

AIR QUALITY and GHG IMPACT ANALYSES

SCW-462

**SHEEP CREEK WATER COMPANY ENHANCED GROUNDWATER
SUPPLY WELL DEVELOPMENT PROJECT**

PHELAN (SAN BERNARDINO COUNTY), CALIFORNIA

Prepared by:

Giroux & Associates
1800 E Garry St., #205
Santa Ana, CA 92705

Prepared for:

Tom Dodson & Associates
Attn: Kaitlyn Dodson-Hamilton
PO Box 2307
San Bernardino, CA 92406

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ATMOSPHERIC SETTING

The climate of the Victor Valley, technically called an interior valley subclimate of Southern California's Mediterranean-type climate, is characterized by hot summers, mild winters, infrequent rainfall, moderate afternoon breezes, and generally fair weather. The clouds and fog that form along the Southern California coastline rarely extend across the mountains to Victorville and surrounding high desert communities. The most important local weather pattern is associated with the funneling of the daily onshore sea breeze through El Cajon Pass into the upper desert to the northeast of the heavily developed portions of the Los Angeles Basin. This daily airflow brings polluted air into the area late in the afternoon from late spring to early fall. This transport pattern creates both unhealthy air quality as well as destroying the scenic vistas of the mountains surrounding the Victor Valley.

The low annual humidity, moderate temperature swings, very low rainfall and frequent breezy conditions are typical of California's "Upper Desert" subclimate. Most years do not see temperatures drop below about 20°F or above about 105°F. Occasionally, however, there are some very hot temperatures over 105°F with a record high of 113°F in 1995, and some colder temps down to a record low of -1°F in December 1949.

The Victor Valley is in a transition area between the semi-arid conditions of the Los Angeles Basin and the completely arid portions of the Mojave Desert. The Valley's location in the "rainshadow" of the San Gabriel Mountains further enhances its dryness. Rainfall averages around 6 inches per year, with light to moderate rain falling on only 10 days per year. Because of Southern California's location on the edge of the mid-latitude storm track, a shift in the jet stream aloft of a few hundred miles north or south can mean the difference between a year with twice the annual average rainfall and one with drought conditions where less than one-half of the normal rainfall is observed. The project area may occasionally experience a light winter snowfall (1-2 inches per year), but temperatures do not remain cold enough for the snow to stay on the ground for very long.

Winds blow primarily from south to north and from west to east in response to the regional pattern of airflow from the cool ocean to the heated interior. A large portion of the airflow across the proposed project area therefore has its origin in more developed areas of the Los Angeles Basin. Over 50 percent of all airflow derives from a narrow sector from south through west. These winds are moderately strong, averaging from 8-12 mph, but become light and variable at night with about 10 percent of all hours almost complete calm. Afternoon winds may, at times, exceed 20 mph and begin to pick up fine dust and other loose material.

The wind distribution is an important atmospheric parameter because it controls both the initial rate of pollutant dispersal near the source as well as the ultimate regional trajectory of air pollution. These prevailing winds provide a vehicle for visible smog to be transported from the South Coast Air Basin through the mountain passes to the Mojave Desert Air Basin (MDAB). The rapid daytime heating of the lower air leads to convective activity. This exchange of upper air tends to accelerate surface winds during the warm part of the day when convection is at a maximum. During the winter, the rapid cooling of the surface layers at night retards this exchange of momentum which often results in calm winds.

In addition to winds which govern the horizontal dispersion of locally generated emissions, vertical temperature structure controls the depth through which pollutants can be mixed. The strong surface heating by day in the Mojave Desert usually creates a vertical temperature distribution that decreases rapidly with height (unstable). At night, especially in winter, cool air settles in low-lying areas and forms shallow radiation-induced temperature inversions (stable) that may temporarily restrict the dispersion of low-level pollutant emissions. Such inversions "burn off" rapidly after sunrise. The elevated subsidence/marine inversions that create major air quality problems in coastal environments are rarely observed in the desert. When they do form, their bases are from 6 - 8,000 feet mean sea level and thus do not impede vertical dispersion. The low-level radiation inversions, however, play an important role in limiting the dispersive capacity of the local airshed from late evening to the next morning. Because they burn off rapidly in the morning, their importance to the dispersion of air contaminants is limited to localized effects.

AIR QUALITY SETTING

AMBIENT AIR QUALITY STANDARDS (AAQS)

In order to gauge the significance of the air quality impacts of the proposed project, those impacts, together with existing background air quality levels, must be compared to the applicable ambient air quality standards. These standards are the levels of air quality considered safe, with an adequate margin of safety, to protect the public health and welfare. They are designed to protect those people most susceptible to further respiratory distress such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise, called "sensitive receptors." Healthy adults can tolerate occasional exposure to air pollutant concentrations considerably above these minimum standards before adverse effects are observed. Recent research has shown, however, that chronic exposure to ozone (the primary ingredient in photochemical smog) may lead to adverse respiratory health even at concentrations close to the ambient standard.

National AAQS were established in 1971 for six pollution species with states retaining the option to add other pollutants, require more stringent compliance, or to include different exposure periods. The initial attainment deadline of 1977 was extended several times in air quality problem areas like Southern California. In 2003, the Environmental Protection Agency (EPA) adopted a rule, which extended and established a new attainment deadline for ozone for the year 2021. Because the State of California had established AAQS several years before the federal action and because of unique air quality problems introduced by the restrictive dispersion meteorology, there is considerable difference between state and national clean air standards. Those standards currently in effect in California are shown in Table 1. Sources and health effects of various pollutants are shown in Table 2.

The Federal Clean Air Act Amendments (CAAA) of 1990 required that the U.S. Environmental Protection Agency (EPA) review all national AAQS in light of currently known health effects. EPA was charged with modifying existing standards or promulgating new ones where appropriate. EPA subsequently developed standards for chronic ozone exposure (8+ hours per day) and for very small diameter particulate matter (called "PM-2.5"). New national AAQS were adopted in 1997 for these pollutants.

Planning and enforcement of the federal standards for PM-2.5 and for ozone (8-hour) were challenged by trucking and manufacturing organizations. In a unanimous decision, the U.S. Supreme Court ruled that EPA did not require specific congressional authorization to adopt national clean air standards. The Court also ruled that health-based standards did not require preparation of a cost-benefit analysis. The Court did find, however, that there was some inconsistency between existing and "new" standards in their required attainment schedules. Such attainment-planning schedule inconsistencies centered mainly on the 8-hour ozone standard. EPA subsequently agreed to downgrade the attainment designation for a large number of communities to "non-attainment" for the 8-hour ozone standard.

Table 1

Ambient Air Quality Standards						
Pollutant	Averaging Time	California Standards ¹		National Standards ²		
		Concentration ³	Method ⁴	Primary ^{3,5}	Secondary ^{3,6}	Method ⁷
Ozone (O ₃) ⁸	1 Hour	0.09 ppm (180 µg/m ³)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m ³)		0.070 ppm (137 µg/m ³)		
Respirable Particulate Matter (PM ₁₀) ⁹	24 Hour	50 µg/m ³	Gravimetric or Beta Attenuation	150 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m ³		—		
Fine Particulate Matter (PM _{2.5}) ⁹	24 Hour	—	—	35 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m ³	Gravimetric or Beta Attenuation	12.0 µg/m ³	15 µg/m ³	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m ³)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m ³)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m ³)		9 ppm (10 mg/m ³)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m ³)		—	—	
Nitrogen Dioxide (NO ₂) ¹⁰	1 Hour	0.18 ppm (339 µg/m ³)	Gas Phase Chemiluminescence	100 ppb (188 µg/m ³)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m ³)		0.053 ppm (100 µg/m ³)	Same as Primary Standard	
Sulfur Dioxide (SO ₂) ¹¹	1 Hour	0.25 ppm (655 µg/m ³)	Ultraviolet Fluorescence	75 ppb (196 µg/m ³)	—	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m ³)	
	24 Hour	0.04 ppm (105 µg/m ³)		0.14 ppm (for certain areas) ¹¹	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas) ¹¹	—	
Lead ^{12,13}	30 Day Average	1.5 µg/m ³	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m ³ (for certain areas) ¹²	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m ³		
Visibility Reducing Particles ¹⁴	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m ³	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m ³)	Ultraviolet Fluorescence			
Vinyl Chloride ¹²	24 Hour	0.01 ppm (26 µg/m ³)	Gas Chromatography			

See footnotes on next page ...

For more information please call ARB-PIO at (916) 322-2990

California Air Resources Board (5/4/16)

Table 1 (continued)

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, 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.
2. 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 three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above $150 \mu\text{g}/\text{m}^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
7. Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.
8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.
9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from $15 \mu\text{g}/\text{m}^3$ to $12.0 \mu\text{g}/\text{m}^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at $35 \mu\text{g}/\text{m}^3$, as was the annual secondary standard of $15 \mu\text{g}/\text{m}^3$. The existing 24-hour PM10 standards (primary and secondary) of $150 \mu\text{g}/\text{m}^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
10. 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. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.
11. 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 one 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.
Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). 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 to 0.075 ppm.
12. The 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.
13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard ($1.5 \mu\text{g}/\text{m}^3$ as a quarterly average) remains in effect until one 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 standard are approved.
14. In 1989, the 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 "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

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Table 2
Health Effects of Major Criteria Pollutants

Pollutants	Sources	Primary Effects
Carbon Monoxide (CO)	<ul style="list-style-type: none"> • Incomplete combustion of fuels and other carbon-containing substances, such as motor exhaust. • Natural events, such as decomposition of organic matter. 	<ul style="list-style-type: none"> • Reduced tolerance for exercise. • Impairment of mental function. • Impairment of fetal development. • Death at high levels of exposure. • Aggravation of some heart diseases (angina).
Nitrogen Dioxide (NO ₂)	<ul style="list-style-type: none"> • Motor vehicle exhaust. • High temperature stationary combustion. • Atmospheric reactions. 	<ul style="list-style-type: none"> • Aggravation of respiratory illness. • Reduced visibility. • Reduced plant growth. • Formation of acid rain.
Ozone (O ₃)	<ul style="list-style-type: none"> • Atmospheric reaction of organic gases with nitrogen oxides in sunlight. 	<ul style="list-style-type: none"> • Aggravation of respiratory and cardiovascular diseases. • Irritation of eyes. • Impairment of cardiopulmonary function. • Plant leaf injury.
Lead (Pb)	<ul style="list-style-type: none"> • Contaminated soil. 	<ul style="list-style-type: none"> • Impairment of blood function and nerve construction. • Behavioral and hearing problems in children.
Respirable Particulate Matter (PM-10)	<ul style="list-style-type: none"> • Stationary combustion of solid fuels. • Construction activities. • Industrial processes. • Atmospheric chemical reactions. 	<ul style="list-style-type: none"> • Reduced lung function. • Aggravation of the effects of gaseous pollutants. • Aggravation of respiratory and cardio respiratory diseases. • Increased cough and chest discomfort. • Soiling. • Reduced visibility.
Fine Particulate Matter (PM-2.5)	<ul style="list-style-type: none"> • Fuel combustion in motor vehicles, equipment, and industrial sources. • Residential and agricultural burning. • Industrial processes. • Also, formed from photochemical reactions of other pollutants, including NO_x, sulfur oxides, and organics. 	<ul style="list-style-type: none"> • Increases respiratory disease. • Lung damage. • Cancer and premature death. • Reduces visibility and results in surface soiling.
Sulfur Dioxide (SO ₂)	<ul style="list-style-type: none"> • Combustion of sulfur-containing fossil fuels. • Smelting of sulfur-bearing metal ores. • Industrial processes. 	<ul style="list-style-type: none"> • Aggravation of respiratory diseases (asthma, emphysema). • Reduced lung function. • Irritation of eyes. • Reduced visibility. • Plant injury. • Deterioration of metals, textiles, leather, finishes, coatings, etc.

Source: California Air Resources Board, 2002.

Evaluation of the most current data on the health effects of inhalation of fine particulate matter prompted the California Air Resources Board (ARB) to recommend adoption of the statewide PM-2.5 standard that is more stringent than the federal standard. This standard was adopted in 2002. The State PM-2.5 standard is more of a goal in that it does not have specific attainment planning requirements like a federal clean air standard, but only requires continued progress towards attainment.

Similarly, the ARB extensively evaluated health effects of ozone exposure. A new state standard for an 8-hour ozone exposure was adopted in 2005, which aligned with the exposure period for the federal 8-hour standard. The California 8-hour ozone standard of 0.07 ppm is more stringent than the federal 8-hour standard of 0.075 ppm. The state standard, however, does not have a specific attainment deadline. California air quality jurisdictions are required to make steady progress towards attaining state standards, but there are no hard deadlines or any consequences of non-attainment. During the same re-evaluation process, the ARB adopted an annual state standard for nitrogen dioxide (NO₂) that is more stringent than the corresponding federal standard, and strengthened the state one-hour NO₂ standard.

As part of EPA's 2002 consent decree on clean air standards, a further review of airborne particulate matter (PM) and human health was initiated. A substantial modification of federal clean air standards for PM was promulgated in 2006. Standards for PM-2.5 were strengthened, a new class of PM in the 2.5 to 10 micron size was created, some PM-10 standards were revoked, and a distinction between rural and urban air quality was adopted. In December, 2012, the federal annual standard for PM-2.5 was reduced from 15 µg/m³ to 12 µg/m³ which matches the California AAQS. The severity of the basin's non-attainment status for PM-2.5 may be increased by this action and thus require accelerated planning for future PM-2.5 attainment.

In response to continuing evidence that ozone exposure at levels just meeting federal clean air standards is demonstrably unhealthful, EPA had proposed a further strengthening of the 8-hour standard. A new 8-hour ozone standard was adopted in 2015 after extensive analysis and public input. The adopted national 8-hour ozone standard is 0.07 ppm which matches the current California standard. It will require three years of ambient data collection, then 2 years of non-attainment findings and planning protocol adoption, then several years of plan development and approval. Final air quality plans for the new standard are likely to be adopted around 2022. Ultimate attainment of the new standard in ozone problem areas such as Southern California might be after 2025.

Of the standards shown in Table 1, those for ozone (O₃), and particulate matter (PM-10) are exceeded at times in the MDAB. They are called "non-attainment pollutants." Because of the variations in both the regional meteorology and in area-wide differences in levels of air pollution emissions, patterns of non-attainment have strong spatial and temporal differences.

BASELINE AIR QUALITY

Monitoring of air quality in the MDAB is the responsibility of the Mojave Desert Air Quality Management District (MDAQMD) headquartered in Victorville, California. Because of the low population density of the air district, limited monitoring resources are distributed over a relatively large geographic area. The heaviest concentration of measurements is in the area of greatest development in the Victor Valley. Existing levels of criteria air pollutants in the project area can generally be inferred from measurements conducted at the Hesperia monitoring station. Although the Hesperia Station does not monitor the complete spectrum of pollutants, data for NO₂ and PM-2.5 are available from the Victorville Monitoring Station. CO is no longer monitored in the Mojave Desert. **Table 3** summarizes the available monitoring history from the Hesperia and Victorville monitoring stations for the last 3 years. From these data one can infer that baseline air quality levels near the project site are occasionally unhealthy, but that such violations of clean air standards usually affect only those people most sensitive to air pollution exposure.

- a. Photochemical smog (ozone) levels occasionally exceed standards. The 8-hour state ozone standard has been exceeded approximately 19 percent of all days in the last three years while the 1-hour state standard has been exceeded almost five percent of all days. The 8-hour federal standard has been exceeded approximately 12 percent of all days in the past three years. Attainment of all clean air standards in the project vicinity is not likely to occur soon, but the severity and frequency of violations is expected to continue to slowly decline during the current decade
- b. Respirable dust (PM-10) levels often exceed the state standard of 50 µg/m³ but the less stringent federal PM-10 standard of 50 µg/m³ has only been violated three times within the last three years. Year 2018 had the lowest maximum 24-hour concentration in recent history.
- c. A substantial fraction of PM-10 is comprised of ultra-small diameter particulates capable of being inhaled into deep lung tissue (PM-2.5). There has only been one measured violation in the last three years.

Although complete attainment of every clean air standard is not yet imminent, extrapolation of the steady improvement trend suggests that such attainment could occur within the reasonably near future.

Table 3

**Air Quality Monitoring Summary (2016-2018)
(Number of Days Standards Were Exceeded, and
Maximum Levels During Such Violations)
(Entries shown as estimated days exceeding standard)**

Pollutant/Standard	2016	2017	2018
Ozone			
1-Hour > 0.09 ppm (S)	25	18	9
8-Hour > 0.07 ppm (S)	65	75	71
8- Hour > 0.075 ppm (F)	47	45	45
Max. 1-Hour Conc. (ppm)	0.119	0.114	0.113
Max. 8-Hour Conc. (ppm)	0.098	0.094	0.100
Nitrogen Dioxide			
1-Hour > 0.18 ppm (S)	0	0	0
Max. 1-Hour Conc. (ppm)	0.097	0.057	0.057
Inhalable Particulates (PM-10)			
24-Hour > 50 µg/m ³ (S)	9	na	na
24-Hour > 150 µg/m ³ (F)	1	2	0
Max. 24-Hr. Conc. (µg/m ³)	203.5	163.9	138.9
Ultra-Fine Particulates (PM-2.5)			
24-Hour > 35 µg/m ³ (F)	1	0	0
Max. 24-Hr. Conc. (µg/m ³)	41.5	27.2	32.7

na = not available
S=State Standard
F=Federal Standard

Source: Hesperia Station: Ozone, PM-10, Victorville Station: CO, NO₂, PM-2.5
data: www.arb.ca.gov/adam/

AIR QUALITY IMPACTS

PROJECT DESCRIPTION

Sheep Creek Water Company (SCWC) is proposing to drill four new wells which will serve as a new source of water to supplement the existing water demand. The total area of disturbance will be less than one acre per well. Each well will be drilled to approximately 1,500 feet deep using a reverse rotary drill unit. The wells will each be equipped with an above ground pump motor on top of an approximate 10-foot x 10-foot concrete pad. At each new well, the new pumps will be enclosed with a masonry block building to minimize exterior noise levels at the nearest residences

It is anticipated that about five persons will be on a given well site at any one time to support drilling the well: three drillers, the hydrologist inspector, and a foreman. Daily trips to complete the well will average about 10 roundtrips per day, including: two roundtrips for drill rigs; between 6 and 12 roundtrips for cement trucks; a few trips to deliver pipe; and about 20 trips per day for employees. It is estimated that it will require about 8 weeks to drill the well, with 24-hour drilling activities for 7 days a week (surrounding housing to be notified in advance).

At each well location a connection pipeline that will be installed will be no greater in length than 500 lineal feet (LF) and may be much shorter in length at two of the well locations (100-200 LF). Each new well pump will be located aboveground and placed in an enclosed structure as previously described.

ADJACENT USES

The closest sensitive use to each well site is as follows:

<u>Well 13:</u>	430 feet to home to the west
<u>Well16:</u>	250 feet to home to the southeast
<u>Wells 12 and 14:</u>	360 feet to the south for school blacktop, 350 feet south to school classroom and 680 feet to the home to the west

STANDARDS OF SIGNIFICANCE

The Mojave Desert AQMD has adopted numerical emissions thresholds as indicators of potential impact even if the actual air quality increment cannot be directly quantified. The MDAQMD thresholds are as follows:

Carbon Monoxide (CO)	548 pounds/day	100 tons/year
Nitrogen Oxides (NOx)	137 pounds/day	25 tons/year
Sulfur Oxides (SOx)	137 pounds/day	25 tons/year
Reactive Organic Gases (ROG)	137 pounds/day	25 tons/year
Particulate Matter (PM-10)	82 pounds/day	15 tons/year
Particulate Matter (PM-2.5)	65 pounds/day	12 tons/year
GHG	548,000 pounds/day	100,000 tons/year

CONSTRUCTION ACTIVITY IMPACTS

CalEEMod was developed by the SCAQMD to provide a model by which to calculate both construction emissions and operational emissions from a variety of land use projects. It calculates both the daily maximum and annual average emissions for criteria pollutants as well as total or annual greenhouse gas (GHG) emissions. CalEEMod was used to analyze project impacts.

Table 4 provides the construction equipment inventory developed by the CalEEMod model for the project.

**Table 4
Construction Activity Equipment and Durations per Well**

Phase Name and Duration	Round Trips per Day:	Equipment
Drilling (8 weeks) 24-hrs/day, 7 days/week	2 for Equipment	1 Drill Rig
	6-12 for Cement	2 Loader/Backhoes
	10 trips Employees	1 Dozer
Pipeline Installation (10 days) 8-hrs/day	1-2 for Pipe	1 Trencher
	10 trips Employees	1 Crane

The activity for construction equipment is based on the horsepower and load factors of the equipment. In general, the horsepower is the power of an engine—the greater the horsepower, the greater the power. The load factor is the average power of a given piece of equipment while in operation compared with its maximum rated horsepower. A load factor of 1.0 indicates that a piece of equipment continually operates at its maximum operating capacity. This analysis uses the CalEEMod model’s default load factors for off-road equipment.

Utilizing the indicated equipment fleets and durations the worst case daily construction emissions are calculated by CalEEMod and are listed in **Table 5**. As shown peak construction emissions would not exceed the daily MDAQMD significance thresholds. The only construction mitigation measure modeled was to water exposed site surfaces at least 3 times per day.

Table 5
Construction Activity Emissions
Maximum Daily Emissions (pounds/day)

Maximal Construction Emissions	ROG	NOx	CO	SO₂	PM-10	PM-2.5
Each Well						
Unmitigated	2.5	27.6	16.9	0.0	1.4	1.1
w/Fugitive Dust Mitigation*	2.5	27.6	16.9	0.0	1.2	1.1
4 Wells						
Unmitigated	10.0	110.4	67.6	0.0	5.6	4.4
w/Fugitive Dust Mitigation*	10.0	110.4	67.6	0.0	4.8	4.4
MDAQMD Thresholds	137	137	548	137	82	65

* fugitive dust control measures provided in Mitigation section of this report
Source: CalEEMod output in report appendix

Since MDAQMD emissions guidelines include a not to exceed annual threshold, these emissions were also evaluated as shown in **Table 6**. As shown annual construction emissions are similarly below thresholds.

Table 6
Construction Activity Emissions
Annual Emissions (pounds/day)

Maximal Construction Emissions	ROG	NOx	CO	SO₂	PM-10	PM-2.5
Each Well						
Unmitigated	0.06	0.65	0.41	0.00	0.03	0.03
w/Fugitive Dust Mitigation*	0.06	0.65	0.41	0.00	0.03	0.03
4 Wells						
Unmitigated	0.24	2.60	1.64	0.00	0.12	0.12
w/Fugitive Dust Mitigation*	0.24	2.60	1.64	0.00	0.12	0.12
MDAQMD Thresholds	25	25	100	25	15	12

* fugitive dust control measures provided in Mitigation section of this report
Source: CalEEMod output in report appendix

OPERATIONAL IMPACTS

Each of the new production wells would require up to 1.5 million KWH to operate per year (if full time) with four wells operating at the same time. Electrical consumption has no single uniquely related air pollution emissions source because power is supplied to and drawn from a regional grid. Electrical power is generated regionally by a combination of non-combustion (nuclear, hydroelectric, solar, wind, geothermal, etc.) and fossil fuel combustion sources. There is no direct nexus between consumption and the type of power source or the air basin where the source is located. Operational air pollution emissions from electrical generation are therefore not attributable on a project-specific basis.

MITIGATION

CONSTRUCTION EMISSIONS MITIGATION

Short-term emissions are primarily related to the construction of the project and are recognized to be short in duration and without lasting impacts on air quality. With the enhanced dust control mitigation measures listed below, construction activity air pollution emissions are not expected to exceed MDAQMD CEQA thresholds for any pollutant even if the wells are under simultaneous construction. Regardless, the PM-10 non-attainment status of the Mojave Desert area requires that Best Available Control Measures (BACMs) be used as required by the Mojave AQMD Rule 403. Recommended construction activity mitigation includes:

Dust Control

- Apply soil stabilizers such as hay bales or aggregate cover to inactive areas.
- Prepare a high wind dust control plan and implement plan elements and terminate soil disturbance when winds exceed 25 mph.
- Stabilize previously disturbed areas if subsequent construction is delayed.
- Water exposed surfaces and haul roads 3 times/day.
- Cover all stockpiles with tarps.
- Replace ground cover in disturbed areas quickly.
- Reduce speeds on unpaved roads to less than 15 mph.
- Trenches shall be left exposed for as short a time as possible.

PROJECT RELATED GHG EMISSIONS GENERATION

GHG THRESHOLDS

The MDAQMD has published thresholds for Greenhouse Gases emissions (CO₂e). The daily threshold is 548,000 lbs/day and the annual threshold is 100,000 MT/year.

CONSTRUCTION ACTIVITY GHG EMISSIONS

The project is assumed to require less than three months for installation. The CalEEMod2016.3.2 computer model predicts that the construction activities will generate the annual CO₂e emissions identified in **Table 7**.

Table 7
Construction Emissions (Metric Tons CO₂e)

	CO₂e Daily	MT CO₂e Annual
Single Well	4,617.7	96.2
4 Wells	18,470.8	384.8
Threshold	548,000	100,000

CalEEMod Output provided in appendix

Construction GHG emissions are less than applicable thresholds.

PROJECT OPERATIONAL GHG EMISSIONS

Except for occasional maintenance, the only operational source of GHG emissions would be associated with pumping operations. Electricity is generated from a variety of resources at various locations in the western United States. The California Climate Action Registry Protocol (2009) states that each megawatt-hour (MW-HR) of electricity consumption in California results in the release of 0.331 MT of CO₂(e).

Each of the new production wells would require up to 1.5 million KWH to operate per year (if full time); and the assumption is that four could operate at the same time. With an 80% load factor this would translate to an annual average of 10.5 MW per year per well in increased project electrical consumption. All four wells would generate 42.0 MW. Electricity use will result in GHG emissions from the fossil fueled fraction of Southern California's electrical resource calculated as follows:

$$42 \text{ MWH/year} \times 0.331 \text{ MT/MWH} = 13.9 \text{ MT/year}$$

The screening threshold of 100,000 MT of CO₂(e) GHG emissions will not be exceeded.

CONSISTENCY WITH GHG PLANS, PROGRAMS AND POLICIES

In March 2014, the San Bernardino Associated Governments and Participating San Bernardino County Cities Partnership (Partnership) created a final draft of the San Bernardino County Regional Greenhouse Gas Reduction Plan (Reduction Plan). This Reduction Plan was created in accordance to AB 32, which established a greenhouse gas limit for the state of California. The Reduction Plan seeks to create an inventory of GHG gases and develop jurisdiction-specific GHG reduction measures and baseline information that could be used by the 21 Partnership Cities of San Bernardino County, which include the City of San Bernardino.

Projects that demonstrate consistency with the strategies, actions, and emission reduction targets contained in the Reduction Plan would have a less than significant impact on climate change. This project, a water supply improvement is GHG neutral, and is not directly relatable to the Reduction Plan and would result in a less than significant impact with respect to GHG emissions.

CALEEMOD2016.3.2 COMPUTER MODEL OUTPUT

- **DAILY EMISIONS**
- **ANNUAL EMISSIONS**