Michael Brandman Associates

Fresno
559.497.0310

Irvine
714.508.4100

Palm Springs
760.322.8847

Sacramento
916.447.1100

San Bernardino
909.884.2255

San Ramon
925.830.2733

May 20, 2010

City of Riverside
Attention: David P. Hernandez, Senior Electrical Engineer
Public Utilities Department
3787 University Drive
Riverside, CA 92501

Subject: **Air Quality and Climate Change Assessment for the City of Riverside Public Utilities Department Casa Blanca Power Project**

Dear Mr. Hernandez:

This letter report contains an air quality and climate change assessment for the City of Riverside Public Utilities Department Casa Blanca Power Project ("Proposed Project") pursuant to the California Environmental Quality Act. The results of this impact analysis conclude that the construction and operation of the Proposed Project would not result in a significant air quality, health risk, or climate change impact.

Proposed Project Location

The Proposed Project site is located in the City of Riverside at the existing City of Riverside Public Utilities Casa Blanca Substation. The Proposed Project is located between residential and commercial buildings on the south side of Evans Avenue and the Santa Fe railroad track right-of-way on the north side of the Project parcels at approximately 886 feet above sea level. Access to the site is located on Evans Avenue. For regulatory purposes, the Proposed Project would come under the jurisdiction of the rules and regulations of the South Coast Air Quality Management District (SCAQMD).

Proposed Project Description

The City of Riverside Public Utilities (RPU) proposes to build a new electrical substation on approximately 0.84 acres within three adjoining parcels consisting of an existing substation (APN 230-245-002) and two commercial buildings (APN 230-245-001, and 003). The existing electrical facility was built in the early 1950's and consists of a step-down transmission substation where voltage is brought in from subtransmission lines at a strength of 33,000 volts (33 kV) and processed so as to reduce the voltage to 4 kV. The resultant voltage is then transmitted onto outgoing power lines for distribution to residential and commercial users.

The Proposed Project will result in an improvement of electrical service that will include extension of 69kV subtransmission lines into the new facility, new 12 kV distribution feeder lines, improvement of critical load relief, and add to the existing backup reliability. Parcels located southwest of the existing substation (APN 230-245-003) and northeast (APN 230-245-001) are planned to be acquired so as to allow for future improvements and increased capacity.

The new substation will consist of the following build components. Construction will occur in phases as the station is reconfigured and rebuilt to planned capacity:

- Revision of existing property lines to a new configuration and construction of block walls, security fences, driveways, sidewalks and curb and gutter.

- 69kV pole bringing incoming power from corner poles on Evans Street.
- A new substation framework for incoming 69 kV power, including subtransmission line terminating structures with lightening arrestors, and line switches, low profile bus with support structures, and gas circuit breakers with air-break disconnect switches.
- New 69 kV to 12 kV oil-filled transformers with oil containment.
- New 12 kV switchgear enclosures for outgoing 12 kV power including indoor switchgear with air-break switches and vacuum circuit breakers.
- Capacitor banks in the southwest corner of the property. A new control building in the northeast corner of the property.
- Build components of the Proposed Project also include off-parcel elements, which are found on exhibits attached to the RFP (No. 1167) for the project including:
- New steel poles installed across Evans Avenue from the new substation. New overhead conductors will be strung from the new poles to the new substation.
- Installation of 5,500 feet of new overhead conductor on existing poles between the new substation and a junction near the corner of Washington Street and Victoria Avenue.
- Installation of 1,200 feet of new overhead conductor on existing poles between the new substation and a point along Evans Avenue just beyond Grace Street.
- Several thousand feet of (underground) conduit duct banks will be installed in previously disturbed existing street right of way extending from the new substation to various points in the neighborhood.
- 150 feet of trench for underground conduits will be excavated in the street right-of-way a few dozen feet southwest of the corner of Madison and Evans.
- The new substation will accept 69kV power from incoming subtransmission lines, then the facility will step the voltage down to 12.47kV. Once stepped-down, the power will be sent onto outgoing distribution lines. The new substation will typically require construction of new framework for incoming lines and substation equipment. The voltage is then sent overhead to step-down power transformers and voltage regulators. The regulated voltage is then sent to a series of switchgears and onto an overhead distribution bus. From there, the voltage is sent to outgoing distribution lines.

Some undergrounding and/or vaults will be required during construction of the new station. These vaults shall be located outside the fenced area. It is not anticipated that excavations associated with the project will exceed 10 feet in depth in any area.

Sensitive Receptors

Sensitive receptors are those individuals who are sensitive to air pollution and include children, the elderly, and persons with preexisting respiratory or cardiovascular illness. For purposes of CEQA, the SCAQMD considers a sensitive receptor to be a location where a sensitive individual could remain for 24 hours, such as residences, hospitals, or convalescent facilities. Commercial and industrial facilities are not included in the definition because employees do not typically remain onsite for 24 hours. However, when assessing the impact of pollutants with 1-hour or 8-hour standards (such as nitrogen dioxide and carbon monoxide), commercial and/or industrial facilities would be considered worker receptors for those purposes.

The closest sensitive receptors consist of numerous residences located immediately to the east and south across Evans Street and Clay Street, and to the southwest of the Proposed Project along its southwestern border.

Background Air Quality Information

Air pollutants are regulated at the national, State, and air basin level; each agency has a different level of regulatory responsibility. The United States Environmental Protection Agency (EPA) regulates at the national level. The California Air Resources Board (ARB) regulates at the State level. The SCAQMD regulates at the air basin level.

The EPA handles global, international, national, and interstate air pollution issues and policies. The EPA sets national vehicle and stationary source emission standards, oversees approval of all State Implementation Plans, provides research and guidance for air pollution programs, and sets National Ambient Air Quality Standards, also known as federal standards. There are national standards for six common air pollutants, called criteria air pollutants, which were identified from provisions of the Clean Air Act of 1970. The national standards were set to protect public health, including that of sensitive individuals; thus, the standards continue to change as more medical research is available regarding the health effects of the criteria pollutants. Primary national standards are the levels of air quality necessary, with an adequate margin of safety, to protect the public health (ARB 2008a).

A State Implementation Plan is a document prepared by each State describing existing air quality conditions and measures that will be followed to attain and maintain National standards. The State Implementation Plan for the State of California is administered by the ARB, which has overall responsibility for statewide air quality maintenance and air pollution prevention. The ARB also administers California Ambient Air Quality Standards for the 10 air pollutants designated in the California Clean Air Act.

The national and State ambient air quality standards, the most relevant effects, the properties, and sources of the pollutants are summarized in Table 1.

Several pollutants listed in Table 1 are not addressed in this analysis. Analysis of lead is not included in this report because the Proposed Project is not anticipated to emit lead. Visibility-reducing particles are not explicitly addressed in this analysis because they are addressed under particulate matter. The Proposed Project is not expected to generate or be exposed to vinyl chloride because Proposed Project uses do not utilize the chemical processes that create this pollutant and there are no such uses in the vicinity. The Proposed Project is not expected to cause exposure to hydrogen sulfide because it would not generate hydrogen sulfide in any substantial quantity. There is no generation of hydrogen sulfide usage in the vicinity.

The EPA and the ARB designate air basins where ambient air quality standards are exceeded as “nonattainment” areas. If standards are met, the area is designated as an “attainment” area. If there is inadequate or inconclusive data to make a definitive attainment designation, they are considered “unclassified.” National nonattainment areas are further designated as marginal, moderate, serious, severe, or extreme as a function of deviation from standards. The Proposed Project is within the South Coast Air Basin (basin), which is designated as nonattainment for the State and national ozone, PM_{10}, and $PM_{2.5}$, standards (ARB 2007a and EPA 2009a).

The SCAQMD is responsible for controlling emissions primarily from stationary sources within the South Coast Air Basin where the Proposed Project would be located. The SCAQMD maintains air quality monitoring stations throughout the basin. The SCAQMD, in coordination with the Southern California Association of Governments, is also responsible for developing, updating, and implementing the Air Quality

Management Plan (AQMP) for the basin. An AQMP is a plan prepared and implemented by an air pollution district for a county or region designated as nonattainment of the national and/or California ambient air quality standards. The term "nonattainment area" is used to refer to an air basin where one or more ambient air quality standards are exceeded. The AQMP serves as a component for the State SIP.

The 2003 AQMP was adopted to lead the basin and portions of the Salton Sea Air Basin under SCAQMD jurisdiction into compliance with the 1-hour ozone and PM_{10} national standards (SCAQMD 2003). The 2007 AQMP was adopted to lead the basin into compliance of the national 8-hour ozone and $PM_{2.5}$ standards (SCAQMD 2007).

The 2003 AQMP also replaced the 1997 attainment demonstration for the national CO standard and provided a basis for a maintenance plan for CO for the future, and updated the maintenance plan for the national nitrogen dioxide standard that the South Coast Air Basin has met since 1992.

Rules and Regulations

The AQMP establishes a program of rules and regulations administered by SCAQMD to attain the State and national air quality standards. The rules and regulations that apply to the Proposed Project include, but are not limited to, the following:

SCAQMD Rule 402 prohibits a person from discharging from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.

SCAQMD Rule 403 governs emissions of fugitive dust during construction and operation activities. Compliance with this rule is achieved through application of standard Best Management Practices, such as application of water or chemical stabilizers to disturbed soils, covering haul vehicles, restricting vehicle speeds on unpaved roads to 15 miles per hour, sweeping loose dirt from paved site access roadways, cessation of construction activity when winds exceed 25 mph, and establishing a permanent ground cover on finished sites.

ARB Regulatory Measure concerning emission reductions of Sulfur hexafluoride from the electricity sector and particle accelerators. This regulation, adopted by the ARB at their February 2010 Board meeting, specifies an initial maximum emission rate of 10 percent of nameplate capacity of sulfur hexafluoride for owners of gas insulated electrical switchgear and a reduction of sulfur hexafluoride emission rates by 1 percent per year over the following 9-year time period beginning in 2011 and ending in 2020.

Table 1: Air Pollutants

Air Pollutant	Averaging Time	California Standard	National Standard [a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
Ozone	1 Hour	0.09 ppm	—	(a) Decrease of pulmonary function and localized lung edema in humans and animals; (b) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (c) Increased mortality risk; (d) Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (e) Vegetation damage; (f) Property damage.	Ozone is a photochemical pollutant as it is not emitted directly into the atmosphere, but is formed by a complex series of chemical reactions between volatile organic compounds (VOC), NO_x, and sunlight. Ozone is a regional pollutant that is generated over a large area and is transported and spread by the wind.	Ozone is a secondary pollutant; thus, it is not emitted directly into the lower level of the atmosphere. The primary sources of ozone precursors (VOC and NO_x) are mobile sources (on-road and off-road vehicle exhaust).
	8 Hour	0.070 ppm	0.075 ppm			
Carbon Monoxide (CO)	1 Hour	20 ppm	35 ppm	(a) Aggravation of angina pectoris (chest pain) and other aspects of coronary heart disease; (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; (d) Possible increased risk to fetuses.	CO is a colorless, odorless, toxic gas. CO is somewhat soluble in water; therefore, rainfall and fog can suppress CO conditions. CO enters the body through the lungs, dissolves in the blood, replaces oxygen as an attachment to hemoglobin, and reduces available oxygen in the blood.	CO is produced by incomplete combustion of carbon-containing fuels (e.g., gasoline, diesel fuel, and biomass). Sources include motor vehicle exhaust, industrial processes (metals processing and chemical manufacturing), residential wood burning, and natural sources.
	8 Hour	9.0 ppm	9 ppm			
Nitrogen Dioxide (NO_2)	1 Hour	0.18 ppm	0.10 ppm	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; (c) Contribution to atmospheric discoloration.	During combustion of fossil fuels, oxygen reacts with nitrogen to produce nitrogen oxides - NO_x (NO, NO_2, NO_3, N_2O, N_2O_3, N_2O_4, and N_2O_5). NO_x is a precursor to ozone, PM_{10}, and $PM_{2.5}$ formation. NO_x can react with compounds to form nitric acid and related particles.	NO_x is produced in motor vehicle internal combustion engines and fossil fuel-fired electric utility and industrial boilers. Natural sources of NO_x include lightning, soils, wildfires, stratospheric intrusion, and the oceans. Natural sources were 7 percent of 1990 emissions of NO_x in the United States.
	Annual	0.030 ppm	0.053 ppm			

Table 1 (cont.): Air Pollutants

Air Pollutant	Averaging Time	California Standard	National Standard [a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
Sulfur Dioxide (SO_2)	1 Hour	0.25 ppm	—	Bronchoconstriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma. Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient sulfur dioxide levels. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.	Sulfur dioxide is a colorless, pungent gas. At levels greater than 0.5 ppm, the gas has a strong odor, similar to rotten eggs. Sulfur oxides (SO_x) include sulfur dioxide and sulfur trioxide. Sulfuric acid is formed from sulfur dioxide, which can lead to acid deposition and can harm natural resources and materials. Although sulfur dioxide concentrations have been reduced to levels well below State and national standards, further reductions are desirable because sulfur dioxide is a precursor to sulfate and PM_{10}.	Human caused sources include fossil-fuel combustion, mineral ore processing, and chemical manufacturing. Volcanic emissions are a natural source of sulfur dioxide. The gas can also be produced in the air by dimethylsulfide and hydrogen sulfide. Sulfur dioxide is removed from the air by dissolution in water, chemical reactions, and transfer to soils and ice caps. The sulfur dioxide levels in the State are well below the maximum standards.
	3 Hour[1]	—	0.5 ppm			
	24 Hour	0.04 ppm	0.14 ppm			
	Annual	—	0.030 ppm			
Particulate Matter (PM_{10})	24 hour	50 µg/m³	150 µg/m³	(a) Exacerbation of symptoms in sensitive patients with respiratory or cardiovascular disease; (b) Declines in pulmonary function growth in children; (c) Increased risk of premature death from heart or lung diseases in the elderly. Daily fluctuations in $PM_{2.5}$ levels have been related to hospital admissions for acute respiratory conditions, school absences, and increased medication use in children and adults with asthma.	Suspended particulate matter is a mixture of small particles that consist of dry solid fragments, droplets of water, or solid cores with liquid coatings. The particles vary in shape, size, and composition. PM_{10} refers to particulate matter that is 10 microns or less in diameter, (1 micron is one-millionth of a meter). $PM_{2.5}$ refers to particulate matter that is 2.5 microns or less in diameter.	Stationary sources include fuel combustion for electrical utilities, residential space heating, and industrial processes; construction and demolition; metals, minerals, and petrochemicals; wood products processing; mills and elevators used in agriculture; erosion from tilled lands; waste disposal, and recycling. Mobile or transportation-related sources are from vehicle exhaust and road dust.
	Mean	20 µg/m³	—			
Particulate Matter ($PM_{2.5}$)	24 Hour	—	35 µg/m³			
	Annual	12 µg/m³	15.0 µg/m³			

Table 1 (cont.): Air Pollutants

Air Pollutant	Averaging Time	California Standard	National Standard [a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
Sulfates	24 Hour	25 µg/m³	—	(a) Decrease in ventilatory function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; (f) Property damage.	The sulfate ion is a polyatomic anion with the empirical formula SO_4^{2-}. Sulfates occur in combination with metal and/or hydrogen ions. Many sulfates are soluble in water.	Sulfates are particulates formed through the photochemical oxidation of sulfur dioxide. In California, the main source of sulfur compounds is combustion of gasoline and diesel fuel.
Lead [b]	30-day	1.5 µg/m³	—	Lead accumulates in bones, soft tissue, and blood and can affect the kidneys, liver, and nervous system. It can cause impairment of blood formation and nerve conduction. The more serious effects of lead poisoning include behavior disorders, mental retardation, neurological impairment, learning deficiencies, and low IQs. Lead may also contribute to high blood pressure and heart disease.	Lead is a solid heavy metal that can exist in air pollution as an aerosol particle component. An aerosol is a collection of solid, liquid, or mixed-phase particles suspended in the air. Lead was first regulated as an air pollutant in 1976. Leaded gasoline was first marketed in 1923 and was used in motor vehicles until around 1970. Lead concentrations have not exceeded State or national air quality standards at any monitoring station since 1982.	Lead ore crushing, lead-ore smelting, and battery manufacturing are currently the largest sources of lead in the atmosphere in the United States. Other sources include dust from soils contaminated with lead-based paint, solid waste disposal, and crustal physical weathering. Lead can be removed from the atmosphere through deposition to soils, ice caps, oceans, and inhalation.
	Quarter	—	1.5 µg/m³			
	Rolling 3-month average	—	0.15 µg/m³			
Vinyl Chloride [b]	24 Hour	0.01 ppm	—	Short-term exposure to high levels of vinyl chloride in the air causes central nervous system effects, such as dizziness, drowsiness, and headaches. Epidemiological studies of occupationally exposed workers have linked vinyl chloride exposure to development of a rare cancer, liver angiosarcoma, and have suggested a relationship between exposure and lung and brain cancers.	Vinyl chloride, or chloroethene, is a chlorinated hydrocarbon and a colorless gas with a mild, sweet odor. In 1990, ARB identified vinyl chloride as a toxic air contaminant and estimated a cancer unit risk factor.	Most vinyl chloride is used to make polyvinyl chloride plastic and vinyl products, including pipes, wire and cable coatings, and packaging materials. It can be formed when plastics containing these substances are left to decompose in solid waste landfills. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites.

Table 1 (cont.): Air Pollutants

Air Pollutant	Averaging Time	California Standard	National Standard [a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
Hydrogen Sulfide	1 Hour	0.03 ppm	—	High levels of hydrogen sulfide can cause immediate respiratory arrest. It can irritate the eyes and respiratory tract and cause headache, nausea, vomiting, and cough. Long exposure can cause pulmonary edema.	Hydrogen sulfide (H_2S) is a flammable, colorless, poisonous gas that smells like rotten eggs.	Manure, storage tanks, ponds, anaerobic lagoons, and land application sites are the primary sources of hydrogen sulfide. Anthropogenic sources include the combustion of sulfur containing fuels (oil and coal).
Volatile Organic Compounds (VOC)		There are no State or national ambient air quality standards for VOCs because they are not classified as criteria pollutants.		Although health-based standards have not been established for VOCs, health effects can occur from exposures to high concentrations because of interference with oxygen uptake. In general, concentrations of VOCs are suspected to cause eye, nose, and throat irritation; headaches; loss of coordination; nausea; and damage to the liver, the kidneys, and the central nervous system. Many VOCs have been classified as toxic air contaminants.	Reactive organic gases (ROGs), or VOCs, are defined as any compound of carbon—excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate—that participates in atmospheric photochemical reactions. Although there are slight differences in the definition of ROGs and VOCs, the two terms are often used interchangeably.	Indoor sources of VOCs include paints, solvents, aerosol sprays, cleansers, tobacco smoke, etc. Outdoor sources of VOCs are from combustion and fuel evaporation. A reduction in VOC emissions reduces certain chemical reactions that contribute to the formulation of ozone. VOCs are transformed into organic aerosols in the atmosphere, which contribute to higher PM_{10} and lower visibility.
Diesel Particulate Matter (DPM)		There are no ambient air quality standards for DPM.		Some short-term (acute) effects of diesel exhaust exposure include eye, nose, throat, and lung irritation, and can cause coughs, headaches, light-headedness, and nausea. Studies have linked elevated particle levels in the air to increased hospital admissions, emergency room visits, asthma attacks, and premature deaths among those suffering from respiratory problems. Human studies on the carcinogenicity of DPM demonstrate an increased risk of lung cancer, although the	DPM is a source of $PM_{2.5}$—diesel particles are typically 2.5 microns and smaller. Diesel exhaust is a complex mixture of thousands of particles and gases that is produced when an engine burns diesel fuel. Organic compounds account for 80 percent of the total particulate matter mass, which is comprised of compounds such as hydrocarbons and their derivatives, and polycyclic aromatic hydrocarbons (PAHs) and their derivatives. Fifteen PAHs are confirmed carcinogens, a number of which are found in	Diesel exhaust is a major source of ambient particulate matter pollution in urban environments. In 2002 in the South Coast Air Basin, the main sources of diesel particulate matter were due to the combustion of diesel fuel in diesel-powered engines. Such engines can include on-road vehicles like diesel trucks, off-road construction vehicles, diesel electrical generators, and various pieces of stationary construction equipment.

Table 1 (cont.): Air Pollutants

Air Pollutant	Averaging Time	California Standard	National Standard [a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
				increased risk cannot be clearly attributed to diesel exhaust exposure.	diesel exhaust.	

Abbreviations:
ppm = parts per million (concentration) μg/m^3 = micrograms per cubic meter Annual = Annual Arithmetic Mean 30-day = 30-day average
Quarter = Calendar quarter
a) National standard refers to the primary national ambient air quality standard, or the levels of air quality necessary, with an adequate margin of safety to protect the public health. All standards listed are primary standards except for 3 Hour SO_2, which is a secondary standard. A secondary standard is the level of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
b) The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
Source of effects: SCAQMD 2007; OEHAA 2002; ARB 2005; EPA 2007.
Source of standards: ARB 2008a.
Source of properties and sources: EPA 1997; EPA 1998; EPA 1999; EPA 2002; EPA 2003; EPA 2008; EPA 2009b; NTP 2005.

Climate Change Background Information

Climate change is a change in the average weather of the earth that is measured by alterations in wind patterns, storms, precipitation, and temperature. These changes are assessed using historical records of temperature changes occurring in the past, such as during previous ice ages. Many of the concerns regarding climate change use this data to extrapolate a level of statistical significance specifically focusing on temperature records from the last 150 years (the Industrial Age) that differ from previous climate changes in rate and magnitude.

The United Nations Intergovernmental Panel on Climate Change constructed several emission trajectories of greenhouse gases needed to stabilize global temperatures and climate change impacts. The Intergovernmental Panel on Climate Change predicted that global mean temperature change from 1990 to 2100, given six scenarios, could range from 1.1 degrees Celsius (°C) to 6.4°C. Regardless of methodology, global average temperatures and sea levels are expected to rise under all scenarios (IPCC 2007).

In California, climate change may result in consequences such as the following.

- A reduction in the quality and supply of water to the State from the Sierra snowpack. If heat-trapping emissions continue unabated, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. This can lead to challenges in securing adequate water supplies. It can also lead to a potential reduction in hydropower (CCCC 206 and Moser 2009).
- Increased risk of large wildfires. If precipitation increases as temperatures rise, wildfires in the grasslands and chaparral ecosystems of southern California are expected to increase by approximately 30 percent toward the end of the 21st century because more winter rain will stimulate the growth of more plant “fuel” available to burn in the fall.
- Reductions in the quality and quantity of certain agricultural products. The crops and products likely to be adversely affected include wine grapes, fruit, nuts, and milk.
- Exacerbation of air quality problems. If temperatures rise to the medium warming range, there could be 75 to 85 percent more days with weather conducive to ozone formation in Los Angeles and the San Joaquin Valley, relative to today’s conditions. This is more than twice the increase expected if rising temperatures remain in the lower warming range.
- A rise in sea levels resulting in the displacement of coastal businesses and residences. During the past century, sea levels along California’s coast have risen about seven inches. If heat-trapping emissions continue unabated and temperatures rise into the higher warming range, sea level is expected to rise an additional 22 to 35 inches by the end of the century. Elevations of this magnitude would inundate coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats.
- Damage to marine ecosystems and the natural environment.
- An increase in infections, disease, asthma, and other health-related problems.
- A decrease in the health and productivity of California’s forests.

Gases that trap heat in the atmosphere are referred to as greenhouse gases. The effect is analogous to the way a greenhouse retains heat. Common greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxides, chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, ozone, and aerosols. Natural processes and human activities emit greenhouse gases. The presence of greenhouse gases in the atmosphere affects the earth’s temperature. Without the natural heat trapping

effect of greenhouse gas, the earth's surface would be about 34°C cooler (CAT 2006). However, it is believed that emissions from human activities, such as electricity production and vehicle use, have elevated the concentration of these gases in the atmosphere beyond the level of naturally occurring concentrations.

Individual greenhouse gas compounds have varying global warming potential and atmospheric lifetimes. Carbon dioxide, the reference gas for global warming potential, has a global warming potential of one. The calculation of the carbon dioxide equivalent is a consistent methodology for comparing greenhouse gas emissions since it normalizes various greenhouse gas emissions to a consistent metric. Sulfur hexafluoride's global warming potential of 23,900 which indicates that sulfur hexafluoride has a 23,900 times greater warming affect than carbon dioxide on a molecule per molecule basis. A carbon dioxide equivalent is the mass emissions of an individual greenhouse gas multiplied by its global warming potential. Select greenhouse gases and sources are summarized in Table 2.

Table 2: Greenhouse Gases

Greenhouse Gas	Description and Physical Properties	Sources
Nitrous oxide	Nitrous oxide is also known as laughing gas and is a colorless greenhouse gas. It has a lifetime of 114 years. Its global warming potential is 310.	Microbial processes in soil and water, fuel combustion, and industrial processes.
Methane (CH_4)	Methane is a flammable gas and is the main component of natural gas. It has a lifetime of 12 years. Its global warming potential is 21.	Methane is extracted from geological deposits (natural gas fields). Other sources are landfills, fermentation of manure, decay of organic matter, and cattle.
Carbon dioxide (CO_2)	Carbon dioxide is an odorless, colorless, natural greenhouse gas. Carbon dioxide's global warming potential is 1. The concentration in 2005 was 379 parts per million (ppm), which is an increase of about 1.4 ppm per year since 1960. Carbon dioxide from fossil fuels contributed 81% of greenhouse gas emissions in 2004 in California (CEC 2006).	Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources are from burning coal, oil, natural gas, and wood.
Hydro-fluorocarbons (HFCs)	The HFCs with the largest measured atmospheric concentrations are HFC-23 and HFC-134a (10 parts per trillion [ppt]) and HFC-152a (1 ppt). Global warming potentials associated with HFCs are: HFC-23 = 11,700, HFC-134a = 1,300, HFC-152a = 140.	HFCs are synthetic manmade chemicals that are used as a substitute for CFCs in applications such as automobile air conditioners and refrigerants.
Per-fluorocarbons	Perfluorocarbons have stable molecular structures and only break down by ultraviolet rays about 60 kilometers above Earth's surface. Because of this, they have long lifetimes, between 10,000 and 50,000 years. Global warming potentials range from 6,500 to 9,200.	Two main sources of perfluorocarbons are primary aluminum production and semiconductor manufacturing.

Table 2 (cont.): Greenhouse Gases

Greenhouse Gas	Description and Physical Properties	Sources
Sulfur hexafluoride	Sulfur hexafluoride is an inorganic, odorless, colorless, and nontoxic, nonflammable gas. Concentrations in the 1990s were about 4 ppt. It has a lifetime of 3,200 years. It has a high global warming potential, 23,900.	This gas is manmade and used for insulation in electric power transmission equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas.
Notes: Measure of concentrations in atmosphere: ppm = parts per million; ppt = parts per trillion Sources: Compiled from a variety of sources, including EPA 2006 and IPCC 2007.		

Within the past five years, there has been significant legislative and regulatory activity that affects climate change and greenhouse gases in California, a few of which are discussed below.

Executive Order S-3-05. California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S 3-05, the following reduction targets for greenhouse gas emissions:

- By 2010, reduce greenhouse gas emissions to 2000 levels.
- By 2020, reduce greenhouse gas emissions to 1990 levels.
- By 2050, reduce greenhouse gas emissions to 80 percent below 1990 levels (CA 2005).

The 2050 reduction goal represents what scientists believe is necessary to reach levels that will stabilize the climate. The 2020 goal was established to be an aggressive, but achievable, mid-term target. To meet these targets, the Governor directed the Secretary of the California EPA to lead a Climate Action Team made up of representatives from the Business, Transportation, and Housing Agency; the Department of Food and Agriculture; the Resources Agency; the Air Resources Board; the Energy Commission; and the Public Utilities Commission. The Climate Action Team's Report to the Governor in 2006 contains recommendations and strategies to help ensure the targets in Executive Order S-3-05 are met (CAT 2006).

AB 32. In 2006, the California State Legislature enacted AB 32, the California Global Warming Solutions Act of 2006. AB 32 focuses on reducing greenhouse gas emissions in California. Greenhouse gases, as defined under AB 32; it includes carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. AB 32 requires that greenhouse gases emitted in California be reduced to 1990 levels by the year 2020. ARB is the State agency charged with monitoring and regulating sources of emissions of greenhouse gases that cause global warming in order to reduce emissions of greenhouse gases.

The ARB Board approved the 1990 greenhouse gas emissions level of 427 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) on December 6, 2007 (ARB 2007b). Therefore, emissions generated in California in 2020 are required to be equal to or less than 427 $MMTCO_2e$.

Under the current "business as usual" scenario, statewide emissions are increasing at a rate of approximately 1 percent per year as noted below. Also shown are the average reductions needed from all statewide sources (including all existing sources) to reduce greenhouse gas emissions back to 1990 levels.

- 1990: 427 MMTCO2e
- 2004: 480 MMTCO2e (an average 11 percent reduction needed to achieve 1990 base)
- 2008: 495 MMTCO2e (an average 14 percent reduction needed to achieve 1990 base)
- 2020: 596 MMTCO2e "Business As Usual" (an average 28 percent reduction needed to achieve 1990 base)

The ARB Board approved the Climate Change Proposed Scoping Plan in December 2008. The Plan "proposes a comprehensive set of actions designed to reduce overall greenhouse gas emissions in California, improve our environment, reduce our dependence on oil, diversify our energy sources, save energy, create new jobs, and enhance public health" (ARB 2008b). The measures in the Scoping Plan will be in place by 2012.

Executive Order S-13-08. Executive Order S-13-08 indicates that "climate change in California during the next century is expected to shift precipitation patterns, accelerate sea level rise and increase temperatures, thereby posing a serious threat to California's economy, to the health and welfare of its population and to its natural resources." Pursuant to the requirements in the order, in August 2009, the California Natural Resources Agency released its 2009 California Climate Adaptation Strategy Discussion Draft (Draft CAS) for public comment. The Draft CAS is the "…first statewide, multi-sector, region-specific, and information-based climate change adaptation strategy in the United States." The goal of the Draft CAS is to "begin a statewide, ongoing, and committed process of adapting to a changing climate in the context of other changes in the environment, the economy and society." Objectives include analyzing risks of climate change in California, identifying and exploring strategies to adapt to climate change, and specifying a direction for future research.

Office of the California Attorney General. The Office of the California Attorney General has published recommended mitigation measures for use in CEQA (AG 2008).

On January 8, 2008, the **California Air Pollution Control Officers Association** (CAPCOA) released a paper to provide a common platform of information and tools for public agencies. The disclaimer states that it is not a guidance document but a resource to enable local decision makers to make the best decisions they can in the face of incomplete information during a period of change. The paper indicates that it is an interim resource and does not endorse any particular approach. It discusses three groups of potential thresholds, including a no significance threshold, a threshold of zero, and non-zero thresholds (CAPCOA 2008). Non-zero quantitative thresholds identified in the paper range from 900 to 50,000 metric tons per year. The CAPCOA paper also identified non-zero qualitative thresholds.

The **Governor's Office of Planning and Research** published a Technical Advisory, which offers interim guidance regarding the steps Lead Agencies can take to address climate change in their CEQA documents prior to the amendments of the CEQA Guidelines (OPR 2008). The paper indicates that each public agency needs to develop its own approach for climate change analyses. The recommended steps for the analysis include the following: identify and quantify greenhouse gas emissions; assess the significance of impact; and if the impact is significant, identify alternatives and/or mitigation measures to reduce the impacts. The advisory does not specify thresholds or approaches for the analysis.

The OPR also transmitted proposed SB 97 CEQA Guidelines Amendments to the Natural Resources Agency on April 13, 2009 (OPR 2009). On July 3, 2009, the Natural Resources Agency commenced the Administrative Procedure Act rulemaking process for certifying and adopting these amendments pursuant to Public Resources Code section 21083.05.

Identification of Significance Thresholds

CEQA Guidelines define a significant effect on the environment as "a substantial, or potentially substantial, adverse change in the environment." To determine if a project would have a significant impact on air quality, the type, level, and impact of emissions generated by the project must be evaluated as discussed below.

The following significance thresholds are contained in Appendix G of the CEQA Guidelines and are applicable to the Proposed Project. A significant air quality impact would occur if a project would:

a) Conflict with or obstruct implementation of the applicable air quality plan;

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation;

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable national or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);

d) Expose sensitive receptors to substantial pollutant concentrations; or

e) Create objectionable odors affecting a substantial number of people.

To assist in the evaluation of the above CEQA thresholds, the SCAQMD had adopted its own set of significance thresholds that it recommends to lead agencies in assessing the regulatory significance of air quality impacts from a project. For purposes of this assessment, the following SCAQMD significance thresholds were used.

- Regional Emission Significance Thresholds - regional emission thresholds are designed to limit the impacts that emissions from a proposed project would have in affecting the ability of the South Coast Air Basin to attain or maintain air quality standards. Such emissions may affect the attainment of air quality standards many miles from a proposed project location. Regional emission thresholds are defined separately for construction and operational activities.
- Localized Significance Thresholds - Local significance thresholds were developed in response to the SCAQMD Governing Board's environmental justice initiatives (EJ initiative I-4) in recognition of the fact that criteria pollutants such as CO, NO_x, and PM_{10} and $PM_{2.5}$ in particular, can have local impacts as well as regional impacts. Local significance thresholds are defined separately for short-term construction activities and long-term operations.
- Health Risk Significance Thresholds – health risk significance thresholds are defined to protect the public from excessive levels of toxic air contaminants that can cause both long-term and short-term health impacts.

The County of Riverside, City of Riverside, and the SCAQMD have not adopted a plan, policy, significance threshold, or regulation for reducing greenhouse gas emissions. In 2006, the California State Legislature enacted AB 32, the California Global Warming Solutions Act of 2006. AB 32 focuses on reducing greenhouse gas emissions in California. Greenhouse gases, as defined under AB 32, include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. AB 32 requires that greenhouse gases emitted in California be reduced to 1990 levels by the year 2020. Therefore, project consistency with the adopted Scoping Plan will be used to determine whether the proposed project generates greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

As a result, the significance thresholds used in this analysis are as follows:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

b) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?

Impact Analysis

Regional Emissions Significance Impact Analysis

Short-term Regional Construction Impacts

Construction emissions occur during all facets of the construction activities involving demolition, grading, paving, and substation infrastructure construction. Such emissions would come from construction equipment combustion exhaust, fugitive dust from the demolition of the existing public works building, grading and earth-moving activities, paving, and emissions from vehicles driven to and from the site by construction workers and delivery vehicles. Construction emissions consist of VOCs, NO_x, CO, oxides of sulfur (SO_x), PM_{10}, and $PM_{2.5}$.

An assessment of short-term construction regional air pollutant emissions was conducted using an inventory of construction equipment typical of the type of construction contemplated for the Proposed Project. The actual construction equipment inventory was not available to incorporate directly into the analysis. The rates of pollutant emissions from the construction activities were derived from information provided by the SCAQMD (SCAQMD 2010).

The Proposed Project would cover a total area of approximately 0.84 acres including the existing substation site and the two parcels to the southwest and northeast of the existing substation. In estimating construction emissions, the following construction activities were included:

- Demolition
  - Demolition of the existing concrete surface on the southwest parcel;
  - Demolition of all existing structures on all three parcels; and
  - Haul away of all demolition debris to an offsite disposal area.
- Grading
  - Grading of all three parcels.
- Trenching
  - Installation of off-parcel underground conduit duct banks in the existing street right of way extending from the new substation to various points in the neighborhood (approximately 3,500 linear feet): and
  - Asphalt resurfacing of the disturbed street right of way.
- Infrastructure construction
  - Delivery of construction materials: and
  - Construction of the substation infrastructure.
- Aggregate Paving
  - Delivery of paving materials: and
  - Paving of the entire area of the three parcels.

From information provided by the applicant, it was assumed that construction of the Proposed Project would commence during August of 2011 with substation energizing to commence during May 2012. Construction was assumed to occur over an 8-hour day during the construction period.

Table 3 presents the estimated maximum daily regional construction emissions for the Proposed Project and compares the estimated emissions with the daily mass regional emission significance thresholds for construction established by the SCAQMD (SCAQMD 2009).

Table 3: Estimated Maximum Daily Regional Construction Emissions

Construction Activity	Emissions (pounds per day)[1]					
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Demolition						
Construction Equipment Exhaust	3.6	26.5	13.1	0.0	1.5	1.4
Fugitive Dust	0.0	0.0	0.0	0,0	1.0	0.2
Worker Vehicle Exhaust	0.1	0.1	0.8	0.0	0.0	0.0
Debris Haul Truck Exhaust	0.6	7.8	2.5	0.0	0.4	0.3
Paved Road Dust	0.0	0.0	0.0	0.0	5.7	1.2
Total	4.3	34.4	16.5	0.0	8.6	3.1
Grading						
Construction Equipment Exhaust	2.5	20.1	9.5	0.0	1.1	1.0
Fugitive Dust	0.0	0.0	0.0	0.0	2.7	0.6
Worker Vehicle Exhaust	0.1	0.1	0.7	0.0	0.0	0.0
Total	2.6	20.2	10.1	0.0	3.8	1.6
Trenching/Underground Utilities						
Conduit Excavation Equipment Exhaust	6.3	41.5	23.3	0.0	2.9	2.6
Worker Vehicle Exhaust	0.1	0.1	1.2	0.0	0.0	0.0
Excavation Haul Truck Emissions	0.4	5.4	1.7	0.0	0.3	0.2
Truck Paved Road Dust	0.0	0.0	0.0	0.0	8.1	1.7
Asphalt Delivery Truck Emissions	0.2	2.7	0.9	0.0	0.1	0.1
Fugitive Asphalt VOC Emissions	0.1	0.0	0.0	0.0	0.0	0.0
Total	7.1	49.7	27.1	0.0	11.4	4.6
Infrastructure Construction						
Construction Equipment Exhaust	4.8	31.3	17.1	0.0	2.1	1.9
Worker Vehicle Exhaust	0.1	0.1	1.4	0.0	0.0	0.0
Vendor Vehicle Exhaust	0.2	2.8	0.9	0.0	0.1	0.1
Paved Road Dust	0.0	0.0	0.0	0.0	2.0	0.4
Total	5.2	34.2	19.4	0.0	4.2	2.5
Aggregate Paving						
Construction Equipment Exhaust	3.7	29.6	13.7	0.0	1.6	1.5
Worker Vehicle Exhaust	0.1	0.1	0.8	0.0	0.0	0.0
Vendor Vehicle Exhaust	1.8	22.3	7.2	0.0	1.1	0.9
Paved Road Dust	0.0	0.0	0.0	0.0	15.5	3.3
Total	5.6	52.0	21.7	0.0	18.2	5.7
Max emissions in 1 day	**7.1**	**52.0**	**27.1**	**0.0**	**18.2**	**5.7**
Regional Threshold	75	100	550	150	150	55
Significant Impact?	No	No	No	No	No	No

Note:
[1] Emissions shown assume compliance with applicable emission regulations including SCAQMD Rule 403.
Source: see attached construction emission spreadsheet.

Note that the particulate matter emission estimates shown in Table 3 incorporate reductions in fugitive dust particulate matter emissions as required by SCAQMD Rule 403's best available control measures. These control measures include watering the all disturbed areas and unpaved roads twice per day and minimizing dust emissions while loading and unloading debris and soil,

As shown in Table 3, construction-related emissions generated by the Proposed Project would not exceed the SCAQMD regional thresholds of significance. Therefore, the impact would be less than significant and no project-specific mitigation is required.

Long-Term Regional Operational Impacts

Long-term operational emissions occur once the Proposed Project commences full operations. Such emissions would come from area sources including gasoline-powered landscaping and maintenance equipment and from mobile sources (e.g., vehicle trips by Public Utilities employees). The Proposed Project represents an improvement of the existing substation to provide critical electrical load relief and greatly enhance back-up reliability. As such, the Proposed Project is not expected to generate any new trips by worker personnel. Negligible amounts of emissions would also be generated from landscape equipment. The maximum daily operational emissions are expected to be less than significant.

Localized Significance Impact Analysis

Short-term Localized Construction Analysis

The analysis of local impacts makes use of the localized significance threshold (LST) methodology developed by the SCAQMD (SCAQMD 2006 and SCAQMD 2008) for assessing the impacts during construction and operation on local air quality. This methodology provides a series of mass emission rate look-up tables that identify the maximum daily emissions from a project that would not cause an exceedance of the most restrictive State or federal ambient air quality standard. The emission estimate depends on the size of the project, its location within the basin, and the distance to the nearest receptor, and applies to emissions of NO_x, CO, and particulate matter (PM_{10} and $PM_{2.5}$).

The localized construction assessment requires an estimate of the construction emissions generated solely from onsite construction activities, that is, emissions from construction equipment and fugitive dust and does not include emissions from offsite delivery or worker vehicles. The localized significance thresholds were derived from the SCAQMD mass rate daily emission tables for a 1 acre construction area in SCAQMD source-receptor area 23 (Metropolitan Riverside County)[1]. The SCAQMD provides mass emission look up tables to identify emission significance thresholds for an area of 1 acre. A receptor distance of approximately 82 feet (25 meters) from the project was also assumed as the distance to the nearest residence which is located adjacent to the southwest parcel of the Proposed Project. Table 4 provides the localized significance threshold analysis results for construction.

[1] The SCAQMD divides the basin into 38 geographical areas called source-receptor areas wherein the meteorology and terrain are relatively consistent and uniform. Source receptor areas are used to identify emission source areas and areas that are impacted by transported pollution in the basin.

Table 4: Construction Localized Assessment

Construction Activity	Maximum Onsite Daily Emissions (pounds per day)			
	NO_x	CO	PM_{10}	$PM_{2.5}$
Demolition				
Construction Equipment Exhaust	26.5	13.1	1.5	1.4
Fugitive Dust	0.0	0.0	1.0	0.2
Total	26.5	13.1	1.6	1.6
Grading				
Construction Equipment Exhaust	20.1	9.5	1.1	1.0
Fugitive Dust	0.0	0.0	2.7	0.6
Total	20.1	9.5	3.8	1.6
Trenching/Underground Utilities				
Conduit Excavation Equipment Exhaust	41.5	23.3	2.9	2.6
Total	41.5	23.3	2.9	2.6
Infrastructure Construction				
Construction Equipment Exhaust	31.3	17.1	2.1	1.9
Total	31.3	17.1	2.1	1.9
Aggregate Paving				
Construction Equipment Exhaust	29.6	13.7	1.6	1.5
Total	29.6	13.7	1.6	1.4
Maximum Daily Emissions	41.5	23.3	3.8	2.6
Localized Significance Threshold(1)	118	602	4	3
Exceeds Threshold?	**No**	**No**	**No**	**No**

Note:
(1) Significance threshold for a 1 acre construction area, in Source Receptor Area 23, and a receptor distance of 25 meters.
Source: see attached construction emission calculation spreadsheet

As shown in Table 4, the construction of the Proposed Project would not exceed any of the SCAQMD localized significance thresholds. Therefore, the impact is less than significant and no mitigation is required.

Long-term Localized Operational Analysis

As noted earlier, the Proposed Project involves the improvement of an existing facility to provide critical electrical load relief and greatly enhance back-up reliability. No new emissions are expected to be generated from onsite operational activities, and therefore, the local operational emissions are less than significant.

Greenhouse Gas Emissions

The primary greenhouse gases that would be released by the construction and operation of the Proposed Project include carbon dioxide, methane, nitrous oxide, and sulfur hexafluoride. The first three greenhouse gases are associated with the operation of the off-road construction equipment and mobile sources such as worker and delivery vehicles. Sulfur hexafluoride is used in the electrical industry as a dielectric medium in high-voltage circuit breakers, switchgear, and other electrical equipment. Information provided by the applicant indicates that the Proposed Project would involve the use of up to six dead tank circuit breakers that contain sulfur hexafluoride. During the normal operation of the circuit breakers, sulfur hexafluoride can be released to the atmosphere by leakage from the seals that contain the gas.

An inventory of greenhouse gas emissions generated by the Proposed Project is presented below. The emissions are converted to metric tons of carbon equivalents ($MTCO_2e$) using the formula: $MTCO_2e$ = (tons of gas) x (global warming potential) x (0.9072 metric tons of gas).

Greenhouse gas emissions from construction were estimated using emission rates developed by the SCAQMD and the type and intensity of construction activities, as discussed previously. Table 5 summarizes the carbon dioxide construction emissions for the Proposed Project. Emissions of nitrous oxide and methane are negligible.

Table 5: Construction Greenhouse Gas Emissions

Construction Activity	Carbon Dioxide Emissions (tons)	Emissions ($MTCO_2e$)
Demolition	7	7
Grading	10	10
Trenching/Underground Utilities	34	31
Infrastructure Construction	291	264
Aggregate Paving	27	26
Total	**369**	**338**

Notes: $MTCO_2e$ = metric tons of carbon dioxide equivalent, converted from tons by multiplying by 0.9072 and the global warming potential of 1.
Source: see attached construction spreadsheet.

Operational or long-term emissions occur over the life of the project. However, since the Proposed Project represents an expansion of an existing facility with no new vehicle trips expected to be generated. The only new greenhouse gas emissions to be generated during operation of the Proposed Project are from the potential leakage of sulfur hexafluoride gas from the operation of the up-to-six circuit breakers. Information provided by the Public Utilities Department (City of Riverside Public Utilities Department 2010) indicates that, depending on the manufacturer of the circuit breakers, the maximum capacity of each breaker is 33 pounds of sulfur hexafluoride gas. The manufacturers of the circuit breakers warrant a gas leak rate of less than 1 percent per year. Assuming that six breakers are in operation at 33 pounds per breaker, the total amount of sulfur hexafluoride in operation is 198 pounds. Assuming further a leak rate of 1 per cent per year, the sulfur hexafluoride leakage rate amounts to 1.98 pounds per year from the operation of the Proposed Project. This amount of sulfur hexafluoride leakage is equivalent to approximately 21 metric tons per year of CO_2e. The SCAQMD recommends amortizing the construction emissions over a 30-year time period. Thus, the total greenhouse gas emissions from both construction and operation are approximately 32 metric tons per year of CO_2e.

The estimated annual construction and operational greenhouse emissions are shown in Table 11.

Table 6: Annual Operational CO2 Emissions

Activity	Carbon Dioxide Emissions (tons)	Emissions ($MTCO_2e$)
Construction(1)	11	11
Operation	24	21

Table 6 (cont.): Annual Operational CO2 Emissions

Activity	Carbon Dioxide Emissions (tons)	Emissions ($MTCO_2e$)
Total	35	32

Notes:
(1) Construction emissions amortized over a 30-year time period following SCAQMD assumptions
$MTCO_2e$ = metric tons of carbon dioxide equivalent, converted from tons by multiplying by 0.9072.
Source: see attached spreadsheets.

It is notable that the Proposed Project would generate substantially fewer emissions than the 25,000 $MTCO_2$ per year required for mandatory reporting to the California Air Resources Board, the 10,000 $MTCO_2$ per year limit under the Assembly Bill 32 cap and trade program, and the 10,000 $MTCO_2$ per year threshold used by SCAQMD for stationary sources where the SCAQMD is the Lead Agency.

Because of the minor nature the Proposed Project, resulting greenhouse gas emissions would be generated at a level that would not significantly contribute to climate change and would not interfere with the goals established in AB32.

Compliance with CEQA Requirements

The analysis of air quality and climate change impacts relies on addressing a number of significance thresholds defined under the CEQA. The following significance threshold checklist questions are contained in Appendix G of the CEQA Guidelines. Each of these questions is addressed below within the context of the estimation of emissions provided earlier.

a) Would the proposed project conflict with or obstruct implementation of the applicable air quality plan?
***Less than Significant Impact*.**

The applicable plan is the 2007 AQMP adopted by the SCAQMD. To address this question, two criteria were used in responding to this checklist question:

1. Do the proposed project's regional construction and operational emissions conform to the SCAQMD's regional emission significance thresholds? and

2. Are the emissions from the proposed project within the emission budgets assumed in the AQMP.

With regard to the first criterion, as shown in Table 3, the construction emissions from the Proposed Project would not exceed any of the SCAQMD's regional construction or operational emission significance thresholds. Therefore, the Proposed Project meets the first criterion. With regard to the second criterion, the AQMP is based in large part on the general plans of the various local planning agencies in defining the type and intensity of land use in estimating future emission budgets. The Proposed Project land use is consistent with the general commercial designation within the City of Riverside General Plan. As a result, the Proposed Project is consistent with the emission budget assumptions contained in the AQMP since it is consistent with the General Plan land use.

b) Would the proposed project violate any air quality standard or contribute substantially to an existing or projected air quality violation?
Less than Significant Impact

Two primary types of significance thresholds have been defined by the SCAQMD that are used to address this impact question: regional emission significance thresholds and localized significance thresholds. These significance thresholds are designed to insure that the air impacts of a proposed project would not cause a new exceedance or contribute to an existing or projected exceedance of an air quality standard either locally or within the South Coast Air Basin. As noted from the results shown in Table 3 and Table 4, the construction of the Proposed Project would not exceed any of the SCAQMD's regional or localized significance thresholds.

c) Would the proposed project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable national or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?
Less than Significant Impact

The CEQA Guidelines indicate that the Proposed Project would create a significant impact if it would "result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)".

The region where the Proposed Project is located is a nonattainment area for PM_{10}, $PM_{2.5}$, and the ozone. The Proposed Project would contribute criteria pollutants to the area during short-term project construction. However, as detailed in response to Checklist Question b) above, these emissions would be less than all SCAQMD regional and localized significance thresholds including emissions of NO_x and VOC which are ozone precursors. Because short- and long- term emissions associated with the Proposed Project would be below SCAQMD thresholds, the Proposed Project's contribution of these pollutants would not be cumulatively considerable and would represent a less than significant impact. In addition because the Proposed Project is consistent with the current land use designated in the City of Riverside General Plan, the Proposed Project is consistent with the SCAQMD's AQMP. Finally, because the project impacts would not exceed any SCAQMD significance threshold, the impacts from the Proposed Project would not result in any cumulative health impacts.

d) Would the proposed project expose sensitive receptors to substantial pollutant concentrations?
Less than Significant Impact

Exposure to sensitive receptors is addressed with two criteria:

1. Compliance with the localized significance thresholds and
2. Exposure to diesel particulate matter exhaust.

With regard to the first criterion, as discussed in response to CEQA Checklist Question b), the results of the localized significance assessment concluded that the construction or operation emissions would not exceed any of the SCAQMD's localized significance thresholds. With regard to the second criterion, the construction of the Proposed Project would result in the temporary release of diesel emissions from the diesel-powered construction equipment and equipment delivery trucks. Diesel particulate matter has been identified by the ARB as a carcinogenic substance. Determination of risk from diesel particulate matter is considered over a 70-year exposure time. Since the construction of the Proposed Project is of a short duration (less than one year), the impact of construction diesel emissions would be less than

significant when considered over a 70-year lifetime exposure. Therefore, the Proposed Project would not expose sensitive receptors to substantial pollutant concentrations.

e) Would the proposed project create objectionable odors affecting a substantial number of people?
Less than Significant Impact

Individual responses to odors are highly variable and can result in a variety of psychological effects (i.e., irritation, anger, or anxiety) to physiological (i.e., circulatory and respiratory effects, nausea, vomiting, and headache). Generally, the impact of an odor results from a variety of interacting factors such as frequency, duration, offensiveness, location, and sensory perception. The frequency is a measure of how often an individual is exposed to an odor in the ambient environment. The intensity refers to an individual's or group's perception of the odor strength or concentration. The duration of an odor refers to the elapsed time over which an odor is experienced. The offensiveness of the odor is the subjective rating of the pleasantness or unpleasantness of an odor. The location accounts for the type of area in which a potentially affected person lives, works or visits; the type of activity they are engaged in, and the sensitivity of the impacted receptor.

The SCAQMD recommends that odor impacts be addressed in a qualitative manner. Such an analysis shall determine whether the project would result in excessive nuisance odors, as defined under the California Code of Regulations and Section 41700 of the California Health and Safety Code, and thus would constitute a public nuisance related to air quality.

Land uses typically considered associated with odors include wastewater treatment facilities, waste-disposal facilities, or agricultural operations. The Proposed Project does not contain land uses typically associated with emitting objectionable odors.

Diesel exhaust and VOCs would be emitted during construction of the project, which are objectionable to some; however, emissions would disperse rapidly from the project site and, therefore, should not reach a level to induce a negative response.

f) Would the proposed project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment or conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?
Less than significant impact.

The County of Riverside, City of Riverside, or the SCAQMD have not developed an applicable plan, policy, or regulations to reduce emissions of greenhouse gases. As noted above in Table 5 and Table 6, the construction and operation of the Proposed Project would generate small amounts of greenhouse gases totaling approximately 32 $MTCO_2e$ per year. Note that the sulfur hexafluoride emissions used during the operation of the circuit breakers are the largest contributor to greenhouse gases from the construction and operation of the Proposed Project. The circuit breakers to be used in the operation of the Proposed Project have been warranted at a sulfur hexafluoride leak rate of 1 percent per year of the name plate capacity. This level is substantially lower than the recently-adopted regulation by the ARB that specifies an initial maximum emission rate of 10 percent of nameplate capacity of sulfur hexafluoride for owners of gas insulated electrical switchgear and a reduction of sulfur hexafluoride emission rates by 1 percent per year over the following 9-year time period beginning in 2011 and ending in 2020 (ARB 2010). Thus, the use of this equipment would substantially reduce emissions of sulfur hexafluoride compared to the allowable rate of emissions, thereby minimizing the Proposed Project's greenhouse gas emissions.

It is notable that the Proposed Project would generate substantially fewer emissions than the 25,000 $MTCO_2$ per year required for mandatory reporting to the California Air Resources Board, the 10,000 $MTCO_2$ per year limit under the Assembly Bill 32 cap and trade program, and the 10,000 $MTCO_2$ per year threshold used by SCAQMD for stationary sources where the SCAQMD is the Lead Agency.

Because of the minor nature the Proposed Project, resulting greenhouse gas emissions would be generated at a level that would not significantly contribute to climate change and would not interfere with the State's ability to meet the goals of AB32.

Prepared by:

Vince Mirabella, Senior Air Quality Scientist
Michael Brandman Associates
621 E. Carnegie Drive, Suite 100
San Bernardino, CA 92408

Enc: Construction and Sulfur Hexafluoride Emission Spreadsheets

356300001

References

AB 32 — State of California. August 31, 2006. Assembly Bill No. 32. Website: www.arb.ca.gov/cc/docs/ab32text.pdf. Accessed April 2010.

AG 2008 — Office of the California Attorney General. The California Environmental Quality Act, Addressing Global Warming Impacts at the Local Agency Level. Updated December 9, 2008. Accessed April 2010. Website: http://ag.ca.gov/globalwarming/pdf/GW_mitigation_measures.pdf

ARB 2005 — California Air Resources Board. Vinyl Chloride. Page updated 2005. www.arb.ca.gov/research/aaqs/caaqs/vc/vc.htm. Accessed in April 2010.

ARB 2007a — California Air Resources Board. Area Designation Maps / State and National. 2006 State Area Designations. Changes became effective July 2007. www.arb.ca.gov/desig/adm/adm.htm. Accessed April 2010.

ARB 2007b — California Air Resources Board. Staff Report. California 1990 Greenhouse Gas Level and 2020 Emissions Limit. November 16, 2007. Accessed April 2010. Website: www.arb.ca.gov/cc/inventory/pubs/reports/staff_report_1990_level.pdf

ARB 2008a — California Air Resources Board. November 17, 2008. Ambient Air Quality Standards. www.arb.ca.gov/research/aaqs/aaqs2.pdf. Accessed April 2010.

ARB 2008b — California Air Resources Board. Climate Change Scoping Plan, a framework for change. December 2008. Accessed April 2010. Website: www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm

ARB 2010 — California Air Resources Board. "ARB Approves Measure to Limit Most Powerful Greenhouse Gas". Accessed in April 2010. http://www.arb.ca.gov/newsrel/2010/nr022510.htm

CA 2005 — State of California, Executive Order S-3-05. June 1, 2005. www.dot.ca.gov/hq/energy/ExecOrderS-3-05.htm. Accessed April 2010.

CAPCOA 2008 — California Air Pollution Control Officers Association. January 2008. CEQA & Climate Change, Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act. www.capcoa.org/. Accessed April 2010.

CAT 2006 — State of California, Environmental Protection Agency, Climate Action Team. March 2006. Climate Action Team Report to Governor Schwarzenegger and the California Legislature. Accessed April 2010. www.climatechange.ca.gov/climate_action_team/reports/index.html

CCCC 2006 — California Climate Change Center. Our Changing Climate, Assessing the Risks to California: A Summary Report from the California Climate Change Center. July 2006. CEC-500-2006-077. Accessed April 2010. Website: www.climatechange.ca.gov/publications/biennial_reports/index.html

City of Riverside 2010 City of Riverside Public Utilities Department. Personal Communication from David Hernandez, Utilities Senior Electrical Engineer. April 22, 2010.

EPA 1997 U.S. Environmental Protection Agency. Office of Air and Radiation. Nitrogen Oxides: Impact on Public Health and the Environment. 1997. www.epa.gov/ttn/oarpg/t1/reports/noxrept.pdf. Accessed in April 2010.

EPA 1998 U.S. Environmental Protection Agency. September 1998. NOx, how nitrogen oxides affect the way we live and breathe. EPA-456/F-98-005. Accessed in April 2010. www.epa.gov/air/urbanair/nox/noxfldr.pdf.

EPA 1999 U.S. Environmental Protection Agency. Ozone and your Health. 1999. EPA-452/F-99-003. www.epa.gov/air/ozonepollution/pdfs/health.pdf Accessed in June 2009.

EPA 2002 U.S. Environmental Protection Agency. Health Assessment Document for Diesel Engine Exhaust. EPA/600/8-90/057F. May 2002. Accessed in April 2010. http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=29060

EPA 2003 U.S. Environmental Protection Agency. September 2003. Particle Pollution and your Health. EPA-452/F-03-001. http://epa.gov/pm/pdfs/pm-color.pdf. Accessed in April 2010.

EPA 2006 U.S. Environmental Protection Agency. Last updated October 19, 2006. High Global Warming Potential Gases. Science. Website: www.epa.gov/highgwp/scientific.html. Accessed April 2010.

EPA 2007 U.S. Environmental Protection Agency, Technology Transfer Network, Air Toxics Website. Last updated November 6, 2007. Health Effects Notebook for Hazardous Air Pollutants. www.epa.gov/ttn/atw/hlthef/hapindex.html. Accessed in April 2010.

EPA 2008 U.S. Environmental Protection Agency. Health and Environmental Impacts of CO. www.epa.gov/air/urbanair/co/hlth1.html. Accessed in April 2010.

EPA 2009a U.S. Environmental Protection Agency. Green Book Nonattainment Areas for Criteria Pollutants. www.epa.gov/air/oaqps/greenbk/. Accessed in April 2010.

EPA 2009b U.S. Environmental Protection Agency. Indoor Air Quality. Sources of Indoor Air Pollution - Organic Gases (Volatile Organic Compounds - VOCs) www.epa.gov/iaq/voc.html. Accessed in April 2010.

IPCC 2007 Intergovernmental Panel on Climate Change. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, Website: http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg1_report_the_physical_science_basis.htm. Accessed April 2010.

Moser et al. 2009 Moser, Susie, Guido Franco, Sarah Pittiglio, Wendy Chou, Dan Cayan. 2009. The Future Is Now: An Update on Climate Change Science Impacts and Response Options

for California. California Energy Commission, PIER Energy-Related Environmental Research Program. CEC-500-2008-071. www.energy.ca.gov/2008publications/CEC-500-2008-071/CEC-500-2008-071.PDF

NTP 2005 Report on Carcinogens, Eleventh Edition; U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program. January 31, 2005. Diesel Exhaust Particles. Accessed in June 2009. http://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s069dies.pdf.

OEHAA 2002 California Environmental Protection Agency. Office of Environmental Health Hazard Assessment. Health Effects of Diesel Exhaust. www.oehha.ca.gov/public_info/facts/dieselfacts.html. Accessed in April 2010.

OPR 2008 Governor's Office of Planning and Research. Technical Advisory. CEQA AND CLIMATE CHANGE: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review. June 19, 2008. www.opr.ca.gov/index.php?a=ceqa/index.html. Accessed April 2010.

OPR 2009 Letter to the Natural Resources Agency from the Governor's Office of Planning and Research, April 13, 2009, Regarding CEQA Guidelines, Sections Proposed to be Added or Amended. www.opr.ca.gov/ceqa/pdfs/Transmittal_%20Letter.pdf and www.opr.ca.gov/ceqa/pdfs/PA_CEQA_Guidelines.pdf

SCAQMD 2003 South Coast Air Quality Management District. 2003. Air Quality Management Plan. www.aqmd.gov/aqmp/AQMD03AQMP.htm. Accessed in April 2010

SCAQMD 2006 South Coast Air Quality Management District. 2006. Final - Methodology to Calculate Particulate Matter (PM) 2.5 and PM2.5 Significance Thresholds. October. www.aqmd.gov/CEQA/handbook/PM2_5/PM2_5.html. Accessed in April 2010.

SCAQMD 2007 South Coast Air Quality Management District. 2007. Final 2007 Air Quality Management Plan. www.aqmd.gov/aqmp/07aqmp/index.html. Accessed in April 2010.

SCAQMD 2008 South Coast Air Quality Management District. June 2003, revised July 2008. Final Localized Significance Threshold Methodology. Accessed in April 2010. www.aqmd.gov/CEQA/handbook/LST/LST.html.

SCAQMD 2009 South Coast Air Quality Management District. Air Quality Significance Thresholds. Revised March 2009. Accessed in April 2010. www.aqmd.gov/ceqa/handbook/signthres.pdf.

SCAQMD 2010 South Coast Air Quality Management District. CEQA Air Quality Handbook. Off-Road ONROAD Mobile Source Emission Factors and On-Road EMFAC (v2.3) Emission Factors. Accessed April 2010. http://www.aqmd.gov/ceqa/hdbk.html

Attachment
Emission Worksheets

Casa Blanca Substation Improvement
City of Riverside Public Utilities Department

Emission Summary - Regional

Activity	VOC (lbs/day)	CO (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)
Demolition: Construction Equipment	3.6	13.1	26.5	0.0	1.5	1.4	2813.4	0.3
Demolition: Fugitive Dust	0.0	0.0	0.0	0.0	1.0	0.2	0.0	0.0
Demolition: Worker Vehicle Exhaust	0.1	0.8	0.1	0.0	0.0	0.0	110.2	0.0
Demolition: Debris Haul Truck	0.6	2.5	7.8	0.0	0.4	0.3	950.9	0.0
Demolition: Paved Road Dust	0.0	0.0	0.0	0.0	5.7	1.2	0.0	0.0
Demolition Total	4.3	16.5	34.4	0.0	8.6	3.1	3874.6	0.4
	VOC (lbs/day)	CO (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)
Grading:Construction Equipment	2.5	9.5	20.1	0.0	1.1	1.0	2116.6	0.2
Grading: Worker Vehicle Exhaust	0.1	0.7	0.1	0.0	0.0	0.0	88.2	0.0
Grading: Fugitive Dust	0.0	0.0	0.0	0.0	2.7	0.6	0.0	0.0
Grading: Total	2.6	10.1	20.2	0.0	3.8	1.6	2204.8	0.2
	VOC (lbs/day)	CO (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)
Infrastructure:Construction Equipment	4.8	17.1	31.3	0.0	2.1	1.9	3023.5	0.4
Infrastructure: Worker Vehicle Exhaust	0.1	1.4	0.1	0.0	0.0	0.0	192.9	0.0
Infrastructure: Vendor Vehicle Exhaust	0.2	0.9	2.8	0.0	0.1	0.1	337.6	0.0
Infrastructure: Paved Road Dust	0.0	0.0	0.0	0.0	2.0	0.4	0.0	0.0
Infrastructure: Total	5.2	19.4	34.2	0.0	4.3	2.5	3554.0	0.5
	VOC (lbs/day)	CO (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)
Paving: Construction Equipment	3.7	13.7	29.6	0.0	1.6	1.5	2987.5	0.3
Paving: Worker Vehicle Exhaust	0.1	0.8	0.1	0.0	0.0	0.0	110.2	0.0
Paving: Vendor Vehicle Exhaust	1.8	7.2	22.3	0.0	1.1	0.9	2719.8	0.1
Paving: Paved Road Dust	0.0	0.0	0.0	0.0	15.5	3.3	0.0	0.0
Paving: Total	5.6	21.7	52.0	0.1	18.2	5.7	5817.5	0.4

	VOC (lbs/day)	CO (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)
Trenching: Construction Equipment	6.3	23.3	41.5	0.0	2.9	2.6	4015.4	0.6
Trenching: Worker Vehicle Exhaust	0.1	1.2	0.1	0.0	0.0	0.0	165.4	0.0
Trenching: Haul Away Truck Exhaust	0.4	1.7	5.4	0.0	0.3	0.0	656.5	0.0
Trenching: Haul Away Truck Paved Road Dust	0.0	0.0	0.0	0.0	5.4	1.1	0.0	0.0
Trenching: Asphalt Delivery Truck Exhaust	0.2	0.9	2.7	0.0	0.1	0.0	328.3	0.0
Trenching: Asphalt Delivery Truck Paved Road Dust	0.0	0.0	0.0	0.0	2.7	0.6	0.0	0.0
Trenching: Asphalt Fugutuve VOC	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trenching Total	7.2	27.1	49.7	0.1	11.3	4.3	5165.5	0.6
Max Daily Regional Emissions	**7.2**	**21.7**	**52.0**	**0.1**	**18.2**	**5.7**	**5817.5**	**0.5**

Emission Summary - Local

Activity	VOC (lbs/day)	CO (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)
Demolition: Construction Equipment	3.6	13.1	26.5	0.0	1.5	1.4	2813.4	0.3
Demolition: Fugitive Dust	0.0	0.0	0.0	0.0	1.0	0.2	0.0	0.0
Demolition Total	3.6	13.1	26.5	0.0	2.5	1.6	2813.4	0.3
Grading:Construction Equipment	2.5	9.5	20.1	0.0	1.1	1.0	2116.6	0.2
Grading: Fugitive Dust	0.0	0.0	0.0	0.0	2.7	0.6	0.0	0.0
Grading: Total	2.5	9.5	20.1	0.0	3.8	1.6	2116.6	0.2
	VOC (lbs/day)	CO (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)
Infrastructure:Construction Equipment	4.8	17.1	31.3	0.0	2.1	1.9	3023.5	0.4
Infrastructure: Total	4.8	17.1	31.3	0.0	2.1	1.9	3023.5	0.4
	VOC (lbs/day)	CO (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)
Paving: Construction Equipment	3.7	13.7	29.6	0.0	1.6	1.5	2987.5	0.3
Paving: Total	3.7	13.7	29.6	0.0	1.6	1.5	2987.5	0.3
	VOC (lbs/day)	CO (lbs/day)	NOx (lbs/day)	SOx (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	CO2 (lbs/day)	CH4 (lbs/day)
Trenching: Construction Equipment	6.3	23.3	41.5	0.0	2.9	2.6	4015.4	0.6
Trenching: Asphalt Fugutuve VOC	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trenching Total	6.4	23.3	41.5	0.0	2.9	2.6	4015.4	0.6
Max Daily Local Emissions	**6.4**	**23.3**	**41.5**	**0.0**	**3.8**	**2.6**	**4015.4**	**0.6**

Greenhouse Gas Emission Summary

	MTCO2e per year
Demolition	7
Grading	10
Infrastructure	264
Paving	26
Trenching	34
Total	341

Casa Blanca Substation Improvement
City of Riverside Public Utilities Department

Demolition Emissions

Estimated Demolition Volume

Demolition of Existing Parking Lot Surface (assumes concrete removal at the southwest parcel)

Total area of existing surface	4150	sq-ft		
Depth of the concrete	0.5	ft		
Total volume of existing concrete	2075	cu-ft or	77	cu-yd

Demolition of Existing Building Structures (southwest and northeast parcels)

Building Structures on the southwest parcel				
Total area	1350	sq-ft		
Average height of structures	12	ft		
Total Volume	16200	cu-ft or	600	cu-yd
Building Structures on the northwest parcel				
Total area	1000	sq-ft		
Average height of structure	12	ft		
Total Volume	12000	cu-ft or	444	cu-yd
Total Existing Building Volume	28200	cu-ft or	1044	cu-yd

Estimated Demolition Fugitive Dust Emissions

Fugitive Dust from Demolition of Existing Southwest Parcel Concrete Parking Lot (Prior to SCAQMD Rule 403)

Demolition Fugitive Dust Emission Factor	0.00042	lbs/cu-ft <---------- from the URBEMIS model
Total Demolition Fugitive Dust Emissions	0.8715	pounds
Duration of Demolition	1	days
Daily Demolition Fugitive Dust Emissions (PM10)	0.9	pounds/day
Daily Demolition Fugitive Dust Emissions (PM2.5)	0.2	pounds/day (assumes PM2.5 is 21% of the PM10)

Fugitive Dust from Demolition of Existing Southwest and Northeast Structures (prior to SCAQMD Rule 403)

Demolition Fugitive Dust Emission Factor	0.00042	lbs/cu-ft <---------- from the URBEMIS model
Total Demolition Fugitive Dust Emissions	11.8	pounds/day
Duration of Demolition	3	days
Daily Demolition Fugitive Dust Emissions (PM10)	3.9	pounds/day
Daily Demolition Fugitive Dust Emissions (PM2.5)	0.8	pounds/day (assumes PM2.5 is 21% of PM10)

Fugitive Dust from Demolition of Existing Concrete Parking Lot and Structures (after SCAQMD Rule 403)

Total Daily Fugitive Dust PM10 Emisisons (unmitigated)	4.8	pounds/day
Total Daily Fugitive Dust PM2.5 Emisisons (unmitigated)	1.0	pounds/day
Emission reductions due to 2x daily watering of disturbed areas and unpaved surfaces and equipment unloading	80%	<---------- from the URBEMIS Model)
Total Daily Fugitive Dust PM10 Emisisons (mitigated)	1.0	pounds/day
Total Daily Fugitive Dust PM2.5 Emisisons (mitigated)	0.2	pounds/day

Estimated Demolition Construction Equipment Exhaust Emissions

Construction Equipment Inventory

Equipment	Number	Work Day (hrs/day)	Exhaust Emission Factor - SCAQMD Composite Emission Factors for 2011 in lbs/hr) VOC	CO	NOx	Sox	PM10	PM2.5	CO2	CH4
Concrete Saw	1	8	0.1179	0.4209	0.6240	0.0007	0.0525	0.0483	58.4636	0.0106
Water Truck	1	2	0.2355	0.6994	2.1941	0.0027	0.0792	0.0729	260.0931	0.0212
Excavator	1	8	0.1388	0.5482	1.0634	0.0013	0.0592	0.0544	119.5811	0.0125
Rubber Tired Loader	1	8	0.1354	0.4959	1.0771	0.0012	0.0608	0.0559	108.6125	0.0122

Construction Equipment Exhaust Emissions

Equipment	Daily Exhaust Emissions (lbs/day) VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4
Concrete Saw	0.943	3.367	4.992	0.006	0.420	0.386	467.709	0.085
Water Truck	0.471	1.399	4.388	0.005	0.158	0.146	520.186	0.042
Excavator	1.110	4.386	8.507	0.011	0.473	0.435	956.649	0.100
Rubber Tired Loader	1.083	3.967	8.617	0.010	0.486	0.447	868.900	0.098
Total	**3.6**	**13.1**	**26.5**	**0.0**	**1.5**	**1.4**	**2813.4**	**0.3**

Estimated Demolition Worker Vehicle Emissions

Number of Worker Vehicles	5	<-------- URBEMIS assumption (Number of vehicles = 125% of the total pieces of equipment)
Number of Vehicle Trips	10	trips/day
Trip Length	10	miles/trip
Total VMT	100	miles/day

Composite Vehicle Emission Factors for the year 2011 from the SCAQMD

Pollutant	EF (lbs/mi)	Emissions (lbs/day)
VOC	0.000852	0.1
CO	0.008263	0.8
NOx	0.000845	0.1
Sox	0.000011	0.0
PM10	0.000088	0.0
PM2.5	0.000057	0.0
CO2	1.102352	110.2
CH4	0.000077	0.0

Estimated Haul Truck Emissions

Total Concrete Volume to be hauled	77	cu-yds
Total Existing building to be hauled	261	cu-yds - assumes 25% of building volume to be hauled
Total Volume to be hauled	338	cu-yds
Haul truck capacity	20	cu-yds
Number of haul trucks	17	trucks
Number of haul truck trips	34	trips
Duration of demolition hauling	3	days
Number of trips per day	11	trips/day
Haul truck Trip Distance	20	miles/trip
Daily VMT	225	miles/day

Composite Vehicle Emisison Factors for Heavy Duty Trucks for the year 2011 from the SCAQMD

Pollutant	EF (lbs/mi)	Daily Emissions (lbs/day)
VOC	0.00279543	0.6
CO	0.01112463	2.5
NOx	0.03455809	7.8
Sox	0.00003972	0.0
PM10	0.00166087	0.4
PM2.5	0.00144489	0.3
CO2	4.2204568	950.9
CH4	0.0001291	0.0

Estimated Haul Truck Paved Road Dust

Paved Road Dust Emission Factor (lb/VMT) = k x (sL/2)^0.65 x (W/3)^1.5		
sL, Silt Loading	0.02	g/m2 (assumed to be freeway travel)
W, Average Vehicle Weight (tons)	30	tons (weight of haul trucks)
k, Particulate Size Multiplier	0.016	
PM10 Emission Factor	0.025	lbs/mi (URBEMIS Model equation for paved road dust)
Daily VMT	225	miles/day

PM10 Emissions	5.7	lbs/day
PM2.5 Emissions	1.2	lbs/day - assumed to be 21% of PM10

Total Maximum Emissions from All Sources

Pollutant	Regional total (lbs/day)	Local Total (lbs/day)
VOC	4.3	3.6
CO	16.5	13.1
NOx	34.4	26.5
Sox	0.0	0.0
PM10	8.6	2.5
PM2.5	3.1	1.6
CO2	3874.6	2813.4
CH4	0.4	0.3

Greenhouse Gas Emissions

Greenhouse Gas	Duration of Demolition (days)	Total Emissions (lbs)	Global Warming Potential	Total Emissions (MT/y CO2e)
CO2	5	14619.5	1	6.6
CH4	5	1.6	21	0.0
Total				6.6

References

URBEMIS2007 Software User's Guide

SCAQMD Off-Road OFFROAD Model Mobile Source Emission Factors

SCAQMD On-Road EMFAC2007 Emission Factors

Casa Blanca Substation Improvement
City of Riverside Public Utilities Department

Substation Construction Grading Emissions

Estimated Fugitive Dust from Grading Operations (assumes all three parcels to be graded)

Fugitive Dust (prior to SCAQMD Rule 403)

Total Area to be Graded	29000	sq-ft
Fugitive Dust Emission Rate (PM10)	20	lbs/acre-day
Daily Fugitive Dust Emissions (PM10)	13.3	lbs/day
Daily Fugitive Dust Emissions (PM2.5)	2.8	lbs/day <----- assumed to be 21% of PM10

Fugitive Dust (after SCAQMD Rule 403)

Emission reductions due to 2x daily watering of disturbed areas and unpaved surfaces and equipment unloading	80%	<---------- from the URBEMIS Model)
Daily Fugitive Dust Emissions (PM10)	2.7	lbs/day
Daily Fugitive Dust Emissions (PM2.5)	0.6	lbs/day

Estimated Grading Construction Equipment Exhaust Emissions

Construction Equipment Inventory

Equipment	Number	Work Day (hrs/day)	Exhaust Emission Factor - SCAQMD Composite Emission Factors for 2011 in lbs/hr) VOC	CO	NOx	Sox	PM10	PM2.5	CO2	CH4
Tractor/Loader/Backhoe	1	8	0.094	0.387	0.628	0.001	0.048	0.044	66.804	0.008
Grader	1	8	0.163	0.622	1.340	0.001	0.071	0.065	132.743	0.015
Water Truck	1	2	0.235	0.699	2.194	0.003	0.079	0.073	260.093	0.021

Construction Equipment Exhaust Emissions

Equipment	Daily Exhaust Emissions (lbs/day) VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4
Tractor/Loader/Backhoe	0.751	3.099	5.020	0.006	0.386	0.355	534.433	0.068
Grader	1.301	4.973	10.723	0.012	0.566	0.520	1061.945	0.117
Water Truck	0.471	1.399	4.388	0.005	0.158	0.146	520.186	0.042
Total	**2.5**	**9.5**	**20.1**	**0.0**	**1.1**	**1.0**	**2116.6**	**0.2**

Estimated Demolition Worker Vehicle Emissions

Number of Worker Vehicles	4	<-------- URBEMIS assumption (Number of vehicles = 125% of the total pieces of equipment)
Number of Vehicle Trips	8	trips/day
Trip Length	10	miles/trip
Total VMT	80	miles/day

Composite Vehicle Emission Factors for the year 2011 from the SCAQMD

Pollutant	EF (lbs/mi)	Emissions (lbs/day)
VOC	0.000852	0.1
CO	0.008263	0.7
NOx	0.000845	0.1
Sox	0.000011	0.0
PM10	0.000088	0.0
PM2.5	0.000057	0.0
CO2	1.102352	88.2
CH4	0.000077	0.0

Total Emissions from All Sources

Pollutant	Regional total (lbs/day)	Local Total (lbs/day)
VOC	2.6	2.5
CO	10.1	9.5
NOx	20.2	20.1
Sox	0.0	0.0
PM10	3.8	3.8
PM2.5	1.6	1.6
CO2	2204.8	2116.6
CH4	0.2	0.2

Greenhouse Gas Emissions

Greenhouse Gas	Duration of Grading (days)	Daily Emission Rate (lbs/day)	Total Emissions (lbs)	Global Warming Potential	Total Emissions MT/y CO2e)
CO2	10	2204.8	22047.5	1	10.0
CH4	10	0.2	2.3	21	0.0
Total					10.0

References

URBEMIS2007 Software User's Guide
SCAQMD Off-Road OFFROAD Model Mobile Source Emission Factors
SCAQMD On-Road EMFAC2007 Emission Factors

Casa Blanca Substation Improvement
City of Riverside Public Utilities Department

Substation Infrastructure Construction Emissions

Estimated Infrastructure Construction Equipment Exhaust Emissions

Construction Equipment Inventory

Equipment	Number	Work Day (hrs/day)	Exhaust Emission Factor - SCAQMD Composite Emission Factors for 2011 in lbs/hr VOC	CO	NOx	Sox	PM10	PM2.5	CO2	CH4
Crane	1	8	0.1507	0.5179	1.3617	0.0014	0.0599	0.0551	128.6501	0.0136
Tractor/Loader/Backhoe	1	8	0.0938	0.3874	0.6276	0.0008	0.0482	0.0444	66.8041	0.0085
Rough Terrain Fork Lift	1	8	0.1181	0.4721	0.7494	0.0008	0.0638	0.0587	70.2808	0.0107
Welder	2	8	0.0758	0.2203	0.2818	0.0003	0.0258	0.0237	25.6027	0.0068
Generator Set	1	8	0.0898	0.3204	0.6121	0.0007	0.0376	0.0346	60.9927	0.0081

Construction Equipment Exhaust Emissions

Equipment	Daily Exhaust Emissions (lbs/day) VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4
Crane	1.206	4.143	10.894	0.011	0.479	0.441	1029.201	0.109
Tractor/Loader/Backhoe	0.751	3.099	5.020	0.006	0.386	0.355	534.433	0.068
Rough Terrain Fork Lift	0.945	3.777	5.995	0.007	0.511	0.470	562.246	0.085
Welder	1.212	3.524	4.508	0.005	0.413	0.380	409.643	0.109
Generator Set	0.719	2.563	4.896	0.006	0.301	0.277	487.942	0.065
Total	**4.8**	**17.1**	**31.3**	**0.0**	**2.1**	**1.9**	**3023.5**	**0.4**

Estimated Infrastructure Worker Vehicle Emissions

Number of Worker Vehicles	9	<-------- URBEMIS assumption (Number of vehicles = 125% of the total pieces of equipment)
Number of Vehicle Trips	18	trips/day
Vehicle Trip Length	10	miles/trip
Total VMT	175	miles/day

Composite Vehicle Emission Factors for the year 2011 from the SCAQMD

Pollutant	EF (lbs/mi)	Emissions (lbs/day)
VOC	0.000852	0.1
CO	0.008263	1.4
NOx	0.000845	0.1
Sox	0.000011	0.0
PM10	0.000088	0.0
PM2.5	0.000057	0.0
CO2	1.102352	192.9
CH4	0.000077	0.0

Estimated Infrastructure Vendor Delivery Vehicle Emissions

Vendor delivery trucks	4	trucks
Number of truck trips	8	truck trips
Number of delivery days	4	days
Number of daily truck trips	2	trips/day
Vendor Trip Distance	40	miles/trip
VMT	80	miles/day

Composite Vehicle Emisison Factors for Heavy Duty Trucks for the year 2011 from the SCAQMD

Pollutant	EF (lbs/mi)	Daily Emissions (lbs/day)
VOC	0.00279543	0.2
CO	0.01112463	0.9
NOx	0.03455809	2.8
Sox	0.00003972	0.0
PM10	0.00166087	0.1
PM2.5	0.00144489	0.1
CO2	4.2204568	337.6
CH4	0.0001291	0.0

Estimated Vendor Truck Paved Road dust Emissions

Paved Road Dust Emission Factor (lb/VMT) = k x (sL/2)^0.65 x (W/3)^1.5

sL, Silt Loading	0.02	g/m2 (assumed to be freeway travel)
W, Average Vehicle Weight (tons)	30	tons (weight of haul trucks)
k, Particulate Size Multiplier	0.016	
PM10 Emission Factor	0.025	lbs/mi (URBEMIS Model equation for paved road dust)
Daily VMT	80	miles/day

PM10 Emissions	2.0	lbs/day
PM2.5 Emissions	0.4	lbs/day - assumed to be 21% of PM10

TOTAL DAILY EMISSIONS

Pollutant	Regional (lbs/day)	Local (lbs/day)
VOC	5.2	4.8
CO	19.4	17.1
NOx	34.2	31.3
Sox	0.0	0.0
PM10	4.3	2.1
PM2.5	2.5	1.9
CO2	3554.0	3023.5
CH4	0.5	0.4

Greenhouse Gas Emissions

Greenhouse Gas	Duration of Construction (days)	Total Emissions (lbs)	Global Warming Potential	Total Emissions (MT/y CO2e)
CO2	180	580298.2	1	263.2
CH4	180	81.0	21	0.8
Total				264.0

References

URBEMIS2007 Software User's Guide
SCAQMD Off-Road OFFROAD Model Mobile Source Emission Factors
SCAQMD On-Road EMFAC2007 Emission Factors

Casa Blanca Substation Improvement
City of Riverside Public Utilities Department

Aggregate Paving of Work Area

Estimated Volume to Cover Parking and Work Area with Aggregate

Volume Aggregate Material

36 inches of aggregate (24 in of #34 and 12in of graded aggregate

Density: 150 lbs/cu-ft or 2.03 tons/cu-yd

Total area to be covered	29000	sq-ft	
Depth of the aggregate	3	ft	
Total volume to be covered	87000	cu-ft or	3222 cu-yd
Density of the aggregare	2.03	tons/cu-yd	
Weight of the aggregate	6541	tons	

Estimated Paving Construction Equipment Exhaust Emissions

Construction Equipment Inventory

Equipment	Number	Work Day (hrs/day)	Exhaust Emission Factor - SCAQMD Composite Emission Factors for 2011 in lbs/hr) VOC	CO	NOx	Sox	PM10	PM2.5	CO2	CH4
Grader	1	8	0.1626	0.6216	1.3404	0.0015	0.0707	0.0650	132.7431	0.0147
Water Truck	1	2	0.2355	0.6994	2.1941	0.0027	0.0792	0.0729	260.0931	0.0212
Rubber Tired Loader	1	8	0.1354	0.4959	1.0771	0.0012	0.0608	0.0559	108.6125	0.0122
Roller	1	8	0.1106	0.4157	0.7342	0.0008	0.0521	0.0480	67.0533	0.0100

Construction Equipment Exhaust Emissions

Equipment	Daily Exhaust Emissions (lbs/day) VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4
Grader	1.301	4.973	10.723	0.012	0.566	0.520	1061.945	0.117
Water Truck	0.471	1.399	4.388	0.005	0.158	0.146	520.186	0.042
Rubber Tired Loader	1.083	3.967	8.617	0.010	0.486	0.447	868.900	0.098
Roller	0.885	3.326	5.873	0.006	0.417	0.384	536.426	0.080
Total	**3.7**	**13.7**	**29.6**	**0.0**	**1.6**	**1.5**	**2987.5**	**0.3**

Estimated Paving Worker Vehicle Emissions

Number of Worker Vehicles	5	<-------- URBEMIS assumption (Number of vehicles = 125% of the total pieces of equipment)
Number of Vehicle Trips	10	trips/day
Trip Length	10	miles/trip
Total VMT	100	miles/day

Composite Vehicle Emission Factors for the year 2011 from the SCAQMD

Pollutant	EF (lbs/mi)	Emissions (lbs/day)
VOC	0.000852	0.1
CO	0.008263	0.8
NOx	0.000845	0.1
Sox	0.000011	0.0
PM10	0.000088	0.0
PM2.5	0.000057	0.0
CO2	1.102352	110.2
CH4	0.000077	0.0

Estimated Asphalt Haul Truck Emissions

Total Aggregate Volume to be hauled	3222	cu-yds
Haul truck capacity	20	cu-yds
Number of haul trucks	161	trucks
Number of haul truck trips	322	trips
Duration of paving	10	days
Number of trips per day	32	trips/day
Haul truck Trip Distance	20	miles/trip
Daily VMT	644	miles/day

Composite Vehicle Emisison Factors for Heavy Duty Trucks for the year 2011 from the SCAQMD

Pollutant	EF (lbs/mi)	Daily Emissions (lbs/day)
VOC	0.00279543	1.8
CO	0.01112463	7.2
NOx	0.03455809	22.3
Sox	0.00003972	0.0
PM10	0.00166087	1.1
PM2.5	0.00144489	0.9
CO2	4.2204568	2719.8
CH4	0.0001291	0.1

Estimated Asphalt Haul Truck Paved Road Dust

Paved Road Dust Emission Factor (lb/VMT) = k x (sL/2)^0.65 x (W/3)^1.5		
sL, Silt Loading	0.02	g/m2 (assumed to be freeway travel)
W, Average Vehicle Weight (tons)	29	tons (weight of haul trucks)
k, Particulate Size Multiplier	0.016	
PM10 Emission Factor	0.024	lbs/mi (URBEMIS Model equation for paved road dust)
Daily VMT	644	miles/day

PM10 Emissions	15.5	lbs/day
PM2.5 Emissions	3.3	lbs/day - assumed to be 21% of PM10

Total Emissions from All Sources

Pollutant	Regional total (lbs/day)	Local Total (lbs/day)
VOC	5.6	3.7
CO	21.7	13.7
NOx	52.0	29.6
Sox	0.1	0.0
PM10	18.2	1.6
PM2.5	5.7	1.5
CO2	5817.5	2987.5
CH4	0.4	0.3

Greenhouse Gas Emissions

Greenhouse Gas	Duration of Construction (days)	Total Emissions (lbs)	Global Warming Potential	Total Emissions MT/y CO2e)
CO2	10	58175.4	1	26.4
CH4	10	4.3	21	0.0
Total				26.4

References

URBEMIS2007 Software User's Guide
SCAQMD Off-Road OFFROAD Model Mobile Source Emission Factors
SCAQMD On-Road EMFAC2007 Emission Factors

Casa Blanca Substation Improvement
City of Riverside Public Utilities Department

Utility Trenching and Paving for Underground Conduit Installation

Estimated Volume of Excavation for Installation of Underground Conduit

Volume Aggregate Material

Total length of excavation	3500	ft		
Depth of the excavation	3	ft		
Width of the excavation	3	ft		
Total volume to be excavated	31500	cu-ft or	1167	cu-yd

Estimated Underground Conduit Construction Equipment Exhaust Emissions

Construction Equipment Inventory

Equipment	Number	Work Day (hrs/day)	Exhaust Emission Factor - SCAQMD Composite Emission Factors for 2011 in lbs/hr VOC	CO	NOx	Sox	PM10	PM2.5	CO2	CH4
Concrete Saw	1	8	0.1179	0.4209	0.6240	0.0007	0.0525	0.0483	58.4636	0.0106
Excavator	1	8	0.1388	0.5482	1.0634	0.0013	0.0592	0.0544	119.5811	0.0125
Rough Terrain Fork Lift	1	8	0.1181	0.4721	0.7494	0.0008	0.0638	0.0587	70.2808	0.0107
Rubber Tired Loader	1	8	0.1354	0.4959	1.0771	0.0012	0.0608	0.0559	108.6125	0.0122
Paver	1	8	0.1684	0.5541	0.9421	0.0009	0.0679	0.0625	77.9347	0.0152
Roller	1	8	0.1106	0.4157	0.7342	0.0008	0.0521	0.0480	67.0533	0.0100

Construction Equipment Exhaust Emissions

Equipment	Daily Exhaust Emissions (lbs/day) VOC	CO	NOx	SOx	PM10	PM2.5	CO2	CH4
Concrete Saw	0.943	3.367	4.992	0.006	0.420	0.386	467.709	0.085
Excavator	1.110	4.386	8.507	0.011	0.473	0.435	956.649	0.100
Rough Terrain Fork Lift	0.945	3.777	5.995	0.007	0.511	0.470	562.246	0.085
Rubber Tired Loader	1.083	3.967	8.617	0.010	0.486	0.447	868.900	0.098
Paver	1.347	4.432	7.537	0.007	0.543	0.500	623.478	0.122
Roller	0.885	3.326	5.873	0.006	0.417	0.384	536.426	0.080
Total	**6.3**	**23.3**	**41.5**	**0.0**	**2.9**	**2.6**	**4015.4**	**0.6**

Estimated Worker Vehicle Emissions

Number of Worker Vehicles	8	<-------- URBEMIS assumption (Number of vehicles = 125% of the total pieces of equipment)
Number of Vehicle Trips	15	trips/day
Trip Length	10	miles/trip
Total VMT	150	miles/day

Composite Vehicle Emission Factors for the year 2011 from the SCAQMD

Pollutant	EF (lbs/mi)	Emissions (lbs/day)
VOC	0.000852	0.1
CO	0.008263	1.2
NOx	0.000845	0.1
Sox	0.000011	0.0
PM10	0.000088	0.0
PM2.5	0.000057	0.0
CO2	1.102352	165.4
CH4	0.000077	0.0

Estimated Haul Truck Emissions from Trenching

Total Volume Excavated	1167	cu-yds	
Tota Volume to Be Hauled	583	cu-yds	<--- Assumed 50% to be hauled, 50% for backfill
Haul truck capacity	20	cu-yds	
Number of haul trucks	58	trucks	
Number of haul truck trips	117	trips	
Duration of Excavation	15	days	
Number of trips per day	8	trips/day	
Haul truck Trip Distance	20	miles/trip	
Daily VMT	156	miles/day	

Composite Vehicle Emisison Factors for Heavy Duty Trucks for the year 2011 from the SCAQMD

Pollutant	EF (lbs/mi)	Daily Emissions (lbs/day)
VOC	0.00279543	0.4
CO	0.01112463	1.7
NOx	0.03455809	5.4
Sox	0.00003972	0.0
PM10	0.00166087	0.3
PM2.5	0.00144489	0.2
CO2	4.2204568	656.5
CH4	0.0001291	0.0

Estimated Haul Truck Paved Road Dust from Trenching

Paved Road Dust Emission Factor (lb/VMT) = k x (sL/2)^0.65 x (W/3)^1.5		
sL, Silt Loading	0.035	g/m2 (assumed to be arterial road travel)
W, Average Vehicle Weight (tons)	29	tons (weight of haul trucks)
k, Particulate Size Multiplier	0.016	
PM10 Emission Factor	0.035	lbs/mi (URBEMIS Model equation for paved road dust)
Daily VMT	156	miles/day
PM10 Emissions	5.4	lbs/day
PM2.5 Emissions	1.1	lbs/day - assumed to be 21% of PM10

Estimated Haul Truck Emissions from Roadway Asphalt Resurfacing

Total Length of Resurfacing	3500.0	ft		
Width of Resurfacing	3.0	ft		
Depth of the Resurfacing	0.5	ft		
Area of Resurfacing	10500	sq-ft or	0.24	acres
Total Volume of Resurfacing	5250	cu-ft or	194	cu-yds
Asphalt Truck Capacity	20.0	cu-yds		
Number of Trucks	10	trucks		
Number of Truck Trips	19	truck trips		
Duration of Resurfacing	5.0	days		
Daily Truck Trips	4	Trips/day		
Haul Trip Distance	20.0	miles/trip		
Daily VMT	78	miles/day		

Composite Vehicle Emisison Factors for Heavy Duty Trucks for the year 2011 from the SCAQMD

Pollutant	EF (lbs/mi)	Daily Emissions (lbs/day)
VOC	0.00279543	0.2
CO	0.01112463	0.9
NOx	0.03455809	2.7
Sox	0.00003972	0.0
PM10	0.00166087	0.1
PM2.5	0.00144489	0.1
CO2	4.2204568	328.3
CH4	0.0001291	0.0

Estimated Haul Truck Paved Road Dust from Asphalt Resurfacaing

Paved Road Dust Emission Factor (lb/VMT) = k x (sL/2)^0.65 x (W/3)^1.5		
sL, Silt Loading	0.035	g/m2 (assumed to be arterial road travel)
W, Average Vehicle Weight (tons)	29	tons (weight of haul trucks)
k, Particulate Size Multiplier	0.016	
PM10 Emission Factor	0.035	lbs/mi (URBEMIS Model equation for paved road dust)
Daily VMT	78	miles/day
PM10 Emissions	2.7	lbs/day
PM2.5 Emissions	0.6	lbs/day - assumed to be 21% of PM10

Fugitive VOC Emissions from Asphalt Resurfacing

Area to be Resurfaced	0.2	acres
VOC Emission Factor	2.6	lbs VOC/acre
Duration of Resurfacing	5.0	days
Total VOC Emissions	0.1	lbs/day

Total Emissions from All Sources

Pollutant	Regional Total (lbs/day)	Local Total (lbs/day)
VOC	7.2	6.4
CO	27.1	23.3
NOx	49.7	41.5
Sox	0.1	0.0
PM10	11.3	2.9
PM2.5	4.7	2.6
CO2	4841.5	4015.4
CH4	0.6	0.6

Greenhouse Gas Emissions

Greenhouse Gas	Duration of Construction (days)	Total Emissions (lbs)	Global Warming Potential	Total Emissions (MT/y CO2e)
CO2	15	74200.4	1	33.7
CH4	15	9.1	21	0.1
Total				33.7

References

URBEMIS2007 Software User's Guide
SCAQMD Off-Road OFFROAD Model Mobile Source Emission Factors
SCAQMD On-Road EMFAC2007 Emission Factors

Casa Blanca Substation Improvement
City of Riverside Public Utilities Department

Estimation of Sulfur Hexafluoride (SF6) Emissions

Number of Circuit Breakers	6	
SF6 Breaker Capacity	33	pounds/breaker
Total SF6 in Breakers	198	pounds
Annual SF6 Leak Rate	1%	per year
Total Amount of SF6 Leakage	1.98	pounds/year
Global Warming Potential of SF6	23,900	
Annual Emissions (tons of CO2e)	23.661	tons of CO2e
Annual Emissions (metric tons of CO2e)	21.5	metric tons of CO2e

Sources: Personal Communication, David P. Hernandez, Riveside Public Utilities Department
4/22/2010