4.2 AIR QUALITY

4.2.1 INTRODUCTION

This section presents existing air quality conditions in the area of the proposed Solar Energy Research Center (SERC) project (proposed project) and analyzes the potential air quality impacts associated with implementation of the proposed project. This section also provides a description of the regulatory framework for air quality management on a federal, state, regional, and local level. In addition, this section evaluates the types and quantities of air emissions that would be generated on a short-term basis due to construction and over the long-term due to the operation of the proposed project.

The analysis of air quality impacts is based on air quality regulations administered by the United States Environmental Protection Agency (U.S. EPA), the California Air Resources Board (CARB), and the Bay Area Air Quality Management District (BAAQMD) with each agency responsible for different aspects of the proposed project's activities. The roles of these agencies are discussed in detail in the Regulatory Considerations section. Other sources used in this assessment include the *BAAQMD California Environmental Quality Act (CEQA) Air Quality Guidelines* adopted by the BAAQMD in June 2010, and the *Bay Area 2005 Ozone Strategy*, adopted by the BAAQMD in January 2006. Other sources of information used in this section include the Lawrence Berkeley National Laboratory (LBNL) documents, the general plans for the cities of Berkeley and Oakland, the Environmental Impact Report (EIR) for the Berkeley General Plan, other environmental documents associated with LBNL projects, and the University of California CEQA Handbook prepared by the UC Office of the President.

In response to the Notice of Preparation for this SERC Environmental Impact Report (EIR), a commenter expressed concern regarding odor impacts associated with diesel trucks serving the project site.

4.2.2 ENVIRONMENTAL SETTING

Climate and Meteorology

The project area is centrally located on the LBNL hill site, which is situated in the eastern hills of the cities of Berkeley and Oakland in Alameda County within the boundaries of the San Francisco Bay Area Air Basin (SFBAAB or Basin). The climate of the Bay Area is Mediterranean in character, with mild, rainy winter weather from November through March and warm, dry weather from June through October. Typically, May through October is considered the ozone smog season when transport studies have shown precursor emissions generated in Oakland and Berkeley are often transported to other regions of the Bay Area and beyond (e.g., Central Valley) that are more conducive to the formation of ozone. The

frequent storms and infrequent periods of sustained sunny weather in the winter are not conducive to ozone formation.

Mean minimum temperatures in the project area range from high 50s in the summer to low 40s in the winter. The average annual temperature in the area is in the mid 50s with mean maximum summer temperatures in the low 80s and winter temperatures in the low 60s. Annual and daily temperatures in the region have fairly small oscillations due to the moderating effects of the nearby ocean. In contrast to the steady temperature regime, rainfall is highly variable and confined almost exclusively to the "rainy" period from November through April. The area receives approximately 30 inches of rainfall annually, of which about 95 percent occurs during November to April. Precipitation may very widely from year to year as a shift in the annual storm track of a few hundred miles can mean the difference between a very wet year and drought conditions. The usual wind pattern in the project area consists of daytime winds originating offshore from the west and northwest as air is funneled through the Golden Gate, and nighttime winds originating from the east and southeast due to the cooling of land areas. Summer afternoon sea breezes can often exceed 20 miles per hour. Peak annual winds occur during winter storms. South and southeast winds typically also precede weather systems passing through the region.

Regional Air Quality

The determination of whether a region's air quality is healthful or unhealthful is made by comparing contaminant levels in ambient air samples to national and state standards. Health-based air quality standards have been established by California and the federal government for the following criteria air pollutants: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable particulate matter less than 10 microns in diameter (PM_{10}), fine particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and lead (Pb). These standards were established to protect sensitive receptors with a margin of safety from adverse health impacts due to exposure to air pollution. California has also established standards for sulfates, visibility reducing particles, hydrogen sulfide, and vinyl chloride. The state and national ambient air quality standards for each of the monitored pollutants and their effects on health are summarized in **Table 4.2-1, Ambient Air Quality Standards**.

Table 4.2-1
Ambient Air Quality Standards

Air Pollutant	Concentration/Averaging Time		Most Relevant Health Effects
	State Standard	Federal Primary Standard	
Ozone[1]	0.070 ppm, 8-hr avg. 0.09 ppm, 1-hr. avg.	0.075 ppm, 8-hr avg. (3-year average of annual 4th-highest daily maximum)	(a) Pulmonary function decrements 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; and (f) Property damage
Nitrogen Dioxide[2]	0.18 ppm, 1-hr avg. 0.030 ppm, annual arithmetic mean	0.100 ppm, 1-hr avg. 0.053 ppm, annual arithmetic mean	(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; and (c) Contribution to atmospheric discoloration
Respirable Particulate Matter (PM_{10})	20 $\mu g/m^3$, annual arithmetic mean 50 $\mu g/m^3$, 24-hr avg.	150 $\mu g/m^3$, 24-hr avg.	(a) Exacerbation of symptoms in sensitive patients with respiratory or cardiovascular disease; (b) Declines in pulmonary function growth in children; and (c) Increased risk of premature death from heart or lung diseases in the elderly
Fine Particulate Matter ($PM_{2.5}$)	12 $\mu g/m^3$, annual arithmetic mean	15 $\mu g/m^3$, annual arithmetic mean (3-year average) 35 $\mu g/m^3$, 24-hr avg. (3-year average of 98th percentile)	(a) Exacerbation of symptoms in sensitive patients with respiratory or cardiovascular disease; (b) Declines in pulmonary function growth in children; and (c) Increased risk of premature death from heart or lung diseases in the elderly
Carbon Monoxide	9.0 ppm, 8-hr avg. 20 ppm, 1-hr avg.	9 ppm, 8-hr avg. 35 ppm, 1-hr avg.	(a) Aggravation of angina pectoris 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; and (d) Possible increased risk to fetuses

Air Pollutant	Concentration/Averaging Time		Most Relevant Health Effects
	State Standard	Federal Primary Standard	
Sulfur Dioxide	0.04 ppm, 24-hr avg. 0.25 ppm, 1-hr. avg.	0.030 ppm, annual arithmetic mean 0.14 ppm, 24-hr avg.	Bronchioconstriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in person with asthma
Lead[3,4]	1.5 μg/m^3, 30-day avg.	0.15 μg/m^3, rolling 3-month average	(a) Increased body burden; and (b) Impairment of blood formation and nerve conduction
Visibility-Reducing Particles	Reduction of visual range to less than 10 miles at relative humidity less than 70%, 8-hour avg. (10 AM—6 PM)	None	Visibility impairment on days when relative humidity is less than 70 percent
Sulfates	25 μg/m^3, 24-hr avg.	None	(a) Decrease in ventilatory function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; and (f) Property damage
Hydrogen Sulfide	0.03 ppm, 1-hr avg.	None	Odor annoyance
Vinyl Chloride[3]	0.01 ppm, 24-hr avg.	None	Known carcinogen

μg/m^3 = microgram per cubic meter.
ppm = parts per million by volume.
Source: California Air Resources Board, "Ambient Air Quality Standards," http://www.arb.ca.gov/research/aaqs/aaqs2.pdf. 2010.
[1] On March 12, 2008, the U.S. EPA revised the federal ozone standard from 0.08 ppm to 0.075 ppm. The standard became effective on May 27, 2008.
[2] On January 25, 2010, the U.S. EPA promulgated a new 1-hour NO_2 standard. The new 1-hour standard is 0.100 parts per million (188 micrograms per cubic meter) and became effective on April 12, 2010.
[3] CARB 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.
[4] On October 15, 2008, the U.S. EPA revised the federal lead standard from 1.5 μg/m^3 to 0.15 μg/m3 based on a 3-month rolling average.

The National Ambient Air Quality Standards (NAAQS) (other than O_3, PM_{10}, $PM_{2.5}$ and those based on annual averages or arithmetic mean) are not to be exceeded more than once per year. The NAAQS for O_3, PM_{10}, and $PM_{2.5}$ are based on statistical calculations over one- to three-year periods, depending on the pollutant. The SFBAAB is currently designated as a marginal nonattainment area with respect to the national standard for 8-hour O_3, and nonattainment for 24-hour $PM_{2.5}$; and is designated as attainment or unclassifiable for all other pollutants. Additional details regarding the attainment status are provided later in this section.

Air quality of a region is considered to be in attainment of the state standards if the measured ambient air pollutant levels for O_3, CO, SO_2 (1- and 24-hour), NO_2, PM_{10}, $PM_{2.5}$, and visibility reducing particles are

not exceeded, and all other standards are not equaled or exceeded at any time in any consecutive three-year period. The SFBAAB is currently designated as a nonattainment area with respect to the state standards for O_3, PM_{10}, and $PM_{2.5}$ and is designated as attainment or unclassified for all other pollutants. Additional details regarding the attainment status are provided later in this section.

The project site is located within the SFBAAB, which includes all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties as well as the southern half of Sonoma County and the southwestern portion of Solano County. The Basin is affected by the pollutants generated within dense population centers, heavy vehicular traffic, and industry. However, as mentioned above, coastal sea breezes tend to transport pollutants generated within the SFBAAB to inland locations such as the Central Valley.

The air pollutants within the Basin are generated by two categories of sources: stationary and mobile. Stationary sources are known as "point sources," which have one or more emission sources at a single facility, or "area sources," which are widely distributed and produce many small emissions. Point sources are usually associated with manufacturing and industrial uses and include sources such as refinery boilers or combustion equipment that produce electricity or process heat. Examples of area sources include residential water heaters, painting operations, lawn mowers, agricultural fields, landfills, and consumer products, such as barbecue lighter fluid or hair spray. "Mobile sources" refer to operational and evaporative emissions from on- and off-road motor vehicles.

Local Air Quality

To identify ambient concentrations of the criteria pollutants, the BAAQMD operates more than 30 air quality monitoring stations throughout the Basin. The nearest monitoring stations to the project site are located at 6th Street in Berkeley, approximately 2.8 miles west of the project site, 822 Alice Street in Oakland, approximately 5 miles southwest of the project site, 9925 International Boulevard in Oakland, approximately 10 miles south of the project site, and Arkansas Street in San Francisco, approximately 11.5 miles from the project site. **Table 4.2-2, Ambient Pollutant Concentrations Measured Nearest the Project Site**, lists the concentrations registered and the exceedances of California Ambient Air Quality Standards (CAAQS) and the NAAQS that have occurred at these monitoring stations from 2006 through 2008, the most recent years for which data is available. During this period (i.e., 2006 through 2008), the stations did not register any days above the state 1-hour or federal 8-hour ozone standard. At the closest monitoring station that monitors for PM_{10} (Arkansas Street station in San Francisco), the state 24-hour PM_{10} standard was exceeded each year except 2008. At the same Arkansas Street station and the 9925 International Boulevard station, the federal 24-hour $PM_{2.5}$ standard was exceeded in 2006 and 2007, but no

exceedances were registered in 2008. No other exceedances of the state or federal standards for NO_2, CO, SO_2, or Pb were registered at these stations between 2006 and 2008.

Table 4.2-2
Ambient Pollutant Concentrations Measured Nearest the Project Site

Pollutant	Standards [1]	Year		
		2006	2007	2008
OZONE (O_3)[2]				
Maximum 1-hour concentration (ppm)		0.053	0.038	0.053
Maximum 8-hour concentration (ppm)		0.046	0.032	0.049
Number of days exceeding state 1-hour standard	0.09 ppm	0	0	0
Number of days exceeding federal 8-hour standard	0.075 ppm	0	0	0
CARBON MONOXIDE (CO)[3]				
Maximum 1-hour concentration (ppm)		2.7	2.5	2.8
Maximum 8-hour concentration (ppm)		2.10	1.60	1.70
Number of days exceeding state 8-hour standard	9.0 ppm	0	0	0
Number of days exceeding federal 8-hour standard	9 ppm	0	0	0
NITROGEN DIOXIDE (NO_2)[4]				
Maximum 1-hour concentration (ppm)		0.107	0.059	0.070
Annual Average (ppm)		0.016	0.016	0.015
Number of days exceeding state 1-hour standard	0.18 ppm	0	0	0
SULFUR DIOXIDE (SO_2)[4]				
Maximum 1-hour concentration in ppm		N/A	N/A	0.014
Maximum 24-hour concentration in ppm		0.007	0.006	0.004
Annual arithmetic mean concentration (ppm)		0.001	0.001	0.000
Number of days exceeding state 1-hour standard	0.25 ppm	0	0	0
Number of days exceeding state 24-hour standard	0.04 ppm	0	0	0
Number of days exceeding federal 24-hour standard	0.14 ppm	0	0	0
PARTICULATE MATTER (PM_{10})[4]				
Maximum 24-hour concentration ($\mu g/m^3$)[5]		61.4	69.8	41.3
Maximum 24-hour concentration ($\mu g/m^3$)[6]		58.0	65.7	41.2
Annual arithmetic mean concentration ($\mu g/m^3$)[5]		22	21	21
Number of samples exceeding state 24-hour standard	50 $\mu g/m^3$	3	2	0
Number of samples exceeding federal 24-hour standard	150 $\mu g/m^3$	0	0	0

Pollutant	Standards [1]	Year 2006	2007	2008
PARTICULATE MATTER ($PM_{2.5}$)[4]				
Maximum 24-hour concentration ($\mu g/m^3$)		54.3	45.2	29.4
Annual arithmetic mean concentration using federal methods ($\mu g/m^3$)		9.6	8.6	-
Number of samples exceeding federal 24-hour standard[6]	35 $\mu g/m^3$	3	5	0

Sources: (i) California Air Resources Board Air Quality Database http://www.arb.ca.gov/adam/welcome.html
(ii) U.S. Environmental Protection Agency Air Quality Database http://www.epa.gov/air/data/

[1] Parts by volume per million of air (ppm), micrograms per cubic meter of air ($\mu g/m^3$) or annual arithmetic mean (aam).

[2] 1-hour and 8-hour ozone data from 2006 was monitored from the Arkansas Street station in San Francisco, California. 1-hour and 8-hour ozone data from 2007-2008 were monitored from the 6th Street station in Berkeley, California.

[3] Carbon monoxide monitoring data was obtained from the BAAQMD's Bay Area Air Pollution Summary from 2006 through 2008.

[4] Sulfur dioxide, nitrogen dioxide, and PM_{10} are monitored at the Arkansas Street station in San Francisco, the closest monitoring station that monitors these pollutants from 2006 through 2008. $PM_{2.5}$ was monitored at the Arkansas Street station in 2006 and at 9925 International Boulevard station from 2007 through 2008.

[5] Using state methods for sampling.

[6] Using federal methods for sampling.

[7] The federal $PM_{2.5}$ standard was revised from 65 to 35 $\mu g/m^3$ in September 2006. Statistics shown for 2006 through 2008 are based on the 35 $\mu g/m^3$ standard.

[8] Pollutant concentrations were obtained from the Arkansas Street station, the closest monitoring station that monitors for lead.

Notes:
Sulfates are monitored at Arkansas Street Station, San Francisco. Sulfates have not exceeded the state standard of 25 $\mu g/m^3$ for more than 20 years.
N/A = not available.

Surrounding Land Uses and Sensitive Receptors

Sensitive land uses in the vicinity of LBNL include residential neighborhoods, open space recreational areas, university student dormitories, and day care centers. Residential neighborhoods are located to the north, south, and west of the proposed project. The nearest residences are approximately 1,600 feet north of the project site.

Land uses such as schools and day care centers are considered relatively sensitive to poor air quality because infants and children are more susceptible to respiratory infections and other air-quality-related health problems than the general public. Residential areas are also considered sensitive to air pollution because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to any pollutants present. Recreational areas are also considered sensitive locations due to vigorous exercise associated with these types of land uses (exercise causes an increased breathing rate that will lead to greater exposure to ambient air pollutants).

Localized Carbon Monoxide Concentrations

Traffic congestion along roadways and at intersections has the potential to generate localized high levels of CO. The BAAQMD monitoring stations have not recorded any exceedances of the state or federal CO standards since 1991. However, because elevated CO concentrations are generally localized, heavy traffic volumes and congestion at specific intersections or roadway segments can lead to high levels of CO, or hotspots, while concentrations at the nearest air quality monitoring station may be below state and federal standards.

4.2.3 REGULATORY CONSIDERATIONS

Air quality within the SFBAAB is addressed through the efforts of various federal, state, regional and local government agencies. These agencies work jointly as well as individually to improve air quality through legislation, regulations, planning, policymaking, education, and a variety of programs. With respect to the proposed project, the BAAQMD would administer most of the air quality requirements affecting the SERC project. Regulatory considerations regarding potential radioactive materials, which are administered by the California Department of Public Health, are discussed in **Section 4.5, Hazards and Hazardous Materials**. The agencies primarily responsible for improving the air quality within the Basin are discussed below along with their individual responsibilities.

U.S. Environmental Protection Agency

Criteria Pollutants

The U.S. EPA is responsible for enforcing the federal Clean Air Act (CAA) and the NAAQS. The NAAQS identify levels of air quality for seven criteria pollutants that are considered the maximum levels of ambient (background) air pollutants considered safe, with an adequate margin of safety, to protect the public health and welfare. The seven criteria pollutants are O_3, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. The federal ambient air quality standards and the relevant health effects of the criteria pollutants are summarized above in **Table 4.2-1**.

The Basin is currently classified by the U.S. EPA as a nonattainment/marginal area for the 8-hour standard for O_3 and a nonattainment area for $PM_{2.5}$. Additionally, it has been designated as an attainment/unclassifiable area for the 1-hour and 8-hour standards for CO and the annual standard for NO_2, and as an attainment area for the quarterly lead standard and 24-hour and annual SO_2 standards. The Basin is currently designated as unclassifiable for the 24-hour PM_{10} standard. In response to its enforcement responsibilities, the U.S. EPA requires each state to prepare and submit a State Implementation Plan (SIP) describing how the state will achieve the federal standards by specified dates,

depending on the severity of the air quality within the state or air basin. The BAAQMD has been delegated the responsibility for implementing many of the CAA requirements for the region, which includes the LBNL hill site. The status of the SFBAAB with respect to attainment with the NAAQS is summarized in **Table 4.2-3**.

Table 4.2-3
National Ambient Air Quality Standards and Status
San Francisco Bay Area Air Basin

Pollutant	Averaging Time	Designation/Classification
Ozone (O_3)	8 Hour	Nonattainment/Marginal
Carbon Monoxide (CO)	1 Hour, 8 Hour	Attainment/Unclassifiable
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean[1]	Attainment/Unclassifiable
Sulfur Dioxide (SO_2)	24 Hour, Annual Arithmetic Mean	Attainment
Respirable Particulate Matter (PM_{10})	24 Hour	Unclassifiable
Fine Particulate Matter ($PM_{2.5}$)	24 Hour, Annual Arithmetic Mean	Nonattainment
Lead (Pb)	Calendar Qtr., Rolling 3-Month Avg.	Attainment

Source: Bay Area Air Quality Management District, "Air Quality Standards and Attainment Status," http://hank.baaqmd.gov/pln/air_quality/ambient_air_quality.htm. 2010.

[1] The U.S. EPA has promulgated a new 1-hour NAAQS for NO_2. The new 1-hour standard is 0.100 parts per million (188 micrograms per cubic meter) and became effective on April 12, 2010. The U.S. EPA will make nonattainment area designations for the 1-hour standard by 2012.

Hazardous Air Pollutants

Regulation of hazardous air pollutants (HAPs) under federal regulations is achieved through federal and state controls on individual sources. Federal law defines HAPs as non-criteria air pollutants with short-term (acute) and/or long-term (chronic or carcinogenic) adverse human health effects. The 1990 federal CAA Amendments offer a comprehensive plan for achieving significant reductions in both mobile and stationary source emissions of HAPs. Under the 1990 CAA Amendments, a total of 189 chemicals or chemical families were designated HAPs because of their adverse human health effects. Title III of the 1990 federal CAA Amendments amended Section 112 of the CAA to replace the former program with an entirely new technology-based program. Under Title III, the U.S. EPA must establish maximum achievable control technology emission standards for all new and existing "major" stationary sources through promulgation of National Emission Standards for Hazardous Air Pollutants (NESHAP). Major stationary sources of HAPs are required to obtain an operating permit from the BAAQMD pursuant to Title V of the 1990 CAA Amendments. A major source is defined as one that emits at least

10 tons per year of any HAP or at least 25 tons per year of all HAPs. The LBNL hill site is not considered a major source.

California Air Resources Board

The California Air Resources Board (CARB), a branch of the California Environmental Protection Agency (CalEPA), oversees air quality planning and control throughout California. It is primarily responsible for ensuring implementation of the 1988 California Clean Air Act (CCAA), for responding to the federal CAA requirements and for regulating emissions from motor vehicles and consumer products within the state. The CCAA and other California air quality statutes designate local air districts, such as the BAAQMD, with the responsibility for regulating most stationary sources, and to a certain extent, area sources.

Like the U.S. EPA, CARB has established ambient air quality standards for the state (i.e., CAAQS). These standards apply to the same seven criteria pollutants as the federal CAA and also address sulfates (SO_4), visibility-reducing particles, hydrogen sulfide (H_2S) and vinyl chloride (C_2H_3Cl). The CCAA standards are more stringent than the federal standards and, in the case of PM_{10} and SO_2, far more stringent. Based on monitored pollutant levels, the CCAA divides O_3 nonattainment areas into four categories – moderate, serious, severe, and extreme – to which progressively more stringent planning and emission control requirements apply.

The Basin is a nonattainment area for the California 1-hour and 8-hour ozone standard. The Basin is designated as nonattainment for the California 24-hour and annual PM_{10} standards, as well as the California annual $PM_{2.5}$ standard. The Basin is designated as attainment or unclassifiable for all other CAAQS. The ozone precursors, ROG and NO_X, in addition to PM_{10}, are the pollutants of concern for projects located in the Basin. The status of the Basin with respect to attainment with the CAAQS is summarized in **Table 4.2-4**.

Table 4.2-4
California Ambient Air Quality Standards and Status
San Francisco Bay Area Air Basin

Pollutant	Averaging Time	Designation/Classification
Ozone (O_3)	1 Hour, 8 Hour	Nonattainment[1]
Carbon Monoxide (CO)	1 Hour, 8 Hour	Attainment
Nitrogen Dioxide (NO_2)	1 Hour	Attainment
Sulfur Dioxide (SO_2)	1 Hour, 24 Hour	Attainment
Respirable Particulate Matter (PM_{10})	24 Hour, Annual Arithmetic Mean	Nonattainment
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	Nonattainment
Lead (Pb)[2]	30 Day Average	Attainment
Sulfates (SO_4)	24 Hour	Attainment
Hydrogen Sulfide (H_2S)	1 Hour	Unclassified
Vinyl Chloride[2]	24 Hour	Unclassified
Visibility Reducing Particles	8 Hour (10 AM–6 PM)	Unclassified

Source: Bay Area Air Quality Management District, "Air Quality Standards and Attainment Status," http://hank.baaqmd.gov/pln/air_quality/ambient_air_quality.htm. 2010.

[1] *CARB has not issued area classifications based on the new state 8-hour standard. The previous classification for the 1-hour ozone standard was Serious.*

[2] *CARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined.*

Toxic Air Contaminants

California law defines Toxic Air Contaminants (TACs) as air pollutants having carcinogenic or other health effects. A total of 245 substances have been designated TACs under California law; they include the federal HAPs adopted as TACs in accordance with Assembly Bill 2728. The Air Toxics Hot Spots Information and Assessment Act of 1987, Assembly Bill 2588 (AB 2588), seeks to identify and evaluate risk from air toxics sources; AB 2588 does not regulate air toxics emissions directly. Under AB 2588, sources emitting more than 10 tons per year of any criteria air pollutant must estimate and report their toxic air emissions to the local air districts. Local air districts then prioritize facilities on the basis of emissions, and high priority facilities are required to submit a health risk assessment and communicate the results to the affected public. Depending on risk levels, emitting facilities are required to implement varying levels of risk reduction measures. The BAAQMD is responsible for implementing AB 2588 in the Basin.

The BAAQMD is currently working to control TAC impacts from local hot spots and from ambient background concentrations. The control strategy involves reviewing new sources to ensure compliance

with required emission controls and limits, maintaining an inventory of existing sources to identify major TAC emissions and developing measures to reduce TAC emissions. The BAAQMD publishes the results of the various control programs in an annual report, which provides information on the current TAC inventory, AB 2588 risk assessments, TAC monitoring programs, and TAC control measures and plans.

One of the TACs being controlled by the BAAQMD is particulate matter from diesel-fueled engines, also known as diesel particulate matter (DPM). Compared to other TACs, DPM emissions are estimated to be responsible for about 70 percent of the total ambient air toxics risk in the Basin. On a statewide basis, the average potential cancer risk associated with these emissions is over 500 potential cancer cases per million exposed people. In addition to these general risks, diesel exhaust particulate can also present elevated localized or near-source exposures. Depending on the activity and nearness to receptors, these potential risks can range from a low number to 1,500 cancer cases per million exposed people (CARB 2010).

Bay Area Air Quality Management District

Management of air quality in the Basin is the responsibility of the BAAQMD. The BAAQMD is responsible for bringing and/or maintaining air quality in the Basin within federal and state air quality standards. Specifically, the BAAQMD has responsibility for monitoring ambient air pollutant levels throughout the Basin and developing and implementing attainment strategies to ensure that future emissions will be within federal and state standards. The following plans have been developed by the BAAQMD to achieve attainment of the federal and state ozone standards. The Clean Air Plan (CAP) and Ozone Strategy fulfill the planning requirements of the CCAA, while the Ozone Attainment Plan fulfills the federal CAA requirements.

Clean Air Plans

The CCAA requires air districts within nonattainment areas to prepare a triennial assessments and revisions to their Clean Air Plans (CAPs). The BAAQMD has prepared a series of CAPs, the most recent and rigorous of which was drafted in March 2010 (BAAQMD 2010a). The 2010 Draft CAP continues the air pollution reduction strategy established by the 1991 CAP and represents the fourth triennial update to the 1991 CAP, following previous updates of 1994, 1997, and 2000. The 2010 CAP is designed to address attainment of the state standard for ozone, particulate matter, air toxics and greenhouse gases. CAPs are intended to focus on the near-term actions through amendments of existing regulations and promulgation of new District regulations.

The Bay Area 2010 CAP provides a comprehensive plan to improve Bay Area air quality and protect public health. The 2010 CAP defines a control strategy that the District and its partners will implement to: (1) reduce emissions and decrease ambient concentrations of harmful pollutant; (2) safeguard public

health by reducing exposure to air pollutants that poses the greatest health risk, with an emphasis on protecting the communities most heavily impacted by air pollution; and (3) reduce greenhouse gas emissions to protect the climate. The 2010 CAP is designed to update the most recent ozone plan, the BAAQMD 2005 Ozone Strategy, to comply with state air quality planning requirements as codified in the California Health and Safety Code. State law required the CAP to include all feasible measures to reduce emissions of ozone precursors and to reduce transport of ozone precursors to neighboring air basins.

The SFBAAB was recently designated as non-attainment for the national 24-hour $PM_{2.5}$ standard, and will be required to prepare a $PM_{2.5}$ State Implementation Plan (SIP) pursuant to federal air quality guidelines by December 2012. The 2010 CAP is not a SIP document and does not respond to federal requirements for $PM_{2.5}$ or ozone planning. However, in anticipation of future $PM_{2.5}$ planning requirements, the CAP control strategy also aims to reduce PM emissions and concentrations. In addition, U.S. EPA is currently reevaluating national ozone standards, and is likely to tighten those standards in the near future. The 2010 CAP updates the BAAQMD's most recent state ozone plan, the 2005 Ozone Strategy, by addressing new emerging challenges and opportunities. The 2010 CAP control strategy includes revised, updated, and new measures in the three traditional control measure categories: Stationary Source Measures, Mobile Source Measures, and Transportation Control Measures. In addition, the CAP identifies two new categories of control measures: Land Use and Local Impact Measures, and Energy and Climate Measures (BAAQMD 2010a). The control measures in the CAP will also help in the Basin's continuing effort to attain national ozone standards.

2001 Ozone Attainment Plan

The BAAQMD developed the 2001 Ozone Attainment Plan as a guideline to achieve the then federal 1-hour ozone standard (BAAQMD 2001). The 2001 Attainment Plan was approved by CARB in 2001 and by the U.S. EPA in 2003. In April 2004, the U.S. EPA determined the SFBAAB had attained the federal 1-hour ozone standard. Due to the attainment status of the Basin, the 1-hour ozone requirements set forth in the 2001 Ozone Attainment Plan were not required anymore. A year later, in 2005, the federal 1-hour ozone standard was revoked by the U.S. EPA for a new and more health-protective 8-hour standard. The Basin was designated as marginal nonattainment for the federal 8-hour ozone standard. Although designated as nonattainment, areas designated as marginal nonattainment or less were not required to submit new attainment plans. Nonetheless, the control measures and strategies described in the 2001 Ozone Attainment Plan for the 1-hour standard will also help achieve attainment with the 8-hour standard.

BAAQMD Rules and Regulations

Specific rules and regulations have been adopted by the BAAQMD that limit emissions that can be generated by various uses and/or activities. These rules regulate not only the emissions of the state and federal criteria pollutants, but also the emissions of TACs. The rules are also subject to ongoing refinement by the BAAQMD.

In general, all stationary sources with air emissions are subject to BAAQMD's rules governing their operational emissions. Some emissions sources are further subject to regulation through the BAAQMD's permitting process. Through this permitting process, the BAAQMD also monitors the amount of stationary emissions being generated and uses this information in developing the CAP. Some of the stationary emission sources that would be constructed as part of the project (e.g., emergency generator) will be subject to the BAAQMD permitting requirements. A few of the primary BAAQMD rules applicable to the project include the following:

- **Regulation 2, Rule 1 (General Requirements):** This rule requires new and modified sources of air pollution to acquire permits (e.g., Authority to Construct, Permit to Operate) in order to monitor stationary source emissions within the BAAQMD's jurisdiction. The rule also includes a list of equipment and processes that would be exempt from permitting requirements. Among others, these include cooling towers and boilers with a heat input rating less than 10 million British thermal units (BTU) per hour fired exclusively with natural gas, liquefied petroleum gas, or a combination, and laboratories located in a building where the total number of fume hoods within the building is fewer than 50 or the total laboratory space is less than 25,000 square feet, provided that responsible laboratory management practices are used.

- **Regulation 2, Rule 2 (New Source Review):** For new and modified stationary sources subject to permitting requirements (see Regulation 2, Rule 1), this series of rules prescribes the use of Best Available Control Technology and the provision of emission offsets (i.e., mitigation) for equipment whose emissions exceed specified thresholds. The applicability of these requirements would be determined upon submittal of an application for an Authority to Construct under Regulation 2, Rule 1.

- **Regulation 2, Rule 5 (New Source Review for Toxic Air Contaminants):** For new and modified stationary sources of toxic air contaminants subject to permitting requirements (see Regulation 2, Rule 1), this rule evaluates potential public exposure and health risk and provides measures for mitigating potentially significant health risks from these exposures, including the use of Maximum Available Control Technology.

- **Regulation 8, Rule 3 (Architectural Coatings):** This rule sets limits on the ROG content in architectural coatings sold, supplied, offered for sale, or manufactured within the BAAQMD's jurisdiction. The rule also includes time schedules that specify when more stringent ROG standards are to be enforced. The rule applies during the construction phase of a project. In addition, any periodic architectural coating maintenance operations are required to comply with this rule.

- **Regulation 8, Rule 15 (Emulsified and Liquid Asphalts):** This rule sets limits on the ROG content in emulsified and liquid asphalt used for maintenance and paving operations. The rule includes specific ROG content requirements for various types of asphalt (e.g., emulsified asphalt, rapid-cure liquid asphalt, slow-cure liquid asphalt). This rule applies during the construction phase of a project. In addition, any future asphalt maintenance of a project's roads would be required to comply with the ROG standards set in Rule 15.

- **Regulation 9, Rule 6 (Nitrogen Oxide Emission from Natural Gas-Fired Water Heaters):** This rule sets a limit on the NO_x emissions from natural gas-fired water heaters. The rule applies to natural gas-fired water heaters manufactured after July 1, 1992 with a heat input rating of less than 75,000 BTU/hr. Water heaters subject to the rule must not emit more than 40 nanograms of NO_x per joule of heat output.

- **Regulation 9, Rule 7 (Nitrogen Oxide and Carbon Monoxide from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters):** This rule limits the NO_x and CO emissions from industrial, institutional, and commercial boilers, steam generators, and process heaters. The rule applies to boilers with a heat input rating greater than 10 million BTU/hr fired exclusively with natural gas, liquefied petroleum gas, or a combination or boilers with a heat input rating greater than 1 million BTU/hr fired with other fuels.

- **Regulation 9, Rule 8 (Nitrogen Oxides and Carbon Monoxide from Stationary Internal Combustion Engines):** This rule limits the NO_x and CO emissions from stationary internal combustion engines. The rule applies to engines rated at greater than 50 brake horsepower, but it exempts emergency generators that would not run for more than 100 hours per year.

BAAQMD CEQA Guidelines

In April 1996, the BAAQMD prepared its *BAAQMD CEQA Guidelines* as a guidance document to provide lead government agencies, consultants and project proponents with uniform procedures for assessing air quality impacts and preparing the air quality sections of environmental documents for projects subject to CEQA. On June 2, 2010, the BAAQMD adopted updated *CEQA Air Quality Guidelines*. These guidelines describe the criteria that the BAAQMD uses when reviewing and commenting on the adequacy of environmental documents, such as this EIR. The updated *BAAQMD CEQA Air Quality Guidelines* recommend thresholds for use in determining whether projects would have significant adverse environmental impacts, identify methodologies for predicting project emissions and impacts, and identify measures that can be used to avoid or reduce air quality impacts. This EIR section was prepared following these recommendations.

Local Plans and Policies

The LBNL hill site is an approximately 200-acre site owned by the Regents of the University of California, where the University conducts research, service, and training work within the University's mission. The LBNL hill site includes research and support structures that are primarily part of a multi-program

national laboratory called the Lawrence Berkeley National Laboratory, a federally funded research and development center operated and managed by the University of California under a U.S. Department of Energy (DOE)-UC contract. As such, the University is exempted by the state constitution from compliance with local land use regulations, including general plans and zoning. However, the University seeks to cooperate with local jurisdictions to reduce any physical consequences of potential land use conflicts to the extent feasible. The SERC project site is located within the portion of the LBNL hill site that lies in the City of Berkeley. The following sections summarize objectives and policies from the 2006 Long Range Development Plan (LRDP), and the City of Berkeley General Plan that relate to air quality.

2006 LRDP Principles and Strategies

The 2006 LRDP proposed four fundamental principles that form the basis for the development strategies provided for each element of the LRDP. The one principle that is most applicable to air quality is to "Preserve and enhance the environmental qualities of the site as a model of resource conservation and environmental stewardship (LBNL 2007)."

Development strategies provided by the 2006 LRDP are intended to minimize potential environmental impacts that could result from implementation of the 2006 LRDP. Development strategies set forth in the 2006 LRDP that are applicable to air quality include the following:

- Protect and enhance the site's natural and visual resources, including native habitats, streams and mature tree stands by focusing future development primarily within the already developed areas of the site.
- Increase development densities within areas corresponding to existing cluster of development to preserve open space, enhance operational efficiencies and access.
- Site and design new facilities in accordance with University of California Presidential Policy for Green Building Design to reduce energy, water, and material consumption and provide improved occupant health, comfort and productivity.
- Increase use of alternative modes of transit through improvements to the Laboratory's shuttle bus service.
- Promote transportation demand management strategies such as vanpools and employee ride share programs.
- Maintain or reduce the percentage of parking spaces relative to the adjusted daily population.
- Consolidate parking into larger lots and/or parking structures, locate these facilities near Laboratory entrances to reduce traffic within the main site.

City of Berkeley General Plan

The City of Berkeley General Plan was adopted on April 23, 2002. The following policies and objectives are contained in the Environmental Management Element of the City of Berkeley General Plan (City of Berkeley 2002).

Objective 3 Reduce emissions and improve air quality.

Policy EM-18: Regional Air Quality Action: Continue working with the Bay Area Air Quality Management District and other regional agencies to:

1. Improve air quality through pollution prevention methods.
2. Ensure enforcement of air emission standards.
3. Reduce local and regional traffic (the single largest source of air pollution in the City) and promote public transit.
4. Promote regional air pollution prevention plans for business and industry.
5. Promote strategies to reduce particulate pollution from residential fireplaces and wood-burning stoves.
6. Locate parking appropriately and provide adequate signage to reduce unnecessary "circling" and searching for parking.

Policy EM-19: 15 percent Emission Reduction: Global Warming Plan: Make efforts to reduce local [air pollutants] emissions by 15 percent by the year 2010;

Policy EM-20: City of Berkeley Fleet: The City should exceed Federal and State [air quality] standards for all City fleet vehicles and use all means practical to reduce emissions of criteria pollutants and greenhouse gases;

Policy EM-21: Alternative Fuels: Work with the University of California, the Berkeley Unified School District, and other agencies to establish natural gas fueling and electric vehicle recharging stations accessible to the public; and

Policy EM-22: Public Awareness: Increase public awareness of air quality problems, rules, and solutions through use of City publications and networks.

In addition, the following policies from the Transportation Element of the City of Berkeley General Plan are applicable to air quality:

Policy T-10 Trip Reduction: To reduce automobile traffic and congestion and increase transit use and alternative modes in Berkeley, support, and when appropriate require, programs to encourage Berkeley citizens and commuters to reduce automobile trips. The programs that would apply to the proposed project are:

1. Participation in Commuter Check Program.
2. Carpooling and provision of carpool parking and other necessary facilities.
3. Telecommuting programs.
4. Programs to encourage neighborhood-level initiatives to reduce traffic by encouraging residents to combine trips, carpool, telecommute, reduce the number of cars owned, shop locally, and use alternative modes.
5. Programs to reward Berkeley citizens and neighborhoods that can document reduced car use.
6. Limitations on the supply of long-term commuter parking and elimination of subsidies for commuter parking.
7. No-fare shopper shuttles connecting all shopping districts throughout the city.

Policy T-12 Education and Enforcement: Support, and when possible require, education and enforcement programs to encourage carpooling and alternatives to single-occupant automobile use, reduce speeding, and increase pedestrian, bicyclist, and automobile safety;

Policy T-13 Major Public Institutions: Work with other agencies and institutions, such as the University of California, the Berkeley Unified School District, Vista Community College, and the Alameda County Court, and neighboring cities to promote Eco-Pass and to pursue other efforts to reduce automobile trips;

Policy T-19 Air Quality Impacts: Continue to encourage innovative technologies and programs such as clean-fuel, electric, and low-emission cars that reduce the air quality impacts of the automobile; and

Policy T-20 Neighborhood Protection and Traffic Calming: Take actions to prevent traffic and parking generated by residential, commercial, industrial, or institutional activities from being detrimental to residential areas.

4.2.4 IMPACTS AND MITIGATION MEASURES

Significance Criteria

For the purposes of this EIR, air quality impacts would be considered significant if they would exceed the following Standards of Significance, which are based on Appendix G of the *State CEQA Guidelines*, the BAAQMD *CEQA Air Quality Guidelines*, and the UC CEQA Handbook. According to these guidelines, a project would normally have a significant impact on air quality if it would:

- Conflict or obstruct with implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- 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);
- Expose sensitive receptors to substantial pollution concentrations;
- Create objectionable odors affecting a substantial number of people;
- Exceed the probability of 10 in 1 million of a maximally exposed individual contracting cancer due to emissions of toxic air contaminants; or
- Have ground level concentrations of non-carcinogenic toxic air contaminants that would result in a hazard index greater than 1.0 for the maximally exposed individual.

The UC CEQA Handbook states that, where applicable, the significance criteria established by the applicable air district may be used to make these determinations. The BAAQMD *CEQA Air Quality Guidelines* recommend analytical methodologies and provide evaluation criteria for determining the level of significance of project impacts under the above-listed general criteria. The BAAQMD's evaluation criteria for determining air quality impacts provide defined screening thresholds for pollutant emissions. These screening thresholds for air quality impacts from the BAAQMD *CEQA Air Quality Guidelines* are presented below.

Construction Emissions

Impacts related to construction emissions associated with the proposed project would be considered significant if the project emissions exceeded the thresholds listed in **Table 4.2-5, BAAQMD Average Daily Construction Emission Thresholds**.

Table 4.2-5
BAAQMD Average Daily Construction Emission Thresholds

Criteria Air Pollutants	Average Daily Emissions (Pounds per Day)
ROG	54
NO_X	54
PM_{10} (Exhaust)	82
$PM_{2.5}$ (Exhaust)	54

Source: Bay Area Air Quality Management District, 2010b.

Operational Emissions

Impacts from direct and/or indirect operational emissions associated with the proposed project would be considered significant if they exceeded the thresholds in **Table 4.2-6, BAAQMD Operational Emission Thresholds**.

Table 4.2-6
BAAQMD Operational Emission Thresholds

Criteria Air Pollutants	Average Daily Emissions (Pounds per Day)
ROG	54
NO_X	54
PM_{10} (Exhaust)	82
$PM_{2.5}$ (Exhaust)	54

Source: Bay Area Air Quality Management District, 2010b.

Direct emissions are those that are emitted on a site and include stationary sources and on-site mobile equipment, if applicable. Examples of land uses and activities that generate direct emissions are industrial operations and sources subject to an operating permit by the BAAQMD. Indirect emissions

come from mobile sources that access the project site, but generally are emitted off site. For many types of land development projects, the principal source of air pollutant emissions is the motor vehicle trips generated by the project.

Local Community Risk and Hazard Impacts

Local community risk and hazard impacts are associated with TACs and $PM_{2.5}$ because emissions of these pollutants can have significant health impacts at the local level. The proposed project would result in a significant impact if its emissions of TACs or $PM_{2.5}$ resulted in any of the following:

- Non-compliance with a qualified risk reduction plan; or,
- An incremental increase in cancer risk of more than 10 in 1 million, or an increase in non-cancer risk (i.e., chronic or acute) as measured by a hazard index greater than 1.0; or
- An incremental increase in ambient $PM_{2.5}$ of more than 0.3 micrograms per cubic meter ($\mu g/m^3$) annual average.

Cumulative Impacts

A project would have a cumulative considerable impact if the aggregate total of TAC or $PM_{2.5}$ emissions from all past, present, and foreseeable future sources within a 1,000-foot radius from the fence line of a source, or from the location of a receptor, plus the contribution from the project, result the following:

- Non-compliance with a qualified risk reduction plan; or,
- An incremental increase in cancer risk of more than 100 in 1 million or an increase in chronic non-cancer risk (from all local sources) as measured by a hazard index greater than 10.0; or
- An incremental increase in ambient $PM_{2.5}$ of more than 0.8 $\mu g/m^3$ annual average.

Local Carbon Monoxide Concentrations

Indirect CO emissions are considered significant if they will contribute to a violation of the state standards for CO (9.0 ppm averaged over 8 hours and 20 ppm over 1 hour). The BAAQMD recommends CO modeling for projects in which: (1) project vehicle emissions of CO would exceed 550 pounds per day; (2) project traffic would affect intersections or roadway segments operating at level of service (LOS) E or F, or would cause a decline to LOS E or F;[1] or (3) project traffic would increase traffic volumes on nearby roadways by 10 percent or more (unless the increase in traffic volume is less than 100 vehicles per hour).

[1] Levels of Service (LOS) range from A (least congested) with a condition of free flow with low volumes and high speeds to F (most congested) with stop and go, low-speed conditions with little or poor maneuverability.

Intersections are determined to operate at an LOS between A and F (LOS A being the best and LOS F being the worst) according to congestion or delay time, demand/capacity ratio, and relative flow of traffic at the intersection. Intersections that are determined to operate at LOS F or E have the potential to cause a CO hotspot (i.e., exceedance of the CAAQS). If necessary, a simplified CO modeling analysis, described in the BAAQMD *CEQA Air Quality Guidelines*, may be used to determine localized CO concentrations. If modeling demonstrates that the source would not cause a violation of the state standard at existing or reasonably foreseeable receptors, the motor vehicle trips generated by the project would not have a significant impact on local air quality.

Odor Impacts

The thresholds of significance for odor impacts are qualitative in nature. A project that would site a new odor source or a new receptor farther than the applicable screening distance provided by the BAAQMD from an existing receptor or odor source, respectively, would not likely result in a significant odor impact. **Table 4.2-7, BAAQMD Odor Screening Distances**, provide the BAAQMD's list of known odor emitting facilities and their screening distances. In addition, an odor source with five or more confirmed complaints per year averaged over three years is considered to have a significant impact on receptors within the screening distance.

Table 4.2-7
BAAQMD Odor Screening Distances

Type of Facility	Distance
Wastewater Treatment Plant	2 miles
Wastewater Pumping Facility	1 mile
Sanitary Landfill	2 mile
Transfer Station	1 mile
Composting Facility	1 mile
Petroleum Refinery	2 miles
Asphalt Batch Plant	2 miles
Chemical Manufacturing	2 miles
Fiberglass Manufacturing	1 mile
Painting/Coating Operations	1 mile
Rendering Plant	2 miles
Coffee Roaster	1 mile

Type of Facility	Distance
Food Processing Facility	1 mile
Confined Animal Facility/Feed Lot/Dairy	1 mile
Green Waste and Recycling Operations	1 miles
Metal Smelting Plants	2 miles

Source: Bay Area Air Quality Management District, CEQA Air Quality Guidelines*, (2010) 3-4.*

Impact Assessment Methodology

Air quality impacts resulting from the implementation of the proposed project fall into two categories: short-term impacts due to construction activities and long-term impacts from the day-to-day operations of the proposed project. Construction activities would impact air quality on a local level due to fugitive dust PM_{10} and other criteria pollutant emissions associated with heavy-duty construction equipment exhaust. The URBEMIS2007 Environmental Management Software, and information provided in the *Software User's Guide [for] URBEMIS2007 for Windows* was used to quantify construction emissions resulting from the development of the proposed project (Rimpo and Associates 2008). The URBEMIS2007 model utilizes the EMPAC2007 emissions factor model for on-road motor vehicle sources and the OFFROAD2007 emissions factor model for off-road equipment.

Following construction of the proposed project, operational criteria pollutant emissions would be generated primarily by project-related motor vehicle trips. Emissions from on-site stationary and area sources such as cooling towers, emergency engines, boilers, natural gas combustion, and landscape maintenance equipment would also be generated. URBEMIS2007 was used to quantify mobile and area source emissions resulting from the operation of the proposed project. Emissions from on-site stationary sources (i.e., cooling towers, emergency engines, and boilers) were calculated using emission factors contained in U.S. EPA's *Compilation of Air Pollutant Emission Factors* (also referred to as AP 42) and the emissions standards for compression-ignition diesel engines established by CARB and the U.S. EPA (US EPA 1995; California Code of Regulations Section 93115). The emission calculations and daily emissions are described in further detail below.

Mitigation Measures Included in the Proposed Project

The following mitigation measures, adopted as part of the LBNL 2006 LRDP, are required by the 2006 LRDP for the proposed project and are thus included as part of the proposed project. The analysis presented below evaluates environmental impacts that would result from project implementation following the application of these mitigation measures.

LRDP EIR MM AQ-1a: During construction of the proposed LRDP buildings, the developer must implement all "basic" control measures to minimize the generation of fugitive dust. In addition, for construction sites greater than 4 acres or projects that would generate large amounts of fugitive dust, "enhanced" and "optional" control measures should be implemented. The recommended control measures are located in Table 2 of the *BAAQMD CEQA Guidelines*.

LRDP EIR MM AQ-1b: During construction of the proposed LRDP buildings, the developer must implement the following mitigation measures to minimize heavy-duty construction equipment exhaust.

- Construction equipment shall be properly tuned and maintained in accordance with manufacturer's specifications.
- Best management construction practices shall be used to avoid unnecessary emissions (e.g., truck and vehicles in loading and unloading queues would turn their engines off when not in use).
- Any stationary motor sources such as generators and compressors located within 100 feet of a sensitive receptor shall be equipped with a supplementary exhaust pollution control system as required by the BAAQMD and CARB.
- Incorporate use of low-NO_X emitting, low-particulate emitting, or alternatively fueled construction equipment into the construction equipment fleet where feasible, especially when operating near sensitive receptors.
- Reduce construction-worker trips with ride-sharing or alternative modes of transportation.

LRDP EIR MM AQ-4a: To avoid the single location where implementation of the 2006 LRDP would result in an increase in health risk in excess of the 10-in-1-million threshold, LBNL shall adjust, prior to the construction of parking structure PS-1 (or similarly configured building), the exhaust system of the existing generator near Building 90 to reduce or eliminate the restriction on upward exhaust flow caused by the existing rain cap. For example,

modeling indicates that removal of the rain cap would reduce the risk caused by construction of parking structure PS-1 in proximity to the existing generator to a level below 10 in 1 million. The Berkeley Lab could install a hinged rain cap, which would prevent moisture infiltration into the generator but still allow unobstructed exhaust flow and would avoid the significant impact identified in the health risk assessment.[2]

4.2.5 PROJECT IMPACTS AND MITIGATION MEASURES

This section presents the project-specific impacts. Cumulative air quality impacts are discussed in **subsection 4.2.6, Cumulative Impacts**.

SERC Impact AQ-1: **Construction of the proposed project would generate short-term emissions of fugitive dust and criteria air pollutants that would not adversely affect local air quality in the vicinity of the construction site and would not exceed the BAAQMD construction significance thresholds. (*Less than Significant*)**

Mass-Based Thresholds

Construction of the proposed project is anticipated to commence in mid 2011 and be completed by mid 2013. The proposed SERC project would construct an approximately 40,000 gross square foot three-story building, which would consist of laboratory, office, and interaction space and would be centrally located on the LBNL hill site at the current location of Buildings 25A, 44, 44A, and 44B in the "Old Town" area. These buildings would be decontaminated and demolished as part of the approved Old Town Demolition project prior to commencement of construction of the proposed SERC project.

Construction activities would include grading/excavation, trenching, building construction, asphalt paving, and architectural coating. Site-specific or project-specific data was used in the URBEMIS2007 model where available. UC LBNL provided a preliminary schedule for construction and grading amounts. Grading would include the export of 13,000 cubic yards of soil. The default construction equipment and vehicle mixes generated by URBEMIS2007 were assumed for grading, building construction, and asphalt paving. The number of vendor trips (e.g., transport of building materials) and worker trips were based on default values in the URBEMIS2007 model. For all proposed projects,

[2] While this measure is not specifically applicable to the proposed project, consistency with its provisions regarding the configuration of the emergency generator stack would help to reduce the potential health impacts associated with the emissions from the proposed emergency generator.

BAAAQMD recommends the implementation of all *Basic Construction Mitigation Measures* (BAAQMD 2010), whether or not construction-related emissions exceed the construction thresholds of significance. Furthermore, **LRDP EIR Mitigation Measures AQ-1a** and **AQ-1b** are part of the proposed project and would be implemented during construction. Therefore, these mitigation measures were applied to the URBEMIS2007 model calculations.

Table 4.2-8, Estimated Construction Emissions, identifies the maximum daily emissions for each pollutant during each phase of project construction. Construction emissions include all emissions associated with the construction equipment, grading and trenching activities, worker trips, and on-road diesel trucks.

Table 4.2-8
Estimated Construction Emissions

	Emissions in Pounds per Day					
Construction Year	**ROG**	**NO_X**	**CO**	**SO_X**	**PM_{10} (PM_{10} exhaust)**	**$PM_{2.5}$ ($PM_{2.5}$ exhaust)**
2011						
Mass Grading	3.60	33.95	16.79	0.02	28.16 (1.54)	6.98 (1.41)
Trenching	1.98	16.48	9.15	0.00	0.83 (0.82)	0.76 (0.76)
Building Construction	1.42	10.92	10.12	0.01	0.66 (0.62)	0.58 (0.57)
Maximum Daily Emissions	**5.59**	**50.43**	**25.93**	**0.02**	**28.99 (2.36)**	**7.74 (2.17)**
BAAQMD Thresholds	54	54	—	—	(82)	(54)
Exceeds Threshold?	NO	NO	—	—	NO	NO
2012						
Building Construction	1.32	10.02	9.61	0.01	0.59 (0.56)	0.52 (0.51)
Maximum Daily Emissions	1.32	10.02	9.61	0.01	0.59 (0.56)	0.52 (0.51)
BAAQMD Thresholds	54	54	—	—	(82)	(54)
Exceeds Threshold?	NO	NO	—	—	NO	NO
2013						
Building Construction	1.21	9.18	9.14	0.01	0.53 (0.49)	0.46 (0.45)
Architectural Coating	20.41	0.01	0.22	0.00	0.00 (0.00)	0.00 (0.00)
Asphalt Paving	1.70	9.73	8.40	0.00	0.81 (0.80)	0.74 (0.74)
Maximum Daily Emissions	**23.32**	**18.92**	**17.76**	**0.01**	**1.34 (1.29)**	**1.20 (1.19)**
BAAQMD Thresholds	54	54	—	—	(82)	(54)
Exceeds Threshold?	NO	NO	—	—	NO	NO

Source: Impact Sciences, Inc. Detailed URBEMIS2007 emissions calculations are provided in ***Appendix 4.2****.*
Totals in table may not appear to add exactly due to rounding in the computer model calculations.

As shown in the above table, construction emissions would not exceed any BAAQMD thresholds of significance; therefore, construction of the proposed project would not have a significant impact on air quality.

Concentration-Based Threshold

The BAAQMD has established a concentration-based threshold for exhaust emissions of $PM_{2.5}$ during construction. Diesel particulate matter (DPM) is primarily emitted as $PM_{2.5}$. The $PM_{2.5}$ concentrations are calculated for emissions from both on-site, off-road construction equipment, and off-site, on-road construction truck traffic. As shown below in **Table 4.2-9, Modeled $PM_{2.5}$ Concentrations (Construction)**, concentrations of $PM_{2.5}$ are much below the threshold. In view of these low concentrations, the resulting Lifetime Excess Cancer Risk (LECR) and chronic health hazard would also be much lower than the BAAQMD significance thresholds and the potential adverse effects to sensitive receptors (e.g., residences) from DPM during construction would not be significant.

Table 4.2-9
Modeled $PM_{2.5}$ Concentrations (Construction)

Emissions Source	Averaging Period	Maximum Concentration (micrograms per cubic meter)
Construction (2011)	Annual	0.009
Construction (2012)	Annual	0.007
Construction (2013)	Annual	0.004
BAAQMD Thresholds	Annual	0.3
Exceeds Threshold?		NO

*Source: Impact Sciences, Inc. Emissions calculations and a summary of the AERMOD modeling input parameters are provided in **Appendix 4.2**.*
Totals in table may not appear to add exactly due to rounding in the computer model calculations.

Mitigation Measure: No project-level mitigation measure is required.

SERC Impact AQ-2: **The proposed project would generate long-term operational emissions of criteria pollutants from increases in traffic and stationary and area sources that would not adversely affect air quality. (*Less than Significant*)**

Mass-Based Thresholds

Operational emissions associated with the proposed project would result from increased vehicular trips to and from the facility (i.e., mobile sources). Other sources of operational emissions associated with the project include area and stationary source emissions, such as the use of natural gas in the boilers and for other lab uses, landscape maintenance equipment, an emergency generator, and a two-cell cooling tower. The mobile source emissions associated with the proposed project were estimated using URBEMIS2007, a land use and emissions estimation model. URBEMIS2007 estimates vehicle emissions based on the amount of development and trip generation rate of the development. The trip generation rate of the proposed project was provided by the traffic study prepared for the proposed project (Fehr & Peers 2010). In addition, URBEMIS2007 incorporates trip distances and emission factors specific to counties, air basins, and air district jurisdictions. For the proposed project, parameters specific to Alameda County were used to estimate mobile and area source emissions. Area source emissions estimated using URBEMIS2007 include natural gas use in laboratories, landscape maintenance equipment, and periodic architectural coating maintenance. The proposed project would be designed consistent with the UC Policy for Sustainable Practices, which requires new buildings to outperform California Code of Regulations Title 24 standards by at least 20 percent, and design and build new buildings to a minimum standard equivalent to a LEED Silver rating. Energy measures being considered during design include a heat recovery system, an evaporative pre-cooling hybrid system, ultra low air pressure drop air handling units, and daylight harvesting. Although the proposed project's design could outperform Title 24 standards by more than 20 percent, the exact percentage is not known at this stage of development. Therefore, area source emissions in URBEMIS2007 were calculated assuming a 20 percent reduction. Detailed URBEMIS2007 outputs, including parameters and assumptions, are provided in **Appendix 4.2**.

The proposed project would also include stationary sources such as an emergency generator, two boilers, and a two-cell cooling tower. A 400-kilowatt emergency generator would be installed, and would act as an energy supply in the case of an electricity outage in the area. Criteria pollutant emissions associated with the emergency generator were calculated using emission standards for off-road diesel (compression-ignition) engines established by CARB and the U.S. EPA (California Code of Regulations Section 93115). Because the engine would have an output rating greater than 50 horsepower, this unit must comply with the BAAQMD's Best Available Control Technology (BACT) measure for stationary compression-ignition engines. The BACT requires new emergency standby engines comply with hydrocarbon, NO_X, SO_2, and CO limits that are applicable to an off-road engine of the same model year and horsepower rating. The BACT further limits the PM emissions from an emergency standby engine to 0.01 gram per horsepower-hour (g/hp-hr) (with a maximum operating limit of 50 hours per year for testing and maintenance), with the Interim Tier-4 standard. Since June 2006, the sulfur content of

available CARB diesel fuel has been 15 ppm (0.0015 percent) by weight, and this concentration was used to estimate the SOx emissions from the proposed engine. The criteria pollutant emissions associated with the operation of the 400-kilowatt emergency generator are included in the stationary source category in **Table 4.2-10**, **Estimated Operational Emissions**.

The proposed project's two-cell cooling tower would provide chilled water for the proposed facility. The emissions were estimated based on the engineering data provided by Baltimore Aircoil Company for a Series 3000 cooling tower. The emissions associated with the boilers were calculated using emission factors contained in the U.S. EPA's AP 42, a compilation of emission factors for various area and point sources (U.S. EPA 1995). Stationary source emissions associated with the proposed project were quantified and included as "stationary sources" in **Table 4.2-10**. Detailed calculations of each stationary source are included in **Appendix 4.2**.

Table 4.2-10
Estimated Operational Emissions

Emissions Source	Emissions in Pounds per Day					
	ROG	NOx	CO	SOx	PM10	PM2.5
Summertime Emissions[1]						
Stationary Sources	0.53	4.17	23.97	0.05	1.01	1.01
Operational (Mobile) Sources	0.83	0.47	4.75	0.01	0.94	0.18
Area Sources	0.39	0.60	2.04	0.00	0.01	0.01
Summertime Emission Totals	**1.75**	**5.24**	**30.76**	**0.06**	**1.96**	**1.20**
BAAQMD Thresholds	54	54	—	—	82	54
Exceeds Threshold?	NO	NO	—	—	NO	NO
Wintertime Emissions[2]						
Stationary Sources	0.53	4.17	23.97	0.05	1.01	1.01
Operational (Mobile) Sources	0.44	0.70	5.13	0.00	0.94	0.18
Area Sources	0.27	0.58	0.49	0.00	0.00	0.00
Wintertime Emission Totals	**1.24**	**5.45**	**29.59**	**0.05**	**1.95**	**1.19**
BAAQMD Thresholds	54	54	—	—	82	54
Exceeds Threshold?	NO	NO	—	—	NO	NO

Source: Impact Sciences, Inc. Detailed URBEMIS2007 and stationary source emissions calculations are provided in ***Appendix 4.2****.*
Totals in table may not appear to add exactly due to rounding in the computer model calculations.
[1] *"Summertime Emissions" are representative of the conditions that may occur during the ozone season (May 1 to October 31).*
[2] *"Wintertime Emissions" are representative of the conditions that may occur during the balance of the year (November 1 to April 30).*

As shown above, operational emissions associated with the day-to-day activities of the proposed project would not exceed any of the operational thresholds of significance. Projects that generate emissions below the regional thresholds of significance would not be considered to contribute a substantial amount of air pollutants. Therefore, operational emissions would be considered to have a less than significant impact, and the project would not contribute substantially to the existing ozone, PM_{10}, and $PM_{2.5}$ nonattainment status for the Basin.

Concentration-Based Threshold

The BAAQMD has established a concentration-based threshold for exhaust emissions of $PM_{2.5}$ during project operation. The $PM_{2.5}$ concentrations are calculated for stationary source emissions and area source emissions. As shown below in **Table 4.2-11**, **Modeled $PM_{2.5}$ Concentrations (Operational)**, concentrations of $PM_{2.5}$ would be much lower than the BAAQMD thresholds and the potential adverse effects to sensitive receptors (e.g., residences) from DPM during operation would be less than significant.

Table 4.2-11
Modeled $PM_{2.5}$ Concentrations (Operational)

Emissions Source	Averaging Period	Maximum Concentration (micrograms per cubic meter)
Operational	Annual	0.011
BAAQMD Thresholds	Annual	0.3
Exceeds Threshold?		NO

*Source: Impact Sciences, Inc. Emissions calculations and a summary of the AERMOD modeling input parameters are provided in **Appendix 4.2**.*
Totals in table may not appear to add exactly due to rounding in the computer model calculations.

Mitigation Measure: No project-level mitigation measure is required.

SERC Impact AQ-3: **The proposed project would increase carbon monoxide concentrations at busy intersections and along congested roadways in the project vicinity but would not expose sensitive receptors to substantial pollution concentrations. (*Less than Significant*)**

Emissions and ambient concentrations of CO have decreased dramatically in the SFBAAB with the introduction of the catalytic converter in 1975. No exceedances of CAAQS or NAAQS for CO have been recorded at nearby monitoring stations since 1991. SFBAAB is currently designated as an attainment area

for the CAAQS and NAAQS for CO; however, localized CO concentrations can exceed CAAQS or NAAQS. CO is produced in greatest quantities from vehicle combustion and is usually concentrated at or near ground level under cool, stable (i.e., low or no wind) atmospheric conditions because it does not readily disperse into the atmosphere. As a result, potential air quality impacts to sensitive receptors are assessed through an analysis of localized CO concentrations. Congested intersections, roadways, and parking structures where high ambient concentrations of CO accumulate are termed CO "hotspots." These hotspots have the potential to exceed the state ambient air quality of 1-hour CO standard of 20 ppm or the 8-hour CO standard of 9.0 ppm. Note that the federal levels are based on 1- and 8-hour standards of 35 and 9 ppm, respectively. Thus, an exceedance condition would occur based on the state standards prior to exceedance of the federal standard. As such, exceedance of the state ambient air quality 1-hour standard of 20 ppm or the 8-hour standard of 9.0 ppm would constitute a significant air quality impact.

The proposed project was evaluated to determine if it would cause a CO hotspot using the BAAQMD's preliminary screening procedure, which provides a conservative indication of whether the proposed project would result in CO concentrations that would substantially contribute to an exceedance of the thresholds of significance. This methodology states that the proposed project would result in a less than significant impact related to localized CO concentrations if the following screening criteria are met: (1) the project is consistent with an applicable congestion management program established by the county congestion management agency for designated roads or highways, regional transportation plan, and local congestion management agency plans; (2) the project traffic would not increase traffic volumes at affected intersections to more than 44,000 vehicles per hour; and (3) the project traffic would not increase traffic volumes at affected intersections to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (e.g., tunnel, parking garage, bridge underpass, natural or urban street canyon, below-grade roadway). The proposed project would be consistent with the applicable congestion management programs established by the County congestion management agency as mentioned above under the transportation policies of LBNL. Moreover, the traffic report prepared for the proposed project did not find any intersections, where the project would increase traffic volumes to more than 44,000 vehicles per hour or where the project trips would increase volumes to more than 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited (Fehr & Peers 2010). Therefore, the proposed project would not have a significant impact on air quality with respect to CO hotspots.

Mitigation Measure: No project-level mitigation measure is required.

SERC Impact AQ-4: **The proposed project would not create objectionable odors affecting a substantial number of people. (*Less than Significant*)**

The proposed project would consist of research laboratory space and offices. Although the proposed operations could conduct activities that would generate odors, each laboratory would be equipped with fume hoods and exhaust systems to control any odor generated within the facility. Each fume hood would be equipped with an airflow sensor. All air exhausts would be located on the SERC building roof. Discharge from the fume exhaust would meet applicable vertical velocity and stack height requirements to enhance dispersion of the exhaust, thereby minimizing any odor impact caused by the proposed project.

In addition, the LBNL hill site, which includes the proposed project site, provides an extensive buffer zone around most of the site's perimeter. It should also be noted that LBNL hill site has no previous history of odor complaints. The proposed project site would be located centrally in the LBNL site. The closest sensitive receptors to the proposed project site are located north of the project site at least 1,600 feet away. These receptors are located outside the zone towards which the prevailing winds blow (toward the east and southeast), which would further reduce the potential for odor impacts. It should be noted that nighttime winds tend to blow toward the northwest, which could carry any potential odors toward the residents located northwest of LBNL. However, this is not the predominant wind direction and would occur during the evening when receptors tend not to be outdoors. Due to the project features described above, the distance to the nearest receptors, and the prevailing wind direction (which blows toward the east and southeast), the proposed project construction and operations would not create objectionable odors that would impact a substantial number of people. Construction truck traffic associated with the proposed project would be controlled so as to avoid traffic congestion and impacts at city intersections. This would also minimize the odors resulting from trucks traveling along Hearst Avenue and other streets. Therefore, this impact would be less than significant.

Mitigation Measure: No project-level mitigation measure is required.

SERC Impact AQ-5: **The proposed project would not expose the maximally exposed individual to an increased cancer risk exceeding 10 in 1 million. (*Less than Significant*)**

A human health risk assessment (HHRA) memorandum was prepared for the proposed project which relied on the overall human health risk assessment calculations performed previously as part of the EIR certified for the 2006 LRDP for the entire LBNL hill site (Golder Associates 2010a). The HHRA

calculations for LBNL were performed based on two different sets of parameters: (1) a set of hypothetical "projects" at various sites around the facility, and (2) a set of "bounding case" parameters, which grouped projects into unrealistic, but conservative, groupings around the perimeter of the LBNL hill site. The HHRA memorandum compares the parameters affecting TAC emissions for the SERC project to the LRDP project assumptions to determine whether it can be shown that 2006 LRDP EIR HHRA adequately assessed the potential human health impacts resulting from the SERC project.

Construction TACs

The proposed SERC project is located within the hypothetical area designated as Building S7 in the 2006 LRDP EIR HHRA. Building S7 covers the areas where the SERC building and the General Purpose Lab (GPL) would be located. TAC emissions associated with the construction of the proposed project would emit DPM primarily from mobile sources powered by diesel-fueled internal combustion engines. In the 2006 LRDP EIR HHRA, impacts from building construction activities were assessed based on the total square footage of the hypothetical buildings being constructed. The combined square footage of the proposed SERC and GPL buildings is less than the square footage of the hypothetical Building S7. Because TAC emissions associated with building construction are expected to be roughly proportional to the square footage of the building being constructed, it is reasonable to conclude that the human health impacts from TAC emissions during construction of the SERC building were adequately accounted for in the 2006 LRDP EIR HHRA.

Operational TACs

TAC emissions from operations at office/laboratory buildings at LBNL occur primarily from the use of chemicals in research laboratories, natural gas combustion in water heaters, and DPM emissions from any associated emergency backup generators. The HHRA memorandum compared the laboratory space, natural gas combustion rate and emergency generator engine size of the SERC, GPL, and hypothetical Building S7. The laboratory square footage and natural gas combustion assessed for the hypothetical Building S7 in the 2006 LRDP was substantially greater than the combined quantities for the SERC and GPL buildings. Since TAC emissions from these sources would be expected to be roughly proportional to these parameters, it is reasonable to conclude that the HHRA in the 2006 LRDP EIR adequately assessed TAC emissions from these sources.

In addition, the HHRA memorandum reviewed the stationary sources included in the SERC project relative to the stationary sources included in the 2006 LRDP EIR HHRA. The combined engine horsepower of the emergency generators for the SERC and GPL buildings (1,120 horsepower) is somewhat greater than the assumed engine horsepower for the emergency generator associated with the

hypothetical Building S-7 in the 2006 LRDP EIR HHRA (670 horsepower). This might imply that estimated TAC emissions (DPM in the case of diesel generators) would be somewhat higher in the case of the proposed SERC and GPL buildings relative to those assessed in the 2006 LRDP HHRA. However, in the 2006 LRDP EIR HHRA assessment, an assumed DPM emission factor of 0.08 gram per horsepower-hour (g/hp-hr) was used. For the recent GPL HHRA assessment, it was determined that available generators would have a maximum DPM emission rate of 0.046 g/hp-hr.[3] So the maximum hourly DPM emission rate for the two generators associated with the SERC and GPL building projects would be 49.2 grams per hour, whereas the assessed DPM emission rate for the single 670 hp generator associated with the hypothetical Building S-7 in the LRDP HHRA was 53.6 grams per hour, or slightly higher than the emission rate for the two projects together. Therefore, it is reasonable to conclude that the HHRA in the 2006 LRDP EIR adequately assessed TAC emissions from the operation of these emergency generators.

The proposed project's HHRA memorandum also reviewed the chemicals that might be used in the SERC building and compared them to laboratory chemicals that would be used in new laboratories in general for the 2006 LRDP EIR HHRA. A list of 34 chemicals was generated, based on chemicals that might be used in quantities exceeding 250 milliliters or 250 grams per year, of which 15 had toxicity factors published by CARB that could potentially be used to quantitatively assess human health effects. All 15 of these chemicals were considered in the 2006 LRDP EIR HHRA. In addition, the projected annual usages of these chemicals were less than 15 percent of the total usage levels assumed in the 2006 LRDP EIR HHRA.

Based on all of the analysis described above, it was concluded that the SERC project was adequately addressed in the 2006 LRDP EIR HHRA and further evaluation was not required.

A project-specific HHRA of the proposed GPL project was completed as part of the Seismic Phase 2 EIR. That analysis estimated a construction cancer risk of 8-in-a-million for the GPL project. Since the proposed SERC project is smaller in size than the GPL project, the SERC project is unlikely to result in a construction cancer risk greater than 8-in-a-million; therefore, construction of the proposed SERC project would not result in TAC emissions that cause the LECR to exceed the BAAQMD's cancer risk significance threshold, and would have a less than significant impact on human health with respect to construction. The Seismic Phase 2 EIR also included an analysis of the GPL's operational TAC emissions and determined that the project would result in an on-site LECR of 0.5-in-a-million and an off-site LECR of 0.2-in-a-million. Based on the size of the SERC project and its general similarity with the proposed GPL, it

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3 Allowable emissions from diesel internal combustion engines have been further restricted by state and federal regulations since the date that the 2006 LRDP HHRA assessment was performed.

is reasonable to conclude that the SERC project would not result in a LECR that would exceed the BAAQMD significance thresholds. The proposed project's impact would be less than significant.

Mitigation Measure: No project-level mitigation measure is required.

SERC Impact AQ-6: **The proposed project would not generate ground level concentrations of noncarcinogenic toxic air contaminants that would result in a Hazard Index greater than 1.0 for the maximally exposed individual. (*Less than Significant*)**

The 2006 LRDP EIR HHRA performed previously for the entire LBNL facility (Golder Associates 2010b) concluded a maximum chronic Hazard Index of 0.062 for construction and 0.003 for on-site receptors and 0.001 for off-site receptors for operations. As the maximum impacts from all LBNL site-wide sources are much less than the threshold of 1.0, non-carcinogenic impacts associated with the proposed SERC project would not exceed the significance threshold. The impact would be less than significant.

Mitigation Measure: No project-level mitigation measure is required.

SERC Impact AQ-7: **Development of the proposed project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under the federal and state ambient air quality standard. (*Less than Significant*)**

The SFBAAB is currently designated as a nonattainment area for state and national ozone standards and particulate matter standards. Past, present and future development projects contribute to the region's adverse air quality impacts on a cumulative basis. No single project is sufficient in size to, by itself, result in nonattainment of ambient air quality standards. Instead, the BAAQMD *CEQA Air Quality Guidelines* states that a project's individual emissions contribute to existing cumulatively significant adverse air quality impacts. According to the BAAQMD, if a project exceeds the identified significance thresholds, its emissions would be cumulatively considerable, resulting in significant adverse air quality impacts to the region's existing air quality conditions. Because as shown in the analysis above, the proposed project would not exceed any of BAAQMD's thresholds of significance, the proposed project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under the federal and state ambient air quality standards. The impact would be less than significant.

Mitigation Measure: No project-level mitigation measure is required.

4.2.6 CUMULATIVE IMPACTS

As stated in **subsection 4.0.4**, the 2006 LRDP EIR included the evaluation of the environmental impacts from the construction of a large building at the proposed site of the SERC project, in conjunction with the rest of the projected growth at the LBNL hill site, growth at UC Berkeley, and in the nearby communities. That cumulative impact analysis (LRDP Impacts AQ-5 and AQ-6) is presented on pages IV.B-47 to IV.B-50 of the 2006 LRDP EIR. The analysis under LRDP Impact AQ-5 concluded that development under the 2006 LRDP, which includes the proposed project, would not contribute considerably to cumulative increases in criteria pollutants, and the cumulative effect would be less than significant. There are no changes in circumstances that would change the conclusion of the previous analysis of the cumulative impacts of criteria pollutant emissions.

The analysis under LRDP Impact AQ-6 concluded that, although the cumulative emissions of toxic air contaminants would decrease as a result of new regulations and improved technologies, the cumulative emissions of toxic air contaminants associated with the 2006 LRDP (including the proposed project), combined with toxic air contaminant emissions from sources on the UC Berkeley campus under the UC Berkeley 2020 LRDP, would result in a maximum off-site cancer risk of 22-in-a-million, exceeding the 10-in-a-million significance threshold used at the time for both project-level and cumulative impacts. Using this standard, the cumulative impact was deemed to be significant and unavoidable in the LBNL 2006 LRDP EIR. Since the certification of the 2006 LRDP EIR, the BAAQMD has issued revised guidance for the evaluation of cumulative impacts from exposure to toxic air contaminants and has adopted a significance threshold of an increase in cancer risk of 100-in-a-million for evaluation of cumulative cancer risk impacts. The total cancer risk from cumulative emissions of toxic air contaminants calculated in the LBNL 2006 LRDP EIR is substantially below the new threshold and therefore the cumulative impact is considered less than significant.

Cumulative Impact AQ-1: **Construction emissions of the proposed project, in conjunction with emissions from other construction projects within 1,000 feet would not result in adverse health impacts. (*Less than Significant*)**

Cumulative air quality impacts from construction emissions associated with the proposed project combined with construction emissions from other construction projects within 1,000 feet of the proposed project were evaluated. Consistent with the BAAQMD cumulative significance thresholds, this analysis includes the cumulative LECR, chronic hazard, and $PM_{2.5}$ impact on both on-site and off-site receptors from project site emissions and the cumulative LECR, chronic hazard, and $PM_{2.5}$ impact on off-site receptors from truck traffic associated with the cumulative projects.

There are four other projects proposed on the LBNL hill site that would be under construction at the same time and within 1,000 feet of the proposed SERC project. These include the GPL under Seismic Phase 2 project, Old Town demolition, CRT facility, and Building 51 and 51A demolition. Construction DPM and $PM_{2.5}$ emissions resulting from these projects were estimated using methods and models described in the sections above. Dispersion modeling was conducted to estimate maximum average DPM and $PM_{2.5}$ concentrations. The LECR and chronic hazard for the hypothetical maximally exposed individual were calculated. The results are reported in **Tables 4.2-12** through **4.2-14** below. Based on these estimates, the cumulative LECR, chronic hazard, and $PM_{2.5}$ impacts would be less than significant.

Table 4.2-12
Cumulative LECR and Chronic Hazard Estimates for On-Site, Off-Road Construction/Demolition Equipment DPM Emissions

Assessment	Maximally Exposed Individual Result	Significance Threshold
Cumulative On-Site LECR	15-in-a-million	100-in-a-million
Cumulative On-Site Chronic Hazard	0.3	1.0
Cumulative Off-Site LECR	25-in-a-million	100-in-a-million
Cumulative Off-Site Chronic Hazard	0.06	1.0

Source: Golder Associates, January 2010

Table 4.2-13
Cumulative LECR and Chronic Hazard Estimates for Construction/Demolition Truck Traffic

Assessment	Maximally Exposed Individual Result	Significance Threshold
Cumulative Off-Site LECR	9-in-a-million	100-in-a-million
Cumulative Off-Site Chronic Hazard	0.02	1.0

Source: Golder Associates, January 2010

Table 4.2-14
Cumulative Maximum Estimated Annual $PM_{2.5}$ Concentration in Ambient Air from Construction/Demolition Emissions

Pollutant	Assessment	Maximum Ambient Concentration	Significance Threshold
$PM_{2.5}$	On-Site, Off-Road Equipment Emissions	0.31 $\mu g/m^3$	0.8 $\mu g/m^3$
$PM_{2.5}$	On-Site, Off-Road Truck Emissions	0.07 $\mu g/m^3$	0.8 $\mu g/m^3$

Source: Golder Associates, January 2010

4.2.7 REFERENCES

Bay Area Air Quality Management District. 1997. *1997 Clean Air Plan and Triennial Assessment*. December.

Bay Area Air Quality Management District. 2000. *2000 Clean Air Plan and Triennial Assessment*. December.

Bay Area Air Quality Management District. 2001. *Revised San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard*. October.

Bay Area Air Quality Management District. 2006. *Bay Area 2005 Ozone Strategy*. January.

Bay Area Air Quality Management District. 2010a. *Draft Bay Area 2010 Clean Air Plan*. March.

Bay Area Air Quality Management District. 2010b. "CEQA Air Quality Guidelines." http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Updated-CEQA-Guidelines.aspx.

California Air Resources Board and Office of Environmental Health Hazard Assessment. 2010. "Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values." http://www.arb.ca.gov/toxics/healthval/healthval.htm.

California Code of Regulations, Title 17, Section 93115, Airborne Toxic Control Measure for Stationary Compression Ignition (CI) Engines.

City of Berkeley Planning & Development Department. 2002. *City of Berkeley General Plan*.

City of Oakland Planning & Zoning Department. 1996. *Open Space, Conservation, and Recreation (OSCAR) Element of the Oakland General Plan*.

City of Oakland Planning & Zoning Department. 1998. *City of Oakland General Plan*.

Fehr & Peers Transportation Consultants. 2010. *Solar Energy Research Center Traffic Analysis Memorandum*.

Golder Associates. 2010a. *Review of Potential Human Health Risks – Solar Energy Research Center Project, Lawrence Berkeley National Laboratory, Berkeley, California*.

Golder Associates. 2010b. *Air Quality Technical Analysis Performed for the Seismic Phase 2 Project at the Lawrence Berkeley National Laboratory*.

Office of Environmental Health Hazard Assessment. Air Toxics Hot Spots Program. 2003. *Guidance Manual for Preparation of Health Risk Assessments*. August.

Rimpo and Associates. 2008. "URBEMIS2007 for Windows." http://www.urbemis.com.

United States Environmental Protection Agency. 1995. "Compilation of Air Pollutant Emission Factors (AP 42), Fifth Edition." http://www.epa.gov/ttnchie1/ap42/

United States Environmental Protection Agency. 2010a. "Class I Ozone Depleting Substances." http://www.epa.gov/ozone/science/ods/classone.html

United States Environmental Protection Agency. 2010b. The Accelerated Phase-Out of Class 1 Ozone-Depleting Substances. http://www.epa.gov/ozone/title6/phaseout/accfact.html.

Lawrence Berkeley National Laboratory. 2007. *Lawrence Berkeley National Laboratory Long-Range Development Plan, Final Environmental Impact Report*.

University of California, Chancellors Interim Lab Director – Lawrence Berkeley National Laboratory. 2009. *Policy on Sustainable Practices*.

University of California, Office of the President. 2001. University of California CEQA Handbook. July.