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CUMULATIVE AIR QUALITY IMPACT ANALYSIS

(Supplemental Filing)

For the:

Palmdale Energy Project

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Cumulative Air Quality Modeling Assessment

A cumulative air quality modeling assessment was made for the proposed Palmdale Energy Project (PEP), currently undergoing an amendment at the California Energy Commission (CEC) to the Final License for the former Palmdale Hybrid Power Project. Localized impacts from PEP could result from emissions of carbon monoxide, oxides of nitrogen, sulfur oxides, and directly emitted PM_{10/2.5}. The potential cumulative localized impacts were modeled for PEP emissions in conjunction with emissions of existing facilities and proposed/permitted facilities not yet in operation but that are reasonably foreseeable. The sources modeled in the cumulative assessment include facilities within a radius of six (6) miles around the plant site and include all Plant 42 sources, which were updated in 2015. Three categories of projects with emissions sources will be used as criteria for identification:

- Projects that have been in operation for a sufficient time period, and whose emissions are included in the overall background air quality data.
- Projects that recently began operations and whose emissions may not be reflected in the ambient monitoring background data.
- Projects for which air pollution permits to construct have not been issued, but that are reasonably foreseeable.

The Antelope Valley Air Quality Management District (AVAQMD) provided the initial list of cumulative sources for use in the analysis. This list was also provided to the CEC. Based on review of the inventory, only sources of pollutants with emissions of five (5) tons per year or more were to be included in the cumulative source analysis. This list was supplemented with Plant 42 cumulative inventories for SO₂, CO, PM₁₀, PM_{2.5} and NO_x emissions (the cumulative analysis in the previously submitted PEP Amendment already included the Plant 42 sources, thus this assessment reanalyzed those impacts with additional sources exceeding five tons per year). There was only one (1) source whose emissions exceed the five ton per year threshold. That source is the diesel drilling engine owned by the Rottman Drilling Company and is a 550 horsepower Tier 3 prime engine. The potential to emit emissions are as follows:

- NO_x 7.607 tpy
- CO 2.453 tpy
- PM_{10/2.5} 0.358 tpy
- SO_x 0.014 tpy

To assess the short-term averaging periods, the 1-hour emission rates were set to the maximum emissions allowed under the Tier 3 limits. This was assumed for the 1-, 3-, 8- and 24-hour averaging periods. It was assumed that the engine could run up to 24-hours per day. The annual limits were based on the ton per year limits as provided by the AVAQMD.

The cumulative modeling methodology for standards, averaging periods, background air quality, hourly meteorology and use of the ambient ratio method was identical to that used in the recently submitted Amendment.

The diesel drilling engine owned by the Rottman Drilling Company is located about 10 kilometers (6 miles) north of the PEP. The modeled emission rates shown below in Table 1 with the modeled stack parameters in Table 2.



Table 1 Rottman Drilling Co. Source–Short-Term/Annual Emissions

Short-Term Emission Rates (g/s)				Annual Emission Rates (g/s)			
NOx	SO ₂	CO	PM10/2.5	NOx	SO ₂	CO	PM10/2.5
4.079E-1	7.686E-4	3.973E-1	2.292E-2	2.188E-1	N/A	N/A	1.030E-2

Table 2 Rottman Drilling Co. Source–Stack Parameters

Height (m)	Temp (Kelvins)	Velocity (m/s)	Diam (m)	Source Type	UTM-X (m)	UTM-Y (m)	Z (m)
3.05	763.7	19.355	0.2032	POINT	396297.85	3843464.33	709.88

The short-term emissions are based on the maximum allowed for Tier 3 engines and the engine was assumed to operate up to 24-hours per day. The annual limits are based on the AVAQM tonnage as provided.

Results

The modeling results are presented below in Table 1. The maximum cumulative annual NO₂ impact occurred in the immediate vicinity of the Rottman Drilling Company. The new cumulative modeled impacts are shown below, with any revised impacts highlighted in red (which are the annual NO₂ impacts only).

Table 3 Air Quality Impact Results for Cumulative Modeling Analysis w/ Rottman Drilling Co. Source–Ambient Air Quality Standards

Pollutant	Avg. Period	Maximum Concentration (µg/m ³)	Background (µg/m ³)	Total (µg/m ³)	Ambient Air Quality Standards CAAQS/NAQS (µg/m ³)	
Normal Operating Conditions						
NO ₂ ^a	1-hour Max	208.7	98	307	339	-
	1-hr 5-yr Avg of 98 th %	N/A	N/A	151.3	-	188
	Annual Max	1.88	15.1	17.0	57	100
CO	1-hour Max	1309.9	2,176	3,486	23,000	40,000
	8-hour Max	502.3 ^b	1,603	2,105	10,000	10,000
SO ₂	1-hour Max	5.85	16	22	655	-
	1-hr 5-yr Avg of 99 th %	1.87	10	12	-	196
	3-hour H2H	1.57	16	18	-	1,300
	24-hour Max	0.801	8	9	105	-



Pollutant	Avg. Period	Maximum Concentration (µg/m ³)	Background (µg/m ³)	Total (µg/m ³)	Ambient Air Quality Standards CAAQS/NAAQS (µg/m ³)	
					CAAQS	NAAQS
PM10	24-hour Max	13.25 ^c (13.25)	185	198	50	-
	24-hour H2H	11.34 ^c (11.35)	80	91	-	150
	Annual Max	0.932	28.3	29.2	20	-
PM2.5	24-hr 5-yr Avg of 98 th %	4.76 ^c (4.47)	18	23	-	35
	Annual Max	0.932	7.2	8.1	12	-
	5-yr Avg of Annual Conc's	0.815	6.1	6.9	-	12.0
Start-up/Shutdown Periods						
NO ₂ ^a	1-hour Max	202.8	98	301	339	-
	1-hr 5-yr Avg of 98 th %	N/A	N/A	151.3	-	188
CO	1-hour Max	1309.9	2,176	3,486	23,000	40,000
	8-hour Max	502.3	1,603	2,105	10,000	10,000

^a NO₂ 1-hour impacts evaluated using the Ozone Limiting Method with 0.5 and 0.2 in-stack NO₂/NO_x ratios for project and nearby cumulative inventory sources, respectively, in accordance with recent USEPA documents and the submitted amendment. NAAQS analysis also includes seasonal hourly NO₂ background values in accordance with USEPA guidance. NO₂ annual impacts evaluated using the Ambient Ratio Method with a 0.75 (75%) ratio.

^b CO 8-hour facility impacts greater for auxiliary boiler operating continuously without any concurrent turbine operations.

^c PM10/PM2.5 24-hour worst-case impacts are for 43% load Case 27, which would be unlikely to occur for two turbines for a full 24-hours (i.e., two turbines at less than 50% load). The worst-case for 24-hour operations at 75% and 100% loads for PM10/PM2.5 is the same as the other pollutants – Case 2 (these impacts shown in parentheses).

As presented in Table 3, the total cumulative impacts (Modeled + Background) are less than the NAAQS and CAAQS for all pollutants and averaging periods.

Conclusion

Based on these results, the Palmdale Energy Project, in conjunction with operation from other existing background sources, will not cause or contribute to violations of the CAAQS or NAAQS for all pollutants and averaging times. The attached modeling CD contains both the input and output files associated with the cumulative analysis.

