LAND 10 AIR QUALITY ASSESSMENT

1.0 EXECUTIVE SUMMARY

The potential impacts of SCE activities associated with the operation and maintenance of the Big Creek Project to regional air quality are presented in this assessment. The Big Creek area is located in the San Joaquin Valley Air Basin and is under the regulatory control of the San Joaquin Valley Air Pollution Control District (SJVAPCD). Regulation VIII of the SJVAPCD air quality rules was developed for fugitive dust sources and are applicable to anthropogenic dust sources. Fugitive dust emissions contain fine particulate matter (PM_{10}) particle and control of fugitive dust will reduce PM_{10} emissions.

In the Big Creek Project area, PM_{10} is generated from vehicles used by SCE, resources agencies (state and federal), commercial businesses, and the general public. Most of the Project lies above 3,000 feet msl the SJVAPCD would not typically require PM_{10} quantification in an environmental review for a project above 3,000 feet msl.

PM_{10} emissions from SCE's use of study area roads below 3,000 feet msl are approximately 6.3 tons per year. The SJVAPCD applies a significance criterion of 15 tons per year to new projects in the San Joaquin Valley (pers comm., Hector Guerra, Senior Air Quality Planner, SJVAPCD). As such, the calculated emissions from SCE's use of study area roads below 3,000 feet is well below the SJVAPCD criterion.

The study provides a calculation of the equivalent emissions that would be produced if the electricity derived from the Big Creek hydroelectric system were instead produced by a combined-cycle, gas-fired power plant. This is the most likely type of new or replacement power to be obtained in California under current and reasonably foreseeable conditions, as development of new hydroelectric or nuclear generation sites are not currently being proposed anywhere in the state.

2.0 STUDY OBJECTIVES

- Identify impacts associated with existing and proposed Project operations and maintenance activities on fugitive dust and develop measures, if needed, to decrease dust emissions.

- Identify PM_{10} generation resulting from Project operations and maintenance activities.

- Provide a comparison of air emissions from a natural gas-fired combined-cycle generating station with a hydroelectric generating unit (of the same size).

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3.0 STUDY IMPLEMENTATION

3.1 STUDY ELEMENTS COMPLETED

- Determined applicable rules/regulations/requirements.
- Evaluated the existing road surface of each study area road.
- Evaluated use of study area roads.
- Quantified Project-related dust emissions associated with study area roads.
- Used existing studies, if available, to evaluate the contribution of the Project to regional air quality degradation.
- Coordinated with other land management agencies and the local air district to determine acceptable methods of dust reduction.
- Evaluated air emission offsets associated with the Big Creek hydroelectric generation.
- Quantified air emissions (in tons per year) associated with the increase in fossil-fuel generation required to offset a decrease in hydroelectric generation.
- Summarized existing air quality permits held by the Big Creek hydroelectric system.

3.2 OUTSTANDING STUDY ELEMENTS

- Propose, if needed, environmentally sound and economic measures to reduce dust generation.

4.0 STUDY METHODOLOGY

4.1 REGULATORY FRAMEWORK REVIEW

The Big Creek study area is located in the San Joaquin Valley Air Basin and is under the regulatory control of the SJVAPCD. SJVAPCD regulations and guidance documents were reviewed for air quality requirements applicable to the operation and maintenance of the Big Creek Project. In addition, SJVAPCD staff members were consulted for clarification on the guidance documents and methods used to quantify PM_{10} emissions.

Section 4.0 of Regulation VIII exempts all activities conducted at or above an elevation of 3,000 feet mean sea level (msl) from dust control measures. Therefore, a detailed quantification of PM_{10} emissions and development of mitigation for PM_{10} reductions are not required for the Big Creek Project, as most of its activities are conducted at or above an elevation of 3,000 feet msl.

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4.2 FUGITIVE DUST PM_{10} EMISSIONS CALCULATIONS

The major source of fugitive dust PM_{10} emissions is from vehicle traffic on paved and unpaved roads. Fugitive dust PM_{10} emissions were estimated for study area roads below an elevation of 3,000 feet msl that are used during the operations and maintenance of the Project. A total of 13 road segments in the study area were identified as being located below 3,000 feet (Table LAND 10-1). Study area roads below 3,000 feet in elevation include those associated with SCE facilities at Dams 5 and 6, Mammoth Pool Powerhouse, and Big Creek No. 3 Powerhouse. Twelve of the 13 road segments are closed to public vehicle access and are used primarily by SCE for the operation and maintenance of the Project. The remaining road segment is a portion of Mammoth Pool Powerhouse Road located between Minarets Road and the powerhouse that is open to public access and is also used by SCE vehicles. Estimates of Fugitive Dust PM_{10} emissions from SCE vehicles along these 13 road segments were calculated based on road use as recorded in vehicle logs. An estimate of fugitive dust emissions generated by SCE vehicles was based on data obtained from vehicle logs for the period between July 1 to December 31, 2002. The collection of vehicle trip data (i.e., vehicle logs) was performed as part of the LAND 6, Traffic and Circulation Study, that was conducted in 2002 (SCE 2003).

Annual PM_{10} emissions for the roads are estimated using methods established by the South Coast Air Quality Management District's CEQA Air Quality Handbook (1993). The following calculations from this Handbook were used:

$E = VMT \times F$

E = PM_{10} Emissions in lbs./day

VMT = Vehicle Miles Traveled in mi./day

F = Emission Factor in lbs./mi.

Vehicle Miles Traveled (VMT) is equivalent to the length of the road segment per vehicle trip. Emission factors (F) vary depending on road surface type and types of vehicles using the roads. The following summarizes a standard emission factor for paved roads and calculations used to determine the emission factor for unpaved roads.

Paved Roads F = 0.33 lbs./mi. (CEQA Handbook default factor)

Unpaved Roads $F = 2.1 \times [G/12] \times [H/30] \times \{[J/3]^{0.7}\} \times \{[I/4]^{0.5}\} \times \{[365 - K]/365\} = 1.16$ lbs./mi.

G = % Surface silt loading

H = Mean vehicle speed in miles per hour (mph)

I = Mean number of wheels on vehicles

J = Mean vehicle weight in tons

K = Mean number of days per year with at least 0.01 inches precipitation

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For the Project the following factors were applied:

G = 12%

H = 15mph

I = 4.5 wheels (vehicle characterization results from Traffic and Circulation study)

J = 3.75 tons (vehicle characterization results from Traffic and Circulation study)

K = 40 days

Total annual PM_{10} emissions from roads below 3,000 feet elevation were estimated for all SCE vehicle trips along all 13 road segments. Estimated PM_{10} emissions were then compared to the SJVAPCD criterion of 15 tons/year.

4.3 AIR EMISSION OFFSETS OF HYDRO GENERATION (EQUIVALENT AIR EMISSIONS FROM FOSSIL-FUEL GENERATION)

If power generation from Big Creek is reduced, it will most likely be made up by increased production of power by natural gas-fired combined-cycle generating stations operating with current Best Available Control Technology (BACT) emission controls for nitrogen oxides (NO_X), carbon monoxide (CO), reactive organic compounds (ROC), fine particulate matter (PM_{10}), and sulfur oxides (SO_X).

In order to calculate the air emissions from a natural gas-fired generating station, the permit conditions contained in a May 2003 South Coast Air Quality Management District (SCAQMD) Permit to Construct (PTC) for a new 250 MW combined-cycle gas turbine generating unit were used as a guide. This is a reasonable assumption, since generation reductions from Big Creek would likely be made up by a natural gas generating station in the SCAQMD jurisdiction. The South Coast Air Basin has long been classified as a serious non-attainment area for multiple national ambient air quality standards. Construction of additional sources of air emissions to replace lost hydro generation would increase the difficulties of achieving air quality standards in that basin. However, with the relatively easy transportation and availability of natural gas, a combined-cycle gas turbine generating unit could also be constructed in the Central Valley, which would increase the difficulties of achieving air quality standards there as well.

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The values below are emissions factors for PM_{10} and SO_X taken from USEPA AP-42, Section 3.1, Stationary Gas Turbines, April 2000. BACT concentrations listed below are corrected to 15% oxygen in stack gas:

Best Available Control Technology - Emission Rate	Nitrogen Oxide (NO_X)	Carbon Monoxide (CO)	Reactive Organic Compounds (ROC)	Paticulate Matter (PM_{10})	Sulphur Oxides (SO_X)	Ammonia (NH_3)
Parts per million (gr/dscf for PM_{10})	2.0	2.0	2.0	0.0015	0.12	5.0
Pounds per million BTU	0.0074	0.0045	0.0026	0.0066	0.0006	0.0068

The SCAQMD permit conditions are used to convert these emission factors to values of lbs/MW-hr.

For comparison purposes, the air emissions from a natural gas-fired power plant are calculated and reported as both pounds per hour (lbs/hr) and tons per year (tons/yr). The values are reported in Section 5 below as unit values (value per MW capacity) so that any case of Big Creek power reduction can be calculated.

4.4 REVIEW EXISTING AIR QUALITY PERMITS

A review and summary was conducted of the permits issued to SCE by the SJVAPCD for the operation of internal combustion engine equipment and aboveground storage tanks.

5.0 STUDY RESULTS AND ANALYSIS

5.1 REGULATORY FRAMEWORK REVIEW

The San Joaquin Valley Air Basin (SJVAB) was classified as a serious non-attainment area of national ambient air quality standards for PM_{10} in 1993. It has subsequently been classified as a serious non-attainment area for other air quality standards. The SJVAB extends from the crest of the Sierra Nevada Mountains including the entire San Joaquin River watershed, across the valley and up to the crest of the coastal range. The SJVAPCD Regulation VIII is the rule regulating activities that generate fugitive dust within the SJVAB. This regulation was adopted by the SJVAPCD to better meet the requirements of the Environmental Protection Agency (EPA) to meet Clean Air Act requirements.

Several components of SJVAPCD guidance documents indicate that a detailed quantification of PM_{10} emissions and development of mitigation for PM_{10} reductions, are not required for the Big Creek Project. SJVAPCD Regulation VIII (Fugitive PM_{10} Prohibitions), as well as a PM_{10} Attainment Demonstration Plan have been developed for the basin to control PM_{10}. These rules exempt all activities conducted at or above an elevation of 3,000 feet msl from dust control measures (Regulation VIII, 2001). According to SJVAPCD this exemption was enacted because studies within the air

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district have indicated that mountainous areas do not significantly contribute to PM_{10} non-attainment in the district (pers. comm., Hector Guerra, Senior Air Quality Planner, SJVAPCD).

In SJVAPCD's "Guide for Assessing and Mitigating Air Quality Impacts" (GAMAQI 1998), the district outlined procedures for addressing air quality in environmental impact analyses. According to this guide, SJVAPCD does not recommend a quantitative analysis of PM_{10} emissions unless sensitive receptors (i.e. schools, hospitals, rest homes) will experience significant adverse affects from cumulative emissions from the Project. Other than the Big Creek School in the community of Big Creek, the study area does not include any sensitive receptors within its geographic limits. The Big Creek School lies at an elevation above 3,000 feet and due to paved road surface and limited traffic in the area, is not expected to experience adverse effect from cumulative emissions as what would otherwise be observed at locations in the Central Valley at elevation below 3,000 feet msl. In addition, with prevailing winds originating from the west, any neighboring schools and/or sensitive receptors in the valley are upwind of the study area. Therefore, PM_{10} emissions from use of study area roads are not considered to have adverse affects to sensitive receptors.

When quantification of PM_{10} emissions is required to assess impacts to sensitive receptors, SJVAPCD staff suggest using the CEQA Air Quality Handbook developed by the South Coast Air Quality Management District (1993), which includes significance criteria (pers comm., Hector Guerra, Senior Air Quality Planner, SJVAPCD). The significance threshold in this Handbook for PM_{10} is 15 tons a year for any project, regardless of size or scope.

5.2 ESTIMATION OF PM_{10} EMISSIONS

Activities associated with the operation and maintenance of the Big Creek Project contributes little PM_{10} to the study area. Typically PM_{10} is generated from vehicles and trucks used by SCE, public agencies, visiting public, and residents within the study area. The SJVAPCD requires dust control for roads below 3,000 feet that experience a traffic load of greater than 75 vehicles per day. A review of the SCE vehicle log data collected during 2002 as part of the LAND 6, Traffic/Circulation Study (SCE 2003) indicate that the greatest number of daily vehicle trips recorded along these 13 road segments was 34 vehicle trips. As such, no dust control recommendation is needed. In addition, 12 of the 13 road segments below 3,000 feet in the study area are already paved, providing the highest level of dust reduction.

Although, quantification of PM_{10} emissions was not required for these road segments, an estimation of PM_{10} emission was still conducted. Table LAND 10-1 provides an estimate of the PM_{10} emissions and summarizes the 13 road segments below 3,000 feet elevation, the road length and surface, and the number of vehicle trips along each segment. The vehicle trip data was based on six months of SCE vehicle logs. Therefore, when estimating annual emissions based on six months of SCE vehicle log data, the emission value was multiplied by a factor of two to yield annual emissions. The sum of the estimated PM_{10} emissions from SCE vehicle traffic along these 13 study

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area road segments is approximately 6.3 tons/per year. This estimated value is below the 15 tons per year guidance value used by the SJVAPCD to determine if the air emissions have reached a significant level.

5.3 AIR EMISSION OFFSETS OF HYDRO GENERATION (EQUIVALENT AIR EMISSIONS FROM FOSSIL-FUEL GENERATION)

Using the assumptions and methods described in Section 4 above, the equivalent emissions per MW-hour for NO_X, CO, ROC, PM_{10}, SO_X, and NH_3 are listed below:

Unit Emissions	NO_X	CO	ROC	PM_{10}	SO_X	NH_3
Pounds per megawatt-hour	0.053	0.033	0.019	0.048	0.004	0.049
Tons per megawatt-year	0.234	0.143	0.082	0.210	0.019	0.216

These tabulated values represent the emissions, in pounds per megawatt-hour and tons per megawatt-year, that a natural gas-fired combined-cycle generating station would emit per MW capacity. That is, if the capacity of Big Creek is reduced by 2 MW as a result of license condition requirements, the corresponding increase in air emissions as a result of a natural gas power plant making up the reduction is given by the values above multiplied by 2.

5.4 SCE AIR PERMITS

SCE holds permits for internal combustion engine equipment and aboveground storage tanks according to SJVAPCD requirements. SCE has seven permits for emergency generators, transportable air compressors, and snow blowing equipment (Table LAND 10-2). SCE maintains four aboveground storage tanks used to store fuels which are also permitted (Table LAND 10-3).

Three of the above mentioned engines are spark ignited internal combustion engines that are greater then 50 horsepower and operate on propane. They are permitted as emergency standby units as required by the SJVAPCD Rule 4702, section 6.1 that operate less than 200 hours per year and are exempt from emissions testing as outlined in Section 4.2 of SJVAPCD Rule 4702. The remaining four engines are diesel powered and must have approved crankcase ventilation systems, hours of operation is to be logged, engines to have 4 degree timing retard, must use low sulfur content diesel fuel, and must not discharge air contaminants that exceeds Ringelmann 1 standard opacity as required in District Rule 4101.

These engines are inspected annually by the SJVAPCD.

District rule 4622 requires routine gasoline vapor recovery system inspections on aboveground fuel tanks based on the amount of fuel dispensed and also requires an Operations and Maintenance Manual to document required inspections, a repair log and also must have a document that includes testing requirements and testing schedule for

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the vapor recovery system. Inspections are conducted annually by the SJVAPCD on the four aboveground storage tanks

6.0 LITERATURE CITED

San Joaquin Valley Unified Air Pollution Control District. January 2002. Guide for Assessing and Mitigating Air Quality Impacts. Prepared by the Mobile Source/CEQA Section, Planning Division, San Joaquin Valley Air Pollution Control District.

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Southern California Edison. 2003. 2002 Draft Technical Study Report Package for the Big Creek Hydroelectric System Alternative Licensing Process. October 2003.

7.0 CONSULTATION

Hector Guerra, Senior Air Quality Planner. San Joaquin Valley Unified Air Pollution Control District. Discussion of significance guidelines, PM_{10} calculations, and PM_{10} regulations and exemptions for the district. Telephone conversation. October 2002.

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TABLES

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Table LAND 10-1. Estimated PM_{10} Dust Emissions from Roads in the Big Creek Project Area Below 3,000 feet Elevation.

Road Name	Road Characteristics			SCE Vehicle Log Data Emissions Estimate	
	Road Access to Public	Road Surface	Road Length (mi.)	SCE Vehicle Trips[1]	PM_{10} (tons/yr.)
9S42, MPPH transmission line access road	Closed	Paved	4.6	2	0.003
Canyon Road, from 1 mile west of Big Creek No. 2 to junction with 8S03	Closed	Paved	8.0	1,848	4.9
Canyon Road, from junction with 8S03 to lower canyon gate	Closed	Paved	1.1	513	0.2
8S03, from MMPH to one mile from MP penstocks access road	Open	Paved	1.3	78	0.03
8S03, from Canyon Road near Big Creek No. 8 to MPPH	Closed	Paved	1.5	1907	0.9
8S44 and 8S44Y, Mammoth Pool transmission line access road	Closed	gravel	0.2	1	0.0002
Access road to Big Creek No. 3 Powerhouse and Admin. Bldg.	Closed	Paved	2.3	884	0.2
Access road to Big Creek No. 3 penstock and gatehouse	Closed	Paved	0.5	77	0.01
Big Creek No. 8 penstocks access road	Closed	Paved	1.8	0	0.001
Access road from 8S03 to Mammoth Pool transmission line	Closed	Paved	0.7	6	0.001
Access road to MPPH	Closed	Paved	0.1	543	0.02
Big Creek No. 2 access road from Canyon Road	Closed	Paved	0.2	354	0.02
Italian Bar Road	Closed	Paved	1.0	4	0.001
Total					**6.3**

[1]Collected from 2002 SCE vehicle logs (data collection period July 1 to December 31, 2002).

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Table LAND 10-2. SCE Internal Combustion Engine Permits.

Location	Description	Permit #	Mfr	Rate hp	Fuel	Comments	Permit Expires
Dam No. 1	Intake gate operator	C-2215-2-1	Ford	95	Propane	200 hr limit	08/31/2006
Dam No. 7	Emergency generator	C-2218-2-0	Ford	100	Propane	200 hr limit	01/31/2007
Shaver Dam	Emergency generator	C-2222-2-1	Ford	95	Propane	200 hr limit	08/31/2006
Big Creek No. 3	Emergency generator	C-2428-1-0	Cummins	750	Diesel	200 hr limit	07/31/2008
Vehicle 7764	Transportable air compressor	C-3900-1-0	John Deere	52	Diesel	--	06/30/2006
Vehicle 2611	Transportable air compressor	C-4050-1-0	Deutz	75	Diesel	--	08/31/2007
Vehicle 6299	Portable snow blower	P-2722-7-0	Detroit	262	Diesel	--	10/17/2004

Table LAND10-3. SCE Aboveground Storage Tank Permits.

Location	Permit Number	Tank Size	Fuel	Permit Expiration Date
Big Creek No. 1	C-1171-2-0	12,000 gallons	8,000 Unleaded 4,000 Diesel	ATC, permit pending
Big Creek No. 3	C-2428-4-0	1,500 gallons	1,000 Unleaded 500 Diesel	07/31/2008
Big Creek No. 8	C-1170-3-0	1,000 gallons	1,000 Unleaded	09/30/2007
Florence Lake Camp	C-1174-8-0	1,000 gallons	500 Unleaded 500 Diesel	09/30/2006

NOTE: Camp 62, 500 gallon diesel AST, no permit required.

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