existing environmentally contaminated sites are expected in this area. As with the Proposed Project, unexpected soil and/or groundwater contamination could be encountered during excavation or grading near the sites listed in Table D.9-1, resulting in a potentially significant but mitigable impact (Impact HZ-1, Class II). Additionally, hazardous materials such as vehicle fuels and oils would be used and stored during construction activities. Spills or releases of these materials could result in a potentially significant but mitigable (Class II) impact (Impact HZ-2). These impacts would be reduced to less than significant levels with the implementation of PP-7, PP-16, PP-32, and PP-33 and Water Quality and Hydrology Project Protocols listed in Table D.6-1, and Mitigation Measures HZ-1a and HZ-2a.

Comparison to Proposed Project

The Jamacha Valley Overhead B Alternative would require construction of a greater number of new poles than the Proposed Project, to replace existing lattice structures, resulting in a slightly greater amount of soil disturbance in the same general area. Impacts of the alternative would be similar due to their similar nature and alignment.

Comparison to Proposed Project with Future Circuit

No significant ground disturbance would occur by installing a future circuit on existing towers, resulting in no potential to encounter existing environmental contamination (Impact HZ-1) versus a minor potential to encounter environmental contamination during excavation for pole foundations for the Jamacha Valley Overhead B Alternative. Impact HZ-2, potential hazardous substance spills during construction, would occur during any construction project to install new transmission lines.

D.9.4.4 City of Santee 138 kV/69 kV Underground Alternative

Environmental Setting

This 0.75-mile underground alternative follows a paved access road from the existing ROW then southwest to Princess Joann Road, west along Princess Joann Road, and back to the existing ROW. Land uses along the City of Santee 138 kV/69 kV Underground Alternative consist of undeveloped open space along the paved access road segment and from Princess Joann Road to the existing ROW, and residential along Princess Joann Road. The open space portions of this alternative traverse moderately sloped hills and valleys covered with a mixture of scrub brush and grasses.

Environmental Impacts and Mitigation Measures

No known existing environmentally contaminated sites are located along this alignment. Based on the land use along this alignment, environmental contamination is not expected. The potential for known or unknown soil and groundwater contamination is therefore considered less than significant (Class III). However, hazardous materials such as vehicle fuels and oils would be used and stored during construction activities. Spills or release of these materials could result in a potentially significant but mitigable (Class II) impact (Impact HZ-2). These impacts would be reduced to less than significant levels with the implementation of SDG&E's PP-7, PP-16, PP-32, and PP-33 and Water Quality and Hydrology Project Protocols listed in Table D.6-1, and Mitigation Measures HZ-1a and HZ-2a.

Comparison to Proposed Project

The City of Santee 138 kV/69 kV Underground Alternative, almost entirely underground within paved roadways, would require significant trenching and soil disturbance. The comparable segment of the Proposed Project would require installation of three new structures, with excavation limited to the foundation area for each structure. Land use is similar along both alignments and existing environmental contamination (Impact HZ-1) is not expected for either. The potential for hazardous substance spills during construction (Impact HZ-2) would be the same for either alignment.

Comparison to Proposed Project with Future Circuit

No significant ground disturbance would occur by installing a future circuit on existing towers, resulting in no potential to encounter existing environmental contamination (Impact HZ-1). Similarly, no environmental contamination is expected along the City of Santee 138 kV/69 kV Underground Alternative. Impact HZ-2, potential hazardous substance spills during construction, would occur during any construction project to install new transmission lines.

D.9.4.5 City of Santee 230 kV Overhead Northern ROW Boundary Alternative

Environmental Setting

This alternative would consist of constructing new steel mono-poles for the 230 kV circuit at the north edge of the existing ROW. As this alternative parallels the existing ROW, the environmental setting is similar to the Proposed Project. The sites listed in Table D.9-1 have minor potential to environmentally impact this alignment.

Environmental Impacts and Mitigation Measures

Excavation would be limited to areas at and near new pole structures near the City of Santee portion of the alignment. No significant impacts from known existing environmentally contaminated sites are expected in this area. As with the Proposed Project, unexpected soil and/or groundwater contamination could be encountered during excavation or grading near the sites listed in Table D.9-1, resulting in a potentially significant but mitigable impact (Impact HZ-1, Class II). Additionally, hazardous materials such as vehicle fuels and oils would be used and stored during construction activities. Spills or release of these materials could result in a potentially significant but mitigable (Class II) impact (Impact HZ-2). These impacts would be reduced to less than significant with the implementation of SDG&E's PP-7, PP-16, PP-32, and PP-33 and Water Quality and Hydrology Project Protocols listed in Table D.6-1, and Mitigation Measures HZ-1a and HZ-2a.

Comparison to Proposed Project

This alternative would construct about the same number of new poles as the Proposed Project, resulting in a similar amount of soil disturbance in the same general area. Impacts of the alternative would be similar to the Proposed Project, but slightly less likely to encounter contamination because it would avoid construction along the access road adjacent to the ROW, just east of Magnolia Avenue.

Comparison to Proposed Project with Future Circuit

No significant ground disturbance would occur by installing a future circuit on existing towers, resulting in no potential to encounter existing environmental contamination (Impact HZ-1) versus a minor potential to encounter environmental contamination during excavation for pole foundations for the City of Santee 230 kV Overhead Northern ROW Boundary Alternative. Impact HZ-2, potential hazardous substance spills during construction, would occur during any construction project to install new transmission lines.

D.9.5 Environmental Impacts of the No Project Alternative – Contamination and Hazardous Materials

The No Project Alternative scenario most likely would eventually result in the installation of new generation in the San Diego area and in other improvements to existing utility systems. Installation of new generation facilities could potentially result in excavation, use, or release of hazardous materials or handling of contaminated soil and/or groundwater, resulting in exposure of workers and the public to hazardous materials. Locations for new facilities could have existing soil or groundwater contamination, which would be encountered during construction excavation. The impacts would occur in the areas where upgrades of existing systems take place, especially when earthwork is required (such as new foundations, footings or trenches).

D.9.6 Electric and Magnetic Fields and Other Field-Related Concerns

Recognizing that there is a great deal of public interest and concern regarding potential health effects from exposure to electric and magnetic fields (EMFs) from power lines, this section provides information regarding EMF associated with electric utility facilities and the potential effects of the Proposed Project related to public health and safety. Potential health effects from exposure to electric fields from power lines is typically not of concern since ***electric fields*** are effectively shielded by materials such as trees, walls, etc., therefore, the majority of the following information related to EMF focuses primarily on exposure to ***magnetic fields*** from power lines. However, this section does not consider magnetic fields in the context of CEQA and determination of environmental impact, first because there is no agreement among scientists that EMF does create a potential health risk, and second because there are no defined or adopted CEQA standards for defining health risk from EMF. As a result, EMF information is presented for the benefit of the public and decisionmakers.

Additional concerns regarding the Proposed Project related to power line fields include: corona; radio, television, and electronic equipment interference; induced currents and shock hazards; and effects on cardiac pacemakers. Environmental impacts are defined for these issues, and mitigation measures are recommended. These field issues are addressed below. In addition, Sections D.8.1 and D.8.3.3 address audible noise issues related to corona.

Defining EMF

Electric and magnetic fields are separate phenomena and occur both naturally and as a result of human activity across a broad electrical spectrum. Naturally occurring electric and magnetic fields are caused by the weather and the earth's geomagnetic field. The fields caused by human activity result from technological application of the electromagnetic spectrum for uses such as communications, appliances, and the generation, transmission, and local distribution of electricity.

The frequency of a power line is determined by the rate at which electric and magnetic fields change their direction each second. For power lines in the United States, the frequency of change is 60 times per second and is defined as 60 Hertz (Hz) power. In Europe and many other countries, the frequency of electric power is 50 Hz. Radio and communication waves operate at much higher frequencies: 500,000 Hz to 1,000,000,000 Hz. The information presented in this document is limited to the EMF from power lines at frequencies of 50 or 60 Hz.

Electric power flows across transmission systems from generating sources to serve electrical loads within the community. The apparent power flowing over a transmission line is determined by the transmission line's voltage and the current. The higher the voltage level of the transmission line, the lower the amount of current needed to deliver the same amount of power. For example, a 115 kV transmission line with 200 amps of current will transmit approximately 40,000 kilowatts (kW), and a 230 kV transmission line requires only 100 amps of current to deliver the same 40,000 kW.

Electric Fields

Electric fields from power lines are created whenever the lines are energized, with the strength of the field dependent directly on the voltage of the line creating it. Electric field strength is typically described in terms of kilovolts per meter (kV/m). Electric field strength attenuates (reduces) rapidly as the distance from the source increases. Electric fields are reduced at many receptors because they are effectively shielded by most objects or materials such as trees or houses.

At reasonably close distances, electric fields of sufficient strength in the vicinity of power lines can cause the same phenomena as the static electricity experienced on a dry winter day, or with clothing just removed from a clothes dryer, and may result in electric discharges when touching long metal fences, pipelines, or large vehicles. An acknowledged potential impact to public health from electric transmission lines is the hazard of electric shock: electric shocks from transmission lines are generally the result of accidental or unintentional contact by the public with the energized wires.

Magnetic Fields

Magnetic fields from power lines are created whenever current flows through power lines at any voltage. The strength of the field is directly dependent on the current in the line. Magnetic field strength is typically measured in milliGauss (mG). Similar to electric fields, magnetic field strength attenuates rapidly with distance from the source. However, unlike electric fields, magnetic fields are not easily shielded by objects or materials.

The nature of a magnetic field can be illustrated by considering a household appliance. When the appliance is energized by being plugged into an outlet but not turned on, so no current would be flowing through it, an electric field is generated around the cord and appliance, but no magnetic field is present. If the appliance is switched on, the electric field would still be present and a magnetic field would also be created. The electric field strength is directly related to the magnitude of the voltage from the outlet and the magnetic field strength is directly related to the magnitude of the current flowing in the cord and appliance.

D.9.6.1 EMF in the Proposed Project Area

The Proposed Project consists of the installation of a 35-mile 230 kV transmission circuit between Miguel Substation and Mission Substation, relocation of the existing 138 kV and 69 kV circuits onto a new pole alignment within the existing SDG&E right-of-way, and modifications to both the Miguel and Mission Substations. The proposed transmission line would pass through both developed and undeveloped lands.

Public exposure to EMFs in developed areas is widespread and encompasses a very broad range of field intensities and durations. In developed areas, EMFs are prevalent from the use of electronic appliances or equipment and existing electric power lines. In general, distribution lines exist throughout developed portions of the community and represent the predominant source of public exposure to power line EMF. Transmission lines are much less prevalent in most developed areas and therefore they generally represent a much lower contribution to overall public exposure to power line EMF. In undeveloped and natural areas, only low level naturally occurring EMFs exist. Measurable EMFs are not present except in the vicinity of existing power line corridors.

EMFs are emitted from existing transmission lines in the ROW. The project ROW varies in width from 150 to 250 feet and accommodates a varying number of transmission lines at 230, 138, and 69 kV. The route also has 12 kV distribution lines within the ROW. EMFs also occur at the existing Miguel and Mission Substations. Table D.9-4 summarizes the existing circuits within the ROW at 69 kV and above according to voltage class and distance from the edge of the ROW, and breaks the project route into 15 subsections: A1 through A3, B1 and B2, C, D, E, and F1 through F7. General locations of these segments are identified in Table B-2 of the Project Description. Land uses near these segments are a mixture of undeveloped land and residential, commercial, and public-purpose uses. Segments A1 (5.0 mi), D (1.2 mi), F2 (2.6 mi), which total 8.8 miles, or 25 percent of the total project length of approximately 35 miles, have no nearby residential uses.

Existing electric field strengths near the project are typical of regions near high voltage transmission lines. Electric fields decrease in strength with distance from the ROW, and are determined by line voltage, line height, the arrangement of conductor phases on the pole or tower, the height aboveground of the wires, and the placement of any parallel circuits. Dense foliage or other obstructions can also provide shielding. Because line voltage is held nearly constant, transmission line electric fields change little over the day. However, field strengths decrease rapidly with perpendicular distance from the line. For typical 230 kV lines under near-worst case conditions, electric field strength decreases from as much as approximately 2.0 kV/m adjacent to a pole or tower to 1.5 kV/m 50 feet from the line. At 100, 200 and 300 feet, the fields fall to 0.3, 0.05, and 0.01 kV/m, respectively (Lee et al., 1993, p. 14). The electric field strength of 0.01 kV/m (equivalent to 10 V/m) at 300 feet is similar to residential fields, which average about 10 V/m (Lee et al., 1993, p. 50).

Magnetic field strengths are determined mainly by line current, line height, and distance. For typical 230 kV lines of a Pacific Northwest power system, Lee et al. (1993) reported that annual average magnetic field strength decreases from as much as approximately 60 mG near a pole or tower to 20 mG 50 feet from the center of the line. At 100, 200, and 300 feet, the average fields fall to 7.0, 2.0, and 1.0 mG, respectively (Lee et al., 1993, p. 19). The average magnetic field strength at 300 feet is

Table D.9-4. Distances to Existing Transmission Lines at Left and Right Sides of Right-of-way by Subsection and Transmission Line Voltage

Subsection	ROW Width (ft)	TL voltage (kV)	Distance from Left* (ft)	Distance from Right* (ft)	Notes
A1	250	69	62	10	Two circuits on pole at R-side; one circuit on tower at L-side.
		138	62	—	One circuit on tower.
		230	—	91	Two circuits on one tower
A2	250	69	62	10	TLs on pole at R-side end within this section at Towers 47, 48.
		138	62	—	One circuit on tower
		230	—	91	Two circuits on one tower
A3	250	69	62	—	One circuit on tower
		138	62	—	One circuit on tower
		230	—	91	Two circuits on one tower
B1	200	69	10	—	One circuit on pole (at 10 ft.), one circuit on tower (at 50 ft.)
		138	50	—	One circuit on tower
		230	—	60	Two circuits on one tower
B2	200	69	10	12	Section B3 contains underbuilt distribution circuits 246, 247
		138	50	—	
		230	—	60	
C	250	69	10	10	
		138	50	—	
		230	—	110	Two circuits on one tower
D	200	69	10	—	
		138	70	—	
		230	—	35	Two circuits on one tower
E	150	69	50	—	
		138	50	—	
		230	—	35	Two circuits on one tower
F1-F7	200	138	—	50	
		230	55	—	One circuit on 9 towers from Fanita Junction, then on 37 steel poles to Mission Substation.

Sources: Miguel-Mission 230 kV #2 Project PEA, SDG&E (2002a); Magnetic Field Management Plan (SDG&E, 2002b)

* Closest distance from edge of ROW to the centerline of tower or pole carrying the transmission line. Left and Right are determined from within the ROW with Miguel Substation behind and Mission Substation ahead. Each line is listed only once, i.e., at the closer side (L or R). In cases where two lines of the same voltage are on the same side, only the one closest to the edge of the ROW is listed. In cases where two lines of the same voltage exist on the right and left sides, both are listed.

similar to residential fields, which average about 0.9 mG (Zaffanella, 1993). Because of the changes in currents throughout the year, peak magnetic fields of the system's 230 kV transmission lines were approximately twice the annual averages (Lee et al., 1993). These peaks occurred less than 1 percent of the time (less than 88 hours in a year).

Magnetic fields were modeled by SDG&E for both the existing lines and the proposed low-reactance configuration of the Proposed Project (see Section D.9.6.4, below, and Appendix 5). The key inputs to modeling of EMF are the line voltage and the line current. Modeling by SDG&E used the amount of current projected to occur in 2007 under peak summer load conditions for calculations of the magnetic field levels. SDG&E calculated magnetic fields at 3.3 feet above the ground level for each route segment according to its guidelines (SDG&E, 1994). By using peak load, extreme temperatures resulting in greatest line sag, and a minimum conductor height (set by the maximum sag), the data represent conditions more extreme than are likely to occur most days of the year, or even any day of the year because the extreme temperature assumed for the model is unlikely (a 10 percent chance) to occur in any given year.

D.9.6.2 Other Field-Related Public Concerns

Other public concerns related to electric power facility projects, are both safety and nuisance issues, and include: radio/television/electronic equipment interference; induced currents and shock hazards; and potential effects on cardiac pacemakers. Each of these issues is described below.

Radio/Television/Electronic Equipment Interference

Although corona can generate high frequency energy that may interfere with broadcast signals or electronic equipment, this is generally not a problem for transmission lines. The Institute of Electrical and Electronic Engineers (IEEE) has published a design guide (Radio Noise Subcommittee 1971) that is used to limit conductor surface gradients so as to avoid electronic interference (IEEE, 1971).

Gap discharges or arcs can also be a source of high frequency energy. Gap discharges occur when an arc forms across a gap in loose or worn line hardware. It is estimated that over 90 percent of interference problems for electric transmission lines are due to gap discharges. Line hardware is designed to be problem-free, but wind motion, corrosion, and other factors can create a gap discharge condition. When identified, gap discharges can be located and remedied by utilities.

Electric fields from power lines do not typically pose interference problems for electronic equipment in businesses since the equipment is shielded by buildings and walls. However, magnetic fields can penetrate buildings and walls thereby interacting with electronic equipment. Depending upon the sensitivity of equipment, the magnetic fields can interfere with equipment operation. Review of this phenomenon in regard to the sensitivity of electrical equipment identifies a number of thresholds for magnetic field interference. Interference with typical computer monitors can be detected at magnetic field levels of 10 mG and above, while large screen or high-resolution monitors can be susceptible to interference at levels as low as 5 mG. Other specialized equipment, such as medical equipment or testing equipment can be sensitive at levels below 5 mG. Equipment that may be susceptible to very low magnetic field strengths is typically installed in specialized and controlled environments, since even building wiring, lights, and other equipment can generate magnetic fields of 5 mG or higher.

The most common electronic equipment that can be susceptible to magnetic field interference is probably computer monitors. Magnetic field interference results in disturbances to the image displayed on the monitor, often described as screen distortion, “jitter,” or other visual defects. In most cases it is annoying, and at its worst, it can prevent use of the monitor. This type of interference is a recognized problem in the video monitor industry. As a result, there are manufacturers who specialize in monitor interference solutions and shielding equipment. Possible solutions to this problem include: relocation of the monitor, use of magnetic shield enclosures, software programs, and replacement of cathode ray tube monitors with liquid crystal displays that are not susceptible to magnetic field interference.

Induced Currents and Shock Hazards

Power line fields can induce voltages and currents on conductive objects, such as metal roofs or buildings, fences, and vehicles. When a person or animal comes in contact with a conductive object a perceptible current or small secondary shock may occur. Secondary shocks cause no physiological harm; however, they may present a nuisance.

Wind, Earthquake, and Fire Hazards

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 National Electrical Safety Code 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.

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. Underground transmission lines are susceptible to ground motion and displacements that may occur under earthquake loading. Earthquake conditions could result in damage or faults to underground transmission lines. Underground transmission line segments considered as project alternatives would use solid dielectric cable, which does not present the environmental or fire hazards that may be associated with oil-filled cable types.

Electrical arcing from power lines can represent a fire hazard. This phenomenon is more prevalent for lower voltage distribution lines since these lines are typically on shorter structures and in much greater proximity to trees and vegetation. Fire hazards from high voltage transmission lines are greatly reduced through the use of taller structures and wider right-of-ways. Further, transmission line right-of-ways are cleared of trees to control this hazard. Fire hazards due to a fallen conductor from an overhead line or ruptured underground cable are minimal due to system protection features. Both overhead and underground high voltage transmission lines include system protection designed to safeguard the public and line equipment. These protection systems consist of transmission line relays and circuit breakers that are designed to rapidly detect faults and cut-off power to avoid shock and fire hazards. This equipment is typically set to operate in two to three cycles, representing a time interval range from 2/60 of a second to 3/60 of a second.

Cardiac Pacemakers

An area of concern related to electric fields from transmission lines has been the possibility of interference with cardiac pacemakers. There are two general types of pacemakers: asynchronous and synchronous. The asynchronous pacemaker pulses at a predetermined rate. It is generally immune to interference because it has no sensing circuitry and is not exceptionally complex. The synchronous pacemaker, however, pulses only when its sensing circuitry determines that pacing is necessary. Interference from transmission line electric field may cause a spurious signal on the pacemaker's sensing circuitry. However, when these pacemakers detect a spurious signal, such as a 60 Hz signal, they are programmed to revert to an asynchronous or fixed pacing mode of operation, returning to synchronous operation within a specified time after the signal is no longer detected. Cardiovascular specialists do not consider prolonged asynchronous pacing a problem, since some pacemakers are designed to operate that way. Periods of operation in this mode are commonly induced by cardiologists to check pacemaker performance. So, while transmission line electric fields may interfere with the normal operation of some of the older model pacemakers, the result of the interference is generally not harmful, and is of short duration (EPRI, 1985 and 1979).

D.9.6.3 Scientific Background and Regulations Applicable to EMF

EMF Research

For more than 20 years, questions have been asked regarding the potential effects within the environment of EMFs from power lines, and research has been conducted to provide some basis for response. Earlier studies focused primarily on interactions with the electric fields from power lines. In the late 1970s, the subject of magnetic field interactions began to receive additional public attention, and research levels increased. A substantial amount of research investigating both electric and magnetic fields has been conducted over the past 20 years; however, much of the body of national and international research regarding EMF and public health risks remains contradictory or inconclusive.

Extremely low frequency (ELF) fields are known to interact with tissues by inducing electric fields and currents in these fields. However, the electric currents induced by ELF fields commonly found in our environment are very weak when compared to natural currents caused by the heart and other muscle activity, or the electrical activity of nerves and brain cells (Sheppard and Eisenbud, 1977; Carstensen, 1987).

Research related to EMF can be grouped into three general categories: cellular level studies, animal and human experiments, and epidemiological studies. These studies have provided mixed results, with some studies showing an apparent relationship between magnetic fields and health effects while other similar studies do not.

Since 1979, public interest and concern specifically regarding magnetic fields from power lines has increased. This increase has generally been attributed to publication of the results of a single epidemiological study (Wertheimer and Leeper, 1979). This study observed an association between the wiring configuration on electric power lines outside of homes in Denver and the incidence of childhood cancer. Following publication of the Wertheimer and Leeper study, many epidemiological, laboratory, and animal studies regarding EMF have been conducted.

Research on ambient magnetic fields in homes and buildings in several western states found average magnetic field levels within most rooms to be approximately 1 mG, while in a room with appliances present, the measured values ranged from 9 to 20 mG (Severson et al., 1988, and Silva, 1988). Immediately adjacent to appliances (within 12 inches), field values are much higher, as illustrated in Tables D.9-5 and D.9-6. These tables indicate typical sources and levels of electric and magnetic field exposure the general public experiences from appliances.

Table D.9-5. Typical Electric Field Values for Appliances, at 12 Inches

Appliance	Electric Field Strength (kV/m)
Electric Blanket	0.25*
Broiler	0.13
Stereo	0.09
Refrigerator	0.06
Iron	0.06
Hand Mixer	0.05
Phonographs	0.04
Coffee Pot	0.03

*1 to 10 kV/m next to blanket wires.
Source: Enertech Consultants, 1985.

Methods to Reduce EMF

EMF levels from transmission lines can be reduced in three primary ways: shielding, field cancellation, or increasing the distance from the source. Shielding, which primarily reduces exposure to electric fields, can be actively accomplished by placing trees or other physical barriers along the transmission line right of way (ROW). Shielding also results from existing structures the public may use or occupy along the line. Since electric fields can be blocked by most materials, shielding is effective for the electric fields but is of limited effectiveness for magnetic fields.

Magnetic fields can be reduced either by cancellation or by increasing distance from the source. Cancellation is achieved in two ways. A transmission line circuit consists of three "phases": three separate wires (conductors) on a transmission tower. The configuration of these three conductors can reduce magnetic fields. First, when the configuration places the three conductors closer together, the interference, or cancellation, of the fields from each wire is enhanced. This technique has practical limitations because of the potential for short circuits if the wires are placed too close together. There are also worker safety issues to consider if spacing is reduced. Second, in instances where there are two circuits (more than three phase wires), such as in the Proposed Project, cancellation can be accomplished by arranging phase wires from the different circuits near each other. In underground lines, the three phases are typically much closer together than in overhead lines because the cables are insulated (coated).

Table D.9-6. Magnetic Field from Household Appliances

Appliance	Magnetic Field (mG) 12" Distant	Magnetic Field (mG) Maximum
Electric range	3 to 30	100 to 1,200
Electric oven	2 to 25	10 to 50
Garbage disposal	10 to 20	850 to 1,250
Refrigerator	0.3 to 3	4 to 15
Clothes washer	2 to 30	10 to 400
Clothes dryer	1 to 3	3 to 80
Coffee maker	0.8 to 1	15 to 250
Toaster	0.6 to 8	70 to 150
Crock pot	0.8 to 1	15 to 80
Iron	1 to 3	90 to 300
Can opener	35 to 250	10,000 to 20,000
Mixer	6 to 100	500 to 7,000
Blender, popper, processor	6 to 20	250 to 1,050
Vacuum cleaner	20 to 200	2,000 to 8,000
Portable heater	1 to 40	100 to 1,100
Fan/blower	0.4 to 40	20 to 300
Hair dryer	1 to 70	60 to 20,000
Electric shaver	1 to 100	150 to 15,000
Color TV	9 to 20	150 to 500
Fluorescent fixture	2 to 40	140 to 2,000
Fluorescent desk lamp	6 to 20	400 to 3,500
Circular saw	10 to 250	2,000 to 10,000
Electric drill	25 to 35	4,000 to 8,000

Source: Gauger, 1985

The distance between the source of fields and the public can be increased by either placing the wires higher aboveground, burying underground cables deeper, or by increasing the width of the ROW. For transmission lines, these methods can prove effective in reducing fields because the reduction of the field strength drops rapidly with distance.

Scientific Panel Reviews

Numerous panels of expert scientists have convened to review the data relevant to the question of whether exposure to power-frequency EMF is associated with adverse health effects. These evaluations have been conducted in order to advise governmental agencies or professional standard-setting groups.

These panels of scientists typically have expertise in a number of disciplines relevant to scientific research on EMFs: epidemiology, medicine, physics and biophysics, laboratory animal studies, cellular physiology, cancer biology, and public health. The panel participants first evaluate the available studies individually, not only to determine what specific information the studies can offer, but also in terms of the validity of the experimental design, methods of data collection, analysis, and suitability of the authors' conclusions to the nature and quality of the data presented. Subsequently, the individual studies, with their previously identified strengths and weaknesses, are evaluated collectively in an effort to identify whether there is a consistent pattern or trend in the data that would lead to a determination of possible or probable hazards to human health resulting from exposure to these fields.

Scientific panel reviews and reports include those prepared by California (California Department of Health Services [CDHS, 2002]) and several states. The most recent and complete federal government report was prepared by the U.S. National Institute of Environmental Health Sciences (NIEHS, 1998; 1999). The World Health Organization (WHO) (2001) and its affiliated International Agency for Research on Cancer (IARC, 2002) also have sponsored in-depth reviews. Ministries and agencies of many countries also have contributed reports based on scientific expertise. Standards-setting organizations such as the International Non-Ionizing Radiation Committee (ICNIRP, 1998), Institute of Electrical and Electronic Engineers (IEEE) International Committee on Electromagnetic Safety (ICES) (IEEE, 2002), and American Conference of Governmental and Industrial Hygienists also have evaluated the literature in order to specify protective levels for workers and the general public. Because each panel reflects the influences of new research, conclusions from various reports have evolved over time. Summaries of key recent reports are presented below, starting with the most recent.

Many of these scientific panels have found that the scientific evidence suggesting that power frequency EMF exposures pose any health risk is weak.

On behalf of the California Public Utilities Commission (CPUC), the California Department of Health Services (DHS) recently completed a comprehensive review of existing studies related to EMF from power lines and potential health risks. This risk evaluation was undertaken by three staff scientists with the DHS. Each of these scientists is identified in the review results as an epidemiologist, and their work took place from 2000 to 2002. The results of this review titled, *An Evaluation of the Possible Risks From Electric and Magnetic Fields (EMFs) From Power Lines, Internal Wiring, Electrical Occupations, and Appliances*, were published in June 2002. The conclusions contained in the executive summary are provided below:

- To one degree or another, all three of the DHS scientists are inclined to believe that EMFs can cause some degree of increased risk of childhood leukemia, adult brain cancer, Lou Gehrig's Disease, and miscarriage.
- They strongly believe that EMFs do not increase the risk of birth defects, or low birth weight.
- They strongly believe that EMFs are not universal carcinogens, since there are a number of cancer types that are not associated with EMF exposure.

- To one degree or another they are inclined to believe that EMFs do not cause an increased risk of breast cancer, heart disease, Alzheimer's Disease, depression, or symptoms attributed by some to sensitivity to EMFs. However, all three scientists had judgments that were "close to the dividing line between believing and not believing" that EMFs cause some degree of increased risk of suicide.
- For adult leukemia, two of the scientists are "close to the dividing line between believing or not believing" and one was "prone to believe" that EMFs cause some degree of increased risk.

The report indicates that the DHS scientists are more inclined to believe that EMF exposure increased the risk of the above health problems than the majority of the members of scientific committees that have previously convened to evaluate the scientific literature. With regard to why the DHS review's conclusions differ from those of other recent reviews, the report states:

> ***"The three DHS scientists thought there were reasons why animal and test tube experiments might have failed to pick up a mechanism or a health problem; hence, the absence of much support from such animal and test tube studies did not reduce their confidence much or lead them to strongly distrust epidemiological evidence from statistical studies in human populations. They therefore had more faith in the quality of the epidemiological studies in human populations and hence gave more credence to them."***

While the results of the DHS report indicate these scientists believe that EMF can cause some degree of increased risk for certain health problems, the report did not quantify the degree of risk.

In June 2001, a scientific working group of the International Agency for Research on Cancer (an agency of WHO) reviewed studies related to the carcinogenicity of EMF. Using standard IARC classification, magnetic fields were classified as "possibly carcinogenic to humans (Group 2B)" based on epidemiological studies showing limited evidence in relation to childhood leukemia. "Possibly carcinogenic to humans" is a classification used to denote an agent for which there is limited evidence of carcinogenicity in humans and less than sufficient evidence for carcinogenicity in experimental animals. Other agents identified as "possibly carcinogenic to humans" include gasoline exhaust, styrene, welding fumes, and coffee (WHO, 2001). In contrast to the findings on childhood leukemia, IARC (2002) concluded there was inadequate evidence that electric and magnetic fields cause other human and animal cancers.

The WHO program on Protection of the Environment includes an initiative concerning potential health effects of powerline electric and magnetic fields. The International EMF Project (IEMFP) was begun in 1996 to identify research needs that were presented in a research agenda (IEMFP, 2001). The IEMFP coordinates research, holds meetings to evaluate research issues, and publishes reports on technical topics, but does not sponsor research. In light of the evaluation of EMF as a Group 2B carcinogen (IARC, 2002), this group has begun a comprehensive assessment that will include both cancer and non-cancer adverse health effects.

In May 1999 the National Institute of Environmental Health Sciences (NIEHS) submitted to Congress its report titled, *Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields*, containing the following conclusion regarding EMF and health effects:

> ***"Using criteria developed by the International Agency for Research on Cancer (IARC), none of the Working Group considered the evidence strong enough to label ELF-EMF exposure as a known human carcinogen or probable human carcinogen. However, a majority of the members of this Working Group concluded that exposure to power-line frequency ELF-EMF is a possible carcinogen [emphasis added]."***

In addition to the uncertainty regarding the level of health risk posed by EMF, individual studies and scientific panels have not been able to determine or reach consensus regarding what level of magnetic field exposure might constitute a health risk. In some early epidemiological studies, increased health risks were discussed for daily time-weighted average field levels greater than 2 mG. However, the IARC scientific working group indicated that studies with average magnetic field levels of 3 to 4 mG played a pivotal role in their classification of EMF as a possible carcinogen.

Public health scientists for the most part agree that laboratory experiments do not demonstrate increased risk of cancer and other diseases in laboratory animals exposed to 50- and 60-Hz electric and magnetic fields and these fields do not disrupt cells and tissues. The results from epidemiologic studies are less certain as they leave unresolved the possibility of an increase in childhood leukemia rates, but give little evidence for increased risks for other childhood diseases (Ahlbom et al., 2000 and Greenland et al., 2000). Studies of diseases in adults are generally negative, with some uncertainty concerning occupational exposures. For all areas, the research now in progress is unlikely to alter the balance of scientific judgment in the near future.

Policies, Standards, and Regulations

A number of counties, states, and local governments have adopted or considered regulations or policies related to EMF exposure. The reasons for these actions have been varied; in general, however, the actions can be attributed to addressing public reaction to and perception of EMF as opposed to responding to the findings of any specific scientific research. Following is a brief summary of regulatory activity regarding EMF.

International Guidelines

The International Commission on Non-Ionizing Radiation Protection (ICNIRP), which itself is not a regulatory agency, developed advisory exposure guidelines that have been adopted as the basis for national standards in a number of countries (ICNIRP, 1998). The ICNIRP guideline for a 60-Hz magnetic field strength limit is approximately 830 mG, which is hundreds of times greater than typical residential magnetic field strengths. The ICNIRP-derived limit for 60-Hz electric field strength is 4.2 kV/m. As described above, the WHO-affiliated International Agency for Research on Cancer, which evaluates scientific data but does not recommend exposure guidelines or regulations, assessed both cancer and non-cancer adverse health effects of EMF exposure. EMF was classified as a possible carcinogen because of an apparent association of average magnetic field strengths of 3 to 4 mG with childhood leukemia.

National Guidelines

Although the U.S. EPA has conducted investigations into EMF related to power lines and health risks, no national standards have been established. However, the IEEE makes voluntary standards available. Standard C95.6 (IEEE, 2002) limits 60-Hz magnetic field exposures for members of the general public to less than 9040 mG and 60-Hz electric field exposures of the whole body to less than 5 kV/m. However, within a powerline ROW, exposures up to 10 kV/m are allowed.

The number of studies sponsored by the U.S. EPA, the Electric Power Research Institute (EPRI), and other institutions has increased in the past few years. Several bills addressing EMF have been introduced at the congressional level and have provided funding for research; however, no bill has been enacted that would regulate EMF levels.

The 1999 NIEHS report to Congress suggested that the evidence supporting EMF exposure as a health hazard was insufficient to warrant aggressive regulatory actions. The report did suggest passive measures to educate the public and regulators on means aimed at reducing exposures. NIEHS also suggested the power industry continue its practice of siting lines to reduce public exposure to EMF and to explore ways to reduce the creation of magnetic fields around lines.

State Guidelines

Several states have adopted limits for electric field strength within transmission line ROWs. Florida and New York are the only states that currently limit the intensity of magnetic fields from transmission lines. These regulations include limits within the right-of-way (ROW) as well as at the edge of the ROW and cover a broad range of values. Table D.9-7 lists the states regulating EMF and their respective limits. The magnetic field limits were based on an objective of preventing field levels from increasing beyond levels currently experienced by the public and are not based upon any link between scientific data and health risks (Morgan, 1991).

Table D.9-7. EMF Regulated Limits (by State)

State	Electric Field (kV/m)	Magnetic Field (mG)	Location	Application
Florida (codified):				
500 kV Lines	10		In ROW	Single circuit
	2	200	Edge of ROW	Single circuit
	2	250	Edge of ROW	Double circuit
230 kV Lines or less	8		In ROW	
	2	150	Edge of ROW	230 kV lines or less
Minnesota	8		In ROW	>200 kV
Montana (codified)	1		Edge of ROW	>69 kV
	7		In ROW	Road crossings
New Jersey	3	Under consideration	Edge of ROW	Guideline for complaints
New York	1.6	200	Edge of ROW	>125 kV, >1 mile
	7		In ROW	Public roads
	11		In ROW	Public roads
	11.8		In ROW	Other terrain
North Dakota	9		In ROW	Informal
Oregon (codified)	9		In ROW	230 kV, 10 miles

Source: Public Utilities Commission of Texas

Elsewhere in the United States, several agencies and municipalities have taken action regarding EMF policies. These actions have been varied and include requirements that the fields be considered in the siting of new facilities. The manner in which EMF is considered has taken several forms. In a few instances, a concept referred to as "prudent avoidance" has been formally adopted. Prudent avoidance, a concept proposed by Dr. Granger Morgan of Carnegie-Mellon University, is defined as ". . . limiting exposures which can be avoided with small investments of money and effort." (Morgan, 1991) Some municipalities or regulating agencies have proposed limitations on field strength, requirements for siting of lines away from residences and schools, and, in some instances, moratoria on the construction of new transmission lines. The origin of these individual actions has been varied, with some initiated by regulators at the time of new transmission line proposals within their community, and some by public grass-roots efforts.

CPUC Guidelines

In 1991, the CPUC initiated an investigation into electric and magnetic fields associated with electric power facilities. This investigation explored the approach to potential mitigation measures for reducing public health impacts and possible development of policies, procedures or regulations. Following input from interested parties the CPUC implemented a decision (D.93-11-013) that requires that utilities use "low-cost or no-cost" mitigation measures for facilities requiring certification under General Order 131-D[1]. The decision directed the utilities to use a 4 percent benchmark on the low-cost mitigation. This decision also implemented a number of EMF measurement, research, and education programs, and provided the direction that led to the preparation of the DHS study described above. The CPUC did not adopt any specific numerical limits or regulation on EMF levels related to electric power facilities.

In Decision D.93-11-013, the CPUC addressed mitigation of EMF of utility facilities and implemented the following recommendations:

- No-cost and low-cost steps to reduce EMF levels
- Workshops to develop EMF design guidelines
- Uniform residential and workplace programs
- Stakeholder and public involvement
- A four-year education program
- A four-year non-experimental and administrative research program
- An authorization of federal experimental research conducted under the National Energy Policy Act of 1992.

The no-cost/low-cost mitigation requirements were to be applied to new and reconstructed facilities and are applicable to the Proposed Project. (See PEA Appendix E, SDG&E's Magnetic Field Management Plan.)

D.9.6.4 Consideration of Electric and Magnetic Fields (EMFs)

As discussed in Section D.9.6.3, there remains a lack of consensus in the scientific community in regard to public health impacts due to EMF at the levels expected from electric power facilities. Further, there are no federal or State standards limiting human exposure to EMFs from transmission lines or substation facilities in California. For those reasons, EMF is not considered in this EIR as a CEQA issue and no impact significance is presented. This information is presented to allow understanding of the issue by the public and decisionmakers.

Proposed Project

EMF levels in the project area would not markedly change during construction, although there might be a temporary increase or decrease of levels as existing lines are modified. Operation of the Proposed Project according to the low-reactance configurations of the Magnetic Field Management Plan (MFMP) (SDG&E, 2002b, 2003, and 2004a) results in changes in EMF both within and outside the ROW. These changed EMF levels at all locations on the ground and near the project ROW are below the limits cited in national and international guidelines discussed above.

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[1] General Order 131-D is entitled "Rules Relating to the Planning and Construction of Electric Generation, Transmission/Power/Distribution Line Facilities and Substations Located in California."

Overall, the project would decrease average magnetic fields at the edges of the ROW by rearranging and relocating the existing circuits and phasing and by distributing the load over the additional circuits. For the existing configuration under 2007 peak load conditions, the average magnetic fields at the edges of the entire ROW over all segments is 37 mG (left) and 106 mG (right). (Subsections A through F are described in Section B.3 of the Project Description, and maps are shown in Appendix 1.) These average magnetic fields would be reduced to 34 mG (left) and 42 mG (right) for the Proposed Project with low-reactance configurations. Comparisons of the existing and proposed configurations show overall reductions at the edges of the ROW of 8 percent (left) and 60 percent (right).

Magnetic fields at the ROW edge would increase in some segments. The largest increases in magnetic field strength would occur along Subsections D, E, and F at the left of the ROW. These areas of increased field levels are listed in Table D.9-8, which shows the approximate location of each affected segment.

Table D.9-8. Proposed Project Segments with Increased Magnetic Fields

Subsection / Segment	Approximate Location
Subsection A	Segment A1: Miguel Substation to Campo Rd (SR-94)
Subsection D	Segment D: Los Coches Substation to north of the San Diego River where the right-of-way turns northwest
Subsection E	Segment E1: North of San Diego River to the east 138 kV Santee Substation Tap (near Oak Creek Dr) Segment E2: East 138 kV Santee Substation Tap (near Oak Creek Dr) to the west Santee Substation Tap (near Magnolia Ave) Segment E3: West 138 kV Santee Substation Tap (near Magnolia Ave) to Fanita Junction
Subsection F	Segment F7: Where the right-of-way turns west to Mission Substation

Source: Magnetic Field Management Plan for the Miguel-Mission 230 kV #2 Project (SDG&E, 2002a), with revisions (SDG&E, 2003), and supplemental tables (SDG&E, 2004a).

Near the Mission Substation (along segment F7), a 10 mG increase from 16 to 27 mG corresponds to a 69 percent increase. Land use in this area is partially residential. Magnetic field strengths of segment F7 within the ROW would decrease sharply with the configuration of the Proposed Project and levels more than 50 feet outside of the ROW would generally be comparable to or lower than for the baseline case.

Subsection D (200-foot ROW, 1.2 miles long), which passes through undeveloped land, would have the greatest reduction in magnetic field strength at the right edge of the ROW (121 mG), illustrating the effectiveness of changed phasing on the two existing 230 kV transmission line circuits that are 35 feet from the right edge of the ROW. Subsection D also exhibits a 15 mG (68 percent) increase at the left side of the ROW, which would be closer to the project 230 kV transmission line, and includes a 138 kV circuit that would be relocated by the project, and an existing 69 kV circuit.

Subsection E3 (150-foot ROW, 2.4 mi long), which includes a residential area of the City of Santee, would have a similar circuit arrangement, but with one fewer 69 kV transmission line than Subsection D. Similar to Subsection D, there would be a large field reduction at the right edge of the ROW (117 mG), and a smaller increase at the left edge (18 mG, 62 percent).

For the remainder of the Proposed Project, the project would result in reductions in magnetic fields at both left and right edges of the ROW. The greatest reductions occur at the right side in segments D to E3, where magnetic fields would be reduced about 120 mG, or by more than 60 percent from approximately 190 mG to approximately 70 mG. At the right edge of the ROW, the Proposed Project reduces magnetic fields by more than one-half in all but two of 18 segments. At the left edge of the ROW, magnetic fields would be decreased in all but six of 18 segments.

Table D.9-9 shows magnetic fields at various distances from the center of the ROW for four selected subsections of the route. Figures D.9-1 through D.9-4 visually depict the changes. These selections illustrate the effects of the MFMP plan for the Proposed Project and the Proposed Project with the future 230 kV circuit.

Table D.9-9. Magnetic Fields at Distances from Right-of-Way Centerline, by Subsection

	Magnetic Field (mG), at distance from ROW Centerline (ft) [a,b]										
Scenario / Segment	**Left 250**	**Left 200**	**Left 150**	**Left 100**	**Left 50**	**0**	**Right 50**	**Right 100**	**Right 150**	**Right 200**	**Right 250**
Baseline (Segment A2, 250 ft wide)	13.0	20.6	**37.8**	82.2	54.3	167.7	240.3	55.5	**74.1**	32.9	18.4
Proposed Project (Segment A2, 250 ft wide)	5.0	9.2	**21.6**	73.2	95.4	66.0	118.2	29.2	**10.2**	5.1	3.1
Proposed with Future Circuit (Segment A2, 250 ft wide)	0.9	1.7	**5.0**	30.4	94.7	53.4	67.8	16.7	**5.6**	2.6	1.5
Baseline (Segment A3, 250 ft wide)	12.3	19.7	**36.6**	81.4	56.8	165.4	256.9	99.6	**41.8**	22.3	13.8
Proposed Project (Segment A3, 250 ft wide)	5.0	9.2	**21.6**	73.2	93.4	66.0	118.2	29.2	**10.2**	5.1	3.1
Proposed with Future Circuit (Segment A3, 250 ft wide)	0.9	1.7	**5.0**	30.4	94.7	53.4	67.8	16.7	**5.6**	2.6	1.5
Baseline (Segment D, 200 ft wide)	5.8	8.1	12.1	**21.3**	51.2	88.8	264.2	**190.8**	64.7	29.2	16.2
Proposed Project (Segment D, 200 ft wide)	3.0	4.7	8.3	**35.8**	113.2	62.3	124.5	**70.2**	18.1	7.5	4.1
Proposed with Future Circuit (Segment D, 200 ft wide)	1.4	2.4	5.8	**21.5**	60.6	74.2	83.0	**39.5**	9.8	3.9	2.0
Baseline (Segment E3, 150 ft wide)	5.4	7.5	11.1	**18.4**	67.6	196.0	270.0	**104.5**	39.8	19.9	11.8
Proposed Project [c] (Segment E3, 150 ft wide)	4.3	7.2	14.6	**39.8**	90.7	100.0	114.9	**33.3**	12.2	6.2	3.7
Proposed with Future Circuit [c] (Segment E3, 150 ft wide)	1.1	2.4	6.4	**26.0**	61.6	68.0	70.1	**17.6**	5.0	2.1	1.0
Baseline (Segment F7, 200 ft wide)	2.3	3.5	6.3	**16.0**	39.8	82.7	172.8	**48.9**	22.3	10.8	6.2
Proposed Project (Segment F7, 200 ft wide)	1.4	2.9	7.5	**26.9**	49.4	9.2	140.8	**56.1**	10.1	3.6	1.7
Proposed with Future Circuit (Segment F7, 200 ft wide)	1.5	3.0	7.9	**26.1**	51.5	11.9	98.4	**47.1**	8.2	2.8	1.3

Source: Magnetic Field Management Plan for the Miguel-Mission 230 kV #2 Project (SDG&E, 2002a), with revisions (SDG&E, 2003), and supplemental tables (SDG&E, 2004a).

Notes:

[a] Distance from center of ROW. Data closest to the edge of the ROW are shown in **boldface**.

[b] Left or right side of the ROW as determined by an observer in the ROW with Miguel Substation behind and Mission Substation ahead.

[c] Levels differ from SDG&E estimates because 138 kV circuit is modeled in southern position (Commonwealth Associates, March 23, 2004).

Figure D.9-1. Magnetic Field Levels: Segments A2 and A3 (250-ft. ROW Width)

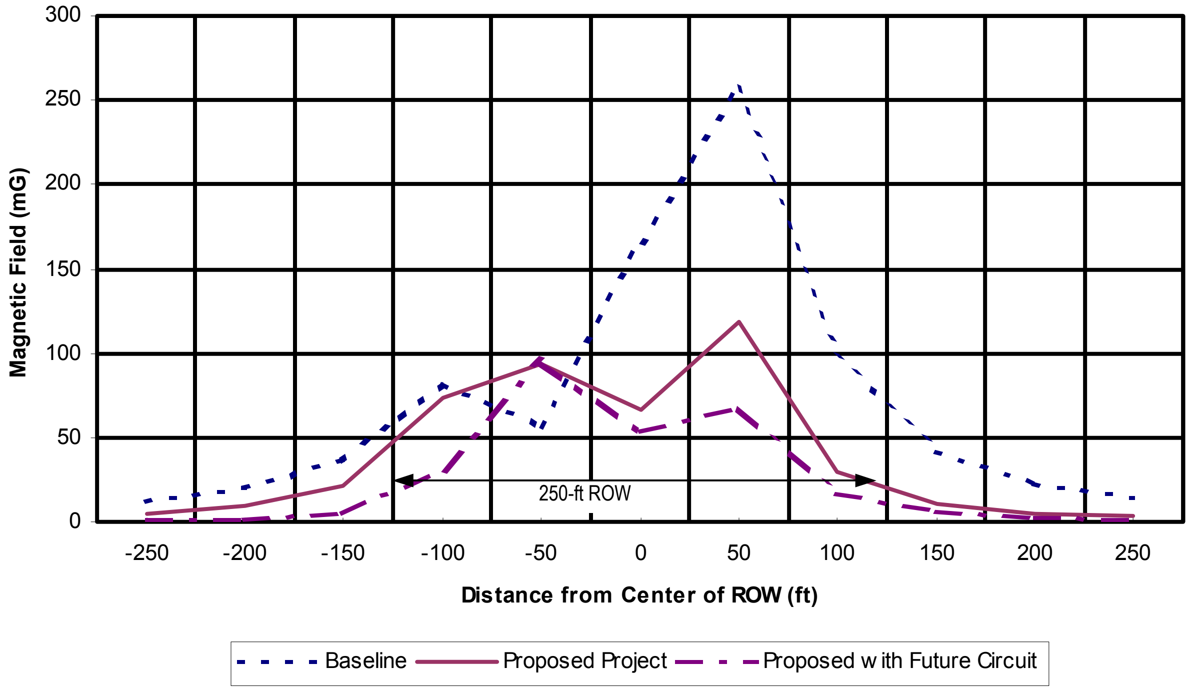


Figure D.9-2. Magnetic Field Levels: Segment D (200-ft. ROW Width)

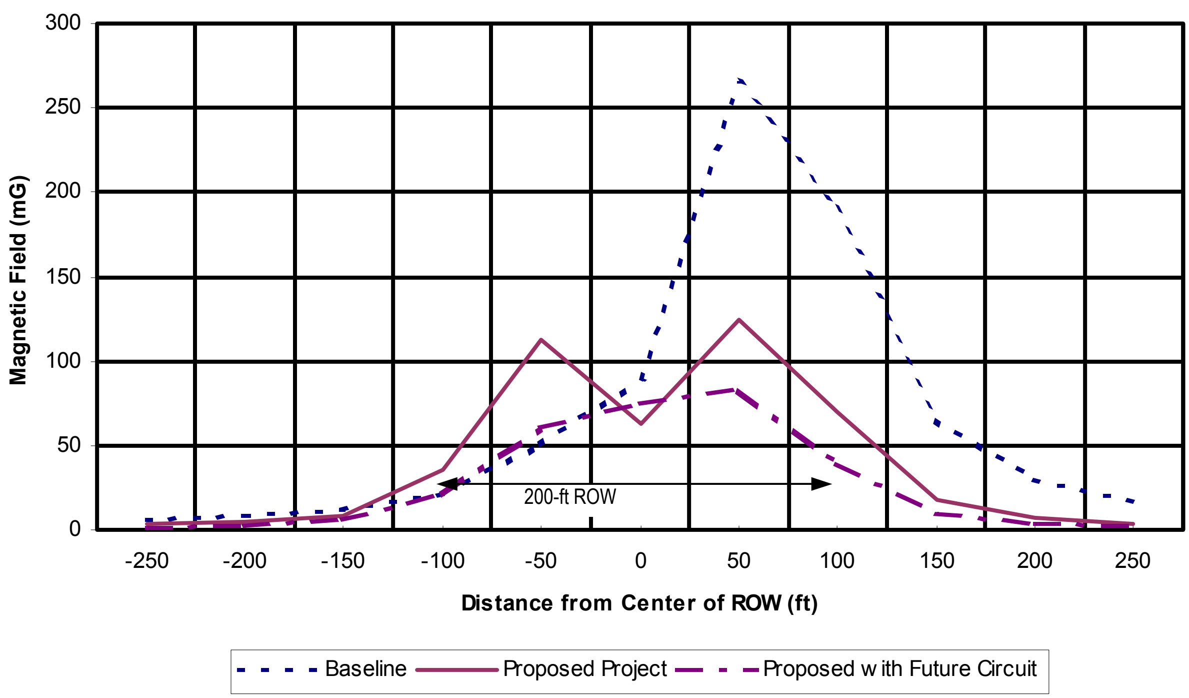


Figure D.9-3. Magnetic Field Levels: Segment E3 (150-ft. ROW Width)

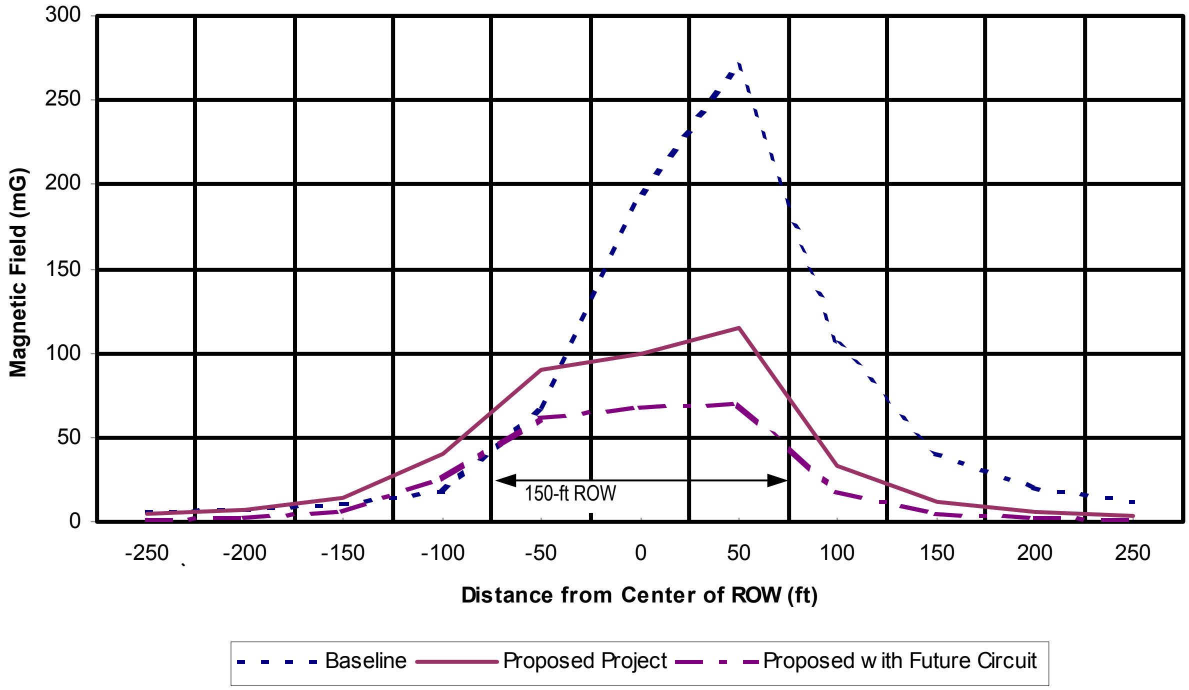
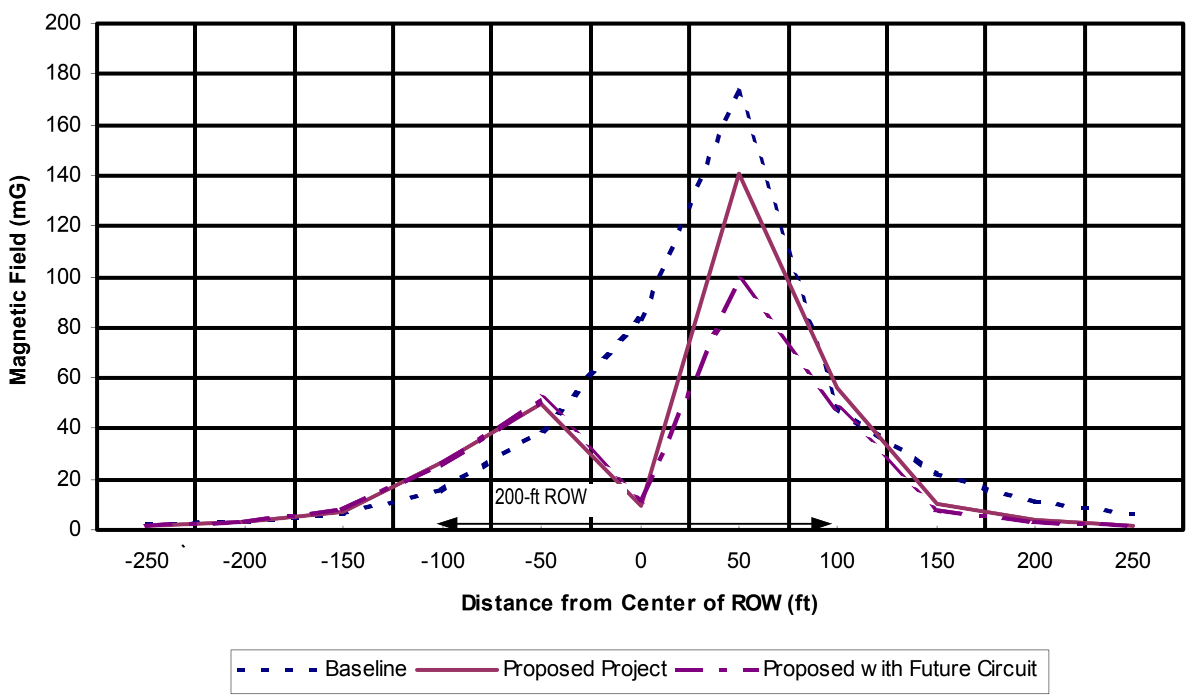


Figure D.9-4. Magnetic Field Levels: Segment F7 (200-ft. ROW Width)



The levels described above include SDG&E's proposed EMF reduction strategy throughout all sections. Subsection A2 (1.8 miles long) contains the largest percentage magnetic field reduction for an edge of ROW location. That segment also is the area where the majority of EMF reduction costs would be incurred. Changes associated with segment A2 were estimated to cost $205,000, which is 57 percent of the estimated total field-reduction costs for the total project of $362,000.

No additional field reduction measures are recommended beyond those presented in the Applicant's magnetic field management plan (SDG&E, 2002b, 2003, 2004a).

SDG&E's Proposed EMF Mitigation

SDG&E proposes to design and construct the project so that project magnetic fields are reduced to practical minimums consistent with CPUC General Order 131-D (CPUC, 1995) and the Commission's guidance that costs associated with magnetic field reduction low-cost or no-cost guidelines set out in Decision 93-11-013.

The no-cost/low-cost mitigation requirements were to be applied to new and reconstructed facilities and are applicable to the Mission-Miguel 230 kV #2 Project.

For transmission line facilities of 200 kV and over, the Commission in GO 131-D requires the following (CPUC, 1995, Section IX, paragraph A; Section X paragraph A; CPUC, 1993):

- A detailed description of the proposed transmission facilities, including route, alternative routes, if any; proposed transmission equipment, (cost, design, length, location, etc.);
- A map of the area surrounding the right-of-way; and
- Low-cost and no-cost options considered and proposed for implementation using 4 percent of total budgeted project cost as a benchmark for EMF mitigation costs.

Consistent with recent practice, SDG&E applied these criteria to the magnetic field component of EMF produced by the transmission lines and developed the Magnetic Field Management (SDG&E, 2002b and 2003). Pursuant to CPUC requirements, SDG&E applied its EMF guidelines (SDG&E, 1994) to develop a plan that evaluated magnetic fields generated by all transmission and distribution lines within the ROW for a base case design and analyzed magnetic field reductions that would result from various rearrangements of circuit and conductor locations and conductor phasing. According to the EMF guidelines, the basis for applying low-cost measures is public concern and therefore prioritization of low-cost measures is based on public concern and, in comparing two areas, their relative population density (SDG&E, 1994, p. 7). SDG&E EMF guidelines state that magnetic field calculations are normally based on adverse system peak load conditions, defined as those at which there is a 10 percent chance that system loads would be greater. Current levels at other times of year may be more appropriate than adverse system peak loads in some cases (SDG&E, 1994 p. 12).

To reduce EMF, SDG&E places 230 kV lines, such as the line proposed for Miguel-Mission project and future Sycamore Canyon #2 circuit, on lattice tower or steel pole support structures capable of carrying two circuits. Circuits are arranged vertically on three horizontal arms (SDG&E, 1994). If only one circuit is needed, only positions on one side are used.

As noted previously, the planned low-reactance configuration of the Proposed Project would decrease EMF levels in all but a couple of segments. Field-reduction costs were also identified.

EMF Issues Applicable to Alternatives

Five alternatives have been identified. Two of these involve placing 138 kV and 69 kV transmission lines underground, and three would alter the proposed configurations of the 138 kV and 69 kV transmission lines and the new 230 kV transmission line within the existing ROW. Relocation of the 138 kV and 69 kV circuits underground would reduce field levels along the ROW and introduce magnetic fields to the route of the underground lines. When compared to field levels from overhead lines, those from underground lines decay much more rapidly with lateral distance, but they can be quite high at locations over the centerline of the cable route. This is because underground conductors would be much closer to ground level than those overhead. For each of the underground alternatives, it was assumed that duct bank for the 138 kV and 69 kV circuits would be covered by at least 36 inches of backfill (Commonwealth, 2004). Compared to the Proposed Project, the alternatives would affect magnetic field levels as follows:

- **Jamacha Valley 138 kV/69 kV Underground Alternative.** Residences are located intermittently along either side of the existing ROW in the Jamacha Valley. Magnetic field levels along the existing ROW in Jamacha Valley would not be substantially reduced by relocating the 138 kV and 69 kV circuits to an underground route: **they would drop from 21.6 mG with the Proposed Project to 21.5 mG under this alternative (at west edge of ROW) and from 10.2 mG to 9.4 mG (east edge)**. Placement of the 138 kV and 69 kV circuits in Willow Glen Drive would introduce field levels of 56.6 mG to locations directly above the duct bank. At either edge of the 70-foot wide road, assuming placement of the duct bank in the center of the road, magnetic field levels would be about 1.7 mG.
- **Jamacha Valley Overhead A Alternative.** Magnetic field levels along the western edge of the existing ROW in the Jamacha Valley would not be substantially reduced, and levels along the eastern edge of the ROW would be increased by roughly 40 percent because of locating the 138 kV and 69 kV circuits near the eastern edge: **they would increase from 21.6 mG with the Proposed Project to 21.4 mG under this alternative (at west edge of ROW) and from 10.2 mG to 14.7 mG (east edge)**.
- **Jamacha Valley Overhead B Alternative.** Magnetic field levels along the western edge of the existing ROW in the Jamacha Valley would be reduced by roughly 10 percent, and levels along the eastern edge would be increased by roughly 20 percent because of the 230 kV circuits being closer to that edge: **they would decrease from 21.6 mG with the Proposed Project to 19.0 mG under this alternative (at west edge of ROW) and increase from 10.2 mG to 12.5 mG (east edge)**.
- **City of Santee 138 kV/69 kV Underground Alternative.** Residences are located immediately adjacent to the southern edge of the existing ROW in the City of Santee. Magnetic field levels along the southern edge of the existing ROW in the City of Santee would be reduced by roughly 30 percent without substantially reducing levels on the northern edge by relocating the 138 kV and 69 kV circuits to an underground route: **magnetic field levels would drop from 39.8 mG with the Proposed Project to 26.4 mG under this alternative (at south edge of ROW) and from 33.3 mG to 32.8 mG (north edge)**. Placement of the 138 kV and 69 kV circuits in Princess Joann Road would introduce field levels of 35.8 mG to locations directly above the duct bank. At either edge of the 40-foot wide road, assuming placement of the duct bank in the center of the road, magnetic field levels would be about 5.0 mG.
- **City of Santee 230 kV Overhead Northern ROW Boundary Alternative.** Magnetic field levels along the southern edge of the existing ROW in the City of Santee would be reduced by roughly 50 percent, and because of locating the 230 kV at the northern edge of the ROW, levels would

increase by nearly 100 percent on the north side of the ROW: **dropping from 39.8 mG with the Proposed Project to 18.0 mG (at south edge of ROW) and increasing from 33.3 mG to 73.1 mG (at north edge of existing ROW)**. This alternative would also expand the existing ROW to the north.

Figure D.9-5 shows the magnetic field levels that would occur along the routes of the two underground alternatives. Table D.9-10 summarizes the magnetic field levels for alternatives in the Jamacha Valley area, and Table D.9-11 summarizes the levels for alternatives in the City of Santee.

Figure D.9-5. Magnetic Field Levels: Underground Alternatives

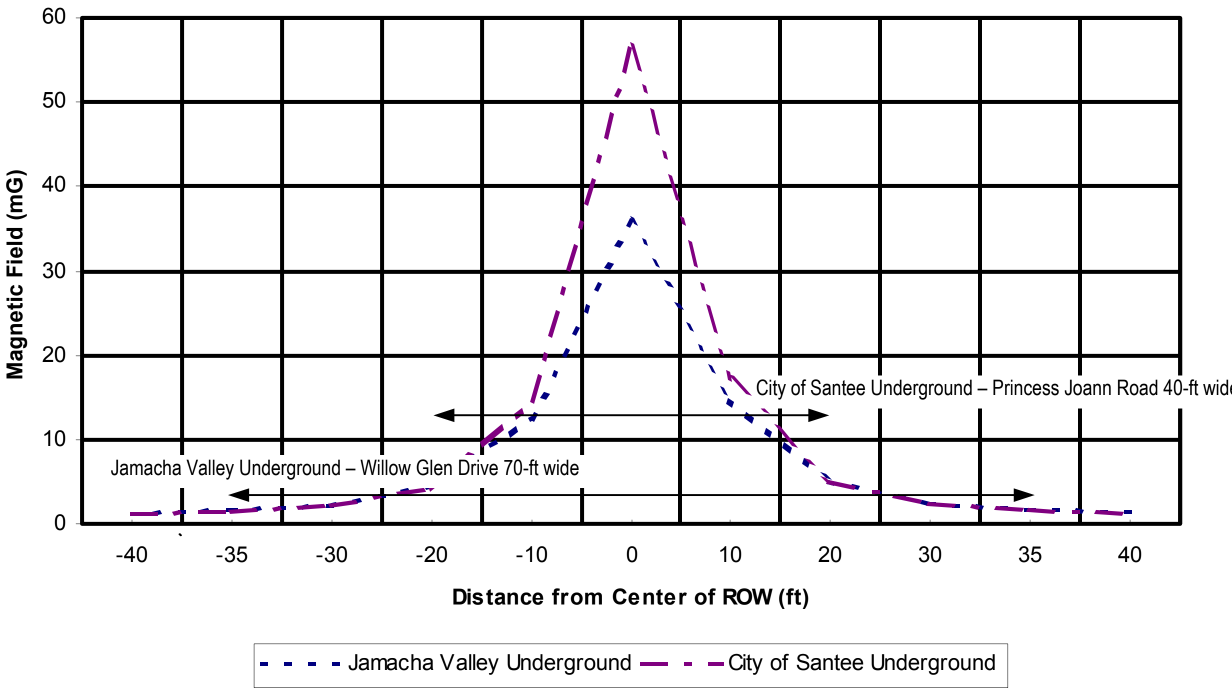


Table D.9-10. Comparison of Magnetic Fields, Jamacha Valley Alternatives

	Magnetic Field (mG), at distance from ROW Centerline (ft)										
Jamacha Valley Alternatives	**West 250**	**West 200**	**West 150**	**West 100**	**West 50**	**0**	**East 50**	**East 100**	**East 150**	**East 200**	**East 250**
Proposed Project (along ROW, Segment A3)	5.0	9.2	**21.6**	73.2	93.4	66.0	118.2	29.2	**10.2**	5.1	3.1
Jamacha Valley Underground											
(along ROW without 138/69 kV)	5.0	9.2	**21.5**	72.4	90.3	84.0	112.0	26.2	**9.4**	4.8	2.9
(in Willow Glen Drive)	0.0	0.1	0.1	0.2	**0.8**	56.6	**0.8**	0.2	0.1	0.1	0.0
Jamacha Valley Overhead A (along existing ROW)	5.0	9.2	**21.4**	72.4	90.6	83.9	111.6	40.0	**14.7**	6.3	3.4
Jamacha Valley Overhead B (along existing ROW)	4.4	7.9	**19.0**	37.6	74.5	104.2	101.5	32.0	**12.5**	6.5	4.0

Source: Commonwealth, March 23, 2004.
Notes:
[a] Distance from center of ROW. Data closest to the edge of the ROW are shown in **boldface**.

Table D.9-11. Comparison of Magnetic Fields, City of Santee Alternatives

	Magnetic Field (mG), at distance from ROW Centerline (ft)										
City of Santee Alternatives	**South 250**	**South 200**	**South 150**	**South 100**	**South 50**	**0**	**North 50**	**North 100**	**North 150**	**North 200**	**North 250**
Proposed Project (along ROW, Segment E3)	4.3	7.2	14.6	**39.8**	90.7	100.0	114.9	**33.3**	12.2	6.2	3.7
City of Santee Underground											
(along ROW without 138/69 kV)	3.4	5.5	10.6	**26.4**	93.4	95.4	116.7	**32.8**	11.6	5.8	3.5
(in Princess Joann Road)	0.0	0.1	0.1	0.2	**0.8**	35.8	**0.9**	0.2	0.1	0.1	0.0
City of Santee Northern ROW (along existing ROW)	3.4	5.1	8.7	**18.0**	42.0	42.1	87.8	**73.1**	24.3	10.9	6.1

Source: Commonwealth, March 23, 2004.
Notes:
[a] Distance from center of ROW. Data closest to the edge of the ROW are shown in **boldface**.

Summary Regarding EMF

After several decades of study regarding potential public health risks from exposure to power line EMF, research results remain inconclusive. Several national and international panels have conducted reviews of data from multiple studies and state that there is not sufficient evidence to conclude that EMF causes cancer. Most recently, the International Agency for Research on Cancer (IARC) and the California Department of Health Services (DHS) both classified EMF as a *possible* carcinogen. The information included in the preceding sections identifies existing EMF exposures within the community, which are widespread and cover a very broad range of field intensities and duration, and specific information on the EMF levels estimated for the Proposed Project are provided. Presently there are no applicable regulations related to EMF levels from power lines; however, the California Public Utilities Commission has implemented a decision requiring utilities to incorporate "low-cost" or "no-cost" measures for managing EMF from power lines. SDG&E's Miguel-Mission 230 kV #2 Project does incorporate low-cost and no-cost measures as mitigation for magnetic fields. The Proposed Project would introduce low-reactance configurations that enhance field cancellation for existing transmission lines of the ROW. These changes generally compensate for the additional magnetic field introduced by the new 230 kV circuit such that EMFs are overall reduced with implementation of the Proposed Project. The preceding information and other potential additional mitigation measures are provided for the benefit of the public and decisionmakers in reviewing the Proposed Project.

D.9.7 Environmental Impacts and Mitigation Measures – Non-EMF Electric Power Field Issues

This section focuses on the following environmental impacts from the proposed Miguel-Mission 230 kV #2 Project: corona; induced current; electronic equipment interference; wind, fire, and earthquake hazards; and effects on cardiac pacemakers. Impacts related to audible noise from corona are discussed in Section D.8.3.3.

D.9.7.1 Definition and Use of Significance Criteria

Radio/Television/Electronic Equipment Interference

There are no local, State, or federal regulations with specific limits on high frequency emissions from electric power facilities. Federal Communication Commission (FCC) regulations do not put limits on incidental radio frequency emissions (interference) from transmission lines, but harmful interference may be reported to the FCC Compliance and Information Bureau (FCC, 2004, p. 12).

Induced Currents and Shock Hazards

The National Electrical Safety Code (NESC) specifies that transmission lines be designed to limit short circuit current from vehicles or large objects near the line to no more than 5 milliampere (mA) (IEEE and ANSI, 2002). CPUC General Order 95 and the NESC also address shock hazards to the public by providing guidelines on minimum clearances to be maintained for practical safeguarding of persons during the installation, operation, or maintenance of overhead transmission lines and their associated equipment.

Cardiac Pacemakers

It has been reported that synchronous pacemakers can be affected by electric fields between 2 kV/m and 9 kV/m (EPRI, 1985; 1979). As described above, when a synchronous pacemaker is in a field in this range, a few older model pacemakers may revert to an asynchronous mode.

Wind, Earthquake, and Fire Hazards

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 National Electrical Safety Code include loading requirements related to wind conditions.

D.9.7.2 Environmental Impacts and Mitigation Measures for the Proposed Transmission Line

Impact PS-1: Radio and Television Interference

SDG&E (2002a, Table 6-12) provided calculated levels for electronic noise in the AM radio band (at 1 MHz) and low-VHF television band (at 75 MHz) for the edge of the ROW on six selected segments of the route under rain and fair weather conditions. The calculations show an impact on AM broadcast signals. The L_{50} values for radio noise during rain ranged from 38.8 to 62.6 $dB_{\mu V/m}$. During fair weather AM calculated radio interference ranged from 21.8 to 45.6 $dB_{\mu V/m}$. AM radio reception could be degraded at the edge of the right-of-way during both fair and rain conditions. Effects on low-VHF band television reception during rain would be impacted to a lesser degree. Mitigation Measures PS-1a and PS-1b are recommended to reduce the potential impacts of interference (Class II).

Mitigation Measures for Impact PS-1, Radio and Television Interference

PS-1a Limit conductor surface potential. SDG&E shall, prior to construction, specify and implement designs that limit the conductor surface electric gradient in accordance with the IEEE Radio Noise Design Guide.

PS-1b Document complaints of broadcast interference. After energizing the transmission line, SDG&E shall respond to and document all radio/television/equipment interference complaints received and document the responsive action taken. These records shall be made available to the CPUC for review upon request. All unresolved disputes shall be referred by SDG&E to the CPUC for resolution.

Impact PS-2: Induced Currents and Shock Hazards in Joint Use Corridors

Based on an estimated maximum electric field strength no greater than 2 kV/m, which would occur only in the ROW, it is unlikely there would be significant impacts from induced currents and shock hazards involving vehicles from operation of the project. However, long conductive objects pose potential hazards that may need mitigation. Mitigation Measure PS-2a is recommended to reduce the potential impacts of induced currents (Class II).

Mitigation Measure for Impact PS-2, Induced Currents and Shock Hazards in Joint Use Corridors

PS-2a **Survey and document potential hazards.** As part of the siting and construction process for the Proposed Project, SDG&E shall identify objects (such as fences, conductors, and pipelines) that have the potential for induced voltages and work with the affected parties to determine proper grounding procedures (CPUC GO 95 and the NESC do not have specific requirements for grounding). SDG&E shall install all necessary grounding measures prior to energizing the line. Thirty days prior to energizing the line, SDG&E shall notify in writing, subject to the review and approval of the CPUC, all property owners within and adjacent to the Proposed 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. SDG&E shall respond to and document all complaints received and document the responsive action taken. These records shall be made available to the CPUC for review upon request. All unresolved disputes shall be referred by SDG&E to the CPUC for resolution.

The written notice shall describe the nature and operation of the line, and the Applicant'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 PS-3: Effects on Cardiac Pacemakers

Based on an estimated maximum electric field strength no greater than 2 kV/m, which would occur only in the ROW, and maximum magnetic field strength of less than 1,000 mG, and the fail-safe nature of designs for the more sensitivity synchronous type of pacemaker, there would be no significant impact for operation of the project. However, persons with synchronous mode pacemakers who are at a ROW location with an electric field of about 2 kV/m might experience reversion to asynchronous mode. Under these circumstances, the interference would be of short duration and is not considered significant or harmful (Class III). No mitigation measures are required or recommended.

Impact PS-4: Wind, Earthquake, and Fire Hazards

Based on the conservative nature of specifications and construction of transmission line towers, poles, and associated hardware, the project poses no significant impact for hazards precipitated by high winds, earthquake, or fires initiated by arcing of downed conductors.

Substations have similar equipment and also transformers, capacitors, reactors, switches, buses, and circuit breakers that are located in a locked, fenced enclosure. Substation equipment for the project poses no significant impact for the above hazards.

SDG&E is required to design the transmission line in accordance with safety requirements of the CPUC's GO 95 and other applicable requirements, so safety impacts from these causes would be less than significant (Class III).

D.9.7.3 Environmental Impacts and Mitigation Measures for Alternatives

As described above, EMF is not evaluated as an environmental impact under CEQA, so an analysis of alternatives is not presented for that issue. For the other field-related concerns (radio and television interference, induced currents and shock hazards, effects on cardiac pacemakers, and other hazards), the impacts and mitigation measures presented in Section D.9.7.2 would apply equally to all alternatives.

D.9.7.4 Environmental Impacts of the No Project Alternative

The No Project Alternative would involve upgrades to various existing SDG&E facilities and the potential construction of new generation within the San Diego area. Impacts related to induced current, cardiac pacemakers, electronic interference, and other hazards could also result from components of the No Project Alternative scenario. The impacts would be similar to those of the Proposed Project, but the location and magnitude would vary depending on the design of the No Project Alternative components.

D.9.8 Mitigation Monitoring, Compliance, and Reporting Table

Table D.9-12 shows the mitigation monitoring, compliance, and reporting program for Public Health and Safety.

Table D.9-12. Mitigation Monitoring Program – Public Health and Safety

IMPACT HZ-1	**Previously Unknown Soil or Groundwater Contamination Could Be Encountered During Construction (Class II)**
MITIGATION MEASURE	**HZ-1a: Observation of soil for contamination.** During trenching, grading, or excavation work for the Proposed Project, the contractor shall observe the exposed soil for visual evidence of contamination. If visual contamination indicators are observed during construction, the contractor shall stop work until the material is properly characterized and appropriate measures are taken to protect human health and the environment. The contractor shall comply with all local, state, and federal requirements for sampling and testing, and subsequent removal, transport, and disposal of hazardous materials. In the event contaminated groundwater is encountered, the contractor shall comply with all applicable regulations and permit requirements. This may include laboratory testing, treatment of contaminated groundwater, or other disposal options. If contamination is observed, the contractor shall document the exact location of the contamination and shall immediately notify the CPUC's Environmental Monitor, describing proposed actions. A weekly report listing encounters with contaminated soils and describing actions taken shall be submitted to the CPUC.
Location	In all construction areas
Monitoring / Reporting Action	Coordinate with monitoring personnel to confirm appropriate training and understanding of testing equipment, review weekly reports prepared by monitoring personnel.
Effectiveness Criteria	Conduct periodic site visits during construction to confirm that proper procedures are being implemented.
Responsible Agency	CPUC, DTSC, and San Diego County Department Environmental Health
Timing	During construction
IMPACT HZ-2	**Potential Hazardous Substance Spills Could Occur During Construction (Class II)**
MITIGATION MEASURE	**HZ-2a: Review of training and response plan.** The Environmental Training, and Hazardous Substance Control and Emergency Response Plan required by PP-7 and PP-32 shall be reviewed and approved by the CPUC and San Diego County Department of Environmental Health, Hazardous Materials Division.
Location	Along the entire alignment and in staging areas
Monitoring / Reporting Action	Plan to be submitted to CPUC and San Diego County Department Environmental Health.
Effectiveness Criteria	Plans approved
Responsible Agency	CPUC and San Diego County Department Environmental Health
Timing	Prior to construction
IMPACT HZ-3	**Release of Hazardous Materials Could Occur During Substation Operations (Class II)**
MITIGATION MEASURE	**HZ-3a: Preparation of plans.** SDG&E shall prepare or update current Spill Prevention, Control, and Countermeasures plans for each substation as appropriate, as outlined in Title 40 of the Code of Federal Regulations, Part 112. SDG&E shall also update, as needed, and submit a revised Hazardous Materials Business Plan in accordance with Chapter 6.95 of the California Health and Safety Code and Title 22, California Code of Regulations. The plan and forms shall be submitted to the appropriate Certified Unified Protection Agency (CUPA). The substations shall be operated in compliance with all applicable federal, State, and local regulations.
Location	At substations
Monitoring / Reporting Action	Review plans and verify plans submittal to agency

Table D.9-12. Mitigation Monitoring Program – Public Health and Safety

Effectiveness Criteria	Plans prepared and submitted
Responsible Agency	CPUC
Timing	Prior to operation of new transmission line and substations
MITIGATION MEASURE	**HZ-3b: Documentation of compliance.** SDG&E shall implement PP-7 and PP-33 at the substations, and shall document compliance by (a) submitting to the CPUC an outline of the proposed Environmental Training Program, and (b) providing a list of names of all operations personnel who have completed the training program.
Location	At substations
Monitoring / Reporting Action	Review documentation provided; verify training of all construction personnel
Effectiveness Criteria	Personnel are trained and appropriately respond to accidents or discoveries of hazardous materials
Responsible Agency	CPUC, DTSC, and San Diego County Department of Environmental Health
Timing	Prior to construction
IMPACT PS-1	**Radio and Television Interference (Class II)**
MITIGATION MEASURE	**PS-1a: Limit conductor surface potential.** SDG&E shall, prior to construction, specify and implement designs that limit the conductor surface electric gradient in accordance with the IEEE Radio Noise Design Guide.
Location	Entire ROW
Monitoring / Reporting Action	CPUC to review design.
Effectiveness Criteria	Design limits noise and interference with electrical equipment.
Responsible Agency	CPUC
Timing	Prior to construction.
MITIGATION MEASURE	**PS-1b: Document complaints of broadcast interference** . After energizing the transmission line, SDG&E shall respond to and document all radio/television/equipment interference complaints received and document the responsive action taken. These records shall be made available to the CPUC for review upon request. All unresolved disputes shall be referred by SDG&E to the CPUC for resolution.
Location	Entire ROW
Monitoring / Reporting Action	CPUC to review records
Effectiveness Criteria	Complaint resolution eliminates interference problems
Responsible Agency	CPUC
Timing	Prior to construction
IMPACT PS-2	**Induced Currents and Shock Hazards in Joint Use Corridors (Class II)**
MITIGATION MEASURE	**PS-2a: Survey and document potential hazards.** As part of the siting and construction process for the Proposed Project, SDG&E shall identify objects (such as fences, conductors, and pipelines) that have the potential for induced voltages and work with the affected parties to determine proper grounding procedures (CPUC GO 95 and the NESC do not have specific requirements for grounding). SDG&E shall install all necessary grounding measures prior to energizing the line. Thirty days prior to energizing the line, SDG&E shall notify in writing, subject to the review and approval of the CPUC, all property owners within and adjacent to the Proposed 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. SDG&E shall respond to and document all complaints received and document the responsive action taken. These records shall be made available to the CPUC for review upon request. All unresolved disputes shall be deferred by SDG&E to the CPUC for resolution. The written notice shall describe the nature and operation of the line, and the Applicant'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.

Table D.9-12. Mitigation Monitoring Program – Public Health and Safety

Location	Entire ROW.
Monitoring / Reporting Action	Review notification.
Effectiveness Criteria	Notification allows negotiation to eliminate potential problems during operation
Responsible Agency	CPUC
Timing	Prior to construction.

D.9.9 References

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