Riverside Energy Resource Center Project
(Docket No. 04-SPPE-01)
CURE Data Requests Set 4
(Nos. 60-93)

CONSTRUCTION EMISSIONS

Fugitive Dust Emissions From Dirt-pushing/Bulldozing

Background

The Application relies on the following equation to estimate on-site fugitive dust emissions from dirt pushing/bulldozing operations, as recommended in SCAQMD's CEQA Handbook (SCAQMD 04/93[1].):

E = 0.45 × (G^1.5)/(H^1.4) × 2.2046 lb/kg × J

where E is the PM10 emission factor from dirt pushing in pounds per day ("lb/day"), G is the silt content of the aggregate in percent, H is the moisture content of the surface material in percent, and J is the daily hours of pushing operations. (Application, revised Appx. 6.1-D, File 2248.2201xls3b.)

The magnitude of emissions calculated with this equation is dependent on the silt content and moisture content of the aggregate. Rather than using the silt content determined in the Project's geotechnical report, the revised Application used a mean silt content of 6.9 percent for bulldozing overburden at western surface coal mines determined from U.S. EPA's AP-42, Section 11.9. Then, instead of also selecting the corresponding mean moisture content for overburden of 7.9 percent from U.S. EPA's AP-42, Section 11.9, the Application uses a moisture content of 15 percent, listed in SCAQMD's CEQA Handbook for "moist" dirt conditions. The U.S. EPA's AP-42, Section 11.9—published five years after the SCAQMD's CEQA Handbook, which is currently undergoing a major revision—uses the same equation with a multiplier of 0.75 for PM10 emissions rather than the SCAQMD's recommended multiplier of 0.45. Note that a 1996 report prepared by the Midwest Research Institute for the SCAQMD to improve construction emission estimates also uses a multiplier of 0.75. (MRI 03/96[2], Table 1, p. 2-4.)

The Application selected the most favorable values for each factor in the equation, *i.e.,* low values for the multiplier and numerator (silt content) and a high value for the denominator (moisture content), thereby effectively decreasing the particulate matter emission factor for dirt-pushing bulldozing operations. Based on these assumptions, the Application estimates total fugitive dust emissions from dirt pushing/bulldozing operations of only 9.9 lb/day of PM10. (Application, revised Appx. 6.1-D, File 2248.2201xls3b.) Even considering the purportedly minimal earthmoving operations at the site, these emissions are substantially lower than typically estimated for similar projects. (Application, revised Air Quality section, p. 84.)

In April of 2004, the Applicant commissioned 33 backhoe excavation trenches at selected locations across the site around the proposed location of the combustion turbines, cooling towers, transformers, and sumps. (LOR 05/04[3].) Results from these trench excavations show that the silt content in topsoil and underlying fill at the site varies from 15 to 40 percent with an average of 28.6 percent,[4] substantially higher than the 6.9 percent assumed in the Applicant's calculations for fugitive dust emissions from bulldozing/dirt pushing operations.

Adjusting the silt content to the average observed 28.6 percent at the site and otherwise using the Applicant's assumptions increases the fugitive dust PM10 emissions from 9.9 to 84 lb/day.[5]

Further, a geotechnical assessment conducted in November 2003 measured moisture content in topsoil and fill ranging from about 1.3 percent to 2.5 percent. (LOR 1/04, Appx. B, boring logs[6].) It is unlikely that watering of the site will increase the moisture content of the surface material to 15 percent. The Application simply assumed a moisture content of 15 percent, without demonstrating how this moisture content will be achieved.

Data Requests

60) Please demonstrate how a moisture content of 15 percent will be achieved by watering starting with a topsoil/fill moisture content of 1.3 to 2.5 percent.

Response:

See response to Data Request 61.

61) Please revise the emission estimates for fugitive dust emissions from bulldozing/dirt pushing operations to reflect the average site-specific soil/fill silt content and, if a soil moisture content after watering cannot be demonstrated, adjust moisture content to a more realistic value.

Response:

The construction emissions analysis has been updated to reflect current project planning. This revised emissions inventory was delivered to CEC on August 2, 2004. The analysis demonstrates that the construction emissions are below the threshold of significance.

The comparison of US EPA AP-42 section 11.9 to SCAQMD CEQA guidance in the data request is incorrect. Specifically, the 0.75 factor cited by US EPA in AP-42, table 11.9-2 reflects PM10 as the percentage of PM15, while the SCAQMD factor of 0.45 exists because the equation also includes a kg/lb factor of 2.2046. The SCAQMD factor is not a scaling factor. SCAQMD CEQA guidelines include no scaling factors and instead reflect the PM15 calculation cited in AP-42 tables 11.9-1 and 11.9-2. If the factor of 0.75 were applied to total PM in AP-42 tables 11.9-1 and 11.9-2, then PM10 mass would exceed PM15 mass. The SCAQMD calculation has been retained in the revised inventory that was delivered to CEC on August 2, 2004.

The revised analysis includes the sieve analyses conducted on site soil sample by LOR associates in early 2004. The average resulting silt content is 13.2% as referenced in the by LOR in its investigation report dated January 21, 2004. That report relied on a sieve analysis at four boreholes with samples in the upper three feet. (For the 33 trenches that were excavated and covered in the May 21, 2004 supplemental report, the silt contents mentioned on the boring logs were visual only and can therefore be disregarded.) The silt content from these boreholes was reported as being between 11 and 15 percent as determined by laboratory testing using a #200 sieve. These values are indicative of what we will tend to find at the surface. As depth increases, the silt content decreases, so depending on the stage of operations, and what level is being excavated or graded, the silt content could be less. Thus using a number lower than 13.2% would be conservative.

In practice, the silt effects will be even lower as water will be applied during earth moving operations. The mitigation due to water is accounted for separately in the analysis.

The 15% moisture content reflects SCAQMD guidance and should be maintainable for this project for the following reasons:

- An on-site monitor will be employed to ensure proper mitigation through water suppression. The monitor will be charged with ordering water application when ever dust is visible and when soil is to be disturbed.
- Water will be applied to the site for dust prevention. For the reasons discussed in the response to Data Request 66 the Applicant believes that adequate water will be applied to the site during earthmoving operations.
- The EPC Contractor plans to have hose streams in play during earth moving operations as a further measure to prevent dust.

An additional consideration, and reason for our confidence that an adequate moisture content can be achieved, is that the soil must be sufficiently wetted to meet compaction requirements. Thus the 15% moisture content assumed for this analysis is reasonable based upon SCAQMD CEQA guidance. It is also consistent with other projects such as the Modesto Irrigation District Ripon project (another 2x0 LM6000 project), decided earlier this year.

Fugitive Dust Emissions From Dirt Loading/Handling

Background

Again, the Application estimates fugitive dust emissions from dirt loading/handling assuming a 15 percent moisture content of the surface material, allegedly based on worst-case conditions for SCAB drought found in SCAQMD's CEQA Handbook, Table A9-9-G-1. Review of this table shows recommendations for dry, moist, and wet conditions but makes no mention of 'drought' conditions. Using a moisture content of 15 percent likely underestimates fugitive dust emissions from dirt loading/handling. (See Data Request 60.)

Data Requests

62) Please revise the emission estimates for fugitive dust emissions from dirt loading/handling operations to reflect a reasonable soil moisture content as discussed in Data Request 60. Please justify your selection of soil moisture content.

Response:

The August 2nd analysis reflects several site-specific characteristics. Even though most earthmoving activities are projected to occur in November, the mean wind speed was increased to 4.24 mph to reflect the higher speeds measured in October and envelope the lower wind speeds that were measured in November. As with grading operations, the presence of an on-site construction monitor will ensure that soil being handled will be watered in a manner to maintain a moist state as it is being handled. As such, SCAQMD's suggested 15% moisture content is warranted.

Fugitive Dust Emissions From Wind Erosion

Background

The Application relies on an equation to estimate on-site fugitive dust emissions from wind erosion recommended in SCAQMD's CEQA Handbook. Again, the Application incorrectly used a silt content of 6.9 percent rather than the average silt content at the site of 28.6 percent as determined from results of the geotechnical report, as discussed in Data Request 60.

Further, the Application assumes that the wind speed at the Project site exceeds 12 miles per hour ("mph") 1.7 percent of the time. This appears to be an annual average rather than an average for the month of November. Since it is known when Project grading would occur, the appropriate factor for November must be used.

Data Requests

63) Please demonstrate how the Applicant arrived at 1.7 as the percentage of time when wind speed exceeds 12 mph. If this value is an annual average, please provide the corresponding value for November.

Response:

See response to Data Request 64.

64) Please revise the emission estimates for fugitive dust emissions from wind erosion to reflect the site-specific soil/aggregate silt content (see Data Request 60).

Response:

The Applicant assumed that wind erosion of disturbed soil could occur at times throughout the duration of the project, rather than only during significant earthmoving operations. The 1.7% factor reflects an annual average of the time during which hourly wind speeds exceed 12 mph based upon the meteorological data used in the air quality impact analysis. The applicant conservatively selected the 1.7% annual value for both daily and total project emissions because no winds in excess of 12 mph actually occurred during November (based on hourly metrological data) when peak daily construction emissions are expected to occur. Additionally, during the last quarter of the analysis year (October through December) hourly wind speeds exceeded 12 mph only 0.92% of the time. Thus the 1.7% values is a conservative and appropriate value to have used in the emissions inventory analyses.

Fugitive Dust Emissions From Unpaved Roads

Background

The Application relies on an equation to estimate on-site fugitive dust emissions from vehicle travel on unpaved roads recommended in SCAQMD's CEQA Handbook. (Application, revised Appx. 6.1-D, File 2248.2201xls3b.) This equation is dependent on surface silt loading, vehicle miles traveled, and control efficiency of any mitigation measures, *e.g.* watering or application of dust palliatives. The Application used incorrect or undocumented values for these factors, thereby considerably underestimating emissions.

First, the Application selected the mean silt loading of 8.5 percent from a range of 0.56 to 23 percent for scraper routes on construction sites reported in U.S. EPA's AP 42, Section 13.2.2, Unpaved Roads, rather than using a site-specific silt loading based on the topsoil/fill silt content determined in the geotechnical report. The silt content at the site, based on an on-site investigation, ranges from 15 to 40 percent and averages 28.6 percent. (See Data Request 60.)

Second, the Application assumes mean round trip distances for vehicle travel on unpaved roads of between 0.2625 and 0.68 miles but does not disclose how these values were derived. Since the water truck travels only a distance of 0.2625 miles (1,386 feet) each time it waters the unpaved areas, it remains unclear how coverage of 0.34 miles, half the roundtrip distance of 0.68 miles would be achieved. Water trucks typically have spray patterns with a reach of 35 to 50 feet; some high-pressure equipment can reach over 100 feet on both sides of the truck. Assuming that the Applicant intends to employ a water truck equipped with high-pressure pumps, the reach combined with the assumed distance of 0.2625 miles appears to be insufficient to water the entire unpaved area over which vehicles travel.

Third, the Application applies a fugitive dust suppression watering control efficiency of 90 percent for fugitive emissions from onsite vehicle travel on unpaved roads, which is unreasonably high. (Application, revised Appx. 6.1-D, File 2248.2201xls3b.) Typical control efficiencies of watering at construction sites have been estimated at 50 percent.[7] Most air districts recommend similarly low control efficiencies for application of water with water trucks. For example, the Monterey Bay Unified Air Pollution Control District recommends a control efficiency of 50 percent. (MBUAPCD[8], pp. 8-1/8-13.)

The SCAQMD's CEQA Handbook—upon which the Application relies for its calculations of fugitive dust from unpaved roads—recommends an emission reduction efficiency of 45 to 85 percent for estimating reduction of fugitive dust emissions from unpaved roads by watering and/or application of non-toxic soil stabilizers. The document emphasizes that "[u]nless justified, the low end of the range should be used. Planners can use the favorable factors identified in Appendix 11 to justify a higher rate of efficiency. (SCAQMD 04/93, pp. 11-7/11-16.) Appendix 11 proceeds to define these "favorable factors" as the use of non-toxic chemical stabilizers formulated for use on unpaved surfaces and further instructs the user to "[u]se the lowest value if better information is not known. If higher than lowest value is used, please provide the supporting analysis and data in the environmental documentation." (SCAQMD 04/93, p. A-11-78.) The Application does not specify the use of dust palliatives in its proposed mitigation measures nor does it provide any other information supporting a watering control efficiency of 90 percent. (*See* Application, revised Air Quality section, p. 89.) Other authoritative sources also report a control efficiency for unpaved roads of 50% using water and 60 to 80 percent using a wetting agent other than water.[9] Other recent CEC siting cases have also used a control efficiency of 50 percent for fugitive dust control. (For example, Blythe Energy Project Phase I (99-AFC-8) and Phase II (02-AFC-01).)

Revising the Application's fugitive dust emissions estimate from paved roads using a silt content of 28.6 percent increases fugitive dust PM10 emissions from 1.5 to 5.0 lb/day. Adjusting the watering control efficiency to 50 or 85 percent would increase fugitive dust PM10 emissions to 25.2 or 7.6 lb/day, respectively. Clearly, using the appropriate watering control efficiency is crucial to estimate fugitive dust emissions from the site.

<u>Data Requests</u>

65) Please describe how round trip distances on site were estimated for each vehicle.

Response:

For passenger vehicles, the Applicant assumed that routes would be from the facility entrance at the southeast corner of the facility to a parking location at the north end of the facility. The facility has maximum dimensions of approximately 1,200 ft long by 600 ft wide (this overestimates the actual site dimensions due to the non-rectangular shape). Average one-way distance on unpaved roads were estimated to be approximately 1,800 ft or 0.34 mile. Round trip distances are, therefore 0.34 mile x 2. For delivery / service vehicles, average one-way distances were assumed to be approximately 1,000 ft.

The applicant used an average speed and operating schedule to determine water truck vehicle miles. An error was made in calculating miles traveled for the water truck in the initial analysis. The applicant revised estimates for miles traveled by the water truck to reflect an increased speed of five miles per hour, an operating schedule of eight hours per day, and a utilization rate of 45-minutes per hour. The revised emissions inventory also reflects an increased silt content of 13.2%, increased speeds for all vehicles, and increased number of wheels on select vehicles. Control efficiency was reduced to 85% consistent with SCAQMD CEQA guidance.

66) Please demonstrate how the water truck achieves full coverage of the unpaved areas.

Response:

As reflected in the revised analysis delivered to CEC on August 2, 2004, the water truck is assumed to operate 8 hours per day at an average speed of five miles per hour and a 75% utilization rate, or 3.75 miles traveled per hour. If a 35 ft wide spray is assumed, then hourly coverage can be in excess of 600,000 square feet (which is approximately equal to the total site area).

67) Please justify the choice of watering control efficiency.

Response:

SCAQMD CEQA guidance suggests 85% as the upper range of control efficiencies. While SCAQMD suggests that chemical stabilizers are favorable to water suppression in Chapter 11 of the CEQA guidance document, SCAQMD does not imply that 85% control efficiency can be achieved only through the use of chemical stabilizers. The relatively small size of this project, combined with the employment of an on-site construction monitor, provides assurance that unpaved roads can be maintained through water application in a way that ensures high control efficiencies. In addition to being in conformance with SCAQMD CEQA guidance, the assumed control efficiencies are consistent with those that were assumed for numerous similar CEC projects including IEEC (88%), Tesla (90%), SVP-PICO (80%), Salton Sea (80%), and Modesto Irrigation (89% - 92%).

68) Please revise fugitive dust emissions from vehicle travel on unpaved roads to reflect answers to Data Requests 65 through 67 as well as the site-specific silt loading.

Response:

A revised emissions inventory was delivered to CEC on August 2, 2004.

Rock Crushing

<u>Background</u>

The Applicant claims that "boulders will be hauled off site" and that "[t]here will be no rock crushing at the facility." (Application, revised Air Quality Section, p. 83.) Considering the size of the boulders found at the site—some more than 10 feet in diameter—hauling the boulders without prior fracturing appears unlikely. The Applicant's statement also appears to be in direct contradiction to the findings of the geotechnical report which states that "smaller areas of non-rippable material should be anticipated, which may require more specialized equipment such as impact equipment for fracturing up the rock. It appears that the bulk of the boulders are large rock which will not reduce in size without specialized crushing equipment…" (LOR 05/04, p. 3.)

Fracturing rock will create additional emissions, both fugitive dust and combustion emissions from the required specialized equipment that are not included in the Applicant's emission inventory.

Data Request

69) Please include fugitive dust emissions and combustion exhaust emissions from specialized equipment associated with fracturing larger boulders on site.

Response:

The contractor confirms that no crushing will occur at the facility. Three large boulders will be broken with small charges. Approximately 50% of the boulders will be retained on-site as landscaping elements. The remaining 50% will be trucked offsite for use as landscaping elements. Boulder removal is projected to occur in October, prior to extensive earthmoving operations. The revised inventory that was delivered to CEC on August 2, 2004 includes emissions from blasting operations. Bulldozing and unpaved road emissions in the revised inventory include the boulder removal operations.

Emissions Associated With Engineered Fill

Background

The Project's geotechnical report indicates that fill material at the site will have to be replaced with a compacted engineered fill. Existing fill can likely be reused, provided it does not contain any organic material. (LOR 1/04, p. 22.) The Application is silent on whether fugitive dust and combustion exhaust emissions from excavating existing fill and replacing it with an engineered fill were factored into the emission estimates.

Emission sources include fugitive dust emissions as well as combustion exhaust emissions from loading the fill material into trucks, unloading onto temporary storage piles, wind erosion from temporary storage piles, loading from temporary storage piles onto trucks, unloading the fill at the final destination, removal of organic materials, and spreading and compacting of fill.

Data Request

70) Please demonstrate how fugitive dust and combustion exhaust emissions from excavating, transporting, storing, cleaning, spreading, and compacting fill were accommodated in the emission inventory.

Response:

Fugitive emissions from loading operations include the handling of backfill. The engineered backfill will likely be aggregate of 0.75 to 1.5 in. diameter and have low silt content. Backfill will be trucked on site and moistened while in the truck. The contractor will also spray water on the backfill as it is being transferred directly from the truck to the trenches. The emissions inventory includes backfill-processing emissions in the combustion, loading and unpaved road fugitive emissions sections.

Fuel Consumption Of Grading/Excavating Equipment

Background

The geotechnical report concluded that "the bulk of the material at the site is rippable to the proposed depths if standard heavy-duty grading equipment is used, such as single shanked D-8 dozers and larger." (LOR 05/01, p. 3.) The Application calculates emissions for much smaller equipment with lower fuel consumption, inadequate for grading operations at the site according to the geotechnical report.

For example, the Application assumes a bulldozer of the Caterpillar D-6 series instead of the recommended D-8 or larger series. Based on hourly fuel consumption tables published by Caterpillar, the D-6 series has a fuel consumption of 3.5 to 6.5 gallons per hour ("gal/hour") at medium load,[10] consistent with the Applicant's assumption of 5.5 gal/hour. In contrast, fuel consumption at medium load in the category D-8 is 7.5 to 10.0 gal/hour. Fuel consumption for larger series, D-9 through D-11, range from 12.5 to 29.5 gal/hour at medium load. Even at low load, which is based on considerable idling or travel with no load, fuel consumption for the D-8 series ranges from 6 to 7.5 gal/hour. (Caterpillar, 10/00[11], p. 22-13.)

For the motor grader, the Application assumes a fuel consumption of 5.0 gal/hour. Caterpillar reports fuel consumption for medium-sized motor graders at high load[12]—representative for the grading phase—on the order of 5.5 to 8.5 gal/hour. Fuel consumption for larger motor graders at high load ranges from 7.5 to 19.4 gal/hour. (Caterpillar, 10/00, p. 22-14.)

Clearly, the assumption of smaller equipment, inadequate for grading the Project site, considerably underestimates fuel consumption and consequently combustion emissions. Revising fuel consumption for the bulldozer and motor grader to more reasonable values considerably increases emissions as shown in the inset table below.

Equipment	Fuel Consumption (gal/hour)	Emissions NOx (lb/day)	CO (lb/day)	ROG (lb/day)	PM10 (lb/day)
Bulldozer	5.5	9.07	2.24	0.60	0.44
	8.75	10.61	7.22	1.09	0.97
Motor Grader	5.0	9.07	2.24	0.60	0.44
	7.0	22.43	22.14	4.27	3.04

Other equipment for which assumed fuel consumption appears to be unreasonably low are the trencher and loader with only 2.0 and 2.5 gal/hour. The emissions inventory for all equipment should be revised to reflect the type of equipment required for grading operations at the site.

Data Requests

71) Please identify and justify the sources for the assumed fuel consumption for construction equipment.

Response:

See response to Data Request 73.

72) Please revise emission estimates from grading to reflect more realistic fuel consumption for heavy-duty equipment required at the site.

Response:

See response to Data Request 73.

73) Please revise transmission line construction emissions to reflect appropriate load factors for the activity and appropriate fuel consumption for local conditions.

Response:

Initial fuel consumption rates were included in the calculation worksheet provided by CEC. The inventory that was delivered to CEC on August 2, 2004 includes revised fuel consumption rates for several equipment categories, including the bulldozer, motor grader, trencher and loader. These revisions reflect CURE's comments as well as comments from CEC and the EPC Contractor. Fuel consumptions rates for the listed equipment categories were updated based upon Caterpillar's performance handbook, Edition 34. Changes similar to those made to the site construction inventory were made to the line construction inventory.

Combustion Emissions From Offsite On-road Travel

Background

Criteria pollutant emissions associated with construction on-road vehicle combustion emissions were calculated using the EMFAC 2002 model and reflect South Coast fleet-weighted average emission factors. Emission rates were determined for light-duty passenger vehicles, light-duty trucks, and heavy-duty diesel trucks by dividing total daily basin-wide emissions from the EMFAC2002 BURDEN report by the number of basin-wide vehicle miles traveled ("VMT"). (Application, revised Air Quality section, p. 86.) The calculations presented in Appendix 6.1-D contain several calculation and rounding errors, which lead to an underestimate of emissions.

First, the Applicant used a pen to circle results on the EMFAC BURDEN report and a calculator to calculate the results, which resulted in several calculation and rounding errors. For example, the Applicant circled the VMT and criteria pollutant emissions for each vehicle class on EMFAC's BURDEN output with a pen. In one instance, the hand-drawn line circling the heavy-duty diesel truck carbon monoxide emissions on EMFAC printout goes through the first number which makes the number look like 19.34 ton/day, when in fact it is 39.34 ton/day. The Applicant proceeded to calculate the emission factor for CO from heavy duty-diesel truck of based on 19.34 ton/day, which underestimated emissions by a factor of two.[13] The NOx emission factor calculated for heavy-duty trucks also contains a substantial calculation error. Instead of the 0.0380 pounds per VMT ("lb/VMT") reported in the Application, the correctly calculated emission factor is 0.0395 lb/VMT.[14] In other instances the emission factors are rounded incorrectly. Further, the Application arbitrarily used four or five significant digits for the calculated emission factors, emphasizing the importance of using a spreadsheet, which defers any rounding to the end of any calculation. The inset table below summarizes calculation and rounding errors.

Vehicle Type Source	VMT/ (1,000 vehicles-day)	Unit	CO	NOx	PM10 Exhaust	PM10 Tire Wear	PM10 Total
Heavy-duty Trucks							
BURDEN printout	13,522						
BURDEN printout		(ton/day)	39.34	267.05			5.26
Handwritten on BURDEN printout		(lb/VMT)	**0.0029**	**0.0380**			**0.00079**
Correct value		(lb/VMT)	**0.0058**	**0.0395**			**0.00078**
Light-duty Passenger Cars							
BURDEN printout	197,662						
BURDEN printout		(ton/day)				4.47	
Handwritten on BURDEN printout		(lb/VMT)				**0.00004**	
Correct value		(lb/VMT)				**0.00005**	
Construction Worker Vehicle (50% Light-duty Diesel Trucks and 50% Light-duty Passenger Cars)							
BURDEN printout	147,405						
BURDEN printout		(ton/day)	1,153.85		2.38		
Handwritten on BURDEN printout		(lb/VMT)	**0.01635**		**0.000035**		
Correct value		(lb/VMT)	**0.01636**		**0.000034**		

<u>Data Request</u>

74) Please revise offsite on-road emission estimates to reflect the correct emission factors.

Response:
The suggested changes are reflected in the revised emissions inventory that was delivered to CEC on August 2, 2004.

Transmission Line Construction Emissions

<u>Background</u>

Most of the above discussed issues related to Project construction are equally relevant to construction of the transmission line.

<u>Data Request</u>

75) Please revise fugitive dust and combustion exhaust emission estimates associated with transmission line construction.

Response:

The changes made to the on-site construction emission inventory were also made to the transmission line emission inventory and delivered to CEC on August 2, 2004.

OPERATIONAL EMISSIONS

Operational Emission Sources

Background

A number of operational emissions sources were omitted from the Applicant's emissions estimates for the Project. The equipment list does not address many emission sources including combustion exhaust from stand-by diesel generators, fire-water pumps, employee and delivery vehicles, *e.g.* for ammonia and maintenance chemicals, and landscaping equipment. PM10 emissions result from materials handling (856 lb/day of solids) associated with the zero-liquid discharge ("ZLD") system, *e.g.*, drop emissions into pond and truck bed.

The drawing M1-3 (describing the plant arrangement) following page 2 in the Application shows a fire-water pump house (item 19). This suggests that the project includes a fire water pump. Fire water pumps are usually diesel-fired and must be tested for at least 30 min every month, to comply with fire codes.

Data Requests

76) Please provide emission estimates for combustion exhaust from standby diesel generators, fire-water pumps, employee and delivery vehicles, and landscaping equipment as well as for PM10 emissions resulting from materials handling associated with the ZLD system.

Response:

There is no diesel engine driven emergency generator or firewater pump.

On August 2, 2004 the applicant delivered an emission inventory for the ZLD discharge system. Based upon a filter cake discharge of 140 lb/hr. When in operation, estimated maximum daily emissions from filter cake handling is less than 0.09 pounds, based upon 24-hours of operation. Typical daily operations would be approximately 0.03 pounds, based upon an eight-hour operating day. Annual emissions are expected to be less than five pounds. If a filter cake press is not used, there will be a low flow slurry discharge. PM-10 emissions from this option would be bounded by the filter press option.

The RERC will typically be a low activity facility the majority of the year consistent with a peaking plant. Thus employee and delivery truck combustion emissions are also expected to be negligible. Average daily deliveries of all types are not likely to exceed one delivery per day. Based upon an assumed traffic volume of four passenger vehicles and one heavy-duty delivery vehicle per day, combined with the on-highway emissions profiles contained in the revised construction emissions inventory, the projected daily traffic during facility operations would produce regional emissions 0.1 lb/day PM10, 0.4 lb/day VOC, 3.3 lb/day CO and 5.0 lb/day NOx in a 60-mile radius of the facility. An emissions worksheet is attached.

Landscaping impacts will be negligible as the RERC will 1) not have extensive landscaping, and 2) what landscaping there is will be low maintenance. The RERC will likely use the same services as the wastewater plant.

Cooling Tower Water Balance

Background

The water balance for the cooling tower does not balance for three of the four evaluated cases. The inflow for Cases I, II, and III are larger than the outflow by the amount of return water from the inlet air cooling coils, as summarized in the inset table below. (Application, p. 21, Process Flow Diagram)

Stream Number	Process Stream	Coolin g Tower Flow	Flow Rate (gpm) Case*			
			I	II	III	IV
3	Makeup water from raw/ fire water storage tank	in	87.04	106.71	63.51	2.75
11	CTG lube oil coolers/ centrifugal chillers	in	5,190	5,190	5,190	240
13a/b	Inlet air cooling coils	in	1.96	1.42	7.40	0.00
10	Evaporation	out	67.70	83.00	49.40	2.48
12	CTG lube oil coolers/ centrifugal chillers	out	5,190	5,190	5,190	240
16	Blowdown and drift	out	19.34	23.71	14.11	0.27
		Balance (in-out)	**1.96**	**1.42**	**7.40**	**0.00**
		Cycles of concentration (makeup water/(blowdown and drift))	4.5	4.5	4.5	10.2

Data Request

77) Please revise the process flow diagram to account for the flow from the inlet air cooling coils to the cooling tower.

Response:

The plant will have two combustion turbines, each with its own set of inlet air coils. Thus the condensate recovery from the inlet air coils (13a + 13b) for both units needs to be considered (flow stream 13a/b is not a single flow). Flow stream 13a is from the combustion turbine inlet air cooling coil on unit 1 and flow stream 13b is from unit 2. In the "Balance in-out" calculations presented by CURE in this data request, both flow streams 13a and 13b need to be included. Therefore, the 1.96, 1.42, and 7.40 values quoted on the 13a/b line need to be doubled. This achieves a "Balance in-out" of zero. As a result, the Process Flow Diagram is correct as is and does not need to be revised.

Cooling Tower PM10 Emissions

Background

For calculation of cooling tower PM10 emissions, the Application assumed a total dissolved solids ("TDS") content in cooling tower blowdown of 2,644 milligrams per liter ("mg/L"). (Application, revised Appx. B, Cooling Tower Emissions Summary.) This TDS content in the circulating water was based on 4.5 cycles of concentration and a TDS content of 588 mg/L in the makeup water, which is reclaimed water provided by the Riverside Wastewater Treatment Plant ("WWTP").[15] (Application, p. 20, Table 2.7-1.)

Presumably, this TDS content in the reclaimed water represents a long-term average. However, higher TDS contents have been observed in the reclaimed water from the WWTP in the past. For example, in June and July 2003, monthly average TDS contents were 598 and 596 mg/L, respectively.[16] The Application should use the highest potential value rather than an observed average to estimate potential emissions from the Project.

The Riverside WWTP apparently does not guarantee the TDS level in the reclaimed water used for the Application's cooling tower emission calculations. We therefore recommend using the Riverside WWTP's National Pollutant Discharge Elimination System ("NPDES") permit for TDS content of 650 mg/L as an upper-bound value to calculate the Project's potential to emit.[17]

Further, maximum daily cooling tower PM10 emissions reported in the Application are inconsistent with 24 hours of operation based on the calculated hourly emission rate of 0.074 lb/day.[18] The Application states that maximum daily operations reflect an operating schedule of 24 hours per day. (Application, revised Air Quality section, p. 78.) However, emissions reported in the Application's summary table, 0.48 lb/day, appear to have been based on 6.5 rather than 24 hours of operation, which would result in 1.78 lb/day.[19]

(*Compare* Application, revised Air Quality section, Table 6.1-23, p. 80, and Application, revised Appx. B, Cooling Tower Emissions Summary.) The operational emissions must reflect maximum daily emissions, *i.e.* 24 hours of operations.

78) Please provide an agreement from the Riverside WWTP guaranteeing a TDS content of 588 mg/L in the reclaimed water used as makeup water for the cooling tower or revise cooling tower emissions to reflect a TDS content of 650 mg/L in the makeup water.

Response:

See response to Data Request 79.

79) Please revise cooling tower emissions to reflect a TDS content of 650 mg/L (in case the Riverside WWTP can not provide a guarantee for 588 mg/L) and 24 hours of operations.

Response:

The Applicant is committed to utilizing an integrated demineralization system that will treat cooling tower intake water. A revised cooling tower emissions inventory was delivered to CEC on August 2, 2004. The revised inventory reflects a raw TDS content of 650 mg/L, solids removal efficiency rates provided by the vendor and increased cycles. The revised emissions are significantly lower than initial estimates and are now projected to be approximately 0.0043 lb/hour and 0.103 lb/day, based on a daily operating schedule of 24-hours. Typical daily operations will be much lower.

Turbine PM10 And ROG Emissions

Background

Compliance with PM10 and ROG emission limits is normally determined using annual stack tests. Therefore, the underlying vendor guarantee on ROG and PM10 emissions is critical to assuring continuous compliance. The General Electric ("GE") vendor guarantee for the turbines is based on "new and clean" conditions, defined to be less than 200 site-fired hours. Further, the PM guarantee assumes that each unit has more than 300 fired hours of operation prior to testing and that each unit must operate at base load 3 to 4 hours just prior to commencing the PM compliance test. (Application, revised Appx. A, GE Turbine Gen Set Performance for RPU – City of Riverside – Capacity Addition.) These conditions do not represent the operating mode anticipated for the Project.

Finally, the Application claims that ROG emissions are based on 1999

CARB BACT guidance (0.0027 lb/mmBTUhhv of ROG, which is equivalent to 2 ppmvd ROG at 15 percent oxygen). (Application, revised Appx. B, Prime Unit Gas Turbine Emissions 910 hours – 1 unit – normal operations.) The value actually used in the Application's calculations for the uncontrolled emission factor from one turbine is 1.88 lb/hour of ROG based on a ROG concentration in the exhaust gas 3 ppmv at 15 percent oxygen or 3.32 ppmv at 14.38 percent oxygen. (Application, revised Appx. B, handwritten calculations by KAL dated February 25, 2004

The Application claims that "[t]he oxidation catalyst will also reduce the VOC (1-hr average) emissions to less than 2.0 ppmvd. This catalytic system will promote the oxidation of CO to carbon dioxide (CO_2) and VOC to CO_2 and water without the need for additional reagents." (Application, p. 17.) The Application assumes a control efficiency of 50 percent due to the CO catalyst resulting in a controlled ROG emission rate of 0.94 lb/hr, which is equivalent to 1.5 ppm at 15 percent oxygen. (See Application, revised Appx. B, Prime Unit Gas Turbine Emissions 910 hours – 1 unit – normal operations.)

The Application contains no vendor guarantee specifying a control efficiency of 50 percent. The only information regarding the CO catalyst in the Application is a printout from Engelhard's website which does not contain any information on ROG reduction. (Application, revised Appx. A.) The only guarantee regarding ROG is the vendor guarantee from GE specifying a ROG concentration in the exhaust gas after the selective catalytic reduction system ("SCR") of 2 ppmvd at 15 percent oxygen, which is higher than the controlled emission rate relied on in the Application, revised Air Quality section, Table 6.1-23. (Application, revised Appx. A, GE Turbine Gen Set Performance for RPU – City of Riverside – Capacity Addition.)

Finally, the SCAQMD has concluded that "[a]lthough minor reduction in toxic contaminants can be expected to occur across a CO catalyst, reduction in VOC and toxic contaminants are typically much lower, and for a worst case scenario, evaluation may be conducted assuming zero percent reduction in VOC and/or toxic contaminants." (SCAQMD 06/04[20].)

Data Requests

80) Please explain how particulate matter ("PM") and ROG emissions will change over the life of the facility. Support your answer with measurements on operating LM6000 turbines.

Response:

Generally, PM emissions from gas turbines are a function of fuel flow and generally remain relatively constant, regardless of turbine age. Often, PM emissions from LM6000 turbines are significantly within the guaranteed level of 3 lb/hour even after significant run hours.

VOC emissions are a function of catalyst life, but guaranteed emission rates reflect conditions after extended operations and not new catalyst conditions.

We are unable to provide operating emissions plant data for LM6000s. That data is the property of the plant owners, and to an extent, the regulator. This data is not available from General Electric and Riverside does not own any other LM6000 engines.

81) Please explain how PM emissions will change for operating conditions other than base load.

Response:

GE's hourly emission guarantee applies to operations from 50% load to 100% load. The applicant intends to operate the gas turbines at full load, with only short start-up operations.

82) Does the vendor guarantee include all PM emissions at the stack, including particulate matter from water injection for NOx control and particulate matter in the inlet air?

Response:

Yes.

83) Does the PM guarantee include both filterable and condensable particulate matter?

Response:

Yes.

84) Please provide a vendor guarantee for the CO catalyst specifying a 50 percent reduction in ROG concentrations in the exhaust gas, or, alternatively, revise the controlled emissions to reflect a 2 ppm ROG concentration after the CO catalyst.

Response:

The vendor is guaranteeing a controlled emission rate of 2 ppmv @ 15% 02. The application inadvertently presented results for a 50% VOC destruction efficiency relative to an uncontrolled emission rate of 3 ppmv @ 15% 02. With a controlled emission rate of 2 ppmv @ 15% 02 as guaranteed by the gas turbine vendor, the hourly controlled emissions are 1.25 lb/hour per turbine, rather than 0.94 lb/hour per turbine. Daily potential emissions for both turbines combined are 66.3 lb, rather than 54.5 lb. Annual potential emissions for both turbines combined are 1.66 tons, rather than 1.3 tons. The increase in VOC emissions will affect the level of needed mitigation, but does not affect permit eligibility, SCAQMD offset exemption eligibility, or compliance with local, state or federal regulations.

85) In the June 12, 2004 letter cited in footnote 26 of this document the SCAQMD requested source test data to support VOC and toxic contaminant reduction assumptions. Please provide a copy of any source tests that you provided to the SCAQMD that support your claimed VOC and toxic contaminant reductions.

Response:

No source test data were delivered in response to SCAQMD's request. SCAQMD chose, instead, to conduct a health risk assessment under the assumption that no toxic emissions would be reduced by the oxidation catalyst. SCAQMD concluded the resulting MICR is within the limit of $1x10^{-6}$, pursuant to SCAQMD Rule 1401.

86) Would the Applicant be willing to accept a condition of certification that required that CO be used as a surrogate for ROG to assure continuous compliance with the ROG limit?

Response:

The suggested condition is not warranted because Vendor guarantees for VOC emission rates reflect conditions at the end of catalyst life, rather than the beginning of catalyst life.

CUMULATIVE SCENARIO

Recip Plant

<u>Background</u>

CURE Data Request 2.a.ii requested that the applicant prepare a cumulative impact analysis that included the adjacent WWTP cogeneration plant. In response, the applicant argued that the wastewater treatment plant had been in operation for the entire 10-year period evaluated in the Application and that the cogeneration engines were installed no later than 2001. In response to CURE Data Request 2.a.iv, the applicant argued that permits to construct had not been issued to sources within a 6-mile radius of the project. However, the materials submitted by the applicant in response to CURE Data Request 1.f indicates that the applicant was concerned about whether a "recip plant" at the WWTP would be evaluated for air permitting purposes.

The May 6, 2003 meeting notes state, with reference to the WWTP site: "…the presence of the existing recip plant that can be used for black start, and other synergies. The only concern with this site is whether the recip plant and the new peaker can be kept separate for air permitting purposes." The June 24, 2003 meeting notes indicate that "SCAQMD will issue a decision supporting segregation of the Acorn project and the WWTP recips."

Data Requests

87) What is the permitting date and construction date for the recip plant?

Response:

The permit to construct was granted in August of 1998. CEMS certification tests occurred on April 10, 2001, so it is likely that the engine commenced operation on or before January 1, 2001.

88) Please provide a copy of the recip plant air permit and air permit application.

Response:

The Riverside Public Utilities Department does not hold the permit for the wastewater treatment facility.

89) Are the recip plant and the cogen plant the same facility?

Response:

Yes, they are the same facility.

90) Please provide copies of any correspondence with the SCAQMD on the relationship between the recip plant and the Project and/or segregation of the recip plant for purposes of air permitting.

Response:

No correspondence exists. SCAQMD was asked to clarify its interpretation of the relationship between the two facilities. After review of the relationship between the two unrelated arms of city government, SCAQMD advised that the two operations should be treated as independent facilities for permitting purposes. The determination is preceded by similar determinations for other municipal entities. SCAQMD's application review and intended permit issuance confirms the agency's consideration of the wastewater operations and the public utility operations as independent facilities.

91) Please explain why the Project would not constitute a modification
of the WWTP for purposes of air permitting

Response:

The Cogen plant is and was an existing facility that was separately permitted and had been in operation prior to the time the RERC was conceived. The Water Quality Control Plant is an "essential facility" and permitted under different regulations than the RERC. Because it was already in operation, its emissions were part of the background.

92) Please explain why the Project would not constitute a single source
with the WWTP for purposes of air permitting.

Response:

See response to Data Request 91.

93) Please explain why the Project should be segregated from the recip
plant for purposes of CEQA evaluation?

Response:

See response to Data Request 91.

Additionally, the impacts of existing operations at the WWTP are reflected in local ambient air quality monitors data used in the analysis of the proposed power generation facility.