4.3 AIR QUALITY

The purpose of the Air Quality section is to address the impacts of the project on ambient air quality and the exposure of people, particularly sensitive individuals, to odors and hazardous pollutant concentrations, including toxic air contaminants. This section evaluates the significance of the increased emissions and exposures associated with the proposed project, and recommends mitigation measures to reduce the emissions and exposures to acceptable levels. The following analysis is derived from the *Air Quality Analysis for the Panorama Planned Development Project* (Tetra Tech EC, Inc., 2008).

This EIR also considers the potential effects of the project on climate change. Emissions of carbon dioxide, an important greenhouse gas, have been calculated and are presented below for the various components of the proposed project (construction, traffic-related emissions, operational emissions). A more detailed analysis of the project's contribution to greenhouse gas emissions is included in Section 5.1: Cumulative Impacts.

Project construction and operation could both result in exceedances of the County's Level "A" thresholds for NO_x and possibly VOCs. In addition, future residents could be exposed to odors, dust, and other air pollutants from nearby agricultural and industrial operations. A number of measures are available to minimize construction-related emissions. Operational emissions can be substantially reduced by eliminating use of wood-burning fireplaces and wood stoves; the passive solar design criterion to be implemented as part of the project proposal would further limit operational emissions. With implementation of these measures, neither short-term nor long-term emissions are considered significant.

The reaction to odors varies from individual to individual. No measures are available to the project proponents to control off-site odor or dust generation. However, provided prospective purchasers of the residences are notified of the potential for off-site odor and dust generation, the potential for impacts would be reduced to an acceptable level.

4.3.1 ENVIRONMENTAL SETTING

CLIMATE AND METEOROLOGY

Shasta County is located at the northern end of the Sacramento Valley Air Basin (SVAB). The SVAB consists of all or part of eleven counties. The SVAB is bounded on the north and west by the Coast Range, and on the east by the southern end of the Cascade Range and the northern end of the Sierra Nevada. These mountain ranges represent a substantial physical barrier to locally created pollution, as well as that transported northward on prevailing winds from the Sacramento metropolitan area.

The climate of the Sacramento Valley Air Basin is dominated by the strength and location of a semi-permanent, subtropical, high-pressure cell over the northeastern

Pacific Ocean, with terrain variations creating various microclimates. The existence of mountains and hills within the basin is responsible, in large part, for the wide variations of rainfall, temperatures, and localized winds that occur throughout the region. Airflow patterns in the basin are predominantly northwesterly in the spring and summer; however, seasonal variations do occur. Calm conditions dominate the winter months. Regional airflow patterns affect air quality by directing pollutants downwind of sources. Localized meteorological conditions, such as light winds and shallow vertical mixing, as well as topographical features, such as surrounding mountain ranges, create areas of high pollutant concentrations by hindering dispersal. Figure 4.3.1: Redding Airport Reporting Station Wind Rose Data shows the wind rose data for the Redding Airport reporting station.

Precipitation is highly variable seasonally. Summer months are often dry, averaging less than one inch in total precipitation per month. Rainfall is most abundant during the winter months and increases with elevation. Annual rainfall is lowest in the valleys, higher in the foothills, and highest in the mountains. Summary climate statistics for the Redding Airport, which lies to the north of the project site, are presented in Table 4.3.1.

Table 4.3.1
Climate Data Summary for the Redding Airport

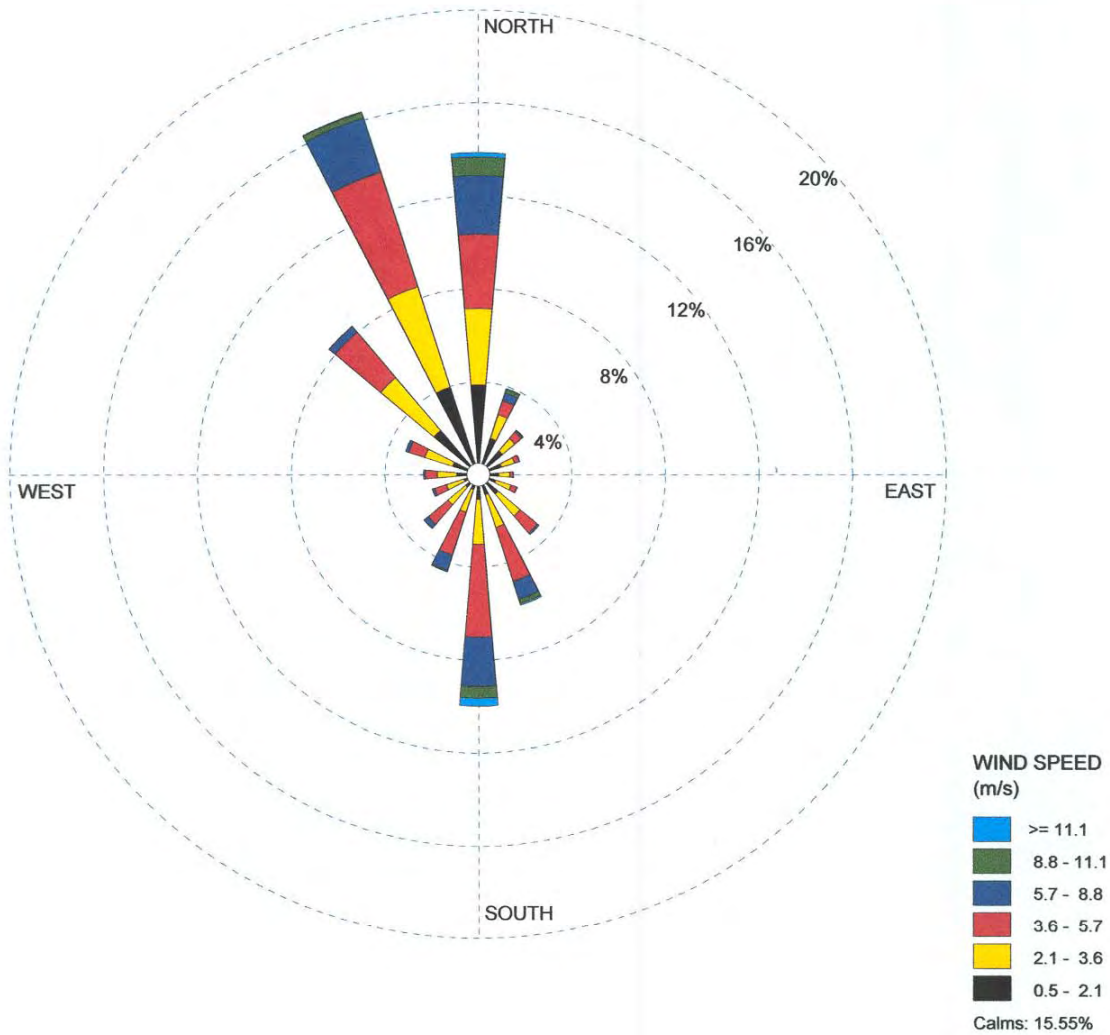
Mean Maximum Temperature, F	75.3
Highest Mean Maximum Temperature, F	103.4
Lowest Mean Maximum Temperature, F	48.9
Mean Minimum Temperature, F	47.9
Highest Mean Minimum Temperature, F	68.7
Lowest Mean Minimum Temperature, F	26.9
Mean Annual Precipitation, in.	33.52
Predominate Wind Direction[2]	N to NW
Annual Average Wind Speed, mph[2]	7.1
% of Calm Conditions[2]	15.55

Source: Tetra Tech EC, Inc., 2008.
[1] NCDC 1971-2000 Monthly Normal Data, Western Regional Climatic Center
[2] Redding Airport wind data for 1988-1991

The valley is frequently subjected to inversions that, coupled with geographic barriers and high summer temperatures, create a high potential for air pollution problems. Generally, areas below 1,000 feet in elevation within Shasta County experience a moderate to poor capability to disperse pollutants in both the horizontal and vertical wind fields. This is, in large measure, due to relatively stable atmospheric conditions which act to suppress vertical air movement. Extremely stable atmospheric conditions referred to as "inversions" act as barriers to the dispersal of pollutants. In valley locations, at or below 1,000 feet in elevation, such as the project area, inversions create a "lid" under which pollutants are trapped. Dust and other pollutants trapped within these inversion layers will not disperse until atmospheric conditions become unstable. This situation creates concentrations of pollutants at or near the ground surface, and as a result may pose significant health risks for plants, animals, and people.

WIND ROSE PLOT:
Station #24257 - REDDING/AAF, CA

DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	1988 1989 1990 1991 **Jan 1 - Dec 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **15.55%**	TOTAL COUNT: **35064 hrs.**	
	AVG. WIND SPEED: **3.17 m/s**	DATE: **5/3/2004**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Figure 4.3.1
Redding Airport Reporting Station Wind Rose Data
(Source: Tetra Tech EC, Inc., 2008)

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REGULATORY SETTING

An overview of existing and proposed *Shasta County General Plan* land use classifications and *Shasta County Zoning Plan* designations for the project site is provided in Section 3.4: Panorama Planned Development Regulatory Setting. A discussion of federal, state, and local regulations related to air quality, as well as objectives and policies in the *Shasta County General Plan* that are pertinent to the air quality analysis for the project, are included below.

Federal Regulations

Environmental Protection Agency. At the federal level, the U.S. Environmental Protection Agency (EPA) has been charged with implementing national air quality programs. The U.S. EPA air quality mandates are derived from the federal Clean Air Act (CAA), which was signed into law in 1970. Congress amended the CAA in 1977 and again in 1990. The CAA required the EPA to establish the national ambient air quality standards (NAAQS), and to also establish deadlines for their attainment. Two types of NAAQS have been established: primary standards, which protect public health, and secondary standards, which protect public welfare from non-health-related adverse effects, such as visibility limitations.

The CAA Amendments of 1990 made major changes in deadlines for attaining NAAQS and in the actions required of areas of the nation that exceed these standards. Under the CAA, state and local agencies in areas that exceed the NAAQS are required to develop and implement air pollution control plans designed to achieve and maintain the NAAQS established by EPA. States may also establish their own standards, provided that state standards are at least as stringent as the NAAQS. California has established California ambient air quality standards (CAAQS) pursuant to California Health and Safety Code.

The CAA required states to develop an air quality control plan referred to as the State Implementation Plan (SIP). The SIP contains the strategies and control measures that California uses to attain the NAAQS. The EPA approved the California SIP in September 1996. The SIP became effective on February 7, 1997. Pursuant to the SIP, the State of California will strive for compliance with federal ozone standards by the year 2010. This will be accomplished using a combination of performance standards and market-based programs that will speed the introduction of cleaner technology and expand compliance flexibility.

State Regulations

California Air Resources Board. The California Air Resources Board (CARB) is the agency responsible for coordination and oversight of state and local air pollution control programs and for implementing the California Clean Air Act (CCAA) of 1988. The CCAA requires that all air districts in the state endeavor to achieve and maintain CAAQS by the earliest practical date. The CCAA mandates that districts focus particular attention on reducing emissions from transportation and area-wide emission sources, and the Act provides districts with the authority to regulate indirect sources.

Each district is to achieve a five percent annual reduction, averaged over consecutive three-year periods, in district-wide emissions of each nonattainment pollutant or its precursors. Air districts in violation of CAAQS are required to prepare an Air Quality Attainment Plan (AQAP) that includes measures for attaining the CCAA mandates.

California's Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24). The Energy Efficiency Standards for Residential and Nonresidential Buildings were established in 24 CCR Part 6 in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow for consideration and possible incorporation of new energy efficiency technologies and methods. The current California Energy Commission standards were adopted in January 2008 (California Energy Commission, 2008), and implemented in January 2010.

Local Regulations

Shasta County Air Quality Management District. The project site is located in the jurisdiction of the Shasta County Air Quality Management District (AQMD). The AQMD is designated by law to adopt and enforce regulations to achieve and maintain ambient air quality standards. The AQMD, along with other air districts in the Sacramento Valley Air Basin (SVAB), has committed to jointly prepare the SVAB Air Quality Attainment Plan for the purpose of achieving and maintaining healthful air quality throughout the air basin. The Plan was initially adopted in 1994 and is intended to be updated on a triennial basis. The most recent update occurred in 2006. The triennial updates of the SVAB Air Quality Attainment Plan address the progress made in implementing the AQAP and propose modifications to the strategies necessary to attain the California ambient air quality standard for the 1-hour ozone standard at the earliest practicable date. Like previous updates of the Air Quality Attainment Plan, the 2006 AQAP focuses on adoption and implementation of control measures for stationary sources, area-wide sources, and indirect sources, and addresses public education and information programs. The 2006 AQAP also addresses the effect that pollutant transport has on the north valley area's ability to meet and attain the State standards. Specific AQMD rules or programs applicable to the proposed project include the following.

- Rule 3:16 – Fugitive, Indirect, or Non-Traditional Sources
- Protocol for Review – Land Use Permitting Activities
- Environmental Review Guidelines – Procedures for Implementing CEQA

Shasta County General Plan. The *Shasta County General Plan* includes various objectives and policies to help protect and improve the County's air quality and to help the County attain and maintain federal and state ambient air quality standards. The objectives and policies most applicable to the proposed project are summarized as follows:

Objectives

AQ-1 To protect and improve the County's air quality in accordance with Federal and State clean air laws in order to: (1) safeguard human health, and (2) minimize crop, plant, and property damage.

AQ-2 To meet the requirements of the: (1) Federal Clean Air Act, and (2) the California Clean Air Act as soon as feasible.

AQ-3 To integrate air quality, land use, housing, transportation, and energy planning efforts to achieve the most efficient use of public resources and to create a healthier and more livable environment through reductions in air pollution contaminants.

AQ-4 To reduce traffic congestion, vehicle trips, vehicle miles traveled, and increase average vehicle ridership through more efficient use of infrastructure and support for trip reduction programs.

AQ-6 To promote site designs that encourage walking, cycling, and transit use.

AQ-8 To reduce emissions related to energy consumption and area sources.

Policies

AQ-1a The County shall require builders/developers to limit fireplace installations in new development to low-emitting fireplaces conforming to a maximum emission limit of 7.5 grams per hour of total particulate matter by being equipped with a EPA-certified insert or by being individually certified to meet the above emission standard.

AQ-1b The County will encourage the development of local programs to minimize emissions from residential wood burning.

AQ-1d The County shall require residential development projects and projects categorized as sensitive receptors to be located an adequate distance from existing and potential sources of toxic emissions such as freeways, major arterials, industrial sites, and hazardous material locations.

AQ-2b The County will work to accurately determine and fairly mitigate the local and regional air quality impacts of projects proposed in the unincorporated portions of Shasta County.

AQ-2c Land use decisions, where feasible, should contribute to the improvement of air quality. New projects shall be required to reduce their respective air quality impacts to below levels of significance, or proceed as indicated in Policy AQ-2e.

AQ-2d Shasta County shall ensure that air quality impacts identified during CEQA review are: (1) consistently and fairly mitigated, and (2) mitigation measures are feasible.

AQ-2e Shasta County will cooperate with the AQMD in assuring that new projects with stationary sources of emissions of non-attainment pollutants or their precursors

that exceed 25 tons per year shall provide appropriate emission offsets. A comparable program which offsets indirect emissions of these pollutants exceeding 25 tons per year from development projects shall also be utilized to mitigate air pollution impacts. An Environmental Impact Report will be required for all projects that have unmitigated emissions of non-attainment pollutants exceeding 25 tons per year.

AQ-2f Shasta County shall require appropriate Standard Mitigation Measures and Best Available Mitigation Measures on all discretionary land use applications as recommended by the AQMD in order to mitigate both direct and indirect emissions of non-attainment pollutants.

AQ-2g Significance thresholds as proposed by the AQMD for emissions shall be utilized when appropriate for: (1) Reactive Organic Gases (ROG) and Oxides of Nitrogen (NO_x), both of which are precursors of ozone, and (2) inhalable particulate matter (PM_{10}) in determining mitigation of air quality impacts.

AQ-2j The County shall work toward measures to reduce particulate emissions from construction, grading, excavation, and demolition to the maximum extent feasible.

AQ-3a The County shall consider potential air quality impacts when planning the land uses and transportation systems needed to accommodate expected growth.

AQ-3b The County shall work towards creating a land use pattern that encourages people to walk, bicycle, or use public transit for a significant number of their daily trips.

AQ-3c The County shall encourage projects proposing pedestrian- or transit-oriented designs at suitable locations.

AQ-3f Existing town centers and rural community centers should be recognized among the primary pedestrian-oriented commercial and service centers as major contributors in promoting air quality goals in the unincorporated portions of the County.

AQ-3h The County will encourage higher residential densities in areas served by the full range of urban services.

AQ-4b The County's development standards shall require the paving of roads as a part of new development permits to the extent necessary to meet access and air quality objectives. These requirements shall be designed to help mitigate potentially significant adverse air quality impacts created by particulate emissions on both an individual and cumulative basis.

AQ-4c The County will encourage and publicize the use of public transit; ridesharing and van pooling; shortened and combined motor vehicle trips for work, shopping and services; use of bicycles; "pedestrian friendly" design criteria and walking.

AQ-4f The County shall consult as appropriate with transit providers to determine potentially significant project impacts on long-range transit plans to ensure that impacts are adequately mitigated.

AQ-5b The Shasta County Department of Resource Management will consult with the AQMD, where appropriate, when conducting CEQA reviews for all discretionary development applications.

AQ-6a The County shall encourage project sites designed to increase the convenience, safety, and comfort of people using transit, walking, or cycling.

AQ-6b The County shall review all subdivision street and lot designs, commercial site plans and multi-family site plans to identify design changes that can improve access by transit, bicycle, or walking.

AQ-8a The County will encourage new development projects to reduce air quality impacts from area sources and energy consumption requirements for heating and cooling.

AQ-8b The County will encourage use of energy conservation features and low-emission equipment for all new residential and commercial development.

BACKGROUND AIR QUALITY

Pollutants of concern include both criteria pollutants and toxic air contaminants. Criteria pollutants are those regulated by federal and State laws since the 1970s pursuant to the federal and State Clean Air Acts: e.g., ozone, carbon monoxide, suspended particulate matter, oxides of nitrogen, and sulfur dioxide. Toxic air contaminants are identified by State regulation: e.g., particulate matter from diesel-fueled engines, asbestos, chlorinated organic compounds, metals, radon and iodine gas, and other contaminants.

Criteria Pollutants

To date, the national ambient air quality standards (NAAQS) have been established for seven criteria pollutants, as follows: sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sub 10-micron particulate matter (PM_{10}), sub 2.5-micron particulate matter ($PM_{2.5}$), and lead (Pb). The criteria pollutants are those that have been demonstrated historically to be widespread and have a potential for adverse health impacts. The State of California has also established ambient air quality standards (CAAQS) that further limit the allowable concentrations of certain criteria pollutants.

Each federal or state ambient air quality standard is comprised of two basic elements: (1) a numerical limit expressed as an allowable concentration, and (2) an averaging time that specifies the period over which the concentration value is to be measured. Table 4.3.2 presents the current federal and state ambient air quality standards.

Table 4.3.2
Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards Concentration	National Standards Concentration
Ozone	1 hour	0.09 ppm (180 µg/m^3)	-
	8 hour	0.07 ppm (137 µg/m^3)	0.075 ppm (147 µg/m^3) (3-year average of annual 4th-highest daily maximum)
Carbon monoxide	8 hour	9.0 ppm (10000 ug/m^3)	9 ppm (10000 ug/m^3)
	1 hour	20 ppm (23000 ug/m^3)	35 ppm (40000 ug/m^3)
Nitrogen dioxide	Annual Average	.030 ppm	0.053 ppm (100 µg/m^3)
	1 hour	0.18 ppm (338 µg/m^3)	-
Sulfur dioxide	Annual Average	-	0.03 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)	-
Respirable particulate matter (10 micron)	24 hour	50 µg/m^3	150 µg/m^3
	Annual Arithmetic Mean	20 µg/m^3	-
Fine particulate matter (2.5 micron)	Annual Arithmetic Mean	12 µg/m^3	15 µg/m^3 (3-year average)
	24 hour	-	35 µg/m^3 (3-year average of 98th percentiles)
Sulfates	24 hour	25 µg/m^3	-
Lead	30 day	1.5 µg/m^3	-
	Calendar Quarter	-	1.5 µg/m^3

Source: Tetra Tech EC, Inc., 2008.
ppm = parts per million
µg/m^3 = micrograms per cubic meter

Brief descriptions of health effects for the main criteria pollutants are as follows.

Ozone. Ozone is a reactive pollutant that is not emitted directly into the atmosphere; rather, it is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving precursor organic compounds (POC) and oxides of nitrogen (NO_x). Significant ozone production generally requires POC and NO_x to be present in a stable atmosphere with strong sunlight for approximately three hours. Ozone is a regional air pollutant because it is not emitted directly by sources, rather is formed downwind of sources of POC and NO_x under the influence of wind and sunlight. Short-term exposure to ozone can irritate the eyes and cause constriction of the airways. In addition to causing shortness of breath, ozone can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema.

Carbon Monoxide. Carbon monoxide is a non-reactive pollutant that is a product of incomplete combustion. Ambient carbon monoxide concentrations generally follow the spatial and temporal distributions of vehicular traffic, and are also influenced by meteorological factors such as wind speed and atmospheric mixing. Under inversion conditions, carbon monoxide concentrations may be distributed more uniformly over an area, out to a particular distance, from vehicular sources. When inhaled at high concentrations, carbon monoxide combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the

brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease, or anemia, as well as for fetuses.

Particulate Matter (PM10 and PM2.5). PM_{10} consists of particulate matter that is 10 microns or less in diameter (a micron is one-millionth of a meter). Fine particulate matter, $PM_{2.5}$, consists of particulate matter 2.5 microns or less in diameter. Both PM_{10} and $PM_{2.5}$ represent fractions of particulate matter that can be inhaled into the air passages and the lungs and can cause adverse health effects. Particulate matter in the atmosphere results from many kinds of dust- and fume-producing industrial and agricultural operations, combustion, and atmospheric photochemical reactions. Some of these operations, such as demolition and construction activities, contribute to increases in local PM concentrations, while others, such as vehicular traffic, affect regional PM concentrations.

Several studies conducted by the U.S. EPA have shown an association between exposure to particulate matter, both PM_{10} and $PM_{2.5}$, and respiratory ailments or cardiovascular disease. Other studies have related particulate matter to increases in asthma attacks. In general, these studies have shown that short-term and long-term exposure to particulate matter can cause acute and chronic health effects. $PM_{2.5}$, which can penetrate deep into the lungs, causes more serious respiratory ailments. These studies, along with information provided by the U.S. EPA in a 1996 staff report, were used as the basis for evaluating the impacts of the proposed project emissions of PM_{10} and $PM_{2.5}$ on public health.

Nitrogen Dioxide and Sulfur Dioxide. Nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) are two gaseous compounds within larger groups of compounds, oxides of nitrogen (NO_x) and sulfur oxides (SO_x), respectively, that are products of the combustion of fuel. NO_x and SO_x emission sources can elevate local NO_2 and SO_2 concentrations, and both are regional precursor compounds to particulate matter. As described above, NO_x is also an ozone precursor compound and can affect regional visibility. Elevated concentrations of these compounds are associated with increased risk of acute and chronic respiratory disease. Sulfur dioxide and nitrogen oxides emissions can be oxidized in the atmosphere to eventually form sulfates and nitrates, which contribute to acid rain.

Lead. Gasoline-powered automobile engines used to be the major source of airborne lead in urban areas. Excessive exposure to lead concentrations can result in gastrointestinal disturbances, anemia, kidney disease, and in severe cases, neuromuscular and neurological dysfunction. The use of lead additives in motor vehicle fuel has been eliminated in California, and lead concentrations have declined substantially as a result.

Toxic Air Contaminants

"Toxic air contaminants" are air pollutants that are believed to have carcinogenic or adverse non-carcinogenic effects but do not have a corresponding ambient air quality

standard. There are hundreds of different types of toxic air contaminants, with varying degrees of toxicity. Sources of toxic air contaminants include industrial processes such as petroleum refining, electric utility and chrome-plating operations, commercial operations such as gasoline stations and dry cleaners, and motor vehicle exhaust.

Toxic air contaminants are regulated under both state and federal laws. Federal laws use the term "Hazardous Air Pollutants" (HAPs) to refer to the same types of compounds referred to as "Toxic Air Contaminants" (TACs) under State law. Both terms encompass essentially the same compounds. For the sake of simplicity, this section will use TACs when referring to these compounds rather than HAPs. Under the 1990 Clean Air Act Amendments, approximately 190 substances are regulated under a two-phase strategy. The first phase involves requiring facilities to install Maximum Achievable Control Technology (MACT); EPA has established MACT standards for a wide variety of industries that emit toxic air contaminants and will develop MACT standards for others over the next several years. Even if MACT is established for a given source category, a facility in that category is subject to MACT only if the TAC emissions are 10 tons per year or more for any substance or 25 tons per year or more for any combination of TACs.

The second phase of control involves determining the residual health risk represented by TAC emissions sources after implementation of MACT standards. The EPA will determine residual risks within eight years after MACT standards for a source category are set. Results of this analysis will be used to determine if the residual risks allow for a reasonable margin of safety for public health.

With respect to State law, in 1983 the State legislature adopted Assembly Bill 1807 (AB 1807), which established a process for identifying toxic air contaminants and provided the authority for developing retrofit air toxics control measures on a statewide basis. In 1992, the State legislature adopted Assembly Bill 2728 to provide a legal framework for the integration of the existing State air toxics programs, including those developed under AB 1807, with the new federal program discussed above. Air toxics in California may also be regulated because of another state law, the Air Toxics "Hot Spots" Information and Assessment Act of 1987, Assembly Bill 2588 (AB 2588). Under AB 2588, toxic air contaminant emissions from individual facilities are required to be quantified by the facility and reported to the local air pollution control agency. The facilities are prioritized by the local agencies based on the quantity and toxicity of these emissions, and their proximity to areas where the public may be exposed. High priority facilities are required to perform a health risk assessment, and if specific risk thresholds are exceeded, they are required to communicate the results to the public in the form of notices and public meetings. Depending on the health risk levels, emitting facilities can be required to implement varying levels of risk reduction measures.

Organic Gases

Volatile Organic Compounds (VOCs) are organic chemical compounds that are in a gaseous form under normal conditions, and readily react with other chemicals, often contributing to the formation of smog. A wide range of carbon-based molecules, such

as aldehydes, ketones, and other light hydrocarbons are VOCs. As defined by the U.S.EPA, VOCs are any volatile compound of carbon, excluding methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate, and exempt compounds. Common artificial VOCs include paint thinners, dry cleaning solvents, and some constituents of petroleum fuels (e.g., gasoline and natural gas). Many VOCs found around the house, such as paint strippers and wood preservatives, contribute to sick building syndrome.

Reactive Organic Gases (ROG) are, for the most part, the same group of compounds as VOC, with some species being VOC and not ROG and vice versa. Total Organic Gases (TOG) consist of both ROG and VOC.

Air Quality Monitoring Data

The nearest criteria pollutant air quality monitoring sites to the proposed project site are in Redding and Anderson. Ambient monitoring data for these sites for the most recent three-year period is summarized in Table 4.3.3. Exceedances of the state and federal standards for both ozone and PM_{10} have been recorded at the Shasta County monitoring stations during the period noted in Table 4.3.3.

Table 4.3.3
Air Quality Monitoring Data Summary (Highest Monitored Values)

Pollutant	Site	Avg. Time	2005	2006	2007
Ozone, ppm	Redding	8 Hr (4th High)	.084	.08	.07
	Anderson		.08	.073	.075
	Redding	1 Hr	.102	.107	.089
	Anderson		.105	.092	.084
PM_{10}, ug/m^3	Redding	24 Hr	30	54	35
	Anderson		47	53	46
PM_{10}, ug/m^3	Redding	Annual Arithmetic Mean	14.9	17.5	15.2
	Anderson		22.3	23.3	20.1
$PM_{2.5}$, ug/m^3	Redding	24 Hr	20.0	31.0	18.9
$PM_{2.5}$, ug/m^3	Redding	Annual Arithmetic Mean	7.3	8.7	5.6
CO, ppm	-	8 Hr	nd	nd	
CO, ppm	-	1 Hr	nd	nd	
NO_2, ppm	-	1 Hr	nd	nd	
NO_2, ppm	-	Annual	nd	nd	
SO_2, ppm	-	Annual	nd	nd	
SO_2, ppm	-	24 Hr	nd	nd	
Sulfate, ug/m^3	-	24 Hr	nd	nd	

Source: Tetra Tech EC, Inc., 2008.

Table 4.3.4 presents a summary of historical air quality data for the air basin for the period 1985 through 2004.

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Table 4.3.4
Historical Air Quality Summary

Sacramento Valley Air Basin

County: Shasta

OZONE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Peak 1-Hour Indicator	0.115	0.115	0.121	0.122	0.119	0.129	0.119	0.117	0.111	0.111	0.105	0.114	0.118	0.127	0.126	0.125	0.110	0.100	0.118	0.112
Peak 8-Hour Indicator	0.106	0.102	0.105	0.106	0.104	0.107	0.103	0.102	0.098	0.100	0.097	0.102	0.100	0.111	0.110	0.110	0.097	0.088	0.099	0.095
4th High 1-Hr. in 3 Yrs	0.100	0.110	0.120	0.120	0.120	0.110	0.110	0.110	0.110	0.110	0.101	0.110	0.110	0.120	0.120	0.120	0.111	0.098	0.107	0.107
Avg. of 4th High 8-Hr. in 3 Yrs	0.077	0.080	0.091	0.088	0.085	0.093	0.091	0.090	0.083	0.084	0.080	0.087	0.086	0.095	0.095	0.093	0.082	0.078	0.075	0.087
Maximum 1-Hr. Concentration	0.120	0.120	0.130	0.120	0.090	0.130	0.110	0.110	0.110	0.113	0.099	0.110	0.119	0.140	0.116	0.102	0.087	0.098	0.114	0.131
Max. 8-Hr. Concentration	0.105	0.097	0.108	0.105	0.083	0.110	0.095	0.091	0.088	0.105	0.084	0.100	0.107	0.126	0.098	0.087	0.079	0.084	0.096	0.096
Days Above State Standard	10	8	25	5	0	13	12	10	1	7	3	16	8	40	23	3	0	4	9	3
Days Above Nat. 1-Hr. Std.	0	0	2	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	1
Days Above Nat. 8-Hr. Std.	9	9	21	3	0	13	11	10	1	8	0	14	6	45	12	1	0	0	6	2

PM_{10} (ug/m³)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Max. 24-Hr. Concentration (State)				60	91	80	83	86	91	64	55	51	63	52	75	53	71	58	52	74
Max. 24-Hr. Concentration (Nat)				60	91	80	83	86	91	64	55	51	63	61	81	49	66	60	53	76
Annual Average (State)							28.7		20.1	24.4	25.1	24.3				24.3	24.1	20.8	21.7	23.6
Annual Average (Nat)				26.4		24.9	28.7		20.1	24.4	25.2	24.3	22.2	23.5		23.7	23.7	25.9	21.5	23.5
Calc Days Above State 24-Hr Std							50		7	12	13	6				6	6	6	12	6
Calc Days Above Nat 24-Hr Std				0		0	0		0	0	0	0	0	0	0	0	0	0	0	0

$PM_{2.5}$ (ug/m³)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Max. 24-Hr. Concentration (State)														50.0	57.0	45.0	49.0	40.0	34.0	26.0
Max. 24-Hr. Concentration (Nat)														50.0	57.0	45.0	49.0	40.0	34.0	26.0
98th Percentile of 24-Hr Conc.															55.0		29.0	38.0	16.0	18.0
Annual Average (State)															12.9		9.2		7.5	
Avg. of Qtrly. Means (Nat)															12.9		9.2	10.5	7.5	7.2

CARBON MONOXIDE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Peak 8-Hr. Indicator	1.1	3.1	3.1		2.4	2.3	2.3	2.7	2.0	2.0										
Max. 1-Hr. Concentration	2.0	5.0	4.0	4.0	4.0	4.0	3.0	3.0	4.0	4.5										
Max. 8-Hr. Concentration	1.1	2.8	2.5	1.8	2.5	2.3	2.0	1.9	2.1	1.7										
Days Above State 8-Hr. Std.	0	0	0	0	0	0	0	0	0	0										
Days Above Nat. 8-Hr. Std.	0	0	0	0	0	0	0	0	0	0										

NITROGEN DIOXIDE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Peak 1-Hr. Indicator		0.091	0.093	0.093	0.090	0.081	0.069	0.069												
Max. 1-Hr. Concentration	0.020	0.090	0.100	0.100	0.080	0.070	0.070	0.050												
Max. Annual Average			0.015				0.012													

SULFUR DIOXIDE (ppm)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Peak 1-Hr. Indicator																				
Max. Annual Average																				
Max. 24-Hr. Concentration																				

No Monitoring Data Available

Source: Tetra Tech EC, Inc., 2008.

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Table 4.3.5 shows the background air quality values based upon the data presented in Table 4.3.4. The background values represent the average of all the highest values reported for all sites during the most recent three-year period.

Table 4.3.5
Background Air Quality Values

Pollutant and Averaging Time	Background Value, ug/m3
Ozone – 8 Hour	164
Ozone – 1 Hour	214
PM_{10} – 24 Hour	55
PM_{10} – Annual	23.3
$PM_{2.5}$ – 24 Hour	31
$PM_{2.5}$ – Annual	8.7
CO – 8 Hour	nd
CO – 1 Hour	nd
NO_2 – 1 Hour	nd
NO_2 – Annual	nd
SO_2 – 1 Hour	nd
SO_2 – 3 Hour	nd
SO_2 – 24 Hour	nd
SO_2 - Annual	nd

Source: Tetra Tech EC, Inc., 2008.

SHASTA COUNTY AIR QUALITY INFLUENCES

Air quality in Shasta County is influenced by two primary mechanisms: pollutant transport and localized emissions. Transport of pollutants from other areas or regions can have a significant effect on localized air quality. Such transport is especially important with respect to ozone impacts. The northern portion of the SVAB is a recognized transport "couplet", as defined by the State Air Resources Board. The ARB report identifies the transport "couplet" between the broader Sacramento area to the Upper Sacramento Valley as ranging from "inconsequential" to "overwhelming."

Table 4.3.6 presents a summary of the most current emissions inventory for Shasta County.

Table 4.3.6
2006 Emissions Inventory Data for Shasta County (Tons/day)

Source Category	TOG	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Total Stationary Sources	3.82	2.01	24.97	7.88	0.28	2.15	1.56
Total Area Sources	23.41	8.46	90.85	1.04	0.15	29.1	10.99
Total Mobile Sources	15.32	14.12	99.41	30.61	0.39	1.59	1.32
Total Natural Sources	177.76	166.89	49.47	1.65	0.51	5.09	4.32
County Total	220.3	191.5	264.7	41.2	1.3	37.9	18.2

Source: Tetra Tech EC, Inc., 2008.

4.3.2 THRESHOLDS OF SIGNIFICANCE

Criteria for determining the significance of impacts related to air quality were based on the Environmental Checklist Form in Appendix G of the State CEQA Guidelines (Cal. Code Regs., Title 14, Section 15000 et seq.). An impact related to air quality was considered significant if it would:

- Conflict with or obstruct implementation of the applicable air quality plan.
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.

For the purposes of environmental review, Shasta County has defined a substantial contribution to an existing or projected air quality violation as generation of air pollutants in excess of the thresholds shown in Table 4.3.7.

Table 4.3.7
AQMD Air Quality Emission Thresholds (lbs/day)

Level	NO_x	ROG (VOC)	PM_{10}
A	25	25	80
B	137	137	137

Source: Tetra Tech EC, Inc., 2008.

Table Footnotes:

- Apply Standard Mitigation Measures (SMM) to all projects based on potential air quality impacts.
- Apply SMM and appropriate Best Available Mitigation Measures (BAMM) when a project exceeds Level "A" thresholds. The appropriate type and number of BAMM applied to a project will be based on the unique characteristics of the project. BAMM will be selected from a list of measures kept updated by the Shasta County Planning Division (SCPD) and the Shasta County Air Quality Management District (AQMD).
- Apply SMM, BAMM, and special BAMM (when project exceeds Level "B" thresholds) based on their emission reduction potential to lower project emissions below Level "B" thresholds. The AQMD will advise the SCPD of the efficiency of proposed emission measures as part of the effort to reduce project emissions below Level "B" thresholds.
- If application of the above procedures results in reducing project emissions below Level "B" thresholds, the project can proceed with an environmental determination of a Mitigated Negative Declaration assuming other project impacts do not require more extensive environmental review.
- If project emissions cannot be reduced to below Level "B" thresholds, emission offsets will be required. The SCPD may seek the assistance of the AQMD regarding other efforts and measures that could be used to reduce unmitigated emissions exceeding the 137 lbs. per day. If, after applying the emissions offsets, the project emissions still exceed the Level "B" threshold, an EIR will be required before the project can be considered for action by the reviewing authority.

4.3.3 ENVIRONMENTAL IMPACTS AND MITIGATION

Impact AQ-4.3-1 Conflict With or Obstruct Implementation of the Applicable Air Quality Plan *(Less-than-Significant Impact with Mitigation Incorporated)*

Air quality impacts from the proposed residential subdivision project can be categorized as follows:

- Temporary impacts during the construction phases from exhaust emissions from construction-related equipment; fugitive dust due to grading, trenching, and surface preparation activities; and volatile organic gases from painting and road paving activities;
- Traffic-related emissions resulting from vehicle uses as the project phases are sold and occupancy is established; and
- Occupancy-related emissions from fuel use, most notably natural gas use, fireplace and wood stove uses, etc.

Generally, these emissions activities are not subject to the permitting regulations of the AQMD, but are subject to the CEQA review guidelines, and indirect source review provisions of the AQMD rules.

Construction Emissions

For the purposes of this analysis, it was assumed that project construction would extend from 2009 through 2019 (delay of project initiation and/or completion by one to several years would result in the actual air emissions being slightly lower than projected, due to improving engine technologies and more stringent air quality standards). Table 3.6.1: Project Construction Phasing and Corresponding Areas of Disturbance in Section 3.6: Project Construction, presents data with regard to the specific project phases and corresponding areas of disturbance. Phases correspond with the *Tentative Site Plans* (SDS, 2007), included on the Appendices Compact Disc. Two types of emissions are of particular concern during construction: fugitive dust emissions and combustion emissions.

Fugitive dust. Fugitive dust emissions from the construction of the project will result from:

- Dust entrained during site preparation, finish grading/excavation, road bed preparation, etc., at the construction site; and
- Dust entrained during construction equipment travel on paved and unpaved surfaces.

Estimated fugitive dust emissions (PM_{10} and $PM_{2.5}$) are presented in Table 4.3.8.

Combustion emissions. Combustion emissions during construction will result from:

- Exhaust from the diesel construction equipment used for site preparation, grading, excavation, and construction of on-site structures;

- Exhaust from water trucks used to control construction dust emissions;
- Exhaust from diesel-powered welding machines, electric generators, air compressors, and water pumps;
- Exhaust from pickup trucks and diesel trucks used to transport workers and materials around the construction site;
- Exhaust from diesel trucks used to deliver concrete, fuel, and construction supplies to the construction site; and
- Exhaust from automobiles used by workers to commute to the construction site.

Table 4.3.8 presents the results of the construction emissions analysis for each phase (per Table 3.6.1) in terms of lbs/day, including fugitive dust. Combustion emissions are based on a typical mix of equipment used on a daily basis, while fugitive dust emissions are based on the acreage of land disturbance. CO_2 data is presented in units of tons for each construction phase. The *Air Quality Analysis for the Panorama Planned Development Project* (Appendices Compact Disc: Air Quality) contains detailed emissions calculations and the support data and assumptions for each phase.

The following mitigation measures have been included as an integral part of the project construction emissions calculations.

Fugitive dust emissions.

- Use either water application or chemical dust suppressant application to control dust emissions from active construction areas (including on-site roads);
- Use vacuum sweeping and/or water flushing of paved road surfaces to remove buildup of loose material to control dust emissions from travel on the paved access road (including adjacent public streets impacted by construction activities) and paved parking areas; and
- Limit traffic speeds on all unpaved or active site construction areas to 5 mph.

Based on review of the AQMD's Standard Mitigation Measures and Best Available Mitigation Measures and other available technologies, implementation of the following emission controls is recommended:

Fugitive dust emissions.

- Implement all adequate dust control measures in a timely and effective manner during all phases of project development and construction;
- Water all excavated, stockpiled, or graded material to prevent fugitive dust from leaving property boundaries and causing a public nuisance or a violation of an ambient air standard. Watering shall occur at least twice daily with complete site coverage, preferably in the mid-morning and after work is completed each day;

- During initial grading, earth moving, or site preparation, construct a paved (or dust palliative treated) apron, at least 100 feet in length, onto the project site from the adjacent paved road(s);
- Sweep adjacent paved streets (recommend water sweeper with reclaimed water) at the end of each day if substantial volumes of soil materials have been carried onto adjacent public paved roads from the project site;
- Install sandbags or other erosion control measures to prevent silt runoff to roadways;
- Apply Department of Public Works approved non-toxic soil stabilizers (according to manufacturer's specifications) to all inactive construction areas (previously graded areas which remain inactive for 96 hours), in accordance with the Shasta County Grading Ordinance;
- Replant vegetation in disturbed areas as quickly as possible;
- Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least two feet of freeboard;
- Use wheel washers or wash off tires of all trucks exiting the construction site; and
- Mitigate fugitive dust emissions from wind erosion of areas disturbed from construction activities (including storage piles) by application of either water or chemical dust suppressant.

Exhaust emissions from the diesel heavy equipment.

- Shut down equipment when not in use to limit engine idling time. Idling time shall be limited to no more than 3 minutes. This idling limit does not apply to circumstances as stated in the California Environmental Protection Agency Air Resources Board Advisory Number 377 (2008) and in Mitigation Measure AQ-4.3-1b;
- Provide regular preventive equipment maintenance to prevent emission increases due to engine problems;
- Use low sulfur and low aromatic fuels meeting California standards for motor vehicle diesel fuel; and
- Use low-emitting gas and diesel engines meeting state and federal emissions standards (Tier I, II, III) for construction equipment.

Other miscellaneous emissions.

- Use low VOC coatings for the architectural coating phase of construction. All coatings must meet the VOC limits per AQMD Rule 3-31;
- Use asphalt mixtures appropriate for the time of year of application, while maintaining compliance with County road design and construction standards;

- Use alternatives to open burning of vegetative material on the project site, unless otherwise deemed infeasible by the AQMD. Among suitable alternatives are chipping, mulching, or conversion to biomasss fuel;
- Provide for temporary traffic control as appropriate during all phases of construction to improve traffic flow as deemed appropriate by the Department of Public Works and/or Caltrans; and
- Schedule construction activities that direct traffic flow to off-peak hours as much as practicable.

Table 4.3.8
Construction Emissions Summary

Phase	NO_x (lbs/day)	CO (lbs/day)	VOC [1] (lbs/day)	SO_x (lbs/day)	PM_{10} [2] (lbs/day)	$PM_{2.5}$ [2] (lbs/day)	CO_2 (tons per const period)
1	31.7	41.1	22.5	0.04	2.2/2.9	2.2/0.42	1240
2	31.7	41.1	22.5	0.04	2.2/3.46	2.2/0.54	830
3	31.7	41.1	24.6	0.04	2.2/8.45	2.2/1.41	830
4	31.7	41.1	24.3	0.04	2.2/8.82	2.2/1.67	830
5	31.7	41.1	25.0	0.04	2.2/10.35	2.2/1.81	830
6	31.7	41.1	21.9	0.04	2.2/2.17	2.2/0.27	830
7	31.7	41.1	21.7	0.04	2.2/2.17	2.2/0.27	830
8	31.7	41.1	22.0	0.04	2.2/3.6	2.2/0.40	830

Source: Tetra Tech EC, Inc., 2008.

[1] VOC includes asphalt off-gassing and structure coating VOC losses.

[2] For PM_{10} and $PM_{2.5}$, two values are presented as V1/V2. V1 is PM from equipment exhaust, while V2 is PM from fugitive dust sources.

Comparison to significance criteria. NO_x emissions are projected to exceed the Level "A" significance thresholds during all phases of construction. VOC emissions are projected to reach but not exceed the Level "A" significance threshold during Phase 3. However, the projections reflect "worst-case" assumptions, and the following should be noted:

- It is highly unlikely that all of the predicted construction equipment would be used each and every day, nor would all of the equipment listed be used for the listed hourly rates each day;
- It is highly unlikely that all of the workers would be on site each and every day, nor would this occur on a supposed "worst case" day; and
- It is highly unlikely that all delivery and support traffic emissions would occur each and every day, nor would all of this activity occur on a supposed "worst case" day.

Nonetheless, without mitigation, the emission thresholds are likely to be exceeded on at least some days. With appropriate mitigations applied, construction emissions are not

expected to result in short- or long-term violations of any current ambient air quality standard. In addition, the State Implementation Plan (South Coast Air Quality Management District, 2003), which includes the Shasta County Air Quality Management District, incorporates an emissions allowance for construction projects. This project will be included in the emissions allowance, as will other similar projects within the AQMD boundaries.

Vehicular Emissions

Vehicular emissions resulting from project-generated trips are based upon the following:

- The average single-family dwelling generates 9.57 one-way trips per day (Institute of Transportation Engineers, 2007);
- The average one-way trip travel distance will be 8.25 miles (KD Anderson & Associates, Inc., 2008);
- Composite vehicle emissions factors generated by EMFAC, for the beginning and ending phase years have been averaged to estimate emissions for each phase; and
- Composite vehicle emissions factors generated by EMFAC for the build-out year have been used to estimate emissions upon final build-out.

Table 4.3.9 presents data based on the calculated average travel distances for vehicles entering and leaving the project, as well as vehicle emissions. Results are presented by phase and for the project build-out configuration. Emissions are based on the maximum distance traveled by phase and for full build-out.

Table 4.3.9
Vehicle Travel and Emissions Summary

Phase	Trips/ day	Total VMT[1]/day	Vehicle Emissions Summary (lbs/day)						
			NO_x	CO	VOC	SO_x	PM_{10}	$PM_{2.5}$[2]	CO_2
1	345	2846	2.96	31.4	5.9	0.03	0.11	0.11	2669
2	565	4461	4.85	51.4	9.67	0.05	0.19	0.19	4371
3	1330	10973	11.41	120.9	22.8	0.11	0.44	0.44	10289
4	565	4461	4.85	51.4	9.67	0.05	0.19	0.19	4371
5	699	5767	6.0	63.6	12	0.06	0.23	0.23	5408
6	153	1262	1.31	13.9	2.6	0.01	0.05	0.05	1183
7	163	1345	1.4	14.7	2.8	0.01	0.05	0.05	1261
8	297	2450	2.55	27	5.1	0.02	0.10	0.10	2297
Build-out	4117	33965	18.7	196	22.8	0.34	0.34	0.34	31654
Build-out (tons/yr):			**3.4**	**35.8**	**4.2**	**0.06**	**0.06**	**0.06**	**5777**

Source: Tetra Tech EC, Inc., 2008.

[1] VMT = vehicle miles traveled

[2] CARB-CEIDARS Updated $PM_{2.5}$ fraction inventory indicates that PM2.5 is 0.998 of PM_{10} for gasoline fuel vehicles.

Vehicle emissions do not exceed the Level “A” significance levels on a phase or build-out basis, and are therefore not considered as a significant impact. Likewise, carbon monoxide “hotspot” emissions are not expected to be significant. Carbon monoxide

concentrations in Shasta County (Redding/Anderson/Cottonwood region) have historically been very low, and well within compliance with both state and federal ambient air quality standards. Historical CO data over the period 1985-1994 showed that the average annual 1-hour CO concentration in the Redding urban (downtown) area was 3.75 ppm which is 19 percent and 11 percent of the state and federal CO standards, respectively. The 8-hour average concentration during the same period was 2.1 ppm, which represents 23 percent of the current state and federal CO standards. Over the ensuing years, a number of industries in the southern Shasta County area that were significant CO sources have closed and ceased operations. These closures have most likely been offset by increases in traffic-related CO emissions. However, the overall effect in the County is that CO concentrations remain relatively low, and it is not anticipated that CO from project traffic would generate a CO "hotspot."

Operational Emissions

Operational emissions from the proposed residential development would consist of those from natural gas consumption, wood-burning stoves and fireplaces, landscaping equipment such as lawnmowers, and consumer products. Emissions from each of these sources are discussed individually below, and a summary of overall operational emissions is also presented.

Natural Gas Consumption. Natural gas would be used for home heating and food preparation. Table 4.3.10 presents a summary of estimated emissions from residential natural gas use.

Table 4.3.10
Residential Natural Gas Emissions Summary

Pollutant	EF*	Emissions by Phase (lb/day)								Build-out (lb/dy)	Build-out (tons/yr)
		1	2	3	4	5	6	7	8		
NO_x	80	0.596	0.98	2.3	0.98	1.21	0.27	0.28	0.513	7.12	1.3
CO	20	0.149	0.24	0.58	0.24	0.30	0.066	0.07	0.128	1.78	0.325
VOC	5.3	0.04	0.065	0.152	0.065	0.08	0.018	0.019	0.034	0.472	0.086
SO_x	0.6	0.0045	0.0073	0.029	0.0073	0.0091	0.0020	0.0021	0.0039	0.0534	0.00975
PM_{10}	0.2	0.0015	0.0024	0.0058	0.0024	0.003	0.0007	0.0007	0.0013	0.0178	0.00325
$PM_{2.5}$	0.2	0.0015	0.0024	0.0058	0.0024	0.003	0.0007	0.0007	0.0013	0.0178	0.00325
CO_2	120,000	894	1465	3452	1465	1812	398	422	797	10678	1949

Source: Tetra Tech EC, Inc., 2008.

*EF = Emission Factor (lbs/million standard cubic feet)

The emissions noted in Table 4.3.10 assume the use of currently approved energy saving home heating and cooking systems. Emissions for future phases may be lower due to changes in the design and emissions signatures of such devices. Emissions from the use of natural gas would not exceed the Level "A" significance thresholds on a phase or build-out basis. Therefore, there would be a less-than-significant impact with regard to residential natural gas emissions.

Wood-burning Stoves and Fireplaces. It is possible that a percentage of the homes proposed would supplement their annual heating needs by installing wood stoves or utilizing built-in fireplaces. For purposes of estimating potential emissions from such a scenario, it was assumed that 45 percent of the homes would supplement heating with wood stoves/fireplaces, with fireplaces being used in 22 percent of these residences, and woodstoves in the remaining 78 percent of the residences (Tetra Tech EC, Inc., 2008). An average of 1.48 cords of wood per year would be burned by each user (using Urbemis 9.2.4 (Rimpo and Associates, Inc., 2008)). Table 4.3.11 presents a summary of the estimated emissions from residential wood combustion sources for the purposes of home heating.

Table 4.3.11
Residential Wood Stove/Fireplace Emissions Summary

Phase	NO_x (lbs/day)	CO (lbs/day)	VOC (lbs/day)	SO_x (lbs/day)	PM_{10} (lbs/day)	$PM_{2.5}$ [1] (lbs/day)	CO_2 [2] (lbs/day)
1	0.35	20.89	7.89	0.05	2.89	2.6	0
2	0.57	34.24	12.93	0.08	4.74	4.3	0
3	1.34	80.66	30.46	0.19	11.17	10.1	0
4	0.57	34.24	12.93	0.08	4.74	4.3	0
5	0.70	42.36	16.0	0.10	5.87	5.3	0
6	0.15	9.28	3.51	0.02	1.29	1.2	0
7	0.16	9.87	3.73	0.02	1.37	1.2	0
8	0.30	17.99	6.79	0.04	2.49	2.2	0
Build-out	4.15	249.53	94.24	0.60	34.55	31.1	0
Build-out, tons/yr	**0.76**	**45.54**	**17.20**	**0.11**	**6.39**	**5.75**	**0**

Source: Tetra Tech EC, Inc., 2008.

[1] $PM_{2.5}$ is 90% of PM10, per CARB-CEIDARS fractionation listing.
[2] CO_2 emissions are carbon neutral for this source category, i.e., carbon uptake in the fuel equals carbon release upon combustion.

Given the above assumptions, VOC emissions would exceed the Level "A" significance threshold during Phase 3, as well as on through final build-out. The VOC emissions for all phases and build-out are significantly influenced by the use of fireplaces, which release more emissions than wood stoves. The above calculations are based on the assumption that all wood stoves and fireplaces will meet District Rule 3:23 (EPA Phase II) emissions standards, therefore the only available mitigation measure is to withhold approval of residential designs that includes the use of fireplaces or other similar inefficient wood or biomass combustion devices for home heating purposes. Implementation of Mitigation Measure AQ-4.3-1d would reduce emissions from this source category to zero.

Landscaping Equipment. Estimates of emissions from residential landscaping equipment use are presented in Table 4.3.12. Emissions from residential landscape equipment use would not exceed the Level "A" significance thresholds.

Table 4.3.12
Residential Landscaping Equipment Emissions Summary

Phase	NO_x (lbs/day)	CO (lbs/day)	VOC (lbs/day)	SO_x (lbs/day)	PM_{10} (lbs/day)	$PM_{2.5}$ [1] (lbs/day)	CO_2 (lbs/day)
1	0.02	1.61	0.29	0.0001	0.004	0.004	2.58
2	0.03	2.63	0.48	0.0001	0.007	0.007	4.23
3	0.07	6.20	1.12	0.0003	0.016	0.016	9.96
4	0.03	2.63	0.48	0.0001	0.007	0.007	4.23
5	0.04	3.26	0.59	0.0001	0.009	0.009	5.23
6	0.01	0.71	0.13	0.0	0.002	0.002	1.15
7	0.01	0.76	0.14	0.0	0.002	0.002	1.22
8	0.02	1.38	0.25	0.0001	0.004	0.004	2.22
Build-out	0.22	19.20	3.48	0.0009	0.051	0.050	30.82
Build-out, tons/yr	**0.039**	**3.5**	**0.635**	**0.0002**	**0.009**	**0.009**	**5.625**

Source: Tetra Tech EC, Inc., 2008.
[1] $PM_{2.5}$ fraction is 0.998 of PM_{10}, per CARB-CEIDARS fractionation listing.

Consumer Products. Estimated emissions for VOCs from the use of consumer products such as aerosols are presented in Table 4.3.13. Emissions from consumer product use would not exceed the Level "A" significance thresholds for VOCs.

Table 4.3.13
Summary of Project-Related Consumer VOC Emissions

Phase	lbs/day	tons/yr
1	1.76	0.32
2	2.89	0.53
3	6.8	1.24
4	2.89	0.53
5	3.57	0.65
6	0.78	0.14
7	0.83	0.15
8	1.52	0.28
Build-out	20.04	3.84

Source: Tetra Tech EC, Inc., 2008.

Total Estimated Operational Emissions. Table 4.3.14 presents a summary of the estimated operational emissions (including vehicle emissions), for the build-out scenario.

Table 4.3.14
Post-Construction Emissions Summary

Component	NO_x (lbs/day)	CO (lbs/day)	VOC (lbs/day)	SO_x (lbs/day)	PM_{10} (lbs/day)	$PM_{2.5}$ (lbs/day)	CO_2 (lbs/day)
Vehicle Travel	18.70	196.00	22.80	0.34	0.34	0.34	31,654
Natural Gas Consumption	7.12	1.78	0.472	0.0534	0.0178	0.0178	10,678
Wood Stoves/ Fireplaces	4.15	249.53	94.24	0.60	34.55	31.10	0
Landscaping Equipment	0.22	19.20	3.48	0.0009	0.051	0.05	30.82
Consumer Products	--	--	20.04	--	--	--	--
TOTAL:	30.2	466.5	141.0	1.0	35.0	31.5	42,363

Source: Tetra Tech EC, Inc., 2008.

As shown above, VOC and NO_x would exceed the Level "A" threshold criteria when considering operational and vehicular emissions together. No pollutant emissions would exceed the Level "B" significance threshold. The VOC emissions are primarily influenced by wood stove/fireplace usage, vehicle travel, and consumer product use, while NO_x emissions are primarily influenced by vehicle travel, natural gas consumption, and wood stove/fireplace usage.

With respect to potential mitigation strategies, the following should be noted.

- Rural and semi-rural areas, such as Shasta County (including the small Redding-Anderson urban area), are generally considered to be "NO_x-limited" regions, i.e., regions where the concentrations of ozone depend on the amount of NO_x in the atmosphere. In NO_x-limited regions, controlling NO_x is the preferred strategy to reduce ozone concentrations.
- The lower elevations of Shasta County are probably the most affected by transport of pollutants from the lower Sacramento Valley areas, most notably the Sacramento metropolitan area, as noted above. The Sacramento metropolitan area, like most large urbanized areas, is a VOC-limited area, i.e., an area in which the concentrations of ozone depend upon the amount of VOCs in the atmosphere. Consequently, controlling VOCs in these areas would reduce ozone. In all likelihood, transport from the Sacramento metropolitan area is highly enriched with VOCs, which when mixed with the local contribution of VOCs, results in a much more NO_x-limited environment.

Considering the above analysis, a balanced strategy of controlling both NO_x and VOCs would most likely the best approach for Shasta County, with an emphasis placed on

NO_x reduction strategies. Further, as stated in the *Shasta County General Plan*, new innovative strategies to reduce travel demand need to be considered. Allowing and encouraging mixed-use centers at major arterial intersections or transit stations, increasing residential densities allowed in the Suburban Residential and Urban Residential General Plan designations in areas served by transit, and promoting alternative modes choices for travel are among ways the County can address air quality impacts created by vehicles.

The following mitigation measures are recommended for the above potentially significant construction- and operation-related impacts:

MM AQ-4.3-1a. The following airborne dust control measures shall be required during all construction operations, the grading of roads, and the clearing of land.

- Use either water application or chemical dust suppressant application to control dust emissions from active construction areas (including on-site roads);
- Use vacuum sweeping and/or water flushing of paved road surfaces to remove buildup of loose material to control dust emissions from travel on the paved access road (including adjacent public streets impacted by construction activities) and paved parking areas;
- Limit traffic speeds on all unpaved or active site construction areas to 5 mph;
- Implement all adequate dust control measures in a timely and effective manner during all phases of project development and construction;
- Water all excavated, stockpiled, or graded material to prevent fugitive dust from leaving property boundaries and causing a public nuisance or a violation of an ambient air standard. Watering shall occur at least twice daily with complete site coverage, preferably in the mid-morning and after work is completed each day;
- During initial grading, earth moving, or site preparation, construct a paved (or dust palliative treated) apron, at least 100 feet in length, onto the project site from the adjacent paved road(s);
- Sweep adjacent paved streets (recommend water sweeper with reclaimed water) at the end of each day if substantial volumes of soil materials have been carried onto adjacent public paved roads from the project site;
- Install sandbags or other erosion control measures to prevent silt runoff to roadways;
- Apply Department of Public Works approved non-toxic soil stabilizers (according to manufacturer's specifications) to all inactive construction areas (previously graded areas which remain inactive for 96 hours), in accordance with the Shasta County Grading Ordinance;
- Replant vegetation in disturbed areas as quickly as possible;
- Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least two feet of freeboard;

- Use wheel washers or wash off tires of all trucks exiting the construction site; and
- Mitigate fugitive dust emissions from wind erosion of areas disturbed from construction activities (including storage piles) by application of either water or chemical dust suppressant.

MM AQ-4.3-1b. The following mitigation measures shall be implemented to control exhaust emissions from the diesel heavy equipment used during construction of the project phases.

- Provide regular preventive equipment maintenance to prevent emission increases due to engine problems;
- Use low sulfur and low aromatic fuels meeting California standards for motor vehicle diesel fuel;
- Use low-emitting gas and diesel engines meeting state and federal emissions standards (Tier I, II, III) for construction equipment; and
- Shut down equipment when not in use to limit engine idling time. Idling time shall be limited to no more than 3 minutes. This idling limit does not apply to circumstances as stated in the California Environmental Protection Agency Air Resources Board Advisory Number 377 (2008), such as:
    - Idling when queuing;
    - Idling to verify that the vehicle is in safe operation condition;
    - Idling for testing, servicing, repairing, or diagnostic purposes;
    - Idling necessary to accomplish work for which the vehicle is designed (such as operating a crane);
    - Idling required to bring the machine system to operating temperature; and
    - Idling necessary to ensure safe operation of the vehicle.

MM AQ-4.3-1c. The following mitigation measures shall be implemented to control other miscellaneous emissions during construction of the project phases.

- Use low VOC coatings for the architectural coating phase of construction. All coatings must meet the VOC limits per AQMD Rule 3-31;
- Use asphalt mixtures appropriate for the time of year of application, while maintaining compliance with County road design and construction standards;
- Use alternatives to open burning of vegetative material on the project site, unless otherwise deemed infeasible by the AQMD. Among suitable alternatives are chipping, mulching, or conversion to biomasss fuel;
- Provide for temporary traffic control as appropriate during all phases of construction to improve traffic flow as deemed appropriate by the Department of Public Works and/or Caltrans; and

- Schedule construction activities that direct traffic flow to off-peak hours as much as practicable.

MM AQ-4.3-1d. To control VOC and PM_{10} emissions during project operation, the use of fireplaces, wood stoves, or other similar wood- or biomass-combustion devices for home heating purposes shall not be authorized.

With implementation of MM AQ-4.3-1 (a-d), the above potentially significant impacts would be reduced to less-than-significant levels.

Impact AQ-4.3-2 Violate an Air Quality Standard or Contribute to an Existing or Projected Air Quality Violation *(Less-than-Significant Impact with Mitigation Incorporated)*

See analysis under Impact AQ-4.3-1.

With implementation of MM AQ-4.3-1, this potentially significant impact would be reduced to less than significant.

Impact AQ-4.3-3 Result in a Cumulatively Considerable Net Increase of any Criteria Pollutant for which the Project Region is in Non-Attainment *(Less-than-Significant Impact with Mitigation Incorporated)*

Impacts related to greenhouse gases are addressed in Section 5: Additional CEQA-Mandated Impact Analyses.

The residual impacts from the construction phases of the proposed project are not expected to be significant since the emissions, with the exception of NO_x, would be below the Level "A" thresholds, and the mitigation measures proposed are anticipated to result in off-site impacts well below state and federal ambient air quality standards.

The residual impacts from long-term occupancy of the planned development would be in the areas of traffic-related emissions, use of woodstoves/fireplaces for supplemental home heating, and the use of consumer products by the residents of the project. Impacts in these categories are dominated by woodstove/fireplace emissions, which can be mitigated by eliminating the use of wood-burning stoves and fireplaces, as recommended in Mitigation Measure AQ-4.3-1. This would substantially limit both VOC and PM_{10}/$PM_{2.5}$ emissions in the long term. In addition, the project would adhere to the California Energy Commission Efficiency Standards for Residential and Nonresidential Buildings (Title 24), including the incorporation of passive solar design. Design of project buildings shall include features to ensure that project buildings provide 15 percent greater energy efficiency than required under the Title 24 regulations (California Energy Commission) in effect at the time of construction.

MM AQ-4.3-3. Design of project buildings shall include features to ensure that project buildings provide 15 percent greater energy efficiency than required under

the Title 24 regulations (California Energy Commission) in effect at the time of construction.

As stated earlier, the County emissions inventory, as well as the SIP emissions inventory, includes current and future year emissions estimates or growth allowance emissions for construction and operation of the planned development (based on population growth, etc.). Therefore, these emissions are accounted for in the normal growth cycle of the County, and are not considered to be cumulatively significant.

With implementation of MM AQ-4.3-1 and MM AQ-4.3-3, impacts resulting in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment are considered to be less than significant; no additional mitigation is necessary.

Impact AQ-4.3-4 Expose Sensitive Receptors to Substantial Pollutant Concentrations *(Less-than-Significant Impact)*

The property surrounding the proposed development is sparsely populated. The community of Cottonwood lies to the south of the project. The Interstate 5 corridor lies due west of the project site. To the north lies the south-Anderson industrial area. It is highly unlikely the proposed development would be exposed to significant concentrations of toxic air contaminants generated in the Cottonwood town center or along the I-5 corridor. However, emissions of both criteria and toxic pollutants could come from a wide range of sources located in the Anderson industrial area. These pollutants can be generated from sources such as biomass power production, sand and gravel processing operations, lumber processing operations, metal fabricating sources, etc.

The Wheelabrator Shasta Energy Company, Inc., located approximately one-half-mile north of the proposed residential development, is one of the largest stationary sources of criteria pollutants in Shasta County. Wheelabrator Shasta is a biomass energy production facility rated at approximately 50 MW. The primary fuels are biomass wood wastes and mill wood wastes. In 2006, this facility was listed by the Shasta County AQMD in the Top Ten Sources for pollutants such as PM_{10}, NO_x, VOCs, CO, and SO_x. Annual pollutant emissions for 2006 are tabulated in Table 4.3.15.

Table 4.3.15
Wheelabrator Shasta Energy Company, Inc.,
Annual Pollutant Emissions for 2006

Pollutant	Tons/Year
PM_{10}	176.2
CO	2395.3
VOC (ROG)	27.2
NO_x	587.3
SO_x	4.5

Source: Tetra Tech LC, Inc., September 2008.

The emissions noted above (for 2006) are well below the allowable or permitted emissions levels. Impact analyses conducted on the allowable or potential emissions during the original facility siting analysis, as well as follow-on permit modification analyses, clearly indicated that the facility emissions would not cause a violation of any state or federal ambient air quality standard, nor would the emissions cause a worsening of any violation of an existing ambient air quality standard. It is therefore not expected that actual emissions, which are less than permitted emissions, would cause any violations of any current state or federal air quality standard or adversely affect residents of the proposed residential development.

With respect to toxic and/or hazardous air pollutants, the risk prioritization values for Wheelabrator Shasta (for 2003) per the AB 2588 Hot Spots program are as follows: (1) carcinogenic score of 3.97, (2) chronic health effects score of 0.48, and (3) acute health effects score of 0.08. These values are compared to the air district prioritization threshold values which range from 0 to 100, with a score of 0 being the lowest, and a score approaching 100 being the highest. Scores less than 10 are considered to represent low priority sources that do not require public notification of risks under the AB 2588 program guidelines. Residents of the proposed development are not expected to be exposed to significant concentrations of toxic or hazardous air pollutants from the Wheelabrator Shasta facility.

In conclusion, there is no evidence that any single source or group of sources would expose project residents to pollutants concentrations that would be above the normal exposures seen elsewhere in the lower elevation areas of Shasta County. The potential for exposure of sensitive receptors to substantial pollutant concentrations would not be significant.

No mitigation is necessary for the above less-than-significant impact.

Impact AQ-4.3-5 Create Objectionable Odors Affecting a Substantial Number of People *(Less-than-Significant Impact)*

The proposed project, as with most residential developments, is not expected to result in generation of objectionable odors. However, there are two existing odor sources in the vicinity that could affect future residents of the project area: the Wheelabrator Shasta Energy Company and the Shasta Livestock Auction Yard.

Wheelabrator Shasta Energy Company, Inc*.*

Typically, fuels for biomass facilities are stored outside and are rotated into the energy production (combustion) process on a schedule that matches fuel needs with fuel storage times. Odors from outside storage of biomass fuels are generally rare, with the typical odor resembling that of recently cut wood, sawdust, or wood chips. Fuel management practices rarely result in fuel being kept on-site for a duration of time where rotting or malodor production can occur; thus, typically, odors from facilities are not anticipated to result in a significant odor impacts. However, data obtained from the Shasta County AQMD indicates that numerous complaints (including odor complaints) have been received concerning the Wheelabrator Shasta facility (period 5-10-93

through 6-9-08). The complaints regarding odor generation possibly indicate a situation where fuel may not be properly stored, managed, or rotated to the energy process. However, it is not the responsibility of the EIR to mitigate for sources that are currently operating beyond permit conditions and standards.

Given the potential for on-going odor generation, purchasers of the proposed residential lots should be clearly informed of the potential for odor impacts from the energy facility. Such notification can be achieved by placing a notice on the deeds of the residential parcel, as recommended under Mitigation Measure AGR-4.2-3. Although this measure would not reduce odor production or exposure, it would serve as an advisory to odor-sensitive prospective purchasers and minimize the potential for future land use conflicts.

Shasta Livestock Auction Yard

The Shasta Livestock Auction Yard is located on the west side of Locust Street, north of Cattleman Drive. Lands owned by the auction yard extend to within approximately 600 feet of the southwest corner of the proposed residential development. However, livestock are kept only on a small portion of the overall site, in the northwest corner. The livestock holding pens are located approximately 1,500 feet or greater from the closest proposed residential lot.

Odors from livestock operations (all varieties) are primarily generated from the anaerobic decomposition of manure and urine. Recent studies have identified up to 200 different gases produced by livestock operations. The primary odiferous compounds are hydrogen sulfide, methane, and ammonia. Generation of these compounds is highly dependent on the following: (1) moisture content, (2) temperature, (3) pH, (4) oxygen concentrations, and (5) environmental conditions such as season of the year, wind patterns, and precipitation patterns. For large operations, odor and gaseous emissions can be controlled by utilizing ventilation systems, management or "housekeeping" practices, on-site waste management systems, or waste application systems. For large or small operations, location of the facility with established buffer zones between other land uses is also a very effective odor management technique. For small sites such as the Shasta Livestock Auction Yard, buffering, waste management, and housekeeping practices are the most viable options.

The use of buffer zones has been studied extensively as applicable to both large and small operations. As an example, the State of Missouri requires buffer zone distances for animal feeding operations as shown in Table 4.3.16.

Table 4.3.16
Recommended Buffer Distances from Animal Feeding Operations

Facility Class	Size Category Definition	Recommended Buffer Distance (ft.)
Class 1A	≥ 7000 AUEs	3000
Class 1B	3000 – 6999 AUEs	2000
Class 1C	1000 – 2999 AUEs	1000

Source: Missouri Department of Natural Resources, 2008.

An AUE (animal unit equivalent) equals the following: 1 beef cow, 0.5 horse, 0.7 dairy cow, 2.5 swine weighing over 55 lbs., 15 swine weighing less than 55 lbs., 10 sheep, 30 laying hens, 55 turkeys, or 100 broiler chickens. The AUE is evaluated on an annual basis, i.e., 1 beef cow held on site for one year is 1 AUE, whereas 1 beef cow held on site for 1 month is 0.083 AUE.

Data obtained from the management of the Shasta Livestock Auction Yard indicates that a total of approximately 80,000 animals flow through the auction yard in a typical year, and that the average animal hold time on site is 2-3 days (0.00822 AUE per head). For purposes of a conservative analysis, it is assumed that all animals are equivalent to beef cattle; auction yard staff estimates that 99 percent of all the animals held on site are cattle. This results in approximately 660 AUEs, which is synonymous with a Class 1C or smaller facility. Therefore, an appropriate buffer zone would be 1,000 feet. It is unlikely that odors from the auction yard will result in significant impacts to residents of the proposed residential development since the distance to the development boundary is approximately 1,500 feet from the animal holding facility, and no odor-generating activities are conducted on auction yard lands within 1,000 feet of the proposed residential development.

Although odor-related impacts from the Wheelabrator Shasta facility and Shasta Livestock Auction Yard are not considered to be significant, implementation of Mitigation Measure AGR-4.2-3, which calls for a notice on the deeds of all residential lots advising potential purchasers of the proximity of industrial and agricultural uses, would further reduce the potential for conflict. Impacts related to odors are considered to be less than significant.

4.3.4 LEVEL OF SIGNIFICANCE AFTER MITIGATION

With implementation of the above mitigation measures (Mitigation Measure AQ-4.3-1 and Mitigation Measure AGR-4.2-3), air quality impacts associated with the proposed project would be less than significant.

End of Section.