

Virginia City Hybrid Energy Center
Response to Data Request
Bruce Buckheit, Member, Virginia Air Pollution Control Board

Question (Page No. 11):

Facts relevant to establishing BACT limits for PM, SO₂ and Hg. - Identify emission levels achieved in practice for the cleanest units – including AES Puerto Rico (EPA Region II), the CFB units cited in the Wayland memo, Oak Creek, Seward Station and Craig Station (EPA Region VIII) to obtain stack test data and CEM data as available.

Response:

It is important to note that lowering certain pollutants many times results in a tradeoff (or increase) in another pollutant(s). For example, lowering CO emissions would have the effect of increasing NO_x emissions. The VCHEC must be viewed as a system. Attachment 1A contains recent BACT limits for PM, SO₂ and Hg for PC, and SCPC boilers. Attachment 1B contains recent BACT limits for PM, SO₂ and Hg for CFB boilers. Highlights have been placed on the lowest (cleanest) emissions levels identified in the EPA RACT/BACT/LAER Clearinghouse (RBLC), units cited in the Wayland memo, or phone calls with state agencies or EPA. Please note that no one facility has the lowest emission levels for all pollutants. Table 22-1 presents a summary of these results below.

Table 22-1. Lowest Emission Limits (Lbs/MMBtu)			
Facility	Pollutant	Permit Limit	Unit Type
VCHEC	SO ₂	0.12	CFB
AES – Puerto Rico ¹		0.022	CFB
Western Farmers – Hugo ²		0.065	PC
Wabash River		0.12	IGCC
VCHEC	PM ₁₀ (Total)	0.012	CFB
Basin Electric – Dry Fork		0.012	PC
Wabash River		0.012	IGCC
VCHEC	Hg	9.01E-07	CFB
Western Farmers - Hugo		8.0E-06	PC
Polk Power		5.2E-06	IGCC
¹ AES – Puerto Rico has low sulfur coal with a permit limit of less than 1% sulfur. VCHEC limits the sulfur content of its coal to 2.28% sulfur. This would account for a higher SO ₂ permit limit. ² Western Farmers Electric Cooperative – Hugo Unit 2 – has low sulfur coal with an approximately sulfur content of 0.35%. VCHEC limits the sulfur content of its coal to 2.28% sulfur. This would account for a higher SO ₂ permit limit.			

ATTACHMENT 1A

Emission Levels of Cleanest (Recent) PC Units

Pollutant	Units	American Municipal Power Generating Station (OH)		Basin Electric - Dry Fork Station (WY)		Western Farmers Electric Coop - Hugo Station (OK)		Black Hills - WYgen 3 (WY)		Sandy Creek Energy Associates - Sandy Creek Energy Station (TX)		Great Plains Energy - KCP&L Iatan Station (KS)		Public Service of CO - Comanche Station (CO)		Newmont Nevada Power Plant (NV)		TS
		Permit Limit	Averaging Period	Permit Limit	Averaging Period	Permit Limit	Averaging Period	Permit Limit	Averaging Period	Permit Limit	Ave. Period	Permit Limit	Averaging Period	Permit Limit	Averaging Period	Permit Limit	Averaging Period	
Permit Issuance	-	2/7/2008		10/15/2007		2/9/2007		2/5/2007		07/24/06		1/27/2006		7/5/2005		5/5/2005		
Boiler Type	-	PC Boiler		PC Boiler		PC Boiler		PC Boiler		PC Boiler		PC Boiler		SCPC Boiler		PC Boiler		
Number of Units	-	2		1		1		1		1		1		1		1		
Fuel Types	-	Pulverized Coal		Coal		PRB Coal		Subbituminous Coal		Coal		Coal		Subbituminous Coal		PRB Coal		
Generation Per Unit	MWh			385		750								750		200		
Heat Input Per Unit	MMBtu/hr	5,191						1,300		8185		7,800		7,421		2,030		
Coal H.H.V.	Btu/lb					8800 (typical)												
Coal Sulfur Content	% wt.					0.35 (typical)												
Coal Ash Content	% wt.									0.4								
Filterable PM ₁₀	lb/MMBtu					0.015	N.A.	0.012	2-hr (test)			0.014	3-hr rolling	0.0130/0.0120	1-hr (test)	0.012	24-hr rolling	
Total PM ₁₀	lb/MMBtu	0.025	3-hr	0.012	Annual	0.025	N.A.			327 (lb/hr)	30-day	0.024	30-day rolling	0.0220/0.0200	1-hr (test)			
Opacity	%	20.000	6-min											10.000	6-min ave			
SO ₂	lb/MMBtu	0.15	30-day rolling	0.070	12-month rolling	0.065	30-day rolling	0.09	12-month rolling	982 (lb/hr)	30-day	0.10	30-day rolling			0.09	24-hr rolling	
NO _x	lb/MMBtu	0.1	24-hr	0.05	12-month rolling	0.05	12-month rolling	0.05	12-month rolling	573 (lb/hr)	30-day	0.10	30-day rolling			0.07	24-hr rolling	
CO	lb/MMBtu	0.154	3-hr	0.15	Annual	0.15	30-day rolling	0.15	1-hr (test)	1228 (lb/hr)	30-day	0.16	30-day rolling	0.13	8-hr	0.15	24-hr rolling	
VOC	lb/MMBtu	0.0037	3-hr	0.0037	Annual	0.0036	Annual	N.A.	N.A.	29 (lb/hr)		0.0036		0.0035	1-hr (test)	N.A.		
Pb	lb/MMBtu	9.82E-06	3-hr	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.55 (lb/hr)		0.00E+00		N.A.		N.A.		
H ₂ SO ₄	lb/MMBtu	7.50E-03	3-hr	2.50E-03	Annual	3.70E-03	N.A.	N.A.	N.A.	127 (lb/hr)				4.20E-03	1-hr (test)	2.06 (lb/hr)		
HF	lb/MMBtu	N.A.	N.A.	2.62 (lb/hr)	Annual	N.A.	N.A.	N.A.	N.A.	72 (lb/hr)		33.150 (lb/hr)		5.00E-04	1-hr (test)	1.170 (lb/hr)		
Hg	lb/MMBtu	N.A.	N.A.	0.0001 (lb/MMV-hr)	12-month rolling	8.00E-06	N.A.	N.A.	N.A.	0.94 (lb/hr)		N.A.		N.A.		N.A.		

Notes: Operational in 2013 Operational in 2011 Operational in 2010 Operational in 2010 Operational in 2012 Operational in 2010 Operational in 2009 Operational in 2008

(a) 2006 12 month weighted average from EPA Clean Air Markets Data base website
 (b) Three unit average
 (c) Average of the two units from 2006 Actual emissions
 (d) Unit 3 - 520 nanograms per joule (1.20 lb per million Btu) heat input and 10 percent of the potential combustion concentration (90 percent reduction) derived from combustion of coal, or 30 percent of the potential combustion concentration (70 percent reduction), when emissions are less than 260 nanograms per Joule (0.60 lb per million Btu) heat input derived from combustion of coal.
 Unit 4 - 180 ng/J (1.4 lb/MMWh) gross energy output on a 30-day rolling average basis, or 5 percent of the potential combustion concentration (95 percent reduction) on a 30-day rolling average basis.
 (e) Unit 3 - 200 nanograms per joule (1.6 pounds per megawatt-hour) gross energy output, based on a 30-day rolling average.
 Unit 4 - 130 nanograms per joule (1.0 pounds per megawatt-hour) gross energy output, based on a 30-day rolling average.
 (f) Average of the two units 2006 12 month weighted average from EPA Clean Air Markets data base website
 (g) Unit 3's 2006 5 month (August - December) weighted average from EPA Clean Air Markets Data Base website

Emission Levels of Cle:

Pollutant	Units	Craig Station (CO)			LG&E- County (KY) Trimble			Dominion Power Station (VA) Clover			Tucson Electric Power Company- Springerville Generating Station Units 1 & 2(AZ)			Tucson Electric Power Company- Springerville Generating Station Units 3 & 4 (AZ)		
		Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period
		5/1/2005			6/20/2003 - (revision 3.2/29/2008)			12/21/2007 (Title V)			7/21/2006			7/21/2006		
Permit Issuance	-	5/1/2005			6/20/2003 - (revision 3.2/29/2008)			12/21/2007 (Title V)			7/21/2006			7/21/2006		
Boiler Type	-	PC			PC			PC			PC			PC		
Number of Units	-	3			1			2			2			2		
Fuel Types	-	Pulverised Coal			Pulverised Coal			Pulverised Coal			Pulverised Coal			Pulverised Coal		
Generation Per Unit	MWh															
Heat Input Per Unit	MMBtu/hr	4.318						4.085								
Coal H.H.V.	Btu/lb															
Coal Sulfur Content	% wt.															
Coal Ash Content	% wt.															
Filterable PM ₁₀	lb/MMBtu	0.030			0.100			0.018			0.020 ^(a)			0.015/0.055		
Opacity	%	20 (30 exception)			20/27 exception			10/20 exception			15.000			15.000		
SO ₂	lb/MMBtu	0.13			0.067 ^(a,b)			0.84			0.04 ^(a)			3-hour rolling ave.		
		90-day rolling ave.			annual ave.			3-hour rolling ave.			Annual			12-month rolling ave.		
								0.156			0.055 ^(a)			0.27		
								0.32			0.29 ^(a)			0.185 ^(f)		
NO _x	lb/MMBtu	0.30			0.45			0.10			0.10			0.15		
CO	lb/MMBtu							0.10			0.01 ^(a)			0.15		
VOC	lb/MMBtu							0.0100			0.003 ^(a)			0.06 lb/ton		
Pb	lb/MMBtu							4.20E-04			5.90-07 ^(a)			1.60E-05		
H ₂ SO ₄	lb/MMBtu										0.006 ^(a)					
HF	lb/MMBtu										1.74-04 ^(a)			4.40E-04		
Hg	lb/MMBtu										5.90-07(c)			6.90E-06		

- Notes:
- (a) 2006 12 month weighted average
 - (b) Three unit average
 - (c) Average of the two units from 200
 - (d) Unit 3 - 520 nanograms per joule
 - Unit 4 - 180 ng/J (1.4 lb/MWh) gross
 - (e) Unit 3 - 200 nanograms per joule (
 - Unit 4 - 130 nanograms per joule (1.0
 - (f) Average of the two units 2006 12 m
 - (g) Unit 3's 2006 6 month (August - C

ATTACHMENT 1B

Emission Levels of Cleanest (Recent) CFB Units

Pollutant	Units	Dominion - VCHEC		EKPC Spurlock Unit 3		EKPC Spurlock Unit 4		Wellington Development Greene Energy Plant		CLECO Rodemacher Unit 4		Reliant Energy Seward, LLC		
		Permit Limit	Averaging Period	Permit Limit	Averaging Period	Permit Limit	Averaging Period	Permit Limit	Ave. Period	Permit Limit	Averaging Period	Permit Limit	Actual Emissions	Averaging Period
Permit Issuance	-	Pending		06/31/2007		06/31/2007		07/21/05		2/23/2006				
Boiler Type	-	CFB Boiler		CFB Boiler		CFB Boiler		CFB Boiler		CFB Boiler		CFB Boiler		
Number of Units	-	2		1		1		2		2		2		
Fuel Types	-	Bituminous Coal (Primary), Waste Coal, Biomass		Bituminous Coal (Primary), Tire-Derived Fuel		Bituminous Coal (Primary), Tire-Derived Fuel		Waste Coal		Petroleum Coke (Primary), Bituminous and Lignite Coal		Coal Refuse or Coal		
Generation Per Unit	MWh	300		270		300		525		330				
Heat Input Per Unit	MMBtu/hr	2,800		2,500		2,800				3,006				
Coal H.H.V.	Btu/lb	7,782				10,400		7600		14000 (Typ.)				
Coal Sulfur Content	% wt.	2.28				4.5		2.4		3.0-5.0 (Typ.)				
Coal Ash Content	% wt.	44.00				20.00		30		<1.0 (Typ.)				
Filterable PM/PM ₁₀	lb/MMBtu	0.01	3-hour ave. (Test)		30-day ave. (CEM)	0.009	30-day ave. (CEM)	0.012 (0.05) ^(a)	3-hour	0.011	3-hour ave. (Test)	0.010		3-hour ave. (Test)
Total PM/PM ₁₀	lb/MMBtu	0.012	3-hour ave. (Test)		3-hour ave. (Test)	0.015	3-hour ave. (Test)	0.012 (0.05)^(b)	3-hour	N.A.	3-hour ave. (Test)	N.A.	0.03067 ^(h)	
Opacity	%	20 (27 exception)	6-min (COM)	20 (27 exception)	6-min (COM)	20 (27 exception)	6-min (COM)	20 (27 exception) ^(c)	6-min (COM)	20 (27 exception)	6-min (COM)	10 (30 exception)		3-min
SO ₂	lb/MMBtu	0.12	30-day ave. (CEM)	0.20	24-hr block (CEM)	0.15	24-hr block (CEM)	0.156	30-day	0.15	3-hour ave. (CEM)	0.60		30-day ave.
NO _x	lb/MMBtu	0.07	30-day ave. (CEM)	0.07 (0.10 max.)	30-day ave. (CEM)	0.07 (0.09 max.)	30-day ave. (CEM)	0.08 (0.1)	24-hour ^(g)	0.07	24-hour ave. (CEM)	0.15		30-day ave.
CO	lb/MMBtu	0.15	30-day ave. (CEM)	0.15	30-day ave. (CEM)	0.10	30-day ave. (CEM)	0.200	30-day	0.15	24-hour ave. (CEM)	0.15		3-hour ave.
VOC	lb/MMBtu	0.005	3-hour ave. (Test)	0.0036	30-day ave. (CEM)	0.002	3-hour ave. (Test)	0.005 ^(d)	3-hour	0.007	3-hour ave. (Test)	0.005	0.001 ⁽ⁱ⁾	3-hour ave.
Pb	lb/MMBtu	9.39E-07	3-hour ave. (Test)	0.000063	3-month ave.	N.A.	3-hour ave. (Test)	0.00065 ^(e)	3-hour	4.70E-05	3-hour ave. (Test)			
H ₂ SO ₄	lb/MMBtu	5.00E-03	3-hour ave. (Test)	5.00E-03	30-day ave.	5.00E-03	3-hour ave. (Test)	0.006	3-hour	3.00E-03	3-hour ave. (Test)			
HF	lb/MMBtu	6.76E-04	3-hour ave. (Test)	4.66E-05	30-day ave.	4.70E-05	3-hour ave. (Test)	0.0014 ^(f)	3-hour	8.80E-05	3-hour ave. (Test)			
Hg	lb/MMBtu	1.30E-06	3-hour ave. (Test)	2.65E-06	3-month ave.	2.65E-06	12-month ave. (Test)	Composit	12-month ave. (Test)	2.75E-05	3-hour ave. (Test)		0.000000013 ^(j)	

Differences from SWW Project

Plant not constructed Low Btu, High ash fuel Intermediate load facility Coal restricted to SWW coal	Plant not constructed Assume High Btu, Low ash fuel Variability in NOx number Lower particulate due to less mass loading	Plant not constructed	Plant not constructed Low Btu, High ash fuel Variability in NOx number Variable PM10 number	Pet Coke (High Btu, Low ash)	Lower particulate due to less mass loading
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Comments

- (a). Total filterable particulate matter based on EPA Method 5 or 17
- (b). Filterable PM10 based on EPA Method 201 or 201A. Condensable PM10 based on EPA Method 202 or other Department approved method for condensable PM10.
- (c). Opacity of the emissions is equal to or greater than 10% for a period, or periods aggregating more than 3 minutes in any hour, or equal to or greater than 30% at any time.
- (d). Based in EPA Methods 25A ad 18.
- (e). Based in EPA Method 29.
- (f). Based in EPA Method 13B.
- (g). According to the permit, NOx limit is 0.08 on a 30-day rolling average and 0.10 on a 24-hr average.
- (h). Based on an average of the three tests (00506A, 00506B, 00506C) conducted on 10/19/06 and 10/20/06 documented in a 1/12/07 letter from Gregory D. Parish to Mark Wayner.
- (i). Based on an average of the three tests (00306A, 00306B, 00306C) conducted on 7/19/06 and 7/20/06 documented in a 1/12/07 letter from Gregory D. Parish to Mark Wayner.
- (j). Based on the 100% load data summary conducted on December 5, 2004.
- (k). Actual Emissions are 2001 TPY from 2003 fact sheet
- (l). Actual emission are 2006 TPY provided by PA DEP
- (m). Permit limit listed is for CFB boiler 1, the permitted limited for CFB boiler 2 is 0.22 lb/MMBtu
- (n). Average of 3 test runs performed in 2005
- (o). Average of 3 test runs performed in 2003
- (p). Average of 3 test runs performed in 2000 Emissions are in lb/hr not lb/MMBtu.
- (q). Boiler 1 stack test (1 run) performed in 2004
- (r). Boiler 2 stack test (1 run) performed in 2004
- (s). Average of 3 test runs performed in 1999 Emissions are in lb/hr not lb/MMBtu.
- (t). Emissions are in lb/ton coal combusted no lb/MMBtu
- (u). When burning Bituminous coal only, Emissions are lb/MWh
- (v). When burning waste coal only, Emissions are lb/MWh
- (w). Average of 3 test runs performed in 2002
- (x). Average of 3 test runs performed in 2005
- (y). Average of 6 test runs performed in 2004
- (z). Average of 6 test runs performed in 2005
- (aa). Average of 3 test runs performed in 2006
- (bb). 12 month weighted average from 2006 Actual Emissions

Emission Levels of Cle

Pollutant	Units	Grant Town			Scrubgrass			River Hill			Robinson Power- Beach Hollow			Western Greenbrier						
		Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period				
Permit Issuance	-	12/22/2003 (Title V)			3/6/2008			7/21/2005			4/1/2005			4/26/2006						
Boiler Type	-	CFB Boiler			CFB Boiler			CFB Boiler			CFB Boiler			CFB Boiler						
Number of Units	-	2			2			1			1			1						
Fuel Types	-	coal refuse (GOB)			Waste Coal (Bituminous)			Waste Coal						Bituminous Coal Coal Fuel Oil Waste #2						
Generation Per Unit	MWh	40			41.5			270						98						
Heat Input Per Unit	MMBtu/hr	552			600			2,871						1,070						
Coal H.H.V.	Btu/lb																			
Coal Sulfur Content	% wt.													1.47						
Coal Ash Content	% wt.													63.71						
Filterable PM/PM ₁₀	lb/MMBtu										0.012		30-day ave.	0.015	N.A.	30-day ave.				
Total PM/PM ₁₀	lb/MMBtu	0.03	202.231 ^(k)		0.03	73.3 ^(l)		0.012		3-hour ave.				0.3	N.A.	30-day ave.				
Opacity	%	10		6-min	10 (30 exception)		3-min	10												
SO ₂	lb/MMBtu	0.83	2237 ^(k)	3-hour ave.	0.45	1644.8 ^(l)	4-hour ave. (CEMS)	0.311		3-hour ave.	0.274		24-hour ave.	0.260		30-day ave.	0.14	N.A.	3-hour ave. & 24-hour ave.	
NO _x	lb/MMBtu	0.4	1632 ^(k)	30-day ave.	0.19 ^(m)	622.9 ^(l)	30-day ave.	0.10		24-hour ave.	0.07		30-day ave.	0.08		30-day ave.	0.1	N.A.	30-day ave.	
CO	lb/MMBtu	0.17	759 ^(k)		0.1	223.1 ^(l)		0.2		loads ≥ 70%	0.25		30-day ave.	0.15		30-day ave.	0.2	N.A.	24-hour ave.	
VOC	lb/MMBtu	0.008	36 ^(k)		0.005	5.8 ^(l)		0.005		3-hour ave.	0.006		3-hour ave.					N.A.		
Pb	lb/MMBtu	1.22E-04	0.05 ^(k)					1.40E-06										N.A.		
H ₂ SO ₄	lb/MMBtu		1.35 ^(k)					0.01										0.006	N.A.	
HF	lb/MMBtu		49.5 ^(k)					0.0014										0.016 ⁽ⁿ⁾	N.A.	
Hg	lb/MMBtu	1.80E-05	0.0032 ^(k)			0.000003 ^(m)		equation based										0.000021 ^(o)	1.4E-06 ^(v)	N.A.

		Contacted PADEP on 4/16/08 to obtain a copy of permit. have not received or no actual emission data available	Contacted PADEP on 4/16/08 to obtain a copy of permit. have not received or no actual emission data available	Facility is not yet operational.
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- Comments
- (a). Total filterable particulate matte
 - (b). Filterable PM10 based on EPA
 - (c). Opacity of the emissions is equi
 - (d). Based in EPA Methods 25A ad
 - (e). Based in EPA Method 29.
 - (f). Based in EPA Method 13B.
 - (g). According to the permit, NO_x liir
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 - (k). Actual Emissions are 2001 TPY
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 - (n). Average of 3 test runs performe
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 - (w). Average of 3 test runs performe
 - (x). Average of 3 test runs performe
 - (y). Average of 6 test runs performe
 - (z). Average of 6 test runs performe
 - (aa). Average of 3 test runs perform
 - (bb). 12 month weighted average fro

Emission Levels of Cle

Pollutant	Units	Dominion - Morgantown Energy			Dominion - North Branch Power Station, WV			Deseret Power - Bonanza			AES - Puerto Rico			Cambria Cogen (Wayland Memo Facility)		
		Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period
Permit Issuance	-							8/30/2007			8/30/2007					8/25/2006
Boiler Type	-					CFB			CFB Boiler			CFB Boiler				CFB Boiler
Number of Units	-					2			1			2				2
Fuel Types	-					Bituminous			Waste Coal/Bituminous Blend							Waste Bituminous
Generation Per Unit	MWh					90			110							85
Heat Input Per Unit	MMBtu/hr								1,445							
Coal H.H.V.	Btu/lb								6550 (50/50 ratio)							>11,000
Coal Sulfur Content	% wt.															<1
Coal Ash Content	% wt.															
Filterable PM/PM ₁₀	lb/MMBtu		0.0083 ^(a)					0.012	N.A.	24-hour ave		N.A.				
Total PM/PM ₁₀	lb/MMBtu		0.003 ^(a)		0.03			0.03/0.0120	N.A.	24-hour ave	0.015/0.030	0.013/0.023		16.8 (lb/hr)	122.4 ⁽ⁱ⁾	
Opacity	%										20 (27 exception)		6-min (COM)			
SO ₂	lb/MMBtu		0.33 ^(bb)					0.055	N.A.	30-day rolling	0.022	0.009/0.01	3-hr (CEM)	556 (lb/hr)	3187.9 ^(j)	
NO _x	lb/MMBtu		0.27 ^(bb)					0.08	N.A.	30-day rolling	0.1	0.096/0.094	24-hr (CEM)	0.3	0.21	
CO	lb/MMBtu				0.17 (Title V)			0.15	N.A.	30-day rolling	0.1	0.036/0.038	8-hr (CEM)	83.91 (lb/hr)	284.9 ^(j)	
VOC	lb/MMBtu							N.A.	N.A.	N.A.	0.0047	0.00066/0.00012	1-hr (Test)		6.5 ⁽ⁱ⁾	
Pb	lb/MMBtu							N.A.	N.A.	N.A.	0.6 (tons/year)	N.A.	Test			
H ₂ SO ₄	lb/MMBtu							0.0035	N.A.	N.A.	0.0024	0.0024	1-hr (Test)			
HF	lb/MMBtu							N.A.	N.A.	N.A.	0.000478	0.0003	12-month rolling (Test)			
Hg	lb/MMBtu							N.A.	N.A.	N.A.	N.A.	N.A.			0.000000482 ⁽ⁿ⁾	

	Facility is not yet operational. Assume High Btu, Low ash fuel	Based on 2004 actual inventory Assume High Btu, Low sulfur fuel, Low ash fuel	Contacted PADEP on 4/16/08 to obtain a copy of permit.
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- Comments
- (a). Total filterable particulate matte
 - (b). Filterable PM10 based on EPA
 - (c). Opacity of the emissions is equi
 - (d). Based in EPA Methods 25A ad
 - (e). Based in EPA Method 29.
 - (f). Based in EPA Method 13B.
 - (g). According to the permit, NO_x liir
 - (h). Based on an average of the thre
 - (i). Based on an average of the thre
 - (j). Based on the 100% load data su
 - (k). Actual Emissions are 2001 TPY
 - (l). Actual emission are 2006 TPY p
 - (m). Permit limit listed is for CFB boi
 - (n). Average of 3 test runs performe
 - (o). Average of 3 test runs performe
 - (p). Average of 3 test runs performec
 - (q). Boiler 1 stack test (1 run) perfor
 - (r). Boiler 2 stack test (1 run) perfor
 - (s). Average of 3 test runs performed
 - (t). Emissions are in lb/ton coal com
 - (u). When burning Bituminous coal or
 - (v). When burning waste coal only. E
 - (w). Average of 3 test runs performe
 - (x). Average of 3 test runs performe
 - (y). Average of 6 test runs performe
 - (z). Average of 6 test runs performe
 - (aa). Average of 3 test runs perform
 - (bb). 12 month weighted average fro

Emission Levels of Cle

Pollutant	Units	Colver Power Plant (Wayland Memo Facility)			Ebensburg (Wayland Memo Facility)			Kline (Wayland Memo Facility)			Panther Creek (Wayland Memo Facility)			Piney Creek (Wayland Memo Facility)		
		Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period	Permit Limit	Actual Emissions	Averaging Period
Permit Issuance	-	2/19/2002														
Boiler Type	-	CFB Boiler			CFB Boiler			CFB Boiler			CFB Boiler			CFB Boiler		
Number of Units	-	1														
Fuel Types	-	Waste Bituminous			Waste Bituminous			Waste Anthracite						Waste Coal		
Generation Per Unit	MWh				50						83			32		
Heat Input Per Unit	MMBtu/hr	705														
Coal H.H.V.	Btu/lb															
Coal Sulfur Content	% wt.															
Coal Ash Content	% wt.															
Filterable PM/PM ₁₀	lb/MMBtu															
Total PM/PM ₁₀	lb/MMBtu		16.7 ^(l)		0.03	40.4 ^(l)		111.8 ^(l)		6.7 ^(l)					15.7 ^(l)	
Opacity	%				20 (60 exception)											
SO ₂	lb/MMBtu		2326.8 ^(l)		3.7	1815.8 ^(l)		864.8 ^(l)		535.8 ^(l)					1067.5 ^(l)	
NO _x	lb/MMBtu		0.15		0.18	0.09	30-day ave.	139.1 ^(l)		0.13					0.14	
CO	lb/MMBtu		337.8 ^(l)		0.25	504 ^(l)		89.7 ^(l)		316.7 ^(l)					85.7 ^(l)	
VOC	lb/MMBtu		3.6 ^(l)			4.1 ^(l)		20.9 ^(l)		4.8 ^(l)					0 ^(l)	
Pb	lb/MMBtu															
H ₂ SO ₄	lb/MMBtu															
HF	lb/MMBtu															
Hg	lb/MMBtu		0.000000582 ^(m)			0.00000114 ⁽ⁿ⁾		0.0000605 ^(p)		5.98E-08 ^(q)		2.08E-08 ^(r)		0.0000123 ^(s)		

Contacted PADEP on 4/16/08 to obtain a copy of permit. Permit limits are not in the RBLC database.		Contacted PADEP on 4/16/08 to obtain a copy of permit. Permit limits are not in the RBLC database.	Contacted PADEP on 4/16/08 to obtain a copy of permit. Permit limits are not in the RBLC database.	Contacted PADEP on 4/16/08 to obtain a copy of permit. Permit limits are not in the RBLC database.
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- Comments
- (a). Total filterable particulate matte
 - (b). Filterable PM10 based on EPA
 - (c). Opacity of the emissions is equi
 - (d). Based in EPA Methods 25A ad
 - (e). Based in EPA Method 29.
 - (f). Based in EPA Method 13B.
 - (g). According to the permit, NO_x liir
 - (h). Based on an average of the thre
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 - (k). Actual Emissions are 2001 TPY
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 - (aa). Average of 3 test runs perform
 - (bb). 12 month weighted average fro

Emission Levels of Cle

Pollutant	Units	Wheelabrator (Wayland Memo Facility)		
		Permit Limit	Actual Emissions	Averaging Period
Permit Issuance	-	3/14/2005		
Boiler Type	-	CFB Boiler		
Number of Units	-	1		
Fuel Types	-	Waste Anthracite		
Generation Per Unit	MWh	42		
Heat Input Per Unit	MMBtu/hr			
Coal H.H.V.	Btu/lb			
Coal Sulfur Content	% wt.			
Coal Ash Content	% wt.			
Filterable PM/PM ₁₀	lb/MMBtu			
Total PM/PM ₁₀	lb/MMBtu	0.012		
Opacity	%			
SO ₂	lb/MMBtu	0.210		
NO _x	lb/MMBtu	0.21	0.13	30-day ave.
CO	lb/MMBtu			
VOC	lb/MMBtu			
Pb	lb/MMBtu			
H ₂ SO ₄	lb/MMBtu			
HF	lb/MMBtu			
Hg	lb/MMBtu			

Contacted PADEP on 4/16/08 to obtain a copy of permit.
 Permit limits are not in the RBLC database.
 Low Btu, high ash waste coal

Comments

- (a). Total filterable particulate matte
- (b). Filterable PM10 based on EPA
- (c). Opacity of the emissions is equi
- (d). Based in EPA Methods 25A ad
- (e). Based in EPA Method 29.
- (f). Based in EPA Method 13B.
- (g). According to the permit, NOx liir
- (h). Based on an average of the thre
- (i). Based on an average of the thre
- (j). Based on the 100% load data su
- (k). Actual Emissions are 2001 TPY
- (l). Actual emission are 2006 TPY p
- (m). Permit limit listed is for CFB boi
- (n). Average of 3 test runs performe
- (o). Average of 3 test runs performe
- (p). Average of 3 test runs performec
- (q). Boiler 1 stack test (1 run) perfor
- (r). Boiler 2 stack test (1 run) perfor
- (s). Average of 3 test runs performed
- (t). Emissions are in lb/ton coal com
- (u). When burning Bituminous coal or
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- (aa). Average of 3 test runs perform
- (bb). 12 month weighted average fro

Comparison of Stack Test and CEM Data to Determine Variability of control Device Performance

Pollutant	Units	Reliant Energy Seward, LLC				Grant Town				Scrubgrass				Dominion - North Branch Power Station, WV				AES - Puerto Rico				
		Permit Limit	Actual Emissions	Averaging Period	% Difference ^(m)	Permit Limit	Actual Emissions	Averaging Period	% Difference ^(m)	Permit Limit	Actual Emissions	Averaging Period	% Difference ^(m)	Permit Limit	Actual Emissions	Averaging Period	% Difference ^(m)	Permit Limit	Actual Emissions	Averaging Period	% Difference ^(m)	
Permit Issuance	-					12/22/2003 (Title V)				3/8/2008								8/30/2007				
Boiler Type	-	CFB Boiler				CFB Boiler				CFB Boiler				CFB Boiler				CFB Boiler				
Number of Units	-	2				2				2				2				2				
Fuel Types	-	Coal Refuse or Coal				coal refuse (GOB)				Waste Coal (Bituminous) #2 oil				Bituminous								
Generation Per Unit	MWh					40				41.5				90								
Heat Input Per Unit	MMBtu/hr					551.9																
Coal H.H.V.	Btu/lb																	>11,000				
Coal Sulfur Content	% wt																	<1				
Coal Ash Content	% wt																					
Filterable PM ₁₀	lb/MMBtu	0.010		3-hour ave. (Test)															N.A.			
Total PM ₁₀	lb/MMBtu	N.A.	0.03067 ^(h)			0.03	202.231 ^(k)			0.03	73.3 ^(l)			0.03	0.0028 ^(m)	0.0191 ⁽ⁿ⁾	64%		0.015/0.030	0.013/0.023 ^(o)		87%
Opacity	%	10 (30 exception)		3-min	10,000		6-min	10 (30 exception)		10 (30 exception)		3-min						20 (27 exception)		6-min (CEM)		
SO ₂	lb/MMBtu	0.80	0.44 ^(p)	30-day ave.	73%	0.83	0.45	3-hour ave.	0.45	0.19 ^(q)	0.13 ^(r)	24-hour ave. (CEMS)	0.27 ^(s)	0.02	0.009/0.01 ^(t)			0.02	0.009/0.01 ^(t)	3-hr (CEM)	59%	
NO _x	lb/MMBtu	0.15	0.10 ^(u)	30-day ave.	67%	0.40	0.07 ^(v)	30-day ave.	18%	0.19 ^(q)	0.13 ^(r)	30-day ave.	68%	0.10	0.38 ^(w)			0.10	0.096/0.094 ^(x)	24-hr (CEM)	94%	
CO	lb/MMBtu	0.15		3-hour ave.		0.17	799 ^(y)			0.10	223.1 ^(z)			0.17 (Title V)	0.0328 ^(aa)	19%		0.10	0.036/0.038 ^(ab)	8-hr (CEM)	38%	
VOC	lb/MMBtu	0.005	0.001 ^(c)	3-hour ave.	20%	0.008	36 ^(d)			0.005	6.8 ^(e)				0.005	0.00066/0.00012 ^(ff)		0.005	0.00066/0.00012 ^(ff)	1-hr (Test)	13%	
Pb	lb/MMBtu					1.22E-04	0.09 ^(g)								0.6 (semi/semi)	N.A.			0.6 (semi/semi)	N.A.	Test	
H ₂ SO ₄	lb/MMBtu						1.35 ^(h)								2.40E-03	2.40E-03			2.40E-03	2.40E-03	1-hr (Test)	100%
HF	lb/MMBtu						49.6 ⁽ⁱ⁾								4.75E-04	0.0003 ^(jj)			4.75E-04	0.0003 ^(jj)	12-month rolling (Test)	63%
H ₂	lb/MMBtu		0.000000013 ^(k)			1.80E-05	0.0032 ^(ll)				0.000003 ^(mm)							N.A.	N.A.			

Comments
 (h). Based on an average of the three tests (00506A, 00506B, 00506C) conducted on 10/19/06 and 10/20/06 documented in a 1/12/07 letter from Gregory D. Parish to Mark Wayner.
 (i). Based on an average of the three tests (00306A, 00306B, 00306C) conducted on 7/19/06 and 7/20/06 documented in a 1/12/07 letter from Gregory D. Parish to Mark Wayner.
 (j). Based on the 100% load data summary conducted on December 5, 2004.
 (k). Actual Emissions are 2001 TPY from 2003 fact sheet
 (l). Actual emission are 2006 TPY provided by PA DEP
 (m). Permit limit listed is for CFB boiler 1, the permitted limited for CFB boiler 2 is 0.22 lb/MMBtu
 (n). Average of 3 test runs performed in 2005
 (o). Average of 6 test runs performed in 2004
 (p). Average of 6 test runs performed in 2005
 (q). Average of 3 test runs performed in 2006
 (r). 2006 12 month weighted average from EPA Clean Air Markets Data base website
 (s). 2006 6 month/April - September weighted average from EPA Clean Air Markets Data base website
 (t). Based on 2004 actual inventory
 (u). Actual lb/MMBtu divided by permitted lb/MMBtu
 (v). 12 month weighted average from 2006 Actual Emissions

