



Alan F. Colton
Manager - Environmental
Sunrise Powerlink
8315 Century Park Court,
CP21G
San Diego, CA 92123-
1550
Office 858-654-8727
Fax 858-637-3731

June 9, 2009

Ms. Billie Blanchard
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102

**RE: Sunrise Powerlink Transmission Project;
Air Quality Mitigation Program for Construction Air Emissions**

Dear Ms. Blanchard:

The California Public Utilities Commission (CPUC) issued a Certificate of Public Convenience and Necessity (CPCN) for the San Diego Gas & Electric Company (SDG&E) Sunrise Powerlink Transmission Project (Project) on December 18, 2008.¹ The Bureau of Land Management (BLM), to satisfy National Environmental Policy Act (NEPA) requirements, issued a Record of Decision (ROD) on January 20, 2009.² Both the CPUC and BLM adopted several air quality mitigation measures for the Project, which are listed in the ROD and the Project Final Environmental Impact Report / Environmental Impact Study (EIR/EIS).³ Accordingly, SDG&E respectfully requests CPUC review and acceptance of the enclosed proposed Air Quality Mitigation Program for Construction Air Emissions. As discussed below, the mitigation program reflects the construction air emission calculations for the approved route and proposes internal reductions, confirmed through monitoring, to satisfy mitigation measure AQ-1h, which is the primary focus of SDG&E's efforts to mitigate project criteria pollutant emissions.

¹ *Decision Granting a Certificate of Public Convenience and Necessity for the Sunrise Powerlink Transmission Project, available at* http://docs.cpuc.ca.gov/PUBLISHED/AGENDA_DECISION/95357.htm#P2905_460034. SDG&E anticipates commencing construction of the Project in 2010.

² *Record of Decision for the Sunrise Powerlink Transmission Project and Associated Amendment to the Eastern San Diego County Resource Management Plan, available at* <http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/elcentro/nepa/2007/eis.Par.9361.File.dat/ROD-SunrisePowerlinkJan2009.pdf>.

³ *See San Diego Gas and Electric's Sunrise Powerlink Project Final Environmental Impact Report / Environmental Impact Statement and Draft Land Use Plan Amendment, Air Quality Section D11, available at* <http://www.cpuc.ca.gov/environment/info/aspen/sunrise/feir/D11%20Air%20Quality.pdf>.

Air Emissions Mitigation Requirements for the Approved Route

Mitigation measure AQ-1h requires 212 tons/year of NOx emission reductions for construction activities in San Diego County. For Imperial County, the measure requires 99 tons/year of oxides of nitrogen (NOx) emission reductions, and 276 tons/year of particulate matter less than 10 micron (PM10) emissions reductions. The emission reduction requirements were based upon projected NOx emissions exceeding a 100 ton/year significance threshold for federal conformity and projected PM10 emissions exceeding a 70 tons/year threshold in Imperial County. These construction air emission calculations are based on the Project's original Proposed Route.

The CPUC ultimately rejected the original Proposed Route through the Anza-Borrego Desert State Park and approved the Final Environmentally Superior Southern Route (FESSR), which runs through southern Imperial and San Diego Counties. The FESSR is shorter than the original Proposed Route. It proceeds west from the Imperial Valley area and cuts north after 36 miles, thus avoiding Anza-Borrego. The Final EIR/EIS included emissions estimates for project alternatives, including the FESSR. The proposed Air Quality Mitigation Program for Construction Air Emissions includes a summary of the criteria pollutant construction emissions for the original Proposed Route and the FESSR, as stated in the Final EIR/EIS. Total emissions of NOx, reactive organic gases (ROG), PM10, carbon monoxide (CO) and oxides of sulfur (SOx) are provided.

Updated to reflect the emissions as presented in the Final EIR/EIS for the FESSR, the AQ-1h requirement is now 243 tons/year of NOx emission reductions for construction activities in San Diego County. For construction activities in Imperial County, the revised requirement is 1 ton/year of NOx emission reductions and 105 tons/year of PM10 emissions reductions. These emission values do not include CPUC-approved mitigation measures, with the exception of fugitive dust control, and do not include final construction equipment usage projections for the FESSR.

Internal Reductions

Prior to the issuance of the ROD, both the Imperial County Air Pollution Control District (ICAPCD) (January 9, 2009⁴) and the San Diego Air Pollution Control District (SDAPCD) (January 12, 2009⁵) provided letters to BLM stating that, rather than securing permanent emission reduction credits, SDG&E may take appropriate actions to reduce short-term construction emissions through incentive programs supplemented with additional emissions reduction measures.

As demonstrated in SDG&E's Air Quality Mitigation Program for Construction Air Emissions (enclosed), mitigation measure AQ-1h will be satisfied primarily through internal reductions as confirmed by monitoring. SDG&E also is committed to providing incentive

⁴ Sunrise Powerlink Project Conformity Determination, Letter from Robert Poiriez, Imperial County Air Pollution Control District to Michael Pool, Bureau of Land Management, January 9, 2009.

⁵ Sunrise Powerlink Project Conformity Determination, Letter from Robert Kard, San Diego Air Pollution Control District to Michael Pool, Bureau of Land Management, January 12, 2009.

mitigation funding to the local air districts to further reduce criteria pollutant emissions from construction of the Project. Although not required to achieve the quantified emission reductions under AQ-1h, such mitigation funding will offer even greater assurance that the requirements of mitigation measure AQ-1h have been satisfied. SDG&E anticipates that the local air districts will use these funds to provide additional emission reductions through programs that may include, but are not limited to, the Carl Moyer Program, road paving, or other eligible programs as selected by the District.⁶

SDG&E appreciates your review of the enclosed Air Quality Mitigation Program for Construction Air Emissions for the Project. If you have any questions or comments, please do not hesitate to contact me.

Sincerely,



Alan Colton
Manager - Sunrise Powerlink Environmental Services

Enclosures.

cc: Bob Kard, San Diego County Air Pollution Control District
Brad Poiriez, Imperial County Air Pollution Control District

⁶ Please note that no credit has been taken for emission reductions achieved through the implementation of local air district programs. Mitigation measure AQ-1h can be independently satisfied through internal project mitigation as confirmed by monitoring

Air Quality Mitigation Program for Construction Air Emissions

SDG&E’s proposed air quality mitigation program for construction emissions will substantially reduce construction air emissions from the Sunrise Powerlink Transmission Project. Table 1 provides a summary of the criteria pollutant construction emissions for the original Proposed Route and the Final Environmentally Superior Southern Route (FESSR), as stated in the Final EIR/EIS. The estimated annual emissions after mitigation implementation are summarized in Table 2. Detailed air emission calculations are provided in Attachment 2.

Table 1. Final EIR/EIS Sunrise Powerlink Project Construction Air Emissions and Comparison to Significance Thresholds (tons/year)

San Diego County

Project Route	NOx	ROG	PM10	CO	SOx
Proposed Route	311.5	40.4	540.9	171.5	5.0
FESSR Alternative	342.9	44.4	595.5	188.8	5.5
<i>less threshold</i>	100	100	N/A	N/A	N/A
AQ-1h Reductions Required	243	--	--	--	--

Imperial County

Project Route	NOx	ROG	PM10	CO	SOx
Proposed Route	199.2	25.8	345.9	109.7	3.2
FESSR Alternative	100.8	13.1	175.1	55.5	1.6
<i>less threshold</i>	100	100	70	N/A	N/A
AQ-1h Reductions Required	1	--	105	--	--

These emission values do not include CPUC-approved mitigation measures, with the exception of fugitive dust control, and do not include final construction equipment usage projections for the FESSR.

In the final EIR/EIS, approximately 67% of projected NOx emissions originally estimated for the original Proposed Route were projected to be from off-road construction equipment, and about 33% from on-road vehicles. Approximately 97% of PM10 emissions were estimated to be from fugitive dust, and most of the remainder was estimated to be from off-road vehicle engines.

Table 2. Sunrise Powerlink Project Construction Air Emissions after Implementing Proposed Reductions (tons/year)

San Diego County

Project Route	NOx	ROG	PM10	CO	SOx
FESSR Alternative, EIR/EIS	342.9	44.4	595.5	188.8	5.5
less internal reductions	-253.1	-28.0	-439.7	-114.3	-3.7
<i>FESSR Alternative, mitigated</i>	89.8	16.4	155.8	74.5	1.8
% Reduction	74%	63%	74%	61%	67%
Additional reductions needed?	NO	--	--	--	--

Imperial County

Project Route	NOx	ROG	PM10	CO	SOx
FESSR Alternative, EIR/EIS	100.8	13.1	175.1	55.5	1.6
less internal reductions	-70.9	-7.6	-123.2	-30.7	-1.0
<i>FESSR Alternative, mitigated</i>	29.9	5.5	51.9	24.8	0.6
% Reduction	70%	58%	70%	55%	63%
Additional reductions needed?	NO	NO	--	--	--

As shown in Table 2, the calculated reductions will satisfy (and exceed) the requirements of updated mitigation measure AQ-1h. Based on the emissions values previously calculated for the original Proposed Route, mitigation measures generally are expected to reduce construction-related emissions by approximately 60-75% in San Diego County and by approximately 55-70% in Imperial County.

In order to satisfy mitigation measure AQ-1h, SDG&E proposes to implement the following procedures:

1. ***Use of Tier 3 Off-Road Equipment.*** SDG&E proposes to provide additional emissions reductions by requiring construction contractors to use Tier 3 diesel off-road equipment rather than Tier 2 equipment as proposed in mitigation measure AQ-1b. This will reduce emissions of NOx, CO and PM10.

Mitigation measure AQ-1b requires the use of low-emission diesel-fueled off-road construction equipment rated greater than 50 hp to meet, at a minimum, Tier 2 California Emission Standards specified in Code of Regulations Title 13, Section 2423(b)(1). Portable generators not in the statewide Portable Equipment Registration Program also must meet the requirement. The Tier 2 NOx + NMHC emission factors are 5.6 g/hp-hr for equipment less than 100 hp, 4.9 g/hp-hr for equipment 100 hp to less than 300 hp, and 4.8 g/hp-hr for larger equipment. NMHC stands for non-methane hydrocarbons, accounting for typically about 5% of diesel off-road engine NOx + NMHC emissions. Therefore, NOx emission calculations are conservative.

The Tier 3 NOx + NMHC emission factors are 3.5 g/hp-hr for equipment 75 hp to less than 100 hp, and 3.0 g/hp-hr for larger equipment. For a 250 hp engine, use of Tier 3

equipment represents about a 39% reduction in NOx emissions. Emissions were calculated for specific equipment types using typical load factors published at www.arb.ca.gov/msei/onroad/downloads/pubs/mo9932.zip.

If Tier 3 equipment cannot be provided by contractors for any scheduled equipment, the contractor will be required to note this situation. If no Tier 3 equipment is available, then the current requirements of mitigation measure AQ-1b will be followed. Contractors will be required to log equipment engine model, hp rating, EPA family number, and approximate daily and hourly usage.

SDG&E conservatively estimates that at least 60% of off-road equipment will meet Tier 3 standards. Tier 3 standards for engines greater than 175 hp became effective in 2006, four years before construction is scheduled to commence.

2. ***Reduce Use of Off-Road Equipment.*** SDG&E has developed a worst-case schedule for FESSR off-road equipment usage that is substantially reduced from the emission calculation assumptions used in the Final EIR/EIS. In the Final EIR/EIS, emission calculations were completed assuming most off-road construction equipment will operate for 12 hours per day and 6 days per week. For the original Proposed Route, off-road, diesel-fueled equipment was projected to be used for about 1,470,000 total hours during construction.

SDG&E's updated worst-case assumptions for off-road diesel-fueled equipment usage (revised to reflect the approved FESSR) includes reducing operating time for equipment to approximately eight hours per day and using equipment only as needed during each construction phase. Some equipment will operate up to ten hours per day as needed, but many equipment pieces will operate only two to six hours per day. The expected hours of off-road equipment operation will be reduced to approximately 316,000 total hours. This technique will result in an estimated 79% reduction in total off-road equipment usage and associated diesel fuel combustion.

SDG&E plans to use helicopters to ferry tower sections to final assembly areas, to install transmission lines, and to shuttle workers to more remote tower assembly locations. This approach is considered to be a non-conventional construction approach. While the non-conventional approach will increase the use of helicopters (and helicopter emissions) from that stated in the Final EIR/EIS, the use of off-road equipment is expected to be further reduced. The mix of off-road equipment and helicopter usage will not be finalized until contractors are selected. Therefore, the updated construction emission calculations in Attachment 2 include a worst-case estimate of conventional off-road equipment usage plus non-conventional helicopter usage. If needed to claim additional internal reductions, further refinement will be made to reflect the estimated use of off-road construction equipment.

Actual operation of off-road equipment will also be reduced by implementing mitigation measure AQ-APM-5 to minimize equipment idling.

3. ***Reduce Construction Worker Trips.*** SDG&E has developed a worker and crew schedule that reduces the number of workers from the schedule assumed for the original Proposed Route in the Final EIR/EIS. In the Final EIR/EIS, 800 workers per day, for 22 days per month, were assumed to be at the site continuously over the first 12 months, with 580 workers per day, six days per week, over the last 10 months. Combined with an assumption of 60 miles round trip (15% on unpaved roads) traveled per day and a 1.3 rideshare factor, about 15,600,000 worker commute vehicle miles traveled (VMT) in light-duty vehicles were estimated. An additional 7,600,000 worker VMT were estimated for crew and QA/QC mobilization in light-duty vehicles. The total worker VMT in the Final EIR/EIS was estimated at about 23,200,000 VMT.

SDG&E proposes a schedule that reduces the number of workers to 450 per day for the first 12 months and 375 per day for the last 10 months, with a total estimated 9,300,000 VMT for worker commutes. The work schedule will be maintained at 22 days per month. The estimated crew and QA/QC mobilization worker trips will be reduced substantially to about 1,400,000 VMT, for total worker VMT of about 10,700,000. This results in a reduction of total VMT and emissions of NO_x, ROG, PM₁₀, CO, and SO_x from light-duty vehicle fuel combustion of about 54% from emissions stated in the Final EIR/EIS. Because fugitive PM₁₀ emissions depend upon worker VMT, these emissions will be substantially reduced. The Final EIR/EIS assumptions of 60 miles per round-trip for VMT per worker per day, the 1.3 rideshare factor, and 15% travel on unpaved roads have been retained in updated emission calculations.

Worker trips will also be reduced by implementing mitigation measure AQ-APM-4, which encourages carpooling, to an expected rideshare factor greater than 1.3. As part of the construction scheduling process, SDG&E is developing a worker carpool program.

Note that the 15% of travel on unpaved roads (9 miles/day) is a highly conservative assumption for this Project. Workers will drive to construction areas on paved roads. They may park in some unpaved areas but will drive very little on unpaved roads. During construction hours, these workers will transfer on-site to work with off-road construction equipment or be ferried to worksites in helicopters. The total length of access roads for the FESSR will be minimized due to the heavier planned usage of helicopters for tower and line installation and shuttling of workers.

4. ***Reduce On-Road Medium-Duty and Heavy-Duty Vehicle Delivery Trips.*** SDG&E proposes to reduce deliveries to only those needed to construct the Project during each phase. Deliveries of steel and parts for tower and transmission line construction are expected to come from the Los Angeles area via Interstates 5, 15 and 8, and State Route 78, or from the San Diego County area via Interstate 8. Deliveries of material removal will be to locations near the Sunrise Powerlink construction areas within San Diego County or Imperial County. The estimated VMT for medium-duty trucks will be 175,800, and about 1,900,000 for heavy-duty trucks. For heavy-duty vehicles, this results in a reduction of in VMT of approximately 80%, from about 9,300,000 estimated in the Final EIR/EIS for the original Proposed Route.

In the Final EIR/EIS, 60 miles round-trip per heavy-duty vehicle was assumed. For deliveries from the Los Angeles area, the assumption has been updated to 150 miles round-trip per vehicle within San Diego County. For all other deliveries, the 60 mile round-trip assumption was retained.

The Final EIR/EIS contained a calculation error for use of heavy-duty vehicles for commercial deliveries, material removal, and equipment, fuel, and water deliveries. For the original Proposed Route, about 16,400,000 VMT for heavy-duty trucks were estimated in the Final EIR/EIS. For fuel transportation and water deliveries, Total VMT was calculated as total days x VMT/day. However, an additional incorrect factor of 22 was included in the calculation. This erroneous factor was carried down from another formula (for material delivery and equipment delivery) in the spreadsheet where Total VMT = VMT/day x 22 days/mo x 22 months.

After correcting the error (removing the factor of 22 for fuel and water deliveries, the revised heavy-duty VMT is approximately 9,300,000. A notable assumption is that 246 material and waste removal deliveries were assumed to occur for heavy-duty vehicles each day for 22 months. In fact, average daily deliveries will be much lower. Emissions are driven by the heavy-duty vehicles. The correction of this error alone leads to a 43% reduction in NOx, ROG, CO, PM10, and SOx emissions from heavy-duty on-road vehicles.

5. ***Implementation of Dust Control Measures.*** Mitigation measures AQ-1a, AQ-APM-2, and AQ-APM-3 will be implemented in San Diego County to minimize dust formation and fugitive PM10 emissions. For example, AQ-1a (a) requires paving, watering, or applying non-toxic stabilizers on all unpaved access roads, parking areas, and staging areas, if visible dust is observed. SDG&E plans to implement watering three times per day. The original EIR/EIS assumption of 75% control from watering and other assumptions were retained for fugitive PM10 calculations without change.
6. ***Mitigation Incentive Funding for the Sunrise Powerlink Project.*** SDG&E has committed to providing incentive funding to the SDAPCD and ICAPCD to be used for air quality mitigation programs. The funding level offered to SDAPCD is \$536,000. The funding level offered to ICAPCD is \$417,064. This funding will be paid to the air districts prior to completing construction. SDG&E anticipates that this funding payment will be used by the air districts to provide additional emission reductions through programs that may include, but are not limited to, the Carl Moyer Program, Vehicle Registration Fund, Lower Emission School Bus Fund, road paving, or other eligible programs. SDG&E understands that payment of incentive funding to the air districts is subject to approval by the respective Air Pollution Control Boards.

Sufficient internal reductions are available to reduce Sunrise Powerlink construction emissions to satisfy mitigation measure AQ-1h. Therefore, this mitigation funding is considered to be additional to current mitigation needs but will provide even greater assurance that mitigation measure AQ-1h will be met.

Other Air Emission Calculation Refinements

SDG&E included several technical refinements to the construction emission calculations provided in the Final EIR/EIS. The following refinements are not related to the emission reduction plans already discussed:

1. ***Emissions Apportionment by County.*** In the Final EIR/EIS, emissions were apportioned to each county based upon the linear distance of the Sunrise Powerlink transmission line. The linear distance for the original Proposed Route was about 150 miles. Approximately 61% of project emissions were apportioned to San Diego County and 39% to Imperial County. The linear distance for the FESSR is 118.1 miles. Approximately 75% of the transmission line will be in San Diego County and 25% in Imperial County. These percentages were used to update the emissions apportionment between counties.
2. ***Non-Conventional Use of Helicopters.*** SDG&E plans to follow a non-conventional transmission line construction approach that includes lifting tower sections from staging areas to installation locations and shuttling workers. The final EIR/EIS did not account for this increased use of several types of helicopters (i.e., light, medium, heavy lift) and higher associated emissions. SDG&E used the Emissions and Dispersion Modeling System (EDMS) to develop helicopter emission factors for various operating modes and helicopter classes. SDG&E developed detailed Project helicopter operating mode information that was used in conjunction with emission factors from EDMS.
3. ***Updated Off-Road Emission Factors to EPA and 2010 OFF-ROAD Model Values.*** Construction emissions calculations included Tier 3 or Tier 2 NO_x + NMHC emission factors, as described previously in this letter. Emission factors for ROG and SO_x were updated from 2008 to 2010 OFFROAD model mix of emission factors published on the South Coast Air Quality Management District (SCAQMD) website, available at <http://aqmd.gov/ceqa/handbook/off-road/off-road.html>.
4. ***Correction for Double-Counting of Load Factors for Off-Road Equipment.*** The Final EIR/EIS contained an error that double-counted off-road equipment load factors. The SCAQMD hourly emission factors that were used already have equipment load factors built in. However, an additional load factor was incorrectly applied, which underestimated emissions. This error has been corrected.
5. ***Updated On-road Vehicle Emission Factors for 2010.*** On-road vehicle emission factors were updated from 2008 to 2010 EMFAC v2.3 values provided on the SCAQMD website, available at <http://aqmd.gov/ceqa/handbook/on-road/on-road.html>.

Emission calculation methods and assumptions do not otherwise differ from those provided in the Final EIR/EIS.

Attachment 1
CPUC Air Quality Mitigation Measures for the Sunrise Powerlink Project

Mitigation measures pertinent to construction criteria pollutant emissions include:

1. Control emissions of dust and particulate matter (AQ-1a, AQ-APM-1, AQ-APM-2, and AQ-APM-3);
2. Use low-emission construction equipment (AQ-1b);
3. Obtain NOx emission offsets (AQ-1h);
4. Encourage carpooling (AQ-APM-4); and
5. Minimize vehicle idling (AQ-APM-5).

Accordingly, SDG&E has committed to implementing the following CPUC-approved quality mitigation measures.

AQ-1a. Suppress dust at all work or staging areas and on public roads. SDG&E shall: (a) pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas if construction activity causes persistent visible emissions of fugitive dust beyond the work area; (b) pre-water sites for 48 hours in advance of clearing; (c) reduce the amount of disturbed area where possible; (d) all dirt stock-pole areas should be sprayed daily as needed; (e) cover loads in haul trucks or maintain at least six inches of free-board when traveling on public roads; (f) pre-moisten, prior to transport, import and export dirt, sand, or loose materials; (g) sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets or wash trucks and equipment before entering public streets; (h) plant vegetative ground cover in disturbed areas as soon as possible following construction; (i) apply chemical soil stabilizers or apply water to form and maintain a crust on inactive construction areas (disturbed lands that are unused for four consecutive days); and (j) prepare and file 30 days in advance of construction with the ICAPCD, SDAPCD, BLM, and CPUC a Dust Control Plan that describes how these measures would be implemented and monitored at all locations of the project. The Dust Control Plan shall identify nearby sensitive receptors, such as land uses that include children, the elderly, the acutely ill and the chronically ill, and specify the means of minimizing impacts to these populations (for example, by locating equipment and staging areas away from sensitive receptors).

AQ-1b. Use low-emission construction equipment. SDG&E shall maintain construction equipment per manufacturing specifications and use low-emission equipment described here. All off-road and portable construction diesel engines not registered under the CARB Statewide Portable Equipment Registration Program, which have a rating of 50 horsepower (hp) or more, shall meet, at a minimum, the Tier 2 California Emission Standards for Off-Road Compression-Ignition Engines as specified in California Code of Regulations, Title 13, Sec. 2423(b)(1) unless

that engine is not available for a particular item of equipment. In the event a Tier 2 engine is not available for any off-road engine larger than 100 hp, that engine shall be equipped with a Tier 1 engine. If any engine larger than 100 hp does not meet Tier 1 standards, that engine shall be equipped with a catalyzed diesel particulate filter (soot filter), unless the engine manufacturer indicates that the use of such devices is not practical for that particular engine type. SDG&E shall substitute small electric-powered equipment for diesel- and gasoline-powered construction equipment where feasible.

AQ-1h. Obtain NOx and particulate matter emission offsets. SDG&E shall obtain and hold for the duration of construction NOx emission reduction credits or fund incentive programs approved by ICAPCD and SDAPCD at sufficient levels to offset the construction emissions of NOx that exceed the ozone nonattainment area federal General Conformity Rule applicability threshold. SDG&E shall secure 99 tons per year of NOx reductions and 276 tons per year of particulate matter reductions in Imperial County, and SDG&E shall secure 212 tons per year of NOx reductions in San Diego County to satisfy this requirement. The emission reduction credits or incentive program shall comply with ICAPCD and SDAPCD rules and regulations, and the credits or reductions shall be obtained by SDG&E prior to commencing construction.

AQ-APM-2. Prohibit construction grading on days when the wind gusts exceed 25 mph to the extent feasible to control fugitive dust.

1. All trucks hauling soil and other loose material will be covered or maintain at least two feet of freeboard.
2. Snow fence-type windbreaks will be erected in areas identified as needed by SDG&E.
3. Vehicle speeds will be limited to 15 mph on unpaved (no gravel or similar surfacing material) roads.
4. Unpaved roads will be treated by watering as necessary.
5. Soil stabilizers will be applied to inactive construction areas on an as-needed basis.
6. Exposed stockpiles of soil and other excavated materials will be contained within perimeter silt fencing, watered or treated with soil binders, as necessary.

AQ-APM-3. To minimize mud and dust from being transported onto paved roadway surfaces, pave, gravel, use rattle plates or apply chemical stabilization at sufficient concentration and frequency to maintain a stabilized surface starting from the point of intersection with the public paved surface. SDG&E will implement this measure where applicable and not conflicting with other requirements.

- AQ-APM-4.** If suitable park-and-ride facilities are available in the project vicinity, construction workers will be encouraged to carpool to the job site to the extent feasible. The ability to develop an effective carpool program for the Proposed Project would depend upon the proximity of carpool facilities to the job site, the geographical commute departure points of construction workers, and the extent to which carpooling would not adversely affect worker show-up time and the project's construction schedule.
- AQ-APM-5.** To the extent feasible, unnecessary construction vehicle and idling time will be minimized. The ability to limit construction vehicle idling time is dependent upon the sequence of construction activities and when and where vehicles are needed or staged. Certain vehicles, such as large diesel-powered vehicles, have extended warm-up times following start-up that limit their availability for use following start-up. Where such diesel-powered vehicles are required for repetitive construction tasks, these vehicles may require more idling time. The project will apply a "common sense" approach to vehicle use; if a vehicle is not required for use immediately or continuously for construction activities, its engine will be shut off. Construction foremen will include briefings to crews on vehicle use as a part of pre-construction conferences. Those briefings will include discussion of a "common sense" to vehicle use.

Mitigation Monitoring and Verification

Mitigation monitoring and verification procedures for each the CPUC-required measures listed above, including mitigation measure AQ-1h are as follows:

< To be completed for selected measures: 1. Monitoring procedure, 2. Verification procedure >.

1. Require contractors to use Tier 3 off-road equipment unless unavailable.
2. Require contractors to minimize idling.
3. For each piece of equipment used, contractors maintain a log of equipment type, engine EPA family #, engine hp rating, fuel type and usage hours (includes ground equipment and helicopters).
4. Contractor checks engine family number for CARB certification prior to usage, State reasons on log if Tier 3 off-road equipment is unavailable.
5. SDG&E Compliance Manager verifies engine certification using EPA family #.
6. Off-road equipment use and certification reports provided to CPUC.
7. Log on-road deliveries, vehicle type and estimated vehicle miles traveled.

Attachment 2: Construction Emission Calculations for the Final Environmentally Superior Southern Route Including Internal Reductions

Project Name	(Enter SGEN Project)
Project Manager	
Date	
EPC or equip NTP	
COD	
	Capacity
Project No.	

Cost Code No.	Description	(\$000's) Budgeted Amount
01-00-00-0000	Labor & Expense	\$ -
01-01-00-0000	Internal Project Management/Execution (E & C)	
01-01-01-0000	Labor/Indirects	
01-01-01-0100	Project Management	\$ -
01-01-01-0200	Permitting	\$ -
01-01-01-0300	Technical Support (Barta's Group)	\$ -
01-01-02-0000	Travel and expenses	\$ -
01-01-03-0000	Miscellaneous Expense	
01-01-03-0100	Promotional	\$ -
01-01-03-0200	Ceremonies	\$ -
01-01-03-0300	Contributions	\$ -
01-01-03-0400	Other	\$ -
01-02-00-0000	Marketing/Planning/Financial	
01-02-01-0000	Labor	
01-02-01-0100	General	\$ -
01-02-02-0000	Travel and expenses	\$ -
01-02-03-0000	Other	\$ -
01-03-00-0000	Project Development	
01-03-01-0000	Labor	\$ -
01-03-02-0000	Travel and expenses	\$ -
01-03-03-0000	Other	\$ -
02-00-00-0000	Partner Labor & Expense	\$ -
02-01-00-0000	Project Development	
02-01-01-0000	Labor	\$ -
02-01-02-0000	Travel and expenses	\$ -
02-01-03-0000	Other	\$ -
03-00-00-0000	Corporate Center Labor & Exp	\$ -
03-01-00-0000	Purchasing/Supply Management	\$ -
03-02-00-0000	Land Management	\$ -
03-03-00-0000	Legal	\$ -
03-04-00-0000	Public Affairs / Media	\$ -
03-05-00-0000	Taxes	\$ -
03-06-00-0000	Human Resources	\$ -
03-07-00-0000	Environmental and Safety	\$ -
03-08-00-0000	Information Technologies	\$ -
03-09-00-0000	Finance	\$ -
03-10-00-0000	Accounting	\$ -
03-11-00-0000	Corporate Center Indirect	\$ -
03-12-00-0000	Other	\$ -
04-00-00-0000	Studies & Consultants	\$ -
04-01-00-0000	Consultants	
04-01-01-0000	Preliminary Engineering Pre-EPC	\$ -
04-01-02-0000	Market Analysis	\$ -
04-01-03-0000	Outside Legal	\$ -
04-01-04-0000	Land Consultants	\$ -
04-01-05-0000	Public Affairs/Media	\$ -
04-01-06-0000	Tax Consultants	\$ -
04-01-07-0000	Finance Consultants	\$ -

Project Name	(Enter SGEN Project)
Project Manager	
Date	
EPC or equip NTP	
COD	
	Capacity
Project No.	

Cost Code No.	Description	(\$000's) Budgeted Amount
04-01-08-0000	O & M Consultant	\$ -
04-01-09-0000	Gas Consultant	\$ -
04-01-10-0000	Water Supply/Discharge Consultant	\$ -
04-01-11-0000	Permitting/Environment Consultant	\$ -
04-01-12-0000	Wind & Met Data Consultants	\$ -
04-01-13-0000	Geotech Consultants	\$ -
04-01-14-0000	Marine	\$ -
04-01-15-0000	Surface Facilities	\$ -
04-01-16-0000	Pipeline Facilities	\$ -
04-01-17-0000	Subsurface	\$ -
04-01-18-0000	ROW Agents	\$ -
04-01-19-0000	Surveying/Alignment Sheets	\$ -
04-01-20-0000	Other Engineering	\$ -
04-02-00-0000	Studies	
04-02-01-0000	Interconnection Study	\$ -
04-02-02-0000	Transmission Design	\$ -
04-02-03-0000	Fuel Study	\$ -
04-03-00-0000	Owners Engineer/Construction Manager	
04-03-01-0000	Owners Engineer During Construction	\$ -
04-03-02-0000	Other	\$ -
04-04-00-0000	Other	\$ -
05-00-00-0000	Engineering, Equipment & Construction	\$ -
05-01-00-0000	EPC Contract	
05-01-01-0000	EPC Equipment	\$ -
05-01-02-0000	EPC Installation	\$ -
05-02-00-0000	EPC Project Management Fees	\$ -
05-03-00-0000	Owner Supplied Equipment	
05-03-01-0000	Gas Turbine	\$ -
05-03-02-0000	Steam Turbine	\$ -
05-03-03-0000	HRSG	\$ -
05-03-04-0000	Transformers	\$ -
05-03-05-0000	Cooling System	\$ -
05-03-06-0000	Wind Turbine	\$ -
05-03-07-0000	Solar Panels	\$ -
05-05-00-0000	Plant Switchyard	\$ -
05-06-00-0000	Transmission Lines	\$ -
05-07-00-0000	Grid Interconnection	\$ -
05-08-00-0000	Gas Interconnection	\$ -
05-10-00-0000	Water Supply	\$ -
05-11-00-0000	Water Discharge	\$ -
05-12-00-0000	Communication Interconnect	\$ -
05-13-00-0000	Construction Bonds	\$ -
05-14-00-0000	Revenue Metering	\$ -
05-15-00-0000	Temp Construction	\$ -
05-16-00-0000	Other	\$ -
06-00-00-0000	Regulatory Costs	\$ -
06-01-00-0000	Permit Application Fees	\$ -
06-02-00-0000	ERC Offsets	\$ -

Project Name	(Enter SGEN Project)
Project Manager	
Date	
EPC or equip NTP	
COD	
	Capacity
Project No.	

Cost Code No.	Description	(\$000's) Budgeted Amount
06-03-00-0000	Land Offsets	\$ -
06-04-00-0000	General	\$ -
07-00-00-0000	Land	\$ -
07-01-00-0000	Plant Site	
07-01-01-0000	Purchase	\$ -
07-01-02-0000	Lease	\$ -
07-02-00-0000	Other Land	
07-02-01-0000	Purchase	\$ -
07-02-02-0000	Lease	\$ -
07-03-00-0000	Easements/ROW	
07-03-01-0000	General	\$ -
07-04-00-0000	Options	
07-04-01-0000	General	\$ -
07-05-00-0000	Site Preparation	\$ -
08-00-00-0000	Financing	\$ -
08-01-00-0000	Financial costs	
08-01-01-0000	Interest During Construction	
08-01-01-0100	Internal	\$ -
08-01-01-0200	External	\$ -
08-01-02-0000	Closing Costs	\$ -
08-01-03-0000	Debt Reserve	\$ -
08-01-04-0000	Developer Fees	\$ -
08-01-05-0000	Lenders Legal	\$ -
08-01-06-0000	Lenders Engineer	\$ -
08-01-07-0000	Title Insurance	\$ -
08-01-08-0000	Commitment Fees	\$ -
08-01-09-0000	Advisory Fees	\$ -
08-01-10-0000	Other	\$ -
09-00-00-0000	Insurance	\$ -
09-01-00-0000	Builders All-Risk Insurance	\$ -
09-02-00-0000	General	
09-02-01-0000	Other	\$ -
10-00-00-0000	Tax	\$ -
10-01-00-0000	Sales Tax	\$ -
10-02-00-0000	Property Tax	\$ -
10-03-00-0000	General	
10-03-01-0000	Other	\$ -
11-00-00-0000	Start-Up Commissioning / Mobilization	\$ -
11-01-00-0000	Facilities and Equipment	
11-01-01-0000	L T S A	\$ -
11-01-02-0000	Admin Building Furnishings	\$ -
11-01-03-0000	Shop Equipment	\$ -
11-01-04-0000	Mobile Maint Equipment	\$ -
11-01-05-0000	Operating Spares	\$ -
11-01-06-0000	Initial Fills	\$ -
11-01-07-0000	Consumables	\$ -
11-02-00-0000	Information Systems	
11-02-01-0000	Hardware	\$ -

Project Name	(Enter SGEN Project)
Project Manager	
Date	
EPC or equip NTP	
COD	
	Capacity
Project No.	

Cost Code No.	Description	(\$000's) Budgeted Amount
11-02-02-0000	Software	\$ -
11-02-03-0000	Contractors	\$ -
11-03-00-0000	Staff Training	\$ -
11-04-00-0000	Working Capital	
11-04-01-0000	Fuel Costs	\$ -
11-04-02-0000	Power Costs	\$ -
11-05-00-0000	Revenue	\$ -
11-06-00-0000	Start-up Costs	
11-06-01-0000	Pre-Op Costs	\$ -
11-06-02-0000	Testing	\$ -
11-06-03-0000	Tools and Equipment	\$ -
11-07-00-0000	Mobilization Contractors	\$ -
11-10-00-0000	General	
11-10-01-0000	Other	\$ -
12-00-00-0000	Owners Contingency	\$ -
Total CAPEX		\$ -

Air Emissions Calculations Summary

FESSR Construction Phase Emissions, Sunrise Powerlink

Assumed Tier 3 offroad engines percentage mix:

60%

Offroad Tiers 2-3 emission factors (EFs) are applied to NOx, PM, and CO. Load factors (LFs) are used in conjunction with Tiers 2-3 EFs.

2010 SCAB EFs (OFFROAD2007 model) are applied to CO2, ROG, SOX. LFs already incorporated in OFFROAD model.

Onroad model (EMFAC) assumes 1990-2011 composite fleet across light, medium, and heavy duty vehicle classes.

Helicopter emissions are calculated using EDMS 5.1 and CCAR recommended emission factors.

Onroad/offroad equipment mix and schedules, including helicopter classes and usage, as provided by construction contractor (Sargent & Lundy LLC)

Annual Emissions of Proposed Project		NOX (tpy)	ROG (tpy)	PM10 (tpy)	CO (tpy)	SOX (tpy)	CO2 (tpy)
Imperial County	Offroad Vehicles and Equipment	23.1	3.3	1.0	16.5	0.0	3,584.8
	Onroad Vehicles	4.2	0.7	0.2	5.7	0.0	1,148.7
	Helicopters	2.6	1.5	0.8	2.6	0.5	1,320.5
	Fugitive Dust	---	---	49.9	---	---	---
	Total for Imperial County *	29.9	5.5	51.9	24.8	0.6	6,054.0
San Diego County	Offroad Vehicles and Equipment	69.4	9.8	3.0	49.5	0.1	10,754.5
	Onroad Vehicles	12.6	2.0	0.6	17.2	0.0	3,446.0
	Helicopters	7.8	4.5	2.4	7.8	1.6	3,961.6
	Fugitive Dust	---	---	149.8	---	---	---
	Total for San Diego County **	89.8	16.4	155.8	74.5	1.8	18,162.1

* Basis: 0.25 of Total Proposed Project divided over two years.

** Basis: 0.75 of Total Proposed Project divided over two years.

Overall Emissions of FESSR, Sunrise Powerlink	NOX (ton)	ROG (ton)	PM10 (ton)	CO (ton)	SOX (ton)	CO2 (ton)
Offroad Vehicles and Equipment with Tier 3	185.0	26.2	8.1	132.0	0.3	28,678.6
Onroad Vehicles	33.6	5.3	1.6	45.8	0.1	9,189.4
Helicopters	20.8	12.1	6.4	20.8	4.3	10,564.2
Fugitive Dust			399.4			
Total Emissions for Project Duration	239.4	43.6	415.5	198.6	4.7	48,432.2

Offroad Emissions Calculation - Using SCAB Emission Factors

2010 SCAB emission factors (EFs) corresponding to OFFROAD2007 model are applied to CO2, ROG, and SOX.
 Tier 2 and 3 EFs are applied to NOx, PM, and CO. Calculation details are provided in *Offroad Tier 2* and *Offroad Tier 3* worksheets.
 Load factors are used in conjunction with Tier 2 and 3 EFs.

Offroad Equipment Project Total

ROG (tons)	SOX (tons)	CO2 (tons)
26.23	0.30	28,678.61

Segments 8A / 8B / 8C / 8D / 8E / 9A
 18 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 41,936	HP Used for OFFROAD	2010 SCAB ROG (lbs/hr)	2010 SCAB SOX (lbs/hr)	2010 SCAB CO2 (lbs/hr)	2010 SCAB ROG (tons)	2010 SCAB SOX (tons)	2010 SCAB CO2 (tons)
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	468	5	4680	500	0.2097	0.0025	256.5709	0.4907	0.0059	600.3760
Road Grader	Grader	350	2	234	8	3744	500	0.2149	0.0023	229.4843	0.4024	0.0042	429.5946
Track Type Dozer	Grader	350	1	70	8	560	500	0.2149	0.0023	229.4843	0.0602	0.0006	64.2556
Drum Type Compactor	Paving Equipment	250	1	70	6	420	250	0.1506	0.0014	122.2913	0.0316	0.0003	25.6812
Excavator	Excavator	300	1	70	8	560	500	0.1984	0.0023	233.7354	0.0555	0.0006	65.4459
Backhoe	Tractor/loader/backhoe	350	1	468	8	3744	500	0.2630	0.0039	344.8534	0.4923	0.0073	645.5656
Backhoe	Tractor/loader/backhoe	200	2	140	8	2240	250	0.1418	0.0019	171.7370	0.1588	0.0022	192.3454
Pressure Diggers	Bore/Drill Rigs	500	2	140	8	2240	500	0.1488	0.0031	311.3087	0.1667	0.0034	348.6657
Rock Drill	Bore/Drill Rig	200	2	140	6	1680	250	0.0957	0.0021	188.1019	0.0803	0.0018	158.0056
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	140	6	1680	250	0.1523	0.0019	170.7965	0.1280	0.0016	143.4691
80 Ton Rough Terrain Cranes	Off-highway Truck	400	2	140	6	1680	500	0.2492	0.0027	272.3339	0.2094	0.0022	228.7605
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	140	5	1400	250	0.1523	0.0019	170.7965	0.1066	0.0013	119.5576
Compressor Truck	Off-highway Truck	350	2	140	8	2240	500	0.2492	0.0027	272.3339	0.2791	0.0030	305.0140
Compressor Truck	Off-highway Truck	350	2	140	8	2240	500	0.2492	0.0027	272.3339	0.2791	0.0030	305.0140
180 Ton Rough Terrain Crane	Off-highway Truck	500	2	140	8	2240	500	0.2492	0.0027	272.3339	0.2791	0.0030	305.0140
Sleeving Rigs	Bore/Drill Rigs	350	2	152	4	1216	500	0.1488	0.0031	311.3087	0.0905	0.0019	189.2757
Hydraulic Pump Motor	Pumps	10	2	10	5	100	15	0.0148	0.0001	7.4238	0.0007	0.0000	0.3712
580 Case Backhoe	Tractor/loader/backhoe	120	1	152	2	304	120	0.0910	0.0006	51.7280	0.0138	0.0001	7.8627
Spacing Carts	Other Gen Indust Equipment	10	4	152	4	2432	15	0.0066	0.0001	6.3955	0.0081	0.0001	7.7769
3 Drum Strawline Pullers	Other Gen Indust Equipment	300	2	152	6	1824	500	0.2500	0.0026	265.4117	0.2280	0.0024	242.0555
60lk Puller	Other Gen Indust Equipment	525	1	152	3	456	500	0.2500	0.0026	265.4117	0.0570	0.0006	60.5139
Triple Conductor Tensioner	Other Gen Indust Equipment	350	1	152	2	304	500	0.2500	0.0026	265.4117	0.0380	0.0004	40.3426
Sag Cat w2 winches	Grader	350	2	152	2	608	500	0.2149	0.0023	229.4843	0.0653	0.0007	69.7632
D8 Cats	Grader	300	4	152	1	608	500	0.2149	0.0023	229.4843	0.0653	0.0007	69.7632
Backhoe	Tractor/loader/backhoe	350	2	76	8	1216	500	0.2630	0.0039	344.8534	0.1599	0.0024	209.6709
Track Type Dozer	Grader	350	1	76	8	608	500	0.2149	0.0023	229.4843	0.0653	0.0007	69.7632
Drum Type Compactor	Paving Equipment	250	1	76	6	456	250	0.1506	0.0014	122.2913	0.0343	0.0003	27.8824
Excavator	Excavator	300	1	76	6	456	500	0.1984	0.0023	233.7354	0.0452	0.0005	53.2917

Offroad Emissions Calculation - Using SCAB Emission Factors

2010 SCAB emission factors (EFs) corresponding to OFFROAD2007 model are applied to CO2, ROG, and SOX.
 Tier 2 and 3 EFs are applied to NOx, PM, and CO. Calculation details are provided in *Offroad Tier 2* and *Offroad Tier 3* worksheets.
 Load factors are used in conjunction with Tier 2 and 3 EFs.

Offroad Equipment Project Total

ROG (tons)	SOX (tons)	CO2 (tons)
26.23	0.30	28,678.61

Segments 9B / 9C

18 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 33,322	HP Used for OFFROAD	2010 SCAB ROG (lbs/hr)	2010 SCAB SOX (lbs/hr)	2010 SCAB CO2 (lbs/hr)	2010 SCAB ROG (tons)	2010 SCAB SOX (tons)	2010 SCAB CO2 (tons)
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	468	5	4680	250	0.1523	0.0019	170.7965	0.3565	0.0045	399.6638
Road Grader	Grader	350	2	108	8	1728	500	0.2149	0.0023	229.4843	0.1857	0.0019	198.2744
Track Type Dozer	Grader	350	1	57	8	456	500	0.2149	0.0023	229.4843	0.0490	0.0005	52.3224
Drum Type Compactor	Paving Equipment	250	1	57	6	342	250	0.1506	0.0014	122.2913	0.0258	0.0002	20.9118
Excavator	Excavator	300	1	57	8	456	500	0.1984	0.0023	233.7354	0.0452	0.0005	53.2917
Backhoe	Tractor/loader/backhoe	350	1	468	8	3744	500	0.2630	0.0039	344.8534	0.4923	0.0073	645.5656
Backhoe	Tractor/loader/backhoe	200	2	114	8	1824	250	0.1418	0.0019	171.7370	0.1293	0.0018	156.6241
Pressure Diggers	Bore/Drill Rigs	500	2	114	8	1824	500	0.1488	0.0031	311.3087	0.1357	0.0028	283.9135
Rock Drill	Bore/Drill Rigs	200	2	114	6	1368	250	0.0957	0.0021	188.1019	0.0654	0.0014	128.6617
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	114	6	1368	250	0.1523	0.0019	170.7965	0.1042	0.0013	116.8248
80 Ton Rough Terrain Cranes	Off-highway Truck	400	2	114	6	1368	500	0.2492	0.0027	272.3339	0.1705	0.0018	186.2764
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	114	5	1140	250	0.1523	0.0019	170.7965	0.0868	0.0011	97.3540
Compressor Truck	Off-highway Truck	350	2	114	8	1824	500	0.2492	0.0027	272.3339	0.2273	0.0024	248.3685
Compressor Truck	Off-highway Truck	350	2	114	8	1824	500	0.2492	0.0027	272.3339	0.2273	0.0024	248.3685
180 Ton Rough Terrain Crane	Off-highway Truck	500	2	114	8	1824	500	0.2492	0.0027	272.3339	0.2273	0.0024	248.3685
Sleeving Rigs	Bore/Drill Rigs	350	2	108	4	864	500	0.1488	0.0031	311.3087	0.0643	0.0013	134.4853
Hydraulic Pump Motor	Pumps	10	2	10	5	100	15	0.0148	0.0001	7.4238	0.0007	0.0000	0.3712
580 Case Backhoe	Tractor/loader/backhoe	120	1	108	2	216	120	0.0910	0.0006	51.7280	0.0098	0.0001	5.5866
Spacing Carts	Other Gen Indust Equipment	10	4	108	4	1728	15	0.0066	0.0001	6.3955	0.0057	0.0001	5.5257
3 Drum Strawline Pullers	Other Gen Indust Equipment	300	2	108	6	1296	500	0.2500	0.0026	265.4117	0.1620	0.0017	171.9868
60k Puller	Other Gen Indust Equipment	525	1	108	3	324	500	0.2500	0.0026	265.4117	0.0405	0.0004	42.9967
Triple Conductor Tensioner	Other Gen Indust Equipment	350	1	108	2	216	500	0.2500	0.0026	265.4117	0.0270	0.0003	28.6645
Sag Cat w2 winches	Grader	350	2	108	2	432	500	0.2149	0.0023	229.4843	0.0464	0.0005	49.5686
D8 Cats	Grader	300	4	108	1	432	500	0.2149	0.0023	229.4843	0.0464	0.0005	49.5686
Backhoe	Tractor/loader/backhoe	350	2	54	8	864	500	0.2630	0.0039	344.8534	0.1136	0.0017	148.9767
Track Type Dozer	Grader	350	1	54	8	432	500	0.2149	0.0023	229.4843	0.0464	0.0005	49.5686
Drum Type Compactor	Paving Equipment	250	1	54	6	324	250	0.1506	0.0014	122.2913	0.0244	0.0002	19.8112
Excavator	Excavator	300	1	54	6	324	500	0.1984	0.0023	233.7354	0.0321	0.0004	37.8651

Offroad Emissions Calculation - Using SCAB Emission Factors

2010 SCAB emission factors (EFs) corresponding to OFFROAD2007 model are applied to CO2, ROG, and SOX.
 Tier 2 and 3 EFs are applied to NOx, PM, and CO. Calculation details are provided in *Offroad Tier 2* and *Offroad Tier 3* worksheets.
 Load factors are used in conjunction with Tier 2 and 3 EFs.

Offroad Equipment Project Total

ROG (tons)	SOX (tons)	CO2 (tons)
26.23	0.30	28,678.61

Segments 10A / 10B

18 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 29,794	HP Used for OFFROAD	2010 SCAB ROG (lbs/hr)	2010 SCAB SOX (lbs/hr)	2010 SCAB CO2 (lbs/hr)	2010 SCAB ROG (tons)	2010 SCAB SOX (tons)	2010 SCAB CO2 (tons)
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	468	5	4680	250	0.1523	0.0019	170.7965	0.3565	0.0045	399.6638
Road Grader	Grader	350	2	108	8	1728	500	0.2149	0.0023	229.4843	0.1857	0.0019	198.2744
Track Type Dozer	Grader	350	1	57	8	456	500	0.2149	0.0023	229.4843	0.0490	0.0005	52.3224
Drum Type Compactor	Paving Equipment	250	1	57	6	342	250	0.1506	0.0014	122.2913	0.0258	0.0002	20.9118
Excavator	Excavator	300	1	57	8	456	500	0.1984	0.0023	233.7354	0.0452	0.0005	53.2917
Backhoe	Tractor/loader/backhoe	350	1	468	8	3744	500	0.2630	0.0039	344.8534	0.4923	0.0073	645.5656
Backhoe	Tractor/loader/backhoe	200	2	86	8	1376	250	0.1418	0.0019	171.7370	0.0976	0.0013	118.1550
Pressure Diggers	Bore/Drill Rigs	500	2	86	8	1376	500	0.1488	0.0031	311.3087	0.1024	0.0021	214.1804
Rock Drill	Bore/Drill Rigs	200	2	86	6	1032	250	0.0957	0.0021	188.1019	0.0494	0.0011	97.0606
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	86	6	1032	250	0.1523	0.0019	170.7965	0.0786	0.0010	88.1310
80 Ton Rough Terrain Cranes	Off-highway Truck	400	2	86	6	1032	500	0.2492	0.0027	272.3339	0.1286	0.0014	140.5243
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	86	5	860	250	0.1523	0.0019	170.7965	0.0655	0.0008	73.4425
Compressor Truck	Off-highway Truck	350	2	86	8	1376	500	0.2492	0.0027	272.3339	0.1715	0.0018	187.3657
Compressor Truck	Off-highway Truck	350	2	86	8	1376	500	0.2492	0.0027	272.3339	0.1715	0.0018	187.3657
180 Ton Rough Terrain Crane	Off-highway Truck	500	2	86	8	1376	500	0.2492	0.0027	272.3339	0.1715	0.0018	187.3657
Sleeving Rigs	Bore/Drill Rigs	350	2	108	4	864	500	0.1488	0.0031	311.3087	0.0643	0.0013	134.4853
Hydraulic Pump Motor	Pumps	10	2	10	5	100	15	0.0148	0.0001	7.4238	0.0007	0.0000	0.3712
580 Case Backhoe	Tractor/loader/backhoe	120	1	108	2	216	250	0.1418	0.0019	171.7370	0.0153	0.0002	18.5476
Spacing Carts	Other Gen Indust Equipment	10	4	108	4	1728	15	0.0066	0.0001	6.3955	0.0057	0.0001	5.5257
3 Drum Strawline Pullers	Other Gen Indust Equipment	300	2	108	6	1296	500	0.2500	0.0026	265.4117	0.1620	0.0017	171.9868
60lk Puller	Other Gen Indust Equipment	525	1	108	3	324	500	0.2500	0.0026	265.4117	0.0405	0.0004	42.9967
Triple Conductor Tensioner	Other Gen Indust Equipment	350	1	108	2	216	500	0.2500	0.0026	265.4117	0.0270	0.0003	28.6645
Sag Cat w2 winches	Grader	350	2	108	2	432	500	0.2149	0.0023	229.4843	0.0464	0.0005	49.5686
D8 Cats	Grader	300	4	108	1	432	500	0.2149	0.0023	229.4843	0.0464	0.0005	49.5686
Backhoe	Tractor/loader/backhoe	350	2	54	8	864	500	0.2630	0.0039	344.8534	0.1136	0.0017	148.9767
Track Type Dozer	Grader	350	1	54	8	432	500	0.2149	0.0023	229.4843	0.0464	0.0005	49.5686
Drum Type Compactor	Paving Equipment	250	1	54	6	324	250	0.1506	0.0014	122.2913	0.0244	0.0002	19.8112
Excavator	Excavator	300	1	54	6	324	500	0.1984	0.0023	233.7354	0.0321	0.0004	37.8651

Offroad Emissions Calculation - Using SCAB Emission Factors

2010 SCAB emission factors (EFs) corresponding to OFFROAD2007 model are applied to CO2, ROG, and SOX.
 Tier 2 and 3 EFs are applied to NOx, PM, and CO. Calculation details are provided in *Offroad Tier 2* and *Offroad Tier 3* worksheets.
 Load factors are used in conjunction with Tier 2 and 3 EFs.

Offroad Equipment Project Total

ROG (tons)	SOX (tons)	CO2 (tons)
26.23	0.30	28,678.61

Segments 7 / 5 / 4A

18 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 32,638	HP Used for OFFROAD	2010 SCAB ROG (lbs/hr)	2010 SCAB SOX (lbs/hr)	2010 SCAB CO2 (lbs/hr)	2010 SCAB ROG (tons)	2010 SCAB SOX (tons)	2010 SCAB CO2 (tons)
											0.3565	0.0045	399.6638
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	468	5	4680	250	0.1523	0.0019	170.7965	0.2012	0.0021	214.7973
Road Grader	Grader	350	1	234	8	1872	500	0.2149	0.0023	229.4843	0.0473	0.0005	50.4865
Track Type Dozer	Grader	350	1	55	8	440	500	0.2149	0.0023	229.4843	0.0249	0.0002	20.1781
Drum Type Compactor	Paving Equipment	250	1	55	6	330	250	0.1506	0.0014	122.2913	0.0436	0.0005	51.4218
Excavator	Excavator	300	1	55	8	440	500	0.1984	0.0023	233.7354	0.4923	0.0073	645.5656
Backhoe	Tractor/loader/backhoe	350	1	468	8	3744	500	0.2630	0.0039	344.8534	0.0685	0.0007	74.8918
30 Ton Crane Truck	Off-highway Truck	300	2	55	5	550	500	0.2492	0.0027	272.3339	0.0624	0.0009	75.5643
Backhoe	Tractor/loader/backhoe	200	2	55	8	880	250	0.1418	0.0019	171.7370	0.0655	0.0013	136.9758
Pressure Diggers	Bore/Drill Rigs	500	2	55	8	880	500	0.1488	0.0031	311.3087	0.0316	0.0007	62.0736
Rock Drill	Bore/Drill Rigs	200	2	55	6	660	250	0.0957	0.0021	188.1019	0.1630	0.0017	178.1064
30 Ton Crane Truck	Off-highway Truck	300	2	109	6	1308	500	0.2492	0.0027	272.3339	0.0996	0.0013	111.7009
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	109	6	1308	250	0.1523	0.0019	170.7965	0.1630	0.0017	178.1064
80 Ton Rough Terrain Cranes	Off-highway Truck	400	2	109	6	1308	500	0.2492	0.0027	272.3339	0.2173	0.0023	237.4752
30 Ton Crane Truck	Off-highway Truck	300	2	109	8	1744	500	0.2492	0.0027	272.3339	0.0830	0.0010	93.0841
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	109	5	1090	250	0.1523	0.0019	170.7965	0.2173	0.0023	237.4752
Compressor Truck	Off-highway Truck	350	2	109	8	1744	500	0.2492	0.0027	272.3339	0.2173	0.0023	237.4752
Compressor Truck	Off-highway Truck	350	2	109	8	1744	500	0.2492	0.0027	272.3339	0.2173	0.0023	237.4752
180 Ton Rough Terrain Crane	Off-highway Truck	500	2	109	8	1744	500	0.2492	0.0027	272.3339	0.2173	0.0023	237.4752
Sleeving Rigs	Bore/Drill Rigs	350	2	88	4	704	500	0.1488	0.0031	311.3087	0.0524	0.0011	109.5806
Hydraulic Pump Motor	Pumps	10	2	10	5	100	15	0.0148	0.0001	7.4238	0.0007	0.0000	0.3712
580 Case Backhoe	Tractor/loader/backhoe	120	1	88	2	176	250	0.1418	0.0019	171.7370	0.0125	0.0002	15.1129
Spacing Carts	Other Gen Indust Equipment	10	4	88	4	1408	15	0.0066	0.0001	6.3955	0.0047	0.0001	4.5024
3 Drum Strawline Pullers	Other Gen Indust Equipment	300	2	88	6	1056	500	0.2500	0.0026	265.4117	0.1320	0.0014	140.1374
60lk Puller	Other Gen Indust Equipment	525	1	88	3	264	500	0.2500	0.0026	265.4117	0.0330	0.0003	35.0343
Triple Conductor Tensioner	Other Gen Indust Equipment	350	1	88	2	176	500	0.2500	0.0026	265.4117	0.0220	0.0002	23.3562
Sag Cat w2 winches	Grader	350	2	88	2	352	500	0.2149	0.0023	229.4843	0.0378	0.0004	40.3892
D8 Cats	Grader	300	4	88	1	352	500	0.2149	0.0023	229.4843	0.0378	0.0004	40.3892
Backhoe	Tractor/loader/backhoe	350	2	44	8	704	500	0.2630	0.0039	344.8534	0.0926	0.0014	121.3884
Track Type Dozer	Grader	350	1	44	8	352	500	0.2149	0.0023	229.4843	0.0378	0.0004	40.3892
Drum Type Compactor	Paving Equipment	250	1	44	6	264	250	0.1506	0.0014	122.2913	0.0199	0.0002	16.1425
Excavator	Excavator	300	1	44	6	264	500	0.1984	0.0023	233.7354	0.0262	0.0003	30.8531

Offroad Emissions Calculation - Using SCAB Emission Factors

2010 SCAB emission factors (EFs) corresponding to OFFROAD2007 model are applied to CO2, ROG, and SOX.
 Tier 2 and 3 EFs are applied to NOx, PM, and CO. Calculation details are provided in *Offroad Tier 2* and *Offroad Tier 3* worksheets.
 Load factors are used in conjunction with Tier 2 and 3 EFs.

Offroad Equipment Project Total

ROG (tons)	SOX (tons)	CO2 (tons)
26.23	0.30	28,678.61

Suncrest Substation
24 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 104,404	HP Used for OFFROAD	2010 SCAB ROG (lb/hr)	2010 SCAB SOX (lb/hr)	2010 SCAB CO2 (lb/hr)	2010 SCAB ROG (tons)	2010 SCAB SOX (tons)	2010 SCAB CO2 (tons)
980 Loader	Tractor/loader/backhoe	350	3	312	10	9360	500	0.2630	0.0039	344.8534	1.2307	0.0182	1613.9140
Backhoe	Tractor/loader/backhoe	85	4	624	10	24960	120	0.0910	0.0006	51.7280	1.1351	0.0076	645.5655
Excavator	Excavator	300	3	312	10	9360	500	0.1984	0.0023	233.7354	0.9284	0.0107	1093.8816
Grader	Grader	350	2	312	10	6240	500	0.2149	0.0023	229.4843	0.6706	0.0070	715.9909
Rock Drill	Bore/Drill Rigs	210	1	312	10	3120	250	0.0957	0.0021	188.1019	0.1492	0.0033	293.4390
Vibratory Compactor	Paving Equipment	80	2	312	10	6240	120	0.1282	0.0006	54.4994	0.3999	0.0020	170.0381
Compressor	Air Compressor	80	2	312	10	6240	120	0.1014	0.0006	46.9502	0.3163	0.0017	146.4847
Dirt Pan	Graders?	425	3	312	10	9360	500	0.2149	0.0023	229.4843	1.0059	0.0105	1073.9864
Foundation Drill Rig	Bore/Drill Rigs	305	2	234	10	4680	500	0.1488	0.0031	311.3087	0.3483	0.0072	728.4622
30 Ton Crane Truck	Off-highway Truck	300	1	234	4	936	500	0.2492	0.0027	272.3339	0.1166	0.0013	127.4523
Caterpillar (D9 or larger)	Grader	338	1	234	2	468	500	0.2149	0.0023	229.4843	0.0503	0.0005	53.6993
Tractors	Tractor/loader/backhoe	85	1	234	4	936	120	0.0910	0.0006	51.7280	0.0426	0.0003	24.2087
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	350	2	234	6	2808	500	0.2097	0.0025	256.5709	0.2944	0.0035	360.2256
Vibratory Compactor	Paving Equipment	80	1	234	2	468	120	0.1282	0.0006	54.4994	0.0300	0.0001	12.7529
Excavator	Excavator	300	1	234	8	1872	500	0.1984	0.0023	233.7354	0.1857	0.0021	218.7763
Backhoe	Tractor/loader/backhoe	85	3	234	8	5616	120	0.0910	0.0006	51.7280	0.2554	0.0017	145.2522
Trencher	Trencher	75	1	234	2	468	120	0.1509	0.0008	64.8951	0.0353	0.0002	15.1855
Manlifts	Aerial Lift	75	2	156	10	3120	120	0.0702	0.0004	38.0718	0.1095	0.0007	59.3920
30 Ton Crane Truck	Off-highway Truck	300	1	156	2	312	500	0.2492	0.0027	272.3339	0.0389	0.0004	42.4841
100 Ton Crane	Off-highway Truck	500	1	10	4	40	500	0.2492	0.0027	272.3339	0.0050	0.0001	5.4467
Forklift	Forklift	75	2	156	6	1872	120	0.0601	0.0004	31.2249	0.0563	0.0003	29.2265
Carryall Vehicles	Off-highway Truck?	180	2	156	4	1248	250	0.1639	0.0019	166.5454	0.1023	0.0012	103.9243
Generator	Generator Sets	30	3	156	10	4680	50	0.1117	0.0004	30.6230	0.2613	0.0009	71.6578

Alpine U/G, Segment 6
24 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 59,088	HP Used for OFFROAD	2010 SCAB ROG (lbs/hr)	2010 SCAB SOX (lbs/hr)	2010 SCAB CO2 (lbs/hr)	2010 SCAB ROG (tons)	2010 SCAB SOX (tons)	2010 SCAB CO2 (tons)
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	624	3	3744	250	0.1523	0.0019	170.7965	0.2852	0.0036	319.7311
Floor Saw	Concrete/Industrial Saws	45	2	390	5	3900	50	0.1231	0.0004	30.2092	0.2401	0.0008	58.9079
Backhoe	Tractor/loader/backhoe	85	4	390	10	15600	120	0.0910	0.0006	51.7280	0.7094	0.0047	403.4785
Hoe / Ram (Backhoe)	Tractor/loader/backhoe	85	1	390	10	3900	120	0.0910	0.0006	51.7280	0.1774	0.0012	100.8696
Hoe / Ram (Excavator)	Excavator	300	1	390	10	3900	500	0.1984	0.0023	233.7354	0.3868	0.0045	455.7840
Excavator	Excavator	300	3	390	10	11700	500	0.1984	0.0023	233.7354	1.1605	0.0134	1367.3520
Rock Drill	Bore/Drill Rigs	210	1	390	2	780	250	0.0957	0.0021	188.1019	0.0373	0.0008	73.3597
Vibratory Compactor	Paving Equipment	80	2	390	2	1560	120	0.1282	0.0006	54.4994	0.1000	0.0005	42.5095
Compressor	Air Compressor	80	1	390	2	780	120	0.1014	0.0006	46.9502	0.0395	0.0002	18.3106
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	350	1	390	2	780	500	0.2097	0.0025	256.5709	0.0818	0.0010	100.0627
Tractor Sweeper	Tractor/loader/backhoe	80	2	390	10	7800	120	0.0910	0.0006	51.7280	0.3547	0.0024	201.7392
U/G Puller	Other Construction Equipment	300	1	234	10	2340	500	0.1705	0.0025	254.2385	0.1995	0.0029	297.4590
Generator	Generator Sets	30	3	234	2	1404	50	0.1117	0.0004	30.6230	0.0784	0.0003	21.4973
Backhoe	Tractor/loader/backhoe	350	2	60	5	600	500	0.2630	0.0039	344.8534	0.0789	0.0012	103.4560
Asphalt Roller	Rollers	110	1	60	5	300	120	0.1201	0.0007	58.9888	0.0180	0.0001	8.8483

Offroad Emissions Calculation - Using SCAB Emission Factors

2010 SCAB emission factors (EFs) corresponding to OFFROAD2007 model are applied to CO2, ROG, and SOX. Tier 2 and 3 EFs are applied to NOx, PM, and CO. Calculation details are provided in *Offroad Tier 2* and *Offroad Tier 3* worksheets. Load factors are used in conjunction with Tier 2 and 3 EFs.

Offroad Equipment Project Total

ROG (tons)	SOX (tons)	CO2 (tons)
26.23	0.30	28,678.61

Reconduct 69kV, TL - 639

4 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 2,836	HP Used for OFFROAD	2010 SCAB ROG (lbs/hr)	2010 SCAB SOX (lbs/hr)	2010 SCAB CO2 (lbs/hr)	2010 SCAB ROG (tons)	2010 SCAB SOX (tons)	2010 SCAB CO2 (tons)
Road Grader	Grader	350	1	16	8	128	500	0.2149	0.0023	229.4843	0.0138	0.0001	14.6870
Track Type Dozer	Grader	350	1	16	8	128	500	0.2149	0.0023	229.4843	0.0138	0.0001	14.6870
Digger Derrick Trucks	Bore/Drill Rigs	350	2	5	8	80	500	0.1488	0.0031	311.3087	0.0060	0.0001	12.4523
Digger Derrick Trucks	Bore/Drill Rigs	350	2	60	8	960	500	0.1488	0.0031	311.3087	0.0714	0.0015	149.4282
Hydraulic Pump Motor	Pumps	10	1	20	3	60	15	0.0148	0.0001	7.4238	0.0004	0.0000	0.2227
Single Reel Pullers / Tensioner	Off-highway Truck	300	1	120	6	720	500	0.2492	0.0027	272.3339	0.0897	0.0010	98.0402
Hydraulic Wind Up Reel Puller	Off-highway Truck	525	1	120	6	720	500	0.2492	0.0027	272.3339	0.0897	0.0010	98.0402
Track Type Dozer	Grader	350	1	5	8	40	500	0.2149	0.0023	229.4843	0.0043	0.0000	4.5897

Reconduct 69kV, TL - 6915

2 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 804	HP Used for OFFROAD	2010 SCAB ROG (lbs/hr)	2010 SCAB SOX (lbs/hr)	2010 SCAB CO2 (lbs/hr)	2010 SCAB ROG (tons)	2010 SCAB SOX (tons)	2010 SCAB CO2 (tons)
Road Grader	Grader	350	1	4	8	32	500	0.2149	0.0023	229.4843	0.0034	0.0000	3.6717
Track Type Dozer	Grader	350	1	4	8	32	500	0.2149	0.0023	229.4843	0.0034	0.0000	3.6717
Digger Derrick Trucks	Bore/Drill Rigs	350	2	5	8	80	500	0.1488	0.0031	311.3087	0.0060	0.0001	12.4523
Digger Derrick Trucks	Bore/Drill Rigs	350	2	16	8	256	500	0.1488	0.0031	311.3087	0.0191	0.0004	39.8475
Hydraulic Pump Motor	Pumps	10	2	2	3	12	15	0.0148	0.0001	7.4238	0.0001	0.0000	0.0445
Single Reel Pullers / Tensioner	Off-highway Truck	300	1	32	6	192	500	0.2492	0.0027	272.3339	0.0239	0.0003	26.1441
Hydraulic Wind Up Reel Puller	Off-highway Truck	525	1	32	6	192	500	0.2492	0.0027	272.3339	0.0239	0.0003	26.1441
Track Type Dozer	Grader	350	1	1	8	8	500	0.2149	0.0023	229.4843	0.0009	0.0000	0.9179

Reconduct 69kV, TL - 6924

2 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 868	HP Used for OFFROAD	2010 SCAB ROG (lbs/hr)	2010 SCAB SOX (lbs/hr)	2010 SCAB CO2 (lbs/hr)	2010 SCAB ROG (tons)	2010 SCAB SOX (tons)	2010 SCAB CO2 (tons)
Road Grader	Grader	350	1	4	8	32	500	0.2149	0.0023	229.4843	0.0034	0.0000	3.6717
Track Type Dozer	Grader	350	1	4	8	32	500	0.2149	0.0023	229.4843	0.0034	0.0000	3.6717
Digger Derrick Trucks	Bore/Drill Rigs	350	2	5	8	80	500	0.1488	0.0031	311.3087	0.0060	0.0001	12.4523
Digger Derrick Trucks	Bore/Drill Rigs	350	2	20	8	320	500	0.1488	0.0031	311.3087	0.0238	0.0005	49.8094
Hydraulic Pump Motor	Pumps	10	2	2	3	12	15	0.0148	0.0001	7.4238	0.0001	0.0000	0.0445
Single Reel Pullers / Tensioner	Off-highway Truck	300	1	32	6	192	500	0.2492	0.0027	272.3339	0.0239	0.0003	26.1441
Hydraulic Wind Up Reel Puller	Off-highway Truck	525	1	32	6	192	500	0.2492	0.0027	272.3339	0.0239	0.0003	26.1441
Track Type Dozer	Grader	350	1	1	8	8	500	0.2149	0.0023	229.4843	0.0009	0.0000	0.9179

Offroad Emissions Calculation - Using SCAB Emission Factors

2010 SCAB emission factors (EFs) corresponding to OFFROAD2007 model are applied to CO2, ROG, and SOX.
 Tier 2 and 3 EFs are applied to NOx, PM, and CO. Calculation details are provided in *Offroad Tier 2* and *Offroad Tier 3* worksheets.
 Load factors are used in conjunction with Tier 2 and 3 EFs.

Offroad Equipment Project Total

ROG (tons)	SOX (tons)	CO2 (tons)
26.23	0.30	28,678.61

Reconduct 69kV, TL - 6916

4 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 2,484	HP Used for OFFROAD	2010 SCAB ROG (lb/hr)	2010 SCAB SOX (lb/hr)	2010 SCAB CO2 (lb/hr)	2010 SCAB ROG (tons)	2010 SCAB SOX (tons)	2010 SCAB CO2 (tons)
Road Grader	Grader	350	1	14	8	112	500	0.2149	0.0023	229.4843	0.0120	0.0001	12.8511
Track Type Dozer	Grader	350	1	14	8	112	500	0.2149	0.0023	229.4843	0.0120	0.0001	12.8511
Digger Derrick Trucks	Bore/Drill Rigs	350	2	5	8	80	500	0.1488	0.0031	311.3087	0.0060	0.0001	12.4523
Digger Derrick Trucks	Bore/Drill Rigs	350	2	52	8	832	500	0.1488	0.0031	311.3087	0.0619	0.0013	129.5044
Hydraulic Pump Motor	Pumps	10	2	10	3	60	15	0.0148	0.0001	7.4238	0.0004	0.0000	0.2227
Single Reel Pullers / Tensioner	Off-highway Truck	300	1	104	6	624	500	0.2492	0.0027	272.3339	0.0778	0.0008	84.9682
Hydraulic Wind Up Reel Puller	Off-highway Truck	525	1	104	6	624	500	0.2492	0.0027	272.3339	0.0778	0.0008	84.9682
Track Type Dozer	Grader	350	1	5	8	40	500	0.2149	0.0023	229.4843	0.0043	0.0000	4.5897

San Luis Rey Substation

40 days

Upgrade

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 2,576	HP Used for OFFROAD	2010 SCAB ROG (lbs/hr)	2010 SCAB SOX (lbs/hr)	2010 SCAB CO2 (lbs/hr)	2010 SCAB ROG (tons)	2010 SCAB SOX (tons)	2010 SCAB CO2 (tons)
Front Loader	Tractor/loader/backhoe	200	1	20	8	160	250	0.1418	0.0019	171.7370	0.0113	0.0002	13.7390
30 Ton Crane Truck	Off-highway Truck	220	1	42	8	336	250	0.1639	0.0019	166.5454	0.0275	0.0003	27.9796
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	180	1	40	4	160	250	0.1523	0.0019	170.7965	0.0122	0.0002	13.6637
Vibratory Compactor	Paving Equipment	80	1	40	2	80	120	0.1282	0.0006	54.4994	0.0051	0.0000	2.1800
Backhoe	Tractor/loader/backhoe	85	1	10	8	80	120	0.0910	0.0006	51.7280	0.0036	0.0000	2.0691
Trencher	Trencher	75	1	20	8	160	120	0.1509	0.0008	64.8951	0.0121	0.0001	5.1916
Manlifts	Aerial Lift	75	2	40	8	640	120	0.0702	0.0004	38.0718	0.0225	0.0001	12.1830
Generator	Generator Sets	30	3	40	8	960	50	0.1117	0.0004	30.6230	0.0536	0.0002	14.6990

Sycamore Canyon Sub

10 Days

Upgrade

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 900	HP Used for OFFROAD	2010 SCAB ROG (lbs/hr)	2010 SCAB SOX (lbs/hr)	2010 SCAB CO2 (lbs/hr)	2010 SCAB ROG (tons)	2010 SCAB SOX (tons)	2010 SCAB CO2 (tons)
Front Loader	Tractor/loader/backhoe	200	1	5	8	40	250	0.1418	0.0019	171.7370	0.0028	0.0000	3.4347
30 Ton Crane Truck	Off-highway Truck	220	1	10	8	80	250	0.1639	0.0019	166.5454	0.0066	0.0001	6.6618
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	180	1	10	4	40	250	0.1523	0.0019	170.7965	0.0030	0.0000	3.4159
Vibratory Compactor	Paving Equipment	80	1	10	2	20	120	0.1282	0.0006	54.4994	0.0013	0.0000	0.5450
Backhoe	Tractor/loader/backhoe	85	1	5	8	40	120	0.0910	0.0006	51.7280	0.0018	0.0000	1.0346
Trencher	Trencher	75	1	5	8	40	120	0.1509	0.0008	64.8951	0.0030	0.0000	1.2979
Manlifts	Aerial Lift	75	2	10	8	160	120	0.0702	0.0004	38.0718	0.0056	0.0000	3.0457
Generator	Generator Sets	30	3	20	8	480	50	0.1117	0.0004	30.6230	0.0268	0.0001	7.3495

Offroad Emissions Calculation - Using SCAB Emission Factors

2010 SCAB emission factors (EFs) corresponding to OFFROAD2007 model are applied to CO2, ROG, and SOX.
 Tier 2 and 3 EFs are applied to NOx, PM, and CO. Calculation details are provided in *Offroad Tier 2* and *Offroad Tier 3* worksheets.
 Load factors are used in conjunction with Tier 2 and 3 EFs.

Offroad Equipment Project Total

ROG (tons)	SOX (tons)	CO2 (tons)
26.23	0.30	28,678.61

Encina Substation
10 Days

Upgrade

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 1,050	HP Used for OFFROAD	2010 SCAB ROG (lbs/hr)	2010 SCAB SOX (lbs/hr)	2010 SCAB CO2 (lbs/hr)
Front Loader	Tractor/loader/backhoe	200	1	10	4	40	250	0.1418	0.0019	171.7370
30 Ton Crane Truck	Off-highway Truck	220	1	10	4	40	250	0.1639	0.0019	166.5454
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	180	1	10	4	40	250	0.1523	0.0019	170.7965
Vibratory Compactor	Paving Equipment	80	1	5	2	10	120	0.1282	0.0006	54.4994
Backhoe	Tractor/loader/backhoe	85	1	10	8	80	120	0.0910	0.0006	51.7280
Trencher	Trencher	75	1	8	5	40	120	0.1509	0.0008	64.8951
Manlifts	Aerial Lift	75	2	20	8	320	120	0.0702	0.0004	38.0718
Generator	Generator Sets	30	3	20	8	480	50	0.1117	0.0004	30.6230

2010 SCAB ROG (tons)	2010 SCAB SOX (tons)	2010 SCAB CO2 (tons)
0.0028	0.0000	3.4347
0.0033	0.0000	3.3309
0.0030	0.0000	3.4159
0.0006	0.0000	0.2725
0.0036	0.0000	2.0691
0.0030	0.0000	1.2979
0.0112	0.0001	6.0915
0.0268	0.0001	7.3495

South Bay Substation
20 Days

Upgrade

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 730	HP Used for OFFROAD	2010 SCAB ROG (lbs/hr)	2010 SCAB SOX (lbs/hr)	2010 SCAB CO2 (lbs/hr)
Front Loader	Tractor/loader/backhoe	200	1	10	4	40	250	0.1418	0.0019	171.7370
30 Ton Crane Truck	Off-highway Truck	220	1	10	4	40	250	0.1639	0.0019	166.5454
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	180	1	10	4	40	250	0.1523	0.0019	170.7965
Vibratory Compactor	Paving Equipment	80	1	5	2	10	120	0.1282	0.0006	54.4994
Backhoe	Tractor/loader/backhoe	85	1	10	8	80	120	0.0910	0.0006	51.7280
Trencher	Trencher	75	1	8	5	40	120	0.1509	0.0008	64.8951
Generator	Generator Sets	30	3	20	8	480	50	0.1117	0.0004	30.6230

2010 SCAB ROG (tons)	2010 SCAB SOX (tons)	2010 SCAB CO2 (tons)
0.0028	0.0000	3.4347
0.0033	0.0000	3.3309
0.0030	0.0000	3.4159
0.0006	0.0000	0.2725
0.0036	0.0000	2.0691
0.0030	0.0000	1.2979
0.0112	0.0001	6.0915
0.0268	0.0001	7.3495

IV Substation
40 Days

Upgrade

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 2,560	HP Used for OFFROAD	2010 SCAB ROG (lbs/hr)	2010 SCAB SOX (lbs/hr)	2010 SCAB CO2 (lbs/hr)
Front Loader	Tractor/loader/backhoe	200	1	40	2	80	250	0.1418	0.0019	171.7370
30 Ton Crane Truck	Off-highway Truck	220	1	40	8	320	250	0.1639	0.0019	166.5454
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	180	1	40	4	160	250	0.1523	0.0019	170.7965
Vibratory Compactor	Paving Equipment	80	1	40	2	80	120	0.1282	0.0006	54.4994
Backhoe	Tractor/loader/backhoe	85	1	60	8	480	120	0.0910	0.0006	51.7280
Trencher	Trencher	75	5	20	8	800	120	0.1509	0.0008	64.8951
Digger Derrick Trucks	Bore/Drill Rigs	350	2	20	4	160	500	0.1488	0.0031	311.3087
Generator	Generator Sets	30	3	20	8	480	50	0.1117	0.0004	30.6230

2010 SCAB ROG (tons)	2010 SCAB SOX (tons)	2010 SCAB CO2 (tons)
0.0057	0.0001	6.8695
0.0262	0.0003	26.6473
0.0122	0.0002	13.6637
0.0051	0.0000	2.1800
0.0218	0.0001	12.4147
0.0604	0.0003	25.9581
0.0119	0.0002	24.9047
0.0268	0.0001	7.3495

2010 SCAB Fleet Average Emission Factors (OFFROAD2007)

These emission factors are applied to CO2, ROG, SOX only. Load factors are already incorporated.

Equipment	MaxHP	NOX (lbs/hr)	ROG (lbs/hr)	PM (lbs/hr)	CO (lbs/hr)	SOX (lbs/hr)	CO2 (lbs/hr)
Aerial Lifts	15	0.0662	0.0104	0.0037	0.0529	0.0001	8.7
	25	0.1013	0.0210	0.0065	0.0577	0.0001	11.0
	50	0.1984	0.0756	0.0189	0.1937	0.0003	19.6
	120	0.4502	0.0702	0.0361	0.2501	0.0004	38.1
	500	1.9198	0.1506	0.0598	0.5801	0.0021	213
	750	3.5605	0.2803	0.1096	1.0486	0.0039	385
Aerial Lifts Composite		0.3600	0.0670	0.0248	0.2093	0.0004	34.7
Air Compressors	15	0.0838	0.0144	0.0061	0.0513	0.0001	7.2
	25	0.1397	0.0325	0.0098	0.0847	0.0002	14.4
	50	0.2386	0.1163	0.0265	0.2813	0.0003	22.3
	120	0.5977	0.1014	0.0545	0.3351	0.0006	47.0
	175	1.0082	0.1274	0.0568	0.5113	0.0010	88.5
	250	1.3983	0.1225	0.0462	0.3413	0.0015	131
	500	2.2062	0.1943	0.0752	0.6778	0.0023	232
	750	3.5002	0.3054	0.1179	1.0476	0.0036	358
	1000	6.0195	0.5203	0.1809	1.8591	0.0049	486
Air Compressors Composite		0.7320	0.1120	0.0526	0.3613	0.0007	63.6
Bore/Drill Rigs	15	0.0754	0.0120	0.0031	0.0632	0.0002	10.3
	25	0.1257	0.0196	0.0065	0.0660	0.0002	16.0
	50	0.2820	0.0545	0.0194	0.2505	0.0004	31.0
	120	0.6155	0.0722	0.0456	0.4812	0.0009	77.1
	175	0.9148	0.0930	0.0481	0.7543	0.0016	141
	250	1.1847	0.0957	0.0384	0.3460	0.0021	188
	500	1.7054	0.1488	0.0614	0.5566	0.0031	311
	750	3.4821	0.2996	0.1231	1.0997	0.0062	615
	1000	8.3092	0.5360	0.2078	1.7074	0.0093	928
Bore/Drill Rigs Composite		1.1331	0.1052	0.0498	0.5146	0.0017	165
Cement and Mortar Mixers	15	0.0505	0.0079	0.0029	0.0388	0.0001	6.3
	25	0.1633	0.0346	0.0107	0.0942	0.0002	17.6
Cement and Mortar Mixers Composite		0.0599	0.0101	0.0035	0.0434	0.0001	7.2
Concrete/Industrial Saws	25	0.1279	0.0200	0.0063	0.0678	0.0002	16.5
	50	0.3070	0.1231	0.0301	0.3210	0.0004	30.2
	120	0.8601	0.1342	0.0719	0.4976	0.0009	74.1
	175	1.6459	0.1927	0.0864	0.8786	0.0018	160
Concrete/Industrial Saws Composite		0.6566	0.1270	0.0552	0.4273	0.0007	58.5
Cranes	50	0.2547	0.1284	0.0289	0.3166	0.0003	23.2
	120	0.6542	0.1117	0.0602	0.3723	0.0006	50.1
	175	0.9302	0.1211	0.0538	0.4880	0.0009	80.3
	250	1.2372	0.1243	0.0470	0.3464	0.0013	112
	500	1.7722	0.1821	0.0685	0.6625	0.0018	180
	750	3.0564	0.3082	0.1166	1.1113	0.0030	303
	9999	12.1879	1.0894	0.3792	4.1317	0.0098	971
	Cranes Composite		1.4515	0.1594	0.0642	0.5431	0.0014
Crawler Tractors	50	0.2780	0.1446	0.0320	0.3520	0.0003	24.9
	120	0.9038	0.1551	0.0819	0.5018	0.0008	65.8
	175	1.4788	0.1941	0.0856	0.7597	0.0014	121
	250	1.9440	0.2051	0.0784	0.5743	0.0019	166
	500	2.7255	0.2913	0.1101	1.1931	0.0025	259
	750	4.9881	0.5240	0.1989	2.1290	0.0047	465
	1000	8.5998	0.7980	0.2810	3.3726	0.0066	658
Crawler Tractors Composite		1.3854	0.1861	0.0854	0.6409	0.0013	114
Crushing/Proc. Equipment	50	0.4700	0.2271	0.0520	0.5592	0.0006	44.0
	120	1.0382	0.1760	0.0960	0.5956	0.0010	83.1
	175	1.8607	0.2367	0.1068	0.9736	0.0019	167
	250	2.5465	0.2243	0.0841	0.6225	0.0028	245
	500	3.4510	0.3091	0.1187	1.0542	0.0037	374
	750	5.6506	0.4956	0.1900	1.6226	0.0059	589
	9999	16.0752	1.3820	0.4812	4.8014	0.0131	1,308
Crushing/Proc. Equipment Composite		1.4394	0.2152	0.0935	0.7260	0.0015	132
Dumpers/Tenders	25	0.0645	0.0108	0.0036	0.0336	0.0001	7.6
Dumpers/Tenders Composite		0.0645	0.0108	0.0036	0.0336	0.0001	7.6
Excavators	25	0.1261	0.0199	0.0057	0.0677	0.0002	16.4
	50	0.2638	0.1131	0.0276	0.3145	0.0003	25.0
	120	0.8402	0.1398	0.0781	0.5318	0.0009	73.6
	175	1.1143	0.1465	0.0663	0.6701	0.0013	112
	250	1.4935	0.1451	0.0519	0.3934	0.0018	159
	500	1.9285	0.1984	0.0711	0.6161	0.0023	234
750	3.3023	0.3313	0.1198	1.0196	0.0039	387	
Excavators Composite		1.1502	0.1483	0.0638	0.5581	0.0013	120

2010 SCAB Fleet Average Emission Factors (OFFROAD2007)

These emission factors are applied to CO2, ROG, SOX only. Load factors are already incorporated.

Equipment	MaxHP	NOX (lbs/hr)	ROG (lbs/hr)	PM (lbs/hr)	CO (lbs/hr)	SOX (lbs/hr)	CO2 (lbs/hr)
Forklifts	50	0.1530	0.0666	0.0163	0.1824	0.0002	14.7
	120	0.3497	0.0601	0.0342	0.2243	0.0004	31.2
	175	0.5540	0.0738	0.0337	0.3306	0.0006	56.1
	250	0.7163	0.0652	0.0227	0.1707	0.0009	77.1
	500	0.8909	0.0868	0.0307	0.2343	0.0011	111
Forklifts Composite		0.5161	0.0686	0.0281	0.2319	0.0006	54.4
Generator Sets	15	0.1154	0.0172	0.0069	0.0726	0.0002	10.2
	25	0.1705	0.0300	0.0107	0.1033	0.0002	17.6
	50	0.3070	0.1117	0.0284	0.2904	0.0004	30.6
	120	0.9075	0.1395	0.0714	0.5054	0.0009	77.9
	175	1.4780	0.1672	0.0721	0.7471	0.0016	142
	250	2.0720	0.1618	0.0618	0.5018	0.0024	213
	500	2.9974	0.2305	0.0917	0.8858	0.0033	337
	750	4.9646	0.3838	0.1502	1.4300	0.0055	544
	9999	12.1384	1.0080	0.3600	3.6008	0.0105	1,049
Generator Sets Composite		0.6440	0.0961	0.0396	0.3293	0.0007	61.0
Graders	50	0.2961	0.1400	0.0323	0.3584	0.0004	27.5
	120	0.9268	0.1553	0.0849	0.5459	0.0009	75.0
	175	1.3532	0.1743	0.0783	0.7409	0.0014	124
	250	1.7904	0.1761	0.0662	0.4934	0.0019	172
	500	2.1198	0.2149	0.0807	0.7523	0.0023	229
	750	4.6098	0.4580	0.1729	1.5877	0.0049	486
Graders Composite		1.4338	0.1723	0.0753	0.6314	0.0015	133
Off-Highway Tractors	120	1.4200	0.2457	0.1255	0.7439	0.0011	93.7
	175	1.7665	0.2326	0.1014	0.8561	0.0015	130
	250	1.7050	0.1881	0.0735	0.5347	0.0015	130
	750	6.8440	0.7400	0.2854	3.5496	0.0057	568
	1000	11.4633	1.1197	0.4009	5.5155	0.0082	814
Off-Highway Tractors Composite		1.9897	0.2368	0.0974	0.8385	0.0017	151
Off-Highway Trucks	175	1.2796	0.1732	0.0771	0.7625	0.0014	125
	250	1.6150	0.1639	0.0574	0.4301	0.0019	167
	500	2.3188	0.2492	0.0872	0.7542	0.0027	272
	750	3.8814	0.4069	0.1436	1.2210	0.0044	442
	1000	7.3260	0.6440	0.2219	2.0615	0.0063	625
Off-Highway Trucks Composite		2.3885	0.2480	0.0875	0.7429	0.0027	260
Other Construction Equipment	15	0.0737	0.0118	0.0030	0.0617	0.0002	10.1
	25	0.1039	0.0162	0.0053	0.0545	0.0002	13.2
	50	0.2787	0.1033	0.0263	0.2930	0.0004	28.0
	120	0.8649	0.1320	0.0740	0.5419	0.0009	80.9
	175	0.9927	0.1168	0.0543	0.5901	0.0012	107
	500	1.9821	0.1705	0.0678	0.6068	0.0025	254
Other Construction Equipment Composite		1.0117	0.1056	0.0442	0.4108	0.0013	123
Other General Industrial Equip	15	0.0466	0.0066	0.0017	0.0391	0.0001	6.4
	25	0.1177	0.0186	0.0054	0.0632	0.0002	15.3
	50	0.2413	0.1281	0.0285	0.3073	0.0003	21.7
	120	0.8218	0.1459	0.0795	0.4647	0.0007	62.0
	175	1.1364	0.1516	0.0676	0.5816	0.0011	95.9
	250	1.5016	0.1400	0.0509	0.3676	0.0015	136
	500	2.6018	0.2500	0.0919	0.8031	0.0026	265
	750	4.4083	0.4153	0.1538	1.3236	0.0044	437
1000	7.1530	0.6374	0.2212	2.2063	0.0056	560	
Other General Industrial Equipmen Composite		1.6649	0.1847	0.0740	0.5948	0.0016	152
Other Material Handling Equip	50	0.3355	0.1773	0.0395	0.4246	0.0004	30.3
	120	0.8014	0.1417	0.0772	0.4524	0.0007	60.7
	175	1.4429	0.1914	0.0856	0.7367	0.0014	122
	250	1.6024	0.1481	0.0542	0.3917	0.0016	145
	500	1.8750	0.1782	0.0660	0.5784	0.0019	192
	9999	9.4509	0.8390	0.2912	2.9174	0.0073	741
Other Material Handling Equipment Composite		1.6150	0.1773	0.0715	0.5556	0.0015	141
Pavers	25	0.1603	0.0278	0.0092	0.0845	0.0002	18.7
	50	0.3110	0.1624	0.0356	0.3860	0.0004	28.0
	120	0.9693	0.1638	0.0853	0.5223	0.0008	69.2
	175	1.6028	0.2049	0.0903	0.7959	0.0014	128
	250	2.3337	0.2426	0.0953	0.7011	0.0022	194
	500	2.5319	0.2622	0.1023	1.1661	0.0023	233
Pavers Composite		0.9868	0.1774	0.0709	0.5644	0.0009	77.9
Paving Equipment	25	0.0993	0.0155	0.0051	0.0521	0.0002	12.6
	50	0.2654	0.1384	0.0303	0.3277	0.0003	23.9
	120	0.7600	0.1282	0.0668	0.4084	0.0006	54.5
	175	1.2577	0.1599	0.0704	0.6208	0.0011	101
	250	1.4619	0.1506	0.0592	0.4363	0.0014	122
Paving Equipment Composite		0.8963	0.1336	0.0629	0.4478	0.0008	68.9

2010 SCAB Fleet Average Emission Factors (OFFROAD2007)

These emission factors are applied to CO2, ROG, SOX only. Load factors are already incorporated.

Equipment	MaxHP	NOX (lbs/hr)	ROG (lbs/hr)	PM (lbs/hr)	CO (lbs/hr)	SOX (lbs/hr)	CO2 (lbs/hr)
Plate Compactors	15	0.0317	0.0050	0.0015	0.0263	0.0001	4.3
Plate Compactors Composite		0.0317	0.0050	0.0015	0.0263	0.0001	4.3
Pressure Washers	15	0.0553	0.0083	0.0033	0.0348	0.0001	4.9
	25	0.0691	0.0122	0.0043	0.0419	0.0001	7.1
	50	0.1388	0.0413	0.0115	0.1143	0.0002	14.3
	120	0.2674	0.0388	0.0193	0.1487	0.0003	24.1
Pressure Washers Composite		0.0989	0.0199	0.0070	0.0666	0.0001	9.4
Pumps	15	0.0862	0.0148	0.0062	0.0528	0.0001	7.4
	25	0.1884	0.0439	0.0133	0.1142	0.0002	19.5
	50	0.3479	0.1339	0.0333	0.3428	0.0004	34.3
	120	0.9216	0.1441	0.0744	0.5136	0.0009	77.9
	175	1.4815	0.1709	0.0742	0.7489	0.0016	140
	250	1.9941	0.1593	0.0609	0.4846	0.0023	201
	500	3.1080	0.2450	0.0973	0.9411	0.0034	345
	750	5.2721	0.4167	0.1631	1.5559	0.0057	571
	9999	15.8590	1.3269	0.4723	4.8008	0.0136	1,355
Pumps Composite		0.5545	0.0936	0.0393	0.3096	0.0006	49.6
Rollers	15	0.0461	0.0074	0.0019	0.0386	0.0001	6.3
	25	0.1049	0.0164	0.0054	0.0551	0.0002	13.3
	50	0.2753	0.1270	0.0292	0.3169	0.0003	26.0
	120	0.7383	0.1201	0.0641	0.4177	0.0007	59.0
	175	1.2022	0.1478	0.0659	0.6270	0.0012	108
	250	1.6232	0.1542	0.0603	0.4540	0.0017	153
	500	2.0882	0.1987	0.0783	0.7785	0.0022	219
Rollers Composite		0.7749	0.1176	0.0547	0.4212	0.0008	67.1
Rough Terrain Forklifts	50	0.3558	0.1590	0.0377	0.4186	0.0004	33.9
	120	0.7326	0.1213	0.0676	0.4447	0.0007	62.4
	175	1.2875	0.1640	0.0749	0.7302	0.0014	125
	250	1.6632	0.1523	0.0567	0.4270	0.0019	171
	500	2.1987	0.2097	0.0788	0.6871	0.0025	257
Rough Terrain Forklifts Composite		0.7988	0.1272	0.0678	0.4766	0.0008	70.3
Rubber Tired Dozers	175	1.7881	0.2398	0.1036	0.8686	0.0015	129
	250	2.4482	0.2776	0.1071	0.7758	0.0021	183
	500	3.2071	0.3621	0.1370	1.7411	0.0026	265
	750	4.9024	0.5457	0.2071	2.6075	0.0040	399
	1000	8.4813	0.8464	0.3018	4.1786	0.0060	592
Rubber Tired Dozers Composite		2.9891	0.3379	0.1288	1.4127	0.0025	239
Rubber Tired Loaders	25	0.1314	0.0206	0.0064	0.0697	0.0002	16.9
	50	0.3333	0.1560	0.0361	0.4005	0.0004	31.1
	120	0.7227	0.1206	0.0660	0.4268	0.0007	58.9
	175	1.1513	0.1476	0.0664	0.6326	0.0012	106
	250	1.5357	0.1493	0.0563	0.4210	0.0017	149
	500	2.1684	0.2172	0.0819	0.7648	0.0023	237
	750	4.5660	0.4484	0.1700	1.5625	0.0049	486
	1000	7.1368	0.6154	0.2156	2.2308	0.0060	594
Rubber Tired Loaders Composite		1.1537	0.1440	0.0651	0.5078	0.0012	109
Scrapers	120	1.3034	0.2236	0.1177	0.7169	0.0011	93.9
	175	1.8284	0.2391	0.1053	0.9290	0.0017	148
	250	2.4818	0.2618	0.1006	0.7368	0.0024	209
	500	3.4250	0.3650	0.1386	1.5182	0.0032	321
	750	6.0373	0.6328	0.2413	2.6115	0.0056	555
Scrapers Composite		2.9078	0.3202	0.1256	1.2424	0.0027	262
Signal Boards	15	0.0450	0.0072	0.0017	0.0377	0.0001	6.2
	50	0.3689	0.1492	0.0364	0.3827	0.0005	36.2
	120	0.9446	0.1495	0.0792	0.5380	0.0009	80.2
	175	1.6203	0.1907	0.0846	0.8437	0.0017	155
	250	2.5094	0.2049	0.0789	0.6138	0.0029	255
Signal Boards Composite		0.1615	0.0224	0.0091	0.0953	0.0002	16.7
Skid Steer Loaders	25	0.1252	0.0249	0.0079	0.0700	0.0002	13.8
	50	0.2463	0.0785	0.0217	0.2507	0.0003	25.5
	120	0.4131	0.0607	0.0355	0.2822	0.0005	42.8
Skid Steer Loaders Composite		0.2919	0.0692	0.0252	0.2489	0.0004	30.3
Surfacing Equipment	50	0.1451	0.0589	0.0142	0.1520	0.0002	14.1
	120	0.7683	0.1192	0.0624	0.4334	0.0007	63.8
	175	0.9169	0.1071	0.0472	0.4787	0.0010	85.8
	250	1.3783	0.1254	0.0494	0.3883	0.0015	135
	500	2.0517	0.1854	0.0741	0.7785	0.0022	221
	750	3.2929	0.2960	0.1173	1.2171	0.0035	347
Surfacing Equipment Composite		1.5685	0.1550	0.0606	0.6164	0.0017	166

2010 SCAB Fleet Average Emission Factors (OFFROAD2007)

These emission factors are applied to CO2, ROG, SOX only. Load factors are already incorporated.

Equipment	MaxHP	NOX (lbs/hr)	ROG (lbs/hr)	PM (lbs/hr)	CO (lbs/hr)	SOX (lbs/hr)	CO2 (lbs/hr)
Sweepers/Scrubbers	15	0.0870	0.0124	0.0033	0.0729	0.0002	11.9
	25	0.1524	0.0239	0.0075	0.0808	0.0002	19.6
	50	0.3297	0.1508	0.0355	0.3893	0.0004	31.6
	120	0.8645	0.1490	0.0843	0.5329	0.0009	75.0
	175	1.4276	0.1856	0.0854	0.8049	0.0016	139
	250	1.5598	0.1344	0.0489	0.3643	0.0018	162
Sweepers/Scrubbers Composite		0.8473	0.1548	0.0686	0.5380	0.0009	78.5
Tractors/Loaders/Backhoes	25	0.1317	0.0214	0.0072	0.0681	0.0002	15.9
	50	0.3114	0.1257	0.0312	0.3548	0.0004	30.3
	120	0.5664	0.0910	0.0515	0.3623	0.0006	51.7
	175	0.9646	0.1216	0.0562	0.5881	0.0011	101
	250	1.5493	0.1418	0.0523	0.4037	0.0019	172
	500	2.7242	0.2630	0.0980	0.8495	0.0039	345
	750	4.2276	0.3986	0.1496	1.2725	0.0058	517
Tractors/Loaders/Backhoes Composite		0.6747	0.1021	0.0521	0.3930	0.0008	66.8
Trenchers	15	0.0617	0.0099	0.0023	0.0517	0.0001	8.5
	25	0.2555	0.0400	0.0125	0.1355	0.0004	32.9
	50	0.3620	0.1837	0.0405	0.4365	0.0004	32.9
	120	0.9082	0.1509	0.0776	0.4840	0.0008	64.9
	175	1.7973	0.2254	0.0990	0.8843	0.0016	144
	250	2.6802	0.2770	0.1103	0.8161	0.0025	223
	500	3.4013	0.3468	0.1373	1.6352	0.0031	311
	750	6.5218	0.6586	0.2602	3.0677	0.0059	587
Trenchers Composite		0.7598	0.1675	0.0637	0.4907	0.0007	58.7
Welders	15	0.0720	0.0124	0.0052	0.0441	0.0001	6.2
	25	0.1091	0.0254	0.0077	0.0661	0.0001	11.3
	50	0.2724	0.1231	0.0287	0.3025	0.0003	26.0
	120	0.4899	0.0807	0.0428	0.2738	0.0005	39.5
	175	1.0896	0.1333	0.0590	0.5515	0.0011	98.2
	250	1.2367	0.1052	0.0400	0.3022	0.0013	119
	500	1.5648	0.1327	0.0520	0.4823	0.0016	168
Welders Composite		0.2920	0.0805	0.0270	0.2246	0.0003	25.6

Offroad Emissions Calculations - Using Tier 2 Emission Factors

Tier 2 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 2 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
238.36	8.06	132.03

Segments 8A / 8B / 8C / 8D / 8E / 9A

18 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 41,936	Load Factor for Tier 2	HP Used for OFFROAD	TIER 2 NOX	TIER 2 PM	TIER 2 CO	TIER 2 NOX	TIER 2 PM	TIER 2 CO
									(lbs/hr)	(lbs/hr)	(lbs/hr)	(tons)	(tons)	(tons)
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	468	5	4680	0.6	500	1.2963	0.0397	0.6878	3.0333	0.0929	1.6095
Road Grader	Grader	350	2	234	8	3744	0.61	500	2.2593	0.0706	1.2238	4.2293	0.1322	2.2909
Track Type Dozer	Grader	350	1	70	8	560	0.61	500	2.2593	0.0706	1.2238	0.6326	0.0198	0.3427
Drum Type Compactor	Paving Equipment	250	1	70	6	420	0.53	250	1.4313	0.0438	0.7595	0.3006	0.0092	0.1595
Excavator	Excavator	300	1	70	8	560	0.57	500	1.8095	0.0565	0.9802	0.5067	0.0158	0.2744
Backhoe	Tractor/loader/backhoe	350	1	468	8	3744	0.55	500	2.0370	0.0637	1.1034	3.8133	0.1192	2.0656
Backhoe	Tractor/loader/backhoe	200	2	140	8	2240	0.55	250	1.1883	0.0364	0.6305	1.3309	0.0407	0.7062
Pressure Diggers	Bore/Drill Rigs	500	2	140	8	2240	0.75	500	3.9683	0.1240	2.1495	4.4444	0.1389	2.4074
Rock Drill	Bore/Drill Rig	200	2	140	6	1680	0.75	250	1.6204	0.0496	0.8598	1.3611	0.0417	0.7222
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	140	6	1680	0.6	250	1.2963	0.0397	0.6878	1.0889	0.0333	0.5778
80 Ton Rough Terrain Cranes	Off-highway Truck	400	2	140	6	1680	0.57	500	2.4127	0.0754	1.3069	2.0267	0.0633	1.0978
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	140	5	1400	0.6	250	1.2963	0.0397	0.6878	0.9074	0.0278	0.4815
Compressor Truck	Off-highway Truck	350	2	140	8	2240	0.57	500	2.1111	0.0660	1.1435	2.3644	0.0739	1.2807
Compressor Truck	Off-highway Truck	350	2	140	8	2240	0.57	500	2.1111	0.0660	1.1435	2.3644	0.0739	1.2807
180 Ton Rough Terrain Crane	Off-highway Truck	500	2	140	8	2240	0.57	500	3.0159	0.0942	1.6336	3.3778	0.1056	1.8296
Sleeving Rigs	Bore/Drill Rigs	500	2	152	4	1216	0.75	500	2.7778	0.0868	1.5046	1.6889	0.0528	0.9148
Hydraulic Pump Motor	Pumps	10	2	10	5	100	0.74	15	0.0914	0.0098	0.0979	0.0046	0.0005	0.0049
580 Case Backhoe	Tractor/loader/backhoe	120	1	152	2	304	0.55	120	0.7130	0.0320	0.5384	0.1084	0.0049	0.0818
Spacing Carts	Other Gen Indust Equipment	10	4	152	4	2432	0.51	15	0.0630	0.0067	0.0675	0.0766	0.0082	0.0820
3 Drum Strawline Pullers	Other Gen Indust Equipment	300	2	152	6	1824	0.51	500	1.6190	0.0506	0.8770	1.4766	0.0461	0.7998
60lk Puller	Other Gen Indust Equipment	525	1	152	3	456	0.51	500	2.8333	0.0885	1.5347	0.6460	0.0202	0.3499
Triple Conductor Tensioner	Other Gen Indust Equipment	350	1	152	2	304	0.51	500	1.8889	0.0590	1.0231	0.2871	0.0090	0.1555
Sag Cat w2 winches	Grader	350	2	152	2	608	0.61	500	2.2593	0.0706	1.2238	0.6868	0.0215	0.3720
D8 Cats	Grader	300	4	152	1	608	0.61	500	1.9365	0.0605	1.0489	0.5887	0.0184	0.3189
Backhoe	Tractor/loader/backhoe	350	2	76	8	1216	0.55	500	2.0370	0.0637	1.1034	1.2385	0.0387	0.6709
Track Type Dozer	Grader	350	1	76	8	608	0.61	500	2.2593	0.0706	1.2238	0.6868	0.0215	0.3720
Drum Type Compactor	Paving Equipment	250	1	76	6	456	0.53	250	1.4313	0.0438	0.7595	0.3263	0.0100	0.1732
Excavator	Excavator	300	1	76	6	456	0.57	500	1.8095	0.0565	0.9802	0.4126	0.0129	0.2235

Offroad Emissions Calculations - Using Tier 2 Emission Factors

Tier 2 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 2 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
238.36	8.06	132.03

Segments 9B / 9C

18 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Load Factor for Tier 2	HP Used for OFFROAD	TIER 2 NOX (lbs/hr)	TIER 2 PM (lbs/hr)	TIER 2 CO (lbs/hr)	TIER 2 NOX (tons)	TIER 2 PM (tons)	TIER 2 CO (tons)
						33,322								
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	468	5	4680	0.6	250	1.2963	0.0397	0.6878	3.0333	0.0929	1.6095
Road Grader	Grader	350	2	108	8	1728	0.61	500	2.2593	0.0706	1.2238	1.9520	0.0610	1.0573
Track Type Dozer	Grader	350	1	57	8	456	0.61	500	2.2593	0.0706	1.2238	0.5151	0.0161	0.2790
Drum Type Compactor	Paving Equipment	250	1	57	6	342	0.53	250	1.4313	0.0438	0.7595	0.2448	0.0075	0.1299
Excavator	Excavator	300	1	57	8	456	0.57	500	1.8095	0.0565	0.9802	0.4126	0.0129	0.2235
Backhoe	Tractor/loader/backhoe	350	1	468	8	3744	0.55	500	2.0370	0.0637	1.1034	3.8133	0.1192	2.0656
Backhoe	Tractor/loader/backhoe	200	2	114	8	1824	0.55	250	1.1883	0.0364	0.6305	1.0837	0.0332	0.5750
Pressure Diggers	Bore/Drill Rigs	500	2	114	8	1824	0.75	500	3.9683	0.1240	2.1495	3.6190	0.1131	1.9603
Rock Drill	Bore/Drill Rigs	200	2	114	6	1368	0.75	250	1.6204	0.0496	0.8598	1.1083	0.0339	0.5881
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	114	6	1368	0.6	250	1.2963	0.0397	0.6878	0.8867	0.0271	0.4705
80 Ton Rough Terrain Cranes	Off-highway Truck	400	2	114	6	1368	0.57	500	2.4127	0.0754	1.3069	1.6503	0.0516	0.8939
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	114	5	1140	0.6	250	1.2963	0.0397	0.6878	0.7389	0.0226	0.3921
Compressor Truck	Off-highway Truck	350	2	114	8	1824	0.57	500	2.1111	0.0660	1.1435	1.9253	0.0602	1.0429
Compressor Truck	Off-highway Truck	350	2	114	8	1824	0.57	500	2.1111	0.0660	1.1435	1.9253	0.0602	1.0429
180 Ton Rough Terrain Crane	Off-highway Truck	500	2	114	8	1824	0.57	500	3.0159	0.0942	1.6336	2.7505	0.0860	1.4898
Sleeving Rigs	Bore/Drill Rigs	350	2	108	4	864	0.75	500	2.7778	0.0868	1.5046	1.2000	0.0375	0.6500
Hydraulic Pump Motor	Pumps	10	2	10	5	100	0.74	15	0.0914	0.0098	0.0979	0.0046	0.0005	0.0049
580 Case Backhoe	Tractor/loader/backhoe	120	1	108	2	216	0.55	120	0.7130	0.0320	0.5384	0.0770	0.0035	0.0581
Spacing Carts	Other Gen Indust Equipment	10	4	108	4	1728	0.51	15	0.0630	0.0067	0.0675	0.0544	0.0058	0.0583
3 Drum Strawline Pullers	Other Gen Indust Equipment	300	2	108	6	1296	0.51	500	1.6190	0.0506	0.8770	1.0491	0.0328	0.5683
60lk Puller	Other Gen Indust Equipment	525	1	108	3	324	0.51	500	2.8333	0.0885	1.5347	0.4590	0.0143	0.2486
Triple Conductor Tensioner	Other Gen Indust Equipment	350	1	108	2	216	0.51	500	1.8889	0.0590	1.0231	0.2040	0.0064	0.1105
Sag Cat w2 winches	Grader	350	2	108	2	432	0.61	500	2.2593	0.0706	1.2238	0.4880	0.0153	0.2643
D8 Cats	Grader	300	4	108	1	432	0.61	500	1.9365	0.0605	1.0489	0.4183	0.0131	0.2266
Backhoe	Tractor/loader/backhoe	350	2	54	8	864	0.55	500	2.0370	0.0637	1.1034	0.8800	0.0275	0.4767
Track Type Dozer	Grader	350	1	54	8	432	0.61	500	2.2593	0.0706	1.2238	0.4880	0.0153	0.2643
Drum Type Compactor	Paving Equipment	250	1	54	6	324	0.53	250	1.4313	0.0438	0.7595	0.2319	0.0071	0.1230
Excavator	Excavator	300	1	54	6	324	0.57	500	1.8095	0.0565	0.9802	0.2931	0.0092	0.1588

Offroad Emissions Calculations - Using Tier 2 Emission Factors

Tier 2 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 2 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
238.36	8.06	132.03

Segments 10A / 10B

18 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 29,794	Load Factor for Tier 2	HP Used for OFFROAD	TIER 2 NOX	TIER 2 PM	TIER 2 CO	TIER 2 NOX	TIER 2 PM	TIER 2 CO
									(lbs/hr)	(lbs/hr)	(lbs/hr)	(tons)	(tons)	(tons)
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	468	5	4680	0.6	250	1.2963	0.0397	0.6878	3.0333	0.0929	1.6095
Road Grader	Grader	350	2	108	8	1728	0.61	500	2.2593	0.0706	1.2238	1.9520	0.0610	1.0573
Track Type Dozer	Grader	350	1	57	8	456	0.61	500	2.2593	0.0706	1.2238	0.5151	0.0161	0.2790
Drum Type Compactor	Paving Equipment	250	1	57	6	342	0.53	250	1.4313	0.0438	0.7595	0.2448	0.0075	0.1299
Excavator	Excavator	300	1	57	8	456	0.57	500	1.8095	0.0565	0.9802	0.4126	0.0129	0.2235
Backhoe	Tractor/loader/backhoe	350	1	468	8	3744	0.55	500	2.0370	0.0637	1.1034	3.8133	0.1192	2.0656
Backhoe	Tractor/loader/backhoe	200	2	86	8	1376	0.55	250	1.1883	0.0364	0.6305	0.8175	0.0250	0.4338
Pressure Diggers	Bore/Drill Rigs	500	2	86	8	1376	0.75	500	3.9683	0.1240	2.1495	2.7302	0.0853	1.4788
Rock Drill	Bore/Drill Rigs	200	2	86	6	1032	0.75	250	1.6204	0.0496	0.8598	0.8361	0.0256	0.4437
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	86	6	1032	0.6	250	1.2963	0.0397	0.6878	0.6689	0.0205	0.3549
80 Ton Rough Terrain Cranes	Off-highway Truck	400	2	86	6	1032	0.57	500	2.4127	0.0754	1.3069	1.2450	0.0389	0.6743
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	86	5	860	0.6	250	1.2963	0.0397	0.6878	0.5574	0.0171	0.2958
Compressor Truck	Off-highway Truck	350	2	86	8	1376	0.57	500	2.1111	0.0660	1.1435	1.4524	0.0454	0.7867
Compressor Truck	Off-highway Truck	350	2	86	8	1376	0.57	500	2.1111	0.0660	1.1435	1.4524	0.0454	0.7867
180 Ton Rough Terrain Crane	Off-highway Truck	500	2	86	8	1376	0.57	500	3.0159	0.0942	1.6336	2.0749	0.0648	1.1239
Sleeving Rigs	Bore/Drill Rigs	350	2	108	4	864	0.75	500	2.7778	0.0868	1.5046	1.2000	0.0375	0.6500
Hydraulic Pump Motor	Pumps	10	2	10	5	100	0.74	15	0.0914	0.0098	0.0979	0.0046	0.0005	0.0049
580 Case Backhoe	Tractor/loader/backhoe	120	1	108	2	216	0.55	250	0.7130	0.0320	0.5384	0.0770	0.0035	0.0581
Spacing Carts	Other Gen Indust Equipment	10	4	108	4	1728	0.51	15	0.0630	0.0067	0.0675	0.0544	0.0058	0.0583
3 Drum Strawline Pullers	Other Gen Indust Equipment	300	2	108	6	1296	0.51	500	1.6190	0.0506	0.8770	1.0491	0.0328	0.5683
60lk Puller	Other Gen Indust Equipment	525	1	108	3	324	0.51	500	2.8333	0.0885	1.5347	0.4590	0.0143	0.2486
Triple Conductor Tensioner	Other Gen Indust Equipment	350	1	108	2	216	0.51	500	1.8889	0.0590	1.0231	0.2040	0.0064	0.1105
Sag Cat w2 winches	Grader	350	2	108	2	432	0.61	500	2.2593	0.0706	1.2238	0.4880	0.0153	0.2643
D8 Cats	Grader	300	4	108	1	432	0.61	500	1.9365	0.0605	1.0489	0.4183	0.0131	0.2266
Backhoe	Tractor/loader/backhoe	350	2	54	8	864	0.55	500	2.0370	0.0637	1.1034	0.8800	0.0275	0.4767
Track Type Dozer	Grader	350	1	54	8	432	0.61	500	2.2593	0.0706	1.2238	0.4880	0.0153	0.2643
Drum Type Compactor	Paving Equipment	250	1	54	6	324	0.53	250	1.4313	0.0438	0.7595	0.2319	0.0071	0.1230
Excavator	Excavator	300	1	54	6	324	0.57	500	1.8095	0.0565	0.9802	0.2931	0.0092	0.1588

Offroad Emissions Calculations - Using Tier 2 Emission Factors

Tier 2 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 2 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
238.36	8.06	132.03

Segments 7 / 5 / 4A

18 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 32,638	Load Factor for Tier 2	HP Used for OFFROAD	TIER 2 NOX (lbs/hr)	TIER 2 PM (lbs/hr)	TIER 2 CO (lbs/hr)	TIER 2 NOX (tons)	TIER 2 PM (tons)	TIER 2 CO (tons)
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	468	5	4680	0.6	250	1.2963	0.0397	0.6878	3.0333	0.0929	1.6095
Road Grader	Grader	350	1	234	8	1872	0.61	500	2.2593	0.0706	1.2238	2.1147	0.0661	1.1454
Track Type Dozer	Grader	350	1	55	8	440	0.61	500	2.2593	0.0706	1.2238	0.4970	0.0155	0.2692
Drum Type Compactor	Paving Equipment	250	1	55	6	330	0.53	250	1.4313	0.0438	0.7595	0.2362	0.0072	0.1253
Excavator	Excavator	300	1	55	8	440	0.57	500	1.8095	0.0565	0.9802	0.3981	0.0124	0.2156
Backhoe	Tractor/loader/backhoe	350	1	468	8	3744	0.55	500	2.0370	0.0637	1.1034	3.8133	0.1192	2.0656
30 Ton Crane Truck	Off-highway Truck	300	2	55	5	550	0.57	500	1.8095	0.0565	0.9802	0.4976	0.0156	0.2695
Backhoe	Tractor/loader/backhoe	200	2	55	8	880	0.55	250	1.1883	0.0364	0.6305	0.5228	0.0160	0.2774
Pressure Diggers	Bore/Drill Rigs	500	2	55	8	880	0.75	500	3.9683	0.1240	2.1495	1.7460	0.0546	0.9458
Rock Drill	Bore/Drill Rigs	200	2	55	6	660	0.75	250	1.6204	0.0496	0.8598	0.5347	0.0164	0.2837
30 Ton Crane Truck	Off-highway Truck	300	2	109	6	1308	0.57	500	1.8095	0.0565	0.9802	1.1834	0.0370	0.6410
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	109	6	1308	0.6	250	1.2963	0.0397	0.6878	0.8478	0.0260	0.4498
80 Ton Rough Terrain Cranes	Off-highway Truck	400	2	109	6	1308	0.57	500	2.4127	0.0754	1.3069	1.5779	0.0493	0.8547
30 Ton Crane Truck	Off-highway Truck	300	2	109	8	1744	0.57	500	1.8095	0.0565	0.9802	1.5779	0.0493	0.8547
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	109	5	1090	0.6	250	1.2963	0.0397	0.6878	0.7065	0.0216	0.3749
Compressor Truck	Off-highway Truck	350	2	109	8	1744	0.57	500	2.1111	0.0660	1.1435	1.8409	0.0575	0.9971
Compressor Truck	Off-highway Truck	350	2	109	8	1744	0.57	500	2.1111	0.0660	1.1435	1.8409	0.0575	0.9971
180 Ton Rough Terrain Crane	Off-highway Truck	500	2	109	8	1744	0.57	500	3.0159	0.0942	1.6336	2.6298	0.0822	1.4245
Sleeving Rigs	Bore/Drill Rigs	350	2	88	4	704	0.75	500	2.7778	0.0868	1.5046	0.9778	0.0306	0.5296
Hydraulic Pump Motor	Pumps	10	2	10	5	100	0.74	15	0.0914	0.0098	0.0979	0.0046	0.0005	0.0049
580 Case Backhoe	Tractor/loader/backhoe	120	1	88	2	176	0.55	250	0.7130	0.0320	0.5384	0.0627	0.0028	0.0474
Spacing Carts	Other Gen Indust Equipment	10	4	88	4	1408	0.51	15	0.0630	0.0067	0.0675	0.0443	0.0047	0.0475
3 Drum Strawline Pullers	Other Gen Indust Equipment	300	2	88	6	1056	0.51	500	1.6190	0.0506	0.8770	0.8549	0.0267	0.4630
60lk Puller	Other Gen Indust Equipment	525	1	88	3	264	0.51	500	2.8333	0.0885	1.5347	0.3740	0.0117	0.2026
Triple Conductor Tensioner	Other Gen Indust Equipment	350	1	88	2	176	0.51	500	1.8889	0.0590	1.0231	0.1662	0.0052	0.0900
Sag Cat w2 winches	Grader	350	2	88	2	352	0.61	500	2.2593	0.0706	1.2238	0.3976	0.0124	0.2154
D8 Cats	Grader	300	4	88	1	352	0.61	500	1.9365	0.0605	1.0489	0.3408	0.0107	0.1846
Backhoe	Tractor/loader/backhoe	350	2	44	8	704	0.55	500	2.0370	0.0637	1.1034	0.7170	0.0224	0.3884
Track Type Dozer	Grader	350	1	44	8	352	0.61	500	2.2593	0.0706	1.2238	0.3976	0.0124	0.2154
Drum Type Compactor	Paving Equipment	250	1	44	6	264	0.53	250	1.4313	0.0438	0.7595	0.1889	0.0058	0.1003
Excavator	Excavator	300	1	44	6	264	0.57	250	1.8095	0.0565	0.9802	0.2389	0.0075	0.1294

Offroad Emissions Calculations - Using Tier 2 Emission Factors

Tier 2 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 2 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
238.36	8.06	132.03

Suncrest Substation

24 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Load Factor for Tier 2	HP Used for OFFROAD	TIER 2 NOX (lb/hr)	TIER 2 PM (lb/hr)	TIER 2 CO (lb/hr)	NOX (tons)	PM (tons)	CO (tons)
						104,404								
980 Loader	Tractor/loader/backhoe	350	3	312	10	9360	0.55	500	2.0370	0.0637	1.1034	9.5333	0.2979	5.1639
Backhoe	Tractor/loader/backhoe	85	4	624	10	24960	0.55	120	0.5772	0.0309	0.3813	7.2030	0.3859	4.7591
Excavator	Excavator	300	3	312	10	9360	0.57	500	1.8095	0.0565	0.9802	8.4686	0.2646	4.5871
Grader	Grader	350	2	312	10	6240	0.61	500	2.2593	0.0706	1.2238	7.0489	0.2203	3.8181
Rock Drill	Bore/Drill Rigs	210	1	312	10	3120	0.75	250	1.7014	0.0521	0.9028	2.6542	0.0813	1.4083
Vibratory Compactor	Paving Equipment	80	2	312	10	6240	0.53	120	0.5235	0.0280	0.3459	1.6332	0.0875	1.0791
Compressor	Air Compressor	80	2	312	10	6240	0.48	120	0.4741	0.0254	0.3132	1.4791	0.0792	0.9773
Dirt Pan	Graders?	425	3	312	10	9360	0.61	500	2.7434	0.0857	1.4860	12.8390	0.4012	6.9545
Foundation Drill Rig	Bore/Drill Rigs	305	2	234	10	4680	0.75	500	2.4206	0.0756	1.3112	5.6643	0.1770	3.0682
30 Ton Crane Truck	Off-highway Truck	300	1	234	4	936	0.57	500	1.8095	0.0565	0.9802	0.8469	0.0265	0.4587
Caterpillar (D9 or larger)	Grader	338	1	234	2	468	0.61	500	2.1818	0.0682	1.1818	0.5105	0.0160	0.2765
Tractors	Tractor/loader/backhoe	85	1	234	4	936	0.55	120	0.5772	0.0309	0.3813	0.2701	0.0145	0.1785
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	350	2	234	6	2808	0.6	500	2.2222	0.0694	1.2037	3.1200	0.0975	1.6900
Vibratory Compactor	Paving Equipment	80	1	234	2	468	0.53	120	0.5235	0.0280	0.3459	0.1225	0.0066	0.0809
Excavator	Excavator	300	1	234	8	1872	0.57	500	1.8095	0.0565	0.9802	1.6937	0.0529	0.9174
Backhoe	Tractor/loader/backhoe	85	3	234	8	5616	0.55	120	0.5772	0.0309	0.3813	1.6207	0.0868	1.0708
Trencher	Trencher	75	1	234	2	468	0.75	120	0.6944	0.0372	0.4588	0.1625	0.0087	0.1074
Manlifts	Aerial Lift	75	2	156	10	3120	0.46	120	0.4259	0.0228	0.2814	0.6644	0.0356	0.4390
30 Ton Crane Truck	Off-highway Truck	300	1	156	2	312	0.57	500	1.8095	0.0565	0.9802	0.2823	0.0088	0.1529
100 Ton Crane	Off-highway Truck	500	1	10	4	40	0.57	500	3.0159	0.0942	1.6336	0.0603	0.0019	0.0327
Forklift	Forklift	75	2	156	6	1872	0.3	120	0.2778	0.0149	0.1835	0.2600	0.0139	0.1718
Carryall Vehicles	Off-highway Truck?	180	2	156	4	1248	0.57	250	1.1083	0.0339	0.5881	0.6916	0.0212	0.3670
Generator	Generator Sets	30	3	156	10	4680	0.74	50	0.2741	0.0220	0.2007	0.6413	0.0515	0.4695

Alpine U/G, Segment 6

24 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Load Factor for Tier 2	HP Used for OFFROAD	TIER 2 NOX (lbs/hr)	TIER 2 PM (lbs/hr)	TIER 2 CO (lbs/hr)	TIER 2 NOX (tons)	TIER 2 PM (tons)	TIER 2 CO (tons)
						59,088								
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	624	3	3744	0.6	250	1.2963	0.0397	0.6878	2.4267	0.0743	1.2876
Floor Saw	Concrete/Industrial Saws	45	2	390	5	3900	0.73	50	0.4056	0.0326	0.2969	0.7908	0.0635	0.5790
Backhoe	Tractor/loader/backhoe	85	4	390	10	15600	0.55	120	0.5772	0.0309	0.3813	4.5019	0.2412	2.9744
Hoe / Ram (Backhoe)	Tractor/loader/backhoe	85	1	390	10	3900	0.55	120	0.5772	0.0309	0.3813	1.1255	0.0603	0.7436
Hoe / Ram (Excavator)	Excavator	300	1	390	10	3900	0.57	500	1.8095	0.0565	0.9802	3.5286	0.1103	1.9113
Excavator	Excavator	300	3	390	10	11700	0.57	500	1.8095	0.0565	0.9802	10.5857	0.3308	5.7339
Rock Drill	Bore/Drill Rigs	210	1	390	2	780	0.75	250	1.7014	0.0521	0.9028	0.6635	0.0203	0.3521
Vibratory Compactor	Paving Equipment	80	2	390	2	1560	0.53	120	0.5235	0.0280	0.3459	0.4083	0.0219	0.2698
Compressor	Air Compressor	80	1	390	2	780	0.48	120	0.4741	0.0254	0.3132	0.1849	0.0099	0.1222
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	350	1	390	2	780	0.6	500	2.2222	0.0694	1.2037	0.8667	0.0271	0.4694
Tractor Sweeper	Tractor/loader/backhoe	80	2	390	10	7800	0.55	120	0.5432	0.0291	0.3589	2.1185	0.1135	1.3997
U/G Puller	Other Construction Equipment	300	1	234	10	2340	0.51	500	1.6190	0.0506	0.8770	1.8943	0.0592	1.0261
Generator	Generator Sets	30	3	234	2	1404	0.74	50	0.2741	0.0220	0.2007	0.1924	0.0155	0.1409
Backhoe	Tractor/loader/backhoe	350	2	60	5	600	0.55	500	2.0370	0.0637	1.1034	0.6111	0.0191	0.3310
Asphalt Roller	Rollers	110	1	60	5	300	0.56	120	0.6654	0.0299	0.5025	0.0998	0.0045	0.0754

Offroad Emissions Calculations - Using Tier 2 Emission Factors

Tier 2 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 2 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
238.36	8.06	132.03

Reconduct 69kV, TL - 639

4 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 2,836	Load Factor for Tier 2	HP Used for OFFROAD	TIER 2 NOX (lbs/hr)	TIER 2 PM (lbs/hr)	TIER 2 CO (lbs/hr)	TIER 2 NOX (tons)	TIER 2 PM (tons)	TIER 2 CO (tons)
Road Grader	Grader	350	1	16	8	128	0.61	500	2.2593	0.0706	1.2238	0.1446	0.0045	0.0783
Track Type Dozer	Grader	350	1	16	8	128	0.61	500	2.2593	0.0706	1.2238	0.1446	0.0045	0.0783
Digger Derrick Trucks	Bore/Drill Rigs	350	2	5	8	80	0.75	500	2.7778	0.0868	1.5046	0.1111	0.0035	0.0602
Digger Derrick Trucks	Bore/Drill Rigs	350	2	60	8	960	0.75	500	2.7778	0.0868	1.5046	1.3333	0.0417	0.7222
Hydraulic Pump Motor	Pumps	10	1	20	3	60	0.74	15	0.0914	0.0098	0.0979	0.0027	0.0003	0.0029
Single Reel Pullers / Tensioner	Off-highway Truck	300	1	120	6	720	0.57	500	1.8095	0.0565	0.9802	0.6514	0.0204	0.3529
Hydraulic Wind Up Reel Puller	Off-highway Truck	525	1	120	6	720	0.57	500	3.1667	0.0990	1.7153	1.1400	0.0356	0.6175
Track Type Dozer	Grader	350	1	5	8	40	0.61	500	2.2593	0.0706	1.2238	0.0452	0.0014	0.0245

Reconduct 69kV, TL - 6915

2 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 804	Load Factor for Tier 2	HP Used for OFFROAD	TIER 2 NOX (lbs/hr)	TIER 2 PM (lbs/hr)	TIER 2 CO (lbs/hr)	TIER 2 NOX (tons)	TIER 2 PM (tons)	TIER 2 CO (tons)
Road Grader	Grader	350	1	4	8	32	0.61	500	2.2593	0.0706	1.2238	0.0361	0.0011	0.0196
Track Type Dozer	Grader	350	1	4	8	32	0.61	500	2.2593	0.0706	1.2238	0.0361	0.0011	0.0196
Digger Derrick Trucks	Bore/Drill Rigs	350	2	5	8	80	0.75	500	2.7778	0.0868	1.5046	0.1111	0.0035	0.0602
Digger Derrick Trucks	Bore/Drill Rigs	350	2	16	8	256	0.75	500	2.7778	0.0868	1.5046	0.3556	0.0111	0.1926
Hydraulic Pump Motor	Pumps	10	2	2	3	12	0.74	15	0.0914	0.0098	0.0979	0.0005	0.0001	0.0006
Single Reel Pullers / Tensioner	Off-highway Truck	300	1	32	6	192	0.57	500	1.8095	0.0565	0.9802	0.1737	0.0054	0.0941
Hydraulic Wind Up Reel Puller	Off-highway Truck	525	1	32	6	192	0.57	500	3.1667	0.0990	1.7153	0.3040	0.0095	0.1647
Track Type Dozer	Grader	350	1	1	8	8	0.61	500	2.2593	0.0706	1.2238	0.0090	0.0003	0.0049

Offroad Emissions Calculations - Using Tier 2 Emission Factors

Tier 2 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 2 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
238.36	8.06	132.03

Reconduct 69kV, TL - 6924

2 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Load Factor for Tier 2	HP Used for OFFROAD	TIER 2 NOX (lbs/hr)	TIER 2 PM (lbs/hr)	TIER 2 CO (lbs/hr)
Road Grader	Grader	350	1	4	8	32	0.61	500	2.2593	0.0706	1.2238
Track Type Dozer	Grader	350	1	4	8	32	0.61	500	2.2593	0.0706	1.2238
Digger Derrick Trucks	Bore/Drill Rigs	350	2	5	8	80	0.75	500	2.7778	0.0868	1.5046
Digger Derrick Trucks	Bore/Drill Rigs	350	2	20	8	320	0.75	500	2.7778	0.0868	1.5046
Hydraulic Pump Motor	Pumps	10	2	2	3	12	0.74	15	0.0914	0.0098	0.0979
Single Reel Pullers / Tensioner	Off-highway Truck	300	1	32	6	192	0.57	500	1.8095	0.0565	0.9802
Hydraulic Wind Up Reel Puller	Off-highway Truck	525	1	32	6	192	0.57	500	3.1667	0.0990	1.7153
Track Type Dozer	Grader	350	1	1	8	8	0.61	500	2.2593	0.0706	1.2238

TIER 2 NOX (tons)	TIER 2 PM (tons)	TIER 2 CO (tons)
0.0361	0.0011	0.0196
0.0361	0.0011	0.0196
0.1111	0.0035	0.0602
0.4444	0.0139	0.2407
0.0005	0.0001	0.0006
0.1737	0.0054	0.0941
0.3040	0.0095	0.1647
0.0090	0.0003	0.0049

Reconduct 69kV, TL - 6916

4 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Load Factor for Tier 2	HP Used for OFFROAD	TIER 2 NOX (lb/hr)	TIER 2 PM (lb/hr)	TIER 2 CO (lb/hr)
Road Grader	Grader	350	1	14	8	112	0.61	500	2.2593	0.0706	1.2238
Track Type Dozer	Grader	350	1	14	8	112	0.61	500	2.2593	0.0706	1.2238
Digger Derrick Trucks	Bore/Drill Rigs	350	2	5	8	80	0.75	500	2.7778	0.0868	1.5046
Digger Derrick Trucks	Bore/Drill Rigs	350	2	52	8	832	0.75	500	2.7778	0.0868	1.5046
Hydraulic Pump Motor	Pumps	10	2	10	3	60	0.74	15	0.0914	0.0098	0.0979
Single Reel Pullers / Tensioner	Off-highway Truck	300	1	104	6	624	0.57	500	1.8095	0.0565	0.9802
Hydraulic Wind Up Reel Puller	Off-highway Truck	525	1	104	6	624	0.57	500	3.1667	0.0990	1.7153
Track Type Dozer	Grader	350	1	5	8	40	0.61	500	2.2593	0.0706	1.2238

NOX (tons)	PM (tons)	CO (tons)
0.1265	0.0040	0.0685
0.1265	0.0040	0.0685
0.1111	0.0035	0.0602
1.1556	0.0361	0.6259
0.0027	0.0003	0.0029
0.5646	0.0176	0.3058
0.9880	0.0309	0.5352
0.0452	0.0014	0.0245

San Luis Rey Substation

40 days

Upgrade

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Load Factor for Tier 2	HP Used for OFFROAD	TIER 2 NOX (lbs/hr)	TIER 2 PM (lbs/hr)	TIER 2 CO (lbs/hr)
Front Loader	Tractor/loader/backhoe	200	1	20	8	160	0.55	250	1.1883	0.0364	0.6305
30 Ton Crane Truck	Off-highway Truck	220	1	42	8	336	0.57	250	1.3546	0.0415	0.7188
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	180	1	40	4	160	0.6	250	1.1667	0.0357	0.6190
Vibratory Compactor	Paving Equipment	80	1	40	2	80	0.53	120	0.5235	0.0280	0.3459
Backhoe	Tractor/loader/backhoe	85	1	10	8	80	0.55	120	0.5772	0.0309	0.3813
Trencher	Trencher	75	1	20	8	160	0.75	120	0.6944	0.0372	0.4588
Manlifts	Aerial Lift	75	2	40	8	640	0.46	120	0.4259	0.0228	0.2814
Generator	Generator Sets	30	3	40	8	960	0.74	50	0.2741	0.0220	0.2007

TIER 2 NOX (tons)	TIER 2 PM (tons)	TIER 2 CO (tons)
0.0951	0.0029	0.0504
0.2276	0.0070	0.1208
0.0933	0.0029	0.0495
0.0209	0.0011	0.0138
0.0231	0.0012	0.0153
0.0556	0.0030	0.0367
0.1363	0.0073	0.0901
0.1316	0.0106	0.0963

Offroad Emissions Calculations - Using Tier 2 Emission Factors

Tier 2 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 2 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
238.36	8.06	132.03

Sycamore Canyon Sub

Upgrade

10 Days

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Load Factor for Tier 2	HP Used for OFFROAD	TIER 2 NOX (lbs/hr)	TIER 2 PM (lbs/hr)	TIER 2 CO (lbs/hr)
Front Loader	Tractor/loader/backhoe	200	1	5	8	40	0.55	250	1.1883	0.0364	0.6305
30 Ton Crane Truck	Off-highway Truck	220	1	10	8	80	0.57	250	1.3546	0.0415	0.7188
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	180	1	10	4	40	0.6	250	1.1667	0.0357	0.6190
Vibratory Compactor	Paving Equipment	80	1	10	2	20	0.53	120	0.5235	0.0280	0.3459
Backhoe	Tractor/loader/backhoe	85	1	5	8	40	0.55	120	0.5772	0.0309	0.3813
Trencher	Trencher	75	1	5	8	40	0.75	120	0.6944	0.0372	0.4588
Manlifts	Aerial Lift	75	2	10	8	160	0.46	120	0.4259	0.0228	0.2814
Generator	Generator Sets	30	3	20	8	480	0.74	50	0.2741	0.0220	0.2007

TIER 2 NOX (tons)	TIER 2 PM (tons)	TIER 2 CO (tons)
0.0238	0.0007	0.0126
0.0542	0.0017	0.0288
0.0233	0.0007	0.0124
0.0052	0.0003	0.0035
0.0115	0.0006	0.0076
0.0139	0.0007	0.0092
0.0341	0.0018	0.0225
0.0658	0.0053	0.0482

Encina Substation

Upgrade

10 Days

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Load Factor for Tier 2	HP Used for OFFROAD	TIER 2 NOX (lbs/hr)	TIER 2 PM (lbs/hr)	TIER 2 CO (lbs/hr)
Front Loader	Tractor/loader/backhoe	200	1	10	4	40	0.55	250	1.1883	0.0364	0.6305
30 Ton Crane Truck	Off-highway Truck	220	1	10	4	40	0.57	250	1.3546	0.0415	0.7188
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	180	1	10	4	40	0.6	250	1.1667	0.0357	0.6190
Vibratory Compactor	Paving Equipment	80	1	5	2	10	0.53	120	0.5235	0.0280	0.3459
Backhoe	Tractor/loader/backhoe	85	1	10	8	80	0.55	120	0.5772	0.0309	0.3813
Trencher	Trencher	75	1	8	5	40	0.75	120	0.6944	0.0372	0.4588
Manlifts	Aerial Lift	75	2	20	8	320	0.46	120	0.4259	0.0228	0.2814
Generator	Generator Sets	30	3	20	8	480	0.74	50	0.2741	0.0220	0.2007

TIER 2 NOX (tons)	TIER 2 PM (tons)	TIER 2 CO (tons)
0.0238	0.0007	0.0126
0.0271	0.0008	0.0144
0.0233	0.0007	0.0124
0.0026	0.0001	0.0017
0.0231	0.0012	0.0153
0.0139	0.0007	0.0092
0.0681	0.0037	0.0450
0.0658	0.0053	0.0482

South Bay Substation

Upgrade

20 Days

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Load Factor for Tier 2	HP Used for OFFROAD	TIER 2 NOX (lbs/hr)	TIER 2 PM (lbs/hr)	TIER 2 CO (lbs/hr)
Front Loader	Tractor/loader/backhoe	200	1	10	4	40	0.55	250	1.1883	0.0364	0.6305
30 Ton Crane Truck	Off-highway Truck	220	1	10	4	40	0.57	250	1.3546	0.0415	0.7188
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	180	1	10	4	40	0.6	250	1.1667	0.0357	0.6190
Vibratory Compactor	Paving Equipment	80	1	5	2	10	0.53	120	0.5235	0.0280	0.3459
Backhoe	Tractor/loader/backhoe	85	1	10	8	80	0.55	120	0.5772	0.0309	0.3813
Trencher	Trencher	75	1	8	5	40	0.75	120	0.6944	0.0372	0.4588
Generator	Generator Sets	30	3	20	8	480	0.74	50	0.2741	0.0220	0.2007

TIER 2 NOX (tons)	TIER 2 PM (tons)	TIER 2 CO (tons)
0.0238	0.0007	0.0126
0.0271	0.0008	0.0144
0.0233	0.0007	0.0124
0.0026	0.0001	0.0017
0.0231	0.0012	0.0153
0.0139	0.0007	0.0092
0.0681	0.0037	0.0450
0.0658	0.0053	0.0482

Offroad Emissions Calculations - Using Tier 2 Emission Factors

Tier 2 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 2 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
238.36	8.06	132.03

IV Substation

Upgrade

40 Days

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 2,560	Load Factor for Tier 2	HP Used for OFFROAD	TIER 2 NOX (lbs/hr)	TIER 2 PM (lbs/hr)	TIER 2 CO (lbs/hr)	TIER 2 NOX (tons)	TIER 2 PM (tons)	TIER 2 CO (tons)
Front Loader	Tractor/loader/backhoe	200	1	40	2	80	0.55	250	1.1883	0.0364	0.6305	0.0475	0.0015	0.0252
30 Ton Crane Truck	Off-highway Truck	220	1	40	8	320	0.57	250	1.3546	0.0415	0.7188	0.2167	0.0066	0.1150
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	180	1	40	4	160	0.6	250	1.1667	0.0357	0.6190	0.0933	0.0029	0.0495
Vibratory Compactor	Paving Equipment	80	1	40	2	80	0.53	120	0.5235	0.0280	0.3459	0.0209	0.0011	0.0138
Backhoe	Tractor/loader/backhoe	85	1	60	8	480	0.55	120	0.5772	0.0309	0.3813	0.1385	0.0074	0.0915
Trencher	Trencher	75	5	20	8	800	0.75	120	0.6944	0.0372	0.4588	0.2778	0.0149	0.1835
Digger Derrick Trucks	Bore/Drill Rigs	350	2	20	4	160	0.75	500	2.7778	0.0868	1.5046	0.2222	0.0069	0.1204
Generator	Generator Sets	30	3	20	8	480	0.74	30	0.2741	0.0220	0.2007	0.0658	0.0053	0.0482

Offroad Emissions Calculations - Using Tier 3 Emission Factors

Tier 3 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 3 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
149.37	8.06	132.03

Segments 8A / 8B / 8C / 8D / 8E / 9A
18 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Load Factor for TIER 3	HP Used for OFFROAD	TIER 3 NOX	TIER 3 PM	TIER 3 CO	TIER 3 NOX (tons)	TIER 3 PM (tons)	TIER 3 CO (tons)
									(lbs/hr)	(lbs/hr)	(lbs/hr)			
						41,936								
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	468	5	4680	0.6	500	0.7937	0.0397	0.6878	1.8571	0.0929	1.6095
Road Grader	Grader	350	2	234	8	3744	0.61	500	1.4120	0.0706	1.2238	2.6433	0.1322	2.2909
Track Type Dozer	Grader	350	1	70	8	560	0.61	500	1.4120	0.0706	1.2238	0.3954	0.0198	0.3427
Drum Type Compactor	Paving Equipment	250	1	70	6	420	0.53	250	0.8763	0.0438	0.7595	0.1840	0.0092	0.1595
Excavator	Excavator	300	1	70	8	560	0.57	500	1.1310	0.0565	0.9802	0.3167	0.0158	0.2744
Backhoe	Tractor/loader/backhoe	350	1	468	8	3744	0.55	500	1.2731	0.0637	1.1034	2.3833	0.1192	2.0656
Backhoe	Tractor/loader/backhoe	200	2	140	8	2240	0.55	250	0.7275	0.0364	0.6305	0.8148	0.0407	0.7062
Pressure Diggers	Bore/Drill Rigs	500	2	140	8	2240	0.75	500	2.4802	0.1240	2.1495	2.7778	0.1389	2.4074
Rock Drill	Bore/Drill Rig	200	2	140	6	1680	0.75	250	0.9921	0.0496	0.8598	0.8333	0.0417	0.7222
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	140	6	1680	0.6	250	0.7937	0.0397	0.6878	0.6667	0.0333	0.5778
80 Ton Rough Terrain Cranes	Off-highway Truck	400	2	140	6	1680	0.57	500	1.5079	0.0754	1.3069	1.2667	0.0633	1.0978
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	140	5	1400	0.6	250	0.7937	0.0397	0.6878	0.5556	0.0278	0.4815
Compressor Truck	Off-highway Truck	350	2	140	8	2240	0.57	500	1.3194	0.0660	1.1435	1.4778	0.0739	1.2807
Compressor Truck	Off-highway Truck	350	2	140	8	2240	0.57	500	1.3194	0.0660	1.1435	1.4778	0.0739	1.2807
180 Ton Rough Terrain Crane	Off-highway Truck	500	2	140	8	2240	0.57	500	1.8849	0.0942	1.6336	2.1111	0.1056	1.8296
Sleeving Rigs	Bore/Drill Rigs	350	2	152	4	1216	0.75	500	1.7361	0.0868	1.5046	1.0556	0.0528	0.9148
Hydraulic Pump Motor	Pumps	10	2	10	5	100	0.74	15	0.0914	0.0098	0.0979	0.0046	0.0005	0.0049
580 Case Backhoe	Tractor/loader/backhoe	120	1	152	2	304	0.55	120	0.4365	0.0320	0.5384	0.0663	0.0049	0.0818
Spacing Carts	Other Gen Indust Equipment	10	4	152	4	2432	0.51	15	0.0630	0.0067	0.0675	0.0766	0.0082	0.0820
3 Drum Strawline Pullers	Other Gen Indust Equipment	300	2	152	6	1824	0.51	500	1.0119	0.0506	0.8770	0.9229	0.0461	0.7998
60lk Puller	Other Gen Indust Equipment	525	1	152	3	456	0.51	500	1.7708	0.0885	1.5347	0.4038	0.0202	0.3499
Triple Conductor Tensioner	Other Gen Indust Equipment	350	1	152	2	304	0.51	500	1.1806	0.0590	1.0231	0.1794	0.0090	0.1555
Sag Cat w2 winches	Grader	350	2	152	2	608	0.61	500	1.4120	0.0706	1.2238	0.4293	0.0215	0.3720
D8 Cats	Grader	300	4	152	1	608	0.61	500	1.2103	0.0605	1.0489	0.3679	0.0184	0.3189
Backhoe	Tractor/loader/backhoe	350	2	76	8	1216	0.55	500	1.2731	0.0637	1.1034	0.7741	0.0387	0.6709
Track Type Dozer	Grader	350	1	76	8	608	0.61	500	1.4120	0.0706	1.2238	0.4293	0.0215	0.3720
Drum Type Compactor	Paving Equipment	250	1	76	6	456	0.53	250	0.8763	0.0438	0.7595	0.1998	0.0100	0.1732
Excavator	Excavator	300	1	76	6	456	0.57	500	1.1310	0.0565	0.9802	0.2579	0.0129	0.2235

Offroad Emissions Calculations - Using Tier 3 Emission Factors

Tier 3 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 3 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
149.37	8.06	132.03

Segments 9B / 9C

18 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 33,322	Load Factor for TIER 3	HP Used for OFFROAD	TIER 3 NOX (lbs/hr)	TIER 3 PM (lbs/hr)	TIER 3 CO (lbs/hr)	TIER 3 NOX (tons)	TIER 3 PM (tons)	TIER 3 CO (tons)
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	468	5	4680	0.6	250	0.7937	0.0397	0.6878	1.8571	0.0929	1.6095
Road Grader	Grader	350	2	108	8	1728	0.61	500	1.4120	0.0706	1.2238	1.2200	0.0610	1.0573
Track Type Dozer	Grader	350	1	57	8	456	0.61	500	1.4120	0.0706	1.2238	0.3219	0.0161	0.2790
Drum Type Compactor	Paving Equipment	250	1	57	6	342	0.53	250	0.8763	0.0438	0.7595	0.1499	0.0075	0.1299
Excavator	Excavator	300	1	57	8	456	0.57	500	1.1310	0.0565	0.9802	0.2579	0.0129	0.2235
Backhoe	Tractor/loader/backhoe	350	1	468	8	3744	0.55	500	1.2731	0.0637	1.1034	2.3833	0.1192	2.0656
Backhoe	Tractor/loader/backhoe	200	2	114	8	1824	0.55	250	0.7275	0.0364	0.6305	0.6635	0.0332	0.5750
Pressure Diggers	Bore/Drill Rigs	500	2	114	8	1824	0.75	500	2.4802	0.1240	2.1495	2.2619	0.1131	1.9603
Rock Drill	Bore/Drill Rigs	200	2	114	6	1368	0.75	250	0.9921	0.0496	0.8598	0.6786	0.0339	0.5881
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	114	6	1368	0.6	250	0.7937	0.0397	0.6878	0.5429	0.0271	0.4705
80 Ton Rough Terrain Cranes	Off-highway Truck	400	2	114	6	1368	0.57	500	1.5079	0.0754	1.3069	1.0314	0.0516	0.8939
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	114	5	1140	0.6	250	0.7937	0.0397	0.6878	0.4524	0.0226	0.3921
Compressor Truck	Off-highway Truck	350	2	114	8	1824	0.57	500	1.3194	0.0660	1.1435	1.2033	0.0602	1.0429
Compressor Truck	Off-highway Truck	350	2	114	8	1824	0.57	500	1.3194	0.0660	1.1435	1.2033	0.0602	1.0429
180 Ton Rough Terrain Crane	Off-highway Truck	500	2	114	8	1824	0.57	500	1.8849	0.0942	1.6336	1.7190	0.0860	1.4898
Sleeving Rigs	Bore/Drill Rigs	350	2	108	4	864	0.75	500	1.7361	0.0868	1.5046	0.7500	0.0375	0.6500
Hydraulic Pump Motor	Pumps	10	2	10	5	100	0.74	15	0.0914	0.0098	0.0979	0.0046	0.0005	0.0049
580 Case Backhoe	Tractor/loader/backhoe	120	1	108	2	216	0.55	120	0.4365	0.0320	0.5384	0.0471	0.0035	0.0581
Spacing Carts	Other Gen Indust Equipment	10	4	108	4	1728	0.51	15	0.0630	0.0067	0.0675	0.0544	0.0058	0.0583
3 Drum Strawline Pullers	Other Gen Indust Equipment	300	2	108	6	1296	0.51	500	1.0119	0.0506	0.8770	0.6557	0.0328	0.5683
60lk Puller	Other Gen Indust Equipment	525	1	108	3	324	0.51	500	1.7708	0.0885	1.5347	0.2869	0.0143	0.2486
Triple Conductor Tensioner	Other Gen Indust Equipment	350	1	108	2	216	0.51	500	1.1806	0.0590	1.0231	0.1275	0.0064	0.1105
Sag Cat w2 winches	Grader	350	2	108	2	432	0.61	500	1.4120	0.0706	1.2238	0.3050	0.0153	0.2643
D8 Cats	Grader	300	4	108	1	432	0.61	500	1.2103	0.0605	1.0489	0.2614	0.0131	0.2266
Backhoe	Tractor/loader/backhoe	350	2	54	8	864	0.55	500	1.2731	0.0637	1.1034	0.5500	0.0275	0.4767
Track Type Dozer	Grader	350	1	54	8	432	0.61	500	1.4120	0.0706	1.2238	0.3050	0.0153	0.2643
Drum Type Compactor	Paving Equipment	250	1	54	6	324	0.53	250	0.8763	0.0438	0.7595	0.1420	0.0071	0.1230
Excavator	Excavator	300	1	54	6	324	0.57	500	1.1310	0.0565	0.9802	0.1832	0.0092	0.1588

Offroad Emissions Calculations - Using Tier 3 Emission Factors

Tier 3 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 3 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
149.37	8.06	132.03

Segments 10A / 10B

18 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 29,794	Load Factor for TIER 3	HP Used for OFFROAD	TIER 3 NOX	TIER 3 PM	TIER 3 CO	TIER 3 NOX	TIER 3 PM	TIER 3 CO
									(lbs/hr)	(lbs/hr)	(lbs/hr)	(tons)	(tons)	(tons)
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	468	5	4680	0.6	250	0.7937	0.0397	0.6878	1.8571	0.0929	1.6095
Road Grader	Grader	350	2	108	8	1728	0.61	500	1.4120	0.0706	1.2238	1.2200	0.0610	1.0573
Track Type Dozer	Grader	350	1	57	8	456	0.61	500	1.4120	0.0706	1.2238	0.3219	0.0161	0.2790
Drum Type Compactor	Paving Equipment	250	1	57	6	342	0.53	250	0.8763	0.0438	0.7595	0.1499	0.0075	0.1299
Excavator	Excavator	300	1	57	8	456	0.57	500	1.1310	0.0565	0.9802	0.2579	0.0129	0.2235
Backhoe	Tractor/loader/backhoe	350	1	468	8	3744	0.55	500	1.2731	0.0637	1.1034	2.3833	0.1192	2.0656
Backhoe	Tractor/loader/backhoe	200	2	86	8	1376	0.55	250	0.7275	0.0364	0.6305	0.5005	0.0250	0.4338
Pressure Diggers	Bore/Drill Rigs	500	2	86	8	1376	0.75	500	2.4802	0.1240	2.1495	1.7063	0.0853	1.4788
Rock Drill	Bore/Drill Rigs	200	2	86	6	1032	0.75	250	0.9921	0.0496	0.8598	0.5119	0.0256	0.4437
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	86	6	1032	0.6	250	0.7937	0.0397	0.6878	0.4095	0.0205	0.3549
80 Ton Rough Terrain Cranes	Off-highway Truck	400	2	86	6	1032	0.57	500	1.5079	0.0754	1.3069	0.7781	0.0389	0.6743
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	86	5	860	0.6	250	0.7937	0.0397	0.6878	0.3413	0.0171	0.2958
Compressor Truck	Off-highway Truck	350	2	86	8	1376	0.57	500	1.3194	0.0660	1.1435	0.9078	0.0454	0.7867
Compressor Truck	Off-highway Truck	350	2	86	8	1376	0.57	500	1.3194	0.0660	1.1435	0.9078	0.0454	0.7867
180 Ton Rough Terrain Crane	Off-highway Truck	500	2	86	8	1376	0.57	500	1.8849	0.0942	1.6336	1.2968	0.0648	1.1239
Sleeving Rigs	Bore/Drill Rigs	350	2	108	4	864	0.75	500	1.7361	0.0868	1.5046	0.7500	0.0375	0.6500
Hydraulic Pump Motor	Pumps	10	2	10	5	100	0.74	15	0.0914	0.0098	0.0979	0.0046	0.0005	0.0049
580 Case Backhoe	Tractor/loader/backhoe	120	1	108	2	216	0.55	250	0.4365	0.0320	0.5384	0.0471	0.0035	0.0581
Spacing Carts	Other Gen Indust Equipment	10	4	108	4	1728	0.51	15	0.0630	0.0067	0.0675	0.0544	0.0058	0.0583
3 Drum Strawline Pullers	Other Gen Indust Equipment	300	2	108	6	1296	0.51	500	1.0119	0.0506	0.8770	0.6557	0.0328	0.5683
60lk Puller	Other Gen Indust Equipment	525	1	108	3	324	0.51	500	1.7708	0.0885	1.5347	0.2869	0.0143	0.2486
Triple Conductor Tensioner	Other Gen Indust Equipment	350	1	108	2	216	0.51	500	1.1806	0.0590	1.0231	0.1275	0.0064	0.1105
Sag Cat w2 winches	Grader	350	2	108	2	432	0.61	500	1.4120	0.0706	1.2238	0.3050	0.0153	0.2643
D8 Cats	Grader	300	4	108	1	432	0.61	500	1.2103	0.0605	1.0489	0.2614	0.0131	0.2266
Backhoe	Tractor/loader/backhoe	350	2	54	8	864	0.55	500	1.2731	0.0637	1.1034	0.5500	0.0275	0.4767
Track Type Dozer	Grader	350	1	54	8	432	0.61	500	1.4120	0.0706	1.2238	0.3050	0.0153	0.2643
Drum Type Compactor	Paving Equipment	250	1	54	6	324	0.53	250	0.8763	0.0438	0.7595	0.1420	0.0071	0.1230
Excavator	Excavator	300	1	54	6	324	0.57	500	1.1310	0.0565	0.9802	0.1832	0.0092	0.1588

Offroad Emissions Calculations - Using Tier 3 Emission Factors

Tier 3 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 3 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
149.37	8.06	132.03

Segments 7 / 5 / 4A
18 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 32,638	Load Factor for TIER 3	HP Used for OFFROAD	TIER 3 NOX (lbs/hr)	TIER 3 PM (lbs/hr)	TIER 3 CO (lbs/hr)	TIER 3 NOX (tons)	TIER 3 PM (tons)	TIER 3 CO (tons)
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	468	5	4680	0.6	250	0.7937	0.0397	0.6878	1.8571	0.0929	1.6095
Road Grader	Grader	350	1	234	8	1872	0.61	500	1.4120	0.0706	1.2238	1.3217	0.0661	1.1454
Track Type Dozer	Grader	350	1	55	8	440	0.61	500	1.4120	0.0706	1.2238	0.3106	0.0155	0.2692
Drum Type Compactor	Paving Equipment	250	1	55	6	330	0.53	250	0.8763	0.0438	0.7595	0.1446	0.0072	0.1253
Excavator	Excavator	300	1	55	8	440	0.57	500	1.1310	0.0565	0.9802	0.2488	0.0124	0.2156
Backhoe	Tractor/loader/backhoe	350	1	468	8	3744	0.55	500	1.2731	0.0637	1.1034	2.3833	0.1192	2.0656
30 Ton Crane Truck	Off-highway Truck	300	2	55	5	550	0.57	500	1.1310	0.0565	0.9802	0.3110	0.0156	0.2695
Backhoe	Tractor/loader/backhoe	200	2	55	8	880	0.55	250	0.7275	0.0364	0.6305	0.3201	0.0160	0.2774
Pressure Diggers	Bore/Drill Rigs	500	2	55	8	880	0.75	500	2.4802	0.1240	2.1495	1.0913	0.0546	0.9458
Rock Drill	Bore/Drill Rigs	200	2	55	6	660	0.75	250	0.9921	0.0496	0.8598	0.3274	0.0164	0.2837
30 Ton Crane Truck	Off-highway Truck	300	2	109	6	1308	0.57	500	1.1310	0.0565	0.9802	0.7396	0.0370	0.6410
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	109	6	1308	0.6	250	0.7937	0.0397	0.6878	0.5190	0.0260	0.4498
80 Ton Rough Terrain Cranes	Off-highway Truck	400	2	109	6	1308	0.57	500	1.5079	0.0754	1.3069	0.9862	0.0493	0.8547
30 Ton Crane Truck	Off-highway Truck	300	2	109	8	1744	0.57	500	1.1310	0.0565	0.9802	0.9862	0.0493	0.8547
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	109	5	1090	0.6	250	0.7937	0.0397	0.6878	0.4325	0.0216	0.3749
Compressor Truck	Off-highway Truck	350	2	109	8	1744	0.57	500	1.3194	0.0660	1.1435	1.1506	0.0575	0.9971
Compressor Truck	Off-highway Truck	350	2	109	8	1744	0.57	500	1.3194	0.0660	1.1435	1.1506	0.0575	0.9971
180 Ton Rough Terrain Crane	Off-highway Truck	500	2	109	8	1744	0.57	500	1.8849	0.0942	1.6336	1.6437	0.0822	1.4245
Sleeving Rigs	Bore/Drill Rigs	350	2	88	4	704	0.75	500	1.7361	0.0868	1.5046	0.6111	0.0306	0.5296
Hydraulic Pump Motor	Pumps	10	2	10	5	100	0.74	15	0.0914	0.0098	0.0979	0.0046	0.0005	0.0049
580 Case Backhoe	Tractor/loader/backhoe	120	1	88	2	176	0.55	250	0.4365	0.0320	0.5384	0.0384	0.0028	0.0474
Spacing Carts	Other Gen Indust Equipment	10	4	88	4	1408	0.51	15	0.0630	0.0067	0.0675	0.0443	0.0047	0.0475
3 Drum Strawline Pullers	Other Gen Indust Equipment	300	2	88	6	1056	0.51	500	1.0119	0.0506	0.8770	0.5343	0.0267	0.4630
60lk Puller	Other Gen Indust Equipment	525	1	88	3	264	0.51	500	1.7708	0.0885	1.5347	0.2338	0.0117	0.2026
Triple Conductor Tensioner	Other Gen Indust Equipment	350	1	88	2	176	0.51	500	1.1806	0.0590	1.0231	0.1039	0.0052	0.0900
Sag Cat w2 winches	Grader	350	2	88	2	352	0.61	500	1.4120	0.0706	1.2238	0.2485	0.0124	0.2154
D8 Cats	Grader	300	4	88	1	352	0.61	500	1.2103	0.0605	1.0489	0.2130	0.0107	0.1846
Backhoe	Tractor/loader/backhoe	350	2	44	8	704	0.55	500	1.2731	0.0637	1.1034	0.4481	0.0224	0.3884
Track Type Dozer	Grader	350	1	44	8	352	0.61	500	1.4120	0.0706	1.2238	0.2485	0.0124	0.2154
Drum Type Compactor	Paving Equipment	250	1	44	6	264	0.53	250	0.8763	0.0438	0.7595	0.1157	0.0058	0.1003
Excavator	Excavator	300	1	44	6	264	0.57	500	1.1310	0.0565	0.9802	0.1493	0.0075	0.1294

Offroad Emissions Calculations - Using Tier 3 Emission Factors

Tier 3 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 3 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
149.37	8.06	132.03

Suncrest Substation
24 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 104,404	Load Factor for TIER 3	HP Used for OFFROAD	TIER 3 NOX (lbs/hr)	TIER 3 PM (lbs/hr)	TIER 3 CO (lbs/hr)	TIER 3 NOX (tons)	TIER 3 PM (tons)	TIER 3 CO (tons)
980 Loader	Tractor/loader/backhoe	350	3	312	10	9360	0.55	500	1.2731	0.0637	1.1034	5.9583	0.2979	5.1639
Backhoe	Tractor/loader/backhoe	85	4	624	10	24960	0.55	120	0.3607	0.0309	0.3813	4.5019	0.3859	4.7591
Excavator	Excavator	300	3	312	10	9360	0.57	500	1.1310	0.0565	0.9802	5.2929	0.2646	4.5871
Grader	Grader	350	2	312	10	6240	0.61	500	1.4120	0.0706	1.2238	4.4056	0.2203	3.8181
Rock Drill	Bore/Drill Rigs	210	1	312	10	3120	0.75	250	1.0417	0.0521	0.9028	1.6250	0.0813	1.4083
Vibratory Compactor	Paving Equipment	80	2	312	10	6240	0.53	120	0.3272	0.0280	0.3459	1.0207	0.0875	1.0791
Compressor	Air Compressor	80	2	312	10	6240	0.48	120	0.2963	0.0254	0.3132	0.9244	0.0792	0.9773
Dirt Pan	Graders?	425	3	312	10	9360	0.61	500	1.7146	0.0857	1.4860	8.0244	0.4012	6.9545
Foundation Drill Rig	Bore/Drill Rigs	305	2	234	10	4680	0.75	500	1.5129	0.0756	1.3112	3.5402	0.1770	3.0682
30 Ton Crane Truck	Off-highway Truck	300	1	234	4	936	0.57	500	1.1310	0.0565	0.9802	0.5293	0.0265	0.4587
Caterpillar (D9 or larger)	Grader	338	1	234	2	468	0.61	500	1.3636	0.0682	1.1818	0.3191	0.0160	0.2765
Tractors	Tractor/loader/backhoe	85	1	234	4	936	0.55	120	0.3607	0.0309	0.3813	0.1688	0.0145	0.1785
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	350	2	234	6	2808	0.6	500	1.3889	0.0694	1.2037	1.9500	0.0975	1.6900
Vibratory Compactor	Paving Equipment	80	1	234	2	468	0.53	120	0.3272	0.0280	0.3459	0.0766	0.0066	0.0809
Excavator	Excavator	300	1	234	8	1872	0.57	500	1.1310	0.0565	0.9802	1.0586	0.0529	0.9174
Backhoe	Tractor/loader/backhoe	85	3	234	8	5616	0.55	120	0.3607	0.0309	0.3813	1.0129	0.0868	1.0708
Trencher	Trencher	75	1	234	2	468	0.75	120	0.4340	0.0372	0.4588	0.1016	0.0087	1.074
Manlifts	Aerial Lift	75	2	156	10	3120	0.46	120	0.2662	0.0228	0.2814	0.4153	0.0356	0.4390
30 Ton Crane Truck	Off-highway Truck	300	1	156	2	312	0.57	500	1.1310	0.0565	0.9802	0.1764	0.0088	0.1529
100 Ton Crane	Off-highway Truck	500	1	10	4	40	0.57	500	1.8849	0.0942	1.6336	0.0377	0.0019	0.0327
Forklift	Forklift	75	2	156	6	1872	0.3	120	0.1736	0.0149	0.1835	0.1625	0.0139	0.1718
Carryall Vehicles	Off-highway Truck?	180	2	156	4	1248	0.57	250	0.6786	0.0339	0.5881	0.4234	0.0212	0.3670
Generator	Generator Sets	30	3	156	10	4680	0.74	50	0.2741	0.0220	0.2007	0.6413	0.0515	0.4695

Alpine U/G, Segment 6
24 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 59,088	Load Factor for TIER 3	HP Used for OFFROAD	TIER 3 NOX (lbs/hr)	TIER 3 PM (lbs/hr)	TIER 3 CO (lbs/hr)	TIER 3 NOX (tons)	TIER 3 PM (tons)	TIER 3 CO (tons)
10,000 lb Rough Terrain Fork Lift	Rough Terrain Forklift	200	2	624	3	3744	0.6	250	0.7937	0.0397	0.6878	1.4857	0.0743	1.2876
Floor Saw	Concrete/Industrial Saws	45	2	390	5	3900	0.73	50	0.4056	0.0326	0.2969	0.7908	0.0635	0.5790
Backhoe	Tractor/loader/backhoe	85	4	390	10	15600	0.55	120	0.3607	0.0309	0.3813	2.8137	0.2412	2.9744
Hoe / Ram (Backhoe)	Tractor/loader/backhoe	85	1	390	10	3900	0.55	120	0.3607	0.0309	0.3813	0.7034	0.0603	0.7436
Hoe / Ram (Excavator)	Excavator	300	1	390	10	3900	0.57	500	1.1310	0.0565	0.9802	2.2054	0.1103	1.9113
Excavator	Excavator	300	3	390	10	11700	0.57	500	1.1310	0.0565	0.9802	6.6161	0.3308	5.7339
Rock Drill	Bore/Drill Rigs	210	1	390	2	780	0.75	250	1.0417	0.0521	0.9028	0.4063	0.0203	0.3521
Vibratory Compactor	Paving Equipment	80	2	390	2	1560	0.53	120	0.3272	0.0280	0.3459	0.2552	0.0219	0.2698
Compressor	Air Compressor	80	1	390	2	780	0.48	120	0.2963	0.0254	0.3132	0.1156	0.0099	0.1222
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	350	1	390	2	780	0.6	500	1.3889	0.0694	1.2037	0.5417	0.0271	0.4694
Tractor Sweeper	Tractor/loader/backhoe	80	2	390	10	7800	0.55	120	0.3395	0.0291	0.3589	1.3241	0.1135	1.3997
U/G Puller	Other Construction Equipment	300	1	234	10	2340	0.51	500	1.0119	0.0506	0.8770	1.1839	0.0592	1.0261
Generator	Generator Sets	30	3	234	2	1404	0.74	50	0.2741	0.0220	0.2007	0.1924	0.0155	0.1409
Backhoe	Tractor/loader/backhoe	350	2	60	5	600	0.55	500	1.2731	0.0637	1.1034	0.3819	0.0191	0.3310
Asphalt Roller	Rollers	110	1	60	5	300	0.56	120	0.4074	0.0299	0.5025	0.0611	0.0045	0.0754

Offroad Emissions Calculations - Using Tier 3 Emission Factors

Tier 3 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 3 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
149.37	8.06	132.03

Reconduct 69kV, TL - 639

4 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 2,836	Load Factor for TIER 3	HP Used for OFFROAD	TIER 3 NOX (lbs/hr)	TIER 3 PM (lbs/hr)	TIER 3 CO (lbs/hr)
Road Grader	Grader	350	1	16	8	128	0.61	500	1.4120	0.0706	1.2238
Track Type Dozer	Grader	350	1	16	8	128	0.61	500	1.4120	0.0706	1.2238
Digger Derrick Trucks	Bore/Drill Rigs	350	2	5	8	80	0.75	500	1.7361	0.0868	1.5046
Digger Derrick Trucks	Bore/Drill Rigs	350	2	60	8	960	0.75	500	1.7361	0.0868	1.5046
Hydraulic Pump Motor	Pumps	10	1	20	3	60	0.74	15	0.0914	0.0098	0.0979
Single Reel Pullers / Tensioner	Off-highway Truck	300	1	120	6	720	0.57	500	1.1310	0.0565	0.9802
Hydraulic Wind Up Reel Puller	Off-highway Truck	525	1	120	6	720	0.57	500	1.9792	0.0990	1.7153
Track Type Dozer	Grader	350	1	5	8	40	0.61	500	1.4120	0.0706	1.2238

TIER 3 NOX (tons)	TIER 3 PM (tons)	TIER 3 CO (tons)
0.0904	0.0045	0.0783
0.0904	0.0045	0.0783
0.0694	0.0035	0.0602
0.8333	0.0417	0.7222
0.0027	0.0003	0.0029
0.4071	0.0204	0.3529
0.7125	0.0356	0.6175
0.0282	0.0014	0.0245

Reconduct 69kV, TL - 6915

2 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 804	Load Factor for TIER 3	HP Used for OFFROAD	TIER 3 NOX (lbs/hr)	TIER 3 PM (lbs/hr)	TIER 3 CO (lbs/hr)
Road Grader	Grader	350	1	4	8	32	0.61	500	1.4120	0.0706	1.2238
Track Type Dozer	Grader	350	1	4	8	32	0.61	500	1.4120	0.0706	1.2238
Digger Derrick Trucks	Bore/Drill Rigs	350	2	5	8	80	0.75	500	1.7361	0.0868	1.5046
Digger Derrick Trucks	Bore/Drill Rigs	350	2	16	8	256	0.75	500	1.7361	0.0868	1.5046
Hydraulic Pump Motor	Pumps	10	2	2	3	12	0.74	15	0.0914	0.0098	0.0979
Single Reel Pullers / Tensioner	Off-highway Truck	300	1	32	6	192	0.57	500	1.1310	0.0565	0.9802
Hydraulic Wind Up Reel Puller	Off-highway Truck	525	1	32	6	192	0.57	500	1.9792	0.0990	1.7153
Track Type Dozer	Grader	350	1	1	8	8	0.61	500	1.4120	0.0706	1.2238

TIER 3 NOX (tons)	TIER 3 PM (tons)	TIER 3 CO (tons)
0.0226	0.0011	0.0196
0.0226	0.0011	0.0196
0.0694	0.0035	0.0602
0.2222	0.0111	0.1926
0.0005	0.0001	0.0006
0.1086	0.0054	0.0941
0.1900	0.0095	0.1647
0.0056	0.0003	0.0049

Reconduct 69kV, TL - 6924

2 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 868	Load Factor for TIER 3	HP Used for OFFROAD	TIER 3 NOX (lbs/hr)	TIER 3 PM (lbs/hr)	TIER 3 CO (lbs/hr)
Road Grader	Grader	350	1	4	8	32	0.61	500	1.4120	0.0706	1.2238
Track Type Dozer	Grader	350	1	4	8	32	0.61	500	1.4120	0.0706	1.2238
Digger Derrick Trucks	Bore/Drill Rigs	350	2	5	8	80	0.75	500	1.7361	0.0868	1.5046
Digger Derrick Trucks	Bore/Drill Rigs	350	2	20	8	320	0.75	500	1.7361	0.0868	1.5046
Hydraulic Pump Motor	Pumps	10	2	2	3	12	0.74	15	0.0914	0.0098	0.0979
Single Reel Pullers / Tensioner	Off-highway Truck	300	1	32	6	192	0.57	500	1.1310	0.0565	0.9802
Hydraulic Wind Up Reel Puller	Off-highway Truck	525	1	32	6	192	0.57	500	1.9792	0.0990	1.7153
Track Type Dozer	Grader	350	1	1	8	8	0.61	500	1.4120	0.0706	1.2238

TIER 3 NOX (tons)	TIER 3 PM (tons)	TIER 3 CO (tons)
0.0226	0.0011	0.0196
0.0226	0.0011	0.0196
0.0694	0.0035	0.0602
0.2778	0.0139	0.2407
0.0005	0.0001	0.0006
0.1086	0.0054	0.0941
0.1900	0.0095	0.1647
0.0056	0.0003	0.0049

Offroad Emissions Calculations - Using Tier 3 Emission Factors

Tier 3 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 3 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
149.37	8.06	132.03

Reconduct 69kV, TL - 6916
4 months

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 2,484	Load Factor for TIER 3	HP Used for OFFROAD	TIER 3 NOX (lbs/hr)	TIER 3 PM (lbs/hr)	TIER 3 CO (lbs/hr)
Road Grader	Grader	350	1	14	8	112	0.61	500	1.4120	0.0706	1.2238
Track Type Dozer	Grader	350	1	14	8	112	0.61	500	1.4120	0.0706	1.2238
Digger Derrick Trucks	Bore/Drill Rigs	350	2	5	8	80	0.75	500	1.7361	0.0868	1.5046
Digger Derrick Trucks	Bore/Drill Rigs	350	2	52	8	832	0.75	500	1.7361	0.0868	1.5046
Hydraulic Pump Motor	Pumps	10	2	10	3	60	0.74	15	0.0914	0.0098	0.0979
Single Reel Pullers / Tensioner	Off-highway Truck	300	1	104	6	624	0.57	500	1.1310	0.0565	0.9802
Hydraulic Wind Up Reel Puller	Off-highway Truck	525	1	104	6	624	0.57	500	1.9792	0.0990	1.7153
Track Type Dozer	Grader	350	1	5	8	40	0.61	500	1.4120	0.0706	1.2238

TIER 3 NOX (tons)	TIER 3 PM (tons)	TIER 3 CO (tons)
0.0791	0.0040	0.0685
0.0791	0.0040	0.0685
0.0694	0.0035	0.0602
0.7222	0.0361	0.6259
0.0027	0.0003	0.0029
0.3529	0.0176	0.3058
0.6175	0.0309	0.5352
0.0282	0.0014	0.0245

San Luis Rey Substation
40 days

Upgrade

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 2,576	Load Factor for TIER 3	HP Used for OFFROAD	TIER 3 NOX (lbs/hr)	TIER 3 PM (lbs/hr)	TIER 3 CO (lbs/hr)
Front Loader	Tractor/loader/backhoe	200	1	20	8	160	0.55	250	0.7275	0.0364	0.6305
30 Ton Crane Truck	Off-highway Truck	220	1	42	8	336	0.57	250	0.8294	0.0415	0.7188
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	180	1	40	4	160	0.6	250	0.7143	0.0357	0.6190
Vibratory Compactor	Paving Equipment	80	1	40	2	80	0.53	120	0.3272	0.0280	0.3459
Backhoe	Tractor/loader/backhoe	85	1	10	8	80	0.55	120	0.3607	0.0309	0.3813
Trencher	Trencher	75	1	20	8	160	0.75	120	0.4340	0.0372	0.4588
Manlifts	Aerial Lift	75	2	40	8	640	0.46	120	0.2662	0.0228	0.2814
Generator	Generator Sets	30	3	40	8	960	0.74	50	0.2741	0.0220	0.2007

TIER 3 NOX (tons)	TIER 3 PM (tons)	TIER 3 CO (tons)
0.0582	0.0029	0.0504
0.1393	0.0070	0.1208
0.0571	0.0029	0.0495
0.0131	0.0011	0.0138
0.0144	0.0012	0.0153
0.0347	0.0030	0.0367
0.0852	0.0073	0.0901
0.1316	0.0106	0.0963

Sycamore Canyon Sub
10 Days

Upgrade

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 900	Load Factor for TIER 3	HP Used for OFFROAD	TIER 3 NOX (lbs/hr)	TIER 3 PM (lbs/hr)	TIER 3 CO (lbs/hr)
Front Loader	Tractor/loader/backhoe	200	1	5	8	40	0.55	250	0.7275	0.0364	0.6305
30 Ton Crane Truck	Off-highway Truck	220	1	10	8	80	0.57	250	0.8294	0.0415	0.7188
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	180	1	10	4	40	0.6	250	0.7143	0.0357	0.6190
Vibratory Compactor	Paving Equipment	80	1	10	2	20	0.53	120	0.3272	0.0280	0.3459
Backhoe	Tractor/loader/backhoe	85	1	5	8	40	0.55	120	0.3607	0.0309	0.3813
Trencher	Trencher	75	1	5	8	40	0.75	120	0.4340	0.0372	0.4588
Manlifts	Aerial Lift	75	2	10	8	160	0.46	120	0.2662	0.0228	0.2814
Generator	Generator Sets	30	3	20	8	480	0.74	50	0.2741	0.0220	0.2007

TIER 3 NOX (tons)	TIER 3 PM (tons)	TIER 3 CO (tons)
0.0146	0.0007	0.0126
0.0332	0.0017	0.0288
0.0143	0.0007	0.0124
0.0033	0.0003	0.0035
0.0072	0.0006	0.0076
0.0087	0.0007	0.0092
0.0213	0.0018	0.0225
0.0658	0.0053	0.0482

Offroad Emissions Calculations - Using Tier 3 Emission Factors

Tier 3 emission factors (EFs) are applied to NOx, PM, and CO. Load Factors (LFs) are used in conjunction with Tier 3 EFs. 2010 SCAB EFs (OFFROAD2007) are applied to CO2, ROG, and SOX. Calculation detail is provided in *Offroad SCAB* worksheet.

Offroad Equipment Project Total

NOX (tons)	PM (tons)	CO (tons)
149.37	8.06	132.03

Encina Substation Upgrade
10 Days

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 1,050	Load Factor for TIER 3	HP Used for OFFROAD	TIER 3 NOX (lbs/hr)	TIER 3 PM (lbs/hr)	TIER 3 CO (lbs/hr)
Front Loader	Tractor/loader/backhoe	200	1	10	4	40	0.55	250	0.7275	0.0364	0.6305
30 Ton Crane Truck	Off-highway Truck	220	1	10	4	40	0.57	250	0.8294	0.0415	0.7188
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	180	1	10	4	40	0.6	250	0.7143	0.0357	0.6190
Vibratory Compactor	Paving Equipment	80	1	5	2	10	0.53	120	0.3272	0.0280	0.3459
Backhoe	Tractor/loader/backhoe	85	1	10	8	80	0.55	120	0.3607	0.0309	0.3813
Trencher	Trencher	75	1	8	5	40	0.75	120	0.4340	0.0372	0.4588
Manlifts	Aerial Lift	75	2	20	8	320	0.46	120	0.2662	0.0228	0.2814
Generator	Generator Sets	30	3	20	8	480	0.74	50	0.2741	0.0220	0.2007

TIER 3 NOX (tons)	TIER 3 PM (tons)	TIER 3 CO (tons)
0.0146	0.0007	0.0126
0.0166	0.0008	0.0144
0.0143	0.0007	0.0124
0.0016	0.0001	0.0017
0.0144	0.0012	0.0153
0.0087	0.0007	0.0092
0.0426	0.0037	0.0450
0.0658	0.0053	0.0482

South Bay Substation Upgrade
20 Days

Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 730	Load Factor for TIER 3	HP Used for OFFROAD	TIER 3 NOX (lbs/hr)	TIER 3 PM (lbs/hr)	TIER 3 CO (lbs/hr)
Front Loader	Tractor/loader/backhoe	200	1	10	4	40	0.55	250	0.7275	0.0364	0.6305
30 Ton Crane Truck	Off-highway Truck	220	1	10	4	40	0.57	250	0.8294	0.0415	0.7188
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	180	1	10	4	40	0.6	250	0.7143	0.0357	0.6190
Vibratory Compactor	Paving Equipment	80	1	5	2	10	0.53	120	0.3272	0.0280	0.3459
Backhoe	Tractor/loader/backhoe	85	1	10	8	80	0.55	120	0.3607	0.0309	0.3813
Trencher	Trencher	75	1	8	5	40	0.75	120	0.4340	0.0372	0.4588
Generator	Generator Sets	30	3	20	8	480	0.74	50	0.2741	0.0220	0.2007

TIER 3 NOX (tons)	TIER 3 PM (tons)	TIER 3 CO (tons)
0.0146	0.0007	0.0126
0.0166	0.0008	0.0144
0.0143	0.0007	0.0124
0.0016	0.0001	0.0017
0.0144	0.0012	0.0153
0.0087	0.0007	0.0092
0.0658	0.0053	0.0482

IV Substation Upgrade
40 Days

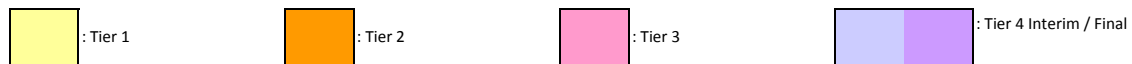
Primary Equipment Description	Offroad Equip Category	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization 2,560	Load Factor for TIER 3	HP Used for OFFROAD	TIER 3 NOX (lbs/hr)	TIER 3 PM (lbs/hr)	TIER 3 CO (lbs/hr)
Front Loader	Tractor/loader/backhoe	200	1	40	2	80	0.55	250	0.7275	0.0364	0.6305
30 Ton Crane Truck	Off-highway Truck	220	1	40	8	320	0.57	250	0.8294	0.0415	0.7188
20,000 lb. Rough Terrain Fork Lift	Rough Terrain Forklift	180	1	40	4	160	0.6	250	0.7143	0.0357	0.6190
Vibratory Compactor	Paving Equipment	80	1	40	2	80	0.53	120	0.3272	0.0280	0.3459
Backhoe	Tractor/loader/backhoe	85	1	60	8	480	0.55	120	0.3607	0.0309	0.3813
Trencher	Trencher	75	5	20	8	800	0.75	120	0.4340	0.0372	0.4588
Digger Derrick Trucks	Bore/Drill Rigs	350	2	20	4	160	0.75	500	1.7361	0.0868	1.5046
Generator	Generator Sets	30	3	20	8	480	0.74	50	0.2741	0.0220	0.2007

TIER 3 NOX (tons)	TIER 3 PM (tons)	TIER 3 CO (tons)
0.0291	0.0015	0.0252
0.1327	0.0066	0.1150
0.0571	0.0029	0.0495
0.0131	0.0011	0.0138
0.0866	0.0074	0.0915
0.1736	0.0149	0.1835
0.1389	0.0069	0.1204
0.0658	0.0053	0.0482

ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards (NMHC+NOx/CO/PM in g/bhp-hr). When ARB and USEPA standards differ, the standards shown here represent the more stringent of the two.

Maximum horsepower	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015+
<11	See Table 2 footnote (a)					7.8 / 6.0 / 0.75					5.6 / 6.0 / 0.6			5.6 / 6.0 / 0.30 ^a							
11-25						7.1 / 4.9 / 0.60					5.6 / 4.9 / 0.60			5.6 / 4.9 / 0.30							
25-50	-					7.1 / 4.1 / 0.60					5.6 / 4.1 / 0.45			5.6 / 4.1 / 0.22				3.5 / 4.1 / 0.02			
50-75											5.6 / 3.7 / 0.30			3.5 / 3.7 / 0.22 ^c				3.5 / 3.7 / 0.02 ^c			
75-100						- / 6.9 / - / - ^b								3.5 / 3.7 / 0.30				0.14 / 0.30 / 3.7 / 0.015 ^{b,c}			
100-175											4.9 / 3.7 / 0.22			3.0 / 3.7 / 0.22				0.14 / 2.5 / 3.7 / 0.015 ^{b,c}			
175-300											4.9 / 2.6 / 0.15							0.14 / 0.30 / 3.7 / 0.015 ^b			
300-600	-	1.0 / 6.9 / 8.5 / 0.40 ^b									4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^e				0.14 / 1.5 / 2.6 / 0.015 ^{b,c}			
600-750																		0.14 / 2.6 / 2.6 / 0.03 ^b			
Mobile Machines > 750hp																		0.30 / 2.6 / 2.6 / 0.07 ^b			
750hp<GEN ≤1200hp						1.0 / 6.9 / 8.5 / 0.40 ^b								4.8 / 2.6 / 0.15				0.14 / 0.50 / 2.6 / 0.02 ^b			
GEN>1200 hp																		0.30 / 0.50 / 2.6 / 0.07 ^b			

- a) The PM standard for hand-start, air cooled, direct injection engines below 11 hp may be delayed until 2010 and be set at 0.45 g/bhp-hr.
- b) Standards given are NMHC/NOx/CO/PM in g/bhp-hr.
- c) Engine families in this power category may alternately meet Tier 3 PM standards (0.30 g/bhp-hr) from 2008-2011 in exchange for introducing final PM standards in 2012.
- d) The implementation schedule shown is the three-year alternate NOx approach. Other schedules are available.
- e) Certain manufacturers have agreed to comply with these standards by 2005.



	TIER 2 Emission Factors					
	NOx		CO		PM	
	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr
Maximum horsepower						
<11	5.6	0.0123457	6	0.0132275	0.6	0.0013228
11hp<25	5.6	0.0123457	4.9	0.0108025	0.6	0.0013228
25hp<50	5.6	0.0123457	4.1	0.0090388	0.45	0.0009921
50hp<75	5.6	0.0123457	3.7	0.008157	0.3	0.0006614
75hp<100	5.6	0.0123457	3.7	0.008157	0.3	0.0006614
100hp<175	4.9	0.0108025	3.7	0.008157	0.22	0.000485
175hp<300	4.9	0.0108025	2.6	0.0057319	0.15	0.0003307
300hp<600	4.8	0.010582	2.6	0.0057319	0.15	0.0003307
600hp-750	4.8	0.010582	2.6	0.0057319	0.15	0.0003307
Mobile Machines > 750hp	4.8	0.010582	2.6	0.0057319	0.15	0.0003307
	4.8	0.010582	2.6	0.0057319	0.15	0.0003307
750hp<GEN -1200hp	4.8	0.010582	2.6	0.0057319	0.15	0.0003307
GEN>1200 hp	4.8	0.010582	2.6	0.0057319	0.15	0.0003307

TIER 3 Emission Factors					
NOx		CO		PM	
g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr
5.6	0.0123457	6	0.0132275	0.6	0.0013228
5.6	0.0123457	4.9	0.0108025	0.6	0.0013228
5.6	0.0123457	4.1	0.0090388	0.45	0.0009921
5.6	0.0123457	3.7	0.008157	0.3	0.0006614
3.5	0.007716	3.7	0.008157	0.3	0.0006614
3	0.0066138	3.7	0.008157	0.22	0.000485
3	0.0066138	2.6	0.0057319	0.15	0.0003307
3	0.0066138	2.6	0.0057319	0.15	0.0003307
3	0.0066138	2.6	0.0057319	0.15	0.0003307
4.8	0.010582	2.6	0.0057319	0.15	0.0003307
4.8	0.010582	2.6	0.0057319	0.15	0.0003307
4.8	0.010582	2.6	0.0057319	0.15	0.0003307
4.8	0.010582	2.6	0.0057319	0.15	0.0003307

% reduction from TIER 2 to TIER 3		
NOx	CO	PM
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
37.50%	0.00%	0.00%
38.78%	0.00%	0.00%
38.78%	0.00%	0.00%
37.50%	0.00%	0.00%
37.50%	0.00%	0.00%
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%

 : Tier 2

 : Tier 3

PSR Offroad Load Factors

Used in conjunction with Tier 2-3 emission factors.

Source: mailout MSC99-32, <http://www.arb.ca.gov/msei/onroad/downloads/pubs/mo9932.zip> (4/2/2009)

Category	Equipment	HP	P/N	Activity (hrs/yr)	Load
Agricultural	Agricultural Mowers	120	P	363	0.43
	Agricultural Tractors	50	P	475	0.70
		120	P	475	0.70
		175	P	475	0.70
		250	N	475	0.70
		500	N	475	0.70
	Balers	50	P	95	0.58
		120	P	95	0.58
	Combines	120	P	150	0.70
		175	P	150	0.70
		250	N	150	0.70
		500	N	150	0.70
	Hydro Power Units	50	P	790	0.48
		120	P	790	0.48
	Irrigation Pumps	50	P	749	0.65
		120	P	749	0.65
		175	P	749	0.65
		250	N	749	0.65
		500	N	749	0.65
	Other Agricultural Equipment	50	P	381	0.51
		120	P	381	0.51
		175	P	381	0.51
		250	N	381	0.51
		500	N	381	0.51
	Sprayers	50	P	90	0.50
		120	P	90	0.50
		175	P	90	0.50
		250	N	90	0.50
		500	N	90	0.50
	Swathers	120	P	110	0.55
175		P	110	0.55	
Tillers >5 HP	250	N	172	0.78	
	500	N	172	0.78	
Commercial	Air Compressors	50	P	815	0.48
		120	P	815	0.48
		175	P	815	0.48
		250	N	815	0.48
		500	N	815	0.48
		750	N	815	0.48
	9999	N	815	0.48	
	Generator Sets	50	N	338	0.74
		120	N	338	0.74
		175	N	338	0.74
		250	N	338	0.74
		500	N	338	0.74
		750	N	338	0.74
		9999	N	338	0.74
	Pressure Washers	50	P	145	0.30
		120	P	145	0.30
	Pumps	50	P	403	0.74
		120	P	403	0.74
		175	P	403	0.74
		250	N	403	0.74
		500	N	403	0.74

PSR Offroad Load Factors

Used in conjunction with Tier 2-3 emission factors.

Source: mailout MSC99-32, <http://www.arb.ca.gov/msei/onroad/downloads/pubs/mo9932.zip> (4/2/2009)

Category	Equipment	HP	P/N	Activity (hrs/yr)	Load
	Welders	9999	N	403	0.74
		50	P	643	0.45
		120	P	643	0.45
		175	P	643	0.45
Construction	Bore/Drill Rigs	50	P	726	0.75
		120	P	726	0.75
		175	P	726	0.75
		250	N	726	0.75
		500	N	726	0.75
		750	N	726	0.75
		9999	N	726	0.75
	Concrete/Industrial Saws	50	P	580	0.73
		120	P	580	0.73
		175	P	580	0.73
	Cranes	50	P	1464	0.43
		120	P	1464	0.43
		175	P	1464	0.43
		250	N	1464	0.43
		500	N	1464	0.43
		750	N	1464	0.43
	Crawler Tractors	50	P	936	0.64
		120	P	936	0.64
		175	P	936	0.64
		250	N	936	0.64
		500	N	936	0.64
		750	N	936	0.64
		9999	N	936	0.64
	Crushing/Proc. Equipment	50	P	955	0.78
		120	P	955	0.78
		175	P	955	0.78
		250	N	955	0.78
		500	N	955	0.78
		750	N	955	0.78
		9999	N	955	0.78
	Excavators	50	P	1162	0.57
		120	P	1162	0.57
		175	P	1162	0.57
		250	N	1162	0.57
		500	N	1162	0.57
		750	N	1162	0.57
	Graders	50	P	965	0.61
		120	P	965	0.61
		175	P	965	0.61
		250	N	965	0.61
		500	N	965	0.61
		750	N	965	0.61
Off-Highway Tractors	120	P	855	0.65	
	175	P	855	0.65	
	250	N	855	0.65	
	750	N	855	0.65	
	9999	N	855	0.65	
Off-Highway Trucks	175	P	1641	0.57	
	250	N	1641	0.57	
	500	N	1641	0.57	

PSR Offroad Load Factors

Used in conjunction with Tier 2-3 emission factors.

Source: mailout MSC99-32, <http://www.arb.ca.gov/msei/onroad/downloads/pubs/mo9932.zip> (4/2/2009)

Category	Equipment	HP	P/N	Activity (hrs/yr)	Load
		750	N	1641	0.57
		9999	N	1641	0.57
Other Construction Equipment		50	P	606	0.62
		120	P	606	0.62
		175	P	606	0.62
		500	N	606	0.62
		500	N	606	0.62
Pavers		50	P	828	0.62
		120	P	828	0.62
		175	P	828	0.62
		250	N	828	0.62
		500	N	828	0.62
Paving Equipment		50	P	622	0.53
		120	P	622	0.53
		175	P	622	0.53
		250	N	622	0.53
Rollers		50	P	748	0.56
		120	P	748	0.56
		175	P	748	0.56
		250	N	748	0.56
		500	N	748	0.56
Rough Terrain Forklifts		50	P	1198	0.60
		120	P	1198	0.60
		175	P	1198	0.60
		250	N	1198	0.60
		500	N	1198	0.60
Rubber Tired Dozers		175	P	899	0.59
		250	N	899	0.59
		500	N	899	0.59
		750	N	899	0.59
		9999	N	899	0.59
Rubber Tired Loaders		50	P	1346	0.54
		120	P	1346	0.54
		175	P	1346	0.54
		250	N	1346	0.54
		500	N	1346	0.54
		750	N	1346	0.54
Scrapers		9999	N	1346	0.54
		120	P	1090	0.72
		175	P	1090	0.72
		250	N	1090	0.72
		500	N	1090	0.72
Signal Boards		750	N	1090	0.72
		50	P	535	0.78
		120	P	535	0.78
		175	P	535	0.78
		250	N	535	0.78
Skid Steer Loaders		50	P	811	0.55
		120	P	811	0.55
Surfacing Equipment		50	P	561	0.45
		120	P	561	0.45
		175	P	561	0.45
		250	N	561	0.45
		500	N	561	0.45
		750	N	561	0.45

PSR Offroad Load Factors

Used in conjunction with Tier 2-3 emission factors.

Source: mailout MSC99-32, <http://www.arb.ca.gov/msei/onroad/downloads/pubs/mo9932.zip> (4/2/2009)

Category	Equipment	HP	P/N	Activity (hrs/yr)	Load
	Tractors/Loaders/Backhoes	50	P	1135	0.55
		120	P	1135	0.55
		175	P	1135	0.55
		250	N	1135	0.55
	Trenchers	50	P	620	0.75
		120	P	620	0.75
		175	P	620	0.75
		250	N	620	0.75
		500	N	620	0.75
		750	N	620	0.75
Dredging	Compressor (Dredging)	50	P	815	0.48
		120	P	815	0.48
	Crane	750	N	1464	0.43
	Deck/door engine	250	N	142	0.80
	Dredger	175	P	878	0.51
		250	N	878	0.51
		750	N	878	0.51
	Generator (Dredging)	50	P	1011	0.74
		120	P	1011	0.74
		175	P	1011	0.74
		250	N	1011	0.74
		500	N	1011	0.74
		750	N	1011	0.74
		9999	N	1011	0.74
	Hoist/swing/winch	50	P	878	0.51
		120	P	878	0.51
		175	P	878	0.51
		250	N	878	0.51
		500	N	878	0.51
		750	N	878	0.51
		9999	N	878	0.51
	Other (Dredging)	120	P	878	0.51
		175	P	878	0.51
		250	N	878	0.51
		500	N	878	0.51
	Pump (Dredging)	175	P	403	0.74
		250	N	403	0.74
		500	N	403	0.74
		9999	N	403	0.74
	Drilling	Compressors (Workover)	120	P	1231
175			P	1231	0.60
250			N	1231	0.60
750			N	1231	0.60
Generator (Drilling)		120	P	1231	0.60
		175	P	1231	0.60
		250	N	1231	0.60
		750	N	1231	0.60
Generator (Workover)		120	P	1231	0.60
		175	P	1231	0.60
		250	N	1231	0.60
		750	N	1231	0.60
Lift (Drilling)		9999	N	1231	0.60
		250	N	1231	0.60
		750	N	1231	0.60
		750	N	1231	0.60

PSR Offroad Load Factors

Used in conjunction with Tier 2-3 emission factors.

Source: mailout MSC99-32, <http://www.arb.ca.gov/msei/onroad/downloads/pubs/mo9932.zip> (4/2/2009)

Category	Equipment	HP	P/N	Activity (hrs/yr)	Load
	Other Drilling Equipment	120	P	1231	0.60
		175	P	1231	0.60
		250	N	1231	0.60
		750	N	1231	0.60
		9999	N	1231	0.60
	Other Workover Equipment	120	P	1231	0.60
		175	P	1231	0.60
		250	N	1231	0.60
		750	N	1231	0.60
		9999	N	1231	0.60
	Pump (Drilling)	120	P	1231	0.60
		175	P	1231	0.60
		250	N	1231	0.60
		750	N	1231	0.60
		9999	N	1231	0.60
	Pump (Workover)	120	P	1231	0.60
		175	P	1231	0.60
		250	N	1231	0.60
		750	N	1231	0.60
		9999	N	1231	0.60
Snubbing	120	P	1231	0.60	
Swivel	120	P	1231	0.60	
	175	P	1231	0.60	
	250	N	1231	0.60	
	750	N	1231	0.60	
Ground Support Equipment	A/C Tug Narrow Body	250	N	606.1839847	0.80
	A/C Tug Wide Body	500	N	759.2692308	0.80
	Air Conditioner	175	N	808.1666667	0.75
	Air Start Unit	500	N	332.9655172	0.90
	Baggage Tug	120	N	1623.8	0.55
	Belt Loader	120	N	1037.643678	0.50
	Bobtail	120	N	1867.428571	0.55
	Cargo Loader	120	N	901.7941176	0.50
	Cargo Tractors	120	N	101	0.54
	Catering Truck	250	N	1600	0.52
	Forklift	175	P	731.5	0.30
	Fuel Truck	250	N	3489.166667	0.25
	Generator	175	N	1629.714286	0.78
	Ground Power Unit	175	N	968.4296875	0.75
	Hydrant Truck	175	N	224.25	0.70
	Lav Truck	175	N	1306.5	0.25
	Lift	120	N	917.3636364	0.50
	Other	175	N	1645.590909	0.50
	Passenger Stand	120	N	70	0.59
	Service Truck	175	N	1930.75	0.20
Sweeper	120	N	12	0.51	
Industrial	Aerial Lifts	50	P	384	0.46
		120	P	384	0.46
		500	N	384	0.46
		750	N	384	0.46
	Forklifts	50	P	1800	0.30
		120	P	1800	0.30
		175	P	1800	0.30
		250	N	1800	0.30

PSR Offroad Load Factors

Used in conjunction with Tier 2-3 emission factors.

Source: mailout MSC99-32, <http://www.arb.ca.gov/msei/onroad/downloads/pubs/mo9932.zip> (4/2/2009)

Category	Equipment	HP	P/N	Activity (hrs/yr)	Load
	Other General Industrial Equipment	500	N	1800	0.30
		50	N	878	0.51
		120	N	878	0.51
		175	N	878	0.51
		250	N	878	0.51
		500	N	878	0.51
		750	N	878	0.51
	Other Material Handling Equipment	50	N	421	0.59
		120	N	421	0.59
		175	N	421	0.59
		250	N	421	0.59
	Sweepers/Scrubbers	50	N	1220	0.68
		120	N	1220	0.68
		175	N	1220	0.68
		250	N	1220	0.68
	Lawn and Garden	Chippers/Stump Grinders	120	P	465
175			P	465	0.73
250			N	465	0.73
500			N	465	0.73
750			N	465	0.73
Leaf Blowers/Vacuums		120	N	120	0.40
		250	N	120	0.40
Snowblowers		175	P	400	0.65
		250	N	400	0.65
		500	N	400	0.65
Logging	Fellers/Bunchers	120	P	1276	0.71
		175	P	1276	0.71
		250	N	1276	0.71
		500	N	1276	0.71
		750	N	1276	0.71
	Shredders	175	P	120	0.40
	Skidders	120	P	1442	0.74
		175	P	1442	0.74
		250	N	1442	0.74
		500	N	1442	0.74
Military Tactical Support	A/C unit	120	P	300	0.60
		250	N	300	0.60
		500	N	300	0.60
	Aircraft Support	120	P	300	0.60
		175	P	300	0.60
	Cart	120	P	300	0.60
		175	P	300	0.60
		250	N	300	0.60
	Communications	50	P	300	0.60
		120	P	300	0.60
	Compressor (Military)	50	P	300	0.60
		120	P	300	0.60
		175	P	300	0.60
		250	N	300	0.60
		500	N	300	0.60
Crane	120	P	300	0.60	

PSR Offroad Load Factors

Used in conjunction with Tier 2-3 emission factors.

Source: mailout MSC99-32, <http://www.arb.ca.gov/msei/onroad/downloads/pubs/mo9932.zip> (4/2/2009)

Category	Equipment	HP	P/N	Activity (hrs/yr)	Load	
		175	P	300	0.60	
		250	N	300	0.60	
	Deicer	120	P	300	0.60	
	Generator (Military)		50	P	300	0.60
			120	P	300	0.60
			175	P	300	0.60
			250	N	300	0.60
			500	N	300	0.60
			120	P	300	0.60
	Hydraulic unit	120	P	300	0.60	
	Lift (Military)	120	P	300	0.60	
	Light	50	P	300	0.60	
	Other tactical support equipment		50	P	300	0.60
			120	P	300	0.60
			175	P	300	0.60
			250	N	300	0.60
			500	N	300	0.60
			750	N	300	0.60
	Pressure Washer	175	P	300	0.60	
	Pump (Military)		50	P	300	0.60
			120	P	300	0.60
	Start Cart		120	P	300	0.60
			500	N	300	0.60
Test Stand		120	P	300	0.60	
		175	P	300	0.60	
		250	N	300	0.60	
		500	N	300	0.60	
Welder		50	P	300	0.60	
		120	P	300	0.60	
Misc. Portable Equipment	Misc Portable Equipment	120	P	484	0.56	
		175	P	484	0.56	
		250	N	484	0.56	
		500	N	484	0.56	
		750	N	484	0.56	
		9999	N	484	0.56	
Transport Refrigeration	Transport Refrigeration Unit	50	N	1341	0.28	
		120	P	1341	0.28	

Helicopter Emissions Calculation

Helicopter flight hours based on estimates from Sargent & Lundy LLC construction contractor:

1 structure/day

- heavy lift helicopter	2	hours per structure
- medium lift helicopter	4	hours per structure
- light lift helicopter	10	hours per structure

NOX (tons)	VOC/ROG (tons)	PM (tons)	CO (tons)	SOX (tons)	CO2 (tons)
20.7852	12.1261	6.3940	20.7852	4.3243	10564.2142

Segments 8A / 8B / 8C / 8D / 8E / 9A

18 months

Structures 140

Primary Equipment Description	HP Estimate	Fuel Type	Activity Schedule Estimate (Days)	Duration of Use (Hours/ Day)	Work Flight Cycles/ Day	Refuel Flight Cycles/ Day	Total Flight Cycles
							11,538
Light Duty/Crew Helicopter	1200	Jet A	140	10	40	10	8,471
Medium Lift Helicopter	3000		140	4	10	4	2,045
Heavy Lift Helicopter	9000		140	2	5	2	1,023

NOX (tons)	VOC/ROG (tons)	PM (tons)	CO (tons)	SOX (tons)	CO2 (tons)
2.3652	0.5771	0.8858	2.3652	0.5573	1361.5280
1.2696	2.7643	0.2568	1.2696	0.3721	909.0206
2.8461	0.4396	0.8511	2.8461	0.4189	1023.4157

Segments 9B / 9C

18 months

Structures 114

Primary Equipment Description	HP Estimate	Fuel Type	Activity Schedule Estimate (Days)	Duration of Use (Hours/ Day)	Work Flight Cycles/ Day	Refuel Flight Cycles/ Day	Total Flight Cycles
							9,396
Light Duty/Crew Helicopter	1200	Jet A	114	10	40	10	6,897
Medium Lift Helicopter	3000		114	4	10	4	1,665
Heavy Lift Helicopter	9000		114	2	5	2	833

NOX (tons)	VOC/ROG (tons)	PM (tons)	CO (tons)	SOX (tons)	CO2 (tons)
1.9260	0.4699	0.7213	1.9260	0.4538	1108.6728
1.0338	2.2509	0.2091	1.0338	0.3030	740.2025
2.3175	0.3580	0.6930	2.3175	0.3411	833.3528

Segments 10A / 10B

18 months

Structures 86

Primary Equipment Description	HP Estimate	Fuel Type	Activity Schedule Estimate (Days)	Duration of Use (Hours/ Day)	Work Flight Cycles/ Day	Refuel Flight Cycles/ Day	Total Flight Cycles
							7,088
Light Duty/Crew Helicopter	1200	Jet A	86	10	40	10	5,203
Medium Lift Helicopter	3000		86	4	10	4	1,256
Heavy Lift Helicopter	9000		86	2	5	2	628

NOX (tons)	VOC/ROG (tons)	PM (tons)	CO (tons)	SOX (tons)	CO2 (tons)
1.4529	0.3545	0.5442	1.4529	0.3424	836.3672
0.7799	1.6981	0.1577	0.7799	0.2286	558.3984
1.7483	0.2700	0.5228	1.7483	0.2573	628.6696

Segments 7 / 5 / 4A

18 months

Structures 109

Primary Equipment Description	HP Estimate	Probable Fuel Type	Activity Schedule Estimate (Days)	Duration of Use (Hours/ Day)	Work Flight Cycles/ Day	Refuel Flight Cycles/ Day	Total Flight Cycles
							8,983
Hughes 500 E Helicopter	1200	Jet A	109	10	40	10	6,595
Medium Lift Helicopter	3000		109	4	10	4	1,592
Heavy Lift Helicopter	9000		109	2	5	2	796

NOX (tons)	VOC/ROG (tons)	PM (tons)	CO (tons)	SOX (tons)	CO2 (tons)
1.8415	0.4493	0.6897	1.8415	0.4339	1060.0468
0.9885	2.1522	0.1999	0.9885	0.2897	707.7375
2.2159	0.3423	0.6626	2.2159	0.3262	796.8022

Helicopter Emission Factors

CO, VOC, NOx, and Sox helicopter emissions are calculated using EDMS 5.1 emission factors

PM helicopter emissions are calculated using factors provided in *Volume 4, Procedures for Emissions Inventory Preparation, EPA420R-92-009*.

CO2 helicopter emissions are calculated using CCAR recommended factor 9.57 kg CO2/gallon jet fuel

Flight cycles based on estimates from Sargent & Lundy and calculated to: 16.43 minutes for heavy lift, 16.43 minutes for medium lift, and 9.92 minutes for light lift helicopter:

Helicopter operating modes, as percentages of total engine run time, are estimated as follows

Taxi Out	10%
Takeoff	5%
Climbout	10%
Approach/Cruising	65%
Taxi In	10%

Density Jet A .8 kg/L
 CO2 emission factor 9.57 kg CO2/gal jet fuel 3156.33 g/kg jet fuel @ 15C

Helicopter Model	Actual Engine	Actual Engine HP	Model Engine	Model Engine HP	Operating Mode	Fuel Flow, kg/s	Time in Mode per Cycle, min	Emission Indices, g/kg fuel					
								CO	VOC	NOx	SOx	PM	CO2
Heavy Lift Helicopter													
Boeing 234 UT	Avro Lycoming AL5512	two 4200	T64-GE-413 /	3925	Taxi Out	0.03608	1.64	2.620	19.876	2.620	1.292	2.920	3156.332
Sikorsky S-64F	PW JFTD12A-5A	two 4800	T56-A7 (PM)	4050	Takeoff	0.207921	2.46	11.020	0.356	11.020	1.292	1.780	3156.332
Sikorsky S-64E	PW JFTD12A-4	two 4500			Approach	0.165387	10.68	8.540	0.403	8.540	1.292	2.850	3156.332
					Taxi In	0.03608	1.64	2.620	19.876	2.620	1.292	2.920	3156.332
Total							16.43						
Medium Lift Helicopter													
Boeing 107II	GE T58	two 1400	T58-GE-8F /	1400	Taxi Out	0.01826	1.64	1.430	150.010	1.430	1.292	0.750	3156.332
Sikorsky S-61S	GE CT58-140	two 1500	T58-GE-5 (PM)	1500	Takeoff	0.099972	0.82	5.470	0.690	5.470	1.292	0.900	3156.332
Sikorsky S-61L	GE CT58-110	two 1500			Climbout	0.078989	1.64	4.697	1.034	4.697	1.292	0.900	3156.332
Eurocopter 332C/L	Makila 1A1	two 1800			Approach	0.074229	10.68	4.476	1.295	4.476	1.292	0.900	3156.332
Bell 214B	Lycoming LTC4B-8	one 2930			Taxi In	0.01826	1.64	1.430	150.010	1.430	1.292	0.750	3156.332
Total							16.43						
Light Duty/Crew Helicopter													
Sikorsky S-58T	PW PT6T6	one 1875	PW PT6A-42 /	850	Taxi Out	0.012958	0.99	2.160	20.030	2.160	1.292	2.900	3156.332
Hughes 500E	Allison 250-C20B/R	one 450	TPE 331-3 (PM)	575	Takeoff	0.1193	0.50	7.299	0.000	7.299	1.292	1.750	3156.332
					Climbout	0.116844	0.99	7.330	0.000	7.330	1.292	1.470	3156.332
					Approach	0.028586	6.45	4.202	0.001	4.202	1.292	2.400	3156.332
					Taxi In	0.012958	0.99	2.160	20.030	2.160	1.292	2.900	3156.332
Total							9.92						

Helicopter Emission Factors

CO, VOC, NOx, and Sox helicopter emissions are calculated using EDMS 5.1 emission factors

PM helicopter emissions are calculated using factors provided in *Volume 4, Procedures for Emissions Inventory Preparation, EPA420R-92-009*.

CO2 helicopter emissions are calculated using CCAR recommended factor 9.57 kg CO2/gallon jet fuel

Flight cycles based on estimates from Sargent & Lundy and calculated to: 16.43 minutes for heavy lift, 16.43 minutes for medium lift, and 9.92 min

Helicopter operating modes, as percentages of total engine run time, are estimated as follows

Taxi Out	10%
Takeoff	5%
Climbout	10%
Approach/Cruising	65%
Taxi In	10%

Density Jet A .8 kg/L
 CO2 emission factor 9.57 kg CO2/gal jet fuel 3156.33 g/kg jet fuel @ 15C

Helicopter Model	Actual Engine	Actual Engine HP	Model Engine	Model Engine HP	Operating Mode	Fuel Flow, kg/s	Time in Mode per Cycle, min	Emissions Per Mode, lbs/engine-cycle					
								CO	VOC	NOx	SOx	PM	CO2
Heavy Lift Helicopter													
Boeing 234 UT	Avro Lycoming AL5512	two 4200	T64-GE-413 /	3925	Taxi Out	0.03608	1.64	0.021	0.156	0.021	0.010	0.023	24.748
Sikorsky S-64F	PW JFTD12A-5A	two 4800	T56-A7 (PM)	4050	Takeoff	0.207921	2.46	0.747	0.024	0.747	0.088	0.121	213.924
Sikorsky S-64E	PW JFTD12A-4	two 4500			Approach	0.165387	10.68	1.995	0.094	1.995	0.302	0.666	737.369
					Taxi In	0.03608	1.64	0.021	0.156	0.021	0.010	0.023	24.748
Total							16.43						
Medium Lift Helicopter													
Boeing 107II	GE T58	two 1400	T58-GE-8F /	1400	Taxi Out	0.01826	1.64	0.006	0.595	0.006	0.005	0.003	12.525
Sikorsky S-61S	GE CT58-140	two 1500	T58-GE-5 (PM)	1500	Takeoff	0.099972	0.82	0.059	0.007	0.059	0.014	0.010	34.286
Sikorsky S-61L	GE CT58-110	two 1500			Climbout	0.078989	1.64	0.081	0.018	0.081	0.022	0.015	54.180
Eurocopter 332C/L	Makila 1A1	two 1800			Approach	0.074229	10.68	0.469	0.136	0.469	0.135	0.094	330.946
Bell 214B	Lycoming LTC4B-8	one 2930			Taxi In	0.01826	1.64	0.006	0.595	0.006	0.005	0.003	12.525
Total							16.43						
Light Duty/Crew Helicopter													
Sikorsky S-58T	PW PT6T6	one 1875	PW PT6A-42 /	850	Taxi Out	0.012958	0.99	0.004	0.034	0.004	0.002	0.005	5.365
Hughes 500E	Allison 250-C20B/R	one 450	TPE 331-3 (PM)	575	Takeoff	0.1193	0.50	0.057	0.000	0.057	0.010	0.014	24.697
					Climbout	0.116844	0.99	0.112	0.000	0.112	0.020	0.023	48.377
					Approach	0.028586	6.45	0.102	0.000	0.102	0.031	0.058	76.931
					Taxi In	0.012958	0.99	0.004	0.034	0.004	0.002	0.005	5.365
Total							9.92						

Helicopter Emission Factors

CO, VOC, NOx, and Sox helicopter emissions are calculated using EDMS 5.1 emission factors

PM helicopter emissions are calculated using factors provided in *Volume 4, Procedures for Emissions Inventory Preparation, EPA420R-92-009*.

CO2 helicopter emissions are calculated using CCAR recommended factor 9.57 kg CO2/gallon jet fuel

Flight cycles based on estimates from Sargent & Lundy and calculated to: 16.43 minutes for heavy lift, 16.43 minutes for medium lift, and 9.92 min

Helicopter operating modes, as percentages of total engine run time, are estimated as follows

Taxi Out	10%
Takeoff	5%
Climbout	10%
Approach/Cruising	65%
Taxi In	10%

Density Jet A .8 kg/L
 CO2 emission factor 9.57 kg CO2/gal jet fuel 3156.33 g/kg jet fuel @ 15C

Helicopter Model	Actual Engine	Actual Engine HP	Model Engine	Model Engine HP	Operating Mode	Fuel Flow, kg/s	Time in Mode per Cycle, min	Emissions Per Mode, lbs/cycle					
								CO	VOC	NOx	SOx	PM	CO2
Heavy Lift Helicopter													
Boeing 234 UT	Avro Lycoming AL5512	two 4200	T64-GE-413 /	3925	Taxi Out	0.03608	1.64	0.041	0.312	0.041	0.020	0.046	49.496
Sikorsky S-64F	PW JFTD12A-5A	two 4800	T56-A7 (PM)	4050	Takeoff	0.207921	2.46	1.494	0.048	1.494	0.175	0.241	427.848
Sikorsky S-64E	PW JFTD12A-4	two 4500			Approach	0.165387	10.68	3.990	0.188	3.990	0.604	1.332	1474.739
					Taxi In	0.03608	1.64	0.041	0.312	0.041	0.020	0.046	49.496
Total							16.43	5.566	0.860	5.566	0.819	1.664	2001.578
Medium Lift Helicopter													
Boeing 107II	GE T58	two 1400	T58-GE-8F /	1400	Taxi Out	0.01826	1.64	0.011	1.191	0.011	0.010	0.006	25.050
Sikorsky S-61S	GE CT58-140	two 1500	T58-GE-5 (PM)	1500	Takeoff	0.099972	0.82	0.119	0.015	0.119	0.028	0.020	68.572
Sikorsky S-61L	GE CT58-110	two 1500			Climbout	0.078989	1.64	0.161	0.035	0.161	0.044	0.031	108.359
Eurocopter 332C/L	Makila 1A1	two 1800			Approach	0.074229	10.68	0.939	0.272	0.939	0.271	0.189	661.892
Bell 214B	Lycoming LTC4B-8	one 2930			Taxi In	0.01826	1.64	0.011	1.191	0.011	0.010	0.006	25.050
Total							16.43	1.242	2.703	1.242	0.364	0.251	888.923
Light Duty/Crew Helicopter													
Sikorsky S-58T	PW PT6T6	one 1875	PW PT6A-42 /	850	Taxi Out	0.012958	0.99	0.007	0.068	0.007	0.004	0.010	10.730
Hughes 500E	Allison 250-C20B/R	one 450	TPE 331-3 (PM)	575	Takeoff	0.1193	0.50	0.114	0.000	0.114	0.020	0.027	49.394
					Climbout	0.116844	0.99	0.225	0.000	0.225	0.040	0.045	96.755
					Approach	0.028586	6.45	0.205	0.000	0.205	0.063	0.117	153.863
					Taxi In	0.012958	0.99	0.007	0.068	0.007	0.004	0.010	10.730
Total							9.92	0.558	0.136	0.558	0.132	0.209	321.472

Onroad Emissions Calculation

Emission factors generated by EMFAC assuming 1990-2011 composite fleet of light, medium, and heavy duty vehicles.
 Vehicle mix, schedules, and workforce by Sargent-Lundy LLC, construction contractor.

Light Duty Autos and Trucks

Overall Personnel to Work Sites	Workers	Months	Veh/Day	RT/day (mi)	Miles/Day	Total Miles
Worker Commute Trips *						
Maximum Labor Force	450	12	346	60	20,769	5,483,077
Typical Labor Force	375	10	288	60	17,308	3,807,692
* Estimated rideshare factor 1.3			SubTot Personnel (mi)		9,290,769	

Composite Emissions for Fleet of Vehicles

NOX (lb/1000mi)	ROG (lb/1000mi)	PM (lb/1000mi)	CO (lb/1000mi)	SOX (lb/1000mi)	CO2 (lb/1000mi)
0.6818	0.5591	0.0882	6.3988	0.0092	954.9929
0.6818	0.5591	0.0882	6.3988	0.0092	954.9929

Operational Emissions - Light Duty
SubTot Crew and QA/QC Mobilize (mi)

RT/day (mi)	Vehicle Days	Total Miles
60	23,497	1,409,820

NOX (lb/1000mi)	ROG (lb/1000mi)	PM (lb/1000mi)	CO (lb/1000mi)	SOX (lb/1000mi)	CO2 (lb/1000mi)
0.6818	0.5591	0.0882	6.3988	0.0092	954.9929

TOTAL Light Duty Autos and Trucks (vmt) 10,700,589

Medium to Heavy Duty Trucks

Operational Emissions - Medium Duty
Splicing/testing vans, dump trucks under 200hp
Miscellaneous hardware deliveries

RT/day (mi)	Vehicle Days	Total Miles
60	2,830	169,800
60	100	6000

Composite Emissions for Fleet of Vehicles

NOX (lb/1000mi)	ROG (lb/1000mi)	PM (lb/1000mi)	CO (lb/1000mi)	SOX (lb/1000mi)	CO2 (lb/1000mi)
3.3530	0.8124	0.1529	8.3004	0.0159	1710.7359
3.3530	0.8124	0.1529	8.3004	0.0159	1710.7359

TOTAL Medium Duty Trucks (vmt) 175,800

Heavy-Heavy Duty Trucks

Operational Emissions - Heavy Duty
Local material deliveries and waste removal
Port to marshalling yards material deliveries
Equipment deliveries
Water transportation
Fuel transportation

RT/day (mi)	Vehicle Days	Total Miles
60	20,336	1,220,160
150	1,050	157,500
60	482	28,920
60	5,561	333,660
60	2979	178,740

Composite Emissions for Fleet of Vehicles

NOX (lb/1000mi)	ROG (lb/1000mi)	PM (lb/1000mi)	CO (lb/1000mi)	SOX (lb/1000mi)	CO2 (lb/1000mi)
30.9414	2.3167	1.1887	11.2972	0.0434	4095.4447
30.9414	2.3167	1.1887	11.2972	0.0434	4095.4447
30.9414	2.3167	1.1887	11.2972	0.0434	4095.4447
30.9414	2.3167	1.1887	11.2972	0.0434	4095.4447
30.9414	2.3167	1.1887	11.2972	0.0434	4095.4447

TOTAL Heavy-Heavy Duty Trucks (vmt) 1,918,980

Onroad Emissions Calculation

Emission factors generated by EMFAC assuming 1990-2011 composite fleet of light, medium, and heavy duty vehicles. Vehicle mix, schedules, and workforce by Sargent-Lundy LLC, construction contractor.

Overall Onroad Emissions

NOX (ton)	ROG (ton)	PM (ton)	CO (ton)	SOX (ton)	CO2 (ton)
33.63	5.29	1.63	45.80	0.09	9,189.41

Light Duty Autos and Trucks

Overall Personnel to Work Sites	Workers	Months	Veh/Day	RT/day (mi)	Miles/Day	Total Miles
Worker Commute Trips *						
Maximum Labor Force	450	12	346	60	20,769	5,483,077
Typical Labor Force	375	10	288	60	17,308	3,807,692
* Estimated rideshare factor 1.3			SubTot Personnel (mi)		9,290,769	

Total Emissions for Vehicles

NOX (ton)	ROG (ton)	PM (ton)	CO (ton)	SOX (ton)	CO2 (ton)
1.8693	1.5328	0.2419	17.5424	0.0253	2618.1497
1.2981	1.0644	0.1680	12.1822	0.0176	1818.1595

Operational Emissions - Light Duty
SubTot Crew and QA/QC Mobilize (mi)

RT/day (mi)	Vehicle Days	Total Miles
60	23,497	1,409,820

NOX (ton)	ROG (ton)	PM (ton)	CO (ton)	SOX (ton)	CO2 (ton)
0.4806	0.3941	0.0622	4.5105	0.0065	673.1840

TOTAL Light Duty Autos and Trucks (vmt) 10,700,589

Medium to Heavy Duty Trucks

Operational Emissions - Medium Duty
Splicing/testing vans, dump trucks under 200hp
Miscellaneous hardware deliveries

RT/day (mi)	Vehicle Days	Total Miles
60	2,830	169,800
60	100	6000

Total Emissions for Vehicles

NOX (ton)	ROG (ton)	PM (ton)	CO (ton)	SOX (ton)	CO2 (ton)
0.2847	0.0690	0.0130	0.7047	0.0014	145.2415
0.0101	0.0024	0.0005	0.0249	0.0000	5.1322

TOTAL Medium Duty Trucks (vmt) 175,800

Heavy-Heavy Duty Trucks

Operational Emissions - Heavy Duty
Local material deliveries and waste removal
Port to marshalling yards material deliveries
Equipment deliveries
Water transportation
Fuel transportation

RT/day (mi)	Vehicle Days	Total Miles
60	20,336	1,220,160
150	1,050	157,500
60	482	28,920
60	5,561	333,660
60	2979	178,740

Total Emissions for Vehicles

NOX (ton)	ROG (ton)	PM (ton)	CO (ton)	SOX (ton)	CO2 (ton)
18.8767	1.4134	0.7252	6.8922	0.0265	2498.5489
2.4366	0.1824	0.0936	0.8897	0.0034	322.5163
0.4474	0.0335	0.0172	0.1634	0.0006	59.2201
5.1620	0.3865	0.1983	1.8847	0.0072	683.2430
2.7652	0.2070	0.1062	1.0096	0.0039	366.0099

TOTAL Heavy-Heavy Duty Trucks (vmt) 1,918,980

Onroad Vehicle Mix and Schedules

Source: Equipment mix and schedules by Art Holland, Sargent-Lundy Construction.

Total Vehicle Workdays

Light	Medium	Heavy
23,497.00	2,830.00	29,358.00

Segments 8A / 8B / 8C / 8D / 8E / 9A

18 months

Primary Equipment Description	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Onroad Vehicle Category	Light Duty Fractional Total Vehicle Workdays	Medium Duty Fractional Total Vehicle Workdays	Heavy Duty Fractional Total Vehicle Workdays
					133,396				
1/2 Ton Pick-up Truck, 4X4	200	2	76	8	1216	light	102.0		
1/2 Ton Pick-up Truck, 4X4	200	8	468	4	14976	light	1248.0		
1/2 Ton Pick-up Truck, 4X4	200	6	468	4	11232	light	936.0		
1 Ton Crew Cab 4X4	300	1	468	2	936	light	78.0		
30 Ton Boom Truck	300	1	468	2	936	heavy			78.0
Truck, Semi, Tractor	350	1	468	8	3744	heavy			312.0
Mechanic Truck	300	2	468	8	7488	heavy			624.0
Fuel Truck	300	2	468	8	7488	heavy			624.0
1 Ton Crew Cab 4X4	300	2	468	4	3744	light	312.0		
Water Trucks	350	3	468	10	14040	heavy			1170.0
Lowboy Trk/Trlr	500	1	70	6	420	heavy			35.0
1 Ton Crew Cab Flat Bed, 4X4	300	9	140	4	5040	light	420.0		
30 Ton Boom Truck	300	2	140	5	1400	heavy			117.0
4000 gallon Water Trucks	350	2	140	8	2240	heavy			187.0
10 cu.yd. Concrete Mixer Trucks	425	8	140	8	8960	heavy			747.0
1 Ton Crew Cab Flat Bed, 4X4	300	2	140	4	1120	light	94.0		
30 Ton Boom Truck	300	2	140	6	1680	heavy			140.0
40' Flat Bed Truck & Trailer	350	2	70	10	1400	heavy			117.0
30 Ton Boom Truck	300	2	140	8	2240	heavy			187.0
3/4 Ton Pick-up Truck, 4X4	300	4	140	4	2240	light	187.0		
1 Ton Crew Cab Flat Bed, 4X4	300	2	140	4	1120	light	94.0		
3/4 Ton Pick-up Truck, 4X4	300	2	140	5	1400	light	117.0		
1 Ton Crew Cab Flat Bed, 4X4	300	2	140	5	1400	light	117.0		
1 Ton Crew Cab Flat Bed, 4X4	300	4	152	8	4864	light	406.0		
Wire Trucks & Trailers	350	6	152	6	5472	heavy			456.0
Dump Truck (Trash)	350	1	152	6	912	heavy			76.0
3/4 Ton Pick-up Truck, 4X4	300	6	152	10	9120	light	760.0		
Man Lifts - Elliott Booms	350	2	152	8	2432	heavy			203.0
30 Ton Manitex	350	9	152	6	8208	heavy			684.0
22 Ton Manitex	350	1	152	8	1216	heavy			102.0
Static / OPGW Truck	350	1	152	2	304	heavy			26.0
Static / OPGW Tensioner	300	1	152	2	304	heavy			26.0
Fuel, Helicopter Support Truck	300	1	152	4	608	heavy			51.0
Low Boy Truck & Trailer	500	1	152	4	608	heavy			51.0
1 Ton Crew Cab 4X4	300	3	76	2	456	light	38.0		
Water Trucks	350	2	76	10	1520	heavy			127.0
Lowboy Trk/Trlr	500	1	76	4	304	heavy			26.0
Mulch Truck	350	1	76	8	608	heavy			51.0

Onroad Vehicle Mix and Schedules

Source: Equipment mix and schedules by Art Holland, Sargent-Lundy Construction.

Total Vehicle Workdays

Light	Medium	Heavy
23,497.00	2,830.00	29,358.00

Segments 9B / 9C
18 months

Primary Equipment Description	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Onroad Vehicle Category	Light Duty Fractional Total Vehicle Workdays	Medium Duty Fractional Total Vehicle Workdays	Heavy Duty Fractional Total Vehicle Workdays
					116,874				
1/2 Ton Pick-up Truck, 4X4	200	2	54	8	864	light	72.0		
1/2 Ton Pick-up Truck, 4X4	200	8	468	4	14976	light	1248.0		
1/2 Ton Pick-up Truck, 4X4	200	6	468	4	11232	light	936.0		
1 Ton Crew Cab 4X4	300	1	468	2	936	light	78.0		
30 Ton Boom Truck	300	1	468	2	936	heavy			78.0
Truck, Semi, Tractor	350	1	468	8	3744	heavy			312.0
Mechanic Truck	300	2	468	8	7488	heavy			624.0
Fuel Truck	300	2	468	8	7488	heavy			624.0
1 Ton Crew Cab 4X4	300	2	468	4	3744	light	312.0		
Water Trucks	350	3	468	10	14040	heavy			1170.0
Lowboy Trk/Trlr	500	1	57	6	342	heavy			29.0
1 Ton Crew Cab Flat Bed, 4X4	300	9	114	4	4104	light	342.0		
30 Ton Boom Truck	300	2	114	5	1140	heavy			95.0
4000 gallon Water Trucks	350	2	114	8	1824	heavy			152.0
10 cu.yd. Concrete Mixer Trucks	425	8	114	8	7296	heavy			608.0
1 Ton Crew Cab Flat Bed, 4X4	300	2	114	4	912	light	76.0		
30 Ton Boom Truck	300	2	114	6	1368	heavy			114.0
40' Flat Bed Truck & Trailer	350	2	57	10	1140	heavy			95.0
30 Ton Boom Truck	300	2	114	8	1824	heavy			152.0
3/4 Ton Pick-up Truck, 4X4	300	4	114	4	1824	light	152.0		
1 Ton Crew Cab Flat Bed, 4X4	300	2	114	4	912	light	76.0		
3/4 Ton Pick-up Truck, 4X4	300	2	114	5	1140	light	95.0		
1 Ton Crew Cab Flat Bed, 4X4	300	2	114	5	1140	light	95.0		
1 Ton Crew Cab Flat Bed, 4X4	300	4	108	8	3456	light	288.0		
Wire Trucks & Trailers	350	6	108	6	3888	heavy			324.0
Dump Truck (Trash)	350	1	108	6	648	heavy			54.0
3/4 Ton Pick-up Truck, 4X4	300	6	108	10	6480	light	540.0		
Man Lifts - Elliott Booms	350	2	108	8	1728	heavy			144.0
30 Ton Manitex	350	9	108	6	5832	heavy			486.0
22 Ton Manitex	350	1	108	8	864	heavy			72.0
Static / OPGW Truck	350	1	108	2	216	heavy			18.0
Static / OPGW Tensioner	300	1	108	2	216	heavy			18.0
Fuel, Helicopter Support Truck	300	1	108	6	648	heavy			54.0
Low Boy Truck & Trailer	500	1	108	4	432	heavy			36.0
1 Ton Crew Cab 4X4	300	3	54	2	324	light	27.0		
Water Trucks	350	2	54	10	1080	heavy			90.0
Lowboy Trk/Trlr	500	1	54	4	216	heavy			18.0
Mulch Truck	350	1	54	8	432	heavy			36.0

Onroad Vehicle Mix and Schedules

Source: Equipment mix and schedules by Art Holland, Sargent-Lundy Construction.

Total Vehicle Workdays

Light	Medium	Heavy
23,497.00	2,830.00	29,358.00

Segments 10A / 10B

18 months

Primary Equipment Description	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Onroad Vehicle Category	Light Duty Fractional Total Vehicle Workdays	Medium Duty Fractional Total Vehicle Workdays	Heavy Duty Fractional Total Vehicle Workdays
					110,610				
1/2 Ton Pick-up Truck, 4X4	200	2	54	8	864	light	72.0		
1/2 Ton Pick-up Truck, 4X4	200	8	468	4	14976	light	1248.0		
1/2 Ton Pick-up Truck, 4X4	200	6	468	4	11232	light	936.0		
1 Ton Crew Cab 4X4	300	1	468	2	936	light	78.0		
30 Ton Boom Truck	300	1	468	2	936	heavy			78.0
Truck, Semi, Tractor	350	1	468	8	3744	heavy			312.0
Mechanic Truck	300	2	468	8	7488	heavy			624.0
Fuel Truck	300	2	468	8	7488	heavy			624.0
1 Ton Crew Cab 4X4	300	2	468	4	3744	light	312.0		
Water Trucks	350	3	468	10	14040	heavy			1170.0
Lowboy Trk/Trlr	500	1	57	6	342	heavy			29.0
1 Ton Crew Cab Flat Bed, 4X4	300	9	86	4	3096	light	258.0		
30 Ton Boom Truck	300	2	86	5	860	heavy			72.0
4000 gallon Water Trucks	350	2	86	8	1376	heavy			115.0
10 cu.yd. Concrete Mixer Trucks	425	8	86	8	5504	heavy			459.0
1 Ton Crew Cab Flat Bed, 4X4	300	2	86	4	688	light	58.0		
30 Ton Boom Truck	300	2	86	6	1032	heavy			86.0
40' Flat Bed Truck & Trailer	350	2	43	10	860	heavy			72.0
30 Ton Boom Truck	300	2	86	8	1376	heavy			115.0
3/4 Ton Pick-up Truck, 4X4	300	4	86	4	1376	light	115.0		
1 Ton Crew Cab Flat Bed, 4X4	300	2	86	4	688	light	58.0		
3/4 Ton Pick-up Truck, 4X4	300	2	86	5	860	light	72.0		
1 Ton Crew Cab Flat Bed, 4X4	300	2	86	5	860	light	72.0		
1 Ton Crew Cab Flat Bed, 4X4	300	4	108	8	3456	light	288.0		
Wire Trucks & Trailers	350	6	108	6	3888	heavy			324.0
Dump Truck (Trash)	350	1	108	6	648	heavy			54.0
3/4 Ton Pick-up Truck, 4X4	300	6	108	10	6480	light	540.0		
Man Lifts - Elliott Booms	350	2	108	8	1728	heavy			144.0
30 Ton Manitex	350	9	108	6	5832	heavy			486.0
22 Ton Manitex	350	1	108	8	864	heavy			72.0
Static / OPGW Truck	350	1	108	2	216	heavy			18.0
Static / OPGW Tensioner	300	1	108	2	216	heavy			18.0
Fuel, Helicopter Support Truck	300	1	108	4	432	heavy			36.0
Low Boy Truck & Trailer	500	1	108	4	432	heavy			36.0
1 Ton Crew Cab 4X4	300	3	54	2	324	light	27.0		
Water Trucks	350	2	54	10	1080	heavy			90.0
Lowboy Trk/Trlr	500	1	54	4	216	heavy			18.0
Mulch Truck	350	1	54	8	432	heavy			36.0

Onroad Vehicle Mix and Schedules

Source: Equipment mix and schedules by Art Holland, Sargent-Lundy Construction.

Total Vehicle Workdays

Light	Medium	Heavy
23,497.00	2,830.00	29,358.00

Segments 7 / 5 / 4A

18 months

Primary Equipment Description	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Onroad Vehicle Category	Light Duty Fractional Total Vehicle Workdays	Medium Duty Fractional Total Vehicle Workdays	Heavy Duty Fractional Total Vehicle Workdays
					103,494				
1/2 Ton Pick-up Truck, 4X4	200	2	44	10	880	light	74.0		
1/2 Ton Pick-up Truck, 4X4	200	8	468	4	14976	light	1248.0		
1/2 Ton Pick-up Truck, 4X4	200	6	468	4	11232	light	936.0		
1 Ton Crew Cab 4X4	300	1	468	2	936	light	78.0		
30 Ton Boom Truck	300	1	468	2	936	heavy			78.0
Truck, Semi, Tractor	350	1	468	8	3744	heavy			312.0
Mechanic Truck	300	2	468	8	7488	heavy			624.0
Fuel Truck	300	2	468	8	7488	heavy			624.0
1 Ton Crew Cab 4X4	300	2	468	4	3744	light	312.0		
Water Trucks	350	3	468	10	14040	heavy			1170.0
Lowboy Trk/Trlr	500	1	55	6	330	heavy			28.0
1 Ton Crew Cab Flat Bed, 4X4	300	9	55	4	1980	light	165.0		
4000 gallon Water Trucks	350	2	55	8	880	heavy			74.0
10 cu.yd. Concrete Mixer Trucks	425	8	55	8	3520	heavy			294.0
1 Ton Crew Cab Flat Bed, 4X4	300	2	109	4	872	light	73.0		
40' Flat Bed Truck & Trailer	350	2	55	10	1100	heavy			92.0
3/4 Ton Pick-up Truck, 4X4	300	4	109	4	1744	light	146.0		
1 Ton Crew Cab Flat Bed, 4X4	300	2	109	4	872	light	73.0		
3/4 Ton Pick-up Truck, 4X4	300	2	109	5	1090	light	91.0		
1 Ton Crew Cab Flat Bed, 4X4	300	2	109	5	1090	light	91.0		
1 Ton Crew Cab Flat Bed, 4X4	300	4	88	8	2816	light	235.0		
Wire Trucks & Trailers	350	6	88	6	3168	heavy			264.0
Dump Truck (Trash)	350	1	88	6	528	heavy			44.0
3/4 Ton Pick-up Truck, 4X4	300	6	88	10	5280	light	440.0		
Man Lifts - Elliott Booms	350	6	88	8	4224	heavy			352.0
30 Ton Manitex / RT	350	9	88	6	4752	heavy			396.0
22 Ton Manitex / RT	350	1	88	8	704	heavy			59.0
Static / OPGW Truck	350	1	88	2	176	heavy			15.0
Static / OPGW Tensioner	300	1	88	2	176	heavy			15.0
Fuel, Helicopter Support Truck	300	1	88	4	352	heavy			30.0
Low Boy Truck & Trailer	500	1	88	4	352	heavy			30.0
1 Ton Crew Cab 4X4	300	3	44	2	264	light	22.0		
Water Trucks	350	2	44	10	880	heavy			74.0
Lowboy Trk/Trlr	500	1	44	4	176	heavy			15.0
Mulch Truck	350	2	44	8	704	heavy			59.0

Onroad Vehicle Mix and Schedules

Source: Equipment mix and schedules by Art Holland, Sargent-Lundy Construction.

Total Vehicle Workdays

Light	Medium	Heavy
23,497.00	2,830.00	29,358.00

Suncrest Substation

24 months

Primary Equipment Description	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Onroad Vehicle Category	Light Duty Fractional Total Vehicle Workdays	Medium Duty Fractional Total Vehicle Workdays	Heavy Duty Fractional Total Vehicle Workdays
					91,986				
Foreman Truck	180	1	624	4	2496	light	208.0		
1/2 Ton Pick-up Truck, 4X4	200	8	624	2	9984	light	832.0		
1/2 Ton Pick-up Truck, 4X4	200	6	624	2	7488	light	624.0		
Survey Truck	180	1	624	2	1248	light	104.0		
Mechanic Truck	250	1	624	10	6240	heavy			520.0
Dump Trucks	180	6	312	10	18720	medium		1560.0	
Large Rock / Dump Trucks	350	3	312	10	9360	heavy			780.0
Water Truck	180	3	312	10	9360	heavy			780.0
Survey Truck	180	1	312	2	624	light	52.0		
Soils Test Crew Truck	180	1	312	2	624	light	52.0		
Crew Trucks	180	2	234	4	1872	light	156.0		
Dump Trucks	180	2	234	4	1872	medium		156.0	
10 cu.yd. Concrete Mixer Trucks	425	4	234	10	9360	heavy			780.0
5-Ton Flatbed Truck	180	5	234	5	5850	heavy			488.0
Water Truck	180	1	234	10	2340	heavy			195.0
Pickup Trucks	180	4	156	2	1248	light	104.0		
Crew Trucks	180	2	156	2	624	light	52.0		
5-Ton Flatbed Truck	180	4	156	3	1872	heavy			156.0
Support Trucks	180	1	156	2	312	light	26.0		
Low Boy Truck & Trailer	500	1	156	1	156	heavy			13.0
Truck Tractor & Trailer	500	1	156	1	156	heavy			13.0
Pickup / Van Trucks	180	1	90	2	180	light	15.0		

Alpine U/G, Segment 6

24 months

Primary Equipment Description	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Onroad Vehicle Category	Light Duty Fractional Total Vehicle Workdays	Medium Duty Fractional Total Vehicle Workdays	Heavy Duty Fractional Total Vehicle Workdays
					78,006				
Foreman Truck	180	1	624	4	2496	light	208.0		
1/2 Ton Pick-up Truck, 4X4	200	8	624	2	9984	light	832.0		
1/2 Ton Pick-up Truck, 4X4	200	6	624	2	7488	light	624.0		
Mechanic Truck	250	1	624	8	4992	heavy			416.0
Survey Truck	180	1	624	2	1248	light	104.0		
1 Ton Crew Cab 4X4	300	1	624	3	1872	light	156.0		
30 Ton Boom Truck	300	1	624	2	1248	heavy			104.0
Truck, Semi, Tractor	350	1	624	3	1872	heavy			156.0
Mechanic Truck	300	2	624	6	7488	heavy			624.0
Fuel Truck	300	2	624	3	3744	heavy			312.0
Crew Trucks	180	2	390	5	3900	light	325.0		
30 Ton BoomTruck	300	1	390	3	1170	heavy			98.0
5 CY Dump Trucks	180	2	390	10	7800	medium		650.0	
10 cu.yd. Concrete Mixer Trucks	425	3	390	5	5850	heavy			488.0
5-Ton Flatbed Truck	180	2	390	5	3900	heavy			325.0
Water Truck	180	1	390	2	780	heavy			65.0
Hydro Vac	180	1	390	2	780	heavy			65.0
Pickup Trucks	180	2	234	2	936	light	78.0		
30 Ton Boom Truck	300	1	234	3	702	heavy			59.0
U/G Puller	300	1	234	10	2340	heavy			195.0
Splicing / Testing Vans	180	4	234	5	4680	medium		390.0	
Low Boy Truck & Trailer	500	1	234	2	468	heavy			39.0
Truck Tractor & Trailer	500	1	234	2	468	heavy			39.0
1 Ton Crew Cab 4X4	300	1	60	5	300	light	25.0		
5 CY Dump Trucks	180	2	60	5	600	medium		50.0	
Water Trucks	350	1	60	5	300	heavy			25.0
Lowboy Trk/Trlr	500	1	60	5	300	heavy			25.0
Mulch Truck	350	1	60	5	300	heavy			25.0

Onroad Vehicle Mix and Schedules

Source: Equipment mix and schedules by Art Holland, Sargent-Lundy Construction.

Total Vehicle Workdays

Light	Medium	Heavy
23,497.00	2,830.00	29,358.00

Reconduct 69kV, TL - 639

4 months

Primary Equipment Description	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Onroad Vehicle Category	Light Duty Fractional Total Vehicle Workdays	Medium Duty Fractional Total Vehicle Workdays	Heavy Duty Fractional Total Vehicle Workdays
					9,280				
1/2 Ton Pick-up Truck, 4X4	200	1	120	8	960	light	80.0		
1/2 Ton Pick-up Truck, 4X4	200	1	120	8	960	light	80.0		
1 Ton Crew Cab 4X4	300	1	16	8	128	light	11.0		
Water Trucks	350	1	16	8	128	heavy			11.0
Lowboy Trk/Trlr	500	1	16	8	128	heavy			11.0
3/4 Ton Pick-up Truck, 4X4	300	1	5	8	40	light	4.0		
1 Ton Crew Cab Flat Bed, 4X4	300	1	5	8	40	light	4.0		
65' Bucket Trucks	350	2	5	8	80	heavy			7.0
3/4 Ton Pick-up Truck, 4X4	300	1	60	8	480	light	40.0		
1 Ton Crew Cab Flat Bed, 4X4	300	1	60	8	480	light	40.0		
65' Bucket Trucks	350	2	60	8	960	heavy			80.0
1 Ton Crew Cab Flat Bed, 4X4	300	1	120	8	960	light	80.0		
3/4 Ton Pick-up Truck, 4X4	300	1	120	8	960	light	80.0		
65' Bucket Trucks	350	3	120	8	2880	heavy			240.0
1 Ton Crew Cab 4X4	300	1	5	4	20	light	2.0		
Water Trucks	350	1	5	8	40	heavy			4.0
Lowboy Trk/Trlr	500	1	5	4	20	heavy			2.0
Mulch Truck	350	1	2	8	16	heavy			2.0

Reconduct 69kV, TL - 6915

2 months

Primary Equipment Description	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Onroad Vehicle Category	Light Duty Fractional Total Vehicle Workdays	Medium Duty Fractional Total Vehicle Workdays	Heavy Duty Fractional Total Vehicle Workdays
					2,584				
1/2 Ton Pick-up Truck, 4X4	200	1	32	8	256	light	22.0		
1/2 Ton Pick-up Truck, 4X4	200	1	32	8	256	light	22.0		
1 Ton Crew Cab 4X4	300	1	4	8	32	light	3.0		
Water Trucks	350	1	4	8	32	heavy			3.0
Lowboy Trk/Trlr	500	1	4	8	32	heavy			3.0
3/4 Ton Pick-up Truck, 4X4	300	1	5	8	40	light	4.0		
1 Ton Crew Cab Flat Bed, 4X4	300	1	5	8	40	light	4.0		
65' Bucket Trucks	350	2	5	8	80	heavy			7.0
3/4 Ton Pick-up Truck, 4X4	300	1	16	8	128	light	11.0		
1 Ton Crew Cab Flat Bed, 4X4	300	1	16	8	128	light	11.0		
65' Bucket Trucks	350	2	16	8	256	heavy			22.0
1 Ton Crew Cab Flat Bed, 4X4	300	1	32	8	256	light	22.0		
3/4 Ton Pick-up Truck, 4X4	300	1	32	8	256	light	22.0		
65' Bucket Trucks	350	3	32	8	768	heavy			64.0
1 Ton Crew Cab 4X4	300	1	1	4	4	light	1.0		
Water Trucks	350	1	1	8	8	heavy			1.0
Lowboy Trk/Trlr	500	1	1	4	4	heavy			1.0
Mulch Truck	350	1	1	8	8	heavy			1.0

Onroad Vehicle Mix and Schedules

Source: Equipment mix and schedules by Art Holland, Sargent-Lundy Construction.

Total Vehicle Workdays

Light	Medium	Heavy
23,497.00	2,830.00	29,358.00

Reconduct 69kV, TL - 6924

2 months

Primary Equipment Description	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Onroad Vehicle Category	Light Duty Fractional Total Vehicle Workdays	Medium Duty Fractional Total Vehicle Workdays	Heavy Duty Fractional Total Vehicle Workdays
					2,712				
1/2 Ton Pick-up Truck, 4X4	200	1	32	8	256	light	22.0		
1/2 Ton Pick-up Truck, 4X4	200	1	32	8	256	light	22.0		
1 Ton Crew Cab 4X4	300	1	4	8	32	light	3.0		
Water Trucks	350	1	4	8	32	heavy			3.0
Lowboy Trk/Trlr	500	1	4	8	32	heavy			3.0
3/4 Ton Pick-up Truck, 4X4	300	1	5	8	40	light	4.0		
1 Ton Crew Cab Flat Bed, 4X4	300	1	5	8	40	light	4.0		
65' Bucket Trucks	350	2	5	8	80	heavy			7.0
3/4 Ton Pick-up Truck, 4X4	300	1	20	8	160	light	14.0		
1 Ton Crew Cab Flat Bed, 4X4	300	1	20	8	160	light	14.0		
65' Bucket Trucks	350	2	20	8	320	heavy			27.0
1 Ton Crew Cab Flat Bed, 4X4	300	1	32	8	256	light	22.0		
3/4 Ton Pick-up Truck, 4X4	300	1	32	8	256	light	22.0		
65' Bucket Trucks	350	3	32	8	768	heavy			64.0
1 Ton Crew Cab 4X4	300	1	1	4	4	light	1.0		
Water Trucks	350	1	1	8	8	heavy			1.0
Lowboy Trk/Trlr	500	1	1	4	4	heavy			1.0
Mulch Truck	350	1	1	8	8	heavy			1.0

Reconduct 69kV, TL - 6916

4 months

Primary Equipment Description	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Onroad Vehicle Category	Light Duty Fractional Total Vehicle Workdays	Medium Duty Fractional Total Vehicle Workdays	Heavy Duty Fractional Total Vehicle Workdays
					8,104				
1/2 Ton Pick-up Truck, 4X4	200	1	104	8	832	light	70.0		
1/2 Ton Pick-up Truck, 4X4	200	1	104	8	832	light	70.0		
1 Ton Crew Cab 4X4	300	1	14	8	112	light	10.0		
Water Trucks	350	1	14	8	112	heavy			10.0
Lowboy Trk/Trlr	500	1	14	8	112	heavy			10.0
3/4 Ton Pick-up Truck, 4X4	300	1	5	8	40	light	4.0		
1 Ton Crew Cab Flat Bed, 4X4	300	1	5	8	40	light	4.0		
65' Bucket Trucks	350	2	5	8	80	heavy			7.0
3/4 Ton Pick-up Truck, 4X4	300	1	52	8	416	light	35.0		
1 Ton Crew Cab Flat Bed, 4X4	300	1	52	8	416	light	35.0		
65' Bucket Trucks	350	2	52	8	832	heavy			70.0
1 Ton Crew Cab Flat Bed, 4X4	300	1	104	8	832	light	70.0		
3/4 Ton Pick-up Truck, 4X4	300	1	104	8	832	light	70.0		
65' Bucket Trucks	350	3	104	8	2496	heavy			208.0
1 Ton Crew Cab 4X4	300	1	5	4	20	light	2.0		
Water Trucks	350	1	5	8	40	heavy			4.0
Lowboy Trk/Trlr	500	1	5	4	20	heavy			2.0
Mulch Truck	350	1	5	8	40	heavy			4.0

Onroad Vehicle Mix and Schedules

Source: Equipment mix and schedules by Art Holland, Sargent-Lundy Construction.

Total Vehicle Workdays

Light	Medium	Heavy
23,497.00	2,830.00	29,358.00

San Luis Rey Substation Upgrade
40 Days

Primary Equipment Description	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Onroad Vehicle Category	Light Duty Fractional Total Vehicle Workdays	Medium Duty Fractional Total Vehicle Workdays	Heavy Duty Fractional Total Vehicle Workdays
					2,216				
Foreman Truck	180	1	40	4	160	light	14.0		
1/2 Ton Pick-up Truck, 4X4	200	1	40	4	160	light	14.0		
1/2 Ton Pick-up Truck, 4X4	200	1	40	4	160	light	14.0		
Mechanic Truck	250	1	40	10	400	heavy			34.0
Crew Trucks	180	3	40	4	480	light	40.0		
Dump Trucks	180	1	8	8	64	medium		6.0	
10 cu.yd. Concrete Mixer Trucks	425	1	20	4	80	heavy			7.0
5-Ton Flatbed Truck	180	1	40	4	160	heavy			14.0
Water Truck	180	1	40	5	200	heavy			17.0
Pickup Trucks	180	1	40	2	80	light	7.0		
Crew Trucks	180	1	40	2	80	light	7.0		
Low Boy Truck & Trailer	500	1	40	2	80	heavy			7.0
Truck Tractor & Trailer	500	1	40	2	80	heavy			7.0
Pickup / Van Trucks	180	1	4	8	32	light	3.0		

Sycamore Canyon Sub Upgrade
10 Days

Primary Equipment Description	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Onroad Vehicle Category	Light Duty Fractional Total Vehicle Workdays	Medium Duty Fractional Total Vehicle Workdays	Heavy Duty Fractional Total Vehicle Workdays
					623				
Foreman Truck	180	1	10	4	40	light	4.0		
1/2 Ton Pick-up Truck, 4X4	200	1	10	4	40	light	4.0		
1/2 Ton Pick-up Truck, 4X4	200	1	10	4	40	light	4.0		
Mechanic Truck	250	1	10	10	100	heavy			9.0
Crew Trucks	180	3	10	4	120	light	10.0		
Dump Trucks	180	1	4	8	32	medium		3.0	
10 cu.yd. Concrete Mixer Trucks	425	1	5	5	25	heavy			3.0
5-Ton Flatbed Truck	180	1	10	4	40	heavy			4.0
Water Truck	180	1	10	5	50	heavy			5.0
Pickup Trucks	180	1	20	2	40	light	4.0		
Crew Trucks	180	1	20	2	40	light	4.0		
Low Boy Truck & Trailer	500	1	20	1	20	heavy			2.0
Truck Tractor & Trailer	500	1	20	1	20	heavy			2.0
Pickup / Van Trucks	180	1	2	8	16	light	2.0		

Encina Substation Upgrade
10 Days

Primary Equipment Description	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Onroad Vehicle Category	Light Duty Fractional Total Vehicle Workdays	Medium Duty Fractional Total Vehicle Workdays	Heavy Duty Fractional Total Vehicle Workdays
					616				
Foreman Truck	180	1	10	4	40	light	4.0		
1/2 Ton Pick-up Truck, 4X4	200	1	10	4	40	light	4.0		
1/2 Ton Pick-up Truck, 4X4	200	1	10	4	40	light	4.0		
Mechanic Truck	250	1	10	10	100	heavy			9.0
Crew Trucks	180	3	10	4	120	light	10.0		
Dump Trucks	180	1	5	8	40	medium		4.0	
10 cu.yd. Concrete Mixer Trucks	425	1	5	4	20	heavy			2.0
5-Ton Flatbed Truck	180	1	5	4	20	heavy			2.0
Water Truck	180	1	5	4	20	heavy			2.0
Pickup Trucks	180	1	20	2	40	light	4.0		
Crew Trucks	180	1	20	2	40	light	4.0		
Low Boy Truck & Trailer	500	1	20	2	40	heavy			4.0
Truck Tractor & Trailer	500	1	20	2	40	heavy			4.0
Pickup / Van Trucks	180	1	2	8	16	light	2.0		

Onroad Vehicle Mix and Schedules

Source: Equipment mix and schedules by Art Holland, Sargent-Lundy Construction.

Total Vehicle Workdays

Light	Medium	Heavy
23,497.00	2,830.00	29,358.00

South Bay Substation Upgrade
20 Days

Primary Equipment Description	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Onroad Vehicle Category	Light Duty Fractional Total Vehicle Workdays	Medium Duty Fractional Total Vehicle Workdays	Heavy Duty Fractional Total Vehicle Workdays
					936				
Foreman Truck	180	1	10	4	40	light	4.0		
1/2 Ton Pick-up Truck, 4X4	200	1	10	4	40	light	4.0		
1/2 Ton Pick-up Truck, 4X4	200	1	10	4	40	light	4.0		
Mechanic Truck	250	1	10	10	100	heavy			9.0
Crew Trucks	180	3	10	4	120	light	10.0		
Dump Trucks	180	1	5	8	40	medium		4.0	
10 cu.yd. Concrete Mixer Trucks	425	1	5	4	20	heavy			2.0
5-Ton Flatbed Truck	180	1	5	4	20	heavy			2.0
Water Truck	180	1	5	4	20	heavy			2.0
65' Bucket Trucks	350	2	20	8	320	heavy			27.0
Pickup Trucks	180	1	20	2	40	light	4.0		
Crew Trucks	180	1	20	2	40	light	4.0		
Low Boy Truck & Trailer	500	1	20	2	40	heavy			4.0
Truck Tractor & Trailer	500	1	20	2	40	heavy			4.0
Pickup / Van Trucks	180	1	2	8	16	light	2.0		

IV Substation Upgrade
40 Days

Primary Equipment Description	HP Estimate	Primary Equip Quantity	Activity Schedule Estimate (Days)	Duration of Use (Hours/Day)	Total Hours of Utilization	Onroad Vehicle Category	Light Duty Fractional Total Vehicle Workdays	Medium Duty Fractional Total Vehicle Workdays	Heavy Duty Fractional Total Vehicle Workdays
					5,632				
Foreman Truck	180	1	40	4	160	light	14.0		
1/2 Ton Pick-up Truck, 4X4	200	1	40	4	160	light	14.0		
1/2 Ton Pick-up Truck, 4X4	200	1	40	4	160	light	14.0		
Mechanic Truck	250	1	40	10	400	heavy			34.0
Crew Trucks	180	10	40	8	3200	light	267.0		
Dump Trucks	180	1	10	8	80	medium		7.0	
10 cu.yd. Concrete Mixer Trucks	425	5	20	4	400	heavy			34.0
5-Ton Flatbed Truck	180	1	20	4	80	heavy			7.0
Water Truck	180	1	40	4	160	heavy			14.0
65' Bucket Trucks	350	2	40	8	640	heavy			54.0
Pickup Trucks	180	1	20	2	40	light	4.0		
Crew Trucks	180	1	20	2	40	light	4.0		
Low Boy Truck & Trailer	500	1	20	2	40	heavy			4.0
Truck Tractor & Trailer	500	1	20	2	40	heavy			4.0
Pickup / Van Trucks	180	1	4	8	32	light	3.0		

Estimated Deliveries from Port to Marshalling Yard and Miscellaneous Hardware

Material	No. Deliveries	Origin	SD Co R/T Miles	Imp Co R/T Miles
Transmission Lines				
Steel	500	Long Beach	150	60
Conductors	400	Long Beach	150	60
Misc Hardware	100	Local	60	60
Underground Structures				
Conductors	100	Long Beach	150	0
Substations				
Steel	40	Long Beach	150	0
Equipment	100	Local	60	0
Transformers	10	Long Beach	150	0

Onroad Emission Factors

Source: EMFAC2007 v.2.3, burden reports for San Diego County and Imperial Counties.

Composite fleet: 1990 - 2011 for light, medium, and heavy duty vehicle classes

Imperial County Vehicle Class	2011 Fleet (VMT/1000)
LDA-TOT	2,206
LDT1-TOT	686
LDT2-TOT	988
MDV-TOT	479
LHDT1-TOT	78
LHDT2-TOT	35
MHDT-TOT	68
HHDT-TOT	790

1990-2011 Composite Fleet County-Wide

NOX (ton/day)	ROG (ton/day)	PM (ton/day)	CO (ton/day)	SOX (ton/day)	CO2 (ton/day)
1.09	0.94	0.07	10.63	0.01	910.00
0.34	0.36	0.03	3.28	0.00	350.00
0.61	0.39	0.05	4.37	0.00	510.00
0.23	0.13	0.02	1.63	0.00	340.00
0.19	0.03	0.00	0.21	0.00	80.00
0.13	0.03	0.00	0.18	0.00	30.00
0.53	0.05	0.02	0.49	0.00	100.00
11.92	0.83	0.44	3.59	0.02	1640.00

NOX (lb/1000mi)	ROG (lb/1000mi)	PM (lb/1000mi)	CO (lb/1000mi)	SOX (lb/1000mi)	CO2 (lb/1000mi)
0.988	0.852	0.063	9.637	0.009	825.023
0.991	1.050	0.087	9.563	0.000	1020.408
1.235	0.789	0.101	8.846	0.000	1032.389
0.960	0.543	0.084	6.806	0.000	1419.624
4.872	0.769	0.000	5.385	0.000	2051.282
7.429	1.714	0.000	10.286	0.000	1714.286
15.588	1.471	0.588	14.412	0.000	2941.176
30.177	2.101	1.114	9.089	0.051	4151.899

San Diego County Vehicle Class	2011 Fleet (VMT/1000)
LDA-TOT	41,721
LDT1-TOT	7,475
LDT2-TOT	20,579
MDV-TOT	8,545
LHDT1-TOT	1,749
LHDT2-TOT	463
MHDT-TOT	1,139
HHDT-TOT	1,515

1990-2011 Composite Fleet County-Wide

NOX (ton/day)	ROG (ton/day)	PM (ton/day)	CO (ton/day)	SOX (ton/day)	CO2 (ton/day)
10.84	10.33	1.58	120.47	0.18	18160.00
2.21	1.85	0.30	20.96	0.04	4020.00
10.02	6.72	1.22	75.94	0.11	11220.00
5.04	2.77	0.50	33.88	0.06	6340.00
4.34	1.27	0.09	7.95	0.02	1700.00
1.73	0.31	0.03	1.71	0.00	390.00
8.86	0.51	0.30	6.06	0.02	1760.00
23.74	1.84	0.93	9.43	0.03	3080.00

NOX (lb/1000mi)	ROG (lb/1000mi)	PM (lb/1000mi)	CO (lb/1000mi)	SOX (lb/1000mi)	CO2 (lb/1000mi)
0.520	0.495	0.076	5.775	0.009	870.545
0.591	0.495	0.080	5.608	0.011	1075.585
0.974	0.653	0.119	7.380	0.011	1090.432
1.180	0.648	0.117	7.930	0.014	1483.909
4.963	1.452	0.103	9.091	0.023	1943.968
7.473	1.339	0.130	7.387	0.000	1684.665
15.558	0.896	0.527	10.641	0.035	3090.430
31.340	2.429	1.228	12.449	0.040	4066.007

Imperial / San Diego Composite Vehicle Class	2011 Fleet (VMT/1000)
Light Duty Autos and Trucks Composite	73,655
Medium to Heavy Trucks Composite	12,556
Heavy-Heavy Duty Trucks Composite	2,305

1990-2011 Composite Fleet County-Wide

NOX (ton/day)	ROG (ton/day)	PM (ton/day)	CO (ton/day)	SOX (ton/day)	CO2 (ton/day)
25.11	20.59	3.25	235.65	0.34	35170.00
21.05	5.10	0.96	52.11	0.10	10740.00
35.66	2.67	1.37	13.02	0.05	4720.00

NOX (lb/1000mi)	ROG (lb/1000mi)	PM (lb/1000mi)	CO (lb/1000mi)	SOX (lb/1000mi)	CO2 (lb/1000mi)
0.682	0.559	0.088	6.399	0.009	954.993
3.353	0.812	0.153	8.300	0.016	1710.736
30.941	2.317	1.189	11.297	0.043	4095.445

	LDA-TOT	LDT1-TOT	LDT2-TOT	MDV-TOT	LHDT1-TOT	LHDT2-TOT	MHDT-TOT	HHDT-TOT
Vehicles	56707	18455	25158	12284	1778	895	1255	4584
VMT/1000	2206	686	988	479	78	35	68	790
Trips	360622	115841	159587	78801	47687	21147	40209	25579
Reactive Organic Gas Emissions								
Run Exh	0.31	0.06	0.08	0.03	0.01	0.01	0.02	0.73
Idle Exh	0	0	0	0	0	0	0	0.08
Start Ex	0.28	0.07	0.09	0.04	0.01	0.01	0.02	0.01
Total Ex	0.58	0.13	0.16	0.07	0.02	0.02	0.04	0.82
Diurnal	0.08	0.03	0.03	0.01	0	0	0	0
Hot Soak	0.08	0.03	0.03	0.01	0	0	0	0
Running	0.15	0.14	0.14	0.03	0.01	0.02	0.02	0
Resting	0.04	0.02	0.02	0.01	0	0	0	0
Total	0.94	0.36	0.39	0.13	0.03	0.03	0.05	0.83
Carbon Monoxide Emissions								
Run Exh	7.66	2.42	3.24	1.2	0.07	0.07	0.22	3.1
Idle Exh	0	0	0	0	0.01	0	0.01	0.38
Start Ex	2.96	0.87	1.13	0.43	0.13	0.1	0.27	0.11
Total Ex	10.63	3.28	4.37	1.63	0.21	0.18	0.49	3.59
Oxides of Nitrogen Emissions								
Run Exh	0.9	0.27	0.47	0.18	0.11	0.09	0.47	10.92
Idle Exh	0	0	0	0	0	0	0.01	0.98
Start Ex	0.19	0.07	0.14	0.06	0.07	0.03	0.05	0.02
Total Ex	1.09	0.34	0.61	0.23	0.19	0.13	0.53	11.92
Carbon Dioxide Emissions (000)								
Run Exh	0.88	0.34	0.49	0.33	0.07	0.03	0.1	1.59
Idle Exh	0	0	0	0	0	0	0	0.06
Start Ex	0.03	0.01	0.02	0.01	0	0	0	0
Total Ex	0.91	0.35	0.51	0.34	0.08	0.03	0.1	1.64
Total Particulate Emissions								
Run Exh	0.02	0.01	0.02	0.01	0	0	0.01	0.37
Idle Exh	0	0	0	0	0	0	0	0.01
Start Ex	0	0	0	0	0	0	0	0
Total Ex	0.02	0.01	0.03	0.01	0	0	0.01	0.38
TireWear	0.02	0.01	0.01	0	0	0	0	0.03
BrakeWr	0.03	0.01	0.01	0.01	0	0	0	0.03
Total	0.07	0.03	0.05	0.02	0	0	0.02	0.44
Lead	0	0	0	0	0	0	0	0
SOx	0.01	0	0	0	0	0	0	0.02
Fuel Consumption (000 gallons)								
Gasoline	94.89	35.03	52.74	34.72	6.41	2.23	1.08	0.56
Diesel	0.04	0.95	0.05	0.04	1.18	0.85	8.34	147.57

< --- > Title : Imperial County
 Version : Emfac2007 V2.3 Nov 1 2006
 Run Date : 2009/03/24 10:12:17
 Scen Year: 2011 -- All model years in the range 1990 to 2011 selected
 Season : Annual
 Area : Imperial County
 I/M Stat : COO Basic (2005)
 Emissions: Tons Per Day

	LDA-TOT	LDT1-TOT	LDT2-TOT	MDV-TOT	LHDT1-TOT	LHDT2-TOT	MHDT-TOT	HHDT-TOT
Vehicles	1119140	190314	526402	205406	37111	10724	16879	7720
VMT/1000	41721	7475	20579	8545	1749	463	1139	1515
Trips	7091150	1204830	3330080	1305160	1037550	242394	523701	56672
Reactive Organic Gas Emissions								
Run Exh	2.35	0.32	1.28	0.72	0.26	0.1	0.3	1.62
Idle Exh	0	0	0	0	0.04	0.01	0.01	0.13
Start Exh	3.2	0.43	1.72	0.89	0.39	0.08	0.15	0.08
Total Ex	5.54	0.74	2.99	1.61	0.69	0.19	0.45	1.83
Diurnal	0.61	0.09	0.3	0.09	0	0	0	0
Hot Soak	1.09	0.17	0.54	0.18	0.04	0.01	0	0
Running	2.63	0.78	2.65	0.82	0.54	0.11	0.06	0.01
Resting	0.46	0.07	0.24	0.08	0	0	0	0
Total	10.33	1.85	6.72	2.77	1.27	0.31	0.51	1.84
Carbon Monoxide Emissions								
Run Exh	82.89	14.93	53.83	24	3.09	0.78	3.41	7.86
Idle Exh	0	0	0	0	0.24	0.05	0.08	0.61
Start Exh	37.59	6.03	22.11	9.88	4.62	0.87	2.58	0.96
Total Ex	120.47	20.96	75.94	33.88	7.95	1.71	6.06	9.43
Oxides of Nitrogen Emissions								
Run Exh	8.14	1.78	7.67	3.96	2.56	1.38	8.35	21.98
Idle Exh	0	0	0	0	0.03	0.02	0.11	1.59
Start Exh	2.71	0.43	2.35	1.08	1.75	0.33	0.4	0.17
Total Ex	10.84	2.21	10.02	5.04	4.34	1.73	8.86	23.74
Carbon Dioxide Emissions (000)								
Run Exh	17.59	3.91	10.89	6.16	1.65	0.38	1.74	2.99
Idle Exh	0	0	0	0	0.01	0	0.01	0.09
Start Exh	0.56	0.11	0.33	0.18	0.04	0.01	0.01	0
Total Ex	18.16	4.02	11.22	6.34	1.7	0.39	1.76	3.08
Total Particulate Emissions								
Run Exh	0.57	0.12	0.68	0.28	0.04	0.02	0.27	0.81
Idle Exh	0	0	0	0	0	0	0	0.02
Start Exh	0.05	0.01	0.06	0.02	0	0	0	0
Total Ex	0.62	0.13	0.74	0.3	0.05	0.02	0.27	0.82
TireWear	0.37	0.07	0.18	0.08	0.02	0.01	0.02	0.06
BrakeWr	0.59	0.11	0.29	0.12	0.02	0.01	0.02	0.05
Total	1.58	0.3	1.22	0.5	0.09	0.03	0.3	0.93
Lead	0	0	0	0	0	0	0	0
SOx	0.18	0.04	0.11	0.06	0.02	0	0.02	0.03
Fuel Consumption (000 gallons)								
Gasoline	1878.61	404.78	1161.05	653.74	149.48	26.4	13.91	3.77
Diesel	1.29	9.28	0.75	0.99	22.88	12.21	146.43	274.76

< --- > Title : San Diego
 Version : Emfac2007 V2.3 Nov 1 2006
 Run Date : 2009/03/23 17:00:09
 Scen Year: 2011 -- All model years in the range 1990 to 2011 selected
 Season : Annual
 Area : San Diego Air Basin Average
 I/M Stat : Enhanced Interim (2005) -- Using I/M schedule for area 38 San Diego (SD)
 Emissions: Tons Per Day

Fugitive Dust Generating Activity Estimates

Proposed Activity Sites and Areas							
(Activity Areas)	Imperial Valley	Anza Borrego	Central	Inland Valley	Coastal	Sycam-Elliot	
Source: Project Description Table B-3, B-7, B-9.	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	
Access Roads							
Proposed Transmission Line Access Roads	119.7	19.4	182.3	24.7	1.2	0.0	
Existing Transmission Line Access Roads	74.1	76.2	31.0	133.0	142.9	29.8	
Central East Substation							
Proposed Central East Substation			106.0				
Construction Staging Areas and Fly Yards							
Drew Road at I-8 in Imperial Valley	5.0						
Westmorland near the IID 161 kV line and SR-86	5.0						
Ocotillo Air Strip, north of SR-78 in Ocotillo Wells	15.0						
SDG&E property adjacent to Borrego Substation		5.0					
Central East Substation (batch plant and fly yard)			15.0				
Warners Substation at intersection of SR-79 and S-2			4.0				
SDG&E property at existing Santa Ysabel Substation			4.0				
Gunn Stage Road at entrance to Mount Gower Preserve				2.0			
SDG&E parcel at Ashley Road and Creelman Lane				5.0			
East of existing Chicarita Substation					5.0		
Total Activity Sites and Areas (acres)	218.8	100.6	342.3	164.7	149.1	29.8	
Duration of Activity (months)	18	18	22	22	12	2	
Total Acre-Months	3,938	1,811	7,531	3,623	1,789	60	
Assume: Sycamore Canyon-Elliot activity occurs over existing 30 ft access road over 8.2 miles = 29.8 acres.							

Proposed Access Roads							
(Grading)	Imperial Valley	Anza Borrego	Central	Inland Valley	Coastal	Sycam-Elliot	
Source: Project Description Table B-3.	(mi)	(mi)	(mi)	(mi)	(mi)	(mi)	
Proposed Transmission Line Access Roads	49.4	8	36.4	8	0.4	0	

Proposed Towers and Poles								
(Excavation, Material Unloading)	Average Excavation	Imperial Valley	Anza Borrego	Central	Inland Valley	Coastal	Sycam-Elliot	All Links
Source: Project Description Table B-1, B-6, B-16.	(cu.yd per #)	#	#	#	#	#	#	(cu.yd)
500 kV Structures								
Tangent lattice	35	132	102	37				9,485
Dead-end lattice	79	5						395
Larger angle lattice	50	24						1,200
Tangent H-frame	75		38					2,850
Tangent tubular steel poles	75	47	4					3,825
230 kV Structures								
Tangent lattice	35							0
Dead-end lattice	79							0
Larger angle lattice	50							0
Tangent tubular steel poles	50			117	120	48		14,250
Dead-end tubular steel poles	95			2	4	2		760
Larger angle tubular steel poles	63							0
69 kV Structures								
Tubular steel poles	32			139				4,448
Wood poles	3						11	33
Avg Rate of Excavation - Total per Link								
Tower and Pole Foundations	(cu.yd/day)	(cu.yd)	(cu.yd)	(cu.yd)	(cu.yd)	(cu.yd)	(cu.yd)	(cu.yd)
	250	9,740	6,720	11,783	6,380	2,590	33	37,246

Trenching for Underground Transmission Line								
(Grading, Excavation, Material Unloading)	Excavation Cross-Sect	Imperial Valley	Anza Borrego	Central	Inland Valley	Coastal	Sycam-Elliot	All Links
Source: Project Description Section B.4.1.2.	(sq.ft)	(mi)	(mi)	(mi)	(mi)	(mi)	(mi)	(cu.yd)
Underground Duct Bank								
69/92 kV	36		6.6					
230 kV Single Circuit	42					4.3		
230 kV Vertical - Double Circuit	84				4.7			
Total Trenching (miles)		0	6.6	0	4.7	4.3		
Avg Rate of Excavation - Total per Link								
Underground Duct Bank	(cu.yd/day)	(cu.yd)	(cu.yd)	(cu.yd)	(cu.yd)	(cu.yd)	(cu.yd)	(cu.yd)
	400	0	46,464	0	77,205	35,317	0	158,987

Fugitive Dust Emissions by Activity

Source: Emission factors from USEPA AP-42 and South Coast Air Quality Management District, where noted.
 VMT has been updated according to schedule from Sargent & Lundy.
 Proposed Access Road and Trench Restoration grading mileage has been updated to reflect length of project Activity, Bulldozing of Overburden, and Excavation information has not been changed.

SubTotals of Fugitive Dust Emissions

Overall Fugitive Dust Emissions	PM10
	(ton)
Overall Proposed Proj.	399.4

Activity Sites and Areas		Source: "Improvement of Specific Emission Factors (BACM Project No. 1), Final Report", prepared for South Coast AQMD by Midwest Research Institute, March 1996		22 = activity days/mo				Overall	
		tonPM10/acre-month	PM2.5 fraction (SCAQMD Methodology for PM 2.5, October 2006)	Activity Areas (acre-mo)	Activity Areas (ac-day)	PM10 (lb/day)	PM2.5 (lb/day)	Activity Areas (acre-mo)	PM10 (ton)
E = Level 2 Factor = tonPM10/ac-month	0.011								
f = 0.21 for PM2.5	0.21								
Control Effectiveness (watering) =	75.0%								
			<u>Emission Factors</u>						
			5.5000 lbPM10 (per acre activity-per mo)	18,752	852	213.09	---	18,752	51.6
			1.1550 lbPM2.5 (per acre activity-per mo)	18,752	852	---	44.75	18,752	---

Grading (Proposed Access Roads and Trench Restoration)		Source: USEPA AP-42, Table 11.9-1, 10/98		4 = passes				Overall	
			<u>Emission Factors</u>	(mi/12hr)	(vmt/day)	(lb/day)	(lb/day)	Grading (miles)	Grading (vmt grader)
E = 0.60 * (0.051)(S^2.0) = lbPM10/VMT			0.069 lbPM10 (per VMT grader)	36	36	2.479	---	117.8	471.2
E = 0.031 * (0.040)(S^2.5) = lbPM2.5/VMT			0.005 lbPM2.5 (per VMT grader)	36	36	---	0.174	117.8	471.2
S = mean vehicle speed =	3.0	mph (estimate for grader)							
Control Effectiveness (watering) =	75.0%								

Grading (Bulldozing of Overburden)		Source: USEPA AP-42, Table 11.9-1, 10/98		Doz/Grad/Scrap				Overall	
			<u>Emission Factors</u>	(hr/day)	(hr/day)	(lb/day)	(lb/day)	Doz/Grad/Scrap (hr)	PM10 (ton)
E = 0.75 * (s^1.5) / (M^1.4) = lbPM10/hr			0.573 lbPM10 (per hr bulldozer or grader)	24	24	13.76	---	70,200	20.1
E = 0.105 * 5.7 * (s^1.2) / (M^1.3) = lbPM2.5/hr			0.309 lbPM2.5 (per hr bulldozer or grader)	24	24	---	7.41	70,200	---
s = silt content =	8.50	percent (average for construction sites, USEPA AP-42 Table 13.2.2-1)							
M = moisture content =	12.00	percent (SCAQMD CEQA Handbook Table A9-9-G-1, with watering)							

Excavation / Trenching (Removal of Overburden)		Source: USEPA AP-42, Table 11.9-2 (dragline operations), 10/98		Excavation				Overall	
			<u>Emission Factors</u>	(yd3/day)	(yd3/day)	(lb/day)	(lb/day)	Excavation (cu.yd)	PM10 (ton)
E = 0.75 * 0.0021 (d^0.7)/(M^0.3) = lbPM10/yd3			0.0023 lbPM10 (per yd3 excavated)	650	650	1.50	---	196,233	0.226
E = 0.017 * 0.0021 (d^1.1)/(M^0.3) = lbPM2.5/yd3			0.0001 lbPM2.5 (per yd3 excavated)	650	650	---	0.06	196,233	---
d = drop height =	5	ft (estimate)							
M = moisture content =	12.00	percent (SCAQMD CEQA Handbook Table A9-9-G-1, with watering)							

Material Unloading/Loading		Source: USEPA AP-42, p. 13.2.4-3, 11/06		4 = transfers				Overall	
				Excavation (yd3/day)	Unloading (yd3/day)	PM10 (lb/day)	PM2.5 (lb/day)	Excavation (cu.yd)	Unloading (cu.yd)
E = (k)(0.0032)[(U/5)^1.3]/[(M/2)^1.4] = lb/ton									
U = average wind speed =	15.00	mph (upper bound wind, p.13.2.4-4)							
M = moisture content =	12.00	percent (SCAQMD CEQA Handbook Table A9-9-G-1, with watering)							
lb of material / yd3 =	2600.00	for moist soil							
			<u>Emission Factors</u>						
k = 0.35 for PM10	0.35	for PM10	0.00049 lbPM10 (per yd3 unloaded)	650	2600	1.29	---	196,233	784,931
k = 0.053 for PM2.5	0.05	for PM2.5	0.00007 lbPM2.5 (per yd3 unloaded)	650	2600	---	0.19	196,233	784,931

Fugitive Dust Emissions by Activity

Source: Emission factors from USEPA AP-42 and South Coast Air Quality Management District, where noted.
 VMT has been updated according to schedule from Sargent & Lundy.
 Proposed Access Road and Trench Restoration grading mileage has been updated to reflect length of project Activity, Bulldozing of Overburden, and Excavation information has not been changed.

SubTotals of Fugitive Dust Emissions
Overall Fugitive Dust Emissions

Overall Proposed Proj.

PM10
(ton)
399.4

Equipment on Unpaved/Industrial Roads											
Source: USEPA AP-42, Section 13.2.2, 11/06											
E = k (s/12) ^{0.9} (W/3) ^{0.45} = lb/vmt											
s = silt content = 8.50 percent (average for construction sites, USEPA AP-42 Table 13.2.2-1)											
Control Effectiveness (watering) = 75.0%											
	k	W	Emission Factors		VMT Class	VMT Unpave	PM10	PM2.5	VMT Class	VMT Unpave	Overall
	(lb/vmt)	(ton)	(lb/vmt)		(VMT/day)	(VMT/day)	(lb/day)	(lb/day)	(vmt)	(vmt)	(ton)
Light Duty Vehicles (PM10)	1.5	2	0.2291	lbPM10 (per LDA vmt unpaved)	27,300	4,095	938.13	---	10,700,589	1,605,088	183.9
Medium to Heavy Duty Trucks (PM10)	1.5	13	0.5319	lbPM10 (per MDT vmt unpaved)	1,860	279	148.40	---	175,800	26,370	7.0
Heavy-Heavy Duty Trucks (PM10)	1.5	30	0.7749	lbPM10 (per HHDT vmt unpaved)	18,798	2,820	2184.97	---	1,918,980	287,847	111.5
Light Duty Vehicles (PM2.5)	0.15	2	0.0229	lbPM2.5 (per LDA vmt unpaved)	27,300	4,095	---	93.81	10,700,589	1,605,088	---
Medium to Heavy Duty Trucks (PM2.5)	0.15	13	0.0532	lbPM2.5 (per MDT vmt unpaved)	1,860	279	---	14.84	175,800	26,370	---
Heavy-Heavy Duty Trucks (PM2.5)	0.15	30	0.0775	lbPM2.5 (per HHDT vmt unpaved)	18,798	2,820	---	218.50	1,918,980	287,847	---

Equipment on Paved Roads											
Source: USEPA AP-42, Section 13.2.1, 11/06.											
E = k (sL/2) ^{0.65} (W/3) ^{1.5} - C = lb/vmt											
sL = road surface silt loading (grams per square meter) (g/m2) = 0.06 g/m2, medium ADT roads (USEPA AP-42 Table 13.2.1-3)											
C = correction factor to remove exhaust											
W = fleet average weight of the heavy vehicles = 6.350 ton (fleet average weight)											
	W	VMT All			VMT All	VMT Paved	PM10	PM2.5	VMT All	VMT Paved	Overall
	(ton)	(vmt)			(VMT/day)	(VMT/day)	(lb/day)	(lb/day)	(vmt)	(vmt)	(ton)
Light Duty Vehicles (PM10)	2	10,700,589			47,958	40,764	186.45	---	12,795,369	10,876,064	24.9
Medium to Heavy Duty Trucks (PM10)	13	175,800			47,958	40,764	---	16.17	12,795,369	10,876,064	---
Heavy-Heavy Duty Trucks (PM10)	30	1,918,980									
	k	C Emission Factors			VMT All	VMT Paved	PM10	PM2.5	VMT All	VMT Paved	Overall
	(lb/vmt)	(lb/vmt)	(lb/vmt)		(VMT/day)	(VMT/day)	(lb/day)	(lb/day)	(vmt)	(vmt)	(ton)
Fleet Average (PM10)	0.016	0.00047	0.004574	lbPM10 (per vmt on paved road)	47,958	40,764	186.45	---	12,795,369	10,876,064	24.9
Fleet Average (PM2.5)	0.0024	0.00036	0.000397	lbPM2.5 (per vmt on paved road)	47,958	40,764	---	16.17	12,795,369	10,876,064	---