TENASKA® ROAN'S PRAIRIE PARTNERS, LLC

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January 21, 2014

Mr. Quang Nguyen
U.S. Environmental Protection Agency
Mail Code 6PD-R
1445 Ross Avenue
Suite 1200
Dallas, TX 75202-2733

Via Overnight Courier and Electronic Mail

Re: GHG PSD Permit Application
Tenaska Roan's Prairie Generating Station

Dear Mr. Nguyen:

Tenaska Roan's Prairie Partners, LLC (Tenaska) herein provides responses to your questions discussed via teleconference on January 16, 2014, regarding the Greenhouse Gas Prevention of Significant Deterioration permit application for the proposed Tenaska Roan's Prairie Generating Station. Please note the attachments relating to item 5 below are confidential and should not be placed on Region 6's website or placed in the public file.

1) Tables B-5, B-6, and B-7: Maximum Hourly Emissions Calculation Methodology

The calculated hourly emission rates in the references tables, for those emissions for which we do not have a guarantee (i.e., H_2SO_4, Pb, and GHGs) use the emission factors shown in terms of lbs/MMBtu multiplied by the maximum turbine heat input rating. Some of the emission factors are calculated and rounded while others, such as CO_2, are hard coded as shown. Further, the turbine heat input is rounded. Therefore, as an example, using the spreadsheet equation and a "hand calculation" using the values on the printed page results in the following two calculations for GE 7FA.05 CO_2:

Spreadsheet: 119.50 lb/MMBtu x 2,377.56741 MMBtu/hr = 284,119.31 lbs/hr

Hand Calculation: 119.50 lb/MMBtu x 2,378 MMBtu/hr = 284,171.00 lbs/hr

2) Conversion from Heat Rate to % Efficiency

The equation to convert Heat Rate (fuel higher heating value, or HHV, basis) to % Efficiency (on the typical fuel lower heating value, or LHV, basis) is as follows:

$$\frac{3{,}412.14\ Btu/hr\ /\ kW}{Heat\ Rate\ (HHV)\ Btu/kWh} = \%\ efficiency\ (HHV)\ x\ \frac{1.11\ LHV}{HHV} = \%\ efficiency\ (LHV)$$

3) Table E-1 Data

For purposes of Step 4 of the BACT analysis, Table E-1 is intended to provide a comparison of numerous generation technologies on a common, avoided-cost-of-CO_2 basis. In order to compare on a common basis, public domain sources were used for the various data including that for the three turbines being considered for the TRPGS. Therefore, the data for these three turbines differ from the direct permitting-related data tables found elsewhere throughout the application, which are based upon project-specific information obtained directly from Siemens and GE.

4) Proposed GHG BACT Limit Averaging Period

The basis for the 720-hr (30-day) averaging period for the proposed GHG BACT limits (lbs CO_2/MWh) is the final PSD permit (No. SD 11-01) issued by EPA Region 9 on November 19, 2012 for the Pio Pico Energy Center, a proposed simple cycle peaking facility located in Otay Mesa, CA. That permit was appealed and recently upheld in its entirety, except for one issue, by the Environmental Appeals Board on August 2, 2013. The GHG BACT averaging period was not one of the issues on appeal.

5) Cost of Avoided CO_2 in Table 4-8 and Table E-1 and its Accompanying Chart

Attached are corrected Table E-1 and its accompanying chart. Please note these are confidential and were submitted as such in the initial permit application in February 2013. Therefore, we ask that they not be placed on Region 6's website or placed in the public file.

6) Applicable Appendix D Performance Cases Used in Table 4-9

The summer design condition turbine output and heat rate data used in Table 4-9 were taken from the Siemens and GE performance data tables contained in Appendix D. During review of this data it was determined that the Siemens data were based upon an inconsistent load/site condition. The corrected conditions are reflected below (now all at 98 °F and 42% relative humidity). Corrected Tables 4-1 and 4-9, reflecting the revised GHG BACT limit for the Siemens turbine option, are attached. Note GE did not numerically label their load/site conditions.

Load ↓	Turbine →	Siemens 5000F(5ee)	GE 7FA.04	GE 7FA.05
Full		"CASE 28"	"BASE" @ 98 °F (E.C. on)	"BASE" @ 98 °F (E.C. on)
Minimum		"CASE 27"	"59.5%" @ 98 °F	"47.9%" @ 98 °F

E.C. = Evaporative Cooler

7) Proposed NSPS TTTT Applicability

The TRPGS will not be subject to the proposed Standards of Performance for Greenhouse Gas Emissions from New Stationary Sources: Electric Utility Generating Units (40 CFR 60 Subpart TTTT) as currently written (79 FR 1430) because we have requested an enforceable limit on the annual capacity factor of each turbine of 33% (approximately equal to 2,920 hours per year at full load). Paragraph 40 CFR 60.5509(a)(2) states the rule would be applicable to stationary combustion turbines that, among other requirements, are "constructed for the purpose of supplying, and supplies, <u>one-third or more</u> of its potential electric output…to a utility distribution system on a 3-yr rolling average basis." (underline added for emphasis) The same requirement is included in proposed paragraph 40 CFR 60.4305(c)(5) should the applicable GHG emission limits be incorporated into existing NSPS Subpart KKKK for Stationary Combustion Turbines in lieu of promulgating an entirely new Subpart TTTT.

We trust these responses satisfactorily address your questions. Please let me know if you have any further questions or require additional information. We look forward to a completeness determination and issuance of the draft permit.

Sincerely,

TENASKA ROAN'S PRAIRIE PARTNERS, LLC,
a Delaware limited liability company
By: Tenaska Roan's Prairie I, LLC, Its Manager

Larry G. Carlson, QEP
Director, Air Programs

Attachments

cc: Melanie Magee, USEPA (email only)
Jeff Robinson, USEPA (email only)
Brad Toups, USEPA (email only)
Sid Rajmohan, ERM (email only)

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Table E-1

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Tenaska Roan's Prairie Generating Station

Grimes County, Texas

Cost of Avoided CO2 Calculations

Roan's Prairie COE and Avoided Cost of CO2 Comparison for Various Technologies

Key assumptions	
Capacity Factor	33%
Hours per Start	10
Fuel Price ($/MMBtu)	5

				Combined Cycle				Simple Cycle					
Description	Plant Type			Conventional with frame-type gas turbines	Flex Plants			Reciprocating Engines	Aeroderitvative Turbines	Frame Type Gas Turbines			
Description	Technology			MHI 501GAC	GE FlexEfficiency 60	Siemens FlexPlant 30	Siemens FlexPlant 10	Wärtsila 50SG					
Description	Gas Turbine / Engine				GE 7F 5-Series	Siemens SGT6-5000F	Siemens SGT6-5000F		GE LMS100PA	GE 7F 5-Series	GE 7FA.04	Siemens SGT6-5000F	Avg
Description	Configuration			2x1	2x1	2x1	2 1x1 Blocks	36 Engines	6x0	3x0	3x0	3x0	3x0
Performance and CO2 Emissions	Performance at ISO Conditions [1]	Heat Rate	(Btu/kWh LHV)	5,763	5,781	5,956	6,994	7,378	7,815	8,817	8,930	8,794	
		Heat Rate	(Btu/kWh HHV)	6,400	6,420	6,615	7,767	8,193	8,679	9,791	9,917	9,766	
		CO_2 Emissions [4]	(lbs/MWhgross)	752	754	777	913	963	1,020	1,150	1,165	1,147	
		Capacity	(MWgross)	811	655	615	550	675	600	647	554	694	
	Site Summer Performance [1,2,3]	Heat Rate	(Btu/kWh LHV)	5,822	5,905	6,008	7,081	7,427	8,028	8,980	9,135	9,158	
		Heat Rate	(Btu/kWh HHV)	6,466	6,557	6,671	7,863	8,248	8,915	9,972	10,144	10,170	
		CO_2 Emissions [4]	(lbs/MWhgross)	760	770	784	924	969	1,048	1,172	1,192	1,195	1,186
		Capacity	(MWgross)	749	622	569	507	649	545	614	506	661	
	Start Time Description [5]	Output in 10min	(MW)	0	409	120	279	649	545	558	0	551	
		% GPO in 10m	(%)	0%	66%	21%	55%	100%	100%	91%	0%	83%	
		Time to Full load	(min)	54	30	35	12	10	10	11	35	12	
Economic Comparison	Operating Profile Assumptions	Capacity Factor	(%)	33%	33%	33%	33%	33%	33%	33%	33%	33%	
		Operating Hours	(hrs)	2,891	2,891	2,891	2,891	2,891	2,891	2,891	2,891	2,891	
		Starts per Year	(#)	289	289	289	289	289	289	289	289	289	
		Generation [7]	(MWhs/yr)	2,165,930	1,798,180	1,645,854	1,466,349	1,875,301	1,576,548	1,773,506	1,463,034	1,911,857	
		CO2 Emissions	(T/yr)	822,755	692,698	645,087	677,393	908,701	825,738	1,039,048	871,946	1,142,310	
	Cost of Capacity	Specific Indicative Plant Capital Cost [6]	($/kW summer gross)	800	850	850	1,095	1,200	950	400	432	400	
		Plant Capital Cost (PCC)	($MM, overnight 2013)	599	529	484	556	778	518	245	219	265	
		Owner's Costs	(% of Plant Cost)	10%	10%	10%	10%	10%	10%	10%	10%	10%	
		Annualized Capital Recovery [8]	($/yr)	$82,417,414	$72,700,401	$66,541,867	$76,381,250	$107,037,743	$71,238,609	$33,742,500	$30,062,862	$36,374,745	
		Capacity Cost	($/MWh gross)	38.05	40.43	40.43	52.09	57.08	45.19	19.03	20.55	19.03	
	Direct Annual Operating Costs	Fixed O&M [10]	($/yr)	8,990,991	7,464,426	6,832,106	6,086,959	20,758,835	2,999,520	3,374,250	2,783,550	3,637,474	
			($/kW-yr)	12	12	12	12	32	6	6	6	6	
			($/MWh)	4.15	4.15	4.15	4.15	11.07	1.90	1.90	1.90	1.90	
		Variable O&M	($/yr)	13,856,541	12,861,105	10,325,367	10,037,380	11,965,283	8,369,718	15,623,644	12,886,910	12,318,777	
			($/MWh gross)	6.40	7.15	6.27	6.85	4.60	0.96	8.81	8.81	6.44	
		Summer Heat Rate	(Btu/kWh, HHV)	6,466	6,557	6,671	7,863	8,248	8,915	9,972	10,144	10,170	
		Fuel Charge	($/yr)	70,021,711	58,953,062	54,901,057	57,650,501	77,336,287	70,275,535	88,429,593	74,208,151	97,217,907	
			($/MWh gross)	32.33	32.78	33.36	39.32	41.24	44.58	49.86	50.72	50.85	
		Subtotal	($/MWh gross)	42.88	44.09	43.78	50.31	56.91	47.43	60.57	61.43	59.20	
	Indirect Annual Operating Costs [9]	G&A Charges @ 0.6539% of PCC	($/yr)	3,919,473	3,457,367	3,164,489	3,632,415	5,090,326	3,387,849	1,604,671	1,429,680	1,729,851	
			($/MWh gross)	1.81	1.92	1.92	2.48	2.71	2.15	0.90	0.98	0.90	
		Insurance @ 0.4801% of PCC	($/yr)	2,877,716	2,538,434	2,323,400	2,666,956	3,737,369	2,487,393	1,178,165	1,049,686	1,270,074	
			($/MWh gross)	1.33	1.41	1.41	1.82	1.99	1.58	0.66	0.72	0.66	
		Property Tax @ 1.3289% of PCC	($/yr)	7,965,418	7,026,295	6,431,090	7,382,040	10,344,906	6,885,017	3,261,121	2,905,494	3,515,520	
			($/MWh gross)	3.68	3.91	3.91	5.03	5.52	4.37	1.84	1.99	1.84	
		Subtotal	($/MWh gross)	6.82	7.24	7.24	9.33	10.22	8.09	3.41	3.68	3.41	
	Summary	Capacity Cost	($/yr)	$82,417,414	$72,700,401	$66,541,867	$76,381,250	$107,037,743	$71,238,609	$33,742,500	$30,062,862	$36,374,745	
		Direct Operating Costs	($/yr)	$92,869,243	$79,278,593	$72,058,530	$73,774,840	$110,060,405	$81,644,773	$107,427,487	$89,878,611	$113,174,159	
		Indirect Operating Costs	($/yr)	$14,762,607	$13,022,096	$11,918,979	$13,681,410	$19,172,600	$12,760,260	$6,043,957	$5,384,860	$6,515,444	
		Total	($/yr)	$190,049,264	$165,001,089	$150,519,376	$163,837,500	$236,270,748	$165,643,642	$147,213,943	$125,326,333	$156,064,348	
		Capacity Cost	($/MWh gross)	38.05	40.43	40.43	52.09	57.08	45.19	19.03	20.55	19.03	
		Direct Operating Costs	($/MWh gross)	42.88	44.09	43.78	50.31	56.91	47.43	60.57	61.43	59.20	
		Indirect Operating Costs	($/MWh gross)	6.82	7.24	7.24	9.33	10.22	8.09	3.41	3.68	3.41	
		Total Cost of Electricity	**($/MWh gross)**	**87.74**	**91.76**	**91.45**	**111.73**	**124.21**	**100.71**	**83.01**	**85.66**	**81.63**	**83.43**
		Avoided Cost of CO2	**($/T)**	**20**	**40.1**	**39.9**	**215.8**	**375.7**	**249.2**	**0 (Reference)**			

[1] New and Clean Conditions, data from public domain sources

[2] 290ft elevation, 0.4% dry bulb temperature (98F) and mean coincedent relative humidity (42%)

[3] With Evaporative Coolers performing at 90% effectiveness; data taken from vendor estimates where available or adjusted according to GER-3567H

[4] Assumes fuel CO2 intensity of 117.5 lb CO2 per MMBtu fuel input (higher heating value basis), no safety margin

[5] For Roan's Prairie Summer Conditions

[6] Based on internal quotations, $2013 overnight basis, excludes owner's costs, financing costs, and interconnect costs; no duct firing for combined cycles

[7] Assumes operation at the Roan's Prairie Summer Ambient Condition for all operating hours

[8] Annual capital recovery at 12.5% of PCC per year

[9] Based on Tenaska Financial Modeling

[10] Based on Tenaska historical project development experience

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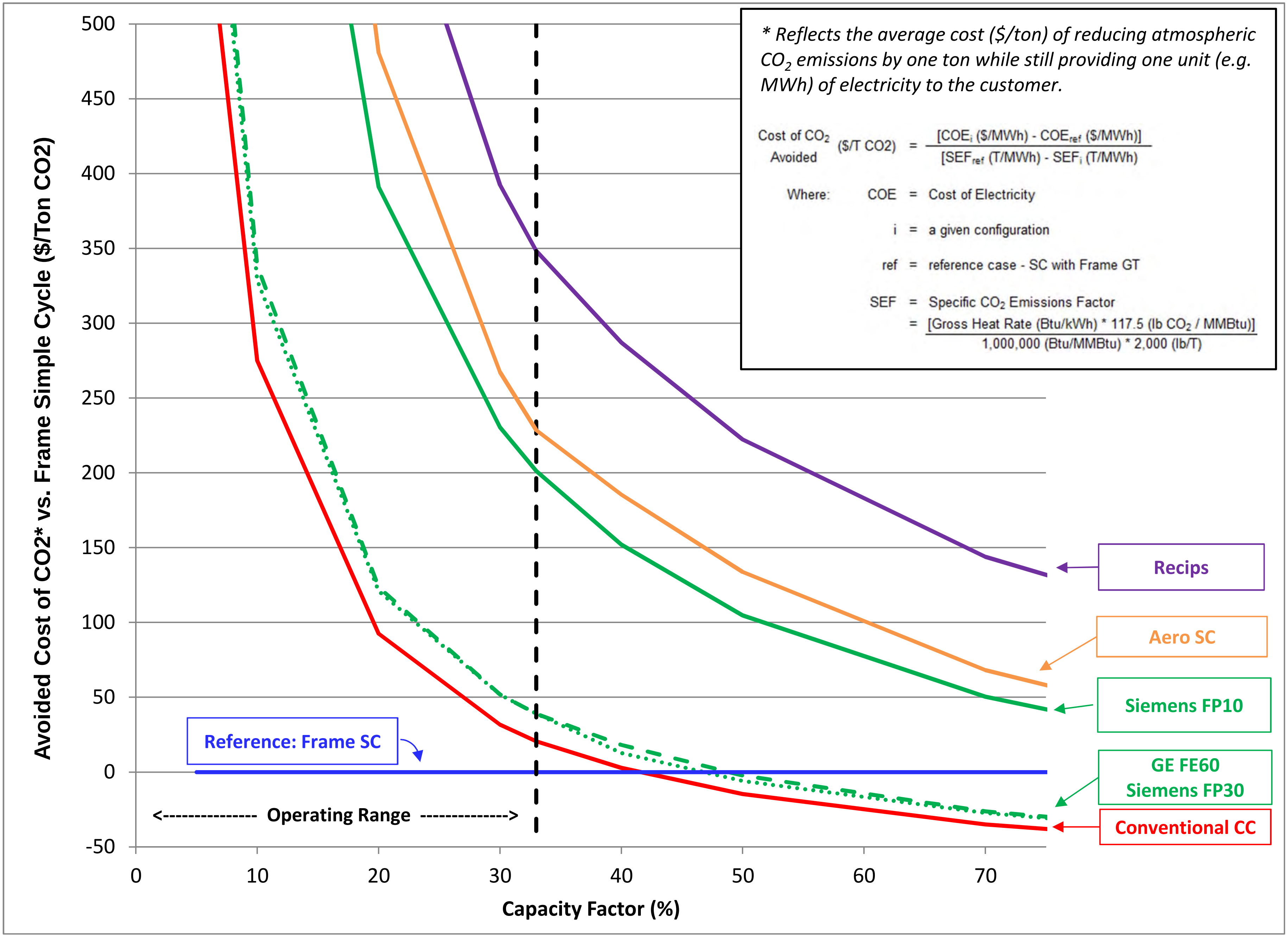

TABLE 4-1: Summary of Proposed BACT for Combustion Turbines

Pollutant	Siemens SGT6-5000F	GE 7FA.05	GE 7FA.04	Control Technology/ Standard	Averaging Time / Compliance Method
CO_2 (lb/MWh_{gross})	1,375	1,356	1,355	Good combustion practices, operations and maintenance Fuel Selection	720 hour rolling avg./ Fuel Monitoring, Recordkeeping
CO_2e (tpy)	1,279,154	1,245,701	1,151,814		12 month rolling avg./ Fuel Monitoring, Recordkeeping

Table 4-9: CO_2 BACT Emission Rate Determination

Parameter	Units	Siemens SGT6-5000F	GE 7FA.05	GE 7FA.04
Full Load at Summer Design Condition [1]				
Load/Site Condition from App D Turbine Performance Data		"CASE 28"	"BASE" @ 98 °F (Evap Coolers on)	"BASE" @ 98 °F (Evap Coolers on)
Output (New and Clean, per Turbine)	(MW)	221.3	204.5	168.7
Heat Rate (New and Clean)	(Btu/kWh HHV)	10,160	9,972	10,144
Assumed Operation Percentage at Full Load	(%)	85%	85%	85%
Minimum Load at Summer Design Condition [1]				
Load/Site Condition from App D Turbine Performance Data		"CASE 27"	"47.9%" @ 98 °F	"59.5%" @ 98 °F
Minimum Load Definition	(MW)	93.0	91.5	93.2
	(% of Full Load)	42%	45%	55%
Heat Rate (New and Clean)	(Btu/kWh HHV)	13,437	13,548	12,526
Assumed Operation Percentage at Min Load	(%)	15%	15%	15%
Blended Permitting Data (85% Ops @ Full Load and 15% Ops @ Min Load) at Summer Design Condition [1]				
Heat Rate (New and Clean)	(Btu/kWh HHV)	10,651	10,509	10,502
CO_2 Fuel Intensity	(lb/MMBtu HHV)	119.5	119.5	119.5
CO_2 Emission Rate (New and Clean)	(lb/MWh)	1,273	1,256	1,255
Degradation Margin	(%)	6%	6%	6%
Commercial Margin	(%)	2%	2%	2%
CO_2 Fuel Intensity Margin	(%)	0%	0%	0%
CO_2 Emission Rate (Margined/Permitted)	(lb/MWh)	1,375	1,356	1,355

[1] Summer design condition defined as 98 °F dry bulb ambient, 42% relative humidity