Appendix C - Air Quality

Air Quality Background Information and Model Output
Adams Avenue Indoor Sports Complex
City of El Centro, California,

Prepared for:

Prepared for:

City of El Centro
1275 W. Main Street
El Centro, CA 92243
760.337.4543

Contacts: Rosie Blankenship, Assistant Planner
Stacy R. Cox, Community Development Specialist I

Prepared by:

Michael Brandman Associates
621 E. Carnegie Drive, Suite 100
San Bernardino, CA 92408
909-884-2255

Contact: Cori Wilson, Air Quality and Climate Change Specialist

March 9, 2009

TABLE OF CONTENTS

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

µm	Micrometer
AQMP	Air Quality Management Plan
ARB	California Air Resources Control Board
CAT	Climate Action Team (Report)
CCAA	California Clean Air Act
CEQA	California Environmental Quality Act
CO	Carbon Monoxide
EPA	Environmental Protection Agency
LOS	Level of Service
LST	Localized Significance Thresholds
NAAQS	National Ambient Air Quality Standards
NOx	Nitrogen oxides
PAH	Polycyclic Aromatic Hydrocarbons
$PM_{2.5}$	Particulate matter less than 2.5 microns in diameter
PM_{10}	Particulate matter less than 10 microns in diameter
ppm	Parts per Million
ppt	Parts per Trillion
PVC	Polyvinyl Chloride
ROG	Reactive Organic Gases
RTP	Regional Transportation Plans
SCAG	Southern California Association of Governments
SIP	State Implementation Plans
VOC	Volatile Organic Compounds

SECTION 1: BACKGROUND INFORMATION

1.1 - Criteria Pollutants

Air pollutants are regulated at the national, State, and air basin level; each agency has a different degree of control. The United States Environmental Protection Agency (EPA) regulates at the national level. The California Air Resources Board (ARB) regulates at the state level. The Imperial County Air Pollution Control District (ICAPCD) regulates at the air basin level.

1.1.1 - Federal and State Regulatory Agencies

The EPA handles global, international, national, and interstate air pollution issues and policies. The EPA sets national vehicle and stationary source emission standards, oversees approval of all State Implementation Plans (SIP), provides research and guidance in air pollution programs, and sets National Ambient Air Quality Standards (NAAQS), also known as federal standards. There are NAAQS for six common air pollutants, called criteria air pollutants, which were identified resulting from provisions of the Clean Air Act of 1970. The criteria pollutants are:

- Ozone
- Particulate matter (PM_{10} and $PM_{2.5}$)
- Nitrogen dioxide
- Carbon monoxide (CO)
- Lead
- Sulfur dioxide

The NAAQS were set to protect public health, including that of sensitive individuals; thus, the standards continue to change as more medical research is available regarding the health effects of the criteria pollutants. National primary standards are the levels of air quality necessary, with an adequate margin of safety, to protect the public health (ARB 2008).

A SIP is a document prepared by each state describing existing air quality conditions and measures that will be followed to attain and maintain NAAQS. The SIP for the State of California is administered by the ARB who has overall responsibility for statewide air quality maintenance and air pollution prevention. The ARB also administers California Ambient Air Quality Standards (CAAQS), for the ten air pollutants designated in the California Clean Air Act (CCAA). The ten State air pollutants are the six NAAQS listed above as well as the following: visibility reducing particulates; hydrogen sulfide; sulfates; and vinyl chloride.

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

Table 1: Air Pollutants

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

Air Pollutant	Averaging Time	California Standard	National Standard	Most Relevant Effects	Properties	Sources
				(c) Contribution to atmospheric discoloration.	compounds to form nitric acid and related particles. This deposition can harm natural resources and materials.	oceans. Natural sources accounted for approximately seven percent of 1990 emissions of NO_x for the United States.
Sulfur Dioxide (SO_2)	1 Hour	0.25 ppm	—	Bronchoconstriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma. Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient sulfur dioxide levels. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.	Sulfur dioxide is a colorless, pungent gas. At levels greater than 0.5 ppm, the gas has a strong odor, similar to rotten eggs. Sulfur oxides (SO_x) include sulfur dioxide and sulfur trioxide. Sulfuric acid is formed from sulfur dioxide, which can lead to acid deposition and can harm natural resources and materials. Although sulfur dioxide concentrations have been reduced to levels well below State and national standards, further reductions are desirable because sulfur dioxide is a precursor to sulfate and PM_{10}.	Human caused sources include fossil-fuel combustion, mineral ore processing, and chemical manufacturing. Volcanic emissions are a natural source of sulfur dioxide. The gas can also be produced in the air by dimethylsulfide and hydrogen sulfide. Sulfur dioxide is removed from the air by dissolution in water, chemical reactions, and transfer to soils and ice caps. The sulfur dioxide levels in the State are well below the maximum standards.
	24 Hour	0.04 ppm	0.14 ppm			
	Mean	—	0.030 ppm			
Particulate Matter (PM_{10})	24 hour	50 µg/m^3	150 µg/m^3	(a) Exacerbation of symptoms in sensitive patients with respiratory or cardiovascular disease; (b) Declines in pulmonary function growth in children; (c) Increased risk of premature death from heart or lung diseases in the elderly. Daily fluctuations in $PM_{2.5}$ levels have been related to hospital admissions for acute respiratory conditions, school absences, and increased medication use in children and adults with asthma.	Suspended particulate matter is a mixture of small particles that consist of dry solid fragments, droplets of water, or solid cores with liquid coatings. The particles vary in shape, size, and composition. PM_{10} refers to particulate matter that is 10 microns or less in diameter, (1 micron is one-millionth of a meter). $PM_{2.5}$ refers to particulate matter that is 2.5 microns or less in diameter.	Stationary sources include fuel combustion for electrical utilities, residential space heating, and industrial processes; construction and demolition; metals, minerals, and petrochemicals; wood products processing; mills and elevators used in agriculture; erosion from tilled lands; waste disposal, and recycling. Mobile or transportation-related sources are from vehicle exhaust and road dust.
	Mean	20 µg/m^3	—			
Particulate Matter ($PM_{2.5}$)	24 Hour	—	35 µg/m^3			
	Mean	12 µg/m^3	15.0 µg/m^3			
Sulfates	24 Hour	25 µg/m^3	—	(a) Decrease in ventilatory function; (b) Aggravation of	The sulfate ion is a polyatomic anion with the empirical formula	Sulfates are particulates formed through the photochemical

Air Pollutant	Averaging Time	California Standard	National Standard	Most Relevant Effects	Properties	Sources
				asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; (f) Property damage.	SO_4^{2-}.	oxidation of sulfur dioxide. Sulfates can also be formed by dissolving a metal in sulfuric acid. The lead-acid battery typically uses sulfuric acid.
Lead	30-day	1.5 µg/m^3	—	Lead accumulates in bones, soft tissue, and blood and can affect the kidneys, liver, and nervous system. It can cause impairment of blood formation and nerve conduction. The more serious effects of lead poisoning include behavior disorders, mental retardation, neurological impairment, learning deficiencies, and low IQs. Lead may also contribute to high blood pressure and heart disease.	Lead is a solid heavy metal that can exist in air pollution as an aerosol particle component. An aerosol is a collection of solid, liquid, or mixed-phase particles suspended in the air. Lead was first regulated as an air pollutant in 1976. Leaded gasoline was first marketed in 1923 and was used in motor vehicles until around 1970. Lead concentrations have not exceeded State or national air quality standards at any monitoring station since 1982.	Lead ore crushing, lead-ore smelting, and battery manufacturing are currently the largest sources of lead in the atmosphere in the United States. Other sources include dust from soils contaminated with lead-based paint, solid waste disposal, and crustal physical weathering. The mechanisms by which lead can be removed from the atmosphere (sinks) include deposition to soils, ice caps, and oceans, and inhalation.
	Quarter	—	1.5 µg/m^3			
	Rolling 3-month average	—	0.15 µg/m^3			
Vinyl Chloride	24 Hour	0.01 ppm (26 µg/m^3)	—	Short-term exposure to high levels of vinyl chloride in the air causes central nervous system effects, such as dizziness, drowsiness, and headaches. Epidemiological studies of occupationally exposed workers have linked vinyl chloride exposure to development of a rare cancer, liver angiosarcoma, and have suggested a relationship between exposure and lung and brain cancers.	Vinyl chloride, or chloroethene, is a chlorinated hydrocarbon and a colorless gas with a mild, sweet odor. In 1990, ARB identified vinyl chloride as a toxic air contaminant and estimated a cancer unit risk factor.	Most vinyl chloride is used to make polyvinyl chloride (PVC) plastic and vinyl products, including pipes, wire and cable coatings, and packaging materials. It can be formed when plastics containing these substances are left to decompose in solid waste landfills. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites due to microbial breakdown of chlorinated solvents.
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	—	High levels of hydrogen sulfide can cause immediate respiratory	Hydrogen sulfide (H_2S) is a flammable, colorless, poisonous gas	Manure, storage tanks, ponds, anaerobic lagoons, and land

Air Pollutant	Averaging Time	California Standard	National Standard	Most Relevant Effects	Properties	Sources
				arrest. It can irritate the eyes and respiratory tract and cause symptoms like headache, nausea, vomiting, and cough. Long exposure to hydrogen sulfide can cause pulmonary edema.	that smells like rotten eggs.	application sites are the primary sources of hydrogen sulfide. Anthropogenic sources include the combustion of sulfur containing fuels (oil and coal) and organic matter that undergoes putrefaction.
Volatile Organic Compounds (VOC)		There are no State or national ambient air quality standards for VOCs because they are not classified as criteria pollutants.		Although health-based standards have not been established for VOCs, health effects can occur from exposures to high concentrations because of interference with oxygen uptake. In general, concentrations of VOCs are suspected to cause eye, nose, and throat irritation; headaches, loss of coordination, nausea, damage to liver, kidney, and the central nervous system. Many VOCs have been classified as toxic air contaminants.	Reactive organic gases (ROGs), or volatile organic compounds (VOCs), are defined as any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. Although there are slight differences in the definition of ROGs and VOCs, the two terms are often used interchangeably.	Indoor sources of VOCs include paints, solvents, aerosol sprays, cleansers, tobacco smoke, etc. Outdoor sources of VOCs are from combustion and fuel evaporation. A reduction in VOC emissions reduces certain chemical reactions that contribute to the formulation of ozone. VOCs are also transformed into organic aerosols in the atmosphere, which contribute to higher PM_{10} and lower visibility.
Benzene		There are no ambient air quality standards for benzene.		Short-term (acute) exposure of high doses from inhalation of benzene may cause dizziness, drowsiness, headaches, eye irritation, skin irritation, and respiratory tract irritation, and at higher levels, loss of consciousness can occur. Long-term (chronic) occupational exposure of high doses has caused blood disorders, leukemia, and lymphatic cancer.	Benzene is a VOC. It is a clear or colorless light-yellow, volatile, highly flammable liquid with a gasoline-like odor. The EPA has classified benzene as a "Group A" carcinogen.	Benzene is emitted into the air from gasoline service stations (fuel evaporation), motor vehicle exhaust, tobacco smoke, and from burning oil and coal. Benzene is used as a solvent for paints, inks, oils, waxes, plastic, and rubber. It is used in the extraction of oils from seeds and nuts and in the manufacture of detergents, explosives, and pharmaceuticals.
Diesel Particulate Matter (DPM)		There are no ambient air quality standards for DPM.		Some short-term (acute) effects of diesel exhaust exposure include eye, nose, throat, and lung	DPM is a source of $PM_{2.5}$—diesel particles are typically 2.5 microns and smaller. Diesel exhaust is a	Diesel exhaust is a major source of ambient particulate matter pollution in urban environments.

Air Pollutant	Averaging Time	California Standard	National Standard	Most Relevant Effects	Properties	Sources
				irritation, and can cause coughs, headaches, light-headedness, and nausea. Studies have linked elevated particle levels in the air to increased hospital admissions, emergency room visits, asthma attacks, and premature deaths among those suffering from respiratory problems. Human studies on the carcinogenicity of DPM demonstrate an increased risk of lung cancer, although the increased risk cannot be clearly attributed to diesel exhaust exposure.	complex mixture of thousands of particles and gases that is produced when an engine burns diesel fuel. Organic compounds account for 80 percent of the total particulate matter mass, which is comprised of compounds such as hydrocarbons and their derivatives, and polycyclic aromatic hydrocarbons (PAHs) and their derivatives. Fifteen PAHs are confirmed carcinogens, a number of which are found in diesel exhaust.	In 2002 in the South Coast Air Basin, the main sources of diesel particulate matter were due to the combustion of diesel fuel in diesel-powered engines. Such engines can include on-road vehicles like diesel trucks, off-road construction vehicles, diesel electrical generators, and various pieces of stationary construction equipment.

Abbreviations:
ppm = parts per million (concentration) $\mu g/m^3$ = micrograms per cubic meter Mean = Annual Arithmetic Mean 30-day = 30-day average Quarter = Calendar quarter
National standard = National ambient air quality standard (NAAQS) = the levels of air quality necessary, with an adequate margin of safety to protect the public health.
Source of effects: South Coast Air Quality Management District (SCAQMD 2007c), OEHAA 2002, ARB 2005b, EPA 2007b, EPA 1992, NTP 2005
Source of standards: California Air Resources Board, Ambient Air Quality Standards (ARB 2008).
Source of properties and sources: Ibid and EPA 1997, EPA 1999, EPA 2002, EPA 2003, EPA 2007a, EPA 2007d, and NTP 2005b.

Several pollutants listed in Table 1 are not addressed in this analysis. Lead is not discussed because the project is not anticipated to emit lead. Visibility reducing particles are not explicitly addressed in this analysis because particulate matter is addressed. The project is not expected to generate or be exposed to vinyl chloride because proposed project uses do not utilize the chemical processes that create this pollutant and there are no such uses in the project vicinity. The proposed project is not expected to cause exposure to hydrogen sulfide because it will not generate hydrogen sulfide in any substantial quantity. There are no uses that would generate hydrogen sulfide in the project vicinity.

ARB Measures to Reduce Emissions

ARB Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling adopts new section 2485 within Chapter 10, Article 1, Division 3, title 13 in the California Code of Regulations. The measure limits the idling of diesel vehicles to reduce emissions of toxics and criteria pollutants. The driver of any vehicle subject to this section: (1) shall not idle the vehicle's primary diesel engine for greater than five (5) minutes at any location; and (2) shall not idle a diesel-fueled auxiliary power system for more than five (5) minutes to power a heater, air conditioner, or any ancillary equipment on the vehicle if it has a sleeper berth and the truck is located within 100 feet of a restricted area (homes and schools).

ARB Final Regulation Order, Requirements to Reduce Idling Emissions from New and In-Use Trucks, Beginning in 2008, would require that new 2008 and subsequent model-year heavy-duty diesel engines shall be equipped with an engine shutdown system that automatically shuts down the engine after 300 seconds of continuous idling operation once the vehicle is stopped, the transmission is set to "neutral" or "park", and the parking brake is engaged. If the parking brake is not engaged, then the engine shutdown system shall shut down the engine after 900 seconds of continuous idling operation once the vehicle is stopped and the transmission is set to "neutral" or "park."

1.1.2 - Imperial County Air Pollution Control District

The following information is from the Imperial County Air Pollution Control District (ICAPCD 2007).

To answer the call of improving and maintaining clean air, the legislature has given local ICAPCD regional authority over the control of air pollution from all sources other than emissions from motor vehicles. The ICAPCD has regulatory control over all stationary sources of air contaminants. These stationary sources are divided into point sources, such as factories, geothermal plants and rock quarries, and indirect sources, such as paved and unpaved roads, open areas and construction projects. These types of sources tend to have emissions that fit a generalized category and are considerably too small to warrant permitting. Generally, point sources of air contaminants are required to obtain specific operational permits from the ICAPCD while indirect sources are exempt. Indirect sources are facilities as well as land uses which do not emit a significant amount of pollution on their own but rather attract or generate motor vehicle trips which result in emissions of ozone precursors (VOC's, ROG, NOx), CO, and particulate matter (PM_{10} and $PM_{2.5}$).

Attainment Plans

The NAAQS and California AAQS established the context for local air quality management plans in 1977 with the Federal Clean Air Act (1977 Amendments). Agencies in any area of the nation not meeting NAAQS must prepare a plan demonstrating the steps that would bring the area into compliance with all national standards by December 31, 1987.

In 1988, because of uncertainty in Federal Clean Air Act reauthorization, the California Legislature enacted the California Clean Air Act (CCAA). The CCAA requires that regional emissions be reduced by 5 percent per year, averaged over 3 year periods, until attainment can be demonstrated.

The 1990 Federal CAA Amendments required that all states with airsheds with "serious" or worse ozone problems submit a revision to the State Implementation Plan (SIP). A SIP is a document prepared by each state describing existing air quality conditions and measures that will be taken to attain and maintain NAAQS. An Air Quality Management Plan (AQMP) is a plan prepared by an air pollution control district for a county or region designated as a non-attainment area, to bring the area into compliance with the requirements of the national and/or California AAQS. AQMPs are incorporated into the SIP.

Imperial County APCD developed and adopted the Imperial County Air Quality Attainment Plan (AQAP) for ozone on April 14, 1992, and the Imperial County SIP for PM_{10} on September 28, 1993. The Imperial County AQAP and SIP for PM_{10} are the air management plans currently in effect. Imperial County APCD is in the process of updating the SIP for PM_{10}. These plans establish programs, rules, and regulations that will bring the Imperial County portion of the SSAB into compliance with all federal and state ambient air quality standards. The Imperial County APCD rules and regulations are directed at attainment of the state and national air quality standards.

1.1.3 - Salton Sea Air Basin

The project site is located within the Salton Sea Air Basin (SSAB). The SSAB consists of the southeast portion of Riverside County and all of Imperial County. The Imperial County portion of the SSAB extends over 4,597 square miles, and is bordered by Mexico to the south, Riverside County to the north, San Diego County on the west, and Arizona to the east. Specifically the SSAB is a north/south facing trough consisting of a flat valley surrounded by the Peninsular Range to the west; the Chocolate, Orocopia, and Cargo Muchaco Mountains to the east; and the Banning Pass to the north. The majority of the SSAB trough is below sea level and it is generally an arid desert region.

Regionally, the large-scale sinking and warming of air in the semi-permanent subtropical high-pressure cell controls local wind patterns within the SSAB. Local area wind statistics indicate prevailing winds are from the west-northwest through southwest, with a secondary flow maximum from the east-southeast also evident. The area occasionally experiences high winds with speeds exceeding 21 knots, which occur most frequently in April and May. Annually, strong winds (>21 knots) are observed 0.6 percent of the time, with an average annual wind speed of 6.74 knots.

The semi-permanent high-pressure cell blocks out most mid-latitude storms except in the winter when the high-pressure zone is weakest. The coastal Peninsular Range to the west prevents the intrusion and influence of any cool, damp marine air. The combination of the subsiding air, protective mountains, and distance from the Pacific Ocean all combine to limit precipitation severely. Rainfall is highly variable: precipitation from a single heavy storm can exceed the annual total precipitation.

Humidity is low throughout the year, ranging from 28 percent in the summer to 52 percent in the winter.

Regional and local air quality within the SSAB is affected by topography and atmospheric inversions. The mountains surrounding the trough are natural barriers to the dispersion of air contaminants. The SSAB experiences surface inversions almost every day of the year. The presence of the subtropical high-pressure cell can cause the air mass aloft to sink. As the air descends, compressional heating warms it to a temperature higher than the air below. This highly stable atmospheric condition, termed a subsidence inversion, can act as a nearly impenetrable lid to the vertical mixing of pollutants. The strength of these inversions makes them difficult to disrupt. Consequently, they can persist for long periods, causing air stagnation and the buildup of pollutants. The highest ozone concentrations are often associated with the presence of this type of inversion.

1.1.4 - Attainment Status

Air basins where ambient air quality standards are exceeded are designated as "nonattainment" areas. If standards are met, the area is designated as an "attainment" area. If there is inadequate or inconclusive data to make a definitive attainment designation, they are considered "unclassified". Federal nonattainment areas are further designated as marginal, moderate, serious, severe, or extreme as a function of deviation from standards.

The proposed project is within Imperial County. The current attainment designations for Imperial County are shown in Table 2. The County is designated as nonattainment for the federal and state ozone and PM_{10} standards.

Table 2: Attainment Status

Pollutant	State Status	National Status
Ozone	Nonattainment	Moderate Nonattainment
Carbon Monoxide	Attainment	Attainment
Nitrogen Dioxide	Attainment	Attainment
Sulfur Dioxide	Attainment	Attainment
PM_{10}	Nonattainment	Serious Nonattainment
$PM_{2.5}$	Unclassified	Attainment
Source: State Status from California Air Resources Board (ARB 2006). National Status from U.S. Environmental Protection Agency (EPA 2007c).		

1.1.5 - Local Air Quality

Monitoring of air quality in the region is the responsibility of the ICAPCD. Air quality monitoring near the project site for ozone, PM_{10}, $PM_{2.5}$), nitrogen dioxide and carbon monoxide is maintained by

ARB at the El Centro monitoring station located at 150 South 9th Street in El Centro, approximately 0.25 mile from the project site.

Air quality monitoring data near the project site for ozone, PM_{10}, $PM_{2.5}$, nitrogen dioxide, and CO is provided in Table 3. As shown in the table, the project area frequently exceeds the maximum 24-hour standard for PM_{10}. The project area exceeded the maximum 1-hour ozone standard (0.09 ppm) every year and also exceeded the maximum 8-hour ozone standard (0.070 ppm) every year during the 2001 through 2007 period.

Table 3: El Centro Air Quality Monitoring Summary 2001-2007

Pollutant/Standard	2001	2002	2003	2004	2005	2006	2007
Ozone:							
Max. 1-Hour Conc. (ppm)	0.134	0.122	0.130	0.096	0.122	0.129	0.118
Max. 8-Hour Conc. (ppm)	0.092	0.098	0.092	0.080	0.097	0.101	0.094
Carbon Monoxide:							
8-Hour > 9.0 ppm (days)	0	0	0	0	0	0	0
Max. 1-Hour Conc. (ppm)	ND	6.4	14.3	2.0	4.2	ND	ND
Max. 8-Hour Conc. (ppm)	7.14	2.93	2.38	1.17	2.23	2.59	1.67
Nitrogen Dioxide:							
1-Hour > 0.18 ppm (days)	0	0	0	0	0	0	0
Max. 1-Hour Conc. (ppm)	0.08	0.10	0.07	0.067	0.065	0.066	0.071
Inhalable Particulates (PM_{10}):							
24-Hour > 50 $\mu g/m^3$ (days exceeding state)	16	18	25	7	6	20	22
Max. 24-Hour Conc. ($\mu g/m^3$)	383	263	180	135	81	146	200
Ultra-Fine Particulates ($PM_{2.5}$):							
24-Hour > 35 $\mu g/m^3$	0	0	0	1	1	0	0
Max. 24-Hour Conc. ($\mu g/m^3$)	23.5	28.9	26.0	74.2	57.9	33.8	30.5

ND = no data
Source: California Air Resources Board, Top 4 Summary, www.arb.ca.gov/adam/cgi-bin/db2www/adamtop4b.d2w/start

1.2 - Climate Change

Briefly stated, climate change is a change in the average weather of the earth that may be measured by changes in wind patterns, storms, precipitation, and temperature. These changes are assessed

using historical records of temperature changes that have occurred in the past, such as during previous ice ages. Many of the concerns regarding climate change use this data to extrapolate a level of statistical significance specifically focusing on temperature records from the last 150 years (the Industrial Age) that differ from previous climate changes in rate and magnitude.

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

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

- A reduction in the quality and supply of water to the State from the Sierra snow pack;
- Increased risk of large wildfires;
- Reductions in the quality and quantity of certain agricultural products;
- Exacerbation of air quality problems;
- A rise in sea levels resulting in the displacement of coastal businesses and residences;
- Damage to marine ecosystems and the natural environment;
- An increase in infections, disease, asthma, and other health-related problems; and
- A decrease in the health and productivity of California's forests (CEC 2006).

1.2.1 - Greenhouse Gases

Gases that trap heat in the atmosphere are called greenhouse gases. The effect is analogous to the way a greenhouse retains heat. Common greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxides, chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, ozone, and aerosols. Natural processes and human activities emit greenhouse gas. The presence of greenhouse gases in the atmosphere affects the earth's temperature. Without the natural heat-trapping effect of greenhouse gas, the earth's surface would be about 34°C cooler (CAT 2006). However, it is believed that emissions from human activities, such as electricity production and vehicle use, have elevated the concentration of these gases in the atmosphere beyond the level of naturally occurring concentrations.

Climate change is driven by forcings and feedbacks. Radiative forcing is the difference between the incoming energy and outgoing energy in the climate system. Positive forcing tends to warm the surface while negative forcing tends to cool it. Radiative forcing values are typically expressed in watts per square meter ($W\ m^{-2}$). The global warming potential (GWP) is the potential of a gas or aerosol to trap heat in the atmosphere; it is the "cumulative radiative forcing effects of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas"

(EPA 2006a). The GWP of a gas is essentially a measurement of the radiative forcing of a greenhouse gas as compared with the reference gas, carbon dioxide.

Individual greenhouse gas compounds have varying GWP and atmospheric lifetimes. Carbon dioxide, the reference gas for GWP, has a GWP of one. The calculation of the carbon dioxide equivalent is a consistent methodology for comparing greenhouse gas emissions since it normalizes various greenhouse gas emissions to a consistent metric. Methane's warming potential of 21 indicates that methane has a 21 times greater warming affect than carbon dioxide on a molecule per molecule basis. A carbon dioxide equivalent is the mass emissions of an individual greenhouse gas multiplied by its GWP.

The greenhouse gases and sources are summarized in Table 4.

Table 4: Greenhouse Gases

Greenhouse Gas	Description and Physical Properties	Sources
Water Vapor	Water vapor is the most abundant, important, and variable greenhouse gas. In the atmosphere, it maintains the climate necessary for life.	Sources include evaporation from the ocean and other water bodies, sublimation of ice and snow, and transpiration from plants.
Ozone (O_3)	Ozone is a short-lived local greenhouse gas and photochemical pollutant. Tropospheric ozone changes contribute to radiative forcing on a global scale. GWPs for short-lived greenhouse gases, such as ozone and aerosols, are not defined by the IPCC.	Ozone is formed from reactions of ozone precursors (nitrogen oxides [NO_x] and volatile organic compounds [VOC]) and sunlight in the atmosphere. VOC and NO_x are emitted from automobiles, solvents, and fuel combustion.
Aerosols	Aerosols are particulate matter suspended in the air. They are short-lived and remain in the atmosphere for about a week. Aerosols warm the atmosphere by absorbing heat and cool the atmosphere by reflecting light, with radiative forcing (RF) cooling effects of –1.2 W m^{-2}. There is a low scientific understanding of the RF of individual aerosols, such as black carbon. Black carbon can cause warming from deposition on snow (+0.1 W m^{-2}) and from suspensions in air (+0.2 W m^{-2}). Reddy and Boucher (2007) identified a GWP of 761 for black carbon. Global cooling potentials for other aerosols in a metric similar to the GWP are not available.	Sulfate aerosols are emitted when fuel containing sulfur is burned. Black carbon (or soot) is emitted during biomass burning and incomplete combustion of fossil fuels (such as diesel fuel).
Methane (CH_4)	Methane is a flammable gas and is the main component of natural gas. GWP = 21.	A natural source of methane is from the anaerobic decay of organic matter. Methane is extracted from geological deposits (natural gas fields). Other sources are from landfills, fermentation of manure, and cattle.

Table 4: Greenhouse Gases

Greenhouse Gas	Description and Physical Properties	Sources
Nitrous oxide (N_2O)	Nitrous oxide is also known as laughing gas and is a colorless greenhouse gas. GWP = 310.	Microbial processes in soil and water, fuel combustion, and industrial processes.
Carbon dioxide (CO_2)	Carbon dioxide is an odorless, colorless, natural greenhouse gas. GWP = 1.	Carbon dioxide is emitted from natural and anthropogenic sources. Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources are from burning coal, oil, natural gas, and wood. The concentration in 2005 was 379 ppm, which is an increase of about 1.4 ppm per year since 1960.
Chloro-fluorocarbons (CFCs)	CFCs are gases formed synthetically by replacing all hydrogen atoms in methane or ethane with chlorine and/or fluorine atoms. CFCs are nontoxic, nonflammable, insoluble, and chemically unreactive in the troposphere (the level of air at the earth's surface). GWPs range from 3,800 to 8,100.	CFCs were first synthesized in 1928 for use as refrigerants, aerosol propellants, and cleaning solvents. They destroy stratospheric ozone; therefore, the Montreal Protocol on Substances that Deplete the Ozone Layer stopped their production in 1987.
Hydro-fluorocarbons (HFCs)	The HFCs with the largest measured atmospheric concentrations are HFC-23 and HFC-134a (10 ppt) and HFC-152a (1 ppt). GWPs: HFC-23 = 11,700, HFC-134a = 1,300, HFC-152a = 140.	HFCs are synthetic manmade chemicals that are used as a substitute for CFCs in applications such as automobile air conditioners and refrigerants.
Per-fluorocarbons (PFCs)	PFCs have stable molecular structures and only break down by ultraviolet rays about 60 kilometers above Earth's surface. Because of this, PFCs have very long lifetimes, between 10,000 and 50,000 years. GWPs range from 6,500 to 9,200.	Two main sources of PFCs are primary aluminum production and semiconductor manufacturing.
Sulfur hexafluoride	Sulfur hexafluoride is an inorganic, odorless, colorless, and nontoxic, nonflammable gas. Concentrations in the 1990s were about 4 ppt. It has the highest GWP of any gas evaluated, 23,900.	It is manmade and used for insulation in electric power transmission equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas.

ppm = parts per million; ppt = parts per trillion (measure of concentration in the atmosphere); GWP = global warming potential
Complied from a variety of sources, including: EPA 2006b, IPCC 2007

There are no adverse health effects from the concentration of greenhouse gases in the atmosphere, with the exemption of ozone and aerosols. The potential health effects of ozone and particulate matter are discussed in criteria pollutant analyses. At very high concentrations, carbon dioxide, methane, sulfur hexafluoride, and some CFCs can cause suffocation as the gases can displace oxygen.

1.2.2 - State Regulatory Environment

There has been significant legislative and regulatory activity regarding climate change and greenhouse gases in California, as discussed below.

Title 24. Although it was not originally intended to reduce greenhouse gases, California Code of Regulations Title 24 Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings, was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficient technologies and methods. The latest amendments were made in October 2005 and currently require new homes to use half the energy they used only a decade ago. The 2005 standards are in effect through July 31, 2009. The 2008 standards will become effective August 1, 2009. The requirement for when the 2008 standards must be followed is dependent on when the application for the building permit is submitted. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases greenhouse gas emissions.

AB 1493. California Assembly Bill 1493 (Pavley), enacted on July 22, 2002, required the ARB to develop and adopt regulations that reduce greenhouse gases emitted by passenger vehicles and light duty trucks. The regulation has been stalled by automaker lawsuits and by the U.S. EPA's denial of an implementation waiver. California is suing the federal government over the unprecedented failure to grant the waiver. Therefore, AB 1493 is not currently in effect. However, President Obama has asked the EPA to review its denial of the waiver.

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

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

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

The Governor signed **Executive Order S-01-07** on January 18, 2007. The order mandates that a statewide goal shall be established to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020. It also requires that a Low Carbon Fuel Standard for transportation fuels be established for California.

SB 1368. In 2006, the State Legislature adopted Senate Bill 1368 (SB 1368), which was subsequently signed into law by the Governor. SB 1368 directs the California Public Utilities Commission to adopt a performance standard for greenhouse gas emissions for the future power purchases of California utilities. SB 1368 seeks to limit carbon emissions associated with electrical energy consumed in California by forbidding procurement arrangements for energy longer than five years from resources that exceed the emissions of a relatively clean, combined cycle natural gas power plant. Due to the carbon content of its fuel source, a coal-fired plant cannot meet this standard because such plants emit roughly twice as much carbon as natural gas, combined cycle plants. Accordingly, the new law will effectively prevent California's utilities from investing in, otherwise financially supporting, or purchasing power from new coal plants located in or out of the State. Thus, SB 1368 will lead to dramatically lower greenhouse gas emissions associated with California's energy demand, as SB 1368 will effectively prohibit California utilities from purchasing power from out of state producers that cannot satisfy the performance standard for greenhouse gas emissions required by SB 1368.

SB 97 was passed in August 2007 and added Section 21083.05 to the Public Resources Code. The code states "(a) On or before July 1, 2009, the Office of Planning and Research shall prepare, develop, and transmit to the Resources Agency guidelines for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions as required by this division, including, but not limited to, effects associated with transportation or energy consumption. (b) On or before January 1, 2010, the Resources Agency shall certify and adopt guidelines prepared and developed by the Office of Planning and Research pursuant to subdivision (a)." Section 21097 was also added to the Public Resources Code. It provides CEQA protection for transportation projects funded by the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 or projects funded by the Disaster Preparedness and Flood Prevention Bond Act of 2006, in stating that the failure to adequately analyze the effects of greenhouse gases would not violate CEQA. However, the CEQA protection section of SB 97 remains in effect only until January 1, 2010.

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

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

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

- 1990: 427 $MMTCO_2e$
- 2004: 480 $MMTCO_2e$ (an average 11% reduction needed to achieve 1990 base)
- 2008: 495 $MMTCO_2e$ (an average 14% reduction needed to achieve 1990 base)
- 2020: 596 $MMTCO_2e$ "Business As Usual" (an average 28% reduction needed to achieve 1990 base)

Under AB 32, the ARB published its Final Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California (ARB 2007). Discrete early action measures are currently underway or are enforceable by January 1, 2010. Early action measures are regulatory or non-regulatory and are currently in progress or to be initiated by the ARB in the 2007 to 2012 timeframe. The ARB has 44 early action measures that apply to the transportation, commercial, forestry, agriculture, cement, oil and gas, fire suppression, fuels, education, energy efficiency, electricity, and waste sectors. Of those early action measures, nine are considered discrete early action measures, as they are regulatory and enforceable by January 1, 2010. The ARB estimates that the 44 recommendations are expected to result in reductions of at least 42 $MMTCO_2e$ by 2020, representing approximately 25 percent of the 2020 target. CEQA is only mentioned once in the Early Action Measures report. The California Air Pollution Control Officer's Association suggested that ARB work with local air districts on approaches to review greenhouse gas impacts under the CEQA process, including significance thresholds for greenhouse gases for projects and to develop a process for capturing reductions that result from CEQA mitigations. ARB's response to this recommendation in the report is as follows: "the Governor's Office of Planning and Research is charged with providing statewide guidance on CEQA implementation. With respect to quantifying any reductions that result from project level mitigation of greenhouse gas emissions, we would like to see air districts take a lead role in tracking such reductions in their regions" (ARB 2007).

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

SB 375 passed the Senate on August 30, 2008 and was signed by the Governor on September 30, 2008. According to SB 375, the transportation sector is the largest contributor of greenhouse gas emissions and contributes over 40 percent of the greenhouse gas emissions in California and automobiles and light trucks alone contribute almost 30 percent. SB 375 indicates that greenhouse gases from automobiles and light trucks can be reduced by new vehicle technology but significant reductions from changed land use patterns and improved transportation are necessary. SB 375 states, "Without improved land use and transportation policy, California will not be able to achieve the goals of AB 32". SB 375 does the following: 1) requires metropolitan planning organizations to include sustainable community strategies in their regional transportation plans for reducing greenhouse gas emissions, 2) aligns planning for transportation and housing, and 3) creates specified incentives for the implementation of the strategies. Concerning CEQA, SB 375, section 21159.28 states that CEQA findings determinations for certain projects are not required to reference, describe, or discuss (1) growth inducing impacts; or (2) any project-specific or cumulative impacts from cars and light-duty truck trips generated by the project on global warming or the regional transportation network if the project:

1. Is in an area with an approved sustainable communities strategy or an alternative planning strategy that the ARB accepts as achieving the greenhouse gas emission reduction targets;

2. Is consistent with that strategy (in designation, density, building intensity, and applicable policies); and

3. Incorporates the mitigation measures required by an applicable prior environmental document.

1.2.3 - Local and Regional

There are currently no local or regional greenhouse gas plans or strategies.

1.3 - References

ARB 2005b — California Air Resources Board. Vinyl Chloride. Page updated 2005. www.arb.ca.gov/research/aaqs/caaqs/vc/vc.htm, Accessed in November 2008.

ARB 2005c — California Air Resources Board. Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling. www.arb.ca.gov/regact/idling/idling.htm, Accessed in November 2008.

ARB 2006 — California Air Resources Board. 2006. Area Designation Maps / State and National. 2004 State Area Designations. Website updated September 29, 2006. www.arb.ca.gov/desig/adm/adm.htm. Accessed in November 2008.

ARB 2007 — California Air Resources Board. Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California Recommended for Board

Consideration. October 2007. www.arb.ca.gov/cc/ccea/meetings/ea_final_report.pdf, Accessed January 21, 2009.

ARB 2008 — California Air Resources Board. Climate Change Proposed Scoping Plan, a framework for change. October 2008. www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm, Accessed January 21, 2009.

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

CA 2005 — State of California, Executive Order S-3-05. June 1, 2005. www.dot.ca.gov/hq/energy/ExecOrderS-3-05.htm, Accessed January 21, 2009.

CA 2006 — State of California. August 31, 2006. Assembly Bill No. 32. www.arb.ca.gov/cc/docs/ab32text.pdf, Accessed January 21, 2009.

CAT 2006 — State of California, Environmental Protection Agency, Climate Action Team. March 2006. Climate Action Team Report to Governor Schwarzenegger and the California Legislature. www.climatechange.ca.gov/climate_action_team/reports/index.html, Accessed January 21, 2009.

CEC 2006 — California Energy Commission, California Climate Change Center. July 2006. Our Changing Climate, Accessing the Risks to California. CEC-500-2006-077. www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF, Accessed in November 2008.

EPA 1992 — U.S. Environmental Protection Agency. Technology Transfer Network, Air Toxics Website. Benzene. 1992. www.epa.gov/ttn/atw/hlthef/benzene.html, Accessed in November 2008

EPA 1997 — U.S. Environmental Protection Agency. Office of Air and Radiation. Nitrogen Oxides: Impact on Public Health and the Environment. 1997. www.epa.gov/ttn/oarpg/t1/reports/noxrept.pdf, Accessed in November 2008.

EPA 1999 — U.S. Environmental Protection Agency. Ozone and your Health. 1999. EPA-452/F-99-003. www.epa.gov/air/ozonepollution/pdfs/health.pdf Accessed in November 2008

EPA 2002 — U.S. Environmental Protection Agency. Health Assessment Document for Diesel Engine Exhaust. EPA/600/8-90/057F. May 2002. http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=29060, Accessed in November 2008.

EPA 2003 — U.S. Environmental Protection Agency. September 2003. Particle Pollution and your Health. EPA-452/F-03-001. http://epa.gov/pm/pdfs/pm-color.pdf, Accessed in November 2008.

EPA 2006a U.S. Environmental Protection Agency, Office of Atmospheric Programs. April 2006. The U.S. Inventory of Greenhouse Gas Emissions and Sinks: Fast Facts. http://epa.gov/climatechange/emissions/downloads06/06FastFacts.pdf, Accessed January 21, 2009.

EPA 2006b U.S. Environmental Protection Agency. 2006. High Global Warming Potential Gases. Science. www.epa.gov/highgwp/scientific.html, Accessed January 21, 2009.

EPA 2007a U.S. Environmental Protection Agency. Six Common Air Pollutants. Health and Environmental Impacts of NOx. www.epa.gov/air/urbanair/nox/hlth.html, Accessed in November 2008.

EPA 2007b U.S. Environmental Protection Agency, Technology Transfer Network, Air Toxics Website. Last updated November 6, 2007. Health Effects Notebook for Hazardous Air Pollutants. www.epa.gov/ttn/atw/hlthef/hapindex.html, Accessed in November 2008.

EPA 2007c U.S. Environmental Protection Agency. 2007. Green Book Nonattainment Areas for Criteria Pollutants. www.epa.gov/air/oaqps/greenbk/, Accessed in November 2008.

EPA 2007d U.S. Environmental Protection Agency. Health and Environmental Impacts of CO. www.epa.gov/air/urbanair/co/hlth1.html Accessed March 9, 2009.

ICAPCD 2007 Imperial County Air Pollution Control District. CEQA Air Quality Handbook. November 2007. www.imperialcounty.net/ag/Departments/Air%20Pollution/Forms%20&%20Documents/CEQA%20Handbk%20Nov%202007.pdf

IPCC 2007 Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, http://www.ipcc.ch/ipccreports/ar4-wg1.htm, Accessed November 6, 2008.

NTP 2005 Report on Carcinogens, Eleventh Edition; U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program. January 31, 2005. Benzene. Accessed in November 2008. http://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s019benz.pdf.

NTP 2005b Report on Carcinogens, Eleventh Edition; U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program. January 31, 2005. Diesel Exhaust Particles. Accessed in November 2008. http://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s069dies.pdf

OEHAA 2002 California Environmental Protection Agency. Office of Environmental Health Hazard Assessment. Health Effects of Diesel Exhaust. www.oehha.ca.gov/public_info/facts/dieselfacts.html, Accessed in November 2008.

SECTION 2: URBEMIS OUTPUT AND GREENHOUSE GAS SPREADSHEETS

3/7/2009 10:47:20 AM

Urbemis 2007 Version 9.2.4

Combined Summer Emissions Reports (Pounds/Day)

File Name: C:\MBA\Client\27990026 Adams Ave Indoor Sports Complex\Adams Ave Operational.urb924

Project Name: Adams Avenue Indoor Sports Complex

Project Location: Imperial County APCD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.42	0.02	1.55	0.00	0.01	0.01	2.81

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.88	1.68	12.27	0.01	1.20	0.25	737.57

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	1.30	1.70	13.82	0.01	1.21	0.26	740.38

3/7/2009 10:47:20 AM

Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hearth - No Summer Emissions							
Landscape	0.12	0.02	1.55	0.00	0.01	0.01	2.81
Consumer Products	0.00						
Architectural Coatings	0.30						
TOTALS (lbs/day, unmitigated)	0.42	0.02	1.55	0.00	0.01	0.01	2.81

Area Source Changes to Defaults

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Summer Pounds Per Day, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Sports Facility - Indoors	0.88	1.68	12.27	0.01	1.20	0.25	737.57
TOTALS (lbs/day, unmitigated)	0.88	1.68	12.27	0.01	1.20	0.25	737.57

Operational Settings:

Does not include correction for passby trips

3/7/2009 10:47:20 AM

Does not include double counting adjustment for internal trips

Analysis Year: 2010 Temperature (F): 90 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Sports Facility - Indoors		30.21	acres	2.35	70.99	685.94
					70.99	685.94

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	43.7	1.4	98.4	0.2
Light Truck < 3750 lbs	15.7	2.5	92.4	5.1
Light Truck 3751-5750 lbs	19.9	1.5	98.0	0.5
Med Truck 5751-8500 lbs	9.3	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	1.4	0.0	71.4	28.6
Lite-Heavy Truck 10,001-14,000 lbs	0.7	0.0	57.1	42.9
Med-Heavy Truck 14,001-33,000 lbs	1.2	8.3	25.0	66.7
Heavy-Heavy Truck 33,001-60,000 lbs	3.9	0.0	2.6	97.4
Other Bus	0.1	0.0	100.0	0.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.1	67.7	32.3	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.9	11.1	77.8	11.1

3/7/2009 10:47:20 AM

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	7.3	3.3	3.7	6.7	8.9	5.0
Rural Trip Length (miles)	10.2	11.7	8.1	16.4	11.9	9.5
Trip speeds (mph)	40.0	40.0	40.0	45.0	45.0	40.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Sports Facility - Indoors				2.0	1.0	97.0

3/7/2009 10:47:29 AM

Urbemis 2007 Version 9.2.4

Combined Winter Emissions Reports (Pounds/Day)

File Name: C:\MBA\Client\27990026 Adams Ave Indoor Sports Complex\Adams Ave Operational.urb924

Project Name: Adams Avenue Indoor Sports Complex

Project Location: Imperial County APCD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.30	0.00	0.00	0.00	0.00	0.00	0.00

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.88	1.68	12.27	0.01	1.20	0.25	737.57

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	1.18	1.68	12.27	0.01	1.20	0.25	737.57

3/7/2009 10:47:29 AM

Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Winter Pounds Per Day, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hearth	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landscaping - No Winter Emissions							
Consumer Products	0.00						
Architectural Coatings	0.30						
TOTALS (lbs/day, unmitigated)	0.30	0.00	0.00	0.00	0.00	0.00	0.00

Area Source Changes to Defaults

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Winter Pounds Per Day, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Sports Facility - Indoors	0.88	1.68	12.27	0.01	1.20	0.25	737.57
TOTALS (lbs/day, unmitigated)	0.88	1.68	12.27	0.01	1.20	0.25	737.57

Operational Settings:

Does not include correction for passby trips

3/7/2009 10:47:29 AM

Does not include double counting adjustment for internal trips

Analysis Year: 2010 Temperature (F): 55 Season: Winter

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Sports Facility - Indoors		30.21	acres	2.35	70.99	685.94
					70.99	685.94

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	43.7	1.4	98.4	0.2
Light Truck < 3750 lbs	15.7	2.5	92.4	5.1
Light Truck 3751-5750 lbs	19.9	1.5	98.0	0.5
Med Truck 5751-8500 lbs	9.3	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	1.4	0.0	71.4	28.6
Lite-Heavy Truck 10,001-14,000 lbs	0.7	0.0	57.1	42.9
Med-Heavy Truck 14,001-33,000 lbs	1.2	8.3	25.0	66.7
Heavy-Heavy Truck 33,001-60,000 lbs	3.9	0.0	2.6	97.4
Other Bus	0.1	0.0	100.0	0.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.1	67.7	32.3	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.9	11.1	77.8	11.1

3/7/2009 10:47:29 AM

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	7.3	3.3	3.7	6.7	8.9	5.0
Rural Trip Length (miles)	10.2	11.7	8.1	16.4	11.9	9.5
Trip speeds (mph)	40.0	40.0	40.0	45.0	45.0	40.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Sports Facility - Indoors				2.0	1.0	97.0

3/7/2009 10:47:39 AM

Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\MBA\Client\27990026 Adams Ave Indoor Sports Complex\Adams Ave Operational.urb924

Project Name: Adams Avenue Indoor Sports Complex

Project Location: Imperial County APCD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.06	0.00	0.16	0.00	0.00	0.00	0.29

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.16	0.31	2.24	0.00	0.22	0.05	134.61

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.22	0.31	2.40	0.00	0.22	0.05	134.90

3/7/2009 10:47:39 AM

Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hearth	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Landscape	0.01	0.00	0.16	0.00	0.00	0.00	0.29
Consumer Products	0.00						
Architectural Coatings	0.05						
TOTALS (tons/year, unmitigated)	0.06	0.00	0.16	0.00	0.00	0.00	0.29

Area Source Changes to Defaults

Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Sports Facility - Indoors	0.16	0.31	2.24	0.00	0.22	0.05	134.61
TOTALS (tons/year, unmitigated)	0.16	0.31	2.24	0.00	0.22	0.05	134.61

Operational Settings:

Does not include correction for passby trips

3/7/2009 10:47:39 AM

Does not include double counting adjustment for internal trips

Analysis Year: 2010 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Sports Facility - Indoors		30.21	acres	2.35	70.99	685.94
					70.99	685.94

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	43.7	1.4	98.4	0.2
Light Truck < 3750 lbs	15.7	2.5	92.4	5.1
Light Truck 3751-5750 lbs	19.9	1.5	98.0	0.5
Med Truck 5751-8500 lbs	9.3	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	1.4	0.0	71.4	28.6
Lite-Heavy Truck 10,001-14,000 lbs	0.7	0.0	57.1	42.9
Med-Heavy Truck 14,001-33,000 lbs	1.2	8.3	25.0	66.7
Heavy-Heavy Truck 33,001-60,000 lbs	3.9	0.0	2.6	97.4
Other Bus	0.1	0.0	100.0	0.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	3.1	67.7	32.3	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	0.9	11.1	77.8	11.1

3/7/2009 10:47:39 AM

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	7.3	3.3	3.7	6.7	8.9	5.0
Rural Trip Length (miles)	10.2	11.7	8.1	16.4	11.9	9.5
Trip speeds (mph)	40.0	40.0	40.0	45.0	45.0	40.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Sports Facility - Indoors				2.0	1.0	97.0

Summary of Operational Greenhouse Gases
Unmitigated
Adams Avenue Indoor Sports Complex
Prepared by Michael Brandman Associates
Buildout Year 2010

	Emissions (tons per year)				
Source	**Carbon Dioxide**	**Nitrous Oxide**	**Methane**	**Other**	**Metric Tons CO2e**
Motor vehicles	135	0.02	0.04		128
Indirect electricity	87	0.00	0.00		79
Refrigerants				0.06	65
Natural gas	46	0.00	0.00		42
Total	268	0.02	0.04	0.06	314
Total	243	0.02	0.04	0.05	metric tons per year
GWP	1	310	21	varies	
Total	243	5	1	65	MTCO2E per year
Total	0.0002	0.0000	0.0000	0.0001	MMTCO2E per year

Total - all gases	314	MTCO2e per year
	0.0003	MMTCO2e per year
California emissions in 2004	500	MMTCO2e per year
Project percent of emissions	0.000063%	
U.S. emissions in 2005	7,260.4	
Project percent of emissions	0.000004%	
Global emissions in 2004	20135	
Project percent of emissions	0.000002%	

Emissions converted from tons per year to metric tons of carbon dioxide equivalents (MTCO2e) per year by using the formula: (tons of gas) x (global warming potential) x (0.9072 metric tons)

Emissions converted to million metric tons of carbon dioxide equivalents (MMTCO2E) using the formula: MMTCO2e = (metric tons of gas) / (1,000,000).

Mobile Emissions - Methane ***Unmitigated*** Page 1
Adams Avenue Indoor Sports Complex 7-Mar-09
Prepared by Michael Brandman Associates
Buildout Year 2010 **Vehicle Miles Traveled** 686

Starting Emissions	0.01	lbs/day	0.0000	tons/day	0.00 tons/year
Running Emissions	0.19	lbs/day	0.0001	tons/day	0.03 tons/year
Total	0.20	lbs/day	0.0001	tons/day	0.04 tons/year

Vehicle Percentages

Vehicle Type	Percent	Non-Catalyst	Catalyst	Diesel
Light Auto	54.7%	1.1%	98.7%	0.2%
Light Truck < 3,750 lbs	15.2%	2.0%	96.0%	2.0%
Light Truck 3,751- 5,750	16.2%	1.2%	98.1%	0.7%
Med Truck 5,751- 8,500	7.3%	1.4%	95.9%	2.7%
Lite-Heavy 8,501-10,000	1.1%	0.0%	81.8%	18.2%
Lite-Heavy 10,001-14,000	0.3%	0.0%	66.7%	33.3%
Med-Heavy 14,001-33,000	1.0%	0.0%	20.0%	80.0%
Heavy-Heavy 33,001-60,000	0.9%	0.0%	11.1%	88.9%
Line Haul > 60,000 lbs	0.0%	0.0%	0.0%	100.0%
Urban Bus	0.2%	0.0%	50.0%	50.0%
Motorcycle	1.6%	68.8%	31.2%	0.0%
School Bus	0.1%	0.0%	0.0%	100.0%
Motor Home	1.4%	7.1%	85.7%	7.2%

Running Emission Factors (g/mile)

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	0.1931	0.1127	0.0161
Light Truck < 3,750 lbs	LDT1	0.2253	0.1448	0.0161
Light Truck 3,751- 5,750	LDT2	0.2253	0.1448	0.0161
Med Truck 5,751- 8,500	MDV	0.2253	0.1448	0.0161
Lite-Heavy 8,501-10,000	LHDT1	0.2012	0.1448	0.0805
Lite-Heavy 10,001-14,000	LHDT2	0.2012	0.1448	0.0805
Med-Heavy 14,001-33,000	MHDT	0.2012	0.1448	0.0805
Heavy-Heavy 33,001-60,000	HHDT	0.2012	0.1448	0.0805
Line Haul > 60,000 lbs	LHV	0.2012	0.1448	0.0805
Urban Bus	UB	0.2012	0.1448	0.0805
Motorcycle	MCY	0.2092	0.2092	0.2092
School Bus	SBUS	0.2012	0.1448	0.0805
Motor Home	MH	0.2012	0.1448	0.0805

Running Emissions (pounds per day)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Light Auto	0.00	0.09	0.00
Light Truck < 3,750 lbs	0.00	0.03	0.00
Light Truck 3,751- 5,750	0.00	0.03	0.00
Med Truck 5,751- 8,500	0.00	0.02	0.00
Lite-Heavy 8,501-10,000	0.00	0.00	0.00
Lite-Heavy 10,001-14,000	0.00	0.00	0.00
Med-Heavy 14,001-33,000	0.00	0.00	0.00
Heavy-Heavy 33,001-60,000	0.00	0.00	0.00
Line Haul > 60,000 lbs	0.00	0.00	0.00
Urban Bus	0.00	0.00	0.00
Motorcycle	0.00	0.00	0.00
School Bus	0.00	0.00	0.00
Motor Home	0.00	0.00	0.00
Total	0.01	0.18	0.00

Mobile Emissions - Methane

Adams Avenue Indoor Sports Complex
Prepared by Michael Brandman Associates
Buildout Year 2010 **Total Trips** 71

Starting Emission Factors (g/start)

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	0.059	0.009	-0.003
Light Truck < 3,750 lbs	LDT1	0.067	0.099	-0.004
Light Truck 3,751- 5,750	LDT2	0.067	0.099	-0.004
Med Truck 5,751- 8,500	MDV	0.067	0.099	-0.004
Lite-Heavy 8,501-10,000	LHDT1	0.147	0.215	-0.004
Lite-Heavy 10,001-14,000	LHDT2	0.147	0.215	-0.004
Med-Heavy 14,001-33,000	MHDT	0.147	0.215	-0.004
Heavy-Heavy 33,001-60,000	HHDT	0.147	0.215	-0.004
Line Haul > 60,000 lbs	LHV	0.147	0.215	-0.004
Urban Bus	UB	0.147	0.215	-0.004
Motorcycle	MCY	0.024	0.024	0.033
School Bus	SBUS	0.147	0.215	-0.004
Motor Home	MH	0.147	0.215	-0.004

Trip Distribution

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	0.4	38.3	0.1
Light Truck < 3,750 lbs	LDT1	0.2	10.4	0.2
Light Truck 3,751- 5,750	LDT2	0.1	11.3	0.1
Med Truck 5,751- 8,500	MDV	0.1	5.0	0.1
Lite-Heavy 8,501-10,000	LHDT1	0.0	0.6	0.1
Lite-Heavy 10,001-14,000	LHDT2	0.0	0.1	0.1
Med-Heavy 14,001-33,000	MHDT	0.0	0.1	0.6
Heavy-Heavy 33,001-60,000	HHDT	0.0	0.1	0.6
Line Haul > 60,000 lbs	LHV	0.0	0.0	0.0
Urban Bus	UB	0.0	0.1	0.1
Motorcycle	MCY	0.8	0.4	0.0
School Bus	SBUS	0.0	0.0	0.1
Motor Home	MH	0.1	0.9	0.1
Total		1.7	67.2	2.1

Starting Emissions (pounds per day)

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	0.0001	0.0008	0.0000
Light Truck < 3,750 lbs	LDT1	0.0000	0.0023	0.0000
Light Truck 3,751- 5,750	LDT2	0.0000	0.0025	0.0000
Med Truck 5,751- 8,500	MDV	0.0000	0.0011	0.0000
Lite-Heavy 8,501-10,000	LHDT1	0.0000	0.0003	0.0000
Lite-Heavy 10,001-14,000	LHDT2	0.0000	0.0001	0.0000
Med-Heavy 14,001-33,000	MHDT	0.0000	0.0001	0.0000
Heavy-Heavy 33,001-60,000	HHDT	0.0000	0.0000	0.0000
Line Haul > 60,000 lbs	LHV	0.0000	0.0000	0.0000
Urban Bus	UB	0.0000	0.0000	0.0000
Motorcycle	MCY	0.0000	0.0000	0.0000
School Bus	SBUS	0.0000	0.0000	0.0000
Motor Home	MH	0.0000	0.0004	0.0000
Total		0.0002	0.0075	0.0000

- Source of running emission factors: U.S. Environmental Protection Agency. Climate Leaders Greenhouse Gas Inventory Protocol, Core Module Guidance. Direct Emissions from Mobile Combustion Sources. October 2004.
- Source of vehicle percentages: URBEMIS default values.
- Source of starting emissions: U.S. Environmental Protection Agency. Prepared by ICF Consulting. EPA420-P-04-016. Update of Methane and Nitrous Oxide Emission Factors for On-Highway Vehicles. November 2004.

Mobile Emissions - Nitrous Oxide ***Unmitigated***
Adams Avenue Indoor Sports Complex 7-Mar-09
Prepared by Michael Brandman Associates
Buildout Year 2010 **Vehicle Miles Traveled** 686

Starting Emissions	0.01	lbs/day	0.0000	tons/day	0.00 tons/year
Running Emissions	0.09	lbs/day	0.0000	tons/day	0.02 tons/year
Total	0.10	lbs/day	0.0000	tons/day	0.02 tons/year

Vehicle Percentages

Vehicle Type	Percent	Non-Catalyst	Catalyst	Diesel
Light Auto	54.7%	1.1%	98.7%	0.2%
Light Truck < 3,750 lbs	15.2%	2.0%	96.0%	2.0%
Light Truck 3,751- 5,750	16.2%	1.2%	98.1%	0.7%
Med Truck 5,751- 8,500	7.3%	1.4%	95.9%	2.7%
Lite-Heavy 8,501-10,000	1.1%	0.0%	81.8%	18.2%
Lite-Heavy 10,001-14,000	0.3%	0.0%	66.7%	33.3%
Med-Heavy 14,001-33,000	1.0%	0.0%	20.0%	80.0%
Heavy-Heavy 33,001-60,000	0.9%	0.0%	11.1%	88.9%
Line Haul > 60,000 lbs	0.0%	0.0%	0.0%	100.0%
Urban Bus	0.2%	0.0%	50.0%	50.0%
Motorcycle	1.6%	68.8%	31.2%	0.0%
School Bus	0.1%	0.0%	0.0%	100.0%
Motor Home	1.4%	7.1%	85.7%	7.2%

Running Emission Factors (g/mile)

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	0.0166	0.0518	0.0161
Light Truck < 3,750 lbs	LDT1	0.0208	0.0649	0.0322
Light Truck 3,751- 5,750	LDT2	0.0208	0.0649	0.0322
Med Truck 5,751- 8,500	MDV	0.0208	0.0649	0.0322
Lite-Heavy 8,501-10,000	LHDT1	0.0480	0.1499	0.0483
Lite-Heavy 10,001-14,000	LHDT2	0.0480	0.1499	0.0483
Med-Heavy 14,001-33,000	MHDT	0.0480	0.1499	0.0483
Heavy-Heavy 33,001-60,000	HHDT	0.0480	0.1499	0.0483
Line Haul > 60,000 lbs	LHV	0.0480	0.1499	0.0483
Urban Bus	UB	0.0480	0.1499	0.0483
Motorcycle	MCY	0.0073	0.0073	0.0073
School Bus	SBUS	0.0480	0.1499	0.0483
Motor Home	MH	0.0480	0.1499	0.0483

Running Emissions (pounds per day)

Vehicle Type	Non-Catalyst	Catalyst	Diesel
Light Auto	0.00	0.04	0.00
Light Truck < 3,750 lbs	0.00	0.01	0.00
Light Truck 3,751- 5,750	0.00	0.02	0.00
Med Truck 5,751- 8,500	0.00	0.01	0.00
Lite-Heavy 8,501-10,000	0.00	0.00	0.00
Lite-Heavy 10,001-14,000	0.00	0.00	0.00
Med-Heavy 14,001-33,000	0.00	0.00	0.00
Heavy-Heavy 33,001-60,000	0.00	0.00	0.00
Line Haul > 60,000 lbs	0.00	0.00	0.00
Urban Bus	0.00	0.00	0.00
Motorcycle	0.00	0.00	0.00
School Bus	0.00	0.00	0.00
Motor Home	0.00	0.00	0.00
Total	0.00	0.09	0.00

Mobile Emissions - Nitrous Oxide
Adams Avenue Indoor Sports Complex
Prepared by Michael Brandman Associates
Buildout Year 2010 **Total Trips** 71

Starting Emission Factors (g/start)

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	0.028	0.072	0.000
Light Truck < 3,750 lbs	LDT1	0.032	0.093	-0.001
Light Truck 3,751- 5,750	LDT2	0.032	0.093	-0.001
Med Truck 5,751- 8,500	MDV	0.032	0.093	-0.001
Lite-Heavy 8,501-10,000	LHDT1	0.070	0.194	-0.002
Lite-Heavy 10,001-14,000	LHDT2	0.070	0.194	-0.002
Med-Heavy 14,001-33,000	MHDT	0.070	0.194	-0.002
Heavy-Heavy 33,001-60,000	HHDT	0.070	0.194	-0.002
Line Haul > 60,000 lbs	LHV	0.070	0.194	-0.002
Urban Bus	UB	0.070	0.194	-0.002
Motorcycle	MCY	0.012	0.012	0.012
School Bus	SBUS	0.070	0.194	-0.002
Motor Home	MH	0.070	0.194	-0.002

Trip Distribution

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	0.4	38.3	0.1
Light Truck < 3,750 lbs	LDT1	0.2	10.4	0.2
Light Truck 3,751- 5,750	LDT2	0.1	11.3	0.1
Med Truck 5,751- 8,500	MDV	0.1	5.0	0.1
Lite-Heavy 8,501-10,000	LHDT1	0.0	0.6	0.1
Lite-Heavy 10,001-14,000	LHDT2	0.0	0.1	0.1
Med-Heavy 14,001-33,000	MHDT	0.0	0.1	0.6
Heavy-Heavy 33,001-60,000	HHDT	0.0	0.1	0.6
Line Haul > 60,000 lbs	LHV	0.0	0.0	0.0
Urban Bus	UB	0.0	0.1	0.1
Motorcycle	MCY	0.8	0.4	0.0
School Bus	SBUS	0.0	0.0	0.1
Motor Home	MH	0.1	0.9	0.1
Total		1.7	67.2	2.1

Starting Emissions (pounds per day)

Vehicle Type	Type	Non-Catalyst	Catalyst	Diesel
Light Auto	LDA	0.0000	0.0061	0.0000
Light Truck < 3,750 lbs	LDT1	0.0000	0.0021	0.0000
Light Truck 3,751- 5,750	LDT2	0.0000	0.0023	0.0000
Med Truck 5,751- 8,500	MDV	0.0000	0.0010	0.0000
Lite-Heavy 8,501-10,000	LHDT1	0.0000	0.0003	0.0000
Lite-Heavy 10,001-14,000	LHDT2	0.0000	0.0001	0.0000
Med-Heavy 14,001-33,000	MHDT	0.0000	0.0001	0.0000
Heavy-Heavy 33,001-60,000	HHDT	0.0000	0.0000	0.0000
Line Haul > 60,000 lbs	LHV	0.0000	0.0000	0.0000
Urban Bus	UB	0.0000	0.0000	0.0000
Motorcycle	MCY	0.0000	0.0000	0.0000
School Bus	SBUS	0.0000	0.0000	0.0000
Motor Home	MH	0.0000	0.0004	0.0000
Total		0.0001	0.0123	0.0000

- Source of running emission factors: U.S. Environmental Protection Agency. Climate Leaders Greenhouse Gas Inventory Protocol, Core Module Guidance. Direct Emissions from Mobile Combustion Sources. October 2004.
- Source of vehicle percentages: URBEMIS default values.
- Source of starting emissions: U.S. Environmental Protection Agency. Prepared by ICF Consulting. EPA420-P-04-016. Update of Methane and Nitrous Oxide Emission Factors for On-Highway Vehicles. November 2004.

Electricity - Indirect Emissions

Project: Adams Avenue Indoor Sports Complex
Prepared by: Michael Brandman Associates
Prepared on: 3/7/2009

Land Use	square feet (sf)	Electricity Use (kWh/sf-year)*	Electricity Use (kWh/year)
Miscellaneous	22000	9.84	216480
			0
			0
			0
Total			216480
			216 MWh/year

Greenhouse Gas	Emission Factor (pounds per MWh/year)	Emissions (pounds/year)	Emissions (tons/year)
Carbon dioxide	804.54	174,167	87
Methane	0.0067	1	0.001
Nitrous oxide	0.0037	1	0.000

Emission factor source: California Climate Action Registry. General Reporting Protocol. Reporting Entity-Wide Greenhouse Gas Emissions. Version 2.2, March 2007. www.climateregistry.org

*Table E-1 from California Energy Commission. California Commercial End-Use Survey. Consultant Report. March 2006. CEC-400-2006-005

Table E-1: Overview of Energy Usage in the Statewide Service Area

Building Type	Floor Stock (kft^2)	Annual Energy Intensities			Total Annual Usage	
		Electricity (kWh/ft^2)	Natural Gas ($therms/ft^2$)	Natural Gas ($kBtu/ft^2$)	Electricity (GWh)	Natural Gas (Mtherms)
All Commercial	4,920,114	13.63	0.26	25.99	67077	1278.60
Small Office (<30k ft^2)	361,584	13.10	0.11	10.54	4738	38.10
Large Office (>=30k ft^2)	660,429	17.70	0.22	21.93	11691	144.80
Restaurant	148,892	40.20	2.10	209.96	5986	312.60
Retail	702,053	14.06	0.05	4.62	9871	32.50
Food Store	144,209	40.99	0.28	27.60	5911	39.80
Refrigerated Warehouse	95,540	20.02	0.06	5.60	1913	5.30
Unrefrigerated Warehouse	554,166	4.45	0.03	3.07	2467	17.00
School	445,106	7.46	0.16	15.97	3322	71.10
College	205,942	12.26	0.34	34.24	2524	70.50
Health	232,606	19.61	0.76	75.53	4561	175.70
Lodging	270,044	12.13	0.42	42.40	3275	114.50
Miscellaneous	1,099,544	9.84	0.23	23.34	10817	256.60
All Offices	1,022,012	16.08	0.18	17.90	16430	182.90
All Warehouses	649,706	6.74	0.03	3.44	4380	22.40

Natural Gas Combustion

Adams Avenue Indoor Sports Complex
Prepared by Michael Brandman Associates
3/7/2009

Gas	Type of Land Use	Square Feet or Units	Natural Gas Usage Factor* (SCF/square foot or unit/month)	Natural Gas Usage for Project (SCF/month)	Natural Gas usage for Project (SCF/year)	Emission Factor (g CO2/SCF)**	Emission Factor (g/MMBTU)**	Heating Value of Natural Gas (BTU/SCF)**	Emissions (tons per year)	Emissions (pounds per day)
Carbon Dioxide	Retail/Shopping	22000	2.9	63800	765600	54.2	N/A	N/A	46	250
Methane	Sports Complex	22000	2.9	63800	765600	N/A	4.75	1020	0.00	0.02
Nitrous Oxide	Sports Complex	22000	2.9	63800	765600	N/A	0.095	1020	0.00	0.00
Total										

Units	Carbon Dioxide	Nitrous Oxide	Methane
pounds per day	250	0.00	0.02
tons per year	46	0.00	0.00
Global warming potential	1	310	21
MTCO2e/year	45.6	0.025	0.086

* Natural gas usage factor from URBEMIS2002 default; Industrial is based on number of buildings

** USEPA, 2004: Direct Emissions from Stationary Combustion Sources, Climate Leaders Greenhouse Inventory Protocol, Core Model Guidance, October 2004

Emissions of CH4, N2O = Emission Factor x Heating Value of Natural Gas x Natural Gas Usage x Number of Units/Square Feet

Air Conditioning and Refrigeration Fugitive Emissions

Project: Adams Avenue Indoor Sports Complex
Prepared by: Michael Brandman Associates
Prepared on: 3/7/2009

Type of Unit	Units	Capacity of Unit (kg)	Annual Leak Rate in percent of capacity	Emissions (kg/year)	Emissions (tons/year)	Global Warming Potential	Metric Tons CO2 Equiv./year
Domestic Refrigeration	5	0.5	0.5%	0.0125	0.000	1300	0
Commercial A/C	5.0	100	10%	50.0	0.055	1300	65
Total					**0.055**		**65**

Source:
U.S. Environmental Protection Agency, Climate Leaders. May 2008. Direct HFC and PFC Emissions from Use of Refrigeration and Air Conditioning Equipment. EPA430-K-03-004. http://www.epa.gov/stateply/documents/resources/mfgrfg.pdf, Accessed in July 2008.