5 AIR QUALITY

5.1 INTRODUCTION

Air pollution can affect public health, harm the natural and built environment, damage crops, and change the earth's climate. Air pollution has localized, regional, and global effects. Some air quality problems are beyond the direct control of the City or beyond the scope of a General Plan. However, the location of stationary sources of air pollution, such as industrial facilities, relative to houses, schools, and other sensitive land uses, is an important consideration in land use planning. There are also very important indirect air quality consequences of land use planning. Development that is not integrated with schools, parks, employment, shopping, and public transit encourages reliance on the automobile, a major source of pollution. This report frames the existing air quality regulatory environment and conditions in the City of Citrus Heights and surrounding region.

5.2 REGULATORY SETTING

Air quality within the Sacramento Valley Air Basin (SVAB), in which Citrus Heights is located, is regulated by such agencies as the Sacramento Metropolitan Air Quality Management District (SMAQMD), California Air Resources Board (ARB), and the U.S. Environmental Protection Agency (EPA). Each of these agencies develops rules, regulations, policies, and/or goals to attain the goals or directives imposed through legislation. Although the EPA regulations may not be superseded, both state and local regulations may be more stringent.

CRITERIA AIR POLLUTANTS

FEDERAL

At the Federal level, EPA has been charged with implementing national air quality programs. EPA’s air quality mandates are drawn primarily from the Federal Clean Air Act (CAA), which was enacted in 1970. The most recent major amendments made by Congress were in 1990.

The CAA required EPA to establish primary and secondary National Ambient Air Quality Standards (NAAQS), which are health-based standards set at levels designed to protect the public health and welfare, respectively. The CAA also required each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP), which is the State’s plan to achieve the NAAQS by a specified date. The Federal Clean Air Act Amendments of 1990 (CAAA) added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is modified periodically to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. EPA has responsibility for reviewing all state SIPs to determine conformity with the mandates of the CAAA and determine whether implementation will achieve air quality goals. Failure to submit an approvable SIP or to implement the plan within the mandated timeframe may result in sanctions to transportation funding and stationary air pollution sources in the air basin. General plan land use and population growth projections are often relied upon in SIP development.

STATE

ARB is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA). The CCAA, which was adopted in 1988, required ARB to establish California Ambient Air Quality Standards (CAAQS). CAAQS are designed to protect the health and welfare of sensitive groups of people (e.g., children, elderly, and people with respiratory conditions). The CCAA requires that all local air districts in the state endeavor to achieve and maintain the CAAQS by the earliest practical date. The CCAA specifies that local air districts should focus particular attention on reducing the emissions from transportation and areawide emission sources, and provides districts with the authority to regulate such indirect emission sources.

Other ARB responsibilities include overseeing compliance with California and federal laws by local air districts, approving local air quality plans, submitting SIPs to EPA, monitoring air quality, determining and updating area designations and maps, and setting emissions standards for new mobile sources, consumer products, small utility engines, off-road vehicles, and fuels.

ARB and local air pollution control districts are currently developing plans for meeting new national air quality standards for ozone and $PM_{2.5}$. California's adopted 2007 State Strategy was submitted to EPA as a revision to the SIP in November 2007 (ARB 2009a).

REGIONAL/LOCAL

Sacramento Metropolitan Air Quality Management District

SMAQMD attains and maintains air quality conditions in Sacramento County through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean-air strategy of SMAQMD includes the preparation of plans for the attainment of ambient air-quality standards, adoption and enforcement of rules and regulations concerning sources of air pollution, and issuance of permits for stationary sources of air pollution. SMAQMD also inspects stationary sources of air pollution and responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements programs and regulations required by the CAA, CAAA, and the CCAA.

The present version of SMAQMD's *Guide to Air Quality Assessment* (SMAQMD 2004) was released in July 2004. The *Guide to Air Quality Assessment* is an advisory document that provides lead agencies, consultants, and project applicant(s) with uniform procedures for addressing air quality in environmental documents. SMAQMD is currently developing a new version of its guide, which is expected to be approved by the SMAQMD's Board of Directors in early 2010. A draft of the new version is presently available for public review (SMAQMD 2009). Both the present version and the draft new version of the guide contain the following applicable components:

- criteria and thresholds for determining whether a project may have a significant adverse air quality impact;
- specific procedures and modeling protocols for quantifying and analyzing air quality impacts;
- methods available to mitigate air quality impacts; and
- information for use in air quality assessments and environmental impact reports (EIRs) that will be updated more frequently such as air quality data, regulatory setting, climate, and topography.

As mentioned above, SMAQMD adopts rules and regulations. All projects are subject to SMAQMD rules and regulations in effect at the time of construction. Specific rules applicable to the General Plan update may include, but are not limited to, the following:

- **Rule 201: General Permit Requirements.** Any project that includes the use of equipment capable of releasing emissions to the atmosphere may require permit(s) from SMAQMD before equipment operation. The applicant, developer, or operator of a project that includes an emergency generator, boiler, or heater should contact SMAQMD early to determine whether a permit is required, and to begin the permit application process. Portable construction equipment (e.g., generators, compressors, pile drivers, lighting equipment) with an internal combustion engine over 50 horsepower (hp) are required to have a SMAQMD permit or ARB portable equipment registration.
- **Rule 403:** Fugitive Dust. The developer or contractor is required to control dust emissions from earthmoving activities or any other construction activity to prevent airborne dust from leaving the project site.
- **Rule 417:** Wood Burning Appliances. The developer or contractor is prohibited from installing any new, permanently installed, indoor or outdoor, uncontrolled fireplaces in new or existing developments.
- **Rule 442:** Architectural Coatings. The developer or contractor is required to use coatings that comply with the volatile organic compound (VOC) content limits specified in the rule.
- **Rule 902:** Asbestos. The developer or contractor is required to notify SMAQMD of any regulated renovation or demolition activity. Rule 902 contains specific requirements for surveying, notification, removal, and disposal of asbestos-containing material.

Air Quality Plans

SMAQMD, in coordination with the air quality management districts and air pollution control districts of El Dorado, Placer, Solano, Sutter, and Yolo Counties, prepared and submitted the 1994 *Air Quality Attainment Plan* (AQAP) in compliance with the requirements set forth in the CCAA, which specifically addressed the nonattainment status for ozone and, to a lesser extent, CO and PM_{10}.

Sacramento County is also part of the Sacramento Federal Ozone Nonattainment Area (SFNA), which also comprises all of Yolo County and portions of El Dorado, Placer, and Solano Counties. As a nonattainment area, the region is also required to submit rate-of-progress milestone evaluations in accordance with the CAAA. The Sacramento region was classified by EPA on June 15, 2004, as a "serious" nonattainment area for the national 8-hour ozone standard with an attainment deadline of June 15, 2013. Emission reductions needed to achieve the air quality standard were identified based on air quality modeling. An evaluation of proposed new control measures and associated reactive organic gases (ROG) and oxides of nitrogen (NO_X) emission reductions concluded that no set of feasible controls was available to provide the needed emission reductions before the attainment deadline year. Given the magnitude of the shortfall in emission reductions and the schedule for implementing new control measures, the earliest possible attainment demonstration year for the Sacramento region is determined to be the "severe" area deadline of 2019.

TOXIC AIR CONTAMINANTS

Toxic air contaminants (TACs) (also called hazardous air pollutants [HAPs] in federal terms) are not considered criteria air pollutants and, thus, are not specifically addressed through the setting of ambient air quality standards. Instead, EPA and ARB regulate TACs and HAPs, respectively, through statutes and regulations that generally require the use of the maximum or best available control technology (MACT and BACT) to limit emissions. These, in conjunction with additional rules set forth by SMAQMD, establish the regulatory framework for TACs (see discussion under "State and Local Toxic Air Contaminant Programs" below).

FEDERAL

EPA has programs for identifying and regulating HAPs. Title III of the CAAA directed EPA to promulgate national emissions standards for HAPs (NESHAP). The NESHAP for major sources of HAPs may differ from those for area sources. Major sources are defined as stationary sources with potential to emit more than 10 tons per year (tpy) of any HAP or more than 25 tpy of any combination of HAPs; all other sources are considered area sources.

The CAAA called on EPA to promulgate emissions standards in two phases. In the first phase (1992–2000), EPA developed technology-based emissions standards designed to reduce emissions as much as feasible. These standards are generally referred to as requiring MACT. For area sources, the standards may be different, based on generally available control technology. In the second phase, EPA promulgated health risk–based emissions standards were deemed necessary to address risks remaining after implementation of the technology-based NESHAP standards.

The CAAA also required EPA to promulgate vehicle or fuel standards containing reasonable requirements that control toxic emissions of, at a minimum, benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of benzene, formaldehyde, and 1,3-butadiene. In addition, Section 219 of the CAAA required the use of reformulated gasoline in selected areas with the most severe ozone nonattainment conditions to further reduce mobile-source emissions.

STATE AND REGIONAL/LOCAL

TACs in California are regulated primarily through the Tanner Air Toxics Act (Assembly Bill [AB] 1807 [Chapter 1047, Statutes of 1983]) and the Air Toxics Hot Spots Information and Assessment Act (AB 2588 [Chapter 1252, Statutes of 1987]). AB 1807 sets forth a formal procedure for ARB to designate substances as TACs. Research, public participation, and scientific peer review must occur before ARB can designate a substance as a TAC. To date, ARB has identified more than 21 TACs and adopted EPA's list of HAPs as TACs. Most recently, particulate matter emissions from diesel exhaust (diesel PM) was added to the ARB list of TACs.

After a TAC is identified, ARB then adopts an airborne toxics control measure (ATCM) for sources that emit that particular TAC. If there is a safe threshold for a substance for which there is no toxic effect, the control measure must reduce exposure below that threshold. If there is no safe threshold, the measure must incorporate BACT to minimize emissions; for example, the ATCM limits truck idling to 5 minutes (Title 13, Section 2485 of the California Code of Regulations).

The Air Toxics Hot Spots Information and Assessment Act requires that existing facilities that emit toxic substances above a specified level prepare an inventory of toxic emissions, prepare a risk assessment if emissions are significant, notify the public of significant risk levels, and prepare and implement risk reduction measures.

ARB has adopted control measures for diesel PM and more stringent emissions standards for various on-road mobile sources of emissions, including transit buses and off-road diesel equipment (e.g., tractors, generators). In February 2000, ARB adopted a new rule for public-transit bus fleets and emissions standards for new urban buses. These new rules and standards include all the following elements:

- more stringent emission standards for some new urban bus engines, beginning with 2002 model year engines;
- zero-emission bus demonstration and purchase requirements applicable to transit agencies; and

- reporting requirements, under which transit agencies must demonstrate compliance with the public-transit bus fleet rule.

Recent and future milestones include the low-sulfur diesel fuel requirement and tighter emissions standards for heavy-duty diesel trucks (2007) and off-road diesel equipment (2011) nationwide. Over time, replacing older vehicles will result in a vehicle fleet that produces substantially lower levels of TACs than under current conditions. Mobile-source emissions of TACs (e.g., benzene, 1,3-butadiene, diesel PM) have been reduced significantly over the last decade and will be reduced further in California through a progression of regulatory measures (e.g., Low Emission Vehicle/Clean Fuels and Phase II reformulated gasoline regulations) and control technologies. With implementation of ARB's Risk Reduction Plan, it is expected that diesel PM concentrations will be reduced by 75% in 2010 and 85% in 2020 from the estimated year-2000 level. Adopted regulations are also expected to continue to reduce formaldehyde emissions from cars and light-duty trucks. As emissions are reduced, it is expected that risks associated with exposure to the emissions will also be reduced.

In addition, the *Air Quality and Land Use Handbook: A Community Health Perspective*, published by ARB, provides guidance on land use compatibility with sources of TACs (ARB 2005). The handbook is not a law or adopted policy, but rather offers advisory recommendations for the siting of sensitive receptors near uses associated with TACs, such as freeways and high-traffic roads, commercial distribution centers, rail yards, ports, refineries, dry cleaners, gasoline stations, and industrial facilities, to help keep children and other sensitive populations out of harm's way.

ODORS

REGIONAL/LOCAL

SMAQMD adopted a nuisance rule that addresses odor exposure. Rule 402 states that no person shall discharge from any source whatsoever such quantities of air contaminants or other material that cause injury, detriment, nuisance, or annoyance to any considerable number of persons, or to the public, or that endanger the comfort, repose, health, or safety of any such persons, or the public, or that cause to have a natural tendency to cause injury or damage to business or property. The provisions of Rule 402 do not apply to odors emanating from agricultural operations necessary for the growing of crops or raising of fowl or animals.

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

Two situations increase the potential for odor problems. The first occurs when a new odor source is located near existing sensitive receptors. The second occurs when new sensitive receptors are developed near existing sources of odors. In the first situation, SMAQMD recommends operational changes, add-on controls, process changes, or buffer zones where feasible to address odor complaints. In the second situation, the potential conflict is considered significant if the planning area is at least as close as any other site that has already experienced significant odor problems related to the odor source. For projects being developed near a source of odors where there is no nearby development that may have filed complaints, and for odor sources being developed near existing sensitive receptors, SMAQMD recommends that the determination of potential conflict be based on the distance and frequency at which odor complaints from the public have occurred in the vicinity of a similar facility.

5.3 EXISTING CONDITIONS

TOPOGRAPHY, CLIMATE, AND METEOROLOGY

The SVAB is relatively flat, bordered by mountains to the east, west, and north. Air flows into the SVAB through the Carquinez Strait, the only breach in the western mountain barrier, and moves across the Sacramento–San Joaquin River Delta, bringing with it pollutants from the heavily populated San Francisco Bay Area. The climate is characterized by hot, dry summers and cool, rainy winters. Periods of dense and persistent low-level fog that are most prevalent between storms are characteristic of SVAB winter weather. From May to October, the region's intense heat and sunlight lead to high ozone concentrations. Summer inversions are strong and frequent, but are less troublesome than those that occur in the fall. Autumn inversions, formed by warm air subsiding in a region of high pressure, have accompanying light winds that do not provide adequate dispersion of air pollutants.

Most precipitation in the area results from air masses that move in from the Pacific Ocean during the winter months. These storms usually move from the west or northwest. More than half the total annual precipitation falls during the winter rainy season (November–February); the average winter temperature is a moderate 49°F. During the summer, daily temperatures range from 50°F to more than 100°F. The inland location and surrounding mountains shelter the area from much of the ocean breezes that keep the coastal regions moderate in temperature.

Regional flow patterns affect air quality patterns by moving pollutants downwind of sources. Localized meteorological conditions, such as moderate winds, disperse pollutants and reduce pollutant concentrations. An inversion layer develops when a layer of warm air traps cooler air close to the ground. Such temperature inversions hamper dispersion by creating a ceiling over the area and trapping air pollutants near the ground. During summer mornings and afternoons, these inversions are present over the Citrus Heights planning area. During summer's longer daylight hours, plentiful sunshine provides the energy needed to fuel photochemical reactions between ROG and NO_X, which forms ozone.

In the winter, temperature inversions dominate during the night and early morning hours but frequently dissipate by afternoon. The greatest pollution problems during this time of year are from carbon monoxide (CO) and NO_X. High CO concentrations occur on winter days with strong surface inversions and light winds. CO transport is extremely limited.

The local meteorology of the planning area is represented by measurements recorded at the Folsom Dam station. The normal annual precipitation, which occurs primarily from November through March, is approximately 24 inches (National Atmospheric Oceanic Administration 1992). January temperatures range from an average minimum of 38°F to an average maximum of 54°F. July temperatures range from an average minimum of 60°F to an average maximum of 94°F (National Atmospheric Oceanic Administration 1992). The predominant wind direction and speed is from the south-southwest at approximately 10 mph (ARB 1994).

CRITERIA AIR POLLUTANTS

ARB and EPA currently focus on the following air pollutants as indicators of ambient air quality: ozone, particulate matter (PM), CO, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead. Because these are the most prevalent air pollutants known to be deleterious to human health and extensive health-effects criteria documents are available, they are commonly referred to as "criteria air pollutants." Sources and health effects associated with each of the criteria air pollutants are summarized below in Table 5-1.

Table 5-1
Common Sources of Health Effects for Criteria Air Pollutants

Pollutants	Sources	Health Effects
Ozone	Atmospheric reaction of organic gases with nitrogen oxides in sunlight	Aggravation of respiratory and cardiovascular diseases; reduced lung function; increased cough and chest discomfort
Respirable and Fine Particulate Matter (PM_{10} and $PM_{2.5}$)	Stationary combustion of solid fuels; construction activities; industrial processes; atmospheric chemical reactions	Reduced lung function; aggravation of respiratory and cardiovascular diseases; increases in mortality rate; reduced lung function growth in children
Carbon Monoxide (CO)	Incomplete combustion of fuels and other carbon-containing substances, such as motor vehicle exhaust; natural events, such as decomposition of organic matter	Aggravation of some heart diseases; reduced tolerance for exercise; impairment of mental function; birth defects; death at high levels of exposure
Nitrogen Dioxide (NO_2)	Motor vehicle exhaust; high temperature stationary combustion; atmospheric reactions	Aggravation of respiratory illness
Sulfur Dioxide (SO_2)	Combination of sulfur-containing fossil fuels; smelting of sulfur-bearing metal ore; industrial processes	Aggravation of respiratory diseases; reduced lung function
Lead	Contaminated soil	Behavioral and hearing disabilities in children; nervous system impairment

Source: South Coast Air Quality Management District 2005; EPA 2009a

OZONE

Ozone is a photochemical oxidant, a substance whose oxygen combines chemically with another substance in the presence of sunlight, and the primary component of smog. Ozone is not directly emitted into the air but is formed through complex chemical reactions between precursor emissions of ROG and NO_X in the presence of sunlight. ROG are volatile organic compounds that are photochemically reactive. ROG emissions result primarily from incomplete combustion and the evaporation of chemical solvents and fuels. NO_X are a group of gaseous compounds of nitrogen and oxygen that results from the combustion of fuels.

A highly reactive molecule, ozone readily combines with many different components of the atmosphere. Consequently, high levels of ozone tend to exist only while high ROG and NO_X levels are present to sustain the ozone formation process. After the precursors have been depleted, ozone levels rapidly decline. Because these reactions occur on a regional scale, ozone is a regional pollutant.

Ozone located in the upper atmosphere (stratosphere) acts in a beneficial manner by shielding the earth from harmful ultraviolet radiation that is emitted by the sun. However, ozone located in the lower atmosphere (troposphere) is a major health and environmental concern. Meteorology and terrain play a major role in ozone formation. Generally, low wind speeds or stagnant air coupled with warm temperatures and clear skies provide the optimum conditions for ozone formation. As a result, summer is generally the peak ozone season. Because of the reaction time involved, peak ozone concentrations often occur far downwind of the precursor emissions. In general, ozone concentrations over or near urban and rural areas reflect an interplay of emissions of ozone precursors, transport, meteorology, and atmospheric chemistry (Godish 2004).

The adverse health effects associated with exposure to ozone pertain primarily to the respiratory system. Scientific evidence indicates that ambient levels of ozone affect not only sensitive receptors, such as asthmatics and children, but healthy adults. Exposure to ambient levels of ozone ranging from 0.10 part per million (ppm) to 0.40 ppm for 1–2 hours has been found to substantially alter lung functions by increasing respiratory rates and pulmonary resistance, decreasing tidal volumes (the amount of air inhaled and exhaled), and impairing respiratory mechanics. Ambient levels of ozone above 0.12 ppm are linked to such symptoms as throat dryness, chest tightness, headache, and nausea. In addition to these adverse health effects, evidence exists relating ozone exposure to an increase in the permeability of respiratory epithelia; such increased permeability leads to an increased response of the respiratory system to challenges and a decrease in the immune system's ability to defend against infection (Godish 2004).

In 1997, EPA promulgated a new 8-hour standard in recognition of impacts resulting from daylong exposure. On April 15, 2004, EPA designated areas of the country that exceed the 8-hour standard ozone standard as nonattainment. The designations were in place as of February 2009. These designations have triggered new planning requirements for the 8-hour standard.

Trends

On-road motor vehicles and other mobile sources are by far the largest contributors to NO_X emissions. According to the 2008 emissions inventory for Sacramento County, approximately 58% of NO_X emissions in Sacramento County are generated by on-road motor vehicles (ARB 2009b). More stringent mobile source emission standards and cleaner burning fuels have largely contributed to the decline in NO_X emissions. ROG emissions have been decreasing for the last 30 years because of more stringent motor vehicle standards and new rules for control of ROG from various industrial coating and solvent operations (ARB 2009b). Even so, the ozone problem in the SVAB ranks among the most severe in the state. Peak ozone values in the SVAB have not declined as quickly over the last several years as they have in other urban areas. The peak 8-hour indicator remained fairly constant from 1987 to 1990. Since 1990, the peak 8-hour indicator has decreased slightly, and the overall decline for the 20-year period is almost 13%. Looking at the number of days above the state and national standards, the trend is much more variable. However, the number of 8-hour exceedance days has declined by more than 50% since 1988 (ARB 2009b).

Respirable and Fine Particulate Matter

Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM_{10}. PM_{10} consists of particulate matter emitted directly into the air, such as fugitive dust, soot, and smoke from mobile and stationary sources; construction operations; fires and natural windblown dust; and particulate matter formed in the atmosphere by condensation and/or transformation of SO_2 and ROG (EPA 2009a). Fine particulate matter ($PM_{2.5}$) is a subgroup of PM_{10}, consisting of smaller particles that have an aerodynamic diameter of 2.5 micrometers or less (ARB 2009b).

The adverse health effects associated with PM_{10} depend on the specific composition of the particulate matter. For example, health effects may be associated with metals, polycyclic aromatic hydrocarbons (PAH), and other toxic substances adsorbed onto fine particulate matter (referred to as the “piggybacking effect”) or with fine dust particles of silica or asbestos. Generally, effects may result from both short-term and long-term exposure to elevated concentrations of PM_{10} and may include breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular diseases, alterations to the immune system, carcinogenesis, and premature death (EPA 2008a). $PM_{2.5}$ poses an increased health risk because the particles can deposit deep in the lungs and may contain substances that are particularly harmful to human health.

Trends

Direct emissions of both PM_{10} and $PM_{2.5}$ increased in the SVAB between 1975 and 2005 and are projected to increase through 2020. These emissions are dominated by area wide sources, primarily because of development. Direct emissions of PM from mobile and stationary sources have remained relatively steady (ARB 2009b).

CRITERIA AIR POLLUTANT EMISSIONS INVENTORY AND SOURCES

The SMAQMD estimates emissions of criteria air pollutants from approximately nine hundred source categories. The estimates are based on SMAQMD permit information for stationary sources (e.g., manufacturing industries, dry-cleaning operations), plus more generalized estimates for area sources (e.g., space heating, landscaping activities, use of consumer products) and mobile sources (e.g., trains, planes, as well as on-road and off-road motor vehicles). Mobile sources compose most of the ozone precursor emissions in Sacramento County, while area sources are the largest contributor of PM emissions (ARB 2009c).

Stationary Sources

Major stationary sources of air pollutant emissions within Sacramento County include industrial processes, fuel combustion from electric utilities and other processes, waste disposal, surface coating and cleaning, petroleum production, and other sources. Local air districts issue permits to various types of stationary sources, which must demonstrate implementation of BACT. A search of the ARB Facility Search database and the EPA Envirofacts database revealed that no major stationary sources of criteria air pollutants or toxics is located in Citrus Heights. Several small dry cleaning facilities located throughout the community are identified as minor stationary sources of air pollutant emissions.

Areawide Sources

Areawide sources of emissions in Citrus Heights include consumer products, application of architectural coatings, residential fuel combustion, construction and demolition, road dust, fugitive dust, landscaping, fires, and other miscellaneous sources.

Mobile Sources

On-road and other mobile sources are the largest contributors of ozone precursor emissions within Citrus Heights. On-road sources consist of passenger vehicles, trucks, buses, and motorcycles, while off-road vehicles and other mobile sources comprise heavy-duty equipment, boats, aircraft, trains, recreational vehicles, and farm equipment. A major roadway in the vicinity of Citrus Heights includes Interstate 80, which handles a maximum of approximately 198,000-224,000 vehicles per day (Caltrans 2008).

The J. R. Davis Railyard is located approximately 1.5 miles to the northwest of the planning area. The Railyard is a large source of NO_X, diesel particulate matter (DPM), and CO_2 emissions. Depending on wind speed and direction, and the proximity of sensitive receptors, the Railyard could result in exposures to DPM. Emissions of several criteria pollutants and toxics (DPM) for the Railyard for the year 2008 are shown in Table 5-2.

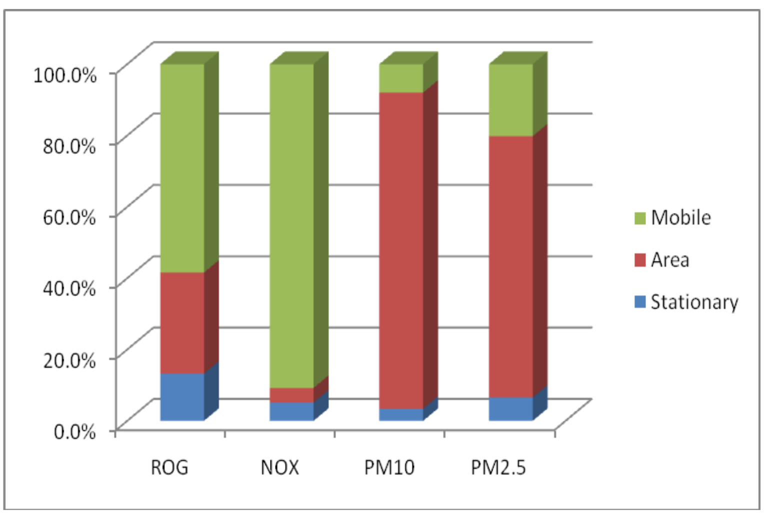
Table 5-2
2008 Facility-Wide Estimated Emissions
Roseville Railyard

Activity	NO_X (tpy)	DPM (tpy)	CO_2 (MT/y)	N_2O (MT/y)	CH_4 (MT/y)	CO_2e (MT/y)
Thru Train Total	45.3	1.11	2,560.4	0.06	0.20	2,584.6
Freight (Idling & Movement)	70.8	2.17	5,699.5	0.14	0.45	5,753.4
Local, Rockpile, & Power Moves	10.8	0.29	625.7	0.02	0.05	631.6
Hump & Trim	275.6	6.00	12,945.7	0.33	1.02	13,068.0
Service Idling & Movements	61.9	1.81	5,032.5	0.13	0.40	5,080.0
Shop Idling	11.2	0.35	973.1	0.02	0.08	982.3
Load Tests	109.2	2.77	6,903.2	0.17	0.54	6,968.4
Non-Locomotive Sources	8.6	0.21	552.2	0.00	0.00	552.7
Total	593	14.7	35,292	0.9	2.7	35,621
Total – In Yard Only	548	13.6	32,732	0.8	2.5	33,036

Notes: DPM = diesel particulate matter, tpy = tons per year, MT/y = metric tons per year
Source: Union Pacific Railroad 2008.

Summary of Sources

Mobile, area, and stationary sources of major criteria pollutant emissions are presented in Figure 5-1. These emission sources do not include the J. R. Davis Railyard, which is not located within the City.



Source: ARB 2009c.

2008 Emissions Inventory for Sacramento County **Figure 5-1**

MONITORING STATION DATA AND ATTAINMENT AREA DESIGNATIONS

Criteria air pollutant concentrations are measured at several monitoring stations in the SVAB. The North Highlands-Blackfoot Way station is the closest monitoring station to the planning area with recent data for ozone, NO_2, and PM_{10}. When data was not available at the North Highlands station, air pollutant monitoring data was obtained from the Del Paso Manor station in Sacramento, which is next closest monitoring station to the planning area. In general, the ambient air quality measurements from these monitoring stations are representative of the air quality in the vicinity of Citrus Heights. Table 5-3 summarizes the air quality data from the most recent 3 years for these two monitoring stations.

Table 5-3
Summary of Annual Ambient Air Quality Data (2006–2008)

	2006	2007	2008
Ozone			
Maximum concentration (1-hour/8-hour average, ppm)	0.135/0.093	0.109/0.096	0.121/0.082
Number of days state 1-hour/8-hour standard exceeded	15/42	1/4	2/4
Number of days national 1-hour/8-hour standard exceeded	1/24	0/2	0/2
Respirable Particulate Matter (PM_{10})			
Maximum concentration (µg/m^3) [b]	67.0	59.0	97.0
Number of days state standard exceeded (measured/estimated) [c]	3/17.9	2/13.0	6/*
Number of days national standard exceeded (measured) [c]	0	0	0
Fine Particulate Matter ($PM_{2.5}$) [a]			
Maximum concentration (µg/m^3) [b]	78.0	61.0	91.3
Number of days national standard exceeded (measured [c])	19	22	8
Number of days national standard exceeded (estimated [c])	19.3	26.1	24.1
Carbon Monoxide (CO)			
Maximum concentration (1-hour/8-hour average, ppm)	7.5/2.7	5.1/1.7	2.3/1.8
Number of days state standard exceeded	0	0	0
Number of days national standard exceeded	0	0	0
Nitrogen Dioxide (NO_2)			
Maximum concentration (1-hour, ppm)	0.097	0.127	0.115
Annual average concentration (ppm)	*	0.013	*
Number of days state 1-hour standard exceeded	0	0	0

Notes: µg/m^3 = micrograms per cubic meter; ppm = parts per million

* Insufficient data to determine the value.

[a] Data was obtained from the Del Paso Manor monitoring station in Sacramento, which is the closest monitoring station to the planning area that monitors $PM_{2.5}$.

[b] Maximum concentration shown are based on California monitoring methods.

[c] Measured days are those days that an actual measurement was greater than the level of the state daily standard or the national daily standard. Measurements are typically collected every 6 days. Estimated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.

Sources: ARB 2009d, EPA 2009b

Both ARB and EPA use this type of monitoring data to designate the attainment status with respect to the CAAQS and NAAQS, respectively, for criteria air pollutants. The purpose of these designations is to identify those areas with air quality problems and thereby initiate planning efforts for improvement. The three basic designation categories are “nonattainment,” “attainment,” and “unclassified.” The “unclassified” designation is used in an area that cannot be classified on the basis of available information as meeting or not meeting the standards.

TOXIC AIR CONTAMINANTS

TACs or HAPs are defined as air pollutants that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations. In general, for those TACs that may cause cancer, there is no concentration that does not present some risk. In other words, there is no threshold level below which adverse health impacts may not be expected to occur. This contrasts with the criteria air pollutants for which acceptable levels of exposure can be determined and for which the ambient standards have been established (Table 5-4).

According to the *California Almanac of Emissions and Air Quality 2008 Edition* (ARB 2009b), the majority of the estimated health risk from TACs can be attributed to relatively few compounds, the most important being PM from diesel-fueled engines (diesel PM). Diesel PM differs from other TACs in that it is not a single substance, but rather a complex mixture of hundreds of substances. Although diesel PM is emitted by diesel-fueled internal combustion engines, the composition of the emissions varies depending on engine type, operating conditions, fuel composition, and lubricating oil, and whether an emission control system is present. Unlike the other TACs, no ambient monitoring data are available for diesel PM because no routine measurement method currently exists. However, ARB has made preliminary concentration estimates based on a PM exposure method. This method uses the ARB emissions inventory’s PM_{10} database, ambient PM_{10} monitoring data, and the results from several studies on chemical speciation to estimate concentrations of diesel PM. In addition to diesel PM, benzene, 1, 3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, *para*-dichlorobenzene, formaldehyde, methylene chloride, and perchloroethylene are the TACs for which data are available that pose the greatest existing ambient risk in California.

Diesel PM poses the greatest health risk among these 10 TACs mentioned. Based on receptor modeling techniques, ARB estimated its health risk to be 360 excess cancer cases per million people in the SVAB. Since 1990 the health risk associated with diesel PM has been reduced by 52%. Overall, levels of most TACs, except for *para*-dichlorobenzene and formaldehyde, have gone down since 1990 (ARB 2009b).

Sources of TACs located throughout the planning area could include, but are not limited to, large volume roadways, gasoline dispensing stations, dry cleaners, auto body painting establishments, and crematoriums. The nearby J. R. Davis Rail Yard is also a potential source of TACs, in particular, DPM.

SENSITIVE LAND USES

Sensitive land uses or sensitive receptors are people or facilities that generally house people (e.g., schools, hospitals, residences) that may experience adverse effects from unhealthful concentrations of air pollutants. There are numerous types of these receptors throughout Citrus Heights.

Table 5-4
Ambient Air Quality Standards and Designations

Pollutant	Averaging Time	California		National Standards[a]		
		Standards[b, c]	Attainment Status[d]	Primary[c,e]	Secondary[c,f]	Attainment Status[g]
Ozone	1-hour	0.09 ppm (180 $\mu g/m^3$)	N (Serious)	–[h]	Same as Primary Standard	–[h]
	8-hour	0.070 ppm (137 $\mu g/m^3$)	–	0.075 ppm (147 $\mu g/m^3$)		N
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 $\mu g/m^3$	N	–[h]	Same as Primary Standard	N
	24-hour	50 $\mu g/m^3$		150 $\mu g/m^3$		
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 $\mu g/m^3$	N	15 $\mu g/m^3$	Same as Primary Standard	N[j]
	24-hour	–	–	35 $\mu g/m^3$		
Carbon Monoxide (CO)	1-hour	20 ppm (23 mg/m^3)	A	35 ppm (40 mg/m^3)	–	U/A
	8-hour	9 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm (57 $\mu g/m^3$)	–	0.053 ppm (100 $\mu g/m^3$)	Same as Primary Standard	U/A
	1-hour	0.18 ppm (339 $\mu g/m^3$)	A	–		–
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	–	–	0.030 ppm (80 $\mu g/m^3$)	–	U
	24-hour	0.04 ppm (105 $\mu g/m^3$)	A	0.14 ppm (365 $\mu g/m^3$)	–	
	3-hour	–	–	–	0.5 ppm (1300 $\mu g/m^3$)	
	1-hour	0.25 ppm (655 $\mu g/m^3$)	A	–	–	–
Lead[i]	30-day Average	1.5 $\mu g/m^3$	A	–	–	–
	Calendar Quarter	–	–	1.5 $\mu g/m^3$	Same as Primary Standard	–
Sulfates	24-hour	25 $\mu g/m^3$	A	**No National**		
Hydrogen Sulfide	1-hour	0.03 ppm	U			

Table 5-4
Ambient Air Quality Standards and Designations

Pollutant	Averaging Time	California		National Standards[a]		
		Standards[b, c]	Attainment Status[d]	Primary[c,e]	Secondary[c,f]	Attainment Status[g]
		(42 µg/m^3)			**Standards**	
Vinyl Chloride[i]	24-hour	0.01 ppm (26 µg/m^3)	–			
Visibility-Reducing Particle Matter	8-hour	Extinction coefficient of 0.23 per kilometer — visibility of 10 miles or more (0.07—30 miles or more for Lake Tahoe) because of particles when the relative humidity is less than 70%.	U			

[a] National standards (other than ozone, PM, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. The PM_{10} 24-hour standard is attained when 99% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. The $PM_{2.5}$ 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the EPA for further clarification and current federal policies.

[b] California standards for ozone, CO (except Lake Tahoe), SO_2 (1- and 24-hour), NO_2, PM, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. CAAQS are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[c] Concentration expressed first in units in which it was promulgated [i.e., parts per million (ppm) or micrograms per cubic meter (µg/m^3)]. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[d] Unclassified (U): a pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment.
Attainment (A): a pollutant is designated attainment if the state standard for that pollutant was not violated at any site in the area during a 3-year period.
Nonattainment (N): a pollutant is designated nonattainment if there was a least one violation of a state standard for that pollutant in the area.
Nonattainment/Transitional (NT): is a subcategory of the nonattainment designation. An area is designated nonattainment/transitional to signify that the area is close to attaining the standard for that pollutant.

[e] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

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

[g] Nonattainment (N): any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.
Attainment (A): any area that meets the national primary or secondary ambient air quality standard for the pollutant.
Unclassifiable (U): any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

[h] The 1-hour ozone NAAQS was revoked on June 15, 2005 and the annual PM_{10} NAAQS was revoked in 2006.

[i] ARB has identified lead and vinyl chloride as toxic air contaminants with no threshold of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for this pollutant.

[j] U.S EPA lowered the 24-hour $PM_{2.5}$ standard from 65 µg/m^3 to 35 µg/m^3 in 2006. EPA issued attainment status designations for the 35 µg/m^3 standard on December 22, 2008. EPA has designated Sacramento County as nonattainment for the 35 µg/m^3 $PM_{2.5}$ standard. The EPA designation will be effective 90 days after publication of the regulation in the Federal Register.

Source: ARB 2009e

Odors

Typically odors are regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

With respect to odors, the human nose is the sole sensing device. The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. There are no major sources of odor in Citrus Heights. Minor sources of odors in the planning area could include, but are not limited to, restaurants with charbroilers and construction sites (diesel exhaust and asphalt paving).

5.4 REFERENCES

California Air Resources Board. 1994 (June). *California Surface Wind Climatology*. Sacramento, CA.

California Air Resources Board. 2005 (March). *Air Quality and Land Use Handbook: A Community Health Perspective*. Sacramento, CA. Available: <http://arb.ca.gov/ch/handbook.pdf>.

California Air Resources Board. 2009a. State Implementation Plan. Available: <http://www.arb.ca.gov/planning/sip/2007sip/2007sip.htm>. Accessed November 18, 2009.

California Air Resources Board. 2009b. *The California Almanac of Emissions and Air Quality*. Sacramento, CA. Available: < http://www.arb.ca.gov/aqd/almanac/almanac09/almanac09.htm >. Accessed November 18, 2009.

California Air Resources Board. 2009c. *Air Resources Board Emissions Inventory*. Available: < http://www.arb.ca.gov/app/emsinv/emssumcat_query.php?F_DIV=-4&F_DD=Y&F_YR=2008&F_SEASON=A&SP=2009&F_AREA=CO&F_CO=34 >. Last updated 2008. Accessed November 18, 2009.

California Air Resources Board. 2009d. *Air Quality Data Statistics.* Available: <http://www.arb.ca.gov/adam/welcome.html>. Accessed November 18, 2009.

California Air Resources Board. 2009e. *Ambient Air Quality Standards and Area Designation Maps - State and National*. Available: <http://www.arb.ca.gov/desig/adm/adm.htm#state>. Last updated February 2009. Accessed November 18, 2009.

California Department of Transportation. 2008. Traffic Counts. Available: < http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/2008all.htm >. Accessed November 18, 2009.

Godish, T. 2004. *Air Quality*. Lewis Publishers. Boca Raton, FL.

National Oceanic and Atmospheric Administration. 1992. *Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1961–1990.* Asheville, NC.

Sacramento Metropolitan Air Quality Management District. 2004 (July). *Guide to Air Quality Assessment in Sacramento County*. Sacramento, CA. Available: <www.airquality.org/ceqa/2004AQMDCEQAGuidelines.pdf>.

Sacramento Metropolitan Air Quality Management District. 2009. *Draft CEQA Guide to Air Quality Assessment in Sacramento County*. Sacramento, CA. Available: < http://airquality.org/ceqa/ceqaguideupdate.shtml>.

South Coast Air Quality Management District. 2005 (May). *Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning*. Available: http://www.aqmd.gov/prdas/aqguide/doc/chapter01.pdf.

Union Pacific Railroad 2008, *Estimated Emissions of DPM, NO_X, and GHGs for the 2008 Calendar Year from the J. R. Davis Rail Yard.* Omaha, NE.

U.S. Environmental Protection Agency. 2009a. *Criteria Air Pollutant Information.* Available: < http://www.epa.gov/air/urbanair/>. Accessed November 18, 2009.

U.S. Environmental Protection Agency. 2009b. *Monitor Value Report*. Available: <http://www.epa.gov/air/data/geosel.html>. Accessed November 18, 2009.

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Acronyms

Sacramento Valley Air Basin (SVAB
Sacramento Metropolitan Air Quality Management District (SMAQMD
California Air Resources Board (ARB
U.S. Environmental Protection Agency (EPA
Federal Clean Air Act (CAA
National Ambient Air Quality Standards (NAAQS
State Implementation Plan (SIP
Federal Clean Air Act Amendments of 1990 (CAAA
California Clean Air Act (CCAA
California Ambient Air Quality Standards (CAAQS
environmental impact reports (EIRs
horsepower (hp
volatile organic compound (VOC
Air Quality Attainment Plan (AQAP
Sacramento Federal Ozone Nonattainment Area (SFNA
reactive organic gases (ROG
oxides of nitrogen (NO_X
Toxic air contaminants (TACs
hazardous air pollutants [HAPs
maximum or best available control technology (MACT and BACT
national emissions standards for HAPs (NESHAP
tons per year (tpy
Assembly Bill [AB
airborne toxics control measure (ATCM
diesel exhaust (diesel PM
carbon monoxide (CO
particulate matter (PM
nitrogen dioxide (NO_2

sulfur dioxide (SO_2
Respirable and Fine Particulate Matter
(PM_{10} and $PM_{2.5}$
Carbon Monoxide (CO)
Nitrogen Dioxide (NO_2)
Sulfur Dioxide (SO_2
part per million (ppm
Fine particulate matter ($PM_{2.5}$
polycyclic aromatic hydrocarbons (PAH