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November 30, 2016

Mike Monasmith
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

RE: Mission Rock Energy Center (15-AFC-02): California Energy Commission Staff's Data Request No. 1

Dear Mr. Monasmith:

In response to Energy Commission ("Commission") Staff's Data Request No. 1, Mission Rock Energy Center, LLC (the "Applicant") is providing the attached table that was submitted to the Ventura County Air Pollution Control District.

Please contact me at 916-447-2166 if you have any questions.

Sincerely,

ELLISON, SCHNEIDER & HARRIS LLP
Greggory L. Wheatland
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Attorneys for the Applicant

APCD Worst case calculations

Assumptions:
Normal turbine emission factors from Attachment 5.1A-1 Turbine performance data (run #1)
Startup/shutdown emission factors from Appendix table 5.1A-1 Maximum hourly, daily, annual emissions calculations.
PM10 at 2.0 lb/hr.
SOx at 0.75 grains all the time.
Worst case hour is startup/shutdown/startup all in 1 hr.
Annual turbine emissions = 150 startups+150 shutdowns+ 2402.5 hrs steady state (based on run #1 emission factors)

Startup and Shutdown Hourly Emissions (lbs)						
Pollutant	Startup Emissions			Shutdown Emissions		
	Startup +	Normal Operation =	**Maximum Hourly Startup**	Shutdown +	Normal Operation =	**Maximum Hourly Shutdown**
Duration (min)	30	30	**60**	9	51	**60**
ROC	1.00	0.3672	**1.3672**	1.00	1.220.60	**2.221.60**
NOx	9.10	2.559	**11.659**	1.820	4.2340	**6.025.60**
PM_{10}	1.00	1.00	**2.00**	0.30	1.70	**2.00**
SOx	0.3060	0.2960	**0.591.20**	0.1018	0.491.02	**0.591.20**
CO	5.50	2.4852	**8.027.99**	1.80	4.238	**6.028**
NH3	1.89	1.89	**3.787**	0.57	3.20	**3.77**

~~Startup/Shutdown/Restart Hourly Emissions (lbs)~~				
~~Pollutant~~	~~Startup +~~	~~Shutdown +~~	~~Restart (Startup) =~~	~~**Maximum Hourly Startup/ Shutdown/ Restart Emissions**~~
~~Duration (min)~~	~~30~~	~~9~~	~~21~~	~~**60**~~
~~ROC~~	~~1.00~~	~~1.00~~	~~0.70~~	~~**2.70**~~
~~NOx~~	~~9.10~~	~~1.20~~	~~6.37~~	~~**16.67**~~
~~PM_{10}~~	~~1.00~~	~~0.30~~	~~0.70~~	~~**2.00**~~
~~SOx~~	~~0.60~~	~~0.18~~	~~0.42~~	~~**1.20**~~
~~CO~~	~~5.50~~	~~1.80~~	~~3.85~~	~~**11.15**~~
~~NH3~~	~~1.89~~	~~0.57~~	~~1.32~~	~~**3.78**~~

Commented [GD1]: This scenario is not proposed for the permit. Only one startup per hour.

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Startup and Shutdown Annual Emissions (per turbine)				
Pollutant	**Startup**		**Shutdown**	
	Pounds Per Startup	Tons Per Year (150 Startups/yr)	Pounds Per Shutdown	Tons Per Year (150 Shutdowns/yr)
ROC	1.00	0.075	1.00	0.075
NOx	9.10	0.683	1.20	0.09
PM_{10}	1.00	0.075	0.30	0.023
SOx	0.360	0.02245	0.1018	0.0074135
CO	5.50	0.4125	1.80	0.135
NH3	1.89	0.14175	0.57	0.042575

New Turbine Emission Calculations - Normal Operation per turbine				
Pollutant	**Emission Factor**	**Emission Factor Basis**	**Maximum Pounds Per Hour (@ 566.2 MMBtu/hr)**	**Annual Tons Per Year (2402.5 hr/yr) (@ 561.0 MMBtu/hr)**
ROC	0.00126251 lb/MMBtu	2.01 ppmvd (BACT)	1.420.71	0.8471.71
NOx	0.00901 lb/MMBtu	2.5 ppmvd (BACT)	5.10	6.134.85
PM_{10}	N/A	2.0 lb/hr per MRECGE?	2.0	2.40
SOx	0.00102137 5 lb/MMBtu	0.75 grain	0.591.21	1.450.74
CO	0.00877 lb/MMBtu	4.0 ppmvd per GE	4.97	5.916
NH3	N/A	5.0 ppmvd (BACT)	3.77	4.4953

New Turbine Emission Calculations – Maximum Annual Emissions					
Pollutant	**Annual Startups**	**Annual Shutdown**	**Annual Normal op**	**Total annual turbine operation**	**Annual x 5 turbines**
	Tons Per Year	Tons Per Year	Tons Per Year	Tons Per Year	Tons per year
ROC	0.075~~0.075~~	0.075~~0.075~~	0.847~~1.71~~	**~~1.86~~1.00**	4.98~~9.30~~
NOx	0.683~~0.68~~	0.09~~0.09~~	4.85~~6.13~~	**5.63~~6.90~~**	28.13~~34.50~~
PM_{10}	0.075~~0.075~~	0.0074~~0.023~~	2.402.40	**2.50**	12.50~~12.50~~
SOx	0.022~~0.045~~	0.0199~~0.0135~~	0.709~~1.45~~	**0.74~~1.51~~**	7.55~~3.69~~
CO	0.4125~~0.4125~~	0.135~~0.135~~	5.91~~5.96~~	**6.46~~51~~**	**32.29~~55~~**
NH3	0.14175~~0.14175~~	0.0425~~0.04275~~	4.49~~4.53~~	**4.49~~71~~**	22.46~~23.55~~

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Max Annual is- 150 SU + 150 SD + 2402.5 hr normal op = 2500 hrs total usage

New Turbine Emission Calculations – Maximum Permitted Emissions Hourly and Annual Operations					
Pollutant	**Hourly***		**Annual****		**Annual x 5 turbines**
	Pounds Per Hour		Tons Per Year		Tons per year
ROC	**1.36**~~2.70~~		**1.00**~~1.86~~		4.98~~9.30~~
NOx	**11.65**~~16.67~~		**5.63**~~6.90~~		28.13~~34.50~~
PM_{10}	**2.00**~~2.00~~		**2.50**~~2.50~~		12.50~~12.50~~
SOx	**0.59**~~1.20~~		0.74~~1.51~~		3.69~~7.55~~
CO	**7.99**~~11.15~~		**6.46**~~6.51~~		32.29~~32.55~~
NH3	**3.78**~~3.78~~		**4.49**~~4.71~~		22.46~~23.55~~

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*Max hourly is -SU/Full Load~~SD/re-SU~~ all in 1 hr
** Annual is -150 hrs startup+ 150 hrs shutdown + 2402.5 hrs normal operation

Engine emission calculations.

Engine operated 52 hrs/yr for maintenance and testing purposes.

New 220 BHP Emergency Fire Pump Engine Emission Calculations				
Pollutant	**Emission Factor (g/bhp-hr)**	**Emission Factor Basis**	**Pounds Per Hour**	**Tons Per Year (52 hr/yr)**
ROC	0.2	EPA Tier 3 non-road diesel standards	0.10	0.003
NOx	2.8	EPA Tier 3 non-road diesel standards	1.36	0.035
PM_{10}	0.15	EPA Tier 3 non-road diesel standards	0.07	0.002
SOx	0.0051	Very low sulfur fuel (15 ppmw) mass balance see below	0.0023	0.00006
CO	2.6	EPA Tier 3 non-road diesel standards	1.26	0.033

$$\frac{0.000015\ lb-S}{lb-fuel}\times\frac{7.1\ lb-fuel}{gallon}\times\frac{2\ lb-SO_2}{1\ lb-S}\times\frac{1\ gal}{137{,}000\ Btu}\times\frac{1\ bhp\ input}{0.35\ bhp\ out}\times\frac{2{,}542.5\ Btu}{bhp-hr}\times\frac{453.6\ g}{lb}=\ 0.0051\ \ \frac{g-SO_x}{bhp-hr}$$

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New Turbine Commissioning Emissions		
Pollutant	**Maximum Commissioning Emissions (lbs/hr) (Per Turbine)**	**Total Commissioning Emissions (tpy) (5 Turbines)**
ROC	3.0~~164.10~~	0.164~~3.52~~
NOx	68.0~~246.30~~	2.07~~11.70~~
CO	117.33~~973.00~~	4.43~~31.74~~