

APPENDIX 5.1G

# Cumulative Impacts Analysis

---

## Cumulative Impacts Analysis for the A2PP

Cumulative air quality impacts from the A2PP and other reasonably foreseeable projects will be both regional and localized in nature. Regional air quality impacts are possible for pollutants such as ozone, which is formed through a photochemical process that can take hours to occur. Carbon monoxide, NO<sub>x</sub>, and SO<sub>x</sub> impacts are generally localized in the area in which they are emitted. PM<sub>10</sub> can create a local air quality problem in the vicinity of its emission source, but can also be a regional issue when it is formed in the atmosphere from VOC, SO<sub>x</sub>, and NO<sub>x</sub>.

The cumulative impacts analysis considers the potential for both regional and localized impacts due to emissions from proposed operation of A2PP. Regional impacts are evaluated by comparing maximum daily and annual emissions from A2PP with emissions of ozone and PM<sub>10</sub> precursors in both Stanislaus County and the entire San Joaquin Valley. Localized impacts are evaluated by looking at other local sources of pollutants that are not included in the background air quality data to determine whether these sources in combination with A2PP would be expected to cause significant cumulative air quality impacts.

### Regional Impacts

Regional impacts are evaluated by assessing A2PP's contribution to regional emissions. Although the relative importance of VOC and NO<sub>x</sub> emissions in ozone formation differs from region to region and from day to day, state law requires reductions in emissions of both precursors to reduce overall ozone levels. The change in the sum of emissions of these pollutants, equally weighted, provides a rough estimate of the impact of A2PP on regional ozone levels.<sup>1</sup> Similarly, a comparison of the emissions of PM<sub>10</sub> precursor emissions from A2PP with regional PM<sub>10</sub> precursor emissions provides an estimate of the impact of A2PP on regional PM<sub>10</sub> levels.

Under SJVAPCD regulations, A2PP will be required to provide offsets for increases in NO<sub>x</sub>, VOC, and PM<sub>10</sub> emissions from the project above certain regulatory thresholds. Regulatory offset requirements are calculated based on quarterly emissions, but the regional inventories are expressed in tons per day of emissions. Comparisons are shown on both a daily and annual basis.

Tables 5.1G-1 and 5.1G-2 summarize these comparisons. A2PP emissions are compared with regional emissions in 2012, as that is the year the project is expected to begin operation. Stanislaus County and SJVAPCD emissions projections for 2012 were estimated by averaging the projected emissions inventories for 2010 and 2015 obtained from the Air Resources Board's web-based emission inventory projection software, available at [www.arb.ca.gov/app/emsmov/emssumcat2007.php](http://www.arb.ca.gov/app/emsmov/emssumcat2007.php).

---

<sup>1</sup> TID is proposing to use direct, and not interpollutant, offsets for ozone precursors, so all NO<sub>x</sub> emissions from the project will be offset using NO<sub>x</sub> ERCs while all VOC emissions will be offset using VOC ERCs.

## Localized Impacts

To evaluate potential cumulative impacts of A2PP in combination with other projects in the area, we requested from the District information regarding projects within a radius of 10 km (6 miles) of the project.

Within this search area, three categories of projects with combustion sources were used as criteria for identification:

- Existing projects that have been in operation since at least 2007;
- Projects for which air pollution permits to construct have been issued and that began operation after January 1, 2008; and
- Projects for which air pollution permits to construct have not been issued, but that are reasonably foreseeable.

Existing projects that have been in operation since at least 2007 are reflected in the ambient air quality data that has been used to represent background concentrations; consequently, no further analysis of the emissions from this category of facilities will be performed. The cumulative impacts analysis adds the modeled impacts of selected facilities to the maximum measured background air quality levels, thus ensuring that these existing projects are taken into account.

A copy of our request to the District for information about potential projects is attached. At the time the AFC was being prepared, we had not yet obtained the requested information. Therefore, a preliminary cumulative impacts analysis is provided here which includes only the existing APP turbine and emergency Diesel fire pump engine, along with the A2PP. If additional projects are identified by the District that would need to be included in a cumulative impacts analysis, the analysis will be updated. Table 5.1G-3 provides the emission rates and stack parameters used in the cumulative impacts analysis. The modeling results are summarized in Table 5.1G-4. The modeling indicates that the maximum modeled impacts from the old and new plants overlap very little, if at all.

**Table 5.1G-1**  
**TID Almond 2 Power Plant**  
**Regional Cumulative Impacts Analysis: Ozone Precursors**

	2012 Stanislaus County Inventory Emissions, tons/day		2012 SJVAPCD Inventory Emissions, tons/day		2012 Stanislaus County Inventory Emissions, tons/yr		2012 SJVAPCD Inventory Emissions, tons/yr	
	NOx	VOC	NOx	VOC	NOx	VOC	NOx	VOC
<b>Source Category</b>								
Stationary Sources	8.9	5.4	105.4	81.7	3,262.6	1,972.1	38,480.3	29,813.2
Area-Wide Sources	1.6	23.0	17.5	156.1	584.2	8,386.6	6,393.5	56,974.3
Mobile Sources	32.6	12.5	367.0	112.9	11,887.0	4,547.0	133,952.4	41,198.1
Total by Pollutant	43.1	40.8	489.9	350.6	15,733.7	14,905.7	178,826.3	127,985.6
Total Ozone Precursors		83.9		840.6		30,639.4		306,811.9
<b>A2PP Emissions</b>								
A2PP Emissions by Pollutant	0.233	0.050	0.233	0.050	70.7	17.0	70.7	17.0
Total A2PP Ozone Precursors		0.28		0.28		87.8		87.8
A2PP Ozone Precursors as Percent of Regional Total		0.34%		0.03%		0.29%		0.03%
<b>Reductions from ERCs</b>	0.291	0.050	0.291	0.050	106.1	18.4	106.1	18.4
A2PP Net Increase	-0.057	0.000	-0.057	0.000	-35.4	-1.3	-35.4	-1.3
Remaining A2PP Ozone Precursors		-0.06		-0.06		-36.7		-36.7
Remaining A2PP Ozone Precursors as Percent of Regional Total		0.00%		0.00%		0.00%		0.00%

**Table 5.1G-2**  
**TID Almond 2 Power Plant**  
**Regional Cumulative Impacts Analysis:**  
**PM10 Precursors**

	2012 Stanislaus County Inventory Emissions, tons/day				2012 SJVAPCD Inventory Emissions, tons/day				2012 Stanislaus County Inventory Emissions, tons/yr				2012 SJVAPCD Inventory Emissions, tons/yr			
	NOx	VOC	SO2	PM10	NOx	VOC	SO2	PM10	NOx	VOC	SO2	PM10	NOx	VOC	SO2	PM10
<b>Source Category</b>																
Stationary Sources	8.9	5.4	1.3	2.4	105.4	81.7	23.0	24.7	3,262.6	1,972.1	486.4	872.7	38,480.3	29,813.2	8,386.1	9,012.6
Area-Wide Sources	1.6	23.0	0.1	23.6	17.5	156.1	1.1	248.2	584.2	8,386.6	24.8	8,625.3	6,393.5	56,974.3	411.4	90,598.7
Mobile Sources	32.6	12.5	0.2	1.8	367.0	112.9	2.0	20.5	11,887.0	4,547.0	58.2	653.0	133,952.4	41,198.1	720.5	7,471.0
Total by Pollutant	43.1	40.8	1.6	27.8	489.9	350.6	26.1	293.4	15,733.7	14,905.7	569.4	10,151.0	178,826.3	127,985.6	9,517.9	107,082.2
Total PM10 Precursors		113.3				1160.0				41,359.8				423,412.0		
<b>A2PP Emissions</b>																
A2PP Emissions by Pollutant	0.293	0.000	0.056	0.090	0.293	0.000	0.056	0.090	70.7	17.0	19.4	32.9	70.7	17.0	19.4	32.9
Total A2PP PM10 Precursors		0.44				0.44				140.0				140.0		
A2PP PM10 Precursors as Percent of Regional Total		0.39%				0.04%				0.34%				0.03%		
<b>Reductions from ERCs</b>	0.291	0.050	0.143	0.000	0.291	0.050	0.143	0.000	106.11	18.36	52.23	0.00	106.11	18.36	52.23	0.00
A2PP Net Increase	0.002	-0.050	-0.087	0.090	0.002	-0.050	-0.087	0.090	-35.37	-1.35	-32.85	32.85	-35.37	-1.35	-32.85	32.85
Remaining A2PP PM10 Precursors		-0.04				-0.04				-36.72				-36.72		
Remaining A2PP PM10 Precursors as Percent of Regional Total		0.00%				0.00%				0.00%				0.00%		

**Table 5.1G-3**

**TID Almond 2 Power Plant**

**Emission Rates and Stack Parameters for Cumulative Impacts Modeling**

	Stack Diam, m	Release Height m	Temp, deg K	Exhaust Flow, m3/s	Exhaust Velocity, m/s	Emission Rates, g/s			
						NOx	SO2	CO	PM10
<b>Averaging Period: One hour (1)</b>									
A2PP Gas Turbines (each)	3.658	24.384	727.44	214.600	20.424	3.1500	0.1085	5.040	n/a
Existing APP CTG	2.788	28.042	408.00	316.972	51.934	0.6362	1.651E-01	1.521	n/a
Existing APP Fire Pump Engine	0.127	4.572	714.11	0.387	30.550	0.0	0.0	0.0	n/a
<b>Averaging Period: Three hours</b>									
A2PP Gas Turbines (each)	3.658	24.384	718.00	330.467	31.452	n/a	0.1966	n/a	n/a
Existing APP CTG	2.788	28.042	408.00	316.972	51.934	n/a	1.651E-01	n/a	n/a
Existing APP Fire Pump Engine	0.127	4.572	714.11	0.387	30.550	n/a	3.149E-03	n/a	n/a
<b>Averaging Period: Eight hours</b>									
A2PP Gas Turbines (each)	3.658	24.384	718.00	330.467	31.452	n/a	n/a	1.722	n/a
Existing APP CTG	2.788	28.042	408.00	316.972	51.934	n/a	n/a	1.521	n/a
Existing APP Fire Pump Engine	0.127	4.572	714.11	0.387	30.550	n/a	n/a	0.185	n/a
<b>Averaging Period: 24 hours, SO2</b>									
A2PP Gas Turbines (each)	3.658	24.384	718.00	330.467	31.452	n/a	0.1966	n/a	n/a
Existing APP CTG	2.788	28.042	408.00	316.972	51.934	n/a	1.651E-01	n/a	n/a
Existing APP Fire Pump Engine	0.127	4.572	714.11	0.387	30.550	n/a	3.149E-03	n/a	n/a
<b>Averaging Period: 24 hours, PM10</b>									
A2PP Gas Turbines (each)	3.658	24.384	727.44	213.693	20.338	n/a	n/a	n/a	0.315
Existing APP CTG	2.788	28.042	408.00	316.972	51.934	n/a	n/a	n/a	2.520E-01
Existing APP Fire Pump Engine	0.127	4.572	714.11	0.387	30.550	n/a	n/a	n/a	1.667E-02
<b>Averaging Period: Annual</b>									
A2PP Gas Turbines (each)	3.658	24.384	694.11	315.473	30.025	0.6783	0.1859	n/a	0.315
Existing APP CTG	2.788	28.042	408.00	316.972	51.934	7.487E-01	1.651E-01	n/a	2.520E-01
Existing APP Fire Pump Engine	0.127	4.572	714.11	0.387	30.550	3.828E-03	3.595E-05	n/a	1.903E-04

Notes

1. For maximum 1-hour impacts, A2PP CTGs are in startup; existing APP fire pump engine is not in operation.

**TABLE 5.1G-4**

Modeled Maximum Cumulative Project Impacts (A2PP and APP only)

Pollutant	Averaging Time	Maximum Localized Impacts ( $\mu\text{g}/\text{m}^3$ )			Background ( $\mu\text{g}/\text{m}^3$ )	Total Impact ( $\mu\text{g}/\text{m}^3$ )	State Standard ( $\mu\text{g}/\text{m}^3$ )	Federal Standard ( $\mu\text{g}/\text{m}^3$ )
		A2PP Alone	Existing APP Facility <sup>a</sup>	Total				
NO <sub>2</sub>	1-hour <sup>b,c</sup>	17.9	1.9	18.2	118.4	137	338	–
	Annual	0.3	0.5	0.6	24.5	25	–	100
SO <sub>2</sub>	1-hour <sup>c</sup>	1.4	0.6	1.4	46.8	48	650	–
	3-hour	1.1	3.2	3.2	33.8	37	–	1300
	24-hour	0.5	1.5	1.5	18.4	20	109	365
	Annual	0.1	<0.1	0.1	5.3	5	–	80
CO	1-hour <sup>c</sup>	65.9	5.6	66.1	8,625	8,691	23,000	40,000
	8-hour <sup>d</sup>	6.4	149.9	149.9	4,144	4,294	10,000	10,000
PM <sub>10</sub>	24-hour	1.2	8.2	8.2	111	119	50	150
	Annual	0.1	0.1	0.2	38	38	20	--
PM <sub>2.5</sub>	24-Hour	1.2	8.2	8.4	64.5	73	–	35
	Annual	0.1	0.1	0.2	16.0	16	12	15

Note:

- a. Existing APP facility includes CTG and fire pump engine.
- b. 1-hour average NO<sub>2</sub> impacts modeled using PVMRM.
- c. 1-hour average impacts assume A2PP in startup and fire pump engine not in operation.
- d. 8-hour average CO impacts include 2 hours of startup for A2PP.

January 12, 2009

Mr. Rupi Gill  
San Joaquin Valley Unified Air Pollution Control District  
4800 Enterprise Way  
Modesto, CA 95356-8712

Re: Cumulative Impacts Analysis  
Turlock Irrigation District Almond 2 Power Plant



1801 J Street  
Sacramento CA 95811  
Tel: (916) 444-6666  
Fax: (916) 444-8373

Ann Arbor MI  
Tel: (734) 761-6666  
Fax: (734) 761-6755

Dear Mr. Gill:

Turlock Irrigation District (TID) will be submitting an application for a Determination of Compliance with the District and an Application for Certification with the California Energy Commission for the Almond 2 Power Plant (A2PP) in March of this year. TID is proposing to add three simple-cycle LM6000 PG SPRINT gas turbines and associated equipment adjacent to its existing Almond power plant site in Ceres. The approximate UTM coordinates of the new power plant are **678031 mE, 4160454 mN (NAD 27)**. As part of the project review, the CEC requires TID to prepare an analysis of the project's cumulative impacts. This is defined by the CEC as "a cumulative air quality modeling impacts analysis of the project's typical operating mode in combination with other stationary source emissions sources **within a six-mile radius** which have received construction permits but are not yet operating, or are in the permitting process." [Emphasis added.] We have interpreted this as follows:

- Projects for which permits to construct have been issued since January 1, 2008; and
- Projects for which permits to construct have not been issued, but are reasonably foreseeable.

We would like to obtain from the District a list of projects within six miles of the new power plant location for which permits to construct have been issued since January 1, 2008, and for which permits to construct have not been issued, but are reasonably foreseeable, along with sufficient emissions information and stack parameters so that we can include these sources in our air quality modeling. Facilities that meet these criteria but emit only VOCs can be excluded.

Thank you very much for your assistance. If you have any questions regarding the information we are requesting, feel free to call.

Sincerely,

  
Nancy Matthews

cc: Randy Baysinger, TID  
Susan Strachan, Strachan Consulting  
Scott Galati, Galati Blek