

Table 1 - Analysis of Marshall Unit 4 Source Test Data [Attachment 1, Tables 2-13 through 2-20] and Implications for Cliffsides Unit 6																	
Runs		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Date (2007)		28-Mar	28-Mar	28-Mar	29-Mar	29-Mar	29-Mar	30-Mar	30-Mar	28-Mar	28-Mar	28-Mar	29-Mar	29-Mar	29-Mar	30-Mar	30-Mar
Time Start		9:35	11:59	14:03	08:41	10:51	12:58	08:26	11:23	9:35	11:59	14:03	08:41	10:51	12:58	08:26	11:23
Time End		11:11	13:35	15:39	10:17	12:27	14:34	10:02	12:59	11:11	13:35	15:39	10:17	12:27	14:34	10:02	12:59
		Location: Unit 4 FGD Inlet/Method - Glass								Location: Unit 4 FGD Inlet/Method - Teflon							
HCl Efd	(lb/MMBtu)	9.35E-02	7.89E-02	7.79E-02	6.75E-02	7.19E-02	6.13E-02	7.61E-02	8.37E-02	6.62E-02	7.96E-02	9.60E-02	6.40E-02	6.69E-02	6.36E-02	7.46E-02	7.91E-02
HCl Efc	(lb/MMBtu)	9.44E-02	8.57E-02	7.79E-02	6.85E-02	7.30E-02	6.19E-02	7.74E-02	8.50E-02	6.66E-02	8.20E-02	9.73E-02	6.49E-02	6.55E-02	6.38E-02	7.69E-02	7.95E-02
Unit 4 FGD Stack - Glass		Location: Unit 4 FGD Inlet/Method - Glass								Location: Unit 4 FGD Inlet/Method - Teflon							
HCl Efd	(lb/MMBtu)	7.76E-05	1.56E-04	8.69E-05	7.24E-05	4.61E-05	7.07E-05	4.60E-05	5.01E-05	6.23E-05	1.22E-04	5.01E-05	1.11E-04	7.97E-05	7.20E-05	3.71E-05	1.82E-04
HCl Efc	(lb/MMBtu)	7.79E-05	1.58E-04	8.74E-05	7.32E-05	4.62E-05	7.04E-05	4.69E-05	5.03E-05	6.20E-05	1.23E-04	5.10E-05	1.11E-04	8.05E-05	7.15E-05	3.78E-05	1.84E-04
HCl Control Eff. Efd		0.9992	0.9980	0.9989	0.9989	0.9994	0.9988	0.9994	0.9994	0.9991	0.9985	0.9995	0.9983	0.9988	0.9989	0.9995	0.9977
HCl Control Eff. Efc		0.9992	0.9982	0.9989	0.9989	0.9994	0.9988	0.9994	0.9994	0.9991	0.9985	0.9995	0.9983	0.9988	0.9989	0.9995	0.9977
Cliffsides Unit 6 Implications																	
Controlled Emissions of HCl	tons/yr	8.88	[per Duke]														
Assumed Control Eff.	%	99.9	[per Duke]														
Calculated Uncontrolled HCl	tons/yr	8880	[calculation]														
Cal. HCl Emitted, per Eff. Efd above	(tons/yr)	7.3699251	17.557414	9.9059307	9.5246222	5.6935744	10.241697	5.3676741	5.3152688	8.356858	13.61005	4.63425	15.40125	10.579013	10.05283	4.416193	20.431858
Cal. HCl Emitted, per Eff. Efc above	(tons/yr)	7.3278814	16.371529	9.9629268	9.4892847	5.6199452	10.099386	5.3807752	5.2548706	8.2666667	13.32	4.6544707	15.187673	10.913588	9.9517241	4.3649415	20.552453

Hydrogen Chloride (HCl) Results

C _{sd}	HCl Concentration (ppmdv)	58.7	49.8	54.0	45.0	51.9
C _{sd7}	HCl Concentration @3% O ₂ (ppmdv)	86.6	73.1	72.1	62.5	73.6
E _{fd}	HCl Rate - Fd-based (lb/MMBtu)	9.35E-02	7.89E-02	7.79E-02	6.75E-02	7.95E-02
E _{fc}	HCl Rate - Fc-based (lb/MMBtu)	9.44E-02	8.57E-02	7.79E-02	6.85E-02	8.16E-02

Hydrogen Fluoride (HF) Results

C _{sd}	HF Concentration (ppmdv)	11.7	7.40	5.58	6.71	7.84
C _{sd7}	HF Concentration @3% O ₂ (ppmdv)	17.2	10.9	7.46	9.31	11.2
E _{fd}	HF Rate - Fd-based (lb/MMBtu)	1.02E-02	6.43E-03	4.42E-03	5.52E-03	6.64E-03
E _{fc}	HF Rate - Fc-based (lb/MMBtu)	1.03E-02	6.98E-03	4.42E-03	5.60E-03	6.82E-03

Hydrogen Chloride (HCl) Results

C _{sd}	HCl Concentration (ppm dv)	42.42	42.17	50.02	55.43	47.51
C _{sd7}	HCl Concentration @3% O ₂ (ppmdv)	66.61	56.75	70.50	77.52	67.85
E _{fd}	HCl Rate - Fd-based (lb/MM Btu)	7.19E-02	6.13E-02	7.61E-02	8.37E-02	7.33E-02
E _{fc}	HCl Rate - Fc-based (lb/MM Btu)	7.30E-02	6.19E-02	7.74E-02	8.50E-02	7.43E-02

Hydrogen Fluoride (HF) Results

C _{sd}	HF Concentration (ppm dv)	5.42	6.25	5.61	6.71	6.00
C _{sd7}	HF Concentration @3% O ₂ (ppmdv)	8.51	8.41	7.90	9.38	8.55
E _{fd}	HF Rate - Fd-based (lb/MM Btu)	5.04E-03	4.99E-03	4.68E-03	5.56E-03	5.07E-03
E _{fc}	HF Rate - Fc-based (lb/MM Btu)	5.11E-03	5.03E-03	4.76E-03	5.64E-03	5.14E-03

Hydrogen Chloride (HCl) Results

C _{sd}	HCl Concentration (ppmdv)	0.052	0.102	0.061	0.052	0.067
C _{sd7}	HCl Concentration @3% O ₂ (ppmdv)	0.072	0.144	0.080	0.067	0.091
E _{fd}	HCl Rate - Fd-based (lb/MMBtu)	7.76E-05	1.56E-04	8.69E-05	7.24E-05	9.81E-05
E _{fc}	HCl Rate - Fc-based (lb/MMBtu)	7.79E-05	1.58E-04	8.74E-05	7.32E-05	9.92E-05
RE	Reduction Efficiency (% Removal) ¹	99.9%	99.8%	99.9%	99.9%	99.9%

Hydrogen Fluoride (HF) Results

C _{sd}	HF Concentration (ppmdv)	<0.0077	<0.011	<0.011	<0.011	<0.010
C _{sd7}	HF Concentration @3% O ₂ (ppmdv)	<0.011	<0.015	<0.014	<0.015	<0.014
E _{fd}	HF Rate - Fd-based (lb/MMBtu)	<6.26E-05	<8.02E-06	<8.57E-06	<6.76E-06	<8.15E-06
E _{fc}	HF Rate - Fc-based (lb/MMBtu)	<8.29E-05	<8.17E-06	<8.62E-06	<8.86E-06	<8.24E-06
RE	Reduction Efficiency (% Removal) ¹	99.9%	99.9%	99.9%	99.9%	99.9%

Hydrogen Chloride (HCl) Results

C _{sd}	HCl Concentration (ppmdv)	0.033	0.050	0.033	0.036	0.038
C _{sd7}	HCl Concentration @3% O ₂ (ppmdv)	0.043	0.065	0.043	0.046	0.049
E _{fd}	HCl Rate - Fd-based (lb/MMBtu)	4.61E-05	7.07E-05	4.60E-05	5.01E-05	5.32E-05
E _{fc}	HCl Rate - Fc-based (lb/MMBtu)	4.62E-05	7.04E-05	4.68E-05	5.03E-05	5.36E-05
RE	Reduction Efficiency (% Removal) ¹	99.9%	99.9%	100.0%	100.0%	99.9%

Hydrogen Fluoride (HF) Results

C _{sd}	HF Concentration (ppmdv)	<0.011	<0.011	<0.012	<0.012	<0.011
C _{sd7}	HF Concentration @3% O ₂ (ppmdv)	<0.015	<0.014	<0.015	<0.015	<0.015
E _{fd}	HF Rate - Fd-based (lb/MMBtu)	<8.77E-06	<8.55E-06	<8.78E-06	<8.90E-06	<8.75E-06
E _{fc}	HF Rate - Fc-based (lb/MMBtu)	<8.80E-06	<8.62E-06	<8.99E-06	<8.93E-06	<8.79E-06
RE	Reduction Efficiency (% Removal) ¹	99.8%	99.9%	99.9%	99.9%	99.9%

Hydrogen Chloride (HCl) Results

C _{sd}	HCl Concentration (ppmdv)	43.82	51.03	56.60	42.69	48.54
C _{sd7}	HCl Concentration @3% O ₂ (ppmdv)	61.28	73.67	88.87	59.24	70.76
E _{fd}	HCl Rate - Fd-based (lb/MMBtu)	8.62E-02	7.96E-02	9.60E-02	6.40E-02	7.64E-02
E _{fc}	HCl Rate - Fc-based (lb/MMBtu)	8.68E-02	8.20E-02	9.73E-02	6.49E-02	7.77E-02

Hydrogen Fluoride (HF) Results

C _{sd}	HF Concentration (ppmdv)	6.34	6.53	5.31	5.50	5.92
C _{sd7}	HF Concentration @3% O ₂ (ppmdv)	8.86	9.43	8.33	7.63	8.56
E _{fd}	HF Rate - Fd-based (lb/MMBtu)	5.25E-03	5.59E-03	4.94E-03	4.52E-03	5.07E-03
E _{fc}	HF Rate - Fc-based (lb/MMBtu)	5.29E-03	5.75E-03	5.01E-03	4.58E-03	5.16E-03

Hydrogen Chloride (HCl) Results

C _{sd}	HCl Concentration (ppmdv)	44.61	43.46	47.85	53.22	47.28
C _{sd7}	HCl Concentration @3% O ₂ (ppmdv)	61.90	58.92	69.08	73.28	65.79
E _{fd}	HCl Rate - Fd-based (lb/MMBtu)	6.68E-02	6.36E-02	7.46E-02	7.91E-02	7.11E-02
E _{fc}	HCl Rate - Fc-based (lb/MMBtu)	6.55E-02	6.38E-02	7.69E-02	7.95E-02	7.14E-02

Hydrogen Fluoride (HF) Results

C _{sd}	HF Concentration (ppmdv)	7.53	6.17	5.71	5.74	6.29
C _{sd7}	HF Concentration @3% O ₂ (ppmdv)	10.45	8.37	8.24	7.90	8.74
E _{fd}	HF Rate - Fd-based (lb/MMBtu)	6.19E-03	4.96E-03	4.88E-03	4.88E-03	5.18E-03
E _{fc}	HF Rate - Fc-based (lb/MMBtu)	6.06E-03	4.97E-03	5.03E-03	4.70E-03	5.19E-03