Attachment 7d
Additional Air Quality Impact Analyses

Additional Air Quality Impact Analyses

The following analyses not included in the original AFC are provided in this section:

- Updated SO_2 Analysis: As described in the main document, propane is being considered as an alternative to natural gas for use in fueling the two auxiliary boilers included in the project. The use of propane will result in an increase in SO_2 emissions by the boilers but no change in the other criteria pollutants. Modeling was performed to demonstrate that Project SO_2 impacts would remain below all applicable standards in the case of propane being used to fuel the auxiliary boilers.

- Updated PM10/PM2.5 Analysis. Two significant changes are being made to the additional modeling provided in the AFC:

    - Maintenance vehicle emissions. Per CEC's request, fugitive emissions from maintenance vehicles operating in the solar field was included in the PM10 and PM2.5 model runs. For the 24-hour runs, the maximum lb/day emission rate was divided by 24 to create a lb/hr emission rate for the vehicles. For the annual runs, the annual emissions in tons per year (tpy) were converted to a lb/hr emission rate for use in the modeling.

    - Alternative cooling tower TDS. The use of water from Koehn Lake for cooling has been proposed as a possible alternative to ground water as was submitted in the AFC. The TDS in the Koehn Lake scenario increases from the original 1600 ppm by a factor of 10 to 16,600 ppm. Modeling of both scenarios, with the addition of the maintenance vehicles as well, was performed to determine the updated impacts.

As can be seen in the results presented below, due to the proximity of maintenance vehicle operations at times being close to the fence line, and because the cooling tower is located in the power block which is in a central part of the facility, the vehicle impacts control the maximum modeled PM10 and PM2.5 concentrations to the point that the difference in TDS is of no consequence in the modeling results.

Normal operation of the Project includes the following air emission sources that were evaluated in the modeling analysis:

- Two auxiliary boilers,

- One fire water pump engine,

- One 11-cell cooling tower, and

- Fugitives from maintenance vehicles.

The two auxiliary boilers, the fire water pump engine and the 11-cell cooling tower were modeled as vertical point sources. Fugitive dust emissions from the maintenance vehicles can occur at any location throughout the solar field. To account for this, the fugitive emissions from the maintenance vehicles were represented by an area source encompassing the entire solar field.

The stack parameters and emission rates input to AERMOD for the boilers, engine and cooling tower for normal operations are summarized in Table 7d-1. For the area source used to represent the fugitive emissions from the maintenance vehicles, a release height of 2.0 meters (m) will be assumed for the maintenance vehicles, with an initial plume height of 15 feet (4.57 m). Following EPA AERMOD guidance (EPA, 2004), the initial area source vertical standard deviation for fugitive emissions is estimated as the plume depth divided by 2.15, or 2.13 m.

The handling of the maintenance vehicles source differs from that of the modeling done by CEC Staff in the BSEP PSA of April, 2009. In their Staff used a rectangular area source of roughly 243 acres that was adjacent to the western boundary and extended over the power block to model the PM10 impact of the maintenance vehicles. This source was the same as the area source used by Staff for modeling construction emissions. The area used in the modeling was too small to sufficiently represent the solar field traffic since the vehicles will operate over the entire area of the solar fields on a given day and the emissions were calculated to represent that activity. Placing all of the emissions for the facility-wide use of maintenance vehicles in an area which is less than 20% of the area the vehicles will operate in is unrealistic. Additionally, the area source Staff used to model the maintenance vehicles covered the power block area. This is also inappropriate as these vehicles will not operate in the power block.

AERMOD was run using two separate cooling tower scenarios; the first with particulate emissions assuming 1,600 ppm (see Section 4.2.1.6) and the second with particulate emissions assuming 16,600 ppm TDS (see section 4.3.1). The results of those two cases are shown in Table 7d-4 and Table 7d-5 below.

Table 7d-1 Stack Parameters for the Ancillary Equipment

Parameter	Auxiliary Boiler #1	Auxiliary Boiler #2	Fire Water Pump	Cooling Tower[1, 2]
UTM Coordinate East (meters)	407794.05	407800.78	407913.29	407822.97
UTM Coordinate North (meters)	3902263.63	3902263.63	3902390.56	3902222.91
Stack Base Elevation (ft)	2106.3	2106.3	2106.3	2106.3
Stack Height (ft)	40	40	10	44.34
Stack Diameter (inches)	30	30	6	336
Exit Temperature (^{o}F)	300	300	770	84.32
Exit Velocity (ft/sec)	60	60	150	30.03

[1] The cooling tower has 11 cells and each was modeled as a single stack. Coordinate provided for a central cell.
[2] Stack height and diameter given is per cooling tower cell.

7d-1 Comparison of the SO_2 Impacts Using Propane vs. Natural Gas

As stated in Section 4.2.1.1 of this document, the substitution of propane for natural gas will result in higher SO_2 emissions due to the higher sulfur content in propane. Modeling was conducted to evaluate the increase in SO_2 emissions for comparison to the CAAQS and NAAQS. Comparing results from previous modeling using natural gas to fuel the auxiliary boilers (Table 7d-2) with results using updated SO_2 emissions using propane (Table 7d-3) shows a substantial increase in SO_2 maximum impacts. The overall SO_2 impacts however, when added to ambient background

values, are still less than 15% of any applicable California Ambient Air Quality Standards (CAAQS) / National Ambient Air Quality Standards (NAAQS) standard for SO_2, and the impacts from Project sources alone are less than 1% of any applicable standard.

Table 7d-2 SO_2 NAAQS and CAAQS Analysis from Previous Modeling (Natural Gas)

Pollutant	Averaging Period	Concentrations (μg/m^3)				
		AERMOD	Ambient Background[1]	Total[2]	CAAQS	NAAQS
SO2	1-hr	0.16	88.46	88.6	665	--
	3-hr	0.08	44.5	44.6	--	1300
	24-hr	0.01	13.1	13.1	105	365
	Annual	0.0002	2.6	2.6	--	80

[1] Short-term values are the highest over 3-years; annual values are highest over 3-years.
[2] Modeled concentration plus ambient background.

Table 7d-3 SO_2 NAAQS and CAAQS Analysis from Updated Modeling (Propane)

Pollutant	Averaging Period	Concentrations (μg/m^3)				
		AERMOD	Ambient Background[1]	Total[2]	CAAQS	NAAQS
SO_2	1-hr	5.2	88.46	93.7	665	--
	3-hr	4.2	44.5	48.7	--	1300
	24-hr	0.8	13.1	13.9	105	365
	Annual	0.01	2.6	2.61	--	80

[1] Short-term values are the highest over 3-years; annual values are highest over 3-years.
[2] Modeled concentration plus ambient background.

7d-2 Comparison of Cooling Tower Impacts for 1,600 ppm and 16,600 ppm (TDS) options

The updated PM10 and PM2.5 emissions were modeled for the BSEP sources including maintenance vehicle operations in the solar fields.

As shown in the tables below, all total concentrations, modeled plus ambient background, are below the NAAQS and CAAQS with the exception of 24-hour and annual PM10. The exceedances occur because the monitored background concentration by itself is greater than the CAAQS. As a result the total impacts of 24-hour and annual PM10 exceed the CAAQS but not the NAAQS. It should be noted that the change in overall PM10 and PM2.5 impacts between the two cooling tower scenarios is very small due to the fact that the maintenance vehicle emissions dominate the overall maximum

impacts. When considering only the maximum cooling tower impacts, the modeled concentration for the cooling tower is 0.18 μg/m^3 for the 1,600 ppm scenario and 1.87 μg/m^3 for the 16,600 scenario.

Table 7d-4 NAAQS and CAAQS Analysis for Cooling Towers at 1,600 ppm TDS

Pollutant	Averaging Period	Concentrations (μg/m^3)				
		AERMOD	Ambient Background[1]	Total[2]	CAAQS	NAAQS
PM10	24-hr	29.1	73.0	102.1	50	150
	Annual	2.1	22.0	24.1	20	--
PM2.5	24-hr	6.3	15.3	21.6	--	35
	Annual	0.5	5.8	6.3	12	15

[1] Short-term values are the highest over 3-years; annual values are highest over 3-years.
[2] Modeled concentration plus ambient background.

Table 7d-5 NAAQS and CAAQS Analysis for Cooling Towers at 16,600 ppm TDS

Pollutant	Averaging Period	Concentrations (μg/m^3)				
		AERMOD	Ambient Background[1]	Total[2]	CAAQS	NAAQS
PM10	24-hr	29.1	73.0	102.1	50	150
	Annual	2.3	22.0	24.3	20	--
PM2.5	24-hr	6.3	15.3	21.6	--	35
	Annual	0.6	5.8	6.4	12	15

[1] Short-term values are the highest over 3-years; annual values are highest over 3-years.
[2] Modeled concentration plus ambient background.