APPENDIX B

LAKE WOHLFORD DAM REPLACEMENT PROJECT AIR QUALITY TECHNICAL STUDY

AIR QUALITY TECHNICAL STUDY
FOR THE
LAKE WOHLFORD DAM REPLACEMENT PROJECT

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SECTION 1
INTRODUCTION

This air quality technical study examines the degree to which the proposed project may result in significant adverse changes in air quality. This study includes a description of existing air quality conditions, a summary of applicable regulations, and an analysis of construction and operational air quality impacts of the proposed project.

1.1 PROJECT DESCRIPTION

The project entails constructing a replacement dam immediately downstream (west) of the existing dam and partially deconstructing the existing dam by removing the hydraulic fill material that is at a higher elevation than the original rock fill. The replacement dam would feature an outlet tower integrated into the dam's upstream face; the top of the existing outlet tower would be demolished, and the bottom of the existing outlet tower and the outlet pipe would be abandoned in place. To accommodate the replacement dam's configuration, the project also entails realignment of the portion of Oakvale Road that passes the southern dam abutment. This portion of the road would be realigned south of its current location, requiring excavation into the adjacent hillside.

The project is intended to achieve the following primary objectives:

1. Alleviate public safety and flooding concerns due to seismic instability of the existing Lake Wohlford Dam.
2. Restore the City's municipal water-storage capacity in Lake Wohlford to its historic capacity of 6,500 acre-feet.
3. Restore water level in Lake Wohlford to previous levels and support fishing and other water-dependent recreational opportunities.
4. Provide a dam facility with a life expectancy of 100 years.
5. Minimize the project's temporary and long-term impact on the environment.

The replacement Lake Wohlford Dam would be constructed immediately downstream of the existing dam, with the replacement dam's crest approximately 200 feet downstream of the existing dam's crest. The replacement dam's crest would rise approximately 125 feet above the foundation grade, to an elevation of 1,490 feet above mean sea level (AMSL), and the crest would span approximately 650 feet from the right (north) abutment to the left (south) abutment.

1.2 PROJECT CONSTRUCTION

Oakvale Road Improvements

Oakvale Road skirts a steep rock face just southwest of the existing left abutment of the existing dam and conflicts with the proposed location for the replacement dam's left abutment. The project entails realigning approximately 1,200 feet of the road toward the south and straightening the road. To create enough of a surface that would accommodate the realignment, the project requires excavation into the hillside and removal of approximately 56,000 cubic yards of rock and earth.

The new road would be constructed to County of San Diego standards and would be 28 feet wide, including two 12-foot lanes with a 3-foot bench constructed on the downhill (northern) side. Drainage improvements would include reconstruction of a storm drain beneath the western end of the roadway improvements, and a new 18-inch storm drain beneath the road on the eastern side of the project limits.

Dam Foundation

Material would be excavated from the downstream canyon floor and rocky slopes to create a solid foundation and suitable surfaces to place the abutments. Consolidation grouting would be provided to ensure a more uniform foundation modulus for support of the dam. A double-row grout curtain would be installed in the foundation to strengthen the foundation and reduce seepage. Approximately 59,516 cubic yards of earth and rock are anticipated to be excavated for establishment of the dam foundation.

Right Abutment Access Road

The project would entail construction of a paved access road from the Lake Wohlford Marina to the right (north) abutment of the replacement dam. The road would provide construction access to the dam construction zone and, following completion of the project, would provide permanent maintenance and inspection access to the right abutment and the dam crest. Constructing the access road would require excavation into the hillside to create a level surface for installation of the road. A locked gate would be installed to prevent trespassing and unauthorized access to the dam crest.

Dam Construction

The dam would be constructed of roller-compacted concrete (RCC), which is a modern method of placing mass concrete for gravity dams. This method utilizes the materials of conventionally placed concrete (cement, coarse aggregate, sand, and water), but minimizes the water content to allow material handling with conventional soil-placing methods. RCC is placed using conveyors, dump trucks, dozers, and roller compactors. Like engineered soil placement, RCC is placed in thin layers starting from the base of the dam (usually 12 inches thick), as opposed to conventionally placed mass concrete, which is poured in large sections that are typically 5 feet thick. The RCC method reduces water content such that the mix is dry enough to prevent roller equipment from sinking, but wet enough to permit adequate distribution of the material in each layer. Approximately 100,000 cubic yards of RCC concrete are anticipated to be placed to form the dam. This phase of project construction is anticipated to involve 24-hour work (weather permitting) to maximize the effectiveness of placing the RCC layers.

Project engineers estimate the 100,000 cubic yards of RCC would require 175,000 tons of aggregate material, 9,250 tons of fly ash, and 8,750 tons of cement, or a total of 193,000 total tons of RCC material that would need to be delivered to the site.

A batch mixer would be established at the primary staging yard located at the Lake Wohlford Marina. RCC can be transported via truck or conveyor, or some combination of the two, and the project engineers intend to maintain flexibility in the transport mode, giving the contractor the option of establishing a conveyor or using trucks. However, the project design is likely to include a conveyor system for transporting material along the access road and placing the material onto the dam.

Demolition of Existing Dam and Existing Outlet Tower

After completion of the new dam construction, the hydraulic fill portion of the existing dam would be removed down to 1,450 feet AMSL. A notch would be constructed in the existing dam to 1,420 feet AMSL to allow full flow access from the reservoir to the new outlet tower. The left abutment of the existing dam will be removed in its entirety to existing natural grade. Excavation quantity for the existing dam removal is estimated at approximately 37,100 cubic yards. The City intends to issue a bid alternative for this construction contract that would involve full removal of the existing dam. This would require additional drawdown of the reservoir, and additional excavation and off-hauling of material. The full demolition excavation is estimated at 22,000 additional cubic yards beyond that described above for the top part of the dam, for a total of 59,100 cubic yards of excavated material that would be hauled off site.

1.3 CONSTRUCTION SCHEDULE

Total project construction, excluding reservoir dredging but including contractor mobilization and demobilization, is expected to require approximately 16 months. The Oakvale Road realignment excavation is anticipated to take approximately 4 months, followed by another month to construct the realigned road. Excavation of the foundation is anticipated to take 2 to 3 months. Establishment of the access road is anticipated to take 1 to 2 months. The dam raise construction is anticipated to take 5 months. Demolition of the existing dam and existing outlet tower would take approximately 9 weeks.

SECTION 2
EXISTING CONDITIONS

2.1 CLIMATE, TOPOGRAPHY, AND METEOROLOGY

Air quality is defined by the concentration of pollutants related to human health. Concentrations of air pollutants are determined by the rate and location of pollutant emissions released by pollution sources, and the atmosphere's ability to transport and dilute such emissions. Natural factors that affect transport and dilution include terrain, wind, and sunlight. Therefore, ambient air quality conditions within the local air basin are influenced by such natural factors as topography, meteorology, and climate, in addition to the amount of air pollutant emissions released by existing air pollutant sources.

Climate, topography, and meteorology influence regional and local ambient air quality. Southern California is characterized as a semiarid climate, although it contains three distinct zones of rainfall that coincide with the coast, mountain, and desert. The project is located in the City of Escondido in San Diego County, and within the San Diego Air Basin (SDAB). The SDAB is a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean to the west and high mountain ranges to the east. The topography in the SDAB region varies greatly, from beaches on the west, to mountains and then desert to the east.

The climate of the SDAB is characterized by warm, dry summers and mild winters. One of the main determinants of its climatology is a semipermanent high-pressure area in the eastern Pacific Ocean. This high-pressure cell maintains clear skies for much of the year. When the Pacific High moves southward during the winter, this pattern changes, and low-pressure storms are brought into the region, causing widespread precipitation. During fall, the region often experiences dry, warm easterly winds, locally referred to as Santa Ana winds, which raise temperatures and lower humidity, often to less than 20 percent.

The local meteorology of the project area is represented by measurements recorded at the Escondido station. Rainfall averages approximately 16 inches annually (WRCC 2015). The heaviest precipitation occurs November through April. Normal January temperatures range from a minimum of 37 degrees Fahrenheit (°F) to a maximum of 65°F, and August temperatures range from a minimum of 59°F to a maximum of 88°F (WRCC 2015).

A dominant characteristic of spring and summer is night and early morning cloudiness, locally known as the marine layer. Low clouds form regularly, frequently extending inland over the coastal foothills and valleys. These clouds usually dissipate during the morning, and afternoons are generally clear.

A common atmospheric condition known as a temperature inversion affects air quality in the SDAB. During an inversion, air temperatures get warmer rather than cooler with increasing height. Inversion layers are important for local air quality, because they inhibit the dispersion of pollutants and result in a temporary degradation of air quality. The pollution potential of an area is largely dependent on a combination of winds, atmospheric stability, solar radiation, and terrain. The combination of low wind speeds and low-level inversions produces the greatest concentration of air pollutants. On days without inversions, or on days of winds averaging over 15 miles per hour (mph), the atmospheric pollution potential is greatly reduced.

2.2 CRITERIA POLLUTANTS

Individual air pollutants at certain concentrations may adversely affect human or animal health, reduce visibility, damage property, and reduce the productivity or vigor of crops and natural vegetation. Six air pollutants have been identified by the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (ARB) as being of concern both on a nationwide and statewide level: ozone; carbon monoxide (CO); nitrogen dioxide (NO_2); sulfur dioxide (SO_2); lead; and particulate matter (PM), which is subdivided into two classes based on particle size: PM equal to or less than 10 micrometers in diameter (PM_{10}) and PM equal to or less than 2.5 micrometers in diameter ($PM_{2.5}$). Because the air quality standards for these air pollutants are regulated using human health and environmentally based criteria, they are commonly referred to as "criteria air pollutants."

Ozone. Ozone is the principal component of smog and is formed in the atmosphere through a series of reactions involving volatile organic compounds (VOC) and nitrogen oxides (NO_X) in the presence of sunlight. VOC and NO_X are called precursors of ozone. NO_X includes various combinations of nitrogen and oxygen, including nitric oxide (NO), NO_2, and others. Ozone is a principal cause of lung and eye irritation in the urban environment. Significant ozone concentrations are usually produced only in the summer, when atmospheric inversions are greatest and temperatures are high. VOC and NO_X emissions are both considered critical in ozone formation.

Carbon Monoxide. CO is a colorless and odorless gas that, in the urban environment, is associated primarily with the incomplete combustion of fossil fuels in motor vehicles. Relatively high concentrations are typically found near crowded intersections and along heavily used roadways carrying slow-moving traffic. Even under most severe meteorological and traffic conditions, high concentrations of CO are limited to locations within a relatively short distance (300 to 600 feet) of heavily traveled roadways. Vehicle traffic emissions can cause localized CO impacts, and severe vehicle congestion at major signalized intersections can generate elevated CO levels, called "hot spots," which can be hazardous to human receptors adjacent to the intersections.

Nitrogen Dioxide. NO_2 is a product of combustion and is generated in vehicles and in stationary sources, such as power plants and boilers. It is also formed when ozone reacts with NO in the atmosphere. As noted above, NO_2 is part of the NO_X family and is a principal contributor to ozone and smog generation.

Sulfur Dioxide. SO_2 is a combustion product, with the primary source being power plants and heavy industries that use coal or oil as fuel. SO_2 is also a product of diesel engine combustion. SO_2 in the atmosphere contributes to the formation of acid rain.

Lead. Lead is a highly toxic metal that may cause a range of human health effects. Previously, the lead used in gasoline anti-knock additives represented a major source of lead emissions to the atmosphere. EPA began working to reduce lead emissions soon after its inception, issuing the first reduction standards in 1973. Lead emissions have significantly decreased due to the near elimination of leaded gasoline use.

PM. Particulate matter is a complex mixture of extremely small particles and liquid droplets. Particulate matter is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. Natural sources of PM include windblown dust and ocean spray. The size of PM is directly linked to the potential for causing health problems. EPA is concerned about particles that are 10 micrometers in diameter or smaller, because these particles generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. Health studies have shown a significant association between exposure to PM and premature death. Other important effects include aggravation of respiratory and cardiovascular disease, lung disease, decreased lung function, asthma attacks, and certain cardiovascular problems, such as heart attacks and irregular heartbeat (EPA 2007). Individuals particularly sensitive to fine particle exposure include older adults, people with heart and lung disease, and children. As previously discussed, EPA groups PM into two categories, which are described below.

$PM_{2.5.}$ Fine particles, such as those found in smoke and haze, are $PM_{2.5}$. Sources of fine particles include all types of combustion activities (motor vehicles, power plants, wood burning, etc.) and certain industrial processes. $PM_{2.5}$ is also formed through reactions of gases, such as SO_2 and

nitrogen oxides, in the atmosphere. $PM_{2.5}$ is the major cause of reduced visibility (haze) in California.

PM_{10}. PM_{10} includes both fine and coarse dust particles; the fine particles are $PM_{2.5}$. Coarse particles, such as those found near roadways and dusty industries, are larger than 2.5 micrometers and smaller than 10 micrometers in diameter. Sources of coarse particles include crushing or grinding operations and dust from paved or unpaved roads. Control of PM_{10} is primarily achieved through the control of dust at construction and industrial sites, the cleaning of paved roads, and the wetting or paving of frequently used unpaved roads.

2.3 HEALTH EFFECTS OF CRITERIA AIR POLLUTANTS

Ozone. Individuals exercising outdoors, children, and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered the most susceptible sub-groups for ozone effects. Short-term exposure (lasting for a few hours) to ozone can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. In recent years, a correlation between elevated ambient ozone levels and increases in daily hospital admission rates, as well as mortality, has also been reported. An increased risk for asthma has been found in children who participate in multiple sports and live in communities with high ozone levels.

Particulate Matter (PM). A consistent correlation between elevated PM_{10} and $PM_{2.5}$ levels and an increase in mortality rates, respiratory infections, number and severity of asthma attacks, and the number of hospital admissions has been observed in different parts of the United States and various areas around the world. In recent years, some studies have reported an association between long term exposure to air pollution dominated by fine particles and increased mortality, reduction in life-span, and an increased mortality from lung cancer.

Daily fluctuations in $PM_{2.5}$ concentration levels have also been related to hospital admissions for acute respiratory conditions in children, to school and kindergarten absences, to a decrease in respiratory lung volumes in normal children, and to increased medication use in children and adults with asthma. Recent studies show lung function growth in children is reduced with long-term exposure to PM. The elderly, people with preexisting respiratory or cardiovascular disease, and children appear to be more susceptible to the effects of high levels of PM_{10} and $PM_{2.5}$.

Carbon Monoxide (CO). Individuals with a deficient blood supply to the heart are the most susceptible to the adverse effects of CO exposure. The effects observed include earlier onset of chest pain with exercise, and electrocardiograph changes indicative of decreased oxygen supply to the heart. Inhaled CO has no direct toxic effect on the lungs, but exerts its effect on tissues by interfering with oxygen transport. Hence, conditions with an increased demand for oxygen supply can be adversely affected by exposure to CO. Individuals most at risk include fetuses, patients with diseases involving heart and blood vessels, and patients with chronic hypoxemia (oxygen deficiency) as seen at high altitudes.

Nitrogen Dioxide (NO_2). Population-based studies suggest that an increase in acute respiratory illness, including infections and respiratory symptoms in children, is associated with long-term exposure to NO_2 at levels found in homes with gas stoves, which are higher than ambient levels found in southern California. Increase in resistance to air flow and airway contraction is observed after short-term exposure to NO_2 in healthy subjects. Larger decreases in lung functions are observed in individuals with asthma or chronic obstructive pulmonary disease (e.g., chronic bronchitis, emphysema) than in healthy individuals, indicating a greater susceptibility of these sub-groups.

Sulfur Dioxide (SO_2). In asthmatics, increase in resistance to air flow, as well as reduction in breathing capacity leading to severe breathing difficulties, is observed after acute exposure to SO_2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO_2. Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient SO_2 levels. In these studies, efforts to separate the effects of SO_2 from those of fine particles have not been successful. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.

Lead. Fetuses, infants, and children are more sensitive than others to the adverse effects of lead exposure. Exposure to low levels of lead can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and lower intelligence quotient. In adults, increased lead levels are associated with increased blood pressure. Lead poisoning can cause anemia, lethargy, seizures, and death, although it appears that there are no direct effects of lead on the respiratory system.

2.4 AIR QUALITY STANDARDS

Health-based air quality standards have been established for these criteria pollutants by EPA at the national level and by ARB at the state level. These standards were established to protect the public with a margin of safety from adverse health impacts due to exposure to air pollution. California has also established standards for sulfates, visibility-reducing particles, hydrogen sulfide, and vinyl chloride. A brief description of each criteria air pollutant is provided below along with the most current monitoring station data and attainment designations for the project study areas. Table 1 presents the National Ambient Air Quality Standards (NAAQS) and the California Ambient Air Quality Standards (CAAQS).

2.5 SAN DIEGO AIR BASIN EXISTING AIR QUALITY

Ambient air pollutant concentrations in the SDAB are measured at air quality monitoring stations operated by ARB and the San Diego Air Pollution Control District (SDAPCD). The closest and most representative SDAPCD air quality monitoring station to the project site is the Escondido monitoring station, located at 600 East Valley Parkway in Escondido, California. Table 2 presents the most recent data over the past 3 years from the Escondido monitoring station as summaries of the exceedances of standards and the highest pollutant levels recorded for years 2012 through 2014. These concentrations represent the existing, or baseline conditions, for the project.

As shown in Table 2, ambient air concentrations of CO and NO_2 at the Escondido monitoring station have not exceeded the NAAQS/CAAQS in the past 3 years. PM_{10} concentrations exceeded the CAAQS in 2013, and $PM_{2.5}$ concentrations exceeded the federal standards in all of the past 3 years. Concentrations of 8-hour ozone registered at the monitoring station also exceeded the NAAQS in 2014 and the CAAQS in all of the past 3 years.

2.6 SDAB ATTAINMENT STATUS

Both EPA and ARB use ambient air quality monitoring data to designate areas according to their attainment status for criteria air pollutants. The purpose of these designations is to identify the areas with air quality problems and initiate planning efforts for improvement. The three basic designation categories are nonattainment, attainment, and unclassified. An “attainment” designation for an area signifies that pollutant concentrations did not exceed the established standard. In most cases, areas designated or redesignated as attainment must develop and implement maintenance plans, which are designed to ensure continued compliance with the standard.

In contrast to attainment, a “nonattainment” designation indicates that a pollutant concentration has exceeded the established standard. Nonattainment may differ in severity. To identify the severity of the problem and the extent of planning and actions required to meet the standard, nonattainment areas are assigned a classification that is commensurate with the severity of their air quality problem (e.g., moderate, serious, severe, extreme).

Table 1
National and California Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [a] Concentration [c]	National Standards [b] Primary [c,d]	National Standards [b] Secondary [c,e]
Ozone	1 hour	0.09 ppm (180 µg/m^3)	–	Same as primary standard
	8 hours	0.070 ppm (137 µg/m^3)	0.075 ppm (147 µg/m^3)	
Respirable particulate matter (PM_{10})[f]	24 hours	50 µg/m^3	150 µg/m^3	Same as primary standard
	Annual arithmetic mean	20 µg/m^3	–	
Fine particulate matter ($PM_{2.5}$) [f]	24 hours	–	35 µg/m^3	Same as primary standard
	Annual arithmetic mean	12 µg/m^3	12 µg/m^3	15 µg/m
Carbon monoxide (CO)	8 hours	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	None
	1 hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	
	8 hours (Lake Tahoe)	6 ppm (7 mg/m^3)	–	–
Nitrogen dioxide (NO_2) [g]	Annual arithmetic mean	0.030 ppm (57 µg/m^3)	0.053 ppm (100 µg/m^3)	Same as primary standard
	1 hour	0.18 ppm (339 µg/m^3)	100 ppb (188 µg/m^3)	None
Sulfur dioxide (SO_2) [h]	Annual Arithmetic Mean	–	0.030 ppm (for certain areas) [h]	–
	24 hours	0.04 ppm (105 µg/m^3)	0.14 ppm (for certain areas) [h]	–
	3 hours	—	–	0.5 ppm (1,300 µg/m^3)
	1 hour	0.25 ppm (655 µg/m^3)	75 ppb (196 µg/m^3)	–
Lead [i,j]	30-day average	1.5 µg/m^3	–	–
	Calendar quarter	–	1.5 µg/m^3 (for certain areas) [j]	Same as primary standard
	Rolling 3-month average	–	0.15 µg/m^3	
Visibility-reducing particles [k]	8 hours	See footnote j	No national standards	
Sulfates	24 hours	25 µg/m^3		
Hydrogen sulfide	1 hour	0.03 ppm (42 µg/m^3)		
Vinyl chloride [i]	24 hours	0.01 ppm (26 µg/m^3)		

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

[a] California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1- and 24-hour), nitrogen dioxide, and particulate matter (PM_{10}, $PM_{2.5}$, 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.

[b] National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than 1. For $PM_{2.5}$, the 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standards.

[c] Concentration expressed first in the units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25 degrees Celsius and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and reference pressure of 760 torr; (ppm) in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

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

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

[f] On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 µg/m3 to 12.0 µg/m3. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 µg/m3, as was the annual secondary standard of 15 µg/m3. The existing 24-hour PM10 standards (primary and secondary) of 150 µg/m3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

[g] To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. California standards are in units of ppm. To directly compare the national 1-hour standard to the California standards the units can be converted from 100 ppb to 0.100 ppm.

[h] On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until 1 year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved. To directly compare the 1-hour national standard to the California standard, the units can be converted to ppm. In this case, the national standard of 75 ppb is identical of 0.075 ppm.

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

[j] The national standard for lead was revised on October 15, 2008, to a rolling 3-month average. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until 1 year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standards are approved.

[k] In 1989, ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are “extinction of 0.23 per kilometer” and the “extinction of 0.07 per kilometer” for the statewide and Lake Tahoe Air Basin standards, respectively.

Source: ARB 2013a

Table 2
Ambient Air Quality Summary –Escondido Monitoring Stations

Pollutant Standards	2012	2013	2014
Carbon Monoxide (CO)			
National maximum 8-hour concentration (ppm)	3.61	*	*
State maximum 8-hour concentration (ppm)	3.70	*	*
Number of Days Standard Exceeded			
NAAQS 8-hour (>9.0 ppm)	0	0	0
CAAQS 8-hour (>9.0 ppm)	0	0	0
Nitrogen Dioxide (NO_2)			
State maximum 1-hour concentration (ppb)	62	61	63
Annual Average (ppb)	13	13	11
Number of Days Standard Exceeded			
CAAQS 1-hour	0	0	0
Ozone			
State maximum 1-hour concentration (ppm)	0.084	0.084	0.099
National maximum 8-hour concentration (ppm)	0.073	0.074	0.079
Number of Days Standard Exceeded			
CAAQS 1-hour (>0.09 ppm)	0	0	1
CAAQS 8- hour (>0.070 ppm)/NAAQS 8-hour (>0.075 ppm)	2/0	4/0	8/5
Particulate Matter (PM_{10}) [a]			
National maximum 24-hour concentration ($\mu g/m^3$)	33.0	80.0	43.0
State maximum 24-hour concentration ($\mu g/m^3$)	33.0	82.0	44.0
State annual average concentration ($\mu g/m^3$)	18.1	23.1	21.5
Measured Number of Days Standard Exceeded			
NAAQS 24-hour (>150 $\mu g/m^3$)	0	0	0
CAAQS 24-hour (>50 $\mu g/m^3$)	0	1	0
Particulate Matter ($PM_{2.5}$) [a]			
National maximum 24-hour concentration ($\mu g/m^3$)	70.7	56.3	77.5
State maximum 24-hour concentration ($\mu g/m^3$)	70.7	56.3	82.3
National annual average concentration ($\mu g/m^3$)	10.5	11.0	9.9
State annual average concentration ($\mu g/m^3$)	*	10.5	9.6
Measured Number of Days Standard Exceeded			
NAAQS 24-hour (>35 $\mu g/m^3$)	1	1	1

$\mu g/m^3$ = micrograms per cubic meter; ppb = parts per billion; ppm == parts per million

Source: ARB 2015a

Finally, an unclassified designation indicates that insufficient data exist to determine attainment or nonattainment. In addition, the California designations include a subcategory of nonattainment-transitional, which is given to nonattainment areas that are progressing and nearing attainment.

As shown in Table 3, the SDAB currently meets NAAQS for all criteria air pollutants except ozone, and meets the CAAQS for all criteria air pollutants except ozone, PM_{10}, and $PM_{2.5}$. The SDAB is designated as "marginal" nonattainment area for the 2008 8-hour ozone standard. The SDAB currently falls under a federal maintenance plan for the 1997 8-hour ozone standard. The SDAB is currently classified as a state nonattainment area for ozone, PM_{10}, and $PM_{2.5}$.

2.7 TOXIC AIR CONTAMINANTS

In addition to criteria pollutants, both federal and state air quality regulations also focus on toxic air contaminants (TACs). TACs can be separated into carcinogens and noncarcinogens based on the nature of the effects associated with exposure to the pollutant. For regulatory purposes, carcinogens are assumed to have no safe threshold below which health impacts would not occur. Any exposure to a carcinogen poses some risk of contracting cancer. Noncarcinogens differ in that there is generally assumed to be a safe level of exposure below which no negative health impact is believed to occur. These levels are determined on a pollutant-by-pollutant basis.

Table 3
San Diego Air Basin Attainment Designations

Pollutant	State	Federal
Ozone (1-hour)	Nonattainment	Attainment
Ozone (8-hour)	Nonattainment	Nonattainment
Carbon Monoxide	Attainment	Unclassified/Attainment
Nitrogen Dioxide	Unclassified/Attainment	Unclassified/Attainment
Sulfur Dioxide	Unclassified/Attainment	Unclassified/Attainment
PM_{10}	Nonattainment	Unclassified
$PM_{2.5}$	Nonattainment	Unclassified/Attainment
Sulfates	Attainment	N/A
Hydrogen Sulfide	Unclassified	N/A
Visibility Reducing Particles	Unclassified/Attainment	N/A
Lead	Unclassified/Attainment	Unclassified/Attainment

Source: ARB 2015b
N/A = not applicable; no standard

TACs may be emitted by stationary, area, or mobile sources. Common stationary sources of TAC emissions include gasoline stations, dry cleaners, and diesel backup generators, which are subject to local air district permit requirements. The other, often more significant, sources of TAC emissions are motor vehicles on freeways, high-volume roadways, or other areas with high numbers of diesel vehicles, such as distribution centers. Off-road mobile sources are also major contributors of TAC emissions and include construction equipment, ships, and trains.

Particulate exhaust emissions from diesel-fueled engines (diesel PM) were identified as a TAC by ARB in 1998. Federal and state efforts to reduce diesel PM emissions have focused on the use of improved fuels, adding particulate filters to engines, and requiring the production of new-technology engines that emit fewer exhaust particulates.

Diesel engines tend to produce a much higher ratio of fine particulates than other types of internal combustion engines. The fine particles that make up diesel PM tend to penetrate deep into the lungs and the rough surfaces of these particles makes it easy for them to bind with other toxins within the exhaust, thus increasing the hazards of particle inhalation. Long-term exposure to diesel PM is known to lead to chronic, serious health problems including cardiovascular disease, cardiopulmonary disease, and lung cancer.

2.8 ODOR

Odors are considered an air quality issue both at the local level (e.g., odor from wastewater treatment) and at the regional level (e.g., smoke from wildfires). Odors are generally regarded as an annoyance rather than a health hazard. However, manifestations of a person’s reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

The ability to detect odors varies considerably among the population and is subjective. Some individuals have the ability to smell minute quantities of specific substances while others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; an odor that is offensive to one person (e.g., from a fast-food restaurant or bakery) may be perfectly acceptable to another. Unfamiliar odors may be more easily detected and likely to cause complaints than familiar ones.

Several examples of common land use types that generate substantial odors include wastewater treatment plants, landfills, composting/green waste facilities, recycling facilities, petroleum refineries, chemical manufacturing plants, painting/coating operations, rendering plants, and food packaging plants.

Offensive odors can potentially affect human health in several ways. First, odorant compounds can irritate the eye, nose, and throat, which can reduce respiratory volume. Second, VOC that cause odors can stimulate sensory nerves to cause neurochemical changes that might influence health, for instance, by compromising the immune system. Finally, unpleasant odors can trigger memories or attitudes linked to unpleasant odors, causing cognitive and emotional effects such as stress.

2.9 SENSITIVE RECEPTORS

Some members of the population are especially sensitive to air pollutant emissions and should be given special consideration when evaluating air quality impacts from projects. These include children, the elderly, people with preexisting respiratory or cardiovascular illness, and athletes and others who engage in frequent exercise. Air quality regulators typically define sensitive receptors as schools, hospitals, resident care facilities, day-care centers, or other facilities that may house individuals with health conditions that would be adversely impacted by changes in air quality.

Residential areas are also considered sensitive to air pollution because residents (including children and the elderly) tend to be at home for extended periods of time, resulting in sustained exposure to pollutants present. Recreational land uses are considered moderately sensitive to air pollution. Exercise places a high demand on respiratory functions, which can be impaired by air pollution even though exposure periods during exercise are generally short. In addition, noticeable air pollution can detract from the enjoyment of recreation. Industrial and commercial areas are considered the least sensitive to air pollution. Exposure periods are relatively short and intermittent as the majority of the workers tend to stay indoors most of the time.

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SECTION 3
REGULATORY FRAMEWORK

3.1 FEDERAL STANDARDS

EPA, under the provisions of the Clean Air Act (CAA), requires each state with regions that have not attained NAAQS to prepare a State Implementation Plan (SIP), detailing how these standards are to be met in each local area. The SIP is a legal agreement between each state and the federal government to commit resources to improving air quality. It serves as the template for conducting regional and project-level air quality analysis. The SIP is not a single document, but a compilation of new and previously submitted attainment plans, emissions reduction programs, district rules, state regulations, and federal controls.

General conformity requires that all federal actions conform to the SIP as approved or promulgated by EPA. General conformity requirements were adopted by Congress as part of the CAA Amendments and were implemented by EPA regulations in the November 30, 1993 Federal Register (40 Code of Federal Regulations [CFR] Sections 6, 51, and 93: "Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule").

The process to evaluate General Conformity for a proposed federal action involves an applicability analysis, conformity determination, and review. According to EPA guidance, the federal agency must apply the applicability requirements found at 40 CFR Section 93.153(b) to the federal action to evaluate whether, on a pollutant-by-pollutant basis, a determination of General Conformity is required. If the regulating federal agency determines that the General Conformity regulations do not apply to the federal action, no further analysis or documentation is required.

Analysis required by the General Conformity Rule focuses on the net increase in emissions compared to ongoing historical conditions. Existing SIPs are presumed to have accounted for routine, ongoing federal agency activities. Conformity analyses are further limited to those direct and indirect emissions over which the federal agency has responsibility and control. General Conformity analyses are not required to analyze emissions sources that are beyond the responsibility and control of the federal agency. Conformity determinations are not required to address emissions that are not reasonably foreseeable or reasonably quantifiable.

A federal action is exempt and considered to conform to the SIP if an applicability analysis shows that total direct and indirect net emissions from construction and operation of the action would be less than specified emission-rate thresholds, known as de minimis levels. The de minimis levels are based on the attainment/maintenance and nonattainment designations and classifications for the project area. If the emissions would exceed the de minimis levels, a formal air quality conformity determination is required.

3.2 STATE STANDARDS

ARB is the lead agency for developing the SIP in California. Local air districts and other agencies prepare Air Quality Attainment Plans or Air Quality Management Plans (AQMPs) and submit them to ARB for review, approval, and incorporation into the applicable SIP. ARB also maintains air quality monitoring stations throughout the state in conjunction with local air districts. Data collected at these stations are used by the ARB to classify air basins as being in attainment or nonattainment with respect to each pollutant and to monitor progress in attaining air quality standards.

The California CAA requires that each area exceeding the CAAQS for ozone, CO, SO2, and NO2 must develop a plan aimed at achieving those standards. The California Health and Safety Code, Section 40914, requires air districts to design a plan that achieves an annual reduction in district-wide emissions of 5 percent or more, averaged every consecutive 3-year period. To satisfy this requirement, the local air districts have to develop and implement air pollution reduction measures, which are described in their AQMPs, and outline strategies for achieving the CAAQS for any criteria pollutants for which the region is classified as nonattainment.

ARB has established emission standards for vehicles sold in California and for various types of equipment. California gasoline specifications are governed by both state and federal agencies. During the past decade, federal and state agencies have imposed numerous requirements on the production and sale of gasoline in California. ARB has also adopted control measures for diesel PM and more stringent emissions standards for various on-road mobile sources of emissions, including transit buses and off-road diesel equipment (e.g., tractors, generators).

TACs in California are regulated primarily through the Tanner Air Toxics Act (Chapter 1047, Statutes of 1983) and the Air Toxics Hot Spots Information and Assessment Act (Chapter 1252, Statutes of 1987). Assembly Bill 1807 sets forth a formal procedure for ARB to designate substances as TACs. Research, public participation, and scientific peer review must occur before ARB can designate a substance as a TAC. The Air Toxics Hot Spots Information and Assessment Act requires that TAC emissions from stationary sources be quantified and compiled into an inventory according to criteria and guidelines developed by ARB, and if directed to do so by the local air district, a health risk assessment (HRA) must be prepared to determine the potential health impacts of such emissions.

3.3 LOCAL STANDARDS

In San Diego County, the SDAPCD is the agency responsible for the administration of federal and state air quality laws, regulations, and policies. Included in the SDAPCD's tasks are monitoring of air pollution, preparation of the SIP for the SDAB, and promulgation of rules and regulations. The SIP includes strategies and tactics to be used to attain the federal ozone standard in the county. The SIP elements are taken from the Regional Air Quality Strategy (RAQS), the SDAPCD plan for attaining the state ozone standard, which is more stringent than the federal ozone standard. The rules and regulations include procedures and requirements to control the emission of pollutants and to prevent adverse impacts.

SDAPCD rules relevant to the proposed project include:

- Regulation IV: Prohibitions; Rule 50: Visible Emissions. Prohibits the generation of particulate matter emissions that exceed the visible emissions threshold.
- Regulation IV: Prohibitions; Rule 51: Nuisance. Prohibits the discharge, from any source, of such quantities of air contaminants or other materials that cause or have a tendency to cause injury, detriment, nuisance, annoyance to people and/or the public, or damage to any business or property.
- Regulation IV: Prohibitions; Rule 55: Fugitive Dust. Regulates fugitive dust emissions from any commercial construction or demolition activity capable of generating fugitive dust emissions, including active operations, open storage piles, and inactive disturbed areas, as well as track-out and carry-out onto paved roads beyond a project site.
- Regulation IV: Prohibitions; Rule 67.0: Architectural Coatings. Requires manufacturers, distributors, and end users of architectural and industrial maintenance coatings to reduce volatile organic compound (VOC) emissions from the use of these coatings, primarily by placing limits on the VOC content of various coating categories.

The project is required to comply with these rules, and conformance will be incorporated into project specifications and procedures. In addition, facilities may be required to obtain permits for any operations or equipment that emits or is capable of emitting air contaminants. The SDAPCD issues Authority to Construct and Permit to Operate permits for concrete batch plant operations. The permit application requires implementation of Best Available Control Technology (BACT) based on emission limits or control options, such as filters.

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SECTION 4
ANALYSIS OF IMPACTS

4.1 THRESHOLDS OF SIGNIFICANCE

According to the Appendix G of the California Environmental Quality Act (CEQA) Guidelines, a significant impact related to air quality would occur if implementation of the project would:

- conflict with or obstruct implementation of the applicable air quality plan,
- violate any air quality standard or contribute substantially to an existing or projected air quality violation,
- result in cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard,
- expose sensitive receptors to substantial pollutant concentrations, or
- create objectionable odors affecting a substantial number of people.

As stated in the CEQA Guidelines, the significance criteria established by the applicable air quality management board or air pollution control district may be relied on to make the impact determinations for specific program elements. SDAPCD has not developed quantitative significance thresholds for CEQA projects. Both the County of San Diego and the City of Escondido have established recommended screening level thresholds of significance for regional pollutant emissions (County of San Diego 2007, City of Escondido 2013). Since the site is located outside the City's municipal boundaries, the City has elected to use the San Diego County screening thresholds for regional pollutant emissions to analyze the impacts of the project pursuant to CEQA. The County of San Diego *Guidelines for Determining Significance and Report Format and Content Requirements, Air Quality*, which outline these screening level thresholds, state that a project that results in an emissions increase less than these levels would not lead to a violation of a NAAQS or CAAQS (County of San Diego 2007). The daily emission thresholds for criteria pollutants are consistent in both the County and City guidelines. The screening level thresholds are shown in Table 4.

Table 4
Regional Pollutant Emission Screening Level Thresholds of Significance

	VOC	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$	Lead
Pounds per hour	–	25	100	25	–	–	–
Pounds per day	75	250	550	250	100	55	3.2
Tons per year	13.7	40	100	40	15	10	0.6

VOC = volatile organic compounds; NO_X = oxides of nitrogen; SO_X = sulfur oxides; CO = carbon monoxide; PM_{10} = respirable particulate matter with an aerodynamic resistance diameter of 10 micrometers or less, $PM_{2.5}$ = fine particulate matter with an aerodynamic resistance diameter of 2.5 micrometers or less

– = No threshold proposed

Source: County of San Diego 2007

If the emissions of the project are below the screening level thresholds, it can be concluded that the project would not violate any air quality standard or contribute substantially to an existing or projected air quality violation.

As discussed in Section 3.1, the General Conformity Rule requires any federal agency responsible for an action in a federal nonattainment or attainment/maintenance area to demonstrate conformity to the applicable SIP. The Federal Energy Regulatory Commission (FERC) is the federal lead agency on this project, and General Conformity Rule analysis is provided for their use in environmental review under the National Environmental Policy Act (NEPA) and federal permitting needs. NEPA air quality impact significance differs from the General Conformity in that all criteria pollutant emissions are considered. Therefore, the NEPA analysis also includes attainment pollutants, as well as nonattainment and maintenance pollutant emissions considered under General Conformity. The General Conformity/NEPA analysis for air quality impacts is provided separately from the CEQA analysis.

General conformity de minimis thresholds are appropriate thresholds to be used for determining NEPA significance. The total annual direct and indirect project emissions of attainment pollutants, as well as the emissions of nonattainment/maintenance pollutants (analyzed for General Conformity) from the proposed project would be compared against the de minimis levels for the attainment status of these pollutants. The applicable de minimis thresholds for the project emissions generated in the SDAB are shown in Table 5.

Table 5
Applicable General Conformity/NEPA Significance Thresholds

Pollutant	*De minimis* Emission Threshold (tons/year)
CO	100
NO_X	100
ROG	100
SO_X	100
PM_{10}	100
$PM_{2.5}$	100

Source: 40 CFR Part 93

Project impact significance under CEQA and NEPA, respectively, was determined by comparing the emissions for the proposed project to the thresholds mentioned above in Tables 4 and 5. Project alternatives with the potential to generate emissions exceeding the thresholds would have a significant impact (CEQA) or adverse effect (NEPA) on air quality. If the project alternative's emissions exceed the significance criteria, mitigation measures are available, depending on the nature of the air quality impact.

4.2 METHODOLOGY

Construction-generated emissions of criteria air pollutants and ozone precursors were assessed in accordance with methods recommended by the County of San Diego. Specific project construction information for the Lake Wohlford Dam, such as construction schedule, phasing of construction activities, expected duration of activities, types of equipment to be used, volume of material to be moved, and number of construction workers, was provided by the project applicant.

Construction emissions from the operation of diesel-fueled off-road equipment were estimated using the ARB's off-road diesel emissions inventory model (OFFROAD), which provides emission rates in pounds per hour based on fuel consumption and activity of various off-road fleet categories (ARB 2014). Construction emissions from the operation of gasoline-fueled on-road light and heavy duty trucks (i.e., worker commute trips, haul trucks, dump trucks, flat-bed trucks, etc.) were estimated using ARB's On-Road Emission Factors (EMFAC) 2011 mobile source emission factors (ARB 2013b). EMFAC2011 allows the user to select an operational year and region for which to develop on-road vehicle emission factors.

Consistent with the traffic analysis for the proposed project, the earliest possible year of construction (i.e., 2015) was selected and conservatively used for all construction activities. It is anticipated that construction activities would also occur in year 2016; however, for the purposes of a conservative analysis, the earliest possible year (2015) was assumed for all construction activities. It is anticipated that later years of construction would result in lower emissions due to turnover in equipment and vehicle fleet and new emissions technology. Emission factors specific to the San Diego County vehicle fleet were used for this analysis.

Fugitive dust emissions are typically associated with various construction activities, including batch plant operations (i.e., material loading/handling operations), realignment of Oakvale Road (i.e., cut/fill operations), access road (i.e., cut/fill operations), dam foundation (i.e., cut/fill operations), demolition of existing dam (i.e., material handling operations), and miscellaneous haul truck travel on unpaved roads. Fugitive dust emissions were estimated using EPA's Compilation of Air Pollutant Factors (AP-42) and based on vehicle miles traveled (VMT), material loading (in tons per day), and hours of operation. The modeling outputs and assumptions are provided in Appendix A.

The proposed project would not involve a change to existing operational activities. Following completion of the proposed project, regular maintenance and inspection activities would not increase beyond existing conditions. Therefore, a net increase in criteria pollutant emissions would not occur and project-related operational activities are not evaluated further in this report.

This analysis does not directly evaluate sulfur oxides (SO_X) or lead because little to no quantifiable and foreseeable emissions of these substances would be generated by the project. On- and off-road diesel fuel used in California must meet low sulfur standards established by ARB. Lead emissions have significantly decreased due to the near elimination of leaded fuel use.

4.3 PROJECT IMPACTS

This section determines whether the potential impacts from project construction and operation would result in a significant impact. Significant impacts are defined below in relation to the thresholds of significance outlined in Section 4.1. If the project would exceed the applicable threshold and potentially result in a significant impact, mitigation measures are required to reduce the potential impact to below a level of significance. If the project would not exceed the applicable threshold, mitigation measures are not required.

Would the project conflict with or obstruct implementation of the applicable air quality plan?

Air quality plans describe air pollution control strategies to be implemented by a city, county, or regional air district. The primary purpose of an air quality plan is to bring an area that does not attain federal and state air quality standards into compliance with those standards pursuant to the requirements of the CAA and California CAA. Projects that are consistent with the assumptions and control measures used in development of the applicable air quality plan are considered to not conflict with or obstruct the attainment of the air quality levels identified in the plan.

The CAA requires that areas in nonattainment for NAAQS develop a SIP that describes how and when the nonattainment area will attain NAAQS for the nonattainment pollutant. On June 4, 2014, EPA approved the Redesignation Request and Maintenance Plan for the 1997 National Ozone Standard for San Diego County, the SDAPCD maintenance plan for the 1997 8-hour ozone standard. The San Diego Air Basin achieved the NAAQS for CO in 1993, and EPA approved a 10-year maintenance plan in 1998. The current version of the maintenance plan is the 2004 Revision to the California State Implementation Plan for Carbon Monoxide Updated Maintenance Plan for Ten Federal Planning Areas.

Elements of the SIP are also taken from the Regional Air Quality Strategy (RAQS), the SDAPCD plan for attaining the state ozone standard (SDAPCD 2009). The RAQS was developed pursuant to California CAA requirements and identifies feasible emission control measures to provide expeditious progress toward attaining the state ozone standard, which is more stringent than the federal ozone standard. The RAQS control measures focus on emission sources under SDAPCD authority, specifically stationary sources and some area-wide sources. The RAQS identifies area-wide sources as mostly residential sources, including water heaters, furnaces, architectural coatings, and consumer products.

The SIP includes on-road motor vehicle emissions budgets that represent the maximum allowable levels of emissions from on-road vehicle travel on the region's transportation system. Conformity determinations must be made by the San Diego Association of Governments (SANDAG), and emissions projected to result from implementation of the transportation plans may not exceed these emissions budgets. Emission forecasts rely on projections of VMT by SANDAG, and population, employment, and land use projections made by local jurisdictions during development of the area and general plans. While the SIP and RAQS include estimates of mobile and area sources, minor changes in the assumptions relative to these sources would not obstruct successful implementation of the strategies for improvement of SDAB’s air quality.

The proposed project is solely a construction project and would not develop any land uses that would result in a net increase in long-term operational emissions. The use of construction equipment in the SIP and the RAQS is estimated for the region on an annual basis, and construction-related emissions are estimated as an aggregate. The project would not increase the assumptions for off-road equipment use in the SIP and the RAQS.

Because the proposed project would comply with all construction-related SDAPCD rules and regulations and would not construct a land use that would result in a net increase in long-term operational emissions, the project would not conflict with or obstruct implementation of the applicable air quality plan. This impact would be less than significant.

Would the project cause a violation of any air quality standard or contribute substantially to an existing or projected air quality violation?

Construction emissions are described as "short-term" or temporary in duration; however, they have the potential to represent a significant impact with respect to air quality. Construction of the project would result in the temporary generation of VOC, NO_X, CO, PM_{10}, and $PM_{2.5}$ emissions. VOC, NO_X, and CO emissions are primarily associated with mobile equipment exhaust, including off-road construction equipment and on-road motor vehicles. Fugitive PM dust emissions are primarily associated with site preparation and vary as a function of such parameters as soil silt content, soil moisture, wind speed, acreage of disturbance area, and VMT by construction vehicles on- and off-site. Earthmoving, material handling operations, and the concrete batch plant are the primary sources of fugitive PM dust emissions from the proposed construction activities.

Construction of the proposed project would include the following construction phases: Oakvale Road Improvements, Dam Foundation, Access Road, Replacement Dam Construction, and Demolition of Existing Dam and Existing Outlet Tower. Total project construction is expected to require approximately 16 months. It is anticipated that construction activities would occur in a linear fashion and that construction phases would not overlap.

As shown in Table 6, construction emissions for the project would result in maximum daily emissions of approximately 19 pounds of VOC, 207 pounds of NO_X, 75 pounds of CO, 131 pounds of PM_{10}, and 22 pounds of $PM_{2.5}$. Additional modeling assumptions and details are provided in Appendix A.

Table 6
Estimated Maximum Daily Construction Emissions

	VOC	NO_X	CO	PM_{10} [1,2]	$PM_{2.5}$ [1]
2015					
Oakvale Road	10.69	108.83	44.04	65.97	17.62
2016					
Dam Foundation	13.93	133.56	51.70	81.41	18.06
Access Road	6.29	51.11	29.60	164.67	27.76
Replacement Dam	19.20	206.87	74.59	115.53	20.22
Demolition of Existing Dam	1.10	29.85	7.55	94.46	14.78
Maximum Daily Construction Emissions (lbs/day)	19.20	206.87	74.59	164.67	27.76
Threshold of Significance (lbs/day)	75	250	550	100	55
Significant Impact?	No	No	No	**YES**	No

[1] PM_{10} emissions shown include the sum of particulate matter (PM) with aerodynamic diameter 0 to 2.5 microns and PM with aerodynamic diameter 2.5 to 10 microns.
[2] Fugitive dust emissions were reduced based on watering two times per day.
VOC = volatile organic compounds; NO_X = oxides of nitrogen; CO = carbon monoxide; SO_2 = sulfur dioxide; PM_{10} = suspended PM; $PM_{2.5}$ = fine PM
Source: Estimated by AECOM in 2015

As shown in Table 5, construction-related emissions of VOC, NO_X, CO, and $PM_{2.5}$ would not exceed the thresholds of significance and would not violate any air quality standard or contribute substantially to an existing or projected air quality violation. However, construction-generated PM_{10} emissions would exceed the applicable mass emission threshold. Construction emissions could violate an ambient air quality standard or contribute substantially to an existing violation. Therefore, construction impacts related to violation of an ambient air quality standard would be significant. Implementation of Mitigation Measure AQ-1 through AQ-3 would be required.

AQ-1 The following measures shall be implemented by the construction contractor to reduce fugitive dust emissions associated with off-road equipment and heavy-duty vehicles:

- Water the grading areas a minimum of twice daily to minimize fugitive dust;
- Stabilize graded areas as quickly as possible to minimize fugitive dust;
- Apply chemical stabilizer or pave the last 100 feet of internal travel path within the construction site prior to public road entry;
- Install wheel washers adjacent to a paved apron prior to vehicle entry on public roads;

- Remove any visible track-out into traveled public streets within 30 minutes of occurrence;
- Wet wash the construction access point at the end of each workday if any vehicle travel on unpaved surfaces has occurred;
- Provide sufficient perimeter erosion control to prevent washout of silty material onto public roads;
- Cover haul trucks or maintain at least 12 inches of freeboard to reduce blow-off during hauling;
- Suspend all soil disturbance and travel on unpaved surfaces if winds exceed 25 mph;
- Cover/water on-site stockpiles; and
- Enforce a 15-mph speed limit on unpaved surfaces.

AQ-2 Minimize idling time by shutting equipment off when not in use or reducing the time of idling to no more than 5 minutes (5-minute limit is required by the state airborne toxics control measure [Title 13, sections 2449 and 2485 of the California Code of Regulations]). Provide clear signage that posts this requirement for workers at the entrances to the site.

AQ-3 Maintain construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated.

Based on estimates consistent with South Coast Air Quality Management District Rule 403 requirements for site-watering activities, Mitigation Measure AQ-1 would reduce fugitive dust emissions by 60 percent. Potential reductions were not estimated for the remaining mitigation measures, since the extent to which they would affect emissions associated with construction of the proposed project is unknown. The maximum mitigated PM_{10} emissions would be 56.50 pounds per day in 2016. Therefore, implementation of Mitigation Measures AQ-1 through AQ-3 would reduce PM_{10} emissions to a less than significant level.

The General Conformity applicability and NEPA analyses are based on estimates of the total direct and indirect net emissions from construction of the proposed project. Table 7 summarizes the projected annual emissions associated with construction of the proposed project.

Table 7
Estimated Maximum Annual Construction Emissions

	VOC	NO_X	CO	PM_{10} [1]	$PM_{2.5}$ [1]
2015					
Oakvale Road	0.66	6.18	2.75	2.72	0.78
Total 2015 Annual Emissions	0.66	6.18	2.75	2.72	0.78
2016					
Dam Foundation	0.42	4.01	1.55	2.44	0.54
Access Road	0.13	1.02	0.59	3.29	0.56
Replacement Dam	0.96	10.34	3.73	5.78	1.01
Demolition of Existing Dam	0.02	0.67	0.17	2.13	0.33
Total 2016 Annual Emissions	1.53	16.04	6.04	13.64	2.44
Maximum Annual Construction Emissions (tons/year)	1.53	16.04	6.04	13.64	2.44
Threshold of Significance (tons//year)	100	100	100	100	100
Significant Impact?	No	No	No	No	No

[1] PM_{10} emissions shown include the sum of particulate matter (PM) with aerodynamic diameter 0 to 2.5 microns and PM with aerodynamic diameter 2.5 to 10 microns.
VOC = volatile organic compounds; NO_X = oxides of nitrogen; CO = carbon monoxide; SO_2 = sulfur dioxide; PM_{10} = suspended PM; $PM_{2.5}$ = fine PM
Source: Estimated by AECOM in 2015

The federal agency can also take measures to reduce emissions below de minimis levels. The changes must be state or federally enforceable to guarantee that emissions would be below de minimis levels. The proposed project assumes that Mitigation Measure AQ-1 would be implemented to meet CEQA requirements. Based on CEQA provisions that mitigation measures be required in, or incorporated into, the project (14 CCR Section 15091[a][1]), Mitigation Measure AQ-1 is considered design features of the proposed project for the purpose of the NEPA and General Conformity applicability analysis. This is not considered "mitigation" under the General Conformity Rule, because the rule does not apply to projects that are below de minimis levels.

As shown in Table 7, the estimated emissions associated with the proposed project would be less than the General Conformity de minimis thresholds. Therefore, temporary emissions associated with the proposed project would conform to the SIP, and a formal conformity analysis would not be required. No substantial adverse direct or indirect effects would occur under NEPA.

Would the project result in 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?

A significant impact related to air quality would occur if implementation of the project would result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard.

The cumulative analysis focuses on whether a specific project would result in a cumulatively considerable increase in emissions. By its very nature, air pollution is largely a cumulative impact. The nonattainment status of regional pollutants is a result of past and present development within the SDAB, and this regional impact is cumulative rather than attributable to any one source. A project's emissions may be individually limited, but cumulatively considerable when taken in combination with past, present, and future development projects.

The thresholds of significance are relevant to whether a project's individual emissions would result in a cumulatively considerable incremental contribution to the existing cumulative air quality conditions. These thresholds are designed to identify those projects that would result in significant levels of air pollution and to assist the region in attaining the applicable state and federal ambient air quality standards. Projects that would not exceed the thresholds of significance would not contribute a considerable amount of criteria air pollutant emissions to the region's emissions profile, and would not impede attainment and maintenance of ambient air quality standards.

Because the proposed project would exceed the project-level air quality significance thresholds for PM_{10} emissions, the proposed project's construction emissions would have a cumulatively considerable contribution to the region's air quality. Therefore, the cumulative impact would be significant. Implementation of Mitigation Measures AQ-1 through AQ-3 would reduce PM_{10} emissions to a less than significant level. This cumulative impact would be less than significant with mitigation.

<u>Would the project expose sensitive receptors to substantial pollutant concentrations?</u>

The nearest off-site sensitive receptors are single-family residences located approximately 900 feet to the northeast of the staging area and batch plant location. The majority of road and dam construction activities would occur at distances of 900 to 3,000 feet from these residences. The residential properties represent the nearest sensitive receptors with the potential to be impacted as a result of construction of the proposed project.

Construction-Related Health Risks

The greatest potential for TAC emissions resulting from construction of the proposed project would originate from diesel PM emissions associated with heavy equipment operations. Construction of the proposed project would result in the generation of diesel PM from the use of off-road diesel construction equipment at the project site. Most diesel PM emissions associated with material delivery trucks and construction worker vehicles would occur off-site.

The generation of diesel PM emissions from construction projects typically occurs in a single area for a short period of time. Construction emissions would occur intermittently throughout the day, as construction equipment is required, rather than as a constant plume of emissions from the project site. All construction emissions would cease following completion of the proposed project.

The dose of TACs to which receptors are exposed is the primary factor used to determine health risk and is a function of concentration and duration of exposure. Dose is a function of the concentration of a substance or substances in the environment and the extent of exposure a person has with the substance. Dose is positively correlated with time, meaning that a longer exposure period to a fixed amount of emissions results in a higher exposure level and higher health risks for the maximally exposed individual.

According to the Office of Environmental Health Hazard Assessment (OEHHA), HRAs that determine the health risks associated with exposure of residential receptors to TAC emissions should be based on a 30-year exposure period (OEHHA 2015). However, HRAs should be limited to the period/duration of activities associated with the emissions activity. As discussed above, project construction activities would occur for a total of 16 months. Therefore, the total exposure time would be approximately 4 percent of the total exposure time for a typical HRA.

Furthermore, the dose (i.e., concentration levels) to which nearby receptors would be exposed would be limited because of the distance from the project site (approximately 900 to 3,000 feet from the nearest sensitive receptor to the site). ARB has published studies that show a 70 percent decrease in PM emissions at 500 feet from freeways and high-traffic roads, which are continuous emission sources (ARB 2005). Emissions would be dispersed around the project site; thus, TAC emissions from project construction would be less concentrated than those from a typical roadway and would be less likely to substantially expose receptors. SDAPCD rules and permits and Mitigation Measures AQ-1 through AQ-3 would also reduce PM_{10} emissions generated by construction of the proposed project. Therefore, it is anticipated that PM concentrations would decrease substantially before affecting the nearest sensitive receptor.

Thus, considering the distance to the nearest sensitive receptor, intermittent emission source, relatively low overall exposure period, and the highly dispersive nature of diesel PM emissions (Zhu et al. 2002), construction emissions would not generate pollutant concentrations that expose sensitive receptors to substantial pollutant concentrations. This impact would be less than significant.

Carbon Monoxide

CO concentration is a direct function of motor vehicle activity, particularly during peak commute hours, and meteorological conditions. Under specific meteorological conditions, CO concentrations may reach unhealthy levels with respect to local sensitive land uses, such as residential areas, schools, preschools, playgrounds, and hospitals. As a result, air districts typically recommend analysis of CO emissions at a local rather than a regional level.

Because increased CO concentrations are usually associated with roadways congested and with heavy traffic volume, many agencies have established preliminary screening criteria to determine with fair certainty that, if not violated, project-generated, long-term operational local mobile-source emissions of CO would not result in, or substantially contribute to, emissions concentrations that exceed the 1-hour ambient air quality standard of 20 parts per million (ppm) or the 8-hour standard of 9.0 ppm.

Level of service (LOS) is a measurement of an intersection's performance based on idling time and speed of vehicles. Intersections operating at LOS E or F would result in a greater number of vehicles idling and/or moving slowly through the intersection, thereby increasing the possibility for a CO hotspot.

During construction of the proposed project, construction-related vehicles would contribute temporary traffic volumes to the existing roadway network. Daily vehicles would occur as result of equipment and material delivery trucks, and construction workers coming to and from the project site.

The traffic analysis prepared or the proposed project indicates that all of the studied intersections are calculated to currently operate at service levels of LOS C or better during both the AM and PM peak hours (LLG 2014). Roadway segments, including Lake Wohlford Road and Valley Parkway, currently operate at LOS C or better. Project trips were distributed regionally based on potential destinations for material hauling from construction activity. The rest of the trips are distributed to regional destinations via the City of Escondido's identified truck routes, ultimately reaching Interstate 15 for regional access (LLG 2014). All intersections and roadway segments would continue to operate at LOS C or better with the addition of project-related trips.

The proposed project's construction traffic would not contribute significant volumes to intersections operating at LOS E or F. Therefore, the CO concentrations resulting from the project would not violate the CAAQS for either the 1-hour period (20 ppm) or the 8-hour period (9.0 ppm). This impact would be less than significant.

Would the project create objectionable odors affecting a substantial number of people?

Sources that may emit odors during construction activities include exhaust from diesel construction equipment and heavy-duty trucks, which could be considered offensive to some individuals. Odors from these sources would be localized and generally confined to the immediate area surrounding the project site. The proposed project would use typical construction techniques, and the odors would be typical of most construction sites and temporary in nature. As discussed above, the nearest sensitive receptor would be located approximately 900 feet away from the batch plant and staging area. Because of the amount and types of equipment, the temporary nature of these emissions, and the highly diffusive properties of diesel exhaust, nearby receptors would not be affected by diesel exhaust odors associated with project construction.

After construction of the proposed project, all construction-related odors would cease. Operation of the proposed project would not be expected to add any new odor sources. As a result, the proposed project would not create objectionable odors affecting a substantial number of people. The impact would be less than significant.

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SECTION 5
CONCLUSIONS AND MITIGATION MEASURES

5.1 CONCLUSIONS

Since the project would not result in a significant increase in criteria pollutant emissions compared to the current assumptions in the SIP and the RAQS, the project would not conflict with or obstruct implementation of the applicable air quality plan. This impact would be less than significant.

Construction emissions would violate an ambient air quality standard or contribute substantially to an existing violation. Therefore, construction impacts related to violation of an ambient air quality standard would be significant. Implementation of Mitigation Measures AQ-1 through AQ-3 would reduce PM_{10} emissions to a less than significant level. This impact would be less than significant with mitigation.

Because the proposed project would exceed the project-level air quality significance thresholds for PM_{10} emissions, the proposed project's construction emissions would have a cumulatively considerable contribution to the region's air quality. Therefore, the cumulative impact would be significant. Implementation of Mitigation Measures AQ-1 through AQ-3 would reduce fugitive PM_{10} dust emissions to a less than significant level. This cumulative impact would be less than significant with mitigation.

Therefore, the CO concentrations resulting from the project would not violate the CAAQS for either the 1-hour period (20 ppm) or the 8-hour period (9.0 ppm). This impact would be less than significant.

Construction of the proposed project would not expose sensitive receptors to substantial pollutant concentrations that would result in a health risk. This impact would be less than significant.

The project's construction activities would not create objectionable odors affecting a substantial number of people. The impact would be less than significant.

5.2 MITIGATION MEASURES

AQ-1 The following measures shall be implemented by the construction contractor to reduce fugitive dust emissions associated with off-road equipment and heavy-duty vehicles:

- Water the grading areas a minimum of twice daily to minimize fugitive dust;
- Stabilize graded areas as quickly as possible to minimize fugitive dust;
- Apply chemical stabilizer or pave the last 100 feet of internal travel path within the construction site prior to public road entry;
- Install wheel washers adjacent to a paved apron prior to vehicle entry on public roads;
- Remove any visible track-out into traveled public streets within 30 minutes of occurrence;
- Wet wash the construction access point at the end of each workday if any vehicle travel on unpaved surfaces has occurred;
- Provide sufficient perimeter erosion control to prevent washout of silty material onto public roads;
- Cover haul trucks or maintain at least 12 inches of freeboard to reduce blow-off during hauling;
- Suspend all soil disturbance and travel on unpaved surfaces if winds exceed 25 mph;
- Cover/water on-site stockpiles; and
- Enforce a 15-mph speed limit on unpaved surfaces.

AQ-2 Minimize idling time by shutting equipment off when not in use or reducing the time of idling to no more than 5 minutes (5-minute limit is required by the state airborne toxics control measure [Title 13, sections 2449(d)(3) and 2485 of the California Code of Regulations]). Provide clear signage that posts this requirement for workers at the entrances to the site.

AQ-3 Maintain construction equipment in proper working condition according to manufacturer’s specifications. The equipment must be checked by a certified mechanic and determined to be running in proper condition before it is operated.

SECTION 6
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APPENDIX A

EMISSIONS ESTIMATES

Lake Wohlford Dam

Construction Emissions Summary

Unmitigated

	Maximum Daily Emissions (lbs/day)					Annual Emissions (tons/year)					Metric Tons
Construction Phase/Source	VOC	NO_X	CO	PM_{10}	$PM_{2.5}$	VOC	NO_X	CO	PM_{10}	$PM_{2.5}$	CO_2e
YEAR 2015						YEAR 2015					
Oakvale Road	*10.69*	*108.83*	*44.04*	*65.97*	*17.62*	*0.66*	*6.18*	*2.75*	*2.72*	*0.78*	*1,017.16*
Construction Equipment	10.52	107.44	40.75	3.87	3.31	0.65	6.11	2.59	0.23	0.21	966.59
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.01	0.07	0.16	0.01	0.01	50.57
Fugitive Dust				61.89	14.18				2.48	0.57	
Year 2015 Maximum Daily	10.69	108.83	44.04	65.97	17.62	0.66	6.18	2.75	2.72	0.78	1,017.16
YEAR 2016						YEAR 2016					
Dam Foundation	*13.93*	*133.56*	*51.70*	*81.41*	*18.06*	*0.42*	*4.01*	*1.55*	*2.44*	*0.54*	*722.56*
Construction Equipment	13.77	132.18	48.41	4.55	3.93	0.41	3.97	1.45	0.14	0.12	692.22
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.00	0.04	0.10	0.01	0.00	30.34
Fugitive Dust				76.65	14.01				2.30	0.42	
Temporary Access Road	*6.29*	*51.11*	*29.60*	*164.67*	*27.76*	*0.13*	*1.02*	*0.59*	*3.29*	*0.56*	*142.25*
Construction Equipment	6.13	49.72	26.31	2.19	2.02	0.12	0.99	0.53	0.04	0.04	122.02
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.00	0.03	0.07	0.00	0.00	20.23
Fugitive Dust				162.27	25.63				3.25	0.51	
Replacement Dam	*19.20*	*206.87*	*74.59*	*115.53*	*20.22*	*0.96*	*10.34*	*3.73*	*5.78*	*1.01*	*1,527.20*
Construction Equipment	19.04	205.49	71.30	6.96	6.09	0.95	10.27	3.56	0.35	0.30	1,476.63
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.01	0.07	0.16	0.01	0.01	50.57
Fugitive Dust				108.36	14.01				5.42	0.70	
Demolition of Existing Dam	*1.10*	*29.85*	*7.55*	*94.46*	*14.78*	*0.02*	*0.67*	*0.17*	*2.13*	*0.33*	*133.00*
Construction Equipment	0.94	28.46	4.25	0.73	0.50	0.02	0.64	0.10	0.02	0.01	110.24
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.00	0.03	0.07	0.00	0.00	22.76
Fugitive Dust				93.51	14.16				2.10	0.32	
Year 2016 Maximum Daily	19.20	206.87	74.59	164.67	27.76	1.53	16.04	6.04	13.64	2.44	2,525.02
											3,542.18

Lake Wohlford Dam
Construction Emissions Summary
Mitigated

	Maximum Daily Emissions (lbs/day)					Annual Emissions (tons/year)					Metric Tons
Construction Phase/Source	VOC	NO_X	CO	PM_{10}	$PM_{2.5}$	VOC	NO_X	CO	PM_{10}	$PM_{2.5}$	CO_2e
YEAR 2015						YEAR 2015					
Oakvale Road	*10.69*	*108.83*	*44.04*	*28.84*	*9.11*	*0.66*	*6.18*	*2.75*	*1.24*	*0.44*	*1,017.16*
Construction Equipment	10.52	107.44	40.75	3.87	3.31	0.65	6.11	2.59	0.23	0.21	966.59
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.01	0.07	0.16	0.01	0.01	50.57
Fugitive Dust				24.75	5.67				0.99	0.23	
Year 2015 Maximum Daily	10.69	108.83	44.04	28.84	9.11	0.66	6.18	2.75	1.24	0.44	1,017.16
YEAR 2016						YEAR 2016					
Dam Foundation	*13.93*	*133.56*	*51.70*	*35.42*	*9.65*	*0.42*	*4.01*	*1.55*	*1.06*	*0.29*	*722.56*
Construction Equipment	13.77	132.18	48.41	4.55	3.93	0.41	3.97	1.45	0.14	0.12	692.22
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.00	0.04	0.10	0.01	0.00	30.34
Fugitive Dust				30.66	5.61				0.92	0.17	
Temporary Access Road	*6.29*	*51.11*	*29.60*	*56.50*	*11.31*	*0.13*	*1.02*	*0.59*	*1.13*	*0.23*	*142.25*
Construction Equipment	6.13	49.72	26.31	2.19	2.02	0.12	0.99	0.53	0.04	0.04	122.02
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.00	0.03	0.07	0.00	0.00	20.23
Fugitive Dust				54.10	9.17				1.08	0.18	
Replacement Dam	*19.20*	*206.87*	*74.59*	*46.84*	*13.35*	*0.96*	*10.34*	*3.73*	*2.34*	*0.67*	*1,527.20*
Construction Equipment	19.04	205.49	71.30	6.96	6.09	0.95	10.27	3.56	0.35	0.30	1,476.63
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.01	0.07	0.16	0.01	0.01	50.57
Fugitive Dust				39.67	7.14				1.98	0.36	
Demolition of Existing Dam	*1.10*	*29.85*	*7.55*	*38.35*	*6.28*	*0.02*	*0.67*	*0.17*	*0.86*	*0.14*	*133.00*
Construction Equipment	0.94	28.46	4.25	0.73	0.50	0.02	0.64	0.10	0.02	0.01	110.24
Construction Worker Vehicles	0.17	1.38	3.29	0.21	0.12	0.00	0.03	0.07	0.00	0.00	22.76
Fugitive Dust				37.41	5.66				0.84	0.13	
Year 2016 Maximum Daily	19.20	206.87	74.59	56.50	13.35	1.53	16.04	6.04	5.40	1.32	2,525.02
											3,542.18
											1771.08909

Fugitive Dust Summary

Construction Activity/Year	Construction Days	Unmitigated Daily Emissions PM10 (lbs/day)	Unmitigated Daily Emissions PM2.5 (lbs/day)	Unmitigated Annual Emissions PM10 (tons/year)	Unmitigated Annual Emissions PM2.5 (tons/year)	Mitigated Daily Emissions PM10 (lbs/day)	Mitigated Daily Emissions PM2.5 (lbs/day)	Mitigated Annual Emissions PM10 (tons/year)	Mitigated Annual Emissions PM2.5 (tons/year)
2015									
Oakvale Road	80	61.89	14.18	2.48	0.57	24.75	5.67	0.99	0.23
2016									
Dam Foundation	60	76.65	14.01	2.30	0.42	30.66	5.61	0.92	0.17
Temporary Access Road	40	162.27	25.63	3.25	0.51	54.10	9.17	1.08	0.18
Replacement Dam	100	108.36	14.01	5.42	0.70	39.67	7.14	1.98	0.36
Demolition of Existing Dam	45	93.51	14.16	2.10	0.32	37.41	5.66	0.84	0.13

Lake Wohlford Damn
Fugitive Dust - Truck Loading Emissions

Truck Loading Fugitive Dust Emission Factors
$EF_D = k \times (0.0032) \times ((U/5)^{1.3})/((M/2)^{1.4})$

Variable	Amount	Units
EF (PM_{10})	0.056	lb/ton
EF ($PM_{2.5}$)	0.009	lb/ton
k (PM_{10})	0.35	factor
k ($PM_{2.5}$)	0.053	factor
U (mean wind speed)	4.92	miles/hr
M (moisture content)	12%	percent
Soil density (CalEEMod default)	1.26	tons/cy
Rip rap density	2.23	tons/cy
Derrick/Grouted stone density	1.96	tons/cy

E (lbs) = EF (lb/ton) x TP (tons)

					Unmitigated		Mitigated	
Construction Phase/Subphase	Work Days	Total Materials Moved (cy)	Total Materials Moved (tons)	Daily Materials Moved (tons/day)	Daily PM_{10} (lbs/day)	Daily $PM_{2.5}$ (lbs/day)	Daily PM_{10} (lbs/day)	Daily $PM_{2.5}$ (lbs/day)
Oakdale Road Realignment								
Rock/Earth Excavation	80	56,000	70,793	884.92	49.84	7.55	19.94	3.02
Total							19.94	3.02
Proposed Dam Foundation								
Rock/Earth Excavation	60	59,516	75,238	1,253.97	70.63	10.70	28.25	4.28
Total							28.25	4.28
Temporary Access Road								
Grout Stone Fill	40	28,000	54,810	1,370.25	77.18	11.69	30.87	4.67
Total							30.87	4.67
Replacement Dam Construction								
Dam Material	100	handled in Batch Plant		-	-	-	0.00	0.00
Total							0.00	0.00
Demolition								
Demolition Materials	45	59,100	74,712	1,660.27	93.51	14.16	37.41	5.66

Rule 403 Control Measures	0.6	percent reduction
Work Days Per Week	6	
Work Days Per Month	24	

Earthwork Fugitive Particulate Matter Emissions - Road Construction

Activity	Equipment	Daily Activity Level	Total Activity Level	PM10 Emission Factor (lb/activity)[1]	PM2.5 Emission Factor (lb/activity)[1]	PM10 (lb/day)[2]	PM2.5 (lb/day)[2]
Bulldozing, Scraping and Grading	2	8.0	16.0	0.753	0.415	12.04	6.64
Total						**12.04**	**6.64**

Earthwork Fugitive Particulate Matter Emissions - Dam Foundation

Activity	Equipment	Daily Activity Level	Total Activity Level	PM10 Emission Factor (lb/activity)[1]	PM2.5 Emission Factor (lb/activity)[1]	PM10 (lb/day)[2]	PM2.5 (lb/day)[2]
Bulldozing, Scraping and Grading	1	8.0	8.0	0.753	0.415	6.02	3.32
Total						**6.02**	**3.32**

Oakvale Road Improvements

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
Equipment Type	**Equipment Category**	**Number**	**Usage Factor (hrs/day or miles/day)**	**Power Rating (hp)**	**Total Days/VMT**	**VOC**	**NOX**	**CO**	**PM10**	**PM2.5**	**VOC**	**NOX**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH4**	**Total GHG Emissions (MT CO2e)**
Vegetation Removal																		
Dozers < = 175	Dozer - D7	1	8	240	15	1.55	11.16	6.67	0.63	0.58	0.01	0.08	0.05	0.00	0.00	7.77	0.00	7.10
Excavators > 50 and < = 120	Excavator - 1CY, 40,000 lbs	1	8	110	15	0.73	4.63	4.08	0.36	0.33	0.01	0.03	0.03	0.00	0.00	4.42	0.00	4.03
Water Truck	3,000 gal water truck	1	8	230	15	1.00	7.85	2.96	0.26	0.24	0.01	0.06	0.02	0.00	0.00	9.99	0.00	9.11
Other Construction Equipment > 120 and < = 175	Brush Chipper	1	8	174	15	0.64	5.31	4.69	0.27	0.24	0.00	0.04	0.04	0.00	0.00	6.39	0.00	5.83
	Highway Truck (25,000 lbs)	1	120		1,800	0.08	2.37	0.35	0.06	0.04	0.00	0.02	0.00	0.00	0.00	3.37	0.00	3.06
Total						**4.00**	**31.32**	**18.75**	**1.58**	**1.44**	**0.03**	**0.23**	**0.14**	**0.01**	**0.01**	**31.93**	**0.00**	**29.13**
Rock Scaling																		
Bore/Drill Rigs > 175 and < = 250	Bore/Drill Rig	1	8	175	20	0.54	3.92	2.74	0.12	0.11	0.01	0.04	0.03	0.00	0.00	15.05	0.00	13.71
Excavators > 50 and < = 120	Excavator - 1CY, 40,000 lbs	1	8	110	20	0.73	4.63	4.08	0.36	0.33	0.01	0.05	0.04	0.00	0.00	5.89	0.00	5.38
Total						**1.27**	**8.55**	**6.82**	**0.48**	**0.44**	**0.01**	**0.09**	**0.07**	**0.00**	**0.00**	**20.94**	**0.00**	**19.08**
Material Excavation																		
Bore/Drill Rigs > 175 and < = 250	Bore/Drill Rig	2	8	175	80	1.09	7.84	5.48	0.23	0.21	0.04	0.31	0.22	0.01	0.01	120.39	0.00	109.65
Excavators > 250 and < = 500	Excavator - 3.5 CY	2	8	384	80	2.52	18.59	7.94	0.66	0.61	0.10	0.74	0.32	0.03	0.02	149.59	0.01	136.36
Tractors/Loaders/Backhoes > 175 and < = 250	Loader - 962	1	8	211	80	0.87	7.24	2.85	0.23	0.22	0.03	0.29	0.11	0.01	0.01	54.96	0.00	50.09
Dozers < = 175	Dozer - D6	2	8	145	80	3.11	22.31	13.33	1.26	1.16	0.12	0.89	0.53	0.05	0.05	82.87	0.01	75.69
Generator Sets > 25 and < = 50	Generators	1	8	210	80	0.56	2.10	1.97	0.15	0.14	0.02	0.08	0.08	0.01	0.01	9.80	0.00	8.97
Water Truck	3,000 gal water truck	1	8	230	80	1.00	7.85	2.96	0.26	0.24	0.04	0.31	0.12	0.01	0.01	53.29	0.00	48.59
	Highway Truck (25,000 lbs)	10	2,100		168,000	1.37	41.51	6.20	1.07	0.73	0.05	1.66	0.25	0.04	0.03	314.07	0.00	285.83
Total						**10.52**	**107.44**	**40.75**	**3.87**	**3.31**	**0.42**	**4.30**	**1.63**	**0.15**	**0.13**	**784.96**	**0.03**	**715.18**
Slope Stabilization																		
Bore/Drill Rigs > 175 and < = 250	Bore/Drill Rig	2	8	175	20	1.09	7.84	5.48	0.23	0.21	0.01	0.08	0.05	0.00	0.00	30.10	0.00	27.41
Tractors/Loaders/Backhoes > 175 and < = 250	Loader - 962	1	8	211	20	0.87	7.24	2.85	0.23	0.22	0.01	0.07	0.03	0.00	0.00	13.74	0.00	12.52
Generator Sets > 25 and < = 50	Generators	1	8	210	20	0.56	2.10	1.97	0.15	0.14	0.01	0.02	0.02	0.00	0.00	2.45	0.00	2.24
Total						**2.52**	**17.18**	**10.30**	**0.62**	**0.57**	**0.03**	**0.17**	**0.10**	**0.01**	**0.01**	**46.29**	**0.00**	**42.18**
Road Construction																		
Tractors/Loaders/Backhoes > 120 < = 175	Loader - 160	1	8	128	40	0.68	5.06	4.68	0.27	0.25	0.01	0.10	0.09	0.01	0.00	16.22	0.00	14.79
Plate Compactors	Compactor	2	8	19	40	0.08	0.50	0.42	0.02	0.02	0.00	0.01	0.01	0.00	0.00	1.38	0.00	1.26
Dozers < = 175	Dozer - D6	1	8	145	40	1.55	11.16	6.67	0.63	0.58	0.03	0.22	0.13	0.01	0.01	20.72	0.00	18.92
Graders > 120 and < = 175	Grader - 120	1	8	135	40	1.04	7.63	5.86	0.42	0.39	0.02	0.15	0.12	0.01	0.01	19.83	0.00	18.09
Paving Equipment > 175 and < = 250	Paving Equipment	1	8	128	40	0.91	8.40	2.75	0.32	0.29	0.02	0.17	0.06	0.01	0.01	19.57	0.00	17.85
Rollers > 175 and < = 250	Roller BW 190AD4	2	8	205	40	1.77	17.52	5.72	0.59	0.54	0.04	0.35	0.11	0.01	0.01	48.99	0.00	44.66
Water Truck	3,000 gal water truck	1	8	230	40	1.00	7.85	2.96	0.26	0.24	0.02	0.16	0.06	0.01	0.00	26.65	0.00	24.30
Total						**7.04**	**58.12**	**29.06**	**2.51**	**2.31**	**0.14**	**1.16**	**0.58**	**0.05**	**0.05**	**153.35**	**0.01**	**139.87**
Demolition																		
Dozers < = 175	Dozer - D6	1	8	145	10	1.55	11.16	6.67	0.63	0.58	0.01	0.06	0.03	0.00	0.00	5.18	0.00	4.73
Tractors/Loaders/Backhoes > 175 and < = 250	Loader - 962	1	8	211	10	0.87	7.24	2.85	0.23	0.22	0.00	0.04	0.01	0.00	0.00	6.87	0.00	6.26
Water Truck	3,000 gal water truck	1	8	230	10	1.00	7.85	2.96	0.26	0.24	0.01	0.04	0.01	0.00	0.00	6.66	0.00	6.07
	Highway Truck (25,000 lbs)	2	240		2,400	0.16	4.74	0.71	0.12	0.08	0.00	0.02	0.00	0.00	0.00	4.49	0.00	4.08
Total						**3.58**	**30.99**	**13.19**	**1.25**	**1.12**	**0.02**	**0.15**	**0.07**	**0.01**	**0.01**	**23.20**	**0.00**	**21.15**

Notes:
Vegetation removal includes one truck operating at 15 miles per hour for 8 hours per day.
Estimates for material excavation assumes 70 truck trips (round trip) per day at a distance of 30 miles.

On Road Construction Emissions

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
	Total Trips	**Distance**	**Average Daily Mileage**	**Calculated Time - Rounded (days)**	**Total Mileage**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH_4**	**Total GHG Emissions (MT CO2e)**
Worker Trips	88	16.8	1,478	100	147,840	0.17	1.38	3.29	0.21	0.12	0.01	0.07	0.16	0.01	0.01	55.44	0.00	50.57

Note: Assumes a total of 44 workers per day.

	Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
Total	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**ROG**	**NO_x**	**CO**	**PM10**	**PM2.5**	**CO_2**	**CH_4**	**Total GHG Emissions (MT CO2e)**
Maximum Daily Emissions	**10.69**	**108.83**	**44.04**	**4.09**	**3.43**								
Maximum Annual Emissions						**0.66**	**6.18**	**2.75**	**0.24**	**0.21**	**1,116.11**	**0.06**	**1,017.16**

Dam Foundation

Equipment Type	Equipment Category	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	Emissions Summary (lbs/day) VOC	NOX	CO	PM10	PM2.5	Emissions Summary (tons per phase) VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Dam Foundation																		
Bore/Drill Rigs > 175 and < = 250	Bore/Drill Rig	1	8	175	60	0.54	3.92	2.74	0.12	0.11	0.02	0.12	0.08	0.00	0.00	45.14	0.00	41.12
Excavators > 250 and < = 500	Excavator - 3.5 CY	7	8	384	60	8.83	65.07	27.80	2.31	2.13	0.26	1.95	0.83	0.07	0.06	392.68	0.02	357.94
Tractors/Loaders/Backhoes > 175 and < = 250	Loader - 962	1	8	211	60	0.87	7.24	2.85	0.23	0.22	0.03	0.22	0.09	0.01	0.01	41.22	0.00	37.57
Dozers < = 175	Dozer - D6	1	8	145	60	1.55	11.16	6.67	0.63	0.58	0.05	0.33	0.20	0.02	0.02	31.07	0.00	28.38
Generator Sets > 25 and < = 50	Generator	1	8	375	60	0.56	2.10	1.97	0.15	0.14	0.02	0.06	0.06	0.00	0.00	7.35	0.00	6.73
	Highway Truck (25,000 lbs)	6	2,160		129,600	1.41	42.69	6.38	1.10	0.75	0.04	1.28	0.19	0.03	0.02	242.28	0.00	220.48
Total						**13.77**	**132.18**	**48.41**	**4.55**	**3.93**	**0.41**	**3.97**	**1.45**	**0.14**	**0.12**	**759.75**	**0.03**	**692.22**

Note:
Estimates for material excavation assumes 96 truck trips (round trip) per day at a distance of 30 miles.

On Road Construction Emissions

	Total Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	Emissions Summary (lbs/day) ROG	NO_x	CO	PM10	PM2.5	Emissions Summary (tons per phase) ROG	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	88	16.8	1,478	60	88,704	0.17	1.38	3.29	0.21	0.12	0.00	0.04	0.10	0.01	0.00	33.27	0.00	30.34

Note: Assumes a total of 44 workers per day.

Total	Emissions Summary (lbs/day) ROG	NO_x	CO	PM10	PM2.5	Emissions Summary (tons per phase) ROG	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**13.93**	**133.56**	**51.70**	**4.76**	**4.05**								
Maximum Annual Emissions						**0.42**	**4.01**	**1.55**	**0.14**	**0.12**	**793.01**	**0.04**	**722.56**

Temporary Access Road

Equipment Type	Equipment Category	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	Emissions Summary (lbs/day) VOC	NOX	CO	PM10	PM2.5	Emissions Summary (tons per phase) VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Temporary Access Road																		
Tractors/Loaders/Backhoes > 120 < = 175	Loader - 160	1	8	128	40	0.68	5.06	4.68	0.27	0.25	0.01	0.10	0.09	0.01	0.00	16.22	0.00	14.79
Plate Compactors	Compactor	2	8	19	40	0.08	0.50	0.42	0.02	0.02	0.00	0.01	0.01	0.00	0.00	1.38	0.00	1.26
Dozers < = 175	Dozer - D6	1	8	145	40	1.55	11.16	6.67	0.63	0.58	0.03	0.22	0.13	0.01	0.01	20.72	0.00	18.92
Graders > 120 and < = 175	Grader - 120	1	8	135	40	1.04	7.63	5.86	0.42	0.39	0.02	0.15	0.12	0.01	0.01	19.83	0.00	18.09
Rollers > 175 and < = 250	Roller BW 190AD4	2	8	205	40	1.77	17.52	5.72	0.59	0.54	0.04	0.35	0.11	0.01	0.01	48.99	0.00	44.66
Water Truck	3,000 gal water truck	1	8	230	40	1.00	7.85	2.96	0.26	0.24	0.02	0.16	0.06	0.01	0.00	26.65	0.00	24.30
Total						**6.13**	**49.72**	**26.31**	**2.19**	**2.02**	**0.12**	**0.99**	**0.53**	**0.04**	**0.04**	**133.78**	**0.01**	**122.02**

On Road Construction Emissions

	Total Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	Emissions Summary (lbs/day) ROG	NO_x	CO	PM10	PM2.5	Emissions Summary (tons per phase) ROG	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	88	16.8	1,478	40	59,136	0.17	1.38	3.29	0.21	0.12	0.00	0.03	0.07	0.00	0.00	22.18	0.00	20.23

Note: Assumes a total of 44 workers per day.

Total	Emissions Summary (lbs/day) ROG	NO_x	CO	PM10	PM2.5	Emissions Summary (tons per phase) ROG	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**6.29**	**51.11**	**29.60**	**2.40**	**2.14**								
Maximum Annual Emissions						**0.13**	**1.02**	**0.59**	**0.05**	**0.04**	**155.96**	**0.01**	**142.25**

Replacement Dam

Equipment Type	Equipment Category	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	Emissions Summary (lbs/day) VOC	NOX	CO	PM10	PM2.5	Emissions Summary (tons per phase) VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Dam Construction																		
Tractors/Loaders/Backhoes > 175 and < = 250	Loader - 962	1	20	211	100	2.16	18.09	7.13	0.59	0.54	0.11	0.90	0.36	0.03	0.03	171.74	0.01	156.53
Cranes > 120 and < = 175	Crane, 30 Ton	1	20	152	100	1.84	13.37	9.59	0.76	0.70	0.09	0.67	0.48	0.04	0.03	80.34	0.01	73.32
Rollers > 175 and < = 250	Roller BW 190AD4	2	20	205	100	4.43	43.79	14.30	1.47	1.35	0.22	2.19	0.72	0.07	0.07	306.18	0.02	279.13
Plate Compactors	Compactor	1	20	19	100	0.10	0.63	0.53	0.02	0.02	0.01	0.03	0.03	0.00	0.00	4.31	0.00	3.94
Cement and Mortar Mixers	Concrete mixer	1	24	2	100	0.18	1.11	0.93	0.05	0.04	0.01	0.06	0.05	0.00	0.00	7.58	0.00	6.92
Pumps > 175 and < = 250	Concrete pump	2	24	210	100	5.22	63.70	19.19	1.81	1.66	0.26	3.18	0.96	0.09	0.08	483.29	0.02	440.39
Generator Sets > 25 and < = 50	Generator	2	24	375	100	3.39	12.61	11.83	0.93	0.85	0.17	0.63	0.59	0.05	0.04	73.50	0.02	67.27
	Highway Truck (25,000 lbs)	14	2,640		264,000	1.72	52.18	7.80	1.34	0.92	0.09	2.61	0.39	0.07	0.05	493.54	0.00	449.12
Total						**19.04**	**205.49**	**71.30**	**6.96**	**6.09**	**0.95**	**10.27**	**3.56**	**0.35**	**0.30**	**1,620.48**	**0.08**	**1,476.63**

Note:
Estimates for material excavation assumes 88 truck trips (round trip) per day at a distance of 30 miles.

On Road Construction Emissions

	Total Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	Emissions Summary (lbs/day) ROG	NO_x	CO	PM10	PM2.5	Emissions Summary (tons per phase) ROG	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	88	16.8	1,478	100	147,840	0.17	1.38	3.29	0.21	0.12	0.01	0.07	0.16	0.01	0.01	55.44	0.00	50.57

Note: Assumes a total of 44 workers per day.

Total	Emissions Summary (lbs/day) ROG	NO_x	CO	PM10	PM2.5	Emissions Summary (tons per phase) ROG	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**19.20**	**206.87**	**74.59**	**7.18**	**6.21**								
Maximum Annual Emissions						**0.96**	**10.34**	**3.73**	**0.36**	**0.31**	**1,675.93**	**0.08**	**1,527.20**

Demolition - Existing Dam

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
Equipment Type	Equipment Category	Number	Usage Factor (hrs/day or miles/day)	Power Rating (hp)	Total Days/VMT	VOC	NOX	CO	PM10	PM2.5	VOC	NOX	CO	PM10	PM2.5	CO_2	CH4	Total GHG Emissions (MT CO2e)
Tractors/Loaders/Backhoes > 120 < = 175	Loader - 924	1	8	128	45	0.68	5.06	4.68	0.27	0.25	0.02	0.11	0.11	0.01	0.01	18.25	0.00	16.64
Cranes > 120 and < = 175	Crane - 30 Ton	1	8	152	45	0.74	5.35	3.84	0.30	0.28	0.02	0.12	0.09	0.01	0.01	14.46	0.00	13.20
	Highway Truck (25,000 lbs)	6	1,440		64,800	0.94	28.46	4.25	0.73	0.50	0.02	0.64	0.10	0.02	0.01	121.14	0.00	110.24
Total						**0.94**	**28.46**	**4.25**	**0.73**	**0.50**	**0.02**	**0.64**	**0.10**	**0.02**	**0.01**	**121.14**	**0.00**	**110.24**

Note:
Estimates for material excavation assumes 96 truck trips (round trip) per day at a distance of 30 miles.

On Road Construction Emissions

						Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
	Total Trips	Distance	Average Daily Mileage	Calculated Time - Rounded (days)	Total Mileage	ROG	NO_x	CO	PM10	PM2.5	ROG	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Worker Trips	88	16.8	1,478	45	66,528	0.17	1.38	3.29	0.21	0.12	0.00	0.03	0.07	0.00	0.00	24.95	0.00	22.76

Note: Assumes a total of 44 workers per day.

	Emissions Summary (lbs/day)					Emissions Summary (tons per phase)							
Total	ROG	NO_x	CO	PM10	PM2.5	ROG	NO_x	CO	PM10	PM2.5	CO_2	CH_4	Total GHG Emissions (MT CO2e)
Maximum Daily Emissions	**1.10**	**29.85**	**7.55**	**0.94**	**0.62**								
Maximum Annual Emissions						**0.02**	**0.67**	**0.17**	**0.02**	**0.01**	**146.09**	**0.00**	**133.00**

Fugitive Dust - Unpaved Roads - Replacement Dam

Daily On-Site Construction Motor Vehicle Fugitive Particulate Matter Emissions												
Vehicle Type	No.	Mi/Veh-Day[f]	Surface Type	Silt Loading (g/m^2)/ Silt Content (%)[a]	Vehicle Weight (tons)	Uncontrolled Emission Factors (lb/mi)[b]		Uncontrolled Emissions (lb/day)[c]		Control Efficiency[d]	Controlled Emissions (lb/day)[f]	
						PM10	PM2.5	PM10	PM2.5		PM10	PM2.5
Truck	88	0.5	Unpaved	6	25	2.09	0.21	91.8	9.2	75%	23.1	2.3

Note: Totals may not match sum of individual values because of rounding.

[a] Unpaved surface silt content from SCAQMD CEQA Handbook, (1993) Table A9-9-D-1 for city and county roads

[b] Equations:

EF (unpaved) = k_u $(s/12)^a$ $(W/3)^b$ Ref: AP-42, Section 13.2.2, "Unpaved Rods," November 2006

Constants:

k_u =	1.5	(Particle size multiplier for PM)
	0.15	(Particle size multiplier for PM2.5)
a =	0.9	for PM10
	0.9	for PM2.5
b =	0.45	for PM10
	0.45	for PM2.5

[c] Uncontrolled emissions [lb/day] = Emission factor [lb/mi] x Number x Daily miles traveled [mi/vehicle-day]

[d] Control efficiency from watering unpaved road twice a day (55%) and limiting maximum speed to 25 mph (44%), from Table XI-A, Mitigation Measure Examples, Fugitive Dust from Construction & Demolition, http://www.aqmd.gov/ceqa/handbook/mitigation/fugitive/MM_fugitive.html

[e] Controlled emissions [lb/day] = Uncontrolled emissions [lb/day] x (1 - Control efficiency [%])

Fugitive Dust - Unpaved Roads - Temporary Access Road

Daily On-Site Construction Motor Vehicle Fugitive Particulate Matter Emissions												
Vehicle Type	No.	Mi/Veh-Day[f]	Surface Type	Silt Loading (g/m^2)/ Silt Content (%)[a]	Vehicle Weight (tons)	Uncontrolled Emission Factors (lb/mi)[b]		Uncontrolled Emissions (lb/day)[c]		Control Efficiency[d]	Controlled Emissions (lb/day)[f]	
						PM10	PM2.5	PM10	PM2.5		PM10	PM2.5
Truck	70	0.5	Unpaved	6	25	2.09	0.21	73.0	7.3	75%	18.4	1.8

Note: Totals may not match sum of individual values because of rounding.

[a] Unpaved surface silt content from SCAQMD CEQA Handbook, (1993) Table A9-9-D-1 for city and county roads

[b] Equations:

EF (unpaved) = $k_u (s/12)^a (W/3)^b$ Ref: AP-42, Section 13.2.2, "Unpaved Rods," November 2006

Constants:

k_u =	1.5	(Particle size multiplier for PM)
	0.15	(Particle size multiplier for PM2.5)
a =	0.9	for PM10
	0.9	for PM2.5
b =	0.45	for PM10
	0.45	for PM2.5

[c] Uncontrolled emissions [lb/day] = Emission factor [lb/mi] x Number x Daily miles traveled [mi/vehicle-day]

[d] Control efficiency from watering unpaved road twice a day (55%) and limiting maximum speed to 25 mph (44%), from Table XI-A, Mitigation Measure Examples, Fugitive Dust from Construction & Demolition, http://www.aqmd.gov/ceqa/handbook/mitigation/fugitive/MM_fugitive.html

[e] Controlled emissions [lb/day] = Uncontrolled emissions [lb/day] x (1 - Control efficiency [%])

Concrete Batch Plant - PM-10 Emissions

Maximum Quantity of Concrete Produced (yd/yr) =	100,000
Days of Operation per Year =	100

Composition of Concrete

Material	lb/yd	ton/yr	
Course Aggregate	1,865	175,000	
Sand	1,428	9,250	
Cement	491	8,750	
Cement Supplement	73	3,650	
Water	167	8,350	[167 = 20 gal/yd X 8.34 lb/gal]
Total Concrete Material Required	4,024	205,000	

Emissions from Concrete Batching

*water spray efficiency 70%

Process	lb/ton	controlled lb/ton	lb/yr	lb/day	tpy
Aggregate delivery to ground storage*	0.0033	0.00231	404.25		
Sand delivery to ground storage*	0.00099	0.000693	6.41		
Aggregate transfer to conveyors*	0.0033	0.00231	404.25		
Sand transfer to conveyor*	0.00099	0.000693	6.41		
Aggregate transfer to elevated storage*	0.0033	0.00231	404.25		
Sand transfer to elevated storage*	0.00099	0.000693	6.41		
Cement delivery to Silo (controlled)		0.00034	2.98		
Cement supplement delivery to silo (controlled)		0.0049	17.89		
Weigh hopper loading*	0.0024	0.00168	309.54		
Central Mix loading (controlled)		0.0048	59.52		
PM10 Emissions from Concrete Batching (lb/yr) =			1621.90	16.219	0.811

Emissions from Unpaved Roads

		lb/day	tpy
Emission Factor of Unpaved Roads (lb/VMT) =	0.8		
# VMT/yr	-		
Abatement Efficiency (%) =	70		
PM10 Emissions from Unpaved Roads (lb/yr) =	-	0.000	0.000

Emissions from Storage Piles

		lb/day	tpy
Emission Factor of Storage Piles (lb/acre/day)	1.7		
Area of Storage Piles (acres) =	1		
# Days Storage Piles Exist =	18		
PM10 Emissions from Storage Piles (lb/yr) =	30.6	0.306	0.015

		lb/day	tpy
Total PM10 Emissions (lb/yr) =	1652.50	16.525	0.826
Total PM10 Emissions (TPY) =	0.83		

Pollutant	Silo Fill lb/ton Cement	Silo Fill lb/ton Cement Supp	Central Mix lb/ton Cement & Cement Supp
Arsenic	4.24E-09	1.00E-06	1.87E-08
Beryllium	4.86E-10	9.04E-08	
Cadmium	4.86E-10	1.98E-10	7.10E-10
Chromium (hexavalent)*	2.50E-09	1.59E-07	5.08E-09
Lead	1.08E-08	5.20E-07	3.66E-08
Manganese	1.17E-07	2.56E-07	3.78E-06
Nickel	4.18E-08	2.28E-06	2.48E-07
Phosphorus		3.54E-06	1.20E-06
Selenium		7.24E-08	

Pollutant	TOTAL lb/yr	Chronic Trigger (lb/yr)	Trigger Acute Screen?	Machine Max lb/hr	Acute Trigger (lb/hr)	Trigger Acute Screen?
Arsenic	3.92E-03	7.20E-03	no	6.90E-05	4.40E-04	no
Beryllium	3.34E-04	4.70E-02	no	5.88E-06		
Cadmium	1.38E-05	2.60E-02	no	2.43E-07		
Chromium (hexavalent)	6.66E-04	7.70E-04	no	1.17E-05		
Lead	2.45E-03	3.20E+00	no	4.31E-05		
Manganese	4.88E-02	3.50E+00	no	8.59E-04		
Nickel	1.18E-02	4.30E-01	no	2.07E-04	1.30E-02	no
Phosphorus	2.78E-02			4.89E-04		
Selenium	2.64E-04	7.70E+02	no	4.65E-06		

machine max output (yd concrete/hr)	220
machine max output (yd concrete/yr)	457600
multiplier for acute risk (machine max/condition max)	4.576

* = http://www.sdapcd.org/toxics/emissions/concrete/concrete1.pdf