4.2 AIR QUALITY

This section evaluates the impacts on air quality resulting from implementation of the 2007 LRDP and is based on the *Air Quality Assessment* and *Air Toxics Health Risk Assessment* prepared for this project by Scientific Resources Associated (SRA) (2007 and 2006) (Appendix B). This evaluation assesses the potential for the 2007 LRDP to conflict with, or obstruct implementation of, applicable air quality plans; violate an 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 not in attainment; expose sensitive receptors to substantial pollutant concentrations; or expose a substantial number of people to objectionable odors. The potential of the 2007 LRDP to result in a significant increase in the risks of carcinogenic and non-carcinogenic health effects from airborne emissions is also addressed in this section of the EIR. In addition, this section evaluates the impacts of ozone (O_3) precursors (which include volatile organic compounds [VOC] and nitrogen oxides [NO_X]), carbon monoxide (CO), sulfur oxides (SO_X), and particulate matter less than 10 microns in diameter (PM_{10}) and less than 2.5 microns in diameter ($PM_{2.5}$) from operational sources and construction activities.

Please refer to Section 5.3 of this EIR for a discussion of climate change and global warming.

4.2.1 ENVIRONMENTAL SETTING

4.2.1.1 CLIMATOLOGY

Meteorological and climatological conditions influence ambient air quality. The climate of Orange County is characterized by warm dry summers and mild winters and is dominated by a semi-permanent high-pressure cell located over the Pacific Ocean. This high-pressure cell maintains clear skies for much of the year. It also drives the dominant onshore circulation and helps create two types of temperature inversions, subsidence and radiation, that contribute to local air quality degradation.

Subsidence inversions occur during warmer months, as descending air associated with the Pacific high-pressure cell comes into contact with cool marine air. The boundary between the two layers of air represents a temperature inversion that traps pollutants below it. Radiation inversions typically develop on winter nights with low wind speeds, when air near the ground cools by radiation, and the air aloft remains warm. A shallow inversion layer that can trap pollutants is formed between the two layers.

According to the Western Regional Climate Center (WRCC), the average annual temperature in the Irvine area is 62.7 degrees Fahrenheit (°F), with an average maximum temperature of 75.6 °F. The mean annual precipitation is 12.82 inches per year, with 56 percent of precipitation occurring in the winter season and 27 percent occurring in the spring season. The prevailing wind direction is from southwest with an annual mean speed of seven and one-half miles per hour (mph).

UCI is located in the South Coast Air Basin (Basin) which encompasses Los Angeles, San Bernardino, Orange, and western Riverside counties.

4.2.1.2 EXISTING AIR QUALITY IN THE PROJECT AREA

Historically, air quality laws and regulations have divided air pollutants into two broad categories: "criteria air pollutants" and "toxic air contaminants (TACs)." Criteria air pollutants are a group of common air pollutants regulated by the federal and state governments by means of ambient standards based on criteria regarding health and/or environmental effects of pollution (U.S. Environmental

Protection Agency [EPA] 1998). While direct ambient air quality standards have not been established for TACs, California Office of Environmental Health Hazard Assessment (OEHHA) and South Coast Air Quality Management District (SCAQMD) have developed risk standards. Under certain conditions, TACs may cause adverse health effects, including cancer and/or acute and chronic noncancer effects. Therefore the risk standards indirectly measure TACs.

Criteria Air Pollutants

The criteria air pollutants pertinent to the analyses in this EIR are O_3, CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$. Other criteria air pollutants that national or California ambient standards have been established for include lead (Pb), visibility-reducing particles, sulfates, hydrogen sulfide, and vinyl chloride. These pollutants are not associated with existing or anticipated UCI uses and, therefore, are not addressed in this EIR.

The closest air quality monitoring station to UCI is Pampas Lane monitoring station in Costa Mesa, which measures O_3, CO, NO_2, and SO_2. The nearest monitoring station to the project that measures PM_{10} and $PM_{2.5}$ is the Mission Viejo station. Table 4.2-1 presents a summary of the highest pollutant concentrations monitored at the Pampas Lane air quality monitoring station, or the Mission Viejo station as appropriate, during the three most recent years (2004 through 2006). The corresponding National Ambient Air Quality Standards (NAAQS) and the California Ambient Air Quality Standards (CAAQS) are also presented in Table 4.2-1. The Basin is considered a nonattainment area for the CAAQS for O_3 and PM_{10} and for the NAAQS for O_3, CO, PM_{10}, and $PM_{2.5}$.

Table 4.2-1. Ambient Air Quality Summary (Costa Mesa and Mission Viejo Monitoring Stations)

Pollutant	Averaging Time	2004	2005	2006	NAAQS	CAAQS	Monitoring Station
		ppm(unless otherwise indicated)					
O_3	8 hour	0.087	0.072	0.062	0.09	0.07	Costa Mesa
	1 hour	0.104	0.085	0.074	-	0.08	Costa Mesa
PM_{10}[1]	Annual Arithmetic Mean	23.7 μg/m³	17.6 μg/m³	21.1 μg/m³	50.0 μg/m³	20.0 μg/m³	Mission Viejo
	24 hour	47 μg/m³	41 μg/m³	57 μg/m³	150.0 μg/m³	50.0 μg/m³	Mission Viejo
$PM_{2.5}$	Annual Arithmetic Mean	12.0 μg/m³	10.6 μg/m³	11.0 μg/m³	15.0 μg/m³	12.0 μg/m³	Mission Viejo
	24 hour	49.4 μg/m³	35.3 μg/m³	46.9 μg/m³	65.0 μg/m³	-	Mission Viejo
NO_2	Annual	0.016	0.014	0.015	0.053	-	Costa Mesa
	1 hour	0.097	0.085	0.101	-	0.25	Costa Mesa
CO	8 hour	4.07	3.16	3.01	9.0	9.0	Costa Mesa
	1 hour	4.9	4.7	3.5	35.0	20.0	Costa Mesa
SO_2	Annual	0.002	0.002	0.001	0.03	-	Costa Mesa
	24 hour	0.008	0.008	0.005	0.14	0.04	Costa Mesa
	3 hour	0.020	0.010	0.009	0.05[2]	-	Costa Mesa
	1 hour	0.031	0.012	0.012	-	0.25	Costa Mesa

Source: www.arb.ca.gov and www.epa.gov/air/data/monvals.html
(1) California averages reported for PM_{10}
(2) Secondary NAAQS

As illustrated in Table 4.2-1, the Costa Mesa monitoring station was in compliance with the CAAQS and NAAQS for CO, NO_2, and SO_2 and the Mission Viejo station was in compliance with the CAAQS and NAAQS for $PM_{2.5}$. However, the Costa Mesa station exceeded the CAAQS O_3 standards (1-hour and 8-

hour) in 2004 and 2005; and the Mission Viejo station exceeded the CAAQS annual PM_{10} standards in 2004 and 2006, and the CAAQS 24-hour PM_{10} standard in 2006.

Based on information published by the U.S. Environmental Protection Agency (EPA) (1998) and the California Air Resources Board (ARB) (2000), the following list describes the health effects for each criteria air pollutant that could be emitted during construction and operation activities associated with implementation of the 2007 LRDP.

CO (Carbon Monoxide) is a colorless, odorless, poisonous gas produced by incomplete burning of carbon-based fuels, including gasoline, oil, and wood. Carbon monoxide is also produced from incomplete combustion of many natural and synthetic products. For instance, cigarette smoke contains carbon monoxide. When carbon monoxide enters the body, it combines with chemicals in the blood and prevents the blood from providing oxygen to cells, tissues, and organs. Because the body requires oxygen for energy, high-level exposures to carbon monoxide can cause serious health effects.

NO_x (Nitrogen Oxide) is a general term pertaining to compounds such as nitric oxide (NO), nitrogen dioxide (NO_2), and other oxides of nitrogen. Nitrogen oxides are produced from burning fuels, including gasoline, diesel, and coal. Nitrogen oxides are smog formers, which react with volatile organic compounds (VOC) to form O_3. Nitrogen oxides are also major components of acid rain.

O_3 (Ozone) is a strong smelling, pale blue, reactive toxic chemical gas consisting of three oxygen atoms. It is a product of the photochemical process involving the energy from sunlight and O_3 precursors, primarily NO_x and VOC. O_3, a major component of smog, exists in the stratosphere, the upper atmospheric layer as well as near the earth's surface in the troposphere. O_3 reacts chemically with internal body tissues, such as the lungs.

PM_{10} and $PM_{2.5}$ (Particulate Matter) includes dust, soot, and other tiny bits of solid materials that are released into, and move around in, the air. Particulates are produced by many sources, including burning of diesel fuels by trucks and buses, incineration of garbage, mixing and application of fertilizers and pesticides, road construction, industrial processes such as steel making, mining operations, agricultural burning (field and slash burning), and operation of fireplaces and woodstoves. Particulate pollution can cause eye, nose, and throat irritation and other health problems.

SO_x (Sulfur Oxide) are comprised mainly of sulfur dioxide (SO_2) and sulfates (SO_4). SO_X are pungent, colorless gases (sulfates are solids) formed primarily by the combustion of sulfur-containing fossil fuels, especially coal and oil. Some industrial processes, such as the production of paper and smelting of metals, produce sulfur dioxide. Sulfur dioxide is closely related to sulfuric acid and plays an important role in the production of acid rain.

Pb (Lead) occurs as particulate matter in the atmosphere and has historically been emitted from vehicles combusting leaded gasoline, as well as from industrial sources. With the phase-out of leaded gasoline, large manufacturing facilities are the sources of the largest amounts of lead emissions. Lead has the potential to cause gastrointestinal, central nervous system, kidney, and blood diseases upon prolonged exposure. Lead is also classified as a probable human carcinogen.

Odor is a chemical dissolved in air, generally at a very low concentration, which is perceived by the sense of olfaction. Adverse health effects have been attributed to odors in the ambient air. Often these health effects are non-specific symptoms (headaches, nausea, reflex nausea, GI distress, fatigue, eye irritation, throat irritation, shortness of breath, runny nose, sleep disturbance, inability to concentrate, classical stress response, etc.) which cannot be directly linked to a specific chemical or exposure event.

Toxic Air Contaminants

TACs are a category of air pollutants that have been shown to have an impact on human health but are not classified as criteria pollutants. Examples include certain aromatic and chlorinated hydrocarbons, certain metals, and asbestos. TACs are generated by a number of sources, including stationary sources, such as dry cleaners, gas stations, combustion sources, and laboratories; mobile sources, such as automobiles; and area sources, such as farms, landfills, construction sites, and residential areas. Adverse health effects of TACs can be carcinogenic (cancer-causing) and long-term (chronic) noncarcinogenic.

Cancer Risk. Cancer risk is defined as the lifetime probability (chance) of developing cancer from exposure to a carcinogen, typically expressed as the increased chances in one million. One of the primary health risks of concern due to exposure to TACs is the risk of developing cancer. The carcinogenic potential of TACs is a particular public health concern because it is believed by many scientists that there is no "safe" level of exposure to carcinogens; that is, any exposure to a carcinogen poses some risk of causing cancer. One in four deaths in the United States is due to cancer. Approximately 1,444,920 new cancer cases are expected to be diagnosed in 2007 from all causes including diet, genetic factors, and lifestyle choices (American Cancer Society, 2007). According to the EPA, approximately one percent of all lung cancers are attributable to air pollution (Harvard Center for Cancer Prevention, 1996).

In March of 2000, the SCAQMD released a report entitled *Multiple Air Toxics Exposure Study (MATES-II) in the South Coast Air Basin* (SCAQMD 2000). MATES-II contains extensive general information regarding regional ambient air toxics levels in the Basin and detailed information on the findings. MATES-II estimated that the average excess cancer risk level from exposure to TACs for the Basin as a whole is approximately 1,400 in one million. According to the study, “mobile sources (e.g., cars, trucks, trains, ships, aircraft, etc.) represent the greatest contributor.” These estimates were based on the monitoring data collected at ten fixed sites from April 1998 through March 1999. The closest fixed-site location to the UCI campus was at 1010 South Harbor Boulevard in Anaheim. At this location, the measured, or predicted, cancer risk, including diesel particulates, is estimated at 1,120 in a million versus high-end measured risks of 1,740 at the Los Angeles, Burbank, Huntington Park, and Pico Rivera monitoring sites. The modeled estimated cancer risk at the Anaheim station is approximately 1,330 in one million whereas the modeled average in the Basin is slightly lower at 1,228 in one million.

Cancer risks are calculated for all carcinogenic TACs, and the results are summed to calculate an overall cancer risk. The calculation procedure assumes that cancer risk is proportional to concentrations at any level of exposure. This is generally considered a conservative assumption at low doses and is consistent with the California Office of Environmental Health Hazard Assessment (OEHHA) regulatory approach.

Non-Cancer Risk. For most noncarcinogens, unlike carcinogens, it is believed that there is a threshold level of exposure to the compound below which it will not pose a health risk. The California Environmental Protection Agency (CalEPA) and California OEHHA have cooperatively developed reference exposure levels (RELs) for noncarcinogen TACs. These RELs are health-conservative estimates of the maximum levels of exposures at which health is not expected to be affected. The noncancer health risk due to exposure to a TAC is assessed by comparing the estimated level of exposure to the REL. The comparison is expressed as the ratio of the estimated exposure level to the REL, called the hazard index (HI).

4.2.2 REGULATORY FRAMEWORK

The UCI campus is subject to major air quality planning programs by both the federal Clean Air Act (CAA) and the California Clean Air Act (CCAA). Both the federal and California statutes provide ambient air quality standards (i.e., NAAQS and CAAQS) to protect public health and timetables for progressing toward achieving and maintaining ambient standards. The CAA and CCAA also require the development of plans to guide the air quality improvement efforts of California and local agencies. The ambient air quality standards identify the level of air quality considered safe to protect the public health and welfare, especially for those most susceptible to respiratory distress such as asthmatics, the very young, the elderly, people weak from other illness or diseases, or persons who engage in heavy work or exercise. Emissions limitations are typically imposed upon individual sources of air pollutants by local agencies or upon certain large or unique facilities by the EPA. Mobile sources of air pollutants such as automobiles, aircraft, and trains are controlled primarily through federal and state agencies. Within the Irvine region, air quality is monitored, evaluated, and controlled by the EPA, ARB, and the SCAQMD, as described in the following sections.

The CAA required the EPA to establish NAAQS, with states retaining the option to adopt more stringent standards or to include other specific pollutants. California had standards in existence before federal standards were established, and most of its standards are more stringent than the federal standards, as shown in Table 4.2-2.

4.2.2.1 FEDERAL

Criteria Air Pollutants

The 1990 Clean Air Act Amendments require emission controls on factories, businesses, and automobiles to reduce criteria pollutant emissions. The CAA Amendments regulate automobiles by lowering the limits on VOC and NO_x emissions, requiring the phasing in of alternative fuel cars, requiring on-board canisters to capture vapors during refueling, and extending emission-control warranties. TACs are reduced by requiring factories to install "maximum achievable control technology" and establishing urban pollution control programs.

The CAA Amendments require that each state have an air pollution control plan called the State Implementation Plan (SIP). The SIP includes strategies and control measures to attain the NAAQS by deadlines established by the CAA. The CAA Amendments dictate that states containing areas violating the NAAQS revise their SIPs to include extra control measures to reduce air pollution. The EPA reviews the SIPs to determine whether the plans would conform to the CAA Amendments and achieve the air quality goals. The EPA may prepare a Federal Implementation Plan for a nonattainment area if the EPA determines a SIP to be inadequate.

The EPA has classified air basins (or portions thereof) as being in "attainment," "nonattainment," or "unclassified" for each criteria air pollutant, based on whether or not the NAAQS have been achieved. If an area is designated unclassified, it is because inadequate air quality data were available as a basis for a nonattainment or attainment designation. The EPA classifies the South Coast Air Basin as in attainment for NO_2, Pb, and SO_2, and nonattainment for O_3, CO, PM_{10}, and $PM_{2.5}$ with respect to federal air quality standards.

Toxic Air Contaminants

Over a 13-year period following passage of the CAA, regulations for seven hazardous air pollutants (HAPs) were promulgated as National Emission Standards for Hazardous Air Pollutants (NESHAPs). The CAA Amendments revamped the NESHAPs program to offer a technology-based approach for reducing the emissions of a greater number of TACs. Under the CAA Amendments, 189 substances were identified as HAPs and slated for regulation. The program requires certain facilities to control TAC emissions by the installation of Maximum Achievable Control Technology (MACT). MACT is implemented and enforced in the SCAQMD Regulation XXX, Title V Operating Permits, which administers the federal operating permits program established by the CAA Amendments. The SCAQMD administers the federal permits for HAP emissions under delegated authority.

Table 4.2-2. Ambient Air Quality Standards

		California Standards (1)	Federal Standards (2)	
Pollutant	**Averaging Time**	**Concentration**	**Primary (3)**	**Secondary (4)**
O_3	1 Hour	0.09 ppm (180 μg/m^3)	0.12 ppm (235 μg/m^3)	Same as Primary Standards
	8 Hour	--	0.08 ppm (157 μg/m^3)	
Respirable Particulate Matter (PM_{10})	24 Hour	50 μg/m^3	150 μg/m^3	Same as Primary Standards
	Annual Arithmetic Mean	20 μg/m	50 μg/m^3	
Fine Particulate Matter ($PM_{2.5}$)	24 Hour	No Separate California Standard	65 μg/m	Same as Primary Standards
	Annual Arithmetic Mean	12 μg/m	15 μg/m	
Carbon Monoxide (CO)	8 Hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	None
	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	--	0.053 ppm (100 μg/m^3)	Same as Primary Standard
	1 Hour	0.25 ppm (470 mg/m^3)	--	
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	--	0.030 ppm (80 μg/m^3)	--
	24 Hour	0.04 ppm (105 μg/m^3)	0.14 ppm (365 μg/m^3)	--
	3 Hour	--	--	0.5 ppm (1300 μg/m^3)
	1 Hour	0.25 ppm (655 μg/m^3)	--	--
Lead	30 Day Average	1.5 μg/m^3	--	--
	Calendar Quarter	--	1.5 μg/m^3	Same as Primary Standard
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer - visibility of ten miles or more due to particles.	No Federal Standards	
Sulfates	24 Hour	25 μg/m^3	No Federal Standards	
Hydrogen Sulfide	1 Hour	0.03 ppm (42 μg/m^3)	No Federal Standards	
Vinyl Chloride	24 Hour	0.01 ppm (26 μg/m^3)	No Federal Standards	

(1) California standards for O_3, CO, SO_2 (1-hour and 24-hour), NO_2, PM_{10}, and visibility reducing particles are values that are not to be exceeded. The standards for sulfates, lead, hydrogen sulfide, and vinyl chloride standards are not to be equaled or exceeded.

(2) National standards, other than 1-hour O_3, 8-hour O_3, 24-hour PM_{10}, 24-hour $PM_{2.5}$, and those based on annual averages, are not to be exceeded more than once a year. The one-hour O_3 standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one. The 8-hour O_3 standard is attained when the 3-year average of the annual fourth-highest daily maximum 8-hour concentrations is below 0.08 ppm. The 24-hour PM_{10} standard is attained when the 3-year average of the 99th percentile 24-hour concentrations is below 150 μg/m^3. The 24-hour $PM_{2.5}$ standard is attained when the 3-year average of the 98th percentile 24-hour concentrations is below 65 μg/m^3.

(3) Concentration expressed first in units in which it was promulgated. Equivalent units given in parenthesis are based on a reference temperature of 25°C and a reference pressure of 760 mm of mercury (1,013.2 millibar). All measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of mercury; parts per million (ppm) in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

(4) National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

(5) National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

(6) Measured as a geometric mean.

(7) Measured as an arithmetic mean.

(8) This standard is intended to limit the frequency and severity of visibility impairment from regional haze and is equivalent to a 10-mile nominal visual range when relative humidity is less than 70 percent.

Source: ARB, 2003. *California Air Quality Data, Summary of 2003 Air Quality Data for Gaseous and Particulate Pollutants*. Annual Summary, Vol. XXIX, Technical Support Division.

4.2.2.2 STATE

Criteria Air Pollutants

The ARB, a part of the CalEPA, is responsible for the coordination and administration of both federal and state air pollution control programs within California. In this capacity, the ARB conducts research, sets the CAAQS, compiles emission inventories, develops suggested control measures, provides oversight of local programs, and prepares the SIP. The ARB establishes emissions standards for motor vehicles sold in California, consumer products, and various types of commercial equipment. It also sets fuel specifications to further reduce vehicle emissions.

California has adopted ambient standards that are more stringent than the federal standards for the criteria air pollutants. Under the CCAA, patterned after the federal CAA, areas have been designated as attainment, nonattainment or unclassified with respect to the CAAQS. The CCAA requires that districts design a plan to achieve an annual reduction in district-wide emissions of five percent or more for each nonattainment criteria pollutant or its precursor(s). These plans include several components: emission control standards that require local districts to stringently control emissions through varying degrees of stationary and mobile source control programs; application of additional control measures if a regional air quality management district contributes to downwind nonattainment areas; cost-effectiveness estimates for all proposed emission control measures; and development and implementation of transportation controls for cities and counties to enforce.

The ARB compiled projected emission inventories of the regulated air pollutants for counties in California, and these emission inventories were summarized in the *2006 Almanac Data* (ARB 2006). Table 4.2-3 presents a summary of the criteria pollutant emission forecast data provided in the ARB *2006 Almanac Data* for Orange County in 2010, 2015, and 2020.

Table 4.2-3. Forecast Emissions Data for Orange County

	Forecast Emissions – Orange County (tons/day)		
Year	**2010**	**2015**	**2020**
CO (annual average)	600.84	502.03	443.20
NO_x (annual average)	122.41	93.39	77.17
VOC (annual average)	114.00	104.00	98.00
PM_{10} (annual average)	53.65	53.55	54.35
$PM_{2.5}$ (annual average)	17.13	16.91	16.97

Source: ARB 2006

Toxic Air Contaminants

California's air toxics control program began in 1983 with the passage of the Toxic Air Contaminant Identification and Control Act, better known as Assembly Bill 1807 (AB 1807) or the Tanner Bill. The Tanner Bill established a regulatory process for the scientific and public review of individual toxic compounds. When a compound becomes listed as a TAC under the Tanner process, the ARB normally establishes minimum statewide emission control measures to be adopted by local air districts. By 1992, 18 of the 189 federal HAPs had been listed by the ARB as state TACs. Later legislative amendments

(AB 2728) required the ARB to incorporate all 189 federal HAPs into the California list of TACs. In April 1993, the ARB added 171 substances to the state program to make the California TAC list equivalent to the federal HAP list.

The second major component of California's air toxics program was provided by the passage of AB 2588, the Air Toxics "Hot Spots" Information and Assessment Act of 1987, which supplemented the Tanner process. AB 2588 regulates over 600 air compounds, including all of the Tanner-designated TACs. Under AB 2588, specified facilities must quantify emissions of regulated TACs and report them to the local air district. If the local air district determines that a potentially significant public health risk is posed by a given facility, the facility is required to perform a health risk assessment and notify the public in the affected area if the calculated risks exceed specified criteria.

On August 27, 1998, the ARB formally identified particulate matter emitted by diesel-fueled engines as a TAC. Diesel engines emit TACs in both gaseous and particulate forms. Diesel particulate matter is coated with chemicals, many of which have been identified by the EPA as HAPs and by the ARB as TACs. Because, by weight, the vast majority of diesel exhaust particles are very small (94 percent of their combined mass consists of particles less than 2.5 microns in diameter), both the particles and their coating of TACs are inhaled into the lungs.

The ARB action was taken at the end of a lengthy process that considered dozens of health studies, extensive analysis of health effects and exposure data, and public input collected over a nine-year period. ARB's Scientific Advisory Committee has recommended a diesel particulate unit risk factor of 300 in one million over a 70-year exposure period. In September 2000, the ARB approved the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles* (Diesel Risk Reduction Plan)(ARB 2000). The Diesel Risk Reduction Plan outlines a comprehensive and ambitious program that includes the development of numerous new control measures over the next several years aimed at substantially reducing emissions from new and existing on-road vehicles (e.g., heavy-duty trucks and buses), off-road equipment (e.g., graders, tractors, forklifts, sweepers, and boats), portable equipment (e.g., pumps), and stationary engines (e.g., stand-by power generators).

Many laboratory fume hoods are operated on the UCI campus. Title 8 of the California Code of Regulations contains California Occupational Safety and Health Administration requirements for these emission sources. The regulations are concerned with worker health and safety and require minimum airflow and face velocity (the rate at which air is drawn through the fume hood) specifications and other design features to protect laboratory personnel during their work. Additionally, the code establishes specific requirements for the use and storage of carcinogens, including a requirement to scrub or filter air emissions from areas where carcinogens are used. Other than the requirement that the top of the fume hood stack be located at least seven feet above the roof, the regulations do not address emissions once the exhausted air mixes with outdoor air.

4.2.2.3 REGIONAL

South Coast Air Quality Management District

The SCAQMD has jurisdiction over air quality programs in Orange County, including the UCI area. SCAQMD does not regulate motor vehicles, marine vessels, aircrafts, and agricultural equipment, which are regulated by the ARB or EPA. California and local government projects, as well as projects proposed by the private sector, are subject to SCAQMD requirements, if the emissions sources are regulated by the SCAQMD. Additionally, the SCAQMD, along with the ARB, maintains and operates ambient air quality monitoring stations at numerous locations throughout the Basin. These stations are used to measure and monitor criteria and toxic air pollutant levels in the ambient air.

The SCAQMD developed the Air Quality Management Plan (AQMP), which was adopted by the SCAQMD Governing Board in 2007 (SCAQMD 2007). This planning document updates the attainment demonstration for the federal standards for O_3 and PM_{10}; includes an attainment demonstration for $PM_{2.5}$; replaces the 1997 attainment demonstration for the federal CO standard and provides a basis for a maintenance plan for CO for the future; and updates the maintenance plan for the federal NO_2 standard that the Basin has met since 1992.

The 2007 AQMP discusses a comprehensive strategy pertaining to controlling pollution from all sources, including stationary sources, on-road and off-road mobile sources, and area sources. The 2007 Plan proposes methods and strategies by which attainment of the federal $PM_{2.5}$ standard will be achieved by 2015 and the 8-hour O_3 standard by 2024. The 2007 AQMP proposes policies and measures to achieve federal standards for healthful air quality in the Basin, addresses several federal planning requirements, and incorporates significant new scientific data, primarily in the form of updated emissions inventories, ambient measurements, new meteorological episodes, and new air quality modeling tools. The 2007 Plan highlights the significant amount of reductions that must be made and the need to identify additional strategies, especially in the area of mobile sources, to meet all federal criteria pollutant standards within the timeframes allowed under the CAA.

The SCAQMD has also adopted significance thresholds for criteria pollutants and TACs. These thresholds are shown in Table 4.2-4, below. Please note these thresholds are applied equally for project-specific air quality studies, such as for a one-acre industrial building, as they are for program-level assessments covering large-scale development, such as that associated with a campus-wide LRDP. As such, it is recognized that the application of these thresholds in this air quality analysis for the 2007 UCI LRDP represents an overly conservative approach.

4.2.2.4 LOCAL

UCI's Environmental Health and Safety (EH&S) Department is responsible for implementing UCI’s Clean Air Program which assesses and facilitates UCI's compliance with air quality laws and regulations. In addition to the permitting programs required by California law and SCAQMD rules, UCI is required to implement a federal operating permit program, which meets federal EPA regulations adopted pursuant to Title V of the CAA Amendments. Title V Program activities include assisting with SCAQMD Permit to Operate administration; monitoring, record keeping, and reporting activities; and developing regulatory programs and informational guidelines to ensure the campus remains in compliance with all local, California and federal regulations.

Several different departments at UCI are involved with this program. Academic department chairs and directors are responsible for reporting new air emission sources to EH&S and maintaining records. Facilities Management and Design and Construction Services provide building and renovation plans to EH&S for review and also report new air emission sources to EH&S. Parking and Transportation Services, while not directly involved with the Clean Air Program, reduce air emissions by implementing the Alternative Transportation Program to reduce vehicular traffic and associated emissions.

Table 4.2-4. SCAQMD Air Quality Significance Thresholds

Pollutant	Construction	Operation
Criteria Pollutants Mass Daily Thresholds		
NO_x	100 lbs/day	100 lbs/day
VOC	75 lbs/day	55 lbs/day
PM_{10}	150 lbs/day	150 lbs/day
$PM_{2.5}$	55 lbs/day	55 lbs/day
SO_x	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day
TAC and Odor Thresholds		
TACs	Maximum Incremental Cancer Risk ≥ 10 in a 1 million Hazard Index ≥ 1.0 (project increment) Hazard Index ≥ 3.0 (facility wide)	
Odor	Project creates an odor nuisance pursuant to SCAQMD Rule 402	
Ambient Air Quality for Criteria Pollutants		
PM_{10} 24-hour	2.5 μg/m^3	
PM_{10} annual geometric mean	1.0 μg/m^3	
Sulfate 24-hour average	1 μg/m^3	
CO 1-hour average	1.1 mg/m^3	
CO 8-hour average	0.50 mg/m^3	

4.2.3 PROJECT IMPACTS AND MITIGATION

4.2.3.1 ISSUE 1 – CONSISTENCY WITH APPLICABLE AIR QUALITY PLAN

Air Quality Issue 1 Summary

Would implementation of the 2007 LRDP result in a conflict with, or obstruct implementation of, an applicable air quality plan?

Impact: Implementation of the 2007 LRDP would not conflict with, or obstruct implementation of, the 2007 AQMP or the SIP.

Mitigation: No mitigation is required.

Significance Before Mitigation: None.

Significance After Mitigation: Not applicable.

Standards of Significance

Based on Appendix G of the CEQA Guidelines, an impact is considered significant if implementation of the 2007 LRDP would result in a conflict with, or obstruct implementation of, an applicable air quality plan.

Impact Analysis

The analysis of whether the 2007 LRDP would conflict with the applicable AQMP begins with population projections. The AQMP is based on population projections which are developed by the Department of Finance (DOF) for California on a county by county basis. South Coast Association of Governments (SCAG) uses these projections, as well as other factors, to determine regional growth and related vehicular transportation patterns. The AQMP relies on information from ARB and SCAG to predict future criteria pollutants, including mobile and area source emissions which in turn are based on these population projections. Likewise, the UC's long term enrollment planning is based on population growth projections from DOF. As a result, the 2007 AQMP accounts for future growth within the Educational Services Sector (Sector 82) at the county level. Sector 82 includes all educational facilities (e.g., schools, universities, etc.) and libraries within Orange County. According to the 2007 AQMP (Appendix 3, Tables 2-5 through 2-6), the growth factor for Sector 82 is estimated to be 37.4% between 2002 (base year) and 2015, and 48.1% between 2002 and 2020. The 2007 LRDP growth projections for these timeframes are consistent with the county-wide growth factors: 31% on-campus growth between the 2005-06 and 2015-16 academic years, and 51% on-campus growth between the 2005-06 and 2025-26 academic years.

Because the AQMP and the SIP are based on population growth projections and the 2007 LRDP is consistent with SCAG projections for regional growth, implementation of the 2007 LRDP would not conflict with, or obstruct implementation of, the AQMP or the SIP.

Mitigation Measures

Implementation of the 2007 LRDP would not conflict with, or obstruct implementation of, applicable air quality plans; therefore, no mitigation measures are required.

4.2.3.2 ISSUE 2 – CONSISTENCY WITH AIR QUALITY STANDARDS

Air Quality Issue 2 Summary

Would implementation of the 2007 LRDP violate any air quality standard or contribute substantially to an existing or projected air quality violation?

Impact: Worst-case construction scenario and operational emissions from future projects associated with implementation of the 2007 LRDP would exceed significance thresholds for CO, VOCs, NO_x, PM_{10} and $PM_{2.5}$ (Air-2). Individual construction projects may or may not result in significant impacts, depending on the project size and features.

Mitigation: Prepare an air quality assessment for projects that could result in significant construction emissions (Air-2A); Implement a construction emissions mitigation plan that incorporates applicable BMPs (Air-2B); and continue implementation of an alternative transportation program (Air-2C).

Significance Before Mitigation: Significant.

Significance After Mitigation: Significant, unavoidable.

Standards of Significance

To determine whether implementation of the 2007 LRDP would result in emissions that would violate any air quality standard or contribute substantially to an existing or projected air quality violation, the estimated criteria air pollutant emissions are evaluated based on the quantitative emission thresholds established by the SCAQMD in their CEQA Air Quality Handbook. In addition, the SCAQMD recently adopted significance thresholds for $PM_{2.5}$. These quantitative thresholds are provided in Table 4.2-4. In this EIR, pollutant emissions above these screening criteria would result in a significant impact to air quality.

To further evaluate the significant air quality impacts associated with the 2007 LRDP construction activities, the SCAQMD's Localized Significance Threshold (LST) Methodology provides a look-up table for construction emissions based on the rate of emissions, location of the emissions, and distance of the emissions to receptors. The LST Methodology is only applicable for projects that are five acres or less in size, and to emissions of NO_x, CO, PM_{10}, and $PM_{2.5}$. For sites greater than five acres, the SCAQMD recommends dispersion modeling be performed to determine NO_x, CO, and PM_{10} concentrations.

To further evaluate the significant air quality impacts associated with the 2007 LRDP operations, emissions of CO, NO_x, PM_{10}, and $PM_{2.5}$ were modeled using the Industrial Source Complex Short Term 3 (ISCST3) model. The main emitters of CO, NO_x, PM_{10}, and $PM_{2.5}$ are combustion sources, including boilers, gas turbines, and emergency generators. Emissions from boilers and emergency generators were estimated based on growth projections for the campus, and emissions were modeled as point sources from their locations on campus. Estimated emissions from gas turbines were provided by the air quality analysis conducted in support of the Permit to Construct for the Central Plant (Environ 2006).

Impact Analysis

Construction Emissions

Since it is not feasible to provide specific construction information for individual projects that implement the 2007 LRDP, a peak-day worst-case scenario was developed to predict maximum air quality impacts associated with 2007 LRDP construction activities. To develop the maximum daily construction scenario, it was assumed that construction of up to six major construction projects could occur simultaneously; two projects under construction in each of three phases: Early Phase, Middle Phase, and Later Phase. The Early Phase mainly involves demolition, vegetation clearing, grading, and site preparation; the Middle Phase involves utilities installation and building construction; and the Later Phase involves external and internal building work (including application of architectural coatings), asphalt paving, and landscaping.

Construction activities would result in temporary increases in air pollutant emissions (Table 4.2-5). These emissions would be generated in the form of fugitive dust emissions (PM_{10} and $PM_{2.5}$) and exhaust emissions (NO_x, SO_x, CO, VOC, PM_{10}, and $PM_{2.5}$). Fugitive dust emissions would be generated from earth disturbance during site grading and building demolition, as well as from vehicles traveling on dirt roads. Operation of heavy equipment and vehicles during the construction phases would generate exhaust emissions due to fuel combustion. Paving activities would generate certain amounts of VOC emissions. Emission calculations were conducted for the following emission categories:

- Heavy equipment exhaust emissions;
- Truck exhaust emissions;
- Site grading fugitive dust emissions;
- Demolition fugitive dust emissions;
- Architectural coatings emissions;
- Asphalt paving VOC emissions; and
- Employee vehicle exhaust emissions.

Air pollutant emissions were estimated using the assumed worst-case activity data, and the emission factors developed by the EPA and ARB. Detailed emission calculations are provided in Appendix B of this EIR. Table 4.2-5 presents a summary of estimated air pollutant emissions for the three construction phases under the worst-case construction scenario associated with the 2007 LRDP. Worst-case air pollutant emissions during construction activities are based on the year 2010 for the purpose of using emission factors of off-road equipment and on-road sources.

Table 4.2-5. Estimated (Peak Daily) Construction Emissions

Emission Source[1]	CO	VOCs[2]	NO_x	SO_x	PM_{10}[3]	$PM_{2.5}$[4]
	pounds per day					
Early Phase						
Heavy Equipment Exhaust	49.48	12.83	99.44	0.19	5.26	4.68
Truck Exhaust	19.69	4.05	53.03	0.07	2.33	2.31
Site Grading Fugitive Dust	-	-	-	-	100.00	21.00
Demolition Fugitive Dust	-	-	-	-	22.68	4.76
Architectural Coatings Emissions	-	6.11	-	-	-	-
Employee Vehicle Exhaust	175.47	8.56	15.33	0.21	1.79	1.72
Total (per project)	244.64	31.55	167.80	0.47	132.06	34.47
LRDP Total (two projects)	498.28	63.10	335.60	0.94	264.12	68.94
Significance Criteria	550	75	100	150	150	55
Significant?	*No*	*No*	*Yes*	*No*	*Yes*	*Yes*
Middle Phase						
Heavy Equipment Exhaust	58.60	14.85	115.36	0.20	5.41	4.81
Truck Exhaust	1.97	0.41	5.30	0.01	0.23	0.23
Site Grading Fugitive Dust	-	-	-	-	5.00	1.05
Architectural Coatings Emissions	-	6.11	-	-	-	-
Employee Vehicle Exhaust	175.47	8.56	15.33	0.21	1.79	1.72
Total (per project)	236.04	29.93	135.99	0.42	12.43	7.81
LRDP Total (two projects)	472.08	59.86	271.98	0.84	24.86	15.62
Significance Criteria	550	75	100	150	150	55
Significant?	*No*	*No*	*Yes*	*No*	*No*	*No*
Later Phase						
Heavy Equipment Exhaust	56.45	13.39	103.35	0.16	3.98	3.54
Truck Exhaust	1.97	0.41	5.30	0.01	0.23	0.23
Site Grading Fugitive Dust	-	-	-	-	5.00	1.05
Architectural Coatings Emissions	-	74.30	-	-	-	-
Asphalt Paving Emissions	-	2.62	-	-	-	-
Employee Vehicle Exhaust	175.47	8.56	15.33	0.21	1.79	1.72
Total (per project)	233.89	99.28	118.68	0.38	11.00	6.54
LRDP Total (two projects)	467.78	198.56	237.36	0.76	22.0	13.08
Significance Criteria	550	75	100	150	150	55
Significant?	*No*	*Yes*	*Yes*	*No*	*No*	*No*

(1) Emissions from construction vehicles were determined using EMFAC2002 and URBEMIS2002.

(2) For the purposes of estimating emissions from the application of architectural coatings, it was assumed that water-based coatings that meet the requirements of SCAQMD Rule 1113 for VOC content using the Green Label specifications for architectural coatings would be used for both exterior and interior surfaces, and that coatings would be applied using electrostatic spray guns and/or brushes. The methodology presented in Table A11-13-D of the SCAQMD CEQA Air Quality Handbook was used to estimate emissions from the use of water-based coatings.

(3) Emissions of fugitive dust associated with demolition of existing buildings and/or pavement was estimated based on the SCAQMD's CEQA Air Quality Handbook emission factor of 0.00042 lb of PM_{10} per cubic foot of building demolished. Emissions associated with cut and fill were represented in the overall grading emission factor of 10 lbs per acre per day, assuming that watering active grading sites three times daily would control fugitive dust by 50 percent (based on URBEMIS2002 control efficiency for watering three times daily).

(4) Based on SCAQMD guidelines, $PM_{2.5}$ is 99 percent of PM_{10} for combustion sources, 89 percent for off-road sources, and 21 percent for fugitive dust sources.

Based on the results of the calculations presented in Table 4.2-5, the significance thresholds would be exceeded for the maximum daily emissions of PM_{10} and $PM_{2.5}$ for the early phases of construction; for the maximum daily emissions of VOCs for the later phases of construction; and for the maximum daily emissions of NO_x for all phases of construction. Therefore, construction would result in temporary adverse impacts to the ambient air quality. The impacts would be short term and dependent on the construction schedule and level of activity on a maximum daily basis. Therefore, actual emissions may be lower than that presented in Table 4.2-5.

The estimated peak daily construction emissions are based on a worst-case assumption that approximately 22 acres would be under simultaneous grading. However, the SCAQMD LST Methodology uses different significance thresholds from those listed in Table 4.2-5 to evaluate emissions of CO, NO_x, PM_{10}, and $PM_{2.5}$ associated with construction at individual sites less than five acres in size. To evaluate these emissions based on the SCAQMD LST Methodology, it was assumed that the nearest receptor would be located less than 25 meters from the emission source, given that construction would occur on campus in the presence of students and workers. According to Table 4.2-6, the estimated maximum daily emissions of CO, NO_x, PM_{10} and $PM_{2.5}$ would exceed the LST thresholds for construction of projects less than five acres in size, and would therefore result in a significant, but temporary, impact on ambient air quality.

Table 4.2-6. Results of LST Methodology Analysis for Construction Emissions

Construction Phase	Maximum Daily Emissions (lbs/day)			
	CO	**NO_x**	**PM_{10}**	**$PM_{2.5}$**
Early Phase	498.28	335.60	264.12	68.94
Middle Phase	472.08	271.98	24.86	15.92
Later Phase	467.78	237.36	22.00	13.08
LST Significance Threshold(lbs/day)	**950**	**335**	**14**	**9**
Significant based on LST Methodology?	**Yes**	**Yes**	**Yes**	**Yes**

To provide perspective regarding the significance of the 2007 LRDP construction emissions, Table 4.2-7 provides a comparison of these estimated emissions with data presented in the ARB's year 2010 projected emissions for the Basin. Emissions on the ARB's website are listed in tons per day. As shown in Table 4.2-7, the emissions associated with construction for the 2007 LRDP would be a small portion (less than 0.12 percent) of the total emissions projected for Orange County for the year 2010.

Table 4.2-7. Summary of Estimated Construction Air Pollutant Emissions

Construction Phase	Maximum Daily Emissions					
	CO	**VOC**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Early Phase (lbs/day)	244.64	31.55	167.80	0.47	132.06	34.47
Middle Phase (lbs/day)	236.04	29.93	135.99	0.42	12.43	7.81
Later Phase (lbs/day)	233.89	99.28	118.68	0.38	11.00	6.54
Maximum Emissions (tons/day)	**0.12**	**0.05**	**0.08**	**0.0002**	**0.07**	**0.02**
Projected 2010 Orange County Emissions (tons/day)	**601.14**	**114.33**	**122.97**	**4.18**	**53.97**	**17.44**
Percentage of 2010Emissions Attributed to UCI	**0.02%**	**0.04%**	**0.07%**	**0.006%**	**0.12%**	**0.10%**

Operational Emissions

Implementation of the 2007 LRDP would increase the amount of building space and the number of people living on campus, which would increase the use of heating and cooling systems and the use of consumer products. The number of persons traveling to and from the campus on a daily basis would increase as well. Other activities or facilities that would generate additional air emissions include landscape maintenance and the operation of steam and chilled water facilities. Other campus operations would also increase in response to the increased on-campus population.

The operational impacts associated with the 2007 LRDP would involve incremental emissions of air pollutants (NO_x, VOC, CO, SO_x, PM_{10}, and $PM_{2.5}$) resulting from three emission source categories: area, stationary, and vehicular sources. The following describes the emission estimation methodologies and estimated emissions for each of these source categories (summarized in Table 4.2-8).

Table 4.2-8. Estimated Operational Emissions at 2007 LRDP Buildout

Emission Source	Maximum Daily Emissions (lbs/day)						Annual Emission (tons/year)					
	CO	VOCs	NOx	SOx	PM_{10}	$PM_{2.5}$ (1)	CO	VOCs	NOx	SOx	PM_{10}	$PM_{2.5}$
Area Sources												
Fuel Combustion	43.17	4.40	59.52	0.00	0.11	0.11	7.88	0.80	10.86	0.00	0.02	0.02
Landscaping	6.87	0.98	0.10	0.00	0.01	0.01	0.362	0.09	0.01	0.00	0.00	0.00
Consumer Product Use	-	66.80						12.19				
Total	*50.04*	***72.18***	*59.62*	*0.00*	*0.12*	*0.12*	*8.50*	***13.08***	***10.87***	*0.00*	*0.02*	*0.02*
Stationary Sources												
Natural Gas Combustion - Central Plant Turbine	41.11	43.07	45.02	3.66	46.66	46.19	7.50	7.90	8.20	0.70	8.50	8.40
Natural Gas Combustion - Central Plant Boilers	270.022	5.30	36.47	0.99	12.60	12.47	49.31	0.97	6.66	0.18	2.30	2.28
Natural Gas Combustion - Unpermitted Boilers	71.17	2.71	84.73	0.51	6.44	6.38	12.99	0.49	15.46	0.09	1.18	1.16
Diesel Combustion - Engines	1.01	0.20	4.66	0.07	0.18	0.18	0.18	0.04	0.85	0.01	0.03	0.03
VOC Emissions - Wood and Metal Coating	-	0.14	-					0.03				
Gasoline and Diesel Storage and Dispensing	-	0.98	-					0.18				
PM Emissions - Spray Booth	-	-	-		0.014	0.014					0.002	0.002
Laboratory Chemical Use	-	21.65	-					3.96				
Total	*383.51*	***74.05***	***170.88***	*5.23*	*65.89*	***65.23***	*69.98*	***13.57***	***31.17***	*0.98*	*12.01*	***11.87***
Vehicular Sources												
Total	***1456.27***	***180.61***	***143.54***	*3.45*	***602.52***	***150.30***	***259.46***	***30.55***	***28.37***	*0.61*	***109.96***	***27.46***
Total Operational Sources	***1889.82***	***326.84***	***374.04***	*8.68*	***668.53***	***215.65***	***337.94***	***57.20***	***70.41***	*1.59*	***121.99***	***39.35***
Significance Threshold	550	55	100	150	150	55	100	10	10	10	70	10
Significant?	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*No*	*Yes*	*Yes*

(1) Based on SCAQMD guidelines, $PM_{2.5}$ is 99% of PM_{10} for combustion sources.

Area Sources. Area sources of air pollutant emissions associated with the 2007 LRDP would include fuel combustion emissions from energy use, including space and water heating; fuel combustion emissions from landscape maintenance equipment; and consumer product VOC emissions. Incremental air pollutant emissions were estimated for each type of area source using land use data associated with the

2007 LRDP. The area source analysis assumed that specific energy saving measures would be implemented with new development where applicable. The energy saving measures included using central plant cooling and heating systems for buildings in the Academic Core; orienting buildings to the north for natural cooling and heating; implementing the UCI standard to exceed Title 24 energy efficiency by 20% or more; and increasing building walls and attic insulation beyond Title 24 requirements. Consumer products emissions were also reduced by 50 percent because certain products would not be used in a dormitory setting (such as cleaners, degreasers, automotive products, charcoal lighters, etc.) and students and faculty may not be living in the on-campus housing for 365 days per year. Table 4.2-8 presents the estimated emissions for the area sources proposed for UCI.

Stationary Sources. Increases in air pollutant emissions associated with the 2007 LRDP would be expected from such stationary sources as the central utilities cogeneration turbines, central utilities boilers, research and academic laboratory uses, paint spray booths, painting operations, gasoline storage and dispensing, refrigerant use and recovery, and diesel-fueled emergency engines and generators. Criteria air pollutants generated from these sources include NO_x, CO, VOC, SO_x, $PM_{10,}$ and $PM_{2.5}$. In general, the air pollutant emissions were estimated using the latest source testing data, operational activity data, and emission factors developed by the ARB and the EPA.

Incremental air pollutant emissions were estimated based on the potential increase in the total gross square feet (gsf) of new developments projected for the 2007 LRDP. The total gross square footage of the UCI campus as of June 2007 is 10,405,740 gsf based on June 2007 development (6,579,340 gsf) and housing estimates, which assumed 1,500 gsf per faculty/staff dwelling units and 200 gsf per undergraduate student bed. For the year 2025-26, the total developed square footage is estimated to increase to 35,708,635 (see Table 3-2), for an increase of 25,302,895. The total increase in the gsf projected for the 2007 LRDP, compared with the existing 10,405,740 gsf, would be about 243 percent. As a result, the incremental air pollutant emissions for stationary sources, including on-site fuel usage and usage of other substances in support of daily operations, were estimated by multiplying the calculated emissions for the existing conditions by a factor of 2.43 (or 243 percent). Likewise, to estimate increases in laboratory chemical use and emissions due to expansion of laboratory space, it was assumed that chemical usage would increase proportionally to the increase in engineering/science building space. As of June 2007, the engineering and science buildings comprise approximately 3,103,000 gsf of space on campus. The 2007 LRDP proposes an increase in engineering, science, and research and development space to approximately 7,444,000 gsf, for an increase of approximately 4,341,000 gsf. Accordingly, it was assumed that the laboratory chemical usage would increase by approximately 140 percent by 2025-26. Table 4.2-8 presents estimated criteria air pollutant emissions from on-campus stationary sources.

Vehicular Sources. Increased numbers of vehicles associated with the 2007 LRDP would contribute to regional incremental emissions of NO_x, VOC, CO, SO_x, PM_{10}, and $PM_{2.5}$. Implementation of the 2007 LRDP is anticipated to result in 69,490 additional average daily trips (ADTs) as compared to the existing 77,064 ADT associated with the campus.

Total Operational Emissions

Table 4.2-8 presents a summary of the total estimated operational air emissions associated with implementation of the 2007 LRDP. Maximum daily and annual emissions would be above the SCAQMD's thresholds for CO, VOCs, NO_x, PM_{10}, and $PM_{2.5}$, and would therefore result in a significant air quality impact. The main source of pollutant emissions would be from vehicular traffic generated by the increased student enrollment at UCI.

To provide perspective regarding the significance of the 2007 LRDP operational emissions, Table 4.2-9 provides a comparison of these estimated emissions with the data presented in the ARB's year 2020 projected emissions for the Basin. Emissions on the ARB's website are listed in tons per day. As shown in Table 4.2-10, the emissions associated with operations for the 2007 LRDP would be a small portion (0. 7 percent or less) of the total emissions projected for Orange County for the year 2020.

Table 4.2-9. Total Estimated Operational Air Pollutant Emissions from Buildout of 2007 LRDP

	Projected Emissions					
	CO	**VOC**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Significance Threshold (tons/year)	100	10	10	10	70	10
Total (tons/year) at UCI	337.94	57.20	70.41	1.59	121.99	39.35
Total (tons/day) at UCI	0.93	0.16	0.19	0.0043	0.33	0.12
Projected 2020 Orange County Emissions (tons/day)	**761.20**	**134.96**	**156.70**	**3.89**	**53.10**	**17.24**
Percentage of 2020Emissions Attributed to UCI	**0.12%**	**0.12%**	**0.12%**	**0.11%**	**0.62%**	**0.70%**

Table 4.2-10. Stationary Source Impacts

Pollutant	Period	Turbine Impact (μg/m³)	Boilers/ Generators Impact (μg/m³)	Total Project Impact (μg/m³)	Rule 1303 Threshold (μg/m³)	Above Threshold?
CO	1-hour	1.5	35.54	37.04	1,100	No
CO	8-hour	1.1	24.14	25.24	500	No
NO_2	1-hour	1.7	10.36(1)	12.06	20	No
NO_2	Annual	0.13	0.687(1)	0.82	1	No
PM_{10}	24-hour	0.7	0.75	1.45	2.5	No
PM_{10}	Annual	0.1	0.14	0.24	1	No
$PM_{2.5}$	24-hour	0.69	0.75	1.44	2.5(2)	No
$PM_{2.5}$	Annual	0.099	0.14	0.24	1(2)	No

(1) Per LST Guidelines, a NO_x to NO_2 ratio of 0.388 was used to adjust annual NO_x impacts (2.18 μg/m³) to represent maximum impacts at 810 meters from the source, based on linear interpolation between the ratio for 500 meters (0.258) and 1000 (0.467) meters downwind. A NO_x to NO_2 ratio of 0.353 meters was used to adjust 1-hour NO_x impacts (36.13 μg/m³) to represent a maximum impact at 728 meters from the source, based on linear interpolation between the ratio for 500 meters (0.258) and 1000 meters (0.467) downwind.

(2) $PM_{2.5}$ thresholds assumed to be the same as PM_{10} per LST guidelines for $PM_{2.5}$ (SCAQMD 2006.)

ISCST3 Model Evaluation of CO, NO_x, PM_{10}, and $PM_{2.5}$. Table 4.2-10 presents the results of the ISCST3 model evaluation of CO, NO_x, PM_{10}, and $PM_{2.5}$ emissions from gas turbines, boilers, and emergency generators. As shown in Table 4.2-10, the impacts would be below the SCAQMD Rule 1303 thresholds, and would not cause or contribute to a violation of an ambient air quality standard.

Impact Air-2 Worst-case construction scenario and operational emissions from future projects associated with implementation of the 2007 LRDP would exceed significance thresholds for CO, VOCs, NO_x, PM_{10} and $PM_{2.5}$.

Mitigation Measures

Under a worst-case assumption (i.e., simultaneous construction of up to six major projects in different phases of development), impacts associated with short-term construction activities would exceed air quality significance thresholds. The construction-related emissions of VOCs, NO_x, PM_{10}, and $PM_{2.5}$ would be above the significance thresholds for the maximum daily emissions scenario (Tables 4.2-5 and 4.2-6). This conclusion may or may not apply to individual construction projects depending on the project size and features. Maximum daily and annual operational emissions associated with implementation of the 2007 LRDP would be above the significance thresholds for CO, VOCs, NO_x, PM_{10} and $PM_{2.5}$. Mitigation measures Air-2A, Air-2B, and Air-2C would reduce the air quality impacts due to construction and operations to the extent feasible, but based on the SCAQMD thresholds some LRDP projects may result in direct air quality impacts that would remain significant following mitigation. In accordance with Section 15130(a)(3) of the CEQA Guidelines, these mitigation measures are consistent with the 2007 AQMP strategies that are designed to alleviate Basin-wide air quality impacts by controlling pollution from all sources, including stationary sources, on-road and off-road mobile sources, and area sources. In addition, the projected air pollutant emissions associated with LRDP implementation would represent an incremental portion of the SIP budgets for the county-wide emissions inventory in 2010 (Table 4.2-7), relative to short-term construction emissions, and in 2020 (Table 4.2-9), relative to long-term operational emissions.

Air-2A During project level environmental review of future projects that implement the 2007 LRDP and that could result in a significant air quality impact from construction emissions, UCI shall retain a qualified air quality specialist to prepare an air quality assessment of the anticipated project-related construction emissions. The assessment shall quantify the project’s estimated construction emissions with and without implementation of applicable Best Management Practices (BMPs) listed in mitigation measure Air-2B and compare them with established SCAQMD significance thresholds. In addition, the air quality assessment shall include analysis of temporal phasing as a means of reducing construction emissions.

If the estimated construction emissions are under SCAQMD’s significance thresholds or if mitigation measure Air-2B would reduce emissions to below established thresholds, then the project’s direct impact to air quality would be less than significant and no additional mitigation would be required. If the project’s construction emissions would exceed established thresholds with implementation of applicable BMPs listed in mitigation measure Air-2B, and no additional mitigation to reduce the emissions below the threshold is feasible, then the project’s direct impact to air quality would remain significant following mitigation.

Air-2B Prior to initiating on-site construction for future projects that implement the 2007 LRDP, UCI shall ensure that the project construction contract includes a construction emissions mitigation plan, including measures compliant with SCAQMD Rule 403 (Fugitive Dust), to be implemented and supervised by the on-site construction supervisor, which shall include, but not be limited to, the following BMPs:

i. During grading and site preparation activities, exposed soil areas shall be stabilized via frequent watering, non-toxic chemical stabilization, or equivalent measures at a rate to be determined by the on-site construction supervisor.

ii. During windy days when fugitive dust can be observed leaving the construction site, additional applications of water shall be required at a rate to be determined by the on-site construction supervisor.

iii. Disturbed areas designated for landscaping shall be prepared as soon as possible after completion of construction activities.

iv. Areas of the construction site that will remain inactive for three months or longer following clearing, grubbing and/or grading shall receive appropriate BMP treatments (e.g., revegetation, mulching, covering with tarps, etc.) to prevent fugitive dust generation.

v. All exposed soil or material stockpiles that will not be used within 3 days shall be enclosed, covered, or watered twice daily, or shall be stabilized with approved non-toxic chemical soil binders at a rate to be determined by the on-site construction supervisor.

vi. Unpaved access roads shall be stabilized via frequent watering, non-toxic chemical stabilization, temporary paving, or equivalent measures at a rate to be determined by the on-site construction supervisor.

vii. Trucks transporting materials to and from the site shall allow for at least two feet of freeboard (i.e., minimum vertical distance between the top of the load and the top of the trailer). Alternatively, trucks transporting materials shall be covered.

viii. Speed limit signs at 15 mph or less shall be installed on all unpaved roads within construction sites.

ix. Where visible soil material is tracked onto adjacent public paved roads, the paved roads shall be swept and debris shall be returned to the construction site or transported off site for disposal.

x. Wheel washers, dirt knock-off grates/mats, or equivalent measures shall be installed within the construction site where vehicles exit unpaved roads onto paved roads.

xi. Diesel powered construction equipment shall be maintained in accordance with manufacturer's requirements, and shall be retrofitted with diesel particulate filters where available and practicable.

xii. Heavy duty diesel trucks and gasoline powered equipment shall be turned off if idling is anticipated to last for more than 5 minutes.

xiii. Where feasible, the construction contractor shall use alternatively fueled construction equipment, such as electric or natural gas-powered equipment or biofuel.

xiv. Heavy construction equipment shall use low NO_x diesel fuel to the extent that it is readily available at the time of construction.

xv. To the extent feasible, construction activities shall rely on the campus’s existing electricity infrastructure rather than electrical generators powered by internal combustion engines.

xvi. The construction contractor shall develop a construction traffic management plan that includes the following:

- Scheduling heavy-duty truck deliveries to avoid peak traffic periods
- Consolidating truck deliveries

xvii. Where possible, the construction contractor shall provide a lunch shuttle or on-site lunch service for construction workers.

xviii. The construction contractor shall, to the extent possible, use pre-coated architectural materials that do not require painting. Water-based or low VOC coatings shall be used that are compliant with SCAQMD Rule 1113. Spray equipment with high transfer efficiency, such as the high volume-low pressure spray method, or manual coatings application shall be used to reduce VOC emissions to the extent possible.

xix. Project constructions plans and specifications will include a requirement to define and implement a work program that would limit the emissions of reactive organic gases (ROG's) during the application of architectural coatings to the extent necessary to keep total daily ROG's for each project to below 75 pounds per day, or the current SCAQMD threshold, throughout that period of construction activity to the extent feasible. The specific program may include any combination of restrictions on the types of paints and coatings, application methods, and the amount of surface area coated as determined by the contractor.

xx. The construction contractor shall maintain signage along the construction perimeter with the name and telephone number of the individual in charge of implementing the construction emissions mitigation plan, and with the telephone number of the SCAQMD's complaint line. The contractor's representative shall maintain a log of any public complaints and corrective actions taken to resolve complaints.

Air-2C UCI shall ensure that operational air emissions, including area sources, stationary sources, and vehicular emissions, are reduced to the extent possible via the following mitigation measures:

i. UCI shall continue to implement and expand its alternative transportation program by continuing to assess new opportunities, programs, and technologies to reduce vehicular trips. This program shall consider the following elements:

- Significant incentives aimed to expand UCI vanpool, carpool, and other ridesharing programs;
- Significant incentives aimed to expand UCI public transit use off campus;
- Promotion of Express Bus service in the campus vicinity and Express Bus service routes from key UCI commuter locations off campus;
- Expansion of campus shuttle and other campus transit systems, including point-to-point shuttles with expanded routes and operations to key destinations, and coordination of the on-campus transit systems with existing and future public transit systems off campus to accommodate routes, transit stops, stations, and other programs and projects as deemed appropriate, including community transit programs in the City of Irvine and City of Newport Beach;
- Expansion of UCI bike programs and bicycle infrastructure, including expanded bikeways, BikePorts, and Bike Service Stations; and
- Support of alternative transportation organizations.

ii. All stationary sources shall comply with the applicable SCAQMD Rules and Regulations, including New Source Review, Best Available Control Technology, and source-specific requirements. Stationary sources shall employ state-of-the-art controls, where applicable, to reduce air emissions to the extent possible.

iii. Emissions from area sources (e.g., cooling and heating systems, landscaping, consumer products, etc.) shall be reduced to the extent possible through implementation of UCI's energy efficiency programs. Energy-saving measures include using central plant cooling and heating systems for buildings in the Academic Core; orienting buildings to the north for natural cooling and heating; implementing the UCI standard to exceed Title 24 energy efficiency by 20% or more; and increasing insulation in building walls and attics beyond Title 24 requirements.

4.2.3.3 Issue 3 – Sensitive Receptors

Air Quality Issue 3 Summary

Would implementation of the 2007 LRDP expose sensitive receptors to substantial pollutant concentrations?

Impact: Implementation of the 2007 LRDP would not expose sensitive receptors to carcinogenic, non-carcinogenic, and localized CO pollutant concentrations in excess of regulatory standards.	**Mitigation:** No mitigation is required.
Significance Before Mitigation: Less than significant.	**Significance After Mitigation:** Not applicable.

Standards of Significance

Based on Appendix G of the CEQA Guidelines, an impact is considered significant if implementation of the 2007 LRDP would:

- Expose sensitive receptors to substantial pollutant concentrations;
- Exceed the probability of 10 in one million of a maximally exposed individual contracting cancer; or
- Have ground level concentration of non-carcinogenic TACs, which would result in a HI greater than one for the maximally exposed individual.

Impact Analysis

A health risk assessment (HRA) was prepared by Scientific Resources Associated (SRA 2006), and included in Appendix B of this EIR, to identify health risks associated with increased development anticipated to occur under the 2007 LRDP. An HRA characterizes human health risks as a result of exposure to TACs. In order to assess health risks associated with the full development proposed under the 2007 LRDP, total health risks for the academic year 2025-26 were evaluated by summing existing campus operations and future development and operations. The HRA included TAC emissions associated with laboratory operations, cogeneration operations, natural gas and diesel operation of medium and large boilers, gasoline storage and recovery, and diesel-fueled emergency engines and generators.

An HRA consists of four basic steps to assess a public health risk. First, the TACs to be evaluated are identified and existing and future emissions are quantified. This was accomplished by a review of activities and materials that are part of existing campus operations and proposed new developments. Laboratory emissions were assessed from a review of data from comparable University of California campuses and the specific laboratory chemical inventory at UCI. Other emission sources were evaluated using accepted EPA and ARB emission factors or specific UCI emissions reports. Second, ground-level impacts resulting from the transport and dilution of these emissions through the atmosphere were assessed by air dispersion modeling. The EPA-approved ISCST3 air dispersion model was used for this assessment. Third, potential public exposure to these compounds resulting from atmospheric transport was calculated. For this step, methods from OEHHA guidance for exposure assessments from inhalation and non-inhalation exposure pathways were employed (OEHHA 2003). Evaluated exposure pathways included direct inhalation, soil ingestion, dermal absorption, and ingestion of plants or fish. Finally, potential cancer and non-cancer health risks resulting from calculated exposures were estimated using dose-response relationships developed from toxicological data. The details of the above summarized steps can be found in the *Air Toxics Health Risk Assessment for the University of California Irvine 2007 Long Range Development Plan* (SRA 2006), located in Appendix B of this EIR.

Cancer Risk

Both individual carcinogenic and non-carcinogenic risks were estimated in the HRA. The approach to calculating individual excess cancer risk for the inhalation pathway involved multiplying the predicted concentration for each carcinogenic TAC at each receptor by the breathing rate for that receptor and the cancer potency factor for that contaminant. The total excess cancer risk for an individual receptor is the sum of the excess cancer risk for each contaminant at that receptor.

The main contributor to incremental cancer risk is exposure to hexavalent chromium, which accounts for 89 percent of the incremental cancer risk for maximally exposed individuals. Exposure to cadmium accounted for 6.36 percent of the incremental cancer risk and polycyclic aromatic hydrocarbons (PAHs) accounted for the remaining 5.52 percent of the cancer risk.

The following subsections discuss the risks predicted for the maximally exposed individual worker, adult on- and off-site resident, student on-site resident, and children exposed to residential and/or school settings both on- and off-site. For all calculated health risks, the methodologies used to assess potential environmental exposures and the resulting human toxicological impacts are conservative and, on balance, probably overestimate the actual health risk impacts. Table 4.2-11 summarizes the results.

Table 4.2-11. Summary of Individual Cancer and Non-Cancer Risks

Receptor	Incremental Cancer Risk	Non-Cancer Hazard Index (HI)	
		Acute	Chronic
Maximally Exposed Individual Worker	8.99 in one million	0.0613	0.0471
Maximally Exposed On-site Adult Resident	6.56 in one million	0.0534	0.00752
Maximally Exposed Off-Site Adult Resident	3.08 in one million	0.0368	0.00567
Maximally Exposed On-site Student Resident	0.931 in one million	0.0534	0.00752
Maximally Exposed On-Site Child Resident	1.26 in one million	0.0534	0.00752
Maximally Exposed Off-Site Child Resident	0.604 in one million	0.0368	0.00567
Significance Threshold	**10 in one million**	**1.0**	**1.0**

Maximally Exposed Individual Worker. Adults working at UCI and at businesses near UCI could be exposed to TACs mainly through inhalation during a normal workday. In accordance with OEHHA guidelines, workers are assumed to be exposed for 8 hours per day, 245 days per year, for a 40-year period. The average worker body weight and breathing rates are assumed to be greater than those for the average residential population. The maximally exposed individual worker would be located in the central campus area. The incremental excess cancer risk for the maximally exposed individual worker was predicted to be 8.99 in one million. This incremental cancer risk is below the SCAQMD significant risk threshold of 10 in one million.

Adult Residents. Adult residents living on campus or near the UCI campus could be exposed to TACs mainly through inhalation. Multi-pathway risks would not contribute to the overall incremental cancer risk associated with UCI operations. In accordance with OEHHA guidelines, adult residents are assumed to be exposed for 24 hours per day, 350 days per year, for a 70-year period.

Maximally Exposed On-Site Adult Resident. The location of the maximally exposed on-site adult resident is in the faculty residential area to the south of the central campus area. The incremental cancer risk predicted for the maximally exposed on-site adult resident was predicted to be 6.56 in one million. This incremental cancer risk is below the SCAQMD significant risk threshold of 10 in one million.

Maximally Exposed Off-Site Adult Resident. The location of the maximally exposed off-site adult resident is in the residential area just to the north and east of the central campus area. The incremental cancer risk predicted for the maximally exposed off-site adult resident was predicted to be 3.08 in one million. This incremental cancer risk is below the SCAQMD significant risk threshold of 10 in one million.

Maximally Exposed On-site Student Resident. To address UCI student exposure in on-campus residences, the 9-year adult residential exposure scenario recommended in OEHHA guidelines was used. The location of the maximally exposed on-site student resident is in the Middle Earth residential area just to the east of the central campus area. The incremental cancer risk predicted for the maximally exposed on-site student resident was predicted to be 0.931 in one million. This incremental cancer risk is below the SCAQMD significant risk threshold of 10 in one million.

Maximally Exposed On-Site Child Resident. Incremental cancer risks associated with child residential exposure was based on a 9-year exposure scenario. The location of the on-site child residential receptor was the same as the adult residential receptor: the faculty residential area to the south of the central campus area. The incremental cancer risk predicted for the maximally exposed on-site child resident was predicted to be 1.26 in one million. This incremental cancer risk is below the SCAQMD significant risk threshold of 10 in one million.

Maximally Exposed Off-Site Child Resident. The location of the maximally exposed off-site child resident is in the residential area just to the north and east of the central campus area. This location is the same as the maximally exposed off-site adult resident. The incremental cancer risk predicted for the maximally exposed off-site child resident was predicted to be 0.607 in one million. This incremental cancer risk is below the SCAQMD significant risk threshold of 10 in one million.

The incremental cancer risks are below the SCAQMD significance level of 10 in one million for all receptors and all exposure scenarios; therefore, no significant impact would occur.

Non-Cancer Health Risk

Adverse health effects from non-carcinogens are divided into an assessment of potential acute and potential chronic exposures. Acute exposure is usually associated with inhalation and chronic exposure is associated with both inhalation and oral exposure. Estimates of health impacts from non-cancer endpoints are expressed as a hazard quotient (HQ) for individual substances or as a hazard index (HI) for multiple substances. For conservative purposes for this HRA, the HQs calculated for exposure to all non-cancer substances emitted from UCI were summed to estimate the HI. The acute HI is based on the highest short-term ground-level air concentrations and acute reference exposure level. The chronic inhalation HI is based on the annual average ground-level concentration divided by the chronic reference exposure level. Generally, the inhalation pathway is the largest contributor to the total dose.

The main contributor to acute non-cancer risks is exposure to formaldehyde, which accounts for 61.3 percent of the hazard risk for maximally exposed individuals. Exposure to ammonia accounted for 36.7

percent of the acute non-cancer hazard risk. The main contributor to chronic non-cancer risk is exposure to cadmium, which accounts for 83.4 percent of the hazard risk for maximally exposed individuals. Exposure to beryllium accounted for 13.7 percent of the chronic non-cancer hazard risk.

The same receptor and exposure scenarios estimated for incremental cancer risk were also estimated for acute and chronic non-cancer risks. Although concentrations would increase with the implementation of the 2007 LRDP scenario, these concentrations would still be well below the 1.0 significance level for chronic or acute non-cancer health effects; therefore, no significant impact would occur. Table 4.2-11 summarizes the results.

Local Carbon Monoxide Impacts

Ambient CO levels are most affected by nearby congested intersections. The congestion level for an intersection is expressed in terms of a Level of Service (LOS). LOS is designated by a letter from A to F, with LOS A representing the best operating conditions and LOS F representing the worst (see Section 4.13 of this EIR for a more detailed discussion of LOS). LOS data for intersections substantially affected by the 2007 LRDP are provided in the traffic study, which was prepared by Austin-Foust Associates (2007) and is included as Appendix I of this EIR. To estimate the worst-case local CO impacts, the CO modeling analyses focused on numerous intersections that would be most affected by the 2007 LRDP traffic volumes and would operate at the worst congested traffic levels (LOS E or F) in 2025-26 among all affected intersections. Accordingly, the off-campus intersections listed in Table 4.2-12 were selected for the CO modeling analysis. Because all on-campus intersections are projected to operate at LOS D or better in the Post 2025 condition, no on-campus intersections were included in the analysis.

Table 4.2-12. Intersections Included in "Hot Spots" Analysis

Intersection	Year 2025 Condition		Post 2025 Condition	
	Peak Hour	**LOS**	**Peak Hour**	**LOS**
Carlson Avenue and Campus Drive	PM	F	PM	E
Carlson Avenue and Michelson Drive	AM	E	AM	F
	PM	E	AM	F
Harvard Avenue and Michelson Drive	PM	F	PM	F
University Drive and Campus Drive	PM	E	AM	E
University Drive and California Avenue	PM	E	-	-
Culver Drive and Michelson Drive	PM	F	PM	F
Culver Drive and University Drive	PM	F	PM	F
Von Karman Avenue and Campus Drive	PM	E	PM	E
Jamboree Road and Campus Drive	PM	F	AM	E
	-	-	PM	F
Jamboree Road and Birch Street	AM	E	AM	F
	PM	E	PM	E
MacArthur Boulevard and Jamboree Road	AM	E	AM	E
	PM	E	PM	F
Jamboree Road and Bristol Street S.	-	-	AM	E
MacArthur Boulevard and San Joaquin Hills Road	PM	F	PM	F
Bonita Canyon and Newport Coast Drive	AM	F	AM	F

To evaluate the potential for CO "hot spots," the procedures in the *Caltrans ITS Transportation Project-Level Carbon Monoxide Protocol* (Caltrans 1998) were used. As recommended in the Protocol, CALINE4 modeling was conducted for the intersections identified above. For conservative purposes, emission factors for low speeds (1 mph) were used to estimate emissions in the CALINE4 model, as low speeds provide a worst-case evaluation of emissions. Table 4.2-13 presents a summary of the predicted CO concentrations (impact plus background) for the intersections evaluated. As shown in Table 4.2-13, the predicted CO concentrations would be substantially below the 1-hour and 8-hour NAAQS and CAAQS (Table 4.2-2).

Table 4.2-13. CO "Hot Spots" Evaluation Predicted CO Concentrations, ppm

Intersection	CO Concentration	
	am	**pm**
Maximum 1-hour Concentration Plus Background, ppm CAAQS = 20.0 ppm; NAAQS = 35.0 ppm; Background 6.1 ppm		
Carlson Avenue and Campus Drive	6.4	6.4
Carlson Avenue and Michelson Drive	6.5	6.4
Harvard Avenue and Michelson Drive	6.6	6.7
University Drive and Campus Drive	6.5	6.6
University Drive and California Avenue	6.5	6.6
Culver Drive and Michelson Drive	6.6	6.7
Culver Drive and University Drive	6.6	6.8
Von Karman Avenue and Campus Drive	6.4	6.5
Jamboree Road and Campus Drive	6.7	6.8
Jamboree Road and Birch Street	6.7	6.7
MacArthur Boulevard and Jamboree Road	6.8	6.9
Jamboree Road and Bristol Street S.	6.8	6.8
MacArthur Boulevard and San Joaquin Hills Road	6.8	6.8
Bonita Canyon and Newport Coast Drive	6.6	6.4
Maximum 8-hour Concentration Plus Background, ppm CAAQS = 9.0 ppm; NAAQS = 9.0 ppm; Background 4.09 ppm		
Carlson Avenue and Campus Drive	4.30	
Carlson Avenue and Michelson Drive	4.44	
Harvard Avenue and Michelson Drive	4.51	
University Drive and Campus Drive	4.44	
University Drive and California Avenue	4.44	
Culver Drive and Michelson Drive	4.51	
Culver Drive and University Drive	4.58	
Von Karman Avenue and Campus Drive	4.37	
Jamboree Road and Campus Drive	4.58	
Jamboree Road and Birch Street	4.51	
MacArthur Boulevard and Jamboree Road	4.65	
Jamboree Road and Bristol Street S.	4.58	
MacArthur Boulevard and San Joaquin Hills Road	4.58	
Bonita Canyon and Newport Coast Drive	4.44	

Implementation of the 2007 LRDP would not violate the NAAQS and CAAQS for CO or expose receptors to substantial CO concentrations associated with vehicle traffic on roadways. The estimated CO concentrations for the most congested intersections associated with 2007 LRDP traffic volumes (under year 2025 and post-2025 conditions) were predicted to be well below the applicable NAAQS and CAAQS for CO; therefore, impacts would be less than significant.

Mitigation Measures

Implementation of the 2007 LRDP would not exceed the standards of significance described above including the probability of 10 in one million of a maximally exposed individual contracting cancer; exposure of ground-level concentrations of non-carcinogenic TACs that would result in a HI greater than one for the maximally exposed individual; a violation of NAAQS or CAAQS for CO; or exposure of sensitive receptors to substantial CO concentrations associated with vehicle traffic on roadways. Therefore, no mitigation measures are required.

4.2.3.4 ISSUE 4 – OBJECTIONABLE ODORS

Air Quality Issue 4 Summary

Would implementation of the 2007 LRDP create objectionable odors affecting a substantial number of people?

Impact: Implementation of the 2007 LRDP is not likely to produce objectionable odors affecting a substantial number of people.

Mitigation: No mitigation is required.

Significance Before Mitigation: None.

Significance After Mitigation: Not applicable.

Standards of Significance

Based on Appendix G of the CEQA Guidelines, an impact is considered significant if implementation of the 2007 LRDP would create objectionable odors affecting a substantial number of people.

Impact Analysis

Assessing odor impacts depends upon such variables as wind speed, wind direction, and the sensitivities of receptors to different odors. To have an odor impact, the perception of an odor in ambient air depends on the properties of the substance emitted, its emission concentration, and dilution of emissions between the emissions source and the receptors.

Certain amounts of odors would be generated from vehicles and/or equipment tailpipe exhaust emissions during construction and operational phases of the 2007 LRDP. Odors would be attributable to concentrations of several unburned hydrocarbons from the vehicle and equipment tailpipes. Unburned hydrocarbon emissions from vehicles and equipment are typically very small. Furthermore, the UCI campus is not considered to be a land use that would generate significant odor impacts. The most typical operational odors detected from time to time could be food odors or vehicle exhaust odors; however, these odors would be temporary in nature. New development under the 2007 LRDP would primarily be institutional land uses, along with some residential and recreational land uses. Therefore, implementation of the 2007 LRDP is not anticipated to generate objectionable odors

Mitigation Measures

Implementation of the 2007 LRDP would not create objectionable odors affecting a substantial number of people; therefore, no mitigation measures are required.

4.2.4 CUMULATIVE IMPACTS AND MITIGATION

Air Quality Cumulative Issue Summary

Would implementation of the 2007 LRDP have a cumulatively considerable contribution to a cumulative air quality impact considering past, present, and probable future projects?

Cumulative Impact	Significance	LRDP Contribution
Consistency with Applicable Air Quality Plan: Because the 2007 LRDP would not conflict with the 2007 AQMP or the SIP, there is no analysis of cumulative impacts.	N/A	N/A
Construction and Operational Emissions: Air quality impacts from construction activities, area sources, new stationary sources and increased vehicular emissions that would exceed air quality standards for CO, VOCs, NO_x, PM_{10} and $PM_{2.5}$.	Significant.	Cumulatively considerable following implementation of mitigation measures Air-2A, Air-2B, and Air-2C.
Sensitive receptors: Exposure of people to substantial carcinogenic, non-carcinogenic, and localized CO pollutant concentrations.	Significant (carcinogenic, non-carcinogenic pollutants); less than significant (CO "hot spots").	Cumulatively considerable for carcinogenic, non-carcinogenic pollutants, but mitigated with implementation of energy-saving projects and programs; not cumulatively considerable for CO "hot spots."
Objectionable Odors: Because the 2007 LRDP would not generate objectionable odors, there is no analysis of cumulative impacts.	N/A	N/A

4.2.4.1 CONSISTENCY WITH APPLICABLE AIR QUALITY PLAN

Section 4.2.3.1 above concluded that implementation of the 2007 LRDP would not conflict with the 2007 AQMP and the SIP. Therefore, this issue is not addressed in this cumulative analysis pursuant to Section 15130(a)(1) of the CEQA Guidelines, which states that "an EIR should not discuss impacts which do not result in part from the project evaluated in the EIR."

4.2.4.2 CONSTRUCTION AND OPERATIONAL EMISSIONS

The geographic context for the analysis of cumulative impacts for construction and operational emissions is the Basin. This analysis accounts for all anticipated cumulative growth within this geographic area, along with full implementation of the 2007 LRDP. Because the Basin is considered a nonattainment area for O_3, CO, PM_{10}, and $PM_{2.5}$, cumulative development could violate an air quality standard or contribute to an existing or projected air quality violation. This condition is considered to be a significant Basin-wide cumulative impact. For the purposes of this analysis, future LRDP projects that contribute to these nonattainment pollutant emissions in excess of SCAQMD thresholds would be cumulatively considerable.

As discussed in Section 4.2.3.2 above, the short-term construction emissions (assuming simultaneous construction of several large and small projects) would be above the significance criteria for O_3 precursors (VOCs and NO_x),, PM_{10}, and $PM_{2.5}$ and would, therefore, result in a short-term significant direct and cumulative impact on the ambient air quality. Furthermore, maximum daily and annual operational emissions associated with implementation of the 2007 LRDP would be above the daily and annual significance thresholds for CO, O_3 precursors (VOCs and NO_x),, PM_{10}, and $PM_{2.5}$ and would, therefore, result in a long-term significant direct and cumulative impact on the ambient air quality. Because the Basin is in nonattainment for these criteria air pollutants, implementation of future LRDP projects that exceed the SCAQMD thresholds would result in a cumulatively considerable contribution to this significant cumulative air quality impact.

Implementation of mitigation measures Air-2A, Air-2B and Air-2C would reduce the LRDP's cumulatively considerable contribution to these impacts to the extent feasible, but based on current SCAQMD thresholds some LRDP projects may result in cumulative air quality impacts that would remain significant following mitigation. In accordance with Section 15130(a)(3) of the CEQA Guidelines, these mitigation measures are consistent with the 2007 AQMP strategies that are designed to alleviate Basin-wide air quality impacts by controlling pollution from all sources, including stationary sources, on-road and off-road mobile sources, and area sources. In addition, the projected air pollutant emissions associated with LRDP implementation would represent an incremental portion of the SIP budgets for the county-wide emissions inventory in 2010 (Table 4.2-7), relative to short-term construction emissions, and in 2020 (Table 4.2-9), relative to long-term operational emissions.

4.2.4.3 SENSITIVE RECEPTORS

The geographic context for the analysis of cumulative impacts for exposure of sensitive receptors to substantial carcinogenic and non-carcinogenic pollutant concentrations is the Basin. This analysis accounts for all anticipated cumulative growth within this geographic area, along with full implementation of the 2007 LRDP. According to the MATES-II study (SCAQMD 2000), the existing carcinogenic risk in the Basin is approximately 1,400 in one million. Mobile sources, such as cars, trucks, trains, and aircraft, represent the greatest contributor and approximately 70% of all risk is attributed to diesel particulate emissions. Therefore, because the cancer risk in the Basin exceeds the significance threshold of ten in one million, a significant cumulative impact exists. For the purposes of this analysis, any contribution to the cancer risk in the Basin by individual projects would be cumulatively considerable.

As discussed in Section 4.2.3.3 above, individual cancer risk was below the significance threshold for each receptor. The highest receptor was the Maximally Exposed Individual Worker with an incremental cancer risk of 8.99 in one million. Therefore, implementation of the 2007 LRDP would result in a less than significant impact to sensitive receptors. However, because the Basin exceeds the established threshold for cancer risk, implementation of future projects under the 2007 LRDP would result in a cumulatively considerable contribution to this significant cumulative air quality impact.

As discussed in Section 4.14 (Utilities, Service Systems, and Energy) of this EIR, UCI implements the following energy-saving projects and programs that reduce carcinogenic and non-carcinogenic pollutant emissions associated with energy production:

- Centralized heating and cooling enables more efficient temperature regulation of campus buildings instead of individualized building systems.
- A Thermal Energy Storage facility holds 4.5 million gallons of water that is chilled at night when less energy is required and then circulated to cool buildings during daytime peak energy use periods.
- The UC Policy for Green Building Design and Clean Energy Standard guides the design of green buildings and the use of clean energy on campus.

Implementation of these energy-saving projects and programs would reduce the LRDP's cumulatively considerable contribution to these impacts to a level of Less than Significant. In accordance with Section 15130(a)(3) of the CEQA Guidelines, these mitigation measures are consistent with the 2007 AQMP strategies that are designed to alleviate Basin-wide air quality impacts by controlling pollution from all sources, including stationary sources, on-road and off-road mobile sources, and area sources.

The geographic context for the analysis of cumulative impacts for exposure of sensitive receptors to substantial CO pollutant concentrations encompasses the on- and off-campus intersections listed in Table 4.2-13 in Section 4.2.3.3 above. Certain receptors near these intersections may be sensitive to CO "hot spots"; therefore, a significant cumulative impact exists. The "hot spots" evaluation summarized in Section 4.2.3.3 above takes into account cumulative traffic generated due to implementation of the 2007 LRDP and other projects considered in the cumulative traffic projections. As shown in Table 4.2-13, project-related traffic would not result in an exceedance in an ambient air quality standard when added to background CO concentrations of the analyzed intersections. Thus, localized CO cumulative impacts associated with the LRDP would not result in a cumulatively considerable contribution to this significant cumulative air quality impact.

4.2.4.4 Objectionable Odors

Section 4.2.3.4 above concluded that implementation of the 2007 LRDP would not generate objectionable odors. Therefore, this issue is not addressed in this cumulative analysis pursuant to Section 15130(a)(1) of the CEQA Guidelines, which states that "an EIR should not discuss impacts which do not result in part from the project evaluated in the EIR."

4.2.5 CEQA Checklist Items Adequately Addressed in Initial Study

The 2007 LRDP Initial Study indicated that all checklist items under the category of air quality should be evaluated in the EIR.

4.2.6 References

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