#### Golder Associates Inc.

6241 NW 23rd Street, Suite 500 Gainesville, FL 32653-1500 Telephone (352) 336-5600 Fax (352) 336-6603

# RECEIVED

SEP 0 8 2000



BUREAU OF AIR REGULATION

September 5, 2000

9939570

Administrator, New Source Review Section Florida Department of Environmental Protection 2600 Blair Stone Road Tallahassee, Florida 32399-2400

Attention: Mr. A.A. Linero, P.E.

RE:

CALPINE CONSTRUCTION FINANCE COMPANY, LP

OSPREY ENERGY CENTER

COMMENTS ON DRAFT AIR CONSTRUCTION PERMIT; RESPONSES TO EPA

COMMENTS ON APPLICATION FOR PERMIT TO CONSTRUCT

Dear Mr. Linero:

The following information provides comments to the draft air construction permit for the proposed Osprey Energy Center in Auburndale, Polk County, Florida prepared by the Florida Department of Environmental Protection (DEP). In addition, responses have been prepared that address the comments made by the U.S. Environmental Protection Agency (EPA) dated June 21, 2000 regarding the air construction permit application.

## COMMENTS TO THE DRAFT AIR CONSTRUCTION PERMIT

Comments to the draft air construction permit were discussed in a meeting held with DEP on June 29, 2000. A summary of these comments is presented in Attachment 1 to this letter.

## EPA COMMENTS AND RESPONSES

### Comment 1

 In November 1999, ABB ALSTOM POWER announced the availability of SCONO<sub>x</sub> systems for any size combustion turbines. Region 4 therefore considers this control method technically feasible for Osprey's combined cycle CTs. Accordingly, FDEP should require the Osprey Energy Center to provide a project-specific BACT analysis for SCONO<sub>x</sub> (economics, environmental impacts, and energy use) before issuing a final permit.

Response: Although SCONO<sub>x</sub><sup>TM</sup> is theoretically technically feasible, it has not been demonstrated on an "F" Class combustion turbine. Performance data on future applications on "F" Class turbines considering SCONO<sub>x</sub><sup>TM</sup> will only likely be available after 2002, well after the Osprey Energy Center is scheduled for construction. The SCONO<sub>x</sub><sup>TM</sup> system has only been operated on a 32 MW facility in California since 1996 and a 5 MW unit in Massachusetts since 1999. The scale up of this complicated technology should not be underestimated. The SCONO<sub>x</sub><sup>TM</sup> technology installed on an "F" Class turbine would involve about a dozen or more different catalyst chambers for absorption and regeneration. Every 15 to 30 minutes, dampers would be operated to isolate a particular catalyst chamber for regeneration. Each regeneration cycle must isolate the chamber so that oxygen is not introduced and regeneration gas (hydrogen) is introduced. There is concern that damper seal leaks would be significant as applied to the large volume flows associated with an "F" Class CT. While ammonia is not required for the SCONO<sub>x</sub><sup>TM</sup> system, the turbine backpressure with SCONO<sub>x</sub><sup>TM</sup> is greater than SCR (about 60%) and SCONO<sub>x</sub><sup>TM</sup> requires natural gas and steam for regeneration of the

catalyst beds. In contrast, SCR is a proven and demonstrated technology that can achieve the same NO<sub>x</sub> reduction performance.

While ammonia is not used or emitted from a SCONO<sub>x</sub><sup>TM</sup> system, there are substantial natural gas and energy requirements for the system that would directly produce air pollutants. The natural gas required to produce the steam needed for SCONO<sub>x</sub><sup>TM</sup> is equivalent to 27 mmBtu/hr or 235,200 mmBtu/year. In contrast, the natural gas requirement needed for SCR is equivalent to 1.8 mmBtu/hr or 15,600 mmBtu/year. These energy requirements, combined with the turbine backpressure and electrical usage would increase emissions of carbon dioxide by about 23,800 ton/year. When all the energy requirements for SCONO<sub>x</sub><sup>TM</sup> are considered, it is about 2.3 percent of the combustion turbine heat input.

The estimated capital cost for SCONO<sub>x</sub><sup>TM</sup> developed for one turbine/HRSG unit for the proposed Osprey Energy Center is \$30 million. This capital cost estimate is based on information supplied by ABB Alstrom and the procedures in the EPA Cost Control Manual. In contrast, the capital costs for SCR is about \$3.0 million, which clearly is about one-tenth the cost of a SCONO<sub>x</sub><sup>TM</sup> system. The annualized cost of SCONO<sub>x</sub><sup>TM</sup> is estimated at \$6.2 million, while the annualized cost for SCR is \$1.6 million. Tables B-3a and B-4a present the capital and annualized costs of SCR and SCONO<sub>x</sub><sup>TM</sup>. The cost effectiveness of SCONO<sub>x</sub><sup>TM</sup> is \$9,300 per ton of NO<sub>x</sub> removed. In contrast, the cost effectiveness of SCR is \$2,400 per ton of NO<sub>x</sub> removed. The cost per ton of NO<sub>x</sub> removed is nearly 4 times higher for the SCONO<sub>x</sub><sup>TM</sup> system than for SCR and incurs the uncertainty in its lack of demonstrated feasibility on large turbines.

## Comment 2

2. We suggest you verify the emission factor used by Golder Associates to estimate potential formaldehyde emissions. The emission factor cited by Golder is only one-fifth of the emission factor cited for formaldehyde from natural gas turbines in the recently revised section 3.1 of AP-42.

Response: Golder Associates has revised the emission factors for hazardous air pollutants (HAPs) to reflect the availability of additional data. The revised HAP emissions are based on emission factors from the April 2000 revision of EPA's AP-42 emission factor database. A summary of the emission factors and emissions for gas firing is presented in Tables A-2, A-3, A-5, A-6, A-8, and A-9.

Except for formaldehyde, the emission factors are those presented in Tables 3.1-4 and 3.1-5 of the revised AP-42 section for combustion turbines. For formaldehyde, a review of EPA's database was conducted and an emission factor was estimated based on comparisons of the turbines and emission characteristics from EPA's database to those proposed for this project. A discussion regarding this review and estimation of the formaldehyde emission factor is presented here.

The original emission factor for formaldehyde used in the application was from the Electric Power Research Institute (EPRI)- sponsored Electric Utility Trace Substances Synthesis Report. This report was submitted to EPA as part the requirements of the 1990 Clean Air Act Amendments to study potentially toxic air pollutants from utility sources. These data were the most technically accurate and complete data available on emission from utility sources. The emission factor used for the proposed CTs for this Project was 34 lb/10<sup>12</sup> Btu. It should be recognized that there are still limited data on formaldehyde emissions from large (i.e., > 100 MW) gas turbines.

The recent EPA emission factor suggests formaldehyde emissions from gas turbines of 780 lb/10<sup>12</sup> Btu when firing natural gas at loads greater than 80 percent. The EPA suggested emission factor for all loads is 3,100 lb/10<sup>12</sup> Btu. These emission factors for formaldehyde when firing natural gas are not appropriate for the proposed CTs for several reasons. First, and most importantly, the data used to develop the AP-42 emission factors are not representative of the Siemens Westinghouse combustion

turbine. Second, an evaluation of the data in the EPA Combustion Turbine Emissions Database clearly suggests a much lower emission factor for formaldehyde. Some of the important aspects of the EPA Gas Turbine Database related to formaldehyde emission are as follows.

- The formaldehyde emissions listed in the database are from small (< 30 MW) gas turbines. The available data are from an average capacity of about 28 MW. More importantly, the median capacity, or the turbine size where an equal number of turbines are above and below that size, is about 15 MW. Data from only 8 large turbines (>30 MW) are included in the EPA database, with a maximum size of 88 MW.
- In contrast to the AP-42 emission factors for formaldehyde, which are based on an average value, the median value in the database is substantially lower. For all loads, the median formaldehyde emission factor is about 320 lb/10<sup>12</sup> Btu; for turbine loads greater than 50 percent, the median emission factor is about 110 lb/10<sup>12</sup> Btu. The median emission factor is about 8 to ten times lower than the average factor which demonstrates the wide range in formaldehyde emissions and how individual turbine combustion characteristics can influence the results. The median is a measure of the middle of the distribution and, in distributions where there is symmetry about the mean, the mean and median coincide. However, in highly skewed distributions, as that observed for formaldehyde emissions, the median is more representative of a "truer average" since the median is not influenced by extreme values.
- There is a strong relationship between formaldehyde and CO emissions, as noted by EPA in the support document and, and as observed in the data. Gas turbines with higher CO emissions had higher observed formaldehyde emissions. An evaluation of the coincident CO and formaldehyde data indicates that formaldehyde emissions were 150 lb/10<sup>12</sup> Btu with CO emissions less than 0.1 lb/mmBtu. The CO emissions from the Siemens Westinghouse 501F turbine are about 0.02 lb/mmBtu under base load conditions and 0.06 lb/mmBtu with power augmentation.

The California Air Resource Borad sponsored a program to develop emission factors for toxic air pollutants. These factors, referred to as California Air Toxic Emission Factors (CATEF), included an emission factor for formaldehyde. The suggested factor is 108 lb/10<sup>12</sup> Btu.

Based on the available data, formaldehyde emissions would be in the range between 100 and 150  $lb/10^{12}$  Btu. An emission factor of 150  $lb/10^{12}$  Btu is considered appropriate for the Osprey Energy Center as a conservative factor for formaldehyde emissions.

Preliminary test data from a Calpine facility in Pasadena indicate formaldehyde emissions of about 150  $\rm lb/10^{12}$  Btu. Therefore, the emissions factor for formaldehyde developed from the EPA database is similar to the preliminary test data. The AP-42 emission factor for acetaldehyde is 40  $\rm lb/10^{12}$  Btu, which is also similar to the preliminary test data.

EPA developed the emission factors for many of the other HAPs in a manner similar to formaldehyde. For these HAPs, fewer data are available and are also considered not representative of state-of-the-art DLN combustion systems. The use of AP-42 emission factors for these HAPs are considered to provide conservative estimates of emissions.

An evaluation of the HAP emissions from the project indicates that emissions are less than 25 tons/year for all HAPs and less than 10 tons/year for any single HAP. As shown in Table2-4, the maximum total emissions of HAPs are estimated to be 8 tons/year with maximum emissions of any single HAPs at 2.6 tons/year (i.e., for formaldehyde). Therefore, the requirements of 40 CFR 63.43 for a maximum achievable control technology are not applicable to the project.

## Comment 3

3. The "Public Notice of Intent to Issue PSD Permit" indicates that the combustion turbines for this project will be General Electric PG7241FA units. It is our understanding, as indicated in the preliminary determination and draft PSD permit, that the Osprey Energy Center will be installing Siemens Westinghouse 501FD combustion turbines. If possible, please clarify this inconsistency before the public notice is published.

**Response:** As a point of clarification, the Siemens Westinghouse 501FD combustion turbines are proposed for the Osprey Energy Center.

We appreciate your timely review of these responses. If you have any additional questions, please contact Mr. Benjamin Borsch of Calpine at (813) 637-3515 or me at (352) 363-5600.

Sincerely,

GOLDER ASSOCIATES INC.

Colute Mc. Cane Ja Kennard F. Kosky, P.E.

Principal

RCM/jkw

cc: Benjamin Borsch, Calpine, Corporation

R.C.McCann, Golder

R. Douglas Neeley, EPA Region

David S. Dee, Landers & Parsons

M. Halpin C. Halladun

NPS

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# ATTACHMENT 1

Comments On Osprey Draft Permit

Permit Ref.	Sec.	Para.	Line	Comment
Intent to Issue PSD Permit	N/A	2	5	Delete "121 foot" or change to "135 foot"
Public Notice to Issue	N/A	1	4	Change "nitrous" to "nitrogen"
Public Notice to Issue	N/A	2	1	Change "General Electric PG7241FA" to "Siemens Westinghouse 501FD"
Public Notice to Issue	N/A	2	4	Change "relatively short stacks" to " stacks"
Public Notice to Issue	N/A	4	Table	NO <sub>x</sub> emissions should be reduced from 258 to 227 TPY in order to reflect the reduction of emission concentration from 4.0 to 3.5 ppmvd corrected to 15% O <sub>2</sub> . The 227 TPY reflects 3.5 ppmvd (corrected) limit and the emergency gas generator and diesel fire pump.
Technical Evaluation and Preliminary Determination (TEPD)	1.1	1	1	Change "Calpine Construction Finance Company" to "Calpine Construction Finance Company, LP"
TEPD	3	2	1	Change "Calpine Construction & Finance Company, LP" to "Calpine Construction Finance Company, LP"
TEPD	4	3	4&5	Delete "Steam cooling of key components of the 501 F minimizes the need for less efficient air-cooling." F turbines do not employ this technology; G turbines do.
TEPD	6.2	1	NO <sub>x</sub>	The NO <sub>x</sub> emissions of the 2 CT/DB with duct firing are 218 TPY; the total is 227 TPY. This reflects the 3.5 ppmvd (corrected) limit.
TEPD	6.4.4	2	2	Change "Because no add-on-on control equipment and no reagents are required, there will be no steam plum or tendency to form ammoniated particulate species" to "There will be no steam plume."
Draft Permit	I(pg1)	1	1	Change "Calpine Construction & Finance Co., LP" to "Calpine Construction Finance Company, LP"
Draft Permit	I(pg2)	1	6	Change "230 KV transmission line" to "transmission line"
Draft Permit	III(pg6)	9	2&3	Add "without power augmentation" at end of first sentence since 1,669 MMBtu/hour is based

Permit Ref.	Sec.	Para.	Line	Comment
				on base load conditions. Also, the 1,669 million Btu per hour at ISO conditions is based on Siemens/Westinghouse guarantees but could change depending on the final installation and testing of the 501F units. Calpine understands that, based on the language of the condition, this could be modified based on "as built" performance curves.
Draft Permit	III(pg7)	10	2	The 250 MMBtu/hour is lower heating value (LHV); Change "(HHV)" to "(LHV)".
Draft Permit	III(pg7)	16	1	Change "simple cycle mode" to "without the use of the SCR system except during periods of startup and shut down." It is possible that the unit could operate in simple cycle mode during steam turbine failure or overhaul or during startup. For example, a dump condenser could be installed to manage the steam generated by the HRSG. With such operation, the SCR system would still be operated to meet emission limits but the unit would be in simple cycle mode.
Draft Permit	III(pg7)	19	1	Change "A certification" to "A manufacturer's certification"
Draft Permit	III(pg8)	20	2	Change "3-hr block average" to "24-hour block average" to be consistent with DEP's BACT Determination
Draft Permit	III(pg8)	20	6	Add after "27.5 lb/hr" the following "(at 95°F ambient temperature with power augmentation and duct firing)". The 27.5 lb/hr reflects NO <sub>x</sub> emissions when duct firing and power augmentation at 95 °F ambient conditions. This mode is more likely during the summer conditions, under cold weather conditions the emissions are 30.7 lb/hr. This is the maximum mass emission and is based on data from Siemens Westinghouse for that ambient temperature. Data sheets are attached.
Draft Permit	III(pg8)	21	2	Change "10 ppm" to "10 ppmvd"
Draft Permit	III(pg8)	21	5	Change "10 ppm" to "10 ppmvd @ 15% O <sub>2</sub> "
Draft Permit	III(pg8)	21	5	Change "45 lb/hr" to "45 lb/hr per unit"
Draft Permit	III(pg8)	21	6	Change "with the duct burner off" to "with the duct burner off and no steam injection for

Permit Ref.	Sec.	Para.	Line	Comment
				power augmentation"
Draft Permit	III(pg8)	21	6	Add "to be demonstrated by annual stack test using EPA Method 10 or through annual RATA testing." Calpine will have a certified CEMS that will demonstrate compliance continuously.
Draft Permit	III(pg8)	22	2 and 3	Change "ppmvd" to "ppmvd @ 15% O₂" and "lb/hr" to "lb/hr per unit"
Draft Permit	III(pg8)	22	5	Add emission limit of 4.2 ppmvd @ 15% O <sub>2</sub> during operations between 60 and 70 percent load per DEPs BACT Determination.
Draft Permit	III(pg8)	23	2	Change "less" to "not greater than"
Draft Permit	III(pg8)	23	5 and 6	Convert the last sentence to a note, since this statement is not relevant to limiting emissions of SO <sub>2</sub> .
Draft Permit	III(pg8)	24	2	Change "the combustion turbine" to "each combustion turbine and HRSG train"
Draft Permit	III(pg9)	25	8	This condition would prohibit operation at or below 60 percent load even if the unit can meet the emission limits for CO. Add the following at the end of the condition: "unless the permittee can demonstrate that the emission limits in Specific Condition III. 21. can be met." The plant will have CEMs and compliance will have to be demonstrated except for the periods outlined in the condition.
Draft Permit	III(pg9)	26	3	Change "3-hr" to "24-hr"
Draft Permit	III(pg9)	27	8	Change "No. 20 through 24" to "No. 20 through 21." Calpine has no way of knowing excess emissions for VOC, SO <sub>2</sub> and PM during startups and shutdowns.
Draft Permit	III(pg9)	29	1-4	Delete "Initial tests shall or change of combustors." What constitutes a "substantial modification" is very subjective in this context and any work performed on the units will likely affect only CO and NO, which are subject to CEMS. In addition, annual compliance tests were performed during every federal fiscal year. Replace with "Any replacement of the major components of the air pollution control equipment or the combustors (e.g., catalyst change-out or combustor replacement) must demonstrate

Permit Ref.	Sec.	Para.	Line	Comment
				compliance with the CEM based emission limits after the replacement is made. This activity must be identified in the quarterly report. If compliance with the CO emission limit is demonstrated through the CEM after the replacement, then no testing of VOCs is required."
Draft Permit	III(pg9)	29	Bul. 4	Delete the last sentence. The BACT standard should not have any relationship to the "ISO" correction and methods used in EPA Method 20. For annual tests, add that compliance with the BACT standard can be demonstrated during the RATA testing required under 40 CFR Part 75
Draft Permit	III(pg10)	30	8	Change "These excess emission periods" to "Excess emission periods"
Draft Permit	III(pg12)	44	All	Calpine understands that the language is taken from the Department's rules and that the appropriate process variables are based on the permit and the test methods prescribed in the permit. Add "No later than 90 days prior to operation, the permittee shall submit for the Department's approval a list of process variables that will be measured to comply with this permit condition."
Draft Permit	III(pg12)	46	Bul. 2	Delete the last sentence of the bullet. The wording presents both interpretation and enforcement difficulties. It is clear that the NO <sub>x</sub> emission limit is CEM based and Calpine will operate the SCR system as required by both the emission limit and the manufacturer's requirements to insure the NO <sub>x</sub> limit is achieved. See also comments to Bullet 5.
Draft Permit	III(pg12)	46	Bul. 3, ln 8&9	Delete the last two sentences. As discussed in our comments to Bullets 5 and 6 of this paragraph, Calpine proposes continuous monitoring, notification and corrective action planning that renders these two sentences unnecessary.
Draft Permit	III(pg13)	46	Bul. 4	Delete the word "minimum" in reference to the ammonia flow rate in the first sentence. Replace "at a minimum of 100% of the ammonia injection rate determined during the test." with "at an ammonia flow rate

Permit Ref.	Sec.	Para.	Line	Comment
				immediately prior to the NO <sub>x</sub> CEM disruption." The system will be operated according to the manufacturer's requirements and information on the flow rate will be provided and the annual tests will include the ammonia emissions. Using an ammonia flow rate just prior to a NO <sub>x</sub> CEM failure would reflect the current state of the catalyst while minimizing ammonia emissions. See also comments to Bullet 5.
Draft Permit	III(pg13)	46	Bul. 5	Calpine offers the following as a condition to monitor ammonia emissions. "Ammonia emissions shall be calculated using inlet and outlet NO <sub>x</sub> concentrations from the SCR system and ammonia flow supplied to the SCR system. The calculation procedure shall be provided with the CEM monitoring plan required by 40 CFR Part 75." There are several procedures, which can be used to calculate ammonia emissions based on the final CEM design. Examples are attached.
Draft Permit	III(pg13)	46	Bul. 6	Delete. This provision is inappropriate since it assumes that ammonia slip will exceed the 9-ppm limit within a year from the time that the ammonia slip is over 7. Indeed, ammonia testing will occur each year to determine compliance. Moreover, ammonia is not a regulated pollutant under the Clean Air Act except for 112 r provisions. The prior provisions to this paragraph provide the DEP with adequate assurances of continuous compliance. Per our discussion with the Department, replace this condition with: "The permittee shall notify the Department within 2 business days if the calculated ammonia emissions exceed 9 ppmvd corrected to 15% O <sub>2</sub> over a 24-hour block average. The notification shall include a corrective action plan to reduce ammonia emissions to below 9 ppmvd corrected to 15% O <sub>2</sub> over a 24-hour block average."
Draft Permit	III(pg13)	46	Bul. 7	Delete. This provision assumes that the cause of an ammonia slip or NO <sub>x</sub> exceedence is saturated catalyst when in fact it could be

Permit Ref.	Sec.	Para.	Line	Comment
				another cause (plugged nozzles, pump malfunctions, etc.). The prior provisions provide DEP with adequate assurances of continuous compliance. Calpine has offered language in Bullet 6 that provides notification and corrective actions to limit ammonia emissions.
Draft Permit	III(pg13)	46	Bul. 8	Delete. Calpine is not aware of any data that suggests maintaining a catalyst age of less than 24 months is necessary to ensure compliance with our NO <sub>x</sub> or ammonia limits. In addition, each unit will have continuous monitoring of NO <sub>x</sub> and ammonia usage (via ammonia flow monitoring), which will provide an indication of the need to replace catalyst. Calpine has offered continuous monitoring and notification procedures (see Bullets 5 and 6) that provide reasonable assurance that the SCR system will comply with ammonia and NO <sub>x</sub> emission limits.
Appendix BD	PgBD-3	Tab.1		The Calpine Sutter and Delta Projects were LAER limits, not BACT limits
Appendix BD	PgBD-7	3	4	The SCONO <sub>x</sub> unit in Massachusetts is operational; however, it has not provided consistently low NO <sub>x</sub> emissions.
Appendix BD	PgBD-8	2	1 and 2	Most of the recent LAER determinations have specified the combination of dry-low NO <sub>x</sub> combustors and SCR, not SCONO <sub>x</sub> .
Appendix BD	PgBD-11	Table	NO <sub>x</sub>	Request that EPA Method 7e be added to the compliance procedures for NO <sub>x</sub> .

Table 2-1. Stack, Operating, and Emission Data for the Combustion Turbines/HRSG and Duct Burners Osprey Energy Center Project

					sion Data * for Ambient	
			Combus	tion Turbine		CT/ HRSG/ Duct Burner
					Power Augmentation	Power Augmentation
Parameter		32 °F	59 °F	95 °F	95 °F	95 °F
Stack Data (ft)						
Height		135	135	135	135	135
Diameter		19	19	19	19	19
100 Percent Load						
Operating Data						
Temperature (°F)		200	200	200	200	200
Velocity (ft/sec)		62.9	60.0	55.2	59.7	60.0
Maximum Hourly Emiss	tions por Unit b					
SO <sub>2</sub>	lb/hr	11.0	10.4	9.4	10.4	12.0
PM/PM <sub>10</sub>	lb/hr	22.3	21.1	7.4 19.0	19.8	22.8
NO <sub>x</sub>	lb/hr	22.3 25.8	24.3	22.1	24.4	27.5
CO CO	lb/hr	45.0	43.0	39.0	106.0	139.3
VOC (as methane)	lb/hr	5.8	5.4	4.9	5.5	12.4
Sulfuric Acid Mist	lb/hr	1.69	1.59	1.44	1.59	1.83
Mercury	lb/hr	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
· · · · · · · · · · · · · · · · · · ·	,					
75 Percent Load						
Operating Data						
Temperature (°F)		200	200	200	•	-
Velocity (ft/sec)		54.8	52.8	50.2	•	•
Maximum Hourly Emiss	ions per Unit b					
SO <sub>2</sub>	lb/hr	8.6	8.1	7.6	-	•
PM/PM <sub>10</sub>	lb/hr	19.0	18.2	16.9	-	•
NO <sub>x</sub>	lb/hr	20.1	19.0	17.7	•	•
CO	lb/hr	35.0	33.0	31.0	•	•
VOC (as methane)	ib∕hr	8.4	7.9	7.4	=	•
Sulfuric Acid Mist	lb/hr	1.31	1.25	1.16	-	•
Mercury	lb/hr	0.00E+00	0.00E+00	0.00E+00	•	•
60 Percent Load						
Operating Data						
Temperature (°F)		200	200	200	-	•
Velocity (ft/sec)		45.9	44.5	42.5	-	-
Maximum Hourly Emiss	ions per Unit b					
SO <sub>2</sub>	lb/hr	7.4	7.2	6.5	•	-
PM/PM <sub>10</sub>	lb/hr	16.0	15.4	14.3	•	•
NO,	lb/hr	17.4	16.8	15.2	-	•
co	lb/hr	152.0	146.0	133.0		•
VOC (as methane)	lb/hr	7.3	7.0	6.3	-	
Sulfuric Acid Mist	lb/hr	1.14	1.10	1.00	-	
Mercury	lb/hr	0.00E+00	0.00E+00	0.00E+00	_	_

<sup>&</sup>lt;sup>a</sup> Refer to Appendix A for detailed information. Data at 100% load and duct firing for 95 °F are based on power augmentation with evaporative cooler on and operating at 95 percent efficiency. With evaporative cooler not operating, emissions are lower.
Duct firing is assumed for 100% operating load. No duct firing is assumed for loads less than 100%

See Appendix A for basis of pollutant emission rates and operating data.

Other regulated pollutants are assumed to have negligible emissions. These pollutants include lead, reduced sulfur compounds, hydrogen sulfide, fluorides, beryllium, arsenic, asbestos, vinyl chloride, and radionuclides.

Table 2-4 Summary of Maximum Potential Annual Emissions for the CT/HRSG, Duct Burner, and Cooling Tower

			Annual Emis	sions (tons/year)							
	_				Power	Duct Burner/					
					Augmentation	Power Augmentation					
	Loed:	100%	75%	60%	100%	100%		Maxim	en Emissions	(Iona/yeaz) >	
Pollutent	Hours.	8,760	8,760	8,760	8,760	8,760	Case A	Case B	Case C	Case D	Ovez
						(@195 Deg. F)					
he Combustion Turbine-Combined Cycle											
\$O <sub>3</sub>		45.4	35.6	31 4	45.6	52.4	45.4	47.7	43.0	45.3	47.2
PM/PM <sub>m</sub>		92.4	79.7	67.6	86.6	99.8	92.4	94.8	87.1	90.6	94.4
NO.		106	83	73	107	115	106.3	109.1	100.8	103.5	109.
co		188	145	639	464	586	188.3	319.0	314.7	396.2	396
VOC (se methane)		23.8	34.8	30.6	23.9	53.0	23.8	33.4	25.0	34.6	34.6
Sulfuric Acid Mint		70	5.5	4.8	70	40	7.0	7.3	6.6	6.9	7.3
Mercury		0.008.+00	0.00E+00	0.00E+00	0:00E+00	0.00E+00	0.00E+00	000E+00	0.00E+00	0.000 + 00	0.00E
,3-Butadiene scetaldehyde		3.49E-03	2.74B-03	2.41E-03	3.50E-03	4.03E-03	3.496-03	3.67E-03	3.31E-03	3.48E-03	3.67B-
		3.25E-01	2.556-01	2.24E-01	3.26E-01	3.75E-01	3.25E-01	3.41E-01	3.065-01	3.24E-01	341B-
Acrolein		5.19E-02	4.06E-02	3.59E-02	5.21E-02	5.99E-02	5.19E-02	5.46E-02	4.92E-02	5.1 <b>6E-02</b>	5.46B-
<b>Вел</b> ие		9.74E-02	7.64E-02	6.73E-02	9.78E-02	1.12E-01	9.74E-02	1.02E-01	9.23E-02	9.72E-00	1.02E-
Sthylbenzene		2.60E-01	2.04E-01	1.796-01	2.61E-01	3.00E-01	2.60E-01	2.736-01	2.46E-01	2.59E-01	2.73E-
Pormadehyde		1.22E + 00	9.56E-01	8.41E-01	1.22E + 00	1 40E+00	1.22E + 00	1.28E+00	1.15E+00	1.21E+00	1.28E+
Naphthalene		1.06E-02	8.28E-03	7.296-03	1 06E-02	1 22E-02	1 06E-02	1.11B-02	1.00E-02	1 05E-02	1.118-
Polycyclic Aromatic Hydrocarbons (PAH)		1.796-02	1.40E-02	1.23E-02	1.79E-02	1.06E-02	1.79E-02	1.88E-02	1.69E-02	1.78E-02	1.88E-
Propylene Oxide		2.35E-01	1.85E-01	1.63E-01	2.36E-01	2.72E-01	2.35E-01	2.47B-01	2.23E-01	2.35E-01	1478-
Toluene		1.06E+00	8.28E-01	7.296-01	1.06E + 00	1.22E + 00	1.06E + 00	1.11E+00	1.000 + 00	1.06E + 00	1.11E+
(ylene		5.19E-01	4.08E-01	3.59E-01	5.21 <b>E-0</b> 1	5.99E-01	5.19E-01	5.46E-01	4.92B-01	5.1 <b>8E-0</b> 1	5.46E-
Total HAPs		3.79E+00	2.98E+00	2.62E+00	3.81E+00	4.38E + 00	3.79E+00	3.96E+00	3.59E+00	3.7 <b>5E</b> + 00	3.96E+
Cooling Tower											
PM		4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
PM <sub>e</sub>		2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
			<del></del>								
we Combustion Turbines- Combined Cycle											
SO <sub>3</sub>		90.8	71.3	62.7	91.1	104 7	90.8	95.4	86.1	90.6	95.4
PM/PM <sub>ss</sub>		145	159	135	173	1997	185	190	174	181	1897
NO,		213	167	147	214	229 6	213	218	202	207	218.2
co		377	289	1,279	929	1.171.4	377	638	629	792	792.5
VOC (es methane)		47.6	69.6	61.2	47.8	106.0	47.6	66.8	49.9	69.1	69.1
Sulfuric Acid Mass		13.9	10.91	9.60	13.96	16.0	13.91	14.61	13.18	13.87	14.6
Mercury		0.00E+00	0.000 + 00	0.00E + 00	0.008 + 00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+
,3-Butodiene		6.90E-03	5.486-03	4.82E-03	7 01E-03	8.05E-03	6.96E-03	7.33E-03	6.62E-03	6.96E-03	7.33E-
cetaldehyde		6.49E-01	5.108-01	4.49E-01	6.52E-01	7.498-01	6.49E-01	6.62E-01	6.15B-01	6.48E-01	6.82B-
crolein		1.04E-01	8 156-02	7.18E-02	1.04E-01	1.20E-01	1.04E-01	1.09E-01	9.85E-02	1.04E-01	1.098-
denzene		1.95E-01	1.53E-01	1.35E-01	1.96E-01	2.25E-01	1.95E-01	2.05E-01	1.858-01	1.948-01	2.05E-
thylbenzene		5.19B-01	4.06E-01	3.598-01	5.218-01	5.99E-01	5.19E-01	5.46E-01	4.92E-01	5.18E-01	5.46E-
ormadehyde		2.438+00	1 91E+00	1.68E + 00	2.44E+00	2.81E+00	2.43E+00	2.56E+00	2.31E+00	2.43E+00	2.56E+
laphthalene		2.11B-02	1.66E-02	1.46E-02	2.12E-02	2.43E-02	2.11E-02	2.22E-02	2.00E-02	2.11E-02	2.228-
olycyclic Aromatic Hydrocarbons (PAH)		3.57E-02	2.80E-02	2.47E-02	3.56B-02	4.128-02	3.578-02	3.75E-02	3.388-02	3.568-02	3.75E-
ropylene Oxide		4.71E-01	3.698-01	3.25E-01	4.736-01	5.438-01	4.718-01	4.956-01	4.46B-01	4.70B-01	4.95E-
ohene		2.11E+00	1.66E+00	1 46E+00	2.12E+00	2.43E+00	2.11E+00	2.22E+00	2.00E+00	2.11E+00	2.22E+
ylene		1 04E+00	8.15E-01	7.18E-01	1.04E+00	1.208 + 00	1.0(E+00	1.09E+00	9.85B-01	1.048+00	1.09E+
rotal HAPs		7.59E+00	5.95E+00	5.24E+00	7.61E+00	8.75E+00	7.59E+00	7.97E+00	7.19E+00	7.57E+00	7.97E+
	. Caaba T									<del></del>	
wo Combustion Turbines-Combined Cycle wit	II COORTUE (O	<u>wer</u> 193	168	144		200	193	198	183	190	198.
PM		190	100	144	182	208	193	130	180	190	

\* Based on 59 °F ambient inlet air temperature except for power augmentation.

Power augmentation and duct firing will be used with CTs operating at 100 percent load. 95 °F ambient inlet air temperature, and evaporative cooler at 95% efficiency. With evaporative cooler not operating, emissions are lower

Mexicanian emission cases:

	Number of Ho	um for Operation		
Operation	Case A	Case B	Case C	Cam D
100 % Load	8,760	5.680	5.700	4,380
100 % Load with PA	0	0	1,560	0
100% Load with PA &				
Dect firing:	0	2880	0	2,880
60% Load	0	0	1,500	1,500
Total hours	8.760	8,760	8,760	8.760

Table 2-5 Summary of Maximum Potential Annual Emissions for the Osprey Energy Center Power Project

		PSD				
Pollutant	2 CT/HRSG with Duct Burners	Cooling Tower	Emergency Gas-Fired Generator	Diesel Fire Pump	TOTAL	Significant Emission Rate (tons/year)
SO <sub>2</sub>	95		0.006	0.056	95	40
PM	190	8.6	0.03	0.34	199	<b>2</b> 5
$PM_{10}$	190	4.3	0.03	0.34	194	15
$NO_x$	218		3.8	4.8	227	40
CO	792		3.79	1.04	<b>7</b> 97	100
VOC (as methane)	69.1		0.09	0.38	70	40
Sulfuric Acid Mist	14.6		Neg.	Neg.	15	7
Mercury	0.0		Neg.	Neg.	0.0	0.1

Table A-2. Maximum Emissions for Criteria and Other Regulated Polistants for the Osprey Energy Center Project
Sismons Westinghouss 501F, Dry Low NOx Combustor, Natural Gas, 100 % Load including Power Augmentation (PA) and Duct Burner (DB)

		Amb	lant/Compress	or Inlet Temper	rature				DUCT B (Ambient Te		
runder	32.7	<b>12</b> T	59 T	95 T	95 T	9517	32.15	59°F	957	95 T	61
	Case 9	PA	Case 6	Cass 3	Case 2	Case 1 (PA)	PA PA	Case 6 (DB)	Case 3 (DB)	Case 2 (DB)	Coord (DRAF)
ours of Operation	8,760	8,760	8,760	8,760	1,760	8,760	8,760	8,760	8,740	\$,760	•
<u>eticulate from CT and SCE</u> eticulate from CT — Emission rate (B/hr) from CT ma											
and, Bylor - provided (a)	16.6	16.6	15.8	14.1	14.4	14.4	16.6	12.0	164	16.7	
urticulate from SCR = Sulfur trickide (formed from o	onversion of SO	J converts to an	monten sulfa	te (= PM_)							
'articulate from conversion of 503 = 503 emissions (B	Mar) = Conversi	on SO <sub>2</sub> to SO <sub>3</sub> x	b 60,/b 50 <sub>2</sub> ×								
Conversion of SO <sub>2</sub> emission rate (B/kr)- calculated	կ≖1690) to (NE 1140	IJ\$O, ±(NH.) 11.#	,50/8-50, 104	9.4	9.8	10.4	11.8	11.9	11.0	11.3	
Conversion (%) from SO <sub>2</sub> to SO <sub>3</sub>	25	25	25	25	25	25	25	25	25	25	
MW 50/50 <sub>2</sub> (80%)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	13	1.3	1.3	
Conversion (%) from SO <sub>3</sub> to (NH <sub>2</sub> ) <sub>3</sub> (SO <sub>4</sub> ) MW (NH <sub>2</sub> ) <sub>3</sub> SO <sub>4</sub> SO <sub>5</sub> (132/80)	100 1.7	100 1.7	100 1.7	100 1.7	180 1.7	100 1.7	100 1.7	100 1.7	100 1.7	100 1.7	
Particulate (Brhr) - culculated	5.48	6.08	5.35	4.86	5.03	5.36	6.06	£15	5.66	5.84	
articulate (fb/ler) from CT + SCR	22.3	22.7	21.1	19.0	19.5	19.8	22.7	24.1	22.0	22.5	
(TPY)	97.6	99.3	92.4	\$3.2	<b>85.3</b>	<b>8</b> 6.6	99.3	105.6	96.4	96.6	
Bur Diuxide (Bylar) = Natural gas (ci/lar) x sulfur cont	-	-							1.000.479		
uel use (clfbr) uliur content (grains/ 100 cl) - assumed (b)	1,924,087 2	2,063,013 2	1,814,130 2	1,648,913 2	1,708,696 2	1,820,652 2	2,063,013 2	2,005,670 2	1, <b>430,652</b> 2	1,9 <b>00,43</b> 5 2	1,09
5O <sub>2</sub> /6 5 (64/32)	2	2	2	2	2	2	2	2	2	2	
nimion rate (B/kr)- calculated (B/kr)- provided (0.2 gs/100 ct) (not mant)	11.0 1.2	11.# 1.2	10.4 1.1	9.4 1.0	9.8 1.1	104 1.1	11.4 1.2	11.9 1.1	11.0 1.0	11.3 1.1	
(IPY)	483	51.6	45.4	41.3	42.0	45.6	51.6	52.3	42.1	49.6	
trogen Oxiden (lb/hr) = NOx(ppm) x ([20.9 x (1 - life) 46 (molu. wgt NOx) x 60 min/hr/ [1545 x (0											
an (annu. arg 1403) x an ampur/ (1315 x (c ann, ppanel € 15% O <sub>2</sub> (a) (d)	.; waap.( r) + 4 15	35	3.5	15 J.5	15	15	15	15	35	15	
idistance (%)	7,92	13.11	844	10.62	11.06	15.81	13.96	9.40	11.66	12.00	
rygen (%)	12.53	11.29	12.51	12.13	11.97	10.90	10.33	11.45	10.97	10.85	
home Flow (actin) myrestore (°F)	2,509,194 1,088	2,661,219 1,108	2,417,049 1,102	2,264,234 1,133	2,317,426 1,126	2,434,907 1,125	2,673,585 1,108	2,429,103 1,102	2,276,513 1,133	2,329,668 1,126	2,41
simion rate (Byler)- colculated	24.4	262	23.0	20.9	21.7	23.1	29.3	24.1	34.0	34.4	
(B/kr)- provided	25.6	27.6	24.3	22.1	22.9	24.4	30.7	27.4	252	26.0	
(TPY)	112.9	120.6	106.3	96.6	100.2	106.0	134.5	114.4	105.2	108.5	
				1.056 oluspe Bow (aci	1.056 ma) ×	1.056	1.049	1.049	1.019	1.069	1
pomio are province; concenium; abon Monoride (B/hz) = CO(ppm) x ( [0.9 x (1 - Moi 20 (moin, wgs CO) x 60 min/hr / [1565 x (C1 min, ppmv 4 - calculated min, ppmv 40 15% C2- calculated	latura(%)/100)] -	Oxygen(%)} x2	11 <b>63 b/6</b> 2 x V		******	1.056 42 31	1.049 37.7 25	22.6 16	24.0 17	23.9 16	
bon Monomide (Brhs) = CO(ppun) x (20.9 x (1 - Moi 28 (moin, wgt CC) x 60 min/hr / [1545 x (C1 nin, ppurvé - calculated nin, ppurvé @ 15% O2-calculated - provident (a)	isture(%)/100)] - T issup.(T) + 466 12.4 10 10	Oxygen(%)} x2 PF) x 1,000,000 ( 33.5 25 25	1163 lb/62 x V adj. (or ppm.) 12.3 10 10	ohaspe Bow (aci 12.4 10 10	12.6 10 10	42 31 25	37.7 25 25	22.6 16	24.0 17	23.9 16	
ton Monoride (B/hr) = CO(ppus) x (D0.9 x () - Moi 28 (mols. wgt COs x 60 min/hr/[1545 x (Cl is, ppmv4- calculated is, ppmv4 ⊕ 15% O2- calculated - provided (a)	isture(%)/100)] - T temp.(T) + 46 124 19 10 7.52	Oxygen(%)) x 2 PF) x 1,000,000 ( 33.5 25 25 13.11	.116.3 lb/fc2 x V adj. for ppm.) j 12.3 10 10 E44	12.4 10 10 10	12.6 10 10 11.08	42 31 25 15.81	37.7 25 25 13.96	22.6 16	24.0 17	23.9 16	
hon Monoride (B/hr) = CO(ppun) x (20.9 x (1 - Moi 28 (moin, wgt CO) x 60 min/hr / [1545 x (CI ni, ppurvd-calculated ni, ppurvd ⊕ 15% O2-calculated - provided (a) obstore (%) ygan (%)	isture(%)/100)] - T issup.(T) + 466 12.4 10 10	Oxygen(%)} x2 PF) x 1,000,000 ( 33.5 25 25	1163 lb/62 x V adj. (or ppm.) 12.3 10 10	ohaspe Bow (aci 12.4 10 10	12.6 10 10	42 31 25	37.7 25 25	22.6 16	24.0 17	23.9 16	. 2,41
bon Monomide (Brhs) = CO(ppun) x {D0.9 x (1 - Mot 28 (moin, wgt CO) x 60 min/he / [LS4S x (C1 sin, ppurv4 calculated sin, ppurv4 ⊕ 15% O2-calculated - provided (q) interec (%) yygen (%) hume Flow (actim) mperstates (*T)	inture(%)/100) - T hem.p.(T) + 46 12.4 10 10 7.52 12.53 2,509,194 1,008	Oxygen(%)) x 2 FF) x 1,000,000 ( 33.5 25 25 13.11 11.29 2,661,219 1,108	116.5 lb/82 x V adj. for ppm) 12.3 10 10 844 12.51 2,417,049 1,102	12.4 10 10 10.62 12.13 2,264,224 1,133	12.6 10 10 11.08 11.97 2.317.426 1,126	42 31 25 15.81 10.90 2,438,907 1,125	37.7 25 25 13.96 10.33 2,673,585 1,108	22.6 16 - 9.40 11.45 2,429,103 1,102	24.0 17 11.45 10.97 2.274.513 1,133	23.9 16 - 12.08 10.85 2,229,668 1,124	- 2,43
bon Monoride (Brhr) = CO(ppun) × (20.9 × (1 - Moi 28 (moin. wgt CO) × 60 min/hr / [1545 × (CI nin. ppunvd- calculated nin. ppunvd ⊕ 15% O2-calculated - provided (a) jogen (S) hume Flow (actim) mperature (T) unious rate (Brhr)- calculated from given ppunvd	inture(%)/100)]- T hump.(%) + 46i 12.4 10 10 7.92 12.53 2,509,194 1.082 42.4	Olcygen(%)) x 2 FF) x 1,000,000 ( 33.5 25 25 13.11 11.29 2,661,219 1,106 113.7	116.8 lb/82 x V adj. (or ppm.) j 12.3 10 10 844 12.51 2.417.019 1.102 40.0	12.4 10 10 10.43 12.13 2.264.224 1.133 36.3	12.6 10 10 11.08 11.97 2.317.426 1.126 37.7	42 31 25 15.81 10.90 2,438,907 1,125 100.4	37.7 25 25 13.96 10.33 2.673.585 1,108 127.3	22.6 16 - 940 1145 2,429,103 1,102 73.3	24.0 17 11.45 10.97 2.276.513 1,133 647	23.9 16 - 12.08 10.85 2,239,668 1,126 71.0	. 24!
bon Monomide (Brhs) = CO(ppm) x (100 9 x (1 - Moto 28 (moin, wgt CO) x 60 min/hr / [1545 x (CI nin, ppmv4 - calculated nin, ppmv4 - 15% O2 - calculated - provided (a) obtates (%) sygen (%) shane Flow (actim) mprosture (°F) histor rate (Brhs) - calculated from givan ppmv4 (Brhs)- provided (IPP)	isture(%)/100)-1 12.4 10 10 7.92 12.53 2,509,194 1,088 42.4 45.0 197.1	Oxygen(%)) x 2 PF) x 1,000,000 ( 33.5 25 25 13.11 11.29 2,661,219 1,108 113.7 128.0 525.6	(1143 lb/82 x V ani) for ppm)] 12.3 10 10 8.44 12.51 2.417.019 1,102 40.0 182.3	12.4 10 10 10.62 12.13 2.264,224 1,133 36.3 39.0 170.6	12.6 10 10 11.08 11.97 2.317.426 1.126 37.7 40.0 175.2	42 31 25 15.81 10.90 2.438,907 1,125 100.4 106.0 444.3	37.7 25 25 13.96 10.33 2.673.585 1,108 127.3 120.0 505.6	22.6 16 • \$40 11.45 2,429,103 1,102 73.3 76.3 32.10	24.0 17 11.45 10.97 2.276.513 1,133 69.7 72.3 305.1	23.9 16 - 11.08 2.27,662 1,124 71.0 73.3	2 <b>4</b> !
ton Mononide (Brhr) = CO(ppm) × (DB 9 × 1) - Moi 28 (moin wgt CO) × 60 min/hr / [1545 × (C1 in, ppmvd- calculated in, ppmvd ⊕ 15% O2- calculated - provided (a) interes (%) yygm (%) hame Flow (actim) mpresture (%) planto inth (Brhr)- calculated from given ppmvd (Brhr)- provided (Brhr)- provided (Brhr)- Brhr provided/calculated)	interes(%)/1009]-17 imap.(%) + 466 102 109 7.90 22.53 2,509,194 1,088 42.4 45.0 197.1 1,060	Oxyg=(%)) x 2 PF) x 1,000,000 ( 33.5 25 25 13.11 11.29 2,661,219 1,108 113.7 128.0 52.5.6 1,056	114.5 lb/82 x V adj. (or ppm.) 12.3 10 10 844 12.51 2.417.049 1.102 40.0 43.0 182.3 1.076	12.4 10 10 10.63 12.13 2.264.224 1,133 36.3 39.0	12.6 10 10 11.08 11.97 2,317.426 1,126 37.7 40.0	42 31 25 15.81 10.90 2.438,907 1.125 100.4	37.7 25 25 13.96 10.33 2.673,585 1,108 127.3	22.6 16 - 940 1145 2,429,103 1,100 73.3 76.3	24.0 17 11.45 10.97 2.274.513 1.133 697 72.3	23.9 16 - 12.08 10.85 2,329,668 1,126 71.0	2 <b>4</b> !
then Memorate (Bhhr) = CO(ppm) × (20.9 × (1) - Mois 28 (mein, wgt CO) × 60 min/hr / [1545 × (CI nin, ppmvd - calculated nin, ppmvd - calculated nin, ppmvd - calculated - provided (a) cointee (%) cygm (%) shame Flow (actim) mperetaine (PI) administrate (Bhrl) - calculated from given ppmvd (Brhs) - provided (CIP) (Bratio Brhr provided/calculated) Cr (Brhr) = VOC(ppm) × [1 - Moistare(%) 100] × 21 16 (mole, wgt as methane) × 60 min/hr / [1545 × (1)	isture(%)/100)-1 T imap.(?) + 46 10 10 10 7.92 12.53 2,509,194 1,085 45.0 197.1 1,060	Oxygen(%)) x 2 PP) x 1,000,000 ( 33.5 25 25 25 13.11 11.29 2,661,219 11.08 113.7 128.0 125.5 1.056 .me flow (acfm)	116.8 lb/82 x V adj. for ppm)  12.3 10 10 8.44 12.51 2.417.019 1.102 40.0 43.0 182.3 1.076	12.4 10 10.48 12.13 12.24 12.13 2.264.224 1.133 36.3 36.3 170.8 1.073	12.6 10 10 11.05 11.95 2,317.426 1,126 37.7 44.0 175.2 1.062	42 31 25 15.81 10.90 2.438,907 1,125 100.4 106.0 444.3	37.7 25 25 13.96 10.33 2,673,565 1,106 127.3 120.0 555.6 0,962	22.6 16 • \$40 11.45 2,429,103 1,102 73.3 76.3 32.10	24.0 17 11.45 10.97 2.276,513 1.133 69.7 72.3 305.1 1.036	23.9 16 12.05 10.05 2,239.668 1,124 71.0 73.3 318.9 1,033	. 2,45
ton Monomide (Brhr) = CO(ppm) x (100 9 x (1 - Moi 28 (moin west CO) x 60 min/her / [1545 x (CI sin, ppmvd- calculated sin, ppmvd @ 15% O2- calculated - provided (a) interes (7h) yygm (%) hame Flow (actim) mperesture (T) intion two (Brhr)- calculated from given ppmvd (Brhr)- provided (TPY) [Ratio Brhr provided/calculated] Ca (Brhr)= VOC(ppm) x [1 - Mointmvt (%) 100] x 21 10 (moles up a methomy x 60 min/hr / [1545 x (6) sin, ppmvd (m CH <sub>3</sub> )- calculated	isture(%)/100)-1 T imap.(?) + 46 10 10 10 7.92 12.53 2,509,194 1,085 45.0 197.1 1,060	Oxygen(%)) x 2 PP) x 1,000,000 ( 33.5 25 25 25 13.11 11.29 2,661,219 11.08 113.7 128.0 125.5 1.056 .me flow (acfm)	116.8 lb/82 x V adj. for ppm)  12.3 10 10 8.44 12.51 2.417.019 1.102 40.0 43.0 182.3 1.076	12.4 10 10 10.62 12.13 2.264,224 1.133 36.3 39.0 170.6 1.073	12.6 10 10 11.08 11.97 2.317.426 1.126 37.7 40.0 175.2	42 31 25 15.81 10.90 2.438,907 1,125 100.4 106.0 444.3	37.7 25 25 13.96 10.33 2.673.585 1,108 127.3 120.0 505.6	22.6 16 • \$40 11.45 2,429,103 1,102 73.3 76.3 32.10	24.0 17 11.45 10.97 2.276.513 1,133 69.7 72.3 305.1	23.9 16 - 11.08 2.27,662 1,124 71.0 73.3	2.4:
oon Monomide (Byhr) = CO(ppum) × (D0.9 × (1 - Moi 28 (moin wgt CO) × 60 min/hr / [1545 × (CI in, ppurvd - calculated in, ppurvd ⊕ 15% O2- calculated in, ppurvd ⊕ 15% O2- calculated - provided (a) intere (%) spun (%) s	teture(%)/109]- T immp.(7) + 66  12.4  10  10.7  12.53  2.509,19  1.085  42.4  45.0  19.701  16.6 Br/82 x Volume(CT temp.(T) + ct.	Oxygen(5,)) x 2 F7) = 1,000,000 ( 33.5 25 25 13.11 11.29 1,100 11.29 1,100 11.00 10.	116.8 lb/f2.x V cell, for ppm.]  12.3 10 10 10 8.44 12.417.049 1.100 4.00 4.00 4.00 1.006 × 0 (edd, for ppm.) 2.8 2.3 2.3	12.4 10 10 10.62 12.33 2.264,234 1.133 36.3 36.0 170.8 1.073	12.6 10 10 11.02 11.02 11.02 11.126 377 40.0 175.2 1.062	42 31 25 15.81 10.90 2.438,907 1,125 106.0 484.3 1.056	37.7 25 25 13.% 10.33 2,673.585 1,108 127.3 120.0 525.6 0,942	22.6 16 9.40 11.45 24.29,103 1.102 73.3 76.3 32.10 1.041	24.0 17 11.45 10.97 2.27-5.91 1.133 305.1 1.038	23.9 16 11.08 11.05 2.279.662 1,124 71.0 73.3 31.0,9 1.003	24
on Monaride (Brhr) = CO(ppm) × (D0.9 × () - Moi 26 (moin west CO) × 60 min/hr / [1545 × (CI in ppmvd - calculated in ppmvd @ 15% O2 - calculated - provided (a) intrace (%) gen (%) inter (moint) ppecutione (?) inter rute (Brhr) - provided from given ppmvd (Brhr) - provided (Calculated (Brhr) - provided (Calculated) 2a (Brhr) = VOC(ppm) × [1 - Mointrace %) 100] × 21 16 (moint west on methanes) × 60 min/hr / [1545 × 6 in ppmvd @ 15% O2 - calculated in ppmvd @ 15% O2 - calculated in ppmvd @ 15% O2 - calculated in provided (a) (d)	Interes (%)/100) - T imap (77) + 46/ 12.4 10 10 7.92 12.53 2,509,194 1,088 42.4 45.0 197.1 1,060 16.8 lb/02 × Volu CT temp (FF) +	Cry gam(5,) x 2 F7) x 1,000,000 ( 33.5 25 25 13.11 11.29 2,661,219 1,105 113.7 126.6 525,6 1,005	1168 lb/f2 x V red), for ppm3 10 10 10 10 10 10 10 10 10 10 10 10 10	12.4 10 10 10.82 12.13 2.264,224 1.133 36.3 370.6 1.073	12.6 10 10.6 11.05 11.05 11.05 1.126 377 440 1752 1.062	42 31 25 15.81 10.90 2.438,907 1.125 100.4 106.0 464.3 1.056	37.7 25 23 13.36 10.33 2,673,585 1,108 127.3 1200 555,6 0,942	22.6 16 9.40 11.45 2.429.103 1.102 73.3 76.3 32.10 1.041	24.0 17 11.45 10.97 2.274.513 1.133 49.7 72.3 305.1 1.038	23.9 16 11.08 10.85 2.29,668 1,126 71.0 73.3 31.0 1,033	24
on Monaride (Brhr) = CO(ppm) × (DB 9 × 1) - Moi 26 (moin west CO) × 60 min/hr / [1545 × (CI in ppmvd - calculated in ppmvd @ 15% O2- calculated - provided (a) intrace (%) gen (%) inter (calculated from given ppmvd (Brhr)- provided (calculated from given ppmvd (Brhr)- VOC(ppm) × [1 - Mointare(%) 100] × 21 16 (moin wgt on methone) × 60 min/hr / [1545 × (in ppmvd @ 15% O2- calculated in provided (ci) (a) pmv (%) gen (%)	interest \$\times \chi \text{100}\right\rig	Cry gam(5,) x 2 FF) x 1,000,000 ( 33.5 25 25 13.11 11.29 2,661,219 1,105 113.7 124.0 525.6 1,005 1,00	116.3 layf2 x V andj, for ppm3] 12.3 10 10 8.44 12.51 2.417.049 1.100 40.0 41.23 1.0076 × 0 (add, for ppm3, 2.3 2.3 2.4 2.417.041 2.417.041 2.417.041	12.4 10 10 10.82 12.13 2.264,224 1.133 36.3 370.8 1.073	12.6 10 10 11.05 11.97 2.317.424 1.126 4.00 1.002 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.	42 31 25 15.81 10.90 2.438,907 1.125 100.4 106.0 464.3 1.056	37.7 25 23 13.36 10.33 2,673,585 1,108 127.3 1200 555,6 0,942	22.6 16 9.40 11.45 2,429.103 1.102 72.3 32.10 1.041	24.0 17 11.45 10.97 2.274.513 1.133 49.7 72.3 305.1 1.038 7.0 4.9	23.9 16 11.05 10.85 2.29,668 1,126 71.0 73.3 310.9 1,003	-
on Monomide (Brhrt) = CO(ppms) x (D0.9 x (1 - Moi 28 (moths west CO) x 60 min/hr / [1545 x (CI is, ppmv4 - calculated is, ppmv4 - calculated is, ppmv4 - calculated - provided (a) intere (%) - pmc (%) intere (%) - pmc (%) intere (%) - pmc (mc (mc) - provided (mc) (Brhrt) - provided (calculated from given ppmv4 (Brhrt) - VOC(ppm) = [1 - Moisture(%)/100] x 21 - 16 (mois wegt as methone) x 60 min/hr / [1545 x (6 is ppmv4 (mc CH <sub>2</sub> ) - calculated is ppmv4 (mc CH <sub>2</sub> ) - calculated is ppmv4 (mc CH <sub>2</sub> ) - calculated is ppmv4 (mc CH <sub>2</sub> ) - calculated - provided (a) (a) isture (%) - gmc (%) - gmc (%) - pmc (ppmv4 (mc) - provided (a) (a) - provided (a) (a) - provided (b) (ppmv4 (mc) - pmc (fr)	tetured %\/109j-1 1 mmp.(7) + 66 12.4 10 10 7.92 12.53 2.509,194 1.086 42.4 45.0 197.1 1.060 1668 Br/82 × Volump.(7) + 4 2.8 2.3 7.9 2.3 7.9 2.1 2.509,194 1.086	Oxygen(5)) x 2 33.5 25 25 25 13.11 11.29 2,661,219 113.7 134.0 55.6 1.085 1.085 1.085 1.085 1.085 1.085 1.18	116.5 lay(2) × V cell, for ppml   12.3 10 10 10 8.44 12.51 2.417.049 11.00 43.0 182.3 1.00% × 0 (cell, for ppml 2.3 2.3 2.3 2.417.049 1.100 12.51 12.51 2.417.049 1.100 12.51 12.51 2.417.040 1.100 12.51 12.51 2.417.040 1.100 12.51 12.5	12.4 10 10 10.8 12.4 10 10 10.4 12.1 13 10.8 12.1 13 10.8 12.1 13 10.8 10.8 10.7 170.8 10.7 170.8 10.7 170.8 10.7 170.8 10.7 10.7 10.8 10.8 10.8 10.8 10.8 10.8 10.8 10.8	12.6 10 10 11.08 11.08 11.08 11.08 11.08 11.08 175.2 1.08 2.3 2.3 11.08 2.3 11.07 2,317,826	42 31 25 15.81 10.99 2.438,907 1.125 100.4 106.0 464.3 1.056	37.7 25 25 13.9 10.33 2,673.56 1,106 127.3 1200 555.6 0,942	22.6 16 9.40 1145 24.29,100 1.102 73.3 32.10 1.041 6.5 4.7 9.40 11.45 24.29,100	24.0 17 11.45 10.97 2.276.913 1.133 49.7 72.3 305.1 1.038 7.0 4.9 11.45 10.97 2.276.513 1.133	23.9 16 12.08 10.85 2,239,668 1,124 71.00 33.82 1,033 6.9 6.9 6.9	-
on Monaride (Brhr) = CO(ppm) x (DB 9 x () - Moi 26 (moin west CO) x 60 min/hr / [1545 x (CI in ppmvd - calculated in ppmvd - calculated - provided (a) intrace (R) gem (R) intrace (P) inter their (Brhr) - calculated from given ppmvd (Brhr) - provided (calculated (Brhr) - provided (calculated (Brhr) - (Brhr) - calculated (Brhr) - (Brhr) - (Brhr) - (Brhr) [Estio Brhr provided/calculated] [TP) [Estio Brhr provided (calculated)] (a (Brhr) - VOC(ppm) x [] - Mointrace(R) 100] x 21 16 (moin wgt m methows x 60 min/hr / [1545 x () in ppmvd (m CH) - calculated in provided (a) (a) isture (R) (gem (R) (Brhr) - calculated intrace (Brhr) - calculated	interest \$\times \chi \text{100}\right\rig	Cry gam(5,) x 2 FF) x 1,000,000 ( 33.5 25 25 13.11 11.29 2,661,219 1,105 113.7 124.0 525.6 1,005 1,00	116.8 layE2 x V andj. for ppm3] 12.3 10 10 8.44 12.51 2.417.049 1.100 182.3 1.006 × 0 (andj. for ppm3 2.3 2.3 2.4 2.417.049 1.102 5.1	12.4 10 10 10.6 10.5 10.5 10.5 10.5 10.5 10.5 10.5 10.5	12.6 10 10 11.08 11.08 11.08 1.126 377 40.0 175.2 1.062 2.3 2.3 11.06 11	42 31 25 15.81 10.90 24.38,907 1,125 100.4 106.0 464.3 1.056	37.7 25 25 13.% 10.33 2.673.545 1.106 127.3 1200 525.6 0.942 3.4 2.3 13.9 (0.33 2.673.545 1,100	22.6 16 9.40 11.45 2,429.103 1.102 7.33 7.63 32.10 1.041 6.5 4.7 9.40 11.45 2,429.103 1.142	24.0 17 11.45 10.97 2.274.513 1.133 69.7 72.3 305.1 1.038 7.0 4.9 11.45 11.45 1.23 1.133 1.133	23.9 16 11.05 2.09,668 1.124 71.0 73.3 31.0 1.003 6.9 4.8 11.001 10.05 2.379,660 1.134	-
on Monaride (Brhr) = CO(ppm) × (DB 9 × 1) - Moi 26 (moin, wgt CO3 × 60 min/hr / [LS45 × (CI in, ppmvd - calculated provided (a) provided (a) provided (a) intere (S) gen (S) inter (Pour (actin) paperetiese (P) inter their (Brhr) - calculated from given ppmvd (Brhr) - provided (calculated from given ppmvd (a) (b) (b) (calculated from given ppmvd (Brhr) - pvc (calculated (a) (a) ppmvd (a) (Brhr) - calculated (Brhr) - provided (a) (a) (Brhr) - provided (CBrr)	interest %\/109\]- T immp\(77\) + 66  12.4  10  10.0  7.52  12.53  1.509\(100)  1.0000  1.000  1.000  1.000  1.000  1.000  1.000  1.0000  1.0000  1.0	Oxygen(%)) x 2 33.5 25 25 13.11 1,100	1163 lo/f21 x V cell, for ppm3/ 12.3 10 10 10 8.44 12.417,049 1.100 4.00 4.10 1.006 x 0(cell, for ppm3/ 2.3 2.4 12.51 2.417,049 1.105 5.1 5.4 2.18 5.4 2.28 2.38 2.48 2.59 2.48 2.59 2.48 2.59 2.48 2.59 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.58 2.58 2.58 2.58 2.58 2.58 2.58	12.4 10 10 10.82 11.33 36.3 2.266,224 1.133 36.3 16.0 170.6 2.3 1.073	12.6 10 10 11.08 11.08 11.126 37.7 40.0 175.2 1.062 2.8 2.3 11.08	42 31 25 15.81 10.90 2.438,907 1.125 100.4 106.0 466.3 1.056 3.0 2.3 2.3 15.81 10.90 2.438,907 1.125 5.2	37.7 25 25 13.96 10.33 2,673.585 1,106 127.3 120.0 525.6 0,942 3.4 2.3 1.3 4 2.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1	22.6 16 9.40 11.45 24.29,100 1,102 73.3 76.3 32.1.0 1.061 6.5 4.7 9.40 11.45 24.29,100 1.145 24.29,100 1.145 24.29,100	24.0 17 11.45 10.97 2.274,513 1.133 305.1 1.038 7.0 4.9 11.45 10.97 2.274,513 11.13	23.9 16 11.08 11.05 1.124 71.00 73.3 31.09 1.003 6.9 4.3 11.04 1.136 1.136 1.131 12.1	-
ton Monomide (Brhr) = CO(ppm) × (1989 × 1) - Moi 28 (moin vegt CO) × 60 min/hr / [1545 × (CI in, ppmvd - calculated in, ppmvd - calculated - provided (a) interes (Sr) ppm (Sr) hame Flow (actim) superstates (T) into twite (Brhr) - calculated from given ppmvd (Brhr) - provided (calculated from given ppmvd in, ppmvd (m CH <sub>2</sub> ) - calculated in, ppmvd (m CH <sub>2</sub> ) - calculated in, ppmvd (m CH <sub>2</sub> ) - calculated (in) ppmvd (m CH <sub>2</sub> ) - calculated (in) ppmvd (m CH <sub>2</sub> ) - calculated (in) (m) - calculated (Brhr) - provided (Brhr) - provided (Brhr) - provided (Brhr) - Brato Brhr provided (calculated)	Interest %/1009)-1 immp/7) + 66  12.4  10  10  7.92  12.53  2.509,194  1.080  4.50  1971  1.080  1.041  2.8  2.3  7.92  1.2.3  7.92  1.2.53  2.509,194  1.080  5.55	Oxygen(5,1) x 2 (200,000 (25,1) x 1,000,000 (25,1) x 1,000,000 (25,1) x 1,11 x 1,12 x	1163 bet2 x V anij, for ppm.)  12.3 10 10 10 844 12.51 2.417,049 1.100 43.0 182.3 1.076 x x 0 1.000 2.3 2.3 2.417,040 1.100 2.51 2.51 2.417,040 1.100 2.51 2.51 5.51	12.4 10 10 10.6 12.1 12.1 12.1 12.1 12.1 12.1 12.1 12	12.6 10 10 11.05 11.97 2.317.426 11.97 2.327 440 1752 1.062 2.3 2.3 11.07 2.317.426 11.92 2.3 2.3 11.05 11.97 2.317.426	42 31 25 15.81 10.99 2.438,907 1.125 100.4 106.0 446.3 1.056 3.0 2.3 2.3 2.3 15.81 10.90 2.438,907 1.125 5.2	37.7 25 25 13.96 10.33 2,673,585 1,100 127.3 120.0 555,6 0,942 3.4 2.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1	22.6 16 9.40 11.45 2,429,100 1.100 73.3 32.19 1.041 4.5 4.7 9.40 11.45 2,429,103 1,102 12.1	24.0 17 11.45 10.97 2.276.513 1.133 69.7 72.3 305.1 1.036 7.0 4.9 11.45 10.97 2.276.513 1.133 11.133	23.9 16 12.05 10.05 1.124 71.0 73.3 318.9 1.033 6.9 4.8 12.00 10.05 2.029,660 1.136 11.11	-
bon Monomide (Brhs) = CO(ppm) × (D0.9 × 1) - Moto 28 (moin wgs CO) × 60 min/hr / [1545 × (C1 nin, ppmvd - calculated - provided (a) - provided (TPr) - Blatio Brhs provided/calculated - provided (TPr) - Blatio Brhs provided/calculated - provided (a) - provided (b) - provided (	interest %\/109\]- T immp\(77\) + 66  12.4  10  10.0  7.52  12.53  1.509\(100)  1.0000  1.000  1.000  1.000  1.000  1.000  1.000  1.0000  1.0000  1.0	Oxygen(%)) x 2 33.5 25 25 13.11 1,100	1163 lo/f21 x V cell, for ppm3/ 12.3 10 10 10 8.44 12.417,049 1.100 4.00 4.10 1.006 x 0(cell, for ppm3/ 2.3 2.4 12.51 2.417,049 1.105 5.1 5.4 2.18 5.4 2.28 2.38 2.48 2.59 2.48 2.59 2.48 2.59 2.48 2.59 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.48 2.59 2.58 2.58 2.58 2.58 2.58 2.58 2.58 2.58	12.4 10 10 10.82 11.33 36.3 2.266,224 1.133 36.3 16.0 170.6 2.3 1.073	12.6 10 10 11.08 11.08 11.126 37.7 40.0 175.2 1.062 2.8 2.3 11.08	42 31 25 15.81 10.90 2.438,907 1.125 100.4 106.0 466.3 1.056 3.0 2.3 2.3 15.81 10.90 2.438,907 1.125 5.2	37.7 25 25 13.96 10.33 2,673.585 1,106 127.3 120.0 525.6 0,942 3.4 2.3 1.3 4 2.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1	22.6 16 9.40 11.45 24.29,100 1,102 73.3 76.3 32.1.0 1.061 6.5 4.7 9.40 11.45 24.29,100 1.145 24.29,100 1.145 24.29,100	24.0 17 11.45 10.97 2.274,513 1.133 305.1 1.038 7.0 4.9 11.45 10.97 2.274,513 11.13	23.9 16 11.08 11.05 1.124 71.00 73.3 31.09 1.003 6.9 4.3 11.04 1.136 1.136 1.131 12.1	. 245
bon Monomide (Brhs) = CO(ppum) × (D0.9 × (1) - Mois 28 (moin way CO) × 60 min/hr / [1545 × (CI nin, ppunvd - calculated nin, ppunvd - D5/k C2-calculated nin, ppunvd - D5/k C2-calculated nin, ppunvd - D5/k C3-calculated - provided (a) - provided (a) - provided (brhs) - calculated from given ppunvd - (Brhs)- provided - (Brhs)- provided - (Brhs)- provided - (Brhs)- VOC(ppun) × [1 - Moistanret/kr/100] × 21 - 10 (moise wgt as methode's + 60 min/hr / [1545 × (1) nin, ppunvd (ac CH <sub>2</sub> )- calculated - provided (a) (a) - provided - provided (a) - provided - (Brhs)- Brhs Brhs provided/calculated - (Brhs)- Brhs Brhs (c)	letared %\/100s)- I mmp.(7) + 66  12.4  10  10.7.92  12.53  2.509,9%  1.088  4.50  1.97:1  1.060  1.648 lb.vtz. x volump.(7) + 4.7  2.8  2.3  7.92  12.53  2.509,19%  1.080  5.55  5.55  5.55  5.57  5.58	Crygmm(5,1) x 2 33.5 25 25 25 13.11 11.22 2,661,219 1.105 52.56 1.055 1.005	116.3 layt2 x V anij, for ppm)   12.3 10 10 10 844 12.51 2.417.049 1.100 182.3 1.076 x 0 (adj, for ppm) 2.3 2.3 2.4 12.51 2.417.040 1.102 5.1 1.402 5.1 1.54 1.1066	12.4 10 10 10.8 12.13 12.264,224 1.133 10.2 2.8 1.073 10.2 2.8 1.073 10.2 2.8 1.133 4.7 4.9 21.6 1.066	12.6 10 10 11.05 11.97 2.317,426 1.126 2.317,426 1.126 2.31 2.31 2.31 11.05 11.26 4.85 5.11 2.24 1.066	42 31 25 15.81 10.90 2.438,907 1.125 100.4 106.0 464.3 1.056 3.0 2.3 2.3 15.81 10.90 2.438,907 1.125 5.2 5.2 3.9 1.056	37.7 25 23 13.36 10.33 2,673,585 1,108 127.3 1200 525,6 0,942 3.4 2.3 1.36 10.33 2,673,585 1,100 6.5 6.2 2,64,9	22.6 16 9.40 11.45 2,429,103 1,102 73.3 76.3 32.10 1,081 6.5 4.7 9.40 11.45 2,429,103 1,102 12.1 12.4 9.2-9 1,094	24.0 17 11.45 10.97 2.276.513 49.7 72.3 305.1 1.038 7.0 4.9 11.45 10.97 2.276.513 1.133 11.46 11.9 50.9 1.023	23.9 16 11.08 10.85 2.29,668 1,126 71.0 73.3 31.0 1.033 6.9 4.8 12.00 10.85 2.29,668 11.12 11.15 11.15 11.00 10.03	. 2.4! 
bon Monomide (Brhs) = CO(ppum) × (D0.9 × 1) - Moto 28 (moin, wgs CO) × 60 min/her / [1545 × (C1 nin, ppured - ulcralented - provided (a) obsteen (5), ppured - ulcram) - provided (a) obsteen (5), ppured - ulcram) - provided (a) obsteen (5), ppured (min) - ulcram) - ulcram -	Interest %1/109)- I hamp (7) + 66  12.4 10 10 7.92 12.53 2,509,194 1,008 42.4 4.50 197.1 1,060 16.8 lb/t2 x Volump (7) + cf 2.3 2.3 7.92 12.53 5.58 1,008 5.58 2.1 1,008 5.58 2.1 1,008 6.80 6.80 6.80 6.80 6.80 6.80 6.80 6	Cry gam(5,) x 2 FP) x 1,000,000 ( 33.5 25 25 13.11 11.29 2,661,219 1,105 1,105 1,105 1,06	116.3 layez x V anij, 6or ppm)   12.3   10   10   10   844   12.51   2.417.049   1.102   40.0   41.23   1.076   x   2.3   2.3   2.417.049   1.102   2.5   2.417.049   1.102	12.4 10 10 10.8 12.13 12.254,204 11.13 12.254,204 1.133 1.073 10.2 2.8 2.3 2.3 2.3 2.3 2.3 2.3 2.4 4.7 4.7 2.166,204 1.1056	12.6 10 11.05 11.07 2.317.426 1.126 2.3 2.3 1.062 2.3 2.3 11.06 1.126 4.8 5.1 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.3	42 31 25 15.81 10.90 2.438,907 1.125 100.4 106.0 464.3 1.056 3.0 2.3 2.3 15.81 10.90 2.438,907 1.125 5.2 5.5 1.056	37.7 25 13.96 10.33 2.673.585 1,108 127.3 1200 525.6 0.942 3.4 2.3 1.136 10.33 2.673.585 1,108 6.5 6.5 6.5 6.5 9.99	22.6 16 940 1145 2,429,103 1.102 723 32.19 1.041 6.5 4.7 9,40 11,45 2,429,103 1,102 12.1 12.4 52.9 1.004	24.0 17 11.45 10.97 2.274.513 1.133 49.7 7.23 305.1 1.038 7.0 4.9 11.45 10.97 2.274.513 1.133 11.4 11.9 50.9 1.023	23.9 16 11.08 10.85 2.29,668 1,126 71.0 73.3 31.0 1.033 6.9 4.8 12.08 10.85 2.29,668 1,116 11.1 11.1 51.6 1.003	. 2.4! 
bon Monomide (Brhs) = CO(ppum) × (DB 9 × 1) - Moto 28 (moin wgs CO) × 60 min/her / [1545 × (C1 in, ppured - calculated in, ppured ⊕ 15% O2 - calculated - provided (q) interes (%) ppured ⊕ 15% O2 - calculated (q) interes (%) ppured ⊕ 15% O2 - calculated (q) interes (%) ppured ⊕ 15% O2 - calculated (q) interes (%) provided (calculated from given ppured (first) provided (calculated first) provided (CB') (first) (calculated first) first first first first first (q) distinct rate (Bris) first (q) distinct rate (Bris) first (q) distinct first first first (q) d	Interest 5,1/100]- T Immp.(7) + 66  12.4 10 10 7.92 12.53 2,509,194 1,008 42.4 4,500 197.1 1,000 197.1 1,000 107.1 2,3 2,509,194 1,000 197.1 1,000 197.1 1,000 1,0	Cry gam(5,) x 2 FF) x 1,000,000 ( 33.5 25 13.11 11.29 2,661,219 1,108 53.6 1,108 11.27 11.00 11.23 1.30 1.	116.3 layez x V anij, 6or ppm31 10 10 10 844 12.51 2.417.049 1.100 182.3 1.006  × 0 (anij, for ppm3 2.3 2.4 1.402 1.102 5.1 1.102 5.1 1.102 5.4 1.	12.4 10 10 10.8 12.13 12.254,204 11.13 12.254,204 1.133 1.073 10.2 2.8 2.3 2.3 2.3 2.3 2.3 2.3 2.4 4.7 4.7 2.166,204 1.1056	12.6 10 11.08 11.97 2,317,426 1.126 37.7 4400 1.062 2.8 2.3 2.1 1.062 1.126 1.	42 31 25 15.81 10.90 2,438,907 1,125 100.4 106.0 464.3 1.056 3.0 2.3 15.81 10.90 2,438,907 1,125 5.2 5.5 2.3 1,056	37.7 25 13.96 10.33 2.673.585 1,108 127.3 1200 525.6 0.942 3.4 2.3 1.136 10.33 2.673.585 1,108 6.5 6.5 6.5 6.5 9.99	22.6 16 9.40 11.45 2,429.103 1.102 7.63 3.21.0 1.041 6.5 4.7 9.40 11.45 2,429.103 1.102 12.4 12.4 52.9 1.094 NA	24.0 17 11.45 10.97 2.274.513 1.133 69.7 72.3 305.1 1.038 7.0 4.9 11.45 11.45 11.45 11.45 11.45 11.45 11.45	23.9 16 11.08 10.85 2.29,668 1,126 71.0 73.3 31.0 1.033 6.9 4.8 12.08 10.85 2.29,668 1,116 11.1 11.1 51.6 1.003	. 245
ton Monomide (Brhn) = CO(ppum) × (DB 9 × 1) - Moin 28 (moin west CO) × 60 min/her / [1545 × (C1 in, ppured - calculated in, ppured @ 15% O2- calculated - provided (a) obstace (%) ppured @ 15% O2- calculated (a) obstace (%) ppured @ 15% O2- calculated (a) obstace (%) ppured @ 15% O2- calculated from given ppured (Brhn) - provided (calculated from given ppured (Brhn) - provided (calculated from given ppured (Brhn) - provided (calculated (TIT))  [Batio Brhn provided (calculated (S) 100] × 21 in (moin from from from from from from from from	Interest %/1009)-1 immp/7) + 66  12.4 10 10 7.92 12.53 2,509,194 1,082 45.50 197:1 1,080 107:1 1,080 1	Chygam(5,1) x 2 (200,000 (25) x 1,000,000 (25) x 1,000,000 (25) x 1,111 11.29 2,661,219 1,100 2,00 1,005 1,0	116.5 bet2 x V and 4 for ppm)   12.3   10   10   10   10   10   10   10   1	12.4 10 10 10.4 10 10.4 10 10.4 10.1 10.4 10.4	12.6 10 10 11.05 11.97 2.317.426 11.97 2.317.426 1.052 1.052 2.3 2.3 11.07 2.317.426 1.126 2.3 2.3 11.05 11.97 2.317.426 4.8 5.1 2.4 1.056	42 31 25 15.81 10.90 2.438,907 1,125 100.4 106.0 464.3 1,056 3.0 2.3 2.3 2.3 15.81 10.90 2.438,907 1,125 5.2 5.2 5.2 5.2 1,066 NA 0 0	37.7 25 25 13.3% 10.33 2.673.585 1,100 1227.3 120.0 505.6 0.942 3.4 2.3 2.3 1.3% 10.31 2.673,585 6.2 2.6.9 0.999	22.6 16 9.40 11.45 2,429,100 1,100 73.3 76.3 32.19 1,041 6.5 4.7 9.40 11.45 2,429,103 1,102 12.1 12.4 52.0 1,004 NA 0	24.0 17 11.45 10.97 2.276.513 1.133 69.7 72.3 305.1 1.036 7.0 4.9 11.45 10.97 2.276.513 11.33 11.45 11.9 50.9 1.023	23.9 16 12.05 10.05 2,229,668 1,124 71.0 73.3 318.9 1,033 6.9 6.9 6.8 12.00 10.05 2,229,660 1,126 11.1 12.1 12.1 12.1 12.1 12.1 12.1 1	. 2.4! 
then Mercenide (Brhs) = CO(ppm) × (D0.9 × (1) - Mois  28 (moin, wgt CO) × 60 min/hr / [1545 × (CI  nin, ppmvd - calculated	Intervet %1/100)-  I mmp (7) + 66  12.4  10  10  7.92  12.53  2.509,94  1.088  1.080  1.061  1.060  1.061  1.060  1.061  1.060  1.061  1.060	Chygam(5,1) x 2 1,000,000 ( 33.5 25 25 25 13.11 11.22 25 25 25 13.11 11.12 25 25 25 25 25 25 25 25 25 25 25 25 25	114.5 lavf22 x V anij, for ppmi] 12.3 10 10 844 12.51 2.417.049 1.100 188.3 1.076 x 0 (adi, for ppmi 2.3 2.3 2.417.049 1.100 5.1 2.118 1.056 NA 0 0	12.4 10 10 10.4 10 10 10.4 10 10.4 10 10.4 10.1 10.4 10.1 10.4 10.4	12.6 10 10 11.08 11.97 2,317,426 1,1	42 31 25 15.81 10.90 2.438,907 1,125 100.4 106.0 464.3 1,056 3.0 2.3 2.3 2.3 15.81 10.90 2.438,907 1,125 5.2 5.5 2.3 1,056 NA 0	37.7 25 25 13.36 10.33 2.673.585 1,100 127.3 1200 525.6 0.942 3.4 2.3 2.3 13.96 10.33 2.673.585 6.2 2.69 0.999	22.6 16 9.40 11.45 2,429,103 1,102 73.3 76.3 32.10 1.061 1.061 4.7 9.40 11.45 2,429,103 12.1 12.4 9.29 1.004 NA 0 0	24.0 17 11.45 10.97 2.276.513 1.133 369.7 7.23 305.1 1.038 7.0 4.9 11.45 10.97 2.276.513 11.33 11.6 11.9 5.0 9 9 1.0 2.3 1.0 3 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	23.9 16 11.08 10.85 2,229,668 1,126 71.0 73.3 33.9 1,033 6.9 4.3 12.08 10.85 2,329,668 11.35 11.36 11.35 11.36 11.30 0 0	. 245
then Memorate (Brhs) = CO(ppm) × (D0.9 × 1) - Mot 28 (meh. wgt CO) × 60 min/hr / [1545 × (C1 min. ppmv4 - calculated nin. ppmv4 - D56 C2 - calculated nin. ppmv4 (9 15% C2 - calculated nin. ppmv4 (9 15% C2 - calculated - provided (a) obstace (%) - provided (a) obstace (%) - provided (a) obstace (%) - provided (TP7) - minion rute (Brhs) - calculated from given ppmv4 (Brhs) - provided (TP7) - bindon rute (Brhs) - provided (C2) - calculated from given ppmv4 (brhs) - VOC(ppm) × [1 - Mointaret %)/100] × 21 - 16 (mota-wgt as medianes) × 60 min/hr / [1545 × (in). ppmv4 (in C31) - calculated nin. ppmv4 (in C31) - calculated nin. ppmv4 (in C31) - calculated nin. ppmv4 (in C31) - calculated (in (in calculated (Brhs) - provided (in (in calculated (Brhs) - provided (Brhs	Intervet %1/100)-  I immp(7) + 66  12.4  10  10  7.92  12.53  2.509,94  1.088  1.080  1.064 Br/02 x Volume(7) + 4  2.8  2.3  7.92  1.253  2.509,194  1.080  0.00  0.00  0.00  0.00  0.00  0.00	Chygam(5,1) x 2 1,000,000 ( 33.5 25 25 25 13.11 11.22 25 25 25 13.11 11.12 25 25 25 25 25 25 25 25 25 25 25 25 25	114.5 lavf22 x V anij, for ppmi] 12.3 10 10 844 12.51 2.417.049 1.100 188.3 1.076 x 0 (adi, for ppmi 2.3 2.3 2.417.049 1.100 5.1 2.118 1.056 NA 0 0	12.4 10 10 10.4 10 10 10.4 10 10.4 10 10.4 10.1 10.4 10.1 10.4 10.4	12.6 10 10 11.08 11.97 2,317,426 1,1	42 31 25 15.81 10.90 2.438,907 1,125 100.4 106.0 464.3 1,056 3.0 2.3 2.3 2.3 15.81 10.90 2.438,907 1,125 5.2 5.5 2.3 1,056 NA 0	37.7 25 25 13.36 10.33 2.673.585 1,100 127.3 1200 525.6 0.942 3.4 2.3 2.3 13.96 10.33 2.673.585 6.2 2.69 0.999	22.6 16 9.40 11.45 2,429,103 1,102 73.3 76.3 32.10 1.061 1.061 4.7 9.40 11.45 2,429,103 12.1 12.4 9.29 1.004 NA 0 0	24.0 17 11.45 10.97 2.276.513 1.133 369.7 7.23 305.1 1.038 7.0 4.9 11.45 10.97 2.276.513 11.33 11.6 11.9 5.0 9 9 1.0 2.3 1.0 3 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	23.9 16 11.08 10.85 2,229,668 1,126 71.0 73.3 33.9 1,033 6.9 4.3 12.08 10.85 2,329,668 11.35 11.36 11.35 11.36 11.30 0 0	. 245
phon Movemble (Byhr) = CO(ppm) x (D0.9 x (1 - Mot 28 (mots, wgt CO) x 60 min/hr / [1545 x (C1 min, ppmv4 - calculated min, ppmv4 - calculated physics (Ph. 155 CO - calculated from given ppmv4 (Byhr) - provided (ClC) (Byhr) - provided (ClC) (Byhr) - VOC(ppm) x [1 - Motetaret %1/100] x 21 16 (motes wgt as methane) x 60 min/hr / [1545 x (1 min, ppmv4 db 15% CO - calculated (ppm) - provided (calculated (Drhr) - provided (ClC) (Byhr) - NA minion Rate Besis (c) minion state Besis (d) minion Rate (Byhr) (RP) (Byhr) + COV (Byhr)	Interved 5\/100g)-  I hump (7) + 666  124  10  7.92  12.53  2,509,194  1,000  197.1  1,000  10.1  1,000  10.1  1.0000  1.000  1.0000  1.0000  1.0000  1.0000  1.0000  1.0000  1.0000  1.	Cry gam(%)) x 2 FF) x 1,000,000 ( 33.5 25 25 13.11 11.29 2,661,219 1,100 352.6 1,100 1,000	116.3 be/62 x V andj. for ppm31 10 10 844 12.51 2.417.049 1.100 40.0 43.0 1.006  × 0 (add) for ppm3 2.3 2.3 2.4 2.417.049 1.100 5.1 2.417.049 1.100 6 NA 0 0 0 10.4	12.4 10 10 10.6 10.5 10.5 10.5 10.5 10.5 10.5 10.5 10.5	12.6 10 11.05 11.07 2.317.426 1.126 4.00 1.062 2.8 2.3 2.3 2.3 11.062 11.264 4.8 1.1266 NA 0 0 0  NA 0 0 0  9.E	42 31 25 15,81 10,90 2,438,907 1,125 100.4 106.6 464.3 1,056 3.0 2.3 2.3 15,81 10,90 2,438,907 1,125 5.5 2,39 1,066 NA 0 0	37.7 25 13.96 10.33 2.673.585 1,106 127.3 1200 525.6 0.942 3.4 2.3 2.3 2.3 2.3 2.3 2.3 2.3 2.573.585 1,100 6.5 6.5 6.5 6.5 9.9 9.9 9.9 9.9 9.0 9.0 9.0 9.0 9.0 9.0	22.6 16 9.40 11.45 2,429.103 1.102 7.33 763 32.10 1.041 6.5 4.7 9.40 11.45 2,429.103 1,102 12.4 12.4 12.0 1.004 NA 0 0 0 NA 0 0	24.0 17 11.45 10.97 2.274.513 1.133 49.7 72.3 305.1 1.038 7.0 4.9 11.45 10.97 2.274.513 1.133 11.43 11.9 10.93 NA 0 0	23.9 16 12.08 10.85 2.29,668 1,126 71.0 73.3 310.9 1,033 6.9 4.8 12.08 10.88 5.23,9,668 1,136 1,136 1,100 0 0 NA 0 0 0 11.3 1.3 1.3	. 245
show Moreowides (Byhr) = CO(ppm) x (198.9 x (1 - Mot) 28 (mots, wgt CO) x 60 min/hr / [1545 x (C1 min, ppmv4 calculated min, ppmv4 b 155 CO-calculated - provided (a) column (Poor (aclm) mygen (N) (Bhr) - provided (calculated from given ppmv4 (Bhr) - provided (calculated from given ppmv4 (Bhr) - POC(ppm) x (1 - Motebard N) 100 x 21 10 (mote wgt pm methaned x 60 min/hr / [1545 x (1 min, ppmv4 (m CH <sub>2</sub> ) - calculated (m/hr) - provided (a) (a) colomn (Poor (aclm) mppmv4 (m CH <sub>2</sub> ) - calculated (m/hr) - provided (m/hr) - provided (m/hr) - provided (m/hr) - provided (m/hr) - NA minion Rate (Byhr) - calculated (m/hr) - NA minion Rate (Byhr) - calculated (m/hr) mrcmy (Byhr) - NA minion Rate (Byhr) (FP1) (FP1) (Stric Acid Mint - SO2 emission rate (Byhr) x convention (Byhr) = convention rat	Interved %/1009)-1 immp.(7) + 66  12.4 10 10 7.92 12.53 2,509,194 1,082 45.50 197.1 1,080 107.1 1,080 107.1 1,080 107.1 1,080 107.1 1,080 107.1 1,080 107.1 1,080 107.1 1,080 107.1 1,080 107.1 1,080 107.1 1,080 107.1 1,080 107.1 1,080 107.1 1,080 107.1 1080 107.1 1080 1080 1080 1080 1080 1080 1080 10	Crypam(5,1) x 2 1,000,000 ( 33.5 25 25 13.11 11.29 2,661,219 1,100 5,55.6 1,055 1,000,000 ( 2.3 2.3 1,311 11.29 2,661,219 x 1,000,000 ( 2.3 2.3 1,311 11.29 2,661,219 1,000,000 ( 5.3 4.6 2,50 1,500,000 ( 5.3 4.6 2,50 1,500,000 ( 5.3 4.6 2,50 1,500,000 ( 5.3 4.6 2,50 1,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1,500 ( 5.3 4.6 2,50 1	114.5 layez x V anij, 4 cor ppm.)  12.3 10 10 8.44 12.51 2.417.049 1.100 40.0 41.0 128.3 1.076  x 2.8 2.3 2.417.041 12.51 2.417.045 1.100	12.4 10 10 10.42 12.13 2.264.224 1.133 2.264.224 1.133 2.264.224 1.133 2.264.224 1.135 2.3 10.62 10.73 10.73 10.62 10.73 10.62 10.73 10.62 10.73 10.62 10.73 10.62 10.73 10.73 10.62 10.73	12.6 10 10 11.05 1	42 31 25 15.81 10.90 2.438,907 1.125 100.4 106.0 464.3 1.056 3.0 2.3 2.3 2.3 15.81 10.90 2.438,907 1.125 5.2 5.2 5.2 5.2 5.3 1.056 NA 0 0	37.7 25 25 13.96 10.33 2,673,585 1,100 127.3 1200 555,6 0,942 3.4 2.3 2.3 1.3 1.3 2,673,585 10.33 2,673,585 NA 0 0 NA 0 0 NA	22.6 16 9.40 1145 2,429,100 1,102 73.3 76.3 32.10 1,041  6.5 4.7 9.40 11.45 2,429,103 1,102 12.1 12.4 52.9 1,004  NA 0 0 NA	24.0 17 11.45 10.97 2.274.513 1.133 49.7 72.3 305.1 1.036 7.0 4.9 11.45 10.97 2.274.513 1.133 11.45 10.97 2.274.513 1.133 11.53 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.0	23.9 16 12.08 10.05 2,229,668 1,124 7120 73.3 318.9 1,033 1,033 6.9 4.8 11.11 12.1 15.14 1,003 NA 0 0 0 NA	

cot (a) Stemamo Westinghouse 1999.
(d) Caldier Assachates Sac. 1999.
(d) EPA 2009, AP-43.
(d) FeN NO, ministron, data originally provided at 25 ppssvd at 15% oxygen.
(d) Fen VOC mainstron, data originally provided at 1.5 ppssvd at 15% oxygen.

Note: ppmvd= parts per sullion, volume dry;  $O_{\lambda^{\prime\prime\prime}}$  oxygen.

Table A-3. Maximum Emissions for Hazardous Air Pollutants for the Osprey Energy Center Project
Stoneous Westinghouses 501F, Dry Low NOx Combustor, Natural Gas, 100 % Load incheding Power Augmentation (PA) and Duct Burner (DB)

		Ambient/Compres		wetere		(	DUCT BURN Ambient Tempera	dura)	
areaneter	32 T	59°F	95 °F	95 °F	95 T	59 T	95 TF	95 T	95 T Case 1 (DB&P/
	Case 9	Case 6	Case 3	Case 2	Coor 1 (PA)	Cese 6 (DB)	Case 3 (DB)	Care 2 (DB)	Case 1 (DB&F/
ours of Operation	8,760	8,760	8,760	8,760	8,760	8,760	8,760	8,760	4
oot Input Rate (MOGEts/hr), HIV-CT	1,968	1,853	1,694	1,746	1,960	1,853	1,684	1,746	3,
Dect berser Total	0 1.966	0 1, <b>85</b> 3	0 1.6 <b>4</b> 6	0 1.746	0 1.860	278 2,131	278 1,962	278 2.024	2
	*			1,740	1,000	4,131	1,		•
mmonia (B/hr) = Ammonia (ppm) x ([20.9 x (1 - 16 17 (molu. wgt ammonia) x 60 min/hr/[1	oisture(%)/100) - Oxygen	%)) x 2116.8 x Volume	flow (actin) x						
17 (most. og ammonta) x so mayar/ (s lasis, ppmvd @15% O <sub>2</sub> (a) (d)	2023 (C.1 emm b*), 5,1 + em.	F) X 3.7 X I,UUU,UUU (20) Q	e ivos bibansi		•			9	
Soluture (%)	7.92	844	10.62	11.08	15.0°i	9.40	11.65	12.08	1
Daygen (%)	12.53	12.51	12.13	11.97	10.90	1145	10.97	10.25	
/olume Flow (actin)	2,509,194	2,417,019	2,264,224	2,317,426	2,436,907	2,429,103	2,276,513	2,329,668	2,45
emperature (T)	1,068	1,102	1,133	1,126	1,125	1,102	1,133	1,124	:
mimion rate (B/kr) (TPY)	23.2 102	21. <b>s</b> 96	19.9	20.6 90	21.9 96	24.8 109	22.# 100	23.6 103	
- Butediene (Bylat) — Besis (Byl0 <sup>12</sup> Btu) x Heet Inp exis 16/10 <sup>12</sup> Btu	ut (MDMBtsv/kr) / 1,000,000 4.30E-01	MMStu/10" Btu 4 30F-01	4.30E-01	4.30E-01	4.30E-01	4.30E-01	4.30E-01	6.30E-01	4.30
lest Input Rate (MMBtu/kr)	1.968	1,853	1,684	1,746	1.860	2.131	1.962	2.024	4.3
minalon Rate (Bylkr)	£46E-04	7.97E-04	7.24E-04	7.51E-04	8.00E-04	9.16E-04	8.43E-04	6.70E-04	9,19
(TPY)	371E-03	3.49E-03	3.17E-03	3.29E-03	3.50E-03	4.01E-03	3.69E-03	3.81E-03	4.00
stalkyde (livkr) – Basis (liv10 <sup>22</sup> litu) × Heat Input	(MIMILITATA / 1.000.000 MG	(Bh/10 <sup>2</sup> Sh							
anis, Br/10 <sup>23</sup> Box	4.00E+01	4.00E+01	4.00E+01	4.00E+01	4.00E+01	4.00E+01	4.00E+01	4.00E+01	4.00
lost Input Rate (I-Ch-EBtu/hr)	1,968	1,853	1,684	1,746	1,860	2,131	1,962	2,024	
minica Reta (Brita) (IPY)	7.87E-02 3.45E-01	7.41E-02 3.25E-01	6.74E-02 2.95E-01	6.90E-02 3.06E-01	7.44E-02 3.26E-01	8.52E-02 3.73E-01	7.85E-02 3.44E-01	8.09E-02 3.55E-01	8.56 3.75
(111)	2436-01	3232-01	4.XXE-01	3000-01	3,500-01	3.7.3(2.01	386-01	3332-01	JA7 -
crolein (B/hr) — Besis (B/10 <sup>22</sup> Bts) x Flest (April (M									
mis, 9/10 <sup>12</sup> Ben	640E+00	640E+00	640E+00	640E+00	640E+00	6.40E+00	640E+00	6.40E+00	6.405
lout Input Rate (I-GrG+u/hr) Incimion Rate (Ih/hr)	1,96 <b>6</b> 1,246-42	1,053 1.19E-02	1,644 1.005-02	1,746 1.12E-42	1,860 1.19E-02	2,131 1,36E-01	1,962 1,266-02	2,024 1,30E-02	1.37
(171)	5.92E-00	519E-02	4.72E-02	4.89E-02	521E-02	5.97E-02	5.50E-02	5.67E-02	5.99
masme (B/hr) — Resis (B/10 <sup>13</sup> Stu) x Heat İnput (M İssis, B/10 <sup>13</sup> Stu	MB tu/ki) / 1,000,000 MD/SB 1.20E+01	tu/10 <sup>22</sup> Bitu 1.20E+01	1.20E+01	1.20E+01	1.20E+01	1.20E+01	1.20E+01	1.30E+01	1.205
lant Input Rate (MARtu/hr)	1.206.701	1.202.+01	1.464	1.746	1.20c+01 1.860	2.131	1.960	2.024	1.200
minion Rate (B/kr)	2.36E-02	2.22E-02	2.02E-02	2.10E-02	2.236-02	2.56E-02	2.35E-03	24至-02	2.50
(TPY)	1. <b>03E-01</b>	9.74E-00	1.05E-02	9.1 <b>8E</b> -02	9.7 <b>4E</b> -02	1.12E-01	1.0XE-01	1.06E-01	1.12
thy from zone (To/he) — Bests (To/10 <sup>52</sup> Stu) x Host Inp	u ( <b>)-()-()</b> -()-()-()-()-()-()-()-()-()-()-()-()-()-	MACLES TO BE							
ionia, By10 <sup>12</sup> Stu	3.20E+01	3.20E+01	3.20E+01	3.20E+01	3.20E+01	3.20E+01	3.20E+01	3.20E+01	3.20E
fast Input Rate (b@:(Btu/kr)	1,966	1,653	1,684	1,746	1,060	2,131	1,962	2,024	1
minion Rate (B/hr) (TPY)	6.30E-02 2.76E-01	5.93E-02 2.60E-01	5.39E-02 2.36E-01	5.59E-02 2.45E-01	5.95E-02 2.61E-01	6.82E-02 2.99E-01	6.26E-02 2.7SE-01	6.68E-02 2.86E-01	6.04 3.00
					2002	2,,,2,01			
ermeidehyde (B/hr) — Besis (B/10 <sup>22</sup> Btn) z Heet la p lasis, B/10 <sup>22</sup> Btn		MGAGBatu/10 <sup>12</sup> Bas 1.50E.+02		1.50E+02	1.50E+02	1.50E+02	1.50E+02	1.50E+02	1.500
anis, Se/10 - Min Lout Lapurt Rate (MOABtu/hr)	1.50E+02 1,968	1.50E+02 1,853	1.50E+02 1,484	1.50E+02 1,746	1.50E.+02 1,860	1_50E+12 2,131	1.50E+02 1.962	1.50E+02 2.024	1.500
mission Rate (Brhs)	1,95E-01	2.78E-01	2.53E-01	2.62E-01	2.79E-01	3.20E-01	2,94E-01	3.01E-01	321
(IFY)	1.29E+00	1.22E+00	1.11E+00	1.15E+00	1.22E+00	1.40E+00	1.29E+00	1.33E+00	1.40E
apthalana (B/kr) = Basis (B/10 <sup>13</sup> Btu) x Host Input	Authornaum Aug / 1 mm mm turn	MIL. 40 <sup>12</sup> Be.							
esis, llv10 <sup>12</sup> Btu	1.30E+00	1.30E+00	1.30E + 00	1.30E+00	1.30E+00	1.30E+00	1.30E+00	1,30E+00	1.306
lost Input Kata (I-CMCStu/hr)	1,968	1,253	1,684	1,746	1,960	2,131	1,942	1,024	
mineien Rete (Brite)	2.56E-03	2.41E-03	2.19E-03	2.27E-03	2.42E-03	2.77E-03	2.55E-63	2.43E-03	3.78
(IIPN)	1.13E-02	1.06E-02	9.59E-03	9.94E-03	1.06E-02	1218-02	1.12E-02	1.15E-02	1.22
nlycyclic Arometic Hydrocerbons (PAH) (lb/kr) = 1	icolo (B/10 <sup>13</sup> Bts) x Hool în	put (MMHHu/hr) / 1,000	,000 MD-GB tw/10	P <sup>12</sup> Btu					
anis, By10 <sup>th</sup> Bits	2.20E+00	2.20E+00	2.20E+00	2.20E+00	2.20E+00	2.20E+00	2.20E+00	2.20E+00	2.205
Sant Engrat Kata (hOcOtra/ks)	1,968	1,853	1,684	1,746	1,860	2,131	1,962	2,024	2
(mission Rate (Brist) (IPY)	4.33E-03 1.90E-02	4.00E-03 1.29E-02	3.70E-03 1.62E-02	3.94E-03 1.64E-02	6.09E-03 1.79E-02	4.69E-03 2.05E-02	4.32E-03 1.89E-02	4.45E-03 1.95E-02	4.70 2.06
•						200 6	-472 48	*******	
ropy ione Oxide (B/kr) = Basis (B/10 <sup>23</sup> Btu) x Heat I									
lasis, B/18 <sup>13</sup> Stu Sont Ingrat Ratu (MD/CStu/kr)	2.90E+01 1.96¢	2.90E+01 1.853	2.90E+01 1.684	2.90E+01 1.746	2.90E+01 1,860	2,90E+01 2,131	2.90E+01 1.962	2.90E+01 2,024	2.90E
nost ingrat Anto (MALBONAT) Indiatos Rato (Byler)	1,966 5.71E-02	1,003 5,37E-02	1,68E-02	1,760 5.06E-02	1,000 5.39E-02	4,131 6,1 <b>25</b> -40.	1,962 5.69E-02	5.87E-02	620
(171)	2.50E-01	2.35E-01	2 14E-01	2.22E-01	2.36E-01	2.71E-01	2.49E-01	2.57E-01	1.72
shume (B/hr) — Basis (B/10 <sup>th</sup> Bin) × Heat Input (M		_ 40 <sup>13</sup> B							
one (Brits) — Sone (Brits) - Stu) x Heat Input (Mi one Brits)	4.000,000 MAMBI 1.30E+02	1.30E+02	1.30E+02	1.30E+02	1.30E+02	1.30E+02	1.30E+02	1.30E+02	1.30E
inst Impat Rate (I-Chilbas/hr)	1,968	1,853	1,444	1,746	1,860	2,131	1,962	2,024	7
mission Late (Brhr)	2.56E-01	2.41E-01	2.19E-01	2.27E-01	2.42E-01	2.77E-01	2.55E-61	2.63E-01	2.76
(IFI)	1.12E +00	1.06E + 00	9.59E-01	9.94E-01	1.06E + 00	1.21E+00	1.12E+00	1.15E+00	1.235
ylano (fis/ks) — Basis (fis/10 <sup>51</sup> Bits) z Host Input ( <i>b/</i> Dd	Bru/hr) / 1,000,000 MM3 tu	/10 <sup>13</sup> Btu							
lanis, 25/10 <sup>13</sup> Stu	640E+01	6.40E+01	6.40E+01	6.40E+01	6.40E+01	6.40E+01	640E+01	6.40E+01	6.40E
fant Input Rato (MMStu/hr)	1,968	1,853	1,684	1,746	1,060	2,131	1,960	2,024	
Lanianico Rato (Bella)	1.24F-01	1.1年-01	1.0EE-01	1.12E-01	1.196-01	1.36E-01	1.24E-01	1.30E-01	1.371
(IP))	5.52E-01	5.19E-01	4.72E-01	4.89E-01	5.21E-01	5.97E-01	5.50E-01	5.67E-01	5.99

Source: EPA, 2000, AP-42.

Table A-5. Maximum Emissions for Criteria and Other Regulated Pollutants for the Osprey Energy Center Project Sismens-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 75 % Load

		imbient/Compressor Inlet Temperatu	re
rameter	32 <b>T</b>	59 F	95 T
	Case 10	Case 7	Casa 4
are of Operation	8,760	8,760	8,760
ionists from CT and SCP			
<u>iculate from CT and SCR</u> iculate (lb/hr) = Emission zate (lb/hr) from manuf	acturer (front- ar	nd back-half)	
is. b/hz - provided (a)	14.6	14.0	13.0
ticulate from SCR= Sulfur trioxide (formed from	convenien of St	L) converts to ammonium suffets (= 1	PMIO
rticulate from conversion of SO <sub>2</sub> = SO <sub>2</sub> emissions			
		0 (NH),80, x (NH), 80/ 16 80,	7.6
SO <sub>2</sub> emission rate (lb/hr)- calculated Conversion (%) from SO <sub>2</sub> to SO <sub>3</sub>	8.6 25	&1 25	7.6 25
MW SO <sub>2</sub> SO <sub>2</sub> (80/61)	1.3	1.3	1.3
Conversion (%) from SO <sub>3</sub> to (NH <sub>2</sub> ) <sub>2</sub> (SO <sub>2</sub> )	100	100	100
MW (NH <sub>2</sub> ), SO <sub>2</sub> SO <sub>3</sub> (132/80) Particulate (b/hr)- calculated	1.7 4.42	1.7 4.19	1.7 3.89
articulate (B/kr) from CT + SCR (TPY)	19.0 83.3	18.2 29.7	16.9 73.9
			73.9
har Dioxide (fb/hr)= Neturel gas (cf/hr) × sulfur co	ntent(gz/100 cf) x	1 lb/7000 gr x (lb \$O <sub>1</sub> /lb \$) /100	
sel use (ci/kr)	1,501,214	1.423.626	1,321,928
alfur content (grains/ 100 cf) - assumed (b)	2	2	2
SO <sub>2</sub> /lb S (64/32) mission zate (lb/hr)- culculated	2 8.6	2 &1	2 7.6
(b/hr)- provided (0.2 gr/100 cf) (not used)	0.93	0.89	0.82
(17)	37.6	35.6	33.1
ogen Oxidee (fb/hr)= NOx(ppm) x { [20.9 x (1 - )d			
46 (mole. wgt NOx) x 60 min/hr / (1545	x (CT temp.(T)	+ 460°F) x 5.9 x 1,000,000 (adj. for pper	n)
is. ppmvd @15% O <sub>2</sub> (a) (d)	3.5	3.5	3.5
cinture (%) xygen (%)	7.12	7.61	9.76 13.10
rygen (%) skume Flow (acfm)	13.42 2.056.955	13.41 2.005.603	13.10 1,947,155
supereture (°F)	998	1,013	1,045
nimics rate (B/br)- calculated	19.0	18.0	16.7
(lb/hr)- provided	20.1	19.0 83.3	17.7
(TPY) [Ratio lb/hr provided/culculated]	87.9 1.056	83.3 1.056	77.4 1.056
ban Manaside (lb/lar)== CO(ppm) x ([20.9 x (1 - M			flow (actin) x
		44 APPR - 1 AAA AAA 4 11 4 11	
28 (mole, wgt CO) x 60 min/hz / [1545 x	(CT temp.(T) +	400'T) x 1,000,000 (adj. for ppm)]	
nia, ppmvd- calculated	10.9	10.8	10.8
nin, ppmvd- calculated nin, ppmvd @ 15% O <sub>2</sub> - calculated	10.9 10	10.8 10	10
in, ppmvd-calculated in, ppmvd @ 15% O <sub>2</sub> -calculated - provided (a)	10.9 10 10	10.8 10 10	10 10
iis, ppasvd-calculated iis, ppasvd @ 15% Or calculated - provided (a) inture (%)	10.9 10 10 7.12	10.8 10 10 2.64	10 10 9.76
is, ppeared-calculated is, ppeared @ 15% O <sub>T</sub> calculated - provided (a) inture (%) ygen (%)	10.9 10 10	10.8 10 10	10 10
is, ppmvd- calculated is, ppmvd @ 15% O <sub>T</sub> calculated - provided (a) isture (%) ygan (%) mme Flow (acfm)	10.9 10 10 7.12 13.42	10.8 10 10 7.64 13.41	10 10 9.76 13.10
sis, pppnvd- calculated sis, ppmvd @ 15% O <sub>Y</sub> calculated - provided (a) sisture (%) sygen (%) hame Plow (acfm) mpsesture (P) sisticn rate @h'u)- calculated from given ppmv	10.9 10 10 7.12 13.42 2.058,955 998 33.0	10.8 10 10 7.64 13.41 2.005.603 1.013 31.3	10 10 9.76 13.10 1,947.156 1,045 29.1
nia, ppmv4-calculated  nia, ppmv4 @ 15% O <sub>T</sub> calculated  - provided (a)  niatura (%)  sygem (%)  hume Flow (acfm)  mperature (P)  ussion rate (b)tur-calculated from given ppmv  (b)tur-provided	10.9 10 10 7.12 13.42 2.058,955 998 33.0 35.0	10.8 10 10 7.64 13.44 2.005.603 1.013 31.3 33.0	10 10 9.76 13.10 1,947.156 1,045 29.1 31.0
nis, ppmvd-calculated nis, ppmvd @ 15% O <sub>T</sub> calculated - provided (a) cisture (%) cygen (%) shame Flow (acfm) susperature (P) nission rate (Brhu)-calculated from given ppmv (Brhu)-provided ((FF))	10.9 10 7.12 13.42 2.058,955 998 33.0 35.0 153.3	10.8 10 10 7.64 13.41 2.005.608 1.013 31.3 33.0 144.5	10 10 9.76 13.15 1,947.156 29.1 31.0 135.8
nis, ppmvd-calculated nis, ppmvd @ 15% O <sub>T</sub> calculated - provided (a) cisture (%) sygan (%) shame Flow (actim) suspensature (*P) (Bo'lur)- calculated from given ppmv (Bo'lur)- provided	10.9 10 10 7.12 13.42 2.058,955 998 33.0 35.0	10.8 10 10 7.64 13.44 2.005.603 1.013 31.3 33.0	10 10 9.76 13.16 1.947.155 1.045 29.1 31.0 135.8
nin, ppmvd-calculated nin, ppmvd-calculated nin, ppmvd-calculated - provided (a) cisture (%) rygen (%) shame Flow (acfm) magnesiture (P) risision rete (B/hr)-calculated from given ppmv (B/hr)-provided (TFY) [Retio B/hr provided/calculated] Cs (B/hr)= VOC(ppm) x [I - Moisture(%) 100] x 2	10.9 10 7.12 13.42 2.068,955 998 33.0 35.0 153.3 1.069	10.8 10 10 7.64 13.41 2.005.608 1.013 31.3 33.0 144.5 1.053	10 10 9.76 13.10 1,947.156 1,045 29.1 31.0
nin, ppnavd-calculated nin, ppnavd-go 15% O <sub>T</sub> calculated - provided (a) ninture (%) yygen (%) hume Piow (acfm) mperature (*P) nineion rate (Brbar)-calculated from given ppmv (Brbar)-provided (ITY) [Retio Brbar provided/calculated] Ca (Brbar) = VOC(ppnn) x [1 - Moisture(% y 100] x 1 16 (mois. wgi as methans) x 60 min/hr / [1545	10.9 10 10 7.12 13.42 2.058.955 998 33.0 35.0 153.3 1.059	10.8 10 10 10 7.64 13.41 2.005.603 1.0/13 31.3 33.0 144.5 1.063 hume flow (acfm) x + 460°F) x 1,000,000 (adj. for ppm)]	10 9.76 13.10 1.947.156 1.045 29.1 31.0 135.8
nia, ppmvd-calculated nia, ppmvd-calculated nia, ppmvd-calculated - provided (a) cisture (%) sygen (%) shame Flow (acfm) suppersture (P) sission rate (B/hu)-calculated from given ppmv (B/hu)- provided (TP') (Ratio B/hr provided/calculated) Cs (B/hu)= VOC(ppm) x [1 - Moisture(%) 100] x 2 16 (mole. wgt as methane) x 60 min/hr / [1545 sis, ppmvd (ss CH <sub>b</sub> )- calculated	10.9 10 10 7.12 13.42 2.058,955 998 33.0 35.0 35.0 153.3 1.059 1116.8 Bytt2 x Vol	10.8 10 10 10 7.64 13.41 2.005.603 1.013 31.3 33.0 144.5 1.063 https://doi.org/10.000/0.00	10 976 13.10 1,947,155 1,045 29.1 31.0 135.8 1,065
nia, ppnavd-calculated nia, ppnavd-g 15% O <sub>T</sub> calculated - provided (a) nisture (%) yygen (%) hume Plow (acfm) mapsesture (P) nistion rate (B/hu)-calculated from given ppmv (B/hu)- provided (IPY) [Ratio By/hu provided/calculated] Cs (B/hu)= VOC(ppm) x [1 - Moisture(%) 100] x 2 16 (mole. wgt as methane) x 60 min/hr / [1545 nia, ppmvd (as CH <sub>d</sub> )- calculated	10.9 10 10 7.12 13.42 2.058.955 998 33.0 35.0 153.3 1.059	10.8 10 10 10 7.64 13.41 2.005.603 1.0/13 31.3 33.0 144.5 1.063 hume flow (acfm) x + 460°F) x 1,000,000 (adj. for ppm)]	10 9.76 13.10 1.947.155 2.9.1 31.0 135.8 1.065
nia, ppmvd-calculated nia, ppmvd @ 15% O <sub>T</sub> calculated - provided (a) cisture (%) cygen (%) cyge	10.9 10 10 7.12 13.42 2.068,955 998 33.0 35.0 153.3 1.069 2116.8 lb/ft2 x Voi x (CT temp.(**)*) 4.6	10.8 10 10 10 7.64 13.41 2.005.603 1.013 33.3 33.0 144.5 1.063 hume flow (ecfm) x + 460°F) x 1.000,000 (ed), for ppm)]	16 9.76 13.16 1.947.155 29.1 31.0 135.6 1.065
in, ppmvd-calculated in, ppmvd @ 15% Or calculated	10.9 10 10 7.12 13.42 2.068,955 998 33.0 35.0 153.3 1.069 2116.8 lbyft2 x Voi x (CT temp.(%) 4.6 4.2 4.2 7.12 13.42	10.8 10 10 10 7.64 13.41 2.005.603 1.013 33.0 144.5 1.063 hame flow (ecfm) x + 460°F) x 1.000,000 (edj. for ppm.)] 4.5 4.2 4.2 7.64 13.41	16 9.76 13.16 1.947.155 29.1 31.0 135.8 1.065 4.5 4.2 4.2 9.76 13.10
is, ppmvd-calculated is, ppmvd-calculated is, ppmvd @ 15% O <sub>T</sub> calculated isture (%) isture (%) isture (%) issure Flow (actim) isparatuse (*P) ission rate (flylur)-calculated from given ppmv (hylur)-provided (IPY) [Ratio llylur provided/calculated] is (hylur)= VOC(ppm) x [I - Mossture(%)/ 100] x	10.9 10 10 7.12 13.42 2.056,555 33.0 35.0 35.0 153.3 1.059 2116.8 lbyft2 x Voi x (CT temp.(T) 4.6 4.2 7.12 13.42 2.056,555	10.8 10 10 10 7.64 13.41 2.005.608 1.013 31.3 33.0 144.5 1.053 hame flow (acfm) x + 460°T) x 1.000,000 (adj. for ppm)] 4.5 4.2 7.64 13.41 2.005.603	10 97 13 16 1,947,155 1,045 29,1 31,0 135,8 1,065 4,5 4,2 9,76 13,10 1,947,155
is, ppmvd-calculated is, ppmvd @ 15% O <sub>T</sub> calculated - provided (a) inture (%)	10.9 10 10 7.12 13.42 2.058,955 998 33.0 35.0 153.3 1.069 2116.8 lbyft2 x Vol x (CT temp, (T)) 4.6 4.2 4.2 7.12 13.42 2.058,955	10.8 10 10 7.64 13.41 2.005.603 1.013 31.3 33.0 144.5 1.053 hume flow (acfm) x + 460°F) x 1.000,000 (adj. for ppm)] 4.5 4.2 4.2 4.2 7.64 13.41 2.005.603 1.013	10 97 13.10 1,947,155 1,045 29.1 31.0 135.8 1 1,065 4.5 4.2 4.2 4.2 9.76 13.10
in, ppenvd- calculated in, ppmvd @ 15% O <sub>T</sub> calculated	10.9 10 10 10 7.12 13.42 2.058,955 998 33.0 35.0 153.3 1.059 2116.8 lb/ft2 x Voi x (CT temp.(**P) 4.6 4.2 7.12 13.42 2.058,956 998 7.9	10.8 10 10 10 7.64 13.41 2.005.603 1.013 31.3 33.0 144.5 1.063	10 9.76 13.10 1.947.155 29.1 31.0 135.8 1.065 4.5 4.2 4.2 9.76 13.10 1.947.155 7.0
in, ppenvel-calculated in, ppenvel @ 15% O <sub>T</sub> calculated - provided (a) inture (%) ygen (%) inture (%) ygen (%) inture (%) ygen (%) inture (%)	10.9 10 10 10 7.12 13.42 2.058,955 998 33.0 35.0 35.0 153.3 1.059 2116.8 bytt2 x Voi x (CT temp,(T) 4.6 4.2 7.12 13.42 2.058,955 998 7.9 3.4	10.8 10 10 10 7.64 13.41 2.005.603 1.013 31.3 33.0 144.5 1.053  htmse flow (scfm) x + 460°T) x 1.000,000 (sdj. for ppm)] 4.5 4.2 7.64 13.41 2.005.603 1.013 7.5 7.9	10 976 13.10 1,947.155 1,045 29.1 31.0 135.8 1.065 4.5 4.2 9.76 13.10 1,947.155 1,045 7.0
in, ppenvd- calculated in, ppmvd @ 15% O <sub>T</sub> calculated	10.9 10 10 10 7.12 13.42 2.058,955 998 33.0 35.0 153.3 1.059 2116.8 lb/ft2 x Voi x (CT temp.(**P) 4.6 4.2 7.12 13.42 2.058,956 998 7.9	10.8 10 10 10 7.64 13.41 2.005.603 1.013 31.3 33.0 144.5 1.063	10 9.76 13.10 1.947.155 29.1 31.0 135.8 1.065 4.5 4.2 4.2 9.76 13.10 1.947.155 7.0
is, ppmvd-calculated is, ppmvd-calculated is, ppmvd @ 15% O <sub>T</sub> calculated - provided (a) inture (%)	10.9 10 10 10 7.12 13.42 2.068.955 998 33.0 35.0 153.3 1.069 2116.8 lbylt2 x Voi x (CT temp, (P) 4.6 4.2 4.2 2.058.955 7.9 8.4 3.67	10.8 10 10 10 7.64 13.41 2.005.603 1.013 31.3 33.0 144.5 1.063 hume flow (acfm) x + 460°F) x 1.000,000 (adj. for ppm)] 4.5 4.2 4.2 4.2 7.64 13.41 2.005,603 1.003 7.5 7.9 34.8	10 9.76 13.10 1.947.155 29.1 31.0 13.8 1.065 4.5 4.2 4.2 4.2 9.76 13.10 1.947,155 7.0 7.4
ini, ppnavd-calculated ini, ppnavd-calculated ini, ppnavd @ 15% O <sub>T</sub> calculated - provided (a) initure (%) ygam (%) initure (%) ygam (%) initure (P) inition rate (B/Mr)-calculated from given ppmv (B/Mr)- provided (IPT)  Ratio B/Mr provided/calculated]  Ca (B/Mr)- VOC(ppm) × [1 - Mointure(%) / 100] × 1 16 (mole. wg as methane) × 60 min/mr / [1545 ini. ppmvd (as CH <sub>d</sub> )- calculated - provided (a) (a) initure (%) ygam (%) inture (%) ymm (F) inture (%) ymm (F) inture (B/Mr)- provided (B/Mr)- provided (IPT) (Betio B/Mr provided/calculated) (IPT) (Retio Br/Mr provided/calculated) (IPMr)- Provided/calculated) (IPMr)- Provided/calculated] (IPMr)- Provided/calculated	10.9 10 10 10 7.12 13.42 2.068.955 998 33.0 35.0 153.3 1.069 2116.8 lbylt2 x Voi x (CT temp, (P) 4.6 4.2 4.2 2.058.955 7.9 8.4 3.67	10.8 10 10 10 7.64 13.41 2.005.603 1.013 31.3 33.0 144.5 1.063 hume flow (acfm) x + 460°F) x 1.000,000 (adj. for ppm)] 4.5 4.2 4.2 4.2 7.64 13.41 2.005,603 1.003 7.5 7.9 34.8	10 9.76 13.10 1.947.155 29.1 31.0 13.8 1.065 4.5 4.2 4.2 4.2 9.76 13.10 1.947,155 7.0 7.4
sia, ppanvd-calculated sia, ppanvd-g) 15% O <sub>T</sub> calculated - provided (a) sisture (%) yygen (%) hume Plow (acfm) mperature (P) sistion rate (B/hr)-calculated from given ppmv (B/hr)- provided (IPY) (Ratio B/hr provided/calculated] Cs (B/hr)= VOC(ppm) x [1 - Moisture(%) 100] x 1 16 (mole. wgt as methane) x 60 min/hr / [1545 sia, ppmvd (se CH <sub>2</sub> )- calculated sia, ppmvd (se CH <sub>2</sub> )- calculated sia, ppmvd (se CH <sub>2</sub> )- calculated sia, ppmvd (se CH <sub>2</sub> )- calculated sia, ppmvd (se CH <sub>2</sub> )- calculated sia, ppmvd (se CH <sub>2</sub> )- calculated (B/hr)- provided (B/hr)- provided (B/hr)- provided (B/hr)- provided (B/hr)- NA siminion Rate Basis (c) sistion rate (B/hr)	10.9 10 10 10 7.12 13.42 2.058,955 998 33.0 35.0 35.0 153.3 1.059 2116.8 Bo/R2 x Voi x (CT temp.(T)) 4.6 4.2 4.2 7.12 13.42 2.058,955 998 7.9 8.4 36.7 1.056	10.8 10 10 10 7.64 13.41 2.005.603 1.013 31.3 33.0 144.5 1.053  hume flow (acfm) x + 460°T) x 1.000,000 (adj. for ppm)] 4.5 4.2 4.2 7.64 13.41 2.005.603 1.013 7.5 7.9 34.8 1.056	10 976 13.10 1,947,155 1,045 29.1 31.0 135.8 1.065 4.5 4.2 9.76 13.10 1,947,155 7.0 7.4 33.3 1.066
nia, ppnavd-calculated nia, ppnavd @ 15% O <sub>T</sub> calculated - provided (a) niature (%) (ygan (%) hame Flow (acfm) mperature (P) nission rate (h/hr)-calculated from given ppmv (h/hr)- provided (IPY) (Ratio lh/hr pcovided/calculated]  Cs (h/hr)= VOC(ppnn) x [1 - Moisture(%) 100] x 2 16 (mole. wgi as methane) x 60 min/hr / [1545 nia, ppmvd (b 15% O <sub>thill</sub> calculated - provided (a) (e) ygan (%) hame Flow (acfm) mperature (P) tission rate (h/hr)-calculated (h/hr)= provided (IPY) (Ratio lh/hr perovided/calculated) (d (h/hr)= NA tissions Rate Basis (c)	10.9 10 10 10 7.12 13.42 2.056,855 998 33.0 35.0 153.3 1.059 2116.8 by/t2 x Voi x (CT temp.(*P) 4.6 4.2 7.12 13.42 2.058,855 998 7.9 8.4 36.7 1.056	10.8 10 10 10 7.64 13.41 2.005.603 1.013 31.3 33.0 144.5 1.053  hame flow (acfm) x + 460°T) x 1.000,000 (adj. for ppm)] 4.5 4.2 7.64 13.41 2.005,603 1.013 7.5 7.9 34.8 1.056	10 97 13 16 1,947,155 1,045 29,1 31,0 135,8 1,065 4,5 4,2 4,2 9,76 13,10 1,947,155 7,0 7,4 33,3 1,056
nia, ppnnvd-calculated nia, ppnnvd-calculated nia, ppnnvd-calculated - provided (a) cisiture (%) (yggm (%) hume Flow (acfm) mapsesture (P) nission rete (B/hu)-calculated from given ppmv (B/hu)-provided (IPY) [Retio B/hu provided/calculated]  Ca (B/hu)= VOC(ppm) x [I - Moisture(%) 100] x 2 16 (mole. wgt as methane) x 60 min/hu / [1545 sis, ppmvd (so CH <sub>a</sub> )-calculated - provided (a) (e) cisiture (%) (yggm (%) hume Flow (acfm) mapsesture (P) sission rate (B/hu)-calculated (B/hu)-provided (IPY) [Retio byhu provided/calculated] d (B/hu)= NA minion Rate Bain (c) minion rate (B/hu) (IPY)	10.9 10 10 10 7.12 13.42 2.058,955 998 33.0 35.0 35.0 153.3 1.059 2116.8 Bo/R2 x Voi x (CT temp.(T)) 4.6 4.2 4.2 7.12 13.42 2.058,955 998 7.9 8.4 36.7 1.056	10.8 10 10 10 7.64 13.41 2.005.603 1.013 31.3 33.0 144.5 1.053  hume flow (acfm) x + 460°T) x 1.000,000 (adj. for ppm)] 4.5 4.2 4.2 7.64 13.41 2.005.603 1.013 7.5 7.9 34.8 1.056	10 97 13 16 1,947,155 1,045 29,1 31,0 135,8 1,065 4,5 4,2 4,2 9,76 13,10 1,947,155 7,0 7,4 33,3 1,056
nis, ppmvd-calculated nis, ppmvd @ 15% Or calculated nis, ppmvd @ 15% Or calculated - provided (a) nisture (%) (Reful) provided (Reful) (Reful) provided (Reful) provided (Reful) provided (Reful) provided (Reful) provided (Reful) provided (Reful) provided (Reful) provided (Reful) provided (Reful) nisture (%) nisture (	10.9 10 10 10 10 7.12 13.42 2.058,955 998 33.0 35.0 153.3 1.059 2116.8 lb/rt2 x Voi x (CT temp.(**p*) 4.6 4.2 7.12 13.42 2.058,955 998 7.9 2.4 36.7 1.056 NA 0 0	10.8 10 10 10 7.64 13.41 2.005.603 1.013 31.3 33.0 144.5 1.063  hame flow (ecfm) x + 460°T) x 1.000.000 (edj. for ppm)] 4.5 4.2 4.2 7.64 13.41 2.005.603 1.003 7.5 7.9 34.8 1.056 NA 0 0	10 10 9.76 13.10 1.947.155 29.11 31.065 4.5 4.2 4.2 9.76 13.10 1.947.155 1.045 7.0 7.4 32.3 1.066
min, ppmrvd-calculated min, ppmrvd-calculated min, ppmrvd @ 15% O <sub>T</sub> calculated - provided (a) cisture (%) sygen (%) shame Flow (acfm) supparatuse (P) sission rate (B/hu)-calculated from given ppmv (B/hu)- provided (TPY) [Ratio B/hr provided/calculated] Cs (B/hu)= VOC(ppm) x [1 - Moisture(%) 100] x 1 16 (mole. wgt as methane) x 60 min/hr / [1545 sis, ppmrvd (so CH <sub>2</sub> )- calculated min ppmrvd (B 15% O <sub>x,tat</sub> r calculated min ppmrvd (B 15% O <sub>x,tat</sub> r calculated cisture (%) cygen (%) cygen (%) spanse Flow (acfm) supparatuse (P) station rate (B/hu) (B/hr)- provided (TPY) (Betio By/hr provided/calculated) d (B/hr)- provided (TPY) (Betio By/hr provided/calculated) d (B/hr)- NA minimin Rate Basis (c) sistents Rate Basis (c) sistents Rate Basis (c) sistents Rate Basis (c) sistents Rate Basis (c) sistents Rate Basis (c) sistents Rate Basis (c)	10.9 10 10 10 10 7.12 13.42 2.058,955 998 33.0 35.0 35.0 153.3 1.069 2116.8 lbytt2 x Voi x (CT temp.(T) 4.6 4.2 7.12 13.42 2.058,955 998 7.9 3.47 3.67 1.056	10.8 10 10 10 7.64 13.41 2.005.608 1.013 31.3 33.0 144.5 1.063  hame flow (ecfm) x + 460°T) x 1.000.000 (ed); for ppm)] 4.5 4.2 7.64 13.41 2.005.603 1.013 7.5 7.9 34.8 1.056	100 976 13.10 1,947,155 1,045 29.1 31.0 133.8 1.065 4.5 4.2 9.76 133.10 1.947,155 1,045 7.0 7.4 33.3 1.066
nia, ppnavd-calculated nia, ppnavd-g) 15% O <sub>T</sub> calculated - provided (a) niature (%) (ygan (%) hume Plow (acfm) maperature e(P) nission rete (B/hr)- calculated from given ppmv (B/hr)- provided (IPY) [Ratio B/hr pcovided/calculated]  Cs (B/hr)= VOC(ppen) x [I - Moisture(%) 100] x 2 16 (mole. wgl as methane) x 60 min/hr / [1545 sis, ppnavd (so CH <sub>2</sub> )- calculated nia ppnavd (g) 15% O <sub>cont</sub> r calculated - provided (a) (e) cisture (%) (ygan (%) hume Flow (acfm) maperature (P) nission rate (B/hr)- calculated (B/hr)- provided (IPY) (Ratio B/hr provided/calculated) d (B/hr)= NA minima Rate Basis (c) minima Rate Basis (c) minima Rate Basis (c) minima Rate Basis (c) minima Rate Basis (c) minima Rate Basis (c) minima Rate Basis (c) minima Rate Basis (c) minima Rate Basis (c) minima Rate Basis (c) minima Rate (B/hr) (IPY)	10.9 10 10 10 10 7.12 13.42 2.058,955 998 33.0 35.0 153.3 1.059 2116.8 byft2 x Voi x (CT temp.(*P) 4.6 4.2 7.12 13.42 2.058,956 998 7.9 2.4 3.67 1.056 NA 0 0 0 NA 0	10.8 10 10 10 7.64 13.41 2.005.603 1.013 31.3 33.0 144.5 1.053 hame flow (acfm) x + 460°T) x 1.000,000 (adj. for ppm)] 4.5 4.2 7.64 13.41 2.005.603 1.013 7.5 7.9 34.8 1.056 NA 0 0	10 10 9.76 13.10 1.947.155 29.11 31.065 4.5 4.2 4.2 9.76 13.10 1.947.155 1.045 7.0 7.4 32.3 1.066
nais, ppmvd-calculated nais, ppmvd @ 15% Or calculated cisisture (%) cisisture (%) cisisture (%) cisisture (%) cisisture (%) cisisture (%) cisisture (%) cisisture (%) naission rate (lb/lur)-calculated from given ppmv (lb/lur)- provided (IPY) (Ratio lb/lur provided/calculated) Ca (lb/lur)- VOC(ppm) x [I - Moisture(%) 100] x ? 16 (moles wgi as methane) x 60 min/lur / [1545 nais, ppmvd (et CH <sub>2</sub> )-calculated nais, ppmvd (et CH <sub>2</sub> )-calculated nais, ppmvd (et CH <sub>2</sub> )-calculated nais, ppmvd (et CH <sub>2</sub> )-calculated nais, ppmvd (et CH <sub>2</sub> )-calculated (sinture (%) reprovided (a) (e) cisisture (%) reprovided (a) (e) cisisture (%) plastic lb/lur)-calculated (lb/lur)-provided (IPY) (Batio lb/lur provided/calculated) ad (lb/lur)= NA minion Rate Basin (c) minion Rate Basin (c) minion Rate Basin (c) minion Rate Basin (c) minion Rate Basin (c) minion Rate Basin (c) minion Rate Clb/lur) (IPY) furic Acid Mint = SO, emission rate (lb/lur) x convex x MW H <sub>2</sub> SO <sub>4</sub> /MW SO <sub>4</sub> (89/64)	10.9 10 10 10 10 7.12 13.42 2.058,955 998 33.0 35.0 35.0 153.3 1.059 2116.8 Ev/t2 x Val x (CT temp.(T) 4.6 4.2 7.12 13.42 2.058,955 998 7.9 8.4 36.7 1.056 NA 0 0 0 NA 0 0 0	10.8 10 10 10 7.64 13.41 2.005.603 1.013 31.3 33.0 144.5 1.053 hame flow (acfm) x + 460°T) x 1.000,000 (adj. for ppm)] 4.5 4.2 7.64 13.41 2.005.603 1.013 7.5 7.9 34.8 1.056 NA 0 0	100 976 13.10 1,947,155 1,045 29.1 31.0 133.8 1.065 4.5 4.2 9.76 133.10 1.947,155 1,045 7.0 7.4 33.3 1.066
ania, ppraved calculated ania, ppraved @ 15% O <sub>T</sub> calculated - provided (a) (cisture (%) xygan (%) chama Ploov (acfm) supperature (*P) mission rate (Br/hr)- calculated from given pprave (Br/hr)- provided (IPY) (Ratio Br/hr provided/calculated]  Co (Br/hr)= VOC(ppra) x [I - Moisture(%) 100] x 2 16 (mola. wgt as methane) x 60 min/hr / [1545 ania, ppraved @ 15% O <sub>x,thir</sub> calculated ania, ppraved @ 15% O <sub>x,thir</sub> calculated - provided (a) (a) (cisture (%) xygan (%) chance Ploov (acfm) supperature (*P) mission rate (Br/hr)- calculated (Br/hr)- provided (IPY) (Ratio Br/hr provided/calculated) (Br/hr)= NA minnium Rate Basis (c) minnium rate (Br/hr) croury (Br/hr) = NA minnium Rate Basis (c) minnium Rate Ratio (c) minnium Rate Ratio (c) minnium Rate Ratio (c) minnium Rate Ratio (c) minnium Rate Ratio (c) minnium Rate Ratio (c) minnium Rate Ratio (c) minnium Rate Ratio (c) minnium Rate Ratio (c) minnium Rate Ratio (c) minnium Rate Ratio (c) minnium Rate Ratio (c) minnium Rate Ratio (c) minnium Rate Ratio (c) minnium Ratio Ratio	10.9 10 10 10 10 7.12 13.42 2.058,955 998 33.0 35.0 153.3 1.059 2116.8 lbyft2 x Voi x (CT temp.(T) 4.6 4.2 7.12 13.42 2.058,956 998 7.9 2.44 36.7 1.056 NA 0 0 0 NA 0 0 0 cursion rate of SO, 4.6	10.8 10 10 10 7.64 13.41 2.005.608 1.013 31.3 33.0 144.5 1.053 hame flow (acfm) x + 460°T) x 1.000,000 (adj. for ppm)] 4.5 4.2 7.64 13.41 2.005.603 1.013 7.5 7.9 34.8 1.056 NA 0 0 0 NA 0 0 10 H <sub>2</sub> SO <sub>4</sub> (%)	100 976 13.10 1,947.155 1,045 29.1 33.0 135.8 1.065 4.5 4.2 976 13.100 1,947.155 1,045 7.0 7.4 33.3 1.066
nain, ppmvd-calculated  nain, ppmvd @ 15% Or calculated  - provided (a)  ciniture (%)  rygen (%)  cinima Plow (acfm)  supperstave (**P)  ninsion rate (h/hr)- provided from given ppmv  (h/hr)- provided  (IPY)  (Batio Br/n provided/calculated]  PCs (h/hr)- VOC(ppm) x [I - Moisture(%) 100] x 1  16 (mola. wg as methane) x 60 min/hr / [1545  nain, ppmvd (# CFL)- calculated  - provided (a) (e)  initure (%)  rygen (%)  principle (h/hr)- calculated  (h/hr)- provided  (IPY)  (IPS)  plastio h/hr provided  (IPY)  (Ratio Br/n provided/calculated]  ad (h/hr)= NA  minion Rate Basis (c)  minion rate (h/hr)  (IPY)  roury (h/hr) = NA  minion Rate Basis (c)	10.9 10 10 10 10 10 7.12 13.42 2.056,955 998 33.0 153.3 1.069 2016.6 lb/ft2 x Voi x (CT temp.(P) 4.6 4.2 4.2 7.12 13.42 2.058,955 998 7.9 8.4 36.7 1.056 NA 0 0 0 cursion rate of SO,	10.8 10 10 10 7.64 13.41 2.005.603 1.013 31.3 33.0 144.5 1.063 144.5 1.063 144.5 1.063 1.013 7.5 7.9 34.8 1.056  NA 0 0 10 H <sub>2</sub> SO <sub>4</sub> (%)	100 976 13.10 1.947.155 29.11 31.065 4.5 4.2 4.2 9.76 13.10 1.947.155 1.065 NAA 0 0
min, ppmvd-calculated min, ppmvd-calculated min, ppmvd-calculated - provided (a) cisture (%) rygen (%) shame Flow (acfm) mapscature (P) sission rate (B/hu)-calculated from given ppmv (B/hu)-provided (TFY) [Ratio B/hu provided/calculated]  Cs (B/hu)= VOC(ppm) x [I - Moisture(%) 100] x 2 16 (mole. wgt as methane) x 60 min/hu / [1545 sis, ppmvd (so CH <sub>a</sub> )-calculated - provided (a) (e) cisture (%) rygen (%) shame Flow (acfm) mapscature (P) sission rate (B/hu)-calculated (B/hu)- provided (TFY) (Ratio By/hu provided/calculated) d (B/hu)= NA minion Rate Bain (c) minion Rate Bain (c) minion Rate Bain (c) minion Rate Bain (c) minion Rate Bain (c) minion Rate Bain (c) minion Rate Bain (c) minion Rate Bain (c) minion Rate Bain (c) minion Rate Bain (c) minion Rate Bain (c) minion Rate Bain (c) minion Rate Bain (c) minion Rate Bain (c) minion Rate Bain (c) minion Rate Bain (c) minion Rate Bain (c) minion Rate (B/hu) (TFY) (TEY) (TEY) (Marie Acid Mint = SO, eminion rate (B/hu) x convex x MW H <sub>2</sub> SO <sub>4</sub> /MW SO <sub>4</sub> (98/6) N2 eminion rate (B/hu)	10.9 10 10 10 10 7.12 13.42 2.058,955 998 33.0 35.0 153.3 1.059 2116.8 lbyft2 x Voi x (CT temp.(T) 4.6 4.2 7.12 13.42 2.058,956 998 7.9 2.44 36.7 1.056 NA 0 0 0 NA 0 0 0 cursion rate of SO, 4.6	10.8 10 10 10 7.64 13.41 2.005.608 1.013 31.3 33.0 144.5 1.053 hame flow (acfm) x + 460°T) x 1.000,000 (adj. for ppm)] 4.5 4.2 7.64 13.41 2.005.603 1.013 7.5 7.9 34.8 1.056 NA 0 0 0 NA 0 0 10 H <sub>2</sub> SO <sub>4</sub> (%)	10 11 19,77,15 1,047,155 1,046 29,1 31,1 135,8 1,066 4,5 4,2 4,2 4,2 9,77 13,1,1 1,947,155 1,046 7,7 4,3 3,3 1,066

Source: (a) Sistemen-Westinghouse 1999
(b) Golder Associates Inc. 1999.
(c) EPA 2000, AP-42.
(d) Pen NOx emissions, data originally provided at 25 ppmvd at 15% oxygen.
(e) For VOC emissions, data originally provided at 2.8 ppmvd at 15% oxygen.

Note: ppasvd= parta per million, volume dry;  $O_3$ = oxygen.

Table A-6. Maximum Emissions for Hazardous Air Pollutants for the Osprey Energy Center Project Siemens-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 75 % Load

urs of Operation  It Input Rate (MMBtu/hr), HHV- CT  Duct burner  Total  monia (b/hr) = Ammonua (ppm) × {[20.9 x (1 - M 17 (mole. wgt ammonia) x 60 min/hr / [ iiii, ppmvd @15% O <sub>2</sub> (a) (d)	32. F Case 10 8,760 1,534 0 1,534	59 °F Case 7 8,760 1,454	95 TF Case : 8,76
t Input Rate (MMBtu/hr), HHV- CT Duct burner Total monia (Bu/hr) = Ammonua (ppm) × { [20.9 × (1 - M 17 (mole. wgt ammonia) x 60 min/hr / [ sia, ppmvd @15% O <sub>c</sub> (a) (d)	8,760 1,534 0	8,760	<u> </u>
t Input Rate (MMBtu/hr), HHV- CT Duct burner Total monia (Bu/hr) = Ammonua (ppm) × { [20.9 × (1 - M 17 (mole. wgt ammonia) x 60 min/hr / [ sia, ppmvd @15% O <sub>c</sub> (a) (d)	1,534		8.76
Duct burner Total  monia (B/tu) = Ammonia (ppm) × (20.9 × (1 - M. 17 (mole. wgt ammonia) × 60 min/tu/[ sis, ppmvd @15% O <sub>1</sub> (a) (d)	0	1 454	
Total monia (lb/tu) = Ammonua (ppm) x { 20.9 x (1 - M 17 (mole. wgt ammonia) x 60 min/tu/ [ sis, ppmvd @15% O <sub>z</sub> (a) (d)		1/2-7	1,35
monia (lb/tır) = Ammonua (ppm) x {[20.9 x (1 - M. 17 (mole. wgt ammonia) x 60 min/tır / [ nia, ppmvd @15% O <sub>2</sub> (a) (d)	1.534	0	(
17 (mole, wgt ammonia) x 60 min/hr / [ sis, ppmvd @15% O <sub>2</sub> (a) (d)		1,454	1,35
17 (mole, wgt ammonia) x 60 min/hr / [ sis, ppmvd @15% O <sub>2</sub> (a) (d)	misture(%)/100H - Oxygen(9	(acfu	n) x
us, ppmvd @15% O <sub>2</sub> (a) (d)			
isture (%)	9	9	•
	7.12	7.61	9.70
ygen (%)	13.42	13.41	13.10
lume Flow (acfm)	2,056,955	2,005,603 1,013	1,947,150 1,045
inperature (°F) sission rate (fb/hr)	998 18.1	1,013	1,043
(TPY)	79	75	71
<b>(,</b>		,,,	
Butadiene (lb/hr) = Basis (lb/10 <sup>12</sup> Btu) x Heat Inp	out (MMBtu/hr) / 1,000,000	MMBtu/10 <sup>13</sup> Btu	
sis, lb/10 <sup>23</sup> Btu	4.306-01	4 30E-01	4.306-0
at Input Rate (MMBtu/hr)	1,534	1,454	1,351
rission Rate (lb/hr)	6.59E-04	6.25E-04	5.81E-0
(ነምነ)	2.89E-03	2.746-03	2.54E-00
alhyde (livhr) - Basis (liv/10 <sup>12</sup> Btu) x Heat Input	(MMRtu/br) / Long non a	48m/10 <sup>12</sup> Bhu	
<i>mnyde (mynn) = Basas (mylu</i> – Bru) x Fleat Imput is. Myl0 <sup>11</sup> Bru	(MMBRI/Rir) / 1,000,000 MIN 4.00E+01	4.00E+01	4.00E+01
at Input Rate (MMBtu/hr)	4.00E +01 1,534	1.00E+01 1.454	4.00£ + 0 1,35i
union Rate (B/hr)	6.136-02	5.82E-02	5.40E-0
(IPY)	2.69E-01	2.55E-01	2.37E-01
lein (lb/hr) = Basis (lb/10 <sup>12</sup> Btu) × Heat Input (M			
is, 16/10 <sup>13</sup> Btu	6.40E+00	6.40E+00	6.40E+0
et Input Rete (MMBtu/hr)	1,534	1,454	1,351
ciseion Rate (B/hr)	9.82E-03 4.30E-02	9.31E-03 4.06E-02	8.64E-03 3.79E-03
(ПРУ)	4.30E-UZ	4.08E-02	3.796-0
zene (lb/hr) = Basis (lb/10 <sup>12</sup> Bh) x Heat Input (M	MBhi/hr) / 1.000.000 MMB	nı/10 <sup>12</sup> Bhı	
is. Ib/10 <sup>12</sup> Btu	1.20E+01	1,20E+01	1.20E+01
nt Input Rate (MMBtu/hr)	1.534	1.454	1,35
tission Rate (B/hr)	1.84E-02	1.75E-02	1.62E-02
(TPY)	8.06E-02	7.64E-02	7.10E-00
Benzene (Britr) = Basis (Br/10 <sup>12</sup> Btu) x Heat Imp			
is, lb/10 <sup>23</sup> Bhs	3.20E+01	3.20E+01	3.20E+01
st Imput Rate (MMBtu/hr) ission Rate (Ib/hr)	1,534 4.916-02	1,454 4 65E-02	1,35i 4 32E-0
(IPY)	2.15E-01	2.04E-01	1.89E-01
<b></b> ,			2.072
uddehyde (lb/lu) = Basis (lb/10 <sup>13</sup> Btu) × Heat Inj	out (MMBtu/hr) / 1,000,000	MMBtu/10 <sup>12</sup> Btu	
ia, lb/10 <sup>12</sup> Btu	1.50E + 02	1.50E+02	1.50E+03
at Imput Rate (MMBtu/hr)	1,534	1,454	1,351
ission Rate (lb/tu)	2.30E-01	2.1 <b>5E-0</b> 1	2.03E-01
(TPY)	1.01E+00	9.56E-01	8.87E-01
h h and h D i annoll no h re of the		an. mall n	
thalene (lb/hr) = Basis (lb/10 <sup>12</sup> Bhi) x Heat Input is, lb/10 <sup>13</sup> Bhi	(MM8tu/hr) / 1,000,000 M2 1.30E+00		1 205 - 0
is, is/10" Btu et Input Rate (MMBtu/hr)	1.30E+00 1.534	1.30E+00 1.454	1.30E+0 1,35
n imput Kine (MAIDMATH) ission Rate (BAIT)	1,596-03	1,459 1,89E-03	1,76E-00
(IPY)	8.73E-03	8.28E-03	7.69E-03
ydic Aramatic Hydrocarbons (PAH) (lb/hr) = E	lasis (lib/10 <sup>12</sup> Btu) × Heat Ing	out (MMBtu/hr) / 1,000,000 MMI	8tu/10 <sup>11</sup> 8tu
, lb/10 <sup>11</sup> Bou	2.20E+00	2.20E+00	2.20E+0
t Input Rate (MMBtu/hr)	1,534	1,454	1,351
ission Rate (B/hr)	3.37E-03	3.20E-03	2.97E-0
(TPY)	1.48E-02	1.40E-02	1.30E-0
ylene Oxide (Bylu) = Basis (Byl0 <sup>12</sup> Btu) × Heat l	nest (MARE) And / I com or	YO MANGRANGI O <sup>12</sup> Pre-	
/hene Crocke (16/107) ≠ Banus (16/1077 1910) x Fleat ( s. 16/10 <sup>12</sup> Bru	nput (MMBhi/hi) / 1,000,0 2,90E+01	2.90E+01	2.90E+0
s, m/10 - peu t Input Rate (MMBtu/hr)	2.90E+01 1.534	2.90E+01 1.454	2.906.+01 1,350
rinput Kate (MMDRL/Ar) seion Rate (B/hr)	4.45E-02	1,454 4,22E-02	3.92E-00
(TPY)	1.95E-01	1.85E-01	1.72E-01
<i>,</i> ,		· <del>-</del>	
zwe (lb/hr) = Basis (lb/10 <sup>12</sup> Btu) x Hest Input (M		u/10 <sup>12</sup> Btu	
is, lb/10 <sup>13</sup> Beu	1.30E+02	1 30E+02	1.30E+00
st Input Rate (MMBtu/tur)	1,534	1,454	1,353
ission Rate (Ib/hr)	1.99E-01	1.89E-01	1.76E-01
(TPY)	8.73E-01	8.28E-01	7.69E-01
- Aleksa a Basis (BA) (Basis 17 - 47 - 19 - 19 A	EDELAND (1 DOMANN) EL PA-	AND BL.	
ene (Br/hr) = Basis (Br/10 <sup>12</sup> Btu) x Heat Input (MA sis, Br/10 <sup>12</sup> Btu		/10 <sup>™</sup> Btu 6.40E+01	2 AME
is, is/10" biu at Input Rate (MMBhi/hr)	6.40E+01 1,534	6.40E + 01 1,454	6.40E+01
in input kine (MMpti/tr) inion Rate (Ib/tu)	9.87E-02	9.31E-02	1,351 8.64E-02
ission Este (Byte)	عبدا مرجوع در	7.54 E-44	

Source: EPA, 2000, AP-42.

Table A-E. Masder use Essissions for Criteria and Other Regulated Poliutants for the Osprey Energy Center Project Stemans-Westinghouse SOIF, Dry Low NOx Combustor, Natural Gas, 40 % Load.

		mbiant/Compressor Inlet Temperatur	
	32 °F Case 11	59 T Case 8	95 T Care :
ours of Operation	1,760	B,760	8,76
·		<del>-</del>	***
<u>ticulate from CT and SCR</u> ticulate (Byhr)— Emission rate (Byhr) from manufac	turer (front- and back		
insin. Bylw (a)	12.2	11.7	11.0
rticulate from SCR - Sulfur trickide (formed from o			
urticulate from conversion of SO <sub>2</sub> = SO <sub>2</sub> aminatons (I Conversio		O <sub>2</sub> to SO <sub>3</sub> x lb SO <sub>2</sub> /lb SO <sub>2</sub> x NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> x (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> lb SO <sub>3</sub>	
SO <sub>3</sub> aminaton rate (flyfer)- calculated	7.4	7.2	6.5
Conversion (%) from SO <sub>3</sub> to SO <sub>3</sub>	25	25	2:
MW SO <sub>2</sub> /SO <sub>3</sub> ( <b>80</b> /64)	1.3 100	1.3 100	1.3 100
MW (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> /SO <sub>3</sub> (132/80)	1.7	1.7	1.3
Particulate (Byter)- calculated	3.04	169	3.33
Particulate (Byter) from CT + SCK	16.0	15.4	14.3
ന്മപ	70.2	67.6	62.0
ithur Dicadde (Byfer) - Natural gas (cl/fer) x suither com	terré(gs/100 cf) x 1 lb//	000 gr x (lb SC) <sub>2</sub> /lb 5)/100	
uni une (ci/hr)	1,303,411	1.252.999	1.137,756
Sulfur combant (grains/ 100 ct) - assumed (b)	2	2	1
b SO <sub>3</sub> /fb S (64/32) Iminsion rate (fb/fer)- calculated	2 7.4	2 7.2	6.5
(Byhr)- provided (0.2 gr/100 cf) (not used)	0.81	0.78	0.71
(IP)	32.6	31.4	24.5
rogan Ozidan (llyfar) — NOs(ppm) x (100.9 x (1 - Mo	isture(%)/100h) - Chro	pan(%)) z 2116.6 z Volume flow (actua	)×
46 (mole. wgt NOx) x 60 min/hr / [1515:			•
issis. ppmvd @15% O <sub>2</sub> (a) (d)	3.5	3.5	3.5
violature (%) Daygen (%)	7.36 13.15	7.94 13.07	9.84 12.91
raygen (n) folume Flow (actss)	1,817,013	1,795,882	1,703,893
emperature (T)	1.076	1,167	1,094
minuton rate (Byhr)- calculated	16.5	15.9	14.4
(Byte)- provided (TP))	17.4 76.3	16.8 23.4	15.2 66.6
[Ratio Byler provided/calculated]	1.056	1.056	1.056
eban Manaside (B/hr) = CO(ppm) x ( [20.9 x (1 - Mo 28 (mole. wgt CO) x 60 min/hr / [1545 x			(actm) ×
26 (mole. wgt CO) x 60 min/hr / [1545 x: lasis, ppmvd- calculated lasis, ppmvd @ 15% O2- calculated	(CT temp.("F) + 460"i 56.8 50	F) x 1,000,000 (adj. for ppm)  56.8 50	55.6 50
28 (mole. wgt CO) x 60 m in/hr / [1545 x   lesis, ppmvd-calculated lesis, ppmvd @ 15% O2-calculated - provided (a)	(CT temp.("F) + 460"i 56.8 50 50	F) x 1,000,000 (adj. for ppm)  56.8 50 50	55.6 50 50
29 (mole, wgl CO) x 60 min/hr / [1545 x: mis, ppmvd-calculated asis, ppmvd ⊕ 15% O3- calculated - provided (a) loishire (%)	(CT lemp.("F) + 460"i 56.8 50 50 7.36	F) x 1,000,000 (edj. for ppm)  56.8 50 50 7.94	55.6 50 56 9. <b>8</b> 6
28 (mole, wgt CO) x 60 m in/hr / [1545 x nais, ppus vd - calculated sais, ppus vd @ 15% C/2 - calculated - provided (a) loshure (%) kygam (%)	(CT temp.("F) + 460"1 56.8 50 50 7.36 13.15	F) x 1.000,000 (edj. for ppm)  56.8 50 50 7.94 13.07	55.6 50 56 9.86 12.99
28 (mole. wgt CO) x 60 m lnyhr / [1545 x i enis, ppmvd-calculated esis, ppmvd ⊕ 15% O2-calculated provided (a) foishare (%) kygen (%) olsen Plow (actm) en preteur (₹)	(CT lemp.("F) + 460"i 56.8 50 50 7.36	F) x 1,000,000 (edj. for ppm)  56.8 50 50 7.94	55.6 50 56 9. <b>8</b> 6
28 (mole. wgt CO) x 60 minyter / [1545 x lasis, ppsevd-calculated eats, ppsevd @ 15% O2-calculated calculated (a) doublase (%) previded (a) doublase (%) hyggan (%) claim e Flow (actin) eat perseure (**P) mission rate (b)thy-calculated from given ppsevd mission rate (b)thy-calculated from given ppsevd	(CT lemp.(*7) + 460*i 56.8 50 50 7.36 13.15 1.617.013 1.076 143.4	F) x 1.000,000 (adj. for ppm)  56.8 50 50 7.94 13.07 1,795,882 L107	55.0 50 9.8 12.99 1,703,893
28 (mole, wgt CO) x 60 minyhr / [1545 x   lanis, pparvd - calculated lesis, pparvd @ 15% O'3- calculated - provided (a) doishare (%) Nygan (%) (whate ? Evo (actin) (an parehaw (?) (minion rate (%)*ray- calculated from given pparvd (%)*rhy- provided (%)*rhy- provided	(CT lemp.(*F) + 460*i 56.8 50 50 7.36 13.15 1.817.013 1.00% 143.4 153.0	F) x 1.000,000 (adj. for ppm)]  56.8  50  50  7.94  1.307  1.795,882  1.407  137.9  146.0	55.6 56 9.86 12.99 1,703,893 1,094 125.2 133.8
28 (mole: wgt CO) x 60 minyhr / [1545 x lasis, ppmvd-calculated sals, ppmvd @ 15% O2-calculated sals, provided (a) dositare (%) byggan (%) byggan (%) clause 2 low (actin) imperature (?) misaton rate (@http:-calculated from given ppmvd (fb/thp-) provided (TP)	(CT temp.(F) + 460°1 56.8 50 50 7.36 13.15 1.617.013 1.006 143.4 152.0 665.8	F) x 1.000,000 (adj. for ppm)  56.8 50 50 7.94 13.07 1,795,882 L107	55.0 56 9.86 12.99 1,703,893 1,094 125.2
28 (mole. wgt CO) x 60 minyhr / [1545 x anis, ppm vvi- calculated anis, ppm vvi- calculated anis, ppm vvi- calculated anis, ppm vvi- calculated (a) loshare (%) provided (a) loshare (%) poygam (%) class # Flow (acts) anisate rate (8) hyp- calculated from given ppm vvi (8) minimum rate (8) hyp- povided (17Pv) provided (17Pv) [Estato Byte provided/calculated] CCs (8) hyp- VOC(ppm) x [1 - Moisture(%) 100 x 21	(CT temp.(F) + 46071  56.8  50  50  7.36  13.15  1.617.013  1.006  143.4  153.0  665.8  1.060	F) x 1.000,000 (adj. for ppm)]  56.8  50  50  7.94  13.07  1,795,082  1,107  137.9  146.0  639.5  1,008	55.6 56 9.88 1.299 1.703.893 1.099 125.2 133.6 582.5
28 (mole. wgt CO) x 60 minyhr / [1545 x insis, ppmvd-calculated eats, ppmvd @ 15% CO-calculated calculated (a) folialize (%) provided (a) folialize (%) pyggan (%) colume Flow (actim) eat persistent (?) minsion rate (bythy-calculated from given ppmvd (bythy-ponvided (TPY) [Ratio Bythr provided/calculated] CPC (Bythr) = VOC(ppm) x [1 - Moletura(%) 100] x 21 16 (mole. wgt as methons) x 60 minyhr / [1545 x 164 mole	(CT temp.(**) + 460** 56.8 50 7.36 13.15 1.87.013 1.076 143.4 152.0 66.5.8 1.060 116.8 39/t2 x Volume i	F) x 1.000,000 (adj. for ppm)]  56.8  50  50  7.94  13.07  1.795,882  L107  137.9  146.0  639.5  1.008  Sow (actm) x  F) x 1.000,000 (adj. for ppm)]	55.6 56 9.88 1.299 1.703.893 1.099 125.2 133.6 582.5
28 (mole. wgl CO) x 60 m lnyhr / [1545 x lanis, ppm vd - calculated lanis, ppm vd - 25% O3- calculated lanis, ppm vd - 25% O3- calculated (a) Ozygem (%) Oygem (%) Oygem (%) Oygem (%) (minister rate (b)hr)- calculated from given ppm vd (b)hr)- provided (TPY) [Eatlo Byhr provided/calculated] OCC (Byhr)- VOC(ppm) x [1 - Moisture(%) 100) x 21 16 (mole. wgl as methans) x 60 m lnyhr / [1545 x lanis, ppm vd (at CH <sub>2</sub> )- calculated	(CT temp.(**) + 460*1  56.8  50  7.36  13.15  1.497.013  1.006  143.4  152.0  66.5 By(**12.x V olume (**)  16.6 By(**12.x V olume (**)  4.8	F) x 1.000,000 (adj. for ppm)]  56.8  50  50  7.94  13.07  1,795,082  1,107  137.9  146.0  639.5  1,008	55.6 56 9.88 1.299 1.703.893 1.099 125.2 133.6 582.5
28 (mole. wgt CO) x 60 m inyhr / [1545 x issie, ppm vvd - calculated sels., ppm vvd - 25% O3- calculated sels., ppm vvd - 25% O3- calculated (a) Oxygem (%) Oxygem (%) Oxygem (%) oxygem (%) mission rate (b/hr)- psevided from given ppm vvd (b/hr)- psevided (TPY) [Estato Byhr provided/calculated]  CCG (Byhr)- VCC(ppm) x [1 - Moisture(%) 100] x 21 16 (mole. wgt as methans) x 60 m inyhr / [1545 x issie, ppm vvd (as CH <sub>2</sub> )- calculated	(CT temp.(**) + 460** 56.8 50 7.36 13.15 1.87.013 1.076 143.4 152.0 66.5.8 1.060 116.8 39/t2 x Volume i	F) x 1.000,000 (edj. for ppm)]  56.8  50  50  7.94  13.07  1.795,002  1.107  137.9  146.0  639.5  1.008  10ow (actm) x  F) x 1.000,000 (edj. for ppm)]	55.6 56 9.86 12.99 1.703,893 1.099 125.5 133.6 562.5 1.062
28 (mole. wgt CO) x 60 m lnyhr / [1545 x anis, ppm vd- calculated onls, ppm vd @ 15% O2- calculated onls, ppm vd @ 15% O2- calculated provided (a) loisture (%) hyggm (%) onls on percentage (?) m instem rate (Britan- calculated from given ppm vd (Britan- provided (TPY)   Batto Britan provided (TPY)   Batto Britan provided (TPY)   Batto Britan provided (SP)   Batto Britan provided (SP)   Batto Britan provided (Britan ppm vd (Britan ppm	(CT temp.(?) + 4601  56.8  50  7.36  13.15  1.47/0.13  1.096  143.4  152.0  665.8  1.040  16.8 Byft2.x Volume if (CT temp.(?) + 460  4.8  4.2  4.2  7.36	F) x 1.000,000 (adj. for ppm)]  56.8  50  50  7.94  13.07  1.795,682  1.107  137.9  146.0  698.5  1.008  1008  1008  4.8  4.2  4.2  7.94	55.6 56 9.86 12.99 1.703.99 1.25.5 133.6 502.5 1.062
28 (mole. wgt CO) x 60 minyhr / [1545 x anis, ppin vid-calculated anis, ppin vid-gill 5% CO: calculated anis, ppin vid-gill 5% CO: calculated (a) iosishine (%) provided (a) iosishine (%) provided (a) iosishine Flow (actim) ani perceivar (??) mineton rate (bythy-calculated from given ppin vid (bythy-provided (flythy-provided (flythy-provided (flythy-provided (flythy-provided (flythy-povided (flyt	(CT temp.(**) + 460**  56.8  50  7.36  13.15  1.87.7.013  1.0%  143.4  152.0  665.8  1.060  16.8 By(**) 2 × Volume 1  (**) CT temp.(***) + 460**  4.8  4.2  7.36  2.315	F) x 1.000,000 (edj. for ppm)]  56.8  50  50  7.94  13.07  1.795,882  L107  137.9  146.0  639.5  1.008  Low (ectm) x  F) x 1.000,000 (edj. for ppm)]  4.8  4.2  4.2  7.94  13.07	55.6 56 9.88 12.99 1.703,893 1.099 125.5 131.6 562.2 4.6 4.2 4.2 9.86
28 (mole. wgl CO) x 60 m inylw / [1545 x issie, ppm vd- calculated sels., ppm vd- calculated sels., ppm vd- calculated (a) - pervided (a) Oxygem (%) Column 2 Now (actm) compressive (?) mission rate (first)- provided (from given ppm vd (first)- provided ((?P!)) [Estato Byler provided (?P!) [Estato Byler provided (Invite) [Estato Byler ppm vd]	(CT temp.(**) + 460*1  56.8  50  7.36  13.15  1.497.013  1.006  143.4  152.0  66.58  1.060  16.8 Byff2 x V olume ( 6 (**) temp.(***) + 460*  4.8  4.2  7.36  13.15  1.315  1.315	F) x 1.000,000 (edj. for ppm)]  56.8  50  50  7.94  13.07  1.795,002  1.107  137.9  146.0  639.5  1.008  10ow (actm) x  F) x 1.000,000 (edj. for ppm)]  4.2  4.2  7.94  13.07  1.795,802	55.6 56 9.86 12.99 1.703.892 1.099 125.5 133.6 562.5 1.062 4.6 4.2 4.2 9.86 12.99
28 (mole. wgl CO) x 60 minylnr / [1545 x insis, ppmwd @ 15% OD: calculated eats, ppmwd @ 15% OD: calculated eats, ppmwd @ 15% OD: calculated (a) indistance (%) provided (a) indistance (%) ppmgm (%) (column 2 flow (actim) insistence (a) (bylnr) provided (flylnr) provided (flylnr) [Batto Bylnr provided/calculated]; DCG (Bylnr) = VOC(ppm) x [1 - Moleture(%) 100] x 21 16 (mole. wgl as methwes) x 60 minylnr / [1545 x esis, ppmwd (as C14)- calculated eats, ppmwd (as C14)- calculated (a) (e) (obtaine (%) obtaine 10to (actim) eats ppmwd (as C14)- calculated (a) (e) (obtaine 10to (actim) eats ppmwd (as C14)- calculated (a) (e) (obtaine 10to (actim) eats ppmwd (actim) eats ppmwd (actim) eats ppmwd (actim) eats ppmwd (actim) eats ppmd (actim)	(CT temp.(**) + 460**  56.8  50  7.36  13.15  1.87.7.013  1.0%  143.4  152.0  665.8  1.060  16.8 By(**) 2 × Volume 1  (**) CT temp.(***) + 460**  4.8  4.2  7.36  2.315	F) x 1.000,000 (edj. for ppm)]  56.8  50  50  7.94  13.07  1.795,882  L107  137.9  146.0  639.5  1.008  Low (ectm) x  F) x 1.000,000 (edj. for ppm)]  4.8  4.2  4.2  7.94  13.07	55.6 56 9.88 12.99 1.703,893 1.099 125.5 131.6 562.2 4.6 4.2 4.2 9.86
28 (mole. wgt CO) x 60 minyhr / [1545 x anis, ppm vd- calculated anis, ppm vd- gl.5% O2- calculated anis, ppm vd- gl.5% O2- calculated (a) hypgm (%) down e Flow (actin) min perceive (??) ministen rate (Bythy- calculated from given ppm vd- (Bythy- provided (Priyr))  [Extilo Bythr provided (Priyr)  [Extilo Bythr provided (In) (In) (Priyr)  [Extilo Bythr provided (In) (In) (Priyr)  [Extilo Bythr provided (In) (In) (Priyr)  [Extilo Bythr provided (In) (In) (Priyr)  [Extilo Bythr provided (In) (In) (Priyr)  [Extilo Bythr provided (In) (In) (Priyr)  [Extilo Bythr priyr)  [Extilo Bythr provided (In) (In) (In) (In) (In) (In) (In) (In)	(CT temp.(**) + 460**  56.8	F) x 1.000,000 (ed.j. for ppm)]  56.8  30  50  7.94  13.07  1.795,862  L107  137.9  146.0  639.5  1.008  1.008  1.000 (ed.m) x  F) x 1.000,000 (ed.j. for ppm)]  4.2  4.2  4.2  7.94  13.07  1.795,882  1.107	55.6 56.9 9.86 1.703,893 1.999 1.352 1.062 4.6 4.2 9.86 1.2,99 1.703,893 1.704,893 1.004
28 (m ole. wgl CO) x 60 m in/hr / [1545 x issis, ppm vv5 - calculated eats, ppm vv6 - 215% O2 - calculated eats, ppm vv6 - 215% O2 - calculated (a) doishare (%) byggm (%) byggm (%) claim e Flow (actin) eat perelawa (??) mission rate (b/hr) - pouvided (first) ppm vv6 (b/hr) - pouvided (?Pr) [Ratio B/hr provided/calculated] (?Pr) [Ratio B/hr provided/calculated] (?Pr) [Statio B/hr provided/calculated] (?Pr) (%) bygm (%) (%) (%) (%) (%) (%) (%) (%) (%) (%)	(CT lemp.(?) + 46071  56.8  50  7.36  13.15  1.87,7.013  1.076  143.4  152.0  66.5.8  1.060  16.8 Bytt2 x Volume 1  4.8  4.2  7.36  1.315  1.417,013  1.0076  6.9  7.3  3.1.8	F) x 1.000,000 (edj. for ppm)]  56.8  50  7.94  13.07  1.795,882  L107  137.9  146.0  639.5  1.008  Low (actm) x  F) x 1.000,000 (edj. for ppm);  4.8  4.2  7.94  13.07  1.795,882  L107  6.6  7.0  30.6	55.6 56.9 9.86 1.703,893 1.999 1.25.2 1.062 4.6 4.2 9.86 1.298 1.703,893 1.703,893 1.704,893 1.705,893 1.705,893
28 (mole. wgl CO) x 60 minylnr / [1545 x issie, ppmvd @ 15% O3- calculated eats, ppmvd @ 15% O3- calculated eats, ppmvd @ 15% O3- calculated (a) doishare (%) provided (a) doishare (%) pmgmm (%) (extra) isspecture (?) mission rate (fichtr)- calculated from given ppmvd (firthr)- provided (?P?) [Ratio Bylnr provided/calculated]  OCG (Bylnr) = VOC(ppm) x [1 - Moisture(%) 100] x 21 16 (mole. wgl as methanely x 60 minylnr / [1545 x issie, ppmvd (ac C14)- calculated - provided (a) (e) doishare (%) pmvd (ac C14)- calculated - provided (a) (e) obtaine Plow (achin) on previous (%) pygmn (%) mission rate (Bylnr)- provided (?P?) [Ratio Bylnr provided/calculated] [Ratio Bylnr provided/calculated]	(CT temp.(**) + 460**  56.8	F) x 1.000,000 (edj. for ppm)]  56.8  30  50  7.94  13.07  1.795,862  1.007  157.9  164.0  699.5  1.008  100w (actm) x  FF) x 1.0000,000 (edj. for ppm)]  4.2  4.2  7.94  13.07  1.795,882  1.107  6.6  7.0	55.6 56 9.8e 12.99 1.703.999 1.25.1 135.2 502.2 1.060 4.6 4.2 4.2 4.2 9.8e 12.99 1.703.999 1.004.999 1.0
28 (mole. wgl CO) x 60 minylw / [1545 x issis, ppm vv6-calculated sals, ppm vv6-calculated sals, ppm vv6-calculated sals, ppm vv6-calculated calculated (solshare (%) Dyggm (%) color 87 low (actin) one perceive (T).  mission rate (8) hybr-povided from given ppm vv6 (8) hybr-povided (TPV)  [Estio Byhr-povided (TPV)  [Estio Byhr-povided/calculated]  CCs (8) hybr-p VCC(ppm) x [1 - Moisture (%) 100] x 21 16 (mole. wgl as mothered) x 60 minylw / [1545 x issis, ppm vv6 (8) 15% O2 calculated sals, ppm vv6 (8) 15% O2 calculated sals, ppm vv6 (8) hybr-povided (a) (n) hybr-povided (Byhr)-provided (TPV)  [Estio Byhr-povided (TPV)  [Estio Byhr-pov	(CT lemp.(?) + 46071  56.8  50  7.36  13.15  1.87,7.013  1.076  143.4  152.0  66.5.8  1.060  16.8 Bytt2 x Volume 1  4.8  4.2  7.36  1.315  1.417,013  1.0076  6.9  7.3  3.1.8	F) x 1.000,000 (edj. for ppm)]  56.8  50  7.94  13.07  1.795,882  L107  137.9  146.0  639.5  1.008  Low (actm) x  F) x 1.000,000 (edj. for ppm);  4.8  4.2  7.94  13.07  1.795,882  L107  6.6  7.0  30.6	55.6 56.9 9.86 1.703,893 1.999 1.25.2 1.062 4.6 4.2 9.86 1.298 1.703,893 1.703,893 1.704,893 1.705,893 1.705,893
28 (mole. wgl CO) x 60 m in/hr / [1545 x inis, ppin vid-calculated asis, ppin vid-calculated asis, ppin vid-calculated asis, ppin vid-calculated asis, ppin vid-calculated (x) lookshire (%) provided (x) colculated (x) colculated (x) provided  (CT temp.(**) + 460*1  56.8  50  7.36  13.15  1.87,7.013  1.076  143.4  152.0  66.5.8  1.060  16.8 Bytt2 x Volume 1  4.8  4.2  7.36  1.315  1.417,013  1.006  6.9  7.3  31.8  1.056	F) x 1.000,000 (edj. for ppm)]  56.8  50  7.94  13.07  1.795,882  L107  137.9  146.0  639.5  1.008  Low (ectm) x  F) x 1.000,000 (edj. for ppm);  4.8  4.2  4.2  7.94  13.07  1.795,882  1.107  6.6  7.0  30.6  1.056	55.6 56.9 9.86 1.703,893 1.999 1.25.2 1.062 4.6 4.2 9.86 1.299 1.703,893 1.004 4.1 9.86 1.005 1.00	
28 (mole. wgt CO) x 60 minyter / [1545 x insis, ppmwd @ 15% OD calculated eats, ppmwd @ 15% OD calculated eats, ppmwd @ 15% OD calculated eats, ppmwd @ 15% OD calculated (a) indistance (%) pwygam (%) of calculated (a) indistance (%) pwygam (%) of calculated from given ppmwd (hythy- provided (TPY)  (The calculated from given ppmwd (TPY)  (The calculated (TPY)  (The calculated (TPY)  (The calculated (TPY)  (The calculated (a) (a) indistance (%) ppmwd @ 15% OD calculated (a) (a) indistance (%) indisance (%) ind	(CT temp.(P) + 46071  56.8  30  7.36  13.15  1.87,013  L076  183.4  152.0  665.8  1.060  164.89/72.* V Ohume 1  4.7  4.7  4.2  4.2  4.2  4.2  4.2  7.36  13.15  1.17,013  1.006  6.9  7.3  31.8  1.056	F) x 1,000,000 (adj. for ppm)]  56.8  30  50  7.94  13.07  1,795,862  L107  137.9  146.0  699.5  1,008  1008  1008  1009 (actim) x  FF) x 1,000,000 (adj. for ppm)]  4.2  4.2  4.2  7.94  13.07  1,795,882  1,107  6.6  7.0  30.6  1056	55.6 56 9.86 12.99 1.703.993 1.060 125.1 135.5 50.2 1.060 4.6 4.2 4.2 4.2 9.86 12.99 1.703.993 1.703.993 1.090 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.
Statis, ppssvd-calculated Statis, ppssvd-calculated Statis, ppssvd ⊕ 15% O'3-calculated - provided (a) sloidshare (%) Syrgem (%) Volume Flow (actin) Sem pershave (?) Initiation rate (Sh'hay-calculated from given ppssvd - (By'hay-provided - (TP') [Ratio By'hay-provided (rost-calculated)] OCS (By'hay-VOC(ppm) × [1 - Moisture(%)/ 100] × 21 - 16 (seeds), wg/s as methanely × 60 minythe / [1545-2 Statis, ppssvd (see CH <sub>3</sub> -calculated - provided (a) (e) doisture (%) Syrgem (%) Volume Flow (actin) Compression (By'hay-calculated - (By'hay-provided - (TP') (Bato By'hay provided - (TP') (Bato By'hay provided/calculated) sed (Sy'hay-NA Instation rate (By'hay (TP') secury (By'hay - NA	(CT temp.(T) + 4607  56.8  50  7.36  13.15  1.877.013  1.076  143.4  153.0  16.8 Byft2 x V ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6	F) x 1.000,000 (ed.j. for ppm)]  56.8  50  7.94  13.07  1,795,882  1.107  137.9  146.0  639.5  1.058  1000 (ecfm) x  F) x 1.000,000 (ed.j. for ppm);  4.8  4.2  7.94  13.07  1,795,882  1.107  6.6  7.0  30.6  1 056	55.6 56.9 9.86 12.99 1.703,893 1.004 562.5 1.062 4.6 4.2 9.86 12.99 1.703,893 1.094 6.0 6.3 2.7 8.1 1.004 1.0
28 (mole. wgl CO) x 60 minylm / [1545 x basis, ppunvd-calculated basis, ppunvd-gl 15% O2-calculated basis, ppunvd-gl 15% O2-calculated colorance (%) O2-calculated colorance (%) O2-calculated colorance (%) O2-calculated from given ppunvd (dothers (7P))  Imination rate (fa/ter)-calculated from given ppunvd (fa/ter)-povolded (7P?)  [Ratio Byler provided/calculated]  OCa (Byler)- VOC(ppm) x [1 - Moisture(%) 100} x 21 16 (mole. wgl on methanes) x 60 minylm / [1545 x basis, ppunvd (m C14)- calculated colorance (%) O2-calculated - provided (a) (e) dothers (%) O2-calculated - provided (Byler)-povided (Byler)-provided (Byler)- NA in bation Rate Basis (c)  in bation Rate Basis (c)  arcuny (Byler) - NA in bation Rate Basis (c)	(CT temp.(**) + 460**  56.8  50  7.36  13.15  1.87.013  L076  43.4  152.0  66.58  1.060  16.8 Bytt2 x Volume (**)  4.2  4.2  4.2  4.2  7.36  13.15  1.076  6.9  7.3  31.8  1.096  NA  0  0	F) x 1,000,000 (adj. for ppm)]  56.8  30  50  7.94  13.07  1,795,882  L107  137.9  146.0  698.5  1,008  Loos (actm) x  F) x 1,000,000 (adj. for ppm)]  4.2  4.2  4.2  7.94  13.07  1,795,882  1,107  6.6  7.9  30.6  1 056  NA  0	55.6 56.9 9.86 1.703.993 1.004 1.25.3 1.35.6 592.3 1.062 4.6.6 4.2 4.2 4.2 4.2 4.2 9.86 12.99 1.708.993 1.004 8.0 8.0 8.0 8.0 8.0 8.0 8.0 8.0
28 (mole. wgl CO) x 60 minyler / [1545 x basis, ppservid exhibited hasis, ppservid @ 15% O2- calculated hasis, ppservid @ 15% O2- calculated (a) Optygen (%) O3- calculated (a) Optygen (%) O3- calculated from given ppservid (form) (ministers rate (forty) - calculated from given ppservid (forty) (forty) pservided (TP)  [Batio Byler provided (TP)  [Batio Byler provided/calculated]  OCC (Byler) = VOC(ppm) x [1 - Moisture(%) 100] x 21 16 (mole. wgl as methanes) x 60 minyler / [1545 x basis, ppservid @ 15% O2- calculated hasis, ppservid @ 15% O2- calculated (s) (w) O3- calculated (byler) provided (TP) (ministers rate (Byler) provided (TP) (ministers rate (Byler) provided (TP) (ministers rate (Byler) (TP) (ministers rate (Byler) (TP) (TP) (TP)	(CT temp.(T) + 4607  56.8  50  7.36  13.15  1.877.013  1.076  143.4  153.0  16.8 Byft2 x V ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6 Byft2 x Ohume   16.6	F) x 1.000,000 (ed.j. for ppm)]  56.8  50  7.94  13.07  1,795,882  1.107  137.9  146.0  639.5  1.058  1000 (ecfm) x  F) x 1.000,000 (ed.j. for ppm);  4.8  4.2  7.94  13.07  1,795,882  1.107  6.6  7.0  30.6  1 056	55.6 56.9 9.86 12.99 1.703,893 1.004 562.5 1.062 4.6 4.2 9.86 12.99 1.703,893 1.094 6.0 6.3 2.7 8.1 1.004 1.0
28 (mole. wgl CO) x 60 minylm / [1545 x lasis, ppsnvd @ 15% OZ calculated asis, ppsnvd @ 15% OZ calculated asis, ppsnvd @ 15% OZ calculated (a) double (%) provided (a) double (%) provided (a) double (%) provided (mylm) (mylm) provided (mylm) (mylm) provided (mylm) (mylm) provided (mylm) (mylm) provided (mylm) (mylm) provided (mylm) (m	(CT leamp.(**P) + 460*T  56.8 30  7.36  13.15  1.87,013  1.006  153.0  153.0  153.0  153.0  153.0  153.0  164.8 p/r2 x Volume ( 164.	F) x 1.000,000 (ed.j. for ppm)]  56.8  50  7.94  13.07  1.795,882  L107  137.9  146.0  639.5  1.008  Low (ectm) x  F) x 1.000,000 (ed.j. for ppm);  4.8  4.2  4.2  7.94  13.07  1.795,882  L107  6.6  7.0  30.6  1 056  NA  0  0  NA	55.6 56.9 9.89 1.703,893 1.999 1.25.2 1.36.2 562.2 1.062 4.4 4.2 9.86 1.299 1.703,893 1.099 1.703,893 1.006 8.1 8.1 8.1 8.2 8.2 8.3 8.3 8.3 8.3 8.3 8.3 8.3 8.3
28 (mole. wgl CO) x 60 minylm / [1545 x basis, ppsmvd-calculated basis, ppsmvd-calculated basis, ppsmvd-calculated basis, ppsmvd-calculated calculated (dosture (%) Dyggm (%) Column a Flow (actm) compression (?)  Initiation rate (byfur)- calculated from given ppsmvd (byfur)- psovided (?P)  [Eatio Byfur provided (?P)  [Eatio Byfur provided (?S) 100] x 21 16 (mole. wgl see metherse) x 60 minylm / [1545 x basis, ppmvd @ 15% O2-calculated basis, ppmvd @ 15% O2-calculated basis, ppmvd @ 15% O2-calculated basis ppmvd (actm) (ppmvd pmvd pmvd pmvd pmvd pmvd pmvd pmvd	(CT leamp.(**P) + 460*T  56.8 30  7.36  13.15  1.87,013  1.006  153.0  153.0  153.0  153.0  153.0  153.0  164.8 p/r2 x Volume ( 164.	F) x 1.000,000 (ed.j. for ppm)]  56.8  50  7.94  13.07  1.795,882  L107  137.9  146.0  639.5  1.008  Low (ectm) x  F) x 1.000,000 (ed.j. for ppm);  4.8  4.2  4.2  7.94  13.07  1.795,882  L107  6.6  7.0  30.6  1 056  NA  0  0  NA	55.6 56.9 9.89 1.703,893 1.999 1.25.2 1.36.2 562.2 1.062 4.4 4.2 9.86 1.299 1.703,893 1.099 1.703,893 1.006 8.1 8.1 8.1 8.2 8.2 8.3 8.3 8.3 8.3 8.3 8.3 8.3 8.3
28 (mole. wgl CO) x 60 minylm / [1545 x basis, ppmwd @ 15% O2-calculated basis, ppmwd @ 15% O3-calculated basis, ppmwd @ 15% O3-calculated of colcuments of the colcuments of	(CT temp.(**) + 460**  56.8   50   7.36   13.15   1.87.013   1.076   153.4   152.0   665.8   1.060   16.8 Bytt2 x Volume ( (CT temp.(**) + 460**  1.076   4.2   4.2   4.2   4.2   4.2   4.2   13.15   1.076   6.9   7.3   31.8   1.096   NA   0   0   NA   0   0   0   NA   0   0   0   0   0   0   0   0   0	F) x 1,000,000 (adj. for ppm)]  56.8  30  50  7.94  13.07  1,795,802  L107  137.9  146.0  699.5  1,008  Loov (actm) x  F) x 1,000,000 (adj. for ppm)]  4.2  4.2  4.2  4.2  4.2  7.94  13.07  1,795,802  1,107  6.6  7.0  30.6  1 056  NA  0  0  NA  0  0  8O4 (%)	55.6 56.5 9.86 1.703.993 1.703.993 1.062 1.062 4.66 4.2 4.2 4.2 4.2 9.86 12.99 1.708,999 1.066 NA NA 0 0
28 (mole, wgl CO) x 68 min/hr / [1545 x insis, ppmvd @ 15% CO: calculated sile, ppmvd @ 15% CO: calculated sile, ppmvd @ 15% CO: calculated sile, ppmvd @ 15% CO: calculated (a) (obstane (%) provided (a) (obstane (%) provided (m) (obstane (%) pmvd (m) [The mole calculated from given ppmvd (m) [The mole calculated from given ppmvd (m) [The mole calculated from given ppmvd (m) [The provided (TP)] [The mole calculated in min/hr / [1545 x insis, ppmvd @ 15% CO: calculated in ppmvd @ 15% CO: calculated in ppmvd @ 15% CO: calculated in ppmvd @ 15% CO: calculated (m) (m) (m) (m) (m) (m) (m) (m) (m) (m)	(CT temp.(**) + 460*1  56.8  30  7.36  13.15  1.87,013  1.096  143.4  152.0  46.8  152.0  46.8  152.0  48.8  42.4  4.2  4.2  4.2  4.2  4.2  4	F) x 1.000,000 (edj. for ppm)]  56.8  50  7.94  13.07  1,795,882  1.107  137.9  146.0  639.5  1.058  Low (actm) x  F) x 1.000,000 (edj. for ppm)]  4.8  4.2  7.94  13.07  1.795,882  1.107  6.6  7.0  30.6  1.056  NA  0  0  NA  0  0  8O <sub>4</sub> (%)	55.6 56.9 9.89 1.703,993 1.999 1.25.2 1.36.2 562.2 1.062 4.6 4.2 9.86 1.299 1.703,993 1.004 8.0 1.056 NAA

rox: (a) Sism ans. Westinghouse 1999.
(b) Calder Associates Inc. 1999.
(c) EPA 2000, AP-42.
(d) For NOx emissions, data originally provided at 25 ppmvd at 15% oxygen.
(e) For VOC emissions, data originally provided at 25 ppmvd at 15% oxygen.

Note: ppm vd-- parts per million, volume dry;  $O_2$ -- oxygen.

Table A-9 Maximum Emissions for Hazardous Air Pollutants for the Osprey Energy Center Project Siemens-Westinghouse 501F, Dry Low NOx Combustor, Natural Gas, 60 % Load

Parameter	Ambie 32.°F	nt/Compressor Inlet Temperatu 59 °F	ure 95.¶∓
ar authertex	Case 11	Case 8	Case 5
ours of Operation	8,760	8.760	8.760
est Input Rate (MMBtu/hr), HHV-CT	1,332	1,280	1.162
Duct burner	0	0	0
Total	1,332	1,280	1,162
mmonia (fb/hr) = Ammonia (ppm) x ([20.9 x (1 -			
17 (mole. wgt ammonia) x 60 min/hr Sasis, ppmvd @15% O <sub>2</sub> (a) (d)	r/[1545 x (CT temp.(T) + 460 9	Tr) x 5.9 x 1,000,000 (adj. for pper q	n)] 9
Moisture (%)	7.36	7.94	986
Oxygen (%)	13.15	13.07	12.99
Volume Flow (acfm)	1,817,013	1,795,882	1,703,893
Temperature (T)	1,076	1,107	1,094
Emission rate (lh/hr)	15.7	15.1	13.7
(TPY)	69	66	60
3- Butacliene (Ib/lu) = Basis (Ib/10 <sup>12</sup> Btu) × Heat	Input (MMBtu/hr) / 1,000,000	MMBtu/10 <sup>12</sup> Btu	
Basis, lb/10 <sup>22</sup> Btu	4.30E-01	4.30E-01	4.30E-01
Heat Input Rate (MMBtu/hr)	1,332	1,280	1,162
Emission Rate (Ib/hr)	5.73E-04	5.50E-04	5.00E-04
(TPY)	2.51E-03	2.41E-03	2.19E-03
cetalbyde (lb/hr) = Basis (lb/10 <sup>12</sup> Btu) x Heat Ing	out (MMBtu/hy) / 1.000.000 M	//Bru/10 <sup>12</sup> Bru	
Sasis, lb/10 <sup>12</sup> Beu	4.00E+01	4.00E+01	4.00E+01
lest Input Rate (MMBtu/hr)	1,332	1,280	1,162
Emission Rate (Byhr)	5.336-02	5.12E-02	4.65E-02
(TPY)	2.33E-01	2.24E-01	2.04E-01
crolein (lb/hr) = Basis (lb/10 <sup>12</sup> Btu) × Heat Input	(MMBtu/hr) / 1.000.000 MMF	tu/10 <sup>12</sup> Btu	
Sasis, Ib/10 <sup>13</sup> Btu	6.40E+00	6.40E+00	6.40E+00
Heat Input Rate (MMBtu/hr)	1,332	1,280	1,162
Emission Rate (lb/hr)	8.52E-03	8.19E-03	7.44E-03
(TPY)	3.73E-02	3.59E-02	3.26E-02
zazene (Bb/hr) = Basus (lb/10 <sup>12</sup> Bru) × Hest Input	(MMBtu/hr) / 1.000.000 MME	tu/10 <sup>11</sup> Btu	
lasis, lb/10 <sup>12</sup> Bru	1 20E + 01	1.20E+01	1.20E+01
feat Input Rate (MMBtu/hr)	1,332	1,280	1,162
mission Rate (lb/hr)	1.60E-02	1.54E-02	1.39E-02
(TPY)	7.00E+02	6.73E-02	6.11E-02
hylbenzene (lb/hr) = Basis (lb/10 <sup>11</sup> Btu) x Heat I	nput (MMBtu/hr) / 1,000.000	MMBru/10 <sup>12</sup> Bru	
Sasis, 25/10 <sup>22</sup> Btu	3.20E+01	3.20E+01	3.20E+01
lest Input Rate (MMBtu/tu)	1,332	1,280	1,162
musica Rate (B/hr)	4.26E-02	4.10E-02	3.72E-02
(TPY)	1 87E-01	1.79E-01	1.63E-01
rmaldehyde (lb/hr) = Basis (lb/10 <sup>13</sup> Btu) × Heat	Input (MMBtu/hr) / 1,000,000	MMBtu/10 <sup>12</sup> Btu	
lasis, B/10 <sup>12</sup> Btu	1.50E+02	1.50E+02	1.50E + 02
lest Input Rate (MMBtu/hr)	1,332	1,280	1,162
Emission Rate (B/hr)	2.00E-01	1.92E-01	1.74E-01
(TPY)	8.75E-01	8.41E-01	7.64E-01
apthalene (lb/hr) = Basis (lh/10 <sup>12</sup> Btu) x Heat Ing	out (MMBtu/hr) / Lannann w	MBtu/10 <sup>12</sup> Btu	
lasis, by 10 <sup>11</sup> Btu	1.30E+00	1.30E+00	1.30E+00
iest Input Rate (MMBtu/hr)	1,332	1,280	1,162
Emission Rate (Byhr)	1.73E-03	1.66E-03	1.51E-03
(IPY)	7.5 <b>8E-0</b> 3	7 29E-03	6.62E-03
nlycyclic Aramatic Hydrocarbons (PAH) (lb/hr)	= Racis (lb/10 <sup>12</sup> Raci v Heat In	out /MMReu/he\ / 1.000.000 NA	(Btu/10 <sup>12</sup> Bes
nycycus Aromanic riydrocamona (PAII) (mAir) anis, lb/10 <sup>12</sup> Btu	= 0asis (ib/10 = 001) x rieat in 2.20E+00	рш (м.м.втили) / 1,000,000 м.м 2.20E+00	2.20E+00
lest Input Rate (MMBtu/hr)	1,332	1,280	1,162
Emission Rate (Byhr)	2.93E-03	2.82E-03	2,56E-03
(IPY)	1.28E-02	1.23E-02	1.12E-02
ropylene Oxide (lb/hr) = Basis (lb/10 <sup>13</sup> Btu) x He	at Insput (MMRhs/k-à/1 200 c	M MMBhi/In <sup>12</sup> Ren	
ropyuence Cacade (acvior) = bases (acvior brou) x rie Sancis, Bo∕10 <sup>13</sup> Brou	an impun (MiMiDiu/Mr) / 1,000,0 2,90€+01	2.90E+01	2.90E+01
lest Input Rate (MMBhu/hr)	1,332	1,280	1,162
mission Rate (lb/hr)	3.86E-02	3.71E-02	3.37E-02
(1171)	1 69E-01	1.63E-01	1.48E-01
okuene (Bo/hr) = Basis (Bo/10 <sup>13</sup> Bhu) × Heat Imput	(MMBtu/br) / Long one serve	su/LO <sup>12</sup> Bin	
ansis, Bylo <sup>13</sup> Btu	1.30E+02	1.30E+02	1.30€ + 02
lest Input Rate (MMBtu/hr)	1,332	1,280	1,162
Emission Rate (lb/hr)	1.73E-01	1.66E-01	1.51E-01
(TPY)	7.58E-01	7.29E-01	6 62E-01
ylene (lb/hr) = Basis (lb/10 <sup>12</sup> Btu) x Heat Input (l	MMB(u/hr) / 1,000.000 MMBn	√10 <sup>12</sup> Bru	
lasis, lb/10 <sup>12</sup> Btu	6.40E+01	640E+01	6.40E+01
Test Input Rate (MMBtu/hr)	1,332	1,250	1,162
Emission Rate (B/hr)	8.52E-02	8.19E-02	7.44E-02

Source: EPA, 2000, AP-42.

Table B-3a. Capital Cost for Selective Catalytic Reduction and SCONOx<sup>TM</sup> for the Siemens Westinghouse 501FD Combined Cycle Combustion Turbine

Cost Component	Costs for SCR Cos	sts for \$CONOx <sup>™</sup>	Basis of Cost Component
Direct Capital Costs			
Pollution Control Equipment	\$1,418,000	\$16,712,000	Vendor Estimates
Ammonia Storage Tank	<b>\$</b> 137,529	\$0	\$35 per 1,000 lb mass flow developed from vendor quotes
Flue Gas Ductwork	\$44,505	\$69,725	Vatavauk,1990
Instrumentation	\$50,000	\$50,000	Additional NO <sub>x</sub> Monitor and System
Гaxes	\$85,080	\$1,002,720	6% of SCR Associated Equipment and Catalyst
Preight	\$70,900	\$835,600	5% of SCR Associated Equipment
Total Direct Capital Costs (TDCC)	\$1,806,014	\$18,670,045	
Direct Installation Costs			
Foundation and supports	\$144,481	1,493,604	8% of TDCC and RCC; OAQPS Cost Control Manual
Handling & Erection	\$252,842	2,613,806	14% of TDCC and RCC; OAQPS Cost Control Manual
Electrical	<b>\$72,241</b>	746,802	4% of TDCC and RCC;OAQPS Cost Control Manual
Piping	\$36,120	373,401	2% of TDCC and RCC;OAQPS Cost Control Manual
nsulation for ductwork	\$18,060	186,700	1% of TDCC and RCC;OAQPS Cost Control Manual
ainting	\$18,060	186,700	1% of TDCC and RCC;OAQPS Cost Control Manual
ite Preparation	\$5,000	\$5,000	Engineering Estimate
uildings	\$15,000	\$15,000	Engineering Estimate
Total Direct Installation Costs (TDIC)	\$561,804	\$5,621,014	
Total Capital Costs (TCC)	\$2,367,819	<b>\$24,291,</b> 059 S	sum of TDCC, TDIC and RCC
Indirect Costs			
Engineering	\$180,601	\$1,867,005	10% of Total DirectCapital Costs; OAQPS Cost Control Manual
SM/RMP Plan	\$50,000	\$0	Engineering Estimate
Construction and Field Expense	\$90,301	\$933,502	5% of TDCC; OAQPS Cost Control Manual
Contractor Fees	\$180,601	\$1,867,005	10% of TDCC; OAQPS Cost Control Manual
tart-up	\$36,120	\$373,401	2% of TDCC; OAQPS Cost Control Manual
erformance Tests	\$18,060	\$186,700	1% of TDCC; OAQPS Cost Control Manual
Contingencies	<b>\$</b> 54,180	<b>\$</b> 560,101	3% of TDCC; OAQPS Cost Control Manual
otal Indirect Capital Cost (TInCC)	\$609,864	\$5,787,714	· -
Total Direct, Indirect and Capital Costs (TDICC)	\$2,977,683	\$30,078,773 S	oum of TCC and TInCC

Table B-4a. Annualized Cost for Selective Catalytic Reduction and SCONOx<sup>TM</sup> for the Siemens-Westinghouse 501FD Combined Cycle Operation

Cost Component	Costs for SCR Costs for SCONOx <sup>TM</sup> Basis of Cost Component			
Direct Annual Costs				
Operating Personnel	\$18,720	\$37,440	24 hours/week at \$15/hr for SCR; SCONOx 2 times SCR costs	
Supervision	\$2,808	\$5,616	15% of Operating Personnel;OAQPS Cost Control Manual	
Ammonia	\$291,393	\$0 \$300 per ton for Aqueous NH <sub>3</sub>		
PSM/RMP Update	\$15,000	\$0 Engineering Estimate		
Inventory Cost	\$34,404	\$68,808 Capital Recovery (10.98%) for 1/3 catalyst for SCR; SCONOx 2 times SCR		
Catalyst Cost	\$313,333	\$470,000	3 years catalyst life; Based on Vendor Budget Estimate	
Contingency	\$20,270	\$17,456	3% of Direct Annual Costs	
Total Direct Annual Costs (TDAC)	\$695,928	\$599,320		
Energy Costs				
Electrical	\$28,032	\$70,080	80kW/h for SCR @ \$0.04/kWh times Capacity Factor; 200 kW for SCONOx	
MW Loss and Heat Rate Penalty	\$336,358	\$840,894	0.3% or 0.54 MW output for SCR; 0.75% or 1.35 MW for SCONOx; EPA, 1993	
Steam Costs for SCONOx	\$0	\$705,663	18,184 lb/hr 600 °F, 85 psig, steam (1,329 Btu/lb steam); 90% boiler eff.; \$3/mmBtu	
Natural Gas for SCONOx	\$0	\$49,347	81 lb/hr; 0.044 lb/scf; 1,020 Btu/scf; \$3/mmBtu	
Total Energy Costs (TEC)	\$364,390	\$1,665,984		
Indirect Annual Costs				
Overhead	187,752	25,834	60% of Operating/Supervision Labor and Ammonia	
Property Taxes	<b>2</b> 9,777	300,788	1% of Total Capital Costs	
Insurance	29,777	300,788	1% of Total Capital Costs	
Annualized Total Direct Capital	326,950	3,302,649	10.98% Capital Recovery Factor of 7% over 15 years times sum of TDICC	
Total Indirect Annual Costs (TIAC)	\$574,256	<b>\$</b> 3,930,058		
Total Annualized Costs	\$1,634,573	\$6,195,362	Sum of TDAC, TEC and TIAC	
Cost Effectiveness	\$2,443		per ton of NO <sub>x</sub> Removed	
	669.01	669.01	tons NOx removed /year; 3.5 ppmvd corrected to 15% oxygen	

# STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION RECEIVED

JUL 1 3 2000

CALPINE CONSTRUCTION FINANCE COMPANY, L.P.,

BUREAU OF AIR REGULATION

Petitioner,

vs.

DEP Draft Permit No. PA 00-41(PSD-FL-287)

DEPARTMENT OF ENVIRONMENTAL PROTECTION,

Res	pondent.
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# CALPINE'S SECOND REQUEST FOR EXTENSION OF TIME TO FILE PETITION

Petitioner, Calpine Construction Finance Company, L.P. ("Calpine"), pursuant to Rule 28-106.1111(3), Florida

Administrative Code, respectfully requests the Department of Environmental Protection ("Department") to grant Calpine an additional extension of time to file a petition for a formal administrative hearing concerning the Department's draft permit for Calpine's Osprey Energy Center (DEP Draft Permit No. PA 00-41(PSD-FL-287)) (the "Draft Permit"). In support of this request, Calpine says:

- 1. On March 16, 2000 Calpine filed an application with the Department for a prevention of significant deterioration ("PSD") permit for Calpine's Osprey Energy Center, a 527 MW electrical power plant to be located at 1501 Derby Avenue, Auburndale, Florida.
  - 2. On May 11, 2000, the Department distributed its "Public

Notice of Intent to Issue PSD Permit", Draft Permit, Technical Evaluation and Preliminary Determination, and Draft BACT

Determination for the Osprey Energy Center. As the applicant for the Draft Permit, Calpine is affected by the Department's proposed action.

- 3. On May 23, 2000, Calpine requested a 45-day extension of time to file its petition. The Department has not yet issued an order concerning Calpine's request for extension of time.
- 4. The Draft Permit is lengthy and complex. Calpine's preliminary review of the Draft Permit indicated that some provisions of the Draft Permit are not consistent with Calpine's application. On June 29, 2000, representatives of Calpine met with Department staff to discuss modifications to the Draft Permit. Based on those discussions with Department staff, Calpine will submit written comments concerning the Draft Permit to the Department.
- 5. Although Calpine does not expect to file a petition for a formal administrative hearing concerning the Draft Permit, Calpine requests a 60-day extension of time to finalize its comments concerning the Draft Permit, and to conduct additional meetings with the Department, before Calpine waives its right to a hearing.
- 6. Petitioner's counsel has discussed this request with Department's counsel, Mr. Scott Goorland. Mr. Goorland indicated that the Department has not yet formulated a position concerning

this request.

WHEREFORE, Calpine requests the Department to grant a 60-day extension of time to file a petition for a formal administrative hearing concerning the Draft Permit.

Respectfully submitted this 7th day of July, 2000.

LANDERS & PARSONS

DAVID S. DEE

Ma. Bar No. 281999

JOHN T. LaVIA, III

Fla. Bar No. 853666

310 West College Avenue (32301)

P.O. Box 271

Tallahassee, Florida 32302

850/681-0311

850/224-5595 (fax)

COUNSEL FOR CALPINE CONSTRUCTION FINANCE COMPANY, L.P.

## CERTIFICATE OF SERVICE

I HEREBY CERTIFY that an original and one copy of the foregoing was furnished by hand-delivery to the CLERK'S OFFICE, Department of Environmental Protection, Office of General Counsel, 3900 Commonwealth Blvd., Room 659E, Tallahassee, Florida 32399; and a copy by U.S. Mail to Scott Goorland, Department of Environmental Protection, Office of General Counsel, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399, on this 7th day of July, 2000.

ATTORNEY

# STATE OF FLORIDA DIVISION OF ADMINISTRATIVE HEARINGS

IN RE:

CALPINE CONSTRUCTION FINANCE COMPANY, L.P. (OSPREY ENERGY CENTER); POWER PLANT SITING DOAH CASE NO. 00-1288EPP OGC CASE NO. 00-0740

APPLICATION NO. PA00-41

# CALPINE'S SUPPLEMENTAL RESPONSE TO DEP'S NOTICE OF INSUFFICIENCY

Calpine Construction Finance Company, L.P. (Calpine), submits this supplemental response to the notice of insufficiency (Notice) served by the Florida Department of Environmental Protection (Department or DEP) and says:

- 1. On March 20, 2000, Calpine filed an application for certification of an electrical power plant (the Osprey Energy Center) pursuant to the Florida Electrical Power Plant Siting Act (Act), Section 403.501, et seq. On May 22, 2000, the Department issued its Notice, which indicates that Calpine's application is "insufficient" because the application does not contain all of the information needed by the Southwest Florida Water Management District (SWFWMD) for the SWFWMD's evaluation of the Osprey Energy Center.
- 2. The Department's Notice indicates that Calpine may pursue several different options under the Act. Under one option, Calpine may submit additional information to the Department within 40 days to make the application sufficient. Under another option, Calpine may advise the Department and the

Administrative Law Judge that Calpine cannot submit the additional information needed to make the application sufficient within 40 days.

- 3. On May 26, 2000, Calpine filed a response to DEP's Notice stating that Calpine intended to submit additional information to make its application sufficient within 40 days.
- 4. Since filing its response to DEP's Notice, Calpine has diligently worked on assembling the additional information requested by the Department and the SWFWMD. On June 13, 2000, Calpine's consultants met with the SWFWMD staff to discuss the issues raised in DEP's Notice. In light of the discussions with SWFWMD staff, Calpine has determined that it requires more time to submit the additional information requested in DEP's Notice.
- 4. Accordingly, pursuant to Section 403.5067(1)(b), Florida Statutes, Calpine hereby advises the Department and the Administrative Law Judge that Calpine requires more time to submit the additional information requested in DEP's Notice. Calpine anticipates that it will submit the additional information within 45 days of this response.

# Respectfully submitted this 7th day of July, 2000.

LANDERS & PARSONS

DAVID S. DEE

Forida Bar No. 281999

JOHN T. LaVIA, III

Florida Bar No. 853666

P.O. Box 271

310 West College Avenue (32301)

Tallahassee, Florida 32302

Phone: 850/681-0311 Fax: 850/224-5595

## CERTIFICATE OF SERVICE

I CERTIFY that a true and correct copy of the foregoing has been sent by U.S. Mail to the following this 7th day of July, 2000.

Steven Palmer, P.E.
Office of Siting Coordination
Department of Environmental
Protection
2600 Blair Stone Road, MS 48
Tallahassee, FL 32399-3000

Scott Goorland
Senior Assistant General
Counsel
Office of General Counsel
Department of Environmental
Protection
3900 Commonwealth Blvd., MS 35
Tallahassee, FL 32399-3000

James V. Antista, General Counsel Florida Fish and Wildlife Conservation Commission 620 South Meridian Street Tallahassee, FL 32399-1600 Sheauching Yu Assistant General Counsel Department of Transportation 605 Suwannee Street, MS 58 Tallahassee, FL 32399-0458

Cathy Bedell
Acting General Counsel
Public Service Commission
2540 Shumard Oak Blvd.
Tallahassee, FL 32399

Cari Roth, General Counsel Andrew Grayson, Asst. Gen. Coun. Office of General Counsel Department of Community Affairs 2555 Shumard Oak Blvd. Tallahassee, FL 32399

Frank Anderson, Asst. Gen. Coun.
Office of General Counsel
Southwest Florida Water
Management District
2379 Broad Street
Brooksville, FL 34609

R. Douglas Leonard Executive Director Central Florida Regional Planning Council P.O. Box 2089 Bartow, FL 33831

Norman White General Counsel Central Florida Regional Planning Council c/o Bradley Johnson Law Firm P.O. Box 1260 Lake Wales, FL 33859-1260

Mark Carpanini County Attorney Polk County P.O. Box 9005 Drawer CA01 Bartow, FL 33831-9005

Patton Kee
City Attorney
City of Auburndale
P.O. Box 186
Auburndale, FL 33823

ATTORNEY



## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

JUN 2 1 2000

RECEIVED

JUN 26 2000

**4APT-ARB** 

BUREAU OF AIR REGULATION

Mr. A. A. Linero, P.E. Florida Department of Environmental Protection Twin Towers Office Building 2600 Blair Stone Road Tallahassee, Florida 32399-2400

SUBJ Preliminary Determination and draft PSD Permit for Calpine Construction & Finance Company, L.P. - Osprey Energy Center in Polk County located near Auburndale, FL

Dear Mr. Linero:

Thank you for sending the preliminary determination and draft prevention of significant deterioration (PSD) permit for the Osprey Energy Center dated May 10, 2000. The draft PSD permit is for the proposed construction and operation of two combined cycle combustion turbines (CTs) and two natural gas-fired heat recovery steam generating units with a total nominal generating capacity of 527 megawatts (MW). The combustion turbines proposed for the facility are Siemens Westinghouse 501FD units. The CTs will combust pipeline quality natural gas only. Total emissions from the proposed project are above the thresholds requiring PSD review for nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), volatile organic compounds (VOC), sulfur dioxide (SO<sub>2</sub>) and particulate matter (PM/PM<sub>10</sub>).

Based on our review of the preliminary determination and draft PSD permit, we have the following comments:

- In November 1999, ABB ALSTOM POWER announced the availability of SCONOx™ systems for any size combustion turbine. Region 4 therefore considers this control method technically feasible for Osprey's combined cycle CTs. Accordingly, FDEP should require the Osprey Energy Center to provide a project-specific BACT analysis for SCONOx™ (economics, environmental impacts, and energy use) before issuing a final permit.
- 2. We suggest you verify the emission rate used by Golder Associates to estimate potential formaldehyde emissions. The emission factor cited by Golder is only one-fifth of the emission factor cited for formaldehyde from natural gas turbines in the recently revised section 3.1 of AP-42.
- 3. The "Public Notice of Intent to Issue PSD Permit" indicates that the combustion turbines for this project will be General Electric PG7241FA units. It is our understanding, as

indicated elsewhere in the preliminary determination and draft PSD permit, that the Osprey Energy Center will be installing Siemens Westinghouse 501FD combustion turbines. If possible, clarify this inconsistency before the public notice is published.

Thank you for the opportunity to comment on the preliminary determination and draft PSD permit for Calpine's Osprey Energy Center. If you have any questions or concerns, please direct them to either Katy Forney at 404-562-9130 or Jim Little at 404-562-9118.

Sincerely,

R. Douglas Neeley

Chief

Air and Radiation Technology Branch

Air, Pesticides and Toxics

Paul Thogas

Management Division

CC: Tr. Halpan C. Halladay NPS B. Oven

SWD