

Mariposa Energy Project  
Table 5.1B.3R  
Startup and Shutdown Emission Estimates  
January 2010

Assumptions	Value	Units	Notes
Total Start Up Duration	30	minutes	Includes 10 minutes of turbine startup to full load (GE Curve) and an additional 20 minutes for SCR/Oxidation Catalyst warm up.
Total Shutdown Duration	15	minutes	Includes 7 minutes prior to the 8 minute turbine shutdown period (GE Curve).
SCR/Ox Cat Start Up Duration	20	minutes	SCR/Ox Cat warm up period after turbine start of 10 minutes.
SCR/Ox Cat Shutdown Duration	7	minutes	Additional SCR/Ox Cat shutdown period in addition to the 8 minute GE shutdown curve.
Starts/Shutdowns/Day	12	each	
Starts/CTG/Year	300	each	
Shutdown/CTG/Year	300	each	

Initial Startup/Shutdown	Emission Rate (pound per period)			Reference
	NOx	CO	VOC	
Startup Emission Data	3.5	3.0	0.058	Initial 10 minutes - GE LM6000 Start Curve at ISO Conditions
Shutdown Emission Data	2.7	2.4	0.047	Final 8 minutes - GE LM6000 Shutdown Curve at ISO Conditions

Maximum Hourly Emission Rate (Steady State)	NOx (lb/hr)	CO (lb/hr)	VOC (lb/hr)	NOx (lb/min)	CO (lb/min)	VOC (lb/min)
	without SCR/Ox Cat control	43.950	66.800	6.370	0.733	1.113
with SCR/Ox Cat control	4.395	4.287	1.191	0.073	0.071	0.020

Pollutant	Start up/Shutdown Emissions Estimate per CTG								
	Start	Shutdown	Single Start <sup>d</sup>	Single Shutdown <sup>d</sup>	Combined Start-up/Shutdown <sup>e</sup>	Starts Only <sup>f</sup>	Shutdowns Only <sup>f</sup>	Starts Only <sup>g</sup>	Shutdowns Only <sup>g</sup>
	Lb/Event <sup>a,b</sup>	Lb/Event <sup>c</sup>	Lb/Hour	Lb/Hour	Lb/Hr	Lb/Day	Lb/Day	Lb/Year	Lb/Year
NOx	14.2	3.2	16.4	6.5	18.5	170.3	38.6	4258.4	963.8
CO	14.1	2.9	16.3	6.1	18.1	169.6	34.8	4240.0	870.0
VOC	1.1	0.2	1.7	1.1	1.6	13.4	2.2	335.9	55.8

<sup>a</sup> NOx lb/event is calculated as: (3.5 pounds during initial period + (14 minutes\*uncontrolled NOx emission rate)+(6 minutes \* controlled emission rate))

<sup>b</sup> The CO and VOC lb/event value assumes the control efficiency of the oxidation catalyst increases linearly from minute 10 through minute 30 of the startup event.

<sup>c</sup> Shutdown lb/event values are calculated as ((7 minutes \* controlled emission rate) + (emissions during final 8 minutes))

<sup>d</sup> The single start and shutdown hourly emission rates assumes one start or one shutdown per hour with the remainder of the hour at the maximum controlled emission rate.

<sup>e</sup> The combined start-up/shutdown emission rate represents the 1-hour emission rate assuming one 30-minute turbine start-up, 15 minutes of the maximum controlled emission rate (i.e., steady-state operation at full capacity with inlet chillers operating), and one 15-minute turbine shutdown.

<sup>f</sup> Daily emission rate only includes the emissions for 12 startup or 12 shutdown events (i.e., does not include hours for steady-state operation)

<sup>g</sup> Annual emission rate only includes the emissions for 300 startup or 300 shutdown events (i.e., does not include hours for steady-state operation)

Pollutant	Start up/Shutdown Emissions Estimate for 4 CTG				
	Start	Shutdown	Start	Shutdown	Start/Stop
	Lb/Day	Lb/Day	Lb/Year	Lb/Year	TPY
NOx	681.3	154.2	17033.4	3855.3	10.4
CO	678.4	139.2	16960.0	3480.2	10.2
VOC	53.7	8.9	1343.6	223.2	0.8