4.4 AIR QUALITY

Information in this section is based primarily upon the CEQA Air Quality Handbook, South Coast Air Quality Management District (SCAQMD); Air Quality Data (California Air Resources Board (CARB)); the SCAQMD Final Air Quality Management Plan; and URBEMIS air quality-modeling software. This section focuses on construction related short-term local and regional air quality impacts associated with the proposed Carbon Canyon Dam Sewer Pipeline project. Mitigation measures are also recommended to reduce the significance of impacts.

EXISTING CONDITIONS

SOUTH COAST AIR BASIN

CLIMATE

The proposed project site is located in the South Coast Air Basin (SCAB), characterized as having a southern California "Mediterranean" climate (a semi-arid environment with mild winters, warm summers and moderate rainfall). The SCAB is a 6,600-square-mile area bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. The SCAB includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties, in addition to the San Gorgonio Pass area in Riverside County. The distinctive climate of the SCAB is determined by its terrain and geographical location, as the SCAB is a coastal plain with connecting broad valleys and low hills. The general region lies in the semipermanent high-pressure zone of the eastern Pacific. As a result, the climate is mild, tempered by cool sea breezes. The usually mild climatological pattern is interrupted infrequently by periods of extremely hot weather, winter storms, or Santa Ana winds.

- *Temperatures*

The climate is characterized by moderate temperatures and comfortable humidities. The average annual temperature varies little throughout the SCAB, averaging 75 degrees Fahrenheit (F). All portions of the SCAB have had recorded temperatures over 100 degrees F in recent years. January is usually the coldest month at all locations, while July and August are usually the hottest months of the year. On rare occasions, temperatures may exceed 100 degrees F or fall below freezing.

- *Rainfall*

The SCAB has a semi-arid climate and precipitation is limited few storms during the winter season (November through April). However, the air near the surface is moist because of the presence of a shallow marine layer. Except for infrequent periods when dry, continental air is brought into the SCAB by off-shore winds, the ocean effect is dominant. Periods with heavy fog are frequent, and low stratus clouds, occasionally referred to as "high fog," are a characteristic climate feature. Annual average relative humidity is 70 percent at the coast and 57 percent in the eastern part of the SCAB. Precipitation is typically 9 to 14 inches annually in the SCAB and is rarely in the form of snow or hail because of typically warm weather. The frequency and amount of rainfall is greater in the coastal areas of the SCAB.

- *Winds*

With very low average wind speeds, the SCAB's atmosphere has a limited capability to disperse air contaminants horizontally. Inland areas record slightly lower wind speeds than coastal areas. Summer wind speed averages are slightly higher than winter wind speeds. The dominant daily wind pattern in the SCAB is a daily sea breeze (from the ocean) and a nighttime land breeze. This regime is broken only by occasional winter storms and infrequent strong northeasterly Santa Ana wind flows from the mountains and deserts north of the SCAB.

- *Temperature Inversions and Smog*

Under ideal meteorological conditions and irrespective of topography, pollutants emitted into the air would be mixed and dispersed into the upper atmosphere. However, the southern California region frequently experiences temperature inversions in which pollutants are trapped and accumulate close to the ground. The inversion is a layer of warm, dry air overlaying cool, moist marine air, and is a normal condition in SCAB. The cool, damp and hazy sea air capped by coastal clouds is heavier than the warm, clear air, which acts as a lid through which the marine layer cannot rise.

The height of the inversion is important in determining air pollutant concentration. When the inversion is approximately 2,500 feet above sea level, the sea breezes carry the pollutants inland to escape over the mountain slopes or through the passes. At a height of 1,200 feet, the high terrain prevents the air pollutants from escaping and then back up along the foothill communities. Below 1,200 feet, the inversion layer puts a tight lid on air pollutants, concentrating them in a shallow layer over the entire coastal basin. Usually, inversions are lower before sunrise than during the daylight hours. Mixing heights of inversions are lower in the summer and more persistent, being partly responsible for the high levels of ozone observed during summer months in the SCAB. Smog in southern California is generally the result of these temperature inversions combining with coastal day winds and local mountains to contain the pollutants for long periods of time, allowing them to form secondary pollutants by reacting with sunlight. The SCAB has a limited ability to disperse these pollutants due to typically low wind speeds. However, pollutant conditions in coastal areas such as the site vicinity are generally much better than in areas further inland.

SENSITIVE RECEPTORS

Sensitive receptors are populations that are more susceptible to the effects of air pollution than the general population. Sensitive populations who are in proximity to localized sources of toxins and CO are of particular concern. Land uses considered as sensitive receptors include residences, schools, playgrounds, childcare centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. Carbon Canyon Regional Park could be considered a sensitive receptor because it contains playgrounds and athletic facilities. There are several sensitive reports with the vicinity of the project site, namely the single-family residences at Rose Drive and Vesuvius Drive.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

Regulatory oversight for air quality in the SCAB rests at the regional level with the South Coast Air Quality Management District (SCAQMD), the California Air Resources Board (CARB) at the State level, and the U.S. Environmental Protection Agency (EPA) Region IX office at the Federal level. Laws, ordinances, regulations, and standards applicable to these three agencies are described below.

U.S. ENVIRONMENTAL PROTECTION AGENCY

The principal air quality regulatory mechanism on the federal level is the Federal Clean Air Act (FCAA) and in particular the 1990 amendments to the Federal Clean Air Act (FCAAA) and the National Ambient Air Quality Standards (NAAQS) that it establishes. These standards identify levels of air quality for "criteria" pollutants that are considered the maximum levels of ambient (background) air pollutants considered safe, with an adequate margin of safety, to protect the public health and welfare. The criteria pollutants include ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2 is a form of NO_X), sulfur oxides (SO_2 is a form of SO_X), particulate matter less than 10 and 2.5 microns in diameter (PM_{10} and $PM_{2.5}$, respectively) and lead (Pb) (refer to Table 4.4-1, *National and California Ambient Air Quality Standards)*. The EPA also has regulatory and enforcement jurisdiction over emission sources beyond state waters (outer continental shelf), and those that are under the exclusive authority of the Federal government, such as aircraft, locomotives, and interstate trucking.

CALIFORNIA AIR RESOURCES BOARD

The California Air Resources Board, (CARB), a department of the California Environmental Protection Agency (CalEPA), oversees air quality planning and control throughout California. Its responsibility lies with ensuring implementation of the 1989 amendments to the California Clean Air Act (CCAA), responding to the FCAA requirements and regulating emissions from motor vehicles sold in California. It also sets fuel specifications to further reduce vehicular emissions.

The amendments to the CCAA establish California Ambient Air Quality Standards (CAAQS), and a legal mandate to achieve these standards by the earliest practicable date. These standards apply to the same criteria pollutants as the Federal CAA, and also include sulfate, visibility, hydrogen sulfide, and vinyl chloride (refer to Table 4.4-1).

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

The SCAQMD is one out of 35 air quality management districts that have prepared Air Quality Management Plans (AQMPs) to accomplish a five-percent annual reduction in emissions. The most recent AQMP was adopted in 2003. The 2003 AQMP relies on a multilevel partnership of governmental agencies at the federal, state, regional and local level. The 2003 AQMP proposes policies and measures to achieve federal and state standards for improved air quality in the SCAB and those portions of the Salton Sea Air Basin (formerly named the Southeast Desert Air Basin) that are under SCAQMD jurisdiction.

The 2003 AQMP also addresses several State and Federal planning requirements and incorporates significant new scientific data, primarily in the form of updated emissions inventories, ambient air measurements, new meteorological episodes, and new air quality modeling tools. The 2003 AQMP is consistent with and builds upon the approaches taken in the 1997 AQMP and the 1999 Amendments to the Ozone State Implementation Plan (SIP), for the SCAB for the attainment of the Federal ozone air quality standard. However, the 2003 AQMP points to the urgent need for additional emission reductions (beyond those incorporated in the 1997/99 Plan) to offset increased emission estimates from mobile sources and meet all Federal criteria pollutant standards within the time frames allowed under the FCAA.

TABLE 4.4-1
NATIONAL AND CALIFORNIA AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	California Standards [1]	Federal Standards[2]	
		Concentration [3]	Primary [3, 4]	Secondary [3, 5]
Ozone (O_3)	1 Hour	0.09 ppm (180 μg/ m^3)	0.12 ppm (235 μg/m^3)[6]	0.12 ppm (235 μg/m^3)[6]
	8 Hour	N/A	0.08 ppm (157 μg/m^3)	0.08 ppm (157 μg/m^3)
Particulate Matter (PM_{10})	24 Hour	50 μg/m^3	150 μg/m^3	150 μg/m^3
	Annual Arithmetic Mean	20 μg/m^3	50 μg/m^3	50 μg/m^3
Fine Particulate Matter ($PM_{2.5}$)	24 Hour	No Separate State Standard	65 μg/m^3	65 μg/m^3
	Annual Arithmetic Mean	12 μg/m^3	15 μg/m^3	15 μg/m^3
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)
	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	35 ppm (40 mg/m^3)
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	N/A	0.053 ppm (100 μg/m^3)	0.053 ppm (100 μg/m^3)
	1 Hour	0.25 ppm (470 μg/m^3)	N/A	N/A
Lead	30 days average	1.5 μg/m^3	N/A	N/A
	Calendar Quarter	N/A	1.5 μg/m^3	1.5 μg/m^3
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	N/A	0.030 ppm (80 μg/m^3)	N/A
	24 Hour	0.04 ppm (105 μg/m^3)	0.14 ppm (365 μg/m^3)	N/A
	3 Hour	N/A	N/A	0.5 ppm (1300 μg/m^3)
	1 Hour	0.25 ppm (655 μg/m^3)	N/A	N/A
Visibility Reducing Particles	8 Hour (10 am to 6 pm, PST)	Extinction Coeff. = 0.23 km@<70% RH	No Federal Standards	
Sulfates	24 Hour	25 μg/ m^3		
Hydrogen Sulfide	1 Hour	0.03 ppm (42 μg/ m^3)		

ppm = parts per million; μg/ m^3 = micrograms per cubic meter; mg/ m^3 = milligrams per cubic meter; km = kilometers; RH = relative humidity; PST = pacific standard time; N/A = not applicable

Notes:

1 – California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter-PM_{10}, and visibility-reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations. In 1990, the CARB identified vinyl chloride as a Toxic Air Contaminant and determined that there was not sufficient available scientific evidence to support the identification of a threshold exposure level. This action allows the implementation of health-protective control measures at levels below the 0.010 ppm ambient concentration specified in the 1978 standard.

2 – National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. EPA also may designate an area as *attainment/unclassifiable*, if: (1) monitored air quality data show that the area has not violated the ozone standard over a three-year period; or (2) there is not enough information to determine the air quality in the area. For PM_{10}, the 24-hour standard is attained when 99 percent of the daily concentrations, averaged over the three years, are equal to or less than the standard. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the EPA for further clarification and current federal policies.

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

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

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

Source: California Air Resources Board.

ATTAINMENT STATUS

The SCAB has been designated as attainment for nitrogen dioxide (NO_x) and sulfur oxides (SO_x) for both State and Federal Standards. The SCAB is designated non-attainment for ozone (O_3) and

particulate matter (PM_{10}) under both Federal and State standards (refer to Table 4.4-2, *South Coast Air Basin Ambient Air Quality Classifications*).

Table 4.4-2
SOUTH COAST AIR BASIN AMBIENT AIR QUALITY CLASSIFICATIONS

Pollutant	State	Federal
Carbon Monoxide	Non-Attainment	Attainment
Ozone (1 hour standard)	Non-Attainment/Severe	Non-Attainment/Severe
Ozone (8 hour standard)	Unclassified	Unclassified
Nitrogen Oxides	Attainment	Attainment
Sulfur Dioxide	Attainment	Attainment
Particulate Matter <10 microns	Serious Non-Attainment	Serious Non-Attainment
Source: Telephone conversation with Charles Blankson, South Coast Air Quality Management District, November 2004.		

EXISTING AMBIENT AIR QUALITY

The CARB monitors ambient air quality at approximately 250 air-monitoring stations across the State. Monitoring stations usually measure pollutant concentrations ten feet above ground level; therefore, air quality is often referred to in terms of “ground-level” concentrations. Ambient air pollutant concentrations in the SCAB are measured at 36 monitoring stations operated by the SCAQMD.

The following air quality information briefly describes the various types of pollutants monitored at the Anaheim, Costa Mesa and La Habra air monitoring stations. These are the three local monitoring stations nearest the project site that measure criteria pollutants. The data collected at these stations are considered to be representative of the air quality experienced on-site. Air quality data from 2000 through 2004 is provided in Table 4.4-3, *Local Air Quality Levels*.

Ozone

Ozone occurs in two layers of the atmosphere. The layer surrounding the earth's surface is the troposphere. The troposphere extends approximately 10 miles above ground level, where it meets the second layer, the stratosphere. The stratospheric or "good" ozone layer extends upward from about 10 to 30 miles and protects life on earth from the sun's harmful ultraviolet rays (UV-B).

“Bad” ozone is what is known as a photochemical pollutant, and needs VOC, NO_x, and sunlight to form. VOC and NO_x are emitted from various sources throughout the county. In order to reduce ozone concentrations, it is necessary to control the emissions of these ozone precursors. Significant ozone formation generally requires an adequate amount of precursors in the atmosphere and several hours in a stable atmosphere with strong sunlight. High ozone concentrations can form over large regions when emissions from motor vehicles and stationary sources are carried hundreds of miles from their origins.

While ozone in the upper atmosphere protects the earth from harmful ultraviolet radiation, high concentrations of ground level ozone can adversely affect the human respiratory system and other tissues. Many respiratory ailments, as well as cardiovascular disease, are aggravated by exposure to high ozone levels. Ozone also damages natural ecosystems such as forests and foothill communities, and damages agricultural crops and some man-made materials, such as rubber, paint, and plastics. Societal costs from ozone damage include increased medical costs, the loss of human and animal life, accelerated replacement of industrial equipment, and reduced crop yields.

The State standard is 0.09 ppm, averaged over one hour. The O_3 levels at the La Habra monitoring station range between.095 ppm in 2004 and .165 ppm in 2003. The one-hour State standard was

exceeded 23 days between 2000 and 2004. The Federal standard for O_3 is 0.12 ppm, averaged over one hour. The Federal standard was exceeded twice between 2000 and 2004. The SCAB is designated as a nonattainment area for State and Federal O_3 standards.

Carbon Monoxide

Carbon monoxide (CO) is emitted by mobile and stationary sources as a result of incomplete combustion of hydrocarbons or other carbon-based fuels. CO is an odorless, colorless toxic gas that is formed by the incomplete combustion of fuels. In cities, automobile exhaust can cause as much as 95% of all CO emissions. At high concentrations, CO can reduce the oxygen-carrying capacity of the blood and cause headaches, dizziness, unconsciousness, and even death. It is generally associated with areas of high traffic density. State and Federal standards were not exceeded between 1999 and 2003. The SCAB is designated as an attainment area for Federal CO standards and non-attainment for State standards.

Nitrogen Dioxide

Nitrogen oxides (NO_x) are a family of highly reactive gases that are a primary precursor to the formation of ground-level ozone, and react in the atmosphere to form acid rain. NO_2, often used interchangeably with NO_X, is a reddish-brown gas that can cause breathing difficulties at high levels. Peak readings of NO_2 occur in areas that have a high concentration of combustion sources (e.g., motor vehicle engines, power plants, refineries, and other industrial operations) in the vicinity.

NO_x can irritate the lungs, cause lung damage, and lower resistance to respiratory infections such as influenza. The effects of short-term exposure are still unclear, but continued or frequent exposure to concentrations that are typically much higher than those normally found in the ambient air may cause increased incidence of acute respiratory illness in children. Health effects associated with NO_X are an increase in the incidence of chronic bronchitis and lung irritation. Chronic exposure to NO_2 may lead to eye and mucus membrane aggravation, along with pulmonary dysfunction.

State and Federal standards were not exceeded between 1999 and 2003. The SCAB is designated as an attainment area for State and Federal NO_2 standards.

Particulate Matter

Particulate matter pollution consists of very small liquid and solid particles floating in the air. Some particles are large or dark enough to be seen as soot or smoke. Others are so small they can be detected only with an electron microscope. Particulate matter is a mixture of materials that can include smoke, soot, dust, salt, acids, and metals. Particulate matter also forms when gases emitted from motor vehicles and industrial sources undergo chemical reactions in the atmosphere. PM_{10} refers to particles less than or equal to 10 microns in aerodynamic diameter. $PM_{2.5}$ refers to particles less than or equal to 2.5 microns in aerodynamic diameter and are a subset, or portion of PM_{10}.

PM_{10} and $PM_{2.5}$ particles are small enough to be inhaled into, and lodge in, the deepest parts of the lung. Health problems begin as the body reacts to these foreign particles. Acute and chronic health effects associated with high particulate levels include the aggravation of chronic respiratory diseases, heart and lung disease, coughing, bronchitis and respiratory illnesses in children. Recent mortality studies have shown a statistically significant direct association between mortality and daily concentrations of particulate matter in the air. Non health-related effects include reduced visibility and soiling of buildings.

The State standard for PM_{10} is 50 micrograms per cubic meter (:g/m^3) averaged over 24 hours. The State standard was exceeded 28 days between 2000 and 2004. The Federal standard for PM_{10} is 150 :g/m^3 averaged over 24 hours. The Federal standard for PM_{10} was not exceeded between 2000 and 2004. The SCAB is designated as a nonattainment area for State PM_{10} standards. Based upon a desire to set clean air goals throughout the State, the CARB created a new annual average standard for $PM_{2.5}$ at 12 μg/m^3. Currently, the CARB has issued a staff report, which recommends that the SCAB be designated as nonattainment for State and Federal $PM_{2.5}$ standards.[1]

Sulfur Dioxide and Lead

Sulfur dioxide is a colorless, pungent gas belonging to the family of sulfur oxide gases (SO_X), formed primarily by combustion of sulfur-containing fossil fuels (primarily coal and oil), and during metal smelting and other industrial processes. Sulfur dioxide (SO_2) often used interchangeably with sulfur oxides (SO_X) did not exceed Federal or State standards between 2000 and 2004. The SCAB is designated as an attainment area for both State and Federal SO_2 standards.

The major health concerns associated with exposure to high concentrations of SOx include effects on breathing, respiratory illness, alterations in pulmonary defenses, and aggravation of existing cardiovascular disease. Major subgroups of the population that are most sensitive to SO_x include individuals with cardiovascular disease or chronic lung disease (such as bronchitis or emphysema) as well as children and the elderly. Emissions of SO_x also can damage the foliage of trees and agricultural crops. Together, SO_x and NO_x are the major precursors to acid rain, which is associated with the acidification of lakes and streams, and accelerated corrosion of buildings and monuments. Sulfur oxides can react to form sulfates, which significantly reduce visibility.

Reactive Organic Gases and Volatile Organic Compounds

Hydrocarbons are organic gases that are formed solely of hydrogen and carbon. There are several subsets of organic gases including Volatile Organic Compounds (VOCs) and Reactive Organic Gases (ROGs). ROGs include all hydrocarbons except those exempted by the California Air Resources Board (CARB). Therefore, ROGs are a set of organic gases based on state rules and regulations. VOCs are similar to ROGs in that they include all organic gases except those exempted by federal law. VOCs are therefore a set of organic gases based on federal rules and regulations. Both VOCs and ROGs are emitted from the incomplete combustion of hydrocarbons or other carbon-based fuels. Combustion engine exhaust, oil refineries, and oil-fueled power plants are the primary sources of hydrocarbons. Another source of hydrocarbons is evaporation from petroleum fuels, solvents, dry cleaning solutions and paint.

The primary health effects of hydrocarbons result from the formation of ozone and its related health effects. High levels of hydrocarbons in the atmosphere can interfere with oxygen intake by reducing the amount of available oxygen through displacement. Carcinogenic forms of hydrocarbons are considered Toxic Air Contaminants, or air toxics. There are no health standards for ROG separately.

[1] http://www.epa.gov/pmdesignations/documents/120/table.htm, November 10, 2004.

TABLE 4.4-3
LOCAL AIR QUALITY LEVELS
(As measured at the Anaheim, Costa Mesa, and La Habra Ambient Air Monitoring Stations)

Pollutant	California Standard	Federal Primary Standard	Year	Maximum[1] Concentration	Days (Samples) State/Federal Std. Exceeded
Carbon Monoxide (La Habra Station)	9 ppm for 8 hours	9 ppm for 8 hours	2000 2001 2002 2003 2004	6.16 4.67 4.49 4.29 3.83	0/0 0/0 0/0 0/0 0/0
Ozone (La Habra Station)	0.09 ppm for 1 hour	0.12 ppm for 1 hour	2000 2001 2002 2003 2004	.137 .114 .121 .165 .095	8/1 4/0 3/0 7/1 1/0
Nitrogen Oxides (La Habra Station)	0.25 ppm for 1 hour	0.053 ppm annual average	2000 2001 2002 2003 2004	.118 .130 .116 .158 .089	0/0 0/0 0/0 0/0 0/0
Sulfur Dioxide (Costa Mesa Station)	0.25 ppm for 1 hour	0.14 ppm for 24 hours or 80 $\mu g/m^3$ (0.03 ppm) annual average	2000 2001 2002 2003 2004	.006 .005 .011 .012 .006	0/0 0/0 0/0 0/0 0/0
PM_{10} (Anaheim Station)[2,3]	50 :g/m^3 for 24 hours	150 :g/m^3 for 24 hours	2000 2001 2002 2003 2004	126.0 93.0 69.0 96.0 62.0	8/0 6/0 5/0 6/0 3/0
$PM_{2.5}$ (Anaheim Station)[3]	No Separate State Standard	65:g/m^3 for 24 hours	2000 2001 2002 2003 2004	113.9 70.8 68.6 115.5 52.9	NA/6 NA/1 NA/1 NA/3 NA/0

ppm = Parts Per Million
:g/m^3 = Micrograms Per Cubic Meter
NA = Not applicable
PM_{10} = particulate matter 10 microns in diameter or less
$PM_{2.5}$ = particulate matter 2.5 microns in diameter or less

NOTES
1. Maximum concentration is measured over the same period as the California Standards.
2. PM_{10} exceedances are based on state thresholds established prior to amendments adopted on June 20,2002.
3. PM_{10} and $PM_{2.5}$ exceedances are derived from the number of samples exceeded, not days.

Source: Data obtained from the California Air Resources Board ADAM Data Summaries Website, www.arb.ca.gov/adam/welcome.html.

Toxic Air Contaminants

According to section 39655 of the California Health and Safety Code, a toxic air contaminant is "an air pollutant which may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health". In addition, 189 substances that have been listed as federal hazardous air pollutants (HAPs) pursuant to section 7412 of Title 42 of the United States Code are TACs under the state's air toxics program pursuant to section 39657 (b) of the California Health and Safety Code.

The TACS can cause various cancers depending on the particular chemicals, type and duration of exposure. Additionally, some of the TACs may cause short-term and/or long-term health effects. The ten TACs posing the greatest health risk in California are acetaldehyde, benzene, 1-3

butadiene, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, perchlorethylene, and diesel particulate matter.

IMPACTS

SIGNIFICANCE CRITERIA

According to the *CEQA Guidelines* (Environmental Checklist Form) and the South Coast Air Quality Management District (SCAQMD) *CEQA Air Quality Handbook*, a potentially significant impact to air quality would occur if the project caused one or more of the following:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violation of any air quality standard or contribute substantially to an existing or projected air quality violation;
- A cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);
- Exposure sensitive receptors to substantial pollutant concentrations; and/or
- Creation of objectionable odors affecting a substantial number of people.

SCAG is responsible under the FCAA for determining conformity of projects, plans and programs with the SCAQMD AQMP. As indicated in the *AQMD Air Quality Analysis Guidance Handbook*, there are two main indicators of consistency:

- Whether the project would not increase the frequency or severity of existing air quality violations or cause or contribute to new violations, or delay timely attainment of air quality standards or the interim emission reductions specified in the AQMP; and
- Whether the project would exceed the AQMP's assumptions for 2020 or increments based on the year of project buildout and phase.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT THRESHOLDS

The SCAQMD *CEQA Air Quality Handbook* provides significance thresholds for both construction and operation of projects within the SCAQMD jurisdictional boundaries. If the project proposes development in excess of the established emission thresholds, as illustrated in Table 4.4-4, *SCAQMD Emissions Thresholds,* a significant air quality impact may occur and additional analysis is warranted to fully assess the significance of impacts.

TABLE 4.4-4
SCAQMD EMISSIONS THRESHOLDS

Phase	Pollutant (lbs/day)				
	ROGs	NO_X	CO	SO_X	PM_{10}
Construction	75	100	550	150	150

ROGs = reactive organic gases; NO_x = nitrogen oxides; CO = carbon monoxide; SO_x = sulfur oxides; PM_{10} = particulate matter up to 10 microns in diameter.
Source: SCAQMD, *CEQA AQMD Air Quality Analysis Guidance Handbook,* page 6-1, April 1993.

IMPACT DISCUSSION

WOULD THE PROJECT:

(a) Conflict with or obstruct implementation of the applicable air quality plan? ***Less Than Significant Impact with Mitigation Incorporated.***

Pollutants associated with sewage transmission projects typically result from operation of internal combustion driven pump stations and result in stationary source impacts. However, as pump stations are not proposed as part of the project, no stationary source impacts would occur. Maintenance associated with the proposed sewage facilities does not have the capacity to generate significant vehicular trips, and the project itself would not have the potential to induce growth beyond the estimates within the AQMP.

Construction Related impacts

Project construction would involve demolition, site grading, excavation, and micro-tunneling activities. Temporary construction related air quality impacts would include: particulate (fugitive dust and PM_{10}) emissions; off-site air pollutant emissions at the power plant(s) serving the site; exhaust emissions and potential odors from the construction equipment; and exhaust emissions from the motor vehicles of the construction crew. These would be potentially significant impacts that require the mitigation measures outlined in the mitigation section to follow.

(b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation? ***Less Than Significant Impact with Mitigation Incorporated.***

The project site is located in the South Coast Air Basin (SCAB), which currently has a non-attainment status for State and Federal ozone, carbon monoxide, and PM_{10} standards. Implementation of the proposed project would result in construction related air quality impacts from grading activities, excavation, demolition (fugitive dust and PM_{10}) and construction equipment exhaust.

(c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)? ***Less Than Significant Impact with Mitigation Incorporated.***

Short-term impacts on air quality would occur during the grading and construction activities required to install the pipeline and related access roads. These temporary impacts would include:

- Particulate (fugitive dust) emissions from clearing and grading activities;
- Off-site air pollutant emissions at the power plant serving the construction site, while temporary power lines and/or portable generators may be needed to operate construction equipment and provide lighting;
- Exhaust emissions and potential odors from construction equipment used on the construction site as well as the vehicles used to transport materials to and from the site; and
- Exhaust emissions from the motor vehicles of the construction crew.

The SCAQMD establishes thresholds for pollutant emissions generated during construction. Table 4.4-5 *Daily Construction Emissions* contain the SCAQMD thresholds and emissions that are anticipated to be generated by construction related activity after all mitigation has been applied. It should be noted that the following construction-related emissions are considered conservative, using the CARB's URBEMIS2002 model.

TABLE 4.4-5
DAILY CONSTRUCTION EMISSIONS

Emissions Source	Pollutant (lbs/day)[1]			
	ROGs	NO_x	CO	PM_{10}
Unmitigated Emissions[2]	14.26	92.44	116.23	8.66
SCAQMD Threshold	75	100	550	150
Is Threshold Exceeded Before Mitigation?	No	No	No	No
Mitigated Emissions[3]	14.26	92.44	116.23	5.57
Is Threshold Exceeded After Mitigation?	No	No	No	No

ROGs = reactive organic gases NOx = nitrogen oxides CO = carbon monoxide PM_{10} = fine particulate matter

NOTES:
1 Emissions calculated using the URBEMIS2002 Computer Model as recommended by the SCAQMD.
2 Calculations include emissions from numerous sources including: site grading, construction worker trips, stationary equipment, diesel mobile equipment, and asphalt off gassing.
3 The reduction/credits for construction emission mitigations are based on mitigation s included in the UREBMIS 2002 computer model and as typically required by the SCAQMD. The mitigations includes the following: proper maintenance of mobile and other construction equipment, replace ground cover in disturbed areas quickly, water exposed surfaces twice daily, cover stock piles with tarps, water all haul roads twice daily and reduce speed limitation on unpaved roads to 15 miles per hour.

Construction-related emissions would fall below SCAQMD emission thresholds, after implementing recommended mitigation measures. The Applicant/contractor would implement standard dust control measures during construction, in accordance with SCAQMD requirements, which would further reduce emissions (refer to recommended mitigation measures). Note that project's construction-related emissions would be relatively short-term in duration. Thus, a less than significant impact would occur in this regard.

(d) Expose sensitive receptors to substantial pollutant concentrations? ***Less Than Significant Impact with Mitigation Incorporated.***

Land uses considered sensitive receptors include residences, schools, playgrounds, childcare centers, athletic facilities, long-term health care facilities, rehabilitation centers, convalescent centers, and retirement homes. Implementation of the proposed project would result in impacts from increased dust (particulate) levels due to grading activities and air pollution emissions from construction activity.

Project implementation could expose residences, which are less than 600 feet away, to pollutant concentrations. Such residents include the single-family residences at Rose Drive and Vesuvius Drive and the southern terminus of the proposed project. This is a potentially significant impact that requires the mitigation measures outlined in the mitigation section.

(e) Create objectionable odors affecting a substantial number of people? ***Less Than Significant Impact.***

Draft Odor Assessment and Odor Control Plan

The purpose of the Draft Odor Assessment and Odor Control Plan that is included in the Preliminary Design Report for the project is to summarize the data collection and analysis and assessment of the odor potential during the construction and odor mitigation measures for the OCSD Carbon Canyon Dam Sewer Pipeline Project. The existing Carbon Canyon Pump Station (CCPS) is located in Carbon Canyon Regional Park near the park entrance and visitor parking lots.

The only potential for odors above current levels could occur during the following activities:

- Construction of the tie-in to the sewer manhole at Rose Drive and Vesuvius Drive.
- Construction of the tie-in to the sewer manhole just upstream of the existing Carbon Canyon Pump station (CCPS) to make the diversion into the new gravity sewer.
- Clean-out of the existing CCPS wet well and abandonment of the pump station.
- Potential odor releasing activities.

In anticipation of the construction, data on wastewater sulfides, sewer (manhole) hydrogen sulfide concentration, and ambient outside air hydrogen sulfide concentration were measured. Two locations were recommended for field data collection:

- Existing Carbon Canyon Pump Station (CCPS); and
- Proposed connection to OCSD trunk sewer at Rose Drive and Vesuvius Drive

As part of the data collection samples of the wastewater were collected by RBF on October 11, 2004 and analyzed for total and dissolved sulfides and pH by Del Mar Analytical Laboratory. In addition OCSD's Odalog® Gas Data Logger was installed in a manhole upstream of the CCPS for continuous recording of hydrogen sulfide concentrations in the sewer headspace. To measure ambient hydrogen sulfide concentrations in the area surrounding the CCPS, OCSD's Odalog® Low Range Hydrogen Sulfide Gas Logger was installed in a tree about 200 feet from the CCPS.

A summary of the results of the liquid wastewater sampling and analysis is presented in Table 4.4-6 *Wastewater Sampling*. The liquid samples were grab samples.

TABLE 4.4-6
WASTEWATER SAMPLING

Time	Dissolved Sulfide (mg/L)[1]	Total Sulfide, (mg/L)[1]	pH	Manhole Gas Phase Odalog® Concentration (ppmv)[2]
10:00 am	ND	ND	7.42	1 - 2
1:00 pm	ND	ND	7.52	2 - 3
3:30 pm	ND	0.14	7.57	8 - 9

mg/L = milligrams per liter; ppmv = parts per million volume
1. Reporting limit = 0.10 mg/L as S=
2. Gas concentrations presented to illustrate relationship between dissolved sulfide and gas phase concentrations; ppmv is parts per million by volume at the time of the sampling the temperature, as measured by the Odalog® was 78ºF.

In wastewater collection systems, hydrogen sulfide is generated in the anaerobic portion of the slime layer in the submerged section of the pipe walls. The hydrogen sulfide dissolves in the wastewater, some of it being present as hydrogen sulfide (H_2S) aqueous; the remainder is either

HS^- ion or $S^=$ ion as shown in the following equation:

$$H_2S_{aq} \leftrightarrow HS^- + H^+ \quad (1)$$
$$HS^- \leftrightarrow S^= + H^+ \quad (2)$$

The partitioning of the hydrogen sulfide into these components depends primarily on the temperature and the pH of the water, although ionic strength, as represented by dissolved solids or electrical conductivity, also affects the partitioning. The amount of aqueous hydrogen sulfide is a function of the pH as illustrated by equation (1). At lower pH values, more of the dissolved sulfides are in the aqueous form.

The summation of the (H_2S) aqueous, HS^- ion and $S^=$ ion represent the total dissolved sulfides and are reported as such in the analysis. (To simplify the reporting, all of the three species are reported as "Sulfur, S.") The HS^- ion and $S^=$ ion produce no odors. Note that there are also some insoluble sulfides present in the wastewater. These are principally precipitates and are not of a major concern in the odor potential. Equation (2), above, occurs only at pH values above 8 and $S^=$ is only significant above pH equal to 9.5 or so.

Some of the (H_2S)aqueous, which is in the wastewater, would escape into the sewer atmosphere. The amount that escapes is a function of Henry's law, as shown in equation (3).

$$Xg = K_H * Pg \quad (3)$$

Xg = mol gas/mol of gas and water
Pg = Partial pressure of the gas, atm, = ppmv/1,000,000
K_H = Henry's constant, atm

Henry's Law represents an equilibrium condition, i.e., a worst-case or maximum concentration in the gas phase. It is not common for sewers to reach an equilibrium condition unless it is poorly ventilated.

Review of the data from the grab sampling indicates low levels of dissolved sulfides, i.e., below the reporting limit. Correlating that with the manhole gas monitoring shows relatively low hydrogen sulfide gas concentrations. An independent analysis, using the temperature and pH data determined that the equilibrium concentrations (using Henry's Law), are around 6 to 7 ppmv. Thus the hydrogen sulfide concentrations in the manhole as recorded by the Odalog® are near equilibrium concentrations. As such, the hydrogen sulfide concentrations would not be expected to be much greater than the values indicated.

Table 4.4-7 *Summary of Hydrogen Sulfide Gas Monitoring in Sewer* presents a summary of the Odalog measurements for hydrogen sulfide in the sewer atmosphere in a manhole upstream of CCPS.

TABLE 4.4-7
SUMMARY OF HYDROGEN SULFIDE GAS MONITORING IN SEWER

Location	Instrument	Summary of Data
In manhole on 24-in gravity sewer, adjacent to Regional Park Visitor Center	Odalog® as manufactured by App-Tek; Range 0 to 200 ppmv; Log Interval: 300 seconds; Accuracy: ± 1 ppm	Minimum: 1 ppmv (10/11/04 @ installation); Maximum: 9 ppmv (10/11/04 @ 15:20); Average: 3 ppmv; Temperature: Minimum 75.2 (10/17/04); Maximum: 79.5 (10/11/04 @ installation)
Monitoring was conducted from October 11-18, 2004 upstream of the Carbon Canyon Pump Station.		

In reviewing the output from the Odalog® unit, the hydrogen sulfide concentrations varied throughout the day, with lower values in the early morning hours. The peaks on Monday (10/11) through Thursday (10/14) were higher than the peaks on Friday through the following Monday (10/18). The peaks were trending downward during the period Monday through Thursday. When the Odalog® was removed from the manhole on Monday 10/18/2004, it was observed that it was wet, possibly indicating that it may have been submerged. If so, it is now known what impact this might have had on the measurements. There was significant rainfall on Saturday (10/16, late night) and on Sunday (10/17). It is now known what impact this might have had on the flows. In summary, the hydrogen sulfide concentrations in the sewer system are not significant.

Data from the low range Odalog® mounted in a tree about 6 feet above ground, midway between the Regional Park Visitor Center and the CCPS was collected in a series of five sessions. Sessions started about 8 am and ended in the afternoon about 3 to 5 pm. The low-range Odalog® has a range of 0.01 to 2.00 ppmv. The accuracy is ± 10 percent of the reading. The logging interval was 1800 seconds (30 minutes). All readings were zero.

The downstream end of the project is at the intersection of Rose Drive and Vesuvius Drive, just downstream from Carbon Canyon Dam. The existing CCPS has two force mains that discharge into a manhole adjacent to the top of Carbon Canyon Dam. From there it flows by gravity, down a significant slope to a manhole about 50 feet northeast of manhole in the middle of the intersection of Rose Drive and Vesuvius Drive. The east side of Rose Drive is undeveloped. There are residences within 100 feet of the intersection of Rose Drive and Vesuvius Drive (southeastern corner).

No data on hydrogen sulfide were collected at this location. Because of the force main discharge from the existing CCPS, the sulfide data collected upstream of the pump station are probably not representative of what is occurring in this location. Odor measurements would be done during the design phase at a time yet to be determined.

Construction-Related Odors

Construction activities associated with the project may generate detectable odors from the construction equipment exhaust. Odors associated with diesel and gasoline fumes are transitory and would not create objectionable odors affecting a substantial number of people. The impacts of these odors would be short-term, would cease upon project completion, and are not anticipated to be significant based on the following odor assessment and control plan for construction.

Odor Assessment and Control Plan for Construction

Based on the data collected to date and the location and duration of the construction activities that would allow odors to escape, the odor impact is minimal. In the case of the work at Carbon Canyon

Regional Park, the hydrogen sulfide concentration in the collection system is low. However, it is possible, depending on the time of year, the connection to the existing sewer manhole is made, odors could be noticed by visitors to the Park. The reason for this is the relatively sheltered area (away from winds) in which the existing pump station is located. There might be some short-term odors associated with the clean out of the existing wet well, prior to abandonment of the Pump Station.

At the downstream end of the project, the major concern would be to minimize odors at the residences to the south and east of the intersection of Rose Drive and Vesuvius Drive. Again the duration of work is expected to be short.

MITIGATION MEASURES

LONG-TERM EMISSIONS

No mitigation is required.

CONSISTENCY WITH REGIONAL PLANS

No mitigation is required.

CONSTRUCTION (SHORT-TERM)

AQ-1 During clearing, grading, earth moving, or excavation operations, excessive fugitive dust emissions shall be controlled by regular water or other dust preventive measures using the following procedures, as specified in the SCAQMD Rule 403.

- On-site vehicle speed shall be limited to 25 miles per hour.
- All material excavated or graded would be sufficiently watered to prevent excessive amounts of dust. Watering would occur at least twice daily with complete coverage, preferable in the late morning and after work is done for the day.
- All material transported on-site or off-site would be either sufficiently watered or securely covered to prevent excessive amounts of dust.
- The area disturbed by clearing, grading, earth moving, or excavation operations would be minimized so as to prevent excessive amounts of dust.
- These control techniques would be indicated in project specifications. Compliance with the measure would be subject to periodic site inspections by the City.
- Visible dust beyond the property line emanating from the project would be prevented to the maximum extent feasible.

AQ-2 All trucks that are to haul excavated or graded material on-site shall comply with State Vehicle Code Section 23114, with special attention to Sections 23114(b)(F), (e)(4) as amended, regarding the prevention of such material spilling onto public streets and roads.

AQ-3 Ozone precursor emissions from construction equipment vehicles shall be controlled by maintaining equipment engines in good condition and proper tune per manufacturer's specifications, to the satisfaction of the City Engineer. Compliance with this measure would be subject to periodic inspections of construction equipment vehicles by the City.

SENSITIVE RECEPTORS

AQ-4 The odor assessment and control plan for construction shall include the following assessment methods when work is occurring in the manhole immediately upstream of the CCPS wet well, the CCPS wet well is being cleaned out, the force mains are being purged and flushed out prior to being abandoned, and when the connection is made at the downstream end of the project:

- Continually monitor and record the hydrogen sulfide concentration at the bottom of the manhole immediately upstream of the CCPS wet well or the manhole at the point of connection in Rose Drive and Vesuvius Drive.

- Monitor and record the ambient air in the vicinity of the CCPS near the visitor parking lot and visitor center and near the closest residence at the intersection of Rose Drive and Vesuvius Drive.

- The specifications shall require the contractor to use an Odalog gas monitor for manhole hydrogen sulfide monitoring and a low range Odalog™ for the ambient air monitoring. The ambient air monitor shall be installed in a tree at "nose" level.

If the hydrogen sulfide concentration indicates possible odor problems, the contractor may take one or more of the following actions to prevent an odor problem:

- Stop work until concentrations decrease or wind conditions change.

- Stop work for the remainder of the day and request the injection of sodium hydroxide into an upstream manhole.

- Install facilities to feed ferrous chloride into the wastewater system upstream of CCPS to reduce odors at the CCPS and the discharge end of the force mains and operate the facilities as needed. Ferrous chloride shall be contained and secured.

- Install facilities to feed Bioxide into the CCPS wet well to reduce sulfide buildup in the force mains thereby reducing odor at the point of connection in Rose Drive and Vesuvius Drive and operate the facilities as needed. Bioxide™ is a relatively innocuous chemical (calcium nitrate – a good grade of fertilizer) and is easier to handle than ferrous chloride.

- Enclose the work area in a temporary structure and exhaust and treat the air with granular activated carbon. This system shall be permitted by the South Coast Air Quality Management District. The contractor shall be required to secure such a permit. Should the contractor use such a system, it is important the contractor be prohibited from using caustic impregnated granular activated carbon, as this type of carbon is subject to bed fires because of its low ignition temperature.

The "action limits" shall be tentatively set at those indicated below. If there are odor

complaints, or if the inspectors can detect odor in the Regional Park or at the sidewalk adjacent to the residences at the intersection of Rose Dr. and Vesuvius Dr., the "action limits" shall be adjusted downward as needed to mitigate the odors.

The proposed action limits are:

- Hydrogen sulfide concentrations at the manhole bases above 25 parts per million volume (ppmv).

- Hydrogen sulfide concentration at the sidewalk near the residences or in the Regional Park within 50 feet of the construction area above 10 parts per billion volume (ppbv).

Note: This is well above the reported detection threshold of 0.5 ppbv (someone detects some odor) and about twice the recognition threshold (the individual recognizes that is the odor of rotten eggs) of about 4.7 ppbv.[2] The 10 ppbv action level is reasonable.

UNAVOIDABLE SIGNIFICANT IMPACTS

No unavoidable significant impacts have been identified.

[2] Water Environment Federation, *Design of Municipal Wastewater Treatment Plants*, 4th ed.